

THE NATURAL RESOURCES OF GARRETT COUNTY, MARYLAND
AND THE GEOGRAPHIC FACTORS INVOLVED IN THEIR UTILIZATION

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INTRODUCTION

Definition of the Problem

The purpose of the dissertation is to analyze the relationships between the geographic equipment and the use of a region. How the various physical factors such as surface configuration, climate, and natural resources including water, vegetation, soils, minerals, and recreational resources, have been assets or liabilities in the occupancy of an area. To take up the problems posed by location and position factors; in short, why Garrett County is and will continue to be unique in Maryland.

Method of Procedure

Much of the information for this study has been obtained through field work during four summers. In addition to personal observation, the field work included interviews with officials, farmers, miners, business men, local historians and educators, and many of the "rank and file" of Garrett County. Other important sources of data have been interviews and correspondence with specialists in pertinent fields at the University of Maryland, in other parts of the State, in Washington, D. C., and elsewhere.

Published and unpublished material, including much statistical data, has been analyzed and utilized whenever and wherever pertinent. Sources of this kind are the Bureau of the Census, Bureau of Agricultural Economics, Bureau of Mines, and periodic reports of both federal and state governments on the censuses of agriculture, population, manufacturing, and other subjects.

Finally, a series of maps has been prepared, with the morphological features of Garrett County as a background. These maps present the correlation of surface features with soils, natural vegetation, pattern of settlement, agricultural use of land, coal mining, transportation, and recreation. For purposes of comparison and contrast, relative conditions of the utilization of natural resources and their implications in Garrett County are measured with those of Maryland as a whole and with those of other counties within the State as they are applicable. The distribution of geographic features within Garrett County and correlations between their variations and utilization have been particularly stressed.

CHAPTER I

DESCRIPTIVE BACKGROUND OF GARRETT COUNTY

Location, Size, and Shape

In relation to the rest of Maryland and other political units.

Garrett County is the westernmost part of Maryland. It is located between the parallels of $39^{\circ}12'$ and $39^{\circ}44'$ north latitude and meridians of $78^{\circ}54'$ and $79^{\circ}30'$ west longitude. It comprises an area of 668 square miles, or about 427,520 acres, and is the largest county in Maryland in total land area, although Frederick County is only about four square miles smaller. (Fig. A.)

The County is bounded on the north by the Mason and Dixon line, which separates it from Somerset and Fayette Counties, Pennsylvania; on the west by Preston County, West Virginia, from which it is separated by a line running north from the Fairfax stone which marks the headwater of the Potomac River, to the Mason and Dixon line; on the southeast and south by the North Branch of the Potomac River, separating it from Grant and Mineral Counties, West Virginia; and on the east by Allegany County, Maryland, this boundary being a straight line drawn from the top of Savage Mountain where it is crossed by the Mason and Dixon line to the center of the mouth of the Savage River where it empties into the Potomac near Bloomington. The only irregular boundary of Garrett County is the southeastern boundary which follows the windings of the Potomac River.

Thus, Garrett County is almost triangular in shape. The length of its western boundary is a little over 36 miles, while along the Mason and Dixon line on the north the County borders on Pennsylvania for about

30 miles. Because of the winding course of the North Branch of the Potomac, the southeastern boundary is about 46 miles in length, while the eastern boundary, separating Garrett and Allegany Counties is about 18-1/2 miles long.

Garrett is the only county in Maryland that is located entirely on the Allegheny Plateau. Its general surface features consist of a series of mountain ridges and intervening valleys, with a broad, rolling upland occupying a large section of the southwestern part. The County has an average elevation of around 2,300 feet. The maximum altitude of 3,360 feet, representing the highest point in Maryland, is on the crest of Great Backbone Mountain at the West Virginia boundary about two miles north of the southwestern corner of the State. The lowest point in the County is at the junction of the Savage and North Branch of the Potomac Rivers, where elevation decreases to about 900 feet.

The mountain and valley section includes about three-fourths of the County area, and is characterized by four prominent ridges which rise 400 to 1,000 feet above the general level. The longest and highest ridge extends in a northeast-southwest direction along the eastern side of the County. It has a continuous, almost uniform crest, separated by the gorge of the Savage River into Big Savage Mountain to the north and Great Backbone, or commonly Backbone, Mountain to the south. West of these mountains are two high ridges with elevations of 3,000 feet or more, Meadow Mountain located east, and Negro Mountain west, of the Casselman River. These ridges again extend in a generally southwesterly direction from the Pennsylvania line, converge just north of Deep Creek Lake, and continue southward as a series of broken ridges, of which Roman Nose and Halls Hill are the most prominent. To the west of Negro

Mountain, Winding Ridge, the westernmost of the four main ridges, extends southwestward from beyond the Pennsylvania line to Bear Creek, whence it continues southward as an irregular group of hills on both sides of the Youghiogheny River. Its elevations, between 2,500 and 2,700 feet, are somewhat lower than those of the ridges to the east. The valleys between the ridges are relatively narrow, but toward the northern part of the County they broaden out to form rather wide stretches of rolling, open country.

To the north and west of Great Backbone Mountain and south of Deep Creek Lake stretches a broad, rolling upland which makes up about a fourth of the County. Centered around Mountain Lake Park, this section includes the towns of Oakland, Deer Park, Gortner, and Red House. Many of the glades, or upland swamps and natural meadows, of Garrett County are located in this area. The rolling upland and valley sections constitute the principal agricultural districts, although some of the flat-topped ridges have considerable summit areas suitable for cultivation.

Some idea of Garrett County's location can be gained by highway mileage distances from Oakland, the County Seat, to several other centers:

Morgantown, W. Va.	44
Grafton, W. Va.	48
Cumberland, Md.	58
Uniontown, Pa.	59
Clarksburg, W. Va.	70
Fairmont, W. Va.	70
Pittsburgh, Pa.	106
Winchester, Va.	108
Hagerstown, Md.	123
Frederick, Md.	160
Washington, D. C.	180
Baltimore, Md.	200

One of the most significant features shown in the above tabulation is the fact that several large centers in West Virginia and Pennsylvania are much nearer to Garrett County than are comparable cities in Maryland; Baltimore is almost twice as far from Oakland as is Pittsburgh. This explains in part the fact that much of Garrett County's economy is connected with centers in these states rather than in Maryland. Most of the larger business establishments in the County which serve either as outlets for its products, or as suppliers of its goods and services, have their head offices in West Virginia or Pennsylvania. In Maryland the city of Cumberland is an important market for Garrett County agricultural products and serves as a retail and wholesale center for the northeastern part of Garrett County. However, the northern, particularly the northwestern, section of the County is oriented more toward Uniontown and the Pittsburgh metropolitan area, while the southern part, in turn, looks toward the adjacent parts of West Virginia to market its products, buy its goods, and find employment.

In relation to the major morphological regions of northeastern United States. Garrett County is a part of the Allegheny Mountain section of the Appalachian Plateau Province, which is a subdivision of the Appalachian Highlands. The Allegheny Mountain section constitutes the high eastern margin of the plateau, extending from northern Pennsylvania to central West Virginia. The Allegheny Front is the southeast-facing escarpment of the plateau and can be traced from north of Williamsport, Pennsylvania, southwestward to west of Lock Haven, Altoona, and Bedford, where it lies immediately west of Highway 220 which connects these cities with Cumberland, Maryland. A few miles north of the Maryland-Pennsylvania line the Allegheny Front jogs eastward about ten miles and then resumes a

southwest trend as Dans and Little Allegheny Mountains in Allegany County, Maryland. In Maryland the edge of the plateau lies between Cumberland and Frostburg. South of the North Branch of the Potomac in West Virginia, the edge of the plateau continues under the name of Allegheny Mountain or Plateau. Near Petersburg, West Virginia, the escarpment jogs westward for about ten miles to Back Allegheny Mountain west of Greenbrier Valley, in the same manner as it jogged to the east in Pennsylvania. Several such minor jogs occur where anticlinal valleys are not quite parallel to the general trend, but are aligned on a more north-south axis.

Bald Knob is located about twenty miles west of Monterey, Virginia, at the southern limits of the Allegheny Mountain section. From this point altitudes decline north, south, and west, and the escarpment disappears.

The western border of the Allegheny Mountain section of the Appalachian Plateau is not so distinct as the eastern which is set off by the Allegheny Front. From Bald Knob northward, however, it can be traced to the east of Grafton, West Virginia, along the divides between the Monongahela and Cheat Rivers to the Pennsylvania line, and beyond northeastward along Chestnut Ridge toward the New York State line, separating the drainage basins of the Allegheny and its tributaries from those of the West Branch of the Susquehanna.

This tri-state tableland, of which Garrett County is a part, is a natural unit. It has a total area of about 4,700 square miles, or approximately 3,000,000 acres, about half of which is in farms. The relatively high elevation has resulted in a fairly uniform, humid climate. Precipitation ranges from 40 to over 50 inches in the higher southwestern

part, and the average frost-free period, or growing season, ranges from about 130 days in the higher sections to 150 days in the lower western and northern areas. Natural conditions favor such crops as pasture grasses and clovers, hay, oats, buckwheat, white potatoes, and the hardier vegetables. They also favor livestock raising, and this is a general farming and dairying area, with a comparatively uniform appearance throughout its extent.

Coal mining and forestry and forest products are characteristic of the tri-state area. The large proportion of land that has been included in national and state forests and game refuges in the Allegheny Mountain section, with its cool summers, bodies of water, and modern highway accessibility from adjacent urban centers have made recreation an increasingly important feature of the entire region.

Many of the problems of expanding agriculture, coal-mining, soil erosion, markets, and others of an economic or social nature are shared alike by the people of this tri-state tableland, and these problems have been intensified by lack of political and economic unity. This situation, however, has to some extent been offset by the increasing centralization in control of collection and distribution of many products, food and dairy products in particular. Then too, there has developed a centralization of processing plants for both dairy and meat products, which has generally favored the West Virginia and Pennsylvania parts of the Allegheny Mountain section rather than the Garrett County area.

The entire region stands in need of better planning for production and distribution of agricultural, forest, and mineral products. Some kind of regional leadership is vitally needed if the tri-state area is to establish and stabilize its economy and way of life to make the best possible use of its natural resources.

Why Garrett County is a part of Maryland.¹ It can be seen from the previous discussion that, except for the section along the North Branch of the Potomac, all of Garrett County's boundaries are artificial. The founding of Maryland, including the Garrett County area, is primarily due to the fact that George Calvert, first Baron of Baltimore, after years in public office in England, decided to spend the rest of his life in the New World. He already held by charter a considerable part of southeastern Newfoundland, called the Province of Avalon, and in 1628 he moved there with his family. After about a year's sojourn in that bleak region, the extreme severity of the long winter and the evident impossibility of making Avalon more than a fishing station, convinced Baltimore that he should find a home in a more temperate region. He asked for a grant of land north of the Potomac, within the territory that had previously been granted to the Virginia Company, but which had reverted to the Crown. Before the charter was legally prepared, George Calvert died, but in 1632 his son, Cecilus Calvert, second Baron of Baltimore, received title to the proprietary colony, with palatinate authority, under which were included all powers, both for peace and war.

The territory thus conveyed was considerably more extensive than that covered by the present State, although the boundaries of the Garrett County area were more or less coextensive with those of today, except for the northern line. Under the charter of 1632, Cecilus Calvert's lands were bounded on the north by the 40th parallel; on the east

1 Members of Johns Hopkins University, and others, "Maryland, Its Resources, Industries and Institutions", The Sun Job Printing Office, Baltimore, Md., 1893, pp. 1-10.

This is the chief source for most of the material on the early history.

by Delaware Bay and River, and the Atlantic Ocean; on the south by a line drawn from the mouth of the Potomac eastward to the ocean; and on the west by the southern, or right, bank of the Potomac to its most distant source, and thence by a line due north to the 40th parallel. This territory included all of what is now the State of Delaware and about a 20-mile strip north of the present Pennsylvania boundary, approximately on a line with Connellsville and Bedford on the west and including York, Chester, and south Philadelphia on the east.

In 1680 William Penn received a charter for a tract of land west of the Delaware River from a point 12 miles north of Newcastle (Delaware) to the intersection of the Delaware River with the 43rd parallel; bounded on the north by the 43rd parallel; on the west by a north-south line five degrees west of the eastern boundary; and on the south by the 40th parallel to its intersection with a circle of 12 miles radius around Newcastle. By the charters of both Maryland and Pennsylvania their mutual boundary along the 40th parallel seemed clear. But Penn soon felt that he needed frontage on Delaware Bay, and furthermore his growing settlement of Philadelphia was just south of the 40th parallel, as is Delaware Bay. Penn argued that "to the beginning of any degree" meant to the end of the preceding degree, and he was willing to accept the 42nd parallel instead of the 43rd as his northern boundary, but insisted that the 39th instead of the 40th should be the southern boundary.

Although based on a compromise reached with Charles Calvert, fifth Lord Baltimore, in 1732, it was not until 1760 that the long-standing dispute was settled. Two English mathematicians, Charles Mason and Jeremiah Dixon were engaged by the proprietaries of Maryland and Pennsylvania to run the line between the provinces and mark it with suitable

and permanent monuments. They began their traverse in 1763 and worked four years. The line thus run is the famous Mason and Dixon's line along the parallel of $39^{\circ}43'19.91''$, which forms the northern boundary between Garrett County, the rest of Maryland, and Pennsylvania.

The western boundary of Maryland was long disputed by Maryland and Virginia, and later by West Virginia. Finally the United States Supreme Court ordered a new survey which was completed in 1912. This survey followed in general the line established in 1787 by Col. Francis Deakins in his survey from the Fairfax stone at the head of the Potomac to Mason and Dixon's line.

The line between Garrett and Allegany Counties was in dispute from 1872 until 1898, when the "Bauer" line was surveyed on the basis of the provisions of the enabling act which established Garrett County.

Thus, although Maryland was founded in 1632, it was not until 280 years later, or in 1912, that the bounds of Garrett County as a part of Maryland were finally established.

Settlement

Early White settlement. Prior to the Revolutionary War there were very few settlers in what is now Garrett County. In 1751, Frederick, the sixth and last Baron of Baltimore, succeeded to the title and estates in America. During the final struggle between Great Britain and France for possession of Canada, Maryland suffered severely from French and Indian raids; and after Braddock's defeat in 1756 it seemed likely that the western part of the colony might be depopulated and abandoned. However, the shift of the theater of war to the St. Lawrence Valley and the Great Lakes area removed the danger, so that after 1763, Baltimore, who never left England, requested Governor Horatio Sharp to have the land "westward from

Fort Cumberland" surveyed and to reserve certain "manors" for his Lordship.

In March 1768, Governor Sharp reported that 96,910 acres, including some Indian "old fields", had been surveyed along the Potomac. In May 1768, acting for Lord Baltimore, Col. Francis Deakins surveyed the "Great Glades Manor", 17,750 acres extending from the mouth of the Little Youghiogheny River, about a mile northwest of present-day Oakland, eastward to the foot of Backbone Mountain. He also surveyed "Green Glades Manor", 4,710 acres along Green Glades Creek. Part of this "manor" land is now covered by the southeast arm of Deep Creek Lake, and part is in farm land along Route 495 north of Swanton.

Before the "proprietary" opened the lands west of Cumberland for settlement only six private grants had been made in what is now Garrett County. They included a total of 1,337 acres. Two of these, Joseph Tomlinson's "Good Will" and Capt. Evan Shelby's "Little Meadows", were along the Braddock Road about two miles east of present-day Grantsville. Froman's "Bad is the Best of it" was on Mill Run about two miles north of the present town of Selbysport on the east bank of the Youghiogheny. Captain Shelby's "Buffellow Run" was on the west side of the Youghiogheny about two miles north of present-day Friendsville. The sixth grant was the only one in the southern part of the County. This was N. Bruce's "Arno Vale" along Glade Run, about two miles north of the Potomac Valley where the village of Gorman now stands, on Route 560. These tracts were all patented between 1761 and 1773.

In the spring of 1774, Frederick, Lord Baltimore, opened his lands west of Cumberland, except for the manor reserves, for settlement. During the first three months about twenty land speculators or their agents,

accompanied by surveyors, came to the Garrett County area with land warrants and surveyed 65 tracts, averaging about 1,000 acres. In general these survey parties followed the Braddock Road and old Indian paths and trails, and usually began their traverses on or near the old paths. Before the patents were issued, however, the Revolutionary War came on, and in 1780 the property of all British subjects in Maryland, including Lord Baltimore, was confiscated. In 1781 the General Assembly reserved all unpatented lands west of Fort Cumberland as bounties for soldiers in the Continental Army. These lands did not, however, include the original six tracts granted before 1774 by Lord Baltimore; but did include the 65 tracts surveyed that year. Most of these tracts were later patented to persons who qualified as patriots, or at least did not bear the stigma of Toryism.

In 1787 Col. Francis Deakins was appointed to continue his survey of the rest of the Garrett County area so that the State could fulfill its promise to war veterans. His party surveyed 4,165 lots of 50 acres each, or a total of 208,250 acres. Of the vast area remaining after the survey of 1774, the surveyors left out the rougher mountain lands and laid off lots in the glades and valleys which they thought could be farmed. However, much rocky and steep land was included in the Bounty lots, the shape of which varied, partly to suit the terrain and partly to conform to previous surveys.

In his report on the survey of 1787 Colonel Deakins stated that there were 323 "squatters" on the reserved lands surveyed, who claimed 636 lots on which they had presumably made some improvements. Of these 246 were permitted to buy the lots they claimed at from 5 to 20 shillings, or about 66 cents to \$2.65 per acre. Many, however, failed or refused to pay, and abandoned their holdings. In 1791 the Assembly

ordered the sale of delinquents' property at not less than 5 shillings, or about 66 cents, an acre, and also provided for the sale of lots to new settlers at not less than 3 shillings 9 pence, or about 45 cents, an acre.

In 1788 the General Assembly appointed a commission to allot land to soldiers and to fix prices to settlers. Under the plan each officer was to receive four lots, or 200 acres, and each enlisted man 50 acres. For a variety of reasons, however, apparently not one of the veterans settled on the lots; most of them sold their land as soon as possible, generally to speculators, for about 100 shillings, or \$13.00.

The release of the reserved land west of Cumberland in 1788 was the beginning of a ten-year period of rapid settlement in that area. Cumberland became an incorporated town in 1787 and the County Seat of Allegany County (including the Garrett County area) in 1789, when that county was organized from the western part of Washington County. Between 1785 and 1795 about 50 tracts, totaling over 41,000 acres, were patented in the Garrett County area.

After the survey of the "military" lots, many small "vacancies" and some large tracts, mostly in the more mountainous parts of the area, remained unsurveyed and the property of the State, but during the next fifty years nearly all of this was disposed of to settlers and speculators.

"Potomac Manor", patented to Gen. John Swain in 1800, included several of the tracts surveyed in 1774 and 31 "military lots", in all 10,794 acres, lying between Backbone Mountain and the Potomac River, between Route 38 and the Savage River, some of which is now in the Potomac State Forest. "Cheviot Dale", of 17,090 acres, was resurveyed

for James Cunningham in 1827. It included several old tracts, military lots, and some previously vacant land, extending eastward from present Deep Creek Lake into the Savage River Valley, and containing considerable rough and hilly land, much of which is now in Savage River State Forest.

After 1800 it became the State policy to dispose of its valuable western lands, including timber and coal, as rapidly as possible for a few cents an acre. This was based on the theory that in private ownership the property would be developed and add to the basis for local and State taxation. Much of the land in what is now Garrett County thus came into the hands of large lumbering and mining interests and non-resident land speculators.

In 1798, at the time of the first property assessment in the Garrett County area, a partial list of 72 taxpayers owned 153,795 acres; but much of the land was owned by non-resident land speculators, three of whom owned 90,000 acres. Assessed value of the land varied considerably depending on location and improvements as well as other considerations. For example, Governor Thomas Johnson owned 25,000 acres in the southern part of the County near Deer Park and in Dunkard Glade, 3-1/2 miles northwest of Oakland. His land was assessed at about 32 cents an acre. Some of the resident land owners, on the other hand, with only 50 or 100 acres, were given assessed values of from \$1.50 to \$1.75 an acre. These resident land owners had, of course, improved their holdings to a much greater extent.

The first Federal census was taken in 1790, but the records for Allegany County, including the Garrett County area, were destroyed. However, from the list of land patents issued during the following decade,

it can be inferred that the period between 1790 and 1800 was one of rather rapid settlement. The increase in population was due to opening up of State lands, construction of the interstate road across the southern part of the area from Westernport to Clarksburg, and the general westward movement of population following the close of the Revolutionary War.

In 1800 what is now Garrett County included the Glades and Sandy Creek Hundreds or districts, and a small portion of the western part of Georges Creek Hundred. The Sandy Creek Hundred comprised the northern and northwestern parts of the County area, along the Braddock Road, down the Morgantown Road to Selbysport and the northwest corner of the County around Blooming Rose, thence up the Youghiogheny to Sang Run. The voting place for Sandy Creek Hundred was at Selbysport. The Glades Hundred included most of the rest of the area--the southern part of the County. Settlements here were between Backbone Mountain and the Potomac, southwest of Bloomington, and from Swanton southwestward and westward across the "Glades" past the site of Deer Park and Oakland and then northwestward along McCullough's Trail and the Old State Road. The center and voting place at that time was at Ingman's Tavern near Swanton.

In 1800 most of the settlers were in the Sandy Creek Hundred. Of the total of 985 inhabitants of whom 87 were slaves, 636 lived in Sandy Creek Hundred and 349 in the Glades Hundred. The total population, including a few families in Georges Creek Hundred who resided in what is now included in Garrett County, was 1,006.

It is interesting to note the considerable Negro population in the area. Slave-owning settlers brought their slaves with them, and these servants contributed to the early development of the County. After they were freed, either by individual owners or by the Proclamation of

Emancipation, these Negroes left the Garrett County area to live either in cities or in parts of the country where vestiges of the plantation system remained and where the agricultural economy offered them some sort of employment.

The main settlement period. During the first three-quarters of the 19th century the Garrett County area gradually was settled and its resources of timber, mine, and soils began to be utilized.

The Accident-Cove area is one of the important farming sections that began to be settled after 1800. This area was occupied largely by people of German ancestry, first by Pennsylvania Dutch and, after 1840, by immigrants from Germany.

McHenry and the area at the northern end of Deep Creek Lake was settled about 1810 on what was then one of the "Glades", Buffalo Marsh. This site was included in tracts surveyed in 1774, which were given such names as "Locust Tree Bottom" and "Wild Cherry Tree Meadow". To relatives in Baltimore, John McHenry wrote, in October 1820:

I have made it appear as clear to myself as arithmetic can make any speculation appear, that I can make my living on Buffalo Marsh, by putting my fine meadow into Timothy, and having a large stock of cows, say 25 or 30—I have engaged a man to put in 5 acres of Timothy this fall by harrowing. If this succeeds, I will go on enlarging till I have enough to winter a stock proceeding from 25 or 30 cows, and will spend the best part of the little capital the defection of the banks has left me in making my place a fine grazing farm.¹

The problem of growing enough feed for the long winter season in Garrett County which still confronts its farmers also faced John McHenry.

1 The Glades Star, Sept. 30, 1947, p. 257.

In April 1821, he wrote:

This has been a disastrous winter and spring on cattle, many have died in the Glades. . . . The ground is now covered with snow, but is melting fast. The winter has been so hard, and the spring so late that my provender gave out. I have been obliged to buy hay . . . and very fortunate for me, I could get it here.¹

By June of that year, however, McHenry was busy

. . . . making shelters for stock and putting land into timothy. By degrees I hope I shall make mine a complete grazing farm.¹

One of the first settlers to help develop land in the Glades of southern Garrett County was Israel Thompson, who was in charge of some cattle pastured in the Glades during the summer of 1820. By 1827 he had bought a herd of cattle and 100 acres of land in Pleasant Valley, about 2-1/2 miles south of Mountain Lake Park. He was soon able to buy or rent more pasture land in the area, and became a dealer, driving his cattle to markets as far away as Lancaster, Pa. In 1839 Thompson moved to Ryan's Glade, between the Potomac River and Backbone Mountain, and in 1849 bought 400 acres of land drained by Glade Run (about 2-1/2 miles north of Gorman on Route Md. 560).

This was a land of plenty. There were sugar maples to tap, wild berries to can, and apples to dry for winter use. Wheat, oats, and buckwheat were sown; there were meadows of timothy and clover, and wild glade hay for the stock. Israel increased his herd and his cattle business.²

When the Baltimore and Ohio Railroad was built across Garrett County in 1850-51 with a labor force of 5,000 men, Thompson contracted to supply

1 Ibid., March 31, 1947, pp. 227-228.

2 Ibid., Sept. 30, 1948, p. 303.

beef for the laborers. This profitable transaction enabled him to expand his cattle business during the next few years, and he employed as many as 50 men at harvest time when meadows were mowed with scythes and grain was cradled. Being a progressive man, one of the first in the area to use the new mouldboard plow, spring harrow, mowing machine, and threshing machine, Thompson became a leader in the movement to found the County of Garrett.¹ The general area developed by him is now known as the White Church district, and is still an important beef-cattle raising area. (See Land Use Areas map, Fig. K.)

The Elder Hill section of Garrett County, about four miles south of Friendsville, was pioneer country eighty or ninety years ago, when a typical family settled there on 100 acres of land. A log house with a stone fireplace was soon built and four or five acres of land were cleared. The rest was wood land,

. . . . much of which was fertile hill land, poor ridge land covered with mountain laurel, and some uncleared valley land drained by waters from a spring.²

Trees on the hilly wood land were white oak, pin oak, red oak, black oak, poplar, chestnut hickory, cherry, locust, beech, maple, butternut, and dogwood.

In those days Pittsburgh was using locust in paving her streets. Much locust timber was cut in our neighborhood and floated down the Youghiogheny River on its way to Pittsburgh.²

Each year a few more acres were cleared and sown to oats or buckwheat or planted to corn, potatoes, or turnips. There was always a garden, and butter was made at home. There were no enclosed pastures for the cows,

1 Ibid., pp. 303-305.

2 E. E. Enlow, "Recalling the Years of my Life", The Glades Star, Dec. 31, 1946, pp. 202-206.

sheep, and hogs. The children went out into the wood land pasture in the evening and brought the cows home to be milked.

They became so well filled during the day that at night they did not wander far from the milking place or where we occasionally salted them. We had a little more trouble to get our hogs home about butchering time. There was so much mast such as acorns and chestnuts, etc. in the woods that the hogs became very fat and wild and preferred to make their home in the woods. My father shot the hogs and hauled them home and prepared them for a part of our winter meat. Of course, at that time settlers did not need to depend entirely on pork, for deer, wild turkeys, pheasants, and even bears were far more abundant than now.¹

The grains were generally summer crops of corn, buckwheat, and oats. Wheat bread was somewhat of a luxury. Occasionally a "truckster" would take a load of farm products to Uniontown, a mining center about forty miles away, and bring back a barrell of wheat flour and other commodities. Later on, as more land was cleared and a field of wheat or rye was raised, the grain was taken to one of the grist mills down the river to be ground. Grain was sown broadcast by hand on the prepared land and then covered by a frame harrow, or a large thorn bush dragged over the field by horses.

As the district became more settled, around 1875 and 1880, and it was necessary to enclose land for livestock, the cleared land was gradually fenced in with hand-split chestnut rails. After several crops of corn, a field was seeded to grass and used as pasture land on which young trees soon began to grow and afford shade for the stock, as well as wood for other uses.

For some time we smoked our own meat, made our own sausage, made our own candles, made our own apple butter, and father made some of our shoes. We never saw much money, yet twelve of us grew to manhood and womanhood due to the thrifty management of our worthy parents.¹

¹ Ibid., Dec. 31, 1946, pp. 202-206.

In the spring of 1858 John M. Davis moved from Somerset County, Pa., to the Garrett County area, where, about three miles northwest of Oakland, he purchased 600 acres of "The Promised Land" which he developed as a beef-cattle farm on the natural pasture of Dunkards Run Glade. In 1906, Mr. Davis wrote:

The entire region was grazing ground for cattle, the native grass was abundant. . . . During the summer season, herds of cattle could be seen in every direction, attracted by the facilities for grazing on the native grass, and being a dealer in cattle I was led to purchase land and secure a home on this mountain top. During the summer of 1859 I herded 600 head of cattle on what is known as the Herrington Creek Glade. At that time from 1,000 to 2,000 cattle were annually pastured within the radius of ten miles. . . . Farmers were few, as it was thought useless to try to raise wheat or corn. . . . I wholesaled a drove of cattle to some eastern buyers, delivered the stock at Harrisburg, Pa., received the proceeds in cash, amounting to about \$5,000.00. I returned on horseback, carrying the money with me.¹

Large-scale exploitation of the virgin forests and mining of bituminous coal awaited the building of railroads. The Cumberland Road, built by the Federal Government from Cumberland to Wheeling on the Ohio between 1811 and 1818, aided considerably the settling of the northern part of Garrett County, through which it passed. Until the Baltimore and Ohio Railroad reached the Ohio in 1852, the Cumberland Road was one of the most important highways between the Eastern Seaboard and the Middle West, and over it traveled many of the migrants and much of the trade and mail. It had its "Golden Age" during the decade after 1842 when passengers transferred from trains to stage coaches at Cumberland, and freight was loaded there onto wagons bound for the West. The numerous inns and wagon-stops along the pike, often only a mile or two apart, afforded a ready market

1 The Glades Star, June 30, 1948, p. 285.

for local produce, and when farmers had idle time they found employment on the road. Grantsville got its start as the agricultural, commercial, and transportation center of the northeastern part of the County during this period.

In the early 1800's Selbysport grew up as the center for the northwestern corner of the Garrett County area. The Morgantown Road, following an Indian trail from Bear Camp on Braddock's Road, crossed the Youghiogheny at this site. In fact, Selbysport, founded in 1798, is the oldest town in Garrett County, and around it lies the oldest farming area. The first grist- and saw-mills were built and operated by water power furnished by Mill, Buffalo, and several other larger tributaries of the Youghiogheny. Much of the farm and mill labor was made up of slaves in those days. A considerable amount of produce and timber was rafted down the Youghiogheny to markets in Pennsylvania; sales were also made to the inns and travelers over both the Cumberland and Morgantown Roads. By 1807 the Glades wagon road from Selbysport through the Deep Creek Glades (now covered by Deep Creek Lake) connected with the State Road between Deer Park and Swanton. This road served as a route to the markets of the Westernport and Georges Creek mining camps, and the wagons brought back goods for the general stores of the Selbysport area. After the Confluence and Oakland Railroad was built in 1890, the old town of Selbysport prospered while the timber of the neighborhood was cut and shipped, but later it was displaced by Friendsville as the commercial center of the Lower Youghiogheny area in Garrett County, and finally, in 1947, when the Youghiogheny flood control project was completed, most of the houses were removed and the lower parts of the town were flooded.

Friendsville, about 2-1/2 miles south, or above, Selbysport, is built on a terrace on the Youghiogheny River. It grew up as the trading center of the Blooming Rose farming area and other neighborhoods to the west. Between 1828 and 1836 a small iron-working plant based on local iron ore and coal was operated here. For many years several large lumber companies were active in the Youghiogheny Valley above Friendsville; and after 1890 the Confluence and Oakland Railroad with several branches or tram lines was built to develop the lumber and mining industries of that part of the County, and up Bear Creek Valley to the east. After about 1910, when practically all of the virgin timber of the valley had been cut, traffic on the Confluence and Oakland Railroad decreased rapidly, and Friendsville lost some of its commercial importance as a lumber and coal center and supplier of produce and material to the lumber camps and coal mines of the area. In 1942 the Confluence and Oakland Railroad was purchased and removed by the Federal Government, and now the old "right of way" is flooded by the Youghiogheny reservoir. Friendsville is still relatively important as the trading center for the northwestern corner of the County.

Bloomington, at the mouth of the Savage River and at the southeastern end of the gorge of that river, is the point where the Old Glades Road, later the Virginia-Maryland Inter-State Road, and the Baltimore and Ohio Railroad began their climb up over Backbone Mountain to the country beyond. Lot 1 of the military lots surveyed in 1787 was located here at the mouth of the Savage. From 1850 to 1855 the town was called "Llangallon", the Welsh name of a coal-mining company. Coal mining and lumbering in the neighborhood were long the basis for the town's existence. However, it suffered from the proximity of Westernport, Piedmont, and Luke which are much larger commercial, transportation, and industrial centers.

Swanton, at the western foot of Backbone Mountain, has a location somewhat similar to that of Bloomington, except that glades and important agricultural lands lie to the westward. In early days it was known as Swan's Mill. Ingmans Tavern, located nearby at the junction of the Old State Road and the Glades Road, was the gathering place and political center for the southern part of Garrett County. After construction of the Baltimore and Ohio Railroad, large lumber mills were operated in Swanton, and for a time it was an important shipping point.

Farther up the Potomac Valley from Bloomington there are several towns which, after the building of the West Virginia Central Railroad from Piedmont to Elkins (1881-1889), were of temporary importance while the timber and coal of the valley were being removed. The railroad crosses the Potomac several times but lies mainly on the West Virginia side, with branches to several mines. Considerable pulpwood and coal are still produced in the upper valley of the Potomac but many of the towns, such as Shallmar, East and West Vindex, Gorman, and Kempton, have declined as coal and forest resources have become exhausted. Kitzmillersville, however, is still an important center for several small mines in the neighborhood.

Oakland, or Yough Glades as it was first known, is the center of the largest continuous area of agricultural land in the County. This area extends southwest of Deep Creek Lake through Oakland, Mountain Lake Park, Deer Park, Gortner, to Red House and the West Virginia line, between Backbone Mountain on the east and a parallel range of hills on the west, of which Roman Nose, Halls Hill, Hoop Pole Ridge, and Charcoal Hill are the most prominent.

The site of Oakland is near the old fords and crossings in the Little Youghiogheny and Youghiogheny Rivers. On the western edge of the present

town the Little Youghiogheny breaks through Hoop Pole Ridge to join the main stream; while the latter curves west and northwest through the main ridge near Crellin, about four miles southwest of Oakland. Several early trails and roads converged on the Oakland site; one crossed the Little Youghiogheny to join McCullough's Path just below Oakland; a second followed the main river north to Sang Run, and toward Friendsville and Selbysport; and a third ran east and west along the general line of the Old Glades Path, later the Inter-State Road. After 1806 Armstrong's Inn at Yough Glades became one of the important points on the Inter-State Road which connected Winchester with Clarksburg and Morgantown. This first permanent settlement on the site of Oakland was at the northwestern edge of the present town, near the oil storage tanks. By 1830 a grist- and saw-mill were in operation on the Little Youghiogheny River where it makes a sharp bend to the north around Totten Hill, a large sandstone ledge which helps form a natural dam, at the southern end of town. The settlement was also known as Slab Town or McCarty's Mill until 1849 when the name Oakland was adopted and part of the bottom land near the mill was laid out into town lots and streets along the right of way of the Baltimore and Ohio, which was completed across southern Garrett County in 1851, and extended to the Ohio at Wheeling in 1852.

During the next few decades Oakland and the surrounding area developed quite rapidly. Great herds of cattle were pastured in the nearby glades, and a considerable number were butchered locally. A large tannery was built in 1858, and by 1870 a large woolen mill had been built on the eastern edge of the town. Other industries and services which soon were established include: a tinsmith who made buckets, pans, stove pipes, etc.; a woodworking plant where wagons, sleighs, and, later, farm implements

were made. Soon there were several large general stores where farm produce was exchanged for "store goods". The timber resources of the neighboring slopes were rapidly exploited during this period, and Deer Park was a large lumber shipping point for several decades.

In 1860 John W. Garrett, president of the Baltimore and Ohio Railroad, wrote in his annual report:

The salubrious climate and beautiful country among the highlands of western Maryland have elicited much attention during the past season; but the absence of adequate hotel accommodations has materially checked the tendency to seek these Glades for summer homes. Arrangements are being made for additional hotels; and a large population from the south, east, and west will probably hereafter select this singularly picturesque and attractive region for a summer resort.¹

The Civil War delayed Garrett's plans for building hotels, but in 1870 the Baltimore and Ohio Railroad opened the Deer Park Hotel and in 1876 the Oakland Hotel. Both were large, three-storied buildings with long porches, and were lavishly furnished according to standards of that time. They were well advertised each season by the railroads, and patrons returned year after year. But as travel became easier, and the automobile made it possible to see new places, interest in resort hotel life around Oakland and Deer Park declined. The days of great summer resorts in the Glades, catering to wealthy patrons, finally ended. The Oakland Hotel closed in 1907 and the Deer Park Hotel in 1911; both have since been demolished. Mountain Lake Park was founded in 1881 on an 800-acre lot two miles east of Oakland. It was organized as a religious, cultural, and recreational center with a tabernacle and assembly hall, and had more than a hundred cottages for members of the organization. For several

1 Ibid., Mar. 31, 1949, p. 334.

years chautauqua sessions provided noted speakers and artists and attracted people from as far away as Cincinnati, Philadelphia, and Baltimore. Finally the popularity of such things vanished and the association property was sold. But Mountain Lake Park is now a growing residential town with services and trading facilities for the surrounding area.

The preceding description of the settling of the Garrett County area during the first three-quarters of the 19th century has shown that almost all of the important agricultural lands were occupied during this time (see Land Use Area map, Fig. K), and that most of the small commercial and trading centers of the present were established in those years. It is also significant that places which grew up rapidly as centers of lumbering industry declined almost as rapidly when the basis for their need was gone. Swanton and Deer Park are examples of these, as are the towns along the lower Youghiogheny, such as Kendall and Krug, which have disappeared entirely. Most of the towns along the upper Potomac Valley which were centers of either mining or lumbering activities have also declined or disappeared with a few exceptions, such as Kitzmiller.

Garrett as a New County

Toward the end of the main period of settlement—between 1800 and 1870—there developed a growing movement among the residents of western Allegany County for the formation of a separate county. The area now included had been under the jurisdiction of four different county governments. When Prince Georges County was organized in 1696 it included all of Maryland to the west, most of which was an unknown wilderness, hunting ground of Indians. The first surveys in the Garrett County area were made in 1748, when all land west of the present Prince Georges, Howard, and Baltimore Counties was organized into Frederick County. In 1776 the part

of Frederick County west of the Blue Ridge or South Mountain was set off as Washington County; and in 1789 the portion of Washington County west of Sideling Hill Creek was organized as Allegany County. For eighty-three years thereafter--the period of settlement and early development--the Garrett County area was part of Allegany County.

In 1871 an active campaign for the organization of a new county, to be composed of the seven western districts of Allegany County, was under way. According to the census of 1870, the population of these districts was as follows:

1. Altamont	1,133
2. Selbysport	1,419
3. Grantsville	1,786
10. Ryan's Glade	854
11. Accident	1,006
14. Sang Run	673
15. Oakland	<u>1,396</u>

This was a total population of 8,267, of whom 76 were colored. Since 1800, when the population was just about 1,000, it had increased at the rate of about 1,000 per decade. By including small parts of three adjoining districts the constitutional requirement of a population of 10,000 and an area of 400 square miles could be fulfilled.

In August 1871, The Glade Star began publication in Oakland with the slogan "Work for the New County". The paper reviewed "the extraordinary resources" of the contemplated new county, especially the Lower Youghiogheny coal basin around Friendsville which had been utilized on a small scale up to that time, but which it expected to see properly developed if rail connections could be made with the Connellsville-Pittsburgh Railroad. Other coal deposits, forest resources, and the agricultural capabilities of the "glades" were also stressed. Perhaps the most convincing point made by The Glade Star was that the area proposed for a new county was

paying \$28,000 a year under the county levy and receiving only \$18,604 in appropriations. The paper also pointed out that the existing county was almost 100 miles in length and the distance from Cumberland, the County Seat, "was inconvenient for the transaction of county business". Among other reasons suggested was that Wicomico County, organized in 1867, had given the Eastern Shore an additional senator and a delegate in the State legislature, which had disturbed the political equilibrium of the two sections of the State. Undoubtedly local pride and ambition played their parts as well.

The people of what was then western Allegany County accepted the editor's proposals in earnest. Public meetings were held in all parts of the projected county, and "speeches were made in every nook and corner, and the matter thoroughly canvassed". In January 1872 petitions were presented to the General Assembly, and on April 1, 1872 an "Act to provide for taking the vote of the people for or against a new county in certain election districts of Allegany County to be called the County of Garrett" was passed, and was approved by Governor Whyte on April 1, 1872. The name Glade County had been suggested during the campaign, but the committee who prepared the petition chose "Garrett" in honor of John Work Garrett, president of the Baltimore and Ohio Railroad at that time, who had taken the county area "into his care and keeping" and was active in developing the resources and hotel resort facilities.

The enabling act providing for the establishment of Garrett County specified that:

All that part of Allegany County lying south and west of a line beginning at the summit of Big Backbone, or Savage, Mountain, where that mountain is crossed by Mason and Dixon's line, and running thence by a straight line to the middle of Savage River, where it empties into the Potomac River; then by a straight line to the nearest

point or boundary of the State of West Virginia; then with the said boundary to the Fairfax stone, shall be a new county, to be called the County of Garrett; provided the provisions as to taking the census of the people and the area of the said county, and the sense of the people therein, shall be complied with in accordance with the constitution of this State.¹

The enabling act further provided for the organization of the new county, to take effect when and if the people voted in favor of it, and after the county seat had been chosen and confirmed by a subsequent act of the legislature.

The election was held on November 4, 1872, and the plan to create the new county was carried by a vote of 1,297 yeas against 405 nays. Votes for the location of the new county seat were: Oakland 653, Grantsville 590, and McHenry 461; a plurality of 63 for Oakland. On December 4, 1872, Governor Whyte declared the area "constituted as a new county to be called Garrett County, the inhabitants to have and enjoy all such rights and privileges as are held and enjoyed by the other counties of this State".¹

During the fall and winter of 1875 a movement was attempted to form another county by the further division of Garrett County. The citizens of the Grantsville area, particularly, still dissatisfied with the close vote that made Oakland the county seat, were anxious for the separation. However, state constitutional requirements for population and area could not be met and the legislature disallowed the petition.

In 1874 the legislature created nine election districts in Garrett County by making those previously known in Allegany County as 1. Altamont, 2. Selbysport, 3. Grantsville, the first three districts in Garrett County.

¹ J. Thomas Scharf, "History of Western Maryland", 1882, Vol. II, pp. 1511-1517.



Figure 1

**Court House at Oakland. Garrett County's
administration center.**



Figure 2

**Stores and office buildings. Second Street,
Oakland.**

Two districts were consolidated to form District 4. Bloomington, and four others were renumbered: 5. Accident, 6. Sang Run, 7. Oakland, and 8. Ryan's Glade, while two others were combined to form District 9. Johnsons.

The population by districts in Garrett County in 1880 was:

1. Altamont (Swanton)	1,561
2. Selbysport (Friendsville)	1,250
3. Grantsville	2,152
4. Bloomington	1,537
5. Accident	1,369
6. Sang Run	794
7. Oakland	2,077
8. Ryan's Glade	1,033
9. Johnsons	<u>402</u>
Total	12,175

During the decade from 1870 to 1880 the population had increased from 8,267 to 12,175, a gain of 3,908 persons, or 47.3 percent. Much of this increase had occurred in the southern half of the County which had been opened up by the building of the Baltimore and Ohio Railroad and the development of lumbering, coal mining, and farming. The "panic of 1873" and the depression which followed may also have been a factor in attracting and holding the population during this decade.

Between 1880 and 1890 several new election districts were organized to conform to the changing pattern of settlement, and shifts within some districts also led to changes in voting places and names. Altamont had been an important center during the building of the Baltimore and Ohio Railroad, but it was replaced by Swanton which had a much better location at the western foot of Backbone Mountain, both as an important lumber shipping point and as a crossroads trading center for the farm lands to the west. The name and voting place for District 1. was changed from

Altamont to Swanton. During the same period Friendsville had also grown in relative importance and District 2. was renamed Friendsville and Selbysport, and later the latter name was dropped entirely. Grantsville continued to be the chief center in District 3., as did also Bloomington in District 4., Accident in District 5., and Sang Run in District 6. A new district, No. 10., Deer Park, was organized from parts of old District 1., Altamont (Swanton), District 7. Oakland, and District 8. Ryan's Glade. The town of Deer Park at this period enjoyed prosperity brought by large lumbering operations and the resort business at Deer Park Hotel. District 11. The Elbow which was currently important with a number of lumbering and mining camps, was organized from the northern part of District 4. Bloomington.

The population of Garrett County by districts and towns in 1890 was:

1. Swanton			1,002
2. Friendsville and Selbysport			1,529
3. Grantsville			2,034
4. Bloomington			1,062
"	Town	(295)	
5. Accident			1,432
6. Sang Run			871
7. Oakland			2,525
"	Town	(1,046)	
8. Ryan's Glade			1,457
9. Johnsons			576
10. Deer Park			1,199
" "	Town	(179)	
11. The Elbow			526
Total			14,213

Between 1680 and 1890 the population of Garrett County increased from 12,175 to 14,231, a gain of 2,056 persons, or 16.9 percent, compared to a 47.3 percent increase in the previous decade. More attractive opportunities to the west during the period were diverting settlers from Garrett County and luring many of its residents as well.

TABLE I
POPULATION OF GARRETT COUNTY

District or Town	1900	1910	1920	1930	1940	1950
1. Swanton	1,263	1,365	1,206	1,030	1,233	1,108
2. Friendsville & Selbysport (Town)	2,203 (---	2,016 466	1,793 408	1,758 494	1,954 569	1,883 607)
3. Grantsville (Town)	1,929 (175	2,245 248	2,232 264	2,160 400	2,407 465	2,476 459)
4. Bloomington (Town)	1,055 (395	1,164 372	788 350	809 369	817 338	742)
5. Accident (Town)	1,257 (---	1,259 ---	1,160 ---	1,138 ---	1,219 236	1,159 237)
6. Sang Run	1,099	1,026	759	742	923	930
7. East Oakland (Oakland Town)	1,555 (1,170	1,913 1,366	1,556 1,225	1,839 1,583	1,187 1,587	1,424 1,632)
<u>In District 7. 7</u>	<u>441</u>	<u>567</u>	<u>502</u>	<u>628</u>	<u>610</u>	<u>771</u>
<u>In District 14. 7</u>	<u>729</u>	<u>799</u>	<u>723</u>	<u>955</u>	<u>977</u>	<u>861</u>
8. Ryan's Glade	1,766	1,554	2,139	2,313	2,343	1,845
9. Johnsons	828	792	740	670	861	929
10. Deer Park (Town)	1,155 (293	1,256 268	1,267 247	1,213 249	950 329	787 320)
11. The Elbow	617	652	510	301	292	221
12. Bittinger	768	874	784	765	674	555
13. Kitzmillersville (Town)	295 (---	1,551 865	2,452 1,044	1,967 827	2,028 870	1,633 649)
14. West Oakland (Oakland Town, Part of)	1,911 (729	2,438 799	2,292 723	2,780 955	3,125 977	3,123 861)
15. Avilton <u>1/</u>	---	---	---	423	471	381
16. Mountain Lake Park <u>2/</u> (Lock Lynn Heights Town) (Mt. Lake Park Town)	---	---	---	---	1,497 339	2,010 415)
	(215 260	216 335	224 231	198 322	551	887)
Garrett County	17,701	20,105	19,678	19,908	21,981	21,206

Compiled from U. S. Bureau of the Census Reports.

- 1/ District 15. Avilton, organized from parts of No. 3. Grantsville, No. 9. Johnsons, and No. 11. The Elbow, in 1922.
- 2/ District 16. Mountain Lake Park, organized from parts of No. 10. Deer Park, and No. 7. East Oakland including towns of Lock Lynn Heights and Mountain Lake Park, in 1936.

Between 1890 and 1900 the pattern of settlement in Garrett County continued to change. In the central part of the County a new district, No. 12. Bittering, was formed from parts of Swanton, Friendsville-and-Selbysport, Grantsville, and Bloomington. This area had been cleared of much of its virgin timber and was becoming a relatively important farming community. District 13. Kitzmillersville was organized from parts of Swanton and Deer Park after 1890, as coal mining was expanding in the Potomac Valley and timber was being removed from the eastern slopes of Backbone Mountain. Oakland district and town were divided into East and West Oakland as the town continued to grow due to its position of County Seat and commercial and service center for the surrounding agricultural, mineral, and forest enterprises.

Up to 1910 there was a relatively rapid but erratic increase in population in Garrett County. Percentage changes in population from 1870 to 1950 for Garrett County and for the State of Maryland are:

TABLE II
PERCENTAGE CHANGES IN POPULATION
FOR GARRETT COUNTY AND MARYLAND

Decade	Garrett County		Maryland
	Decrease	Increase	Increase
1870-1880		47.3	19.7
1880-1890		16.9	11.5
1890-1900		24.4	14.0
1900-1910		13.5	9.0
1910-1920	2.1		11.1
1920-1930		1.2	12.5
1930-1940		10.4	11.6
1940-1950	3.5		27.6

Compiled from U. S. Bureau of the Census Reports.

During the 40-year period of 1870-1910 Garrett County's population was increasing at a considerably more rapid rate than was that of Maryland as a whole. Between 1910 and 1930, however, Garrett County experienced a net decline of about 1 percent, while the State as a whole gained about 25.9 percent. During that 20-year period, the first World War and the industrial expansion of the 1920's had drawn young men into the armed services and other Garrett County residents into industries, with a permanent loss to the County. Garrett County's growth in population during the decade between 1930 and 1940 compared quite favorably with that of the State as a whole. This growth was partly due to the general decrease in economic activity, lack of opportunity elsewhere, and the back-to-the-land movement.

In many respects the decade of 1940 to 1950 was similar to the 1910-1920 period. Again, several hundred of the County's young men left to enter the armed forces, while other residents were drawn away by demand for labor in the war effort. Apparently this migration resulted in a permanent loss for Garrett County. Between 1940 and 1950 there were 2,019 resident deaths and 5,118 resident births in the County, a natural increase of 3,099 births over deaths. Without any migration into or out of the County, and on the basis of a population of 21,985 in 1940, there would have been 25,084 persons in Garrett County by 1950. However, according to the 1950 census, the County had only 21,206 persons, or a difference of 3,878 who were largely lost through migration. This represents a real loss of 17.6 percent during the decade. In other words, Garrett County is a surplus-population area, just as it is in many of its agricultural, mineral, and forest products.



Figure 3
Residential section of Second Street, Oakland.



Figure 4
New home on outskirts of Oakland, in an area of part-time farming.

Density of population. Per square mile Garrett County has fewer people than any other county in Maryland, and much less than the average for the State as a whole. The absence of any urban center larger than Oakland (1,632 in 1950), accounts in part for this fact, but it also reflects the agricultural and extractive nature of its economy.

TABLE III
POPULATION PER SQUARE MILE
FOR MARYLAND AND SELECTED COUNTIES

State or County	1930	1940	1950	Percentage Change 1940--1950
Maryland	164.1	184.2	235.1	27.6
Garrett	29.1	32.9	31.7	- 3.6
Allegany	178.6	204.2	210.1	2.9
Calvert	43.7	47.9	56.0	16.9
Worcester	43.7	44.0	47.9	8.9
Frederick	82.1	86.3	93.6	8.5

U. S. Bureau of the Census.

Population density in Garrett County has been remarkably stable for the 20-year period. Incidentally, in 1790, the year of the first Federal Census, Maryland had a population density of 32 persons per square mile, about the same as the present density in Garrett County, 31.7. In fact, all of Garrett County's population would occupy only 1.8 square miles at the present rate of density for the city of Baltimore.

The other counties included in Table III show conditions of several kinds. Calvert and Worcester Counties are predominantly agricultural areas, but with a cash-crop economy, large Negro populations, and relatively high rates of tenancy. A combination of local demand for agricultural labor, limitations of opportunity, etc., have kept a larger percentage of the residents of those counties from migrating than has been

true of Garrett County. Frederick County, although the leading agricultural county in the State, also shows a substantial increase between 1940 and 1950. Much of this, however, reflects the city of Frederick, which had an increase of 14.5 during the decade. The density of population in Allegany County is, of course, primarily due to Cumberland, Frostburg, and Westernport and the numerous mining and transportation centers of the Georges Creek Valley. Most of these cities and towns actually showed a decrease between 1940 and 1950.

Density of an area's population is an important factor in, as well as a reflection of, the nature and stage of its economy. A small population, if it maintains or increases the prosperity and adequately meets the requirements of an area's development, may contribute more to its economic stability than a larger number of inhabitants controlled largely by conditions that make better use of the labor resources and a more adequate income difficult to achieve. The fact that Garrett County's population apparently has stabilized around 21,000 or 22,000 should indicate that either the County's resources are limited or have not been adequately developed to provide for the natural increase of its population. Later an attempt will be made to show how use of natural resources and the geographic and economic conditions which control their utilization have influenced the population of Garrett County. The degree of economic development of an area and the probable success of further development depends not only on its resources and geographic conditions, but also upon the size, distribution, stability, composition, needs, and enterprise of the resident population. Adequate knowledge and understanding of population conditions are important guides to intelligent action.

Distribution of population by age groups. Several conditions which characterize the population of Garrett County may be shown by comparing the percentages of the population in different age groups for the County, the State as a whole, and other areas within the State. It is not a part of this study to analyze the complex problem of demography in Garrett County, but some explanation may help to show trends in past decades.

The following table is based on reports of the U. S. Bureau of the Census for 1920. It shows the different proportion of certain age groups for the State of Maryland, the City of Baltimore, and Calvert and Garrett Counties. In the latter two the population is entirely rural, but in Calvert County it is almost half Negro, while in Garrett County it is over 99 percent native-born white.

TABLE IV
PERCENTAGE DISTRIBUTION OF POPULATION
FOR MARYLAND AND SELECTED COUNTIES,
BY AGE PERIODS IN 1920

Age Period Years	Maryland		Baltimore City		Calvert County		Garrett County	
Under 7	14.2		13.1		18.1		19.6	
7 to 13	13.6	27.8	12.0	25.1	19.3	37.4	17.8	37.4
14 to 17	7.3		6.5		9.3		8.7	
18 to 20	5.5	12.8	5.3	11.8	4.9	14.2	5.1	13.8
21 to 44		42.5		46.6		33.0		34.0
45 and over		22.4		21.8		20.3		19.9

Computed from U. S. Census Reports.

One of the greatest contrasts is the higher proportion of children 13 years old and younger in Garrett County (and also in Calvert County) than in Baltimore City and the State as a whole. Another is the reverse condition in the 18 to 44 year group; Baltimore City, as well as the State as a whole, had a higher proportion of persons in this, most productive

group. A relative disproportion is also noticeable in the 14 to 17 year old group in Garrett County, while in the 18 to 20 year old group Garrett County is significantly below the percentage for the State, which includes all urban centers. Calvert County shows a composition of population by age groups similar to that of Garrett. Apparently migrations out of both of these rural counties had caused a serious loss in teen-agers and mature persons, and left them with a higher proportion of real young, as well as a relatively higher proportion of older persons, especially in view of the loss in the 18 to 44 year group. The decade 1910-1920 included the period of extensive migrations during World War I.

TABLE V
PERCENTAGE DISTRIBUTION OF POPULATION
FOR MARYLAND AND SELECTED COUNTIES
BY AGE PERIODS IN 1930 AND 1940

Age Period Years	Maryland		Baltimore City		Calvert County		Garrett County	
	1930	1940	1930	1940	1930	1940	1930	1940
Under 15	28.1	23.8	25.6	21.2	36.2	32.5	37.1	32.5
15 to 19	8.9	9.2	8.4	8.8	10.9	10.5	10.7	11.1
20 to 24	8.1	9.1	9.4	9.3	8.4	8.0	7.7	8.9
20 to 44	38.8	40.6	42.3	42.9	29.7	33.3	30.1	33.1
45 and over	23.8	26.5	23.3	27.0	22.9	23.5	22.0	23.2

Computed from U. S. Bureau of the Census Reports.

Although percentages for 1930 and 1940 are not strictly comparable to those of 1920, somewhat similar age groupings show that the trend in migration from rural areas to urban centers continues to make significant changes in the composition of the population.

In 1930 and 1940 the differences in the under 14 year groups between Garrett County and the City of Baltimore as well as for the State as a whole are more or less similar to those of the 13 and under groups in 1920,

due, in part, to effects of the depression. The much greater proportion of the 20 to 44 year group in Baltimore City and the State as compared to the rural counties of Calvert and Garrett is of special significance. The reversal of proportions between 15 to 19 and 20 to 24 year groups also indicates the effect of previous migrations, a trend that will probably continue. Greater proportions of 15 to 19 year olds were found in rural counties of Calvert and Garrett, but fewer of the 20 to 24 year old persons. Although the proportion of 45-year and older groups were somewhat similar for all areas shown, there was a sizeable difference by 1940 in that both the State as a whole and Baltimore City had increased their proportions of older people. These represent in part the losses of younger people by rural areas in previous years. In both Calvert and Garrett Counties, however, the proportion of persons 45 years old and older were relatively much greater when compared to their 20 to 44 year old groups.

Further implications of the loss of its most productive and potentially productive age groups that Garrett County experienced during the period under consideration may now be taken up briefly. In 1940, for example, 55.7 percent of the people in Garrett County were either only 14 years of age or younger, or 45 years old or older; while only about 33 percent were in the 20 to 44 year old group. In the City of Baltimore, in contrast, 48.2 percent were either 14 and under or 45 and over, while 42.9 percent were in the 20 to 44 year group. When differences in occupations are taken into consideration, many more of the 45 years or older group in Baltimore would be more productive than is the case in a rural county where agriculture, mining, and lumbering call for a generally younger labor force for greatest efficiency.

In other words, in Garrett County a smaller proportion of the most productive group must contribute toward the support of a relatively larger, less productive group. In social and political problems there are also important implications involved in a disproportion of age groups. One of the most vital problems is the inadequacy of the County's school system. For example, 115 one-room school houses were abandoned during the past fifteen years because of inaccessibility, low attendance, and difficulty in securing teachers. Of the 47 remaining schools, including five high schools, 25 are still one-room, one-teacher plants. A recent survey made by three educational experts resulted in the recommendation that 32 of the 47 schools should be classified as temporary centers until a consolidation program could be carried out. The recommended program would cost over \$4,600,000, to be financed over a 25-year period, with payment of \$140,000 a year on the principal alone.¹

A disproportionate number of older persons raises the problem of old age and dependency, and of employment policies which will find some place for the older agricultural worker, or the miner left stranded when coal seams have been dug out. In all political, social, and economic activities, in family life, standards of living, and in many other respects, the influence of older people, both as cause and effect, will tend to emphasize conservatism. Unfortunately, many of the problems that confront the people of Garrett County need the progressiveness and "lack of respect for customary ways of doing things" that characterized the youthful pioneers of its early settlement.

1 Interview with the Garrett County Superintendent of Schools.

TABLE VI
AREA AND POPULATION PER SQUARE MILE
IN GARRETT COUNTY, BY MINOR CIVIL DIVISIONS

Division	Area in Sq. Mi.	Population Per Sq. Mi.	
		1940	1950
1. Swanton	56.5	21.8	19.6
2. Friendsville & Selbysport	52.7	37.0	35.7
3. Grantsville	68.7	35.0	36.0
4. Bloomington	41.5	19.7	17.9
5. Accident	50.6	24.1	22.9
6. Sang Run	65.5	14.1	14.2
7. East Oakland	13.3	89.2	107.1
8. Ryan's Glade	70.4	33.3	26.2
9. Johnsons	26.1	33.0	35.6
10. Deer Park	30.7	30.9	25.6
11. The Elbow	25.4	11.5	8.7
12. Bittering	40.8	16.5	13.6
13. Kitzmillersville	17.7	114.6	92.3
14. West Oakland	59.7	52.3	52.3
15. Avilton	23.8	19.8	16.0
16. Mountain Lake Park	24.3	61.6	82.7
Garrett County	668.4	32.9	31.7

Computed from U. S. Bureau of the Census Reports.

There is considerable range in density of population in the minor civil divisions of Garrett County. A comparison of these figures with the map of Minor Civil Divisions (Fig. D) and with the map of Pattern of Settlement (Fig. B) will show that the districts with less than about 20 persons per square mile contain much of the rougher land along the major streams and their tributaries, such as along the Youghiogheny in Sang Run (District 6), along the Savage River in Bloomington (District 4), The Elbow (District 11), Bittering (District 12), and Avilton (District 15). It is also in these districts that most of the State Forest lands are found. (See State Forest map, Fig. J.) One exception is Kitzmillersville (District 13) which contains a number of the most im-

portant mining villages along the Potomac; and for this reason it is one of the most densely populated areas in the County. The districts with close to the County average of 32 persons per square mile are also the most important agricultural areas, such as Friendsville-Selbysport (District 2), Grantsville (District 3), Ryan's Glade (District 8), and Johnsons (District 9). (See Land Use Area map, Fig. K.) East Oakland (District 7) and Mountain Lake Park (District 16) are well above the average and reflect the denser concentrations of "rurban" centers within them.

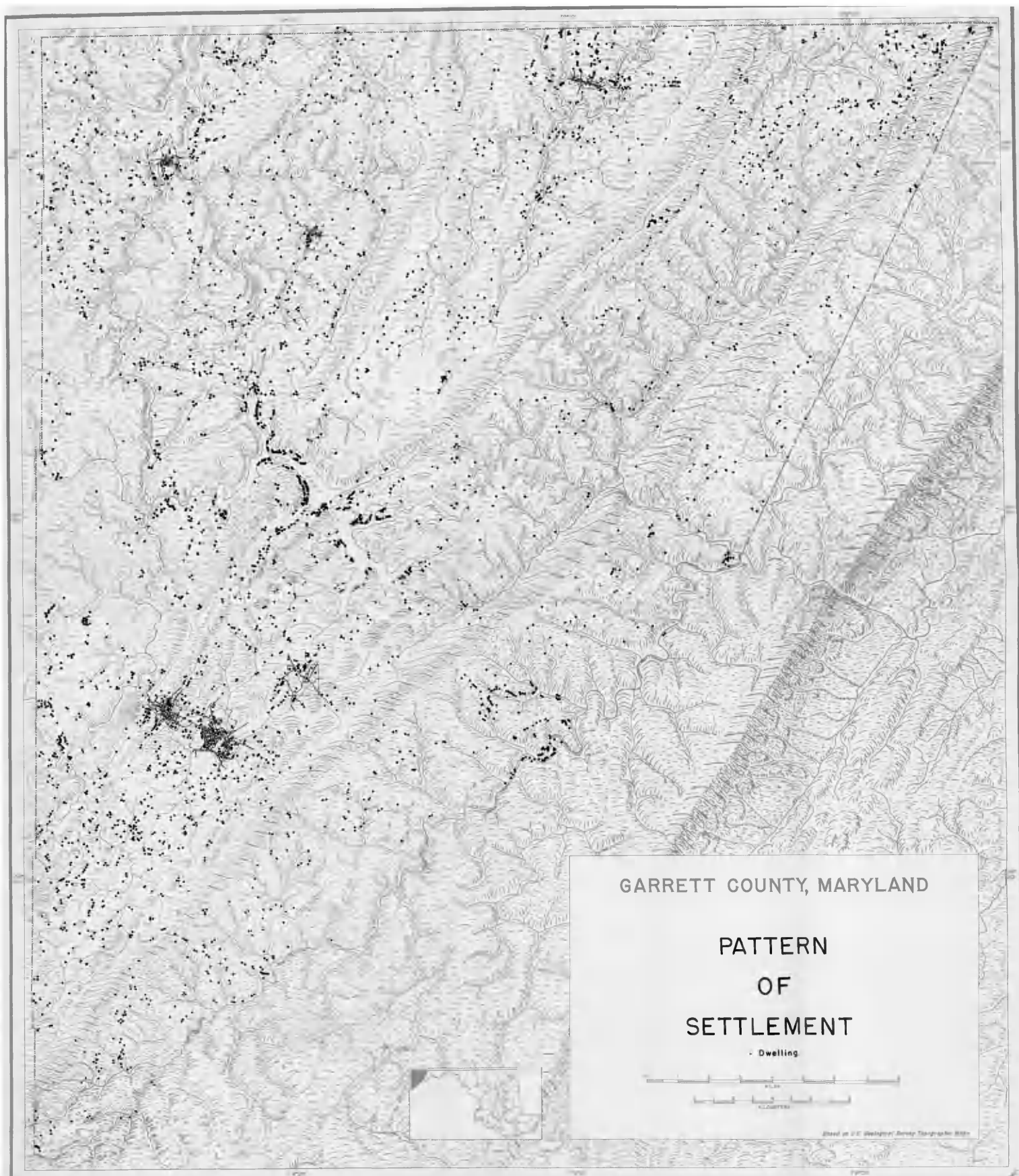


Figure K.

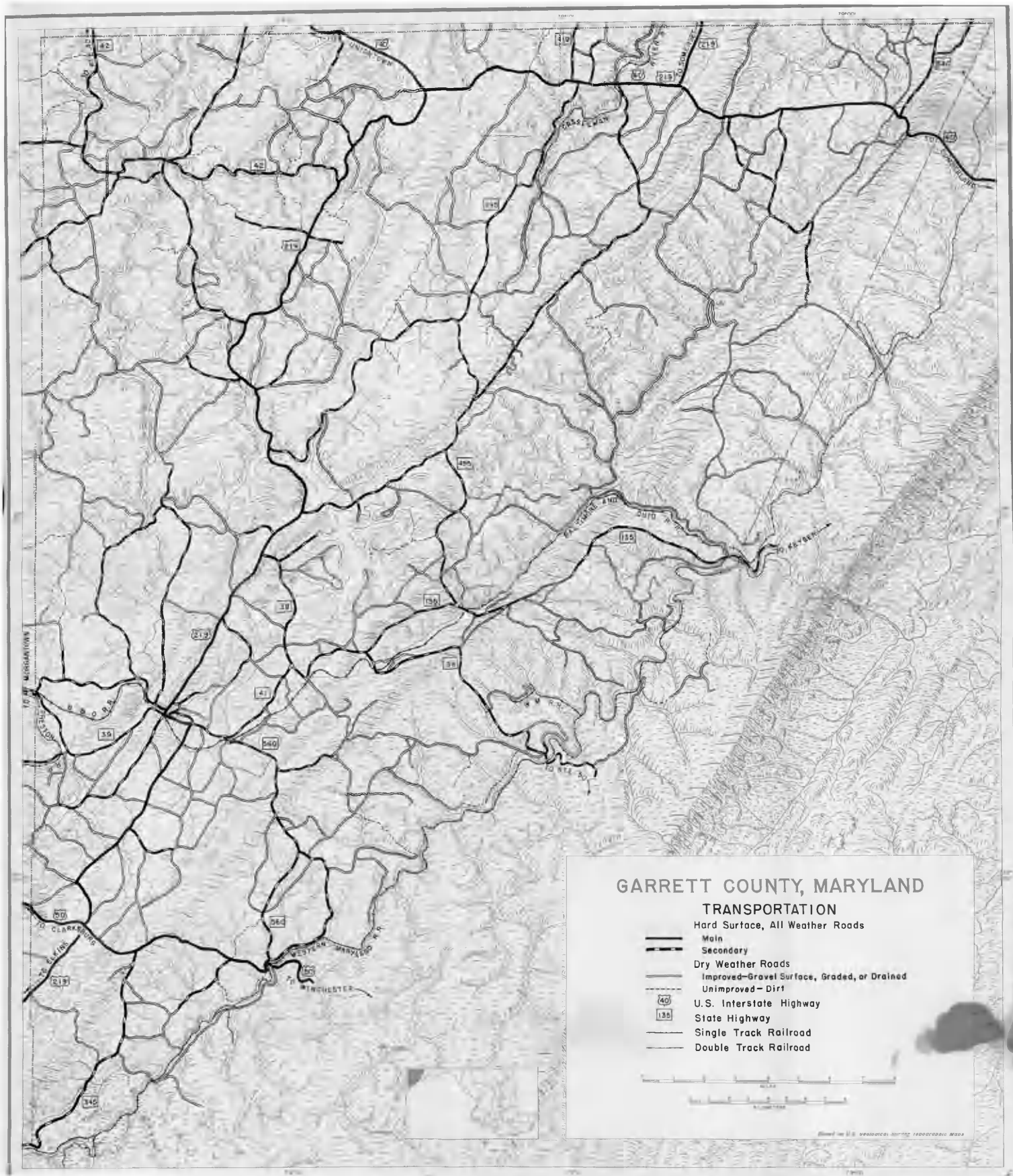


Figure C.

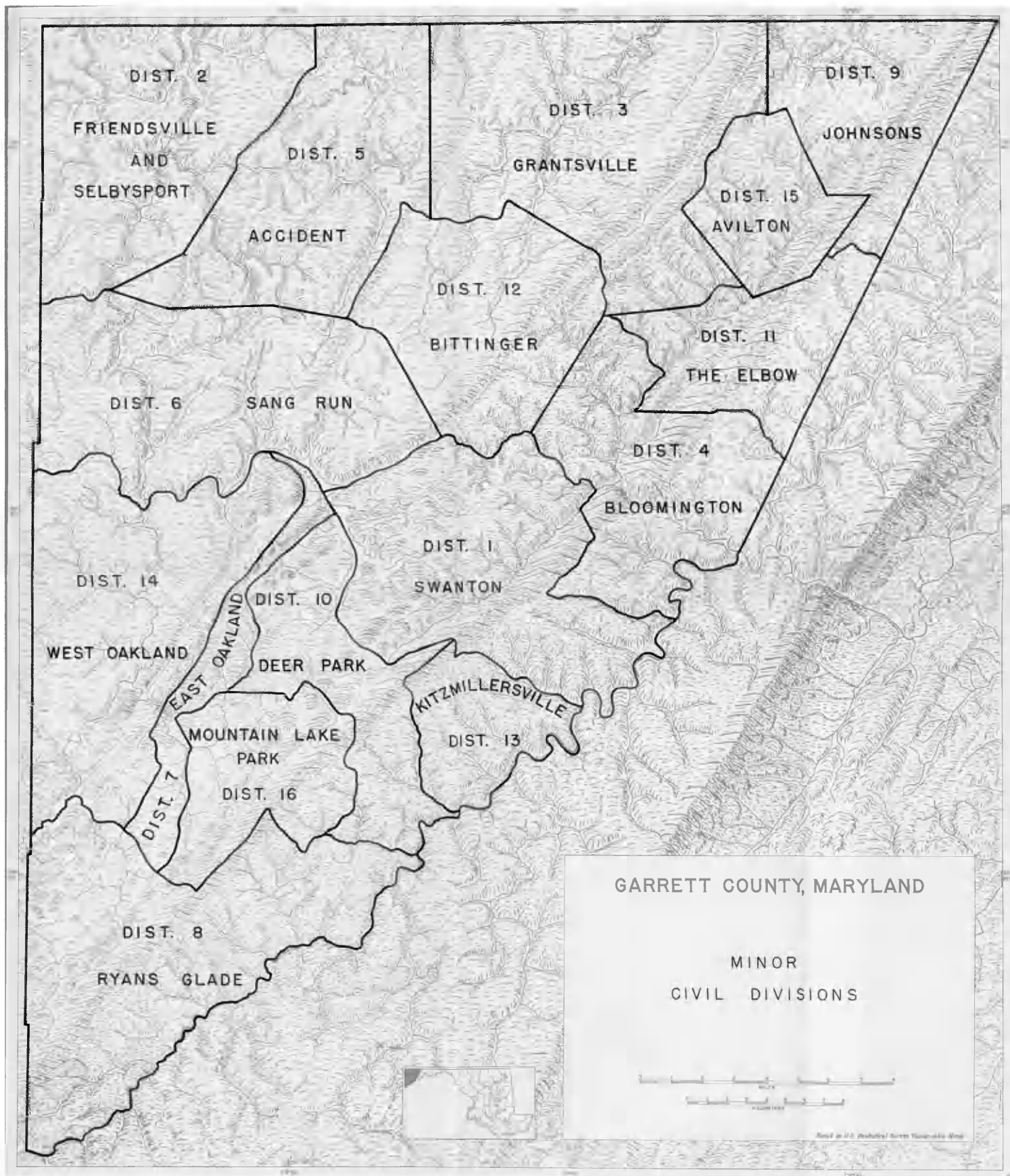


Figure D.

CHAPTER II

RELATIONSHIP OF PHYSICAL FEATURES, NATURAL RESOURCES, ECONOMIC ACTIVITIES, AND PLANNING

Contrasts Within Maryland

The physical features of Garrett County exert a profound influence upon the activities of its inhabitants and on their social and economic conditions. Occupations in Garrett County have their characteristic adaptations, as have those of the Eastern Shore. In localities bordering on the ocean or on Chesapeake Bay, the inhabitants find still other means of livelihood. For example, in Wicomico County on the Eastern Shore of Maryland most of the land is less than 50 feet above sea level and all has a slope of 3 percent or less. The growing season--the interval between last killing frost in spring and first killing frost in autumn--averages over 180 days, with relatively small variations from year to year. The soils, mostly sandy loams, are used for truck, fruit, and vegetable farming. Strawberries, tomatoes, sweet potatoes, snap and lima beans, watermelons, and canteloupes are among the most important crops. Vegetable production requires a great deal of labor per acre, and large amounts of commercial fertilizer. The long growing season makes it possible even to double-crop much of the land. The ratio of colored population, tenancy, and mules is high. Chief markets are the large eastern cities and the great number of local canning factories. Truck routes and railroads facilitate the overnight delivery of produce. Because of its location tidewater fisheries are important supplementary sources of income in this area.

In contrast, most of Garrett County's agricultural land is around 2,500 feet above sea level, with elevations of 3,000 to 3,400 feet along the higher ridges that traverse the County; much of the land is rolling to steep; the best agricultural lands have slopes of from 3 to 9 percent, and the rest slopes as much as 20 percent or more. The growing season averages only from 120 to 130 days in the farming areas of the County, and there are wide departures from year to year. Frosts may occur late in June and, again, in the later part of August. The agricultural soils, mostly gravelly silt loams, are used to a great extent for general, self-sufficing farming, though dairying is becoming important. The possibilities of commercial agriculture are limited by the topography and short growing season. Distinctive crops are oats, hay, buckwheat, and white potatoes, but much of the farm land is devoted to pasture. Although farms are larger than in Wicomico County, farming is more extensive than intensive, and large amounts of hand labor are not needed. Livestock, especially dairy and beef cattle, as well as horses, sheep, and hogs are much more important than on the lower Eastern Shore. Coal mining and forest products, including maple syrup, are major sources of supplementary income for Garrett County farmers. The cool summer temperatures, mountains, lakes, and forests of Garrett County are the base of a growing recreational use of natural resources.

Thus regional differences in natural resources deeply influence the occupations and traits of people, as well as the population capacity, types and intensity of land utilization, and, therefore, the potential development of any given area.

Economic Importance of Garrett County's Natural Resources

The economic importance of Garrett County's natural resources can be measured primarily by the present and future ability to meet essential needs, contribute to the purchasing power of the community, and provide to some degree the amenities of its people. The potential possibilities of these natural resources, as well as the extent of their present development must be considered in determining their value in this connection.

The importance of natural resources, as measured in definite terms, is indicated primarily by the monetary value of the products, and by the number of persons directly or indirectly employed or supported by them. The amount of capital now invested in them, and the opportunities for further investment which they afford are also matters of economic importance.

A number of conditions determine the extent to which natural resources may be made to contribute to the material welfare of Garrett County. Among the more important of these conditions are: areal extent and endowment with natural resources; geographical location with respect to the rest of the State and the country; extent to which the resources have already been developed or improved; efficiency of management; extent of demand for the products; proximity to adequate markets; and sufficiency of transportation facilities.

The natural resources of Garrett County, especially the agricultural, timber, mineral, and recreational resources, are of fundamental importance. Contributing at first to the feeding, clothing, and sheltering of the aboriginal inhabitants and early settlers, they later became

the foundation upon which the County's economic structure was built and must be maintained.

Despite the vital importance of the various natural resources of the County and their potential effectiveness as a group in the establishment and maintenance of permanent occupance, they have usually been considered as entirely separate economic units. Each resource has been developed according to the amount of initiative, enterprise, and available capital contributed by the individuals or groups involved. Each has been subjected to varying degrees of governmental control and cooperation as part of a plan, in most cases, for its individual development.

Development of the County's natural resources--of its farms, forests, mines, and recreational advantages--has been largely unguided and undirected by any integrated program which would stress the value of their combined potentialities as a factor in its growth, or by any program of utilization that might most effectively contribute to the general economic progress of the County, or even of any particular section of it.

Agencies Involved in Utilization of Garrett County's Natural Resources

Until comparatively recent years utilization, development and exploitation of Garrett County's natural resources was carried on by means of private initiative and private capital, with very little governmental cooperation or direction. These activities were undertaken whenever necessity or opportunity called for them, or conditions appeared favorable. In many cases wasteful methods of production were used, and the value of the resources effected was temporarily or permanently injured.

This was especially true of the forests. Currently, strip mining is creating a problem that awaits solution.

In recent years, however, there has gradually developed in the public mind a sense of the importance of natural resources as the basic factor upon which economic stability and progress must depend. Increasing slowly after the first world war, and more rapidly after 1932, the extent of governmental cooperation in the better use of natural resources and of control over certain phases of their development has become progressively greater during the last decade.

Governmental control over natural resources has been directed primarily along the lines of conservation, although it has also been asserted in other directions, and the results of such control have frequently been of great value. Governmental cooperation in the development of natural resources, however, has assumed a multitude of forms, many of which are definite contributions to the County's economic welfare. On the other hand, some forms of governmental activity--such as subsidies--while not unique in Garrett County, have created there conditions that are artificial and economically unsound, and even detrimental to the stable, long-range development, particularly of agriculture.

It should be emphasized, however, that, generally speaking, national and state cooperation has greatly assisted private efforts to make possible the setting in motion of new developmental enterprises, and favor or stimulate a greater or more intensive use of natural resources. The retirement of thousands of acres of sub-marginal farm lands; the purchase of these and of depleted forest and waste land for incorporation into state forests has been the most noteworthy example of bene-

ficial government cooperation in Garrett County. This has been accompanied by a practical forestry program and development and greatly increased use of recreational facilities.

Need for More Scientific Utilization of the Natural Resources

The necessity for better systematic employment of the County's resources should be more generally recognized, but many people are beginning to realize that they are not receiving from their resources as full economic value as could be derived under adequate and efficiently executed programs of development. The present state of development of natural resources, the character and extent of their utilization, and their potentialities need more than ever before to be surveyed and appraised. In some respects present utilization is unsound and unhealthy—especially of the coal resources—and much could be done to improve permanent pastures and the livestock industry.

Some of the factors that have contributed to such conditions are both causes and results of the migration of population. In the last decade Garrett County's population decreased from 21,981 to about 21,200 despite a birth rate almost as high as that of any county in the State.¹ Other factors include neglect of natural resources and of opportunities for their development; failure to adjust production to requirements; wasteful methods of production, including lack of adequate and proper utilization of by-products; and lack of scientific development of adequate markets.

1 U. S. Bureau of the Census, preliminary figures for 1950.

Periodically during industrial and commercial "recessions" the production of natural resources--forest, mineral, and agricultural products--is reduced to a minimum. Property remains idle or is abandoned, while taxes and other carrying charges continue. Unemployment follows, accompanied by extensive disorganization of production and sales activities, and communities effected lose the benefits that formerly resulted from active operations.

There is a recognized need for more scientific utilization of the County's natural resources; governmental agencies are examining closely, from new viewpoints, the conditions that control their development and use. The resources must be regarded as constructive factors in a more intensive regional development, and carefully-planned measures for their conservation and intelligent utilization should be undertaken as a means of promoting the general welfare of their people.

Improper or inadequate use of natural resources has such important effects upon the welfare and prosperity of the County that planning should come more and more under the influence of organized community effort. This is exemplified in the Soil Conservation District Plan, in which successful practices usually must extend across farm boundaries. Success in these efforts demands comprehensive and exact information regarding existing conditions, an appraisal of potentialities that is approximately accurate, and a determination to correct, if possible, such economic or other conditions as may now discourage or retard development activities.

Surveys and resurveys of the natural resources, particularly soils and forests, are being made. Measures should be taken for their conservation in some instances, and for their rehabilitation in others. In any

event, plans should be devised to prevent their despoliation. Legal enactments--such as Maryland's Forestry Acts--and other regulations are being adopted and revised to secure a more intelligent and helpful control over development operations. Greater promotional efforts should be undertaken to attract new enterprises and additional capital for their further development.

In many states, counties, and municipalities throughout the country, agencies are now undertaking to secure a more effective utilization of natural resources. These include not only federal and state agencies, functioning by means prescribed by law, but also development commissions, trades associations, transportation agencies, universities, and other organizations.

In different parts of the country, in addition, commercial organizations have recognized the importance of this task as a means for improving economic conditions in their "trade-areas". These organizations realize that they cannot restrict their activities to the communities in which they are located and ignore conditions in the territory upon which their members are dependent for markets.

It is generally recognized by commercial organizations that the development of unfavorable economic conditions in their trade-areas will undoubtedly have an adverse influence on business in the communities which they represent. They realize, on the other hand, that any extension of economic activities in their trade-area will usually be followed by improvement of economic conditions both throughout the area and in the trading center. Some commercial organizations endeavor to learn through trade-area surveys the status of conditions in their territory, and to devise means by which those conditions can be improved and a larger purchasing power developed.

Through intelligent action of such commercial organizations potentialities of the natural resources are receiving a degree of attention that is greater than any previously given them. Membership of these organizations often includes the most influential state leaders, and often represents the largest holdings and greatest control of capital in the area. These groups possess influence that can give, directly or indirectly, greater stimulus and impetus to the development of the natural resources of their "trade-areas" than can be done by any other agency.

CHAPTER III

LAND FORMS

Origin

As has already been indicated, Garrett County lies entirely within the Allegheny Mountain section, which is one of the seven sub-divisions of the Appalachian Plateau extending from central New York to central Alabama.

At the beginning of the Paleozoic era, this whole region was a vast trough or geosyncline, occupied by an inland sea, which was receiving large accumulations of sediments from the erosion of the old continental land mass "Appalachia" lying to the east. This process continued throughout the era. Toward the end of the Devonian period, or some time in the Mississippian or Lower Carboniferous periods, the surface of the great geosyncline was characterized by shallow bodies of water and extensive low and flat coastal plains areas, subject to alternating slight submergence and emergence. During the periods of slight emergence such areas supported a luxuriant growth of plants, largely of the swamp forest type, until the end of the Carboniferous period. During the periods of submergence the vegetal material was buried by sediments still being derived from the eroding land mass that bordered the region on the east, accumulations which finally predominated. The buried organic accumulation later became, through time and change, the coal beds of today.

All during the Paleozoic period there must have been a gradual sagging or sinking as the tremendous weight of the sediments settled in the trough. The sediments themselves were eventually compressed, or cemented,

and formed into sandstones, shales, conglomerates, limestones, and extensive seams of coal, which are exposed at many places today.

Structure

Toward the end of the Paleozoic period, the sediments which had originally been laid down in a nearly horizontal position were compressed into a series of folds and elevated into a mountain system many thousands of feet high. Along the eastern side in the Ridge and Valley province, where pressure was greatest, folding was most pronounced, but farther west in the regions to which Garrett County belongs it was relatively moderate. Much of the area to the west was simply elevated, acquiring a gentle downward slope toward the northwestern limits of the Appalachian region.

Within the County lie parts of four major synclines and three major anticlines, (see Structure map, Fig. F). Along the eastern boundary occurs a long syncline, the Georges Creek-Potomac. West of this lies a long anticline, the Deer Park, which extends from the northeast to near the southwest corner of the County. This is succeeded on the west by two synclines, the Casselman at the north and Upper Youghiogheny to the south. These are separated by a low arch, the Deep Creek anticline, and are neither parallel nor aligned. West of them occur two anticlines, the Accident to the north and Cranesville to the south, which are disconnected and somewhat out of alignment. Northwest of these lies the Lower Youghiogheny syncline.

Processes. The end of the period of orogenesis inaugurated another period during which the processes of erosion and destruction attained dominance. This period, with some fluctuation in the rate of erosive activity, has continued until the present time. With the exception of local stream deposits it is believed that no sedimentation has taken place in

the Garrett County area since Paleozoic times. During this long period the surface of the County has been reduced to a base-level once, and partially so on other occasions, after which streams were rejuvenated by uplifts. Today the area can best be characterized as a highly dissected plateau with much sloping land and steep valleys.

Quite probably by the end of the Jurassic period the Allegheny Mountain section, including Garrett County, was base-levelled and the tops of the anticlines had been truncated. All strata above the Pottsville formation--virtually all of the coal measures--were removed from the anticlinal regions so that the present-day coal deposits of Garrett County are found only in the synclines or basins, where, for the most part, they have been protected from erosion. (Compare Geological Formations and Structure maps, Figs. E and F).

The surface produced by the end of Jurassic or Cretaceous times is known as the Schooley peneplain, which was first described and studied in Pennsylvania and New Jersey, and named by William Morris Davis.¹ The remnants of the Schooley peneplain in Garrett County are represented today by the rather accordant summit levels of the highest ridges. Standing on some elevated central point, such as on Keyser's Ridge (see Fig. 7) these long, level-topped crests seem to rise to nearly the same general height, although there is a gradual decrease in elevation toward the north and toward the west. The long ridges are arranged in almost parallel ranks with a general northeastward-southwestward trend which follows the broad curves of the whole Appalachian system.

1 William Morris Davis, "The Rivers of New Jersey", National Geographic Magazine, 1890, Vol. II, pp. 81-110.

From east to west these representatives of the Schooley peneplain with a general elevation of 3,000 feet are: Big Savage-Great Backbone, continuous along the eastern margin except for the Savage River gorge; Meadow Mountain and its southwestward continuation in Roman Nose, Halls Hill, and Charcoal Hill; Keyser's Ridge and Negro Mountain; Winding Ridge and other summits to the northwest; and Snaggy Mountain on the West Virginia line west of Swallow Falls.¹ All are capped by massive conglomerates and sandstones of the Pottsville formation.

While the surface was being reduced to the Schooley peneplain level, the stream patterns were being developed for carving out the prominent ridges during a later period. As a result of uplifts or vertical rises, which have taken place since the Schooley peneplain was produced, the streams that developed on that surface whose courses followed the axes of exposed cores of anticlines have deepened their valleys many hundreds of feet. Other streams, although they occupied courses also located in yielding or less resistant rocks, followed synclinal valleys and have not, even after uplift and rejuvenation, deepened their courses as much as have most other types of streams.¹

The major types of land forms which have been developed in Garrett County, can be grouped into three general categories. They are: (1) the mountain ridges, and hill-tops of the highest levels; (2) the wide, elongated and originally rather even-floored valleys of intermediate elevations; and (3) the narrow, steep-sided gorges which existing streams have cut below the average valley-floor levels.

These land forms have a distinct correlation to soil types, land use, and the pattern of transportation and settlement which can be seen by

¹ Cleveland Abbe, "A General Report on the Physiography of Maryland", Maryland Weather Service, Baltimore, 1899, Vol. I, pp. 149-169.



Figure 5

Looking northwest from Backbone Mountain toward Deep Creek Lake.



Figure 6

Looking east from Route 219 near Accident. Negro Mountain in background. Shale hills in foreground.

comparing the respective maps. The highest ridges are for the most part used for woodland with the notable exception of Keyser's Ridge which is much broader than the other high ridges. Most of the agricultural soils, and consequently the agricultural lands, are found in the intervening uplands. These also have been used for roads in most cases, as the narrow river valleys generally do not provide enough room for either roads or settlements. The latter, however, have been used as routes for the railways which cross the County, and in these valleys also most of the coal mines are found.

The land forms of Garrett County, and particularly their development, can best be explained by a regional discussion. For convenience the pattern shown in the structural map will be followed, and emphasis will be placed on the relationship between structure, differences in resistance to erosion offered by the various underlying strata, and the adjustment of stream channels which have etched the present land forms.

The most easterly of these regions, the Georges Creek-Upper Potomac district, occupies the western half as a broad, flat-bottomed syncline made up of several series of limestones and weak shales alternating with strong sandstones and conglomerates. The upper, resistant strata of the Pottsville formation on the west flank of the syncline mark the even crest of Great Backbone-Big Savage mountain. This ridge maintains a rather uniform elevation, but with a slight increase to the south due to the pitching axis of the syncline, so typical of major structures in the whole region. The summit, as has been previously discussed, is a remnant of the old Schooley surface. Georges Creek, in the northern half of the synclinal area, in Allegany County, flows in accord with the pitch of the axis and thus may be considered as an example of a consequent stream. Since this area contains the youngest Paleozoic rocks (Permian) in the

plateau section of Maryland, it is possible that Georges Creek is also the oldest consequent stream in the area. It may be a survivor of the original drainage which existed for a time, at least, after the Appalachian folding attained its maximum.¹

The North Branch of the Potomac occupies, in part, an axial position in the southern part of the same regions of synclinal structure. It also follows the axis which pitches downward from both the southwest and northwest toward the junction of these two streams. The meandering character of its present deep, narrow gorge indicates that the North Branch assumed its present direction of flow at about the same time Georges Creek did, at, or shortly after, the close of the Appalachian Revolution.

The even-topped hills with gentle eastward slopes that lie to the east of Backbone are carved from a series of shales, sandstones, and limestones above the resistant Pottsville sandstone. The horizontal position of the beds near the Potomac-Georges Creek Valley seems to have influenced the morphology of these eastern hills. Where the horizontal beds begin to turn upward along the eastern flank of Backbone-Savage, weak shales of the Allegheny formation are exposed just above Pottsville. This series of weak rocks extends in a band parallel to the crests of the mountains, and it is along this belt that the subsequent valleys of the headwater tributaries have developed - separating the eastern hills from the main ridges. The summits of the hills are between 2,600 and 2,700 feet in elevation, and they may be correlated with the second partial peneplain, or Harrisburg surface, previously discussed, and which will be referred to again in connection with development of land forms in other parts of the County to the west. To the east these hills slope down sharply in places, form-

1 William Morris Davis, National Geographic Magazine, Vol. I, 1888, p. 203.

ing the west side of the deep, narrow valleys occupied by Georges Creek and the North Branch of the Potomac.

The eastern slopes of Backbone-Savage and its bordering hills are drained by a number of short streams which enter the main streams at almost right angles. These tributaries have courses down the dip of the strata and are consequent streams. Their valleys are narrow and steep-sided and have steep gradients. Occasionally, however, as in the case of Glade Run (north of Gorman) and Laurel Run (north of Schell), some less resistant strata give opportunity for lateral widening of their valleys. In such places the streams have reduced considerable areas along their lower courses to low, rolling meadows or even, flat, marshy land. Such examples are rare and may be due to local increase in the solubility of rocks rather than to conditions favorable for base-leveling. Most of the tributaries to the main streams have at their mouths cones of sand and other debris washed down from the steep hillsides.

The North Branch of the Potomac has developed several stretches of rocky flood plain. In places, too, terraces can be seen at different levels. At Gorman, for example, there are three terraces at elevations of 10, 20 (the widest), and 100 feet above the present channel. At Bloomington there are four terraces at levels of 10, 20, 50, and 300 feet above the channel. The upper terrace is covered with gravel and can be seen along the river road which enters Bloomington from the south, as well as in cuts in the village streets.

The Central (Deer Park) Valley, lies just west of the Georges Creek-Upper Potomac region. In contrast, however, the former has been developed primarily on anticlinal structures. The central region is bounded on the east by the long crests of Backbone-Savage Mountain. On the west lies the crest of Meadow Mountain and its southwestward extensions of Roman Nose,

Halls Hill and other which extend to near the southwest corner of the County.

While the crests of these opposing limbs may be considered as remnants of the old Schooley surface, the succession of flat-topped hills which intervene in the northern part of the valley may be correlated with the Harrisburg surface. The summits of the hills which represent the old valley floor, which was produced after the elevation of the Schooley surface, all lie between 2,600 and 2,700 feet. From the Pennsylvania line southward they include: Walnut Hill, Pea Ridge, Turkey Lodge Ridge, The Elbow, Jenkins Hill, Peapatch Ridge, and Solomon Ridge. It can be seen from any of the maps that this old valley floor is by no means continuous at the present time. The present streams have cut narrow valleys, varying in depth from 300 feet north of Pea Ridge in the Avilton area, to 900 feet as shown in those of Big and Monroe Runs south of Peapatch Ridge and about 4 miles northwest of Bloomington.

The southern part of the central or Deer Park anticlinal region is drained by Green Glade Run, Little Youghiogheny River, and several branches of Cherry Creek south of Gortner. Here, again, the remnants of the old valley floor, or Harrisburg surface, have general elevations of about 2,650 feet. In this southern part, however, the old surfaces are more continuous, and the present streams have not cut such deep valleys.

The contrast between the land forms in the Savage River area and those of the southern glades, drained by the tributaries of the Youghiogheny, and their different development, are of particular interest. On both sides of the valley tributaries of the two principal rivers have developed along lines determined by the position and strike of a series of weak shales and limestones, the Mauch Chunk and Greenbrier, between the strong Pottsville sandstones forming the crests of Backbone-Savage Mountains to the east and



Figure 7

Looking south from Keyser's Ridge. Negro Mountain in left background.



Figure 8

The Youghiogheny River Valley near Sang Run.

Meadow Mountain and its southern extension to the west, and the somewhat less resistant Pocono sandstones forming the crests of The Little Mountain, Hoop Pole Ridge, and Little Savage Mountain (see Geology map, Fig. E and Location map, Fig. A).

The series of conical hills which make up The Little Mountain range were formed apparently by the transverse cutting of the southeastern tributaries of the Youghiogheny as they worked through the Pocono sandstones and established themselves on the Greenbrier formation. In the northern part of this region, and at the same general elevations, similar gaps have been cut in the Pocono ridges of Elbow Mountain, Red Ridge, Little Savage Mountain, and Four-mile Ridge. Many of these northern gaps, however, are not occupied by streams at present as are their counterparts to the southwest. On the other hand, there are long streams in valleys upon the limestone and shale behind these ridges, such as those now occupied by Little Savage River, and Red Run between Red Ridge and Meadow Mountain. No such long streams are found in the southern part, for instance, between The Little Mountain and Backbone Mountain.

The wind gaps of Elbow Mountain and Red Ridge were originally cut by streams in much the same manner as water gaps of The Little Mountain are at present being worn down to the general level of the old valley floor. The tributaries of the Savage River, however, having already brought their gaps down to the general level of the old valley floor, seem to have gone to work vigorously upon their outer channels, cutting the deep trenches which now characterize this northern part of this region.

During this period of deepening some of the streams, working at greater advantage than others, extended their headwaters rapidly along valleys already started on the weaker rocks. In this way, the more active streams captured the headwaters of the less favored ones. The water gaps occupied

by the weaker streams became wind gaps, while the pirate streams increased their volume and deepened both their gaps and valleys. For example, a deep wind gap just east of New Germany indicates the point where Elklick Run formerly crossed Red Ridge. The more favored Poplarlick Run was able to work around and up the western side of the ridge, intercept the waters of Elklick Run, leaving the trunk of the beheaded stream to drain only the eastern slope of the ridge. In a somewhat similar way Twomile Run has been beheaded by Red Run just south of Piney Grove on Route 40. Similar adjustments of stream courses and divides with reference to bands of strong and weak rocks, may be traced in several other parts of the region. The eastern tributaries of Savage River, for instance, and its southern tributary, Crabtree Creek, and the headwaters of the Youghiogheny exhibit close adjustment to structure.

Marshy and swampy areas are frequently found in association with these readjusted streams, particularly with subsequent streams and along sections of present streams which were captured from earlier transverse streams. Among the most noticeable of these swampy or poorly-drained areas are those along the headwaters of Red and Poplarlick Runs, northeast of New Germany, and in the southern part in the glades drained by Cherry Creek, Deep Creek, and Little Youghiogheny River.

The capture of headwaters involves a decrease in volume of the beheaded stream, and a corresponding decrease in its erosive power. At the same time there is an increase in volume and in erosive power of the pirate stream. The weakened stream might, therefore, be expected to have swamps about its upper reaches since there it has become overloaded with the wash from surrounding slopes. On the other hand, the increased power of the pirate stream should prevent the accumulation of debris about its headwaters in quantities that would obstruct its flow. In nearly every

instance swampy areas belong to the original headwaters of beheaded streams, and they are located above the points at which the diversions must have been effected. However, they may not have been due entirely to stream capture.

A comparison of the topographic and geologic maps will help to explain, in part, the marshy character of the subsequent headwaters of these streams. All have valleys located on the weak Greenbrier limestone and shale, and the captured headwaters were so located while the main part of the beheaded streams were at work, but at a much slower rate upon the relatively resistant sandstone (Pocono) in the present wind gaps. During this interval there may well have been enough time for the production of a flat, swampy head valley even before the capture took place. A further consideration would be the solvent powers of underground water in such areas of limestone rock where rapid flow of surface water would be checked.

After the capture, the pirate stream may have been slow in extending its lower channel headward, or the whole upper portion of the subsequent valley may have been lowered rapidly through solution to a new and lower level determined by the level of the channel at its new point of crossing the resistant and much less soluble sandstone. In short, these marshy subsequents may be explained in part as the result of chemical action, which, together with mechanical corrasion, has progressed faster in the upper part of the valley than in the lower.

In one case, that of Poplarlick Run, marshy ground occurs at both the new and the old level. For a mile or so northeast of the pond at New Germany there is a marsh at the new level, which apparently has been produced since the diversion of the stream. Upstream the channel rises rapidly toward the northeast from about the 2,500-foot contour until, at about 2,600 feet, the old level apparently is reached. It is occupied by Wolf

Swamp, which is also drained toward the northeast by Red Run, a tributary of Big Piney Run and of the Casselman.

In the southern part of the Central Valley there are several broad, flat, marshy areas which are known locally as "glades". They may also represent former local base-levels which the newer drainage has not yet destroyed. The waters of Deep Creek Lake cover what was an extensive glade. Before the dam was built in 1925 the channel of Deep Creek meandered over a typical glade area, and at the present Glendale Bridge, Deep Creek had cut a narrow gap through Hoop Pole Ridge. On the western edge of Oakland the Little Youghiogheny River has also cut through the ridge. This stream with its many small meandering tributaries drains a large "glady" area north, east, and south of Oakland. About four miles southwest of Oakland, Cherry Creek has made a similar break through the Pocono sandstone ridge and carries in a northwestward direction the drainage of another large glade around Gortner and Pleasant Valley. The area southwest of Redhouse is drained by several small streams which flow northwestward into Rhine Creek, a tributary of the Youghiogheny.

In regard to the land forms of the Central Valley, particularly the Savage River section, the significance of the North Branch of the Potomac as a temporary base-level for its tributaries should be considered. At Bloomington where the Savage River joins the Potomac the elevation is just over 1,000 feet. The stream profile of the Savage increases rapidly until, only 4-1/2 miles northwest of Bloomington, at the junction with Crabtree Creek, the elevation is 1,380 feet. To the west of Big Savage Mountain the profile of the river channel increases in elevation toward the northeast until at the source near Sampson Rock it is about 2,760 feet.

The gradients of the main tributaries of the Savage are all quite steep; for example, from the upper western slopes of Big Savage Mountain,

Elklick, Poplar Lick, Big Run and Monroe Run all drop about 1,000 feet in four miles. These steep gradients, both of the main stream and of its tributaries, are typical of the youthful characteristics resulting from rejuvenation in the area southwest of Avilton, which consists of a succession of flat-topped ridges separated by narrow, steep sided valleys.

In contrast, the tributaries of the Youghiogheny have weak, sluggish currents. They are associated with a more mature topography, with valleys that lie from 200 to 400 feet above those of the Savage River tributaries. Although the summit levels of the old valley floor in both the northern and southern parts are quite accordant, a great contrast is seen in the general form of the two portions because of these differences in depth of the present networks of stream valleys. The character of the Youghiogheny tributaries indicates that they produced the valley between Backbone and Meadow Mountain. The nature of the Savage River system and particularly of Crabtree Creek further indicates that in comparatively recent geologic time it has begun to encroach on the drainage area of the Youghiogheny; that the divide quite probably rested upon the crest of Backbone-Savage Mountain; and that now the Savage River is gradually moving the divide westward toward the crests of Meadow Mountain and Roman Nose.

The contrast in land use between the southern part and the rugged northern section will be referred to in subsequent chapters.

The Casselman River Valley has had, undoubtedly, an origin and history quite different from that of the Savage. The latter and its tributaries, as well as the Youghiogheny, have eroded valleys in the soft core of a broad, eroded anticline, which was originally roofed by the massive Pottsville conglomerates and sandstones. In contrast, the Casselman valley occupies an area of synclinal structure, floored with a considerable thickness of Conemaugh and Allegheny sandstones and shales of much less resistant

nature, but further underlain by the same Pottsville formation. (See Geologic map, Fig. E).

The Casselman basin, in Garrett County, is similar in shape to a canoe cut in half; the "bow" lying to the south and the open "waist" extending northeastward beyond the Pennsylvania line. The sides or "gun-wales" are formed by the upturned edges of the Pottsville sandstone, and appear as two long, even-crested mountains, Meadow Mountain on the east and Negro Mountain on the west. These two ridges converge to the south, just north of Deep Creek Lake, and continue south of the lake in Roman Nose, Halls Hill, and beyond. (See Topographic and Geologic maps, Figs. F and E).

Both Meadow and Negro Mountains have crest lines of rather uniform height. Maximum elevations on Meadow Mountain (3,030 feet) are at a point about 2 miles northeast of New Germany, and again about 1 mile south of the Pennsylvania border. Meadow Mountain has an average elevation of around 2,980 feet throughout its extent in Maryland, while Negro Mountain rises from about 2,900 feet at its southern end to about 3,080 feet at a point about 2 miles south of the Pennsylvania line at Lookout Tower. (See Topographic map, Fig. F).

The crests of both mountains are notched by wind gaps and at the southern end of the synclinal valley Cherry Creek has cut a deep, narrow outlet through the "bow". There is a noticeable uniformity in the levels of the gaps in Meadow Mountain; their average elevation is about 2,770 feet. Negro Mountain has three well-marked wind gaps. One, just north of High Point on Route 40 between Keyser's Ridge and Grantsville, has an elevation of 2,880 feet; two miles south of this a second wind gap at 2,830 feet; and about a mile farther south is a third wind gap at 2,845 feet. These wind gaps are used by connecting roads between Routes 219

and 495. The average elevation of all these wind gaps on Negro Mountain is 2,830 feet, so that they stand at a higher average than do those on Meadow Mountain, 2,770 feet.

The area lying between Negro and Meadow Mountains is one of broad hills averaging about 2,800 feet in altitude in the south and gradually declining to about 2,700 feet above sea-level at the Pennsylvania line, as for example, on Chestnut Ridge. These mature and accordant hills, and the repetition of the almost horizontal strata in each hill, indicate that they once formed a gently rolling and continuous valley floor. The present streams are incising their channels below the general level of the former floor. The resulting dissection of the surface has been carried to the greatest depth along the northern or lower portion of the course of Casselman River, while south of "The Dunghill" and especially south-east of Bittering, the surface is less sharply incised. There are several large swampy glades in the southwestern part of the area around Cherry Creek.

The relative difference of only 200 or 300 feet between the average height of the Negro and Meadow Mountain crests and that of the included hills is a noticeable feature of this Casselman Valley district, as is also the similarity between the general level of the interior and of the wind gaps in the enclosing mountain ranges. These features will be discussed in considering the development of the land forms in this area.

There is a series of alluvial terraces in the broader parts of the Casselman Valley, especially for several miles south of Grantsville along both the north and the south branches of the Casselman. The main terrace lies at an elevation of about 2,200 feet above sea-level and about 30 feet above the Casselman River. This terrace extends along both sides of the valley from the mouth of Shade Run to, and above, the mouth of the North

Fork. It is composed of stratified sands and clays in which are numerous rounded quartz pebbles. The surface, a mellow silt loam, is one of the most productive soils in the County although very limited in extent.

The Casselman River drains most of the basin to the north. A small portion of the southern half is drained by Cherry Creek which is a marshy tributary of the Deep Creek-Youghiogheny system. Only in its lower course has the Casselman River incised its valley to any extent. In general the stream is overloaded by material brought in by tributaries or by the waste from the valley sides and is cutting its channel as a youthful stream in only a few places. Over most of its course the meandering of the stream is more suggestive of late maturity.

Some of the tributaries of the Casselman, however, show a tendency to degrade their channels and entrench themselves. Most of them also show considerable adjustment to variations in resistance offered by the underlying rocks. For example, on the east, Chestnut Ridge and Saltblock Mountain are separated by the subsequent valleys of Big Laurel and Meadow Runs. On the west, the North Branch of the Casselman has worked out a similar valley between Negro Mountain, Ridgley Hill, and "The Dunghill". Farther south, Pleasant Valley Run and other tributaries of the North Branch, are also of the same type. The adjusted courses of these tributaries, the meandering course of the Casselman, and the gentle, accordant character of the general topography indicate that this river system and its basin have been, at one time, close to the completion of an erosion cycle. The narrower valleys, now filled by parts of the Casselman River and its two main branches, indicate youthful conditions following the more advanced stages just described.

Cherry Creek flows out of the south end of the structural valley through a narrow gorge, the steep sides of which are carved in the hard

Pottsville sandstone which forms the boundaries of the area. Above the gorge the creek and its tributaries occupy comparatively broad and shallow valleys, located along the bands of weaker rocks. In other words, the headwaters of this stream are characterized by rather advanced topographic features and adjusted courses.

Just above the gorge and near the heads of some of the tributaries of Cherry Creek are several poorly drained areas. The largest of these, roughly triangular in shape, is at the junction of the main tributaries, near the gorge. The smaller areas all drain into Cherry Creek, but the second largest one is drained both by Pleasant Valley Run of Casselman River, and by way of Cherry Creek into Deep Creek Lake and the Youghiogheny River.

Most of these marshes are probably similar in origin to some of those found in the Savage Valley district, that is, they may be marshes of solution caused by the retarding influence of the resistant sandstone through which Cherry Creek has cut its gorge. However, the steeper slopes of the divides are always toward the Casselman River, and silting up of some of the Cherry Creek streams and the presence of these marshy areas may then indicate that the encroachment of Casselman tributary streams with steeper valleys upon the more gentle Cherry Creek ones has resulted in decreasing the volume and power of the latter streams. Probably the explanation for all of the marshes in this section would include both conditions.

The adjustments and mature character of the Cherry Creek tributaries suggest that the Casselman River valley has been in a mature stage of development at least once before the present epoch. At that time the area may have been characterized by a broad, undulating surface lying between two low ridges where Negro and Meadow Mountains now stand. The area, perhaps, was occupied by precursors of Casselman River and Cherry Creek, both

occupying essentially the same relative positions as do the present streams, except that probably Cherry Creek then drained more of the region now drained by Casselman River. Tributaries of the Casselman later succeeded in extending their sources beyond the boundaries of the area, cutting gaps through the ridges where the wind gaps are now, and whose floors have been seen to be accordant in elevation with the old valley floors, both within and outside the basin. The modification of old water gaps into the present wind gaps may be due: first, to encroachment of the Youghiogheny River tributaries, as the much lower outlet of Deep Creek near Swallow Falls made this possible; second, to a more recent invasion by the young and vigorous Savage River tributaries which have captured most of the tributaries of the Casselman that once flowed from the east through the present wind gaps on Meadow Mountain. On the west, Bear Creek seems to have played a part similar to that of the Savage River. Although the Casselman River seems to be encroaching a little on Cherry Creek, on the whole it is losing ground to the Savage, and to the Youghiogheny River by way of Bear Creek.

The Accident-Cove area. As seen from some elevation of average height, around 2,600 feet as in the vicinity of Hoyes - 2 or 3 miles north of Deep Creek Lake, or in the Cove area- 4 or 5 miles north of Accident, the landscape appears rather undulating, with higher hills of the Winding Ridge range and the long crest of Negro Mountain rising above it on all sides. If the former surface were restored, it is quite probable that it would appear as a broad, strongly rolling one, having a general elevation of from 2,600 to 2,700 feet. Today, however, it is one of broad, rounded or flat-topped hills separated by deep, steep-sided valleys.

The range of higher hills to the northwest, west, and southwest, of which Winding Ridge is the most prominent, reflect the rocks which compose

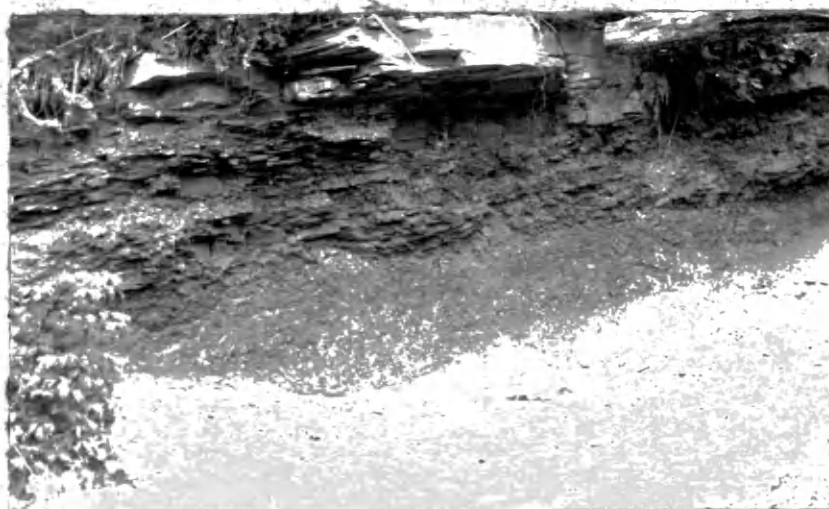


Figure 9

Sandstone (Pottsville) overlying shale (Mauch Chunk). Near crest of Halls Hill, northwest of Oakland.



Figure 10

Sandstone and shale (Devonian) in Bear Creek Valley, northeast of Accident.

them and the arrangement of the strata, as do Negro Mountain and Meadow, Savage and Backbone Mountains to the east. The crest of Winding Ridge, composed of the same sandstone and conglomerates (Pottsville) as are the other main ridges, has a southern extension, Marsh Hill, which is separated from Negro Mountain by the valley of Marsh Run, now occupied by the northern arm of Deep Creek Lake near McHenry. From Marsh Hill the crestline swings westward in Upper Ford Hill and Ginseng Hill. Then it turns northward along Gap Hill, Bishops Hill, Elder Hill, and north of Bear Creek it follows Winding Ridge proper northeastward into Pennsylvania where it finally rejoins the eastern limb, Negro Mountain.

This roughly oval area is the Accident-Cove amphitheater, enclosed by the sandstone-capped crests of Winding Ridge and Negro Mountain. The hard formation forming the crests dips away from the center in all directions. Within and somewhat parallel to these ridges of Pottsville sandstone is a secondary oval of less continuous elevations composed of Pocono sandstone. The hills around Hoyes, the horseshoe shaped ridge enclosing the head of Cove Run, Georges Hill, and Callis Hill, are all parts of this inner ring.

In examining the structure of Winding Ridge, it appeared that the strata had once formed part of an elliptical dome, the longer axis of which was about on a line running through Hoyes, Accident, and Cove. Bear Creek, the most important stream in this area, originates about a mile east of McHenry at the northern end of Deep Creek Lake. From there it follows a northeasterly direction in a deep but rather open, subsequent valley which has developed mostly on Greenbrier shales and limestones, between Negro Mountain and the secondary series of hills to the west, including Callis and Georges Hills. About 2 miles east-northeast of Accident the subsequent valley ends, and the stream turns sharply toward the

west through a deep gorge in the Pocono sandstone ridge northeast of Georges Hill near Kaese Mill. It then follows a narrower, winding valley across the shales (Hampshire and Jennings) composing the core of the Accident anticlinal valley. About 3 miles west of Kaese Mill, Bear Creek again crosses the Pocono sandstones of the western inner rim and is joined on the north by a small, subsequent tributary, Fikes Run. Flowing west in a narrow gorge cut through the Pottsville sandstone of Winding Ridge it joins the Youghiogheny at Friendsville.

Just west of Winding Ridge, Bear Creek is joined by its South Branch, which is also a transverse stream at this point. The South Branch, too, had worked back through Winding Ridge and the inner Pocono sandstone ridge. From there it extended its branches to the south and east, toward Elder, Hoyes, and Accident; with its tributaries it has dissected the southwestern part of the Accident amphitheater, underlain by less resistant shales and sandstones and has cut deep, relatively narrow valleys below the general level of the old valley floor. Remnants of this surface, as previously explained, lie at about 2,500 feet, and can be recognized on the hill-tops around Accident and Hoyes.

Mill Run, to the north of Bear Creek, flows for most of its course between Winding Ridge and the Youghiogheny. In its lower reaches, apparently, it is a consequent stream, but its headwaters break through the crest of Winding Ridge to the east and flow in subsequent valleys on the shales and limestones in the northwestern part of the Accident-Cove area.

Marsh Run Creek in the extreme southern part of this area was formerly a small stream occupying a relatively broad level valley with steep sides cut into the south flank of Negro Mountain and Marsh Hill. It has extended its headwaters through the resistant sandstone rim to the southern slopes of the inner ridge about 2 miles southeast of Hoyes. One small

eastern branch is only separated from the southern extremity of Bear Creek by a low saddle a few hundred feet wide about a mile northeast of McHenry. The most westerly branch of Marsh Run has apparently captured the headwaters of Hoyes Run and naturally the eastern branch might be expected to capture that of Bear Creek, but since the construction of Deep Creek Lake and flooding of most of Marsh Run Valley, its tributaries have a much higher base-level. As a consequence, the southern extension of Bear Creek may in time capture the eastern branch of Marsh Run.

West of the Youghiogheny the arrangement of Snaggy Mountain, Lewis Knob, Whites Knob and Dog Ridge, to the east of Pine Swamp, are similar in appearance to the Winding Ridge group. These crests are the north-western part of a roughly oval area most of which lies in West Virginia, and which may be called the Cranesville amphitheater. The originally consequent nature of Saltblock Run and Muddy Creek has been changed by their development into transverse streams across the Snaggy Mountain-Dog Ridge range. They have developed headwater subsequent courses along the weak rocks (Greenbrier limestones and shales) lying to the west of these ridges; and have begun adjusting their courses to the structure of the Cranesville amphitheater. In this connection Muddy Creek has produced some notable features. Its headwaters have widened and levelled their valleys much more than the lower section of the stream has been able to do in the resistant sandstone which it crosses in the vicinity of Browning Mill. The construction of the mill dam at that point has had some influence, since the result of both natural and artificial damming has been the formation of a level, boggy surface of solution, on the limestones above the mill, which is known as Pine Swamp.

The Upper Youghiogheny area adjoins the Central or Deer Park Valley which lies to the east. Its western limits are the crests of Snaggy Moun-

tain just discussed. On the north are Roman Nose and the southern hills of the Winding Ridge group. Most of the central part of the area is underlain by shales and coal seams such as those around Crellin; there is a great deal of sloping surface and the area is mostly in forest.

The Youghiogheny follows a consequent course in the synclinal valley and its meandering channel is entrenched in what appears to be an older, much wider one which in places is now occupied by terraces. One of the most noticeable of these is in the vicinity of Crellin. To the west of the river and from north of Crellin to the vicinity of Herrington Manor there is an extensive flat-topped area at about 2,500 feet. Farther north in Swallow Falls State Forest the surface is much more dissected, however most of the small interstream areas here also have flat-tops at about the same elevation. These surfaces again represent remnants of an old valley floor which has since been incised by streams with valleys now about one hundred feet deep. The valley of the Youghiogheny in this section is much narrower, and the walls are much steeper than in the vicinity of Crellin.

The Lower Youghiogheny area is a synclinal valley and includes the northwestern part of the County west of Winding Ridge. The branching or dendritic pattern of the tributary streams entering the Youghiogheny River from the west in this area is the result of typical streams in almost horizontal strata. From about a mile south of Friendsville northward to the Pennsylvania line, the Youghiogheny meanders through a broad valley with wide terraces on one or both sides of the present channel. Since the construction of the dam at Confluence, Pennsylvania, in 1948, however, most of this low terrace has been covered by the impounded waters as far south as Friendsville. There are still traces of other submerged terraces at several points, especially at the mouths of Buffalo and Mill Runs. Most of the higher elevations in the area are flat-topped hills, such as Guards

Hill north of Shelbyport, Thomas Ridge in the northwestern corner of the County, and Gum Hill, Frazee Ridge, Emberson Hill, Blooming Rose Hill, and others to the west of the main stream. Some of the larger tributaries occupy rather wide valleys such as those of Glade Run and the lower course of Buffalo Run. However, most of the area to the west along the West Virginia line is considerably more dissected by the branches of these streams.

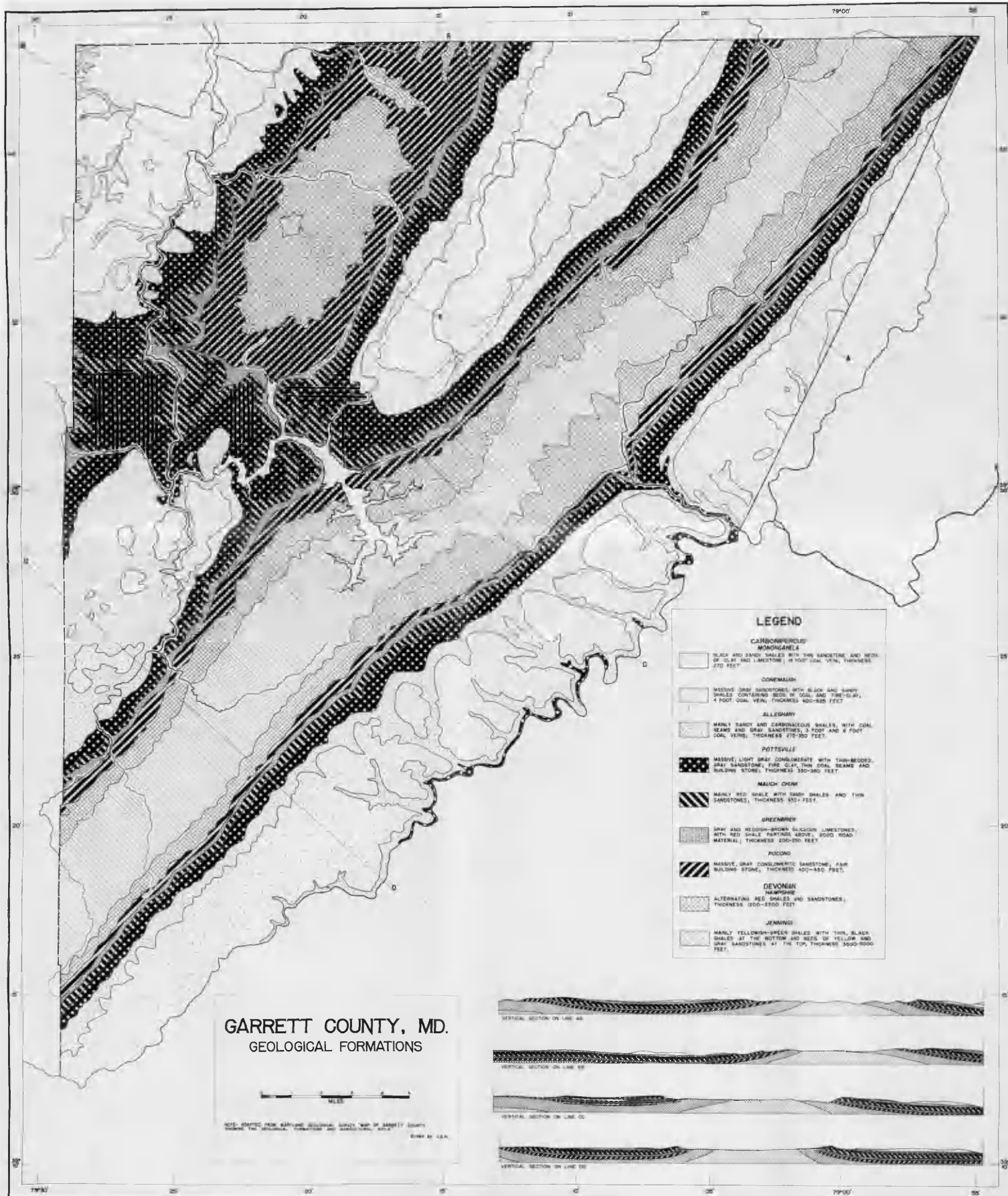


Figure E.

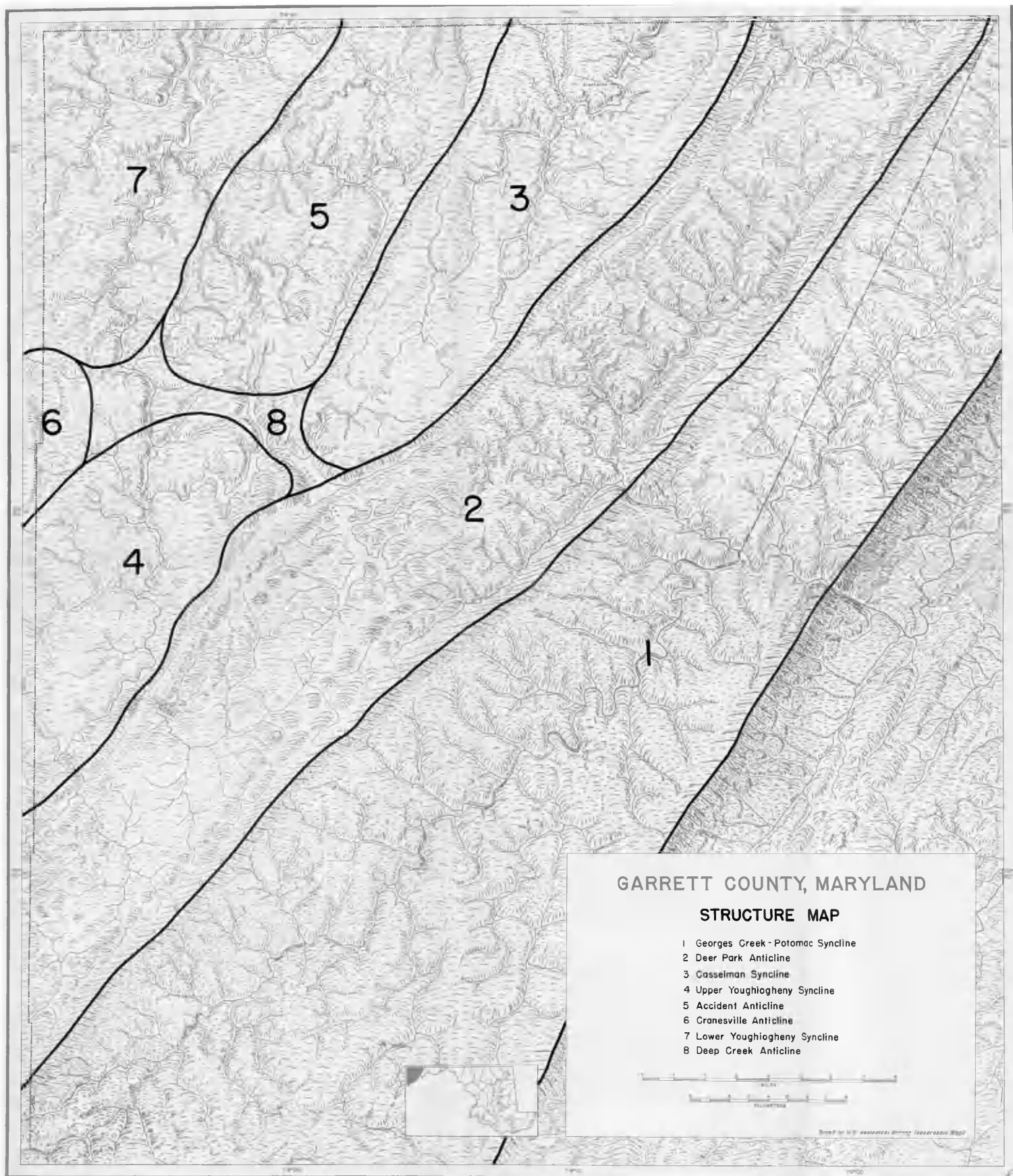


Figure F.

CHAPTER IV

CLIMATE

General Conditions

The nature of the various types of climates and of their associated soil and vegetative types provides the physical basis upon which agricultural land utilization rests. Where the occurrence of minerals make mining possible or where nearness to major transportation routes and centers of production and consumption make it possible for urban areas to be established, man can engage in other forms of land utilization with less concern for climate and its related natural conditions. But in agricultural use of land, whether for crop production or grazing, certain basic limitations are imposed by nature which are either impossible to overcome, or if they can be wholly or partially overcome, it may be only with a burden of higher cost of production.¹

Certain factors governing agricultural operations can be modified in many instances to meet the needs of the farmer. The soil can be fertilized, relief features modified to a minor degree, distances relatively changed through more efficient transportation, and plants and animals controlled, but elements of climate will continue to be uncertain and uncontrolled, and will limit farming by their peculiarities. Climate shows its effects in many ways--in housing, clothing, food, occupation, migrations--in short, the general manner of living in every region is more or less regulated by its climate.

¹ "The Future of the Great Plains", U. S. Great Plains Committee, 1936, p. 143.

Climate is the prime factor in the geographical distribution of crops. Settlement of a region is encouraged or retarded to a considerable degree by climate. A tendency to limit intensity of agricultural operations is directly reflected in other industries, in commerce, and in fact, in all human activities.

Characteristics. Garrett County has greater climatic extremes than any other section of Maryland. These are due primarily to the fact that the greater part of the County has an elevation of more than 2,300 feet, while in the rest of the State only relatively small portions exceed 600 feet. Garrett County has the shortest growing season, heaviest precipitation, greatest snowfall, coldest winters, coolest summers, and greatest annual range of temperature. Although there are some local climatic variations because of differences in altitude or location with respect to the high mountain ridges, on the whole, the County has a fairly uniform climate pattern.

Average yearly precipitation in Garrett County varies between 43 and 54 inches, with the greater amounts being received at the higher elevations. Thunderstorms occur frequently during the warmer months, and there are more days with a hundredth of an inch or more of precipitation than anywhere else in Maryland. Annual snowfall is generally heavy, averaging between 60 and 70 inches, and exceeding 100 inches in some years. Every year snow falls during the months of November to April, and sometimes in October and May. About 15 percent of the annual precipitation is in the form of snow.

While winters in Garrett County are rather cold, periods of severe weather last only a few days at a time. Summers are characterized by warm days and cool nights. There are relatively few days during which

the temperature rises above 90 degrees Fahrenheit. Temperature extremes range from a high of 101 degrees F. to a low of 40 degrees F. below zero. The average length of the frost-free season is about 130 days, but this includes extremes of 90 and 171 days, and the growing season varies considerably from year to year. Killing frosts have been reported during every month except July, but even in July slight frosts do occur, as on the 20th and 21st of that month in 1929 when minima of 34-35 degrees and 35-36 degrees Fahrenheit were reported at Grantsville and Oakland respectively.

Climatic limitations, obviously, have influenced the County's agricultural development, but the annual growing period is usually long enough for production of a wide variety of staple and specialized crops, such as oats, white potatoes, hay, peas, sweet corn, and maple sugar.

The topography of the County has been discussed at length in the preceding chapter and requires only brief reference here. Practically the entire County, with the exception of the Potomac and Youghiogheny Valleys, has an elevation of over 2,000 feet, with an average elevation of between 2,300 and 2,400 feet. Several ridges and chains of hills extend across the area from northeast to southwest. They rise from 2,800 feet or so at the north to as high as 3,400 feet toward the southern part of the County.

Weather stations have been maintained over varying periods in the Oakland area of the southern part of the County, between Great Backbone Mountain on the east and Hoop Pole Ridge on the west. These stations are, or were, in open rolling country, with considerable areas of comparatively level land, and fairly representative of the important farming areas south of Oakland to Redhouse. The present station for Oakland

is at Weber's, a large greenhouse and nursery about 1-1/2 miles southeast of the town on Route 219 and just north of the Baltimore and Ohio Railroad and the Little Youghiogheny River. The station at Grantsville, in the north central part of the County, is located in a rather level area between the Casselman River and Shade Run, between Meadow Mountain on the east and Negro Mountain on the west. Grantsville is also the center of an important farming area.

All of the stations mentioned are at elevations between 2,350 and 2,450 feet, and their records are quite representative for most of Garrett County.

The Friendsville section, in the northwestern part of the County, is located on a terrace in the valley of the Youghiogheny River at the mouth of Bear Creek. This station is only a little above 1,500 feet in elevation, and is the lowest in the County. However, the valley of the Youghiogheny here swings to the east and is surrounded by steep slopes; apparently air drainage is an important factor in reducing the climatic differences that might be expected.

Sines is also in the Youghiogheny Valley northwest of Deep Creek Lake and is also surrounded by steep slopes. The weather station is near a hydroelectric plant, and the elevation is about 2,030 feet. The location is in a steep-sided, forested valley and records are important more for comparative value than as representative of an agricultural area.

Influence of atmospheric circulation. The "lows" or storm areas which chiefly affect the weather and climate of Garrett County move across the United States by any one of three general storm paths which are fairly well defined. One is along the Canadian border; another over Colorado, Kansas, Missouri, the Ohio Valley, and New England or

the St. Lawrence Valley; and the third is over Utah, New Mexico, the Gulf States, and thence northeastward along the Atlantic Coast.

Two of the principal storm paths across the United States lie to the north of Garrett County, and one lies south of the County. When a storm area passes to the south of Garrett County, the winds over the area "back" through the southeast, east, northeast, north, and northwest. At such a time the area will be in the colder, or northern, quadrant of the disturbance, where the air is being drawn down from Canada. On the other hand, when a storm area passes to the north of Garrett County the winds shift through the southwest, west, and northwest, with a comparatively rapid change to clearing weather. It is generally true that on any day in Garrett County when the wind is changing from south to northwest, through the southwest and west, there will be partial to full sunshine. In addition, when the disturbance is passing to the north of Garrett County the area will be in the warm, or southern quadrant, where the air is being drawn northward from the south.

The storm areas that travel the middle route are often deflected northeastwardly after reaching the lower Ohio Valley, while those which follow the southern track are usually deflected toward the northeast by high pressure over the Atlantic Ocean as they approach the coast and cause the greater portion of Garrett County's precipitation in fall, winter, and spring. They are popularly known as "northeasters" because the wind blows from the northeast while the storm area is approaching from the southwest. Generally storm areas that travel over one or the other of the two northern routes cause only brief periods of stormy weather, or none at all; they cause a shift in wind from south to northwest, through southwest and west.

The high-pressure areas bring cool, fair, settled weather to Garrett County. Many of the "highs" reach the Atlantic Coast in the vicinity of Maryland, and when they settle over the south Atlantic states, as some of them do, temperature begins to rise in this area and the weather remains fair.¹

The most important climatic elements influencing agricultural operations are moisture and temperature. The available moisture determines potential agriculture. That is, it determines suitability of the land for any kind of crop without artificial application of water. Where moisture is sufficient, prevailing temperatures determine geographical distribution of crops. In other words, there exists a moisture optimum and a temperature optimum for each crop, and where the two coincide the crop tends to grow luxuriantly, provided, of course, that soil and topographic conditions are also favorable.²

Temperature

Because of its greater elevation above sea level, Garrett County has a mean annual temperature considerably below that of any other county in Maryland. Under normal conditions there is a general decrease in temperature with increasing elevation. Although the rate of decrease is not uniform, varying with time of day, season, and location, the average is approximately 3.3°F. for each 1,000-foot rise. For instance, average elevations at Deer Park, Oakland, and Grantsville are slightly above 2,400 feet, while their average annual temperature is 47.3°F. At

1 "Our Climate", Maryland State Weather Service, 1939, pp. 36-45.

2 W. S. Hamill, "The Agricultural Industry of Maryland" pp. 13-16.

Frederick, east of the Blue Ridge on the Piedmont, in approximately the same latitude, and at an altitude of about 300 feet above sea level, the mean annual temperature is 54.3°F., showing a difference of 7 degrees for a difference in elevation of 2,100 feet, or 1 degree for every 300 feet.

The monthly average temperature in Garrett County varies from about 68°F. in July to about 28°F. in both January and February. Quite often, in fact, February temperatures have averaged fully 2 degrees below those of January. The coldest weather of the year frequently comes during the first week or two of February, but on the whole the rest of the month generally averages higher than January.

The difference between summer and winter temperatures becomes very marked when a comparison is made between an abnormally warm summer month, as for example, July, 1901, with an average of 73°F., and an abnormally cold winter month, February, 1901, with 18.6°F., a difference of 53.2 degrees. While such figures mark the climate as one of great changes between summer and winter, the full extent of temperature variability is not shown until comparisons are made between absolute extremes occurring within a given month of a year, rather than between average monthly values.

For example, on the 8th of February, 1900, the temperature rose to 72°F. at Deer Park; on the 20th of the same month a minimum temperature of 14°F. below zero was recorded, making a range of 86 degrees within 12 days. The highest temperature ever recorded in Garrett County was 101°F. in August, 1918, and the lowest was -40°F. in February, 1912, both in Oakland. Although these did not occur in the same year, they show a possible absolute range of 141 degrees for the County.

The average difference between maximum and minimum temperatures of the day is 23 degrees. This difference varies with season of year, being greatest in the month of September (27.5 degrees) and least in January. The actual daily fluctuations may, of course, greatly exceed these monthly averages. Differences of 40 degrees or more between afternoon and early morning temperatures are of frequent occurrence. The greatest fluctuations within a 24-hour period occur in the winter months in connection with the passage of cold waves. During such periods the temperature may fall 20 degrees or more within 24 hours and strong importation of cold Polar continental air following a cold front. The sharp drop in temperature, the cold wave, occurs when the wind shifts from a southerly to a northwesterly direction. The lowest temperature, however, may not be reached during the blowing of the strong northwest wind but rather a day or two later in the calm air of the following anticyclone, when radiation and conduction produce the maximum surface cooling in the Polar continental air mass.

The following figures represent, in degrees Fahrenheit, the greatest daily ranges of temperature recorded in Garrett County during each month of the year:

Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.
64	55	52	51	50	50	48	50	49	53	52	56

U. S. Weather Bureau.

While average daily range increases steadily from winter months to summer months, following increasing power and duration of solar radiation, non-periodic changes accompanying the passage of cold waves, together with intense nocturnal radiation, cause extreme daily ranges to be greatest in midwinter.

Frequency of frost days. Garrett County differs materially from all other counties in the State in frequency of cold days, and in degree of cold experienced. This difference is due to the greater elevation which causes greater intensity of radiation from the ground during night hours. The lowest temperatures recorded within the State have usually occurred in the Oakland area. The lowest ever recorded was -40°F. at Oakland (Weber's) in 1912, while a minimum of -33°F. has been experienced at Deer Park, of -26°F. at Grantsville, of -23°F. at Sines (near the hydroelectric power plant), and of -19°F. at Friendsville. The last two stations are in the Youghiogheny River Valley and at elevations several hundred feet below the average of the rest of the County.

Lowest temperatures of the year are most likely to occur in the first ten days of February. Average minimum temperatures for February are 17.4°F. at Grantsville and 17.6°F. for Oakland. Corresponding figures for January are 18.4°F. and 18.6°F. respectively. Friendsville averages are somewhat higher, with January the coldest month; the figures there are 21.1°F. for January and 21.5°F. for February.

Freezing weather has occurred in Garrett County every month of the year. The average number of days per year in which a minimum of 32 degrees or less has been recorded is 160. The frequency varies from place to place, with a minimum of 142 days at Grantsville, to a maximum of 187 days at Deer Park. Annual frequency of days with a freezing temperature is shown in Table VII.

The month of February, 1934, was the coldest on record for Maryland. This coldest of Februarys for the State as a whole was caused by an unusual frequency of strong high-pressure areas and very low temperatures

which originated in central Canada and overspread the northeastern portion of the United States. Departures below normal were greater over eastern and central Maryland than over the western part of the State. The lowest temperature for the month was at Oakland, 25 degrees below zero on the 28th, and the range on that date was from -25 to 31 or 57 degrees.

TABLE VII
FREQUENCY OF FROST DAYS PER YEAR
IN GARRETT COUNTY

Station		J	F	M	A	M	J	J	A	S	O	N	D	Year
Deer Park	(Greatest No.	31	28	28	19	10	1	1	1	6	23	29	30	187
	(Least No.	26	26	15	12	0	0	0	0	1	10	17	24	182
Grantsville	(Greatest No.	31	28	28	15	5	1	0	0	2	17	29	29	156
	(Least No.	24	24	17	10	0	0	0	0	0	5	14	22	142
Sunnyside	(Greatest No.	31	28	28	22	9	1	0	0	4	19	29	30	184
	(Least No.	24	23	18	11	0	0	0	0	1	5	15	24	152

Maryland Weather Service.

The monthly mean temperature for February, 1934, was 22.5°F., or 11.5 degrees below normal for the State as a whole. For Baltimore it was 24.3°, or -11.1 degrees below normal, and at Oakland, 17.2°, or -10.8 degrees below normal. The highest temperature for the month at Baltimore was 46°F. on the 15th, and the lowest -7°F. on the 9th, or a range of 54 degrees, while comparable figures for Oakland were 52°F. on the 18th and -25°F. on the 28th, making a monthly range of 78 degrees.

Frequency of hot days. Frequency of days with a maximum afternoon temperature of 90 degrees or above is far less in Garrett County than for any other part of the State. The intense solar radiation of a summer day results in shade temperatures at lower altitude stations far in excess of those recorded at places in Garrett County.

The record for the month of July, 1930, illustrates freedom from excessively high summer afternoon temperatures in Garrett County. This particular month was one of extremely high temperatures throughout the central and eastern sections of the country. A heat wave of unprecedented intensity for Maryland began on the 18th and continued into the second week of August. At Baltimore the monthly mean temperature was 80.6°F. and at Grantsville, 67.6°F; these were the highest and lowest mean temperatures respectively for the month of July. The maximum afternoon temperatures at Baltimore for the 19th to the 22nd were 101, 106, 106, and 103 degrees, or from 16 to 20 degrees above the normal for the period. During the same afternoons the highest temperatures at Grantsville were 90, 91, 91, and 87 degrees, not greatly exceeding their average values of 79 or 80 degrees. Temperatures at Cumberland, which is only about twenty miles east of Grantsville, but at an elevation of 625 feet compared to 2,350 feet, were 99, 98, 103, and 100 degrees. During the rest of July and the first ten days of August, 1930, there was a corresponding similarity of changes in temperature from day to day at Grantsville and Baltimore, but there was a significant difference in absolute values of 8 and 13 degrees respectively.

Night temperatures at Grantsville during this hot spell are also worth noting. While maximum and minimum temperatures at Baltimore and the maximum at Grantsville show similar changes from day to day, minimum temperatures at Grantsville are considerably out of agreement. They show a consistently lower range in night temperatures as compared to the respective afternoon temperatures.

As previously stated, days with an afternoon temperature of 90°F. and above are of comparatively infrequent occurrence in Garrett County.

Over a period of years the average of such days has been about three in each year, but frequencies vary from year to year and have ranged from as few as two per year to as high as eleven. Compared with frequency of such days in other parts of the State, these figures are small. For Baltimore, as an example, the average number of days with temperatures of 90°F. or above per year is about 20, but, again, such days have ranged from 8 to 43.

TABLE VIII

MAXIMUM AFTERNOON AND MINIMUM NIGHT TEMPERATURES
AT BALTIMORE AND GRANTSVILLE -- JULY 16-25, 1930
(In degrees Fahrenheit)

	JULY									
	16	17	18	19	20	21	22	23	24	25
<u>Maximum Afternoon:</u>										
At Baltimore	83	87	92	103	102	104	100	91	91	96
At Grantsville	81	84	88	90	91	91	87	84	84	89
<u>Minimum Night:</u>										
At Baltimore	61	67	72	76	80	83	80	75	74	72
At Grantsville	39	46	56	58	64	68	68	59	56	54

Climatological data for 1930, Vol. XXV, p. 28.

As Garrett County was in the center of an area of excessively high temperatures during this period in July-August, 1930, embracing nearly all of the country east of the Rocky Mountains, the small excess of temperatures above normal in the County at this time would seem to indicate the importance of elevation as a factor in temperature.

Another illustration of the comparative freedom from hot days in the County is afforded by the maximum and minimum temperatures at Baltimore and Deer Park during a more intense but briefer hot wave from June 26 to July 7, 1901. While the departures from normal temperatures

at Deer Park were quite pronounced, the absolute degrees of heat were from 8 to 10 degrees less than at Baltimore. On July 2 the maximum at Baltimore was 102°F., at Deer Park 93°F., while minimum for the same night was 80°F. and 57°F. respectively.

The growing season. Perhaps the most important relationship between temperatures and agriculture is the number of days between last killing frost in spring and first killing frost in autumn, since this represents the normal period of safe plant growth.

Late frosts of spring are most injurious, as a rule, because the tender young plants are very easily damaged. No such serious damage results from the occurrence of frosts in autumn, since there is comparatively little tender vegetation remaining in the fields, and the more hardy crops are generally far enough advanced to sustain some frost.

One influence of altitude and relief on the climate of Garrett County is seen in the variability of the frost-free period from year to year. For example, Grantsville, at an elevation of about 2,350 feet, has an average of 132 days between average date of last killing frost in spring (May 20) and first killing frost of autumn (Sept. 29). These figures are based on the yearly records from 1899 to 1938 inclusive, or a 40-year period. But for individual years the growing season has ranged from 171 days in 1911 (May 7 to Oct. 25), to 93 days in 1913 (June 10 to Sept. 11), a difference of 78 days. The earliest date for last killing frost in spring was April 24, in 1905, while the latest date was June 24, in 1918, or a range of 61 days. The earliest date of first killing frost on record was August 21 in 1922, and the latest date in fall was October 25 in 1911, a range of 65 days.

Thus it is evident that in both spring and fall there are periods of over 60 days in which killing frosts may affect the growing season.

TABLE IX
LENGTH OF GROWING SEASON
AT GRANTSVILLE, GARRETT COUNTY, MARYLAND¹
(Dates of killing frosts)

Year	Last in Spring	First in Fall	Interval In Days	Year	Last in Spring	First in Fall	Interval in Days
1899	May 22	Sept. 15	116	1919	Apr. 26	Sept. 27	154
1900	10	19	132	1920	May 16	Oct. 3	140
1901	4	20	139	1921	17	9	145
1902	29	15	109	1922	1	Aug. 21	112
1903	9	Oct. 25	169	1923	25	Sept. 15	113
1904	16	Sept. 22	129	1924	31	7	99
1905	Apr. 24	26	155	1925	27	Oct. 8	134
1906	May 11	Oct. 12	154	1926	12	8	149
1907	28	9	134	1927	28	Sept. 22	117
1908	3	Sept. 31	150	1928	14	25	134
1909	12	Oct. 2	143	1929	23	19	119
1910	16	24	161	1930	June 1	Oct. 1	122
1911	7	25	171	1931	May 4	Sept. 29	148
1912	Apr. 28	Sept. 28	153	1932	June 9	25	108
1913	June 10	11	93	1933	15	Oct. 14	121
1914	17	28	103	1934	May 27	13	139
1915	May 27	23	119	1935	26	Sept. 30	127
1916	Apr. 30	19	142	1936	29	Oct. 25	149
1917	May 26	11	108	1937	11	Sept. 18	130
1918	June 24	30	98	1938	25	Oct. 2	130
Mean - 1899-1938				May 20	Sept. 29	132	

"Climate and Man", Yearbook of Agriculture, U.S.D.A., 1941, pp. 907-8.

1 Elevation at Grantsville, 2,350 feet.

The town of Oakland in the southwestern part of the County lies at an elevation of about 2,460 feet, or about 100 feet higher than Grantsville. At Oakland the average date of last killing frost is May 24, as compared to May 20 for Grantsville; the average date of first killing frost in fall is Sept. 23 (Sept. 29 for Grantsville), making an average interval of 122 days, or 10 days less than at Grantsville. At Oakland, of course, there are the same yearly variations. The shortest frost-free period on record at Oakland was 85 days, between June 18

and Sept. 11, in 1917, while the longest was 170 days, between May 7 and Oct. 24, in 1911.

Although Friendsville, in the northwestern part of the County, is located at an elevation of only 1,500 feet above sea level, or 800 and 900 feet lower than Grantsville and Oakland respectively, comparable differences in temperature are not so great as might be expected. Friendsville is built on a low alluvial deposit or terrace in the valley of the Youghiogheny at the mouth of Bear Creek. On all sides of the town are steep slopes with summits of 2,000 feet or more, so that air drainage is an important climatic factor locally, and tends to offset differences in relative elevations. Based on a 20-year record the average frost-free period at Friendsville is only 133 days, or about one day more than at Grantsville, and 11 days longer than at Oakland.¹

Precipitation

In Garrett County precipitation is abundant at all seasons of the year. It is considerably more than that of any other county of Maryland and averages well over 3 inches a month except for November. There is, however, considerable variation even within the narrow limits of the County. Apparently the southern and northwestern parts of the County receive more precipitation than does the northeastern third. This may be due, in part, to local situations of weather stations, but undoubtedly the major factor is topographic conditions. Prevailing winds throughout the year are from a westerly direction, while the trend of the major ridges and summits is northeast-southwest. The monthly pre-

¹ J. B. Kincer, "Climate and Weather Data for the United States", Climate and Man, Agricultural Yearbook, U.S.D.A., 1941, p. 904.

precipitation rarely is less than 1 inch; in July, 1930, an exceptionally dry year, only .76 and .71 inches were reported for Friendsville and Grantsville respectively, while at Oakland 1.91 inches were recorded for the same period. In October, 1930, precipitation for Friendsville, Grantsville, and Oakland amounted to .47, .48, and .47 of an inch respectively.¹

Over a long period of years November has been the driest month in Garrett County, with an average for all stations of about 2.75 inches. Quite frequently, however, precipitation minima may occur in either September or October.²

Excessive rainfall usually is experienced during the summer months in connection with thunder-storms. In July, 1898, the observer at Grantsville reported a fall of 4 inches within two hours accompanying a severe storm of this character. The largest amounts in any one month recorded at Oakland were 12.54 inches in July, 1912, 12.73 and 10.13 inches in August 1911 and 1926 respectively.³

Snowfall. As might be anticipated from the number of days with temperatures at or below the freezing point, a considerable part of the annual precipitation in Garrett County is in the form of snow. For most years snow has been reported in every month from November to April, frequently in October and May, and occasionally in September. Monthly amounts vary from a trace to over 48 inches, while annual amounts have varied from less than 36 to more than 126 inches. The greatest and

1 Climatological Data for 1930, Vol. XXV, p. 28-30.

2 J. B. Kincer, op. cit.

3 Climatic Summary of the United States, 1932, p. 91-11.

least amounts so far recorded were for the years 1901 and 1895 respectively.¹ Combining the snowfall records of all the stations in the County results in the following figures for average, greatest, and least amounts of snow on record.

TABLE X
SNOWFALL IN GARRETT COUNTY
(Combined records of all stations in Garrett County)

	J	F	M	A	M	J	J	A	S	O	N	D	Year
Average	14.8	15.7	12.0	5.8	.3	.0	.0	.0	T	1.3	4.7	11.3	66.0
Greatest	40.0	41.8	48.5	25.0	6.0	.0	.0	.0	T	2.0	3.1	3.3	126.5
Least	3.0	4.0	2.0	.0	.0	.0	.0	.0	.0	.0	.0	5.0	35.9

Maryland Weather Service.

Duration of snow cover has several important results in Garrett County. Lasting from sometime in November to late in April with infrequent short periods when the ground is bare, the snow cover undoubtedly has a marked effect upon cool-season temperatures. Once the area is covered by a white mantle of snow, the ground itself ceases to have much influence upon air temperature. Sunlight falling upon snow is largely reflected so that little of the solar energy is effective in heating the ground or the atmosphere above it. Furthermore, although loss of energy by earth radiation goes on very rapidly from the top of a snow surface, the low conductivity of snow tends greatly to retard the flow of heat from the ground below to replace that which is being lost. The effect of snow cover is greatly to reduce winter temperatures. Although temperatures of 20°F. below zero may be observed at

¹ "Climatological Data", 1930, Vol. XXV, p. 49.

the surface of a snow cover that of the ground beneath may be only a few degrees below freezing. Thus the snow cover tends to keep ground warmer and prevents, to a large extent, deep freezing of the soil and winter killing of perennials such as clover or winter wheat. As spring advances, however, the snow cover acts to retard warming of the air, since much of the solar energy is expended in melting the snow and ice.

Quite often in late April Garrett County experiences heavy snow-falls which melt rapidly causing high water and freshets in streams and rivers and contributing to floods of the Potomac and other large rivers, because so much of the land is in steep slope and the run-off so rapid.

Most winters snow removal and keeping County roads open for school buses as well as for emergencies is a major problem and expense to the County. In some years about 10 percent of the expenditures for roads is for snow removal.¹

The recreational uses of the snow cover in Garrett County have not been developed to any important extent. Recent developments have included five miles of ski trails along the slopes of Meadow Mountain in the vicinity of New Germany, and a ski-lift on the eastern slopes of Hoop Pole Ridge between Oakland and Deep Creek Lake. With proper planning, organization, and publicity much more could be done to make Garrett County a winter recreational area.²

Thunder-storms. Although thunder-storms may occur in all seasons of the year in Garrett County, they are rare occurrences from November

1 Annual Report of County Commissioners, Garrett County, 1946, p. 17.

2 "Maryland Recreational Areas", Maryland State Planning Commission, Sept. 1940, p. 18.

to February. The month of greatest frequency is July, with an average number of about 12 or 14. Seasonal distribution of these storms and their frequency in Garrett County compared to Baltimore are shown in the following table.

TABLE XI
FREQUENCY OF THUNDER-STORMS
AT GRANTSVILLE AND BALTIMORE, MARYLAND

	Number of Days												Year
	J	F	M	A	M	J	J	A	S	O	N	D	
<u>Grantsville:</u>													
Greatest	1	1	3	5	10	16	17	11	9	1	1	0	56
Least	0	0	0	0	0	4	11	6	0	0	0	0	27
Average	.3	.4	1.6	1.4	5.9	10.1	14	8	3.6	.1	.3	0	45.6
<u>Baltimore:</u>													
Greatest	1	2	4	3	7	10	9	9	4	2	2	1	36
Least	0	0	0	0	0	4	5	1	1	0	0	0	20
Average	.2	.6	1	.6	3	6	7	4.7	2.7	.3	.2	.1	27.2

Maryland Weather Service.

These figures, based on a ten-year record, show that thunder-storms are much more frequent in Garrett County compared to the Baltimore area. Of course, since the months with greatest or least number of thunder-storms did not occur in any particular years their totals are not the same as those for the years with the most or fewest storms of this type. The concentration of thunderstorms during the months of June to August inclusive and in July especially are quite obvious.

On hot, humid days of July and August when convection is especially strong, cumulus clouds may ascend to heights of 20,000 feet and develop into cumulus-nimbus clouds, or thunder-heads. Since this is essentially a vertical movement of warm, humid air, cooling and condensation are likewise accelerated, and the rainfall resulting is usually in the form

of heavy showers. Because these thunder-heads, or cumulus-nimbus clouds, cover only a relatively small area and are carried along laterally, the associated shower is not of long duration.

Such heavy showers, however, are less effective for crop growth since much of the moisture, instead of entering the soil, is lost through run-off or surface drainage. This is a real menace to plowed fields or row crops, particularly those not planted along the contours, and soil removal through slope wash and gullying under such conditions is serious. On the other hand, convectional rain or thunder-showers come at the most effective time of year for growing crops and provide maximum rainfall with a minimum of cloudiness. It is not uncommon for the average amount of precipitation for a whole month to fall in an hour or two during a thunder-storm.¹

Hail. During very intense thunder-storms, hail, the most destructive form of precipitation is developed. Fortunately in Garrett County it occurs in only a few such storms and usually in only restricted areas or belts within any particular storm. Some hail falls in Garrett County every year and does damage of varying degree to crops, to structures such as green houses, and occasionally even kills livestock in the fields. For example, on the 18th of July, 1926, between 5:00 and 6:00 p.m., hailstones reportedly the size of hen or goose eggs fell along a belt about 4 miles wide, including Hoyes, Accident, and Bittering. As a result damage to crops in that small area was estimated at \$75,000 and to property at \$25,000.²

1 Verner C. Finch and Glenn T. Trewartha, "Elements of Geography", 1942, pp. 147-154.

2 Climatological Data. Maryland and Delaware, 1926.

Thunder-squalls. Thunder-squalls or thunder-gusts result from the strong outrushing mass of cool air just in front of a thunderstorm. They are associated with squall-clouds, the onrushing dark gray, boiling arch or roll of cloud which is the forward projection of the lower portion of the storm cloud. The velocity of the squall wind at times attains hurricane violence, and can do serious damage. The force of the squall is due in part to the cool air brought down from aloft with the mass of falling rain. Being denser than the warm surface air, it spreads out in front of the storm, under-running the warm air. In part its velocity is due also to the onrushing motion of the storm mass itself, so that forward and outward motion is combined. On August 11, 1942, there were two parallel thunder-gusts in Garrett County. One was in the vicinity of McHenry at the head of Deep Creek Lake, and the other was between Deer Park and Swanton, east of Oakland. About \$8,000 damage was caused to property.¹ On July 19, 1944, a severe thunder-gust of almost tornado proportions struck a belt one mile wide and six miles long between Mt. Lake Park and Deer Park. Three persons were killed and 25 others injured, and 10 farm houses, 28 other buildings, 19 barns, and some machinery were destroyed. Trees were twisted off or uprooted, some cattle and horses killed. Property loss was about \$150,000, and crops and orchards suffered over a \$50,000 loss.²

The effect of climate of Garrett County on agriculture and crop production will be further discussed under specific crops in Chapter X.

1 Climatological Data, Vol. XXIX, No. 13, 1942, p. 15-53.

2 Ibid, Vol. XXXI, No. 13, 1944, p. 15-52.



Figure 11
Rotary snowplow used on Garrett County roads.

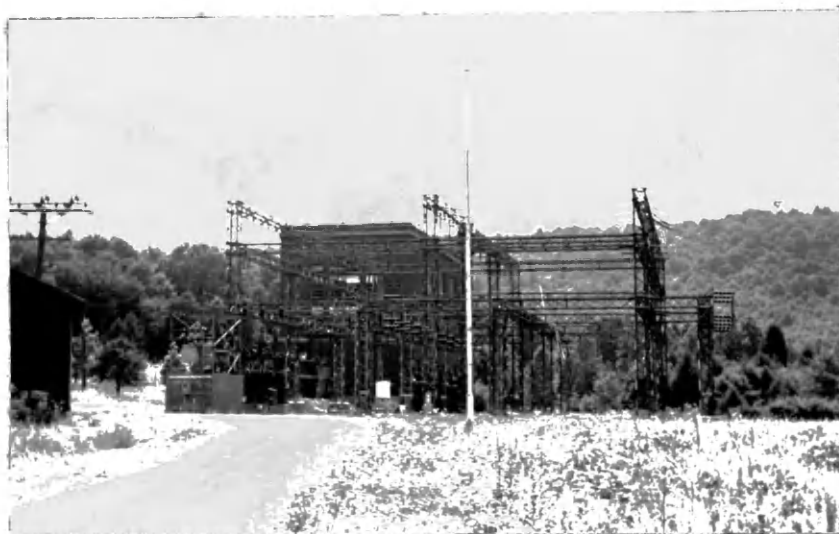


Figure 12
Hydroelectric power plant, supplied by Deep Creek Lake.

CHAPTER V

ECONOMIC ASPECTS OF WATER RESOURCES

Water is, perhaps, Garrett County's most abundant and, with the exception of air, its most necessary resource. The water resources of a land area are derived, either directly or indirectly, from atmospheric precipitation, falling as rain, hail, sleet, or snow. Although the greater part of the annual precipitation that Garrett County receives leaves the area in a matter of a few hours or days, the supply is replenished quite uniformly throughout the year, and year after year.

Some conception of the amount of water which falls in some form of precipitation within the County's borders may be gained from the fact that, on the average, the equivalent of about 45 inches of water falls on its land and water surfaces during each year. One inch of rain falling on one acre of ground would amount to 27,143 gallons of water, or about 603 barrels of 45 gallons each. Garrett County has an area of 427,520 acres, and 45 inches of rainfall on an area of this size would amount to 522,187,891,200 gallons, or about 1,663 million acre-feet. By way of comparison, the capacity of the largest reservoir in the United States--Lake Mead impounded by the Hoover-Boulder Dam on the Colorado River in Nevada and Arizona--is about 10,148,000,000 gallons, or about 32 million acre-feet.

A considerable portion of the annual precipitation immediately flows away in surface streams and ultimately reaches the sea. The proportion which sinks into the ground to be added to the underground water supply and partly to return to the surface as springs depends on

several factors: (1) character of rains, whether slow and steady or torrential; (2) nature of the countryside, whether mountainous, flat, or intermediate; (3) character of vegetation, whether thick and facilitating storage or thin and with little influence in preventing rapid run-off; (4) character of the soil, whether porous and absorbent or heavy and close-grained, like rock and clays which are more or less impervious; (5) previous state of saturation of underlying beds.

Other forms of precipitation, particularly snow, act in a similar way in areas such as southern Maryland or the lower Eastern Shore where snow seldom accumulates for more than a day or two; but in colder, mountainous regions such as much of Garrett County the snow cover may remain until it thaws in the spring. Then a considerable amount of water may suddenly be added to the seasonal rainfall and accelerate and augment the normal movements such as run-off, fly-off, or evaporation, etc.

In Garrett County the amount of precipitation that is lost by evaporation, or that becomes chemically bound, is comparatively small, and the amount extracted by growth of vegetation, while larger, is still relatively small compared to the amount of run-off, both direct and indirect.

Surface Waters

The surface waters of Garrett County may be grouped under streams, swamps, lakes, ponds, and reservoirs. The latter three are valuable for domestic, industrial, and recreational uses and, including swamps, in preventing, or at least retarding, rapid and destructive run-off. Without reservoirs or lakes, such as the recently completed Youghiogheny Reservoir below Friendsville, or the Savage River Reservoir, the flow of the streams, including the Potomac River, fluctuates greatly since,

due to steep slopes, stream level is immediately affected by rainfall.

The North Branch of the Potomac River, flowing in a northeasterly direction, forms the southern boundary of the County. This stream with its numerous short tributaries drains the southeast slopes of Backbone Mountain. The tributaries are in general only five or six miles in length, and come down as mountain torrents to add their water to the large stream. The Savage River flows through the water gap between Backbone and Savage Mountains, and together with its branches drains more than a hundred square miles of the northeastern part of the County between Big Savage and Meadow Mountains, as well as the northern part of the northwestern slopes of Backbone Mountain.

Precipitation falling on the southern part of the northwestern slope of Backbone Mountain flows down the steep mountainsides in numerous creeks and runs which unite to form several tributaries of the Youghiogheny River. The latter stream flows north, drains all of the western part of Garrett County and flows into Pennsylvania, where it joins the Monongahela at McKeesport.

The north-central part of Garrett County, between Negro and Meadow Mountains, is drained by the Casselman River and its tributaries. It flows north into Pennsylvania, and, following a winding course westward, joins the Youghiogheny and Laurel Hill Creek at Confluence, or Three Forks, as it was formerly known. Backbone and Meadow Mountains and an irregular group of hills--including Black Ridge, Monkey Lodge Hill, and Contrary Knob--which link them form a continental divide. Rain falling on the southeast side flows into the Potomac and reaches the Atlantic Ocean, while rain falling on the northwest side of the divide, after flowing into the Youghiogheny or its tributaries, eventually reaches

the Gulf of Mexico as part of the Mississippi system. It is noteworthy that Garrett County receives practically no water from the surrounding region, but is a collecting and conserving area for the large rivers to the north and southeast.

Mountain slopes in the County are so steep and valleys of all streams so narrow that precipitation quickly reaches main streams or reservoirs. Because during heavy rains or rainy spells of weather a large proportion of the water flows so swiftly down mountainsides that it does not have an opportunity to seep into the ground, there is comparatively little ground water storage to keep up the flow during dry periods and streams tend to show a relatively small run-off in comparison to their drainage area. The artificial lakes, ponds, and reservoirs which have been built in recent years help store the waters of wet seasons, particularly of spring when melting snows augment normal precipitation. During dry spells water flow in the North Branch of the Potomac and its upper tributaries is particularly low and sudden rises to flood height after heavy or prolonged rainfall are common, even though most of the mountain slopes are covered with a rather heavy growth of hardwood. Continued reforestation will help considerably in water conservation.

The headwaters of the North Branch of the Potomac are at Potomac Spring, just west of Fairfax stone, the starting point of the West Virginia-Maryland state line. From an elevation of about 3,200 feet, the river flows northeasterly in a winding course of 46 miles, its right bank forming the line between Garrett County, Maryland, and Grant and Mineral Counties, West Virginia. The North Branch of the Potomac drains about 74 square miles of the southeastern part of Garrett County.

Along its upper course, above Bloomington at the mouth of the Savage, the North Branch of the Potomac flows through a narrow, tortuous valley, with steep, rough, wooded sides which offer little opportunity for settlement. There is not much room along the Maryland side of the river's bank for anything but a poorly maintained dirt road, and the Western Maryland Railroad, which follows the river, is built almost entirely on the West Virginia side. Coal mining, which has declined seriously in recent years, and some lumbering are responsible for the scattered settlements such as Kitzmiller, Gorman, and Kempton; but even these are dependent on east-west, or transverse, highways (except for the railroad) for access to other parts of the region.

In the Garrett County section of its course the North Branch of the Potomac has a considerable gradient, averaging about 46 feet per mile, with stretches exceeding 60 feet per mile, and at the junction with Savage River the elevation is about 1,000 feet, or 2,200 feet lower than at the source. Along this section there is an almost continuous series of riffles and small falls, the latter in some places having a drop of 5 feet or more. Little or nothing has ever been done to develop the water power of this stretch of the river. Freshets are frequent and heavy and would cause serious damage to any inexpensive form of mill dam. Stone or loose-rock dams would be swept away or be in constant need of repair and rebuilding. Dams built to withstand the heaviest floods passing over the narrow valleys would have to be of elaborate construction and therefore expensive. Even when saw mills and tanneries were numerous in the valley, around 1900, they used steam power. Saw mills were supplied with plenty of fuel at no cost, in the form of sawdust and slabs for which at that time there was little demand. They

were temporary structures, likely to be moved whenever it was found advantageous to shorten the distance for hauling logs. Tanneries, though of a more permanent nature, used steam power, since, in addition to being able to utilize tan-bark as fuel, they needed steam in some of the tanning processes.

During the period of 1880-1912 large quantities of sawdust were discharged directly into the river or its tributaries. Several of the mills had capacities of from 20,000 to 100,000 feet of lumber a day. Several tanneries which processed from 300 to 800 hides a day were also discharging waste into the Upper Potomac. This waste consisted of tanning solutions, lime water, and tanbark washed from the banks at times of high water. During dry spells pollution was particularly noticeable, and the water had a dark-brown tinge. At about this time coal mines were being developed along the Upper Potomac Valley from Bloomington to Kempton as well as on the West Virginia side, and acid waters from mining operations added to the pollution. Today with abandonment of these mines, no one is responsible for such pollution, and it has been estimated that the equivalent of 86 tons of sulphuric acid is discharged daily from active and abandoned coal mines along the Upper Potomac Valley.¹

Another source of pollution in the Upper Potomac is the West Virginia Pulp and Paper Company plant at Luke, W. Va., across the river from Bloomington. From this plant an estimated 8,000,000 gallons of industrial waste is discharged into the river daily.²

1 "Ten Rivers in America's Future", The Report of the President's Water Resources Policy Commission, Vol. II, 1950, p. 598.

2 Report of the Water Resources Commission of Maryland, 1933, p. 63.

The Savage River rises in the valley west of Backbone and Savage Mountains and enters the North Branch of the Potomac at Bloomington at the southern end of the Garrett-Allegany county line. It is relatively small and is less polluted since only small-scale saw mills are in operation and mining has never been significant in its watershed. This is important because the towns of Westernport, Md., and Piedmont, W. Va., obtain their water supply from a reservoir filled by water pumped from the Savage River about 1-3/4 miles above the new Savage River dam. The quantity pumped daily is estimated at about 700,000 gallons. (Incidentally, about the same amount of untreated waste is discharged daily into the Upper Potomac by these cities.) Part of Frostburg's water supply is obtained from the Little Savage River about three miles northwest of the city. The station there pumps about 400,000 gallons per day. Frostburg has a reservoir on Piney Creek, a tributary of the Casselman, a mile and a half north of Route 40, and eight miles northwest of Frostburg. About 400,000 gallons are supplied daily by this reservoir.¹

The Savage River dam is being built about five miles above the river's junction with the North Branch of the Potomac. The dam was sponsored by the Upper Potomac River Commission to supplement low stream flows for industrial use and for pollution abatement, particularly between Luke and Cumberland in Allegany County. Work on the dam was started in 1939 by the Works Progress Administration and was about 60 percent completed in 1942 when construction was halted because of the war. Completion of the project, resumed by the Corps of Engineers in 1949, is scheduled for some time in 1951. The design calls for a compacted earth and rock fill structure about 175 feet in height with a

1 Ibid.

storage capacity of 20,000 acre-feet. It will control the run-off of a drainage area of about 105 square miles in Garrett County. The dam is planned to increase the minimum flow of the North Branch of the Potomac at Bloomington to 93 cubic feet per second, from a previous minimum flow of 23 cubic feet per second.¹

The Casselman River drains about 68.7 square miles of Garrett County between Meadow and Negro Mountains, including the Grantsville area. As previously stated, it joins the Youghiogheny and Laurel Hill Creek at Confluence, Pa., about 15 miles below Friendsville. Although small saw- and grist-mills were formerly quite important along the Casselman and its branches, little use is being made of its waters at present.

The Youghiogheny River is the largest stream which actually flows through Garrett County. It joins the Monongahela at McKeesport about 15 miles above Pittsburgh. Its headwaters, on the western slopes of Backbone Mountain, lie at an altitude of almost 3,400 feet above sea level. For about 19 miles above McKeesport the main stream has an average fall of only about 2 feet per mile, but above that point it increases to 5 feet per mile. Above Friendsville rapids and falls become more numerous and larger, and on one of its tributaries, Muddy Creek, just west of Swallow Falls there is a fall of 75 feet, the highest in the State. The river averages less than 100 feet in width south of Friendsville, but widens to well over 500 feet in the lower 20 miles or so of its course. The Youghiogheny drains about 397 square miles of Garrett County, or about 75 percent of the total area.

In 1949 the Youghiogheny River Reservoir dam was completed at Confluence, Pa. Waters of the reservoir have been impounded in the river

¹ The Report of the President's Water Resources Policy Commission. op. cit. p. 586.

valley as far south as Selbysport, about 3 miles below Friendsville. This reservoir is part of the Ohio River Basin Flood Control plan and was constructed primarily for that purpose, as well as for low-water regulation. It is also planned for future hydroelectric power production, and has a storage capacity of 250,000 acre-feet. In 1942, preliminary to construction of the reservoir, the Confluence and Oakland Railroad, which had served Friendsville and the northwestern corner of Garrett County since 1890, was purchased by the Federal Government for \$306,000 and removed. Several small-scale coal mines in the Friendsville area ceased operations after 1942, apparently because they could not find other means of transportation for their product. From about 1890 to 1915 the Confluence and Oakland Railroad, originally planned to extend to the main line of the Baltimore and Ohio Railroad at Oakland, served as an outlet for large timber operations in the Lower Youghiogheny Valley of Garrett County, but this activity had declined greatly in the interim. However, after 1942 Garrett County lost the tax revenue on the railroad which had an assessed value of about \$90,000. In addition, most of the fertile valley loam in the Youghiogheny Valley below Friendsville is now covered by the reservoir. Several residents and property owners along the reservoir have summer houses, and plans have been made to develop recreational facilities in the area for public use.

In 1925 the Pennsylvania Electric Company built a dam on Deep Creek, one of the tributaries of the Youghiogheny in Garrett County. The dam is located about 2 miles northeast of Swallow Falls and about 6 miles north of Oakland. It is of the earth-filled type, about 250 feet wide and 120 feet high at the face. Waters of the lake cover about 4,800 acres in the valley of Deep Creek and several of its tributaries.

Active storage capacity of Deep Creek Lake is about 80,000 acre-feet. A tunnel 1-1/2 miles long leads northwest to the surge tanks and penstocks on the right bank of the Youghiogheny above the power house, which is located on a terrace along the river. Here a 400-foot head of water is maintained. Installed capacity is 19,200 kilowatts, and average annual energy transformed is about 28,000,000 kilowatt hours. All the electric power is carried by a transmission line to the company's regional station in Pennsylvania. Future plans call for expansion of the Sang Run Power Plant to an ultimate installed capacity of 69,000 kilowatts, with an expected annual energy of 162,000,000 kilowatt hours. The projected plan includes construction of another power plant at Swallow Falls above the present plant on the Youghiogheny with a capacity of 24,000 kilowatts, and an annual output of 57,400,000 kilowatt hours.¹

Undoubtedly many thousands of gallons of acid mine water are discharged into the Youghiogheny or its tributaries daily. The town of Oakland discharges at least 15,000 gallons of untreated sewage into the Youghiogheny daily, while Deer Park and Mt. Lake Park use the Little Youghiogheny for their untreated sewage.²

Underground Waters

Nearly all of the water for drinking and domestic use in Garrett County is obtained from relatively shallow, drilled wells or from springs, which are fairly numerous in most parts of the County. The town of Oakland gets its water supply from four wells with depths of 150, 165, 200,

1 Report of the President's Water Resources Policy Commission. op. cit. p. 651.

2 Report of the Water Resources Commission of Maryland, 1933, pp. 55-56.

and 250 feet, located on the northwestern edge of town. Water from these wells is pumped by electricity into the large water-storage tanks on Crook Crest, a hill about 3,000 feet high, 600 feet above the town. Gravity feed provides water for the town's domestic and fire mains, and average daily consumption is about 15,000 gallons. There are also several private wells owned by processing plants, one of which has a daily capacity of more than 46,000 gallons.

In and around Grantsville water for domestic and industrial use is obtained from 10 or more drilled wells varying in depth from 50 to 500 or more feet. In recent years three new wells have been drilled by milk and meat processing plants in Grantsville. These have daily capacities of 13,500, 15,000 and 33,000 gallons.

Mountain Lake Park and the adjacent town of Loch Lynn depend on six large springs for their water supply. The size of these springs is indicated by an estimated daily consumption of over 100,000 gallons for both domestic and industrial use in these two towns. Deer Park uses water from drilled wells and springs. One of the wells, dug in 1890 by the Baltimore and Ohio Railroad for its summer hotel at Deer Park, is more than 2,000 feet deep.

Friendsville's water supply is also furnished by two large springs with daily capacity of about 25,000 gallons. Other towns like Accident, Kitzmiller, and Bloomington use a combination of springs and drilled wells. Several wells in Accident reach water at from 50 to 90 feet below the surface, and in some the water rises to within 3 or 5 feet of the top.

The broken topography of Garrett County with exposed outcrops of sedimentary rocks of varying imperviousness, together with the heavy

rainfall, furnish nearly all parts of the County with numerous springs which are used for farm water supplies. Drilled or dug wells of 30 or 40 feet or less can usually be depended upon to yield sufficient water, although there is a tendency for both springs and wells to subside markedly in drier summers and even dry up temporarily.

Since 1945 all drilling of wells except for domestic or farm use is licensed by the State Department of Geology, Mines and Water Resources. Not only is use of ground water regulated, but core samples from drillings may be requested for study by the Department.

Since there are no large industrial or manufacturing plants in the County, little in the way of this type of water pollution originates there. As already stated, however, untreated sewage of towns in the County and in other parts of the adjoining area is discharged into major streams, especially the Upper Potomac Valley. The greatest and most difficult pollution problem is caused by acid mine drainage into the Potomac, Youghiogheny, and Casselman Rivers from coal mines both active and abandoned in those basins. Acid pollution increases the corrosiveness and hardness of stream waters. It damages water supply systems, power plants, navigation structures and equipment, and destroys aquatic life. Domestic and industrial organic pollution control has been handicapped since there is little incentive to construct treatment plants when stream waters would still be unsuitable because of acid pollution. Corrective action for abandoned mines is a serious financial and administrative problem since mined areas frequently are no longer under control of responsible coal operators.¹

¹ Report of the President's Water Resources Policy Commission. op. cit. p. 271.

No satisfactory and economical method for reducing pollution from acid mine waters is in operation, either in Maryland or nearby states. Pennsylvania has spent over 2.5 million dollars on basic research and mine sealing operations since World War II. The coal industry has contributed some financial aid to such basic research, but probably not enough in view of the seriousness of the problem and its present and potential effects on the economy of regions which are now important markets for coal.¹ The Federal Bureau of Mines has proposed a research program which would include the following objectives:¹

1. Methods for recovery of pyrite, the source of the acid.
2. Plans for sealing worked-out sections of operating mines.
3. Methods for mechanical separation of sludge from coal-washing waters.
4. Systems for diversion of surface waters from stripping operations.
5. Possibilities of reworking low-grade coal waste to recover merchantable coal and sulphur.
6. Methods for storing mine refuse from underground mines and overburden from stripping operations which would reduce acid formation.

At present the problem of sealing worked-out seams in operating mines, of sealing openings in abandoned mines, and of getting cooperation from operators of strip mines is being considered by inspectors and other officials of the Maryland Bureau of Mines. Pollution of stream waters is also a concern of the State Department of Health, which takes samples from all bodies of water for study in its efforts to guard against contamination. However, except for voluntary cooperation with

1 Ibid.

the Bureau of Mine officials on the part of some mine operators in sealing a relatively few openings, little or none of this type of pollution abatement has been carried out in Garrett County.

The importance of such artificial bodies of water as Deep Creek Lake and of those at Herrington Manor in Swallow Falls State Forest, at New Germany in Savage River State Forest, and of Lake Cunningham in the Pleasant Valley recreational area, as well as of the streams of Garrett County used for recreational activities is discussed in Chapter VIII.

CHAPTER VI

SOIL RESOURCES

Soil may be considered the basic natural resource upon which the people of Garrett County depend, either directly or indirectly, for their livelihood. Together with the other physical factors or conditions, soils determine in large degree the utilization of land. These physical factors do not operate separately and in considering any one in some detail the influence of the others must always be recognized. They can be classified into four groups: 1. Topography, or land form; the configuration of the surface, degree and direction of slope, roughness or smoothness of the land. 2. Soils, including physical structure and chemical and bacteriological characteristics. 3. Moisture conditions; rainfall, snowfall, hail, fog, humidity, and rate of evaporation. 4. Temperature conditions; particularly growing season temperatures and dates of latest spring and earliest fall frosts.

In addition, there are two other factors, also physical but of different character: location and size.

While moisture and temperature conditions relate primarily to the atmosphere, topographic and soil conditions have to do primarily with the surface of the land, or lithosphere. The climatic factors, moisture and temperature conditions, influence particularly the development of the general system of farming--dairying, livestock raising, mixed farming, etc., whereas the edaphic factors of slope and soil more often determine the utilization of a particular piece of land or part of a farm, whether it should be used for crops, pasture, or forest, and, if suitable for crops, whether for wheat, potatoes, corn, etc.

Everywhere over the surface of Garrett County, covering hills and valleys alike, is a coating of soil, varying in depth, and grading into the underlying parent material which, in turn, rests directly upon the surface of rocks. This covering of soil supports a growth of varying species of trees and plants, more or less abundant, depending on conditions surrounding the soil and present within the soil itself. In the valleys the soil is relatively deep and productive, but along the upper slopes and crests it becomes shallow and stony, furnishing scant nourishment to only the hardiest trees and plants.

In places the soil has a deep reddish color similar to that of the underlying beds of shale and sandstone. Elsewhere the dark grayish or brownish clay soils seem to show little relationship to the subsurface material; while on the mountain tops the soils consist of a mass of broken gray sandstone fragments mixed with relatively small amounts of sand and clay.

Whatever its characteristics, it is this soil covering with which the farmer or other user of land must deal. It determines to a great extent the type of land utilization which will ultimately be adopted; and such conditions as texture, structure, composition, slope, fertility, and potential productiveness become more important as population increases or decreases, as knowledge and practices of agriculture advance, transportation facilities are improved, and supply of capital and labor is adjusted; in short, as agriculture and forestry become more highly organized and commercialized.

Origin

Soils formed from the underlying rocks in place are called residual soils, and it is to this class that by far the greater part of the soils

found in Garrett County belong. Thus, when soils over the most important agricultural areas of the County are examined--as, for example, in the wide valley that lies southwest of Deep Creek Lake and extends beyond Oakland and Gortner to Red House--it is found that they consist of particles of sand, silt, and clay, bits of rocks, and partially decomposed organic matter, and of a variable amount of water with various substances in solution. It can also be seen that in such areas the soil grades into broken and partially decomposed rocks, and these in turn grade into solid rock. Furthermore, in many parts of the County, the color of the soil and of the fresh rock is the same, or bits of rock mingled with the soil are similar in appearance and composition to the rock found several feet below the surface. In any of these cases it appears that the soil has originated from reduction by weathering of the underlying rock mass.

Thus it can be seen that a great number of forces and agencies are constantly in action in the development of a covering soil upon the rocks. Whether the soil covering will become deeper depends on the forces which carry away the loosened rock particles. On the steep slopes of Backbone or Savage Mountains, transporting agents such as rain and the slow creeping of soil particles down the slopes by gravity are so powerful that the soil covering is very shallow or completely absent. In the valleys and on the gentler slopes, however, the soils are but little disturbed and accumulate to a relatively greater depth. Along stream bottoms, which are flooded in the late fall or early spring, the soil deposit consists almost altogether of materials brought down from slopes and hillsides by rains and water erosion. Such soils are called alluvial soils, and constitute only a small portion of those in Garrett County. They are best exemplified by the limited narrow belts along the larger streams,

such as around Friendsville, south of Grantsville on the Casselman, and in places along the North Branch of the Potomac. A third kind of soil, based on its situation, would be that which has been carried but a short distance down slopes by soil creep; and although much of the County is in slopes of 20 percent or more, perhaps 50 percent or more of the soil might be so classified. However, such areas are not within the important agricultural areas and are mostly in forested lands.

Fertility

Productiveness of a soil depends upon the soil itself, as well as upon external conditions around. The depth, texture, structure, and other characteristics must be considered. Shallow soils are seldom productive, while those composed largely of coarse sand are not inherently fertile. Essential elements of plant food such as potash, nitrogen, phosphoric acid, lime, and other substances have to be present in the soil in such condition that growing plants can use them. The texture of the soil determines largely its capacity for holding water; if too porous it may be "droughty" and crops or vegetation in it will suffer in spells of dry weather, or if the soil is composed of fine silty or clay particles, drainage may be obstructed and cultivation and the creation of root systems difficult.

The position of soil with reference to large bodies of water, elevation above sea level, and to prevailing winds, must be considered in the relationship of soil to crop production.

Finally, even though a soil may be rich and productive, no important agricultural development can take place upon it when its position with reference to market is unfavorable and transportation facilities are limited.

Soil Types

There are comparatively few types of soil in Garrett County. Stony silt loams and gravelly silt loams make up approximately 78 percent of soils of all types. As previously stated, the soils are mainly residual, derived from weathering of shales and sandstones and, to a much smaller extent, from limestones. These are all sedimentary rocks, and the process by which soils are derived from them is comparatively simple. Cementing materials are dissolved, setting free particles of sand and silt which, mingling with partially decomposed organic matter, form soils.

That soils of Garrett County are young, at least over most of the area, is indicated by the fact that little or no definite profile has been developed. Apparently erosion has largely kept pace with disintegration and weathering of rocks, and as a result only a relatively thin mantle of soils has accumulated. In a few places a well-developed, heavier subsoil layer occurs, but usually decaying rock lies directly under the surface layer, or "A" horizon.

Although a number of different rocks have weathered into similar soil types, the soils preserve many features of their parent rocks. For example, soils derived from coarse, gray sandstones have a close resemblance to one another, while soils derived from two red shale formations are also similar in many respects.

All of the soils are prevailing low in organic matter, as might be expected in soils developed under forest vegetation and conditions, where decaying vegetation rests on a thin layer of mold on the surface and does not become incorporated with the mineral part of the soil as happens under grassland conditions. All of the soils are normally slightly acid and generally benefit by the application of lime. Even soils developed over thin bands of limestone have no accumulation of

calcium carbonate because of the cool, humid climate, where precipitation is in excess of evaporation and movement of moisture is either downward or in the form of run-off.

Nearly all soil types in Garrett County contain varying proportions of small angular rock fragments and gravel, and in many places stones varying in size from a few inches to several feet are scattered over the surface and distributed throughout the soil section. In many places broken bedrock comes within 2 or 3 feet of the surface, and on some ridges and steeper slopes it either outcrops or carries only a very thin covering of soil. As stated previously, nearly all soils in the area have gravel and stone in sufficient quantities to be classified as gravelly and stony types. There are, however, a few areas of upland silt loam and silty clay loam practically free from rock fragments.

On top of Big Savage Mountain and in a few other places on the highest ridges, there are small areas of podsol soil. This soil has a profile, in its natural state, consisting of a dark-colored surface layer mostly of organic matter; next a light grayish layer a few inches thick of coarse sandy appearance; then a layer of dark-brown, fluffy, friable material from 1 to 4 inches thick; and finally a yellowish-brown layer that grades at from 12 to 24 inches down, into the disintegrated sandstone bedrock. Where this soil has been disturbed, the profile in the first three layers has been changed and podsol characteristics destroyed.

The upland soils are derived from weathering in place of underlying rocks. There are extensive areas of alternating red shale and sandstone and yellowish-green shale. Other rocks are mainly gray massive sandstones, sandy shales, and massive light-gray conglomerate, with thin-bedded sandstone and narrow belts of red shale. Along some stream beds

there are minor outcroppings of limestone, but these apparently have relatively little effect on soils of the County as a whole.

Although the soils or covering of weathered material over the bed-rock is comparatively thin, as is typical in a humid, mountainous, forested area where erosion at times is as active as weathering, at present there is less surface washing or serious erosion than might be expected. This is more or less due to the checking effect of forest growth, surface stones, and of keeping much of the cleared land in permanent pasture or sown to hay crops. During the winter the soil is frozen much of the time and covered with snow, and leaching and erosion are kept in check by these conditions.

Soil materials derived from various underlying rocks of Garrett County have given rise to soils that differ in color, texture, structure, and gravel and rock content. For purposes of this study, however, they have been grouped by texture or the relative proportions of sand, silt, or clay in the surface soil, as well as by the presence or absence of gravel and stones.

Upland silt loams. Upland silt loams, although covering only about 19,800 acres, or 4.5 percent of the total land area in Garrett County, are generally the most inherently productive and responsive to proper management of any of the upland soils. They have developed from grayish-brown silicious shales, fine-grain sandstones, and red shales. Those developed from the first two parent materials are typically brownish-yellow or grayish-brown to a depth of 4 or 6 inches, and are underlain by a yellowish-brown subsoil of compact, heavy silt or silty clay loam 12 to 18 inches thick. Largest areas of these brownish silt loams are north and south of Grantsville and east and northeast of Oakland and Deer Park.

Along both sides of the central valley or Deer Park anticline are upland silt loams which have developed from bands of red shale and fine-grained sandstones. These soils are typically reddish-brown to a depth of 6 or 8 inches and are underlain to a depth of 2 or 2½ feet by Indian-red subsoils of friable, silty clay loam or, in places, silty clays.

The surface of areas covered by upland silt loams varies from quite level to gently rolling. The topsoil is relatively free of rock fragments and gravel and cultivates easily; about 80 percent is cleared and largely in cropland or improved pasture land. The greatest need is to increase organic material and improve tilth or physical condition. Legumes such as clover, vetch, and cowpeas grow well on these silt loams, but Timothy and clover are the principal hay and pasture varieties grown at present. There is also a need for greater use of lime, manure, and commercial fertilizers, especially phosphates. Yields of corn, oats, wheat, buckwheat, and hay are above average for Garrett County, and these silt loams support some of the best farms in the Oakland and Grantsville areas.

Upland silty clay loams. There are about 11,000 acres, 2.6 percent of the total area, of silty clay loam in Garrett County. The largest area of this is south and southwest of Oakland as far as Red House on Route 219. The surface soil is a brownish-yellow or light brown silty clay loam from 5 to 7 inches deep. The subsoil is yellow or brownish-yellow silty clay or silty clay loam to a depth of 30 inches or so. The lower part of the subsoil is often somewhat mottled and streaked with gray and brown and is a silty clay or clay. The surface soil has a somewhat heavy texture and is improved by increasing the content of organic matter. Then, too, because of the tendency toward compactness

these silty clay loams retain considerable moisture and remain "cold" late in spring. Unless the supply of organic matter is maintained, yields decline, and best results have been obtained by turning under large quantities of manure and green-manure crops. Leguminous crops, such as clover, vetch, and cowpeas, and applications of lime have also proved beneficial in improving and maintaining the physical condition of these silty clay loams. Corn, oats, wheat, buckwheat, potatoes, and clover and timothy hay yield better than average for the County when this soil is properly handled. The surface is comparatively smooth, with generally low, rounded hills, and gentle slopes; and about 90 percent of the land is cleared and in cropland or improved pasture. Some of the best general and dairy farms in Garrett County are found on silty clay loams in the Gortner area and especially east and south of Oakland in Pleasant Valley.

Upland gravelly silt loams. These cover about 145,000 acres, or about 1/3 of the land in Garrett County. They are the most typical and extensive agricultural soils in all of the agricultural areas, especially those in the northern part of the County. Most prevalent is a grayish-yellow or light brown silt loam, about 6 or 8 inches thick, underlain by a compact, heavy silt loam. The color of the subsoil is brownish-yellow or golden yellow and the texture becomes heavier with depth until it grades into a very heavy silt loam or silty clay loam. Considerable gravel and small fragments of shale and sandstone are scattered over the surface and mixed with the soil and subsoil. Usually, however, this gravel and the fragments of rock do not interfere with cultivation. The surface is rolling to steeply rolling, but generally smooth, and about 70 percent is cleared and under cultivation. Yields of most of the

staple crops grown in the County are usually moderate; but can be increased by relatively heavy applications of fertilizer, lime, and especially by growing leguminous crops to increase the amount of organic material which is naturally low. Oats, buckwheat, potatoes, and clover and timothy hay are usually more productive than corn and wheat on these light-brown gravelly silt loams. Largest continuous areas are found in the Bittering and Grantsville areas of the Casselman syncline; in the Accident-Cove area of the Accident anticline; in the Friendsville area of the northwestern part of the County; and in the Avilton and Johnsons districts of the northeast. There are also extensive areas in the central valley from Deer Park southwestward to Red House and beyond.

Closely allied in texture to the gravelly silt loam described above is a reddish-brown gravelly silt loam 5 to 7 inches deep. The subsoil is an Indian-red silty clay loam of rather firm but brittle structure, resting at about 30 or 35 inches down on red shale and sandstone. Scattered over the surface and mixed with the soil and subsoil are angular fragments of red sandstone and shale, generally becoming more numerous with depth. Largest areas of this reddish gravelly silt loam are in the vicinity of Accident and Cove, and along the eastern side of the central valley northeast of Swanton. There are also long belts of this soil along the eastern and western sides of the central valley in the Avilton and Johnsons districts of the northeast. The surface consists of low, rolling hills and in places slopes become excessively steep for cultivation. The more level areas occupied by this reddish gravelly silt loam, as in the Accident-Cove farming district, have some of the best farms in the County. About 70 or 75 percent of the land is cleared on these more level areas and yields, especially of oats, buckwheat, and potatoes, are good. Corn, wheat, and hay crops are materially improved with applica-

tions of phosphate and nitrates and where legumes are included in the cropping system to increase the organic matter.

Stony silt loams. These are most prevalent of all the soils in Garrett County, occupying about 187,000 acres, or 44 percent of the total area. They occur in long belts, especially on the eastern slopes of Big Backbone Mountain; along the slopes of Big Savage, Meadow, and Negro Mountains; the highly dissected lands of the middle Savage River Valley; along and around Winding Ridge in the northwestern part of the County, and in the Youghiogheny River Valley. The surface layer consists of a yellowish-brown to grayish-yellow silt loam 6 to 8 inches deep. This is underlain by a pale yellow to yellowish-brown heavy silt loam to silty clay loam. Fragments of sandstone, some of them large, are scattered over the surface and mixed with the soil and subsoil. In many places the coarse material is so abundant that even if cultivation were attempted, it would be almost impossible to remove the larger fragments without excessive use of labor. Even the less steeply sloping areas contain so many large fragments of sandstone as to prevent their use for crops if not cleared. The surface is strongly rolling to steep, to hilly, and even mountainous; and large fragments of sandstone and shale and boulders become more numerous toward the upper margin. Only small patches of this stony, silt loam are now cleared and provide only fair pasture for sheep or other livestock. Over 90 percent is in woodland and much of this land is now in state forests. Because of the high degree of slope and the prevalence of large rock fragments and boulders, the only practical use of the land is for forestry and in connection with the recreational resources of the County. The forest growth is a mixture of oak, chestnut, maple, ash, walnut, hickory, beech, and some white pine and hemlock.

There is usually a dense undergrowth of blackberry, huckleberry, and other shrubs. The use of this land for timber resources depends primarily on the varying character of the forest growth and on accessibility.

Stony sandy loams. These occupy about 15,500 acres, or 3.6 percent, and are found mostly along the tops of ridges, as along the crest of the northern half of Big Backbone, and in places along the crest of Meadow Mountain, and particularly Negro Mountain. The surface soil is very shallow, with only 3 or 4 inches of brownish-gray to yellowish-brown, medium sandy loam; and is underlain by a brownish-yellow sandy loam subsoil, which contains varying amounts of quartz gravel. Generally disintegrated rock is reached within 2 feet or less of the surface. Over the surface and mixed with the soil are numerous fragments of gray sandstone and conglomerate; and in many places huge boulders lie upon, or are partly buried in, the surface layer.

Because of its rough, stony character, this soil has little or no value for agriculture. Not more than 5 percent has ever been cleared, because of the difficulty of removing stumps, underbrush, and the large quantity of stones and boulders. Most of it is covered with a mixture of oak, chestnut, locust, maple, hemlock, and pine, and with a dense undergrowth of fern, huckleberry and mountain laurel. Its value for forestry depends largely on the character of the forest growth and degree of accessibility.

Rough stony land. About 30,000 acres, or 7.0 percent, of land in Garrett County can be classified as rough stony land. It includes the more rugged crests and steepest slopes which are either too steep or too completely covered with outcropping ledges or large rock fragments to be of any agricultural value. The surface soil is generally a grayish-

yellow sandy loam and very shallow. In places there is enough soil material to support a scant growth of native grasses, but where rocks are not too numerous to prevent tree growth, by far the best use of this land is for forestry. This rough stony land is derived mostly from massive sandstone and conglomerate rocks. It occurs principally along Backbone and Big Savage Mountains, along Meadow Mountain, and in scattered areas in the west-central part of the County. The forest growth consists mainly of oak, chestnut oak, and chestnut, with some pine, hemlock, beech, maple, hickory, walnut, ash, and hazel. Some of it has been grazed by sheep, but aside from the forest cover and the underlying coal in the upper Potomac Valley, it has little value.

Glade and valley clay loams. About 11,000 acres of glades and river valleys have a silty clay loam. This acreage is 2.6 percent of the total land in Garrett County. The surface soil is a dark-gray to grayish-brown heavy silty clay loam about 6 to 8 inches deep. The upper part of the subsoil is a gray, silty, clay loam usually mottled with streaks of brown, and about 20 inches below the surface there is a mottled light-gray and brownish-yellow heavy, silty, clay loam. In many places the material is saturated with water at a depth of about 30 inches. In places where considerable organic material has accumulated, the surface soil ranges from very dark gray to almost black. One of the most extensive strips of this valley clay loam is along the Little Youghiogheny River and the Baltimore and Ohio Railroad from Deer Park southwest through Mt. Lake Park and northwest through Oakland. The existing glades are best represented on both sides of the road from Deep Creek Lake northeastward toward Bittering in the southern part of the Casselman syncline between the converging ridges of Negro and Meadow Mountains.

The areas of glade and valley clay loams are nearly flat, but in places are broken by meandering streams which divide into numerous channels as along Cherry Creek south of Cortner on Route 219. Marshy and boggy places are common along these small streams or where seepage water comes out of the sides of adjacent hills. Although a small part of this marsh land has been drained by straightening stream courses and ditching, most of it has not been improved. Natural vegetation on these poorly drained areas consists of alder, coarse grass, and ferns; and, along some of the streams, of willow, bullrush, and similar plants. One of the largest areas is now covered by the waters of Deep Creek Lake. Very little of the so-called "glade-land" or glades, has been cleared, drained and used for cultivated crops, and most of what has been cleared is used for pasture. In places, such as along the Little Youghiogheny, south and southeast of Oakland, where the glady land has been cleared and drained, corn and timothy hay yields are fair. However, it is better adapted to vegetable crops such as cabbage, celery, and onion, and makes excellent pasture, especially during dry summers when better drained upland pastures may be droughty. The use of these glades and stream valley clay loams for cultivated crops depends primarily on thorough drainage, and heavy applications of lime to correct acidity. The narrow belts in which it usually occurs, however, limit its use.

Valley and flood plain loams. On the first bottoms or floodplains of some of the larger streams in Garrett County are narrow belts of alluvial loams. The surface soil is grayish to reddish brown loam 6 to 8 inches thick. This is underlain by a reddish or reddish-brown heavy silt loam 14 to 16 inches deep, resting on a silty clay loam. The surface is nearly flat in most places, rising a little immediately along

streams. These belts generally lie from 5 to 20 feet above the normal level of the stream, but in other places are high enough to have the appearance of terraces. This is especially true along the Youghiogheny River in the vicinity of Friendsville. North of that town similar terrace-like areas are now covered by the Youghiogheny reservoir. Along the North Branch of the Casselman River from one to three miles southwest of Grantsville are similar belts of this flood-plain loam. Other belts are located along the west bank of the Casselman River east and northeast of Grantsville. They also occur along the middle Savage River, west of Big Savage Mountain, and along the North Branch of the Potomac between Kitzmillersville and Bloomington. Unfortunately, these flood-plain loams are very limited in Garrett County, now occupying only about 500 acres in all along these major streams. These soils are easily cultivated and can be prepared for excellent seed beds. These features, together with their natural productiveness, make them one of the most desirable types in the County. Corn and hay, especially, as well as clover, vetches, and other legumes produce excellent crops. Since these flood-plain strips receive deposits of alluvial material almost every year, field crops have been grown profitably without the use of fertilizers or lime. However, where they are used for vegetables year after year, heavy applications of fertilizers have to be used.

Summary

From a comparison of the Soils map (Fig. G) with that of Land Use Areas (Fig. K) it can be seen that the important agricultural districts of Garrett County are located on the most extensive of the silt loams, silty clay loams, and gravelly silt loams. These are not only the most important soils for crop agriculture, but also occupy the most level and

least steeply rolling lands in the County. The great contrast, for example, in the Central Valley or Deer Park anticline is especially noticeable. The Oakland general farming and dairying area extends from northeast of Deep Creek Lake southwestward through Deer Park, Mountain Lake Park, Oakland, Cortner, and Red House to the West Virginia line. In this valley between Big Backbone in the east and Hoop Pole Ridge and its southwestern extension on the west, is found the largest continuous farming area in the County. An examination of the Soils map (Fig. G) will show that the northern limit of the Oakland farming district coincides quite closely with the boundary between the gravelly silt loams and the stony silt loams to the east of Deep Creek Lake. The northeastern part of the Central Valley includes the Avilton-Finzel mixed and part-time farming area. Its boundaries also coincide quite well with those of the gravelly silt loams in that area. Between the Oakland area on the southwest and the Avilton-Finzel area on the northeast is an area of stony silt loam including rough, highly dissected valleys of the middle Savage River and its tributaries in parts of The Elbow, Bloomington, Bittering, and Grantsville districts (see map of Minor Civil Divisions, Fig. D). The great contrasts in farm characteristics, number and value of farms, use of farm facilities, proportion of farmland used for crops, all show remarkably strong correlation, as is discussed later.

There is also a close relationship in the amount of mountainous, forested land and in the areas included in State forests with the distribution of soil types in Garrett County. A comparison of the areas covered by stony silt loam; stony sandy loam; and rough stony land as shown on the Soils map (Fig. G), with the maps of Land Use Areas (Fig. K) and of Vegetation (Fig. H) and State Forests (Fig. J) gives further indication of corresponding patterns.

In the Accident-Cove general farming, livestock and dairying area there is also a predominance of upland gravelly silt loam. Similar conditions are found in the Friendsville general farming area in the lower Youghiogheny syncline in the northwestern corner of the County, where lands occupied by farms and used for crops coincide quite closely with the areas of silt loams and gravelly silt loams.

Of particular interest is the "White Church" beef cattle grazing area shown on the Land Use Areas map (Fig.K) in the southeastern part of the County, east of Big Backbone Mountain. Here extensive "pockets" of gravelly silt loams and valley clay loams have provided pasture and feed crops in stream valleys and on more level lands since the days of early agriculture in Garrett County. This is Ryan's Glade area where Israel Thomson had a large cattle farm almost a century ago during the building of the Baltimore and Ohio Railroad across the County.

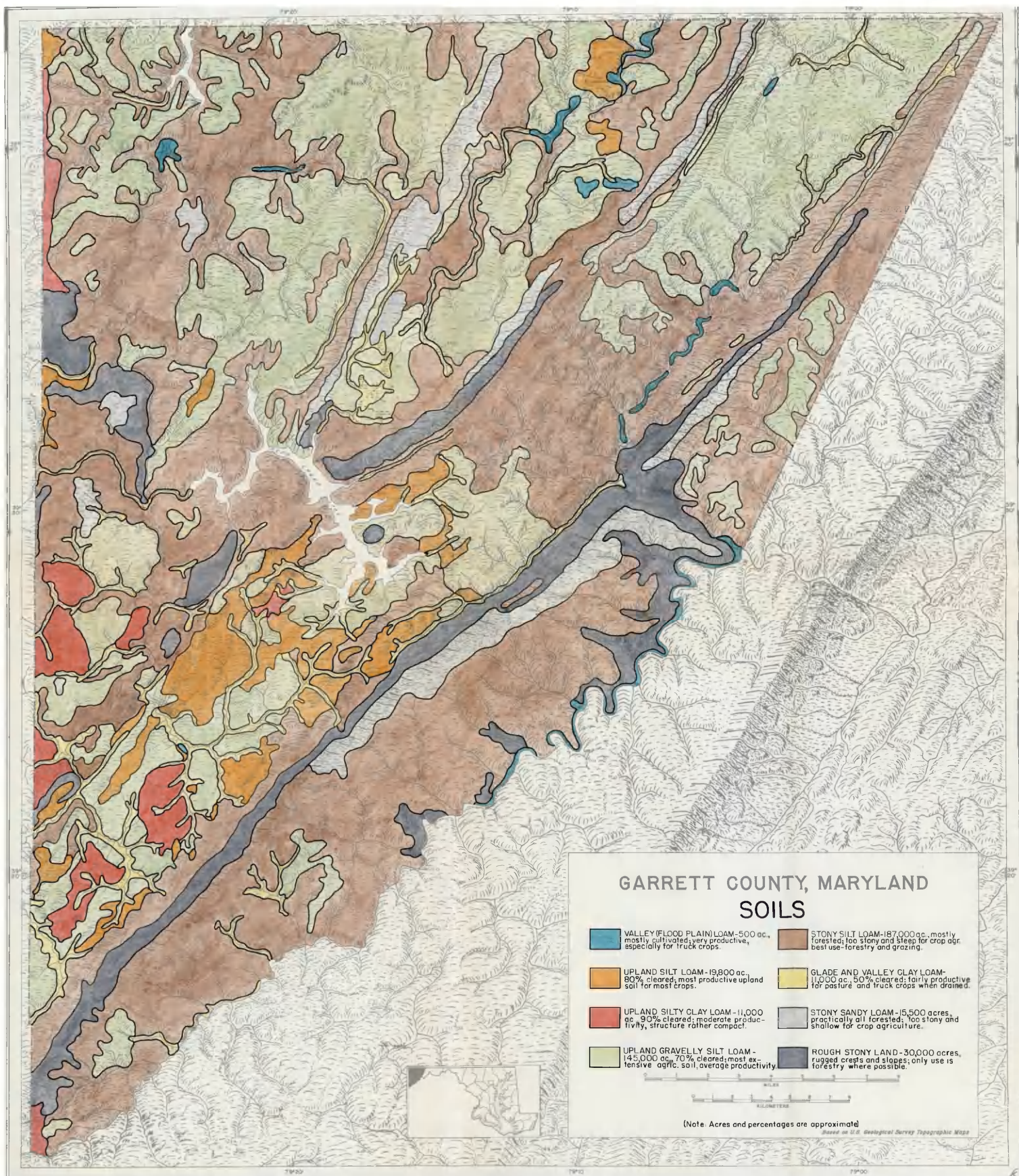


Figure G.

CHAPTER VII

FOREST RESOURCES

Nature and Original Extent

Prior to settlement the greater portion of Garrett County, probably over 90 percent, was covered by an almost unbroken forest, although scattered areas of glade, swamp, and bare rock were unsuited for tree growth. Since forests of Garrett County have been modified by more than a century of exploitation and by many destructive fires, it is difficult to describe their original condition.

Although the exact proportions are not recorded, at least 65 percent of the virgin stands were coniferous trees such as northern white pine (Pinus strobus), pitch pine (Pinus rigida), eastern hemlock (Tsuga canadensis), and red spruce (Picea rubra). Among the hardwoods were a wide variety of commercially valuable species, such as white and red oak (Quercus alba and Q. rubra), sugar maple (Acer saccharophorum), basswood (Tilia americana), shagbark hickory (Carya ovata), yellow birch (Betula lutea), and beech (Fagus grandifolia).

The general character and composition of undisturbed virgin forests usually remains unaltered over long periods. As a result of intensive lumbering practices, however, the nature of the forest cover was changed relatively rapidly. Frequently all or most of the desirable species were culled out, leaving only inferior kinds to reproduce. Practically all of Garrett County's forest area has been culled over at least once, and much of it several times. Where land has been cleared for agricultural

use and later abandoned, changes in the character of the soils permit or foster growth of species to which it was not particularly adapted originally. Chance re-seeding of cleared and abandoned land, destructive effects of forest fires, disease, and insect pests have all been factors in altering the composition of the forest covering.

The various softwood species, formerly important constituents of Garrett County's forests, have decreased markedly in relative abundance. Hardwood forests have been pretty well stripped of the most desirable trees; the few remaining are generally scattered.

Present Distribution

Whereas the original occurrence of forests in Garrett County resulted from climatic and soil conditions which fostered tree growth, the present extent of forest land has been determined by a combination of physical and economic factors. Since settlement of the County, forests have represented only one of several forms of land utilization, and areas now devoted to wood land are those which are not suitable or not needed for other purposes, such as crops, pasture, homes, villages, lakes, reservoirs, or rights of way for roads, railroads, and power lines.

In localities where conditions are comparatively favorable for crop agriculture, forested land is generally confined--as in the Oakland district--to rather limited areas. (See Soils, Vegetation, and Land Use maps (Figs. G, H, and K.) In other districts, such as on ridges and the upper slopes of Backbone and Negro Mountains, and on the highly dissected lands of the middle Savage and Youghiogheny River Valleys, conditions of topography, soil, and slope offer little encouragement to farming, and forests are frequently found in continuous tracts over large areas.

Several other factors enter into the competitive relationships between forests and other forms of land use. These include increase or decrease in population, development of more efficient transportation facilities, adoption of more intensive farming practices, demand for forest products, and development of programs for conservation, public works, recreation, and other purposes. Since the effects of these factors vary considerably in magnitude from place to place and from time to time, it is apparent that the proportion of land devoted to forests will also show similar differences.

Efforts of early settlers in Garrett County were directed primarily toward clearing away enough virgin forest to provide farm land for their slowly expanding needs. In order to transform wood land into crop land as rapidly as possible, trees were girdled or stripped of their bark and left to die, while others were arduously cut and burned. The clearing for agricultural purposes, however, contributed little to the exploitation of forest resources. Most of the commercial forest utilization was characterized by large-scale exploitation on the part of lumbermen. This took place mostly after 1870, although by that time about 35 percent of the forest area had been cleared for agricultural purposes.

Lumber companies reduced large parts of the virgin forests within a very brief period, especially after construction of the Baltimore and Ohio Railroad through the southern part of the County, and of the Confluence and Oakland Railroad in the northwestern part. They gave no consideration to possibilities of reforestation and continuous productivity, and since many cutting areas possessed little agricultural value, they were abandoned, and subsequent forest fires further reduced opportunities for satisfactory second growth.

Despite a century of extractive exploitation, forest resources of Garrett County show considerable recovery from the low point of greatest devastation. Favorable climatic conditions have fostered the maintenance of some kind of forest growth over most of the County. However, many areas that have been culled repeatedly, and others that were cut clean but have since reestablished young stands, are still in a depleted condition. Growing interest in the economic possibilities of intensive forest management is gradually being developed into a definite program to improve the character and quality of forest resources in Garrett County.

Types of Present Forests

The total forest area of Garrett County is about 296,000 acres, or 69.2 percent of total land surface. Of this total forest area about 65,000 acres are in farm wood lots, about 146,000 acres in other private holdings including some large tracts owned by mining, lumbering, and railroad interests, and approximately 75,000 acres in State-owned or leased forest areas. Of the area that is not in forests about 78,900 acres are in crop land, 72,500 acres in grass or permanent pasture, and about 9,450 acres are in use for roads, railroads, reservoirs, strip mines, and towns and villages.¹

Distribution of types of timber. A very few small tracts of virgin forests have survived in Garrett County, and even in the present condition of the forested land it is possible to observe differences in occurrence and distribution of species due primarily to topographic factors

1 Unpublished Data of the Soil Conservation Service.

and to the influence of soil or edaphic conditions.

On the gently rolling surfaces of the central valley extending northeast and southwest of Oakland and in more level parts of the northwestern or Friendsville area, there appear to be two types of forests. These two types occupy, respectively, silty loams and sandy loams. It would be difficult to discover whether these differences existed in the virgin forests, since most land in these two areas has been thoroughly lumbered over and is now occupied mostly by farm lands. However, the silty loams now carry a deciduous forest chiefly of white oak and black oak, while the sandier soils are characterized by a considerable percentage of pitch pine, as well as some white oak.

On steep, lower slopes of mountain ridges, where the soil is relatively shallow, or occurs in pockets in the rock, and along the rocky banks of larger streams, there is a coniferous forest type in which hemlock is or was the predominant species. In some localities these rocky slope forests and those of the lower, soil-covered slopes merge, resulting in a mixed deciduous and coniferous type, as at several places along the Casselman River south of Grantsville.

In relatively deep soils of the broad valleys and along some of the larger streams there were formerly pure stands of white pine. Although practically no pure stands of white pine are left, there are small tracts of white pine and black spruce.

In upland swamps of the County there are tracts of coniferous forest made up chiefly of black spruce with some hemlock and larch or tamarack. One of the most extensive of these lies along the road between Deep Creek Lake and Bittering. Another is located west of Swallow Falls along the West Virginia line, and a third near Finzel in the extreme

northeast corner of the County. Most of the boreal species which have their southern limit in Garrett County or nearby West Virginia, occur in or around these swamps, such as dwarf dogwood (Cornus canadensis), gold thread or canker root (Coptis trifolia), narrow-leaved gentian (Gentiana lineaus), and fake violet (Delibarda repens).

Approximately 293,000 acres of forest, about 99 percent of the existing wooded area of Garrett County, can be classified as cut-over or culled forests. (See Map, Fig. .) The best, in most cases all, of the commercially valuable timber on these lands was removed several decades ago. Present growth ranges from mountain laurel (Kalmia latifolia) and barren or scrub oak (Quercus ilicifolia) to some mature second- or third-growth stands. On these cut-over and culled lands species of varying size now predominate. Much of the soil of the cut-over areas is poor, shallow, and rocky, unsuited for any agricultural use except possibly poor pasture for sheep or goats.

The largest areas of cut-over and culled forests extend from north of Crellin and west of Oakland on both sides of the Youghiogheny River, and especially from Swallow Falls, to Friendsville. Another large area lies north of Swanton to the vicinity of Avilton in the Middle Savage River Valley. A third important area includes much of the eastern slopes of Big Backbone and Savage Mountains.

Slope forests. From a commercial point of view these are undoubtedly the most important forests, although they are only 2,000 or 3,000 acres in extent. Composition of slope forests varies between two extremes. On steep rocky slopes around Boiling Spring, 2 miles southeast of Deer Park on the west flank of Backbone Mountain, and around Swallow Falls, west of Deep Creek Lake in the Youghiogheny River Valley, there

are two small tracts of virgin hemlock forest. This type once was extensive along the banks of the Youghiogheny, Casselman, and Savage Rivers, and occurred in small areas at the heads of tributary streams. In its virgin state, hemlock reportedly formed from 75 to 90 percent of the stands. Thorough methods used in lumbering the original tracts apparently were extremely unfavorable to natural re-seeding of hemlock since there is generally little or no second-growth hemlock in these cut-over areas now.

The principal deciduous trees on rocky slopes are yellow birch, red maple, and sugar maple, while relatively minor species include beech, white oak, butter-nut, basswood, and sweet birch. In some parts of the rocky slope type of forests, particularly along streams, there are dense thickets of Rhododendron maximum. In other places the forest floor is almost clear of shrubs and is carpeted instead with small herbaceous plants, mosses, hepaticas or liverworts. In addition to rhododendron, mountain laurel is abundant in places. Another shrub found in this association is the hobble bush (Viburnum lantanoides). It is common in moister parts of remnant virgin forests, but is not found apparently elsewhere in the State. Red-berried elder (Sambucus racemosa) is common, and in pockets of deep soil prostrate yew (Taxus minor), with foliage resembling hemlock, is frequently found. Less common shrubs include American fly honeysuckle (Lonicera canadensis), and bush honeysuckle (L. Diervilla).

Infrequent in rocky slope forests, but apparently not growing elsewhere in the State are long-bracted green orchis (Habenaria bracteata), large round-leaved orchis (Habenaria orbiculata), and sharp-lobed liverleaf (Hepatica acutiloba). On fallen logs and in open places in the forest there is a thick growth of mosses, lichens, and hepaticas.

Elsewhere along the slopes of Backbone, Savage, and Negro Mountains, and on Roman Nose, particularly in the moist, richer coves are mature stands in which white oak is the most common species. The virgin forests of these slopes consisted predominantly of white oaks reaching heights of 125 to 150 feet, with clean boles often 100 feet tall. Although white oak is still the most common tree, occurring in varying percentages, it seldom if ever forms as much as half the stand, and few of these second-growth trees exceed 75 feet in height. Most common subordinate species, which are about equally represented, are basswood (Tilia americana), cucumber tree (Magnolia acuminata), shagbark hickory (Carya ovata), sugar maple, sweet birch (Betula lenta), and red oak. Relative abundance of these six species is the chief characteristic of "white oak" slope forests, and none is so common in any other habitat in the State.

Much less frequent on slopes are butter-nut (Juglans cinerea), scarlet oak (Quercus coccinea), chestnut oak (Q. montana), chestnut (Castanea dentata), wild black cherry (Prunus serotina), and pignut hickory (Carya glabra). Apparently chestnut oak and chestnut are much more common in ridge forests, and coniferous trees are rare except where conditions favor an occasional hemlock. Other less important species of slopes are striped maple (Acer pennsylvanicum), beech (Fagus grandifolia), blue beech (Carpinus caroliniana), mountain maple (Acer spicatum), black oak (Quercus velutina), and service berry (Amelanchier canadensis).

Most distinctive shrubs of the slope forest type are witch hazel (Hamamelis virginiana), wild hydrangea (Hydrangea arborescens), blue huckleberry (Vaccinium vacillans), alternate-leaved dogwood (Cornus alternifolia), arrow-wood (Virburnum acerifolium), rhododendron, and gooseberry (Ribes rotundifolium).

On the intermediate slopes, between the hemlock and white oak types of the slope forest where these two species were the most common, there is a sub-type with a mixed stand of hemlock and hardwoods. In other places, as along the slopes at Sang Run, on the Youghiogheny, and along Monroe Run, a tributary of the Savage River, the stands were almost pure chestnut before that species was killed by a blight about forty years ago. Predominant species are now sugar maple, basswood, red oak, birch, and beech. The mixed hemlock and hardwood sub-type was once quite extensive, occupying large belts on gentler slopes along streams. At present there are only three small representative tracts in Garrett County, two on the Casselman River and the other on Bear Creek east of Friendsville. Even these small stands have been partly destroyed and repeatedly injured by fires from adjacent lumbering operations, and little reproduction, especially of hemlock, can take place except by artificial planting. Formerly hemlock made up about one-third of the stand in these tracts, but since they were the most desirable species, the principal object of lumbering operations was their complete removal. Main hardwood of the sub-type is sugar maple, which makes up about 30 percent of the stand. Sugar groves are often found at present in the areas from which hemlock and other hardwoods, except the maple, have been removed.

Ridge forests. These occupy some 20,000 acres on benches and rocky crests of Backbone, Big Savage, Meadow, and Negro Mountains. Such habitats are poor in tree species, and from 75 to 90 percent of the second-growth forests are composed of three species: chestnut, chestnut oak, and red oak. Chestnut, which once made up about 50 percent of these ridge forests, has been completely destroyed by blight during the last forty years. Trees of secondary abundance and of economic value include

white oak, shagbark hickory, black oak, sweet birch, sassafras, cucumber tree, and basswood, although the last two are relatively uncommon.

In reality there is no sharp line between ridge and slope type forests, but rather a gradual change along the upper slopes from one to the other, as can be seen along Route 135 which leads up over Backbone Mountain from Bloomington to Swanton.

In many places along the crest of Backbone Mountain the mantle of soil overlying the sandstone is very thin, and sometimes the entire surface is composed of rock outcrops and large boulders. Stunted sweet birch and mountain ash grow in crevices; this appears to be a peculiar habitat for mountain ash which is generally found in glade or swamp forests. The presence in the rocky crests of snapweed or touch-me-not (Impatiens pallida) is also unusual, as it is commonly found only on flood-plains and moist meadows. It may be that small local springs serve as reservoirs of moisture which feeds out into the crevices and thus favors growth of moisture-loving plants in a habitat otherwise unsuited to them.

Many trees in the ridge forests are stunted and have short boles because of poor, shallow soils and small root systems and because of their exposed, wind-swept locations. Serious fires have repeatedly injured or killed many trees, or have destroyed the bark so that fungi and insects could enter the trunks and complete the destruction. These ridge-type forests have persisted because their generally poor quality makes them undesirable for commercial use, and also because of their inaccessability.

A few of the more characteristic shrubs of ridge-type forests in Garrett County include deerberry (Vaccinium staminum), black huckleberry

(Saxifraga baccata), blue huckleberry (Vaccinium vacillans), dogberry (Ribes cynosbati), and dotted hawthorn (Crataegus punctata).

Swamp forests. The swamp-type forest, occupying a total of only 600 or 700 acres, is best exemplified perhaps in Cranberry Swamp, between Little and Big Savage Mountains, near the northeastern corner of the County; in Wolf Swamp between New Germany and Piney Grove, Meadow Mountain and Red Ridge; in Pine Swamp along the West Virginia boundary and about four miles west of Swallow Falls; in the swampy areas between Hoop Pole Ridge and Roman Nose Mountain west of Route 219 between Oakland and Deep Creek Lake; and in the glades area between Meadow and Negro Mountains around the headwaters of Cherry Creek.

In each of these there are, or were until recently, small remnants of virgin forests or very old second-growth trees. This type is distinctly coniferous with black spruce or white pine the predominant species, and hemlock and larch the principal secondary trees. In some areas black spruce formed 60 to 75 percent of the stand, white pine and hemlock together about 15 or 20 percent, with larch or tamarack present only in parts of Pine Swamp and in the swamps west of Hoop Pole Ridge. Deciduous species include red maple, yellow birch, mountain ash, and black ash (Fraxinus nigra).

Areas of swamp forests surround and adjoin wetter, sedge-covered tracts along streams, and the "glades", or mountain meadows. The wetter portions of these swamps support a cover of herbaceous plants and alder brush, while drier portions contain spruce and especially white pine.

White pine originally was present and accessible along streams and rivers of Garrett County, and was one of the first species removed. It grew best in almost pure stands on moist, level lands sur-

rounding swamps and mountain meadows. However, areas occupied by this sub-type of swamp forest were never more than a few acres in extent and were relatively few in number. As a scattered tree along streams and mountain slopes it was fairly common and frequently reached large size. Reproduction of white pine has been fairly abundant, however, considering the few remaining old trees and the destructive cutting and fires of the past. Young seedlings are found throughout the County, in most cases as a result of natural re-seeding.

An example of the black spruce sub-type of swamp forest existed until recently at the head of Cherry Creek between Negro and Meadow Mountains. Best specimens of spruce are found on level or gently sloping land bordering swampy areas. As slope increases and as land becomes better drained, oak and other hardwoods become more numerous in the transition toward slope-type forests. Spruce and white pine are also found as minor components of moist slope forests in places along Backbone Mountain toward the southwestern corner of the County.

There is very little shrubby vegetation where the growth of spruce is dense; instead the rather saturated ground is covered with mosses, ferns, sedges, and scattered plants of skunk cabbage (Symplocarpus foetides), arrow-leaved violets (Viola sagittata), and wake robin (Trillium erectum). Along small streams in swamps or where stands of trees are more open, there are often dense thickets of rhododendron. Other commonly found shrubs include speckled alder (Alnus rugosa), witheredod (Viburnum cassinoides), black choke-berry (Pyrus melanocarpa), black alder (Ilex verticellata), and spice bush (Lindera benzoin).

There are several areas in Garrett County which are, in appearance, typical bogs. These are all situated near areas of swamp or glade

forests, or in places where these forests formerly stood, with black spruce and white pine as the predominant tree species. Such bog-like areas exist around the margins of Wolf Swamp near Finzel, near Thayerville on Route 219 south of Deep Creek Lake, in places between Oakland and Crellin, and between Oakland and Deer Park. In virgin swamp forests doubtless narrow belts of bog around the margins of these forests formed transition zones between swamp and slope-type forests. Apparently clearing of swamp forests resulted in occupation of the bare forest floor by sphagnum and other mosses forming a cover into which plants of adjoining bog areas later migrated.

Several characteristic species in these bog-like areas of Garrett County are also abundant in bogs of the glaciated portion of the continent to the north. These include cotton-grass (Erophorum virginicum), cranberry (Vaccinium oxycoccus), swamp blackberry (Rubus hispidus), crested shield-fern (Dryopteris cristata), small green wood orchis (Habanaria clavellata), marsh St. John's-wort (Hypericum virginicum), and three-way sedge (Dulichium arundinaceum).

Shrubs which are characteristic of bog areas include speckled alder (Alnus rugosa), hoary alder (A. incana), mountain holly (Nemopanthus mucronata), winterberry or black alder (Ilex verticillata), white azalea or swamp honeysuckle (Rhododendron viscosum), and bushy St. John's-wort (Hypericum densiflorum).

The present encroachment of shrubs, alders and seedling trees, chiefly red maples, indicates that these bog-like areas will eventually return to forest if left undisturbed.

The relationship between surface features and forest types in Garrett County as shown in the preceding discussion may now be reviewed.

The presence of higher mountain ridges and of long intervening valleys with relatively level floors has maintained a diversity in natural vegetation which is far greater than in the rest of the State.

In relatively level valleys the influence of the underlying rocks on the character of the soil, has made a considerable part of it suitable for crop agriculture. In other situations in the County topography plays a dominant role in determining the vegetation; in short, it is responsible for distinction of slope, ridge, and swamp types of forest.

Saw Timber Resources

The forest resources in Garrett County range from areas of almost complete devastation, through areas in various stages of partial restocking or restocking with trees of inferior types or quality, to relatively limited areas which are producing trees at or near capacity. Since almost no virgin timber remains, the merchantable supply is made up almost entirely of spontaneous second- or third-growth. A considerable part of the present supply of timber consists of merchantable rejects from previous logging operations.

The value of timber stands varies greatly according to location, species, quality, and size, as well as availability to consumers of wood. Among a wide variety of tree species, the majority of the more desirable are often of scattered or infrequent occurrence; that is, comparatively few species are found in abundance in any one place. The prevalence of this condition increases cost of lumbering operations and penalizes manufacturers and other users of wood by forcing them to absorb substantial freight charges to bring lumber from other parts of the country.

In Garrett County, as well as in the rest of Maryland, the Doyle Rule is generally used by foresters and lumbermen in calculating the number of board feet of lumber that can be sawed from logs of different sizes. It was originally intended that in the use of this rule the average diameter of the log should be taken, but the usual custom is to measure the diameter inside the bark at the small end. The chief disadvantage of its use in Garrett County is that the Doyle Rule underestimates the number of board feet that can be sawed from logs measuring less than 28 inches in diameter. Since a negligible number of the County's forest trees are more than 28 inches, saw-timber resources are undoubtedly considerably larger than those given in official and other reports. It has also been found that by careful sawing of second-growth timber 20 percent or more additional lumber can be secured than is credited by the Doyle Rule.

According to reports of the State Department of Forests and Parks the stand of saw timber in Garrett County can be estimated as follows:¹

*Saw timber	500,000,000	Board Feet
Hardwood	485,000,000	" "
Softwood	15,000,000	" "

The estimated 500,000 M.B.F. included only trees with a diameter of 7 inches measured one foot above the ground. Of all general classes of forest growth, saw timber is by far the most important, since it is the raw material for lumber, veneer, railroad ties, and other sawed or sliced products. Of equal importance is the long period of time required for growing saw timber, which complicates the problem of continuous production, particularly in the case of private owners.

¹ Maryland Board of Natural Resources, Seventh Annual Report, 1950, p. 105.

The quantity of saw timber is not in direct proportion to forest acreage, due primarily to the fact that much of the forested area is poorly stocked with regard to suitable trees or is covered with trees too small to be classified as saw logs. Stumpage value would be more accurate, since it is based on value of standing trees by species, size, straightness, soundness, and accessibility, and would be in direct proportion to the stand of timber. According to appraisals made by forestry specialists in recent years the average stumpage value in Garrett County is about \$100 per 1,000 board feet.

In addition to species of trees, density of stand is an important factor in determining value of lumber. For general purposes this is the estimated amount of standing timber per acre. According to recent timber-marking operations by forestry officials, the average stand of marketable saw timber in Garrett County is about 1,700 board feet per acre, while the average for the State is about 3,000 board feet per acre. The relative scarcity of saw timber in Garrett County is more clearly understood when it is pointed out that:

21	logs	12'	long	by	12"	in	diameter	equals	1,000	B.F.	of	lumber;
7	"	12'	"	"	18"	"	"	"	1,000	B.F.	"	"
3	"	12'	"	"	25"	"	"	"	1,000	B.F.	"	"
												<u>1</u>

On this basis it would require about 36 logs approximately 12 feet long and 12 inches in diameter to produce the estimated per-acre volume of saw timber on Garrett County forest lands--1,700 board feet. But logs of even 12 inches are certainly larger than average in the County at the present time. In fact, while minimum cutting size permitted by the State

^{1/} The Woodsman's Handbook, U.S.D.A. Bureau of Forestry Bulletin No. 36, pp. 39-41.

Department of Forests and Parks is 16 inches measured one foot above the ground in eastern Maryland, for Garrett County minimum requirements are now only 7 inches. If the average diameter were 6 inches, it would take approximately 250 logs 12 feet long to produce 1,700 board feet of lumber according to the Doyle Rule.

General availability of saw timber. Although there is an estimated stand of 500,000 M.B.F. of saw timber in Garrett County, of which over 96 percent is hardwood, the actual quantity available at the present time is considerably less. There are several factors which make it both impractical and uneconomical to cut the existing stand in as short a time as possible.

Complete removal of all trees large enough for saw logs would mean a serious timber shortage until another crop could be grown. If a sustained yield of forest products is to be maintained there must always be a balance between the amount of timber removed and the amount left standing as growing stock. There is also the problem of economic availability; whether a particular stand can be logged at a profit, or at least without loss. This depends on density of the stand, size and quality of trees, proportion of inferior species, lumbering problems, transportation, and prices.

It may be that not much over 18 or 20 percent of Garrett County's saw timber supply could be lumbered with prevailing conditions. In 1944, for example, of a total of 16,500 acres that were examined by State forestry specialists only about 3,000 acres were found to contain commercially suitable saw timber. The wood land examined at that time was not picked at random, but consisted of stands which the owners considered suitable for cutting.

It is true that standards of merchantability of timber change rather frequently. As accessible and desirable stands are depleted it becomes increasingly profitable to log more remote areas. The diminishing supply of most valuable species, together with an increasing knowledge of wood utilization and adaptability, are creating markets for many woods formerly considered inferior. With growing scarcity of large-size trees the grades accepted at saw mills have dropped considerably, while improvements in technology and equipment have enabled mills to utilize much material that otherwise would be rejected or wasted.

It would be difficult to estimate the proportion of existing timber stands in Garrett County which may in the future prove economically available. Ever-changing conditions, especially continued success in developing competitive and substitute materials for wood, make it reasonable to assume that a considerable portion of the County's present supply of timber may never be economically useful for saw logs. On the other hand, encouraging possibilities in the utilization of species and qualities now of little use are being demonstrated in the manufacture of processed wood-fiber and fiber boards in other parts of the United States; or, for example, the use of redwood sawdust in California for making masonite.

Utilization of Wood

The wood of Garrett County reaches markets in two forms: as manufactured products and as raw material. Manufactured products are lumber, including plank, square, or dimension pieces, and similar material. Raw material includes pulpwood, mining timbers, piling, poles, mining timbers, railroad ties, fence posts, cordwood or fuel, etc. As might be

expected value and amount of manufactured products usually exceed those of raw material.

Lumber. Most of the timber cut in Garrett County is sawed into boards, planks, or dimension stuff. Production fluctuates considerably from year to year as the following table shows.

TABLE XII
LUMBER PRODUCTION IN GARRETT COUNTY
BY REGISTERED OPERATORS
(For selected years)

Year	No. of Sawmills	Board Feet of Lumber Sawed
1944	54	18,505,000
1946	48	4,332,989
1947	52	13,294,504
1948	34	7,124,504
1949	27	2,979,800

Department of State Forests and Parks.

Most of the lumber, over 95 percent, produced during these years was hardwood. Sugar maple and white and red oak furnish the bulk of hardwood lumber, although considerable amounts of beech, yellow and sweet birch, chestnut oak, and basswood are also used. Softwood lumber is generally produced from white pine, hemlock, and spruce.

There is no available information on how much of this lumber came from private forest lands and how much from the State forest areas. Since figures on the production from private holdings would also divulge the quantity furnished by cuttings on State owned land, and the amount of income from this source, it has not, apparently, been the policy of the State Department of Forests and Parks to make such information available.

Several reasons have been given for the fluctuations in production of lumber in Garrett County and for the decrease since 1944. During the war years construction of military training centers and other establishments for the war effort in all parts of the country diverted a considerable amount of lumber that would normally have come into Maryland to meet local demands and consequently there was great expansion in domestic lumber production in Garrett County as well as in other parts of the State. After the war, although lumber was still in short supply, most of the demand was for large quantities of building material in or near big cities. This lumber was purchased in car-load lots by building supply companies from production centers in the South and far West. Production in Garrett County, meanwhile, was being adjusted to the limited local needs. In recent years owners of wood land in Maryland who wish to sell or cut saw timber must get permission from the local forestry officials, who frequently impose restrictions on the basis that the proposed cutting is not feasible or that selective cutting involves a relatively small part of the stand. A considerable amount of standing timber is sold to saw mill and timber operators from outside the County, and when saw logs are hauled to their respective mills for processing, they are not included as part of Garrett County's lumber production.

Most of the saw mills operated in Garrett County are of a portable type which can be moved to areas where a worthwhile amount of saw timber is available.

Laths, shingles, shooks, etc. Formerly a number of saw mills were equipped to make laths and shingles from softwood slabs, but the output has practically stopped because the local market is rather limited, and



Figure 13
Wood land in Garrett County.



Figure 14
Lumber and portable saw mill.

especially because of the growing use of wall-board of various types in place of laths and plaster, and of sheet metal, asbestos, and other substitutes for roofing purposes. One large mill at Friendsville is (or was until recently) equipped to make barrels or shooks which are sets of staves and heading. These are almost entirely made of white oak.

Pulpwood. Generally only small or inferior trees and tops are used for pulpwood, although softwood slabs are sometimes used for certain grades. Figures on annual production in Garrett County are difficult to obtain, since much of the pulpwood is cut by owners or operators who are not required to register with the Department of State Forests and Parks in order to cut pulpwood alone. A considerable amount is produced by small, part-time operators who haul loads by motor truck to the West Virginia Pulp and Paper Company at Luke near Westernport on the North Branch of the Potomac. Although registered operators report about 200 or 300 cords of pulpwood annually, this probably represents not more than a fifth of the total production.

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Mine timbers. The mines of Georges Creek Valley and of the Upper North Branch of the Potomac have been important users of mine timbers from Garrett County for many years. Considerable quantities of mine posts and props also go to mines in the vicinity of Uniontown, Pa. Almost any sound tree about six inches in diameter can be used for mine timber. The demand for this material naturally depends upon mining activities in Garrett County, Allegany County, and in nearby West Virginia and Pennsylvania. For a number of years shaft mine production has been declining at a rapid rate in most of the area, with a consequent decrease in use of mine timbers. However, in 1949 about 112,000 mine posts and

props were produced by registered operators in Garrett County. Ordinarily a considerable part of the mine timber is owned and cut by the mine operators.

Railroad ties. Best quality ties are cut from small-size but sound white and red oak and chestnut oak; formerly much chestnut was used. Beech, birch, maple, and hemlock are other species used for this purpose. Much of the cutting is done by farmers or small operators during the winter and other slack periods. Farm woodlots as well as larger holdings furnish most of this timber. In recent years annual production has been between 15,000 and 20,000 ties.

Fencing material. Farmers generally obtain ample supplies of good fencing material from the culled forests surrounding agricultural areas. Second- or third-growth white oak, locust, and chestnut oak are chiefly used for fences. Chestnut from ridge forests was formerly preferred for rails.

Fuel. Use of wood for fuel is probably less important in Garrett County than anywhere else in Maryland. Coal is relatively cheap and is found in small deposits on many farms, where it is produced in limited quantities during the winter. It is commonly used for all heating purposes, although Oakland is supplied with natural gas from West Virginia, and fuel oil is being used in increasing quantities. The general use of coal has made it difficult to dispose of waste hardwood tops and inferior timber. Thousands of cords of oak and other hardwoods have been left to rot in the woods, and large amounts of slash have always contributed to destructive fires. Industries using small and inferior material would permit a much fuller use of the hardwood cut. Charcoal kilns, chemical

plants, wood-fiber factories, tool handle or spool manufacture and other similar industries could use valuable wood now going to waste and creating fire hazards in the County.

The Economic Importance of Farm Wood Lots

Forestry is closely related to crop agriculture and should be more closely coordinated with it in Garrett County, since the more profitable the wood lot becomes the easier it is to sustain other farm activities. This is particularly true in connection with general or diversified farming, where cash income is derived from a number of products usually subject to considerable seasonal fluctuations. Forestry is especially important in Garrett County where climatic conditions favor the growth of trees and where opportunities for growing other profitable crops are relatively limited by the fact that much of the land on farms is hilly and has thin soils. The adoption of forestry as a definite farm activity would be an important factor in increasing and maintaining the prosperity of many of the County's farms.

In addition to furnishing the most profitable crop that can ordinarily be produced on poorer soils and steep slopes, there are several other important advantages to a thriving farm wood lot. It can:

1. Serve as a windbreak for farm buildings and livestock.
2. Help prevent destructive soil erosion.
3. Increase the supply of water for wells, springs, farm ponds, and streams.
4. Furnish the farmer with fuel, building materials, and other supplies.
5. Provide an important source of cash income.
6. Improve the general appearance of the farm and undoubtedly raise its value.
7. Be relatively easy to manage, requiring less time and attention than other crops.

6. Yield products ready for harvesting at almost any season, thus making it possible for farm labor to be employed when it would have little other farm work.

Timber can be an actively growing crop yielding better returns than any other on poorer soils and other unfavorable conditions on many farms. The quantity of wood products raised within a given time can be increased and the quality improved. A wood lot can be used on a self-sustaining basis, yielding a small number of trees every year or every few years, or it can be clean cut and reproduced at intervals of 30 to 50 years. Either method will yield sizeable returns compared to the investment of capital and labor.

In many ways the farmer has a definite advantage over the large-scale operator who grows timber as a crop, in that funds invested in the farmer's timber are smaller in the aggregate, while his uses of wood can be varied. Then too, necessary labor can be supplied by farm hands, horses, and other equipment when they would otherwise be idle. Care of farm woodlots requires little work beyond getting out the annual supply of firewood, fence posts, and other similar material, which, as trimmings and improvement cuttings, may be made to increase the value of the stand.

Although many farm wood lots in Garrett County are in a run-down condition from repeated culling, lack of management, and other unfavorable conditions, timber produced on farm wood lands is not necessarily inferior to that grown in large commercial holdings. Many wood lots contain high-grade timber and are capable of yielding high-grade lumber, provided it is properly sawed and seasoned. In fact, because of its scarcity in larger forest tracts, much of the existing supply of high-quality timber is found on farm wood lots. Under proper management,

therefore, land not suitable for cultivation or pasture can often be put to better use by growing timber.

Since 1935 there has been a considerable decrease in total acreage of farm wood lots in Garrett County. In 1935 there were 116,074 acres while in 1945 only 74,251 acres were classified as farm wood land. Almost all of the 41,823 acres difference had been acquired by the State. The total value of all forest products sold by Garrett County farmers in 1934 was only \$21,039, but by 1939 it had increased to \$249,494, and by 1944 to \$589,155. These figures, of course, represent great differences in general economic activity; they are not strictly comparable when price differences are considered.

Perhaps one of the most destructive practices in use of farm wood lots in Garrett County is the prevalence of pasturing livestock on them. In 1944, for example, of the 74,251 acres of farm wood land almost 50 percent, or 35,827 acres, were pastured. Over-grazing of herbaceous and shrubby forage tends to bare the ground surface to direct impact of rain and also permits the sun's rays to increase destruction of forest litter, thus robbing the soil surface of its normal accumulation of leaves, grass stalks, and other organic matter. In addition, seedlings are browsed and trampled and further growth destroyed. All of these unfavorable effects lower the capacity of land to store water and cause destructive run-off, accelerated erosion, and sedimentation in streams.

Another cause of damage is fire, often preventable and usually the result of carelessness or even maliciousness. A tradition which has pretty well disappeared was the annual burning of pasture land with the intention of keeping down brush and weeds and fostering new growth of forage. In the past fires have destroyed hundreds of acres of valuable

wood land and caused serious loss of wealth as well as heavy expense for extinguishing fires. Largely due to enforcement of regulations and to educational programs carried on by the State Department of Parks and Forests (which will be discussed later) damage from wood land fires has been greatly reduced in recent years.

Maple Products

Throughout the days of early settlement, maple syrup and sugar were among staple articles of food in Garrett County, as was true in other parts of northeastern United States and eastern Canada. With the introduction of cane sugar, however, maple sugar has become more or less a luxury. Since climate and edaphic conditions on the lower slopes of main ridges in Garrett County are the principal natural habitat of the sugar maple (Acer saccharophorum Koch, or Acer saccharum Marshall) in Maryland, that County has produced the bulk of maple syrup and sugar for many years.

It has been a common practice in logging tracts of timber containing a considerable percentage of sugar maples, to remove only the other merchantable hardwoods and such conifers as white pine and hemlock, leaving the sugar maple in groves or "camps" as they are known locally. Formerly the sugar maple was not considered a timber tree for which a long bole free of branches is desired, but rather as a paying sap producer. For this purpose the full, heavy crown with large leaf surface which is typical of the sugar maple is also a desirable feature.

Much of Garrett County is adapted by conditions of climate, soils, and slope to growth of sugar maple trees. The tree requires considerable moisture and will usually grow well where soil is fairly deep and moisture is present throughout the year. Average annual precipitation

in Garrett County, varying from 44 to 47 inches over most of the County is adequate for sugar maples. Heavier annual precipitation is usually received on higher, exposed slopes in the southwestern part of the County, where in many years it is as high as 54 inches or more. In the lower, sheltered localities such as around Bloomington, annual precipitation is usually only about 36 inches. But these amounts are neither too great nor too little for the tree's growth. Relatively heavy snowfall is conducive to high yields and high quality syrup. Average annual snowfall is about 79 inches at Grantsville, 67 inches at Oakland, and about 60 inches in the Youghiogheny Valley at Friendsville. It declines somewhat with decrease in elevation, being only about 35 inches at Westernport, across the Potomac from Bloomington.

As far as temperature requirements are concerned, the most critical period is between February 15 and April 15, when temperatures should fluctuate above and below freezing during the tapping season. Such conditions occur around Grantsville and Oakland, but at lower elevations, such as around Friendsville in the Lower Youghiogheny Valley, temperatures remain too much above freezing to favor the best flow of sap. At still lower elevations, such as around Bloomington at the mouth of the Savage River and along the North Branch of the Potomac, temperatures begin to remain above freezing early in the tapping season.

The sugar maple thrives on slopes where drainage conditions are favorable, and almost half of the land in Garrett County has slopes of 20 percent or more. Degree of slope is relatively unimportant as a limiting factor in the growth of sugar maples, but if the slope is too steep it may make commercial operations difficult if not impracticable. Direction of slope is, however, of considerable economic importance.

Although sap begins to flow earlier on south and southeast slopes than on north or northwest slopes, flow is more gradual and continues for a longer period and production in general is greater on the latter exposures.

There are about 125 sugar maple groves in Garrett County almost all of which are concentrated in three districts. About 50 of the groves that are usually tapped every year are in Grantsville (District 3), mostly on the slopes above Casselman River. Approximately 25 or 30 groves are on similar situations just to the southwest in Bittering (District 12). Most of the rest of the "operated" maple groves in the County are along the southeastern slopes of Backbone in Ryan's Glade (District 8), south of Route 50. Most of the maple groves in these areas are on either gravelly silt loam or stony silt loam.

In a survey made by the Department of Agricultural Economics, University of Maryland, in 1938, it was found that 75 percent of the sugar groves in Garrett County were between 176 and 225 years of age at that time.¹ Many or most of the owners, however, have done little to improve old groves or to produce new ones. Then too, especially during the shortage and high price of timber in the past decade, a considerable number of maple groves have been sold and cut down.

At the time of the survey mentioned, only about 10 percent of operators of sugar groves were planting young trees to replace old worn-out groves, and only seven operators in the County were protecting natural growth of young trees, since the general practice is to pasture livestock in maple groves. However, almost all operators made a practice

1 Roy E. Huffman, S. H. DeVault and J. W. Coddington, "An Economic Study of the Maple Products Industry in Garrett County, Maryland", Agricultural Experiment Station, University of Maryland, Bulletin No. 431, 1940, p. 164.

of cutting out old trees, trees of other species, and cutting off dead limbs.¹

Formerly about 50,000 or more maple trees were tapped annually in Garrett County, but the number declined to an average of 38,000 between 1938 and 1947 inclusive, and to 34,000 and 32,000 during the 1948 and 1949 seasons respectively. For many years the trend has been toward lower production of sugar and increased output of syrup. In 1910 over 350,000 pounds of sugar were produced, but since that time production has declined rapidly and steadily until it averaged only about 10,000 pounds a year between 1938 and 1947, and only a little over 6,000 and 7,000 pounds for the years 1948 and 1949. Annual maple syrup production fluctuates around 16,000 gallons of 11 pounds each.²

Normally about 95 percent of the maple sugar and syrup produced in Garrett County is sold, while the remainder is used at home. One factor in the increase in production of syrup compared to sugar is that over two-thirds of the syrup is usually shipped to companies processing maple products in Vermont. This portion of the syrup is shipped in 50-gallon drums furnished by the company buying the product, and at no cost to the producer in Garrett County. Some companies deliver empty drums to the farm before the season begins and collect full drums at the end of the season. Others pay the producer a small sum to pick up and deliver drums at railroad stations. Although such facilities are inducements to Garrett County producers and practically eliminate marketing costs, prices received are considerably below those that could be obtained

1 Ibid. pp. 198-199

2 Crop Reporting Board, B.A.E., U.S.D.A. Annual Summary, 1949, p. 81.

through efficient marketing by the producers themselves. The remaining production of maple sugar and syrup in Garrett County is handled by local trade, some is sold direct from the farm, or is retailed by stores in the County. One large establishment on Route 40 at Grantsville sells a sizeable quantity to transient customers. The maple products retailed in small amounts directly in the County naturally bring a much higher price than does the bulk of the product marketed in drums.

On considerable areas in Garrett County maple products provide a very favorable alternative use of lands unsuited for crop production. A major problem in any attempt to expand the industry, however, is the time required to develop a young grove to producing age and size. This could be partly compensated for by supplemental uses of the land, such as planting rapidly growing species with the sugar maples. These faster-maturing trees would yield a forest crop during the fifty years or so that the sugar grove requires to reach producing age. Expense of such a plan would be comparatively low as the timber species could be cut in the thinning process. The practice of pasturing such wood land, however, should be discouraged; young trees are seriously handicapped in obtaining a start due to damage from trampling and browsing of livestock. Even the mature maple grove would offer very little pasture, since relatively close planting and the full crowns would tend to shade the ground and retard growth of grass and other forage.

Physical characteristics are important factors in considering possibilities of expanding maple products resources of Garrett County. Almost all soil types represented are adapted to growing the species, except for those in poorly-drained areas. Limiting factors are climate and slope. Areas at the lowest elevations, such as around Bloomington, with

shorter season and lighter snowfall are not well adapted to commercial production. In other places, although soil and climatic conditions are almost ideal, many slopes are so steep that gathering sap would be impracticable without the use of some expensive method such as a pipe line.¹

Production of maple products offers an opportunity for more efficient utilization of farm labor during the season from late February to early April when demand is relatively small. On typical general farms of Garrett County labor requirements are high during the summer and much lighter in late autumn and early spring, and particularly in winter. If a farmer can arrange his labor supply to meet requirements from June to October, he could doubtless plan to use more in February, March, or April, and even in May by a shift to maple production activities and with better balance of the labor load over a longer period.

Areas where maple production might best be expanded are those where it is now greatest: principally the south and southeast slopes of the Grantsville and Bittering districts and on similar slopes along Backbone Mountain. Doubtless present maple groves in these situations find conditions that are best adapted for their growth and production. There are also many farms in the Oakland agricultural area that have land with poorly managed wood lots or old, hilly pastures well suited to growth of sugar maples. Consideration of production of maple products on such land for increasing income, should not be overlooked in any plans for the future. There is, of course, much land in the County that is limited in use for maple groves by problems of slope. Such areas include the

¹ C. S. Herr, "Maple Syrup and Sugar Production in New Hampshire", New Hampshire Extension Service Circular No. 135, 1932.

steep upper slopes and crests of most of the prominent ridges as well as highly dissected areas in the middle Savage and Youghiogheny Valley. Then, too, much of this type of land is already in State forests. In most instances development of new groves would be most feasible on land already in farms but which is not being utilized profitably at present. The most efficient method of developing a maple sugar grove would be by thinning and proper care of a natural growth of saplings.

Producers of maple products in Garrett County should in some way be encouraged to market a larger part of their production in small containers. At present they are missing an opportunity to develop a market among people who consider maple products a luxury and buy in small quantities. Efficiently-operated retail outlets on main highways that traverse this County have literally thousands of potential customers. The large number of summer visitors and tourists at resort centers should also be considered.

Certainly in any land planning program for the County, development of sugar maple groves should have an integral part. There is still a large amount of land which should be in permanent wood land because of its unsuitability for field crops or pasture. Trees represent its best use, and in this connection a double advantage would be gained by use of such productive trees as sugar maples.

Extent and Economic Importance of State Forests

It seems fitting that establishment of the State Forestry Department in 1906 was for the immediate purpose of taking over and administering about 2,000 acres of forest land in Garrett County offered by Robert and John Garrett of the Baltimore and Ohio Railroad to the State as a gift, provided an agency was set up to administer it. Building that railroad

had facilitated the development of the timber industry, which dominated the County's economy from about 1870 to 1920. Unfortunately this was accompanied by destructive logging practices and fires, and many large tracts were abandoned with little or no opportunity for recovery. Organization of the old State Department of Forestry marked the beginning of a definite movement to increase and maintain productiveness of Garrett County's forest resources as well as those of the rest of the State.

There were many reasons for such a movement. Forests are of value not only for wood they produce, but also for their influence upon climate, control of floods by retarding run-off of rainfall and melting snow, in holding soil on steep slopes and thus preventing destructive erosion, in reducing silting of streams and reservoirs, in protection of game and other forms of wildlife, and as outdoor recreational areas of great importance.

Although most of these values are of unquestionable and substantial benefit to the public, the individual owner seldom realizes any income from them. He can cut and market timber on his own land, and wherever forest land is profitable for timber production alone, much of it is and doubtless will remain in private ownership. There are, however, large areas on watersheds of important streams like the Savage, the North Branch of the Potomac, the Middle Youghiogheny Valley, and parts of the Casselman Valley, where continuous forest is essential to the welfare of people and to economic activities in Garrett County and far beyond its boundaries. These forests are a public concern and should properly be under public ownership.

It is generally expected when such land is set aside that its use will justify the expenditure of public funds in its acquisition. Some

of the land in State forests in Garrett County has been used to demonstrate efficient forestry practices. Although the Extension Service has been advising and helping private owners, this method does not afford the degree of control over practical demonstrations that is possible when they are conducted on public lands. A forestry experiment if it is to be successfully concluded must often be extended beyond the span of an individual's lifetime, and the probability of succeeding generations of land owners carrying on the same experiment is rather remote. Obviously a greater continuity of specific action can be assured if public lands are used for experimental purposes. Private owners of wood land should be free to examine experimental tracts, judge results, and decide whether or not the same techniques could be profitably applied to their own holdings. Demonstrations can also be adapted to areas where the primary object is not necessarily growing the largest possible volume of wood or forest products. The private owner may be equally interested in being shown how to stop destructive erosion and manage watersheds in conserving water resources, or how to increase the supply of game and develop recreational resources.

Making certain that public benefits are safeguarded from private monopolistic use is another important reason for acquiring public forests. Examples may be found on any river or stream that drains a sizeable area, where ownership of land at the headwaters is divided among several individuals with conflicting interests. One owner may be a hill farmer whose chief concern is doggedly trying to make a living from the soil, and to do this he cuts and frequently wastes timber that should properly be left on steep hillsides, and tears up roots which have bound the soil. As a result his own farm is made poorer, and by erosion the inherently poor mineral soils eventually cover the richer

bottomlands of neighboring farms. Some of this soil is also deposited in the river channel, causing the stream to rise and overflow its banks during periods of heavy rain and rapidly melting snows, thus extending the area of more or less permanent damage; or if the river is navigable, shoals created by silting may make dredging necessary in order for boats to pass. It is apparent that such critical areas cannot be subject to indiscriminate individual exploitation without resulting in great loss to the public, and that such lands should be in public ownership.

Timber growth is frequently so depleted in many areas that private owners can afford neither the time nor the investment required to produce another crop, and such areas are usually neglected. The resultant loss of taxable wealth which would put an added burden on more productive lands creates a purely economic reason for obtaining state forests. Acquisition and management by the State of neglected and cut-over land also provides opportunities for local employment. Workers are needed to protect such forests from fire, insect and disease epidemics, and to harvest forest products and manufacture them into useful articles.

State forests are also needed for public recreational purposes. They provide opportunities for picnicking, camping, hiking, hunting, fishing, studying nature, and relaxing. For a number of very good reasons most private owners resent such use of their lands, and the only satisfactory solution to the problem is acquisition of public lands for these purposes.

Every year practical forestry is demonstrated in State forests in Garrett County. By selective cutting of trees of suitable species and quality State foresters show how an annual crop of timber may be obtained. These timber trees are sold to local saw mills and thus provide an

increasing part of funds for future forestry activities. Other trees are cut to show proper thinning and elimination of less valuable species and are sold for pulpwood, mine timbers, and other uses.

Procedure for acquisition of state forest lands. Tracts of privately owned land adjacent to existing state forests which are offered at a fair price are examined by specialists of the State Department of Forests and Parks. In suitable areas that are not adjacent to present state forests, however, individual tracts are examined for purchase if it appears that through subsequent acquisition of nearby properties an ultimate unit of 5,000 acres can be secured in a reasonable time. If lands are found suitable for state forest purposes and price per acre is acceptable, options are taken for a period of time sufficient to make surveys and examine titles. In addition to acquisition by purchase lands for state forests are also acquired by gift, as in the original transfer by the Garrett brothers in 1906, and by Charles M. Howard of the Mt. Nebo tract in 1941. Other tracts are obtained through default in payment of taxes. Some areas of State forest, particularly in Savage River watershed, are now held by the State under a 99-year lease from the Farm Security Administration of the U. S. Department of Agriculture.

Swallow Falls State Forest. This includes several separated blocks of state-owned land located between the Youghiogheny River and the West Virginia boundary. The nucleus of this forest was made up of the original tracts donated by the Garrett brothers. They include: Swallow Falls, 823 acres; Skipnish Reserve, 888 acres; and Kindness, 206 acres. Most of the rest of Swallow Falls State Forest was acquired through pur-

chase of large tracts formerly held by lumbering interests, and include much rough, dissected land. By 1936 Swallow Falls State Forest had increased to 4,854 acres, and by 1948 to 7,458 acres. In addition to its primary use for timber production, some of the area within Swallow Falls State Forest has been developed for recreational use. This will be discussed in Chapter VIII.

Potomac River State Forest. This is made up of several disconnected tracts extending from the North Branch of the Potomac, over the crest of Backbone Mountain, and down onto the northwestern slopes. It was established in 1931 by purchase of about 8,600 acres of cut-over timber and mining holdings of the Manor Mining and Manufacturing Company. Through further purchase and donations of cut-over lands, the Potomac River State Forest has been increased to 12,107 acres. Although used mostly for production of timber, several forms of recreation are provided in some sections.

Savage River State Forest. This includes a considerable number of large separate tracts in the highly dissected lands of the Middle Savage River Valley, and a number of tracts which extend up over the crest of Meadow Mountain to the west, over the crest of Big Savage Mountain, and onto its southeast slopes as far as the Allegany County line on the east (see State Forest map, Fig. J). In 1933-34 about 31,000 acres of cut-over and submarginal agricultural land in the Savage River watershed were purchased by the Resettlement Administration of the U. S. Department of Agriculture. In 1939-40 this land was transferred to the State of Maryland under a 99-year lease by the Farm Security Administration of the U. S. Department of Agriculture. Since that time addi-

tional areas have been acquired by the State through purchase and donation as they became available. At present there are still many small holdings of private land scattered throughout the Savage River State Forest, and these will undoubtedly be acquired to fill out the presently held blocks of State Land. It is by far the largest State forest in Maryland, comprising 51,517 acres. Its use in addition to production of timber is discussed in Chapter VIII.

Comparison of the maps of Patterns of Settlement, Soils, and Agricultural Land Use (Figs. B, G, and K) shows that most of the lands in these state forest areas are highly dissected, steep, with much stony, shallow soil, and are not suitable for any use other than wood land, recreation, prevention of destructive erosion, flood control, and propagation of wildlife. The retirement of this land from hundreds of private holdings for administration by the State Department of Forests and Parks was doubtless the best solution to a serious problem which still applies to other such areas in Garrett County

Administration of State Forests. In 1941 ten agencies which had administered natural resources in Maryland were reorganized, and the Forestry Department, which had been supervised by the Board of Regents of the University of Maryland, was set up as the Department of State Forests and Parks, one of five under a new Board of Natural Resources, of which one member is the State Forester.¹ In 1943 the State Legislature passed the Forestry Conservancy Districts Act for protection of all timber resources, both public and private, in the State.²

1 Maryland Board of Natural Resources, Annual Report, 1944, p. 7.

2 Ibid., p. 63.

Under the Forestry Conservancy Districts Act the Department of State Forests and Parks regulates forest practices on privately-owned timberland, largely by example and through education. Objectives are:

To ensure on such areas a healthy young growing stock of the more valuable tree species, to prevent clean cutting except under prescribed conditions, to reduce fire damage, and to prevent "tree butchery" such as that practiced by out-of-state operators ^{1/}

District forestry boards, one of which is in Garrett County, are set up to judge timber needs based on local conditions. In this way cutting regulations and types of wood products--lumber, mine props, pulpwood, etc.--can be based more accurately on kinds and quality of wood available. The District Forester acts as executive secretary of the Garrett County District Forestry Board.²

The Department of State Forests and Parks, through the District Forester, is responsible for the protection of all woodland from fire. Assistant district foresters, specially trained in fire prevention and equipped to fight forest fires, are assigned to all forested areas. Methods of fire control include three basic measures:

1. Prevention. This is carried out largely by public education in safety measures to keep fires and fire hazards at a minimum. A forest patrolman visits each wood land owner in his area at least twice a year to pass on latest information and literature on the subject, to discuss safety measures, such as when brush may be burned in spring and fall, to check on the owner's available fire-fighting tools and nearby sources of water, and in general to become familiar with local conditions.

^{1/} Maryland Manual, 1948-49 (Code 1943, Supp. Act. Art. 39A Secs. 52-64), p. 87.

² Maryland Board of Natural Resources, Annual Report, 1947, p. 91.

2. Quick detection. There are six fire towers located on strategic crests of prominent ridges in Garrett County which are connected with local authorities by telephone and with forestry fire patrol trucks in the district by two-way F.M. radios.

3. Trained fire-fighters. Trained men with tools, modern pumpers and hose, etc. are ready, particularly during the critical months of spring and fall when dry weather may make conditions particularly hazardous. In addition, hundreds of local volunteer "wardens" are on call. For greater efficiency in fighting forest fires there is a program for dividing State forests into relatively small blocks by means of roads and trails which act as safety strips. These help to make all parts of the forests readily accessible in case of fire, as well as for recreational uses. The plan calls for blocks of forests ranging from a few acres up to 100 acres, eventually to be reduced to not more than 50 acres each.

One regulation, No. 4 of the Forestry Conservancy Act, stipulates that from September to December and from March to May inclusive, brush may be burned only between 4:00 p.m and 12:00 midnight when wind and moisture conditions are considered best for safe burning. When necessary land owners are also required to plow safety strips around the area to be burned and to have enough help and tools on hand for emergencies.

For many years forest fires have been a serious problem in Garrett County, and until the recent development of an organized, efficient fire-fighting system thousands of acres of valuable wood land were destroyed each year. Carelessness in burning of brush and by smokers, but especially maliciousness of incendiaries have been by far the chief causes. It is difficult to apprehend incendiaries and to understand their motives. According to foresters they result from grudges, envy,

desire for excitement, juvenile delinquency, and the opportunity to earn money during periods of unemployment by fighting fires. One incendiary attached a wire with an oil-soaked cloth to a live turtle's shell as a means of starting and spreading fires on the slopes of Savage Mountain.

Some idea of the extent and cause of forest fires in Garrett County and of the growing efficiency of fire control in recent years may be obtained from the following figures from reports of State Department of Forests and Parks. During the period 1924 to 1932 inclusive, there was an annual average of 109 forest fires which burned about 6,450 acres. This included the extremely dry year of 1930 when over 16,450 acres were burned in 257 fires. In contrast, in 1947 only about 764 acres were burned in 31 fires. According to available records, during the nine-year period of 1924-1932 incendiarism was responsible for 35.6 percent of the forest fires in Garrett County, with smoking a close second. That intentionally-set fires are still a major problem is indicated by the fact that in 1947 of the total 764 acres burned over about 560 acres, or 73 percent, were caused by incendiaries; careless brush burning accounted for the burning of 122 acres.¹

For many years the State Department of Forestry, and later the State Department of Forests and Parks, offered private wood land owners a timber appraisal service. Trees that should be removed were marked and an estimate of their current market value given. This cooperation helped prevent indiscriminate cutting and encouraged the practice of leaving enough young trees of desirable species for future crops. The

¹ State Department of Forestry, Biennial Reports 1921/23 to 1930/32, Maryland Board of Natural Resources, Fifth Annual Report, 1948.

average owner of wood land does not usually cut his own timber, since he often lacks necessary experience and equipment, and is seldom very well informed on forestry and general market conditions. He sells the standing timber to a saw mill operator who logs the tract.

Under terms of the Forest Conservancy Districts Act of 1943, timber marking is virtually obligatory. District and assistant district foresters also cooperate with saw mill operators in technical advice on use and maintenance of equipment to get the largest amount and highest grade of lumber from available timber. Applications for prospective timber cutting must be made, except where only cordwood or small amounts of wood for other purposes are needed for the owner's personal use. Before wooded tracts are lumbered they are examined, free of charge, by a State forestry technician, who furnishes owners with a report listing tree species, diameter classes, and other pertinent data, including recommendations for management. If the tract bears merchantable timber, the owner may have it marked for cutting by the same examiner, and although he must furnish two assistants, no charge is made for this service either, unless the wood lot exceeds 25 acres, in which case the rate is \$15.00 a day.

When marking is completed, the owner is given a lump sum estimate of value of marked trees at current prices. Each forester has a list of all saw mill operators in his district from which the owner may select prospective bidders. Since all trees are marked the bidder can see what is offered for sale. The forester also furnishes the owner with a form of contract which provides insurance against unnecessary damage to young growth by timber operations.

Summary

Garrett County has large areas of forested land which with fire protection, scientific management, and regulated cutting should yield a steady supply of timber for years to come. As a means of securing a constant supply of timber and also increasing and preserving the recreational resources of the County, the State has acquired, and probably should continue to acquire, non-agricultural land available for establishment of forest reserves. State and regional cooperation should be extended for protection of water sheds, control of erosion, conservation of water resources, and other worthwhile purposes.

Because of inherent conditions such as cool, humid climate, relatively heavy annual precipitation, numerous streams, much land highly dissected and in considerable degree of slope, Garrett County will continue to have forests and forestry, flood and erosion control, and development of recreational resources as important future characteristics.

On privately owned land much remains to be done in development and proper management of farm wood lots. To this end the Department of State Forests and Parks can provide much practical information and assistance through its locally stationed representatives who are acquainted with conditions in their areas.

With regard to maple products, doubtless much more could be done through proper methods of production and cooperative marketing in expanding this industry to an extent that might well make it an important source of supplementary income on many farms in Garrett County.

Note: See Appendix page 536.

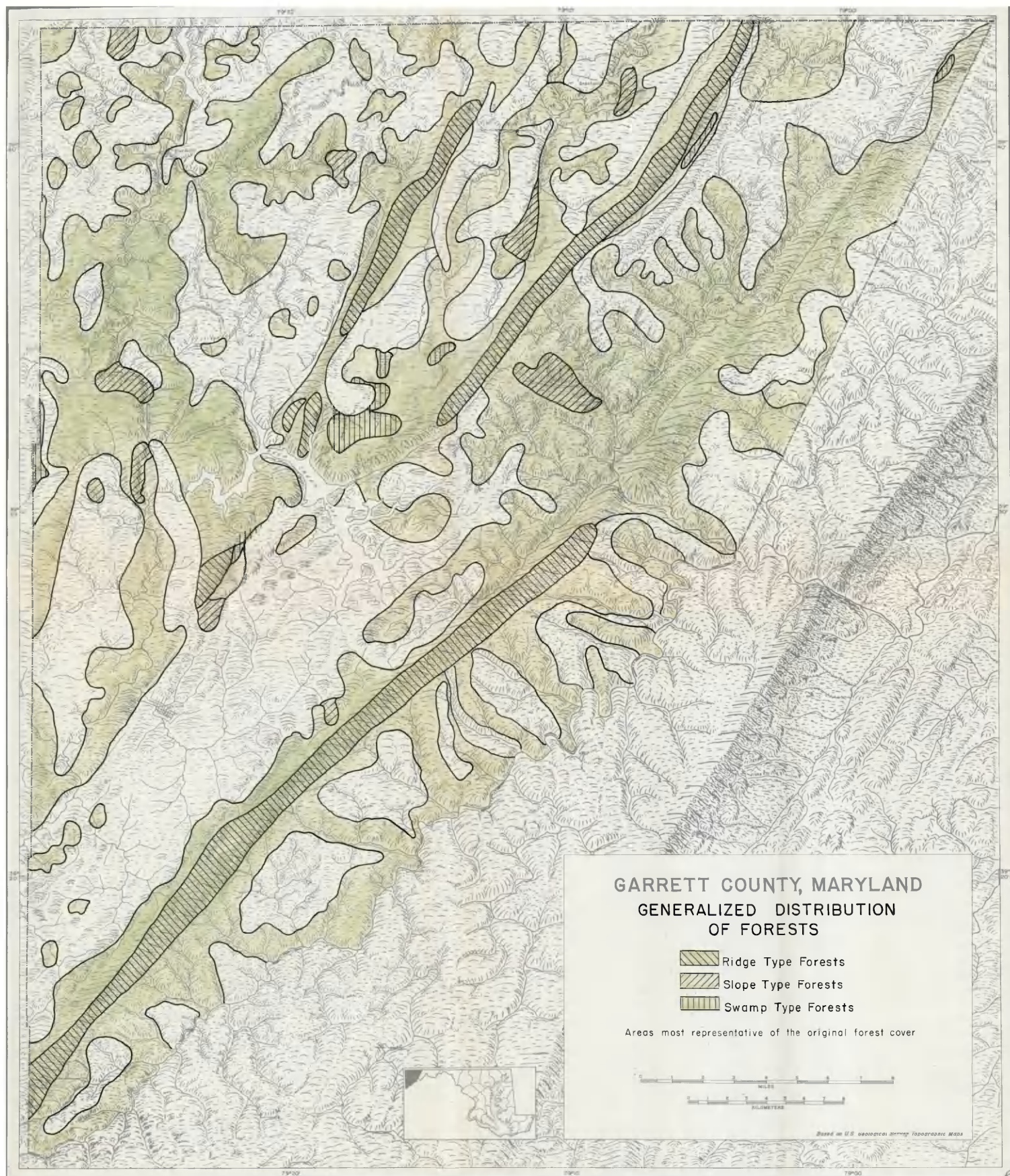


Figure H.

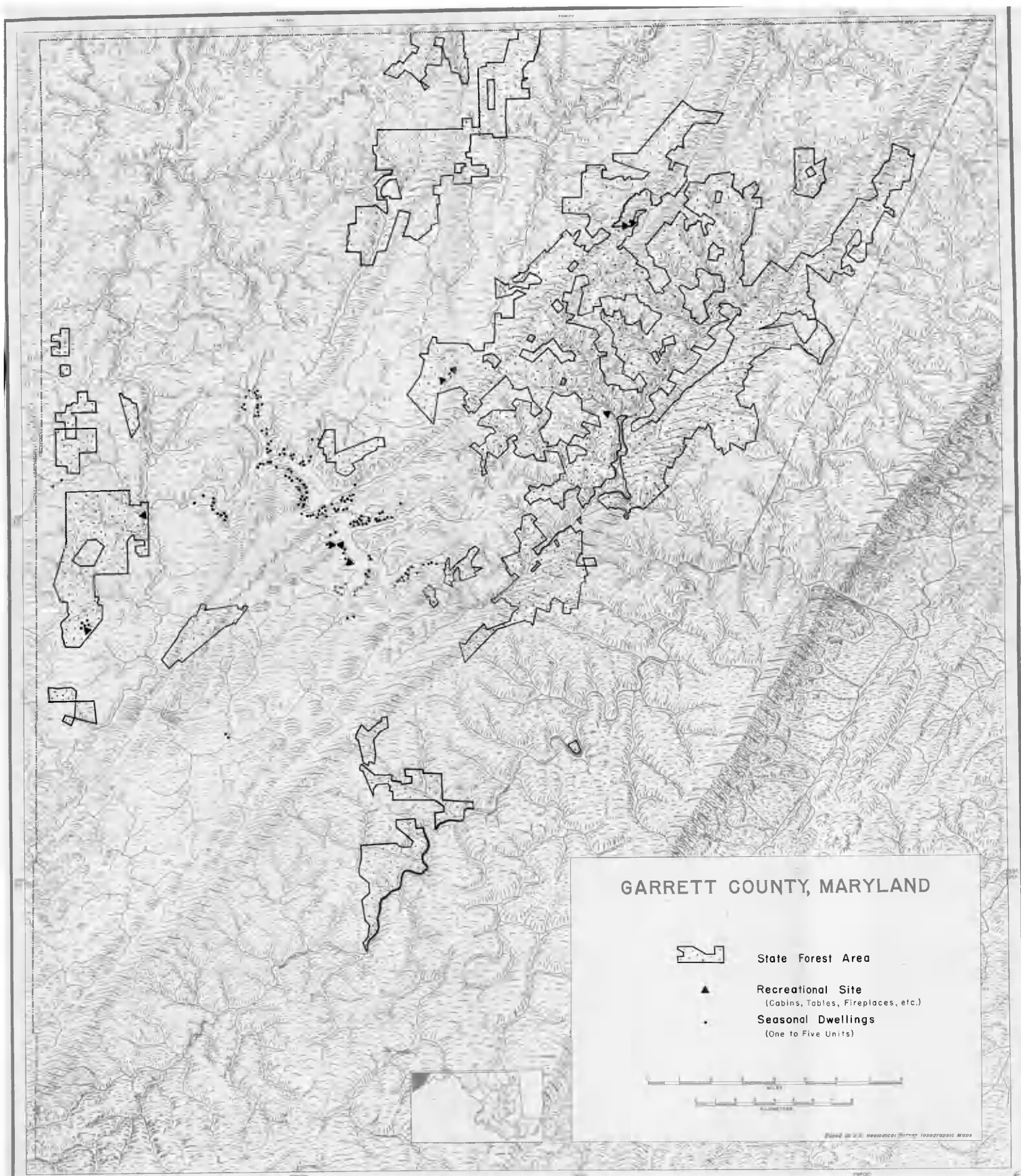


Figure J.

CHAPTER VIII

RECREATIONAL USE OF NATURAL RESOURCES

Recreational use of natural resources in Garrett County is closely allied with forest resources, their conservation and regulated use, as well as the conservation and development of water resources. In addition, the most important public recreational facilities in Garrett County are under administration of the Department of State Forests and Parks or of Game and Inland Fish as integrated programs.

The first important attempts to utilize, or perhaps commercialize, recreational resources in Garrett County were made about 75 years ago by the Baltimore and Ohio Railroad. In 1872 it built a large summer hotel at Deer Park and shortly thereafter a second huge structure at Oakland. The environs of these hotels became very popular, and many famous and wealthy people were included among hundreds of visitors every summer who came by train from Washington, Baltimore, Philadelphia, and Cincinnati. In the 1880's the Methodist church established Mt. Lake Park as a summer resort, combining religious, educational, and recreational activities along organized lines. However, by 1910 or 1915 popularity of these resorts as meccas for annual pilgrimages declined rapidly with the expanding possibilities of automobile tourism; and it was not until the 1920's that a renewed interest in Garrett County's vacation possibilities developed.

Completion in 1925 of a hydro-electric dam on Deep Creek, a tributary of the Youghiogheny River, marked the beginning of a second period in popularizing the County's recreational attractions. The waters of



Figure 15

Youghiogheny River below Swallow Falls in the
State Forest.



Figure 16

Recreation on Deep Creek Lake

Deep Creek Lake now cover about 4,500 acres of what was formerly glade land, farm land, or forest land. It is fed by springs and a number of small mountain streams. The shoreline is very irregular, including many inlets and embayments of mouths of tributary creeks, and is about 65 miles in length. The lake is about 15 miles long and varies in width from a few hundred feet, particularly where streams have cut through sandstone ridges as at Glendale Bridge or Deep Creek Bridge, to a mile and a half where embayments of tributary streams occur on opposite sides of the lake. Depths vary from about 85 feet at the dam to a few feet where shores are gently sloping. The shoreline ranges from steep, rocky, and wooded slopes to almost level natural glades or upland meadows which are used for camp sites and cottages.

Deep Creek Lake is owned by the Pennsylvania Electric Company and is leased to Maryland Game and Inland Fish Commission. The power company retains control from the water level of the lake to its property line; this area is known as a "safety" strip. Owners of adjacent property are issued permits by the power company or may obtain leases for lake shore privileges, giving them access to the lake and private use of the shoreline.

In 1947 the Maryland General Assembly enacted legislation for controlling recreation in the Deep Creek Lake area. A sanitary district authority was established to issue building permits and to control sanitation from the water line to one-half mile inland. In cooperation with State police and County officers, the State Game and Inland Fish Commission is responsible for policing the lake area.

The Commission also regulates fishing and the stocking of Deep Creek Lake with suitable species of fish, particularly trout, bass, perch, and

crappie, and provides for the protection and propagation of wildlife in the vicinity. A State fish hatchery is maintained on Bear Creek, just east of the junction of Routes 219 and 42 north of Accident, for the propagation of brook and rainbow trout for Garrett County waters.

The Deep Creek Lake area has become the summer home of hundreds of families from southwestern Pennsylvania, northeastern West Virginia, and Maryland, as well as the year-round residence of a considerable number of County families. Accommodations range from very modest one-room sleeping quarters to elaborate, well-built frame, stone, and brick houses with well-landscaped grounds. Many of these private homes are rented for varying periods of time to hundreds of summer visitors, while others stay at tourist homes at the lake or in hotels in Oakland or Mt. Lake Park.

According to County assessor's records for 1949, almost 700 lots were owned on property adjacent to Deep Creek Lake. At that time there were about 400 seasonal cabins, cottages, and permanent homes at the lake, assessed at from \$50 or \$100 to \$5,000 or more. Total assessment of property at Deep Creek Lake was almost 1-1/2 million dollars, compared to 22 million dollars for all real estate in Garrett County.¹

Visitors and residents come to the lake for boating, swimming, and fishing. More than 300 boats, registered with the Game and Inland Fish Commission, are used on the lake. These include all types of craft from kayaks, canoes, and row-boats to boats with outboard motors, sailboats, speedboats, and large motor launches. Breezes and air currents in the

1 Personal interview with J. J. Ashby, Clerk, County Commissioners of Garrett County, Maryland.



Figure 17
Summer home at Deep Creek Lake.



Figure 18
Stone cabin and private dock at Deep Creek Lake.

main valley of the lake as well as in the numerous coves, oriented in a choice of directions, make sailing conditions particularly good. At several docks adjacent to Route 219 speedboats and other craft are available to the public. Bathing beaches, both public and private, have been developed at suitable sites around the lake, and are equipped with floats and diving boards. The Garrett County Chapter of the Red Cross has equipped and maintains first-aid stations at six points on the lake.

These aspects of recreation in Garrett County have some commercial or exploitive characteristics and their development has been more or less secondary to other activities. The first attempts were made in the 1870's after the Baltimore and Ohio Railroad had crossed the Allegheny Mountains and its president had seen the possibilities of extending mountain summer climate and scenery to others, and of increasing passenger traffic on the railroad. The large hotels at Deer Park and Oakland catered to wealthy people, and little in the way of recreation was provided for the general public, with the possible exception of the servants who accompanied their employers. After construction of Deep Creek Lake in 1925, primarily as a source of hydro-electric power, several residents and groups of residents of Garrett County, including owners of property adjacent to the lake, local merchants, and businessmen, saw commercial advantages in developing it as a summer resort.

Thousands, seeking escape from hot, crowded cities
a week-end retreat. . . . Here sports of the seashore
combine with brisk mountain climate to make the perfect
combination sought by those on pleasure bent. 1/

1/ "Garrett County", published by the Deep Creek Association, 1947, p. 9.

In 1936 an association of property owners in the Deep Creek Lake area was organized

To promote the health, happiness, and interests of all who came to the lake.^{1/}

There is no question regarding the suitability of summer climate, mountain scenery, and recreational facilities available at Deep Creek Lake. The present discussion is an attempt to show that the second phase of development of Garrett County as a recreational area also had strong commercial motives. The amount of taxable property at the lake, and the amount of money spent by summer visitors for amusement, taxable beverages and food, as well as for rent, have become a considerable, although unmeasurable, source of income for the County. Some criticism, however, might be directed toward the growing tendency on the part of some owners of cabins, cottages, and tourist homes, and of the operators of eating, drinking, and amusement establishments to declare an "open season" on summer visitors. Many owners of very poorly constructed and furnished cabins ask exorbitant amounts for renting these structures. Many places where food is served apparently have very little supervision by health authorities. However, such abuses are not peculiar to Garrett County, and local caterers to public tastes are undoubtedly satisfying those of an important segment of summer visitors.

Recreational Use of State Forests

Consideration is now given to development and use of natural resources in Garrett County as a combination of outdoor recreation and conservation. The Maryland Department of State Forests and Parks, and

^{1/} Ibid., pp. 15-16.

of Game and Inland Fish are carrying out such an integrated program in Garrett County. In addition to serving as areas for reforestation, erosion control, and conservation of water resources and wildlife, three State forest areas in Garrett County are being used for their natural attractions as recreational areas. The Department of Forests and Parks, by building roads and trails primarily for fire control and forest improvement, is also making large parts of the forests accessible to the public. Within the forest areas certain tracts have been set aside and camp sites established with fireplaces and tables, cabins built for vacation use by the public, and a variety of other facilities furnished. In much of this work the Department of Game and Inland Fish works jointly with the Department of State Forests and Parks.

Savage River State Forest. In this 51,517-acre forest with elevations of 1,400 to 3,000 feet, there are over 35 miles of motor roads, over 30 miles of hiking trails, 20 miles of bridle paths, a fire lookout tower, and 4 wildlife reserves. The forest area annually attracts thousands of fishermen and hunters, and in recent years the number of deer and other game have brought more hunters there than to any other State-owned area.

At New Germany, about 8 miles south-southeast of Grantsville, a 100-acre tract has been set aside as a recreation area. It has an artificial 13-acre lake with public beach and bathhouse. About 10 rustic cabins equipped with beds and bedding, tableware, kitchen utensils, ice, firewood, and suitable for from two to six persons, can be rented for vacation use by advance reservation. In addition, there are several picnic sites with fireplaces and tables. The New Germany area is also being developed as a winter sports center. Ice-skating, tobogganning,

and skiing are attracting growing numbers of "week-enders" from late December through February. A number of tourist homes along Route 40, in the neighborhood of Grantsville, have facilities for accommodating visitors the year round. About six miles southwest of New Germany on Meadow Mountain Road is another recreation area of 50 acres in Savage River State Forest. Here, at "Whiskey Hollow" on Big Run, a tributary of the Savage River, over five miles of downhill and cross-country ski trails have been constructed on the slopes of Meadow Mountain. In addition to nine overnight cabins, there is also a ski lodge with cooking and sleeping accommodations for 26 persons, which can be used by organized groups at any time of year by advance reservation with the District Forester at New Germany.

Near High Point on Route 40 between Grantsville and Keyser's Ridge is situated one of several of the scattered outlying tracts of Savage River State Forest. Here at a forest lookout tower on the crest of Negro Mountain at 3,075 feet, a 1-1/2-acre picnic site has several tables, fireplaces, and a comfort station. The tower furnishes an exceptional vantage point for observing the plateau features of Garrett County. The popularity of this site is evidenced by the fact that over 5,000 visitors are reported annually.

During the year 1947 about 81,500 persons used the Savage River State Forest. Attendance during the months of that year, according to the official report of the Department of State Forests and Parks, was:¹

January	1,425	May	10,234	September	6,334
February	790	June	16,539	October	3,032
March	1,743	July	19,215	November	2,468
April	7,045	August	9,903	December	2,750

¹ Annual Report, Maryland Board of Natural Resources, 1948, p. 88.



Figure 19
Oakland Golf Course.



Figure 20
Ski lift on Hoop Pole Ridge, northeast of
Oakland.

In 1949 approximately 71,860 persons visited recreational areas in Savage River State Forest. The popularity of the Forest, particularly during the summer months, is shown by the following figures:¹

January	885	May	5,294	September	4,261
February	1,177	June	13,685	October	1,635
March	1,150	July	22,683	November	2,085
April	3,926	August	12,115	December	2,963

Undoubtedly a considerable number of persons in addition to those enumerated also utilized the recreational facilities during the year.

Swallow Falls State Forest. This tract of 7,458 acres is located northwest of Oakland between the Youghiogheny River and western boundary of the State, and has elevations of between 2,200 and 2,900 feet. It has over 15 miles of motor roads, over 12 miles of hiking trails, and 8 or 10 miles of bridle paths. Although not so popular for hunting and fishing as Savage River State Forest, Swallow Falls State Forest is an outstanding picnicking area with reportedly over four times as much use for that purpose as any other area in the State. This is especially interesting in view of its relative isolation in respect to centers of population. Parties come not only from many points in Maryland and nearby Pennsylvania and West Virginia, but cars with license plates from twenty different states and the District of Columbia have been seen there at one time. An outstanding scenic site containing 20 acres of virgin hemlock and white pine along the Youghiogheny and its tributaries from the west accounts for much of this patronage. Several waterfalls, including one of 70 feet on Muddy Creek, highest in the State, are other exceptional points of attraction.

¹ Ibid., 1950, p. 117.

Adjacent to Swallow Falls State Forest, a 600-acre tract called Herrington Manor, about five miles northwest of Oakland, is one of the most extensive recreational developments of the Department of State Forests and Parks. A 53-acre lake has been built on Herrington Creek with public beaches, a bathhouse, boathouse, and boats for hire. There are also 13 stone cottages fully equipped, including water and sewage facilities, for family vacation use. These are rented by advance reservation. On the average, these cottages are used from 10 to 12 weeks during the summer for periods of a week or two weeks. An assistant district forester is stationed at Herrington Manor (Post Office, Oakland).

At several suitable sites, especially at Herrington Manor and Swallow Falls, there are also picnic and camp facilities including at least 20 picnic tables, 10 fireplaces, and a comfort station. Some indication of the great increase in recreational use of Swallow Falls State Forest can be seen from the fact that in 1923, for example, 1,675 persons from ten different states and the District of Columbia camped or picnicked there, while during the calendar year of 1947 over 52,000 persons in automobiles from at least twenty states used recreational facilities at Swallow Falls State Forest areas. Monthly distribution of this use was:¹

January	955	May	1,752	September	5,700
February	174	June	7,828	October	1,651
March	237	July	14,966	November	943
April	1,698	August	14,486	December	1,734

1 Ibid., 1948, p. 88.

Its popularity for summer vacations and picnicking is indicated by the fact that 56.5 percent of attendance was during the months of July and August.

In 1949 over 88,000 persons used recreational facilities in Swallow Falls State Forest. Of these, over 50,000 were counted at the picnic area at Swallow Falls, and about 38,500 more at the Herrington Manor area. Monthly attendance at Swallow Falls picnic areas was:¹

January	51	May	1,539	September	3,988
February	82	June	7,791	October	1,601
March	153	July	20,090	November	303
April	548	August	13,039	December	1,043

At Herrington Manor the attendance was:¹

January	384	May	1,674	September	2,917
February	320	June	5,497	October	1,512
March	370	July	8,352	November	1,119
April	782	August	7,280	December	8,268

Potomac State Forest. This area of 12,057 acres has elevations between 1,500 and 3,000 feet, extending from the Potomac River up over the crest of Backbone Mountain in the southeastern part of the County. Highway 135 from Bloomington to Swanton passes through part of the forest. At present there are no permanent vacation cabins in Potomac State Forest, but it has a picnic area with fireplaces and tables, and it is made accessible by over ten miles of motor road, eight miles of hiking trails, and five miles of bridle paths. There are suitable vacation and day-use camping sites, and it is used for hunting and fishing in season. An assistant district forester is stationed at Tasker Corners, about 2-1/2 miles northeast of Kiarney on Route 560 (Post Office, Deer Park).

¹ Ibid., 1950, p. 117.

In 1947 over 21,600 persons used Potomac State Forest, and the emphasis on hunting, particularly during the deer-hunting season in December, is indicated by the following figures on use by months:¹

January	1,080	May	1,350	September	2,430
February	200	June	3,456	October	1,860
March	130	July	3,050	November	1,015
April	1,160	August	1,830	December	4,040

Comparable figures on recreational use of Potomac State Forest for 1949 show that only 9,175 persons were officially counted during the year. This decrease from figures for 1947 is partly due to lack of adequate day and overnight facilities in Potomac State Forest, and to the growing popularity of recreational areas in Swallow Falls State Forest during the deer-hunting season in December as well as in summer. Monthly figures in 1949 for visitors to Potomac State Forest were:²

January	190	May	800	September	1,290
February	170	June	755	October	520
March	235	July	890	November	1,180
April	815	August	1,320	December	1,010

A combined recreational-educational area in Garrett County, known as the Cunningham Tract, or Pleasant Valley Recreation Area, has been leased to the University of Maryland. This 1,800-acre tract, formerly part of the 30,000 acres of submarginal agricultural land purchased by the Resettlement Administration of the U. S. Department of Agriculture, is adjacent to the southern part of Savage River State Forest. It is located about six miles northeast of Deep Creek Lake on Pleasant Run at the northwest foot of Meadow Mountain, and just south of Bittering on Route 495. It has a 20-1/2-acre lake, bathing beaches, bathhouses, and other permanent recreational buildings. The tract is used for combined

1 Ibid., 1948, p. 88

2 Ibid., 1950, p. 117.

recreational-educational activities of organized groups such as 4-H clubs, under direction of the University's Extension Service. Camping and picnic facilities, including about 40 fireplaces and 40 picnic tables, comfort stations, play areas, and bathing facilities are also available to private parties and other organized groups, such as Boy Scouts. Pleasant Valley Recreational-Educational Area will probably be used by other State agencies, such as the Departments of State Forests and Parks, Game and Inland Fish, and Soil Conservation Service, for educational and demonstration purposes each summer.

Closely allied with the joint program of recreation and conservation in Garrett County, which is primarily a function of the Department of State Forests and Parks, are certain other areas which are primarily game and wildlife refuges or reservations. These are operated by the Department of Game and Inland Fish for the protection, propagation, and provision of game, fresh-water fish, and other wildlife. This department also is responsible for the administration of fishing and hunting regulations, issuing of licenses, and prosecution of violations.

In 1947 there were 11 game refuge areas with a total of about 5,000 acres in Garrett County. One, the Mt. Nebo State Forest and Game Refuge, is administered jointly by the Departments of State Forests and Parks and of Game and Inland Fish. It contains 1,895 acres, of which 1,791 were bequeathed to the State in 1941, and includes the crests and slopes of Halls Hill (Mt. Nebo), Roman Nose, and Hoop Pole Ridge, and the intervening swampy area drained by Millers Run and its branches. Parts of it are located on both sides of Route 219 between 2 to 3 miles northeast of Oakland. This area is ideal for joint use as a forest, animal, bird, and fish reserve.

Thayerville Game Refuge, of 977 acres, is located just north of Deep Creek Lake on the slopes above Cherry Creek Run. In Swallow Falls State Forest is Tolliver Game Refuge of about 200 acres. There is also a game refuge in Potomac State Forest of about the same size. Within Savage River there are four game refuges which have been set off in different districts. One is a 100-acre tract in Wolf Swamp, about three miles northeast of New Germany. Another is in Pine Swamp south of The Elbow, between Savage River and Savage Mountain, where 200 acres are set aside for wildlife propagation. There is also a 700-acre game refuge near the High Rock Lookout Tower on the eastern slopes of Big Savage Mountain, about five miles north of Bloomington. A fourth game refuge is on Bear Creek near the State Fish Hatchery, east of the junction of Routes 219 and 42 between Accident and Keyzers Ridge.

Eventually all game-refuge areas will be fenced in and programs carried out to restore and develop wildlife habitats by providing permanent natural food and cover areas, and seed stock refuges. This will be done in cooperation with farmers, conservation clubs, 4-H clubs, Boy and Girl Scout troops, Izaak Walton League, U. S. Fish and Wildlife Service, Soil Conservation Service, University of Maryland Extension Service, and public schools of the County. A permanent wildlife field superintendent is in charge of the program.

At present, game refuges are stocked annually with animals and wild fowl as they become available by trapping, by purchasing, or by raising them. These may include deer, rabbits, squirrels, raccoons, opossum, quail, wild turkeys, ruffed grouse, chuka pheasants, woodcock, ducks, geese, and rail birds. Some idea of the influence of game propagation in Garrett County is given by the increasing number of deer which are

"legally" killed during the six-day season in December of each year. In 1934, of a total of only 62 deer reported killed in the State, 49 were killed in Garrett County, by 1944 the County reported 307 of a total of 475 in Maryland, in 1945 the figure was 290 of a State kill of 381, in 1946 a record 517 deer were killed in the County, and for 1947, 1948, and 1949 the respective totals were 466, 484, and 493 deer killed in the County.

The relative importance of hunting as a form of recreation in Garrett County is indicated by the following table:

TABLE XIII
HUNTING LICENSES ISSUED - GARRETT COUNTY

Fiscal Year July 1-June 30	Resident \$1.00	Non-Resident \$15.25	Special	Total
1944-45	2,682	76	48	3,006
1945-46	3,381	109	58	3,548
1946-47	4,132	185	127	4,444
1947-48	3,852	192	84	4,128
1949-50	3,974	187	97	4,258

Computed from Annual Reports, Maryland Board of Natural Resources.

Restocking of Garrett County waters with fish, particularly brook and rainbow trout and small-mouth bass, has also been an important factor in the increasing importance of angling as a form of recreation. A State Fish Hatchery is operated on Bear Creek, about a mile east of the junction of Route 219 and 42 north of Accident. The plant includes a refrigeration room for storage of ten tons of meat for fish food, and concrete-lined ponds for rearing fingerling brook trout for restocking the natural trout streams of the County. There is also electric equipment for grinding and mixing fish food, and for pumping water.

During the fiscal year July 1, 1945 to June 30, 1946, about 10,000 mature, or legal size, and 128,000 young brook, brown, and rainbow trout were placed in 19 of the County's larger streams, mostly tributaries of the Savage and Youghiogheny Rivers, as well as in Deep Creek Lake. During the same period over 600 largemouthed bass, and over 1,200 crappie were also released in the lake. In the 1946-47 season, over 11,000 adult and 50,000 young trout were planted in streams, and 1,100 legal-size and 26,000 young largemouthed bass were placed in Deep Creek Lake. Fish planted from July, 1947 to June, 1948 inclusive were: 19,000 trout, 1,050 black bass, 600 crappie, 20,000 bluegill sunfish, or a total of over 40,000, almost all of which were mature or legal to catch during the season. During the July 1, 1949 to June 30, 1950 period, over 42,000 fish were planted in Garrett County waters. These included 32,000 sunfish, 3,400 brook trout, 1,645 crappie, and 4,650 largemouthed bass.¹

The importance of fishing in Garrett County waters is shown in the following table:

TABLE XIV
ANGLING LICENSES ISSUED - GARRETT COUNTY

Fiscal Year July 1-June 30	Resident \$1.25	3-day Tourist \$1.50	Non- Resident \$5.25	Special Boats Deep Creek Lake	Total
1944-45	1,439	863	341	21	2,664
1945-46	2,091	1,245	507	62	3,905
1946-47	2,180	1,249	564	340	4,333
1947-48	2,645	1,951	879	656	6,131
1949-50	2,928	3,255	1,354	755	8,292

Compiled from Annual Reports, Maryland Board of Natural Resources.

¹ Compiled from Annual Reports, Maryland Board of Natural Resources, 1945-50.

The rapidly increasing use of Garrett County streams and of Deep Creek Lake by County residents as well as a greater number of out-of-State anglers should be a source of encouragement as well as practical evidence of the work being done by the State Game and Inland Fish Commission. Strict enforcement of fishing regulations should also attract the most desirable type of sportsmen who appreciate the provisions being made for their recreation in Garrett County.

Summary

The present number of overnight cabins in State Forests in Garrett County is totally inadequate to meet the demand; hence, each year hundreds of requests for reservations are denied. Picnic facilities are also insufficient to meet peak attendance during summer months. To encourage the use of recreational facilities, additional cabins, tables, and fireplaces should be provided at suitable places, including several areas such as those at Swallow Falls, Herrington Manor, and New Germany, and particularly in Potomac State Forest. Plans for the future should include development of new recreation areas on the Youghiogheny Reservoir, which is easily accessible from Route 40. Due to lack of funds, many of the existing facilities are in need of extensive repairs or replacement.

CHAPTER IX

MINERAL RESOURCES

Beginning of the Coal-Mining Industry In Western Maryland

The coal deposits of Garrett County were undoubtedly known by the Indians prior to the coming of the White man, inasmuch as there are, and were, many surface outcroppings of coal which were easily recognized by early surveyors, military forces, and pioneers who penetrated the area during the middle of the 18th century.

The economic value of the deposits, however, depended upon their appraisal for utilization purposes, and actual use by settlers of the region. The deposits were located in a mountainous, forested region that would have offered little encouragement to settlers who were seeking new homes. It is possible that discovery and utilization of the coal deposits would have been delayed for many decades had this region not been on one of the principal early routes from the Atlantic seaboard to the West. Opened first as a trade route to the Ohio Valley, and used shortly afterward for military operations, it determined the line of advance of pioneer settlers. Fort Cumberland developed into a trading post of considerable importance, and by 1790, the year of the first federal census of population, there were over 4,800 residents in the area now included in Allegany and Garrett Counties, of whom about 1,000 were in the Garrett County area.

It is probable that the settlers mined and used coal locally prior to 1790. A "mine de charbon" is shown near Bloomington on a "Carte

Générale des Treize Etats Unis et Indépendants de l'Amérique Septentrionale" made by M. Bonne and dated 1782. The first coal mine in the Garrett County area was just north of Little Meadows where one Philip Hare was digging coal as early as 1800. The Thistle Mine, two miles west of Grantsville, was being worked prior to 1810. These mines supplied fuel for the blacksmith shops along the Braddock and National Roads.

The discovery of coal near Frostburg in the upper end of Georges Creek Valley in 1804 had an important influence on the development of coal mining in Maryland. The transportation route which connected Cumberland with Frederick and Baltimore, and its continuation westward from Cumberland to the Ohio Valley, made the region accessible to settlers. This National Road also provided an outlet for coal mined in the Upper Georges Creek Valley and prior to 1850 this was the general region in which the important coal mining companies were operating. Early development of this "Cumberland Basin" was stimulated during the first two decades of the 19th century by a growing recognition of the value of coal for heating and industrial purposes in eastern United States. By 1820 production of bituminous coal in the Richmond area of Virginia and of anthracite in Pennsylvania was mounting rapidly. Increased production around Frostburg, stimulated by growing demand, soon exceeded local requirements and an outlet to other markets became necessary. While some coal undoubtedly was transported overland by wagons, the markets that promised greatest demand were located down the Potomac River. Coal for down-river shipment was hauled in wagons from the mines to Cumberland, the shipping point, where it was stored in large piles along the river bank until high water in spring permitted boats to run the river. De-

livery was made at points as far east as Georgetown. The standard boat used for transporting coal was the "flat-boat" type, rectangular, and with "raking" or sloping ends. The usual dimensions were: length 80 feet, width 13 feet, depth 3 feet. Each carried 1,500 to 1,800 bushels¹ (about 60 tons) of coal with a draft of about 2 feet 6 inches. While they usually carried a crew of four men, the current was the primary means of propulsion. Some years later another class of coal boat came into use. This was the "sprung rib" boat, built of sheathing on frames of hewed timbers after the sheathing had been made pliable by steaming. They had round bottoms, sharp prows, and square sterns.

This trade was, of course, highly seasonal, shipments being made and the year's supply reaching delivery points during the period of high water. When the river reached "boating stage" the work of loading was pushed as rapidly as possible in order to dispatch all available boats while the water was high enough for navigation. Twenty boats reportedly left Cumberland in one "fleet" and as many as forty in one day. There was usually a boating stage from March until May and frequently a short period, known as the "strawberry" freshet in June, and some shorter, infrequent periods in the fall. The boats were frail structures and to touch a rock usually meant loss of the boat and even some of the crew. The boats were sold at destination for what they would bring and the crew returned to Cumberland on foot.

Market prices for coal ranged from 7 to 8 cents per bushel (75 lbs.) at Cumberland, 28 to 33 cents at Williamsburg, 35 to 45 cents at Harpers Ferry, and 50 to 60 cents at Georgetown.

1 A bushel of bituminous coal weighs between 70 and 80 pounds.

This method of transportation gradually disappeared in the face of railroad competition and ceased entirely on completion of the canal to Cumberland. The Baltimore and Ohio Railroad was completed to Cumberland in 1842 and for some time coal was brought to Dam No. 6, to which point the canal had been completed, and then loaded on canal boats for shipment to tidewater.

The Mt. Savage and Cumberland Railroad running between Cumberland and Mt. Savage (about 3-1/2 miles northeast of Frostburg) was built in 1844 by the Maryland and New York Mining Company. The line from Cumberland to Eckhart, a branch of the Cumberland Pennsylvania Railroad, was built a few years later by the Maryland Mining Company. Upon completion of the railroad to Mt. Savage, tramways were built from the mines north of Frostburg to Mt. Savage and coal was then transported in mine cars and loaded onto railroad cars at the latter point.

About this time a flume or sluiceway was built from Vale Summit to Clarysville on the Maryland Mining Company's railroad for transporting coal by a stream of water. Owing to its fragile nature, however, the coal was so badly damaged by this operation that the scheme was soon abandoned.

The freight rate from the mines at Mt. Savage and Eckhart to Cumberland was 3 cents per ton-mile and remained unchanged for several years after the opening of the roads, while the rate from Cumberland to Baltimore decreased from \$3.66 in 1845-46 and \$2.64 in 1846-47 to \$2.46 in 1849. Upon completion of the Chesapeake and Ohio Canal to Cumberland this rate was further reduced to \$1.75, but was later raised to \$2.25.

Completion of the railroad to Cumberland in 1842 not only strengthened Baltimore's connection with the westward movement, brought to

that city the coal that was needed there, and provided the railroad with a constantly increasing volume of revenue freight, but it greatly stimulated coal mining in the Upper Georges Creek Valley or Cumberland Basin. In the first year of its operation from Cumberland in 1842, the railroad hauled 1,708 tons of Maryland coal. This quantity increased annually, and by 1850 when the Chesapeake and Ohio Canal was completed to Cumberland, the railroad shipments amounted to 192,800 tons.

The Coal Deposits of Garrett County

The coal-bearing strata of Maryland are located exclusively in Allegany and Garrett Counties where they underlie a combined area of over 455 square miles in the Georges Creek, Upper Potomac, Casselman, Upper Youghiogheny, and Lower Youghiogheny Basins. The Georges Creek Basin is located in both Allegany and Garrett Counties, while the Maryland portion of the other four basins is located entirely within the boundaries of Garrett County.

There are five different series of coal-bearing strata in Maryland. Not all of the series, however, are found in each of the five coal basins just listed. The coal deposits occur in beds which are generally less than ten feet in thickness; their horizontal extent varies from a few acres to several square miles. Most of the coal beds in western Maryland are more or less horizontal. There is usually more than one bed of coal in a particular area, and some contain up to six or more. As a rule the beds lie practically parallel to each other, one above the other, and are separated by sedimentary layers that vary from a few inches to six feet or more. While the space between the coal beds may be nearly constant over large areas, it may also vary greatly, at times within a relatively short distance.

There is little uniformity in the thickness of Garrett County coal beds. Individual beds vary from thin sheets to a maximum of 14 feet in the Pittsburgh, or Big Vein. Most of the coal beds in Maryland average less than 3 feet in thickness, with some of them more or less uniform and others extremely variable. Some deposits are in the form of "lenses" which have a center thickness of several inches and a marginal thickness that diminishes practically to a sharp edge less than an inch thick. When bituminous coal is found in isolated deposits, however, it usually has the shape of a "blanket" rather than a lens. There is little relation between thickness and extent of a coal bed, since some of the thinnest beds have the largest areal extent. Some deposits may consist of a solid mass of coal, the full thickness of the bed. In many cases, however, the seam is divided horizontally into two or more sheets or "benches", separated by strata of many kinds which may range from a mere film to several feet in thickness.

Material that separates a coal bed into benches is called a "parting" if it breaks free when the coal is mined, or a "binder" if it clings to the coal on either the upper or lower side of the bench. The thinner partings usually consist of clay, and the thicker of shale. These partings, even the thinnest, have a special significance for the coal miner. Because they result from changes in conditions during deposition of the ancient vegetal material that was later transformed into coal, they also indicate possibilities of differences in character of the benches of coal that adjoin them above and below.

It is often found that in a seam which is composed of several benches, the highest and lowest contain coals that are inferior in grade to that in the remainder of the seam. As a rule the inferiority of coal in the

highest bench is caused by an abnormally high sulphur content and in the lowest bench by an abnormally high ash content. The best coal is usually found in the middle benches of a seam, and as a rule the thickest bench contains the purest coal of the entire seam. In addition to difference in grade of the coals comprising the benches, there may also be other differences in characteristics.

Certain sediments are usually found associated with coal, although exceptions are not infrequent. Coal deposits generally rest upon beds of clay which, because of its low content of alkalies, has an important economic value as a fire clay. This underlying bed or floor is composed of soil from which ages ago the alkalies were extracted by the growing plants which constituted the coal-forming flora.

The roof of a coal bed usually consists of shale, although it may consist of any one of many kinds of rock. Consolidated sediments that overlie coal beds are materials that were deposited upon, and thus preserved, accumulated vegetal debris. The character of the roof of a coal bed is a most important factor in mining operations. If a thick, solid rock overlies the coal seam, fewer supports are required, and accidents from falling material are less frequent than when a thin, friable material constitutes the roof of the seam. Setting a complicated system of roof supports is an important item in the cost of mining which places the operator involved at a disadvantage when competing with similar coals under a solid rock roof.

When coal beds were laid down their position must have been nearly or quite horizontal, but at the present time may be more or less inclined. This change in the attitude of strata has been caused by folding at the end of the Paleozoic era. During this time most of the rocks

on, and east of, the Allegheny Front were turned at high angles. West of the Allegheny Front the beds were only gently folded. These folds were both anticlinal and synclinal, with coal strata carried in both. As previously mentioned, coal deposits in Garrett County are now found only in the synclines or basins, since the coal strata that were formerly contained in the anticlines or upfolds, have long since been removed by erosion.

Georges Creek Basin. This is the oldest and most important coal-producing field in Maryland, and the reputation that Maryland coals acquired in the early days of coal mining in the State was largely made by the quality of the coal from this field.

The Georges Creek Basin lies between Dan's Mountain on the east and Big Savage Mountain on the west, and extends southwesterly from the Pennsylvania line to the Potomac River. It is about 20 miles long and averages about 5 miles in width. Most of the basin lies in Allegany County, the northern end of the Allegany-Garrett County line being close to the western side of the basin. This line, starting at the crest of Big Savage Mountain, gradually encroaches upon the area until at the southern end of the basin it lies close to its eastern boundary.

The basin may be considered as the northeastern extension of the Upper Potomac Basin, in the synclinal valley which is bisected by the Savage River, a branch of the Potomac, and the general structure of the basin is that of a deep, broad syncline. It contains the most complete sequence of coal-bearing strata to be found in the State, extending from the Permian to the base of the Middle Carboniferous, or Pennsylvanian. Because there are many more coal beds in the Georges Creek Basin, espec-

ially in the Conemaugh series, than in the other four basins of Garrett County, it is the most important coal field in the State.

The coal measures of the Georges Creek Basin have been extensively eroded by the larger streams, the upper formations having lost more, of course, than the lower. Outcrops of the upper coal seams occur not only on the flanks of the syncline but also in the main stream valleys, and as the streams descend from higher to lower levels these outcrops rise higher and higher above the stream beds. It is only at the extreme southern and northern ends of the basin, however, that the lower coals have been seriously affected by valley cutting.

The more important coals that have been worked in the Georges Creek Basin are: Waynesburg, Lower Sewickley (Tyson), Pittsburgh or Big Vein, Lower Bakerstown or Thomas (Upper Freeport in some surveys), Lower Freeport or Barrellville, Upper Kittanning or Montell, and Harlem or Fossil.

As previously indicated the coal series of the Georges Creek Basin are unique in Maryland, inasmuch as it is the only basin where all five of Maryland's coal formations have been found. They are, in order of their descent:

1. Dunkard coals. Highest of the five found in the State, these coals are referred to in the early surveys as the Upper Barren measures, and are found in Maryland only in the central portion of the Georges Creek Basin. Rather restricted in area and generally too thin to be of economic value, they have not yet been materially developed.
2. Monongahela coals. These are found only in the Georges Creek Basin. A former small area in the Upper Potomac Basin was worked out long ago. This is the most valuable series in Maryland, containing the Pittsburgh or Big Vein. Referred to in early surveys as "Upper Productive Measures", they were, and still are, in the principal seam mined in the State. Coals of the Monongahela series are more accessible than are the older coals which are deeply buried throughout the central part of

the basin. The workable coals of the Monongahela series in the Georges Creek Basin include: Pittsburgh or Big Vein, Redstone, Lower Sewickley (Tyson), and Waynesburg (Koontz).

3. Conemaugh coals. Lying underneath the Monongahela and Dunkard, they were referred to earlier as the Lower Basin Measures. This series as a whole is less important than the Allegheny series immediately underneath, being more restricted in areal extent, more lenticular and variable than either Allegheny or Monongahela. The coals of the Conemaugh series which may be considered workable in the Georges Creek Basin include: Piedmont, Lower Bakerstown (Thomas), Upper Bakerstown (Maynadier), Harlem, Barton (Four-Foot), Wellersburg, Franklin (Dirty Nine-Foot), and Little Pittsburgh.
4. Allegheny coals. These are more important than the Conemaugh Series just above, or the Pottsville Series just below. Some seams are mined in the lower part of the basin. The Allegheny coals have larger areal extent than have those of later or upper series, and undoubtedly will be mined extensively, especially after exhaustion of the Pittsburgh, or Big Vein, coal. Coals of this series considered workable include: Upper Mount Savage, Upper Kittanning (Montell), Lower Kittanning (Ellerslie), Upper Freeport (Davis), and Lower Freeport (Barrellville).
5. Pottsville coals. These lie at the base of Maryland's coal-bearing strata. Here they are far less valuable than farther south in Virginia and West Virginia. In the latter state they include the famous Pocahontas and New River seams. Several beds are present in Georges Creek Basin, but are hardly workable, being less than 2 feet in thickness.

The Upper Potomac Basin. This coal basin lies in the southern and southeastern parts of Garrett County, to the east and south of Backbone Mountain. The North Branch of the Potomac flows near the axis of the basin, so that only about one-half of the area is in Maryland. Structurally the basin is a continuation of the Georges Creek syncline, although it is somewhat wider and shallower. The upper strata of the Conemaugh series, except for two small areas where deposits of the Monongahela series have been found, and most of the overlying beds have eroded from the western or Garrett County side of the basin. The important coal seams on the Maryland side of the basin are: Barton (sometimes called Four-Foot or Bakerstown), Lower Bakerstown or Thomas (Upper

Freeport), Upper Freeport or Davis (previously called Lower Kittanning).

There are four coal series in the Upper Potomac Basin. In order of descent they are:

1. Monongahela coals. These are found only in two small areas, one of which was on the side of Manor Hill but has been worked out. None has any economic value now.
2. Conemaugh coals. They are poorly developed in the Upper Potomac Basin. They were formerly known as Lower Barren Measures. Seams of possible use are: Piedmont, Lower Bakerstown (Thomas), Upper Bakerstown (Maynadier), Harlem, and Barton (Four-Foot).
3. Allegheny coals. These are the most important coal series in this basin. Several are of workable thickness especially toward the southern end. Since almost all of the overlying Dunkard and Monongahela series have been removed by erosion, these coals can be reached by drifts or short shafts throughout the central part of the valley. They include Upper Kittanning (Montell) and Upper Freeport (Davis).
4. Pottsville coals. These are almost absent in the Upper Potomac Basin, lying either below the river level, or occurring in thin, poorly defined outcrops along the slopes.

The Casselman Basin. This basin lies between Meadow and Negro Mountains, which join just north of Deep Creek Lake in a typical, canoe-shaped, synclinal structure. All of the Dunkard and Monongahela series, as well as the upper strata of the Conemaugh, have been eroded. The most important coal seams that have been worked in this basin are: Lower Bakerstown (Thomas), Upper Freeport (Davis or, locally, Beachy or Grantsville), and Harlem.

Three series are of some significance in the Casselman Basin:

1. Conemaugh coals. These are the best known since they lie near the surface and have generally been dissected by streams, so that they outcrop at many points. They are the principal source of coal for local consumption and probably will continue to be unless further evidence shows the underlying Allegheny coals to be of considerable economic value.

2. Allegheny coals. These lie at considerable depth, except where they outcrop along the flanks of the syncline. Their general character and extent is not very well known, but as far as is known the Upper Freeport (Davis) seam is the only one of this series that is workable. Although the workable coal of this series underlies a much greater area than do the Conemaugh coals, comparatively deep shafts will be needed to reach it.
3. Pottsville coals. The Pottsville coals in this basin are thin, unimportant seams, outcropping around the margin of the syncline and apparently of little economic value.

The Upper Youghiogheny Basin. This basin lies in west-central Garrett County, between Snaggy Mountain on the west, and Roman Nose and Halls Hill, the continuations of Meadow Mountain, on the east. This is also a broad, shallow syncline which is somewhat irregular in the central part. The Dunkard, Monongahela, and most of the workable Conemaugh coals are absent, the Allegheny containing the main beds. Much of the coal now mined in this field is reached by means of slope and shaft entries, although strip mining is also carried on. The most valuable seams are: Piedmont, Upper Freeport (Davis), and Lower Freeport (Barrellville). The three series in the basin may be described as:

1. Conemaugh coals. Of limited extent only, all but the lower bed of these coals is entirely removed. Small, scattered areas in the central part of the basin contain workable seams of Piedmont, Lower Bakerstown (Thomas), and Upper Bakerstown (Maynadier).
2. Allegheny coals. They underlie most of the basin, although the upper beds of this series have been considerably dissected by the major streams. Outcrops are located along the stream valleys; they are the most important in the basin and have been the most mined. They include: Upper Kittanning (Montell), Lower Freeport (Barrellville), and Upper Freeport (Davis).
3. Pottsville coals. These coals are thin here and of almost no economic value. They are found around the margins of the syncline and only the Lower Mercer seam is economically workable.

The Lower Youghiogheny Basin. The Garrett County portion of this basin is small and is located in the northwest corner of the County, west of Winding Ridge and north of Dog Ridge. Most of the field lies in adjoining Pennsylvania and West Virginia. The general structure is again that of a broad, shallow syncline, with a low anticline in the western portion. The Dunkard and Monongahela series have been removed by erosion, but the basin contains coal seams ranging from the Upper Conemaugh down to the base of the Pottsville, the lowest of the five series found in Maryland. Although all seams of the Conemaugh are represented they are, as a rule, unworkable. The coals of this basin, generally speaking, are less valuable than those of the other basins of the County. Most important of the seams in this field are the Lower Bakerstown (Thomas) and Lower Kittanning (Ellerslie). The three series present are:

1. Conemaugh coals. These are thin and unworkable, even for local use as a rule. They include the following seams, however, which have been worked to some extent: Brush Creek, Lower Bakerstown (Thomas), and Harlem.
2. Allegheny coals. They extend over most of the basin and are the principal series of this district. The lower beds are deeply buried and require slope or shaft mining. The workable seams include Lower Freeport (Barrellville) and Upper Freeport (Davis).
3. Pottsville coals. As in the other basins, these coals have little or no economic value. They outcrop around the eastern and southern rim of the basin and extend westward and northward into Pennsylvania and West Virginia. None of the Pottsville seams ever approaches two feet in thickness and thus they can hardly be considered workable.

TABLE XV
PERCENTAGE DISTRIBUTION OF COAL PRODUCTION
IN MARYLAND - BY COAL BASINS

(For selected years)

Year	Georges Creek	Upper Potomac	Cassel- man	Lower Youg- hiogheny	Upper Youg- hiogheny	% in Garrett County
1923	71.0	26.1	1.0	1.3	.6	34.0
1924	72.0	26.7	.2	.9	.2	31.1
1925	74.7	23.6	.1	1.5	.1	28.9
1926	76.7	21.0	.4	1.8	.1	26.1
1927	77.7	20.6	.3	1.4		26.5
1928	77.8	20.8	.2	1.1	.1	25.8
1929	74.1	24.0	.5	1.3	.1	30.3
1930	72.6	25.2	.8	1.3	.1	32.7
1943	57.5	39.5	2.5	.0	.5	42.6
1944	55.0	42.7	1.9	.0	.4	46.1
1945	60.0	38.2	1.4	.0	.4	46.3
1946	60.0	33.5	5.6	.0	.9	49.4
1947	54.3	39.6	2.5	.0	3.6	55.9
1948	54.5	40.6	2.9	.1	1.9	54.4

Computed from Annual Reports. Maryland Bureau of Mines.

Most of the Maryland part of the Georges Creek Basin is in Allegany County and is the source of all that County's coal production. Its relative importance declined rather steadily except for the 1945-1946 period when strip mining, partly in Garrett County, caused a small increase.

TABLE XVI
PRODUCTION OF COAL AND PERCENTAGE OF TOTAL
BY COAL BASINS -- GARRETT COUNTY
(for selected years)

Year	Upper Potomac		Georges Creek		Casselman River		Lower Youghiogheny		Upper Youghiogheny		Total
	net tons	%	net tons	%	net tons	%	net tons	%	net tons	%	
1923	599,032	78.5	97,811	12.8	23,438	3.1	29,928	3.9	12,889	1.7	763,098
1924	550,573	83.7	81,282	12.4	3,109	.5	19,322	2.9	3,536	.5	657,822
1925	635,561	80.9	103,659	13.2	4,264	.5	40,160	5.1	2,093	.3	785,737
1926	646,323	80.1	92,387	11.4	11,839	1.5	54,882	6.8	1,872	.2	807,303
1927	571,159	79.7	98,833	13.8	8,371	1.2	37,205	5.2	723	.1	716,291
1928	556,217	80.7	94,597	13.7	6,611	.9	30,087	4.4	1,990	.3	689,502
1929	636,630	79.5	113,109	14.1	13,365	1.7	35,427	4.4	2,044	.3	800,575
1930	573,084	77.0	122,319	16.4	18,167	2.5	28,261	3.8	2,385	.3	744,216
1943	764,497	91.2	16,678	2.0	47,760	5.7	0	.0	9,678	1.1	838,613
1944	801,221	92.2	24,674	2.8	34,707	4.0	0	.0	8,728	1.0	869,330
1945	679,421	82.4	114,144	13.8	24,324	2.9	0	.0	6,738	.9	824,627
1946	680,940	67.8	191,740	19.1	114,836	11.4	0	.0	16,729	1.7	1,004,245
1947	812,945	70.9	209,460	18.3	50,669	4.4	0	.0	72,787	6.4	1,145,861
1948	669,836	74.7	146,385	16.3	47,028	5.2	1,968	.3	31,081	3.5	896,298
1949	355,206	76.0	80,201	17.2	25,440	5.4	2,824	.6	3,696	.8	467,367

Compiled from Annual Reports, Maryland Bureau of Mines.

Although for many years the bulk of Maryland's coal production has come from the Georges Creek Basin, that of Garrett County has been preponderantly from the Upper Potomac Basin, except that strip mine operations in the Georges Creek area after 1943 increased output there considerably for several years. The Casselman River Basin, which has contributed relatively little to production, has large reserves that may be developed in the future. The Lower Youghiogheny Basin has had a very small share since abandonment and removal of the Confluence and Oakland Railroad in 1942. The Upper Youghiogheny coals have been but little exploited thus far, except for stripping operations in 1947 and 1948.

TABLE XVII

TONS OF COAL PRODUCED BY SEAMS - GARRETT COUNTY

(As reported by operators)

1930-1939

Seam	1930	1931	1932	1933	1934	1935	1936	1937	1938	1939
1. Kittanning	510,853	432,167	359,255	338,527	338,884	311,744	422,540	458,084	366,541	401,579
2. Freeport	63,307	53,330	44,429	32,608	32,656	38,981	47,723	63,779	98,628	90,631
3. Bakerstown	127,904	117,281	73,428	82,775	34,659	37,883	14,568	15,044	11,147	16,057
4. Morgart	5,197								297	
5. "C" Prime	35,424	40,128	26,850	11,699	14,028	25,542	48,424	49,150	46,420	92,608
6. "B" Seam	151	74	108	106	168	149				
7. New River	509			280	798					
8. Big Vein		1,473		619	1,686		397	114		
9. Tyson				619				450	1,227	644
10. 18-inch Seam					355	24				
11. Harlem (Harlan)					70	66				
12. Split Six						4,064	373	1,407	1,790	1,247
13. Copper (New River)						300	180	300		580
14. Louis ("C" Prime)						9,440	9,373			
15. Clarion							55	89	254	155
16. Mahoning							539		267	169
17. E "C" Seam								2,819	214	
18. Honeycomb								431	559	1,205
19. Dirty "5"								114	22	
20. Sandrock										955
21. Miscellaneous and Unknown	869	362		356	809	337	277	50	1,163	547
Total	744,214	644,815	504,070	467,589	424,113	428,530	544,449	591,831	528,529	606,377

Compiled from Annual Reports of Maryland Bureau of Mines, 1930-1939.

For twenty years or more the bulk of Garrett County's coal has come mostly from a relatively few seams. These are mainly the Lower Kittanning, Upper Freeport, Bakerstown, and more recently the Big Vein and Tyson. The

TABLE XVIII

TONS OF COAL PRODUCED BY SEAMS - GARRETT COUNTY

(As reported by operators)

1940-1948

Seam	1940	1941	1942	1943	1944	1945	1946	1947	1948
1. Kittanning	365,404	468,160	671,537	655,839	721,841	481,239	434,747	454,103	401,685
2. Freeport	95,395	85,131	92,962	60,989	89,825	209,970	322,000	414,735	268,117
3. Bakerstown	20,082	22,664	23,903	20,967	27,239	31,374	39,868	47,711	51,879
4. Morgart			5,520	8,165					
5. "C" Prime	51,878	74,115	32,614	13,045				960	
6. "B" Seam									
7. New River			3,355						
8. Big Vein	648	12,822	1,116		2,606	85,977	175,165	147,313	66,398
9. Tyson		1,268	1,714	2,956	3,258	3,455		23,729	42,300
10. 18-inch Seam									
11. Harlem (Harlan)									
12. Split Six	854	661		1,462	2,309				
13. Copper (New River)	1,336	1,114	1,167						1,115
14. Louis ("C" Prime)									
15. Clarion	5,457	29,158	14,504	60,048	1,632			51,732	
16. Mahoning									
17. E "C" Seam		3,407		14,125	19,676	12,535			10,856
18. Honeycomb	940	896		400	943				142
19. Dirty "5"									
20. Sandrock	624	416							
21. Miscellaneous and Unknown	1,248	4,507	108	615		75	32,465	5,576	53,803
Total	543,866	704,319	848,500	838,611	869,329	824,625	1,004,245	1,145,859	896,295

Compiled from Annual Reports of Maryland Bureau of Mines, 1940-1948.

figures are based in part on names reported by operators, which for several reasons are not always correct. However, the preponderance of 5 or 6 seams out of 20 or more that have been worked for several decades is significant.

Maryland Coals Compared
With Coals of Nearby Competing States

The soft coal trade in the United States is highly competitive, especially trade in highest grade bituminous, or semi-bituminous, coal. This coal undoubtedly represents the "cream" of the market, since it is particularly suitable for raising steam, domestic and industrial heating, and for blending in the manufacture of metallurgical coke. Practically the entire output of Garrett County mines consists of semi-bituminous coal, although total production of this type is relatively small compared to that of Pennsylvania, West Virginia, and Virginia. Thus it must be marketed in direct competition with similar coals available in much larger quantities in neighboring regions. It is, therefore, necessary that comparative qualities of these competing coals be known, in order that it may be possible to capitalize on any outstanding characteristics which the local product may possess. This is especially important in the formulation of any plans for a more extensive sale of County coals.

For many years the "Pittsburgh" or "Big Vein" coal seam was the leading producer in Maryland. The coals from this bed early acquired a wide reputation as being among the best for steam-raising purposes. In later years, however, many smaller coal seams were opened and relatively large quantities of coal taken from them annually. Because of the enviable reputation achieved by the "Big Vein" coals for their superior qualities in both domestic and industrial uses, the idea has developed, unfortunately, that these qualities are reflected in the product of all other seams in the County. While some of these other coals are excellent, and several have characteristics which make them particularly suitable for specialized uses, there are also marked differences in some cases between these coals and those of the "Big Vein".

TABLE XIX

ANALYSIS OF "LEADING" SEMI-BITUMINOUS OR SMOKELESS COALS
OF MARYLAND, PENNSYLVANIA, WEST VIRGINIA, AND VIRGINIA
(Arranged stratigraphically, from top to bottom)

Coal Seam	Fixed Carbon	Volatile Matter	Moisture Content	Ash Content	Sulphur Content	Heating Value
	%	%	%	%	%	B.T.U.
Maryland Semi-Bituminous Coals:						
Tyson	71.35	19.10	2.60	6.95	1.20	14,135
Pittsburgh (Big Vein)	72.00	18.05	2.40	7.55	1.00	14,100
Barton	71.00	17.05	2.30	9.65	1.55	13,700
Lower Bakerstown	68.00	19.05	2.95	10.00	1.65	13,590
Piedmont	71.55	15.50	2.75	10.20	1.45	13,545
Upper Freeport	69.80	17.55	2.75	9.90	1.85	13,650
Lower Freeport	74.70	16.65	3.75	4.90	1.15	14,255
Upper Kittanning	68.20	16.60	2.75	12.45	1.95	13,130
Pennsylvania Semi-Bituminous:						
Pittsburgh	69.00	20.60	2.90	7.50	.95	14,045
Upper Freeport (Cambria Co.)	67.40	21.60	2.75	8.25	1.55	13,930
(Somerset Co.)	66.30	18.50	2.40	12.80	1.80	13,865
Upper Kittanning (Cambria Co.)	71.90	16.25	2.55	9.30	2.10	13,865
(Somerset Co.)	71.00	17.35	2.75	8.90	1.40	13,810
Lower Kittanning (Cambria Co.)	72.45	18.65	2.30	6.60	1.44	14,400
(Somerset Co.)	73.05	16.20	2.75	8.00	1.70	13,990
Bloss	70.25	19.10	1.40	9.25	.70	14,000
Kelly	69.00	17.60	1.10	12.30	2.30	13,500
Barnett	72.25	17.20	2.10	8.45	1.90	14,300
Fulton	71.80	18.30	1.20	8.70	1.45	14,200
West Virginia Semi-Bituminous:						
Bakerstown	73.83	15.05	.70	10.42	2.23	14,204
Upper Freeport	71.11	14.92	3.61	10.35	1.73	13,473
Sewell (McDowell Co.)	74.30	19.00	2.35	4.35	.70	14,730
(New River Dis)	72.20	22.50	2.10	3.20	.65	14,860
Welch	71.35	19.10	1.90	7.35	.70	14,430
Beckley	76.45	17.20	2.55	3.60	.65	14,750
Fire Creek	74.70	18.00	2.40	4.90	.65	14,600
Pocahontas No.6	75.35	22.20	1.35	3.10	.60	14,865
No.4	77.40	15.95	1.90	4.75	.65	14,660
No.3	75.00	17.75	2.60	4.65	.65	14,635
Virginia Semi-Bituminous:						
Pocahontas No.3	71.50	21.20	2.90	4.40	.55	14,550

Compiled from Keystone Coal Manual, 1930

Garrett County coals, as well as those of competing areas, should be sold on their individual merits. Table XIX indicates that leading semi-bituminous coals of Maryland compare favorably with those of Pennsylvania, West Virginia, and Virginia, and, on the basis of analysis, should compete on advantageous terms with similar coals produced in the other three states.

Range analyses, by seams, of coals in Garrett and Allegany Counties. The coal beds currently being worked in Garrett and Allegany Counties range from 3 feet of bony, or shaly, coal in small veins in many mines to a thickness of 14 feet of nearly pure coal in the Pittsburgh or Big Vein seam. Thinner beds, such as the Barton, Montell, and Thomas, are usually worked for the 3 or 4 feet in the purest section of the seam. All seams actively mined for general commercial shipment are semi-bituminous in rank.

Barrellville Seam. See Lower Freeport Seam.

Barton Seam. Also known as Four-Foot Seam. This seam is mined in the Georges Creek and Upper Potomac districts, where it reaches a maximum thickness of 42 inches. Range analysis for the Barton Seam shows:

Fixed Carbon	69.6 -	73.1 %
Volatile Matter	14.9 -	20.3
Moisture	1.3 -	3.0
Ash	7.8 -	11.6
Sulphur	.6 -	3.0
B.t.u.	13,345 -	14,005 units
Fusion Temperature	2,110 -	3,010 degrees F.

Bakerstown Seam. See Lower Bakerstown Seam.

Big Vein Seam. See Pittsburgh Seam.

Davis Seam. See Upper Freeport Seam.

Elk Garden Seam. See Pittsburgh Seam.

Fourteen-Foot Seam. See Pittsburgh Seam.

Freeport Seam. See Upper and Lower Freeport Seams.

Honeycomb Seam. See Lower Bakerstown Seam.

Kittanning Seam. See Upper Kittanning Seam.

Koontz Seam. See Waynesburg Seam.

Lower Bakerstown Seam. Also known as Honeycomb, Thomas, and Three-Foot Seams. This seam is mined in the Georges Creek and Upper Potomac fields and has been developed to a lesser extent in the Casselman and Youghiogheny Basins. A variable shale parting splits the bed into two benches in the Georges Creek and Upper Youghiogheny Basins; the upper bench reaches a thickness of almost 4 feet in parts of the Georges Creek field, but the lower bench is thin and unimportant. In the Casselman and lower Youghiogheny Basins there is no division and the seam ranges from 18 to 36 inches in thickness. Range analysis for the Lower Bakerstown Seam shows:

Fixed Carbon	61.4 - 72.4 %
Volatile Matter	15.6 - 22.3
Moisture	1.8 - 4.2
Ash	5.9 - 19.9
Sulphur	1.4 - 4.0
B.t.u.	11,690 - 14,190 units
Fusion Temperature	2,150 - 2,710 degrees F.

Lower Freeport Seam. Also known as Barrellville Seam. This seam is mined in Georges Creek, Upper Potomac, and Upper Youghiogheny Basins, where it ranges from 42 to 48 inches in thickness. In the Georges Creek section the seam is frequently split into two benches by a thick parting.

Montell Seam. See Upper Kittanning Seam.

Piedmont Seam. Also known as the Six-Foot Seam. This seam is mined in Georges Creek, Upper Potomac, and Upper Youghiogheny Basins. The seam is subject to rapid changes in thickness, reaching a maximum of about 6 feet in the vicinity of Piedmont, West Virginia. In Maryland mines in this seam, the thickness ranges from 48 to 54 inches. The seam was designated as the Lower Kittanning in some of the earlier State reports. In some places the coal carries a series of 1- or 2-inch partings between beds 1 or 2 feet thick. Some reports indicate that the Piedmont seam is possibly a rider or upper bench of the Davis seam, but the Piedmont bed is best in quality in sections where the underlying Davis seam is inferior. Range analysis for the Piedmont seam shows:

Fixed Carbon	57.5 - 73.9 %
Volatile Matter	14.0 - 25.7
Moisture	1.2 - 4.3
Ash	8.4 - 14.8
Sulphur	.7 - 4.8
B.t.u.	13,220 - 13,880 units
Fusion Temperature	2,150 - 3,010 degrees F.

Pittsburgh Seam. Also known as Big Vein, Elk Garden, or Fourteen-Foot Seams. This seam is the most important bed worked in the Georges Creek district and has been the chief source of Maryland coal for almost a century. A large part of the present output, however, is coming from second and third mining. This seam has been found to reach a maximum thickness of 22 feet at the southern end of Georges Creek Basin, but this is exceptional. Generally the seam is divided into three parts: a typical section shows 1-1/2 feet of top coal underlying a shale roof and separated from the breast coal by a well-defined parting; the breast or middle section ranges from 6 to 8 feet in thickness and in turn is separated from the bottom coal by a shale layer or "mining ply" 2 to 3 inches thick; the bottom bench of coal, ranging from 2 to 3 inches in thickness, which formerly was frequently left, is now mined with the rest of the seam. Coal from the Pittsburgh seam typically has a jet-black and glossy appearance. Range analysis for the Pittsburgh seam shows:

Fixed Carbon	61.9 - 79.3 %
Volatile Matter	14.0 - 22.0
Moisture	1.7 - 4.6
Ash	5.1 - 11.9
Sulphur	.6 - 1.7
B.t.u.	13,070 - 14,480 units
Fusion Temperature	2,600 - 3,010 degrees F.

Sewickley Seam. See Tyson Seam.

Six-Foot Seam. See Piedmont Seam.

Split-Six Seam. See Upper Freeport Seam.

Thomas Seam. See Lower Bakerstown Seam.

Three-Foot Seam. See Lower Bakerstown Seam.

Tyson Seam. Also known as Sewickley and Lower Sewickley. This seam is mined in Georges Creek Basin, where it ranks second in importance to the Pittsburgh bed. The Tyson is double-bedded and consists of a main lower bed with a top split, or rider, at many places. Seam thickness ranges from 28 to 54 inches. Generally the thinner coals are free from interbedded shale, but the thicker coal may carry one or two streaks of impurities near the center of the seam. In some sections, there are several small binders which can usually be removed in loading out the coal; in others, the bed shows neither partings nor bone coal and, for the most part, the coal mined from this seam has no serious shale or bone partings. Range analysis for the Tyson seam shows:

Fixed Carbon	66.4 - 76.2 %
Volatile Matter	13.5 - 21.2
Moisture	1.3 - 4.7
Ash	3.8 - 15.9
Sulphur	.9 - 2.1
B.t.u.	12,290 - 14,620 units
Fusion Temperature	2,800 - 3,010 degrees F.

Upper Freeport Seam. This is one of the most widely distributed and valuable seams in Maryland. It is found in the Cumberland-Piedmont district, where it also is known as the Davis and Split-Six seams; in the Casselman Basin, where it is called Beachy or Grantsville bed; and in the Upper Youghiogheny Basin, where it is known locally as the Corinth Seam. Important commercial development, however, occurs only in the Upper Potomac field, where the seam ranges from 48 to 63 inches in thickness. A clay binder usually is present between two benches which range from a few inches to several feet in thickness. In the southern part of the Upper Potomac Basin, around Kempton, the best coal is found in the upper bench; while the lower bench is less pure and carries a number of binders of varying thickness. Although the seam reaches a thickness of 6 feet in some localities in Georges Creek Basin, it thins out toward the northern part of that area. Range analysis for the Upper Freeport Seam in the Cumberland-Piedmont district shows:

Fixed Carbon	63.6 -	72.8 %
Volatile Matter	15.4 -	21.9
Moisture	1.7 -	5.3
Ash	5.3 -	14.1
Sulphur	.8 -	4.2
B.t.u.	12,890 -	14,245 units
Fusion Temperature	2,150 -	2,680 degrees F.

Upper Kittanning Seam. Also known as the Montell, this seam is mined in Georges Creek district, where it ranges from 48 to 60 inches in thickness, and also in the Upper Youghiogheny Basin west of Oakland. In the Georges Creek district the seam is split in many places by a thick parting near the top. Range analysis for the Upper Kittanning Seam in the Georges Creek Basin shows:

Fixed Carbon	64.5 -	71.6 %
Volatile Matter	15.2 -	16.3
Moisture	1.9 -	3.3
Ash	9.6 -	15.5
Sulphur	.8 -	3.6
B.t.u.	12,510 -	13,540 units
Fusion Temperature	2,300 -	3,010 degrees F.

Waynesburg Seam. Also known as Koontz, this seam is mined in Georges Creek Basin, where it ranges from 48 to 52 inches in thickness. The seam is separated into two benches by coal and bone partings, which are removed by the miner in loading. A tendency to break into small cubes, especially in the top bench, is characteristic of Waynesburg coal.

Principal and Potential Uses of Garrett County Coal

All of the coal mined in Garrett County for general commercial shipment is semi-bituminous, the better grades of which are recognized as excellent for steaming and other purposes that require a high degree of heat. Also, because of their lower volatile content, they are virtually smokeless when properly burned. In general, they are very friable, or tend to break down in size, and this may or may not be a disadvantage to consumers.

Semi-bituminous coal. The term "semi-bituminous" is an unfortunate misnomer. It is applied to a kind of coal that is really "super-bituminous", ranking higher than bituminous, although a literal translation of the name would imply that this coal ranks only one-half as high as bituminous. This fact is especially significant in relation to Garrett County since almost all of its commercial production is of this type. Because the best grade of this coal is nearly smokeless and is superior to other coals in heating value, it requires less bunker space per unit of heat, and is ideally suited for steamship use.

It has a relatively high percentage of fixed carbon, and from this derives its smokeless quality when properly stoked. Its fuel ratio varies from 3 to 6. Much of Garrett County's coal is minutely jointed, as a rule, and is extremely friable; about half of the production is in the form of "slack", broken up into small particles. During transportation many of the lumps become broken, and by the time the coal reaches the consumer, especially if it has been transshipped or rehandled, much of it has been reduced to small size. This high proportion of slack has been considered a detriment by most consumers, but the increasing adoption of mechanical

stokers should augment the market for slack coal, since many types of mechanical stokers require pulverized coal. Therefore, its fineness, when purchased, becomes an asset owing to the fact that much of it is of the required size and needs no further preparation. This is a comparatively new form of utilization on which Garrett County coal operators should be able to capitalize.

It should be stressed that not all Garrett County coals possess this property of extreme friability. Some coals of the smokeless variety with high heating value are quite cohesive and are available in sizes for almost any use, even domestic heating purposes. In fact, some of these coals are being mined for sale in competition with anthracite.

In general, a "good" coal can be used for almost any purpose with more or less satisfactory results, but in practice some coals, because of their special qualities, excel over others in their ability to meet specific requirements. It is customary to list for a particular use only those coals which are especially adapted to that use. The best coals for a given purpose, however, are not always used for that purpose, since coals are often purchased because of factors other than their actual qualities and merits. It has been found that in many cases it is more economical to use a cheaper, inferior coal than a more expensive type of higher quality. In certain areas, for example, which are remote from deposits of coal best suited for a given purpose, local coals of inferior quality are commonly utilized. At times there may be mutual interests between consumer and producer which are expressed in terms of preferential treatment. In such cases only secondary consideration may be given to actual quality of coal purchased.

Among other factors of importance in influencing selection of coal are reputation of the mining operator in adhering to specifications,

regularity of mining operations, and type of mechanical equipment used. Burning coal under actual conditions of operation is the best test of its qualifications for a specific use.

Coals from Garrett County have been recognized for many years as being adapted to the following uses: (1) domestic use; (2) generation of steam for industrial use; (3) smithing purposes; (4) brick kiln purposes; (5) generation of producer gas; (6) bunker, or steamship, fuel; and (7) locomotive fuel. It should not be assumed, however, that all Garrett County coals are equally suitable for all of these uses, but the better coal, having a high thermal content, will meet primary requirements of all uses.

For instance, conditions under which steam is produced for industrial use are so varied that coals of every rank, grade, and size are used. There are, generally speaking, two principal types of stationary steam-generating installations, stationary heating plants, and stationary power plants. An important characteristic of the first type is that the load is comparatively steady, and demands on steam capacity do not fluctuate materially. For this type of service both anthracite and certain kinds of bituminous coal are satisfactory. In stationary power plants, however, the load may be either steady or variable. In electric utilities, for example, the load is subject to sudden, major fluctuations, and a "flexible" fire is required for efficient operation. Certain basic manufacturing industries have similar requirements, while a more or less steady fire is needed in many secondary manufacturing industries. The needs of a fluctuating load cannot be met as well by anthracite, as a rule, as they can by semi-bituminous or bituminous coal; the latter kinds exceeding anthracite in volatile content and ability to burn rapidly.

This property, together with their higher heating value, largely governs the choice of the two upper bituminous ranks for this particular purpose. Because of their greater thermal content and free-burning quality, these coals are preferable to anthracite even for industrial operations that require steady heat, particularly since anthracite usually costs about 25 percent more than the better grades of bituminous coals.

The relative steaming properties of different coals are difficult to evaluate without qualifications. The efficiency of a given coal is greatly affected by stability of the power load, by firing practices, and by kind of equipment used. Proper weight must be given to such factors as size of grate area, draft pressure, rate of feed, etc., rather than to variables such as chemical composition of the coal or records of past performance. The University of Maryland at College Park uses from 30,000 to 40,000 tons of coal annually, most of which has come from Garrett County.

Gas produced by a generator is used in many industrial operations, such as in reverberatory furnaces for small castings, in puddling furnaces in the steel industry, in reheating and annealing furnaces, in enameling processes, in making lime, cement, glass, brick, china, and porcelain, in manufacturing high-degree sulphuric acid, and in regeneration of bone-black or charcoal.

Almost any coal can be used for generating producer gas, but not with the same degree of efficiency. Best gas producer coals have very low coking properties so as not to obstruct the draft. Coals in which the ash has a low fusion point also tend to obstruct the draft and must be broken up frequently. The best sizes of coal for making producer gas are designated as "egg" and "nut", although "run-of-the-mine" coal is also used.

Coals used for locomotive fuel range all the way from lignite to anthracite, and, of course, wood is still used for this purpose in some parts of the world. Railroads usually purchase their fuel from mines located along their lines, or within easy access of them. Many diversified factors, apart from coal itself, influence the choice of fuel for locomotives. These include: type of locomotive, design of fire-box and grate, intensity of draft, kind of service, types of loads hauled, and character of grades on the line. A coal that has proved highly efficient under a certain set of conditions might be very inefficient under a different set. Suitability of a coal for locomotive use, therefore, can only be found under actual conditions of operation on the individual line.

The draft pressure employed in firing a locomotive is greater than that used in generating steam for other purposes. Thus the semi-bituminous coal mined in Garrett County is not so well suited to heavy locomotive service. This is due primarily to the fact that in mining usually more than half is produced as "slack" coal, with much of fine size, owing to its friability, and a considerable amount of fine coal is blown out the stack by the heavy draft. Anthracite and some of the less friable semi-bituminous coals are best for locomotive use as a rule, other conditions being equal. Because of their low volatility these coals also serve to meet the objection to excess smoke on railroads. During recent years growing use of Diesel and electric locomotives has become a source of serious competition to all coals. In fact, Diesel locomotives are used to haul most of the coal carried by railroads that serve the Garrett County coal mines.

Coal for bunker or steamship operation must furnish a constant boiler load. Ability of anthracite coal to deliver heat at a uniform rate makes it the best type for this purpose, and in former years it was extensively used by steamship companies. However, the comparatively high cost of anthracite has forced use of other high-grade but less expensive fuels.

The excellent performance and economies which result from use of high-grade semi-bituminous coals make them greatly preferred over other types in exacting steamship operation. They are usually delivered as "run-of-mine" and may contain as much as two-thirds fine coal, but since the draft in steamship service is relatively low and fine particles are not blown out of the stack, these coals can be used for bunker purposes.

The amount of bunker space available is necessarily limited in most cases, and it must be used to best possible advantage for economy and maximum operating revenue. To use cargo space for storing additional amounts of low-grade coals would obviously affect earning capacity of a vessel. Each year the Port of Baltimore supplies from 100,000 to 150,000 tons of bunker coal to vessels operating in foreign trade. The proportion that is semi-bituminous or that comes from Garrett County is not ascertainable. But here again, Diesel and other oil-burning power-plants have greatly restricted use of coal.

Coal for smithing purposes must also meet definite qualifications for most efficient results. Semi-bituminous coals, with their high thermal value, low ash content, and coking qualities, have been standard smithing coals for many years, especially in plants where large quantities are used. Such coals have the following characteristics: low moisture content, low ash content (not over 7 percent), high thermal value (over

14,000 B.T.U. per pound of coal), low to medium volatile content (ranging from 19 to 26 percent), and quick and positive coking qualities. It should produce a fire that is sensitive to forge blasts, but that will not disintegrate rapidly and blow out of the fire-box under draft. Smithing coal, if it meets all other qualifications, may have a sulphur content ranging up to as high as 1 percent. The Pittsburgh or Big Vein coals, especially, have had a nation-wide reputation for their suitability as smithing coals.

Coal for domestic use should preferably have high heating value, low volatility, low ash content, and free-burning and non-coking properties. It should be unfriable, clean, and lumpy, and of such degree of hardness as to be reducible to proper sizes--a large amount of fine coal interferes with draft and requires frequent attention. Coal with a high ash content becomes "pasty" upon combustion and spreads into a coked mass requiring frequent breaking to permit air to pass through the fuel bed. High volatile coals that produce much smoke are also objectionable. In eastern United States anthracite coal is most generally used for heating residences, although it is considerably higher in price than certain semi-bituminous coals that are very well suited to this purpose. Suitability of the latter coals for household heating, for which they are acquiring increasing recognition, is due largely to their very high heating value, free-burning quality, low moisture and volatile matter content, non-clinkering properties, and to the fact that they are practically smokeless when properly burned.

In determining properties of coal for export, in order to compete in foreign markets with coals of other countries, recognition should be given to the fact that international coal trade is very competitive in

each of its branches, and for almost every grade of coal. Overseas movement of American coal has always been spasmodic and unstable. Apparently there has not been the consistent and determined effort to obtain part of the world's coal trade that has characterized activities of American exporters in introducing soft drinks, sound motion pictures, and other commodities into foreign markets.

There have been occasions when exportation of coal from the country has attained large proportions, such abnormal movements have been due largely to opportunities to penetrate foreign markets that have been created by emergencies in other coal-producing and exploiting countries --such as during the two world wars. These extensive emergency sales of American coal in foreign markets, however, have served to advertise quality of the American product.

It is probable that this trade would have to be developed with high-grade semi-bituminous coals, such as are produced in Maryland, Pennsylvania, and West Virginia. These can compete in quality with coals that are produced elsewhere. Due to influence of several economic factors, however, such as cost of production, distance from market, selling expenses, etc., these coals would undoubtedly encounter intense competition from production of other coals, especially when offered for sale for ordinary purposes of consumption.

Perhaps most promising opportunities for sale of coal abroad would be in connection with demands for high-grade coals for highly specialized uses, such as smithing operations, steam generation under exacting conditions, etc. Semi-bituminous coals are particularly well adapted to meet, in a highly efficient manner, requirements of specialized uses of this character. They probably constitute the most satisfactory basis

for a permanent export trade in American coal. Canada is normally the largest foreign market for semi-bituminous coal, frequently receiving 50 percent of that exported in a year. Most of this coal is produced in southern West Virginia, western Pennsylvania, and eastern Kentucky coal fields, and is shipped by way of ports in Ohio on Lake Erie.

Accessibility of Coal Deposits

Accessibility of the coal-bearing strata has a very marked influence on the methods of mine operation that must be adopted, and the cost of production. In the Appalachian region there are three types of mine openings in general use--drifts, slopes, and shafts. Wherever the seams of coal lie in a practically horizontal position and outcrop along hillsides, tunnels are usually driven into the coal. This type of opening is called a "drift" entry, and is the most economical of the three. Where seams of coal outcrop on the surface or along hillsides at varying angles of inclination, they are opened by tunnels so inclined as to follow the coal seams down from the surface or outcrop. This type of opening is known as a "slope" entry. In places where the coal seams lie at considerable depths, or where no outcrops occur within the limits of the property, the third type of opening or "shaft" entry is used.

All three types of entries have been used to some extent in the coal fields of Garrett County. In the Georges Creek Basin, where the streams have eroded deep valleys, most of the coal seams are exposed along hillsides, and most of the mine openings in this basin are of the drift type. In only a few places have slope or shaft entries actually been used. In all of the other four basins in Garrett County the entries to mines have been mostly of the drift type. If the coals of these areas are ever in-

tensively developed, it will no doubt be necessary to resort to slope and shaft entries. It should be remembered, however, that over one-third of Garrett County's coal has been produced in recent years by removing the overburden, or by "strip" mining.

The practicability of attempts to develop coal deposits depends to a large extent upon ability of the operators to move coal to market at a reasonable cost after it is mined. This is controlled to a great extent by the topography of a region in which deposits are located and by the influence which the topography has upon construction of necessary railroads or other means of transportation. Deposits are often found in areas where unfavorable physical characteristics of terrain make the cost of building railroads, tramways, or truck roads so high that their construction would not be justified by existing conditions in the coal market. In any plans which may be considered for future development of latent deposits in Garrett County recognition must be given to unfavorable conditions of this nature which exist in certain localities, and which render some of these deposits more or less inaccessible except at considerable expense for transportation facilities.

The watershed in Garrett County, comprised of Big Savage, Great Backbone, and Meadow Mountains has had an important influence in development of its coal deposits, inasmuch as it has determined the course of the railroads by which the five coal basins are served. Drainage of this region is separated by the watershed into northward and southward movements. The streams that lie on the eastern slopes of the watershed flow southward into the Potomac River, and thence into the Atlantic Ocean, while practically all of the rest of the streams of Garrett County that lie on the western slopes flow northward draining through the Casselman

and Youghiogheny into the Monongahela River, and thence, by way of the Ohio and Mississippi Rivers, into the Gulf of Mexico.

The courses of practically all of those railroads that constitute primary outlets for the coal mines, and consequently determine direction of the outbound flow of coal, have been obliged to follow the northerly and southerly directions of the streams because of the highly dissected topography of the region. (See Transportation map, Fig. C.) The main line of the Baltimore and Ohio Railroad, however, crossing Georges Creek Valley and Garrett County from Cumberland to Oakland and points beyond, has followed the general east-west direction of Savage River, Crabtree Creek, and Little Youghiogheny River. The other railroads that serve the western Maryland fields show that the general direction of their construction was strongly influenced by topography. The Cumberland and Pennsylvania up the Georges Creek Valley, the Western Maryland Railroad up the North Branch of the Potomac, the Casselman River Railroad up the valley of that river, the Preston railroad along the valleys of Snowy and Lurel Runs, and, until 1942, the Confluence and Oakland Railroad up the Youghiogheny Valley.

The question of accessibility is not a factor of such great importance in the use of deposits that have already been brought into production, although construction and operating costs resulting from unusual railroad grades, and from unusual construction work required for the movement of coal from the mine mouth, may be reflected to some degree in present net earnings. Each of the five coal basins is now provided with a railroad outlet for its production, with the exception of the Lower Youghiogheny, and the more important mines in each basin have track connections.

The question of accessibility is, however, a factor to which attention should be given in planning for opening of deposits of coal that are now lying latent. The topography of regions in which many such deposits are located would undoubtedly impose a cost for track construction or for provision of adequate truck roads which would only be justified by promise of an abnormally heavy and prolonged demand for the coal that might be mined. While necessary track construction would be limited to branches of railroads already serving the different coal basins, penetration of many localities would be difficult, if not wholly impracticable. The highly dissected topography of Garrett County would make the cost of cross-country construction almost prohibitive, and in many places stream valleys are narrow and steep, with practically no flood plains on which railways or roads might be constructed. This condition undoubtedly will be a major influence in delaying, possibly for many years, any material development of certain of the coal deposits of Garrett County, particularly those of the Upper Youghiogheny and Lower Youghiogheny Basins.

Another factor which may retard development of the Garrett County deposits is that productive capacity of the active mines in western Maryland, or of the inactive mines which are capable of production, is more than ample to satisfy a much greater demand for Maryland coal than exists at the present time. The principal justification for new openings would have to be the development of a greater demand for Maryland coal than could be satisfied by seams that have already been brought into production. Because of present trends in the general coal market it is doubtful that any such excessive demands for Garrett County coal will develop in the near future, except, perhaps, as a result of greatly disorganized conditions in other mining areas.

Composition of the Coal Mining Industry

In the development of coal fields in Garrett County, as well as in other areas, there has been a more or less constant change in the composition of the industry as a whole. Many early companies have disappeared or have been absorbed by those formed later, new operators have appeared in the field, and some of the earlier operators have increased production and become important factors in the industry. In times of heavy market demand, such as during the two world war periods, new mines have been opened or old ones reopened by operators who worked them for a more or less limited period in order to participate in the abnormal trade that then existed. With contraction of market demand many of these producers suspended or ceased operations. In the industry as a whole there has been a gradual centralization of the bulk of production in the hands of a decreasing number of larger companies.

However, production of coal in Garrett County is not confined to operations of a few large companies. The deposits have attracted a considerable number of operating units, each trying to get a share of the market demand. They usually operate independently in their production and sales activities, although the more important are associated in a fairly compact group for the protection of common interests. The presence of such a large number of independent operators in a relatively small area necessarily results in a competitive situation that could perhaps be improved by more tonnage pooling for sales purposes. For example, there were 77 mine operators in Garrett County in 1948. The largest mine employed 216 men, the second largest had 175 employees, the third 73, two others had 65 men each, the next 5 had between 20 and 24 men each, but 58 mines employed less than 10 men, and most of these employed fewer than 5.

TABLE XX

GARRETT COUNTY COAL MINES
WITH SPECIFIED NUMBER OF EMPLOYEES

Year	Number of mines with						
	150 or more	100- 149	50- 99	25- 49	10- 24	5- 9	4 or Less
1930	1	3	2	2	3	3	8
1931	2	1	3	2	1	2	8
1932	2	1	3	2	1	3	7
1933	2	1	3	2	1	4	17
1934	2	2	1	2	2	6	44
1935	1	1	3	2	3	10	30
1936	1	2	2	3	2	10	35
1937	2	1	1	4	4	7	46
1938	2	0	2	6	5	8	44
1939	2	0	3	8	3	6	31
1940	1	1	3	6	6	8	63
1941	1	1	3	4	3	10	60
1942	2	0	2	5	7	7	48
1943	2	0	2	2	9	6	43
1944	2	0	3	2	10	7	38
1945	1	1	3	2	4	7	39
1946	2	0	3	2	9	11	33
1947	2	0	3	1	17	12	36
1948	2	0	3	0	14	21	36

Computed from Annual Reports. Maryland Bureau of Mines.

Almost all changes in the number of operating mines in Garrett County between 1930 and 1948 inclusive have been in small mines, those with less than 25 employees, and particularly in those with less than 10 workers. A few of the increases in the 5 to 9 man group have been in new underground operations, but in recent years most of the increase has been in connection with strip mining.

For only a few of the years between 1930 and 1949 have mines of any size operated more than 300 days. With one exception, 1936, this was only during the war years. During the 1943 to 1945 period about 20 percent of the Garrett County mines were working between 250 and 299

days. Between 1940 and 1945 there was a general increase in the number of working days due in part to increased activity in mines that had formerly been working fewer days per year. After 1945 there was a corresponding reduction as demands for coal decreased. Most of the mines working less than 99 days a year have been the smaller, "snow-bird" type, operated in winter.

TABLE XXI

COAL MINES IN GARRETT COUNTY
OPERATING SPECIFIED NUMBERS OF DAYS PER YEAR

Year	Number of days operated									Mines Rptg.
	300 or more	250- 299	200- 249	150- 199	100- 149	50- 99	25- 49	10- 24	9 or less	
1930	0	1	4	5	3	5	1	4	0	23
1931	0	1	2	7	4	4	1	0	0	19
1932	0	0	1	4	8	2	4	0	0	19
1933	0	1	2	3	8	9	5	1	1	30
1934	0	1	3	9	12	16	11	5	2	59
1935	0	3	5	3	14	13	10	5	3	56
1936	1	2	4	8	12	19	8	2	0	56
1937	0	3	8	8	12	14	10	7	2	64
1938	0	4	4	8	18	16	7	7	2	66
1939	0	4	7	10	15	19	16	6	1	78
1940	0	3	6	7	20	25	15	10	3	89
1941	0	4	12	14	13	18	10	8	3	82
1942	1	9	15	4	17	13	5	5	1	70
1943	2	12	10	5	8	11	8	8	0	64
1944	2	14	5	7	8	9	12	3	0	60
1945	2	13	7	7	6	10	8	1	3	57
1946	1	2	11	14	10	12	4	4	1	59
1947	0	7	13	14	9	12	11	3	2	61
1948	0	5	13	17	13	9	6	11	2	76
1949	0	0	4	14	20	13	6	12	0	69

Computed from Annual Reports. Maryland Bureau of Mines.

TABLE XXII

NUMBER OF COAL MINES IN GARRETT COUNTY
BY QUANTITY OF ANNUAL PRODUCTION

Year	Number of mines producing quantities specified - in net tons														Mines Rptg.
	200,000 & over	150,000- 199,999	100,000- 149,999	50,000- 99,999	25,000- 49,999	10,000- 24,999	5,000- 9,999	2,500- 4,999	1,000- 2,499	500- 999	200- 499	100- 199	50- 99	1- 49	
1930	0	2	2	0	3	1	3	1	1	6	1	2	1	0	23
1931	0	0	4	0	3	1	0	2	3	3	3	0	1	0	20
1932	0	0	4	2	2	2	0	1	4	1	3	2	0	0	19
1933	0	0	2	2	1	1	2	2	5	5	5	4	0	1	30
1934	0	1	2	2	2	2	1	3	9	8	12	10	5	4	61
1935	0	1	0	1	3	3	4	4	5	8	11	8	5	3	56
1936	1	0	0	2	2	2	3	10	3	6	19	5	3	0	56
1937	0	1	1	1	2	4	1	7	7	6	16	10	4	5	65
1938	0	1	1	0	2	5	4	2	11	11	15	5	5	5	67
1939	0	2	0	0	2	6	3	8	11	11	18	9	3	4	77
1940	1	0	0	1	3	4	5	4	14	9	24	14	3	8	90
1941	1	0	1	1	2	5	1	7	14	16	19	9	3	4	83
1942	2	0	0	0	1	9	4	6	12	9	15	8	0	4	70
1943	2	0	0	1	2	5	4	6	12	10	10	8	2	2	64
1944	2	0	0	3	1	2	5	7	11	5	16	4	5	1	62
1945	1	0	1	4	0	5	2	7	11	8	5	7	2	3	56
1946	1	1	0	4	3	8	3	9	5	13	7	5	0	3	62
1947	2	0	0	4	3	9	5	8	17	9	6	6	1	2	72
1948	0	2	0	1	5	9	9	12	16	6	4	7	4	2	77

Computed from Annual Reports. Maryland Bureau of Mines.

From 1930 to 1948 inclusive only relatively few mines in Garrett County were producing more than 25,000 net tons of coal annually. Over the greater part of that period most mines were in the groups producing between 200 and 2,499 net tons. Many of these mines were small operations which began to work more days each year, with the partial resumption of general economic activity after 1934. An increased number of mines with annual output of 1,000 to 2,499 net tons has been more or less characteristic of Garrett County coal production since 1937.

TABLE XXIII
COAL PRODUCTION
BY METHOD -- GARRETT COUNTY
(in net tons)

Year	Production by Method			Total Tons	% of State Total
	Pick	Machine	Strip		
1930	414,568	329,348		744,216	32.7
1931	353,281	291,537		644,818	32.4
1932	249,120	254,953		504,073	35.1
1933	161,718	305,874		467,592	30.2
1934	184,828	239,288		424,116	25.1
1935	155,458	273,075		428,533	25.1
1936	198,079	346,373		544,452	31.1
1937	253,750	338,082		591,832	40.6
1938	235,172	293,362		528,534	40.2
1939	243,794	363,587		607,381	41.2
1940	206,651	337,218		543,869	35.2
1941	199,709	504,615		704,324	40.8
1942	260,527	587,975		848,502	41.7
1943	301,288	535,507	1,818	838,613	42.6
1944	341,120	491,755	36,455	869,330	46.1
1945	345,056	393,593	85,978	824,627	46.3
1946	308,995	415,608	279,641	1,004,245	49.4
1947	312,889	564,422	268,550	1,145,861	55.9
1948	245,462	424,211	226,625	896,298	54.4
1949	89,781	295,602	81,984	467,367	65.5

Compiled from Annual Reports. Maryland Bureau of Mines.

The trend in method of production of coal in Garrett County between 1930 and 1949 shows the influence of machinery and of strip mining on types of mine workers employed. While hand labor and pick output continued to be important, and actually increased during the war period, machine production increasingly exceeded the old method for much of this period. During the 1946-1948 period, stripping operations accounted for a sizable amount of total production. In 1949, however, a year of drastic reduction in coal output, machine mining comprised more than 63 per cent of the total.

Some Social and Economic
Characteristics of Garrett County Coal Mining

Coal mining operations of any kind, particularly those in underground mines, are vitally affected by characteristics and dependability of personnel employed. The earliest mining in Garrett County required comparatively few men and they were recruited largely from the surrounding countryside. After completion of the Baltimore and Ohio Railroad and the Chesapeake and Ohio Canal to Cumberland in the 1850's, followed by construction of the Cumberland and Pennsylvania Railroad and the Western Maryland Railroad, new mines were opened, production of older mines expanded, and an increased labor supply became necessary.

Many of the laborers, mostly of Irish birth, who had helped construct the canal and railroads later became coal miners in western Maryland. As workings grew larger and more complicated, more skill was needed, and miners, largely as foremen, were imported from mining districts in Wales and Scotland. These were later followed by relatives and friends, until the bulk of the mine labor was being supplied by persons of these three nationalities and their descendants.

As number of mines and miners increased, friction between employees and operators also increased. For many years each operator acted independently in wage agreements, and strikes were numerous, although usually confined to one or two properties at a time. The "Knights of Labor" were well established in western Maryland coalfields by 1880, and as there was little or no unity among operators, control of mines practically passed into the hands of employees. This condition forced operators to unite, and in 1882 they reduced the mining rate from 65 to 50 cents a ton and fought the resulting strike as a unit. This strike lasted six

months and was accompanied by considerable violence. Outside labor, mostly Germans, Slavs, and Italians were brought in, and although most of them had little or no experience in coal mining, many soon became satisfactory miners. A few continued as miners and were followed in this occupation by their descendants, but most of them bought farms as soon as they had saved enough money from mining, and went into agriculture.

By 1930 foreign-born white persons comprised only 1.4 percent of Garrett County's population. Coal miners of today are over 99 percent native-born white, and the area is one of the most completely Americanized coal-producing parts of the country. Some families have been connected with coal mining since the beginning of operations in their community; at times three generations of a family have been employed at the same mine. For many years the town of Bloomington was known as Llangallan, the name of a coal-mining company operating in the vicinity. Welsh and Scotch names still predominate on mining company payrolls, as indicated by the following which appeared frequently on recent lists of employees: Evans, Davis, James, Williams, Johnson, Stewart, Douglas, Ross, Thomas, Peel, Watson, McKenzie, Mowbray, Lowery, Hughes, Moffatt, Wilson, Morgan, Lewis, Jones, Robertson, and Knox.

Such conditions tend to develop a type of personnel with a high degree of stability. Although an asset during prosperous times in the mining industry, stability is akin to immobility, a trait which is not so desirable during inactive periods. In fact, in some cases in recent years stranded miners and their families have become a chronic problem of the area, as will be demonstrated later.

There are many limitations to the statistics that attempt to show the number of persons engaged in coal-mining operations in Garrett

County. Many different methods are used by operators in keeping records, and no standard procedure has ever been adopted, so that accurate figures cannot be obtained as to the number of men actually employed during a more or less extended period of time.

As is true for the industry as a whole, coal mining in Garrett County is characterized by intermittent operations caused by fluctuating market demands. As a rule, most of the larger mines have had what may be called a "normal working force". This is usually employed when the mine is in operation. During periods of low market demand, and consequently of low operations, it is the general practice to reduce number of days worked rather than size of working force.

The figures presented in the following tables do not represent the average number of men who worked at any one time or during a given year, nor do they represent aggregate number on the payrolls. They represent, rather, the number of men who are normally dependent upon the mines for employment. That is, the number of men who ordinarily report for work whenever the mines resume operation, plus those who are more or less dependent upon such operations, but who, for one reason or another, did not report for work. The figures do show, in reality, number of persons who worked for all the mines that were in operation during the year, no matter for how short a period.

The mining of coal, especially in larger operations, involves many types of labor, some of which require highly specialized training, while others do not. Some members of the mine personnel, such as electricians, are not directly concerned with actual removal of coal from the seam, but are connected with those general activities which make operation of the mine possible. The larger the operations, the more diversified as a rule

becomes the type of labor required. While operations in Garrett County, particularly in larger mines, involve a number of different kinds of workers, the Maryland Bureau of Mines classified employees as follows: Miners, drivers, inside laborers, and outside laborers.

TABLE XXIV
CLASSIFICATION OF EMPLOYEES
IN COAL MINES IN GARRETT COUNTY - BY TYPES OF LABOR
(Number employed in each type)

Year	Miners	Drivers	Inside Laborers	Outside Laborers	Total
1923	856	106	158	191	1,311
1924	614	77	103	151	945
1925	669	78	115	161	1,023
1926	568	73	129	142	912
1927	609	75	145	140	969
1928	518	60	114	117	809
1929	513	60	118	117	808
1930	606	61	112	113	892
1931	605	58	114	107	884
1932	608	39	111	106	894
1933	547	39	169	124	879
1934	566	46	116	113	841
1935	533	49	111	108	801
1936	585	84	90	112	871
1937	592	81	94	109	876
1938	644	79	110	93	926
1939	848	118	112	126	1,204
1940	728	107	91	103	1,029
1941	637	101	72	106	916
1942	655	121	95	110	981
1943	533	114	86	128	861
1944	524	113	104	152	893
1945	442	112	87	116	757
1946	497	130	107	215	949
1947	479	133	175	235	1,022
1948	448	128	226	255	1,057
1949	345	86	234	122	787
1950	318	86	224	133	761

Computed from Annual Reports, Maryland Bureau of Mines.

While in former years actual "miners" comprised roughly from 65 to 70 percent of the entire personnel, there has been a decrease in proportion of miners and a great increase in the actual and proportionate numbers of other forms of mine labor. This change is explained in part by the increased use of mining machinery for cutting, loading, and conveying coal underground, and for most strip mining operations. All employees in strip mines are classified by the Maryland Bureau of Mines as "outside laborers". In some of the smaller mines the total number of men reported does not include one or more of the specified groups, where apparently "miners" performed all the work. These differences in practice are due to variations in the character or extent of the operations being conducted.

An outstanding characteristic of coal mining, as well as of mining in general, is that only male labor is employed. What is more distinctive, perhaps, is the fact that miners, who regard themselves as skilled craftsmen, have no established apprenticeship system. It is true that in the old days a miner took his son into the mine and trained him while he worked with him, or young boys started in subsidiary occupations as "trippers" (to open and close ventilating doors underground when a "trip", or train of mine cars, had to pass through) or as "breaker" boys, picking slate in the tibble. Today only vestiges of this system remain and able-bodied young men, after a short period of training following their employment, quickly begin to receive the same rates of pay as men who have spent a lifetime in the same jobs.

It has been claimed by some operators that with increased mechanization of mines the miner's job is a young man's job. During the war period, however, when many young men were in the armed services, and the propor-

tion of older men in the mines was higher, the largest tonnage of soft coal mined in any 4-year period, and the largest production for any single year, 1947, were attained. Not counting strip mining, the highest productivity per man per day (5.04 tons) was also achieved that year. In 1940 before the last war, and consequently prior to the time when many young miners enlisted or were drafted into the armed services, or had left mining for higher-paying war time industries, about 15.6 percent of all the men employed in western Maryland coal mines were over 54 years old. Almost 45.9 percent were between 35 and 54 years old, about 25.3 percent were between 25 and 34 years, and only 13.3 percent were under 25 years of age. In some of the most productive states men 55 years of age and over constituted even higher proportions of mine workers. In Illinois 23.5 percent were 55 years old or older, 17.8 percent in Indiana, and 16.3 percent in Ohio. In West Virginia, however, only 8.2 percent of miners were in the oldest age group, and in Pennsylvania about 12.7 percent.¹

About 19.7 percent of all employed males 14 years old and over in Garrett County were employed in coal mining operations in 1940. The relative significance of coal mining as a source of employment has never been high in Garrett County compared, for example, to McDowell County, West Virginia, where 85.1 percent of employed males 14 years old and older were employed in mining coal, or Harlan County, Kentucky, with 87.2 percent so employed in 1940.²

1 Bureau of the Census, Report on Population, 1940, Vol. 3.

2 Ibid.



Figure 21
Power house and tipple at coal mine near Crellin.



Figure 22
Miners' homes at Crellin, four miles south-
southwest of Oakland.

Working environment. The type and characteristics of coal mines depend in part on the extent, depth, slope, and thickness of coal beds. In most of the coal basins of Garrett County, workable beds can be reached relatively easily by drift entries or slope entries, as in the Upper Potomac River and Georges Creek or Casselman River Basins. In recent years coal lying close to the surface has been mined after the relatively thin cover of earth and rock has been stripped off with excavating machinery. Shaft mines in Garrett County generally range from 150 to 700 feet in depth, and some of the larger drift or slope mines in the County have 2,000 to 3,000 feet of earth coverage.

In western Maryland a large proportion of the coals mined in recent years has come from seams less than 4 feet thick. This is also true of most mines in adjacent parts of Pennsylvania, West Virginia, and Virginia. In Ohio at least 70 percent of the coal is mined from seams 4 to 6 feet thick.

Removal of coal from underground deposits develops spaces with roofs of varying capacity to withstand stress. In Garrett County roofs are so faulty with fractures, fissures, and other defects that removal of coal results in the fall of rock, unless artificial props are placed beneath the roof. Moisture and air penetrate cracks in the roof, extending the fissures so that large sections may split apart from the overlying structure. Although props are always used in Garrett County mines, roof supports are often inadequate owing to insufficient props, errors in judgment in their placement, inadvertent displacement, and decay. Mine safety training given by the Maryland Bureau of Mines inspectors especially emphasizes attention to roof conditions, and experience of the miners should dictate caution; nevertheless, for many years falling roofs

have caused the greatest number of injuries and fatalities in Garrett County mines.

In most of the larger mines coal is removed by single-track railroads. Haulage equipment consists of electrically driven locomotives and coal cars with capacities of 1 to 10 tons, depending on requirements of particular mines. Such transportation systems involve the hazards associated with electrical and automotive conveyances, and cause a variety of accidents. Men are struck by locomotives or cars, run over, squeezed between cars and locomotives, or crushed between cars and the sides or roof of the mine.

Where coal beds are relatively level or where grades change only slightly runaway cars do not constitute a severe hazard. In mines developed on coal seams that have a pronounced grade, mobile equipment may be run down-grade under its own weight. Personnel, mechanical, and material failures sometimes cause equipment to run away on the slopes and endanger the men below.

In some mines where trolley wires with 250 or 500 volts of electricity, and other overhead wiring for heavy power machinery, is carried through haulageways, the miner is constantly surrounded by hazards of high-voltage electrical current. The moving parts of machinery used for cutting, drilling, and loading coal present additional hazards despite safety devices built into the machines for the miner's protection.

In thick coal beds, the miner can work erect, and, since these seams lend themselves to mechanical equipment, much of the laborious work is done by machinery. In beds only 2 or 4 feet thick, or even less, much of the heavy work of loading coal is done by hand labor. In such beds the miner must squat, kneel, lie on his side, stoop, or crawl. Although

the miner adapts himself to the most comfortable positions within the limits of his working space, he cannot do laborious work efficiently. Not only is his ability to mine coal seriously restricted, but back injuries, sprains, and other disabilities of a more or less permanent nature are common. The word "sacro-iliac" appears quite frequently in reports of Maryland Bureau of Mines inspectors. Puncture wounds resulting from handling of picks, axes, and saws in cramped positions are likewise frequently reported.

Ventilation in underground mining operations is of vital importance. It dilutes and removes explosive or toxic gases and furnishes vital supplies of oxygen for men, horses, and mules. Methane gas occurs in crevices in coal seams or in the strata above or below them, and as the bed is opened and mining goes on, gas is usually liberated into the mine atmosphere. When mixed in sufficient amounts with air, it is explosive, and may readily be ignited by a flame or spark, resulting in a serious explosion. Although smoking is prohibited in all underground mines in Maryland, the rule is frequently ignored, especially by young or inexperienced workers. Other gases present in coal mines of the County are oxides of sulphur and hydrogen sulfide. Presence of these gases is related to sulphur content of coal and to the use of explosives. Frequently poisonous oxides of nitrogen resulting from detonation of explosives is present in the atmosphere at working faces immediately after blasting.

Continuous passage of air through the mine dilutes and removes these gases and minimizes toxic effects. Circulating air currents also dilute and remove from the working area excessive concentrations of dust thrown into the air by mining operations. There are two main methods of provid-

ing mechanically controlled ventilation: first, by means of large fans fresh air is forced into the mine; second, by using large exhaust fans air within the mine is sucked out along return air passages, and fresh air flows into the mine through other openings from the surface. Of these methods, exhaust-type ventilation is preferred by Federal and state bureaus of mines. The exhaust system, placed on a return air course, produces a negative pressure within the mine. After gases present in crevices in the coal seam are released they may be impounded or may generate negative pressure developed by exhaust fans, and flow out of the mine in the direction of negative pressure. With forced ventilation, on the other hand, gases may tend to collect in pockets and, when pressure is reduced, flow into mine passageways. The pathway along which air enters or leaves a mine is called an aircourse. Location of intake and return aircourses may vary. For example, in some Garrett County mines the intake aircourse is also the mine haulageway, while in others the intake course is a separate entry. There are several reasons for using either type of intake aircourse.

Using the main haulageway as the intake aircourse is said to be advantageous in case of fire or explosion in the mine, because the resulting smoke and gases will not be expelled along the main entrance, and rescue workers can advance with the fresh air. Another advantage of having the intake on the main haulageway is that methane and other explosive gases generated or released in the mine are removed along non-haulage aircourses which are generally free of electrical wiring and equipment. Conversely, if the main haulageway is a return aircourse, the explosive mixtures of gases may be carried along and ignited by sparks and arcs from locomotive trolleys or other electrical equipment along the haulageway.

One objection to using the main haulageway for conducting intake air into the mines is that roof deterioration and roof falls in the haulageway may result from this practice. This is especially prevalent in summer months when incoming, relatively warm, humid air strikes the cool mine strata and condenses, depositing moisture on roof and walls of the mine. Under these conditions men travelling along the main haulageway are constantly in danger of roof falls. Motormen and drivers are especially exposed because of vibration caused by motors and by coal cars along tracks. When a non-haulage entry is used for the intake air-course, and a main haulageway for the return aircourse, the air has been cooled and relieved of its moisture during circulation through the mine workings. Under these circumstances moisture and changes of temperature ordinarily cause less damage and roof deterioration in the main haulageway is minimized.

The most serious accident of recent years in a Garrett County mine occurred in 1948, when four miners and a driver were killed by suffocation due to fumes from a fire in the fan house of a mine near Kitzmiller. The fan house, constructed of wood, was ignited by a fire on the gasoline motor which drove the fan. Gases, mostly carbon monoxide, were forced into the main airway, suffocating the victims as they tried to escape toward the entrance where the fan house was located. The gases also prevented rescue operations until gas-masks could be obtained, too late to prevent loss of life.

Ventilation is used to dilute the concentrations of finely divided coal dust which is produced and thrown into the air by mining operations. The dust is carried away from the working face by air currents and deposited along return aircourses, heavier particles settling first and

most of the lighter particles later; some of the very fine dust is altogether removed from the mine by the ventilating currents. This finely divided coal dust is very explosive, even in absence of gases. It can be ignited by open flames such as matches, and by carbide lamps or electric arcs. In gas explosions, the fine coal dust, stirred up by concussion, ignites and extends the explosion. The use of water in drilling, cutting, and loading coal also helps reduce dust at the working face, and prevents its spread through the mine to some extent. Elimination of open flames, and application of incombustible rock dust on exposed surfaces of mines, minimize hazards of coal dust ignition and the extension of explosions. Under the Federal Mine Safety Code all mines are required to use rock dust if Federal mine inspectors declare the need exists.

The range of temperature in Garrett County mines is between 60 and 70 degrees Fahrenheit, with an approximate average of 65 degrees, and relative humidity of 80 to 90 percent, depending on time of year and conditions in each mine. At times the relative humidity at or near the working face is almost 100 percent. In summer, when outside temperatures range from 80 to 90 degrees, with high relative humidity, temperatures underground remain fairly uniform at about 65 degrees F., as they do throughout the year. Lower temperatures in the mine cause incoming warm, humid air to condense and form moisture on surfaces of mine workings. Humidity at the working faces and in the return aircourses is very high where large quantities of water are used underground for dust control. In winter, when outside temperatures are often below zero, working conditions are generally better in the underground mines, since the colder, damp air is warmed and its relative humidity lowered when it is drawn into the mine. Many small private mines are, therefore, worked only in winter

under these relatively comfortable atmospheric and temperature conditions, and when natural ventilation and drainage, upon which most of them depend, are much more satisfactory than in summer.

In strip mining large mechanical shovels excavate the varying amounts of overlying material to expose the coal seam. These or other power shovels then cut into the seam and load the coal into trucks. Hazards of strip mining are similar to those connected with general use of heavy machinery, trucking, and excavation. Injuries due to tripping and falling and from earth slides and rock falls, while obvious and fairly common, are not so prevalent in comparison to hazards of underground operations.

Although frequent periodic inspections of mines are made by inspectors of both Federal and State bureaus of mines, workers in Garrett County mines are exposed to potential hazards of gas, dust, explosives, electricity, heavy machinery, and transportation. Their place of work is often poorly lighted and in an enclosed environment beneath a roof which is constantly subject to falling. Hazards of exposure to disease are present in underground mines because of the general absence of sanitary facilities and the miners' custom of using abandoned underground workings without regard to sanitary disposal.

During the twenty-year period shown in Table XXV non-fatal accidents were generally more frequent in Garrett County coal mines than in those of Allegany County. Only during the period from 1934 to 1937 were they consistently higher in the latter county. During the war years, and since that time, non-fatal accidents have been considerably more prevalent in Garrett County. The year 1942, with a high of 27 percent, was due in part to substitution of inexperienced help for experienced miners

who had gone into other industries. However, several fatal accidents in recent years have been caused by direct violation of mine safety rules, such as negligent handling of explosives, entering mines alone or during prohibited hours, and disregard of direct orders from foremen. During the war particularly discipline in mines was poor, and often disregarded entirely by some workers who took advantage of emergency conditions and the ease with which they could obtain employment.

TABLE XXV
NUMBER OF ACCIDENTS
IN GARRETT AND ALLEGANY COUNTY COAL MINES

Year	Garrett County				Allegany County			
	Total Mine Workers	Accidents			Total Mine Workers	Accidents		
		Non-Fatal		Fatal		Non-Fatal		Fatal
		No.	%			No.	%	
1930	892	132	14.8	4	2,559	320	12.5	2
1931	884	104	11.8	3	2,384	275	11.5	3
1932	894	92	10.3	1	2,314	189	8.2	2
1933	879	103	11.7	1	2,111	237	11.2	2
1934	841	78	9.3	3	2,170	319	14.7	7
1935	801	71	8.9	2	2,221	434	19.5	5
1936	871	102	11.7	0	2,091	421	20.1	3
1937	876	130	14.8	5	1,746	282	16.2	3
1938	926	107	11.6	0	1,631	114	7.0	4
1939	1,204	117	9.7	0	1,660	125	7.5	1
1940	1,029	128	12.4	1	1,620	153	9.4	1
1941	916	162	17.7	2	1,641	173	10.5	4
1942	981	267	27.2	2	1,526	170	11.1	1
1943	861	165	19.2	3	1,252	124	9.9	2
1944	893	104	11.6	3	1,431	100	14.3	3
1945	757	139	18.4	1	1,041	138	13.3	2
1946	949	125	13.2	1	1,148	106	9.2	3
1947	1,022	161	15.8	1	1,140	89	7.8	4
1948	1,057	136	12.9	5	992	52	5.2	3
1949	787	77	9.8	2	641	20	2.4	2

Computed from Annual Reports, Maryland Bureau of Mines.

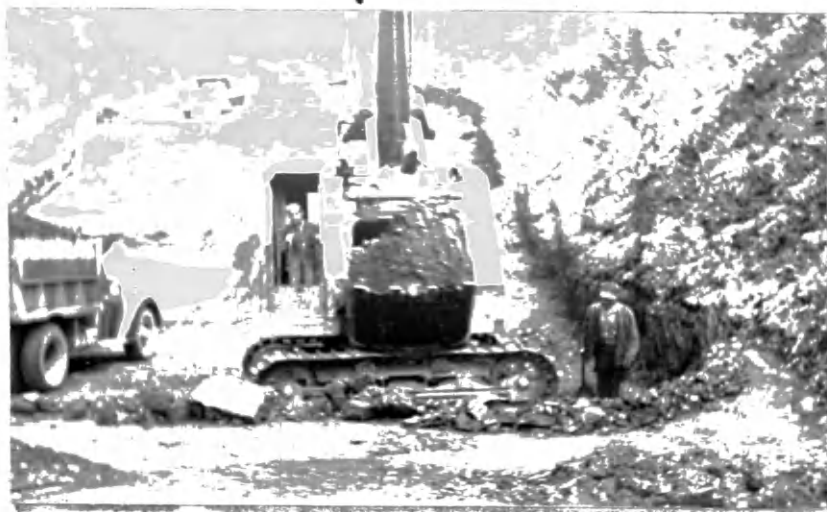


Figure 23
Strip mining with power shovel, near Crellin.



Figure 24
Loading coal truck at strip mine near Crellin.

Labor conditions. Prior to 1930 coal mines in Garrett County were almost all "open-shop" workings, and for several years success in unionizing the County's coal mines lagged considerably behind those of other competing fields. In 1930 there was no uniformity in wage scales in Garrett County mines. Difference in local conditions, such as thickness of seams, proportion of impurities, physical characteristics of individual seams, size of operations, and length of working year made it impractical to adopt a uniform scale of wages for all mines.

For example, in 1930 in mines along the Upper Potomac Basin, miners were paid on both a tonnage and a yardage basis. In the Barton (Bakers-town or "4-foot") seam and in the Kittanning (Piedmont or "6-foot") seam the scale of wages in 1930 was as follows:

Four-foot Seam

Pick coal	\$.63	- .65	per gross ton
Yardage		.57-1/2	per 15 inches, plus
		.02-1/2	per inch of additional thickness.

Six-foot Seam

Pick coal	.63	- .65	per gross ton
Yardage		.84	for 1 - 15 inches, plus
		.04-1/2	per inch of additional thickness.

Both Seams

Drivers		.45	per hour
Motormen	.48	- .50	" "
Brakemen	.46	- .50	" "
Surface Labor	.40	- .50	" "
Inside Labor	.47	- .50	" "
Machine Loaders	.46	- .47	per gross ton
Machine Cutting		.09	" " "

Annual Report, Maryland Bureau of Mines, 1930.

For the calendar year 1931, the scale of wages in the Upper Potomac Basin was:

Six-foot Seam (mostly)

Pick Coal	(per gross ton)		
Jan. 1 - May 31			.63
June 1 - Dec. 31		\$.55	- .62
Machine Coal	(per gross ton)		
Jan. 1 - May 31			.47
June 1 - Dec. 31		.40	- .42
Loading	(per gross ton)		
Jan. 1 - Dec. 31			.47
Motorman	(per hour)		
Jan. 1 - May 31		.48	- .50
June 1 - Dec. 31			.40
Outside Day Labor	(per day)		
Jan. 1 - Dec. 31		3.00	- 3.20
Pick Mining	(per net ton)		
Jan. 1 - Dec. 31		.50	- .55
Machine Loading	(per net ton)		
Jan. 1 - Dec. 31			.38
Machine Cutting	(per net ton)		
Jan. 1 - Dec. 31			.45

Maryland Bureau of Mines, Annual Report, 1931.

During the latter part of 1930 and all of 1931 coal mining in Garrett County, as well as in the rest of Maryland and in other fields, reflected the general decrease in national economic activity. Coal operators repeatedly cut coal prices in order to sell their product, and often buyers "pitted one operator against another"¹ and succeeded in beating down the selling price, until in most cases coal was sold at less than cost of production. Some large consumers did not contract for their usual supplies as in previous years, but depended on coal offered by "frantic"¹ operators, or bought at their own prices "distress"¹ coal, shipped from mine to market on consignment, in the hope that market price

¹ Maryland Bureau of Mines, Annual Report, 1931, p. 61.

would rise before the coal arrived at destination, and could then be sold at a profit.

In 1931, as shown above, when operators reduced selling price of coal, they were immediately forced to ask miners to accept substantial reductions in tonnage rates and day wages in order to reduce costs and keep mines in operation. "That these adjustments were made amicably and without cessation of work is a splendid tribute to the type of mine employees living in western Maryland."¹

Scale of wages in the Upper Potomac Basin for 1932 were:

Outside Labor				
Unclassified	(per hour)			
Jan. 1 - Apr. 29		.34	-	.36
Apr. & May - Dec. 31		.30	-	.32
Skilled	(per hour)			
Jan. 1 - Apr. 29	.42	-	.45	- .60
May 1 - Dec. 31		.32	-	.42
Inside Labor				
Pick Mining	(per gross ton)			
Jan. 1 - Apr. 30		.55	-	.62
May 1 - Dec. 31	.34	-	.45	- .49-1/2
Jan. 1 - Apr. 30 (per net ton)		.32	-	.42
May 1 - Dec. 31		.42	-	.45
Machine Loading	(per gross ton)			
Jan. 1 - Apr. 30	.32	-	.40	- .46
May 1 - Dec. 31	.32	-	.46	- .40
Motorman	(per hour)			
Jan. 1 - Dec. 31		.38	-	.42
Brakeman	(per hour)			
Jan. 1 - Dec. 31	.36	-	.38	- .40
Unclassified	(per hour)			
Jan. 1 - Apr. 30		.32	-	.37
May 1 - Dec. 31	.21-7/8	-	.31-1/2	- .33
Machine Cutting				
Top Cutters				
Jan. 1 - Dec. 31 (per hour)				.38
(per net ton)		.07	-	.08
Bottom Cutters				
Jan. 1 - Dec. 31 (per net ton)				.08

Maryland Bureau of Mines, Annual Report, 1932.

¹ Ibid.

During 1932 mining and selling of western Maryland coal was in a very depressed condition. Most miners were working only 1 or 2 days a week, and coal was being sold at less than cost of production. Competition between coal operators and salesmen was aggravated by lack of demand. As seen above, mine workers in Garrett County were forced to accept reductions in tonnage and day rates, and many families were in need of vital food and clothing. Coal companies in many cases remitted rents on company-owned houses, extended credit in company stores, and apportioned work among employees.

During 1933 coal mines in Garrett County were almost completely organized by a national labor organization, The United Mine Workers of America, and beginning on August 1 of that year almost all mines were in daily operation until the end of the year. The influence that unionizing had on the wages of miners in Garrett County can be seen in the following wage scale in the Upper Potomac Basin for 1933:

Inside Labor				
Pick Mining	(Gross ton)	Jan. - Aug.	\$.45 -	.54
		Aug. - Sept.		.55
		Oct. - Dec.		.697
	(net ton)	Jan. - Feb.		.42
		Feb. - July		.37
		Aug. - Oct.		.50
		Oct. - Dec.		.622
Machine Loading	(gross ton)	Jan. - March		.383
		Mar. - July		.30
		Aug. - Sept.		.40
Conveyor shooting & Loading				
Bottom Coal (Davis Seam)		Jan. 1 - Feb. 15		.34
		Feb. 16 - July 31		.295
		Aug. - Sept.		.38
		Oct. - Dec.		.405
Unclassified	(day wage)	Jan. 1 - Feb. 15		2.58
		Feb. 16 - July 31		2.40
		Aug. - Sept.		3.04
		Oct. - Dec.		3.96

Maryland Bureau of Mines, Annual Report, 1933.

An agreement signed September 29, 1933, effective October 2, 1933, included the following basic rates:

Tonnage rates for 2,000 pounds of run-of-the-mine coal:

Pick Mining.	(Bakerstown & Waynesburg Seams)	.69
	(All other seams)	.622
Machine Loading	(all seams, except Bakerstown and Waynesburg)	.45
	(Bakerstown Seam)	.57
	(Waynesburg Seam)	.52

Hourly and Day Rates:

	<u>Hourly</u>	<u>Day</u>
Inside Labor		
Motormen, Rock Drillers	.545	4.36
Drivers, Brakemen, etc.	.525	4.20
Coal Drillers, Trackmen, etc.		
Wiremen, Timbermen, etc.		
Pumpers, helpers, and others	.495	3.96
Greasers, etc.	.325	2.60
Outside Labor		
Bit sharpener, Car Dropper, Trimmer, Dumper, etc.	.43	3.44
Car cleaners, etc.	.40	3.20
Slate Pickers	.325	2.60

Maryland Bureau of Mines, Annual Report, 1933, p. 10.

During 1934, mines in Garrett County continued to operate on an almost 100 percent unionized basis. The basic wage rates were enforced, despite objections of both operators and miners in most of the small mines, who felt that they were at a disadvantage when compelled to adopt the same tonnage and day wages as those paid in the larger mines.

Basic pay rates for miners in Garrett County coal mines were re-adjusted for the year beginning April 1, 1934. They were as follows:

Tonnage rates for 2,000 pounds of run-of-the-mine coal:

Pick Mining	(Bakerstown & Waynesburg Seams)	\$.78
	(all other seams)	.722
Machine Loading	(Bakerstown Seam)	.65
	(Waynesburg Seam)	.60
	(all other seams)	.53

Hourly and Day Rates:

	<u>Hourly</u>	<u>Day</u>
Inside Labor		
Motormen, Rock Drillers	.68	4.76
Drivers, Brakemen, Coal Drillers,		
Wiremen, Timbermen, etc.	.657	4.60
Pumpers, helpers, etc.	.623	4.36
Greasers, etc.	.428	3.00
Outside Labor		
Sharpeners, Car Droppers, Trimmers, etc.	.548	3.84
Cleaners, etc.	.514	3.60
Slate Pickers	.428	3.00

Maryland Bureau of Mines, Annual Report, 1934.

The 1934-35 agreement between coal operators and United Mine Workers of America was reaffirmed in April 1935, and was signed to continue in effect until April 1, 1937. The following changes, however, were made in the rates of pay, effective from April 1, 1935 on:

Tonnage rates for 2,000 pounds of run-of-the-mine coal:

Pick Mining	(Bakerstown & Waynesburg Seams)	.87
	(all other seams)	.812
Machine Loading	(Bakerstown Seam)	.73
	(Waynesburg Seam)	.68
	(all other seams)	.61

Hourly and Day Rates:

	<u>Hourly</u>	<u>Day</u>
Inside Labor		
Motormen, Rock Drillers	.751	5.26
Drivers, Brakemen, Coal Drillers,		
Wiremen, Timbermen, etc.	.729	5.10
Pumpers, helpers, etc.	.694	4.86
Greasers, etc.	.500	3.50
Outside Labor		
Sharpeners, Car Droppers, Trimmers, etc.	.620	4.34
Cleaners, etc.	.586	4.10
Slate Pickers	.500	3.50

Maryland Bureau of Mines, Annual Reports, 1935-1937.

This agreement was on the basis of a 7-hour day, 35-hour week.

During 1936 prices of coal had become stabilized and uniformity of wage scales helped reduce some of the wasteful competition among coal operators and the price-cutting which had prevailed in previous years.

As a result, in part at least, of generally increased demand for coal, better working conditions under the Joint Working Agreement, and steadier employment, production per mine employee in Garrett County in 1936 was 625 net tons, compared to 535 net tons in 1935.¹ During 1937 conditions in coal mining operations in the County were unusually steady and several mines established new records for continuous operations; one of the largest was operated 244 out of a possible 260 days. During 1937 coal production was about 676 tons per man.²

During 1938 wage scales of the 1935-37 period were still in effect. Prices of coal, however, promulgated by the Bituminous Coal Commission, had not been adjusted to cost of production and market demand. Many miners lost much time and operators began to undersell competitors, thus furthering uneconomic conditions. Production per mine worker had declined to an annual average of 571 net tons in 1938.

In 1939 union coal mines were closed from April 1 to May 15 while negotiations between operators and labor officials continued. During this period, however, several open-shop mines were in operation, while many small mines, dependent on local markets, operated only during the winter months. Average annual production was 504 net tons per mine worker, and reflected the work-stoppage period as well as decrease in man hours during the year.

1 Ibid, 1935 and 1936 .

2 Ibid, 1937.

In 1940 one of the largest mines in Garrett County was closed from June to November because the tippie was destroyed by fire. This caused a material reduction in the coal output for that year, but production for the County was about 527 net tons per mine worker. The average pay for miners was \$7.00 a day during the year.

During 1941 and 1942 general economic activities in connection with World War II were reflected in coal mining. Demand and production were up, but mines were losing employees to other industries, particularly war industries, and absenteeism added to the problem of keeping up the daily output of coal. Supplies and repairs to mines were other growing problems. With ceiling prices on coal, some mines actually turned down orders because of mounting production costs. However, production per mine worker in 1941 was 769 net tons and in 1942 increased to 865 net tons, reflecting the increases in number of operating days and of man days.

In 1943 there was a growing scarcity of mine labor and an increase in absenteeism. Many skilled men, such as electricians and hoist operators, were attracted to other industries, and many of the young men entered military service. Although the total number of employees in Garrett County mines decreased from 981 in 1932 to 861 in 1943, average production per man increased to 974 net tons, making total production practically the same for those years. Despite difficulties in obtaining and holding labor, the 893 mine employees in the County in 1944 produced an average of 973 net tons per mine worker. At several of the mines it was possible to offset some of the manpower shortages by installing and using new mining machinery, including cutting, conveying, and cleaning equipment. By these means production was maintained, despite the fact

that many skilled men had been replaced by help inexperienced in underground operations. About 36,000 tons were produced by strip operations in 1944, compared to only 1,800 tons in 1943, the first year this method was used in Garrett County.

In 1945 the total number of mine workers in Garrett County was only 757, compared to 893 the previous year, and 1,029 and 1,204 in 1940 and 1939 respectively. Many young men were still leaving the mines for military service, and even an increase of average daily wages to over \$12.00 failed to prevent losses to other industries, so that shortages, particularly of key men, such as mine foremen, became a problem by 1945. However, installation of additional machinery and equipment, especially in one of the largest mines, helped considerably to increase production, until an average output per mine worker of 1,089 net tons was reached for that year. Strip operations produced almost 86,000 net tons, or over 10 percent of the total.

In 1946 total mine workers again increased to 949, and production exceeded a million tons for the first time since the 1916-19 period of World War I. Strip mining furnished about 280,000 net tons, or about 28 percent of the 1,004,245 total tonnage. Annual production averaged about 1,058 net tons per mine worker. Coal production per man by striping methods averaged about 1,667 net tons, while production from underground mines was only 929 net tons per mine worker. This production was possible, despite a work stoppage in union mines from April 1 to May 22, pending labor agreements, and a general shortage of coal cars, particularly in the fall and early winter.

In 1947 coal production in Garrett County exceeded a million net tons for the second consecutive year. A total of 1,022 mine workers

produced an average of about 1,121 net tons per mine worker. Of the total, about 268,500 net tons, or 23 percent, were from strip mines. Some indication of the relative production may be gained from the fact that 152 men working an average of 78 days produced 268,549 net tons in strip mines, while 870 men working an average of 150 days at underground mines produced 877,312 net tons. The chief handicap to strip mining in the County is a climatic one, since freezing weather prevents operations during the months from November to April. In contrast, many of the small underground mines are worked only during winter months, "off-season" for most farming operations. Furthermore, many small mines depend on natural drainage and ventilation, which are generally better in the cooler season of the year.

In 1948 coal production in Garrett County decreased to 896,298 net tons, although 1,057 mine workers were employed, making a net production of 848 net tons per mine worker. Of the total coal produced, 226,625 net tons, or 25 percent, were from strip mines. In relative output, 155 men working an average of 82 days produced 25 percent of the total for the year while the remaining 75 percent was produced at underground mines by 902 men working an average of 144 days. In other words, 17 percent of the miners produced 25 percent of the coal in only about 10 percent as much time.

In 1949 there was a drastic reduction in coal production in Garrett County; for the first time since 1935 total output was below 500,000 net tons. Starting in July 1949 nearly all mines went on a 3-day week schedule, and in September there was a complete stoppage of work in all unionized mines which lasted until December. This resulted in a serious, and apparently permanent, setback for the coal industry of the County. Sev-

eral of the largest mines did not reopen at all due to loss of a market for their coal during the latter part of the year. Total output of 467,367 net tons by 787 men gave an annual average of only 594 net tons per mine worker. During the year only 81,984 net tons, or about 17 percent, of the total was produced by strip mines, and only six strip mines were worked by 44 men for an average of 62 days to produce this share of the total output. At deep mines 743 men were employed an average of 110 days to produce the remaining 385,000 net tons, of which about 77 percent was mined with machines. A large part of this machinery was dismantled and permanently removed from two large mines during the first part of 1950.

It is wellnigh impossible to predict with any degree of accuracy what the future has in store for coal mining in Garrett County, but some of the effects on the men and their families, who live in a mining village with only one large coal company as a source of employment, have already become apparent. The dependability and stability which for many years had been such gratifying characteristics of Garrett County coal miners, had become, by 1950, an almost hopeless immobility.

A tragic example of miners and their families stranded as a result of the permanent closing of a large mine received nation-wide attention in December 1949. The principal of an elementary school at Shallmar, about two miles from Kitzmiller up the North Branch of the Potomac, sent a pupil home on December 9, 1949, because she appeared faint from hunger. He found that the girl's family "had literally been living on apples for two weeks". Other pupils had been forced to stay home from school for lack of clothing. The fifty or so families in Shallmar were virtually destitute because their sole means of employment, the Wolf Den Coal mine,

after operating only 2 or 3 days a week since August 1948, was forced to close down entirely on March 31, 1949 because of lack of orders.

When the mine closed, 85 or 90 men were made dependent on unemployment compensation, which expired after six months, in September 1949. Some men had gone to West Virginia mines as far as 90 miles away for three days work a week. A very few others had found jobs on road construction which had been suspended during winter weather. Generally, the miners felt they could not afford to move away or that they could not get the type of work needed to support their families.

The Kittenning seam which had been worked by the mining company for many years had been largely exhausted and production had decreased from about 70,000 tons to 40,000 tons in recent years, although its labor force had been maintained at about the same level and modern mining machinery was being used. The increased wages of miners and increasing difficulty of obtaining the coal had made operations uneconomic in competition with larger-scale mines producing similar coal in other states. Prospects that Wolf Den Mine can resume operations on anything like its former scale were still very poor in 1950.

Between January 1 and May 11, 1950, the mine had operated only eight days. Unemployment compensation was based on the number of days worked the previous year, and would only amount to a maximum of \$100. Nevertheless, only one of the 50 families in Shallmar had moved away up to that time in 1950.

On March 1, 1950, the "Manor No. 3" mine at Vindex on the North Branch of the Potomac was closed by its operators. It had been for several years one of the two largest mines in Garrett County with usually 200 or more miners and production generally over 200,000 tons a year.

Several openings in Kittanning seams had previously been worked out and abandoned. As in the case of Wolf Den Mine, although its labor force had been maintained at about the same level for several years and modern machinery and methods were being used, increasing costs of production forced the mine to discontinue operations. All equipment was removed from the mine, and, except for some strip mines which are being worked on the slopes above Vindex, there is little chance that employment will be provided in the vicinity for any but a few of the miners. Even though the mine closed on March 1, by May 11, 1950, only three families had left the village.

An example of one of the most serious cases of stranded miners in Garrett County is the situation that resulted from the permanent closing of "Kempton No. 42" mine on April 15, 1950. For many years this had been one of the two largest mines in the County, with more than 200 employees producing from 200,000 to 280,000 tons of coal annually. By 1948, however, production was down to about 166,000 net tons, with 208 employees, despite an investment of over a million dollars in new equipment after World War II. All of this equipment, including pumps, was removed, and the mine has since been flooded. For a short time some miners were employed in dismantling the mine, but only a very few had obtained jobs in other mining operations in the vicinity. All the rest were living on unemployment insurance which would continue for six months.

Considerable criticism was directed at miners stranded by the closing of mines. Very few apparently had any hope of finding employment elsewhere or in other occupations. At least one had used County relief money to buy a second-hand automobile. In another case a newspaper's appeal for help for a miner's child had brought a total of \$500.00 from

its readers; this sum, too, had been used for the purchase of a used car. According to officials of the Bureau of Mines, however, such criticism was not entirely justified, since in some instances at least these automobiles were used to find employment in other mines both within and outside of the State.

During 1950 a number of miners and their families moved from Kempton, Vindex, and Shallmar to other coal-mining centers, particularly in West Virginia.

In the spring of 1951 progress was being made in resumption of operations at both Vindex and Shallmar, but apparently Kempton No. 42 is permanently closed, mostly due to the prohibitive cost of installing pumping equipment, as well as other difficulties in trying to bring a flooded mine back into operation.

Factors Involved in the Market Distribution of Garrett County Coal

Transportation. There are many conditions that influence quantity and distribution of sales of coal. Extent of the seams being mined, character and quality of deposits, ability of operators to undertake large annual deliveries, type of preparation and cleaning equipment, nature and location of market demand, and character of sales efforts put forth, are some factors that enter into marketing and distribution.

Even if all local conditions favored extensive production and transportation of coal, it is more than likely that the most intelligent and aggressive sales promotion methods would not assure penetration of some markets, except to meet unusual demands. In eastern United States there are two conditions especially that greatly restrict distribution of coal from a specific district and rather definitely limit its market area

with only incidental regard for locations of the producing areas.

These conditions are that: extensive coal reserves are distributed somewhat generally throughout the eastern part of the country; and cost of transportation for long-distance rail movements is high.

These two factors are closely related in their effects upon distribution of coal sales. Demand for coal in certain states west of the Mississippi River, for example, located within reasonable distance from producing areas, must be satisfied by the production from those areas, even though their coal may be less suitable for a specific purpose than that produced in more distant fields. The deciding factor is usually the cost of transportation between the point of demand and the area producing the better grade of coal. The per-ton value of coal at the point of shipment in Maryland, as well as at other Appalachian mines, plus transportation costs to western states, so greatly exceeds cost to consumers of coal mined in those states as practically to close the markets there to eastern coal. Of course, the same set of conditions acts as a barrier to the sale of western coal in eastern markets.

It is generally recognized that combination rail-water rates are considerably lower, as a rule, than all-rail rates, and that shipments of coal from eastern fields to some of the western states are possible through such combination railroad-water movements. Large shipments are made from the Appalachian field by rail to points on the Great Lakes to take advantage of lower water transportation rates to the head of the Lakes and points beyond. High-cost, all-rail transportation generally prevents rail movements from this field, however, to most of the western states and all of the southern states except, as has been mentioned, for special or emergency uses. Distance to market, costs of transporta-

tion, and existing reserves are three very important conditions in market penetration of Garrett County coal.

In all coal-producing regions of any importance the primary motive for mining operations is extent of the commercial market demand. There is, of course, a localized demand for coal to meet the needs of consumers located within or adjacent to the coal-mining districts, but the larger portion of production is consumed at points some distance from the mines. The extent of distribution of sales depends largely upon how great a charge for transportation the product can absorb and still compete with that of other areas.

During the years 1919 to 1930 inclusive, between 95.9 percent and 97.3 percent of the coal produced in Garrett County, by mines producing 1,000 tons a year or more, was loaded at the mines "for shipment by rail". In 1935 the percentage was 90.8, and in 1945 the proportion was 90.1 percent. The relatively small decrease in recent years was due to a corresponding increase in the amount "shipped by truck or wagon" by the larger mines. These figures do not include the considerable production of many small mines. During recent years strip mining has become significant, and almost all of this production is hauled by truck. In 1948, for instance, of the total 896,298 net tons produced in Garrett County, about 226,625 net tons were from strip mines. Thus only about 60 percent of Garrett County's output of coal is transported to final destination by railroads. (See Table XXVI.) Varying quantities are exported to foreign countries and to coastal points in this country and involve use of water transportation with a combination of rail-water rates.

TABLE XXVI

COAL MINES IN GARRETT COUNTY
ACCORDING TO PRIMARY TYPE OF TRANSPORTATION

Year	Total Active Mines No.	Mines Shipping By:		Employees of Truck Mines No.	% of Total Miners %	% of Total Prod. %
		Rail No.	Truck or Wagon No.			
1930	23	12	11	49	5.5	2.4
1931	20	12	8	16	1.0	1.2
1932	18	8	10	26	2.9	1.4
1933	30	15	15	28	3.2	1.6
1934	55	12	43	100	11.9	6.3
1935	56	16	40	154	19.2	12.6
1936	56	16	40	201	23.1	13.3
1937	65	9	57	249	28.4	17.2
1938	67	7	60	345	37.3	27.1
1939	80	11	69	489	40.6	26.3
1940	90	17	73	446	43.3	27.6
1941	92	15	77	373	40.7	23.7
1942	71	9	62	292	29.8	17.1
1943	64	9	55	255	29.6	13.7
1944	62	7	55	312	34.9	17.3
1945	57	7	50	255	33.7	25.1
1946	62	9	51	348	36.7	37.7
1947	72	15	57	334	32.6	28.6
1948	77	12	66	499	47.3	40.8

Computed from Annual Reports, Maryland Bureau of Mines.

The coal sold to local trade or to mine employees is delivered by wagon or motor truck, with a transportation cost that somewhat separates this portion of production from that destined to the larger commercial markets under railroad freight rates approved by the Interstate Commerce Commission. The short haul involved, and elimination of other expenses resulting from sales activities, extra handling, etc., make it possible for consumers within economic trucking radius to purchase coal more cheaply than can those obliged to buy through the ordinary commercial market.

The rapid increase during the last twenty years in motor-truck transportation for bulk freight is changing established methods of selling and distributing coal within areas of a 50- or 100-mile radius of producing mines. This makes it possible for operators themselves to sell direct to consumers within those areas. It permits direct deliveries from mines to consumers, and makes possible at least the reduction, if not complete elimination, of certain local cost factors, such as sales commissions and local handling delivery charges. There are certain definite restrictions to use of trucks for this purpose, however, which should be taken into consideration. Recognition must be given to the relatively high initial cost of large trucks, or the capital investment; to overhead charges for depreciation, taxes, insurance, interest, etc.; and also, especially on long hauls, to the almost essential requirement of a return load. While it is possible for a mining company to develop a demand for its coal at points within reasonable trucking distance from its mine, advantages of such development might be completely nullified by direct expenses to the company imposed by this method of transportation. Such trucks would probably be used only incidentally for other purposes involving pay loads. Unless it is possible to use trucks as common carriers on return trips there will be definite limitations on the extent of their use in distribution and delivery of coal, as the entire cost of transportation must be borne by the coal consumer. The relatively high transportation charges on new passenger automobiles which are transported by "one-way" car carriers is a common example of this situation.

The coal basins of Garrett County are served directly by the Baltimore and Ohio Railroad, Western Maryland Railway, Cumberland and Penn-

sylvania Railway (now operated by the Western Maryland Railway Company), Casselman River Railroad (since 1925 controlled by the Baltimore and Ohio Railroad), Preston Railroad, and indirectly by the Pennsylvania Railroad which enters Cumberland. A branch of the Western Maryland Railway serves the Chaffee-Vindex area mines, and another the Shallmar area southwest of Kitzmiller.

TABLE XXVII

MARYLAND COAL TRANSPORTED BY
RAILROADS TRAVERSING WESTERN MARYLAND'S COAL FIELDS

Year	Total Production	Transported By Railroads		Cumberland & Penna. Railroad	Western Maryland Railroad	B. & O. Railroad
	Net Tons	Net Tons	%	Net Tons	Net Tons	Net Tons
1930	2,272,872	2,096,438	92.2	1,032,680	1,022,210	41,548
1931	1,967,595	1,821,860	92.5	896,180	885,410	40,270
1932	1,431,904	1,275,097	89.0	567,262	678,330	29,505
1933	1,535,789	1,347,224	87.7	674,538	658,025	14,611
1934	1,641,746	1,391,475	84.8	737,214	638,845	15,416
1935	1,687,809	1,384,659	82.0	735,219	586,965	42,475
1936	1,708,231	1,381,028	80.8	696,508	618,565	65,955
1937	1,564,589	1,279,892	81.4	592,877	609,865	77,150
1938	1,311,687	1,070,519	81.6	471,397	503,145	95,977
1939	1,467,850	1,170,062	79.7	493,665	540,035	136,362
1940	1,537,160	1,169,332	76.1	563,782	507,665	97,885
1941	1,717,215	1,374,810	80.0	593,115	652,880	128,815
1942	2,016,418	1,602,604	79.5	619,516	912,330	70,758
1943	1,931,791	1,509,356	78.2	572,191	899,060	38,605
1944	1,875,804	1,522,469	81.2	517,294	963,865	41,310
1945	1,779,231	1,295,715	72.8	375,887	898,265	21,563
1946	2,032,869	1,700,714	83.7	781,755	825,940	93,019
1947	2,049,995	1,713,823	83.6	719,033	868,890	125,900
1948	1,648,486	1,293,458	78.5	555,187	669,055	69,216

Compiled from Annual Reports, Maryland Bureau of Mines.

The Baltimore and Ohio Railroad, Western Maryland Railway and the Pennsylvania Railroad are essentially trunk line common carriers engaged in inter-state commerce. The Casselman River and Preston Railroads are small lines that operate primarily in Garrett County and furnish an outlet

for coal mines in their territories. The amount of coal carried by these two lines, however, is relatively unimportant, with comparatively much greater fluctuation. The Cumberland and Pennsylvania Railroad was developed largely to provide an outlet for production of the coal mines located in Georges Creek Valley. It also serves as a common carrier. The coal that it receives from the mines served by it, however, is generally delivered to one of the three trunk line railroads for further transportation.

Most of the mines of commercial importance are served by spur-track connections with one of these railroads, or by trucks or inclined planes to transport coal to the railroad sidings in valleys. Since the bulk of Garrett County commercial coal production is in the Georges Creek and Upper Potomac Valleys, it is natural that the Western Maryland Railway and the Cumberland and Pennsylvania Railroad would carry most of the coal transported by railroads. In 1948, for example, total coal production in Allegany and Garrett Counties was 1,648,487 net tons, and these two railroads reported joint shipments for that calendar year of 1,224,242 net tons, or about 74.3 percent of the total production. The Baltimore and Ohio Railroad's share of the traffic has been much lower for many years; in 1948 it carried only 69,216 net tons, or about 4.2 percent.

Other factors. Three of the most pertinent factors in distribution of coal sales from a particular field are: location, size, and stability of the market. There are a number of different reasons why coal of a given area enters a certain market and why it does not enter other markets. In the case of Maryland coal fields it is difficult to distinguish between destinations of coal from Garrett County and coal from Allegany County. Coal trains destined for any one of several markets are often made up

of coal cars filled at mines in either county. Shipments are made generally to points in the eastern part of the country, from the New England States to Virginia, and to Missouri and Iowa in the west. About 1/4 of the coal shipped from Maryland mines by rail is consigned to piers, particularly the Port of New York District piers (mostly in New Jersey), and to Baltimore and Philadelphia piers. Some of this coal is delivered to piers on the Great Lakes at such points as Toledo, Lorain, Cleveland, Fairport, Conneaut, Buffalo, and Rochester for transshipment, either by coal boats or car ferries, to points on the upper Lakes and in Canada.

The Maryland coal that is delivered at seaboard piers enters coast-wise trade to some extent, although it is used largely for bunkering steamships, for public utility plants, and for other purposes within the harbor districts where the piers are located. Some coal delivered to piers in the Baltimore area is also shipped to other points along the Chesapeake Bay.

About 3/4 of the coal shipped by rail from Maryland mines is consigned to track sidings in other states and in Canada. Most of these points are in Maryland, Pennsylvania, or New Jersey, these three states receiving about 80 percent, with Maryland leading. For the remaining 20 percent, the New England States have been a fairly large and consistent market with Connecticut and Massachusetts taking most and Vermont least. Relatively small amounts, delivered by rail, are destined to the District of Columbia, West Virginia, Iowa, Missouri, Illinois, Michigan, Wisconsin, Virginia, and Canada; and in many cases these coals are for special uses.

The market distribution of Maryland coals by principal uses varies somewhat from year to year depending on conditions of business activities.

A fairly representative estimate by the U. S. Bureau of Mines, however, shows major uses, percentage of total production which is distributed to each use, and those economic activities in which the most extensive demands for Maryland coal are to be found.

TABLE XXVIII
DISTRIBUTION OF MARYLAND COAL
BY PRINCIPAL USES

Distribution	% of Total
Industries and Public Utilities: Chiefly for steam generation (except coke ovens and smelting operations).	65.0
Sales to local dealers	15.0
Railroad fuel, including shop and station fuel	11.0
Smelting coal	3.0
Exports	3.0
Bunkers	2.0
By-product coke ovens	1.0
	100.0

U. S. Bureau of Mines.

Among the more important factors that govern character and extent of market demand for bituminous coal are: climatic conditions, which influence demand for heating purposes and for public utility use; variations in seasonal requirements, for domestic and public utility use as well as in seasonal industrial activities such as canning of fruit; and the general industrial situation. The bituminous coal industry is sensitive to any change in general tone of business, and production drops rapidly during business depressions.

The market demand is especially influenced by the geographical relationship between producing fields and centers of consumption. Expense of transportation usually forms an important item in cost of coal to con-

sumers, with charges increasing as coal moves out from its source. This condition tends to create a natural market around or near the source of supply and often restricts the radius of distribution, except in the case of coal for specialized uses.

Methods used in distributing bituminous coal to ultimate consumers, and types of selling agencies involved, have been determined largely by conditions that govern character, extent, and location of market demand. An important part of the output of bituminous coal comes from mines owned directly, or financially controlled, by consumers. However, only a relatively small proportion of Maryland coal is produced by such "captive" mines. Varying amounts of coal are used by mines for generating power and heat, some is used by mine employees or is sold to the local trade. The greater portion enters the general commercial market and is disposed of by the following selling agencies:

Selling department of the coal-mining company. Many of the larger producers maintain a selling department for disposal of at least part of their production.

Sales agents working on a commission basis. These agents do not assume title to the coal, but receive as commission a certain percent of its value.

Independent wholesale coal dealers or jobbers. These agents purchase and resell coal to consumers or coal retail dealers without physically handling it, the coal being shipped directly from the mine to the retailer or consumer. As a rule the wholesale coal dealer or jobber is established in a permanent business.

Coal brokers. Although somewhat similar to jobbers, brokers do not receive title to the coal they sell, do not handle it physically, and are paid on a commission basis. Brokers differ from jobbers, however, in that their operations are usually carried on only when market conditions are especially favorable.

Wholesale trestle or dock companies. These are usually separate and permanent corporations, although they may be owned or controlled by mining companies or railroads, etc. They store coal in large quantities and act as wholesale merchants, selling, as a general rule, only in carload lots.

Retailers. They buy and store the coal they sell and, although at times they may sell in carload lots, they usually break carload deliveries into smaller quantities for their customers.

The functions of a distribution agency are not always restricted to those that distinguish a particular type of agency. For example, the sales department of a producing mine may operate as a sales agent on commission, or as a jobber, selling the production of neighboring mines; a sales agent, in turn, may become financially interested in a mine, and still handle coals from other mines on a jobbing basis; while a wholesale dealer or jobber may have a financial interest in one or more mines, may handle coal from other mines on a commission basis, and may also act as a jobber or retailer.

The selling agencies described above usually market a variety of coals and seldom confine their activities to the product of any one mine or even of any one field, in order to serve most effectively the varying requirements of their customers. In general, the larger portion of bituminous coal is billed direct from mines to ultimate consumers, while most of the remainder is consigned to wholesale or retail storage yards to meet the demand of smaller consumers.

Competition problems. It is natural that operators of coal mines should first attempt to develop a market in territory that is more or less adjacent to their own producing areas. It would also appear to be to their best interests, especially from the point of view of economy in sales promotion activities and cost of transportation to develop possibilities of this territory more intensively than those in more distant parts of the country. This proposition seems to apply particularly to the state in which mining operations are being conducted, since in many cases it might be more economical for consumers to meet their needs through use of coal

produced in the state rather than by importing it from mining areas in other states.

In an intensive development of trade possibilities of the state in which mines are located, it is important for operators to learn, if possible, how much coal is consumed in the state, general character of the coal, sources from which it is obtained, who the competitors are, and degree of competition offered by each competing state. Furthermore, they would have to analyze power and tonnage needs of the principal classes of coal users, if they would meet these requirements effectively.

TABLE XXIX

CHARACTER OF COAL CONSUMED IN MARYLAND
EXCLUSIVE OF RAILROAD AND STEAMSHIP FUEL ^{1/}

Class of Coal	Net Tons		Percent of Total		% of Total Bituminous	
Anthracite (Baltimore City)		839,100		13.2		
Bituminous:						
Low volatile	3,237,744		51.0		58.7	
Medium volatile	26,111		.4		.5	
High volatile	2,246,594		35.4		40.8	
Imports	1,120	5,511,569	*	86.8	*	100.0
Total		6,350,669		100.0		100.0

U. S. Bureau of Mines

^{1/} Average of recent years.

* Less than .1 of 1 percent.

Table XXIX shows the general character of coal consumed in Maryland in recent years, exclusive of railroad and steamship fuel. It shows that the quantity of bituminous coal used in Maryland greatly exceeds that of anthracite. It also shows that a greater quantity of low-vola-

tile bituminous coal is used than either medium- or high-volatile coals. The production of Maryland's mines for general commercial distribution is all low-volatile coals of semi-bituminous rank. The State's output has averaged around 1,500,000 net tons, of which about 700,000 tons are generally mined in Garrett County. Extent of the market in Maryland for the class of coal produced here, as shown in the table, is brought out by the fact that consumption in Maryland of low-volatile coals alone exceeded twice the State's average production of such coals for many years, and Garrett County's production by four times.

There are certain fundamental conditions that govern operations in the bituminous coal industry of the country as a whole, and these react in turn on production of any particular area.

In general, the industry is over-capacitated for ordinary demand. Some studies have used peak production years such as 1918 or 1945 as indicators of capacity of the industry to produce bituminous coal, but increases at such times are primarily to meet emergency demands. With changing conditions that influence demand for soft coal, certain mines, particularly those producing poor grades, have gone out of production either temporarily or permanently; capacity of others has been increased proportionately so that capacity of the industry probably has not changed materially so far as increase or decrease in quantity is concerned. Consumption trends are materially influenced by such factors as improved methods of using coal, competition from other sources of heat and energy, and the probability that foreign demand for American coal will not increase in any appreciable degree.

Competition of other fuels is undoubtedly the most influential of these factors. This is particularly true in industrial, transportation,

and mechanical groups, where competing fuels have made serious inroads into fields that have been served almost exclusively in the past by bituminous coal. These include substitution of oil and electricity for coal in manufacturing plants, and of oil and gas for coal in heating residences and other buildings. Even population increases and industrial expansion which may occur in the future will not necessarily involve any substantially greater demand for bituminous coal than now exists.

If it is possible to increase consumption, and therefore production, of coal from Garrett County mines, it will probably be accomplished, not through an increase in the country's demand for coal, but rather through successful competition with coal from other states, both in Maryland and other sections of the distribution area which is now served by the output of western Maryland mines. It is possible, also, that growth of population in Maryland and expansion of industrial and commercial activities in the State may create a somewhat larger potential market within the boundaries of Maryland.

In view of the importance of Garrett County's coal-mining industry as a basic factor in the County's economic structure, there is need for more intensive promotion efforts in selling and distributing its coal. The high reputation that Maryland coals established many years ago is a sound basis for sales promotion efforts. It is true that much of the earlier production came from mines working in the upper, thicker coal beds--Pittsburgh (Big Vein) and Sewickley (Tyson etc.)--which are approaching depletion after many years of mining. But coals of the lower, thinner beds are also of low-volatile coking type, suitable for blending in making metallurgical coke. These smokeless, semi-bituminous coals are also suitable for domestic and industrial use in the relatively nearby

Washington, Baltimore, and Pittsburgh areas. They compare favorably with similar coals mined in Virginia, West Virginia, and Pennsylvania, and should be able, at least on the basis of analysis, to compete on advantageous terms with semi-bituminous coals produced in those states. Except in isolated instances, they are generally equal on a performance basis to the best semi-bituminous coals mined anywhere.

Coals mined in Garrett County are now used primarily for industrial, steaming, and smithing purposes, for generation of gas and electricity in public utility plants, for railroad and steamship fuel, for use in by-product coke ovens, and for domestic and other heating purposes. Some varieties are also excellent substitutes for Pennsylvania anthracite coal in heating of residences, apartment houses, and commercial and other buildings.

During recent years about 80 percent of the County's commercial production has been used for industrial steaming purposes and for heating buildings, and while it is possible that greater demand might be developed along other lines of consumption, it is probable that a greater measure of success would result from sales promotion efforts in these two general divisions of the coal market than in other fields. Being of low-volatile variety, however, Garrett County's coal is relatively free from smoke when properly fired, a quality important to all classes of users in cities where smoke ordinances are enforced.

An extensive demand for semi-bituminous coal that runs into many millions of tons annually exists throughout the eastern part of the country. Several million tons are consumed each year in Maryland alone, and the local market, including the District of Columbia, could absorb a much larger portion of the production of Maryland mines than it is using at the present time.

The present areal distribution of Maryland coal indicates to some extent the geographical location of those markets in which a greater demand for coal for steaming and heating purposes might reasonably be anticipated from more active sales promotion efforts. Present demand is restricted almost exclusively to the United States, shipments abroad being negligible in volume. Although a small, but fairly well established demand exists in certain states west of the Mississippi River and several states east of that river and north of the Tennessee-North Carolina line, the larger portion of Maryland's production that is shipped by rail to the commercial market is consigned to points in Maryland, Pennsylvania, New Jersey, and New York. Aggregate shipments to track sidings and piers in those four states amounts annually to between 85 and 90 percent of the total shipped from Maryland mines by rail. Shipments to fourteen other states and to Canada are relatively small, not more than 10 percent, and ranging from a few tons to several thousand.

The established reputation of Maryland coals in the four states named indicates that a quicker response to increased sales promotion activities might reasonably be anticipated in those states than could be expected in regions where they are not so well known and where much educational work might be necessary. Official records of bituminous coal receipts in other states, however, show that the potential market for Maryland coal is much broader than the area comprised by the four states in question.

Usually over 70 percent of total annual production of bituminous coal in the United States is used for industrial and other purposes, except railroad and steamship consumption, which uses somewhat over 20 percent, while the remaining tonnage is exported. In view of the many and

highly diversified conditions that influence purchases of coal, it is not possible to make even an approximate estimate of extent of the open market on a competitive basis. Sale of coal is influenced in many cases by reciprocal or other relationships between consumers and producers, and by investments of consumers and others in operating mines. In most cases, however, such coal cannot be considered as entering the competitive market. Also, at least one-fourth of the bituminous coal consumed in the United States is taken from mines that are owned or controlled by railroads, steel manufacturing concerns, public utility companies, and other interests which use at least 50 percent of the coal from such mines. Coal used by these industries is not considered a part of that available for the commercial market.

Extent of the demand for bituminous coal varies greatly in different states and different regions of the country. The states lying east of the Mississippi and north of the Ohio and Potomac Rivers consume over a period of years more than 70 percent of the total, excluding railroad and steamship fuel. Of this group Pennsylvania, Ohio, the Chicago industrial area, New York, and Michigan account for over 50 percent of the total. The southeastern states, those east of the Mississippi and south of the Ohio and Potomac Rivers, generally take about 11 or 12 percent, while the 22 states lying west of the Mississippi form a market for the remaining 15 percent or so.

On the basis of this distribution the mines of western Maryland are especially well located geographically to serve states east of the Mississippi and north of the Ohio and Potomac Rivers, inasmuch as they occupy a central position in this region which has an aggregate consumption of at least 300,000,000 net tons a year.

Character of demand, however, differs widely in different states, both in the kind of bituminous coal used and in uses to which coal is put. New England and New Jersey, for example, are essentially low-volatile coal markets; extensive manufacturing operations there, together with operation of large public utility plants, require high quality steaming coals. In other states, such as Pennsylvania, Ohio, and Alabama, where the steel industry has reached outstanding proportions, the consumption consists primarily of high-volatile coals. In New York State there is a relatively large demand for medium-volatile coals.

As has been stated previously, all of the coal mined in western Maryland is of the low-volatile variety. States east of the Mississippi and north of the Ohio and Potomac Rivers generally use about 90 percent of the low-volatile bituminous coal, exclusive of railroad and steamship fuel. In most states north of the Ohio and Potomac Rivers, low-volatile coals come into strong competition with high-volatile coals. In New England and New Jersey, however, a much greater proportion of low-volatile coals is used; in the former 75 percent and in the latter about 60 percent. Although Pennsylvania, Ohio, the Chicago district, New York, and Michigan use much more high-volatile than low-volatile varieties, demand for the latter in these areas is also relatively large, each one using annually several times the entire Maryland production.

Existing demands for coal of higher grades for specific purposes cannot properly be satisfied by lower grade, high-volatile coals, and economies, for which search is constantly made in industrial transportation, public utility, and other fields, will undoubtedly result in ever-increasing demand for coal of the low-volatile variety. It is reasonable to assume, therefore, that such an increasing demand for

low-volatile coals should afford opportunity for Garrett County operators to increase their production.

Most of the low-volatile coal produced in the United States is from mines in Pennsylvania, West Virginia, Virginia, and Maryland. While there are deposits of low-volatile semi-bituminous coal in Georgia, Arkansas, Oklahoma, and Washington, annual production is relatively small; their aggregate production makes up less than 10 percent of the total as a general rule.

The greater proportion of low-volatile coal mined in the four states of the northern Appalachian field, or around 60 percent, is from the New River-Winding Gulf and Pocahontas-Tug River districts of southern West Virginia. Over 25 percent is from the central Pennsylvania district, and the remaining 10 or 12 percent comes from the Somerset-Meyersdale-Cumberland-Piedmont districts of Pennsylvania, Maryland, and West Virginia. It is obvious, from these figures, that the country's requirements of low-volatile coal are met in only a small measure by production of Maryland mines.

States which lie east of western Maryland mining districts--that is, New England, New York, New Jersey, Pennsylvania, Delaware, Maryland, and the District of Columbia--normally use over 60 percent of the total tonnage of low-volatile coal consumed in the entire area east of the Mississippi and north of the Ohio and Potomac Rivers. Of this quantity New River-Winding Gulf and Pocahontas-Tug River districts supply about 35 percent, most of which goes to New England, although around a million tons each are used by New York and the District of Columbia. Over 45 percent of low-volatile coal used in the area east of western Maryland mines is produced by the central Pennsylvania district, which supplies

most of the coal consumed in New York, New Jersey, Pennsylvania, and Delaware, as well as over 500,000 tons received by the State of Maryland. The remaining 18 or 20 percent of the entire quantity used in the area under discussion is obtained from the Somerset-Meyersdale-Cumberland-Piedmont districts. Over half of this is used in Maryland and Pennsylvania, or about 4,500,000 tons by both states, New Jersey and New England normally take well over 1,000,000 tons each, while between 500,000 and 600,000 tons are distributed in New York, Delaware, and the District of Columbia.

On the average, about 35 percent of low-volatile coal shipped from the four northern Appalachian districts is sent to the area between western Maryland and the Mississippi. This includes the states of Ohio, Indiana, Illinois, Michigan, and Wisconsin. Almost all of this coal comes from the two West Virginia districts; and of the rest almost all is from the Somerset-Meyersdale-Cumberland-Piedmont districts and goes principally to Ohio. Incidentally, the Chicago industrial area, largest coal market in the country, receives more low-volatile coal from the two West Virginia fields than does any other single section of northeastern United States, while Ohio and Michigan are also relatively large markets and next in importance for this West Virginia coal.

Comparatively speaking, demand for low-volatile coal in states south of the Ohio and Potomac Rivers is not extensive. Over a period of years the total known consumption of low-volatile coals from the north Appalachian district has not been more than 10 percent of the aggregate for the entire country. Over 90 percent was used in Virginia, West Virginia, and North Carolina, with Virginia consuming about half. Approximately 94 percent of the coal shipped to the southeastern states, from the four

districts under discussion, was from the two West Virginia districts, due partly to proximity of these fields to the states in question. The greater portion of the remainder was mined in the West Virginia section of the Cumberland-Piedmont district and was used in that state.

Most coal consumed in states west of the Mississippi is of the high-volatile variety, and ordinarily only about 500,000 or 600,000 tons of low-volatile coal is shipped from the north Appalachian districts to that part of the United States. Over 91 percent was used in Minnesota, Iowa, and Missouri, and over 90 percent came from West Virginia.

This analysis shows a much greater penetration of West Virginia low-volatile coal into markets of the three major geographical divisions of the country in question than of coal from either Pennsylvania or Maryland. While there is a substantial and more or less established demand for low-volatile coals from central Pennsylvania in certain northeastern states, West Virginia mines apparently possess particular competitive advantages that have given a firmer foothold in the low-volatile coal markets of the country. In recent years Maryland's share in coal shipped from the north Appalachian districts has averaged around 1,500,000 tons or only around 2 percent of the aggregate quantity shipped by rail to track sidings throughout the country. This indicates that in an extensive market of from 80 to 100 million tons of low-volatile coals, Maryland production is now a relatively unimportant factor. While considerable of the country's consumption represents non-competitive business, it is evident that there exists a market for low-volatile coals in the United States, especially in the northeastern states, which might be capitalized on by Maryland operators to a materially greater extent than is the case at the present time.

In considering ability of Maryland coals to penetrate domestic or foreign markets in competition with coals from other producing areas, recognition should be given to the fact that transportation costs constitute one of the most important factors in the price paid by the ultimate consumer. As a rule, they amount, even for relatively short distances to almost as much as the value of the coal f.o.b. the mine. In 1948, for example, average value of Maryland coal at the mine, as reported by the U. S. Bureau of Mines, was \$3.41 per net ton, whereas the railroad freight rate on coal from western Maryland to Baltimore amounted to \$3.15 per ton. It may be stated that as a general condition rates from a given field increase more or less proportionately as length of haul increases to more and more distant mines. They eventually reach a level, however, which constitutes a theoretical, but more or less practical, barrier to further movement of coal, except for specialized use. Coal then meets competition from local reserves or other fields which can usually be overcome only by urgency of market demand, by establishment of reciprocal or other relationships between producer and consumer, by granting of concessions, or other arrangements.

In some instances, however, freight rates show little relationship to distance. (See Table XXX.) One purpose for maintenance of this condition is to afford coal from a given field opportunity to enter markets which might otherwise be inaccessible. This may be illustrated by comparing the rate of \$4.04 per gross ton for the 226-mile haul from the Cumberland, Maryland, district to Baltimore, with the rate of \$4.96 per gross ton for the haul of 462 miles from the New River-Winding Gulf field in West Virginia to Baltimore. In this instance the West Virginia coal moves 236 miles farther, or over twice as far as coal from Maryland, but at only 92 cents more per ton hauled.

Freight rates that have been, or are, in effect between a common market and competing field, however, have been a basis for many active controversies and petitions for rate adjustments. In many cases the "distance principle" covers the relationship and determination of competitive rates; the difference between rates varying more or less proportionately with the spread between the distances.

In some instances lower rates for longer all-rail hauls govern movement from competing fields to a common market and constitute a more or less artificial type of subsidy, which penalizes producers in the least distant area. One example of this situation can be cited: The distance from Cumberland, Maryland, to Sandusky, Ohio, is shorter by 105 miles than from a shipping point in the McRoberts field of eastern Kentucky, the former haul being 380 miles and the latter 485 miles. Railroad freight rates on coal from Cumberland to Sandusky, however, were greater by 25 cents than the rate from the McRoberts field, being \$3.37 per net ton as against \$3.12 from the McRoberts field, as of March 1949. The 1950 freight rate for the 182-mile haul from Cumberland to Baltimore, for example, was \$3.15 per ton, and the rate for the 384-mile haul from Clay-Elk field in West Virginia to Baltimore was \$3.55. Although the distance from Clay-Elk field is 111 percent greater, the freight rate was greater by only 11.3 percent.

Such illustrations show that railroad freight rates which cover distribution of coal in the United States present many apparent inconsistencies, and in many cases tend to deprive a particular field of competitive advantages which are inherent in its geographical location.

On the basis of freight rates, production of western Maryland mines can compete on equal terms in many of the important markets of the country

with coal from the other low-volatile districts of the north Appalachian region. This is especially apparent between the rates that cover all-rail movements for the western Maryland field to certain important western markets and those rates to the same markets from the low-volatile districts of West Virginia.

Large quantities of this type of coal are received by a number of states in the Mississippi Valley, and most of it is shipped from the West Virginia field. Equal rates are in effect from both the Maryland and West Virginia districts to Indianapolis, Detroit, Chicago, Milwaukee, and St. Louis. Much low-volatile coal also moves annually from the Appalachian districts to Lake Erie ports in Ohio for water transportation to points up the Great Lakes. Despite the fact, however, that western Maryland coal has a lower freight rate to Ohio docks than have coals of the West Virginia districts, over 99 percent of the total tonnage frequently comes from the New River-Winding Gulf and Pocahontas-Tug River fields.

For many years, well over a million tons of semi-bituminous, low-volatile coal have been used annually in the District of Columbia. Notwithstanding the fact that both distance and freight rate to Washington from the low-volatile districts in West Virginia are greater than from districts producing such coal in Maryland and central Pennsylvania, over 80 percent of the coal consumed in the Capital comes from West Virginia mines.

Freight rates to Baltimore from the two low-volatile districts in West Virginia are also greater than from similar coal mines in Maryland and central Pennsylvania. Baltimore, however, receives large quantities of low-volatile coal from West Virginia. Coal of low-volatile variety

used in Pennsylvania, Delaware, New Jersey, and New York, is received from mines in central Pennsylvania and the Somerset-Meyersdale-Cumberland-Piedmont districts. Freight rates to points in the Middle Atlantic States are the same from both of these districts, while higher all-rail rates are in effect to those points from the two districts in West Virginia.

There is a large consumption of semi-bituminous, low-volatile coal in New England. Again, freight rates are the same for the Pennsylvania and Maryland districts, and while these districts sell relatively large quantities of coal in New England, most of the coal of this variety used there comes from the two West Virginia fields, being shipped under rail-water rates from the mines to Hampton Roads, and from there by water to destination.

It is apparent, therefore, that the freight rate situation does not, in itself, constitute an obstacle to the penetration of Maryland coals of the larger markets extending from the Mississippi Valley to the Hudson River, but that the large sale of West Virginia coals in that territory has resulted from operation of other influences. It has been a popular conception that an unfavorable freight rate situation has prevented Maryland coals from entering certain of the country's more important markets, but rates to the great markets of the Middle West are identical, while to other markets they are considerably cheaper, so that the contention does not appear to be well founded.

The following figures (Table XXX) show approximate mileages from main competing fields to most of the important markets, together with freight rates per ton (west-bound in net tons and east-bound in gross tons) as of April 4, 1951.

TABLE XXX

COMPARATIVE ALL-RAIL FREIGHT RATES ON BITUMINOUS COAL
FROM FOUR LOW-VOLATILE DISTRICTS OF THE APPALACHIAN REGION
TO SOME OF THE MORE IMPORTANT MARKETS OF THE COUNTRY

(Effective April 4, 1951)

TO:	FROM:							
	Cumberland-Piedmont District 1/		Central Pennsylvania District 2/		New River-Winding Gulf District 3/		Pocahontas-Tug River District 4/	
	Approx. Dist.	Freight Rate	Approx. Dist.	Freight Rate	Approx. Dist.	Freight Rate	Approx. Dist.	Freight Rate
	Miles	Tons	Miles	Tons	Miles	Tons	Miles	Tons
<u>Rate per Net Ton:</u>								
Minneapolis, Minn.	1,022	\$6.81	1,098	\$6.81	1,015	\$6.81	1,003	\$6.81
Des Moines, Iowa	904	6.31	1,050	6.31	752	6.31	956	6.31
St. Louis, Mo.	678	4.48	763	4.48	633	4.48	635	4.48
Milwaukee, Wisc.	711	5.25	762	5.25	665	5.25	667	5.25
Chicago, Ill.	626	4.50	677	4.50	580	4.50	582	4.50
Detroit, Mich.	495	4.05	489	4.05	462	4.05	473	4.05
Indianapolis, Ind.	500	3.82	543	3.87	404	3.82	414	3.82
Lorain, Ohio (Lake piers)	275	2.89	293	3.24	430	3.81	--	--
<u>Rate per Gross Ton:</u>								
Baltimore, Md.	226	4.04	246	4.04	462	4.96	413	4.96
Washington, D. C.	208	4.04	283	4.04	413	4.49	363	4.49
Harrisburg, Pa.	219	3.62	188	3.62	486	4.89	453	4.89
Philadelphia, Pa.	328	4.04	266	4.04	565	4.05	563	5.45
Newark, N. J.	397	4.45	334	4.45	646	5.70	644	5.70
New York City	423	4.58	350	4.58	653	4.83	654	5.83
New Haven, Conn.	525	4.95	425	4.95	745	6.05	--	6.05
Providence, R. I.	634	5.56	535	5.56	833	6.81	--	6.81
Boston, Mass.	660	5.58	580	5.58	884	6.94	--	6.94

Source: Coal Traffic Managers of the respective railroads.

- 1/ Baltimore and Ohio routing.
2/ Norfolk and Western routing.
3/ Chesapeake and Ohio routing.
4/ Pennsylvania routing.

Natural Gas

Although no evidence has been found of the presence of petroleum in Garrett County, two small natural gas wells have recently come into production. In October 1949 one well producing almost 500,000 cubic feet of gas daily, from a depth of 4,910 feet, was in operation near Gortner. A second well, 2,846 feet in depth, is located between Oakland and Mountain Lake Park; it began producing in September 1950. Both of these have been connected by 6-inch, high-pressure pipe lines with those of the Cumberland and Allegheny Gas Company which serves the Oakland area from nearby West Virginia sources.

Fire Clay

Among the mineral resources of Garrett County are clay deposits of several kinds, such as fire clays, residual clays, sedimentary clays, and shales. These resources have never been developed to any extent commercially, except for some of the fire clay deposits. Most of this utilization has been fairly recent, although small-scale mining was carried on for many years.

In coal mining, any clay underlying a coal is frequently spoken of as "fire clay", but this is not always correct. A true fire clay will stand high temperatures without fusing or melting and can for that reason be used for the manufacture of fire brick, crucibles, etc. Heat resistance usually ranges from 2,714 to 2,984 degrees Fahrenheit.

The inherent characteristics of a clay, however, cannot be determined by its mode of occurrence or appearance. Many clays have the external appearance of a fire clay, but will not stand a high enough temperature to be classed as fire clay. Some of the most accessible fire

clays in Garrett County do not now underlie coal seams, and occur near the top of the Pottsville, which caps most of the higher, long ranges such as Mt. Savage, Meadow, and Negro Mountains, and Winding Ridge. It should be stated, however, that fire clays also occur buried deeply in the coal basins of Garrett County. The clay in the Pottsville is known to clay miners and fire-brick manufacturers as "Mt. Savage" fire clay. The deposit occurs as a relatively constant horizon. Near the crests of the main ridges the clay generally does not show at the surface because it is mostly concealed by talus or colluvial material from an overlying sandstone. Fragments of flint clay can usually be found at or near the surface on these upper slopes.

Near the northeastern corner of the County, toward the crest of Mt. Savage, this fire clay has a thickness of from 8 to 14 feet, averaging about 10 feet in most cases. Within a few feet of the crest it is overlain by a seam of coal about 3 feet thick, above which lies a quartzitic, massive sandstone often 30 or more feet thick. Two types of clays are usually present, a soft or plastic and a "flint" or non-plastic, and both can be used in making fire bricks if they are refractory or have a high-fusion point.

Apparently there is no uniformity in the occurrence of these two clays in relation to each other, but usually the plastic clay overlies the other. However, on the upper eastern slopes of Backbone Mountain, about a mile southwest of Kitzmillersville, the flint clay lies above the plastic type. On the upper slopes of the Youghiogheny Valley at Swallow Falls a bed of plastic or soft clay lies above a 3-foot seam of coal. This plastic clay occurs under a layer of flint clay 1 to 3 feet thick, which, in turn, underlies about 6 feet of shale. The upper 50

feet or so consists of a massive quartzitic sandstone similar to that on the crests of the other main ridges in the County.

On the slopes of Negro Mountain, north of the North Branch of Casselman River, and about two miles north of Jennings, lies another deposit of fire clay which is being currently mined by the Garrett County Refractories Company for its brick plant at Jennings. Here the flint clay consists of about a 3-1/2 foot outcrop. A chemical analysis of this flint clay is as follows:¹

Silica	51.881
Alumina	36.460
Ferric Oxide	1.01
Lime	.98
Magnesia	.10
Alkalies	. Trace
Water	<u>10.500</u>
	100.932

The clay is hard and dense in appearance, and has practically no plasticity when ground and mixed with water. Consequently, its tensile strength is very low and it must be mixed with plastic fire clay for the manufacture of fire brick or other refractories. However, its refractoriness or ability to withstand a large amount of heat without fusing is a very important quality. Its fusion point is about 3,326 degrees F. These qualities make the clay from the Negro Mountain area one of the most refractory clays found in the United States.

The only production of fire clay in western Maryland for several decades was in Allegany County. Because of the expansion of steel production as well as the demand for fire clay in other industries and for

1 Maryland Geological Survey, Vol. IV, p. 504.

other purposes, output of fire clay increased in Allegany County from about 80,000 net tons in 1940 to 106,000 net tons in 1941, and 119,000 net tons in 1942. Production in 1938, incidentally, was only about 42,800 net tons, and in 1939 about 69,200 net tons.

In 1943 the Union Mining Company of Mt. Savage started fire clay stripping on Negro Mountain. Flint clay of suitable quality was stripped by power shovel and hauled by trucks 27 miles to the Company's plant at Mt. Savage, north of Frostburg. Total production for that year in Garrett County was 65,867 net tons, and in Allegany County 75,422 net tons, a total for the State of 142,309 net tons. During the year the Garrett County Refractories Corporation was organized at Grantsville for the development of fire clay deposits in the Jennings area, where construction of a new brick plant was started.

Production of fire clay in 1944 in Garrett County amounted to 36,217 net tons. During the same year production in Allegany County was 45,388 net tons. A new opening was made in the Freeport seam of the Jenkins Mine of the Burnwell Coal Company between Grantsville and New Germany. It was found that clay underlying the coal seam was a high-grade flint fire clay, and some of it was hauled in trucks to the Union Mining Company at Mt. Savage, Allegany County, and later to the new plant at Jennings in Garrett County.

The Garrett County Refractories Corporation completed construction of the brick plant on the Casselman River Railroad at Jennings, about five miles south-southwest of Grantsville, in 1945. This plant was supplied on a small scale during the year by soft fire clay from a stripping operation on the Yoder tract near Stone House about three miles east of Grantsville on Route 40, on the slopes of Meadow Mountain. In addition

hard, or flint, fire clay was obtained from stripping operations in the outcrops on Negro Mountain northwest of Jennings. About 2,181 net tons of soft clay were produced on the Yoder tract, and 5,080 net tons of hard clay were obtained from the Negro Mountain strip operation.

In 1946 a total of 27,977 net tons of fire clay were produced in Garrett County for the Jennings plant. Of this, 25,063 net tons were produced from the Negro Mountain deposit, and 2,914 net tons at Yoder's, or Meadow Mountain strip mine.

Fire clay production in Garrett County for 1947 was all from the Negro Mountain deposits northwest of Jennings. Both hard, flint or non-plastic, and soft, or plastic, fire clay were produced by strip operations along the outcrop; a total of 45,895 net tons of both types of clay. In 1947 the fire clay of Garrett County was all produced by the Union Fire Brick Company (formerly The Garrett County Refractories Corporation) with its plant at Jennings. The following year fire clay production in Garrett County amounted to 59,080 net tons. Strip operations at the Negro Mountain mine produced 50,544 net tons, and the Meadow Mountain strip mine accounted for 8,536 net tons. Fire clay production in the County in 1949 totaled 49,379 net tons, or about 10,000 net tons below the 1948 output. While production in Allegany County was 71,971 net tons, or only about 500 net tons less than in 1948. All of the fire clay produced in Garrett County was from strip operations on the Negro Mountain deposits northwest of Jennings.

There is considerable fluctuation in mining by strip methods. Where a fire clay or coal seam is exposed for a considerable distance, or has only a few feet of overburden to be removed, and the dip of the outcrop is not too great, generally production per man is much greater than in

drift or slope openings which must be worked with pick and shovel or by cutting machine or pneumatic hammers. However, as the exposed outcrop is dug away and the overburden increases, the relative advantages of strip mining with bulldozers and power shovels decrease.

The Union Fire Brick Company's plant at Jennings, south of Grantsville in the Casselman Basin, is the largest of three refractory products plants in western Maryland. Its production capacity is 1,750,000 fire bricks per month. The work is done in two tunnel kilns. For maximum capacity about 70,000 tons of clay must be mined annually, and under present conditions about 25 percent must be plastic clay and the remainder flint clay. The future of the refractory products industry in western Maryland naturally depends on the availability of raw clay of refractory grade. One of the two original source areas for clay in western Maryland, near the summit of Big Savage Mountain, has been worked out. The brick plant at Jennings has been using clay bodies known to exist as far back as 1900. If this plant continues to operate at anything like capacity, new deposits must be found, as strip mining removed the bulk of the clay that can be produced by strip methods within five years after the plant began operations in 1946. At present there is no way of estimating the extent of availability of clay deposits and consequently none of judging how long the present mining operations will support the fire clay products industry in Garrett County.¹

1 Karl M. Waage, "Refractory Clays of the Maryland Coal Fields", Mines and Water Resources, Department of Geology, Bulletin 9, 1950, pp. 107-108.

CHAPTER X

AGRICULTURAL RESOURCES

General Character and Economic Importance

Agriculture occupies a basic position among the various types of economic activity and as a form of use for a major natural resource, the soil. This is due to the fact that plant and animal products furnish the fundamental constituents of the human diet. Products of the farm supply the most essential human need, and are a necessary basis to development and maintenance of practically all other forms of enterprise, such as manufacturing, transportation, and trade.

Another important aspect of agriculture is its permanence. Mineral and even forest resources, through intensive exploitation, sooner or later become exhausted. The soil, on the other hand, can, with proper management, be improved with usage and contribute a variety of products to satisfy man's growing wants.

Because of the great demand that exists for farm products in the densely populated industrial and other urban areas situated within comparatively short distances from Garrett County, its agricultural industries must be considered among its most valuable present and potential assets. The present economic importance of agriculture is indicated by the fact that the livelihood and welfare of most of the County's population is dependent upon the conduct of farming operations. In 1940, for example, of a total of 5,042 male persons 14 years old and over who were employed in Garrett County, 2,014 were working in some form of agriculture, 1,137 were employed by the coal-mining industry, and the third-

largest group comprised 341 persons in "logging and saw-mills". Every agency capable of doing so should cooperate in helping to expand and develop Garrett County's agriculture, and thus improve the economic position of those dependent upon it.

An evaluation of the economic importance to Garrett County of agriculture as compared to other basic industries might be made on the basis of value of production. It is rather difficult, however, to obtain statistical data for a comparison of the value of agricultural production with that of mining, lumbering, and manufacturing. No accurate value of agriculture can be shown because there are no satisfactory statistics on a comparative basis available. For example, figures for certain important agricultural items such as annual increase in value of livestock on farms, rental value of farmers' dwellings, etc., are not published by the U. S. Bureau of the Census. Moreover, such statistics would not give a clear indication of trends over a period of years, because of fluctuations in the dollar value.

According to the census reports, however, for many years the gross value of agricultural production in Garrett County has represented about 50 percent of the total income. Lumber and timber production and coal mining have produced around 20 percent each, while manufactured products have represented the remaining 10 percent.

Capital invested in agriculture. Although there are no complete figures available to show the actual amount of capital invested in agriculture in Garrett County, U. S. Bureau of the Census figures showing values of specified types of farm property indicate quite satisfactorily the amount of capital involved during census years and, to some extent, the trend during the period from 1900 to 1945.

TABLE XXXI

CAPITAL INVESTED IN AGRICULTURE
IN GARRETT AND FREDERICK COUNTIES

Year	Total Value			Change since Previous census		Value per Farm			Change since Previous census	
	Garrett County	Frederick County	Garrett vs. Frederick*	Garrett	Frederick	Garrett County	Frederick County	Garrett vs. Frederick*	Garrett	Frederick
	\$	\$	%	%	%	\$	\$	%	%	%
Land and Buildings:										
1900	3,892,880	18,040,410	21.6	—	—	2,177	4,816	45.2	—	—
1910	6,015,265	21,427,731	28.1	+ 54.5	+ 18.8	2,897	5,633	51.4	+ 33.1	+ 17.0
1920	8,466,103	33,492,407	25.3	+ 40.7	+ 56.3	4,677	8,775	53.3	+ 61.4	+ 55.8
1925	8,416,550	28,075,943	30.0	- 0.6	- 16.2	4,263	7,390	57.7	- 8.9	- 15.8
1930	8,093,452	26,034,407	31.1	- 3.8	- 7.3	4,401	7,582	58.0	+ 3.2	+ 2.6
1940	6,983,419	21,674,644	32.2	- 13.7	- 16.7	3,377	5,098	66.2	- 23.3	- 32.8
1945	7,670,477	26,443,623	29.0	+ 9.8	+ 22.0	3,561	6,254	56.9	+ 5.4	+ 22.7
Farm Machinery and Implements:										
1900	226,210	855,380	26.4	—	—	127	228	55.7	—	—
1910	342,827	1,061,563	32.3	+ 51.6	+ 24.1	165	279	59.1	+ 29.9	+ 22.4
1920	728,957	2,666,799	27.3	+112.6	+151.2	403	699	57.7	+144.2	+150.5
1925	726,852	2,746,005	26.5	- 0.3	+ 3.0	368	723	50.9	- 8.7	+ 3.4
1930	785,477	2,324,025	33.8	+ 8.1	- 15.4	427	677	63.1	+ 16.0	- 6.4
1940	759,289	2,325,270	32.7	- 3.3	+ 0.1	367	670	54.8	- 14.1	- 1.0
1945	1,032,025	3,741,820	27.6	+ 35.9	+ 60.9	479	1,103	43.4	+ 30.5	+ 64.6
Livestock:										
1900	822,072	2,160,795	38.0	—	—	459	577	79.5	—	—
1910	1,099,828	3,463,428	31.8	+ 33.8	+ 60.3	530	910	58.2	+ 15.5	+ 57.7
1920	1,707,021	5,370,007	31.8	+ 55.2	+ 55.0	943	1,407	67.0	+ 77.9	+ 54.6
1925	1,184,594	3,829,905	30.9	- 30.6	- 28.7	600	1,008	59.5	- 36.4	- 28.4
1930	1,672,400	4,869,867	34.3	+ 41.2	+ 27.2	909	1,418	64.1	+ 51.5	+ 40.7
1940	1,131,538	4,092,450	27.6	- 32.3	- 16.0	547	1,181	46.3	- 39.8	- 16.7
1945	1,775,094	7,329,985	24.2	+ 56.9	+ 79.1	824	2,161	38.1	+ 50.6	+ 83.0
Total Farm Property:										
1900	4,941,162	21,056,505	23.5	—	—	2,763	5,620	49.2	—	—
1910	7,503,325	25,952,722	28.9	+ 51.8	+ 23.3	3,614	6,822	53.0	+ 30.8	+ 21.4
1920	10,902,081	41,529,213	26.3	+ 45.3	+ 60.0	6,023	10,880	55.4	+ 66.7	+ 59.5
1925	10,326,996	34,651,853	29.8	- 5.3	- 16.6	5,231	9,121	57.4	- 13.1	- 16.2
1930	10,655,153	33,228,229	32.1	+ 3.2	- 4.1	5,794	9,676	59.9	+ 10.8	+ 6.1
1940	8,874,246	28,092,364	31.6	- 16.7	- 15.5	4,291	8,105	52.9	- 25.9	- 16.2
1945	10,477,596	37,515,428	27.9	+ 18.1	+ 33.5	4,864	11,059	44.0	+ 13.4	+ 36.4

Computed from U. S. Bureau of the Census Reports.

* Percentage of value in Garrett County in proportion to Frederick County.

In Table XXXI no adjustment has been made for differences in value of the dollar from year to year, but a comparison of the relative value of farm property in Garrett County with that of Frederick County may give some indication of the respective importance of agriculture, and of contrasts in specified years.

From 1900 to 1920 both counties showed a definite upward trend in the aggregate value of all classes of farm property, as well as in the component types of property. Incidentally, a similar trend for this period is indicated by figures for the State as a whole. The decade of 1900 to 1910 was one of relatively rapid development of agriculture in Garrett County; the much greater increase in value of farm property and of machinery and implements, compared to similar items for Frederick County, are especially noteworthy. During the decade over 20,000 acres had been added to the farm land area in Garrett County, and the number of farms had increased by 16.1 percent; in Frederick County the area of land in farms had remained about the same, and the number of farms had increased only 1.5 percent. In short, there was a much greater relative increase in the amount and value of farm real estate and of farm machinery and implements in Garrett County between 1900 and 1910 than there was in Frederick County. During the decade, however, while general farming was characteristic of Garrett County, there was a very material expansion in number of livestock, particularly dairy cattle, in Frederick County. The marked increase in value of machinery and equipment between 1910 and 1920 was influenced to a great extent by World War I conditions. Large demands for farm products had to be met despite a severe shortage of labor, and this situation resulted in an increase in the use of machinery, on which prices had more than doubled. Although inflationary conditions

had made farm real estate values abnormally high, the relative change in value of all farm lands and buildings in Garrett County was less than it had been between 1900 and 1910, and much less than in the case of Frederick County. Moreover, during the period there was a 12.8 percent decrease in number of farms in Garrett County, while in Frederick County there was a .3 percent increase, so that the relatively greater increase in value of farm lands and buildings per farm in Garrett County resulted to a considerable degree from the decrease in number of farms. During the same period the total value of livestock in the two counties showed almost the same increase. This higher value of farm land and buildings and of livestock, however, did not indicate as great an increase as did value of machinery and equipment, which had to be purchased.

From 1920 to 1925 there was a general decrease in value of all farm property, particularly in value of livestock (to some extent due to reduction in numbers) as compared to land and buildings and machinery and equipment. As might be expected, there was a greater relative and actual decrease in value of real estate, especially land in Frederick County, since, as will be shown, land values there have been generally higher than in Garrett County.

Between 1925 and 1930 total value of land and buildings continued to decline in both counties, although, since the number of farms had also declined, value per farm showed a slight increase. The greatest relative increase during this period was in value of livestock in Garrett County, and, to some extent, machinery and implements.

The depression years following 1930 seriously affected values of farm property, particularly of livestock in Garrett County and real estate in Frederick County. Values per farm in Garrett County were es-

pecially influenced by the fact that between 1930 and 1940 the number of farms there increased by 12.4 percent, and by less than 1 percent in Frederick County.

The greatest changes between 1940 and 1945 were increase in value of farm implements and livestock in Frederick County, and of livestock in Garrett County. Increase in value of land and buildings, although over 20 percent in Frederick County, and, like other values, influenced largely by abnormal conditions of World War II, was only moderate in Garrett County. It was further offset by a 4.1 percent increase in the number of farms in the latter county, while there was a decrease of 2.1 percent in Frederick County.

Although the two counties have about the same amount of total land area--427,520 acres in Garrett County and 424,960 acres in Frederick County--for many years there have been about 350,000 acres of farm land in Frederick County and only about 220,000 or 230,000 acres in Garrett County. Of the land in farms in Frederick County about 180,000 or 190,000 acres are usually in harvested crop land, while in Garrett County there are less than 60,000 acres of crop land harvested. Then too, Frederick County has had 3,400 or 3,500 farms for many years, and Garrett County has had only 1,800 to 2,100 during the last forty years.

Thus with almost three times the amount of crop land and nearly twice as many farms, agricultural operations have been on a much larger scale in Frederick County. During the period from 1900 to 1945 the average value of land and buildings per farm in Garrett County has been only 55.5 percent of that for Frederick County, value of farm machinery and implements about 55.0 percent, of livestock, with wide fluctuations from year to year, about 59.0 percent, and of all specified farm property

about 53.1 percent. In short, for many years the capital investment of an average Garrett County farm is only a little more than one-half that of an average farm in Frederick County.

Factors involved in the number of farms. The past and present trend in number of farms in Garrett County is important for several reasons. The total number compared to the total number of families and to the number of inhabitants in the County indicates, in a general way, the extent to which individuals have been attracted to farming; the trend in number of farms helps to show the degree of stability of agriculture.

It is of real significance that in an age of industrial centralization and of the corporate type of organization in so many forms of economic activities, agriculture has retained a predominance of individual entrepreneurs in its operation. Because the vast majority of farming enterprises are in the hands of individuals, they comprise a large body of entrepreneurs whose influence upon social, political, and economic life of County, State, and nation is very considerable and widespread.

Due to changes in the definitions of "a farm" given in the instructions to enumerators for different census years, it is not possible to show accurately the changes in number of farms that occurred from census to census. Most changes of definition, however, affected farms of less than three acres, and since the number of farms in this class has usually been low, any resultant change in the long-range statistics is relatively small. Nevertheless, some part of any decrease shown may be attributable to this cause. In some cases enumerators have unintentionally used statements concerning population as criteria for the determination of "farms" rather than the definitions carried on farm schedules. Thus a farm might consist of a single tract of land or a number of separate distinct tracts,

and these tracts may be held under different tenures, as where one tract is owned by the farmer and another is hired by him. Furthermore, when a land owner has one or more tenants, renters, or managers, the land operated by each could be considered as one "farm".

TABLE XXXII
NUMBER OF FARMS IN GARRETT COUNTY AND MARYLAND

Year	Maryland	Garrett County	
	No.	No.	%
1880	40,517	1,221	3.0
1890	40,798	1,408	3.4
1900	46,012	1,788	3.9
1910	48,923	2,076	4.2
1920	47,908	1,810	3.8
1925	49,001	1,974	4.0
1930	43,203	1,839	4.3
1935	44,412	1,999	4.5
1940	42,110	2,068	4.9
1945	41,275	2,154	5.2

U. S. Bureau of the Census.

The increase or decrease in number of farms listed by the census does not necessarily involve corresponding expansions or contractions of agricultural operations. This is a significant point since many investigators have been prone to applaud an increase in number of farms and "view with alarm" any decrease, without careful consideration of the many factors that result in decrease in number of farms as enumerated by the Bureau of the Census. Thus they sometimes overlook more important and practical implications.

It is true that areas adjacent to larger towns, such as Oakland and Mountain Lake Park, are used to take care of natural growth. It is part of a general tendency in recent years for towns to spread out and for "suburban" development to take place on lands formerly used for agricul-



Figure 25

General farming near Hoyes in Sang Run District.



Figure 26

General farming near Elder Hill in western part of Accident District.

tural purposes. Another factor has been the consolidation of farms for more efficiency in operating. Here again land is not lost to agriculture, but, on the contrary, becomes more productive as a result of this change. There is some abandonment of small unprofitable farms, but when submarginal land cannot be operated on a profitable basis it is much better for all concerned that it should not be farmed. Such adjustments do not mean that farming as a whole is declining or becoming unprofitable.

Other causes for decrease in number of farms include: use of former farm lands by hunting and sporting clubs for recreational purposes; condemnation of certain lands for building or impounding reservoirs for water power projects, flood control, or municipal water supplies.

Even with decrease in number of farms, or even of farm acreage, agricultural production has been increased by greater efficiency in the use of farm land, which has more than offset any decline that has taken place in the land area devoted to agricultural purposes.

In reality, although the number of farms in the State of Maryland decreased from a peak of 49,001 in 1925, according to the census figures, to 41,275 in 1945, the number of farms in Garrett County increased from 1,974 in 1925 to 2,154 in 1945. Perhaps the chief reason for this increase during the past few decades has been the increase in part-time farming, or, conversely, part-time work off the farm.

Part-time farming. The concept of part-time farming varies somewhat according to the desires of the researcher and, of course, to data at hand, or to data which may be made available for a particular study. Perhaps the most prevalent view is that part-time farming is a mode of living whereby a family resides on a farm but receives income, in more or less substantial degree, from non-farm sources. In short, it usually connotes a combination of industry and agriculture.

Other restrictions or amplifications can be made. Not all interpretations have made an occupation outside of farming a prerequisite, as income from agricultural work not connected with the farm on which the family resides, or outside income from non-occupational sources, such as pensions, interest, dividends, etc., may be part of the interpretation.

Part-time farming could also be used in a broad sense to include farms on which some member or members of the operating family engage in quasi- or strictly non-farming activities at the farm, such as operating roadside stands and filling stations, maintaining boarding and lodging accommodations, or custom grinding, sawing, sirup-making, or blacksmithing. Furthermore, part-time farming may be thought of from the standpoint of the amount of farming activity without any reference to an outside source of income.

As the term implies, any interpretation of part-time farming must include farming activities of some sort. Some surveys and farm schedules of censuses have set maximum or minimum limitations on the amount of farm work required for the enterprise to be classified as a part-time farm or the operator as a part-time farmer.

Historically, part-time farming probably began through attempts of families engaged in agricultural pursuits to supplement their farm income. Gradually, through better transportation and power distribution, and with added impetus given by the depression of the early '30's, the one-foot-in-the-country idea has developed as a plan for providing greater economic security to industrial and non-farm workers, whether engaged in factory or clerical work, mining, lumbering, transportation, etc. It is possible, therefore, to approach the concept of part-time farming

either from the standpoint of the agricultural enterprise or from a non-farm point of view. In the first instance, outside income supplements farm income, while in the latter, farm income supplements income from non-farm sources.

The most reasonable concept of part-time farms seems to be one in which part of the family living is contributed by farming activities, and a material contribution to the family support from outside income is made by any immediate member of the operating family. In a strict sense, perhaps, the family does not necessarily need to live on the land where the farming activity takes place. However, there are limitations to available census data relating to farming activities and outside income as outlined in this concept.

From a study of census definitions of a farm, and of schedule inquiries relative to days of work off the farm, it seems apparent that the data are restricted to those tracts of land meeting the rather arbitrary test of what constitutes a farm, whose operators worked one or more days off their farms for pay or income at non-farm work or at work on another farm.

In reality there are in Garrett County many tracts of land of less than three acres in total extent which contributed to family living or perhaps provided a small surplus of products for sale, but were not included as farms because they did not produce at least \$250 worth of agricultural products.

A sizeable group of bona fide farms were not classified as "part-time" because the operators did not work off their farms, even though some member contributing to the family's support did work away from the farm for pay or income. Other farms were excluded from the part-time

groups when operators did not work off their farms even though they, or members of their families, had another important source of income such as interest, dividends, pensions, etc.

Finally, there is no way of determining to what extent such at-the-farm activities as conducting roadside stands, filling stations, boarding and lodging places, and custom work were reported as outside work. One of the disadvantages of including farms whose operators had only a few days off-farm work with those of operators who spent practically full time away from the management of their farms has been corrected in part, in recent censuses, by making tabulations by time groups; i.e., according to the number of days each operator spent off his farm for pay or income. A confusing factor of census data is the inclusion in commercial and semi-commercial farms of residential and suburban tracts of land with enough farming activities to be classified as farms.

During the Census of 1930 part-time farms were classified as those whose operators "spent 150 days or more at work for pay at jobs not connected with his farm, or must have given an occupation other than farmer, provided in either case the value of products of the farm did not exceed \$750".

In 1935 the farm schedule included time- or day-groups in classifying part-time farmers by the number of days worked away from the farm: 1-24 days, 25-49, 50-74, 75-99, 100-149, 150-199, 200-249, and 250 days or over.

In 1940 and 1945 the day-groups were given in the following categories: 1-49 days, 50-99, 100-149, 150-199, 200-249, and 250 days and over.

TABLE XXXIII
PART-TIME FARMERS
IN GARRETT COUNTY AND MARYLAND

Farm Operators	1930		1935		1940		1945	
	Garrett	Md.	Garrett	Md.	Garrett	Md.	Garrett	Md.
Total Farmers	1,839	43,203	1,999	44,412	2,068	42,110	2,154	41,275
Part-time, No.*	273	4,439	732	12,071	854	12,291	998	12,307
Part-time %	14.9	10.3	36.6	27.2	41.3	29.2	46.3	29.8

U. S. Bureau of the Census.

* For 1930 only 150 days or more.

TABLE XXXIV
CLASSIFICATION OF PART-TIME FARM OPERATORS
IN GARRETT COUNTY - BY NUMBER OF OPERATORS

Number of days worked off farm	1935	1940	1945
Total Part-time Farmers	732	854	998
1 to 24 days)	64)		
25 to 49)	79)	118	94
50 to 99	170	119	82
100 to 149	157	132	90
150 to 199)	174	161)	94)
200 to 249)		157)	182)
250 days and over	88	167	456

U. S. Bureau of the Census.

From Table XXXIII it is evident that part-time farming is much more prevalent in Garrett County than for the State as a whole. Allowance must be made in the 1930 figures for the fact that only those farm operators who worked off the farm for 150 days or more were included. It is quite likely that this number is less than one-half, and perhaps not much more than one-third, of those who worked off the farm less than

150 days during the preceding year. From 1935 to 1945 the percentage of part-time farmers in Garrett County increased from 36.6 to 46.3, while for the State the corresponding increase was only from 27.2 to 29.8 percent.

The most significant fact brought out by Table XXXIV is the relative decrease in number of farm operators in Garrett County who worked 149 days or less off the farms and the much greater increase in the groups beyond that number of days. In 1935 only 12 percent worked 250 days or more off the farm, while by 1945 this number had increased to 45.7 percent.

In establishing these time groups it was assumed that 1 to 24 days would approximate a month of work, 25 to 49 days 2 months of work, 150 to 199 days 6 to 8 months, and 250 days from 9 months to a year of work off the farm. On this basis it would appear that almost half (45.7 percent) of the part-time farmers in Garrett County had full-time jobs off the farm, or at least worked more than eight months of the year at such jobs in 1945.

In the absence of definite proof, it might be assumed that for the majority of farm operators who worked less than 150 days (less than 6 months) off their farms, agriculture was their primary source of income, and, conversely, that for those who worked 150 days or more (6 months or more) off their farms, agriculture was their secondary source of income. To any such assumption there would have to be numerous exceptions. Many types of agriculture and other outside occupations are very seasonal in character, so that it would not be necessary for a person to devote full time to either class of work.

Perhaps the dividing line between these two main groups of part-time farmers should be set at a considerably lower figure than 150 days of off-

farm work. It might be safe to assume that most operators who worked 100 or more days off their farms in a calendar year had an outside labor income which was larger than the total income from their farm operations, while most of those who worked 1 to 49 days had an outside labor income secondary to their agricultural income. The in-between group of 50 to 99 days might be considered as a hybrid group of which some individuals might belong to the former category and others to the latter. In 1945 over 82 percent of the part-time farmers in Garrett County reported 100 or more days of work off the farm, and, on the basis of the above assumption, received the greater part of their incomes from off-farm work.

Because of the differences in farm schedules for the different census years it is very difficult to ascertain the type of work done off the farm by part-time farmers. In 1935, for example, of the 732 part-time farmers reporting in Garrett County, 595 reported non-agricultural work, 107 were listed as unclassified, and only 173 reported other agricultural work not on their own farm. By personal interviews with farmers in Garrett County it was found that the greatest number of part-time farmers were employed in coal-mining during their off-farm work; other important types of off-farm occupation were forestry and lumbering, construction (including carpentering and highway), factory work, day labor, common labor, etc. In this connection it is significant that of the 2,154 farms listed in Garrett County in 1945, over half, or 1,180, were classified as producing products primarily for their own household use.

Small-scale or part-time farming for mining families in Garrett County should be encouraged, with mining and agriculture as integrated parts of the use and development of two of the County's chief natural resources. Idle days at the mines are scattered throughout the year,

and not concentrated necessarily in the growing season. The typical miner will continue to have many off days, which he can profitably devote to gardening or small-scale farming, subject, of course, to limitation on heavy labor in the sun which underground workers must recognize.

Much of the labor on the little farm can be supplied by the boys of the family, or in other cases by fathers who have retired from mining, while a son has taken his place. Such combined family farming and mining is promising in that it augments the income by using idle time of the family to develop agricultural resources. As can be seen by the foregoing tables part-time farming is of growing significance in Garrett County. In many cases, however, the most that can be expected from the spread of family farming-mining is greater insurance against the insecurity of the miner's job. It is quite probable that there is only limited chance of its extension on a scale sufficient to provide for any surplus of population. This is especially true in view of the fact that the County's population decreased over 1,000 between 1940 and 1950, while size of families and natural rate of reproduction were considerably higher than the average for the State.

In this connection it might be well to consider the possibilities of developing manufacturing to absorb the labor surplus. It seems doubtful that any growth of manufacturing in Garrett County or in the neighboring regions would suffice to foster an industrial-agricultural type of family economy that would hold the County's people on the land.

Home handicrafts and rural industry are a wholesome development deserving encouragement, but unlikely to expand on a scale sufficient to avert the need for migration. For example "cottage handicrafts" are already established in the area and their quality is not often appreciated

by the outside world. They are in reality a survival from earlier days, though the very improvement in transportation and communication with the outside world which enlarges the potential market also brings competition of machine products that undermine the local demand for handicraft. Thus while homemade textiles, basketry, and furniture move to cities, imported flour and meal and hardware displace the local gristmill and county blacksmith.

Many Garrett County women are adept at making textile products such as coverlets, luncheon sets, table scarfs, napkins, rugs, shawls, etc., but the greatest number of craft workers make wood products, as might be expected in a region where wood is easily obtainable. These products include baskets, chairs, plow-stocks, hoop tubes, and hoe, pick, axe, and shovel handles. Some can make porch and lawn sets, and a few are skilled cabinet workers in making mantels, kitchen cabinets, dressers, bedsteads, and other pieces of furniture.

There are both possibilities and limitations in such "fireside industry". Garrett County handicraft deserves encouragement by instruction in schools, provision of power tools, and promotion of sales outlets through interested agencies and farmer cooperatives. Supplied with power tools and intelligently organized instruction, the output of handicraft might be greatly increased, but even under the best auspices it seems unlikely to become a major source of livelihood. Nevertheless, aside from the supplemental income, handicraft has valuable by-products in developing skills and new interests, elevating public taste, and raising living standards.

Rural and small-town factories are also potential sources of employment and income in Garrett County. It is possible for such factories to

be established and to operate successfully. For example, they might employ both village folk and farmers in making textile and wood products, leather articles, furniture, and similar items. They would create a source of demand for wool, hides, and forest products, all of which are, or can be, obtained in the County.

Community and cooperative organizations could be used to develop small-scale industries and manufacturing plants, primarily, perhaps, to provide auxiliary employment for members of families with free time, or during seasonal periods of idle time.

Size of farms. An almost endless variety of factors operate to determine the size of individual farms. Among the important of these factors might be included type of farming activity, demand for agricultural products, competition with other producing areas (thus causing a more or less intensive or specialized type of cultivation), condition of farm land as to soil fertility, topography, location, etc., also the fact that most agricultural operations are carried on by individuals. Thus, size of a farm often depends upon the amount of land that can be economically cultivated by the farmer's own labor.

Relationships of the various factors may be more or less uniform over a large area, or may differ widely over a relatively small area. Any increase or decrease in size of individual farms in various localities is often due to an adjustment of agricultural operations to those types of production to which each is best adapted during the period concerned. It may, perhaps, be stated that as a general rule sizes of individual farms, particularly the areas of improved land, tend to approximate that from which farmers possessing average capital can secure the largest returns.

TABLE XXXV
AVERAGE SIZE OF FARMS
IN MARYLAND AND IN GARRETT COUNTY
(in acres)

Year	Mary- land	Garrett County
1880	126	168
1890	121	159
1900	112	136
1910	103	128
1920	99	135
1925	91	121
1930	101	131
1935	99	120
1940	100	114
1945	102	102

U. S. Bureau of the Census

Table XXXV shows that in Maryland as a whole the trend was gradually downward from 1880 to 1910, and that after 1910 farm sizes remained remarkably stable. In contrast, in Garrett County the decrease in average size of farm has been much greater and more rapid except for a relatively small increase resulting from the first World War and high prices during the late 20's. However, with a shift to dairying and increased use of farm machinery, not even the demands of World War II caused an increase in average size of farms in Garrett County, so that by 1945 averages for both State and County were the same.

Average size of farms, however, gives only a very general picture since it does not show the range in size of individual farms. And if farms vary considerably in size, the average number of acres per farm represents, of course, a fictitious index to actual conditions. In addition to the fact that total farm area and total number of farms change from one Census period to another, the average number of acres per farm

is likewise subject to considerable fluctuation. For example the range in average size of farms between counties in Maryland was as follows from 1900 to 1945:

TABLE XXXVI
RANGE IN AVERAGE SIZE OF FARMS
BETWEEN COUNTIES IN MARYLAND
(in acres)

Year	Range in Size	
	From	To
1900	179.9	75.7
1910	159.6	73.6
1920	160.7	67.0
1925	151.7	57.9
1930	164.2	67.4
1935	159.5	66.3
1940	191.2	68.3
1945	212.9	71.1

U. S. Bureau of the Census.

A further classification by size groups has been made for selected census years. In 1880 and 1890, for example, the number of farms by size groups were as follows:

TABLE XXXVII
SIZE OF FARMS IN GARRETT COUNTY
BY SIZE GROUPS

Size of farms acres	Number of Farms	
	1880	1890
3 - 10	4	16
10 - 20	27	30
20 - 50	90	108
50 - 100	302	371
100 - 500	753	831
500 - 1000	34	41
1000 acres and over	11	11
Total Farms	1,221	1,408
Average Size of Farm	168	159

U. S. Bureau of the Census.

These early census figures give the impression that about 60 per cent of the farms in Garrett County were between 100 and 500 acres in size, with the added implication that a considerable number were above the average in size. This fault is due, of course, to the fact that category five was too great a group range for actual conditions, as will be seen in the added number of size groups given in later census records.

TABLE XXXVIII
SIZE OF FARMS IN GARRETT COUNTY BY SIZE GROUPS
FOR SELECTED YEARS

Size of Farms	Number of Farms						
Acres	1910	1920	1925	1930	1935	1940	1945
Under 3	1	4	0	6	1	1	74
3 - 9	69	36	82	51	89	153	226
10 - 19	106	56	86	73	89	136	183
20 - 49	286	212	245	246	286	322	285
50 - 99	629	525	570	500	565	534	515
100 - 174	561	574	605	536	555	536	508
175 - 259	226	238	246	260	257	238	207
260 - 499	156	128	110	132	129	122	132
500 - 999	33	26	22	29	23	19	22
1000 and over	9	11	8	6	5	7	2
Total Farms	2,076	1,810	1,974	1,839	1,999	2,068	2,154
Average Size of Farm (in acres)	128	135	121	131	119	114	102

U. S. Bureau of the Census.

A further breakdown of the above figures for the years 1935, 1940, and 1945 showed that more farms were in a size group of between 100 and 139 acres; the number of farms for these years being 378, 357, and 322 respectively. The most outstanding feature in the above table is the great increase in small farms in the decade between 1935 and 1945. It should be remembered that a \$250 minimum for value of products as a basis for classifying farms of less than 3 acres did not allow for

the differences in price levels between 1940 and 1945. However, the increase in farms of 19 acres or less during the 1935-1945 period is particularly significant in connection with the increase in part-time farming which has already been discussed. Later it will be shown that there is also a distinct correlation between size and type of farms in Garrett County.

Distribution of farm operators by tenure. Perhaps one of the best indices of the stability and permanence of the agricultural use of land in Garrett County is the high percentage of owners compared to other classes of farm operators. This factor is brought out by a comparison between the trend in Garrett County and the rest of the State, and also with Calvert County.

In 1880 of the 1,221 farms reported in Garrett County, 983 were operated by owners, 138 were rented for fixed money rent, and 100 farms were operated on shares of products; in other words, in the new County 80.5 percent of its farms were operated by owners.

In 1890, of a total of 1,408 farms, 1,155, or 82.0 percent were operated by owners; 145, or 10.3 percent, by renters; and 108, or 7.6 percent, were rented for shares of products.

Table XXXIX shows that for many years Garrett County has had a much higher percentage of owner-operated farms than the average for the State as a whole. Figures for Calvert County were included for comparison, especially since tenancy there has been highest in the State for many years. In this connection it should be pointed out that acreage per farm has been much larger in Garrett County than in Calvert County; the most numerous size-group in the former being the 100-193 acre farm, while the most common in Calvert County is the 10-29 acre size farm. Also

while Garrett County has led the State in acreage devoted to hay and oats, and has ranked among the highest in production of white potatoes, Calvert County has frequently ranked lowest in these crops, as well as in most kinds of livestock. On the other hand, Calvert County has been highest in production of tobacco, which is grown on between 85 to 90 percent of that county's farms.

TABLE XXXIX
DISTRIBUTION OF FARM OPERATORS BY TENURE
IN MARYLAND AND IN GARRETT AND CALVERT COUNTIES

	1900	1910	1920	1925	1930	1935	1940	1945
Percentage of farms operated by owners:								
Maryland	64.1	68.5	68.5	71.7	71.3	70.9	72.2	75.0
Garrett County	84.6	88.5	91.0	89.9	88.6	86.0	88.9	91.7
Calvert County	56.2	65.0	68.3	67.0	55.7	48.9	48.1	50.2
Percentage of farms operated by managers:								
Maryland	2.3	2.0	2.6	1.9	2.2	1.9	1.7	2.0
Garrett County	.9	1.6	1.2	1.3	.6	.5	.3	.1
Calvert County	.3	.2	.9	.1	.6	.1	.6	.7
Percentage of farms operated by tenants:								
Maryland	33.6	29.5	28.9	26.4	26.5	27.2	26.1	23.0
Garrett County	14.5	9.9	7.7	8.9	10.8	13.5	10.8	8.2
Calvert County	43.5	34.8	30.8	32.9	43.7	51.0	51.3	49.1

U. S. Bureau of the Census.

One other comparison is brought out in the following table:

TABLE XL
COLOR OF FARM OPERATORS - PERCENTAGE OF WHITE OPERATORS

	1900	1910	1920	1925	1930	1935	1940	1945
Maryland	87.3	87.0	87.0	86.3	87.8	90.0	90.4	89.8
Garrett County	99.6	99.8	100.0	99.9	99.9	100.0	100.0	100.0
Calvert County		60.1	62.6	55.0	60.4	60.7	61.3	54.6

U. S. Bureau of the Census.

The two preceding tables on farm tenure and color of operator show great contrasts between Garrett and Calvert Counties. These are a reflection of the difference in climate, soil, and other natural features with consequent differences in land uses and occupance. Because of the suitability of soil and climate, Calvert County since colonial times has raised tobacco as its chief money crop, and with its abundance of Negro labor still resembles parts of the Old South.

Garrett County, in contrast, has had diversified or general farming as its chief type, with no single cash-crop dominant in its economy. None of its crops or agricultural operations requires the large amounts of hand labor that tobacco does in Calvert County. In its extensive rather than intensive use of somewhat limited agricultural resources, it has had no "room" for either tenants or Colored farm labor.

Types of farms. The types of farms, based on principal source of income, are also indicative of adaptations to conditions of climate, soil, location, and transportation facilities, as well as other geographic factors in Garrett County. The basis for classifying types of farms varies somewhat for the census years of 1930, 1940, and 1945; but in general the schedules used value of products from a particular source in relation to value of products from all sources.

"Source" in this connection relates to a product or products from which income is derived, either from the sale of a single product, such as potatoes or tobacco, or from the sale of several products, such as milk, cream, butter, etc., which can be grouped as dairy products. In addition a separate category was made for farms producing "primarily for own household use or as a major source of income".



Figure 27

General and dairy farms in Pleasant Valley,
south of Oakland and Mt. Lake Park, and east
of Gortner.

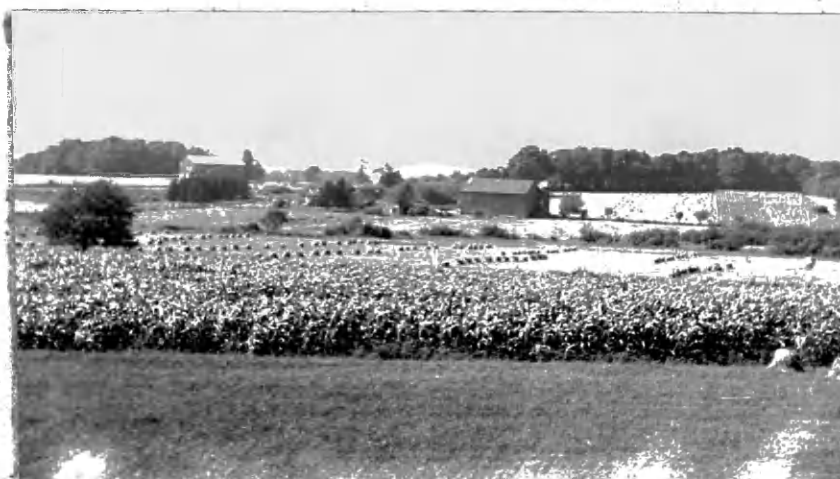


Figure 28

Dairy farms in Pleasant Valley.

In 1930 several major types of farms were listed in which 40 per cent or more of the total value of all products came from the products or group of products listed. The list used in the 1930 census was as follows:

1. Cash grain: corn, wheat, oats, barley, buckwheat, etc.
2. Crop-specialty: crops for sirup or sugar, soybeans, field peas, and beans, tobacco, hay, peanuts, white or sweet potatoes, and other field crops.
3. Fruit farms: small fruits and tree fruits, nuts, and grapes.
4. Truck farms: all vegetables sold.
5. Dairy farms: milk, cream, butterfat, butter, and dairy cows and calves.
6. Poultry farms: chickens, ducks, geese, turkeys, and eggs.
7. Animal specialty: all meat animals, beef cattle, sheep, hogs, wool, and slaughtered animals.
8. General farms: value of products from any one source less than 40 percent of total value of all products.
9. Self-sufficing farms: value of farm products used by family was 50 percent or more of all products.
10. Abnormal farms: institutions or country estates, part-time (operator spent 150 days or more at off-farm work, or value of products less than \$750), boarding or lodging, forest products, horse or feed lot, or livestock dealer.
11. Unclassified farms: those not operated in 1929 or where reports were missing or incomplete.

The figures shown in the following table indicate that in 1930 about 65 percent of all farms in Garrett County were classified either as general or self-sufficing farms, while only about 8 percent of the farms in Calvert County were so grouped; and that only about 35 percent of the farms in Maryland came under these two types. In contrast about 85 percent of all farms in Calvert County were in the crop-specialty group,

reflecting the dependence on tobacco in contrast to Garrett County's diversified farming and family consumption of farm products. The significance of part-time farming is also indicated in this table, as well as the relatively greater importance of dairying in Garrett County as compared to Calvert County.

TABLE XLI
TYPE OF FARM - 1930

Type	Maryland	Garrett County	Calvert County
General	11,201 (26 %)	776 (42 %)	55 (5 %)
Cash Grain	2,125	8	1
Crop-specialty	5,489 (12.7%)	20	937 (85 %)
Fruit	1,137	0	2
Truck	3,891	0	6
Dairy	5,652 (13 %)	140 (8 %)	1 (.1%)
Animal-specialty	577	76	0
Poultry	2,941	52	7
Self-sufficing	3,747 (9 %)	426 (23 %)	30 (2.9%)
Abnormal	4,965	316	34
(Part-time)	(4,439)(10.3%)	(273)(14.9%)	(32)(2.9%)
Unclassified	1,478	25	30
Total Farms	43,203	1,839	1,103

U. S. Bureau of the Census.

In 1940 the census schedule used a somewhat similar classification based on "major source of income" groups of products sold, traded, or used by farm households. These included:

1. Livestock: horses, mules, cattle, swine, sheep, and lambs.
2. Dairy products: milk, cream, butter, butterfat, cheese.
3. Poultry and poultry products: poultry, eggs, baby chicks, etc.
4. Other livestock products: wool, meat, hides, bees, honey, fur animals, and pelts.

5. Field crops: corn, small grains, hay, potatoes, tobacco.
6. Vegetables: except white and sweet potatoes.
7. Fruits and nuts: small fruits and tree fruits, nuts (including wild).
8. Horticultural: hot-house and nursery products.
9. Forest products: firewood, fuel, standing timber, saw logs, pulp wood, mine props, fence and railroad material, and maple products.
10. Products used mainly by farm household: at least 50 percent.

TABLE XLII

TYPE OF FARM - 1940

Type	Maryland	Garrett County	Calvert County
Livestock & Products	1,460	177 (8.5%)	3
Dairy	6,942 (16.5%)	132 (6.4%)	0
Poultry and Products	3,796	127 (6.1%)	6
Field crops	10,251 (24.3%)	120 (5.8%)	1,092 (92.8%)
Vegetables	3,294	4	0
Fruit and nuts	1,009	2	4
Horticultural	266	2	0
Forest products	161	53 (2.6%)	1
Used by farm family	13,759 (32.7%)	1,411 (68.2%)	53 (4.5%)
1/ Total farms	42,110	2,068	1,177

U. S. Bureau of the Census.

1/ Total number of farms is greater than total listed by types, since reports from some farms were inadequate for classification purposes.

Due to different methods employed in classifying types of farms in 1930 and in 1940, Tables XLI and XLII are not comparable. The main difference for the purpose of this study was omission of the "General" and "Self-sufficing" types and substitution of "Products used by Farm Family" type in 1940; and substitution of "Field Crops" for crop specialty and cash-grain types.

One criticism of the schedule for the 1940 census is that many farms for which the value of products used by the farm households was only slightly larger than the value of the largest sales item, such as livestock, dairy products, field crops, etc., were classified under the subsistence or "family living" type, while in reality they had such diversified operations that the total value of farm products sold was considerably in excess of the value of products for farm household use. Logically, of course, such farms belong in a "general farm" category. Another factor that may account in large part for the marked increase in the number of "self-sufficing" or "products used mainly for farm household" type of farm is the increase in part-time farming, as shown in Tables XXXIII and XXXIV.

With these substitutions in mind the contrast in type of farm between Garrett and Calvert Counties was even more marked, however, in 1940 than in 1930, as were also the comparisons between these two counties and the State as a whole. The importance of a one-crop economy in Calvert County is brought out by the fact that almost 93 percent of the farms were of the "field crop" type under which tobacco is listed. In contrast over 68 percent of Garrett County farms were listed in 1940 as of the type where 50 percent of the farm product was used by the farm family; in fact in all the other types of farms listed in Garrett County from 15 to 20 percent of the farm products were so used.

Other contrasts in "types of farms" between Garrett and Calvert Counties in 1940 were the relatively greater importance of livestock, dairy, and poultry farming in the former county.

In the census of 1945 farms were classified as to type under two main groups: farms producing products primarily for sale; and farms producing products primarily for own household use. If the value of

farm products used by the farm household exceeded the total value of all farm products sold, the farm was classified as a "farm producing products primarily for own household use". Conversely, if value of all farm products sold equaled or exceeded the value of farm products used at home, then it was classified as a "farm producing products primarily for sale". These farms were further classified into nine major types, on the basis of source of income. If the value of products sold from one source of income was more than 50 percent of the total value of all farm products sold, then the farm was classified as to the type corresponding to that source of income. Farms for which the value of products from any one of the eight sources of income did not exceed 50 percent of the total value of all farm products sold were classified as "general" farms.

The 1945 schedule was, therefore, an improvement over that of the 1940 census, in that it eliminated the inaccurate designation of "farms with products used mainly by farm household" type, which gave the implication that they were a subsistence or "family living" type when in many cases they were "general" or more properly "diversified products" farms.

As shown in the following table, the relative difference in types of farms was about the same in 1945 as in 1940. Again, the great preponderance of tobacco as a cash crop in Calvert County is brought out by the fact that approximately 93 percent of farms in that county produced the crop, with less than 5 percent classified as "farms producing products primarily for own household use", and only 7 "general" type farms.

In contrast Garrett County had only 2.7 percent of its farms classified as "all other" or field crop type, which included those that raised hay, grain, or white potatoes primarily for sale. On the other hand, al-

most 55 percent of Garrett County farms used at home products with a value of at least 50 percent of the value of all products produced on them. In addition, 12.7 percent of the County's farms were of the "general" or diversified type with two or more sources of products contributing at least 40 percent of the value of all products sold. It must be remembered that a farm could use 51 percent of its products and sell or trade the other 49 percent and still be arbitrarily classified as a "subsistence" or household use farm. There were undoubtedly many farms that were "border-line" cases with only a small percentage of value of products deciding their classification. If the "general" and "household use" or "self-sufficing" farms in Garrett County for the years 1930, 1940, and 1945 are combined, they comprise close to 68 percent of all farms by types for each of these years.

TABLE XLIII
TYPE OF FARM - 1945

Type	Maryland	Garrett County	Calvert County
Livestock	1,889 (4.6%)	137 (6.4%)	4
Dairy	5,793 (14.0%)	280 (13.0%)	3
Poultry	4,972 (12.0%)	155 (7.2%)	10
All other (Fld.) crops	7,638 (18.5%)	58 (2.7%)	1,254 (93.1%)
Vegetables	3,626 (8.8%)	8	0
Fruit and Nuts	611	1	0
Horticultural	201	3	1
Forest	139 (.3%)	31 (1.4%)	5
General	5,360 (13.0%)	274 (12.7%)	7
Household Use	10,252 (24.8%)	1,180 (54.8%)	61 (4.5%)
Total farms	41,275	2,154	1,347

U. S. Bureau of the Census.

A significant change in Garrett County between 1940 and 1945 was the actual and relative increase in dairy farms. In 1940 there were



Figure 29
Looking west across the Cove farming area.
Winding Ridge in the background.



Figure 30
Contour cultivation in the Cove area.

132 or 6.4 percent of all farms in the County classified with "dairy" products as the chief source of income. In 1945, 280, or 13 percent, of all farms in Garrett County were listed as producing dairy products as the chief source of income. The number of cows milked increased from 6,782 in 1940 to 8,175 in 1945, an increase of 20.5 percent, while for the State as a whole the increase was only 9.1 percent.

Between 1940 and 1945 there was also an increase in the number of poultry farms in Garrett County from 127 to 155. On the other hand, the number of livestock, field crop, and forest product farms showed a substantial decrease.

On the basis of the foregoing tables the probable trend in types of farming will be a continued preponderance of general, diversified, or self-sufficing farms, according to specifications in farm schedules, with dairying and dairy farms and the raising of poultry growing in importance.

Accessibility. An important factor in agriculture is accessibility, or relationship between a farm or farming district and its local market center, that is, between the farm and the place where its produce is sold and supplies are purchased. In Garrett County this factor is especially significant because the large proportion of hilly land and the long, cold winters with heavy snowfall impose transportation difficulties not present in Eastern Shore counties, for example, where the land is almost level, winters are mild, and snowfall is a minor problem. Of course, in many rural districts unpaved or earth roads may be impassable in fall and spring as well as in winter.

TABLE XLIV

DISTANCE FROM FARM TO NEAREST ALL-WEATHER ROAD

In percentage of farms reporting - 1945

County or State	0-.2 miles	.3-.5 miles	.6-.9 miles	1-1.9 miles	2-4.9 miles	5 or more miles	Under 1 mile	1 or more miles
Maryland	62.1	11.9	3.2	14.0	7.8	1.0	77.2	22.8
Garrett	43.9	12.2	3.5	20.2	14.4	5.8	59.6	40.4
Baltimore	86.1	7.0	1.5	4.9	.5	.0	94.6	5.4
Frederick	63.5	15.3	4.8	12.0	4.3	.1	83.6	16.4
Calvert	69.3	10.2	2.2	12.5	5.5	.3	81.7	18.3
Worcester	53.1	10.2	2.0	19.8	12.8	2.0	65.4	34.6
Kent	63.3	12.0	2.9	14.4	7.2	.2	78.2	21.8
Montgomery	76.0	7.3	3.0	11.0	2.2	.0	86.8	13.2

Computed from U. S. Bureau of the Census Data.

The above table is based on distance from farm entrance to the nearest all-weather road in 1945. While about 62 percent of all farms in Maryland had main entrances located 2/10 of a mile or less from an all-weather road, and over 77 percent were less than a mile distant, only about 44 percent of farms in Garrett County were within 2/10 of a mile, and only about 60 percent were under a mile. The percentage of farms in Garrett County which were over a mile from the nearest all-weather road was almost twice that for the State as a whole. Almost 95 percent of Baltimore County farms had main entrances less than a mile from all-weather roads, while Montgomery, Frederick, and Calvert County farms were also mostly accessible throughout the year. The general similarity of relative distances between farms and all-weather roads in Garrett and Worcester Counties is largely offset by the contrast in local relief and climatic conditions, especially winter weather. Compared to the State as a whole, and to the counties shown in the table, a much larger percentage of Garrett County farmers are handicapped by this lack of accessibility.

TABLE XLV

DISTANCE FROM FARM TO NEAREST ALL-WEATHER ROAD
GARRETT COUNTY BY MINOR CIVIL DIVISIONS - 1945

In percentage of farms reporting

County or District	0-.2 miles	.3-.5 miles	.6-.9 miles	1-1.9 miles	2-4.9 miles	5 or more miles	Under 1 mile	1 or more miles
1 Swanton	46.4	9.9	.7	27.8	15.2	.0	57.0	43.0
2 Friendsville	53.0	10.1	2.2	22.5	10.5	1.7	65.3	34.7
3 Grantsville	44.5	19.6	9.4	31.2	17.3	8.0	43.5	56.5
4 Bloomington	1.6	.0	.0	8.1	32.3	58.0	1.6	98.4
5 Accident	44.0	11.3	3.3	27.4	14.0	.0	58.6	41.4
6 Sang Run	59.8	8.3	.8	20.5	10.6	.0	68.9	31.1
7 East Oakland	85.0	12.8	1.1	1.1	.0	.0	98.9	1.1
8 Ryan's Glade	39.8	19.7	2.1	22.2	13.0	3.2	61.6	38.4
9 Johnsons	33.9	20.0	20.9	9.5	15.7	.0	74.8	25.2
10 Deer Park	16.7	10.3	.0	43.5	29.5	.0	27.0	73.0
11 The Elbow	11.1	.0	.0	6.7	51.1	31.1	11.1	88.9
12 Bittinger	22.7	8.2	3.1	26.8	26.8	12.4	34.0	66.0
13 Kitzmillersville	48.8	23.3	2.3	25.6	.0	.0	74.4	25.6
14 West Oakland	62.9	10.2	2.0	13.2	9.3	2.4	75.1	24.9
15 Avilton	3.2	4.8	8.1	35.5	37.1	11.3	16.1	83.9
16 Mt. Lake Park	75.8	14.7	1.1	8.4	.0	.0	91.6	8.4
Garrett County	43.9	12.2	3.5	20.2	14.4	5.8	59.6	40.4

Computed from Unpublished Data, U. S. Bureau of the Census.

Within the different districts of Garrett County there are much greater extremes in accessibility, i.e. nearness to all-weather roads, than is shown by averages for the County as a whole. As indicated in Table XLV, a few districts—East and West Oakland and Mt. Lake Park—have relatively high percentages of farms within 2/10 of a mile from an all-weather road. A comparison of the maps of Minor Civil Divisions, Patterns of Settlement, and of Transportation Facilities in Garrett County (Figs. D, B, and C) shows that the close network of all-weather roads in the Oakland-Mt. Lake Park area gives it greatest accessibility within the County. In East Oakland (District 7), almost 99 percent of farms were located less than 1 mile from an all-weather road. In contrast to this

was Bloomington (District 4) where 58 percent of farms were five miles or more from the nearest all-weather road, and where local relief is a major problem. A high degree of inaccessibility is a serious handicap to agriculture in Avilton (District 15) and The Elbow (District 11), and this inaccessibility shows a remarkable correlation to the generally lower percentages of land in farms and in crops, to large proportions of wood land both private and state owned, and to the lack of farm facilities. The basic cause is the large amount of rough land, steep slopes, and shallow, stony soils in these districts, which largely restrict their use to wood land and recreational purposes. In each of the 16 districts in Garrett County there is a strong relationship between conditions of slope and soil and consequent use.

Farm labor. Among the innumerable factors which influence amount and kind of labor employed in agriculture are: Character of surface features, soil, type of farming, degree of mechanization, seasonal requirements, size of farms, and scale of activity. Some indication of type and amount of farm labor in Garrett County, in Maryland as a whole, and for several representative counties is given in Table XLVI.

The table includes all farm workers 14 years old and over who worked the equivalent of two or more days during the first week of January, 1945. Since for most of Maryland relatively few transient or seasonal workers are employed in January, except possibly in southern counties of the Chesapeake Bay area, the table actually indicates permanent farm labor, employed for much of the year.

As might be expected in a general farming area such as Garrett County with long, cold winters, January is a "slack" time of year for farm labor. The average number of workers per farm is, therefore, con-

siderably below that for the State as a whole. Prevalence of part-time farming and of work in mines, forests, and other industries by many part-time farmers and employable members of their families is also characteristic of Garrett. On the other hand, the percentage of unpaid family workers is comparatively high, since dairy cattle and other livestock increase the demand for year-round farm labor.

TABLE XLVI

FARM LABOR IN MARYLAND AND SELECTED COUNTIES
PERSONS 14 YEARS OLD AND OVER
WORKING DURING FIRST WEEK IN JANUARY 1945

State or County	Farm Workers Total	Aver- age Per Farm	Hired Workers		Family Workers			
					Total	Oper- ators	Unpaid	
			No.	% ^{1/}			No.	% ^{2/}
Maryland	64,821	1.86	13,060	20.1	51,761	31,791	19,970	38.6
Garrett	3,265	1.63	102	3.1	3,163	1,913	1,250	39.5
Baltimore	5,588	2.09	1,199	21.5	4,389	2,650	1,739	39.6
Frederick	5,813	1.89	1,263	21.7	4,550	2,892	1,658	36.4
Calvert	1,435	1.31	83	5.8	1,352	1,057	295	21.8
Worcester	2,312	1.90	546	23.6	1,766	1,098	668	37.8
Kent	1,306	2.00	493	37.7	813	638	175	21.5
Montgomery	3,585	2.05	1,002	28.0	2,583	1,548	1,035	40.1

Computed from U. S. Bureau of the Census Reports.

^{1/} % of Total Farm Workers.

^{2/} % of Total Family Farm Workers.

The farm-family type of agriculture, so characteristic of Garrett County, is indicated by the extremely low percentage of hired labor compared to most of the other counties shown, except Calvert where a cash one-crop economy, raising tobacco, with high tenancy and seasonal demands for farm labor prevail. Also in contrast to Garrett County farm labor characteristics, is the very high proportion of hired labor on the large grain-and-dairy farms of Kent County, a considerable part of which are

very large enterprises operated by managers. Large-scale truck (and potatoes) and poultry farms of Worcester County require a large number of hired workers the year-round, due in large part to the long growing season, which makes double-cropping an important characteristic of its farm economy.

The total amount of money, as well as the average and prevalent amounts spent, give an indication of the degree of commerciality, type of farming, and size of the farm business. Table XLVII shows the proportion of farms in Garrett County, in Maryland as a whole, and in representative counties which hire labor for cash, also the total amount spent for hired labor and the average amount per farm in 1944.

TABLE XLVII
CASH EXPENDITURES FOR FARM LABOR
IN MARYLAND AND SELECTED COUNTIES - 1944

State or County	Total Farms	Farms with cash labor	% of total farms	Amount spent for cash labor	Amount per re- porting farm
	No.	No.	%	\$	\$
Maryland	41,275	25,438	62	23,333,144	917
Garrett	2,154	894	42	234,195	262
Baltimore	3,592	1,807	50	2,230,258	1,234
Frederick	3,392	2,471	73	1,896,753	768
Calvert	1,347	749	56	268,464	358
Worcester	1,484	1,098	74	1,452,533	1,323
Kent	724	537	74	790,139	1,471
Montgomery	2,179	1,389	64	1,639,643	1,180

Computed from U. S. Bureau of the Census Reports.

About 62 percent of Maryland farms spent over 23 million dollars, or about \$917 per farm for hired labor in 1944. The proportion of farms in Garrett County spending cash for labor in that year was 42 percent, or only two-thirds that of the State as a whole, and only about 57 percent

compared to Worcester, Kent, and Frederick Counties, where large-scale commercial farming results in very high seasonal demand for labor, as well as considerably above average the year round, as indicated in Table XLVII. In Baltimore County there are, of course, relatively high proportions of small-scale or part-time farmers who need little or no hired labor. Calvert County, as might be expected, with its one-crop, high-tenancy farm economy, would not demand a high proportion of hired labor.

The extremely low average amount paid per farm for hired labor in Garrett County compared to that of the State as a whole, and especially Baltimore and Kent Counties, indicates the very low percentage of year-round hired labor, as well as the relatively short periods when labor, usually teen-age, is hired for planting and harvesting potatoes, and during hay and grain harvests. The general, self-sufficing, family farms, as well as exchange of labor between farm families are important factors in reducing amounts of hired labor and of cash expenditure for labor on Garrett County farms.

TABLE XLVIII

CASH WAGES PAID HIRED FARM LABOR IN 1944
IN MARYLAND AND SELECTED COUNTIES

State or County	No. Farms reporting hired labor	% of farms paying \$1-\$49.	% of farms paying \$50 to \$99.	% of farms paying \$100 - \$199.	% of farms paying \$200 - \$499.	% of farms paying \$500 - \$999.	% of farms paying \$1000. & over
Maryland	25,438	13.5	10.5	14.1	18.2	17.1	26.6
Garrett	894	37.8	18.6	15.6	14.5	7.2	6.3
Baltimore	1,807	10.0	9.9	13.1	14.0	15.9	37.1
Frederick	2,471	14.4	9.3	11.8	17.8	19.3	27.4
Calvert	749	19.6	17.5	17.2	21.6	14.4	9.7
Worcester	1,098	7.6	7.7	18.4	17.1	12.9	36.3
Kent	537	3.4	4.1	6.9	11.9	21.6	52.1
Montgomery	1,389	12.6	10.3	12.0	13.1	16.8	35.2

Computed from U. S. Bureau of the Census Reports.

Not only is the average amount of cash wages paid for hired farm labor very low in Garrett County, compared to such expenditures by all of Maryland farms, and by those of representative counties, but the most common amounts are extremely low as well. This characteristic further emphasizes the very small amount of year-round hired labor, as well as the highly seasonal nature of this type of farm work.

Table XLVIII shows that almost 38 percent of the farms in Garrett County that hired labor in 1944 spent less than \$50; a characteristic almost three times as prevalent when compared to the State as a whole, and over ten times as frequent as in Kent County. At the other extreme, only a little over six percent of Garrett County farms employing hired labor (2.6 percent of all farms), paid out \$1,000 or more, while for the State as a whole over 1/4 of farms employing hired workers, and over 1/2 in Kent County, were in this group. The comparisons with other counties are given primarily to show the correlation, which has been indicated previously, that exists between relief, soil, growing season, location, and type of land use, as expressed in farm characteristics.

Some of the differences in agricultural use of land within Garrett County can also be indicated by the range in frequency and amount of cash expended for farm labor in the 16 districts, as shown in Table XLIX.

Although 42 percent of all farms in Garrett County spent some cash for labor during 1944, the percentage of farms which hired workers ranged from none to five percent in the four hilly and rough northeastern and east-central districts of The Elbow, Avilton, and Bloomington and the small-scale, part-time farms of Johnsons, to a relatively high proportion in the important agricultural parts of Accident (District 5), Sang Run (District 6), East Oakland (District 7), West Oakland (District 14), and

Swanton (District 1). A comparison of the maps of Minor Civil Divisions, Soils, and Agricultural Areas (Figs. D, G, K) shows a correlation with these differences in the percentages of farms which hired labor for cash. Also the varying amounts of land in crops in the different districts as shown in Table LIII indicate a similar trend.

TABLE XLIX

CASH EXPENDITURES FOR FARM LABOR IN 1944
IN GARRETT COUNTY BY MINOR CIVIL DIVISIONS

District	Total no. of farms	Farms rptg. cash expend.	% of total farms	Amount spent	Expend. per farm rptg.	Av. exp. all farms
	No.	No.	%	\$	\$	\$
1 Swanton	152	93	61	9,519	102	63
2 Friendsville	229	53	23	10,325	195	45
3 Grantsville	178	102	57	42,512	417	239
4 Bloomington	63	3	5	1,560	520	25
5 Accident	150	134	89	26,402	197	176
6 Sang Run	138	99	72	15,874	160	115
7 East Oakland	86	55	64	45,542	828	530
8 Ryan's Glade	287	152	53	25,674	169	89
9 Johnsons	124	1	1	1,200	1,200	10
10 Deer Park	102	17	17	12,098	712	119
11 The Elbow	45	0	0	0	0	0
12 Bittinger	97	10	10	9,891	989	102
13 Kitzmillersville	44	6	14	2,000	333	45
14 West Oakland	208	132	63	16,012	121	77
15 Avilton	85	2	2	1,020	510	12
16 Mt. Lake Park	98	25	25	9,226	369	94
Garrett County	2,154	894	42	254,195	262	109

Computed from Unpublished Data, U. S. Bureau of the Census.

There are several noteworthy differences between average expenditures by farms which hired labor and average expenditures in relation to all farms in the various districts. For example, although average expenditure per labor-hiring farm in Johnsons (District 9) was \$1,200 (for one farm), only an average of \$10 was spent for all farms in the whole dis-

trict. Thus, although the going rate of pay for hired labor in Garrett County was apparently highest in the Johnsons District, in reality opportunities for work by hired farm labor were practically non-existent. The greatest contrast to this condition was in Accident (District 5) where the average actual amount spent by farms hiring labor was not very much above the average spent for all farms in the district. In East Oakland (District 7) there is a considerably higher average amount of year-round hired labor in connection with several large dairy farms, and also in connection with a large nursery and greenhouse establishment. The districts of Deer Park and Bittering, and to some extent Mt. Lake Park also show similar trends in connection with several relatively large dairy and poultry farms. The larger-than-average general and dairy farms of Grantsville (District 3) also require the assistance of a considerable amount of hired labor both year-round and seasonal. Most hired labor on the 72 percent of all farms in Sang Run (District 6) is seasonal, as is also true in Swanton (District 1).

Although many complicated factors are involved in the amount and extent of hired labor in Garrett County, several basic differences between physical conditions in one district as compared to another have been pointed out in the preceding discussion of farm characteristics. In proportion of farms equipped with several common facilities, in accessibility to all-weather roads, in value of farm land and buildings, and in use of hired labor, it is evident that physical conditions in East Oakland (District 7) and Grantsville (District 3) are for the most part very much more favorable for agricultural use of land than they are in The Elbow (District 11) and Avilton (District 15). In short, the fairly level to generally rolling, silty or sandy loams of the Oakland

and Grantsville areas stand out in sharp contrast to the rough, rocky, stony, shallow soils of much of The Elbow and Avilton. Certainly it is more than coincidence that the differences in the use of their respective resources should reflect correlative differences in almost all aspects of their agricultural economy.

Farm facilities. In order to give some indication of the level of living among farm families in Garrett County, the extent of installation of several modern facilities is given in Table L.

TABLE L
SPECIFIED FARM FACILITIES IN GARRETT COUNTY
BY MINOR CIVIL DIVISIONS -- JANUARY 1, 1945

District	All Fms.	Running water		Elec- tricity		Radios		Tele- phones		Within 1/4 mile of an Elec. line	
		Farms		Farms		Farms		Farms		Farms	
	No.	No.	%	No.	%	No.	%	No.	%	No.	%
1 Swanton	152	18	11.8	57	37.5	104	68.4	0	.0	80	52.6
2 Friendsville	229	65	28.4	111	49.8	168	73.3	17	7.4	171	74.7
3 Grantsville	178	105	59.0	100	56.2	123	69.1	81	45.5	97	54.5
4 Bloomington	63	1	1.6	2	3.2	1	1.6	1	1.6	4	6.3
5 Accident	150	81	54.0	89	59.3	127	84.7	37	24.7	102	68.0
6 Sang Run	138	48	34.8	53	38.4	111	80.4	23	16.7	75	54.3
7 East Oakland	86	47	54.7	54	62.8	68	79.1	35	40.7	59	68.6
8 Ryan's Glade	287	95	33.1	92	32.1	182	63.4	63	22.0	105	36.6
9 Johnsons	124	25	20.2	54	43.5	53	42.8	6	4.8	106	85.5
10 Deer Park	102	14	13.7	30	29.4	65	63.7	16	15.7	32	31.4
11 The Elbow	45	2	4.4	8	17.8	8	17.8	1	2.2	10	22.2
12 Bittering	97	32	33.0	48	49.5	61	62.9	38	39.2	57	58.8
13 Kitzmillersville	44	27	61.4	17	38.6	40	90.9	8	18.2	25	56.8
14 West Oakland	208	92	44.2	79	38.0	144	69.2	51	24.5	102	49.0
15 Avilton	85	4	4.7	0	.0	0	.0	0	.0	12	14.1
16 Mt. Lake Park	98	57	58.2	40	40.8	81	82.7	29	29.6	45	45.9
Incorporated Towns	68	49	72.1	60	88.2	62	91.2	26	38.2	64	94.1
Garrett County	2154	762	35.4	897	41.6	1398	64.9	432	20.1	1146	53.2

Computed from Unpublished Data, U. S. Bureau of the Census.

Only about 35 percent of all farm houses in Garrett County in 1945 had running water. This meant that all water needed for household work--cooking, washing, bathing, etc.--had to be carried from sources such as wells, pumps, or tanks located outside the farm house. As has been shown for other farm characteristics, there was considerable range in percentage of farm houses in the County that had a source of running water within the house. Of the farms located within the boundaries of incorporated towns--Oakland and Kitzmillersville--72 percent had running water in the house. This relatively high proportion raised the average for the districts in which those towns are located. In contrast to districts where 40 or 50 percent of the farm houses were equipped with running water were Bloomington, The Elbow, and Avilton where practically none had that facility. By way of comparison, over 45 percent of all farm houses in Maryland had running water in 1945; in Baltimore County, 73 percent; in Frederick County, 50 percent; and in Calvert County only 17 percent. It can be seen that in relation to farm houses of the State as a whole, in a suburban county (Baltimore) and in a leading agricultural county (Frederick), Garrett County farm houses fell far below the averages in facilities for running water. However, compared to Calvert County, with a one cash-crop economy, high percentages of tenancy, and Colored farm people, Garrett County farm households were about twice as advanced in this respect.

Although 42 percent of all farms in Garrett County were furnished with electricity in 1945, about 88 percent of farms located within the limits of incorporated towns had electricity, and districts in which the towns of Oakland, Accident, Grantsville, and Friendsville are located reported at least 50 percent of their farms with electricity. At the

other extreme was Avilton (District 15) with none, Bloomington (District 4) with only two farmhouses out of a total of 65, and only eight of 45 farms in The Elbow (District 11) were so equipped. In comparison 61 percent of all farms in Maryland had electrical facilities in 1945, in Baltimore County 87 percent, in Frederick County 75 percent, and in Calvert County only 18 percent. Of the 23 counties in Maryland, Garrett County ranked 18th in percentage of farms reporting electricity in 1945.

About 65 percent of all farms in Garrett County had radios in 1945. For most of the districts relatively high numbers of 60 to 80 percent and higher were reported. Probably due to the fact that many radio sets were battery-operated, more farms in most districts had radios though they did not have any of the other specified facilities. For all of Maryland about 76.6 percent of all farms had radios in 1945. Again Baltimore County ranked first with 89.5 percent, Frederick County reported 84.9 percent, and Calvert ranked last with only 55 percent of its farms reporting radio sets. In Garrett County the districts of Avilton with no radios, Bloomington with only 1 out of 65 farms, and The Elbow with 8 out of 45 farms, indicate the generally low level of living which reflects the disadvantages of farming on unsuitable land.

With only 20 percent of its farms equipped with telephones, Garrett County ranked lowest of all counties in Maryland in 1945. Grantsville (District 3) was highest in the County, but only a little above the average of 41.5 percent for all farms in the State. Of particular significance is the fact that none of the 152 farms in Swanton (District 1), 1 of 65 farms in Bloomington (District 4), 17 of 229 farms in Friendsville (District 2), and none of 85 farms in Avilton (District 15), reported telephones in 1945. Since that time, however, telephone service

has been extended in the Friendsville, Sang Run, and Avilton districts. For comparison, in 1945 about 65 percent of farms in Montgomery County had telephone facilities and it ranked first in the State, while Calvert County ranked 16th, with 31 percent. Evidently tobacco farmers in the latter county accounted for this higher average, since in all other facilities it ranked considerably lower.

In 1945 about 53 percent of farms in Garrett County were within 1/4 mile of an electric distribution line and about 77 percent of these had obtained that facility. In the State as a whole about 73 percent of all farms were also located within the same distance of electric power lines and 84 percent had availed themselves of this service. At the same time 98 percent of farms in Baltimore County of the 88.5 percent within 1/4 mile of electric power were so equipped. At the other extreme only 33 percent of Calvert County farms were located within 1/4 mile of this potential power, and only 55 percent of these were receiving it. In Garrett County the Bloomington, Avilton, and The Elbow districts were especially isolated as far as potential electric power was concerned, while most of the important agricultural districts, especially Johnsons in the northeast, and Accident, Friendsville, and East Oakland were much above average in availability. By 1950 the Eastern Shore and southern Maryland Counties had been supplied with electric power facilities through the Rural Electrification Administration of the Federal Government. Power lines for southern Maryland counties had been built by the Southern Maryland Electric Cooperative of Hughesville, St. Mary's County, while similar facilities were completed for the Eastern Shore by the Choptank Electric Cooperative of Denton, Caroline County. In contrast, only the extreme northwestern corner of Garrett County along Route 42 had been "electrified"

by the Somerset Rural Electric Cooperative of Somerset, Pennsylvania.¹

From a comparison of the four facilities used on farms and the possibilities of further electrification of farm homes in Garrett County it is seen that the County ranks very low compared to use of these facilities on Maryland farms in general, and especially on those in suburban agricultural farms in Baltimore and Montgomery Counties, or leading agricultural counties such as Frederick. Within Garrett County itself the relatively high utilization of these facilities in the leading agricultural districts--Grantsville, Accident, East and West Oakland, Friendsville, and Bittering--is in sharp contrast to the very low average in Avilton, Bloomington, and The Elbow. Comparisons of the maps of Minor Civil Divisions, Soil, Agricultural Areas, and Patterns of Settlement (Figs. D, G, K, and B) also show a correlation between levels of living as indicated in the preceding discussion. This is further indicated by a comparison of Table LIII, page 362, giving proportionate use of agricultural land, and Table LIV, page 368, showing average value of land and buildings. Several other characteristics which reflect differences in suitability of land for agriculture in Garrett County will be discussed in succeeding sections.

Several characteristics of degree of mechanization and use of automotive power on Garrett County farms show considerable range within the County, as compared to the State as a whole, and to certain other agricultural counties.

Automobiles are probably the most common type of electrical or mechanical facility found on Garrett County farms, with the possible ex-

1 Personal communication from R.E.A., 1950.

ception of radios. This is also true of Maryland farms in general but not in certain counties. Nevertheless, with the relatively high ownership of 62 automobiles for every 100 farms, Garrett County ranked next to lowest among the 23 counties in the State in 1945. For the State as a whole about 77 percent of all farms reported automobiles, with highest percentages in Howard County (87.5) and Baltimore County (86.0), and lowest in Garrett County (61.9) and Somerset County (57.5).

TABLE LI
AUTOMOBILES, MOTOR TRUCKS, AND TRACTORS
ON FARMS IN GARRETT COUNTY - 1945

District	Total Farms	Automobiles		Motor Trucks		Tractors	
		Farms		Farms		Farms	
		No.	%	No.	%	No.	%
1 Swanton	152	88	58	39	26	41	27
2 Friendsville	229	132	58	48	21	35	15
3 Grantsville	178	123	69	69	39	62	35
4 Bloomington	63	44	70	17	29	4	6
5 Accident	150	124	83	41	27	57	38
6 Sang Run	138	82	59	33	24	29	21
7 East Oakland	86	62	72	30	35	38	44
8 Ryan's Glade	287	134	47	93	32	85	30
9 Johnsons	124	83	67	22	18	5	4
10 Deer Park	102	58	57	29	28	31	30
11 The Elbow	45	33	73	10	22	3	7
12 Bittering	97	65	67	25	26	26	27
13 Kitzmillersville	44	32	73	9	20	7	16
14 West Oakland	208	118	57	55	26	46	22
15 Avilton	85	65	76	20	24	5	6
16 Mt. Lake Park	98	55	56	38	39	30	31
Garrett County	2,154	1,334	62	591	27	510	24

Computed from Unpublished Data, U. S. Bureau of the Census.

The farm automobile is usually used as a pick-up truck for transporting small quantities of relatively valuable farm produce such as eggs, fruit, and vegetables to market towns and for bringing back pur-

chased goods. It has also given the farmer, particularly the part-time farmer, a mobility which allows him to seek and obtain work within daily commuting distance of 30 or 40 miles, or more. The comparatively small range in percentage of farms with automobiles in Garrett County for all districts emphasizes this phenomenon strikingly. The relatively unimportant farming districts of Avilton, The Elbow, Kitzmillersville, and Bloomington all had higher than average ownership of automobiles on farms, and in all of these districts part-time farming is especially prevalent, with a considerable amount of work in mines, on highways and other construction, and in industries in Westernport, Cumberland, Maryland, and nearby Luke and Piedmont in West Virginia. The high percentage of farm-owned automobiles in the important agricultural district of Accident has been attributed to the fact that there is only one small shopping center in this large community, and for many farm families the nearest stores are in either of the towns of Grantsville or Friendsville. An interesting contrast is shown in the equally important farming district of Ryan's Glade southwest of Oakland where only 47 percent of farms had automobiles. This low number was due primarily to the presence of a large settlement of people whose religious tenets forbid the ownership of passenger automobiles or "pleasure" cars. This contrast between two communities and its basic causes have been verified by personal observation and by personal interviews with residents of the two districts.

Less than half as many farms in Garrett County had motor trucks as compared to those owning automobiles. In 1945 only 27 percent of the farms in the County owned motor trucks compared to 39 percent of all farms in Maryland and 51 and 46 percent respectively in Wicomico and Worcester Counties in the truck-farming area of the lower Eastern Shore.

Garrett County ranked 21st of the 23 counties in Maryland in number of farms with motor trucks in 1945, lowest in that year was Allegany with 22 percent. For much of the farm-to-market transportation in Garrett County the farm family automobile undoubtedly suffices. A large share of farm produce, particularly bulk milk, potatoes, and livestock, are collected at the farm by company or jobbers' trucks, eliminating much of this type of transportation by individual farmers. Within the County the Grantsville, Mt. Lake Park, East Oakland, and Ryan's Glade districts had percentages of farm-owned motor trucks materially above average. These are leading agricultural sections of the County and include some of the largest dairy and livestock farms as well. Most farmers in these districts haul a considerable amount of their produce and purchased bulky goods, such as feed and fertilizer, to and from nearby railroads, dairy processing plants, or feed and fertilizer stores in their districts. It is also noteworthy that the least important agricultural districts of Avilton, The Elbow, and Bloomington have relatively large percentages of farm-owned motor trucks. In these districts lumbering and production of mine props and pulpwood as well as coal from a number of small, seasonally-operated coal mines provide bulky loads to be hauled to railroad sidings in the Upper Potomac Valley or to the large paper mill at Luke, across the Potomac River from Bloomington.

In the percentage of farms with tractors in 1945, Garrett County ranked 21st of 23 counties in Maryland. About 1 in 4 of Garrett County farms, or 24 percent, had tractors, compared to 39 percent for all farms in Maryland. Incidentally, Garrett County ranked 9th in percentage of farms with horses in that year. In comparison, the large dairy-wheat farms of the upper Eastern Shore, where farms of over 200 acres are common, which is about twice as large as the average for Garrett County

and the State (102 acres), mechanization is much higher. In Kent County where farms average 213 acres, over 73 percent had tractors, and Talbot County, with average size farms of 153 acres, had tractors on 62 percent of its farms. Compared to Garrett County, only Calvert County with its cash crop (tobacco) and large supply of cheap agricultural labor, had fewer farms with tractors (23 percent), and Allegany County with a high percentage of small part-time and self-sufficient farms (16 percent), ranked lowest of all. Undoubtedly the large proportions of rough and steeply sloping land and small, irregularly shaped fields in Garrett County farms were dominant factors in limiting the use of tractors.

Utilization of Farm Land

The total area of land in farms in Garrett County, as given by the U. S. Bureau of the Census, is not the best index to the general character and intensity of agricultural development, inasmuch as extensive areas of land are not actually under cultivation, some are not even used for pasture, and some have only limited, if any, agricultural possibilities.

Data on classification of farm land in the various censuses are not uniform. Prior to the census of 1925 farm land was classified into two general categories--"improved" and "unimproved" land, with unimproved land broken down into "woodland" and "other unimproved land". Improved land included all land regularly tilled or mowed, land in pasture which had been cleared or tilled, land lying idle or fallow, land in gardens, orchards, vineyards, nurseries, and land occupied by farm buildings. "Woodland" included all land covered with natural or planted forest trees, which produce, or later may produce, firewood or other forest products; "other unimproved land" included brush land, rough or stony land, swamp land, and any other land not improved, or in forest.

Beginning with the census of 1925 a more elaborate classification of farm land was adopted. This included three classes of crop land: "crop land harvested", "crop failure", and "crop land idle or fallow". "Crop land harvested" included all land from which cultivated crops were harvested, all land from which hay was cut (including wild hay cut within the limits of the farm), and all land in small fruits, orchards, vineyards, gardens, nurseries, and greenhouses. "Crop failure" referred to land from which no crop was harvested because of crop failure or destruction from any cause such as drought, flood, insects, or disease. "Idle or fallow" was defined as cropland lying idle or which was in cultivated summer fallow the previous year.

In 1925 three classes of pasture were specified--plowable, woodland, and other pasture. "Plowable pasture" included all land used for pasture which could have been plowed or used for crops without clearing, draining, or irrigating. "Woodland pasture" included all farm wood lots or timber tracts, natural or planted, and cut-over land with young growth, but excluding woody shrubs, which had been used for pasture at any time during the previous year. "Other pasture" included all land used for pasture during the previous year, which was not classified under plowable or woodland pasture.

"Woodland not used for pasture" referred to all woodland in farm acreages not pastured during the previous year. "All other land in farms" included rough, swampy, or waste lands not in forests, pastures, or crops; also land occupied by buildings, barnyards, feed lots, roads, ditches, etc.

Thus statistical data on "improved land" were collected for 1880, 1890, 1900, 1910, and 1920, but have not been included for later years. For comparative purposes, however, the figures for 1925 and later census

years and the regular earlier years, from 1880 to 1920, can be reduced to approximately the same basis. For the earlier years the definition of improved land included "land occupied by farm buildings". From 1925 on figures are available for all the items included as improved land in the earlier census, with the exception of land occupied by buildings. The Census Bureau has estimated, however, that by adding 4 acres to the cropland and plowable pasture for every farm in the County the total will compare in a general way and serve to indicate the trend of what was formerly "improved farm land".

In general there has been a considerable decrease in the improved farm land area. This is undoubtedly due primarily to changes in character of farming operations and to new methods for securing higher yields from farm lands.

TABLE LII
FARM LAND IN GARRETT COUNTY

Year	Land in Farms	Improved Farm Land	% of Farm Land Improved	Crop Land Harvested
	Acres	Acres	%	Acres
1880	205,325	100,741	49.1	40,501
1890	223,685	109,736	49.1	53,115
1900	243,510	123,932	50.9	57,831
1910	265,220	122,318	46.1	60,910
1920	244,754	112,811	46.1	62,739
1925	238,960	92,408	38.7	57,992
1930	241,248	93,751	38.9	58,888
1935	238,825	98,852	41.4	57,862
1940	235,522	97,846	41.5	56,931
1945	220,047	76,831 ^{1/}	34.9	58,028

U. S. Bureau of the Census

^{1/} 1945 figures are not strictly comparable with those of 1940, since 1940 figures included land pastured which could have been plowed and used for crops without additional clearing, drainage, or irrigation. This land may not have been plowed within 7 years prior to 1940.

In census figures prior to 1940 the total land area of Garrett County is given as 438,400 acres. A remeasurement of the County area in 1939 reduced it to 427,520 acres, without any change in County boundaries. The latter figure for total area is used in all tables in this study.

Garrett County, although it is first in total land area and sixth in "land in farms", was 19th of 23 counties in proportion of total land area in farms. It was also next to lowest in percentage of improved land in farms, with Allegany County lowest. In 1945 about 66.4 percent of the land area of Maryland was in farms. Proportions for other counties ranged from 90.2 percent for Carroll, 89.1 for Queen Anne's, and 86.4 percent for Talbot, to as low as 45.7 for Anne Arundel and 40.9 for Allegany.

While about half the land in Garrett County is classified as land in farms (51.5 percent of total area in 1945), only about 14 percent is crop land. (See Table LIII.) Within the County there is considerable range in percentage of total land in farms, since election districts, or minor civil divisions, include all types of surface features, with varying proportions of steeply sloping, highly dissected, poorly drained, or level to rolling lands. A number of them include relatively good agricultural land as well as land suitable only for woodland or permanent pasture. (See map of Minor Civil Divisions, Fig.D.)

Of the total land in minor civil divisions the proportion in farms ranges from 86 percent in East Oakland and 74.2 percent in Ryan's Glade, to as low as 25 percent in Bloomington, 32.4 percent in The Elbow, and 35 percent in Kitzmillersville. In the first two there are a number of "glade" areas with considerable relatively level to gently rolling land;

they constitute some of the best agricultural land in the County. The total land area in the Bloomington, Kitzmillersville, and The Elbow Districts includes the steep slopes of Backbone and Big Savage Mountains and the highly dissected area between Savage and Negro Mountains in the Savage River Valley. Much of this land is so rough and in such steep slopes that it can be used only for forest and recreation (see Land Use and State Forest maps, Figs. K and J). Together with the southeastern part of Grantsville (District 3) and a considerable part of West Oakland, much of this steep, rougher land is in State forests.

TABLE LIII
AGRICULTURAL LAND IN GARRETT COUNTY
BY MINOR CIVIL DIVISIONS -- JANUARY 1, 1945
(According to use in 1944)

Minor Civil Divisions	% of All Area in Farms	Crop Land		Plowable & Perm. Pasture		Woodland Pasture		Pasture of all Types		Woodland not Pastured		All Woodland		All other Land	
		% of All Area	% of Farm Land	% of All Area	% of Farm Land	% of All Area	% of Farm Land	% of All Area	% of Farm Land	% of All Area	% of Farm Land	% of All Area	% of Farm Land	% of All Area	% of Farm Land
1 Swanton	36.7	11.3	30.8	12.4	33.7	7.8	21.3	20.2	55.0	4.9	13.3	12.7	34.7	.2	.7
2 Friendsville	61.9	17.8	28.7	17.6	28.5	8.7	14.0	26.3	42.5	16.1	26.0	24.8	40.8	1.7	2.7
3 Grantsville	52.6	16.5	31.4	11.2	21.3	8.9	16.8	20.1	38.2	15.2	29.0	24.1	45.8	.7	1.4
4 Bloomington	24.9	4.5	18.0	20.3	82.0	.0	.0	20.3	82.0	.0	.0	.0	.0	.0	.0
5 Accident	65.6	20.0	30.4	20.6	31.5	11.3	17.2	32.0	48.7	13.3	20.2	24.6	37.5	.4	.6
6 Sang Run	36.5	9.5	26.1	11.3	31.2	7.3	20.0	18.7	51.1	7.9	21.6	15.2	41.6	.4	1.2
7 East Oakland	86.1	34.5	40.1	32.9	38.2	8.0	9.3	40.9	47.5	10.0	11.6	18.0	20.9	.6	.7
8 Ryan's Glade	74.2	18.8	25.3	25.4	34.2	17.6	23.7	43.0	57.8	9.2	12.4	26.8	36.1	3.4	4.5
9 Johnsons	44.6	10.3	23.0	33.8	75.6	.0	.0	33.8	75.6	.5	1.2	.5	1.2	.0	.1
10 Deer Park	52.7	16.8	31.8	21.3	40.5	3.7	6.9	25.0	47.3	8.0	15.2	11.7	22.1	2.9	5.5
11 The Elbow	32.4	6.2	19.3	25.6	78.8	.0	.0	25.6	78.8	.0	.0	.0	.0	.6	1.9
12 Bittering	45.0	11.1	24.7	11.6	25.7	13.9	30.9	25.4	56.6	6.8	15.2	20.7	46.1	1.5	3.5
13 Kitzmillersville	35.2	7.1	20.1	9.6	27.5	5.3	15.1	15.0	42.7	12.4	35.2	17.7	50.3	.7	2.0
14 West Oakland	48.7	12.0	24.6	15.9	32.7	7.0	14.4	22.9	47.1	13.3	27.2	20.3	41.6	.6	1.3
15 Avilton	56.1	12.8	23.0	43.2	77.1	.0	.0	43.2	77.1	.0	.0	.0	.0	.0	.0
16 Mt. Lake Park	67.7	20.0	29.5	18.3	27.0	19.5	28.4	37.5	55.4	8.9	13.1	28.1	41.5	1.3	1.9
Garrett County	51.5	14.1	26.6	18.9	36.7	8.4	16.3	27.3	53.0	9.0	17.5	17.4	33.7	1.0	2.0

Computed from Unpublished Data, U. S. Bureau of the Census.

As shown in Table LIII there was considerable range in proportions of cropland to total land area for the different minor civil divisions. About 34.5 percent of the total land area of East Oakland (over 40 percent of the farm land) was used for crops. The Accident and Mountain Lake Districts, with 20 percent of their total area in cropland (about 30 percent of their farmland), had the next highest percentages of cropland. The large areas of highly dissected land in the Grantsville and Accident Districts were important factors in reducing the percentages of total land area in cropland to about 18.2 percent (about 30 percent of their farmland). In the Accident-Cove area, for example, the eastern and western boundaries follow the crests of Negro Mountain and Winding Ridge, so that much of the land along these sides of the district is in steep slopes and largely forested. Then too, the valleys of both branches of Bear Creek and their tributaries contain much dissected land. The proportions of the districts of Bloomington, The Elbow, and Kitzmillersville used for crops are only 4.5 percent, 6.2 percent, and 7.1 percent respectively (amount of farmland used for crops in these three districts is only about 18 or 20 percent).

Only about 7,950 acres of land in Garrett County were classified as plowable pasture in 1945. Any land used for pasture which had been plowed within seven years was included in this category. About 3,550 acres, or two-fifths, of all plowable pasture in Garrett County was reported in Deer Park (District 10). This large proportion in the Deer Park area has been characteristic of that district for the past fifteen or twenty years. The area contains several of the largest dairy farms in the County, as well as some of the best improved pasture. There are also a number of farms which grow commercial crops of vegetables for processing, where a



Figure 31

Hay, small grains, and corn on Keyser's Ridge near junction of Routes 40 and 219.



Figure 32

Contour farming north of Deer Park. Permanent pasture in the foreground.

large proportion of the land is in rotations that include plowable pasture.

Plowable and permanent pasture, excluding woodland pasture, constitute about 80,000 acres, or almost 19 percent of all land area (36.7 percent of all farm land) in Garrett County. About 36,000 acres of wood land were also used for pasture, amounting to 8.4 percent of the total area (16.3 percent of the farm land). The total area of all kinds of land used for pasture was almost 117,000 acres, or 27.3 percent of all land in the County (53.0 percent of the land in farms).

Percentages of plowable and permanent pasture in the minor civil divisions ranged from as low as 9.6 percent to 11.6 percent of all land in the districts of Kitzmillersville, Grantsville, and Sang Run, to as high as 33 or 34 percent in East Oakland and Johnsons, and over 43 percent in Avilton. The percentages of farm land used for pasture were naturally much higher since many districts included much public land in state forests, as well as considerable areas of private woodland. The highest proportions of farm land used for pasture are in the northeastern districts, which include large areas on the steep slopes of Backbone and Big Savage Mountains, or the highly dissected valleys of the Savage River and its tributaries between Big Savage and Meadow Mountains. These districts are Bloomington with 82 percent of all farm land in permanent pasture, The Elbow with 79 percent, Avilton with 77 percent, and Johnsons with 76 percent. Those districts with about a third or less of all farm land in plowable or permanent pasture include most of the important agricultural areas, such as Grantsville with 21 percent, Friendsville with 28.5 percent, Accident and Sang Run with 31 percent, Bittinger with 25.7 percent, Mt. Lake Park, East Oakland, West Oakland, and Ryan's Glade. (See maps of Minor Civil Divisions and Agricultural Areas, Figs. D and K)

When the amount of woodland used for pasture is included, over 27 percent of all land in Garrett County is used for some form of pasture, and about 53 percent of all farm land. However, the northeastern districts of Bloomington, The Elbow, Avilton, and Johnsons did not report any woodland pasture. In most of these districts, as has been indicated previously, much of the rougher and steeply sloping land has been acquired by the State, and is now in public forests. In some of the other districts woodland pasture constituted well over 20 percent of all farm land. In Bittering (District 12), for example, almost 31 percent of all farm land was classified as woodland pasture. Most of this woodland pasture was on the slopes of Meadow and Negro Mountains, and of the Casselman River Valley, as well as a considerable area of brushy pasture in the poorly drained Cherry Creek area in the west central part of Bittering District. (See map of Minor Civil Divisions, Fig. D.) Considerable areas of woodland pasture were found in Mt. Lake Park (District 16) and Ryan's Glade (District 8). The eastern parts of both these districts include steep slopes on both sides of Backbone Mountain.

In general, the use of woodland for pasture in Garrett County is an unsatisfactory use of land. "It is now generally conceded that a farm woodlot cannot be economically productive of wood products and livestock at the same time."¹ The chief danger is overgrazing. When livestock overcrop herbaceous and shrubby forage, the ground surface is bared to the direct impact of rain. This practice also opens the vegetative canopy, permitting the sun's rays to increase destruction of ground litter. Even if it were true that consumption of woodland forage "put

1 Edward H. Graham, "Natural Principles of Land Use", 1944, p. 130.

pounds on the grazing animals", it robs the soil surface of its normal annual accumulation of dead grass, stalks, and leaves. In addition the hoofs of grazing animals pack the soil, making it impervious to water, and push it downhill on slopes particularly. All of these effects lower the capacity of land to soak up and store water, and therefore favor destructive run-off, accelerated erosion, and greater sediment loads in streams. Thus, without any change in climate, watershed impairment results in more and larger storm flows and greater sediment loads.¹ Controlled experiments have shown, moreover, that cattle actually lose weight when confined to woodlands. Continued grazing means eventual destruction of woodland. It follows then that one of the first steps in woodland management is control of overgrazing.²

There are about 74,000 acres of farm woodland in Garrett County, or about 17 percent of all land, and over 33 percent of all farm land. More than 50 percent of all farm land in Kitzmillersville (District 13) is classified as woodland. Grantsville and Bittering each has over 45 percent, while Friendsville, Sang Run, West Oakland, and Mt. Lake Park Districts all have over 40 percent of farmland in woodland. A comparison of the maps of Minor Civil Divisions and of Land Use (Figs. D and K) will readily show that all these districts contain considerable percentages of highly dissected and steeply sloping land, suitable only for woodland, wildlife, recreation, or for watershed protection. Much of it has shallow soils which wash easily, and steep slopes that range from over 25 percent to 60 percent or more.

1 George W. Craddock and Charles R. Hursh, "Watersheds and How to Care for Them", Yearbook of Agriculture, 1949, p. 608.

2 Glenn K. Rule, "Soil Defense in the Northeast", Farmers Bulletin No. 1610, 1938, p. 32.

TABLE LIV

AVERAGE VALUE OF LAND AND BUILDINGS
BY MINOR CIVIL DIVISIONS, GARRETT COUNTY -- JANUARY 1, 1945

Districts	Total Farms	Value of Land and Buildings	Av. Val. of Land and Bldgs.	Aver. Size of Farms	Av. Val. Per Acre Land & Bldgs.
	No.	\$	\$	Acres	\$
1 Swanton	152	104,300	2,660	87	30.57
2 Friendsville	229	503,129	2,197	91	24.14
3 Grantsville	178	1,032,075	5,798	130	44.60
4 Bloomington	65	104,400	1,606	105	15.29
5 Accident	150	723,600	4,824	142	33.97
6 Sang Run	138	477,585	3,461	111	31.18
7 East Oakland	86	448,834	5,219	85	61.40
8 Ryan's Glade	287	1,158,549	4,037	117	34.50
9 Johnsons	124	211,200	1,703	61	27.92
10 Deer Park	102	434,220	4,257	102	41.73
11 The Elbow	45	78,100	1,736	117	14.84
12 Bittinger	97	360,350	3,715	121	30.70
13 Kitzmillersville	44	92,825	2,110	91	23.19
14 West Oakland	208	782,155	3,760	89	42.25
15 Avilton	85	157,000	1,847	101	18.28
16 Mt. Lake Park	98	477,610	4,874	107	45.55
Garrett County	2,154	7,670,477	3,561	102	34.91

Computed from Unpublished Data, U. S. Bureau of the Census.

As might be expected, there is considerable range in value of farm lands and buildings within Garrett County. Table LIV above shows the difference in farm values by minor civil divisions for January 1, 1945. The average value per farm for land and buildings in Garrett County at that time was \$3,561. The highest average value per farm was in Grantsville (District 3), and the lowest in Bloomington (District 4). The remaining three districts in the northeastern part of the County, Johnsons (District 9), The Elbow (District 11), and Avilton (District 15), which include much highly dissected land in the Savage River Valley and steep slopes of Big Savage Mountain, also had very low average values

for land and buildings per farm. All of the most important agricultural districts had average farm values considerably above the County average. In addition to Grantsville, they were East Oakland (District 7), Mt. Lake Park (District 16), Accident (District 5), Deer Park (District 10), and Ryan's Glade (District 8).

For purposes of comparison, it is interesting to note that in 1945 the average value of land and buildings for all farms in Maryland was \$8,596, or about 2-1/2 times the average for Garrett County. Similar figures for Baltimore County were \$12,789, and for Frederick County, \$4,796. Thus it is evident that when land values, and capital invested in farming, are used as indications of the intensity of land use for agriculture, Garrett County lags considerably behind the rest of the State.

In value of land and buildings per acre, several significant characteristics may be indicated. The average value of land and buildings per acre in Garrett County in 1945 was \$34.91. Due primarily to the small average size of farms in East Oakland (District 7), as well as to more intensive use of land in the vicinity of the County Seat, and to greater improvements in land and buildings, average value of farm lands and buildings was much higher than in any other district, and almost twice as high as the County average. Average value per acre was also relatively high in Grantsville (District 3), Deer Park (District 10), West Oakland (District 11), and Mt. Lake Park (District 16). In all of these districts, however, land values have been increased to some extent by the demand for building lots in the vicinity of the three incorporated towns of Oakland, Deer Park, and especially Mt. Lake Park. Districts in Garrett County with very low values per acre of farm land and buildings

were those in the rough, mountainous area in the east-central and north-eastern parts of the County. They were The Elbow, Bloomington, and Avilton.

The average value per acre of all farm lands and farm buildings in Maryland in 1945 was \$84.48. Similar figures for Baltimore County were \$173.07; for Frederick County, \$76.36; and for Allegany County, which had the lowest value per acre for farm lands and buildings, \$34.51, or only 40 cents an acre less than Garrett County. These figures again show a low relative investment in agriculture in Garrett County, and help explain the relatively low level of living as indicated by farm facilities which has been discussed.

All of these indicate to a considerable extent the limitations imposed on farmers in Garrett County by such geographic factors as large extent of rough and steeply sloping land, limited areas of cultivable land, a relatively short and variable growing season, unfavorable location, and unfavorable marketing facilities.

Crop Production

A comparison of acreage devoted to the principal crops in Garrett County, and the proportion of cropland used in growing them, is given in Table LV. Although figures for the 1879-1899 period are not strictly comparable with those for later years, it is evident that the amount of land utilized for crops in Garrett County continued to increase until it reached a peak in 1919 with the expansion of agriculture during World War I. The early 1920's reflect the retrenchment in general economic activities. The total amount of crop land had decreased about 9.2 percent by 1924, and the land in wheat had decreased almost 50 percent. At the same time, however, there was considerable expansion in hay land.

During the late 1920's total crop land harvested increased with the general economic recovery of that period, and although there were relatively large decreases in acreages of corn and hay, land in potatoes, buckwheat, and some of the minor crops such as barley increased considerably. During the 1930's total crop land harvested showed a rather steady decline with some significant changes in the relative importance of crops. Most significant of these was the expansion of food crops, wheat in particular, and of potatoes in the early depression years; and also the increase in the acreage of corn in order to produce more home-grown feed. The influence of World War II, especially in livestock production, is seen in the increased hay land acreage in 1944, and although decreases occurred in principal grain and potato acreages, there were relatively large increases in barley and in silage crops, as will be discussed later.

TABLE LV
CROP LAND AND CROP ACREAGES IN GARRETT COUNTY

Year	Land ^{1/} in crops	Corn ^{2/}		Oats		Wheat		Buckwheat		Potatoes		Hay		Other	
	Acres	Acres	%	Acres	%	Acres	%	Acres	%	Acres	%	Acres	%	Acres	%
1879	40,501	3,714	9.2	8,657	21.4	4,122	10.2	4,989	12.3	—	?	16,269	40.2	?	?
1889	53,115	3,290	6.2	10,999	20.7	2,562	4.8	5,466	10.3	1,101	2.1	21,307	51.4	2,390	4.5
1899	57,831	5,690	9.8	10,336	17.9	3,037	5.3	5,174	8.9	1,435	2.5	21,334	47.1	4,925	8.5
1909	60,910	6,821	11.2	11,396	18.7	2,761	4.5	5,440	8.9	1,707	2.8	27,743	45.6	5,042	8.3
1919	62,739	6,881	11.0	13,531	21.6	4,671	7.4	5,147	8.2	1,429	2.3	26,587	42.4	4,493	7.1
1924	57,992	6,860	11.8	11,469	19.8	2,373	4.1	5,059	8.7	1,537	2.7	29,693	51.2	1,001	1.7
1929	58,888	5,049	8.6	11,394	19.3	2,236	3.8	5,368	9.1	1,808	3.1	27,716	47.1	5,317	9.0
1934	57,862	6,352	11.0	10,422	18.0	3,161	5.5	3,750	6.5	3,012	5.2	24,718	42.7	6,447	11.1
1939	56,931	6,859	12.0	10,947	19.2	3,798	6.7	3,334	5.9	1,915	3.4	25,294	44.4	4,784	8.4
1944	58,028	6,719	11.6	9,873	17.0	3,239	5.6	3,235	5.6	1,346	2.3	30,193	52.0	3,423	5.9
			10.5		19.4		5.8		8.4		2.9		46.4		6.8

U. S. Bureau of the Census.

^{1/} Land in crops for 1879, 1889, 1899. Crop Land Harvested since 1909.

^{2/} Corn for grain.

In addition to changes between 1879 and 1944 in the relative number of acres devoted to principal crops, there were great fluctuations in production, as shown in Table LVI. These were largely due to climatic conditions during the years preceding the census enumerations. Corn grown for grain, for example, reflects extreme variations in yield. In 1919 average yield was about 36.8 bushels per acre, and in 1924 only about 13.5 bushels per acre were produced on the average. On almost the same acreage only about 37.5 percent as much corn was obtained in 1924 as in 1919. Significant differences between 1939 and 1944 are also evident, despite the growing use of hybrid seed, supposedly adapted to local conditions. Respective yields for those years were 38.3 bushels and 23.9 bushels per acre. In contrast, oats, by far the most important grain crop in Garrett County, shows relatively minor variations in yields from one census year to another. Climatic and soil conditions are much better suited to production of oats, and the secondary importance of corn has, of course, had a definite influence on type of farming and on livestock production, as will be discussed later. The trend in production of other crops and of changes in yields can, perhaps, best be considered on an individual basis.

Hay. Acreage of hay has generally been twice that of any other crop in Garrett County. In fact, over half the plowable land in the County is devoted to hay and pasture; an indication of the importance of livestock in its agricultural economy. Most of the hay grown is timothy and clover mixed, with lesser amounts of timothy alone, clover, alfalfa, and other legumes and grass. The greater part of the hay crop is used for feeding stock on the farm, while the balance is sold to local and outside markets.

TABLE LVI

ACREAGE AND PRODUCTION OF PRINCIPAL CROPS IN GARRETT COUNTY

Crops	1879		1889		1899		1909		1919	
	Acres	Bushels	Acres	Bushels	Acres	Bushels	Acres	Bushels	Acres	Bushels
Corn (for grain)	3,714	87,295	3,290	93,294	5,690	169,150	6,821	197,204	6,881	253,244
Oats	8,657	171,723	10,999	230,414	10,336	290,160	11,396	248,390	13,531	401,648
Wheat	4,122	44,399	2,562	30,427	3,037	51,540	2,761	45,853	4,671	82,643
Rye	2,746	21,552	930	8,139	1,406	15,450	805	9,933	617	7,384
Buckwheat	4,989	72,333	5,466	77,781	5,174	71,400	5,440	85,493	5,147	115,871
Potatoes	1/	101,637	1,101	63,587	1,435	133,602	1,707	157,946	1,429	164,844
		Tons		Tons		Tons		Tons		Tons
Hay - All	16,269	8,759	27,307	33,684	27,234	30,658	27,743	27,822	26,587	27,792
- Tame	1/	1/	1/	1/	26,408	29,837	26,891	26,690	26,152	27,417
- Wild	1/	1/	1/	1/	806	797	828	1,053	378	329
Silage Crops	1/	1/	1/	1/	1/	1/	1/	1/	1,062	11,875
Coarse Fodder	1/	1/	1/	1/	35	147	221	1,919	997	1,276
	1924		1929		1934		1939		1944	
		Bushels		Bushels		Bushels		Bushels		Bushels
Corn (for grain)	6,860	92,463	5,049	181,152	6,352	143,747	6,859	262,878	6,719	160,547
Oats	11,469	341,625	11,394	336,574	10,422	330,563	10,947	339,371	9,873	324,697
Wheat	2,373	35,516	2,236	39,005	3,161	65,528	3,798	78,479	3,239	64,293
Rye	334	4,059	305	4,120	501	6,240	154	2,198	52	780
Buckwheat	5,059	90,654	5,368	103,823	1/	1/	3,334	65,510	1/	1/
Potatoes	1,537	119,880	1,808	210,185	3,012	511,630	1,915	243,249	1,346	201,769
		Tons		Tons		Tons		Tons		Tons
Hay - All	29,693	32,127	27,716	32,761	24,718		25,294	31,256	30,193	35,236
- Tame	1/	1/	1/	1/	1/		1/	1/	1/	1/
- Wild	1/	1/	1/	1/	1/		137	127	1/	1/
Silage Crops	1/	1/	1/	1/	1/				1/	1/
Coarse Fodder	1/	1/	1/	1/	1/		1,500	16,320	1/	1/

U. S. Bureau of the Census

1/ Data not available.

Hay is made up of stems, leaves, and, in some cases, seeds, of relatively fine-stemmed plants which are harvested and dry-cured, especially for animal feed. It is usually distinguishable from such roughage as corn fodder and stover by the fineness of its stem and because it is prepared for animal consumption by dry curing. Sometimes fine stemmed crops may be cut and fed green, or stored and fed as silage, but these are also distinctive from hay. Hay should not be confused with straw which is a by-product of such crops as oats, wheat, rye, etc., that have been harvested for another purpose.

It is the most nutritious common roughage in general use in Garrett County. It supplies need for dried roughage in the diet of livestock, can be stored in a minimum of space, and transported with less effort and cost than other comparable feeds.

In spite of the fact that numerous plants might be used to produce hay, only relatively few are actually used for that purpose. The different kinds vary much less in nutritive value than do other classes of feed. In feeding mature animals, which are being worked or fattened, the quality of hay is perhaps as important as its variety.

Timothy hay is still cultivated more generally than any other grass in Garrett County. Although it is comparatively coarse or "strawy", with few leaves, its general character of growth allows it to be cured readily. It grows best on the deeper, moisture-retaining loams and is valuable in maintaining the humus supply of the soil. As timothy lacks the ability to use nitrogen from the atmosphere that the legumes have, it is a much more "exhaustive" crop than, for example, clover. This lack may be considerably offset by growing a small amount of clover with it. The popularity in Garrett County of timothy hay, and especially of a mixture of clover and timothy in which the latter predominates, is indicated by the

fact that it is grown on over 90 percent of the farms growing hay crops. Timothy and clover-and-timothy hay have comprised over 95 percent of the total production for many years. Its advantages as a hay crop are that it yields well, is a palatable and digestible feed, can be harvested cheaply and easily, keeps well in storage, is usually in good demand at good prices, can be fed with little or no waste, and, if properly cared for, the plant lives for several years.

Clover grown alone has never been important as a hay crop in Garrett County. Although several varieties have been grown quite successfully, the total acreage is usually relatively small, in most years not exceeding 500 or 600 acres. Since the soils are inherently neutral or slightly acid, quite heavy applications of lime are needed for productive crops of clover, as well as other legumes. Clover is, however, becoming recognized as a potentially important crop, as with proper use in a crop rotation system and with adequate liming, it provides nitrogen and humus in the soil.

Red, alsike, and mammoth clovers are the most important varieties, with sweet, crimson, and Japan clovers produced to a much more limited extent. Red clover is grown most frequently in a mixture with timothy. Alsike is often seeded with timothy, and is especially adapted to wet soils and soils too low in humus for red clover. This plant makes a cleaner, better hay than red clover, since it has smooth leaves and fine stems, and withstands rain during curing much better. Mammoth is a form of red clover, not distinct enough botanically to have a varietal name. It is useful for seeding in mixture with timothy, since both blossom at the same time. Sweet clover has less value as a forage crop, primarily because of its bitterness—a quality which belies its name—but the animals can acquire a taste for it, and when they do it provides a very

satisfactory feed. Crimson clover is especially valuable as a winter annual, sown from the middle of July until late in autumn. It provides a winter cover crop which prevents sheet erosion on lighter soils. Jap-an clover, or lespedeza, is not so well suited to Garrett County climatic conditions, although it does well in the southern part of the State where winter killing is not a problem. Where it can be grown it has a decided advantage over other hay crops because of the longer period of time over which it can be harvested. In addition its small stem and low moisture content make it possible for lespedeza to be cured very rapidly and easily compared to most hay crops.

Alfalfa is the leading hay legume in the "piedmont" counties where it does well on limestone soils. It is a leafy, long-lived perennial, which, under favorable conditions, is productive for fifteen years or longer. From two to six cuttings of alfalfa may be made each year depending on length of growing season. Alfalfa is one of the most nutritious and palatable feeds, either green or as hay, for all classes of farm animals. Its lack of bulkiness facilitates heavy consumption of grain and hay at the same time. Unfortunately Garrett County lacks deep, well-drained soils, rich in lime, and reasonably free from weeds, which are necessary for the best growth of alfalfa. Generally only 200 or 300 acres of alfalfa hay have been grown annually in the County. Undoubtedly more could be done to extend the acreage of alfalfa by heavier applications of lime, by better preparation of the seed bed, and, particularly, by securing hardier varieties. However, the risk of winter-killing of the plant because of the short growing season and danger from frost, and the long-time success with red clover, especially mixed with timothy, have discouraged the growing of alfalfa in Garrett County.

Other "tame" or cultivated hay crops include red top, orchard grass, sweet clover, hay cut from old meadows, and "volunteer" grasses which follow cultivated crops. Although yields are low from such acreages, several thousand acres of "tame" hay are mowed each year in Garrett County.

Wheat, oats, rye, and barley are all used for hay to some extent, the acreage varying somewhat from year to year, depending primarily on weather conditions and their influence on growth and harvest. Grain hay has a relatively high feeding value because of the grain it contains.

The acreage of annual legumes saved for hay in Garrett County is insignificant compared to that on farms of the Eastern Shore and southern Maryland. However, soybeans, cowpeas, and vetches are used to an increasing extent in mixtures for silage crops on Garrett County dairy farms.

Oats. Next to hay, oats occupy the largest acreage among crops in Garrett County. For many years the County has had 10,000 or more acres in oats, or close to one-third of the State total. There has been a gradual decrease in oats acreage since 1920, which has followed the decrease in the number of horses on farms, but for both oats and horses the decrease has not been so rapid in Garrett County as in the State as a whole.

There are several reasons for the preeminence of oats as a grain crop in Garrett County. First of all, the cool, moist climate. Oats require more water per pound of dry matter produced than any of the other major grains, with the possible exception of rye. The yields in Garrett County of 30 to 32 bushels to the acre, are much higher than those of most Maryland counties. Since corn is a relatively minor crop in Gar-

rett County, spring oats and, to a minor degree, spring barley are the major grain crops available for the feeding of livestock. Another physical factor which tends to make oats the most important grain crop in Garrett County is that oats are less exacting in soil requirements than corn, wheat, or barley. Almost any soil with fair drainage and well supplied with moisture is adapted to oat production, even light, sandy soils will produce oats under favorable moisture conditions. The best yields, however, are obtained on loamy and heavy soils which are more retentive of moisture. Oats do better than the other cereals on "cold" wet soils, such as the silty clay loams. Most Garrett County soils have adequate amounts of nitrogen for good yields; in fact, excess nitrogen tends to make the plant "stalky", may cause serious "lodging" in stormy weather, and reduce the growth of the "head" or panicle and consequently the yield of grain. Except on sandy soils, oats respond less to phosphorus and potassium than do other cereals. The oat crop is usually planted during the middle of April and harvested during the second week in August.

Not only are climatic and soil conditions in Garrett County generally suited to oats, but the crop fits into a place in the general rotations practiced in the County. These are usually either a three-year rotation of corn, oats (or other small grain), and hay; or a four-year sequence with a year of pasture or hay added. As a general rule oats follow corn. The crop can be seeded with little expense, since plowing is not necessary to prepare the seedbed for oats the following spring. Oats are also used as a nurse crop for clover and grasses; both kinds of seed are planted at the same time, the oats are harvested the same summer and a hay crop the next, or the field may be used for green feed or pasture. In addition, a five- or six-year crop rotation is used in

Garrett County. It consists of corn, oats, grass two years, followed by wheat, buckwheat, or potatoes.

The oat crop in Garrett County is used almost exclusively for feed, particularly for horses on the farm where it is produced. It is also a good feed for many other classes of livestock, such as breeding stock and young animals. Oats are relatively high in fat, protein, and mineral matter, and when crushed can be used in mash feeds for hogs and poultry. Because of its relatively high content of crude fiber, which makes it bulky and of relatively low volume value, and its limited industrial uses, the oat crop does not compete in commercial channels to the extent that corn or barley do.

Corn. In Maryland corn occupies the largest acreage and is by far the most valuable crop, usually planted on over 25 percent of the crop land area and producing about a quarter or more of the total value of farm crops. In Garrett County corn for grain is less important than in any other part of the State. It is usually grown on between six and seven thousand acres, from 10 to 11 percent of the total cropland area, and constitutes only about 12 percent of the value of all crops, being considerably exceeded in value by hay and potatoes.

Corn for grain does best where the growing season is 140 days or more in length, with a mean summer temperature of around 75°F., and with night temperatures exceeding 55°F. One effect of cool nights, even when days are warm, is to delay ripening. This effect is best seen at higher elevations where nights are cool. Varieties of corn that will mature in 100 days at an elevation of 1,000 feet require 130 to 140 days at elevations of 2,000 to 3,000 feet. Sunshine is another important requirement for corn, and in regions where it is cloudy for half the time corn

does not do so well as where hot, sunshiny days prevail in summer.

Climatic conditions in Garrett County are not optimum for production of corn for grain. Average length of growing season is between 120 and 130 days at different stations in the County. But year to year departures from the average are considerable, with late frosts in June or early frosts in August being fairly common. Mean summer temperatures are around 67°F., and night temperatures of 50° or less are relatively frequent; generally too cool for best growth of corn. As far as rainfall is concerned, there is usually no lack of moisture during the growing season, average for the summer months being between 10 and 11 inches. It is apparent, therefore, that unfavorable temperature conditions in summer are the chief limiting factors in the production of corn for grain in Garrett County.

The following table gives a comparison of average yield of corn per acre in Garrett and Frederick Counties, and for the State of Maryland.

TABLE LVII

AVERAGE YIELD OF CORN FOR SELECTED YEARS
IN MARYLAND AND GARRETT AND FREDERICK COUNTIES

Year	Maryland	Garrett County	Frederick County
Bushels per acre			
1899	26	30	40
1909	28	29	32
1919	34	37	30
1924	28	13	37
1929	32	26	35
1934	36	23	27
1939	34	38	41
1944	38	24	37
1945	37	25	40
1946	38	26	41
1947	22	25	38
1948	39	30	50
Average	32.4	27.1	37.3

U. S. Bureau of the Census

University of Maryland Extension Service.

For the years selected, which are quite representative, Garrett County average yields of corn were about 5.3 bushels an acre less than for Maryland as a whole, and more than 10 bushels an acre less than those of Frederick County, the leading corn producing area in the State. In this connection the following comparison of climatic features in the two counties is significant.

TABLE LVIII
CLIMATIC COMPARISON
OAKLAND AND FREDERICK, MARYLAND

	Oakland Garrett County	Frederick Frederick County
<u>Average Summer Temperatures (in degrees F.):</u>		
June	63.3	71.9
July	66.8	76.4
August	<u>65.5</u>	<u>73.9</u>
June-August	65.2	74.1
<u>Average Minimum Temperatures (in degrees F.):</u>		
June	50.5	60.3
July	54.2	65.2
August	<u>53.2</u>	<u>63.0</u>
June-August	52.6	62.8
<u>Average Precipitation (in inches):</u>		
June	4.62	4.38
July	4.60	3.94
August	<u>4.29</u>	<u>3.72</u>
Total	13.51	12.04
<u>Average Dates of Killing Frosts:</u>		
Last in Spring	May 24	Apr. 11
First in Autumn	Sept. 23	Oct. 16
<u>Average Length of Frost-Free Period:</u>		
Number of days	122	180

U. S. Weather Bureau.

In Frederick County corn for grain usually can be planted any time between April 30 and June 6; while in Garrett County it must be planted between May 1 and May 31. Harvesting in Frederick County is usually between September 3 and October 7; and in Garrett County between September 10 and October 15, although damage from frost is not an important factor after the corn is ripe.

It can readily be seen that climatic conditions for growing corn for grain in Garrett County are hazardous, while in Frederick County they are close to optimum. Although other physical factors are involved, particularly soils, as well as economic and social considerations, these differences in climatic conditions alone explain in large part why corn is a leading crop in Frederick County and doubtless will continue to be of secondary importance as a grain crop in Garrett County.

In general, the best corn soils are fertile, dark-colored loams or silt loams, warm, well drained, and with a good supply of humus. Corn flourishes on land rich in nitrogen, while small grains would lodge on such soil. Heavy clay soils, such as would produce good timothy for example, are not especially good for corn, and sandy soils, suitable for potatoes, are too light for best results in corn, unless heavily manured. Preferably the land should be rather easy to prepare and cultivate for profitable production, as corn is an extensive rather than intensive crop, and it must be relatively cheap to cultivate.

In Garrett County the best soils for corn are the valley loams and upland silt loams (see Soils map, Fig. G). Unfortunately the valley loams are very limited in extent, the biggest belts being along the larger streams. There are, however, about 20,000 acres of upland silt loams in the County. The most extensive area of this kind of soil is found in the central valley, from Deep Creek Lake southwestward to be-

yond Oakland. There are other areas of silt loams around Grantsville. Usually about half of the corn produced in Garrett County is grown in these two districts. Gravelly silt loams, especially in the Accident, Cove, and Friendsville areas are also fairly well adapted to corn production. In fact, on individual farms in these areas yields are frequently as high as any in the County.

As an ensilage crop corn is becoming increasingly important in Garrett County, especially in connection with the expanding dairy industry. In recent years 1,600 to 1,800 acres of corn have been grown for silage or fodder. In 1939 the average yield of corn cut for silage was 10.9 tons per acre, compared to a State average of 9.7 tons per acre.

Wheat. Soft red winter wheat is a relatively important food and market grain crop in Garrett County, although it usually occupies only about 4,000 acres, or approximately six percent of the crop land. Like all soft red winter wheat grown in the more humid eastern United States it has a much lower content of protein and gluten than the hard spring wheats of the Dakotas or Minnesota, and is more suitable for biscuits and pastry than for bread, although it can be blended with harder varieties in order to make a "stronger" bread flour. Most popular varieties of wheat grown in Garrett County are Fulz and Fulcaster, both of which originated in Lancaster County, Pennsylvania.

Wheat was one of the first crops grown in what is now Garrett County and it still has a traditional place in the farming system. In fact, it would be difficult to replace, as it fits well into the crop rotations, is valuable as a "nurse" crop for hays and pastures, protects the soil from erosion, provides straw for dairy and other livestock operations, and furnishes cash as well as food for the farmer.

In the humid eastern United States the southern boundary of the winter wheat belt apparently follows quite closely the isotherm of 68°F. during the two months preceding harvest. In Garrett County wheat is generally harvested between June 20 and July 15; and average temperatures for May and June are about 56.5° and 64.3° respectively. Thus it is apparent that spring temperatures are usually well below the safe limits for the wheat crop. Weather conditions affect both growth and quality in wheat, a high moisture content in the soil during early stages of growth favors a good root system and tillering. Thus the plant becomes less susceptible to winter injury than when unfavorable growing weather prevails in the autumn. Winter killing of wheat is a potential threat every year, and damage to the crop may cause a loss of 10 percent or more. Winter damage is due to several causes. Heaving is perhaps the most common danger and is most likely to happen during occasional mild spells in winter and during the alternate freezing and thawing of late winter and early spring. Heaving lifts the plants out of the soil, particularly in areas of heavy or poorly drained soils, and breaks the root system, leaving the roots exposed to the air. The wheat plant may also be damaged by being smothered when the ground is covered by an ice sheet, which may be caused by freezing of melted snow, or by sleet and glaze covering the plants. Plants are sometimes killed by the direct effect of cold on the tissues when snow protection is absent. This kind of injury usually increases with degree and duration of cold, but a sudden freeze of short duration following a warm period, especially in spring, is often very harmful.

Although wheat may be in poor condition at the beginning of winter, favorable weather later may produce satisfactory yields. On the other

hand, good growing conditions may prevail throughout the season, until near harvest time, when a short period of unfavorable weather may prove disastrous. Hot, dry weather during the ripening period, especially following a spring and summer season of warm weather and abundant moisture, is especially harmful.

The annual rainfall of 43 to 46 inches in Garrett County, of which about 11 inches fall during the spring months, apparently is not unfavorable for satisfactory production of wheat, especially since average temperatures are from 4 to 10 degrees below the upper limit for wheat. In fact, the warmer weather of the last half of May and the first three weeks of June in Frederick County, for example, which precedes the wheat harvest there, doubtless has an adverse influence on the crop. Not only is leaching of soils greater, but danger from rusts and other fungus diseases and pests is also increased. Then too, the difficulty of harvest in rainy weather is an unfavorable factor. On the other hand, cool spring weather is conducive to larger yields of better quality grain.

Best yields in Garrett County, as elsewhere, are obtained on silt loam or clay loam soils. In general, wheat is more sensitive to soil conditions and fertility of the soil must be more readily available than for either oats or corn. It requires a more thoroughly pulverized soil, and if, for example, barnyard manure is applied or sod is turned under, it must reach a greater degree of decomposition to produce a good effect on the wheat crop, as compared to oats or corn. In general practice it is more common to grow corn, oats, or potatoes on a clover sod, or directly after manuring, than wheat. Also as the soil becomes depleted the farmer generally begins applying commercial fertilizer to wheat before other cereal crops, since wheat is considered more important as

a money crop by most of the farmers. While good crops of oats are secured in Garrett County after a corn crop, by merely disking the soil well, or on corn land which has been plowed but not thoroughly pulverized and packed, much more thorough preparation is necessary for wheat. Winter wheat is usually sown six or eight weeks before the ground freezes, which means about the first half of September. Apparently when plowing can be done from one to two months before seeding, in either July or August, the yield is considerably increased, as compared to plowing and "fitting" the ground just before seeding.

One important reason for improved yield from early plowing is that the seedbed will not only be fine, but firm. A loose seedbed does not allow proper root development, due to air spaces, and it also tends to be droughty if the weather preceding planting is dry. Long experience has shown that wheat plants do not winter kill to so great an extent on a firm seedbed, probably because of better root development.

Commercial fertilizer is usually applied to a wheat crop rather than to oats or corn, since wheat, being more sensitive to soil conditions, responds somewhat more readily, and since grass and clover are commonly sown together with wheat, the fertilizer benefits them as well.

Production of wheat in Garrett County varies somewhat from year to year depending on the acreage planted and weather conditions. As a rule, somewhere around 3,500 acres are harvested, and production may range from 70,000 to 85,000 bushels. This is relatively small compared to Frederick County, for example, where usually more than 55,000 acres are in wheat and production is well over a million bushels each year.

The chief wheat producing sections of Garrett County are the Accident-Cove, Friendsville, and Grantsville areas. At least 50 percent of

acreage and production is usually found in these three parts of the County. The agricultural soils in the Accident-Cove area are practically all gravelly silt loams, and although the soils of the Friendsville and Grantsville areas are largely the gravelly silt loam type, there are relatively extensive areas of silt loams as well. In general yields are higher in the Accident-Cove and Grantsville areas than in the Friendsville section of the County. Undoubtedly part of this greater production is due to better farming practices and greater use of fertilizers and soil conservation methods, particularly in the Accident-Cove area.

TABLE LIX

AVERAGE YIELDS OF WHEAT FOR SELECTED YEARS
IN MARYLAND AND GARRETT AND FREDERICK COUNTIES
(in bushels per acre)

Year	Maryland	Garrett County	Frederick County
1899	15.2	16.9	14.1
1909	16.0	16.6	17.5
1919	14.5	17.6	15.2
1924	15.8	14.9	14.1
1929	18.0	17.4	16.5
1934	18.7	20.7	18.6
1939	18.9	20.6	19.4
1944	22.6	19.8	23.6
1945	18.5	17.2	21.0
1946	20.0	22.0	20.0
1947	21.0	21.0	22.0
1948	16.0	18.0	14.8
Average	17.9	18.5	18.1

U.S.D.A. Bureau of Agricultural Economics.

Average yields of wheat in Garrett County compare very well with those of Frederick County which leads the State in wheat production. Average yields in both counties are generally higher than those for the State as a whole; while over a period of almost half a century Garrett

County's yields have been significantly higher than those of either Frederick County or the State. According to most studies the soils of Frederick County are rated considerably higher for production of wheat than are those of Garrett County. It is likely that the cooler spring weather in May and June in Garrett County is more favorable for greater yields of wheat as compared to Frederick County and the State as a whole. As long as general or diversified farming holds a prominent place in Garrett County's agriculture, wheat will doubtless continue to have a definite place in crop production.

Buckwheat. Although buckwheat is not a grass and cannot be called a true cereal, it is used in making flour for human consumption, and in this respect is a cereal substitute. It is a comparatively unimportant crop in the United States and in the rest of Maryland, but in Garrett County it has long been a principal grain crop, usually producing at least 85 percent of all buckwheat grown in the State. For many years the acreage devoted to buckwheat in Garrett County has exceeded that of any other harvested crop except hay and oats. It usually occupies over 3,000 acres, or somewhere between 6 and 9 percent of the crop land harvested each year.

The continued growing of buckwheat in Garrett County is primarily due to the fact that it can be grown on soils not suited for wheat and therefore permits production of a bread grain a little farther into otherwise unproductive areas. Buckwheat ripens in a shorter season than any other grain crop, and can be used as a "catch" crop, or substitute for a staple crop which, because of unfavorable conditions, has failed.



Figure 35
Field of buckwheat, near Gortner between
Oakland and Red House.



Figure 36
Harvesting grain with combine on Keyser's
Ridge.

Cool, moist summer weather is ideal for buckwheat. In the United States very little is grown where summer temperatures average over 70°F. and practically none where it exceeds 75°. It is well adapted to higher altitudes with shorter growing seasons, as 10 to 12 weeks are usually sufficient for maturity. It is very sensitive to cold, however, and consequently the period of growth must be free from frost. Like oats, buckwheat requires warm weather during germinating and early growth, but the weather should be cool and moist during the later period, especially when the grain is forming. High temperatures and drought are unfavorable during the blooming stage, particularly. Under such conditions the flowers are "blasted", that is, after blooming freely they die but no seed appears. The rather high and hilly portions of northeastern United States, with comparatively cool summers and sufficient rain to keep the plant in healthy growth, favor a good "set" of seed. It is not by accident that buckwheat culture follows in a general way the hills and mountainous belt extending from New York through Pennsylvania and Garrett County into West Virginia and Virginia. Being a quick-growing crop it can be sown in midsummer, thus bringing the blossoming stage into the more favorable fall weather. In addition, buckwheat will continue to blossom for several weeks so that a period of favorable weather occurring at any time during this season may result in a good set of seed. In Garrett County buckwheat is planted, as a rule, sometime between the middle of June and the first week of July. It is usually ready for harvest during the first three weeks of September.

Buckwheat is one of the crops that will do fairly well on poor soils, especially those deficient in lime and drainage; in fact, it seems to prefer acid soils. It is often planted on newly cleared land or land that is just being brought under cultivation. While buckwheat will

naturally do well on more productive soils, it comes into competition with more profitable crops such as wheat or corn, and competing crops are always an important consideration in determining whether or not a crop will be grown. Often buckwheat land is poorly prepared, as it is sown during a relatively busy season and other crops are cared for first. Late plowing, just before planting buckwheat, is commonly practiced, yet perhaps no crop responds better to early plowing and thorough preparation of the seedbed.

Since buckwheat takes only about 70 days to mature, it can be sown late enough to ripen before the average date of first killing frost in autumn, which is about September 21 in Garrett County. It continues to blossom and set seed until frost occurs, and is usually harvested when the largest yield of ripe seed can be secured. Since the ripe grain "shatters" off easily, buckwheat is cut on a damp day, or early in the morning before the dew has evaporated.

Much of the crop is ground by local millers, and after the local demand is supplied the surplus is shipped to outside markets. When buckwheat is ground about 50 to 60 percent is recovered as flour, 25 percent as middlings, and the rest as hulls. The flour, of course, is used chiefly for making griddle or pan cakes. The middlings, which are high in protein and fat, are considered very suitable for stock feed, particularly for cattle. The whole grain is also an important feed for poultry.

Beekeepers have long recognized the buckwheat blossom as a source of an abundant and superior grade of honey. Buckwheat straw has little feeding value compared to oat straw, for instance, but is quite valuable as mulch. It rots down so quickly that old stocks of buckwheat straw are often hauled directly onto fields as manure.

Owing to its ability to grow on poor land, buckwheat is used as a means of soil improvement. Apparently the plant can use relatively unavailable mineral nutrients in the soil to better advantage than small grains, and the crop undoubtedly improves the mechanical condition of the soil. Buckwheat is also useful as a green manure crop. It can be sown after a rye crop, for example, has been plowed under, and in turn can be harvested or turned under. Rye and buckwheat may be sown together in late June or in July, the buckwheat harvested in September, the rye left until the following June when it is plowed down as green manure. This may be repeated for several years on the same field, thus increasing the humus supply of the soil, and meantime paying expenses with the buckwheat crop. In places where winter rye does not seem to be successful, crimson clover has been used with buckwheat to advantage.

In view of the favorable climatic and soil conditions for growing buckwheat in Garrett County, it is very likely that it will continue to be an important crop there. It is another of the traditional crops of the County, particularly among farmers of German ancestry. Its adaptability to farming systems, tolerance of a wide range of edaphic conditions, its value as a catch-crop, and as a soil builder make it a worthwhile crop even as agricultural practices improve. Its value as a feed crop, especially for poultry and cattle, make it equally desirable in the increased dairying and poultry farming which has occurred in recent years. To some extent the acreage of buckwheat has decreased during the last decade as emphasis on more and better silage crops and on the extension of improved pasture land has accompanied the growth of dairy farming. Certainly buckwheat griddle cakes and home produced maple sirup should have permanent priority on Garrett County farm breakfast tables.

Barley. Spring barley requires a shorter period from seeding to maturity than any other grain crop, with the possible exception of buckwheat. The growing season, however, may be shortened either by lack of sufficient moisture to sustain growth or by low temperatures. It is not strictly drought resistant but rather drought resisting, depending on climatic conditions and the time of year when it is grown. During growth it needs moderate temperatures and a fairly abundant supply of moisture.

Barley is not an important crop in Garrett County, although its production, particularly in the dairy areas of the Piedmont counties of the State, has increased rapidly in recent decades. However, most of the crop grown in Maryland is spring barley; attempts to grow fall-sown barley in Garrett County have not been successful, primarily because the rate of winter-killing makes it too hazardous.

Barley is also affected much more by spring frosts than either oats or corn. Apparently best yields are obtained where April and May are comparatively warm and dry, and June cool, and where rainfall in May and June is moderately above normal, two inches in the more humid eastern United States. The crop is planted sometime between April 15 and 30 in Garrett County, and is harvested during the period of July 15 to 25. Average temperatures there for April and May are about 46° and 56°F. respectively, while average minimum temperatures for the same months are as low as about 33° and 42°F., and average date of late killing frosts in spring as late as about May 20.

In contrast, Carroll County, one of the leading dairy and barley producing divisions of the State, has average temperatures for April and May of about 52° and 63°F., with average minima of 41° and 51° re-

spectively, and average date of last killing frost in spring on April 20, about a month earlier than in Garrett County. Average rainfall for April and May in Garrett County is 4.13 and 4.05 inches, and for Carroll County 3.65 and 4.29 inches respectively. The contrast in climatic conditions during these two critical months for the early vegetative period of barley shows enough physiological difference to explain, in part at least, why barley is an important crop in Carroll County and of only very minor importance in Garrett County. While April and May are relatively mild and have a rainfall moderately above normal in Carroll County as compared to most of the humid eastern United States, these two months are considerably cooler in Garrett County. This together with the physiologically much greater available moisture in Garrett County, make spring weather too cool and moist for optimum growth of barley. At the same time, these climatic conditions are favorable for the pre-ripening period of growth for winter wheat and for the early growth of spring oats. However, in connection with efforts to expand the County's dairy industry, barley does have a potential value as a crop cut green for hay and in a mixed crop for green feed or silage, especially since growing conditions for corn are also considerably short of optimum.

In its soil requirements barley is also quite specific. It demands better drainage than either wheat or oats. For this reason it is not well adapted to heavy clay soils in humid regions. It is also more sensitive to mineral deficiencies than wheat and generally less tolerant of soil acidity than most other cereals. Barley production is not successful on sandy soils. Most of the limited acreage of barley grown in Garrett County is raised in the Grantsville and Accident-Cove districts, where soils are largely gravelly silt loams and silt loams, and farming

practices are above average for the County, with particular emphasis on soil improvement.

The following table is given primarily to show trends in barley production in Maryland, in Garrett County, and in Carroll County where it has been an important crop for many years.

TABLE LX
BARLEY PRODUCTION FOR SELECTED YEARS
IN MARYLAND AND GARRETT AND CARROLL COUNTIES

Year	Maryland			Carroll County			Garrett County		
	Acres	Bushels	Bu. per Acre	Acres	Bushels	Bu. per Acre	Acres	Bushels	Bu. per Acre
1899	1,515	42,560	28	754	22,940	30	30	610	20
1919	3,888	111,221	29	1,724	53,754	31	100	2,437	24
1924	10,783	288,522	27	3,057	87,341	29	70	2,042	29
1929	9,832	286,208	29	2,562	80,714	32	289	7,780	27
1934	36,869	992,129	27	6,322	183,481	29	139	3,991	29
1939	59,745	1,835,675	31	8,842	294,229	33	86	2,439	28
1944	67,412	2,075,524	31	9,477	314,032	33	318	8,763	28

U. S. Bureau of the Census.

The increase in barley in Maryland between 1929 and 1939 was one of the most outstanding changes in crop production in the State, expansion of both acreage and production amounting to over six times that of 1930. The chief cause of this was the decrease in agricultural prices during most of that decade and the need for dairy farmers to produce more home-grown feed. Since that time it has been recognized as a good substitute for part of the corn in feed rations, and it requires much less labor per unit of feed produced. A striking contrast to this great expansion of barley production in the Piedmont counties is the relative insignificance and actual decline of the crop in Garrett County between 1929 and 1939. Unlike the trend in the rest of Maryland the acreages of

corn and wheat, as well as of certain kinds of hay, were increased during the 1930's. The relatively important increase in barley acreage in Garrett County between 1939 and 1944 reflected the increase in livestock production during the war period, and the need for increased home-grown feed. Other factors, such as the location of Carroll County in relation to the Baltimore-Washington milkshed, and the much greater development of dairy farming, with attendant demands for feed concentrates, are parts of a complex geographic-economic and social relationship.

Rye. In common with the rest of the United States, rye has been a comparatively minor crop in Maryland, and particularly in Garrett County, where climate and soil conditions are rather favorable for its production. The reasons for its unimportance in the County are economic and social rather than physical.

Rye is a typical cool-weather grain. It may be sown later in fall than wheat and can be grown where winters are too cold for winter wheat. It will germinate and grow with temperatures only a little above freezing and is usually not seriously affected by light frosts when it has reached the milk stage. For best results, it apparently needs drier and warmer weather in April than usually prevails in Garrett County, although the rather abundant moisture supply in May, and cool weather in June are quite favorable. In general, suitable conditions include considerable warmth and moisture before formation of heads, and cool, damp weather thereafter, with moderate temperatures and dry weather during the blooming period. The crop does not fill out well if there is too much rain when the heads are in bloom.

Rye is less exacting in its soil requirements than most of the other cereals, and for this reason alone would be suited to soils of Garrett

County. It grows well over a wide range of conditions with respect to soil moisture, although deficient drainage is unfavorable. It is able to withstand considerable acidity and makes a fair growth at low levels of fertility. On the other hand, relatively luxuriant growth under especially favorable conditions does not impair the quality of the grain, nor are losses due to lodging from excessive nitrates nearly so severe as for wheat, and especially oats. In general, however rye is less responsive, and increase in yields on good soils are relatively smaller than for other small grains. This is, perhaps, a basic reason why it is a crop of little or no importance in Garrett County, as well as generally, since good land is used for wheat, oats, corn, or barley to greater advantage, depending, of course, on climatic conditions, farming systems, and other cultural and economic factors.

Although rye is not important in Maryland compared to other crops, in recent years there has been a remarkable change in the distribution of the crop within the State. For many years the bulk of production was on the dairy and livestock farms of the Piedmont counties. During the past decade, the lower Eastern Shore has increased its acreage considerably, while that of winter wheat, and of white potatoes particularly, has generally declined. This change has been due, in part, to the increased demands for feed crops and improved pastures in the expanding livestock and dairy industry, and to the fact that the long growing season makes it possible to double crop much of the farm land.

The following table shows the trend in rye production in Maryland, in Garrett County, and in Dorchester County. The latter county is included to show the great increase in acreage on the lower Eastern Shore.

TABLE LXI

RYE PRODUCTION FOR SELECTED YEARS
MARYLAND AND GARRETT AND DORCHESTER COUNTIES

Year	Maryland			Dorchester County			Garrett County		
	Acres	Bushels	Bu. per acre	Acres	Bushels	Bu. per acre	Acres	Bushels	Bu. per acre
1899	21,621	279,550	12.9	130	1,290	9.9	1,406	15,450	11.0
1909	28,095	357,562	12.7	35	219	6.2	805	9,933	12.3
1919	21,196	230,596	10.9	661	6,643	10.0	617	7,384	12.0
1924	14,610	185,575	12.7	755	7,882	10.4	334	4,059	12.1
1929	18,409	232,727	12.6	630	8,039	12.8	305	4,120	13.5
1934	22,649	299,454	13.2	2,187	26,175	12.0	501	6,240	12.5
1939	16,045	235,746	14.7	3,481	51,379	14.8	154	2,198	14.3
1944	22,066	364,916	16.5	4,474	74,504	16.7	42	780	18.6

U. S. Bureau of the Census.

In general acreage of rye for grain has not fluctuated greatly in Maryland for many years. As previously stated, however, despite its unimportance in Garrett County, the crop acreage of rye has increased rapidly on the southern Eastern Shore, particularly in Dorchester, Caroline, and Wicomico Counties. The figures for Dorchester County in the above table are typical of this increase.

Without digressing too much from the main purpose of this study, it may be worthwhile to find some of the important reasons why the southern Eastern Shore has increased its acreage of winter rye, while as a crop rye has never been important in Garrett County, and, according to recent figures, has virtually disappeared from its fields.

In the three Eastern Shore Counties referred to, truck farming, or the growing of vegetables for the fresh market or for canning, has been the most important type of agricultural production for many years. In recent years poultry and dairy farming have become relatively important as well. On truck farms a suitable system of crop rotation is a vital problem and to maintain organic matter, prevent erosion, and control plant diseases and insect pests, truck crops must be rotated, and

preferably not more than half the land should be in cultivated crops each year. The lighter or more sandy the soil, the greater the need for care in arranging the rotation. In fact, the recommended practice for the Eastern Shore is to have several rotations on the same farm.

Owing to its adaptation to poor and sandy soils, winter rye has become a very important crop in building up and maintaining the fertility of these truck-crop soils of the southern Eastern Shore. It is sown generally between September 21 and November 14 in these counties, makes good growth the following spring, and may be plowed under in May in time to plant some other crop, or is ready to harvest between the middle of June and the middle of July. When rye follows corn it can be sown in the standing corn at the time of last cultivation, or planted later with a narrow drill, as is done by some farmers. Rye is also planted after the early crop of potatoes in July or the late crop in November. A number of Eastern Shore farmers also alternate crops of rye and buckwheat. The rye is sown about July first with the buckwheat which is harvested for grain that fall, while the young rye is allowed to grow and is plowed under the following summer. This may be repeated for several years, gradually improving the soil by the large addition of organic matter.

The rye crop is used both as a feed crop on the farm or the grain can be sold as a cash crop. Since commercial farming has been practiced on the Eastern Shore for many years, market contacts with Baltimore, as well as other large centers, have long been established. In some years a considerable part of the rye crop is sold primarily on the Baltimore market, where there is a relatively good demand for "rye" type breads. There are also several large distilleries in the Baltimore area, which increase the demand for rye grain. In addition, rye straw is a market-

able product, and in some years is worth about as much per ton as timothy hay. Formerly in great demand for bedding in livery stables, its use for that purpose is confined mostly to horse racing parks and to farms where these horses are raised and trained. Rye straw is also used for packing and in upholstery in the Baltimore industrial area.

Thus rye has proved a versatile and valuable crop on Eastern Shore truck farms. Its use as a cover or green-manure crop for soil improvement, as well as the value of its grain as feed and straw for bedding on the farm, and for sale, have helped to raise farm incomes and stabilize the agriculture of the area.

In contrast, Garrett County depends almost entirely on winter wheat as a cover crop and for food, feed, and sale off the farm. Even with the increase in livestock production and dairy farming, more attention has been given to corn and mixed crops for silage. Very little has been done in Garrett County to test the possibilities of rye as a pasture crop, especially in providing early green feed in spring and extending and improving grazing in late summer and early fall.

Wheat has proved to be the most reliable fall-sown grain crop in Garrett County, and its relative importance among field crops there has become traditional. In addition to its value as a bread grain and for poultry feed, wheat yields in Garrett County have been rather consistently higher than those of rye. Over a period of nearly fifty years, average yield of wheat for Garrett County has been about 18.5 bushels per acre. During the same period the average yield of rye has been only about 13.3 bushels per acre. In other words, if a Garrett County farmer decided to raise a grain crop for market, and had ten acres to plant for that purpose, he could reasonably expect about 185 bushels of

wheat, or 133 bushels of rye. Furthermore, between 1908 and 1944 inclusive, the average price of wheat in Garrett County was about \$1.14 per bushel, compared to about 93 cents per bushel for rye. In dollars and cents the ten acres of wheat would represent \$210, while the same acreage of rye would be worth only \$124.

Because competition of other more profitable crops is more significant in Garrett County, where the shorter growing season limits flexibility of farming practices to a greater extent than in the southern Eastern Shore Counties, there is little likelihood that rye for grain will be an important crop in Garrett County.

White potatoes. The white potato has been one of the principal cash crops in Garrett County for many years. However, acreage and production there have declined somewhat in recent years, as emphasis has shifted to dairy and other livestock production, and to the greater need for home-grown feed and pasture crops. In contrast to the early crop of the lower Eastern Shore, which furnishes the bulk of Maryland's production, potatoes raised in Garrett County are a "late" crop. The early crop must be marketed promptly when harvested, competition being keen, and a detailed system of marketing has been developed. In contrast, the late potato crop raised in Garrett County can be stored for considerable periods of time, thus lengthening the marketing season.

The rolling nature of much of the farm land in Garrett County is suitable for potatoes as this crop requires land that is well drained in order to prevent water from standing on the plants, and to allow freer movements of air both over and in the soil. The soils of Garrett County are light colored and relatively low in organic matter. In general, however, they are neutral to slightly acid, a desirable condition



Figure 37

Hilly permanent pasture near Sang Run. Note gully in center, and natural seedlings.



Figure 38

Cleared slopes between McHenry and Accident, east of Hoyes.

for production of disease-free potatoes, as too much lime in the soil fosters scab and other diseases. Most of the agricultural soils of Garrett County are shaley silt loams with a loose friable structure, and in general are very suitable for potato production, except that they are low in organic matter. Good potato soils must be of this loose, shaley or sandy nature to permit easier planting, cultivating, and digging. It also facilitates freer development of the fragile root systems, the potatoes grown are smoother as a result of more uniform development of the tubers, fertilizer and manure are more effective, freer movement of air through the soil also lessens the damage by diseases, and the crop matures quicker.

When potatoes are planted in the latter part of May or early June, as is most of the crop in Garrett County, July is usually considered the critical month. During this period the tubers are forming and spells of temperature above 70°F. reduce yields considerably. Average July temperature in Garrett County is about 68°F. and maximum temperatures during that month seldom exceed 80°.

The potato plant requires large quantities of water in its processes. In most of the best late-crop producing areas of the United States the rainfall ranges between 12 and 18 inches from the time of planting until harvest time. However, it is necessary that these 12 to 18 inches of precipitation come at regular intervals throughout the growing season. In Garrett County the average precipitation for the period of May to September ranges between 15 and 17 inches, and is well distributed over the growing season. Too much moisture, of course, may have harmful effects upon potato production, being especially conducive to the growth of Late Blight disease. Frequent heavy rains also prevent the use of heavy spray machines, cultivators, and other equipment.

Many farms in Garrett County that grow commercial crops of potatoes are larger than the average of all farms in the County, being around 160 acres in size, with an average of 100 acres for all farms in the area. Due to the large percentage of rolling to steeply rolling topography in the County, however, often only from 30 to 40 percent of the total acreage is available for crops. In addition, most farms are of a general self-supporting type and cropped acreage is a definite limitation on size as such farms need large acreages of feed and roughage crops. Most of the land suitable for cultivation lies either along streams or on tops of the ridges. Fields tend to be relatively small, and the large proportion of rough land in farms limits much of it to permanent pasture or wood land.

The average acreage of potatoes per farm, on those farms where the crop is grown on a commercial scale, is about 5 acres. This relatively small acreage is caused, in part, by the smaller size of fields due, as has been stated, to the large proportion of rugged land on many farms. Then, too, the relative newness of commercial potato production in Garrett County tends to limit the amount of land devoted to the crop on each farm. To grow large acreages of potatoes successfully special machinery is needed, and most farmers have not had sufficient capital to buy planters, sprayers, and diggers. As a result the acreage is limited to a size that can be handled with general farm equipment and, perhaps, an inexpensive shovel-type digger. Another limiting factor is the shortage of labor during harvest season, the peak of which lasts only about two weeks. Extra labor is acquired usually from neighbors, mostly on an exchange basis.

In working crops into a rotation, most Garrett County potato growers prefer to have the land in two years of hay or grass before using

it for potatoes. It is a general practice to follow a small-grain crop, usually oats or wheat, with clover and timothy hay, and then plow up the sod; although some farmers with small acreages of crop land use a three-year rotation of small-grain, hay, and potatoes.

As shown in the following table the long-time trend in increased potato acreages in Garrett County continued until about 1934, since that time the trend has been rather steadily downward; a combination of low prices and heavy losses from disease during a few seasons immediately after 1934 discouraged many producers. In recent years, however, there has been more emphasis on proper spraying and in the development of varieties more resistant to disease, so that yields have been maintained at a fairly high level.

TABLE LXII
POTATO PRODUCTION
IN MARYLAND AND GARRETT AND WORCESTER COUNTIES

Year	Maryland			Garrett County			Worcester County		
	Acres	Bushels	Yield	Acres	Bushels	Yield	Acres	Bushels	Yield
1899	26,472	1,991,357	75.2	1,435	133,602	93.1	1,385	135,947	98.2
1909	39,299	3,444,311	87.6	1,707	157,946	92.5	3,661	410,075	112.0
1919	46,837	4,918,766	105.0	1,429	164,844	115.4	9,434	1,276,839	135.3
1924	36,501	3,408,106	93.4	1,537	119,880	78.0	10,363	1,151,744	111.1
1929	29,958	3,366,152	112.4	1,808	210,185	116.3	7,708	1,232,767	160.0
1934	33,547	3,404,271	101.5	3,012	511,630	169.9	6,675	779,274	116.7
1939	19,406	1,930,081	99.5	1,915	243,249	127.0	4,988	561,237	112.5
1944	16,131	1,300,773	80.6	1,346	201,769	150.0	3,558	369,442	104.0

U. S. Bureau of the Census.

It must be recognized that in the above table totals for Maryland include both early and late potatoes, while those for Worcester County apply only to an early crop, and those for Garrett County only to a late crop. The table does indicate, however, that both acreage and production of potatoes have been generally decreasing in Maryland for

many years. For the State as a whole the peak was reached shortly after the first World War. Inasmuch as the bulk of commercial production has long been grown on the Eastern Shore, the decrease was caused primarily by a shift to production of other vegetables and more diversification in crops and livestock. This trend has been beneficial, since over-specialization in potatoes resulted in low incomes when the price was low, while a variety of vegetable crops spread out the labor load over a longer period, and having several crops for sale helped reduce the loss from crop failure. The mild winters of the southern Eastern Shore also permit double-cropping.

Table LXII also shows that yields in Worcester County and for the State as a whole have not increased in recent decades, but in general have decreased, while in Garrett County there has been a considerable upward trend in yields. Most of this increase has been due to better cultural practices and especially to improvement of breeding and selection of seed potatoes adapted to local conditions. Yields of potatoes vary widely on individual farms, and may range from as low as 40 bushels an acre to over 300 bushels an acre. Why, then, in view of the greatly increased yield per acre which should encourage expansion, has total acreage devoted to potatoes decreased steadily?

According to estimates made by the Maryland Crop Reporting Service the area in potatoes in Garrett County since the war has declined to only about 1,000 acres in 1949. Compared to most other crops the cost of producing an acre of potatoes is relatively high, and, although income from an acre of potatoes may be considerably more than from an acre of most other crops grown in the County, the added expense of production reduces the differences in net income and gross income. Pro-

duction of potatoes requires a large amount of labor, and many operations on Garrett County farms are still performed by hand labor or with a two-horse team. The most time-consuming operation is harvesting, which often requires up to 40 percent or more of all man labor; other operations include planting, grading, cultivating, manuring, preparing seed-bed, spraying and dusting, roguing and bagging, and marketing. These requirements have often resulted in a labor shortage in Garrett County where there is generally little or no transient farm labor.

Other expenses include cost of materials, of which cost of seed is by far the greatest. Other materials include commercial fertilizers and disinfectants.

To reduce the amount of spring work, much of the plowing is done in the fall, then in spring it is necessary only to harrow and smooth the land for planting. Horse power is still used by most Garrett County farmers in preparing potato land, but on farms equipped with tractors only about a quarter of the man hours per acre are needed to plow and harrow potato land, compared to the time involved with horse power.

On farms where small acreages of potatoes are grown, the rows are opened with a plow and the "sets" or seed potatoes are dropped by hand. However, about three-fourths of the commercial potato growers in the County use a "picker" type of planter, which has a mechanism that picks the seed from the bottom of a hopper and carries it into the soil where it is covered by two trailing sticks which form a ridge of soil over the seed.

Cultivation is done mostly with a horse-drawn, one-row cultivator, which cuts weeds from the furrow and "hills up" the soil around the plant. Usually the crop has to be cultivated five or six times during

the summer, and in addition there is a considerable amount of hand weeding and hosing between the plants where the cultivator does not reach. The average amount of labor required in cultivation involves about ten percent of the total man hours per acre, depending upon type of cultivator, condition of the ground before planting, and, of course, upon climatic conditions during the growing season.

Spraying and dusting are also time-consuming operations. During particularly rainy summers, according to personal interviews, these operations must be repeated as many as twelve times, since rain falling a few hours after dusting and spraying washes off the preparation. Usually about five or six percent of the total man hours per acre are required for spraying or dusting operations, depending on the number of applications, but in some seasons almost as much time was spent as in cultivation, or about ten man hours per acre.

"Roguing" refers to removing diseased or otherwise unhealthy and undesirable plants, and although a minor operation as far as time is concerned, it is often a very important one.

Harvesting, as previously stated, is the most expensive operation in producing potatoes in Garrett County. Usually about fifty percent of the total man hours per acre is involved, depending on the yield and the type of digger used. Most farmers use a "shovel-plow" type, and the potatoes must be picked up by hand after they are plowed out of the ground. A considerable number of growers, however, are using elevator diggers which load the potatoes directly into a truck or wagon, a much more efficient method so far as labor is concerned.

Most grading is done by hand and consists of removing small or damaged tubers. Although hand grading is also a large time-consumer,

many farmers believe it results in a better quality product. Then, too, prices for well-graded potatoes are usually sufficiently higher to convince growers of the need for careful sorting. With the present smaller crop other farmers feel that they get more total income by selling potatoes ungraded at a reduced price. In this connection, however, there is danger of establishing local prices for graded potatoes below what they should be. If acreage and production were to be increased, it would be necessary to find new markets and then increased competition would force either better grading or a serious reduction in price.

Unfortunately, no systematic method of storing potatoes has been generally adopted in Garrett County. Larger producers often find that lack of storage facilities is a major problem, although many of them use regular potato houses or dugout cellars. The dugout cellar is usually located in the side of a hill, and is equipped with a raised slat floor to allow air to circulate around the potatoes; it has a ventilator shaft extending through the roof to the center of the room. Most growers in the County, however, use the basement of the house, which is frequently insufficiently ventilated and too warm for potato storage.

Compared to the detailed system of marketing potatoes and other vegetables established on the Eastern Shore, potato marketing in Garrett County is rather haphazard. The acreage planted and total production has never been great compared to large producing areas, and this means that the market has never been extensive either. Within a comparatively short radius of the County, however, there are a considerable number of industrial towns which provide favorable local outlets. In fact, to more adequately supply this "local" demand for potatoes would

require a much larger production in Garrett County. Long shipments out of the County do not seem to be expected, and therefore competition that would intensify marketing will probably come from potatoes being shipped into the local market area.

Nearby industrial cities in West Virginia provide the principal outlet for Garrett County potatoes. Usually about one-fourth of all potatoes sold by growers go to the Clarksburg market, and about a fifth to the Fairmont and Morgantown areas. Uniontown, Pennsylvania, is the principal market for potatoes grown in the northwestern part of the County, while growers in the northeastern, or Grantsville, district sell most of their potatoes direct to retailers in Frostburg or Cumberland. Keyser and Petersburg, West Virginia, and Winchester, Virginia, also usually receive several thousand bushels of potatoes from Garrett County. The Westernport-Piedmont area as well as the mining towns of Georges Creek Valley and the Upper Potomac Valley are also within the Garrett County potato market area, and furnish most of the market for the remainder that is sold.

Independent retail merchants and chain store managers within the market area of the four states mentioned, usually obtain only about a fourth of the potatoes sold in their stores from Garrett County. This would indicate a much larger potential market than has been obtained. About half of these stores have been critical of the quality of Garrett County potatoes, compared to those from other producing areas. One of their chief criticisms concerned the type of containers: that whereas potatoes from other areas came in new "branded" bags, those from Garrett County were shipped in old bags previously used for a variety of commodities.

Usually about 70 percent of the potatoes marketed in Garrett County are sold at the farm to local dealers and shippers. The popularity of this method is due to the fact that the buyer stands the cost of transportation to market, the farmer does not have to spend time on the market, and he receives his money at once. Most of the truckers and wholesale dealers grade the potatoes themselves, or at least set the standards when the farmer grades them in order to maintain their reputation with their customers. Usually the dealer makes deliveries every week or every two weeks as the retailing stores need new supplies. Ordinarily direct sales to retailers by farmers account for about 20 percent of the total sold. Most of these are sold to stores in Oakland, Frostburg, and Cumberland.

There are several factors that affect the production of potatoes as a cash crop in Garrett County. As is true in any economic undertaking, some of these, such as the human factor, are more of a qualitative nature and at best can only be evaluated roughly, while others of a more strictly quantitative nature can be measured much more accurately. Although exact determination of the extent to which each factor affects profitability of potato growing in Garrett County is probably not ascertainable, it is possible to point out tendencies which are applicable in any geo-economic study. Inasmuch as potatoes are one of the principal cash crops in Garrett County and physical conditions, while not ideal, are fairly suitable for their production, it seems rather important to find out, if possible, what are the chief factors that have prevented the expansion of acreage and production. It might be stated further that in any study, whether of a geographic, economic, social, or historical nature, none of the other disciplines should be ignored. For example, a historian who ignores or

neglects geographical influences has only partially investigated the integrated setting or "milieu" of his subject, just as has the economist who has refused to take notice of the historical and geographical implications in his "frame of space and time".

In a study of potato production in Garrett County¹ it was found that acreage of potatoes per farm affected profitableness only to the extent that it affected efficiency in operation. In other words, the most profitable farms did not necessarily have the largest potato acreage. Farms having over six acres of potatoes showed, in general, proportionately less profit than did farms having four to six acres; cost of production per bushel showed a negative relationship to yield, or, as yield per acre increased, cost of production per bushel decreased. It was also shown that, in general, yields above 155 bushels per acre were necessary before growers had any net gain. Primary factors affecting yields per acre included amount of fertilizer applied per acre, number of times sprayed, cost of disinfectants, and acreage of potatoes per farm. In addition to frequent sprayings, it was necessary that efficient machinery be used. Disease and insect control, by spraying and dusting, was of major importance in affecting yields. With one or two applications of spray or dust average yield was only about 124 bushels per acre; with three or four, yield was 180 bushels; with five or six, yields averaged 196 bushels; seven to eight, about 237 bushels; but for over eight applications average yield dropped to about 220 bushels per acre. Therefore, up to a limit, spraying and dusting apparently were essential for

1 A. B. Hamilton and S. H. DeVault, "The Potato Enterprise in Garrett County, Maryland", Bulletin No. A4, University of Maryland Agricultural Experiment Station, 1941.

efficient production of potatoes. The variety of potatoes planted was, of course, also very important, but of equal importance was the quality and care of the seed planted. Disinfecting of seed potatoes was a minor item of expense, often only 35 cents per acre, but was very necessary as disease organisms usually are present in the soil.

The survey showed further that cost of production per acre tended to increase as net gain increased. Farms which made highest returns had greater costs for fertilizer, spraying and dusting, harvesting, and grading. However, cost per acre was not the only consideration. Yields per acre were much higher on the most profitable farms; and, therefore, cost per bushel was more important. Total cost of growing and marketing of potatoes on the most profitable group of farms was only about 44 percent of the cost for the least profitable group. Then, too, most profitable farms averaged in return from five to ten cents more per bushel of potatoes produced than did the other growers. Higher returns per bushel were caused in part by differences in prices received, because of variations in quality of the crop and in methods of marketing. However, the most profitable farms were those where more time was spent in increased care in production and in grading, and this no doubt explains the difference in price received.

In evaluating the position of potato production in the agricultural use of land resources in Garrett County several basic conditions may be pointed out. Potatoes have been an important food and cash crop in Garrett County for many years. Until about 1930, however, no particular varieties were grown; but since that time seed improvement work has introduced several standard varieties that have helped to increase yields and which are more resistant to disease. In spite of this, disease

hazards have affected the popularity of potatoes as a cash crop, and together with a labor shortage, particularly during the war, have influenced many farmers to choose other types of farming, especially dairying and the growing of more feed crops.

As previously stated, although soil conditions in Garrett County are not optimum for commercial potato growing, the soils are generally friable and mellow, and easy to cultivate. They are relatively responsive to fertilizers, but rather low in organic matter. In order to overcome this deficiency, the general practice is to plant potatoes after a crop of clover or other hay and with heavy applications of barnyard manure before the sod is plowed. Many farms are also applying several hundred pounds of commercial fertilizers at the time the potatoes are planted.

In general, climatic conditions are not considered limiting factors in Garrett County, but summers that are rainier than usual interfere with spraying and dusting operations and increase the hazard of pests and disease. Over much of the County topography favors both air and moisture drainage, but at the same time limits the extension of crop farming and of the range of crops that can be grown. On many farms not more than a third of the land is in crops.

In raising potatoes as a cash crop efficient production is a prerequisite to increasing the size of operations. The main factors affecting efficient production of potatoes in Garrett County include: acreage per farm, yield, cost of production, and income per bushel. Average acreage is relatively small on potato farms, being only about five acres. This is due to the fact that many operations are done either with a two-horse team or by hand, and to the need of more disease-resistant varieties to make the enterprise more profitable, and

encourage expansion, and also the need for better and more efficient potato-production machinery to reduce labor costs. Disease is the chief factor affecting yields, and apparently a yield of 150 bushels an acre is necessary before farms can show a net profit. Therefore, frequent spraying or dusting with pressure equipment that covers the entire plant is essential. On farms with the lowest returns only two or three applications of spray or dust are usually made, and average yields are only about 75 bushels per acre, or about half the yield necessary to be commercially profitable. On farms where at least five or six applications are made, yields average about 250 bushels per acre. Man labor is the largest item of expense in the cost of production and reflects the need for greater use of labor saving methods. Other expenses include the cost of commercial fertilizer, seed, and marketing. Income per bushel of potatoes is also a measure of efficient production. The highest prices are generally obtained by growers who are the most careful in preparing the ground, selecting seed, cultivation, harvesting, and especially grading. Although costs of production were higher on these farms, yields and quality of potatoes grown were still higher. As yield increased, costs of production increased at a much slower rate, with a resulting increase in net income.

Other vegetables. The growing of vegetables began in the early days of settlement in the Garrett County area. As was generally true, several of the food crops, particularly corn, beans, and squash or pumpkins, had been grown by the Indians before that time. Settlers frequently brought with them seeds of vegetables that had been grown in older settlements to the east or in Europe, and vegetables were grown on a broader scale in home gardens to supplement the meat diet obtained through hunting.

Although commercial production of vegetables, excluding white potatoes which are a field crop, has not become an important branch of agriculture in Garrett County, more farms grow vegetables for home use in preference to any other crop. Importance of the farm garden is determined not only by the volume and value of products grown, but also by the fact that it supplies the farmer's table with a greater variety of products in larger quantities than would generally be purchased off the farm.

Climatic and edaphic conditions in Garrett County are generally quite favorable for growing most common vegetables such as cabbage, brussels sprouts, kale, turnips, rutabagas, kohlrabi, collards, sprouting broccoli, spinach, beets, parsnips, cauliflower, head lettuce carrots, celery, peas, sweet corn, onions, beans, and tomatoes.

On the basis of climatic conditions to which they are best suited, vegetables may be divided into cool-season and warm-season groups. Vegetables of the cool-season group grow best where the growing period is comparatively cool and moist, or they may be grown, as in the South, during the cooler period of the year. This group includes such vegetables as lettuce, garden peas, radishes, spinach, white potatoes, turnips, cabbage, celery, and cauliflower. The warm-season group includes cucumbers, melons, squash, pumpkins, sweet corn, string and lima beans, eggplant, peppers, sweet potatoes, and tomatoes. Intermediate between these two groups in their temperature requirements are beets, carrots, onions, parsley, asparagus, and rhubarb. Improvement and adaptations in varieties, especially development of quicker-maturing strains, have increased the tolerance of most of these vegetables and extended their range considerably beyond what might be called optimum conditions.

Almost all vegetables require relatively large amounts of available water in the soil throughout the crop season. In fact, little commercial

production is found outside of regions with less than 30 inches of annual precipitation at least half of which occurs during the growing season, except under irrigation. Average annual precipitation in Garrett County is usually between 43 and 46 inches, of which around 22 or 23 inches fall during the months of May to September inclusive. The growing, or frost-free, period of from 122 to 132 days on the average is ample for successful production of most common vegetables, especially since most of them are adaptable to a wide range of climatic conditions.

Most vegetables grow best on well-drained, friable, mellow soils which may range in texture from sands to clay loams, and even though these soils may be inherently low in chemical fertility or in adequate organic matter, which are essential for most successful vegetable production, such deficiencies can be artificially adjusted by the use of commercial fertilizers and stable and green manure. Even the glade clays can be used for crops like celery, onions, and cabbage when properly handled. In Garrett County the silt loams, gravelly silt loams, and sandy loams (see Soil map, Fig. G) are the most suitable for vegetable production. Despite almost ideal physical conditions, however, commercial production of vegetables, with the exception of white potatoes, has been relatively unimportant in Garrett County.

TABLE LXIII

VALUE OF VEGETABLES GROWN FOR FARM HOUSEHOLD USE
IN MARYLAND AND GARRETT, BALTIMORE, AND WICOMICO COUNTIES
IN 1944

State or County	Farms Reporting	Percentage of Total	Total Value of Vegetables Used	Average Value Per Farm
Maryland	No.	%	\$	\$
Maryland	35,043	85.0	3,744,880	107
Garrett	1,980	92.0	235,707	119
Baltimore	3,209	89.0	432,957	135
Wicomico	1,339	68.0	66,873	50

Compiled from U. S. Bureau of the Census Reports.

Vegetables are grown under three systems of farming: (1) home gardening or primarily for use by farm household; (2) market gardening; (3) and truck gardening. The second and third systems constitute the commercial vegetable industry and are of comparatively recent origin. Rapid transportation and refrigeration, large urban populations, and the increased prices of meat are among the principal causes of this development of the commercial vegetable industry. In addition there has been a rapidly growing advocacy and recognition of the value of vegetables in the diet.

Since the great majority of farmers and villagers produce their own vegetables, the larger towns and cities constitute the big market for the commercial vegetable industry. Thus market gardens tend to become concentrated near cities and the short haul to market enables the farmer to furnish the consumer with fresh vegetables at lower cost. In Maryland this trend is exemplified by the predominance of market gardens in the environs of Baltimore, in Anne Arundel and Baltimore Counties, and southeast of Washington, D. C. in Prince Georges County. At one time such market garden areas adjoined Baltimore and Washington, but the demand for land for suburban development, as well as competition from more distant areas, has removed much of the land from use for market gardens.

Location near such large market areas is still significant in vegetable production, as distinguished from most other farm products, since freshness is a quality particularly desired by consumers, and also because fresh vegetables contain a large amount of water in proportion to solid matter and will therefore not bear the cost of transportation over great distances unless price becomes very high. Furthermore, the fluctuating demand for labor which is characteristic of market gardening, is more easily met near cities where there is normally an available supply of common labor.

The main distinction between truck- and local market-gardening, in Maryland at least, is that most truck-farming relates to the growing for shipment to distant markets out of season, or for canning, while the latter is confined more or less to growing vegetables for a local market in season. Truck farming has reached gigantic proportions in the past fifty years, and local market gardening which has been carried on for a much longer period of time has also increased rather significantly as a result of the rapid development of urban centers and local interurban transportation facilities. Local growers have, however, felt the competition of specialists at distant points, where conditions for growth are so unusually favorable as to overcome the expense of transportation. Where local market-gardening has succeeded it is primarily because growers have concentrated on production of those crops that could be cultivated to greater advantage by them. Improved implements and machinery have enabled them to reduce cost of production and maintain a margin of profit. Fields are cultivated with increasing intelligence and intensiveness each year. Produce is marketed in a more attractive form. The demand for these goods has also been maintained and in many cases greatly increased. As a result market-gardening for local sale in the environs of large centers of population, such as Washington and Baltimore, has increased despite frequent readjustments and shifting of conditions. Much of this produce is sold direct from the wagon or truck to the consumer or retailer, or the market gardener may retail or wholesale his vegetables at a stall or booth in a produce market in Baltimore or Washington.

The difference between truck-gardening and the type called market-gardening is that in the latter location is the determining factor, and in the former it is climate and to some extent soil. However, the truck

gardener is frequently more of a specialist than is the market gardener, usually confining himself to a limited number of the more staple vegetable crops. Truck gardening may be carried on at a long distance from the market provided rapid transportation and refrigeration are available.

The sections most handicapped by distance are often most favored by climate, so that, given favorable transportation facilities, the Florida truck-farmers, for example, are able to place their early crops on the northern market at a profit. As the season progresses, sections nearer that market contribute to the vegetable supply, each in turn taking advantage of its more favorable climate, in relation to sections farther north, and its more favorable location in relation to sections farther south. Finally, the market gardens adjacent to the cities, and the truck farms nearest to them, from New Jersey north into New England, furnish the consumers with their fresh vegetables during the warm summer months.

The lower Eastern Shore counties, from Somerset through Wicomico, Dorchester, and northward through central Carolina County, which provide the great bulk of truck crops in Maryland are in reality a section of the Norfolk-Long Island vegetable belt. The light soil, mild climate, long growing season, precipitation of between 35 to 40 inches well distributed throughout the year, relative nearness to markets, and adequate transportation all favor vegetable production. In addition to vegetables large quantities of cantaloupes and watermelons are also grown. The long growing season makes it possible to double-crop much of the land, and more feed and green manure crops as well as livestock and poultry have been produced in recent years to make up a more balanced type of agriculture.

The chief outlets for truck crops of the lower Eastern Shore are large northeastern markets and local quick-freeze and canning companies.

By means of truck transportation, vegetables can now be harvested in the afternoon of one day and reach the markets by the following morning.

The chief vegetables canned are tomatoes and snap beans. In 1944 the value of vegetables, excluding white and sweet potatoes, sold by these four counties was over \$6,400,000, or about 43 percent of the State total.

Within a radius of about 200 or 250 miles of Garrett County are located the most important commercial vegetable-growing areas of northeastern United States. One extends from Utica, New York, westward through Buffalo, Erie, Pa., and on to Toledo, Ohio, and beyond. Another vegetable belt extends from south to north through central Indiana. In the environs of Pittsburgh and Cincinnati there are large concentrations of commercial vegetable farms. All of these areas are much nearer to large centers of population, and because of their increased development have a far greater mass effect on their respective market areas. In other words, Garrett County is "fenced out" so far as any metropolitan market is concerned, and must depend on the smaller markets within a relatively small perimeter, which in turn have their own local supplies of vegetables.

TABLE LXIV

SPECIFIED VEGETABLES HARVESTED FOR SALE
IN MARYLAND AND GARRETT, BALTIMORE, AND WICOMICO COUNTIES
IN 1944
(in acres)

Harvested for Sale	Maryland	Garrett County	Baltimore County	Wicomico County
Tomatoes	50,179	10	4,294	3,748
Sweet corn	43,252	560	3,958	333
Snap or string beans	19,351	32	4,458	2,799
Green peas	9,777	635	873	507
Cabbage	1,544	9	644	2
All other vegetables*	37,810	77	7,924	11,217
Total	161,913	1,323	22,151	18,606
Value of vegetables*				
Sold	\$14,782,559	\$75,861	\$2,060,176	\$2,128,942

Compiled from U. S. Bureau of the Census Reports.

* Excludes white and sweet potatoes.

The leading vegetable-producing counties of Maryland are Baltimore and Wicomico. In production of tomatoes, however, Dorchester County's 8,435 acres in 1944 was highest for the State and Frederick County led in sweet corn with 6,596 acres and Carroll County in green peas with 3,916 acres for 1934.

In Garrett County commercial production of vegetables, with the exception of green peas and sweet corn, has been insignificant compared to that of leading counties. Sweet corn has about the same general soil requirements as field corn, but it is more sensitive to climatic conditions. The greater portion of the crop grown in Maryland is canned, and since any canning crop has relatively low acre-value, sweet corn is not grown where land is scarce or high priced. It is not surprising, therefore, that with physical conditions so favorable for corn Frederick County is a leading producer, even though commercial production of other vegetables is not especially important in that county. Garrett County produces good quality sweet corn, but because of the distance to any large market for fresh corn, production has been primarily for canning at a plant in Mt. Lake Park.

The production of green peas in Garrett County has also been primarily for canning at the same plant. Formerly most of the peas were grown on a contract basis, and pea-vining equipment was set up near Gortner and Accident. As both peas and beans, as well as other leguminous vegetables, add nitrogen and in other ways help improve the soil, especially if the vines are plowed under for organic material, farmers consider these characteristics as added advantages in commercial production. Furthermore, peas are a short-season crop and can be grown with less frost hazard.



Figure 39
Pea-vining shed near Red House.



Figure 40
Mt. Lake Park vegetable packing and canning
plant.

During the summers of 1948 and 1949, Garrett County had unusually cool, rainy weather, and crops of both peas and string beans were unsuitable for canning. The serious decline in vegetable production in the County in 1949 compared to that of 1944, as shown in Table LXIV, is given in the preliminary report as follows: Tomatoes 2 acres, sweet corn 114 acres, string beans 3 acres, green peas 64 acres, cabbage 4 acres; total, including other vegetables, 189 acres. Value of vegetables sold in 1949 was \$12,607, or only about 17 percent of the 1944 receipts.

An attempt has been made to ship fresh, locally-grown vegetables, as well as broccoli trucked in from Canaan Valley in Tucker County, West Virginia. The vegetables were trimmed, packed, and iced, and sent by railroad to New York City. Marketing this produce, however, did not prove particularly successful, primarily because of the newness of the venture and inexperience of the operators; on such a small scale, no organized marketing program had been established. During the season of 1950 the canning and packing plant was closed.

In 1951 Garrett County farmers, under the direction of the County Agricultural Agent and the Horticultural Agent of the Baltimore and Ohio Railroad were planning a limited cauliflower production and marketing program. A one-acre experimental plot of cauliflower was grown in 1950 on Harvey Peninsula on the east side of Deep Creek Lake. The trial plot was chosen in order to include a variety of soil types and drainage conditions. On the better-drained sections, yields of cauliflower were at the rate of nearly 500 crates per acre. This soil was relatively high in organic matter and a heavy application of commercial

fertilizer was used. An unexpected magnesium deficiency which appeared after planting was corrected by application of Epsom salts. Three sprayings of D. D. T. apparently controlled insects. On another trial plot near Mt. Lake Park one-half acre each of broccoli and cauliflower were grown. The soil types here were not in such good tilth and state of fertility, however the yields of both crops were considered satisfactory.

The production plan for 1951 involves about 30 acres of cauliflower and, if results are favorable, acreage will be expanded; and other crops such as broccoli, cabbage, head lettuce, and spinach, which require similar growing conditions, will be tried. The Horticultural Agent of the Baltimore and Ohio Railroad will have charge of the processing and marketing problems. Attempts have recently been made to reopen the Mt. Lake Packing and Canning Company, and to install quick-freeze equipment.

Both the County Agricultural Agent and the Horticultural Agent of the Baltimore and Ohio Railroad are convinced that cool-weather vegetables offer the people of Garrett County a profitable cash crop. Such production, which would fit well into general farming and marketing, would be on a cooperative basis between farmers and the Agricultural Development Department of the Baltimore and Ohio Railroad.

Livestock Production

Dairy production. No other group of foods, perhaps, has received so much attention in the United States during the past few years as have the products of dairying. This is due primarily to the ever-increasing methods for more efficient production of food, to recent discoveries and developments in the science of dietetics, and to the constantly rising standards of living for most of the population. It is generally accepted that in the United States milk is one of the most economical human foods produced by animals. Given the same amount of feed, dairy cattle will produce about twice the amount of available human food as will beef cattle or sheep.

But even the fact that milk is an economical food does not explain completely its rise in importance in the United States, for individuals as well as nations, who are wealthy enough do not need to be economical in their selection of food. More effective than considerations of economy are the urgings of dietitians, health institutions, health officers, and, of course, milk producers themselves, who are unanimous in their pleas for greater consumption of milk and milk products. It is generally agreed that milk is a nearly perfect food in that it contains most of the essentials of the human diet in almost perfect proportion. For these reasons, and another important one which will be mentioned later, the consumption of dairy products is constantly increasing.

A rising standard of living is important in promoting an increase in the use of products derived from milk. Butter, fancy cheeses, milk chocolate, condensed and evaporated milk, ice-cream powders, and other milk products fit into a diversified and ample diet which characterizes a relatively high standard of consumption.



Figure 41

Crop and pastureland in considerable slope.
Near McHenry, north of Deep Creek Lake.



Figure 42

Dairy cattle near Gortner, south of Oakland.

In line with the general tendency toward greater intensification in processing of food products, it is expedient to examine the position of dairying in agriculture. Dairying lends itself to intensification in two ways. First, the cow is an efficient utilizer of many crops and even of agricultural by-products, especially on the average general farm which often will support one or two cows. Furthermore, crops and by-products can be converted more efficiently than would be possible in production of beef cattle or sheep, so that keeping of milk cows may be said to be more intensive than production of beef or mutton. Then, too, value of by-products of dairying in the form of manure is certainly not inconsiderable, and the consequent building up of soil fertility is an integral part of intensification.

Dairying is intensive in still another way. In the most specialized areas, such as in Montgomery or Baltimore Counties, only standing room is occupied by dairy animals. They eat some home-grown crops, but depend mostly on purchased feed, and are pastured on carefully cultivated forage crops, although in most cases the average pasture land per dairy cow is much lower than in the case of beef animals or sheep. Much more capital and labor, and less land, is used, therefore, in dairying than in meat production.

As a general rule it is safe to say that, in the United States at least, the distribution of dairy cattle is similar to that of the human population. This is due, of course, primarily to the relative perishability of milk products. Although there have been many improvements in handling, transporting, and preserving these products, it is still not common for fresh milk to be consumed very far from centers of production. More could, perhaps, be said of such major factors as regu-

lations and discrimination which tend to offset extension of milksheds.

Production and marketing of dairy products is a broad and complex undertaking. The variety of milk derivatives and the widely different conditions which prevail in various producing areas show a considerable lack of uniformity. In the dairy industry, then, milk, butter, or cheese production should be given specific consideration on the basis of location of the industry. A common problem, however, is the preliminary analysis of the production of dairy cows.

There is no doubt about the enormous difference in efficiency of dairy cows. Even in the most uniform herd there are noticeable differences in production between individual cows, and a comparison between first-class dairy animals and ordinary farm milk cows shows as great variation as between different species. This difference in efficiency is particularly important in the dairy industry because of the comparatively high cost of production of dairy products. Ordinarily, of course, it is quite easy to measure efficiency of dairy stock, since as a rule the herd is uniformly fed, and by keeping milk records of individual cows a workable estimate of comparative efficiency is readily available. This simple method of estimating the work of an individual cow has been of great importance in development of better dairy herds, particularly in specialized dairy regions, where inefficient cows and their offspring are soon eliminated.

To increase efficiency through use of a scientifically determined diet is not so practicable or easy. Available feed stuffs must be utilized as a general rule, and although experiments indicate that much better results can be obtained through scientific feeding, general conclusions covering all possible combinations of feeds have not been

developed to such an extent as to make them widely acceptable. In areas of specialized dairying and of fairly uniform conditions, however, efficiency in feeding has increased remarkably.

In Maryland, as in general, the most important production problems have to do with fresh milk, since the bulk of the total product is used in this form. There is a gradual change in production methods, however, which varies with distance from Baltimore, Washington, and Pittsburgh, or other comparable areas of consumption. There is, of course, no definite line between producing areas, but generally they follow the radiating pattern of transportation facilities of large markets, being extended along main lines of railroads and highways and falling back between them.

In the environs of Washington, Baltimore, and Pittsburgh, dairy farms are highly specialized and occupy relatively small areas of land. These dairies operate at fairly high costs because land prices are too high to devote much acreage to feed production and practically all feed must be bought and shipped in. Lower transportation costs, together with highly efficient production, make it possible for these dairy farms to operate.

Farther out there is a transition to a second type of specialized dairying, as in the Hagerstown Valley of Washington County and the upper Eastern Shore in Kent, Cecil, and Queen Anne's Counties. Here land is not so costly and it is generally found profitable to raise a large part of the feed consumed. This land is built up by the cows which consume its produce, and quite efficient land utilization results. In addition to land that is used for feed production, there is commonly a large amount of permanent pasture and often crop land is pastured.

As the extreme limits of the milk-producing area tributary to Baltimore and Washington are approached, a third type of production is found. This is on the diversified or general farm with milk as one of the products of diversification. It is here that the magnitude of the scope of agricultural production is limited by topography and a shorter growing season. While farms may be larger than average, often only half, or even less, of the land is in crops. Production is frequently, or primarily, for home or local consumption. Because of cool, moist summers much land is devoted to pasture, hay, and other forage crops with livestock, such as dairy and beef cattle, and hogs and sheep as well as poultry being well represented. Usually, or formerly, cream is shipped or sold and the milk by-products fed to hogs and poultry. The cows consume specially produced feeds, such as silage, pasture grasses, and cash-crop by-products, and in turn help build up the soil of crop and pasture land on the farm. Until recently this type of dairy production has been characteristic in Garrett County, but since establishment of dairy-products plants in Oakland and Grantsville dairy farming has expanded and become commercial enough so that the transition is toward the second type of specialized dairying discussed just previously.

Perhaps it might be well to reemphasize the fact that there is no definite line of demarcation between these three types of dairy farms, but there is undoubtedly a tendency for them to be distributed about as has been indicated. The nature of the area, particularly with reference to presence or absence of good pasture land does sometimes offset distribution of types of dairying; nevertheless, distance from the city market has a powerful influence upon the type of milk production that will prevail.

In areas such as Garrett County the dairy industry is partly a result of having consuming markets of several large towns and cities within favorable distances, such as Cumberland, Uniontown, and Morgantown as well as smaller towns adjacent to or in the County. Fundamentally, however, Garrett County is itself particularly suited to dairying, much as is the area westward from Lake Michigan across Wisconsin and into southeastern Minnesota. The cool, moist summers in both of these areas foster an abundance of pasture grasses, and much of the land is not suitable for cultivated crops. As a result such areas tend to be surplus-milk producing areas; that is, their markets for consumption of fresh milk are not adequate, and a considerable part of the production must be processed. In this part of Wisconsin, for example, much of the nation's cheese is made, while in Garrett County a large percentage of the whole milk is processed and sold as evaporated or condensed milk and ice cream. Formerly, of course, much more butter was made on farms in such areas, but the trend has been to sell whole milk or butter-fat. In both regions milk is produced by either specialized dairy farms which raise much of their own feed, or by the general or diversified farms with the latter usually predominant.

One of the most important developments in the dairy industry has been improvement in methods of transporting fresh milk. The limits of metropolitan milk sheds are frequently well over a hundred miles from the city itself, and, experimentally at least, fresh milk has been shipped successfully from Wisconsin to New York. Such long shipments are possible through use of special railway transportation facilities. A common method of transportation is to assemble large cans of milk at country railroad stations and then ship them by special refrigerator



Figure 43

New dairy barns. Near Gortner, south of Oakland.



Figure 44

Livestock auction center near Accident.

trains. Formerly the cans were covered with cakes of ice and in this way low temperatures were maintained throughout the trip. Later methods of transporting milk include specially built tank cars. On some, the tanks are built in sections and the cars are equipped with cranes by means of which sections are loaded or unloaded as required. Vacuum tanks are also used, but plain, glass-lined sections, cooled by any one of several methods, are apparently very satisfactory and relatively cheap. It is obvious that such methods of transportation can be commercially and economically used only where large quantities of milk are produced in one district and where distance to market is relatively great.

As in many other phases of transportation, hauling of milk by motor truck has greatly modified distribution of milk production. Good highways and roads make truck transportation easy, and as milk must be hauled over the highway at some stage of its journey, it is often more economical to haul it all the way rather than change from truck to train and then back to truck again when it arrives in the city. In other words, for distances up to fifty miles or so truck is cheaper than railroad transportation largely because of elimination of rehandling charges, since trucks can compete with railroads for distances up to 100 miles. This tendency toward use of trucks has been so well developed, that certain large railroad companies have made truck forwarding an important adjunct to their transportation systems. Naturally a good road system must exist before highway transportation can be undertaken at all. Nevertheless, hauling by truck has certain disadvantages according to some authorities. There is danger of spoilage by the milk-churning process which is imparted by the truck's motion, and the fact that

it is impossible to carry large quantities of ice for relatively long trips. But modern methods of refrigeration and specially constructed tank trucks have done away with these objections just as they have for railroad transportation.

Most cities up to the size of Cincinnati, Indianapolis, Pittsburgh, and Columbus receive well over half their total milk supply by truck without intermediate railway transportation. Larger metropolitan areas such as New York, Philadelphia, and Chicago, chiefly because of their great size and the consequent longer radii of their milk sheds, depend to much greater extent on railroads as a means of obtaining their supplies.

Undoubtedly development of highway milk transportation has been a benefit to both producer and consumer. Except where artificial and arbitrary obstacles offset such advantages, marketing costs are reduced, cities receive a more plentiful and better supply of milk than would otherwise be possible, and farmers have a wider and more flexible market for their product.

Expansion of milk production in Garrett County has been facilitated by development of roads both within the County and to potential markets, and by the consequent growth of motor truck transportation. Apparently since the total population of the County has reached a peak of somewhere around 21,000 the local market for milk would limit any considerable expansion of the dairy industry if it were cut off from outside markets. Garrett County has been a surplus-milk producing area for many years. Formerly the surplus milk was used for butter production on farms with by-products being fed to hogs and poultry. Now most of the surplus milk is sent to dairy-products plants in Oakland and Grantsville, and

made into ice cream or partly processed for shipment to large condensing factories in West Virginia and Pennsylvania. Practically all of this movement of milk and milk products is by motor truck.

The importance of cattle in the agriculture of Garrett County, as well as in any area of mixed farming in the United States, lies in the fact that coarse forage, grains, grass, and other feed, either unsuitable or not wanted for human consumption, can be converted into valuable and much desired food products.

As previously stated, grazing of cattle on the natural grasses of the "glades" in Garrett County was the first agricultural use of land in that area. As early as 1720 it was a fairly common practice to drive herds up to these natural meadows in summer from more settled areas in Virginia. Some of the first tracts of land occupied were used for production of beef cattle. In the first assessment roll of 1798 a partial list gives at least 859 cattle owned by 79 residents in what is now Garrett County. Jacob Vanmeter apparently was "cattle king" of that early time with 79 head assessed at about \$16.00 per animal. Grazing increased, and by 1859 a herd of at least 600 head of cattle were being pastured in Herrington Creek Glade just north of Oakland, and over 2,000 more within a ten-mile radius.

In Garrett County, as elsewhere in the State, at first the same cows served as work animals and as sources of beef, milk, butter, cheese, and other products. As the County developed, cattle raising became more specialized, with certain breeds raised principally for beef production and others primarily for their superior milk production. Specialization in dairying has developed for several reasons. Dairy cows can occupy permanent pasture and land otherwise unsuited for crops, as well as ro-

tation pasture, and can utilize by-products of crop production such as waste or stunted grain and crops planted mainly for their effect upon the soil, converting them, together with other various kinds of feed, into milk. Soil fertility can be built up and maintained by keeping dairy cattle as well as other farm animals on a large percentage of the farm land. Successful dairying provides a cash income throughout the year, which is a distinct incentive to the farmer, and furthermore, prices of dairy products are generally stable from year to year compared with prices for many other farm products. Production of meat, although of secondary importance in dairy farming, is, nevertheless, an important factor. The quantity of meat coming from this source is considerable and is derived mainly from two general classes of animals: beef from discarded bulls, cows, and some heifers and steers of dairy breeding; and veal from calves.

In statistics on livestock for different census years, date when census is taken, as well as difference in schedules and variations in their interpretation, greatly affect comparability of figures. In the past, censuses were taken in January, April, or June. A large percentage of farm animals born during the spring months would not be enumerated in a January census. Despite such limitations, however, census figures do indicate general distribution and relative importance of beef cattle or milk cows over a period of years. (See Table LXV.)

Beef cattle have been important in Garrett County since pre-settlement days. The rough topography, cool, humid climate, the large percentage of pasture, and prevalence of general farming have been major factors in maintaining this relatively extensive type of land use in the County. For statistical purposes, however, the number of beef

cattle has been obtained in only a few censuses. Prior to 1920 cattle were classified as "dairy cows", and "other cattle"; in 1920 an attempt was made for the first time to further classify all cattle. In 1925, 1930, and 1940 the distinction between beef and dairy cattle is made only for cows and heifers, while for 1935 and 1945 the figures refer to "all cattle" and "cows and heifers milked". Since on many farms a general-purpose type of cow is raised, it is often a matter of individual opinion as to whether the animal should be classified as "beef" or as "dairy". These few facts illustrate the difficulty of presenting on a comparable basis for the several census years data showing the number of beef cattle on the farms in Garrett County.

The following tables are presented primarily to show the trend in number of cattle in Maryland and in Garrett and Frederick Counties for selected census years. Frederick County was chosen for comparative purposes because it is the leading cattle-producing county of the State, and also because these two counties are almost identical in total area: Garrett County has 427,520 acres, and Frederick County, 424,960 acres. Differences in farm land, crop land, and pasture land, which will be given later, should help to explain differences in size of cattle and dairy enterprises in the two counties.

Table LXV is presented primarily to show the magnitude of cattle production on Maryland farms, and in Frederick and Garrett Counties. As has been stated previously, differences in time of year when the census was taken, and in definitions and schedules considerably reduce the comparability from census year to census year. However, the table does indicate the relative importance of cattle in individual years.

TABLE LXV

ALL CATTLE AND CALVES ON FARMS
IN MARYLAND AND FREDERICK AND GARRETT COUNTIES

(for selected years)

Date	Maryland	Frederick County		Garrett County	
	No. of Head	No. of Head	% of Total	No. of Head	% of Total
June 1, 1900	292,646	35,046	12.0	18,620	6.4
Apr. 15, 1910	287,751	34,185	11.9	16,138	5.6
Jan. 1, 1920	283,377	35,433	12.5	13,887	4.9
Jan. 1, 1925	272,509	35,980	13.2	14,876	5.4
Apr. 1, 1930	318,779	44,565	14.0	17,903	5.6
Jan. 1, 1935	307,432	40,127	13.1	16,559	5.4
Apr. 1, 1940	298,439	44,730	15.0	14,284	4.8
Jan. 1, 1945	390,305	55,676	14.3	19,046	4.9

U. S. Bureau of the Census.

Over the 45-year period, Frederick County has had from about 12 to 15 percent of all cattle, while for most of that period Garrett County produced about 5 or 5-1/2 percent of the total number of cattle of all kinds in Maryland.

TABLE LXVI

DAIRY CATTLE^{1/} ON FARMS
IN MARYLAND AND FREDERICK AND GARRETT COUNTIES

(for selected years)

Date	Maryland	Frederick County		Garrett County	
	No. of Head	No. of Head	% of Total	No. of Head	% of Total
June 1, 1900	147,284	17,473	11.9	5,994	4.1
Apr. 15, 1910	153,548	19,967	13.0	6,578	4.3
Jan. 1, 1920	161,972	21,710	13.5	4,612	2.9
Jan. 1, 1925	172,581	23,293	13.5	5,351	3.1
Apr. 1, 1930	190,416	26,940	14.1	7,866	4.1
Jan. 1, 1935	197,792	26,294	13.3	9,157	4.6
Apr. 1, 1940	184,703	27,168	14.7	7,533	4.1
Jan. 1, 1945	241,147	38,113	15.8	10,914	4.5

U. S. Census of Agriculture.

^{1/} Cows and Heifers 2 years old and over kept mainly for milk.

Table LXVI is given to show relative importance of cows and heifers 2 years old and over which were kept primarily for milk. These figures reflect the judgment and conclusions of many farmers and census enumerators, and undoubtedly many of these cattle were destined for beef production. During the 45-year period Frederick County has had from about 12 to 15.8 percent of all milk cattle in the State. The percentage decrease in that county shown in 1945 reflects the growing importance of dairying in Garrett County as well as in other parts of Maryland, especially in northeastern counties.

TABLE LXVII

MILK PRODUCTION - IN GALLONS
IN MARYLAND AND FREDERICK AND GARRETT COUNTIES
(for selected years)

Year	Maryland			Frederick County			Garrett County		
	Cows Milked	Milk Produced	Per Cow	Cows Milked	Milk Produced	Per Cow	Cows Milked	Milk Produced	Per Cow
1919	166,443	58,754,193	353	22,207	10,126,394	456	5,922	2,291,954	387
1924	173,170	74,042,696	428	22,981	12,501,664	544	7,086	2,614,734	369
1929	166,651	87,785,709	527	24,460	14,727,891	602	6,904	3,419,340	495
1934	181,918	87,372,567	480	25,287	14,510,112	574	7,992	3,210,938	402
1939	175,079	98,533,692	563	26,753	17,145,614	640	6,782	3,443,168	508
1944	190,988	116,265,976	609	31,553	22,241,558	705	8,175	3,714,287	454

U. S. Bureau of the Census.

Table LXVII shows the trend of milk production in Maryland and in Frederick and Garrett Counties over a 25-year period. For most of the period average production per cow in Frederick County, which is usually highest in the State, has been considerably higher than the State average. During the same period average production per cow in Garrett County has been almost as consistently below the State average. The difference in productivity per cow in the two counties was even more marked. In fact,

during the quarter century cows milked in Garrett County were only about 75 percent as productive as those in Frederick County. The difference reflects the much greater efficiency of milk production in Frederick County, which in turn involves selection of better animals, greater production of forage and pasture crops, and a much higher expenditure for purchased feed. A comparison between Frederick and Garrett Counties in production and purchase of feed crops, which is given below, will explain in large part the much higher development of commercial dairy farming that has been possible in Frederick County as compared to Garrett County. Such factors as relative location in respect to large fluid milk markets like Washington and Baltimore are equally important. For example, Frederick, Maryland, is 43 and 47 miles from Washington and Baltimore respectively, while distances from Oakland, in Garrett County, to the two cities are 180 and 200 miles respectively. Pittsburgh, Pa., the nearest city of comparable size, is 106 miles from Oakland.

Table LXVIII indicates several significant factors and trends in comparing production and purchase of feed in Garrett and Frederick Counties. For example, production of corn for grain per head of cattle of all kinds has been from about three to over seven times as great in Frederick County. In contrast Garrett County has had a much greater relative dependence on oats as a feed crop. A further source of home-grown feed in Frederick County since 1929 has been the comparatively great production of barley, which is a minor crop in Garrett County. In recent years Garrett County has depended more on hay, although there has been some decrease in production per head of cattle in both counties. The relative production of silage and coarse forage crops in 1944 was three times as great per cow in Frederick County as in Garrett County,

TABLE LXVIII

FEED PRODUCED, AND EXPENDITURE FOR FEED, PER HEAD OF CATTLE
IN GARRETT AND FREDERICK COUNTIES
(for selected years)

Year	Hay		Corn for Grain		Silage & Forage		Oats		Barley		Pasture		Feed Purchased	
	Tons per Head		Bushels Per Head		Tons per Head		Bushels Per Head		Bushels Per Head		Acres Per Head		Dollars Per Head	
	Gar- rett	Fred- erick	Gar- rett	Fred- erick	Gar- rett	Fred- erick	Gar- rett	Fred- erick	Gar- rett	Fred- erick	Gar- rett	Fred- erick	Gar- rett	Fred- erick
1909	1.7	1.7	12.2	54.7	.4	1.4	15.4	1.9			5.0	1.8	4.97	6.23
1919	1.5	1.5	13.6	49.6	.7	2.3	28.9	1.6	.2	.5	6.5	1.8	5.24	25.07
1924	2.2	1.8	6.2	46.8	.6	1.0	23.0	3.4	.1	1.0	6.8	1.9	11.66	21.99
1929	1.8	1.5	10.1	37.3	.8	.9	18.8	1.9	.4	.9	6.1	1.8	10.11	23.27
1939	1.8	1.5	18.4	44.4	1.1	1.1	23.8	1.2	.2	9.2	7.9	2.0	14.01	19.71
1944	1.6	1.0	8.4	25.0	.9	2.7	17.0	1.1	.5	6.1	6.1	1.8	39.14	71.37

Data compiled from U. S. Bureau of the Census Reports.

although post-war figures, if available, would show a considerable increase for Garrett County, judging from personal observations and interviews with County farmers. Pasturage of all kinds, a large part of which is of rather inferior grade, has been much more extensively depended upon in Garrett County than in Frederick County. Another significant contrast is the much greater expenditure for feed, both relatively and actually, in Frederick County for most of the years shown, especially between 1939 and 1944.

Turning to the utilization of dairy products, several trends are indicated by the census reports. Probably the most significant indication of the stage of development and degree of commerciality of dairying in an area is the proportion of milk produced that is sold fresh or fluid, as well as the amount of cream that is sold as butter-fat compared to fresh cream sold for direct consumption.

The following table shows the amount of whole milk sold by dairy farmers and its percentage in relation to total production in the State

and in Garrett and Frederick Counties, for selected years.

TABLE LXIX

MILK SOLD WHOLE

IN MARYLAND AND FREDERICK AND GARRETT COUNTIES

(In gallons and percentage of total milk production)

Year	Maryland		Frederick County		Garrett County	
	Gallons	%	Gallons	%	Gallons	%
1899	20,654,446	32	2,268,780	26	197,152	9
1909	19,424,325	46	2,532,077	36	45,391	3
1919	29,842,910	51	6,125,582	60	134,327	6
1924	42,982,724	58	8,837,403	71	151,958	6
1929	65,080,112	74	11,942,458	81	572,883	17
1939	77,285,674	78	14,615,064	85	618,402	18
1944	98,212,637	84	20,405,262	91	2,360,999	64

Compiled from U. S. Bureau of the Census Reports.

The figures show that commercial dairying was developed much earlier in Maryland as a whole and in Frederick County than in Garrett County. For the State there has been a remarkably steady growth in the sale of whole fresh milk during the 45-year period shown. In Frederick County participation in the large metropolitan milk sheds of Washington and Baltimore after 1909 is indicated by the more rapid increase in proportion of milk sold whole; by 1944 over 90 percent was disposed of in this way. In contrast, less than 10 percent of Garrett County's milk was sold whole before 1929, and less than one-fifth even as late as 1939.

In the early days nearly every family in Oakland kept a cow, which was usually pastured in a field on the outskirts of the town, led to and from the home at milking time during the summer, and kept in a small stable near the house during the long winter months. As early as 1880, however, a few small dairy farms were being operated near the town, and milk was delivered from door to door by one-horse wagons, but even in

1909 many families in Oakland depended on buying milk from neighbors who kept cows, and the supply was often uncertain. In 1919 a farm dairy was established on the eastern edge of Oakland and has since developed into a modern plant. The barn has concrete floors, milking is done by machinery, milk is aerated, pasteurized, and refrigerated before delivery in steam-sterilized bottles to retail stores and consumers.

Since 1920 the Imperial Ice-Cream Company, which is now a subsidiary of the Fairmont Foods Company of Omaha, Nebraska, has collected and separated milk, shipping most of the cream to one of the Company's plants in Parkersburg, W. Va., about 150 miles west of Oakland, by truck and railroad.¹ In 1947-48 the Oakland branch of the Imperial Ice-Cream Company was extensively enlarged and modernized, and its utilization of Garrett County milk has expanded considerably during recent years. In 1949 the dairy farmers of Garrett County received over \$750,000 from sales of raw milk to this one plant alone.

In 1939 the Carnation Milk Company, with head offices in Los Angeles, Calif., made a survey of dairying in Garrett County. It found that there was an unusually good health record for dairy cows of the area and that natural conditions for dairy farming were favorable. A Carnation Company collecting plant was opened in Oakland in 1940. Milk is collected from over 500 farms in Garrett County as well as nearby Pennsylvania and West Virginia. This milk is trucked from farms by either the Company's or the farmers' vehicles which haul the steam-

1 Some of the cream is also sent to other of the Company's ice cream manufacturing plants in Huntington, W. Va., and Pittsburgh, Pa.



Figure 45

The Carnation Milk Company's collecting and pasteurizing plant at Oakland.



Figure 46

The Imperial Ice-Cream Company's plant at Oakland.

cleaned and sterilized cans from plant to farms. The milk is pasteurized at the Oakland plant and shipped in glass-lined trucks to the Carnation's evaporating and canning plant at Clarksburg, W. Va., about 70 miles west of Oakland. In 1946 the Oakland plant was processing about 600 gallons of milk a day, and during the year purchased between 200,000 and 225,000 gallons of milk from farmers in the area. Since that time it has expanded its consumption of Garrett County milk considerably.

In addition to these two large bulk receiving plants for fluid milk in Oakland, the Grantsville area of the County is served by the Grantsville Creamery, Inc. This plant is now a subsidiary of the I. N. Hagan Ice-Cream Company of Uniontown, Pa. In 1949 the plant was extensively remodeled and furnished with modern milk-processing equipment.

Table LXIX shows that increase in percentage of milk sold whole in Garrett County between 1939 and 1944 is extremely abrupt. From 18 percent in 1939 it had increased to 64 percent by 1944. Total production in 1939 was 3,443,168 gallons and in 1944 reached 3,714,287 gallons, and while only 618,402 gallons were sold whole in 1939, almost four times as much, or 2,360,999 gallons, were so disposed of in 1944. Part of this considerable increase was due to war-time demands and removal of restrictions which ordinarily keep Garrett County milk from entering the Washington-Baltimore market. However, a large part of the increase was caused by new outlets provided by the Carnation Company's plant at Oakland. Since that time the increased percentage of milk sold whole in Garrett County has been made possible by expansion of the processing plants in Oakland and Grantsville. Thus, although a large part of the County's milk is sold whole, only a portion is consumed in that form. Much of it is eventually evaporated, used for ice cream, cottage cheese,

milk beverages, and other products. This characteristic of the use of whole milk from Garrett County farms puts dairying in that area in the second-class type of dairy farming in contrast to such areas as Frederick County, where almost all milk is sold whole and consumed in that form in the nearby Washington and Baltimore consuming areas.

Garrett County's markets for whole milk are seriously restricted. Oakland, the County Seat, is the largest town in the County and has a population of only about 1,630 according to the 1950 census figures. Friendsville, Grantsville, Kitzmillersville, and a few of the mining villages along the Potomac are only small settlements of a few hundred people at most. Cumberland, Frostburg, and Westernport in Allegany County are the nearest and largest markets for fresh whole milk and cream.

In fact, Garrett County is, and will continue to be for years to come, a surplus milk-producing area, and the surplus will increase if and as milk production continues to increase. Authoritative estimates of milk production in Garrett County for 1949 and 1950 are around 4,000,000 gallons annually. In contrast annual milk consumption in Allegany County is estimated at 3,500,000 gallons, but only about 1,500,000 gallons are produced in that area. Much of this deficit is now being brought into Allegany County, principally to the Cumberland area, from Washington County, Md., Bedford County, Pa., and Mineral County, W. Va. Distances in miles from Cumberland to other towns within the market area are as follows:

Towns in Garrett County:

Oakland	58
Grantsville	20
Keyser's Ridge	29

Towns outside of Garrett County:

Bedford, Pa.	30
Hancock, Md.	39
Keyser, W. Va.	26

From these mileages it can be seen that the northern part of Garrett County is favorably located in relation to the Cumberland milk market as compared to centers in other participating areas. Oakland, the center of dairying in the southwestern part of Garrett County, is considerably farther away, but not too far to participate to a greater extent than it does in the Cumberland market. The biggest handicap in this respect is lack of an efficient system of collecting, distributing, and marketing. As has been indicated previously, there is also lack of adequate milk-processing plants in Garrett County, a result of the fact that much of the product is only partially processed at Oakland or Grantsville and must be shipped to either West Virginia or Pennsylvania for final processing. This means that much of the value of products originating in Garrett County is received elsewhere. It should be stated, however, that presence of branches of large food corporations in Garrett County has created a source of cash income that farmers there did not enjoy previously. The definite and rapid trend toward large-scale handling of dairy and other food products in recent years has, nevertheless, had an accompanying tendency more and more to limit the outlets of small producers. This trend has also led to standardization of dairy products with a demand being developed for quality products instead of quantity. This also restricts the small producer in direct development of his own outlets.

Several other trends in production of dairy products in Maryland, Frederick, and Garrett Counties can be indicated by the comparative importance of butter made on farms and proportion of the product that has been sold during the period 1899 to 1944. Unfortunately schedules for different census years were not uniform, and thus returns are not

comparable for all years, but the long-time trend can be shown and relative conditions for individual years are the same for comparisons between Maryland and the counties under consideration.

TABLE LXX

BUTTER MADE ON FARMS AND BUTTER SOLD
IN MARYLAND AND FREDERICK AND GARRETT COUNTIES

Year	Maryland			Frederick County			Garrett County		
	Butter Made	Butter Sold		Butter Made	Butter Sold		Butter Made	Butter Sold	
	Lbs.	Lbs.	%	Lbs.	Lbs.	%	Lbs.	Lbs.	%
1899	9,096,662	5,828,684	64	1,493,740	1,146,740	77	420,883	256,237	61
1909	8,739,620	5,682,228	65	1,354,173	1,070,611	79	573,715	350,707	61
1919	6,162,501	3,925,042	64	726,654	569,302	78	565,938	372,525	66
1924	5,255,281	3,300,000*	63	557,594			562,002		
1929	3,625,704	2,173,009	60	320,004	256,515	80	421,346	238,624	57
1934	3,033,061	1,650,000*	54	283,319			363,363		
1939	2,166,325	1,083,206	50	171,312	132,624	77	365,209	194,802	53
1944	1,500,000†	541,145			83,803			35,196	

Compiled from U. S. Bureau of the Census Reports.

* Bulletin No. X3, Maryland Farm Statistics, University of Maryland, 1944.

† Estimate based on Bulletin No. X3 (preliminary report).

The above table shows that production of farm-made butter in Maryland declined rather steadily from over 9 million to a little more than 2 million pounds in 1939. Total production of farm butter in 1943 for all of Maryland had further declined to 1,500,000 pounds. The amount of butter made on farms in Frederick County declined very rapidly between 1909 and 1919, reflecting the shift to sale of whole milk to the Washington-Baltimore market. Since 1919 the decline in farm-made butter was relatively more rapid in that County than in the State as a whole. In contrast, in Garrett County farm-made butter has always been relatively much more important as a dairy product, when differences in

milk production are considered. After 1924 production of home-made butter in Garrett County began to exceed that of Frederick County, the leading dairy county of Maryland; so that by 1939 it was more than double. Since that time production of farm-made butter has generally declined in all parts of the State, attending the greater increase in proportion of milk sold whole either for direct consumption or for further processing.

The relatively greater importance of farm-made butter in Garrett County reflects the much slower development of commercial dairying in that area, and the prevalence of general or diversified farms there. As previously discussed, Garrett County remained in the third, or "outer", ring as far as type of dairy farms is concerned until a much later date than did Frederick County. In fact, Frederick County may be said to have evolved or shifted to an "inner" ring type by 1919, while Garrett County did not reflect this change until after 1939.

In regard to percentage of farm-butter sold, Frederick County has always sold considerably more than 75 percent of its total production. Figures for the State as a whole declined from about 65 percent in 1909 to 50 percent or less after 1939. Garrett County farm households used a much larger proportion of their home-made butter during the period shown than did Frederick County farms. This again reflects the greater importance of self-sufficing farming as well as limited markets for farm products in an "outer" ring dairying area compared to more favorable locations as related to large metropolitan markets such as have been enjoyed by Frederick County dairy farmers.

The general decrease in production of farm-made butter has been influenced by a variety of factors. During the war years there were

restrictions under O.P.A. regulations, and a reluctance on the part of farmers to report production and sales of butter. There has been a long-time trend downward in production of farm-made butter. Before creameries and butter factories were widely developed, farm butter was made extensively. During the past few decades, however, amounts of farm butter have generally decreased rapidly while the commercial product has increased greatly. The general practice today is for dairy farmers to sell milk and cream or butter-fat and buy creamery butter. This situation is somewhat unfortunate in one respect at least, for it almost invariably means that the farm family consumes less butter and cheese. The change is another reflection of the shift to large-scale preparation of food products. It is true that small retailers hesitate to buy farm butter because of lack of grading, variations in quality, color, odor, and general appeal to customers. At the same time the standardized product, sold under widely advertised brand names, has also changed the demand of consumers. Then, too, recent changes in federal and local regulations on distribution of sale of butter substitutes have further complicated the situation.

Other ways in which dairy products are utilized are as fresh cream or as butter-fat. The eventual use of either fresh cream or butter-fat may be the same, as, for example, in the making of creamery butter, some types of cheese, and powdered products. However, as a general rule most butter-fat that is sold is used for making creamery butter, while much of the fresh cream sold is used either for direct consumption or for manufacture of ice cream. Although sweet cream is by far the chief source of fat in ice cream, when it is not available in sufficient quantities, unsalted butter may be used for this purpose.

The following table shows to some extent the trend in sales of fresh cream and butter-fat in Maryland and in Frederick and Garrett Counties for selected years. It should be noted that figures for fresh cream are given in gallons, while those for butter-fat are in pounds. No attempt has been made to convert either set of figures so as to conform with the other since percentage of butter-fat per gallon of cream varies considerably from county to county and even between individual farm herds and animals. However, for general purposes, and as a basis for averaging, there are between 2 and 2-1/2 pounds of butter-fat per gallon of cream.

TABLE LXXI

CREAM AND BUTTER-FAT SOLD
IN MARYLAND AND FREDERICK AND GARRETT COUNTIES
(for selected years)

Year	Maryland		Frederick County		Garrett County	
	Cream Sold	Butter-fat Sold	Cream Sold	Butter-fat Sold	Cream Sold	Butter-fat Sold
	Gals.	Lbs.	Gals.	Lbs.	Gals.	Lbs.
1899	135,169		51,610		1,091	
1909	455,496	343,148	182,718	155,741	2,924	
1919	311,436	448,266	85,547	73,266	2,038	3,550
1924	245,581	1,891,383	93,550	273,686	5,194	133,265
1929	192,004	811,812	98,888	177,812	7,514	328,245
1934		680,000				
1939		1,070,515		202,561		271,202
1944		980,662		181,022		114,811

Compiled from U. S. Bureau of the Census Reports.

Unfortunately schedules for various census years were not uniform so that strict comparisons are not possible. From 1900 to 1930 schedules called for the amount of fresh cream sold as well as for separate figures on the amount of butter-fat sold. From 1909 until 1929 there was a comparatively rapid decline in the amount of fresh cream sold in

Maryland as a whole. Formerly much of the whole milk was separated into skim milk and cream on the farm, and the less bulky and proportionately more valuable cream sold to creameries, while skim milk was used for livestock and poultry feed. From 1909 onward the amount of butter-fat sold increased both relatively and actually, although the peak for the State as a whole was reached between 1924 and 1929. Except, however, for the decline shown in 1934, largely a result of economic conditions, the sale of butter-fat continued to show an upward trend.

It is interesting to note that in 1929, the last year that both butter-fat and cream were reported in the census, Garrett County supplied about 40.4 percent of the butter-fat sold in the State, and Frederick County only about 21.4 percent. In contrast, during the same period, Frederick County furnished 51.3 percent of the fresh cream sold by Maryland farms, while Garrett County's share of the total was only 3.9 percent. This is, apparently, a good example of the comparative advantage that Frederick County enjoyed in relation to metropolitan markets over Garrett County. It is also an indication of the much larger scale of dairy operations in the former county. While fresh cream must be produced in large quantities, handled carefully, and marketed promptly, butter-fat can be collected over a period of several days until a marketable quantity is accumulated. Furthermore, it can be marketed after it has started to turn sour, and, because of the adaptability of modern butter-making, butter-fat of low quality or other varying characteristics can be utilized to produce a fairly standardized product. Low quality cream demands additional operations in the process of butter making that are not necessary with high quality cream,

and because of different feeds and climatic conditions, the operations required at one season of the year vary from those used at other seasons.

As the proportion of milk sold whole reached a figure of over 90 percent in Frederick County and over 60 percent in Garrett County in recent years, the proportion of milk that is separated at the farm has decreased. In 1939, Garrett County farmers sold about 270,000 pounds of butter-fat compared to about 200,000 pounds in Frederick County. By 1944 the amount sold in Frederick County had decreased to around 180,000 pounds, but in Garrett County there had been a decrease to a little over 100,000 pounds of butter-fat sold. When compared to the striking increase of from only 18 percent of the total milk being sold in 1939 to 64 percent in 1944, the accompanying drastic decrease in both farm butter and butter-fat sold by Garrett County farmers is particularly significant. It helps to visualize the rapid change that took place in five years due to expansion of Garrett County's market for fluid milk.

It might be well to remember that this expansion cannot be thought of as a normal "outlet" for fluid milk, most of which is destined for consumption in that form, but rather as a funnel attached to a pipeline which syphons off the milk for processing outside the County. In other words, the present volume of milk production and any increase that may come in the future, depends on continued purchase of milk to be processed, evaporated, canned, made into butter, cheese, powdered products, and ice cream for consumption well beyond the limits of Garrett County. This situation in regard to dairying and production of dairy products in Garrett County is basic in understanding its position as an area of surplus production with rather limited and prescribed facilities for marketing most of the products based on its natural resources.

Beef production. Cattle raising, which requires a large proportion of pasture and feed crops, has been an important characteristic of agricultural use of land in Garrett County from the earliest days of its settlement. As has been stated previously, much of Garrett County's land is either rough or in considerable slope so that intensive cultivation of crops is restricted to about one-seventh of the total land area, or about 60,000 of its 427,000 acres. Much of the rest of the land is either in permanent pasture, brush, or woodland.

For many years a large part of this other land has been used, often inefficiently and unwisely, as pasture for both cattle and sheep. During recent years, however, some adjustments have been made to improve both pasture and woodland in Garrett County. Woodland improvement has included, primarily, curtailment of its use for pasturage, while improvement in pasture land has been brought about by selection of grasses and legumes better adapted to the area, and by greater use of commercial fertilizer and lime. Some land has been retired from use as permanent pasture and devoted to the growing of tree crops under both public and private ownership. In other cases considerable acreages of woodland and brushy pasture land have been cleared and improved for pasture, and even for cropland.

On farms where a variety of crops can be grown, such as is characteristic of farms in Garrett County, beef cattle may be fitted into the farming program to distinct advantage. In fact, beef cattle merit particular consideration in any system of farming that produces a large quantity of coarse and relatively low-grade roughage which has a low market value.

Beef cattle consume large quantities of coarse hay, fodder, and other low-grade and non-salable feeds into beef. Perhaps no other

class of farm animal, with the exception of hogs, is capable of utilizing so much of what otherwise might be wasted on the farm.

The utilization of labor of both men and horses on the farm during slack seasons is an important problem. During the cultivation and harvesting seasons all available labor is usually required in the field, but in winter finding use for such labor is often a problem. Beef cattle, together with dairy cattle and other livestock and poultry, make possible a more uniform distribution of farm labor. This is especially true of beef cattle, since they do not require much attention during summer months, when demands for farm labor are at a peak.

In 1940 and 1945 about 113,000 and 116,000 acres respectively were classified as pasture land; this represents almost 27 percent of the total land area of the County. During the same period most of the crop land was devoted to such feed crops as hay, silage and coarse fodder, oats, and corn for grain. On a well managed farm beef cattle can utilize practically the total production of feed grains and roughages. In such a program of farm management improvement and maintenance of soil fertility is considerably simplified and facilitated by return of animal manure to both pasture and crop land. With about 27 percent of the land in Garrett County in grass at present there is still the possibility that a sizeable amount of less productive land that is now cultivated or classed as plowed land could also be retired more or less permanently for grass land. Beef cattle are well suited to the utilization of rocky, hilly, and wet grass lands which are found on many farms. It is a rather generally accepted fact that beef cattle usually require less labor than other classes of livestock, and this is a distinct advantage to the farmer. It is also true that the investment required in

buildings and other equipment for beef cattle is considerably less than for dairy cattle, for instance. This is also an important advantage in raising beef cattle. The risk of losses from death is also generally less for beef cattle than for most other classes of farm animals, because they are subject to fewer fatal ailments and diseases. It is generally true, too, that beef cattle are easier to feed than most other kinds of livestock. This is advantageous to the beginner, as well as where close supervision of inexperienced labor is difficult. In the winter time, for example, it is a common practice to feed beef cattle twice daily, but some farmers feed only once daily.

There are primarily five different phases or types of beef production: breeding and raising calves, growing stockers, feeding or fattening for the slaughter market, baby beef production, and breeding pure-bred cattle.

The practice of breeding and raising calves and selling them in the fall to feeders in other areas, particularly in Pennsylvania and Virginia, has considerable possibilities in Garrett County. Its big advantage is that the calves can be raised on home-grown feed during summer, thus permitting an annual turnover with a minimum of grain feeding through the long winter which might involve purchase of expensive feeds.

Growing of stockers could also be expanded in Garrett County. Stocker cattle are of two basic kinds: heifers for use in the breeding herd, and steers and heifers for the feeder cattle market. The principal condition that favors this phase of beef production is an abundance of cheap feed, either in the form of harvested roughage or of cheap and abundant pasture. Stockers are usually marketed as yearlings and two-year-olds.

Fattening of beef cattle for the slaughter market has not been a very important part of livestock production in Garrett County. With improved pastures and an abundance of good pasture grass it is possible to put yearlings or two-year-olds on the grass in spring and allow them to fatten. Steers finished in this way are sold in late summer as grass-fed animals. On farms where sufficient feed crops can be produced yearlings and two-year-olds can be fed rather heavily during the winter, thus putting enough "finish" on relatively mature cattle to make them acceptable for the slaughter market. Farmers with ample supplies of grain such as oats, corn, or by-products like wheat bran and middlings can also fatten the calves they have raised or even buy feeders and fatten them for the market. Variations in the practice followed depend largely on individual conditions on farms as to available feed. Such a plan provides an outlet for utilization of labor during winter months, converts farm produced grain into beef, and permits the farmer to retain on the farm much of the plant food elements in the feed. Thus, the farmer is materially aided in his efforts to maintain soil fertility.

Production of baby beef has been on the increase throughout the United States for many years. This is due, in part, to the fact that consumer demand for small cuts of beef has been steadily and constantly increasing. A baby beef is a fat beef animal which is usually from 10 to 15 months old and weighs between 700 and 900 pounds. To produce the highest quality baby beef requires intensive use of palatable and highly nutritious feeds, hence baby beef production requires an ample supply of grain. For the most part farmers who follow the practice of feeding baby beef raise and feed their own calves. The general practice is to

start the calves on feed as soon as they will eat. A trough or self-feeder called a "creep" is placed in a pasture near the barn or watering place, enclosed in a pen with an opening which permits calves to enter, but which is too small to admit cows. The self-feeder trough is usually supplied with crushed or cracked grain and calves are free to eat as often and as much as they choose. This method makes maximum use of feed while calves are young and results in maximum growth of the calves. The calves may be sold in the fall or they may be fed until the following spring. Time of marketing is determined by the farmer and depends on such factors as the price of beef cattle, the feed supply, available labor, etc. This type of beef production might be expanded in Garrett County, since it fits well with diversified crop production and the market in general will doubtless continue to favor small but well-finished animals. However, this type of beef production is so intensive that high quality calves are essential to get maximum profits from such a system of feeding. Well-bred and carefully selected cows and bulls are necessary to produce the short, thick, compact, smooth, and deep-fleshed calves which are best suited to this purpose. Among the best breeds for such purposes are Aberdeen Angus, Hereford or White-Face, and Shorthorn.

The following tables are presented to show, as far as possible with the figures available, something of the relative importance of beef cattle in Maryland, and Frederick and Garrett Counties for selected years. As previously stated, differences in census schedules and in their interpretation makes comparisons from year to year difficult, but the relative trend in the State of Maryland and in the two counties can generally be shown since figures for individual years are based on more

or less identical conditions, inasmuch as economic conditions would not vary to any extent within the State, and the censuses were obtained in all parts of the State at the same time.

TABLE LXXII

KINDS OF CATTLE ON FARMS - JUNE 1, 1900
IN MARYLAND AND FREDERICK AND GARRETT COUNTIES

Kind of Cattle	Maryland		Frederick County		Garrett County	
Calves under 1 year	55,465	19.0	6,672	19.0	4,517	24.3
(Steers 1 year & over)	(41,450	14.2	4,506	12.9	5,124	27.5)
("Other cows")	(9,490	3.2	570	1.6	1,097	5.9)
Steers and other cows	50,940	17.4	5,076	14.5	6,221	33.4
Bulls 1 year & over	10,027	3.4	1,897	5.4	329	1.8
Heifers 1-2 years old	28,930	9.9	3,228	11.2	1,559	8.4
Dairy cows 2 Yrs. & over	147,284	50.3	17,473	50.0	5,994	32.2
Total Cattle	292,646	100.0	35,046	100.0	18,620	100.0

Compiled from U. S. Census of Agriculture Reports.

The chief characteristic of cattle production in Garrett County in 1900, compared to Frederick County and the State as a whole, was the much greater proportion of steers and "other" cows which together made up one-third of all kinds of cattle in the County. In addition, a considerably high percentage of calves were being raised in Garrett County compared to the State as a whole and Frederick County. In contrast 50 percent of all cattle in Maryland and in Frederick County were classified as dairy cows, while only about one-third were so classified in Garrett County. This difference clearly indicates both the much greater importance of beef production and the relative under-development of the dairy industry at that time, on the rolling pasture land of Garrett County.

The following table shows comparable conditions in cattle production for 1910 in Maryland and in Frederick and Garrett Counties.

TABLE LXXII

CLASSES OF CATTLE ON FARMS - APRIL 15, 1910
IN MARYLAND AND FREDERICK AND GARRETT COUNTIES

Classes of Cattle	Maryland		Frederick County		Garrett County	
Calves	39,064	13.6	4,436	13.0	2,951	18.3
(Steers and Bulls)	(35,786	12.4	4,085	11.9	2,539	15.7)
("Other" cows)	(18,816	6.5	1,897	5.5	1,332	8.3)
Steers, bulls & "Other" cows	54,602	18.9	5,982	17.4	3,871	24.0
Yearling heifers	27,226	9.5	3,303	9.7	2,330	14.4
Dairy cows	166,859	58.0	20,464	59.9	6,986	43.3
All Cattle	287,751	100.0	34,185	100.0	16,138	100.0

Compiled from U. S. Census of Agriculture Reports.

Unfortunately in the schedule of the 1910 census bulls and steers were grouped together; however, since bulls are destined for beef production and usually make up but a small proportion of the cattle population, no serious disparity in figures was caused. The most significant contrast shown in the categories given for that year was the higher proportion of beef type cattle, including steers, bulls, and "other" cows in Garrett County where they made up almost a quarter of all cattle; and also the considerably higher percentage of calves being raised in that County compared to Maryland as a whole and to Frederick County. In contrast, although the proportion of dairy cattle had generally increased there was still a considerable lag in Garrett County.

The differences in proportion of different classes of cattle in 1910 compared to 1900 were due in part to differences in time of year of enumeration, June 1, 1900 and April 15, 1910. Other factors are involved in causing such differences. Most classes of livestock tend to change in numbers between years and periods of years through rather definite cycles, which often reflect price relationships and other economic conditions. Since censuses are taken arbitrarily every five or ten years

they occur at different points of a cycle and thus interfere with the determination of long-time trends. However, on the basis of comparable figures, conditions for individual years reflect relative trends and the magnitude of cattle production.

TABLE LXXIV
TYPES OF CATTLE ON FARMS - JANUARY 1, 1920
IN MARYLAND AND FREDERICK AND GARRETT COUNTIES

Types of Cattle	Maryland		Frederick County		Garrett County	
Beef Cattle	53,666	18.9	4,276	12.1	7,013	50.5
Calves	6,177	2.2	332	.9	1,932	13.9
Heifers	3,308	1.2	169	.5	934	6.7
Cows	10,396	3.7	216	.6	2,475	17.8
Steers	31,686	11.2	3,293	9.3	1,521	11.0
Bulls	2,099	.7	266	.7	151	1.1
Dairy Cattle	229,711	81.1	31,157	87.9	6,874	49.5
Calves	31,345	11.1	3,830	10.8	1,358	10.0
Heifers	26,565	9.4	3,818	10.8	785	5.6
Cows	161,972	57.2	21,710	61.3	4,612	33.2
Bulls	9,829	3.5	1,799	5.1	119	.9
Total Cattle	283,377	100.0	35,433	100.0	13,887	100.0

Compiled from U. S. Census of Agriculture Reports.

The census taken on January 1, 1920 is unique in that cattle were classified by sex, age, and as beef and dairy cattle. The contrast between beef cattle production in Garrett County, in the State as a whole, and in Frederick County at that time was particularly well demonstrated by this classification. In Garrett County the cattle were almost equally divided between the two main groups; while in the State as a whole dairy cattle made up over 80 percent, and almost 88 percent in Frederick County. The rapid growth of commercial dairying in Frederick County around this time has already been discussed. The disproportion of beef calves and beef cows in Garrett County is also significant in this connection.

TABLE LXXV

CLASSES OF CATTLE ON FARMS - JANUARY 1, 1925
 IN MARYLAND AND FREDERICK AND GARRETT COUNTIES
 (In number and percent of total)

Classes of Cattle	Maryland		Frederick County		Garrett County	
Calves	25,763	9.5	3,175	8.8	3,024	20.3
(Beef heifers)	(3,895	1.4	397	1.1	1,068	7.2)
(Beef cows)	(19,160	7.0	2,741	7.6	2,343	15.8)
(Steers)	(16,767	6.2	1,796	5.0	1,819	12.2)
Beef Cattle & Steers	39,822	14.6	4,934	13.7	5,230	35.2
Bulls	10,551	3.9	1,758	4.9	302	2.0
Milk heifers	23,792	8.7	2,820	7.9	969	6.5
Milk cows	172,581	63.3	23,293	64.7	5,351	36.0
Total Cattle	272,509	100.0	35,980	100.0	14,876	100.0

Compiled from U. S. Census of Agriculture Reports.

Although distinction between beef calves and dairy calves was not made in 1925, the much higher proportion of calves in Garrett County when considered in relation to the greater relative proportion of beef heifers, cows, and steers in that County is especially noteworthy. If only half the calves in Garrett County in that year were considered as destined for beef, the proportion of beef animals to all cattle would have approached the figures for 1920. The comparative figures for dairy cows in the State and in Frederick County again show the much greater importance relatively of dairying as contrasted to Garrett County.

Changes in the schedule for the 1930 census make it impossible to separate both calves and yearling heifers as to their main use. The figures for beef cows and steers, however, will serve to indicate the continued importance in Garrett County of beef production. A further indication of this trend is shown by the much greater importance of milk cows in all of Maryland and in Frederick County.

TABLE LXXVI

CLASSES OF CATTLE ON FARMS - APRIL 1, 1930
IN MARYLAND AND FREDERICK AND GARRETT COUNTIES
(In number and percent of total)

Classes of Cattle	Maryland		Frederick County		Garrett County	
Calves	48,732	15.3	7,388	16.6	3,339	18.6
Heifers (yearlings)	41,883	13.1	5,567	12.5	2,574	14.4
(Beef Cows)	(7,118	2.2	574	1.3	1,054	5.9)
(Steers)	(21,602	6.8	2,618	5.9	2,805	15.7)
Beef cows & Steers	28,720	9.0	3,192	7.2	3,859	21.6
Bulls over 1 year	9,028	2.8	1,478	3.3	265	1.5
Milk heifers	25,982	8.2	3,574	8.0	1,286	7.2
Milk cows	164,434	51.6	23,366	52.4	6,580	36.7
Total Cattle	318,779	100.0	44,565	100.0	17,903	100.0

Compiled from U. S. Census of Agriculture Reports.

TABLE LXXVII

CLASSES, SALE, AND FARM BUTCHERED CATTLE
ON FARMS - APRIL 1, 1940
IN MARYLAND AND FREDERICK AND GARRETT COUNTIES
(In number and percent of Total)

Classes of Cattle	Maryland		Frederick County		Garrett County	
Cattle under 2 Yrs. old	105,523	35.3	17,006	38.0	5,453	30.2
Cattle over 2 Yrs. old	192,916	64.7	27,724	62.0	8,831	61.8
(Beef Cows)	(8,213	2.8	556	1.2	1,258	8.8)
(Milk Cows)	(184,703	61.9	27,168	60.7	7,573	53.0)
Cows and Calves						
Sold in 1939	(128,803	43.2	20,690	46.2	5,299	37.0)
Cows and Calves						
Butchered in 1939	(4,190	1.4	553	1.2	742	5.2)
All Cattle	298,439	100.0	44,730	100.0	14,284	100.0

Compiled from U. S. Census of Agriculture Reports.

The schedule of the 1940 census did not call for the number of steers or other beef cattle except the relatively small number of beef cows shown in Table LXXVII above. However, this category shows that in proportion to

numbers there were over three times as many beef cows in Garrett County as in all of the State and over seven times as many as in Frederick County. On this basis it seems reasonable to imply a considerable number of other cattle in Garrett County were raised primarily for beef production. It can also be seen from the above figures that the proportion of milk cows had increased considerably in Garrett County as compared to the percentages for Maryland and for Frederick County between 1920 and 1940. The number of cattle and calves sold alive apply to the year 1939 and undoubtedly reflect a considerable amount of duplication, since many sales were between farmers, and the same animal could have been sold several times during the year.

The inclusion of percentages of cattle and calves sold alive in 1939 compared to the total number of cattle in 1940 is given primarily to show something of the scope and magnitude of such commerce. It is not possible to give the total number of cattle in individual counties in 1939, but the comparison between the two sets of figures does show that buying and selling of cattle in Maryland involves a high proportion of all cattle. The number sold included both beef and dairy cattle, but their ultimate destination and the number of transactions reflected can not possibly be determined.

The number of cows and calves butchered on farms included those for use on the particular farm as well as those for sale as dressed meat from that farm. The percentages given in Table LXXVII for cattle and calves slaughtered on farms in 1939 are in relation to the total number of cattle on farms in 1940. They are given in an attempt to show that farm slaughtering has not been a relatively important part of processing beef in recent years. In 1939, however, about 13 percent of all cattle and

calves slaughtered on farms in Maryland were so processed in Frederick County, while Garrett County farms accounted for about 18 percent.

TABLE LXXVIII
CLASSES, SALE, AND FARM BUTCHERED CATTLE
ON FARMS - JANUARY 1, 1945
IN MARYLAND AND FREDERICK AND GARRETT COUNTIES
(In number and percent of total)

Classes of Cattle	Maryland		Frederick County		Garrett County	
Cattle under 2 Yrs. old	149,158	38.2	17,561	31.5	8,132	42.7
Cattle over 2 Yrs. old	241,147	61.8	38,113	68.5	10,914	57.3
(Beef cows)	(50,159	12.9	6,560	11.9	2,739	14.4)
(Milk cows)	(190,988	48.9	31,553	56.6	8,175	42.9)
Cows and calves						
Sold in 1944	(170,259	43.6	25,883	46.5	7,402	38.8)
Cows and calves						
Butchered in 1944	(6,130	1.6	959	1.7	570	3.0)
All Cattle	390,305	100.0	55,674	100.0	19,046	100.0

Compiled from U. S. Census of Agriculture Reports.

The classification of cattle in 1945 is quite comparable to that for 1940. Due to several factors, primarily increased demand for meat and dairy products during the war years, the total number of cattle showed a considerable increase. The greatest relative increase was in beef cattle, although in actual numbers they were much less important. However, this increase in beef production was much greater for the State and for Frederick County than for Garrett County. Undoubtedly, the increase was due to abnormal conditions, and furnishes an example of results of interference with cyclical trends. The relatively greater importance of beef cattle production in Garrett County which has been presented by this series of tables beginning with 1900 is still clearly shown. It is also significant in comparing the figures on proportion of milk cows to note that while there was over a 10 percent

decrease in the percentage of milk cows, as related to total cattle in Maryland as a whole and in Garrett County, the decrease in Frederick County was only about 4 percent.

A comparison of the proportion of cattle and calves sold alive in 1944, as related to the total number of cattle on farms on January 1, 1945, shows a remarkable similarity to comparable figures for 1939 and April 1, 1940. Frederick County accounted for about 15.2 percent of all cattle and calves sold in the State in 1939, while Garrett County's share amounted to only 4.3 percent. Since these sales involved both dairy cattle and beef cattle, many of them undoubtedly were sold to dairy farmers for milk production, and it is not unusual that the high-milk production records of Frederick County dairy cows would create a demand for young stock from that area. It should be remembered that these sales undoubtedly reflect some duplication, since the same animal may have been sold several times.

The figures for cows and calves slaughtered on farms in 1944 do not show any increase in relative importance to all cattle on farms in 1945. However, conditions were reversed to some extent compared to 1939. Of the cattle slaughtered on farms in 1944, Frederick County furnished 15.6 percent, and Garrett County about 9.2 percent.

In common with most of Garrett County's agricultural products, the local market for beef is limited and somewhat restricted. The most important consuming center for dressed beef within the market area is the city of Cumberland. A chronic problem the Garrett County farmer faces is fluctuating demand, which results from frequent periods of unemployment in coal mining and industrial centers within or near the County. Garrett County itself is a surplus-beef-producing area. Most of the

beef cattle must be sold alive since the County has little or nothing in the way of adequate processing plants. Although there are a few small butcher shops in the County, most livestock goes to slaughter houses in Pennsylvania.

Livestock is sold primarily through auction market at which both local and outside buyers bid. With development of roads and use of trucks, livestock moves to market with greater ease and flexibility. The only large auction business in Garrett County is located just south of Accident on Route 219. Sales are held there once or twice weekly, depending on seasonal conditions. Another large livestock auction house which serves Garrett County is located at Triple Lakes in Allegany County.

If raising of beef cattle is to be sustained or expanded on a profitable basis in Garrett County, several problems must be recognized. First of all, the local market for beef has been mostly for quantity rather than quality products. Much of the so-called grass-fattened beef cannot compete with the heavier and choicer meats from the Corn Belt, or even with those from such areas as Frederick County, Maryland, the Shenandoah Valley of Virginia, or Lancaster County, Pennsylvania. With a very limited local demand for high-grade beef there is little tangible encouragement for Garrett County cattle farmers to improve their product.

There is also need for a much more extensive pasture improvement program, and for greater production of home-grown feed. Considerable progress has been made in selecting better stock and in herd improvement, but until it can be demonstrated to more farmers that such efforts are worthwhile and have a dollar-and-cents basis the general improvement of livestock will be slow.

As in so many other of its products, the raising of beef cattle has many natural advantages, including much land well adapted by relief and

climatic conditions to supplying pasture, hay and feed crops. However, as long as the present inadequate local markets and facilities for extending the market area remain under-developed, Garrett County will be a supplier of surplus raw material. Most of the beef cattle will be sold on the hoof and sent outside the area to be further finished or fattened and processed by outside concerns. And the difference between the price that Garrett County beef cattle farmers receive for the animals and the price paid by the consumer in other retail market areas will not benefit Garrett County.

Horses. The number of horses on Garrett County farms has declined rather steadily in the last 30 or 40 years as part of the general trend. They are, nevertheless, important, and even indispensable on many of the hilly farms. The majority of the horses in the County are of the large draft type, Percheron and Belgian being the most common breeds. While total number of farm horses in Maryland in 1944 was only 44.5 percent of the number in 1900; and was only half as numerous in Frederick County; Garrett County farms still had about 62 percent.

TABLE LXXIX

HORSES ON FARMS
IN MARYLAND AND GARRETT AND FREDERICK COUNTIES

Date	Maryland	Garrett County	Frederick County
June 1, 1900	148,994	4,373	15,849
Apr. 15, 1910	155,438	4,753	17,130
Jan. 1, 1920	141,341	4,664	16,514
Jan. 1, 1925	116,711	3,942	14,830
Apr. 1, 1930	94,099	3,369	11,921
Jan. 1, 1935	79,933	3,127	10,762
Apr. 1, 1940	79,539	3,094	11,344
Jan. 1, 1945	66,322	2,705	7,934

Compiled from U. S. Bureau of the Census Reports.

Increasing use of tractors, motor trucks, and automobiles, has, however, made it possible to conduct farming activities with fewer horses. This is particularly true on farms with large amounts of relatively level land where automotive power can be used. With the general improvement of roads and hard-surfacing of highways, motor vehicles have become much more efficient for hauling produce to more distant market centers and returning with farm and household supplies.

The number of tractors on Maryland farms increased from 7,208 in 1930 to 18,789 in 1945; in Frederick County from 523 to 1,550; and in Garrett County from 227 to 549. During the same period, motor trucks on farms in Maryland increased from 11,284 to 19,197; in Frederick County from 628 to 1,512; and in Garrett County from 352 to 645. Increases in automobiles on farms in Maryland for the period were relatively less, from 37,972 to 41,485; while in Frederick County there was a decrease of from 3,489 to 3,355; and in Garrett County an increase from 1,294 to 1,414. Light pickup trucks are becoming increasingly popular, as they can be used for business during the week and for the Saturday night pleasure trip into town.

As horses are replaced for draft purposes, purchased motor fuel replaces feed formerly raised for horses, with the result that increasing amounts of feed are becoming available for other farm animals. This change has resulted in relative decreases in production of oats and expansion in production of types of feed crops and pasturage better suited to cattle, a shift which favors the expanding dairy industry. Preliminary figures show a further decline in the number of horses in Garrett County of from 2,705 in 1945 to only 1,905 in 1950. During the same

period, cattle of all types increased from 19,046 to 20,904; pigs from 5,371 to 6,673; and sheep from 6,097 to 6,269.

Sheep and lambs. Although the raising of sheep and lambs is of minor importance in Maryland compared to the number of cattle, hogs, and poultry, it is relatively significant in the central Eastern Shore counties and in Western Maryland. In 1945 there were about 48,000 sheep and lambs in the State; of these, Talbot County had about 8,600 or 17.8 percent; Garrett County about 6,100 or 12.6 percent; Queen Anne's County 9.6 percent; and Washington County 8.5 percent. Together, the four counties had almost half of all the sheep and lambs on farms in Maryland.

In Garrett County a large amount of rough and steeply sloping land provides suitable pasture and grazing land for livestock, including sheep, which graze on a variety of weeds and underbrush unsuitable for cattle or horses. Because sheep help to keep fields and fence corners cleared, and can utilize rougher forage than most livestock, it is feasible to keep them on land that otherwise would not be used for pasture. In the more level parts of the County where greater portions of the land are cultivated, cattle and hogs are more profitable and sheep become relatively unimportant. In Swanton (District 1), for instance, which extends from the North Branch of the Potomac up over the crest of Backbone Mountain to Deep Creek Lake, there is much rough and steeply sloping land, and about 1,000 to 1,200 sheep and lambs are raised there each year. The eastern part of Ryan's Glade (District 8), and most of Kitzmiller (District 13), include large areas of similar land,

and together account for about 2,500 sheep and lambs annually. In East Oakland (District 7), where a large part of the land is in cultivated crops, dairying is much more important and only about 150 sheep and lambs are raised on the few farms that maintain flocks.

In Talbot County, physical conditions under which sheep and lambs are raised are quite different than those of Garrett County. Much of the land is level and slopes are gentle. The highest elevations in the eastern part are only about 75 feet above sea level, while the western half lies less than 20 feet above the waters of the Chesapeake Bay. Large areas of the soil are heavy-textured silt loams. With 40 or more inches of precipitation well distributed throughout the year, and a frost-free period of around 200 days, such areas provide very suitable pasture land for livestock, and especially for sheep. For many years, general farming, or production of livestock and of grain as a cash crop, was characteristic of Talbot County as it has been of Garrett County, and sheep have had a traditional place in the agriculture of both counties. Dairying has become more important in recent years, although the trend started earlier in Talbot County due to its more favorable location in relation to large markets such as Baltimore, Wilmington, and Philadelphia.

At first the sheep were raised primarily for their wool, and for many years Merina was the favorite breed. Since the introduction of dual-purpose breeds, which produce good quality meat as well as wool, the principal breeds have been Shropshire, Southdown, and Hampshire, with the latter dominant since sheep and lambs are now produced primarily for meat. A considerable number of lambs raised in Garrett County

are shipped to the Baltimore market, while most of those from Talbot County are sent to Philadelphia since railroad and highway transportation as well as marketing facilities favor the area.

TABLE LXXX
SHEEP PRODUCTION
IN MARYLAND AND GARRETT AND TALBOT COUNTIES

(All sheep and lambs on farms at date of census)

Date	Maryland	Garrett County	Talbot County
June 1, 1900	191,101	32,581	18,499
Apr. 15, 1910	237,137	27,498	26,479
Jan. 1, 1920	103,027	17,458	11,588
Jan. 1, 1925	91,878	10,227	13,241
Apr. 1, 1930	194,152	22,330	24,041
Jan. 1, 1935	93,518	13,375	11,318
Apr. 1, 1940	56,410	9,185	7,946
Jan. 1, 1945	48,296	6,097	8,587

Compiled from U. S. Bureau of the Census Reports.

Unfortunately, the different times of year when censuses were taken make comparisons of trends in sheep production rather unsatisfactory. It is apparent, however, that the number of sheep and lambs had decreased somewhat by 1930 as compared to 1910, since figures for both years were taken in April. It seems obvious, too, that since 1930 sheep raising has declined steadily and rapidly for the State as a whole. Between 1940 and 1945, although allowance should be made for different dates of enumeration, the number of sheep in Garrett County decreased about 33.6 percent, while cattle increased about 33.3 percent and hogs about 6 percent. In Talbot County during the same period the number of sheep had increased 8.1 percent, cattle about 38.3 percent, and hogs 90.6 percent. Not only has there been a general decrease in the total number of sheep in the

last 40 or 50 years, but also in the number of farms which raise them. In Garrett County, for example, about 60 percent of the farms had sheep in 1920; by 1935, about 34 percent; in 1940, about 25 percent; and in 1945, only about 15 percent of the total farms reported sheep.

There was a general shift in Maryland from sheep to cattle, and to hogs particularly in Talbot County, with a consequent competition for pasture and feed crops. Although other factors were involved, this competition is doubtless the chief reason for the decrease in sheep in most counties, and for the relatively small increase shown for Talbot County. In addition to the greater demand for beef and dairy products, certain disadvantages in sheep raising also influenced farmers to shift to cattle. These include such hazards as loss of young lambs due to unseasonable spring weather, and of both sheep and lambs from poisonous plants, parasitic diseases, and predatory animals, particularly packs of wild dogs. Although many farms have extensive acreages of rough forage suitable for sheep, the prohibitive cost of adequate fencing to protect the flocks has been an important factor in the decrease of sheep production.

Some sheep and lambs are slaughtered on farms for home use and for the sale of meat, but most of them, particularly lambs, are sold alive. Although local butchers provide a limited outlet for these animals, most of them are sold to jobbers and wholesalers at livestock auctions in Accident or in the vicinity of Cumberland for shipment to meat packing houses in Pennsylvania or to the Baltimore market, and, to a limited extent, to nearby cities in the tri-state area of West Virginia, Maryland, and Pennsylvania. In 1939, about 6,200 sheep and lambs from Garrett County were sold alive, and 5,540 from Talbot County; in 1944, Garrett County farmers sold 5,229 sheep and lambs, while about 3,975 were sold in Talbot County.

Production of wool in Maryland in 1944 was only 27.7 percent of that for 1879 with comparatively rapid decrease in wool and total number of sheep from 1929 on. The decrease, which had been under way in most of the State since 1929, did not occur in Garrett County until after 1935. Even though the number of sheep in Talbot County was greater in 1945 than in 1940, production of wool was only about 72 percent as great.

TABLE LXXXI
WOOL PRODUCTION
IN MARYLAND AND GARRETT AND TALBOT COUNTIES
(in pounds)

Year	Maryland	Garrett County	Talbot County
1879	850,084	61,981	60,036
1899	632,119	75,854	70,148
1909	705,320	93,571	69,260
1919	551,194	87,766	62,608
1924	429,914	52,168	64,943
1929	556,255	72,942	75,830
1934	505,445	74,455	68,719
1939	320,750	51,157	50,708
1944	235,401	32,503	36,286

Compiled from U. S. Bureau of the Census
Reports.

With decrease in wool production in Garrett County and elsewhere in the State, making of homespun clothing and knitted apparel, and weaving of woolen textiles by small local mills has largely disappeared. Between 1870 and 1890, for example, there was a woolen mill located on the Old Deer Park Road just northeast of Oakland at Wilson's Creek. It was equipped to make blankets, flannel, yarn for knitting, and batting for quilts. It also carded wool to be spun and woven at home. Eventually, ownership was acquired by outside interests and the machinery, including five carding machines, a spinning jack, and the steam power

plant, was moved to Keyser, West Virginia, to equip a woolen mill which is still in operation. Since that time apparently no one has been interested in the possibilities of establishing a woolen textile mill in the County. Just north of Winchester, Va., on Route 11, there is a small woolen mill with a sales office which does a thriving business based largely on transient trade. Such a plant built at a suitable place on one of the main highways which traverse Garrett County, possibly at Red House on Route 50, Grantsville or Keyser's Ridge on Route 40, or some location on Route 219 near Deep Creek Lake might very well become an outlet for woolen products based on local resources.

Despite the fact that there has been considerable decrease in the raising of sheep and lambs and in production of wool in Garrett County in recent decades, it is likely that a sizable acreage of pasture land, not suitable for other classes of livestock, will continue to be utilized for sheep raising. According to preliminary figures furnished by the U. S. Bureau of the Census there were 6,269 sheep and lambs on Garrett County farms in April, 1950, and during 1949 about 24,300 pounds of wool were shorn from County flocks.

Hogs. In Garrett County hogs are raised primarily for home consumption and are slaughtered on farms to a much greater extent than any other farm animal. They fit into most types of farming and their efficiency in utilizing by-products of farming operations is considerably greater than that of other classes of livestock. They may be considered as an adjunct or as incidental to other farm activities in that they consume a wide variety of unsalable feeds such as damaged grain, surplus milk, potatoes and other vegetables, and garbage, or animal and vegetable refuse. Hogs are very prolific and mature in about 6 months. Since only

inexpensive equipment and small capital investment are required, they can be raised by most farmers.

As has been true for many years, more pork than any other meat is eaten on Garrett County farms. In addition to its use as fresh or uncured hams, shoulders, loins, and chops, the meat can be preserved or smoked, and suitable parts are prepared for later use in the form of bacon, sausage, "head cheese", pickled feet or souse, etc. Pork is a favorite meat eaten with most vegetables, legumes, cereals, and eggs, and the fat is commonly used as a seasoner or enricher in cooking such foods. The rendering of lard is still practical, but increased substitution of vegetable shortening for lard in recent years has caused a decrease in the demand, and Garrett County hogs are generally of the bacon rather than the lard type.

TABLE LXXXII

SWINE OF ALL AGES ON FARMS
IN MARYLAND AND GARRETT AND FREDERICK COUNTIES

Date	Maryland	Garrett County	Frederick County
June 1, 1900	317,902	8,264	36,568
Apr. 15, 1910	301,583	8,208	31,773
Jan. 1, 1920	306,452	6,847	33,994
Jan. 1, 1925	187,656	4,315	26,269
Apr. 1, 1930	205,361	6,171	26,187
Jan. 1, 1935	159,087	4,722	19,831
Apr. 1, 1940	158,546	5,064	22,817
Jan. 1, 1945	252,640	5,371	22,453

Compiled from U. S. Bureau of the Census Reports.

Since litters are farrowed in the spring, mature in about 6 months, and are mostly butchered or sold in autumn, census figures on the number of hogs on farms in January obviously do not show total production. Between 1900 and 1935, however, there was a general decrease in the number

of hogs on farms in Garrett County, as well as for the State. A combination of factors influenced this trend, chief of which was the increased proportion of whole milk sold, compared to cream sold in former decades, with a consequent reduction in the amount of skim milk which had been fed to hogs. As commercial dairying increased there was greater demand for available feed for dairy cows, which also resulted in reduced hog production. The general increase in number of hogs since 1935 can be attributed to low prices for grains and other feeds, and a comparatively favorable price for meat; in 1940 the average value of hogs on Maryland farms was about \$6.70 per head and by 1949 it had increased to \$30.80.¹

Although production of hogs in Garrett County is relatively important compared to corresponding numbers of cattle and sheep, the total has usually been less than 25 percent of that for Frederick County, which leads the State in production of corn, wheat, barley, and hay and raises much larger amounts of all feed crops, with the exception of oats, than does Garrett County. See Table LXVIII, Page 463.

In 1934 a total of 323,821 hogs were slaughtered on Maryland farms or were sold alive. Frederick County farms produced 41,255 (about 12.7 percent), while Garrett County furnished 7,611 (2.4 percent). In 1939 a total of 156,405 hogs were sold alive by Maryland farmers. Of these about 19,302 (12.3 percent) came from Frederick County and 4,745 (3.0 percent) from Garrett County. In 1944 Maryland farmers sold 234,640 hogs, of which 19,378 (8.3 percent) were from Frederick County and 5,344

¹ Maryland Livestock Statistics, 1939-1949, Supplement II to Bulletin No. X3, published by University of Maryland, Agriculture Experiment Station and Extension Service, 1950, p.2.

(2.3 percent) from Garrett County. Although sales were about 50 percent higher than in 1939, the sale of hogs in Frederick County was practically the same for both years, and Garrett County showed an increase of about 12.6 percent. Incidentally, there was an increase of from 10,459 to 25,514 (about 144.0 percent) in the number of hogs sold by farmers in Baltimore County between 1939 and 1944. Proximity to Baltimore City has given that county a much greater advantage in production and marketing of many kinds of fresh produce; the increase in hog production there in recent years has been phenomenal.

In 1939 a total of 122,087 hogs were slaughtered on Maryland farms. Of this total 16,121 (13.2 percent) were so disposed of in Frederick County, and 6,932 (5.7 percent) in Garrett County. In 1949 the total for the State was 111,756, of which Frederick County reported 14,151 (12.7 percent) and Garrett County 5,229 (4.8 percent). The number of hogs slaughtered on farms in Baltimore County (6,813 in 1939 and 6,576 in 1944) was proportionately much less than the number sold alive.

From the preceding statistics it seems evident that Garrett County's hog industry constitutes a relatively small part of the total for the State, particularly when compared to that of Frederick County, and also that a more significant share of its hogs are slaughtered on farms primarily for home use. In common with the sale of other livestock, a considerable number of the hogs sold alive in Garrett County are destined for the Baltimore City market. Most are sold at livestock auctions in Accident or at Triple Lakes in Allegany County. Some are shipped to processing plants in Pennsylvania, and a limited market is found in nearby cities and towns, and through sales to local butchers and retail outlets.

As long as general or diversified farming is a chief characteristic of agricultural operations in Garrett County, hog production will be relatively important there. Pork is one of the important products that can be raised both for home use and for sale. Preliminary census figures indicate that there were 6,673 hogs of all ages on farms in the County in April 1950, and that during 1949 about 6,149 were sold alive and 3,922 were butchered on farms.

Poultry and poultry products. Chickens and hens are raised on about 80 percent of the farms in Garrett County. Production ranges from small, back-yard flocks kept primarily for home use of meat and eggs, to large commercial enterprises with several thousand fowls and usually specializing in either fryers and broilers or eggs. The domestic hen has always had a relatively important place on the self-sufficing or general farms which are characteristic of the County.

Of the 2,127 farms classified by type and value of products in 1945, about 150, or 7.3 percent, reported poultry and poultry products as their chief source of income. About 1,180 farms, or 55 percent, were self-sufficing, that is, the value of farm products used at home exceeded the value of those sold. In 1944 about 32 percent of the total value of all livestock and livestock products sold was poultry and eggs. Dairying furnished 43 percent, and other livestock the remaining 25 percent.

The number of mature chickens on farms at the time of census enumeration is an approximation of the laying and breeding stock, and therefore an indication of the relative importance of poultry production. Although the ages were not specified before 1930, for that year and 1935, only those over 3 months old were considered mature; and since that time only those over 4 months. As is true of other types of livestock, the month



Figure 47

Part of a flock of 2,000 white leghorns on a poultry farm near Cherry Creek, east of Red House.



Figure 48

Greenhouses and nursery at Weber, southeast of Oakland.

in which the census was taken has some influence on comparative value of statistics, but modern methods of incubation and care in the breeding of chicks has modified to some extent the differences due to local climatic conditions.

TABLE LXXXIII

MATURE CHICKENS ON FARMS
IN MARYLAND, AND GARRETT AND BALTIMORE COUNTIES

Date	Maryland	Garrett County	Baltimore County
Apr. 15, 1910	2,908,958	72,295	257,465
Jan. 1, 1920	3,436,376	81,414	272,755
Jan. 1, 1925	4,198,305	105,326	362,456
Apr. 1, 1930	3,777,072	101,065	360,860
Jan. 1, 1935	3,589,071	119,015	350,452
Apr. 1, 1940	3,139,761	118,870	347,190
Jan. 1, 1945	3,793,011	156,096	473,355

Compiled from U. S. Bureau of the Census Reports

Although there has been considerable variation in the number of mature chickens on farms in Maryland as a whole and in the two counties, the general trend has been upward since 1910, and the increase between 1940 and 1945 is especially noticeable. The increase in this five-year period was 20.8 percent, in Garrett County 31.3 percent, and in Baltimore County 36.3 percent. In 1945, although Garrett County had only about 4 percent of the mature chickens in the State, it had about one-third as many as Baltimore County, which ranked first. The great advantage which the latter county enjoys in relation to the Baltimore City market is, perhaps, the chief cause of its predominance in the raising of mature chickens for egg production.

TABLE LXXXIV

EGGS PRODUCED ON FARMS
IN MARYLAND, AND GARRETT AND BALTIMORE COUNTIES
(In Dozens)

Year	Maryland	Garrett County	Baltimore County
1909	15,238,591	357,250	1,203,390
1919	15,085,691	448,640	1,241,071
1924	20,068,986	597,620	2,031,203
1929	27,709,334	832,512	2,770,295
1934	21,064,915	826,044	2,272,307
1939	22,780,919	910,792	2,885,948
1944	27,814,664	1,266,365	4,056,191

Compiled from U. S. Bureau of the Census Reports

Figures on average production per hen are not very satisfactory as there are wide variations between seasons of the year and also between breeds and flocks in a given locality. For the State as a whole the average production was about 90 per mature chicken in 1944, in Garrett County about 100, and in Baltimore County about 105. Figures based on estimates furnished by the University Extension Service show a considerably higher rate of egg production per laying hen since laying hens make up only about 75 or 80 percent of the total number of mature chickens. For Maryland as a whole in 1944 the average was 113 eggs per laying hen for the month of January, and 149 for the year.¹

Although in former years about one-third of the eggs were used at home, in recent years production has greatly exceeded requirements for home use, and the percentage sold has increased accordingly. In 1929 about 80 percent of the eggs layed on Maryland farms were sold; for Garrett County the figure was about 75 percent, and for Baltimore County

¹ Supplemental II to Bulletin No. X3, Maryland Livestock Statistics, 1939-1949, published by University of Maryland Agriculture Experiment Station and Extension Service.

about 85 percent. Unfortunately, comparative figures are not available for all census years, but by 1948 eggs produced in Maryland had reached a total of which only about 12 percent were needed for home use.²

According to preliminary census figures 931,769 dozen eggs, with a total value of \$419,992, were sold by Garrett County producers in 1949. Local food stores are outlets for only a minor share of the eggs; in many instances they may be exchanged for other foodstuffs or sold as a source of pin money for farm housewives, a traditional farm practice. In addition to limited markets in Frostburg, Cumberland and other nearby cities, eggs are shipped in large quantities, mostly by motor truck, to Pittsburgh and Baltimore. In recent years, eggs from registered flocks have been shipped to Eastern Shore Counties for hatching on poultry farms. At least one of the large chains of foodstores regularly sends trucks to some of the larger commercial poultry farms in Garrett County to deliver empty cases and pick up those filled with eggs for sale in its retail stores in the Baltimore-Washington area.

Chickens are raised as replacements for the mature stock and for sale as fryers or broilers. Most farmers plan to keep the best pullets for replacements and sell the rest, as well as almost all of the cock-erels. Garrett County has not had the extraordinary expansion in production of young chickens for the market that has taken place in northern Worcester County and eastern Wicomico County on the Eastern Shore.

2 Ibid.

TABLE LXXXV

CHICKENS RAISED ON FARMS
IN MARYLAND, AND GARRETT AND WORCESTER COUNTIES

Year	Maryland	Percent Sold	Garrett County	Percent Sold	Worcester County	Percent Sold
1909	5,568,745	40.8	98,175	44.3	326,622	36.1
1919	5,257,655	30.8	91,331	42.6	271,056	27.7
1924	6,025,180		118,808		344,578	
1929	7,422,461	48.0	149,749	53.9	559,630	48.4
1934	7,030,654		154,926		626,949	
1939	11,923,718	70.9	183,380	49.6	3,322,320	92.4
1944	35,052,647		288,029		10,487,931	

Compiled from U. S. Bureau of the Census Reports.

The number of chickens raised on farms in Garrett County increased 193 percent between 1909 and 1944; for all farms in Maryland the increase was 529 percent; and in Worcester County, 3,110 percent.

Between 1909 and 1934 variations in the number of chickens raised were relatively minor, and although there were some fluctuations due to economic factors such as high grain and feed prices and expansion of other agricultural activities during World War I, and decreased demand between 1929 and 1934, the general trend was upward. Between 1929 and 1939 chicken production in Garrett County increased only about 22.5 percent, while for all of Maryland it increased 60.6 percent and in Worcester County 493.7 percent. However, between 1939 and 1944 production in Garrett County increased 57.0 percent; in Maryland 194.0 percent; and in Worcester County 215.7 percent. During the same period the amount spent for purchased feed in Worcester County increased 560.2 percent; most of the feed was for chickens since the raising of other livestock was relatively unimportant in that county. Unfortunately, data on the type of feed purchased are not available and therefore figures on cost of feed

in all of Maryland and in Garrett County would not be comparable. However, the cost of all feed purchased in Garrett County in 1944 showed a relatively small increase of 72.3 percent over 1939.

Some indication of the commercial aspects of chicken production can be shown for certain years by the percentage of chickens sold. From 1909 to 1929 most of the chickens were generally raised for home consumption, but even with its small poultry industry, Garrett County showed a relatively greater surplus in the latter year when over one-half of its chickens were sold. However by 1939 the surplus sold in Maryland had increased to over 70 percent, while Garrett County farm households were using about one-half, and, in Worcester County as might be expected with the great increase in production, well over 90 percent were marketed.

The market distribution for Garrett County chickens is similar to that for eggs. The local and nearby towns purchase a limited amount, but the bulk of the poultry is trucked to either Pittsburgh or Baltimore. In 1944 Garrett County raised only 0.8 percent of the State's total number of chickens used primarily for fryers or broilers, while Worcester County produced 30.0 percent, Wicomico County 24.8 percent Somerset County 10.9 percent, and Caroline County 9.7 percent. These four Eastern Shore Counties raised 75 percent of the total for the State. For twenty years or more the main centers in these counties such as Westover, Snowhill, Berlin, Salisbury, and Denton have had established truck routes to Philadelphia, New York, and even Boston. These routes, developed originally in the marketing of fresh vegetables and fruit, are also used for transportation of broilers and fryers to markets in those metropolitan areas.

In 1939 the value of poultry and poultry products sold in Garrett County was \$234,312, and in Worcester County \$1,447,036. In 1944 Garrett County farmers received \$589,155 and Worcester County farmers \$11,207,600. Figures are not available for the total number of chickens raised in Garrett County in 1949, but preliminary reports indicate that 253,370 chickens valued at \$250,000 were sold during that year. Although the increase in poultry production in recent years in the County has been considerable, much more could be done to expand the industry as an additional source of income for producers, and for those who might find employment if a processing plant were established in the County. The great increase in preparation and distribution of refrigerated fryers and broilers ready for pan or oven should encourage such a plant. One example of the possibilities is the success of such a plant at Broadway, Rockingham County, Virginia. Rockingham County, like Garrett County, had established no large markets for fresh poultry prior to 1940, but through modern methods of processing, refrigeration, advertising, and distribution, consumers in the Washington and Baltimore areas frequently regard ready-to-fry or -broil chicken and "Rockingham" as almost synonymous. A tangible result of this success is shown by the fact that Rockingham County farmers received \$2,596,891 for poultry and poultry products in 1939, and in 1944 they received \$8,044,593.

One type of production in which Garrett County has shown a relatively great increase in recent years is turkey raising. The traditional Thanksgiving or Christmas bird was plentiful in its wild state in the early days of settlement, and furnished an important source of food throughout the fall and winter months. For many years small flocks of domestic turkeys were raised for home use and for sale. Although the

number of turkeys raised in Maryland is relatively small compared to the number of chickens, commercial production has become increasingly important in recent years in counties adjacent to Baltimore and on the Eastern Shore as well as in Garrett County.

TABLE LXXXVI

TURKEYS RAISED ON FARMS
IN MARYLAND AND GARRETT AND OTHER SELECTED COUNTIES

Year	Maryland	Garrett County	Howard County	Baltimore County	Talbot County	Queen Anne's County	Somerset County
1929	278,579	6,136	7,118	8,172	28,141	42,590	816
1939	340,442	15,683	20,603	19,373	49,515	36,478	5,184
1944	356,532	24,151	24,413	30,449	31,500	23,803	46,487

Compiled from U. S. Bureau of the Census Reports.

The number of turkeys raised on farms is not available for years prior to 1929, since only those on the farms at the time of census taking were enumerated, but it is possible to show total production since 1929 and change in relative importance in the six leading counties. Between 1929 and 1939 the number raised in the State as a whole increased 22 percent, in Garrett County 155 percent, in Howard County 189 percent, in Baltimore County 137 percent, in Talbot County 76 percent, in Somerset County over 535 percent, while in Queen Anne's County there was a decrease of 14.4 percent. The early importance of turkeys in the central Eastern Shore Counties was in due part to favorable location in relation to large markets in Wilmington, and especially Philadelphia, and in part to the fact that during the decade there had been quite a shift from cash-grain farming, particularly wheat, to cattle and dairying. Increases in Baltimore and Howard Counties were due in large part to proximity to the City of Baltimore. The unusually large percentage increase

for Somerset County is explained by its relatively insignificant number of turkeys in 1929. Incidentally, Somerset County suffered severe losses in farm population, number of farms, and land in crops, and consequently showed actual decreases in almost every other type of livestock and crop production. In Garrett County the relatively large increase in turkey production was almost entirely concentrated on 82 farms in the Bittering area.

The total number of turkeys raised in Maryland was only 4.7 percent in 1944 above the number in 1939. The increase in Garrett County, however, amounted to 54 percent, in Howard County to 18.5 percent, in Baltimore County 57 percent, and while Talbot and Queen Anne's Counties showed decreases of -45.6 percent and -34.7 percent respectively, Somerset County again showed a remarkable increase, 796.7 percent, probably because growing demands for farm products gave that county the necessary impetus to increase turkey production; it is significant that its greatest increases were in poultry--the number of chickens raised was about 525 percent higher than in 1939.

In 1944 turkey production in Garrett County was still centered in the Bittering area, where more than 10,000 birds were raised on 16 farms. In the adjacent district of Sang Run there were over 7,000 turkeys on 11 farms, while more than 2,900 were raised just to the northeast of Bittering in the Grantsville district. About 85 percent of all turkeys in Garrett County in 1944 were produced in these three districts on only 34 of the total 2,154 farms in the County.

This is an example of the contagion of success. Preliminary census figures indicate that turkey raising is increasing in Garrett County. In 1949 about 51,000 turkeys were raised on only 58 farms, almost all in

the three above-mentioned districts. The bronze turkey is the type that has been most popular with Garrett County producers. Practically all are sold to meet the Thanksgiving demand as weather conditions are considered unfavorable for holding the flocks until Christmas. This expansion of turkey production in recent years has been encouraging, and is an indication of the possibilities of expanding other types of agricultural specialties in Garrett County.

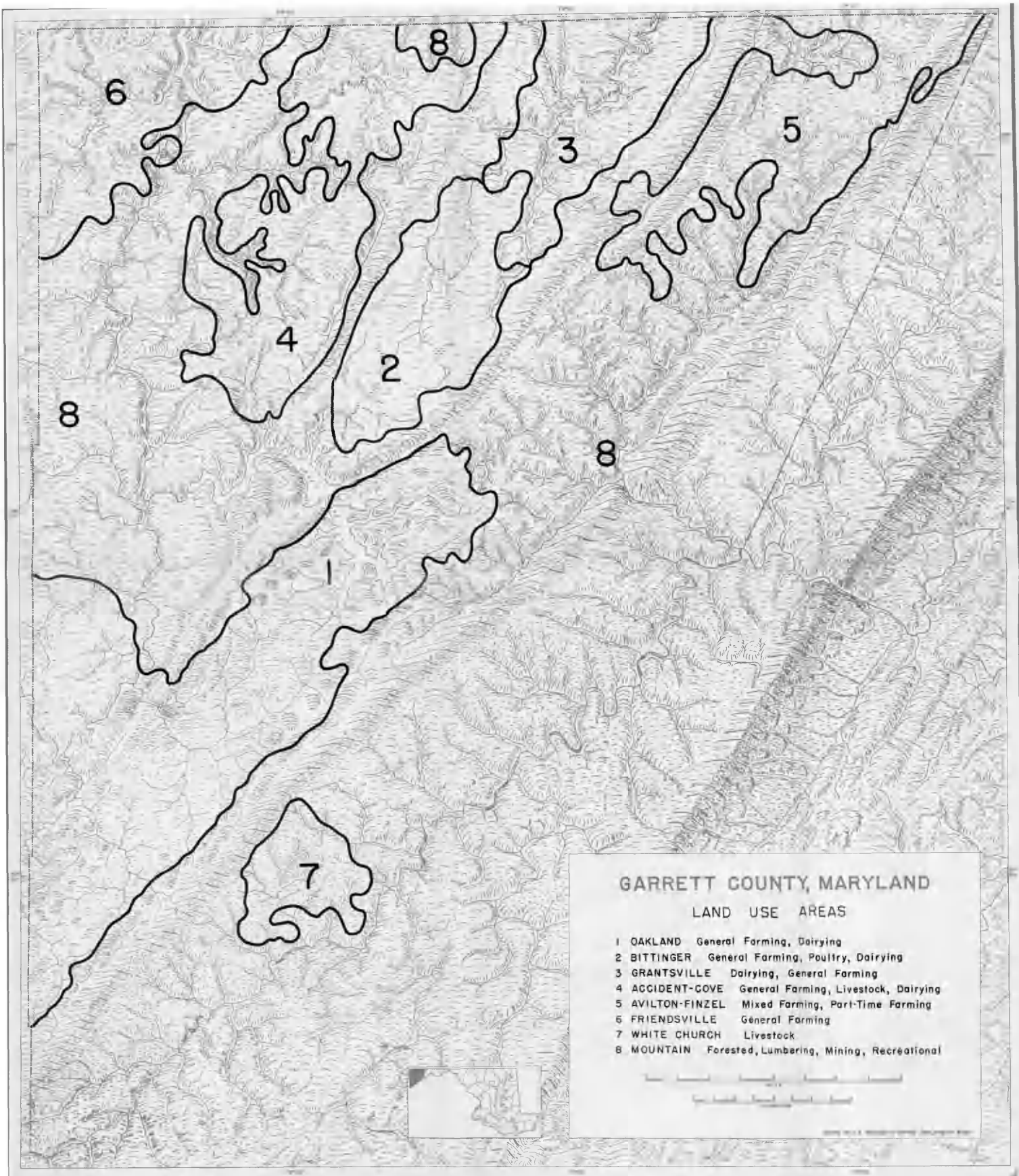


Figure K.

GENERAL SUMMARY AND CONCLUSIONS

As each natural resource has been analyzed in the preceding discussion there has been a conscious effort to reach conclusions about their individual nature and use, and to appraise all factors - mainly the geographic ones - involved. In most cases these conclusions have been given topically. There has been an awareness, too, of the need to show the relationships between different economic activities involving the use of resources, such as mining and part-time farming. Some resources have diversified uses; for example, the use of Deep Creek Lake for the generation of electric power and for recreational purposes, or the use of the State forests for exploitation of timber and recreational purposes. The contrasts in land forms and soils and the corresponding differences in land use have been emphasized, particularly in relation to agricultural and forest resources.

Not only have local variations been shown, but comparisons have been made with other typical counties, and with Maryland as a whole, in order more properly to gauge the relative importance of each phase of the agricultural use of land.

A general summary of important characteristics of the present uses of natural resources may serve to indicate possible future developments. Basic considerations include those resulting from a decreasing population; trends in the use of land in connection with dairying and mixed farming, forestry, mining, and recreation; and improvement of production and distribution methods and facilities.

Garrett is the youngest, largest, and most sparsely settled county in Maryland. Its folk, virtually all native-born white, number at present

about 21,200. During the past decade the County lost over 3,800 people through migration, which indicates that its resources are limited, depleted, or have not been developed to provide adequately for the natural population increase. As a result of past emigration there is a disproportionately large number of old people and a deficiency of people between the ages of twenty and forty years. Several implications of these disparities in size of the age groups should be considered, particularly in regard to agriculture. Many farms are not properly operated; often inadequate portions are in rotation crops while acreages left in permanent pasture gradually revert to brush and woodland. On such farms crops are likely to be planted later than advisable on poorly prepared soil, may receive minimum care during the growing season, and may be damaged by delayed harvests.

Such conditions might be remedied, particularly on large farms, if they were divided and parts sold or given to prospective young farmers. Revenue from sales of surplus land could be used to improve land and buildings on remaining acres; and capable young purchasers or donees would have an incentive to properly care for their own lands. Whether the land on farms so divided was sold or given to sons or relatives would be of secondary significance to benefits resulting from more intensively cultivated, smaller farms and from settlement of new, young owners. Better crops and pastures provide better livestock and more marketable produce. A greater number of families established on their own land would facilitate economic and social progress. A growing population in turn increases the local markets, not only for agricultural products but for other goods and services.

Manufacturing will probably continue to be based on processing farm and forest products. A serious handicap to Garrett County's economic de-

velopment and the establishment of local processing plants is the limited local market which restricts the County to small-scale production of many crops, livestock, and forest items for which it is fairly well adapted, but which are unprofitable in competition with larger, more efficient producers elsewhere. With a more intensified use of agricultural and forest resources, and by efficient processing and marketing methods, such manufacturing activities might well be expanded. Vegetables, chicken, or beef which are canned, or processed otherwise, are not produced in sufficient quantity, if at all, to supply local demand. Wood products, including inexpensive furniture for home and outdoor summer use, might afford another field for expansion of the County's industries. Perhaps varied uses could be made of leather, with belting and harnesses, as well as tooled leather objects for sale to summer visitors, forming the chief items of production.

In considering the possibilities of supporting a larger population by more intensive use of natural resources, northwestern Europe might be an important, although small, source of immigration. Farmers and artisans from the British Isles, Holland, Denmark, Norway, Sweden, and even from Germany, could contribute new techniques, new ideas, and new vigor for the County's development of its natural resources. Skilled mechanics, dairy-men, foresters, miners, and men trained in other occupations or professions are certainly needed in Garrett County.

Quite probably general farming or mixed farming with production of both crops and livestock, and with dairying becoming increasingly important, will continue to be characteristic of agriculture in Garrett County. The soil and climate favor a farming economy based on growing roots or tubers, grasses, legumes, small grains, and livestock.

The dairy industry is already well established, and is capable of substantial expansion with a proportionate increase in annual income of

Garrett County farmers. With more emphasis on dairying, greater attention will have to be given to improving the quality of the dairy cattle, as well as of the feed. More, or at least better pastures are necessary under such a plan, and pasture land can be improved by cultivation to eliminate weeds, by sowing approved mixtures of pasture grasses, and by the application of adequate amounts of manure, commercial fertilizers, and lime. In view of the relatively short pasturing period - May to September, inclusive - there is a need for greater attention to crops for barn feeding. In addition to hay and oats, consideration might well be given to developing suitable strains of summer barley. Greater attention should also be given to ensilage crops such as corn, red clover, and alfalfa, and especially the combination oats-peas-vetches. One combination which has proved successful is corn, -sorghum, -sudan grass, -and soybean, which gave a yield of fourteen tons per acre on a farm near Gortner.

Further consideration should also be given to the production of beef cattle. Perhaps improvement by selection of better beef animals, and through better feed and fattening crops, would so improve the quality of the product as to increase the demand for locally finished animals rather than simply providing feeder stock for other areas.

Sheep will probably continue to have a definite place on County farms where considerable land is unsuitable for cultivated crops or pasture for other types of livestock. Sheep are more profitable on parts of some farms than other types of farm animals, as they provide added revenue in spring lamb production, as well as wool for sale or for use at home.

Hog raising is a valuable adjunct to dairying. Bacon-type hogs consume by-products such as buttermilk and whey, and also turn low-grade crops into products of much higher value per unit of weight or volume.

Horses are furnishing less motive power than machinery and vehicles on Garrett County farms. Motor trucks have replaced horse drawn vehicles in collecting milk, cream, eggs, and other perishable produce, and have extended the distance such products can be hauled to market. In this connection, the improvement of many secondary roads would provide better farm-to-market facilities, permit residents to get better acquainted with one another and with summer visitors and to appreciate to a much greater extent their common interests in life in Garrett County.

Poultry and eggs provide a growing share of the agricultural revenue and nearly every farm has a flock, although relatively few large commercial poultry farms are operated. An efficient egg collection service, high standards of grading, and efficient marketing facilities would favor a growing market. Poultry raising could be expanded on some farms by converting inferior grades of grain and potatoes into much more saleable and profitable products.

In cooperation with local agencies such as the extension service, and with agricultural agents of railroads, it is possible that truck gardening and the canning or processing of a variety of vegetables can be expanded.

By increasing production of livestock and crops such as dairy and poultry products, and vegetables, and by a concentrated effort to market them, Garrett County farmers could: expect an increasing cash income for the purchase of equipment and supplies like fertilizer, maintain homes in better condition, and enjoy the amenities of a more complete way of life.

Cost of transportation is particularly significant to Garrett County farmers. Eggs, processed dairy products, maple sugar, and meat have much higher values per unit of weight or volume than fresh milk, potatoes, oats or hay; and, therefore, are more profitable forms in which to market farm

produce. Without larger production, local processing of many of these products will not be feasible and thus they must be shipped elsewhere for processing, with a consequent loss of income that might accrue to the County. The nearest metropolitan market area, Pittsburgh, is over one hundred miles away from most of Garrett County; and Baltimore and Washington are over twice as far away so that cost of transportation is an unfavorable factor in competing with other agricultural areas which are much nearer those centers.

Scientific forestry sponsored by the Department of State Forests and Parks, and in cooperation with 4-H clubs and other agencies of the State Agricultural Department, should do much in improving the County's woodlands. In the past unsuccessful farming and abandoned farms have resulted from attempts to use land for field crops that should have been used for woodland. Proper care of farm woodlots includes clearing out of brush and poorly developed trees or trees of undesirable species, planting desirable species such as white pine, and even-age cutting of timber. Such care insures a steady annual supply of forest resources and products.

The development of a State forests program has done much to improve Garrett County's depleted and abandoned woodland areas. Such a program would not be possible under private management. In addition to a scientific plan for development of forest resources, suitable areas within State forests have been set aside and provided with recreation facilities, including cabins, fireplaces, and picnic tables. The number of cabins should be increased not only in the present areas, but provision should be made for similar facilities in other suitable parts of the forests.

Commercial recreational facilities, mostly in connection with Deep Creek Lake, are providing for an increasing number of summer visitors. The County's summer weather, scenery, swimming, boating, and fishing

attractions should be more widely publicized. It might be added that short courses in catering to tourists might be encouraged for the personnel of stores, restaurants, service stations, and other places dealing with the public. An increasing vacation-trade furnishes a local summer market for dairy products, vegetables, fruit and fresh meat. In addition, consideration should be given to the possibilities of developing a home-craft products industry through which rugs, hand-knit woolens, pottery, painting, and souvenirs could be made for sale to summer visitors.

For many years semi-bituminous coal has been an important source of Garrett County's mineral wealth. During the past forty or fifty years production has averaged around 700,000 net tons, but in the last two years it has decreased to less than 400,000 net tons. Most of the coal formerly came from underground workings in the Upper Potomac basin. Recently, however, strip mine operators in the Garrett County part of Georges Creek basin and in Casselman River basin have increased, to some extent, the relative standings of these two areas. Relatively little has been produced in recent years in the Lower Youghiogheny Valley; while in the Upper Youghiogheny Valley, west of Oakland, production has been spasmodic, with considerable increase in some post-war years due to stripping operations.

The earliest, and for many years chief, commercial production of coal was from the Pittsburgh (Big Vein) and Sewickley (Tyson) seams. High-grade coals from these upper seams gave the Maryland product its reputation and helped create a demand that lasted for many years. They have been largely depleted, however, and this is the chief cause of the existing condition of the industry in Western Maryland as a whole. In Garrett County, the Kittanning, Freeport, and Bakerstown coals are also approaching exhaustion. Several problems have accompanied the long-time decline of coal production. Not only has the position of some of the largest operating companies been

weakened, both financially and in maintaining a share of the market, but the production of several was so reduced as to cause termination of operations. Unemployment has been chronic for years and many mine workers and their families have become stranded and destitute. The decline in purchasing power of mining families has seriously reduced commercial activities in and near mining centers. Transportation agencies and other interests more or less dependent on operation of the mines have also suffered losses of business as a result.

The future of coal mining in Garrett County will be endangered by the continuation of such conditions. Permanent stoppage of operations in larger mines will lead to disintegration of the excellent personnel that has been so characteristic of mining in the area, and to a migration of mine workers compelled to find employment elsewhere. A considerable amount of recoverable coal from the Big Vein and other seams is in pillars left by former operations using that type of mining. Experienced miners are needed for the recovery of this valuable fuel, however, and it would probably involve some form of State subsidy.

Continued production, whether it be maintained or increased, will most likely have to come from lower, thinner, and less accessible beds. While coals of the upper beds were of high-grade, semi-bituminous rank, and excellent for steaming and other uses requiring a high degree of heat, not so much is known of the properties of coals in the lower, largely unworked seams. However, they are generally of a low-volatile coking variety, and especially suitable for blending in making metallurgical coke. These coals are rather friable, as are most Maryland coals, but as run-of-the-mine or properly screened, can be prepared to meet a variety of uses. The friability is an asset when coal is used as pulverized fuel for automatic stokers. Perhaps their greatest potential use will be as

semi-smokeless fuel for domestic and industrial purposes in such relatively nearby areas as Washington and Baltimore.

Pollution of major streams by acid mine water from operating and abandoned mines has been a problem for many years. Restoration of land after strip mining operations is a comparatively recent problem, and unless operators themselves can be made responsible, much of this work will have to be done by State agencies, perhaps in cooperation with allied branches of the Federal government. Recently the state Department of Game and Inland Fish has re-seeded some of these strip mine tracts with locust, red pine, dogwood, and wild cherry trees in connection with the wildlife management program.

The character of the use of natural resources in Garrett County with many economic, historical, social, and even political ramifications has been under thoughtful consideration in the preceding chapters. Present conditions, as well as possible future trends, have been indicated. Today, Garrett County may choose one of two ways of life. It can return to old ways and practice more self-sufficing and even subsistence types of using its resources. Such a program would lower cash incomes and curtail the enjoyment of life's amenities. Many of the folk, however, are too progressive and energetic to accept retrogressive measures. They have a due share of industriousness, orderliness, thrift, and all of the other virtues. Education, too, has been prized and fairly attained in the County's one-room school houses. Though they may lack, as individuals and collectively, some of the daring and sublime self-confidence which material success has bred in people elsewhere, the folk of Garrett County can rely on their staying qualities to succeed as masters of their own destinies.

Through intensified use of land and other resources, especially through dairying and livestock, eggs, poultry, and the raising of vege-

tables, together with proper forestry practices and further development of the recreation industry, its sources of wealth can be maintained and expanded. Through cooperative effort in production and sale of the products of their natural resources, the County's purchasing power can be increased and more of the good things of life obtained. These include not only radios, automobiles, better homes, fruit and food from other climatic regions, but also more opportunity to enjoy books, ideas, and other attributes of a pleasant life.

To insure future growth and prosperity, the people of Garrett County must appreciate themselves, take inventory of their resources, and plan for the best use of all they have. Such a knowledge will form the surest foundation in building for the future.

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GAZETTEER OF GARRETT COUNTY

Note: This list does not include every place name in Garrett County, nor every name in local usage, but will aid in locating points referred to in the text.

A

- Aaron Run: branch of Savage River, head 1-1/4 miles southeast of High Rock, (3-1/2 miles north of Bloomington).
- Accident: incorporated town, 6 miles north of Deep Creek Lake, on Route 219; population 250+; elevation 2,395 feet.
- Allegheny Heights: a summit on Backbone Mountain, 5 miles southeast of Oakland; elevation 3,187 feet.
- Altamont: station (on Baltimore and Ohio Railroad and Route 38), 3-1/4 miles east of Deer Park; elevation 2,632 feet.
- Ambrose Run: branch of Cherry Creek, head 1-1/2 miles north of Gortner.
- Asher Glade: settlement, 4 miles northwest of Friendsville on Route 42; elevation 1,920 feet.
- Avilton: village, 3 miles southeast of Piney Grove; population 60+; elevation 2,740 feet, (7 miles east-southeast of Grantsville).

B

- Backbone Mountain: running from West Virginia northeasternly through southeast section of County, known as "Continental Divide"; elevation 2,800-3,400 feet, (Great Backbone Mountain).
- Bear Creek: branch of Youghiogheny River at Friendsville, head 1-3/4 miles east of McHenry.
- Bear Hill: southernmost end of Fourmile Ridge, 3-1/2 miles south of Avilton; elevation 2,780 feet.
- Bear Pen Run: branch of Savage River, between Jenkins Hill and Peapatch Ridge.
- Beckman: settlement, 3 miles north of Swanton on Route 495; elevation 2,560 feet.
- Bevansville: settlement, 3-1/2 miles southwest of Grantsville on Route 495; elevation 2,725 feet.
- Big Curve Station: station on Baltimore and Ohio Railroad, 2-1/2 miles northwest of Bloomington.

Big Laurel Run: branch of South Branch (Casselman River), head 4 miles southeast of Grantsville.

Big Piney Run: branch of Casselman River, rising 1/2 mile southeast of Finzel.

Big Run: branch of Savage River, mouth northeast of Solomon Ridge.

Big Savage Mountain: between Savage River and George's Creek, northeastern continuation of Great Backbone Mountain.

Big Shade Run: branch of Casselman River, mouth 1 mile southwest of Grantsville.

Bishop Hill: 2 miles northeast of Sang Run village; elevation 2,745 feet.

Bittinger: settlement, 4 miles southeast of Bevansville; elevation 2,660 feet; P. O., Casselman River Railroad, and Route 495.

Black Ridge: 2 miles long, extending south and east of Beckman; elevation 2,940 feet.

Blackhawk Run: branch of Middle Fork Creek, rising 3-1/2 miles south of Bittinger.

Blacklick Run: branch of Savage River, rising 3-1/2 miles southwest of Piney Grove.

Blooming Rose Settlement: 1-1/2 miles west of Friendsville; elevation 2,100 feet.

Bloomington: town, on North Branch Potomac River, 1-1/2 miles west of Westernport; incorporated; elevation 1,040 feet; population 340; P. O.; on Baltimore and Ohio Railroad, and Route 135.

Blossom Hill: between Pine Hill and Solomon Ridge, bordering on Blackhawk Run; elevation 2,620 feet.

Bluelick Run: branch of Savage River, mouth 3-3/4 miles southwest of Avilton.

Bond: former settlement on Savage River at mouth of Big Run (now camp site in Savage River State Forest).

Bond Station: on Baltimore and Ohio Railroad, 3-1/2 miles northwest of Bloomington; elevation 1,380 feet.

Bradshaw: settlement on North Branch Potomac River, 3 miles south of Tasker Corners; elevation 2,075 feet.

Brew Mahr Mill: 1-1/2 miles northwest of Swallow Falls, on Browning Creek; elevation 2,410 feet.

Brier Ridge: on north side of Herrington Run, 5 miles northwest of Oakland; elevation 2,580 feet.

Broad Ford Run: branch of Little Youghiogheny River, rising 4-1/2 miles northeast of Oakland (flows into lake at Mountain Lake Park).

Browning Run: branch of Muddy Creek, rising in West Virginia and flowing east into Maryland, mouth 1-1/4 miles northwest of Browning Mill.

Browning Mill: 3 miles northwest of Swallow Falls; elevation 2,520 feet.

Buck Hill: southern end of Peapatch Ridge, just north of junction of Big Run and Savage River.

Buffalo Run: branch of Youghiogheny River, mouth 2-3/4 miles north of Friendsville.

Ball Glade Run: branch of Murley Run, rising 3-1/2 miles west of Swallow Falls.

C

Caledonia Hill: on Allegany County line, 1 mile west of Barton, between Butcher and Mill Runs; elevation 2,240 feet.

Carey Run: branch of Savage River, mouth 3-1/4 miles northeast of Avilton.

Casselman River: branch of Youghiogheny River, flows north one mile east of Grantsville. (also Castleman River).

Cherry Creek: branch of Youghiogheny River, mouth 1-1/2 miles southeast of Grellin.

Cherry Creek: branch of Deep Creek Lake, mouth 2-1/4 miles north of Thayerville.

Cherry Glade Run: branch of Little Youghiogheny River, mouth at Oakland.

Chestnut Knob: 3 miles northeast of Beckman; elevation 2,580 feet.

Chestnut Ridge: 3 miles east of Grantsville; elevation 2,751 feet.

Chisholm Run: branch of Youghiogheny River, mouth 2-1/2 miles west of Oakland.

Christley Run: branch of Mudlick Run, mouth 3/4 miles northeast of Avilton.

Chub Run: branch of Mill Run, mouth 3 miles northeast of Selbysport.

Church Run: branch of Big Piney Run, mouth 2-3/4 miles northeast of Piney Grove.

- Clark Run: branch of Cherry Creek, mouth 1-1/2 miles south of Gortner.
- Collier Run: flows in Youghiogheny Reservoir, 3 miles north of Selbysport.
- Comegys Run: branch of Broad Fork Run, mouth 2 miles east of Oakland.
- Contrary Knob: 2 miles north of Beckman; elevation 2,680 feet.
- Conway Hill: spur of Backbone Mountain, 2 miles east of Redhouse; elevation 2,760 feet. (Conneway Hill).
- Corinth: settlement 1/4 mile west of Hutton, in West Virginia.
- Cove: village 3 miles northeast of Accident; elevation 2,440 feet.
- Cove Run: branch of Bear Creek, mouth 2 miles north of Accident.
- Cove Run: branch of Mill Run, mouth near Mineral Spring.
- Crab Run: branch of Casselman River, mouth 1-3/4 miles northeast of Grantsville.
- Crabtree: settlement on Baltimore and Ohio Railroad, 4-1/2 miles northwest of Bloomington.
- Crabtree Creek: branch of Savage River, mouth 4-1/2 miles northwest of Bloomington.
- Crellin: mining village, 4 miles west southwest of Oakland; elevation 2,390 feet; population 200+; P. O., on Maryland Route 39.
- Crooked Run: branch of North Branch Potomac River, mouth 2 miles southeast of Tasker Corners.
- Cunningham Lake: 20.5 acres in Pleasant Valley Recreation Center, 4 miles southwest of Bittering.
- Cunningham Swamp: just north of Cunningham Lake.
- Cunningham Tract: (formerly part of a 32,000-acre tract purchased for the purpose of removing submarginal land from cultivation). 1,800 acres leased by the University of Maryland for recreation with emphasis on use by 4-H clubs and other organized groups for educational and demonstrative purposes. (Also called Pleasant Valley Recreation Center).

D

- Deep Creek: branch of Youghiogheny River, mouth 1/2 miles north of Swallow Falls.

- Deep Creek Lake:** artificial lake about 7 miles northeast of Oakland, dam completed in 1925; built as source of hydroelectric power; lake covers about 4,500 acres, has over 65 miles of shoreline and, with over 450 summer homes, is most important recreational center in Western Maryland; on Route 219.
- Deer Park:** incorporated town, 4-1/2 miles northeast of Oakland; elevation 2,450 feet; population 300+; P. O., on Baltimore and Ohio Railroad and on Routes 38-41.
- Detmold Hill:** spur of Big Savage Mountain, on Allegany and Garrett County boundary, 1-3/4 miles west of Lonaconing; elevation 2,340 feet.
- Dobbin:** former settlement 1-1/2 miles southwest of Wilson; elevation 2,600 feet; on North Branch Potomac River.
- Dodson:** former mining village, 2 miles southwest of Kitzmillerville, on North Branch Potomac River; elevation 1,820 feet; population 200+.
- Dog Ridge:** from 1-1/2 miles west of Sang Run (village) extends northwest into West Virginia; elevation 2,700-2,900 feet.
- Double Lick Run:** branch of Blackhawk Run, mouth 3-1/2 miles south of Bittering.
- Douglass Run:** branch of Cherry Creek, mouth 1 mile south southwest of Gortner.
- Dry Run:** branch of Savage River, mouth 1-3/4 miles northeast of Floyd.
- Dunkard Lick Run:** branch of Youghiogheny River, mouth 2 miles northwest of Oakland.

E

- Eagle Rock:** summit in Great Backbone Mountain, 2-1/2 miles east southeast of Deer Park; elevation 3,162 feet.
- Edgewood:** settlement, 1/2 mile southeast of Hutton, on Baltimore and Ohio Railroad; elevation 2,520 feet.
- Elbow Mountain:** between Savage River and Pine Swamp Run, 6 miles north of Bloomington; elevation 2,820 feet.
- Elder:** settlement, 3 miles southeast of Friendsville; elevation 2,480 feet.
- Elklik Run:** branch of Savage River, mouth 3-1/4 miles southeast of New Germany.
- Emberson Hill:** 1-3/4 miles northwest of Friendsville; elevation 2,140 feet.

Empire: former mining settlement, on North Branch Potomac River, 2 miles west of Bloomington.

Eagle Mill: 2 miles northeast of Accident, on Bear Creek; elevation 2,100 feet.

F

Fair Sweep: former mining settlement, 2-1/4 miles southeast of Crellin; elevation 2,640 feet.

Fearer: settlement, 3 miles northwest of Friendsville; population 60+; elevation 2,210 feet; on Route 42.

Feik Run: branch of Bear Creek, mouth 2-1/4 miles northwest of Accident.

Fike: settlement, 4-1/2 miles northwest of Friendsville; elevation 1,820 feet.

Finzel: village, 4-1/4 miles northwest of Frostberg; population 50+; elevation 2,560.

Fish Hatchery: on Bear Creek, 1 mile east of Route 219 on Route 42.

Floyd: settlement, 5 miles northwest of Bloomington on Baltimore and Ohio Railroad; elevation 1,693 feet.

Folly Run: branch of North Branch Potomac River, mouth 3 miles southwest of Bloomington.

Fort Pendleton: 1/2 mile west of Gorman; elevation 2,675 feet.

Fourmile Ridge: beginning at junction of Savage and Little Savage Rivers and extending northeast for 7 miles; elevation 2,900 feet.

Fox Run: branch of Cherry Creek, mouth 2 miles south of Gortner.

Franklin Hill: 2 miles north of Bloomington; elevation 2,260 feet.

Franklin Mines: 2-1/2 miles north of Bloomington; elevation 1,020 feet.

Frankville: station on Baltimore and Ohio Railroad, about 5 miles northwest of Bloomington.

Frazee Ridge: 3/4 mile northeast of Asher Glade; elevation 2,220 feet.

Friendsville: incorporated town, on Youghiogheny River, 5 miles northwest of Accident; elevation 1,500 feet; population 600+; P. O., on Route 52.

Frozen Camp Run: branch of Cherry Run, mouth 1 mile west of Gortner.

G

Gap Hill: just north of Sang (Ginseng) Run.

Gap Run: branch of Youghiogheny River, mouth 1 mile north of Sang Run village.

George Hill: 2 miles southeast of Accident; elevation 3,000 feet.

Ginseng Hill: just east of Sang Run village and Youghiogheny River.

Ginseng Run or Sang Run: branch of Youghiogheny River, Sang Run village at mouth.

Glade Run: branch of North Branch Potomac River, mouth 1-1/4 miles northeast of Gorman.

Gnegy Church: settlement, 3 miles southwest of Red House; elevation 2,550 feet; on Route 219.

Gorman: mining village, on North Branch Potomac River, on Western Maryland Railroad, and Routes 50 and 560; population 140+; elevation 2,312 feet.

Gortner: village, 4 miles southwest of Oakland, on Route 219; elevation 2,425 feet.

Grantsville: incorporated town, on Routes 40, 219, 417, 495; population 500+; elevation 2,350 feet.

Great Backbone Mountain: extends northeast-southwest through southeastern part of County, northwest of North Branch of Potomac River, crest 2,800-3,400 feet (also Backbone Mountain).

Green Glade Run: branch of Deep Creek Lake, lower course forms southeastern arm of lake.

Guard's Hill: 2-1/4 miles north of Selbysport, on east side of Youghiogheny Reservoir; elevation 1,920 feet.

Gum Hill: 1 mile north-northeast of Asher Glade.

H

Halls Hill: southwestern extension of Roman Nose (mountain), 2 miles north of Oakland; elevation 2,780 feet.

Hamilton Island: in North Branch Potomac River, 2 miles southwest of Bloomington; elevation 1,100 feet.

Hauser: settlement, 2-1/2 miles southwest of Red House on Route 219; elevation 2,540 feet.

Herrington Manor: recreational center in Swallow Falls State Forest, cabins, etc., about 4 miles northwest of Oakland.

Herrington Run: branch of Youghiogheny River, mouth 4 miles northwest of Oakland.

High Rock: summit on Big Savage Mountain, 5 miles northwest of Bloomington; elevation 3,000 feet.

Hinebaugh: settlement, 3 miles southwest of Friendsville; elevation 2,140 feet.

Hoop Pole Ridge: beginning at Oakland, just north of Little Youghiogheny River and extending 8-1/2 miles northeastward to Deep Creek Lake; elevation 2,985 feet.

Hoyes Run: settlement, 4 miles southwest of Accident; elevation 2,612 feet, (also called Johnstown locally).

Hoyes Run: branch of Youghiogheny River, mouth 3-3/4 miles southwest of McHenry.

Hoyes Run (Sines): village on Youghiogheny River.

Hutton: village, 4-1/2 miles west of Oakland on Baltimore and Ohio Railroad and Route 39; population 100+; elevation 2,465 feet.

I - J

Jenkins Hill: bordered by Savage River, Bear Pen Run, and Poplar Lick Run; elevation 2,640 feet.

Jennings: village, 4 miles south-southwest of Grantsville on Casselman River Railroad; population 150+; elevation 2,260 feet (Fire Clay plant).

K

Kaese Mill: on Bear Creek, 3/4 mile east of Route 219 on Route 42; elevation 2,100 feet.

Kearney: settlement, on Route 639, 2-1/2 miles northwest of Bradshaw; elevation 2,742 feet.

Kelso Gap: in Backbone Mountain, 3 miles southeast of Mountain Lake Park, on Route 560; elevation 2,990 feet.

Kempton: mining village, southwestern corner of County, on spur of Western Maryland Railroad; population 500+; elevation 2,750 feet.

Kendall: former settlement, 2-1/2 miles south of Friendsville, on the east side of Youghiogheny River; elevation 1,600 feet, (also known as Krug).

Keyser: village about 5-1/4 miles west of Grantsville, at the junction of Routes 219 and 40; elevation 2,880 feet, (also called Keyser's Ridge on some maps).

Kitzmillerville: incorporated mining town on North Branch Potomac River, 12 miles east-southeast of Oakland (18 by road), on Route 38; population 870+; elevation 1,100 feet.

L

Lake Louise: artificial lake on Puzzley Run, 1 mile southeast of Keyser's Ridge; elevation 2,567 feet.

Laurel Run: rising in Big Savage Mountain in Garrett County, flowing into George's Creek at Moscow Mills, Allegany County.

Laurel Run: branch of Buffalo Run, mouth 1 mile southeast of Asher's Glade (in northwestern part of County).

Laurel Run: branch of North Branch Potomac River, mouth at Schell.

Laurel Run: branch of North Branch Potomac River, mouth 3/4 mile south of Wilson.

Laurel Run: branch of Youghiogheny River, mouth 1-3/4 miles northwest of Elder.

Laurel Run: branch of Youghiogheny River, mouth at Crellin.

Lewis Knob: 3 miles southwest of Sang Run Village; elevation 2,960 feet.

Little Buffalo Run: branch of Buffalo Run, mouth 2-1/2 miles west of Friendsville.

Little Laurel Run: branch of South Branch of Casselman River, mouth 1/4 mile south of Jennings.

Little Savage Mountain: running parallel to and northwest of Big Savage Mountain for 4 miles to Pennsylvania Boundary; elevation 2,840 feet.

Little Savage River: branch of Savage River, mouth 4-1/4 miles southeast of New Germany; elevation 1,940 feet.

Little Shade Run: branch of Big Shade Run, mouth 1 mile southwest of Grantsville.

Little Youghiogheny River: branch of Youghiogheny River, mouth 1-1/4 miles northwest of Oakland.

Loch Lynn Heights: incorporated town, 1/2 mile south of Mountain Lake Park, on Routes 51 and 560; population 350+; elevation 2,420 feet.

Locust Grove: settlement, 3 miles west of Friendsville; elevation 2,097 feet.

Lookout Hill: also called Observatory Hill on some maps - $3/4$ mile east of Deer Park town; elevation 2,767 feet.

Lostland Run: branch of North Branch Potomac River, mouth 3 miles east of Tasker Corners.

M

Manor No. 1: mining village, 1 mile south of Vindex, on Route 38; elevation 2,150 feet.

Maplekiln Run: branch of Crabtree Creek, mouth $2-1/2$ miles northeast of Swanton.

Marsh Hill: northwest of Deep Creek Lake; elevation 3,080 feet.

Marsh Run: branch of Deep Creek Lake, mouth at McHenry.

Maynardier Ridge: spur of Meadow Mountain, $3-1/2$ miles south of Grantsville; elevation 2,780 feet.

McHenry: village at north end of Deep Creek Lake, on Route 219; population 50+; elevation 2,475 feet.

Meadow Mountain: extending northeast from Deep Creek Lake into Pennsylvania; elevation 2,800-3,000 feet.

Meadow Mountain Run: branch of Deep Creek Lake, mouth 1 mile northeast of Glendale Bridge.

Merrill: settlement at confluence of Savage River and Elk Lick Run, 4 miles southeast of New Germany; elevation 1,720 feet.

Middle Fork Creek: branch of Crabtree Creek, mouth $1/2$ mile northeast of Floyd.

Middle Ridge: spur of Red Ridge, between Big Run and Monroe Run, 4 miles north of Floyd; elevation 2,620 feet.

Mill Run: rising on Big Savage Mountain, Garrett County, and flowing into George's Creek $1-1/2$ miles south-southwest of Barton, Allegany County.

Mill Run: flows into Youghiogheny Reservoir 3 miles north of Selbysport.

Miller Run: branch of Big Run, mouth $3-1/4$ miles southeast of Bittering.

Miller Run: branch of Youghiogheny River, mouth 3 miles north of Oakland.

Mineral Spring: settlement on Mill Run, 3 miles northwest of Selbysport; elevation 1,660 feet.

Monkey Lodge Hill: $2-1/2$ miles northwest of the southeastern end of Deep Creek Lake (or just southwest of Contrary Knob); elevation 2,660 feet.

Monroe Run: branch of Big Run, mouth 3-1/4 miles northeast of Floyd.

Moon Ridge: spur of Backbone Mountain, lying between South Fork and North Fork Branches, and 1 mile northwest of Wilson; elevation 2,920 feet.

Mount Nebo: between Crabtree Creek, Dry Run, and Middle Fork, and 2 miles north of Floyd; elevation 2,604 feet.

Mount Zion Church: settlement, 1-3/4 miles northeast of Vindex; elevation 2,698 feet.

Mountain Lake Park: incorporated town, 2 miles southeast of Oakland, on Baltimore and Ohio Railroad and Routes 41 and 560; population 550+; elevation 2,405 feet.

Muddy Creek: branch of Youghiogheny River, mouth at Swallow Falls.

Mudlick Run: branch of Savage River, mouth 1-1/4 miles southeast of Avilton.

Murley Run: branch of Herrington Run, mouth 4-1/2 miles northwest of Oakland.

N

Ned Run: flows into Pine Swamp on West Virginia boundary, 4 miles southwest of Sang Run village.

Negro Mountain: West of Meadow Mountain, beginning at Deep Creek Lake and extending northeast into Pennsylvania; elevation 3,082 feet.

Nethken Run: local name for one of several small runs that flow into Pine Swamp, 4 miles southwest of Sang Run village.

New Germany: recreational center for Savage River State Forest, 3-1/2 miles southeast of Jennings; elevation 2,471 feet.

Niles Mill: settlement on Mill Creek, 3/4 mile northeast of Mineral Spring; elevation 1,800 feet.

North Branch: of Casselman River, mouth 2-1/4 miles southwest of Grantsville.

North Branch Potomac River: southern bank forms boundary between Garrett County, Maryland, and Grant and Mineral Counties, West Virginia. (Joins South Branch near Oldtown, Allegany County, about 15 miles southeast of Cumberland).

North Fork Crabtree Creek: joins South Fork at Swanton.

North Fork: branch of Sand Run, mouth 1/2 mile southwest of Wilson.

North Glade Run: eastern tributary of Deep Creek Lake.

Nydegger Run: branch of North Branch Potomac River, mouth at Gorman.

O

- Oak Shoals:** shoals in the Youghiogheny River, 2-3/4 miles south of Swallow Falls.
- Oakland:** incorporated town and County seat, on Little Youghiogheny River, on Baltimore and Ohio Railroad and Routes 219, 39, 41, 560; population 1,600+; elevation 2,460 feet.
- Oakton:** settlement on Route 40, near Pennsylvania boundary, 4 miles northwest of Keyser.
- Observatory Hill:** also Lockout Hill, 3/4 mile east of Deer Park town; elevation 2,767 feet.
- Ottaway:** former settlement, 1/2 mile south of Hutton, on Baltimore and Ohio Railroad and Route 39; population 175+; elevation 2,500 feet.

P

- Pawn Run:** tributary and arm of Deep Creek Lake, mouth 2-3/4 miles southeast of Thayerville.
- Pea Ridge:** spur of Red Ridge, bordering Savage River on west, and between Bluelick and Mudlick Runs; elevation 2,770 feet.
- Peapatch Ridge:** spur of Red Ridge, bordering Savage River on west, and between Big and Bear Pen Runs; elevation 2,580 feet.
- Phoenix Hill:** 4 miles northeast of Bloomington; elevation 2,040 feet.
- Pickell Hill:** on border of Allegany and Garrett Counties, 3 miles west-southwest of Lonaconing, Allegany County; elevation 2,080 feet.
- Pine Hill:** spur of Meadow Mountain, bordered by Middle Fork Creek, Blackhawk and Double Lick Runs; elevation 2,740 feet.
- Pine Swamp:** on boundary between Garrett County and Preston County, West Virginia, 3 miles southwest of Sang Run village.
- Pine Swamp Run:** branch of Savage River, mouth 2-1/2 miles southwest of High Rock.
- Piney Grove:** village on Route 40, 6 miles east of Grantsville; elevation 2,650 feet.
- Piney Mountain:** west of Youghiogheny River, between Hoyer and Sang Runs; elevation 2,780 feet.
- Piney Run:** branch of Muddy Creek, mouth 1 mile east of Browning Mill.
- Pleasant Valley:** important farming area south of Oakland and Mt. Lake Park.

Pleasant Valley Recreation Center: including Cunningham Lake, organized camping and day use, picnic tables, fireplaces, etc., 4-1/2 miles southwest of Bittering on Route 495, covers 1,800 acres, under supervision of University of Maryland; elevation in tract varies from 2400-2,800 feet.

Pleasant Valley Run: branch of North Branch of Casselman River, rising in Meadow Mountain, 4-1/4 miles southwest of Bittering.

Point Ridge: bordering Savage River on west, and between Jenkins Hill and Poplar Lick Run; elevation 2,660 feet.

Poplar Lick Run: branch of Savage River, mouth northeast of Point Ridge.

Potomac State Forest: over 10,000 acres under jurisdiction of State Department of Forestry, in southeastern part of County, between Gorman and Kitzmiller, and east and southeast of Mt. Lake Park.

Puzzley Run: rising in Negro Mountain, 1 mile southeast of Keyser and flowing northward into Pennsylvania.

Q - R

Reason Run: branch of Youghiogheny River, head 1 mile northeast of Asher Glade, flowing northward into Pennsylvania.

Red Oak Run: branch of Laurel Run, mouth 3 miles southwest of Wilson.

Red Ridge: parallel to Meadow Mountain on east; elevation 2,760 feet.

Red Run: branch of Big Piney Run, mouth 2-3/4 miles northwest of Piney Grove.

Redhouse: settlement at intersection of Routes 50 and 219; elevation 2,557 feet.

Rhodes Hill: spur of southwestern end of Big Savage Mountain, 2 miles southwest of High Rock; elevation 2,720 feet.

Ridgley Hill: 4 miles southeast of Keyser; elevation 2,617 feet.

River Hill: 1 mile west of Sang Run village; elevation 2,700 feet.

River View Hill: 3 miles southwest of Friendsville; elevation 2,200 feet.

Rock Run: branch of Buffalo Run, mouth 1 mile south of Fearer (or Locust Grove).

Roman Nose Mountain: 4-1/2 miles northeast of Oakland; elevation 3,140 feet.

Roth Rock: mountain, 3 miles south of Redhouse; elevation 3,340 feet.

Round Glade Run: branch of Youghiogheny River, mouth 2 miles south of Swallow Falls.

Roundpine Swamp Run: branch of Muddy Creek (rising in West Virginia), mouth near County line, 1-1/2 miles northwest of Browning Mill.

Rush Hill: 1 mile northwest of Friendsville; elevation 1,980 feet.

Rush Run: branch of Buffalo Run, mouth 1 mile north of Friendsville.

S

St. John Rock: summit on Big Savage Mountain, 2-1/4 miles northwest of Frostburg; elevation 2,930 feet.

Salt Block Mountain: spur of Meadow Mountain, 2-3/4 miles southeast of Grantsville; elevation 2,768 feet.

Saltblock Run: branch of Youghiogheny River, mouth 1-1/4 miles north of San Run village.

Sampson Rock: near northeast corner of County, at head of Savage River, 1 mile southeast of Finzel; elevation 2,942 feet.

Sand Run: branch of North Branch Potomac River, mouth at Wilson.

Sand Spring: settlement, 3 miles west-northwest of Friendsville; elevation 2,140 feet.

Sang Run: branch of Youghiogheny River, mouth at Sang Run village.

Sang Run: village on Youghiogheny at mouth of Sang Run, 6 miles below Swallow Falls; population 100+; elevation 1,990 feet.

Sausman Mine: on Mill Run, 1/2 mile northeast of Mineral Spring.

Savage River: branch of North Branch Potomac River, mouth at Bloomington.

Savage River State Forest: over 47,000 acres of forest land on crests and steep slopes of Negro Meadow and Big Savage Mountains.

Savagelick Run: branch of Crabtree Creek, mouth 2 miles northeast of Swanton.

Schell: mining settlement on North Branch Potomac River, at mouth of Laurel Run, 2-3/4 miles southeast of Tasker Corners; elevation 1,975 feet.

Schoolhouse Run: branch of Casselman River, mouth 1-1/4 miles southeast of Grantsville.

Selbysport: village, 2 miles northeast of Friendsville, on east bank of Youghiogheny Reservoir; population 200+; elevation 1,425 feet.

Shallmar: mining town on North Branch Potomac River, 1-3/4 miles southwest of Kitzmillersville; population 350+; elevation 1,820 feet.

Shields Run: branch of North Branch Potomac River, mouth 2-1/2 miles southwest of Gorman.

Short Run: branch of North Branch Potomac River, mouth at Shallmar.

Sickle Hill: on boundary of Garrett County and Preston County, west Virginia, 2 miles southwest of Ashers Glade (near northwest corner of County); elevation 2,400 feet.

Sines (Hoyes Run): settlement on Youghiogheny River, at mouth of Hoyes Run; elevation 2,080 feet.

Skipnish: former settlement on Baltimore and Ohio Railroad, 3-1/2 miles west of Oakland; elevation 2,500 feet.

Slaubaugh Run: branch of Casselman River, mouth 1-1/4 miles northeast of Grantsville.

Snaggy Mountain: on Garrett County and Preston County (West Virginia) boundary, 4 miles west of Swallow Falls; elevation 3,040 feet.

Snowy Creek: branch of Youghiogheny River, mouth at Crellin.

Solomon Ridge: between Meadow Mountain and Savage River, and bordered by Monroe and Dry Runs, 2 miles north of Floyd; elevation 2,586 feet.

South Branch: of Bear Creek, mouth 1-1/4 miles southeast of Friendsville.

South Branch: of Casselman River, mouth 2-1/4 miles southwest of Grantsville.

South Branch: of Laurel Run, mouth 3 miles northwest of Friendsville.

South Fork Branch: of Sand Run, mouth 1/2 mile northwest of Wilson.

South Fork Crabtree Creek: joins North Fork Crabtree Creek at Swanton.

Spaelman Mills: formerly at mouth of Mill Run, 2-1/4 miles north of Selbysport.

Spiker Run: branch of Casselman River, mouth 1-1/2 miles southwest of Grantsville.

Springlick Run: branch of Crabtree Creek, mouth 4 miles northeast of Swanton.

Stabaugh Run: see Slaubaugh Run.

Steyer (Stoyer): mining settlement on North Branch Potomac River and Western Maryland Railroad, 3 miles northeast of Gorman; elevation 2,300 feet.

Stoney Hollow: branch of North Branch Potomac River, mouth 2 miles east of Vindex.

Strecker: settlement on Baltimore and Ohio Railroad, 2-1/4 miles northeast of Swanton; elevation 2,060 feet.

Sunnyside: settlement on Route 219, 2 miles southwest of Gortner; population 50+; elevation 2,500 feet.

Swallow Falls: in the Youghiogheny River, 8 miles north of Oakland.

Swallow Falls State Forest: north of Oakland and between Youghiogheny River and West Virginia boundary, covers 5,900 acres, with elevations between 2,360 and 2,960 feet, 15 miles motor roads, 3 picnic areas, picnic tables and fireplaces, hiking trails, cabins, also 20-acre tract of virgin hemlock, one of last original stands.

Swamp Run: branch of Little Savage River, mouth at the northeast end of Elbow Mountain.

Swanton: village on Baltimore and Ohio Railroad, and junction of Routes 135 and 495, 6-1/4 miles northeast of Deer Park; population 125+; elevation 2,290 feet.

T

Table Rock: summit on Backbone Mountain, 2 miles southeast of Redhouse (village); elevation 3,100 feet.

Tarklin Run: see Tarkill Run.

Tarkill Run: branch of Casselman River, mouth 4 miles southeast of Keyser; elevation 2,500 feet.

Tasker Corners: settlement on Trout Run, 2-1/2 miles northeast of Kearney; elevation 2,646 feet.

Teen Glade: open way through woods between Herrington and Toliver Runs, 1/2 mile west of Youghiogheny River; elevation 2,460 feet.

Thayerville: settlement on Route 219, on Deep Creek Lake, 6 miles north of Deer Park; elevation 2,493 feet.

The Dunhill: summit between North and South Branches of Casselman River, 4 miles north of Bittering; elevation 2,780 feet.

The Elbow: summit between Savage River and Big Savage Mountain, 4 miles southeast of New Germany; elevation 2,640 feet.

The Little Mountain: northwest of, and parallel to, Great Backbone Mountain, 4 miles southeast of Oakland; elevation 2,920 feet.

Thomas Ridge: near northwestern corner of County; elevation 2,360 feet.

Thrufork Run: branch of North Branch Potomac River, mouth 3 miles northeast (below) Kitzmillersville; elevation 1,600 feet.

Toliver Run: branch of Youghiogheny River, mouth at Swallow Falls; elevation 2,550 feet.

Tom Ridge: 4-1/2 miles north-northeast of Swanton; elevation 2,600 feet.

Toms Lick Run: branch of Little Youghiogheny River, mouth at Deer Park; elevation 2,484 feet.

Trap Run: branch of Youghiogheny River, 3 miles south of Kendall; elevation 2,500 feet.

Trout: settlement on Trout Run, 1-1/2 miles northwest of Tasker Corners; elevation 2,678 feet.

Trout Run: branch of Little Youghiogheny River, mouth just southwest of Mountain Lake Park; elevation 2,400 feet.

Trout Run: branch of Laurel Run, mouth 1 mile south of Tasker Corners; elevation 2,650 feet.

Truesdell Heights: hill, 1-1/2 miles northeast of Deer Park; elevation 2,809 feet.

Turkey Lodge Hill: 2 miles southeast of New Germany, between Elklick and Blacklick Runs; elevation 2,640 feet.

Twomile Run: branch of Big Piney Run, mouth 1 mile east of Piney Grove; elevation 2,424 feet.

U - V

Vindex: mining village on Threefork Run, 2 miles north of Kitzmillersville, on spur of Western Maryland Railroad; population 250+; elevation 1,900 feet.

W

Wallman: former settlement (mining) between Bradshaw and Steyer, on Western Maryland Railroad; population 200+; elevation 2,200 feet.

Walnut Hill: between Christley and Bluelick Runs, 1-1/2 miles northwest of Avilton; elevation 2,770 feet.

Warnick Point: spur of Elbow Mountain, projecting toward Savage River, 1 mile south of Merrill; elevation 1,700 feet.

Warnick Run: branch of Savage River, between The Elbow and Warnick Point.

Weber: settlement, 1-1/2 miles southeast of Oakland on Route 219 and Baltimore and Ohio Railroad; elevation 2,400 feet.

White Meadow Run: branch of Cherry Creek, mouth 1-1/2 miles southeast of Crellin; elevation 2,600 feet.

White Rock Glade: wide valley 3 miles northwest of Sang Run village; elevation 2,280 feet.

White Rock Run: branch of Youghiogheny River, 2-1/2 miles northwest of Sang Run village; elevation 2,000 feet.

Whiteoak Spring Run: branch of Muddy Creek, mouth 1 mile west of Browning Mill; elevation 2,700 feet.

Whites Knob: mountain, 2-1/2 miles west-southwest of Sang Run village; elevation 2,940 feet.

Wilson: settlement, 1 mile northeast of Altamont on Baltimore and Ohio Railroad and Route 38; elevation 2,560 feet.

Wilson: mining settlement on North Branch Potomac River at mouth of Sang Run, 4-1/2 miles southwest of Gorman; elevation 2,500 feet.

Winding Ridge: mountain extending from Bear Creek, 1-1/4 miles southeast of Friendsville, in northeast direction to Pennsylvania line near Oakton; elevation 2,775 feet.

Wolf Den Run: branch of North Branch Potomac River, mouth 1 mile west of Kitzmillersville; elevation 1,900 feet. (also Wolfden Run on some maps).

Wolf Gap: in Big Savage Mountain, 2 miles south-southeast of Finzel; elevation 2,720 feet.

Wolf Swamp: between Meadow Mountain and Red Ridge, beginning 1/4 mile north of New Germany and extending northeasterly to 1 mile northwest of Piney Grove; elevation 2,600 feet.

X - Y - Z

Youghiogheny Reservoir: extending from the Dam at Confluence, Pennsylvania southward to Friendsville in the valley of the Youghiogheny River. (Part of the Pittsburgh Flood Control Area).

Youghiogheny River: branch of Monongahela River, drains western part of Garrett County.

SELECTED WEATHER STATIONS IN MARYLAND

Station	County	Elev. Feet	Location Features
Annapolis	Anne Arundel	4	Vicinity low and flat. At mouth of Severn River near Chesapeake Bay.
Baltimore	Independent City	14	In center of city, near Customs Building.
Cambridge	Dorchester	20	Vicinity low and flat. Near Choptank River about 10 Mi. E. of Chesapeake Bay.
College Park	Prince Georges	160	On University of Maryland Campus. Open, rolling country.
Crisfield	Somerset	5	On east shore of Little Annemessex River. 3 Mi. from Chesapeake Bay.
Cumberland	Allegany	623	In valley of North Branch of Potomac. Surrounded by high hills and mts.
Deer Park	Garrett	2,450	In open, rolling country, 4-1/4 miles E. of Oakland.
Elkton	Cecil	28	On Elk River. Representative of upper Eastern Shore.
Fallston	Harford	450	Flat, open country. Inner coastal plain and upper Chesapeake Bay.
Frederick	Frederick	297	Typical of Piedmont and Monocacy Valley.
Friendsville	Garrett	1,501	On terrace in Upper Youghiogheny Valley.
Frostburg	Allegany	2,005	On eastern slope of Big Savage Mountain.
Grantsville	Garrett	2,351	Rolling plateau between two mountain ridges.
Hancock	Washington	428	Potomac Valley. In ridge and valley section.
Oakland	Garrett	2,351	Open, rolling country. 1-1/4 Mi. S.E. of Oakland.
Princess Anne	Somerset	17	Low, flat. Southern Eastern Shore. 10 Mi. E. of Chesapeake Bay.
Sines (Deep Creek)	Garrett	2,030	Near power plant in Youghiogheny Valley.
Solomons	Calvert	20	Low, flat. At mouth of Patuxent River, on Chesapeake Bay.
Westernport	Allegany	1,000	In Potomac Valley. Just north of Savage River mouth.
Westminster	Carroll	770	Eastern Piedmont. Dissected, rolling upland.

AVERAGE MONTHLY AND ANNUAL TEMPERATURES
FOR 35-YEAR PERIOD FOR SELECTED STATIONS IN MARYLAND

(in degrees Fahrenheit)

Station	J	F	M	A	M	J	J	A	S	O	N	D	Year
Annapolis	34.8	35.1	43.5	53.3	64.3	73.3	77.7	76.1	69.7	58.1	47.1	37.3	55.8
Baltimore	34.9	35.4	43.2	53.5	64.4	73.1	77.7	75.5	69.1	58.0	46.7	37.4	55.7
Cambridge	36.4	36.1	45.2	54.6	65.1	73.4	77.8	76.1	70.4	59.0	47.9	38.2	56.7
College Park	34.1	34.6	43.8	52.9	62.8	71.4	75.6	73.8	68.0	56.2	45.1	36.2	54.5
Crisfield	38.6	39.2	46.7	54.8	64.5	73.6	77.6	76.3	71.8	60.5	50.0	40.6	57.9
Cumberland	31.7	33.2	40.4	52.0	62.8	70.7	74.5	72.5	66.0	54.5	42.9	34.2	52.9
1/Deer Park	26.5	23.5	35.8	44.9	56.5	64.1	67.4	66.4	60.5	48.4	37.7	28.6	46.7
Elkton	34.7	32.8	42.2	51.3	62.7	71.8	76.3	74.3	68.1	55.7	46.0	35.3	54.3
Fallston	31.5	32.0	40.2	50.7	61.4	69.7	74.2	72.3	66.3	55.2	43.8	34.1	52.6
Frederick	32.7	33.3	42.5	52.9	63.7	72.1	76.7	74.2	67.8	55.9	44.5	34.8	54.3
Friendsville	30.7	31.3	38.3	47.4	56.9	65.2	69.2	67.4	62.9	51.5	40.8	32.1	49.5
Frostburg	30.6	30.7	39.2	49.5	59.8	67.7	71.8	70.1	64.7	53.9	42.0	32.0	51.0
Grantsville	27.7	27.0	36.4	45.8	56.4	63.7	68.0	66.4	61.1	50.0	39.0	29.5	47.6
Hancock	31.5	31.9	41.9	51.4	61.9	70.4	74.7	72.8	67.1	54.1	43.6	33.4	52.9
Oakland	28.8	28.3	36.8	46.0	55.8	63.7	67.3	65.9	61.0	49.5	38.5	29.8	47.6
Pr. Anne	37.2	37.0	45.4	53.9	62.9	71.2	76.1	74.5	68.9	57.5	47.5	38.7	55.9
Sines	29.4	28.1	35.4	44.8	55.5	63.7	67.9	65.7	60.0	48.1	38.2	29.8	47.2
Solomons	36.5	36.2	44.8	55.1	64.9	73.4	78.2	77.1	71.6	60.3	48.9	39.0	57.1
Westernport	31.9	32.5	42.1	51.7	62.0	69.5	73.7	72.1	66.8	55.0	43.4	33.6	52.9
Westminster	32.3	32.4	41.7	51.7	62.6	70.7	75.2	73.2	67.6	55.6	44.8	35.2	53.6

Maryland State Weather Service.

1/ 7-year period.

MONTHLY AND ANNUAL
MEAN MAXIMUM AND MEAN MINIMUM TEMPERATURES
FOR SELECTED MARYLAND STATIONS
(in degrees Fahrenheit)

Station	J	F	M	A	M	J	J	A	S	O	N	D	Year
Annapolis:													
Maximum	42.9	42.4	53.1	62.8	73.7	81.8	86.1	84.1	78.9	67.5	55.6	44.4	64.4
Minimum	27.6	26.5	35.5	44.4	55.1	64.1	68.9	67.8	62.1	50.1	39.6	30.3	47.7
Baltimore:													
Maximum	41.7	42.6	51.2	62.2	73.3	81.8	86.1	83.6	77.4	66.4	54.1	44.0	63.7
Minimum	27.9	28.2	35.1	44.7	55.4	64.3	69.3	67.4	61.1	49.5	39.3	30.8	47.8
Cambridge:													
Maximum	45.0	45.6	55.2	65.6	76.5	83.8	88.1	85.9	80.5	69.4	57.2	46.6	66.6
Minimum	28.1	27.7	35.5	44.0	53.9	62.7	67.8	66.0	60.2	48.8	38.6	30.2	47.0
College Park:													
Maximum	43.5	44.6	55.5	65.7	75.8	83.6	87.7	85.8	80.5	69.5	56.7	45.4	66.2
Minimum	23.7	23.7	32.4	40.1	50.0	59.4	64.1	62.2	55.8	43.1	33.4	25.6	42.8
Crisfield:													
Maximum	46.8	47.8	56.3	64.9	74.2	82.2	85.5	84.4	80.2	69.8	58.5	48.5	66.6
Minimum	30.3	30.6	37.2	44.8	54.8	65.1	69.6	68.3	63.4	51.2	41.5	32.8	49.0
Elkton:													
Maximum	43.4	43.7	54.1	63.8	74.2	81.4	85.8	83.9	78.9	68.1	56.3	45.4	64.9
Minimum	27.0	26.3	34.5	42.6	52.6	61.5	66.8	65.0	58.8	47.3	37.5	29.1	45.7
Fallston:													
Maximum	40.4	40.3	51.1	61.7	72.2	79.6	84.2	82.0	76.8	66.1	53.4	41.9	62.5
Minimum	24.4	23.2	32.0	40.7	50.9	59.7	64.5	63.4	57.1	45.8	38.0	26.5	43.8
Friendsville:													
Maximum	40.2	41.2	49.3	59.3	69.6	77.2	81.0	78.7	75.1	64.1	50.9	41.3	60.6
Minimum	21.1	21.5	27.4	35.3	44.2	53.2	57.5	56.0	50.8	38.9	30.8	23.0	38.3
Frostburg:													
Maximum	39.9	40.5	49.9	61.5	71.9	79.8	83.9	81.9	77.0	65.7	51.8	40.8	62.0
Minimum	21.3	20.8	28.4	37.5	47.7	55.5	59.8	58.1	52.4	42.1	32.2	23.4	39.9
Grantsville:													
Maximum	36.9	36.8	46.8	57.5	68.9	75.8	79.9	78.3	73.9	62.3	48.8	38.2	58.7
Minimum	18.4	17.4	26.0	34.1	43.9	51.6	56.0	54.6	48.3	37.6	29.1	20.9	36.5
Hancock:													
Maximum	41.6	42.7	53.7	65.5	76.6	84.6	88.8	86.5	81.1	68.2	55.1	43.4	65.6
Minimum	21.7	20.9	29.8	37.8	47.2	56.3	60.6	59.0	53.0	40.0	32.2	23.5	40.2
Oakland:													
Maximum	39.0	38.8	48.3	58.9	69.2	76.3	79.9	78.4	74.5	63.2	49.7	39.5	59.6
Minimum	18.6	17.8	25.3	33.1	42.1	50.7	54.7	53.6	47.5	35.7	27.3	20.2	35.6
Pr. Anne:													
Maximum	46.0	45.5	55.1	64.0	73.2	80.4	84.6	82.9	78.6	68.8	57.6	47.2	65.3
Minimum	27.0	26.4	34.4	41.9	51.6	60.8	66.4	64.7	58.1	45.6	35.8	28.2	45.1
Sines:													
Maximum	39.2	39.1	45.9	57.0	69.1	77.3	81.2	78.2	72.8	60.8	48.8	39.4	59.1
Minimum	19.6	17.2	24.8	32.7	41.9	50.0	54.5	53.2	47.3	35.3	27.7	20.2	36.2
Solomons:													
Maximum	43.9	44.0	53.6	63.0	73.9	81.8	86.3	84.9	79.4	68.5	56.6	46.2	65.2
Minimum	29.0	28.4	36.0	44.9	56.0	65.0	70.0	69.2	63.8	52.1	41.2	31.9	49.0
Westernport:													
Maximum	41.1	42.3	53.8	64.7	76.0	82.9	87.0	85.0	80.5	68.4	54.1	42.3	64.8
Minimum	22.7	22.6	30.8	38.7	48.1	56.2	60.4	59.1	53.2	41.7	32.7	25.0	40.9
Westminster:													
Maximum	41.1	41.4	52.1	63.1	74.1	82.7	86.7	84.4	79.0	66.7	54.4	43.4	64.1
Minimum	24.2	23.5	31.9	40.5	50.5	59.2	63.2	61.8	57.2	44.4	35.7	27.3	43.3

HIGHEST AND LOWEST TEMPERATURES RECORDED AND RANGE
FOR SELECTED STATIONS IN MARYLAND

(in degrees Fahrenheit)

Station	J	F	M	A	M	J	J	A	S	O	N	D	Year
<u>Annapolis:</u>													
High	74	79	88	90	95	99	105	106	98	89	85	71	106
Low	- 3	- 6	10	13	35	42	53	51	40	28	13	1	- 6
Range	77	85	78	77	60	57	52	55	58	61	72	70	112
<u>Baltimore:</u>													
High	74	83	88	94	98	101	104	105	101	92	82	73	105
Low	- 6	- 7	5	15	34	46	55	51	39	30	12	- 3	- 7
Range	80	90	83	79	64	55	49	54	62	62	70	76	112
<u>Cambridge:</u>													
High	76	83	91	93	100	102	106	104	98	91	82	71	106
Low	- 5	- 1	13	17	31	42	49	45	37	24	8	- 2	- 5
Range	81	84	78	76	69	60	57	59	61	67	74	73	111
<u>College Park:</u>													
High	76	84	91	97	97	102	107	106	101	94	83	76	107
Low	-26	-11	5	11	27	35	42	42	30	21	3	-12	-26
Range	102	95	86	86	70	67	65	64	71	73	80	88	133
<u>Crisfield:</u>													
High	70	78	82	90	90	94	100	97	94	87	78	69	100
Low	9	5	15	19	26	46	55	50	44	31	15	12	5
Range	61	73	67	71	64	48	45	47	50	56	63	57	95
<u>Cumberland:</u>													
High	74	77	90	97	101	102	106	109	99	95	82	76	109
Low	-11	- 7	0	9	31	34	45	43	32	21	5	- 5	-11
Range	85	84	90	88	70	68	61	66	67	74	77	81	120
<u>Elkton:</u>													
High	71	83	81	92	95	98	105	103	98	92	82	67	105
Low	- 5	2	12	24	33	35	48	44	35	23	7	5	- 5
Range	76	81	69	68	62	63	57	59	63	69	75	62	110
<u>Fallston:</u>													
High	74	79	82	91	94	97	104	103	96	92	81	69	104
Low	- 7	-14	- 1	10	30	42	49	47	33	24	9	- 6	-14
Range	81	93	83	81	64	55	55	56	63	68	72	75	118
<u>Frederick:</u>													
High	75	80	90	98	100	104	108	106	102	94	84	72	108
Low	-21	-12	0	13	30	38	48	45	31	23	7	-12	-21
Range	96	92	90	85	70	66	60	61	71	71	77	84	129
<u>Friendsville:</u>													
High	66	72	82	88	86	95	95	97	91	88	81	69	97
Low	-17	-10	- 1	1	27	31	38	31	27	15	- 8	- 8	-17
Range	83	82	83	87	59	64	57	66	64	73	89	77	114
<u>Frostburg:</u>													
High	70	74	82	92	92	95	101	104	99	90	80	72	104
Low	-14	-22	1	5	29	34	41	39	30	20	- 3	- 7	-22
Range	84	96	81	87	63	61	60	65	69	70	83	79	126
<u>Grantsville:</u>													
High	74	70	80	87	90	93	95	100	92	86	78	65	100
Low	-26	-22	- 7	- 3	22	29	34	33	25	14	-11	-15	-26
Range	100	92	87	90	68	64	61	67	67	72	89	80	126
<u>Hancock:</u>													
High	73	79	91	97	101	102	106	105	103	96	81	72	106
Low	-21	-18	- 4	7	27	30	41	38	30	17	- 3	- 6	-21
Range	94	97	95	90	74	72	65	67	73	79	84	78	127
<u>Oakland:</u>													
High	75	71	83	88	89	93	95	101	91	88	78	69	101
Low	-40	-29	-15	- 2	18	26	33	30	23	6	-16	-32	-40
Range	115	100	98	90	71	67	62	71	68	82	94	101	141
<u>Pr. Anne:</u>													
High	73	79	89	93	93	96	105	102	97	92	82	73	105
Low	- 8	-10	6	17	30	35	48	44	33	22	8	- 3	-10
Range	81	89	83	76	63	61	57	58	64	70	74	76	115
<u>Solomons:</u>													
High	73	78	89	89	100	99	103	104	99	93	80	71	104
Low	- 3	- 5	13	17	40	47	53	49	43	31	13	- 1	- 5
Range	76	83	76	72	60	52	50	55	56	62	67	72	109
<u>Westernport:</u>													
High	76	76	90	96	96	102	107	107	102	98	87	74	107
Low	-17	-13	- 3	7	28	32	41	38	28	16	- 2	- 8	-17
Range	93	89	93	89	68	70	66	69	74	82	89	82	124
<u>Westminster:</u>													
High	72	79	83	94	99	101	103	104	98	92	78	73	104
Low	-13	-16	3	9	29	38	46	44	34	23	7	- 3	-16
Range	85	95	80	85	70	63	57	60	64	69	71	76	120

Computed from Bulletin "W". U. S. Weather Bureau.

AVERAGE EARLIEST AND LATEST DATES
WITH TEMPERATURES OF 32°F., OR LOWER
FOR SELECTED STATIONS IN MARYLAND

Station	Latest in Spring	Earliest in Fall	Average Frost-Free Period (in days)	Latest in Spring	Earliest in Fall
Annapolis	Apr. 11	Oct. 30	203	May 12	Oct. 11
Baltimore	Apr. 7	Nov. 2	209	May 12	Oct. 1
Cambridge	Apr. 15	Oct. 31	199	May 12	Oct. 8
College Park	Apr. 26	Oct. 15	172	May 16	Sept. 23
Crisfield	Apr. 10	Nov. 6	210	Apr. 30	Oct. 21
Cumberland	May 1	Oct. 10	162	May 29	Sept. 6
Elkton	Apr. 23	Oct. 19	179	Apr. 30	Oct. 5
Fallston	Apr. 19	Oct. 20	184	May 12	Oct. 3
Frederick	Apr. 20	Oct. 18	181	May 16	Sept. 23
Friendsville	May 20	Oct. 1	134	June 15	Aug. 21
Frostburg	May 1	Oct. 7	159	May 29	Sept. 11
Grantsville	May 19	Sept. 28	132	June 24	Aug. 21
Hancock	May 7	Oct. 9	155	June 1	Sept. 11
Oakland	May 25	Sept. 26	124	June 24	Aug. 21
Princess Anne	Apr. 21	Oct. 16	178	May 15	Sept. 24
Sines	May 26	Oct. 2	129	June 15	Sept. 19
Solomons	Apr. 9	Nov. 8	213	May 12	Oct. 12
Westernport	May 6	Oct. 9	156	June 1	Sept. 19
Westminster	Apr. 24	Oct. 19	178	May 29	Oct. 5

Maryland State Weather Service.

AVERAGE MONTHLY AND ANNUAL PRECIPITATION
FOR 35-YEAR PERIOD FOR SELECTED STATIONS IN MARYLAND

(in inches)

Station	J	F	M	A	M	J	J	A	S	O	N	D	Year
Annapolis	3.55	3.23	3.79	3.70	3.52	4.32	4.53	4.96	3.46	3.14	2.57	3.54	44.33
Baltimore	3.43	2.87	3.46	3.47	3.24	3.53	4.13	4.82	3.18	2.99	2.41	3.26	40.79
Cambridge	3.58	3.19	4.01	3.66	3.34	3.88	4.24	5.14	3.03	3.31	2.61	3.38	43.37
College Park	3.23	2.81	3.50	3.42	3.53	4.02	3.92	4.41	3.21	2.70	2.40	3.20	40.35
Crisfield	3.21	3.37	3.34	3.58	3.13	3.77	4.15	4.88	2.61	3.01	2.34	3.55	40.95
Cumberland	2.68	2.34	3.02	3.09	3.33	4.12	3.08	3.80	2.63	2.54	1.95	2.71	35.29
Deer Park	4.01	3.56	3.95	3.92	4.60	4.93	4.27	4.24	3.00	3.15	2.58	3.90	46.21
1/Elkton	3.65	3.09	3.66	3.41	3.59	4.33	4.24	6.32	3.53	3.27	2.82	2.89	44.70
Fallston	3.57	3.11	3.58	3.68	3.29	4.10	4.16	5.18	3.65	3.42	2.75	3.60	44.09
Frederick	3.23	2.92	3.48	3.39	3.44	4.30	4.03	4.35	3.05	3.03	2.35	3.25	40.82
Friendsville	3.58	2.85	4.11	3.49	3.75	4.71	4.34	3.98	2.79	2.96	2.51	3.65	42.72
Frostburg	3.41	2.78	3.70	3.78	3.83	4.82	3.81	4.00	3.00	3.16	2.38	2.89	41.56
Grantsville	3.59	3.12	3.98	3.77	4.05	4.45	4.03	4.27	2.81	2.94	2.70	3.53	43.24
Hancock	2.55	2.28	3.10	3.43	3.18	4.82	3.30	3.74	2.83	3.16	1.96	2.71	37.06
Oakland	3.79	3.28	4.00	3.92	4.37	4.78	4.66	4.28	3.07	3.30	2.82	3.92	46.19
Pt. Anne	3.21	3.27	3.84	3.51	3.19	4.01	4.15	5.30	2.90	3.10	2.36	3.35	42.19
2/Sines	4.06	3.25	4.35	4.11	4.33	4.27	4.55	4.16	3.01	3.74	2.90	3.43	46.16
Solomons	2.82	2.59	3.32	2.98	2.86	3.12	4.13	4.21	2.64	2.39	1.84	2.72	35.62
Westernport	2.60	2.29	2.91	2.99	3.61	4.01	3.59	3.60	2.56	2.54	1.95	2.45	35.10
Westminster	3.43	3.12	3.50	3.32	3.41	4.18	4.05	4.89	3.70	3.11	2.25	3.37	42.33

Maryland State Weather Service.

1/ 12-year period.

2/ 13-year period.

PRECIPITATION -- MONTHLY AND ANNUAL AMOUNTS
OF THE DRIEST AND WETTEST YEARS ON RECORD
FOR SELECTED STATIONS IN MARYLAND

(in inches)

Station	J	F	M	A	M	J	J	A	S	O	N	D	Year
Annapolis:													
1907 W	3.85	3.55	3.45	4.12	8.02	7.85	5.09	5.01	10.95	3.43	6.19	5.08	66.59
1930 D	3.67	1.88	1.73	1.29	1.28	2.78	3.37	.21	.69	.85	1.23	2.18	21.16
Baltimore:													
1889 W	4.22	2.53	5.71	8.70	6.82	6.17	11.03	1.40	4.59	4.12	6.45	.61	62.35
1930 D	2.66	2.38	2.27	3.12	2.91	2.97	.64	.78	.37	.37	1.13	1.95	21.55
Cambridge:													
1903 W	4.71	6.56	6.94	3.20	1.81	4.36	4.70	7.15	3.04	5.97	1.83	4.27	54.54
1930 D	3.81	1.51	1.13	1.62	2.79	2.26	2.85	1.83	.70	1.17	1.55	2.41	23.63
College Park:													
1889 W	3.68	2.36	4.47	9.20	8.80	6.80	8.73	1.78	3.58	4.60	5.85	.26	60.11
1930 D	3.24	1.80	2.03	3.33	1.95	2.27	.71	.71	.91	.19	.77	1.99	19.90
Crisfield:													
1922 W	4.72	6.35	9.22	1.77	2.95	6.99	4.41	5.57	4.51	2.25	1.10	5.75	55.59
1930 D	2.95	1.45	2.10	1.90	2.99	2.57	1.72	.42	.52	2.20	1.31	3.85	23.98
Cumberland:													
1890 W	1.46	4.24	5.18	3.58	7.13	3.07	1.67	7.07	6.77	6.65	1.83	3.77	52.42
1930 D	.65	1.69	1.17	2.26	1.03	3.12	.58	1.87	1.51	.03	.73	3.47	18.11
Deer Park:													
1911 W	6.89	1.75	3.37	3.75	1.09	7.65	2.96	11.36	5.65	6.23	2.56	3.27	56.53
1895 D	6.50	.90	3.25	3.20	2.85	4.01	3.55	1.31	.50	.99	.94	1.50	29.50
Elkton:													
1928 W	2.36	3.93	2.60	5.30	2.90	6.22	7.24	13.61	4.77	1.15	1.30	1.84	53.22
1930 D	3.48	2.80	2.33	1.58	2.77	2.67	2.94	2.07	1.26	1.49	1.30	2.27	26.96
Fallston:													
1889 W	5.40	2.22	5.57	7.77	6.33	6.45	12.37	1.55	8.65	5.02	8.13	.71	70.17
1930 D	2.71	2.15	2.37	3.10	1.29	2.85	.47	.48	2.62	.41	1.51	2.12	22.08
Frederick:													
1915 W	7.35	5.06	1.07	.70	4.21	7.14	3.59	9.49	3.59	4.49	1.62	3.67	51.98
1930 D	1.98	1.81	2.26	2.87	1.10	2.67	.22	1.26	.58	.44	1.08	3.57	19.84
Friendsville:													
1927 W	3.14	5.22	3.01	5.55	4.60	4.77	3.74	4.71	1.20	5.04	3.73	4.38	49.09
1930 D	1.83	3.08	2.86	2.30	2.08	4.97	.76	2.57	1.87	.47	1.40	4.22	28.41
Frostburg:													
1901 W	2.36	1.25	4.26	7.97	9.56	6.02	5.49	5.02	2.83	.54	2.12	6.32	53.74
1930 D	1.30	1.58	1.57	2.79	1.20	3.93	.99	2.27	1.37	.10	1.41	3.50	22.01
Grantsville:													
1907 W	6.56	3.04	7.50	2.76	4.16	5.46	7.07	3.89	3.93	2.18	4.60	5.15	56.30
1930 D	1.95	3.05	3.07	2.86	2.09	5.37	.71	2.78	2.16	.48	1.43	3.57	29.52
Oakland:													
1911 W	8.17	1.75	4.18	3.77	2.09	6.02	2.63	12.73	5.58	5.63	2.39	2.64	57.58
1930 D	1.43	3.00	2.46	2.81	2.85	4.61	1.91	2.37	1.67	.61	1.34	4.35	29.41
Pr. Anne:													
1920 W	3.55	7.70	4.04	3.73	1.06	5.44	6.83	7.30	3.67	.93	5.82	3.73	53.80
1930 D	2.87	1.14	2.15	2.00	3.90	2.38	2.57	.50	2.16	2.06	1.40	2.04	25.17
Solomons:													
1906 W	1.62	3.68	4.66	1.34	1.89	5.73	6.11	8.91	3.60	4.23	1.72	2.48	45.97
1930 D	3.03	1.39	.65	1.64	3.33	3.80	1.59	.42	.95	1.42	.76	1.73	20.71
Westernport:													
1907 W	4.48	2.17	5.07	2.10	4.06	6.53	4.71	3.01	5.32	1.50	3.52	2.18	44.65
1930 D	.84	1.64	1.59	2.69	2.08	3.35	2.02	2.25	1.06	.19	1.23	2.53	21.47
Westminster:													
1901 W	2.87	.90	3.56	3.74	3.51	2.47	8.00	9.80	6.00	1.90	2.40	8.50	53.65
1930 D	2.75	2.29	3.09	3.01	1.63	4.99	.68	1.89	1.72	.54	1.11	3.46	27.16

Compiled from Bulletin "W", U. S. Weather Bureau.

W Wettest year on record

D Driest year on record.

AVERAGE MONTHLY AND ANNUAL SNOWFALL
FOR SELECTED STATIONS IN MARYLAND

(unmelted snow in inches)

Station	J	F	M	A	M	J	J	A	S	O	N	D	Year
Annapolis	6.5	7.0	3.4	.4						.1	.6	3.5	21.5
Baltimore	6.2	6.8	4.8	.8	T					T	.7	3.9	23.2
Cambridge	4.8	4.8	2.3	.3						T	.4	3.7	16.3
College Park	5.7	6.3	3.3	.4	T					.1	.5	3.0	19.3
Crisfield	1.7	4.6	1.1	.1						T	.3	2.4	10.2
Cumberland	8.1	8.9	5.4	1.5	T					.1	1.1	5.2	30.3
Elkton	4.6	7.5	4.1	.1						T	1.0	3.4	20.7
Fallston	6.9	7.3	4.2	1.4	T					.1	1.1	4.0	25.0
Frederick	7.4	8.3	4.6	.7	T					.1	.8	4.5	26.4
Friendsville	12.6	13.9	12.9	5.6	.2				T	.7	4.8	11.0	61.7
Frostburg	11.4	12.2	8.8	4.0	.1	T				.4	2.4	8.4	47.7
Grantsville	16.3	15.5	12.9	6.7	.2				T	1.2	5.6	11.8	70.2
Hancock	7.0	8.1	5.2	1.2	T					.2	.7	4.9	27.3
Oakland	14.6	14.7	13.0	5.5	.4				T	1.4	5.4	11.8	66.8
Pr. Anne	2.9	4.4	2.0	.3						T	.5	2.3	12.4
Sines	10.8	12.5	15.6	4.9	T				T	.5	7.7	11.7	63.7
Solomons	4.3	5.0	2.6	.3	T					T	.5	3.1	15.8
Westernport	9.2	8.2	6.3	2.4	T					.2	1.3	5.8	33.5
Westminster	7.5	8.8	5.9	.8	T					.1	1.1	3.9	28.1

Maryland State Weather Service.

AVERAGE MONTHLY AND ANNUAL NUMBER OF
DAYS WITH 0.01 INCH OR MORE OF PRECIPITATION
FOR SELECTED STATIONS IN MARYLAND

Station	J	F	M	A	M	J	J	A	S	O	N	D	Year
Annapolis	9	9	10	9	10	10	10	10	7	7	7	9	107
Baltimore	11	10	12	11	11	11	11	11	9	8	9	11	125
Cambridge	9	9	10	9	9	8	9	8	6	6	7	9	99
College Park	9	9	10	9	10	10	9	9	7	6	7	8	103
Crisfield	10	9	10	10	10	9	9	8	6	6	8	10	105
Cumberland	9	8	10	10	11	11	10	10	8	7	8	9	111
Elkton	9	9	11	9	11	8	10	10	9	7	8	9	110
Fallston	10	9	11	11	12	11	11	11	8	8	8	9	119
Frederick	10	10	11	11	12	11	11	11	8	9	8	10	122
Friendsville	13	12	14	12	12	10	10	10	8	9	11	14	135
Frostburg	12	10	13	12	12	12	11	12	9	9	9	11	132
Grantsville	13	12	13	12	12	12	12	11	8	8	10	13	136
Hancock	8	8	9	9	10	10	9	9	8	7	7	8	102
Oakland	16	14	15	15	14	14	13	12	10	11	12	15	161
Pr. Anne	10	9	10	9	9	9	10	9	7	6	7	9	104
Sines	17	15	18	14	14	12	12	12	10	11	13	15	163
Solomons	10	10	10	10	10	10	10	10	7	7	7	9	110
Westernport	10	8	10	10	10	11	11	10	8	7	7	9	111
Westminster	9	9	10	9	10	10	10	10	8	7	8	9	109

Maryland State Weather Service.

NOTE ON FOREST STATISTICS

"Forest Statistics for Western Maryland", released May, 1951, by Northeastern Forest Experiment Station, Upper Darby, Pa., and furnished by the Maryland Department of Research and Education, gives the following preliminary figures for Garrett County:

	<u>Acres</u>
Saw-timber stands of:	
more than 5,000 bd. ft. per acre	5,800
between 1,500 and 5,000 bd. ft. per acre	29,200
Pole-timber stands of:	
600 cu. ft. to 1,500 bd. ft. per acre	27,300
200 to 600 cu. ft. per acre	54,100
Sapling and seedling stands	15,800
Poorly-stocked stands	<u>22,700</u>
Total all stands	154,900

The above figures are based on the International Four-Inch Log Rule.
Total forest area is estimated at 296,000 acres.