# CHAPTER II

# DESCRIPTION OF THE STUDY AREA

## LOCATION

The study area is located in Fayette County in southwest Pennsylvania. Redstone Creek drains a 109 square mile area of central Fayette County. It originates three miles north of Hopwood near Chestnut Ridge and flows northwest 28 miles to the confluence with the Monongahela River at Brownsville. The northeastern portion of the Uniontown Syncline extends from the northeastern Redstone Creek Watershed boundary to Everson, and is defined by the Pittsburgh Coal seam outcrop. The southwestern portion of the syncline included in this study is located in the Browns Run Watershed between the Redstone Creek Watershed and the Georges Creek Watershed. The study area is shown on Figure 3.

Prominent communities of the study area are Everson and Connellsville in the northeast, Uniontown in the south, and Brownsville in the northwest.

## LOCATION OF SUBWATERSHEDS WITHIN THE PROJECT AREA

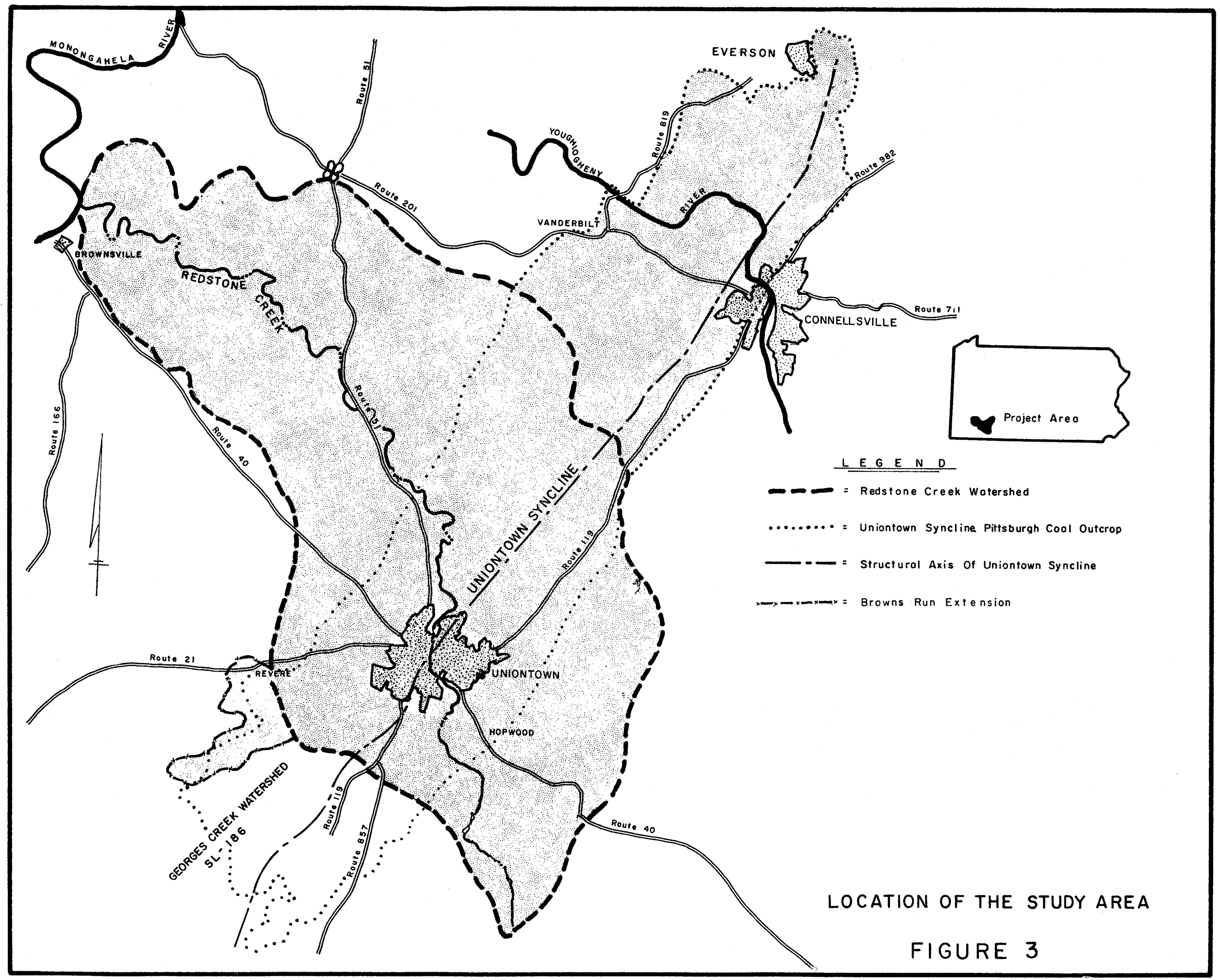
Of the 15 subwatersheds within the project area, nine drain into Redstone Creek, five into the Youghiogheny River, and one into the Monongahela River. The locations of these subwatersheds are shown on Figure 4.

The boundary of the Redstone Creek portion of the study area was based on the drainage area. The boundary of the Uniontown Syncline in the Youghiogheny Basin and the Browns Run Watershed was based on the geologic structure and, for the purpose of this report, was defined by the outcrop of the Pittsburgh Coal seam, as shown on Figure 3.

## POPULATION AND ECONOMIC CHARACTERISTICS

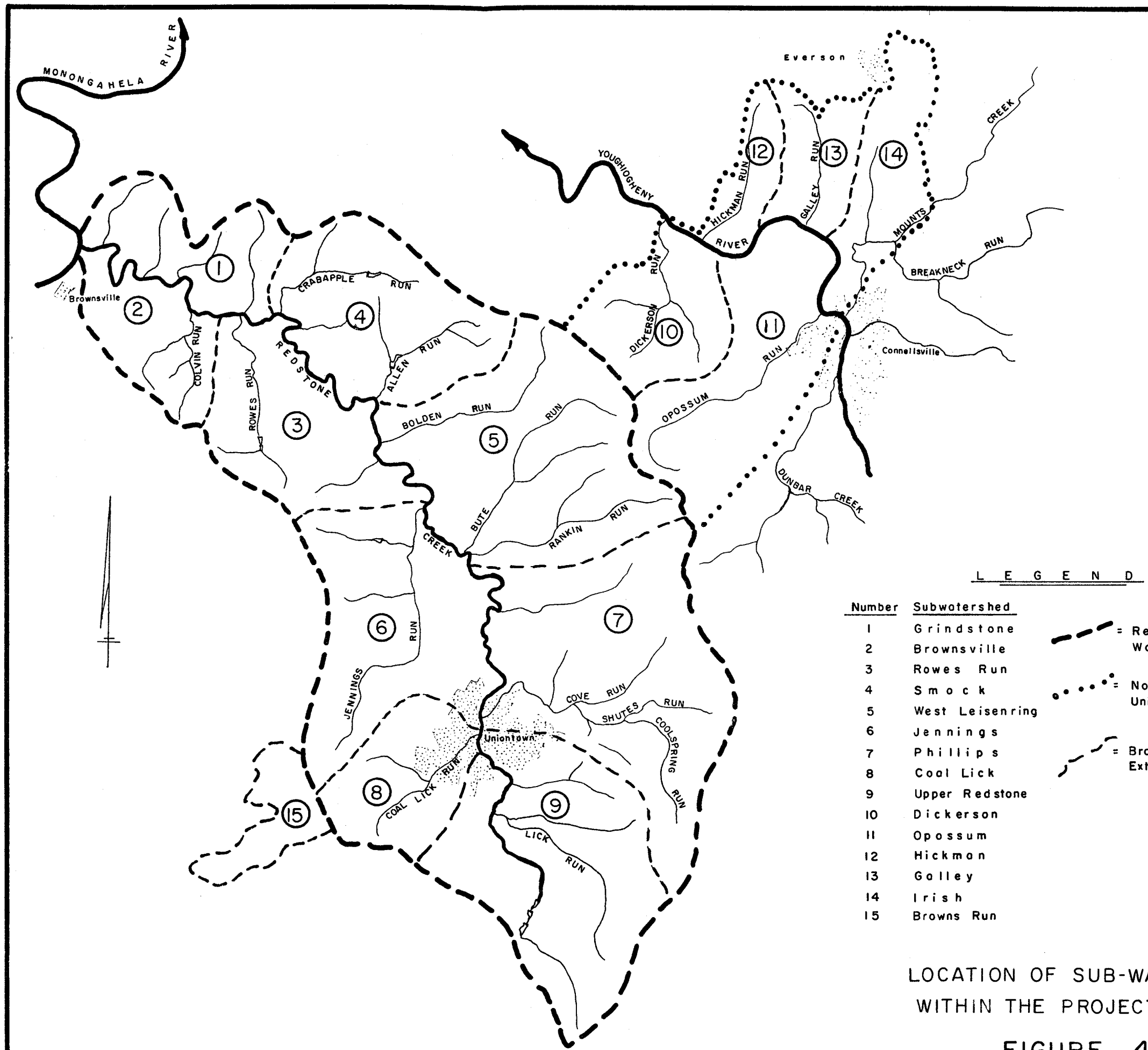
### POPULATION

The townships, boroughs, and cities lying entirely or partially within the Redstone Creek project area have a population of about 101,300 while the population of Fayette County is 154,667 (5). The county population has decreased from 1950 levels showing a 10.8% decrease from 1950 to 1960 and an 8.7% decrease from 1960 to 1970. Population estimates for Fayette County from 1980 to 2020 were calculated using OBERS Projections (6) and are shown on Table 1. The OBERS projections estimate an overall 16% decrease in population based on the 1970 census figures over the next 50 years.




LOCATION OF THE STUDY AREA

FIGURE 3




L E G E N D

| Number | Subwatershed |
|---|---|
| 1 | Grindstone |
| 2 | Brownsville |
| 3 | Rowes Run |
| 4 | Smock |
| 5 | West Leisenring |
| 6 | Jennings |
| 7 | Phillips |
| 8 | Coal Lick |
| 9 | Upper Redstone |
| 10 | Dickerson |
| 11 | Opossum |
| 12 | Hickman |
| 13 | Golley |
| 14 | Irish |
| 15 | Browns Run |

= Redstone Creek Watershed

= Northeost Portion Uniontown Syncline

= Browns Run Extention

LOCATION OF SUB-WATERSHEDS WITHIN THE PROJECT AREA

FIGURE 4

TABLE 1
POPULATION PROJECTIONS FOR FAYETTE COUNTY, PENNSYLVANIA

| | Projected Fayette County Population | % Difference in County Population | Projected Pennsylvania Population |
|---|---|---|---|
| 1970 Census | 154,667 | From Previous Census | 11,879,000 (Census) |
| 1980 | 140,848 | -9 | 11,901,000 |
| 1985 | 146,062 | +4 | 13,026,800 |
| 1990 | 145,113 | -1 | 13,415,500 |
| 2000 | 138,373 | -5 | 13,994,300 |
| 2020 | 129,325 | -7 | 15,103,700 |

Source: Bureau of Economic Analysis, U. S. Department of Commerce, and Economic Research Service, and U. S. Department of Agriculture, "OBERS" Projections, Series C., 1972.

Eighteen percent of the county population is concentrated in the Connellsville and Uniontown areas. Communities of greater than 2,500 people account for 43% of the total county population.

## ECONOMIC CONDITIONS

Fayette County, according to the 1970 census, has a total population of 154,667, of which 46,150 people, both male and female over the age of 16, were actively employed. The manufacturing industry employs approximately 28.5% of the total work force, an increase since 1960. The mining industry, which has shown an employment decline since peak coal production years, employs about 8.3% (1970) of the total work force (7).

According to the 1970 census, unemployment in Fayette County was about 6.7%. The current unemployment rate for the area, as of May, 1976, was estimated at 8.2% (8).

A summary of labor force characteristics is presented on Tables 2 and 3.

## GEOLOGY

### STRUCTURE

The major structural characteristics of the study area are discussed below and shown on Figure 5 and on the Project Area Map in the inside rear cover:

Uniontown Syncline: The Uniontown Syncline basin trends northeast-southwest through the middle of Fayette County and lies roughly parallel with and about five miles west of the Chestnut Ridge Anticline. The axis of the Uniontown Syncline crosses the Westmoreland-Fayette County boundary one mile east of Scottdale near McClure and trending southwestward, passes west of Connellsville through Monarch, Uniontown, Smithfield and crosses the West Virginia line near Lake Lynn. The Uniontown Syncline is approximately 27 miles long and is canoe-shaped with a steeper eastern

TABLE 2

ECONOMIC CHARACTERISTICS – 1970

| Category | Fayette County |
|---|---|
| Total Population - 16 yrs. and Older | 109,209 |
| Males - 16 yrs. and Older | 51,296 |
| Male Labor Force - 16 yrs. and Older | 34,129 |
| Percent of Total | 66.5% |
| Male Civilian Labor Force - 16 yrs. and Older: | |
| Employed | 31,673 |
| Unemployed | 2,402 |
| Unemployment Rate - Males | 7.0% |
| Females - 16 yrs. and Older | 57,913 |
| Female Labor Force - 16 yrs. and Older | 15,372 |
| Percent of Total | 26.5% |
| Female Civilian Labor Force - 16 yrs. and Older: | |
| Employed | 14,477 |
| Unemployed | 895 |
| Unemployment Rate - Females: | 5.8% |
| Total Unemployment Rate - Males and Females: | 6.7% |

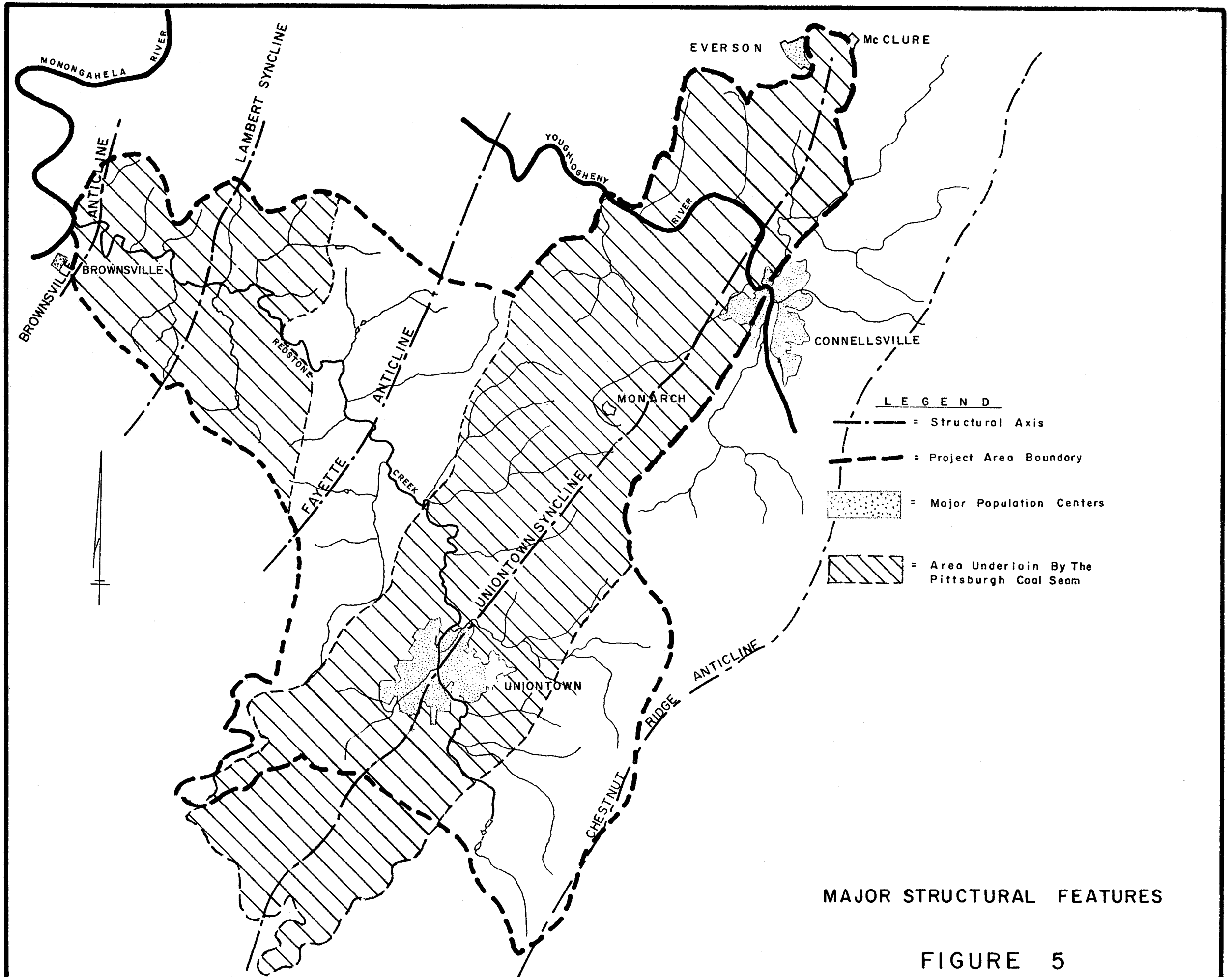
Source: U. S. Bureau of Census, Census of Population, General Social and Economic Characteristics, Pennsylvania, 1970

TABLE 3

INCOME AND POVERTY STATUS BY FAMILIES - 1969

| Income Range | Fayette County |
|---|---|
| Less than $1,000 | 1,141 |
| $1,000 to $1,999 | 2,146 |
| $2,000 to $2,999 | 3,131 |
| $3,000 to $3,999 | 3,511 |
| $4,000 to $4,999 | 3,006 |
| $5,000 to $5,999 | 3,155 |
| $6,000 to $6,999 | 3,688 |
| $7,000 to $7,999 | 3,852 |
| $8,000 to $8,999 | 3,872 |
| $9,000 to $9,999 | 2,816 |
| $10,000 to $11,999 | 4,398 |
| $12,000 to $14,999 | 3,127 |
| $15,000 to $24,999 | 2,467 |
| $25,000 to $49,999 | 373 |
| More than $50,000 | 31 |
| Median Income: | $7,150 |
| Mean Income: | $7,594 |
| Percent Below Poverty Status (below $3,000) | 16.7% |
| Percent at or Above $15,000 | 7.1% |

Source: U. S. Bureau of Census, Census of Population, General Social and Economic Characteristics, Pennsylvania, 1970




MAJOR STRUCTURAL FEATURES

FIGURE 5

flank and a wide gradual sloping western flank. The synclinal axis is level for two miles south of the Westmoreland County boundary, but in the next nine miles it plunges southward 500 ft. to a two-mile long low area midway between Monarch and Uniontown. The axis rises 550 ft. to a high point one mile south of Smithfield. Beyond this point the axis again plunges gently to the Pennsylvania-West Virginia boundary. The Pittsburgh coal outcrop, which defines the syncline area in this report, encompasses about 95 square miles. Approximately 30% of the syncline drains into the Youghiogheny River. This area has been designated as the northeastern portion of the syncline in this report. Forty percent of the syncline drains into the Redstone Creek Watershed, and the remaining portion of the syncline drains to the south into the Browns Run and Georges Creek Watersheds. The Pittsburgh Coal seam has been essentially "mined-out" in the entire area of the Uniontown Syncline by drift and slope entries along the outcrops and by shafts in the center of the basin (9).

Fayette Anticline: The Fayette Anticline axis lies west of, but is not quite parallel to, the Uniontown Syncline. At the Westmoreland-Fayette County boundary the two are six miles apart, but in southern Fayette County they are only 2-1/2 miles apart (10).

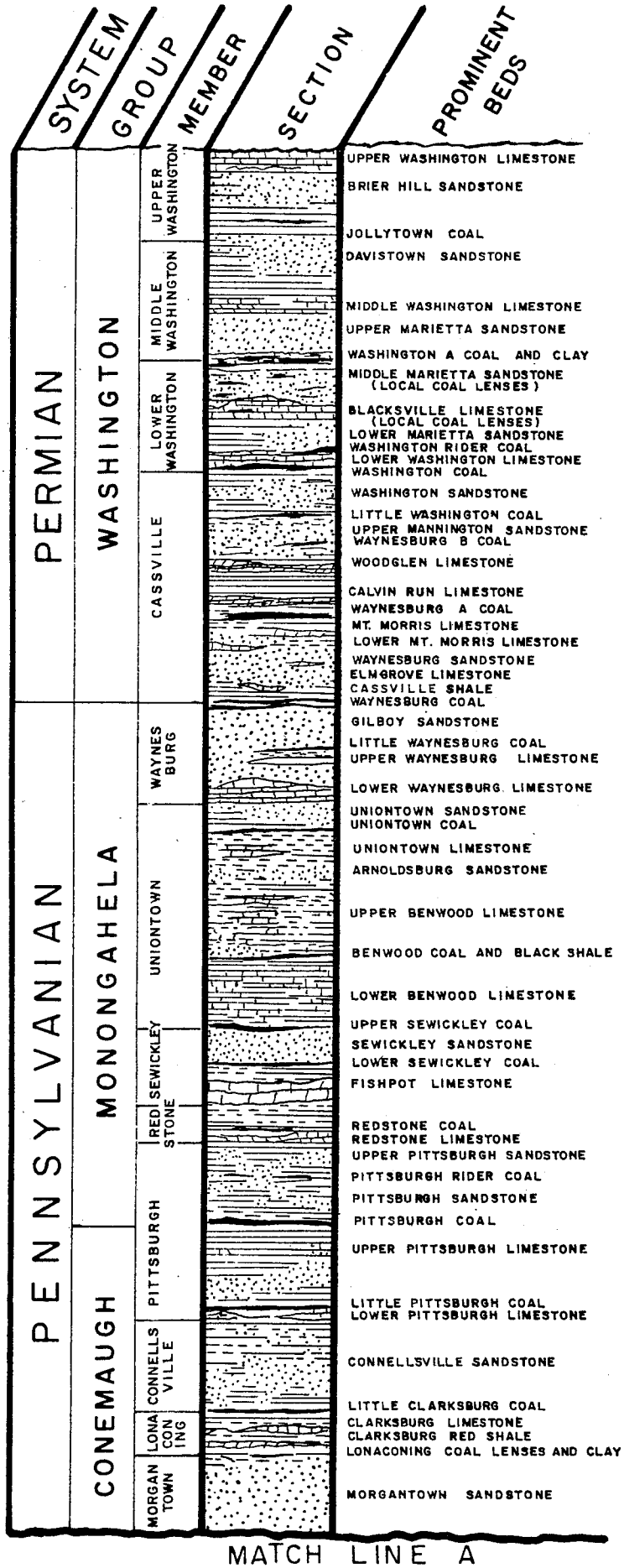
Lambert Syncline: The Lambert Syncline axis passes a short distance east of Redstone, Grindstone, and Davidson and west of Lambert where it swings southwest to cross the Monongahela River at Gates (10).

Brownsville Anticline: The Brownsville Anticline has three minor high points in Fayette County; one west of Redstone, the second northeast of Brownsville, and the third west of Merrittstown, but the high and low points along this axis vary only 50 to 100 ft. (10)

## STRATIGRAPHY

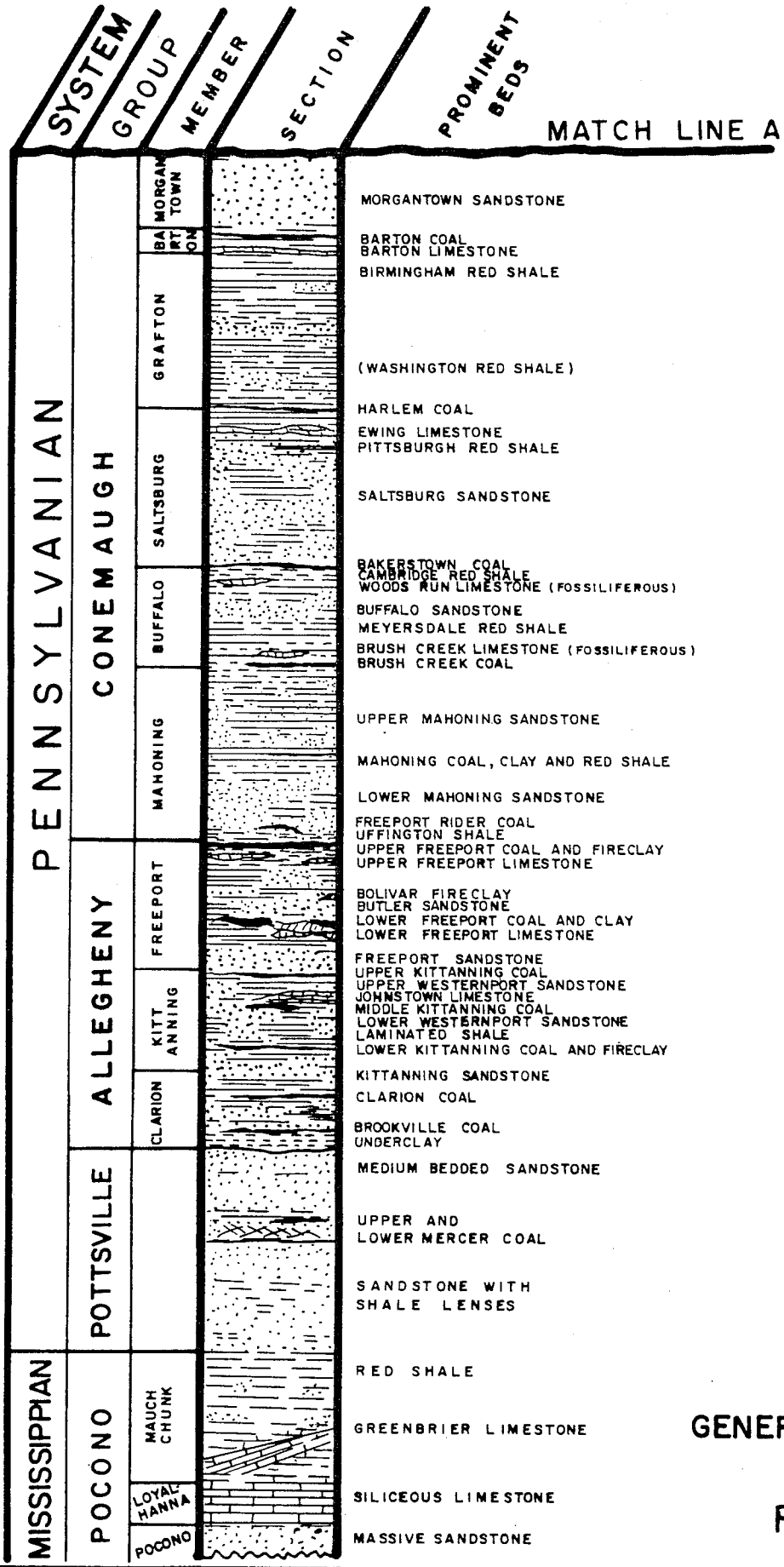
The rock exposed within the study area includes the interval from the Pocono Group of the Mississippian System to the Washington Group of the Permian System. The rock types within the area are typically a cyclical repetition of sandstones, limestones, claystones, shales and coal seams. Many of the coal seams have been mined; notably, the Pittsburgh, Upper Freeport, Sewickley, and, recently, the Waynesburg. The Pittsburgh coal seam has been mined the most extensively and is the largest contributor to the acid mine drainage problem.

The Washington Group contains some of the youngest rocks in the area and are exposed only in the synclines with some minor exposure of the Monongahela Group on isolated hilltops outside the syncline areas. The remainder of the watershed is underlain by the Conemaugh Group. A generalized geologic section is shown in Figure 6.




GENERALIZED GEOLOGIC SECTION

FIGURE 6




GENERALIZED GEOLOGIC SECTION

FIGURE 6

PITTSBURGH COAL SEAM (10)

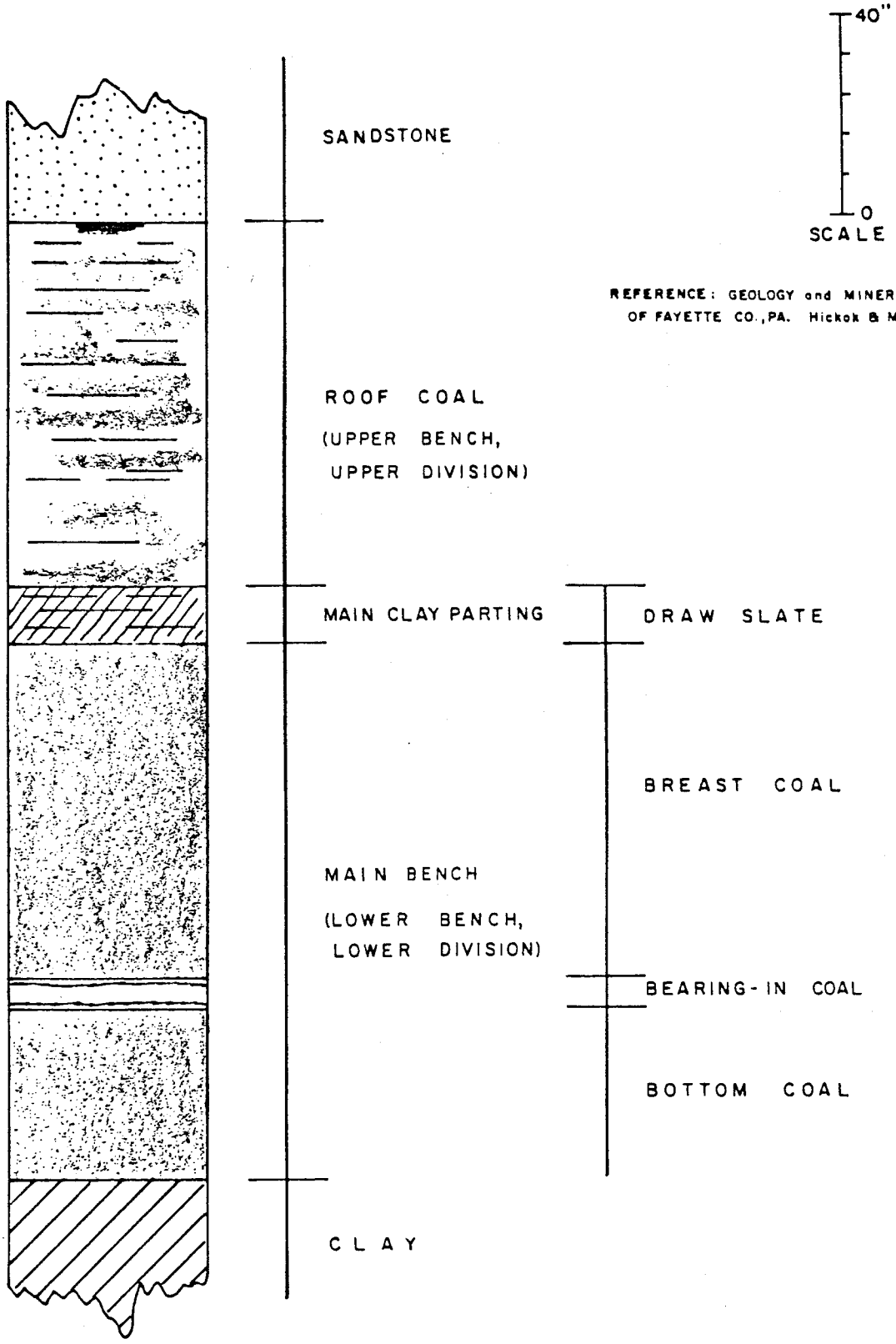
The character and physical make-up of the Pittsburgh Coal are remarkably regular and persistent throughout the county. The bed is typically double-benched and the divisions are the roof coal or upper bench, and the lower or main bench separated by the main clay parting or overclay. Generally these members have a total thickness of between 10 and 20 ft. A typical section of the Pittsburgh Coal is shown in Figure 7.

The upper division, or roof coal, occurs persistently in the Uniontown-Connellsville Basin, although it may be replaced in some areas by sandstone faults of the overlying Pittsburgh sandstones. The roof coal varies in thickness from 3 to 10 ft. and is composed of numerous layers of coal or bone up to 24 in. thick which are separated by black shale partings up to 18 in. thick. As a rule, the coal and black shale partings are inseparable, and the roof coal is of little economic value. The roof coal is generally present except in the area where the Lambert Syncline attains its greatest structural depth. The roof coal is absent in most of eastern Luzerne, northern German and central Redstone Townships (see Figure 8 for the location of township boundaries). In areas bordering the synclinal axis, the roof coal usually consists of a single bed of bony coal from 2 to 18 in. thick. Farther from the axis it resumes the normal character which persists over the remainder of the district.

The main clay parting or overclay of the Pittsburgh Coal bed is the socalled "draw slate" of Fayette County. It is generally persistent and is between 2 and 24 in. thick. Locally, it may be replaced by the overlying Pittsburgh sandstone. In southern Springhill Township the overclay appears to be missing over sizable areas and the roof coal rests directly on the lower division. The main clay parting is troublesome in mining the lower coal bench because it tends to fall away from the roof coal and cling to the top of the underlying coal.

The lower main coal bench contains the commercial coal of the Pittsburgh bed. It usually ranges in thickness from 72 to 120 in. in Fayette County, but exceptional thicknesses considerably below and above these limits have been reported. Generally the lower coal bench attains its greatest thickness in the Uniontown-Connellsville Basin north of Uniontown. In this basin south of Uniontown it is slightly thinner. The smallest average thickness is found in the northwest corner of the county.

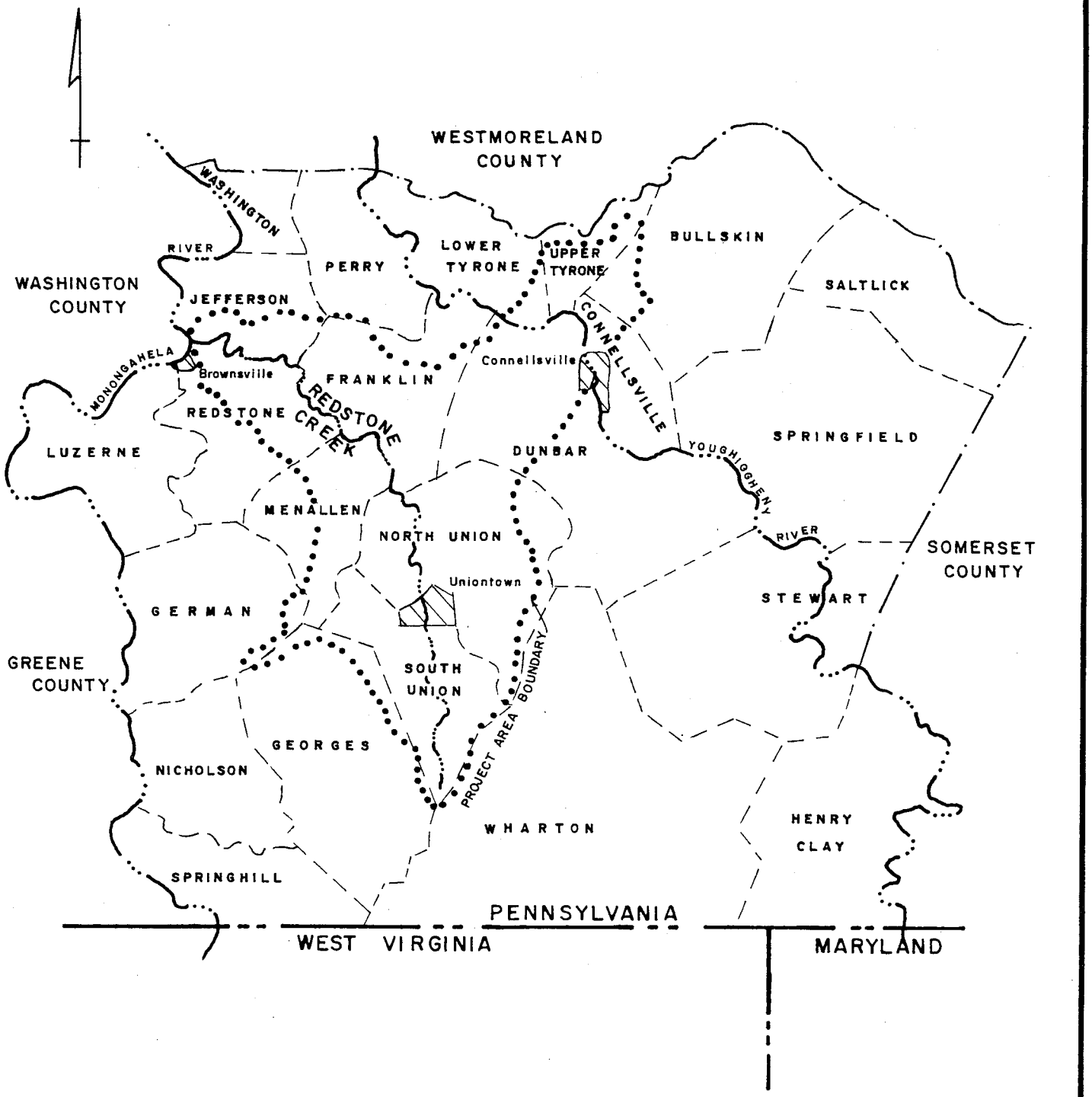
The lower division is subdivided into three benches known from top to bottom as the breast coal, bearing in coal, and bottom coal.




REFERENCE: GEOLOGY and MINERAL RESOURCES OF FAYETTE CO., PA. Hickok & Moyer, 1940

TYPICAL SECTION OF PITTSBURGH COAL

FIGURE 7




FAYETTE COUNTY TOWNSHIP BOUNDARIES

FIGURE 8

The breast coal, at the top of the lower division, ranges from between 36 and 80 inches in thickness and is generally free from persistent partings. In the northern half of the Uniontown-Connellsville Basin a thin shale binder generally less than 1/2 in. thick is frequently found near the center of the breast coal. The coal in this bench usually is clean and friable and tends to break into small cubes. However, in the southwest part of the county, the top 4 to 10 in. of the breast coal is dirtied by numerous shale and pyrite streaks up to 1/2 in. thick. Hence, in this area, the top 4 to 8 in. of coal is left in place during first mining to serve the double purpose of supporting the overlying "draw slate" and to preserve the high quality of the underlying coal. The top layer is usually recovered in retreat mining and is suitable for use as steam or gas coal. It is general practice wherever the overlying "draw slate" is troublesome to leave the top 6 to 12 in. of the breast coal in place to support the roof and to recover this coal in retreat mining.

The bearing in coal underlying the breast coal is easily recognizable throughout the county. It consists of a layer of coal from 2 to 7 in. thick bounded on the top and bottom by shale binders that average less than 1/2 in. thick. Locally, either one of the binders may be absent. At some places the entire bearing in bench is reported to consist of bone coal, but this condition is rare. In mining, the two binders tend to cling to the adjacent coal and are difficult to separate.

The bottom coal is 24 to 46 in. thick and generally contains clean coal, free from shale binders. The upper part of this bench usually has a blocky character and is slightly harder than the lower part. In the northwest corner of the county this difference is marked by a thin shale parting. These parts correspond to the brick and lower bottom coals of other regions and are respectively 14 and 16 in. thick in the northwest part of Fayette County. Frequently, 4 to 8 in. at the base of the bed is left in place during the first mining. This may or may not be recovered, depending on the purity and the evenness of the coal and underlying contact. In Fayette County the floor of the Pittsburgh bed is generally free of any marked irregularities, but is reported to have minor rolls or "horse-backs" in places. It consists usually of a gray plastic clay which may contain nodules of limestone or iron carbonate. Locally, it is troublesome during mining operations as it tends to soften and squeeze after exposure to air. In such cases the bottom 6 to 12 in. of the lower division is left in place during first mining and recovered later.

## CLIMATE

The study area is located in the southwestern plateau climatic division of Pennsylvania. The yearly average normal temperature and precipitation for the project area measured at Uniontown is 53.3 degrees Fahrenheit and 40.05 in. respectively. Table 4 illustrates the temperature and precipitation during the study period from August, 1974, to July, 1975, and the normals for the same period (11).

## MINERAL RESOURCES

### COAL RESERVES

Four major coal seams of recoverable dimensions (greater than 28 in. thick) are found within the project area. The quantity of reserves within the project area were estimated from generalized coal reserve maps (12). The seams and their estimated reserves are listed below:

| | |
|---|---|
| Waynesburg | 45,650,000 tons |
| Sewickley | 61,420,000 tons |
| Pittsburgh | 56,105,000 tons |
| Upper Freeport | 24,325,000 tons |
| Total: | 187,500,000 tons |

Several other seams are found in isolated patches within the study area but are of variable extent and minor importance. A description of the coal reserves and their relation to future mining is found in Chapter III.

### STONE QUARRIES

There is estimated to be an abundance of limestone and sandstone reserves within Fayette County and the study area. Presently there is one limestone quarry in operation mining the Loyalhanna limestone. The quarry is located in North Union Township, 3.4 miles east of Uniontown. There is also a slate quarry located about 0.5 miles west of Brownfield in South Union Township.

### NATURAL GAS

Eighteen gas fields are know to exist in Fayette County and are encountered in the western part of the county. The largest gas deposits are found in the German Township area. New techniques and continued exploration can potentially lead to further development of these fields.

### FIRE CLAYS

There are no known clay mining operations in the study area. Reserves of fire clays are widely distributed throughout the area. Future mining is dependent upon the economic feasibility, technical advances, and fire clay quality.

TABLE 4

PRECIPITATION AND TEMPERATURE DURING PROJECT PERIOD

| | Precipitation (inches) | | Temperature (Degrees F) | |
|---|---|---|---|---|
| | Actual | Normal | Actual | Normal |
| 1974 | | | | |
| August | 3.69 | 3.63 | 71.2 | 71.8 |
| September | 5.06 | 3.05 | 62.2 | 65.8 |
| October | 1.40 | 2.63 | 48.9 | 55.5 |
| November | 1.98 | 2.91 | 43.6 | 44.4 |
| December | 4.53 | 2.71 | 34.5 | 34.3 |
| 1975 | | | | |
| January | 4.12 | 2.96 | 33.5 | 32.3 |
| February | 3.14 | 2.43 | 33.4 | 33.8 |
| March | 4.28 | 3.65 | 37.8 | 41.7 |
| April | 3.78 | 3.62 | 44.8 | 53.3 |
| May | 3.65 | 4.24 | 64.1 | 62.3 |
| June | 3.72 | 4.25 | 70.0 | 70.4 |
| July | 1.56 | 3.97 | 72.7 | 73.4 |
| Means: | 3.41 | 3.34 | 51.4 | 53.3 |

SOURCES: National Oceanic and Atmospheric Administration, Environmental Data Service, "Climatological Data, Pennsylvania," Volume 79, No. 13, 1974; and Monthly "Climatological Data," Nos. 1-8, Jan. through Aug., 1975.