

Chapter 1. Project Area Characteristics

Project Area

Located in Allegheny, Beaver, Butler, and Lawrence counties, the Connoquenessing Creek watershed flows 54.1 miles from its headwaters in Concord Township, Butler County to its confluence with the Beaver River, approximately one mile west of Ellwood City, Lawrence County. Converging with the Beaver River, the waters become part of the Ohio and Mississippi Rivers until ultimately emptying into the Gulf of Mexico.



An overview of the Connoquenessing Creek watershed

The Connoquenessing Creek watershed encompasses 830 square miles and has seven major tributaries (Figure 1-1). The largest of those tributaries is Slippery Rock Creek. Although a major tributary to the Connoquenessing, with approximately 400 square miles, Slippery Rock Creek was not included in this study because both watersheds are better served through the development of separate plans specific to each's unique character.

Connoquenessing Creek and its six named tributaries will be the focus of this report. The project covers an area of 430 square miles and includes four counties and 33 municipalities. Figure 1-2 indicates the study area for this report, while Table 1-1 identifies the municipalities with jurisdictions within the project area.

A diversity of landscapes from rural to urban exists, with each possessing its own impacts and attributes. Connoquenessing Creek begins in its headwaters as a calm, slow-flowing stream, mostly surrounded by rural landscapes. Tributaries join, and the stream grows and increases speed ever so slightly. It enters into more urbanized areas where impacts and attributes change. The Connoquenessing remains a generally docile stream until it nears Ellwood City, where Slippery Rock Creek enters. There the channel narrows, the substrate becomes rocky, and the flow increases drastically, transforming the stream into class III white water rapids, more typical of the Slippery Rock Creek subwatershed. This rapid flow is maintained until its confluence with the Beaver River.

Major Tributaries

Six major tributaries flow into Connoquenessing Creek. Bonnie Brook flows through Donegal, Oakland, and Summit townships, and East Butler Borough before it enters Connoquenessing Creek just upstream of the City of Butler (Butler County). Thorn Creek begins in the southeastern portion of Summit Township, and flows through Jefferson and Penn townships (Butler County). Glade Run flows through Richland Township (Allegheny County), Clinton, Middlesex, Adams, and Forward townships (Butler County). Breakneck Creek begins in Richland Township (Allegheny County), and flows through Valencia Borough, Adams Township, the Borough of Mars, Callery Borough, Forward Township, Evans City Borough, and Jackson Township in Butler County. Little Connoquenessing Creek, the only major tributary other than Slippery Rock Creek to enter on the north side of the creek, flows through Center, Butler, Connoquenessing, Lancaster, and Jackson townships (Butler County). Brush Creek begins in Pine Township (Allegheny County), and flows through Marshall Township (Allegheny County), Cranberry Township (Butler County), and New Sewickley, Marion, and North Sewickley townships (Beaver County) before it enters Connoquenessing Creek.

Climate

The climate follows that of a typical temperate climate with hot, dry summers and cold winters. The average high temperature ranges from 34 to 85 degrees Fahrenheit, while the average low temperature ranges from 16 to 60 degrees Fahrenheit (McNab & Avers, 1994). Historically the coldest day on record was negative 29 degrees Fahrenheit in January 1930. The warmest day on record, 103 degrees Fahrenheit, occurred in July 1988 in Zelienople (The Weather Channel, 2006).

Accumulation of rain or snow averages 35 to 45 inches per year. For the most part, the summers are dry and have a low humidity, giving the region a growing season between 120 to 180 days (McNab & Avers, 1994).

Table 1-1. Municipalities

Municipality	Square Miles	Percent of Watershed	Municipality	Square Miles	Percent of Watershed
<i>Allegheny County</i>			<i>Butler County</i>		
Bradford Woods Borough	0.342	0.10	Clinton Township	4.855	1.36
Marshall Township	6.093	1.71	Concord Township	10.899	3.05
Pine Township	4.55	1.27	Connoquenessing Borough	1.351	0.38
Richland Township	3.04	0.85	Connoquenessing Township	23.132	6.48
West Deer Township	0.08	0.02	Cranberry Township	22.797	6.38
<i>Beaver County</i>			Donegal Township	1.427	0.40
Daugherty Township	1.633	0.46	East Butler Borough	1.034	0.29
Franklin Township	16.199	4.54	Evans City Borough	0.727	0.20
Marion Township	10.368	2.90	Forward Township	23.489	6.58
New Sewickley Township	18.359	5.14	Franklin Township	7.526	2.11
North Sewickley Township	11.1	3.11	Harmony Borough	0.408	0.11
<i>Lawrence County</i>			Jackson Township	21.333	5.97
Ellport Borough	0.502	0.14	Jefferson Township	18.422	5.16
Ellwood City Borough	2.487	0.70	Lancaster Township	23.219	6.50
Perry Township	7.23	2.02	Mars Borough	0.453	0.13
Shenango Township	1.31	0.37	Middlesex Township	20.643	5.78
Slippery Rock Township	0.546	0.15	Muddy Creek Township	10.947	3.07
Wayne Township	6.424	1.80	Oakland Township	22.68	6.35
<i>Butler County</i>			Penn Township	24.132	6.76
Adams Township	22.323	6.25	Portersville Borough	0.446	0.12
Butler City	2.578	0.72	Prospect Borough	3.062	0.86
Butler Township	21.678	6.07	Saxonburg Borough	0.615	0.17
Callery Borough	0.451	0.13	Seven Fields Borough	0.856	0.24
Center Township	22.732	6.36	Summit Township	20.028	5.61
Clay Township	1.737	0.49	Valencia Borough	0.374	0.10
Clearfield Township	1.093	0.31	Zelienople Borough	2.02	0.57

Topography

The project area is within the boundary of the Appalachian Plateaus Province, the largest physiographic province in Pennsylvania. A physiographic province is a region that contains similar terrain and has been shaped by geologic history. Characterized by elevation, relief, and geologic structure, each physiographic province can be subdivided into sections based on the distribution patterns of historic rock formations, deformation, erosion, specific landforms or other geologic features (Radford University, 2005).

Characterized as a highland eroded by streams to create deep valleys and hilly topography, the Appalachian Plateaus Province is further divided into 10 sections. Connoquenessing Creek is located in the Pittsburgh Low Plateau section. The smooth to irregular undulating surface, the narrow and relatively shallow valleys, strip mines, and reclaimed lands of shale, sandstone, siltstone, limestone, and coal are evident in this region. Streams follow a dendritic, or branching, drainage pattern. The elevation ranges from 660 to 2,340 feet above sea level.

In addition to being located in the Appalachian Plateaus geomorphic province, the area is also located in the Humid Temperate Domain ecoregion. An ecoregion is the name given to an area having a distinctive composition and pattern of plant and animal species distribution (Washington State Department of Natural Resources, 2003). Other features such as climate, landform, soil, and hydrology are important in the development of an ecosystem and thus help define ecoregions. The relationship between species and their physical environments are in essence alike. Although both province and ecoregion delineations consider the geology of the area, the difference is that an ecoregion also views the distribution of species and ecosystems across the landscape.

Each ecoregion is subdivided into divisions and subregions. The project area is located within two of these subregions. The majority of the area lies within the Southern Unglaciaded Allegheny Plateau subregion covering the Allegheny, Beaver, and Butler portions of the watershed. The remainder of the study area in Lawrence County is located within the Western Glaciaded Allegheny Plateau subregion.

The Southern Unglaciaded Allegheny Plateau

High hills, sharp ridges, and narrow valleys characterize the Southern Unglaciaded Allegheny Plateau subregion, as it is part of the Appalachian Plateau geomorphic province. Due to extensive mining of coal layers, strip mined lands are a notable landform.

The Western Glaciaded Allegheny Plateau

Modified by glaciations, the Western Glaciaded Allegheny Plateau geomorphic province is a maturely dissected upland characterized by rounding hills, ridges, and broad valleys (NcNab & Avers, 1994). Being located on the edge of the Western Glaciaded Allegheny Plateau, the project area shows very little evidence of the glacial features that are evident in other areas of this subregion.

Air Quality

Each year, nearly 200 million tons of toxic emissions pollute the air in the U.S., making air pollution the nation's largest environmental risk (DEP, 2003). Any substance in the air that causes damage to life, ecosystems, or property is an air pollutant. Natural and synthetic processes can lead to air pollution. Over 90 percent of the pollutants originate from industry, power plants, vehicles, and other human influences. In 1970, the Clean Air Act was passed, setting a national goal to have clean and healthy air for everyone. The act was amended in 1977, and again in 1990.

Airborne pollutants can travel very long distances. They can fall to the ground in raindrops, fog and dew, dust, or simply due to gravity. Identifying sources of airborne pollutants to a body of water can be complicated. Pollutants can enter waterways through direct deposition (falling directly into waterways) or through indirect deposition (falling onto land and being washed into waterbodies as runoff). Researchers developed the concept of airsheds to assist in the study of atmospheric deposition, which is the process of airborne pollutants falling to the ground [U.S. Environmental Protection Agency (EPA), 2003].



Air quality impacts are caused by airborne pollutants discharged hundreds of miles away

Airsheds are geographic areas responsible for emitting 75 percent of the air pollution reaching a body of water. Different pollutants have different airsheds because of their varying behaviors in the atmosphere. Airsheds are determined using mathematical models of atmospheric deposition, as opposed to watersheds, which utilize physical features of the landscape (EPA, 2003).

Atmospheric Deposition

Atmospheric deposition is the process of airborne pollutants falling to the ground. There are two types of atmospheric deposition: dry and wet. Dry deposition refers to gases and particles that fall to the earth. They deposit on buildings, cars, homes, trees, etc where these particles can be washed away as runoff during storm events.

Rain, fog, and snow are examples of wet deposition. One type of wet deposition is acid rain, which typically occurs when nitrous oxides and sulfur dioxide react in the atmosphere with water, oxygen, and other chemicals to form various acidic compounds.

Atmospheric deposition can affect the water quality in lakes and streams; terrestrial and aquatic wildlife; forests; human health; visibility; and materials, such as automobiles, statues, and buildings. More information about the effects of acid precipitation is located in the Water Resources chapter.

Critical Pollutants

Six critical pollutants have been identified nationally as affecting air quality. They include carbon monoxide, lead, nitrogen oxides, ozone, particular matter, and sulfur dioxide.

Carbon Monoxide

Carbon monoxide is a poisonous compound that results from the incomplete burning of fuels, such as motor vehicle exhaust, industrial processes, and wood stoves. It can impair vision, alertness, and other mental and physical functions when inhaled. Individuals suffering from cardiovascular disease are at the highest risk, but healthy individuals can also be affected. Carbon monoxide poisoning can be fatal when high enough levels are present, because it replaces the oxygen in blood and inhibits the delivery of oxygen to body tissues (DEP⁵).

Lead

Lead is emitted into the atmosphere through the burning of leaded fuel and industrial processes, such as battery manufacturers and lead smelters. Metal processing is the major source of lead emissions. Lead poisoning reduces mental abilities; damages blood, nerves, and organs; and raises blood pressure when ingested or inhaled (DEP⁵). Lead is highly toxic and accumulates in the body; even small doses are harmful.

Nitrogen Oxides

Nitrogen oxides (NO_x) are produced when fossil fuels are burned at temperatures greater than 1,200 degrees Fahrenheit. Automobiles, trucks, buses, airplanes, industries, and power plants emit NO_x into the atmosphere. They contribute to the deposition of nitrogen in soil and water through acid rain and play a major role in the formation of ground-level ozone. Human health is impacted when NO_x enters the lungs and makes breathing more difficult (DEP⁵).

Ozone

Ozone is a colorless, odorless gas that forms in the atmosphere. Depending on where it is located in the atmosphere, it can be beneficial or harmful. When located in the upper atmospheric layer, it is called the ozone layer and it filters the sun's harmful ultraviolet rays. When it is located in the lowest atmosphere it is called ground-level ozone. Ground-level ozone is a secondary pollutant—a pollutant that is formed in the atmosphere instead of being directly emitted from a specific source. It forms when NO_x combines and reacts with volatile organic compounds in the presence of sunlight and warm temperatures (DEP⁵). Ozone, and the pollutants that cause it, can be transported from hundreds of miles away.

When inhaled, ozone reacts with tissues in our lungs making breathing difficult. People with asthma and lung disease are most seriously impacted, but even healthy individuals are at risk with prolonged exposure.

Particular Matter

Particulates are tiny drops of liquid or small particles of dust, metal, or other materials that float in the air. A mixture of these particles is known as particular matter. Four different types and sizes of particular matter exist. These particles travel into the lungs and become trapped. They can cause respiratory ailments and can carry cancer-causing chemicals, producing greater health problems (DEP⁵).

Total suspended particulates vary in size up to 45 micrometers in diameter. They can remain suspended in the air for a few seconds or up to several months (DEP⁵). There are no federal or state air-quality standards for total suspended particulates.

Particular matter 10 (PM₁₀) is solid matter or liquid droplets from smoke, dust, fly ash, or condensing vapors that can be suspended in air for long periods. They are less than 10 micrometers in diameter.

Particular matter 2.5 (PM_{2.5}) are fine particles with diameters less than 2.5 micrometers. They can accumulate in the respiratory system and are associated with numerous adverse health effects, especially among children, the elderly, and individuals with asthma or cardiopulmonary disease (DEP⁵).

Sulfates and nitrates are classified together as a critical pollutant. Sulfates are one of the key components in the formation of acid rain. Nitrates are currently being studied to determine if they have an impact on the formation of acid rain. Both sulfates and nitrates have a role in reducing visibility.

Sulfur Dioxide

Sulfur dioxide is emitted into the atmosphere by industrial processes such as burning coal or oil containing sulfur. Trees, plants, and agricultural crops are damaged by sulfur dioxide and it can accelerate the corrosion of materials, such as monuments, buildings, and iron-containing metals (DEP⁵). Sulfur dioxide is the main component of acid rain, joining with water vapor in the atmosphere to form sulfuric acid. Children, the elderly, and individuals with asthma, chronic lung disease, and cardiovascular disease, are more susceptible to negative health effects from this pollutant.

Mercury

Although mercury is not identified as a national critical pollutant, it is an important one. Mercury occurs naturally in air, water, and soil. Many rocks, including coal, release mercury into the atmosphere when burned. It is estimated that half of all mercury deposition within the U.S. comes from sources within the U.S. (EPA, 2005). Approximately 40 percent of the domestic mercury released is from coal-burning power plants. Of the mercury emissions from coal-burning power plants, only one-third is deposited in the U.S.

Mercury emitted into the atmosphere eventually settles into water or onto land, where it can be carried to water by runoff. Once deposited, certain microorganisms can change it into methylmercury, a highly toxic form that builds up in fish, shellfish, and animals that eat fish (EPA, 2005). Some species of fish and shellfish build up more methylmercury than others and, depending on what they eat, how long they live, and where they are located in the food chain, the level of methylmercury varies.

Humans are exposed to methylmercury primarily through the consumption of fish and shellfish. At high levels, mercury exposure can harm the brain, heart, kidneys, lungs, and immune system (EPA, 2005). In unborn babies, newborns, and young children, high levels of methylmercury can affect the development of the nervous system and impair learning.

EPA, U.S. Food and Drug Administration, and individual states work together to establish local fish advisories for certain types of commercially harvested fish and shellfish. These advisories suggest how often women who may become pregnant, pregnant women, nursing mothers, and young children should eat certain types of fish. Advisories for men, women, and children of all ages are also issued when appropriate. Advisories for Pennsylvania are updated annually and can be accessed on the DEP's website, keyword: fish advisories.

Impacts of Air Pollution

Air pollution not only affects the quality of the air, but the economy, health, and environment. It contributes to land and water pollution by altering the chemical makeup of streams and soils. It can lead to impairment or destruction of habitats (through the loss of trees, plants, and animals), decreasing property values and incomes, and increasing medical expenses and employee absenteeism (Kling & Wuebbles, 2003).

Air Quality Partnership, a public/private coalition of volunteers, is working to improve the air quality in the four most populous areas of Pennsylvania. The majority of the Connoquenessing watershed, with the exception of Lawrence County, is located within the Pittsburgh Region. The goals of the partnership include: increasing public understanding of impacts of air pollution, provide alerts for days with high air pollution, provide health effect information and guidelines to prevent and reduce exposure, and encourage voluntary action to reduce air pollution emission (Air Quality Partnership).

Utilizing EPA's standard air quality index (AQI) the partnership alerts communities when the air is unhealthy to breath. The index utilizes a four-staged color system to alert communities. When the AQI is green the air is considered to be in a healthy or good condition. A yellow AQI occurs when the air quality is in fairly good condition and recommends individuals that are extremely sensitive to limit exposure to the outdoors. A ranking of orange is considered unhealthy for sensitive individuals and recommends limited exposure to the outdoors, especially in elderly and extremely young individuals. An AQI of red is unhealthy for everyone to be exposed to the outdoors for any period of time.

Socioeconomic Profile

Land-Use Planning and Regulation

Pennsylvania municipalities in the watershed are only utilizing a portion of the land-use regulation control powers granted to them by the state legislature in the Pennsylvania Municipalities Planning Code. Granted land-use regulation control powers include comprehensive planning, subdivision regulation, and zoning. Unwanted land uses may result from uncontrolled industrial, commercial, or residential development. Table 1-2 and Figure 1-4 identify land use regulations being utilized in the watershed.

Comprehensive Plans

Comprehensive plans are created to serve as a guide to public and private actions and decisions to ensure the appropriate development of public and private property (Allegheny County Maryland Planning Department, 2002). Many municipalities and counties recognize that, without formal plans, they may be vulnerable to undesirable land uses through uncontrolled industrial, commercial, or residential development. Although often used to guide municipal actions, comprehensive plans have no regulatory authority, unless implemented through the development of ordinances and other municipal regulations that may relate to the plans. According to the Municipalities Planning Code, counties in Pennsylvania are required to review and update their comprehensive plans every 10 years.

Allegheny, Beaver, Butler, and Lawrence counties have comprehensive plans. Only 55 percent of the municipalities within the watershed have municipal comprehensive plans. All watershed municipalities in Allegheny and Beaver counties have completed comprehensive plans. Thirty-three percent of the watershed municipalities in Lawrence County and 45 percent of the watershed municipalities in Butler County have comprehensive plans. Municipalities that do not have plans and municipalities whose plans are older than 10 years should consider conducting or updating their plan.

Subdivision Regulations

Only 37 percent of the municipalities utilize subdivision regulations. Subdivision regulations limit the number of times that a parcel can be split into two or more smaller parcels; and therefore, represent an important tool in controlling sprawl. Subdivision regulations can ensure that new developments do not overburden local roads, facilities, and services; new roads and infrastructure are integrated with existing and planned roads and facilities; and provide adequate provisions for stormwater management, erosion control, water, wastewater, and traffic access (Vermont Conservation Education Fund, 2002). Municipalities currently not utilizing subdivision regulations should consider establishing them to assist in managing the growth of the region.

Zoning and Land-Use Ordinances

Zoning is a legal mechanism by which government bodies, for the sake of protecting public health, safety, morals, and general welfare, can limit a landowner's right to use privately owned land. This is done through the development of zoning ordinances. Zoning ordinances divide all land within a governing body's area into districts, and create regulations that apply generally to the governing body as a whole, as well as specifically to individual districts.

The majority of municipalities (67 percent) utilizes zoning and land-use ordinances. Municipalities not using zoning and land-use ordinances are susceptible to unwanted and undesirable land uses that could degrade the quality of life of their residents. Municipalities should consider establishing land-use ordinances to protect the character of their communities and the watershed.

Table 1-2. Land-Use Ordinances

Municipality	Comprehensive Plan	Zoning Ordinance	Subdivision Ordinance	Floodplain Ordinance	Municipality	Comprehensive Plan	Zoning Ordinance	Subdivision Ordinance	Floodplain Ordinance
Allegheny County					Butler County				
Bradford Woods Borough	Yes	Yes	NA	NA	Clinton Township	Yes	No	Yes	Yes
Marshall Township	Yes	Yes	Yes	NA	Concord Township	No	No	NA	NA
Pine Township	Yes	Yes	NA	NA	Connoquenessing Borough	No	Yes	NA	NA
Richland Township	Yes	Yes	NA	NA	Connoquenessing Township	No	No	NA	NA
West Deer Township	Yes	Yes	NA	NA	Cranberry Township	Yes	Yes	Yes	NA
Beaver County					Donegal Township				
Daugherty Township	Yes	Yes	Yes	NA	East Butler Borough	No	Yes	NA	NA
Franklin Township	Yes	No	Yes	NA	Evans City Borough	No	Yes	NA	NA
Marion Township	Yes	No	Yes	NA	Forward Township	Yes	No	NA	NA
New Sewickley Township	Yes	Yes	Yes	NA	Franklin Township	Yes	Yes	Yes	Yes
North Sewickley Township	Yes	No	Yes	NA	Harmony Borough	No	Yes	NA	NA
Lawrence County					Jackson Township				
Ellport Borough	No	Yes	NA	NA	Jefferson Township	Yes	Yes	NA	NA
Ellwood City Borough	Yes	Yes	Yes	Yes	Lancaster Township	No	Yes	NA	NA
Perry Township	No	No	NA	NA	Mars Borough	No	Yes	NA	NA
Shenango Township	Yes	Yes	NA	NA	Middlesex Township	Yes	No	NA	Yes
Slippery Rock Township	No	No	Yes	Yes	Muddy Creek Township	Yes	No	Yes	NA
Wayne Township	No	No	NA	NA	Oakland Township	No	Yes	Yes	NA
Butler County					Penn Township				
Adams Township	Yes	Yes	Yes	Yes	Portersville Borough	Yes	Yes	NA	NA
Butler City	Yes	Yes	NA	Yes	Prospect Borough	No	Yes	NA	NA
Butler Township	No	Yes	NA	Yes	Saxonburg Borough	Yes	Yes	NA	NA
Callery Borough	No	Yes	NA	NA	Seven Fields Borough	No	Yes	NA	NA
Center Township	Yes	Yes	Yes	NA	Summit Township	No	Yes	NA	Yes
Clay Township	Yes	No	Yes	NA	Valencia Borough	No	No	NA	NA
Clearfield Township	No	No	NA	Yes	Zelienople Borough	Yes	Yes	NA	NA

(Sources: Andrus, personal communication, 2007; Municipal surveys; Pennsylvania Center for Local Government Services, 2005)

Conservation by Design

Conservation by Design is an approach used to conserve open spaces, greenways, and natural resources while also addressing development issues. Conservation by Design utilizes conservation through local zoning and subdivision ordinances. When utilizing Conservation by Design strategies, the development is rearranged to decrease the amount of buildable space on each individual parcel by at least half, setting aside community open space. Conservation by Design is a four-step process that follows a formalized procedure (Natural Lands Trust, 2001). The general process includes:

Step 1 – Identify land that should be permanently protected. These lands become the community open space and can include natural features such as floodplains and steep slopes, historical sites, farmland, etc.

Step 2 – Locate sites of homes so that their views of the open space are maximized.

Step 3 – Identify the locations where roads and trails should go. This is the reverse of the conventional development process where roads are the first things to be identified.

Step 4 – Determine the boundaries of the lots.

For more information, visit Natural Lands Trust website at www.natlands.org.

Smart Growth

Municipalities and counties should consider implementing cooperative land-use strategies to improve their quality of life. They also should consider initiating Smart Growth practices when development issues are being addressed. Some strategies to consider are (Smart Growth Network, 2006):

- Mixing land uses
- Taking advantage of compact building designs
- Creating a range of housing opportunities and choices
- Creating walkable neighborhoods
- Fostering distinctive, attractive communities with a strong sense of place
- Preserving open space, farmland, natural beauty, and critical environmental areas
- Strengthening and directing development toward existing communities
- Making development decisions predictable, fair, and cost-effective
- Encouraging community and stakeholder collaboration in development decisions



Utilizing downtown areas for housing and business is one way to mix land uses and create walkable communities

Demographics and Population Patterns

Utilizing census block group data from the 1990 census and the 2000 census, the population of the study area was calculated. Table 1-3 displays the population change by county between 1990 and 2000. Over that time, the overall population increased by 10,803 people to a total population of 149,910. Butler County experienced the greatest increase of residents, while Lawrence County experienced the only decrease.

The watershed population in 2000 is displayed on Figure 1-5, while Figure 1-6 displays the population change from 1990 to 2000.

Eighty-four percent of the total population in 2000 was native residents to Pennsylvania, while in 1990, the total population native to Pennsylvania was 88 percent.

Table 1-3. Watershed Population

County	1990	2000	Change	% Change
Allegheny	11,406	16,187	4,781	41.90%
Beaver	8,929	9,405	476	5.30%
Butler	104,650	115,152	10,502	10.04%
Lawrence	14,122	9,166	-4,956	-35.09%
Total	139,107	149,910	10,803	7.66%

(Sources: Free Demographics, 2005; U.S. Bureau of Census, 1990; U.S. Bureau of Census, 2000)

Table 1-4. Population by Sex and Age

Years	Male	Female	Total
<5	51.60%	48.40%	6.23%
5-17	47.60%	52.40%	19.75%
18-24	52.14%	47.86%	6.11%
25-40	48.84%	51.16%	19.38%
40-61	49.70%	50.30%	29.29%
≥62	50.86%	49.14%	19.25%

(Sources: Free Demographics, 2005; U.S. Bureau of Census 2000)

Among the municipalities within the project area, Cranberry Township has the largest population, with 23,625 residents. Butler Township and the City of Butler are the second and third largest with 17,185 and 15,121 respectively.

The ratio of males to females is approximately one to one, with females holding a slight edge of two percent (Free Demographics, 2005). Table 1-4 displays the percentage of the population by sex and age. Six age classes were selected and include pre-school aged, school aged, college aged, post collegiate aged, midlife aged, and retirement aged.

Infrastructure

Infrastructure is a set of interconnected structural elements that provide the framework supporting an entire structure. Although, the term has diverse meanings it typically refers to municipal infrastructure, such as roadways, public transit, airports, sewage, and public water supply, as in this instance. The existence of infrastructure is important in the development and redevelopment of communities. Sanitary sewer systems and public water supplies usually determine how much development a given area can support. A lack of clean water and proper sewage treatment and disposal can hinder the development process, and therefore send potential jobs to other locations. Planning for development and redevelopment are key to the future of the area.

Sanitary Sewer Systems

There are eight public sewage systems. However, not all residents have access to public facilities. Many rural residents cannot connect to public sewage systems, nor is it economically feasible to do so. These individuals utilize septic systems and other alternatives to public sewage. Table 1-5 identifies the public sewage systems and their service areas.

Public Water Supply

There are eight public water systems that provide drinking water to area residents. The majority of public water systems are located in urbanized areas around the population centers. Many residents rely on springs and wells to provide them with drinking water. Table 1-6 identifies the public water suppliers.

Transportation and Safety

The primary method of transportation in the watershed is through the usage of area roadways. There are two interstates, two U.S. routes, 11 state highway routes, and numerous state, township, and private roads. In addition there are five active railroad lines. Figures 1-8 and 1-9 display transportation and safety features.

Table 1-5. Public Sewage Systems

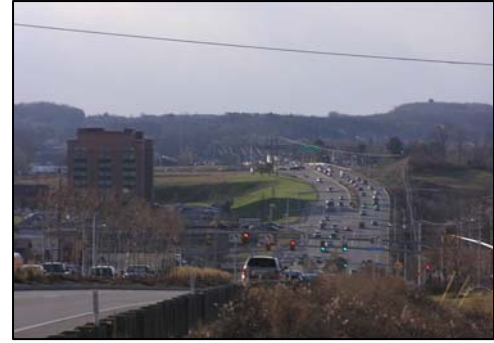
Treatment System	Daily Average (gallons per day)	Service Area
Breakneck Creek Region Authority	900,000	Mars Borough, Valencia Borough, Seven Fields Borough, Adams Township, Pine and Richland Townships Allegheny County, and a portion of Cranberry Township
Butler Area Sewer Authority	6.118 million	City of Butler, Butler Township, Center Township, Summit Township, East Butler Borough, and portions of Connoquenessing Township, Oakland Township, and Penn Township
Cranberry Municipal Authority	2.46 million	Cranberry Township, Marshall Township, and Pine Township
Evans City Breakneck Creek Plant	69 % of capacity	Evans City Borough and Callery Borough
McCandless Sanitary Authority	NA	Bradford Woods Borough
Prospect Borough	123,450	Prospect Borough
Saxonburg	375,000	Saxonburg Borough
Western Butler County Authority	1.02 million	Harmony Borough, Jackson Township, Zelienople Borough, and Lancaster Township

Table 1-6. Public Water Systems

Treatment System	Source	Daily Average (gallons per day)	Service Area
Borough of Mars	Wells	195,000	Mars Borough
Butler Area	Lake Oneida and Thorn Run Reservoir	7,250,175	NA
Center Township Municipal Water Authority	Pennsylvania American Water	215,994	Center Township
Connoquenessing	Pennsylvania American Water	97,240	Connoquenessing Borough and Connoquenessing Township
Cranberry Township Authority	Brush Creek and wells	1,917,673	Cranberry Township and Evans City Borough
Evans City Borough	Licken's Run Reservoir	237,874	Evans City and portions of Forward Township and Jackson Township
Harmony Borough	Little Connoquenessing Creek	132,954	Harmony Borough
Richland Township Municipal Authority	NA	NA	Richland Township
Saxonburg	NA	NA	Saxonburg
West View Water Authority	NA	100,000-130,000	Seven Fields Borough, Adams Township, Marshall Township, Pine Township, and Bradford Woods Borough
Zelienople Borough	Scholar's Run	479,947	Zelienople Borough

Roadways

Roads traversing the region can be categorized as primary routes, secondary routes, tertiary routes, and unnamed township, state, and local roads. Primary routes are typically four-lane routes that link larger towns or boroughs to one another, such as Butler, Cranberry, Ellwood City, and Zelienople. Secondary routes are typically two-lane routes that link communities to one another, while tertiary routes are two-lane routes within communities.



Route 19 in Cranberry Township

The primary routes include Interstate 79, Interstate 76, U.S. 19, U.S. 422, and PA Route 8. Secondary routes include Route 38, Route 65, Route 68, Route 228, Route 308, Route 351, Route 356, Route 488, Route 528, and Route 588. There are numerous tertiary routes that are state, township, or local unnamed roads.

- **Interstate 79** traverses the western border of Butler County traveling from north to south.
- **Interstate 76**, also known as the Pennsylvania Turnpike, travels east to west across the southern portion of the watershed in Pine and Marshall townships in Allegheny County and Cranberry Township in Butler County, where it follows Brush Creek through New Sewickley and Marion townships in Beaver County.
- **U.S. Route 19** parallels Interstate 79 in the watershed traveling north to south through the western portion of Butler County.
- **U.S. Route 422** travels east to west across the northern portion of the watershed crossing through Butler on its way to New Castle.
- **State Route 8** travels north to south through the eastern portion of the watershed. This route is a major corridor for traffic to and from the City of Butler.
- **State Route 38** travels north from Butler and follows along Lake Oneida and Connoquenessing Creek.
- **State Route 65** travels north to south across the western edge of the watershed through Ellwood City.
- **State Route 68** travels west to east from Unionville through Zelienople, Evans City and Butler.
- **State Route 228** travels east to west across the watershed from the Glade Mills area to Cranberry Township.
- **State Route 308** travels north from State Route 8 through the headwaters of Connoquenessing Creek.
- **State Route 351** follows Connoquenessing Creek west from Ellwood City where it turns south, just short of the confluence with the Beaver River.
- **State Route 356** travels in a northeastern direction through the eastern portion of the watershed into Butler.
- **State Route 488** travels from Ellwood City northeast through Perry Township, Lawrence County and follows the northern boundary of the watershed to Prospect, Butler County.
- **State Route 528** travels north from Interstate 79 in Jackson Township, Butler County through Evans City to Prospect where it continues north into the Slippery Rock Creek watershed.
- **State Route 588** traverses the watershed in a western direction from Zelienople to just beyond Fombell, where it makes a southern dip to Barrisville and continues west out of the watershed.

Airports

Four airports are located within the study area. They include Zelienople Municipal Airport, Butler Farm Show Airport, Butler County Airport, and the Lakehill Airport. The Zelienople Municipal Airport is a public airport owned by the Borough of Zelienople and operated by the municipal authority. It is located on 240 acres of a rehabilitated strip mine from the 1940s. The Butler Farm Show Airport is located five

miles east of Butler and is classified as a general service airport. The Butler County Airport is located five miles southwest of Butler. The Lakehill Airport is located one mile northwest from the Borough of Mars.

Also located within close proximity are four regional airports. They include Beaver County Airport, New Castle Municipal Airport in Lawrence County, McVie Airport in Armstrong County, and Rock Airport of Pittsburgh. The Pittsburgh International Airport is the closest major airport providing passenger service.



Zelenople Airport, one of the regional airports in the area

Railroads

There are 86 miles of active railroad lines among five rail service providers. There are also two inactive lines. Figure 1-9 identifies the active and inactive railroads.

The longest active line is the CXS, which travels the P&W Subdivision from Allegheny County to Lawrence County. The Main Line of the Bessemer and Lake Erie is the second longest line traveling from Mercer County to Allegheny County. The other two railroads are part of the Buffalo and Pittsburgh lines. The Main Line, the larger of the two lines, travels from Eidenau to Armstrong County. The Northern Subdivision travels from Wadesworth to Burin. The final active line is a part of the Western Allegheny Line of the Bessemer and Lake Erie Railroad. It travels from Butler to Armstrong County.

Methods of Transportation

The most popular method of transportation used by residents is the automobile. Within the project area, 93 percent of the working population drives a personal vehicle to work. Approximately nine percent of those who drive participate in a carpool.

Between 1990 and 2000, the number of people utilizing public transportation and walking to work had decreased, while the number of people bicycling to work had doubled. Figure 1-8 shows the percentages and methods people used to get to work, according to the 1990 and 2000 censuses.

Emergency Services

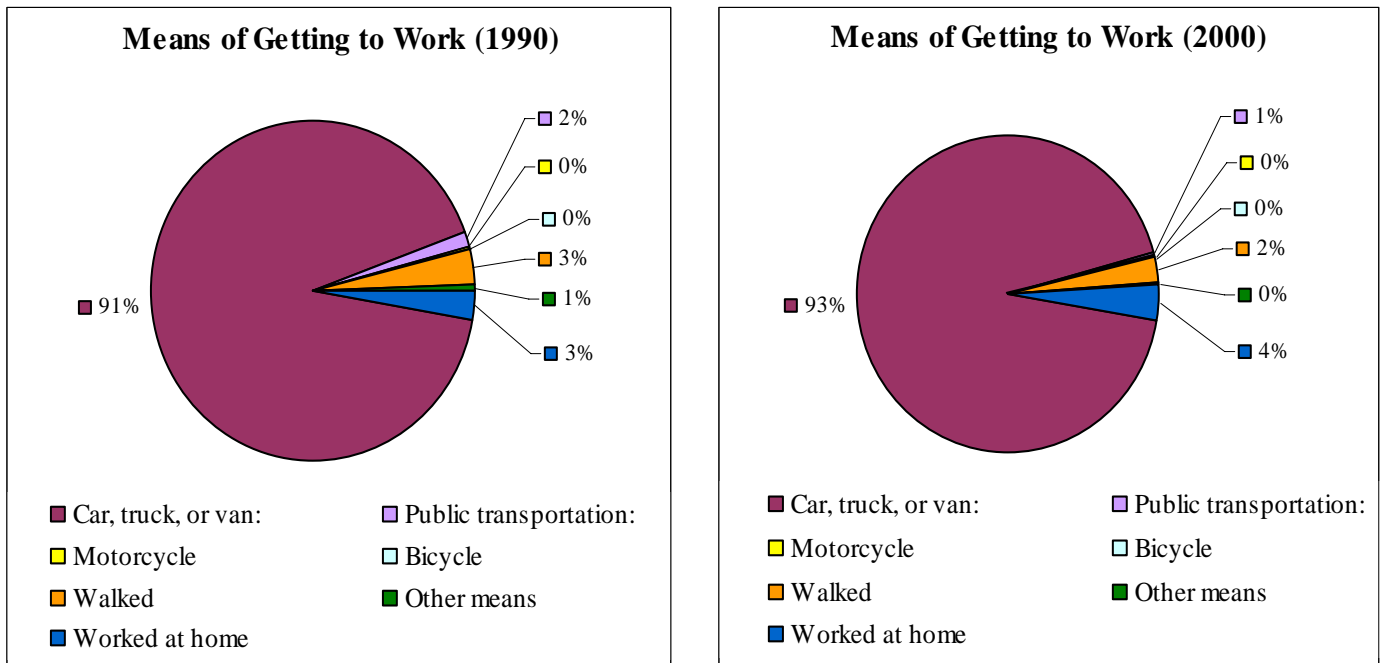
Having access to emergency services is essential. Emergency services and facilities are typically found in centralized population areas, where responders can quickly reach emergency situations. Ambulance, police departments, fire departments, and hospitals are examples of emergency services and facilities. Services to communities outside the population centers also are available, but with possible delays. There are 42 facilities available to respond in case of an emergency. They include four hospitals, 15 police departments, 20 fire departments, and three ambulance service centers. Figure 1-13 displays the locations of emergency service facilities.

Economy and Employment

The economy is constantly changing. Various tools are used to monitor the economic conditions, including average household income and unemployment rate. Table 1-7 compares the average household income and the unemployment rate within the watershed to that of Pennsylvania and U.S.

In 1980, the average household income was \$21,015, and in 2000 it increased to \$60,020, an increase of 186 percent. Some of the increase can be attributed to the inflated cost of living. Another influence on the average household income could be the average household income is rising population in the area.

Figure 1-8. Method of Transportation Comparison 1990 to 2000



The seasonally adjusted unemployment rate—the indicator typically used—is a statistical technique employed to determine whether monthly employment changes are due to normal seasonal patterns or changing economic conditions.

Historically, the local unemployment rate has been below the national rate. As of February 2006, for the most part, that pattern had not changed. The unemployment rate in Allegheny and Butler counties, at 3.5 percent, was below the 4.5 percent (not seasonally adjusted) unemployment rate. Beaver County, at 4.4 percent, was also below the national rate as well. Lawrence County, at 4.7 percent, was slightly above the national average. The local unemployment rate for 2007 could not be calculated due to a lack of data available.

Major Employers

There are 44 major employers within the project area. A major employer is designated as one who employs 200 or more people. Table 1-8 identifies the top ten major employers. A listing of all major employers is located in Appendix C.

Table 1-7. Economic Comparison

Year	Connoquenessing Watershed	Pennsylvania	U.S.
Average Household Income			
1980	\$21,015	19,744	\$20,382
1990	\$36,874	36,675	\$38,464
2000	\$60,020	52,682	\$56,643
Unemployment Rate (Seasonally Adjusted)			
1990	5.2%	5.9%	6.2%
2000	3.7%	5.7%	5.7%
Oct 2007	Data Not Available	4.50%	4.70%

(Source: Bureau of Labor Statistics 2007, Free Demographics 2005, U.S. Census Bureau 2000, U.S. Census Bureau 1990)

Employment Industry

Consistent with the U.S. and the Commonwealth of Pennsylvania, manufacturing was the leading employment industry represented by 18 percent of the employed workers. Retail trade was the second leading industry accounting for 13.5 percent of the workforce. The third leading industry was healthcare and social services. Table 1-9 displays the breakdown of employment by industry for the U.S., Pennsylvania, and the Connoquenessing Creek watershed.

Table 1-8. Top Ten Major Employers

Employer	Location	Employees
AK Steel Corporation	Butler	4,000
Butler Memorial Hospital	Butler	1,200
Three Rivers Aluminum Co. Inc.	Cranberry Township	900
Butler Area School District	Butler	850
Lutheran Affiliated Services	Cranberry Township	800
Penn United Technology, Inc.	Saxonburg	675
Spang and Co. Inc.	Butler	600
Manheim’s Pennsylvania Auction	Cranberry Township	595
Wal-Mart Supercenter	Cranberry Township	550
Mine Safety Appliance Co.	Cranberry Township	500

(Source: Harris Infosource, 2005)

Table 1-9. Breakdown of Employment by Industry

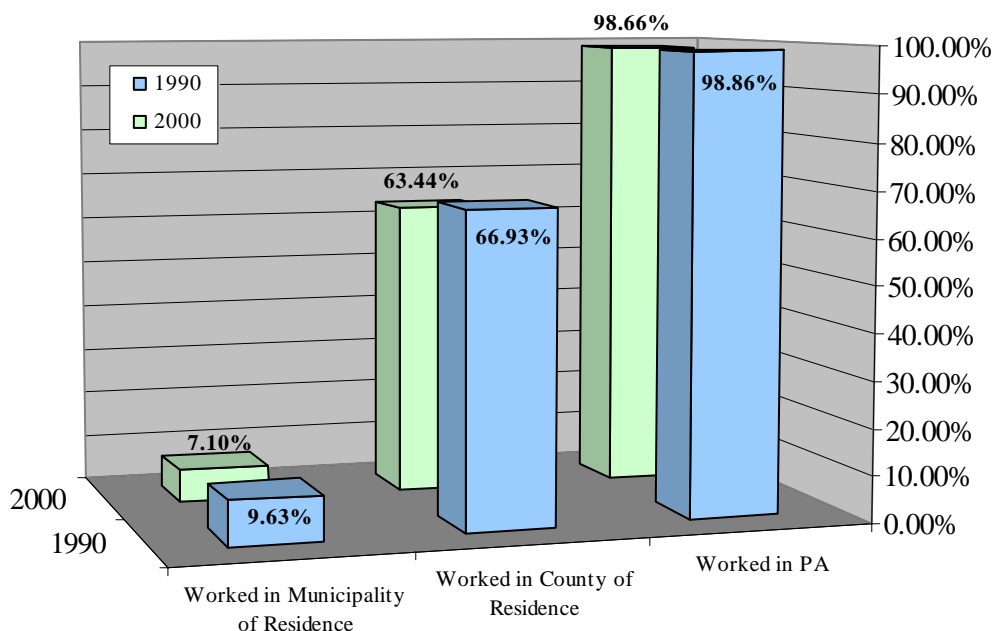
Industry	Connoquenessing		Pennsylvania		U.S.	
	Absolute Employment	%	Absolute Employment	%	Absolute Employment	%
Accommodation and food services	4,471	5.83%	324,035	5.72%	7,902,849	6.09%
Administrative and support and waste management services	1,936	2.53%	167,338	2.95%	4,395,117	3.39%
Agriculture, forestry, fishing, and hunting	665	0.87%	56,904	1.00%	1,931,064	1.49%
Arts, entertainment, and recreation	809	1.06%	73,855	1.30%	2,306,263	1.78%
Construction	5,233	6.83%	339,680	6.00%	8,811,981	6.79%
Educational services	5,544	7.23%	497,026	8.78%	11,364,630	8.76%
Finance and insurance	3,534	4.61%	293,969	5.19%	6,483,758	5.00%
Health care and social assistance	9,870	12.88%	739,803	13.06%	14,459,058	11.15%
Information	1,745	2.28%	148,845	2.63%	3,996,594	3.08%
Management of companies and enterprises	151	0.20%	4,140	0.07%	70,434	0.05%
Manufacturing	14,110	18.41%	906,901	16.01%	18,295,669	14.10%
Mining	144	0.19%	16,566	0.29%	496,771	0.38%
Other services (except public administration)	4,131	5.39%	274,059	4.84%	6,320,480	4.87%
Professional scientific and technical services	4,271	5.57%	307,537	5.43%	7,597,636	5.86%
Public administration	188	0.25%	235,866	4.16%	6,212,425	4.79%
Real estate and rental and leasing	1,098	1.43%	78,123	1.38%	2,448,199	1.89%
Retail trade	10,376	13.54%	684,296	12.08%	15,222,240	11.73%
Transportation and warehousing	3,998	5.22%	248,936	4.40%	5,569,629	4.29%
Utilities	661	0.86%	55,528	0.98%	1,174,876	0.91%
Wholesale trade	3,718	4.85%	210,136	3.71%	4,669,192	3.60%
Total	76,653		5,663,543		129,728,865	

(Sources: Free Demographics, 2005; U.S. Bureau of Census, 2000)

Work Location and Time Traveled to Work

Only seven percent of the local workforce worked within the municipality where they reside, while 63 percent worked within the county in which they reside. Less than 1.5 percent of residents worked outside the boundaries of Pennsylvania in 2000. Figure 1-11 shows the work location of residents in 1990 and 2000.

Figure 1-11. Work Locations



The amount of time people travel to work has increased due to urban sprawl, which is very common in the region. Many people have moved to the region while maintaining employment in Pittsburgh. Between 1990 and 2000, there was an eight percent increase in the number of people living within the study area and commuting more than 30 minutes to work. Figure 1-12 shows a comparison of how long people traveled to get to work in 1990 and 2000.

Education

Primary and secondary educational facilities exist. There are seven major school districts that maintain 41 schools. There are 10 private schools. Beaver, Butler, and Lawrence counties also have county-wide vocational technical schools.

Secondary educational opportunities are available. Butler County Community College is the only secondary school located within the project area; however six other institutions are located close by. Table 1-10 identifies the schools and their enrollments.

Figure 1-12. Travel Time to Work Comparison 1990-2000

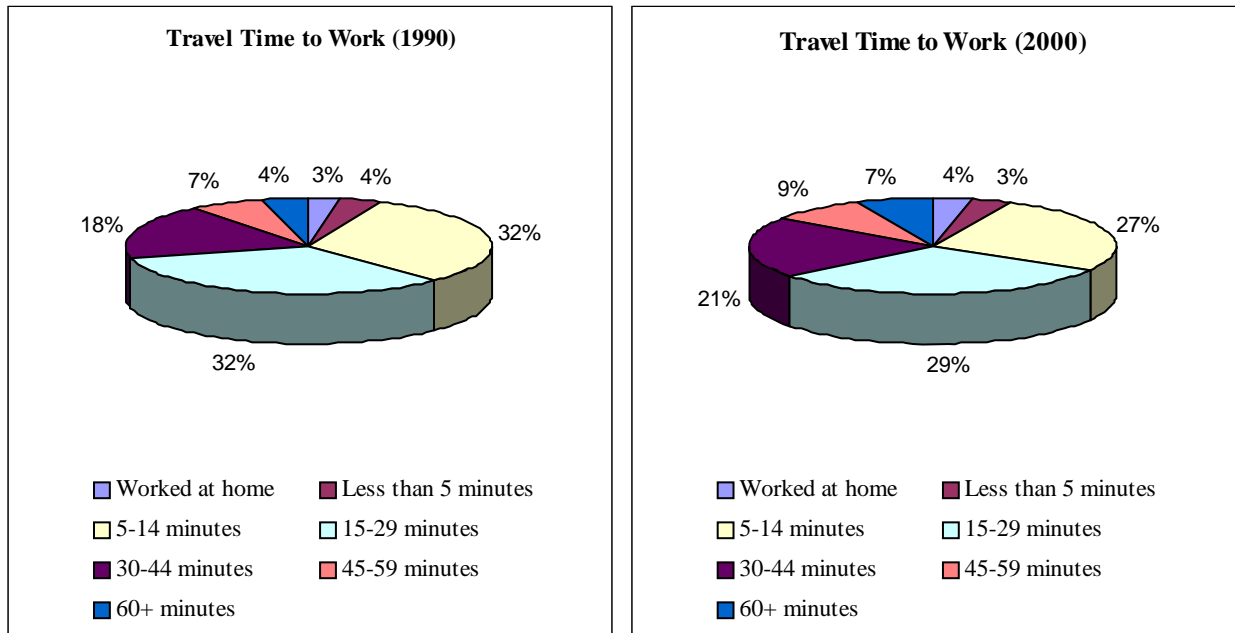


Table 1-10. School Districts and School Enrollment

School	Grades	Enrollment
Butler Area School District		
Broad Street School	K-6	314
Butler Area Intermediate High School	9-10	1,407
Butler Area Junior High School	7-8	1,291
Butler Area Senior High School	11-12	1,317
Center Avenue School	K-6	243
Center Township School	K-6	757
Clearfield Elementary School	K-6	273
Connoquenessing Elementary School	K-6	314
Emily Brittain Elementary School	K-6	441
McQuiston Elementary School	K-6	544
Meridian School	K-6	427
Northwest School	K-6	451
Oakland Township School	K-6	334
Summit Elementary School	K-6	268
Mars Area School District		
Adams Elementary School	3-5	388
Mars Area Middle School	6-8	654
Mars Area Senior High School	9-12	872
Mars Primary Center	K-2	570
Middlesex Elementary School	3-5	223

Table 1-10. School Districts and School Enrollment (continued)

School	Grades	Enrollment
<i>Seneca Valley School District</i>		
Connoquenessing Valley Elementary School	K-4	769
Evans City Elementary School	K-4	619
Evans City Middle School	5-6	530
Haine Elementary	K-4	690
Haine Middle School	5-6	626
Rowan Elementary School	K-4	837
Seneca Valley Intermediate High School	9-10	1,176
Seneca Valley Middle School	7-8	1,207
Seneca Valley Senior High School	11-12	1,091
<i>South Butler County School District</i>		
Knoch High School	9-12	1,014
Knoch Middle School	6-8	739
South Butler Intermediate Elementary School	4-5	386
South Butler Primary School	K-3	778
<i>Private Schools</i>		
Butler Catholic School, Butler	K-8	317
Butler County Children's Center, Butler	PK-K	60
Butler Wesleyan Academy, Butler	PK-12	25
Butler Montessori School, Butler	NA	50
Calvary Academy, Butler	NA	NA
First Baptist Christian School, Butler	PK-12	119
His Kids School, Butler	PK-3	NA
Holy Redeemer School, Ellwood City	PK-6	184
Holy Sepulcher Elementary School, Butler	K-8	192
Home Acre Christian Academy, Butler	Ungraded	38
Living Word Academy, Butler	3-12	9
Lutheran Youth-Family Services	2-12	80
Montessori Preschool of Merida	PK-12	42
North Main Christian School	K-7	101
Penn Christian Academy, Butler	K-6	NA
Portersville Christian School, Portersville	K-12	326
Purification BVM School	PK-6	186
St. George Elementary School	K-8	199
St. Gregory School, Zelenople	K-8	207
St. Stephens Lutheran Academy, Zelenople	Ungraded	130
St. Wendelin Elementary School, Butler	PK-8	140
Vision Christian Academy	PK-K	22
<i>Slippery Rock Area School District</i>		
Moraine Elementary School	K-5	511

Table 1-10. School Districts and School Enrollment (continued)***Ellwood City Area School District***

Hartman Elementary School	K-6	314
Lincoln Junior Senior High School	7-12	1,080
North Side School	K-6	380
Perry Township School	K-6	294
Walnut Ridge School	K-6	138

Riverside Beaver County School District

Riverside High School	9-12	675
Riverside Intermediate Center	5-8	622
Riverside KDG Center	K	113
Riverside Primary Center	1-4	519

Colleges and Universities

	<i>Part Time</i>	<i>Full Time</i>
Butler County Community College	1,653	1,923
Community College of Allegheny County	10,736	7,374
Community College of Beaver County	1,244	1,272
Geneva College	268	1,696
Penn State University /University Coll-Beaver	130	600
Slippery Rock University	917	7,313
Westminster College	151	1,357

(Sources: Butler Eagle, 2006; Pennsylvania Department of Education; Pennsylvania Department of Education, 2007; Private school review)