

## CHAPTER 1. YOUGHIOGHENY HEADWATERS

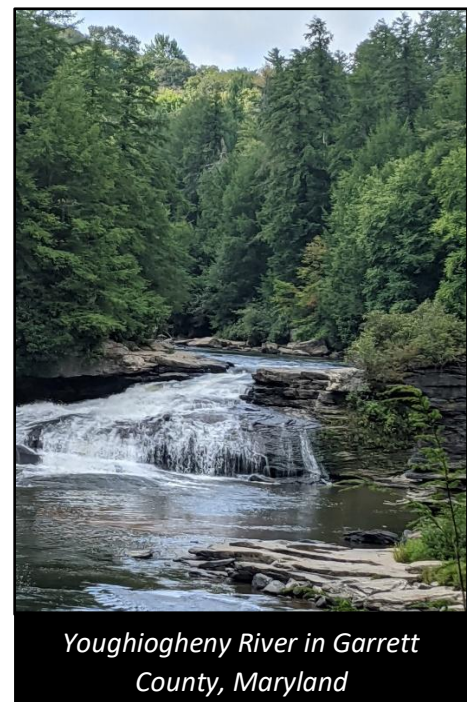
Originating near Eglon, West Virginia, the Youghiogheny (Yok-i-gay-nee) River, or Yough (Yok) for short, flows in a northerly direction for approximately 132 miles to where it joins the Monongahela River in McKeesport, Pennsylvania. The name is from a Native American word meaning “a stream flowing in a contrary direction.” The Youghiogheny River Basin is the only River Basin in Maryland that does not flow to the Chesapeake Bay.

The Youghiogheny Headwaters Management Unit focuses on the area of land that encompasses all the streams which flow into the Youghiogheny River from the headwater tributaries to the confluence of Deep Creek. For information on Deep Creek see chapter two.

### PROJECT AREA CHARACTERISTICS

The headwaters are the very beginning of the watershed. These streams tend to be much smaller in size and may often be intermittent, or only flowing during part of the year. The Youghiogheny River starts from two springs on Backbone Mountain along the border of West Virginia and Maryland, southeast of Aurora, West Virginia. This ridgeline holds Hoyes Crest (3360'), the highest point in Maryland, and is on the eastern Continental Divide. An area characterized by broad upland areas and ranges of mountains that extend in a generally northeast-southwest direction, the basin lies within the Allegheny Plateau ecoregion.

The headwaters portion of the Youghiogheny River encompasses approximately 118,275 acres and contains 34 miles of streams. The watershed is primarily composed of rural communities in Garrett County, Maryland and Preston County, West Virginia.



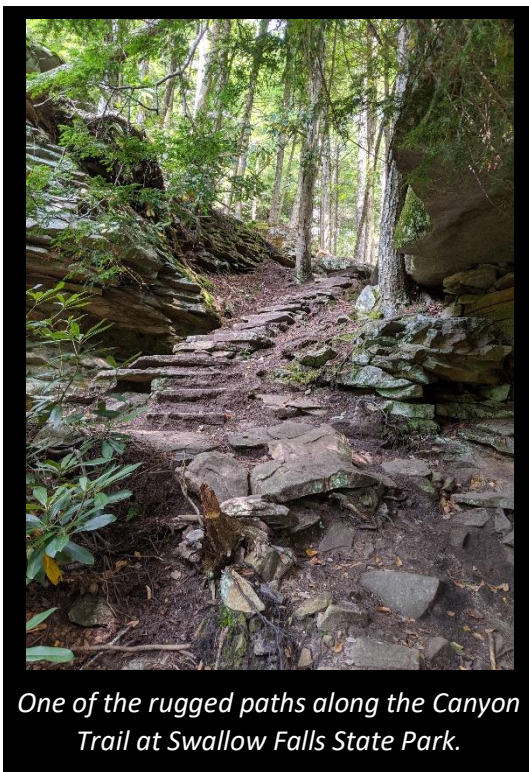
*Youghiogheny River in Garrett County, Maryland*

### Stream Classification

In order to compare waterways, geographers, geologists, and hydrologists classify each waterbody into stream orders. The higher the stream order, the larger the waterbody. Waterways with stream orders between one to three are headwater streams—meaning they are the start of a watershed. Often, these streams are intermittent; they may not flow all the time and are typically unnamed. Moving up the scale, streams in orders three to five are slightly larger because they are a merger of order one and two streams. Lastly, larger streams such as the Youghiogheny, Monongahela, and the Ohio Rivers are considered to be between streams orders six to eight, depending on the number of smaller tributaries that have merged into them (Briney, 2019).

Most of the streams in this region are designated as IIP with P meaning protection for use as public water supply. The only exception is Broadford Lake subwatershed, which is designated as IP above the reservoir, within the reservoir and in the Perry Glade Run tributary. A designation of IIP in Maryland means that the waterway is managed as a nontidal cold-water stream that serves as a public water supply. An IP designation is managed for water contact recreation and protection of non-tidal warm water aquatic life and public water supply.

Within the Youghiogheny Headwaters Management Unit there are 15 named tributaries that flow directly into the Youghiogheny River. Those 15 tributaries contain another 28 named tributaries, in addition to the numerous unnamed streams in this management unit. A listing of all the tributaries, their sizes and stream designations, is located in Appendix C.



*One of the rugged paths along the Canyon Trail at Swallow Falls State Park.*

### **Topography**

Youghiogheny headwaters have a mixture of topographic features. The topography ranges from flat floodplains to steep rock cliffs. The most rugged terrain is on the east slope from Gap Run to Trap Run and the west slope from White Rock to Laurel Run. This physical change has created an elevation ranging from 3,360 feet above sea level on Backbone Mountain (located on the ridge of the Allegheny Mountains and the Appalachian Mountains) to 1,480 feet above sea level at Friendsville (Kurak, E, et al. 1996). From the headwaters, the Youghiogheny River narrows and carves through the region creating the topographic western portion as Chestnut Ridge; the eastern portion created is Laurel Hill.

### **Climate And Climate Change**

Climate change is a “hot” topic but what actually is climate change? It is important to recognize that climate is not the same as weather. Weather

is a short-term measurement of the state of the atmosphere in a single location. It involves air temperature, how much humidity is in the air, both rain and snowfall precipitation, and wind speed. Climate tracks averages and patterns of weather over long periods of time over an entire region. Basically, climate change is the study of changes in the averages and patterns of weather over time.

The Earth’s climate has been changing for many centuries. However, these changes are not equivalent to the changes currently referred to as climate change. Although data supports that the Earth’s rotation and orbit change the amount of solar energy received, and thus alters climate over long time intervals, recent studies support that climate has been drastically fluctuating at an unnatural rate (Carbon Brief, 2011).

Carbon dioxide (CO<sub>2</sub>) is a small portion of the makeup of Earth's atmosphere but the fluctuations in CO<sub>2</sub> play a huge role in climate change. CO<sub>2</sub> is a common, naturally occurring gas. We inhale oxygen and exhale carbon dioxide. It is the most natural cycle on Earth, plants take in carbon dioxide and release oxygen.

However, human activities have exacerbated this natural cycle and have offset the amount of carbon dioxide our atmosphere can handle. It is widely accepted that the warming of global temperatures is a direct result of man-made emissions of greenhouse gasses (Carbon Brief, 2011). Burning fossil fuels and stripping the land of trees and plants has increased the amount of CO<sub>2</sub> while decreasing the natural world's ability to offset the emissions. Humans have increased atmospheric CO<sub>2</sub> concentration by 48% since the Industrial Revolution began, a greater leap than what had happened naturally over a 20,000-year period up to 1850. Since 1950, our fossil fuel consumption has increased by 550% while carbon dioxide emissions have increased by 500% (National Aeronautics and Space Administration (NASA)).

Scientists agree the level of CO<sub>2</sub> in the atmosphere needs to stay below 350 parts per million (ppm) to address the catastrophic impacts of climate change. In 2019, CO<sub>2</sub> concentrations surpassed 415ppm in the atmosphere, the first time this has occurred in at least 2.5 million years (NASA). The last measurement recorded on NASA's website during the writing of this conservation plan was 421ppm in April 2023.

The current range of uncertainty lies between 350ppm and 450ppm, a threshold that is rapidly approaching. Exceeding 450ppm will land the Earth in the high-risk zone, a point where there will be irreversible tipping points. There are already irreversible impacts at current CO<sub>2</sub> levels from intense heat waves, heavy rainfall events, increased drought durations, melting ice caps and warming sea levels. There are many ways in which climate change will impact and is already impacting the Youghiogheny River Watershed (NASA and Staeffen, et. al, 2015).

Maryland has recorded an average temperature nearly 4° F higher than the average between 1895-1915. Compared with temperatures in 1910, Maryland has 30 fewer days with temperatures below freezing. Winter temperatures have become warmer, at a rate of 1.3° F per decade from 1970 to 2000 in the northeast U.S. Even more alarming, projections show it could be as much as 5.4 °F warmer by 2050 than it was in the 1990s. Since the late 1800s, global temperatures have increased by about 2 degrees Fahrenheit. According to the NASA website on Global Climate Change, 19 of the warmest years have occurred since 2000, with the exception of 1998. The years 2016 and 2020 are tied for the warmest year on record since we started keeping track back in 1880.

In addition to the higher temperatures, Maryland has also seen an increase in annual precipitation. More rain events are considered downpours, which increase flooding hazards. About 30% of Maryland's rainstorms between 2007-2016 would have fallen into the top 1% of storm intensity had they occurred in the 1950s. Increased precipitation goes hand in

hand with a higher frequency of large storm events, causing changes in peak stream flows, more erosion, and pollution runoff (University of Maryland Extension, 2023 and DCNR).

The temperature of water in streams is an important factor in maintaining a healthy aquatic ecosystem. However, increased temperatures can lead to warmer streams. This does not sit well with our cold-water fish species like brook trout. Projections show Maryland could be unsuitable for cold water fish species by the year 2100 if greenhouse gas emissions are not curbed (University of Maryland Extension, 2013).

As precipitation changes and increased temperatures carve the path for a longer growing season, residents can expect to see changes in stream flows. The peak stream flows are expected to occur 10-14 days earlier and summer low-flows are expected to last about a month longer. This could also impact our forest ecosystems that rely on the early spring flows of ephemeral streams.

As the climate changes and plant hardiness zones shift northward at an estimated 13.6 miles per decade, species are inhibited by habitat fragmentation when they would instinctively move north with suitable climate for their habitat needs. Maintaining and restoring habitat connectivity is crucial in a holistic approach to conservation efforts.

Recommendations set forth in this River Conservation Plan are steps forward in addressing climate change impacts to our regional ecosystems. Efforts to mitigate impacts of severe weather events by repairing riparian buffers, reducing loss of tree cover, and protecting land from habitat degradation are identified. Informed citizens urging others to participate in water and habitat conservation will help mitigate climate change impacts locally.

## **Socioeconomic Profile**

### Demographics & Population Patterns

The Youghiogheny River Headwaters Region occupies approximately 118,275 acres or 184.8 square miles. That area contains ten municipal units, seven in Maryland and three in West Virginia. It is estimated that 38,176 people live in the Youghiogheny Headwaters Region. Table 1-1 identifies the population by the municipal unit.

### Land Use Planning & Zoning

Zoning is an important tool available to communities. Although it can be viewed in a negative light as an infringement of landowner rights, when used properly, zoning can help safeguard a community's character. Zoning ordinances give reasonable consideration to the character of districts and their suitability for particular uses. For example, they encourage orderly development and the most appropriate use of lands.

Ordinances can conserve the value of land and buildings while promoting the conservation of natural resources and can prevent environmental pollution. In

addition, they promote health and general welfare, avoid undue concentration of population, and provide for adequate light and air. Ordinances have also been written to secure safety from fire, panic and other dangers; lessen congestion on roads; facilitate the adequate provision of transportation, parking, water, sewage, parks and other public facilities.

Within the Headwaters Management Unit there is no countywide zoning in Garrett County, MD, or Preston County, WV. In Maryland, Garrett is the only county that does not have county-wide zoning. However, a few towns in the Headwaters Management Unit have their own zoning. They include: Oakland, Mountain Lake Park, and Loch Lynn Heights.

Both counties do have a few subdivision ordinances. While there are not many details about them, Preston County does have ordinances for: Abandoned and Dilapidated Property; E911 Address, Exotic Entertainment; Hotel Tax; Mass Gatherings; Fire Department Charging Fee; Unlawful for dogs running at large; Floodplain; Litter; and the Preston County Farmland Protection Program. Garrett County has a few subdivision ordinances which are discussed in more detail below.

- **Sensitive Areas Ordinance**

The Sensitive Area Regulation establishes regulations for the following sensitive areas:

Steep Slopes: controls and limits growth on slopes of 30% or more;

Stream Buffers: establishes a 25-foot setback in growth areas and a 50-foot setback in rural areas;

Rare, Threatened and Endangered Species: no permits issued by the county without approval by state or federal agencies where rare, threatened & endangered species or their habitat is impacted;

Enforcement of the Floodplain Management Ordinances: ensures compliance with Maryland's Non-Tidal Wetlands Act; and

Source Water Protection: establishes minimum requirements to protect these resources from contamination

- **Water & Sewer Master Plan**

The Sustainable Growth and Agricultural Preservation Act of 2012 (aka Septic Bill) created four land use categories to identify where major residential subdivisions may be located and what type of sewage system will serve them:

Tier I: currently serviced by public sewage systems

Tier II: planned to be served by public sewage for major subdivisions

Tier III: not planned to be serviced by public sewage. Growth on septic systems can occur.

Tier IV: planned for preservation and conservation or dominated by agriculture or forest. Major residential subdivisions (more than 7 lots) are prohibited.

- **Accounting for Growth Regulations**  
Requires owners of new homes to pay an offset fee for nutrients added to the watershed (nitrogen, sediment and phosphorus) from their septic system or enter into a trading market or pay a fee.
- **Transient Vacation Rental Unit Licensing Ordinance (TVRUs)**  
The purpose is to license and regulate the use of residential property rented on a transient or short-term basis.

### Income

Table 1-2 below displays the average and median household incomes for each of the municipal units in the region. The median household income is the point where half the people make more and the other half make less; fundamentally, it is the middle point. It is used over the mean or average income for statistical analysis because individuals with extremely high salaries may skew the results and bring the average up. Per capita income is another common figure utilized when comparing incomes. Essentially, the per capita income is the average income earned per person (age 15 and older) in a given area and within a specific year.

Within the Youghiogheny River Headwaters Management Unit there are approximately 14,998 households. Of those households 42.5% receive some sort of Social Security income and 27.6% receive retirement income. Out of those same households only 1.9% receive public assistance while 15.3% receive food stamps or Supplemental Nutrition Assistance Program benefits (U.S. Census Bureau, 2023).

### Poverty

The federal poverty level is a measure used to determine the level of income at which an individual or family qualifies for federal benefits and programs. This level is a set minimum amount that a family needs to provide clothing, shelter, transportation, and other necessities.

As of 2021, 13.5% of the people in the United States live below the poverty level. Within the Youghiogheny Headwaters Region, state data is the only data available. In Maryland, 10.3% of the population are living below poverty levels while in West Virginia 16.8% do so (U.S. Census Bureau, 2023).

### Environmental Justice

Environmental justice is defined as “the fair treatment and meaningful involvement of all people regardless of race, color, national origin, or income, with respect to the development, implementation, and enforcement of environmental laws, regulations, and policies. This goal will be achieved when everyone enjoys: the same degree of protection from environmental and health hazards, and equal access to the decision-making process to have a healthy environment in which to live, learn, and work” (U.S. EPA).

In Maryland, each census tract is given an Environmental Justice Socioeconomic score that takes into account the community’s minority population, poverty level, and community’s English-speaking proficiency. Communities with 50% or more minorities, poverty rates exceeding 25%, or having 15% limited English proficiency are given higher scores. A score over 75 makes the community eligible for Environmental Justice status. In the Youghiogheny Headwaters Management Unit none of the census tract areas qualify as Environmental Justice Communities.

Housing

There are over 22,500 housing units within the Youghiogheny Headwaters Management Unit. Of those 83% are single unit structures and 2% are housing units with 10 or more structures. It is estimated that in 2020 there were 7,547 vacant housing units, of which 65.5% were vacant because they are for seasonal, recreational, or occasional use. Another 11% of the vacant homes are available for rent, and 2.6% were for sale (U.S. Census Bureau, 2023).

**TABLE 1-1. HOUSE VALUES IN YOUGHIOGHENY HEADWATERS**

| State                                   | Municipal Unit                  | 2020 Median Home Value | 2020 Average Home Value |
|---|---------------------------------|------------------------|-------------------------|
| MD                                      | District 16, Mountain Lake Park | \$134,000              | \$180,211               |
| MD                                      | District 8, Red House           | \$139,200              | \$172,295               |
| MD                                      | District 10, Deer Park          | \$167,600              | \$267,643               |
| WV                                      | Fifth District                  | \$84,000               | \$98,164                |
| WV                                      | Second District                 | \$151,000              | \$202,700               |
| MD                                      | District 6, Sang Run            | \$249,800              | \$267,848               |
| WV                                      | Fourth District                 | \$104,900              | \$128,516               |
| MD                                      | District 1, Swanton             | \$341,300              | \$465,625               |
| <i>Source: U.S. Census Bureau, 2023</i> |                                 |                        |                         |

Employment

Within the Youghiogheny Headwaters Region, of the total population approximately 16,031 individuals are in the workforce. Of those individuals 68% work in the state and county in which they reside. Of the remaining individuals, 17% work within the state of their residence but outside the county and 15% work outside the state of their residence.

The majority of the workforce, 62%, has a commute under 30 minutes with 26% spending 15 minutes or less. Almost 78% of the workforce drives themselves to work while 7% work from home. Please note this data is based on data submitted in 2020 and the start of the Coronavirus pandemic. This was a transitional time in the

workforce with many companies modifying schedules and employees' abilities, enhancing work from home opportunities (U.S. Census Bureau, 2023).

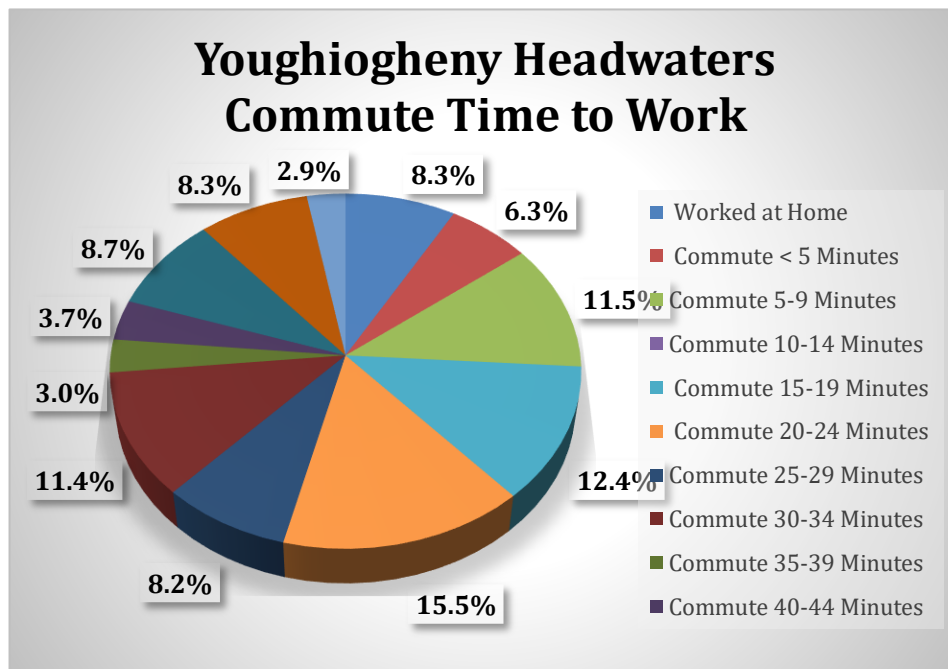


Figure 1-1. Displays the commute times that residents within the Youghiogheny River Headwaters Management Unit typically spend on a daily basis.

The top five employment industries in the Youghiogheny River Headwaters Management include:

1. Health Care/Social Assistance – 18%
2. Construction – 15%
3. Educational Services – 11 %
4. Real Estate/Rental/Leasing – 10%
5. Public Administration – 10%

**Utilities and Infrastructure**

Public utilities vary in their availability, coverage, and reliability within the entire Youghiogheny Watershed. Broadband internet, cell phone service, sewage and drinking water systems that serve the public and their residential and commercial needs, electricity, and natural gas are all examples of utilities that exist in some portion of the Youghiogheny Watershed. Areas with elevated population density and areas that have increased tourism use are often better equipped than nearby rural areas.

Public Sewage

Public sewer systems are situated throughout the watershed, and some systems may transfer water that originates in one watershed to another. Public sewage is available in Oakland and Crellin. Many other multiple-source sewage systems exist, including campgrounds like Big Bear.



Drinking Water

There are many drinking water systems throughout the watershed. Similar to sewage system infrastructure, the service areas often extend outside of the Youghiogheny River Watershed. There are 13 drinking water systems operated by the Garrett County, MD Public Works Department.

Internet Services

Internet service is available through DSL or Fiber Optic in many parts of the watershed. There are still areas that do not have reliable access. Many internet utilities in the area were expanding their systems during the pandemic due to the increased demand from business and homeowners.

Natural Gas

Natural gas is available through direct service lines and storage tanks at individual points of use. Service through direct service lines is non-existent in the rural areas. There are many different companies who offer delivery to businesses or homes. Additionally, many offer tank rentals and service contracts.

**Education**

There are two school districts in the Youghiogheny Headwaters Management Unit, Preston County School District in West Virginia and Garrett County School District in Maryland. Both Maryland and West Virginia operate on county-wide school districts.

There were approximately 6,643 individuals from the Youghiogheny River

Headwaters Region enrolled at a school in 2020. The majority of individuals were enrolled in a public learning institution. Table 1-2 identifies the school enrollments.

**TABLE 1-2. SCHOOL ENROLLMENTS IN THE YOUGHIOGHENY HEADWATER MANAGEMENT UNIT**

| School Type                  | Total       | Public      | Private    |
|------------------------------|-------------|-------------|------------|
| Pre School                   | 375         | 360         | 15         |
| Elementary School Grades K-4 | 1930        | 1865        | 65         |
| Middle School Grades 5-8     | 1517        | 1420        | 97         |
| High School Grades 9-12      | 1600        | 1495        | 105        |
| College                      | 851         | 729         | 122        |
| Grad/Professional Schooling  | 370         | 301         | 69         |
| TOTAL                        | <b>6643</b> | <b>6170</b> | <b>473</b> |

*Source: U.S. Census Bureau, 2023*

**LAND RESOURCES**

**Geology**

Youghiogheny Headwaters are located in the Allegheny Mountain Section of the Appalachian Plateaus Physiographic Province. The Allegheny Mountain Section is where erosional remnants of upward folds of the earth’s crust or “anticlines” remain. The low hills and valleys between these two ridges are on the downward parts of the folded crust or “syncline” (Smith, 1998, and Wagner and Coxe, 2000). The three major geologic structures

are the Chestnut Ridge and Laurel Hill anticlines, and the syncline is centered in Ohiopyle State Park.

The bedrock of the ridges varies from the Shenango, Burgoon, Mauch Chunk, Catskill Oswayo, and the Allegheny Group, which is composed of gray sandstone and shales. The Pottsville Formation is thickly bedded, cross-stratified, pebbly orthoquartzite Homewood Sandstone, that forms the crests of multiple waterfalls which include Ohiopyle Falls. These bedrock strata formed between the Devonian, Mississippian, and Pennsylvanian periods, ranging from 280 to 400 million years ago (Smith, 1998, and Wagner and Coxe, 2000).

### **Soil Characteristics**

Soil is a record of the geological climatic history of the region (Blumberg, et. al, 1982). The physical landscape depicts how the land is used; the soil type and conditions influence the determination of these land users. For example, mining only occurs in areas where coal and limestone deposits exist. In Maryland, the soil is influenced by weathering, vegetation, climate, and time. Sedimentary rocks, such as shale, sandstone and limestone, are prevalent in the Youghiogheny Watershed and subsequently along the Youghiogheny Headwaters.

The development of soil relies on several factors: climate, plant and animal organisms, parent material, time, and differences in elevation. Soils with similar characteristics, such as horizons (soil layers), thickness, and arrangement, are identified as soil series. The influence of each factor of the soil varies, creating the diversity of soil series, both locally and regionally. These series are commonly named after towns or geological features where they were first discovered and mapped. They can differ in texture of the surface soil, slope, and stoniness, among other characteristics. These differences divide the soil series into phases, and the phases are a feature that can be used to determine management practices. It is important to note that there can be several phases within a soil series that can exist.

Individual soils have different characteristics that affect their behavior and may limit some uses. For example, soils with seasonally high-water tables are not ideal for farming as they frequently experience flooding. Therefore, the type of soil determines the use of the land.

### Soil Associations

Soil associations consist of two or three major soil types, and a few minor soil types, grouped together. They are landscapes with distinct, proportional patterns of soils. Individual soils can occur in more than one soil association in different proportions or patterns. Preston County in West Virginia has six different soil associations. All six are found along the Youghiogheny Headwaters. Garrett County in Maryland has six different soil associations. Of these, only five are found along the river. These associations are important, especially to the public, to provide basic information about soil and to provide a general guide for watershed management.

- **Calvin-Gilpin**

*Description-* Gently sloping to steep, moderately deep, well-drained soils; formed over acid, red to gray shale, and sandstone

Location- Extends from near McHenry north-northeastward on both sides of U.S. Highway 219 to the Pennsylvania line. It also extends from near New Germany northeastward to the Pennsylvania line. The last one extends from near North Glade southwestward through Oakland to the West Virginia line.

Land Use- Generally supports the most intensive farming in the county. Mainly row crops are alternated with strips of hay or close-growing crops. Many of the farms specialize in producing milk, beef, or other animal products.

Limitations- Moderate limitation for basement excavations due to bedrock. The slope and the depth to bedrock is a severe limitation for sewage disposal by septic tanks, so other means of disposal may be required in many places.

- **Gilpin-Cookport-Dekalb**

Description- Gently sloping to steep, moderately deep, well-drained, and moderately well-drained soils; formed over acid, gray to yellowish sandstone, and shale.

Location- Extends from the vicinity of Cunningham Lake, north-northeastward through Bittering and Grantsville to the Pennsylvania line. It also includes most of the Swallow Falls State Forest and extends southward and slightly westward to the West Virginia line.

Land Use- Large areas better suited to forage crops and pastures.

Limitation- Severely limited onsite sewage disposal by septic tanks because of subsoil wetness, slow movement of soil moisture through the subsoil, and limited depth over bedrock, or slope.

- **Gilpin-Wharton-Dekalb**

Description- Gently sloping to steep, moderately deep and deep, well-drained and moderately well-drained soils; formed over acid, gray to brown, soft clay shale to hard sandstone.

Location- Occupies one area in the extreme western part of the county. Most are gently sloping to moderately sloping, but there are many steep areas where slopes are comparatively short.

Land Use- Seasonally wet soils with more acreage used for pasture and forage crops. Most areas are also wooded.

Limitations- Limited building sites because of seasonal wetness, particularly buildings with basements. Sewage disposal by septic tanks, limited depth to bedrock, slow permeability, subsoil wetness, and slope.

- **Dekalb-Calvin-Gilpin**

Description- Gently sloping to steep, moderately deep, well-drained, very stony soils; formed over acid, red to gray sandstone, and shale.

Location- Located in the greater part of the Savage River Watershed in the east-central and northeastern part of the county, on the western slopes of

Backbone Mountain, and the area between Red Run Cove and Gap Run in the west-central part of the county.

Land Use- Forage crops, and pastures, but mostly for woodland, wildlife habitat, watershed protection, and some kinds of outdoor recreation.

Limitations- Large boulders and some outcroppings of hard rock. The area is not used for cultivated crops.

- **Dekalb-Gilpin-Cookport**

Description- Gently sloping to steep, moderately deep, well-drained and moderately well-drained, very stony soils; formed over acid, gray to yellowish sandstone, and shale.

Location- Primarily of the eastern slopes of Backbone Mountain and Big Savage Mountain along the entire eastern part of the county. The other area is irregular and extends over many parts of the county west of Hoop Pole Ridge and Meadow Mountain.

Land Use- Small areas for forage crops and pasture, but generally for woodland, wildlife habitat, watershed protection, and outdoor recreation.

Limitation- Not suitable for cultivated crops.

- **Gilpin-Rayne-Wharton**

Description- Derived from acid sandstone, siltstone, and clay shale. The slopes are often steep and rugged.

Location- Relatively smooth especially on the rounded hills and broad level ridgetops.

Land Use- Corn, small grains, and hay grown mostly for livestock feed. Farms are mainly dairy, beef cattle, or general.

Limitation- Mining in many of these areas. Most farms were abandoned because of the sale of strip-mining rights.

- **Calvin-channery Gilpin**

Description- Made up of mostly acid sandstone and shale.

Location- Found on moderately sloping soils near Terra Alta.

Land Use- Corn, small grains, and hay crops grown for livestock feed. Buckwheat is grown for a cash crop or for feed.

Limitation- Steep slopes making the productivity low for pastures. The winter is cold and long, and the summer is short, making the amount of rainfall greater.

- **Dekalb**

Description- Sandstone ridge tops and steep, stony, side slopes marked by bedrock. Soils are shallow to moderately deep, coarse textured, and often stony.

Location- Can be found on Briery Mountains, Laurel Ridge, Snaggy Mountain, Chestnut Ridge, and the Cheat River Gorge.

Land Use- Mostly woodland.

Limitation- Small farms that only supply a small part of the family income.

- **Belmont**

Description- Derived from red shales and limestone. The soil occupies gently to steep slopes.

Location- Located on the lower slopes and soils of the Melvin series on the narrow bottom lands.

Land Use- Among the most fertile soil in the county. Used mainly for pasture, but farmers will grow limited amounts of row crops and of small grains for use on the farm.

Limitation- Too steep for cultivation.

- **Clymer**

Description- Shallow to moderately deep stony Dekalb soils associated with the moderately well-drained Cookport and the very poorly drained Lickdale soils.

Location- Extensive in two areas near Aurora and near Cranesville. Occupies broad, gently sloping crests of ridges.

Land Use- Most of the area is tilled. The area has a cool climate and the deep, well-drained soils are favorable for growing potatoes, an important crop to the area.

Limitation- No limitations shown.

- **Atkins (glades)**

Description- Mainly of colluvial and alluvial origin.

Location- Outer fringes of glade areas.

Land Use- Drained, limed and fertilized soil good for pastures and producing hay crops.

Limitation- Has numerous small, poorly drained tracts, most of them near the heads of streams.

### Prime Agricultural Soils

Prime farmland is defined by the U.S. Department of Agriculture as land that has the best combination of physical and chemical characteristics for producing food, feed, forage, fiber, and oilseed crops and is available for these uses. It can be cultivated land, pastureland, or forestland, but cannot be urban or built-up land or water areas. Prime farmland has a dependable supply of moisture, a favorable growing season, acceptable acidity or alkalinity, an acceptable salt and sodium content, few or no rocks, and is not excessively erodible or saturated with water for long periods. The slope is mainly between 0 and 6 percent. Prime farmland is of major importance in meeting the nation's short and long-range needs for food and fiber, and should be used wisely.

There are 16 different prime agricultural soils within Preston County, West Virginia and Garrett County, Maryland (Natural Resources Conservation Service).

**Land Use**

Land use within the Youghiogheny Headwaters Management Unit has low development and elevated percentages of hay and pasture lands. Over 60% of this unit is forested with high percentages of woody wetlands and emergent herbaceous wetlands. Table 1-3 lists the land uses within the Youghiogheny Headwaters.

**Ownership**

For this plan, properties are categorized as private property, public lands or state lands.

Private property refers to the ownership of property by private parties - essentially anyone or anything other than the government. Public lands are any lands and interests in lands owned by the United States (U.S.) (Cornell Law School). State lands are properties owned by a U.S. state which provide opportunities for enjoying healthy outdoor recreation and serve as outdoor classrooms for environmental education (DCNR).

The Youghiogheny Headwaters are located within two counties, Garrett County in Maryland and Preston County in West Virginia.

The majority of Garrett County is privately owned. One property totaling 1,887 acres is owned by Wildlife and Heritage Service and defined as public lands (Public Lands). Preston County is also majorly privately owned. Preston County has one property listed as public in the watershed, totaling 253 acres owned by The Nature Conservancy (Public Lands). The Youghiogheny Headwaters, therefore, has about 2,140 acres of public land.

Four properties are listed as State Lands in the Youghiogheny Headwaters: Garrett State Forest, Mt Nebo Wildlife Management Area, Youghiogheny River Natural Environment Area and Cathedral State Park. Garrett State Forest totals 7,311.9 acres, but a portion of the forest is located in a neighboring watershed, bringing the total for the Youghiogheny Headwaters to about 6,913.9 acres. Mt Nebo Wildlife Management Area is entirely in the Youghiogheny Headwaters, totaling 1,887.2 acres. Youghiogheny River Natural Environmental Area totals 3,788.9 acres and is partially located in a neighboring watershed. Approximately 888.4 acres of the Youghiogheny River Natural Environmental Area is located in the Youghiogheny Headwaters. The first three properties were located in

**TABLE 1-3. LAND USE IN YOUGHIOGHENY HEADWATERS**

| Total Acres | Percent | Land Cover Class             |
|-------------|---------|------------------------------|
| 580         | 0.5%    | Open Water                   |
| 6,642       | 5.8%    | Developed, Open Space        |
| 1,143       | 1.0%    | Developed, Low Intensity     |
| 606         | 0.5%    | Developed, Medium Intensity  |
| 185         | 0.2%    | Developed, High Intensity    |
| 304         | 0.3%    | Barren Land                  |
| 54,064      | 47.4%   | Deciduous Forest             |
| 1,691       | 1.5%    | Evergreen Forest             |
| 14,595      | 12.8%   | Mixed Forest                 |
| 1,386       | 1.2%    | Shrub/Scrub                  |
| 1,291       | 1.1%    | Herbaceous                   |
| 23,739      | 20.8%   | Hay/Pasture                  |
| 1,301       | 1.1%    | Cultivated Crops             |
| 3,325       | 2.9%    | Woody Wetlands               |
| 3,232       | 2.8%    | Emergent Herbaceous Wetlands |

*Source: U.S. Census Bureau, 2023*

Maryland and the final property, Cathedral State Park, totaling 149.8 acres is in Preston County. These four properties bring the total State Lands acreage in the Youghiogheny Headwaters to about 9,839.3 acres (PAD\_StateLands).

## Land Protection

### Agricultural Preservation

According to the American Farmland Trust, America loses 1.5 million acres of farmland each year. Between 2012 and 2017 alone, Pennsylvania lost approximately 464,596 acres of agricultural land (USDA Pennsylvania Profile). Garrett County appears to deviate from the average as they had an addition of 73 farms to their county from 2002-2017, equating to a 0.115141956% change according to their Maryland.gov iMaps, Change in Farms and Percent Change in Farms database.

Maryland.gov's Permanently Preserved Agricultural Lands database lists multiple agricultural properties as permanently preserved, totaling 9,042.49 acres in Garrett County. About 62% of Garret County is located within the Youghiogheny River Headwaters. The majority of these properties are listed as protected through "AGEASE," meaning an agricultural easement. The easements ensure that the properties are forever restricted from development on prime farmland and woodland (Maryland.gov's Permanently Preserved Agricultural Lands database).

According to the Protected Agricultural Land Database, there are about 212 acres of property preserved in Preston County, West Virginia, within the Youghiogheny Headwaters.

### Conservation Lands

A conservation easement is a voluntary legal agreement between a landowner and a land trust or government agency that permanently limits uses of the land in order to protect its conservation values (Western Pennsylvania Conservancy).

Preston County and Garret County do not have any recorded conservation easements according to the PAD-US Geodatabase within the Youghiogheny Headwaters boundaries.

## Critical Areas

### Erosion & Sedimentation

Erosion is a natural process where rocks and soil are removed from one location and deposited in another. This process is often aided by human influences, such as vegetation removal along streambanks. With a lack of vegetation along stream banks and steep slopes, loose soil particles become dislodged and can be washed into streams during periods of precipitation. They are carried by the water and will eventually deposit somewhere downstream. The process of sedimentation will

potentially change the stream channel's path. This is apparent throughout the watershed where soil particles have formed islands or point bars. Over time these particles play havoc to the stream habitat needed for many biological species, such as macroinvertebrates. Sediment not only changes the suitable habitat it also impacts the food source for these species along with the physical and chemical properties of the stream. Sediment in the water can even change the water temperature, heating up a cold-water stream. More information about erosion and sedimentation is located in the section on Water Resources.

#### Fish & Wildlife Habitat

- **Riparian Corridors**, the vegetative areas adjacent to streams, are important to the health of the watershed, providing important habitat that impacts both aquatic life and terrestrial wildlife. By providing shade to the streams, riparian corridors allow streams to maintain cool temperatures that support trout populations and more importantly the macroinvertebrates that serve as the food source for the trout. The plants and shrubs that naturally grow along stream banks also provide adequate shelter for some terrestrial wildlife. More information about the benefits of riparian corridors is located in the Water Resources section.
- **Floodplains** are natural areas of low-lying ground next to some stream segments that increase the stream's capacity to move water during periods of high flows. These areas tend to have vegetation that is water tolerant and good for absorbing and filtering the stream's excess flow. Floodplains exist for a purpose and that is to provide the excess water a place to go, to decelerate the speed at which it flows, and to alleviate potential flooding downstream. More information about Floodplains is located in the section on Water Resources.
- **Wetlands** are areas of land that for at least part of the year are covered with water, maintain a dominance of water loving plants, and have soils that are hydric or wet in nature. Wetlands are essential as they are sites of groundwater recharge; they are also excellent filtering agents and are essential in flood prevention. More information about Wetlands is located in the Water Resources section.

#### **Hazardous Area**

##### Coal Mine Sites

There are five permitted surface mines and no underground mines.

Coal mining has occurred for many years throughout Western Maryland and Northern West Virginia. Many of the smaller mines were considered "Farmer" mines in Maryland or "Punch" mines in West Virginia. Four abandoned underground mines and seven of these smaller mines were in operation in the headwaters. Many of



these sites originated in the early 1900's and have been reclaimed. Mining equipment, coal refuse piles, and sources of abandoned mine drainage (AMD) are still present within the watershed. There are 35 Abandoned Mine Lands (AML) points in the Yough Headwaters. These points include locations for mine, openings, portals, seeps, discharges, refuse piles, or locations.

#### Non-Coal Mining

Mineral mines or quarries are industrial mines where operators are removing rocks like limestone and shale that are later crushed down into various sizes for construction activities.

Often the impacts of quarries are similar to those of coal mining: water quality degradation, increased truck traffic and air pollution. Damage to homes during blasting can occur. Because rocks, and soil are removed, the topography of the site changes, which could lead to a change in natural drainage patterns. The aesthetics of the remaining product scars the landscape and takes years before new trees begin to grow and heal the landscape.

Within the Yough Headwaters Watershed no mineral mines or quarry sites exist.

#### Oil and Gas

Natural gas has been extracted from the Youghiogheny Watershed for nearly 150 years. Overtime, extracting these resources has been done via conventional or unconventional drilling. Conventional drilling is the most common method. Small conventional well sites are common throughout Appalachia.

Unconventional or hydraulic fracturing is currently banned in Maryland. West Virginia and Pennsylvania have an extensive fracking history and it is currently allowed in both states.

There were 31 proposed oil and gas sites in the Yough Headwaters. There is only 1 active well, 16 plugged wells, 3 abandoned, 7 that were permitted and never drilled, and 3 permits that were never approved.

#### Landfills and Illegal Dumpsites

Although no permitted landfills exist within the Youghiogheny Headwaters Watershed, the area is not immune to trash disposal. Some people, in lieu of trash pickup, opt for burning or burying their trash, and others just dispose of it along back roads in illegal dump sites.

Trash pickup within the watershed is not mandatory, and there are costs associated with having weekly trash pickup. Garrett County, MD, does operate a landfill and several transfer stations available to all Garrett County residents.

Illegal dumpsites along the roadside are not only unsightly but can have environmental, health and safety, and economic impacts that are hazardous to the area. Environmentally, these dumpsites can pollute the soil, air, and water. Chemicals may leach out into soil, into the water table, and into the streams. If burned, the chemicals in plastics and other items can be released into the air and are toxic to breathe for any one downwind. Illegal dumpsites also pose health and safety issues, especially to children who may play near the dumpsites. Economically, property values can decrease, property owners can be held liable, and the cost of cleanup can be expensive. Items disposed of at these orphan dumps vary from site to site but typically can contain furniture, household trash, tires, electronics, vehicle parts, paint and other chemicals. There are no illegal dumpsites within the Yough Headwaters Watershed that are documented, although this does not mean they are not present.

### Waste Sites

Waste sites are categorized by two programs: The Resource Conservation Recovery Act (RCRA) and Comprehensive Environmental Response Compensation and Liability Act (CERCLA). The major difference between these two programs is that RCRA regulations are for waste facilities that are currently active in operation where CERCLA manages the remediation of abandoned and inactive facilities.

- RCRA is federal legislation that was passed in 1976 that oversees solid waste from “cradle to grave,” or origination to disposal (U.S. Environmental Protection Agency). Regulations are in place to manage generation, transportation, treatment, storage, and disposal. The waste can be in either solid, liquid or a gaseous state. Under the legislation the waste is divided into two categories: Subtitle C – Hazardous waste and Subtitle D - Non-Hazardous waste. Although underground storage tanks are managed as a non-hazardous waste, they have been pulled aside to give it the attention they need.
  - Hazardous Waste is managed by the United States Environmental Protection Agency (U.S. EPA) although it may authorize state agencies to implement key provisions of the hazardous waste requirements. A hazardous waste is any waste that is ignitable, corrosive, reactive, or toxic. More information about the specific sites is located in Appendix E.
  - Non-Hazardous Waste is managed by states; however, the Environmental Protection Agency sets minimum standards for how facilities should be designated and operated. This includes the issuance of permits that ensure compliance and federal criteria for municipal and industrial waste landfills. The practice of open dumping is banned. Individual states may implement more stringent requirements.

- Underground storage tanks are also regulated as a Non-Hazardous Waste. In order to be classified as an underground storage tank, the tank, combination of tanks and piping must have at least 10% of its combined volume underground. Underground means below the surface and surrounded by soil. A fuel tank in a person's basement is not considered an underground storage tank. In Pennsylvania, storage tanks must be registered annually and a valid operating permit is required before operations can start. Within the Yough Headwaters many closed storage tanks exist. A listing of all the tanks active, closed and removed is located in Appendix F.
- The Comprehensive Environmental Response Compensation Liability Act (CERCLA), more familiarly known as Superfund, investigates and cleans up sites contaminated with hazardous substances. The United States Environmental Protection (US EPA) agency was granted responsibility for overseeing cleanup activities at uncontrolled or abandoned waste sites as well as accidents, spills, or other emergency releases of pollutants and contaminants. When responsible parties can be identified, their participation can be assured through orders, consent decrees or small party settlements. Costs are also recovered from financially viable individuals or companies upon completion of the cleanup action. When a responsible party cannot be identified, the US EPA ultimately cleans up the site.

Across the country more than 40,000 Superfund sites exist. The worst of these sites requiring long-term remediation are put onto a list known as the National Priorities List. No National Priority List or active Superfund sites exist in Yough Headwaters.

#### Brownfields

Brownfields are defined as any previously developed property that has been contaminated by hazardous waste and identified by the United States Environmental Protection Agency as a candidate for cleanup. These sites possess a risk to human health and/or the environment. Expansion, redevelopment or reuse of the land may be complicated by the presence or potential presence of a hazardous substance, pollutant, or contaminant. Only one land restoration project has been identified in the Youghiogheny Headwaters Watershed, the Oakland Junkyard Site.

#### Landslides

"Landslides are a natural geological process involving the movement of earth materials down a slope" (Delano & Wilshusen, 2001). Because of the damage that can occur to buildings, roadways, etc., they are deemed a significant geological hazard. The extent of damage from landslides does vary depending on location, the

amount of earth that is moved, the speed at which it moves, and any influences by humans.

A landslide occurs naturally when land, including rocks, soils, earth, and soil slip or move. This typically occurs due to certain geological features and gravity. It is also aided by heavy periods of precipitation that saturate the soil and by human influences. Human influences, such as construction activities, modify the slope leaving some areas susceptible to landslides.

The Youghiogheny Watershed is highly susceptible to landslides. The hillsides above Yough Lake along Route 40 had a massive movement in June 2021 and closed the main transportation route for several weeks.

#### Sinkholes/Mine Subsidence

“Sinkholes are a subsidence feature that can form rapidly and are characterized by a distinct break in the land surface and downward movement of surface materials into the resulting hole or cavity” (Kochanov, 2015). Although sinkholes can occur naturally, it is more prevalent in central and eastern portions of Pennsylvania where carbonate bedrock exists.

That does not mean the Youghiogheny Watershed is immune. Human influences such as underground mining, installation of utilities underground, or excessive pumping of groundwater can also cause subsidence leading to the development of sinkholes. Technically, when subsidence is caused by mine drainage, it is termed mine subsidence rather than a sinkhole.

## **WATER RESOURCES**

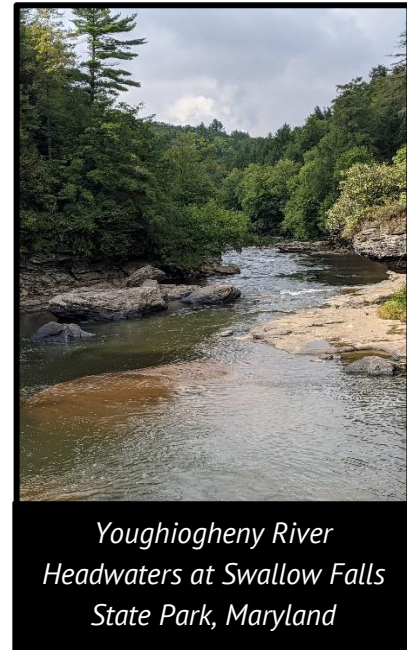
The Youghiogheny River Watershed is the only watershed in Maryland that flows into the Gulf of Mexico. Its northerly flow also makes it unique. The watershed includes a gauntlet of conditions from pristine trout waters to acid-laden streams. Farming and agriculture continue to affect its waters as well as failing sewage and septic systems. However, the overall pristine nature of this watershed along with its high elevations make it a mecca for outdoor recreation with miles of trout streams, lakes for boating, hike/bike trails, waterfalls, whitewater rafting; the Youghiogheny River and its tributaries are a very special place.

According to the stream assessment completed in 2000, the water quality varies from poor to excellent with most stream and river segments rated as good. Some of the problems include, lack of riparian buffers, high bacteria levels associated with raw sewage discharges, nutrients, suspended sediments and low pH due to acid mine drainage from abandoned mines. Atmospheric deposition (acid rain) is also a problem in some parts of the basin due to naturally low buffering capacity. The Maryland Department of the Environment has listed the Little Youghiogheny River and the Youghiogheny River subwatersheds and their tributaries as impaired.

## Water Quality

### Current Conditions

Currently, most of the Youghiogheny River Watershed is meeting its designated use for both Recreation and Public Water Supply. The designated use for aquatic life continues to be impaired in many sections. Data continues to show that low pH in many of the streams throughout both basins is the predominant cause of biological community degradation. Low pH results from both natural (e.g., organic acidity from wetlands, low neutralizing capacity of geology and groundwater associated with sulfur bearing geology) and anthropogenic sources (atmospheric deposition and acid mine drainage). A secondary cause of biological community degradation is increased chloride concentrations resulting from non-point runoff from transportation corridors.



Water Quality Standards are the foundation for water quality-based control programs mandated by the Clean Water Act. These Standards form the legal basis for controls on the amount of pollution entering waters from sources such as industrial facilities, wastewater treatment plants and storm sewers. Standards are also the technical basis for reducing runoff from rural and urban areas.

A standard can consist of either numeric or narrative limits for a specific physical or chemical parameter. When a stream or lake is not meeting adopted water quality standards, the assessment may lead to a determination of impairment, initiating further action such as a Total Maximum Daily Load limit (TMDL) or other regulatory procedures. These rules spell out the “designated uses” for the waterways. The designated uses are Aquatic Life and Human Health with various subcategories such as contact recreation. If these designated uses were not being attained in a particular waterway, then the stream was deemed to be impaired.

The Maryland Department of the Environment classifies all surface waters into four categories or “uses.” All waters that receive a Use I designation are suitable for contact recreation, fishing and protection of aquatic life and wildlife. Use II waters are suitable for shellfish harvest. Uses III and IV are designated as Non-Tidal Cold Water and Non-tidal Cold Water Recreational Trout Waters. The Youghiogheny River and most of its tributaries are protected as Use III-P. “P” adding in protections for use as a public water supply.

An added designation to the protection of streams is a Tier Class I, II, III designation. There are no Tier I or Tier III designations in the management unit. According to the 2022 Integrated Report from the Maryland Department of the Environment, the streams listed as impaired in 2000 continue to show the same impairments for Aquatic Life but show attainment of their Designated Use for Drinking Water and Recreation.

#### Point Source Discharges

For discharges from a point source (basically a pipe), a National Pollutant Discharge Elimination System (NPDES) permit is required. Maryland issues the majority of NPDES permits for sewage, water treatment for water supplies, industrial waste, stormwater, concentrated animal feeding operations and biosolids.

There are 20 active NPDES permits issued for the Youghiogheny Headwaters Management Unit. These permits are listed in Appendix H.

#### Nonpoint Source Discharges

Non-point source pollution originates from many sources: abandoned mine drainage, agriculture, silviculture, urban/rural/industrial run-off, failing septic systems, and atmospheric deposition. Several tools are available to the states in order to help assess and restore impaired streams.

A Watershed Implementation Plan (WIP) is one tool that can be used. Once the WIP is developed, funding from the Federal Clean Water Act Section 319 Program is available to implement restoration projects. Another tool used to reduce nonpoint pollution is to develop a TMDL (Total Maximum Daily Loads) for a particular watershed. A TMDL is the amount of pollutant loading that a waterbody can assimilate and meet our water quality standards. If a TMDL or a WIP is not needed, then a Water Quality Assessment is a final tool that a state could use to address the impaired stream and restore it. All of the planning tools and assessments must be approved by the US Environmental Protection Agency.

Most of the tributaries in the management unit meet their designated use classes for either recreation and drinking water, but the aquatic life use class is severely under threat. There have been basin-wide TMDLs developed for low pH, nutrients, bacteria and stream modification (lack of riparian buffer), and TSS (total dissolved solids, specifically nitrogen and sediment). The lakes and some portions of the main stem are impaired with mercury from atmospheric deposition. Fortunately, the amount is under the threshold for drinking water purposes, so all streams and lakes are attaining their designated use for public water supply. But there are fish consumption limits posted because fish can absorb the mercury through their skin.

#### Source Water Protection

As a result of the 1996 Amendments to the Safe Drinking Water Act, the Maryland Department of the Environment initiated a program to assess the vulnerability to

contamination of all public drinking water sources. The effort encompasses both large and small water systems. Water can be pulled from many different groundwater aquifers, springs or even surface flow from a river or stream. Within the Youghiogheny Headwaters Management Unit there is only one Source Water Assessment Plan for Mountain Lake, which draws water from the Little Youghiogheny River via four wells and a spring.

### Lakes

Maryland's lakes are valuable natural resources that provide numerous recreational and ecological benefits. Section 314 of the federal Clean Water Act established the Clean Lakes program, which was designed to identify publicly owned lakes, assess their water quality condition, implement in-lake and watershed restoration activities and develop programs to protect restored conditions. Funding was discontinued in 1995 for this program, and any lake project must now be funded through the 319 Nonpoint Source Program or other funding sources. (*Maryland DOE Prioritization Strategy for Monitoring Maryland's Lakes, September, 2021*)

- **Herrington Lake**

Herrington Lake is located a few miles from Swallow Falls State Park. It began in the 1930s with the aid of the Civilian Conservation Corps. A 53-acre lake was formed by damming Herrington Creek. Cabins were built and the park offers swimming, boating, canoes, picnicking, and hiking. It became a state park in 1964. The Eastern Brook Trout Joint Venture, a project of Trout Unlimited, has suggested that current water quality is consistent with past water quality that sustained a Brook Trout population in the stream and lake. However, there have been no specific assessments looking at Brook Trout population. Because of the cold water within the lake, it is stocked with trout for recreation purposes.

Low pH has been a problem in Herrington Lake. A project in 2020-2021 was scheduled to add limestone in Herrington Run in order to increase the pH.

In 2022, a sediment study was completed for the lake. Fifteen samples collected throughout the lake were similar to sediments of other nearby lakes, including Deep Creek Lake. No abnormalities were found in regard to the physical or chemical properties of the bottom sediments of Herrington Lake.

## **Important Components of Watershed Health**

### Wetlands

Wetlands are areas of land that, for at least part of the year, are covered with water. They also maintain water loving plants and have soils that are hydric or wet in nature. Wetlands are essential because they are sites of groundwater recharge; they are excellent filtering agents and are essential in flood prevention.

Wetlands are broken down and classified into systems. Within the Youghiogheny Headwaters, wetlands are Palustrine, Riverine, or Lacustrine. Palustrine wetlands are in non-tidal areas that are dominated by trees, shrubs, persistent emergent, and emergent mosses or lichens (National Wetlands Inventory, 2019). According to the National Wetland Inventory, the Youghiogheny Headwaters have 3,767 acres of Palustrine wetlands. Most of these wetlands are scrub-shrub (1,455 acres), forested (1,240 acres), and emergent (844 acres). Scrub-shrub wetlands include areas that are dominated by woody vegetation less than 20 ft tall. Forested wetlands are characterized by woody vegetation that is 20 ft tall or taller. Finally, emergent wetlands consist of perennial plants, excluding mosses and lichens, that are the tallest lifeform with at least 30% areal coverage.

The Youghiogheny Headwaters also contain 613 acres of Riverine wetlands (National Wetlands Inventory, 2019). Riverine wetlands contain deep water habitats that are contained within a channel (National Wetlands Inventory, 2019). These channels are open conduits that are created naturally or artificially, and they periodically or continuously contain flowing water. Additionally, these conduits provide a link between two bodies of water (National Wetlands Inventory, 2019).

Other than Palustrine and Riverine wetlands, Lacustrine wetlands make up for 348 acres of the Youghiogheny Headwaters. Lacustrine systems include wetlands and deepwater habitats within a topographic depression or a dammed river channel, lacking trees, shrubs, persistent emergents, and emergent mosses or lichens with 30 percent or greater coverage, and total an area of at least 20 acres (National Wetlands Inventory, 2019).

### Floodplains

Floodplains are another important component to watershed health. These are natural areas of low-lying ground next to stream segments that increase the stream's capacity to move water during periods of high flow. These areas tend to have vegetation that is water tolerant and that is good for absorbing and filtering the stream's excess flow. Floodplains exist for a purpose, and that is to provide the excess water a place to go, to decelerate the speed at which it flows, and to alleviate potential flooding downstream.

Flood areas were calculated from the National Flood Hazard Layer provided by FEMA (FEMA, 2021) and land cover data (MRLC, 2019) and were used to determine if the area was developed, natural, or farmland. The Youghiogheny Headwaters has a total of 3,094 acres of floodplains. Of that 3,094 acres, 222 acres are developed, and 343 acres are farmland. The remaining 2,529 acres are natural. It is critical that these areas remain undeveloped. Development in floodplains and riparian corridors decreases the safety net they provide and can result in flooding downstream. Cutting down trees, mowing riparian buffers, and development in floodplains are

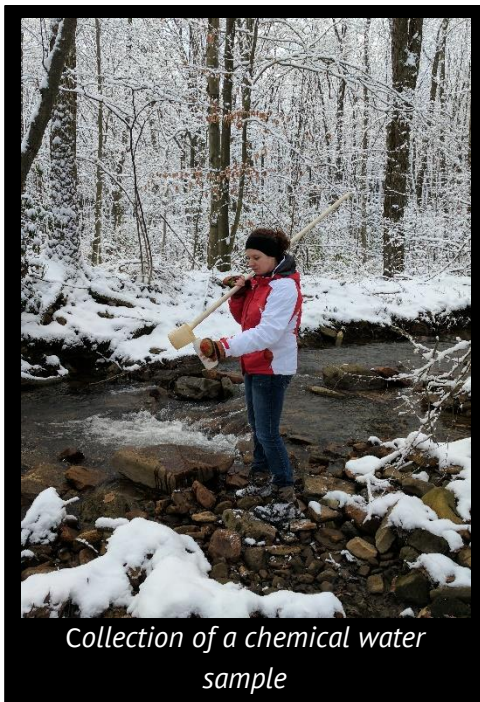


done at an area's peril. Communities that have participated in these activities often wonder why they are now experiencing flooding and bank erosion.

### Riparian Corridors

In the Youghiogheny Headwaters Management Unit, there are 2,529 acres of natural floodplain areas considered riparian corridors. Riparian Corridors are vegetated areas of land adjacent to streams. They too play an important role in stream health. They are the interface between terrestrial and aquatic ecosystems (Oates, 2000). The wider the buffer, the more effective it functions. Riparian vegetation typically includes trees, shrubs, and grasses that depend on wet environments to survive. Buffers provide many benefits to area streams including: reduction of water temperature; pollution, sediment, and nutrient trapping; channel stability; flood control; habitat; economic value; and recreational and aesthetic values. It is critical that these areas remain undeveloped.

### **Water Quality Monitoring**



Socioeconomic activities, urbanization, industrial operations, and agricultural production influence the environment and have increased dramatically during the past few decades, affecting freshwater environments (UNEP and WHO, 1996). These human induced impacts have created a pressing need for comprehensive and accurate assessments of trends in water quality, to raise awareness of the need to address the consequences of present and future threats of contamination, and to provide a basis for action at all levels. Reliable monitoring data is the essential basis for such assessments. Monitoring is important as it provides information that permits rational decisions to be made on describing water resources and identifying actual and emerging problems of water pollution; formulating plans and setting priorities for water quality management; developing and implementing water quality management programs; and evaluating the effectiveness of management actions.

### Chemical Water Monitoring

Chemical water monitoring is the sampling and analysis of water constituents and conditions (EPA, 2009). These may include introduced pollutants, such as pesticides, metals and oil; constituents found naturally in water that can, nevertheless, be affected by human sources, such as dissolved oxygen and nutrients. Currently, there is no routine monitoring for the Youghiogheny Headwaters. Initiating a chemical monitoring program for the Youghiogheny Headwaters can highlight any significant changes or trends that may be evident in water bodies over time. The Maryland

portion of the watershed had water chemical qualities analyzed in 2000 (Kline, Kazyak, Boward, & Prochaska, 2000). This could act as a baseline to see how the watershed has fared over the past two decades.

#### Biological Sampling

Biological sampling is an evaluation of the condition of a waterbody by sampling species that spend all or part of their lives in that waterbody. Sampling is conducted to gather a representative sample of the biological community located in the waterbody (USEPA, 2011). For each site sampled, specific attributes, known as biological indicators, are compared to the conditions expected for that indicator based on reference sites. Biological indicators may include fish, benthic macroinvertebrates, algae, amphibians, aquatic plants and birds. Data collected at reference sites provide a benchmark for assessing the biological condition of surveyed sites. Metrics are quantitative measures of biological indicators and can provide information on both the present and past effects of anthropogenic stress on aquatic systems. Physical and chemical changes in freshwaters can produce diverse biological effects ranging from severe, such as a total fish kill, to subtle, such as changes in enzyme levels or subcellular components of organisms. These sorts of changes can indicate that the ecosystem is under stress and that it has become unbalanced. As a result, there could be possible implications for the intended uses of the water and even risks to human health. Biological sampling is important as it provides a baseline to help ensure that the quality of waters and their associated aquatic life uses are protected and maintained. Benthic sampling took place in 1996 in the small West Virginia portion of the Youghiogheny Headwaters (WVDEP, 1996). In 2000, biological sampling took place in the Maryland portion of the watershed, acquiring fish and benthic macroinvertebrate data (Kline, Kazyak, Boward, & Prochaska, 2000).

#### Bacteria Sampling

Bacteria present in water is one of the most important water quality issues world-wide, specifically to sources of drinking water and water contact recreation. Testing can also be conducted to monitor compliance of NPDES permit discharges for fecal coliform. This is necessary as there are known facilities that consistently exceed their permitted discharges in the watershed. Any summer swimmable waters that are popular in the watershed need to be tested for *E. coli* for the protection of the community. Bacterial testing was completed in 1996 on streams located in the West Virginia portion of the Youghiogheny Headwaters (WVDEP, 1996).

#### **Takeaways**

- Headwaters are essential to watershed health because they dictate the downstream water quality (Lowe & Likens, 2005).
- Due to the small size of headwater streams, they are highly vulnerable to anthropogenic disturbances and changes in climate.
- More extensive, routine monitoring needs to take place in the Youghiogheny Headwaters to ensure the quality of the entire Youghiogheny Watershed.

## BIOLOGICAL RESOURCES

### Natural Setting

The Youghiogheny River Headwaters Management Unit is located within the Appalachian Plateau, just one of six physiographic provinces in Maryland. It is known for having the highest elevations that parallel mountain ridges separated by deep gorges creating whitewater conditions.

Of the eight classes of forest growth in Maryland, the western portion of the state is located within the Northern Hardwood, White/Red/Jack Pine, Elm/Ash/Cottonwood, and Exotic Softwoods according to the United States Department of Agriculture Forest Service.

The Northern Hardwood Forest contains a variety of beech, birch and maple trees that are common within the Appalachian Plateau where the elevation is higher and the climate is cooler, providing favorable growing conditions for the northern tree species.

### Biodiversity

Clean air, clean water, and fertile soils are required for a healthy ecosystem that benefits everyone and everything. Having a diversified population of plants and wildlife is essential, and a more diversified community of organisms increases that ecosystem's resilience. A resilient ecosystem is important especially with all the stresses and challenges organisms face to survive between predators and invasive species.

### Species of Concern/Species of Greatest Conservation Need

Several species classified as rare, endangered, or threatened reside in the Youghiogheny Headwaters Management Unit. These include several species of plants, fish, amphibians, reptiles, birds, and mammals.

#### Species of Special Concern

Species of special concern (rare, threatened, or endangered species) are tracked by the state and federal natural resource agencies. It is a matter of policy for the resource agencies not to provide specific site location information in order to provide a level of protection to these organisms and their critical habitats. The state's natural resource agencies are to be contacted if any land disturbance



*A winter landscape displaying the natural beauty of the area*

activities are planned to determine if those activities could potentially impact any species of special concern or their habitat.

Species of concern in Garrett County, Maryland, consist of 16 species of mammals, 23 bird species, 4 reptiles, 5 amphibians, 4 fish, 26 insects, 12 butterflies/moths, and 2 flatworms. In West Virginia, there are 21 federally endangered species, 7 federally threatened species, 3 species proposed for listing, and 1 candidate species.

#### Species of Greatest Conservation Need

Species of Greatest Conservation Need (SGCN) include plants and animal species in which the species themselves or their habitat are declining to a level of concern. This listing is a broader group than the species of concern, but the species of concern are also identified as SGCN. The purpose of identifying these species is so that conservation activities and protections can be made in an effort to keep them from being identified as a rare, threatened or endangered species.

In Maryland, the SGCN data is currently only available for the entire state. Many of the species in this listing may not reside in the Youghiogheny Headwaters portion of the watershed, for example, the bottlenose dolphin. In Maryland, there are 41 mammals, 143 birds, 26 reptiles, 19 amphibians, 31 fish, 272 insects—36 bees/wasps, 101 butterflies/moths, 93 dragonflies/damselflies, 14 mayflies/stoneflies/caddisflies—and 78 other invertebrates that include 14 snails, 14 freshwater mussels, and 10 flatworms.

In West Virginia, the Youghiogheny River Watershed is located within the Allegheny Mountain ecosystem region. This region, which extends way beyond the watershed, includes 28 amphibians, 69 bird species, 40 butterflies/moths, 58 cave invertebrates, 5 crayfish, 56 dragonflies/damselflies, 15 fish, 17 mammals, 18 mussels, 18 reptiles, 49 snails, 3 tiger beetles, and 243 plant species identified as SGCN.

#### **Invasive Species**

A number of invasive species are found in the watershed. An invasive species is defined by the United States Department of Agriculture (USDA) Forest Service as “a species that is non-native to the ecosystem under consideration; and, whose introduction causes or is likely to cause economic or environmental harm, or harm to human health” (Executive Order 13112). There are both plant and animal invasive species within the watershed boundary.

Invasive species can be damaging to native species, infrastructure, agriculture, and ecological processes vital for native and foundation species. The ecological impacts of invasive species vary depending on the species and their means of taking over an area.

Many invasive species are nearly impossible to control once they have taken over an area. In all cases, prevention and early treatment is of utmost importance. The USDA Forest

Service recommends the following management practices to prevent the introduction of invasive species:

1. Inspect any plants or trees for egg masts or plant seeds before bringing them into the watershed or transporting them between watersheds.
2. Inspect and clean any forest machinery for egg masts or plant seeds before transporting the equipment between watersheds.
3. Inspect and clean all fishing, kayaking, or boating equipment using hot water and letting dry completely before entering a different body of water.
4. Limit transport of firewood from far away areas into the watershed; find locally sourced firewood.

### Plants

Invasive plants have a tendency to displace natives and dominate landscapes, especially areas that have recently been disturbed. Some invasive plants, such as the ground vine mile-a-minute, smother natives. The invasive tree-of-heaven produces a chemical in its roots that prevents the establishment of other plants (Jackson and Grover). Others outcompete native plants for sunlight and nutrients. Once an invasive plant is introduced to an area, especially after a land disturbance has occurred, it often takes over the area and spreads rapidly. This causes issues for wildlife, including lack of necessary food resources from native plants and inability to traverse through thick stands of some invasive plants.

- **English ivy** originally brought to the United States as an ornamental plant quickly escapes when not maintained. It is able to climb vertical structures and produces berries that are carried from one place to another by birds. Once established in natural areas, the ivy quickly covers the ground surface, eliminating habitat for native plants. The ivy can smother tree canopies adding weight and increasing the tree's susceptibility to windthrow. In addition, tree trunks covered in the ivy hold in moisture providing protection of borers and other insects. (Maryland Department of Natural Resources, 2016).
- **Japanese stiltgrass** occurs in uplands and wetland habitats. It is believed to have been introduced in the United States in the early 1900s from eastern Asia from packing materials in packages. It establishes a lush green carpet where the grass crowds out native plants, especially in shady conditions. It can remain dormant in soil for many years making management and eradication efforts challenging. (Maryland Department of Natural Resources, 2016).
- **Japanese knotweed** was introduced from East Asia in the late 1800s as an ornamental plant to help stabilize streambanks. It spreads profusely dominating over native plants in wetlands, stream corridors, forest edges, drainage ditches, etc. It can grow up to 11 feet and due to its extensive

network of underground rhizomes, it is very difficult to eradicate and control.

Japanese knotweed has multiple impacts to land and streams. The dense thickets of knotweed out compete native species due to its deep root system, making it difficult for other species to grow. It compacts the soil, limiting its ability to absorb water and nutrients, which results in a decrease of food and habitat available for birds and other wildlife. These deep roots can cause streambanks to erode increasing flooding. The plants release toxic chemicals to wildlife that eat them as well as to area streams. These chemicals then degrade the water quality and harm aquatic life such as fish and macroinvertebrates.

- **Garlic mustard** was introduced in the United States in the 1880s brought in by early settlers to New York for medicinal purposes. This flowering herb spreads rapidly through upland forest habitats where it outcompetes native plants. It is especially concerning because certain rare butterflies lay their eggs on it instead of native species. When the eggs are laid on garlic mustard, they fail to develop. Like stiltgrass garlic mustard is hard to eradicate because it can remain dormant for five years. (Maryland Department of Natural Resources, 2016).
- **Purple loosestrife** was introduced to Maryland in the 19<sup>th</sup> century. It arrived in ships' ballast water and attached to other materials. It was imported as a medicinal and decorative plant. While the plant is attractive, it reproduces quickly and outcompetes native plants, disrupting food chains and habitats in wet areas and marshes. (Maryland Department of Natural Resources, 2016).
- **Wavyleaf basketgrass** is a recent invader to the Maryland ecosystems being first detected in 1996 before expanding to various parks and natural areas in the 2000s. Like most invasives it spreads quickly by creating dense mats of shade-tolerant grass that covers the forest floor. They easily adhere to passing animals, people and equipment only to fall off later, traversing large distances from the initial plant. It is a worthy target for eradication because its presence is limited to Maryland and Virginia. (Maryland Department of Natural Resources, 2016).
- **Phragmites** dominate native wetlands plants including native varieties of phragmites. They first arrived in Maryland in the 18<sup>th</sup> century.

### Animals

Invasive invertebrates and vertebrates commonly disrupt food chains, outcompete native species, and interrupt other ecological processes. Invasive insects with no effective natural predators can decimate native vegetation. Many invasive insects

have no effective defense against them. It is paramount to prevent the spread of invasive insects. Below is a list of common invasive species identified or speculated to be located within the Youghiogheny Headwaters.

- **Emerald ash borers** have already destroyed a significant population of ash trees and are expected to cause close to 100% mortality of ash trees in the United States. Because of its rapid spread and thriving population, the emerald ash borer has almost no effective controls.
- The **hemlock woolly adelgid** is slowly killing the Eastern Hemlock, an important species for headwater health. The Hemlock-Northern Hardwood Forests are a key wildlife habitat. Maryland has over 42,000 acres of vulnerable hemlock forest at risk of infection by the hemlock woolly adelgid. The Maryland Department of Agriculture is working on a treatment and suppression plan.
- **Gypsy moths** devour the leaves of oaks and other hardwood species, impacting several key wildlife habitats.
- **Spotted lanternfly** has wreaked havoc in Pennsylvania and the majority of Maryland; however, it has not been identified in Garrett County as of March 2023.
- **Virile crayfish** are a great threat to native crayfish diversity in the Youghiogheny Headwaters. These crayfish have the capacity to displace native crayfish and alter aquatic food webs and habitats. First reported in the 1950s, the virile crayfish has become widely established in western Maryland primarily through its use as bait by anglers. In addition, these invasive crayfish are also found in West Virginia; and while the Rusty Crayfish is found in other parts of Maryland and in West Virginia, its presence within watershed has not been detected.

## Conservation

### Conservation Threats

- **Land Conversion/Habitat Loss and Fragmentation**  
Habitats can change and have over the years. One of the greatest historical changes occurred following the glaciers. While they never quite advanced to Maryland, they did impact lower portions of the Youghiogheny River Watershed in Pennsylvania. Habitats can change via natural circumstances such as storms, floods, and fires, or they can be a result of human activities, such as clearing lands for development or agriculture.

In the United States, the number one greatest threat to biodiversity is habitat loss (Stein et al., 2000). Residential development is expanding from

cities to rural areas and encroaches on the potential habitat for many species of plants and animals. Between 1973 and 2010, Maryland's forests lost almost a quarter of a million acres according to the Maryland Department of Planning. Just between 2002 and 2010 alone, Maryland forests decreased by 3% leaving only 38% of the Maryland landscape to be forested. Agricultural land also decreased by 3.2% from 2002 to 2010, which is not as drastic as the 19% loss experienced between 1973 to 2010. While the acreage of wetlands decreased by more than 1,000 acres since 1973, the acreage of lands covered by water grew by nearly 4,000. Low-density residential development increased nearly three times and industrial land uses increased by four times. Barren lands, including quarries and mines doubled between 1973 and 2010 (Maryland Department of Natural Resources, 2016).

In order for optimal survival of all plant and animal species, terrestrial or aquatic efforts are needed to preserve continuous habitats when applicable. When continuous habitats cannot be preserved, establishing a corridor is essential so that plants and animals do not become isolated to small parcels. More research including assessments and surveys are needed so it can be documented and then properly incorporated and used in future planning efforts.

- **Agriculture and Aquaculture**

Large spans of open, cleared lands for agricultural production have an impact on the habitat and connectivity of some SGCN species that require large contiguous forest and grasslands. Aquaculture, including the rearing of trout and other fish species for stocking, may have an impact on native species and their habitats.

- **Energy Production and Mining**

Maryland produces over half of the energy it uses in-state from coal deposits and gas reserves in western Maryland, as well as hydroelectric potential in some rivers, solar energy and wind in the western mountain ridges, like those in the Deep Creek Management Unit. In addition to the threats that these activities pose, their supporting infrastructure such as pipelines, access roads, etc. are also of concern. Some of these greatest concerns are the increases in fragmentation of forest lands and other habitats. Other concerns are the placement of large facilities for wind and solar being located in movement corridors for birds and bats or displacing feeding areas and degrading the overall health of the habitat.

- **Transportation and Service Corridors**

Transportation corridors provide a multitude of threats from fragmentation—increased predator access, physical barriers isolating populations—increased wildlife mortality via roadkill, easy pathways for the



spread of invasive species, and noise disturbances leading to an overall decrease for quality of life.

Many invasive species have been introduced accidentally via packaging materials on shipments from other countries. Once these species are introduced, they are often hard to eradicate. See the section on invasive species for more information.

One impact of transportation, even at the local level that is often overlooked, is fish passage. If road culverts are improperly placed or incorrectly designed, they can block upstream movement for aquatic organisms that rely on that for reproduction.

- **Harvesting Impacts**

- *Bycatch and accidental mortality*: These are plants and animals that were not the original target, but were accidentally collected and are often injured or killed during the collection process. This includes being trampled. Plants are often accidentally trampled.
- *Persecution against species*: Many nuisance or pest species are also being eradicated from certain areas because they are unwanted by people whether they are captured and released in a different habitat or they are killed on site. In some instances, species are misidentified; for example, many people think that water snakes are copperhead snakes, and because they are undesired by people they are killed. Just like wildlife, plant species are also in jeopardy for being falsely persecuted via misidentification.
- *Excessive harvesting*: The overharvesting of a particular species includes fishing, hunting, and plant harvesting. This is very prevalent for desirable flowers, herbs, or medicinal plants, but the practice can be limited by placing harvest limitations, which has been done in Maryland for American ginseng, which now requires a permit in order to harvest. The forest product industry also needs to be monitored to ensure they are following regulations and incentives like the Sustainable Forestry Act of 2009. This act encourages good practices through the use of incentives for harvesters. Even with protections in place sometimes SGCN are impacted by fragmentation and invasive species.

- **Human Influences via Outdoor Recreation**

The outdoor recreation industry is a huge component to tourism and probably even more post the Coronavirus pandemic. However, certain activities can have drastic impacts to the plants and wildlife surrounding them. Below is a listing of some activities and their potential impacts:

- Hunting and Fishing  
Hunting and fishing draw in millions of people annually and are beneficial in helping maintain biological systems so that species do not become overpopulated for their available habitat; however, managing the harvest is essential so that species do not become overharvested. Sportsmen need to be careful that they do not transport invasive species from one location to another; this is particularly important for fishermen. They also need to watch where they step and use designated paths to reduce the accidental trampling of potentially sensitive plant species and small animals such as salamanders and frogs.
  - Motorized Recreation/Bicycling  
Motorized, recreational vehicle riding can upset or destroy natural lands and habitat for significant plant and animal species. They can increase erosion, provide easy transportation for invasive species disturbance, and can even cause mortality via accidental trampling. Staying on designated paths for motorized and non-motorized riding is essential.
  - Boating Activities  
Boating in sensitive areas can impact bird nesting habitats or cause direct mortality of aquatic species. Boats that have not been thoroughly cleaned and/or dried between waterways have the potential to transport invasive species from one waterway to another.
  - Hiking/Wildlife Observation  
Wildlife observation and hiking should be done in designated areas by staying on designated trails and paths. This will help reduce erosion in sensitive habitats, eliminate accidental trampling, and reduce the spread of invasive species.
- **Invasive Species** – See section on invasive species
  - **Climate change** – See previous section on climate change

#### Important Areas for Conservation: Natural Heritage Areas

In Maryland, Natural Areas are a voluntary recognition of special properties that contain vital natural resources. The Maryland Natural Heritage Program is a coordinated system that recognizes and seeks to conserve the best remaining examples of Maryland's diverse native landscape. While participation in the program is voluntary, the selected and cooperating sites are sustainably managed to conserve the natural features for which the areas were initially recognized. The goal of the program is to identify and conserve natural areas for future generations while increasing public awareness of these special places.

Within the Headwaters of the Youghiogheny River Watershed two Natural Areas have been identified: Cranesville Swamp and Swallow Falls.

- **Cranesville Swamp Natural Area**

Cranesville Swamp is a 1,600-acre boreal peat bog relic left behind nearly 15,000 years ago during the ice age when the glaciers stopped just short of Maryland. It is one of just a few remaining boreal bogs remaining in the southern United States. It is significant because the bog is home to a variety of plant and animal species that are typically only found in northern climates. Bog Copper Butterfly, Nashville Warbler, Northern Saw-whet Owl, Montane Peatland Wetland and American Larch and Red Spruce are a few of the key elements found at the site although other rare, threatened and endangered species also call the swamp home. It was one of the first National Natural Landmarks to be designated by the National Parks Service in 1965. The Nature Conservancy owns and manages the Cranestville Swamp. (Maryland Natural Areas Guide<sup>a</sup>)

- **Swallow Falls Natural Area**

Swallow Falls is one of the remaining old growth forests surviving the 1800-1900 timbering that occurred in the eastern United States. It houses Maryland's oldest grove of Eastern Hemlock and White Pine of which some are thought to be at least 360 years of age. It also contains Muddy Creek Falls, Maryland's highest waterfall cascading 53 feet. Key elements of the site include multiple waterfalls, Sable Clubtail, Blackburnian Warbler, Cliff and Rock Outcrops and the old growth Eastern Hemlock Forest. Since this site is a Maryland State Park, there is an entry fee, marked trails, and a visitor's center. (Maryland Natural Areas Guide<sup>b</sup>)

### Important Bird Areas

The Important Bird Area (IBA) Program was established in the 1980s in Europe by Birdlife International. In the United States, the National Audubon Society became a partner organization and manages the program in 46 states including Maryland, Pennsylvania and West Virginia.

The goal of the program is threefold: identify, monitor, and conserve areas that are the most essential for sustaining native bird populations. Once identified,



*A Bobolink in fall*  
*Photo courtesy of Robert Bell*

sites are monitored for changes to habitat or species that reside or visit the area. Lastly, conservation efforts for long-term protection are prioritized to these sites. IBA sites are identified as essential habitats for one or more species of vulnerable bird populations, including nesting areas, migration stops, and wintering grounds. Sites can be established on public and private lands and just because a site is identified as an IBA does not mean the public has access to it. Sites are designated with bird and habitat protection in mind, not public access.

There are four IBAs located in the Youghiogheny Headwaters Management Unit, of which two are recognized and two are identified. While the Cranesville Swamp and Pleasant Valley IBAs are located entirely within the management unit; that is not the case with the remaining areas. The Youghiogheny Valley IBA also expands into the Deep Creek and Upper Youghiogheny River Management Units. Only a small portion of the Allegheny Mountain Forest Block is located within the Youghiogheny River Watershed. Table 1-4 identifies the IBAs within the Youghiogheny Headwaters Management Unit.

**TABLE 1-4. IMPORTANT BIRD AREAS IN YOUGH HEADWATERS MANAGEMENT UNIT**

| IBA                             | Acres     | Status     | Priority |
|---------------------------------|-----------|------------|----------|
| Cranesville Swamp               | 2,623     | Recognized | State    |
| Allegheny Mountain Forest Block | 3,742,095 | Recognized | Global   |
| Youghiogheny Valley             | 49,139    | Identified | State    |
| Pleasant Valley                 | 17,063    | Identified | State    |

#### Important Mammal Areas

Mammals are an important component to the natural environment. In Maryland, there are over 20 mammal species that are considered to be rare, threatened, or endangered. In addition, six species are believed to be extirpated and no longer found living wild. They include the Gray Wolf, American Elk, Eastern Mountain Lion, Snowshoe Hare, American Marten and Eastern Harvest Mouse. In Pennsylvania, following the strategies and logic behind the Important Birds Area Program, the Important Mammals Area Project has been initiated to help protect and preserve precious habitats that sensitive mammal species need to survive. Maryland officials should reach out to Pennsylvania to discuss this program and determine if establishing an Important Mammal Program could be beneficial to protecting sensitive mammals in the Deep Creek Watershed and Maryland in general.

## CULTURAL RESOURCES

### Recreational Resources

#### Trails

Trails are an asset to a community whether designed for recreational purposes or as a connector to a neighboring community. Within the Youghiogheny River Headwater Management Unit, the majority of trails have been established for recreational purposes to allow visitors the opportunity to enjoy the natural surroundings of the region. Trail uses in the area vary among walking/hiking, mountain biking, cross-country skiing, equestrian use, and all-terrain vehicles or off-road vehicles. There are 19 trails or trail systems in the management unit varying from a tenth of a mile to 8.5 miles and from easy to moderate level. Descriptions of each trail are located in Appendix K.

#### Parks

Parks are areas of land set aside for public use maintained for enjoyment and the recreational use of people (Landes, 2004). Parks can vary from small neighborhood parks to large state or federal parks. They can be publicly or privately owned and may vary with access being free or having a user's fee.

Located within the Youghiogheny Headwaters region is the Garrett State Forest, two nature preserves and two Maryland State Parks (Swallow Falls and Herrington Manor) and Cathedral State Park in West Virginia. In Maryland, access to state parks does require an admittance fee.

Other parks and recreational facilities in the area include: Broadford Park, Woodell Park, Veteran Park, Village Park, Broadford Recreation Area, Mountain Lake Park Tennis Club, Garrett County Historical Society Museum, and Alpine Lake Resort.

- **State Forest**

*Garrett State Forest* is situated in southwestern Garrett County in Maryland. Maryland has the distinction of being the birthplace of forestry conservation when 1,917 acres of land were donated by the Garrett brothers in 1906. "Not only did this serve as the foundation for the Garrett State Forest, but it is the root of Maryland's Public Land and Forest Service" (Maryland Department of Natural Resources). Currently, the state forest encompasses nearly 19,000 acres, although only a portion of that is located within the Youghiogheny River Watershed.

- **State Parks**

*Swallow Falls State Park* is located 9 miles north of Oakland, Maryland, and features a 1.25-mile trail that follows the Youghiogheny River, displaying some of western Maryland's most scenic landscape and 3 waterfalls. Other

recreational facilities include 64 campsites, pavilion rental, picnic tables and grills.

Herrington Manor State Park is a 365-acre park located within Garrett State Forest that was designated in 1964. It offers a variety of recreational opportunities including canoeing, kayaking, swimming on Lake Herrington, biking, hiking, courts for tennis, basketball, and volleyball, a picnic pavilion along with picnic tables and grills, and a playground nearby. The park offers 5 trails that traverse 12 miles. In addition, there are 20 furnished cabins. While hunting is not permitted within the state park, some of the trails in the park connect with trails in the Garrett State Forest which does permit hunting.

Cathedral State Park is West Virginia's largest, old-growth forest containing one of the largest stands of virgin hemlocks in West Virginia (West Virginia State Parks). This 133-acre park offers picnicking and 3.4 miles of trails for their users.

- **Nature Preserves**

The Cranesville Swamp is a 1,600-acre boreal peat bog that is owned and managed by The Nature Conservancy. It was previously discussed within the biological resources section.

The Caroline M. Wilson Sanctuary is an 85.8-acre, landlocked parcel of land, containing hardwood forests and wetlands. It is located in the headwaters of the Little Youghiogheny River with 5 feeder tributaries joining on the property. The Maryland Ornithological Society was gifted the property in 1988 from The Nature Conservancy. It is an excellent place to view Alder Flycatcher and Ruffed Grouse. Since the parcel is landlocked, the only access is walking along the railroad tracks on the northern side of the preserve. (Maryland Ornithological Society).

### Camping

Camping is a popular recreational activity that increased in popularity due to the Coronavirus pandemic in 2020 to 2021. The majority of camping opportunities are made available through the two Maryland State Parks. A small portion of the Youghiogheny River Headwaters also start within the Big Bear Campground in West Virginia, although the majority of the campground and its resources to campers are located outside of the Youghiogheny River Watershed. There is also one church camp within the headwater's region of the Youghiogheny River Watershed. A listing of camping opportunities is identified in Appendix L.

### Boating

Boating within the headwaters of the Youghiogheny is limited to three lakes and two sections of river. The Youghiogheny River between Route 50 and Millers Run,

Millers Run to Swallow Falls Rd, Terra Alta Lake, Alpine Lake, and Broadford Lake. The American Whitewater's website and their River Info page has the latest information about flows, rapid classes and descriptions, access points, and other important information.

Youghiogheny River (Section 0 per American Whitewater) Route 50 to Millers Run- is a meandering section of the river that contains Class I rapids at normal flows. Limited details are available on this section besides being a slower section surrounded by fields and meadows with areas of dense hemlock and rhododendron.

Youghiogheny River (Section 1 per American Whitewater) Millers Run/Oakland Sang Run Rd. to Swallow Falls Rd begins with 3 miles of flatwater through a pretty wooded setting then transitions to Class II to IV rapids for the last mile. This section is a great add-on to the beginning of a run down the Top Yough, which will be described in the Upper Youghiogheny Section.

Alpine Lake is only available to homeowners and their guests and visitors from Alpine Lake Resort.

Broadford Lake is located near Oakland, MD, and was originally built as a drinking water supply reservoir. Public access is open and boating is permitted on Bradford Lake but is limited to the use of electric motors. Outboard motors do not need to be removed from vessels, but should be trimmed completely out of the water. Paddle craft are welcome on the lake but must be launched at one of the two designated launch areas.

Terra Alta Lake is a small, shallow lake located near Terra Alta WV. Limited information is available but there are two locations for public access.

### Fishing

In Maryland, there are nearly 100 species of freshwater fish within four ecological stream types: Highlands Warmwater, Highlands Coldwater, East Piedmont, and Coastal Plain. The Youghiogheny River Headwaters are most likely to fall within the Highlands Coldwater habitat. Most common fishes likely to occur in the management unit include the cold water-preferring, common species, such as the Blacknose Dace, Creek Chub, Tessellated Darter and Bluegill. In addition, some non-native fishes have been introduced to establish or maintain recreational fishing while others were introduced illegally as unused bait, aquarium pets, or purchased from live seafood markets. Maryland now has approximately 20-25 introduced fish, some of which are popular like the Largemouth Bass and Rainbow Trout while some have become invasive in some parts of the state.

Noteworthy regulations in the region include that any Brook Trout caught in Bear Creek, Herrington Creek, the mainstem of Snowy Creek, and in the Youghiogheny at Crellin or Oakland must be released back.

### Hunting

In Maryland, licensed permit holders are permitted to hunt all legal, in-season birds and mammals. Licenses are valid from August 1 through July 31 of the next year. Some species, such as deer, migratory game birds, furbearers, and bear, require additional permits or stamps in order to hunt. Licenses are made available to both residents and nonresidents of Maryland and costs vary. In order to obtain hunting licenses, hunters must take and pass an educational safety course unless they can document proof of hunting prior to 1977.

Public lands within the Youghiogheny River Headwaters region open to hunting include: Garrett State Forest and Mount Nebo Wildlife Management Area.

- **Garrett State Forest**

Hunting is permitted within the 19,000 acres of the Garrett State Forest, with the exception of posted safety areas and the two state parks: Herrington Manor and Swallow Falls that are located within the state forest. Hunters must possess valid hunting licenses and proper hunting seasons must be followed.

- **Mount Nebo Wildlife Management Area**

The Mount Nebo Wildlife Management Area is an 1854-acre tract dominated by a mixed hardwood forest with about the remaining 10% containing wetland bog, agricultural fields, and powerline right of way habitat. One of Maryland's unique red spruce bogs is located within this management unit.

### Golfing

The Oakland Golf Course is the only opportunity for golfing in the headwater's region of the Youghiogheny River. The course contains 18 holes over 6,395 yards of mountainous scenery available for all skill levels. In addition to the course, the club has a practice putting green and driving range.

## **Environmental Education**

The Youghiogheny River has unique opportunities for environmental education that should be utilized to their fullest extent. The Youghiogheny holds educational opportunities for people of all ages. It could be utilized as an outdoor environmental classroom or become a topic for an essay contest for school children. It could be a research experience for adolescents through adults or a history lesson detailing the past events that helped shape our nation. There are many other opportunities for children, adults and seniors to continue their education, including subjects about history, science, math, English, biology, hobbies, and environmental stewardship. The Youghiogheny Valley was filled with a vast quantity of historic, cultural and environmental resources that have just begun to be rediscovered.



The Hickory Environmental Education Center in Accident, Maryland, currently fulfills the environmental learning requirement for Garrett County public school students. All students in grades K through eight visit Hickory twice each year. High school students in Environmental Science, Biology, Chemistry, Earth Science, and Physical Science complete lessons at Hickory once each semester.

Expanding environmental education in this area would be beneficial to individuals as well as the community at large in fostering a better understanding of the importance of conservation and stewardship. Environmental education also exposes individuals to possible careers in these fields as well as empowers them to be better advocates for environmental justice.



*A young girl learning about stream bugs*

## Historical Resources

### Watershed History

Little is known about the people of the Youghiogheny Watershed before the arrival of Europeans. It is believed that a clan known as the Monongahela lived in the area approximately from A.D 900 to 1600. They were nomadic gatherer-hunters, residing in temporary or semi-permanent camps. Their lives were very much tied to the seasons. Most of their efforts in the spring through the early autumn would have been growing crops. Everyone participated in the planting and harvesting, but women, children, and older adults were responsible for tending the crops during the growing season. Men were responsible for most of the hunting. However, the cooperation of everyone was needed for processing. Men and women butchered the animals; women were responsible for preserving them.

The Monongahela lived in round, dome-shaped houses 9 ft to 30 ft in diameter. These dome houses were made by cutting down small trees and pushing the cut end into the ground in a circle formation. The tops of the trees were then bent together and tied to make a frame. Poles were then bent around the outside of the frame to make the house more stable. Finally, large pieces of bark were cut and placed over the frame. A hole was left at the top of the roof to allow smoke from the campfire to escape out of the house. During the summer, cattails covered the houses and kept the rain from dripping inside, yet allowing air to circulate. The inside of the house was simplistic. The walls were lined with sleeping benches constructed from sticks and lined with animal skins or plant mats.

The houses were arranged in large circles to form a village. The center of the village was left open for group or ceremonial activities. A large fence, a stockade, surrounded some villages to help protect against raids from unfriendly groups. They had storage rooms attached to their houses, like a kitchen pantry, where they stored dried and preserved foods. Sometimes, these rooms were used for cooking.

Monongahela did not have a complex government. Instead, they had what is referred to as an egalitarian society, where everyone had a say in how the village was run. This is believed because most houses within the village were similar in size; most homes had their own food storage; and there were no apparent differences in how people were buried. Each house controlled its resources, though cooperation between families was necessary for the good of the village (Boyd & Ferguson, 1999).

Historically, known Native trails in the Meyersdale, Pennsylvania area may have been used by the Monongahela for trading with outside groups, such as the Turkeyfoot Path (Figure 1-1). These trails were probably the same ones used for hundreds of years by prehistoric Native groups. Trade evidence is apparent from stone flakes and tools made from rocks from faraway parts of the country.



Figure 1-1: Monongahela Villages' locations and trading paths in Somerset County of the Youghiogheny Watershed. Image taken from

<http://www.phmc.state.pa.us/portal/communities/archaeology/files/mysteryofmonindians.pdf>

The Monongahela mysteriously disappeared from the area 400 to 1,000 years ago. Following the Monongahela People, the Shawnee, Seneca, and Delaware tribes utilized the area as a hunting ground but not as a permanent home. The name Ohiopyle comes from the Lenape, members of the Delaware nation. Their name for the area was “ahi opihøle,” which means “white frothy water,” referring to the falls and the whitewater in the area.

The earliest reference to the Youghiogheny River is a caption on a map drawn in 1737 by William Mayo: Spring heads of Yok-yo-gane river, a south branch of the Monongahela. The name originated from one of the dialects from the Lenape and means “a stream flowing in a contrary direction” because it flows north for sixty miles, then north and west. Other variations of the name include Joxhio Geni, Yoxhio Geni, Yayughagany, Youghiogheni, Yehiogany, Yoxhiogany, Yohogania, Yochi Geni, Youghanne, and Yuh-wiac-hanne.

Since the Youghiogheny connected to the broad and boatable Ohio River, these rivers opened access to the entire western frontier. For this reason, Ohio became the target of colonial explorers, traders, armies, and settlers in the 1700s. The basin was strategic, the height of land between the Potomac Valley and the Ohio Valley. Trails from Virginia were among the first routes leading to the interior, and they crossed the Youghiogheny.

Ownership of the Youghiogheny lands was under debate in the 1700s. The Iroquois claimed the land after they spent twenty years fighting other Native Nations for it. The French thought the land was theirs; they dated their claim from 1682 when La Salle canoed the Mississippi and declared that France owned the entire basin. The British believed it should belong to them because they intended to settle the land. They also claimed the land through a 1744 treaty with the Iroquois. In 1753, George Washington made his first appearance in the area at 21 years old to carry a message from the Governor of Virginia to the French at Fort LeBoeuf to tell them to stop the occupation of lands claimed by the English.

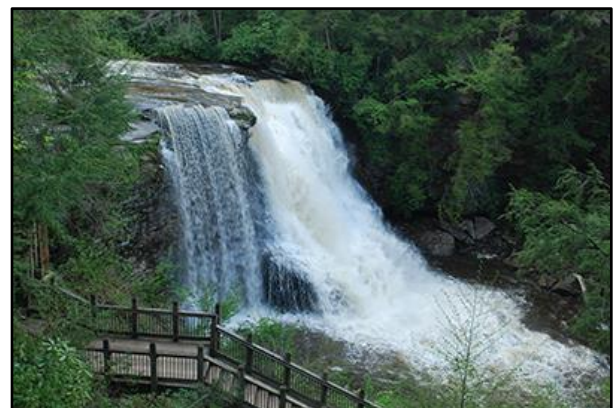
The waters of the Youghiogheny begin in the smaller watershed, known as the Youghiogheny Headwaters, on top of Backbone Mountain. On top of this mountain lies Hoyes Crest, 3,360 feet above sea level, and is Maryland’s highest peak. After leaving the source on Backbone Mountain, the first dam of the water is at Silver Lake. The dam is not substantial, just four feet wide, and is believed to have been used for a timber mill. After the dam, the source winds down into a farming region called Pleasant Valley. After Pleasant Valley, the first town it reaches is Crellin, Maryland, just 15 miles below the source, southwest of Oakland.

Crellin was a company lumber and coal town. Settlers named the town Sunshine, but Rolland P. Crellin, a Pennsylvania investor from the Preston Lumber Company, built a sawmill in the 1890s. After that, the name changed from Sunshine to Crellin. From 1892 to 1905, the Preston company sawed 250 million board feet of lumber into mine props, boards and pulpwood. In 1924, the Kendall Lumber Company bought the mill, cut another 350 million board feet, and employed 750 men until 1938 (Packard, 2011). Laborers built makeshift dams on the Yough near Silver Lake to create temporary ponds filled with logs. The dams were then blasted to allow the logs to ride the flood to mills in Crellin. As the lumber business declined in the 1900s, coal mining boomed, and in 1925 Crellin consisted of 75 families in company-owned houses. A small tributary, Snowy Creek, joins the Youghiogheny at Crellin and is the first known instance of acid mine drainage (AMD) entering the Youghiogheny. In 1949, mine acid killed fish for 25 miles to Friendsville.

The Youghiogheny flows northeast to Oakland, where the tributary, the Little Youghiogheny, enters the stream. Oakland was the only town in Garrett County that did not have a sewage treatment plant until 1985. Until that point, Oakland was a significant source of pollution to the Yough, with 30 pipes dumping raw sewage straight into the Little Youghiogheny 1 mile above the confluence. The town is home to a historic B&O Railroad Station, listed on the National Register of Historic Places in 1973 and restored in the 2000s. One of Oakland's most prominent and historic churches is St. Matthew's Episcopal Church, where United States Presidents Ulysses S. Grant, James Garfield, Grover Cleveland and Benjamin Harrison attended services. Because of these visitors, it is now called the "Church of Presidents."

As the Yough continues to flow in a northern direction, the final destination within the Youghiogheny Headwaters is Swallow Falls State Parks. In 1784, George Washington camped near Swallow Falls. In 1921, Henry Ford, Thomas Edison, and Harvey Firestone also camped here. In 1906, a donation by John and Robert Garrett of Baltimore of 1917 acres (about the area of Philadelphia Airport) was to be used as a state forest.

Swallow Falls is home to the oldest grove of White Pine and Eastern Hemlock in Maryland, with some trees being over 360 years old (Maryland DNR, 2023). The area is most noted for Muddy Creek Falls, Maryland's tallest single-drop waterfall at 53 feet. Muddy Creek originates in Cranesville Swamp in West Virginia and merges with the Youghiogheny within the park.



*Muddy Falls within Swallow Falls State Park in Maryland. Photo from Maryland Department of Natural Resources*

### Historical Sites - National Register of Historic Places

The National Register of Historic Places was established by the National Historic Preservation Act of 1966. The National Parks Service maintains the list nationally, and in Maryland it is administered by the Maryland Historic Trust.

For consideration, or placement on the National Register a landowner applies to the State Historic Preservation Office. The first step is the completion of a Historic Resource Survey. This provides a historical description of the buildings, sites, structure, object, or district that the landowner would like placed on the National Register. The state office reviews the forms and, if needed, reaches out to the landowner for additional information to determine if it meets eligibility guidelines. If not, the landowner is provided appeal information. If a property does meet the initial eligibility, it is then nominated to the State Historic Preservation Board. If the Board approves the nomination, it recommends placement to the National Parks Service. Again, if it is denied by the Historic Preservation Board, the landowner is given information about how to appeal.

Within the Youghiogheny Headwaters Management Unit 16 historical sites have been identified.

- **Glamorga (Kittery Hill)**  
*Listed Reason:* Architecture  
*Listed Date:* 9/13/1984  
*Listed Category:* Building
  
- **Pennington Cottage**  
*Listed Reason:* Architecture  
*Listed Date:* 5/17/1996  
*Listed Category:* Building
  
- **Creemore (Sincell Cottage)**  
*Listed Reason:* Architecture  
*Listed Date:* 12/27/1984  
*Listed Category:* Building
  
- **Mountain Lake Park Historic District**  
*Listed Reason:* Community Planning and Development; Landscape Architecture; Entertainment/Recreation; Education; Architecture; Religion  
*Listed Date:* 9/1/1983  
*Listed Category:* District
  
- **Baltimore and Ohio Railroad Station, Oakland (Oakland Railroad Station)**  
*Listed Reason:* Transportation; Architecture  
*Listed Date:* 2/5/1974

Listed Category: Building

- **Garrett County Courthouse**  
Listed Reason: Politics/Government; Architecture  
Listed Date: 11/12/1975  
Listed Category: Building
- **Hoye Site (Hoye Prehistoric Indian Village Archeological Site; Sang Run)**  
Listed Reason: Prehistoric  
Listed Date: 5/12/1975  
Listed Category: Site
- **Oakland Historic District**  
Listed Reason: Commerce; Economics; Transportation;  
Entertainment/Recreation; Education; Politics/Government;  
Architecture; Communications  
Listed Date: 1/26/1984  
Listed Category: District
- **James S, Lakin House**  
Listed Reason: Architecture; Commerce  
Listed Date: 1/1/1997  
Listed Category: Building
- **Reckart Mill**  
Listed Reason: Industry; Social History; Agriculture  
Listed Date: 6/30/1980  
Listed Category: Building
- **Terra Alta Bank**  
Listed Reason: Architecture; Commerce  
Listed Date: 7/9/1997  
Listed Category: Building
- **Terra Alta First United Methodist Church**  
Listed Reason: Architecture  
Listed Date: 4/15/2022  
Listed Category: Building
- **Brookside Historic District**  
Listed Reason: Entertainment/Recreation; Agriculture; Architecture;  
Commerce; Art; Transportation; Communication  
Listed Date: 5/8/2013  
Listed Category: District

- **Gaymont**  
*Listed Reason:* Commerce; Entertainment/Recreations; Architecture  
*Listed Date:* 4/14/1992  
*Listed Category:* Building
  
- **Red Horse Tavern**  
*Listed Reason:* Commerce; Art; Transportation; Architecture  
*Listed Date:* 7/2/1973  
*Listed Category:* Building
  
- **Red Horse Tavern (Boundary Increase)**  
*Listed Reason:* Commerce  
*Listed Date:* 5/4/1972  
*Listed Category:* Building