

CHAPTER 3. UPPER YOUGHIOGHENY

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.” In Maryland, it is the only river basin that does not flow to the Chesapeake Bay.

The Upper Youghiogheny River Management Unit, focuses on the area of land that encompasses all the streams that flow into the Youghiogheny River from Deep Creek to the confluence of the Casselman River.

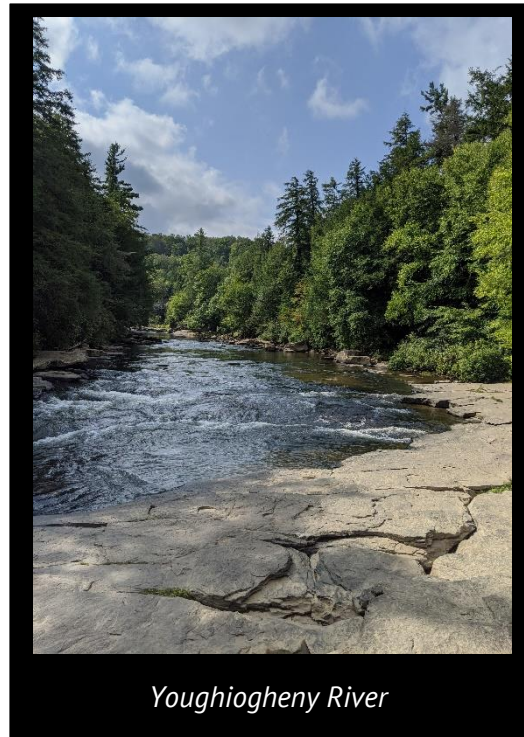
PROJECT AREA CHARACTERISTICS

The Upper Youghiogheny River is one of the most natural and scenic portions of the entire Youghiogheny River Watershed. It contains some of the exclusive, pristine portions of watershed with 21 miles receiving special protection as a wild and scenic river. It also offers a variety of recreational opportunities in both Maryland and Pennsylvania with the Youghiogheny River Lake spanning the border of the two states.

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).

Since the Upper Youghiogheny River Watershed is located in Maryland, Pennsylvania and West Virginia, the stream designations are determined by the states; thus, the systems used for designation are different. The system used and the stream classifications are discussed below for Maryland and Pennsylvania.



Youghiogheny River

Maryland

In Maryland, all of the streams in Upper Youghiogheny River Watershed are designated as “IIP.” A designation of “IIP” in Maryland means that the waterways are managed as nontidal cold-water streams plus for public drinking water (the P means water suitable for human consumption).

Pennsylvania

In Pennsylvania, the Upper Youghiogheny Watershed has a stream designation as a warm water fishery (WWF).

Within the Upper Youghiogheny River Management Unit there are 16 named tributaries that flow directly into the Youghiogheny River. Those 16 tributaries contain another 17 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.

Topography

The Upper Youghiogheny River has 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 upper portion, the Youghiogheny River narrows and carves through the region creating the topographic western portion of Chestnut Ridge; the eastern portion created is Laurel Hill.

Climate & 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 (CO₂) is a small portion of the makeup of Earth’s atmosphere but the fluctuations in CO₂ play a huge role in climate change. CO₂ 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 gases (Carbon Brief, 2011). Burning fossil fuels and stripping the land of trees and plants has increased the amount of CO₂ while decreasing the natural world's ability to offset the emissions. Humans have increased atmospheric CO₂ 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% Earth (National Aeronautics and Space Administration (NASA)).

Scientists agree the level of CO₂ in the atmosphere needs to stay below 350 parts per million (ppm) to address the catastrophic impacts of climate change. In 2019, CO₂ 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 350 ppm and 450 ppm, a threshold that is rapidly approaching. Exceeding 450 ppm 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 CO₂ 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 United States. 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 1880 when temperatures were first tracked.

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 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 Upper Youghiogheny Watershed occupies approximately 118,148 acres or 185 square miles. Within that area there are 11 municipal units, 5 in Maryland, 5 in Pennsylvania, and 1 in West Virginia. It is estimated that 22,601 people live in the Deep Creek Management Unit. Table 3-1 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; to lessen congestion on roads; to facilitate the adequate provision of transportation, parking, water, sewage, parks and other public facilities.

Within the Upper Youghiogheny River Management Unit there is no countywide zoning; however, Friendsville and Accident have their own zoning.

- **Maryland Zoning and Subdivision**

In Maryland, Garrett is the only county that does not have county-wide zoning. The town of Grantsville has its own zoning ordinance that was enacted in 1997 to prevent overcrowding of land; encourage the most appropriate land uses; conserve the value of land and buildings; lessen congestion on the roads and streets; avoid undue congestion of population; provide for adequate light and air; secure safety, and facilitate adequate provision of transportation, water, sewage and other public facilities.

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: The ordinance controls and limits growth on slopes of 30% or more and establishes a 25-foot setback in growth areas and a 50-foot setback in rural areas.
Rare, Threatened and Endangered Species: No permits will be 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.
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 new homeowners to pay an offset fee for nutrients added to the watershed (nitrogen, sediment and phosphorus) from their septic systems, 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.

- **Pennsylvania Zoning and Subdivision**

Somerset County does not have county-wide zoning; however, it does have regionalized zoning around the airport, interchanges, and the Route 31 corridor.

In January of 2022, the Somerset County Commissioners updated the Subdivision and Land Development ordinances that were in place for the county. The new ordinances were put in place to protect and provide for the public health, safety and general welfare of Somerset County residents. The ordinances also guide future growth and development within the county while protecting and preserving the value of land, the natural beauty, topography, and environment of the county while assuring adequate and efficient transportation, sewage, water, and other requirements and facilities.

Some ordinances of importance to the Casselman River Watershed include those for developing campgrounds and/or recreational vehicle parks and wind energy towers.

- **West Virginia Zoning and Subdivision**

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.

Income

The average and median household incomes for each of the municipal units in the region is located in Appendix E. 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.

In the Upper Youghiogheny River Management Unit there are approximately 23,780 households. Of those households, 18% receive some sort of Social Security income and 11% receive retirement income. Out of those same households only 0.9% receive public assistance while 6.4% 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 are living below the poverty level. Within the Upper Youghiogheny River region, state data is the only data available. The percent of the population living below poverty levels varies by state. In Maryland, its 10.3%, Pennsylvania 12.1%, and West Virginia its 16.8% (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).

- **Maryland**

In Maryland, each census tract is given an Environmental Justice Socioeconomic score that takes into account the community’s minority population, poverty level, and communities’ 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. Within the Youghiogheny Headwaters Management Unit none of the census tract areas qualify as Environmental Justice Communities.

- **Pennsylvania**

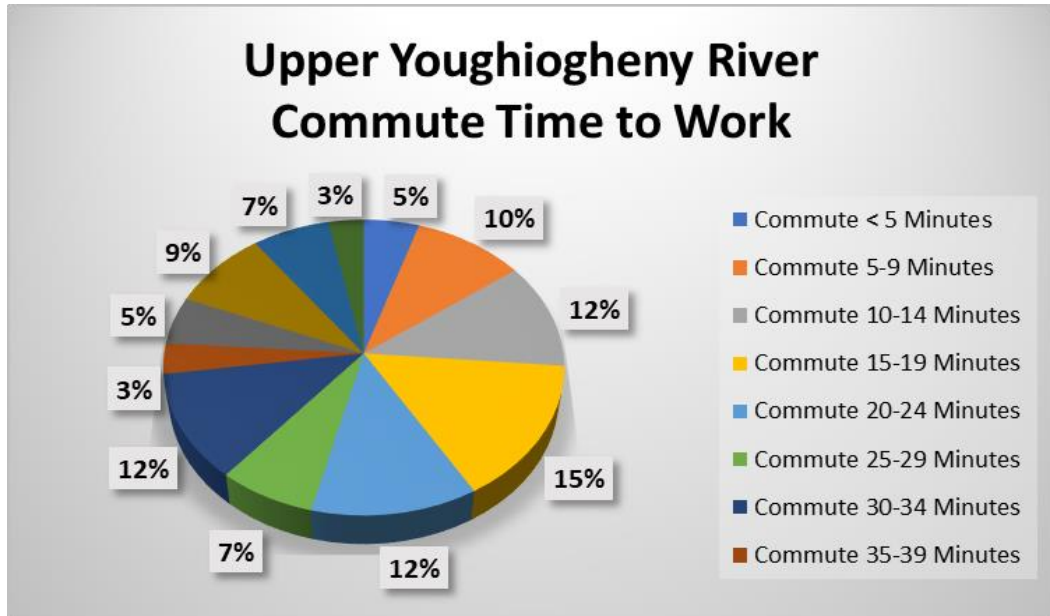
In Pennsylvania, prior to March 2023, in order for a community to qualify as an Environmental Justice Area either 20% or more of the people living in a census tract were living in poverty or 30% or more of the population in the census tract were considered a minority. Somerset Borough, located in the East Branch Coxes Creek subwatershed of the Casselman, makes up Census Tract 211 in Somerset County. This area has been identified as an Environmental Justice Area because 38% of the population is living in poverty.

In March 2023, Pennsylvania rolled out a new program to designate Environmental Justice Areas to evaluate environmental hazards and risk into

the equation. As part of this program, census block groups are re-evaluated every two years to determine their Environmental Justice Area status.

Employment

In the Upper Youghiogheny River Watershed, of the total population approximately 10,959 individuals are in the workforce. Of those individuals 64.5% work in the



state and county in which they reside. Of the remaining individuals, 19.1% work within the state of their residence but outside the county and 16.4% work outside the state of their residence.

The majority of the workforce, 61%, has a commute under 30 minutes with 26% percent spending less than 15 minutes. Approximately 7% work from home. This data is based on data submitted in 2020 at the start of the Coronavirus pandemic. This was a time of change in our workforce with many companies modifying schedules and employees’ abilities to work from home.

The top five employment industries within the Upper Youghiogheny River Management Unit include:

1. Health Care/Social Assistance -16%
2. Construction – 12%
3. Educational Services – 9%
4. Accommodations/Food Service– 8.5 %
5. Manufacturing – 8%

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 Confluence, Friendsville, Garrett. Many other multiple source sewage systems exist typically at campgrounds.

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. Larger utilities include National Pike Water Authority, PA American Water, North Fayette Municipal Authority, and Indian Creek Valley Water Authority in Pennsylvania. 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 increase in 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

Both Maryland and West Virginia operate on county-wide school districts while Pennsylvania area school districts are more community oriented with the potential of having more than one school district per county. Within the Upper Youghiogheny River Management Unit there are four schools: Preston County School District in West Virginia, Garrett County School District in Maryland, Turkeyfoot Valley in Somerset County Pennsylvania, and Uniontown in Fayette County, Pennsylvania.

LAND RESOURCES

Geology

The Upper Youghiogheny is 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, including 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 uses. For example, mining only occurs in areas where coal and limestone deposits exist. In Maryland, the soil is influenced by weather, vegetation, climate, and time. Sedimentary rocks, such as shale, sandstone, and limestone, are prevalent in the Youghiogheny Watershed and subsequently along the Upper Youghiogheny River.

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.

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, just in different proportions or patterns. Garrett County in Maryland has six soil associations. Of these, four out of the six are located along the Upper Youghiogheny River. Preston County in West Virginia has six soil associations. Of these, three out of the six are located 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-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-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 on 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 the is used 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 are grown mostly for feed for livestock. Farms are mainly dairy, beef cattle, or general.
Limitation- Mining in many of these areas. Most farms were abandoned because of the sale of stripping rights.

- **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 which 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.

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

The Upper Youghiogheny Subwatershed has low development with the second highest percentage of open water, due to Yough Lake. Other land use category percentages are similar to the rest of the Youghiogheny Watershed. See Table 3-1 for land uses in the Management Unit.

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 healthful outdoor recreation and serve as outdoor classrooms for environmental education (DCNR).

The Upper Youghiogheny Watershed is located in both Pennsylvania and Maryland and has one property listed as public. The public property is Youghiogheny River Lake, designated as a Recreation Reservoir. The Youghiogheny River Lake property totals 2,639 acres (*Public Lands*).

There are four properties listed as State Lands in the Upper Youghiogheny Watershed. Garrett State Forest totals 7,311.9 acres, but the majority is located in another watershed. An estimated 398 acres of Garrett State Forest are located in the Upper Youghiogheny Watershed. Youghiogheny River Natural Environmental Area, totaling 3,788.9 acres, is partially located in a neighboring watershed. An estimated 2,900.5 acres of the Youghiogheny River Natural Environmental Area are located in the Upper Youghiogheny Watershed. Savage River State Forest is another property partially located in the watershed. Savage River State Forest totals 53,370.4 acres with about 38,294.7 acres located in the Upper Youghiogheny Watershed. Finally, part of the Ohiopyle State Park, which in total is 18,648.26 acres, has about 701.0 acres located in the Upper Youghiogheny Watershed (*PAD_StateLands*).

The remainder of the Upper Youghiogheny water is privately owned (*Public Lands*).

TABLE 3-1. UPPER YOUGHIOGHENY RIVER LAND USE

Total Acres	Percent	Land Cover Class
3,098	2.7%	Open Water
5,231	4.5%	Developed, Open Space
696	0.6%	Developed, Low Intensity
482	0.4%	Developed, Medium Intensity
57	0.0%	Developed, High Intensity
305	0.3%	Barren Land
71,484	62.0%	Deciduous Forest
807	0.7%	Evergreen Forest
11,019	9.6%	Mixed Forest
432	0.4%	Shrub/Scrub
752	0.7%	Herbaceous
17,991	15.6%	Hay/Pasture
2,420	2.1%	Cultivated Crops
213	0.2%	Woody Wetlands
331	0.3%	Emergent Herbaceous Wetlands

Source: U.S. Census Bureau, 2023

Land Protection

Agricultural Preservation

The Protected Agricultural Lands Database lists nine properties located in the Upper Youghiogheny watershed, totaling approximately 796.3 acres. The properties are all listed as MALPF Easements with the Maryland Agricultural Land Preservation Foundation. The earliest agricultural preservation area was established in 1989 and the newest in 2007.

Conservation Lands

Upper Youghiogheny Watershed has four recorded conservation easements according to the PAD-US Geodatabase. The properties total 1,013 acres. The easements were established in 2012 or are unknown. They are also held in Garrett County, MD.

The conservation easements in the watershed have a Gap Analysis Project (GAP) Status Code, a measure of the conservation type of each parcel based on protection level categories that provide a measure of management intent for the long-term protection of biodiversity (United States Geological Survey (USGS)). A 101-acre property, titled Bear Creek Rural Legacy Area, has a GAP status code of 3 with a comment stating it is managed for multiple uses - subject to extractive (e.g. mining or logging) or off highway vehicle (OHV) use PAD-US Geodatabase.

The second property titled Maryland Environmental Trust Easement #9 contains 752 acres and has a GAP status code of 4. The comment next to the GAP status code states no known mandate for biodiversity protection. The easement is held with Maryland Environmental Trust.

The third easement property, titled Bear Creek Rural Legacy Area, contains 79 acres and has a GAP code of 3. The easement is held by Garrett County, MD.

The fourth easement property, also titled Bear Creek Rural Legacy Area, contains 81 acres and has a GAP code of 3 as well, managed for multiple uses - subject to extractive (e.g., mining or logging) or OHV use (PAD-US Geodatabase.)

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 streambanks 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 with the stream habitat needed for many biological species, such as macroinvertebrates. Sediment not only changes the suitable habitat; it 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 streambanks 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 a location for excess water, 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 Areas

Coal Mining

Currently, no active surface or underground coal mines are in operation in the Upper Yough Watershed. Nine surface mines have completed operations, and the McCullough was the only underground mine, which is now closed.

Coal mining has occurred for many years throughout western Maryland, northern West Virginia, and southwest Pennsylvania. Several other small coal mines are

likely to have existed, and many areas still contain refuse piles and other visible reminders of the mining that had taken place.

Quarries

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 Upper Youghiogheny Watershed, four active Non-Coal Mining sites are in operation and one closed site has been reclaimed.

Oil & Gas

Natural gas has been extracted from the Youghiogheny Watershed for nearly 150 years. The first documented oil well in Pennsylvania was established in 1859 (Dilmore et al., 2015). Overtime, extracting these resources has been done one of two ways—either by conventional or unconventional drilling. Conventional drilling is the most common method. Small conventional well sites are common throughout the entirety of 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 are 17 horizontal wells and three vertical oil and gas projects in the Upper Yough Watershed. Most of the vertical wells are located in Pennsylvania.

Landfills & Illegal Dumps

Although no permitted landfills exist within the Upper Yough 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. Several landfills are in operation in Fayette County, PA, and Garrett County does operate a landfill and several transfer stations available to all Garrett County, MD residents.



Old tires are often disposed of in the river. This impacts water quality and stream life.

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 and property owners can be held liable; 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 three documented, illegal dumpsites within the Upper Yough Watershed, although this does not mean that others 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 Upper Yough Watershed.

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 Upper Yough Watershed is highly susceptible to landslides. Over the past few years, the Pittsburgh area has had hillsides, taking out houses and roads. In June 2022, the hillsides above Yough Lake along Route 40 had a massive movement 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 have become a mecca for outdoor recreation. With miles

of trout streams, lakes for boating, hiking/biking 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 following subwatersheds and their tributaries as impaired: Youghiogheny River Lake and mainstem, Hoyes Run, Fork Run, Ginseng Run, an unnamed tributary to Mill Run and sections of Bear Creek and Buffalo Run.

In 1976, Maryland designated a 21-mile stretch of the Youghiogheny River just north of Oakland, Maryland, to the town of Friendship, Maryland, as a wild and scenic river. This corridor is managed by the Maryland Park Service in order to preserve the wild and natural scenic nature and resources that this section of the river possesses. This was the first ever Wild River designation declared in Maryland.

Water Quality

Current Conditions

Currently, most of the Youghiogheny River Watershed is meeting its designated use for both recreation and public water supply. However, 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 nonpoint runoff from transportation corridors.

Water Quality Standards are the foundation of the water quality-based control program 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 spelled 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 is 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. The “P” designation is 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 either basin. However, there are several Tier II (High Quality) designations. In the Youghiogheny River sections of Hoyes Run, Buffalo Run, Bear Creek, which includes Little Bear Creek and South Branch Bear Creek, Mill Run and several unnamed tributaries to the main stem are designated as Tier II. In addition, the Youghiogheny River also has the distinction of having a section of the main stem in Maryland listed as a Scenic and Wild River. In 1976, a 21-mile segment of the river was designated as Maryland’s first Wild River. Managed by the Maryland Park Service, the protected corridor along the river preserves its natural and aesthetic resources and only allows primitive trails to be developed.

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 them attaining their designated use for drinking water and recreation.

Point Source

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

There are 28 active NPDES permits issued for the Youghiogheny and Casselman River Watersheds in Maryland.

Nonpoint Source

In both Pennsylvania and Maryland, non-point source pollution originates from many sources: abandoned mine drainage, agriculture, silviculture, runoff from urban, rural, industrial sources, 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 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 Youghiogheny River in Maryland meet their designated use classes for either recreation and drinking water, but the aquatic life use class is severely under threat. There has been basin wide TMDLs developed for low pH, nutrients, bacteria and stream modification (lack of riparian buffer), and TSS (total suspended 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. However, 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. Table 3-2 below lists the Source Water Assessment Plans for the Upper Youghiogheny River Watershed.

TABLE 3-2. Source Water Protection Plans for the Upper Youghiogheny River Watershed

Number	Name	Type	Source
Not available	Town of Friendsville	Surface	Youghiogheny River
1110005	Northern High School	1 Well	Bear Creek
1110006	Northern Middle School	1 Well	Bear Creek
In addition, there are 91 Transient Non-Community Water Systems with smaller plans developed and spread throughout the Casselman, Youghiogheny, N. Branch Potomac, Savage River Basins. (All are groundwater wells, with the exception for one)			

Source: Maryland DOE Source Water Program

Lakes and Reservoirs

The Youghiogheny River Lake encompasses approximately 2,800-acres with 38 miles of shoreline and includes 16 miles of the Youghiogheny River. While it has an

average depth of 54 feet, the deepest section extends 121 feet. The reservoir spans two states, starting just north of Friendsville, Maryland, and extending to the dam in Confluence, Pennsylvania (Maryland Department of Natural Resources).

The reservoir is primarily a recreational destination, but it was originally constructed in 1944 as a flood control structure and for hydroelectric power generation. It is owned and managed by the United States Army Corps of Engineers out of the Pittsburgh, Pennsylvania District.

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. In the Upper Youghiogheny area, there are 4,106 acres of wetlands.

Wetlands are broken down and classified into systems. Within the Upper Youghiogheny area, wetlands are Lacustrine, Palustrine, or Riverine. According to the National Wetland Inventory, the Youghiogheny Headwaters have 2,708 acres of Lacustrine wetlands. Lacustrine systems include wetlands and deepwater habitats within a topographic depression or a dammed river channel, lacking trees, shrubs, persistent emergent, and emergent mosses or lichens with 30 percent or greater coverage, and total an area of at least 20 acres (National Wetlands Inventory, 2019).

The Upper Youghiogheny area also has 882 acres of Palustrine wetlands. Palustrine wetlands are in non-tidal areas that are dominated by trees, shrubs, persistent emergent and emergent mosses or lichens (National Wetlands Inventory, 2019). Most of these wetlands are emergent (272 acres), scrub-shrub (240 acres), and forested (212 acres). Emergent wetlands consist of perennial plants, excluding mosses and lichens, that are the tallest lifeform with at least 30% areal coverage. Scrub-shrub wetlands include areas that are dominated by woody vegetation less than 20 ft tall. Finally, forested wetlands are characterized by woody vegetation that is 20 ft tall or taller. The remaining wetlands are unconsolidated Bottom wetlands (158 acres), which consist of deepwater habitats with at least 25% cover of particles smaller than stones and a vegetative cover less than 30% (National Wetlands Inventory, 2019).

Other than Lacustrine and Palustrine, Riverine wetlands make up 85 acres of the Upper Youghiogheny. 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).

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 a place for excess, 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 flood areas are developed, natural, or farmland. The Upper Youghiogheny has a total of 2,027 acres of floodplains. Of that 2,027 acres, 227 acres are developed, and 121 acres are farmland. The remaining 1,678 acres are natural. It is critical that these areas remain undeveloped. Development in floodplains 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

The 1,678 acres of natural floodplain areas in the Upper Youghiogheny are 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; providing habitat; economic value; and recreational and aesthetic values. It is critical that these areas remain undeveloped.

Water Quality Monitoring

Socio-economic 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. The Municipal Authority of Westmoreland County has been monitoring at the mouth of the Youghiogheny Lake for short periods from 2010 to 2012, and then again from 2020-2022.

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 sub-cellular 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. Abundant biological sampling has occurred in the Maryland portion of the Upper Youghiogheny Watershed through the Maryland Biological Stream Survey (MDDNR, 2009). Streams are selected randomly throughout the year across the state. Sampling within the watershed appears to have begun in 1995. Information can be found on their interactive map (<https://maryland.maps.arcgis.com/apps/webappviewer/index.html?id=30ee9336f8d54e4ebf971c3a1a7576ed>). A report on the biological impairment of the Youghiogheny River Watershed in Garrett County can be found here: https://mde.maryland.gov/programs/Water/TMDL/DocLib_Youghiogheny_05020201/BSID_Yough_031914_final.pdf.

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 used for 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. All popular

summer swimmable waters in the watershed need to be tested for E. coli for the protection of the community.

Dataloggers

Between 2011 and 2017, seven dataloggers were used to gather much needed baseline water quality data for the Upper Youghiogheny Watershed. The dataloggers were primarily installed to monitor for impacts related to drilling within the Marcellus Shale formation. While drilling was not prevalent in the watershed, Mountain Watershed Association was proactive in collecting baseline data that could be used if drilling activities were to take place. Solinst Jr. LTC levelloggers were used to monitor conductivity, temperature, and water level of the stream every 15 minutes. The data was then downloaded every two weeks and analyzed for any spikes in conductivity.

While dataloggers are no longer deployed in the watershed, historic data has established baseline conditions. If drilling once again becomes active and threatens the water resources, resuming water quality monitoring with dataloggers will be warranted.

BIOLOGICAL RESOURCES

Natural Setting

The Youghiogheny River Watershed has a rich history. It has experienced industrial impacts, such as mining, for both coal and minerals, hydroelectric dams, and wind turbines. It also has a vast amount of agriculture as well as natural space with numerous state and federal lands available for recreation by tourists and local residents.

The Upper Youghiogheny River Management Unit is located within the Appalachian Plateau in Maryland and within the Allegheny Mountain Section of the Appalachian Plateau Province in Pennsylvania. It is known for having the highest elevations that parallel mountain ridges separated by deep gorges creating whitewater conditions.

The natural landscape of the watershed has been dramatically affected by commercial development and invasive species. Impacts of past colonization such as mining, logging, and agriculture have left their scars, but foreign invaders like invasive species have also had dramatic impacts especially on hemlocks, ash, and chestnut trees. This does not even take into account the amount of sprawl that the watershed has experienced with vacation homes and rentals, four-season resorts, along with infrastructure to support these tourists.



A golden stonefly is one of the macroinvertebrates typically found in healthy clean streams

Most of the landscape is composed of second and third growth stands of timber containing maples, oaks, Black Cherry, and Tulip Poplar trees. Rhododendron, Mountain Laurel along with blackberries, blueberries and huckleberries are common. Fortunately, some of the oldest, old growth forests remaining in both Pennsylvania and Maryland within the Youghiogheny River have been maintained due to the numerous amounts of state park and forest lands in the states.

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.

In the Pennsylvania portion, Appalachian Hemlock Northern Hardwood forests are typically found containing cool, moist slopes containing hemlocks, maple, beech, poplar and birch species. There is also a North Central Interior Floodplain Forest especially along rivers and bottomlands. River scour communities or communities where the force of the flow has caused the removal of sediment from the streambed or streambanks of a waterbody, especially along the Youghiogheny River, provide habitat for many rare plant species. This watershed boasts of diversity for natural communities, including but not limited to streams, ponds, lakes, wetlands, grasslands, open marshes, bogs, swamps, floodplains, forests, marshes and vernal pools.

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 the 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.

Over the next few sections, the biodiversity that this watershed contains will be discussed in much further detail through natural heritage areas, species of concern, species of greatest conservation needs, important bird and mammal areas.

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. A listing of these species will be included in Appendix G.

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 natural resource agencies are to be contacted if any land disturbance 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. The Maryland list contains all the species in Garrett County, Maryland, whether it is in the Youghiogheny River Watershed or in another watershed.

In West Virginia, there are 21 federally endangered species, 7 federally threatened species, 3 species proposed for listing and 1 candidate species. Like Maryland, this list for West Virginia may include species outside the Youghiogheny River Watershed as it is for the entire state.

In Pennsylvania, 23 species of concern have been listed within the Upper Youghiogheny River Management Unit. They include 14 plant species, 1 mammal, 1 bird, 1 butterfly, 2 communities, and 4 species of special concern not identified in order to protect the species.

Species of Greatest Conservation Need

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 natural resource agencies are to be contacted if any land disturbance activities are planned to determine if those activities could potentially impact any species of special concern or their habitat.

Currently in Maryland, this data is only available to the public by state. Many of the species in this listing may not reside in the Youghiogheny Headwaters portion of the watershed, for example, the bottlenose dolphin. Within 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 Pennsylvania, there are 35 SGCN located within the Upper Youghiogheny River Management Unit. Of those three bird species, one mammal, and two butterflies have been identified as globally important.

In West Virginia, the Youghiogheny River Watershed is located within the Allegheny Mountain ecosystem region. Within this region, which extends way beyond the watershed, 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 are 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 its 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 in packaging materials. 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 spread profusely, dominating 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, compacting the soil and 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 19th 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. The mats 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 18th century.
- **Kudzu** was introduced to the United States from Asia during the 1876 World's Fair in Philadelphia, Pennsylvania. During the Great Depression, it was touted as a way to reduce farmland erosion. It is a deciduous, climbing, semi-woody perennial vine that can grow 35-100 feet long. It spreads via runners, rhizomes and from nearly every node that touches the ground. In its third year it produces flowers from June to September. It spreads rapidly in open areas including disturbed areas such as abandoned fields, roadsides, and forest edges (Kling, 2022).
- **Hydrilla** or **Waterhyme** is a fast-growing submersed, rooted aquatic invasive plant that can grow in water up to 20 feet deep and can survive at depths of 40 feet if the water is non-turbid. It forms dense mats at the surface of water which can restrict native vegetation, irrigation practices recreation, hydroelectric production and water flow. It can invade slow to still water systems. It is believed to be native to Asia or Africa and was first introduced into North America as an aquarium plant in the 1950s (Hydrilla, 2018).

- **Japanese barberry** is an ornamental shrub first transported to the United States in 1875. Historically, it was used as a living fence for livestock and for herbal medicines. It is now used as an ornamental hedge plant and can be a nuisance as it harbors ticks that can cause Lyme's disease. Although invasive, it is still sold in nurseries and garden centers.
- **Poison hemlock** is a tall poisonous invasive plant commonly mistaken for Queen Anne's Lace. It is an erect, bi-annual (meaning it takes two years to complete its life cycle and flower) that can grow six to ten feet high. It is toxic and can be fatal to humans and livestock if ingested, affecting the respiratory, central nervous, and reproductive systems. It can also cause skin rashes by coming into contact with it. It is native to northern Europe, western Asia, and North Africa. It was introduced in North America in the 1800s as an ornamental and has spread throughout American, Canada, and Mexico. (Behnke, 2022).
- **Carolina fanwort** is an herbaceous perennial aquatic plant that is an early identification species, just beginning to be a problem in Pennsylvania. It contains long branched stems with fibrous roots that fan-like underwater leaves that can be submerged or floating. Native to South America, it was introduced as an aquarium plant. Once established, the dense growth of this plant can impede water flow and clog drainage canals and freshwater streams thus impacting recreation, agricultural and aesthetic uses. It can form dense stands, crowding out native species.
- **Japanese angelica tree** is another early identification species, just beginning to be a problem in Pennsylvania. This upright, deciduous shrub or tree can reach a height of 20-40 feet with a 15-30 ft in width. The stems are covered in spines, and in the fall, leaves turn yellow to reddish purple. It forms suckers from its base to spread in addition to spreading from the dispersal of its berries that are eaten and distributed by wildlife.
- **Sawtooth Oak** is an early identification species, just beginning to be a problem in Pennsylvania. It has been spotted in recent years to escape plantings and establish in nearby forests, displacing native vegetation. It is a native of Asia and has been widely planted in the United States as an ornamental and as food for wildlife. While it is no longer recommended for planting in the United States, it is still sold and many places debate listing it as an invasive species.
- **Wisteria** is an early identification species, just beginning to be a problem in Pennsylvania. Similar to Sawtooth Oak, many people do not see wisteria as

an invasive species, and it is still commonly sold at nurseries, garden centers, and online. Native to Asia, these plants were imported for landscaping uses. While some wisteria is native to the region, the non-native species have become more desirable for their colors.

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. Somerset County was added to Pennsylvania's list of quarantine counties in March of 2023.
- **Virile crayfish** are a great threat to native crayfish diversity in the Youghiogheny River. These crayfish have the capacity to displace native crayfish and alter aquatic food webs and habitats. These invasive crayfish are also found in West Virginia.
- **Rusty crayfish**, like the virile crayfish, are a great threat to native crayfish diversity in the Youghiogheny River. These crayfish have the capacity to displace native crayfish and later aquatic food webs. While they are found in Pennsylvania and West Virginia, they have not been identified in the

Maryland portion of the Youghiogheny River, although they are found in other portions of Maryland.

- **Asian clam (*Corbicula fluminea*)** has definitely been identified in the Youghiogheny River Watershed in Pennsylvania when Western Pennsylvania Conservancy and Mountain Watershed Association completed a mussel survey in 2021. This clam can alter the ecology of aquatic systems making it less hospitable to native assemblage of freshwater mussels, fish, invertebrates and plants.
- **Chestnut blight** is a fungus that was accidentally introduced on nursery stocks imported from Asia. It was first discovered in 1904 and attacked the American Chestnut tree. It caused a fungal disease that virtually eliminated mature American Chestnut trees.

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 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 expands 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 Upper Youghiogheny River 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 the displacement of feeding areas, 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 in 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, a frequent occurrence.
- 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 that 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 area was 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 Upper Youghiogheny River Management Unit in Maryland no sites have been identified as Natural Areas.

In Pennsylvania, Natural Heritage Areas (NHAs) are designated areas of ecological importance, including those relatively undisturbed by human activity, potential habitats for species of special concern, significant assemblages of plants and animals, and areas important for general wildlife habitat, scientific study, and recreation.

A Natural Heritage Inventory (NHI) was conducted in Somerset County in 2006 to catalog important biological resources and to identify and map the Natural Heritage Areas within each county. A total of four NHAs have been identified in the Upper

Youghiogheny River Watershed (Table 3-3). Descriptions of each NHA in the watershed can be found in Appendix J.

TABLE 3-3. NATURAL HERITAGE AREAS IN THE UPPER YOUGHIOGHENY RIVER MANAGEMENT UNIT

Site Name	Management Type	Significance
Youghiogheny River Lake	NHA	State
Markleysburg Bog	NHA	Regional
Confluence Bog	NHA	State
Middle Youghiogheny River Gorge	NHA	Global

The information recorded in each NHI should be considered during planning processes to ensure the protection of these resources. One recommendation is that appropriate buffers be established around BDAs to protect wildlife, maintain hydrology, and prevent invasive species from entering the areas. Another implementation goal of this River Conservation Plan (RCP) is to work towards gaining “formal dedication” of additional NHAs and increase protection of ecological systems and biological diversity through the designation of Dedicated Areas (DA), that could be secured through landowner agreements, special programs, or other methods.

Areas can gain formal dedication by becoming a PA DCNR- designated Natural Area. A Natural Area is an area of unique scenic, historic, geologic, or ecological value that will be maintained in a natural condition by allowing physical and biological processes to operate, usually without direct human intervention and with restricted use of the area (PA DCNR).

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, 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.

Two IBAs have been identified within the Upper Youghiogheny River Management Unit, see Table 3-4.

TABLE 3-4. IMPORTANT BIRD AREAS IN UPPER YOUGHIOGHENY RIVER MANAGEMENT UNIT

IBA	Acres	Status	Priority
Youghiogheny Valley	49,139	Identified	State
Youghiogheny Valley, Ohiopyle State Park	157,319	Recognized	State

Important Mammal Areas

Mammals are an important component to our 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 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 Youghiogheny River Watershed and Maryland in general.

There are no Important Mammal Areas identified in the Upper Youghiogheny River Management Unit.

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 Upper Youghiogheny River Management Unit, there is a transition of trails from primarily recreational purposes in natural surroundings to community walking trails with a focus on fitness and exercise. There are five trails or trail systems in the management unit, one of which, the Margraff Plantation, is a mountain biking trail system. Trails are listed 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.

Significant parks in the Upper Youghiogheny region include the Youghiogheny River Lake and portions of Ohiopyle State Park. Additional recreational facilities include the Friendsville Community Park, Friendsville Memorial Park, Roaring Knob Motorsports Complex, Borough of Markleysburg Park, Henry Clay Township Park, Toll House Park and Marclay Elementary School.

- **Youghiogheny River Lake**

The Youghiogheny River Lake is a 16-mile lake managed by the United States Army Corps of Engineers. It provides a variety of recreational opportunities especially to boaters and anglers. It also has three campgrounds, two beaches, two playgrounds, and a marina.

The dam was constructed in 1944 as a flood control structure and for hydroelectric power generation. Today, it provides for a variety of recreational opportunities. It serves as the best powerboat and water-skiing lake in southwestern Pennsylvania. First, the lake provides a diversity of fish and spawning habitats. The reservoir is an excellent Smallmouth Bass fishery and maintains a naturally reproducing Walleye population (see fishing section for more information). While the reservoir does experience water fluctuations, depending on annual rainfall, it does provide a constant flow in the Youghiogheny River through the summer months that supports whitewater rafting, kayaking, and canoeing further downstream. Among the 38 miles of shoreline there are several beaches for swimming. Boating on the reservoir itself is also open for motorboating, water skiing, and jet skiing, in addition to unpowered watercraft.

- **Ohiopyle State Park**

Outskirt portions of Ohiopyle State Park are contained within the management unit. Overall, Ohiopyle State Park contains 20,500 acres of rugged, natural beauty in the Laurel Highlands region of Pennsylvania. It is one of Pennsylvania's premier state parks as it provides some of the best whitewater boating in the eastern United States, in addition to numerous trails and picnicking facilities. While there is no designated swimming beach, recreational users flock to the park to swim, especially areas like the Meadow Run Natural Waterslides and below Cucumber Falls. Swimming is not permitted directly above or below the main waterfalls. Scenic vistas, wildflowers, and wildlife capture the hearts of photographers. The park also features an environmental education center near the main waterfalls in Ohiopyle Borough.

- **Nature Preserves**

The Casselman River Conservation Area includes 644 acres along multiple sections of the Great Allegheny Passage Trail and the Casselman River in Somerset County. The area is open for hiking. Within it, a 40-acre tract the Josh Whetzel Jr. Memorial Recreation Area is dedicated to Western Pennsylvania Conservancy's former president and board chairperson. This parcel includes a quarter-mile trail to a scenic observation area overlooking Confluence, Pennsylvania, the Great Allegheny Passage, as well as both the Casselman and Youghiogheny Rivers. The area is open to fishing, hunting, and hiking.

Camping

Camping is a popular recreational activity that increased in popularity due to the Coronavirus pandemic in 2020 to 2021. Within the Upper Youghiogheny River Management Unit there are three campgrounds available right off Yough Lake. There are also two campgrounds for seasonal campers and one church camp. Each of these camping opportunities has a website for information about amenities and programs. There are also a variety of cabin and Airbnb rentals available in the area.

Boating

The Upper Youghiogheny Watershed offers many options for boating. The Upper Yough is a major whitewater boating destination and heavily visited during summer months. Many sections of the main stem contain small rapids (Class I). Other sections require a higher level of skill and proper gear in order to handle the continuous gradient. From Oakland to Confluence, a paddler will enjoy scenic views and quality Class IV rapids. Access points along the river have been established, in part of Swallow Falls State Park, Friendsville, and the US Army Corps of Engineers (USACE).



*National Falls in the Upper Youghiogheny River
(Photo credit: Cara Giannone)*

Yough Lake offers several access points and motor boats of a certain length are permitted. Overcrowding on busy weekends has been noted in public comments and assessments completed by the USACE.

The Upper Yough offers guided rafting trips and equipment rentals through several outfitters. Training, lessons, and instruction are offered by several outfitters as well. Known for its continuous nature, the Upper Yough is a destination for boaters from the surrounding area, in part, due to its reliable whitewater dam releases from Deep Creek in summer months.

Several of the smaller tributaries are considered boatable after heavy rains or spring melts. American Whitewater's website offers information related to the Upper Yough boating information including flows, directions to access points, and any important alerts.

Fishing

Fishing is a popular recreational activity, especially within the Upper Youghiogheny River Management Unit. Both Pennsylvania and Maryland provide ample opportunities for anglers. This management unit is also blessed with the presence of the Youghiogheny River Lake that spans the two states. A cooperative agreement is in place that requires anglers fishing from boats in the water to possess either a Pennsylvania or Maryland fishing license; however, shoreline anglers must possess the appropriate license for whichever state they are currently fishing at.

The reservoir is an excellent Smallmouth Bass fishery and maintains a naturally reproducing Walleye population. It has the ability to produce trophy size fish such as Crappie and Northern Pike. Other species include Yellow Perch, Carp, Largemouth and Smallmouth Bass, Bluegill, Pumpkinseed, Rock Bass, Brown Bullhead, Channel Catfish, Chain Pickerel, Hybrid Striped Bass and Alewife.

- **Pennsylvania**

Fishing in Pennsylvania is regulated by the Pennsylvania Fish and Boat Commission (PFBC). They work to protect, conserve and enhance the aquatic resources and provide fishing and boating opportunities. In an effort to achieve their goal, they handle streams through various management designations and stream stockings.

In order to fish in Pennsylvania, all anglers ages 16 and up are required to purchase an annual fishing license, and to fish on known trout streams, fishermen need to purchase a trout stamp. Resident and non-resident licenses are available to purchase at a variety of sporting goods stores and online through the PFBC website.

Special regulation Stocked Trout Waters Open to Year-Round Fishing include the Youghiogheny River from outflow of lake downstream to the confluence of the Casselman River.

- **Maryland**

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 Upper Youghiogheny River Watershed is most likely to fall within the Highlands Coldwater habitat. Most common fishes likely to occur within the management unit include the cold-water common species such as the Blacknose Dace, Creek Chub, Tessellated Darter, and Bluegill. In addition, 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 of which some are popular like the Largemouth Bass and Rainbow Trout while some have become invasive in some parts of the state.

Brook Trout caught must be released in the following streams: Bear Creek, Mill Run and the Youghiogheny River at Friendsville.

Hunting

- **Pennsylvania**

The Casselman River Watershed is located within the 2C Wildlife Management Unit for hunting as designated by the Pennsylvania Game Commission. Wildlife management units are delineated based on habitat and human-related characteristics, such as population density, public vs private land ownership, recognizable features consisting of roads and streams, as well as land use practices like agriculture, timbering, and development. They are used to manage all game with the exception of elk, waterfowl, and migratory game birds. Hunting is permitted on public and private lands during the appropriate hunting seasons. For more information about hunting seasons in Pennsylvania, hunters can visit the Pennsylvania Game Commission website. However, prior to hunting on private lands, landowner permission should be obtained even if hunting in forest game and hunter-access properties.

State Game Lands (SGL) are lands purchased and managed by the Pennsylvania Game Commission to provide habitat for wildlife, increasing opportunities for lawful hunting and trapping. These lands are open to the public. There are portions of three State Game Lands within the Middle Youghiogheny Watershed; they include: SGL 50, 231, and 271.

- **Maryland**

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 bears 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 a hunting license, hunters must take and pass an educational safety course unless they can document proof of hunting prior to 1977.

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 and supporting existing environmental education in this area would be beneficial to individuals as well as the community at large to foster 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 variety of organizations provide environmental education opportunities to landowners, students, and visitors in and around the Indian Creek Watershed. Environmental education programs are also offered at our neighboring state parks, and Forbes State Forest. These programs are geared towards providing hands-on, in-field learning experiences and getting people outside away from the electronic devices that control their lives.

Mountain Watershed Association

Mountain Watershed Association (MWA) is a non-profit, 501©3 organization with the mission to protect, preserve and restore the Youghiogheny River Watershed and its broader communities through conservation, recreation, education and advocacy. Yearly, MWA works with over 3,000 learners over the course of about 50

environmental education events. MWA hosts their own educational events and also visits schools, community centers, scout groups, libraries, and more to teach their watershed education curriculum.

- **Outdoor Lending Library**

Upon receiving a grant from the Fayette County Community Foundation, with materials supplemented by the Grable Foundation and the DEP education grants, MWA has created a library of outdoor gear and educational resources available to the public! This comprehensive and inclusive resource library is located in MWA's office, and items will be available to be checked out during our office hours.

- **Water Guardians After-School Club**

Water Guardians is an after-school education program developed with a generous grant from the Pennsylvania DEP. Water Guardian club meetings provide students with a plethora of opportunities to gain experience through ecology-based activities. Their main goal is to have fun and spark a connection between students and their local environment.

- **Family Field Day at Laurel Hill State Park**

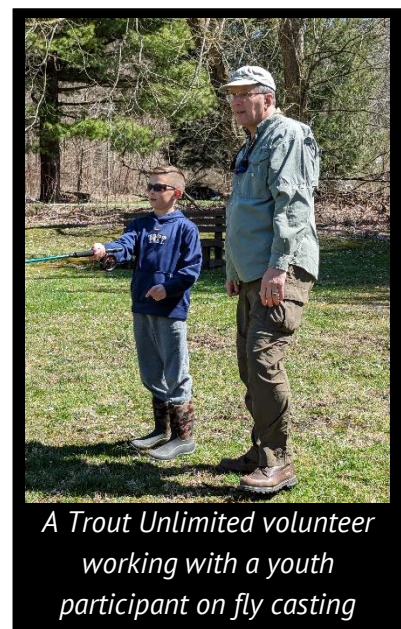
Together with the State Park Rangers at Laurel Hill State Park, Mountain Watershed Association held its first annual Family Field Day in June 2023. Using funds from the DEP's generous education grant, we provided local families with a fun day of outdoor learning and recreation on the shores of Laurel Hill Lake.

- **Indian Creek Watershed Fishing Festival**

This fishing derby and clinic has been hosted annually at CW Resh Park in Indian Head, PA for 15 years. Families came from near and far to enjoy a day of free activities along Indian Creek. The event features free fishing and lunch for kids 12 and under, hands-on environmental education activities, door prizes, a fly-casting clinic with PA Fly Co, and goods from local vendors. The event wraps up with the highly anticipated Indian Creek Duck Race, in which the MWA team released 1000 rubber ducks into the creek.

- **Fly-Fishing Clinics – 6 per year**

In 2022, MWA started hosting free fishing and fly-tying clinics in partnerships with local Trout Unlimited chapters and PA Fly Co, a local fly-fishing business.



A Trout Unlimited volunteer working with a youth participant on fly casting

- **Professional Development Trainings – 4 per year**

Growing up WILD **Growing Up WILD** is an early childhood education curriculum that builds on children’s sense of wonder about nature and invites them to explore wildlife and the world around them. Through a wide range of activities and experiences, Growing Up WILD provides an early foundation for developing positive impressions about the natural world and lifelong social and academic skills.

Project WILD’s mission is to provide wildlife-based conservation and environmental education that fosters responsible actions toward wildlife and related natural resources.

Population Education is all about people – how many of us there are, how we shape the world, and how we interact with each other. And as the go-to program providing innovative lesson plans and professional development on human population growth and its effects, Population Education supports K-12 teachers across content areas. Our human population has grown from 1 billion to 8 billion in just over 200 years and is expected to grow through this century, so it is critical to examine human impacts on wildlife, climate and natural resources, while working toward equality and justice for the world’s people.

County Conservation Districts

County Conservation Districts (CCD) provide a diversity of programs and services to their constituents that include: abandoned mines, agricultural land preservation, erosion and sedimentation control, floodplain management, forest management, nutrient management program, stormwater management plans, waterway and wildlife management protection, dirt and gravel and low volume road programs as well as environmental education. They accomplish this hosting events and environmental educational programs in addition to sponsoring county Envirothon competitions.

- **Envirothon**

Each CCD works with teachers and professionals throughout Pennsylvania to host an Envirothon competition. High school students are guided through this natural resource environmental education program that combines classroom learning and outdoor activities. This exposure to nature and seeing how humans impact the natural world provide invaluable lessons for understanding ecosystems and our environment.

At the Envirothon, teams of five high school students compete in field testing using their knowledge in five topic areas – Soils and Land Use, Aquatic Ecology, Forestry, Wildlife, and Environmental Issues. A current environmental issue is chosen each year as the “hot topic” for the focus of

this station as well as the oral presentation component. The winners of each county competition, then compete for the state title with that winner representing Pennsylvania at the national Envirothon competition.

Penn State Extension

It is the belief of Penn State Extension to deliver science-based information to people, businesses and communities. They do this through a variety of programs and educational sessions. Each county has an Extension office and the programs available between counties. Some of the more notable programs include: 4-H, master gardener, master watershed, and master well steward programs.

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 they were used for cooking.

They 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 3-1). 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.

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 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.



Figure 3-1: 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 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.

Discharges from Deep Creek enter Maryland’s only designated ‘wild’ river, which begins at the Upper Youghiogheny portion of the watershed. The Maryland State Scenic Rivers system began in 1975 with legislation that designated several ‘scenic’ rivers, including a three-mile stretch of the Youghiogheny from Oakland to Miller’s Run. In 1976, a 21-mile stretch segment of the Youghiogheny was designated as Maryland’s first Wild River. A state-protected corridor along the river runs from Miller’s Run just north of Oakland to Friendsville. This corridor is managed by the Maryland Park Service to preserve the wild and natural scenic, geologic, historical, ecological, recreational, fish, wildlife, and cultural resources. A wild river is a free-flowing river whose shoreline and related land are undeveloped, inaccessible except by trail, or predominantly primitive in a natural state for at least four miles. The locals did not love the designation because state officials, instead of buying the land needed from the locals, zoned the areas around the river to prohibit building along the river permits for coal mining and other activities that could degrade the river.

The water floats down the steep gorge where it enters Sang Run. Sang Run consists of a bridge and several houses. Its name goes back to the Friend brothers, who settled in Friendsville in 1765 and explored southward, where they found ginseng, a small plant of the deep woods. They filled their bags with the gingerbread-man-shaped roots and named a Youghiogheny tributary 'Ginseng Run.' This begins one of the most challenging kayaking and rafting runs on the east coast, the Upper Yough.

Ed Gertler, author of *Keystone Canoeing*, calls these nine-and-a-half miles 'the big whitewater challenge.' Specifically, what makes it unique are four miles of unrelenting boulder piles, ledges, blocked views, unobvious passages, menacing undercuts, and technical difficulties (Gertler, 1996). The Upper Yough was first run on May 31, 1959, by Tom Smyth, Dave Kurtz, and Bill Bickham, all from State College, Pennsylvania. They had no idea what they were getting into but were excellent paddlers. After checking out some topographic maps at Penn State University and hunting for a river with a steep gradient, they loaded their gear and

came to Sang Run with aluminum Grumman canoes.



Dave Demaree throwing an ender at the rapid Powerful Popper on the Upper Yough, 1974.

River access did not just happen. In the mid-1970s, to protest the recent designation of the Upper Youghiogheny as a State Scenic River, local landowners began harassing paddlers who attempted to run this stretch. Connected by

a CB network, locals acted when cars bearing boats were spotted on roads approaching the Sang Run Bridge. Crowds materialized at the bridge. Rocks were thrown. Threats were made. Cars were vandalized. Even a few shots were fired at a passing raft (Walbridge, 2003). Landowners fenced off access to the river at the bridge. Later, a county ordinance was passed that prohibited paddlers from stopping on the bridge and climbing down the abutment, and a paddler was hauled into court for doing this. A paddling club in Washington, DC, raised money to support his legal fees. Finally, Imre Szylagi, owner of Appalachian Wildwaters Outfitter, purchased a plot of land upstream of the bridge. He allowed private paddlers to park and put in there at no charge. This took care of the trespass issue, which was the landowners' biggest complaint. Imre kept a piece of land for his company, sold similar plots to other outfitters and transferred the rest of the parcel to the Natural Land Trust. They, in turn, donated it to the state of Maryland, which built and maintained a paddler and fisherman access. In 1999, the state passed

legislation requiring cost recovery on all state-owned lands. Efforts by the Maryland Department of Natural Resources (DNR) to collect fees at Sang Run were met with hostility by paddlers, and very little money found its way to the collection box. DNR proposed to station a ranger there and to raise the access price to pay for the ranger. Fortunately, American Whitewater, a non-profit organization, and Jason Robertson negotiated a management agreement.

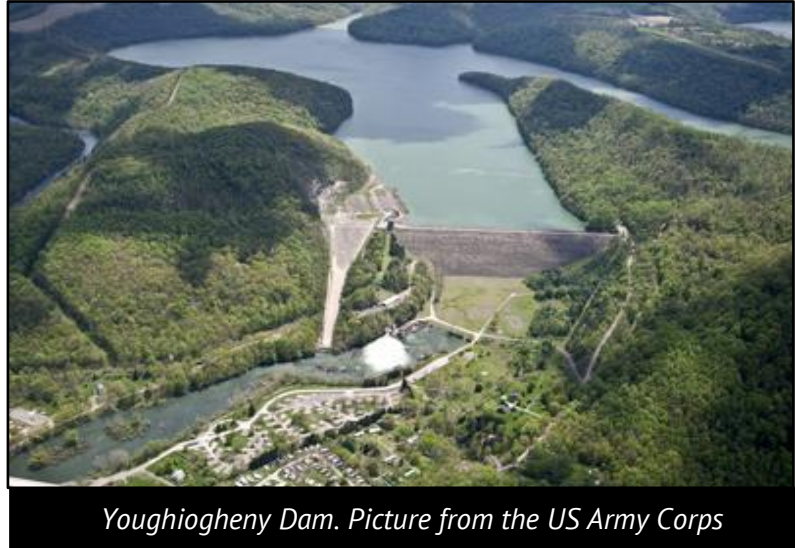
Historically, paddlers use property owned by John Mason and his company, Mountain Surf, for the take-out. In the early 2010s, American Whitewater worked with the paddling community to raise \$25,000 for a take-out parking lot in Friendsville, Maryland. The seed money was leveraged to attract over \$200,000 in grants for the town to complete the take-out facility with additional parking (Singleton, 2015). In 2007, a new permit issued by the Maryland Department of the Environment instituted a new schedule of releases from Deep Creek Reservoir into the Upper Yough. The new release schedule significantly improved whitewater boating opportunities (American Whitewater, 2007).

As the whitewater section of the Upper Yough begins to settle, there is a big pool. This marks the site of Kendall. The old town has yielded to trees and Rhododendron with a few piles of coal and some obscured ruins. The Confluence and Oakland Railroad was built from Friendsville to Kendall in 1891. The town had a boarding house, grocery store, clubhouse, and homes. Today, hikers can walk the old railroad grade three miles from Friendsville to Kendall, then another few miles to a bridge site where tram lines crossed and climbed farther upstream.

At the take-out of the Upper Yough lies Friendsville. The town started as a Native Village and remained quiet and pleasant. Even though the town lies in the heart of the mountains with a heritage of timber and coal, it does not show much of the grime indigenous to most Appalachian burghs. John Friend established the town as the first white settlement of Garrett County. He squatted in defiance of King George III's proclamation that prohibited occupation of Native Lands west of the Alleghenies. Today, the town is a hub for adventure, nature, and history.

Just below Friendsville begins the Youghiogheny Lake, formed by the Youghiogheny Dam (Figure 6). It is made of dirt and rocks, 184 feet tall, and 1,610 ft wide. It is tapered from the bottom (1,000 feet) to the top (25 feet). It was built and operated by the U.S. Army Corps of Engineers. The dam is built in the Youghiogheny Valley, 59 miles down from the source and 1.2 miles above Confluence. The dam's purpose is to make low flows higher and high flows lower, protecting Pittsburgh from flooding, helping industry by maintaining levels for barges, abating pollution, and inadvertently supporting whitewater recreation below Ohiopyle.

The head of the organization that is now known as the Department of Environmental Resources was against hydroelectric use as it would not be in the interest of one of Pennsylvania's primary industries – coal – and an unwarranted expenditure of public funds not contributing in any way to the solution of the main problem of flood control. As dilution is the solution to pollution, 8% of the Youghiogheny Dam benefits water quality control. When runoff is low, increased flows from the dam dilute acid mine drainage, sewage, and industrial waste. However, after 1972 and the Clean Water Act, dilution benefits can no longer be cited to justify dams.



Historical Sites

The National Register of Historic Places was established by the National Historic Preservation Act of 1966. The National Parks Service maintains the list nationally; in Pennsylvania it is administered by the Pennsylvania State Historic Preservation Office within the Pennsylvania Historic Museum Commission and in Maryland it is 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 Upper Youghiogheny River Management Unit three sites have been listed on the National Register.

- **Petersburg Tollhouse**
Listed Reason: Transportation, Architecture
Listed Date: 3/20/1979
Listed Category: Building

- **Wable-Augustine Tavern**
Listed Reason: Commerce, Architecture
Listed Date: 11/27/1995
Listed Category: Building

- **Mercy Chapel at Mill Run**
Listed Reason: Architecture
Listed Date: 9/7/1984
Listed Category: Building