

CHAPTER 7. INDIAN CREEK WATERSHED

Originating near Eglon, West Virginia, the Youghiogheny (Yok-i-gay-nee) River, or Yough (Yok) for short, flows in a northerly direction for approximately 132 miles to where it joins the Monongahela River in McKeesport, Pennsylvania. The name is from a native American word meaning “a stream flowing in a contrary direction.”

The Indian Creek Management Unit focuses on the area of land that encompasses all the streams which flow into Indian Creek, which empties into the Youghiogheny River within the Middle Youghiogheny River Management Unit. Indian Creek was pulled out because of the extensive restoration efforts that this watershed has experienced thanks to the Mountain Watershed Association and Pennsylvania Department of Environmental Protection’s Bureau of Abandoned Mine Reclamation.



Laurel Run is just one of the tributaries that flow into Indian Creek

PROJECT AREA CHARACTERISTICS

Location

Located in Southwestern Pennsylvania, the Indian Creek Watershed encompasses 125 square miles (approximately 80,000 acres) and contains 276 miles of streams. The watershed is primarily composed of rural communities in both Westmoreland and Fayette Counties (PADER 1984).

Originating near the community of Jones Mills, Indian Creek flows in a southwesterly direction for approximately 30 miles before entering the Youghiogheny River. Entering the river across from Camp Carmel, the confluence of Indian Creek and the Youghiogheny River is located approximately five miles upstream from the Borough of South Connellsville.

Though not considered navigable waters by the U.S. Army Corps of Engineers (USACOE), Indian Creek is essential to the communities it runs through and the ecosystems it supports (USACOE, 1995).

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). Regarding this scale, Indian Creek is a fifth order stream. Therefore, all the named tributaries within this watershed fall between stream orders one to five.

The 13 named tributaries in the watershed are listed in Appendix C with their corresponding acreages of drainage area. Indented streams in the table are tributaries to the stream listed above. In addition to these, there are several small tributaries that are formally unnamed. However, residents may have local names for them. With this in mind, petitioning the Pennsylvania Department of Protection to name some of these unnamed tributaries will provide less confusion and preserve some of the local culture of these streams.

Topography

The project area has a mixture of topographic features. The upper and middle portions of the Indian Creek Watershed have mountains, hills, wide flat bottom valleys, and moderate to steep slopes. The lower reach of the watershed has mountains, narrowing valleys, and steep slopes (PADER, 1984). The highest land elevation is located near Lake Tahoe at Seven Springs, a mountain resort in Fayette County, and has an elevation of 2,994 feet. The lowest elevation in the project area is located at the point where Indian Creek discharges into the Youghiogheny River in Springfield Township, Fayette County. This low point has an elevation of 940 feet, a drop of over 2000 feet. Other topographic features can be seen at the sub-basin level (USGS, 1973–1994). The top of the sub-basins located along the western portion of the watershed, forms the topographic feature known as Chestnut Ridge; whereas, the area located along the eastern portion of the watershed forms the topographic feature known as Laurel Hill.

Climate and Climate Change

Climate change is a “hot” topic but what actually is climate change? It is important to recognize that climate is not the same as weather. Weather is a short-term measurement of the state of the atmosphere in a single location. It involves air temperature, how much humidity is in the air, both rain and snowfall precipitation, and wind speed. Climate tracks averages and patterns of weather over long periods of time over an entire region. Basically, climate change is the study of changes in the averages and patterns of weather over time.

The Earth’s climate has been changing for many centuries. However, these changes are not equivalent to the changes currently referred to as climate change. Although data supports that the Earth’s rotation and orbit change the amount of solar energy received, thus altering 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 gasses (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).

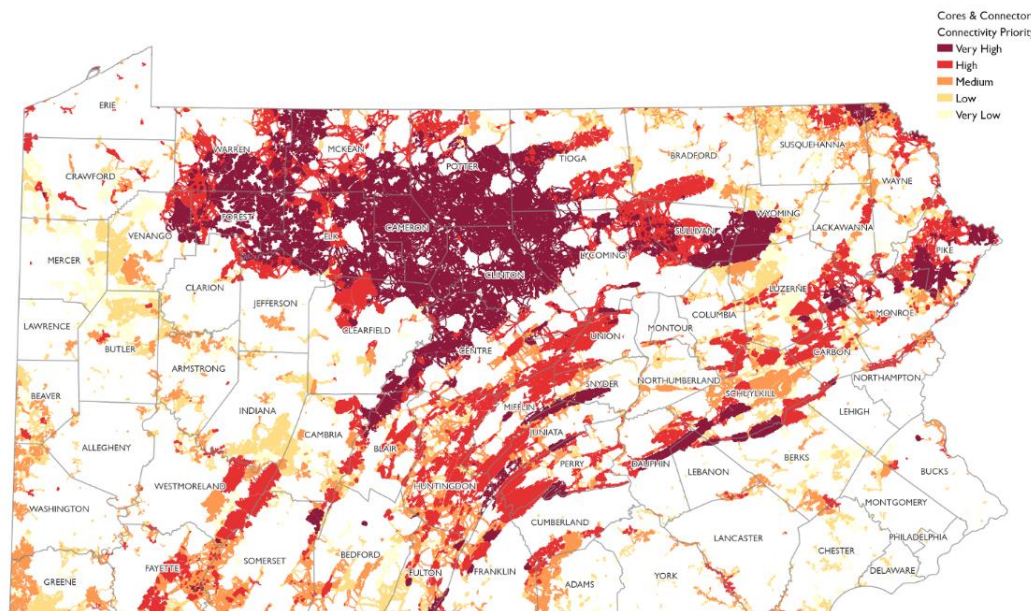
Since the early 1900s, Pennsylvania has recorded an average temperature increase of 1.8° F. Winter temperatures have become warmer at a rate of 1.3° F per decade from 1970 to 2000 in the northeast United States. Even more alarming, projections show it could be as much as 5.4 °F warmer by 2050 than it was in the 1990s. Since the late 1800s, global temperatures have increased by about two 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 record keeping began.

In addition to the higher temperatures, Pennsylvania has also seen an increase in annual precipitation, which is expected to increase by 8%, with a winter increase of 14%. Increased precipitation goes hand-in-hand with a higher frequency of large storm events, changes in peak stream flows and decreased snow cover.

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 the cold-water fish species like Brook Trout. Projections show Pennsylvania could be unsuitable for cold-water fish species by the year 2100 if greenhouse gas emissions are not curbed.

As precipitation changes and temperatures increase, a longer growing season and changes in stream flows are expected to occur. 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 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. As mapped out by the Pennsylvania Natural Heritage Program, areas within the Youghiogheny River Watershed range from medium to very high priority in connectivity priority.



Climate Change Connectivity Priority Scores

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 and Population Patterns

In total, there are nine distinct municipalities in the 125 square mile Indian Creek Watershed. Five of these municipalities have less than ten percent of their municipal boundary in the watershed, and each makes up less than one percent of the watershed area. Therefore, the focus will be on the remaining four municipalities. Table 7-1 lists all the municipalities and the portion of each municipality in the watershed.

The population of the Indian Creek Watershed in 2010 was estimated at 8,114 (U.S. Census Bureau, 2010). It was calculated using Census Tract and Census Block Group data. Census Tract 2605 is located in Saltlick and Springfield Townships in Fayette County. Census Tract 8086, Block Group 1 data, was used to approximate Donegal Township in Westmoreland County. Combined, these two datasets provide the best data for determining the watershed population.

TABLE 7-1 WATERSHED & MUNICIPAL AREA COMPARISON

MUNICIPALITY	% OF MUNICIPALITY IN WATERSHED	% OF WATERSHED IN MUNICIPALITY
<i>Fayette County</i>		
Bullskin Township	0.40%	<1%
Saltlick Township	98.50%	30%
Seven Springs Borough	Not available	<1%
Springfield Township	84.80%	41%
Stewart Township	5.40%	<1%
<i>Westmoreland County</i>		
Cook Township	9%	<1%
Donegal Borough	12.60%	<1%
Donegal Township	84%	27%
Mt. Pleasant Township	4.10%	<1%

(Source Skelly and Loy, 2001)

Based on historical population data obtained from the Fayette County Comprehensive Plan, the estimated population change within Saltlick and Springfield Townships over the past five decades can be determined. Unfortunately, this historical data was not found for Westmoreland County municipalities. Between 1970 and 2010, Saltlick Township's population increased by 20%, while Springfield Township's population increased 19%. Over the fifty years there was a steady

population increase throughout the region until the last decade. Then, population started to decline slightly and is evident in each of the four major municipalities. Table 7-2 identifies the population by municipality and population changes.

TABLE 7-2. MUNICIPALITY POPULATION & POPULATION CHANGE

MUNICIPALITY	1970	1980	1990	2000	2010	Pop. Change (2000- 2010)	Pop. Change (1970- 2010)
Donegal Borough				165	120	-6%	
Donegal Township				2,442	2,403	-2%	
Saltlick Township	2,774	3,241	3,253	3,715	3,461	-7%	20%
Springfield Township	2,465	2,865	2,968	3,111	3,043	-2%	19%

Sources: U.S. Census Bureau 2000, U.S. Census Bureau, 2010, HRG, 2019).

Land Use Planning, Regulation, and 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. Throughout the public participation in the development of the plan, local residents have expressed a desire for some zoning in the watershed, especially along the Route 31 corridor in Donegal Township. Residents fear an influx of chain-restaurants and businesses around the Donegal Turnpike area. They have expressed that they are afraid that this location could bring urban sprawl to the rural watershed, changing the character of the region.

Because the watershed is contained within two political subdivisions, land-use planning and regulations vary accordingly, so they will be reviewed independently by county.

- **Fayette County**

In 2019, Fayette County updated its County Comprehensive Plan to manage future growth and development, in addition to infrastructure needs. Some of those needs were identified as preserving agricultural lands and open space, conserving natural resources, and enhancing land-use controls. The objectives were to enhance economic development and tourism opportunities, increase housing and diversity of housing available, improve cooperation between all levels of local government, and enrich quality of life while preserving the essential rural character of the county (HRG, 2019). Within the Indian Creek Watershed, this plan primarily includes Saltlick Township and Springfield Township as major components, but also recognizes Bullskin Township, Stewart Township, and Seven Springs Borough as minor portions.

Saltlick and Springfield Townships, in cooperation with Wharton Township, Stewart Township, Henry Clay Township, Ohio pyle Borough, and Markleysburg Borough, have partnered to form a regional vision for their communities in establishing the Fayette County Mountain Area Multi-Municipal Comprehensive Plan. In 2006, growing demands on municipal services, traffic conflicts, and infrastructure expansions, due to increased tourism in the area, made it clear that a plan was necessary to embrace growth in a more structured and less haphazard manner. The comprehensive plan clearly states that “the partnership between the Mountain Area municipalities will encourage economic growth and new development to enhance municipal resources while ensuring the preservation of the high quality of life presently enjoyed by residents” (Mackin Engineering, 2010). Additionally, many of the visions in this comprehensive plan are consistent with the needs and recommendations being identified in this River Conservation Plan, such as: supporting the remediation of abandoned mine drainage, eliminating litter and illegal dumping, extending public sewage and water services, updating the Act 537 plan, identifying a location for a park-n-ride, and extending the Indian Creek Valley Trail (Mackin Engineering, 2010).

Overall, zoning in the Fayette County portion of the watershed is directed by the county since local municipalities do not have their own zoning. However, Saltlick Township has some local land use ordinances, such as the noise ordinance.

- **Westmoreland County**

Westmoreland County updated its County Comprehensive Plan in 2018. It is important to note that Donegal Township is the main municipality in the Westmoreland County portion of the Indian Creek Watershed. However, slight portions of Cook Township, Mount Pleasant Township and Donegal Borough are also included. The goal of the Westmoreland County Comprehensive plan is “to enact strategies that will attract development and retain a diverse and stable workforce that will sustain a healthy economy” (Houseal Lavigne Associates, 2018). Through the development of the plan, seven objectives were identified to help manage land use and growth in Westmoreland County (Houseal Lavigne Associates, 2018): align workforce, education, employers, and entrepreneurship; discover Westmoreland; reposition our towns; connect with parks and nature; build healthy and whole communities; plug into the new economy; and create transportation choices.

Westmoreland County has no county-wide zoning. It leaves zoning in the hands of individual municipalities. At this time, Donegal Borough and Donegal Township have no zoning. However, when it comes to subdivision and land development ordinances, those do fall to the county’s ordinances

because the local municipalities do not have their own municipal ordinances.

In 2015, work began to create an Integrated Water Resources Plan (IWRP) for Westmoreland County to address all water resources within the county, study water issues, impacts, and solutions across the county's watersheds, and fulfill the requirements of the Pennsylvania Stormwater Management Act 167. The IWRP and Act 167 plan was approved by PA DEP in February 2020 and by the Westmoreland County Commissioners in June 2020.

The Pennsylvania Stormwater Management Act 167 of Oct. 4, 1978, (P.L. 864, No. 167) provides for the regulation of land and water use for flood control and stormwater management purposes, imposing duties and conferring powers on the PA Department of Environmental Protection (DEP), municipalities, and counties. The Act requires that each county prepare and adopt a watershed stormwater management plan for each watershed located in the county in consultation with the municipalities located within each watershed, and review and revise the plan(s) at least every five years. The plans must be submitted to DEP for approval and municipalities must enact ordinances or regulations consistent with the plans. Donegal Borough, Donegal Township and Mount Pleasant Township adopted the ordinance in December 2020.

Income

The median household income in 2017 for the watershed was estimated at \$46,953.50. This was calculated by averaging the median household incomes for Census Tract 2605 and Block Group 1 of Census Tract 8086. 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.

Table 7-3 compares the median household income and per capita income of the watershed municipalities with the county and state. The 17-year span in table 1.4 shows that the median household income and per capita income has increased, but not at the rate of inflation.

Since 2000, inflation in the United States has increased by 49.8 percent meaning that if someone bought an item for a dollar in 2000, that same item in 2020 would now cost you \$1.50 (Inflation Calculator, 2020).

TABLE 7-3. COMPARISON OF MEDIAN HOUSEHOLD INCOME AND PER CAPITA INCOME

	<u>2017</u>		<u>2010</u>		<u>2000</u>	
	Median Household Income	Per Capita Income	Median Household Income	Per Capita Income	Median Household Income	Per Capita Income
Pennsylvania	\$56,951	\$31,476	\$50,398	\$27,049	\$40,106	\$20,880
Fayette County	\$41,632	\$24,247	\$34,796	\$19,209	\$27,451	\$15,274
Saltlick Township	\$39,534	\$30,794	\$33,945	\$17,888	\$33,945	\$17,888
Springfield Township	\$40,865	\$20,833	\$39,263	\$18,399	\$29,133	\$12,608
Westmoreland County	\$56,702	\$31,827	\$47,689	\$25,842	\$37,106	\$19,674
Donegal Borough	no data	\$23,974	\$58,472	\$30,053	\$23,875	\$12,656
Donegal Township	\$56,000	\$24,511	\$51,514	\$20,592	\$29,741	\$14,764
Census Tract 2605	\$39,844					
Census Block Group 8086 BG1	\$54,063					

Source: U.S. Census Bureau ², U.S. Census Bureau ⁴, U.S. Census Bureau ⁶

Poverty

Poverty is something that the Indian Creek Watershed community is all too familiar with, and it has been increasing over the past 17 years. 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.

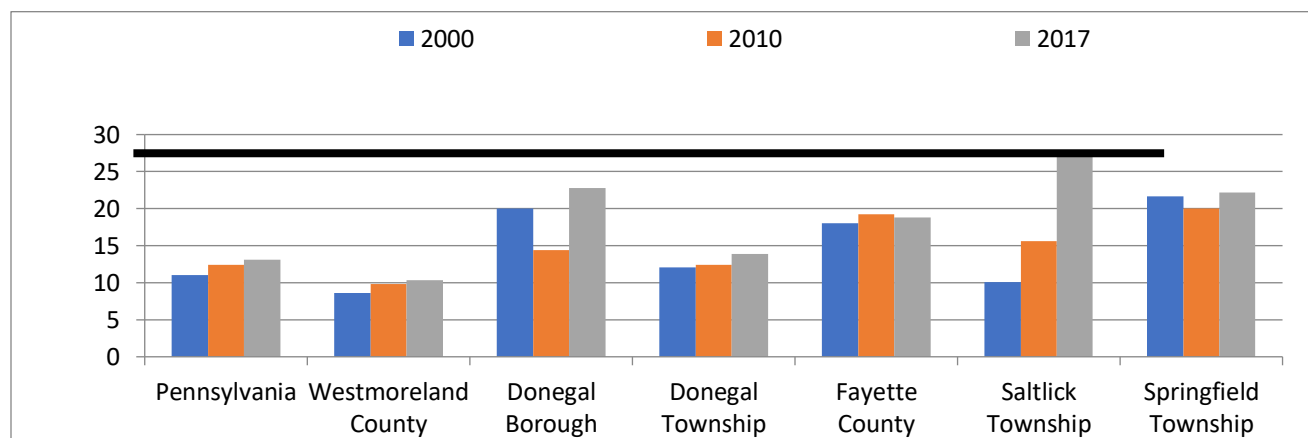
The percentages of individuals living in poverty in the majority of the watershed municipalities are higher than those of Pennsylvania. According to the 2017 U.S. Census Bureau 2017, it is estimated that Saltlick Township has the highest percentage of individuals (27.9%) living in poverty within the watershed and has experienced the greatest increase in percentage of individuals living in poverty since 2000. Springfield Township and Donegal Borough are not much better off. Donegal Township mirrors the state’s poverty levels of 13.1%.

TABLE 7-4. RATES OF POVERTY COMPARISON BY MUNICIPALITY

	Pennsylvania	Donegal Borough	Donegal Township	Saltlick Township	Springfield Township
2017 % Individual	13.1	22.8	13.9	27.9	22.2
% Family	8.9	21.5	9.7	19.3	15.2
% Family w/Children	15.1	32	13.2	50.33	27.3
% Children under 18	18.6	23.5	17.7	65.7	35.7
% People 65 and over	8.2	20.5	17.4	14.4	9.8
2010 % Individual	12.4	14.4	12.4	15.6	20
% Family	8.5	4.3	11.4	14.8	14.5
% Family w/Children	14.2	0	23.8	26.8	25
% Children under 18	17.3	0	27.1	34.5	36.5
% People 65 and over	8.6	33.3	1.6	14.4	13.1
2000 % Individual	11	20	12.1	10.1	21.7
% Family	7.8	21.1	8	8.4	17.3
% Family w/Children	12.1	22.2	10.1	10.4	26.5
% Children under 18	14.3	18.9	12.1	12.1	28.2
% People 65 and over	9.1	17.1	12.1	12.1	11

Source: U.S. Census Bureau⁴, U.S. Census Bureau⁵, U.S. Census Bureau⁶

FIGURE 7-1. PERCENT INDIVIDUALS LIVING IN POVERTY



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).

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 are living in poverty or 30% or more of the population in the census tract is considered a minority. The Saltlick and Springfield townships portion of the watershed make up Census Tract 2605; 26% of the population living in this Census Tract is living in poverty, while the minority component does not apply as only one percent of the Census Tract is of minority descent. Donegal Borough does not qualify because it is in a Census Tract with Donegal Township, which has a much lower percent of the population living in poverty, and Environmental Justice status is determined by the full census block, not the individual municipalities.

In March 2023, Pennsylvania rolled out a new program to designate Environmental Justice Areas, adding 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.

Housing

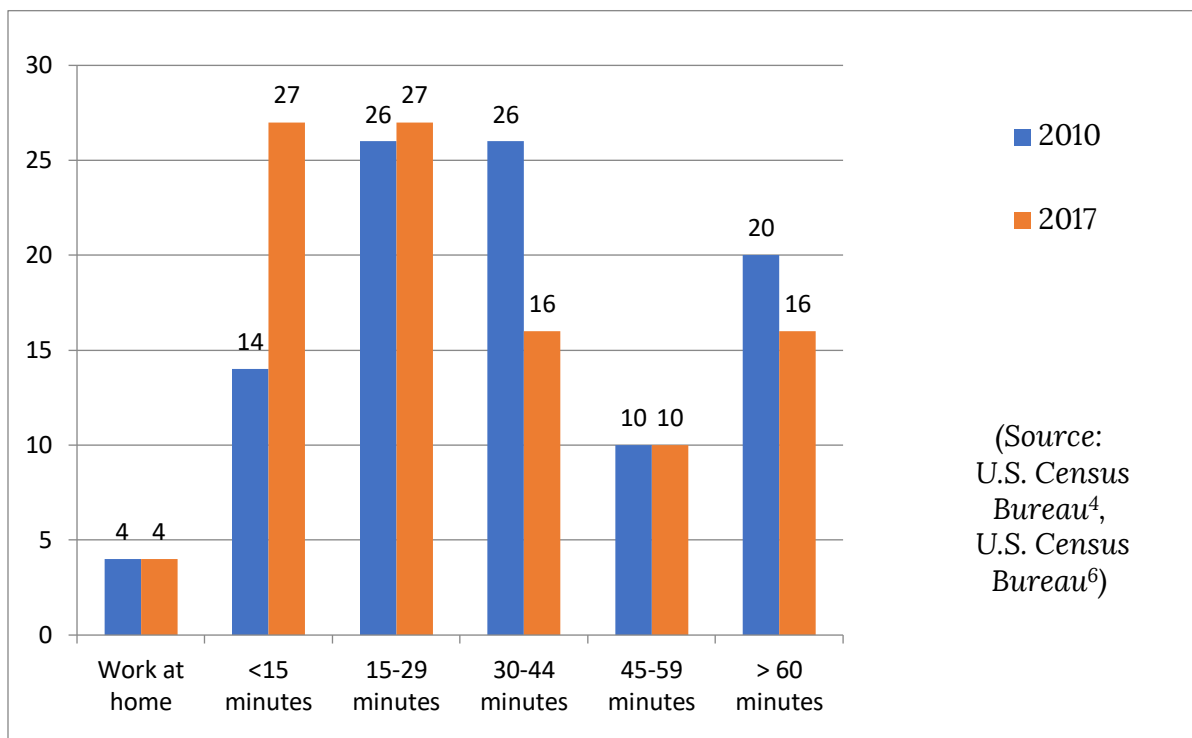
Within the four major municipalities of the watershed, there are 4,761 housing units of which 3,498 are occupied. The majority, 82%, are owned by the occupying individuals/families. Additionally, 68% of these units are single unattached dwellings, while 25% are mobile homes. When looking at all the options for heating, fuel oil/kerosene is the most common option with 45% popularity. Electric is the second most used method at 25%, wood heating at 13%, and coal at 4%.

Employment

A major employer is a company that has a minimum of 200 employees. There are no major employers within the confines of the Indian Creek Watershed. The majority of the employers are non-franchised, local businesses. Education, health care, and social assistance are the leading employment industries among watershed residents, as seen in table 1.6. The large majority of residents, 98%, work in Pennsylvania. However, only 55% work within the county where they reside. This is in part due to the watershed location being split between Fayette and Westmoreland Counties, in addition to Somerset County bordering the watershed.

About 4% of watershed residents work at home, and this number has not significantly changed over the past seven years. What has changed is the time people are traveling for work. There has been a reduction in commute time by 14%. Figure 7-2 compares the percentage of commuters and their travel time to work over the past seven years.

FIGURE 7-2 RESIDENT COMMUTE TIMES TO WORK BY PERCENT



The top five employment industries within the Indian Creek Management Unit include:

1. Educational services, health care, and social assistance -22.4%
2. Arts, entertainment, recreation, accommodation and food services – 12.5%
3. Manufacturing – 12.4%
4. Construction – 11.9%
5. Retail Trade – 9.1%

Tourism is not separated out by the Census Bureau and is incorporated into the arts, entertainment, recreation, accommodations, and food service categories. Due to the rural nature of the watershed and its location within the Laurel Highlands, these results are not surprising.

Utilities And Infrastructure

Septic and Sewage

Public sewage is lacking within the Indian Creek Watershed, and this issue is starting to come up more frequently now that the efforts of mine drainage remediation are no longer masking the sewage impacts. Cost is a major limiting factor towards the installation of a public sewage system. The lack of municipal treatment means that individual landowners have what are called on-lot septic systems. On-lot means they have a sand mound or septic system located on their property to dispose of their sewage waste.

Each municipality in Pennsylvania is required to implement an official sewage management plan that adequately addresses present and future sewage needs in their municipality, or regionally, if several municipalities work together to address regional sewage needs. These plans are known as Act 537 plans.

Act 537 plans are modified when a municipality's sewage disposal needs to be changed, such as due to a new development in a municipality. Currently, in the Indian Creek Watershed, all the municipalities have Act 537 plans that are greater than 40 years old, and the Pennsylvania Department of Environmental Protection (DEP), who is responsible for overseeing this program, has mandated Donegal Township in Westmoreland County to update its Act 537 plan. The DEP has required Donegal Township to establish a public treatment system along a section of the Route 31 corridor between Hellion School Road and Laurel Mountain Camplands. At this time, there is no pressure on Saltlick or Springfield townships in Fayette County by the DEP.

However, according to the Fayette County Comprehensive Plan adopted in 2019 and the Fayette County Mountain Area Multi-Municipal Comprehensive plans, both Saltlick and Springfield Townships have identified areas in need of public sewage. Updating the Act 537 plan would be a necessary step to ensure that appropriate areas are selected for these upgrades to the community.

Faulty on-lot systems have the potential to pose serious health conditions and environmental threats to both humans and animals. Public or private drinking water supplies could become polluted, by various bacteria, viruses, and parasites. Water contact through recreational activities, such as swimming, fishing, and boating, could also be impacted by this issue. Overall, area property values can decrease due to failing septic systems.

Faulty or failing systems are often hard to detect by landowners, and many may not even know their systems are failing. Another major concern is the cost to repair failing systems. Throughout the Laurel Highlands region, which Indian Creek Watershed is part of, the soils are not suitable for traditional on-lot systems. This means sand mounds or other alternative methods, which typically cost more or require frequent maintenance to keep them functioning adequately, are needed (Perry, et. al, 2019).

Drinking Water

Potable drinking water is a right that is afforded to every citizen in the Clean Water Act. Despite this some residents in the Indian Creek Watershed do not have safe drinking water. Due to the area's mining history, many of the area streams and aquifers have been impacted and contain dangerously high levels of iron.

The Indian Creek Valley Water Authority does provide public drinking water to a large component of residents in the Indian Creek Watershed. Currently, the Indian Creek Valley Water Authority supplies public drinking water to only 2,100 residential customers within nine municipalities in Fayette and Westmoreland Counties. They provide water from Laurel Ridge as the eastern boundary, Chestnut Ridge as the western boundary, the PA Turnpike in Donegal as the northern boundary, and Ohio Pyle as the southern boundary. They have an 80% participation rate, meaning where their existing water lines run, 80% of the surrounding homes have tapped into their service. The other 20% percent opted out relying on private wells and springs.

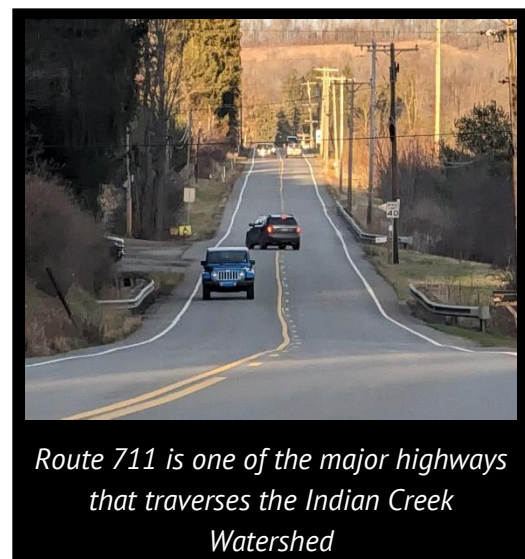
Some people who rely on wells and springs on their property often need to have expensive water purification and softener systems to ensure that their water is safe to drink. Meanwhile, others have springs and wells that are more pristine. However, homeowners with springs and wells are also responsible for testing their own water to ensure that it is safe for consumption.

Many people throughout the region, who do not have access to their own wells/springs, rely on public springs like the one along Red Dog Road in Acme. This can be problematic because these water sources are not tested on a regular basis to ensure they are safe for drinking. The identification and testing of popular springs throughout the watershed are needed, not only for safe consumption by users but also as an educational component. The Mountain Watershed Association began a roadside spring monitoring program in 2021 including the site along Red Dog Road. Sites are monitored quarterly and the results are posted on their website so users can make educated decisions on whether or not to consume the water. The site along Red Dog Road tends to have high levels of E. coli and is not recommended for consumption without implementing some purification techniques.

Transportation

Due to the rural characteristics of the Indian Creek Watershed, transportation throughout the area is primarily limited to vehicular traffic, other than biking or walking. The Pennsylvania Turnpike passes through the watershed, with the closest access being the Donegal interchange. Additionally, State Routes 31, 381, and 711 transverse through the watershed with the remainder of the roadways being mostly township routes.

Municipalities and other public road owning entities can apply for grant funding through the Fayette and



Route 711 is one of the major highways that traverses the Indian Creek Watershed

Westmoreland Conservation Districts through the Dirt, Gravel and Low Volume Roads Grant Program. This program provides funding to improve sections of unpaved and low volume (less than 500 vehicles per day) paved/ tar and chip surface roads, making them more passable for drivers and less prone to erode and create sedimentation issues in nearby streams.

For the number of roadways, the townships must maintain, they do an amazing job. Not only do they address snow removal in the winter, but they also have to keep the ruts out of the roads through patching and/or resurfacing when necessary. They do all of this plus keep bridges up to standards on a limited budget. Additional funding for road development, maintenance, and bridge work is needed throughout the watershed, especially since it is a major corridor for recreational access to numerous locations such as Seven Springs, Hidden Valley, Fallingwater, and Ohiopyle State Park.

A portion of the 68-mile Scenic Byway follows Route 711 and parallels Indian Creek. The designation highlights the beautiful scenery of the Laurel Highlands region from rolling hills, farms, pristine waters, and numerous recreational destinations along the way.

There are no airports in the watershed. Nearby the Arnold Palmer Regional Airport in Latrobe, Pennsylvania provides a limited passenger service domestically in the United States.

Public transportation is limited due to the rural nature of the watershed. Ride sharing opportunities such as Uber and Lyft are extremely limited, if nonexistent, and are not reliable in the area. Fayette Area Coordinated Transit (FACT) has no public bus service stops in what they deemed as the “mountain area” of Fayette County, basically, the Indian Creek Watershed locale. FACT does have a shared ride program for eligible participants to pre-authorized destinations, but these rides must be scheduled. Go Westmoreland is the Westmoreland County Transit system. They do not have any scheduled stops in the watershed area. But like FACT, Westmoreland Go does offer limited, prescheduled ride share opportunities for eligible participants. Both services have eligibility determinations. They also have special rates and services for seniors, individuals with disabilities, medical assistance, and welfare to work programs.

With the economic and Environmental Justice status of parts of the region, more public transportation opportunities should be offered. Rides for employment and medical attention are important. Local bus stops for these two transit agencies should be located in the service area, so watershed residents are not denied the services which their tax dollars are funding.

Telecommunication

As the world evolves, communication is essential. In order for the watershed community to thrive, it needs to advance its communication technology as well. Cellular service is unreliable throughout the watershed with numerous areas lacking service or with spotty service at best. This lack of service can be trying, especially during emergency situations or for visitors to the region. Additionally, these tourists are likely unfamiliar with the entirety of our vast area and rely on telecommunications, such as GPS, to navigate.

High speed internet has been identified as a need throughout the watershed. It is needed for telecommuting, which is becoming a popular employment feature. Faster speeds of internet, along with 4G and 5G services, in rural areas are in demand for locals and visitors. Phone, internet, and cable television services throughout the watershed are provided by Laurel Highlands Total Communications. Television users also have alternative options with satellite television. Also, Hughes Internet is starting to offer services in at least a portion of the watershed.

Education

Education is essential in preparing children to go out into the world. Whether they decide to attend college, a trade school, or enter the workforce, students need to be ready. There are portions of two public schools and one private school located within the Indian Creek Watershed. Students who attend public school and live in the Westmoreland County portion of the watershed are enrolled in the Mount Pleasant School District, while students in the Fayette County portion attend Connellsville Area School District. The Champion Christian School is a private school that is located in the watershed; however, portions of their enrollment can reside outside of the watershed boundaries as their enrollment is not limited by political boundaries.

During the 2018-2019 school year, 4,101 students were enrolled in the Connellsville School District, while 2,005 students attended classes within the Mount Pleasant School District (Pennsylvania Information Management System, 2019). However, not all the students enrolled in either of these school districts necessarily reside within the Indian Creek Watershed. Both public school systems have been undergoing changes over the past three years, including closing down some school buildings and rearranging the alignment of students attending individual schools. Part of this realignment could be due to the declining enrollment that both school districts are experiencing or are expected to experience. Based on data from the Pennsylvania Department of Education, enrollment in both school districts is expected to decline partially due to a projected decline in birth rates (2019).

Champion Christian School is the third school system within the watershed boundary. This is a private school and unlike the public schools, students who attend this school are not restricted by boundaries to dictate which school they attend, but whose families choose to pay tuition. One hundred and sixteen students are enrolled from pre-kindergarten through

12th grade. The majority of students are enrolled in the pre-kindergarten program, with remaining grades averaging about ten students per grade level.

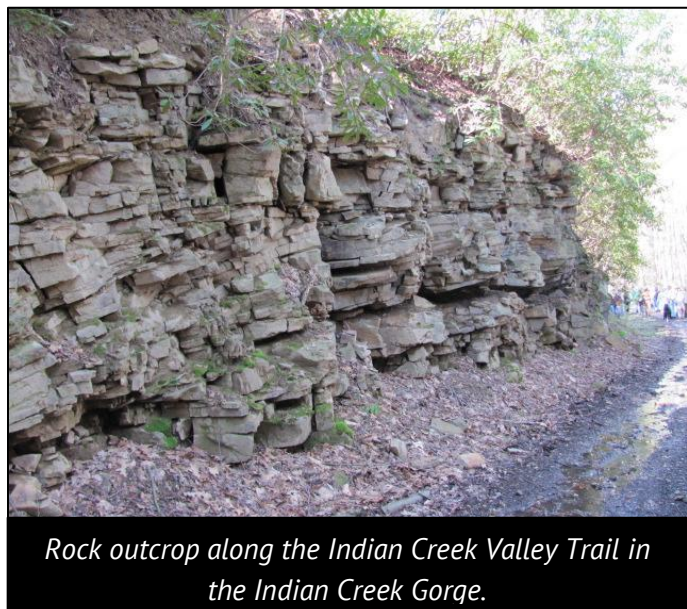
Based on data from the 2012-2016 American Community Survey of the Indian Creek Watershed municipalities, there are 2,095 area students enrolled at educational institutions, spanning preschool to college. The majority of whom, 80%, attend elementary and high school (US Census Bureau¹). When evaluating the population aged 25 and older, only 86% of that population graduated from high school and from that only 23% of these graduates furthered their education by receiving an associate, bachelor, or graduate degrees (U.S. Census Bureau²).

LAND RESOURCES

Geology

The Indian Creek Watershed is located in the Allegheny Mountain Section of the Appalachian Plateau's 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 valley 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 anticline, the Laurel Hill anticline, and the intermediate Ohiopyle [Ligonier] syncline. The Chestnut Ridge and Laurel Hill anticlines are oriented in a northeast/southwest trend and are located at higher elevations, thus forming the east and west watershed boundaries. The Ohiopyle syncline is located at the low elevations in the Indian Creek valley (USDA, 2000).

The bedrock of the ridges varies from the Shenango, Burgoon, Mauch Chunk, Catskill, Pottsville, and the Allegheny Group that is composed of gray sandstone and shales. Sections of sandy cross bedded limestone, referred to as Loyalhanna limestone, outcrop in places along the ridgeline. 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).



Rock outcrop along the Indian Creek Valley Trail in the Indian Creek Gorge.

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 Pennsylvania soils are influenced by weathering, vegetation, climate and time. Sedimentary rock, such as shale, sandstone, and limestone, are prevalent in southwestern Pennsylvania and the Indian Creek Watershed.

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 (layers of soil), thickness, and arrangement are identified as a soil series. The influence that each factor of the soil has varies, creating the diversity of soil series both locally and regionally. These series are named for a town or geological feature where they were first discovered and mapped. They can differ in texture of the surface soil, slope, stoniness among other characteristics. These differences divide the soil series into phases and the phases are a feature that can be used to indicate management. 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. Fayette County has five different soil associations, of these only four are found in the Indian Creek Watershed. Westmoreland County has seven different soil associations and four of them are found within the Indian Creek Watershed. These associations are important, especially to the general public, to provide basic information about soils and to provide a general guide for watershed management.

- **Gilpin-Wharton-Earnest**

Description – Moderately deep and deep, well-drained and moderately well-drained, medium textured, nearly level to very steep soils underlain by acid shale and some sandstone bedrock on uplands.

Location – Typically smooth rounded hills and irregular or undulating slopes.

Land Use – Some of the better farming soils in Fayette County. Area is adapted to pasture and general crops.

Limitations – Moderate to severe limitations for use as building sites.

- **Dekalb-Hazelton-Cookport**

Description – Moderately deep and deep, well-drained and moderately well-drained. Moderately coarse textured and medium textures that are level to very steep soils underlain by bedrock that is dominantly acid sandstone on uplands.

Location – Generally located along Chestnut Ridge and Laurel Hill along the Youghiogheny River.

Land Use – Well-suited for trees as soils, but not good for farming.

Limitations – Most uses restricted by the depth to bedrock of the Dekalb soils and seasonal wetness of the Cookport soils.

- **Upshur-Albright**

Description – Deep, well-drained to somewhat poorly drained, gently sloping to very steep, reddish soils on uplands.

Location – The upper slopes of the Chestnut Ridge and Laurel Hill.

Land Use – Well-suited to crops and trees with Black Locust and Yellow Poplar growing naturally. Beef cattle and general farming are principal agricultural uses. Few large stone quarries produce road gravel in this association.

Limitations – Prime soil limitations for farming due to wetness and erosion. Also, severe limitations for sewage disposal because of restricted permeability and seasonal wetness.

- **Monongahela-Philo-Atkins**

Description – Deep, moderately well-drained and poorly drained, medium textured, nearly level to sloping soils on stream terraces and floodplains.

Location – Steep valley sides or escapement in contrast to nearby associations. Soils formed in deep alluvial deposits and are common along the Youghiogheny River.

Land Use – Community and industrial development throughout most of Fayette County. Space for future development is limited because of the narrow areas between rivers and the steep valley sides.

Limitations – Moderate to severe limitations as sites for buildings. The low floodplain along rivers and streams are subject to flooding

- **Gilpin-Wharton-Cavode**

Description – Deep and moderately deep, well-drained to somewhat poorly drained soils over acid, gray shale and siltstone.

Location – Typically located on steep and hilly landscapes and at elevations below the Pittsburgh coal seam.

Land use – Primarily farm woodlots and cultivated crops.

Limitations – Moderate to severe limitations affecting farming along with residential and commercial development due to the moderate depth of bedrock, steep slopes, and a seasonally high-water table. Soil limitations affecting on-lot disposal of septic tank effluent are severe.

- **Gilpin-Dekalb-Cavode**

Description – Deep and moderately deep, well-drained to somewhat poorly drained soils on ridges. Underlain by acid and gray shale and sandstone.

Location – Mainly on Chestnut Ridge and Laurel Hill in the eastern portion of Westmoreland County at elevations below the Freeport coal seam.

Land Use – Woodlands owned by private entities and state agencies for the propagation of wildlife and for timber production. Deeper soils on less sloped areas are also fairly well-suited for residential and industrial development.

Limitations – Stoniness and droughtiness of some soils and seasonally high-water table in others limit agricultural uses.

- **Calvin**

Description – Moderately deep, well-drained, red soils on ridges.

Location – Occurs in the uppermost portions of Chestnut Ridge and Laurel Hill on the eastern portion of Westmoreland County.

Land Use – Primarily woodlands. Less sloping areas are fairly well suited to farming.

Limitations – Moderate depth and steep slopes are major limitations affecting residential and industrial development.

- **Philo-Monongahela-Atkins**

Description – Deep, moderately well-drained to poorly drained soils on terraces and floodplains.

Location – Occurs along larger streams in Westmoreland County.

Land Use – Majority in woodlands with the remaining being utilized as pasture and croplands. If drained, limed, and fertilized, the soils are fairly well-suited to farming.

Limitations – Frequent flooding and a high-water table for residential and industrial development. Disposal of septic tank effluent is also limited in this association.

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 29 different prime agricultural soils within Westmoreland and Fayette Counties, the counties making up the Indian Creek Watershed (Natural Resources Conservation Service).

Land Use

Land use in the Indian Creek Watershed is primarily deciduous forest and hay/pasture lands as depicted in Table 7-7. Although when compared to other management units within the Youghiogheny River Watershed the percentage of hay/pasture is low. There are pockets of low and medium intensity of development with the only high intensity development area being in the outskirts of Seven Springs Resort. When single homes on large lots are scattered, it is considered a low-density development. These are typical for rural areas similar to the Indian Creek Watershed. Medium-density developments are individual houses on smaller lots such as we see in villages like Melcroft, Indian Head, and Mill Run. High density developments are typically multi-unit dwellings like the condos and vacation rentals on the outskirts of Seven Springs Resort.

Ownership

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

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

TABLE 7-5. LAND USE IN THE INDIAN CREEK WATERSHED

Total Acres	Percent	Land Cover Class
93	0.1%	Open Water
3,603	4.6%	Developed, Open Space
840	1.1%	Developed, Low Intensity
326	0.4%	Developed, Medium Intensity
63	0.1%	Developed, High Intensity
203	0.3%	Barren Land
54,283	69.7%	Deciduous Forest
47	0.1%	Evergreen Forest
5,998	7.7%	Mixed Forest
593	0.8%	Shrub/Scrub
481	0.6%	Herbaceous
10,313	13.3%	Hay/Pasture
850	1.1%	Cultivated Crops
129	0.2%	Woody Wetlands
11	0.0%	Emergent Herbaceous Wetlands

The Indian Creek Watershed does not have any properties listed as public (*Public Lands*). The watershed has three properties listed as State Lands. The only State Lands property entirely located in the watershed is Roaring Run Natural Area with 3,391.48 acres. Both Forbes State Forest and Laurel Ridge State Park are partially located in the watershed.

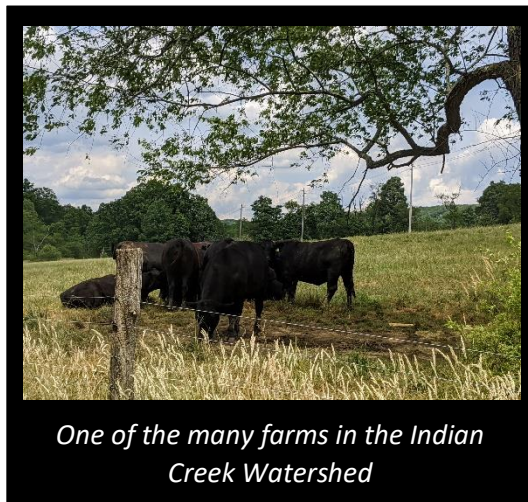
Laurel Ridge State Park contains 14,437.6 acres with the majority located outside of the Youghiogheny River Watershed boundaries. It is estimated that about 1,385.51 acres of Laurel Ridge State Park are located in Indian Creek Watershed. Forbes State Forest contains 43,204.7 acres and is spread out throughout multiple watersheds. Given the property’s shape, it is difficult to determine an accurate acreage total, but it is estimated that there are at least 4,500 acres of Forbes State Forest in Indian Creek Watershed, if not more. In total, there are at least 9,276.99 acres of State Lands in Indian Creek Watershed (PAD_StateLands).

The remainder of the watershed is privately owned (public lands).

Land Protection

Agricultural Preservation

According to the American Farmland Trust, America loses 1.5 million acres of farmland each year. Between 2012 and 2017 alone, Pennsylvania lost approximately 464,596 acres of agricultural land (USDA Pennsylvania Profile). In that five-year span, Fayette and Westmoreland Counties saw 11% and 14% decreases in the number of farms, respectively. However, they did not see a large change in total acres of farmland, as the average size of farms increased 12% and 17% for Fayette and Westmoreland Counties (USDA Fayette and Westmoreland



One of the many farms in the Indian Creek Watershed

County Profiles). The number, size, and location of farms are all important factors in understanding the potential impacts on ecology, culture, and economy as farmland continues to change and be threatened.

Much of the agricultural land lost in Pennsylvania is converted to developed uses as scattered development spreads into rural areas. Scattered development often leads to the establishment of ordinances prohibiting farming, increased farm

taxes, and increased land speculation. This puts prime farmland at risk of being lost for agricultural purposes. Some of the loss of agricultural acres is due to impacts of natural gas drilling. More information about that is discussed in the gas section. Fortunately, the Indian Creek Watershed is not seeing this trend.

The Agricultural Land Preservation Program serves to protect agricultural lands for permanent agricultural use by enabling state, county, and local governments to buy development rights or conservation easements from farmers. With a conservation easement agreement, the owner authorizes the easement holder to monitor and enforce restrictions set forth in the agreement, and ensures that the property will be protected indefinitely for agricultural use. Since the program began in 1989, over 552,702 acres of Pennsylvania farmland have been preserved on 5,329 farms. In fact, Pennsylvania leads the nation in the number and acres of farms permanently preserved for agriculture (PDA “Farmland Preservation”).

Preserved farm properties are managed by local landowners using best management practices for soil and water conservation. When properly managed, farmland can support wildlife, recharge aquifers, clean water, and sequester carbon. The preservation of agricultural lands also benefits the local economy, culture, and

future food security. Locally produced foods are typically healthier, cheaper, and more sustainable due to less preservation and transportation.

The Protected Agricultural Lands Database lists one property in the Indian Creek Watershed, established in 2005. The property contains 71.1 acres of land in Fayette County.

- **Agricultural Security Areas**

An agricultural Security Area (ASA) is an area of farmland enrolled in the statewide program to protect farmland from non-agricultural uses. To qualify for this program, the property must be a minimum of 250 acres of viable farmland, including non-adjacent land of at least 10 acres or producing \$2,000 annually. Farmers must submit a petition to their township supervisors to be considered for an Agricultural Security Area (PDA “Agricultural Security Areas”).

In return, the farmers receive special consideration regarding protection against local ordinances and nuisance laws affecting normal farming activities and special review of farmland condemnation by state and local government agencies. Additionally, ASAs of at least 500 acres may be considered for conservation easement purchase under the Agricultural Land Preservation Program.

There are approximately 1,897 acres of ASAs in the major municipalities making up the Indian Creek Watershed, as detailed below (*Bureau of Farmland Preservation 2018 Annual Report*):

- Donegal Township: 1,841 acres, 25 parcels, 19 landowners.
- Springfield Township: 56 acres, 1 parcel, 1 landowner.
- Saltlick Township: 0 ASAs recorded.

Conservation Lands

Indian Creek Watershed does not have any recorded conservation easements according to the 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 Indian Creek 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 Chapter 3 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 section on water resources.
- **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 land 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 section on water resources.

Hazardous Area

Coal Mine Sites

Mining, and abandoned mine drainage (AMD) are a part of the legacy of the Indian Creek Watershed. Local citizens concerned about impacts a new mine would have on the community, especially the water resources, formed the Mountain Watershed Association, Inc. in 1994. Although the residents won the initial battle, they discovered that much abandoned mine cleanup needed to be done. More about the organization's restoration efforts is located in the Water Resources chapter.

Currently 16 active coal mining permits have been issued within the Indian Creek Watershed. A person or company can have an active coal mining permit with no mining operations occurring. With an active permit, 12 inspections are required each year whether there is activity at the site or not. Three of the active coal mining permits are for site which have been proposed but to date no mining activities ever started. Six permitted sites have some form of reclamation complete, likely land reclamation, but AMD is still likely on site. Three active mine sites are located in the Indian Creek Watershed. They include the Rustic Ridge Mine, Kalp Surface Mine, and the Revtai Government Financed Construction Contract.



Seven inactive permits are located in the watershed. These sites are no longer conducting mining activities. They are, however, working through the stages of reclamation. During these stages the sites are required to be inspected on a quarterly basis. There are six categories the District Mining Office uses to qualify inactive permits: Reclaimed/Passive Treatment, Stage 2 Approved, Stage 2 Eligible, Bond in Forfeiture, Primacy Bond Forfeited, and Bond Forfeited/Passive Treatment. Two sites in the watershed have forfeited their bonds, meaning the operator left the site unfinished and relinquished the bond money to the state to take care of restoration.

Once the bond is released, a site is considered Reclamation Complete and the site no longer requires inspections. The files are deemed closed and moved to the archives. Some sites, despite being deemed complete, still have mine drainage flowing from them; they are called Reclamation Complete-Passive Treatment or Reclamation Complete-Chemical Treatment. There are 13 sites in the Indian Creek Watershed that are classified as Reclamation Complete.

Two areas are being explored for additional mining. The first exploration is an expansion for the Rustic Ridge Mine in Donegal Township. The second is called the Jordan Mine. It is an exploration near the intersection of Imel and Poplar Run Roads within the Newmyer Run subwatershed of Poplar Run.

Newmyer Run is a tributary severely impacted by mine drainage. It is already impacted by the Rondell-Correal and Marsolino-Leighty discharges. Newmyer Run is one of the impaired streams in the Indian Creek Watershed which actually had a study completed called a Total Maximum Daily Load (TMDL). These plans identify the maximum amount of a pollutant that the receiving streams can tolerate in order to meet their designated use. More discussion on a stream's designated use is

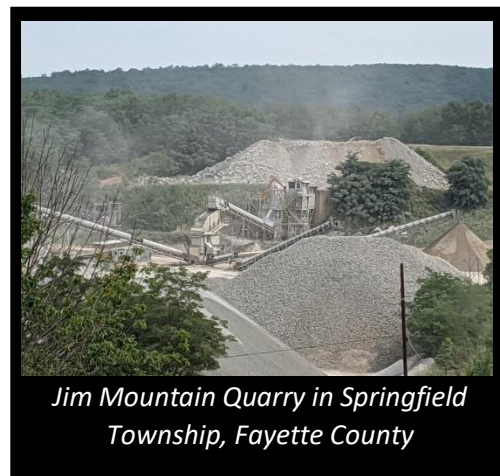
located in the Water Resources chapter. TMDL studies are conducted on impaired or polluted streams.

Mining has a variety of impacts in a community such as increased truck traffic and damage to the roads. Other impacts can have a devastating effect, such as contamination of drinking water, the loss of water, damages to nearby homes and property, air pollution, and obviously mine drainage. Once minerals get into drinking water supplies, the water requires the addition of extra chemicals and increased cost for treatment. Mining can also lead to subsidence and the collapse of the land similar to a landslide. Anyone's property that is undermined is highly encouraged to purchase mine subsidence insurance. The majority of homeowner policies do not cover mine subsidence or flooding.

Non-Coal Mining

Quarries are industrial mines, but instead of removing coal the operators are removing rocks like limestone and shale that are later crushed down into various sizes for construction activities. Like coal mines, they are regulated by the Pennsylvania Department of Environmental Protection and should follow established guidelines.

Often the impacts of quarries are similar to those of coal mining: 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 can 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.



Jim Mountain Quarry in Springfield Township, Fayette County

The Indian Creek Watershed has three active industrial mining sites: two large sites and one small site.

Oil and Gas

Pennsylvania has been a hotspot for oil and natural gas drilling for over 150 years with the first documented oil well in the state being 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, also known as traditional drilling, is the older and more affordable practice because this method relies on a well's natural pressure to pump oil to the surface through permeable formations underground (Conventional oil vs. unconventional oil, 2019).

On the other hand, unconventional drilling is able to extract oil, where conventional drilling cannot, because of its advanced technology.

Being developed much more recently, unconventional drilling is able to target rock formations that have very low permeability (Dilmore et al., 2015; Conventional oil vs. unconventional oil, 2019). These denser formations are known as unconventional formations and are accessed by using horizontal drilling methods (Unconventional shale development, 2020). For example, the most popular unconventional horizontal drilling method is hydraulic fracturing. Hydraulic fracturing, also known as fracking, applies pressure in low permeability formations. This pressure creates cracks in these formations and subsequently makes pathways to previously inaccessible oil and gas deposits (Conventional oil vs. unconventional oil, 2019; Unconventional shale development, 2020).

Both conventional and unconventional wells are commonly used in Pennsylvania and have an impact on the environment. It is approximated that Pennsylvania has between 470,000-750,000 inactive oil/gas wells—making it a leading state in this statistic (Kang, et al., 2016). However, the true number of inactive wells in Pennsylvania is still unknown. This is due to poor documentation. Newly constructed wells were not required to be registered until 1957, and older wells only began to be retroactively recorded in the 1980s (Dilmore et al., 2015). Owners of inactive wells are responsible for plugging them. However, this does not always happen due to factors like bankruptcy, land transfers, and plugging costs (Rewriting Pennsylvania’s legacy, 2020). This is a problem because these abandoned wells are responsible for a large output of methane, a greenhouse gas with a global warming potential 86 times greater than carbon dioxide (Kang, et al., 2016).

Although a substantial issue, methane is not the only undesirable byproduct associated with drilling. Unconventional drilling, specifically fracking, poses a threat to people and the environment. Air pollutants—like ethane, propane, smog, and carcinogenic benzene and formaldehyde—are some of several hazards linked to fracking. These air pollutants have the potential to cause cancer, reproductive harm, birth defects, and other health issues (Compendium of Fracking, 2019, p.46). Along with air pollutants, water contamination is a very real risk with fracking. Dangerously unmonitored, the United States oil and gas sector is “permitted to inject known hazardous materials near, or directly into, underground drinking aquifers” (Compendium, of Fracking, 2019, p. 68, par. 2). This industry also is not required to fully disclose the chemicals they use to drill, and they are not responsible for monitoring the damage they do to drinking water aquifers. Furthermore, wastewater is a huge byproduct of fracking. By definition, water is needed in hydraulic fracturing. This water, along with chemical additives, is pumped deep within the earth where it is contaminated by heavy metals, radioactive elements, brine, and volatile organic compounds (Compendium, of Fracking, 2019, p.68 p.3). This contaminated water has no purpose; it either gets left within shale bedrock where it is lost to the hydrologic cycle, or it is brought

back to the surface where it is considered a hazardous waste that cannot be filtered or reintroduced to the environment (Compendium of Fracking, 2019, p. 68 par.5).

This industry's environmental impact can be staggering. Likewise, its economic complexities can also be very damaging. Like all states, Pennsylvania is responsible for regulating the management and decommissioning of its wells (Ho et al., 2019, p.17, par. 1). However, the state is not initially financially responsible for plugging inactive wells; this obligation falls to a well's operator, as noted above. In an attempt to hold well operators financially responsible, Pennsylvania's Department of Environmental Protection (DEP) surcharges between \$150-200 for new oil and gas permits (Rewriting Pennsylvania's legacy, 2020). Along with this, operators in Pennsylvania must proactively provide the state with "financial assurance." This financial assurance is typically paid in bonds and is supposed to act as a safety net for the state and cover the monetary means to decommission a well if its operator is unable to do so (Ho et al., 2019, p. 21, par, 1). However, the minimum amount an operator could front for an individual well is only \$2500 (Ho et al., 2019, p. 25-26). This current safety net typically is nowhere near enough to cover the cost to fully decommission a well (Ho et al., 2019, p. 46, par. 7). In reality, it can take tens of thousands of dollars to plug a well (Rewriting Pennsylvania's Legacy, 2020).

Without a doubt, this industry has its flaws. That is why it is important to monitor how oil and gas drilling is handled in the Indian Creek Watershed. There are several wells in the area. The watershed contains a total of 28 wells; 25 conventional and three unconventional. Along with these sites, there are wells immediately outside the boundary, such as WPX Energy Appalachia's Kalp Well Pad in Donegal Township, PA. This well is notable because it is responsible for contaminating drinking water in its surrounding area. Multiple families were impacted by this contamination and struggled for years to get clean drinking water. This problem was so severe that these families had to rely purely on bottled water for their drinking, cooking, and bathing needs (Andren, 2014). It is obvious that oil and gas drilling can pollute individual households. Considering the abundance and proximity of wells within the watershed, it is very important not to turn a blind eye to this industry and the problems experienced in Donegal Township.

Citizen Science and community oversight is needed, especially during installation of pipelines and well pads but even after installation to ensure that water supplies do not become contaminated and that drilling companies and operators are held accountable for any damages they cause. Organizations like ALLARM (Alliance for Aquatic Resource Monitoring) at Dickenson College and the Mountain Watershed Association in Melcroft, Pennsylvania are essential for protecting communities and individual drinking water supplies. ALLARM also provides technical assistance and resources, including water monitoring training sessions for volunteers in Pennsylvania.

From 2010 to 2017, the Mountain Watershed Association maintained ten dataloggers in the Indian Creek Watershed for the purpose of collecting baseline water quality. MWA deployed Solinst Jr LTC (Level, Temperature, Conductivity) Leveloggers at strategic places in the watershed. The leveloggers, also known as dataloggers, collected a reading every 15 minutes. The dataloggers were then downloaded every two weeks and analyzed. Mountain Watershed discontinued the datalogger program in 2017 when the leveloggers became outdated and repairs could no longer be conducted. At that point enough baseline data had been documented and there was a lack of active Marcellus Shale drilling in the Indian Creek Watershed. If drilling becomes prominent in the watershed again, Mountain Watershed Association will reevaluate and could potentially reinstate the program.

Landfills and Illegal Dumpsites

Although no permitted landfills exist within the Indian Creek 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. The townships do organize specific cleanup days once or twice a year where people can properly get rid of some of the harder to



A tire dump in the Rasler Run subwatershed located in Springfield Township, Fayette County

dispose of items. In an effort to save money, or because they cannot afford trash pickup, some area residents burn their trash. This can be hazardous for anyone downwind who has to breathe the chemicals released in the burning process. Individuals who are sensitive or have compromised immune systems can really be impacted and forced to stay indoors.

Historically, trash throughout the valley had been buried underground. The lack of liners under these dumpsites can also be hazardous. Over time contaminants can leach out, move through the soil and enter the water table. Once in the water table, contaminants can enter a stream, and a community's drinking water can be contaminated.

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 15 illegal dumps identified in the Indian Creek Watershed (PA Cleanways, 2003, PA Cleanways 2005). Table 7-6 identifies the dumpsites in the watershed accounting for 50.75 tons of trash.

TABLE 7-6. ILLEGAL DUMPSITES

Dump #	Roadway	Tons	Near Waterway	Active?
50	Camp Run Road	0.5	No	Yes
52	Lower Tabernacle Road	0.25	No	No
53	Upper Tabernacle Road	0.5	No	Yes
96	Clinton Road	0.5	No	Unknown
97	Melcroft Road	0.5	Within 50 ft	Yes
98	Pritts Road	0.5	No	Unknown
188	Killarney Road	2.5	50-100 ft	Yes
189	Stewart Road #1	30	Within 50 ft	Yes
190	Stewart Road #2	3	Within 50 ft	Yes
191	Stewart Road #3	2	In waterway/wetland	Yes
192	Mountain Road #1	2	Within 50 ft	Yes
193	Mountain Road #1	3	No	Yes
194	Mountain Road #1	2	No	Yes
195	Camp Achievement Rd.	3	Within 50 ft	Yes
196	Hawkins Hollow	0.5	No	Yes

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 them the attention they need.

- Hazardous Waste is managed by the United States Environmental Protection Agency (U.S. EPA) although they 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. There are ten sites regulated under RCRA in the Indian Creek Watershed. Five are small quantity generators; three are conditionally exempt small quantity generators; one is a large quantity generator; and one is unknown.
- 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 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. In the Indian Creek Watershed there are currently 18 active underground storage tanks at 5 locations. The tanks in the watershed hold gasoline, diesel, kerosene, and heating oil. An additional 48 tanks have been removed, 33 closed within the watershed. These 81 tanks are inactive and there are another 5 tanks that are exempt from Pennsylvania State Law.
- 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. While no National Priority List or active Superfund sites exists in the Indian Creek Watershed, there are three archived sites (Pennsylvania Environmental Hazards Report). For a site to be declared archived, it must be deemed that no additional cleanup or further investigation is needed.

- Enertel Corp Matowski and Fullem Lumber – completed 1981
- Saltlick Township Landfill – completed 1986
- Springfield Township Landfill – completed 1987

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 Brownfield has been identified in the Indian Creek Watershed; it is located in Donegal Township near the intersection of Routes 31 & 711.

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 saturates the soil and by human influences. Human influences, such as construction activities, modify the slope leaving some areas susceptible to landslides.

Southwestern Pennsylvania is more susceptible to landslides than anywhere else in Pennsylvania. Over the past few years, the Pittsburgh area has had hillsides come down, taking out houses and roads. Fortunately for the Indian Creek Watershed, damage has not been that significant although the area where slides are likely to occur is along lake bluffs and stream banks. The Indian Creek Valley Trail experienced a landslide in 2018 due to poor timber management techniques and an extreme weather event.

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 western Pennsylvania 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. Regardless of what it is called, the damages remain the same. Due to the rich underground mining history in the Indian Creek Watershed, the possibility of mine subsidence is very real.

In an attempt to help homeowners impacted by underground mining the Pennsylvania Department of Environmental Protection offers Mine Subsidence Insurance. By visiting their website, a landowner can determine if their property has been undermined and is in need of protection. Few homeowner policies cover mine subsidence.

WATER RESOURCES

Indian Creek flows for approximately 28.1 miles in a southwestern direction from the Forbes State Forest in Westmoreland County to where it enters the Youghiogheny River, around five miles upstream of Connellsville in Fayette County. The Indian Creek Watershed drains approximately 125 square miles and contains an estimated 276 stream miles. Conditions in the Indian Creek Watershed have vastly improved over the past 25 years due to the extensive restoration efforts conducted by the Mountain Watershed Association, Inc. (MWA), Natural Resource Conservation Services (NRCS), U.S. Department of Interior’s Office of Surface Mining (OSM), and the Pennsylvania Department of Environmental Protection’s Bureau of Abandoned Mine Reclamation (BAMR).



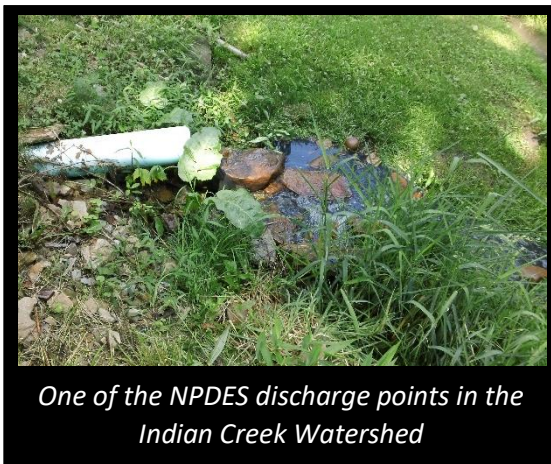
The Indian Creek Gorge

Water Quality

Indian Creek is designated as a High-Quality Cold-Water Fishery from its headwaters to the confluence of Champion. From Champion Creek to the confluence with the Youghiogheny River, Indian Creek is designated as a Cold-Water Fishery. There are 13 named tributaries that directly flow into Indian Creek; these tributaries are identified in Appendix C along with their stream designation.

Every stream in Pennsylvania is given a water quality designation based on its use. The two main designations are warm-water fishery and cold-water fishery. There are no warm-water fisheries in the Indian Creek Watershed. It does have Cold-Water Fisheries (CWF), which are streams that are often maintained for the propagation of fish species, such as those in the trout family that are native to a cold-water habitat. Some area streams have water quality that exceeds the basic Cold-Water Fishery criteria and supports high quality aquatic communities. These streams have been designated as High-Quality Cold-Water Fisheries (HQ-CWF). Finally, some streams have the highest water quality designation. These are labeled as Exceptional Value (EV) waterways and Camp Run, a tributary to the headwaters of Indian Creek that flows through Forbes State Forest, has one of these high-ranking streams. Streams receiving this designation exceed the requirements of the HQ-CWF and are of exceptional ecological significance.

Then there are streams that do not achieve their designation due to impairment. More often than not, stream impairment is caused by metals, pH, and/or total dissolved solids from industrial development, untreated sewage, abandoned mines or siltation, and/or turbidity from vegetation removal and land development activities. Within the Indian Creek Watershed, there are 14.52 miles of impaired streams according to the 2018 Water Quality Integrated Report published by the Pennsylvania Department of Environmental Protection. This report identifies which streams are impaired and the source of their impairment. Appendix G identifies the stream segments that are impaired within the Indian Creek Watershed. While the ultimate goal is to have zero stream miles impaired in the watershed, the area has seen great progress since the birth of MWA. In the original Indian Creek River Conservation Plan 47.96 miles of streams were listed as impaired, meaning that 70% of the impaired streams identified in 2000 have been restored (Skelly and Loy, Inc., 2001).



One of the NPDES discharge points in the Indian Creek Watershed

Point Source Discharges

The area's streams are impacted by point source and nonpoint source discharges. Point source discharges are most easily defined as discharges that enter a stream from a specific point of entry, such as a pipe. These types of discharges are typically managed through a provision of the Clean Water Act that prohibits the discharge of pollutants into the waters of the United States. The National Pollution Discharge Elimination System (NPDES) requires polluters to receive

a special permit that is issued by Pennsylvania Department of Environmental Protection (DEP) or United States Environmental Protection Agency (US EPA). Pollutants that are typically managed under this policy include wastewater from commercial and industrial facilities, fecal coliform, oil and grease, toxic pollutants and nonconventional pollutants (National Pollutant Discharge Elimination System Law and Legal Definition). Dischargers are limited on the amount and type of pollution that they can discharge into the stream. They are monitored through

inspection and data review. Those that exceed those limits are subject to civil and criminal action against them including fines and or penalties (National Pollutant Discharge Elimination System Law and Legal Definition).

Within the Indian Creek Watershed these discharges tend to be from private sewage systems and active mine sites. Appendix H identifies the current NPDES permits that have been issued in the Indian Creek Watershed.

Non-point Source Discharges

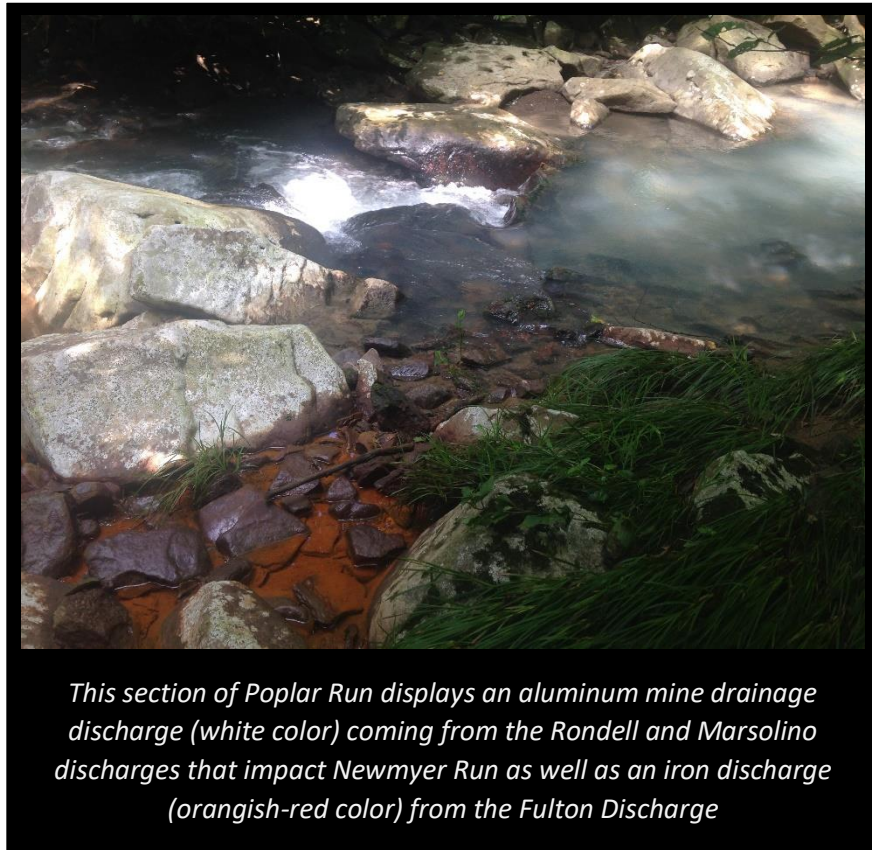
Non-point source discharges are also prevalent throughout the watershed and include abandoned mine drainage, agricultural runoff, and stormwater runoff. These sources are harder to identify and manage, and unlike point source discharges they are not regulated. Nonpoint source discharges are the discharges from which a single point or source is not identifiable. Sometimes they are referred to as polluted runoff.

- **Abandoned Mine Drainage**

Abandoned mine drainage has a major impact on the water quality in the Indian Creek Watershed. The watershed is plagued by the remnants of the mining industry. At one point, 17.4 miles of the Indian Creek mainstem were impacted by abandoned mine drainage. Overall, there are 130 abandoned mine discharges within the 125 square miles of the Indian Creek Watershed. These discharges were identified through the development of the Indian Creek Watershed Plan and Environmental Assessment, also known as the PL566 study, (2000) and the Mountain Watershed Association Comprehensive Plan for Abandoned Mine Reclamation in the Indian Creek Watershed (1998).

Some of the worst discharges have been addressed through the installation of treatment systems; however, other discharges continue to spew toxic metals into the water. To date, five passive treatment systems have been installed in the watershed, in addition to a land liming project. Through these remediation efforts approximately ten miles of Indian Creek have been restored.

Installation of treatment systems, either passive or active, are not a cheap endeavor and become an extremely long commitment as these discharges will likely outlive current residents. For reference, some of the systems in the Indian Creek Watershed were installed with rather hefty price tags. The Kalp Treatment system cost \$3.4 million, Melcroft \$1.1 million, and by the time the Gallentine Treatment system was completed, its cost also reached \$1 million dollars.



This section of Poplar Run displays an aluminum mine drainage discharge (white color) coming from the Rondell and Marsolino discharges that impact Newmyer Run as well as an iron discharge (orangish-red color) from the Fulton Discharge

Once a treatment system is installed, MWA staffers do not get to wipe their hands clean, pat themselves on the back, and walk away. These systems require ongoing maintenance and monitoring to keep them functioning efficiently. Theoretically, they are designed to last 15-20 years, but on average they typically need repaired within 5-10 years (Skousen, et.al, 2016). In 2014, an additional \$1.3 million was spent rehabilitating the Kalp Treatment system, and a little over \$507,000 in 2021 to rehab the Gallentine Treatment system.

Mountain Watershed Association (MWA) has secured grants in 2023 to redesign both the Kalp and Melcroft Treatment Systems. The Kalp redesign project also comes with funding to purchase additional property in order to expand the size of the treatment system. This grant was awarded through Pennsylvania's Growing Greener Grant Program. The award for the Melcroft project came from the Infrastructure Investment and Jobs Act (IIJA) program and is federal money. MWA also plans to apply to the IIJA for funding to design the next phase of treatment at the Marsolino site.

The Indian Creek Watershed is fortunate that it qualifies as an approved hydrologic unit and is eligible for funding through the Abandoned Mine Drainage Set-Aside program to help establish and maintain the treatment

systems. MWA is also fortunate to have plans for comprehensive restoration of the whole watershed. In 2015, MWA received a small trust fund for maintaining the treatment systems as part of developing an Operation, Maintenance, and Replacement Plan. However, funding for just one maintenance project using this trust fund would wipe out the entire fund. Additional funding for operation and maintenance of abandoned mine drainage treatment systems is something that is needed locally and across the Commonwealth of Pennsylvania.

Within the Indian Creek Watershed, MWA continues to lead efforts in abandoned mine land remediation. In addition to the five passive treatment systems they are currently maintaining, the Association is monitoring several other discharge sites to determine if establishing treatment is feasible. Most of these efforts are in the Poplar Run subwatershed and at a Rogue Discharge that flows directly into Indian Creek upstream of the existing Sagamore Treatment system.

The *Poplar Run Land Liming Project* was initiated in 2012 in order to address some of the 26 abandoned mine discharges that are scattered throughout the landscape of this subwatershed. These discharges collectively account for 33 tons of acid, 7.4 tons of iron, and .9 tons of aluminum each year (United States Department of Agricultural Natural Resource Conservation Services, 2000 and MWA, 1998). Establishing individual treatment systems for each of these discharges was not technically or economically feasible since many of the discharges were oozing out at stream bed level.

Collecting the discharges and piping them to a central treatment system was also not possible. Working with the United States Department of Agricultural Natural Resource Conservation Services (NRCS), it was determined that strategically placed piles of alkaline lime along the streambank would improve the water quality of Poplar Run enough for reestablishment of aquatic life. The alkaline material would slowly dissolve into the soil and be carried into the stream, thereby raising the pH and reducing the acidity. This would boost the



Piles of lime that slowly washed into streams in the Poplar Run Watershed as part of the Land Liming Project

streams' alkalinity (Indian Creek Watershed Comprehensive Plan for Acid Mine Drainage Remediation, 1998). The anticipated life expectancy of the lime addition is ten years when reapplication will be needed.

This project has been successful based on the results of an increased presence of macroinvertebrates collected during biological monitoring in the Poplar Run Watershed. Five sample sites were monitored twice a year, Spring and Fall. Once the macroinvertebrates were identified, several biological indices were utilized providing us with an Index of Biological Integrity (IBI) score for each site. The results of this monitoring are displayed in Figure 3-8.

The Rondell-Correal Discharge is located at the headwaters of Newmyer Run, a major tributary to Poplar Run. This discharge has a pH around 3, which means it is very acidic, and contains high concentrations of iron and aluminum. Finding a treatment option for this discharge has become an ongoing battle as new technologies that treat high levels of aluminum are being sought. At one point, the Pennsylvania Department of Environmental Protection (DEP) said this segment of stream might just need to be written off due to a lack of treatment options.

In 2021, MWA worked with Cosmos Technologies to try a new treatment technology using the Rondell Correal Discharge. While the treatment method did work to remove the iron and aluminum as designed, ultimately the cost for the volume of discharge was not economically beneficial, so MWA has suspended that treatment. New treatment technologies that could be more cost efficient are being pursued.

Phase one of the Marsolino-Leighty Project was installed in 2016. The Bureau of Abandoned Mine Reclamation (BAMR) installed a low wall drain to capture the discharge and transport it via a limestone channel to previously existing settling ponds that remained from the former mining activities. From these ponds the discharge flows into an unnamed tributary to Newmyer Run just before its confluence with Newmyer Run.

Since the installation in December 2016 monthly water quality monitoring has occurred at the site and then was expanded in 2018 to include additional site locations and constituents. BAMR continues to review the water quality data and has requested the Mountain Watershed Association to apply for an IJA grant to design a treatment system for the Marsolino-Leighty discharge in 2024.

Completing all three of these projects would improve ten miles of stream and revert Poplar Run into the fishery it once was before mining was prevalent in the area.

The *Rogue Discharge* is a local name given to a discharge that seeps out of the ground along the Indian Creek Valley Trail just upstream of the Sagamore Treatment System. The actual source of this discharge is unknown, although it is suspected to originate from the abandoned Big Chief Mine. The extreme difference in chemical composition of the Rough Discharge compared to the Sagamore Discharge indicates that the Sagamore system is not failing, but instead being impacted by this more elusive new discharge. Interestingly, the Sagamore Discharge is actually two discharges: one acidic and one alkaline that, when brought together, treat each other. Both of these discharges contain high levels of iron but no aluminum. This indicates that the new discharge is not related to the preexisting treatment facility. Unlike the Sagamore Discharges, it contains high levels of iron and aluminum.

This chemical difference provides challenges for treatment because it cannot just be piped and added to the existing Sagamore Treatment System. When the Sagamore system was designed, it was only intended to treat iron. The new discharge contains high concentrations of aluminum, which would be incompatible with the current infrastructure and hinder the existing treatment system. In fact, the system successfully treated the discharges for years before the Rogue Discharge became part of the hydrology. MWA, through its water-quality monitoring program, is trying to determine how the Rogue Discharge is impacting Indian Creek. Any evidence of degradation in this section of stream will support acquisition of additional funding and research, which could lead to future treatment options.

- **Runoff**

Water is powerful, especially when it is moving. It has the capacity to move rocks and boulders, carve out canyons, or simply undercut streambanks which would cause sections of land to slowly erode into a stream or be washed out completely. Runoff, which is water that is not absorbed into the ground and travels on top of the ground as it creates its own path to existing bodies of water, typically occurs following periods of precipitation--whether it be rain or snowmelt. As the water flows over the ground, it picks up and carries pollutants such as silt, nutrients, bacteria, pesticides, petroleum byproducts, etc. to the water bodies. These pollutants can alter stream habitats, foster an unmanageable influx of algae, spread disease, poison native species, etc. Run-off is considered a serious pollution source of concern, just behind AMD, within the watershed, and it is very possible that it is harming the watershed. This theory is further supported by the number of stream segments listed as impaired due to land development and/or removal of vegetation.

Siltation or soil particles that have washed into streams during periods of precipitation are carried by the water and will eventually deposit

somewhere downstream, potentially changing the stream channel's path. This is apparent throughout the Indian Creek Watershed where soil particles have formed islands or point bars. Over time these particles play havoc with stream habitats that are needed for many keystone species, such as the macroinvertebrates. Sediment not only changes the suitable habitat, but 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, for example, heating up a cold-water stream.



AmeriCorps member planting a live stake at a streambank stabilization project along Back Creek in Saltlick Township, Fayette County

The impacts of sedimentation can be limited through implementation of best management practices, such as preserving riparian corridors. Healthy riparian corridors in the watershed are extremely important for conservation and are relatively simple to implement and maintain. Riparian corridors are stretches of land adjacent to water and heavily vegetated with trees, shrubs, and plants serving as barriers against runoff. They act as a safeguard by holding the soil on the bank via root systems. This makes it harder for banks to erode and for sedimentation to occur. These plant species also filter out nutrients by using them for their own growth, and thus help maintain the biological balance of a waterway.

Prevention is key and there are several advantages riparian landowners can do to protect the property and the health of their stream segments. By not mowing along a stream, people are able to leave this needed vegetated buffer intact. Additionally, landowners along streams can plant trees by their shorelines. This will help stabilize the bank and will provide shade to the stream to help maintain the water's cooler temperature.

Flooding is an excessive form of runoff, and one that typically gathers people's attention due to the threat of safety and the extent of damage that occurs. The impacts of flooding can be exacerbated by land use choices along stream corridors, such as channelizing the stream, dredging, and building in floodplains.

Channelization, the outcome of solidifying a stream bank with a "wall," creates a situation where water rapidly moves downstream. This process

increases the risk of erosion, eliminates habitat, and decreases biodiversity. Additionally, this often causes problems downstream—one landowner channelizing their portion of a stream could flood their neighbors downstream. However, in some cases, stream channelization can also be used to protect eroding streambanks by forcing the water from the banks to the center of the stream. But this needs to be executed thoughtfully with foresight on potential negative impacts. There are several areas in the watershed where channelization could be utilized to reduce erosion but must be implemented properly following engineering guidelines to reduce downstream impacts.

Dredging has been used historically to remove sedimentation that has filled a stream channel. The use of dredging deepens and widens the channel all at once, which drastically increases the stream's capacity to carry more water in a short timeframe. This leads to bank instability and erosion. Like channelization, dredging speeds up the velocity of flow. Obviously, water has the capacity to be powerful and having more water traveling at a faster rate significantly increases risks downstream. Dredging should be a last resort against sedimentation.

Source Water Protection

Minimizing the impacts and potential pollutants from getting into the water supply is extremely important. Protection of drinking water, especially the source of the water supply, is critically important for the health and wellbeing of a community. For that reason, the Indian Creek Source Water Protection Plan was developed. This plan identifies all the sources of water that make up our community's drinking water supply. Each of these sources was then assessed for potential risks of contamination. Source water protection areas were then developed around these sources to minimize the potential contamination of the community's drinking water supply. The plan also discusses the steps to be taken in the event that one of the drinking water sources becomes impacted.

In addition to the contamination of the drinking water supply, another concern is the quantity of water availability. Act 220 of the Water Resources Planning Act identifies areas where water availability for current and/or future needs is not met or may lead to water shortages. These areas are identified as critical water planning areas. They require the development of critical area resource plans in order to remain sustainable. While these plans have no regulatory authority, if voluntarily adopted, they could alleviate a potential water shortage.

Within the Indian Creek Watershed, the Back Creek Subwatershed has been identified as a critical water planning area. Thankfully for the residents near Back Creek, the Back Creek Critical Area Resource Plan has been developed and updated in 2019.

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 a dominance of 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 Indian Creek area, there are 1,017 acres of wetlands.

Wetlands are broken down and classified into systems. Within Indian Creek, wetlands are Riverine, Palustrine, or Lacustrine. Indian Creek contains 516 acres of Riverine wetlands. 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).

Palustrine wetlands are in non-tidal areas that are dominated by trees, shrubs, persistent emergent and emergent mosses or lichens (National Wetlands Inventory, 2019). According to the National Wetland Inventory, Indian Creek has 438 acres of Palustrine wetlands. Most of these wetlands are forested (321 acres), scrub-shrub (29 acres), and emergent (12 acres). Forested wetlands are characterized by woody vegetation that is 20 ft tall or taller. Scrub-shrub wetlands include areas that are dominated by woody vegetation less than 20 ft tall. Finally, emergent wetlands consist of perennial plants, excluding mosses and lichens, that are the tallest lifeform with at least 30% areal coverage.

Other than Palustrine and Riverine wetlands, Lacustrine wetlands make up for 63 acres for Indian Creek. Lacustrine systems include wetlands and deepwater habitats within a topographic depression or a dammed river channel, lacking trees, shrubs, persistent emergents, and emergent mosses or lichens with 30 percent or greater coverage, and total an area of at least 20 acres (National Wetlands Inventory, 2019).

Floodplains

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

Flood areas were determined from the National Flood Hazard Layer provided by FEMA (FEMA, 2021) and land cover data (MRLC, 2019) and were used to determine if the area was developed, natural, or farmland. Indian Creek has a total of 1,687

acres of floodplains. Of that 1,687 acres, 236 acres are developed, and 98 acres are farmland. The remaining 1,353 acres are natural. It is critical that these areas remain undeveloped. Development of floodplains increases the safety net they provide and can result in flooding downstream. Cutting down trees, mowing riparian buffers and development in floodplains is done at a community's peril. Communities that have participated in these activities often wonder why they are experiencing flooding and bank erosion.

Riparian Corridors

The 1,353 acres of natural floodplain areas 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 effectively 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

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

Chemical Water Monitoring

Chemical water monitoring is the sampling and analysis of water constituents and conditions (EPA, 2009). These may include introduced pollutants, such as pesticides, metals, and oil; constituents found naturally in water that can, nevertheless, be affected by human sources, such as dissolved oxygen, and nutrients. MWA collects their chemical sample using the grab-sampling technique, meaning they are a snapshot of the water quality when the sample was collected. Samples are usually collected using a bottle or cup on a stick. The bottle or cup is rinsed three times using water from the current site to ensure that the collected sample does not contain constituents from a previous sample. This ensures that it is a true representation of the sampled location. The sample bottles are filled completely,

limiting the amount of air in the bottles. Depending on which parameters are being analyzed, some bottles may be fixed with acids (meaning 20 drops of acid are added to the bottle so that any metals that are in solution remain in solution until the analysis is completed). Samples are then preserved on ice and transported to a certified laboratory for analysis. In the Indian Creek Watershed, the chemical samples collected are primarily focused around abandoned mine drainage discharges and treatment systems. Through a partnership with the Pennsylvania Bureau of Abandoned Mine Reclamation, these samples are collected on a quarterly basis, at minimum, with some sites being monitored monthly. There are 61 different sites where samples are collected. Annually, approximately 430 samples are collected by MWA.

The Municipal Authority of Westmoreland County (MAWC) has also conducted water chemistry monitoring in the Indian Creek watershed. Samples were collected from Mill Run Reservoir and Poplar Run from 2010-2012 and from 2020-2023. From 2020-2023, MAWC also collected samples from Indian Creek.

Due to the two active mine sites in the watershed, Rustic Ridge and Revtai, there are an additional 14 sites that are monitored and an additional 93 water samples collected. These samples are used to monitor compliance of the mine operations and to determine whether there are negative impacts on the water resources.

Biological Sampling

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

Biological monitoring activities were started in 2011 as part of a Growing Greener Grant that led to the development of an Operation, Maintenance, and Replacement Plan for Mountain Watershed Association's existing project sites. The majority of

this biological monitoring is conducted through macroinvertebrate surveys. Since its implementation, this program has continued and advanced. Samples are collected annually at 12 sites twice a year, and at 3-5 sites once a year. These samples are processed and analyzed in-house, and an index of biological integrity scores are calculated to determine if sites are attaining their designated uses or are suffering from an impairment.



Mountain Watershed Association and Western Pennsylvania Conservancy conducted surveys for freshwater mussels in Indian Creek in 2021

Based on macroinvertebrate surveying data, MWA is able to confidently state that Indian Creek is improving due to the many restoration projects that have been implemented in the area; however, this is just one source of data. To document that life is returning to the stream, additional biological monitoring such as mussel, fish, and hellbender surveys need to be conducted throughout the Indian Creek Watershed.

Recently, MWA worked with Jonah Ventures' beta testing, a

DNA sequencing technology they are using to quantify DNA in an environment. Through the collection of a single water sample, they were able to identify seven fish species that are present in the Indian Creek Gorge. This process enables the confirmation of the presence of other vertebrates in the watershed, including hellbenders. Conducting biological surveys using this method could be beneficial and cost effective as it drastically reduces the labor needed to inventory all these species through individual field work. MWA also recently partnered with Western Pennsylvania Conservancy to conduct fish surveys in portions of the Indian Creek Watershed. However, additional survey work for the remaining portions of the watershed still needs to be conducted.

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 swimming. Testing can 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.

Bacteria sampling is occurring within the Indian Creek Watershed through the Swimmable Waters Project. During the swim season in Pennsylvania, May 1-September 30, popular swimming holes in the Youghiogheny River Watershed are being monitored weekly for E. coli concentrations by MWA. Results are compared to

the Pennsylvania standard for water contact recreation and results shared with the public on theswimguide.org and MWA's website. A couple locations are located in the Indian Creek watershed. Samples are collected and brought to the Mountain Watershed Association office in Melcroft, Pennsylvania, where they are processed and analyzed at an in-house laboratory within 24 hours.

Dataloggers

Between 2011 and 2017, dataloggers were used to gather much needed baseline water quality data throughout the Indian Creek Watershed. The dataloggers were primarily installed throughout the Laurel Highlands region 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. There was a total of 52 dataloggers installed throughout the Laurel Highlands with 10 being installed within the Indian Creek Watershed. 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 these 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.

Through years of colonization, invasive invaders and natural events, the landscape in the watershed has evolved. 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 our 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.

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 remain in both Pennsylvania and Maryland within the Youghiogheny River Watershed due to the numerous amounts of state park and forest lands in our states.

Appalachian Hemlock Northern Hardwood Forests are typically found containing cool, moist slopes containing Eastern Hemlocks, maple, beech, Tulip Poplar and birch species. There is also a North Central Interior Floodplain Forest, especially along rivers and bottomlands. River scour communities, 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 the community of organisms, the more it 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 Indian Creek watershed. These include several species of plants, fish, amphibians, reptiles, birds, and mammals.

Species of Special Concern

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

Within the Indian Creek Watershed 11 species of concern have been identified.

Species of Greatest Conservation Need

Species of Greatest Conservation Need (SGCN) include plants and animal species in which the species themselves or their habitat are declining to a level of concern.

This listing is a broader group than the species of concern, but the species of concern are also identified as SGCN. The purpose of identifying these species is so that conservation activities and protections can be made in an effort to keep them from being identified as a rare, threatened or endangered species.

Within the Laurel Hill Creek Watershed there are 64 species identified as SGCN. Eight, have been identified as globally or regionally important species, including four birds (Cerulean Warbler, Golden-winged Warbler, American Bittern, and Lesser Scaup), one butterfly the West Virginia White, one moth the Melsheimer's Sack Bearer and one sensitive species not identified in order to protect the species. A full listing of SGCN will be included in Appendix I.

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 an inability to traverse through thick stands of some invasive plants.

- **Japanese Knotweed** was introduced from East Asia in the late 1800s as an ornamental plant to help stabilize streambanks. It spreads 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 outcompete native species due to its deep root system, making it difficult for other species to grow. It compacts the soil, limiting its ability to absorb water and nutrients, which results in a decrease of food and habitat available for birds and other wildlife. These deep roots can cause streambanks to erode, increasing flooding. The plants release toxic chemicals to wildlife that eat them as well as to area streams. These chemicals then degrade the water quality and harm aquatic life such as fish and macroinvertebrates.

- **Garlic Mustard** was introduced in the United States in the 1880s, brought in by early settlers to New York for medicinal purposes. This flowering herb spreads rapidly through upland forest habitats where it outcompetes native plants. It is especially concerning because certain rare butterflies lay their eggs on it instead of on 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).
- **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. It was historically 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 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 contact. 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, Canda, 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 and 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 suckers from its base 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 native to 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, wisteria is not seen by many people 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 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.
- **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. Fayette County was added to Pennsylvania's list of quarantine counties in March of 2023.
- **Rusty Crayfish**, like the Virile crayfish, Rusty 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 the Western Pennsylvania Conservancy and the Mountain Watershed Association completed a mussel survey in 2021. This clam can alter the ecology of aquatic systems, making it less hospitable to native assemblages of freshwater mussels, fish, invertebrates and plants.
- **Chestnut Blight** is a fungus imported from Asia that was accidentally introduced on nursery stock. It was first discovered in 1904 and attacked the American Chestnut tree with 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 quite advanced to Maryland, they did impact lower portions of the Youghiogheny River Watershed in Pennsylvania. Habitats can change via natural circumstances such as storms, floods, and fires, or they can be a result of human activities, such as clearing lands for development or agriculture.

Since colonization nearly 400 years ago, the Northeast region of the United States continues to be one of the most densely populated regions in the country (Moore et. al, 1997). Housing and urban development has been identified as a top threat in every state in the northeastern United States. Even commercial and industrial developments contribute to the sprawl, especially in the Appalachian region with the expansion of wind turbines and communication towers that fragment forests habitats important to native species. Roads and railways contribute to the fragmentation of habitats dividing once larger tracts of land into smaller parcels resulting in more edge habitats as opposed to interior habitats required for some species.

In the United States, the number one greatest threat to biodiversity is habitat loss (Stein et al., 2000). Residential development expanding from cities to rural areas encroaches on the potential habitat for many species of plants and animals. The impacts are not limited to only terrestrial animals, plants, and habitats. Aquatic communities and organisms are also impacted by development leading to changes in water quality and even quantity. Along with development comes an increase of water consumption or use and then disposal post use that can lead to contamination in the area's streams, lakes, and rivers.

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**

Threats that energy production and mining activities pose, their supporting infrastructure such as pipelines, access roads, etc. are of concern. While there are obvious concerns of nearby residents such as loss of wells, structural damages to homes, and the potential of mine drainage there are also concerns for the biological resources. 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 and degrading the overall health of the habitat.

- **Transportation, Service Corridors, Culverts and Dams**

Transportation corridors provide a multitude of threats from fragmentation: increased predator access, physical barriers isolating populations, increased wildlife mortality via roadkill, easy pathways for the spread of invasive species, and noise disturbances, leading to an overall decrease for quality of life.

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

One impact of transportation, even at the local level that is often overlooked is road stream crossings. Depending on the type and placement of road culverts, if improperly placed, they can block upstream movement for aquatic organisms that rely on that for reproduction, such as trout. These conduits can also disrupt ecosystem processes such as hydrology, sediment and debris transportation.

Like culverts, dams also alter the flow patterns, transportation of sedimentation and limit the movement of aquatic organisms. Aquatic organisms, especially fish and mussels, become isolated and cannot return upstream in order to reproduce. Unnecessary dams should be removed, and necessary dams should have some type of aquatic organism passage.

- **Impervious Surfaces and Riparian Buffers**

Impervious surfaces are surfaces that do not allow for the percolation of water into the subsurface. These include things such as paved roadways, parking lots. These surfaces can accelerate runoff and transport pollutants, leading to an increase in peak flows that can lead to flooding, channel erosion and water temperature changes, all of which can impact the quality and quantity of aquatic communities.

Transitional zones between terrestrial and aquatic habitats that provide a buffer, commonly known as riparian buffers, provide many beneficial functions. Not only do these areas host a variety of rare and common species and communities, they also help with nutrient exchange, modify hydrology, stabilization banks, and can even help with water temperatures in the case of forested buffers (Palone & Todd, 1997).

- **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. Plants are often accidentally trampled.
- *Persecution against species*: Many nuisance or pest species are also being eradicated from certain areas because they are unwanted by people whether they are captured and released in a different habitat or they are killed on site. In some instances, species are misidentified; for example, many people think that water snakes are copperhead snakes and because they are undesired by people, they are killed. Just like wildlife, plant species are also in jeopardy for being falsely persecuted via misidentification.
- *Excessive harvesting*: The overharvesting of a particular species. This includes fishing, hunting, and plant harvesting. This is very prevalent for desirable flowers, herbs, or medicinal plants., but the practice can be limited by placing harvest limitations, which has been done in Maryland for American ginseng, which now requires a permit in order to harvest. The forest product industry also needs to be monitored to ensure they are following regulations and incentives like the Sustainable Forestry Act of 2009. This act encourages good practices through the use of incentives for

harvesters. Even with protections in place, SGCN are still impacted by fragmentation and invasive species.

- **Human Influences via Outdoor Recreation**

The outdoor recreation industry is a huge component of tourism and probably even more so after 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. 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 when available 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. Riders need to stay on designated paths for motorized and non-motorized riding.

- 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

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.

Natural Heritage Inventories (NHI) were conducted by in Fayette and Westmoreland counties in 1998 and 2000, respectively, to catalog important biological resources and to identify and map the NHAs within each county. Western Pennsylvania Conservancy through the Natural Heritage Program conduct the inventories and establish the NHAs. A total of 13 Biological Diversity Areas (BDA), 2 Landscape Conservation Areas (LCA), 1 Dedicated Area (DA), and 5 MLs have been identified in the Indian Creek Watershed. See Table 7-7 for a listing of these areas while the descriptions of each NHA in the watershed can be found in Appendix J.

TABLE 7-7. NATURAL HERITAGE AREAS IN THE INDIAN CREEK WATERSHED

Site Name	Management Type	Significance
Laurel Ridge	NHA	State
Laurel Run-Fayette County	NHA	State
Taby Road	NHA	State
Champion Creek near Donegal	NHA	State
Roaring Run Natural Area	NHA	Global
Pike Run at Roaring Run Natural Area	NHA	Regional
Camp Run Springs	NHA	Global
Indian Creek, Little Run	NHA	Regional
Indian Creek Valley	NHA	Global
Upper Middle Fork	NHA	State
Lower Indian Creek	NHA	Global
Trout Run Hill	NHA	State
Upper Indian Creek	NHA	State
Upper Indian Creek at Little Run	NHA	State
Lower Camp Run Springs	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 RCP is to work towards gaining “formal dedication” of additional NHAs. Presently, only one area within the watershed, Roaring Run Natural Area, is recognized as a DA, dedicated to the protection of ecological systems and biological diversity. Additional DAs could be secured through landowner agreements, special programs, or other methods. Two potential areas are the Indian Creek Gorge and Rasler Run. The lower Indian Creek Watershed area,

which encompasses the scenic gorge, is partially encompassed by the Youghiogheny River BDA and Youghiogheny River LCA.

In addition, areas can gain formal dedication by becoming a PA DCNR- designated Natural Area. This is a different designation than the NHA. 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 for bird watching.

Within the Indian Creek Watershed two Important Bird Areas have been identified; they are listed in Table 7-8.

TABLE 7-8. IMPORTANT BIRD AREAS IN INDIAN CREEK MANAGEMENT UNIT

IBA	Acres	Status	Priority
Youghiogheny Valley, Ohiopyle State Park	157,319	Recognized	State
Laurel Ridge Forest Block	65,810	Potential	State

Important Mammal Areas

In 2001, the Pennsylvania Game Commission initiated the Important Mammals Area Project to promote the conservation of mammals through the identification of critical habitats and to educate the public about the importance of mammals, modeling it after the Important Bird Areas project. The project was a joint venture among the Pennsylvania Game Commission, National Wildlife Federation, Pennsylvania Wildlife Federation, Federation of Sportsmen's Clubs, Mammal Technical Committee/Pennsylvania Biological Survey and the Carnegie Museum of Natural History.

There are five categories in which sites must meet at least one criterion in order to be nominated. However, they can be nominated for more than one category.

- Habitats that support diverse or unique mammal communities by supporting significant populations of species or subspecies with specific habitat requirements or are representative of rare, threatened, or unique species.
- Habitats that support high density mammal populations with habitats that support significant aggregations of mammals during one or more seasons or support important core populations or population segments.
- Habitats that support species or subspecies listed as endangered or threatened by the Pennsylvania Biological Survey. The site supports a confirmed viable local population or species or subspecies that regularly occur at the site during one or more seasons.
- Habitats that support species or subspecies that are declining or vulnerable nationally or listed as candidate species by the Pennsylvania Biological Survey (specifically candidate-proposed, candidate-at-risk, candidate-rare). Sites must sustain a confirmed viable local population or species or subspecies that regularly occur at the site during one or more seasons.
- Habitats that are important for wildlife viewing and public education. The sites include wild populations of mammals that can be viewed in their natural habitat or natural areas associated with an established educational program that interprets the natural history of resident mammals.

Currently, there are no Important Mammal areas located in the Indian Creek Watershed.

CULTURAL RESOURCES

The Indian Creek Watershed is located in an area that is widely known for its vast wilderness, recreational opportunities and deep history. As part of the Laurel Highlands region, the area is often referred to as Pittsburgh's playground since it is within an hour's drive from Pittsburgh proper due to easy access via the Pennsylvania Turnpike. The Indian Creek Watershed is a major corridor to popular destinations like Ohiopyle State Park and Fallingwater, but it also has its own ecological attractions which seem to be more eclectic.

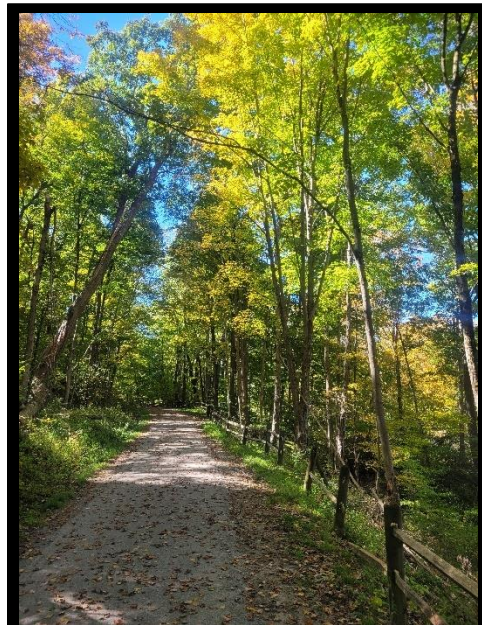
Recreational Resources

Trails

Trails are greenways between our communities providing a vital connection from one small town to the next. These pathways are an asset to the Indian Creek and Youghiogheny River Watershed communities that not only provide users with recreational opportunities, but can be used as transportation passageways. As a region that experiences low-income levels and a higher quantity of families living in poverty, the trail is a legitimate transportation corridor.

- **Indian Creek Valley Trail**

The Indian Creek Valley Trail was initially opened in 1989 when Sattlick Township obtained the railroad right-of-way and opened up the Indian Creek Hike-Bike Trail that spanned six miles along the original Indian Creek Valley Railroad corridor from Champion to Indian Head. While Sattlick Township saw the value in utilizing the abandoned railroad corridor for the trail development, the neighboring townships of Donegal and Springfield were not interested at that time.



*Indian Creek Valley Trail
(photo courtesy of Beth Telford)*

The corridor in the Donegal Township section was acquired by the Western Pennsylvania Conservancy who later conveyed the corridor to Mountain Watershed Association (Indian Creek Valley Hike-Bike Trail Feasibility Study, 2009). In 2009, an additional 1.5 miles of trail known as the Alonzo Kalp, Jr section was added, but it was not until 2014 when Mountain Watershed Association constructed a pedestrian bridge crossing Indian Creek that the trail was able to reach Route 31 and the current northern terminus of the trail.

The corridor in Springfield Township reverted back to the adjacent landowners because there was no entity interested in preserving the corridor at the time of abandonment. The Municipal Authority of Westmoreland County owns a significant portion of that corridor and has entered into a lease with Mountain Watershed Association so that the Indian Creek Valley Trail can continue along the original Indian Creek Valley Railroad corridor to the Youghiogheny River. In 2019, the Mountain Watershed Association completed a major drainage and resurfacing project along 4.3 miles of one of the most pristine sections of the trail, the Indian Creek Gorge.

In addition to the Municipal Authority, there are several individual landowners who own portions of the trail. Some of them have signed easements allowing the trail to continue and some have not, leaving gaps in the trail. While the Mountain Watershed Association continues to communicate with those landowners to establish easements, they also continue trail development. Construction was recently completed on the old Steyer Bridge that crosses Indian Creek. It established decking and railing

on the bridge, installed an open-bottom culvert for an unnamed tributary, allowing for fish passage and enhanced an additional half mile of trail. Over the past two summers the Saltlick Township supervisors have resurfaced the Saltlick Township section of trail. The ultimate goal is to connect the Indian Creek Valley Trail with the Great Allegheny Passage near Camp Carmel, which will require crossing the Youghiogheny River.

- **Mountain Streams Trail System**

The Mountain Streams Trail System is located in the Forbes State Forest and the headwaters of the Indian Creek Watershed. Several old railroad grades including the Indian Creek Valley Railroad and Blair Brothers Railroad are contained within this hardwood forest with old farm fields reverting to forest. There are five maintained trails open for hiking, cross-country skiing, mountain biking, snowshoeing and equestrian use. Several township roads also traverse this area and are open to hiking, biking and equestrian use with some roadways open to snowmobiling use in the winter.

A connection from the Blair Brothers Trail to the Indian Creek Valley Trail is possible by crossing Route 31; however, a formal connection has not been finalized. Connecting the two trails requires cooperation from the Pennsylvania Department of Transportation since Route 31 is a state highway. The speed limit where the crossing would take place has already been reduced, but safety signs alerting users to the trail crossing will be needed. Completing this connection would increase opportunities for recreational users of both trail systems.

- **Roaring Run Natural Area**

Located within the watershed is the Roaring Run Natural Area which hosts eight trails, over 3,593 acres of second and third growth forests and features a mountain stream, Roaring Run. Trails in the Natural Area are limited to foot traffic such as hiking, cross-country skiing and snowshoeing. These trails are highlighted in Appendix K.

- **Indian Creek Valley ATV Club**

The Indian Creek Valley ATV Club is a private membership club that started in 2000 as a family-oriented organization to promote outdoor safety and respect for the environment. The club currently has 40 miles of trails over 750 acres available for riding. The club requires all vehicles to be registered and insured, users to wear helmets, and display a club membership decal. Camping, littering, night driving and campfires are prohibited.

The club is actively adding and enhancing trail ways for users and has recently completed a master site plan. This plan is guiding the development of the trails to ensure they are safe, environmentally responsible, and enjoyable for members.

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 owned with no cost to utilize the parks' resources; or sometimes, they are privately owned and visitors may be charged an entrance or activity fee. Within the Indian Creek Watershed there are two community parks, Mill Run Athletic Fields and Resh Park, a neighborhood park in Melcroft; two school playgrounds; and ballfields in Davistown and Normalville. A portion of the Laurel Ridge State Park skirts the watershed; however, none of the park's amenities are located in the watershed. In addition, there are two pay-to-play parks, Living Treasures Animal Park and Caddy Shak, that charge visitors for use of their services.

Mill Run Athletic Fields

The Mill Run Athletic Fields is a county-owned park that is managed by Springfield Township. This park features two baseball fields, one of which is multifunctional and can be converted to a football field. The fields play host to a variety of sectional and divisional baseball tournaments, attracting many visitors to the region. Other amenities at the park include, a basketball court that in the winter can be converted into an ice-skating rink, a playground, and Mill Run, a high-quality stream supporting wild trout. The park does have restrooms and a picnic pavilion that are highly utilized, especially when the athletic fields host a variety of sectional and divisional baseball tournaments.

A few needs have been identified to enhance visitors' experiences at the park including upgrading the facilities to be compliant with the American Disability Act (ADA), establishing a spur from the Indian Creek Valley Trail to the park, and improving the playground. The playground needs proper drainage, a safety surface, and upgraded equipment including a handicapped accessible swing.

C.W. Resh Memorial Park

C.W. Resh Memorial Park is located in Indian Head at the confluence of Back Creek and Indian Creek. The park is owned and maintained by Saltlick Township. Features at the park include the playground, three picnic pavilions that can be rented, a basketball court, a volleyball court, baseball fields, access to the Indian Creek Valley Trail and a children's only fishing area. During the summer months portable toilets and a handwashing station are also available.

The park does have handicapped parking available at the pavilion closest to the main playground; however, adding a handicapped swing would be a benefit to the park.

Melcroft Park

Melcroft Park is a smaller neighborhood park located along Melcroft Road, just before Route 711. The park has a war memorial, a picnic table, swings, a basketball court and a baseball field directly across the road.

Enhancements needed at this park include ADA accessibility, some upgraded equipment including a small playground. The actual name of this park is unknown.

Living Treasures Wild Animal Park

Living Treasures is a zoo in the Laurel Highlands Region. The nine-acre parcel opened in 1998 and now has 300 animals and 50 different species that permit visitor interaction. Living Treasures prides itself with providing visitors with a unique interactive experience that allows visitors to get close to the animals. There is an admission charge associated with visiting this park.

Caddie Shak

Caddie Shak is a 50-acre pay-to-play park with action-packed attractions for fun and excitement. The park features three Go-Kart tracks, two miniature golf courses, bumper boats, batting cages, golf driving range, paintball shooting gallery, kiddie rides, arcade, playground, picnic pavilion, a snack shack and more.

Camping

Camping is a major recreational activity that provides an economic boost to the region. Many of the local businesses cater to this seasonal industry by expanding their hours of service from Memorial Day to Labor Day each year.

Camping is permitted in Forbes State Forest, except within the Roaring Run Natural Area. Camping in Forbes State Forest is restricted to back-pack type camping except for several motorized sites. Camping out of vehicles or campers is not allowed.

Camping longer than one night requires a permit; however, all campers are encouraged to obtain a permit so they can be reached in emergency situations. The Forbes State Forest website lists information and restrictions about where to camp.

There are seven campgrounds in the Indian Creek Watershed. Services available vary from primitive to private resorts. These are all pay-to-play services. Appendix L identifies camping opportunities within the Indian Creek Watershed.

Boating

Boating in the Indian Creek Watershed is very limited due to inconsistent and variable water depth and public access. Boating activities can only be done during periods of adequate flow. With the close proximity of Ohiopyle, only the more experienced boaters view Indian Creek as a viable location. From time to time when conditions are right, kayakers can be seen below the Indian Creek Reservoir in the

Gorge. Development of a formal water trail and the installation of canoe and kayak launches are needed.

Fishing

Fishing is once again a viable activity in the Indian Creek Watershed. Years of restoration projects have improved the quality of Indian Creek so that it presently supports the aquatic life needed to sustain healthy fish populations. Fishing is a attracts visitors to the region.

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



Stocked rainbow trout caught at Indian Creek Watershed Festival held at Resh Park in Saltlick Township, Fayette County

Indian Creek is stocked from the Route 381 bridge in Jones Mills to the Indian Creek Reservoir near Mill Run. In addition, sections of the main stems of Back Creek and Mill Run are also stocked. Back Creek is stocked in the children's fishing area located in Resh Park several times a year for various kids' fishing derbies throughout the spring and then again in the fall for the Indian Creek Watershed Festival. Sections of Indian Creek are also stocked by B&G Bait Shop in Normalville. They hold fundraisers in order to raise money to purchase trout to stock.

- **Wilderness Trout Stream**

"Wilderness Trout Stream management is based upon the provision of a wild trout fishing experience in a remote, natural, and unspoiled environment where man's disruptive activities are minimized" (PFBC). The purpose of this designation is to protect and promote native brook trout fisheries and the ecological requirements necessary for natural trout reproduction. Roaring Run is the only stream in the Indian Creek Watershed with this designation, lying within the boundaries of Forbes State Forest and, more specifically, the Roaring Run Natural Area.

- **Special Regulation Areas**

Only one Special Regulation Area exists within the Indian Creek Watershed. It is located on the mainstem of Indian Creek between the Route 381

parking lot and Hunter Lane. This 1.64-mile section of stream is designated as a delayed harvest, artificial lures only area, meaning this stretch is open to fishing year-round; however, anglers may only keep their catch if the trout is nine inches or greater and it is caught between June 15 and Labor Day. During that time frame the creel limit is three trout regardless of species. From sunset on Labor Day to an hour before dawn on June 15, anglers must practice catch-and-release. Other restrictions in this section of stream require anglers to use artificial lures constructed of metal, plastic, rubber, and/or wood, or flies and streamers constructed of natural and synthetic materials. The type of gear, fly-rod or spinning rod is not restricted.

- **Class A Wild Trout Waters**

Class A Wild Trout Waters are streams that support populations of naturally producing trout of sufficient size and abundance to support a long-term reward fishery. Streams that are designated as Wild Trout streams are not eligible for stocking. Nine tributaries with 35.81 miles of stream in the Indian Creek Watershed are designated as Class “A” Wild Trout Waters; they are identified in Table 7-9.

Stream	Fishery	Length	Section Description	% Public Ownership
Buck Run	Brook Trout	2.88	Headwaters to 2300m upstream of mouth	11%
Camp Run	Brook Trout	4.26	Headwaters to mouth	81%
Fulton Run	Brook	3.65	Headwaters to mouth	0%
Indian Creek	Brown Trout	6.2	Headwaters to Township 916 Bridge	57%
Middle Fork Laurel Run	Brook Trout	3.51	Headwaters to mouth	0%
Neals Run	Brook Trout	2.77	Headwaters to mouth	3%
Pike Run	Brook	5.19	Headwaters to mouth	17%
Rasler Run	Brook/ Rainbow Trout	5.15	Headwaters to mouth	0%
Roaring Run	Brook Trout	2.2	Forbes State Forest Boundary to mouth	5%

(Source: Pennsylvania Fish and Boat Commission)

- **Wild Trout Waters**

Wild Trout Waters are capable of supporting natural reproduction of trout. This designation, unlike that of the Class A Waters, has no limitations for management and is eligible to be stocked with hatchery trout. There are 83.1 miles of stream in the Indian Creek Watershed that support natural trout reproduction, see Table 7-10.

TABLE 7-10. NATURALLY REPRODUCING TROUT STREAMS IN THE INDIAN CREEK WATERSHED		
Stream	Wild Trout Limits	Miles
Back Creek	Headwaters downstream to mouth	3.6
Buck Run	Headwaters downstream to 2.3 kilometers upstream of mouth	1.7
Camp Run	Headwaters downstream to mouth	4.1
Clay Run	Headwaters downstream to mouth	3.12
Fulton Run	Headwaters downstream to mouth	3.66
Indian Creek	Headwaters to Indian Head Bridge	15.36
Laurel Run	Headwaters downstream to mouth	4.75
Little Run	Headwaters downstream to mouth	2.1
Middle Fork Laurel Run	Headwaters downstream to mouth	3.5
Mill Run	Headwaters downstream to mouth	6.61
Neals Run	Headwaters downstream to mouth	2.4
Pike Run	Headwaters downstream to mouth	4.6
Poplar Run	Headwaters downstream to confluence Newmyer Run	1.68
Rasler Run	Headwaters downstream to mouth	3.31
Roaring Run	Headwaters downstream to mouth	5.12
Stony Run	Headwaters downstream to mouth	2.94
Tates Run	Headwaters to mouth	2.65
Trout Run	Headwaters downstream to mouth	3.5
UNT Indian Creek (RM 0.49)	Headwaters to mouth	1.16
UNT Indian Creek (RM 25.55)	Headwaters to mouth	2.31
UNT Poplar Run (RM 3.12)	Headwaters to mouth	1.41
UNT Rasler Run (RM 1.99)	Headwaters downstream to mouth	2.19
UNT Rasler Run (RM 3.04)	Headwaters downstream to mouth	1.33
Source: Pennsylvania Fish and Boat Commission)		

Hunting

Public hunting within the watershed is limited to tracts in Forbes State Forest and Pennsylvania State Game Lands unless permission is secured from private landowners. Before hunting on any private lands interested hunters should contact individual landowners for permission to hunt.

Forbes State Forest has a dominant presence in the headwaters of the Indian Creek Watershed. It is administered by the Pennsylvania Bureau of Forestry within the Pennsylvania Department of Conservation and Natural Resources. The forest is managed for long-term health and productivity while conserving native wild plants.

Pennsylvania State Game Lands 51 and 111 are open to hunting within the Indian Creek Watershed. State Game Lands are managed by the Pennsylvania Game

Commission to provide habitat for wildlife increasing opportunities for lawful hunting and trapping.

Golfing

Locations for golfing in the Indian Creek Watershed are very limited; the only golf course in the watershed is a 9-hole, par 32 private course located at the Pike Run Country Club. The course is a well-manicured, scenic course that is family-friendly. This course is also unique in that there are no scheduled tee times. However, a golfer must be a member of the club, or a guest of a member of the club to use the facilities.

Shooting Facility

Pike Run Country Club offers its members a state-of-the-art shooting facility that offers trap, skeet, five-stand, and sub trap shooting. They hold monthly competitive shooting events for all levels including inter-club events for the more competitive shooters. They also have a variety of safety and instructional clinics for all levels of shooters.

Environmental Education

Educating citizens to be environmentally responsible is an ongoing venture that spans many generations. Often, when most people think about environmental education, they quickly think about youth; however, environmental education is needed for everyone. Everyday decisions have a profound impact on the surrounding environment. For example, where does the water go at the end of the swimming season when swimming pools are drained? Usually, it is discharged with all its chemicals into stormwater drains leading directly into one of the streams. The aquatic organisms, including fish, living in the streams do not tolerate this chemical well. The same stream that these chemicals are discharged into is also the community's drinking water supply!



Pennsylvania Game Commission conducting an environmental education program at the Indian Creek Watershed Festival in 2018

It is the little decisions that are made without a thought that can harm the watershed. Through educating landowners about the effects of their actions, MWA hopes to encourage a modification of behavior that will benefit them and encourage sound, healthy stewardship. By educating the youth MWA hopes to exhort the next generation to be compassionate about the environment in which they must live.

Environmental education was first deployed in the agricultural community through the implementation of conservation practices. These conservation practices not only helped the environment, but were beneficial to the landowner. Educating the public about important

environmental challenges and developing knowledgeable citizens who actively participate in addressing today's environmental challenges is critical to sustaining the balance between environmental and human activities, maintaining community quality of life, ensuring the health and welfare of the watershed, protecting human health, advancing quality education, expanding employment opportunities, promoting sustainable development and protecting the natural heritage (Pennsylvania Department of Education, 2000).

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.



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

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.

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

Prior to European settlement of Southwestern Pennsylvania, the Indian Creek Valley was most likely inhabited by the Monongahela culture of Native Americans who were widespread within and around the Monongahela River Valley in the modern-day states of Pennsylvania, West Virginia, and Ohio. Though that specific group of native peoples disappeared around 1635, the vacuum left by them was filled by

either newcomers or descendants as a few conflicts well into the 1700s between settlers and Native Americans in the area are cited in *History of Fayette County* by Franklin Ellis (Pennsylvania Heritage Foundation, 2019 and Ellis, 1882). Originally known by frontiersmen as Great Salt Lick Creek in the first half of the 18th century from the numerous salt deposits that cropped out along its banks, it eventually took on the name Indian Creek in the latter half. This name supposedly originated in 1758 when a group of British Army soldiers under the command of Captain Harris moved a herd of cattle upstream from a natural meadow near the mouth of Mill Run where they were camped. While moving along Indian Creek, they came across a Native American village, empty at that time, that showed signs that the valley was highly trafficked for hunting and fishing. Consequently, they referred to it as Indians' Creek, which spread and evolved into the modern name of Indian Creek (Ellis, 1882).

Permanent European settlements began to crop up in the Indian Creek Watershed following the end of the Revolutionary War, and with them came sawmills and grist mills. These provided lumber and flour respectively to the area, taking advantage of readily available moving water provided by Indian Creek and its numerous tributaries to turn water wheels power mill gearing. Small communities began to form around the nucleus of these mills, as is the origin story of many small hamlets on the rural frontier (Ellis, 1882).

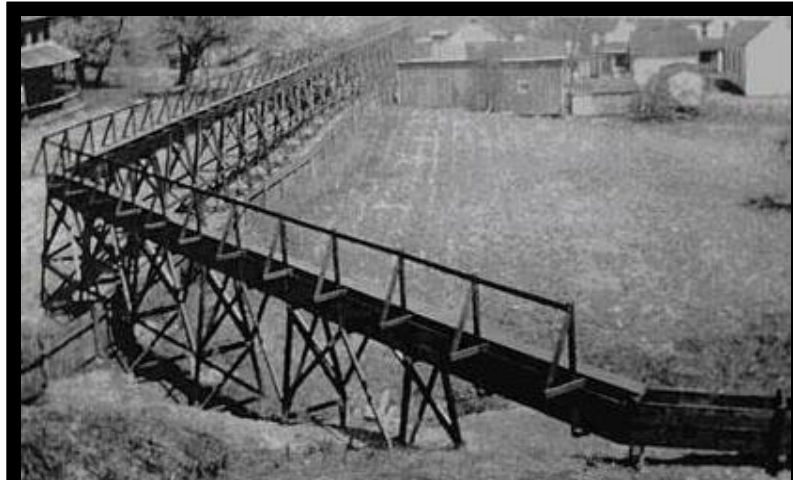
It was not long before residents and entrepreneurs sought to take advantage of the rich natural resources in the watershed: iron ore, limestone, timber, and surface deposits of quality coal, sometimes six feet thick. As early as 1807, iron ore was being collected and processed at the St. John Furnace near the mouth of Indian Creek. At the other end of the watershed in Forbes State Forest the Fountain Furnace was built and in blast by 1812 at the latest. There was at least one more furnace known as the Fayette Furnace operated along the streambank of Buck Run. Stone ruins of these three furnaces are still there, with the Fayette Furnace being the most structurally intact (Ellis, 1882; Coke Oven Mike, 2016, & Coke Oven Mike, 2017).

Quarried limestone was used in the form of lime as flux in the iron furnaces or as a treatment for farm fields to increase crop productivity. Trees from early clearing of the vast ancient woodlands provided lumber locally and plenty of tannin from bark. Tannin is used in the hide tanning process, so tanneries were also set up within the watershed to provide leather goods. Blacksmiths were the first to capitalize on easily accessible coal deposits around 1835, and several small mines were established by the latter half of the 19th century to supply businesses and households throughout the valley and nearby surrounding area. Since the mountainous area is isolated and Indian Creek is not a large enough waterway for commercial transport, the resources of the watershed stayed within the watershed for the most part unless it was produced near the mouth at the larger and floatable Youghiogheny River (Ellis, 1882).

Underground coal mining began in the Indian Creek Valley in the mid to late 19th century and continued until the late 1960s. These mines were developed on the Middle Kittanning coal seam, known locally as the Miller B Coal, adjacent to the Indian Creek and Champion Creek valleys. With few exceptions, underground mines were developed up-dip to facilitate drainage, a practice that resulted in mines discharging into the local waterways.

The beginning of relatively modern transportation into and out of the area occurred around 1871 when the Baltimore and Ohio Railroad built a train station at the mouth of Indian Creek. Into the 1880s and 1890s, the Southeastern portion of the watershed near the boundary of Fayette and Somerset Counties became well known for illicit distilling of whiskey by moonshiners like the infamous Bill Pritts; they hid whiskey hidden away in this rural area to avoid the taxation that went along with distilling and selling whiskey (Bruner, 2016). Mass resource extraction did not come until 1906 when the Indian Creek Valley Railroad (ICVRR) was established, following the path of Indian Creek hauling timber and coal out of the watershed to connect with the Baltimore and Ohio Railroad at the Youghiogheny. This opened the gate for huge coal companies to come in and build entire mining towns, like Melcroft, to sustain the miners, their families, and all the accompanying infrastructure.

Abandoned mine drainage (AMD) problems were prevalent early on during mine development and have continued through the present. As early as 1924, Melcroft Coal Company and other mining companies were enjoined and restrained from allowing AMD discharges into the upper Indian Creek Watershed by the Fayette County Court of Common Pleas. The order resulted from a lawsuit brought against the various coal companies by the Pennsylvania Railroad and several private water companies. The lawsuit claimed that the mines were causing pollution downstream of the Mill Run Reservoir. In order to comply with the court ruling, the mining companies constructed a mine drainage “flume” to collect and convey mine drainage to a point downstream of the reservoir. The system was over seven miles in length and utilized piping to provide connections to existing mine workings. The flume system discharged below the reservoir into Charles Run, a tributary of Indian Creek, near Normalville.



The flume structure that was constructed to transport mine discharges past the Indian Creek valley after the railroad 'company's court victory over the coal companies in 1924

During the mid-1970s the flume system began to malfunction as a result of deterioration, plugging, and lack of any significant maintenance. AMD from these abandoned mines began to enter the main channel of Indian Creek at the down-dip mine entries or as coal crop line discharges. The majority of the discharges enter between the villages of Melcroft and Indian Head, where the axis of the Ohio-Pyle-Ligonier Syncline crosses the Indian Creek valley. Flow rates and corresponding pollution loads vary. In addition to abandoned underground mining AMD sources, several forfeited abandoned surface mine sites also contribute significant pollution loads to Indian Creek and its tributaries. The ICVRR ran until 1969 when it was officially abandoned and truck transportation took over for hauling resources (Mountain Watershed).

A very small number of historic structures in the Indian Creek Watershed survive today; they have been lost to time through fire, development, sale, or just plain neglect. There are at least a few houses still standing built prior to 1800 in the Fayette County portion according to online property records (Fayette County Department of Assessments). There are undoubtedly more in the Westmoreland portion, but those property records are not nearly as accessible. The last known water-powered mill standing in the watershed, the Mathews grist mill in Jones Mills, was disassembled and moved out of the area over 20 years ago. Other historic artifacts dot the landscape, such as the above-mentioned iron furnaces, damp spring houses, crumbling foundations, a lonely stone chimney standing in the woods, or an overgrown family graveyard. Historic resources such as these give cultural meaning and context to the area, but the vast majority have vanished over the past almost 250 years. Documentation and preservation efforts are important moving into the future for those still around. None of these sites is currently recognized on the National Register of Historic Places.

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; but in Pennsylvania it is administered by the Pennsylvania State Historic Preservation Office within the Pennsylvania Historic Museum Commission.

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.

Currently there are no sites on the National Register within the Indian Creek Watershed.