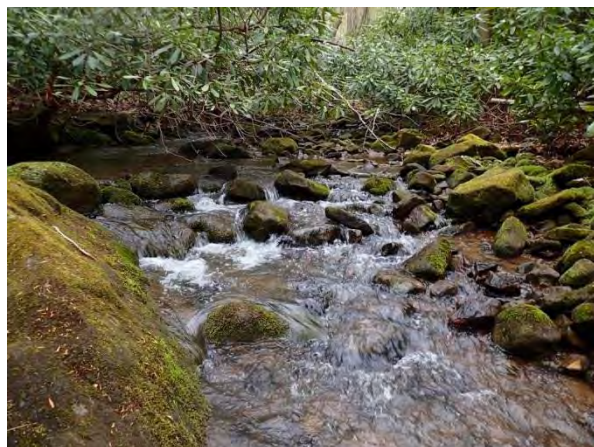


# ***Green Lick Run Coldwater Heritage Partnership Assessment***

***Bullskin Township, Fayette County, Pennsylvania***



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Abbreviated terms used in this report:

Cal U	California University of Pennsylvania
CRTU	Chestnut Ridge Trout Unlimited
DEP	Pennsylvania Department of Environmental Protection
DCNR	Pennsylvania Bureau of Conservation and Natural Resources
EPA	Environmental Protection Agency
FPW	Foundation for PA Watersheds
FCCD	Fayette County Conservation District
F&BC	Pennsylvania Fish and Boat Commission
JCWA	Jacobs Creek Watershed Association
IUP	Indiana University of Pennsylvania
MAWC	Municipal Authority of Westmoreland County
NRCS	Natural Resources Conservation Service
PATU	Pennsylvania Council of Trout Unlimited
WIP	Watershed Implementation Plan
WPC	Western Pennsylvania Conservancy

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## 1) **Executive Summary**

Green Lick Run has fascinated members of the local community and angling enthusiasts for a number of years. Its cold headwaters cascading off of Chestnut Ridge used to hold vast numbers of native brook trout and rumors circulated that there are even wild reproducing rainbow trout located there. Throughout the late 1800's and early 1900's, it had been the public drinking water supply for the Boroughs of Scottdale and Everson. (*PA Public Service Commission.....1920*) In addition, throughout the 1990's, and even today, this tiny watershed has become a battleground between homeowners and limestone quarries. (*Biological Assessment of the Connellsville II Quarry....1999*)

Therefore, the Jacobs Creek Watershed Association decided to assess this small watershed. They applied for a Coldwater Heritage Partnership grant funded by the Pennsylvania Department of Conservation and Natural Resources (DCNR), Pennsylvania Fish and Boat Commission (F&BC) and Foundation for Pennsylvania Watersheds (FPW), and administered by the Pennsylvania Council of Trout Unlimited (PATU). The grant was awarded to JCWA in April 2016 to accomplish the following goals:

1. Assess fish and macroinvertebrate diversity
2. Collect water samples for chemistry analysis to determine any potential threats or pollutions
3. Evaluate fish/macroinvertebrate habitat characteristics and structures for improvement
4. Add the study results to the organization's Watershed Implementation Plan (WIP) update in order to be eligible for EPA's Nonpoint Source Pollution 319 funding for projects in this watershed
5. Generate an efficient conservation plan that will promote a protection strategy for Green Lick Run
6. Promote awareness and community involvement in the overall conservation efforts of our cold-water streams by using Green Lick Run as the local example

Project partners for this assessment along with the Jacobs Creek Watershed Association (JCWA) were the Indiana University of Pennsylvania (IUP), Pennsylvania Department of Environmental Protection (DEP), Bullskin Township Supervisors, Fayette County Conservation District (FCCD), Pennsylvania Fish and Boat Commission (F&BC), California University (Cal U), and Chestnut Ridge Chapter of Trout Unlimited (CRTU).

Sampling immediately started in April 2016. The last samples were collected by the F&BC for a fish habitat survey in July 2019 and macroinvertebrates were collected by Cal U professor Dr. David Argent in October 2019.

JCWA hosted their first public meeting on May 5, 2016 at the Mount Vernon Park in Bullskin Township. The goals of the project, information on past studies and the most recent sampling results were presented at this meeting. No comments were received from the public. On November 18, 2019, at the Bullskin Township Senior Center, a second public

meeting was held to present the findings from additional sampling events, discuss recommendations and present potential projects. Educational information was available to attendees as to what they can do to improve and protect this fragile watershed. Comments from the audience were included in this final document.

## **Results/Issues**

The water quality and macroinvertebrate results from this assessment are somewhat similar to past studies completed by the DEP and F&BC. There are little to no iron discharges that degrade the streams in the watershed, alkalinity is excellent, and acidity is very low. pH numbers range from 6.5 to 7.2 in the headwaters and the middle sections. However, the pH increases to between 8 and 8.2 in the lower portion of the watershed. This is consistent with prior samplings. In the lower sections of Green Lick Run and Latta Run, Green Lick's tributary, there are farms where the riparian buffer is smaller or even destroyed. The lack of a riparian buffer allows more sediment and pollution to enter the stream. Therefore, a robust education/outreach project should be implemented in order to re-establish the riparian buffer.

Native brook trout were found above MAWC's low head dams located in the middle section of Green Lick Run. Reproducing Rainbow Trout were found below the dams. Though not in high enough numbers to be classified as a Class A Trout Stream, Green Lick Run has the protection of a Chapter 93 Exceptional Value designation and the parameters from this assessment show that it continues to meet that designation.

One major result that raised a flag was that the macroinvertebrate population has declined slightly in certain areas. There are a few factors that could be affecting the population: a) removal of the riparian buffer and extra sediment in the stream from logging or poor agricultural practices, b) extra sediment and stream bank erosion from ATV crossings, and c) scouring of stream habitat and extra sediment from an increase in record breaking rain events over the last few years. Storm events occurring numerous times throughout a year could scour the streambed or release extra volumes of sediment which would affect the macroinvertebrate population. At the public meeting in November 2019, Mountain Watershed Association stated that their macroinvertebrate populations also have not been as high in the last few years compared to past samplings and they believe it is due to the record breaking storm events in the Laurel Highlands area. Restoring the riparian buffer and stopping the ATV and logging traffic in the streams will help to solve the issue of some sediment entering the stream. Once a robust riparian buffer is established, the root system will stabilize the streambanks and possibly control the larger volume of water during record breaking events.

1. The largest issue facing this watershed is deforestation and loss of riparian buffer due to logging, agriculture, gas well development, private landowner general yard maintenance and ATV use which lead to:
  - a. Siltation/stream bank erosion
  - b. Thermal pollution (warming of a cold water ecosystem)
  - c. Stormwater/runoff/flooding

- d. Increased risk of invasive species gaining a foothold in the watershed
2. There are two small (4') dams placed on MAWC's property. The good news is that the dams are holding back some silt/sediment. The sampling results have shown more fish, macroinvertebrates and better water quality are below the dam than above. In addition, it also slows down the number of Rainbow Trout from entering the upper reaches of Green Lick Run that may compete with the fragile Brook Trout population. However, the dams impede the number of Brook Trout moving down stream for better cover or food sources. Further investigations are needed for the following: a) MAWC's use of this stream as a water supply. Many of these smaller tributaries owned by MAWC are used to "offset" their permit withdrawal allowances from the main stem of the Youghiogheny River; b) whether removal of the dams could cause water loss into the limestone beneath the dams; c) whether removal of the dams could cause the loss of the Brook Trout population when mixed with the more aggressive Rainbow Trout population
2. Dewatering of stream – the potential exists, due to the Loyalhanna Limestone beneath Green Lick Run, that gas well drilling, blasting from the neighboring quarry, and potential dam removal could fracture the limestone and cause water loss. A study in 1904 by the Citizens Water Company, who were the owners of the dam on Green Lick Run, showed that the new wall of the dam was placed too deep into the stream bed and a water loss occurred. They then contracted with the American Pipe and Construction Company to pump water from neighboring Spruce Run and Mounts Creek to keep the dam full. Unfortunately, that did not help as the additional water would also leak into the limestone. In 1910, the company built a new dam with a shallower wall. (*Borough of Scottdale et al vs. Citizens Water Company.....May 4, 1920*).

In a study completed by Castleberry & Associates (1998), the hydrology of Green Lick Run is tied to the Loyalhanna Limestone that underlies this stream. Over 70% of the flow of Green Lick is from the limestone layer. A water quantity assessment should be undertaken by JCWA in order to document flow rates of the streams over time.

3. ATVs, whether legal or illegal, are crossing the stream in numerous places. This is creating sediment to enter the stream from ruts on the hillsides above the stream and in the stream itself. A large number of these crossings are occurring on the MAWC property. This ATV issue was also happening on MAWC property in the neighboring Indian Creek watershed. MAWC instituted a volunteer program of people who would take their lawn chairs and picnic at these crossings and stop the ATVs from crossing. The volunteers had the authority to hand out warnings to the ATV owners that if they are caught again they will be turned in for legal action for trespassing and to the F&BC for ruining a native trout stream. This action worked successfully for the Indian Creek incidents and could be useful here.
4. Sediment from dirt roads. Green Lick Hollow Road, Ohler Road and Ridgeview Road are dirt roads. The Township has asked the FCCD for assistance in getting "Dirt and Gravel Road" funds. However, a few landowners are contesting whether Bullskin Township actually owns the roads and have blocked the Township's ability to maintain



them. The dirt roads are not properly graded or sloped and many ruts are present that discharge sediment directly to the streams.

5. Garlic mustard, an invasive plant, was noticed growing in some fields. Invasive species will grow in areas that have been disturbed and could rapidly take over habitat and crowd out native plants.

### **Recommendations and Next Steps**

**Engage the residents.** By implementing best management practices on their property and becoming “keepers” of good water quality, it will actually increase the value of their property. In addition, residents should be given information about gas well development, logging and construction activities. All of these have the potential to add sediment and pollutants in the watershed. Several projects within this watershed have already been identified in the EPA’s 319 Watershed Implementation Plan (WIP) that JCWA completed in 2019. There are five locations in Green Lick Run and six locations in Latta Run where best management practices should be implemented to reduce sediment and runoff into the stream. Potential projects would be: improve stream habitat by creating better riffle/pools, install fencing to keep livestock out of the stream, re-establish the riparian buffer, stabilize stream banks and improve dirt and gravel road drainage. (WIP, 2019) JCWA would have to petition the DEP to add Latta Run and sections of Green Lick Run to the EPA’s Nonpoint Source 303(d) List of Impaired Waters. This would open additional funding through the 319 program that JCWA. The funding is federal from the EPA and channeled through states for Non-Point Source Pollution restoration work. By using this assessment and the information from the WIP, JCWA has found areas of concern that would qualify for the funding.

Projects could also be implemented by JCWA and/or their project partners such as the FCCD using other funds available, such as: the DEP Growing Greener funds, DCNR watershed restoration funds and riparian buffer grants, Department of Community and Economic Development (DCED) Act 13 Watershed restoration funds, and private foundations. Partners would include the WPC, Westmoreland Land Trust, and other regional land groups who work with landowners to obtain future conservation easements, land donations, and preservation in perpetuity. As an example, through this outreach, JCWA would use the WIP and visual inspections to identify all of the areas where the loss of riparian buffer has occurred and engage those residents in allowing JCWA to obtain grants to re-establish the buffer.

**Remove the dams.** However, a thorough study would have to be completed to make sure that no water loss would occur or is occurring right now. In addition, removal of the dams could impact the fragile Brook Trout population by allowing the more aggressive Rainbow Trout to swim upstream. Serious discussions between JCWA, F&BC and other partners should occur. In addition, the water authority should be contacted to see if removal of the dams would violate their permitted withdrawal on the main stem of the Youghiogheny River. Usually, a permitted water withdrawal on the main stem of a river can be offset by the water authority owning the water in the smaller tributaries and it is not known whether a dam with a reservoir has to be placed or maintained on that smaller tributary.

**Improve Dirt and Gravel Roads.** Meet with the landowners and township to work out the dirt road issues and identify improvements that would help prevent sediment from entering the stream from the roadways.

**Stop ATV and off road vehicles in streams.** The stream banks are eroding and stream habitat is being destroyed by the ATV and off road vehicle traffic in this watershed. Whether the culprits are from this watershed or not, this practice is destroying the macroinvertebrate population that live in the stream as well as adding sediment and pollutants into the water. JCWA should work with partners to discuss a remedy to this issue.

**Implement a Comprehensive Monitoring Program.** A monitoring program should be created that will assess water quality and quantity, fish and macroinvertebrates. Moving forward from this study additional sampling within this watershed will assure that JCWA bases any project on sound scientific data. It will also allow them to see a situation brewing (such as a rapid change in pH) and respond to it quickly. New data should continue to be collected and compared to old data in order to understand where improvements need to be targeted.

**Petition DEP to Assess Green Lick Reservoir.** To date, the lake management group has not assessed Green Lick Reservoir. Without a good assessment, JCWA is not able to know whether there are invasive water plants lurking beneath the surface and how to eradicate them. In addition there are many new water quality improvement structures developed to reduce sediment suspended in lakes; such as “floating island” structures. DEP would be able to coach JCWA on the new ways to improve the water quality.

**Petition Fayette County to Update the Natural Heritage Inventory and to Designate the Upper Green Lick Run Watershed “Special Protection Status”.** The NIH is 20 years old and only a small section of the Green Lick Run watershed was properly assessed. Since a lot of this watershed contains steep forested slopes and good water quality, JCWA feels that there must be many more rare and endangered plants and animals living within this watershed that have not been discovered. Also, Fayette County has, on occasion, designated an area “special protection status.” This will help to save the endangered species living in the upper watershed.

**Bird Study.** Chestnut Ridge is the first major ridge east of the Rocky Mountains. It is a flyway for migrating song birds and raptors. A study has never been completed on this section of Chestnut Ridge.

**Conservation Easements or Donation of Large Tracts of Land.** There are several landowners with large tracts of land. In order to offer the best protection of this watershed, JCWA should approach them with information about conservation easements, donation or purchase of some or all of these parcels.

## 2) Background

### **Project Area:**

- a) **Location** Green Lick Run is located in Bullskin Township, Fayette County, in southwestern Pennsylvania (Figure 1). The watershed starts on top of Chestnut Ridge as a very small mud/sandy headwater stream as shown in the photo. Chestnut Ridge is the first major ridge east of the Rocky Mountains and has become an important



area for raptor migration. Green Lick Run flows down the ridge's flank in a southwesterly direction. It flows under State Route 982 (Pleasant Valley Road) to its intersection with tributary, Latta Run, where it turns more westerly before entering Green Lick Reservoir and empties into Jacobs Creek shortly after the outflow from the reservoir's dam. Jacobs Creek is part of the Youghiogheny River basin (19D).

This watershed is part of the Appalachian Plateau Province of which the headwaters is located in the Allegheny Mountain section identified by wide ridges separated by broad valleys. The lower portion of Green Lick with Latta Run is in the Pittsburgh Low Plateau Section identified by smooth to irregular undulating surfaces with narrow relatively shallow valleys. (*PA DEP Stream Redesignation Evaluation Report...January, 2001*) This region is also part of the Laurel Highlands eco-region for tourism and is noted for good water quality, fishing, white water activities, bird watching, hiking, and biking.

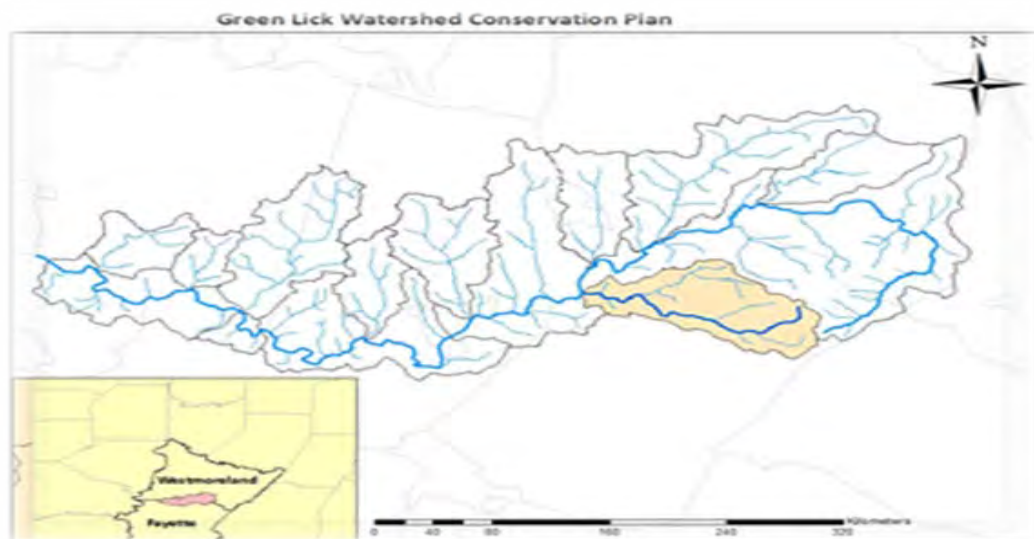


Figure 1: Green Lick Run Watershed

The main stem of Green Lick Run is accessible from Greenlick Hollow Road (T825). (See Figure 2 below) The western access to Greenlick Hollow Road is from State Route 982 (Pleasant Valley Rd) and the northeastern access on Chestnut Ridge is from Bear Rocks Road (T1009). Latta Run, the major tributary to Green Lick, drains off of Chestnut Ridge from Kreinbrook Hill Road (T1056) and Sweitzer Road (T883) and crosses State Route 982 (Pleasant Valley Road) before joining with Green Lick at Mudd School Road (T760).

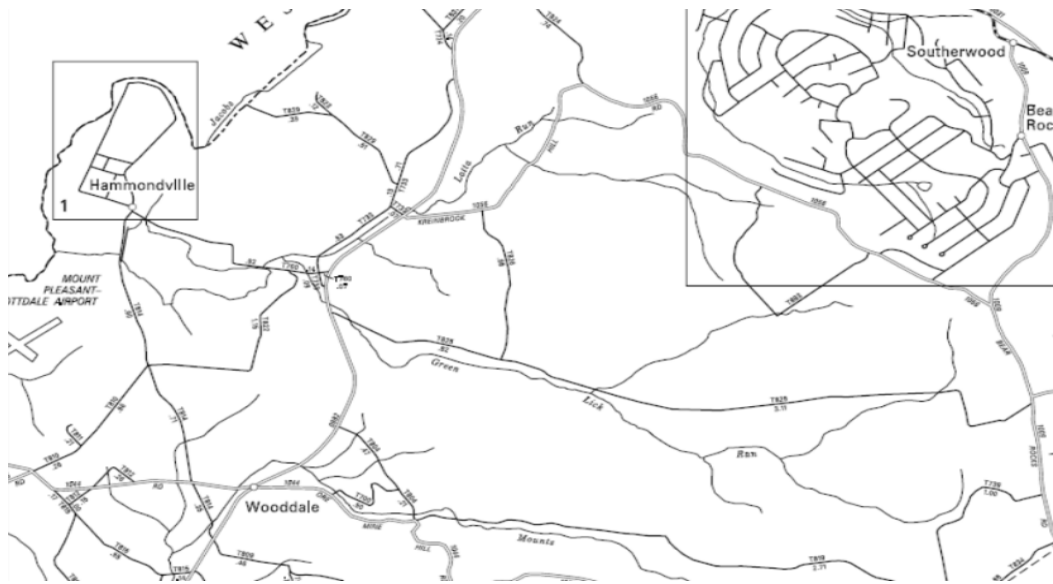


Figure 2: Roads In and Around the Watershed

**b) Size of Watershed** Meandering its way down the western flank of Chestnut Ridge, from an elevation of 2,196 feet, the Green Lick Run watershed covers 14.9 stream miles and an area of 7.2 square miles. Its Latitude - 40.1142391 and Longitude -79.5397605 puts it in an area where it receives four distinct seasons with average temperatures in Spring and Fall of 60°F; Summertime highs in the 80s and Winter daytime temperatures in the 40s. Temperatures can vary from 4-7° between the top of Chestnut Ridge and the valley below. Occasionally extreme temperatures in the summer months in the 90s and cold temperatures in the teens during the winter arrive due to its location of receiving alternating periods of warm air from the south and cold air from Canada. This area receives an average of 37 inches of rainfall and 43 inches of snow in a year. (*Fayette Chamber of Commerce .....2012*)

**c) Geology** – The rocks of Fayette County are almost entirely sedimentary and were deposited during the Mississippian, Pennsylvania and Permian Periods. The Allegheny Mountain Section east of the west flank of Chestnut Ridge consists of strata that are Devonian, Mississippian and Pennsylvania in age. ([www.fayettecountypa.org/282/geology](http://www.fayettecountypa.org/282/geology)).

In the upper Green Lick Run watershed, at the very top of Chestnut Ridge, the predominant geology is the Allegheny Group of the Pennsylvania Formation. It is an olive to dark-gray, nodular claystone; light-gray, thin- to massively bedded, fine- to coarse-grained sandstone containing stylolites; gray siltstone; nodules of limestone and siderite; local gray conglomerate; coal and clay. Well water ranges from soft to very hard; iron, manganese and aluminum concentrations exceeding drinking water standards are common; excessive concentrations of zinc, lead, dissolved solids, magnesium and sulfate also occur. Well yield is around 6 gal/min.

As the watershed moves down the western flank of Chestnut Ridge, the Pottsville Group of the Pennsylvanian Formation is encountered. It is gray to light-gray crossbedded sandstone, quartz-pebble conglomerate and siltstone; dark-gray, carbonaceous clay shale and claystone and thin, non-persistent coal. Massive beds of sandstone are not uncommon. Well water is generally soft; but very high concentrations of iron and manganese are a common problem and high concentrations of aluminum may occur; dissolved solids are low. Well yield is around 5 gal/min.

Embedded within the Pottsville Group are two groups from the Mississippian Formation; the Burgoon Sandstone and the Mauch Chunk Formation. The Burgoon Sandstone is a buff, medium-grained, crossbedded sandstone containing some basal conglomerate. The Mauch Chunk is mostly grayish-red sequence of shale, siltstone, sandstone and some conglomerate. This particular formation has the highly crossbedded, gray siliceous Loyalhanna Limestone which is sought after by the stone companies. In addition, both of these formations yield soft to moderately hard water, but were within drinking water standards; though iron and manganese could be a problem at times. Because of the decent water quality and quantity, these formations are also what water suppliers target, hence the dam further downstream on Green Lick Run years ago. Well yields range from 0.5 to 46 gal/min with most wells ranging from 4-8 gal/min.

Downstream of the dam, the watershed geology changes to the Conemaugh Group of the Pennsylvanian Formation; the Glenshaw and the Casselman Formations. The Glenshaw formation is an olive-to-dark-gray, thin-bedded, fossiliferous, marine limestone and clay shale; red claystone; locally massive, fine- to coarse-grained sandstone; minor amounts of freshwater limestone; and thick, but generally persistent, coal. Water from wells is mostly hard to very hard; concentrations of iron and manganese exceeding drinking water standards are common; unsafe concentrations of aluminum and lead may also occur. Medium well yield is around 7 gal/min. The Casselman Formation is think-bedded, green and red, commonly calcareous claystone; think-bedded, gray siltstone; locally massive, fine- to medium-grained, gray sandstone; locally massive limestone and thin, non-persistent coal. Well water is also generally hard to very hard; and can exceed standards for iron and manganese. Well yield is around 10 gal/min.

Latta Run, the major tributary to Green Lick, is comprised of the Pottsville and Allegheny Groups of the Pennsylvania Formation.

The Green Lick Reservoir is surrounded by the Casselman Formation. However, the geology changes near the outflow of the reservoir and where Green Lick Run enters Jacobs Creek. This area is from the Quaternary Formation of the Alluvium Group. It consists of the unconsolidated deposit of gravel, sand, silt, and clay that occupy the floodplains of streams and, in some places, forms low terraces above the floodplains. Well water quality may be a problem here but has not been well documented. Well yields from this area could range from 3 to 300 gal/min. It is unknown how much subsurface waters from Jacobs Creek could be impacting wells here.

- d) Natural Gas Pools* - There are five pools of deep gas (unconventional gas) in the Oriskany sandstone layer located in this watershed. The Oriskany layer lies below the Marcellus Shale and Onondago layers. Unconventional gas extraction is a major cause for concern because three of the gas pools lay directly beneath the main stem of Green Lick Run. The two remaining pools are slightly north of Latta Run.

In addition to the five Oriskany gas pools, shallow gas pools, also called “conventional” gas, from the Venango and Bradford Groups discovered in 1975, are located to the north of Green Lick Reservoir as well as the western edge of Latta Run.

Several landowners along the main stem of Green Lick Run and Latta Run have leases signed with exploration companies and recorded at the courthouse and some have gas wells developed, but it is unclear whether these are conventional or unconventional gas wells.

- e) Soils* – Four types of soil exist in the Green Lick Run watershed. At the top of Chestnut Ridge is the Dekalb Hazelton Cookport Association. This association is very stony, developed in residuum from acid rocks. Most of this association is forested for which it is well suited and is not good for farming. Also along the upper slopes of Chestnut Ridge is the Upshur Albrights Association. This is where black locust and yellow poplar trees grow naturally, with a few scattered farms (beef cattle). Principal use limitations are wetness and erosion. Stone quarries are usually located here and this soil has severe limitations for on-lot sewage systems.

Further down the watershed and around the Latta Run tributary the soils are comprised of the Guernsey Westmoreland Clarksburg and the Gilpin-Wharton Ernest Associations. These contain some of the better farming soils; adapted to pasture and general crops. Surface drainage is generally good but with moderate to severe limitations on building sites for septic systems due to the slower infiltration rates of the water. Water supplies seems adequate for livestock and households. (<https://www.fayettecounty.pa.org/290/Soil-Resources>)

Figures 3 and 4 below show the different soils that allow water to infiltrate (or soak) into the ground. Water that does not soak into the ground will runoff into the stream and carry sediment and other pollutants with it. This water will also accumulate and has the potential to flood roads and houses. A large portion of the soils are the type that do not

infiltrate well such as the Dekalb Hazelton Cookport and the Upshur Albrights Associations.

Figure 3 – Map of Soil Infiltration

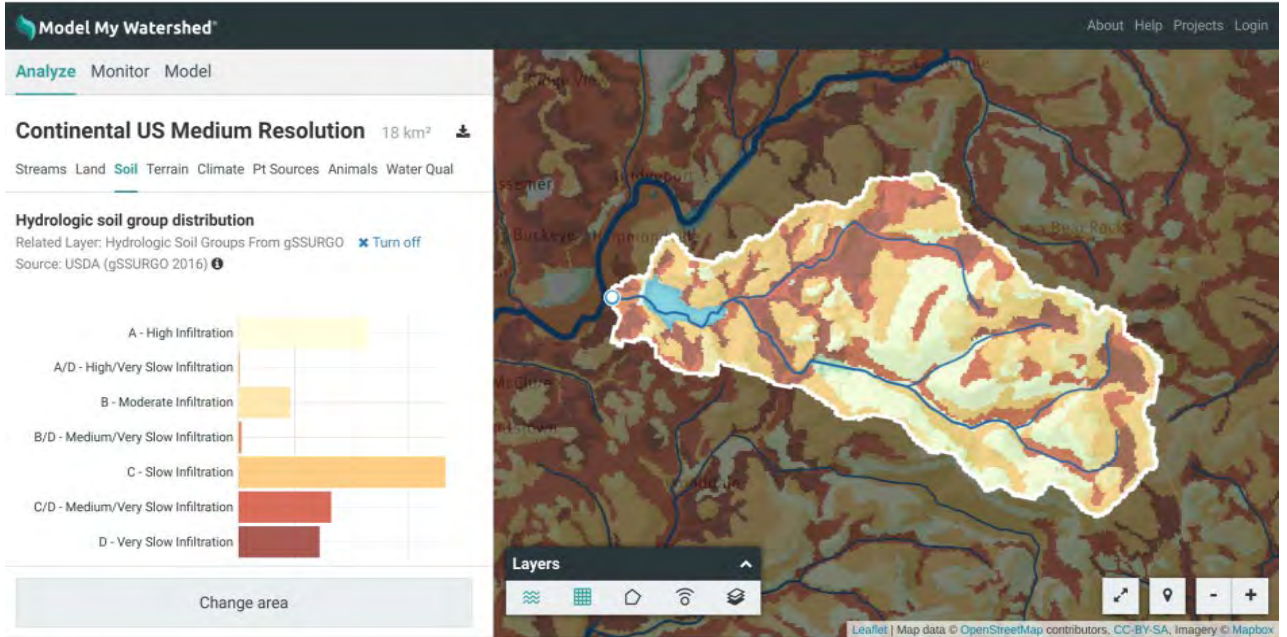


Figure 4 –Percentage of Soil Infiltration Types

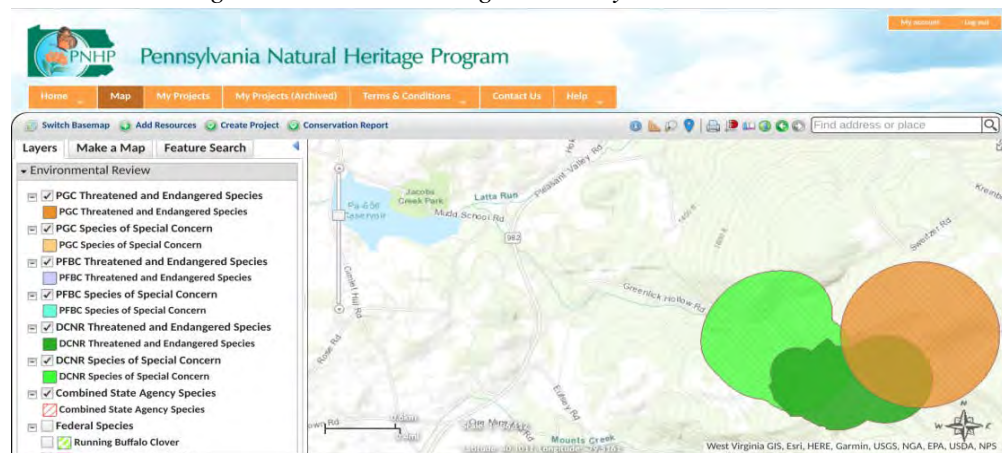
Type	Area (km <sup>2</sup> )	Coverage (%)
A - High Infiltration	4.23	23.0
A/D - High/Very Slow Infiltration	0.00	0.0
B - Moderate Infiltration	1.68	9.1
B/D - Medium/Very Slow Infiltration	0.09	0.5
C - Slow Infiltration	6.74	36.6
C/D - Medium/Very Slow Infiltration	3.02	16.4
D - Very Slow Infiltration	2.64	14.4

f) **Stream designation** – Green Lick Run from its headwaters to its tributary, Latta Run, is currently designated as Exception Value. Latta Run, Green Lick’s major tributary, is designated as a Cold Water Fishery. From the confluence of Latta and Green Lick Run thru the reservoir and until it reaches Jacobs Creek, Green Lick Run is designated as a Warm Water Fishery. (*PA DEP Stream Redesignation, October 2002 and Chapter 93 Designation*). The current Chapter 93 regulations concur with this assessment. The Pennsylvania 2019 Integrated Water Quality Monitoring and Assessment Report created by the DEP has only identified the outflow of the reservoir and its confluence to Jacobs Creek as impaired due to habitat modification.

g) **Natural Heritage Inventory** – The Green Lick Run watershed is listed in the 2002 Fayette County Natural Heritage Inventory, Figure 5 and 6 below. The watershed supports three plant species and one animal species of special concern. For the protection of the plant and animals species, their names are not provided here. One plant species is found in seepage areas in the uppermost section of the hollow and is also found in rocky floodplain woods in the lower section of the hollow. A second and third plant species of concern grows on rich, moist lower slopes within the valley. The plants within the study are listed as rare and uncommon in the state. The animal of concern is associated with the rock outcrops and steep slopes of the hollow. It is listed as Pennsylvania Threatened and state protections guarantee the habitat and environmental factors that support that species. It was determined through this sampling, that the region is of high significance to the region for biodiversity and protection. This document states:

"Loss of canopy, direct disturbance to the soils or other changes in microhabitat could adversely affect the plants... Direct disturbances to the rock outcrops or structural change in the forest that alters the microclimate of the forest can negatively affect ... [Development] may have affected water quality and have certainly fragmented this largely forested watershed... Limestone quarrying and the activities associated with it could severely change the structure and landscape of the entire area... Large-scale extraction may not be compatible with the overall integrity of the valley and the watershed." (Western Pennsylvania Conservancy, *Fayette County Natural Heritage Inventory, July, 2002*)

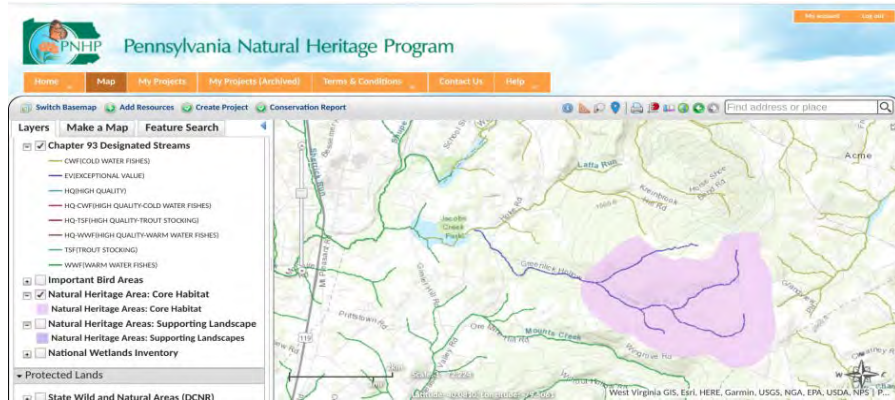
Figure 5: Natural Heritage Inventory Areas





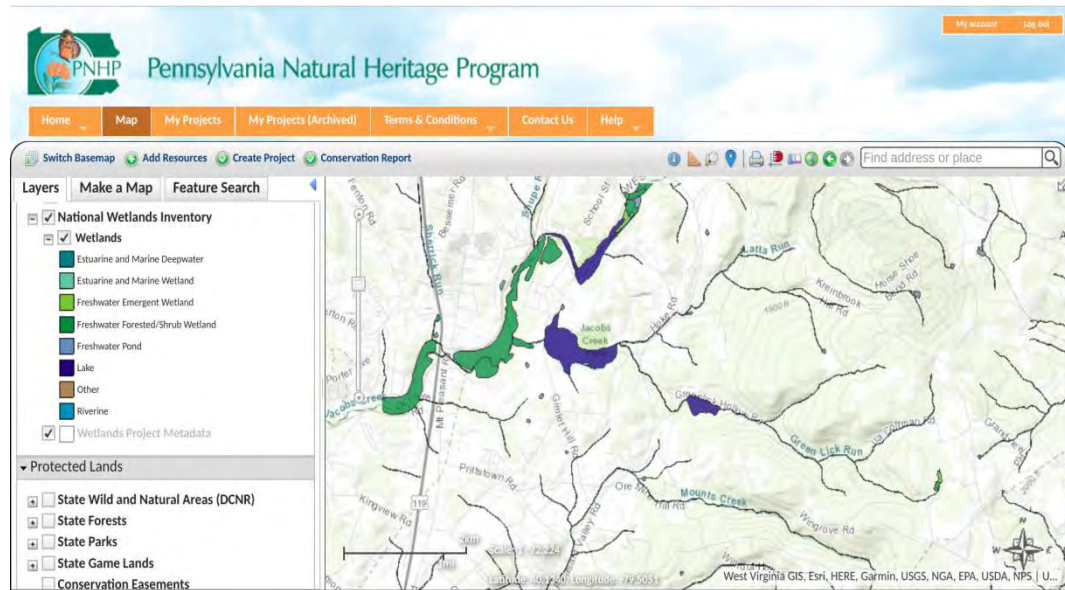
The core habitat area (see Figure 6 below) denotes the area that has the best habitat to meet the needs of the rare and endangered species. This should be the most protected area of the watershed.

Figure 6 – Core Habitat Area



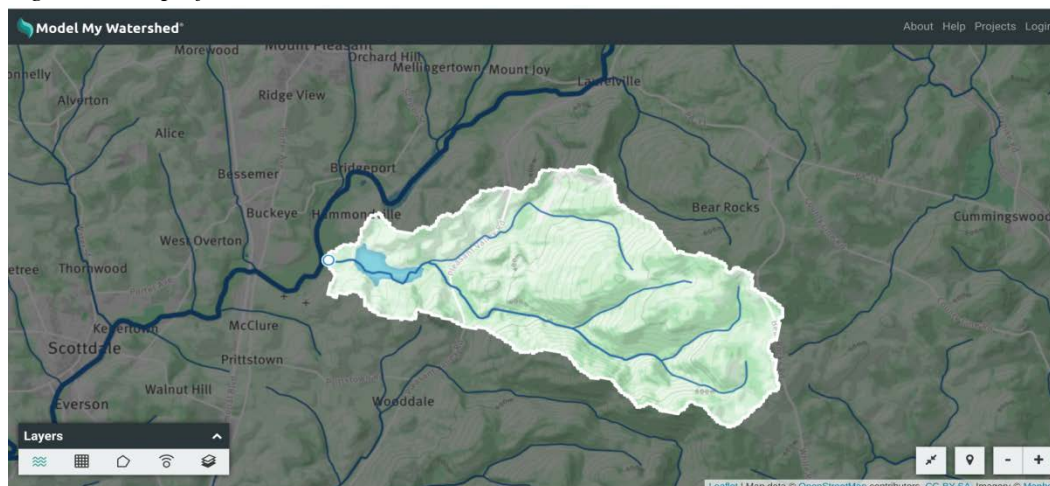
In addition, three wetlands are listed in the National Wetlands Inventory

Figure 7: Wetland Locations Identified in the National Wetlands Inventory



## *h) Map of Watershed*

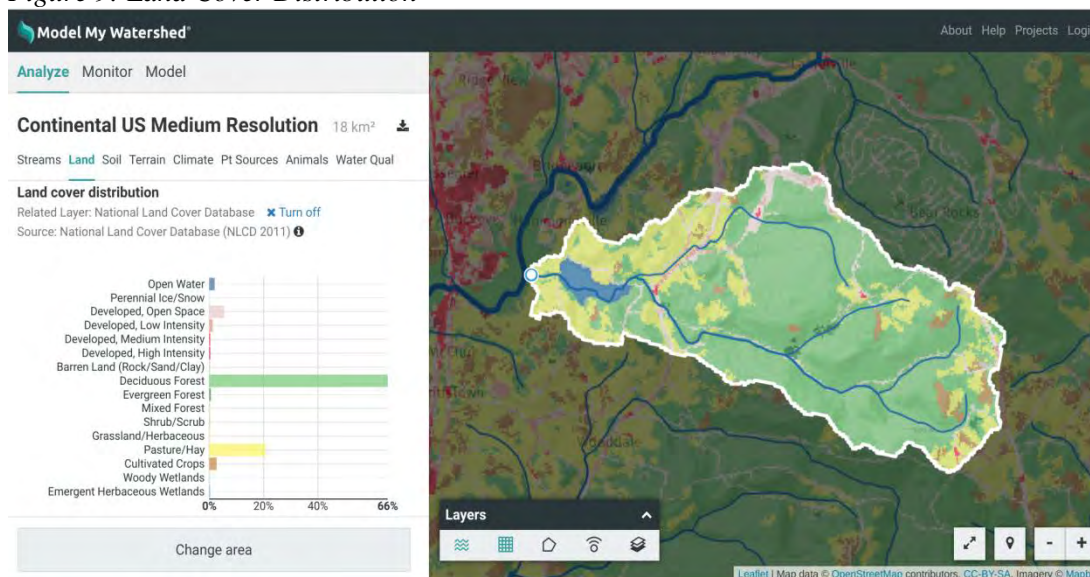
*Figure 8: Map of Watershed*



- i) Land Use (farming, residential, commercial/industry)* Figure 9 below shows the distribution of land cover types. The upper portions of Green Lick Run, on Chestnut Ridge, is a mixture of large farmland with crops and pasture (mostly beef and dairy), open land, some forested tracks, as well as containing some historic coal mined areas.

The middle section is mostly large forest land. This forest is reaching maturity. This heightens the risk that this area and Green Lick Run's riparian buffers are ripe for logging.

*Figure 9: Land Cover Distribution*

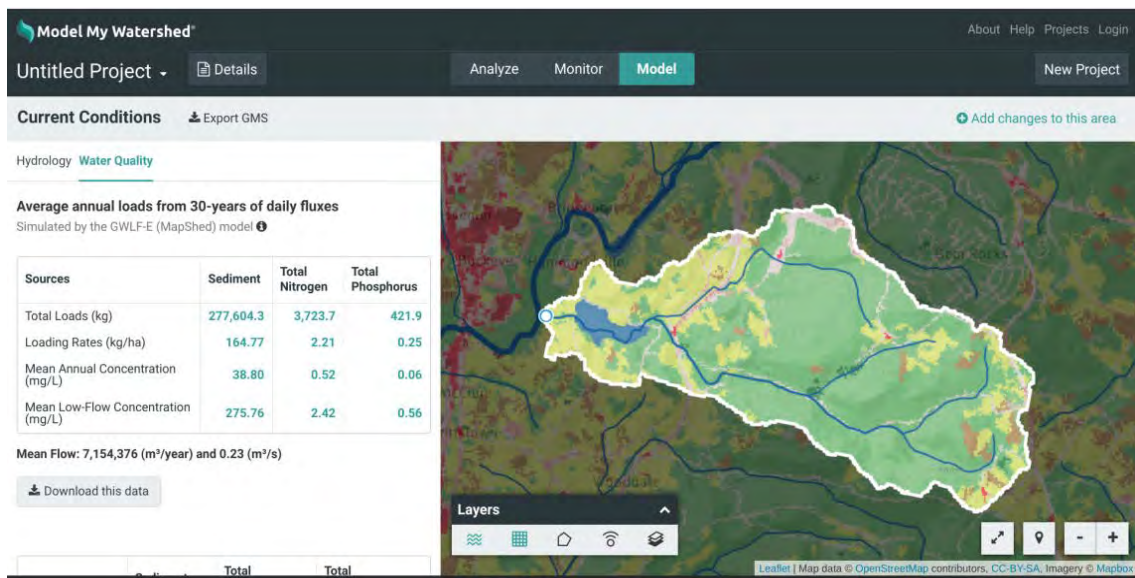


The middle section is also scattered with occasional residential housing within mainly wooded lots. This section is the location of the two water obstructions installed within Greenlick Run. The first dam was built in the 1800s for water supply to the Boroughs of Scottdale and Everson and rebuilt several times by the different water authorities. A legacy headwall is still located within the stream channel within this section of the creek. The dams are currently owned by the MAWC along with 236 acres. However, the MAWC is currently not using Green Lick Run as a water supply, but may be using the amount of water available to offset their taking of water from the Youghiogheny River. Further investigation into the potential use of this water by MAWC should be completed. This area also has three pools of deep gas in the Oriskany sandstone layer and some gas wells have been developed.



The lower section, where Latta Run enters, is a mixture of open farmland and residential areas and has large areas without riparian buffers and several shallow gas wells. Land use contributes a significant portion of nonpoint source pollution to the creek during each rain storm. Figure 10 below shows the amount of sediment loading into the Green Lick Run watershed.

Figure 10: Sediment Loads Within the Watershed



**j) Ownership – public and private – large tracts** – there are no public lands located in the headwaters of Green Lick or Latta Run. However, in the lower portion of the watershed there is the Green Lick Reservoir. This reservoir, seen in Figure 11 below, is a 101 acre lake owned and operated by the F&BC and home to Jacobs Creek Park (located within the reservoir) owned by Fayette County.

*Figure 11: Green Lick Reservoir and Jacobs Creek Park*



The largest private tracts of land are owned by the MAWC (236 acres), a land development corporation (231 acres) and Bullskin Stone & Lime LLC owns several tracts totaling 463.5 acres. A recommendation from this assessment is for JCWA to reach out to MAWC, the quarry and the land development corporation to discuss conservation easements, selling or donating the parcels to a land trust for protection. Since the quarry's application to mine was denied and Green Lick Run upgraded to Exceptional Value waters by the DEP, it seems unlikely that the agency would issue a permit in the future.

There are four farms with conservation easements registered under the Farmland Preservation Program. Several landowners in the middle section of Green Lick Run have leases with gas exploration companies. It is unknown whether these leases are for shallow or deep gas.

**k) Stream Impairment (303d list status – causes and sources)** Very little of this watershed is on the 303d list of impaired waters. Only the lower section of Green Lick Run, below the reservoir, and before it empties into Jacobs Creek is listed as impaired due to habitat modification and aquatic life. The reservoir has not been assessed by the DEP. However, it has been assessed by the F&BC (see Section 3, Data Analysis, b. Biological Analysis, 3. Aquatic Life). However, based on the Coldwater Heritage Plan assessment, the following issues are cause for concern within the 303 (d) list of impairments and are discussed further in Section 4) Areas of Concerns or of Opportunities.

**1) Abandoned Mine Drainage** – There were two areas that were mined for coal, however, no significant discharges remain. The field crew found a few seeps in the headwaters of Green Lick Run but they could be naturally occurring and did not degrade water quality.

- 2) **Abandoned Mined Lands** - A few areas were surface-mined but no noticeable features or degradation were observed.
- 3) **Active Mining (both coal and limestone)** – There are no active coal mines within this watershed, however, there is a closed limestone quarry in the Latta Run watershed and an operating quarry in the neighboring watershed of Mounts Creek. It is unknown whether the quarry in the neighboring watershed is impacting the water quantity of Green Lick Run. A study to document water quantity issues is recommended for a future project.
- 4) **Acid Precipitation** – Past pH results in the headwaters do not indicate that acid precipitation is degrading the watershed. However, recent water quality data in the headwaters show slightly lower pH. The limestone layer beneath Green Lick Run helps to neutralize any acid precipitation that might be occurring in the stream. A comprehensive water monitoring program is needed to further assess whether acid precipitation is present.
- 5) **Agriculture** – This is occurring throughout the watershed. However, the farms at the top of Chestnut Ridge are using established best management practices and several are in the Farmland Preservation program. The Latta Run watershed seems to be the most impacted. Farms in this tributary have no riparian buffers along the stream. Figures 12 below and 13 on Page 22 show lack of vegetated cover (riparian buffer) along Latta Run. Several projects have been identified in JCWA’s 2019 WIP. Recommendations from the WIP include stream bank fencing, riparian buffer plantings and instream habitat restoration.

Figures 12: Farm 1 - Lack of Riparian Buffer along Latta Run



Figure 13: Farm 2 - Lack of Riparian Buffer



- 6) **Logging** is occurring in small lots throughout the watershed and has caused minimal damage. However, approx. 90 acres was logged in the headwaters of Green Lick Run and equipment was driven through the stream. Figure 14 below shows the extent of the logging along the headwaters. The F&BC was notified and the owner cited. JCWA should reach out to landowners with information as to the best practices to use that will protect the stream during logging.

Figure 14: Logging in Headwaters of Green Lick Run

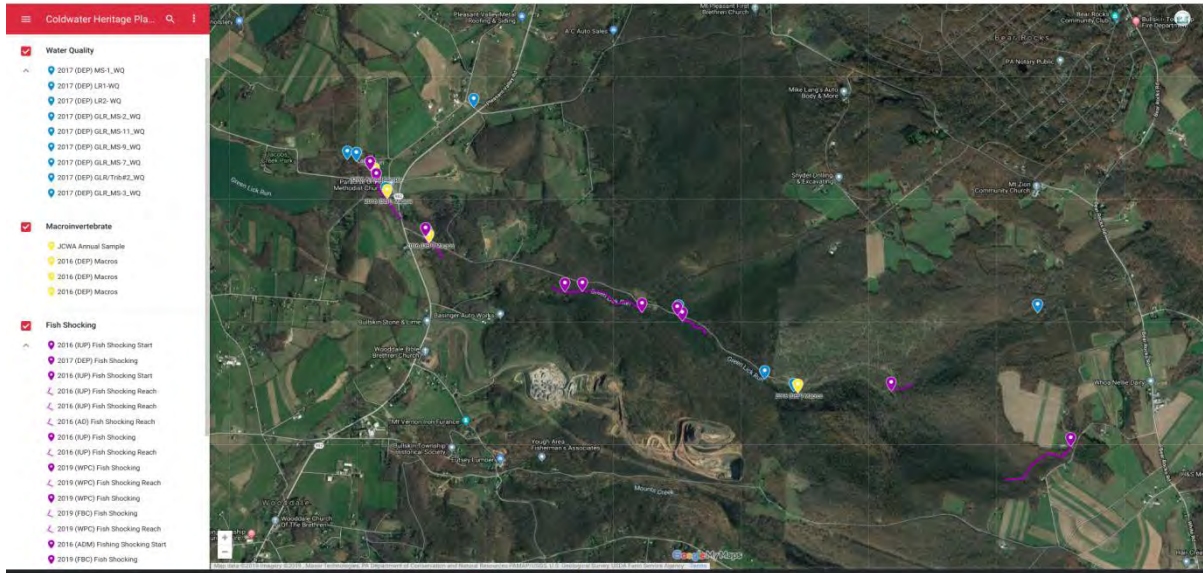


- 7) ***Illegal Dumping*** – There is a small amount of illegal dumping occurring in the watershed and can be cleaned quickly. However, this issue should be kept on JCWA’s radar screen since other areas within the Jacobs Creek watershed have serious illegal dumps.
- 8) ***Invasive Species*** – Garlic mustard is noted in open fields, however, a full study on invasive species was not completed during this assessment. This could be a project for future work.
- 9) ***Construction Activities*** – There are several construction locations at private residences with minimal impact on the watershed. However, one large construction project was an addition to the Paradise Church along Green Lick Run. The riparian buffer was cut down as part of the project, but the watershed group has educated the church about the importance of riparian buffers and will work with the church to re-establish the buffer.
- 10) ***Erosion and Sedimentation*** – Erosion is occurring throughout the watershed due to riparian habitat loss, logging, improperly maintained dirt and gravel roads, ATV crossings, and lack of proper agriculture practices. JCWA should keep this on their radar screen as well as discuss the potential risks with landowners.
- 11) ***Sewage*** – There is no public sewage in this watershed and testing for bacteria and excess nutrients from waste water was not performed under this grant.
- 12) ***Natural Gas Development*** – Several shallow gas wells exist within the watershed and the potential for development of “deep” gas wells exists in the Oriskany sandstone layer. When or if this will occur is unknown.

### 3) Data Analysis

#### a. *Map of Watershed showing proposed sampling points:*

Figure 15: Actual Sampling Points in 2016, 2017 and 2019



#### b. *Physical/Biological/Chemical Analysis*

##### 1. *Habitat assessments*

###### a) *Instream*

The upper main stem of Green Lick Run is heavily shaded by rhododendron and mountain laurel. The creek descends Chestnut Ridge quickly, and forms continuous riffle and pools around large boulders. Latta Run descending Chestnut Ridge also has the same characteristics. However, as Latta starts to encounter residential and agricultural areas, the habitat changes to a more sediment laden stream, some riffle/pools are noted. Green Lick maintains a nice riffle/pool and cobble bottom its entire length to its confluence with Latta Run. However, due to the lack of riparian buffers in the lower portions of Latta Run, it has caused erosion/sediment issues and loss of habitat leading to reduced macroinvertebrate and subjects Green Lick Run to extra sediment at its confluence.

b) *Riparian Corridor and surrounding areas* – The 2002 Fayette County Natural Heritage Inventory describes the forested areas of Green Lick and Latta as follows:



“The rich slopes are dominated by tulip tree (*Liriodendron tulipifera*), red maple (*Acer rubrum*), sugar maple (*Acer saccharum*), yellow birch (*Betula allegheniensis*), red oak (*Quercu rubra*) and beech (*Fagus grandifolia*) in the overstory.

Understory includes rosebay rhododendron (*Rhododendron maximum*), spicebush (*Lindera benzoin*), elderberry (*Sambucus canadensis*), cucumber tree (*Magnolia accuminata*) and wild hydrangea (*Hydrangea arborescens*).

Herbs present are nodding mandarin (*Disporum lanuginosum*), intermediate shield fern (*Dryopteris intermedia*), broad beech fern (*Phegopteris hexagonoptera*), jack-in-the-pulpit (*Arisaema triphyllum*), wild oats (*Uvularia perfoliata*) and many others.” (Fayette County’s Natural Heritage Inventory, July, 2002).



**c) Aquatic organism passage (stream crossings)** Green Lick Hollow Road, Pleasant Valley Road and Mudd School Road have culverts channeling the streams but all are in good repair. As seen in the photo below, after a culvert, the gabion basket area has filled in nicely with vegetation thereby minimizing erosion and sedimentation. However, there are noticeable areas where ATV trails are crossing the streams on the property owned by MAWC and one of the landowners logged in the headwaters. In addition, there are two old dams constructed on the main stem of Green Lick Run which has been rebuilt several times since the late 1800’s when it was used as a water supply. The current owner, MAWC is not using Green Lick Run as a water supply.



## 2. Water quality (pH, alkalinity)

Data was collected from historical documents. Two major reports dealt with stream re-designation due to the threat of a limestone quarry’s application. Both reports show water quality results that meet the designated use of an Exceptional Value Stream (EV) and the stream was upgraded in 2002. Using the historical information, nine water grab samples were collected by JCWA and analyzed by DEP’s laboratory in Harrisburg, PA. Parameters tested include: acidity, alkalinity, conductivity, aluminum, manganese, iron, phosphates, nitrates, total dissolved solids, and hardness.

The 2017 water sampling results (Figure 16 below) are consistent with prior sampling and meets the parameters of an EV designation along the main stem of Green Lick Run and a CW-CWF designation for Latta Run. However, JCWA should investigate why Aluminum, Suspended Solids and TDS were elevated at Sample location I20170017707. This location, along with sample location 120170017708, are at the very top of Chestnut Hill, in the headwaters of Green Lick Run. In addition, Sample number 1201700177710, located in a tributary in the headwaters, shows a slightly lower pH value. Other watershed groups in the area have found that acid precipitation is affecting the pH and chemistry of the water. Continuous monitoring may show that this was a one-time event. However, if occurring frequently, efforts should be made to improve water quality.

Green Lick Run Lab Results for Water Samples 6/30/2017

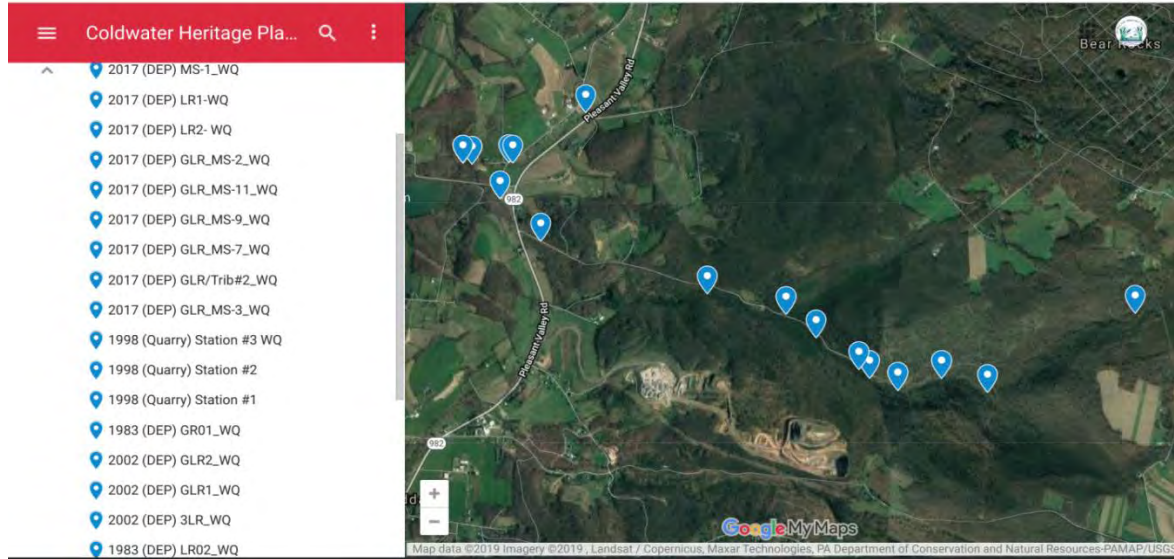
Sample ID	Temp C	Temp F	Alkalinity mg/L	Chloride mg/L	Magnesium mg/L	Manganese mg/L	Aluminum mg/L	Calcium mg/L	Iron mg/L	Sodium mg/l	Suspended Solids mg/L	Hot Acidity mg/L	Sulfates mg/L	TDS mg/L	pH
I20170017703	21.77	71.1	26.2	3.6	2.432	0.021	< 0.20	11.2	0.168	3.006	8	-21.2	<20.0	72	7.3
I20170017704	21.73	71.1	30.6	11.2	2.932	0.037	< 0.20	12.4	0.194	7.295	< 5.0	-24.6	<20.0	84	7.4
I20170017705	20.74	69.3	23.6	11.2	2.458	0.019	< 0.20	10.5	0.110	7.006	< 5.0	-5.4	< 20.0	78	7.2
I20170017706	21.62	70.9	24.6	3.2	2.421	0.012	< 0.20	11.2	0.131	2.1	< 5.0	-19.6	< 20.0	68	7.3
I20170017707	20.40	68.7	20.4	9.9	1.829	0.034	0.645	9.41	0.817	5.886	14	-3.4	< 20.0	346	7.1
I20170017708	20.29	68.5	29.6	3.9	1.482	0.023	0.277	6.648	0.328	3.626	<5.0	-25.8	< 20.0	284	7.4
I20170017709	20.26	68.5	17.4	3.8	1.731	0.018	0.202	9.32	0.190	2.232	< 5.0	-16.2	< 20.0	60	7.2
I20170017710	20.20	68.3	9.6	3.0	1.445	0.022	0.217	6.859	0.221	1.855	< 5.0	-8.2	< 20.0	46	6.9
I20170017711	20.20	68.3	23.2	3.2	2.289	0.010	< 0.20	10.2	0.140	1.762	< 5.0	-20.6	< 20.0	68	7.3

Figure 16 – Lab Results for Water Samples June 30, 2017

Sampling locations 120170017704 and 120170017705 are in the Latta Run watershed. Those samples show an increase in Chloride, Magnesium and Sodium. Temperature also starts to increase at those sample location along with sample locations 120170017703 and 120170017706 which were taken on the main stem of Green Lick Run before and after Latta Run enters. This area is where extensive agriculture is taking place as well as the removal of the riparian buffers. With the re-establishment of a robust riparian buffer, improved agricultural practices and some stream habitat work on Latta Run, the stream could be upgraded to a high quality (HQ) designation.

All historical and current water quality sampling locations are shown below:

Figure 17: Historical and Current Water Quality Sampling Locations



### 3. Aquatic life

#### a. Invertebrates

Historical data was collected on the macroinvertebrate populations and it was determined that eight sampling locations would be used for this grant. Those sampling points (which include the historical locations) are noted below in Figure 18. To collect macroinvertebrates, a large kick-net with fine pore-size mesh was used. Larger rocks that could not be moved during the kicking process were flipped and scraped off by hand. At each location multiple areas that cover different benthic habitats, such as: riffles, pools, and runs were sampled. After kick-netting was completed, individuals were stored in 75% laboratory grade ethanol and returned to the laboratory to be identified by Order and Family at the IUP's Aquatic Ecology Laboratory. Literature used to identify macroinvertebrates were: *Freshwater Macroinvertebrates of Northeastern North America* (Peckarsky et al. 1990), *Introduction to Aquatic Insects of North America* (Merritt and Cummins 2008), as well as many family level identification keys that are designated to certain sensitive species. Results of the macroinvertebrates can be found in Figure 19 below. The species caught were diversified from pollution intolerant mayflies to pollution tolerant midges. The numbers of species was slightly lower in the 2016 and 2017 samples.

Figure 18: Historical and Current Invertebrate Sampling Locations

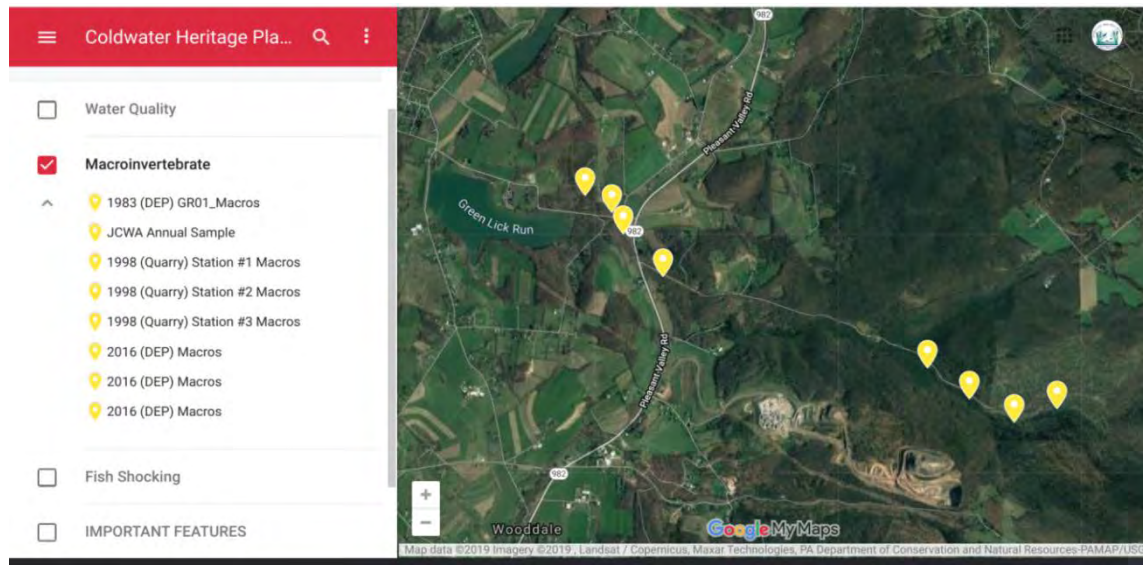


Figure 19: Results of Sampling at the Confluence of Green Lick and Latta Run

ORDER	FAMILY	COMMON NAME	2015	2016	2017
Megaloptera	Corydalidae	Dobsonflies/Hellgrammites			2
Plecoptera	Leuctra	Rolled-Winged Stoneflies/Needleflies	10		
Coleoptera	Elmidae	Riffle Beetles	21	2	
Coleoptera	Psephenidae	Water Penny Beetles	5	2	
Decapoda	Cambaridae	Crayfish		2	2
Diptera	Tipulidae	Crane Fly Larva	17	10	9
Diptera	Chironomidae	Nonbiting Midges	20	2	2
Diptera	Tabanidae	Horsefly Larva/Deer Flies	1		
Ephemeroptera	Leptophlebiidae	Prong-Gilled Mayflies	4		5
Ephemeroptera	Baetidae	Minnow Mayfly Larva	1		1
Ephemeroptera	Heptageniidae	Flat-Head Mayfly Larva	46	10	4
Lepidoptera	Noctuidae	Cutworms/Owlet Moths/Dagger Moths	2		
Plecoptera	Perlidae	Common Stoneflies	7	2	5
Plecoptera	Peltoperlidae	Roachlike Stoneflies	1		1
Plecoptera	Perlodidae	Perlodid Stoneflies/Striptails/Springflies			2
Trichoptera	Philopotomidae	Finger-Net Caddisflies	43		1
Trichoptera	Hydropsychidea	Net-Spinning Caddisflies	28	3	9
Trichoptera	Limnephilidae	Northern Caddisfly		1	
Trichoptera	Polycentropodidae	Trumpet Net/Tube Making Caddisfly			1
Trichoptera	Psychomyiidae	Similar to Tube Making Caddisfly Above			1

Total taxa richness for the entire watershed (below) has fluctuated slightly from the historical results. The highest amount was during the DEP investigation for the upgrade to the watershed. Results from 2016, 2017 and 2018, although good, show a decline. One suggestion was made during the final public meeting that due to the last several years of intense rain events the macroinvertebrate populations in neighboring watersheds has taken a sharp decline. This could possibly be the answer in this watershed. Other suggestions to the concern of the downward trend made during the public meeting were: (a) due to the destruction of the riparian buffers along the stream; (b) ATVs usage running through the streams. JCWA must be committed to continue to sample this watershed and start to implement measures to stop the decline.

*Figure 20: Historical and Current Total Taxa Richness*

	1983 (FBC)	1999 (Quarry)	2002 (DEP)	2016 (JCWA)	2016 (CWH)	2017 (JCWA)	2018 (JCWA)
Total TAXA Richness	17	10	24	9	15	14	10

**b. Fish**

The electrofishing protocol was based off F&BC Unassessed Trout Waters Program. All historical data was collected and eight sampling locations were identified for this grant. Prior to electroshocking, however, conductivity, alkalinity, and pH were measured using a YSI probe. Afterwards, a 100-meter reach of each sampling location was surveyed and all fish species were captured by dip nets and identified to species. When Trout species were caught, length measurements were taken to evaluate the different sizes classes. All other fish species were identified, and the total number of individuals caught per species were recorded. After fish data processing had concluded, all individual fishes were returned to the water. Brook Trout that were caught were returned to their exact location from where they were captured.

The figure below summarizes three historical assessments and the JCWA sampling in April, 2016. The F&BC sampled at two sites: one immediately above and one immediately below the small low head dam. The Rainbow Trout caught were below the dam. The EcoSolutions assessment sampled at three locations. Eight Rainbow trout were captured below the dam and the 13 Brook trout were collected above the dam. In the DEP assessment, they collected fish at one location, near the dam. They found Rainbow trout, but the report does not say how many or whether the sample site was above or below the dam. JCWA sampled at nine locations; seven on Green Lick Run and two on Latta Run. Six Rainbow trout and two Brook trout were collected below the dam area where Green Lick Run crosses under SR 982. Two Rainbow Trout were collected immediately above the dam area. One Rainbow Trout and one Brook Trout were collected further upstream from the dam in the area of where the logging had taken place. This presents a challenge to JCWA. In the EcoSolutions sampling several Brook Trout were found above the dam and no Rainbow Trout were collected. In JCWA’s sampling a Rainbow Trout was collected and only one Brook Trout leading

to the summation that the Brook Trout population could be in jeopardy. JCWA should continue sampling in the headwaters of Green Lick Run and notify the landowners that logging thru a stream is not a good practice. Finding Brook Trout below the dam was very surprising. This could mean that water quality is improving further in the watershed but more than likely they were washed over the dam during times of flooding. The WPC is in negotiations with MAWC, the owner the dam, in order to remove it. There is a concern that allowing the more aggressive Rainbow Trout to move into the historical area of the Brook Trout range above the dam could further decimate the fragile Brook Trout population. Further discussions should take place between all parties.

Figure 21: Historical and Current Trout Collections

	PA F&B Study 6/1996	EcoSolutions 11/1998	PA DEP 1/2001	JCWA 4/2016
Wild Reproducing Rainbow Trout	5	8	X*	9
Brook Trout	0	13		3
* No Specific Numbers were reported in the DEP 2001 Assessment				

Figure 22: Historical and Current Fish Shocking Locations

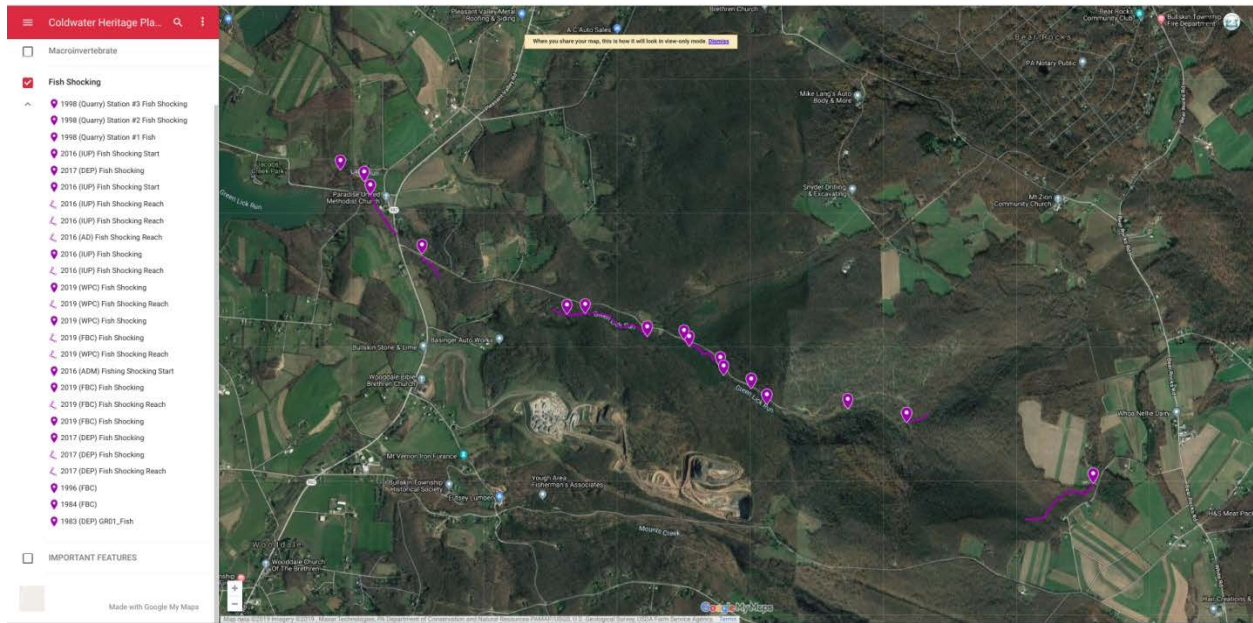


Figure 23: Table of Other Fish Caught during Electroshocking

Table 3: Electrofishing Identification Summary

Species	Site #				Species Total
	1	5	10	14	
Blacknose dace	6	102	3	67	178
Bluegill	1			1	2
Common shiner				4	4
Creek chub		1	5	27	33
Emerald shiner				7	7
Fantail darter			1		1
Johnny darter				4	4
Longnose dace	1	24	2	65	92
Margined madtom				1	1
Northern hogsucker	21		5	1	27
Pumpkinseed	1	4	4	2	11
Rainbow darter	9			6	15
Slimy sculpin				1	1
Tessellated darter	55			49	104
White sucker	1	10	2	3	16
<b>Site Totals</b>	<b>95</b>	<b>141</b>	<b>22</b>	<b>238</b>	<b>496</b>

However, the final results, when looking at the overall types of cold water loving, pollution intolerant species of invertebrates and fish; and good water quality, show that the watershed is continuing to meet its designated uses of EV for Green Lick Run and CWF for Latta Run. Once the riparian buffer is re-established along Latta, a petition could be submitted to upgrade the stream to HQ.

#### 4. The Reservoir

The **Green Lick Reservoir** is a 101 acre lake owned by the Commonwealth of Pennsylvania and managed by the F&BC for walleye, largemouth bass, crappie, bluegills, carp, channel catfish and suckers. It has a Chapter 93 designation as a warm water fishery. However, before Green Lick Run enters the impoundment, it is classified as a cold water fishery and trout have been caught within the lake. In addition, the outfall area of the reservoir is listed on the 303d List of Impaired Waters by the DEP which would allow EPA's 319 Program funds to be used here. JCWA felt that the reservoir should be part of the Green Lick Run Cold Water Heritage Partnership Assessment because if the riparian buffers were re-established before the lake, more trout will be able to move freely to and from the lake as weather changes.

The lake is a mildly turbid lake with moderate productivity (alkalinity 20 parts per million). It has a variety of habitats ranging from vegetated near shore zones to rock ledges. Fayette County maintains Jacobs Creek Park within this reservoir. Using funds from DCNR, a Master Plan for the park was completed in 2019. One of the proposed projects from the Master Plan is to construct a walking trail around the lake. This will allow more fishing opportunities.

Biologists from the F&BC's Area 8 office in Somerset, PA surveyed the lake in March and April 2016 using night electrofishing and trap nets to evaluate the lake's walleye population.

*Figure 24: F&BC Fish Assessment of Green Lick Reservoir*

**Length and frequency distribution of fish from April, 2016 trap netting.**

Species	Number caught	Size range (inches)	Comments
Walleye	76	13-23"	88% legal fish
Black Crappie	68	3-11"	40% over 9 inches
White Crappie	4	3-10"	75% over 9 inches
Bluegill	120	2-8"	40% over 7 inches
Pumpkinseed	2	4-5"	
Yellow Perch	20	3-8"	
Muskellunge	1	41"	
Northern Pike	1	27"	
Flathead Catfish	2	25"	
Common Carp	4	Not Measured	
Emerald Shiner	1	Not Measured	
Golden Shiner	3	Not Measured	
White Sucker	15	Not Measured	

*Pennsylvania Fish and Boat Commission Biologist Report.....2016*

However, the DEP has not assessed the lake for water quality parameters. This is an opportunity for the watershed group to petition the agency to do so.

The outflow of the lake is listed on the 303d List of Impaired Waters for habitat modifications and lack of aquatic life. Further investigation by JCWA is needed to design a project to improve the habitat and petition the EPA for 319 Program funds handled by a section of the DEP.



#### **4) Areas of Concerns or of Opportunity**

1. Large farms with no riparian buffers and killing of roadside vegetation beside their fields are allowing silt/sediment, herbicides and pesticides to discharge directly into the stream.
2. A dam is impeding the spread of native brook trout from moving to find better cover or food sources. However, it is also holding back silt and sediment and improving the water quality of the downstream portion of the stream. According to the results of this study, the portion of the stream below the dam has a larger diversity of fish and macro invertebrates. If the dam is removed, the contractor has to be careful that the silt/sediment is not transferred to the downstream section of the stream in large quantities. It could have a disastrous effect on the downstream ecosystem. Also, work should be done upstream of the dam to reduce the sediment load and increase the alkalinity before the dam is removed. Further investigation should also occur as to whether the removal of the dam will increase water loss into the limestone below the stream bed. This has been an issue in the past when the dam was replaced and they placed the highwall too deep into the bed of the stream. A final issue would be to discuss the removal of the dam with the current water authority. They could be using the dam (water reservoir) to offset their permitted water withdrawal on the main stem of the Youghiogheny River. The final major concern to the dam removal is whether the fragile Brook Trout population living above the dam would be decimated by the more aggressive Rainbow Trout population living below the dam.
3. A limestone quarry with a new asphalt plant, in the adjacent watershed, may be impacting surface and groundwater flow and possibly creating air and particle emissions. This will need a further review with the Pennsylvania District Mining Office as well as a need for further hydrologic studies. Land within the Green Lick Run watershed is owned by Bullsken Stone and Lime. They should be approached to determine if they would donate or sell their property or enter into a conservation easement with a land trust for protection.
4. Logging operations have stripped the entire riparian buffer and forest canopy in some of the headwaters and machinery driven through the stream. The F&BC had been called to this site. This is an opportunity for JCWA to work with the landowner to re-establish the riparian buffer and to educate other landowners within the watershed as to the benefits of the riparian buffer. This would be a good opportunity for JCWA to mention entering into a conservation easement, selling or purchasing the land for protection.
5. Stream habitat improvement is needed throughout this entire watershed. Some areas have heavy siltation, other areas have the riparian buffer missing.
6. The outflow area from the Green Lick reservoir should be assessed and improvements made. This section is on the 303d list of impaired waters, as determined by the DEP in their 2019 Integrated Water Quality Report. Further investigation by JCWA is needed. DEP has not assessed the lake under their Lake Management Section.
7. There are five pools of deep gas (unconventional gas) in the Oriskany sandstone layer located in this watershed. Unconventional gas extraction is a major cause for concern

because three of the gas pools lay directly beneath the main stem of Green Lick Run. The two remaining pools are slightly north of Latta Run. In addition to the five Oriskany gas pools, shallow gas pools (conventional) from the Venango and Bradford Groups discovered in 1975 are located to the north side of Green Lick Reservoir as well as the western edge of Latta Run. Several landowners along the main stem of Green Lick Run and Latta Run have leases signed with exploration companies and recorded at the courthouse but the information at the DEP office does not state whether they are conventional or unconventional gas wells. JCWA should address future gas well development within this watershed with the landowners. The potential exists for dewatering or contamination of the surface water and aquifer.

8. Several township roads throughout the watershed are in need of improvement to keep sediment out of the stream. Bullsken Township has used the Dirt and Gravel Road Program but needs to concentrate their efforts on utilizing environmentally sensitive maintenance practices on the steeper sections of the roads. The gravel is washed away in these sections, and the water picks up dirt and rocks and carries them into the stream. Several sections of the roads have deep ruts in the middle of the roads as well as the ditches that have been carved out from periods of intense precipitation. Installing water bars across sections of the road to divert the sediment laden water into grass swells will significantly improve the water quality in these areas.

Greenlick Hollow Road – vegetated edge



Greenlick Hollow Road – dirt and erosion



9. The Natural Heritage Inventory assessment for Green lick Run is 20 years old. A new inventory should be completed in order to evaluate what has changed within this watershed. In the meantime, simple forest management plans and agriculture best management practices should be made available to the large property owners. In addition, monitoring of plants and animal populations is critical in understanding the effects that activities within and outside of the watershed have on their viability.

10. A positive outcome of working on this project has allowed JCWA to meet some of the farmers in the headwaters. There is a great working relationship now with the “Whoa Nellie” farm. In fact, they have received NRCS funds to do fencing and better pasture

grazing for their beef and milk cows. They are hoping to convince neighboring farms to apply for NRCS funds.

## **5) Conclusions and Recommendations**

- a. Several projects for restoration have surfaced while completing this study.
  - 1) Landowner outreach should be a top priority moving forward. Many landowners do not realize that riparian forest buffers should be maintained for the health of the stream or that their wells should be tested regularly for both quality and quantity purposes. In addition, larger landowners should be approached to protect the riparian corridor by either securing conservation easements; donated to a land trust or outright purchase of property. ATVs running through streams is a major source of siltation. JCWA should reach out to landowners.
  - 2) Riparian forest buffers have to be replaced in this watershed. Several areas were clear cut and machinery was run through the small headwater streams. Specific locations are in the headwaters of Green Lick Run; Paradise Church property; most of the Latta Run sub-watershed.
  - 3) Two small low head dams were discovered keeping brook trout from moving up and down the stream. This dam should be evaluated further as to the pros and cons to be removed. On one hand it is impeding trout from moving up and down the stream for better habitat or food and on the other hand the dam is holding back the more aggressive Rainbow Trout from mingling with the Brookies. The dams also hold back excess sediment and helps to oxygenate the water below. Macroinvertebrate samples show increased populations below the dam.
  - 4) Stream habitat improvement should be completed in the headwaters where it was logged and along Latta Run as well as where it enters Green Lick Reservoir. The section where it enters Green Lick Reservoir is a muddy, silty bottom in a pastured field with livestock and is an unhealthy habitat for macroinvertebrates, as well as fish.
  - 5) Education and outreach about gas well drilling and the leasing of property should be employed. Many landowners do not know how to get their drinking water wells tested before, during and after a well is drilled not only for quality but quantity purposes. There are also erosion and sediment control measures that drilling companies should follow. After a well is constructed, there should be follow up to control invasive species from colonizing the area. Many people within this watershed have not signed lease agreements yet. They may not know that there is gas located here or they have refused to sign. JCWA has to be careful in getting the message out about proper lease agreements and to possibly purchase the riparian buffer from the property owners to help protect the stream from siltation before gas leases are in place.
  - 6) JCWA and Bullskin Township should partner to improve the dirt roads in this watershed. Water bars should be used on the steeper areas to divert the water into vegetated roadside ditches instead of directly to the stream. The Dirt and Gravel Road Program should be explored as a source of funds.
  - 7) Streambank fencing on some of the larger farms in the area will help to keep animals out of the stream and the small tributaries, thus reducing erosion and sedimentation. The USDA Natural Resources Conservation Service (NRCS) is currently looking for landowners to install best management practices.
  8. Petition PA DEP Lake Management Group to assess the Green Lick Reservoir. Innovative technologies such as “floating island wetlands” could be installed within the reservoir to reduce the sediment particles within the lake.

9. Assess the outflow area of the reservoir to identify projects to improve the habitat and macroinvertebrate population.

**b. *Include goals, objectives and specific projects which can be undertaken in the future. Include options that promote resource awareness and stewardship.***

1. Petition the WPC to update the Natural Heritage Inventory for Green Lick Run. In reading through the document, it seemed like they only targeted Green Lick Hollow Road - there are several tributaries not close to the road that should be inventoried. In addition, sections of Latta Run near Sweitzer Road and Ohler Road should be assessed.
2. At the final public meeting hand outs were available on best management practices and green infrastructure ideas for agricultural areas, and private residences as well as information on the importance of protecting and preserving the riparian buffers. JCWA will follow up with the property owners in order to discuss the potential for projects under the EPA's 319 program.
3. Discuss the removal of the dam with the MAWC and the WPC, especially the pros and cons.
4. Discuss the potential of conveying easements of the riparian buffer to the WPC. They are already in possession of several conservation easements in Fayette County.
5. A bird study, especially migratory birds, should be completed. Chestnut Ridge is the first major ridge east of the Rocky Mountains. The National Fish and Wildlife Foundation is currently seeking applications from the Laurel Highlands region for assessments of certain types of migratory birds, brook trout and hellbenders.
6. Convince Fayette County Commissioners to enact special protection for the Green Lick Run watershed.
7. Establish a water quality and quantity monitoring program for the watershed. It is unknown whether the limestone quarry in the adjacent watershed is having an impact on the aquifer of Green Lick Run.

**c. *Is there an opportunity for a Chapter 93 designation upgrade?*** The upper reaches of Green Lick Run to its confluence with Latta Run are already designated as Exceptional Value. The only additional protection would be if it is classified as a Class A Wild Trout Stream.

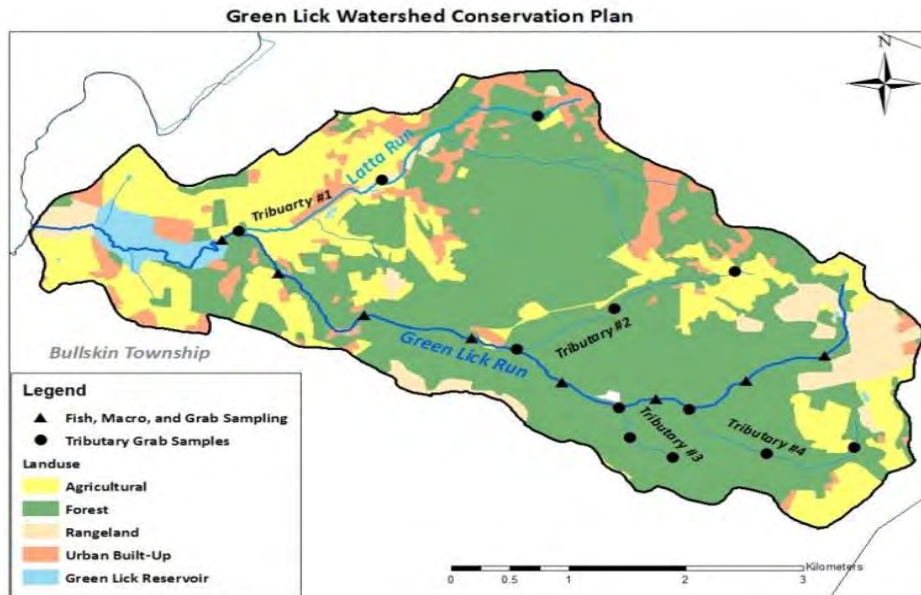
However, Latta Run is identified as a cold water fishery but with the re-establishment of the riparian buffer, and improved agricultural practices it could be upgraded to a high quality cold water fishery.

The remaining section from Latta Run into Green Lick Reservoir and eventually into Jacobs Creek is classified as a warm water fishery. However, if a robust forest riparian buffer were re-established as well as stream habitat improvements implemented, allowing the benthic community to re-establish itself, then this area could be upgraded to a Cold water fishery.

- d. *Future funding opportunities and/or potential partners.* The Coldwater Heritage Plan will become part of the JCWA's WIP which receives funding from the EPA's 319 Non-point Source Program. However, JCWA has to petition DEP to add the specific locations identified in WIP onto the 303d list of impaired waters. Any recommendations for projects in this Plan could be eligible for the 319 funds once the locations are on the list. In addition, there are watershed grants for small projects available from the WPC, Community Foundations as well as the implementation funds through the Coldwater Heritage Partnership. The JCWA would be able to match these grants in order to do a small project. The current project partners such as CRTU, Bullsken Township Supervisors and the FCCD would be able to assist when needed.

**Appendices - Additional Information Not Cited in the Narrative Above**

***Proposed Sampling Points for the Grant Application with Old Land Cover Information***



**Current Land Cover Data**

Model My Watershed<sup>®</sup>

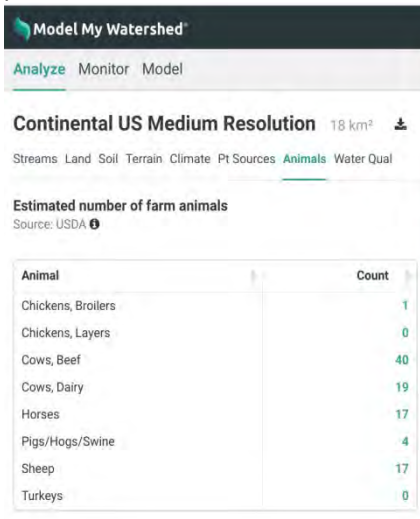
Untitled Project - Details

Current Conditions Export GMS

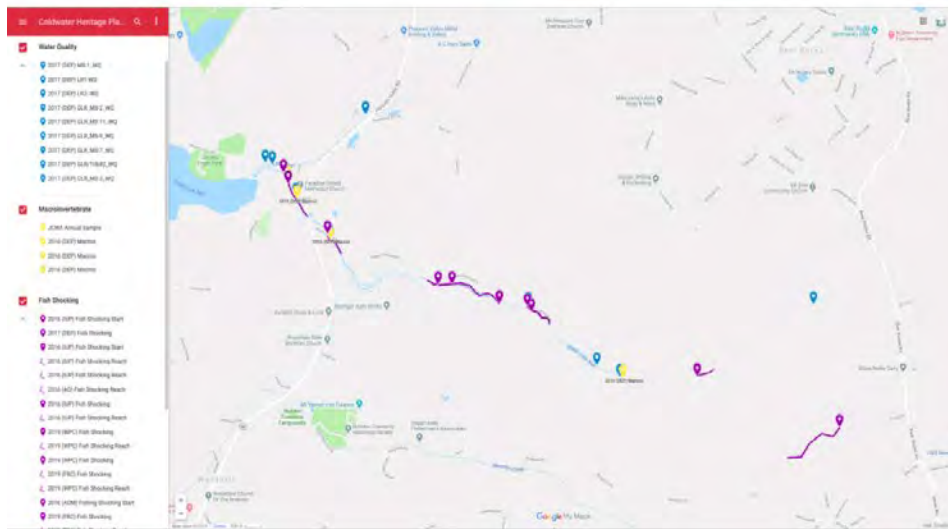
Hydrology Water Quality

Sources	Sediment (kg)	Total Nitrogen (kg)	Total Phosphorus (kg)
Hay/Pasture	77,971.8	425.4	116.1
Cropland	75,398.4	365.1	76.2
Wooded Areas	961.8	55.8	3.6
Wetlands	0.0	0.0	0.0
Open Land	0.0	0.0	0.0
Barren Areas	1.5	0.3	0.0
Low-Density Mixed	273.7	6.7	0.7
Medium-Density Mixed	214.9	3.8	0.4
High-Density Mixed	10.2	0.2	0.0
Low-Density Open Space	1,210.2	29.8	3.2
Farm Animals	0.0	359.8	93.8
Stream Bank Erosion	122,772.0	105.0	26.0
Subsurface Flow	0.0	2,393.7	105.1
Point Sources	0.0	0.0	0.0
Septic Systems	0.0	8.1	0.0

## Types of Livestock within the Watershed

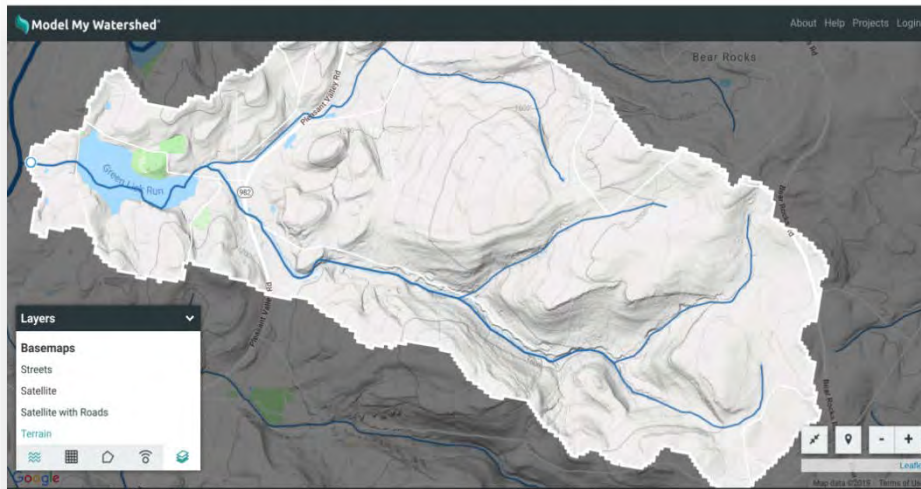


## Combination of Sampling Points Over the Years





## Map Showing Steep Slopes



## Additional Photos

Wild Geraniums  
(*Geranium maculatum*)  
Known as Spotted geranium and Cranesbill  
has showy pink to lavender flowers.  
Blooms early, Mar-June and  
likes shade, part shade. Spreads in  
woodland areas by rhizomes and seeds



Wild Pink Azalea  
(*Rhododendron arborescens*)  
known as the sweet azalea, has white to  
blush pink flowers with red stamens and a  
very strong fragrance. Blooms in late spring  
and can be found growing near streams or  
moist areas



*One of the farms preserved through the PA Farmland Preservation Program*



**c. References**

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- Pennsylvania Public Service Commission....*Borough of Scottdale et al vs Citizens Water Company*....May 4, 1920
- Pennsylvania State University digital geologic maps
- Western Pennsylvania Conservancy, *Fayette County Natural Heritage Inventory* July, 2002