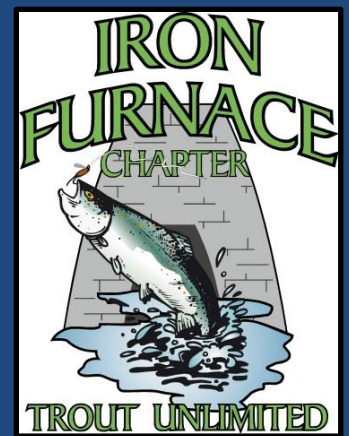


CATHERS RUN WATERSHED ASSESSMENT

Prepared by:

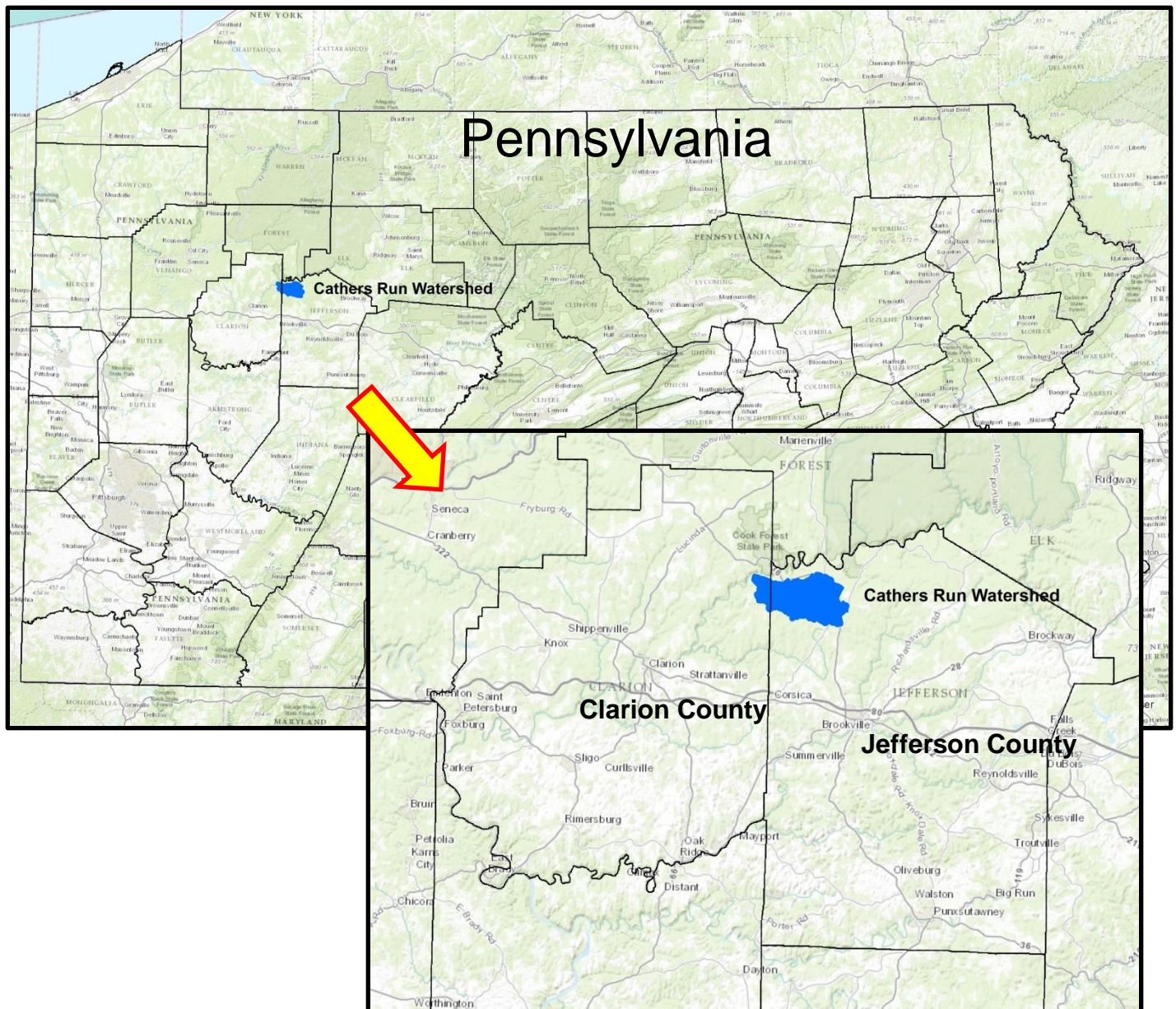
Bruce Dickson
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Applied Geology and Environmental Science
February 14, 2014



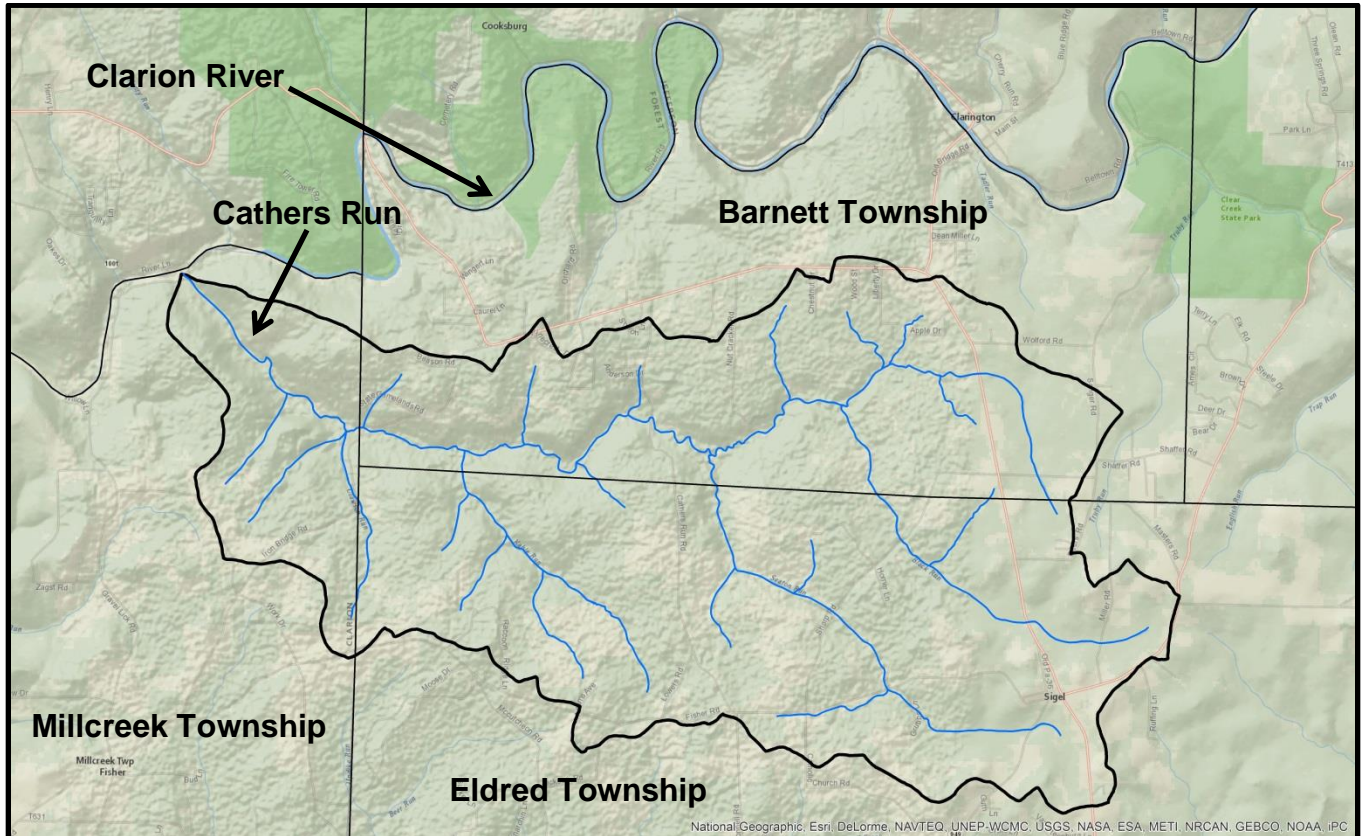
Cathers Run Watershed Assessment

Introduction

Cathers Run is a small cold water stream located in Clarion County and Jefferson County in the northwestern portion of Pennsylvania (see maps below) in the Allegheny River basin. Cathers Run is one of a few streams in Clarion County or Jefferson County that was not historically impacted by surface mining that supports a native Brook Trout population. The latter makes it a popular fishing destination not only to locals but also for those that come from the Cleveland and Pittsburgh metropolitan areas. Population centers located near Cathers Run include Brookville, Marienville, and Clarion. Smaller towns include Sigel and Fisher. The watershed is also in close proximity to Cook Forest State Park and Allegheny National Forest.



Cathers Run flows in a generally westward direction and confluences with the Clarion River downstream of Cooksburg, Pennsylvania (see map below). The Clarion River is part of the National Wild and Scenic River System. The Clarion River meets the Allegheny River at Parker, PA.



As previously stated the watershed is located in Clarion and Jefferson County. Three townships share the watershed. Millcreek Township is located in Clarion County on the western portion of the watershed. Barnett and Eldred Township are in Jefferson County with the former located on the north side of the watershed and the latter in the southern portion.

Purpose of Assessment

The completion of a preliminary watershed assessment will produce an overview of current resource conditions in the Cathers Run watershed. The information generated from the watershed characterization will be used by Iron Furnace TU and Millcreek Township to develop a strategic plan for follow-on data collection (i.e., comprehensive watershed data collection if needed to support a Rivers Conservation Plan and eventual placement in the Rivers Registry) and/or advance watershed based planning, management, and restoration options at the local level to identify and implement priority conservation projects.

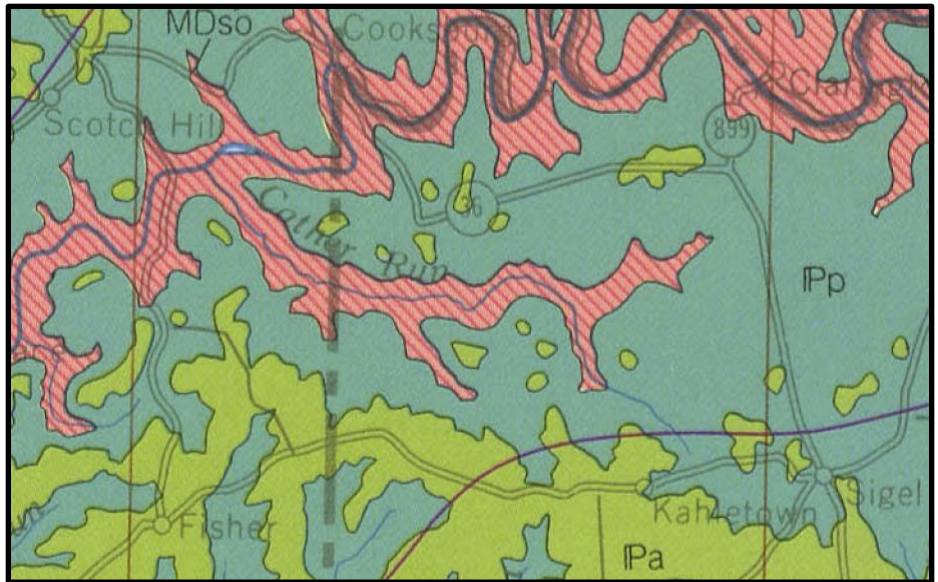
Watershed Description

Cathers Run drains 17.87 sq. mi. (11,436 acres) of mixed topography. Mean annual precipitation is 45 inches. Much of the watershed is forested and a significant portion is in public ownership.

The watershed is located entirely on the Allegheny Plateau and contains no carbonate bedrock and has not been influenced by the Laurentide ice sheet.

Geology is composed of Pennsylvanian and Mississippian/Devonian formations. The Pennsylvanian formation is composed of the Allegheny and Pottsville groups. Both of these are dominated by sandstone and shale. These formations are generally found at higher elevations in the Cathers Run watershed (see map at right). Detailed descriptions of the formations are also included.

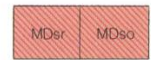
The Cathers Run main stem corridor is underlain by the Mississippian and Devonian formations (Shenango/Oswayo Undivided group; MDso) dominated by sandstone, siltstone, and shale. Although coal deposits are associated with these formations their depth below the surface has prohibited them from being economically viable and therefore they remain unmined. This has spared Cathers Run the impacts that historical surface mining has generated in watersheds farther south in Clarion and Jefferson County.



ALLEGHENY GROUP
Cyclic sequences of sandstone, shale, limestone, clay, and coal; includes valuable clay deposits and Vanport Limestone; commercially valuable Freeport, Kittanning, and Brookville-Clarion coals present; base is at bottom of Brookville-Clarion coal.



POTTSVILLE GROUP
Predominantly gray sandstone and conglomerate; also contains thin beds of shale, claystone, limestone, and coal; includes Olean and Sharon conglomerates of northwestern Pennsylvania; thin marine limestones present in Beaver, Lawrence, and Mercer Counties; minable coals and commercially valuable high-alumina clays present locally.

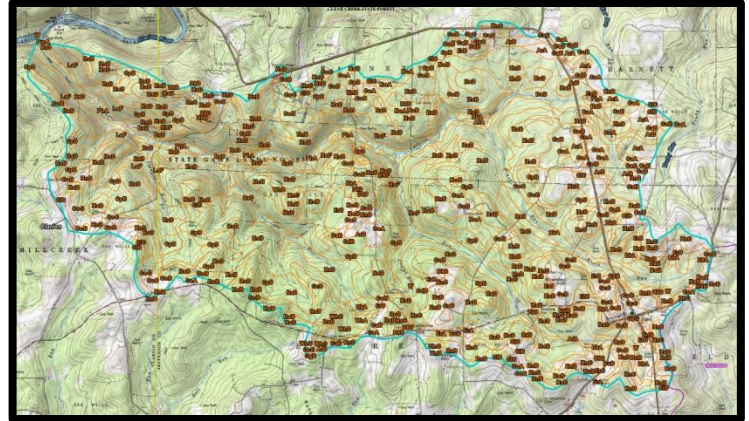


SHENANGO FORMATION THROUGH RICEVILLE FORMATION, UNDIVIDED (MDsr)
Sandstone, siltstone, and shale in varying proportions; distinguished from Shenango-through-Oswayo (MDso) interval on basis of more common gray shale in Riceville as compared with olive-colored shale and sandstone of Oswayo; contains marine fossils.

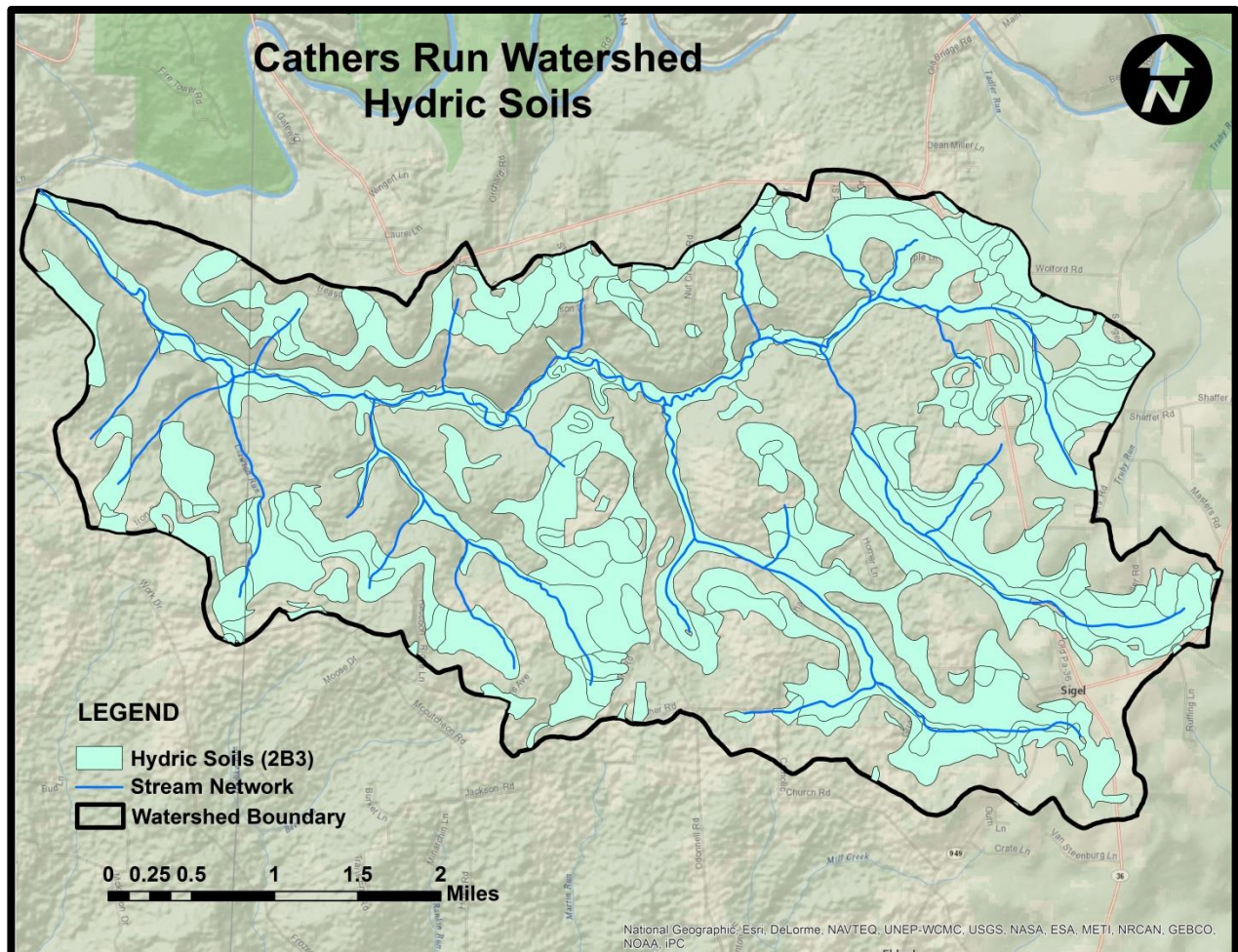
SHENANGO FORMATION THROUGH OSWAYO FORMATION, UNDIVIDED (MDso)
Greenish-gray, olive, and buff sandstone and siltstone, and gray shale in varying proportions; includes "Pocono" ("Knapp") and Oswayo of earlier workers; difficult lithologic distinction between Oswayo and "Knapp"; "Pocono" south and east of type area at Olean, New York; contains marine fossils; includes lateral equivalents of Shenango Formation, Cuyahoga Group, Corry Sandstone, Bedford Shale, and Cussewago Sandstone, plus Oswayo Formation.

Soils

The Cathers Run watershed soils information was generated from USDA-NRCS and includes data from portions of Clarion County and Jefferson County. The dominant soil in the watershed is the extremely stony Hazleton channery sandy loam (2,088.9 acres or 18.3%) found on 8 to 25 percent slopes. A comprehensive soils report for the entire watershed is included in Appendix X. The map (right) shows the NRCS soils map for the Cathers Run Watershed.



Hydric soils are also present and widely distributed in the watershed and occur in flood plains, depressions, and along hill slopes. Approximately 5,100 acres of mapped soil units in the watershed meet hydric criteria (2B3). However, the percentage of these soil



units that contain functional wetlands is relatively limited. Map unit components that are rated as hydric soils are documented in the NRCS hydric soils report in Appendix X.

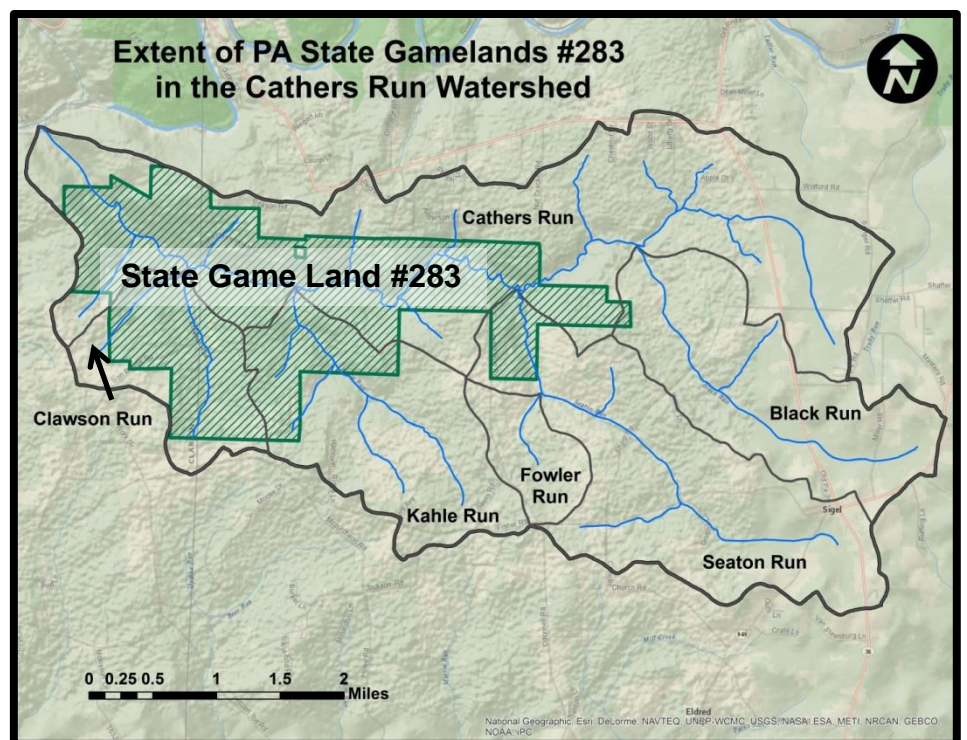
Hydric soils classified as 2B3 are defined below:

- 2) Soils in Aquic suborders, great groups, or subgroups, Albolls suborder, Historthels great group, Histoturbels great group, Pachic subgroups, or Subgroups that:
- B. are poorly drained or very poorly drained and have:
- 3) a water table at a depth of 1.0 foot or less during the growing season if permeability is less than 6.0 in/hour in any layer within a depth of 20 inches.

Land Use

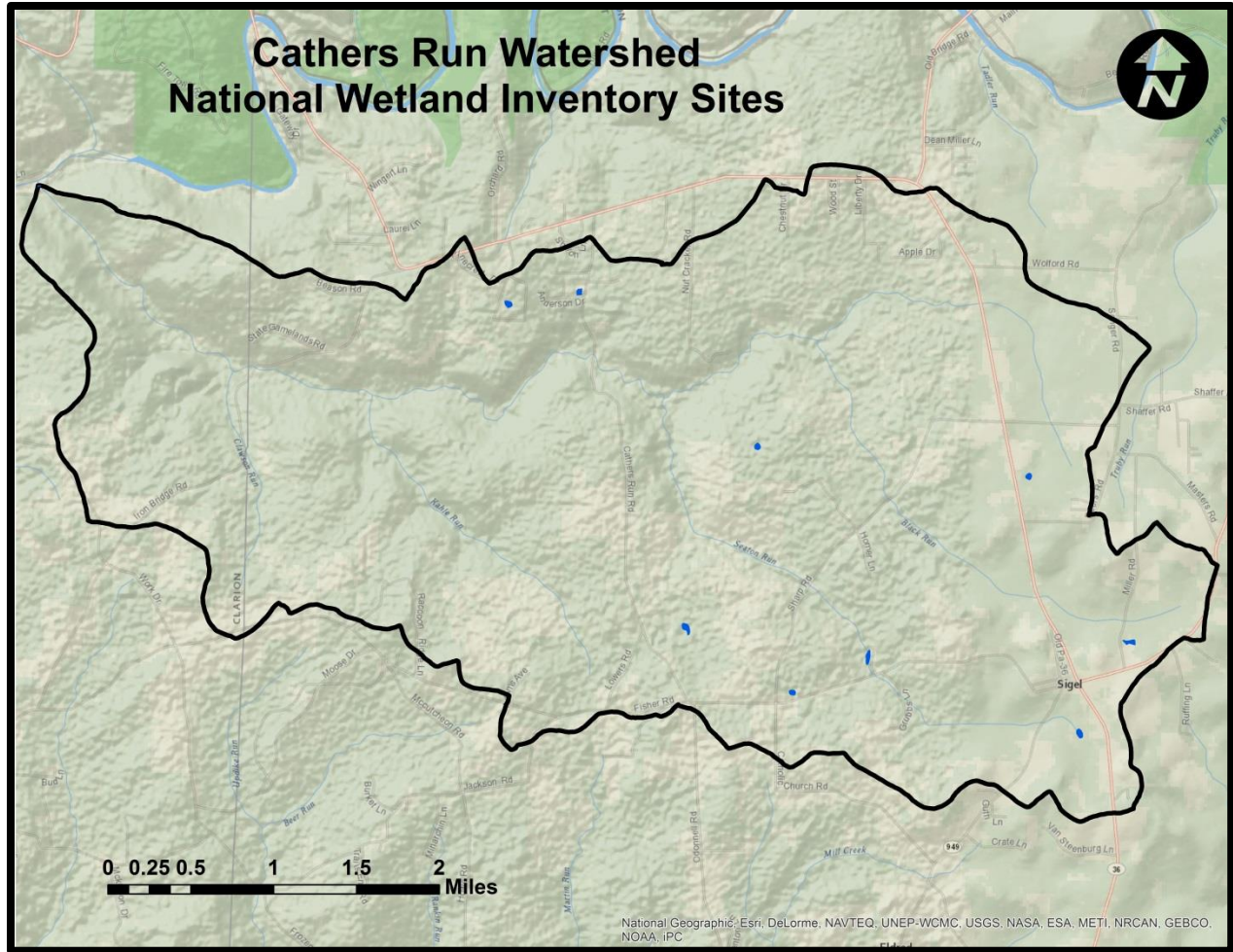
Cathers Run contains 11,436 acres of mixed land uses types. The watershed is dominated by mixed hardwood forest (92%) that is managed primarily for timber production, wildlife, and recreation. Stream corridor slopes and riparian areas contain Hemlock (*Tsuga Canadensis*) and White Pine (*Pinus sylvestrus*). Urban areas account for about 2% of the watershed leaving the remaining 6% in a mix of scrub/brush and agricultural lands in crop production and pasture. Much of the farmland is of marginal quality. Most of the watershed is in private ownership.

Public ownership totals 3,064 acres of the watershed (27 percent) in State Game Lands 283. A significant portion of the lower main stem of Cathers Run beginning near the mouth and extending upstream is within SGL 283 providing access to fisherman in much of the best trout habitat in the watershed.



Water Resources and Wetlands

Wetlands are relatively uncommon in the Cathers Run watershed. Ten mapped sites comprise 7.87 acres in the National Wetland Inventory. Of the ten sites nine are classified as ponds. Many of these ponds are located in the upper reaches of the watershed in agricultural areas.

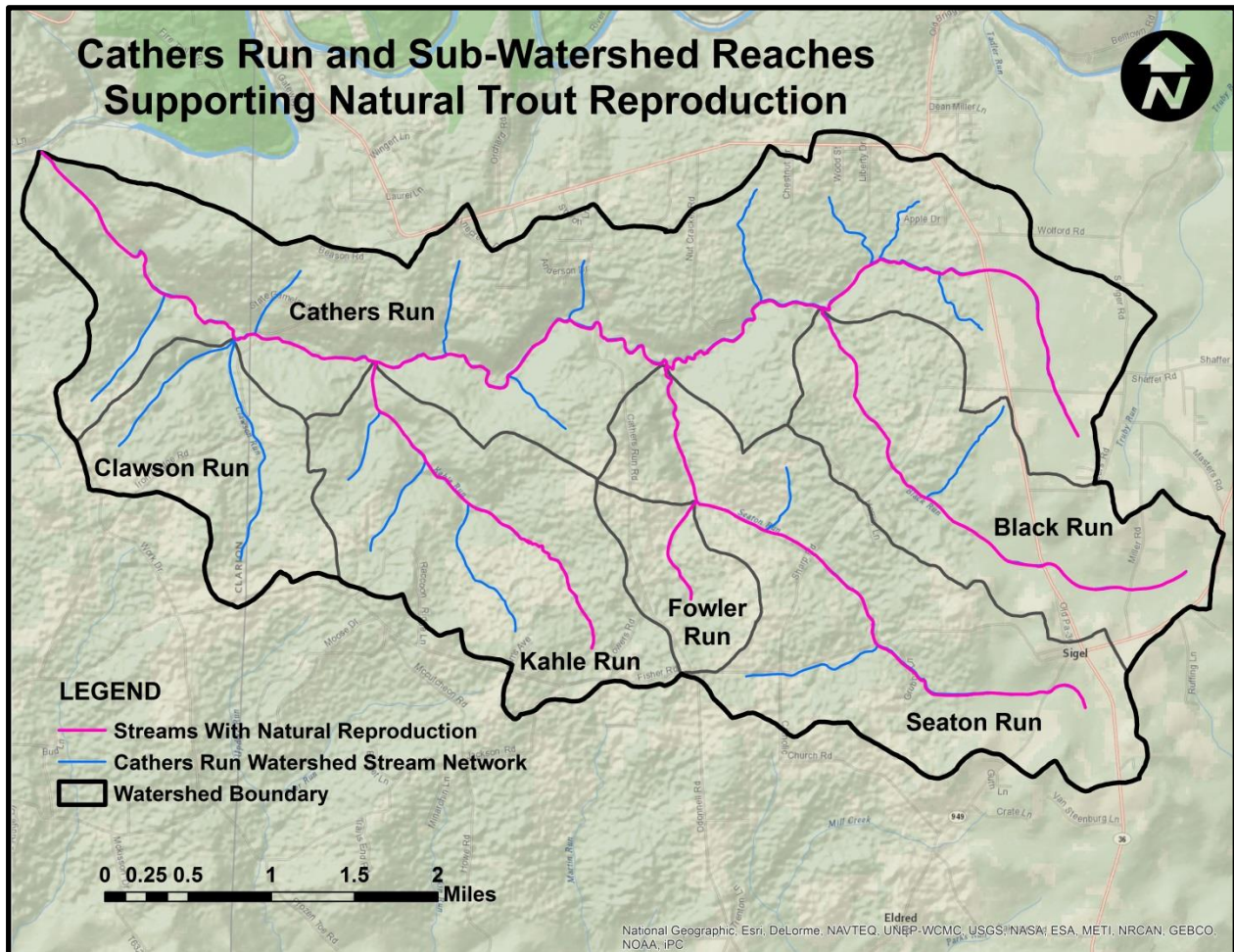


Cathers Run Stream Network

The Cathers Run watershed consists of the Cathers Run main stem and 5 tributaries: Black Run, Clawson Run, Fowler Run, Kahle Run, and Seaton Run. The drainage network totals 30.3 miles. Of this 18.2 miles are 1st order streams, 5.7 miles second order streams, and 6.4 miles of 3rd order streams. Total stream miles for each sub-watershed are presented in the table at right.

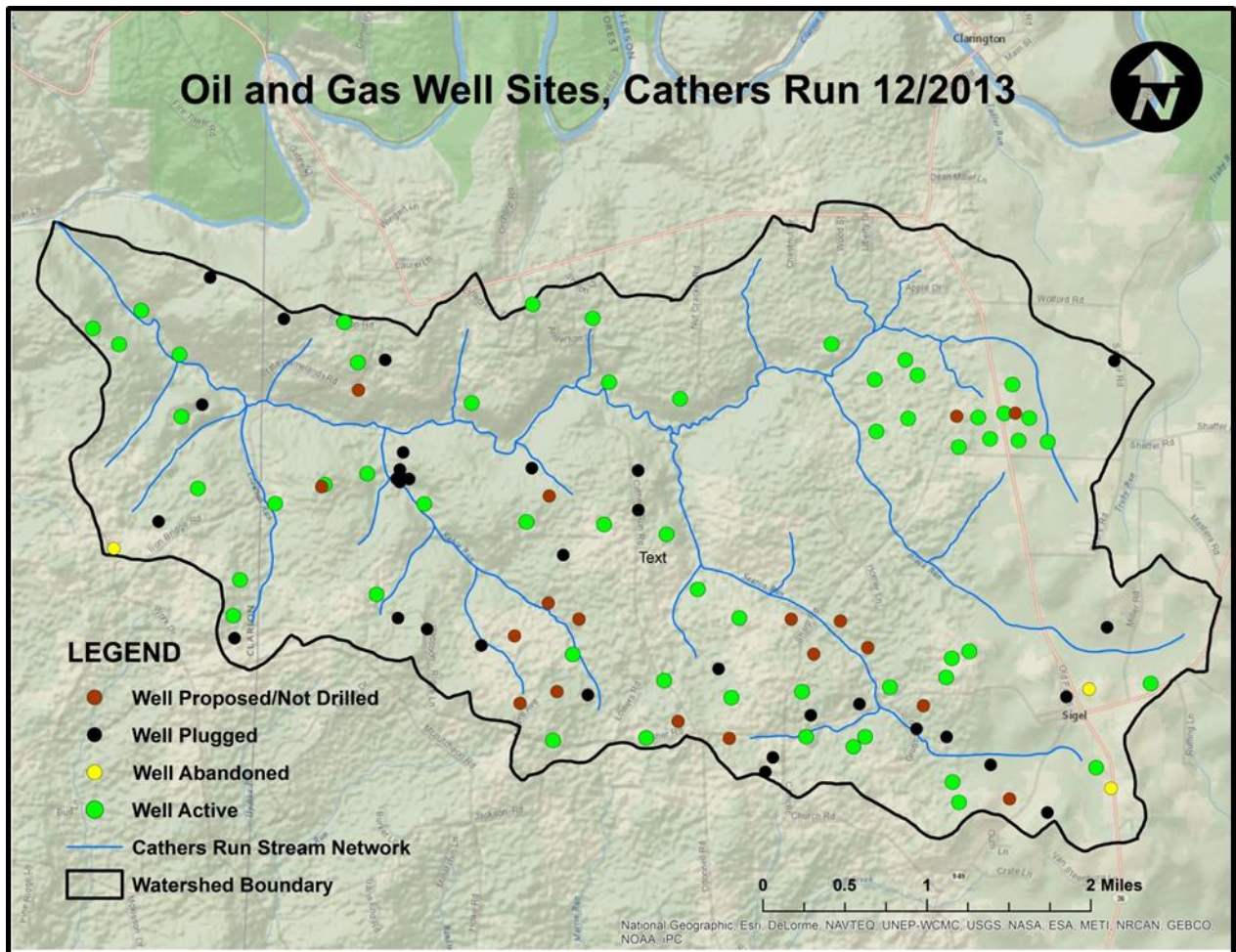
| Stream | Miles |
|--------------|-------------|
| Black Run | 3.9 |
| Cathers Run | 13.8 |
| Clawson Run | 2.4 |
| Fowler Run | 0.7 |
| Kahle Run | 4.4 |
| Seaton Run | 5.1 |
| Total | 30.3 |

The entire Cathers Run main stem and all of the tributaries are classified under Chapter 93 of the PA Code as HQ-CWF (High Quality-Cold Water Fishes). Additionally, the entire main stem of Cathers Run and all the main stems of the sub-watersheds support natural trout reproduction. No streams in the watershed are classified as Class A trout fisheries by the Pennsylvania Fish and Boat Commission.



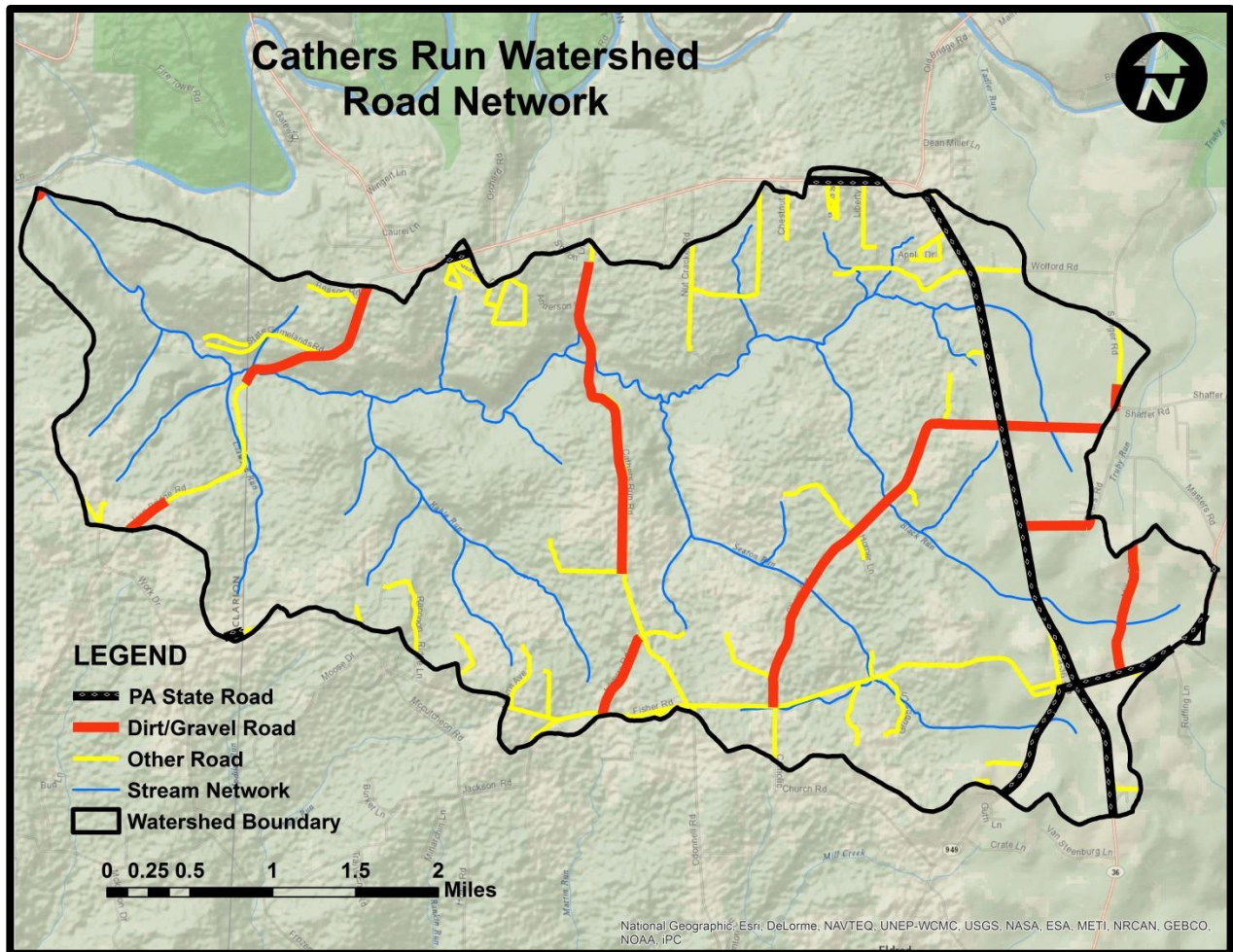
Oil and Gas Production

Conventional oil and gas production is currently occurring within the watershed and has been present for many years. Deep shale gas production notifications were received by Millcreek Township in 2012 but no wells have been drilled to date. At the end of 2013 PADEP reported 68 active well sites in the watershed. In addition there were 3 wells reported to be abandoned, 19 wells proposed but never drilled, and 35 wells were plugged. No unconventional wells have been drilled to date. The map below shows well location by type in the watershed.



Transportation

Cathers Run supports a relatively limited road network. The majority of the roads are paved. State Route 36 traverses the eastern portion of the watershed in a north-south orientation and intersects State Route 949 at Sigel. Dirt and gravel roads comprise 8.42 miles of the total network.

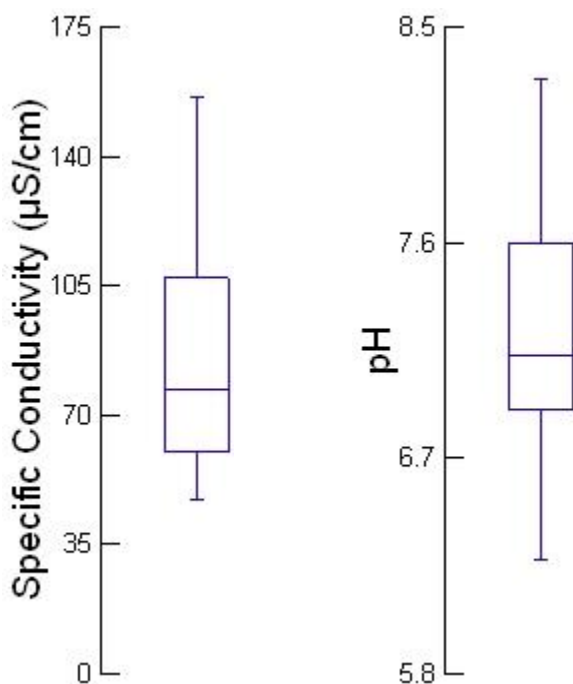


Water Quality

Water quality in the Cathers Run watershed was monitored from September 2012 through May 2013. Water quality was monitored with a satellite station installed near the mouth of Cathers Run. Data was collected at 4 hour intervals (6 readings per day) for pH, specific conductivity (SC), and temperature (C), with a YSI 6920V2 sonde (photo above right).

Data was transmitted with a solar/battery powered sending unit installed at streamside and was posted and subsequently downloaded from the Iron Furnace Trout Unlimited website at www.ironfurnacetu.net

Box plots and summary statistics of specific conductivity and pH from the Cathers Run watershed from September 2012 through May 2013 are presented below.



| CATHERS RUN WATER QUALITY SUMMARY DATA | | | |
|--|--------|--------------|-------|
| September 2012 - May 2013 | | | |
| | | Specific | |
| | Temp C | Conductivity | pH |
| Mean | 6.4 | 86.7 | 7.3 |
| Min | 0.0 | 47.0 | 6.3 |
| Max | 19.7 | 156.0 | 8.3 |
| Median | 5.6 | 77.0 | 7.1 |
| N | 1,116 | 1,116 | 1,116 |

Fisheries

Historical fisheries information for Cathers Run was provided by the regional PAFBC Fisheries Management Area 2 office in Tionesta.

Formal fisheries reports¹ date back to 1976 although the PA Fish Commission reports that non-game species were abundant in Cathers Run but trout were scarce.

Electrofishing surveys were conducted at two locations in 1976 and 1983 by Lee. Stations were located 100 meters upstream from the mouth of Cathers Run and 220 meters upstream from where Cathers Run Road (Eldred Township Road 346) crosses Cathers Run. During this time Cathers Run was regularly stocked with hatchery raised

| Date | Species Collected | Station | |
|--------------------------------|--------------------------------|------------------------------|------|
| | | Mouth | T346 |
| 6/15/1976 | <i>Salvelinus fontinalis</i> | ✓ | ✓ |
| | <i>Salmo trutta</i> | ✓ | ✓ |
| | <i>Rhinichthys atratulus</i> | ✓ | ✓ |
| | <i>Semotilus atromaculatus</i> | ✓ | ✓ |
| | <i>Catostomus commersoni</i> | ✓ | ✓ |
| | <i>Hypentilium nigricans</i> | ✓ | ✓ |
| | <i>Etheostoma blennoides</i> | ✓ | ✓ |
| | <i>Cottus bairdi</i> | ✓ | ✓ |
| | <i>Campostoma anomalum</i> | ✓ | |
| | <i>Etheostoma nigrum</i> | ✓ | |
| | <i>Etheostoma zonale</i> | ✓ | |
| | <i>Percina maculata</i> | ✓ | |
| | 7/28/1983 | <i>Salvelinus fontinalis</i> | ✓ |
| <i>Salmo trutta</i> | | ✓ | ✓ |
| <i>Rhinichthys atratulus</i> | | ✓ | ✓ |
| <i>Semotilus atromaculatus</i> | | ✓ | ✓ |
| <i>Catostomus commersoni</i> | | ✓ | ✓ |
| <i>Hypentilium nigricans</i> | | ✓ | |
| <i>Etheostoma blennoides</i> | | ✓ | ✓ |
| <i>Cottus bairdi</i> | | ✓ | ✓ |
| <i>Campostoma anomalum</i> | | | |
| <i>Etheostoma nigrum</i> | | ✓ | |
| <i>Etheostoma zonale</i> | | | |
| <i>Percina maculata</i> | | | ✓ |
| <i>Moxostoma erythrum</i> | | ✓ | ✓ |
| <i>Nocomis micropogon</i> | | ✓ | |
| <i>Notropis cornutus</i> | | ✓ | |
| <i>Ictalurus nebulosus</i> | | ✓ | |
| <i>Etheostoma flabellare</i> | | ✓ | |
| <i>Etheostoma variatum</i> | | ✓ | |
| <i>Notropis photogenis</i> | | ✓ | |

¹ Historical fisheries information for Cathers Run was provided by the regional PAFBC Fisheries Management Area 2 office in Tionesta.

Brook Trout and Brown Trout. Surveys at that time were most concerned with trout presence and abundance. Other species were recorded but generally not counted.

These surveys results are typical for a stream of this size and how the PAFBC was managing the fishery at that time. Cathers Run was being stocked regularly during the late 70s and into the 80s with about 2,000 Brook and Brown Trout per year. Many of the trout collected during these sampling events were stocked fish but Lee noted that 1 Brook Trout captured in 1976 was a native fish.

Lee noted that during this period water chemistry was generally acceptable with pH's in the low 7s, alkalinity between 13 mg/l and 28 mg/l, and specific conductivity ranging the upper 80 ($\mu\text{S}/\text{cm}$) and that Cathers Run was appropriately classified as HQ-CWF. The surveys also documented riparian areas as being well vegetated with much of the stream was shaded.

The fish community in general was more diverse at the lower station near the mouth (16 species) on Cathers Run than at the upstream station above the Cathers Run Road bridge (9 species). This is a normal condition as fish would have the opportunity to move into the lower reach of Cathers Run from the Clarion River. Lee also noted that trout densities had increased between the 1976 and 1983 surveys and that natural reproduction had been documented at both stations.

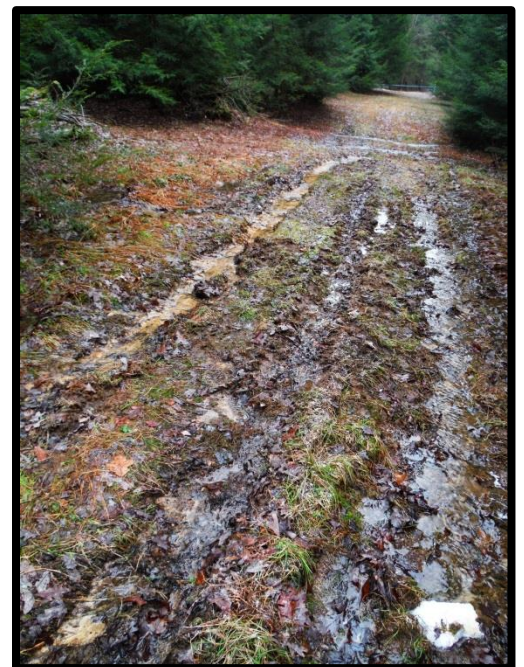
Fish surveys were conducted again in 2000 by the PAFBC at approximately the same locations that were sampled in 1976 and 1983. These surveys found 13 species inhabiting Cathers Run and documented natural reproduction of both Brook Trout and Brown Trout. However, a marked reduction in trout density was found when compared to the prior surveys. PAFBC recommended management of the upper section under the Natural Yield Option and the lower reach as an Approved Trout Water.

Watershed Challenges

Cathers Run has a significant portion of its watershed acres in public ownership (SGL 283) while the remainder is in private hands. Oil and gas development occurs throughout the watershed and pipelines, both commercial lines and local lines, are widely distributed. The existence of pipelines and haul roads developed for timbering and PAGC entry has provided walk-in recreational access for hunting and fishing. Additionally, this road network has also created one of the more serious land management problems in the watershed – illegal use by ATVs.

Many of the pipelines and all of the roads on SGL 283 have restricted access and many are gated. Despite the efforts of PAGC and National Fuel Gas in policing these access roads ATV traffic is pervasive throughout the watershed and damaging to the stream network.

Sediment delivery at undeveloped crossings of Caters Run and its tributaries can be found at numerous locations where ATV use exists. This is not restricted to the larger streams but at nearly every location where small feeder streams and drainage swales intersect pipelines or other roads. ATV tracks erode into the pipelines and channel sediment laden water directly downslope and into streams as shown in the photo to the right. This sedimentation only serves to reduce stream productivity by reducing benthic and fish habitat quality.





These illegal crossings can be seen in air photos of the watershed (directly above). In the example here three (3) crossing of Cathers Run occur in less than 0.15 miles of pipeline near the Cathers Run Road Bridge on the National Fuel Gas pipeline.

The photo to the right shows a major crossing of Cathers Run just upstream of the Cathers Run Road bridge on the National Fuel pipeline. This is the typical condition encountered at crossing of the main stem and major tributaries. This crossing can be seen in the air photo above at the far right.



Additional sedimentation occurs on oil and gas well roads throughout the watershed. Many of these roads are poorly maintained and often have little or no designed drainage, ditching, water bars, or sediment traps. Sediment typically flows down incised vehicle tracks and accumulates around well sites (as shown to the right) or is transported into local streams.

This study did not inventory the condition of all well access roads but most are producing sediment and are in generally poor condition.



Another source of sediment in the watershed emanates from the dirt and gravel road network. GIS Analysis of unpaved roads in the watershed show approximately 30 total miles. Many of these are maintained privately or are PAGC and NFG roads. Dirt and

gravel roads maintained by Millcreek, Eldred, or Barnett Township total 16 miles and include three major roads that cross the watershed: Iron Bridge Road (3 miles), Cathers Run Road (2.5 miles), and Sharp Road (3 miles).

All three of the townships in the watershed participate in the PA Dirt and Gravel Roads Program. Mill Creek Township will be conducting its regularly scheduled cycle of road maintenance in 2014.

Abandoned Lumber Mill Sites

There are a number of abandoned sites in the watershed where lumber mills once existed. These sites do not support mill activity now but refuse piles can still be found



throughout the watershed. These sawdust piles degrade slowly especially if they are large. Leachate from sawdust and other wood material can degrade the quality of nearby water sources by reducing pH, mobilizing metals within the soil, and lowering dissolved oxygen in surface water that can impact stream biota. The photos above

shows a small sawdust pile located in the Clawson Run watershed and a much larger one along Cathers Run (below) as seen in an air photo from Google Earth.



Summary

Cathers Run remains a high quality stream within a marginally developed forested watershed. Native Brook Trout populations exist throughout the watershed and opportunities for recreational fishing are abundant. Water quality as measured during 2013 showed that conditions have not changed dramatically over the last 30 years but is probably influenced by oil and gas production in the watershed as seen in higher specific conductivity levels than other similar watersheds in the region.

Stream channel observations indicate that the primary challenge in the watershed is control of erosion and sedimentation associated with dirt roads and off-road ATV use. Dirt and gravel road programs implemented by the townships in the watershed provide ongoing maintenance of public roads throughout the watershed.

Oil and gas well access roads are also contributing to sedimentation and should be monitored and upgraded. This is especially important if additional drilling occurs in the watershed.

Off-road ATV use is occurring on pipelines and other access roads and trails found throughout the watershed despite prohibitions. ATV use on pipelines has generated a significant amount of erosion by creating water diversions in wheel tracks that often connect directly to the Caters Run main-stem, perennial tributaries, drainage swales, and ephemeral streams. Continued monitoring and enforcement related to ATV use is recommended. Alternatively, stream crossings could be designed and built to minimize riparian and stream bed impacts at existing locations and thereby reduce sedimentation and associated habitat degradation in Caters Run.

References and Credits

Lee et. al. 1977. Cathers Run Stream Examination Report 8/19/77. Pennsylvania Fish and Boat Commission Fisheries Management Office, 172 Hatchery Lane, Tionesta, PA 16353

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Cover photo by Tom Distefano.

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