



COLDWATER CONSERVATION PLAN
SOUTH BRANCH OF THE LITTLE AUGHWICK CREEK
SUMMER 2009

Acknowledgments:

This conservation plan was made possible from help from the Coldwater Heritage Partnership (CHP), Friends of the Little Aughwick Creek (FLAC), The Alliance for Aquatic Resource Monitoring (AALARM) from Dickinson College, and the Fulton County Conservation District (FCCD).

A watershed map, the GPS coordinates for sampling sites and a corresponding site map are available in the appendix.

Overview:

This Coldwater Conservation Plan project was undertaken in the summer of 2009 to study and locate potential problem areas that could affect the South Branch of the Little Aughwick Creek (hereafter referred to as the South Branch). Eight stream sampling sites were chosen along the mainstream of the South Branch. A habitat/physical assessment was charted at each site, along with benthic macroinvertebrate sampling and measurements of various chemical parameters. These tests were used to evaluate the potential for the South Branch to support a naturally reproducing wild trout fishery. This study has identified potential threats to water quality in the South Branch watershed and will assist Friends of the Little Aughwick Creek (FLAC) and the Fulton County Conservation District (FCCD) as they work together to preserve and enhance fishing opportunities in the watershed.

The South Branch is a tributary of the Little Aughwick Creek, which is a tributary of the Juniata River. The South Branch has a drainage area of 15.1 square miles, which includes approximately 21.5 stream miles in Dublin and Todd Townships, Fulton County. The South Branch runs from the headwaters above Cowans Gap Lake, through Cowans Gap State Park, and portions of the Buchanan State Forest, to Burnt Cabins, and to the confluence of the North Branch to form the Little Aughwick. (Figure 2 in Appendix)

Some important features of the South Branch watershed include: Cowans Gap Lake, the village of Burnt Cabins, and the 200-year-old historical Grist Mill in Burnt Cabins. These areas are very important and may impact water quality of the South Branch.

Most of the drainage area of the South Branch above the village of Burnt Cabins is PA State Forest. After passing through an impounded stretch above the Burnt Cabins Grist Mill and the village of Burnt Cabins, the stream meanders through some agricultural lands and backyards to the confluence with the North Branch, forming the mainstem of Little Aughwick Creek. Along the majority of its length the South Branch is well vegetated and provides plenty of instream cover for aquatic life.

The South Branch is designated, by the PA Department of Environmental Protection (PA DEP) as Exceptional Value (EV) above Cowans Gap Lake and designated a High Quality-Coldwater Fishery (HQ-CWF) from below Cowans Gap Lake to its mouth. These designations warrant special regulatory consideration under Chapter 93 of the Pennsylvania Code. The South Branch is also recognized as an Approved Trout Water by the PA Fish & Boat Commission (PAFBC). While there is no official record of naturally reproducing trout with the PAFBC, locals assert the South Branch does support naturally reproducing trout.

The South Branch has been under study for about three years by the Friends of the Little Aughwick Creek (FLAC), a local watershed group, with help from the Fulton County Conservation District (FCCD) and The Alliance for Aquatic Resource

Monitoring (AALARM) at Dickinson College. FLAC conducts chemical (one weekend/month), physical (once/year), and biological (twice/year) monitoring also. However, their efforts are focused on the entire Little Aughwick Creek watershed and only one of their six regular sampling sites is found on the South Branch - near the confluence with the North Branch.

A stream survey completed for the South Branch of the Little Aughwick in 1995 by the PA DEP and the Bureau of Watershed Conservation was helpful as a point of comparison for our fieldwork. The 1995 study, current results of Coldwater Conservation Plan and FLAC's studies should be used to determine areas of impact in the watershed. Data may be used to assess the impact of the Grist Mill Dam and the wastewater treatment plant (WWTP) at Cowans Gap Lake. The data might also be used to examine the effects of a controversial centralized wastewater treatment plant in Burnt Cabins, a project that has been under consideration for many years. It is known that some on-lot wastewater treatment systems in and around the village of Burnt Cabins are malfunctioning. The number of malfunctioning systems and their effect on local drinking water and stream water quality has been a point of some debate. In the summer of 2009, it seemed likely construction of centralized wastewater treatment in the village of Burnt Cabins would be undertaken in the next two years.

While the South Branch is a largely forested watershed with minimal impacts from development or agriculture, some potential impacts are as follows: the WWTP at Cowans Gap, Logging done by the Department of Conservation of Natural Resources (DCNR) in the state forest, the Grist Mill dam, and the village of Burnt Cabins. These areas will be discussed further in the Interpretations & Recommendations section.

Methods:

Field sampling was done in the summer of 2009, primarily the month of July. Sampling included walking the entire mainstream of the South Branch to evaluate stream conditions and select appropriate sample sites. Eight sample sites were selected and chemical, physical, and biological parameters were tested at each.

Fieldwork involved assessment of physical stability and habitat quality of the stream and its surroundings. The scoring system used was drawn from the "Habitat Assessment Field Data Sheet: Riffle/Run Prevalence." from PA DEP's "Assessment and Listing Methodology for Integrated Water Quality Monitoring and Assessment Reporting." (See Chart 2 in the Appendix for blank sheet, and the actual scores in the Results section.)

Aquatic macroinvertebrate sampling was conducted using a kick net to collect macroinvertebrates (aquatic insects). These macroinvertebrates were then identified to the taxonomic family level. Like fish, groups of macroinvertebrates exhibit various levels of pollution tolerance.

Stream water was tested for several chemical parameters - nitrate, phosphorus, pH, and dissolved oxygen. For these tests the HACH DR/800 series colorimeter was used. Nitrates and phosphorus are essential nutrients for plant growth and may stimulate growth of algae and other aquatic plants to create food and cover in streams. When nitrates get too high, however, algae may grow to excess. In freshwater systems, particularly still-water systems, excessive algae or weed growth may overrun open water habitats and/or decomposition of excessive dead plant material may rob the aquatic system of oxygen. The effects of excessive nutrients in estuary systems like the Chesapeake Bay can be equally damaging, leading to excessive algal blooms and anoxic zones, devoid of oxygen and aquatic life.

pH is tested to determine the acidity of the stream. While rainwater may have a pH near 5.5, southcentral Pennsylvania rainwater may have a pH approaching 4. Buffering of rainwater by soil and local geology results in higher pH in most streams, if acid mine drainage is not an issue.

Dissolved oxygen is tested to see how much oxygen is available in the stream. Coldwater fishes, including trout, require high levels of oxygen.

Results:

July water temperatures and dissolved oxygen levels were found to be well within the preferred range of brook, brown and rainbow trout (Table 1). In comparison to the 1995 survey of the South Branch, our results showed higher water temperature and lower dissolved oxygen levels (Table 3). Higher temperatures may be explained by sampling dates - 1995 sampling was done in the spring months of March and April where our sampling was done in the summer month of July. The spring and early summer of 2009 had been relatively cool.

Phosphorus levels were higher than 1995 results, and showed no longitudinal trend as we travelled downstream. The upstream most sampling site seemed relatively high and the sampling done above and below the mill dam at Burnt Cabins seemed particularly low.

Physical stability and habitat quality were consistently high throughout the watershed (Table 2). Good floodplain connectivity was observed along most of the mainstem.

Macroinvertebrate sampling showed a good diversity of organisms that require clean, coldwater systems. High diversity and abundance of aquatic macroinvertebrates, particularly pollution intolerant taxa is an indicator of good stream health. Mayflies, stoneflies, and caddisflies, three macroinvertebrates groups indicative of good water quality, were found at each of the sample sites (Table 4).

Interpretations & Recommendations:

General Observations

Both the lack of longitudinal trends and high standard deviation among sites in the total phosphorus results, suggests further study is needed to determine the sources of phosphorus in the watershed and the impact of those sources upon stream water quality.

Temperatures data showed no obvious warming in the downstream direction and did not show any warming as a result of the mill pond impoundment above Burnt Cabins. It is recommended that temperature be inventoried twice per year, sampling all sites in as small a time window as possible, during the warmest and coolest seasons of the year, to detect any effects of Cowans Gap lake and/or the mill pond impoundment.

Physical stability and habitat quality were high at our chosen sample sites, though road crossing, logging and the Grist Mill impoundment all threaten to potentially impact stream habitat quality if not managed carefully.

Origin of mainstem to Cowans Gap Lake

The portion of the South Branch above Cowans Gap is rated by DEP's Water Quality Standards as Exceptional Value (EV) Waters. According to a field study from the spring of 1995, DEP and the Department of Watershed Conservation established this rating based largely on the presence of an endangered plant species and two endangered dragonfly species. The plant species present is Glade spurge (*Euphorbia purpurea*) and the dragonflies – Roger's clubtail (*Gomphus rogersi*) and Thorey's grayback (*Tachopteryx thoreyi*). Also everything above the lake is in the Buchanan State Forest up to the headwaters. Therefore there is no agricultural influence and little human interaction. It is mostly dense forested area that is under a planned cutting schedule by DCNR. These cuttings are scheduled for winter months when the ground is frozen and little to no damage is done. There are a few areas that show signs of erosion leading to potential sedimentation in the stream, although these impacts seem minimal.

Logging in the upper watershed should be closely monitored to ensure minimal erosion. Several cabins, located on leased PA DCNR land, are found near the stream in the upper watershed. Educational efforts could inform these part time residents of the need for proper on-lot wastewater treatment and vegetated stream buffers. (See photos of site #1-3)

Cowans Gap Lake to Burnt Cabins Grist Mill

The next portion of the South Branch from the lake dam to the dam at the Grist Mill in Burnt Cabins is rated by DEP's Water Quality Standards as High Quality-Cold Water Fishes (HQ-CWF). The stream flows through the Buchanan State Forest for about three and a half miles below the Cowans Gap Lake. This portion flows through dense forested areas providing an abundance of shade due to the presence of the streamside forests. After crossing the state forest boundary line, the stream flows approximately three more miles, through numerous private properties, to the dam at the Burnt Cabins Grist Mill. The near stream areas through this reach are often densely forested. However, open streamside areas are found as the stream exits the forest, and crosses the Aughwick Road above the impoundment at the Burnt Cabins Grist Mill. The dam is a major problem because of water temperature and sediment deposits. The earthen dam, that historically served to store and divert water to the mill race has fallen into disrepair and become an erosion problem as well as an area of stream with potential high solar gain. The failed impoundment allows legacy sediment to erode during higher flows, which are carried to lower watershed. This area is a major concern for the stream above and below the dam. The Fulton County Conservation District is working is pursuing grant and private funding to eliminate the old impoundment while allowing the Grist Mill to deliver water to the mill race and utilize water power to run the mill. (See photos of sites #4 through #7 and Photos 11 - 13)

Burnt Cabins Grist Mill Dam to Confluence with North Branch

The last portion of the South Branch from the grist mill dam to the confluence of the North Branch is still rated by DEP's Water Quality Standards as High Quality-Cold Water Fishes (HQ-CWF) (See photo of site #8). This area runs through the village of Burnt Cabins and some agricultural areas. Agricultural pollutants, sewage, and the proximity of yards to the stream are the main concerns for the area. Another major concern along this reach of stream is the pending plan for a stream-discharge wastewater treatment facility in the village of Burnt Cabins. The plans for the plant have been on hold for a few years now because of funding and unhappy citizens. However, funding is currently in place and, the plant is likely to be constructed within the next two to three years. Area anglers and locals are concerned about the stream and how it is going to be affected. Further research is needed on the impacts of failing on-lot septic systems in the village of Burnt Cabins on both stream water quality and private water wells. Phosphorus concentrations appeared to rise at the Decorum Rd. site (furthest downstream) and it was noted that an area about a half a mile upstream appears to have some animal wastes running into the water from a backyard barnyard. Further nutrient testing above and below the village of Burnt Cabins is recommended to look for potential effects from barnyard runoff and/or failing septic systems in Burnt Cabins.

Within the next 8-10 years some areas that are of concern that can effects the South Branch will be the wastewater plant at Cowans Gap Lake. The next area of impact is the dam at the mill and how they are going to try to fix it. In addition to those the next major concern is the plans for the wastewater plant in the community of Burnt

Cabins. Along with that in Burnt Cabins the FCCD has a grant with Growing Greener to build a storm water ditch from the post office down Decorum Road to the bridge. This might help the water quality by reducing any contaminants from the village to the stream. I believe that if there were a stocking effort above the lake, that trout would be able to survive and reproduce. The only way this would work is if you stocked them and didn't tell anyone. Some other areas that might need some buffers or attention would be along the roads below the lake dam going towards Burnt Cabins. Some of the areas where the road is along the stream show no vegetation or any buffer to help what comes off the roads.

Conclusion:

The FCCD and FLAC should work together to preserve and enhance fishing opportunities in the watershed. It is believed the South Branch of the Little Aughwick holds the potential to become a Class A stream. Below is a prioritized list of concerns and management recommendation.

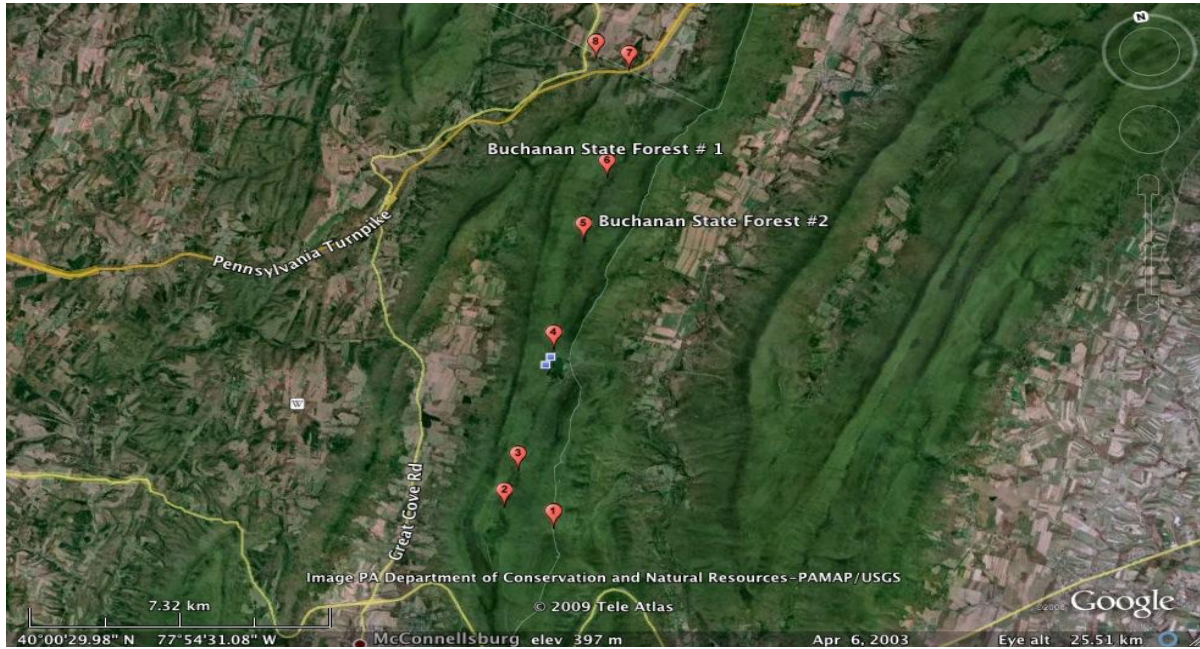
- (1) It seems likely a centralized wastewater treatment plant will soon be built below the village of Burnt Cabins. This project has the potential to eliminate malfunctioning septic systems and improve groundwater and streamwater quality. However, concerns abound locally regarding 1) the ability of the citizenry to support the maintenance costs of such a facility and 2) the ability of such a system to provide high quality treated effluent to the stream. Other small centralized systems in nearby watersheds have proven hard to manage.
- (2) The compromised dam above the Burnt Cabins Grist Mill threatens to introduce a large amount of fine sediment to the lower SBLAC watershed. At low water, the dam still represents an impediment to fish passage. Efforts should continue to raise funds to implement a restoration project that will allow the historic Grist Mill to function while enhancing the stream and eliminating the potential erosion and sedimentation now present.
- (3) Although the wastewater plant at Cowans Gap Lake appears to be well run and effective, the facility represents perhaps the largest source of potential pollution in the upper watershed. 6,000 people may utilize Cowan's Gap State Park in a single summer weekend. The continued effective operation of this facility should be a high priority.
- (4) Forest management will continue throughout the watershed and it should be a priority to encourage forestry practices that protect the unique resource that is the South Branch of the Little Aughwick. Where possible, streamside forests should remain intact and large woody debris should not be removed from the system. Information on sustainable forestry and the importance of streamside forests should be provided to private landowners in the watershed.

- (5) Streams that support a population of naturally produced trout of sufficient size and abundance to support a long-term and rewarding sport fishery may be designated as Class A Trout Waters by the PAF&BC. These streams are managed to support or enhance natural reproduction of wild populations, with no stocking. As mentioned earlier, there is no official record of naturally reproducing trout with the PAFBC, however, locals assert the South Branch does support naturally reproducing trout. Local watershed advocates might contact the PFBC to inquire about the possibility of accurately assessing trout populations and the presence or absence of naturally reproducing trout in the watershed. If deemed appropriate, the designation of the South Branch as a Class A trout Water could be pursued. At the very least, the goal of creating a Class A Trout Water should guide concerned groups and citizens as they attempt to enhance and restore a wild trout fishery to the watershed.
- (6) The Fulton County Conservation District and the Friends of the Little Aughwick Creek should continue to educate public and private landholders of the importance of the South Branch. Efforts should continue to acquire funding from grants and/or organizations to implement watershed projects. It may be advisable to work with the PA Fish and Boat Commission Habitat Biologists to identify areas where constructing fish habitat structures may provide the most benefit for holding and encouraging the natural reproduction of trout along the South Branch of the Little Aughwick.

Bibliography

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4. Merritt, R. W., Cummins K. W. An Introduction to Aquatic Insects of North America. Dubuque, Iowa. Kendall and Hunt Publishing Company, 1978,1984,1996.
5. Special Report Evaluation Report, Water Quality Standards Review: South Branch Little Aughwick Creek. Bureau of Watershed Conservation and Department of Environmental Protection. June 1995.

Figure 1:



Site #1: ¼ Mile Upstream From King Trail

Site #2: 2nd Bridge Above Cowans Gap Lake

Site #3: 1st Bridge Above Cowans Gap Lake

Site #4: Beside Waste Water Treatment Plant: Below the Cowans Gap Lake

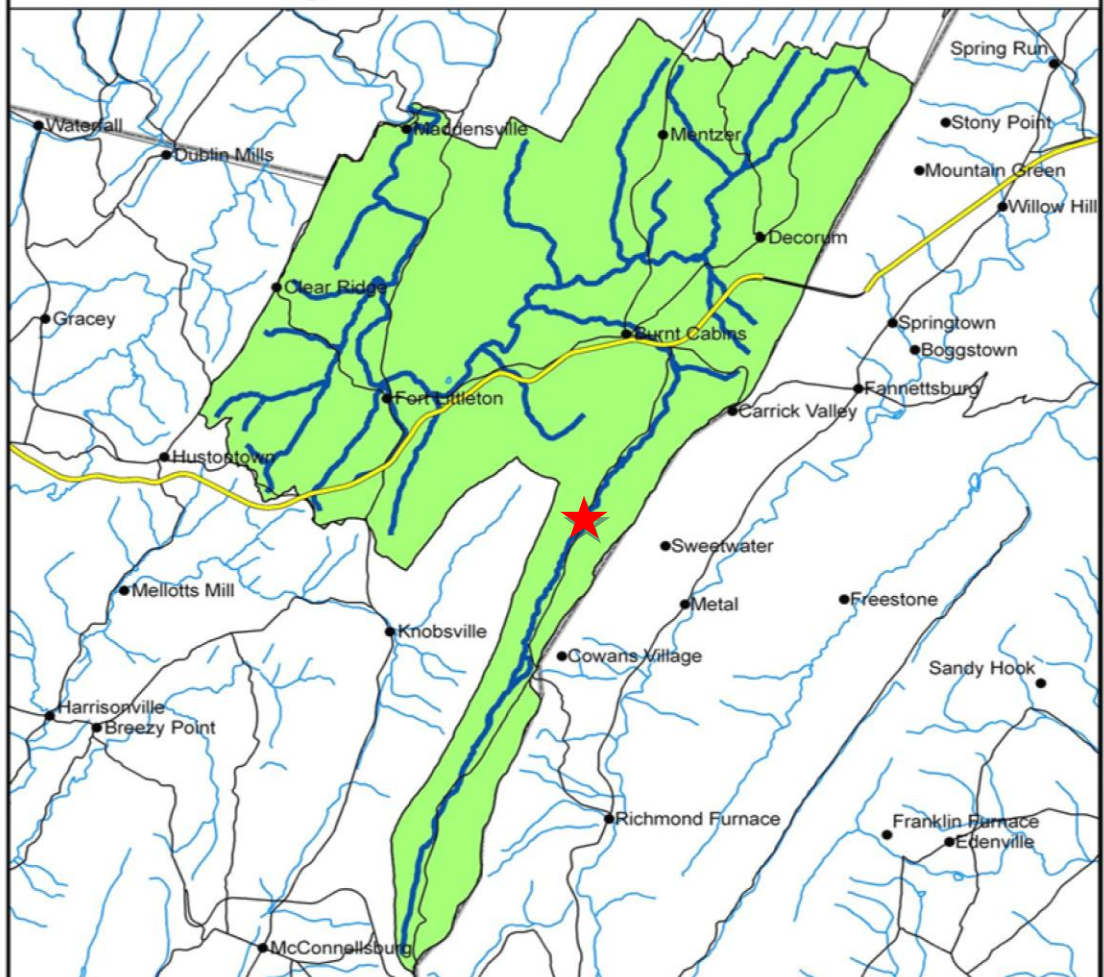
Site #5: Buchanan State Forest Test Area #2

Site #6: Buchanan State Forest Test Area #1

Site #7: Burnt Cabins: Mill Dam

Site #8: Decorum Road – Burnt Cabins

Little Aughwick Creek Watershed



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Data Sources: PA DOT, PSU, USGS



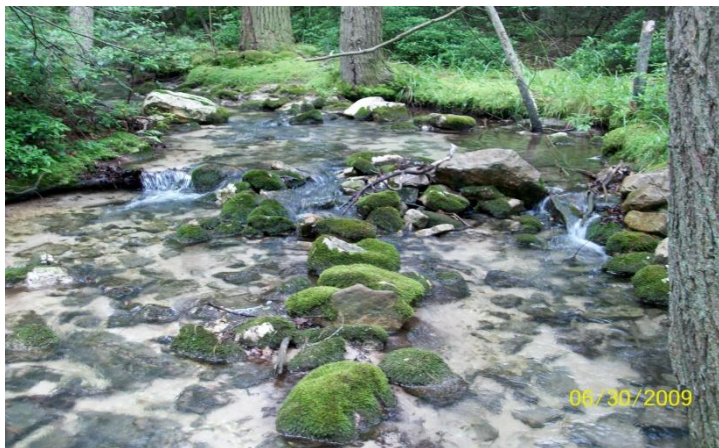
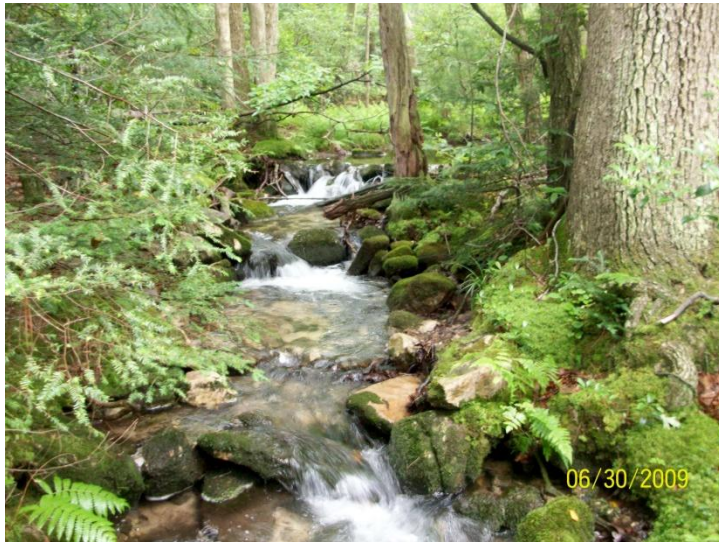
0 0.5 1 2 Miles

- Towns
- PA Turnpike (US 76)
- Roads
- Little Aughwick & tributaries
- Little Aughwick Watershed

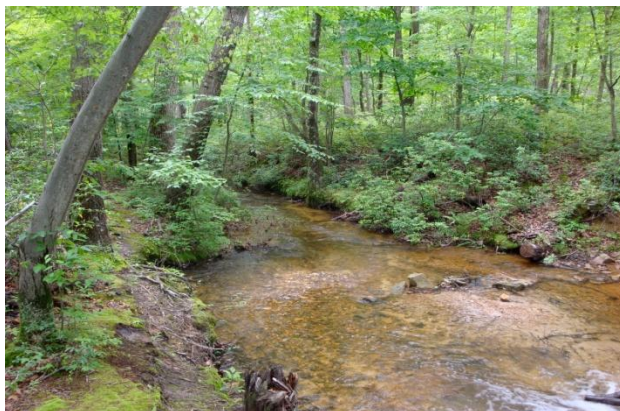
Spring 2008

Figure 2: Little Aughwick Creek Watershed Map

Photos of Sample Sites (Photos 1-8):



Site #1 - These two photos show healthy head waters



Site #2– Stream starts to widen and is now coming in contact people and yards.



Site #3 – More impact by road; stream access to the right where there is a well-worn path.



Site #4 – Just below the WWTP at Cowans Gap Lake. Largely eroded banks present in this area.



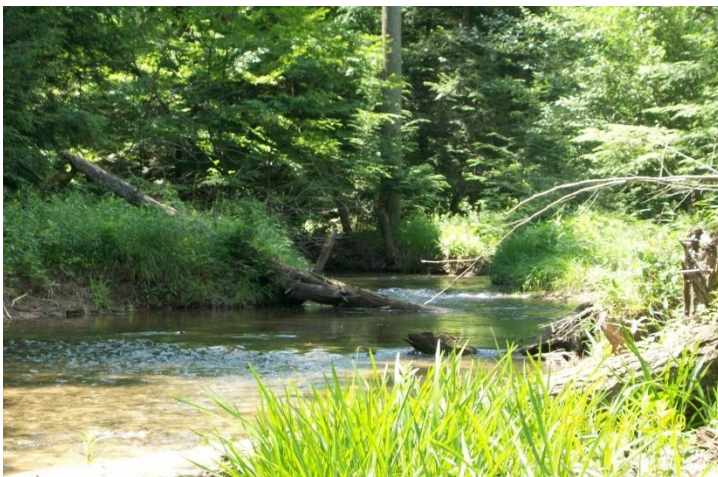
Site #5 – Floodplain is an easy access to the right, with a steep bank with the Aughwick Road just at the top of the bank on the left.



Site #6 – Decent sloping banks showing access to the floodplain, some erosion present by it is not significant.



Site #7 – This is feeder stream that has broken through the dam and is carrying the legacy sediment around the dam and into the stream below.



Site #8 – Area just below Decorum Road.

Areas of Concern:



Photo 9. This running water flows through this front yard of the cabin. An area that was timbered over the winter of 08-09.



Photo 10. An area in Buchanan State Forest where the bank was stabilized by tree roots from erosion. However, now that the trees were cut the bank might fail and the sediment will run under the road and into the South Branch.



Photo 11. Breach in former emergency spillway at Burn Cabins Grist Mill leads to excessive erosion - Bank approx. 9 ft. high



Photo 12. Looking at the current impoundment above the Burnt Cabins Grist Mill, with some flow running parallel to the impoundment and flowing over the spillway. The small dam in the foreground is a makeshift structure to facilitate the needed height for water to enter the gate valve at the top of the mill race (on which the photographer is standing)



Photo 13. Streamflow below the impoundment looking downstream. Notice excessive sedimentation.

Appendix:

GPS Coordinates of Sample Sites

SITES TESTED	GPS	ELEVATION
Decorum Rd. – Burnt Cabins	N- 40 ⁰ 04' 48.9" W- 77 ⁰ 53' 34.0"	986 Feet
Below Mill Dam – Burnt Cabins	N- 40 ⁰ 04' 32.4" W- 77 ⁰ 53' 3.8"	1000 Feet
Buchanan State Forest #1	N – 40 ⁰ 02' 51.7" W – 77 ⁰ 53' 52.5"	1129 Feet
Buchanan State Forest #2	N – 40 ⁰ 01' 54.3" W – 77 ⁰ 54' 31.7"	1253 Feet
Water Treatment Plant (Beside) – Cowans Gap Lake	N – 40 ⁰ 00' 13.6" W – 77 ⁰ 55' 28.5"	1339 Feet
1 st Bridge Above Cowans Gap Lake	N – 39 ⁰ 58' 22.4" W – 77 ⁰ 56' 33.9"	1472 Feet
2 nd Bridge Above Cowans Gap Lake	N – 39 ⁰ 57' 49.4" W – 77 ⁰ 56' 56.4"	1487 Feet
¼ Mile Upstream From King Trail	N – 39 ⁰ 57' 23.2" W – 77 ⁰ 56' 11.5"	1530 Feet

HABITAT ASSESSMENT FIELD DATA SHEET

RIFFLE/RUN PREVALENCE

DATE-TIME-INITIALS : _____

Surveyed by: _____

Habitat Parameter	Category			
	Optimal	Suboptimal	Marginal	Poor
1. Instream Cover (fish)	Greater than 50% mix of boulder, cobble, submerged logs, undercut banks, or other stable habitat.	30-50% mix of boulder, cobble, or other stable habitat; adequate habitat.	10-30% mix of boulder, cobble, or other stable habitat; habitat availability less than desirable.	less than 10% mix of boulder, cobble, or other stable habitat; lack of habitat obvious.
SCORE: _____	20 19 18 17 16	15 14 13 12 11	10 9 8 7 6	5 4 3 2 1 0
2. Epifaunal Substrate	Well-developed riffle and run; riffle is as wide as stream and length extends two times the width of stream; abundance of cobble.	Riffle is as wide as stream but length is less than 2 times width; abundance of cobble; boulders and gravel common.	Run area may be lacking; riffle not as wide as stream and its length is less than 2 times the stream width; gravel or large boulders and bedrock prevalent; some cobble present.	Riffles or run virtually nonexistent; large boulders and bedrock prevalent; cobble lacking.
SCORE: _____	20 19 18 17 16	15 14 13 12 11	10 9 8 7 6	5 4 3 2 1 0
3. Embeddedness	Gravel, cobble, and boulder particles are 0-25% surrounded by fine sediment.	Gravel, cobble, and boulder particles are 25-50% surrounded by fine sediment.	Gravel, cobble, and boulder particles are 50-75% surrounded by fine sediment.	Gravel, cobble, and boulder particles are more than 75% surrounded by fine sediment.
SCORE: _____	20 19 18 17 16	15 14 13 12 11	10 9 8 7 6	5 4 3 2 1 0
4. Velocity/Depth Regimes	All four velocity/depth regimes present (slow-deep; slow-shallow; fast-deep; fast-shallow).	Only 3 or the 4 regimes present (if fast-shallow is missing, score lower than if missing other regimes).	Only 2 or the 4 regimes present (if fast-shallow or slow-shallow are missing, score low).	Dominated by 1 velocity/depth regime (usually slow-deep).
SCORE: _____	20 19 18 17 16	15 14 13 12 11	10 9 8 7 6	5 4 3 2 1 0

Habitat Parameter	Category																				
	Optimal					Suboptimal					Marginal					Poor					
7. Frequency of Riffles	Occurrence of riffles relatively frequent; distance between riffles divided by the width of the stream equals 5 to 7; variety of habitat.					Occurrence of riffles infrequent; distance between riffles divided by the width of the stream equals 7 to 15.					Occasional riffle or bend; bottom contours provide some habitat; distance between riffles divided by the width of the stream is between 15 to 25.					Generally all flat water or shallow riffles; poor habitat; distance between riffles divided by the width of the stream is > 25.					
SCORE: _____	20	19	18	17	16	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	0
8. Channel Flow Status	Water reaches base of both lower banks and minimal amount of channel substrate is exposed.					Water fills > 75% of the available channel; or < 25% of channel substrate is exposed.					Water fills 25 - 75% of the available channel and/or riffle substrates are mostly exposed.					Very little water in channel and mostly present as standing pools.					
SCORE: _____	20	19	18	17	16	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	0
9. Condition of Banks	Banks stable; no evidence of erosion of bank failure.					Moderately stable; infrequent, small areas of erosion mostly healed over.					Moderately unstable; up to 60% of banks in reach have areas of erosion.					Unstable; many eroded areas; "raw" areas frequent along straight sections and bends; on side slopes, 60-100% of bank has erosional scars.					
SCORE: _____	20	19	18	17	16	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	0
10. Bank Vegetative Protection	More than 90% of the streambank surfaces covered by vegetation.					70 - 90% of the streambank surfaces covered by vegetation.					50 - 70% of the streambank surfaces covered by vegetation.					Less than 50 % of the streambank surfaces covered by vegetation.					
SCORE: _____	20	19	18	17	16	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	0
11. Grazing or Other Disruptive Pressure	Vegetative disruption through grazing or mowing is minimal or not evident; almost all plants allowed to grow naturally.					Disruption evident but not affecting full plant growth potential to any great extent; more than one-half of the potential plant stubble height remaining.					Disruption obvious; patches of bare soil or closely cropped vegetation common; less than one-half of the potential plant stubble height remaining.					Disruption of streambank vegetation is very high; vegetation has been removed to 2 inches or less in average stubble height.					

SCORE: _____	20	19	18	17	16	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	0
12. Riparian Vegetative Zone Width	Width of riparian zone >18 meters; human activities (i.e. parking lots, roadbeds, clear-cuts, lawns or crops) have not impacted zone.					Width of riparian zone 12-18 meters; human activities have impacted zone only minimally.					Width of riparian zone 6 -12 meters; human activities have impacted zone a great deal.					Width of riparian zone <6 meters; little or no riparian vegetation due to human activities.					
SCORE: _____	20	19	18	17	16	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	0

Totals - (Side 2): _____

(Side 1): _____

STATION SCORE: _____