

Lost Creek Coldwater Conservation Plan

2013

Prepared by the Juniata County Conservation District



EXECUTIVE SUMMARY

Lost Creek is a tributary to the Juniata River originating in the northeastern part of Juniata County, Pennsylvania. The entire stream is 17.5 miles in length, but only the upper portion, from its origin to where it crosses State Route 35 in Oakland Mills, PA is classified as a High Quality Cold Water Fishery (HQ-CWF) by the Pennsylvania Fish and Boat Commission (25 Pa. Code § 93.9). PA FBC also considers this section of the stream a naturally reproducing, Class A Wild Trout Stream. The entirety of this section of the watershed is located within Fayette Township.

In order to determine if this exceptional resource is continuing to serve Juniata County as a high quality cold water resource, the Juniata County Conservation District (JCCD) set out to validate the stream's ratings via chemical testing (through both lab-verified and in-house tests), lab verified Macroinvertebrate testing, and stream habitat assessment. Additionally, JCCD sought to identify threats and opportunities within the watershed to ensure future conservation of this nearly pristine natural area.

According to lab data and data collected by JCCD staff, the Lost Creek watershed upstream of State Route 35 in Oakland Mills, PA does, in fact, measure up to its designation. Although threatened by agricultural industry, residential development, and logging, Lost Creek offers great recreational opportunities and can certainly be preserved for the enjoyment of many generations to come, as well as for the benefit of the plentiful and somewhat rare natural communities that thrive within its boundaries.



The Main Stem of Lost Creek within the Lost Creek Rod and Gun Club Property.

BACKGROUND

Watershed Description:

Much of the upper reaches of the Lost Creek watershed above State Route 35 is forested, especially the headwaters region. Steep gradients have prevented intensive development in the headwaters area. Additionally, a large parcel of land covering approximately 1943 acres in the headwaters region of the watershed is owned by Lost Creek Rod and Gun Club and maintained as a recreational area for members to hunt and fish. The watershed is fragmented by State Route 235, as well as other state and township roadways. A variety of hunting camps and permanent rural residences also pepper the area. Further downstream, several agricultural operations can be found within the watershed boundaries, including poultry, dairy, hog, and cropping operations. Of these, four operations are classified as Concentrated Animal Feeding Operations (CAFOs), which are closely monitored by JCCD as well as the Pennsylvania Department of Environmental Protection (DEP) and the Environmental Protection Agency (EPA). At the very base of the portion of watershed lies Lost Creek Golf Course. A few commercial business operations are located in the watershed, specifically four pallet shops and one saw mill.

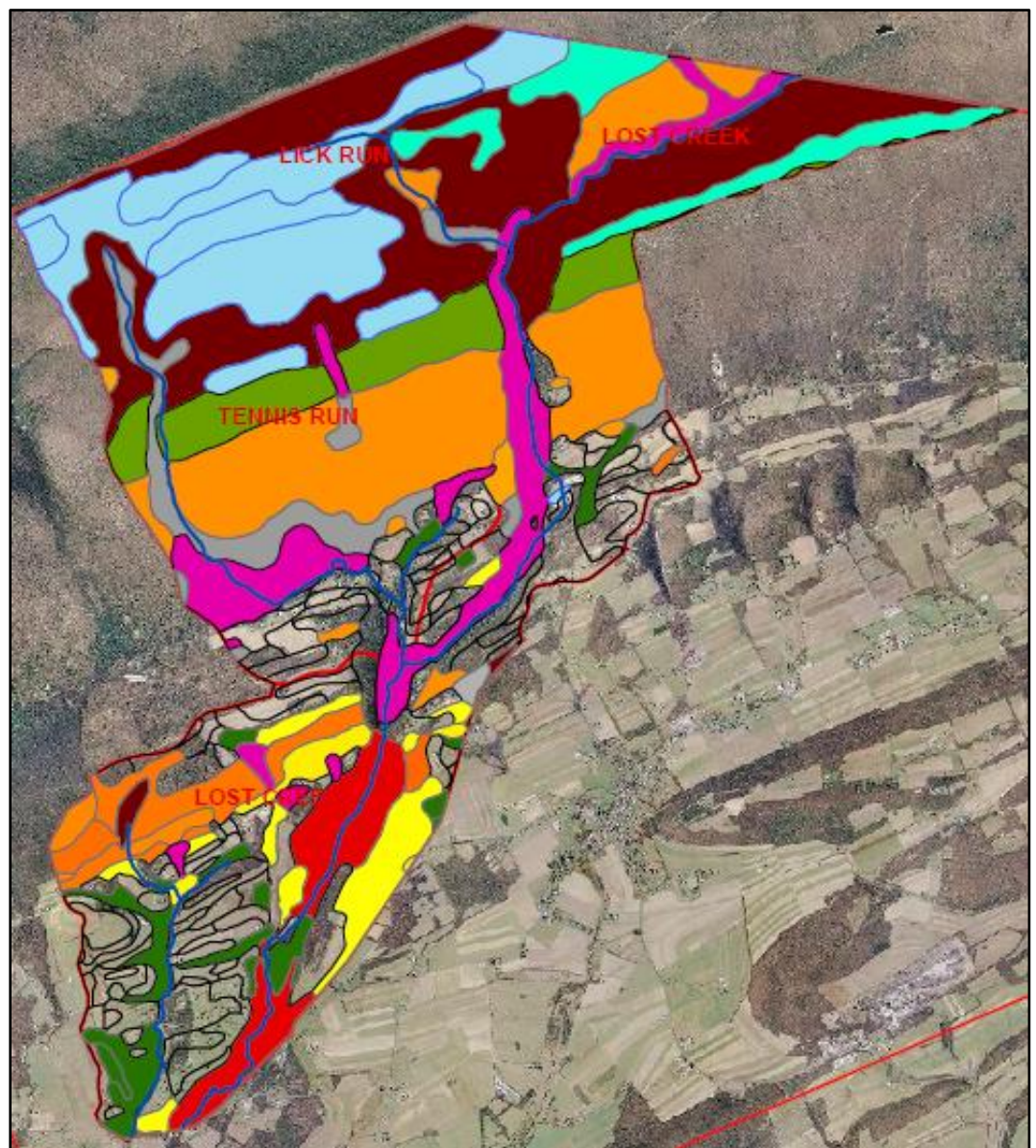


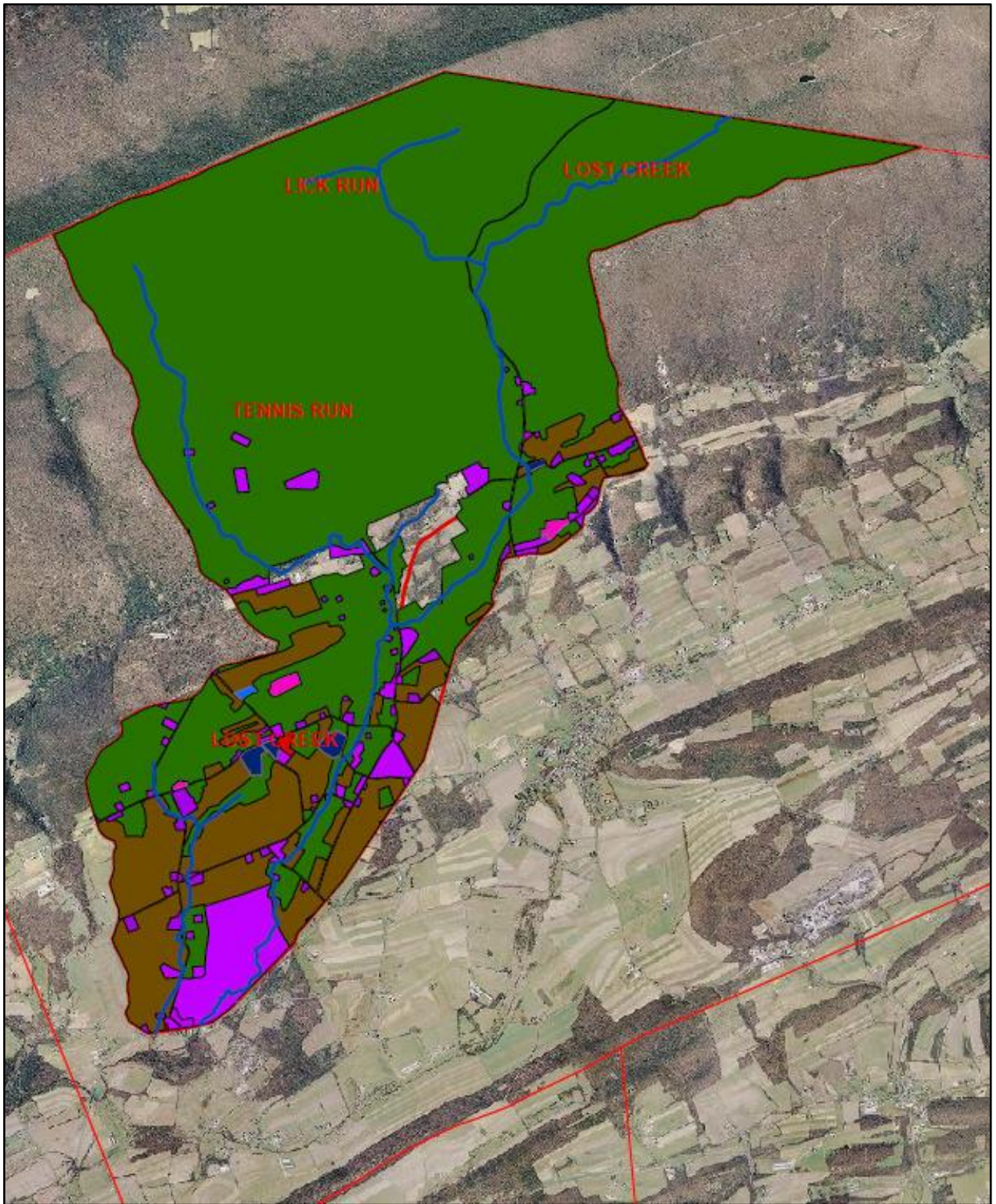
Agricultural activities and roadways are impact concerns within the Lost Creek watershed.



Lost Creek Golf Course is located at the very tip of the HQ-CWF portion of the Lost Creek Watershed. The Main Stem of Lost Creek flows directly through the golf course green.

The studied portion of the Lost Creek Watershed covers approximately 3554 acres, or 6.2 square miles. Lost Creek is situated in the heart of the Ridge and Valley physiographic province. The most prominent soil type is Allenwood (orange on the map), while other soils in the watershed include Andover (pink and red), Hazelton (light blue), Hazelton-Dekalb (brown), Leetonia (turquoise), Ladig and Morrison (oranges), Brinkerton (dark green), Edom (lighter green), and Newark and Watson (yellows).





The Lost Creek watershed is largely forested, especially in the headwaters region, as depicted by the large, green segments on the map above. The purple areas on the map signify areas of rural development, while the brown depicts agricultural lands. The few, scattered dark blue segments are industrial areas.

History:

In 1752, the area that encompasses the Lost Creek watershed and all of Juniata County was opened to Scot-Irish immigrants via a treaty with the Iroquois. German farmers followed and began to clear land. Lumbering became a primary industry in the area. The Lost Creek watershed was likely timbered in its entirety during this time period. After the land was cleared, farming became prevalent. Several distilleries existed in the watershed during this time period; it was the only market for corn and rice. Local farmers were often given a barrel of whiskey in part pay. Juniata County was officially formed from Mifflin County on March 2nd, 1831, and encompasses 394 square miles. Fayette Township, where the watershed was located, was then formed in 1834. At the time of its formation, the Juniata County was home to less than 10,000 people. Historically, the area was important to both trade and travel, as a canal system built alongside the Juniata River was one of the quickest forms of transportation throughout the state. Later, important railways replaced canal travel. Now Route 322, a major PA State Route highway, cuts through the county.

Descendants of the original German settlers remain in the region, which is still home significant Mennonite and Amish communities. Farming remains a primary industry, while logging is no longer quite as prevalent. None of the distilleries remain. Juniata County remains sparsely populated; the 2010 census data shows a population of 24,636.



An historic photo of Tennis Sawmill, courtesy of Betsy Phillips, originally published in the McAlisterville and Fayette Township Bicentennial Book.

Outstanding Natural Features:

According to the Juniata County Natural Heritage Inventory, completed in 2007, several areas of exceptional and local significance are located within the headwaters of the Lost Creek watershed. These include the Slim Valley Wetlands (exceptionally significant), the Lost Creek Headwaters Pool and the Lick Run Headwaters Pool (locally significant).

The Slim Valley Wetlands are a series of natural pools, including ephemeral/fluctuating natural pools, which are communities which have a vulnerable status in Pennsylvania, and therefore are of serious conservation priority. Additionally, plant spotted pondweed (*Potamogeton pulcher*), which is ranked as critically imperiled in Pennsylvania, and the plant twinning screw-stem (*Bartonia paniculata*), which is a Pennsylvania vulnerable species. Logging and roadwork, if performed without an adequate buffer, threaten this site. Another concern would be fragmentation of the wetlands area.



A natural pool within the Slim Valley Wetlands in the early springtime.

The Lost Creek and Lick Run Headwaters Pools are separately contained within small topographic saddles in the headwaters of Lost Creek and Lick Run, respectively. The large, isolated pools are surrounded by blackgum forest (*Nyssa sylvatica*) with a mountain laurel (*Kalmia latifolia*) understory in the case of Lick Run, and dry oak – heath community with chestnut oak (*Quercus montana*) dominating the overstory and a thick layer of mountain laurel (*Kalmia latifolia*) being the understory in the case of the Lost Creek pool. Both pools are in good condition. Logging is the primary threat to these pools, and a large, no-cut buffer should be established around each area. Additionally, the surrounding area should maintain an intact forest canopy to minimize habitat fragmentation issues to maintain habitat for the species that occur there.

Two Pennsylvania Natural Diversity Inventory (PNDI)’s were conducted for the project area; one for the upper portion of the watershed and one for the lower watershed segment.



A pair of Mallard Ducks visits an ephemeral pool in the Lost Creek watershed.

Neither PNDI indicated that conservation and restoration projects might cause any adverse impacts upon any endangered species or species of special concern that occupy the area. These reports, valid two years from the date they were procured, will be on file with the Juniata County Conservation District.

MONITORING AND ASSESSMENT

Throughout 2013, Juniata County Conservation District conducted both chemical and macroinvertebrate samples on 8 sites within the Lost Creek Watershed, which were then verified by PA DEP certified laboratories. JCCD also collected data with in-house equipment to compare to the lab-verified data. The goal of this monitoring project was to determine whether or not Lost Creek continues to meet its High Quality designation.

Eight sites within the Lost Creek watershed were sampled for this project. Seven of the sites were selected just for this project, while the eighth is a site where JCCD has historically collected chemical data. In the map shown on the following page, sites LC CWH 1-7 are the unique sampling sites, while the site LC 1 is the site where historic data has been collected. The historic site may also be referred to as LC-SC (standing for Lost Creek Saddle Club, the name of the sampling location) later in this text.

Chemical monitoring was conducted with a Hach Colorimeter, a pH/TSD/Conductivity multimeter, and a Dissolved Oxygen sensor owned by JCCD. Lab samples were verified by Fairway Laboratories in Altoona, Pennsylvania after being collected by JCCD personnel. In order for a stream to be rated as an HQ-CWF (High Quality Cold Water Fishery), which is the designation of the studied portion of Lost Creek, the DO (Dissolved Oxygen) should be above 7 mg/l, the Nitrate should be below 10mg/l, the pH should be between 6.0 and 9.0, Phosphorus should be between .1mg/l and 1.0 mg/l, and Conductivity should be between 20 and 60 micromhos. TDS should not be more than 750mg/l at any given time, and the temperature should range between 3 and 19 degrees Celsius. The maximum Fecal Coliform should be less than 2000.

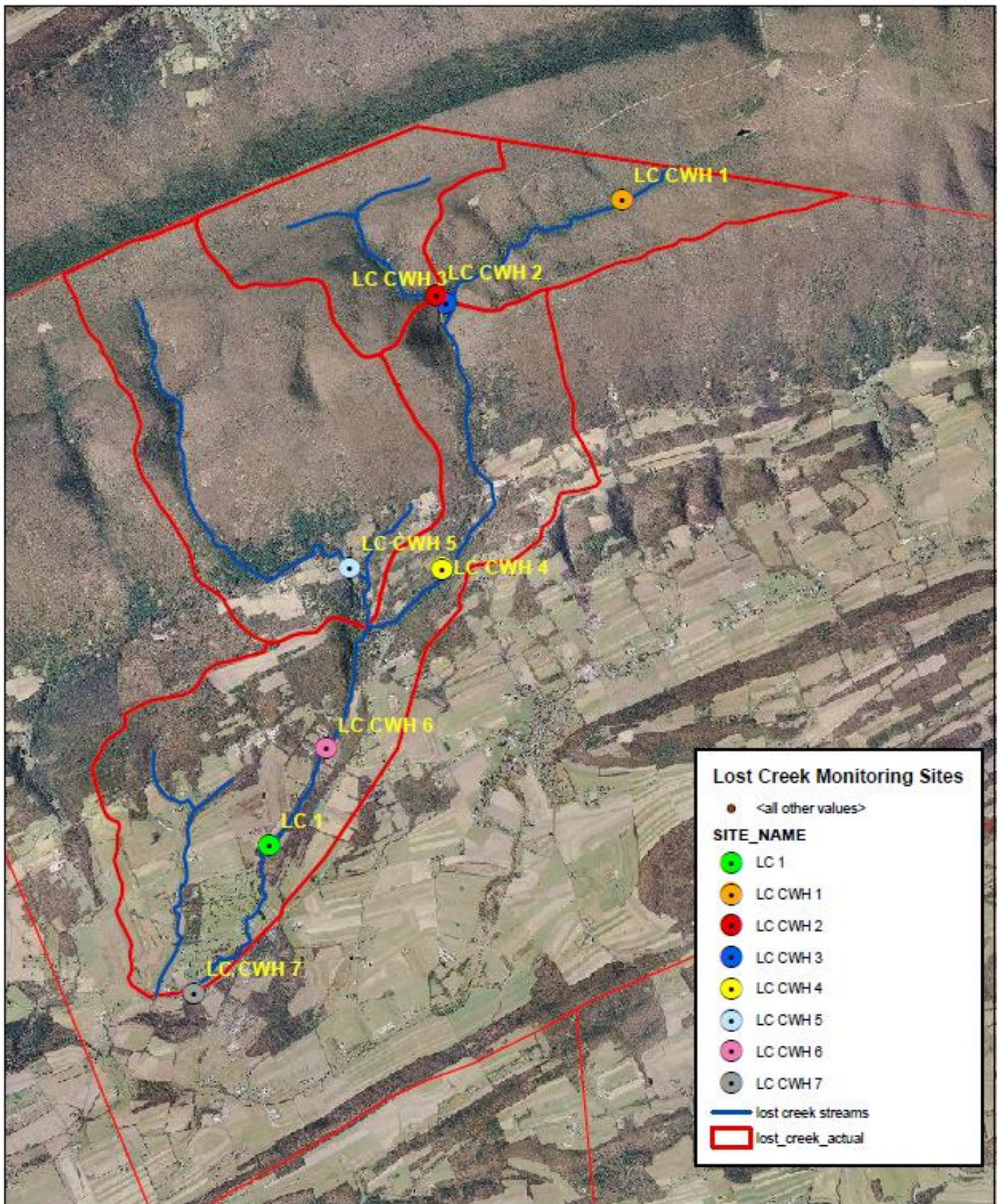
Macroinvertebrate monitoring was conducted by JCCD staff following DEP established Instream Comprehensive Evaluation (ICE) surveying methods. Specifically, the Biological sampling methods and Index of Biological Integrity (IBI) were followed. Samples were processed by Cole Ecological, Inc. using the established PA DEP IBI. Macroinvertebrate Samples were rated based on the EPT Index. EPT stands for Ephemeroptera (mayflies), Plecoptera (stoneflies), and Trichoptera (caddisflies). These orders of aquatic insects are common in natural streams. However, they decline rapidly with the introduction of pollutants. High Quality streams should have great species richness within these three orders. Samples were rated on percent EPT. The higher the percentage, the better the water quality. Generally, above 30 percent EPT is considered quite high quality.

Stream Habitat Assessment Field Data Sheets as developed for the Senior Environment Corps, were also used by JCCD staff to assess habitat up and downstream of each sampling site. These sheets are used to rate a stream as Optimal, Suboptimal, Marginal, or Poor in habitat quality. Parameters that were rated included Instream Cover (for fish), Epifaunal Substrate, Embeddedness, Velocity/Depth Regimes, Channel Alteration, Sediment Deposition, Frequency of Riffles, Channel Flow Status, Condition of Banks, Bank Vegetative Protection, Grazing or Other Disruptive Pressure, and Riparian Vegetative Zone Width. Each category was ranked on a scale of 0-20, and the scores of each were added together to obtain the overall score for the stream segment. An example data sheet can be found in Appendix A: Stream Habitat Data Sheets.

Table of Sampling Site Locations

Site	Latitude/Longitude	Description
LC-CWH 1	N 40° 41.413' / W 77° 16.296'	Headwaters near county line
LC-CWH 2	N 40° 39.600' / W 77° 17.080'	Lick Run tributary
LC-CWH 3	N 40° 38.760' / W 77° 17.072'	Rod and Gun Club Camp site
LC-CWH 4	N 40° 41.248' / W 77° 17.178'	Mainstem off of Powel Lane
LC-CWH 5	N 40° 41.248' / W 77° 17.760'	Tennis Run tributary
LC-CWH 6	N 40° 38.223' / W 77° 17.970'	Degan Road bridge
LC-CWH 7	N 40° 36.526' / W 77° 18.554'	At SR 35 bridge, base of watershed
LC-1/LC-SC	N 40° 37.412' / W 77° 18.226'	Lost Creek Saddle Club property

Lost Creek Watershed - CWH Grant



LC-CWH 1:



LC-CWH 1 is located in the headwaters of the Lost Creek watershed on Lost Creek Rod and Gun Club Property, near the Juniata/Snyder county line. The site somewhat remote, and is accessed by a gated, private dirt road that winds down a steep grade until reaching the stream. The site is also crisscrossed by several hiking trails.

Within the past several years, property near the site has been logged. The site has most certainly suffered an increase in sedimentation as a result. Fortunately, a sizeable buffer was left uncut near the stream.

This site scored 201 out of 240 on the Stream Habitat Assessment Field Data Sheet, placing it in the Optimal category. The areas only notable degradates were in Instream Cover and Embeddedness, and Sediment Deposition due to sedimentation in the channel from recent logging activities.

LC CWH 1

JCCD Chemical Parameters- Spring 2013

Water Temperature °C	8.8
DO %	70.5
DO ppm	8.20
Conductivity	0.6
Specific Conductivity	0.06
Salinity	0
pH	7.91
TDS	42.9
Turbidity	1
Phosphorus	0.93
Nitrate	0.3

JCCD Chemical Parameters- Fall 2013

Water Temperature °C	13
DO %	91.9
DO ppm	9.70
Conductivity	16.3
Specific Conductivity	17.1
Salinity	0
pH	7.45
TDS	22.6
Turbidity	1
Phosphorus	0.1
Nitrate	0.2

LC CWH 1

Fairway Laboratories Chemical Parameters- Spring 2013

Total Alkalinity	<20.0
Specific Conductance (EC)	37
Dissolved Oxygen	11
Nitrate as N	<1
pH	7.64
Phosphorus	<0.05
Total Dissolved Solids	26
Turbidity	1.57
E. Coli	2.0
Total Coliforms	200

Fairway Laboratories Chemical Parameters- Fall 2013

Total Alkalinity	<20.0
Specific Conductance (EC)	45.8
Dissolved Oxygen	10.4
Nitrate as N	<1
pH	6.85
Phosphorus	<0.05
Turbidity	<1

All of the sampled chemical parameters fell within the ranges to determine that the headwaters of Lost Creek continue to function as a HQ-CWF. Chemically, the LC CWH headwaters range is very functional and seems to suffer from very few, if any, chemical stressors.

Macroinvertebrate Data as provided by Cole Ecological, Inc. for LC-CWH 1

Sum of Count					CE_Lab_Sam_ID
					13-130-01
					LC01
Phylum	Class	Order	Family	PA Taxon	03-Oct-13
Annelida	Oligochaeta			Oligochaeta	
Annelidae	Clitellata	Branchiobdellida	Branchiobdellidae	Branchiobdellidae	
Arthropoda	Arachnida			Hydracarina	2
	Crustacea	Amphipoda	Gammaridae	Gammarus	
		Decapoda	Cambaridae	Cambaridae	
	Insecta	Coleoptera	Dryopidae	Helichus	
			Elmidae	Dubiraphia	
				Optioservus	17
				Oulimnius	11
				Promoresia	13
				Stenelmis	
			Psephenidae	Ectopria	
				Psephenus	1
		Diptera	Athericidae	Atherix	
			Ceratopogonidae	Ceratopogonidae	1
			Chironomidae	Chironomidae	94
			Empididae	Hemerodromia	
			Simuliidae	Simulium	
			Tipulidae	Antocha	
				Dicranota	6
				Hexatoma	1
				Limnophila	2
				Tipula	
		Ephemeroptera	Baetidae	Acentrella	
				Acerpenna	
				Baetis	1
				Dipheter	2
				Plauditus	
			Ephemerellidae	Ephemerella	4
				Eurylophella	2
				Teloganopsis	
			Ephemeridae	Ephemera	
			Heptageniidae	Epeorus	
				Leucrocuta	
				Maccaffertium	2
				Stenacron	
				Stenonema	
			Isonychiidae	Isonychia	
			Leptophlebiidae	Paraleptophlebia	5

	Megaloptera		Corydalidae	Nigronia	
	Odonata		Gomphidae	Gomphidae	
				Lanthus	1
	Plecoptera		Capniidae	Allocaenia	
			Chloroperlidae	Sweltsa	1
			Leuctridae	Leuctra	3
			Peltoperlidae	Tallaperla	2
			Perlidae	Acroneuria	
			Perlodidae	Isoperla	4
			Pteronarcyidae	Pteronarcys	
			Taeniopterygidae	Taeniopteryx	
	Trichoptera		Apataniidae	Apatania	
			Brachycentridae	Adicropheps	2
				Micrasema	
			Glossosomatidae	Glossosoma	
			Hydropsychidae	Ceratopsyche	1
				Cheumatopsyche	
				Diplectrona	34
				Hydropsyche	
			Hydroptilidae	Hydroptila	5
				Leucotrichia	
				Palaeagapetus	3
			Lepidostomatidae	Lepidostoma	
			Philopotamidae	Dolophilodes	1
			Polycentropodidae	Polycentropus	
			Psychomyiidae	Psychomyia	
			Rhyacophilidae	Rhyacophila	3
Mollusca	Gastropoda	Basommatophora	Ancylidae	Ferrissia	
	Pelecypoda	Veneroida	Sphaeriidae	Sphaeriidae	
Nemata				Nematoda	
Nemertea	Enopla		Tetrastemmatidae	Prostoma	
Platyhelminthes	Turbellaria			Turbellaria	
Grand Total					224

The macroinvertebrate sample for LC CWH 1 is 33% EPT, which is perfectly acceptable for an HQ-CWF within its headwaters reaches. Biologically, this site maintains its functionality and sensitive species richness. This site appears to rank lower than other sites further downstream in the watershed, but due to its small, remote, headwaters nature, and recent logging pressures, this is to be expected.

LC CWH 2:



LC CWH 2 is a sampling site along a tributary to Lost Creek known as Lick Run. This site is located near a pull-off along SR 235, and is on Lost Creek Rod and Gun Club property. The site is crisscrossed by hiking trails. Just downstream of the site, Lick Run flows through an old stone culvert under SR 235, and meets Lost Creek shortly thereafter.

This site may be somewhat affected by its proximity to the nearby roadway, but otherwise seems to suffer from no major degradation.

LC CWH 2 scored 199 out of 240 on the Stream Habitat Assessment Field Data Sheet, placing it in the Optimal category. The site scored within the Optimal category for each individual assessment parameter besides sedimentation. Some sediment in the stream is likely due to historical logging within the watershed.

LC CWH 2

JCCD Chemical Parameters- Spring 2013

Water Temperature °C	8.5
DO %	74.7
DO ppm	8.75
Conductivity	7.1
Specific Conductivity	8.1
Salinity	0
pH	8.2
TDS	13.1
Turbidity	0
Phosphorus	1.64
Nitrate	.4

JCCD Chemical Parameters- Fall 2013

Water Temperature °C	14.6
DO %	90.2
DO ppm	9.18
Conductivity	15.7
Specific Conductivity	15.9
Salinity	0
pH	7.43
TDS	9.4
Turbidity	5
Phosphorus	0.04
Nitrate	.03

LC CWH 2

Fairway Laboratories Chemical Parameters- Spring 2013

Total Alkalinity	<20.0
Specific Conductance (EC)	26.1
Dissolved Oxygen	11.4
Nitrate as N	<1
pH	6.54
Phosphorus	<0.05
Total Dissolved Solids	44.0
Turbidity	<1
E. Coli	3.1
Total Coliforms	200

Fairway Laboratories Chemical Parameters- Fall 2013

Total Alkalinity	<20.0
Specific Conductance (EC)	23.2
Dissolved Oxygen	9.95
Nitrate as N	<1
pH	6.76
Phosphorus	<0.05
Turbidity	1.46

All of the sampled chemical parameters fell within the ranges to determine that this section of the Lost Creek watershed continues to function as a HQ-CWF. Chemically, the LC CWH2 site range is very functional and seems to suffer from very few, if any, chemical stressors.

Macroinvertebrate Data as provided by Cole Ecological, Inc. for LC-CWH 2

Sum of Count					Field_Samp_ID
					13-130-02
					LC02
Phylum	Class	Order	Family	PA Taxon	03-Oct-13
Annelida	Oligochaeta			Oligochaeta	4
Annelidae	Clitellata	Branchiobdellida	Branchiobdellidae	Branchiobdellidae	
Arthropoda	Arachnida			Hydracarina	2
	Crustacea	Amphipoda	Gammaridae	Gammarus	
		Decapoda	Cambaridae	Cambaridae	
	Insecta	Coleoptera	Dryopidae	Helichus	
			Elmidae	Dubiraphia	
				Optioservus	1
				Oulimnius	21
				Promoresia	6
				Stenelmis	
			Psephenidae	Ectopria	1
				Psephenus	
		Diptera	Athericidae	Atherix	
			Ceratopogonidae	Ceratopogonidae	3
			Chironomidae	Chironomidae	53
			Empididae	Hemerodromia	1
			Simuliidae	Simulium	
			Tipulidae	Antocha	2
				Dicranota	
				Hexatoma	1
				Limnophila	
				Tipula	
		Ephemeroptera	Baetidae	Acentrella	
				Acerpenna	1
				Baetis	1
				Dipheter	2
				Plauditus	
			Ephemerellidae	Ephemerella	
				Eurylophella	7
				Teloganopsis	
			Ephemeridae	Ephemera	
			Heptageniidae	Epeorus	
				Leucrocuta	2
				Maccaffertium	4
				Stenacron	
				Stenonema	
			Isonychiidae	Isonychia	
			Leptophlebiidae	Paraleptophlebia	12
		Megaloptera	Corydalidae	Nigronia	
		Odonata	Gomphidae	Gomphidae	
				Lanthus	1

		Plecoptera	Capniidae	Allocaenia	6
			Chloroperlidae	Sweltsa	2
			Leuctridae	Leuctra	10
			Peltoperlidae	Tallaperla	1
			Perlidae	Acroneuria	2
			Perlodidae	Isoperla	10
			Pteronarcyidae	Pteronarcys	2
			Taeniopterygidae	Taeniopteryx	
		Trichoptera	Apataniidae	Apatania	1
			Brachycentridae	Adicropheps	2
				Micrasema	
			Glossosomatidae	Glossosoma	
			Hydropsychidae	Ceratopsyche	7
				Cheumatopsyche	
				Diplectrona	24
				Hydropsyche	
			Hydroptilidae	Hydroptila	6
				Leucotrichia	
				Palaeagapetus	
			Lepidostomatidae	Lepidostoma	
			Philopotamidae	Dolophilodes	14
			Polycentropodidae	Polycentropus	
			Psychomyiidae	Psychomyia	
			Rhyacophilidae	Rhyacophila	16
Mollusca	Gastropoda	Basommatophora	Ancylidae	Ferrissia	
	Pelecypoda	Veneroida	Sphaeriidae	Sphaeriidae	1
Nemata				Nematoda	1
Nemertea	Enopla		Tetrastemmatidae	Prostoma	
Platyhelminthes	Turbellaria			Turbellaria	
Grand Total					230

The macroinvertebrate sample for LC CWH 2 is 57% EPT, which is excellent for an HQ-CWF stream. Biologically, this site maintains its functionality and sensitive species richness. It appears that the natural biology of the stream has not been significantly disrupted and is highly functional.

LC CWH 3:



LC CWH 3 is located off of SR 235 and accessed via the Lost Creek Rod and Gun Club's Camp Property. This sampling location is quite close to a cabin and parking area maintained by the Rod and Gun Club. This portion of the stream is closed to fishing. Trails crisscross the area. SR 235 parallels the site at a distance of several hundred yards. Here, the streambanks are steeper, and the stream gradient itself is quite steep. The area is marked by many drops and pools.

This site could potentially be affected by activities at the camp or in the parking area, although no degradation is apparent.

LC CWH 3 scored 196 out of 240 on the Stream Habitat Assessment Field Data Sheet, placing it in the Optimal category. The site scored within the Optimal category for each individual assessment parameter except Channel Alteration, Sediment Deposition, and Condition of Banks, which scored in the Suboptimal category. The channel is crossed by several foot bridges, and the steeper banks in the area are somewhat unstable in nature, leading to slight sediment deposition.

LC CWH 3

JCCD Chemical Parameters- Spring 2013

Water Temperature °C	8.5
DO %	74.4
DO ppm	8.72
Conductivity	28.9
Specific Conductivity	33.2
Salinity	0
pH	7.89
TDS	21.7
Turbidity	7
Phosphorus	.63
Nitrate	.2

JCCD Chemical Parameters- Fall 2013

Water Temperature °C	13.9
DO %	94.1
DO ppm	9.70
Conductivity	34.2
Specific Conductivity	35.2
Salinity	0
pH	7.62
TDS	28.7
Turbidity	5
Phosphorus	1
Nitrate	.4

LC CWH 3

Fairway Laboratories Chemical Parameters- Spring 2013

Total Alkalinity	<20.0
Specific Conductance (EC)	44.6
Dissolved Oxygen	11.4
Nitrate as N	<1
pH	6.61
Phosphorus	<0.05
Total Dissolved Solids	<20.0
Turbidity	1.42
E. Coli	2
Total Coliforms	200

Fairway Laboratories Chemical Parameters- Fall 2013

Total Alkalinity	<20.0
Specific Conductance (EC)	49.2
Dissolved Oxygen	9.99
Nitrate as N	<1
pH	6.83
Phosphorus	0.0550
Turbidity	20.5

All of the sampled chemical parameters fell within the ranges to determine that this section of the Lost Creek watershed continues to function as a HQ-CWF. Chemically, the LC CWH3 site range is very functional and seems to suffer from very few, if any, chemical stressors.

Macroinvertebrate Data as provided by Cole Ecological, Inc. for LC-CWH 3

2013 Juniata CCD Macroinvertebrates

Sum of Count					Coll Date
					13-130-03
					LC03
Phylum	Class	Order	Family	PA Taxon	03-Oct-13
Annelida	Oligochaeta			Oligochaeta	1
Annelidae	Clitellata	Branchiobdellida	Branchiobdellidae	Branchiobdellidae	8
Arthropoda	Arachnida			Hydracarina	5
	Crustacea	Amphipoda	Gammaridae	Gammarus	
		Decapoda	Cambaridae	Cambaridae	1
	Insecta	Coleoptera	Dryopidae	Helichus	1
			Elmidae	Dubiraphia	1
				Optioservus	2
				Oulimnius	14
				Promoresia	20
				Stenelmis	
			Psephenidae	Ectopria	1
				Psephenus	
		Diptera	Athericidae	Atherix	
			Ceratopogonidae	Ceratopogonidae	4
			Chironomidae	Chironomidae	41
			Empididae	Hemerodromia	
			Simuliidae	Simulium	
			Tipulidae	Antocha	
				Dicranota	2
				Hexatoma	
				Limnophila	
				Tipula	1
		Ephemeroptera	Baetidae	Acentrella	
				Acerpenna	3
				Baetis	
				Dipheter	
				Plauditus	
			Ephemerellidae	Ephemerella	2
				Eurylophella	1
				Teloganopsis	
			Ephemeridae	Ephemera	
			Heptageniidae	Epeorus	1
				Leucrocuta	1
				Maccaffertium	5
				Stenacron	
				Stenonema	

			Isonychiidae	Isonychia	
			Leptophlebiidae	Paraleptophlebia	14
	Megaloptera		Corydalidae	Nigronia	
	Odonata		Gomphidae	Gomphidae	
				Lanthus	1
	Plecoptera		Capniidae	Allocapnia	2
			Chloroperlidae	Sweltsa	1
			Leuctridae	Leuctra	5
			Peltoperlidae	Tallaperla	5
			Perlidae	Acroneuria	1
			Perlodidae	Isoperla	2
			Pteronarcyidae	Pteronarcys	3
			Taeniopterygidae	Taeniopteryx	
	Trichoptera		Apataniidae	Apatania	10
			Brachycentridae	Adicropheps	3
				Micrasema	5
			Glossosomatidae	Glossosoma	
			Hydropsychidae	Ceratopsyche	16
				Cheumatopsyche	1
				Diplectrona	20
				Hydropsyche	
			Hydroptilidae	Hydroptila	1
				Leucotrichia	
				Palaeagapetus	
			Lepidostomatidae	Lepidostoma	2
			Philopotamidae	Dolophilodes	2
			Polycentropodidae	Polycentropus	2
			Psychomyiidae	Psychomyia	
			Rhyacophilidae	Rhyacophila	18
Mollusca	Gastropoda	Basommatophora	Ancylidae	Ferrissia	
	Pelecypoda	Veneroida	Sphaeriidae	Sphaeriidae	
Nemata				Nematoda	
Nemertea	Enopla		Tetrastemmatidae	Prostoma	
Platyhelminthes	Turbellaria			Turbellaria	
Grand Total					229

The macroinvertebrate sample for LC CWH 3 is 49% EPT, which is excellent for an HQ-CWF stream. Biologically, this site maintains its functionality and sensitive species richness. It appears that the natural biology of the stream has not been significantly disrupted and is highly functional.

LC CWH 4:



LC CWH 4 is located off of Powel Road, a private drive used to access several camps, or privately owned temporary residences in the area. This sampling location is quite close to a privately owned cabin.

This site could potentially be affected by activities at the cabin, although no degradation is visible.

LC CWH 4 scored 191 out of 240 on the Stream Habitat Assessment Field Data Sheet, placing it in the Optimal category. The site scored within the Optimal category for each individual assessment parameter except Sediment Deposition, and Condition of Banks, and Riparian Vegetative Zone Width. The left bank (as seen in photo above) is where the privately owned cabin is located. The cabin sits within several yards of the streambank, and the bank is maintained in that area with little to no vegetation. The riparian zone on that bank is almost non-existent, leading to a patch of bank instability.

LC CWH 4

JCCD Chemical Parameters- Spring 2013

Water Temperature °C	8.7
DO %	74.7
DO ppm	8.89
Conductivity	30.9
Specific Conductivity	35.3
Salinity	0
pH	7.59
TDS	16.5
Turbidity	3
Phosphorus	.28
Nitrate	.4

JCCD Chemical Parameters- Fall 2013

Water Temperature °C	17.3
DO %	89.2
DO ppm	8.57
Conductivity	43.2
Specific Conductivity	41.6
Salinity	0
pH	7.68
TDS	33.6
Turbidity	6
Phosphorus	.05
Nitrate	.2

LC CWH 4

Fairway Laboratories Chemical Parameters- Spring 2013

Total Alkalinity	<20.0
Specific Conductance (EC)	47.4
Dissolved Oxygen	11.4
Nitrate as N	<1
pH	6.62
Phosphorus	<0.05
Total Dissolved Solids	<20.0
Turbidity	1.41
E. Coli	15
Total Coliforms	200

Fairway Laboratories Chemical Parameters- Fall 2013

Total Alkalinity	<20.0
Specific Conductance (EC)	56.1
Dissolved Oxygen	9.39
Nitrate as N	<1
pH	7.16
Phosphorus	<0.05
Turbidity	7.19

All of the sampled chemical parameters fell within the ranges to determine that this section of the Lost Creek watershed continues to function as a HQ-CWF. Chemically, the LC CWH 4 site range is very functional and seems to suffer from very few, if any, chemical stressors.

Macroinvertebrate Data as provided by Cole Ecological, Inc. for LC-CWH 4

Sum of Count					
					13-130-04
					LC04
Phylum	Class	Order	Family	PA Taxon	03-Oct-13
Annelida	Oligochaeta			Oligochaeta	1
Annelidae	Clitellata	Branchiobdellida	Branchiobdellidae	Branchiobdellidae	
Arthropoda	Arachnida			Hydracarina	3
	Crustacea	Amphipoda	Gammaridae	Gammarus	
		Decapoda	Cambaridae	Cambaridae	
	Insecta	Coleoptera	Dryopidae	Helichus	
			Elmidae	Dubiraphia	
				Optioservus	2
				Oulimnius	31
				Promoresia	5
				Stenelmis	
			Psephenidae	Ectopria	3
				Psephenus	3
		Diptera	Athericidae	Atherix	
			Ceratopogonidae	Ceratopogonidae	
			Chironomidae	Chironomidae	44
			Empididae	Hemerodromia	
			Simuliidae	Simulium	
			Tipulidae	Antocha	1
				Dicranota	
				Hexatoma	1
				Limnophila	
				Tipula	
		Ephemeroptera	Baetidae	Acentrella	1
				Acerpenna	
				Baetis	3
				Dipheter	
				Plauditus	1
			Ephemerellidae	Ephemerella	4
				Eurylophella	
				Teloganopsis	1
			Ephemeridae	Ephemera	
			Heptageniidae	Epeorus	
				Leucrocuta	3
				Maccaffertium	10
				Stenacron	
				Stenonema	

			Isonychiidae	Isonychia	6
			Leptophlebiidae	Paraleptophlebia	20
	Megaloptera		Corydalidae	Nigronia	2
	Odonata		Gomphidae	Gomphidae	
				Lanthus	
	Plecoptera		Capniidae	Allocapnia	
			Chloroperlidae	Sweltsa	5
			Leuctridae	Leuctra	4
			Peltoperlidae	Tallaperla	
			Perlidae	Acroneuria	3
			Perlodidae	Isoperla	5
			Pteronarcyidae	Pteronarcys	1
			Taeniopterygidae	Taeniopteryx	8
	Trichoptera		Apataniidae	Apatania	1
			Brachycentridae	Adicrophleps	
				Micrasema	1
			Glossosomatidae	Glossosoma	
			Hydropsychidae	Ceratopsyche	15
				Cheumatopsyche	11
				Diplectrona	14
				Hydropsyche	
			Hydroptilidae	Hydroptila	
				Leucotrichia	
				Palaeagapetus	
			Lepidostomatidae	Lepidostoma	
			Philopotamidae	Dolophilodes	8
			Polycentropodidae	Polycentropus	2
			Psychomyiidae	Psychomyia	2
			Rhyacophilidae	Rhyacophila	5
Mollusca	Gastropoda	Basommatophora	Ancylidae	Ferrissia	
	Pelecypoda	Veneroida	Sphaeriidae	Sphaeriidae	1
Nemata				Nematoda	
Nemertea	Enopla		Tetrastemmatidae	Prostoma	
Platyhelminthes	Turbellaria			Turbellaria	
Grand Total					231

The macroinvertebrate sample for LC CWH 4 is 58% EPT, which is excellent for an HQ-CWF stream. Biologically, this site maintains its functionality and sensitive species richness. It appears that the natural biology of the stream has not been significantly disrupted and is highly functional.

LC CWH 5:



LC CWH 5 is located on a tributary of Lost Creek known as Tennis Run, near the intersection of Mountain Road and Tennis Park Road. This sampling site is located on private property, and is crossed by a private driveway bridge. A personal garage is located within several yards of the streambank, and a permanent residence sits several hundred yards away.

Some impacts can be seen at the site due to its proximity to a permanent residence; mainly the results of the driveway crossing. Impacts have been minimal.

LC CWH 5 scored 185 out of 240 on the Stream Habitat Assessment Field Data Sheet, placing it in the Optimal category. The site scored within the Optimal or Suboptimal categories for each individual assessment parameter. Lower scores were received in categories such as Channel Alteration, Grazing or Other Disruptive Pressure, Riparian Vegetative Zone Width due to the garage and residence and their proximity to the stream.

LC CWH 5

JCCD Chemical Parameters- Spring 2013

Water Temperature °C	9.1
DO %	77.6
DO ppm	8.96
Conductivity	33.2
Specific Conductivity	37.1
Salinity	0
pH	8.62
TDS	17.9
Turbidity	0
Phosphorus	Over Limit (over 2.75)
Nitrate	.3

JCCD Chemical Parameters- Fall 2013

Water Temperature °C	16.3
DO %	95.6
DO ppm	9.38
Conductivity	33.0
Specific Conductivity	32.3
Salinity	0
pH	8.45
TDS	101.5
Turbidity	0
Phosphorus	.12
Nitrate	.3

LC CWH 5

Fairway Laboratories Chemical Parameters- Spring 2013

Total Alkalinity	<20.0
Specific Conductance (EC)	51.6
Dissolved Oxygen	11.4
Nitrate as N	<1
pH	7.06
Phosphorus	<0.05
Total Dissolved Solids	42.0
Turbidity	3.34
E. Coli	7.5
Total Coliforms	200

Fairway Laboratories Chemical Parameters- Fall 2013

Total Alkalinity	74
Specific Conductance (EC)	165
Dissolved Oxygen	10.4
Nitrate as N	<1
pH	8.08
Phosphorus	<0.05
Turbidity	1.4

All of the sampled chemical parameters fell within the ranges to determine that this section of the Lost Creek watershed continues to function as a HQ-CWF. Chemically, the LC CWH 5 site range is very functional and seems to suffer from very few, if any, chemical stressors.

Sum of Count					
				13-130-05	
				LC05	
Phylum	Class	Order	Family	PA Taxon	03-Oct-13
Annelida	Oligochaeta			Oligochaeta	13
Annelidae	Clitellata	Branchiobdellida	Branchiobdellidae	Branchiobdellidae	
Arthropoda	Arachnida			Hydracarina	8
	Crustacea	Amphipoda	Gammaridae	Gammarus	2
		Decapoda	Cambaridae	Cambaridae	1
	Insecta	Coleoptera	Dryopidae	Helichus	
			Elmidae	Dubiraphia	
				Optioservus	12
				Oulimnius	36
				Promoesia	3
				Stenelmis	
			Psephenidae	Ectopria	
				Psephenus	1
		Diptera	Athericidae	Atherix	
			Ceratopogonidae	Ceratopogonidae	
			Chironomidae	Chironomidae	30
			Empididae	Hemerodromia	
			Simuliidae	Simulium	4
			Tipulidae	Antocha	12
				Dicranota	
				Hexatoma	
				Limnophila	
				Tipula	1
		Ephemeroptera	Baetidae	Acentrella	1
				Acerpenna	
				Baetis	7
				Dipheter	
				Plauditus	
			Ephemerellidae	Ephemerella	7
				Eurylophella	
				Teloganopsis	2
			Ephemeridae	Ephemera	
			Heptageniidae	Epeorus	
				Leucrocuta	1
				Maccaffertium	1
				Stenacron	
				Stenonema	
			Isonychiidae	Isonychia	1
			Leptophlebiidae	Paraleptophlebia	
		Megaloptera	Corydalidae	Nigronia	
		Odonata	Gomphidae	Gomphidae	
				Lanthus	
		Plecoptera	Capniidae	Allocapnia	1

			Chloroperlidae	Sweltsa	4
			Leuctridae	Leuctra	
			Peltoperlidae	Tallaperla	2
			Perlidae	Acroneuria	
			Perlodidae	Isoperla	
			Pteronarcyidae	Pteronarcys	1
			Taeniopterygidae	Taeniopteryx	4
		Trichoptera	Apataniidae	Apatania	
			Brachycentridae	Adicrophleps	
				Micrasema	
			Glossosomatidae	Glossosoma	
			Hydropsychidae	Ceratopsyche	35
				Cheumatopsyche	7
				Diplectrona	13
				Hydropsyche	14
			Hydroptilidae	Hydroptila	
				Leucotrichia	
				Palaeagapetus	
			Lepidostomatidae	Lepidostoma	
			Philopotamidae	Dolophilodes	2
			Polycentropodidae	Polycentropus	
			Psychomyiidae	Psychomyia	
			Rhyacophilidae	Rhyacophila	5
Mollusca	Gastropoda	Basommatophora	Ancylidae	Ferrissia	
	Pelecypoda	Veneroida	Sphaeriidae	Sphaeriidae	
Nemata				Nematoda	
Nemertea	Enopla		Tetrastemmatidae	Prostoma	7
Platyhelminthes	Turbellaria			Turbellaria	
Grand Total					238

The macroinvertebrate sample for LC CWH 5 is 43% EPT, which is excellent for an HQ-CWF stream. Biologically, this site maintains its functionality and sensitive species richness. It appears that the natural biology of the stream has not been significantly disrupted and is highly functional.

LC CWH 6:



LC CWH 6 is located on the main stem of Lost Creek, near where the stream crosses under Degan Road. This sampling site flows through private property, and is near a commercial garage operation and a poultry farm.

Some impacts can be seen at the site due to its proximity to industry, agriculture, and permanent residences. Direct impacts have been minimal despite these threats due to an intact buffer zone.

LC CWH 6 scored 189 out of 240 on the Stream Habitat Assessment Field Data Sheet, placing it in the Optimal category. The site scored within the Optimal or Suboptimal categories for each individual assessment parameter. Lower scores were received in categories such as Instream Cover, Embeddedness, Bank Vegetative Protection, and Riparian Vegetative Zone Width due to the development nearby. A lower score in Channel Alteration is also due to the presence of the bridge on Degan Road that crosses the stream.

JCCD Chemical Parameters- Spring 2013

Water Temperature °C	9.2
DO %	75.4
DO ppm	8.67
Conductivity	36.3
Specific Conductivity	40.1
Salinity	0
pH	8.35
TDS	20.1
Turbidity	3
Phosphorus	.51
Nitrate	.4

JCCD Chemical Parameters- Fall 2013

Water Temperature °C	17.3
DO %	90.4
DO ppm	8.68
Conductivity	84.7
Specific Conductivity	81.5
Salinity	0
pH	8.41
TDS	66.5
Turbidity	1
Phosphorus	.05
Nitrate	.2

LC CWH 6

Fairway Laboratories Chemical Parameters- Spring 2013

Total Alkalinity	<20.0
Specific Conductance (EC)	55.1
Dissolved Oxygen	11.5
Nitrate as N	<1
pH	7.08
Phosphorus	<0.05
Total Dissolved Solids	50
Turbidity	2.59
E. Coli	27.1
Total Coliforms	200

Fairway Laboratories Chemical Parameters- Fall 2013

Total Alkalinity	42
Specific Conductance (EC)	109
Dissolved Oxygen	9.66
Nitrate as N	<1
pH	7.87
Phosphorus	<0.05
Turbidity	1.98

All of the sampled chemical parameters fell within the ranges to determine that this section of the Lost Creek watershed continues to function as a HQ-CWF. Chemically, the LC CWH 6 site range is very functional and seems to suffer from very few, if any, chemical stressors.

Macroinvertebrate Data as provided by Cole Ecological, Inc. for LC-CWH 6

Sum of Count					13-130-06
					LC06
Phylum	Class	Order	Family	PA Taxon	03-Oct-13
Annelida	Oligochaeta			Oligochaeta	2
Annelidae	Clitellata	Branchiobdellida	Branchiobdellidae	Branchiobdellidae	
Arthropoda	Arachnida			Hydracarina	4
	Crustacea	Amphipoda	Gammaridae	Gammarus	
		Decapoda	Cambaridae	Cambaridae	
	Insecta	Coleoptera	Dryopidae	Helichus	1
			Elmidae	Dubiraphia	
				Optioservus	14
				Oulimnius	12
				Promoresia	8
				Stenelmis	
			Psephenidae	Ectopria	
				Psephenus	15
		Diptera	Athericidae	Atherix	1
			Ceratopogonidae	Ceratopogonidae	
			Chironomidae	Chironomidae	22
			Empididae	Hemerodromia	
			Simuliidae	Simulium	
			Tipulidae	Antocha	2
				Dicranota	2
				Hexatoma	
				Limnophila	
				Tipula	1
		Ephemeroptera	Baetidae	Acentrella	1
				Acerpenna	
				Baetis	5
				Dipheter	
				Plauditus	
			Ephemerellidae	Ephemerella	6
				Eurylophella	1
				Teloganopsis	2
			Ephemeridae	Ephemera	
			Heptageniidae	Epeorus	
				Leucrocuta	
				Maccaffertium	10
				Stenacron	
				Stenonema	
			Isonychiidae	Isonychia	4
			Leptophlebiidae	Paraleptophlebia	2
		Megaloptera	Corydalidae	Nigronia	
		Odonata	Gomphidae	Gomphidae	1
				Lanthus	
		Plecoptera	Capniidae	Allocapnia	13

			Chloroperlidae	Sweltsa	1
			Leuctridae	Leuctra	
			Peltoperlidae	Tallaperla	
			Perlidae	Acroneuria	
			Perlodidae	Isoperla	
			Pteronarcyidae	Pteronarcys	
			Taeniopterygidae	Taeniopteryx	3
	Trichoptera		Apataniidae	Apatania	
			Brachycentridae	Adicropheps	
				Micrasema	2
			Glossosomatidae	Glossosoma	
			Hydropsychidae	Ceratopsyche	48
				Cheumatopsyche	17
				Diplectrona	13
				Hydropsyche	2
			Hydroptilidae	Hydroptila	
				Leucotrichia	
				Palaeagapetus	
			Lepidostomatidae	Lepidostoma	
			Philopotamidae	Dolophilodes	5
			Polycentropodidae	Polycentropus	
			Psychomyiidae	Psychomyia	
			Rhyacophilidae	Rhyacophila	5
Mollusca	Gastropoda	Basommatophora	Ancylidae	Ferrissia	7
	Pelecypoda	Veneroida	Sphaeriidae	Sphaeriidae	2
Nemata				Nematoda	
Nemertea	Enopla		Tetrastemmatidae	Prostoma	3
Platyhelminthes	Turbellaria			Turbellaria	
Grand Total					237

The macroinvertebrate sample for LC CWH 6 is 60% EPT, which is excellent for an HQ-CWF stream. Biologically, this site maintains its functionality and sensitive species richness. It appears that the natural biology of the stream has not been significantly disrupted and is highly functional.

LC CWH 7:



LC CWH 7 is located on the main stem of Lost Creek where the project area ends, as Lost Creek crosses under SR 35.

Impacts at this site are visible. They have been caused by the roadway, and because this section of Lost Creek flows through the Lost Creek Golf Course. The riparian zone has been dramatically altered from its original state, and in-stream impacts are also noticeable as a result.

LC CWH 7 scored 125 out of 240 on the Stream Habitat Assessment Field Data Sheet, placing it in the Suboptimal category. Its lowest scores came from the Grazing or Other Disruptive Pressure and Riparian Vegetative Zone Width parameters, as the streambanks are constantly under pressure from mowing of the Lost Creek Golf Course green. There is little to no forested riparian zone in this reach. As a result of these activities, Sediment Deposition was prevalent, Epifaunal Substrate and Instream Cover were compromised, and Embeddedness was profound.

LC CWH 7

JCCD Chemical Parameters- Spring 2013

Water Temperature °C	10.1
DO %	84.5
DO ppm	9.51
Conductivity	38.8
Specific Conductivity	42.9
Salinity	0
pH	7.92
TDS	19.3
Turbidity	0
Phosphorus	.28
Nitrate	.3

JCCD Chemical Parameters- Fall 2013

Water Temperature °C	20.1
DO %	104.9
DO ppm	9.52
Conductivity	94.7
Specific Conductivity	86.6
Salinity	0.1
pH	9.01
TDS	69.6
Turbidity	3
Phosphorus	.14
Nitrate	.2

LC CWH 7

Fairway Laboratories Chemical Parameters- Spring 2013

Total Alkalinity	<20.0
Specific Conductance (EC)	59.4
Dissolved Oxygen	10.9
Nitrate as N	<1
pH	7.16
Phosphorus	<0.05
Total Dissolved Solids	<20
Turbidity	5.17
E. Coli	34.4
Total Coliforms	200

Fairway Laboratories Chemical Parameters- Fall 2013

Total Alkalinity	48
Specific Conductance (EC)	113
Dissolved Oxygen	10.4
Nitrate as N	<1
pH	8.60
Phosphorus	<0.05
Turbidity	1.97

All of the sampled chemical parameters fell within the ranges to determine that this section of the Lost Creek watershed continues to function as a HQ-CWF except the fall sampled Specific Conductance (EC.) The top end of this parameter should not exceed 60. It is likely that chemical pressure from the just-upstream golf course recreational, residential, and/or agricultural activities might have some effect on this lower most portion of the HQ-CWF Lost Creek Watershed. Additionally, the pH is nearing the uppermost portion of its tolerable range and the temperature is slightly higher than ideal. Chemically, the LC CWH 7 site range is functional yet it does appear to suffer from some chemical pressures which could lead to future degradation.

Macroinvertebrate Data as provided by Cole Ecological, Inc. for LC-CWH 7

Sum of Count					13-130-07
					LC07
Phylum	Class	Order	Family	PA Taxon	02-Oct-13
Annelida	Oligochaeta			Oligochaeta	14
Annelidae	Clitellata	Branchiobdellida	Branchiobdellidae	Branchiobdellidae	
Arthropoda	Arachnida			Hydracarina	11
	Crustacea	Amphipoda	Gammaridae	Gammarus	1
		Decapoda	Cambaridae	Cambaridae	
	Insecta	Coleoptera	Dryopidae	Helichus	
			Elmidae	Dubiraphia	
				Optioservus	10
				Oulimnius	1
				Promoresia	2
				Stenelmis	1
			Psephenidae	Ectopria	1
				Psephenus	17
		Diptera	Athericidae	Atherix	
			Ceratopogonidae	Ceratopogonidae	
			Chironomidae	Chironomidae	98
			Empididae	Hemerodromia	
			Simuliidae	Simulium	5
			Tipulidae	Antocha	4
				Dicranota	
				Hexatoma	
				Limnophila	
				Tipula	1
		Ephemeroptera	Baetidae	Acentrella	
				Acerpenna	
				Baetis	2
				Dipheter	
				Plauditus	
			Ephemerellidae	Ephemerella	1
				Eurylophella	1
				Teloganopsis	2
			Ephemeridae	Ephemera	
			Heptageniidae	Epeorus	1
				Leucrocuta	
				Maccaffertium	6
				Stenacron	
				Stenonema	1
			Isonychiidae	Isonychia	4
			Leptophlebiidae	Paraleptophlebia	1

		Megaloptera	Corydalidae	Nigronia	
		Odonata	Gomphidae	Gomphidae	
				Lanthus	
		Plecoptera	Capniidae	Allocaenia	
			Chloroperlidae	Sweltsa	
			Leuctridae	Leuctra	
			Peltoperlidae	Tallaperla	
			Perlidae	Acroneuria	
			Perlodidae	Isoperla	
			Pteronarcyidae	Pteronarcys	
			Taeniopterygidae	Taeniopteryx	
		Trichoptera	Apataniidae	Apatania	
			Brachycentridae	Adicropheps	
				Micrasema	
			Glossosomatidae	Glossosoma	
			Hydropsychidae	Ceratopsyche	2
				Cheumatopsyche	16
				Diplectrona	
				Hydropsyche	5
			Hydroptilidae	Hydroptila	
				Leucotrichia	2
				Palaeagapetus	
			Lepidostomatidae	Lepidostoma	
			Philopotamidae	Dolophilodes	
			Polycentropodidae	Polycentropus	
			Psychomyiidae	Psychomyia	
			Rhyacophilidae	Rhyacophila	2
Mollusca	Gastropoda	Basommatophora	Ancylidae	Ferrissia	
	Pelecypoda	Veneroida	Sphaeriidae	Sphaeriidae	
Nemata				Nematoda	5
Nemertea	Enopla		Tetrastemmatidae	Prostoma	
Platyhelminthes	Turbellaria			Turbellaria	1
Grand Total					218

The macroinvertebrate sample for LC CWF 7 is 20% EPT, which is significantly lower than the 30% EPT that should be found in HQ-CWF watersheds. It is clear that chemical pressures as can be observed in the LC CWF 7 site's chemical data, and also sedimentation pressures have already impacted the biological functioning at this downstream-most portion of the HQ-CWF watershed. Pressures from the golf course, agricultural, and residential activities should be addressed in order to restore optimal functionality to the rest of the Lost Creek Watershed.

LC 1 / LC SC:



LC 1 / LC SC is an historic JCCD sampling site located along Saddle Club Road. It is flanked on one side by the Lost Creek Saddle Club property, and on the other side by private property.

Chemical data was not newly sampled at this site, nor were Lab Verified chemical parameters taken, as this was not a new sampling site for this grant. Historical data has shown that no major chemical concerns occur here. However, macroinvertebrate samples were taken and lab verified by Cole Ecological, Inc. and a Stream Habitat Assessment was preformed by JCCD staff.

LC 1 / LC SC scored a 167 out of 240 on the Stream Habitat Assessment Field Data Sheet, placing it in the Suboptimal Category. Major impacts occur in the areas of Channel Alteration, Condition of Banks, Grazing or Other Disruptive Pressure, and Riparian Vegetative Zone Width. The private residence seems to be attempting to build some sort of ineffective stone wall alongside the stream. Large rocks, debris, and dirt from this “wall” are constantly being washed in stream during high water events. Now, this foreign material dominates the stream substrate. There is a very small riparian zone due to the Saddle Club and Residence and their proximity to the channel. Impacts at this location due to these infringements are evident.

Sum of Count					13-130-08
					LCSC
Phylum	Class	Order	Family	PA Taxon	02-Oct-13
Annelida	Oligochaeta			Oligochaeta	3
Annelidae	Clitellata	Branchiobdellida	Branchiobdellidae	Branchiobdellidae	
Arthropoda	Arachnida			Hydracarina	2
	Crustacea	Amphipoda	Gammaridae	Gammarus	
		Decapoda	Cambaridae	Cambaridae	
	Insecta	Coleoptera	Dryopidae	Helichus	
			Elmidae	Dubiraphia	
				Optioservus	8
				Oulimnius	6
				Promoresia	
				Stenelmis	
			Psephenidae	Ectopria	
				Psephenus	6
		Diptera	Athericidae	Atherix	
			Ceratopogonidae	Ceratopogonidae	
			Chironomidae	Chironomidae	56
			Empididae	Hemerodromia	
			Simuliidae	Simulium	2
			Tipulidae	Antocha	4
				Dicranota	
				Hexatoma	
				Limnophila	
				Tipula	
		Ephemeroptera	Baetidae	Acentrella	2
				Acerpenna	
				Baetis	4
				Dipheter	
				Plauditus	
			Ephemerellidae	Ephemerella	7
				Eurylophella	2
				Teloganopsis	1
			Ephemeridae	Ephemera	1
			Heptageniidae	Epeorus	1
				Leucrocuta	
				Maccaffertium	14
				Stenacron	2
				Stenonema	
			Isonychiidae	Isonychia	17
			Leptophlebiidae	Paraleptophlebia	2
		Megaloptera	Corydalidae	Nigronia	
		Odonata	Gomphidae	Gomphidae	3
				Lanthus	
		Plecoptera	Capniidae	Allocapnia	25

			Chloroperlidae	Sweltsa	
			Leuctridae	Leuctra	
			Peltoperlidae	Tallaperla	
			Perlidae	Acroneuria	3
			Perlodidae	Isoperla	
			Pteronarcyidae	Pteronarcys	
			Taeniopterygidae	Taeniopteryx	3
	Trichoptera		Apataniidae	Apatania	
			Brachycentridae	Adicrophleps	
				Micrasema	
			Glossosomatidae	Glossosoma	1
			Hydropsychidae	Ceratopsyche	24
				Cheumatopsyche	25
				Diplectrona	
				Hydropsyche	5
			Hydroptilidae	Hydroptila	
				Leucotrichia	
				Palaeagapetus	
			Lepidostomatidae	Lepidostoma	
			Philopotamidae	Dolophilodes	2
			Polycentropodidae	Polycentropus	2
			Psychomyiidae	Psychomyia	1
			Rhyacophilidae	Rhyacophila	3
Mollusca	Gastropoda	Basommatophora	Ancylidae	Ferrissia	2
				Sphaeriidae	
	Pelecypoda	Veneroida	Sphaeriidae	Sphaeriidae	
Nemata				Nematoda	
Nemertea	Enopla		Tetrastemmatidae	Prostoma	
Platyhelminthes	Turbellaria			Turbellaria	
Grand Total					239

The macroinvertebrate sample for LC-1 / LC SC, located only slightly upstream of site LC CWH 7, is 62% EPT, which is excellent for an HQ-CWF stream. Biologically, this site maintains its functionality and sensitive species richness. It appears that the natural biology of the stream has not been significantly disrupted and is highly functional. When contrasted to site LC CWH 7, it is clear that a combination of the recreational, residential, and agricultural impacts located between these two sites lead to significant impacts within the lower portions of the Lost Creek watershed.

CONCLUSIONS AND CONSERVATION RECCOMENDATIONS

Conclusions:

Mike Cole, PhD and Ecologist for Cole Ecological, Inc. summed it up quite well when returning the processed macroinvertebrate samples by saying “Lost Creek is quite the coldwater resource!” The taxonomic richness, and "EPT" Ephemeroptera (mayflies), Plecoptera (stoneflies), and Trichoptera) richness in particular is indicative of the High Quality of Lost Creek. There were numerous other cold/cool water obligates in the samples: Diplectrona, Tallaperla, and Dipheter, to name several. The data generally suggest that the benthic communities of Lost Creek are diverse and largely comprise taxa that require clean, cold water.

From both our chemical and macroinvertebrate sampling, and from our Stream Habitat Assessments, it has become quite clear that Lost Creek does continue to meet its High Quality designations and continues to serve the residents of Juniata County quite fully, especially in the upstream portions of watershed.

As the stream progresses from its headwater reaches to SR 35, some impacts can be noticed. Macroinvertebrate species richness and water chemistry parameters at site LC CWH 7 aren't quite as pristine as in the forested headwaters, but they are still quite respectable. With careful conservation and preservation of this watershed, and some restoration efforts in its lower reaches, Lost Creek can continue to serve as a High Quality fishery within Juniata County for many years to come. With some conservation work, the possibility that the streams health could improve downstream does exist.

Recommendations:

Education-

Watershed stakeholders, including landowners, business operators, farmers, and other players within the Lost Creek Watershed should be educated to ensure proper land management and appreciate for the resource that is Lost Creek and its tributaries.

Outreach to all landowners, farmers, residents, township supervisors and other elected officials within the Lost Creek watershed should focus first on recognizing Lost Creek and its entire watershed as an asset. Further education should emphasize Best Management Practices and controlling Non-Point Source (NPS) Pollution. These efforts may be carried out by Juniata County Conservation District, the local Natural Recourse Conservation Services (NRCS) personnel, or any future watershed groups that may form.

Inventory Restoration Opportunities-

Opportunities for streambank restoration, especially in the lower portions of the Lost Creek watershed, should be further inventoried. Agricultural Landowners, businesses, private landowners, and the Lost Creek Golf Course are potential targets. Riparian buffer restorations, streambank restorations, fish habitat enhancement projects, and Agricultural BMPs are potential restoration opportunities that exist within the Lost Creek watershed.

Focusing on these types of restoration projects will only enhance the habitat and water quality of Lost Creek and its tributaries.

Illegal Dumpsite Cleanup-

With the steep gradients and rural nature of the Lost Creek watershed, illegal dumping has the potential to become a serious problem. Dumpsites are not only eyesores, the insidious nature of the problem goes beyond aesthetics. Illegal dumping poses direct hazards to both surface waters and groundwater. Where dumpsites are located close to waterways, as is often the case, direct run-off into streams can carry a number of hazardous pollutants, and leachate from dumpsites can ultimately affect surface waters and groundwater.

Through Keep Juniata County Beautiful, an affiliate of Keep Pennsylvania Beautiful, opportunities exist to clean up any existing and future dumpsites that may arise through volunteer efforts.

Keep Pennsylvania Beautiful has identified at least 1 dumpsite within the Lost Creek watershed in Juniata County in its Juniata County Illegal Dump Survey Final Report, published in 2010. This site should be given cleanup priority, and any sites identified in the future should also be cleaned up as soon as possible.

Formation of a Watershed Group-

Lost Creek and its tributaries would benefit greatly from the formation of a Watershed Group comprised of concerned citizens and stakeholders within the watershed. A Watershed Group is a citizen based group interested in protecting a nearby waterway and its surrounding drainage area. Formation and functionality of this group could be assisted by the Juniata County Conservation District staff and Board of Directors.

Additional Maps and Photos



Adicropheps hitchcocki



Paleagapetus celsus

JCCD Lost Creek Samples, processed by Cole Ecological, Inc. contained these two uncommon headwater obligate macroinvertebrate species.



A recently logged area in the Lost Creek Headwaters



A hiking trail bridge crosses an Unnamed Tributary on Lost Creek Rod and Gun Club property.



Lost Creek Rod and Gun Club Camp/Cabin.



The mainstem of Lost Creek flowing through rocky hemlock forest.



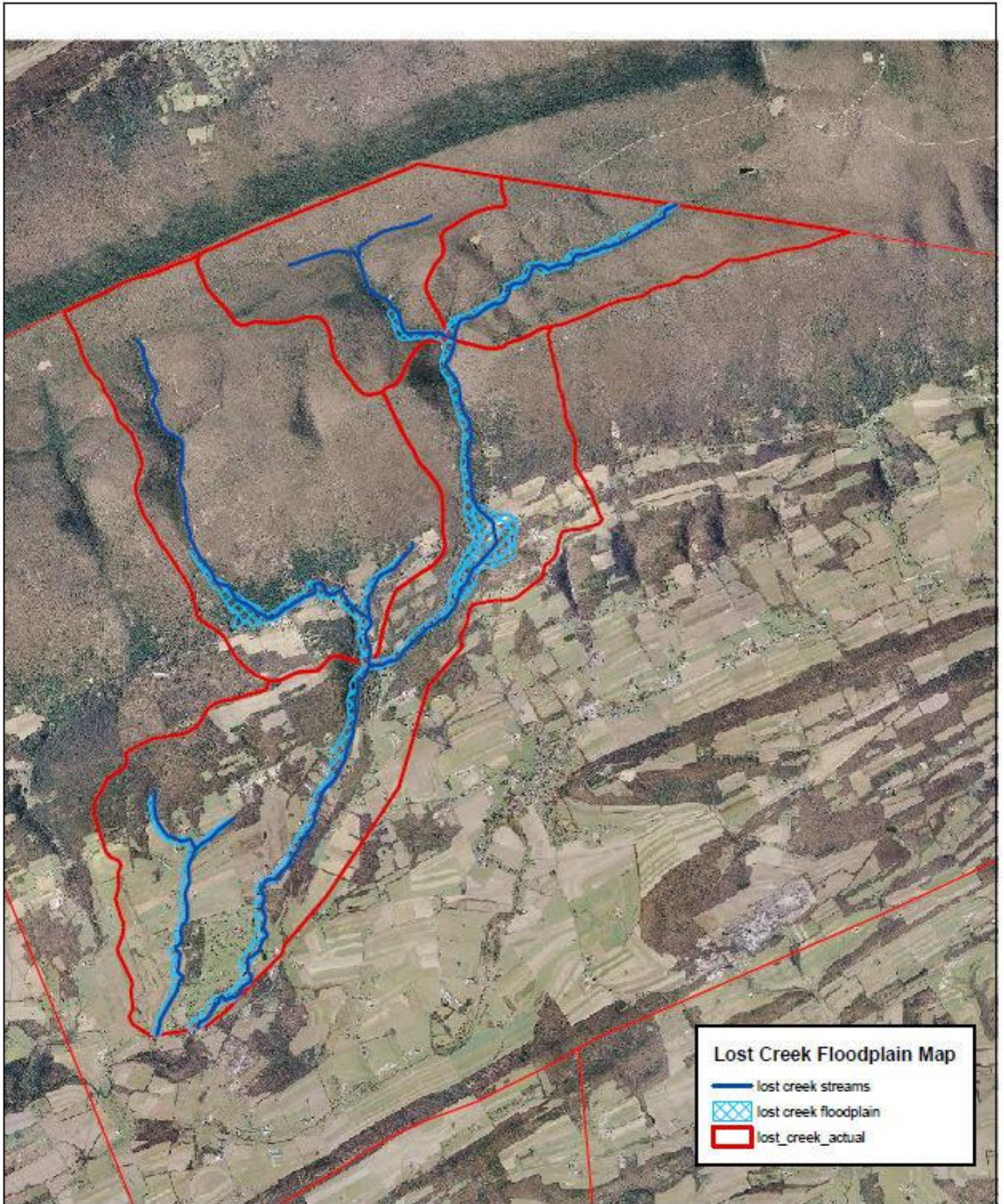
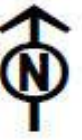
A poultry operation within the Lost Creek watershed.

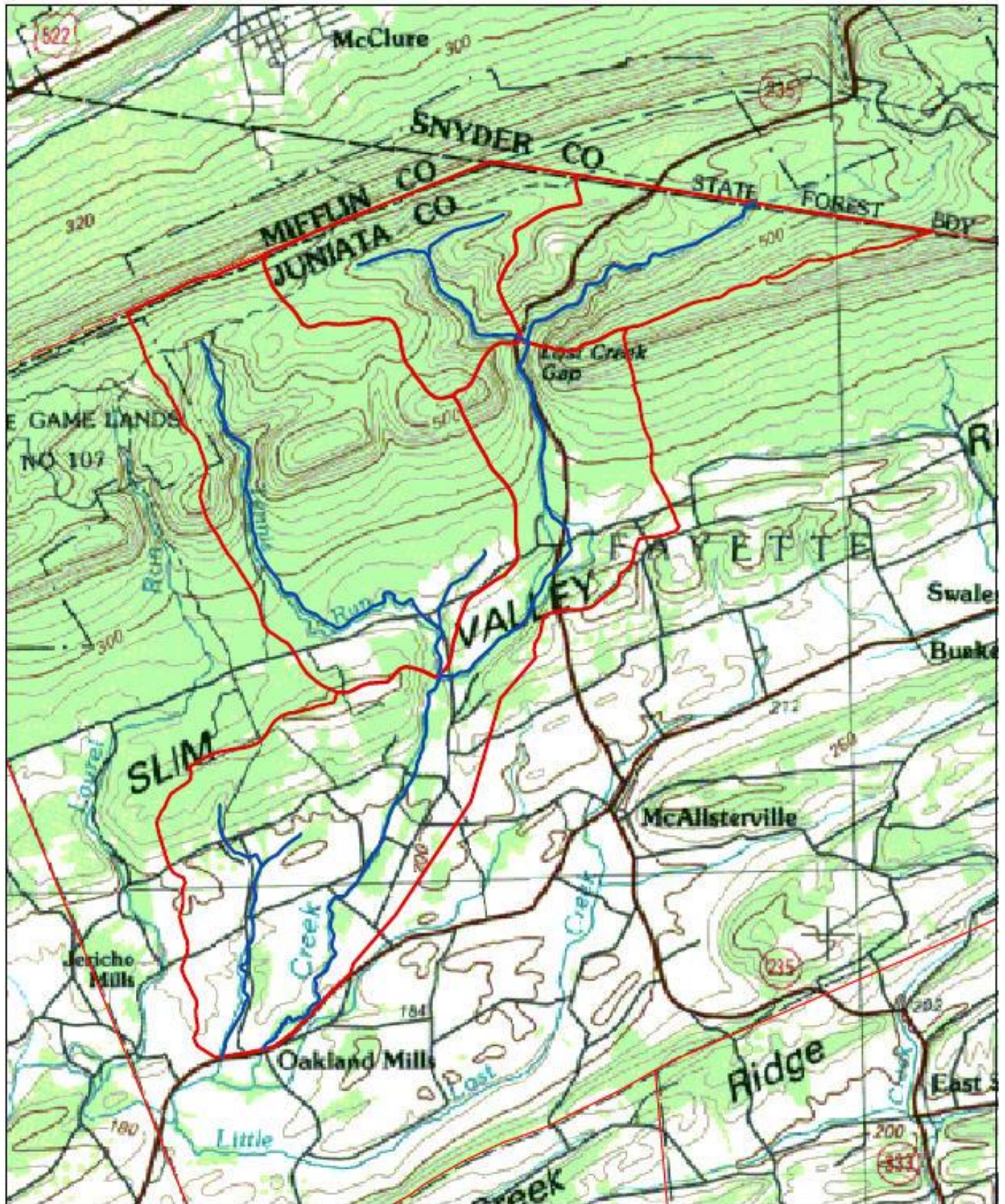


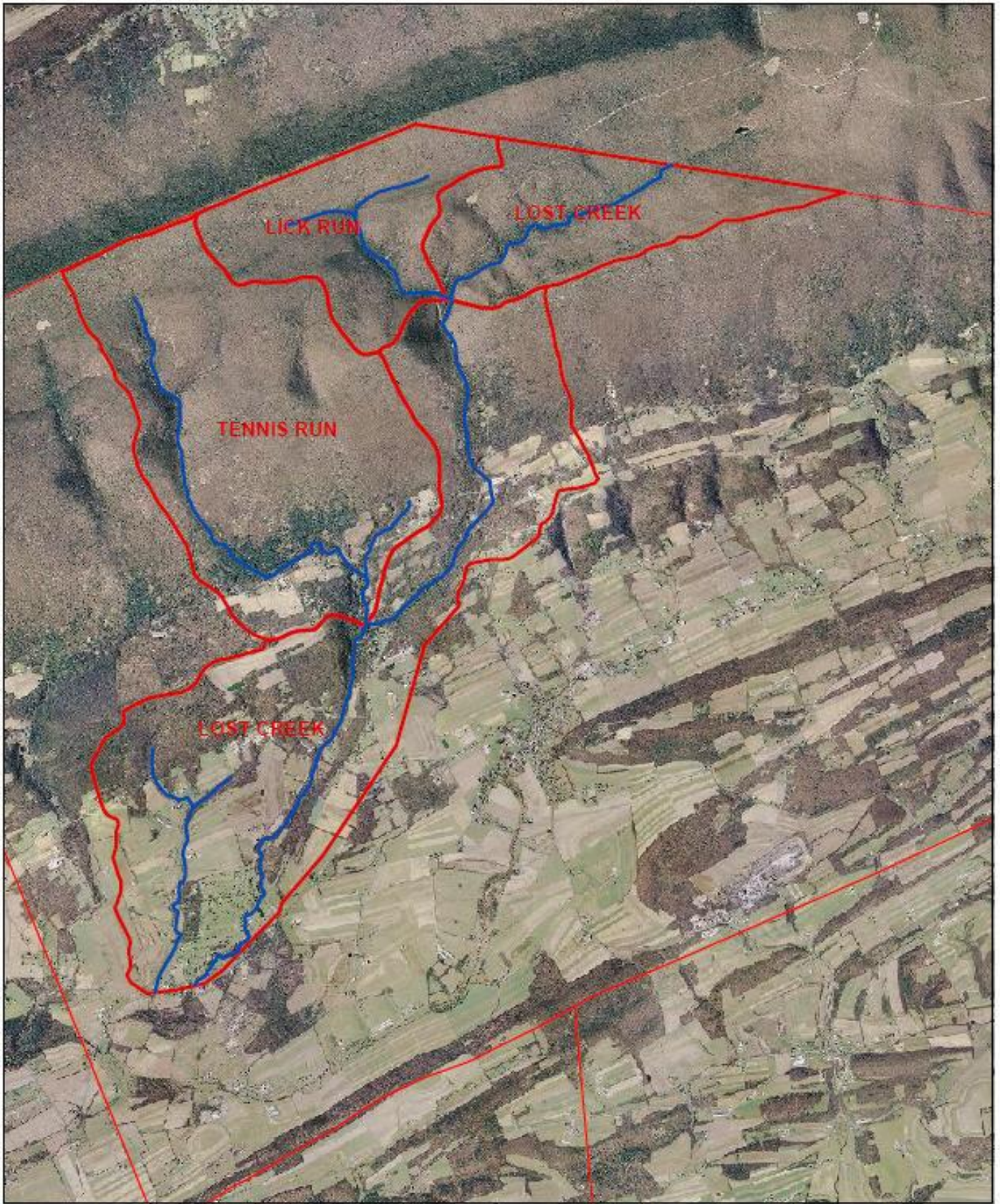
An Amish Farm within the Lost Creek watershed.



A sawmill operation within the Lost Creek watershed.







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Appendix A: Stream Habitat Data Sheets



SENIOR ENVIRONMENT CORPS

Stream Habitat Assessment Field Data Sheet Riffle/Run Prevalence

Date _____ Time _____ Site ID # _____

Surveyed by: _____ Volunteer ID # _____

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

Total _____ (1-3)



Riffle/Run Prevalence

Habitat Parameter	Category			
	Optimal	Suboptimal	Marginal	Poor
4. Velocity/Depth Regimes	All four velocity/depth regimes present (slow-deep; slow-shallow; fast-deep; fast-shallow).	Only 3 of the 4 regimes present (if fast-shallow is missing, score lower than if missing other regimes).	Only 2 of 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
5. Channel Alteration	No channelization or dredging present.	Some channelization present, usually in areas of bridge abutments; evidence of past channelization, i.e. dredging (greater than 20 yr) may be present, but recent channelization is not present.	New embankments present on both banks; and 40-80% of stream reach channelized and disrupted.	Banks shored with gabion or cement; over 80% of the stream reach channelized and disrupted.
Score:	20 19 18 17 16	15 14 13 12 11	10 9 8 7 6	5 4 3 2 1 0
6. Sediment Deposition	Little or no enlargements of islands or point bars and less than 5% of the bottom affected by sediment deposition.	Some new increase in bar formation, mostly from coarse gravel; 5-30% of the bottom affected; slight deposition in pools.	Moderate deposition of new gravel, coarse sand on old and new bars; 30-50% of the bottom affected; sediment deposits at obstructions, constrictions, and bends; moderate deposition of pools prevalent.	Heavy deposits of the material, increased bar development; more than 50% of the bottom changing frequently; pools almost absent due to substantial sediment deposition.
Score:	20 19 18 17 16	15 14 13 12 11	10 9 8 7 6	5 4 3 2 1 0

Total _____ (4-6)



Riffle/Run Prevalence

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 or 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

Total _____ (7-10)



Riffle/Run Prevalence

Habitat Parameter	Category			
	Optimal	Suboptimal	Marginal	Poor
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

Total _____ (11-12)
 Total _____ (1-3)
 Total _____ (4-6)
 Total _____ (7-10)
 _____ **TOTAL**