# Upper East Branch White Clay Creek Watershed Assessment Report

West Marlborough Township, New Garden Township, London Grove Township, and Avondale Borough, Chester County, White Clay Watershed, Pennsylvania

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Prepared for: White Clay Wild and Scenic River Program 182 Saw Mill Road Landenberg, PA 19350 (484) 716-6836



Prepared by: Clauser Environmental, LLC 1915 Leiby Lane Kutztown, PA 191530 (570) 294-0669

Aaron S. Clauser, PhD, CPESC

Kora S. Clauser

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#### 1.0 INTRODUCTION

Since 1965, the White Clay Watershed Association has worked toward the preservation, restoration, and enhancement of natural and cultural resources within the White Clay Creek Watershed. In 2000, the White Clay Creek Watershed was the first entire watershed to be designated a National Wild and Scenic River by the National Park Service. With this designation, the entire White Clay Watershed is to be presevered in its freeflowing state because of its value to the public and the environment. Even with the focused attention that the White Clay Creek has received, issues related to flooding and water quality impairments remain within the watershed. To take the next step in restoring the watershed, this study focuses on the Upper East Branch of White Clay where agricultural siltation and habitat alterations, agricultural nutrients (organic enrichment, low dissolved oxygen [DO]), urban runoff/storm sewers (siltation, water/flow variability), and mercury contamination continue to cause impairment (DEP, 2020). These pollutants not only degrade the water quality in the immediate area where they discharge into the stream, but also contribute to degraded water quality downstream. To address these concerns, the White Clay Wild and Scenic River Program has collaborated with Clauser Environmental, LLC to develop this assessment report and a corresponding restoration plan for the Upper East Branch White Clay Watershed.

#### 2.0 BACKGROUND

The Upper East Branch White Clay Watershed is located in West Marlborough Township, New Garden Township, London Grove Township, and Avondale Borough, Chester County, Pennsylvania. The headwaters are located in an agricultural area that stretches between Doe Run Road and PA-842. The Pennsylvania Department of Environmental Protection (DEP) considers a stream sourced from a spring west of the intersection of Newark Road and PA-842 to be the source of the mainstem of the Upper East Branch White Clay Creek. The mainstem begins within an active farming area. Downslope, the mainstem passes through a forested area and multiple agricultural fields where it meets up with multiple small tributaries sourced from small ponds and springs before meeting up with Trib 00461 which drains from a farm field west of the mainstem. The East Branch White Clay continues downslope where it meets with Trib 00460 that drains from the east across Newark Road. The East Branch White Clay Creek meets with Trib 00460 just south of Street Road (PA Route 926). After the confluence with Trib 00460, the East Branch White Clay drains southward through a matrix of forested and agricultural areas and past the Stroud Water Research Center to its confluence with Trib 00457. The East Branch White Clay meets with Trib 00457 on the newly preserved property that was formerly Loch Nairn Golf Club. This confluence is located just north of the Kennett Oxford Bypass. Trib 00457 originates in a forested area just west of the intersection of East Marlborough, West Marlborough, and New Garden Townships. Trib 00457 flows west through agricultural areas and farmland and picks up one smaller tributary (sourced from a pond located on property that was formerly Loch Nairn Golf Club) before reaching its confluence with East Branch White Clay Creek. The East Branch White Clay Creek continues south underneath the Kennett Oxford Bypass and through a residential area where it meets its confluence with Trib 00454 just upstream

of a large mushroom farm. Trib 00454 originates to the north of PA Route 842 and flows downslope through a forested corridor, agricultural fields, residential areas, and under the Kennett Oxford Bypass before meeting its confluence with the East Branch White Clay Creek. Trib 00454 flows from the west and picks up multiple smaller tributaries and one larger tributary (Trib 00455) before its confluence with the mainstem. After this confluence with Trib 00454, the Upper East Branch White Clay Creek flows south through a forested corridor between agricultural fields and eventually into the town of Avondale. A large section of the Upper East Branch White Clay Creek and its unnamed tributaries are classified by the Pennsylvania Department of Environmental Protection (DEP) as being of exceptional value (EV), the highest level of water quality-based protection afforded to Pennsylvania streams. The DEP states that measures should be taken to preserve or improve the water quality of streams of exceptional value (DEP, 2023). The only section of the watershed within the study area that is not designated as exceptional value is the section of the Upper East Branch White Clay Creek below East 3rd Street in Avondale. This section of stream is classified as a Cold Water Fishery/ Migratory Fishery. The 2020 Pennsylvania Integrated Water Quality Monitoring and Assessment Report specifically identifies agricultural siltation and habitat alterations, agricultural nutrients (organic enrichment, low dissolved oxygen), urban runoff/storm sewers (siltation, water/flow variability), and mercury contamination as impairments to this watershed (DEP).

#### 2.1 Agricultural Siltation, Habitat Alterations

Excessive siltation within streams smothers critical benthic habitat. As sediment fills in around the gravels, cobbles, and boulders on the stream bottom, the bottom becomes more uniform and loses its diversity of microhabitats. As the diversity of available niches (positions or jobs within the ecosystem) decreases, the diversity and stability of the macroinvertebrate community is reduced. Excessive siltation within stream systems also increases maintenance costs for structures (i.e. culverts, bridges, and dams) within and around the stream.

Within the Upper East Branch White Clay Watershed, the stream corridor contains substantial sediment deposits that have accumulated during decades of farming within the watershed. These accumulated "legacy" sediments continue to impact the stream system as the streambanks erode. The accelerated erosion and siltation of the streambanks may be minimized through streambank restoration, native plantings, and floodplain restoration projects. While soil loss from the upland areas has decreased with a decrease in farming within the watershed and from implementation of conservation farming techniques, siltation from the uplands still reaches the stream corridor and more opportunities for conservation exist. In this assessment, relative siltation levels within the stream channels are analyzed as part of the habitat assessment protocol.

#### 2.2 Agricultural Nutrients (Organic Enrichment/ Low DO)

Within the Upper East Branch White Clay Watershed, agricultural nutrients likely contribute to the impaired biology of the stream. When nitrogen and phosphorus are added to stream systems, algal blooms often occur. The algal blooms typically are unsustainable and result in a massive algal die-off when resources become limited. The dying algae are consumed by bacteria that take up oxygen. The bacteria populations boom within the decaying algae and take up much of the dissolved oxygen within the stream. With depressed dissolved oxygen conditions, fish and macroinvertebrate kills may result.

Within the Upper East Branch White Clay Watershed, dominant sources of nutrient enrichment likely include residential and commercial application of fertilizers to lawns, agricultural runoff, livestock, and erosion of soil particles that contain high levels of nutrients from legacy impacts. Within the historically agrarian Upper East Branch White Clay Watershed, nutrient inputs to the landscape have been occurring for decades. Over time, excessive nutrients become bound to soil particles that provide an ongoing source of nutrients to the stream system for some time after current discharges are minimized. In this study, nitrogen and phosphorus levels were determined through laboratory analysis on the day of instream sampling and are compared to established thresholds for watershed impairment. Nutrient inputs to a stream vary seasonally and in accordance with precipitation events. So, multiple samplings over an extended time period are often needed to gain a more complete picture of nutrient inputs within a watershed.

Reduction of ongoing nutrient inputs to the stream system is possible with improved management of fertilizer application, riparian buffer enhancements, and installation of agricultural best management practices (BMPs). Soil particle bound nutrient inputs to the stream can be minimized through reductions in streambank and upland erosion.

#### 2.3 Urban Runoff/Storm Sewers (Siltation, Water/Flow Variability)

A review of recent and historic aerial photography indicates that the Upper East Branch White Clay Watershed has become increasingly urbanized during the last 85 years (Appendices A and B). With increased urbanization and corresponding increases in impervious cover, stream flows have likely been impacted. As impervious cover increases, streams become much more variable in flow and have more pronounced peaks in runoff. With greater fluctuations in runoff, stream channels become less stable and erosion of legacy sediment is exacerbated. The Stroud Water Research Center (Stroud) office is located within the watershed. Stroud has been a leader in stormwater management in Pennsylvania for many years and has worked with landowners to ensure that current stormwater management regulations are being upheld and to develop and install innovative stormwater management techniques. When coupled with the increased scrutiny development within exceptional value watersheds receives during permit reviews, the Upper East Branch White Clay Watershed has received substantially more protection from development than many other Pennsylvania watersheds. While older developments may lack stormwater management BMPs, most of the existing developments within the watershed have stormwater rate controls in place. New

developments are required to design stormwater systems that account for both stormwater rate and volume. Point sources of pollutant discharges within the Christina River Watershed are subject to existing total maximum daily load (TMDL) limitations (EPA 2006 [a, b], 2007).

#### 2.4 Mercury Contamination

While a specific source of mercury contamination has not been identified in the Upper East Branch White Clay Watershed, the possibility of contaminated American eels migrating through the watershed exists. Segments of White Clay Creek are currently listed as impaired for mercury by the DEP (DEP 2022). While mercury in its ambient form in bodies of freshwater do not pose a risk for humans or wildlife, the bioaccumulation of the metal through aquatic food chains is a risk to those who consume fish from contaminated bodies of water. Currently, American eel are under a consumption advisory for the entire White Clay Creek with a meal frequency limit of two meals per month. (PFBC)

Common sources of mercury pollution from humans include inappropriate disposal of household goods, industrial manufacturing plants, and water treatment plants. Coal-fired power plants are the biggest source of mercury contamination in the U.S., accounting for over a third of all human-related mercury emissions (Driscoll et al, 2007). Mercury emissions and other forms of mercury pollution are regulated under multiple environmental laws and regulations including The Clean Water Act, the Resource Conservation and Recovery Act, and Safe Drinking Water Act. On-going monitoring by the Pennsylvania Fish and Boat Commission (PFBC) will determine when the mercury in the watershed is at safe levels to remove all fish consumption advisories.

#### 2.5 Watershed Geology

The Upper East Branch White Clay Watershed is located within the Piedmont Upland Physiographic Section. It consists of broad, gently rolling hills and valleys. The rock formations, as described by the Pennsylvania Topographic and Geologic Survey, starting at the top of the sub-watersheds within the area of investigation are mafic gneiss, Cockeysville Marble, felsic and intermediate gneiss, Setters Quartzite, and pegmatite (DCNR, 2022).

Mafic gneiss is composed mainly of dark-colored minerals and typically formed in the lower Paleozoic period. Cockeysville Marble formed during the late Precambrian period and is best known for its historic use as dimensional stone in structures such as the Washington Monument. Felsic and intermediate gneiss are largely made of quartz, feldspar, and mica. They formed during the Precambrian period. Setters Quartzite formed during the lower Paleozoic period, as well. It includes white feldspathic quartzite, gray mica gneiss, and mica schist. Pegmatite is coarse-grained consisting of quartz and other minerals, typically formed in the lower Paleozoic. It is typically formed in dikes.

The uplands of the Piedmont Upland Section appear to be made of the remnants of a formerly continuous sloping surface that is now dissected by the valleys eroded into it. Elevations in the Upper East Branch White Clay Watershed range from 260 to 595 feet above mean sea level. As noted, many of the rocks are metamorphic in nature. These rocks

tend to have a very well-developed plane or "schistocity" that was formed during metamorphism. This plane dips to form moderately steep angles to the south and stream erosion is usually parallel to or normal to the plane of schistocity (DCNR 2022). The drainage patterns tend to be dendritic, however in some locations it has a rectangular orientation.

#### 3.0 METHODOLOGY

Clauser Environmental, LLC conducted upland sub-watershed analysis and in-stream sampling within the Upper East Branch White Clay Watershed.

#### 3.1 Sub-watershed Analysis

The Upper East Branch White Clay Watershed was divided into 8 sub-watersheds based on land use and the location of major unnamed tributaries (Appendix A). For each sub-watershed, land use was analyzed through the use of USGS Streamstats version 4.3.11 (USGS, 2022). The resulting data was compiled to prepare an estimate of percentage of urban and forested cover classes for each sub-watershed. To provide greater depth in understanding of the potential impacts of the impervious cover within each sub-watershed, stormwater best management practices (BMPs) were identified. By combining a review of high-resolution aerial photography and ground-truthing, structural stormwater BMPs were identified and included in watershed mapping. In order to gain a greater understanding of historical land use, aerial photography from 1937, 1957-58, and 1971 was compiled, georeferenced, and reviewed (Appendix B).

#### 3.2 Sample Locations

Twelve (12) sample locations are located within the Upper East Branch White Clay Watershed (Appendix A). Sample Site 1 is located on the edge of a small public park in Avondale. This section of the East Branch White Clay Creek is located within a forested riparian zone that receives drainage from several residential areas and a large agricultural area just upstream. Sample Site 2 is located just downstream of the Kennett Oxford Bypass. This section of the East Branch White Clay Creek runs through a residential area and is just upstream of a mushroom farm. Sample Site 3 is located in a field on a tributary to East Branch White Clay Creek just upstream of Loch Nairn Golf Club. This tributary drains a mixture of residential, agricultural, and commercial areas. Site 4 is located along the western boundary of the Loch Nairn Golf Club and just upstream of the Kennett Oxford Bypass. Sample Site 5 is located near the top of the watershed, just south of Street Road. Sample Site 5, which is on the mainstem of East Branch White Clay Creek, is located in a forested area that is surrounded by agricultural and residential parcels. Sample Site 6 is located just west of Sample Site 5 along a tributary to East Branch White Clay Creek. Sample Site 6 is also located just south of Street Road. Sample Site 7 is located where an unnamed tributary to East Branch White Clay Creek crosses under Glen Willow Road. It drains residential, agricultural, and forested areas. Sample Site 8, on the same tributary as Sample Site 7, is located just north of Woodview Road, in an open field. Sample Site 9

is located along East London Grove Road in an area that is mainly agricultural and residential. Sample Site 9 is located on a tributary to East Branch White Clay Creek. Sample Site 10 is located just northeast of the intersection of Street Road and Big Springs Road in a forested patch. The surrounding area is mainly residential and agricultural although the stream corridor is principally forested. Sample Site 11 is located just north of Glen Willow Road in an open field surrounded by residential areas. Sample Site 11 is on an unnamed tributary to East Branch White Clay Creek. Sample Site 12 is located just north of Street Road alongside a horse farm. The surrounding area is mostly agricultural, residential, and open area.

#### 3.3 Macroinvertebrate Sampling

The Pennsylvania Department of Environmental Protection (DEP) Instream Comprehensive Evaluation Survey (ICE) protocol (DEP 2013) was utilized to collect benthic macroinvertebrates at each of the sample locations. Field sampling occurred on May 19, 2022. The 6 D-frame method of sample collection was utilized in accordance with the DEP Standardized Biological Field Collection and Laboratory Methods (DEP "Methods", Section V.C.). Samples were processed, sub-sampled, and identified in the lab following DEP protocols. Identification of collected organisms was conducted with the aid of established taxonomic keys (Merrit and Cummins 1996).

Data analysis included the evaluation of six metrics for the macroinvertebrate community at each site. The six metrics were combined via an established DEP weighting function to determine the more robust Index of Biological Integrity (IBI) value for each site. The IBI value allows for comparison with the established DEP threshold for biological impairment. During the sampling period, an IBI value of 50 or less indicates impaired biological conditions for streams designated as cold water fisheries (Site 1). An IBI value of 63 or less indicates impaired biological conditions for exceptional value designated streams during the sampling period (Sites 2-12). Sites with an IBI value above the threshold for macroinvertebrates are considered unimpaired. The six metrics that comprise the IBI value include:

#### 3.3.1 Total Taxa Richness

The total taxa richness of a site is a count of the total number of taxa within the sub-sample and is a measure of the diversity of the macroinvertebrate community at the site. In general, the more impaired a stream segment is, the lower the total taxa richness will be. As water quality and habitat improve, the stream segment will be less impaired. As a stream segment becomes less impaired, the total taxa richness and corresponding community diversity typically increase.

#### 3.3.2 Ephemeroptera + Plecoptera + Trichoptera Taxa Richness

The Ephemeroptera, Plecoptera, and Trichoptera (EPT) taxa richness metric is a count of the total number of pollution sensitive taxa (Pollution Tolerance Value 0-4) within the mayflies, stoneflies, and caddisflies. In general, impaired stream segments will have a lower EPT taxa richness while unimpaired stream segments will have a higher EPT taxa richness.

#### 3.3.3 Beck's Index

This version of the Beck's Index evaluates taxonomic richness and tolerance as a weighted count of pollution sensitive taxa with Pollution Tolerance Values of 0, 1, or 2. Within the analysis, the more pollution sensitive an organism is, the greater weight it receives within the metric. As such, a higher Beck's Index score generally indicates a less impaired stream segment.

#### 3.3.4 Shannon Diversity Index

This metric measures community composition by evaluating both taxonomic richness and evenness of individuals across taxa of the sub-sample. In general, this metric decreases in a more impaired stream segment as fewer pollution-tolerant taxa dominate. The Shannon Diversity Index typically increases in less impaired stream segments.

#### 3.3.5 Hilsenhoff Biotic Index

This metric evaluates community composition by determining an average pollution tolerance value for the individuals in a sub-sample. As pollution tolerance value is higher in tolerant taxa, the Hilsenhoff Biotic Index typically is higher in an impaired stream segment than in an unimpaired stream segment.

#### 3.3.6 Percent Sensitive Individuals

Percent Sensitive Individuals is a determination of the percentage of individuals within a sub-sample with Pollution Tolerance Values of o-3. This metric typically decreases in a more impaired stream segment and increases in a less impaired stream segment.

#### 3.4 Habitat Analysis

Twelve parameters including instream cover (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 were assessed at each sample location. Each parameter was given a score of 1 to 20 in accordance with the DEP Instream Comprehensive Evaluation Survey protocol and DEP "Methods" (DEP 2013). The sum of all scores at each sample location gives a cumulative score for habitat impairment. Forested, cold-water, high-gradient stream segments having a total habitat score above 140 are considered unimpaired while those scoring a 140 or less are considered impaired. Additional impairment thresholds exist. Cold water streams are considered impaired for habitat if either riffle/run embeddedness plus sediment deposition or condition of banks plus bank vegetation metrics total score is 24 or less. A cumulative score of 240-192 is considered "optimal"; "suboptimal" 180-132; "marginal" 120-72; and, "poor" 60 or less. The decision gaps between categories allows for the discretion of the field investigator (DEP 2013).

#### 3.5 Water Quality Analysis

Water quality analysis was conducted at all sample sites on May 19, 2022. Chemical and physical water quality analyses were conducted in accordance with the Department of Environmental Protection Instream Comprehensive Evaluation Survey protocol (DEP 2013). Field measurements of dissolved oxygen and temperature were taken in-situ with a YSI Pro20 portable dissolved oxygen meter. Conductivity and pH were measured in the field with a YSI-63 portable handheld meter. All meters were calibrated in accordance with the manufacturer's recommendations. A two-point (4.00 and 7.00) slope calibration was utilized to calibrate the pH meter. Total dissolved solids (TDS) was measured using a YSI Professional Plus meter with TDS Pro 10102030 cable.

CWM Environmental, a certified water quality laboratory, completed laboratory analysis. Water quality site sampling laboratory analysis parameters included Phosphorus, Total Kjeldahl Nitrogen (TKN), Nitite as N, Nitrate as N, and Alkalinity (total to pH 4.5). Total Nitrogen was calculated as the sum of the TKN, Nitrite, and Nitrate at each sample site.

#### 4.0 RESULTS

#### 4.1 Sub-watershed Analysis Results

The 8 sub-watersheds of the Upper East Branch White Clay Watershed ranged from 0.02 to 24.73 percent in approximate percent of urban development (Table 1). Sub-watershed F, which is south of the Kennett Oxford Bypass and includes a significant portion of the Borough of Avondale, has the highest approximate percent urban development at 24.73 percent. Sub-watershed G, which includes the area that drains to Sample Sites 11 and 12 has the lowest approximate percent urban development at 0.02 percent. The sub-watersheds of Upper East Branch White Clay Watershed ranged from 23.32 to 33.84 percent in approximate percent of forested area (Table 1). Sub-watershed E, which has the lowest approximate percent forested area, includes primarily agricultural and residential areas. The sub-watershed with the highest percentage of forested area was Sub-watershed B, which is in the northeastern corner of the overall watershed.

Table 1
Upper East Branch White Clay Watershed
Percent Impervious Cover Data

	Approx. Total	Approx. %	Approx. %
Sub-watershed	Square Miles	Urban Development	Forested Area
A	1.18	0.09	29.38
В	0.77	0.04	33.84
C	1.44	4.26	26.42
D	1.51	3.58	31.54
E	1.33	4.09	23.32
F	1.20	24.73	32.81
G	1.88	0.02	31.08
Н	2.29	2.21	29.24
Total	11.6	4.47	29.50

#### 4.2 Macroinvertebrate Sampling Results

Macroinvertebrates that were sampled within the Upper East Branch White Clay Watershed comprised at least 78 taxa (Appendix C). Data collected by Clauser Environmental, LLC indicates that the benthic macroinvertebrate population was unimpaired at Site 10 and impaired at the other 11 sample sites (Table 2).

Table 2
Upper East Branch White Clay Watershed
Benthic Macroinvertebrate Data

	Modified Becks Index	EPT Taxa Richness (TV 0-4)	Total Taxa Richness	Shannon Diversity Index	HBI Index	% Sensitive Individuals (TV 3 or less)	IBI Value
Site 1	3	4	17	1.09	5.66	7.8	30.2
Site 2	10	6	19	1.51	6.21	3.8	36.6
Site 3	1	0	13	1.64	6.67	0.5	23.5
Site 4	5	5	18	1.86	5.40	10.1	37.9
Site 5	9	8	22	2.12	5.22	21.3	48.5
Site 6	11	9	21	2.00	5.92	17.6	46.8
Site 7	9	7	23	2.25	6.11	7.8	44.3
Site 8	7	6	23	0.95	4.72	27.0	41.7
Site 9	4	3	16	1.54	5.39	10.1	32.91
Site 10	33	22	38	3.07	<b>3.4</b> 7	37.85	91.71
Site 11	4	5	21	1.89	2.88	14.57	45.28
Site 12	14	6	17	1.28	1.55	8.21	46.45

Table 3
Upper East Branch White Clay Watershed
Impairment Determination Values

Site	Macroinvertebrate IBI Value	Total Habitat Value	Riffle/Run Habitat	Condition of Banks
1	30.2	151	13	21
2	36.6	155	21	21
3	23.5	150	16	<b>2</b> 7
4	37.9	138	18	22
5	48.5	196	31	29
6	46.8	190	28	35
7	44.3	159	18	22
8	41.7	178	29	24
9	32.9	170	30	21
10	91.7	215	36	36
11	45.3	148	23	17
12	46.5	170	16	29

Macroinvertebrate and habitat impairment is based upon the DEP ICE protocol (2013). Blue values indicate unimpaired; red values indicate impaired. During the sampling period, an IBI value of 50 or less indicates impaired biological conditions for cold water fisheries (Site 1). An IBI value of 63 or less indicates impaired biological conditions for exceptional value steams during the sampling period (Sites 2-12).

At sample sites 1, 2, 3, 4, 5, 6, 7, 9, and 12, the total of midges (Chironimidae), segmented worms (Oligochaeta), and roundworms (Nematoda) comprise more than half of the individuals collected (Appendix C). Midge and worm species are often dominant in habitats that are impaired by sediment and high nutrient concentrations. Some macroinvertebrate populations throughout the watershed are severely impaired and indicative of stream conditions that are degraded by sedimentation. Sample site 10 was an outlier, scoring an IBI score characteristic of that of an exceptional value stream (Table 3).

#### **Habitat Analysis Results** 4.3

The ICE protocol habitat analysis data for the Upper East Branch White Clay Watershed indicates that all Sample Sites except Site 4 are "Blue" (un-impaired) for total habitat score (DEP 2013). Sample Sites 5, 6, and 10 have "optimal" habitat conditions at the sample site. Sites 1, 2, 3, 4, 7, 8, 9, 11, and 12 are considered "sub-optimal" for total habitat score. Sample Sites 1, 2, 4, and 7, were impaired for both riffle/run habitat and condition of banks and vegetation. Sample Sites 3 and 12 were impaired for riffle/run habitat. Sample Sites 8, 9, and 11 were impaired for condition of banks and vegetation (Table 3).

#### **Water Quality Analysis Results** 4.4

Water temperatures throughout the Upper East Branch White Clay Watershed ranged from 14.4 to 17.1°C throughout the study (Table 4). Dissolved oxygen (DO) levels ranged from 8.24 to 11.48 mg/L and were near saturation values for all of the sample sites (Table 4). Throughout the watershed, pH values were near neutral. The pH values ranged from 6.80 to 7.44 (Table 4). Specific conductance ranged from 157.0 – 479.0 umhos throughout the watershed. Alkalinity was sufficient to buffer the pH throughout the watershed and ranged from 41 to 136 mg CaCO3/L.

Table 4 **Upper East Branch White Clay Watershed** 

**Water Quality Sampling Data** 

Site	Temp	DO	DO	pН	Specific Cond.	Alkalinity
	(oC)	(mg/L)	(% sat.)		(umhos)	(mg CaCO <sub>3</sub> /L)
1	15.2	8.24	81.8	7.00	373.4	97
2	14.8	9.34	92.2	<b>7.03</b>	<b>329.</b> 7	95
3	16.1	8.27	84.0	7.22	479.0	136
4	<b>15.</b> 7	11.01	110.4	7.44	238.3	74
5	16.1	11.48	116.2	7.42	167.1	42
6	16.3	9.98	100.3	7.06	242.5	86
7	14.9	9.27	91.4	7.08	283.0	69
8	14.4	<b>9.5</b> 7	93.6	6.80	219.3	53
9	15.6	10.33	103.3	6.81	242.9	<b>6</b> 7
10	15.2	10.06	100	6.94	231.2	72
11	16.0	10.69	108.1	7.14	157.0	41
12	17.1	10.38	107.1	7.13	157.2	43

Total kjehldahl nitrogen (TKN) concentration was 1.01 mg/L or less across all 12 sample sites. TKN measures ammonia and organic forms of nitrogen. Nitrite levels were less than 0.10 mg/L at all sample sites (Table 5). Concentrations of nitrate values ranging from 1.44 to 4.19 mg/L were measured throughout the watershed. Total nitrogen concentrations were greater than at least 1.44 mg/L at all 12 sample sites (Table 5). At all sample sites except 11 and 12, the calculated total nitrogen concentration exceeds the threshold of 2.01 mg/L for impaired streams (Sheeder and Evans 2004).

Total phosphorus levels within the Upper East Branch White Clay Watershed were below the limit of the laboratory testing performed and were less than 0.10 mg/L across the watershed (Table 5). Sheeder and Evans found that impaired streams typically exceed a total phosphorus concentration of 0.07 mg/L (2004).

Table 5
Upper East Branch White Clay Watershed
Nutrient Sampling Data

Site	TKN (mg/L)	Nitrite (mg/L)	Nitrate (mg/L)	Total Nitrogen (mg/L)	Total Phosphorus (PO4) (mg/L)
1	<1.00	<0.10	4.19	>4.19	<0.10
2	<1.00	<0.10	3.33	>3.33	<0.10
3	1.01	<0.10	4.05	>5.06	<0.10
4	<1.00	<0.10	2.78	>2.78	<0.10
5	<1.00	<0.10	3.23	>3.23	<0.10
6	<1.00	<0.10	2.30	>2.30	<0.10
7	<1.00	<0.10	3.95	>3.95	<0.10
8	<1.00	<0.10	3.12	>3.12	<0.10
9	<1.00	<0.10	3.04	>3.04	<0.10
10	<1.00	<0.10	2.92	>2.92	<0.10
11	<1.00	<0.10	1.59	>1.59	<0.10
12	<1.00	<0.10	1.44	>1.44	<0.10

#### 5.0 DISCUSSION

Within the Upper East Branch White Clay Watershed, eleven of the twelve sample sites had impaired biology as determined during the macroinvertebrate sampling. Sample Site 10 had a macroinvertebrate community that shows this section is unimpaired and attains the exceptional value designation. Sample Site 10 demonstrates the potential aquatic community for this watershed. The dominant impairments throughout the watershed are related to sediment and nutrient legacy impacts being exacerbated by increased stormwater discharges that are related to deforestation, development and climate change throughout the watershed.

The mainstem of the Upper East Branch White Clay originates just southwest of the intersection between Upland Road (842) and Newark Road. All of the drainage area from the origin of the stream to its confluence with Trib 00460 is within Sub-watershed A. The water quality of the stream within this sub-watershed is encapsulated by Sample Site 6. This sample site was impaired for macroinvertebrate life, but had optimal habitat conditions at the sample site. Sub-watershed A consists of primarily open areas, agricultural fields, forests and corridors of buffer, as well as some residences. The water quality analysis data on the day of sampling indicates that nitrogen levels in the stream were at levels high enough to contribute to the biological impairment of this stream reach. Restoration of this stream section should focus on reducing nutrient runoff from the agricultural and residential areas within the watershed and extending the riparian buffers.

Sub-watershed B consists of Trib 00460 and the area that drains to it. The water quality of Sub-watershed B is captured by Sample Site 5. Like Sample Site 6, this sample site was impaired for macroinvertebrate life and has optimal habitat near the sample site. The nitrogen levels were slightly higher in this sub-watershed than Sub-watershed A on the day of sampling. Sub-watershed B consists primarily of agricultural fields, open areas, and patches of forest. Despite the lack of urban development within this sub-watershed, Trib 00460 is still impaired. The impairments are primarily tied to impacts from agriculture. Restoration of this tributary should focus on reduction of nutrient inputs and stormwater discharges to the stream in the headwaters of the tributary to the east of Newark Road.

Sub-watershed C is drained by Trib 00457 and the smaller unnamed tributaries, Tribs 00458 and 00459, that drain into it. A large portion of this sub-watershed is the former Loch Nairn Golf Club, which has recently been purchased by New Garden Township to create a 106-acre passive recreation park. Sub-watershed C consists of approximately 4% urban development which is primarily roadways and residential areas. Approximately 26% of this sub watershed is forested area. Sample Site 3 was taken just upstream of the golf club and had the lowest macroinvertebrate score and highest nutrient pollution levels within the watershed. This sub-watershed should be a target for restoration. Recommended BMPs include agricultural practices to reduce nutrient discharges to the

stream, planting native riparian buffers, wetland creation, and reconnecting stream sections to the active floodplain.

Sub-watershed D includes the mainstem of the East Branch White Clay Creek and has similar percentages of forested and urban areas as Sub-watersheds A, B, and C. This sub watershed receives water from those three sub-watersheds. This sub-watershed has a high concentration of installed best management practices that target agricultural runoff in the upstream section of the sub-watershed surrounding the Stroud Water Research Center. Stormwater from roadways, residences, and farm fields appears to still be contributing to the impairment of this stretch of stream. The water quality of Sub-watershed D is represented above the Kennett Oxford Bypass by Sample Site 4, and below the Kennett Oxford Bypass by Sample Site 2. Both of these sample sites were impaired for habitat and macroinvertebrate life, with Sample Site 4 being the only site that scored as impaired for all impairment determination values (Table 4). Sample Sites 2 and 4 are impacted by legacy, post-colonial sediment in the valley floor that has restricted the stream channel's access to the active floodplain, contributed to streambank erosion, and provides a source of nutrient rich soil that is released into the stream channel when the streambanks erode. Future work in this section of the watershed should focus on installing additional agricultural runoff focused best management practices and planting forested riparian buffers. In the portion of the sub-watershed that is adjacent to Sample Site 4, restoration of the active floodplain, streambank restoration with bank grading and native plantings, and wetland creation should be considered.

Sub-watershed G stretches from the very top of the overall watershed where Trib 00454 originates to the confluence of Trib 00454 with Trib 00455 just south of E. London Grove Road. The water quality of Sub-watershed G is identified in Sample Sites 11 and 12. This sub-watershed has less than 1% urban development, and approximately 31% forested area. Much of the land within Sub-watershed G is open space or agricultural fields. The nutrient concentrations on the day of testing were the lowest in the overall watershed within Sub-watershed G and fell below the impairment thresholds. Of the parameters investigated, sediment within the stream channel from legacy farming impacts and riparian forest width appear to be the main source of impairment to this stream section. BMPs within this stream section should focus on extending the riparian forested buffers and the creation of floodplain wetlands that are connected to the active floodplain of the stream. Appropriately sited wetlands could have the potential to provide a location for legacy sediment that is moving within the channel a place to deposit during storm events and absorb some of the flooding flows that impact downstream communities. Additionally, focused agricultural stormwater best management practices would aid in mitigating future degradation of this sub-watershed.

Sub-watershed H is located in the northwest corner of the watershed and includes the area draining to Trib 00455 upstream of its confluence with Trib 00454. This sub-watershed is represented by Sample Sites 10 and 9. The headwaters of Trib 00454 flows through a forested area. Sample Site 10 was the only unimpaired sample site within the Upper East Branch White Clay Creek Watershed. The Sample Site 10 aquatic and riparian

zone habitat was considered optimal, and the macroinvertebrate study identified 38 different taxa within the sample. Since 1937, the forested cover upstream of Sample Site 10 has continually increased (Appendix B). Preservation of the water quality and habitat conditions of this headwater area that provides a refuge for sensitive species within the watershed should be a high priority for conservation organizations within the watershed. Downstream of Sample Site 10, Trib 00455 runs through mostly forested corridors that are surrounded primarily by agricultural fields. Historically, the lower portion of this subwatershed was cleared for agricultural. Since 1971, substantial regrowth of trees within the riparian zone has occurred. But, the legacy impact of sediment within the riparian zone disconnects the stream channel from an active floodplain. The legacy sediment is actively eroding into the stream channel and continues to impair this stream section (Sample Site 9 in Table 3). Restoration of the section of Sub-watershed H downstream of Sample Site 10 should focus on reconnecting the stream channel to the active floodplain by removing legacy sediment within the riparian zone, installing floodplain wetlands, expanding the riparian forested buffer, and stream restoration that incorporates the removal of legacy sediment to achieve a stable, vegetated slope.

The stretch of Trib 00454 that flows downstream of the confluence with Trib 00455 to the confluence with the Upper East Branch White Clay is identified as Sub-watershed E. Sub-watershed E is dominated by open agricultural areas and is only 23.3% forested. This sub-watershed, represented by Sample Sites 7 and 8, is impaired for both macroinvertebrates and habitat at both sample sites. As the water flows through this subwatershed, measured nitrogen levels increased on the day of sampling (Table 5). At both sample sites, the streambanks were moderately unstable with up to 60% of the banks in the reach having areas of erosion. Streambank erosion of legacy soils from past farming operations is likely the major source of sediment within the stream channel. The sediment carried by the channel results in increased embeddedness of the stream bottom in downstream areas with lower gradients such as at Sample Site 7 (Appendix D). Restoration of this sub-watershed should focus on expanding the riparian forested buffer, reconnecting the stream channel to the active floodplain by removing legacy sediment within the riparian zone, installing floodplain wetlands, and stream restoration that incorporates the removal of legacy sediment to achieve a stable, vegetated slope of the streambank. Agricultural BMPs that reduce sediment and nutrient inputs to the stream system should be installed where necessary.

The stretch of the Upper East Branch White Clay that flows from the confluence with Trib 00454 to the bottom of the overall area of investigation is identified as Sub-watershed F. Sub-watershed F flows through the heart of the Borough of Avondale. The borough, surrounding developments, and businesses contribute to 24% of the land usage in this sub-watershed being urban development. Sub-watershed F also contains some agricultural areas and is approximately 32.8% forested. Downstream of the East 3<sup>rd</sup> Street bridge, the East Branch White Clay Creek loses its exceptional value designation and is considered a cold-water fishery. Sample Site 1 is located just downstream of that bridge crossing. The steam exhibited both impaired biology and habitat conditions that are likely due to the high levels of sediment and nutrients in the steam channel. Restoration of this

sub-watershed should focus on restoring the floodplain, stabilizing streambanks by removing legacy sediment and planting native vegetation, and increasing the extent of forested riparian buffers.

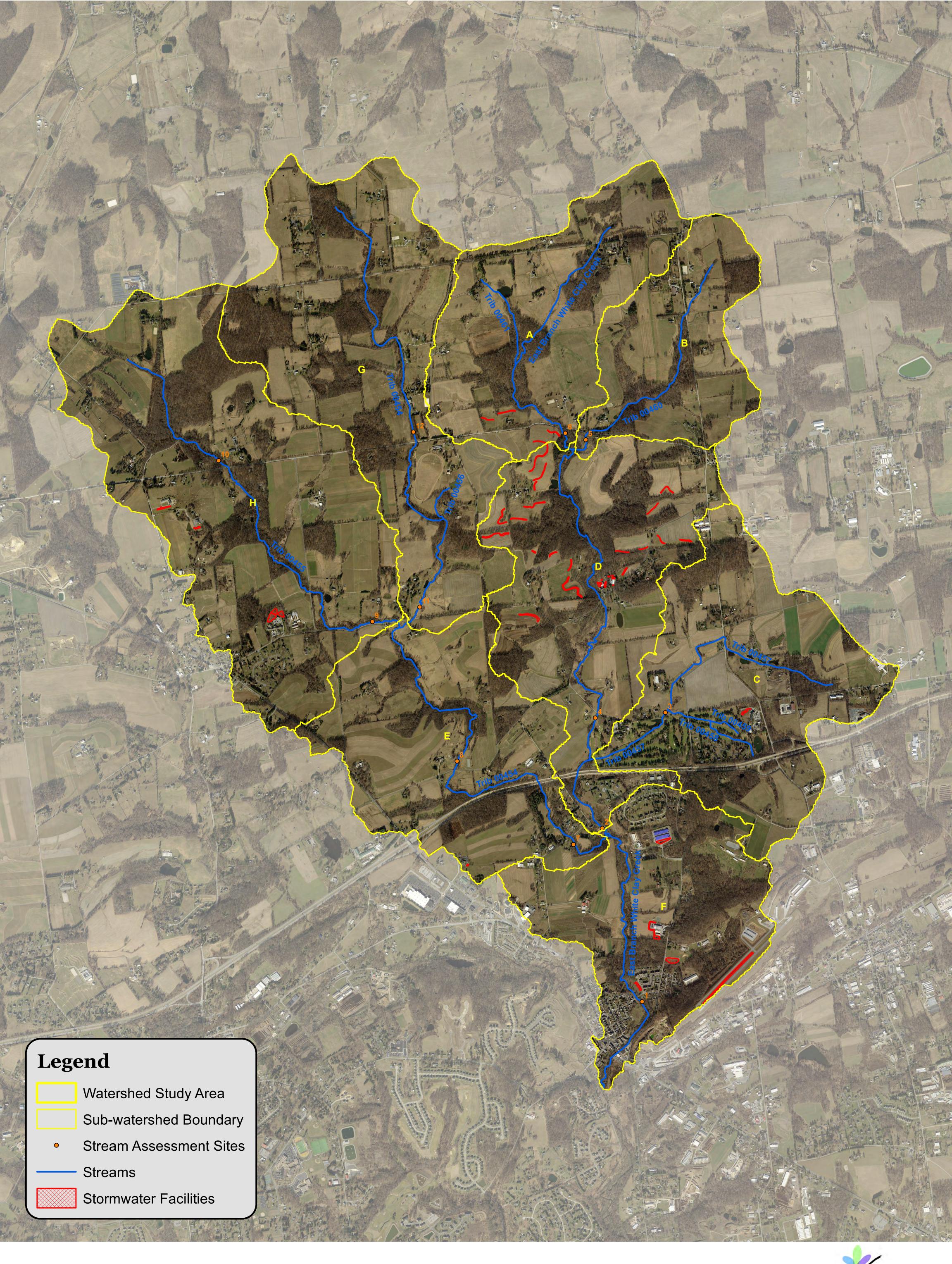
Improving the water quality and habitat within the Upper East Branch White Clay Watershed should lead to biological improvements within the stream community. The primary focus of restoration within this watershed should be on addressing the legacy impacts of agriculture, managing stormwater and nutrient discharges to the stream from agricultural areas and new developments, restoring floodplains, creating wetlands, and expanding the riparian buffers. Additionally, the area of Sub-watershed H that is upstream of Sample Site 10 should be preserved to maintain the diversity of aquatic life within the watershed. In this study, the legacy impacts of past practices within the watershed were determined to still be contributing to impairments to habitat and the aquatic community in most of the watershed. The full effects of decreased pollutant inputs to the stream from current conservation farming practices and already implemented best management practices are not yet realized. As the newly planted riparian buffers mature and additional conservation practices are implemented, the aquatic community within the watershed should continue to build diversity and resiliency to both local and global change.

#### LITERATURE CITED

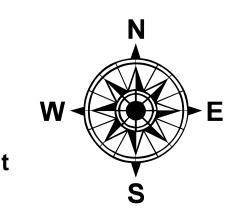
- DCNR, Geologic Maps. http://www.dcnr.state.pa.us/topogeo/gismaps/geomaps.aspx. Viewed on June 10, 2022.
- Driscoll, Charles T., et al. 2007. Mercury Contamination in Forest and Freshwater Ecosystems in the Northeastern United States. BioScience. vol. 57, no. 1, pp. 17–28.
- Hook, D.D., B. Davis, J. Scott, and J. Strubble. 1995. Locating Delineated Wetland Boundaries in Coastal South Carolina Using Global Positioning Systems. Wetlands 15(1):31-36.
- Merrit R.W. and K.W. Cummins. 1996. Aquatic Insects of North America. 3rd Ed. Kendall/Hunt Publishing Company. Dubuque, Iowa. 862 pp.
- Pennsylvania Department of Environmental Protection (DEP). 2006. Standardized Biological Field Collection and Laboratory Methods.
- Pennsylvania Department of Environmental Protection (DEP). 2018. Water Quality Monitoring Protocols for Stream and Rivers.
- Pennsylvania Department of Environmental Protection (DEP). 2013. Instream Comprehensive Evaluation Surveys.
- Pennsylvania Department of Environmental Protection (DEP). 2015. An Index of Biotic Integrity for Benthic Macroinvertebrate Communities in Pennsylvania's Wadeable, Freestone, Riffle-Run Streams.
- Pennsylvania Department of Environmental Protection (DEP). 2017. Wadeable, Freestone, Riffle Run Stream Macroinvertebrate Assessment Method.
- Pennsylvania Department of Environmental Protection (DEP). 2020. Pennsylvania Integrated Water Quality Monitoring and Assessment Report.
- Pennsylvania Department of Environmental Protection (DEP). 2022. Commonwealth of Pennsylvania Fish Consumption Advisory 2022.
- Pennsylvania Department of Environmental Protection (DEP). eMapPA. https://gis.dep.pa.gov/emappa/. Viewed on June 12, 2022.
- Pennsylvania Department of Environmental Protection (DEP). 2023. Stream Redesignations Stream Redesignation Evaluations Status and Draft Reports.

- Sheeder S. A. and B. M. Evans. 2004. *Estimating Nutrient and Sediment Threshold Criteria for Biological Impairment in Pennsylvania Watersheds*. Journal of the American Water Resources Association 40 (4): 881–888.
- United States Environmental Protection Agency. 2006(a). *Total Maximum Daily Load* for Bacteria and Sediment in the Christina River Basin, Pennsylvania, Delaware, and Maryland.
- United States Environmental Protection Agency. 2006(b). *Total Maximum Daily Load of Nutrients and Dissolved Oxygen Under Low-Flow Conditions in the Christina River Basin, Pennsylvania, Delaware, and Maryland.*
- United States Environmental Protection Agency. 2007. Total Maximum Daily Load of Nutrients and Dissolved Oxygen Under High-Flow Conditions in the Christina River Basin, Pennsylvania, Delaware, and Maryland.
- United States Geological Survey (USGS). 2001. Geology. http://geology.usgs.gov/. Viewed on May 25, 2022.
- USGS. Streamstats. https://streamstats.usgs.gov/ss/. Viewed on May 25, 2022.

# APPENDIX A WATERSHED ASSESSMENT MAP



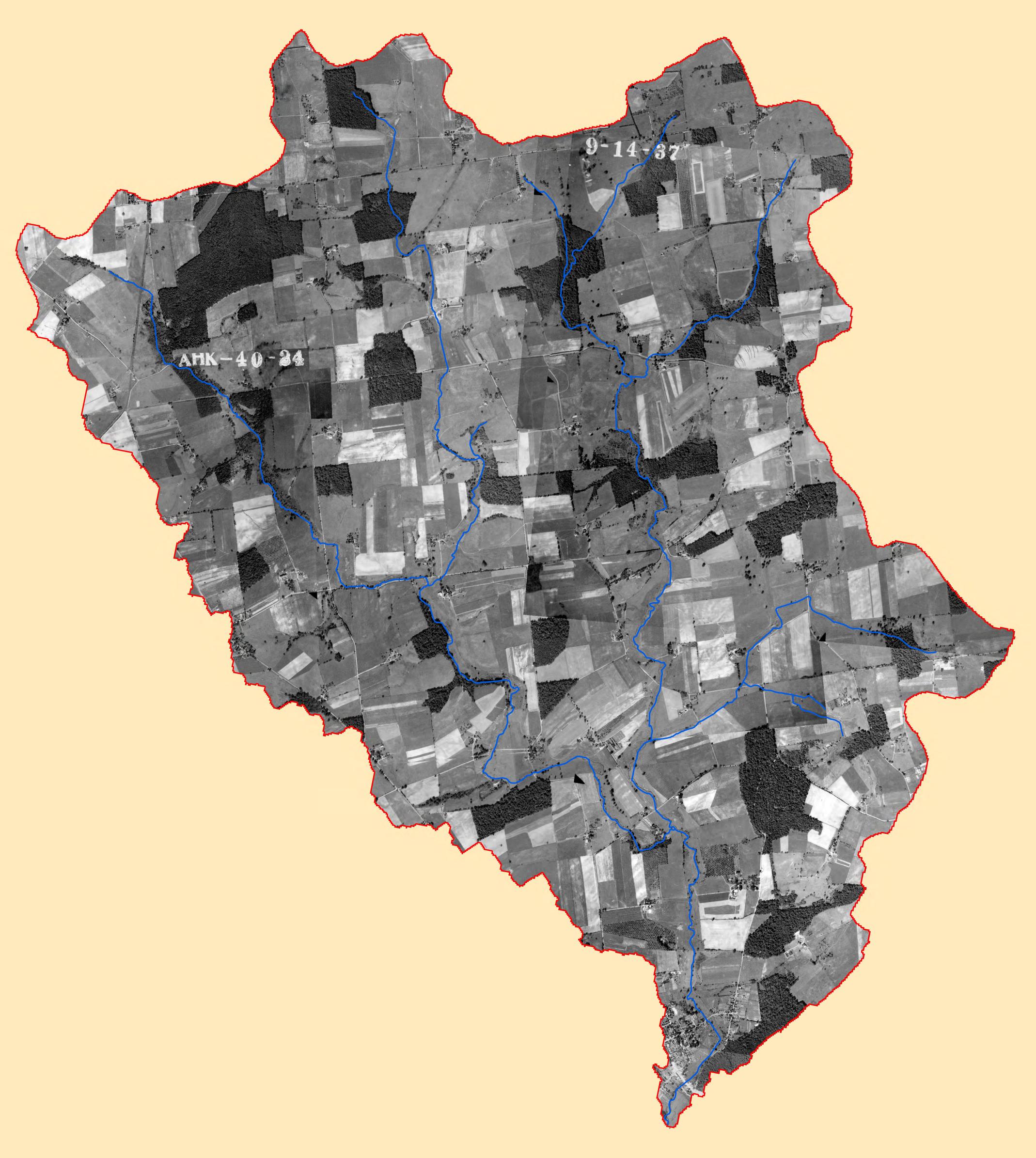


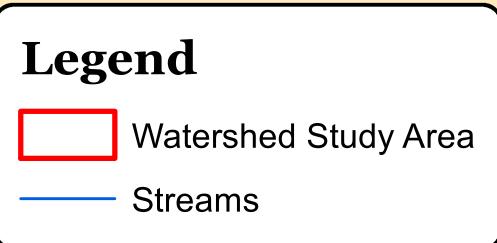


Upper East Branch White Clay Creek Watershed Assessment Map Chester County, Pennsylvania



#### APPENDIX B HISTORIC AERIAL PHOTOGRAPHY MAPS



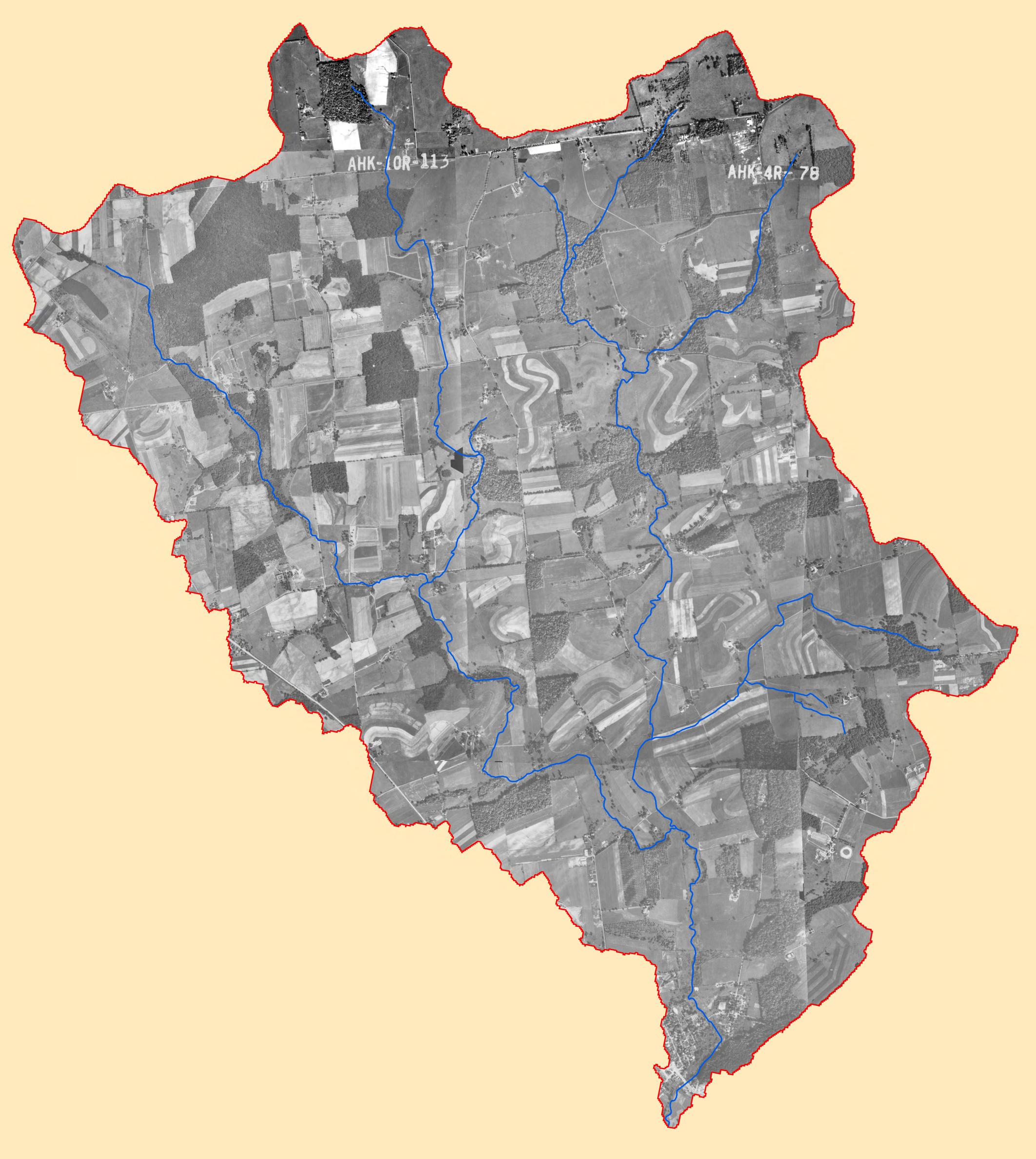


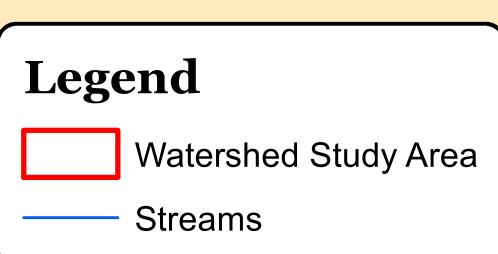
0 1,000 2,000 4,000 Feet

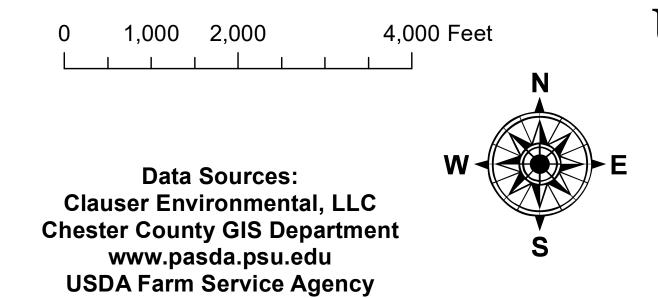
N N E S

Upper East Branch White Clay Creek 1937 Aerial Photography Chester County, Pennsylvania



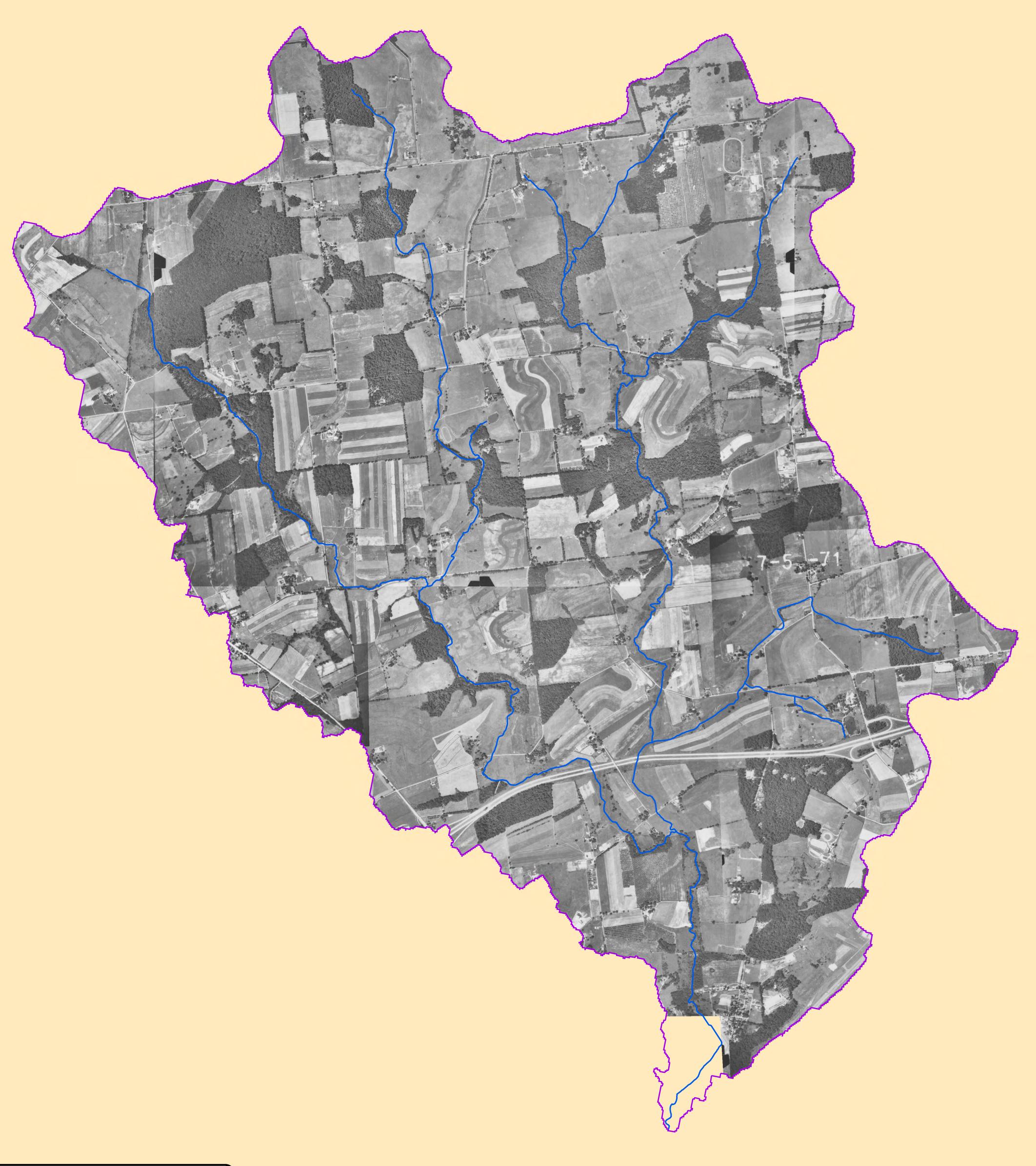


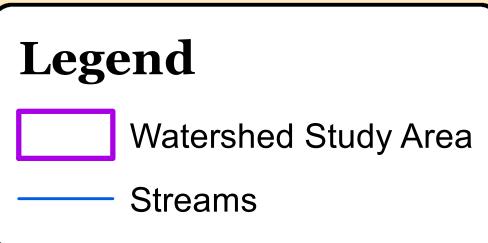


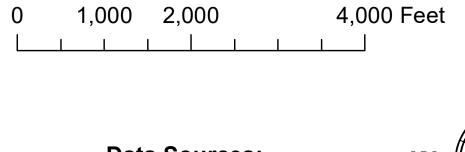


Upper East Branch White Clay Creek 1957-58 Aerial Photography Chester County, Pennsylvania



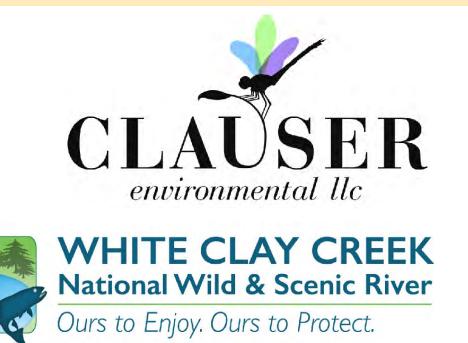






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Upper East Branch White Clay Creek 1971 Aerial Photography Chester County, Pennsylvania



### APPENDIX C MACROINVERTEBRATE TAXA LISTS

## **Macroinvertebrate Taxa List**

Site	Class/Order/Suborder	Family	Genus	Quantity
1	Diptera	Chironomidae		167
	Diptera	Tipulidae	Antocha sp.	1
	Diptera	Empididae	Hemerodromia sp.	1
	Diptera	Tipulidae	Tipula sp.	2
	Coleoptera	Elmidae	Oulimnius sp.	1
	Coleoptera	Elmidae	Microcylloepus sp.	10
	Coleoptera	Elmidae	Stenelmis sp.	7
	Coleoptera	Psephenidae	Psephenus sp.	1
	Trichoptera	Hydropsychidae	Ceratopsyche sp.	2
	Trichoptera	Hydropsychidae	Hydropsyche sp.	2
	Oligochaeta			1
	Nematoda			2
	Ephemeroptera	Ephemerellidae	Ephemerella sp.	2
	Ephemeroptera	Baetidae	Baetis sp.	15
	Ephemeroptera	Isonychiidae	Isonychia sp.	1
	Ephemeroptera	Heptageniidae	Stenonema sp.	3
	Ephemeroptera	Baetidae	Acentrella sp.	1
				n=219
2	Diptera	Chironomidae		128
	Diptera	Tipulidae	Antocha sp.	1
	Diptera	Simuliidae	Simulium sp.	7
	Coleoptera	Psephenidae	Psephenus sp.	6
	Coleoptera	Elmidae	Stenelmis sp.	11
	Coleoptera	Elmidae	Oulimnius sp.	3
	Coleoptera	Elmidae	Optioservus sp.	1
	Coleoptera	Elmidae	Microcylloepus sp.	1
	Trichoptera	Hydropsychidae	Ceratopsyche sp.	1
	Trichoptera	Philopotamidae	Chimarra sp.	1
	Trichoptera	Philopotamidae	Dolophilodes sp.	1
	Trichoptera	Limnephilidae	Goera sp.	1
	Nematoda			32
	Oligochaeta			2
	Turbellaria			3
	Ephemeroptera	Baetidae	Baetis sp.	5
	Ephemeroptera	Ephemerellidae	Eurylophella sp.	1
	Ephemeroptera	Ephemerellidae	Serratella sp.	2
	Ephemeroptera	Ephemerellidae	Ephemerella sp.	2
				n=209

Site	Class/Order/Suborder	Family	Genus	Quantity
3	Diptera	Chironomidae		88
	Diptera	Scathophagidae		1
	Diptera	Simuliidae	Simulium sp.	16
	Diptera	Ceratopogonidae	Probezzia sp.	1
	Coleoptera	Elmidae	Stenelmis sp.	2
	Coleoptera	Elmidae	Microcylloepus sp.	1
	Coleoptera	Dytiscidae	Agabus sp.	1
	Coleoptera	Dytiscidae	Ilybius sp.	4
	Coleoptera	Elmidae	Dubiraphia sp.	38
	Odanata	Coenagrionidae	Argia sp.	5
	Isopoda			1
	Oligochaeta			34
	Bivalvia			6
				n=198
4	Diptera	Chironomidae		92
	Diptera	Tipulidae	Antocha sp.	2
	Diptera	Empididae	Hemerodromia sp.	1
	Diptera	Simuliidae	Simulium sp.	1
	Coleoptera	Elmidae	Macronychus sp.	1
	Coleoptera	Elmidae	Microcylloepus sp.	3
	Coleoptera	Elmidae	Optioservus sp.	30
	Coleoptera	Elmidae	Oulimnius sp.	19
	Coleoptera	Elmidae	Stenelmis sp.	2
	Ephemeroptera	Heptageniidae	Stenonema sp.	3
	Ephemeroptera	Ephemerellidae	Ephemerella sp.	10
	Ephemeroptera	Ephemerellidae	Serratella sp.	1
	Ephemeroptera	Ephemerellidae	Eurylophella sp.	2
	Ephemeroptera	Baetidae	Barbaetis sp.	1
	Ephemeroptera	Baetidae	Baetis sp.	8
	Ephemeroptera	Baetidae	Acentrella sp.	2
	Nematoda			18
	Acari	Hydracarina		2
				n=198

Site	Class/Order/Suborder	Family	Genus	Quantity
5	Diptera	Chironomidae		76
	Coleoptera	Elmidae	Dubiraphia sp.	1
	Coleoptera	Elmidae	Gonielmis sp.	1
	Coleoptera	Elmidae	Stenelmis sp.	2
	Coleoptera	Elmidae	Optioservus sp.	17
	Coleoptera	Elmidae	Oulimnius sp.	16
	Coleoptera	Elmidae	Microcylloepus sp.	2
	Coleoptera	Ptilodactylidae	Anchytarsus sp.	1
	Trichoptera	Hydropsychidae	Ceratopsyche sp.	2
	Trichoptera	Hydropsychidae	Hydropsyche sp.	1
	Trichoptera	Philopotamidae	Chimarra sp.	1
	Nematoda	•	•	26
	Oligochaeta			8
	Plecoptera	Leuctridae	Leuctra sp.	18
	Plecoptera	Perlidae	Beloneuria sp.	1
	Ephemeroptera	Ephemerellidae	Serratella sp.	10
	Ephemeroptera	Ephemerellidae	Ephemerella sp.	2
	Ephemeroptera	Leptophlebiidae	Habrophlebia sp.	1
	Ephemeroptera	Leptophlebiidae	Habrophlebiodes sp.	1
	Ephemeroptera	Leptophlebiidae	Paraleptophlebia sp.	3
	Ephemeroptera	Baetidae	Baetis sp.	3 1
	Ephemeroptera	Heptageniidae	Stenonema sp.	6
	Ернешегория	Treptagemidae	stenonema sp.	n=197
5	Diptera	Chironomidae		70
	Coleoptera	Elmidae	Microcylloepus sp.	1
	Coleoptera	Elmidae	Oulimnius sp.	8
	Coleoptera	Elmidae	Optioservus sp.	2
	Coleoptera	Elmidae	Dubiraphia sp.	1
	<del>-</del>	Dytiscidae	Agabus sp.	
	Coleoptera	•	-	1
	Trichoptera	Hydropsychidae	Hydropsyche sp.	1
	Trichoptera	Philopotamidae	Dolophilodes sp.	3
	Plecoptera	Leuctridae	Leuctra sp.	10
	Plecoptera	Perlidae	Perlesta sp.	2
	Ephemeroptera	Heptageniidae	Stenonema sp.	7
	Ephemeroptera	Heptageniidae	Stenacron sp.	3
	Ephemeroptera	Ephemerellidae	Ephemerella sp.	11
	Ephemeroptera	Ephemerellidae	Serratella sp.	1
	Ephemeroptera	Ephemerellidae	Timpanoga sp.	3
	Ephemeroptera	Ephemerellidae	Eurylophella sp.	5
	Ephemeroptera	Baetidae	Baetis sp.	8
	Ephemeroptera	Baetidae	Procloeon sp.	1
	Nematoda			63
	Gasteropoda	Ancylidae		1
	Acari	Hydracarina		2
				n=204

Antocha sp.  ae Culicoides sp.  Optioservus sp.	118 1 1 4
ae Culicoides sp. Optioservus sp.	1
Optioservus sp.	
	4
Ilubiue en	
ngoius sp.	1
Microcylloepus sp.	2
Stenelmis sp.	5
Oulimnius sp.	7
Dryopidae sp.	1
Psephenus sp.	2
e Ceratopsyche sp.	2
e <i>Hydropsyche sp.</i>	1
Oecetis sp.	1
Perlesta sp.	2
	1
	41
e Stygobromus sp.	1
e Ephemerella sp.	4
Baetis sp.	4
e Timpanoga sp.	1
e Attenella sp.	2
Stenonema sp.	2
e Serratella sp.	2
_	1
	n=206
	Ilybius sp. Microcylloepus sp. Stenelmis sp. Oulimnius sp. Dryopidae sp. Psephenus sp. e Ceratopsyche sp. Oecetis sp. Perlesta sp.  Stygobromus sp. Ephemerella sp. Baetis sp. Timpanoga sp. Attenella sp. Stenonema sp.

Site	Class/Order/Suborder	Family	Genus	Quantity
8	Diptera	Chironomidae		61
	Diptera	Tipulidae	Antocha sp.	1
	Diptera	Simuliidae	Simulium sp.	1
	Coleoptera	Elmidae	Stenelmis sp.	12
	Coleoptera	Hydrophilidae	Derallus sp.	1
	Coleoptera	Elmidae	Oulimnius sp.	3
	Coleoptera	Psephenidae	Psephenus sp.	4
	Coleoptera	Elmidae	Optioservus sp.	16
	Coleoptera	Elmidae	Microcylloepus sp.	2
	Trichoptera	Hydropsychidae	Ceratopsyche sp.	2
	Trichoptera	Hydropsychidae	Hydropsyche sp.	2
	Trichoptera	Hydropsychidae	Cheumatopsyche sp.	2
	Trichoptera	Hydroptilidae	Leucotrichia sp.	1
	Plecoptera	Perlidae	Perlesta sp.	2
	Oligochaeta		_	2
	Nematoda			9
	Ephemeroptera	Heptageniidae	Stenonema sp.	11
	Ephemeroptera	Ephemerellidae	Ephemerella sp.	21
	Ephemeroptera	Ephemerellidae	Serratella sp.	15
	Ephemeroptera	Baetidae	Baetis sp.	23
	Ephemeroptera	Baetidae	Acentrella sp.	2
	Ephemeroptera	Oligoneuriidaae	Isonychia sp.	1
	Acari	Hydracarina		2
		·		n=196
9	Diptera	Chironomidae		126
	Coleoptera	Elmidae	Stenelmis sp.	9
	Coleoptera	Elmidae	Oulimnius sp.	20
	Coleoptera	Elmidae	Microcylloepus sp.	5
	Coleoptera	Elmidae	Optioservus sp.	9
	Trichoptera	Hydropsychidae	Hydropsyche sp.	2
	Trichoptera	Hydropsychidae	Cheumatopsyche sp.	1
	Trichoptera	Hydroptilidae	Hydroptila Sp.	1
	Plecoptera	Leuctridae	Zealeuctra sp.	1
	Oligochaeta		•	2
	Nematoda			2
	Ephemeroptera	Ephemerellidae	Eurylophella sp.	1
	Ephemeroptera	Ephemerellidae	Ephemerella sp.	12
	Ephemeroptera	Ephemerellidae	Serratella sp.	1
	Ephemeroptera	Baetidae	Baetis sp.	13
	Acari	Hydracarina	4	2
		•		n=207
				,

Site	Class/Order/Suborder	Family	Genus	Quantity
10	Diptera	Chironomidae		26
	Diptera	Tipulidae	Antocha sp.	1
	Coleoptera	Elmidae	Oulimnius sp.	13
	Coleoptera	Ptilodactylidae	Anchytarsus sp.	2
	Coleoptera	Psephenidae	Ectopria sp.	1
	Collembolla			1
	Coleoptera	Elmidae	Optioservus sp.	7
	Trichoptera	Hydropsychidae	Ceratopsyche sp.	2
	Trichoptera	Hydropsychidae	Hydropsyche sp.	10
	Trichoptera	Philopotamidae	Chimarra sp.	3
	Trichoptera	Polycentropodidae	Polycentropus sp.	2
	Trichoptera	Lepidostomatidae	Lepidostoma sp.	3
	Trichoptera	Odontoceridae	Psilotreta sp.	1
	Trichoptera	Glossosomatidae	Agapetus sp.	3
	Trichoptera	Hydroptilidae	Hydroptila Sp.	1
	Plecoptera	Peltoperlidae	Tallaperla sp.	11
	Plecoptera	Perlidae	Perlesta sp.	1
	Plecoptera	Perlidae	Eccoptura sp.	1
	Plecoptera	Perlidae	Beloneuria sp.	2
	Plecoptera	Perlodidae	Diploperla sp.	1
	Plecoptera	Perlodidae	Isoperla sp.	4
	Plecoptera	Leuctridae	Leuctra sp.	9
	Plecoptera	Nemouridae	Amphinemura sp.	1
	Plecoptera	Nemouridae	Podmosta sp.	3
	Plecoptera	Capniidae	Paracapnia sp.	1
	Oligochaeta	-		5
	Nematoda			3
	Ephemeroptera	Ephemerellidae	Eurylophella sp.	1
	Ephemeroptera	Ephemerellidae	Serratella sp.	10
	Ephemeroptera	Ephemerellidae	Ephemerella sp.	19
	Ephemeroptera	Leptophlebiidae	Paraleptophlebia sp.	2
	Ephemeroptera	Leptophlebiidae	Habrophlebiodes sp.	4
	Ephemeroptera	Heptageniidae	Stenonema sp.	4
	Ephemeroptera	Heptageniidae	Epeorus sp.	2
	Ephemeroptera	Heptageniidae	Leucrocuta sp.	2
	Ephemeroptera	Baetidae	Baetis sp.	32
	Acari	Hydracarina	•	8
	Gastropoda	Hydrobiidae		12
	Decapoda	•		1
	-			n=215

Site	Class/Order/Suborder	Family	Genus	Quantity
11	Diptera	Chironomidae		71
	Diptera	Ceratopogonidae	Probezzia sp.	1
	Diptera	Tipulidae	Antocha sp.	1
	Coleoptera	Elmidae	Oulimnius sp.	27
	Coleoptera	Elmidae	Microcylloepus sp.	10
	Coleoptera	Elmidae	Optioservus sp.	15
	Coleoptera	Elmidae	Stenelmis sp.	18
	Coleoptera	Elmidae	Dubiraphia sp.	5
	Coleoptera	Hydraenidae	Limnebius sp.	2
	Coleoptera	Psephenidae	Psephenus sp.	8
	Trichoptera	Hydropsychidae	Ceratopsyche sp.	1
	Plecoptera	Nemouridae	Podmosta sp.	1
	Oligochaeta		•	4
	Nematoda			4
	Ephemeroptera	Ephemerellidae	Eurylophella sp.	2
	Ephemeroptera	Ephemerellidae	Ephemerella sp.	16
	Ephemeroptera	Heptageniidae	Stenonema sp.	1
	Ephemeroptera	Heptageniidae	Stenacron sp.	2
	Ephemeroptera	Caenidae	Caenis sp.	1
	Ephemeroptera	Baetidae	Barbaetis sp.	1
	Ephemeroptera	Baetidae	Baetis sp.	2
	Acari	Hydracarina	Buctis sp.	6
	neum	Trydracarma		n=199
12	Diptera	Chironomidae		122
	Diptera	Simuliidae	Simulium sp.	2
	Coleoptera	Elmidae	Microcylloepus sp.	
	Coleoptera	Elmidae	Stenelmis sp.	5 6
	_	Elmidae	Oulimnius sp.	
	Coleoptera		*	14
	Coleoptera	Elmidae	Optioservus sp.	3
	Coleoptera	Dytiscidae	Ilybius sp.	1
	Coleoptera	Psephenidae	Psephenus sp.	3
	Collembolla	G1 111	C.I.	1
	Tricoptera	Glossosomatidae	Glossosoma sp.	1
	Trichoptera	Hydropsychidae	Ceratopsyche sp.	3
	Trichoptera	Hydropsychidae	Hydropsyche sp.	1
	Trichoptera	Philopotamidae	Dolophilodes sp.	5
	Plecoptera	Perlidae	Perlesta sp.	2
	Plecoptera	Leuctridae	Leuctra sp.	3
	Oligochaeta			2
	Nematoda			1
	Ephemeroptera	Heptageniidae	Stenonema sp.	1
	Ephemeroptera	Ephemerellidae	Ephemerella sp.	9
	Ephemeroptera	Baetidae	Acentrella sp.	3
	Enhamanantana	Baetidae	Baetis sp.	19
	Ephemeroptera	Daetidae	Duens sp.	19

## APPENDIX D WATER QUALITY NETWORK HABITAT ASSESSMENT FORMS

WATERBODY NAME	East Branch Whit	e Clay (reek	STR CODE/RM	020402050013
	MP-1		N 39,82788 N	
DATE 5/19/20	22		: 47 an	
AQUATIC ECOREGIC			Chester	
INVESTIGATORS AS	SC. USC. SM	. 646/1/10		
	BY Aarons, Clause	r PL D	DIECI E	RUN PREVALENCE
Habitat	1 1000113,010030	Cate		RUN PREVALENCE
Parameter	Optimal	Suboptimal	Marginal	Poor
1. Instream Cover (Fish)	Greater than 50% mix of boulder, cobble, submerged logs, undercut banks, or other stable habitat.  20 19 18 17 16	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 is obvious.
2. Epifaunal				5 4 3 2 1
Substrate  SCORE 13	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 two 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 two times the stream width; gravel or large boulders and bedrock prevalent; some cobble present.  10 9 8 7 6	Riffles or run virtually nonexistent; large boulders and bedrock prevalent; cobble lacking.
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.
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).  15 14 13 12 11	Only 2 of the 4 habitat regimes present (if fast-shallow or slow-shallow are missing, score lower than if missing other regimes).  10 9 8 7 6	Dominated by 1 velocity/depth regime (usually slow-deep).
5. Channel Alteration	No channelization or dredging present.  20 19 18 17 16	Some channelization present, usually in areas of bridge abutments; evidence of past channelization, i.e., dredging, (greater than past 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 gabion or cement; over 80% of the stream reach channelized and disrupted.
Total Side 1 60				

Parameter	Optimal	Categ Suboptimal	Marginal	Poor
6. Sediment Deposition	Little or no enlargement 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 obstruction, constriction, and bends; moderate deposition of pools prevalent.	Heavy deposits of fine material, increased bar development; more than 50% of the bottom changing frequently; pools almost absent due to substantial sediment deposition.
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, 10 9 8 7 6	Generally all flat water or shallow riffles; poor habitat; distance between riffles divided by the width of the stream is between ratio >25.  5 4 3 2
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.  10 9 8 7 6	Very little water in channel and mostly present as standing pools.
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.
10. Bank Vegetative Protection	More than 90% of the streambank surface covered by vegetation.	70-90% of the stream- bank surface covered by vegetation.	50-70% of the stream- bank surfaces covered by vegetation.	Less than 50% of the streambank surface covered by vegetation.
SCORE	20 19 18 17 16	15 14 13 12 11	10 9 8 7 6	5 4 3 2 1
11. Grazing or Other Disruptive Pressure	Vegetative disruption, through grazing or mowing, minimal or not evident; almost all plants allowed to grow naturally.  20 19 18 17 16	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.  10 9 8 7 6	Disruption of vegetation is very high; vegetation has been removed to 2 inches or less in average stubble height.
12. Riparian Vegetative Zone Width	Width of riparian zone >18 meters; human activities (i.e., parking lots, roadbeds, clear- cuts, lawns, or crops)	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.

WATERBODY NAME	East Branch Wh	ite Clay Creek	STR CODE/RM	11 02040205000 136
STATION NUMBER _	MP-Z	LOCATION	39.84122 N 7	5.78375 W
DATE 5/19/20		2		
AQUATIC ECOREGIO			Chester	
INVESTIGATORS A	SC, IASC, SM	1		
FORM COMPLETED E	BY Auron S. Clause	s, PhD	RIFFLE	/RUN PREVALENCE
Habitat		Categ		
Parameter	Optimal	Suboptimal	Marginal	Poor
1. Instream Cover (Fish)	Greater than 50% mix of boulder, cobble, sub- merged 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 is obvious.
SCORE 13	20 19 18 17 16	15 14 (13) 12 11	10 9 8 7 6	5 4 3 2 1
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 two 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 two times the stream width; gravel or large boulders and bedrock prevalent; some cobble present.  10 9 8 7 6	Riffles or run virtually nonexistent; large boulders and bedrock prevalent; cobble lacking.
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
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 habitat regimes present (if fast-shallow or slow-shallow are missing, score lower than if missing other regimes).  10 9 8 7 6	Dominated by 1 velocity/depth regime (usually slow- deep).
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 past 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 gabion or cement; over 80% of the stream reach channelized and disrupted.
771	20 19 18 17 16	15 14 (13) 12 11	10 9 8 7 6	5 4 3 2 1
Total Side 1 7				

Habitat Parameter	Optimal	Categ Suboptimal	Marginal	Poor
6. Sediment Deposition	Little or no enlargement 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 obstruction, constriction, and bends; moderate deposition of pools prevalent.	Heavy deposits of fine material, increased bar development; more than 50% of the bottom changing frequently; pools almost absent due to substantial sediment deposition.
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.  10 9 8 7 6	Generally all flat wate or shallow riffles; poor habitat; distance between riffles divided by the width of the stream is between ratio >25.  5 4 3 2 1
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.  15 14 13 12 11	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.
9. Condition of Banks SCORE	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.  5 4 3 2 1
10. Bank Vegetative Protection	More than 90% of the streambank surface covered by vegetation.	70-90% of the stream- bank surface covered by vegetation.	50-70% of the stream- bank surfaces covered by vegetation.	Less than 50% of the streambank surface covered by vegetation.
11. Grazing or Other Disruptive Pressure	Vegetative disruption, through grazing or mowing, 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.  15 14 13 12 11	Disruption obvious; patches of bare soil or closely cropped vegetation common; less than one-half of the potential plant stubble height remaining.	Disruption of vegetation is very high; vegetation has been removed to 2 inches or less in average stubble height.
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.  5 4 3 2 1

	17. 17.	Fara Lavil A	. L	
	Unnormed Tributary to			
STATION NUMBER			139.84992 N 7	5. 17718 W
DATE 5/19/202	22	TIME //:	4.8 am	
AQUATIC ECOREGIO	N	COUNTY	Chester	
INVESTIGATORS A	SC, HSC, SM			
	BY Aurons, Clauses,	PLD	PIEEL E	RUN PREVALENCE
Habitat	100000000000000000000000000000000000000	Categ		MONTALINGE
Parameter	Optimal	Suboptimal	Marginal	Poor
1. Instream Cover (Fish)  SCORE	Greater than 50% mix of boulder, cobble, submerged logs, undercut banks, or other stable habitat.  20 19 18 17 16	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.  10 9 8 7 6	Less than 10% mix of boulder, cobble, or other stable habitat; lack of habitat is obvious.
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 two 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 two 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.
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.
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).  15 14 13 12 11	Only 2 of the 4 habitat regimes present (if fast-shallow or slow-shallow are missing, score lower than if missing other regimes).  10 9 8 7 6	Dominated by 1 velocity/depth regime (usually slow-deep).
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 past 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 gabion or cement; over 80% of the stream reach channelized and disrupted.
SCORE 15	20 19 18 17 16	15 14 (13) 12 11	10 9 8 7 6	5 4 3 2 1
Total Side 1				

Optimal  Little or no enlargement of islands or point bars	Suboptimal Some new increase in	Marginal  Moderate deposition of	Poor Heavy deposits of fine
and less than 5% of the bottom affected by sediment deposition.  20 19 18 17 16	bar formation, mostly from coarse gravel; 5-30% of the bottom affected; slight deposition in pools.	new gravel, coarse sand on old and new bars; 30-50% of the bottom affected; sediment deposits at obstruction, constriction, and bends; moderate deposition of pools prevalent.	material, increased bar development; more than 50% of the bottom changing frequently; pools almost absent due to substantial sediment deposition.
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 wate or shallow riffles; poor habitat; distance between riffles divided by the width of the stream is between ratio >25.  5 4 3 2 1
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.
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.
More than 90% of the streambank surface covered by vegetation.	70-90% of the streambank surface covered by vegetation.	50-70% of the stream- bank surfaces covered by vegetation.	Less than 50% of the streambank surface covered by vegetation.
20 19 18 17 16	(15) 14 13 12 11	10 9 8 7 6	5 4 3 2 1
Vegetative disruption, through grazing or mowing, minimal or not evident; almost all plants allowed to grow naturally.  20 19 18 17 16	Disruption evident but not affecting full plant growth potential to any great extent; more than one-half of the potential plant stubble height remaining.  15 14 13 12 11	Disruption obvious; patches of bare soil or closely cropped vegetation common; less than one-half of the potential plant stubble height remaining.	Disruption of vegetation is very high; vegetation has been removed to 2 inches or less in average stubble height.
Width of riparian zone >18 meters; human activities (i.e., parking lots, roadbeds, clear- cuts, lawns, or crops) have not impacted zone. 20 19 18 17 16	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.  5 4 3 2 1
Orocaty : Nation : Nation	Occurrence of riffles relatively frequent; distance between riffles divided by the width of the stream equals 5 to 7; variety of habitat.  20 19 18 17 16  Water reaches base of both lower banks and minimal amount of channel substrate is exposed.  20 19 18 17 16  Banks stable; no evidence of erosion or bank failure.  20 19 18 17 16  More than 90% of the streambank surface covered by vegetation.  20 19 18 17 16  Vegetative disruption, through grazing or mowing, minimal or not evident; almost all plants allowed to grow naturally.  20 19 18 17 16  Width of riparian zone 18 meters; human activities (i.e., parking lots, roadbeds, clear-cuts, lawns, or crops) have not impacted zone.	Occurrence of riffles relatively frequent; distance between riffles divided by the width of the stream equals 5 to 7; variety of habitat.  20 19 18 17 16 15 14 13 12 11  Water reaches base of both lower banks and minimal amount of channel substrate is exposed.  20 19 18 17 16 15 14 13 12 11  Water reaches base of both lower banks and minimal amount of channel substrate is exposed.  20 19 18 17 16 15 14 13 12 11  Banks stable; no evidence of erosion or bank failure.  Moderately stable; infrequent, small areas of erosion mostly healed over.  20 19 18 17 16 15 14 13 12 11  Moderately stable; infrequent, small areas of erosion mostly healed over.  20 19 18 17 16 15 14 13 12 11  Wegetative disruption, through grazing or mowing, minimal or not evident; almost all plants allowed to grow naturally.  20 19 18 17 16 15 14 13 12 11  Wegetative disruption, through grazing or mowing, minimal or not evident; almost all plants allowed to grow naturally.  20 19 18 17 16 15 14 13 12 11  Width of riparian zone 18 meters; human activities (i.e., parking lots, roadbeds, clearcuts, lawns, or crops) have not impacted zone.	20 19 18 17 16 15 14 13 12 11 10 9 8 7 6  Occurrence of riffles relatively frequent; distance between riffles divided by the width of the stream equals 5 to 7; variety of habitat.  20 19 18 17 16 15 14 13 12 11  Water reaches base of both lower banks and minimal amount of channel substrate is exposed.  20 19 18 17 16 15 14 13 12 11  Water fills > 75% of the available channel; or <25% of channel substrate is exposed.  20 19 18 17 16 15 14 13 12 11  Moderately stable; infrequent, small areas of erosion mostly healed over.  20 19 18 17 16 15 14 13 12 11  Moderately stable; infrequent, small areas of erosion mostly healed over.  20 19 18 17 16 15 14 13 12 11  More than 90% of the streambank surface covered by vegetation.  20 19 18 17 16 15 14 13 12 11  Disruption evident but not affecting full plant surface covered by vegetation.  20 19 18 17 16 15 14 13 12 11  Disruption evident but not affecting full plant growth potential to any great extent; more than one-half of the potential plant stubble height remaining.  20 19 18 17 16 15 14 13 12 11  Disruption obvious; patches of bare soil or closely cropped wegetation.  Width of riparian zone >18 meters; human activities (i.e., parking ots, roadbeds, clear-outs, lawns, or crops) have not impacted zone.

WATERBODY NAME	East Branch White	Clay Creek	STR CODE/RM	11 020 40205000137
	MP-4	LOCATION	39.84969 N	
DATE 5/19/2027		1.70		
AQUATIC ECOREGIO			Chester	
INVESTIGATORS A	SC, KSC, SM			
	BY Awron S. Clay	SPC PhD	RIFFI F	RUN PREVALENCE
Habitat		Categ	jory	MONT NETALLINGE
Parameter	Optimal	Suboptimal	Marginal	Poor
Instream Cover (Fish)  SCORE	Greater than 50% mix of boulder, cobble, submerged logs, undercut banks, or other stable habitat.  20 19 18 17 16	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.  10 (9) 8 7 6	Less than 10% mix of boulder, cobble, or other stable habitat; lack of habitat is obvious.
Epifaunal Substrate  SCORE	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 two 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 two times the stream width; gravel or large boulders and bedrock prevalent; some cobble present.  10 9 8 7 6	Riffles or run virtually nonexistent; large boulders and bedrock prevalent; cobble lacking.
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.
4. Velocity/Depth Regimes  SCORE 12	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 habitat regimes present (if fast-shallow or slow-shallow are missing, score lower than if missing other regimes).  10 9 8 7 6	Dominated by 1 velocity/depth regime (usually slow-deep).
5. Channel Alteration  SCORE 17	No channelization or dredging present.	Some channelization present, usually in areas of bridge abutments; evidence of past channelization, i.e., dredging, (greater than past 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 gabion or cement; over 80% of the stream reach channelized and disrupted.
Total Side 1 5 H		3.6		

Parameter	Optimal	Categ Suboptimal	Marginal	Poor
6. Sediment Deposition	Little or no enlargement 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 obstruction, constriction, and bends; moderate deposition of pools prevalent.	Heavy deposits of fine material, increased bar development; more than 50% of the bottom changing frequently; pools almost absent due to substantial sediment deposition.
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 between ratio >25.  5 4 3 2
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.
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.
10. Bank Vegetative Protection	More than 90% of the streambank surface covered by vegetation.	70-90% of the streambank surface covered by vegetation.	50-70% of the streambank surfaces covered by vegetation.	Less than 50% of the streambank surface covered by vegetation.
SCORE	20 19 18 17 16	15 14 13 12 11	10 9 8 7 6	5 4 3 2
11. Grazing or Other Disruptive Pressure	Vegetative disruption, through grazing or mowing, minimal or not evident; almost all plants allowed to grow naturally.  20 19 18 17 16	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 vegetation is very high; vegetation has been removed to 2 inches or less in average stubble height.
12. Riparian Vegetative Zone Width	Width of riparian zone >18 meters; human activities (i.e., parking lots, roadbeds, clear- cuts, lawns, or crops)	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.

WATERBODY NAME	East Branch White	Clase Creek	STR CODE/RM	11 040205000138
STATION NUMBER _		7	39.8709 N 7	
DATE 5/19/202		TIME		,
The second second second	ON _		Chester	
INVESTIGATORS A				
	BY Aason S. Claus	es. PLD	DIEE! E	KRUN PREVALENCE
Habitat	1 pood - Gras	Categ		TRON FREVALENCE
Parameter	Optimal	Suboptimal	Marginal	Poor
Instream Cover (Fish)  SCORE _ 8	Greater than 50% mix of boulder, cobble, submerged logs, undercut banks, or other stable habitat.  20 19 18 17 16	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 is obvious.
Epifaunal Substrate  SCORE 18	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 two 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 two 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.
3. Embeddedness SCORE 17	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.
4. Velocity/Depth Regimes  SCORE	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).  15 14 13 12 11	Only 2 of the 4 habitat regimes present (if fast-shallow or slow-shallow are missing, score lower than if missing other regimes).  10 9 8 7 6	Dominated by 1 velocity/depth regime (usually slow- deep).
5. Channel Alteration  SCORE	No channelization or dredging present.	Some channelization present, usually in areas of bridge abutments; evidence of past channelization, i.e., dredging, (greater than past 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 gabion or cement; over 80% of the stream reach channelized and disrupted.
Total Side 1 84	20 19 18 17 16	15 14 (3) 12 11	10 9 8 7 6	5 4 3 2 1

Parameter	Optimal	Categ Suboptimal	Marginal	Poor
6. Sediment Deposition	Little or no enlargement 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 obstruction, constriction, and bends; moderate deposition of pools prevalent.  10 9 8 7 6	Heavy deposits of fine material, increased bar development; more than 50% of the bottom changing frequently; pools almost absent due to substantial sediment deposition.
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.  10 9 8 7 6	Generally all flat wate or shallow riffles; poor habitat; distance between riffles divided by the width of the stream is between ratio >25.  5 4 3 2 1
8. Channel Flow Status	Water reaches base of both lower banks and minimal amount of channel substrate is exposed.  20 19 18 17 16	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.
9. Condition of Banks SCORE 13	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.  5 4 3 2 1
10. Bank Vegetative Protection	More than 90% of the streambank surface covered by vegetation.	70-90% of the streambank surface covered by vegetation.	50-70% of the streambank surfaces covered by vegetation.	Less than 50% of the streambank surface covered by vegetation.
SCORE	20 19 18 17 16	15 14 13 12 11	10 9 8 7 6	5 4 3 2 1
11. Grazing or Other Disruptive Pressure	Vegetative disruption, through grazing or mowing, minimal or not evident; almost all plants allowed to grow naturally.  20 19 18 17 16	Disruption evident but not affecting full plant growth potential to any great extent; more than one-half of the potential plant stubble height remaining.  15 14 13 12 11	Disruption obvious; patches of bare soil or closely cropped vegetation common; less than one-half of the potential plant stubble height remaining.  10 9 8 7 6	Disruption of vegetation is very high; vegetation has been removed to 2 inches or less in average stubble height.
12. Riparian Vegetative Zone Width	Width of riparian zone >18 meters; human activities (i.e., parking lots, roadbeds, clear-	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.

WATERBODY NAME	Unraned Tributary to	East Bardillite Co	& Creak STR CODE/RM	N 0204020500060
STATION NUMBER _			39.87146 N 7	
DATE 5/19/22		TIME		
AQUATIC ECOREGIC	ON		Chester	
INVESTIGATORS A	SC, KSC, SM	0 42 34 34 34		
	BY Awon S. Clauser	(p). (i)	DIEELE	RUN PREVALENCE
Habitat	, ,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,	Categ		TON PREVALENCE
Parameter	Optimal	Suboptimal	Marginal	Poor
Instream Cover (Fish)  SCORE   Z	Greater than 50% mix of boulder, cobble, sub- merged 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 is obvious.
	20 19 18 17 16	15 14 13 (12) 11	10 9 8 7 6	5 4 3 2 1
2. Epifaunal Substrate  SCORE 49	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 two 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 two times the stream width; gravel or large boulders and bedrock prevalent; some cobble present.  10 9 8 7 6	Riffles or run virtually nonexistent; large boulders and bedrock prevalent; cobble lacking.
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.
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 habitat regimes present (if fast-shallow or slow-shallow are missing, score lower than if missing other regimes).  10 9 8 7 6	Dominated by 1 velocity/depth regime (usually slow-deep).
5. Channel Alteration  SCORE 3	No channelization or dredging present.	Some channelization present, usually in areas of bridge abutments; evidence of past channelization, i.e., dredging, (greater than past 20 yr) may be present, but recent channelization is not present.  15 14 13 12 11	New embankments present on both banks; and 40-80% of stream reach channelized and disrupted.	Banks shored gabion or cement; over 80% of the stream reach channelized and disrupted.
Total Side 1 76				5 4 5 2 1

Parameter	Optimal	Categ Suboptimal	Marginal	Poor
S. Sediment Deposition  SCORE 12	Little or no enlargement 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 obstruction, constriction, and bends; moderate deposition of pools prevalent.  10 9 8 7 6	Heavy deposits of fine material, increased bar development; more than 50% of the bottom changing frequently; pools almost absent due to substantial sediment deposition.
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.  10 9 8 7 6	Generally all flat water or shallow riffles; poor habitat; distance between riffles divide by the width of the stream is between ratio >25.  5 4 3 2
8. Channel Flow Status	Water reaches base of both lower banks and minimal amount of channel substrate is exposed.  20 19 18 17 16	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.
9. Condition of Banks SCORE 17	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.  5 4 3 2
10. Bank Vegetative Protection	More than 90% of the streambank surface covered by vegetation.	70-90% of the streambank surface covered by vegetation.	50-70% of the stream- bank surfaces covered by vegetation.	Less than 50% of the streambank surface covered by vegetation.
SCORE	20 19 18 17 16	15 14 13 12 11	10 9 8 7 6	5 4 3 2
11. Grazing or Other Disruptive Pressure	Vegetative disruption, through grazing or mowing, minimal or not evident; almost all plants allowed to grow naturally.  20 19 18 17 16	Disruption evident but not affecting full plant growth potential to any great extent; more than one-half of the potential plant stubble height remaining.  15 14 13 12 11	Disruption obvious; patches of bare soil or closely cropped vegetation common; less than one-half of the potential plant stubble height remaining.	Disruption of vegetation is very high; vegetation has been removed to 2 inches or less in average stubble height.
12. Riparian Vegetative Zone Width	Width of riparian zone >18 meters; human activities (i.e., parking lots, roadbeds, clear- cuts, lawns, or crops)	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.

Optimal ter than 50% mix of ler, cobble, sub- ed logs, undercut s, or other stable at.  19 18 17 16	COUNTYCOUNTYCOUNTYCatego   Suboptimal   30-50% mix of boulder, cobble, or other stable habitat; adequate habitat.	Chester	Poor Less than 10% mix of boulder, cobble, or other stable habitat; lack of habitat is
Optimal ter than 50% mix of ler, cobble, sub- ed logs, undercut s, or other stable at.	COUNTYCOUNTYCOUNTYCatego   Suboptimal   30-50% mix of boulder, cobble, or other stable habitat; adequate habitat.	RIFFLE  Ory  Marginal  10-30% mix of boulder, cobble, or other stable habitat; habitat availability less than	Poor  Less than 10% mix of boulder, cobble, or other stable habitat; lack of habitat is
Optimal ter than 50% mix of ler, cobble, sub- ed logs, undercut s, or other stable at.	County	RIFFLE  Ory  Marginal  10-30% mix of boulder, cobble, or other stable habitat; habitat availability less than	Poor  Less than 10% mix of boulder, cobble, or other stable habitat; lack of habitat is
Optimal ter than 50% mix of ler, cobble, sub- ed logs, undercut s, or other stable at.	Catego Suboptimal 30-50% mix of boulder, cobble, or other stable habitat; adequate habitat.	RIFFLE Marginal  10-30% mix of boulder, cobble, or other stable habitat; habitat availability less than	Poor  Less than 10% mix of boulder, cobble, or other stable habitat; lack of habitat is
Optimal ter than 50% mix of ler, cobble, sub- ed logs, undercut s, or other stable at.	Suboptimal 30-50% mix of boulder, cobble, or other stable habitat; adequate habitat.	Marginal 10-30% mix of boulder, cobble, or other stable habitat; habitat avail- ability less than	Poor  Less than 10% mix of boulder, cobble, or other stable habitat; lack of habitat is
Optimal ter than 50% mix of der, cobble, sub- ed logs, undercut s, or other stable at.	Suboptimal 30-50% mix of boulder, cobble, or other stable habitat; adequate habitat.	Marginal 10-30% mix of boulder, cobble, or other stable habitat; habitat avail- ability less than	Poor  Less than 10% mix of boulder, cobble, or other stable habitat; lack of habitat is
ter than 50% mix of der, cobble, sub- ed logs, undercut s, or other stable at.	Suboptimal 30-50% mix of boulder, cobble, or other stable habitat; adequate habitat.	Marginal 10-30% mix of boulder, cobble, or other stable habitat; habitat availability less than	Less than 10% mix of boulder, cobble, or other stable habitat; lack of habitat is
der, cobble, sub- ed logs, undercut s, or other stable at.	cobble, or other stable habitat; adequate habitat.	cobble, or other stable habitat; habitat avail- ability less than	boulder, cobble, or other stable habitat; lack of habitat is
19 10 17 16			obvious.
davalanad della and			5 4 3 2 1
iffle is as wide as m and length ads two times the of stream; dance of cobble.	stream but length is less than two times width; abundance of cobble; boulders and gravel common.	ing; riffle not as wide as stream and its length is less than two 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.
der particles are % surrounded by 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.
ur velocity/depth nes present (slow- , slow-shallow, fast-	Only 3 of the 4 regimes present (if fast-shallow is missing, score lower than if missing other regimes).	Only 2 of the 4 habitat regimes present (if fast-shallow or slow-shallow are missing, score lower than if missing other regimes).  10 9 8 7 6	5 4 3 2 1  Dominated by 1 velocity/depth regime (usually slow- deep).
	Some channelization present, usually in areas of bridge abutments; evidence of past channelization, i.e., dredging, (greater than past 20 yr) may be present, but recent channelization is not present.  15 14 13 12 11	New embankments present on both banks; and 40-80% of stream reach channelized and disrupted.	Banks shored gabion or cement; over 80% of the stream reach channelized and disrupted.
	developed riffle and riffle is as wide as mand length has two times the of stream; dance of cobble.  19 18 17 16 el, cobble, and der particles are % surrounded by sediment.  19 18 17 16 our velocity/depth hes present (slow-ly, slow-shallow), fast-shallow).  19 18 17 16 channelization or ging present.	developed riffle and riffle is as wide as stream but length is less than two times width; abundance of cobble; boulders and gravel common.  19 18 17 16 15 14 13 12 11  el, cobble, and der particles are 36 surrounded by sediment.  19 18 17 16 15 14 13 12 11  our velocity/depth nes present (slow-ly, slow-shallow, fast-ly, fast-shallow).  19 18 17 16 15 14 13 12 11  Only 3 of the 4 regimes present (if fast-shallow is missing, score lower than if missing other regimes).  19 18 17 16 15 14 13 12 11  Some channelization present, usually in areas of bridge abutments; evidence of past channelization, i.e., dredging, (greater than past 20 yr) may be present, but recent channelization is not present.	developed riffle and riffle is as wide as stream but length is less than two times wide as stream and its length is less than two times width; abundance of cobble; boulders and gravel common.  19 18 17 16 15 14 13 12 11 10 9 8 7 6  Gravel, cobble, and boulder particles are % surrounded by sediment.  19 18 17 16 15 14 13 12 11 10 9 8 7 6  Gravel, cobble, and boulder particles are 25-50% surrounded by fine sediment.  19 18 17 16 15 14 13 12 11 10 9 8 7 6  Only 3 of the 4 regimes present (slow-present (slow-present (slow-present (slow-present)), fast-shallow, a slow-shallow, a fast-shallow).  19 18 17 16 15 14 13 12 11 10 9 8 7 6  Only 2 of the 4 habitat regimes present (if fast-shallow is missing other regimes).  Some channelization present, usually in areas of bridge abutments; evidence of past channelization, i.e., dredging, (greater than past 20 yr) may be present, but recent channelization is not present.

Optimal	Suboptimal Categ	Marginal	Poor
Little or no enlargement 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 obstruction, constriction, and bends; moderate deposition of pools prevalent.	Heavy deposits of fine material, increased bar development; more than 50% of the bottom changing frequently; pools almost absent due to substantial sediment deposition.
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 wate or shallow riffles; pool habitat; distance between riffles divided by the width of the stream is between ratio >25.  5 4 3 2 1
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.
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.
More than 90% of the streambank surface covered by vegetation.	70-90% of the streambank surface covered by vegetation.	50-70% of the stream- bank surfaces covered by vegetation.	Less than 50% of the streambank surface covered by vegetation.
20 19 18 17 16	15 14 13 (12) 11	10 9 8 7 6	5 4 3 2 1
Vegetative disruption, through grazing or mowing, minimal or not evident; almost all plants allowed to grow naturally.  20 19 18 17 16	Disruption evident but not affecting full plant growth potential to any great extent; more than one-half of the potential plant stubble height remaining.  15 14 13 12 11	Disruption obvious; patches of bare soil or closely cropped vegetation common; less than one-half of the potential plant stubble height remaining.	Disruption of vegetation is very high; vegetation has been removed to 2 inches or less in average stubble height.  5 4 3 2 1
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.
	Little or no enlargement of islands or point bars and less than 5% of the bottom affected by sediment deposition.  20 19 18 17 16  Occurrence of riffles relatively frequent; distance between riffles divided by the width of the stream equals 5 to 7; variety of habitat.  20 19 18 17 16  Water reaches base of both lower banks and minimal amount of channel substrate is exposed.  20 19 18 17 16  Banks stable; no evidence of erosion or bank failure.  20 19 18 17 16  More than 90% of the streambank surface covered by vegetation.  20 19 18 17 16  Vegetative disruption, through grazing or mowing, minimal or not evident; almost all plants allowed to grow naturally.  20 19 18 17 16  Width of riparian zone > 18 meters; human activities (i.e., parking lots, roadbeds, clear-	Little or no enlargement of islands or point bars and less than 5% of the bottom affected by sediment deposition.  20 19 18 17 16 15 14 13 12 11  Occurrence of riffles relatively frequent; distance between riffles divided by the width of the stream equals 5 to 7; variety of habitat.  20 19 18 17 16 Occurrence of riffles relatively frequent; distance between riffles divided by the width of the stream equals 5 to 7; variety of habitat.  20 19 18 17 16 Uvater reaches base of both lower banks and minimal amount of channel substrate is exposed.  20 19 18 17 16 Uvater fills > 75% of the available channel; or <25% of channel substrate is exposed.  20 19 18 17 16 Uvater fills > 75% of the available channel; or <25% of channel substrate is exposed.  20 19 18 17 16 Uvater fills > 75% of the available channel; or <25% of channel substrate is exposed.  20 19 18 17 16 Uvater fills > 75% of the available channel; or <25% of channel substrate is exposed.  20 19 18 17 16 Uvater fills > 75% of the available channel; or <25% of channel substrate is exposed.  20 19 18 17 16 Uvater fills > 75% of the stream equals 7 to 15.  21 10 Uvater fills > 75% of the stream equals 7 to 15.  22 19 18 17 16 Uvater fills > 75% of the stream equals 7 to 15.  23 19 18 17 16 Uvater fills > 75% of the stream equals 7 to 15.  24 19 18 17 16 Uvater fills > 75% of the stream equals 7 to 15.  25 10 19 18 17 16 Uvater fills > 75% of the stream equals 7 to 15.  26 19 18 17 16 Uvater fills > 75% of the stream equals 7 to 15.  27 19 18 17 16 Uvater fills > 75% of the stream equals 7 to 15.  28 10 19 18 17 16 Uvater fills > 75% of the stream equals 7 to 15.  29 19 18 17 16 Uvater fills > 75% of the stream equals 7 to 15.  20 19 18 17 16 Uvater fills > 75% of the stream equals 7 to 15.  29 19 18 17 16 Uvater fills > 75% of the stream equals 7 to 15.  20 19 18 17 16 Uvater fills > 75% of the stream equals 7 to 15.  20 19 18 17 16 Uvater fills > 75% of the stream equals 7 to 15.  20 19 18 17 16 Uvater fills > 75% of the stream equals 7 to 15.  20 19 18 17 16 Uv	Little or no enlargement 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 by sediment deposition.  20 19 18 17 16 15 14 13 12 11 10 9 8 7 6  Occurrence of riffles relatively frequent; distance between riffles divided by the width of the stream equals 5 to 7; variety of habitat.  20 19 18 17 16 15 14 13 12 11 10 9 8 7 6  Water reaches base of both lower banks and minimal amount of channel substrate is exposed.  20 19 18 17 16 15 14 13 12 11 10 9 8 7 6  Water reaches base of both lower banks and minimal amount of channel substrate is exposed.  20 19 18 17 16 15 14 13 12 11 10 9 8 7 6  Moderated deposition of new gravel, coarse sand on old and new bars; 30-50% of the bottom affected; sediment on obstruction, constriction, and bends; moderate deposition of pools prevalent.  10 9 8 7 6  Occurrence of riffles riffles divided by the width of the stream equals 7 to 15.  Water reaches base of both lower banks and minimal amount of channel substrate is exposed.  20 19 18 17 16 15 14 13 12 11 10 9 8 7 6  Moderatel deposition of new gravel, coarse sand on old and new bars; 30-50% of the bottom affected; sediment deposits at obstruction, constriction, and bends; moderate deposition of pools prevalent.  Occurrence of riffles riferate deposition of pools prevalent.  10 9 8 7 6  Water fills of the stream is between riffles divided by the width of the stream is between 15 to 25.  Water fills > 75% of the available channel and/or riffle substrates are mostly exposed.  20 19 18 17 16 15 14 13 12 11 10 9 8 7 6  Wordth of riparian zone stable; infrequent, small areas of erosion mostly healed over.  20 19 18 17 16 15 14 13 12 11 10 9 8 7 6  Disruption obvious; patches of banks in reach have areas of erosion.  20 19 18 17 16 15 14 13 12 11 10 9 8 7 6  Disruption obvious; patches of banks in reach have areas of erosion or less than one-half of the potential plant stubble height remaining.  20 19 18 17 16

Total Side 1

## COMMONWEALTH OF PENNSYLVANIA DEPARTMENT OF ENVIRONMENTAL PROTECTION BUREAU OF POINT AND NON-POINT SOURCE MANAGEMENT

		TAT AGGEGGIVIE		
WATERBODY NAME	Unnaved Tributary	to East Branch While	Clay Cod STR CODE/RM	NI 02040205000607
	MP-8		139.84656 N 7	5.7978 W
DATE 5/19/20	22	TIME_9	09 am	
	N	COUNTY	Chester	
INVESTIGATORS A	SC, KSC, SM			
FORM COMPLETED I	BY ANTON S. Clause	r. PhD	RIFFLE	RUN PREVALENCE
Habitat		Categ		
Parameter	Optimal	Suboptimal	Marginal	Poor
1. Instream Cover (Fish)  SCORE	Greater than 50% mix of boulder, cobble, submerged logs, undercut banks, or other stable habitat.  20 19 18 17 16	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.  10 9 8 7 6	Less than 10% mix of boulder, cobble, or other stable habitat; lack of habitat is obvious.
2. Epifaunal	Well developed riffle and			
Substrate  SCORE	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 two 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 two times the stream width; gravel or large boulders and bedrock prevalent; some cobble present.  10 9 8 7 6	Riffles or run virtually nonexistent; large boulders and bedrock prevalent; cobble lacking.
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.
4. Velocity/Depth Regimes  SCORE 18	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).  15 14 13 12 11	Only 2 of the 4 habitat regimes present (if fast-shallow or slow-shallow are missing, score lower than if missing other regimes).  10 9 8 7 6	Dominated by 1 velocity/depth regime (usually slow-deep).
5. Channel Alteration  SCORE	No channelization or dredging present.  20 19 18 17 16	Some channelization present, usually in areas of bridge abutments; evidence of past channelization, i.e., dredging, (greater than past 20 yr) may be present, but recent channelization is not present.  15 14 (13) 12 11	New embankments present on both banks; and 40-80% of stream reach channelized and disrupted.	Banks shored gabion or cement; over 80% of the stream reach channelized and disrupted.

Parameter	Optimal	Categ Suboptimal	Marginal	Poor
6. Sediment Deposition	Little or no enlargement 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 obstruction, constriction, and bends; moderate deposition of pools prevalent.	Heavy deposits of fine material, increased bar development; more than 50% of the bottom changing frequently; pools almost absent due to substantial sediment deposition.
7. Frequency of Riffles  SCORE	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.  10 9 8 7 6	Generally all flat water or shallow riffles; poor habitat; distance between riffles divided by the width of the stream is between ratio >25.  5 4 3 2
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.  10 9 8 7 6	Very little water in channel and mostly present as standing pools.
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.  5 4 3 2 1
10. Bank Vegetative Protection	More than 90% of the streambank surface covered by vegetation.	70-90% of the stream- bank surface covered by vegetation.	50-70% of the stream- bank surfaces covered by vegetation.	Less than 50% of the streambank surface covered by vegetation.
SCORE _/ 4_	20 19 18 17 16	15 14 13 12 11	10 9 8 7 6	5 4 3 2 1
Grazing or Other     Disruptive Pressure  SCORE//	Vegetative disruption, through grazing or mowing, minimal or not evident; almost all plants allowed to grow naturally.  20 19 18 17 16	Disruption evident but not affecting full plant growth potential to any great extent; more than one-half of the potential plant stubble height remaining.  15 14 13 12 11	Disruption obvious; patches of bare soil or closely cropped vegetation common; less than one-half of the potential plant stubble height remaining.  10 9 8 7 6	Disruption of vegetation is very high; vegetation has been removed to 2 inches or less in average stubble height.  5 4 3 2 1
12. Riparian Vegetative Zone Width	Width of riparian zone >18 meters; human activities (i.e., parking lots, roadbeds, clear- cuts, lawns, or crops)	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.

WATERBODY NAME	Unnamed Tributary to 1	East Barch White Clay	Creek STR CODE/RM	11 02040205000608
	MP-9		N_39.85732 N 7	
DATE 5/19/202				
AQUATIC ECOREGIO			Chester	
	SC, KSC, SM			
	BY Aaron S. Clauses	PLD	DIECIE	/RUN PREVALENCE
Habitat	1 Moore Canases	Categ		/KON FREVALENCE
Parameter	Optimal	Suboptimal	Marginal	Poor
1. Instream Cover (Fish)  SCORE 12	Greater than 50% mix of boulder, cobble, sub- merged 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 is obvious.
An instruction and	20 19 18 17 16	15 14 13 (12) 11	10 9 8 7 6	5 4 3 2 1
2. Epifaunal Substrate  Substrate  SCORE	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 two 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 two times the stream width; gravel or large boulders and bedrock prevalent; some cobble present.  10 9 8 7 6	Riffles or run virtually nonexistent; large boulders and bedrock prevalent; cobble lacking.
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
4. Velocity/Depth Regimes  17  SCORE	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).  15 14 13 12 11	Only 2 of the 4 habitat regimes present (if fast-shallow or slow-shallow are missing, score lower than if missing other regimes).  10 9 8 7 6	Dominated by 1 velocity/depth regime (usually slow-deep).
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 past 20 yr) may be present, but recent channelization is not present.  15 14 (13) 12 11	New embankments present on both banks; and 40-80% of stream reach channelized and disrupted.	Banks shored gabion or cement; over 80% of the stream reach channelized and disrupted.
Total Side 176				

		Cate	egory	RUN PREVALENCE
Parameter	Optimal	Suboptimal	Marginal	Poor
6. Sediment Deposition	Little or no enlargement 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 obstruction, constriction, and bends; moderate deposition of pools prevalent.	Heavy deposits of fir
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; pool habitat; distance between riffles divide by the width of the stream is between ratio >25.
8. Channel Flow Status  SCORE 20	Water reaches base of both lower banks and minimal amount of channel substrate is exposed.  20 19 18 17 16	Water fills > 75% of the available channel; or <25% of channel substrate is exposed.  15 14 13 12 11	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.
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.
10. Bank Vegetative Protection	More than 90% of the streambank surface covered by vegetation.	70-90% of the stream- bank surface covered by vegetation.	50-70% of the streambank surfaces covered by vegetation.	Less than 50% of the streambank surface covered by vegetation.
11. Grazing or Other Disruptive Pressure	Vegetative disruption, through grazing or mowing, 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.  15 14 13 12 11	potential plant stubble height remaining.	5 4 3 2 1 Disruption of vegetation is very high; vegetation has been removed to 2 inches or less in average stubble height.
Riparian Vegetative Zone Width	Width of riparian zone >18 meters; human activities (i.e., parking	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.

STATION NUMBER   MP   O	WATERBODY NAME	Unnamed Tributary to	East-Branch White CA	4 Crek STR CODE/RM	02040205000608
AQUATIC ECOREGION				Comments of the Comments of th	
AQUATIC ECOREGION  INVESTIGATORS  A SC. H.S. SM  FORM COMPLETED BY A D. Causer PLD  RIFFLE/RUN PREVALENCE  Habitat Parameter  Optimal  Greater than 50% mix of boulder, cobble, and cobble, or other stable habitat; adequate habitat.  SCORE  20 19 18 17 16 15 14 13 12 11 10 9 8 7 6 5 4 3 2 1  SCORE  20 19 18 17 16 15 14 13 12 11 10 9 8 7 6 5 4 3 2 1  Gravel, cobble, and boulder particles are 0-25% 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  Gravel, cobble, and boulder particles are 0-25% 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  Gravel, cobble, and boulder particles are 0-25% 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  Gravel, cobble, and boulder particles are 0-25% 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  Gravel, cobble, and boulder particles are of bridge abutments; 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  Gravel, cobble, and boulder particles are of bridge abutments; 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  SCORE  20 19 18 17 16 15 14 13 12 11 10 9 8 7 6 5 4 3 2 1  SCORE  20 19 18 17 16 15 14 13 12 11 10 9 8 7 6 5 4 3 2 1  SCORE  30 19 18 17 16 15 14 13 12 11 10 9 8 7 6 5 4 3 2 1  SCORE  31 Fine sediment.  SCORE  32 19 18 17 16 15 14 13 12 11 10 9 8 7 6 5 4 3 2 1  SCORE  32 19 18 17 16 15 14 13 12 11 10 9 8 7 6 5 4 3 2 1  SCORE  34 Velocity/Depth Regimes present (slow-deep, slow-shallow), fast-deep, slow-shallow), fast-deep, slow-shallow, fast	DATE 5/19/202	2			
Habitat Parameter Optimal Suboptimal Optimal					
Habitat Parameter Optimal Suboptimal Optimal	INVESTIGATORS F	ASC. KSC.SM	13.1		
Habitat   Parameter   Optimal   Suboptimal   Discovery   Clist   Optimal   Suboptimal   Discovery   Clist   Optimal   Optima			TET PLD	DIEE! E	PUN PREVALENCE
Parameter Optimal Suboptimal Marginal Poor  1. Instream Cover (Fish)  Greater than 50% mix of boulder, cobble, or other stable habitat, adequate habitat, adequate habitat.  SCORE 19 18 17 16 15 14 13 12 11 10 9 8 7 6 5 4 3 2 1  Gravel, cobble, and boulder stream and length extends two imes the width of stream; aboundance of cobble.  SCORE 20 19 18 17 16 15 14 13 12 11 10 9 8 7 6 5 4 3 2 1  Gravel, cobble, and boulder particles are 0-25% 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  Gravel, cobble, and boulder particles are 0-25% 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  Gravel, cobble, and boulder particles are 50-75% 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  Gravel, cobble, and boulder particles are 50-75% 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  Gravel, cobble, and boulder particles are 50-75% 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  Fregimes present (slow-deep, fast-shallow).  SCORE 20 19 18 17 16 15 14 13 12 11 10 9 8 7 6 5 4 3 2 1  Fregimes present (slow-deep, fast-shallow).  SCORE 20 19 18 17 16 15 14 13 12 11 10 9 8 7 6 5 4 3 2 1  Fregimes present (glow-deep, fast-shallow).  SCORE 20 19 18 17 16 15 14 13 12 11 10 9 8 7 6 5 4 3 2 1  Fregimes present (glow-deep, fast-shallow).  SCORE 20 19 18 17 16 15 14 13 12 11 10 9 8 7 6 5 4 3 2 1  Fregimes present (glow-deep, fast-shallow).  SCORE 20 19 18 17 16 15 14 13 12 11 10 9 8 7 6 5 4 3 2 1  Fregimes present (glow-deep, fast-shallow).  Fregi	A STATE OF THE STA				MONTREVALENCE
boulder, cobble, submerged logs, undereated habitat; adequate habitat; adequate habitat; adequate habitat, habitat availability less than desirable.  20 19 18 17 16 15 14 13 12 11 10 9 8 7 6 5 4 3 2 1 1 10 9 8 7 6 5 4 3 2 1 1 10 9 8 7 6 5 4 3 2 1 1 1 10 9 8 7 6 5 4 3 2 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1	Parameter	Optimal			Poor
Well developed riffle and run, riffle is as wide as stream and length extends two times the width of stream; abundance of cobble.   Score   Quip   18   17   16   15   14   13   12   11   10   9   8   7   6   5   4   3   2   1   10   9   8	(Fish)	boulder, cobble, sub- merged logs, undercut banks, or other stable habitat.	cobble, or other stable habitat; adequate habitat.	cobble, or other stable habitat; habitat avail- ability less than desirable.	boulder, cobble, or other stable habitat; lack of habitat is obvious.
Substrate    run, riffle is as wide as stream and length extends two times the width of stream; abundance of cobble.   SCORE   20   19   18   17   16   15   14   13   12   11   10   9   8   7   6   5   4   3   2   1   10   9   8   7   6   5					
boulder particles are 0-25% 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  4. Velocity/Depth Regimes Present (slow-deep, slow-shallow, fast-deep, fast-shallow).  SCORE 20 19 18 17 16 15 14 13 12 11 10 9 8 7 6 5 4 3 2 1  5. Channel Alteration No channelization or dredging present.  SCORE 20 19 18 17 16 15 14 13 12 11 10 9 8 7 6 5 4 3 2 1  SCORE 20 19 18 17 16 15 14 13 12 11 10 9 8 7 6 5 4 3 2 1  SCORE 20 19 18 17 16 15 14 13 12 11 10 9 8 7 6 5 4 3 2 1  SCORE 20 19 18 17 16 15 14 13 12 11 10 9 8 7 6 5 4 3 2 1  SCORE 20 19 18 17 16 15 14 13 12 11 10 9 8 7 6 5 4 3 2 1  SCORE 20 19 18 17 16 15 14 13 12 11 10 9 8 7 6 5 4 3 2 1  SCORE 20 19 18 17 16 15 14 13 12 11 10 9 8 7 6 5 4 3 2 1  SCORE 20 19 18 17 16 15 14 13 12 11 10 9 8 7 6 5 4 3 2 1	Substrate	run, riffle is as wide as stream and length extends two times the width of stream; abundance of cobble.	stream but length is less than two times width; abundance of cobble; boulders and gravel common.	ing; riffle not as wide as stream and its length is less than two times the stream width; gravel or large boulders and bed- rock prevalent; some cobble present.	nonexistent; large boulders and bedrock prevalent; cobble lacking.
4. Velocity/Depth Regimes  All four velocity/depth regimes present (slow-deep, slow-shallow, fast-deep, fast-shallow).  SCORE  20 19 18 17 16 15 14 13 12 11  Only 2 of the 4 habitat regimes present (if fast-shallow is missing, score lower than if missing other regimes).  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 past 20 yr) may be present, but recent channelization is not present.  SCORE  20 19 18 17 16 15 14 13 12 11 10 9 8 7 6 5 4 3 2 1	10	boulder particles are 0-25% surrounded by fine sediment.	boulder particles are 25-50% surrounded by fine sediment.	boulder particles are 50-75% surrounded by fine sediment.	boulder particles are more than 75% surrounded by fine sediment.
regimes present (slow-deep, slow-shallow, fast-deep, fast-shallow).  SCORE			15 14 13 12 11	10 9 8 7 6	5 4 3 2 1
dredging present.  present, usually in areas of bridge abutments; evidence of past channelization, i.e., dredging, (greater than past 20 yr) may be present, but recent channelization is not present.  SCORE	Regimes	regimes present (slow-deep, slow-shallow, fast-deep, fast-shallow).	present (if fast-shallow is missing, score lower than if missing other regimes).	regimes present (if fast- shallow or slow-shallow are missing, score lower than if missing other regimes).	1 velocity/depth regime (usually slow- deep).
20 10 10 17 10 10 12 11 10 9 6 7 6 5 4 5 2 1		dredging present.	present, usually in areas of bridge abutments; evidence of past channelization, i.e., dredging, (greater than past 20 yr) may be present, but recent channelization is not present.	present on both banks; and 40-80% of stream reach channelized and disrupted.	or cement; over 80% of the stream reach channelized and disrupted.
Total Side 1 69	00	20 19 18 17 16	15/ 14 13 12 11	10 9 8 7 6	5 4 3 2 1

Habitat Parameter	Optimal	Categ Suboptimal	Marginal	Poor
6. Sediment Deposition  SCORE	Little or no enlargement 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 obstruction, constriction, and bends; moderate deposition of pools prevalent.  10 9 8 7 6	Heavy deposits of fine material, increased bar development; more than 50% of the bottom changing frequently; pools almost absent due to substantial sediment deposition.
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 divide by the width of the stream is between ratio >25.  5 4 3 2
8. Channel Flow Status  SCORE	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.
9. Condition of Banks SCORE 17	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.
10. Bank Vegetative Protection	More than 90% of the streambank surface covered by vegetation.	70-90% of the streambank surface covered by vegetation.	50-70% of the streambank surfaces covered by vegetation.	Less than 50% of the streambank surface covered by vegetation.
11. Grazing or Other Disruptive Pressure	Vegetative disruption, through grazing or mowing, 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 vegetation is very high; vegetation has been removed to 2 inches or less in average stubble height.
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.

WATERBODY NAME	Unnoved Tributary to	East Branch white Cl	OY Creek STR CODE/RM	02040205000609
STATION NUMBER			39.85854 N 75	
DATE 5/19/20	22	TIME 12:		
AQUATIC ECOREGIO			Chester	
INVESTIGATORS A	SC. KSC, SM			
	BY ANTON S. Chrise	es PLD	RIFFLE	RUN PREVALENCE
Habitat		Categ		
Parameter	Optimal	Suboptimal	Marginal	Poor
Instream Cover (Fish)  SCORE 3	Greater than 50% mix of boulder, cobble, sub-merged 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 is obvious.
SCORE	20 19 18 17 16	15 14 (13) 12 11	10 9 8 7 6	5 4 3 2 1
2. Epifaunal Substrate  SCORE 3	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 two 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 two times the stream width; gravel or large boulders and bedrock prevalent; some cobble present.  10 9 8 7 6	Riffles or run virtually nonexistent; large boulders and bedrock prevalent; cobble lacking.
3. Embeddedness  SCORE	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.
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 habitat regimes present (if fast-shallow or slow-shallow are missing, score lower than if missing other regimes).  10 9 8 7 6	Dominated by 1 velocity/depth regime (usually slow-deep).
5. Channel Alteration  SCORE 13	No channelization or dredging present.	Some channelization present, usually in areas of bridge abutments; evidence of past channelization, i.e., dredging, (greater than past 20 yr) may be present, but recent channelization is not present.  15 14 (3) 12 11	New embankments present on both banks; and 40-80% of stream reach channelized and disrupted.	Banks shored gabion or cement; over 80% of the stream reach channelized and disrupted.
Total Side 1 67	20 10 10 11 10	10 14 (9) 12 11	10 9 0 1 6	0 4 3 2 1

Parameter	Optimal	Categ		Door
Parameter		Suboptimal	Marginal	Poor
6. Sediment Deposition	Little or no enlargement 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 obstruction, constriction, and bends; moderate deposition of pools prevalent.  10 9 8 7 6	Heavy deposits of fin material, increased bar development; more than 50% of the bottom changing frequently; pools almost absent due to substantial sediment deposition.
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.  10 9 8 7 6	Generally all flat water or shallow riffles; pool habitat; distance between riffles divide by the width of the stream is between ratio >25.  5 4 3 2
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.
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 slope: 60-100% of bank has erosional scars.
10. Bank Vegetative Protection	More than 90% of the streambank surface covered by vegetation.	70-90% of the streambank surface covered by vegetation.	50-70% of the streambank surfaces covered by vegetation.	5 4 3 2 Less than 50% of the streambank surface covered by vegetation.
SCORE	20 19 18 17 16	15 14 13 12 (11)	10 9 8 7 6	5 4 3 2
11. Grazing or Other Disruptive Pressure	Vegetative disruption, through grazing or mowing, minimal or not evident; almost all plants allowed to grow naturally.  20 19 18 17 16	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 vegetation is very high; vegetation has been removed to 2 inches or less in average stubble height.
12. Riparian Vegetative Zone Width	Width of riparian zone >18 meters; human activities (i.e., parking lots, roadbeds, clear-	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

	240.62	TAT ASSESSIVE	77.7 7	
WATERBODY NAME	Unnamed Tributary to	East Branch White Cl	Ly Creek STR CODE/RN	11 02040205060611
STATION NUMBER _	MP-12	LOCATION	39.87174 N 75	,8015 W
DATE 5/19/200	12	TIME 2	: 45 pm	
AQUATIC ECOREGIO	N		Chester	
INVESTIGATORS _A	SC. KSC, SM			
	BY Aaron S. Claus	ESPLO	RIFFLE	RUN PREVALENCE
Habitat		Categ	10/10/2	.,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,
Parameter	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 is obvious.
SCORE/_	20 19 18 (7) 16	15 14 13 12 11	10 9 8 7 6	5 4 3 2 1
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 two 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 two 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 15	20 19 18 17 16	15 14 (13) 12 11	10 9 8 7 6	5 4 3 2 1
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
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 habitat regimes present (if fast-shallow or slow-shallow are missing, score lower than if missing other regimes).  10 9 8 7 6	Dominated by 1 velocity/depth regime (usually slow- deep).
2011	100			
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 past 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 gabion or cement; over 80% of the stream reach channelized and disrupted.
Total Side 1	20 10 10 11 10	10 14 (02 12 11	10 9 0 7 6	3 4 3 2 1
Total Side I				

Habitat Parameter	Optimal	Categ Suboptimal	Marginal	Poor
6. Sediment Deposition	Little or no enlargement 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 obstruction, constriction, and bends; moderate deposition of pools prevalent.	Heavy deposits of fin material, increased bar development; more than 50% of the bottom changing frequently; pools almost absent due to substantial sediment deposition.
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.  10 9 8 7 6	Generally all flat water or shallow riffles; poor habitat; distance between riffles divide by the width of the stream is between ratio >25.  5 4 3 2
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.
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 slope 60-100% of bank has erosional scars.  5 4 3 2
10. Bank Vegetative Protection	More than 90% of the streambank surface covered by vegetation.	70-90% of the stream- bank surface covered by vegetation.	50-70% of the streambank surfaces covered by vegetation.	Less than 50% of the streambank surface covered by vegetation.
11. Grazing or Other Disruptive Pressure	Vegetative disruption, through grazing or mowing, 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.	5 4 3 2 Disruption of vegetation is very high; vegetation has been removed to 2 inches or less in average stubble height.  5 4 3 2
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.

## APPENDIX E FLOWING WATER BODY FIELD DATA FORMS



# COMMONWEALTH OF PENNSYLVANIA DEPARTMENT OF ENVIRONMENTAL PROTECTION BUREAU OF CLEAN WATER

#### FLOWING WATERBODY FIELD DATA FORM

Date-Time Exam 20040212-0	4			double IIII	nes are required	database em	ries. Other fields	are optiona	al for pers	onal us	e.)	
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Secondary	Station ID	MI	0-1	U	EBWC	Surve	eyed by: Aa	son S.		SJ.	PLD	
*Date as YYYYM	MMDD, time a	s military tir	me, and your	initials uni	quely identify th	e stream reach		SWP Wat	and the same of th			
					Survey T	ype	_					
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					Locatio	n						
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Location Desc	ription:											
					Landus	e						
Residential:	3.5%	Comme	rcial:	%	Industrial:	%	Cropland:	%	Pasture	: -	%	
Abd. Mining: Landuse Com	%	Old Fiel	ds:	%	Forest:	29.7%	Other:	%	A CONTRACTOR OF THE PARTY OF TH		\$ U.S.	
			Field N	leter Per	Water Qua							
	-4	Field Meter Readings: Bottle Notes (N-normal, MNF-metals non-										
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Habitat Impairment Thresholds  Riff(Run: embeddedness or #3 Glide/Pool: substrate character + #6 Sediment Deposition = 24 or ss (20 or less for warm water, low gradient streams)  Condition of Banks +#10 Bank Vegetation = 24 or less (20 or less for warm water, low gradient reams)  2   Stal habitat score 140 or less for forested, cold water, high gradient streams (120 or less for warm ater, low gradient streams)  3   Stal habitat score 140 or less for forested, cold water, high gradient streams (120 or less for warm ater, low gradient streams)  3   Second Condition   Second Cond	Macroinvertebrate sampling	
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SRIFI/Run: embeddedness or #3 Glide/Pool: substrate character + #6 Sediment Deposition = 24 or ses (20 or less for warm water, low gradient streams)  Condition of Banks + #10 Bank Vegetation = 24 or less (20 or less for warm water, low gradient reams  Condition of Banks + #10 Bank Vegetation = 24 or less (20 or less for warm water, low gradient reams)  Condition of Banks + #10 Bank Vegetation = 24 or less (20 or less for warm water, low gradient reams)  Condition of Banks + #10 Bank Vegetation = 24 or less (20 or less for warm water, low gradient reams)  Condition of Banks + #10 Bank Vegetation = 24 or less (20 or less for warm water, low gradient reams)  Condition of Banks + #10 Bank Vegetation = 24 or less (20 or less for warm water, low gradient reams)  Condition of Banks + #10 Bank Vegetation = 24 or less (20 or less for warm water, low gradient reams)  Condition of Banks + #10 Bank Vegetation = 24 or less (20 or less for warm water, low gradient reams)  Condition of Banks + #10 Bank Vegetation = 24 or less (20 or less for warm water, low gradient reams)  Condition of Banks + #10 Bank Vegetation = 24 or less (20 or less for warm water, low gradient reams)  Special Condition  Special Condition  Special Condition  Special Condition  Special Condition of Banks + #10 Bank Vegetation = 24 or less (20 or less for warm water, low gradient reams (120 or less for warm water, low gradient reams)  Special Condition of Banks + #10 Bank Vegetation = 24 or less (20 or less for warm water, low gradient reams (120 or less for warm water, low gradient reams)  Special Condition  Special Condition  Special Condition  Special Condition of Banks + #10		
Special Condition  Special Condi		Metric Score
otal habitat score 140 or less for forested, cold water, high gradient streams (120 or less for warm ater, low gradient streams)  Special Condition  Special Condition  See this block to describe conditions that justify attainment/impairment of stations with IBI score <63 and >53.  Common descriptors: Water Odors - none normal sewage petroleum chemical other, Water Surface Oils - none slick sheen globs flex unbidliby clear, slight, turbid openue, NPS Pollution - no evidence, some potential, obvious: Sediment Odors - none normal sewage	#3 Riff/Run: embeddedness <u>or</u> #3 Glide/Pool: substrate character + #6 Sediment Deposition = 24 or less for warm water, low gradient streams)	13
abitat Comments:  Special Condition  se this block to describe conditions that justify attainment/impairment of stations with IBI score <63 and >53.  Common descriptors: Water Odors - none normal sewage petroleum chemical other, Water Surface Oils - none slick sheen globs flee uphidity clear, slight, turbid openue, NPS Pollution - no evidence, some potential obvious: Sediment Odors - none normal sewage	#9 Condition of Banks + #10 Bank Vegetation = 24 or less (20 or less for warm water, low gradient streams	21
Special Condition  se this block to describe conditions that justify attainment/impairment of stations with IBI score <63 and >53.  Common descriptors: Water Odors - none normal sewage petroleum chemical other; Water Surface Oils - none slick sheen globs flee uphidity - clear slight turbid opaque. NPS Pollution - no evidence, some potential obvious: Sediment Odors - none normal sewage	Total habitat score 140 or less for forested, cold water, high gradient streams (120 or less for warm water, low gradient streams)	151
se this block to describe conditions that justify attainment/impairment of stations with IBI score <63 and >53.  Common descriptors: Water Odors - none normal sewage petroleum chemical other, Water Surface Oils - none slick sheen globs flet unbid opaque. NPS Pollution - no evidence some potential obvious. Sediment Odors - none normal sewage	Habitat Comments:	
se this block to describe conditions that justify attainment/impairment of stations with IBI score <63 and >53.  Common descriptors: Water Odors - none normal sewage petroleum chemical other, Water Surface Oils - none slick sheen globs flet unbid opaque. NPS Pollution - no evidence some potential obvious. Sediment Odors - none normal sewage		
se this block to describe conditions that justify attainment/impairment of stations with IBI score <63 and >53.  Common descriptors: Water Odors - none normal sewage petroleum chemical other, Water Surface Oils - none slick sheen globs flet unbid opaque. NPS Pollution - no evidence some potential obvious. Sediment Odors - none normal sewage		
se this block to describe conditions that justify attainment/impairment of stations with IBI score <63 and >53.  Common descriptors: Water Odors - none normal sewage petroleum chemical other, Water Surface Oils - none slick sheen globs flet unbid opaque. NPS Pollution - no evidence some potential obvious. Sediment Odors - none normal sewage		
Common descriptors: Water Odors - none normal sewage petroleum chemical other, Water Surface Oils - none slick sheen globs fleat	Special Condition	
Common descriptors: Water Odors - none normal sewage petroleum chemical other, Water Surface Oils - none slick sheen globs fleat	Use this block to describe conditions that justify attainment/impairment of stations with IBI so	ore <63 and >53.
Common descriptors: Water Odors - none normal sewage petroleum chemical other, Water Surface Oils - none slick sheen globs fled		
Common descriptors: Water Odors - none normal sewage petroleum chemical other, Water Surface Oils - none slick sheen globs fled		
urbidity - clear slight turbid opaque: NPS Pollution - no evidence, some potential obvious: Sediment Odors - none normal sewage		
urbidity - clear slight turbid opaque: NPS Pollution - no evidence, some potential obvious: Sediment Odors - none normal sewage		
irbidity - clear slight furbid opaque; NPS Pollution - no evidence some potential obvious, Sediment Odors - none normal sewage	Common descriptors: Water Odors - none normal sewage petroleum chemical other, Water Surface Oils - none	slick sheen globs fleck
etroleum chemical anaerobic; Sediment Oils - absent slight moderate profuse; Deposits - none sludge sawdust paper fiber sand relict st her. Are the undersides of stones deeply embedded black?	petroleum chemical anaerobic: Sediment Oils - absent slight moderate profuse; Deposits - none sludge sawdust par	per fiber sand relict she



# COMMONWEALTH OF PENNSYLVANIA DEPARTMENT OF ENVIRONMENTAL PROTECTION BUREAU OF CLEAN WATER

#### FLOWING WATERBODY FIELD DATA FORM

(In	formation te-Time-	and comme						entries. Other fie		al for pers	onal use.)
	Exam	ple	2022	0519	1041	ASC	VV	atershed Code (HUC)	Stream	Code	Ch. 93 Use
20	040212-0	312-XYZ	Date		Time	Initials	02	040205	0204020	5000 136	EV
Sec	condary S	Station ID	MP.	-2		VEBW	C Sui	rveyed by:	won S. (		r, PLD
*Date	as YYYYM	MDD, time a	s military tir	ne, and your	initials uni	quely identify t	he stream rea		SWP Wa		
						Survey '	Туре				
(1) Ba	asin Survey egradation	r, (2) Cause [Special Prote	Effect, (3) ection], (8)	Fish Tissue Toxics, (10) (	, (4) Instrea Use Attaina	am Comprehe ability, (11) WC	nsive Evaluat N, (12) Limes	ion [ICE], (5) Poir stone, (13) Low-gr	nt-of-First-Use, adient [Multiha	(6) SERA, bitat]	(7) 4
						Locati	on				
Cou	nty: C	hester		Municipa	ality: N	ew Gord	en Twp	Topo Quad:	Wes.	+ 60	ove
				CHESCHOOL STATE	•	Landu					
	dential:	2,3 %	Comme	1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1	%	Industrial:		% Cropland:	%	Pasture:	%
A COUNTY	Mining: use Comn	%	Old Fiel	ds:	%	Forest:	29.9	% Other:	%		
				Field I	Meter Rea	Water Quadings:	uality	Bottle Notes	(N-normal N	NE-metal	e non-
	Collec		mn (0C)	DO	1	SPC	Alkalinity	filtered, MF-n			
1.	seque	100# 11	emp (°C) 14.8	(mg/L)	7,03	(umhos)	mg/l	indicate)			
2.				92,29		26/11					
3.						0.2					
Wate	er Appea	rance/Od	or Comm	ents: (^se	ee botton	n of back fo	r common o	descriptors)			
S	Linit	1=0.2									
						Findin	gs				
Imp	Not aired:	b	npaired iology?		Impaire habitat	?	loca	mpact alized?	desig	evaluate nated use	?
reeva	ion comr iluations;	nents. Des special co	cribe the	rationale forments:	or your "I etc.:	Not Impaired	i" or "Impai	red" decision;	reach location	ons for us	e designation
		36.6		al Habitat		155					
								*			

Macroinvertebrate sampling	
Sampling protocol: Std. kick screen:   D-frame:  Other:  protocol?:	
Comments/Abundance Notes:	
Habitat Impairment Thresholds	Metric Score
#3 Riff/Run: embeddedness <u>or</u> #3 Glide/Pool: substrate character + #6 Sediment Deposition = 24 or less (20 or less for warm water, low gradient streams)	21
#9 Condition of Banks + #10 Bank Vegetation = 24 or less (20 or less for warm water, low gradient streams	21
Total habitat score 140 or less for forested, cold water, high gradient streams (120 or less for warm water, low gradient streams)	155
Habitat Comments:	
Special Condition	
Use this block to describe conditions that justify attainment/impairment of stations with IBI s	core <63 and >53.
^Common descriptors: Water Odors - none normal sewage petroleum chemical other; Water Surface Oils - none Turbidity - clear slight turbid opaque; NPS Pollution - no evidence some potential obvious; Sediment Odors - none petroleum chemical anaerobic, Sediment Oils - absent slight moderate profuse; Deposits - none sludge sawdust pa	normal sewage



# COMMONWEALTH OF PENNSYLVANIA DEPARTMENT OF ENVIRONMENTAL PROTECTION BUREAU OF CLEAN WATER

#### FLOWING WATERBODY FIELD DATA FORM

(In	formation	and comme	ents for field	s boxed in	double lin	es are require	ed database				al for perso	onal use.	)
	te-Time- Examp	ole	2022	.0519	1148	· ASC	W		ned Code UC)	Stream	Code	Ch. 93	Use
200	040212-0	312-XYZ	Date		Time	Initials	s 02	04 02	1.05	02040205	000605	EV	
Sec	ondary S	Station ID	MP-	-3		UEBW	C Su	rveye	d by: Aa	ron S.	Claus	er, P	40
*Date	as YYYYM	IMDD, time	as military tin	ne, and your	initials uni	quely identify	the stream rea	ich.		SWP Wat	tershed		
						Survey	Туре		-				
(1) Ba Antide	sin Survey gradation [	, (2) Cause Special Pro	/ Effect, (3) tection], (8) T	Fish Tissue, oxics, (10) U	(4) Instre Jse Attaina	am Comprehe ability, (11) WC	ensive Evaluat QN, (12) Limes	ion [IC stone, (	E], (5) Point- 13) Low-grad	of-First-Use, ient [Multihat	(6) SERA, bitat]	(7)	4
				9.		Locati	ion						
Cour	nty:	hest	05	Municipa	lity:	lest-Maste	porough Tup	Торо	Quad:	West	Grove	2	
Locat	ion Descr	iption:											
			-			Landu	ise						
- CONCRE	ential:	0.5 %			%	Industrial:		1000	Cropland:	%	Pasture:		%
Abd. I	Mining:	%	Old Field	ls:	%	Forest:	25.7	% C	Other:	%			
Cuno	py cover	. open (p	artly shaded		Meter Rea	Water Qu	uality	Dott	la Natas (N				
^	Collec	The second secon		DO	Teter Net	SPC	Alkalinity	filte	tle Notes (N red, MF-me	tals filtered	d, B-bac't	others	:
1.	sequer	ice# T	emp (°C)	(mg/L)	pH	(umhos)	mg/l	indi	cate)			1	
2.			1011	8409	7,22	479,0		+	-				
3.						0,2							
	r Appea linity		or Comm	ents: (^se	e botton	n of back fo	r common	descri	iptors)				
						Findin							
Impa	lot aired:	L	mpaired piology?		Impaire habitat	?	loca	mpact	,	design	evaluate nated use	?	
reeva	luations;	special co	ondition co	mments;	etc.:	Not Impaired	d" or "Impai	red" c	lecision; re	ach locatio	ns for us	e desigr	nation
IBI S		23.5		I Habitat		150							
	4		·										

MP-3

Macroinvertebrate sampling	
Sampling protocol: Std. kick screen:   D-frame:   Other:   protocol?:	
Comments/Abundance Notes:	
Habitat Impairment Thresholds	Metric Score
#3 Riff/Run: embeddedness or #3 Glide/Pool: substrate character + #6 Sediment Deposition = 24 or less (20 or less for warm water, low gradient streams)	16
#9 Condition of Banks + #10 Bank Vegetation = 24 or less (20 or less for warm water, low gradient streams	27
Total habitat score 140 or less for forested, cold water, high gradient streams (120 or less for warm water, low gradient streams)	150
Habitat Comments:	
Special Condition	
Use this block to describe conditions that justify attainment/impairment of stations with IBI so	core <63 and >53.
^Common descriptors: Water Odors - none normal sewage petroleum chemical other, Water Surface Oils - none Turbidity - clear slight turbid opaque; NPS Pollution - no evidence some potential obvious; Sediment Odors - none petroleum chemical anaerobic; Sediment Oils - absent slight moderate profuse; Deposits - none sludge sawdust parother. Are the undersides of stones deeply embedded black?	normal sewage



## COMMONWEALTH OF PENNSYLVANIA DEPARTMENT OF ENVIRONMENTAL PROTECTION BUREAU OF CLEAN WATER

#### FLOWING WATERBODY FIELD DATA FORM

Date-	The second second	minenta	TOT HEIGS	boxed in d	ouble lin	es are required	database en	tries. Other field:	s are optiona	ii ioi persona	ii use.)
Example 20040212-0312-XY		ls*	202205		225	· ASC	Mat	ershed Code (HUC)	Stream		h. 93 Use
20040	0212-0312-X	Z	Date	7	Time	Initials	020	40205	02040205	5000137	EV
Secon	ndary Station	ID	MP-	1		UEBWI	Surv	eyed by: A	von S. C	Clauses	PLD
*Date as	YYYYMMDD,	ime as m	nilitary time,	and your ir	nitials uni	quely identify the	e stream reach	1.	SWP Wat		
						Survey Ty	уре				
(1) Basin Antidegra	n Survey, (2) Cadation [Special	ause / Ef I Protecti	fect, (3) Fis on], (8) Tox	sh Tissue, ( ics, (10) Us	4) Instrea e Attaina	ability, (11) WQN	I, (12) Limesto	n [ICE], (5) Point- ne, (13) Low-grad	of-First-Use, lient [Multihab	(6) SERA, (7) itat]	4
-3-20/1		1	Total Control			Locatio	n				
County	Description:	tes	M	unicipal	ity:	ondon G	rove T	opo Quad:	West	Grove	2
Residen	tial:	0/, (	Cammoroli	-1.	0/ [	Landus				:	
Abd. Mir	000		Commercia Old Fields:		%	Industrial: Forest:	31.8 %		%	Pasture:	%
Canopy	cover: oper	partly	/ shaded	Field Me		THE RESIDENCE OF THE PERSON NAMED IN COLUMN 2 IN COLUM		Bottle Notes (N	-normal, M	NF-metals r	non-
	sequence #			DO (mg/L)	рН	pH (umhos) mg		filtered, MF-me indicate)	tals filtered	, B-bac't, O	thers:
1.		1.0	,7	11.01	7,44	2383					
/				110,42	11	4771					
3.											
3.	Appearance	Ool	Commen	its: (^see	botton	of back for o		escriptors)			
3. Water A	unity=	0.1				Finding	s				
Sol	ed:	Impa	aired		Impaire	Findings	s Is implicable	pact D	design	evaluate nated use?	
Not Impaire	ed:	Impa biolo Descri	aired ogy?	ionale for	Impaire habitat	Findings	s Is implicable	pact	design	ated use?	esignation
Not Impaire	ed:	Impa biolo Descri	aired ogy? lbe the rat ition com	ionale for	Impaire habitat' your "N	Findings	s Is implicable	pact D	design	ated use?	esignation

Macroinvertebrate sampling	
Sampling protocol: Std. kick screen: D-frame: Other: protocol?:	
Comments/Abundance Notes:	
Habitat Impairment Thresholds	Metric Score
#3 Riff/Run: embeddedness or #3 Glide/Pool: substrate character + #6 Sediment Deposition = 24 or less (20 or less for warm water, low gradient streams)	18
#9 Condition of Banks + #10 Bank Vegetation = 24 or less (20 or less for warm water, low gradient streams	22
Total habitat score 140 or less for forested, cold water, high gradient streams (120 or less for warm water, low gradient streams)	138
Habitat Comments:  Special Condition	462 and 552
^Common descriptors: Water Odors - none normal sewage petroleum chemical other, Water Surface Oils - none strubidity - clear slight turbid opaque, NPS Pollution - no evidence some potential obvious; Sediment Odors - none in petroleum chemical anaerobic, Sediment Oils - absent slight moderate profuse; Deposits - none sludge sawdust pap	slick sheen globs flecks;

MP-4



## COMMONWEALTH OF PENNSYLVANIA DEPARTMENT OF ENVIRONMENTAL PROTECTION BUREAU OF CLEAN WATER

#### FLOWING WATERBODY FIELD DATA FORM

(In	formation	and comme	ents for field	ds boxed in	double lin	es are requir	ed database	entri	ies. Other fields	are option	al for pers	onal use	e.)
Da	te-Time- Examp	Initials*		0519		· , AS	V	Vater	shed Code (HUC)	Stream	W. C. Control		3 Use
20	040212-0	312-XYZ	Date		Time /	1.14 Initials	s 0°	20'	4.0205	040205	000138	E	/
Sec	ondary S	Station ID	Mp-	-5		UEB	WC SI	urve	yed by: Aa	ron S. C	lause	s, P	LD
*Date	as YYYYM	IMDD, time a	as military tin	ne, and your	initials uni	quely identify	the stream re	each.		SWP Wat			
						Survey	Туре			,			
(1) Ba Antide	sin Survey gradation [	r, (2) Cause Special Prot	/ Effect, (3) ection], (8) T	Fish Tissue, Toxics, (10) U	, (4) Instrea Jse Attaina	am Com <mark>pre</mark> he bility, (11) WC	nsive Evalua N, (12) Lime	ation   estone	[ICE], (5) Point-0 e, (13) Low-grad	of-First-Use, ient [Multihat	(6) SERA, pitat]	(7)	4
						Locati	on						
Cou	nty: C	heste	5	Municipa	ality:	est Marl	borough	To	po Quad:	Lost	Gro	ve	
Locat	ion Descr	iption:					J						
		100				Landu	ise						
	lential:	0.04%	THE RESERVE OF THE PERSON NAMED IN			Industrial:		%	Cropland:	%	Pasture:	STATE OF THE PERSON NAMED IN	%
	Mining:	nents: S +			%	Forest:	34.2	%	Other:	%			
Cano	py cover	: open pa	artly shade	d mostly s	shaded for	ully shaded Water Qu	ıality						
				Field N	Meter Rea		adiity	В	ottle Notes (N	normal M	NF-metal	e non-	
	Collec	4 5 10 5 10 10 10 10 10 10 10 10 10 10 10 10 10	(0.0)	DO		SPC	Alkalinity mg/l	/ fil	tered, MF-me				
1.	sequer	ice# I	emp (°C)	(mg/L)		7,42 167,1		in	dicate)				
2.			10.1	116.2	1112	16/11		1					
3.						0.1							
Wate	r Appea	rance/Od	or Comm	ents: (^se	e botton	of back fo	r common	des	criptors)				
Sa	linity	=0.1											
	,					Findin	gs						
Imp	lot aired:	b	mpaired piology?		Impaire habitat	?	loc	impa calize	d?	design	evaluate nated use	?	
reeva	ion comr luations;	nents. Des special co	ondition co	rationale fo mments;	or your "I etc.:	Not Impaired	d" or "Impa	aired	" decision; re	ach locatio	ns for us	e desig	nation
IBIS	core:	48.5	Tota	al Habitat	Score:	196							
			,	10									

MP-5

Macroinvertebrate sampling	
Sampling protocol: Std. kick screen: D-frame: X Other: protocol?:	
Comments/Abundance Notes:	
	Matric On the
Habitat Impairment Thresholds	Metric Score
#3 Riff/Run: embeddedness <u>or</u> #3 Glide/Pool: substrate character + #6 Sediment Deposition = 24 or less (20 or less for warm water, low gradient streams)	31
#9 Condition of Banks + #10 Bank Vegetation = 24 or less (20 or less for warm water, low gradient streams	29
Total habitat score 140 or less for forested, cold water, high gradient streams (120 or less for warm water, low gradient streams)	196
Habitat Comments:	
Special Condition	
Use this block to describe conditions that justify attainment/impairment of stations with IBI so	core <63 and >53.
^Common descriptors: Water Odors - none normal sewage petroleum chemical other; Water Surface Oils - none state of turbidity - clear slight turbid opaque; NPS Pollution - no evidence some potential obvious; Sediment Odors - none spetroleum chemical anaerobic; Sediment Oils - absent slight moderate profuse; Deposits - none sludge sawdust papother. Are the undersides of stones deeply embedded black?	normal sewage



# COMMONWEALTH OF PENNSYLVANIA DEPARTMENT OF ENVIRONMENTAL PROTECTION BUREAU OF CLEAN WATER

#### FLOWING WATERBODY FIELD DATA FORM

		and comme	its for fiel	ds boxed in	double lir	nes are require		entries. Other		are optiona	for perso	nal us	e.)
Example 20040212-0312-XY			2022	.0519	13:47	· ASC	Wa	tershed C (HUC)	ode	Stream	Code	Ch. 9	3 Use
200	040212-03	312-XYZ	Date		Time	Initials	020	40205		0204020	5000606	E	V
Sec	ondary S	tation ID	MP	-6		LIEBU	1000	veyed by:		on S. C	lauses	· P	D
'Date a	as YYYYMI	MDD, time a	s military ti	me, and you	r initials un	iquely identify t	he stream rea	ch.	100	SWP Wat			10
						Survey	Туре		_				
1) Bas Antide	sin Survey, gradation [S	, (2) Cause / Special Prote	Effect, (3) ection], (8)	Fish Tissue Toxics, (10)	, (4) Instre Use Attain	am Comprehe ability, (11) WC	nsive Evaluati N, (12) Limes	on [ICE], (5) tone, (13) Lov	Point-o v-gradi	f-First-Use, ( ent [Multihab	(6) SERA, itat]	(7)	4
						Locati	on -						-
Coun	ity: C	heste	5	Municip	ality:	Jest Mar	lborough	Topo Qua	d:	West	Gm	Ve.	
_ocati	on Descri	ption:					Tw	P					
						Landu	se						
Reside	ential:	0.1 %	Comme	ercial:	%	Industrial:		% Croplan	d:	%	Pasture:	10	9/
	Mining:	ments: Str	Old Fiel		%	Forest:	29.0	LONG STREET		%	T dottalo.		70
	15500			Field	Meter Rea	Water Quadings:	lality	Bottle Not	es (N.	normal M	NE-motals	non	
J.	Collect	CONTRACTOR OF THE PARTY OF THE	mn (00)	DO		SPC	Alkalinity	filtered, M					
1.	sequen		mp (°C)	(mg/L)	7.06 242.5		mg/l	indicate)				_	
2.				100,39	8	-/							
	r Annear	rance/Ode	r Comp	onto: //o	h-#	Os/							
vater	Appear	ance/ouc	or Comm	ients: ("s	se potton	n of back fo	r common o	lescriptors)					
Sal	Unity	=0.1											
910	-	- 0 0 1				Findin	as						
		_ Im	paired	<b>A</b>	Impaire habitat	ed	Is in	npact lized?		design	valuate		
Ne		bi	ology?				ll or illnon oil	ed" decisio	n: rea	ch location	t dica ase:	de e i e	nation
No Impa Decisi	on comm	nents. Des	ology?	rationale f	or your "	Not Impaired	or "Impair	eu decisio	,		ns for use	desig	
No Impa Decisi eeval	on comm	bi nents. Des special co	ology? cribe the ndition co	rationale fomments;	or your "l etc.:		or "Impali	eu decisio			ns for use	desig	
No Impa Decisi eeval	on communities;	nents. Des	ology? cribe the ndition co	omments;	or your "l etc.:	Not Impaired	or "Impair	eu decisio			ns for use	desig	
No Impa Decisi eeval	on communities;	bi nents. Des special co	ology? cribe the ndition co	omments;	or your "l etc.:		or impair	ed decisio			ns for use	aesig	
No Impa Decisi eeval	on communities;	bi nents. Des special co	ology? cribe the ndition co	omments;	or your "l etc.:		or "impail	eu decisio			ns for use	desig	
No Impa Decisi eeval	on communities;	bi nents. Des special co	ology? cribe the ndition co	omments;	or your "l etc.:		or "Impail	eu decisio			ns for use	desig	

MP-6

Macroinvertebrate sampling	
Sampling protocol: Std. kick screen:   D-frame: Other: protocol?:	
Comments/Abundance Notes:	
Habitat Impairment Thresholds	Metric Score
#3 Riff/Run: embeddedness <u>or</u> #3 Glide/Pool: substrate character + #6 Sediment Deposition = 24 or less (20 or less for warm water, low gradient streams)	28
#9 Condition of Banks + #10 Bank Vegetation = 24 or less (20 or less for warm water, low gradient streams	35
Total habitat score 140 or less for forested, cold water, high gradient streams (120 or less for warm water, low gradient streams)	190
Habitat Comments:  Special Condition  Use this block to describe conditions that justify attainment/impairment of stations with IBI so	ore <63 and >53.
^Common descriptors: Water Odors - none normal sewage petroleum chemical other; Water Surface Oils - none state of turbidity - clear slight turbid opaque; NPS Pollution - no evidence some potential obvious; Sediment Odors - none spetroleum chemical anaerobic; Sediment Oils - absent slight moderate profuse; Deposits - none sludge sawdust papother. Are the undersides of stones deeply embedded black?	normal sewage



Exam 20040212-0	-Initials*			2000	n .	10/-	ntries. Other field	is are optional to	or person	al use.)
20040212-0	ple	2025	0519-	0920	. ASC	vva	tershed Code (HUC)	Stream Co	ode (	ch. 93 Use
Out the second		Date		Time	Initials	020	10205	020402050	0060	EV.
Secondary S		MP	-7		UE BW		veyed by: A	son S. C.		r PLD
*Date as YYYYM	MMDD, time	as military ti	me, and your	initials u	niquely identify th	ne stream read	ch.	SWP Waters		100
					Survey T	уре				
(1) Basin Survey Antidegradation	/, (2) Cause [Special Pro	/ Effect, (3) lection], (8)	) Fish Tissue, Toxics, (10) U	(4) Instr Jse Attair	eam Comprehen nability, (11) WQN	sive Evaluatio N, (12) Limest	on [ICE], (5) Point- one, (13) Low-grad	of-First-Use, (6) S dient [Multihabitat]	SERA, (7)	4
0-4	1 1				Locatio	n				
County: C	hest	5	Municipa	lity:	-ondon Gr	ove !	Topo Quad:	West G	TOUG	-
					Landus	e				
Residential:	1,9 %	Comme	rcial:	%	Industrial:	9/	6 Cropland:	% Pa	sture:	9
Abd. Mining: Landuse Comm	%	Old Fiel	ds:	%	Forest:	28.39		%	isture.	7
			Field M	eter Re	Water Qua	ality				
The second secon							Bottle Notes (N	normal MANE		
Collec		amp (0C)	DO		SPC	Alkalinity	Bottle Notes (N filtered, MF-me	-normal, MNF-ı tals filtered, B-	metals n	on-
sequen	ce# Te	emp (°C)		рН	SPC (umhos)	Alkalinity	Bottle Notes (N filtered, MF-me indicate)	-normal, MNF-I tals filtered, B-	metals n bac't, O	on- thers:
sequen 1. 2.	ce# Te		DO (mg/L)		SPC (umhos)	Alkalinity	filtered, MF-met	-normal, MNF-I tals filtered, B-	metals n bac't, O	on- thers:
1. 2. 3.	ice# Te	4,90	DO (mg/L) 9, 27 91,4%	рН 708	SPC (umhos)	Mg/I	filtered, MF-me indicate)	-normal, MNF-I tals filtered, B-	metals n bac't, O	on- thers:
sequen 1. 2. 3.	rance/Ode	4,90	DO (mg/L) 9, 27 91,4%	рН 708	SPC (umhos)	Mg/I	filtered, MF-me indicate)	-normal, MNF-ı tals filtered, B-	metals n bac't, O	on- thers:
sequen  1. 2. 3.  Nater Appear	rance/Odd	or Comm	DO (mg/L) 9, 27 91,4%	pH 7#08	spc (umhos) 283.0 m of back for of	mg/I	filtered, MF-mer indicate)	-normal, MNF-i tals filtered, B-	metals n bac't, Of	on- ihers:
Not Impaired:	rance/Odd	pr Comm	DO (mg/L) 9, 27 91,4% ents: (^see	pH 7#08  e bottor	spc (umhos) 283.0  on of back for of	common de	escriptors)	Reevalu	bac't, O	thers:
Not Impaired:	rance/Odd	pr Comm	po (mg/L) 9,27 91,4% ents: (^sec	pH 7#08 e bottor	spc (umhos) 283.0  on of back for of	common de	escriptors)	Reevalu	bac't, O	thers:
Not Impaired:	rance/Odd	pr Comm	po (mg/L) 9,27 91,4% ents: (^sec	pH 7.08  e bottor  Impaire habitat	spc (umhos) 283.0  on of back for of	common de	escriptors)	Reevalu	bac't, O	thers:
Not Impaired: Decision commeevaluations;	rance/Odd	pr Comm	ents: (^see	pH 7.08  e bottor  Impaire habitat	sPC (umhos) 283.0  on of back for of sed of	common de	escriptors)	Reevalu	bac't, O	thers:

Macroinvertebrate sampling	
Sampling protocol: Std. kick screen:   D-frame:   Other:   protocol?:	
Comments/Abundance Notes:	
Habitat Impairment Thresholds	Metric Score
#3 Riff/Run: embeddedness <u>or</u> #3 Glide/Pool: substrate character + #6 Sediment Deposition = 24 or less for warm water, low gradient streams)	18
#9 Condition of Banks + #10 Bank Vegetation = 24 or less (20 or less for warm water, low gradient streams	22
Total habitat score 140 or less for forested, cold water, high gradient streams (120 or less for warm water, low gradient streams)	159
Habitat Comments:  Special Condition	
Use this block to describe conditions that justify attainment/impairment of stations with IBI stations.	core <63 and >53.
^Common descriptors: Water Odors - none normal sewage petroleum chemical other; Water Surface Oils - none Turbidity - clear slight turbid opaque; NPS Pollution - no evidence some potential obvious; Sediment Odors - none petroleum chemical anaerobic; Sediment Oils - absent slight moderate profuse; Deposits - none sludge sawdust pa other. Are the undersides of stones deeply embedded black?	slick sheen globs fleck normal sewage per fiber sand relict she



Date-Time-	-Initials*	2020	20010	0.00		10/-4	1 10 1	as are options	ar for perso	onal use.)
Exam 20040212-0	ple	1	2.0519 -	7:09	· ASC	Wat	tershed Code (HUC)	Stream	Code	Ch. 93 Use
20010212-0	312-X12	Date		Time	Initials	020	140205	0204020	5000607	EV
Secondary S		MP.	U	į,	NEBW		reyed by:	0	Clause	5 PhD
Date as YYYYM	MMDD, time a	s military ti	me, and your	initials ur	niquely identify th	e stream reac	h.	SWP Wat		1.110
					Survey T					
(1) Basin Survey Antidegradation	/, (2) Cause [Special Prot	/ Effect, (3) ection], (8)	Fish Tissue, Toxics, (10) U	(4) Instre Jse Attain	eam Comprehensability, (11) WQN	sive Evaluatio N, (12) Limesto	n [ICE], (5) Point one, (13) Low-grad	of-First-Use, dient [Multihat	(6) SERA, pitat]	(7) 4
					Locatio				•	,
County: C	heste	5	Municipa	lity:	ondon Gr	OVE TWO T	Topo Quad:	West	Grove	
Residential:	1.1%	Comme	reigh	0/ 1	Landus	99				
Abd. Mining:	1.1 %	Old Field		%	Industrial:	%		%	Pasture:	9/
anduse Comm		Old Field	us.	%	Forest:	29 %	Other:	%		
Canopy cover:		eams		haded f		ality		1	÷11	
	open (pa		d mostly si	haded f	Water Qua	-	Bottle Notes (N	-normal Mi	NF-metals	non
Collec	tor-	artly shade	mostly si	leter Rea	Water Qua	Alkalinity	Bottle Notes (N	l-normal, Mi	NF-metals	s non- Others:
Collec sequen	tor-	emp (°C)	Field M DO (mg/L)	eter Rea	Water Quandings:	Alkalinity	Bottle Notes (N filtered, MF-me ndicate)	l-normal, Mi tals filtered	NF-metals	s non- Others:
Collec sequen 1.	tor-	artly shade	mostly si	leter Rea	Water Quandings:	Alkalinity	filtered, MF-me	l-normal, MI tals filtered	NF-metals , B-bac't,	s non- Others:
Collec sequen 1. 2.	tor-	emp (°C)	Field M DO (mg/L) 9.57	pH	Water Quandadings: SPC (umhos) 2/9,3	Alkalinity 1 mg/l i	filtered, MF-me Indicate)	l-normal, Mi tals filtered	NF-metals,	s non- Others:
Collec sequen 1. 2. 3. Vater Appear	tor- ice # Te	emp (°C)	Field M DO (mg/L) 9.57	pH	Water Quandadings: SPC (umhos) 2/9,3	Alkalinity 1 mg/l i	filtered, MF-me Indicate)	I-normal, MI tals filtered	NF-metals , B-bac't,	s non- Others:
Collec sequen 1. 2.	tor- ice # Te	emp (°C)	Field M DO (mg/L) 9.57	pH	Water Quandings: SPC (umhos) 2/9,3	Alkalinity 1 i	filtered, MF-me Indicate)	I-normal, Mi tals filtered	NF-metals, B-bac't,	s non- Others:
Collect sequent 1. 2. 3. Vater Appear	tor- ice # Te rance/Odd	emp (°C)	Field M DO (mg/L) 9.57	pH 6.80	Water Quandings: SPC (umhos) 2/9,3 n of back for continuous	Alkalinity mg/l i	scriptors)	tals filtered	NF-metals, B-bac't,	s non- Others:
Collector sequent 1. 2. 3. Water Appear Solicit to the Impaired:	tor- ice # Te  rance/Odd	emp (°C)  Or Comm  Opaired ology?  Cribe the r	Field M DO (mg/L) 9,57 43.6% ents: (^see	pH 6.80 e botton	Water Quandings: SPC (umhos) 2/9/3 n of back for of	Alkalinity mg/l i	scriptors)	tals filtered	, B-bac't,	Others:
Collector sequent 1. 2. 3. Water Appear Source to Impaired: Decision commerce aluations;	tor- ice # Te  rance/Odo  Im bi nents. Des	emp (°C)  G.4.4  praired ology?  cribe the radition co	Field M DO (mg/L) 9.57 43.6% ents: (^sec	pH 6.80 e botton Impaire habitat'r your "N	Water Quandings: SPC (umhos) 2/9/3 n of back for of Findings d Not Impaired"	Alkalinity mg/l i	scriptors)	tals filtered	, B-bac't,	Others:
Collector sequent 1. 2. 3. Water Appear Source to Impaired: Decision commerce aluations;	tor- ice # Te  rance/Odd	emp (°C)  G.4.4  praired ology?  cribe the radition co	Field M DO (mg/L) 9,57 43.6% ents: (^see	pH 6.80 e botton Impaire habitat'r your "N	Water Quandings: SPC (umhos) 2/9/3 n of back for of	Alkalinity mg/l i	scriptors)	tals filtered	, B-bac't,	Others:
Collector sequent 1. 2. 3. Water Appear Source to Impaired: Decision commence of the commence of the collection of the c	tor- ice # Te  rance/Odo  Im bi nents. Des	emp (°C)  G.4.4  praired ology?  cribe the radition co	Field M DO (mg/L) 9.57 43.6% ents: (^sec	pH 6.80 e botton Impaire habitat'r your "N	Water Quandings: SPC (umhos) 2/9/3 n of back for of Findings d Not Impaired"	Alkalinity mg/l i	scriptors)	tals filtered	, B-bac't,	Others:
Collector sequent 1. 2. 3. Vater Appear Solicit for Impaired: Pecision commercial sevaluations;	tor- ice # Te  rance/Odo  Im bi nents. Des	emp (°C)  G.4.4  praired ology?  cribe the radition co	Field M DO (mg/L) 9.57 43.6% ents: (^sec	pH 6.80 e botton Impaire habitat'r your "N	Water Quandings: SPC (umhos) 2/9/3 n of back for of Findings d Not Impaired"	Alkalinity mg/l i	scriptors)	tals filtered	, B-bac't,	Others:
Collector sequent 1. 2. 3. Water Appear Source to Impaired: Decision commerce aluations;	tor- ice # Te  rance/Odo  Im bi nents. Des	emp (°C)  G.4.4  praired ology?  cribe the radition co	Field M DO (mg/L) 9.57 43.6% ents: (^sec	pH 6.80 e botton Impaire habitat'r your "N	Water Quandings: SPC (umhos) 2/9/3 n of back for of Findings d Not Impaired"	Alkalinity mg/l i	scriptors)	tals filtered	, B-bac't,	Others:
Collectory 1. 2. 3.  Nater Appear  Not Impaired:	tor- ice # Te  rance/Odo  Im bi nents. Des	emp (°C)  G.4.4  praired ology?  cribe the radition co	Field M DO (mg/L) 9.57 43.6% ents: (^sec	pH 6.80 e botton Impaire habitat'r your "N	Water Quandings: SPC (umhos) 2/9/3 n of back for of Findings d Not Impaired"	Alkalinity mg/l i	scriptors)	tals filtered	, B-bac't,	Others:

Macroinvertebrate sampling	I STATE OF THE STA
Sampling protocol: Std. kick screen: D-frame: M Other: D protocol?:	
Comments/Abundance Notes:	
Habitat Impairment Thresholds	Metric Score
#3 Riff/Run: embeddedness <u>or</u> #3 Glide/Pool: substrate character + #6 Sediment Deposition = 24 or less for warm water, low gradient streams)	29
#9 Condition of Banks + #10 Bank Vegetation = 24 or less (20 or less for warm water, low gradient streams	24
Total habitat score 140 or less for forested, cold water, high gradient streams (120 or less for warm water, low gradient streams)	178
Habitat Comments:	
Special Condition	
Use this block to describe conditions that justify attainment/impairment of stations with IBI	score <63 and >53.
^Common descriptors: Water Odors - none normal sewage petroleum chemical other, Water Surface Oils - none	e slick sheen globs flec
Turbidity - clear slight turbid opaque; NPS Pollution - no evidence some potential obvious, Sediment Odds - none sludge sawdust professional anaerobic. Sediment Oils - absent slight moderate profuse; Deposits - none sludge sawdust profuse; Deposi	paper fiber sand relict sh
other. Are the undersides of stones deeply embedded black?	



Date-Time-	and comme	nts for fields b	oxed in double li	nes are requir	ed database	entries. Other fiel	ds are option	nal for pers	onal use.)
Examp 20040212-0	ole	202205/	19 -13:16		c	/atershed Code (HUC)		Code	Ch. 93 Use
	ANGEL STORY	Date	Time	Initia	s 02	040205	0204020	500608	EV
Secondary S		MP-9		UEB	70.00	urveyed by:	taron S.	Clau	ses, PhO
*Date as YYYYM	IMDD, time a	s military time, a	and your initials un	iquely identify	the stream re	each.	SWP Wa		
				Survey					
(1) Basın Survey Antidegradation [	, (2) Cause Special Prote	Effect, (3) Fish ection], (8) Toxic	Tissue, (4) Instre s, (10) Use Attain	eam Comprehe ability, (11) Wo	ensive Evalua QN, (12) Lime	ation [ICE], (5) Poin estone, (13) Low-gra	t-of-First-Use, adient [Multiha	(6) SERA, bitat]	(7) 4
			146	Locat					
County: C	heste	5 Mu	inicipality:	order G	rove Twp	Topo Quad:	West	- 610	1/0
									18
Residential:	2,3 %	Commercial	0/ 1	Landu	ise				
Abd. Mining:	200 %	Old Fields:	%	Industrial: Forest:		% Cropland:	%	Pasture:	%
Landuse Comm		reamsta	7.5	i olest.	29.1	% Other:	%		
			Field Meter Rea	Water Quadings:	uanty	Bottle Notes (	N-normal M	INE motel	
Collec			DO	SPC	Alkalinity	filtered, MF-m	etals filtered	d, B-bac't,	Others:
1.			ng/L) pH	(umhos)	mg/l	indicate)			
2.			3,3%	212.					
3.				Oct				×	
water Appear	ance/Odo	r Comments	s: (^see botton	n of back fo	r common	descriptors)			
Salinity	1=0.1								
				Findin	as				
Not Impaired:		paired blogy?	Impaire habitat	d $\Box$	Is	mpact	Re	evaluate	
Decision comm eevaluations;	ents. Desi	ribe the ratio	nale for your "	Not Impaired	or "Impai	red" decision; re	design each locatio	nated use	e designation
	32.9	idition commi	abitat Score:	170					1107,000
				170					

MP-9

	Macro	invertebrate s	sampling	
Sampling protocol: Std. kick screen:	D-frame: 🖾	Other:	protocol?:	
Comments/Abundance Notes:				
	tat Impairmer			Metric Score
#3 Riff/Run: embeddedness or #3 Glide/ less (20 or less for warm water, low grad	dient streams)			30
#9 Condition of Banks + #10 Bank Vege streams	tation = 24 or l	ess (20 or les	s for warm water, low gradient	2/
Total habitat score 140 or less for fores water, low gradient streams)	ted, cold water	, high gradier	nt streams (120 or less for warm	170
Habitat Comments:		2		
		Special Cond	dition	
*Common descriptors: Water Odors - none Turbidity - clear slight turbid opaque; NPS petroleum chemical anaerobic; Sediment Oil	normal sewage	petroleum che	mical other, Water Surface Oils - no	ne slick sheen globs flecks



Date Time Initials Example 20040212-0312-XYZ  Date Time Initials D2040205 D204020500000 EV  Secondary Station ID DP - D DEBUC Surveyed by: Auron S. Clauser, Ph.D  *Date as YYYYMMDD, time as military time, and your initials uniquely identify the stream reach.  Survey Type  (1) Basin Survey, (2) Cause / Effect, (3) Fish Tissue, (4) Instream Comprehensive Evaluation [ICE], (5) Point-of-First-Use, (6) SERA, (7) Antidegradation [Special Protection], (8) Toxics, (10) Use Attainability, (11) WQN, (12) Limestone, (13) Low-gradient [Multihabitat]  Location  County: Chester Municipality: London Grove Tup Topo Quad: West Grove  Landuse  Residential: 10 26 96 Commercials of the total stream of the total stream code (HUC) Stream Code (HUC) D204010500000 EV  Landuse	(Information	and comn	nents for fiel	ds boxed in	double li	nes are require	ed databas	e entr	ies. Other field	s are optiona	al for perso	nal use.)	
Secondary Station ID MP - D URBUC Surveyed by: Away S. Clauser, Ph.D Date as YYYYMMDD, time as military time, and your initials uniquely identify the stream reach.  Survey Type  (1) Basin Survey. (2) Causer / Effect. (3) Fish Tissue, (4) Instream Comprehensive Evaluation [ICE]. (5) Point-of-First-Use, (6) SERA, (7) Antidegradation [Special Protection], (8) Toxics, (10) Use Attainability, (11) WON, (12) Limestone, (13) Low-gradient [Multihabitar]  Location  County: Location Description:  Landuse  Residential: 0,09 % Commercial: % Industrial: % Cropland: % Pasture: Abd. Mining: % Old Fields: % Forest: 36.2 % Other: %  Landuse Comments: Streams tasks  Canopy cover: open partly shaded mostly shaded fully shaded Water Quality  Field Meter Readings: Bottle Notes (N-normal, MNF-metals non-filtered, MF-metals filtered, B-bac't, Others: indicate)  1.	Date-Time Exam	-Initials*						Vate	rshed Code				se
**Date as YYYYMMDD, time as military time, and your initials uniquely identify the stream reach  Survey Type  (1) Basin Survey, (2) Cause / Effect, (3) Fish Tissue, (4) Instream Comprehensive Evaluation [ICE], (5) Point-of-First-Use, (6) SERA, (7)	20040212-0	312-X12	Date		Time	Initials	s 01	204	0205	0204020	5000608	EV	
Survey Type  (1) Basin Survey, (2) Cause / Effect, (3) Fish Tissue, (4) Instream Comprehensive Evaluation (ICE), (5) Point-of-First-Use, (6) SERA, (7)    Location  County:	Secondary S	Station ID	Mp-	10		UEB	BUCS	urve	yed by: Aau	ron S. Cla	Wiler.	PLD	
(1) Basin Survey. (2) Cause / Effect, (3) Fish Tissue, (4) Instream Comprehensive Evaluation [ICE]. (5) Point-of-First-Use, (6) SERA, (7) Antidegradation (Special Protection), (8) Toxics, (10) Use Attainability, (11) WON, (12) Limestone, (13) Low-gradient [Multihabitat]  Location  County: Location  County: Location  Landuse  Residential: 0.08 % Commercial: % Industrial: % Cropland: % Pasture: Abd. Mining: % Old Fields: % Forest: 36.2 % Other: %  Landuse Comments: Streams tasts  Canopy cover: open partly shaded mostly shaded fully shaded  Water Quality  Field Meter Readings: Bottle Notes (N-normal, MNF-metals non-filtered, MF-metals filtered, B-bac't, Others: indicate)  1. 15.2 10.06 6.94 2.31.2 3. Water Appearance/Odor Comments: (*see bottom of back for common descriptors)  Salvity = 0.1  Findings  Not Impaired biology? Impaired habitat? Impaired is impact designated use?  Part of the part of the part of the paired designated use?  Part of the part of	*Date as YYYYM	MMDD, time	as military tir	ne, and your	initials un	iquely identify t	the stream r	each.	7.00				
Location						Survey	Туре						
County: Chestes   Municipality: London Grove Twp   Topo Quad:   West Grove	(1) Basin Survey Antidegradation	y, (2) Caus [Special Pr	e / Effect, (3) otection], (8)	Fish Tissue, Toxics, (10) U	(4) Instre	eam Comprehe ability, (11) WQ	nsive Evalu N, (12) Lim	ation   estone	[ICE], (5) Point- e, (13) Low-grad	of-First-Use, lient [Multihab	(6) SERA,	(7) 4	
Landuse  Residential: 0.08 % Commercial: % Industrial: % Cropland: % Pasture: Abd. Mining: % Old Fields: % Forest: 36.2 % Other: %  Landuse Comments: Streams tests  Canopy cover: open partly shaded mostly shaded fully shaded  Water Quality  Collector-sequence # Temp (°C) (mg/L) pH SPC Alkalinity (umhos) mg/l indicate)  1. 1/5.2 10.0% 6.94 231.7 2. 3. Water Appearance/Odor Comments: (^see bottom of back for common descriptors)  Salvity = 0.1  Findings  Impaired: Impaired blology: Impaired blology: Impaired localized? Reevaluate designated use? Decision comments. Describe the rationale for your "Not Impaired" or "Impaired" decision; reach locations for use designatio eevaluations; special condition comments, etc.:											-		
Landuse  Residential: 0.08 % Commercial: % Industrial: % Cropland: % Pasture: Abd. Mining: % Old Fields: % Forest: 36.2 % Other: % Water Quality  Canopy cover: open partly shaded mostly shaded fully shaded  Water Quality  Collector-sequence # Field Meter Readings: Bottle Notes (N-normal, MNF-metals non-filtered, MF-metals filtered, B-bac't, Others: indicate)  1.	County:	heste	5	Municipa	ality:	onden Gi	rove Tw	To	po Quad:	West	Grave		
Residential: 0.08 % Commercial: % Industrial: % Cropland: % Pasture:  Abd. Mining: % Old Fields: % Forest: 36.2 % Other: %  Canopy cover: open partly shaded mostly shaded    Water Quality  Field Meter Readings:  Bottle Notes (N-normal, MNF-metals non-filtered, MF-metals filtered, MF-me													
Abd. Mining: % Old Fields: % Forest: 36.2 % Other: %  Canopy cover: open partly shaded mostly shaded Water Quality  Water Quality  Field Meter Readings: Bottle Notes (N-normal, MNF-metals non-filtered, MF-metals filtered, B-bac't, Others: indicate)  1.	De et de en et		. (0.200000000			Landu	se						
Canopy cover: open partly shaded mostly shaded fully shaded  Water Quality  Field Meter Readings:  Bottle Notes (N-normal, MNF-metals non-filtered, MF-metals filtered, B-bac't, Others: indicate)  1.	A SUPPLIED THE PROPERTY.	-	100000000000000000000000000000000000000	200000000000000000000000000000000000000		CANAL PROPERTY.	2			%	Pasture:		%
Canopy cover: open partly shaded mostly shaded Water Quality  Water Quality  Field Meter Readings: SPC Alkalinity filtered, MF-metals filtered, B-bac't, Others: indicate)  1.	3		6 Old Field	ds:	%	Forest:	36.2	%	Other:	%			159
Collector-sequence # Temp (°C) (mg/L) pH (umhos) mg/l filtered, MF-metals filtered, B-bac't, Others: indicate)  1.	The same			Field N	leter Rea		lality	Bo	ottle Notes (N	I-normal M	NE-motals	non-	_
1.   15.2   10.06 6.94   231.2   3.   3.   Water Appearance/Odor Comments: (^see bottom of back for common descriptors)    Salinity = 0.  Findings   Impaired   Impaired   Is impact   Gesignated use?   Decision comments. Describe the rationale for your "Not Impaired" or "Impaired" decision; reach locations for use designation elevaluations; special condition comments; etc.:	1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1		Temp (°C)		nH			y fil	tered, MF-me	tals filtered	, B-bac't,	Others:	
Nater Appearance/Odor Comments: (^see bottom of back for common descriptors)  Findings  Not Impaired   Impaired   Impaired   Is impact   Reevaluate   designated use?  Decision comments. Describe the rationale for your "Not Impaired" or "Impaired" decision; reach locations for use designation eevaluations; special condition comments; etc.:	1.			10.06			mg/i	- "	dicate)				
Nater Appearance/Odor Comments: (^see bottom of back for common descriptors)  Findings  Not Impaired   Impaired   Impaired   Is impact   Reevaluate   designated use?  Decision comments. Describe the rationale for your "Not Impaired" or "Impaired" decision; reach locations for use designation eevaluations; special condition comments; etc.:				100%		-73 /							
Findings  Not Impaired: Impaired biology? Impaired habitat? Is impact designated use?  Decision comments. Describe the rationale for your "Not Impaired" or "Impaired" decision; reach locations for use designation eevaluations; special condition comments; etc.:		rance/O	dor Comm	ents: (Ase	e hotton	n of book for			auto to un V				_
Not Impaired   Impaired   Impaired   Is impact   Reevaluate   Decision comments. Describe the rationale for your "Not Impaired" or "Impaired" decision; reach locations for use designation every decision comments; etc.:			JOI COMM	ents. ( se		II OI DACK IOI	common	des	criptors)				
Impaired: biology? habitat? localized? Reevaluate designated use?  Decision comments. Describe the rationale for your "Not Impaired" or "Impaired" decision; reach locations for use designation evaluations; special condition comments; etc.:	N. I						gs						
covariations, special condition comments; etc.:	Impaired:	elite.	biology?		habitat	2	lo	ozilea	42	design	-+!		
	eevaluations;	special c	ondition co	mments; e	r your "l tc.:	Not Impaired	or "Impa	aired'	decision; re	ach location	ns for use	designation	n
						1215							_

MP-10

Macroinvertebrate sampling	
Sampling protocol: Std. kick screen: D-frame: M Other: D protocol?:	
Comments/Abundance Notes:	
Habitat Impairment Thresholds  #3 Riff/Run: embeddedness or #3 Glide/Pool: substrate character + #6 Sediment Deposition = 24 or	Metric Score
less (20 or less for warm water, low gradient streams)  #9 Condition of Banks + #10 Bank Vegetation = 24 or less (20 or less for warm water, low gradient streams	36
Total habitat score 140 or less for forested, cold water, high gradient streams (120 or less for warm water, low gradient streams)	215
Habitat Comments:	
Special Condition  Use this block to describe conditions that justify attainment/impairment of stations with IBI so	ore <63 and >53



# COMMONWEALTH OF PENNSYLVANIA DEPARTMENT OF ENVIRONMENTAL PROTECTION BUREAU OF CLEAN WATER FLOWING WATERBODY FIELD DATA

(Information Date-Tin	ion and cor ne-Initials	mments for t	ields boxed in	double I	ines are requi	ired database	e entri	es. Other field	s are option	nal for pers	onal use.)	
Exa	ample 2-0312-XY	202	20519	125	4- AS	C	Vater:	shed Code HUC)		Code	Ch. 93	100
		Da		Time	Initia	als 02	2040	205	020402	.05000609	EV	
Secondar		' '	11		UEB			ed by: Aa	son S. C			
*Date as YYY	YMMDD, tir	ne as military	time, and you	r initials u	niquely identify	the stream re	each.	,,,,,	SWP Wa		no	
					Survey	Type						_
(1) Basin Sur Antidegradati	vey, (2) Cau	use / Effect,	(3) Fish Tissue B) Toxics, (10)	, (4) Instr			ation [	CEI. (5) Point-	of-First-Use	(6) SEDA	(7)	_
· ····································	on [opecial i	rotection), (a	3) Fish Tissue 3) Toxics, (10) (	Use Attair	cabinty, (11) vv	QIV, (12) LIIIR	estone,	(13) Low-grad	lient [Multiha	bitat]	" 4	
County:	01 -1		Monte	104	Locat							
Location De	Chast	0	Municipa	ality:	ondon G	rove Twp	Top	oo Quad:	West	- Grov	le	
Residential:		0/ 10			Landı	use						_
Abd. Mining:	0.2	10000000	nercial:	%	Industrial:		%	Cropland:	%	Pasture:		%
anduse Cor		No. of the last	stats	%	Forest:	31.3	%	Other:	%	1		
	7 - 1		Field M	leter Rea	Water Quadings:	uanty	Dat	41- N-4 (A)				
7	ector- ence #	Tomp (0c)	DO		SPC	Alkalinity	filte	tle Notes (N- red, MF-met	normal, M	NF-metal:	Others:	
1.	CIICE #	Temp (°C)	(mg/L)	7./4	(umhos)	mg/I	indi	cate)		,	Cincis.	
2.			108.1	2119	13/10		1					
	277.777.77				01							
Salini			ments: (^se	e botton	n of back for	r common	descr	iptors)				
Net					Finding	gs						
Not Impaired: ecision com	ments D	Impaired biology?	- Andrews I for	Impaire habitat			mpact			valuate ated use?	[	
evaluations	; special	condition o	rationale fo	r your "r tc.:	Not Impaired	or "Impai	red" d	lecision; rea	ch location	ns for use	designat	ion
BI Score:	45.3		tal Habitat		148		_					
					1 10							

Macroinvertebrate sampling	
Sampling protocol: Std. kick screen:   D-frame:   Other:   protocol?:	
comments/Abundance Notes:	
#3 Riff/Run: embeddedness or #3 Glide/Pool: substrate character + #6 Sediment Deposition = 24 or less (20 or less for warm water, low gradient streams)	Metric Score
#9 Condition of Banks + #10 Bank Vegetation = 24 or less (20 or less for warm water, low gradient streams	17
Total habitat score 140 or less for forested, cold water, high gradient streams (120 or less for warm water, low gradient streams)	148
Habitat Comments:	
Special Condition  Use this block to describe conditions that justify attainment/impairment of stations with IBI s	.00 1.50
u	core <63 and >53.



	Initials*						ries. Other field			
Examp 20040212-03	ole	20220	519	1445	5 · ASC	vvate	ershed Code (HUC)	Stream	Code	Ch. 93 L
20040212-03	312-XYZ	Date		Time	Initials					
Secondary S	Station ID	MP-	12		LEBWE	Surve	eyed by: Aa	son S. (	Clause	s Phl
Date as YYYYM	IMDD, time a	s military tim	ne, and your	initials un	niquely identify th			SWP Wat		
4					Survey T	уре	,			
(1) Basin Survey Antidegradation [	, (2) Cause / Special Prote	Effect, (3) ection], (8) T	Fish Tissue, oxics, (10) U	(4) Instre se Attain	eam Comprehen ability, (11) WQN	sive Evaluation N, (12) Limeston	[ICE], (5) Point- ne, (13) Low-grad	of-First-Use, lient [Multihal	(6) SERA, bitat]	(7) 4
0 1 0	1 1				Location	-				
County: Cocation Descri	heste	5	Municipa	lity:	onden G	rove Typ To	opo Quad:	West (	Grove	
					Landus	se	-			
Residential:	0.03 %	Commer	cial:	%	Industrial:	%	Cropland:	%	Pasture:	
Abd. Mining: Landuse Comm	0/0	Old Field	is:	%	Forest:	32.8 %	Other:	%	i dotaio.	
Canopy cover:	open pa	rtly shaded	d (mostly st	naded) f		ality				
Canopy cover:	open pa	rtly shaded		18	Water Qua		Sottle Notes (N	-normal M	NF-metal	s non-
Collec	etor-		Field M	eter Re	Water Qua	Alkalinity fi	Bottle Notes (N	l-normal, M tals filtered	INF-metal	s non- Others:
Collec sequen	etor-	emp (°C)	Field M	18	Water Qua adings: SPC (umhos)	Alkalinity fi	Bottle Notes (N litered, MF-me ndicate)	l-normal, M tals filtered	INF-metal	s non- Others:
Collec sequen 1.	etor-	emp (°C)	Field M DO (mg/L)	eter Rea	Water Qua	Alkalinity fi	Itered, MF-me	l-normal, M tals filtered	INF-metal I, B-bac't,	s non- Others:
Collec sequen 1. 2. 3.	tor- nce # Te	emp (°C)	Field M DO (mg/L)   0.7.1%	pH	Water Quadrings: SPC (umhos)	Alkalinity fi	Itered, MF-me ndicate)	l-normal, M tals filtered	INF-metal I, B-bac't,	s non- Others:
Collec sequen 1. 2. 3.	tor- nce # Te	emp (°C)	Field M DO (mg/L)   0.7.1%	pH	Water Quadrings: SPC (umhos)	Alkalinity fi	Itered, MF-me ndicate)	l-normal, M tals filtered	INF-metal d, B-bac't,	s non- Others:
Collec sequen 1. 2. 3. Vater Appear	rance/Odo	emp (°C)	Field M DO (mg/L)   0.7.1%	pH	Water Quadrings: SPC (umhos)	Alkalinity fi	Itered, MF-me ndicate)	i-normal, M tals filtered	INF-metal	s non- Others:
Collec sequen 1. 2. 3. Water Appear	rance/Odo	emp (°C)	Field M DO (mg/L)   0.7.1%	pH	Water Quadings: SPC (umhos) 157,2	Alkalinity fi in common des	Itered, MF-me ndicate)	I-normal, M tals filtered	INF-metal I, B-bac't	s non- Others:
Collect sequent 1. 2. 3. Nater Appear	rance/Odd	or Commo	Field M DO (mg/L)   0.7.1%	pH Z/3	Water Quadrings: SPC (umhos) 157, 2 m of back for Finding	Alkalinity mg/l in common des	scriptors)	tals filtered	INF-metal	s non- Others:
Collectory Salvey = Not Impaired:	rance/Odd	paired ology?	Field M DO (mg/L) 10.38 107.1% ents: (^sec	pH 7/3 e bottor	Water Quadrings: SPC (umhos) /57, 2 m of back for Finding	Alkalinity fi in common des	scriptors)	Rec	evaluate	Others:
Collect sequent 1. 2. 3. Nater Appear	rance/Odo	or Comme	Field M DO (mg/L) 10,38 107,1% ents: (^set	pH Z/3 e botton impaire habitat	Water Quadadings: SPC (umhos) /57, 2 m of back for Findinged Rot Impaired	Alkalinity fi in common des	scriptors)	Rec	evaluate	Others:
Collect sequent 1. 2. 3. Water Appear Salindty = Not Impaired: Decision commerce valuations;	rance/Odd	or Comme	Field M DO (mg/L) 10.38 107.1% ents: (^sec	pH Z/3 e botton impaire habitat	Water Quadrings:  SPC (umhos)  /57, 2  m of back for  Findinged  Rot Impaired**	Alkalinity fi in common des	scriptors)	Rec	evaluate	Others:
sequen  1. 2. 3. Water Appear  Salinty =  Not Impaired: Decision commeevaluations;	rance/Odo	or Comme	Field M DO (mg/L) 10,38 107,1% ents: (^set	pH Z/3 e botton impaire habitat	Water Quadrings:  SPC (umhos)  (57, 2)  m of back for  Finding	Alkalinity fi in common des	scriptors)	Rec	evaluate	Others:
Collect sequents.  1. 2. 3. Water Appear Salindty = Not Impaired: Decision commerce valuations;	rance/Odo	or Comme	Field M DO (mg/L) 10,38 107,1% ents: (^set	pH Z/3 e botton impaire habitat	Water Quadrings:  SPC (umhos)  (57, 2)  m of back for  Finding	Alkalinity fi in common des	scriptors)	Rec	evaluate	Others:
Collect sequent 1. 2. 3. Water Appear Salindty = Not Impaired: Decision commerce valuations;	rance/Odo	or Comme	Field M DO (mg/L) 10,38 107,1% ents: (^set	pH Z/3 e botton impaire habitat	Water Quadrings:  SPC (umhos)  (57, 2)  m of back for  Finding	Alkalinity fi in common des	scriptors)	Rec	evaluate	Others:
Collect sequent 1. 2. 3. Water Appear	rance/Odo	or Comme	Field M DO (mg/L) 10,38 107,1% ents: (^set	pH Z/3 e botton impaire habitat	Water Quadrings:  SPC (umhos)  (57, 2)  m of back for  Finding	Alkalinity fi in common des	scriptors)	Rec	evaluate	Others:

	Macro	invertebrate s	sampling	
Sampling protocol: Std. kick screen:	D-frame: 💢	Other:	protocol?:	
Comments/Abundance Notes:				
#3 Riff/Run: embeddedness or #3 Glide/	tat Impairmer Pool: substrate			Metric Score
less (20 or less for warm water, low gradient streams)  #9 Condition of Banks + #10 Bank Vegetation = 24 or less (20 or less for warm water, low gradient				
Total habitat score 140 or less for forested, cold water, high gradient streams (120 or less for warm water, low gradient streams)				170
Habitat Comments:				
Use this block to describe condition		attainment/i		core <63 and >53.
^Common descriptors: Water Odors - none Turbidity - clear slight turbid opaque, NPS f petroleum chemical anaerobic; Sediment Oils other. Are the undersides of stones deeply e	ollution - no evi - absent slight	dence some po moderate profus	tential obvious Sediment Odors - none	normal sewage

# APPENDIX F PROFESSIONAL QUALIFICATIONS

### Aaron S. Clauser, PhD, CPESC

At Clauser Environmental, LLC, he serves as the technical/production lead on scientific projects. Dr. Clauser earned his bachelor's degree in Biology and Environmental Studies from East Stroudsburg University of Pennsylvania and a doctorate in Environmental Science from Lehigh University. Dr. Clauser is a Certified Professional in Erosion and Sediment Control. He served as an environmental regulator with the Berks and Schuvlkill Conservation Districts where he performed at both the technician and managerial levels. Dr. Clauser consulted as a Senior Environmental Scientist and Project Manager for RETTEW Associates, Inc. He has given oral presentations at conferences held by the Ecological Society of America, American Society of Limnology and Oceanography, Coldwater Heritage Partnership, Partnership for the Delaware Estuary, Delaware Riverkeeper, Pocono Comparative Lakes Program and Schuvlkill and Berks Conservation Districts and has collaborated on an article published about Pacific Northwest amphibians in a peer-reviewed journal. Dr. Clauser has completed numerous training courses including DEP sponsored NPDES, Chapter 102 and 105 technical seminars, Applied Fluvial Geomorphology for Engineers (FGE) by Wildland Hydrology, Inc., and Environmentally Sensitive Maintenance of Dirt and Gravel Roads Training. Dr. Clauser served in the PA Air National Guard where he attained the rank of Staff Sergeant. His doctoral dissertation entitled "Zooplankton to Amphibians: Sensitivity to UVR in Temporary Pools" includes quantitative optical and organismal level models that are extended to landscape level variations in pool optical properties and population level sensitivity to Ultraviolet Radiation.

#### Kora S. Clauser, BS

Kora works as a biologist with Clauser Environmental, LLC. She has experience with watershed studies, wetland delineation, scientific field investigations, and project delivery. She is currently working towards an M.B.A degree at Lehigh University. She completed her B.S. in Biological Science with a minor in Psychology at Rowan University.

#### Krista S. Clauser, MEd

As the president of Clauser Environmental, LLC, she is responsible for overall client satisfaction, quality assurance, educational outreach programs, and project management. Krista has her bachelor's degree in Special Education and Elementary Education from Kutztown University of Pennsylvania. She has her Master of Education degree from the University of Georgia, with a concentration in Learning, Leadership, and Organization Development. Krista has completed additional graduate level coursework at Kutztown University of Pennsylvania and Indiana Wesleyan University. Currently, she is a doctoral student, pursuing her EdD at Drexel University in Leadership and Management, concentrating in Creativity and Innovation. She is a certified yoga teacher, breathwork coach, reiki teacher, and qi gong teacher. She has experience as a special education teacher at Schuylkill Intermediate Unit and as a homeschool educator at the elementary, middle, and high school levels. Krista has expertise in integrating environmental/outdoor curricula into a diversity of subjects and educational settings.