

Coldwater Conservation Plan for Ash Creek
Clifton Township, Lackawanna County
2016 Coldwater Conservation
Planning Grant

Prepared by

North Pocono C A R E

[Citizens Alert Regarding the Environment]

123 Bear Lake Road

Thornhurst, PA 18424

Submitted to:

Coldwater Heritage Partnership

450 Robinson Lane

Bellefonte, PA 16823

December 2017

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North Pocono CARE
[Citizens Alert Regarding the Environment]
Coldwater Conservation Plan
For Ash Creek, Clifton Township, Lackawanna County
December 2017

Introduction and Background

North Pocono CARE (NP CARE) is a 501(c)(3) organization established in 1988. The organization is dedicated to the preservation of the upper Lehigh River and its tributaries, a unique ecosystem in a mainly forested area with rare, threatened and endangered animal and plant species. NP CARE is an all volunteer organization with approximately 80 members. It receives financial support from individual contributions, governmental organizations, foundations and others. The organization's dedication is reflected in the receipt of a technical assistance grants and subsequent training that enabled NP CARE's many volunteers to acquire the skills needed to monitor the waters in this critical area. Volunteers monitor monthly selected sites on the Lehigh River and its tributaries for temperature, pH, dissolved oxygen, conductivity and nitrite/nitrate. In addition, collection and analysis of macroinvertebrates takes place annually, introducing young people to this important indicator of water quality.

NP CARE, with the support of several municipalities, conservation districts and organizations, successfully petitioned to have the upper Lehigh River basin from the source to Tobyhanna Creek upgraded from High Quality-Cold Water Fishery to Exceptional Value (EV), providing 219 stream miles with the highest Chapter 93 designation and level of protection. The redesignation became effective in 2010. The focus of this study and conservation plan is Ash Creek, one of the tributaries of the Lehigh River that benefits from the redesignation to Exceptional Value.

Watershed/Project Area Description

Ash Creek, in Clifton Township, Lackawanna County, is a tributary to the upper Lehigh River. The Ash Creek watershed consists of Ash Creek, an unnamed tributary, Mash Creek, and Fenner Mill Run. As noted above, Ash Creek and its tributaries are Exceptional Value streams. In addition, Ash Creek from its mouth to a point in the State Game Lands approximately 2 miles upstream (41degree 14' 17.00" N x 75 degrees 33' 35.00" W) is a Class A wild trout fishery for brook trout. The Pennsylvania Fish and Boat Commission notes that 50% of this Class A wild trout stream is open to the public, but public access is far higher than that when the tributaries in State Game Lands 135 are taken into consideration. See Maps in Appendix A.

The watershed for Ash Creek, including its tributaries, is 3,510 acres. The land use is State Game Lands 135, other open land and some low density residential. In a statement regarding State Game Lands 135, the Pennsylvania Game Commission notes, "Late succession corridors will be established along all exceptional value streams and will include coniferous palustrian forest stands." Efforts to maintain such corridors are

fully supported by NP CARE. Ash Creek and its tributaries are popular with anglers, as well as those seeking to appreciate its wild beauty, for recreational as well as educational purposes.

Ash Creek, one unnamed tributary and one named tributary, Fenner Mill Run, were recently crossed by a high voltage transmission line and the resulting clearing of the right-of-way. This is part of what is called the PPL's Northeast/Pocono Reliability Project. The location and trajectory of the transmission line crossing (circled in red) is shown on PPL Map Extent 4, Real Estate Review, PPL Northeast/Pocono Reliability Project and on the Sampling Locations on Ash Creek map in Appendix A. This 150' wide right-of-way has been identified as a threat to this coldwater stream.

When PPL's Project was announced, NP CARE helped organize and conduct public meetings on the PPL line and its impact on the many upper Lehigh River's EV streams it was slated to cross between the West Pocono Substation (now Acahela) and the North Pocono Substation. When PPL filed an application with the Pennsylvania Public Utility Commission (PUC), NP CARE intervened in order to address the potential impact on Exceptional Value streams. We provided expert testimony and the testimony of area residents. The PUC approved the transmission line. However, PPL made some concessions regarding stream disturbances and riparian vegetation removal along EV streams. As stated by Michael J. Hasel, Manager of Environmental Compliance at PPL-EU, to Michael Tarconish, of the Pennsylvania Department of Environmental Protection (DEP), in his June 10, 2015 e-mail, they include the following:

PPL has agreed to adopt limited clearing for Border Zone around EV streams, which addresses NP CARE's primary concern. Although the Wire Zones* located near stream crossings will continue to be cleared of all the vegetation, except grass and herbaceous or non-woody plants, selectively clearing the Border Zones* within 150 feet of an EV stream crossing will significantly minimize the impacts to stream crossing. PPL argues that this is a reasonable compromise (sic) of competing interests.

PPL has made reasonable attempts to address NP CARE's concerns. PPL has agreed to adopt limited clearing for the Border Zone around EV streams, which addresses one of NPCARE's primary concerns. PPL has also agreed not to remove any stumps that are within 150 feet of any EV streams excepts where pole structure or foundations are located. Appendix B.

*The Wire Zone is defined as that area of the right-of-way corridor that extends from the centerline to a distance ten (10) feet from the outermost conductors. The Border Zone is defined as that area of the right-of-way corridor that extends from the limits of the Wire Zone to the limits of the easement boundary." PPL Electric Utilities Specification for Transmission Vegetation Management" Effective January 1, 2015, p. 10.

NP CARE remained active during the DEP permitting process and petitioned DEP to schedule a public hearing in Thornhurst on PPL's permit applications impacting Ash Creek and other EV streams. NP CARE and many concerned citizens and environmental organizations provided testimony at that public hearing as well as written comments. In response, DEP recognized PPL's stated concessions but did not include them or other riparian buffer requirements as DEP permit conditions.

NP CARE remained concerned about current, as well as future, detrimental effects of the PPL transmission line clearing on Ash Creek as well as other EV streams from soil disturbance, wetland compaction, loss of vegetative cover, warming of streams, increased sedimentation, and polluted runoff. An additional concern was the use of herbicides within PPL's rights-of-way and its impact on the waters, the fish, and other fauna and flora. PPL made certain concessions regarding the use of herbicides within 50 feet of streams but they were limited in scope. See Appendix B.

NP CARE has maintained an active stream monitoring program for many years, using volunteers for chemical monitoring and experts for benthic macroinvertebrate collection and analysis. Our monitoring activities at that time did not include Ash Creek, in spite of its noted value, because the stream at the point of the PPL right-of-way crossing is not readily accessible due to its location approximately one mile from the highway within gated lands owned by the Pennsylvania Game Commission.

NP CARE applied for a Coldwater Heritage Partnership Planning Grant in order to focus on Ash Creek and the potential impact of the PPL right-of-way crossing of this highly sensitive stream. With the assistance of a grant from the Coldwater Heritage Partnership, NP CARE was able to evaluate the macroinvertebrates, as well as pH, dissolved oxygen, conductivity, turbidity, temperature, nitrate/ nitrites and pesticide levels, a necessary step prior to working with others to address the detrimental impacts from this and other potential stressors.

Maps of Watershed and Study Area

The maps in Appendix A show the Ash Creek watershed including its tributaries, the location of the PPL 230 kV transmission line right-of-way as it crosses Ash Creek and its tributary (circled), and the water chemistry and macroinvertebrate sampling locations upstream and downstream from the PPL right-of-way.

Previously Existing Information and Current Data Analysis

Prior to the receipt of the Coldwater Heritage Planning Grant, NP CARE had not sampled or collected any data along Ash Creek. The Pennsylvania Department of Environmental Protection had collected data to determine the eligibility of Ash Creek for redesignation to EV, and found it to be eligible, but this study was undertaken before 2010. No recent water quality data was known to exist at the time we undertook the study.

At one point, the land along Ash Creek, according to local lore, was privately owned and used for limited farming, hunting, fishing, lumbering and associated activities until acquired by the state. The area being monitored currently is located

within State Game Lands 135 and is accessed by the public from a parking area along Clifton Beach Road. There is another parking area and access along Sandy Beach Road, but it is more remote.

The Ash Creek watershed is part of the glaciated Pocono Plateau, with expressions of gray sedimentary rock. It is located in the USGS Thornhurst Quad with parts extending north into the Moscow Quad. The stream is at an elevation of 1,640 feet, flanked by significantly higher elevations on both sides. The land along Ash Creek is 87% terrestrial northern hardwood forest, with secondary and tertiary growth of maple, beech, oak, cherry and native shrubs, plus some early successional forest habitat. There are periodic dormant season cuttings performed along access paths established by the Game Commission to allow understudy plant growth for animal consumption and protection. Access paths and bridges reinforced by PPL for maintenance of the transmission line also exist close to the sampling area. One of the bridges is adjacent to the area where samples are taken.

The PPL right-of-way on either side of Ash Creek is in a basically east-west orientation. Because of this orientation, the land along this portion of Ash Creek is exposed to sunlight from dawn to dusk, with only limited shade afforded to the stream.

In the Spring of 2016, NP CARE volunteers established two sites along Ash Creek, one above the PPL transmission line clearing and one below it that volunteers could access for water sampling and observation. Volunteers monitored air and water temperature, pH, turbidity, conductivity, nitrate/nitrites and dissolved oxygen on a monthly basis, and at selected additional times to capture the impact of storm events. As a way to expedite collection at this remote location and improve accuracy, a handheld meter was purchased to measure water temperature, pH, turbidity, conductivity and dissolved oxygen. Data collection upstream and downstream of the transmission line right-of-way allowed us to determine whether there were other stressors upstream of the right-of-way and determine the impact of the PPL right-of-way itself. The results of the data collection are attached as Appendix C.

Macroinvertebrate collection and analysis was performed by Aquatic Resource Consulting, with the assistance of volunteers, on May 2, 2016 and May 9, 2017. The sampling locations are indicated on the Sampling Locations on Ash Creek map in Appendix A. The Macroinvertebrate Reports are attached as Appendix D.

A pesticide sampling and analysis was performed on October 11-12, 2016. It was intended that this be a baseline study before the application of any herbicides; however, PPL contractors had already applied some herbicides prior to sampling. Seewald Laboratories, Inc. herbicide analysis is attached as Appendix E.

NP CARE worked with its partners the Pennsylvania Game Commission, the Lackawanna Conservation District, and PPL and shared data with them. In addition, NP CARE held two public meetings at the Thornhurst Fire Hall and invited the public, the Game Commission, PPL, and township and county officials. The public meetings were well attended and Aquatic Resource Consulting's Don Baylor, Joseph Kasulaitis from NP CARE, and Alana Roberts (Community Relations) and Michael Trotta

(Forester, Northeast Region) from PPL were helpful in explaining the findings and options. The minutes from the public hearings are attached as Appendix F.

Areas of Concern and Opportunity

The findings from the studies of Ash Creek have determined the areas of concern and opportunities in the Ash Creek watershed going forward. Generally, NP CARE found that there was less impact from the transmission line clearing than we initially thought there would be. This is due in large part to the agreement between PPL and NP CARE regarding activities within 150 feet of EV stream crossings. As noted above, PPL agreed to engage in limited clearing in the Border Zone around EV streams, and more extensive clearing only in the Wire Zone leaving only grass and herbaceous or non-woody plants. In addition PPL did not take heavy machinery into this area and did not grub out stumps. These practices made a difference in protecting the stream.

The macroinvertebrate results for 2016 and 2017 show the index of biotic integrity (IBI) scores were very similar at stations above and below the power line crossing. "No impairment was indicated between the stations. Invertebrates were abundant, and intolerant taxa were well represented." (Benthic Macroinvertebrates of Ash Creek, Tributary to the Upper Lehigh River for North Pocono C A R E, May 2, 2016 and May 9, 2017, p.2. Executive Summary.) Don Baylor went on to note that the scores were slightly better in 2017 than 2016, perhaps indicating some healing. Appendix D.

The herbicide analysis showed that neither herbicides nor surfactants were detected in the stream at the time of sampling. Appendix E.

The water quality data from thirteen months showed no noted difference between the upstream and downstream stations, except for water temperature. Here, there was a difference of 1 degree centigrade during the summer months. The basic east-west trajectory of the power line cut and the reduced vegetation provide little shade for Ash Creek during the summer months. It is believed that this contributes to the temperature difference. This is viewed as an area of concern and an opportunity for improvement going forward. See Appendices C and G.

Another concern noted was the introduction of invasive plants into the watershed, perhaps tracked in by construction vehicles. This too is viewed as an area in which NP CARE should engage in further study.

Recommendations

It is recommended that NP CARE continue to monitor the conditions on Ash Creek. Volunteers should continue to monitor temperature, pH, turbidity, conductivity, nitrate/nitrites and dissolved oxygen at least four (4) times a year. It is recommended that professional services be retained to continue the collection and analysis of macroinvertebrates both upstream and downstream of the transmission line right-of-way at least every 2-4 years. In addition, volunteers should collect periodic samples for pesticide analysis (glycophate or others if necessary) to be taken to an approved diagnostic laboratory for analysis. The sampling should be timed to follow any application of herbicides by PPL or its contractors, which is slated to occur next in 2020.

In addition, it is recommended that NP CARE engage in the planting of appropriate flora along exposed riparian edges within the transmission line right-of-way to allow temperatures within the coldwater stream to stabilize and to protect native brook trout populations. It is recommended that NP CARE work with PPL, state agencies, local scouting organizations and area schools in order to secure the plantings, attract funding and other assistance with the project. A coordinated approach with PPL is necessary, given the federal and state regulatory requirements regarding transmission line right-of-way maintenance and PPL's concerns regarding plantings of over a certain height. In addition, since the Pennsylvania Game Commission is the property owner, it is recommended that NP CARE work with this agency to secure plants and access. The goal of the project is to provide vegetative planting and regrowth, in order to shade Ash Creek and protect it from excessive solar heating.

NP CARE is developing a list of plants based on those that are readily available from sources such as the Pennsylvania Game Commission and other state agencies, PPL and Pennsylvania universities. An emphasis will be placed on native species that are appropriate for riparian areas, are relatively deer resistant and under 10-15' in height. It is recommended that the first planting be undertaken in the Spring of 2018. This would be the first planting project undertaken by NP CARE.

It is also recommended that NP CARE closely monitor invasive plant species within the transmission line right-of-way and access roads. NP CARE volunteers should secure the cooperation of local universities as well as PPL and others in order to identify the invasive plants and development of a management approach. The plantings along Ash Creek will help to discourage invasive plants, as well as control runoff and provide shade.

Future Funding Opportunities and Potential Partners

NP CARE would like to pursue monetary and plant donations from several sources. PPL and some state agencies have indicated their willingness to help in this effort, but neither funds nor plant commitments have been secured to date.

NP CARE will reach out to local schools and scout groups with the assistance of the Department of Conservation and Natural Resources that maintains a list of available groups in our area. These groups would be helpful in tree/bush planting along Ash Creek. If this effort is successful on Ash Creek, NP CARE would consider undertaking a similar project in the riparian area where the transmission line crosses Choke Creek, located in the Pinchot State Forest, Thornhurst Township, Lackawanna County.

NP CARE will continue to seek the assistance of Natural Lands and Wildlands Conservancy, both of which have help in the past with mapping and outreach projects.

NP CARE will continue to coordinate all monitoring efforts with Trout Unlimited chapters, the Pennsylvania Game Commission, the Pennsylvania Fish and Boat Commission, Clifton Township and Lackawanna Conservation District.

Volunteers, which comprise the membership of NP CARE, will continue to be the major source of support and legwork for task completion.

NP CARE will maintain open communication with PPL's forester to promote continued cooperation in the protection of Ash Creek.

Summary and Conclusions:

Ash Creek water quality data from 2016 and 2017 indicate that the stream has not been substantially impacted by the PPL transmission line right-of-way to date. This is due in large part to the agreement reached between NP CARE and PPL to provide for selective cutting in a large part of the riparian corridor along Ash Creek.

Macroinvertebrate studies suggest that Ash Creek continues to be a healthy breeding stream for the highly sensitive macroinvertebrates that feed the native brook trout. Water quality data also indicates that the stream retains suitable habitat for brook trout.

However, the comparison of water temperatures upstream and downstream shows a slight increase in temperature downstream of the right-of-way. Shading of Ash Creek in the riparian area within the right-of-way may help to keep the coldwater stream at a temperature required by the native brook trout. Plantings of appropriate native shrubs and other plants along the stream could provide adequate shade and reduce any temperature increase downstream. It is recommended that NP CARE undertake an initial planting in the Spring of 2018.

These plantings could reduce turbidity during periods of heavy rainfall, as well. Given the steep slopes in the right-of-way, plantings may cut down on sedimentation.

It is recommended that chemical data continue to be collected above and below the right-of-way along Ash Creek at least four times per year, and macroinvertebrate analysis be performed every 2-4 years. After herbicide is applied by PPL or its contractors, it is recommended that samples be taken for pesticide analysis. NP CARE should seek funding for the macroinvertebrate and herbicide studies.






It is recommended that invasive plant species in the right-of-way and access roads be identified and monitored. NP CARE should seek the cooperation of PPL and the Game Commission for management of those species without detriment to Ash Creek.

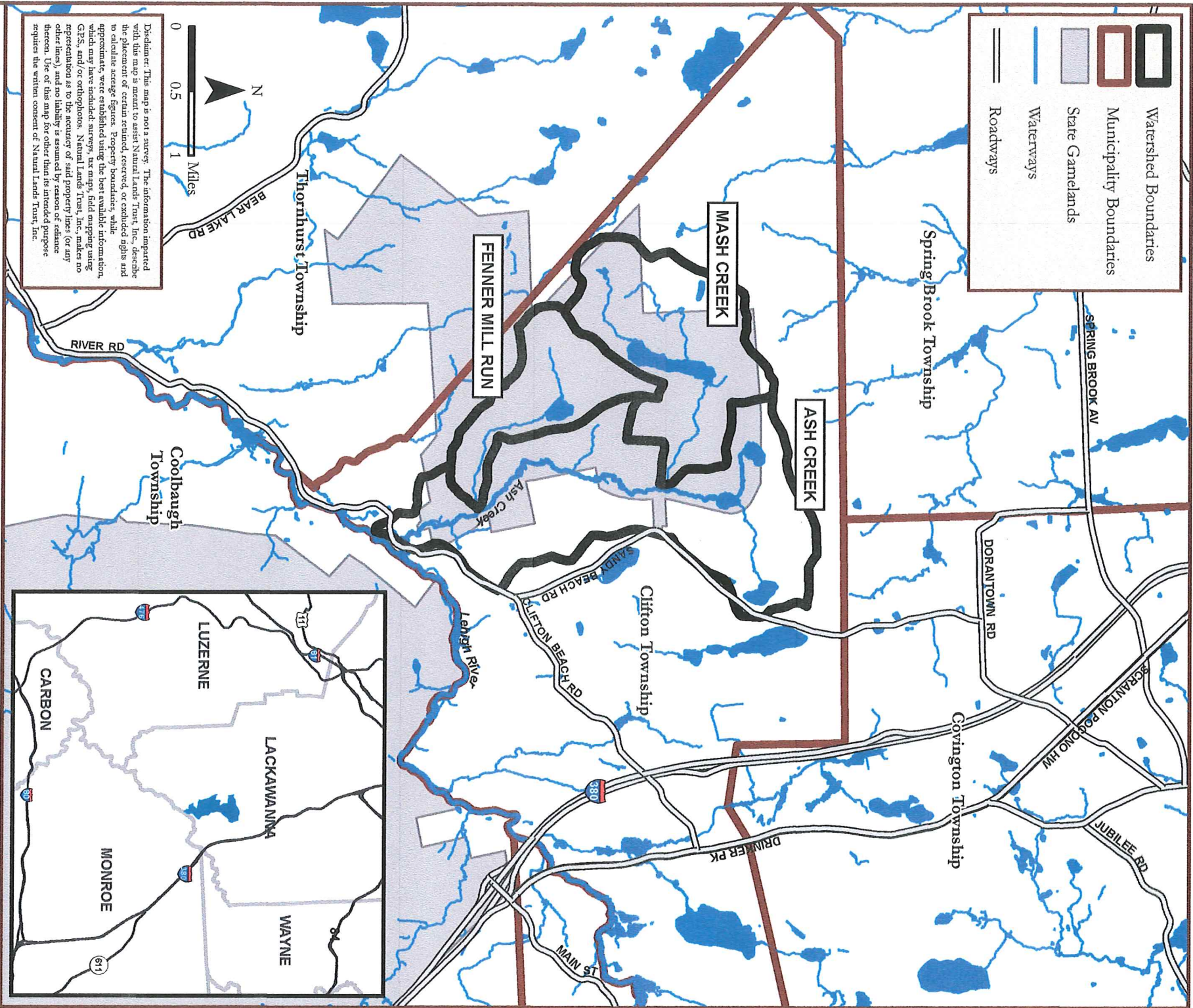
Our volunteers have been enthusiastic participants, to date, and their continued interest and involvement is crucial to the success of this project. Their interest will be maintained through continuing environmental education and other programs.

We are grateful for the cooperation and interest of the Pennsylvania Game Commission, PPL, the Lackawanna Conservation District and other state and local agencies. We look forward to working with them in the future. We also wish to express our gratitude to the Coldwater Heritage Partnership and its members: Pennsylvania Fish & Boat Commission, Pennsylvania Department of Conservation and Natural Resources, Foundation for Pennsylvania Watersheds, and Pennsylvania Council of Trout Unlimited. We could not have accomplished this in-depth study without a planning grant and other support from the Coldwater Heritage Partnership.

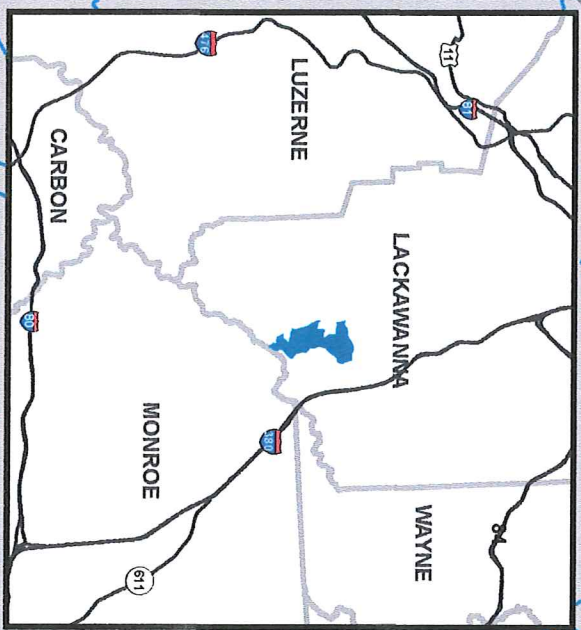
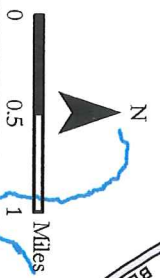
APPENDIX A

MAPS OF ASH CREEK,
ASH CREEK WATERSHED,
INCLUDING TRIBUTARIES,
AND
STREAM SAMPLING STATIONS

	Watershed Boundaries
	Municipality Boundaries
	State Game Lands
	Waterways
	Roadways



Disclaimer: This map is not a survey. The information imparted with this map is meant to assist Natural Lands Trust, Inc., describe the placement of certain retained, reserved, or excluded rights and to calculate acreage figures. Property boundaries, while approximate, were established using the best available information, which may have included surveys, tax maps, field mapping using GPS, and/or orthophotos. Natural Lands Trust, Inc., makes no representation as to the accuracy of said property lines (or any other lines) and no liability is assumed by reason of reliance thereon. Use of this map for other than its intended purpose requires the written consent of Natural Lands Trust, Inc.



Location

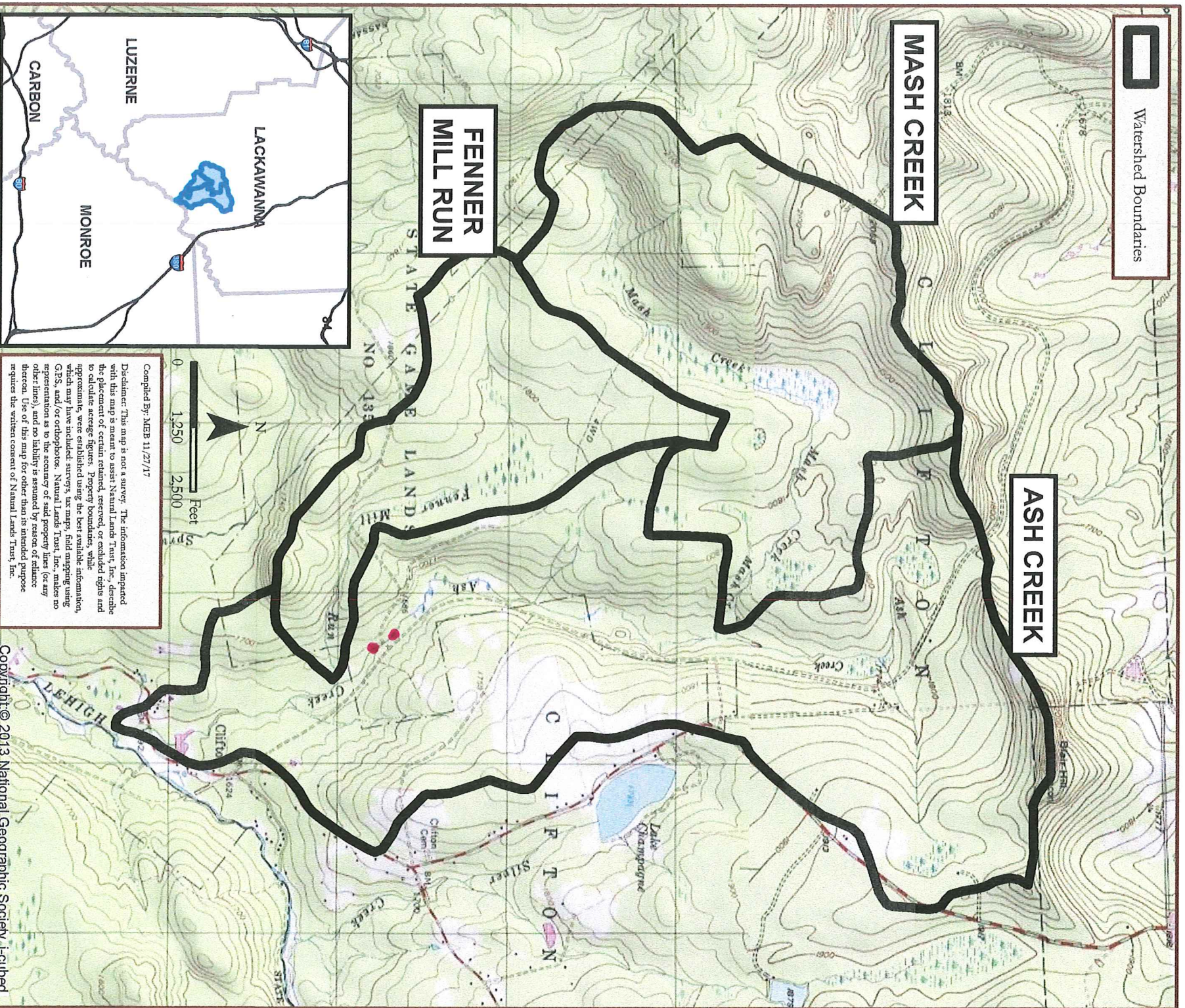
ASH CREEK WATERSHED

Clifton Township, Lackawanna County, PA

Natural Lands Trust
1031 Palmers Mill Road, Media, PA 19063
610-353-5587 ~ www.naturalands.org



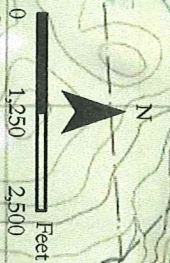
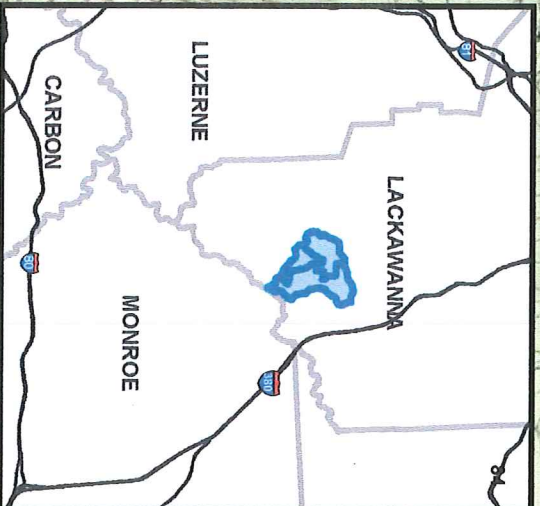
Watershed Boundaries



ASH CREEK

MASH CREEK

FENNER MILL RUN



Disclaimer: This map is not a survey. The information imparted with this map is meant to assist Natural Lands Trust, Inc., describe the placement of certain retained, reserved, or excluded rights and to calculate acreage figures. Property boundaries, while approximate, were established using the best available information, which may have included surveys, tax maps, field mapping using GPS, and/or orthophotos. Natural Lands Trust, Inc., makes no representation as to the accuracy of said property lines (or any other lines), and no liability is assumed by reason of reliance thereon. Use of this map for other than its intended purpose requires the written consent of Natural Lands Trust, Inc.

Compiled by: NEB 11/27/17

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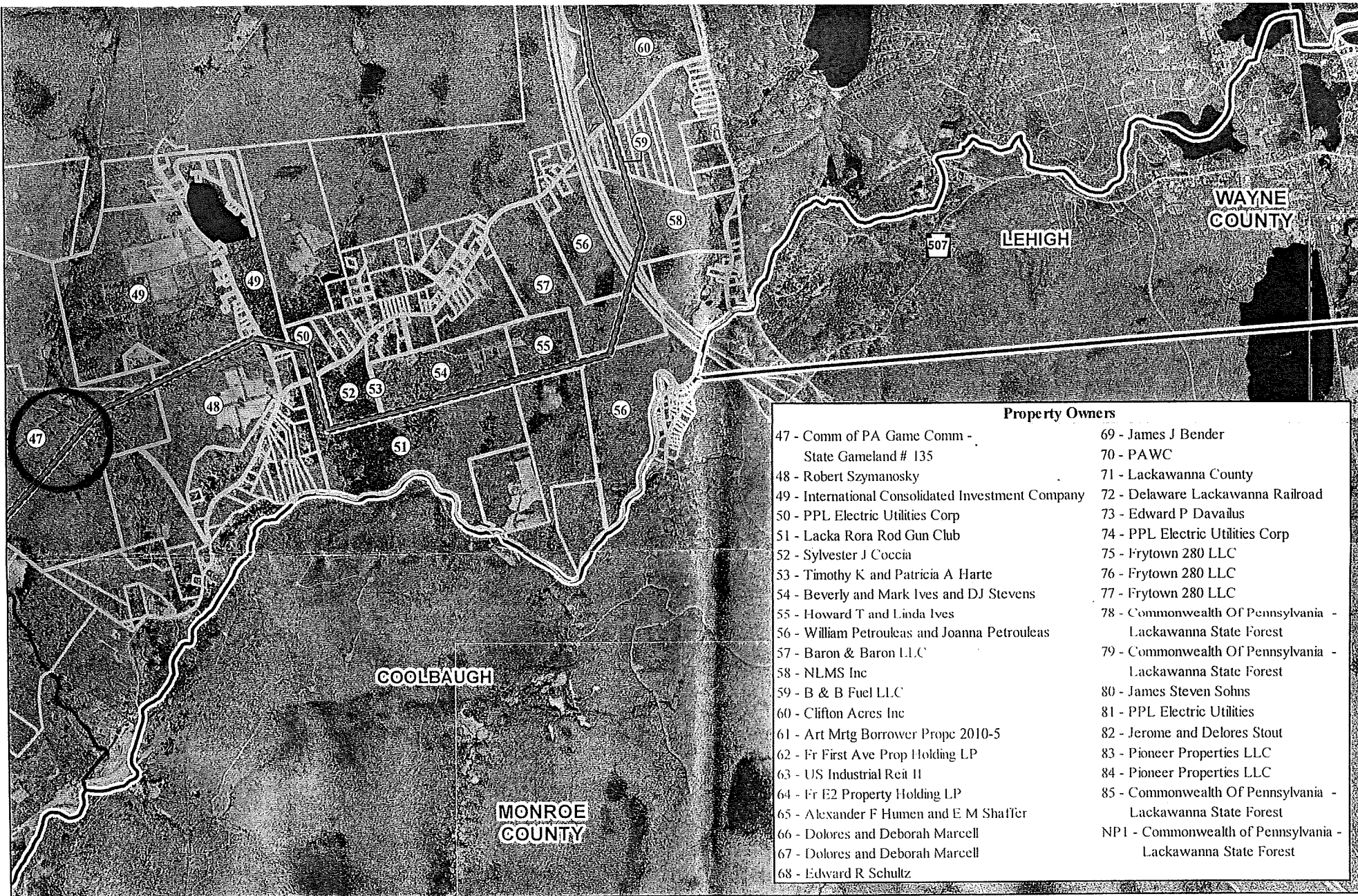
Location

ASH CREEK, MASH CREEK, AND
FENNER MILL RUN WATERSHEDS

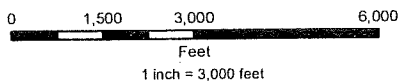
● Sampling
Stations



1031 Palmers Mill Road, Media, PA 19063
610-353-5587 | natulands.org



Property Owners	
47 - Comm of PA Game Comm - State Gameland # 135	69 - James J Bender
48 - Robert Szymanosky	70 - PAWC
49 - International Consolidated Investment Company	71 - Lackawanna County
50 - PPL Electric Utilities Corp	72 - Delaware Lackawanna Railroad
51 - Lacka Rora Rod Gun Club	73 - Edward P Davailus
52 - Sylvester J Coccia	74 - PPL Electric Utilities Corp
53 - Timothy K and Patricia A Harte	75 - Frytown 280 LLC
54 - Beverly and Mark Ives and DJ Stevens	76 - Frytown 280 LLC
55 - Howard T and Linda Ives	77 - Frytown 280 LLC
56 - William Petrouleas and Joanna Petrouleas	78 - Commonwealth Of Pennsylvania - Lackawanna State Forest
57 - Baron & Baron L.L.C	79 - Commonwealth Of Pennsylvania - Lackawanna State Forest
58 - NLMS Inc	80 - James Steven Sohms
59 - B & B Fuel LLC	81 - PPL Electric Utilities
60 - Clifton Acres Inc	82 - Jerome and Delores Stout
61 - Art Mrtg Borrower Propc 2010-5	83 - Pioneer Properties LLC
62 - Fr First Ave Prop Holding LP	84 - Pioneer Properties LLC
63 - US Industrial Reit II	85 - Commonwealth Of Pennsylvania - Lackawanna State Forest
64 - Fr E2 Property Holding LP	NP1 - Commonwealth of Pennsylvania - Lackawanna State Forest
65 - Alexander F Humen and E M Shaff'er	
66 - Dolores and Deborah Marcell	
67 - Dolores and Deborah Marcell	
68 - Edward R Schultz	



**Map Extent 4
Real Estate Review
PPL Northeast/Pocono
Reliability Project**

Legend

- Selected Route
- Selected Route ROW
- Properties within ROW
- Parcel Boundaries
- New substation location
- Municipalities

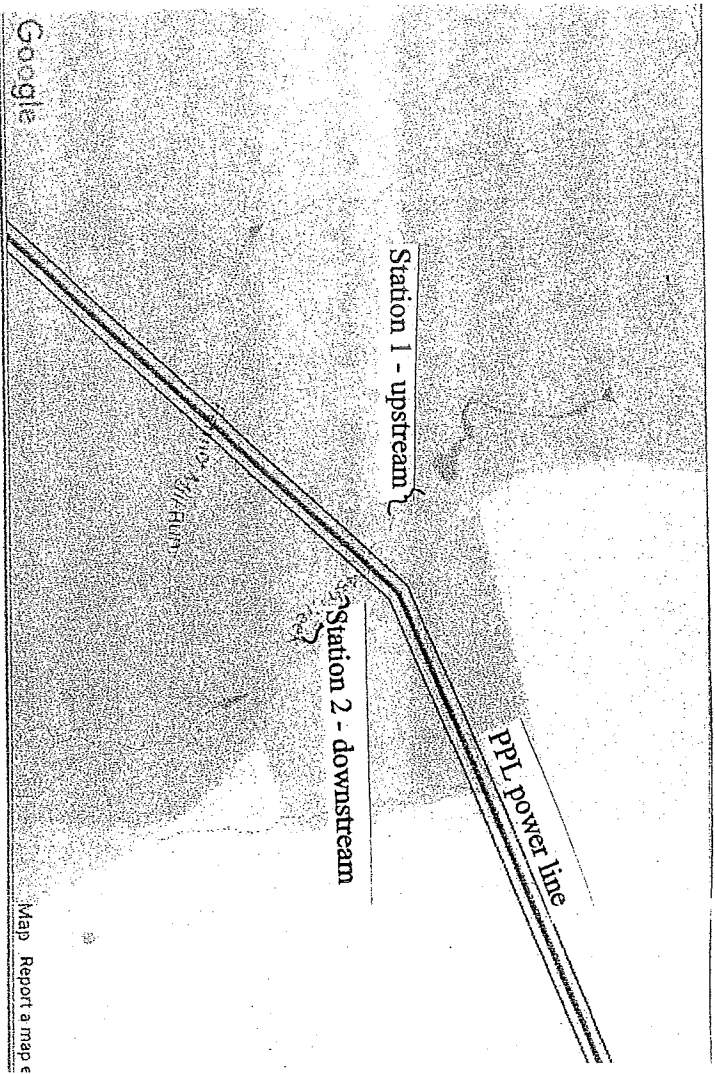


PPL Electric Utilities

NAD 1983 StatePlane Pennsylvania North
Projection Lambert Conformal Conic
Linear Unit: US Foot

PPL Transportation Data 2017
GIS State & Local Road Data provided by
Pennsylvania Department of Transportation
Municipality Boundaries provided by PennDOT
PA MAP 2008 Digital Imagery

Parcel Data generated from PPL
Metes and Bounds Survey



SAMPLING LOCATIONS ON ASH CREEK

APPENDIX B

PPL VEGETATION CLEARING AND EV STREAM BUFFER AGREEMENT

Tarconish, Michael

From: Hasel, Michael J <mjhasel@pplweb.com>
Sent: Wednesday, June 10, 2015 2:31 PM
To: Tarconish, Michael
Cc: Hasel, Michael J; Barry Baker (barry.baker@aecom.com); Townsend, Ryan S; deborah.poppel@aecom.com
Subject: PPL Pocono Permit - Veg & EV Stream Buffer Response

Mike,

This email is a follow-up to our call today regarding the enhanced veg clearing around high quality streams. This question was raised to you by the PA Fish & Boat Commission as part of the permit review process. As we discussed today, the veg clearing was a topic of interest (from the public) during the siting process for which PPL EU agreed to several items. These responses to public input are now part of the PUC's Official Order for the project approval. Below are the specific items agreed to around veg clearing near streams and the one reference to PGC I could find.

- Finding of Fact 317 - PPL does not apply herbicides in the following areas or situations: pastures within 50 feet of any body of water, except that PPL will use herbicides approved for watershed/aquatic use for stump treatments, within any actively maintained orchard or cultivated planting, near susceptible crops or other non-target vegetation where drift, runoff, or vapors can cause injury; where weather conditions create excessive drift; or rights-of-way under jurisdiction of the DCNR, Pennsylvania Game Commission (PGC), PFBC, and the U. S. Park Service unless prior approval is granted by these agencies; on watershed properties, or in the vicinity of springs, irrigation ditches, or other potable water sources, unless prior approval is granted by the property owner for use of a watershed/aquatic approved herbicide; in gullies or ravines where tree clearing is minimal. PPL St 7-R, p. 11
- RD page 174 - PPL has agreed to adopt limited clearing for Border Zone around EV streams, which addresses NP CARE's primary concern. Although the Wire Zones located near stream crossings will continue to be cleared of all the vegetation, except grass and herbaceous or non-woody plants, selectively clearing the Border Zones within 150 feet of an EV stream crossing will significantly minimize the impacts to stream crossing. PPL argues that this is a reasonable compromise of competing interests. PPL R.B. p. 65.
- RD page 187 - PPL has made reasonable attempts to address NP CARE's concerns. PPL has agreed to adopt limited clearing for the Border Zone around EV streams, which addresses one of NP CARE's primary concerns. PPL has also agreed not to remove any stumps that are within 150 feet of any EV streams except where pole structure or foundations are located.

If you should have any further questions, please do not hesitate to call me.

Michael Hasel, PMP | Manager – Environmental Compliance, EU
Technical Development & Improvement | Cell | 4701 737-1530, office | (84) 951-4273 | mjhasel@pplweb.com



PPL EU
1639 Chulock Street
Allentown, PA 18104-9342

Don't forget to visit the [TD&I website](#) to find answers to your common questions!

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APPENDIX C

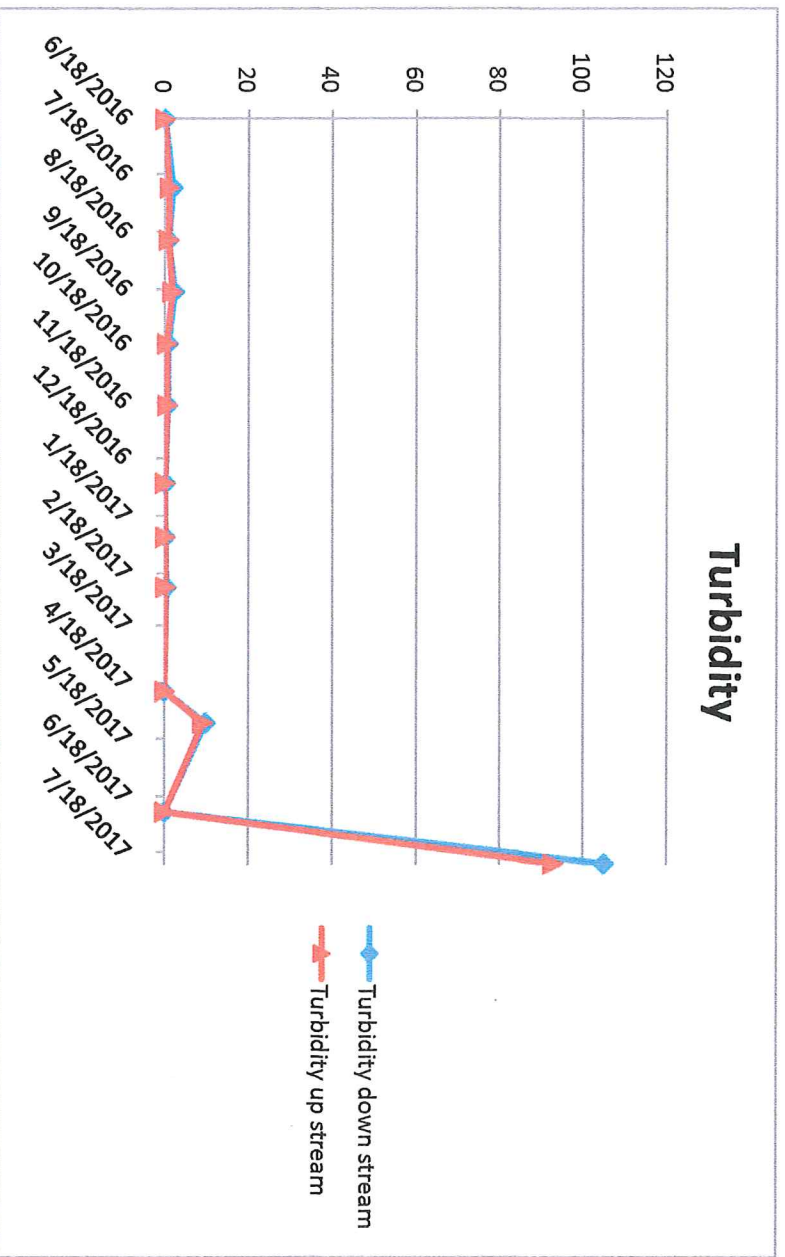
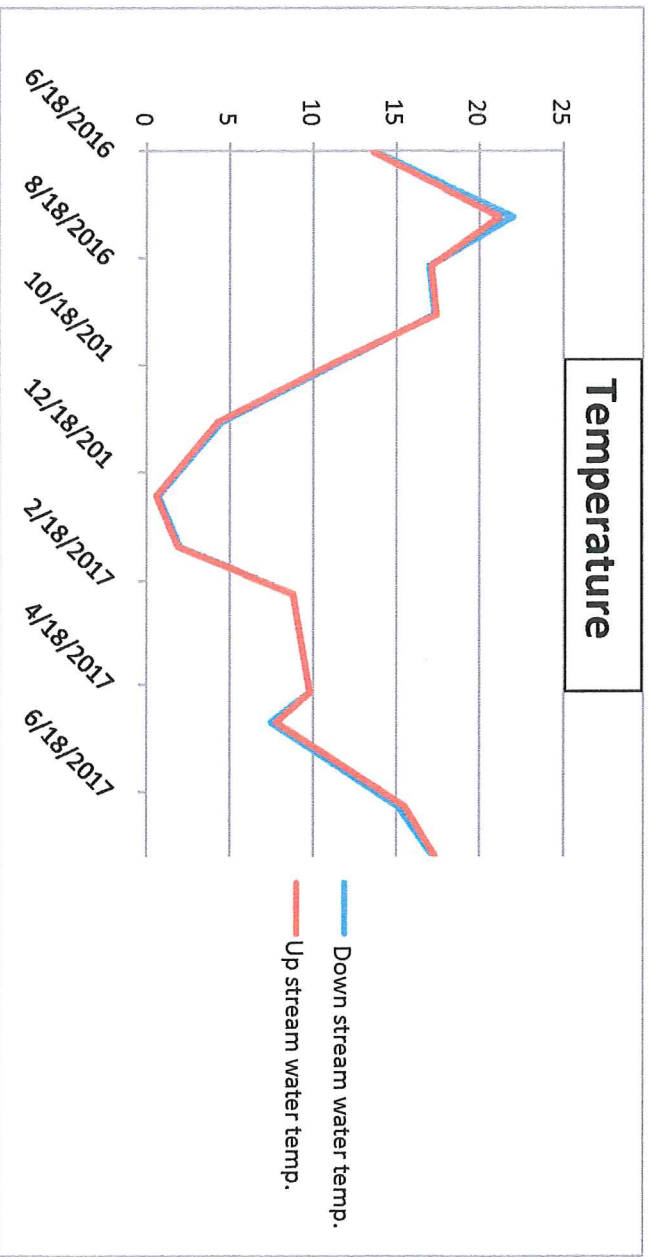
WATER QUALITY CHEMISTRY

stream	location	date	time	air temp C	c.weather	past 24hr weather	DO	water temp.	pH	Nitrate-N	Conductivity	Turbidity
Ash Creek	up	6/18/16	8:00	16	clear	clear	7.32	13.6	6.24	0	30.9	0
Ash Creek	up	7/25/16	12:15	28	overcast	clear	6.41	21.2	6.42	0	39.3	1.1
Ash Creek	up	8/22/16	9:30	17	clear	rain(steady)	6.89	17.1	6.05	0	29.9	0.9
Ash Creek	up	9/19/16	12:30	21	overcast	rain(steady)	7.5	17.4	6.57	0	33.7	1.8
Ash Creek	up	10/17/16	10:00	19	overcast	clear	8.75	11.1	7.19	0	42.8	0.5
Ash Creek	up	11/19/16	8:25	4	clear	clear	11.7	4.3	6.75	0	42.7	0.6
Ash Creek	up	12/31/16	13:15	n/a	clear	clear	13.38	0.6	6.62	0	29.2	0
Ask Creek	up	1/29/17	15:30	n/a	clear	clear	13.3	1.9	6.78	0	28.2	0.1
Ash Creek	up	2/25/17	9:00	n/a	overcast	rain(steady)	10.08	8.8	6.33	0	28.1	0.2
Ash Creek	up	4/22/17	8:40	13	overcast	overcast	9.83	9.8	6.43	0	27.1	0
Ash Creek	up	5/9/17	10:05	15	clear	overcast	11.29	7.8	6.6	0	28.3	9.2
Ash Creek	up	6/26/17	10:09	n/a	clear	clear	7.66	15.5	6.24	0	32	0
Ash Creek	up	7/24/17	10:48	20	overcast	rain(heavy)	7.63	17.3	5.15	0	20.8	93

Ash Creek Water Sampling
Up Stream of PPL Transmission Line Right-of-Way

stream	location	date	time	air temp C	weather	past 24hr weather	DO	water temp.	pH	Nitrate-N	Conductivity	Turbidity
Ash Creek	down	6/18/16	7:45	16	clear	clear	8	13.7	6.63	0	30.9	0.1
Ash Creek	down	7/25/16	12:00	27	overcast	clear	7.61	22	6.56	0	38.4	1.91
Ash Creek	down	8/22/16	9:15	16	clear	rain(steady)	7.91	17	6.16	0	30	0.9
Ash Creek	down	9/19/16	12:30	22	overcast	rain(steady)	7.94	17.3	6.85	0	33.8	2.3
Ash Creek	down	10/17/16	9:45	18	overcast	clear	9.26	11.3	7.52	0	43.8	0.8
Ash Creek	down	11/19/16	8:15	4	clear	clear	12	4.5	7	0	43.1	0.7
Ash Creek	down	12/31/16	13:00	n/a	clear	clear	13.44	0.7	7.62	0	29.3	0.2
Ash Creek	down	1/29/17	15:10	n/a	clear	clear	12.95	2	7.4	0	28.6	0.2
Ash Creek	down	2/25/17	8:54	n/a	overcast	rain(steady)	10.15	8.8	6.68	0	28.2	0.4
Ash Creek	down	4/22/17	8:20	13	overcast	overcast	10.1	9.8	6.63	0	28.2	0
Ash Creek	down	5/9/17	9:30	15	clear	overcast	11.5	7.5	6.6	0	27	9.8
Ash Creek	down	6/26/17	10:00	n/a	clear	clear	8.48	15.1	6.75	0	31.8	0
Ash Creek	down	7/24/17	9:30	20	overcast	rain(heavy)	8.02	17.2	5.79	0	21.2	105

Ash Creek Water Sampling
Down Stream of PPL Transmission Line Right-of-Way



Comparison of Up Stream and Down Stream Parameters of Concern - Temperature and Turbidity

APPENDIX D

MACROINVERTEBRATE REPORTS

By

Aquatic Resource Consulting

May 2, 2016

May 9, 2017

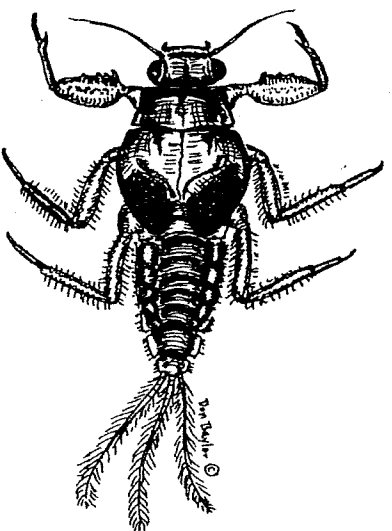
BENTHIC MACROINVERTEBRATES OF ASH CREEK

TRIBUTARY TO THE UPPER LEHIGH RIVER

FOR

NORTH POCONO CARE

MAY 2, 2016



Submitted by:

Don Baylor

For

Aquatic Resource Consulting

521 Quail Ridge

Stroudsburg, PA 18360

BENTHIC MACROINVERTEBRATES OF ASH CREEK, MAY 2, 2016

BACKGROUND

On May 2, 2016, Aquatic Resource Consulting (ARC) biologist Don Baylor sampled benthic macroinvertebrates at two stations on Ash Creek, a tributary to the upper Lehigh River, Lackawanna County, PA. The purpose of the study was to assess potential impact of the PPL power line crossing to the water quality of Ash Creek. North Pocono C A R E volunteers sampled water chemistry at the same time and stations.

Aquatic macroinvertebrates are preferred indicators of stream water quality because of their limited mobility, one to three year life cycles, and specific sensitivities to pollutants. Clean streams usually support numerous species of invertebrates, theoretically evenly represented numerically. Impairment may be indicated by low taxa richness, shifts in community balance toward dominance of pollution-tolerant forms, or overall scarcity of invertebrates (Platkin, et al. 1989). In order to assure an accurate assessment, recent work in bio-monitoring stresses the use of several parameters, or metrics, to measure different components of the community structure.

EXECUTIVE SUMMARY

Index of biotic Integrity (IBI) scores were very similar at stations above and below the power line crossing. No impairment was indicated between the stations. Invertebrates were abundant, and intolerant taxa were well represented. IBI scores indicated Aquatic Life Use attainment at both stations according to PA DEP criteria.

BENTHIC MACROINVERTEBRATES OF ASH CREEK, MAY 2, 2016

METHODS

Macroinvertebrate sampling methods followed those recommended by the US Environmental Protection Agency Protocol III (Plafkin, et al., 1989) with the latest modifications adopted by the PA Department of Environmental Protection for riffle/run freestone streams (PA DEP, 2012). At each station, six samples were taken with a D-frame kick net (Wildlife Supply Company #425-D5) of 500u nitex from the best riffle/run areas in a one hundred meter stretch. Samples were taken by placing the net against the substrate and disturbing approximately one square meter above the net by foot for one minute. Organisms and debris were composited for each station in a plastic container and preserved in alcohol for transport to the laboratory. Habitat was evaluated at each station using DEP's Water Quality Network Habitat Assessment forms for streams with riffle/run prevalence. Twelve habitat parameters were ranked on a scale of 1-20 and combined for a total habitat score.

In the laboratory, samples were rinsed in a USGS No. 35 sieve and placed in a white pan marked with a grid to delineate 28 squares measuring two inches on a side. Organisms were then picked from randomly selected grids until 200 organisms +/- 20% were obtained. Organisms were identified to the lowest taxonomic level practicable, enumerated, and assigned a pollution tolerance value (PA DEP, 2009). Metrics for riffle/run freestone streams were calculated for each subsample, including total taxa richness, Ephemeroptera + Plecoptera + Trichoptera taxa richness (EPT), Modified Beck's Index, Hilsenhoff biotic index, Shannon diversity index, and percent sensitive individuals. A description and brief rationale for each of the metrics follow:

1. **Total Taxa Richness** – is an index of diversity. The number of taxa (kinds) of invertebrates indicates the health of the benthic community through measurement of the variety of species present. Generally, number of species increases with increased water quality. However, variability in natural habitat (stream order and size, substrate composition, current velocity) also affects this number.

BENTHIC MACROINVERTEBRATES OF ASH CREEK, MAY 2, 2016

2. **Ephemeroptera, Plecoptera, and Trichoptera Taxa Richness (PTV 1-4)**
 Mayflies, stoneflies, and caddisflies, collectively referred to as EPT, are generally considered pollution sensitive (Plafkin et al. 1989). Thus, the total number of taxa within the EPT insect groups is used to evaluate community balance. This metric has been modified to include only the EPT taxa with pollution tolerance values of 1-4. Healthy biotic conditions are reflected when these taxa are well represented in the benthic community.

3. **Modified Beck's Index** is a weighted count of taxa with pollution tolerance values of 0, 1, or 2. This metric is expected to decrease in value with increasing anthropogenic stress to a stream ecosystem, reflecting the loss of pollution sensitive taxa. It is calculated by multiplying by 3 the number of taxa with a pollution tolerance value of 0, multiplying by 2 the number of taxa with a pollution tolerance value of 1, and multiplying by 1 the number of taxa with a pollution tolerance value of 2. The three values are added to yield the Modified Beck's Index score.

4. **Hilsenhoff Biotic Index** – is a direct measure of organic pollution in streams. The biotic index value is the mean tolerance value of all organisms in a sample. Tolerance values range from 0.00 to 10.00; the higher the value, the greater the level of pollution indicated.

Table 1. Evaluation of water quality using biotic index values (Hilsenhoff, 1987)

BIOTIC INDEX	WATER QUALITY	DEGREE OF ORGANIC POLLUTION
0.00-3.50	Excellent	None Apparent
3.51-4.50	Very Good	Possible Slight
4.51-5.50	Good	Some
5.51-6.50	Fair	Fairly Significant
6.51-7.50	Fairly Poor	Significant
7.51-8.50	Poor	Very Significant
8.51-10.00	Very Poor	Severe

BENTHIC MACROINVERTEBRATES OF ASH CREEK, MAY 2, 2016

5. **Shannon Diversity Index** measures taxonomic richness and evenness of numbers of individuals across the taxa of a subsample. This metric is expected to decrease in values with increased anthropogenic stress to a stream ecosystem, reflecting loss of pollution-sensitive taxa and predominance of a few pollution-tolerant taxa.

6. **Percent Sensitive Individuals** is the percentage of individuals in the subsample with pollution tolerance values of 0-3. It is expected to decrease in value with increasing anthropogenic stress to a stream ecosystem.

INDEX CALCULATION

An overall index is used to integrate information from these various metrics and standardize them into one score. The values for any standardized core metric are set to a maximum value of 1.00, with values closer to zero corresponding to increasing deviation from the expected reference condition and progressively higher values corresponding more closely to the biological reference condition. The adjusted standardized metric values for the six core metrics are averaged and multiplied by 100 to produce an index of biotic integrity (IBI) score ranging from 0-100. The following table shows metric standardization equations and index calculations for the sub-sample from Station 1 on Ash Creek using DEP's smaller stream values.

Table 2. Metric standardization and index of biotic integrity calculations for the benthic macroinvertebrate sample from the upper Station 1 on Ash Creek on May 2, 2016.

Metric	Standardization Equation	Observed Metric Value	Standardized Metric Score	Adjusted Standardized Metric Score Maximum =1.00
Total Taxa Richness	Observed value / 33	24	0.727	0.727
EPT Taxa Richness	Observed Value/ 19	15	0.789	0.789
Modified Beck's Index	Observed value/38	33	0.868	0.868
Shannon Diversity Index	Observed value / 2.86	1.88	0.657	0.657
Hilsenhoff Biotic Index	10-observed value/ (10-1.89)	3.64	0.784	0.784
Percent Sensitive Individuals	Observed value / 84.5	47.71	0.565	0.565
Average of adjusted standardized core metric scores x 100 = IBI score				73.17

BENTHIC MACROINVERTEBRATES OF ASH CREEK, MAY 2, 2016

SAMPLING STATIONS

Two stations were sampled for benthic macroinvertebrates on Ash Creek, one above the PPL power line crossing at coordinates 41 degrees 13.860/075 degrees 33.473 and a second one below at 41 degrees 13.827/075 degrees 33.423 (Figure 1).

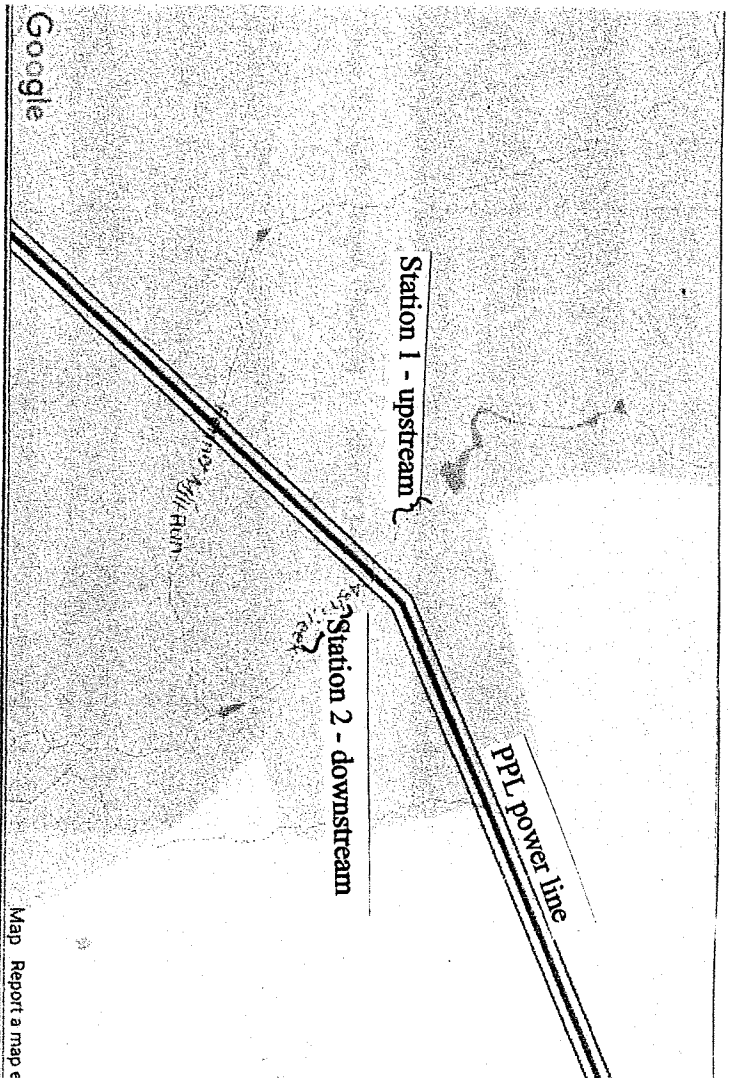


Figure 1. Map of sites on Ash Creek sampled for benthic macroinvertebrate on May 2, 2016.

BENTHIC MACROINVERTEBRATES OF ASH CREEK, MAY 2, 2016



Figure 2. Ash Creek Station 1 - above the PPL power line crossing.



Figure 3. Ash Creek Station 2 - below the PPL power line crossing.

BENTHIC MACROINVERTEBRATES OF ASH CREEK, MAY 2, 2016

RESULTS AND DISCUSSION

Benthic Macroinvertebrate Communities

Table 3 shows the taxa, numbers, and biotic index pollution tolerance value (PT) for benthic macroinvertebrate subsamples from Ash Creek on May 2, 2016. . Table 4 shows metrics and IBI scores for those samples according to DEP's 2012 protocols.

Table 3			
Taxa, numbers, and biotic index pollution tolerance value (PT) for benthic macroinvertebrate samples from Ash Creek on May 2, 2016.			
TAXA	STATION 1 UPSTREAM	STATION 2 DOWNSTREAM	PT
Ephemeroptera (mayflies)			
<i>Epeorus spp.</i>	1	4	0
<i>Maccaffertium spp.</i>	4	3	3
<i>Ephemerella spp.</i>	49	55	1
<i>Seratella spp.</i>	1	1	2
<i>Paraleptophlebia spp.</i>	14	-	1
<i>Baetis spp.</i>	4	2	6
<i>Acerpenna spp.</i>	1	-	6
<i>Dipheter spp.</i>	-	1	6
Trichoptera (caddisflies)			
<i>Rhyacophila spp.</i>	1	3	1
<i>Dolophilodes spp.</i>	3	1	0
<i>Diplectrona spp.</i>	6	10	0
<i>Ceratopsyche spp.</i>	-	3	5
<i>Hydropsyche spp.</i>	-	1	5
<i>Micrasema spp.</i>	1	-	2
<i>Polycentropus spp.</i>	2	-	6
<i>Pycnopsyche spp.</i>	-	1	4
Plecopters (stoneflies)			
<i>Pteronarcys spp.</i>	2	1	0
<i>Tallaperla spp.</i>	3	-	0
<i>Acroneuria spp.</i>	4	4	0
<i>Isoperla spp.</i>	3	7	2
<i>Diploperla spp.</i>	-	8	2
<i>Clioperla spp.</i>	3	-	2
<i>Swalia/Swelisa spp.</i>	-	1	0
<i>Leuctra spp.</i>	1	0	0

Table 3. continued.

TAXA	STATION 1 UPSTREAM	STATION 2 DOWNSTREAM	PT
Diptera (true flies)			
Chironomidae	104	109	6
<i>Simulium spp.</i>	2	9	6
<i>Dicranota spp.</i>	3	5	3
Odonata (dragonflies)			
<i>Cordulegaster spp.</i>	-	1	3
<i>Lanthus spp.</i>	-	2	5
<i>Gomphus spp.</i>	1	-	5
Coleoptera (beetles)			
<i>Promesia spp.</i>	4	6	2
<i>Microcylloepus spp.</i>	-	1	2
Megaloptera (helgrammites)			
<i>Nigronia spp.</i>	1	-	2
Oligochaeta (worms)	-	1	10

Table 4
Macroinvertebrate Community Metrics for Samples from Ash Creek on May 2,
2016.

METRIC	STATION 1		STATION 2	
	Observed Metric Value	Adjusted Standardized Metric Score Maximum =1.00 upper	Observed Metric Value	Adjusted Standardized Metric Score Maximum =1.00 lower
Number of Organisms	218	-	240	-
Number of Grids Picked /Subsample	4	-	6	-
Total Taxa Richness	24	0.727	25	0.758
EPT Taxa Richness	15	0.789	13	0.684
Beck's Index	33	0.868	27	0.711
Shannon Diversity	1.88	0.657	1.95	0.682
Hilsenhoff Biotic Index	3.64	0.784	3.75	0.771
Percent Sensitive Individuals	47.71	0.565	46.25	0.547
Index of Biotic Integrity (IBI) Score		73.17		69.22

BENTHIC MACROINVERTEBRATES OF ASH CREEK, MAY 2, 2016

The 3.95 point difference between the upstream Station 1 IBI score (73.17) and the downstream Station 2 IBI score (69.22) was well within the range (11 points) expected from natural variability absent anthropogenic impact (Table 4). Thus, no impairment was indicated between the stations above and below the power line crossing at the time of sampling. Extensive analysis by DEP of samples from unimpaired Special Protection Pennsylvania streams found a natural variability of up to 11 points among samples and that a difference of greater than 11 points in IBI scores is indicative of anthropogenic impairment between stations with similar habitat (DEP 2009).

For samples collected from smaller Exceptional Value streams between October and May, an IBI score of 63 or higher results in Aquatic Life Use Attainment and a score less than 63 results in Aquatic Life Use Impairment. Both stations on Ash Creek had IBI scores indicating Aquatic Life Use Attainment. Both had an abundance of mayfly, caddisfly, and stonefly taxa and individuals as expected in streams of Exceptional Value (Table 3). Mayflies tend to be the most sensitive group to acidification, so their abundance is an indication that Ash Creek has not been subject to excessive acidification. At both stations, macroinvertebrates were abundant. Only 4 and 6 of 28 grids were picked at upstream and downstream stations respectively to obtain 200 organisms + or - 20%.

The poorest observed metric value and Adjusted Standardized Metric Score at both stations were for Percent Sensitive Individuals (Table 4). This was caused largely by the predominance of chironomid (midge) larvae, which are moderately tolerant. They comprised 48% and 45% of the organisms at Stations 1 and 2, respectively (Table 3).

Habitat

The upper and lower stations were sufficiently similar that differences in benthic macroinvertebrate communities among stations would not be expected due to physical habitat within the sampling reaches. Except for the power line crossing, Ash creek is in a very natural, undisturbed setting with well vegetated banks and little bank erosion (Figures 2 and 3). Habitat scores fell within the optimal range (Table 5). Slightly poorer scores for instream cover and velocity/ dept regimes are a reflection of the small stream size.

BENTHIC MACROINVERTEBRATES OF ASH CREEK, MAY 2, 2016

Table 5
Habitat Assessment of Sampling Stations on Ash Creek May 2, 2016.

HABITAT PARAMETER	STATION 1 upper	STATION 2 lower
1. Instream Cover	14	13
2. Epifaunal Substrate	18	17
3. Embeddedness	16	16
4. Velocity/Depth Regimes	15	16
5. Channel Alteration	20	20
6. Sediment Deposition	18	18
7. Frequency of Riffles	19	17
8. Channel Flow Status	19	19
9. Condition of Banks	18	17
10. Bank Vegetative Protection	20	20
11. Grazing or Other Disruptive Pressure	20	20
12. Riparian Vegetative Zone Width	20	20
TOTAL SCORE	217	213
Score Ranges: Optimal 240-192, Suboptimal 180-132, Marginal 120-72, Poor less than 60.6.0		

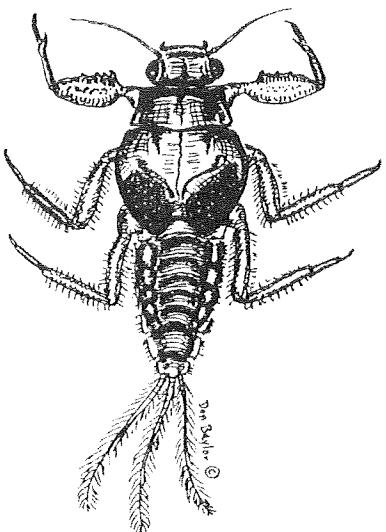
BENTHIC MACROINVERTEBRATES OF ASH CREEK, MAY 2, 2016**REFERENCES**

- Hilsenhoff, William L. 1987. An improved biotic index of organic stream pollution. *Great Lakes Entomologist*. 20(1): 31-39.
- Pennsylvania Department of Environmental Protection. 2012. An Index of Biotic Integrity for Benthic Macroinvertebrate Communities in Pennsylvania's Wadeable Freestone, Riffle-Run Streams. (draft).
- Plafkin, J. L. et al. 1989. Rapid bioassessment protocols for use in streams and rivers: Benthic macroinvertebrates and fish. EPA/440/4-98/001. U.S. Environmental Protection Agency, Office of Water Regulations and Standards, Washington, D.C. 20460.

BENTHIC MACROINVERTEBRATES OF ASH CREEK
TRIBUTARY TO THE UPPER LEHIGH RIVER

FOR
NORTH POCONO CARE

MAY 9, 2017



Submitted by:

Don Baylor

For

Aquatic Resource Consulting

521 Quail Ridge

Stroudsburg, PA 18360

BENTHIC MACROINVERTEBRATES OF ASH CREEK, MAY 9, 2017

BACKGROUND

On May 9, 2017, Aquatic Resource Consulting (ARC) biologist Don Baylor sampled benthic macroinvertebrates at two stations on Ash Creek, a tributary to the upper Lehigh River, Lackawanna County, PA. The purpose of the study was to assess potential impact of the PPL power line crossing to the water quality of Ash Creek. North Pocono C A R E volunteer sampled water chemistry at the same time and stations.

Aquatic macroinvertebrates are preferred indicators of stream water quality because of their limited mobility, one to three year life cycles, and specific sensitivities to pollutants. Clean streams usually support numerous species of invertebrates, theoretically evenly represented numerically. Impairment may be indicated by low taxa richness, shifts in community balance toward dominance of pollution-tolerant forms, or overall scarcity of invertebrates (Plafkin, et al. 1989). In order to assure an accurate assessment, recent work in bio-monitoring stresses the use of several parameters, or metrics, to measure different components of the community structure.

EXECUTIVE SUMMARY

On May 9, 2017, Index of biotic Integrity (IBI) scores were very similar at stations above and below the PPL power line crossing of Ash Creek. No impairment was indicated between the stations. Invertebrates were abundant, and intolerant taxa were well represented at stations above and below the power line crossing.

BENTHIC MACROINVERTEBRATES OF ASH CREEK, MAY 9, 2017

METHODS

Macroinvertebrate sampling methods followed those recommended by the US Environmental Protection Agency Protocol III (Plafkin, et al., 1989) with the latest modifications adopted by the PA Department of Environmental Protection for riffle/run freestone streams (PA DEP, 2012). At each station, six samples were taken with a D-frame kick net (Wildlife Supply Company #425-D5) of 500u nitex from the best riffle/run areas in a one hundred meter stretch. Samples were taken by placing the net against the substrate and disturbing approximately one square meter above the net by foot for one minute. Organisms and debris were composited for each station in a plastic container and preserved in alcohol for transport to the laboratory. Habitat was evaluated at each station using DEP's Water Quality Network Habitat Assessment forms for streams with riffle/run prevalence. Twelve habitat parameters were ranked on a scale of 1-20 and combined for a total habitat score.

In the laboratory, samples were rinsed in a USGS No. 35 sieve and placed in a white pan marked with a grid to delineate 28 squares measuring two inches on a side. Organisms were then picked from randomly selected grids until 200 organisms +/- 20% were obtained. Organisms were identified to the lowest taxonomic level practicable, enumerated, and assigned a pollution tolerance value (PA DEP, 2009). Metrics for riffle/run freestone streams were calculated for each subsample, including total taxa richness, Ephemeroptera + Plecoptera + Trichoptera taxa richness (EPT), Modified Beck's Index, Hilsenhoff biotic index, Shannon diversity index, , and percent sensitive individuals. A description and brief rationale for each of the metrics follow:

1. **Total Taxa Richness** – is an index of diversity. The number of taxa (kinds) of invertebrates indicates the health of the benthic community through measurement of the variety of species present. Generally, number of species increases with increased water quality. However, variability in natural habitat (stream order and size, substrate composition, current velocity) also affects this number.

BENTHIC MACROINVERTEBRATES OF ASH CREEK, MAY 9, 2017

2. **Ephemeroptera, Plecoptera, and Trichoptera Taxa Richness (PTV 1-4)**
Mayflies, stoneflies, and caddisflies, collectively referred to as EPT, are generally considered pollution sensitive (Plafkin et al. 1989). Thus, the total number of taxa within the EPT insect groups is used to evaluate community balance. This metric has been modified to include only the EPT taxa with pollution tolerance values of 1-4. Healthy biotic conditions are reflected when these taxa are well represented in the benthic community.

3. **Modified Beck's Index** is a weighted count of taxa with pollution tolerance values of 0, 1, or 2. This metric is expected to decrease in value with increasing anthropogenic stress to a stream ecosystem, reflecting the loss of pollution sensitive taxa. It is calculated by multiplying by 3 the number of taxa with a pollution tolerance value of 0, multiplying by 2 the number of taxa with a pollution tolerance value of 1, and multiplying by 1 the number of taxa with a pollution tolerance value of 2. The three values are added to yield the Modified Beck's Index score.

4. **Hilsenhoff Biotic Index** – is a direct measure of organic pollution in streams. The biotic index value is the mean tolerance value of all organisms in a sample. Tolerance values range from 0.00 to 10.00; the higher the value, the greater the level of pollution indicated.

Table 1. Evaluation of water quality using biotic index values (Hilsenhoff, 1987)

BIOTIC INDEX	WATER QUALITY	DEGREE OF ORGANIC POLLUTION
0.00-3.50	Excellent	None Apparent
3.51-4.50	Very Good	Possible Slight
4.51-5.50	Good	Some
5.51-6.50	Fair	Fairly Significant
6.51-7.50	Fairly Poor	Significant
7.51-8.50	Poor	Very Significant
8.51-10.00	Very Poor	Severe

BENTHIC MACROINVERTEBRATES OF ASH CREEK, MAY 9, 2017

5. **Shannon Diversity Index** measures taxonomic richness and evenness of numbers of individuals across the taxa of a subsample. This metric is expected to decrease in values with increased anthropogenic stress to a stream ecosystem, reflecting loss of pollution-sensitive taxa and predominance of a few pollution-tolerant taxa.

6. **Percent Sensitive Individuals** is the percentage of individuals in the subsample with pollution tolerance values of 0-3. It is expected to decrease in value with increasing anthropogenic stress to a stream ecosystem.

INDEX CALCULATION

An overall index is used to integrate information from these various metrics and standardize them into one score. The values for any standardized core metric are set to a maximum value of 1.00, with values closer to zero corresponding to increasing deviation from the expected reference condition and progressively higher values corresponding more closely to the biological reference condition. The adjusted standardized metric values for the six core metrics are averaged and multiplied by 100 to produce an index of biotic integrity (IBI) score ranging from 0-100. The following table shows metric standardization equations and index calculations for the sub-sample from Station 1 on Ash Creek using DEP's smaller stream values.

Table 2. Metric standardization and index of biotic integrity calculations for the benthic macroinvertebrate sample from the upper Station 1 on Ash Creek on May9, 2017.

Metric	Standardization Equation	Observed Metric Value	Standardized Metric Score	Adjusted Standardized Metric Score Maximum =1.00
Total Taxa Richness	Observed value / 33	25	0.758	0.758
EPT Taxa Richness	Observed Value/ 19	12	0.632	0.632
Modified Beck's Index	Observed value/38	18	0.474	0.474
Shannon Diversity Index	Observed value / 2.86	2.03	0.710	0.710
Hilsenhoff Biotic Index	10-observed value/(10-1.89)	2.07	0.978	0.978
Percent Sensitive Individuals	Observed value / 84.5	79.47	0.940	0.940
Average of adjusted standardized core metric scores x 100 = IBI score				74.8

BENTHIC MACROINVERTEBRATES OF ASH CREEK, MAY 9, 2017

SAMPLING STATIONS

Two stations were sampled for benthic macroinvertebrates on Ash Creek, one above the PPL power line crossing at coordinates 41 degrees 13.860/075 degrees 33.473 and a second one below at 41 degrees 13.827/075 degrees 33.423 (Figure 1 and 2).



Figure 1. Ash Creek Station 1 - above the PPL power line crossing.



Figure 2. Ash Creek Station 2 - below the PPL power line crossing.

BENTHIC MACROINVERTEBRATES OF ASH CREEK, MAY 9, 2017

RESULTS AND DISCUSSION

Benthic Macroinvertebrate Communities

Table 3 shows the taxa, numbers, and biotic index pollution tolerance value (PT) for benthic macroinvertebrate subsamples from Ash Creek on May 9, 2017. . Table 4 shows metrics and IBI scores for those samples according to DEP's 2012 protocols.

Table 3

Taxa, numbers, and biotic index pollution tolerance value (PT) for benthic macroinvertebrate samples from Ash Creek on May 9, 2017.			
TAXA	STATION 1 UPSTREAM	STATION 2 DOWNSTREAM	PT
Ephemeroptera (mayflies)			
<i>Epeorus spp.</i>	-	3	0
<i>Maccaffertium spp.</i>	-	3	3
<i>Stenacron spp.</i>	1	-	4
<i>Ephemerella spp.</i>	93	97	1
<i>Seratella spp.</i>	-	1	2
<i>Eurylophella spp.</i>	-	2	4
<i>Isonychia spp.</i>	1	-	3
<i>Paraleptophlebia spp.</i>	17	9	1
<i>Baetis spp.</i>	2	-	6
<i>Acerpenna spp.</i>	3	1	6
<i>Acentrella spp.</i>	-	1	4
Trichoptera (caddisflies)			
<i>Rhyacophila spp.</i>	-	2	1
<i>Dolophilodes spp.</i>	-	1	0
<i>Chimarra spp.</i>	2	1	4
<i>Diplectrona spp.</i>	6	5	0
<i>Ceratopsyche spp.</i>	2	-	5
<i>Hydropsyche spp.</i>	2	6	5
<i>Cheumatopsyche spp.</i>	2	-	6
<i>Micrasema spp.</i>	-	1	2
<i>Pycnopsyche spp.</i>	1	-	4
Plecopters (stoneflies)			
<i>Pteronarcys spp.</i>	2	1	0
<i>Acroneuria spp.</i>	4	3	0
<i>Isoperla spp.</i>	10	2	2
<i>Clioptera spp.</i>	10	4	2
<i>Amphinemura spp.</i>	1	-	3

Table 3. continued.

TAXA	STATION 1 UPSTREAM	STATION 2 DOWNSTREAM	PT
Diptera (true flies)			
Chironomidae	21	42	6
Ceratopogonidae	-	1	6
<i>Simulium spp.</i>	2	4	6
<i>Dicranota spp.</i>	2	-	3
<i>Antocha spp.</i>	1	-	3
<i>Hexatoma spp.</i>	-	2	2
<i>Pseudolimnophila spp.</i>	2	-	2
Odonata (dragonflies)			
<i>Boyeria spp.</i>	1	-	2
<i>Stylogomphus spp.</i>	1	-	4
Coleoptera (beetles)			
<i>Promoresia spp.</i>	-	3	2
<i>Megaloptera (helgrammites)</i>			
<i>Nigronia spp.</i>	1	3	2

Table 4
Macroinvertebrate Community Metrics for Samples from Ash Creek on May 9,
2017

METRIC	STATION 1		STATION 2	
	Observed Metric Value	Adjusted Standardized Metric Score Maximum =1.00 upper	Observed Metric Value	Adjusted Standardized Metric Score Maximum =1.00 lower
Number of Organisms	190	-	196	-
Number of Grids Picked /Subsample	7	-	5	-
Total Taxa Richness	25	0.758	24	0.727
EPT Taxa Richness	12	0.632	16	0.842
Beck's Index	18	0.474	28	0.737
Shannon Diversity	2.03	0.710	1.86	0.650
Hilsenhoff Biotic Index	2.07	0.978	2.44	0.932
Percent Sensitive Individuals	79.47	0.940	70.41	0.833
Index of Biotic Integrity (IBI) Score		74.8		78.7

BENTHIC MACROINVERTEBRATES OF ASH CREEK, MAY 9, 2017

The upstream and downstream stations on Ash Creek had very similar IBI scores on May 9, 2017 indicating no impairment from the power line crossing between stations (Table 4). In fact, the downstream IBI score was slightly superior. Extensive analysis by DEP of samples from unimpaired Special Protection Pennsylvania streams found a natural variability of up to 11 points among samples and that a difference of greater than 11 points in IBI scores is indicative of anthropogenic impairment between stations with similar habitat (DEP 2009). Station 2 downstream had an IBI score 3.9 points higher than Station 1 above the power line crossing.

For samples collected from smaller Exceptional Value streams between October and May, an IBI score of 63 or higher results in Aquatic Life Use Attainment and a score less than 63 results in Aquatic Life Use Impairment. Both stations on Ash Creek had IBI scores indicating Aquatic Life Use Attainment. Both had an abundance of mayfly, caddisfly, and stonefly taxa and individuals as expected in streams of Exceptional Value (Table 3). Mayflies tend to be the most sensitive group to acidification, so their abundance is an indication that Ash Creek has not been subject to excessive acidification. At both stations, macroinvertebrates were abundant. Only 7 and 5 of 28 grids were picked at upstream and downstream stations respectively to obtain 200 organisms + or - 20% (Table 4).

Both stations had excellent Adjusted Standardized Metric Scores for Hilsenhoff Biotic Index and Percent Sensitive Individuals, both fairly direct measures of degree of organic enrichment (Table 4). For both stations, the predominant taxon was *Ephemera* spp. mayflies with a pollution tolerance value of 1 (Table 3). This intolerant mayfly comprised approximately 49% of organisms at each station. The poorest Adjusted Standardized Metric Score was for the Modified Back's Index at Station 1. Beck's Index is calculated on number of intolerant taxa rather than intolerant individuals. Thus, despite the low Beck's Index score, Station 1 was excellent in terms of Percent Sensitive Individuals (Table 4).

Comparison of 2016 and 2017 Ash Creek Samples

Benthic macroinvertebrate samples from above and below the PPL power line crossing on Ash Creek were very similar in 2016 and 2017. IBI scores were very similar at the Station 1 upstream - 73.17 in 2016, and 74.8 in 2017. At Station 2 downstream the IBI score was 9.48 better in 2017 - 69.22 in 2016 and 78.7 in 2017. Although the 9.48 points is within the range of natural variability, it may be an indication of slight recovery since the power line was constructed. The Beck's Index score at Station 1 was poorer in 2017, but the Percent Sensitive Individuals was higher at both stations in 2017.

BENTHIC MACROINVERTEBRATES OF ASH CREEK, MAY 9, 2017**Habitat**

Habitat remained virtually unchanged from the 2016 to the 2017 sampling.

The upper and lower stations were sufficiently similar that differences in benthic macroinvertebrate communities among stations would not be expected due to physical habitat within the sampling reaches. Except for the power line crossing, Ash creek is in a very natural, undisturbed setting with well vegetated banks and little bank erosion (Figures 2 and 3). Habitat scores fell within the optimal range (Table 5). Slightly poorer scores for instream cover and velocity/ dept regimes are a reflection of the small stream size.

Table 5
Habitat Assessment of Sampling Stations on Ash Creek May 9, 2017.

HABITAT PARAMETER	STATION 1 upper	STATION 2 lower
1. Instream Cover	14	13
2. Epifaunal Substrate	18	17
3. Embeddedness	16	16
4. Velocity/Depth Regimes	15	16
5. Channel Alteration	20	20
6. Sediment Deposition	18	18
7. Frequency of Riffles	19	17
8. Channel Flow Status	19	19
9. Condition of Banks	18	17
10. Bank Vegetative Protection	20	20
11. Grazing or Other Disruptive Pressure	20	20
12. Riparian Vegetative Zone Width	20	20
TOTAL SCORE	217	213
Score Ranges: Optimal 240-192, Suboptimal 180-132, Marginal 120-72, Poor less than 60.6.0		

BENTHIC MACROINVERTEBRATES OF ASH CREEK, MAY 9, 2017**REFERENCES**

- Hilsenhoff, William L. 1987. An improved biotic index of organic stream pollution. *Great Lakes Entomologist*. 20(1): 31-39.
- Pennsylvania Department of Environmental Protection. 2012. An Index of Biotic Integrity for Benthic Macroinvertebrate Communities in Pennsylvania's Wadeable Freestone, Riffle-Run Streams. (draft).
- Plafkin, J. L. et al. 1989. Rapid bioassessment protocols for use in streams and rivers: Benthic macroinvertebrates and fish. EPA/440/4-98/001. U.S. Environmental Protection Agency, Office of Water Regulations and Standards, Washington, D.C. 20460.

APPENDIX E

HERBICIDE ANALYSIS

By

Seewald Laboratories, Inc.



Environmental & Agricultural Testing
"Providing Quality Analytical Services Since 1939"

2829 Reach Road, Williamsport, PA 17701 • Phone: (570) 326-4001 • Fax: (570) 326-0399 • www.seewaldlabs.com

Certificate of Analysis

October 27, 2016

Barbara L. Smith

Work Order: 1620553

North Pocono CARE

Project: General

123 Bear Lake Rd.

Thornhurst, PA 18424

Dear Barbara L. Smith,

Enclosed is your report of analysis that contains the result(s) of the sample(s) received on 10/12/2016. Please direct any questions or comments regarding the content of this report to our Client Services Manager, Mr. Kevin Green, or the Laboratory Director, Mr. Raymond J. Martrano at (570) 326 - 4001.

Seewald Laboratories, Inc. is a National Environmental Laboratory Accreditation Program (NELAP) accredited laboratory and the analytical result(s) contained in this report meet those regulation requirements, except where noted. For example, all drinking water testing and/or analysis comply with the requirements in 40 CFR part 141. All wastewater testing and/or analysis comply with the requirements in 40 CFR part 136. All Solid and Chemical Material testing and/or analysis complies with the requirements in SW-846. All quantitative solid result(s), unless otherwise indicated, are reported on a dry weight basis.

Sample(s) that were collected by Seewald Laboratories, Inc. personnel are done in accordance with the latest revision of the Laboratory's Field Sampling and Field Analysis Standard Operating Procedures. The result(s) contained within this report are representative of the sample(s) as received. Any and all information provided to us by the client was not performed by Seewald Laboratories, Inc. and is not within our scope of accreditation. Any abnormalities in how the sample(s) were received are noted in the documentation contained herein.

All information contained within this report is the property of Seewald Laboratories, Inc. and that of the client. This report may not be reproduced in any form without prior consent from either an authorized representative of Seewald Laboratories, Inc. or the client for which this report was intended. If required, this report must be reproduced in its entirety. Seewald Laboratories, Inc. is not responsible for the use or interpretation of the data included herein.

Please visit www.seewaldlabs.com for a complete list of our accredited parameters and other topics of interest.

Regards,

Seewald Laboratories, Inc.



Approved by: _____

Ray Martrano, Laboratory Director

PA Lab ID: 41-00034 • Maryland Certificate #: 202 • Delaware Office of Drinking Water • NY State Lab ID: 12028

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North Pocono CARE
 123 Bear Lake Rd.
 Thornhurst, PA 18424

Project: General
 Project Number: General
 Reported: 10/27/2016 14:30

Sample Summary

Lab ID	Sample	Matrix	Sampled	Received
1620553-01	Choke Creek Up	Drinking Water	10/11/2016 1450	10/12/2016 1545
1620553-01	Choke Creek Up	Drinking Water	10/11/2016 1450	10/12/2016 1545
1620553-02	Sand Spring Down	Drinking Water	10/11/2016 1730	10/12/2016 1545
1620553-02	Sand Spring Down	Drinking Water	10/11/2016 1730	10/12/2016 1545
1620553-03	Sand Spring Up	Drinking Water	10/11/2016 1745	10/12/2016 1545
1620553-03	Sand Spring Up	Drinking Water	10/11/2016 1745	10/12/2016 1545
1620553-04	Ash Creek Down	Drinking Water	10/11/2016 1300	10/12/2016 1545
1620553-04	Ash Creek Down	Drinking Water	10/11/2016 1300	10/12/2016 1545
1620553-05	Ash Creek Up	Drinking Water	10/11/2016 1330	10/12/2016 1545
1620553-05	Ash Creek Up	Drinking Water	10/11/2016 1330	10/12/2016 1545
1620553-06	Choke Creek Down	Drinking Water	10/11/2016 1430	10/12/2016 1545
1620553-06	Choke Creek Down	Drinking Water	10/11/2016 1430	10/12/2016 1545





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North Pocono CARE
 123 Bear Lake Rd.
 Thornhurst, PA 18424

Project: General
 Project Number: General
 Reported: 10/27/2016 14:30

Analytical Results

Subcontracted To: PA Lab ID 68-00370

Sample ID: Ash Creek Down **Sampled:** 10/11/2016 13:00
Lab ID: 1620553-04 **Received:** 10/12/2016 15:45
Matrix: Drinking Water

Analyte	Result	Units	Qualifier	Reporting Limit	Prepared	Analyzed	Method	Analyst
Subcontract								
2,4,5-TP (Silvex)	ND	ug/L		0.2		10/22/2016 09:13	EPA 515.1	SUB
2,4-D	ND	ug/L		0.1		10/22/2016 09:13	EPA 515.1	SUB
Dalapon	ND	ug/L		1		10/22/2016 09:13	EPA 515.1	SUB
Dinoseb	ND	ug/L		0.2		10/22/2016 09:13	EPA 515.1	SUB
Pentachlorophenol	ND	ug/L		0.04		10/22/2016 09:13	EPA 515.1	SUB
Picloram	ND	ug/L		0.1		10/22/2016 09:13	EPA 515.1	SUB
Glyphosate	ND	ug/L		6		10/19/2016 20:46	EPA 547	SUB





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North Pocono CARE
 123 Bear Lake Rd.
 Thornhurst, PA 18424

Project: General
 Project Number: General
 Reported: 10/27/2016 14:30

Analytical Results

Sample ID: Ash Creek Up **Subcontracted To:** PA Lab ID 68-00370 **Sampled:** 10/11/2016 13:30
Lab ID: 1620553-05 **Matrix:** Drinking Water **Received:** 10/12/2016 15:45

Analyte	Result	Units	Qualifier	Reporting Limit	Prepared	Analyzed	Method	Analyst
Subcontract								
2,4,5-TP (Sivex)	ND	ug/L		0.2		10/22/2016 1017	EPA 515.1	SUB
2,4-D	ND	ug/L		0.1		10/22/2016 1017	EPA 515.1	SUB
Dalapon	ND	ug/L		1		10/22/2016 1017	EPA 515.1	SUB
Dinoseb	ND	ug/L		0.2		10/22/2016 1017	EPA 515.1	SUB
Pentachlorophenol	ND	ug/L		0.04		10/22/2016 1017	EPA 515.1	SUB
Picloram	ND	ug/L		0.1		10/22/2016 1017	EPA 515.1	SUB
Glyphosate	ND	ug/L		6		10/19/2016 2115	EPA 547	SUB





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North Pocono CARE
 123 Bear Lake Rd.
 Thornhurst, PA 18424

Project: General
 Project Number: General
 Reported: 10/27/2016 14:30

Notes and Definitions

Item	Definition
ND	Not Detected at or above the Minimum Reporting Limit
Reporting Limit	This value represents the minimum concentration that the target analyte can be identified and quantitated with confidence





SEEWALD
LABORATORIES, INC.

2829 Reach Road
Williamsport, PA 17701
Phone: (570) 326 - 4001 Fax: (570) 326 - 0399
Complete Online at www.seewaldlabs.com



1620553

PA/MD/DE Drinking Water Only

Circle State of Origin for Compliance Monitoring
PWSID # _____ NA
Type: Annual Semi-Annual Quarterly Monthly
Monitoring Period: _____ to _____
Reporting Type: C D E F I L M P R S
Location Code: _____

Billing: Cash PO: NA
Check Ck#: _____
Credit Not Paid

Turn Around Time: Standard Rush
Rush Due: _____

Reporting: Basic or QC Report
Email or US Postal

Customer Information:

First Time Customer? / N
Report to / Bill to (if different): _____

Contact Person: Barbara L. Smith
Client/Co.Name: North Peconic CARE
Address: 123 Bear Lake Road
City, State, Zip: Thornhurst PA 18424
Telephone No: 570-472-3274
Cell No: 570-262-7055
Fax No: _____
Email Address: NP CARE @ ATT. NET

Receipt Info: Lab Employee FedEx UPS US Postal Walk in Other: _____

of Coolers: 1 Temp: 49°C
Received on ice? N
Coolers & samples intact? N
COC intact & complete? N
Correct container provided? N
Sample/COC/Analysis agree? N
Adequate sample volumes? N
Headspace present? Y N NA
Sample(s) pH acceptable? N

Completed By: Val Y = Yes N = No

Reporting Type Key:
C = Check F = Follow-up
D = Dist. I = Initial
E = Entry Point L = Lead
M = Max Res. service
R = Raw P = Plant
S = Special

Client Notified? Y N
Date: _____ Time: _____
Spoke to: _____
Reason: _____

Comment(s)/Note(s):
Sub per permit V, RA 10/2/16

Sample Information: Project Name:

Field	pH: _____ SU Temp: _____ °C Meter #: _____	*Comp #1 8 12 24	*Comp #2 8 12 24	T1: <u>RA 10/2/16</u> T2: <u>JR 10/2/16</u>
Data	O ₂ : _____ mg/L Temp: _____ °C Meter #: _____	Start: @ _____	Start: @ _____	Container Type/Preservation (see keys)
	CL ₂ : Tot: _____ Free: _____ mg/L Meter: _____	End: @ _____	End: @ _____	AG V P _____

Seewald LIMS No(s)	Sample Identification	Matrix (key)	Sample Date (MM/DD/YY)	Sample Time (HHMM)	Grab or Composite *	AG	V	P	Indicate number of containers below				Analyses/Method Request	
<u>04</u>	Site: <u>Ash Creek - down</u>	DW NPN	<u>10/11/16</u>	<u>1:00 PM</u>	Grab	2			3					Herbicides Glyphosate (Method 547) MBAs (Surfactants)
<u>05</u>	Site: <u>Ash Creek - up</u>	DW NPN	<u>10/11/16</u>	<u>1:30 PM</u>	Grab	2			3					Herbicides Glyphosate (Method 547) MBAs (Surfactants)
<u>06</u>	Site: <u>Choke Creek down</u>	DW NPN	<u>10/11/16</u>	<u>2:30 PM</u>	Grab	2			3					Herbicides Glyphosate (Method 547) MBAs (Surfactants)

Container: (CG) Clear Glass (AG) Amber Glass (P) Plastic (V) Vial (SP) Sterile Plastic (WP) Whirl-Pak (O) Other
Preservation: (0) none (1) H₂SO₄ (2) HCl (3) HNO₃ (4) NaOH (5) Zn(O₂CCH₃)₂ (6) Na₂S₂O₃ (7) NH₄Cl (8) H₃PO₄ (9) Other (a) NH₄Cl (b) C₆H₆O₆ (c) MeOH (d) NaHSO₄
Matrix: (DW) Drinking Water (NPW) Non-Potable Water (SCM) Solid/Chemical Materials (D) Dairy (FD) Frozen Desserts (F) Food (PC) Plastic Cont. (ENV) Env. Swabs (SW) Surface Water (GW) Ground Water
(A) Air (DI) Reagent Water (O) Other

(Signatures Only) Sampled By (1st): X Robert Crowne Initials: X.R.C.
Relinquished By (1st): X Robert Crowne → Received By (2nd): Pod T... → Date: 10/12/16 Time: 13:40
Relinquished By (2nd): RBF → Received By (3rd): ... → Date: 10-12-16 Time: 1545
Relinquished By (3rd): _____ → Received By (4th): _____ → Date: _____ → Time: _____

APPENDIX F

MINUTES OF PUBLIC MEETINGS

August 15, 2016

August 21, 2017

North Pocono Care
Public Meeting
Monday August 15th 2016

Call to Order:

Meeting called to order by President Bonnie Smith at 8:30 pm.

Bonnie Smith says that NP Care received a grant from The Coldwater Heritage Partnership for \$5,000.00. The grant requires you to study a trout stream and to develop a conservation plan. NP Care decided to monitor Ash Creek. 27 Exceptional Value streams are in our watershed have been crossed by the PP&L line project and we thought we could learn something about the impact of this by studying Ash Creek.

Don Baylor: Did macroinvertebrate study on Ash Creek in May. Study was done upstream and downstream from the point where the PP&L lines crossed Ash Creek. Six samples were taken from each site and 200 bugs were obtained from a cross-section of the samples. The metrics that he looked at were: diversity of species, kinds, number of most pollution intolerant, number of most pollution tolerant, and balance of number to overall number collected. The biotic index numbers were crunched and the upstream number was 73.17 and the downstream number was 69.22. These numbers indicate no impairment between the upstream and the down stream sites.

Don Baylor recommends doing yearly studies between the months of late October and early May.

Joseph Kasulaitis did water chemistry testing at the same site, upstream and downstream. PH, dissolved oxygen, conductivity, nitrates, and temperature were tested. All chemistries were good at both sites. There was a one degree temperature difference at the downstream site. Joe will continue to do monthly water chemistry monitoring on Ash Creek.

PP&L had no violations in 2016.
There was one question about the amount of downed trees at some sites that were left at various sites.

PP&L sent three representatives to this meeting.
A PP&L representative answered that is their policy to drop and log. That way more damage is not done by sending in additional equipment to remove trees.

Will consider planting in row to create more shade. Elderberry or blueberry plants. Things that would grow no bigger than seven feet.
The next public meeting will be in winter or early spring.

**NORTH POCONO CARE
PUBLIC MEETING ON ASH CREEK MONITORING AND CONSERVATION PLAN
MONDAY, AUGUST 21ST 2017
THORNHURST FIREHOUSE**

Call to Order: Meeting called to order by president Bonnie Smith at 7:15pm.

Presentation: In March of last year NP Care received a Coldwater Heritage Partnership Grant for Ash Creek in Clifton Township to study the impact of the PP&L transmission lines on this Exceptional Value stream. We had a public meeting last year on impacts. Don Baylor, from Aquatic Resource Consulting did macroinvertebrate studies. Joseph Kasulaitis, Bob Crowmover, Joan Halle, have been looking at the chemistry of the stream and he will also report. We also have Mike Trotta, who is a PP&L Forester, who will explain how they monitor and manage after the work has been done.

Don Baylor: He samples the macroinvertebrates (the bugs) in the water and is the main way to monitor water quality. Six samples are taken with a kick net. Samples are then subsampled and 200 bugs are identified and counted. This amount gives us a good statistical analysis of the samples. Six different metrics are done. The metrics are: diversity of species, kinds, number and percentage of pollution intolerant, number and percentage of pollution tolerant, and balance of number to overall number collected. In a healthy stream, you have more kinds. Diversity is a number that tells you how evenly they are distributed. In a good environment, you have a fairly even representation. Pollution intolerance or tolerance is called the biotic index and is measured on a scale of zero to ten. Zero means they can't tolerate any organic pollution. Ten means they could probably live in raw sewage. Don follows Pa DEP protocols. All the metrics give you one score. Scores range from zero to 100, with 100 being the best. A natural variation between sites is eleven points. If you have a higher than an eleven -point difference, it suggests that something is impacting that site. Samples are taken upstream and downstream of where PP&L lines cross.

Results for Ash Creek:
Upstream: 74.8
Downstream: 78.9

This shows no manmade impact.

These scores were nine points higher than in 2016, suggesting that there may have been some healing. Mayflies, a pollution intolerant group, were dominant both years. Many intolerant species were abundant.

Sandspring Results:
Last Year upstream was 61 and downstream was 66.

2017 Results:
Upstream: 67.3
Downstream: 86.6

This is a 19 point variation for the better. It could be caused by the lines causing more light and growth of algae. Algae provides more food for bugs.

Choke Creek:
Upstream: 58

Downstream: 53

Difference with Choke Creek is that they are not really high. The same results as last year. Don suspects that the water is more acid and that this is natural. There are many acid streams on the Pocono Plateau.

All testing showed very little or no impact.

DEP's benchmark score for a High Quality or Exceptional Value stream is 63.

Trout Creek:

Above ALCA was pretty good and below showed bugs were similar, but got much less of them downstream. Very sparse population downstream this year.

Studies are done in spring because macroinvertebrate population most abundant and diverse in the spring. Most bugs emerge in spring and early summer.

Don recommends doing studies every three years now that we have results for two years in a row.

Joe Kasulaitis:

Joe and his team did chemistry studies at the same sites. Studies are done once a month. Turbidity, PH, Conductivity, dissolved oxygen, nitrates, and temperature were done at Ash Creek.

The temperature results before and after crossing only showed a temperature change of a half to one degree. Dissolved oxygen did not change much above and below. It rained many times before we tested this year, so had many storm water events. Chemistry studies showed no problems.

There is an increase in turbidity due to run off after it rains.

We would like to go in and plant some blueberry bushes and other short bushes to hold soil.

Choke Creek doesn't have a lot of vegetation. There are more Hemlock trees around Choke Creek and they make the soil more acid. Having a hard time building up a new plant base. Ph on Choke Creek changes. PH is low. He has had PH readings of 4 to 6.5. There are a lot of swamps and tannic acid.

Ranges of PHs on Ash Creek 7 to 8. Highest temperature was 71 degrees.

Average is 62. Usually the same one degree difference with downstream being one degree higher.

Choke Creek is colder. Mostly 60 degrees in summer.

Mike Trotta:

Will talk about PP&L's vegetation management scheme. Mike is a forester for PP&L. The reason why the reliability project was built was part of a bigger project. There are new substations built with 230 volt transmission lines built to replace old 69 volt lines. Old lines had a lot more exposure to tree outages. Tree outages are the number one reason for outages. Whole system was built to increase reliability for our customers. Mike is in charge of vegetation maintenance post construction. Work is contracted out and Mike has to make sure that they follow best management practices. PP&L did leave some of the combative species in the buffer zones. Left many things that don't grow too large. Last summer did do a herbicide treatment. Herbicide treatment is done on a four-year cycle. Two types of work are done: maintenance and herbicide. Maintenance will be done in 2018, looking for hazard trees. In 2020 the area will be sprayed. The goal of a good vegetation management project is to decrease over time. Hazard tree is any tree that has grown tall or is dead or dying that might lead to an outage. PP&L does not spray in buffer zones right

now, but could because have NPDES permit to do so. As long as we use aquatic approved herbicides we can spray. The bushes that don't grow tall would not be sprayed. Before planting, the area where planting is being done might have to be prepped using herbicides to remove incompatible species.

Whenever work is planned, whether it is herbicide, cutting, or removal, we track the work being done using software on a daily basis. Mike oversees work.

Any work in gamelands is permitted. Gamelands and DCNR are not opposed to using herbicides. Herbicides are not over applied and is used according to label.

Vegetation management is contracted out. We use small local companies when possible.

PP&L is willing to help out with the planting at Ash Creek to make sure good species are planted. He will work with Joe to get site in good shape.

Plantings also have to be maintained. Goal is to keep compatible vegetation and to maintain.

Bonnie says that we will continue to monitor the three streams.

Discussion about planting.

Will look for volunteers to participate in planting.

Cost: The Game Commission is willing to provide compatible species.

PP&L is also willing to provide species.

Any species that does not grow over 15 feet can be used. Will plan over the winter for planting in the spring. Monroe County is working with Penn State Extension to train volunteers. June Eik says that Clifton Township is willing to get involved.

Adjournment:

Meeting adjourned at 8:30 pm.

Respectfully submitted,

Susan Berkery-Secretary

APPENDIX G

PHOTOGRAPHS OF ASH CREEK AND MONITORING ACTIVITIES



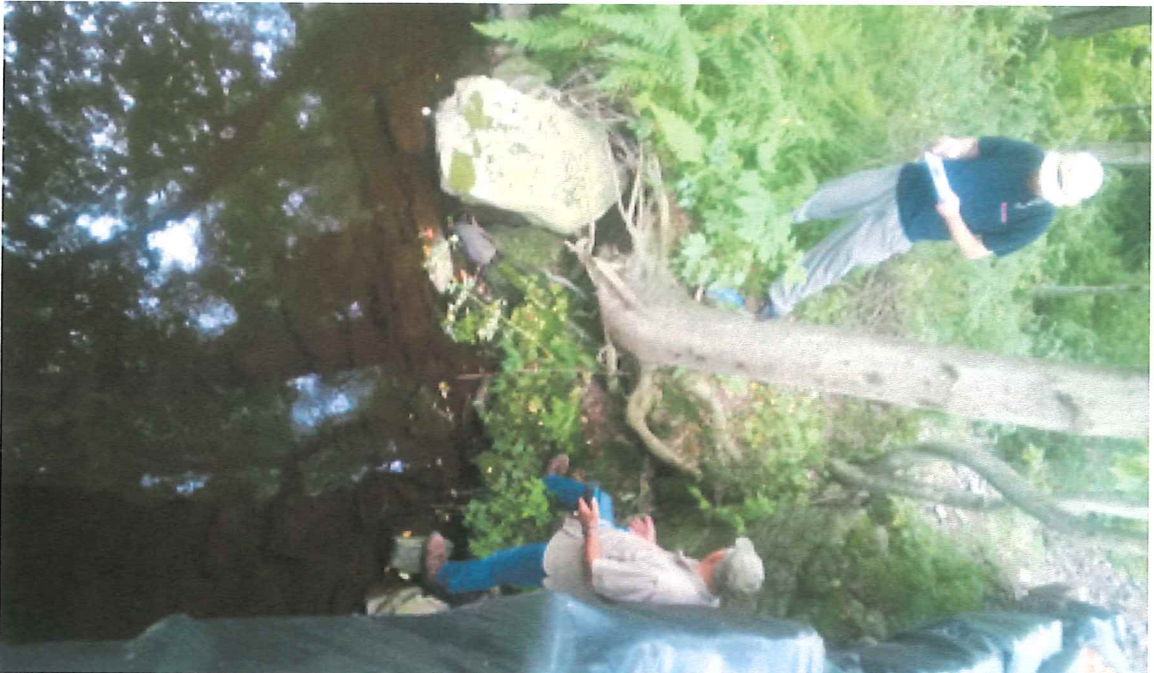
Looking west across Ash Creek toward riparian area and steep hillside.

August 2015



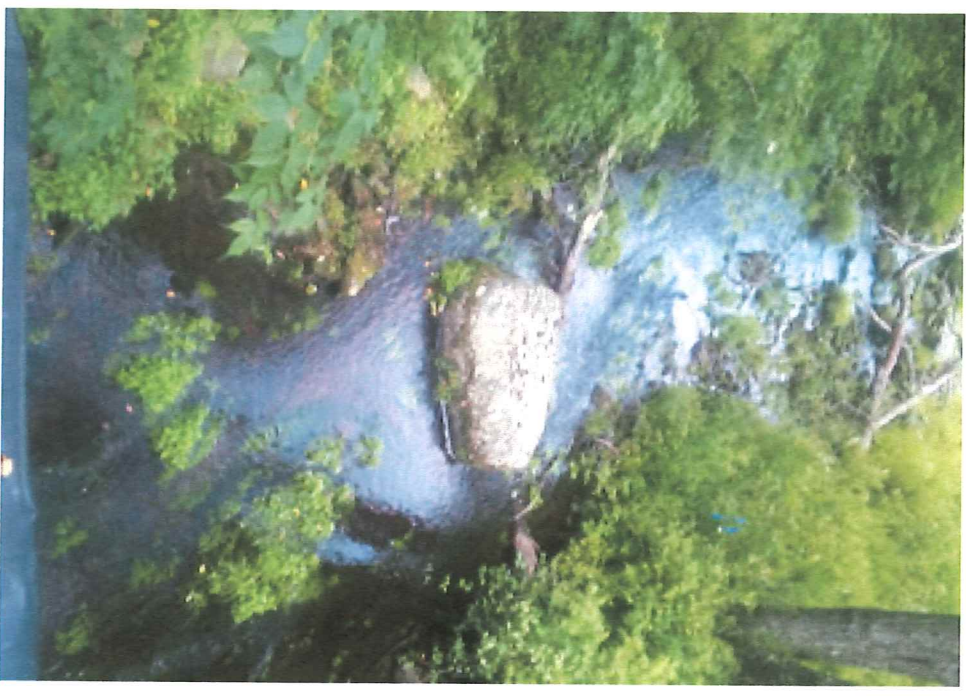
NP CARE board member and PPL forester looking west across Ash Creek.

July 2017



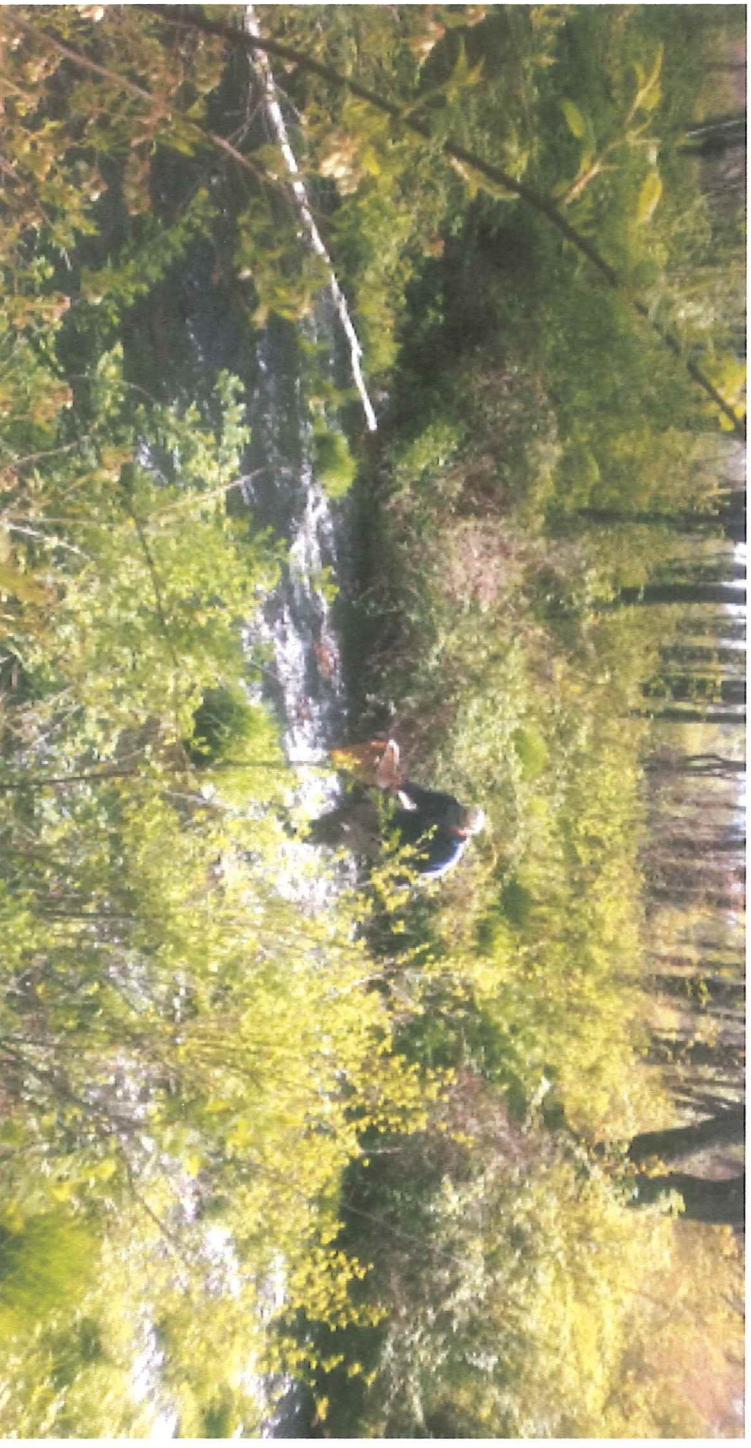
Two NP CARE volunteers monitoring downstream of the PPL transmission line right-of-way. July 2016

A view of Ash Creek looking upstream through the PPL transmission line right-of-way. July 2016





Two NP CARE volunteers crossing PPL right-of-way and walking toward upstream sampling site. July 2016



ARC's Don Baylor sampling macroinvertebrates.

May 2017