DUQUESNE UNIVERSITY
BAYER SCHOOL OF NATURAL AND ENVIRONMENTAL SCIENCES
CENTER FOR ENVIRONMENTAL RESEARCH & EDUCATION

331 FISHER HALL
600 FORBES AVENUE
PITTSBURGH, PA 15282
TEL 412.396.4233
FAX 412.396.4092
www.science.duq.edu/esm

September 28, 2012

PA Department of Environmental Protection
c/o Tony Shaw
P.O. Box 2063
Harrisburg, PA 17105-2063

Dear Tony,

Duquesne University is pleased to submit the redesignation petition of Little Sewickley Creek, Allegheny County to the Department of Environmental Protection. The watershed is home to a diverse aquatic and terrestrial ecosystem. Little Sewickley Creek's biodiversity helps warrant it special protection under the Exceptional Value status. The watershed is a green oasis within Allegheny County.

The following petition will take you through a year and a half of hard work. The physical, chemical and biological data that has been collected from outside sources and by Duquesne all point to the same conclusion. There have been thirty documented families of macroinvertebrates and fifteen reside within the EPT taxa. On top of the macroinvertebrate data, the stream has a documented twenty-three species of fish within its lower reaches. The stream is home to naturally reproducing brown trout, and five species of darters, including the state threatened blue-breasted darter. This is just a sample of the type of data that is within the following document.

Duquesne University looks forward to working with the DEP in helping to redesignated Little Sewickley Creek. Please contact us if you have any questions or concerns with the petition.

Thank you for your time.

Nathan Reinhart
Graduate Student
Center for Environmental Research and Education
Duquesne University
reinhartn@duq.edu

0120-FM-PY0004 Rev. 3/2003

COMMONWEALTH OF PENNSYLVANIA
ENVIRONMENTAL QUALITY BOARD

PETITION FORM

I. PETITIONER INFORMATION

Name: Nathan Reinhart and Edward Schroth

Mailing Address: Duquesne University
Center for Environmental Research and Education
600 Forbes Avenue
Pittsburgh, Pa 15282

Telephone Number: 412-396-4749

Date: 9/28/2012

II. PETITION INFORMATION

A. The petitioner requests the Environmental Quality Board to (check one of the following):

☐ Adopt a regulation

☒ Amend a regulation (Citation 25 PA Code § 93.9w)

☐ Repeal a regulation (Citation)

Please attach suggested regulatory language if request is to adopt or amend a regulation.

B. Why is the petitioner requesting this action from the Board? (Describe problems encountered under current regulations and the changes being recommended to address the problems. State factual and legal contentions and include supporting documentation that establishes a clear justification for the requested action.)

Little Sewickley Creek Watershed is a region in Allegheny County like no other and deserves higher protection. The watershed has historical, environmental and recreational importance to the region. The land uses of the watershed have remained steady through out the last century and there has been little commercial or industrial development. The lack of these two developments along with the preserving of lands in municipal parks has allowed Little Sewickley Creek to maintain high quality water. This high quality water has been proven by 40 years of chemical testing provided by Quaker Valley High School under the direction of Mr. Edward Schroth. There has been chemical data collected by the Army Corps of Engineers and by Duquesne University. The chemical data can also be backed up by the vast amount of biological data that has been collected along the stream. The biological data indicates a very diverse stream for both macroinvertebrates and fish. The redesignation of the watershed will insure its protection for future generations and require best management plans for future developments.

C. Describe the types of persons, businesses and organizations likely to be impacted by this proposal.

The increase in protection of the watershed will increase its noteriety and allow more residents to seek out the area as a recreational hotspot. These visitors rely on the protection of the riparian and surrounding woodlands. The influx of visitors in the region will allow an economic surge and local businesses will benefit. Allegheny Land Trust, Western Pennsylvania Conservancy, Little Sewickley Creek Watershed Association, Duquesne University and local municipalities will benefit by having an easier time acquiring grants to protect existing land parcels and for restoration and preservation projects within the watershed.

D. Does the action requested in the petition concern a matter currently in litigation? If yes, please explain.

No

E. For stream redesignation petitions, the following information must be included for the petition to be considered complete. Attach supporting material as necessary.

1. A clear delineation of the watershed or stream segment to be redesignated, both in narrative form and on a map.
2. The current designated use(s) of the watershed or segment.
3. The requested designated use(s) of the watershed or segment.
4. Available technical data on instream conditions for the following: water chemistry, the aquatic community (benthic macroinvertebrates and/or fishes), or instream habitat. If such data are not included, provide a description of the data sources investigated.
5. A description of existing and proposed point and nonpoint source discharges and their impact on water quality and/or the aquatic community. The names, locations, and permit numbers of point source discharges and a description of the types and locations of nonpoint source discharges should be listed.
6. Information regarding any of the qualifiers for designation as high quality waters (HQ) or exceptional value waters (EV) in §93.4b (relating to qualifying as High Quality or Exceptional Value waters) used as a basis for the requested designation.
7. A general description of land use and development patterns in the watershed. Examples include the amount or percentage of public lands (including ownership) and the amount or percentage of various land use types (such as residential, commercial, industrial, agricultural and the like).
8. The names of all municipalities through which the watershed or segment flows, including an official contact name and address.
9. Locational information relevant to items 4-8 (except for contact names and addresses) displayed on a map or maps, if possible.

All petitions should be submitted to the
Secretary of the Department of Environmental Protection
P.O. Box 2063
Harrisburg, PA 17105-2063

Petition to Upgrade Little Sewickley Creek Watershed Allegheny County

Submitted by: Nathan Reinhart and Edward Schroth
Duquesne University
Date: 9/28/2012

DUQUESNE UNIVERSITY

Table of Contents

1. Delineation of the Watershed 13
a. Historical and Cultural Data on Watershed 15
2. Current Designated Use of the Watershed 26
3. Requested Designated Use of the Watershed 26
4. Available Technical Data on In-stream Conditions 26
a. Physical Data 26
i. Hydrograph Data 26
ii. DEP and PFBC Habitat Evaluation 37
iii. Duquesne GIS Riparian Zone Analysis 39
b. Chemical Data 40
i. 40 Years of Chemical Data – "Up the Creek Gang" 40
ii. 3 Rivers 2nd Nature Chemical Analysis 2003 42
iii. United States Army Corps of Engineers/3R2N/ALCOSA Phase IV 2003 44
iv. DEP, PFBC and DU 46
v. DEP Groundwater Monitoring Wells 48
vi. Duquesne University 49
c. Biological Data 53
i. Macroinvertebrates 53
1. 3 Rivers 2nd Nature 55
1. PA DEP 58
2. Duquesne University 62
ii. Fish 79
1. 3 Rivers 2nd Nature 81
2. PFBC – 2006 Report 85
3. Duquesne University 88
iii. Other Biological Data – Duquesne University 102
1. Crayfish Survey 102
2. Salamander Survey 102
5. Existing and Proposed Point Source and Non-Point Source Dischargers 103
a. NPDES Permits 103
b. Water Pollution Control Facilities 104
c. Erosion and Sediment Control Facilities 105
d. Water Resources 106
e. Municipal Separate Storm Sewer Systems 107
6. Information regarding any of the qualifiers for designation as Exceptional Value waters used as a basis for the requested designation 108
a. 7.3(f)(ii)(C): Outstanding National, State, Regional or Local Resource Water 108
i. Coordinated Water quality Protective measures adopted by regional or local governments. 108
b. 7.3(f)(ii)(D): Surface Water of Exceptional Recreational Significance 109
c. 7.3(f)(ii)(E): Biological Assessment Qualifier 111
d. 7.3(f)(ii)(G): Surface Water of Exceptional Ecological Significance 112
ii. Natural Heritage Inventory 112
7. Land Use and Development Patterns in the Watershed 116
a. Manmade Resources 116
b. Natural Resources 127
8. The names of all the municipalities through which the watershed or segment flows, including an official contact name and address. 137
a. Municipal Contact List 138
b. Letters of Endorsement 139

Table of Figures

Figure 1: Location Map 13
Figure 2: Aerial of Watershed 14
Figure 3: Map of Sewickley Bottoms Around 1838 Pre-Dredging 16
Figure 4: Allegheny County Bridge #1 (Beaver Rd) 17
Figure 5: Township Map 1871 Pre-Dredging 18
Figure 6: Photo of Grist Mill after Heavy Flooding 19
Figure 7: Woodland Bridge 20
Figure 8: School Children in Front of Woodland Bridge 20
Figure 9: Looking Upstream at Beaver Road Bridge 21
Figure 10: Looking Upstream from atop Woodland Road Bridge 21
Figure 11: Stevens Type F Water Level Recorder 26
Figure 12: Location of Flow Gauges and Rain Gauge 27
Figure 13: Upper Gauge Hydrograph 9/25-10/2/2009 29
Figure 14: Lower Gauge Hydrograph 9/25-10/6/2009 30
Figure 15: Upper Gauge Hydrograph 8/24-27/2011 32
Figure 16: Lower Gauge Hydrograph 8/24-27/2011 33
Figure 17: Lower Gauge Hydrograph 8/31-9/7/2011 34
Figure 18: Habitat Evaluation Sites 37
Figure 19: Riparian Zone Analysis Map 39
Figure 20: pH Values over Decades 40
Figure 21: Water Temperatures over Decades 41
Figure 22: Dissolved Oxygen Values over Decades 41
Figure 23: General Water Chemistry Sites 46
Figure 24: Locations of DEP Monitoring Wells 48
Figure 25: Map of 2011 Duquesne Chemical Testing Sites 49
Figure 26: Water Temperature Graph from 4/28 - 9/6/2012 50
Figure 27: Occurrences under Temperature Standards 51
Figure 28: Percentage of Occurrence per Degree Celsius 52
Figure 29: Macroinvertebrate Sampling Sites 53
Figure 30: Photograph of Sample Station 2003 57
Figure 31: 2012 Study Sample Sites 62
Figure 32: Photo of Site 1 65
Figure 33: Photo of Site 2 67
Figure 34: Photo of Site 3 69
Figure 35: Photo of Site 4 71
Figure 36: Photo of Site 5 73
Figure 37: Photo of Site 6 75
Figure 38: Number of Families Compared 76
Figure 39: Comparison of Population Metrics 76
Figure 40: IBI Scores Compared 77
Figure 41: 3R2N IBI's Comparison 78
Figure 42: Locations of Fish Surveys on LSC 79
Figure 43: Blue-Breasted Darter 90

Figure 44: Brown Trout (Young of the Year) 90
Figure 45: Mature Brown Trout from Upper Station 96
Figure 46: NPDES Permit Locations 103
Figure 47: Locations of WPCF (PA eMAP) 104
Figure 48: Locations of ESCF's (PA eMAP) 105
Figure 49: Locations of Water Resources (PA eMAP) 106
Figure 50: MS4 Classification by Municipality 107
Figure 51: Recreational Opportunities in Watershed 109
Figure 52: Unprotected Greenways 110
Figure 53: NHI Inventory of Watershed 112
Figure 54: Land Use According to Parcel Data 116
Figure 55: Zoning Data 117
Figure 56: Zoning vs. Actual Land Use 117
Figure 57: Tax Code 118
Figure 58: Residential 119
Figure 59: Non-Profit/Municipal Lands 120
Figure 60: Agricultural Lands 121
Figure 61: Commercial Lands 122
Figure 62: Industrial Lands 123
Figure 63: Educational Lands 124
Figure 64: Vacant Lands 125
Figure 65: Impervious Surface and Building Footprints 126
Figure 66: Elevation 127
Figure 67: Slope 128
Figure 68: Geological Formations 129
Figure 69: Cross-Section of Geological Formations Present in the Watershed 130
Figure 70: Pittsburgh Red Beds 130
Figure 71: Soil Profile 131
Figure 72: Landslide Prone Soils 132
Figure 73: Prime Agricultural Soils 133
Figure 74: Woodlands 134
Figure 75: Wetlands 135
Figure 76: 100-year and 500-year Floodplains 136
Figure 77: Municipalities 137

Table of Tables

Table 1: Analysis of Hydrographs from Sept. 25th to Oct. 2nd 2009 31
Table 2: Analysis of Hydrographs 35
Table 3: Corresponding Rankings to Scores 37
Table 4: RBP Habitat analyses for site 0101 (RM 0.33) on Little Sewickley Creek, Section 01 (Allegheny Co) in June 2006. 38
Table 5: PA DEP Physical Habitat Assessment located along the main stem of Little Sewickley Creek at Walker Park. 38
Table 6: PA DEP Physical Habitat Assessment located upstream of Fern Hollow's confluence to Little Sewickley Creek. 38
Table 7: Percent of Intact Riparian Zone at 100ft and 150ft Widths 39
Table 8: Selected Parameters for Tributary Streams in the Ohio River Study Area 42
Table 9: Average Results from Dry Weather Events for Little Sewickley Creek 43
Table 10: Fecal Coliform and *E. Coli* Dry Weather Data 43
Table 11: Field Parameters taken by USACE 44
Table 12: Laboratory Metal Analysis 44
Table 13: Laboratory Nutrient Analysis 45
Table 14: Laboratory Bacterial Analysis 45
Table 15: Other Tested Parameters 45
Table 16: PFBC General Water Chemistry from Fish Survey 46
Table 17: PA DEP Little Sewickley Creek Water Chemistry from Macro Survey 47
Table 18: PA DEP Fern Hollow Water Chemistry from Macro Survey 47
Table 19: DU Water Chemistry from Fish Surveys 47
Table 20: Chemical Analysis of Groundwater 48
Table 21: 2011 YSI Chemical Data 49
Table 22: Statistical Analysis of Temperature Data by Month 52
Table 23: Documented Families of Macros Found in Little Sewickley Creek 54
Table 24: 3R2N Sample Site Characteristics 55
Table 25: 3R2N Rapid Invertebrate Biological Assessment May 2003 56
Table 26: 3R2N 2003 Sample Totals 56
Table 27: Family Listing of Site 1 64
Table 28: Overview of Site 1 Sample 64
Table 29: IBI for Site 1 65
Table 30: Family Listing for Site 2 66
Table 31: Overview of Site 2 Sample 66
Table 32: IBI for Site 2 67
Table 33: Family Listing for Site 3 68
Table 34: Overview of Site 3 Sample 68
Table 35: IBI for Site 3 69
Table 36: Family Listing for Site 4 70
Table 37: Overview of Site 4 Sample 70
Table 38: IBI for Site 4 71
Table 39: Family Listing for Site 5 72
Table 40: Overview of Site 5 Sample 72
Table 41: IBI for Site 5 73

Table 42: Family Listing for Site 6 74
Table 43: Overview of Site 6 Sample 74
Table 44: IBI for Site 6 75
Table 45: Documented Species of Fish Observed in Little Sewickley Creek 80
Table 46: Stream Station Characteristics 82
Table 47: Little Sewickley Creek Fish Species Distribution/ Catch-per-Hour from 3R2N 82
Table 48: Little Sewickley Creek Statistical Summary 83
Table 49: Overall Results from Little Sewickley Creek 84
Table 50: Fish Collected from Little Sewickley Creek (PFBC 6/29/2006) 85
Table 51: Length/Frequency Distribution and Abundance Statistics for Brown Trout 86
Table 52: Length/Frequency Distribution and Abundance Statistics for Hatchery Brown Trout 86
Table 53: Length/Frequency Distribution and Abundance Statistics for Sauger 86
Table 54: Length/Frequency Distribution and Abundance Statistics for Smallmouth Bass 87
Table 55: Coordinates of Lower Sample Station 89
Table 56: Lower Station Species Listing 89
Table 57: Lower Station Length and Weight Listings 91
Table 58: Lower Station Index of Biological Integrity 92
Table 59: Lower Station Index of Well-Being 93
Table 60: Lower Station Modified Index of Well-Being 94
Table 61: Upper Station Coordinates 95
Table 62: Upper Station Species Listing 95
Table 63: Upper Station Total Length and Weight 97
Table 64: Upper Station Index of Biological Integrity 98
Table 65: Upper Station Index of Well-Being 99
Table 66: Upper Station Modified Index of Well-Being 100
Table 67: Crayfish Species Present in LSC 102
Table 68: Salamander Species Present in LSC 102
Table 69: Information on NPDES Permits 103
Table 70: Information on WPCF's 104
Table 71: Information on ESCF's 105
Table 72: Information on Water Resources 106
Table 73: MS4 Information 107
Table 74: Recreational Opportunities by Name 109

Petition to PA DEP for Stream Redesignation of Little Sewickley Creek, Allegheny County

1. Delineation of the Watershed

The Little Sewickley Creek Watershed is located in Allegheny County, about 20 miles northwest of Pittsburgh. It is a third order, southwest flowing, medium gradient, limestone-influenced, clear water stream that empties into the Ohio River. Figure 1 below gives the exact location of the watershed, highlighted in green, with respect to Allegheny County.

Figure 1: Location Map

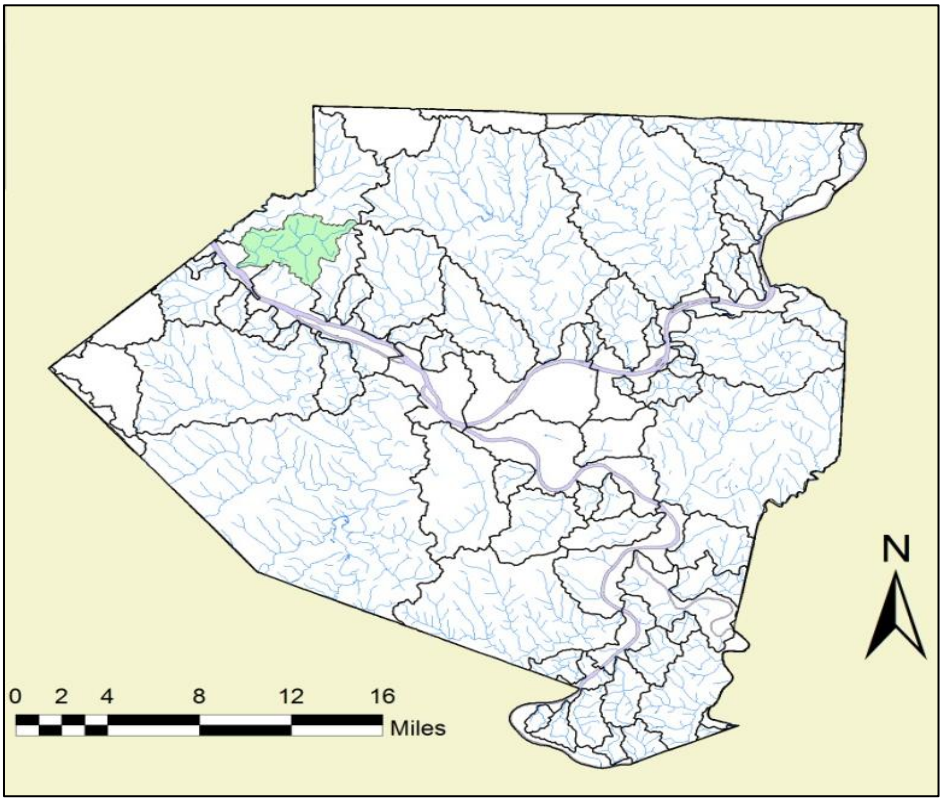
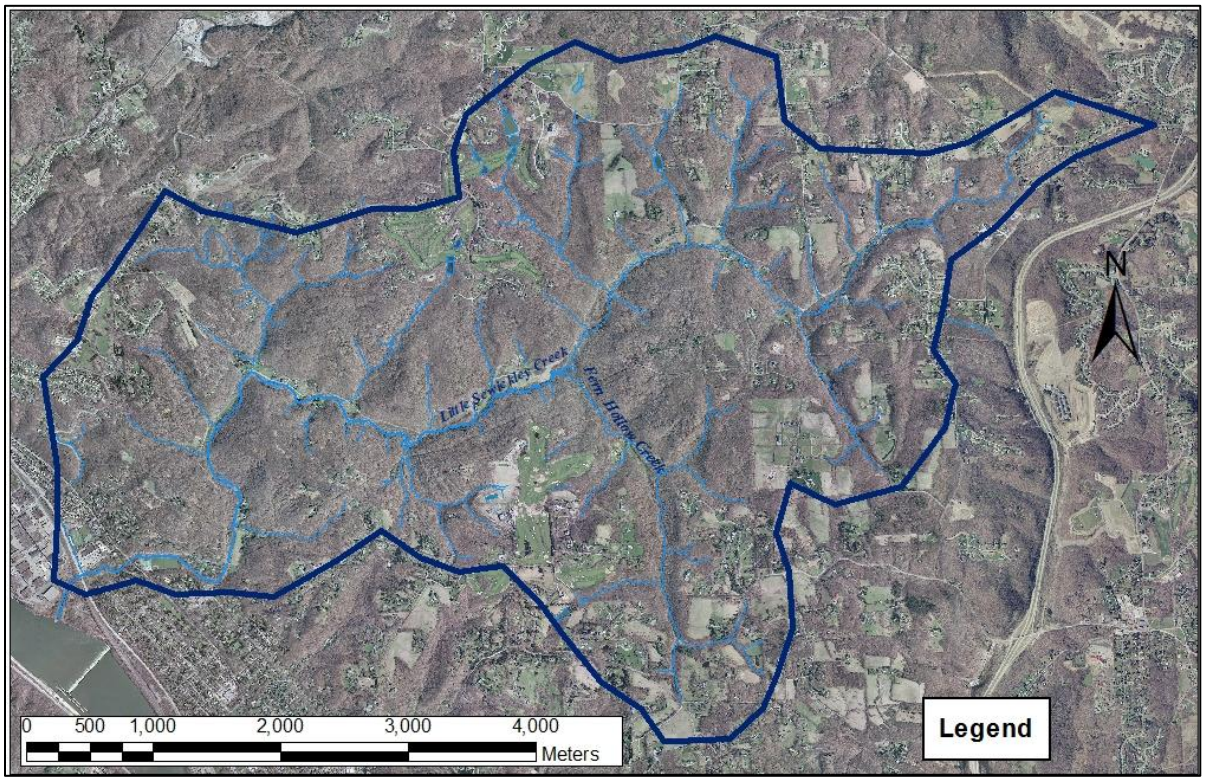


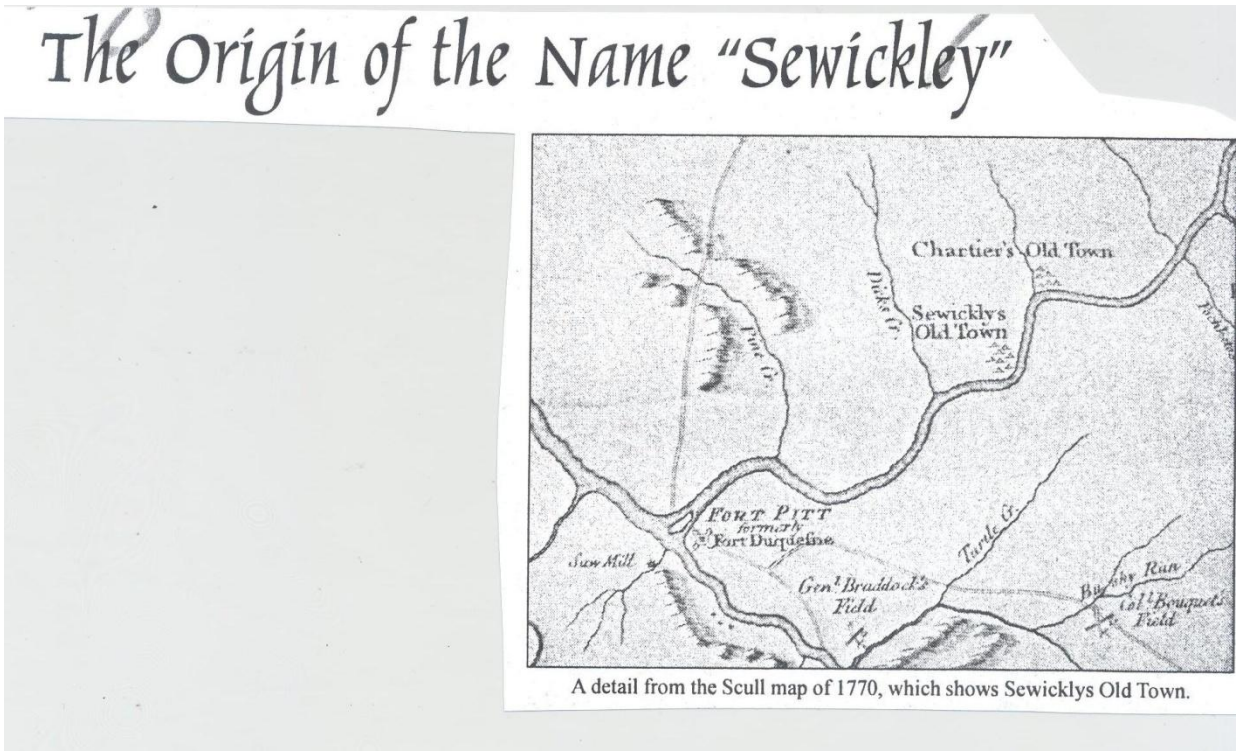
Figure 2: Aerial of Watershed



The watershed encompasses an area of 9.608 square miles with a total stream length of 18.6 miles. The mean slope of the stream is approximately 1.03 percent from headwaters to confluence. The main tributary flowing into Little Sewickley Creek is known as Fern Hollow Creek. This tributary has 2.7 miles of stream length and has a sub-watershed that drains 2.156 square miles. Figure 2 above shows an aerial photo of the watershed that is outlined in blue.

a. Historical and Cultural Data on Watershed

Origin



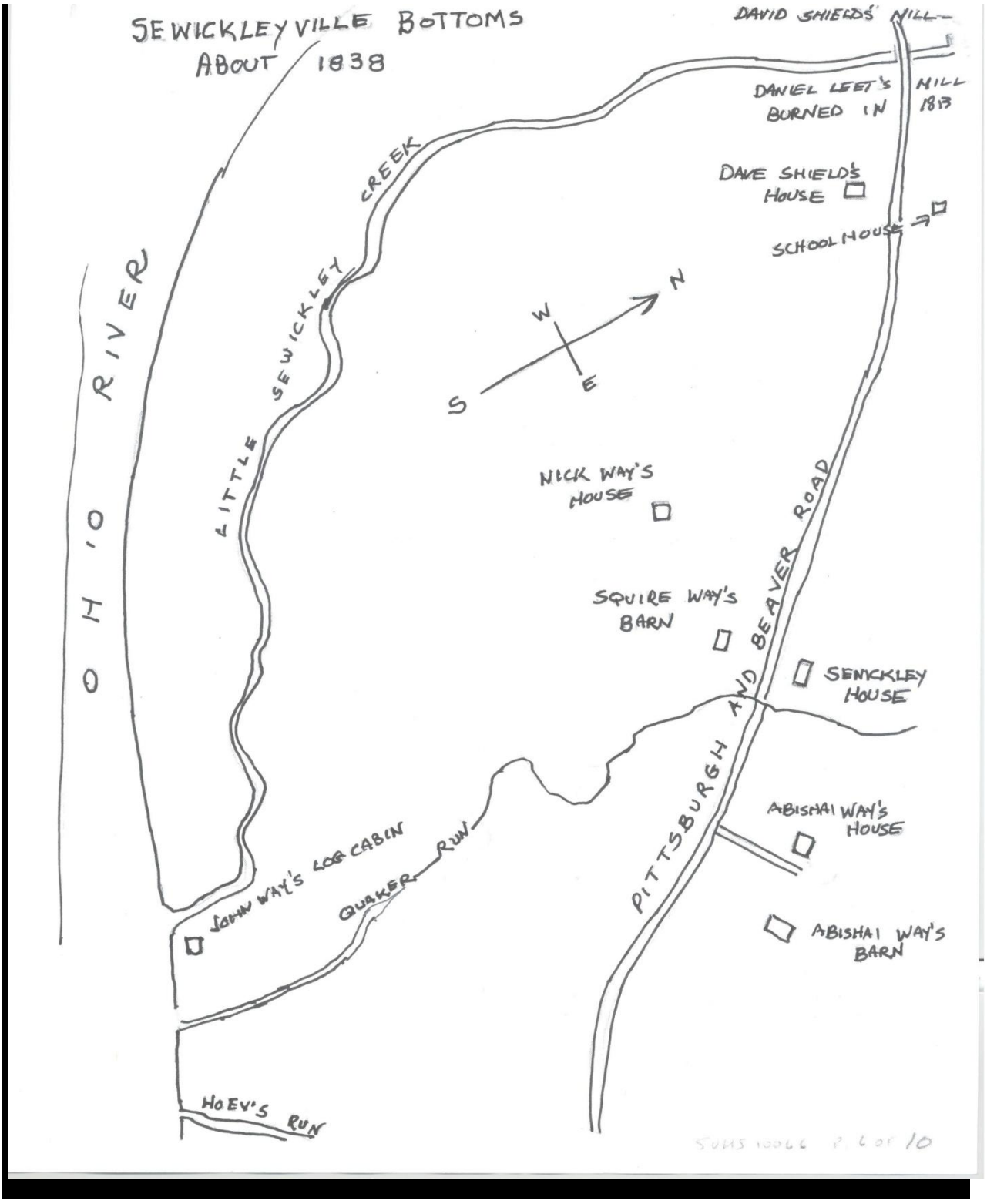
A detail from the Scull map of 1770, which shows Sewicklys Old Town.

The Indians called the water Seweekly that ran from the maple trees, meaning sweet water, and for a time the trees were called by the old residents "Seweekly trees." Gradually the streams were called Seweekly, and we now know them as Big Sewickley Creek and Little Sewickley Creek.

Properties within the Little Sewickley Creek Watershed, "Waggoners' Hollow, between Camp Meeting and Fern Hollow Roads and "Devil's Hollow" on Sevin Road were clothed in forest, then as now. They belonged only to God and Indian hunters until 1681 when Charles II gave William Penn a land grant. The lots in this area were surveyed in 1785 by Major Daniel Leet and sold at public auction. This district containing 12,202 acres realized an average price of $1.12/ acre. When you visit the Little Sewickley Creek Watershed remember the intrepid surveyors of 225 years ago and what a forest they must have seen.

1883

Figure 3: Map of Sewickley Bottoms Around 1838 Pre-Dredging



1841

Allegheny County Bridge # 1

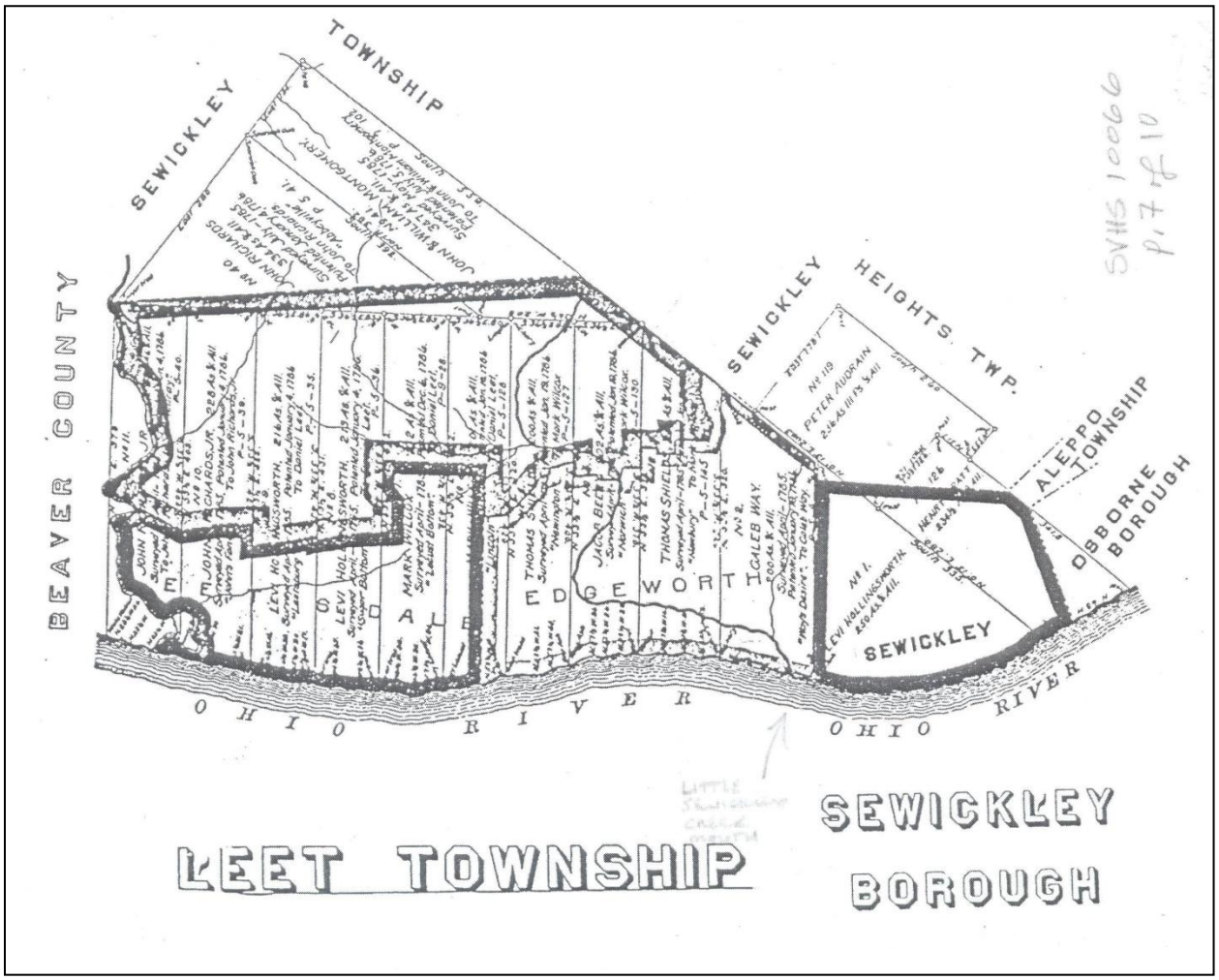
The 1918 Beaver Road Bridge was rebuilt as part of the ''second generation'' of Allegheny County arch bridges, consisting of a concrete arch faced in masonry. According to the plaque, the bridge incorporates an older 1841 stone arch; in 1918 that bridge was widened and lined. The 1841 bridge is not visible at all. Beaver Road was once part of the Lincoln Highway (now US 30) and was part of an important route connecting Pittsburgh with small villages and forts along the Ohio River.

Figure 4: Allegheny County Bridge #1 (Beaver Rd)

1871

A simple piece of engineering was undertaken which changed the face of a section of Little Sewickley Creek which flowed through the "Sewickley Bottoms." In 1871, the cutting of a channel through about six hundred feet of land that intervened between the river and the Little Sewickley Creek, immediately below Shields Station, permitted the stream to flow straight into the Ohio River, instead of winding along its original channel between the railroad and the river, a distance of almost a mile. Much of the creek bed was then plowed over and cultivated.

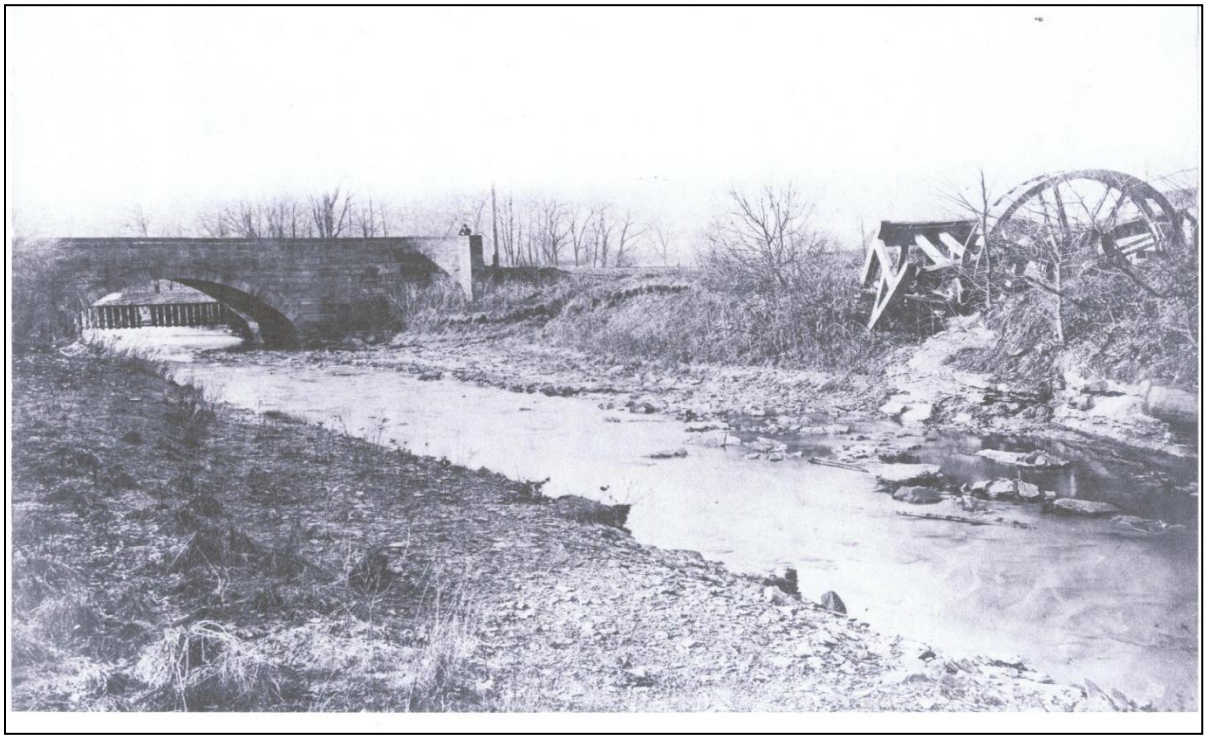
Figure 5: Township Map 1871 Pre-Dredging



1883

Grist Mill

Figure 6: Photo of Grist Mill after Heavy Flooding



David Shields built a grist mill on the bank of the Little Sewickley Creek in 1833 and for years the name “Mill Race Road” was applied to Little Sewickley Creek Road. This late nineteenth century photograph shows the water wheel and mounting from that mill. The barrier below the Beaver Road Bridge kept cows from wandering into the cornfield below.

1889

Figure 7: Woodland Bridge

This bridge on Woodland Road Extension spans Little Sewickley Creek. This bridge was erected by Allegheny County in 1889. The engineer was Charles Davis, and the builder was William Dickson.

Figure 8: School Children in Front of Woodland Bridge

A class from Sewickley Public School on an outing in 1899. The newly constructed bridge is in the background.

1947

Figure 9: Looking Upstream at Beaver Road Bridge

Beaver Road Bridge

Figure 10: Looking Upstream from atop Woodland Road Bridge

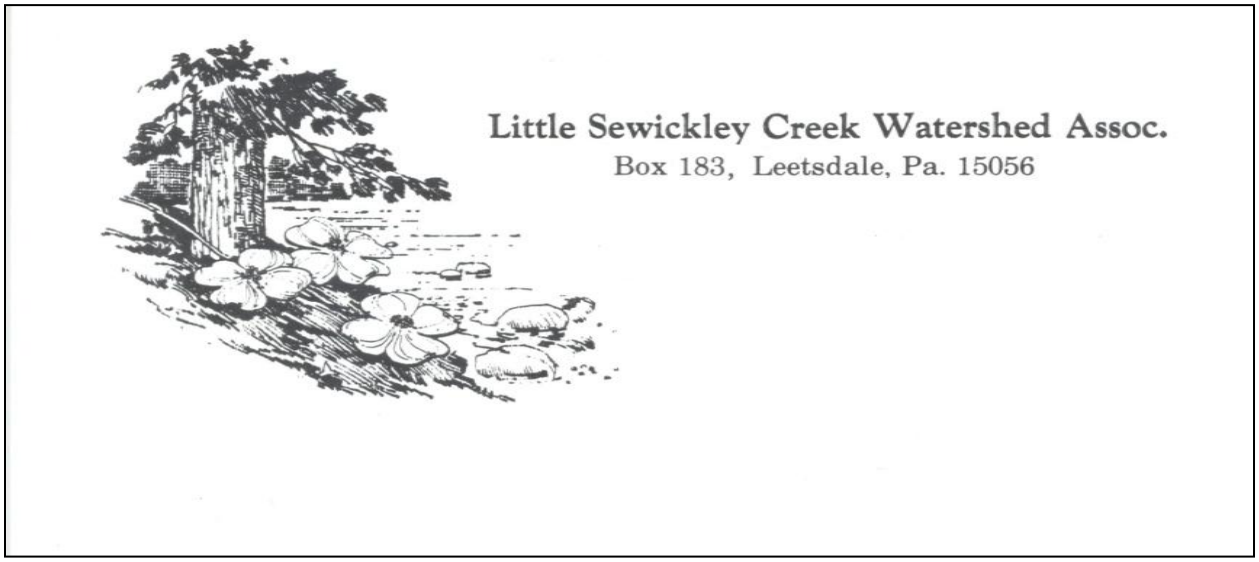
Woodland Road Bridge

1971

Little Sewickley Creek Watershed Association

A group of area citizens with a desire to preserve and beautify the Valley of the Little Sewickley Creek and its watershed invited interested citizens to a public meeting at Shields Church, Edgeworth, on Thursday, March 11th, 1971. The purpose of the meeting was to plan for the formation of a Little Sewickley Creek Watershed Association. Mrs. D. Leet Shields was the chairman of the Planning Committee

.



The Little Sewickley Creek Watershed Association now owns: 167 acres within the watershed.

1979

Neubeck's Research

MEASURING the depth of the stream was one of Bill Neubeck's duties as expert in residence. (Photos by Remsem Behrer Jr.)

SEWICKLEY HERALD: WED

"Baseline Study of the Hydrology and Morphology of Little Sewickley Creek"

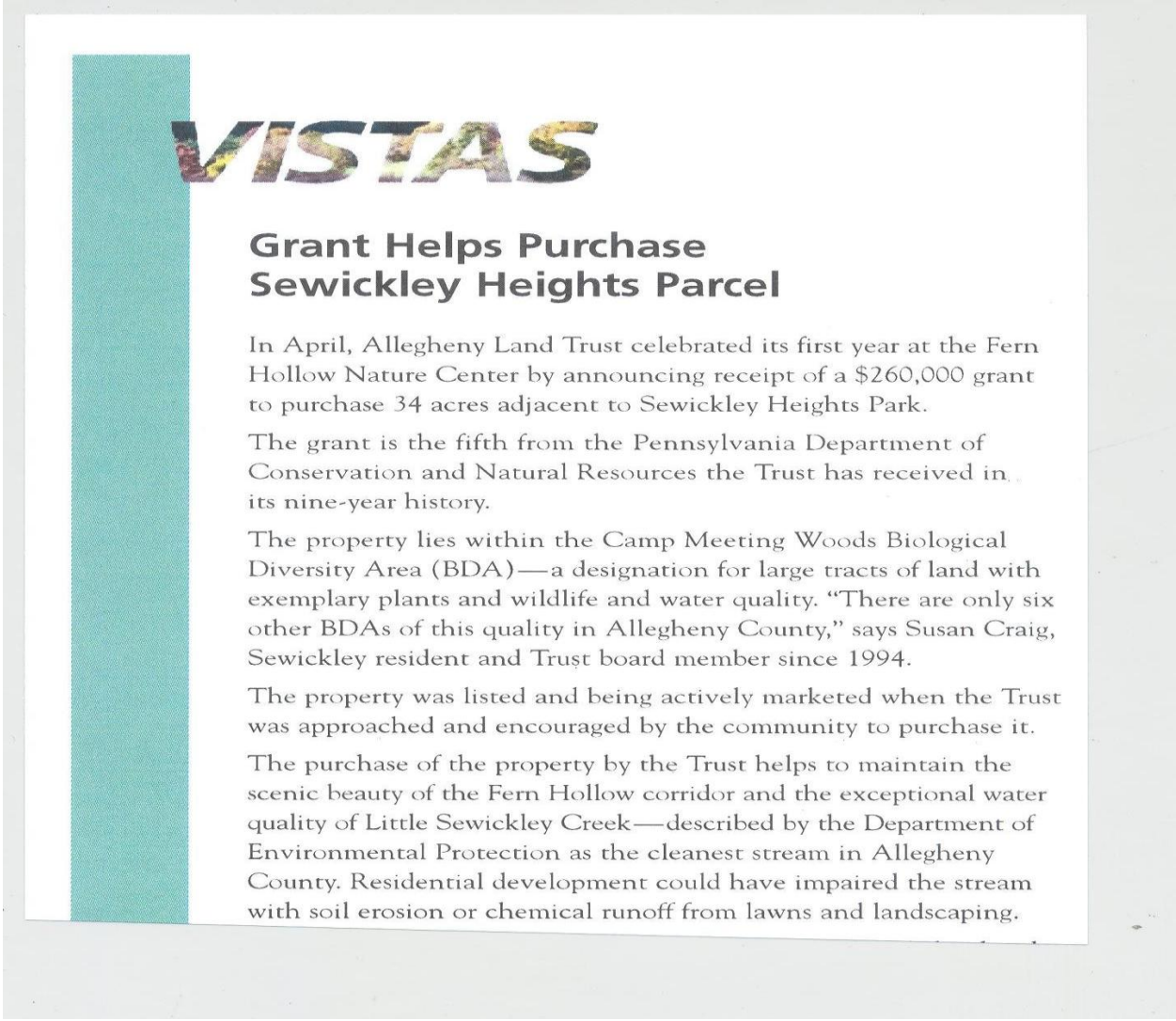
William Neubeck, a graduate intern at the State University of New York at Binghamton.

2002

Allegheny Land Trust

Allegheny Land Trust 's (ALT) mission is to serve as the lead land trust conserving and stewarding lands that support the scenic, recreational, and environmental well-being of communities in Allegheny County.

ALT helps local people save local land that contributes to the scenic, recreational, educational and environmental wealth of our communities. In 2002, ALT's first purchase in the Little Sewickley Creek watershed was 34 acres within the Camp Meeting Woods Biological Diversity Area. Today ALT protects 54 acres in our watershed



VISTAS

Grant Helps Purchase Sewickley Heights Parcel

In April, Allegheny Land Trust celebrated its first year at the Fern Hollow Nature Center by announcing receipt of a $260,000 grant to purchase 34 acres adjacent to Sewickley Heights Park.

The grant is the fifth from the Pennsylvania Department of Conservation and Natural Resources the Trust has received in its nine-year history.

The property lies within the Camp Meeting Woods Biological Diversity Area (BDA)—a designation for large tracts of land with exemplary plants and wildlife and water quality. "There are only six other BDAs of this quality in Allegheny County," says Susan Craig, Sewickley resident and Trust board member since 1994.

The property was listed and being actively marketed when the Trust was approached and encouraged by the community to purchase it.

The purchase of the property by the Trust helps to maintain the scenic beauty of the Fern Hollow corridor and the exceptional water quality of Little Sewickley Creek—described by the Department of Environmental Protection as the cleanest stream in Allegheny County. Residential development could have impaired the stream with soil erosion or chemical runoff from lawns and landscaping.

Fern Hollow Greenway

. 

Source of Photographs & documents in this section are from the Sewickley Historical Society.

2. Current Designated Use of the Watershed

Little Sewickley Creek is currently designated as a High Quality–Trout Stocking Fishery (HQ-TSF).

3. Requested Designated Use of the Watershed

The petitioners are requesting that Little Sewickley Creek be designated as Exceptional Value (EV).

4. Available Technical Data on In-stream Conditions

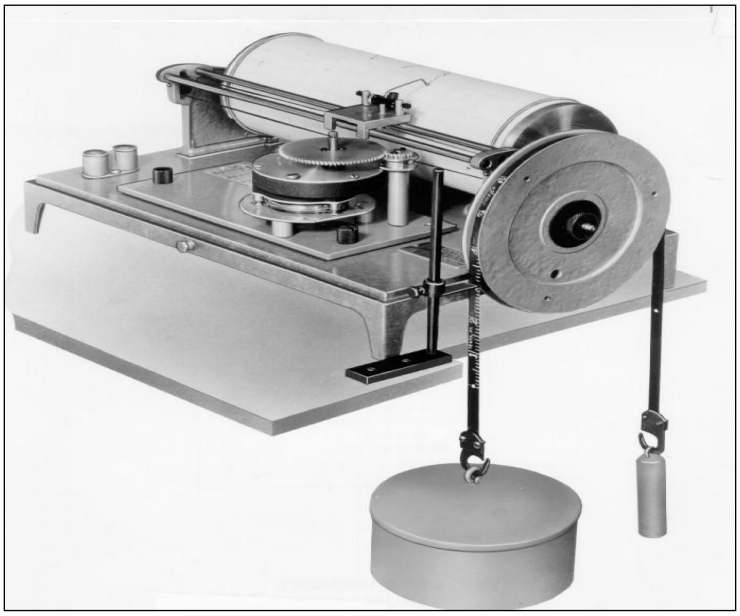
a. Physical Data

i. Hydrograph Data

Introduction:

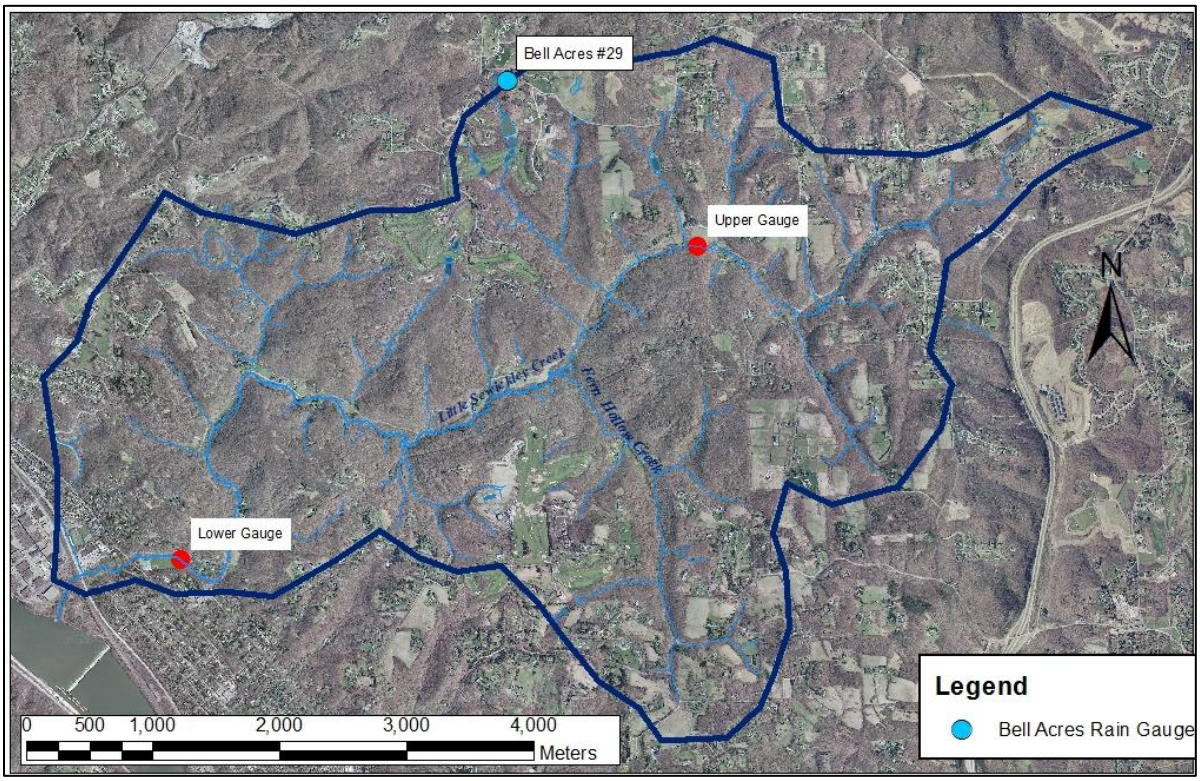
The Stevens Type F Water Level Recorder shows the water level against a record of time. Time scales relate to the rate that the pen travels across the chart and are expressed in inches on an 8-day scale.

Figure 11: Stevens Type F Water Level Recorder



Data collection on the surface hydrology of Little Sewickley Creek has been obtained by installing two Stevens Recorders (1978 → present) on the main truck of Little Sewickley Creek. One is placed near the mouth (UTM 17 0572204 4492529) and the other approximately halfway (4 miles) up the trunk (UTM 17 0568135 4490060). This allows analysis of both the upper and lower sections of the watershed.

Figure 12: Location of Flow Gauges and Rain Gauge



The map above shows the location of the upper and lower gauges that are stationed along the stream. The distance separating these two gauges is approximately 4 miles.

Rainfall data is obtained from 3 Rivers Wet Weather Rain Gauge # 29 - Bell Acres.

Little Sewickley Creek
DISCHARGE MEASUREMENTS [cfs]*

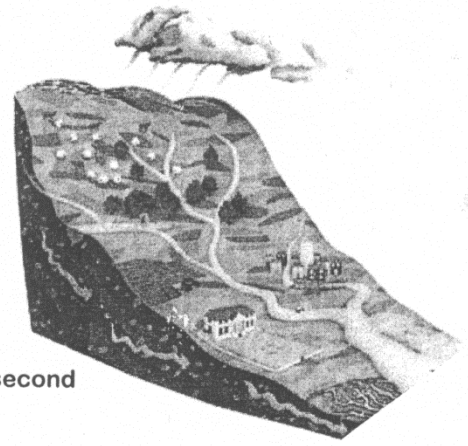
Upper Gauge

Baseflow	=	.32 c.f.s.
.25"	=	1.0 c.f.s.
1.85"	=	5.3 c.f.s.
3.5"	=	14.3 c.f.s.
5.75"	=	15.7 c.f.s.
6.25"	=	20 c.f.s.

Lower Gauge

Baseflow	=	1.78 c.f.s.
.75"	=	5.0 c.f.s.
2.5"	=	30 c.f.s.
6.75"	=	86 c.f.s.
7."	=	99 c.f.s.

1 cubic foot = 7.48 gallons/second



- U.S. Geological Survey expresses the volume in Cubic feet / second

The gauges have been on the stream since the late 1970's and over the years a standardized set of data has been formulated for each gauge. This standardized curve data is displayed above in the figure and allows for the flow to be correlated from the height of the gauge water.

Hydrograph: September 25th – October 2nd, 2009

Figure 13: Upper Gauge Hydrograph 9/25-10/2/2009

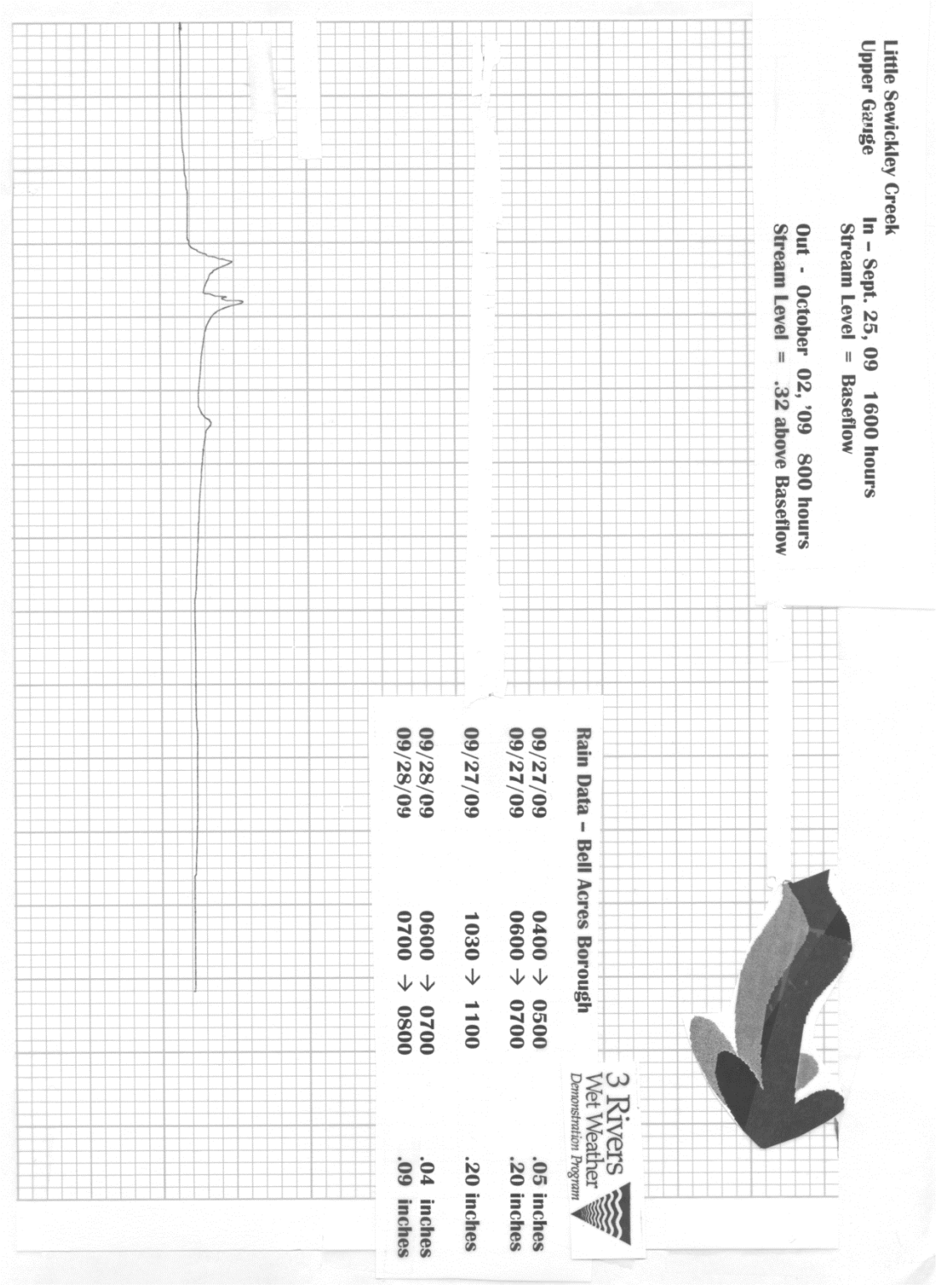


Figure 14: Lower Gauge Hydrograph 9/25-10/6/2009

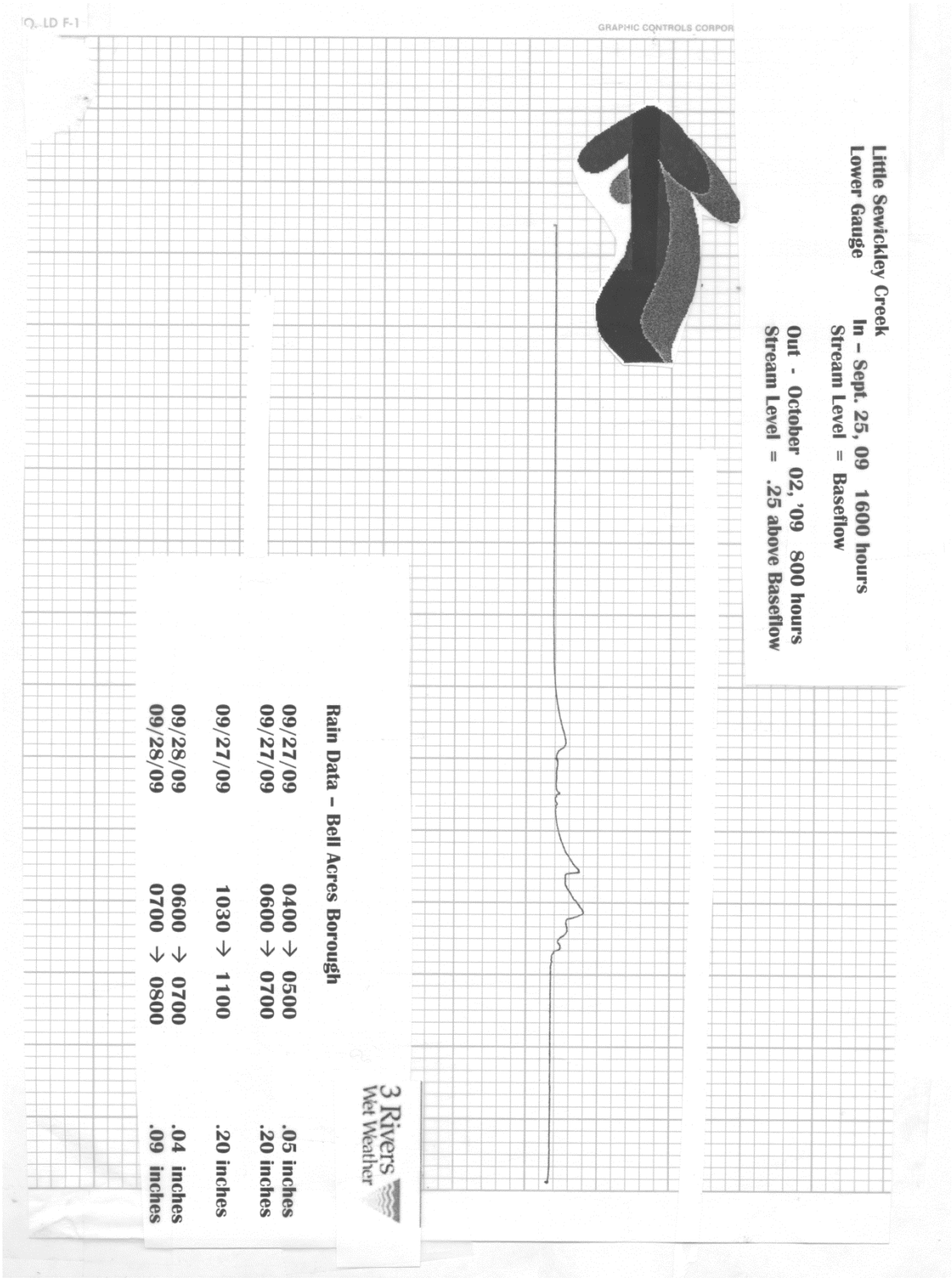
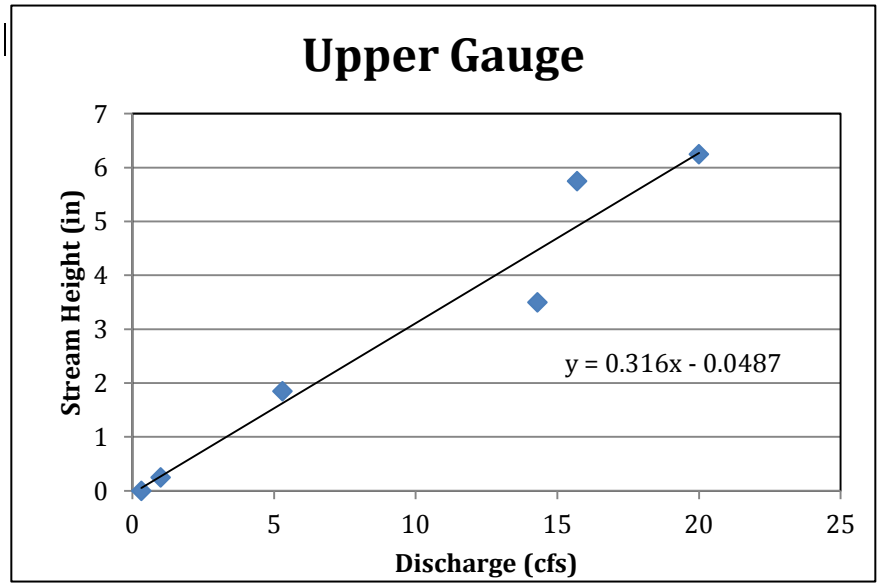
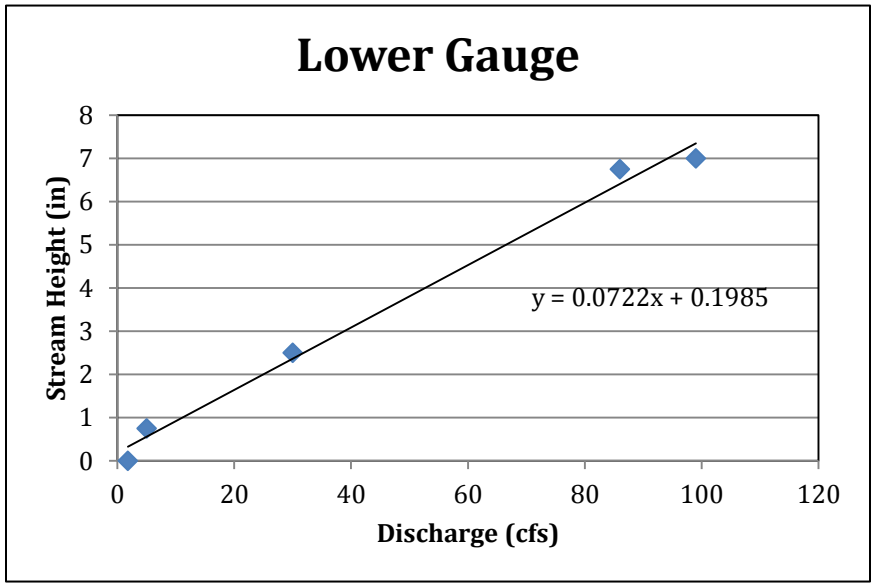


Table 1: Analysis of Hydrographs from Sept. 25th to Oct. 2nd 2009

	Time	Total Rainfall (in)	Rate of Rainfall (in/min)	Peak	Height of Peak (in)	Discharge at Peak (cfs)	Middle of Storm	Lag Time (hrs)	Back to Base Flow	Recovery Time (hrs)
Storm 1										
Lower Gauge	0400-0700	0.25	0.0021	1400	1.25	17.114519	530	8.5	NA	NA
Upper Gauge	0400-0700	0.25	0.0021	700	1.75	5.5866747	530	1.5	NA	NA
Storm2										
Lower Gauge	1030-1100	0.2	0.0067	2100	1	13.651916	1045	10.25	500	8
Upper Gauge	1030-1100	0.2	0.0067	1315	2	6.3778139	1045	2.5	1530	10
Storm 3										
Lower Gauge	0600-0800	0.13	0.0011	1900	0.5	6.7267078	700	12	300	8
Upper Gauge	0600-0800	0.13	0.0011	900	1	3.213257	700	2	1100	28





Hydrograph: August 24th – August 27th, 2011

Figure 15: Upper Gauge Hydrograph 8/24-27/2011

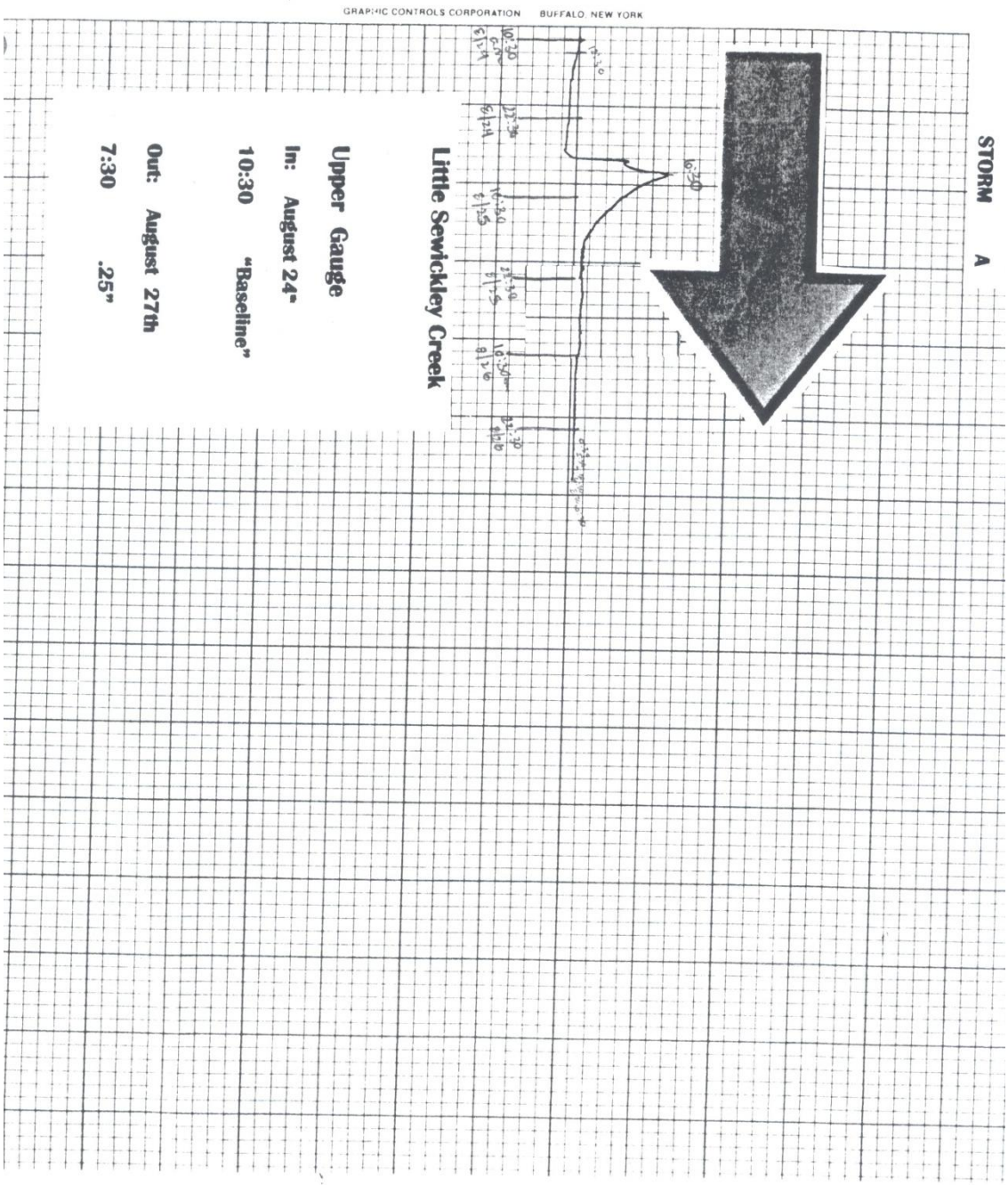
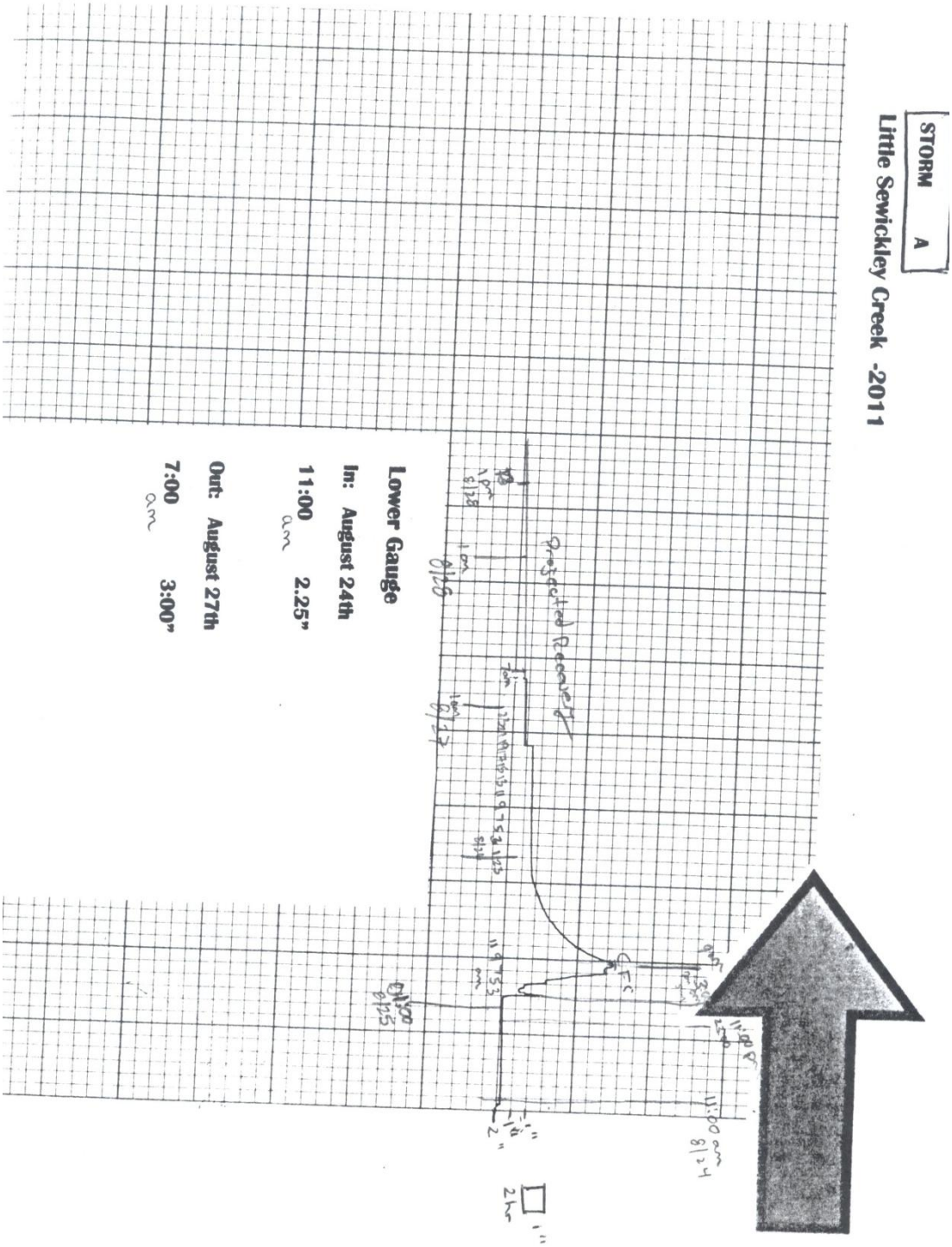


Figure 16: Lower Gauge Hydrograph 8/24-27/2011



Hydrograph: August 31st – September 7th, 2011

Figure 17: Lower Gauge Hydrograph 8/31-9/7/2011

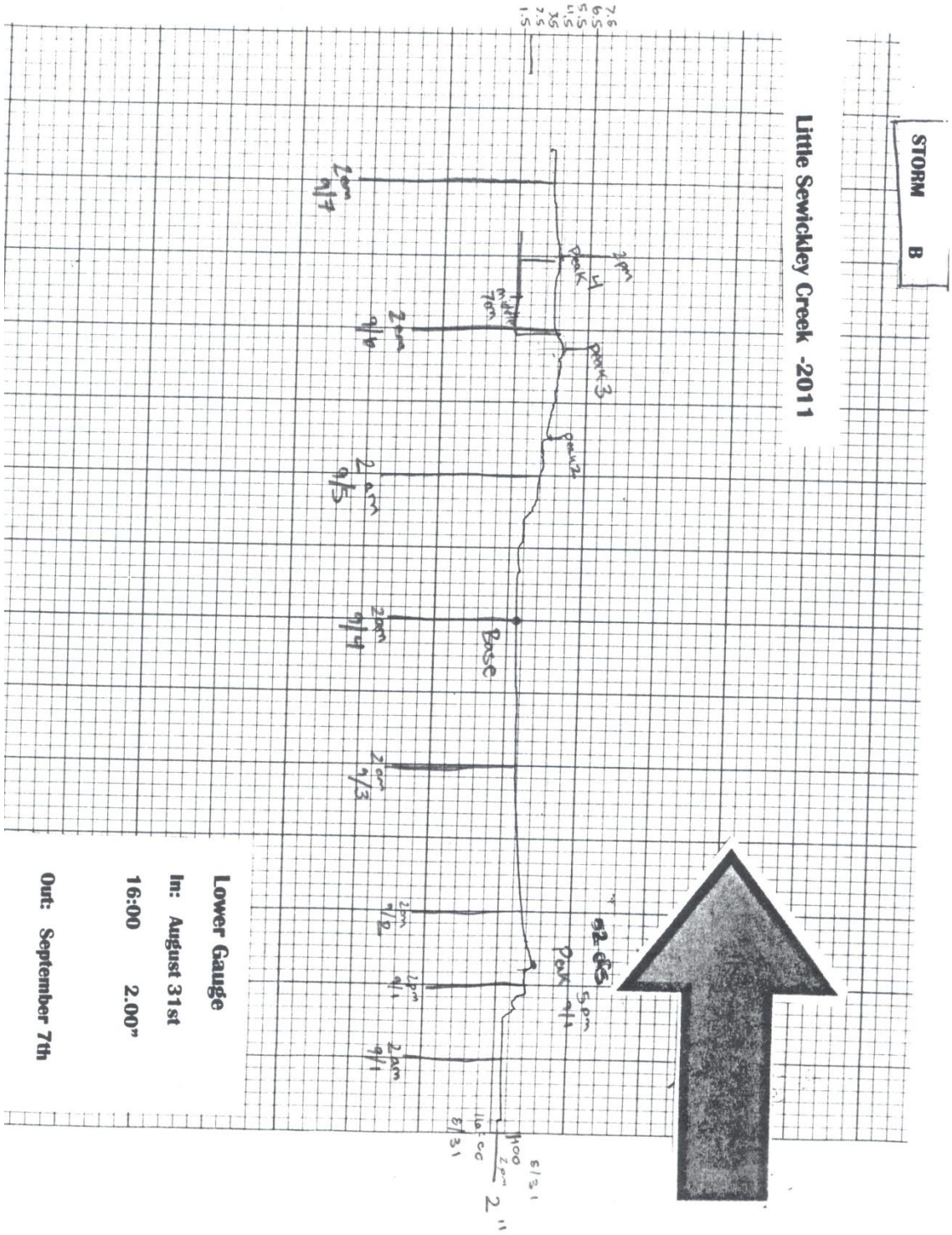
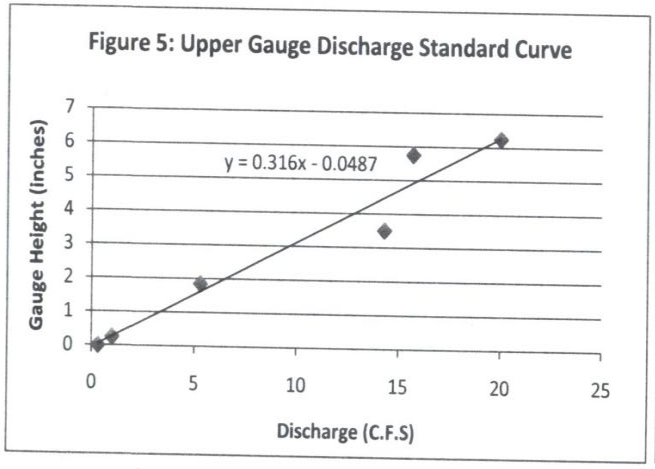
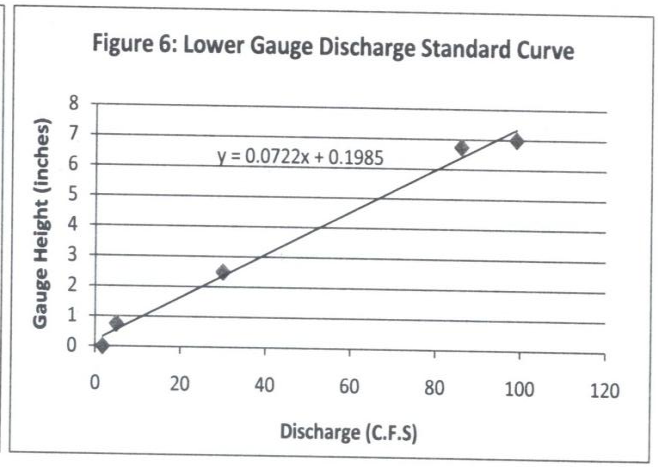


Table 2: Analysis of Hydrographs

	Time	Total Rainfall (inches)	Rate of Rainfall (in/min)	Peak	Height of Peak (inches)	Discharge at Peak (cfs)	Middle of Storm	Lag Time (hrs)	Back to Base Flow	Recovery Time (hrs)
Storm A										
Lower Gauge	195	0.850	0.0044	8/25/2011 8:30	9.5	129	8/25/2011 5:45	3	8/28/2011 13:30	~77
Upper Gauge	195	0.850	0.0044	8/25/2011 6:30	6	19	8/25/2011 5:45	1	8/27/2011 6:30	48
Storm B (Lower Gauge)										
Storm 1	345	0.058	0.00017	9/1/11 17:00	4	52.65	9/1/2011 11:30	5.5	9/4/2011 2:00	~57
Storm 2	660	0.476	0.00072	9/5/11 8:00	4	52.65	9/4/11 0:00	8	NA	NA
Storm 3	975	0.54	0.00055	9/5/11 23:00	5	66.50	9/5/11 12:30	10.5	NA	NA
Storm 4	720	0.23	0.00032	9/6/11 14:00	4.5	59.58	9/6/11 7:00	7	NA	>18





Discussion:

The data from the two separate gauges allow us to see some very interesting factors. There are some significant differences between the upper gauge and lower gauge that should be expected since they are located 4 miles apart. The strongest data is the lag time, the upper gauge's lag time is significantly lower than the lower gauge. A meteorological factor in lag time is the type and amount of precipitation. A short heavy rain will have a short lag time and long slow rain will have a longer lag time.

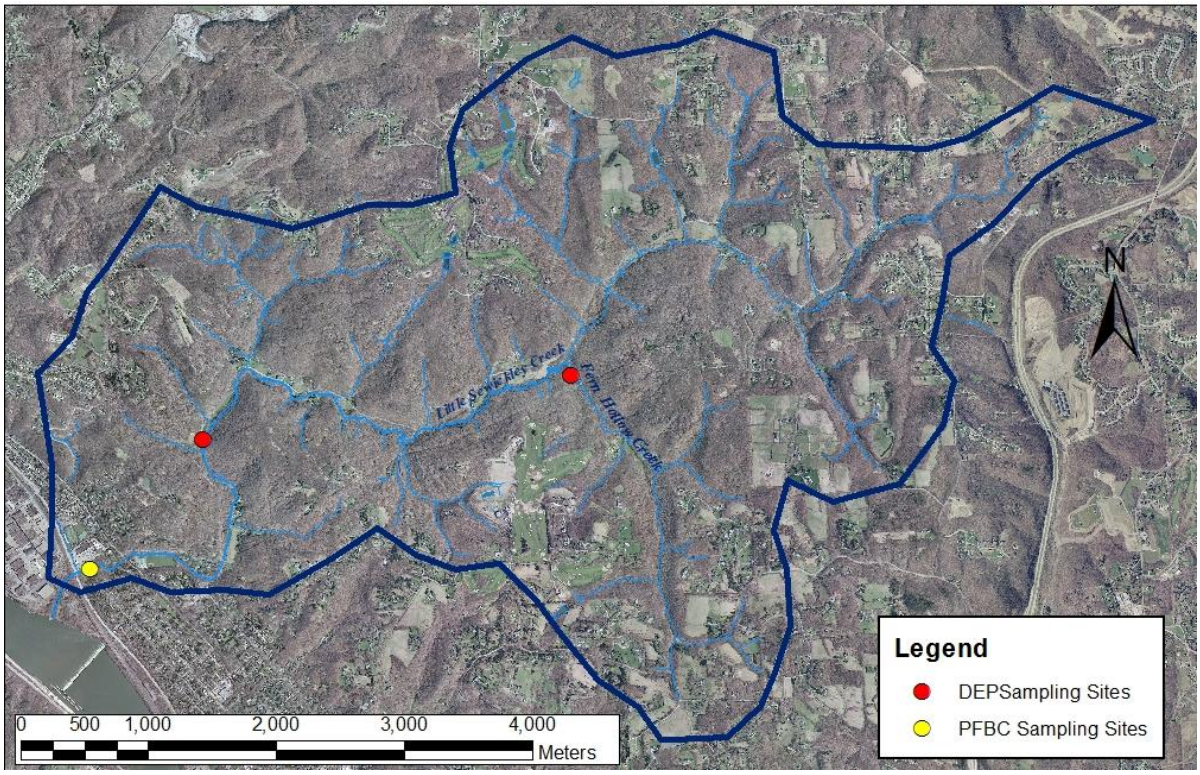
The upper gauge is located in the headwater region with a higher slope gradient and a narrower channel. These features allow precipitation to flow at a faster rate and the discharge will peak faster. The lower gauge is located down in the floodplain region and is affected by all of the inflowing tributaries to the main stem. The channel width is much wider and can handle a larger volume of water because of it.

The time of recession displays a few other characteristics of the watershed. The time that it takes for Little Sewickley Creek to reach base flow again is a long time period due to the high influence of groundwater on the stream. The stream will drop at a very slow rate because the rainfall has recharged the surrounding aquifers and begins to flow towards the stream channel. The type of precipitation affects the soil matrix. A fast hard rain will not completely absorb into the soil and will mainly be a runoff event. However, if the rainfall happens in a long soft rain then the soil will be able to capture the rainfall and turn it into groundwater.

The riparian vegetation also influences the amount of runoff that hits the stream. In the headwaters, there is denser vegetation surrounding the stream, which allows for a higher absorption rate. The Little Sewickley Creek riparian zone is extremely healthy, which will be shown in the habitat surveys and the GIS map that will follow in the next sections.

ii. DEP and PFBC Habitat Evaluation

Figure 18: Habitat Evaluation Sites



The PFBC and the PA DEP have conducted habitat analyses at three sites within the watershed. There are two assessments along the main stem of the stream and one assessment of the main tributary near the confluence to Little Sewickley Creek. This data is displayed in order as one would move up the watershed.

Table 3: Corresponding Rankings to Scores

RBP Habitat Ratings with Total Score:	
Rating	**Score**
Optimal	151-200
Suboptimal	101-150
Marginal	51-100
Poor	0-50

Table 4: RBP Habitat analyses for site 0101 (RM 0.33) on Little Sewickley Creek, Section 01 (Allegheny Co) in June 2006.

Habitat Parameter	RM 0.33
Epifaunal substrate/Available cover (0-20)	16
Embeddedness (0-20)	17
Velocity/Depth Regime (0-20)	17
Sediment Deposition (0-20)	17
Channel Flow Status (0-20)	15
Channel Alteration (0-20)	15
Frequency of Riffles (or bends) (0-20)	18
Right Bank Stability (0-10)	7
Left Bank Stability (0-10)	8
Right Bank Vegetative Protection (0-10)	6
Left Bank Vegetative Protection (0-10)	5
Right Bank Riparian Zone Width (0-10)	4
Left Bank Riparian Zone Width (0-10)	4
TOTAL SCORE:	**149**
HABITAT RATING:	**suboptimal**

Table 5: PA DEP Physical Habitat Assessment located along the main stem of Little Sewickley Creek at Walker Park.

Physical Habitat Assessment							Pool/Glide Assessment	N
Instream Cover	15	Substrate / Cover	0	Frequency of Riffles	16	Contition of Banks	15	
Epifaunal Substrate	16	Velocity/Depth Regimes	15	Channel Sinuosity	16	Bank Vegetation	15	
Embeddedness	13	Pool Variability	0	Channel Flow Status	15	Disruptive Pressure	16	
Pool Substrate	0	Sediment Deposition	15	Channel Alteration	16	Riparian Zone	14	
Instream Score	59	Riparian Score	44	Total Score	181			

Table 6: PA DEP Physical Habitat Assessment located upstream of Fern Hollow's confluence to Little Sewickley Creek.

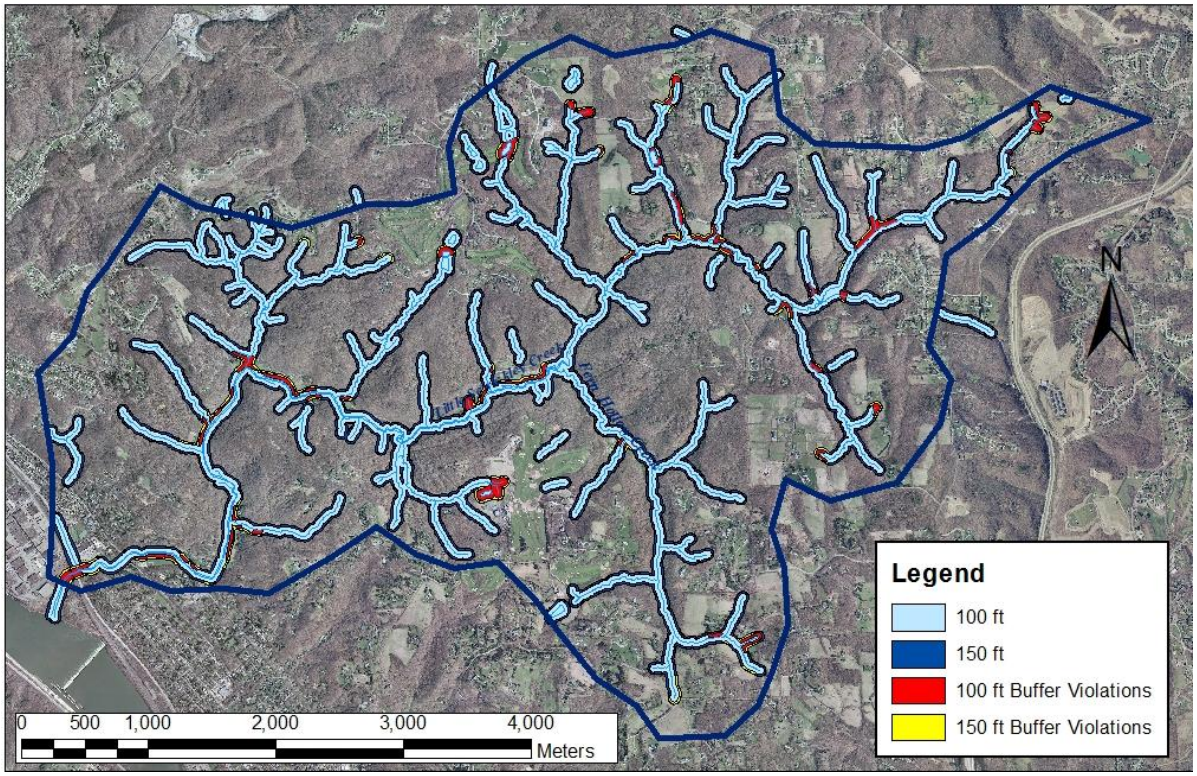
Physical Habitat Assessment							Pool/Glide Assessment	N
Instream Cover	16	Substrate / Cover	0	Frequency of Riffles	16	Contition of Banks	15	
Epifaunal Substrate	17	Velocity/Depth Regimes	16	Channel Sinuosity	16	Bank Vegetation	16	
Embeddedness	13	Pool Variability	0	Channel Flow Status	16	Disruptive Pressure	17	
Pool Substrate	0	Sediment Deposition	13	Channel Alteration	17	Riparian Zone	18	
Instream Score	59	Riparian Score	49	Total Score	190			

Conclusion:

The PFBC scored Little Sewickley Creek at 149, just shy of optimal, only 0.33 miles upstream of the confluence. The DEP has performed surveys further upstream. Little Sewickley Creek scored 181 and Fern Hollow scored 190 signifying optimal habitat. The three scores signify an optimal habitat along the main stem of the stream.

iii. Duquesne GIS Riparian Zone Analysis

Figure 19: Riparian Zone Analysis Map



The map pictured in Figure 19 displays the riparian buffer zone and the violation to that buffer. The riparian zone can be broken down into the main stem and all tributaries.

Table 7: Percent of Intact Riparian Zone at 100ft and 150ft Widths

Buffer Zones	Total Buffer Zone (mi^2)	Intact Buffer Zones (mi^2)	Percent Intact Buffer Zone (%)
Main Stem			
100 ft	0.49	0.43	87.84
150 ft	0.24	0.20	81.76
Total	**0.73**	**0.63**	**85.81**
All Stream Segments			
100 ft	1.51	1.41	93.80
150 ft	0.69	0.63	90.31
Total	**2.20**	**2.04**	**92.70**

b. Chemical Data

i. 40 Years of Chemical Data – "Up the Creek Gang"

Introduction:

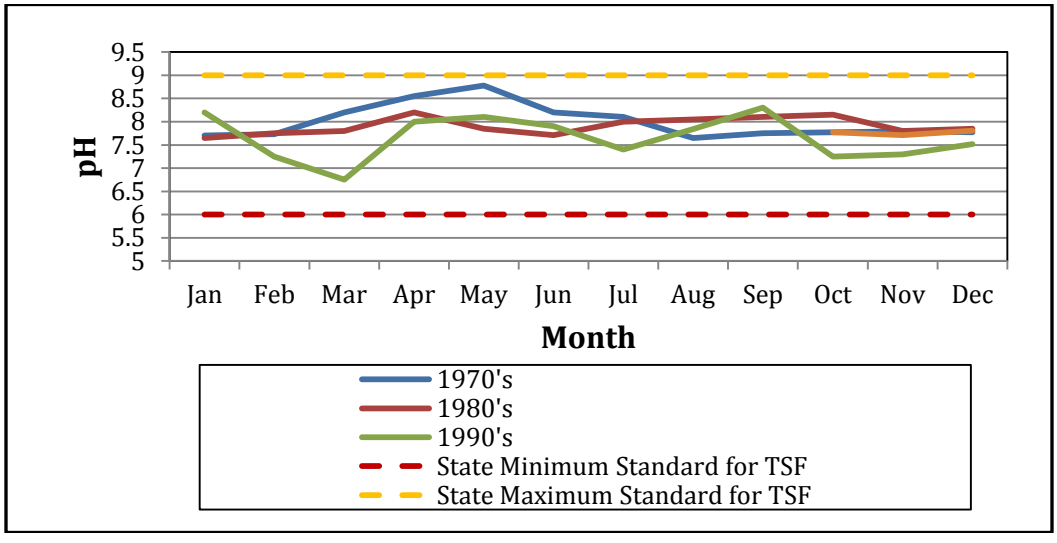
The Up the Creek…..Gang was a group of high school students from the Quaker Valley School District who worked together with the Little Sewickley Creek Watershed Association and various governmental agencies to monitor and protect local streams within the Quaker Valley School District. It was founded in 1978 by Edward Schroth, a Quaker Valley High School Biology teacher. Students dedicated time after school, on weekends, and during the summer months collecting scientific data and performing water quality analysis throughout the Little Sewickley Creek Watershed.

The Up the Creek…Gang's activities were comprised of performing water quality chemical analysis; bacterial analysis; recording water discharge; serving as nature walk guides for elementary students; and maintaining bird boxes for bluebirds and Wood Ducks.

The Gang received many distinguished honors. Among them were the Allegheny County Commissioners' Commendation, the Pennsylvania Department of Education's Environmental Education Award in Excellence, Two E.P.A. President's Environmental Youth Awards, the Take Pride in Pennsylvania Award", an invitation to China, by its government, to organize Up the Creek Chapters in Chinese High Schools (The first known invitation of this kind to an American High School group) and the Pennsylvania Environmental Council's Three Rivers Environmental Award.

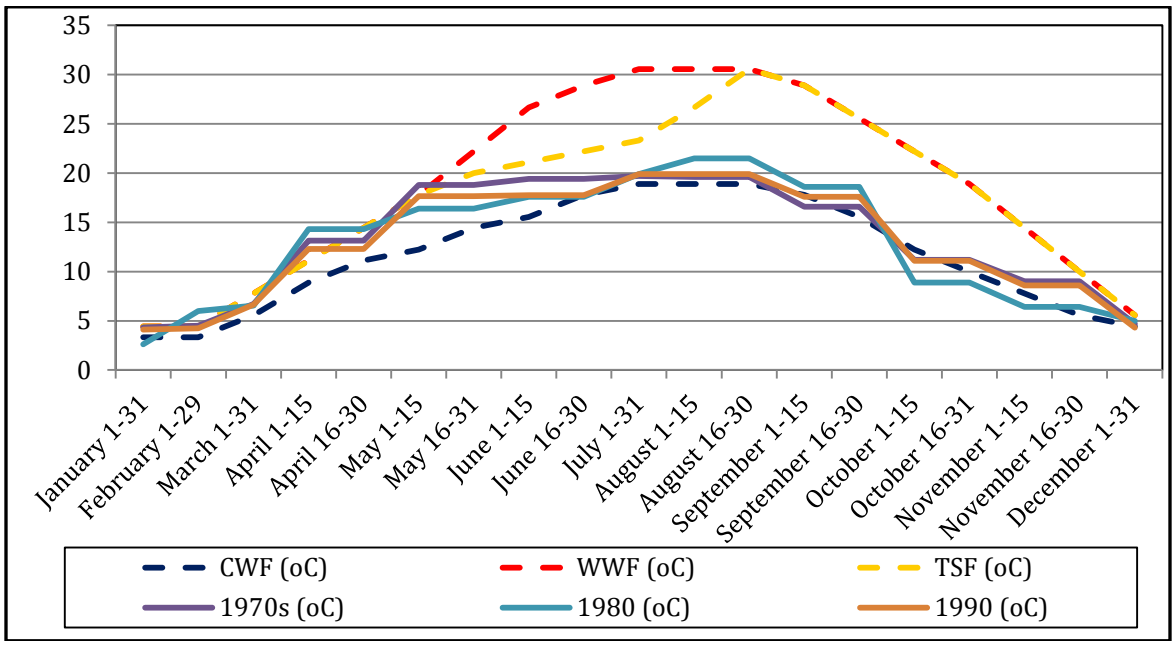
40 years of Chemical Records

Figure 20: pH Values over Decades



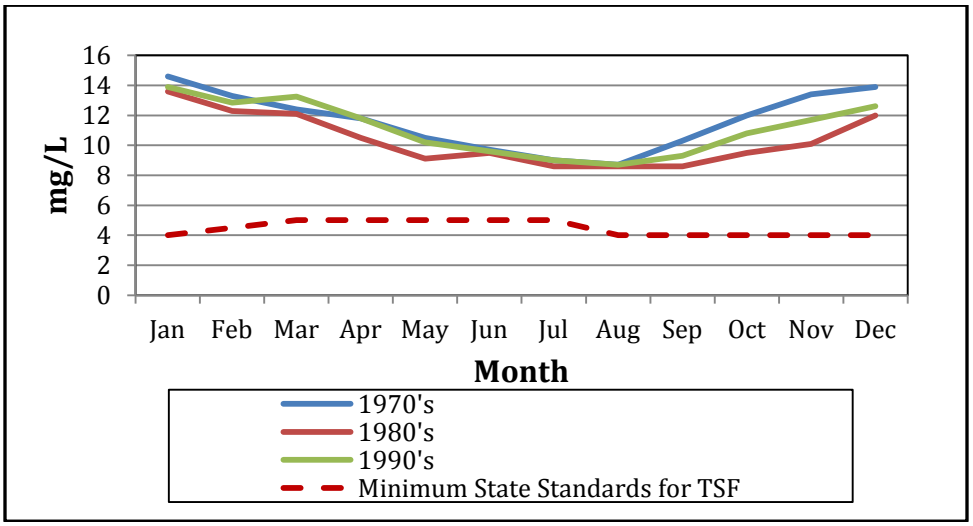
The averaged pH values over a 30 year period show that Little Sewickley Creek has continually fell between the standards for pH. The stream has a thin layer of limestone present within the watershed that allows a high buffering capacity and causes the mean pH to be more basic than acidic.

Figure 21: Water Temperatures over Decades



The averaged water temperatures throughout the last three decades show a solid trend of Little Sewickley Creek. The stream temperature follows the Trout-Stocking Fishery Standard early in the year, but by summer has cooled and reached the Coldwater Fishery Standard. The watershed is heavily dominated by deciduous forests and full protection of the waterway is not reached till June.

Figure 22: Dissolved Oxygen Values over Decades



The dissolved oxygen values taken on Little Sewickley Creek continually exceed the state minimum and never fall below 8 mg/L. As expected the D.O. values drop in the summer due to the increase in water temperature.

ii. 3 Rivers 2nd Nature Chemical Analysis 2003

Introduction:

The 3 Rivers 2nd Nature water quality report was partnered with 3 Rivers Wet Weather Inc. (3RWW), ALCOSAN, and Allegheny County Health Department (ACHD). The study focused on two separate categories; the Ohio River, and the tributaries that feed it. Since Little Sewickley is one of these tributaries the second half of the report will be summarized in the following report. The tributary streams were sampled at the first stream riffle, so the backflow from the Ohio would not affect the results. The table below summarizes the chemical parameters that were analyzed at each tributary.

Methods:

Table 8: Selected Parameters for Tributary Streams in the Ohio River Study Area

Parameter	Justification	Field/Lab	Method
pH	Important for Aquatic Life	Field Test	4500-H B
Temperature	Important for Aquatic Life	Field Test	2550 B
Conductivity	Important for Aquatic Life	Field Test	2510 B
DO	Important for Aquatic Life	Field Test	4500-O G
Total Coliform	Data gathered as part of *E.coli*	ALCOSAN Lab	Idexx
E.Coli	Indicator species of mammalian fecal	ALCOSAN Lab	Idexx
Enterocci	Indicator species of mammalian fecal	ALCOSAN Lab	Idexx
Fecal Coliform	Indicator for fecal contamination	Allegheny Co. Lab	9220 D
TDS	Toxic to Aquatic Life	ACHD Lab	2540 C
Ammonia	Toxic to Aquatic Life	ACHD Lab	4500-NH3F
Hardness	Indication of Metals Availability	ACHD Lab	2340 C
Alkalinity	Indicator of Acid Mine Drainage	ACHD Lab	2320 B
Iron	Indicator of Acid Mine Drainage	ACHD Lab	3500-Fe B
Al*	Indicator of Acid Mine Drainage	ACHD Lab	3500-Al B
Cu**	Toxic to Aquatic Life - Synergistic with Zinc	ACHD Lab	3500-Cu B
Zinc**	Toxic to Aquatic Life - Synergistic with Copper	ACHD Lab	3500-Zn B

(methods taken from APHA et al., 1992)
*Dependent of pH value. If above 8.0 or below 3.0, sample will be analyzed for Al
**Dependent on analysis of upstream NPDES discharges

Results:

Table 9: Average Results from Dry Weather Events for Little Sewickley Creek

Temp * C	pH* SU	DO* mg/l	Conductivity * uS/cm3	Hardness ** mg/l	Iron** mg/l	Ammonia** mg/l	Alkalinity* * mg/l	TDS** mg/l
10.64	8.97	9.14	546	108	0.0376	0.0449	101	349
* 4 data points, **2 data points								

Table 10: Fecal Coliform and *E. Coli* Dry Weather Data

	10/8/2003	10/9/2003	10/21/2003	11/3/2002	Geometric Mean	Arithmetic Mean
Fecal Coliform (CFU/100 ml)	70	145	40	50	67	76
E.coli (CFU/100 ml)	44	115	48	102	71	77

Conclusions:

The chemical results from 3R2N show Little Sewickley Creek complying with all chemical parameters according to its classification (HQ-TSF) under Chapter 93. The tributary also fell below the 200 CFU/100ml benchmark for geometric mean of fecal coliform and *E. Coli*. Little Sewickley Creek was the least impacted by bacterial contamination in the Ohio River tributary system.

iii. United States Army Corps of Engineers/3R2N/ALCOSA Phase IV 2003

Introduction:

The USACE completed the 4th phase of the 3 Rivers 2nd Nature project in 2003. The phase combined physical, chemical, and biological data of all the tributaries located in Allegheny County. The previous section was part of Phase 1 of the project. The USACE expanded the chemical testing from Phase 1 to include more parameters that will be listed in the results of this section. The laboratory analyses included metals, nutrients, sodium, potassium, magnesium, calcium, hardness, alkalinity, acidity, total hardness, color, turbidity, and TDS. Pathogen data included the geometric means and total fecal coliform bacteria*, E. coli*, and enterococci. The laboratory analysis was paired with field measurements that included pH, DO, conductivity, ORP, and water temperature.

Results:

Table 11: Field Parameters taken by USACE

Field Parameters	
Water Temperature (°C)	11.81
Field pH (SU)	8.79
Dissolved Oxygen (mg/l)	9.4
Sp Conductivity Field (uS/cm3)	534.8
* 5 Samples/Parameter	

Table 12: Laboratory Metal Analysis

Metals	
Total Aluminum (ug/l)	60
Total Antimony (ug/l)	5
Total Arsenic (ug/l)	4
Total Barium (ug/l)	61
Total Beryllium (ug/l)	2
Total Cadmium (ug/l)	0.5
Total Calcium (ug/l)	40.7
Total Chromium (ug/l)	2
Total Copper (ug/l)	5
Total Iron (ug/l)	72
Total Lead (ug/l)	2
Total Manganese (ug/l)	14
Total Magnesium (ug/l)	10.8
Total Mercury (ug/l)	0.2
Total Nickel (ug/l)	10
Total Potassium (mg/l)	2.59
Total Selenium (ug/l)	5
Total Silver (ug/l)	2
Total Sodium (mg/l)	41
Total Zinc (ug/l)	10
* 1 Sample/Parameter	

Table 13: Laboratory Nutrient Analysis

Nutrients	
Total Kjeldahl Nitrogen as N (mg/L)*	0.3
Total Nitrate and Nitrite as N (mg/L)*	0.88
Total Ammonia Nitrogen as N (mg/L)**	0.038
Total Phosphorus as P (mg/L)*	0.04
* 1 Sample/Parameter ** 2 Samples/Parameter	

Table 14: Laboratory Bacterial Analysis

Bacteria	
Total Coliform CFU (#/100 ml)*	2419
E.Coli CFU (#/100ml)*	77
E.Coli Geo. Mean CFU (#/100 ml)**	71
Enterococci CFU (#/100 ml)*	24
Fecal Coliform CFU (#/100 ml)*	76
Fecal Coliform Geo. Mean CFU (#/100 ml)*	67
* 4 Samples/Parameter ** 1 Sample/Parameter	

Table 15: Other Tested Parameters

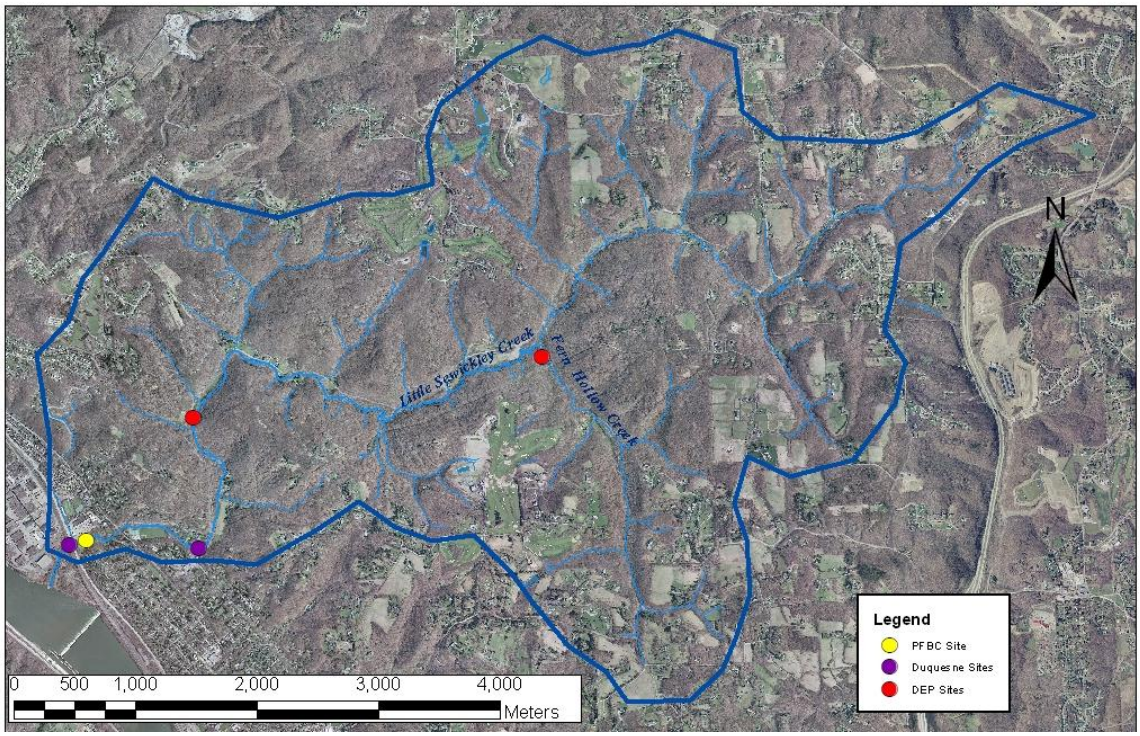
Other Parameters Measured	
Sp Conductivity @25C (uhmos/cm)*	463
Lab pH (SU)*	7.89
Total Acidity as CaCO3 (mg/l)*	1.94
Total Alkalinity as CaCO3 (mg/l)**	90.91
ORP MV*	208.2
Sodium Absorption Ratios*	2.56
Total Hardness as CaCO3 (mg/l)**	128
Turbidity (NTU)*	1.93
* 1 Sample/Parameter ** 2 Samples/Parameter	

Conclusions:

Little Sewickley Creek according to the analysis by the Army Corps of Engineers only violated one parameter out of ten for sewage/nutrification parameters. The stream exceeded two of six parameters for mineralization (winter deicing salts) ranking. There were no exceedences of the 15 parameters for metals. The ACE concluded that salt was the primary stressor on Little Sewickley Creek.

iv. DEP, PFBC and DU

Figure 23: General Water Chemistry Sites



The PFBC and PA DEP have collected general water chemistry characteristics within the watershed at the same three sites as the habitat surveys. Their findings are listed in the following tables below.

Table 16: PFBC General Water Chemistry from Fish Survey

Sample Depth (m)	Water Temp (ºC)	Dissolved Oxygen (mg/l)	Alkalinity (mg/l)	Hardness (mg/l)	Specific Conductance (umhos/cm@25ºC)	pH (SU)
0	19		81	130	473	7.7

Additional Chemistries Collected:

Total Dissolved Solids - Depth:0(m) - Value: 328 mg/l

General Chemistries Sample Time Of Day: 1300 6/29/2006

Table 17: PA DEP Little Sewickley Creek Water Chemistry from Macro Survey

Field Measurements		Lab samples			
Temperature (℃)	20.9	Dissolved Oxygen (mg/L)	11.1	Flow (CFS)	
pH	8.2	Alkalinity (mg/L as CaCO3)		Conductivity	443

Table 18: PA DEP Fern Hollow Water Chemistry from Macro Survey

Field Measurements		Lab samples			
Temperature (℃)	16.1	Dissolved Oxygen (mg/L)	12.5	Flow (CFS)	
pH	7.7	Alkalinity (mg/L as CaCO3)		Conductivity	267

Table 19: DU Water Chemistry from Fish Surveys

Water Quality Data	Upper Sample (2012)	Lower Sample (2012)
Turbidity (NTUs) *	1.34	1.41
Temp. (oC)	7.1	10.6
D.O. (mg/l)	13.13	12.43
D.O. (%)	108.3	112.1
Conductivity (uS/cm3)	289.9	327
pH (SU)	7.98	8.38
* Average of 3 Samples		

Analysis:

The three entities have data that supports a limestone-influenced stream, because of the high alkalinity and a pH on the upper end of the spectrum. The dissolved oxygen values are all high and the high conductivity can be attributed to the calcium carbonate.

v. DEP Groundwater Monitoring Wells

Figure 24: Locations of DEP Monitoring Wells

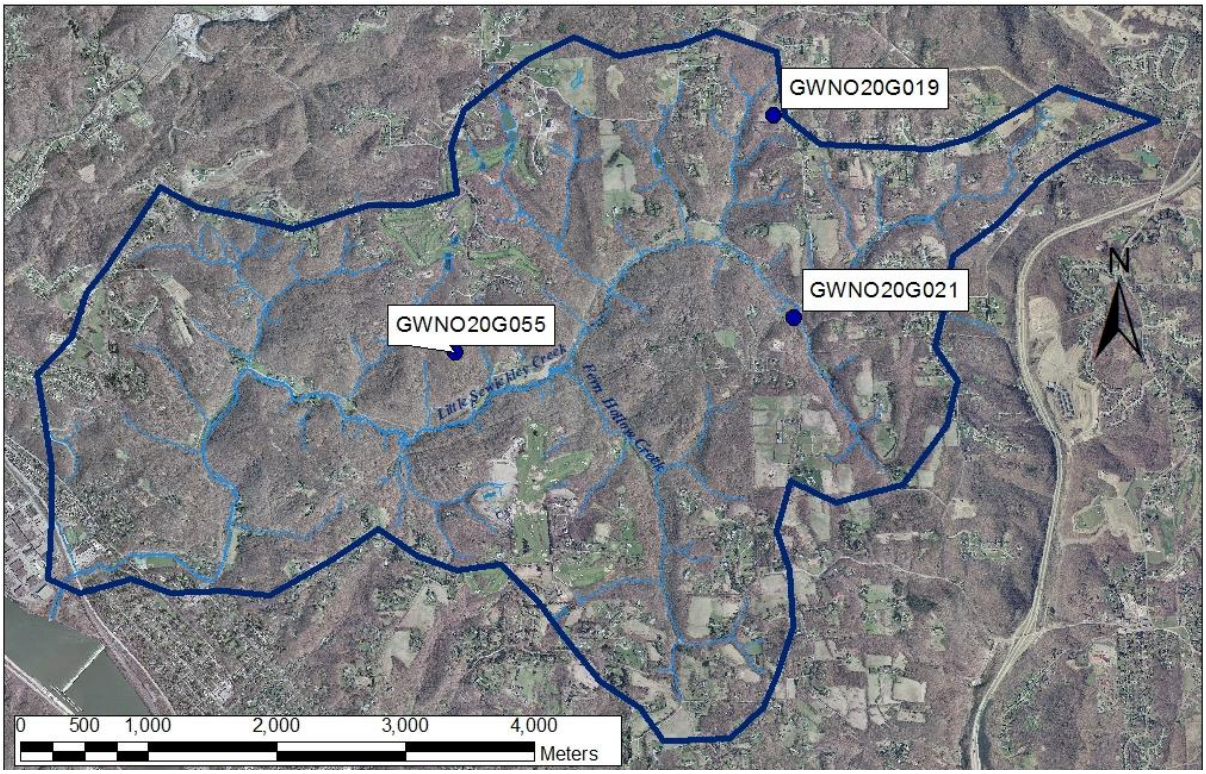


Table 20: Chemical Analysis of Groundwater

	GWN…019	GWN…021	GWN…055		GWN…019	GWN…021	GWN…055
Nitrogen	15	15	4	Sulphates	75	47	59
pH	6.8	7.4	6.7	Silica	0	0	0
Alkalinity	100	210	18	Arsenic	4	4	4
TDS	524	370	216	Barium	138	105	10
Ammonia	0.03	0.02	0.02	Cadmium	10	10	10
Nitrite	0.004	0.004	0.004	Chromium	50	50	50
Nitrate	0.04	0.24	1.94	Copper	10	10	10
Phosphorus	0	0	0	Iron	4350	20	75
Hardness	313	234	81	Lead	4	4	4
Calcium	75.7	60.5	17.7	Manganese	0	0	0
Magnesium	30.4	21.6	8.6	Zinc	10	10	10
Sodium	37.1	20.7	3.7	Mercury	1	1	1
Potassium	1.43	1.58	1.31	Turbidity	19.5	1	1
Chlorine	178	34	4				

vi. Duquesne University

Introduction:

The chemical analysis under Duquesne University comes two categories. In 2011, chemical data was taken from 10 sites along the stream. This data includes turbidity, temperature, DO, conductivity, and pH. The data was taken with a YSI probe and the sampling sites are shown in Figure 4 below. There was also YSI chemical data taken at the two fish sampling locations, which is also listed within the results section. Finally a water temperature gauge has been position in the stream located at Site 6. This gauge takes water temperature readings every 15 minutes.

2011 Chemical Watershed Analysis

Figure 25: Map of 2011 Duquesne Chemical Testing Sites

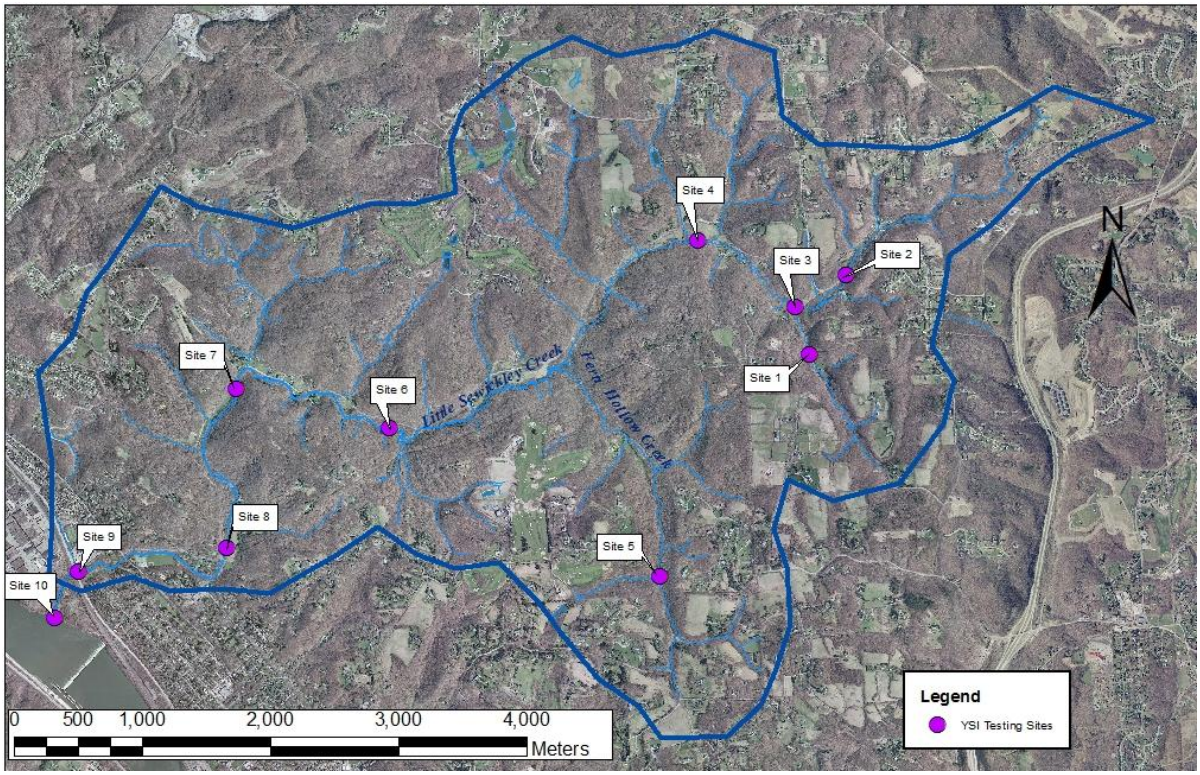
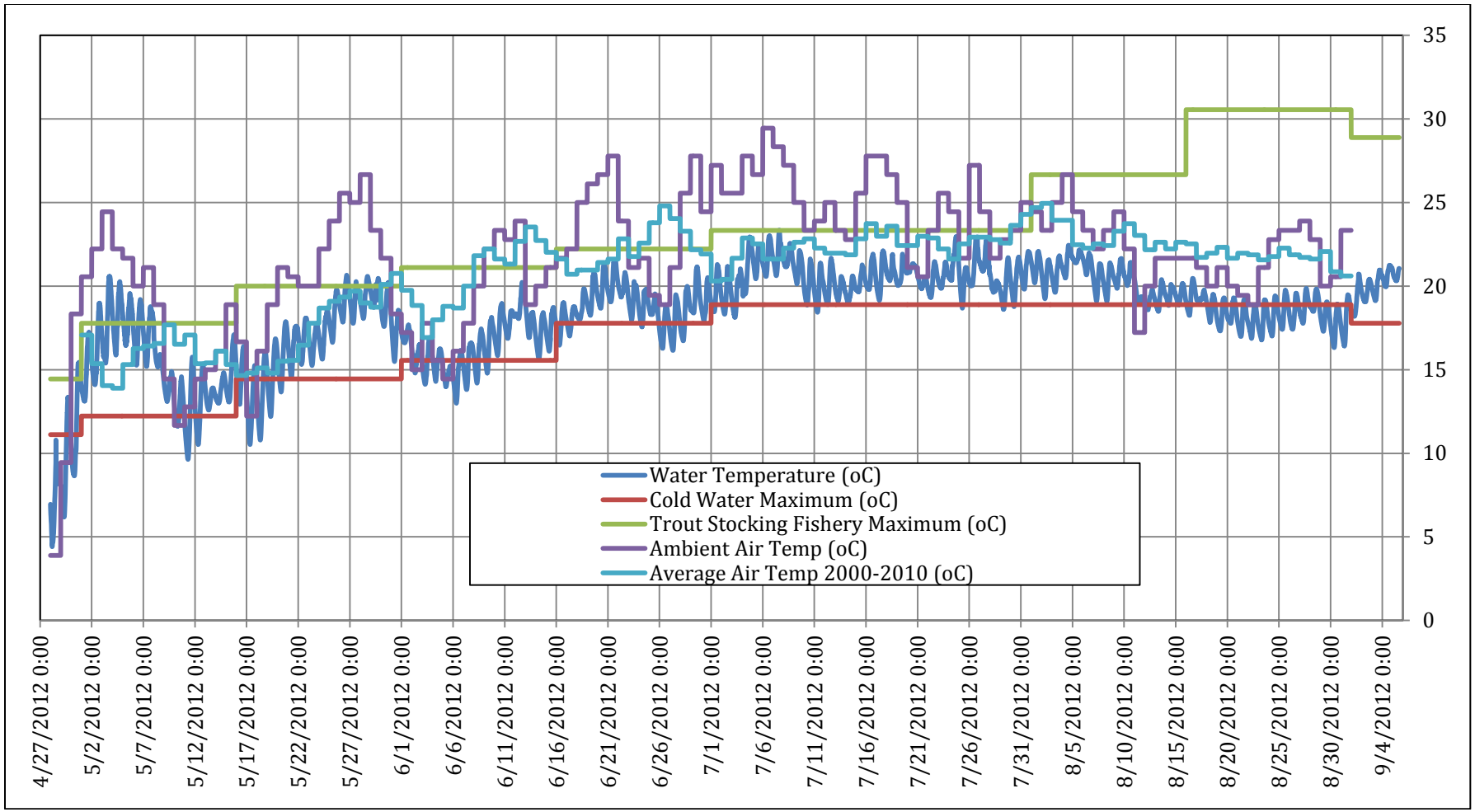


Table 21: 2011 YSI Chemical Data

Water Quality	S.1	S. 2	S. 3	S. 4	S. 5	S. 6	S. 7	S. 8	S.9	S. 10
Turbidity (NTUs) *	7.13	2.13	4.63	2.13	1.08	1.57	1.87	1.43	3.4	1.17
Temp. (^{o}C)	16.68	16.87	16.59	16.34	15.23	16.03	15.92	16.06	16.31	16.32
D.O. (mg/l)	11.28	11.7	11.11	11.96	12.65	11.65	12.03	11.96	12.76	12.7
D.O. (%)	116	121.1	114.2	122.4	126.2	118.2	121.8	121.5	130	129.4
Conductivity ($_{u}$S/cm3)	288	449	409	422	395	341	325	406	410	272
pH (SU)	7	7.41	7.48	7.4	7.4	7.68	7.77	7.72	7.94	8.07
*Average of 3 Samples										

Water Temperature Thermometer

Figure 26: Water Temperature Graph from 4/28 - 9/6/2012



Analysis:

The temperature graph on the previous page has been taking readings on a 15-minute interval. This data gives a real in-depth view of the fluctuations of water temperature within Little Sewickley Creek. The graph also has the daily ambient air temperature and the average air temperature from 2000 to 2010. The graph also has the cold water and trout stocking temperature standards for each corresponding time frame.

Figure 27: Occurrences under Temperature Standards

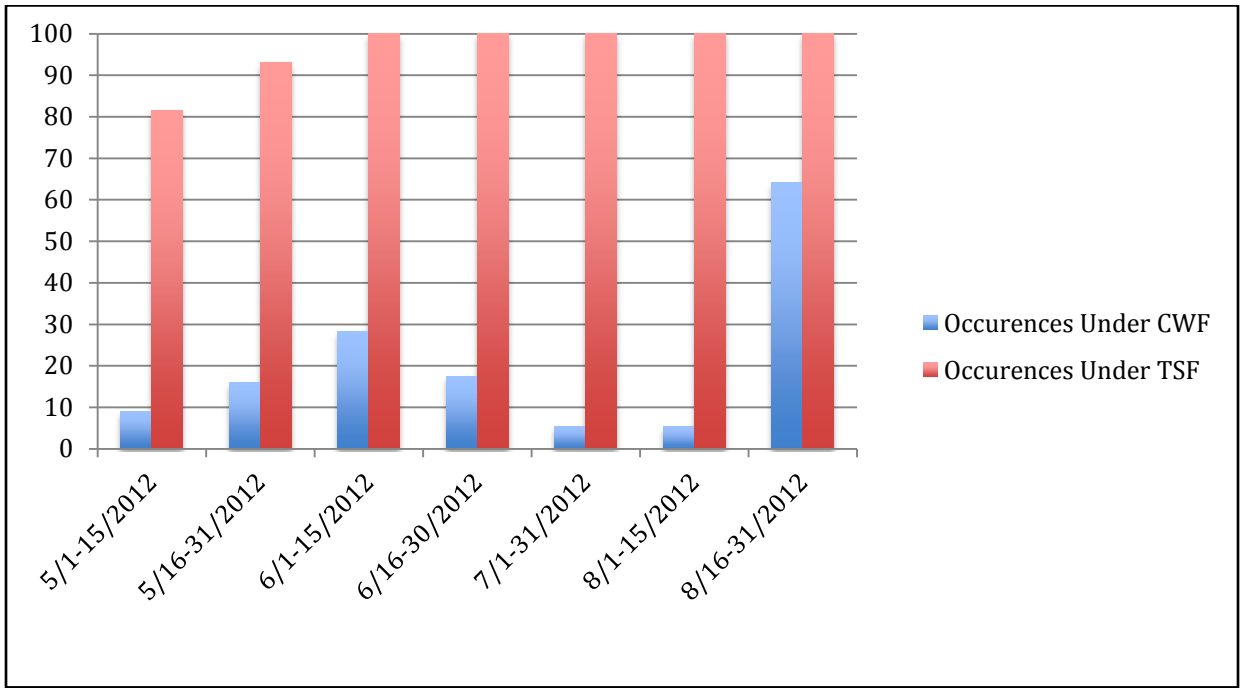


Figure 28: Percentage of Occurrence per Degree Celsius

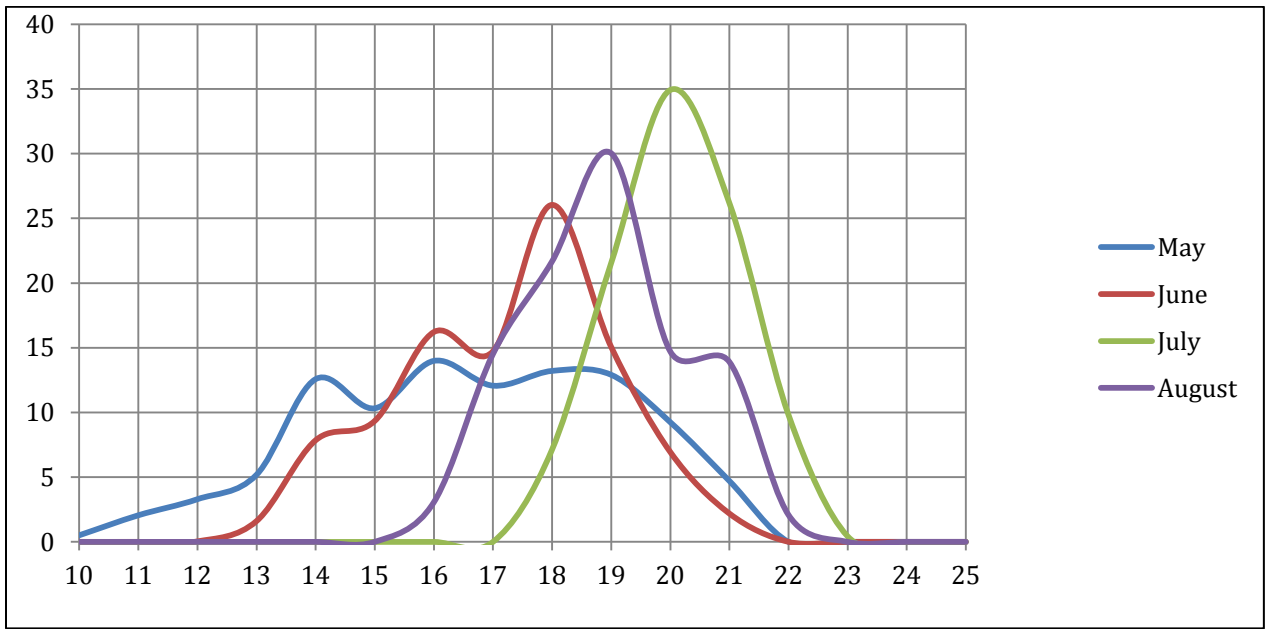


Table 22: Statistical Analysis of Temperature Data by Month

	May	June	July	August
Mean	16.10	17.68	20.60	19.38
Min	9.63	12.99	18.13	16.32
Max	20.65	21.56	23.35	22.44
Standard Deviation	2.51	1.80	1.05	1.36

Conclusions:

The data that Duquesne University has collected on Little Sewickley Creek shows a stream that never exceeds its limits as a HQ-TSF. The water temperature data also suggests that if the ambient temperature was more of a yearly average the stream may register as a CWF. The university was not able to compile the parameters that the USACE sampled on metals and nutrients due to lack of equipment and time.

c. Biological Data

i. Macroinvertebrates

Overview:

There have been three separate macroinvertebrate studies performed in the watershed. 3 Rivers 2nd Nature completed a study in 2003, the PA DEP performed a study consisting of two separate sites and Duquesne University sampled six sites in 2012. There have been a total of nine sites sampled throughout the stream reach, seven performed on Little Sewickley Creek and two on the main tributary Fern Hollow. These sample sites have yielded a large list of different families; the list is displayed below in Table 22. There have been 30 documented families of invertebrates spanning 7 orders of insects and 6 orders of non-insects. The families within the EPT taxa are well represented signifying a stream that contains cold clean water for the majority of the year. The three reports by the organizations are broken down further in the following pages. The only agency to identify to the genus-species level was 3 Rivers 2nd Nature.

Figure 29: Macroinvertebrate Sampling Sites

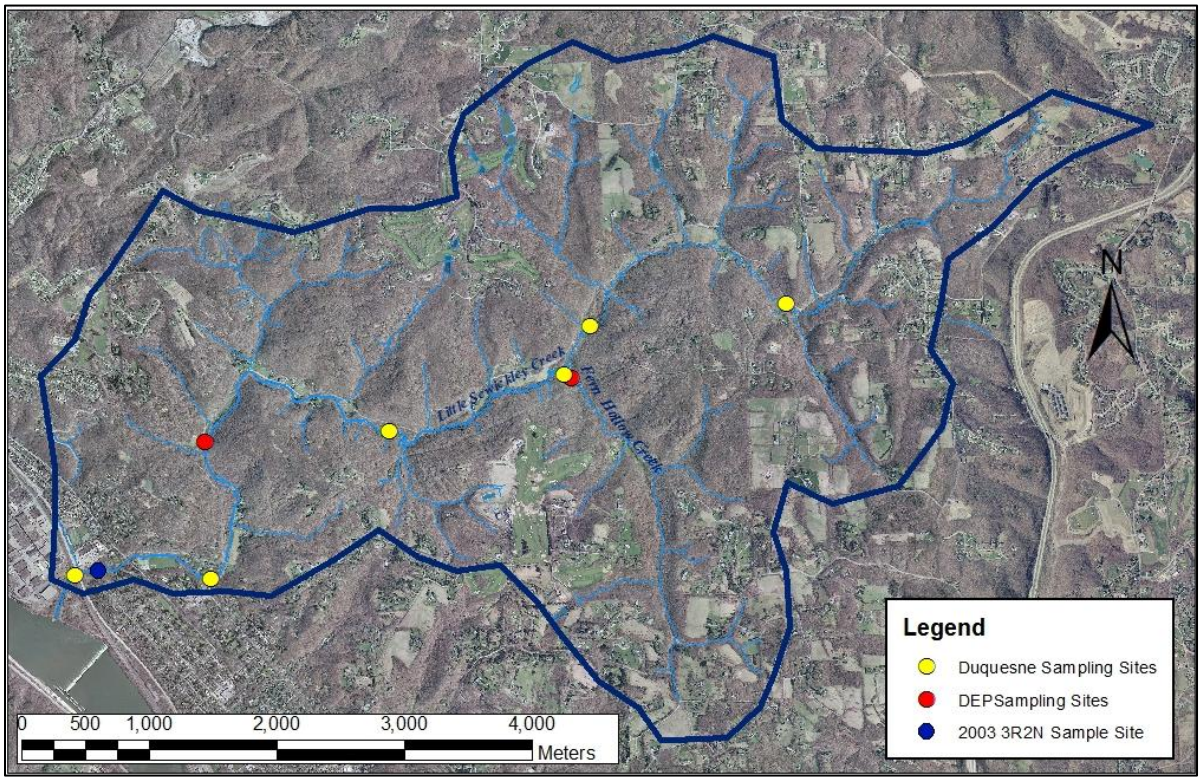


Table 23: Documented Families of Macros Found in Little Sewickley Creek

Scienitific Name	Common Name
Ephemeroptera	**Mayfly**
Baetidae	Small Minnow
Heptageniidae	Flat-headed
Ephemerellidae	Spiny Crawler
Caenidae	Small Square-gill
Leptohyphidae	Little Stout Crawlers
Plecoptera	**Stonefly**
Perlidae	Common
Leuctridae	Rolled-Winged
Nemouridae	Winter
Peltoperlidae	Roachlike
Capniidae	Small Winter
Trichoptera	**Caddisfly**
Hydropsychidae	Netspinning
Hydroptilidae	Microcaddis
Polycentropodidae	Trumpetnet and Tubemaking
Glossosomatidae	Saddlecase Makers
Philopotamidae	Fingernet
Zygoptera	**Damselfly**
Calopterygidae	Broad-winged
Anisoptera	**Dragonfly**
Gomphidae	Clubtail
Diptera	**True Fly**
Chironomidae	Midge
Simuliidae	Black Fly
Tipulidae	Crane Fly
Dolichopodidae	Longlegged Fly
Empididae	Dance Fly
Coleoptera	**True Bug**
Elmidae	Riffle Beetle
Crustacea	**Non-Insects**
Amphipoda	**Malacostracan**
Gammaridae	Scud
Isopoda	**Peracarid**
Asellidae	Aquatic Pill Bug
Decapoda	**Ten-Footed**
Cambaridae	Crayfish
Gastropoda	**Snails**
Physidae	Tadpole-Snail
Ancylidae	Limpet
Annelida	**Segmented Worms**
Oligochaeta	Aquatic Earthworm
Turbellaria	**Flatworms**

1. 3 Rivers 2nd Nature

Introduction

The 3 Rivers 2nd Nature (3R2N) project sampled 18 stream stations along the Ohio River in the spring of 2003. The study collected both chemical data and invertebrate data along these waterways and included Little Sewickley Creek. The chemical data that was collected was previously presented in a prior section. The sample taken from Little Sewickley Creek was a short distance upstream of the confluence. The 3R2N team was accompanied by the U.S. Army Corps of Engineers in their sampling of all the stream reaches.

Methods

The invertebrate sampling followed the U.S. Environmental Protection Agency's protocol for Rapid Biological Assessments. The EPT and pollution sensitive organisms were identified to genus, while the pollution tolerant organisms were only identified to family levels. The samples were quantified using specific metrics and a condition score. All samples were collected in the spring of 2003 to eliminate the seasonal changes. The stations were sampled with Surber sampler for a total of ten minutes, encompassing two samples at five minutes each.

Results:

The report reported on the results of the whole Ohio River drainage basin, this results section will focus only on the findings on Little Sewickley Creek. The stream ranked sixth overall out of the 18 streams in the Ohio Valley and 26th of the 74 streams in Allegheny County based on a condition score and a reference stream station. The researchers collected 469 individuals that encompassed 25 different taxa, of those taxa 15 were pollution sensitive EPT taxa. The sample contained 116 EPT individuals totaling 24.7% of the total population size. The results of the sampling are listed below in Table 2.

Table 24: 3R2N Sample Site Characteristics

Stream Name		Little Sewickley Creek
Tributary To		Ohio River, Right Bank River Mile 13.6
Total Drainage Area (mi2)		9.6
Station Location		in Leetsdale/Edgeworth
Station Location River Mile		0.4
Station Number (prefix 4TRS1)		152
Stream Width (Mean (ft))		15.2
Length of Station (ft), Habitat, and Sampling Time	Length	126
	Riffle/Run	70
	Pool	30
	Time	10
Station Coordinates	Latitude	40 33 28
	Longitude	80 12 10

Table 25: 3R2N Rapid Invertebrate Biological Assessment May 2003

Ephemeroptera		**Diptera**	
Baetidae		Chironomidae	319
Baetis sp.	8	Simuliidae	
Acentrellasp.	16	*Simulium sp.*	3
Heptageniidae		Tipulidae	
Heptagenia sp.	27	*Tipula sp.*	1
Stenacron sp.	1	*Limnophila sp.*	1
Ephemerellidae		*Antocha sp.*	1
Ephemerella sp.	33	Dolichopodidae	1
Caenidae		**Crustacea**	
Caenis sp.	2	**Amphipoda**	
Plecoptera		Gammaridae	
Perlidae		*Gammarus sp.*	3
Perlesta sp.	2	**Isopoda**	
Leuctridae		Asellidae	
Leuctra sp.	2	*Caecidotea sp.*	22
Nemouridae		**Decapoda**	
Amphinemura sp.	7	Cambaridae	
Trichoptera		*Orconectes obscurus*	1
Hydropsychidae		**Annelida**	
Diplectrona sp.	2	Oligochaeta	1
Hydropsyche sp.	8		
Hydropsyche slossome	1		
Hydroptilidae			
Hydroptila sp.	5		
Polycentropodidae			
Polycentropus sp.	1		

Table 26: 3R2N 2003 Sample Totals

Total Number of Taxa	25
Total Number of Organisms	469
Total Number of EPT Taxa	15
Total # of EPT Organisms	116
Percent EPT Organisms	24.7
Percent A & C Organisms	68.2

Figure 30: Photograph of Sample Station 2003

Conclusion:

The 3R2N team concluded from their results that more sample sites needed to be selected within watersheds of interest. The expansion of study sites would allow the headwaters of the streams to be studied, along with the ability to pinpoint hot spots of organic loading. The study would also allow for the main tributaries to be studied, instead of just an area of above the confluence. The sample stations were highly developed compared to the headwaters, especially in the Little Sewickley sample. This recommendation led to the selection of 6 sample sites within the watershed in 2012.

1. **PA DEP**

Pennsylvania Department of Environmental Protection - Statewide Surface Waters Assessment Protocol (SSWAP)

Benthic macroinvertebrate sample summary

Station ID 20030717-1500-GJK

Stream Name Little Sewickley Creek (01179676) **Stream Code** 36657 **Strahler** 2

Survey ID 51956 **Sample Method** Kick Screen: Statewide Surface Water Assessment Program

Collection Date **Collection Time** **Latitude** 40.56681635 **Longitude** -80.1927119

HUC8 05030101 Upper Ohio

Station Location Comments

Quad - Ambridge 40080e2
Northwest of Sewickley, take Beaver Road and turn onto Little Sewickley Creek Road - 1 mile on right, park picnic area - Pulloff there - Sampled straight in and Upstream 50'

Biology / Physical Habitat Comments

Land Use Comments

Other: Roads

Impairment Status Comments

Taxa List

Taxa Name	Abundance Category	Abundance Range	PTV	FFG
Baetidae	Present	3-9	6	CG
Leuctridae	Abundant	25-100	0	SH
Hydropsychidae	Common	10-24	5	FC
Chironomidae(other)	Present	3-9	6	
Tipulidae	Present	3-9	4	SH
Turbellaria	Rare	<3	9	
Gammaridae	Common	10-24	4	CG

SSWAP metrics and IBI

	Raw Metric Value	Standardized Metric Value
Total Richness	7	31.8
EPT Richness (PTV 0 - 4)	1	9.1
Beck's Index (version 3)	3	21.4
Hilsenhoff Biotic Index	2.67	98.9
Shannon Diversitiy	1.53	57.8
	SSWAP IBI	**43.8**

Pennsylvania Department of Environmental Protection - Statewide Surface Waters Assessment Protocol (SSWAP)

Benthic macroinvertebrate sample summary

Station ID 20030717-1500-GJK

Stream Name Little Sewickley Creek (01179676) **Stream Code** 36657 **Strahler** 2

Survey ID 51956 **Sample Method** Kick Screen: Statewide Surface Water Assessment Program

Collection Date **Collection Time** **Latitude** 40.56681635 **Longitude** -80.1927119

HUC8 05030101 Upper Ohio

1. Abundance obviously low		N
2. Seven or fewer families		Y
3. Three or fewer mayfly individuals (exclude Baetidae, Caenidae, Siphlonuridae)		Y
4. Stoneflies collectively present	N	
5. Mayflies and caddisflies collectively abundant (exclude Baetidae, Caenidae, Siphlonuridae, Hydropsychidae, Polycentropidae)	N	
6. Jul - Sep: at least four EPT families with tolerance value of 4 or less Nov - May: at least six EPT families with tolerance value of 4 or less	N	
7. Four or more famlies with tolerance value of 3 or less	N	
8. Six or more families with tolerance value of 4 or less	N	
9. Dominant family with tolerance value of 4 or less	Y	
10. Dominant family with tolerance value greater than 5 (criteria 7 and 8 negate this criterion)		N
11. Seven or more families with tolerance value of 6 or more (criteria 7 and 8 negate this criterion)		N
12. Sample dominated by families with a mean tolerance value of 5 or less	Y	
13. Sample dominated by families with a mean tolerance value of 6 or more		N
14. Embeddedness (or substrate character for pool/glide) + sediment deposition = 24 or less (20 or less for warmwater, low gradient streams)		N
15. Condition of banks + bank vegetation = 24 or less (20 or less for warmwater, low gradient streams)		N
16. Total habitat score 140 or less for forested, coldwater, high gradient streams (120 or less for warmwater, low gradient streams)		N
17a. Special conditions (attaining)	Y	
17b. Special conditions (impaired)		N

17c. Special conditons description

Leuctridae abundant

Not impaired Y **Biology impaired** N **Habitat impaired** N **Insufficient data** N

Rock pick influenced assessment Y **Impact is localized** N **Re-evaluate designated use** N

Use Assessment Status for Stream Reach **Designated Use** HQ-TSF **Existing Use**

Aquatic Life Attaining (20030717-1500-GJK)

Fish Consumption

Potable Water Supply

Recreation

Pennsylvania Department of Environmental Protection - Statewide Surface Waters Assessment Protocol (SSWAP)

Benthic macroinvertebrate sample summary

Station ID 20030724-1100-GJK

Stream Name Little Sewickley Creek (Unamed Trib 99682392 To) **Stream Code** 36664 **Strahler** 2

Survey ID 52002 **Sample Method** Kick Screen: Statewide Surface Water Assessment Program

Collection Date **Collection Time** **Latitude** 40.57105737 **Longitude** -80.1587936

HUC8 05030101 Upper Ohio

Station Location Comments

Quad - Ambridge 40080e2
Off Fern Hollow Road pass intersection with Little Sewickley Creek Road - Heading toward Sewickley - Pulloff 500' on right - Monitoring well site - Walked in on horse trail 70' and sampled upstream of trail

Biology / Physical Habitat Comments

Flow was high due to rain at time of sampling

Land Use Comments

Other: Roads and Allegheny Country Club

Impairment Status Comments

Taxa List

Taxa Name	Abundance Category	Abundance Range	PTV	FFG
Baetidae	Present	3-9	6	CG
Leuctridae	Common	10-24	0	SH
Philopotamidae	Present	3-9	3	FC
Hydropsychidae	Common	10-24	5	FC
Glossosomatidae	Rare	<3	0	SC
Elmidae	Rare	<3	5	CG
Tipulidae	Present	3-9	4	SH
Gammaridae	Present	3-9	4	CG

SSWAP metrics and IBI

	Raw Metric Value	Standardized Metric Value
Total Richness	8	36.4
EPT Richness (PTV 0 - 4)	3	27.3
Beck's Index (version 3)	6	42.9
Hilsenhoff Biotic Index	3.12	92.9
Shannon Diversitiy	1.78	67.6
	SSWAP IBI	**53.4**

Pennsylvania Department of Environmental Protection - Statewide Surface Waters Assessment Protocol (SSWAP)

Benthic macroinvertebrate sample summary

Station ID 20030724-1100-GJK

Stream Name Little Sewickley Creek (Unamed Trib 99682392 To) **Stream Code** 36664 **Strahler** 2

Survey ID 52002 **Sample Method** Kick Screen: Statewide Surface Water Assessment Program

Collection Date **Collection Time** **Latitude** 40.57105737 **Longitude** -80.1587936

HUC8 05030101 Upper Ohio

1. Abundance obviously low		N
2. Seven or fewer families		N
3. Three or fewer mayfly individuals (exclude Baetidae, Caenidae, Siphlonuridae)		Y
4. Stoneflies collectively present	N	
5. Mayflies and caddisflies collectively abundant (exclude Baetidae, Caenidae, Siphlonuridae, Hydropsychidae, Polycentropidae)	N	
6. Jul - Sep: at least four EPT families with tolerance value of 4 or less Nov - May: at least six EPT families with tolerance value of 4 or less	N	
7. Four or more families with tolerance value of 3 or less	N	
8. Six or more families with tolerance value of 4 or less	N	
9. Dominant family with tolerance value of 4 or less	Y	
10. Dominant family with tolerance value greater than 5 (criteria 7 and 8 negate this criterion)		N
11. Seven or more families with tolerance value of 6 or more (criteria 7 and 8 negate this criterion)		N
12. Sample dominated by families with a mean tolerance value of 5 or less	Y	
13. Sample dominated by families with a mean tolerance value of 6 or more		N
14. Embeddedness (or substrate character for pool/glide) + sediment deposition = 24 or less (20 or less for warmwater, low gradient streams)		N
15. Condition of banks + bank vegetation = 24 or less (20 or less for warmwater, low gradient streams)		N
16. Total habitat score 140 or less for forested, coldwater, high gradient streams (120 or less for warmwater, low gradient streams)		N
17a. Special conditions (attaining)	Y	
17b. Special conditions (impaired)		N

17c. Special conditons description

Dominant Taxa Leuctridae

Not Impaired Y **Biology Impaired** N **Habitat Impaired** N **Insufficient data** N

Rock pick influenced assessment N **Impact is localized** N **Re-evaluate designated use** N

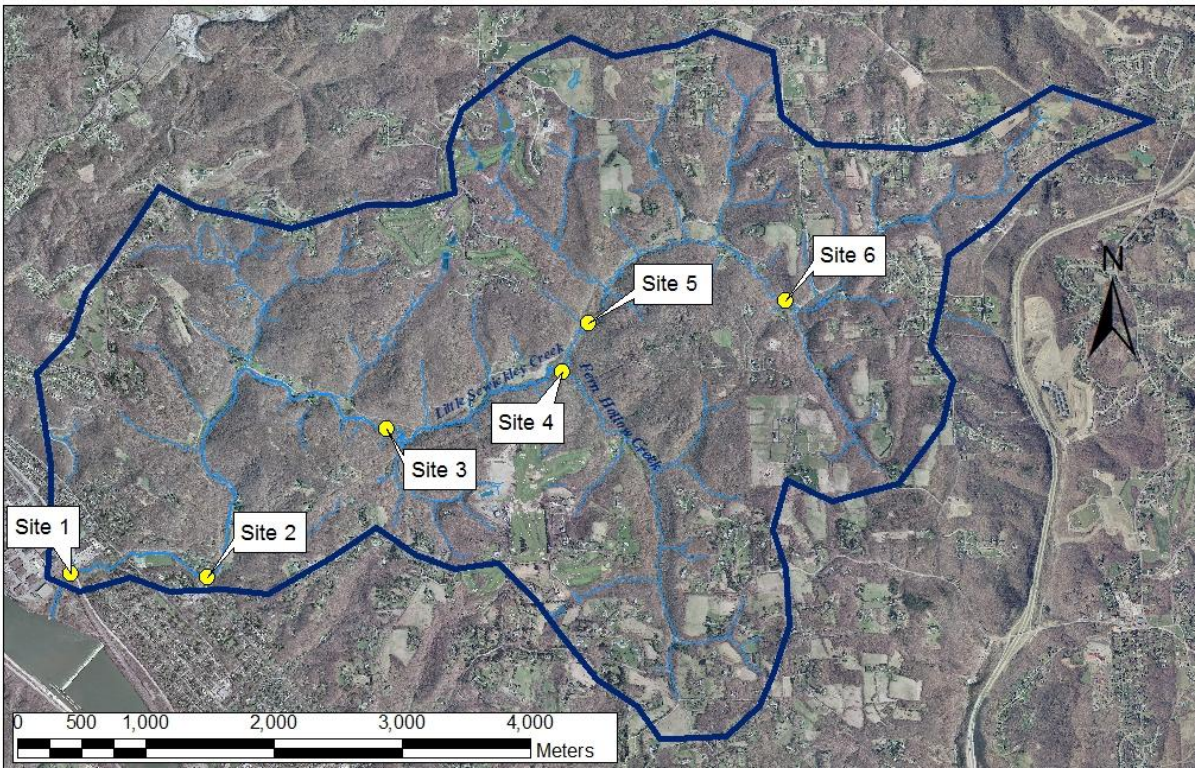
Use Assessment Status for Stream Reach	**Designated Use** HQ-TSF	**Existing Use**
Aquatic Life	Attaining (20030724-1100-GJK)	
Fish Consumption		
Potable Water Supply		
Recreation		

2. Duquesne University

Introduction:

In the spring of 2012, Nate Reinhart of Duquesne University set out to use 3R2N's recommendations to expand study sites. The focus was centered on the Little Sewickley Creek Watershed, there were 5 new sample sites selected along the main stem of the stream and 1 site above the confluence of Fern Hollow Creek (Site 4) into the main stem. Fern Hollow is a second order stream and when it enters into Little Sewickley Creek it upgrades it to a third order stream. The map below depicts the six sample sites located throughout the watershed.

Figure 31: 2012 Study Sample Sites



Methods

Site Selection:

The first sample station is below the 2003 sample site and was located in the area of the stream that is channelized and is most affected by anthropogenic sources. Site 1 and Site 2 were selected as samples, since there is also corresponding fish data at these sites. The third site is the location of the temperature thermostat and area that easily accessed. As stated above Site 4 is located on the main tributary to the stream and Site 5 was selected randomly. The final site is downstream of the confluence of the two main tributaries that form Little Sewickley Creek into a second order stream.

Collections:

The samples were collected using a Surber Sampler, because of this methodology, only riffles were sampled. Each sample station comprised a 300 meter stretch and four riffles were selected along the reach. The riffle was sampled once for 5 minutes total, the entire sample of each station took approximately 20 minutes. The macroinvertebrates along with some substrate were transferred from the Surber Sampler into jars of 95% ethanol. These samples were then transferred back to the lab for identification. The samples were then randomly sub-sampled until approximately 300 individuals were taken from the original population. The sub-sample was then identified down to family, since time and expertise did not allow for identification to genus-species level.

Indices:

Once the samples were quantified and identified, the PA DEP Index of Biological Integrity for Benthic Macroinvertebrate Communities was used. The samples were only identified down to family, so the IBI scores only represent a snap-shot of the stream's water quality and are not final values. The IBI encompassed six separate metrics that included; Beck's Biotic Index, EPT Richness, Total Richness, Shannon's H for Diversity, Hilsenhoff Biotic Index, and Percent Intolerant Individuals. This data for each site is listed in the results section below.

Results:

Site 1:

Table 27: Family Listing of Site 1

Site 1			
Ephemeroptera		**Diptera**	
Baetidae	2	Chironomidae	320
Heptageniidae	0	Simuliidae	22
Ephemerellidae	0	Tipulidae	3
Leptohyphidae	0	Empididae	0
Caenidae	0	Dolichopodidae	0
Plecoptera		**Coleoptera**	
Perlidae	0	Elmidae	0
Chloroperlidae	0	**Amphipoda**	
Leuctridae	1	Gammaridae	1
Nemouridae	0	**Isopoda**	
Peltoperlidae	1	Asellidae	0
Capniidae	0	**Decapoda**	
Trichoptera		Cambaridae	0
Hydropsychidae	6	**Gastropoda**	
Philopotamidae	1	Physidae	0
Hydroptilidae	1	Ancylidae	0
Polycentropodidae	2	**Annelida**	
Zygoptera		Oligochaeta	0
Calopterygidae	0		
Anisoptera			
Gomphidae	1		

Table 28: Overview of Site 1 Sample

# Families	12
# Individuals	361
# EPT Families	7
# EPT Individuals	14
% EPT Individuals	3.878116
% A & C Individuals	88.64266

Table 29: IBI for Site 1

IBI	Standardized Equation	Observed	Adjusted
Beck's Biotic Index	Observed/33	14	0.424242
EPT Richness	Observed/19	7	0.368421
Total Richness	Observed/38	12	0.315789
Shannon's H	Observed/2.86	0.540721	0.189063
Hilsenhoff	(10-Observed)/(10-1.89)	5.867036	0.509613
Percent Intolerant Individuals	Observed/84.5	4.71	0.05574
			1.862869
			0.310478
		IBI	**31.04782**

Figure 32: Photo of Site 1

Site 2:

Table 30: Family Listing for Site 2

Site 2			
Ephemeroptera		**Diptera**	
Baetidae	13	Chironomidae	237
Heptageniidae	0	Simuliidae	24
Ephemerellidae	3	Tipulidae	4
Leptohyphidae	1	Empididae	0
Caenidae	0	Dolichopodidae	0
Plecoptera		**Coleoptera**	
Perlidae	0	Elmidae	0
Chloroperlidae	0	**Amphipoda**	
Leuctridae	1	Gammaridae	1
Nemouridae	9	**Isopoda**	
Peltoperlidae	0	Asellidae	1
Capniidae	1	**Decapoda**	
Trichoptera		Cambaridae	0
Hydropsychidae	23	**Gastropoda**	
Philopotamidae	0	Physidae	2
Hydroptilidae	0	Ancylidae	0
Polycentropodidae	3	**Annelida**	
Zygoptera		Oligochaeta	0
Calopterygidae	1		
Anisoptera			
Gomphidae	0		

Table 31: Overview of Site 2 Sample

# Families	15
# Individuals	324
# EPT Families	8
# EPT Individuals	54
% EPT Individuals	16.66666667
% A & C Individuals	73.14814815

Table 32: IBI for Site 2

IBI	Standardized Equation	Observed	Adjusted
Beck's Biotic Index	Observed/33	17	0.515151515
EPT Richness	Observed/19	8	0.421052632
Total Richness	Observed/38	15	0.394736842
Shannon's H	Observed/2.86	1.117279	0.390656993
Hilsenhoff	(10-Observed)/(10-1.89)	5.546296296	0.549161986
Percent Intolerant Individuals	Observed/84.5	17.28	0.204497041
			2.475257009
			0.412542835
		IBI	**41.25428348**

Figure 33: Photo of Site 2

Site 3:

Table 33: Family Listing for Site 3

Site 3			
Ephemeroptera		**Diptera**	
Baetidae	54	Chironomidae	87
Heptageniidae	0	Simuliidae	9
Ephemerellidae	62	Tipulidae	7
Leptohyphidae	0	Empididae	0
Caenidae	0	Dolichopodidae	0
Plecoptera		**Coleoptera**	
Perlidae	2	Elmidae	4
Chloroperlidae	0	**Amphipoda**	
Leuctridae	1	Gammaridae	7
Nemouridae	8	**Isopoda**	
Peltoperlidae	0	Asellidae	0
Capniidae	2	**Decapoda**	
Trichoptera		Cambaridae	0
Hydropsychidae	27	**Gastropoda**	
Philopotamidae	17	Physidae	1
Hydroptilidae	1	Ancylidae	1
Polycentropodidae	13	**Annelida**	
Zygoptera		Oligochaeta	1
Calopterygidae	0		
Anisoptera			
Gomphidae	0		

Table 34: Overview of Site 3 Sample

# Families	18
# Individuals	304
# EPT Families	10
# EPT Individuals	187
% EPT Individuals	61.51316
% A & C Individuals	28.94737

Table 35: IBI for Site 3

IBI	Standardized Equation	Observed	Adjusted
Beck's Biotic Index	Observed/33	18	0.545455
EPT Richness	Observed/19	10	0.526316
Total Richness	Observed/38	18	0.473684
Shannon's H	Observed/2.86	2.091077	0.731146
Hilsenhoff	(10-Observed)/(10-1.89)	3.924342	0.749156
Percent Intolerant Individuals	Observed/84.5	63.16	0.747456
			3.773212
			0.628869
		IBI	**62.88687**

Figure 34: Photo of Site 3

Site 4:

Table 36: Family Listing for Site 4

Site 4			
Ephemeroptera		**Diptera**	
Baetidae	82	Chironomidae	31
Heptageniidae	7	Simuliidae	2
Ephemerellidae	159	Tipulidae	3
Leptohyphidae	0	Empididae	0
Caenidae	0	Dolichopodidae	0
Plecoptera		**Coleoptera**	
Perlidae	0	Elmidae	5
Chloroperlidae	0	**Amphipoda**	
Leuctridae	31	Gammaridae	3
Nemouridae	36	**Isopoda**	
Peltoperlidae	0	Asellidae	0
Capniidae	0	**Decapoda**	
Trichoptera		Cambaridae	0
Hydropsychidae	28	**Gastropoda**	
Philopotamidae	12	Physidae	0
Hydroptilidae	0	Ancylidae	0
Polycentropodidae	28	**Annelida**	
Zygoptera		Oligochaeta	0
Calopterygidae	0		
Anisoptera			
Gomphidae	0		

Table 37: Overview of Site 4 Sample

# Families	13
# Individuals	427
# EPT Families	8
# EPT Individuals	383
% EPT Individuals	89.69555
% A & C Individuals	7.259953

Table 38: IBI for Site 4

IBI	Standardized Equation	Observed	Adjusted	Fixed
Beck's Biotic Index	Observed/33	16	0.484848	0.484848
EPT Richness	Observed/19	8	0.421053	0.421053
Total Richness	Observed/38	13	0.342105	0.342105
Shannon's H	Observed/2.86	1.946036	0.680432	0.680432
Hilsenhoff	(10-Observed)/(10-1.89)	2.674473	0.903271	0.903271
Percent Intolerant Individuals	Observed/84.5	85.714	1.014367	1
				3.831709
				0.638618
			IBI	**63.86182**

Figure 35: Photo of Site 4

Site 5:

Table 39: Family Listing for Site 5

Site 5			
Ephemeroptera		**Diptera**	
Baetidae	4	Chironomidae	204
Heptageniidae	35	Simuliidae	30
Ephemerellidae	0	Tipulidae	17
Leptohyphidae	4	Empididae	0
Caenidae	0	Dolichopodidae	0
Plecoptera		**Coleoptera**	
Perlidae	0	Elmidae	2
Chloroperlidae	0	**Amphipoda**	
Leuctridae	0	Gammaridae	0
Nemouridae	4	**Isopoda**	
Peltoperlidae	0	Asellidae	0
Capniidae	2	**Decapoda**	
Trichoptera		Cambaridae	0
Hydropsychidae	32	**Gastropoda**	
Philopotamidae	3	Physidae	2
Hydroptilidae	0	Ancylidae	0
Polycentropodidae	6	**Annelida**	
Zygoptera		Oligochaeta	0
Calopterygidae	0		
Anisoptera			
Gomphidae	0		

Table 40: Overview of Site 5 Sample

# Families	13
# Individuals	345
# EPT Families	8
# EPT Individuals	86
% EPT Individuals	24.92754
% A & C Individuals	59.13043

Table 41: IBI for Site 5

IBI	Standardized Equation	Observed	Adjusted
Beck's Biotic Index	Observed/33	17	0.515152
EPT Richness	Observed/19	8	0.421053
Total Richness	Observed/38	13	0.342105
Shannon's H	Observed/2.86	1.480418	0.517629
Hilsenhoff	(10-Observed)/(10-1.89)	4.988406	0.617952
Percent Intolerant Individuals	Observed/84.5	29.86	0.353373
			2.767263
			0.461211
		IBI	**46.12105**

Figure 36: Photo of Site 5

Site 6:

Table 42: Family Listing for Site 6

Site 6			
Ephemeroptera		**Diptera**	
Baetidae	6	Chironomidae	108
Heptageniidae	3	Simuliidae	36
Ephemerellidae	8	Tipulidae	20
Leptohyphidae	2	Empididae	1
Caenidae	0	Dolichopodidae	0
Plecoptera		**Coleoptera**	
Perlidae	0	Elmidae	13
Chloroperlidae	0	**Amphipoda**	
Leuctridae	0	Gammaridae	0
Nemouridae	23	**Isopoda**	
Peltoperlidae	0	Asellidae	1
Capniidae	0	**Decapoda**	
Trichoptera		Cambaridae	0
Hydropsychidae	73	**Gastropoda**	
Philopotamidae	15	Physidae	1
Hydroptilidae	0	Ancylidae	0
Polycentropodidae	13	**Annelida**	
Zygoptera		Oligochaeta	0
Calopterygidae	0		
Anisoptera			
Gomphidae	0		

Table 43: Overview of Site 6 Sample

# Families	15
# Individuals	322
# EPT Families	8
# EPT Individuals	143
% EPT Individuals	44.40994
% A & C Individuals	33.54037

Table 44: IBI for Site 6

IBI	Standardized Equation	Observed	Adjusted
Beck's Biotic Index	Observed/33	17	0.515151515
EPT Richness	Observed/19	8	0.421052632
Total Richness	Observed/38	15	0.394736842
Shannon's H	Observed/2.86	2.00587294	0.701354175
Hilsenhoff	(10-Observed)/(10-1.89)	4.680124224	1.005456522
Percent Intolerant Individuals	Observed/84.5	50.62	0.599053254
			3.63680494
			0.606134157
		IBI	**60.61341566**

Figure 37: Photo of Site 6

Comparison:

Figure 38: Number of Families Compared

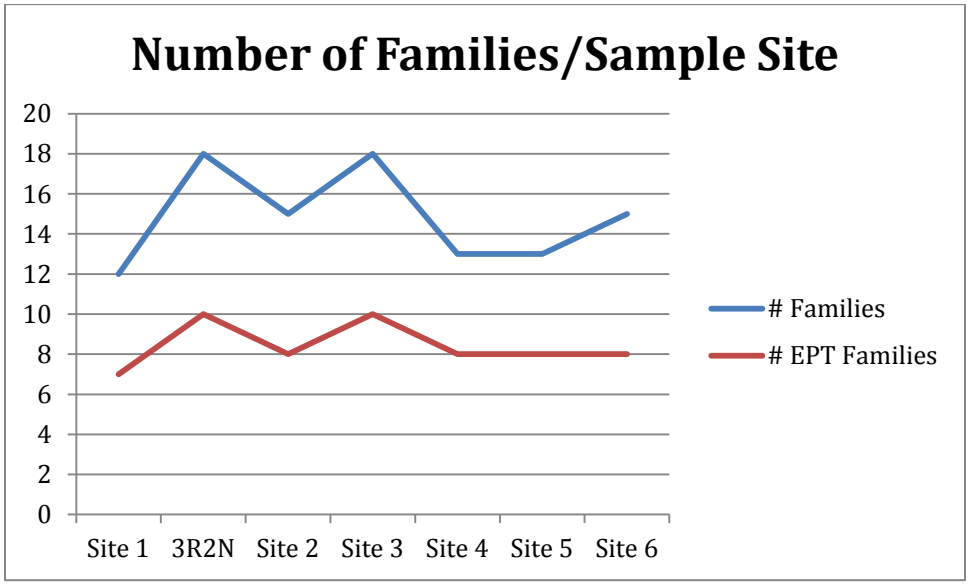


Figure 39: Comparison of Population Metrics

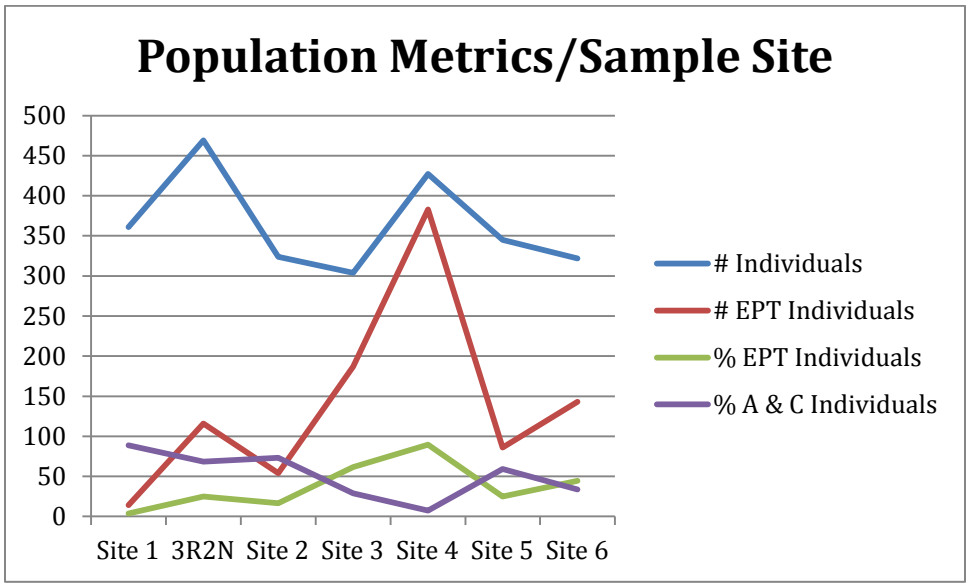
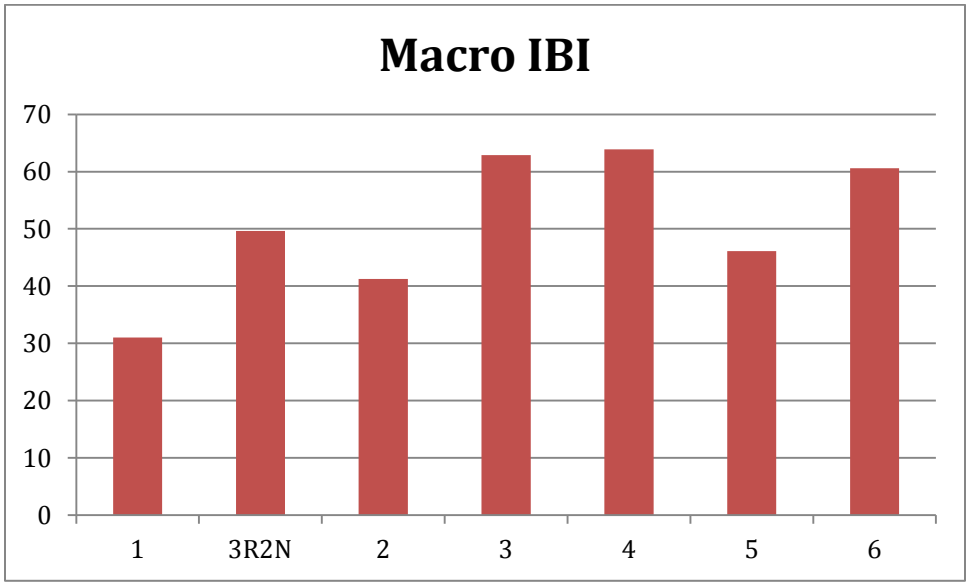


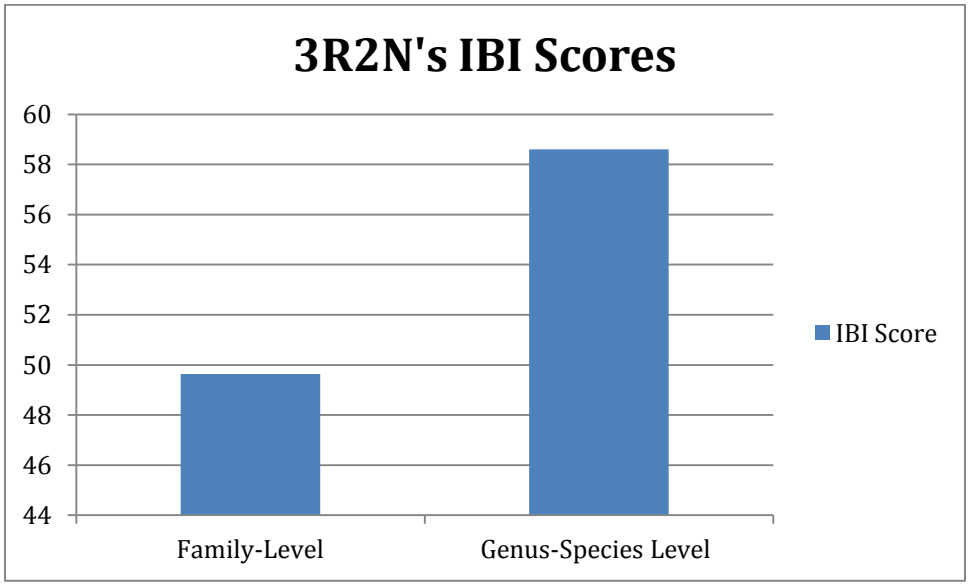
Figure 40: IBI Scores Compared



Conclusion:

The 2012 macroinvertebrate study gives a snapshot of the entire watershed. It was expected that the samples closest to the confluence will be the most affected by outside influences. These areas scored the lowest on their IBI's, but still had the presence of EPT taxa. Site 4, which was located on the main tributary to the stream had the highest IBI and had an outstanding population of pollution sensitive mayflies. The effects of this tributary can be seen at Site 3, which had the second highest IBI on the stream. The headwaters still reflected healthy waterways with their IBI's, but did not come close to the outstanding results further downstream. The IBI's were calculated using family as the taxa and not genus-species. The 3R2N team identified down to genus-species and their results were tabulated as both a family-level IBI and a genus-species level IBI, these results can be seen in the figure below.

Figure 41: 3R2N IBI's Comparison



The genus-species IBI scored more than 10 points higher than the family-level IBI, these results can be used to infer that the family-level IBI's for the 2012 study are actually lower than their actual values. The correlation allows for the stream to be seen as extremely productive in the headwaters with a little degradation towards the confluence, which should be expected.

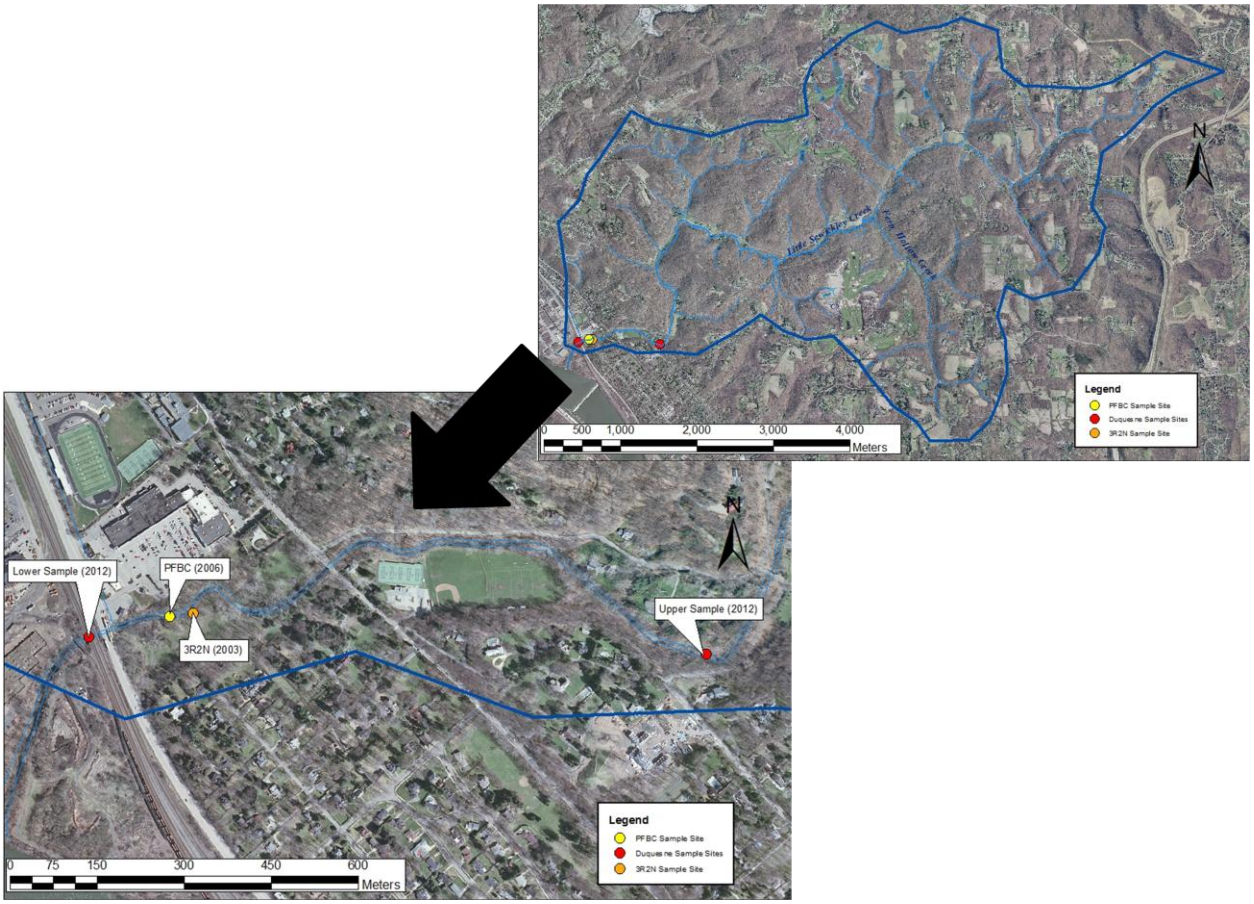
Recommendations:

The study portrays the water quality of the watershed in a new light. The expansion of the study would include more sites along the main tributary, Fern Hollow, and more sites reaching into the first order tributaries that form Little Sewickley as a second order stream. The 2012 study also had some flaws in its sampling protocol; only riffles were sampled, which excludes pool dwelling macroinvertebrates. The inclusion of pool habitats will provide a higher yield of individuals, along with a more diverse sample with more families.

ii. Fish

Overview:

Figure 42: Locations of Fish Surveys on LSC



Little Sewickley Creek has fish survey data from three separate entities including 3 Rivers 2nd Nature, PFBC, and Duquesne University. There are a total of four locations sampled along the main stem of the stream. The four surveys have produced a species list that includes 26 species of fish that span 7 separate families. The three separate groups collected data that brown trout are naturally reproducing within the stream. The whole listing is presented in Table 45 below.

Table 45: Documented Species of Fish Observed in Little Sewickley Creek

Common Name	Scientific Name
Minnows	***Cyprinidae***
Blacknose Dace	*Rhinichthys atratulus*
Bluntnose Minnow	*Pimephales notatus*
Central Stoneroller	*Campostoma anomalum*
Creek Chub	*Semotilus atromaculatus*
Emerald Shiner	*Notropis atherinoides*
Golden Shiner	*Notemigonus crysoleucas*
Longnose Dace	*Rhinichthys cataractae*
Mimic Shiner	*Notropis volucellus*
Sand Shiner	*Notropis stramineus*
Silverjaw Minnow	*Notropis buccatus*
Spotfin Shiner	*Notropis spilopterus*
Striped Shiner	*Luxilus chrysocephalus*
Suckers	***Catostomidae***
Golden Redhorse	*Moxostoma erythrurm*
Northern Hog Sucker	*Hypentelium nigricans*
White Sucker	*Catostomus commersoni*
Trout	***Salmonidae***
Brown Trout	*Salmo trutta*
Sculpins	***Cottidae***
Mottled Sculpin	*Cottus bairdi*
Sunfishes	***Centrarchidae***
Bluegill	*Lepomis macrochirus*
Smallmouth Bass	*Micropterus dolomieui*
Perches	***Percidae***
Banded Darter	*Etheostoma zonale*
Blue-Breasted Darter	*Etheostoma camurum*
Fantail Darter	*Etheostoma flabellare*
Greenside Darter	*Etheostoma blennioides*
Rainbow Darter	*Etheostoma caeruleum*
Sauger	*Sander canadensis*
Freshwater Drum	***Sciaenidae***
Freshwater Drum	*Aplodinotus grunniens*

1. 3 Rivers 2nd Nature

Introduction:

In 2002 and 2003, the fish communities of the tributaries emptying into the three rivers; Ohio, Allegheny, and Monongahela were sampled in Allegheny County. This included Little Sewickley Creek as a tributary to the Ohio. The study was part of the 3 Rivers 2nd Nature project and the fish sampling was performed by Koryak Environmental and Health Consultants for the U.S. Army Corps of Engineers. The full document is electronically available entitled "Fishes of Small Tributaries to the Ohio River in Allegheny County, Pennsylvania."

Methods:

The station at Little Sewickley Creek was sampled on August 11th, 2003 by using single-pass backpack electrofishing. The operator was equipped with a Coffett Model BP-2 backpack shocker equipped with two hand held electrodes and powered by a Honda EX 350 generator, once the fish were stunned they were collected by two netters. The fish were kept in 5 gallon buckets until they were processed. The processing consisted of measuring length, to the nearest millimeter (mm), and weight, to the nearest gram (g). Abundant smaller species were length ranged and group weighed. All fish were released back into the stream once processed, except for some of the shiners (Notropis spp.) that needed to be further examined in the lab for identification.

Results:

The scope of the results will focus just on Little Sewickley Creek instead of the whole report's results. There were 13 species collected from Little Sewickley Creek ranking it 5th among all tributaries in Allegheny County according to species richness. Brown trout were captured in Little Sewickley Creek and the researchers believe that they might be reproducing naturally. The stream is not stocked by the Pennsylvania Fish and Boat Commission (PFBC), but rather by the sportsmen club and watershed association. In terms of productivity Little Sewickley Creek had 80.5 kg/hectare of fish of which, 74.5% of the biomass consisted of predatory species (23.1 kg/hectare smallmouth bass and 36.9 kg/hectare brown trout). The brown trout that had been collected had a nice size range between 86 to 388 mm (3.4 to 15.3 inches) and representing 3 to 4 year classes. The only transient fish species found in the stream was a drum.

The fish communities also had Index of Biotic Integrity (IBI) scores run on them. Little Sewickley Creek scored 46 out of 60 on the index, which classifies it under the good category. The score was the highest of all tributaries in the Ohio drainage and the second highest, Little Bull Creek (48), of all tributaries in Allegheny County.

Table 46: Stream Station Characteristics

Stream Stations Sampled by Electrofishing in 2003	
Stream Name	Little Sewickley Creek
Tributary To	Ohio River, Right Bank River Mile 13.6
Total Drainage Area (mi^2)	9.6
Station Location	in Leetsdale/Edgeworth
Station Location River Mile	0.4
Station Number (Prefix 4TRS1)	152
Stream Width Along Station Reach	
Maximum	21.2
Minimum	11.6
Mean	15.2
Length of Station (ft), Habitat, and Sampling Time	
Length	336
Riffle/Run (%)	70
Pool (%)	30
Time (HR)	0.4
Station Coordinates	
Latitude	40 33 28
Longitude	80 12 10

Table 47: Little Sewickley Creek Fish Species Distribution/ Catch-per-Hour from 3R2N

Little Sewickley Creek	
Brown Trout	17.5
Smallmouth Bass	22.5
Freshwater Drum	2.5
Hog Sucker	2.5
Creek Chub	2.5
Blacknose Dace	12.5
Longnose Dace	2.5
Sand Shiner	15
Spotfin Shiner	2.5
Silverjaw Minnow	2.5
Stoneroller	7.5
Mottled Sculpin	92.5
Rainbow Darter	50

Table 48: Little Sewickley Creek Statistical Summary

Little Sewickley Creek	
Number/Hour	233
Kilograms/Hour	9.55
Number/Hectare	1960
Kilograms/Hectare	80.51
Number of Species	13
% Tot Wt Sport Fish	74.53%
% Tot Wt Carp/Sucker/Drum	16.75%
% Tot Wt Minnows	1.39%
% Tot Wt Darters	1.05%
%Tot Wt Sculpin	6.28%

Table 49: Overall Results from Little Sewickley Creek

Little Sewickley Creek
August 11, 2003

Species	Total Number	Number Per Hour	% By Number	Range (mm)	Total Weight (grams)	% Of Total Weight	Kilograms Per Hour	Number Per Hectare	Kilograms Per Hectare
SPORT FISH									
Smallmouth Bass	9	22.50	9.68%	158-263	1,097	28.72%	2.74	190	23.119
Brown Trout	7	17.50	7.53%	86-388	1,750	45.81%	4.38	148	36.882
Suckers/Drum									
Freshwater drum	1	2.50	1.08%	348	410	10.73%	1.03	21	8.641
N. hog sucker	1	2.50	1.08%	265	230	6.02%	0.58	21	4.847
Minnows									
Sand shiner	6	15.00	6.45%	43-51	6	0.16%	0.02	126	0.126
Blacknose dace	5	12.50	5.38%	27-34	1	0.03%	0.00	105	0.021
Stoneroller	3	7.50	3.23%	98-110	40	1.05%	0.10	63	0.843
Creek chub	1	2.50	1.08%	33	1	0.03%	0.00	21	0.021
Longnose dace	1	2.50	1.08%	70	3	0.08%	0.01	21	0.063
Spotfin shiner	1	2.50	1.08%	47	1	0.03%	0.00	21	0.021
Silverjaw minnow	1	2.50	1.08%	28	1	0.03%	0.00	21	0.021
Darters									
Rainbow darter	20	50.00	21.51%	47-60	40	1.05%	0.10	422	0.843
Sculpin									
Mottled sculpin	37	92.50	39.78%	40-101	240	6.28%	0.60	780	5.058
TOTALS	**93**	**233**			**3,820**		**9.55**	**1,960**	**80.507**
SPORT FISH	16	40.00	17.20%		2,847	74.53%	7.12	337	60.001
SUCKERS/DRUM	2	5.00	2.15%		640	16.75%	1.60	42	13.488
MINNOWS	18	45.00	19.35%		53	1.39%	0.13	379	1.117
DARTERS	20	50.00	21.51%		40	1.05%	0.10	422	0.843
SCULPINS	37	92.50	39.78%		240	6.28%	0.60	780	5.058

SURVEY PARAMETERS							
Date 11 August 2003		Effort - hours	0.4	Time: 1100-1124			
Method: Backpack EF; Coffelt Model BP 2 equipped with Honda EX350 Generator; AC 200 Volts 1.6 Amps							
Survey Participants:	Koryak (Mike & Ben), Stafford, Bonislawsky, Hoskin						
Stream length sampled (feet)	336	Average stream width (feet)	15.2	Area sampled (hectares)	0.04745	Watershed	Ohio River
Flow: low and clear		pH: 7.72		Stream temp: 18.64 C		W.Q. Time 1055	
Dissolved Oxygen: 9.35 mg/l		Conductivity: 484 umhos/cm				Air temp: 70's F	
NOTES: Thirteen fish species collected.							

2. PFBC – 2006 Report

Overview:

The Pennsylvania Fish and Boat Commission sampled Little Sewickley Creek on June 29th, 2006. Their main focus was to assess the stream as a sport fishery. The survey produced 13 different species of fish including the game fish; brown trout, smallmouth bass, and sauger. The game fish were grouped by length and counted while all other species were just marked as present. The tables below go into each game fish separately.

Table 50: Fish Collected from Little Sewickley Creek (PFBC 6/29/2006)

Common Name	***Scientific name***
Blacknose Dace	*Rhinichthys atratulus*
Bluegill	*Lepomis macrochirus*
Brown Trout	*Salmo trutta*
Brown Trout - Hatchery	*Salmo trutta*
Central Stoneroller	*Campostoma anomalum*
Creek Chub	*Semotilus atromaculatus*
Golden Redhorse	*Moxostoma erythrurum*
Greenside Darter	*Etheostoma blennioides*
Mottled Sculpin	*Cottus bairdii*
Northern Hog Sucker	*Hypentelium nigricans*
Rainbow Darter	*Etheostoma caeruleum*
Sauger	*Sander canadensis*
Smallmouth Bass	*Micropterus dolomieu*
White Sucker	*Catostomus commersonii*

Table 51: Length/Frequency Distribution and Abundance Statistics for Brown Trout

Length Group (mm)	Catch	Total Catch/Total Effort CPUE
50	3	5.66
75	2	3.77
150	1	1.89
175	1	1.89
200	1	1.89
300	1	1.89
350	1	1.89
Total	**10**	**18.88**

Table 52: Length/Frequency Distribution and Abundance Statistics for Hatchery Brown Trout

Length Group (mm)	Catch	Total Catch/Total Effort CPUE
225	2	3.77
Total	**2**	**3.77**

Table 53: Length/Frequency Distribution and Abundance Statistics for Sauger

Length Group (mm)	Catch	Total Catch/Total Effort CPUE
200	5	9.43
225	11	20.75
250	3	5.66
275	4	7.55
Total	**23**	**43.39**

Table 54: Length/Frequency Distribution and Abundance Statistics for Smallmouth Bass

Length Group (mm)	Catch	Total Catch/Total Effort CPUE
100	1	1.89
150	1	1.89
175	2	3.77
Total	**4**	**7.55**

Analysis:

The PFBC collected ten native brown trout spanning from 50mm to 350mm, showing natural reproduction present in the stream. They also collected a total of twenty-three sauger in a sampling time of 0.53 hours. The lower stretch of Little Sewickley Creek, along with the confluence to the Ohio River is a major sport fishing area. The cold clean water coming through the tributaries provide a refuge for transient fish coming out of the river and river fish, which will hang out by the confluence.

3. Duquesne University

Introduction:

In 2012 a follow up study was performed on Little Sewickley Creek to confirm the results extracted from 3 Rivers 2nd Nature's results in 2003. The study was performed by Dr. Brady Porter, Ed Schroth, and Nathan Reinhart of Duquesne University, along with several other university students. Dr. Brady Porter, a trained ichthyologist, helped in the identification process. The study consisted of two sample sites, an upper and a lower, and they are portrayed in the map. The 3R2N sample of 2003 was not replicated.

Methods:

The methods employed in this study were very similar to the 2003 study. The stations were both sampled on April 5th, 2012 using the single-pass backpack electrofishing method. The operator was equipped with a Smith-Root LR-24 battery powered electrofisher. A backdrop seine was used to collect the stunned fish in the current along with two students with dip-nets alongside the backpack operator. The collected fish were kept alive in aerated 5 gallon buckets until they were processed. The processing consisted of measuring length in millimeters (mm) and weight in grams (g). Species that were of smaller size and abundant were put in size ranges and group weighed. All species were released back into the stream after they were processed. Water quality data was also taken at each site and is listed in the tables below.

Overview:

The total sampling of both stations yielded 21 different species of fish, with a total abundance 2594 individuals, weighing 7522 grams. The sampling also recorded 5 darter species, including the state threatened blue-breasted darter. A brown trout measuring 320 mm and weighing 340 g was collected signifying year-round holdover, since the stocking would not occur for another week. Two other brown trout were collected, one that was young of the year (32 mm, 1 g) and another (110 mm, 14.5 g) giving clear evidence that brown trout are naturally reproducing within the stream. Indices including; Index of Biological Integrity (IBI), Index of Well-Being (IWB), and Modified Index of Well-Being (MIWB) were run separately on each station. These results will be discussed in the next few sections.

Lower Station Results:

The location for 100 meter stretch that accounts for the lower station is displayed in Table 55 below.

Table 55: Coordinates of Lower Sample Station

Little Sewickley Creek at Ohio River Boulevard 5 April 2012			
BAP 1493	Start Coordinates	40.557417	-80.204909
	End Coordinates	40.557733	-80.203801

There were 17 different species of fish collected in the lower section with a total abundance of 2121 individuals weighing 3761.5 grams. The collection was dominated by emerald shiners (980 individuals) and mimic shiners (776 individuals). There were 5 species of darter collected including; banded darter (1), blue-breasted darter (13), fantailed darter (1), greensided darter (3), and rainbow darter (62). Two age classes of brown trout were also collected including a young of the year, and a yearling. The complete species listing collected from the lower station is portrayed in Table 56 below.

Table 56: Lower Station Species Listing

Species	Total Abundance	Total Weight (g)
Banded Darter	1	1
Blacknose Dace	10	18.5
Blue-Breasted Darter	13	20.5
Bluntnose Minnow	48	100
Brown Trout	2	15.5
Central Stoneroller	2	65.5
Creek Chub	14	24.5
Emerald Shiner	980	1532.5
Fantailed Darter	1	3
Golden Shiner	1	6
Greenside Darter	3	13
Longnose Dace	28	55.5
Mimic Shiner	776	1321.5
Mottled Sculpins	131	349
Northern Hog Sucker	4	64.5
Rainbow Darter	62	103
Spotfin Shiner	45	68
Species 17	**2121**	**3761.5**

The complete listing of size ranges and group weights of the collection can be found in Table 57 of this document. The indices were run on the sample and the results can be found later in the document Table 58 represents the IBI, while Table 59 shows the IWB, and Table 60 the MIWB. The population sampled scored 56 out of 60 in the IBI signifying an exceptional waterway. The metrics were the same metrics that were employed in the 3R2N

and came from the Ohio EPA. The only two metrics that the sample did not score the maximum score of 5 were the number of headwater species and the number of minnow species.

Figure 43: Blue-Breasted Darter

The other two indices IWB and MIWB use similar scoring techniques using two abundance and two diversity measures. This value represents the population more realistically than just a single measurement. The overall IWB accounts for every species collected, while the MIWB retracts pollution tolerant species from the calculations. The change increases the pollution sensitivity to the index. The highest score that can be achieved in these indices is 12. The lower station's population sample scored 10.88 out of 12 on the IWB and 10.55 out of 12 on the MIWB. These high scores signify that the sample had a high abundance and diversity and the little difference between the IWB and the MIWB shows that the population was not dominated by pollution tolerant species.

Figure 44: Brown Trout (Young of the Year)

Table 57: Lower Station Length and Weight Listings

Species	Length (mm)	Weight (g)	Species	Length (mm)	Weight (g)
Banded Darter	30	<1	Mimic Shiner (100)	43-69	170
Blacknose Dace (10)	40-65	18.5	Mimic Shiner (100)	43-70	165
Bluebreast Darter	53	2	Mimic Shiner (100)	43-71	161
Blue-Breasted Darter	45-55	20.5	Mimic Shiner (100)	43-72	191
Bluntnose Minnow	50	2	Mimic Shiner (100)	43-73	161
Bluntnose Minnow	35-80	98	Mimic Shiner (100)	43-74	175
Brown Trout	110	14.5	Mimic Shiner (102)	43-68	172
Brown Trout	32	<1	Mimic Shiner (74)	43-75	126.5
Creek Chub	85	6	Mottled Sculpin (10)	35-80	17.5
Creek Chub	55	3	Mottled Sculpin (13)	40-100	70.5
Creek Chub (12)	45-65	15.5	Mottled Sculpin (14)	35-85	34.5
Emerald Shiner	35-80	220.5	Mottled Sculpin (29)	45-90	96
Emerald Shiner	35-81	242.5	Mottled Sculpin (5)	32-44	5
Emerald Shiner	35-82	240	Northern Hog Sucker	105	13.5
Emerald Shiner	35-83	245.5	Northern Hog Sucker	58	30
Emerald Shiner	40-85	220.5	Northern Hog Sucker	100	15
Emerald Shiner (23)	48-76	40.5	Northern Hog Sucker	80	6
Emerald Shiner (33)	45-70	56	Rainbow Darter (20)	30-55	38.5
Emerald Shiner (46)	45-75	81.5	Rainbow Darter (26)	30-60	40.5
Emerald Shiner (60)	50-85	110	Rainbow Darter (3)	40-45	3.5
Emerald Shiner (65)	35-84	92	Rainbow Darter (6)	41-59	11.5
Emerald Shiner (80)	40-70	121	Rainbow Darter (7)	35-55	9
Fantailed Darter (1)	44	3	Sculpin (60)	25-100	125.5
Golden Shiner	75	6	Spotfin Shiner (37)	35-80	55.5
Greenside Darter	65	4	Spotfin Shiner (4)	40-65	7
Greenside Darter (1)	68	3	Spotfin Shiner (4)	35-80	5.5
Greenside Darter (1)	80	6	Stoneroller	155	62.5
Longnose Dace (13)	50-60	31.5	Stoneroller	80	3
Longnose Dace (3)	53-57	4.5			
Longnose Dace (5)	45-55	7			
Longnose Dace (7)	30-65	12.5			

Table 58: Lower Station Index of Biological Integrity

Species	Total Abundance	SPC Group	River Size	Feed Guild	Tolerance	Breeding Guild
Creek Chub	14	M	P	G	T	N
Blacknose Dace	10	M	H	G	T	S
Longnose Dace	28	M	-	I	R	S
Rainbow Darter	62	D	-	I	M	S
Greenside Darter	3	D	-	I	M	S
Blue-Breasted Darter	13	D	-	I	R	S
Fantailed Darter	1	D	H	I	-	R
Banded Darter	1	D	-	I	I	S
Northern Hog Sucker	4	R	-	I	M	S
Bluntnose Minnow	48	M	P	O	T	C
Mottled Sculpins	131	SC	H	I	-	C
Golden Shiner	1	N	-	I	T	M
Spotfin Shiner	45	N	-	I	-	M
Emerald Shiner	980	N	-	I	-	S
Mimic Shiner	776	N	-	I	I	M
Central Stoneroller	2	M	-	H	-	N
Brown Trout	2	SA	-	-	-	N

IBI Metrics	Number	Score
Total Species	17	5
Darters + Sculpins	6	5
Headwaters Species	3	3
Minnow Species	5	3
Sensitive Species	5	5
% Tolerant Species	3%	5
% Pioneering Species	3%	5
% Omnivores	2%	5
% Insectivores	96%	5
Simple Lithophils	8%	5
% DELT	0%	5
Fish Numbers	6363	5

IBI	Max Total
56	60

Table 59: Lower Station Index of Well-Being

Species	Total Abundance	Total Weight (g)	Shannon's H Abundance	Shannon's H Biomass
Creek Chub	14	24.5	0.033139179	0.032787598
Blacknose Dace	10	18.5	0.025257227	0.02613953
Longnose Dace	28	55.5	0.0571279	0.062208839
Rainbow Darter	62	103	0.103260505	0.098518661
Greenside Darter	3	13	0.0092801	0.019587693
Blue-Breasted Darter	13	20.5	0.031226316	0.028405965
Fantailed Darter	1	3	0.003611336	0.00568972
Banded Darter	1	1	0.003611336	0.002188641
Northern Hog Sucker	4	64.5	0.011830926	0.069719808
Bluntnose Minnow	48	100	0.085735603	0.09643501
Mottled Sculpins	131	349	0.171976604	0.220589634
Golden Shiner	1	6	0.003611336	0.010273795
Spotfin Shiner	45	68	0.081746403	0.072547773
Emerald Shiner	980	1532.5	0.356741431	0.365827051
Mimic Shiner	776	1321.5	0.367873917	0.367501143
Central Stoneroller	2	65.5	0.006569067	0.070532834
Brown Trout	2	15.5	0.006569067	0.022629765
Totals	**2121**	**3761.5**	**1.35916825**	**1.5715835**

IWB	Maximum Total
10.87685974	12

Table 60: Lower Station Modified Index of Well-Being

Species	Total Abundance	Total Weight (g)	Shannon's H Abundance	Shannon's H Biomass
Creek Chub	14	24.5		
Blacknose Dace	10	18.5		
Bluntnose Minnow	48	100		
Golden Shiner	1	6		
Longnose Dace	28	55.5	0.058685354	0.06415373
Rainbow Darter	62	103	0.105880881	0.10142973
Greenside Darter	3	13	0.00955958	0.02025015
Blue-Breasted Darter	13	20.5	0.032117044	0.02934823
Fantailed Darter	1	3	0.003722958	0.00589083
Banded Darter	1	1	0.003722958	0.00226772
Northern Hog Sucker	4	64.5	0.012184228	0.0718738
Mottled Sculpins	131	349	0.175866327	0.22578328
Spotfin Shiner	45	68	0.083890646	0.07477925
Emerald Shiner	980	1532.5	0.352697796	0.36376975
Mimic Shiner	776	1321.5	0.367715809	0.36787363
Central Stoneroller	2	65.5	0.006769015	0.07270917
Brown Trout	2	15.5	0.006769015	0.02338973
Totals	**2048**	**3612.5**	**1.21958161**	**1.423519**

MIWB	Maximum Total
10.5514878	12

Upper Station Results:

The upper station was sampled on April 5th, 2012 same as the lower station. The table below depicts the location of 100 meter stretch.

Table 61: Upper Station Coordinates

Little Sewickley Creek Below Dam: Smith House 5 April 2012		
BAP 1492	Start Coordinates	UTM 17 T0568378 4489903
	End Coordinates	UTM 17 T0568502 4490042

The species composition of the upper station differs somewhat from that of the lower station. They are separated by approximately a mile to a mile and a half, so one would expect to have less transient species. However, there are no obstacles to fish migration until you reach the old mill dam that is located another 100 meters upstream from the upper station's end point.

Table 62: Upper Station Species Listing

Species	Total Abundance	Total Weight (g)
Banded Darter	1	1
Blacknose Dace	66	124.5
Blue Breasted Darter	1	1.5
Bluntnose Minnow	29	134
Brown Trout	1	340
Central Stoneroller	35	234
Creek Chub	32	874
Emerald Shiner	1	4.5
Golden Redhorse Sucker	1	7
Greenside Darter	1	4.5
Longnose Dace	8	12.5
Mottled Sculpin	133	659.5
Northern Hogsucker	3	44.5
Rainbow Darter	97	166.5
Sand Shiners	3	5
Spotfin Shiner	35	88.5
Striped Shiner	1	13
White Sucker	25	1046
18 Species	**473**	**3760.5**

There were a total of 18 species collected from this station with a total abundance of 473 and a total weight of 3760.5 grams. The population had less than four times the individuals but the total weight stayed the same. This section was dominated by larger fish that is evident when looking Table 63. This population was not dominated by shiner species, but rather by mottled sculpins (133 individuals) and rainbow darters (97). This section had four species of darters, all the same as the lower station, but without the fantail darter. The blue breasted darter was present once again in this station. A mature brown trout was also collected from this section weighing 340 grams. The populations between the two samples are very similar but yet very different in composition.

Figure 45: Mature Brown Trout from Upper Station

The IBI presented in Table 65 below, calculates the biological integrity for this section of the stream. Once again the same metrics were used as the lower station and the upper station scored an exceptional score of 56 out of 60, falling short on the number of headwater species and minnow species.

The IWB and the MIWB scores of the upper station were 11.25 and 9.73 out of 12. The upper station had one more species present than the lower station and the abundances were not as skewed, because they were not heavily weighted on the shiner species as they were in the lower section. However, there is a heavier drop in the MIWB, because the upper station sample had more weight in pollution tolerant species than did the lower station.

Table 63: Upper Station Total Length and Weight

Species	Length (mm)	Weight (g)	Species	Length (mm)	Weight (g)
Banded Darter (1)	33	1	Golden Red Horse	86	7
Blacknose Dace (23)	44-69	63	Greenside Darter	75	4.5
Blacknose Dace (38)	35-65	47.5	Longnose Dace (4)	49-65	8.5
Blacknose Dace (5)	32-75	14	Longnose Dace (4)	45-72	4
Blue Breasted Darter	53	1.5	Rainbow Darter (15)	35-70	25
Bluntnose Minnow	70	3.5	Rainbow Darter (31)	35-66	52
Bluntnose Minnow	85	10	Rainbow Darter (51)	39-60	89.5
Bluntnose Minnow	50	1	Sand Shiners (3)	50-56	5
Bluntnose Minnow (2)	50-78	6.5	Sculpin (34)	40-95	130.5
Bluntnose Minnow	48-85	116.5	Sculpin (45)	41-87	310
Brown Trout	320	340	Sculpins (54)	37-80	219
Creek Chub	215	112	Spotfin Shiner (2)	75-83	10.5
Creek Chub	190	79.5	Spotfin Shiner (29)	35-85	70
Creek Chub	155	43	Spotfin Shiner (4)	52-70	8
Creek Chub	160	49.5	Stoneroller	150	57
Creek Chub	150	39.5	Stoneroller	143	48.5
Creek Chub	105	16	Stoneroller (14)	56-105	70.5
Creek Chub	130	25.5	Stoneroller (8)	50-75	32
Creek Chub	115	20	Stoneroller (11)	63-80	58
Creek Chub	115	20	Striped Shiner	100	13
Creek Chub	115	21	White Sucker	160	54.5
Creek Chub	150	37.5	White Sucker	150	40.5
Creek Chub	160	52.5	White Sucker	140	37.5
Creek Chub	150	39	White Sucker	120	26
Creek Chub	125	32.5	White Sucker	250	165.5
Creek Chub	132	30.5	White Sucker	210	136
Creek Chub	110	19	White Sucker	235	169
Creek Chub	115	21.5	White Sucker	165	48.5
Creek Chub	115	20	White Sucker	165	55
Creek Chub	123	25	White Sucker	150	46
Creek Chub	111	18.5	White Sucker	119	78.5
Creek Chub	105	17.5	White Sucker	175	57.5
Creek Chub (2)	40-119	24	White Sucker	115	21.5
Creek Chub (2)	90-117	30	White Sucker	140	42
Creek Chub (8)	64-110	80.5	White Sucker	140	35
Emerald Shiner	77	4.5	White Sucker	110	18.5

Table 64: Upper Station Index of Biological Integrity

Species	Total Abundance	SPC Group	River Size	Feed Guild	Tolerance	Breeding Guild
Banded Darter	1	D	-	I	I	S
Blacknose Dace	66	M	H	G	T	S
Blue Breasted Darter	1	D	-	I	R	S
Bluntnose Minnow	29	M	P	O	T	C
Brown Trout	1	SA	-	-	-	N
Central Stoneroller	35	M	-	H	-	N
Creek Chub	32	M	P	G	T	N
Emerald Shiner	1	N	-	I	-	S
Golden Redhorse	1	R	-	I	M	S
Greenside Darter	1	D	-	I	M	S
Longnose Dace	8	M	-	I	R	S
Mottled Sculpin	133	SC	H	I	-	C
Northern Hogsucker	3	R	-	I	M	S
Rainbow Darter	97	D	-	I	M	S
Sand Shiner	3	N	-	I	M	M
Spotfin Shiner	35	N	-	I	-	M
Striped Shiner	1	N	-	I	-	S
White Sucker	25	R	-	O	T	S

IBI Metrics	Value	Score
Total Species	18	5
Darters + Sculpins	5	5
Headwaters Species	2	3
Minnow Species	5	3
Sensitive Species	6 (I,M) 8(I,M,R)	5
% Tolerant Species	0.32	5
% Pioneering Species	0.13	5
% Omnivores	0.11	5
% Insectivores	0.6	5
Simple Lithophils	0.11	5
% DELT	0	5
Fish Numbers	1419	5

IBI Score	Max Total
56	60

Table 65: Upper Station Index of Well-Being

Species	Total Abundance	Total Weight (g)	Shannon's H Abundance	Shannon's H Biomass
Blue Breasted Darter	1	1.5	0.013021343	0.003121995
White Sucker	25	1046	0.155402725	0.355920536
Creek Chub	32	874	0.182214595	0.33914752
Rainbow Darter	97	166.5	0.324916042	0.138022186
Blacknose Dace	66	124.5	0.274805672	0.112829726
Northern Hogsucker	3	44.5	0.032096087	0.052503231
Sand Shiners	3	5	0.032096087	0.008805836
Bluntnose Minnow	29	134	0.171167415	0.118818942
Greenside Darter	1	4.5	0.013021343	0.008051332
Stoneroller	35	234	0.192666293	0.172800092
Mottled Sculpin	133	659.5	0.356751063	0.305298296
Longnose Dace	8	12.5	0.069000488	0.018968816
Spotfin Shiner	35	88.5	0.192666293	0.088236528
Banded Darter	1	1	0.013021343	0.002189152
Brown Trout	1	340	0.013021343	0.217296354
Emerald Shiner	1	4.5	0.013021343	0.008051332
Striped Shiner	1	13	0.013021343	0.019591983
Golden Redhorse Sucker	1	7	0.013021343	0.011701843
Totals	**473**	**3760.5**	**2.07493216**	**1.981355701**

Index of Well Being	Max
11.25198916	12

Table 66: Upper Station Modified Index of Well-Being

Species	Total Abundance	Total Weight (g)	Shannon's H Abundance	Shannon's H Biomass
Blue Breasted Darter	1	1.5	0.017979567	0.006600171
White Sucker	25	1046		
Creek Chub	32	874		
Rainbow Darter	97	166.5	0.361628735	0.236957268
Blacknose Dace	66	124.5		
Northern Hogsucker	3	44.5	0.043671298	0.100447244
Sand Shiners	3	5	0.043671298	0.018195345
Bluntnose Minnow	29	134		
Greenside Darter	1	4.5	0.017979567	0.016675509
Stoneroller	35	234	0.241630085	0.282682063
Mottled Sculpin	133	659.5	0.365063038	0.364752348
Longnose Dace	8	12.5	0.092012451	0.038248392
Spotfin Shiner	35	88.5	0.241630085	0.161305101
Banded Darter	1	1	0.017979567	0.004656413
Brown Trout	1	340	0.017979567	0.330436056
Emerald Shiner	1	4.5	0.017979567	0.016675509
Striped Shiner	1	13	0.017979567	0.039456034
Golden Redhorse Sucker	1	7	0.017979567	0.023984668
Totals	**321**	**1582**	**1.51516396**	**1.6410721**

MIWB	Max
9.725179216	12

Conclusion:

The samples that were taken in 2012 used a drop seine to collect the stunned fish unlike that of the 2003 sample. This allowed for more individuals and species, especially darter species, which are hard to net with just dip nets. The overall time spent sampling in 2012 was much longer than the 2003 study, which only spent 24 minutes on the stream. However, this does not take away from the data in either study. Previous Duquesne University studies under Dr. Brady Porter have shown that streams that support blue breasted darters also support tippecanoe darters and spotted darters, which are also state threatened fish. The proportion of these two species compared to the blue breasted darter is much lower, which makes them more difficult to observe. The study also found that the peak spawning time for all three of these species is between the months of June and July. It would be of interest to sample during these high spawning periods to see if all three of these threatened species of darters are using Little Sewickley Creek as a spawning ground. If this is the case the stream should receive higher protection to ensure that their spawning grounds are protected from development.

The presence of naturally reproducing brown trout was confirmed in all three samplings. The sampling performed by 3R2N has shown 3 to 4 different age classes of brown trout, PFBC found 10 natural reproduced brown trout spanning several age classes and the 2012 study showed 3 age classes. The nine year gap proves that brown trout have been successfully spawning in the stream for almost a decade. Little Sewickley Creek may be able to become a higher class of wild trout, if restoration work takes place to ensure that the brown trout have preferable spawning grounds.

The high scores on the indices show that Little Sewickley Creek is home to a wide variety of fish species and it is not just dominated by pollution tolerant, generalist species, but rather is a well functioning ecosystem that has well defined breeding and feeding guilds. Little Sewickley Creek may provide refuge for certain transient species, along with a clean water spawning area.

Recommendations:

The data on the stream suggests that the dam inhibits some species of fish to travel further upstream. In depth sampling should take place to observe the longitudinal succession of fish species from the confluence to the headwaters. This may include searching out areas of spawning interest for brown trout or even the introduction of native brook trout back into the stream.

iii. Other Biological Data – Duquesne University

1. Crayfish Survey

There have been three species of crayfish observed in the watershed. A graduate student at Duquesne performed a study and Dr. James W. Fetzner Jr. the head of Section of Invertebrate Zoology at the Carnegie Museum of Natural History helped identify the specimens.

Table 67: Crayfish Species Present in LSC

Scientific Name	**Common Name**
Orconectes obsurus	Allegheny Crayfish
Cambarus carinirostris	Rock Crayfish
Cambarus monogalensis	Blue Crayfish

2. Salamander Survey

In the fall of 2011, another student at Duquesne performed a salamander survey of Little Sewickley Creek. The specimens were collected and with help from Dr. Sarah Woodley of Duquesne were identified. The survey yielded four species of salamanders.

Table 68: Salamander Species Present in LSC

Scientific Name	**Common Name**
Eurycea bislineata	Two-Lined
Desmognathus fuscus	Northern Dusky
Desmognathus ochrophaeus	Mountain Dusky
Desmognathus monticola	Appalachian Seal

5. Existing and Proposed Point Source and Non-Point Source Dischargers

a. NPDES Permits

Figure 46: NPDES Permit Locations

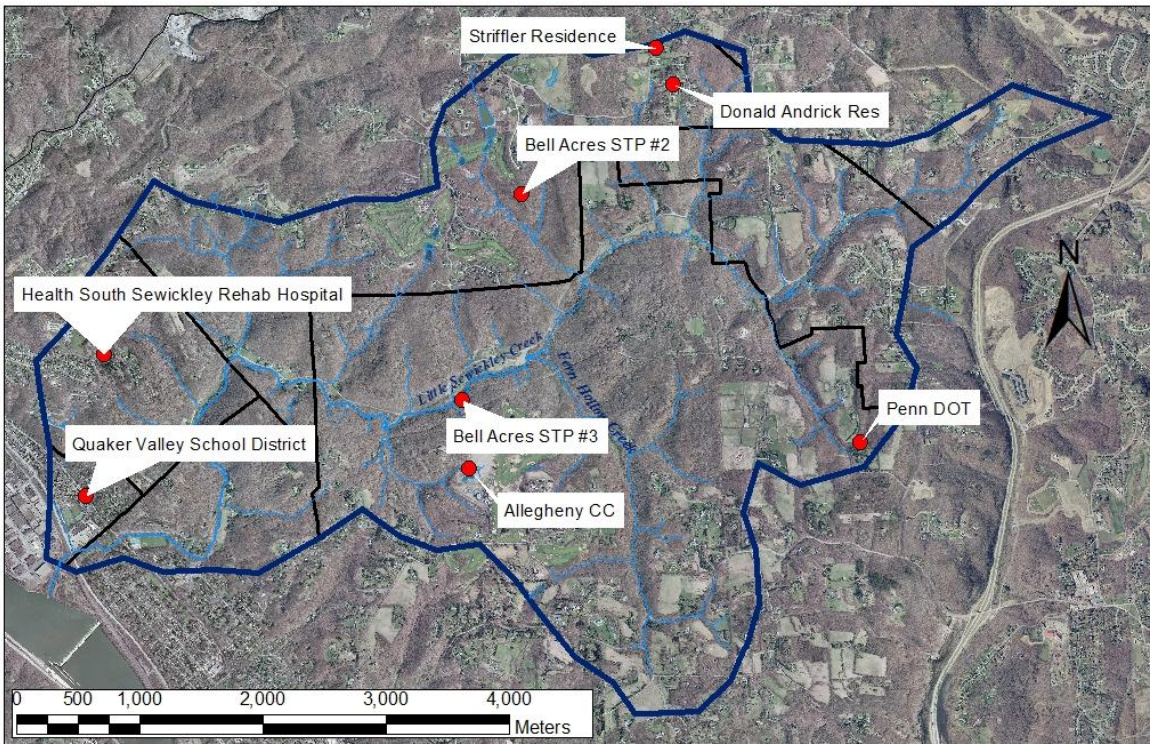


Table 69: Information on NPDES Permits

NPDES ID	Facility Name	Address	Issued	Expired	SIC Code/SIC Desc
PA0030287	Allegheny CC	Country Club Rd Sewickley, PA 15143	5/24/2008	5/31/2013	7997 = Recreation Clubs
PA0028515	Bell Acres STP #1	Sewickley Heights Estates Sewickley, PA 15143	5/25/2004	5/31/2009	4952 = Sewerage Systems
PA0095435	Bell Acres STP #2	Backbone Rd, Sewickley, PA 15143	5/4/2004	5/31/2009	4952 = Sewerage Systems
PA0030376	Bell Acres STP #3	Grouse Ln, Sewickley, PA 15143	6/1/2004	6/30/2009	4952 = Sewerage Systems
PA0219240	Donald Andrick	108 Hamilton Rd, Sewickley, PA 15143	9/5/2002	9/5/2007	4952 = Sewerage Systems
PA0092339	Grouse Ridge Homeowners Assn STP	2A Highview Drive, Sewickley, PA 15143	2/25/2003	2/25/2008	4952 = Sewerage Systems
PAG046396	Monheim Sr STP	2481 A Camp Meeting Rd, Sewickley, PA 15143	4/29/2009	2/4/2014	8811 = Private Households
PA0042242	Sewickley Hills STP	Killbuck Run STP, Sewickley, PA 15143	5/11/1999	5/11/2004	4952 = Sewerage Systems
PA0203734	Weaver & Simkovich SFTF	Magee Rd Ext, Sewickley, PA 15143	1/26/2012	1/31/2017	8811 = Private Households

b. Water Pollution Control Facilities

Figure 47: Locations of WPCF (PA eMAP)

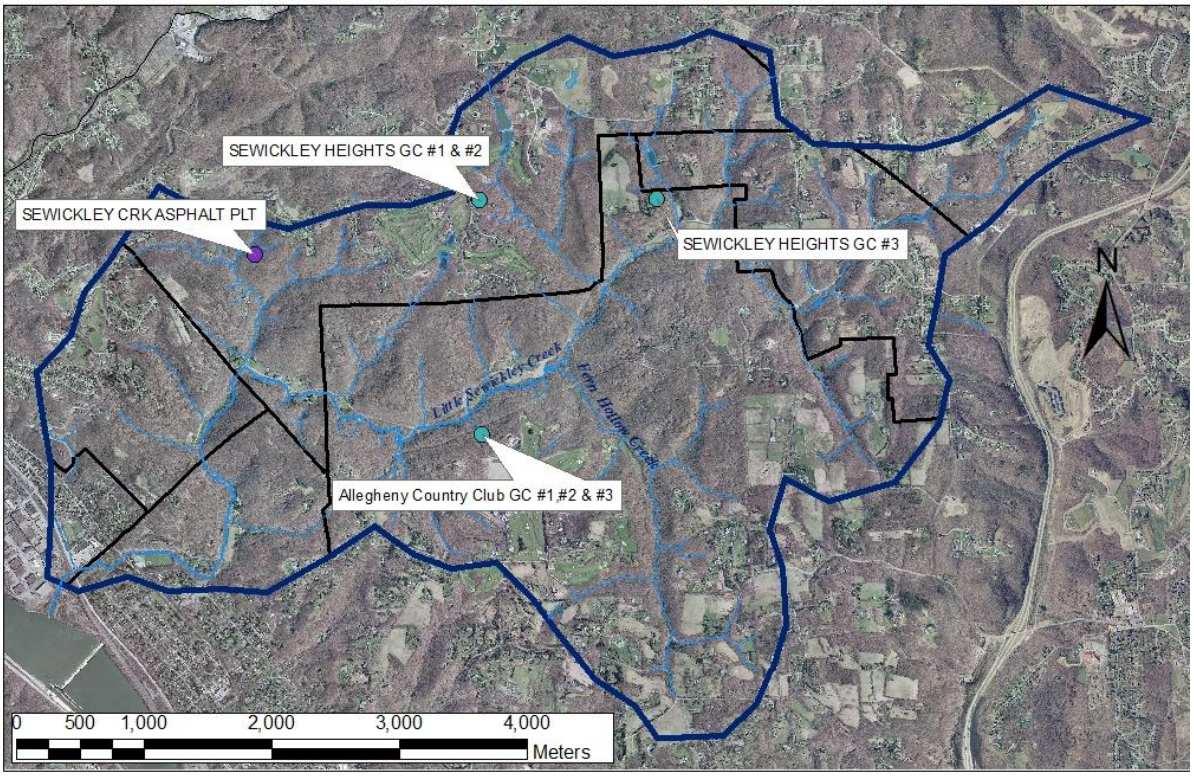


Table 70: Information on WPCF's

Organization	Primary Facility	Primary ID	Sub-Facility	Facility ID	Type	Number
Sewickley Heights GC #1	Irrigation Pond #17	752899	Outfall 001	1078475	Industrial Waste	SW-02-18-12
Sewickley Heights GC #2	Tee Pond #14	752895	Outfall 001	1078472	Industrial Waste	SW-02-16-12
Sewickley Heights GC #3	Tee Pond #17/ Green Pond #14	752896	Outfall 001	1078473	Industrial Waste	SW-02-17-12
Sewickley Creek Asphalt Plant	Sewickley Creek Asphalt Plant	561018	SW Outfall 002	1011204	Stormwater-Industrial	PAR706121
Allegheny Country Club #1	Pond #3	752882	Outfall 001	1078449	Industrial Waste	SW-02-13-12
Allegheny Country Club #2	Pumphouse #3	752892	Outfall 001	1078467	Industrial Waste	SW-02-14-12
Allegheny Country Club #3	Pond #7	752893	Outfall 001	1078469	Industrial Waste	SW-02-15-12

c. Erosion and Sediment Control Facilities

Figure 48: Locations of ESCF's (PA eMAP)

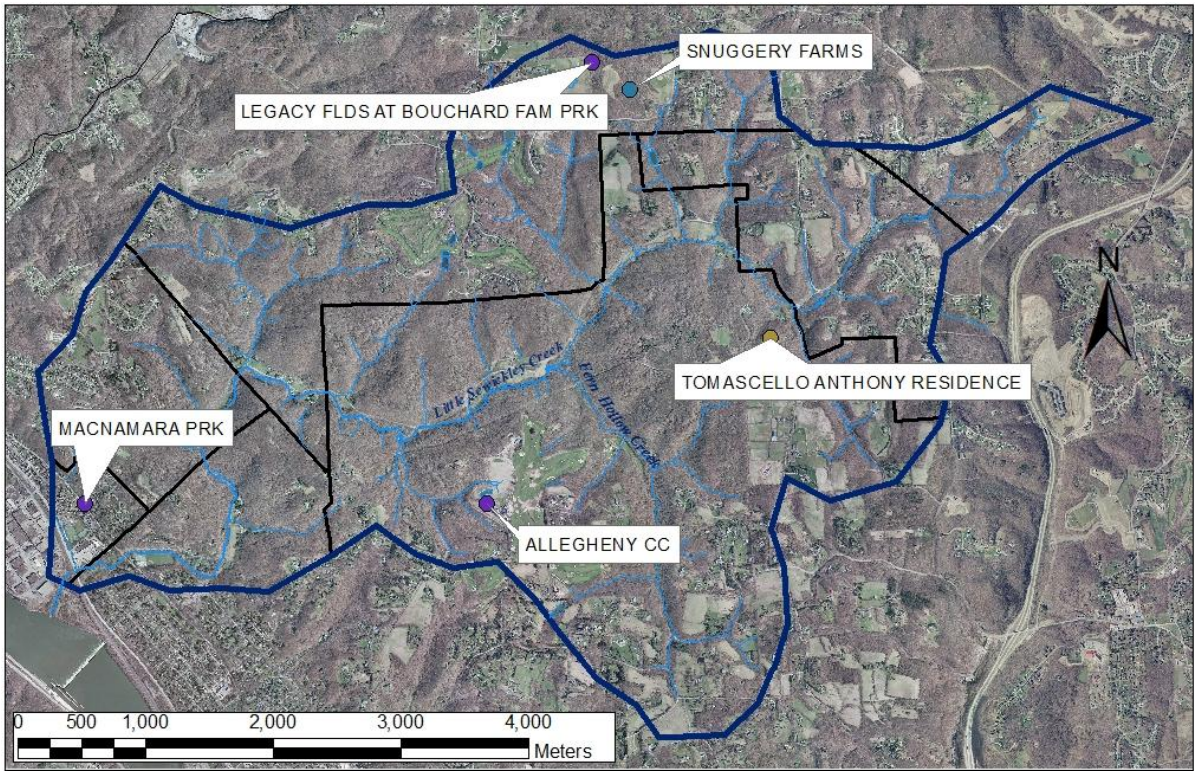


Table 71: Information on ESCF's

Organization	Facility Name	Primary ID	Sub-Facility ID	Facility ID	Type
Quaker Valley School District	Macnamara Park	647925	792506	PAI050204001	Recreational Facilities
Quaker Valley School District	Legacy Fields	721721	996609	PAI050209004	Recreational Facilities
Tomascello, Anthony J.	Tomascello Residence	669019	898360	PAI050205006	Private Road or Residence
Allegheny Country Club	Allegheny Country Club	663720	844475	PAI050205001	Recreational Facilities
Gregg, Walter Jr	Snuggery Farms	561039	536400	PAS10A110	Residential Subdivision

d. Water Resources

Figure 49: Locations of Water Resources (PA eMAP)

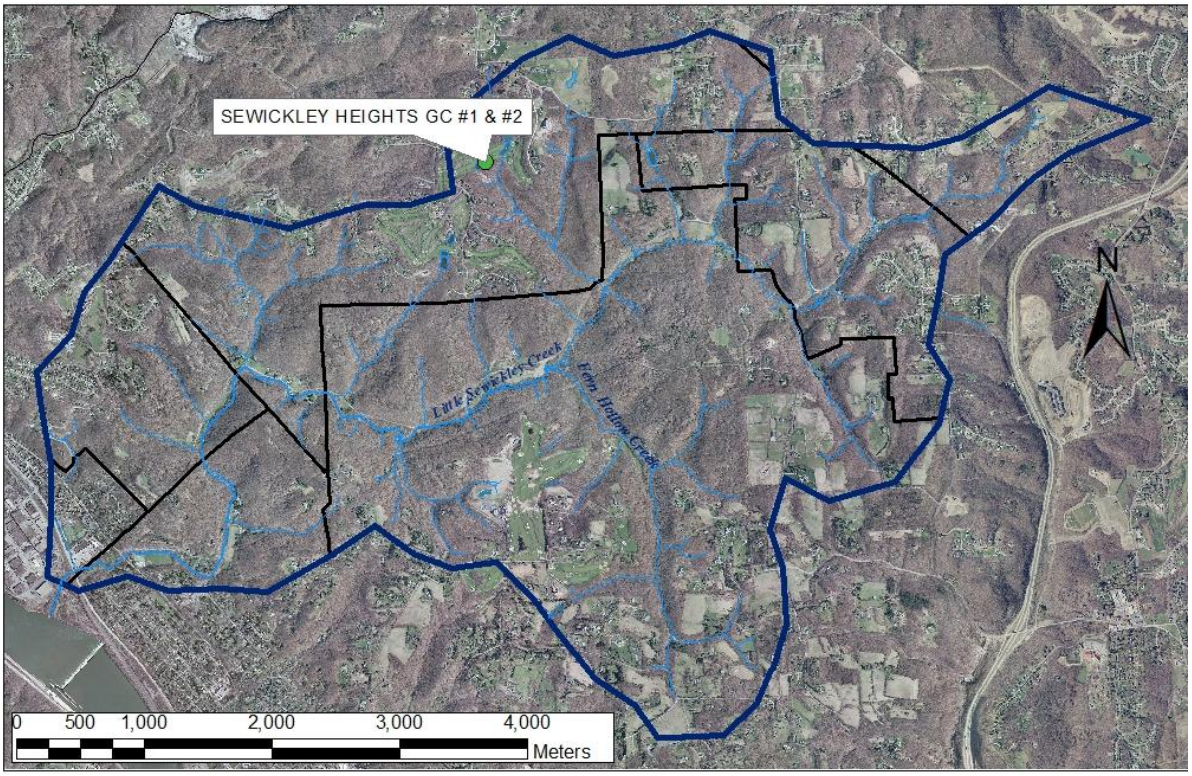


Table 72: Information on Water Resources

Organization	Client ID	Site ID	Primary ID	Facility	Type
Sewickley Heights GC #1	80295	253883	264552	Lakes	Surface Water Withdrawal
Sewickley Heights GC #2	80295	253883	264552	GW RC	Discharge

e. Municipal Separate Storm Sewer Systems

Figure 50: MS4 Classification by Municipality

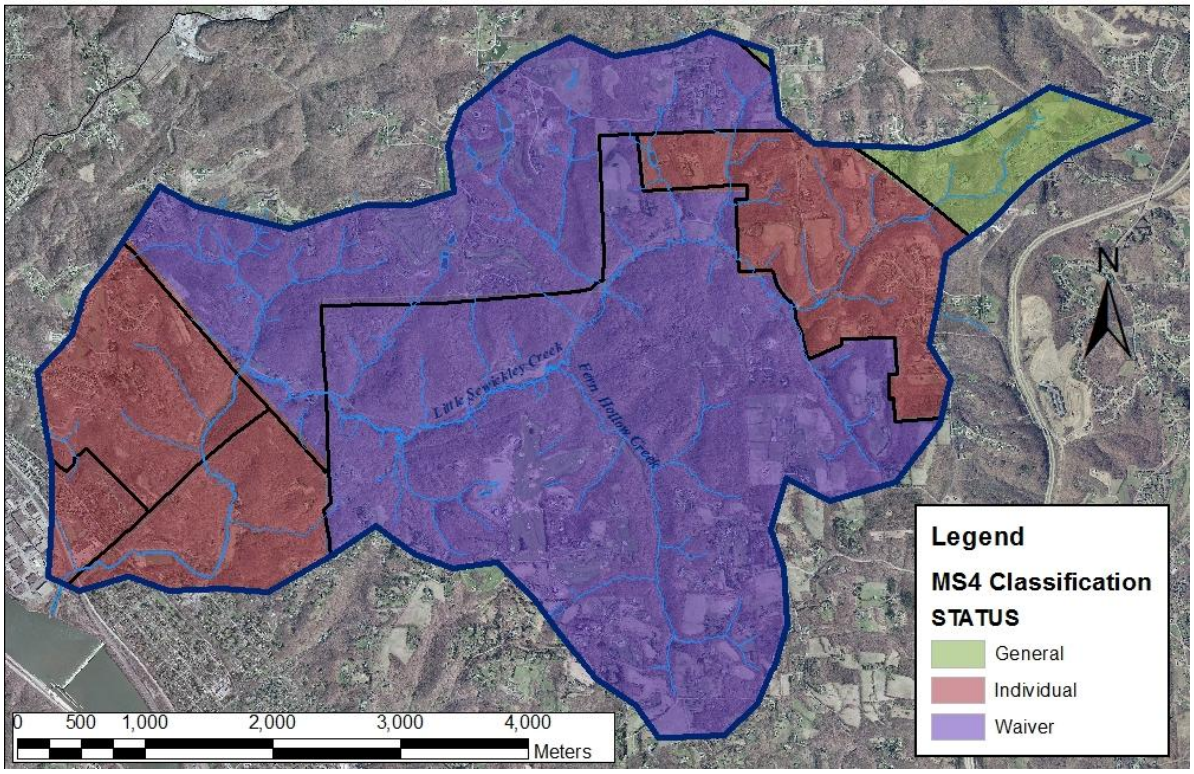


Table 73: MS4 Information

Municipality	Status	Permit Number	Approved Date
Bell Acres	Waiver	PAI136124	1/9/2004
Edgeworth	Individual	PAI136103	4/1/2004
Franklin Park	General	PAG136175	9/15/2003
Leet	Individual	PAI136108	4/1/2004
Leetsdale	Individual	PAI136113	4/1/2004
Sewickley Heights	Waiver	PAG136253	10/27/2003
Sewickley Hills	Individual	PAI136132	8/16/2004

6. Information regarding any of the qualifiers for designation as Exceptional Value waters used as a basis for the requested designation

Little Sewickley is already classified as a high quality waterway and the petitioners believe that the stream qualifies as an exceptional waterway under the following qualifiers.

a. 7.3(f)(ii)(C): Outstanding National, State, Regional or Local Resource Water

i. Coordinated Water quality Protective measures adopted by regional or local governments.

The ordinances of all of the municipalities are attached in a separate appendix. The ordinances of several of the municipalities are in the stages of revamping. The wordage in many of these ordinances seeks out to protect water quality and limit certain land uses within the watershed.

The Ordinances hit on the same keywords:

1. Conservation Subdivision
2. Floodplain Ordinances
3. Special Storm water Management Planning and Design Requirements
4. Wellhead Protection Design Requirements
5. Impervious Surface/Infiltration Requirements
6. Zoning Ordinances that are Dedicated to Open Space, Conservation, or Protection
7. Resource Conservation
8. Open Space/ Open Space Design Standards
9. Riparian Buffer Ordinances
10. Critical Environmental Area
11. Native Vegetation Planting Ordinances
12. Natural Streambank Stabilization Ordinances
13. Greenway Land Requirements/Greenway Design Standards
14. Special Impervious Development Requirements
15. Low Impact Development Design Requirements
16. Requirements for Conservation Easements and/or Deed Restrictions

b. 7.3(f)(ii)(D): Surface Water of Exceptional Recreational Significance

Figure 51: Recreational Opportunities in Watershed

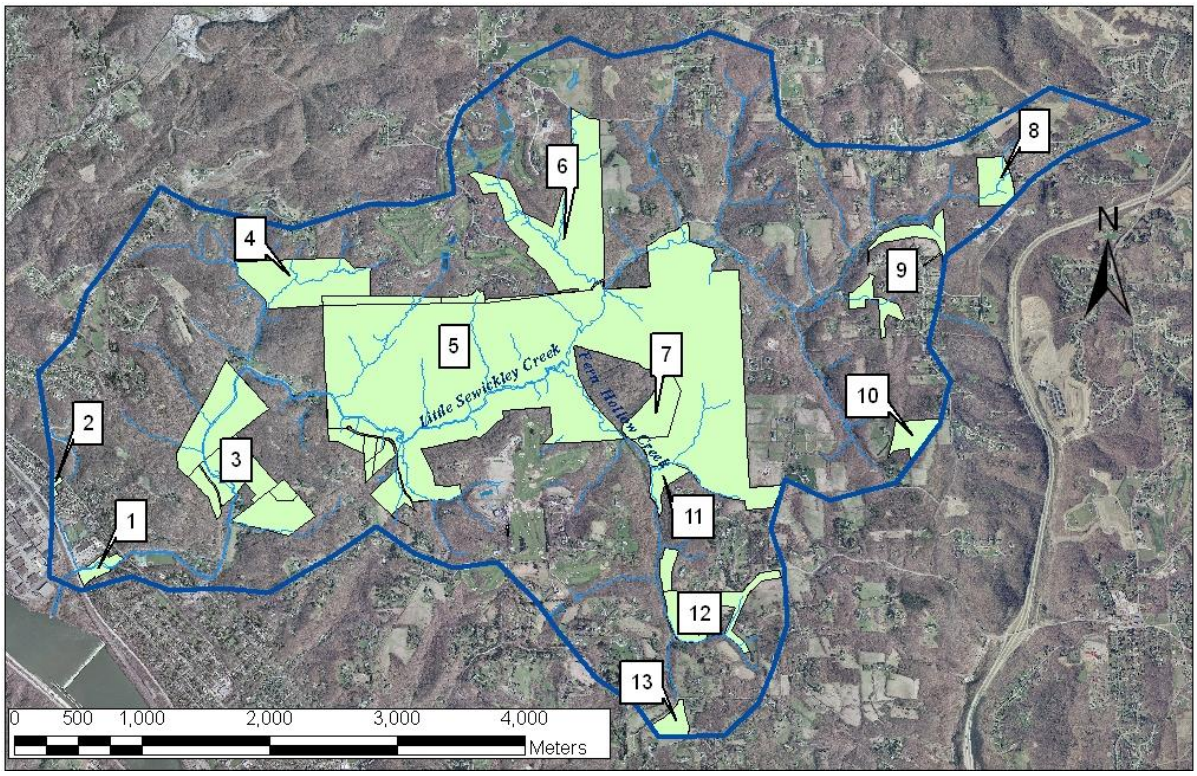
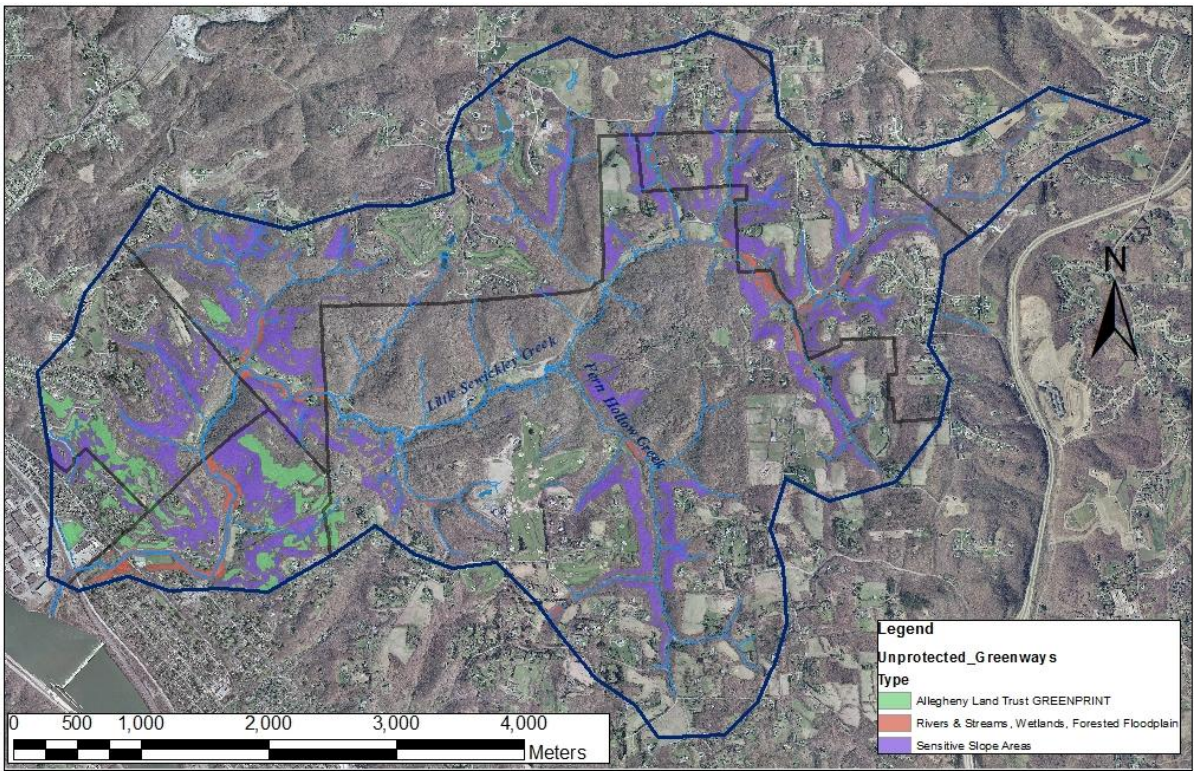


Table 74: Recreational Opportunities by Name

Parcel #	Name	Parcel #	Name
1	Edgeworth Park	8	Franklin Park Land
2	Leetsdale Park	9	Sewickley Hills Park
3	Walker Park	10	Audubon Greenway (ALT)
4	LSCWA Land	11	Sewickley Heights Land
5	Sewickley Heights Park	12	Sewickley Heights Land
6	Wagner Hollow (LSCWA)	13	Sewickley Heights Land
7	Fern Hollow Greenway (ALT)		

The watershed is dominated by publicly owned land along with wooded corridors to each one of these green spaces. The parks have extension trail systems throughout them that create an awesome recreational experience. Many residents and visitors use the system for hiking, biking and horseback riding. These conserved lands provide Little Sewickley Creek with a large riparian buffer, which provides the creek with clean filtered water and prevents flooding and runoff. The stream is also used as a trout fishery and the lower stretch of the stream is home to numerous game fish coming up out of the Ohio River.

Figure 52: Unprotected Greenways



Along with the publicly owned greenways there are numerous areas that are referenced as greenways that are unprotected. However, these areas are protected under various laws. The streams and wetlands are regulated under Section404 of the CWA by the U.S. Army Corps of Engineers, the streams, wetlands and floodplains are regulated by the PA DEP under Chapter 105, and the steep slopes are regulated by the municipal ordinances. In an overall sense much of the watershed is protected by its natural resources from the underlying geological formations.

c. 7.3(f)(ii)(E): Biological Assessment Qualifier

The documented biological data for Little Sewickley Creek is an example of a highly diversified site, especially for Allegheny County. The macroinvertebrate data has produced 30 documented families of invertebrates spanning 7 orders of insects and 6 orders of non-insects. The EPT taxa represent 15 of the 30 total families observed within the stream.

The fish data includes 26 species of fish that span 7 separate families. The three studies have also all proven that brown trout are naturally reproducing within the stream. The blue-breasted darter, a threatened species, has also been observed. Dr. Brady Porter has suggested that the stream may also be spawning grounds for other threatened darters including; the tippecanoe darter, and the spotted darter.

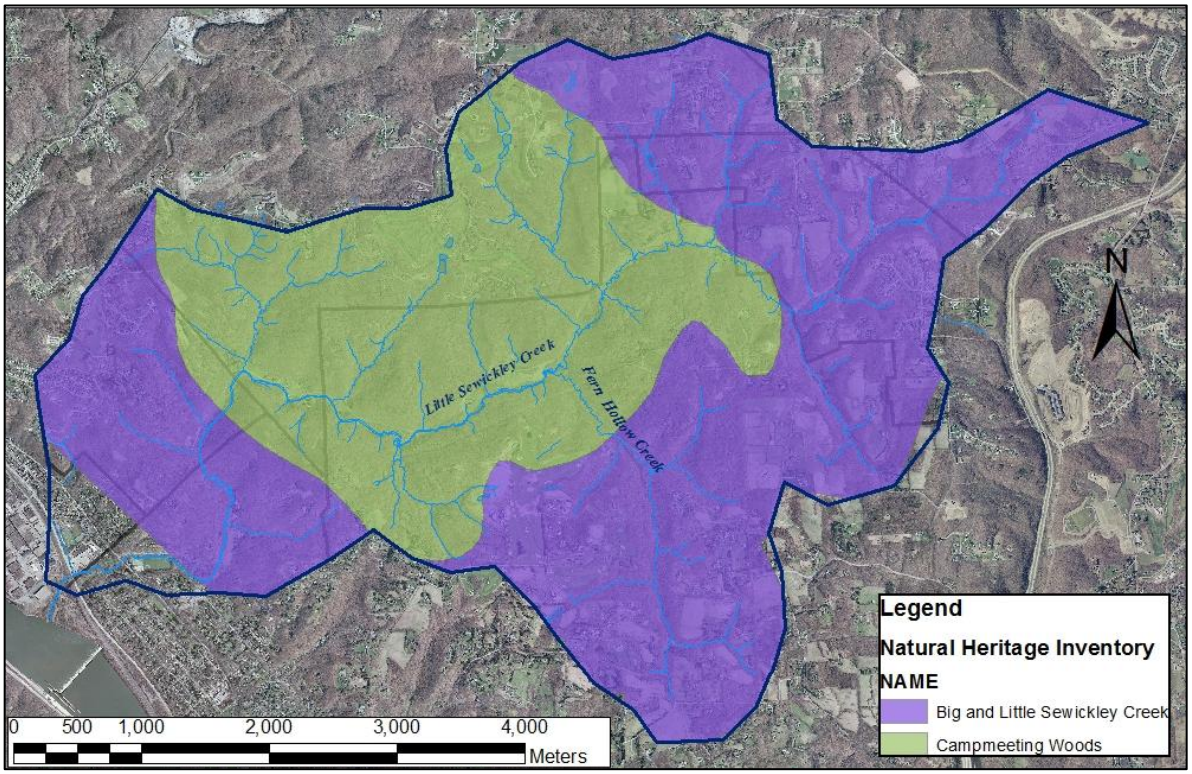
The clean cold water coming from Little Sewickley Creek represents a biological hotspot within Allegheny County, which deserves to be protected from further development or land use changes.

d. 7.3(f)(ii)(G): Surface Water of Exceptional Ecological Significance

ii. Natural Heritage Inventory

The Natural Heritage Inventory has classified to two parcels of lands within the watershed. The watersheds of Big and Little Sewickley Creek are classified as exceptional significant Landscape Conservation Areas (LCA). There is also an exceptional significant Biological Diversity Area known as Campmeeting Woods. This area is seen as both a High Diversity Area and a Community/Ecosystem Conservation Area, because it has both forest and stream communities.

Figure 53: NHI Inventory of Watershed



ALLEGHENY COUNTY
NATURAL HERITAGE INVENTORY

Prepared by: Western Pennsylvania Conservancy

AMBRIDGE QUADRANGLE
The Ambridge quadrangle represents the most natural, contiguous forest in Allegheny County. The Big Sewickley Creek watershed and the Little Sewickley Creek watershed, both tributaries to the Ohio River, have maintained, with little exception, much of their natural forest character. The development that has occurred in these watersheds has been restricted to the areas along the Ohio River where the streams end and to some of the upland areas that have been zoned for large lots such as in Sewickley Heights Borough. Most of this green landscape is situated northeast of the Ohio River, which cuts across the southern portion of the quadrangle and heads in a northwest direction to where it enters Beaver County in the northwest quadrant of the map.

The Ohio River has been designated the **Ohio River BDA**, since it provides habitat for a fish species of special concern (**SA001**). It should be noted that this Special Species Habitat also extends into Beaver County where it was designated and noted in the Beaver County Natural Heritage Inventory (Smith, 1993). Some of the key features on this stretch of the river before it leaves Allegheny County and enters Beaver County near Leetsdale are the downstream end of Neville Island and the Dashields Dam, both of which are places where the fish species of special concern were actually collected.

A large area north of the Ohio River that encompasses portions of the Big Sewickley Creek watershed and the entire Little Sewickley Creek watershed has been designated the **Big and Little Sewickley Creek LCA**. This Landscape Conservation Area is not only significant as the largest tract of a relatively contiguous, undeveloped "green space" in the county, but as an area that contains a large Biological Diversity Area and four managed lands. A large part of the protection focus of this LCA is the Little Sewickley Creek watershed. The Little Sewickley Creek has been designated a high quality-trout stocked fishery by the D.E.R (1992a). Presently, this stream is believed to be the highest quality stream in the county and is also the best example of a Medium-Gradient Clearwater Creek Community (**NC001**) of all of the river tributary streams in its size class in the county (D.E.R., 1992b). Although the stream is designated a trout stocked fishery, it is not stocked with fish. This is a benefit to the aquatic community since fish stocking almost always involves the introduction of non- native fish species such as brown trout which often results in the competition for resources with native species.

If stocking of this stream is to occur in the future, it is highly recommended that consideration be given to limiting the stocked fish to native species only. Further protection of the stream includes maintenance of a forested buffer, monitoring of water quality, and enforcement of discharge regulations. Although some of the land within the LCA has been moderately developed for residential use, the main disturbance that the land is recovering from is logging and some agricultural use. Nonetheless, this Landscape Conservation Area and the natural features contained in its boundaries represent some of the most mature, biologically diverse, and extensive forest in the county and therefore, merit protection and special consideration. See the LCA section under General Recommendations for the Protection of Natural Heritage Areas.

The southern portion of the Big and Little Sewickley Creek LCA includes a large Biological Diversity Area known as the **Campmeeting Woods BDA**. This BDA is recognized as both a High Diversity Area and a Community/Ecosystem Conservation Area which encompasses a significant forest and stream community on the north and south sides of Campmeeting Road in Bell Acres Borough and the Borough of Sewickley Heights. Portions of both the Big Sewickley Creek and Little Sewickley Creek Watershed are included in this BDA. The primary focus of the BDA is the Mesic Central Forest Community (**NC002**) that covers most of the area within the BDA boundary, however, also included within this BDA are sections of Little Sewickley Creek, a Medium-Gradient Clearwater Creek Community (NC001).

The highest quality examples of the Mesic Central Forest Community exist in the more protected, steep walled valleys within the site. Some of the exceptional examples of this forest community are located in the stream valleys and some slope areas off of Turkeyfoot Road and off of Sevin Road. The north facing slopes and tributary valleys, as well as the north tributary known as Wagner Hollow along Little Sewickley Creek provide other highly significant

examples of this forest community within the BDA. In general, the different examples of the Mesic Central Forest Community within the BDA are characterized by mature sugar maple (Acer saccharum), American beech (Fagus grandifolia), red oak (Quercus rubra), white oak (Quercus alba), basswood (Tilia sp.), tulip poplar (Liriodendron tulipifera), spicebush (Lindera benzoin), ironwood (Carpinus caroliniana), flowering dogwood (Cornus florida), witch-hazel (Hamamelis virginiana), and mapleleaf viburnum (Viburnum acerifolium) and a highly diverse herbaceous layer. Oak species take a more dominant role in the canopy of this natural community at higher elevations on the slope where conditions are drier and more exposed to sun and wind. The more mesic species such as sugar maple, tulip poplar and basswood are the more dominant species on the lower slopes and valley bottoms.

Some of the herbaceous species that represent the rich mesic soils include bloodroot (Sanguinaria canadensis), wild ginger (Asarum canadensis), jack-in-the-pulpit (Arisaema atrorubens), mayapple (Podophyllum peltatum), wild geranium (Geranium maculatum), Christmas fern (Polystichum acrostichoides), hepatica (Hepatica americana), violets (Viola spp.), black snakeroot (Cimicifuga racemosa), marginal shield fern (Dryopteris marginalis), lady fern (Athyrium filix-femina), wild leek (Allium tricoccum), and largeflowered trillium (Trillium grandiflora). This diversity of herbaceous species suggests the quality and richness of the forest community at this site. Some of the upland areas to the north and south of Campmeeting Road and to the south of Little Sewickley Creek, the slopes along Turkeyfoot Road and along the north and south banks of Little Sewickley Creek, and the bottomland/floodplain areas along Little Sewickley Creek that provide buffer for NC002 are generally forested and are characterized by younger successional stages of the Mesic Central Forest Community. The many topographic features, aspects, and elevational ranges provided within this large BDA add to the overall biological diversity and potential natural qualities of this site.

Of the past land uses and disturbances impacting the forest and streams in this BDA, logging and agricultural practices appear to be most prominent. A number of present threats to NC002 and the surrounding forest within this site exist. Since the highest quality examples of NC002 are sometimes located in small valleys and slopes, activity in the upland areas almost always has an impact on the forest community. This is true for a number of areas within the site where a golf course or housing development is situated in the upland or at the head of the valley. Aside from general restriction of the forest to the slopes and valleys, use of chemical fertilizers and herbicides related to the maintenance of the golf course turf could potentially impact the quality of the streams and associated soils in the forest. Evidence of some of the disturbances related to this type of upland development include erosion of stream beds which is due to increased runoff from pavement and storm water diversion both of which result in an unnatural influx of water into the valley. Erosion has resulted in tree falls and unstabilized stream banks.

The natural qualities exhibited within the Campmeeting Woods BDA can best be protected by allowing the forest and stream to continue through successional stages without alteration or disruption caused by future logging, development or infrastructural development related to residential development (i.e., sewer lines, utility right-of-ways, roads, etc.). Maintenance of a buffer zone is recommended which should include any upland or upper slope area that is presently forested or has the potential to revert back to forest.
A number of managed lands, or portions of, are situated within the boundary of the BDA. One of these is **Wagner Hollow**. This managed land is owned by the Little Sewickley Creek Watershed

Association and is presently managed for the protection of the natural resources that are present in the valley. Although a hands-off management approach is being implemented no management plan has been developed for this area. It is recommended, therefore, that the watershed association continue to manage the site by allowing natural succession to occur, restricting the construction of structures, maintaining the low impact use of the site, and developing a management plan or document that will give guidance to this type of management. See Natural and Dedicated Areas under the section titled General Recommendations for the Protection of Natural Heritage Areas for ideas on how the management of this site should occur. Presently the only use of the valley appears to be that by equestrians on a main trail that runs along the floodplain next to the stream. This trail, as well as the floodplain, has suffered substantially from overuse. Use during wet weather has caused a good deal of erosion and compaction of the soil. Further, the stream itself has no doubt been subject to greater sediment loads resulting from the erosion that is occurring along the stream bank. It is recommended that activity resulting in erosion be reduced and kept to a minimum and be limited to one trail on the floodplain instead of many.

Some of the high quality examples of the Mesic Central Forest Community are situated on lands owned by the Borough of Sewickley Heights. The **Sewickley Heights Borough Park** is located on the south side of Little Sewickley Creek near the intersection of Little Sewickley Creek Road and Fern Hollow Road. This managed land consists of forested slopes, uplands, and floodplain, as well as cleared upland areas that are mowed or reverting forest. The north facing slopes along Little Sewickley Creek within this managed land provide some of the best examples of NC002. It appears that some of the forest and bordering uplands are being permitted to undergo natural succession processes. The only apparent disturbances to the forest are fragmentation that has resulted from pipeline construction and past logging and possible grazing that has occurred. It is recommended that the borough continue to allow natural processes to occur and continue to permit only low impact use such as hiking and horseback riding in the forested sections of the park. Maintenance of a forested buffer on the uplands within the park is critical for the recovery of the forest community on the slopes.

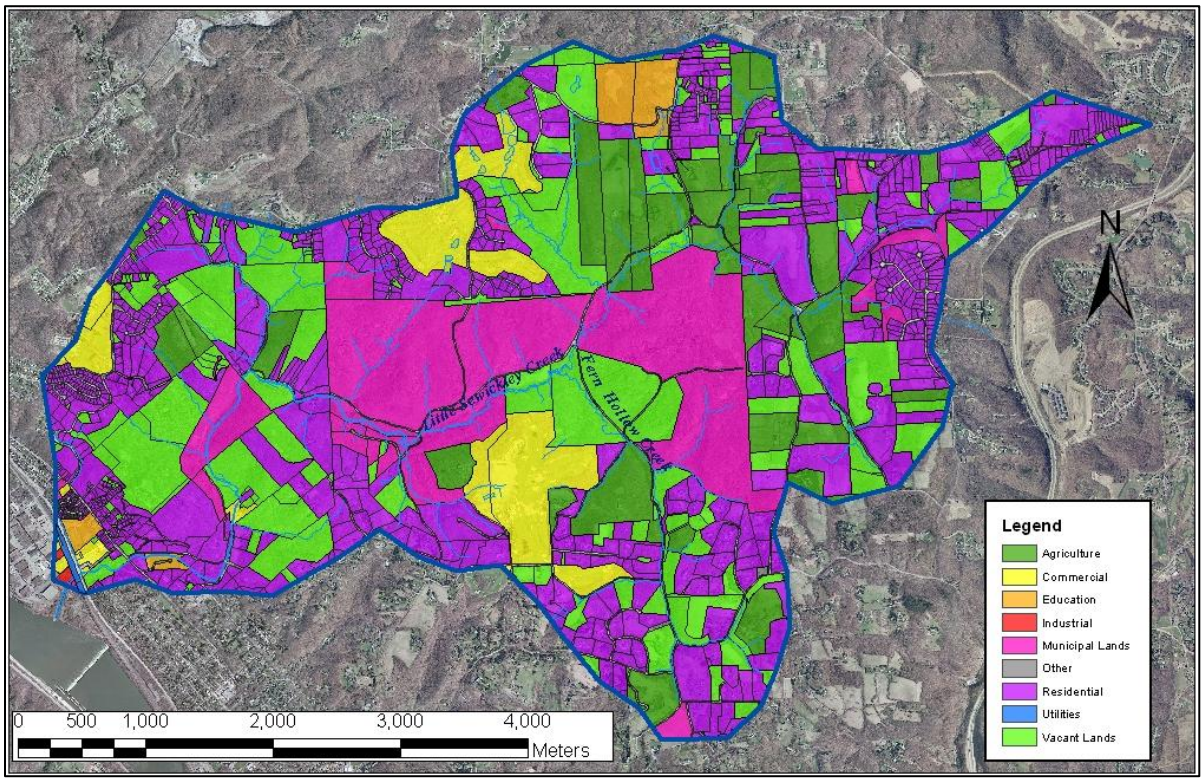
Another managed land, partly within the boundaries of the Campmeeting Woods BDA is **Walker Park**. This small park let is owned by Leet Township and comprises a section of cleared floodplain along Little Sewickley Creek, as well as some of the lower slopes along the creek. In order to better protect the natural qualities in the park and, at the same time, expand and better protect the Campmeeting Woods BDA from future development and disturbances, Leet Township could acquire lands adjacent to Walker Park.

The only recognized fossil locality in Allegheny County is the **Brush Creek Marine Zone at Sewickley Bridge** (Hoskins, et al., 1983). Recognized for its diversity of marine fossils, this site is a road cut on the south side of the Ohio River just across the river from Sewickley.

7. Land Use and Development Patterns in the Watershed

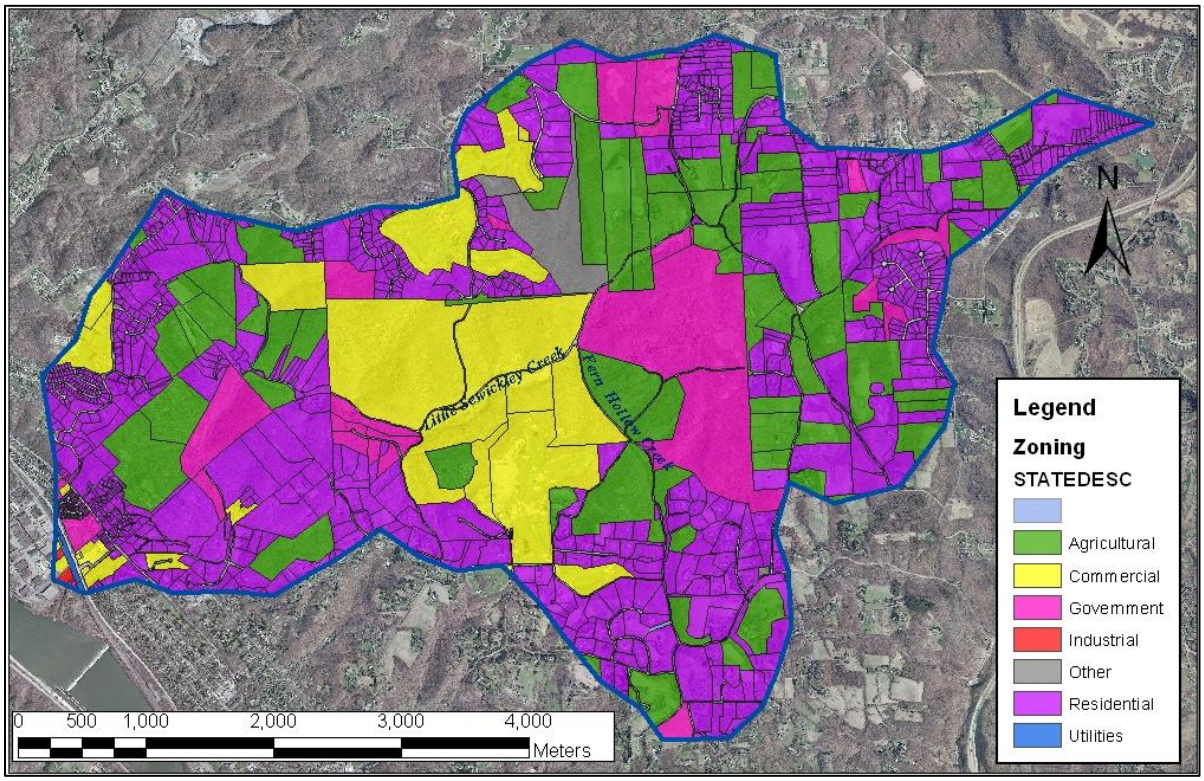
a. Manmade Resources

Figure 54: Land Use According to Parcel Data



The map depicted in Figure 4 is based on the land uses according to the County Tax Assessment data and field views. The land use data differs from the actual zoning of lands which is depicted in Figure 5 below. The watershed is dominated by residential land use accounting for 35.85% of the area. The next largest percentage of area is classified as government owned or municipal owned which accounts for 25.09%; followed by vacant lands (22.55%), agriculture (13.31%), commercial (5.55%), education (1.64%), utilities (0.09%), industrial (0.07%), and other (0.02%).

Figure 55: Zoning Data



These percentages can then be compared to the actual zoning percentages of the watershed. Once again residential is the major player with 42.69% of the watershed; followed by agriculture (23.83%), government (19.6%), commercial (16.68%), other (1.70%), utilities (0.09%) and industrial (0.07%).

Figure 56: Zoning vs. Actual Land Use

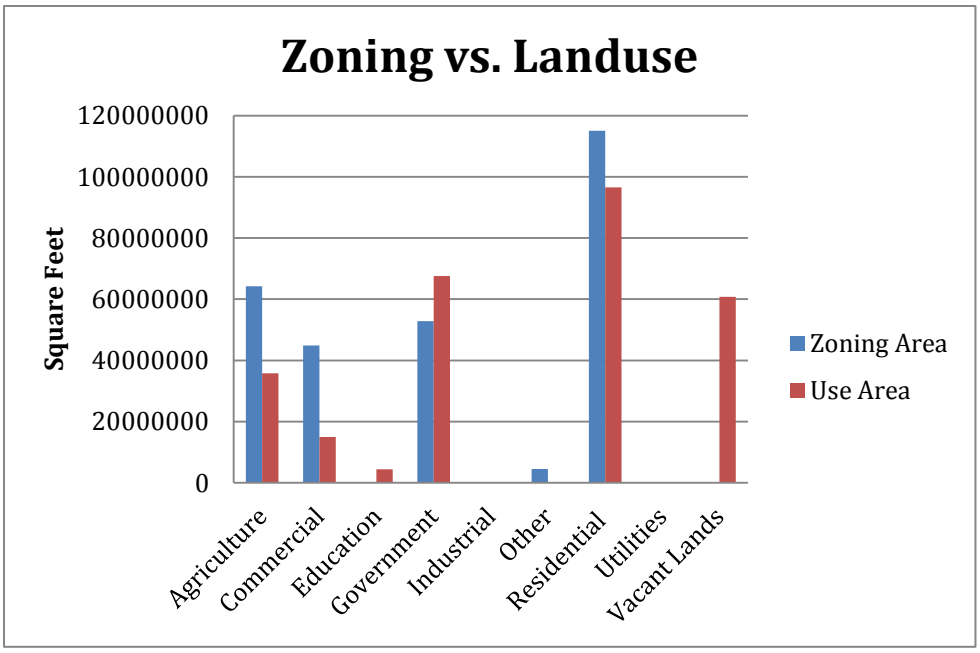


Figure 57: Tax Code

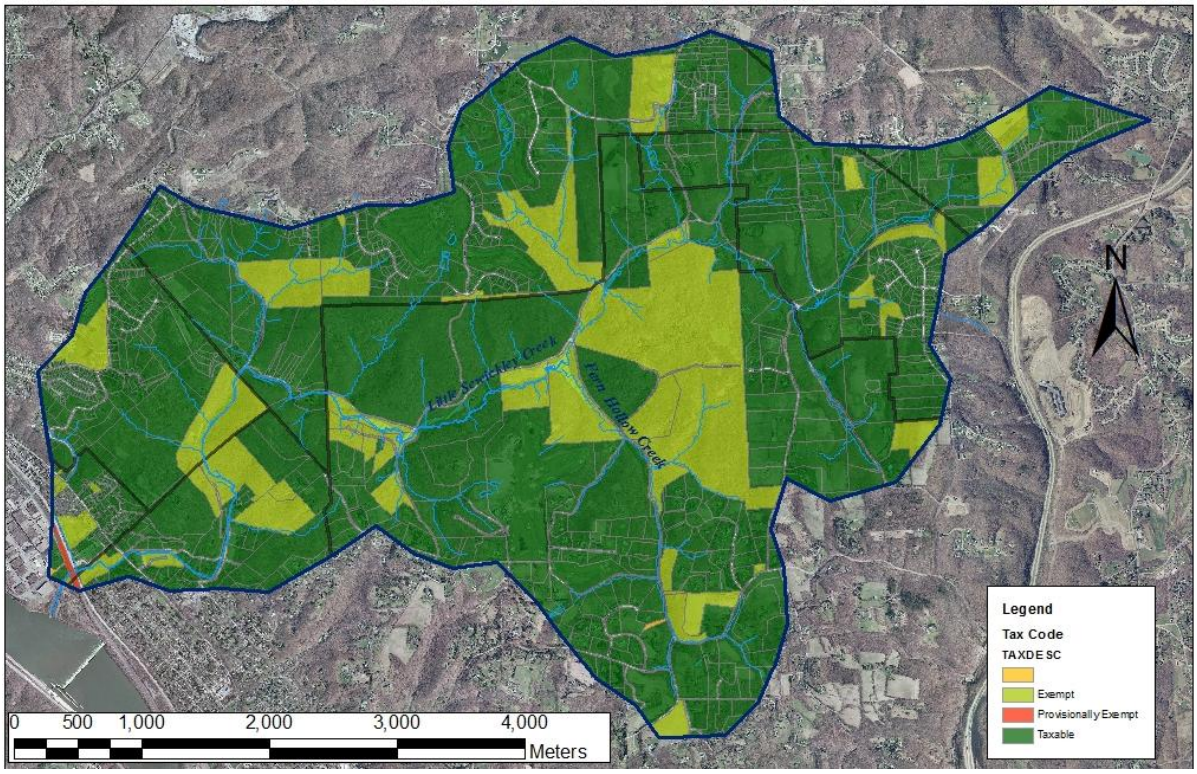
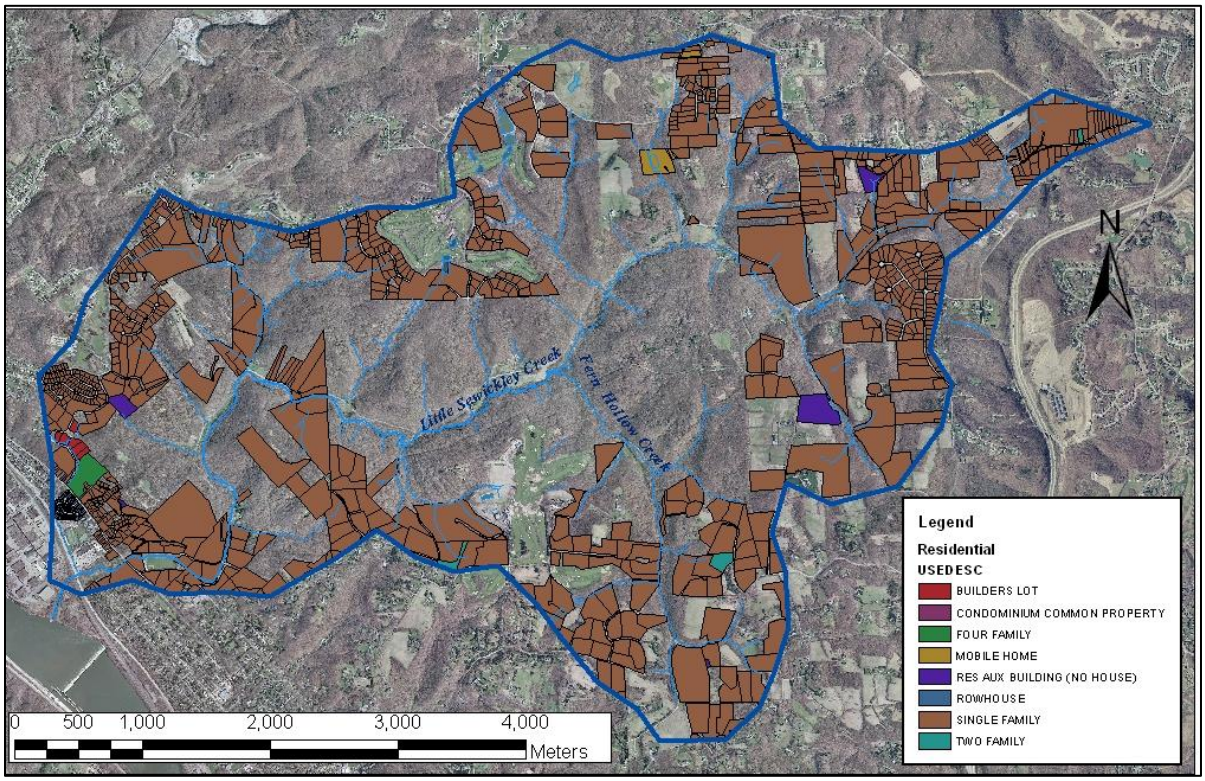


Figure 58: Residential

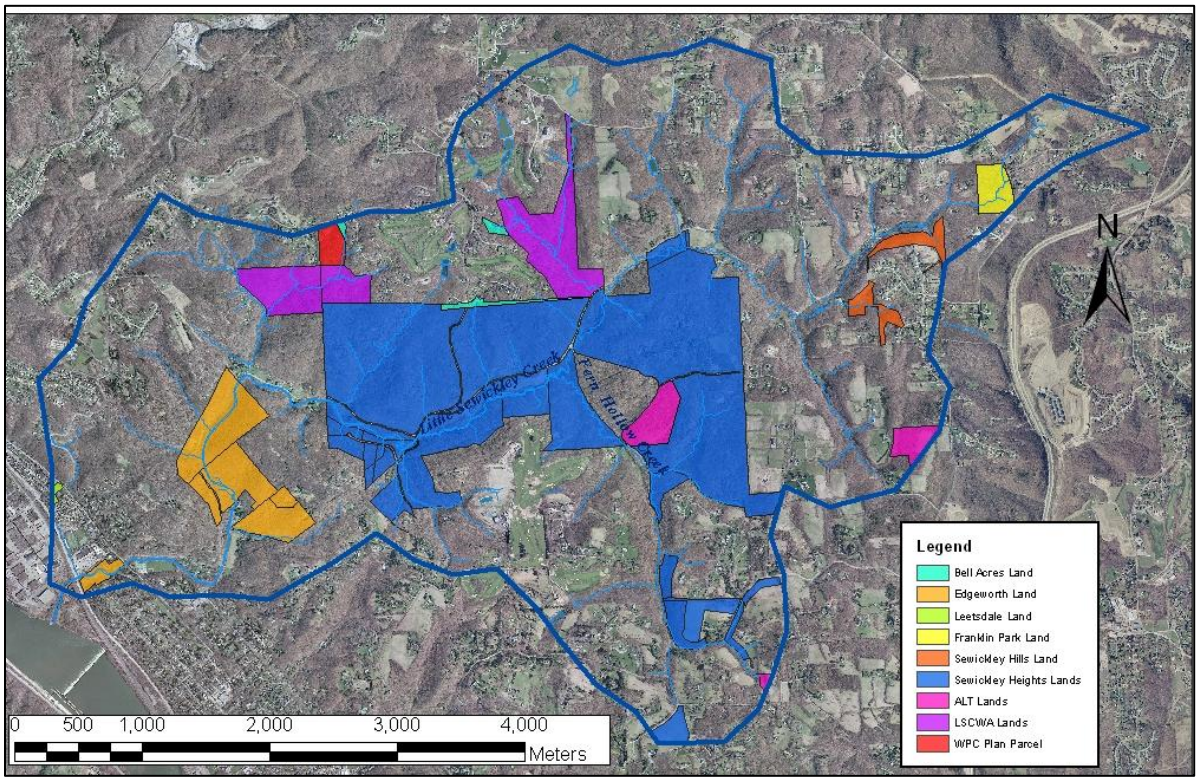


The main land use within the watershed is residential which encompasses 1037 parcels totaling 2216.48 acres. These parcels can be broken down into subcategories including:

- Builders Lot (7) encompassing 0.13% of the watershed;
- Condominium Common Property (2) encompassing 0.03%;
- Four Family (1) at 0.21%;
- Mobile Home (2) at 0.22%
- Aux Building (7) at 0.45%;
- Rowhouses (125) at 0.13%;
- Single Family (888) at 34.5%; and
- Two Family (5) at 0.16%.

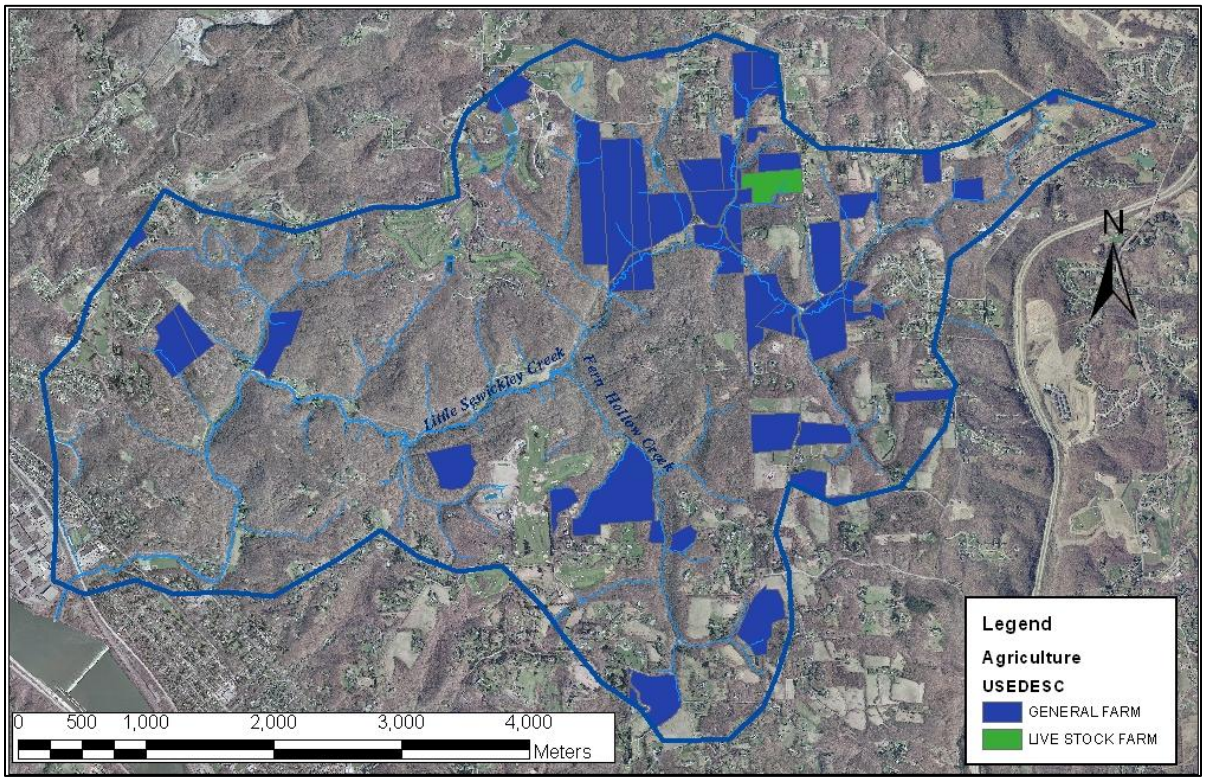
Although the residential development in the upland areas do not directly impact the creek through lot development, the development nonetheless indirectly and cumulatively impacts the stream primarily by changes in storm water runoff and the ground water infiltration regime. The average size single family plot within the watershed is 2.4 acres and Sewickley Heights has a 5 acre minimum within its municipal boundaries.

Figure 59: Non-Profit/Municipal Lands



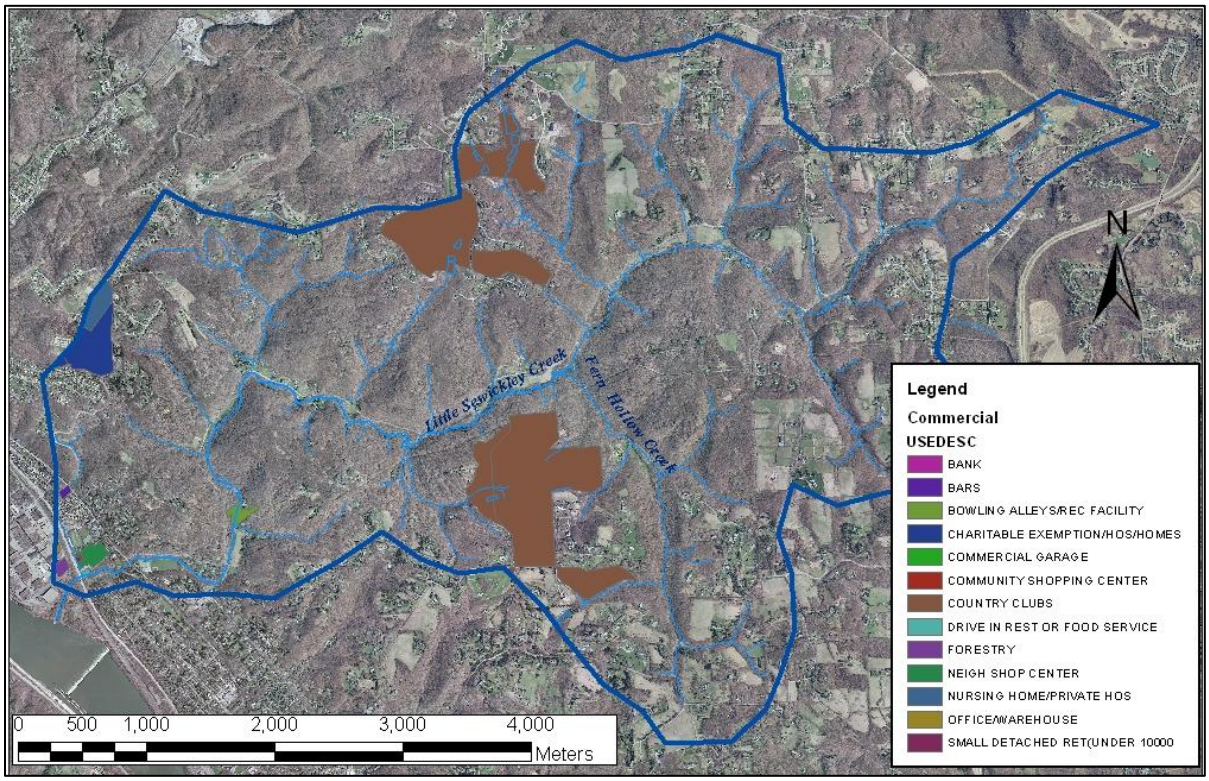
Municipal owned land, Figure 6 above, accounts 25.09% of that percentage each municipality has properties within the watershed except for Leet Township. These properties total 1551.1 acres of land within the watershed. Sewickley Heights owns the most land within the watershed that accounts for 24.56% of the total area. Edgeworth is the next municipality owning 3.76% of the watershed; followed by Sewickley Hills (0.53%), Franklin Park (0.39%), Bell Acres (0.22%), and Leetsdale at (0.03%).

Figure 60: Agricultural Lands



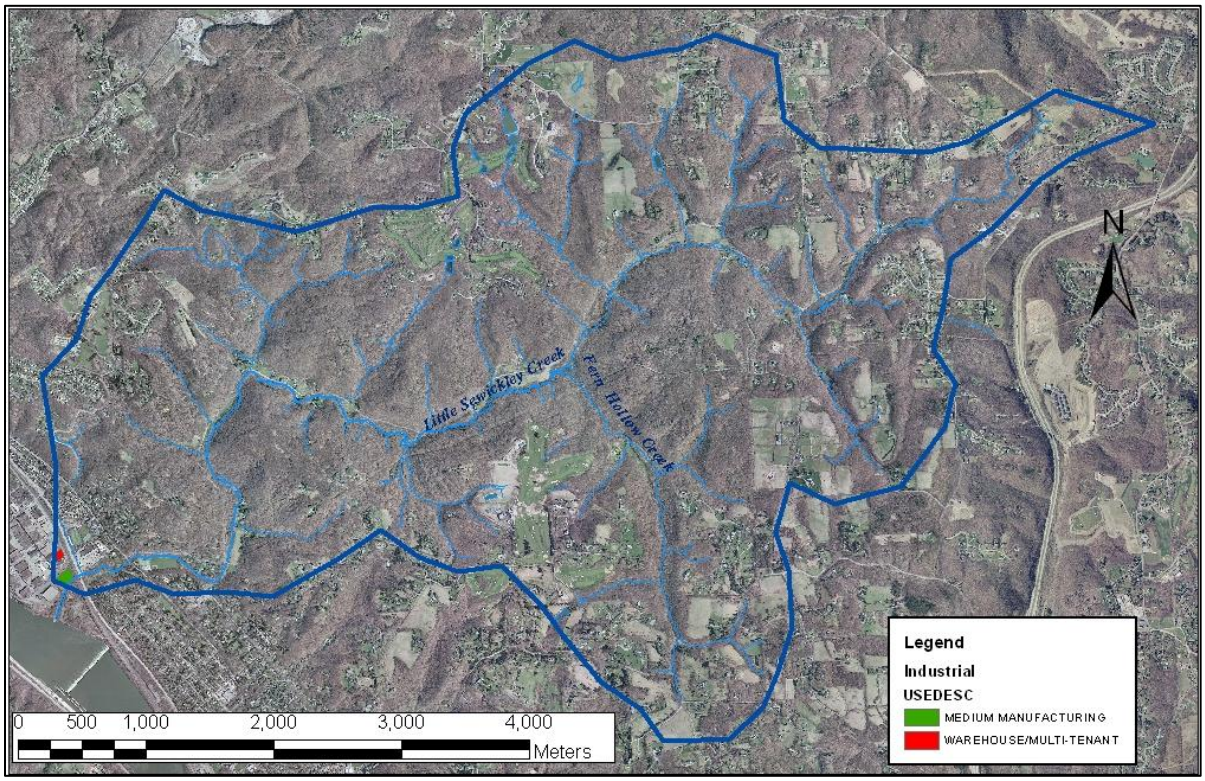
The watershed has 40 parcels of agriculture within its boundaries, which totals 822.81 acres of land. The parcels can be broken down into subcategories with 39 of the pieces characterized as general farms and 1 as a livestock farm. General farms account for 12.95% of the watershed, while the livestock farm accounts for 0.35%. The farms present in the watershed are mainly family farms that raise horses; there is a small margin of cultivated crops within the watershed. These farms are also good candidates for preservation through conservation easements or purchase.

Figure 61: Commercial Lands



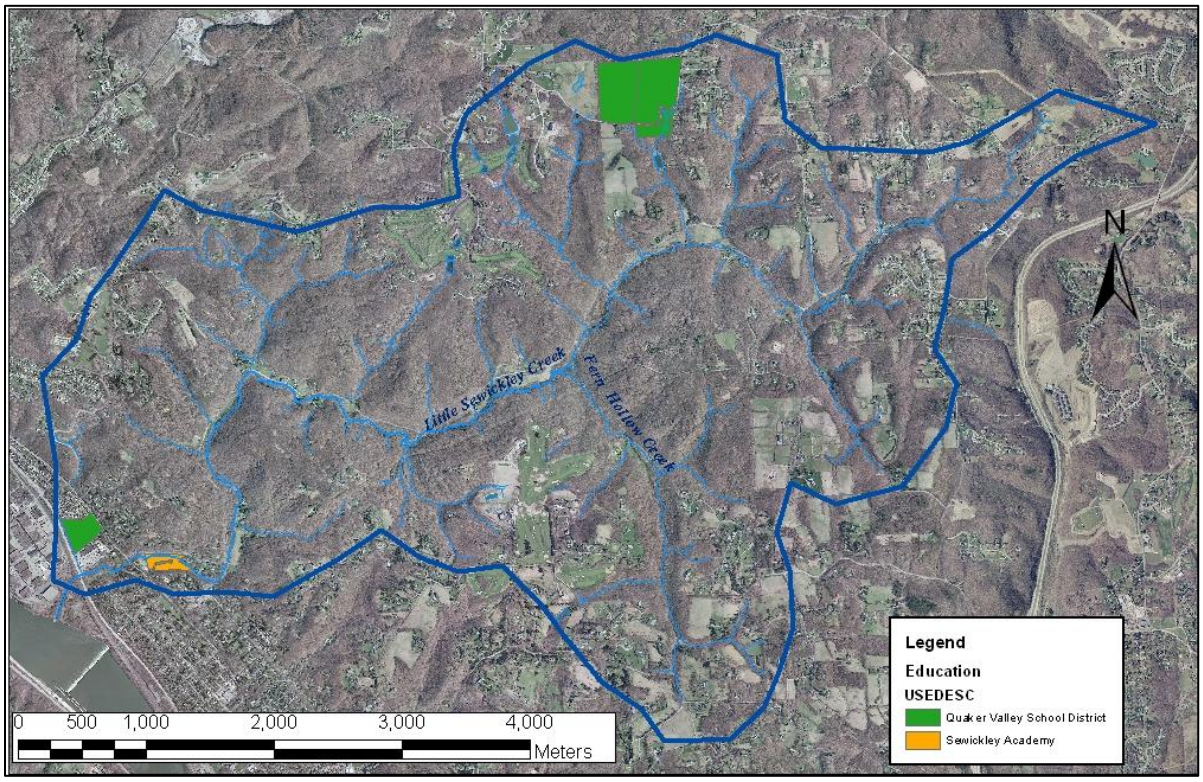
The commercial land use within the watershed carries a variety of categories these include; banks, bars, country clubs, community pool, home for disable children, nursing home, commercial garage, shopping center, fast food restaurants, forestry, and warehouses. The total acreage of commercial lands is approximately 342.86. The main contributors to this land use are the two country clubs within the watershed, later they are identified as greenways. They compose 4.50% of the total watershed, while the other categories are all less than a percent.

Figure 62: Industrial Lands



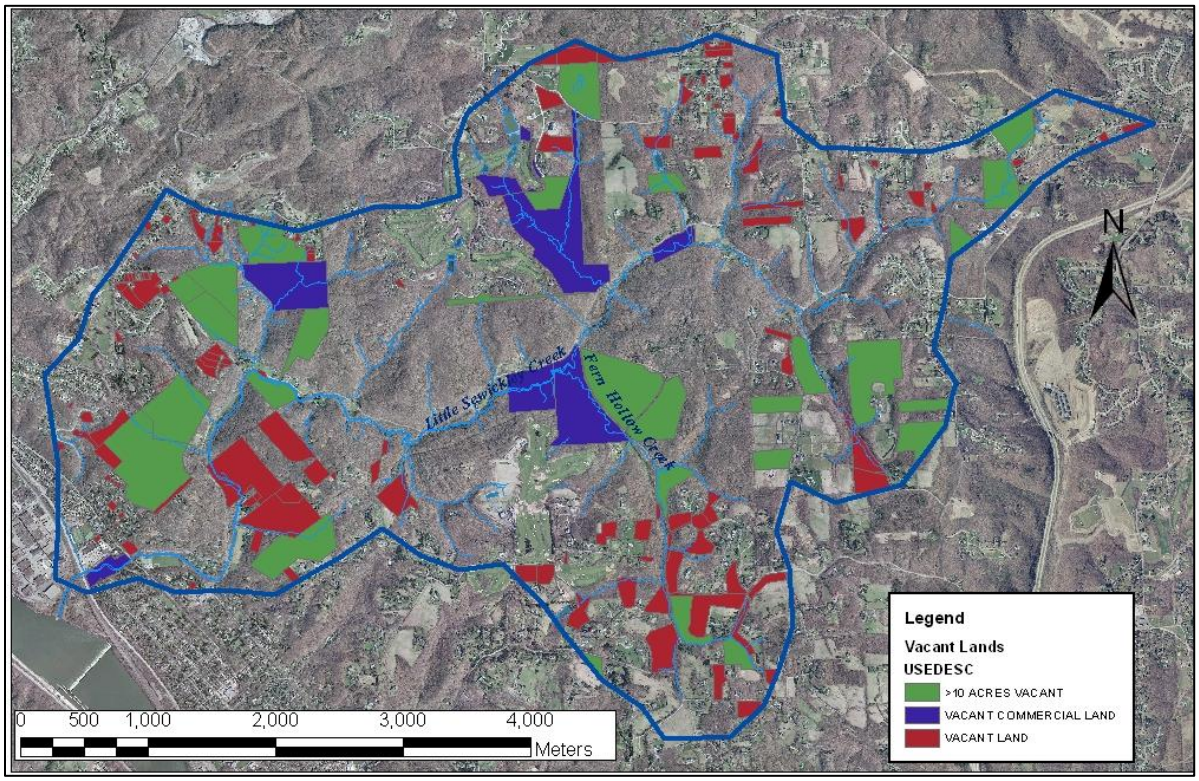
The industrial land use with in the watershed is at a minimum with only two parcels located near the confluence accounting for 4.11 acres of land. These parcels include one warehouse and a medium manufacturing shop.

Figure 63: Educational Lands



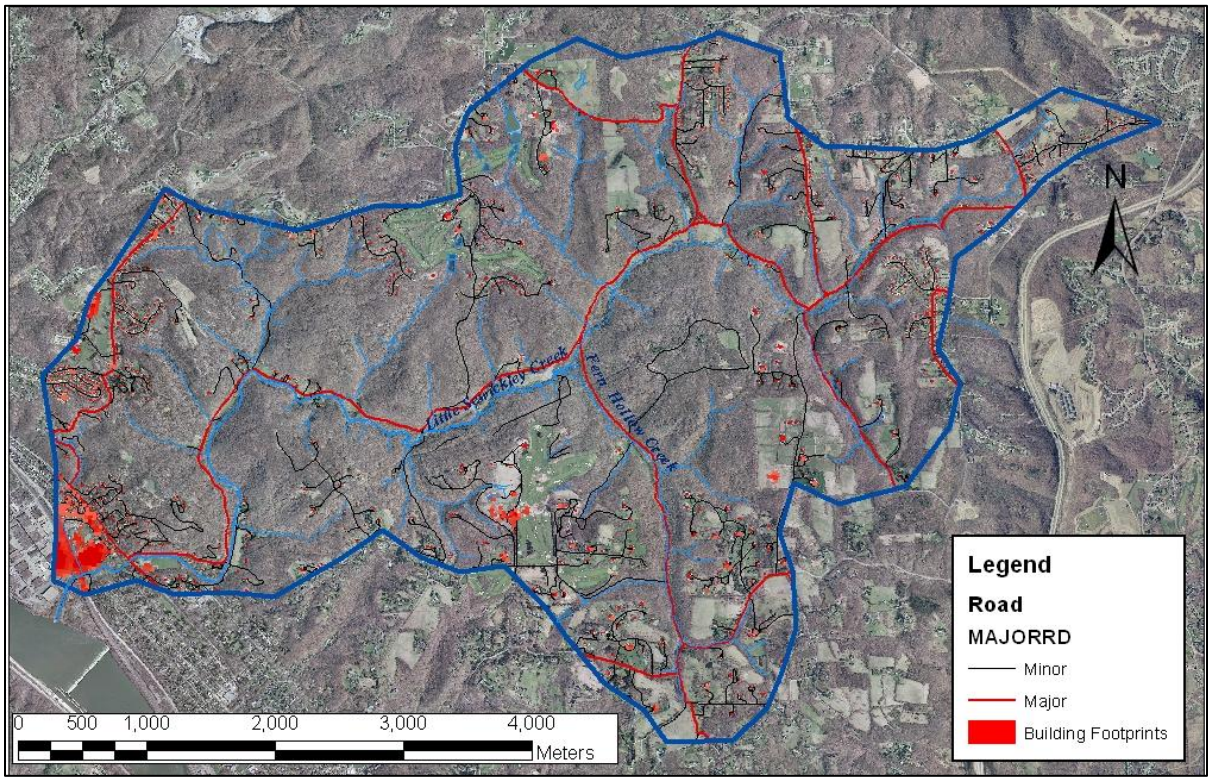
Little Sewickley Watershed has land owned by two separate educational institutions, Quaker Valley School District and Sewickley Academy. The total acreage dedicated to education in the watershed totals 101.51. Quaker Valley has its high school located near the confluence of the stream and some athletic fields located in the headwaters of a smaller tributary. The school district encompasses 1.50% of the watershed. Sewickley Academy owns athletic fields on the lower reach of the stream and accounts for less than one percent.

Figure 64: Vacant Lands



The watershed has 205 parcels that are classified as vacant lands, which are lands that are currently undeveloped. These parcels total 1394.5 acres of watershed land. The vacant lands have been broken down into three subcategories including; > 10 acres vacant lands, commercial vacant lands, and vacant lands. The category of >10 acres encompasses 10.41% of the watershed, while vacant lands account for 7.74% and commercial vacant lands account for 4.40%. Vacant lands are important, because they have an opportunity to become further protected.

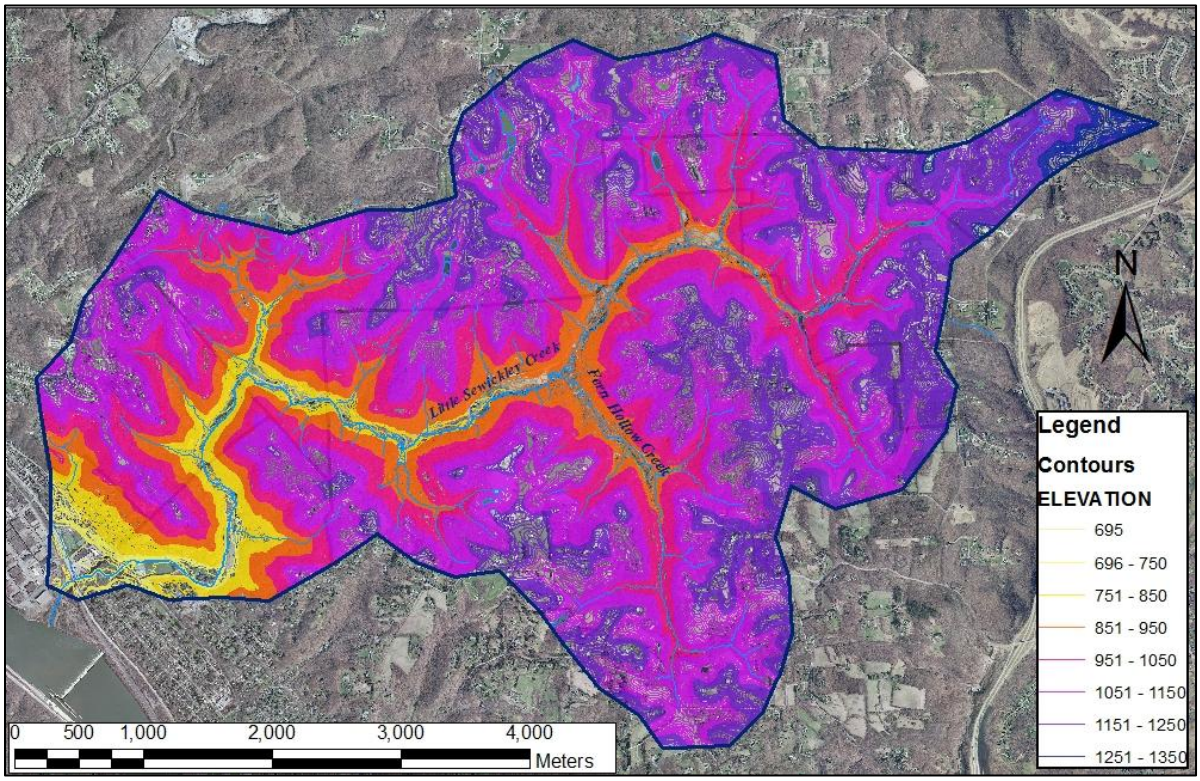
Figure 65: Impervious Surface and Building Footprints



The map pictured in Figure 65 depicts the watershed's impervious surfaces, along with the roads and building footprints. The watershed is composed of 3.9% impervious surface. The impervious surface is concentrated towards the confluence of Little Sewickley Creek near Rt. 65. There is a shopping plaza off of Rt. 65, with a parking lot. Little Sewickley Creek Road is the main roadway running through the watershed and it follows the main stem of stream from Beaver Road all the way to the headwaters.

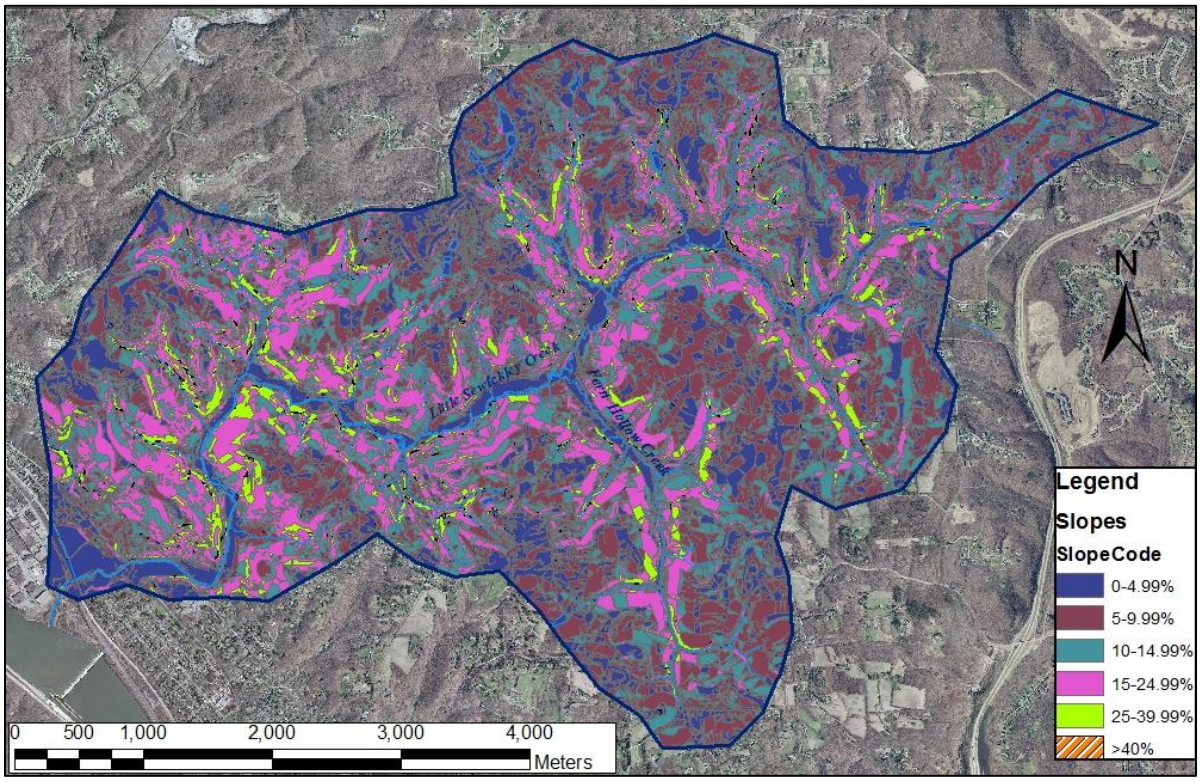
b. Natural Resources

Figure 66: Elevation



The development patterns within the watershed allude to the topography of the area. The maps pictured in Figure 66 and 67 allow for a better understanding of the elevation and slope of the area. The watershed is composed of flat uplands about 1150 to 1250 feet above sea level. These uplands are where most of the residential development has taken place. These areas are the only ones that one could consider flat in the watershed once you begin to move toward the main tributaries of the streams the contour lines become very tight and the slope begins to pick up. The watershed begins to flatten out again towards the confluence and development begins once again.

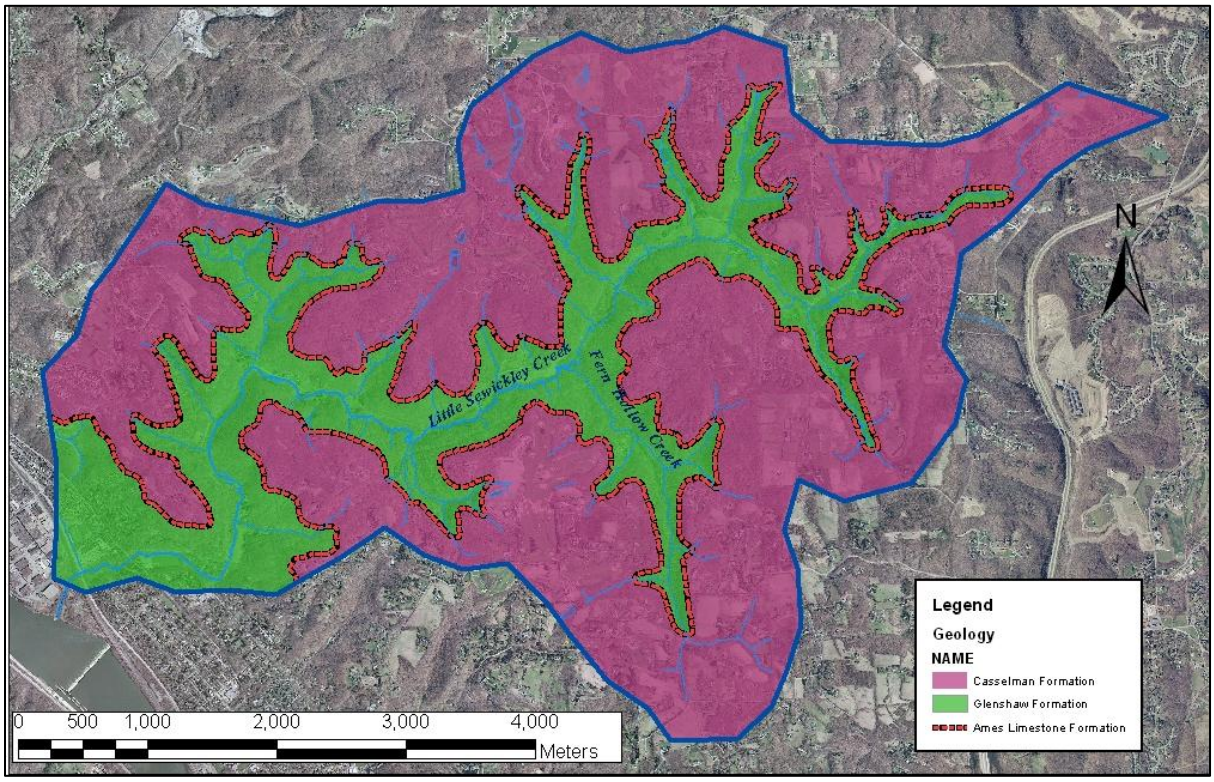
Figure 67: Slope



The slope of the watershed is an important aspect due to its restrictions on development. Over the years the slopes of the valleys have been natural assets that have protected the watershed. The steep slopes that line the stream are undevelopable because the majority of them are over 15 %. These slopes have also allowed for a nice riparian buffer zone to take hold and protect the stream even more. The breakdown of percentage categories by area looks something like this:

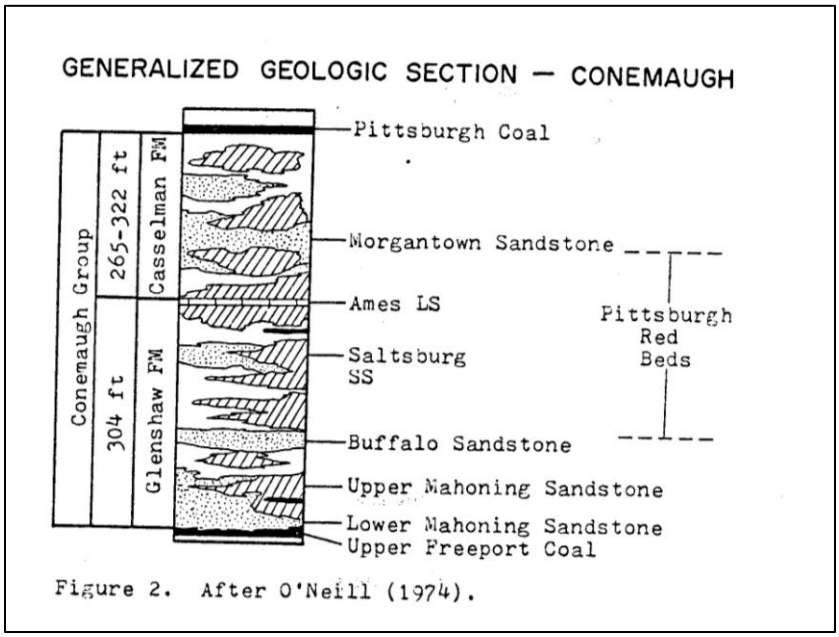
- 0 – 5% composes 34% of the total watershed;
- 5-10% accounts for 24%;
- 10-15% accounts for 16.7%;
- 15-25% accounts for 19.2%;
- 25-40% accounts for 5.8%; and
- > 40% accounts for 0.25%.

Figure 68: Geological Formations



The geology of the watershed is of extreme importance also due to the formation found within the area. The watershed is dominated by two formations, the Casselman Formation and the Glenshaw Formation. The Casselman Formation is located more in the uplands of the watershed and then gives way to the Glenshaw Formation found mainly in the valleys. The formations are separated by a limestone layer known as the Ames Limestone Formation. This limestone layer is the source of alkalinity to Little Sewickley Creek and gives it an increased pH, along with an increase in conductivity.

Figure 69: Cross-Section of Geological Formations Present in the Watershed



These formations within the Pittsburgh Low Plateau region have sequences of Pittsburgh Red Beds. Pittsburgh Red Beds are extremely prone to landslides and are composed of claystones and shales. In the watershed these red beds are present around the Glenshaw/Casselman interface and are shown in Figure 69.

Figure 70: Pittsburgh Red Beds

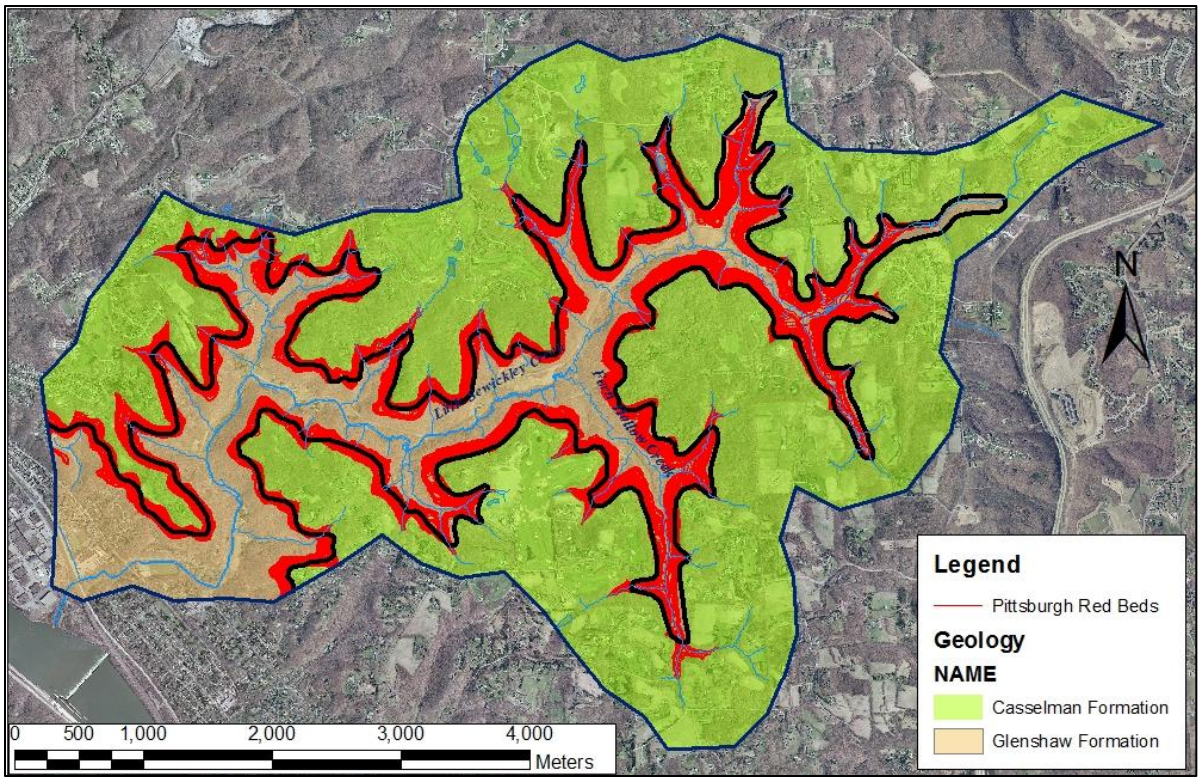
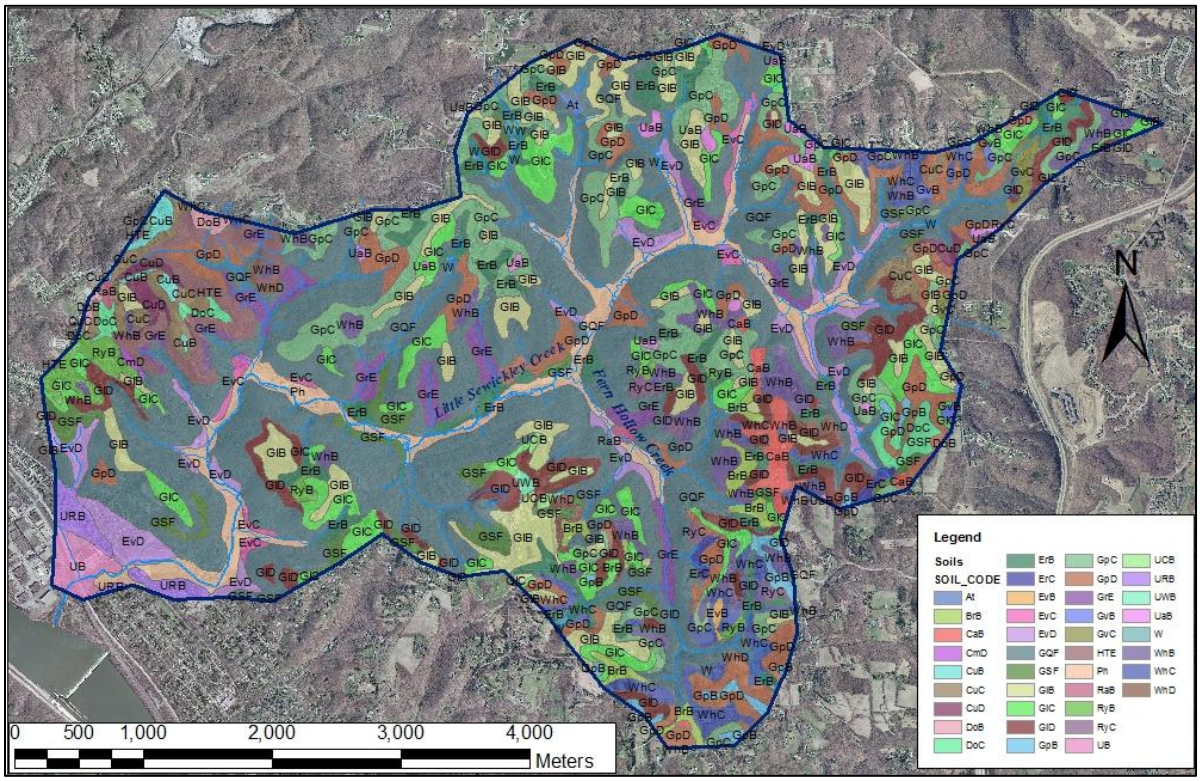
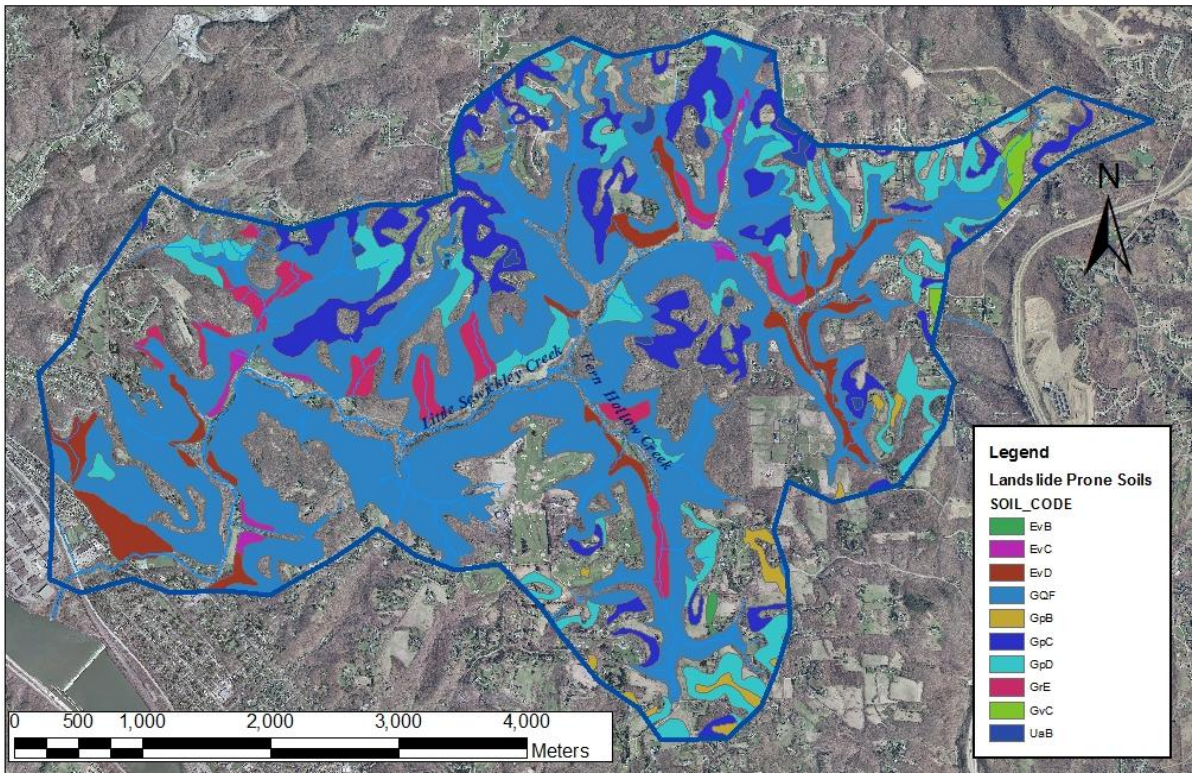


Figure 71: Soil Profile



The watershed is composed of 37 different soil associations; however, of these there are two major players in total area composition. The Gilpin-Upshur Complex (GpB, GpC, GpD, GQF) composes 47.6% and the Gilpin Silt Loam (GlB, GlC, GlD) composes 17.8% of the total watershed. The watershed also contains the majority of its natural soils and only contains approximately 2% of urban fill.

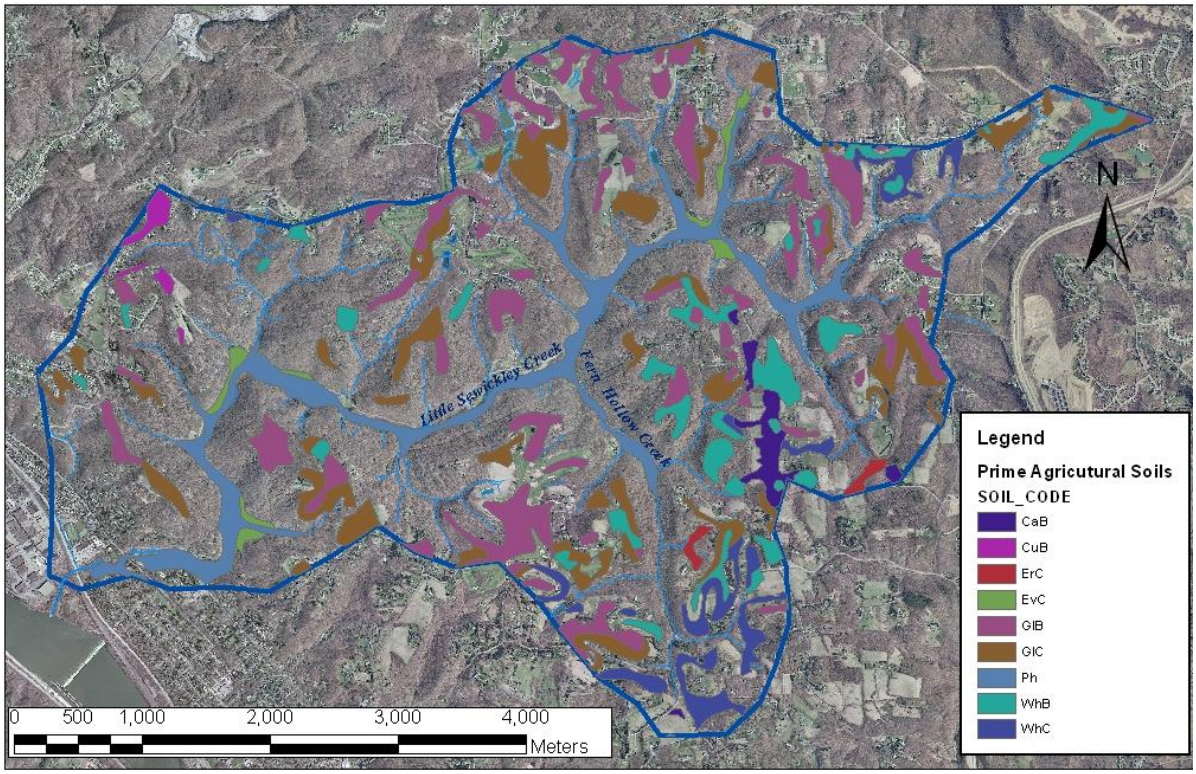
Figure 72: Landslide Prone Soils



The most important of these soils is the GQF association that accounts by itself 32% of the watershed. This is important to the watershed protection for several reasons:

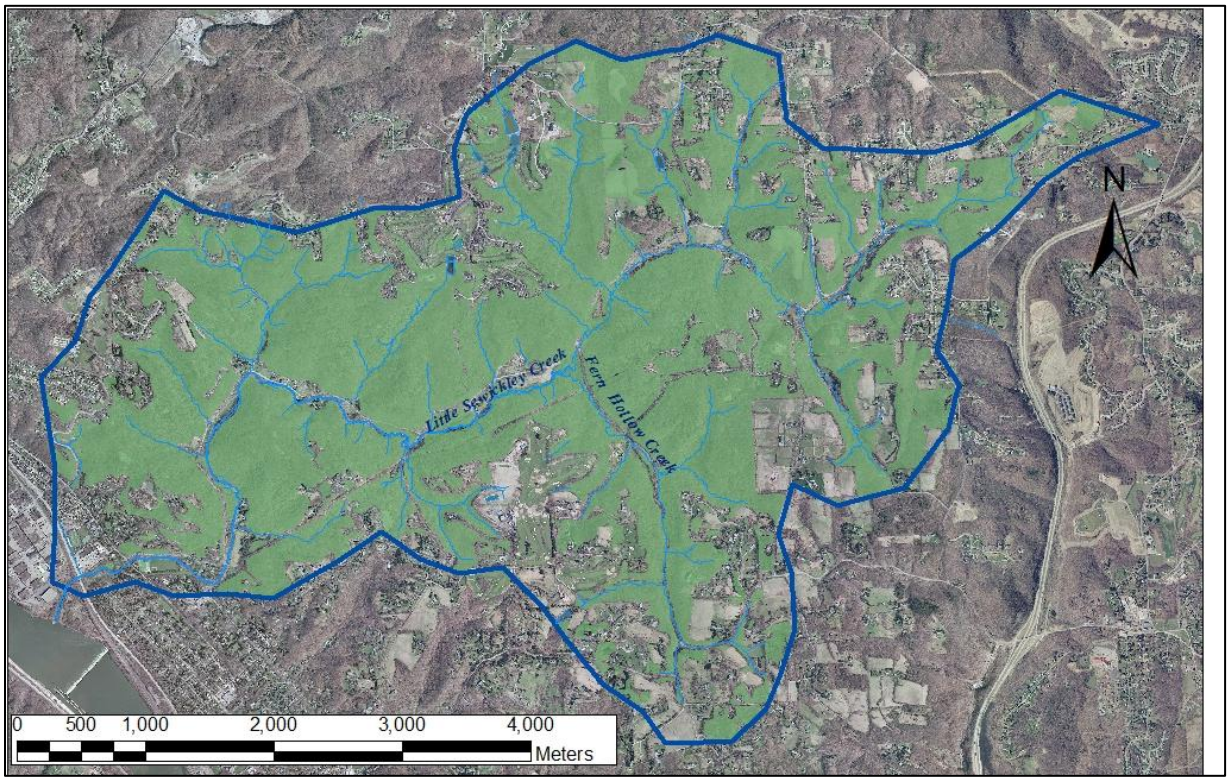
- This soil is located along the valley sides and can have a slope of 25 – 80%;
- Runoff is extremely rapid and ground water springs are very common;
- Susceptible to landslides;
- Unsuitable for development or agricultural, just woodland and wildlife habitat.

Figure 73: Prime Agricultural Soils



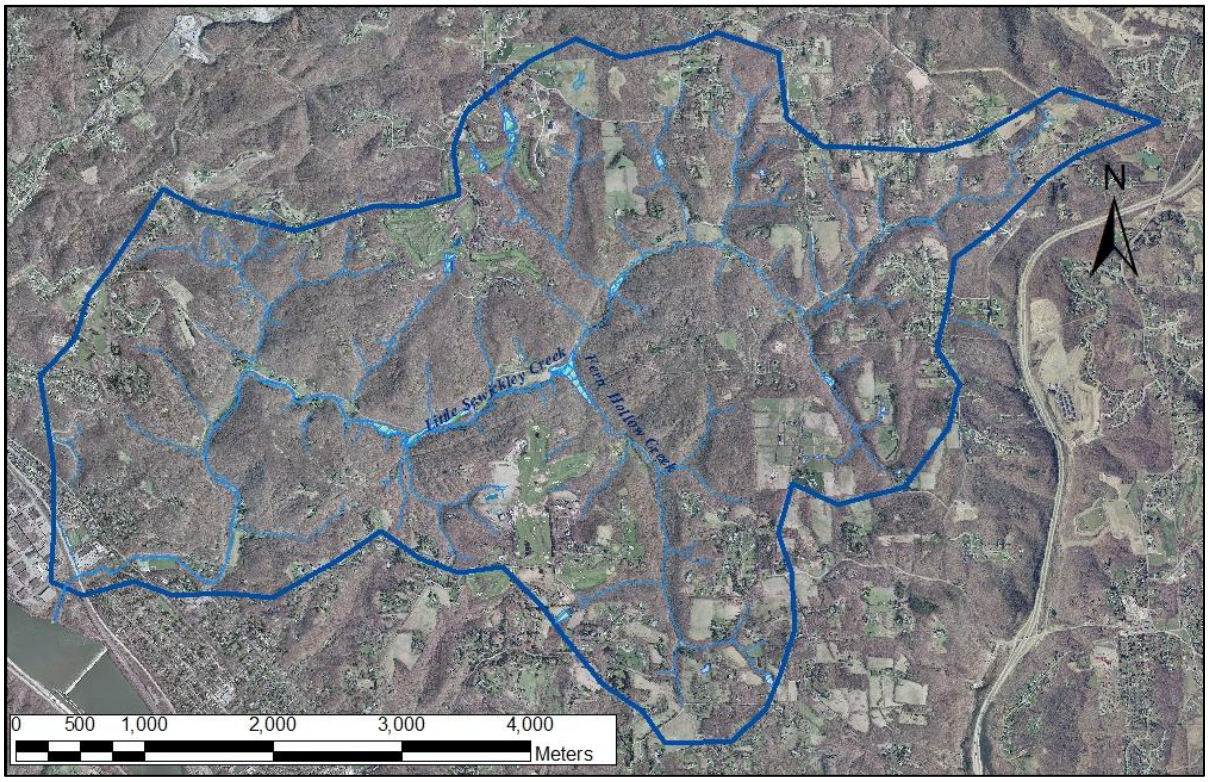
The map above shows the area within the watershed that is home to prime agricultural soils. These soils are located on the uplands of the watershed and provide areas of groundwater recharge, since they are moderately well drained to well-drained. These soil types attribute a total 25.64% of the soils within the watershed.

Figure 74: Woodlands



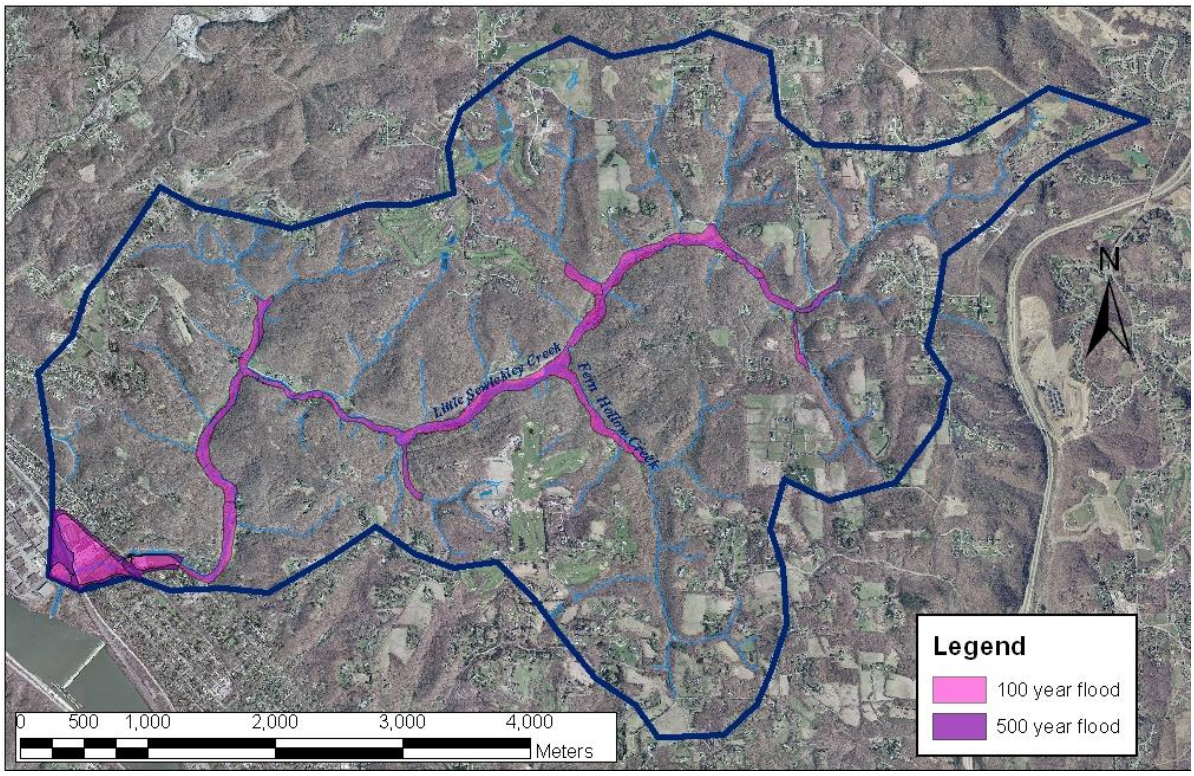
The watershed is dominated by forest and this can be seen in the map above. The total percentage of the watershed that is covered by woodlands is approximately 60%. The woodlands of the watershed is dominated by climax forest including; beech, maple, and hemlock forest stands.

Figure 75: Wetlands



The map above depicts the location of the wetlands within the watershed. These wetlands only account for 0.5% of the area; however, this data was taken from the National Wetland Inventory, so the area is just an estimate, since it is not a field drawn out map. The NWI can miss wetland areas up to 3 acres in size.

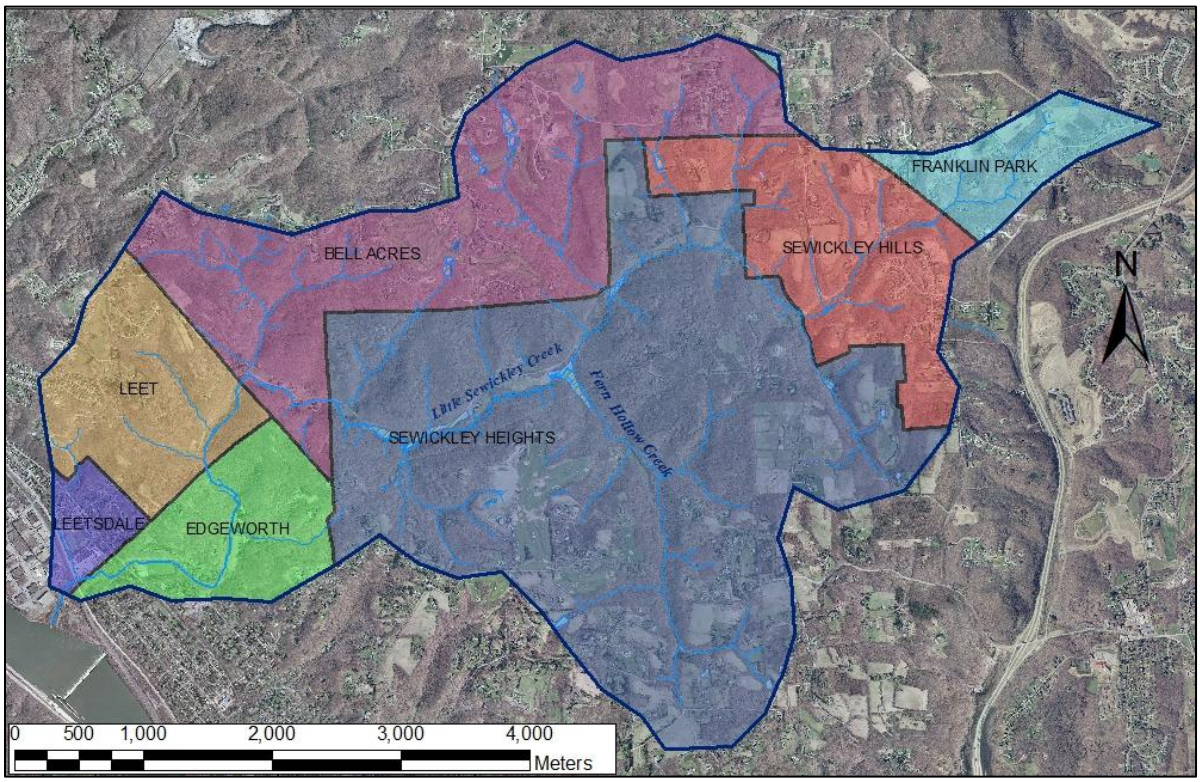
Figure 76: 100-year and 500-year Floodplains



The floodplain map above depicts the floodplain level for a 100-year flood and a 500-year flood. The floodplain stretches up the entire length of the main stem and into the main tributaries to Little Sewickley Creek. In a 500-year flood event the presence of back flow from the Ohio River can visualized.

8. The names of all the municipalities through which the watershed or segment flows, including an official contact name and address.

Figure 77: Municipalities



The watershed is also composed of seven municipalities including; Bell Acres, Edgeworth, Franklin Park, Leet, Leetsdale, Sewickley Heights and Sewickley Hills. The area of the municipality within the watershed is shown in Figure 3. The Borough of Sewickley Heights is the main player in the watershed comprising 46.26 % of the total area; followed by Bell Acres (22.27%), Sewickley Hills (10.85%), Leet Township (8.09%), Edgeworth (6.51%), Franklin Park (4.07%), and Leetsdale (1.95%).

The populations of the municipalities according to the 2010 Census are, as follows:

- Bell Acres – 1388
- Edgeworth - 1680
- Franklin Park – 13470
- Leet Township – 1634
- Leetsdale – 1218
- Sewickley Heights – 810
- Sewickley Hills – 639

These population values account for the whole municipality not the portion of the municipality within the watershed.

a. Municipal Contact List

Bell Acres

Contact Name: Charles D. Kulbacki, Manager
Address: 1153 Campmeeting Rd.
Sewickley, PA 15143-8325
Phone Number: (412) 741-5448

Edgeworth

Contact Name: Joseph T. Hoepp, President
Address: 301 Beaver Rd.
Edgeworth, PA 15143
Phone Number: (412) 741-2866

Franklin Park

Contact Name: Amy E. Sable, President
Address: 2344 West Ingomar Rd.
Pittsburgh, PA 15237
Phone Number: (412) 364-4115

Leet

Contact Name: Gary L. Bradel, President
Address: 198 Ambridge Ave
Fair Oaks, PA 15003
Phone Number: (724) 266-2280

Leetsdale

Contact Name: Joseph McGurk, President
Address: 373 Beaver St.
Leetsdale, PA 15056
Phone Number: (724) 266-4820

Sewickley Heights

Contact Name: S. Phil Hundley, President
Address: 238 Country Club Rd
Sewickley, PA 15143
Phone Number: (412) 741-5119

Sewickley Hills

Contact Name: Cynthia Phillips, President
Address: 349 Magee Road
Sewickley, PA 15143
Phone Number: (412) 741-4892

b. Letters of Endorsement

The Borough of Sewickley Heights

INCORPORATED AUGUST 3, 1935

Borough Hall
238 Country Club Road
Sewickley, PA 15143-9449

OFFICE OF THE
BOROUGH MANAGER

412/741-5119 • 412/741-5946
FAX 412/741-2215

August 29, 2012

Mr. Edward F. Schroth
Duquesne University
12 Valley Lane
Leetsdale, PA 15056

Re: Little Sewickley Creek designation

Dear Mr. Schroth:

On behalf of the Borough of Sewickley Heights, we enthusiastically support your petition to change the designation of Little Sewickley Creek in Allegheny County from its current designated use of High Quality (H.Q.) to Exceptional Value (E.V.).

We agree that these waters should be given the highest level of protection, based upon your in-depth study which produced a wealth of biological support data.

Almost one half of the entire Little Sewickley Creek watershed lies within the limits of the Borough of Sewickley Heights; and our public park and recreation lands, comprised of forests and meadows, make up the majority of this water shed. Little Sewickley Creek, the Borough's most treasured natural resource, is enjoyed by residents and nonresidents alike who deeply value its clean waters, scenic views and diverse recreational opportunities.

Please convey our support to the Pennsylvania Department of Environmental Protection and the Environmental Quality Board.

Sincerely,

S. Phil Hundley, Council President

John C. Oliver, III, Mayor

Visit us at sewickleyheightsboro.com

THE BOROUGH OF BELL ACRES
PENNSYLVANIA
1153 CAMPMEETING ROAD / SEWICKLEY, PA. 15143
OFFICE : 412-741-5448 / FAX : 412 –741-6302
Email – buzztrap@comcast.net

September 10, 2012

Edward F. Schroth – Duquesne University
12 Valley Lane; Leetsdale, Pennsylvania 15056

Dear Mr. Schroth,

Bell Acres Borough is pleased to support your petition to change the designation of Little Sewickley Creek from its current designated use:

High Quality **(H.Q.)** to Exceptional Value **(E.V.)**.

We agree that these waters should be given the highest level of protection.

Bell Acres Borough wants to protect this valuable resource of which 22% is located within Bell Acres Borough. In a day of housing developments and shopping malls it is unique to have a stream which contains pure water. A healthy Benthic Macroinvertebrates Community. A Biodiversity of Fish Populations and Recreational Opportunities. We take pride in the fact that this stream has been protected and nurtured not only by local conservation groups, but by the community at large.

We hope that you will convey our support to the Pennsylvania Department of Environmental Protection and the Environmental Quality Board.

Sincerely,

Dennis Young
President of Council – Bell Acres Borough

Allegheny Land Trust
Suite 206B
409 Broad Street
Sewickley, PA 15143
t: 412-741-2750
f: 412-741-3253

www.alleghenylandtrust.org

Resolved July 26, 2012: The Allegheny Land Trust Board of Directors hereby approves and authorizes Mr. Ed Schroth to include Allegheny Land Trust in the list of organizations supporting the petition to elevate the status of LSC to Exceptional Value Waters.

Phil Brooks

Interim President

FERN HOLLOW NATURE CENTER

1901 Glen Mitchell Road
PO Box 8
Sewickley, PA 15143

Phone: 412-741-6136
E-mail: info@fhnc.org
Web Site: www.fhnc.org

August 23, 2012

Edward F. Schroth
Duquesne University
12 Valley Lane
Leetsdale, PA 15056

Dear Mr. Schroth:

Fern Hollow Nature Center is pleased to support your petition to change the designation of Little Sewickley Creek (Allegheny Co.) from its current designated use High Quality (H.Q.) to Exceptional Value (E.V.). We agree that these waters should be given the highest level of protection.

Over the past 40 years, the Little Sewickley Creek has served as a vital environmental resource for educating schools, families and community groups in the Quaker Valley area Biological data collected over the last 4 decades has revealed the stream's remarkably high level of biodiversity and water quality parameters. The stream is home to at least 17 different species of native fish, including an actively reproducing Brown Trout population. The creek's abundance of birds, insects, amphibians, reptiles and fish species makes it a great teaching tool for all of the nature center's current programs.

For over 15 years, Fern Hollow Nature Center has conducted formal stream-based learning experiences for pre-K through the 8th grade level. Last year over 1,250 students from 13 different schools participated in a variety of hand-on programs within the Little Sewickley Creek watershed. In addition, Fern Hollow Nature Center conducts an annual internship program (*entitled "QV Creekers*) for Quaker Valley high school. Participating students work throughout the entire school year with environmental educators from Fern Hollow Nature Center and the Creek Connections Program at Allegheny College to biologically and chemically monitor the health of the Little Sewickley Creek. *QV Creekers* then collaborate with other community groups to do projects that protect and benefit the watershed. Some of these projects have included: a Jefferson salamander breeding pool restoration project, macroinvertebrate leaf pack studies, creek clean-up events and annual fish diversity inventories.

Fern Hollow also facilitates community level programs for local families to learn about and enjoy the creek. Some of these programs include springtime amphibian hikes, trout stocking events and wooden boat races along the Little Sewickley Creek. We have also introduced numerous families and community groups to fishing in our watershed. This past year, the nature center staff took approximately 330 people fishing in the Little Sewickley Creek Watershed.

In conclusion, it is obvious that the Little Sewickley Creek is a community treasure that warrants the exceptional value moniker. If you have any additional questions about Fern Hollow Nature Center or our programs involving Little Sewickley Creek, please feel free to contact me at any time.

Sincerely,

April Claus
Director of Environmental Education
Fern Hollow Nature Center
Sewickley, PA 15143
(412)-741-7536

September 2, 2012

Edward F. Schroth – Duquesne University

12 Valley Lane

Leetsdale, Pennsylvania 15056

Dear Mr. Schroth,

On behalf of Little Sewickley Creek Nature Guides, I am pleased to support your petition to change the designation of Little Sewickley Creek from its current designated use High Quality (H.Q.) to Exceptional Value (E.V.).

We agree that these waters should be given the highest level of protection.

For over 30 years Little Sewickley Creek Nature Guides has provided educational programming to local elementary school children that would not have been possible in a less biodiverse and healthy watershed. First-graders take their very first nature walk to look for signs of spring in Walker Park. Fourth grade students follow the creek from Morrow Pontefract Park all the way to the Ohio River to study the habitats of birds including the Kingfisher, Baltimore Oriole and Bald Eagle. Fifth graders learn about watersheds, food chains and the benthic macroinvertebrates community. These are the same children who later return to the parks to picnic with their families, to camp with their scout troops and to fish on opening day of trout season. We want to protect this valuable resource for future generations so that they too may have the opportunities to learn and play along the creek that flows through their community.

We hope that you will convey our support to the Pennsylvania Department of Environmental Protection and the Environmental Quality Board.

Sincerely,

Jean Daniels

Past President

Little Sewickley Creek Nature Guides

429 Oliver Road

Sewickley, PA 15143