

# Pike County Surface Water Quality Report 2024



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Pike County  
Conservation District

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## Introduction

Bioassessment, the use of living organisms to evaluate conditions, is a standard today in the scientific community for monitoring the health and quality of streams. Streams are assessed by observing the macroinvertebrate and fish communities as they have been shown to exhibit changes in response to stressors, such as non-point source pollution. Bioassessment using these macroinvertebrate and fish communities has been shown and accepted to be an effective tool in water quality monitoring practices nationwide. Since the early 1990s, Pike County Conservation District (PCCD or District) has been monitoring the surface waters of the county using biological, chemical, and habitat assessments.

Pike County contains over 1,800 miles of streams. These streams are almost all within the Pennsylvania Code, Title 25, Chapter 93, Water Quality Standards for either High-Quality (HQ) or Exceptional Value (EV). It is rare a county possesses surface water quality such as this and thus it is critical to monitor the conditions. Recreational activities focused on the surface water and the resources tied to it are also of vital importance to Pike County residents and the economy. It is critical the surface waters continue to be monitored for water quality changes. The information collected from monitoring is important for detecting significant disturbances as well as for long term planning within the county.

## Methods

District staff sampled stream sites established at the inception of the program as baseline and non-point source sites by their proximity to areas of development and point-source discharge. The macroinvertebrate sites are sampled in the spring (April-May) with each site being sampled on a three-year rotational schedule. The fish sites were sampled in the fall (August-September) with each site being sampled on a five-year rotational schedule. Stream reaches are determined by choosing an area (100 meters) that best represents all habitat conditions in the stream to get the most accurate sample. The District works with the Pennsylvania Fish and Boat Commission on the permitting required and the timing of the sampling. In addition, the District works closely with the landowners who have provided permission to access the stream sites through their properties over the past 20 years so the data is consistent in area and scope. In 2024, District staff were trained on protocol and audited on performance by the Pennsylvania Department of Environmental Protection (PA DEP) to submit Tier 3 Habitat and Macroinvertebrate data. This is the highest quality of data that PA DEP will accept.

### **Habitat**

Habitat assessments using the PA DEP Water Quality Network Habitat Assessment form are completed at each site. This form ranks twelve stream characteristics from 1 to 20 with 1 being

poor and 20 being optimal. These characteristics include stream embeddedness, sediment deposition, condition of banks, and riffle frequency (Table 4).

### **Chemistry**

Chemical measurements from the stream site as well as air temperature are recorded on the PA DEP Flowing Waterbody Field Data Form. The chemistry measurements are collected using a YSI ProQuatro Meter which is owned by the District and checked and calibrated as needed at the beginning of each sampling day to ensure accurate readings. The meter has several different probes and can measure pH, galvanic dissolved oxygen (DO), temperature (C), and conductivity. The meter also detects barometric pressure and can calculate the total dissolved solids (TDS), salinity, and specific conductance. Alkalinity is measured using a Hach alkalinity test kit. The air temperature is measured with a field thermometer (Table 5).

### **Macroinvertebrates**

Macroinvertebrate community samples are obtained utilizing the protocol described by PA DEP in the Water Quality Monitoring Protocols for Streams and Rivers 2021 document. In each stream reach, six separate one-minute kicks are done using a D-frame kick net with 500um mesh. Each kick lasts for one minute with the net directly downstream of the kick area. Kicks are done starting downstream and heading upstream and are spaced throughout the targeted stream area to get a composite sample. After each one-minute kick, the net is emptied into a sample jar for the site. All six kicks from each site are deposited in the same jar for a composite sample. The contents of each jar are then preserved with 99% ethyl alcohol and sent to be identified and enumerated. In 2024, PCCD contracted Mike Bilger and his team to analyze the macroinvertebrate samples.

Several metrics are calculated using the information from macroinvertebrate sample analysis. Bilger identified and enumerated the macroinvertebrate samples for each site using white pans marked with grids to delineate twenty-one 2 inch by 2 inch squares. Grids are then randomly selected, and organisms identified until the sample reaches 200 individuals. The individuals are identified to genus and species, if possible. PADEP has assigned tolerance values to each species of macroinvertebrate. The tolerance values and numbers of individuals at each value are then used to calculate several metrics.

Six separate metrics were calculated by Rachael Marques of PCCD which are used together to determine the Index of Biotic Integrity (IBI) for the site (Table 6). These six metrics are:

- Total Taxa Richness
- Ephemoptera + Plecoptera + Trichoptera Taxa Richness (EPT)
- Beck's Index
- Shannon Diversity Index

- Hilsenhoff Biotic Index
- Percent Sensitive Individuals

These are all standard metrics and are described further in the PA DEP Assessment Book 2021. The IBI is calculated and is used as a way to standardize all of the above-mentioned metrics. The maximum IBI score is 100. These values can be used to determine if the stream is considered attaining or impaired. Attaining means the water body is of good enough quality to meet the criteria and uses designated by Pennsylvania Code, Title 25, Chapter 93. Uses for water bodies as defined by Chapter 93 include special protections such as the High Quality (HQ) and Exceptional Value (EV) status of the streams in Pike County. They can also include uses such as Fishing, Potable Water Supply, Migratory Fishes, and so on. A water body is considered impaired when the data shows the waterway is no longer able to meet the designated use.

**Table 1.** Example from PA DEP Assessment Book 2021 of the metrics and calculation of the Index of Biotic Integrity (IBI).

**Table 3.** Index calculation process for Lycoming Creek.

Metric	Standardization Equation (using large-stream standardization values)	Observed Metric Value	Standardized Metric Score	Adjusted Standardized Metric Score Maximum = 100
Total Taxa Richness	$(\text{observed value} / 31) * 100$	33	106.5	100
EPT Taxa Richness	$(\text{observed value} / 16) * 100$	22	137.5	100
Beck's Index	$(\text{observed value} / 22) * 100$	40	181.8	100
Hilsenhoff Biotic Index	$[(10 - \text{observed value}) / (10 - 3.05)] * 100$	3.47	94.0	94.0
Shannon Diversity	$(\text{observed value} / 2.86) * 100$	2.67	93.4	93.4
Percent Sensitive Individuals	$(\text{observed value} / 66.7) * 100$	48.8	73.2	73.2
Average of standardized core metric scores = IBI Score =				<b>93.4</b>

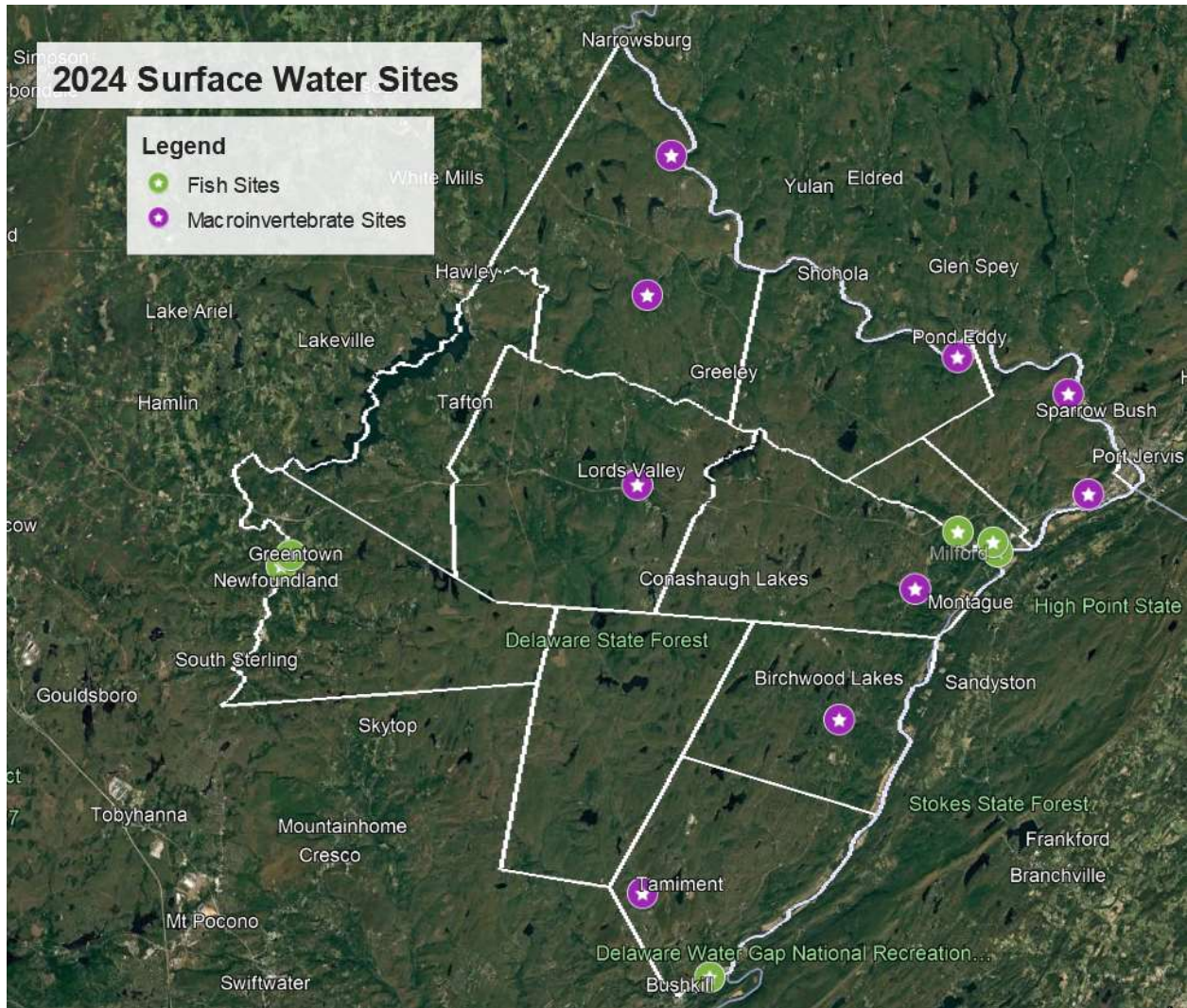
## Fish Communities

Fish communities are sampled using electrofishing procedures as outlined in the PA DEP Water Quality Monitoring Protocols for Streams and Rivers 2021 document. Mike Bilger and Dave Isenberg operated their electrofishing equipment which includes a backpack with a battery, an anode staff, and a cathode to create a current. The voltage can be adjusted and varies by stream conditions such as conductivity. Because of this, chemistry readings were completed onsite first to adjust for streams conditions before the onset of the fish survey. To sample as accurately as possible, the team moved upstream in a zig-zag movement instead of straight ahead. Each site was sampled until the group reached the end of the 100-meter stream reach. District staff, volunteers, and Bilger's team netted fish stunned by the current and all fish

caught during that time were stored in a live well. Upon reaching the end of the stream reach, the fish were identified and enumerated, then returned to the stream as quickly as possible to avoid accidental mortality. Individuals were also observed for any abnormalities such as growths or deformities.

The Pennsylvania Department of Environmental Protection (PA DEP) has begun using a metric, the Thermal Fish Index (TFI), to look at fish communities and stream health. The Thermal Fish Index (TFI) is calculated as described in the PA DEP Assessment Methodology for Streams and Rivers 2021. Each fish species is given a thermal class by PA DEP as described in the Technical Development of a Thermal Fish Index. These values range from 1 to 5 with 1 being cold and 5 being warm thermal classes. The percentage of individuals in each sample belonging to each of the five thermal classes was calculated by Rachael Marques of PCCD and used to calculate a TFI value (Table 7). The values range from 2 to 10 with scores closer to 2 being an assemblage of cold water and 10 being an assemblage of warm water. Values in the middle would be considered transitional. These indices can be used to determine if a waterway is attaining or impaired for its assessed use.

# Sampling Stations



**Figure 1.** Site map of the surface water monitoring sites for the 2024 season.

**Macroinvertebrates:**

**Table 2.** The stream sites sampled for macroinvertebrates in spring 2024.

<b>Site ID</b>	<b>Stream Name</b>
<b>6</b>	Dingmans Creek
<b>8</b>	Raymondskill Creek
<b>12</b>	Bushkill (Millrift) Creek
<b>16</b>	Masthope Creek
<b>19N</b>	Saw Creek
<b>26N</b>	Rosetown Creek
<b>35N</b>	Shohola Creek
<b>36N</b>	Pond Eddy Creek
<b>40N</b>	Westfalls Creek

**Fish:**

**Table 3.** The stream sites sampled for fish in fall 2024.

<b>Site ID</b>	<b>Stream Name</b>
<b>3</b>	Little Bushkill Creek
<b>10</b>	Vandermark Creek
<b>17</b>	Wallenpaupack Creek
<b>18</b>	East Branch Wallenpaupack Creek
<b>24N</b>	Sawkill Creek
<b>25N</b>	Vandermark Creek



# Results

## Habitat Assessments

**Table 4.** The data from the habitat assessment forms for each site using the PADEP Assessment Form.

	<b>Dingmans Creek</b>	<b>Raymondskill Creek</b>	<b>Bushkill (Mill Rift) Creek</b>	<b>Masthope Creek</b>	<b>Saw Creek</b>	<b>Rosetown Creek</b>
<b>Site Number</b>	<b>6</b>	<b>8</b>	<b>12</b>	<b>16</b>	<b>19N</b>	<b>26N</b>
<b>Date Sampled</b>	4/22/2024	4/22/2024	4/24/2024	4/23/2024	4/22/2024	4/17/2024
<b>Instream Cover</b>	19	13	20	20	19	18
<b>Epifaunal Substrate</b>	18	8	19	20	10	10
<b>Embeddedness</b>	16	16	17	15	18	17
<b>Velocity/Depth Regimes</b>	19	14	19	19	12	15
<b>Channel Alteration</b>	20	15	15	15	18	11
<b>Sediment Deposition</b>	13	18	17	18	20	19
<b>Frequency of Riffles</b>	20	8	20	20	20	20
<b>Channel Flow Status</b>	19	19	19	19	19	19
<b>Bank Condition</b>	14	16	17	17	17	13
<b>Bank Vegetative Protection</b>	19	18	16	18	15	8
<b>Disruptive Pressure</b>	20	16	17	19	12	19
<b>Riparian Vegetative Zone Width</b>	18	15	7	15	11	11
<b>Total Habitat Score</b>	<b>215</b>	<b>176</b>	<b>203</b>	<b>215</b>	<b>191</b>	<b>180</b>

**Table 4.** (continued)

	<b>Shohola Creek</b>	<b>Pond Eddy Creek</b>	<b>Westfalls Creek</b>	<b>Little Bushkill Creek</b>	<b>Vandermark Creek</b>	<b>Wallenpaupack Creek</b>
<b>Site Number</b>	<b>35N</b>	<b>36N</b>	<b>40N</b>	<b>3</b>	<b>10</b>	<b>17</b>
<b>Date Sampled</b>	4/23/2024	4/17/2024	4/23/2024	8/13/2024	8/12/2024	8/12/2024
<b>Instream Cover</b>	15	19	19	19	19	10
<b>Epifaunal Substrate</b>	16	18	20	20	20	15
<b>Embeddedness</b>	8	20	13	16	18	13
<b>Velocity/Depth Regimes</b>	17	18	19	20	17	18
<b>Channel Alteration</b>	15	15	18	19	15	13
<b>Sediment Deposition</b>	8	19	12	15	19	16
<b>Frequency of Riffles</b>	12	20	20	20	20	17
<b>Channel Flow Status</b>	18	18	19	20	20	19
<b>Bank Condition</b>	14	15	13	19	18	16
<b>Bank Vegetative Protection</b>	18	17	13	20	19	20
<b>Disruptive Pressure</b>	20	20	20	19	17	20
<b>Riparian Vegetative Zone Width</b>	11	18	16	20	14	18
<b>Total Habitat Score</b>	<b>172</b>	<b>217</b>	<b>202</b>	<b>227</b>	<b>216</b>	<b>195</b>

**Table 4.** (continued)

	<b>East Branch Wallenpaupack Creek</b>	<b>Sawkill Creek</b>	<b>Vandermark Creek</b>
<b>Site Number</b>	<b>18</b>	<b>24N</b>	<b>25N</b>
<b>Date Sampled</b>	8/12/2024	8/13/2024	8/12/2024
<b>Instream Cover</b>	20	20	16
<b>Epifaunal Substrate</b>	20	20	20
<b>Embeddedness</b>	19	19	19
<b>Velocity/Depth Regimes</b>	15	18	10
<b>Channel Alteration</b>	15	15	17
<b>Sediment Deposition</b>	18	16	19
<b>Frequency of Riffles</b>	20	20	20
<b>Channel Flow Status</b>	20	20	20
<b>Bank Condition</b>	20	18	18
<b>Bank Vegetative Protection</b>	20	18	17
<b>Disruptive Pressure</b>	20	20	15
<b>Riparian Vegetative Zone Width</b>	17	20	12
<b>Total Habitat Score</b>	<b>224</b>	<b>224</b>	<b>203</b>

## Site Chemistry

**Table 5.** Chemical data collected at each site with the YSI ProQuatro meter and Hach alkalinity kit.

	Dingmans Creek	Raymondskill Creek	Bushkill (Mill Rift) Creek	Masthope Creek	Saw Creek	Rosetown Creek
<b>Site Number</b>	<b>6</b>	<b>8</b>	<b>12</b>	<b>16</b>	<b>19N</b>	<b>26N</b>
<b>Date Sampled</b>	4/22/2024	4/22/2024	4/24/2024	4/23/2024	4/22/2024	4/17/2024
<b>Water Temp (C)</b>	10.8	11.2	10.3	9.2	10.3	10.9
<b>Dissolved Oxygen (mg/L)</b>	10.83	10.6	11.17	11.47	11.22	7.16
<b>pH</b>	7.4	7.29	7.08	7.65	7.35	7.36
<b>Conductivity (uS/cm)</b>	41.9	70	27	28.1	25.5	22.5
<b>Specific Conductance (uS/cm)</b>	57.5	95.2	37.5	40.2	35.5	30.7
<b>Alkalinity (mg/L CaCO<sub>3</sub>)</b>	10	15	15	15	10	15
<b>TDS (g/L)</b>	0.0374	0.0618	0.0243	0.0262	0.0231	0.02
<b>Salinity (ppt)</b>	0.03	0.05	0.02	0.02	0.02	0.02

**Table 5.** (continued)

	<b>Shohola Creek</b>	<b>Pond Eddy Creek</b>	<b>Westfalls Creek</b>	<b>Little Bushkill Creek</b>	<b>Vandermark Creek</b>	<b>Wallenpaupack Creek</b>
<b>Site Number</b>	<b>35N</b>	<b>36N</b>	<b>40N</b>	<b>3</b>	<b>10</b>	<b>17</b>
<b>Date Sampled</b>	4/23/2024	4/17/2024	4/23/2024	8/13/2024	8/12/2024	8/12/2024
<b>Water Temp °C</b>	10.5	10.6	10.1	20.1	16.3	17.4
<b>Dissolved Oxygen (mg/L)</b>	11.14	10.87	11.58	8.52	9.78	9.12
<b>pH</b>	6.45	7.38	7.4	7.32	7.36	7.41
<b>Conductivity (uS/cm)</b>	39.3	19.1	60.2	43.9	121.9	58.9
<b>Specific Conductance (uS/cm)</b>	54.4	26.5	84.2	48.5	146.2	68.8
<b>Alkalinity (mg/L CaCO<sub>3</sub>)</b>	15	15	20	15	30	30
<b>TDS (g/L)</b>	0.0354	0.0172	0.0547	0.0315	0.095	0.0448
<b>Salinity (ppt)</b>	0.03	0.02	0.04	0.03	0.07	0.04

**Table 5.** (continued)

	<b>East Branch Wallenpaupack Creek</b>	<b>Sawkill Creek</b>	<b>Vandermark Creek</b>
<b>Site Number</b>	<b>18</b>	<b>24N</b>	<b>25N</b>
<b>Date Sampled</b>	8/12/2024	8/13/2024	8/12/2024
<b>Water Temp °C</b>	19.2	17.4	16.5
<b>Dissolved Oxygen (mg/L)</b>	8.52	9.06	9.03
<b>pH</b>	7.43	7.8	6.83
<b>Conductivity (uS/cm)</b>	36.6	97.9	88.1
<b>Specific Conductance (uS/cm)</b>	41.1	114.5	105.2
<b>Alkalinity (mg/L CaCO<sub>3</sub>)</b>	25	25	20
<b>TDS (g/L)</b>	0.0267	0.0744	0.0685
<b>Salinity (ppt)</b>	0.02	0.06	0.05

## Macroinvertebrates

**Table 6.** Index of Biotic Integrity calculations for the macroinvertebrate sites sampled in spring 2024.

	Dingmans Creek	Raymondskill Creek	Bushkill (Millrift) Creek	Masthope Creek	Saw Creek	Rosetown Creek
<b>Site Number</b>	<b>6</b>	<b>8</b>	<b>12</b>	<b>16</b>	<b>19N</b>	<b>26N</b>
<b>Total Taxa Richness</b>	37	35	32	36	35	26
<b>EPT Richness (0-4)</b>	16	16	18	20	17	15
<b>Beck's Index</b>	29	19	45	44	27	40
<b>Hilsenhoff Biotic Index</b>	3.73	4.69	2.17	3.01	3.53	3.35
<b>Shannon Diversity Index</b>	2.85	2.69	3.08	2.75	2.75	2.31
<b>Percent Sensitive Individuals</b>	33.67	19.34	75.00	53.00	57.14	48.77
<b>IBI Value</b>	<b>79.57</b>	<b>69.42</b>	<b>96.17</b>	<b>90.85</b>	<b>84.02</b>	<b>79.67</b>

	Shohola Creek	Pond Eddy Creek	Westfalls Creek
<b>Site Number</b>	<b>35N</b>	<b>36N</b>	<b>40N</b>
<b>Total Taxa Richness</b>	29	33	25
<b>EPT Richness (0-4)</b>	14	20	15
<b>Beck's Index</b>	27	52	33
<b>Hilsenhoff Biotic Index</b>	3.98	1.78	2.79
<b>Shannon Diversity Index</b>	2.73	2.86	2.46
<b>Percent Sensitive Individuals</b>	42.45	75.12	59.71
<b>IBI Value</b>	<b>75.39</b>	<b>98.15</b>	<b>81.21</b>

## Fish Communities

**Table 7.** The Thermal Fish Index (TFI) calculations for the 6 sites sampled for fish species in fall of 2024.

Little Bushkill Creek- 3		
Thermal Class	P Values	Weighted Average
1	0.00	0.00
2	0.00	0.00
3	0.54	1.63
4	0.37	1.47
5	0.09	0.45
	<b>TFI</b>	<b>7.09</b>

Vandermark Creek- 10		
Thermal Class	P Values	Weighted Average
1	0.00	0.00
2	0.60	1.20
3	0.33	0.99
4	0.07	0.27
5	0.00	0.00
	<b>TFI</b>	<b>4.93</b>

Wallenpaupack Creek- 17		
Thermal Class	P Values	Weighted Average
1	0.00	0.00
2	0.06	0.11
3	0.67	2.01
4	0.27	1.08
5	0.01	0.03
	<b>TFI</b>	<b>6.45</b>

East Branch Wallenpaupack Creek- 18		
Thermal Class	P Values	Weighted Average
1	0.00	0.00
2	0.03	0.05
3	0.77	2.32
4	0.19	0.78
5	0.01	0.03
	<b>TFI</b>	<b>6.36</b>

Sawkill Creek- 24N		
Thermal Class	P Values	Weighted Average
1	0.00	0.00
2	0.20	0.39
3	0.73	2.20
4	0.07	0.28
5	0.00	0.00
	<b>TFI</b>	<b>5.75</b>

Vandermark Creek- 25N		
Thermal Class	P Values	Weighted Average
1	0.88	0.88
2	0.00	0.00
3	0.12	0.36
4	0.00	0.00
5	0.00	0.00
	<b>TFI</b>	<b>2.49</b>



## Conclusions

In 2024, all of the 9 sites sampled for macroinvertebrates were considered attaining and not impaired.

According to the PA DEP Assessment Methodology, High-Quality (HQ) and Exceptional Value (EV) streams should have an IBI score of 63 or higher. All sites scored above this with some even reaching into the 90 range.

In 2024, the District began looking at the historical macroinvertebrate data for the sites sampled during the season. It appears that though some sites may have had fluctuations in IBI score over the years, most of them are trending either stable or upward. There are 4 sites which did not trend upward, when looking at the historical data, in varying degrees. Those sites are: 8 Raymondskill Creek, 19N Saw Creek, 35N Shohola Creek, and 40N Westfalls Creek. It is important to note again, that none of the sites scored below the threshold for impairment and that all are still considered attaining. When looking at the chemistry data from these sites, there is nothing that stands out as a cause. This seemingly downward trend could be for a variety of reasons; therefore, it is something that will require a further investigation and perhaps a look at the larger watershed to determine potential cause. The District will keep this in mind as we move forward with future sampling and seek to find an explanation for this pattern as well as others that may emerge.

Regarding the fish data for 2024, the thermal fish index (TFI) is still relatively new, and we continue to navigate what this metric means for Pike County streams. Values closer to 2 are more ideal and indicative of a colder water environment, while values closer to 10 are potentially indicative of impairment and warm water conditions. While warm water environments are ecologically important; cold waters are important for sensitive fish species such as trout. The streams in Pike County are typically rated as Cold-Water Fisheries (CWF), which reflect the anticipated results of the sampling.

Many of the sites we sampled had a calculated TFI between 5 and 7, which is unexpected. This could have been due to many factors, which include the time of the sampling. Due to a tropical storm event causing high waters in Eastern Pennsylvania several days before sampling, there is potential that fish may have moved downstream, and chemistry may have been affected. Wetlands, lakes, and ponds typically attract different fish species that cooler water areas and could be part of the reason we found some warmer water fish species in the streams we sampled. Some of the streams sampled in 2024 had warm water areas connected directly to the creek and within the sampling reach. These influences could also be part of the reason that some of the values for the fish index ended up being different than anticipated.

It is important to discuss that while the TFI calculated values ended up being outside of the expected range, we are still navigating how to interpret the values for Pike County. This is only the second year we have used the metric to look at fish communities. We anticipate completing

sampling at all sites using metric in the next several years so the District can better understand Pike County waters from a fish perspective. We will continue to see if the older metric can be translated to the new one as well. It is worth noting that recreationally important fish such as trout, bass, and eel were found among the sites and do reflect positively overall from a recreational fishing perspective.

In the future, the District will continue to monitor the sites noted to determine whether or not the numbers are outliers and not representative of the actual stream conditions. We will also be continuing to work with PA DEP to assess the data we currently have and navigate the relatively new fish metrics. In 2025, PCCD will be monitoring eleven macroinvertebrate sites and nine fish sites. PCCD has recently restructured the rotation of sites to reflect a watershed-based approach to each sampling year instead of a completely random rotation of sites. The District will also be working on updating protocol as more information becomes available from PA DEP.

## Literature Cited

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# Appendix A

## Macro Species Table

Pike County Conservation District 2024 Macroinvertebrate Data

Species	6 Dingmans Creek	8 Raymondskill Creek	12 BushKill (MillRift) Creek	16 Masthope Creek
Acroneuria (P)	9	5		2
Agapetus (T)	3	1	1	1
Alloperla (P)			1	1
Ameletus ( E)				
Blepharicera			6	1
Diplectrona (T)	2		1	
Dolophilodes (T)			9	5
Epeorus spp ( E)			26	7
Glossosoma (T)				
Haploperla (P)			4	1
Leuctra (P)	17	3	6	
Psilotreta (T)				1
Pteronarcys (P)				
Rhithrogena ( E)				
Sweltsa (P)	1		8	
Tallaperla (P)				
Wormaldia (T)				
Cinygmula ( E)			9	1
Culoptila/Protoptila (T)				
Drunella spp. ( E)	4	11	2	21
Ephemerella spp ( E)	7	3	19	34
Lepidostoma (T)				
Leucrocuta ( E)			4	3
Nigronia	1		1	
Ophiogomphus		1		1
Paragnetina (P)			3	2
Paraleptophlebia ( E)	1		13	3
Rhyacophila (T)	1		6	
Agnatina (P)				
Ancryonyx				
Atherix				1
Boyeria	1			
Corduliidae/Libellulidae				
Cultus (P)				
Hexatoma			5	1
Isoperla (P)		2		5
Labiobaetis ( E)				
Macronychus	2			
Micrasema (T)				1
Microcyloepus	1	3		

Species	6 Dingmans Creek	8 Raymondskill Creek	12 BushKill (MillRift) Creek	16 Masthope Creek
Ostrocerca (P)				1
Perlodidae (P)				
Promoresia				
Prostoia (P)				
Psychomyia (T)		1		
Stactobiella (T)		2		
Taeniopteryx (P)				
Teloganopsis (E)	1		21	8
Aeschnidae				
Amphinemura (P)	2		6	
Antocha	1	2		
Bolotoperla (P)				
Ceraclea (T)		1		
Dicranota				
Isonychia (E)	1	4	4	1
Maccaffertium (E)	12	2	2	4
Neophylax			2	
Perlidae (P)				
Acentrella €	44	6		34
Chimarra (T)	2	8		
Corydalus		2		
Eurylophella (E)		2		
Gomphidae				
Leptoceridae (T)				
Optioservus				
Perlesta (P)	1			
Psephenus	6	3	1	4
Pycnopsyche (T)		1		
Stenacron (E)		1		
Stylogomphus	1	6		
Tipula				
Anchytarsus				
Ectopria				
Hydropsyche	8	3	1	5
Hydroptilidae				
Lanthus				
Oulimnius	2	7	4	1
Prosimulium			13	5
Staphylindae				
Stenelmis	15	37		1
Acerpenna				
Argia	1	1		
Baetis	6	11	7	6
Caecidotea				

Species	6 Dingmans Creek	8 Raymondskill Creek	12 BushKill (MillRift) Creek	16 Masthope Creek
Calopteryx				
Cheumatopsyche	4	5		1
Chironomidae	29	64	15	32
Clinocera/Trichoclinocera	2			1
Dipheter				
Gammarus				
Habrophlebia				
Hemerodromia	2	1		
Hydroptila				
Nemertea		2		
Neoplasta	1	1		
Polycentropus	1			
Probezzia				
Sialis				
Simulium	4	3	9	1
Stegopterna				
Tabanidae				
Acariformes				
Neureclipsis				
Hyalella				
Oecetis (T)				
Pisidiidae		6		
Collembola				
Hypogastruridae				
Nematomorpha				
Platyhelminthes		1	1	1
Aeolosomatidae	1			
Clitellata	2		2	2
<b>Total</b>	<b>199</b>	<b>212</b>	<b>212</b>	<b>200</b>

Species	19N Saw Creek	26N Rosetown Creek	35N Shohola Creek	36N Pond Eddy Creek
Acroneuria (P)	2		1	4
Agapetus (T)				1
Alloperla (P)		3		
Ameletus (E)		1		1
Blepharicera		1		1
Diplectrona (T)		10		25
Dolophilodes (T)				2
Epeorus spp (E)		29	1	31
Glossosoma (T)				
Haploperla (P)		1		1
Leuctra (P)	2	4	3	11
Psilotreta (T)				
Pteronarcys (P)		1		1
Rhithrogena (E)				
Sweltsa (P)		9		6
Tallaperla (P)		1		
Wormaldia (T)				1
Cinygmula (E)		21		15
Culoptila/Protoptila (T)				
Drunella spp. (E)	5		1	8
Ephemerella spp (E)	30	8	31	28
Lepidostoma (T)	1	1		
Leucrocuta (E)	2		1	2
Nigronia	2		1	2
Ophiogomphus				
Paragnetina (P)				
Paraleptophlebia (E)	2	2	1	7
Rhyacophila (T)	1	1	1	3
Agnetina (P)				2
Ancryonyx			2	
Atherix				
Boyeria				
Corduliidae/Libellulidae				
Cultus (P)				
Hexatoma				
Isoperla (P)	9		7	2
Labiobaetis (E)				
Macronychus	2			
Micrasema (T)	17		6	
Microcylloepus	1		3	



Species	19N Saw Creek	26N Rosetown Creek	35N Shohola Creek	36N Pond Eddy Creek
Ostrocerca (P)				
Perlodidae (P)				
Promoresia	9		11	
Prostoia (P)				
Psychomyia (T)	4			
Stactobiella (T)				
Taeniopteryx (P)				
Teloganopsis (E)	23		13	
Aeschnidae				
Amphinemura (P)	2	5		2
Antocha	1			
Bolotoperla (P)				
Ceraclea (T)	1			
Dicranota				1
Isonychia (E)	4			
Maccaffertium (E)	4		7	
Neophylax		1		
Perlidae (P)				
Acentrella €	2			
Chimarra (T)			3	
Corydalus				
Eurylophella (E)				
Gomphidae				
Leptoceridae (T)				
Optioservus			1	
Perlesta (P)			1	
Psephenus				9
Pycnopsyche (T)				
Stenacron (E)				
Stylogomphus			3	
Tipula				
Anchytarsus				
Ectopria				1
Hydropsyche	7		8	1
Hydroptilidae	1			
Lanthus				
Oulimnius		1		1
Prosimulium		1		2
Staphylindae				
Stenelmis			27	
Acerpenna	7		8	
Argia				
Baetis	1	70		21
Caecidotea				

Species	19N Saw Creek	26N Rosetown Creek	35N Shohola Creek	36N Pond Eddy Creek
Calopteryx				
Cheumatopsyche	11		4	4
Chironomidae	54	19	41	8
Clinocera/Trichoclino-cera				
Diphetero-	1	8		4
Gammarus				
Habrophlebia				
Hemerodromia				
Hydroptila				
Nemertea				
Neoplasta				
Polycentropus	2	2		
Probezzia				
Sialis	1			
Simulium	2	1	17	
Stegopterna				
Tabanidae				
Acariformes				
Neureclipsis				
Hyalella				
Oecetis (T)	2		2	
Pisidiidae	1		5	1
Collembola				
Hypogastruridae				
Nematomorpha		1		
Platyhelminthes				
Aeolosomatidae				
Clitellata	1	1	2	
<b>Total</b>	<b>217</b>	<b>203</b>	<b>212</b>	<b>209</b>

Species	40N Westfalls Creek	Total Individuals
Acroneuria (P)		23
Agapetus (T)		7
Alloperla (P)	1	6
Ameletus ( E)		2
Blepharicera	6	15
Diplectrona (T)	4	42
Dolophilodes (T)		16
Epeorus spp ( E)	45	139
Glossosoma (T)		0
Haploperla (P)		7
Leuctra (P)	2	48
Psilotreta (T)	1	2
Pteronarcys (P)		2
Rhithrogena ( E)		0
Sweltsa (P)	2	26
Tallaperla (P)		1
Wormaldia (T)		1
Cinygmula ( E)		46
Culoptila/Protoptila (T)		0
Drunella spp. ( E)	18	70
Ephemerella spp ( E)	10	170
Lepidostoma (T)		2
Leucrocuta ( E)		12
Nigronia		7
Ophiogomphus		2
Paragnetina (P)	1	6
Paraleptophlebia ( E)		29
Rhyacophila (T)	1	14
Agnetina (P)	1	3
Ancryonyx		2
Atherix		1
Boyeria		1
Corduliidae/Libellulidae		0
Cultus (P)		0
Hexatoma	6	12
Isoperla (P)		25
Labiobaetis ( E)		0
Macronychus		4
Micrasema (T)		24
Microcyloepus		8

Species	40N Westfalls Creek	Total Individuals
Ostrocerca (P)		1
Perlodidae (P)		0
Promoresia	2	22
Prostoia (P)		0
Psychomyia (T)		5
Stactobiella (T)		2
Taeniopteryx (P)		0
Teloganopsis ( E)	18	84
Aeschnidae		0
Amphinemura (P)		17
Antocha		4
Bolotoperla (P)		0
Ceraclea (T)		2
Dicranota		1
Isonychia ( E)	4	18
Maccaffertium ( E)	1	32
Neophylax		3
Perlidae (P)		0
Acentrella €	2	88
Chimarra (T)		13
Corydalus		2
Eurylophella ( E)		2
Gomphidae		0
Leptoceridae (T)		0
Optioservus		1
Perlesta (P)		2
Psephenus	6	29
Pycnopsyche (T)		1
Stenacron ( E)		1
Stylogomphus	2	12
Tipula		0
Anchytarsus		0
Ectopria		1
Hydropsyche	1	34
Hydroptilidae		1
Lanthus		0
Oulimnius		16
Prosimulium	2	23
Staphylindae		0
Stenelmis		80
Acerpenna		15
Argia		2
Baetis	46	168
Caecidotea		0

Species	40N Westfalls Creek	Total Individuals
Calopteryx		0
Cheumatopsyche		29
Chironomidae	19	281
Clinocera/Trichoclinocera		3
Dipheter	5	18
Gammarus		0
Habrophlebia		0
Hemerodromia		3
Hydroptila		0
Nemertea		2
Neoplasta		2
Polycentropus		5
Probezzia		0
Sialis		1
Simulium		37
Stegopterna		0
Tabanidae		0
Acariformes		0
Neureclipsis		0
Hyaella		0
Oecetis (T)		4
Pisidiidae		13
Collembola		0
Hypogastruridae		0
Nematomorpha		1
Platyhelminthes		3
Aeolosomatidae		1
Clitellata		10
<b>Total</b>	<b>206</b>	<b>1870</b>

# **Appendix B**

## Fish Species Table

2024 Pike County Conservaton District Fish Data

Species	3	10	17
	Little Bushkill Creek	Vandermrk Creek	Wallenpaupack Creek
Grass Pickerel	2	0	2
Redbreast Sunfish	1	0	0
Pumpkinseed	2	0	0
Bluegill	4	0	0
White sucker	14	1	45
Fallfish	28	0	0
Blacknose Dace	9	0	28
Longnose Dace	9	10	18
Shield Darter	1	0	0
Margined Madtom	4	1	0
Cutlip Minnow	2	0	2
Largemouth Bass	4	0	1
Smallmouth Bass	0	5	1
American Eel	18	17	0
Sea Lamprey	2	0	0
Brown Trout	0	53	11
Brook Trout	0	0	0
Tesselated Darter	0	1	25
Eastern Mudminnow	0	0	9
Common Shiner	0	0	42
Creek Chub	0	0	2
River chub	0	0	14
Mottled Sculpin	0	0	0
Bluegill x Redbreast hybrid	1	0	0
<b>Total</b>	<b>101</b>	<b>88</b>	<b>200</b>

Species	18	24N	25N	Total
	E. Branch Wallenpaupack Creek	Sawkill Creek	Vandermark Creek	
Grass Pickerel	0	0	0	4
Redbreast Sunfish	0	0	0	1
Pumpkinseed	0	0	0	2
Bluegill	0	0	0	4
White sucker	4	7	0	71
Fallfish	0	0	0	28
Blacknose Dace	9	45	32	123
Longnose Dace	60	0	0	97
Shield Darter	0	0	0	1
Margined Madtom	16	5	0	26
Cutlip Minnow	9	0	0	13
Largemouth Bass	1	0	0	6
Smallmouth Bass	5	0	0	11
American Eel	0	0	1	36
Sea Lamprey	0	0	0	2
Brown Trout	4	14	0	82
Brook Trout	0	0	22	22
Tesselated Darter	0	0	0	26
Eastern Mudminnow	0	0	0	9
Common Shiner	9	0	0	51
Creek Chub	0	0	0	2
River chub	37	0	0	51
Mottled Sculpin	0	0	217	217
Bluegill x Redbreast hybrid	0	0	0	1
<b>Total</b>	<b>154</b>	<b>71</b>	<b>272</b>	<b>886</b>