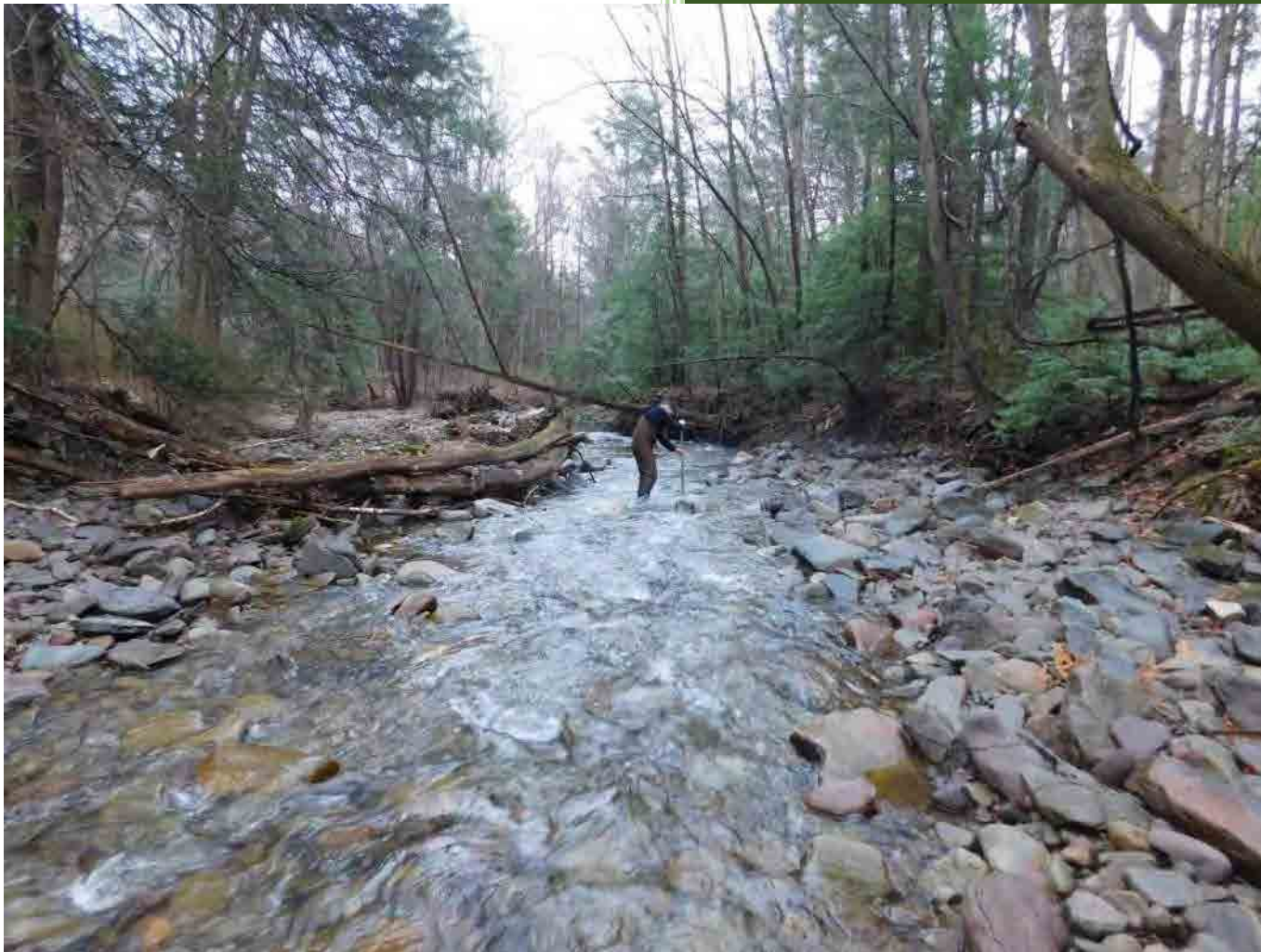


2021

Monroe County Water Quality Study



**Monroe County Planning Commission
Monroe County Conservation District**

701 Main Street, Suite 405
Stroudsburg, PA 18360-2169

(570) 517-3100

Fax (570) 517 3858

www.monroecountypa.gov

Section VI. Discussion & Conclusion

Detailed results for each site (USGS discharge data, field data sheets, habitat assessment sheets, lab analysis results and macroinvertebrate scoring sheets) can be found in the Technical Appendix. Sites with IBI scores below the Aquatic Life Use attainment thresholds are discussed below.

(APPECR02) **Appenzell Creek 02:** 62.0
(MARSCR19) **Marshall's Creek 19:** 55.2
(LISACR21) **Little Sambo Creek 21:** 48.3
(POCOCR09) **Pocono Creek 09:** 46.7
(SASPRN01) **Sand Spring Run 01:** 43.3
(SASPRN02) **Sand Spring Run 02:** 41.7
(TUNKCR04) **Tunkhannock Creek 04:** 49.7
(UPTNCR01) **Upper Tunkhannock 01:** 30.8
(UPTNCR02) **Upper Tunkhannock 02:** 43.3
(KEIPRN02) **Keiper Run 02:** 34.5

Appenzell Creek 02 (HQ-CWF)

This is the second year in a row that APPECR02 has scored slightly below the HQ Aquatic Life Use attainment threshold. Of the 6 metrics used in the IBI analysis, 5/6 scored near ($\pm 2\%$) or above the ALU threshold. APPECR02 had a value of 49.7% for the Percent Sensitive Individuals metric due to a large number of *Chironomidae* sp. in the sample. This brought the average of the six metrics below the ALU threshold. Continued monitoring is necessary to determine if this is a result of site conditions at the time of sampling or if there has been a decline in the health of the aquatic community.

Marshall's Creek 19 (HQ-CWF)

The results for this reach came back with 141/207 individuals being of the *Ephemerella* genus. This resulted in a high value for Percent Sensitive Individuals, 93.7%, but the lack of diversity within the sample resulted in low values for the other 5 metrics. Habitat within this reach was limited to mostly large boulders and aquatic vegetation. The lack of diversity in habitat may have contributed to the lack of diversity in the macroinvertebrate community. The high percentage of pollution sensitive individuals indicates that overall water quality was not the reason for the low IBI value.

Little Sambo Creek 21 (CWF)

This reach scored low by all six metrics. There was minimal diversity in the sample, with approximately 64% of the 236 individuals being *Simulium* sp. (54 individuals) or *Chironomidae* sp. (97 individuals). Both of the dominant species have pollution tolerance scores of six, contributing to the Percent Sensitive Individuals score of 7.5%. Siltation was noted as an issue in this reach, with both Embeddedness and Sediment Deposition being scored as sub-optimal on the habitat assessment sheets. There was also a heavy presence of filamentous algae throughout this reach. These factors may have contributed to the low IBI score for this stream.

Pocono Creek 09 (HQ-CWF)

Similar to Little Sambo Creek, this reach scored low by all six metrics due to lack of species diversity and the presence of large quantities of pollution tolerant individuals. *Baetis sp.*, a genus of pollution tolerant mayflies, made up 39.1% of the sample. Due to historic channelization of the Pocono Creek between Rt. 80 and 611, this site has little connection to its floodplain. This results in a lack of diversity in flow regimes, with most of the habitat consisting of riffles with very few pools and runs. The lack of habitat diversity, entrenchment of the stream and other upstream factors may have contributed to the low IBI score of this reach.

Sand Spring Run 01 & Sand Spring Run 02 (HQ-CWF, Existing Use EV)

We began sampling these reaches in 2019 in order to evaluate the long-term efficacy of a restoration project occurring upstream. Construction has not yet begun, but is scoped to begin in January of 2022. The IBI scores for both sites have continued to score below the EV Aquatic Life Use attainment threshold, indicating potential impairment. These reaches have headwaters in largely undeveloped areas, limiting the number of potential sources for impairment. These two sites will continue to be monitored to determine if the upstream habitat restoration improves the health of the aquatic community.

Tunkhannock Creek 04 (HQ-CWF, Existing Use EV)

This reach is surrounded by a large tract undeveloped forest and wetlands, which may have actually contributed to the low IBI score in this reach. The biota of the forest and wetlands have created a high concentration of tannic acid in Tunkhannock Creek, leading to the “tea stained” water and low pH observed on site. The high concentration of tannic acid and subsequent low pH create a habitat that’s inhospitable for many macroinvertebrates. Another influence may have been that our sample period coincided with a hatch of *Simulium sp.*, which comprised 60.6% of our sampled individuals. The large number of *Simulium sp.* lowered the scores of the diversity metrics used in the analysis.

*The IBI score for this site was analyzed as riffle/run habitat by our consultant. A table with the low gradient scores used in this report can be found in the technical appendix.

Upper Tunkhannock 01 & 02 (HQ-CWF)

Both of these sites are located within narrow reaches between two large lake systems. The short distance between these lake systems may not have allowed enough time for the natural development of a stream channel & community. Only 76 individuals were found in the entire sample for UPTNCR01 and 49 in UPTNCR02. A minimum of 160 individuals are required to generate an accurate assessment. The metrics were still calculated, the results are considered unreliable. No determination can be made based on the data collected at these sites.

Keiper Run 02 (HQ-CWF)

The low score seen at this reach is due to a lack of diversity in the macroinvertebrate community combined with a heavy presence of both *Simulium sp.* (84/188 individuals) and *Chironomidae sp.* (57/188 individuals). This may be caused by the lack of diverse habitat within the reach. The reach is comprised almost entirely of riffles with few runs and almost no pools. The stream bed substrate was also classified as suboptimal for the amount of embeddedness and sediment deposition observed. Those two factors can impact colonization of the substrate due to the lack of interstitial space.

Highlights for 2021

The macroinvertebrate populations sampled at the following five sites were some of the most diverse and pollution sensitive communities found in the county. The scores came in well above the Aquatic Life Use attainment threshold.

(AQUACR19) **Aquashicola Creek 19**: 97.7

(BRODCR22) **Brodhead Creek 22**: 96.5

(BRODCR30) **Brodhead Creek 30**: 91.6

(BUSHCR07) **Bushkill Creek 07**: 95.6

(CHERCR06) **Cherry Creek 06**: 90.1

Recommendations

After reviewing the data from the 2021 Water Quality Study, the lead agencies recommend the following:

- Further analysis of the low-scoring sites listed above in our conclusions. If these sites continue to trend below the ALU attainment threshold, contact PA DEP's Water Quality Division.
- Addition of discharge measurements to compare year-to-year flow conditions during sampling.
- Continue to collect data at existing sites to further develop long-term trends of Monroe County's water quality. As part of this ongoing effort, results for the past six years of sampling at these sites can be found in Table 6 on the following page.

Table 6: IBI trends 2015 to 2021.

Site ID	IBI 2015	IBI 2016	IBI 2017	IBI 2018	IBI 2019	IBI 2020	IBI 2021
AQUACR19					74.2	78.3	97.6
BUCKCR01			73.5	62.5	76.1	81.9	65.2
POHOCCR01			88.5	86.2	93.8	88.9	77.8
POHOCCR29			83.8	74.0	75.9	92.8	85.4
MIDDCR04				72.4	86.6	93.8	83.0
JONACR01			81.6	77.6	89.5	79.6	86.6
APPECR02					92.6	62.0	62.0
MCMICR22			81.9	95.7	85.6	92.8	88.6
MCMICR37	93.6	76.2	78.6	52.1	78.5	78.6	65.4
CHERCR01				61.1	66.6	72.0	76.9
CHERCR06*	80.8	56.5	64.4	-	73.2	73.0	90.1
CHERCR06R*	67.2	73.6	68.7	-	72.0	67.6	85.7
BRODCR27			93.0	99.0	59.3	97.2	81.9
BRODCR27R						97.4	79.5
MILLCR03		83.2	97.0	80.4	89.5	90.0	80.2
BUHICR07	89.2	91.3	86.1	82.5	78.2	93.3	75.8
BRODCR22		74.1	87.1	84.6	87.5	95.0	96.5
PARACR08		85.2	82.5	86.5	85.9	95.4	83.6
BRODCR30						87.4	91.6
BRODCR31						70.4	70.3
BUTZRN01			76.0	70.9	82.8	75.7	84.4
BUSHCR07	86.7	95.3	88.6	91.0	89.8	81.4	95.6
MARSCR11	95.7	89.1	80.5	80.5	79.7	74.1	83.6
MARSCR18			76.0	70.9	80.8	92.9	63.5
MARSCR19					66.3	66.6	55.2
LISACR21							48.3
SAMBCR02						47.1	51.4
POCOCR09			80.2	72.4	55.7	90.4	46.7
POCOCR14	62.3	72.5	82.1	73.1	74.5	78.5	65.1
POCOCR01			75.9	80.7	78.2	76.4	80.7
SWIFCR10	75.8	83.2	90.6	48.2	77.5	90.3	78.5
INDIRN03				85.6	69.1	78.1	56.0
SASPRN01		50.8	-	-	56.8	48.8	43.3
SASPRN02					58.0	47.7	41.7
TOBYCR01	85.6	-	68.2	66.2	-	-	66.4
TOBYCR14	76.0	64.8	88.0	74.6	83.9	86.4	86.2
TUNKCR03	81.5	-	67.8	73.0	78.2	62.6	65.0
TUNKCR04							49.7
UPTNCR01							30.8
UPTNCR02							43.3
KEIPRN02						33.5	34.5

* IBI Scores from 2015 through 2017 assessed as Riffle Run, not as Low Gradient