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MEMORANDUM

TO: Hickory Creek Watershed

FROM: Roger Klocek, Huff & Huff, Inc.
Lindsay Birt, Ph.D. Huff & Huff, Inc.

DATE: January 04, 2019

RE: 2018 Bio Blitz Macroinvertebrate Results
Hickory Creek Watershed Planning Group
Will County, Illinois

1.0 INTRODUCTION

Hickory Creek Watershed Planning Group (HCWPG) hosted a one-day Bio-Blitz (a rapid biological assessment) within Hickory Creek Watershed on September 8, 2018. Bio-Blitz was established in 2014 to conduct yearly sampling of macroinvertebrates within Hickory Creek Watershed to assess stream health and promote the participation of citizen scientists in data collection.

More than 100 volunteers collected and sorted aquatic macroinvertebrates from streams within the Hickory Creek Watershed during the 2018 assessment. Volunteers teamed with trained biologists and HCWPG members to sample aquatic macroinvertebrates at six sites within the watershed:

1. Union Ditch in the Village of Tinley Park,
2. Hickory Creek at the Joliet Water and Sewer Service Center,
3. Hickory Creek at New Lenox Sanitary Treatment Plant (STP) #1,
4. Hickory Creek at Pilcher Park #1 (above the dam),
5. Hickory Creek at the Veterans of Foreign Wars (VFW) Post 9545 in New Lenox, and
6. Crystal Creek Prairie Path in Mokena, Illinois.

A seventh site was also sampled at a newly restored section of the East Branch of Marley Creek at the Mokena Crystal Creek Prairie Path on October 19, 2018. This site was added to assess downstream improvements in aquatic diversity after a 300-ft stretch of the East Branch of Marley Creek streambank was regraded and restored on September 22, 2018. The initiative was part of HCWPG's ongoing efforts to conduct public outreach and establish a baseline aquatic community assessment, which are goals established in the watershed management plan.



Aquatic macroinvertebrates were sampled because they can be used to characterize stream quality and prioritize restoration efforts. Aquatic macroinvertebrates consist of aquatic worms, macro-crustaceans, aquatic insects, and mollusks which meet the following criteria: 1) they spend all or part of their life cycles in or on aquatic substrates; 2) can be seen with the naked eye; and 3) can be retained in a U.S. Standard No. 30 sieve. Aquatic macroinvertebrates are often used to assess stream water quality due to their relative abundance, diversity, and presence in most aquatic systems.

2.0 METHODOLOGY

A variety of methodologies have been developed to assess stream macroinvertebrate communities. The Illinois Environmental Protection Agency (IEPA) developed the 20-jab multi-habitat method in 2008 (IEPA 2011). The multi-habitat method is a standard methodology in the State of Illinois for stream assessment using macroinvertebrates. The IEPA method uses a fine mesh net to take qualitative samples for laboratory processing and analysis.

The metric used in evaluating the macroinvertebrate community in Illinois is the Macroinvertebrate Biotic Index (MBI) and the multi-habitat method, the Macroinvertebrate Index of Biotic Integrity (MIBI). The MBI for each sample was calculated using the numerical rating of each taxa developed by the IEPA (2011). MBI values and tolerance values range from 0 to 11, with 0 assigned to the most sensitive taxa (Hilsenhoff 1997, IEPA 2011).

The MIBI uses seven individual metrics, including the MBI, Coleoptera taxa, Ephemeroptera taxa, total taxa, intolerant taxa, percent scrapers, and percent Ephemeroptera, Plecoptera, Trichoptera (EPT) taxa, to score the sample. Best values represent the best macroinvertebrate metric score one would typically expect to encounter in a similar sized stream with similar habitat attributes in Illinois. The best values for each metric from the least disturbed Illinois streams are listed in Table 2.1. For the MIBI, a higher score is indicative of a higher quality macroinvertebrate community (Table 2.2). The MIBI is a preferred metric to the MBI as a finer resolution of detail can often be acquired from the statistically based MIBI compared to more broadly-based identifications used to formulate the MBI.

Table 2.1. IEPA Macroinvertebrate “Best Value” Metric Scores for Least Disturbed Streams in Illinois

Metric	Best Value*
Coleoptera Taxa	5
Ephemeroptera Taxa	10.2
Total taxa	46
Intolerant Taxa	9
MBI	4.9
Percent Scrapers	29.6
Percent EPT Taxa	74

*Source: IEPA 2011b



Table 2.2. IEPA Method of Interpreting MIBI Scores

Lower Boundary Score	Upper Boundary Score	Comparison to Reference Conditions	Narrative Description
73	100	> 75 th Percentile	Exceptional
41.8	72.9	> 10 th Percentile	Good
20.9	41.7	Bisects 10 th percentile (Upper)	Fair
0	20.8	Bisects 10 th Percentile (lower)	Poor

Source: IEPA 2011a

3.0 RESULTS

The 2018 MBI and MIBI scores from the seven sampling locations in the Hickory Creek Watershed are listed in Table 3.1. Table 3.2 presents the metric data used to determine the MIBI scores for the 2018 sampling locations. Hickory Creek at New Lenox STP #1 had the second highest numerical MIBI score for all sample sites at 52.3 and a narrative rating of “good”. New Lenox STP #1 site has consistently had an MIBI narrative rank of “good” over the last five years. The habitat at this site is composed of cobble, gravel, and sand with boulders present and infrequent snags of woody debris. The habitat is conducive to diverse aquatic fauna. Hickory Creek at New Lenox STP #1 had 18 taxa, including one intolerant taxon represented by 324 individuals.

In 2018, Hickory Creek at the VFW Post 9545 in New Lenox had an MIBI score of 53.6 with a narrative rating of “good”. In 2017, Hickory Creek at the VFW Post had an MIBI score of 59.0 with a narrative rating of “good”. In 2018, Hickory Creek had high water causing poor visibility in sampling which, resulted in a lower MIBI score than 2017. In 2018, this site had a good number of aquatic beetle and mayfly taxa. In 2018, the VFW sample site had the highest number of taxa at 23, represented by 312 individuals. Habitat at the VFW site is primarily comprised of cobble, gravel, and sand with some boulders and sparse woody debris present, which is consistent with rapid water movement and good oxygenation for organisms. In May of 2018, the VFW completed 475 linear-feet of streambank stabilization and 0.19 acres of restoration along the reach of Hickory Creek at the VFW Post 9545. Because vegetation installed as part of the streambank stabilization was not fully established at the time of the 2018 sampling of this site, additional assessment of macroinvertebrate diversity is recommended in the future to monitor stream health once the full benefits of the restoration/stabilization have been achieved.

Hickory Creek at the Joliet Water and Sewer Service Center had an MIBI score of 42.1 with a narrative rank of “good”. In comparison to the 2017 sample (MIBI score of 55.1 with a narrative rating of “good”) the 2018 score decreased but the narrative rating was the same. The decrease in numeric MIBI score is most likely attributed to stream flashiness associated with recent rainfall and the completion of streambank stabilization along Hickory Creek prior to conducting the 2018 sampling. The habitat is primarily composed of cobble, gravel, and sand, with frequent boulders and infrequent woody debris. Rooted macrophytes and filamentous algae are almost absent. The habitat supports a reasonable number of mayfly, but caddisflies and beetles were not abundant. One intolerant taxa was present in 2018 collections, which is one of the metrics used to calculate the MIBI. Fourteen (14) taxa were present in 2018 represented by 276 individuals. Because vegetation installed as part of the streambank stabilization was not fully established at the time of the 2018 sampling of this site, additional



assessment of macroinvertebrate diversity is recommended in the future to monitor stream health once the full benefits of the restoration/stabilization have been achieved.

Union Ditch in Tinley Park had a numerical score of 42.8 with a narrative rating of “good” for the MIBI. Union Ditch primarily has finer and softer substrates, which are not preferred habitats for many aquatic organisms. Seventeen taxa were collected in 2018 represented by 89 individuals. The number of individuals collected during 2018 was well below the recommended sample size. One intolerant taxa were collected in Union Ditch during the last four years.

Hickory Creek at Pilcher Park #1 (above the dam) had an MIBI score during 2018 at 40.1 with a narrative rating of “fair”. During 2017, this site had an MIBI score of 53.8 and a narrative rank of “good”. The shoreline habitat at Pilcher Park #1 (above the dam) is primarily comprised of silty and muddy substrates with abundant woody debris. One small section of shoreline is rocky and is comprised of cobbles, gravel, and sand. In 2017, the sample was collected in this rocky shoreline area, 0.05 miles south of the 2018 sampling location. Because the less diverse organisms were collected from the silty and muddy substrates in 2018 rather than the rocky habitat, the MBI score was decreased in 2018 compared to 2017. Care should be taken to ensure that samples are gathered from the same location in “typical” habitat in the future, avoiding the atypical rocky location, for ease in comparison of MIBI scores. Fifteen taxa were collected represented by 126 individuals in 2018. The number of individuals collected was below the recommended sample size of 300 organisms. No intolerant organisms were collected during 2018.

Crystal Creek (also known as East Branch Marley Creek) upstream of the creek bend, at Crystal Creek Prairie Path, has an MIBI score of 34.0 with a narrative rating of “fair”. The site was located 280 feet upstream of a 300-foot stretch of the stream, which was under construction at the time of the Bio-Blitz event. Fifteen taxa were collected represented by 75 individuals in 2018. The substrates were predominately silty sand and sandy gravel with scattered cobble and irregular deposits of small woody debris and leaf packs. Rooted aquatic vegetation is sparse. Few mayflies and isopods were collected.

Crystal Creek at the Crystal Creek Prairie Park downstream of the creek bend was sampled after restoration was completed on October 19, 2018. The creek had an MIBI numerical score of 48.1 with a narrative rating of “good”. Twenty (20) taxa were collected represented by 179 individuals in 2018. The substrates were predominately silty sand and sandy gravel with a moderate amount of cobble and scattered boulders. The newly restored shoreline habitat is primarily comprised of cobbles and boulders with traces of woody debris, leaf packs, and rooted aquatic vegetation. Caddisflies as snail cased caddisflies and a few isopods were present at this site.

The IEPA methodology for calculating MIBI scores states a minimum of 300 ± 20 percent of organisms should be collected per sampling site. The minimum number of organisms recommended for collection was not completed at four sites in 2018; Union Ditch in Tinley Park, Pilcher Park #1 (above the dam), and Crystal Creek (both upstream and downstream of restoration). Despite the low number of organisms collected at these sites, the MBI and MIBI scores were calculated and compared against 2017 results (Figure 3.1).



Table 3.1. 2018 MBI And MIBI Scores by Site

Site	MBI Score	MIBI Score	MIBI Narrative rank	Change in MIBI Score since 2017
Hickory Creek at VFW Post 9545, New Lenox	4.9	53.6	“good”	About the Same ¹
Hickory Creek at Joliet Water and Sewer Service Center	4.3	42.1	“good”	About the Same ¹
Union Ditch in Tinley Park	5.6	42.8	“good”	About the Same
Hickory Creek at Pilcher Park (#1) (above dam)	5.3	40.1	“fair”	Decrease
Hickory Creek at New Lenox STP #1	4.4	52.3	“good”	About the Same
Crystal Creek (upstream of creek bend)	5.6	34.0	“fair”	Increase
Crystal Creek (downstream of creek bend)	4.7	48.1	“good”	Increase

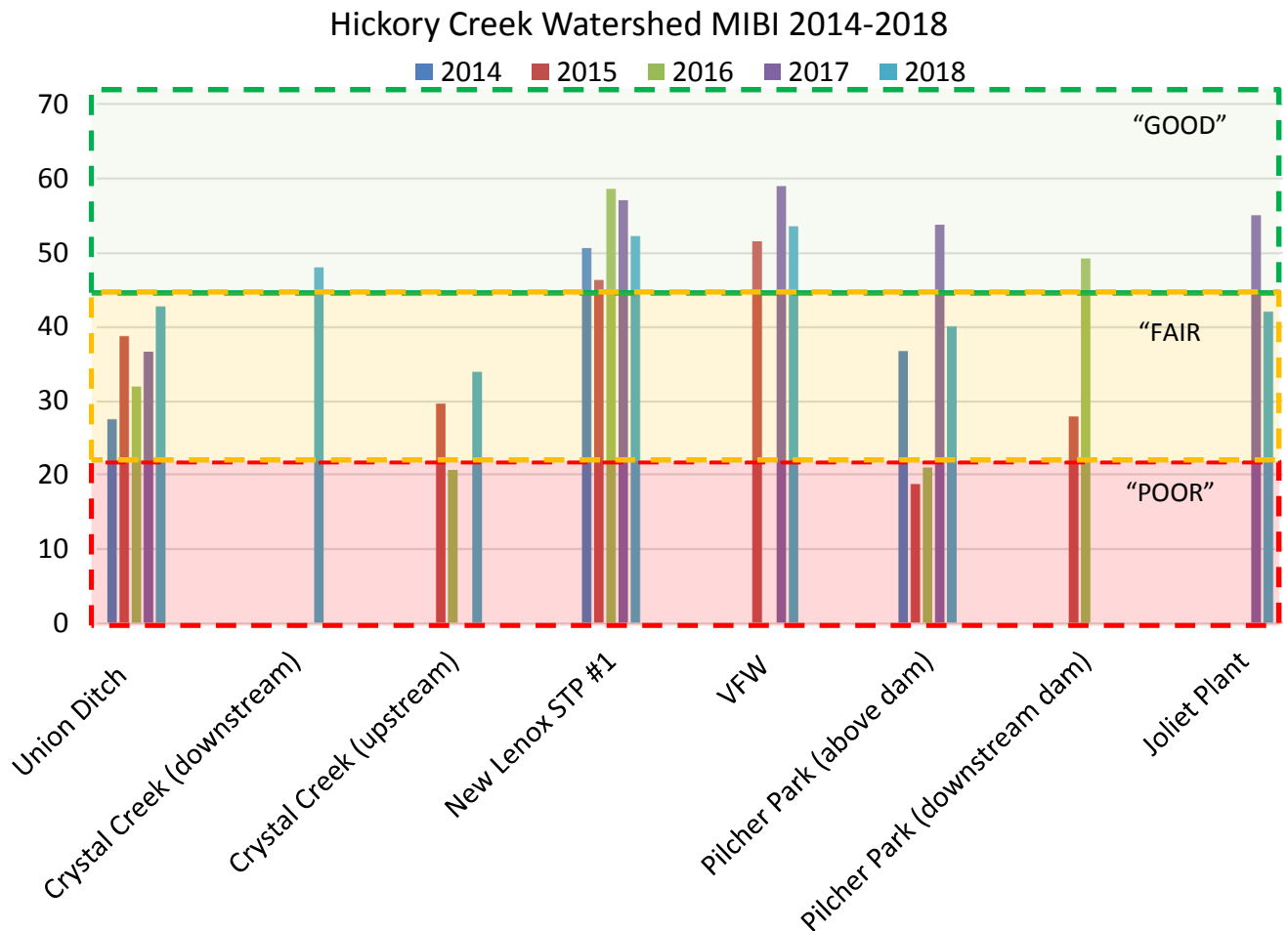
¹Sample was collected after recent construction and streambank restoration was completed at the site.

Table 3.2. 2018 Metrics for MIBI Scores²

Site	Number Total Taxa	Number Individuals	# Taxa Beetles	# Taxa Mayflies	# Taxa Intolerant	% EPT Individuals	% Scrapers
Hickory Creek at VFW Post 9545, New Lenox	23	312	4	4	1`	25.7	67.3
Hickory Creek at Joliet Water and Sewer Service Center	14	276	2	1	1	88.4	4
Union Ditch in Tinley Park	17	89	1	3	1	61.8	9.0
Hickory Creek at Pilcher Park #1 (above dam)	15	126	1	3	0	30.2	19.1
Hickory Creek at New Lenox STP #1	18	324	2	3	1	34.3	71.3
Crystal Creek (upstream of creek bend)	15	75	1	1	1	16.0	16.0
Crystal Creek (downstream of creek bend)	20	179	1	2	1	50.3	31.3

²Metrics listed are used to calculate MIBI score, which is provided in Table 3.1.

FIGURE 3.1. A Comparison of MIBI Scores from 2014 to 2018



4.0 DISCUSSION

The collection of data across multiple years provides comparative data for each site, allowing for tracking of the quality of the macroinvertebrate communities over time. The use of the metrics and comparison across years is dependent on the validity and consistency of the data. With additional years of data collected, greater inferences regarding the causes of the changes in the macroinvertebrate communities at each site can be made. Changes in MIBI scores over time could be due to changes in the stream water quality, habitat, or missing taxa from the samples; however, a low number of organisms was collected in 2018, except at the VFW site, the Joliet Water and Sewer Service Center, and the New Lenox STP #1. The narrative ranking trends for stream quality at each site over the sampling timeframe (2014 to 2018) is consistent, except for Pilcher Park #1 (above dam). Conclusions regarding changes in the quality of the stream macroinvertebrate communities at Pilcher Park #1 (above dam) should consider the sample collected in 2018 did not have the recommended minimum number of organisms.



Low numbers of collected organisms can result in artificially high or low MIBI scores, depending on the proportion of tolerant or intolerant species in the sample. However, it is apparent that the downstream-of-the-dam sample site at Pilcher Park has a greater diversity of organisms and a higher MIBI than the impounded upstream-of-the-dam site at Pilcher Park during comparative years, an effect that is to be expected as dams often reduce the strength of macroinvertebrate diversity as stream stability is altered downstream of a dam.

The Crystal Creek site (upstream) also showed significant variation in MIBI score over the years of sampling, which may be due to small stream size (near headwaters size) and shallow depth, making this site susceptible to yearly rainfall and summer heat retention variations. However, the aquatic diversity at Crystal Creek site (downstream) improved from Crystal Creek (upstream), with higher numbers of organisms collected in 2018, possibly due to recent stabilization of the streambank which improved stream habitat.

Works Consulted

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