
Biological and Habitat Assessment of the Great Miami River 2018 Montgomery County, Ohio

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Biological and Habitat Assessment of the Great Miami River 2018

Montgomery County, Ohio

MBI Technical Report 2019-3-1

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PROJECT DESCRIPTION

The Midwest Biodiversity Institute (MBI) conducted a biological and habitat assessment of the Great Miami River mainstem at five sites within the City of Dayton in 2018. A Level 3 Project Study Plan (PSP) that describes the spatial and temporal sampling design and the indicators and parameters that were collected was submitted to and approved by Ohio EPA (MBI 2018). The PSP described the biological sampling methods for fish and macroinvertebrate assemblages and habitat assessment that were employed. As a result the biological and habitat assessment was accomplished in conformance with Level 3 specifications of the Ohio Credible Data Law (OCDL) (ORC 6111.5) and OCDL rules (OAC 3745-4) making the data eligible for reevaluating the current Warmwater Habitat (WWH) Use designation and aquatic life use attainment status for the Great Miami River mainstem which is the major objective of this study.

The sampling design employed a targeted-intensive pollution survey. This survey design has been widely employed by Ohio EPA since 1979 to fulfill multiple management purposes and goals in addition to the determination of the existing status of the extant biological assemblages and their relationship to chemical, physical, and biological stressors. The 2018 survey included five sites, each of which were previously sampled by Ohio EPA and which provided new data about current conditions in the Great Miami River following the removal of the Tait Station Dam in 2018 and the construction of two kayak chutes, one as a modification of the Monument Street Dam, in 2017.

STATEMENT OF OBJECTIVES – GREAT MIAMI RIVER BIOASSESSMENT

The results and analysis of the Great Miami River bioassessment were intended to accomplish the following:

1. Evaluate the appropriateness of the existing WWH aquatic life use designation and make recommendations for any changes to that designation.
2. Provide pre-dam removal/modification data upstream and downstream from the Tait Station and Downtown Dayton Dams.
3. Evaluate the 2018 results against prior biological surveys conducted by MBI (2017) and Ohio EPA (1980, 1989, 1995, 2010); and,
4. Determine the aquatic life status of the Great Miami River mainstem in quantitative terms, i.e., not only if the waterbody is impaired, but the spatial extent and severity of any impairments and their respective departures from established criteria.

To meet these objectives MBI developed the data generated by methods and implementation

consistent with the Ohio Credible Data Law (ORC 6111.51) and regulations (OAC 3745-4).

Credible Data Requirements

In order to accomplish two of the key planned uses of the data and subsequent analyses, the data and information must be obtained in conformance with the provisions of the Ohio Credible Data Law (ORC 6111.51). Under the regulations that govern the Credible Data program at Ohio EPA, data and analyses must be performed by and under the direction of Level 3 Qualified Data Collectors (OAC 3745-4) for certain purposes. An important project objective is to evaluate the attainability of aquatic life uses and determine the attainment status of the Great Miami River. As such, the sampling and analysis conducted conformed to these requirements under an approved Level 3 PSP.

Scope

The Great Miami River study area extended downstream from the Island Park Dam impoundment to downstream from the Tait Station Dam in Dayton, OH. This included five sites located over approximately six miles of the Great Miami River mainstem. The Great Miami River mainstem in the vicinity of the project area in Dayton has historically been impacted by urban stormwater discharges, riparian encroachment (mowed levees), and habitat modifications in the form of run-of-river low head dam impoundments. Unique to many other large Ohio municipalities, the sanitary sewer system is separated with no combined sewer overflows discharging to the study area. Also, there are no major flow diversions for public or industrial water uses as is common in the urbanized segments of many other Ohio large rivers. Significant supplies of groundwater located along both Mad River and the Great Miami meet the water supply needs of the Dayton metropolitan area.

Intensive Pollution Survey Design

The delineation of sampling locations in the Great Miami River positioned sites upstream and downstream from each of the existing and modified dams (Figure 1). Sampling sites were located at prior Ohio EPA locations as much as was possible and are described with site coordinates, Ohio EPA stream and basin codes, Ohio EPA river mile index, and a geographical description (Table 1). A map of the study area and sites appears in Figure 1. The Island Park Dam impoundment was sampled by MBI in 2017 only. Some of the data from the 2017 electrofishing sites located further downstream were not included due to concerns about sampling effectiveness. All of the 2018 data was deemed to be acceptable for Level 3 purposes.

Table 1. Great Miami River mainstem sampling sites showing Ohio EPA basin-river codes, river mile (RM), Ohio EPA sampling year, Ohio EPA site code, drainage area, UTM coordinates, and a geographical description of each location.

| BASIN | STREAM | RIVER | RM | OEPA DATE | Site_ID | DRAIN. AREA | LATITUDE | LONGITUDE | LOCATION DESCRIPTION |
|-------|--------|-------------------|------|-----------|---------|-------------|----------|-----------|---|
| 14 | 001 | Great Miami River | 81.6 | 2009 | GMRB25 | 1853 | 39.7722 | -84.1899 | Downstream Island Park Dam - upstream Mad River |
| 14 | 001 | Great Miami River | 81.1 | 2010 | GMRB25 | 2511 | 39.7647 | -84.1944 | Upstream Downtown Dayton Dam - between I-75 and Main Street |
| 14 | 001 | Great Miami River | 79.9 | 1995 | H09W72 | 2583 | 39.7523 | -84.1989 | Upstream U.S. 35, downstream Wolf Creek |
| 14 | 001 | Great Miami River | 77.9 | 1989 | H09W02 | 2589 | 39.7303 | -84.2019 | Upstream Tait Station Dam - river left ust. I-75 |
| 14 | 001 | Great Miami River | 76.9 | 1995 | GMRB23 | 2591 | 39.7269 | -84.2252 | Upstream Dayton WWTP |

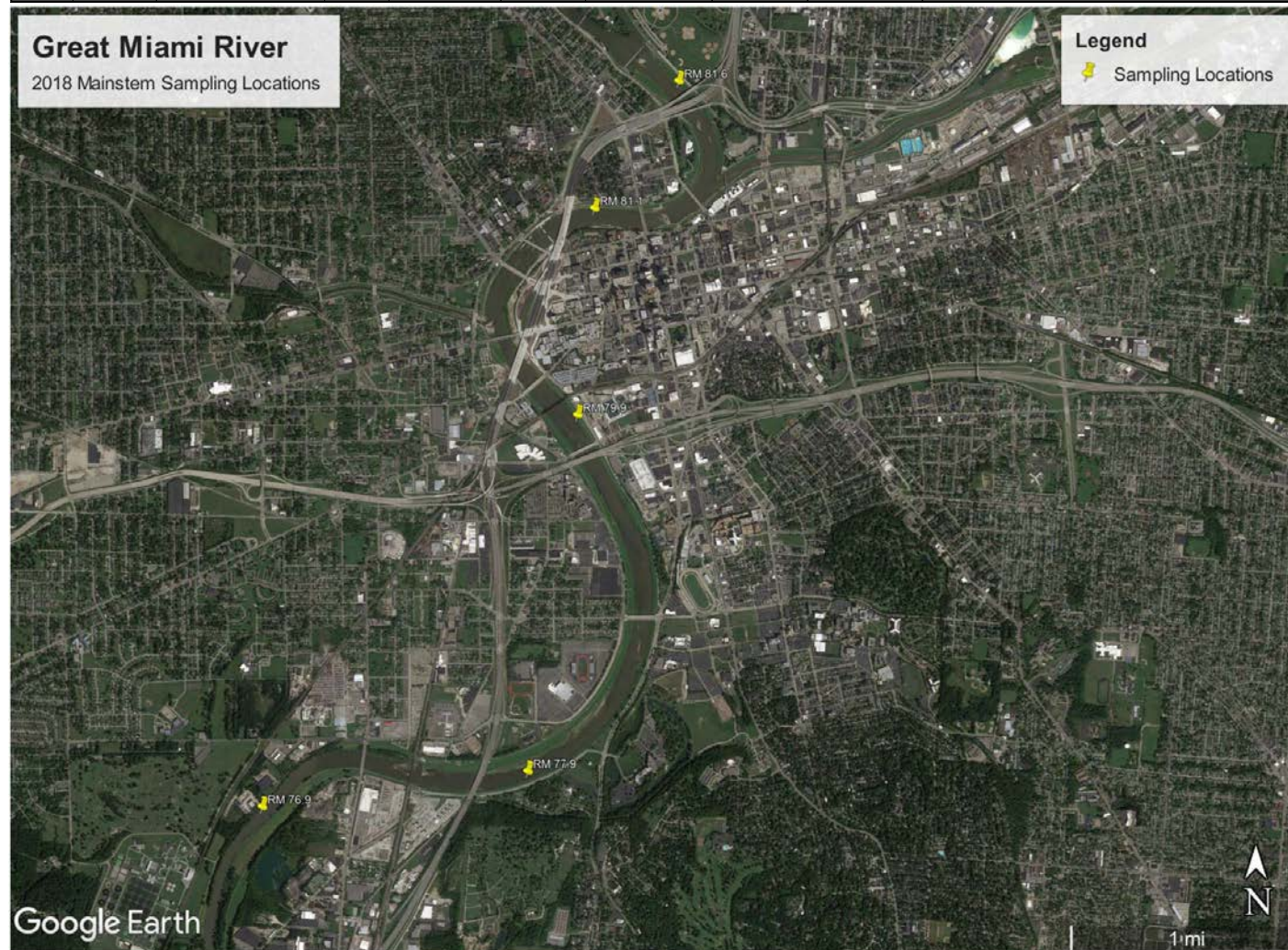


Figure 1. Map of the Great Miami River mainstem showing the five Great Miami River mainstem sampling locations sampled in 2018. These approximate the center point of the 0.5 km electrofishing zone. Artificial substrates were set within or immediately adjacent to the electrofishing zones.

DESCRIPTION OF POINT AND NONPOINT SOURCES

Significant stressors in the 2018 Great Miami River study area included nonpoint sources in the form of urban runoff via numerous stormwater outfalls, habitat alterations from riparian modifications, and three run-of-river low head dams (Table 2). There are no permitted point sources with any potential to affect water quality in the 2018 study area. The Dayton WWTP discharges approximately two miles downstream from the DP&L Tait Dam and there are no combined or sanitary sewer overflows. The DP&L Tait Dam was removed prior to and during the 2018 sampling and the Monument Street Dam was modified as a kayak chute which reduced the upstream impoundment. A new kayak chute was added 0.5 miles upstream. The Steele Dam at Island Park forms an impounded reach in the upstream portion of the study area.

Table 2. List of major modifications that occur in the 2018 Great Miami River study area.

| Stream/River | River Mile(s) | Facility/Source(s) |
|---------------------|----------------------|--|
| Great Miami R. | 82.2 | Steele (Island Park) Dam |
| Great Miami R. | 81.3 | Kayak Chute (constructed in 2017) |
| Great Miami R. | 80.8 | Monument Street Dam (modified in 2017) |
| Great Miami R. | 77.5 | DP&L Tait Station Dam (removed 2018) |

Nonpoint sources in the basin upstream from Dayton are typical of the Loamy, High Lime Till Plains subregion (55b) of the Eastern Corn Belt Plains ecoregion within which the 2018 study area lies. This subregion is glaciated with level to rolling glacial till plains with moderate-low gradient streams, end moraines, and glacial outwash landforms. Geologically it consists of loamy, high lime, late-Wisconsinan glacial tills with glacial outwash and scattered loess overlying Paleozoic carbonates and shale bedrock. The potential natural vegetation is comprised of beech and oak-sugar maple forests on end and ground moraines and elm-ash swamp forests in valley bottoms. Current land uses upstream from Dayton include a mosaic of corn, soybean, and livestock farming with scattered beech-maple and pin oak and swamp white oak woodlands. Urban-industrial activity occurs in the municipalities (Woods et al. 1995).

PARAMETER COVERAGE

The 2018 study focused on the collection of biological and habitat data. Biological sampling produced fish relative abundance and macroinvertebrate taxa and organism density data. Habitat data consisted of the Qualitative Habitat Evaluation Index (QHEI) adapted for large, non-wadeable rivers. Field parameters included temperature, dissolved oxygen, pH, and conductivity collected at each electrofishing site. The biological and habitat locations were

denoted by Ohio EPA river mile index (RMI), GPS coordinates, and a description of each location (Table 1).

FIELD SAMPLING & DATA ANALYSIS METHODS

Biological Methods

Biological sampling for fish and macroinvertebrate assemblage data followed established protocols of the Ohio EPA (1989; 2015) for large rivers. Biological and habitat sampling adhered to the Ohio EPA summer-early fall index periods of June 16-October 15 for fish and macroinvertebrates. Data summaries and data sheets appear in the Appendices.

Fish Methods

Fish sampling methods followed Ohio EPA specifications for boatable sites (Ohio EPA 1989, 2015). The application of this method has been well established for the mainstem of the Great Miami River by prior Ohio EPA surveys in 1980, 1989, 1995, and 2010. Fish were field processed by Level 3 QDCs for the fish community and habitat specialties. The retention of voucher specimens followed the requirements of the Level 3 PSP and Ohio EPA (1989; 2015). In addition to the baseline relative abundance data (counts, biomass, and species identifications) specified in Ohio EPA (1989, 2015), the identification and enumeration of DELT anomalies (Ohio EPA 1996) was also included. All fish results including the Index of Biotic Integrity (IBI) for boatable sites, the Modified Index of Well-Being (MIwb), and species relative abundance data by sampling date and for the overall study area appear in Appendix A.

Macroinvertebrate Methods

Macroinvertebrate sampling methods likewise followed Ohio EPA (1989; 2015) using the modified Hester-Dendy (HD) artificial substrate method as the principal method. Artificial substrates were deployed over a six-week colonization period during August 15-October 10 and 17, 2018, the latter being extended due to recurring elevated flows in October. A qualitative dip net/hand pick method that included a visual estimation of relative abundance was also employed at the time of HD retrieval. Macroinvertebrate laboratory procedures followed Ohio EPA (1989, 2015) methods and keys (Ohio EPA 2015). For the artificial substrates laboratory processing included the production of a sample by the disassembly and cleaning of the individual plates and subsampling procedures followed by Ohio EPA (1989, 2015). Taxonomic resolution at the lowest practicable resolution for the common macroinvertebrate assemblage groups such as mayflies, stoneflies, caddisflies, midges, and crustaceans was accomplished in keeping with the practices of Ohio EPA (1989, 2015) and as required for calculation of the Invertebrate Community Index (ICI, Ohio EPA 1987). Voucher specimens and a reference collection are also maintained by MBI and as required by the Level 3 PSP. Execution of all field sampling and laboratory processing was accomplished by a Level 3 QDC for the macro-

invertebrate sampling, data analysis, and taxonomy specialty. All macroinvertebrate results including the ICI and taxa relative abundance at each site appear in Appendix B.

Habitat Assessment

The QHEI (Rankin 1989, 1995; Ohio EPA 2006) was used as the principal aquatic habitat assessment methodology for the Great Miami River mainstem. The protocol is accomplished as part of the fish assemblage methodology in order to produce the data quantity and quality required by the Level 3 PSP (MBI 2018). This was performed by the Level 3 QDCs for the fish community and habitat specialty. QHEI data is needed not only for assessing the quality of available habitat, but also for its role in assessing aquatic life use attainability. All QHEI data and the field sheets appear in Appendix C.

Data Management

All data was managed by MBI in internal databases that permit ready access and analysis. Biological and habitat data are stored in a routine based on the Ohio ECOS format that MBI uses for all data management tasks and it is readily transferable to the Ohio EPA EA3 system. Biological data analysis included the calculation of the fish IBI and MIwb and their accompanying attributes to determine the condition of the fish assemblage at each site. Habitat data was analyzed using the QHEI and the QHEI attributes matrix to aid in assessing any habitat changes through time.

RESULTS AND DISCUSSION

The status of aquatic life uses in Ohio is based on the biological criteria found in the Ohio WQS (OAC 3745-1-07; Table 1) for both the fish and macroinvertebrate assemblages. The results are summarized in an “attainment” table for each site sampled across all years in the format shown in Table 2. The current use designation for the Great Miami River in the 2018 study area is Warmwater Habitat (WWH). The aquatic use designations that currently apply in the Great Miami River Basin are found in OAC 3745-1-21 and the WWH designation presently applies downstream from the CSX railroad bridge at RM 84.5. Upstream of that point the Exceptional Warmwater Habitat (EWH) use designation applies to all except a few disjunct segments of the mainstem to Quincy, OH. One of the primary goals of the 2018 study is to evaluate the status of the WWH use designation with regard to improved habitat and connectivity with the removal and modification of dams and kayak chutes in downtown Dayton. The aquatic life use attainment status was assessed for both the current WWH use and for EWH simultaneously in Table 2. If WWH was not attained then we did not record the obvious non-attainment of EWH. All years of data that bracketed the reach of the mainstem from the Steele (Island Park) dam impoundment (RM 82-84) to just upstream from the Dayton WWTP (RM 76.2) was included in

Table 2. Aquatic life use attainment status based on IBI, MIwb, and ICI results for fish and macroinvertebrates in the Great Miami River in Dayton, OH for sampling by MBI (2017 and 2018) and Ohio EPA (2010, 1995, 1989, and 1980).

| River Mile | Year | IBI | MIwb | ICI | QHEI | Attainment Status | Comment |
|--|------|------------------|-------------------|-----|------|-----------------------------------|--|
| Great Miami River – MBI 2017/2018 | | | | | | | |
| 82.70 | 2017 | 34* | 7.2* | -- | 51.0 | Fails WWH | Steele Dam Impoundment (Island Park) |
| 81.80 | 2018 | 51 | 9.8 | 54 | 77.0 | Full EWH | Dst. Steele Dam; Ust. Mad River |
| 81.10 | 2018 | 51 | 9.5 | 48 | 72.5 | Full EWH | Dst. Mad River; Main Street |
| 79.50 | 2018 | 51 | 10.4 | 48 | 80.0 | Full EWH | Dst. U.S. 35 |
| 77.90 | 2018 | 54 | 10.3 | 54 | 79.0 | Full EWH | Former DP&L Tait Dam Impoundment |
| 76.80 | 2018 | 54 | 10.1 | 40 | 74.5 | Full WWH; Partial EWH | Dst. Broadway Street; Ust. Dayton WWTP |
| Great Miami River – Ohio EPA 2010 | | | | | | | |
| 81.10 | 2010 | 44 | 8.7 | E | 48.0 | Full WWH | Ust. Downtown Dam (Salem Ave.) |
| 78.90 | 2010 | 54 | 10.0 | 46 | 62.0 | Full EWH | Ust. DP&L Tait Impoundment (Stewart St.) |
| 77.30 | 2010 | 52 | 9.8 | 42 | 72.8 | Full EWH (^{ns} for ICI) | Dst. DP&L Tait Dam (Broadway Street) |
| Great Miami River – Ohio EPA 1995 | | | | | | | |
| 83.30 | 1995 | 32* | 8.5 | -- | 44.0 | (Partial WWH) | Steele Dam Impoundment (Island Park) |
| 82.20 | 1995 | 52 | 9.9 | 42 | 66.0 | Full EWH (^{ns} for ICI) | Dst. Steele Dam |
| 80.70 | 1995 | 51 | 9.5 | 38 | 74.0 | Full WWH; Partial EWH | Dst. Monument Ave. |
| 79.90 | 1995 | 55 | 9.1 | 38 | 71.5 | Full WWH; Partial EWH | Dst. Wolf Creek (Fifth Street) |
| 78.10 | 1995 | 42 | 8.3 ^{ns} | -- | 42.5 | (Full WWH) | Dst. Industrial discharges (impounded) |
| 77.10 | 1995 | 38 ^{ns} | 8.9 | -- | 44.0 | (Full WWH) | DP&L Tait Dam Impoundment |
| 76.90 | 1995 | 45 | 9.0 | 44 | 75.0 | Full EWH (^{ns} for all) | Dst. DP&L Tait Dam |

Table 2. Aquatic life use attainment status based on IBI, MIwb, and ICI results for fish and macroinvertebrates in the Great Miami River in Dayton, OH for sampling by MBI (2017 and 2018) and Ohio EPA (2010, 1995, 1989, and 1980).

| Great Miami River – Ohio EPA 1989 | | | | | | | |
|-----------------------------------|------|------------------|-------------------|------------------|------|---------------|--------------------------------------|
| 82.90 | 1989 | 32* | 8.4 ^{ns} | -- | 36.0 | (Partial WWH) | Steele Dam Impoundment (Island Park) |
| 82.20 | 1989 | 39 ^{ns} | 9.3 | -- | 50.0 | (Full WWH) | Dst. Steele Dam |
| 80.40 | 1989 | 47 | 9.7 | 50 | 68.0 | Full EWH | Dst. Monument Ave. |
| 80.10 | 1989 | 50 | 9.7 | 46 | 70.5 | Full EWH | Dst. Wolf Creek |
| 77.90 | 1989 | 34* | 8.5 | -- | 53.0 | (Partial WWH) | DP&L Tait Dam Impoundment |
| 76.90 | 1989 | 35* | 9.5 | 50 | 61.5 | Partial WWH | Dst. DP&L Tait Dam |
| Great Miami River – Ohio EPA 1980 | | | | | | | |
| 83.30 | 1980 | 27* | 7.6* | -- | 57.0 | (Fails WWH) | Steele Dam Impoundment (Island Park) |
| 81.10 | 1980 | 21* | 8.7 | 34 ^{ns} | -- | Fails WWH | Dst. Steele Dam |
| 80.70 | 1980 | 33* | 8.7 | 32 ^{ns} | 56.0 | Partial WWH | Dst. Monument Ave. |
| 78.10 | 1980 | 34* | 8.2 ^{ns} | 26* | -- | Partial WWH | DP&L Tait Dam Impoundment |
| 77.10 | 1980 | 26* | 6.5* | 40 | 59.0 | Partial WWH | Dst. DP&L Tait Dam |

| Biological Criteria – E. Corn Belt Plains Ecoregion | | | |
|---|----------------|----------------|----------------|
| Index | WWH | EWH | MWH-I |
| IBI – Boat | 42 | 48 | 26 |
| MIwb - Boat | 8.5 | 9.6 | 6.4 |
| ICI | 36 | 46 | 22 |
| ICI Narrative | G ¹ | E ¹ | F ¹ |

* significant departure from biocriterion (≤4 IBI units; ≤0.5 MIwb units).

^{ns} non-significant departure from biocriterion (>4 IBI units; >0.5 MIwb units).

¹ G – Good = WWH; E = Exceptional; F = fair; P = Poor; VP = Very Poor

Table 2. Both the fish and macroinvertebrate assemblages fully met the EWH biocriteria at four of the five sites sampled in 2018. The site sampled in the Steele Dam (Island Park) impoundment in 2017 was included with the 2018 results in Table 2 to provide perspective about how permanently impounded habitat affects the fish and macroinvertebrate assemblages, in this case failing to attain the WWH use. The site downstream from Broadway Street (RM 76.8) was in partial attainment of EWH due to the ICI of 40 not meeting the EWH biocriterion of 46 (42 would have been within nonsignificant departure of EWH). The fish assemblage with an IBI of 54 and MIwb of 10.1 surpassed the minimum EWH biocriteria of 48 and 9.6, respectively. The failure to meet the ICI EWH biocriterion was attributed to excessive siltation resulting from the sediment plume generated by the active removal of the Tait Dam before and during the HD deployment in 2018. We should expect this site to improve once that activity has ceased and natural recovery processes exert their beneficial effects.

SYNTHESIS AND RECOMMNDATION

Evidence for EWH potential in this reach of the Great Miami River mainstem first surfaced in 1989 when two sites upstream and downstream from Wolf Creek fully met the EWH biocriteria (Table 2). The 1995 results were not as compelling when only one site downstream from the Steele Dam fully attained EWH with the remaining sites easily meeting WWH and two sites with partial EWH performance. In 2010, two of the three sites sampled upstream and downstream from the DP&L Tait Dam and impoundment fully attained EWH. The habitat assessment results (Figure 2) show that in 2018 all of the high influence modified attributes observed in prior surveys had been eliminated and that the moderate influence modified attributes had been reduced which boosted the QHEI scores to very good and excellent quality. While QHEI is not a standalone arbiter of what use designation should apply, it does support the observations of improving habitat for this reach of the Great Miami River mainstem over time.

The solid attainment of the EWH biocriteria in 2018 might seem at odds with the appearance of modified riparian characteristics (mowed levees) along the Great Miami River mainstem and the numerous stormwater outfalls that occur in this reach. Levees have been maintained along the entirety of this reach by the Miami Conservancy District (MCD) for many decades and their return to a more natural and wooded riparian is precluded by their maintenance. Given what could be seen by some as a serious deficiency in the riverscape, other factors that support the exceptional performance of the biological assemblages must also be considered. As indicated previously the City of Dayton is unique among cities in Ohio and the Midwest by not having a combined sewer system. This precludes the periodic pollution by sewage constituents that have been shown to result in marginal water quality that results in WWH impairment in other Ohio rivers and streams that are impacted by combined sewer systems.

Figure 2. Qualitative Habitat Evaluation Index (QHEI) scores showing good and modified Habitat attributes at sites in the Great Miami River in 2018/17, 2010, 1995, 1989, and 1980. Color code legend: yellow – altered; orange – moderately altered; red – severely altered.

| Site ID | River Mile | QHEI | Good Habitat Attributes | | | | | | | | | | High Influence Modified Attributes | | | | | Moderate Influence Modified Attributes | | | | | | | Ratios | | | | | | | |
|--|------------|------|-------------------------|-------------------------|-----------|----------------------------|-------------------------|--------------------------|--------------------|---------------------------|-------------------|------------------------|------------------------------------|----------------------------|----------------------|--------------|-----------------|--|--------------------------------|--------------------------------|---------------------|----------------------------------|----------------|------------------------|---------------|-----------------|-----------------------------------|-----------------------|----------------------------|----------------------|-----------|-------------------------|
| | | | No Channelization | Boulder, Cobble, Gravel | Silt Free | Good-Excellent Development | Moderate-High Sinuosity | Moderate-Extensive Cover | Fast Flow w Eddies | Little to No Embeddedness | Max Depth > 40 cm | No Riffle Embeddedness | “Good” Habitat Attributes | Channelized or No Recovery | Silt/Muck Substrates | No Sinuosity | Sparse No Cover | Max Depths <40 cm | High Influence Poor Attributes | Recovering from Channelization | Mod-High Silt Cover | Sand Substrates (Boatable sites) | Hardpan Origin | Fair- Poor Development | Low Sinuosity | < 2 Cover Types | Intermittent Flow or Pools <20 cm | No Fast Current Types | Mod-Extensive Embeddedness | Mod-Extensive Riffle | No Riffle | Poor Habitat Attributes |
| Great Miami River – MBI 2018 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| GMRB25 | 81.8 | 77.0 | ■ | ■ | | ■ | | ■ | ■ | ■ | ■ | 7 | | | | | 0 | | | | | | ● | | | | ● | | | 2 | 0.00 | 0.29 |
| GMRB24 | 81.1 | 72.5 | ■ | ■ | | ■ | | ■ | ■ | ■ | ■ | 7 | | | | | 0 | | ● | | | | ● | | | | ● | | | 3 | 0.00 | 0.43 |
| H09W72 | 79.5 | 80.0 | ■ | ■ | | ■ | ■ | ■ | ■ | ■ | ■ | 9 | | | | | 0 | | | | | | | | | | | | | 0 | 0.00 | 0.00 |
| H09W02 | 77.9 | 79.0 | ■ | ■ | | ■ | ■ | ■ | ■ | ■ | ■ | 9 | | | | | 0 | | | | | | | | | | | | | 0 | 0.00 | 0.00 |
| GMRB23 | 76.8 | 74.5 | ■ | ■ | | ■ | ■ | ■ | | ■ | ■ | 7 | | | | | 0 | | ● | | | | | | | | ● | ● | | 3 | 0.00 | 0.43 |
| Great Miami River – MBI 2017 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| GMRB26 | 82.7 | 51.0 | | ■ | | | | ■ | | | | 3 | | | | | 0 | | ● | ● | | ● | ● | | | ● | ● | | ● | 7 | 0.00 | 2.33 |
| Great Miami River – Ohio EPA 2010 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| GMRB25 | 81.1 | 48.0 | ■ | ■ | | | | | | ■ | | 3 | | ● | | ● | 2 | | ● | | | ● | ● | | | ● | ● | | | 5 | 0.67 | 2.33 |
| H09W02 | 78.9 | 62.0 | | ■ | | | | | | ■ | | 2 | | | | ● | 1 | | ● | ● | | ● | ● | | | ● | ● | ● | | 7 | 0.50 | 4.00 |

Figure 2. Qualitative Habitat Evaluation Index (QHEI) scores showing good and modified Habitat attributes at sites in the Great Miami River in 2018/17, 2010, 1995, 1989, and 1980. Color code legend: yellow – altered; orange – moderately altered; red – severely altered.

| Site ID | River Mile | QHEI | Good Habitat Attributes | | | | | | | | | | High Influence Modified Attributes | | | | | Moderate Influence Modified Attributes | | | | | | | Ratios | | | | | | | | | | |
|--|------------|------|--|-----------|----------------------------|-------------------------|--------------------------|--------------------|---------------------------|-------------------|------------------------|---------------------------|------------------------------------|----------------------|--------------|-----------------|-------------------|--|--------------------------------|---------------------|----------------------------------|----------------|------------------------|---------------|-----------------|-----------------------------------|-----------------------|----------------------------|----------------------|-----------|-------------------------|------------------------------|-----------------------------|------|------|
| | | | No Channelization Boulder, Cobble, Gravel | Silt Free | Good-Excellent Development | Moderate-High Sinuosity | Moderate-Extensive Cover | Fast Flow w Eddies | Little to No Embeddedness | Max Depth > 40 cm | No Riffle Embeddedness | “Good” Habitat Attributes | Channelized or No Recovery | Silt/Muck Substrates | No Sinuosity | Sparse No Cover | Max Depths <40 cm | High Influencing Poor Attributes | Recovering from Channelization | Mod-High Silt Cover | Sand Substrates (Boatable sites) | Hardpan Origin | Fair- Poor Development | Low Sinuosity | < 2 Cover Types | Intermittent Flow or Pools <20 cm | No Fast Current Types | Mod-Extensive Embeddedness | Mod-Extensive Riffle | No Riffle | Poor Habitat Attributes | Ratio of Poor (High) to Good | Ratio of Poor (All) to Good | | |
| H09W67 | 77.3 | 72.8 | ■ | | ■ | | ■ | ■ | | ■ | | | | | 5 | | | | | | | | | | | | | | | | | | 6 | 0.20 | 1.40 |
| Great Miami River – Ohio EPA 1995 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 600310 | 83.3 | 44.0 | | | | ■ | ■ | | | | | | | | 3 | | ● | | | | | | | | | | | | | | | 5 | 0.33 | 2.00 | |
| GMRB25 | 82.0 | 66.0 | ■ | | ■ | | ■ | ■ | ■ | ■ | ■ | | | | 7 | | | | | | | | | | | | | | | | | 2 | 0.14 | 0.43 | |
| 610060 | 80.7 | 74.0 | ■ | | ■ | ■ | ■ | ■ | ■ | ■ | ■ | | | | 8 | | ● | | | | | | | | | | | | | | | 1 | 0.00 | 0.13 | |
| H09W72 | 79.9 | 71.5 | ■ | | ■ | ■ | ■ | ■ | ■ | ■ | ■ | | | | 8 | | ● | | | | | | | | | | | | | | | 1 | 0.00 | 0.13 | |
| H09W02 | 78.1 | 42.5 | ■ | | | ■ | ■ | | | ■ | | | | | 4 | ● | ● | | | | | | | | | ● | ● | | | | | 4 | 0.75 | 1.75 | |
| H09W67 | 77.1 | 44.0 | | | | ■ | ■ | | | ■ | | | | | 3 | ● | ● | | | | | | | | | ● | ● | | | | | 4 | 1.00 | 2.33 | |
| GMRB23 | 76.9 | 75.0 | ■ | | ■ | ■ | ■ | ■ | ■ | ■ | ■ | | | | 8 | | ● | | | | | | | | | | | | | | | 1 | 0.00 | 0.13 | |
| Great Miami River – Ohio EPA 1989 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| GMRB26 | 82.9 | 36.0 | | | | | | | | ■ | | | | | 1 | ● | ● | ● | ● | | | | | | | | | | | | | 4 | 4.00 | 8.00 | |
| GMRB25 | 82 | 50.0 | ■ | | | | | | ■ | ■ | | | | | 3 | | | | | | | | | | | | ● | ● | ● | | | 7 | 0.30 | 2.70 | |

Figure 2. Qualitative Habitat Evaluation Index (QHEI) scores showing good and modified Habitat attributes at sites in the Great Miami River in 2018/17, 2010, 1995, 1989, and 1980. Color code legend: yellow – altered; orange – moderately altered; red – severely altered.

| Site ID | River Mile | QHEI | Good Habitat Attributes | | | | | | | | | | High Influence Modified Attributes | | | | | Moderate Influence Modified Attributes | | | | | | | Ratios | | | | | | | | | |
|--|------------|------|-------------------------|-------------------------|-----------|----------------------------|-------------------------|--------------------------|--------------------|---------------------------|-------------------|------------------------|------------------------------------|----------------------------|----------------------|--------------|-----------------|--|--------------------------------|--------------------------------|---------------------|----------------------------------|----------------|------------------------|---------------|-----------------|-----------------------------------|-----------------------|----------------------------|----------------------|-----------|-------------------------|------------------------------|-----------------------------|
| | | | No Channelization | Boulder, Cobble, Gravel | Silt Free | Good-Excellent Development | Moderate-High Sinuosity | Moderate-Extensive Cover | Fast Flow w Eddies | Little to No Embeddedness | Max Depth > 40 cm | No Riffle Embeddedness | “Good” Habitat Attributes | Channelized or No Recovery | Silt/Muck Substrates | No Sinuosity | Sparse No Cover | Max Depths <40 cm | High Influence Poor Attributes | Recovering from Channelization | Mod-High Silt Cover | Sand Substrates (Boatable sites) | Hardpan Origin | Fair- Poor Development | Low Sinuosity | < 2 Cover Types | Intermittent Flow or Pools <20 cm | No Fast Current Types | Mod-Extensive Embeddedness | Mod-Extensive Riffle | No Riffle | Poor Habitat Attributes | Ratio of Poor (High) to Good | Ratio of Poor (All) to Good |
| 610060 | 80.4 | 68.0 | | ■ | | | | ■ | ■ | ■ | ■ | ■ | 6 | | | | | 0 | ● | | | | | | | | | | | | | 3 | 0.00 | 0.50 |
| GMRB24 | 80.1 | 70.5 | | ■ | | ■ | | ■ | ■ | ■ | ■ | ■ | 7 | | | ● | | 1 | ● | | | | | | | | | | | | | 3 | 0.10 | 0.60 |
| H09W02 | 77.9 | 53.0 | | ■ | | | | ■ | | ■ | | | 3 | ● | | | | 1 | | | | | | | | ● | ● | | | | 4 | 0.30 | 1.70 | |
| GMRB23 | 76.9 | 61.5 | | ■ | | | | ■ | ■ | | ■ | | 4 | | | | | 0 | ● | ● | | | | | | | ● | | | | 5 | 0.00 | 1.30 | |
| Great Miami River – Ohio EPA 1980 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 600310 | 83.3 | 57.0 | ■ | ■ | | | | | | ■ | ■ | | 4 | | | | ● | 1 | | | | | | | | | | | | | 3 | 0.30 | 1.00 | |
| 610060 | 80.7 | 56.0 | | ■ | | | | ■ | | ■ | ■ | | 4 | ● | | | | 2 | | | | | | | | | | | | | 4 | 0.50 | 1.50 | |
| H09W67 | 77.1 | 59.0 | ■ | ■ | | | | | | ■ | ■ | | 4 | | | | ● | 1 | | | ● | | | | | | | | | | 5 | 0.30 | 1.50 | |

There are no significant surface flow diversions for public or industrial water supplies that are common to many other Ohio municipalities which results in serious enough hydrological modifications to make attainment of even the WWH use a challenge in some Ohio rivers. This can be especially exacerbated when combined sewer overflows are present as the pollutants and their lingering effects are not as readily assimilated during the critical low flow periods of the summer and early fall. The situation in the Great Miami River in downtown Dayton is quite the opposite with more than adequate base flows being provided by the upper Great Miami, Mad, and Stillwater Rivers all of which enter either just upstream or in the upper reach of the 2018 study area. It is the combined and beneficial effect of the sustained flows that overcomes what might otherwise be seen as physical limitations to EWH attainability and attainment. The improvements observed since 1980 is part of a general pattern of improvements seen in Ohio's large rivers especially (Ohio EPA 2018). This is a largely the product of Clean Water Act mandated water quality-based pollution controls installed by major wastewater treatment plants throughout Ohio in the late 1980s combined with some successes with voluntary or incentive based nonpoint source controls that have allowed for an unprecedented recovery of river and stream biological assemblages that is continuing yet today (Yoder et al., in press; Rice and Zimmerman 2019). While the future status of these ongoing improvements is uncertain, acting to protect the highest quality resources now is the best approach that is currently available. Designating this reach to EWH would contribute to that protection.

The criteria for designating a river or stream reach as EWH is for *both* the fish and macroinvertebrate assemblages to fully meet the EWH biological criteria and at a sufficient number of sites within a reach with multiple sampling sites. With only one exception this was strongly evident in the 2018 results. The single site in partial attainment of EWH was due to the temporal impact of excessive sedimentation resulting from the sediment plume caused by the Tait Dam removal which was actively occurring during the deployment of the artificial substrates in 2018. The expectation is that once the dam removal activity has ceased the sedimentation will be reduced by the natural recovery processes in the mainstem. Taken together the 2018 results are ample justification for revising the current WWH use designation to EWH for the reach between the Steele Dam (RM 82.2) to the Dayton WWTP (RM 76.2). The impounded reach formed by the Steele Dam would remain at the current WWH designation between the dam upstream to the CSX RR bridge which is the downstream boundary of the currently EWH designated upstream reach (Table 3). This recommendation will be submitted to Ohio EPA as part of the requirements for submitting data and results under the Ohio Credible Data Law and Regulations.

Table 3. Waterbody use designations for the Great Miami River mainstem. Designations based on the 1978 and 1985 standards for which results of a biological field assessment are since available are indicated with a “+”. A delta (▲) indicates new recommendation(s) based on the findings of this report.

| Water Body Segment | Use Designations | | | | | | | | | | | | Comments | |
|--|----------------------|-----|-----|-----|-----|-----|--------------|-----|-----|------------|----|-----|----------|---|
| | Aquatic Life Habitat | | | | | | Water Supply | | | Recreation | | | | |
| | SRW | EWH | WWH | MWH | SSH | CWH | LRW | PWS | AWS | IWS | BW | PCR | | SCR |
| Great Miami River - CSX RR bridge (RM 84.5) to the Troy dam(RM 107.0). - Steele Dam (RM 82.0) to the Dayton WWTP outfall (RM 76.2). - at RMs 86.6, 90.3, 118.5 and 130.2. - RM 108.0 to downstream of Piqua dam (RM 114.0). - Main street (RM 115.15) to the Sidney water works dam (RM 130.2). - Pasco-Montra Rd. (RM 134.8) to the Quincy dam (RM 143.4). - all other segments | | + | + | | | | | | + | + | | + | | PWS intakes - Dayton (RMs 86.6 and 90.3), Piqua (RM 118.5), and Sidney (RM 130.2) |
| | ▲ | | | | | | | + | + | + | | + | | |

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APPENDIX A: Fish Assemblage Data

Appendix Table A-1. Boatable IBI scores and metrics for sites sampled in the Great Miami River from 1980 to 2018.

| Site ID | River Mile | Type | Drainage Date | Drainage area (sq mi) | Number of | | | | Percent of Individuals | | | | | | Rel.No. minus tolerants /(1.0 km) | Modified | | | |
|-----------------------------|------------|------|---------------|-----------------------|---------------|-----------------|----------------|--------------------|------------------------|-------------------|-----------------|-----------|----------------|--------------|-----------------------------------|-----------------|-----|------|--------|
| | | | | | Total species | Sunfish species | Sucker species | Intolerant species | Rnd-bodied suckers | Simple Lithophils | Tolerant fishes | Omnivores | Top carnivores | Insectivores | | DELTA anomalies | IBI | lwb | Source |
| Great Miami River - (14001) | | | | | | | | | | | | | | | | | | | |
| Year: 2018 | | | | | | | | | | | | | | | | | | | |
| GMRB25 | 81.80 | P | 08/27/2018 | 1852 | 30(5) | 4(5) | 7(5) | 4(5) | 34(3) | 51(5) | 8(5) | 33(1) | 4(1) | 61(5) | 0.0(5) | 702(5) | 50 | 10.2 | MBI |
| GMRB25 | 81.80 | P | 10/08/2018 | 1852 | 24(5) | 3(3) | 6(5) | 5(5) | 62(5) | 68(5) | 5(5) | 22(3) | 4(1) | 74(5) | 0.0(5) | 796(5) | 52 | 9.4 | MBI |
| GMRB25 | 81.10 | A | 08/27/2018 | 2511 | 27(5) | 4(5) | 8(5) | 3(3) | 39(5) | 52(5) | 8(5) | 29(1) | 10(3) | 61(5) | 0.0(5) | 458(5) | 52 | 9.4 | MBI |
| GMRB25 | 81.10 | A | 10/08/2018 | 2511 | 23(5) | 3(3) | 7(5) | 3(3) | 51(5) | 63(5) | 4(5) | 20(3) | 7(3) | 72(5) | 0.0(5) | 360(3) | 50 | 9.6 | MBI |
| H09W72 | 79.50 | A | 08/27/2018 | 2590 | 19(3) | 1(1) | 7(5) | 5(5) | 60(5) | 84(5) | 3(5) | 4(5) | 3(1) | 86(5) | 0.0(5) | 622(5) | 50 | 10.2 | MBI |
| H09W72 | 79.50 | A | 10/08/2018 | 2590 | 26(5) | 3(3) | 7(5) | 5(5) | 44(5) | 72(5) | 3(5) | 3(5) | 5(1) | 82(5) | 0.7(3) | 1300(5) | 52 | 10.7 | MBI |
| H09W02 | 77.90 | A | 08/27/2018 | 2589 | 17(3) | 2(3) | 6(5) | 4(5) | 56(5) | 63(5) | 3(5) | 24(3) | 9(3) | 64(5) | 0.0(5) | 498(5) | 52 | 10.2 | MBI |
| H09W02 | 77.90 | A | 10/08/2018 | 2589 | 27(5) | 3(3) | 7(5) | 5(5) | 60(5) | 78(5) | 1(5) | 5(5) | 7(3) | 87(5) | 0.0(5) | 580(5) | 56 | 10.3 | MBI |
| GMRB23 | 76.80 | A | 08/27/2018 | 2600 | 26(5) | 2(3) | 6(5) | 6(5) | 39(5) | 77(5) | 3(5) | 4(5) | 12(5) | 80(5) | 0.0(5) | 762(5) | 58 | 10.3 | MBI |
| GMRB23 | 76.80 | A | 10/08/2018 | 2600 | 21(5) | 1(1) | 7(5) | 5(5) | 47(5) | 74(5) | 1(5) | 2(5) | 4(1) | 94(5) | 0.5(3) | 726(5) | 50 | 9.8 | MBI |
| Year: 2017 | | | | | | | | | | | | | | | | | | | |
| GMR-82. | 82.70 | A | 09/22/2017 | 1180 | 14(3) | 5(5) | 3(3) | 1(1) | 20(3) | 20(1) | 11(5) | 50(1) | 8(3) | 42(3) | 0.0(5) | 118(1) * | 34 | 7.2 | MBI |
| GMRB25 | 81.10 | A | 09/22/2017 | 2511 | 8(1) | 0(1) | 5(3) | 2(3) | 93(5) | 94(5) | 0(5) | 4(5) | 1(1) | 94(5) | 0.0(5) | 180(1) * | 40 | 6.6 | MBI |
| H09W02 | 77.90 | A | 09/22/2017 | 2589 | 7(1) | 0(1) | 5(3) | 2(3) | 72(5) | 78(1) | 11(1) | 17(1) | 6(1) | 72(1) | 5.6(1) | 32(1)** | 20 | 7.2 | MBI |
| Year: 2010 | | | | | | | | | | | | | | | | | | | |
| GMRB25 | 81.10 | A | 10/01/2010 | 2511 | 19(3) | 1(1) | 6(5) | 2(3) | 39(5) | 41(5) | 9(5) | 35(1) | 8(3) | 56(5) | 0.0(5) | 212(3) | 44 | 8.7 | OEPA |
| H09W02 | 78.90 | A | 08/04/2010 | 2587 | 20(3) | 3(3) | 7(5) | 4(5) | 47(5) | 53(5) | 6(5) | 7(5) | 19(5) | 69(5) | 0.0(5) | 406(3) | 54 | 10.0 | OEPA |
| H09W67 | 77.30 | A | 08/04/2010 | 2590 | 25(5) | 6(5) | 5(3) | 2(3) | 36(3) | 38(5) | 5(5) | 5(5) | 6(3) | 84(5) | 0.0(5) | 636(5) | 52 | 9.8 | OEPA |
| H09W73 | 75.70 | A | 08/09/2010 | 2594 | 23(5) | 6(5) | 6(5) | 2(3) | 31(3) | 34(3) | 11(5) | 15(5) | 16(5) | 66(5) | 0.0(5) | 334(3) | 52 | 9.6 | OEPA |
| Year: 2009 | | | | | | | | | | | | | | | | | | | |
| GMRB25 | 81.60 | A | 08/12/2009 | 1853 | 26(5) | 5(5) | 7(5) | 4(5) | 35(3) | 58(5) | 9(5) | 12(5) | 14(5) | 70(5) | 0.0(5) | 1082(5) | 58 | 10.8 | OEPA |
| GMRB25 | 81.60 | A | 09/08/2009 | 1853 | 31(5) | 5(5) | 7(5) | 5(5) | 40(5) | 55(5) | 11(5) | 12(5) | 27(5) | 61(5) | 0.8(3) | 918(5) | 58 | 10.6 | OEPA |
| Year: 2000 | | | | | | | | | | | | | | | | | | | |
| 610060 | 80.50 | A | 07/27/2000 | 2511 | 22(5) | 5(5) | 7(5) | 4(5) | 51(5) | 55(5) | 11(5) | 14(5) | 14(5) | 72(5) | 0.4(5) | 440(5) | 60 | 9.4 | OEPA |
| Year: 1995 | | | | | | | | | | | | | | | | | | | |

♦ - IBI is low end adjusted.

* - < 200 Total individuals in sample

** - < 50 Total individuals in sample

Appendix Table A-1. Boatable IBI scores and metrics for sites sampled in the Great Miami River from 1980 to 2018.

| Site ID | River Mile | Type | Drainage Date | Drainage area (sq mi) | Number of | | | | Percent of Individuals | | | | | | | Rel.No. tolerants /(1.0 km) | Modified IBI | lwb | Source |
|------------|------------|------|---------------|-----------------------|---------------|-----------------|----------------|--------------------|------------------------|-------------------|-----------------|-----------|----------------|--------------|-----------------|-----------------------------|--------------|------|--------|
| | | | | | Total species | Sunfish species | Sucker species | Intolerant species | Rnd-bodied suckers | Simple Lithophils | Tolerant fishes | Omnivores | Top carnivores | Insectivores | DELTA anomalies | | | | |
| 600310 | 83.30 | A | 09/13/1995 | 1174 | 13(3) | 4(5) | 5(3) | 0(1) | 18(1) | 18(1) | 32(1) | 27(3) | 4(1) | 69(5) | 0.8(3) | 214(3) | 30 | 8.3 | OEPA |
| 600310 | 83.30 | A | 08/22/1995 | 1174 | 18(3) | 6(5) | 4(3) | 0(1) | 33(3) | 33(3) | 44(1) | 19(3) | 4(1) | 76(5) | 1.4(3) | 276(3) | 34 | 8.7 | OEPA |
| GMRB25 | 82.00 | A | 08/23/1995 | 1852 | 26(5) | 7(5) | 5(3) | 3(3) | 52(5) | 55(5) | 11(5) | 20(3) | 7(3) | 71(5) | 0.6(3) | 908(5) | 50 | 10.1 | OEPA |
| GMRB25 | 82.00 | A | 09/14/1995 | 1852 | 25(5) | 6(5) | 7(5) | 2(3) | 37(3) | 39(5) | 13(5) | 10(5) | 13(5) | 77(5) | 0.8(3) | 670(5) | 54 | 9.7 | OEPA |
| 610060 | 80.70 | A | 08/23/1995 | 2511 | 23(5) | 7(5) | 8(5) | 3(3) | 64(5) | 65(5) | 10(5) | 14(5) | 9(3) | 77(5) | 0.7(3) | 832(5) | 54 | 9.5 | OEPA |
| 610060 | 80.70 | A | 09/14/1995 | 2511 | 26(5) | 6(5) | 6(5) | 1(1) | 26(3) | 27(3) | 26(3) | 8(5) | 11(5) | 80(5) | 1.0(3) | 678(5) | 48 | 9.4 | OEPA |
| H09W72 | 79.90 | A | 08/23/1995 | 2583 | 22(5) | 4(5) | 6(5) | 4(5) | 70(5) | 72(5) | 4(5) | 15(5) | 6(3) | 79(5) | 0.5(5) | 806(5) | 58 | 9.6 | OEPA |
| H09W72 | 79.90 | A | 09/14/1995 | 2583 | 17(3) | 4(5) | 7(5) | 2(3) | 79(5) | 82(5) | 5(5) | 7(5) | 7(3) | 86(5) | 1.4(3) | 476(5) | 52 | 8.6 | OEPA |
| H09W02 | 78.10 | A | 08/23/1995 | 2589 | 13(3) | 4(5) | 4(3) | 1(1) | 50(5) | 51(5) | 18(3) | 19(3) | 12(5) | 69(5) | 1.4(3) | 242(3) | 44 | 8.3 | OEPA |
| H09W02 | 78.10 | A | 09/14/1995 | 2589 | 15(3) | 5(5) | 4(3) | 0(1) | 19(1) | 19(3) | 15(5) | 10(5) | 13(5) | 77(5) | 3.8(1) | 328(3) | 40 | 8.3 | OEPA |
| H09W67 | 77.10 | A | 08/23/1995 | 2591 | 15(3) | 6(5) | 3(3) | 0(1) | 31(3) | 31(3) | 15(3) | 33(1) | 6(3) | 61(5) | 1.0(3) | 362(3) | 36 | 8.9 | OEPA |
| H09W67 | 77.10 | A | 09/14/1995 | 2591 | 16(3) | 5(5) | 4(3) | 0(1) | 25(3) | 28(3) | 17(3) | 13(5) | 10(3) | 77(5) | 5.4(1) | 434(5) | 40 | 8.8 | OEPA |
| GMRB23 | 76.90 | A | 08/24/1995 | 2591 | 19(3) | 4(5) | 6(5) | 2(3) | 49(5) | 51(5) | 13(5) | 30(1) | 5(3) | 63(5) | 2.9(3) | 560(5) | 48 | 9.2 | OEPA |
| GMRB23 | 76.90 | A | 09/15/1995 | 2591 | 21(5) | 6(5) | 3(3) | 1(1) | 21(3) | 23(3) | 3(5) | 50(1) | 6(3) | 44(3) | 0.3(5) | 764(5) | 42 | 8.9 | OEPA |
| H09W10 | 76.10 | A | 08/24/1995 | 2594 | 14(3) | 2(3) | 6(5) | 2(3) | 57(5) | 62(5) | 10(5) | 9(5) | 9(3) | 81(5) | 2.2(3) | 1360(5) | 50 | 10.2 | OEPA |
| H09W10 | 76.10 | A | 09/15/1995 | 2594 | 18(3) | 3(3) | 5(3) | 3(3) | 22(3) | 24(3) | 52(1) | 52(1) | 4(1) | 43(3) | 1.0(3) | 970(5) | 32 | 9.4 | OEPA |
| H09W73 | 75.90 | A | 08/24/1995 | 2594 | 20(3) | 4(5) | 6(5) | 2(3) | 51(5) | 55(5) | 10(5) | 21(3) | 10(5) | 68(5) | 1.6(3) | 614(5) | 52 | 9.7 | OEPA |
| H09W73 | 75.90 | A | 09/15/1995 | 2594 | 18(3) | 5(5) | 4(3) | 1(1) | 44(5) | 47(5) | 9(5) | 12(5) | 11(5) | 76(5) | 1.0(3) | 544(5) | 50 | 9.4 | OEPA |
| Year: 1989 | | | | | | | | | | | | | | | | | | | |
| GMRB26 | 82.90 | A | 07/10/1989 | 1175 | 15(3) | 4(5) | 5(3) | 1(1) | 6(1) | 6(1) | 50(1) | 21(3) | 3(1) | 77(5) | 0.0(5) | 220(3) | 32 | 7.7 | OEPA |
| GMRB26 | 82.90 | A | 09/11/1989 | 1175 | 17(3) | 7(5) | 5(3) | 1(1) | 11(1) | 11(1) | 30(1) | 39(1) | 10(5) | 50(3) | 0.0(5) | 358(3) | 32 | 9.0 | OEPA |
| GMRB25 | 82.00 | A | 07/11/1989 | 1852 | 22(5) | 6(5) | 7(5) | 1(1) | 11(1) | 12(1) | 23(3) | 50(1) | 8(3) | 42(3) | 1.4(3) | 664(5) | 36 | 9.8 | OEPA |
| GMRB25 | 82.00 | A | 08/15/1989 | 1852 | 20(5) | 6(5) | 5(3) | 0(1) | 11(1) | 12(1) | 25(3) | 33(1) | 12(5) | 55(5) | 1.8(3) | 636(5) | 38 | 8.7 | OEPA |
| GMRB25 | 82.00 | A | 09/13/1989 | 1852 | 22(5) | 6(5) | 6(5) | 0(1) | 20(3) | 23(3) | 31(1) | 22(3) | 10(5) | 67(5) | 1.9(3) | 442(5) | 44 | 9.5 | OEPA |
| 610060 | 80.40 | A | 07/11/1989 | 2512 | 22(5) | 6(5) | 6(5) | 1(1) | 19(1) | 22(3) | 16(3) | 35(1) | 19(5) | 45(3) | 1.6(3) | 456(5) | 40 | 10.0 | OEPA |
| 610060 | 80.40 | A | 08/15/1989 | 2512 | 24(5) | 7(5) | 7(5) | 1(1) | 40(5) | 42(5) | 18(3) | 31(1) | 14(5) | 56(5) | 2.7(3) | 470(5) | 48 | 9.6 | OEPA |

◆ - IBI is low end adjusted.

* - < 200 Total individuals in sample

** - < 50 Total individuals in sample

Appendix Table A-1. Boatable IBI scores and metrics for sites sampled in the Great Miami River from 1980 to 2018.

| Site ID | River Mile | Type | Drainage Date | Drainage area (sq mi) | Number of | | | | Percent of Individuals | | | | | | Rel.No. tolerants /(1.0 km) | Modified IBI | lwb | Source | |
|------------|------------|------|---------------|-----------------------|---------------|-----------------|----------------|--------------------|------------------------|-------------------|-----------------|-----------|----------------|--------------|-----------------------------|--------------|-----|--------|-----------------|
| | | | | | Total species | Sunfish species | Sucker species | Intolerant species | Rnd-bodied suckers | Simple Lithophils | Tolerant fishes | Omnivores | Top carnivores | Insectivores | | | | | DELTA anomalies |
| 610060 | 80.40 | A | 09/12/1989 | 2512 | 25(5) | 6(5) | 9(5) | 3(3) | 49(5) | 52(5) | 14(5) | 16(5) | 14(5) | 69(5) | 2.3(3) | 413(3) | 54 | 9.4 | OEPA |
| GMRB24 | 80.10 | A | 07/11/1989 | 2583 | 21(5) | 4(5) | 7(5) | 4(5) | 20(3) | 22(3) | 6(5) | 64(1) | 9(3) | 27(3) | 0.3(5) | 816(5) | 48 | 9.3 | OEPA |
| GMRB24 | 80.10 | A | 08/15/1989 | 2583 | 24(5) | 6(5) | 8(5) | 3(3) | 38(5) | 40(5) | 15(3) | 29(1) | 13(5) | 57(5) | 2.8(3) | 428(5) | 50 | 10.2 | OEPA |
| GMRB24 | 80.10 | A | 09/13/1989 | 2583 | 21(5) | 4(5) | 8(5) | 4(5) | 42(5) | 45(5) | 11(5) | 35(1) | 12(5) | 53(3) | 0.0(5) | 408(3) | 52 | 9.7 | OEPA |
| H09W02 | 77.90 | A | 07/11/1989 | 2589 | 12(3) | 4(5) | 4(3) | 0(1) | 16(1) | 17(1) | 26(3) | 40(1) | 20(5) | 40(3) | 2.1(3) | 220(3) | 32 | 8.5 | OEPA |
| H09W02 | 77.90 | A | 08/15/1989 | 2589 | 14(3) | 5(5) | 4(3) | 0(1) | 17(1) | 19(3) | 42(1) | 17(3) | 6(3) | 77(5) | 1.6(3) | 268(3) | 34 | 8.5 | OEPA |
| H09W02 | 77.90 | A | 09/13/1989 | 2589 | 14(3) | 5(5) | 5(3) | 0(1) | 16(1) | 17(1) | 20(3) | 9(5) | 13(5) | 78(5) | 5.2(1) | 384(3) | 36 | 8.6 | OEPA |
| GMRB23 | 76.90 | A | 07/11/1989 | 2591 | 17(3) | 5(5) | 4(3) | 0(1) | 4(1) | 9(1) | 21(3) | 24(3) | 21(5) | 53(3) | 0.0(5) | 320(3) | 36 | 9.0 | OEPA |
| GMRB23 | 76.90 | A | 08/15/1989 | 2591 | 16(3) | 6(5) | 3(3) | 0(1) | 4(1) | 4(1) | 22(3) | 14(5) | 12(5) | 71(5) | 1.0(3) | 553(5) | 40 | 8.1 | OEPA |
| GMRB23 | 76.90 | A | 09/13/1989 | 2591 | 13(3) | 6(5) | 2(1) | 0(1) | 4(1) | 4(1) | 20(3) | 48(1) | 4(1) | 46(3) | 0.5(5) | 378(3) | 28 | 7.4 | OEPA |
| H09W10 | 76.10 | A | 07/17/1989 | 2594 | 13(3) | 3(3) | 4(3) | 0(1) | 1(1) | 2(1) | 29(1) | 39(1) | 6(3) | 52(3) | 0.7(3) | 2040(5) | 28 | 9.8 | OEPA |
| H09W10 | 76.10 | A | 08/15/1989 | 2594 | 15(3) | 4(5) | 3(3) | 0(1) | 9(1) | 12(1) | 24(3) | 12(5) | 11(5) | 74(5) | 0.8(5) | 594(5) | 42 | 8.8 | OEPA |
| H09W10 | 76.10 | A | 09/13/1989 | 2594 | 12(3) | 3(3) | 3(3) | 0(1) | 10(1) | 12(1) | 13(5) | 39(1) | 10(3) | 50(3) | 0.7(3) | 1260(5) | 32 | 9.8 | OEPA |
| H09W73 | 76.00 | A | 07/17/1989 | 2594 | 19(3) | 6(5) | 4(3) | 0(1) | 4(1) | 5(1) | 37(1) | 26(3) | 8(3) | 66(5) | 0.2(5) | 698(5) | 36 | 9.0 | OEPA |
| H09W73 | 76.00 | A | 08/15/1989 | 2594 | 17(3) | 6(5) | 3(3) | 0(1) | 2(1) | 3(1) | 29(1) | 22(3) | 9(3) | 68(5) | 0.3(5) | 757(5) | 36 | 9.0 | OEPA |
| H09W73 | 76.00 | A | 09/13/1989 | 2594 | 18(3) | 6(5) | 4(3) | 0(1) | 3(1) | 5(1) | 19(3) | 20(3) | 7(3) | 73(5) | 0.5(3) | 750(5) | 36 | 9.0 | OEPA |
| H09W73 | 75.90 | A | 07/17/1989 | 2594 | 21(5) | 6(5) | 5(3) | 0(1) | 3(1) | 4(1) | 33(1) | 30(1) | 8(3) | 61(5) | 0.8(3) | 966(5) | 34 | 9.4 | OEPA |
| H09W73 | 75.90 | A | 08/15/1989 | 2594 | 20(5) | 6(5) | 4(3) | 0(1) | 4(1) | 5(1) | 27(1) | 19(3) | 9(3) | 69(5) | 0.2(5) | 812(5) | 38 | 9.3 | OEPA |
| H09W73 | 75.90 | A | 09/13/1989 | 2594 | 19(3) | 6(5) | 4(3) | 0(1) | 5(1) | 7(1) | 18(3) | 25(3) | 8(3) | 67(5) | 0.0(5) | 852(5) | 38 | 9.4 | OEPA |
| Year: 1987 | | | | | | | | | | | | | | | | | | | |
| GMRB25 | 82.30 | A | 08/18/1987 | 1851 | 16(3) | 4(5) | 5(3) | 0(1) | 18(0) | 19(3) | 35(1) | 32(3) | 3(3) | 65(5) | 1.3(5) | 61(1) * | 33 | 7.0 | OEPA |
| Year: 1980 | | | | | | | | | | | | | | | | | | | |
| 600310 | 83.30 | A | 07/10/1980 | 1174 | 11(3) | 5(5) | 2(1) | 1(1) | 13(1) | 13(1) | 72(1) | 9(5) | 3(1) | 89(5) | 0.0(5) | 84(1) | 30 | 6.5 | OEPA |
| 600310 | 83.30 | A | 08/12/1980 | 1174 | 14(3) | 5(5) | 6(5) | 1(1) | 14(1) | 15(1) | 32(1) | 30(1) | 2(1) | 68(5) | 11.7(1) | 226(3) | 28 | 8.2 | OEPA |
| 600310 | 83.30 | A | 09/16/1980 | 1174 | 13(3) | 4(5) | 5(3) | 1(1) | 17(1) | 19(1) | 36(1) | 34(1) | 1(1) | 65(5) | 6.7(1) | 172(1) | 24 | 8.1 | OEPA |
| GMRB25 | 81.80 | A | 08/05/1980 | 1852 | 12(3) | 2(3) | 6(5) | 1(1) | 8(1) | 9(1) | 86(1) | 83(1) | 1(1) | 15(1) | 13.1(1) | 40(1) | 20 | 4.7 | OEPA |

♦ - IBI is low end adjusted.

* - < 200 Total individuals in sample

** - < 50 Total individuals in sample

Appendix Table A-1. Boatable IBI scores and metrics for sites sampled in the Great Miami River from 1980 to 2018.

| Site ID | River Mile | Type | Drainage Date | Drainage area (sq mi) | Number of | | | | Percent of Individuals | | | | | | | Rel.No. minus tolerants /(1.0 km) | Modified | | |
|---------|------------|------|---------------|-----------------------|---------------|-----------------|----------------|--------------------|------------------------|-------------------|-----------------|-----------|----------------|--------------|-----------------|-----------------------------------|----------|-----|--------|
| | | | | | Total species | Sunfish species | Sucker species | Intolerant species | Rnd-bodied suckers | Simple Lithophils | Tolerant fishes | Omnivores | Top carnivores | Insectivores | DELTA anomalies | | IBI | lwb | Source |
| GMRB25 | 81.80 | A | 08/12/1980 | 1852 | 15(3) | 6(5) | 4(3) | 0(1) | 4(1) | 7(1) | 74(1) | 63(1) | 5(1) | 33(3) | 6.3(1) | 124(1) | 22 | 6.3 | OEPA |
| GMRB25 | 81.80 | A | 09/17/1980 | 1852 | 16(3) | 6(5) | 5(3) | 0(1) | 3(1) | 8(1) | 68(1) | 69(1) | 10(3) | 22(1) | 24.0(1) | 120(1) | 22 | 7.0 | OEPA |
| 610060 | 80.70 | A | 07/10/1980 | 2511 | 14(3) | 4(5) | 6(5) | 0(1) | 27(3) | 28(3) | 44(1) | 41(1) | 14(5) | 45(3) | 0.0(5) | 120(1) | 36 | 7.8 | OEPA |
| 610060 | 80.70 | A | 08/12/1980 | 2511 | 16(3) | 3(3) | 6(5) | 1(1) | 26(3) | 28(3) | 28(1) | 47(1) | 20(5) | 33(3) | 9.5(1) | 138(1) * | 30 | 8.5 | OEPA |
| 610060 | 80.70 | A | 09/17/1980 | 2511 | 21(5) | 7(5) | 8(5) | 1(1) | 14(1) | 26(3) | 28(1) | 39(1) | 14(5) | 45(3) | 12.5(1) | 254(3) | 34 | 9.7 | OEPA |
| H09W02 | 78.10 | A | 08/12/1980 | 2589 | 14(3) | 7(5) | 2(1) | 0(1) | 26(3) | 28(3) | 27(1) | 23(3) | 14(5) | 63(5) | 10.0(1) | 238(3) | 34 | 8.3 | OEPA |
| H09W02 | 78.10 | A | 09/17/1980 | 2589 | 16(3) | 5(5) | 6(5) | 0(1) | 22(3) | 24(3) | 15(3) | 26(3) | 9(3) | 64(5) | 12.8(1) | 288(3) | 38 | 9.2 | OEPA |
| H09W02 | 78.10 | A | 07/21/1980 | 2589 | 11(3) | 4(5) | 3(3) | 1(1) | 11(1) | 11(1) | 62(1) | 41(1) | 4(1) | 55(5) | 1.4(3) | 56(1) * | 26 | 7.1 | OEPA |
| H09W67 | 77.10 | A | 07/21/1980 | 2591 | 13(3) | 4(5) | 3(3) | 0(1) | 8(1) | 8(1) | 38(1) | 36(1) | 14(5) | 46(3) | 2.0(5) | 62(1) * | 30 | 6.9 | OEPA |
| H09W67 | 77.10 | A | 08/13/1980 | 2591 | 11(3) | 6(5) | 1(1) | 0(1) | 6(1) | 6(1) | 38(1) | 63(1) | 12(5) | 26(1) | 7.5(1) | 150(1) | 22 | 7.0 | OEPA |
| H09W67 | 77.10 | A | 09/24/1980 | 2591 | 12(3) | 4(5) | 2(1) | 0(1) | 0(1) | 5(1) | 37(1) | 44(1) | 6(3) | 47(3) | 0.0(5) | 98(1) * | 26 | 5.7 | OEPA |

♦ - IBI is low end adjusted.

* - < 200 Total individuals in sample

** - < 50 Total individuals in sample

Appendix A-2: Midwest Biodiversity Institute

Fish Species List - Grand Totals

Rivers: *Great Miami River*

Years: 2018

Number of Samples: 10 Data Sources: 99 Data Types: A; P

| Species Code: | Species Name: | Feed Guild | Tolerance | Breed Guild | IBI Group | No. Fish | Rel. No. | % by No. | Rel. Wt. | % by Wt. | Av. Wt. |
|---------------|------------------------|------------|-----------|-------------|-----------|----------|----------|----------|----------|----------|---------|
| 20-003 | GIZZARD SHAD | O | | M | | 265 | 53.0 | 7.49 | 1996 | 3.28 | 37.6 |
| 40-005 | QUILLBACK CARPSUCKER | O | | M | C | 62 | 12.4 | 1.75 | 4338 | 7.12 | 349.8 |
| 40-008 | SILVER REDHORSE | I | M | S | R | 11 | 2.2 | 0.31 | 17 | 0.03 | 7.7 |
| 40-009 | BLACK REDHORSE | I | I | S | R | 201 | 40.2 | 5.68 | 2356 | 3.87 | 58.6 |
| 40-010 | GOLDEN REDHORSE | I | M | S | R | 615 | 123.0 | 17.37 | 9908 | 16.26 | 80.5 |
| 40-013 | RIVER REDHORSE | I | I | S | R | 169 | 33.8 | 4.77 | 9464 | 15.53 | 280.0 |
| 40-015 | NORTHERN HOG SUCKER | I | M | S | R | 393 | 78.6 | 11.10 | 3060 | 5.02 | 38.9 |
| 40-016 | WHITE SUCKER | O | T | S | W | 51 | 10.2 | 1.44 | 131 | 0.21 | 12.8 |
| 40-023 | SMALLMOUTH REDHORSE | I | M | S | R | 327 | 65.4 | 9.24 | 6278 | 10.30 | 95.9 |
| 43-001 | COMMON CARP | O | T | M | G | 30 | 6.0 | 0.85 | 8520 | 13.98 | 1420.0 |
| 43-002 | GOLDFISH | O | T | M | G | 1 | 0.2 | 0.03 | 100 | 0.16 | 500.0 |
| 43-005 | RIVER CHUB | I | I | N | N | 6 | 1.2 | 0.17 | 11 | 0.02 | 9.1 |
| 43-013 | CREEK CHUB | G | T | N | N | 3 | 0.6 | 0.08 | 2 | 0.00 | 4.6 |
| 43-020 | EMERALD SHINER | I | | M | N | 134 | 26.8 | 3.79 | 48 | 0.08 | 1.7 |
| 43-021 | SILVER SHINER | I | I | S | N | 186 | 37.2 | 5.25 | 133 | 0.22 | 3.5 |
| 43-022 | ROSYFACE SHINER | I | I | S | N | 8 | 1.6 | 0.23 | 7 | 0.01 | 4.7 |
| 43-025 | STRIPED SHINER | I | | S | N | 33 | 6.6 | 0.93 | 7 | 0.01 | 1.1 |
| 43-032 | SPOTFIN SHINER | I | | M | N | 53 | 10.6 | 1.50 | 33 | 0.05 | 3.1 |
| 43-034 | SAND SHINER | I | M | M | N | 19 | 3.8 | 0.54 | 3 | 0.01 | 0.8 |
| 43-035 | MIMIC SHINER | I | I | M | N | 5 | 1.0 | 0.14 | 1 | 0.00 | 1.2 |
| 43-043 | BLUNTNOSE MINNOW | O | T | C | N | 51 | 10.2 | 1.44 | 26 | 0.04 | 2.5 |
| 43-044 | CENTRAL STONEROLLER | H | | N | N | 97 | 19.4 | 2.74 | 62 | 0.10 | 3.2 |
| 47-002 | CHANNEL CATFISH | | | C | F | 33 | 6.6 | 0.93 | 6830 | 11.21 | 1034.8 |
| 47-007 | FLATHEAD CATFISH | P | | C | F | 12 | 2.4 | 0.34 | 3453 | 5.67 | 1438.7 |
| 47-008 | STONECAT MADTOM | I | I | C | | 2 | 0.4 | 0.06 | 3 | 0.00 | 7.5 |
| 54-002 | BLACKSTRIPE TOPMINNOW | I | | M | | 1 | 0.2 | 0.03 | 0 | 0.00 | 2.0 |
| 70-001 | BROOK SILVERSIDE | I | M | M | | 9 | 1.8 | 0.25 | 2 | 0.00 | 1.3 |
| 77-002 | BLACK CRAPPIE | I | | C | S | 2 | 0.4 | 0.06 | 74 | 0.12 | 185.0 |
| 77-003 | ROCK BASS | C | | C | S | 28 | 5.6 | 0.79 | 335 | 0.55 | 59.9 |
| 77-004 | SMALLMOUTH BASS | C | M | C | F | 152 | 30.4 | 4.29 | 2184 | 3.58 | 71.8 |
| 77-006 | LARGEMOUTH BASS | C | | C | F | 13 | 2.6 | 0.37 | 133 | 0.22 | 51.1 |
| 77-008 | GREEN SUNFISH | I | T | C | S | 2 | 0.4 | 0.06 | 16 | 0.03 | 40.0 |
| 77-009 | BLUEGILL SUNFISH | I | P | C | S | 49 | 9.8 | 1.38 | 112 | 0.18 | 11.4 |
| 77-010 | ORANGESPOTTED SUNFISH | I | | C | S | 1 | 0.2 | 0.03 | 0 | 0.00 | 3.0 |
| 77-011 | LONGEAR SUNFISH | I | M | C | S | 25 | 5.0 | 0.71 | 102 | 0.17 | 20.4 |
| 77-012 | REDEAR SUNFISH | I | | C | E | 26 | 5.2 | 0.73 | 61 | 0.10 | 11.7 |
| 77-015 | GREEN SF X BLUEGILL SF | | | | | 1 | 0.2 | 0.03 | 16 | 0.03 | 80.0 |
| 80-002 | WALLEYE | P | | S | F | 1 | 0.2 | 0.03 | 60 | 0.10 | 300.0 |
| 80-003 | YELLOW PERCH | | | M | | 1 | 0.2 | 0.03 | 22 | 0.04 | 110.0 |
| 80-005 | BLACKSIDE DARTER | I | | S | D | 18 | 3.6 | 0.51 | 6 | 0.01 | 1.8 |

Appendix A-2: Midwest Biodiversity Institute Fish Species List - Grand Totals

Rivers: *Great Miami River*

Years: 2018

Number of Samples: 10 Data Sources: 99 Data Types: A; P

| Species Code: | Species Name: | Feed Guild | Tolerance | Breed Guild | IBI Group | No. Fish | Rel. No. | % by No. | Rel. Wt. | % by Wt. | Av. Wt. |
|---------------|------------------|------------|-----------|-------------|-----------|----------|----------|----------|----------|----------|---------|
| 80-011 | LOGPERCH | I | M | S | D | 204 | 40.8 | 5.76 | 114 | 0.19 | 2.8 |
| 80-014 | JOHNNY DARTER | I | | C | D | 11 | 2.2 | 0.31 | 3 | 0.01 | 1.4 |
| 80-015 | GREENSIDE DARTER | I | M | S | D | 74 | 14.8 | 2.09 | 56 | 0.09 | 3.8 |
| 80-016 | BANDED DARTER | I | I | S | D | 66 | 13.2 | 1.86 | 24 | 0.04 | 1.8 |
| 80-022 | RAINBOW DARTER | I | M | S | D | 84 | 16.8 | 2.37 | 30 | 0.05 | 1.8 |
| 80-026 | SAUGER X WALLEYE | P | | | E | 5 | 1.0 | 0.14 | 800 | 1.31 | 800.0 |

No Species: 46 **Nat. Species:** 41 **Hybrids:** 2 **Total Counted:** 3540 **Total Rel. Wt. :** 60946

Appendix Table A-3. Midwest Biodiversity Institute Fish Species List

Site ID: River: 14-001 Great Miami River RM: 76.80 Date: 08/27/2018
 Time Fished: 2398 Distance: 0.500 Drainge (sq mi): 2600.0 Depth: 0
 Location: dst Dam removal site Lat: 39.72961 Long: -84.22380

| Species Code: | Species Name: | Feed Guild | Tolerance | Breed Guild | IBI Group | No. Fish | Rel. No. | % by No. | Rel. Wt. | % by Wt. | Av. Wt. |
|---------------|---------------------|------------|-----------|-------------|-----------|----------|----------|----------|----------|----------|---------|
| 20-003 | GIZZARD SHAD | O | | M | | 5 | 10.0 | 1.27 | 1080 | 0.53 | 108.0 |
| 40-009 | BLACK REDHORSE | I | I | S | R | 5 | 10.0 | 1.27 | 3800 | 1.87 | 380.0 |
| 40-010 | GOLDEN REDHORSE | I | M | S | R | 16 | 32.0 | 4.07 | 30800 | 15.12 | 962.5 |
| 40-013 | RIVER REDHORSE | I | I | S | R | 2 | 4.0 | 0.51 | 11400 | 5.60 | 2850.0 |
| 40-015 | NORTHERN HOG SUCKER | I | M | S | R | 60 | 120.0 | 15.27 | 13930 | 6.84 | 116.0 |
| 40-016 | WHITE SUCKER | O | T | S | W | 3 | 6.0 | 0.76 | 30 | 0.01 | 5.0 |
| 40-023 | SMALLMOUTH REDHORSE | I | M | S | R | 71 | 142.0 | 18.07 | 17360 | 8.52 | 122.2 |
| 43-001 | COMMON CARP | O | T | M | G | 5 | 10.0 | 1.27 | 48600 | 23.87 | 4860.0 |
| 43-005 | RIVER CHUB | I | I | N | N | 1 | 2.0 | 0.25 | 14 | 0.01 | 7.0 |
| 43-013 | CREEK CHUB | G | T | N | N | 1 | 2.0 | 0.25 | 12 | 0.01 | 6.0 |
| 43-021 | SILVER SHINER | I | I | S | N | 69 | 138.0 | 17.56 | 526 | 0.26 | 3.8 |
| 43-025 | STRIPED SHINER | I | | S | N | 1 | 2.0 | 0.25 | 10 | 0.00 | 5.0 |
| 43-032 | SPOTFIN SHINER | I | | M | N | 5 | 10.0 | 1.27 | 50 | 0.02 | 5.0 |
| 43-035 | MIMIC SHINER | I | I | M | N | 2 | 4.0 | 0.51 | 2 | 0.00 | 0.5 |
| 43-043 | BLUNTNOSE MINNOW | O | T | C | N | 3 | 6.0 | 0.76 | 44 | 0.02 | 7.3 |
| 43-044 | CENTRAL STONEROLLER | H | | N | N | 3 | 6.0 | 0.76 | 22 | 0.01 | 3.6 |
| 47-002 | CHANNEL CATFISH | | | C | F | 12 | 24.0 | 3.05 | 64800 | 31.82 | 2700.0 |
| 70-001 | BROOK SILVERSIDE | I | M | M | | 1 | 2.0 | 0.25 | 6 | 0.00 | 3.0 |
| 77-003 | ROCK BASS | C | | C | S | 9 | 18.0 | 2.29 | 2540 | 1.25 | 141.1 |
| 77-004 | SMALLMOUTH BASS | C | M | C | F | 36 | 72.0 | 9.16 | 7900 | 3.88 | 109.7 |
| 77-006 | LARGEMOUTH BASS | C | | C | F | 1 | 2.0 | 0.25 | 10 | 0.00 | 5.0 |
| 77-009 | BLUEGILL SUNFISH | I | P | C | S | 5 | 10.0 | 1.27 | 120 | 0.06 | 12.0 |
| 80-011 | LOGPERCH | I | M | S | D | 20 | 40.0 | 5.09 | 220 | 0.11 | 5.5 |
| 80-014 | JOHNNY DARTER | I | | C | D | 2 | 4.0 | 0.51 | 12 | 0.01 | 3.0 |
| 80-015 | GREENSIDE DARTER | I | M | S | D | 14 | 28.0 | 3.56 | 98 | 0.05 | 3.5 |
| 80-016 | BANDED DARTER | I | I | S | D | 17 | 34.0 | 4.33 | 102 | 0.05 | 3.0 |
| 80-022 | RAINBOW DARTER | I | M | S | D | 24 | 48.0 | 6.11 | 154 | 0.08 | 3.2 |

No Species: 27 **Nat. Species:** 26 **Hybrids:** 0 **Total Counted:** 393 **Total Rel. Wt. :** 203642
IBI: 58.0 **MIwb:** 10.3

Appendix Table A-3. Midwest Biodiversity Institute Fish Species List

Site ID: River: 14-001 Great Miami River RM: 76.80 Date: 10/08/2018
 Time Fished: 1898 Distance: 0.500 Drainge (sq mi): 2600.0 Depth: 0
 Location: dst Dam removal site Lat: 39.72961 Long: -84.22380

| Species Code: | Species Name: | Feed Guild | Tolerance | Breed Guild | IBI Group | No. Fish | Rel. No. | % by No. | Rel. Wt. | % by Wt. | Av. Wt. |
|---------------|-----------------------|------------|-----------|-------------|-----------|----------|----------|----------|----------|----------|---------|
| 40-005 | QUILLBACK CARPSUCKER | O | | M | C | 2 | 4.0 | 0.54 | 3000 | 1.77 | 750.0 |
| 40-009 | BLACK REDHORSE | I | I | S | R | 2 | 4.0 | 0.54 | 1260 | 0.74 | 315.0 |
| 40-010 | GOLDEN REDHORSE | I | M | S | R | 31 | 62.0 | 8.45 | 25060 | 14.78 | 404.1 |
| 40-013 | RIVER REDHORSE | I | I | S | R | 56 | 112.0 | 15.26 | 81100 | 47.85 | 724.1 |
| 40-015 | NORTHERN HOG SUCKER | I | M | S | R | 38 | 76.0 | 10.35 | 10450 | 6.17 | 137.5 |
| 40-016 | WHITE SUCKER | O | T | S | W | 2 | 4.0 | 0.54 | 30 | 0.02 | 7.5 |
| 40-023 | SMALLMOUTH REDHORSE | I | M | S | R | 47 | 94.0 | 12.81 | 29850 | 17.61 | 317.5 |
| 43-001 | COMMON CARP | O | T | M | G | 1 | 2.0 | 0.27 | 7800 | 4.60 | 3900.0 |
| 43-020 | EMERALD SHINER | I | | M | N | 72 | 144.0 | 19.62 | 80 | 0.05 | 0.5 |
| 43-021 | SILVER SHINER | I | I | S | N | 59 | 118.0 | 16.08 | 500 | 0.29 | 4.2 |
| 43-022 | ROSYFACE SHINER | I | I | S | N | 3 | 6.0 | 0.82 | 6 | 0.00 | 1.0 |
| 43-025 | STRIPED SHINER | I | | S | N | 10 | 20.0 | 2.72 | 40 | 0.02 | 2.0 |
| 43-032 | SPOTFIN SHINER | I | | M | N | 3 | 6.0 | 0.82 | 40 | 0.02 | 6.6 |
| 43-043 | BLUNTNOSE MINNOW | O | T | C | N | 1 | 2.0 | 0.27 | 8 | 0.00 | 4.0 |
| 47-002 | CHANNEL CATFISH | | | C | F | 1 | 2.0 | 0.27 | 3800 | 2.24 | 1900.0 |
| 54-002 | BLACKSTRIPE TOPMINNOW | I | | M | | 1 | 2.0 | 0.27 | 4 | 0.00 | 2.0 |
| 77-003 | ROCK BASS | C | | C | S | 2 | 4.0 | 0.54 | 270 | 0.16 | 67.5 |
| 77-004 | SMALLMOUTH BASS | C | M | C | F | 12 | 24.0 | 3.27 | 6060 | 3.58 | 252.5 |
| 80-011 | LOGPERCH | I | M | S | D | 12 | 24.0 | 3.27 | 100 | 0.06 | 4.1 |
| 80-015 | GREENSIDE DARTER | I | M | S | D | 3 | 6.0 | 0.82 | 18 | 0.01 | 3.0 |
| 80-016 | BANDED DARTER | I | I | S | D | 2 | 4.0 | 0.54 | 8 | 0.00 | 2.0 |
| 80-022 | RAINBOW DARTER | I | M | S | D | 7 | 14.0 | 1.91 | 20 | 0.01 | 1.4 |

No Species: 22 **Nat. Species:** 21 **Hybrids:** 0 **Total Counted:** 367 **Total Rel. Wt. :** 169504

IBI: 50.0 **MIwb:** 9.8

Appendix Table A-3. Midwest Biodiversity Institute Fish Species List

Site ID: River: 14-001 Great Miami River RM: 77.90 Date: 08/27/2018
 Time Fished: 1251 Distance: 0.500 Drainge (sq mi): 2600.0 Depth: 0
 Location: ust. Dam removal site Lat: 39.73040 Long: -84.20190

| Species Code: | Species Name: | Feed Guild | Tolerance | Breed Guild | IBI Group | No. Fish | Rel. No. | % by No. | Rel. Wt. | % by Wt. | Av. Wt. |
|---------------|----------------------|------------|-----------|-------------|-----------|----------|----------|----------|----------|----------|---------|
| 20-003 | GIZZARD SHAD | O | | M | | 47 | 94.0 | 18.36 | 20970 | 3.66 | 223.0 |
| 40-005 | QUILLBACK CARPSUCKER | O | | M | C | 8 | 16.0 | 3.13 | 11400 | 1.99 | 712.5 |
| 40-009 | BLACK REDHORSE | I | I | S | R | 4 | 8.0 | 1.56 | 2500 | 0.44 | 312.5 |
| 40-010 | GOLDEN REDHORSE | I | M | S | R | 48 | 96.0 | 18.75 | 69200 | 12.09 | 720.8 |
| 40-013 | RIVER REDHORSE | I | I | S | R | 52 | 104.0 | 20.31 | 265660 | 46.42 | 2554.4 |
| 40-015 | NORTHERN HOG SUCKER | I | M | S | R | 4 | 8.0 | 1.56 | 2540 | 0.44 | 317.5 |
| 40-023 | SMALLMOUTH REDHORSE | I | M | S | R | 35 | 70.0 | 13.67 | 66694 | 11.65 | 952.7 |
| 43-001 | COMMON CARP | O | T | M | G | 7 | 14.0 | 2.73 | 51500 | 9.00 | 3678.5 |
| 43-021 | SILVER SHINER | I | I | S | N | 12 | 24.0 | 4.69 | 96 | 0.02 | 4.0 |
| 43-032 | SPOTFIN SHINER | I | | M | N | 2 | 4.0 | 0.78 | 28 | 0.00 | 7.0 |
| 47-002 | CHANNEL CATFISH | | | C | F | 8 | 16.0 | 3.13 | 29500 | 5.15 | 1843.7 |
| 47-007 | FLATHEAD CATFISH | P | | C | F | 6 | 12.0 | 2.34 | 47200 | 8.25 | 3933.3 |
| 77-003 | ROCK BASS | C | | C | S | 3 | 6.0 | 1.17 | 100 | 0.02 | 16.6 |
| 77-004 | SMALLMOUTH BASS | C | M | C | F | 13 | 26.0 | 5.08 | 4604 | 0.80 | 177.0 |
| 77-009 | BLUEGILL SUNFISH | I | P | C | S | 2 | 4.0 | 0.78 | 220 | 0.04 | 55.0 |
| 80-011 | LOGPERCH | I | M | S | D | 3 | 6.0 | 1.17 | 40 | 0.01 | 6.6 |
| 80-016 | BANDED DARTER | I | I | S | D | 1 | 2.0 | 0.39 | 8 | 0.00 | 4.0 |
| 80-022 | RAINBOW DARTER | I | M | S | D | 1 | 2.0 | 0.39 | 4 | 0.00 | 2.0 |

No Species: 18 **Nat. Species:** 17 **Hybrids:** 0 **Total Counted:** 256 **Total Rel. Wt. :** 572264

IBI: 52.0 **MIwb:** 10.2

Appendix Table A-3. Midwest Biodiversity Institute Fish Species List

Site ID: River: 14-001 Great Miami River RM: 77.90 Date: 10/08/2018
 Time Fished: 1621 Distance: 0.500 Drainge (sq mi): 2600.0 Depth: 0
 Location: ust. Dam removal site Lat: 39.73040 Long: -84.20190

| Species Code: | Species Name: | Feed Guild | Tolerance | Breed Guild | IBI Group | No. Fish | Rel. No. | % by No. | Rel. Wt. | % by Wt. | Av. Wt. |
|---------------|----------------------|------------|-----------|-------------|-----------|----------|----------|----------|----------|----------|---------|
| 20-003 | GIZZARD SHAD | O | | M | | 2 | 4.0 | 0.68 | 1320 | 0.70 | 330.0 |
| 40-005 | QUILLBACK CARPSUCKER | O | | M | C | 8 | 16.0 | 2.72 | 15100 | 7.98 | 943.7 |
| 40-009 | BLACK REDHORSE | I | I | S | R | 4 | 8.0 | 1.36 | 3460 | 1.83 | 432.5 |
| 40-010 | GOLDEN REDHORSE | I | M | S | R | 78 | 156.0 | 26.53 | 43500 | 23.00 | 278.8 |
| 40-013 | RIVER REDHORSE | I | I | S | R | 20 | 40.0 | 6.80 | 13740 | 7.26 | 343.5 |
| 40-015 | NORTHERN HOG SUCKER | I | M | S | R | 40 | 80.0 | 13.61 | 5050 | 2.67 | 63.1 |
| 40-016 | WHITE SUCKER | O | T | S | W | 1 | 2.0 | 0.34 | 720 | 0.38 | 360.0 |
| 40-023 | SMALLMOUTH REDHORSE | I | M | S | R | 33 | 66.0 | 11.22 | 34080 | 18.02 | 516.3 |
| 43-001 | COMMON CARP | O | T | M | G | 3 | 6.0 | 1.02 | 30800 | 16.28 | 5133.3 |
| 43-020 | EMERALD SHINER | I | | M | N | 19 | 38.0 | 6.46 | 204 | 0.11 | 5.3 |
| 43-021 | SILVER SHINER | I | I | S | N | 4 | 8.0 | 1.36 | 40 | 0.02 | 5.0 |
| 43-022 | ROSYFACE SHINER | I | I | S | N | 1 | 2.0 | 0.34 | 10 | 0.01 | 5.0 |
| 43-025 | STRIPED SHINER | I | | S | N | 1 | 2.0 | 0.34 | 8 | 0.00 | 4.0 |
| 43-032 | SPOTFIN SHINER | I | | M | N | 3 | 6.0 | 1.02 | 20 | 0.01 | 3.3 |
| 43-044 | CENTRAL STONEROLLER | H | | N | N | 2 | 4.0 | 0.68 | 100 | 0.05 | 25.0 |
| 47-002 | CHANNEL CATFISH | | | C | F | 1 | 2.0 | 0.34 | 5800 | 3.07 | 2900.0 |
| 47-007 | FLATHEAD CATFISH | P | | C | F | 3 | 6.0 | 1.02 | 30040 | 15.88 | 5006.6 |
| 70-001 | BROOK SILVERSIDE | I | M | M | | 1 | 2.0 | 0.34 | 4 | 0.00 | 2.0 |
| 77-003 | ROCK BASS | C | | C | S | 3 | 6.0 | 1.02 | 930 | 0.49 | 155.0 |
| 77-004 | SMALLMOUTH BASS | C | M | C | F | 15 | 30.0 | 5.10 | 3770 | 1.99 | 125.6 |
| 77-009 | BLUEGILL SUNFISH | I | P | C | S | 3 | 6.0 | 1.02 | 110 | 0.06 | 18.3 |
| 77-011 | LONGEAR SUNFISH | I | M | C | S | 1 | 2.0 | 0.34 | 20 | 0.01 | 10.0 |
| 80-005 | BLACKSIDE DARTER | I | | S | D | 2 | 4.0 | 0.68 | 12 | 0.01 | 3.0 |
| 80-011 | LOGPERCH | I | M | S | D | 28 | 56.0 | 9.52 | 230 | 0.12 | 4.1 |
| 80-014 | JOHNNY DARTER | I | | C | D | 1 | 2.0 | 0.34 | 8 | 0.00 | 4.0 |
| 80-015 | GREENSIDE DARTER | I | M | S | D | 5 | 10.0 | 1.70 | 30 | 0.02 | 3.0 |
| 80-016 | BANDED DARTER | I | I | S | D | 4 | 8.0 | 1.36 | 16 | 0.01 | 2.0 |
| 80-022 | RAINBOW DARTER | I | M | S | D | 8 | 16.0 | 2.72 | 30 | 0.02 | 1.8 |

No Species: 28 **Nat. Species:** 27 **Hybrids:** 0 **Total Counted:** 294 **Total Rel. Wt. :** 189152
IBI: 56.0 **MIwb:** 10.3

Appendix Table A-3. Midwest Biodiversity Institute Fish Species List

Site ID: River: 14-001 Great Miami River RM: 79.50 Date: 08/27/2018
 Time Fished: 1113 Distance: 0.500 Drainge (sq mi): 2590.0 Depth: 0
 Location: dst. Wolf Creek Lat: 39.75180 Long: -84.19980

| Species Code: | Species Name: | Feed Guild | Tolerance | Breed Guild | IBI Group | No. Fish | Rel. No. | % by No. | Rel. Wt. | % by Wt. | Av. Wt. |
|---------------|----------------------|------------|-----------|-------------|-----------|----------|----------|----------|----------|----------|---------|
| 20-003 | GIZZARD SHAD | O | | M | | 1 | 2.0 | 0.31 | 300 | 0.14 | 150.0 |
| 40-005 | QUILLBACK CARPSUCKER | O | | M | C | 3 | 6.0 | 0.94 | 5300 | 2.44 | 883.3 |
| 40-009 | BLACK REDHORSE | I | I | S | R | 14 | 28.0 | 4.38 | 17960 | 8.27 | 641.4 |
| 40-010 | GOLDEN REDHORSE | I | M | S | R | 23 | 46.0 | 7.19 | 34008 | 15.65 | 739.3 |
| 40-013 | RIVER REDHORSE | I | I | S | R | 11 | 22.0 | 3.44 | 58200 | 26.79 | 2645.4 |
| 40-015 | NORTHERN HOG SUCKER | I | M | S | R | 72 | 144.0 | 22.50 | 10440 | 4.81 | 72.5 |
| 40-016 | WHITE SUCKER | O | T | S | W | 4 | 8.0 | 1.25 | 80 | 0.04 | 10.0 |
| 40-023 | SMALLMOUTH REDHORSE | I | M | S | R | 71 | 142.0 | 22.19 | 57500 | 26.47 | 404.9 |
| 43-001 | COMMON CARP | O | T | M | G | 5 | 10.0 | 1.56 | 21500 | 9.90 | 2150.0 |
| 43-005 | RIVER CHUB | I | I | N | N | 1 | 2.0 | 0.31 | 16 | 0.01 | 8.0 |
| 43-021 | SILVER SHINER | I | I | S | N | 9 | 18.0 | 2.81 | 80 | 0.04 | 4.4 |
| 43-032 | SPOTFIN SHINER | I | | M | N | 3 | 6.0 | 0.94 | 40 | 0.02 | 6.6 |
| 43-044 | CENTRAL STONEROLLER | H | | N | N | 23 | 46.0 | 7.19 | 300 | 0.14 | 6.5 |
| 47-002 | CHANNEL CATFISH | | | C | F | 2 | 4.0 | 0.63 | 9600 | 4.42 | 2400.0 |
| 77-004 | SMALLMOUTH BASS | C | M | C | F | 8 | 16.0 | 2.50 | 1000 | 0.46 | 62.5 |
| 77-009 | BLUEGILL SUNFISH | I | P | C | S | 3 | 6.0 | 0.94 | 280 | 0.13 | 46.6 |
| 77-012 | REDEAR SUNFISH | I | | C | E | 1 | 2.0 | 0.31 | 80 | 0.04 | 40.0 |
| 80-011 | LOGPERCH | I | M | S | D | 26 | 52.0 | 8.13 | 280 | 0.13 | 5.3 |
| 80-015 | GREENSIDE DARTER | I | M | S | D | 20 | 40.0 | 6.25 | 188 | 0.09 | 4.7 |
| 80-016 | BANDED DARTER | I | I | S | D | 8 | 16.0 | 2.50 | 24 | 0.01 | 1.5 |
| 80-022 | RAINBOW DARTER | I | M | S | D | 12 | 24.0 | 3.75 | 64 | 0.03 | 2.6 |

No Species: 21 **Nat. Species:** 19 **Hybrids:** 0 **Total Counted:** 320 **Total Rel. Wt. :** 217240
IBI: 50.0 **MIwb:** 10.2

Appendix Table A-3. Midwest Biodiversity Institute Fish Species List

Site ID: River: 14-001 Great Miami River RM: 79.50 Date: 10/08/2018
 Time Fished: 3530 Distance: 0.500 Drainge (sq mi): 2590.0 Depth: 0
 Location: dst. Wolf Creek Lat: 39.75180 Long: -84.19980

| Species Code: | Species Name: | Feed Guild | Tolerance | Breed Guild | IBI Group | No. Fish | Rel. No. | % by No. | Rel. Wt. | % by Wt. | Av. Wt. |
|---------------|----------------------|------------|-----------|-------------|-----------|----------|----------|----------|----------|----------|---------|
| 40-005 | QUILLBACK CARPSUCKER | O | | M | C | 1 | 2.0 | 0.15 | 1180 | 0.51 | 590.0 |
| 40-008 | SILVER REDHORSE | I | M | S | R | 10 | 20.0 | 1.49 | 150 | 0.07 | 7.5 |
| 40-009 | BLACK REDHORSE | I | I | S | R | 98 | 196.0 | 14.56 | 43962 | 19.11 | 224.2 |
| 40-010 | GOLDEN REDHORSE | I | M | S | R | 105 | 210.0 | 15.60 | 60344 | 26.24 | 287.3 |
| 40-015 | NORTHERN HOG SUCKER | I | M | S | R | 62 | 124.0 | 9.21 | 14940 | 6.50 | 120.4 |
| 40-016 | WHITE SUCKER | O | T | S | W | 18 | 36.0 | 2.67 | 1270 | 0.55 | 35.2 |
| 40-023 | SMALLMOUTH REDHORSE | I | M | S | R | 23 | 46.0 | 3.42 | 36300 | 15.78 | 789.1 |
| 43-001 | COMMON CARP | O | T | M | G | 2 | 4.0 | 0.30 | 5740 | 2.50 | 1435.0 |
| 43-005 | RIVER CHUB | I | I | N | N | 4 | 8.0 | 0.59 | 80 | 0.03 | 10.0 |
| 43-013 | CREEK CHUB | G | T | N | N | 1 | 2.0 | 0.15 | 10 | 0.00 | 5.0 |
| 43-020 | EMERALD SHINER | I | | M | N | 43 | 86.0 | 6.39 | 458 | 0.20 | 5.3 |
| 43-022 | ROSYFACE SHINER | I | I | S | N | 4 | 8.0 | 0.59 | 60 | 0.03 | 7.5 |
| 43-025 | STRIPED SHINER | I | | S | N | 1 | 2.0 | 0.15 | 12 | 0.01 | 6.0 |
| 43-032 | SPOTFIN SHINER | I | | M | N | 29 | 58.0 | 4.31 | 230 | 0.10 | 3.9 |
| 43-043 | BLUNTNOSE MINNOW | O | T | C | N | 2 | 4.0 | 0.30 | 30 | 0.01 | 7.5 |
| 43-044 | CENTRAL STONEROLLER | H | | N | N | 61 | 122.0 | 9.06 | 1012 | 0.44 | 8.2 |
| 47-002 | CHANNEL CATFISH | | | C | F | 8 | 16.0 | 1.19 | 56000 | 24.35 | 3500.0 |
| 47-008 | STONECAT MADTOM | I | I | C | | 2 | 4.0 | 0.30 | 30 | 0.01 | 7.5 |
| 77-002 | BLACK CRAPPIE | I | | C | S | 1 | 2.0 | 0.15 | 380 | 0.17 | 190.0 |
| 77-003 | ROCK BASS | C | | C | S | 4 | 8.0 | 0.59 | 316 | 0.14 | 39.5 |
| 77-004 | SMALLMOUTH BASS | C | M | C | F | 26 | 52.0 | 3.86 | 4404 | 1.91 | 84.6 |
| 77-009 | BLUEGILL SUNFISH | I | P | C | S | 5 | 10.0 | 0.74 | 440 | 0.19 | 44.0 |
| 80-005 | BLACKSIDE DARTER | I | | S | D | 5 | 10.0 | 0.74 | 20 | 0.01 | 2.0 |
| 80-011 | LOGPERCH | I | M | S | D | 91 | 182.0 | 13.52 | 1030 | 0.45 | 5.6 |
| 80-015 | GREENSIDE DARTER | I | M | S | D | 21 | 42.0 | 3.12 | 220 | 0.10 | 5.2 |
| 80-016 | BANDED DARTER | I | I | S | D | 26 | 52.0 | 3.86 | 84 | 0.04 | 1.6 |
| 80-022 | RAINBOW DARTER | I | M | S | D | 19 | 38.0 | 2.82 | 104 | 0.05 | 2.7 |
| 80-026 | SAUGER X WALLEYE | P | | | E | 1 | 2.0 | 0.15 | 1200 | 0.52 | 600.0 |

No Species: 27 **Nat. Species:** 26 **Hybrids:** 1 **Total Counted:** 673 **Total Rel. Wt. :** 230006
IBI: 52.0 **MIwb:** 10.7

Appendix Table A-3. Midwest Biodiversity Institute Fish Species List

Site ID: River: 14-001 Great Miami River RM: 81.10 Date: 08/27/2018
 Time Fished: 2233 Distance: 0.500 Drainge (sq mi): 2510.0 Depth: 0
 Location: dst. Main Street Lat: 39.76462 Long: -84.19328

| Species Code: | Species Name: | Feed Guild | Tolerance | Breed Guild | IBI Group | No. Fish | Rel. No. | % by No. | Rel. Wt. | % by Wt. | Av. Wt. |
|---------------|----------------------|------------|-----------|-------------|-----------|----------|----------|----------|----------|----------|---------|
| 20-003 | GIZZARD SHAD | O | | M | | 49 | 98.0 | 19.60 | 7400 | 8.72 | 75.5 |
| 40-005 | QUILLBACK CARPSUCKER | O | | M | C | 5 | 10.0 | 2.00 | 5400 | 6.36 | 540.0 |
| 40-008 | SILVER REDHORSE | I | M | S | R | 1 | 2.0 | 0.40 | 20 | 0.02 | 10.0 |
| 40-009 | BLACK REDHORSE | I | I | S | R | 22 | 44.0 | 8.80 | 820 | 0.97 | 18.6 |
| 40-010 | GOLDEN REDHORSE | I | M | S | R | 44 | 88.0 | 17.60 | 52300 | 61.62 | 594.3 |
| 40-013 | RIVER REDHORSE | I | I | S | R | 1 | 2.0 | 0.40 | 5400 | 6.36 | 2700.0 |
| 40-015 | NORTHERN HOG SUCKER | I | M | S | R | 24 | 48.0 | 9.60 | 300 | 0.35 | 6.2 |
| 40-016 | WHITE SUCKER | O | T | S | W | 14 | 28.0 | 5.60 | 320 | 0.38 | 11.4 |
| 40-023 | SMALLMOUTH REDHORSE | I | M | S | R | 5 | 10.0 | 2.00 | 120 | 0.14 | 12.0 |
| 43-001 | COMMON CARP | O | T | M | G | 1 | 2.0 | 0.40 | 4800 | 5.66 | 2400.0 |
| 43-021 | SILVER SHINER | I | I | S | N | 11 | 22.0 | 4.40 | 98 | 0.12 | 4.4 |
| 43-025 | STRIPED SHINER | I | | S | N | 4 | 8.0 | 1.60 | 8 | 0.01 | 1.0 |
| 43-032 | SPOTFIN SHINER | I | | M | N | 4 | 8.0 | 1.60 | 30 | 0.04 | 3.7 |
| 43-034 | SAND SHINER | I | M | M | N | 12 | 24.0 | 4.80 | 40 | 0.05 | 1.6 |
| 43-043 | BLUNTNOSE MINNOW | O | T | C | N | 4 | 8.0 | 1.60 | 8 | 0.01 | 1.0 |
| 47-007 | FLATHEAD CATFISH | P | | C | F | 1 | 2.0 | 0.40 | 580 | 0.68 | 290.0 |
| 77-003 | ROCK BASS | C | | C | S | 4 | 8.0 | 1.60 | 320 | 0.38 | 40.0 |
| 77-004 | SMALLMOUTH BASS | C | M | C | F | 15 | 30.0 | 6.00 | 5800 | 6.83 | 193.3 |
| 77-006 | LARGEMOUTH BASS | C | | C | F | 4 | 8.0 | 1.60 | 306 | 0.36 | 38.2 |
| 77-008 | GREEN SUNFISH | I | T | C | S | 2 | 4.0 | 0.80 | 160 | 0.19 | 40.0 |
| 77-009 | BLUEGILL SUNFISH | I | P | C | S | 10 | 20.0 | 4.00 | 180 | 0.21 | 9.0 |
| 77-011 | LONGEAR SUNFISH | I | M | C | S | 5 | 10.0 | 2.00 | 220 | 0.26 | 22.0 |
| 80-003 | YELLOW PERCH | | | M | | 1 | 2.0 | 0.40 | 220 | 0.26 | 110.0 |
| 80-005 | BLACKSIDE DARTER | I | | S | D | 1 | 2.0 | 0.40 | 4 | 0.00 | 2.0 |
| 80-011 | LOGPERCH | I | M | S | D | 1 | 2.0 | 0.40 | 6 | 0.01 | 3.0 |
| 80-014 | JOHNNY DARTER | I | | C | D | 3 | 6.0 | 1.20 | 8 | 0.01 | 1.3 |
| 80-015 | GREENSIDE DARTER | I | M | S | D | 1 | 2.0 | 0.40 | 4 | 0.00 | 2.0 |
| 80-022 | RAINBOW DARTER | I | M | S | D | 1 | 2.0 | 0.40 | 2 | 0.00 | 1.0 |

No Species: 28 **Nat. Species:** 27 **Hybrids:** 0 **Total Counted:** 250 **Total Rel. Wt. :** 84874
IBI: 52.0 **MIwb:** 9.4

Appendix Table A-3. Midwest Biodiversity Institute Fish Species List

Site ID: River: 14-001 Great Miami River RM: 81.10 Date: 10/08/2018
 Time Fished: 1725 Distance: 0.500 Drainge (sq mi): 2510.0 Depth: 0
 Location: dst. Main Street Lat: 39.76462 Long: -84.19328

| Species Code: | Species Name: | Feed Guild | Tolerance | Breed Guild | IBI Group | No. Fish | Rel. No. | % by No. | Rel. Wt. | % by Wt. | Av. Wt. |
|---------------|----------------------|------------|-----------|-------------|-----------|----------|----------|----------|----------|----------|---------|
| 20-003 | GIZZARD SHAD | O | | M | | 13 | 26.0 | 6.95 | 4020 | 5.35 | 154.6 |
| 40-005 | QUILLBACK CARPSUCKER | O | | M | C | 18 | 36.0 | 9.63 | 21240 | 28.27 | 590.0 |
| 40-009 | BLACK REDHORSE | I | I | S | R | 25 | 50.0 | 13.37 | 480 | 0.64 | 9.6 |
| 40-010 | GOLDEN REDHORSE | I | M | S | R | 30 | 60.0 | 16.04 | 23000 | 30.61 | 383.3 |
| 40-013 | RIVER REDHORSE | I | I | S | R | 16 | 32.0 | 8.56 | 1220 | 1.62 | 38.1 |
| 40-015 | NORTHERN HOG SUCKER | I | M | S | R | 16 | 32.0 | 8.56 | 1740 | 2.32 | 54.3 |
| 40-016 | WHITE SUCKER | O | T | S | W | 4 | 8.0 | 2.14 | 120 | 0.16 | 15.0 |
| 40-023 | SMALLMOUTH REDHORSE | I | M | S | R | 8 | 16.0 | 4.28 | 6660 | 8.86 | 416.2 |
| 43-001 | COMMON CARP | O | T | M | G | 2 | 4.0 | 1.07 | 6200 | 8.25 | 1550.0 |
| 43-013 | CREEK CHUB | G | T | N | N | 1 | 2.0 | 0.53 | 6 | 0.01 | 3.0 |
| 43-021 | SILVER SHINER | I | I | S | N | 9 | 18.0 | 4.81 | 120 | 0.16 | 6.6 |
| 43-044 | CENTRAL STONEROLLER | H | | N | N | 1 | 2.0 | 0.53 | 6 | 0.01 | 3.0 |
| 47-007 | FLATHEAD CATFISH | P | | C | F | 1 | 2.0 | 0.53 | 40 | 0.05 | 20.0 |
| 70-001 | BROOK SILVERSIDE | I | M | M | | 1 | 2.0 | 0.53 | 2 | 0.00 | 1.0 |
| 77-003 | ROCK BASS | C | | C | S | 1 | 2.0 | 0.53 | 10 | 0.01 | 5.0 |
| 77-004 | SMALLMOUTH BASS | C | M | C | F | 10 | 20.0 | 5.35 | 9540 | 12.70 | 477.0 |
| 77-006 | LARGEMOUTH BASS | C | | C | F | 1 | 2.0 | 0.53 | 20 | 0.03 | 10.0 |
| 77-009 | BLUEGILL SUNFISH | I | P | C | S | 3 | 6.0 | 1.60 | 200 | 0.27 | 33.3 |
| 77-011 | LONGEAR SUNFISH | I | M | C | S | 13 | 26.0 | 6.95 | 420 | 0.56 | 16.1 |
| 77-012 | REDEAR SUNFISH | I | | C | E | 3 | 6.0 | 1.60 | 50 | 0.07 | 8.3 |
| 80-005 | BLACKSIDE DARTER | I | | S | D | 2 | 4.0 | 1.07 | 6 | 0.01 | 1.5 |
| 80-011 | LOGPERCH | I | M | S | D | 5 | 10.0 | 2.67 | 30 | 0.04 | 3.0 |
| 80-014 | JOHNNY DARTER | I | | C | D | 2 | 4.0 | 1.07 | 4 | 0.01 | 1.0 |
| 80-015 | GREENSIDE DARTER | I | M | S | D | 1 | 2.0 | 0.53 | 4 | 0.01 | 2.0 |
| 80-022 | RAINBOW DARTER | I | M | S | D | 1 | 2.0 | 0.53 | 4 | 0.01 | 2.0 |

No Species: 25 **Nat. Species:** 23 **Hybrids:** 0 **Total Counted:** 187 **Total Rel. Wt. :** 75142
IBI: 50.0 **MIwb:** 9.6

Appendix Table A-3. Midwest Biodiversity Institute Fish Species List

Site ID: River: 14-001 Great Miami River RM: 81.80 Date: 08/27/2018
 Time Fished: 2702 Distance: 0.500 Drainge (sq mi): 1860.0 Depth: 0
 Location: Dst. I-75 Lat: 39.77129 Long: -84.18925

| Species Code: | Species Name: | Feed Guild | Tolerance | Breed Guild | IBI Group | No. Fish | Rel. No. | % by No. | Rel. Wt. | % by Wt. | Av. Wt. |
|---------------|------------------------|------------|-----------|-------------|-----------|----------|----------|----------|----------|----------|---------|
| 20-003 | GIZZARD SHAD | O | | M | | 82 | 164.0 | 21.58 | 4110 | 3.66 | 25.0 |
| 40-005 | QUILLBACK CARPSUCKER | O | | M | C | 13 | 26.0 | 3.42 | 12220 | 10.88 | 470.0 |
| 40-009 | BLACK REDHORSE | I | I | S | R | 3 | 6.0 | 0.79 | 1390 | 1.24 | 231.6 |
| 40-010 | GOLDEN REDHORSE | I | M | S | R | 79 | 158.0 | 20.79 | 34240 | 30.48 | 216.7 |
| 40-013 | RIVER REDHORSE | I | I | S | R | 8 | 16.0 | 2.11 | 29800 | 26.53 | 1862.5 |
| 40-015 | NORTHERN HOG SUCKER | I | M | S | R | 38 | 76.0 | 10.00 | 8440 | 7.51 | 111.0 |
| 40-016 | WHITE SUCKER | O | T | S | W | 5 | 10.0 | 1.32 | 90 | 0.08 | 9.0 |
| 40-023 | SMALLMOUTH REDHORSE | I | M | S | R | 1 | 2.0 | 0.26 | 2040 | 1.82 | 1020.0 |
| 43-001 | COMMON CARP | O | T | M | G | 2 | 4.0 | 0.53 | 8000 | 7.12 | 2000.0 |
| 43-002 | GOLDFISH | O | T | M | G | 1 | 2.0 | 0.26 | 1000 | 0.89 | 500.0 |
| 43-021 | SILVER SHINER | I | I | S | N | 10 | 20.0 | 2.63 | 90 | 0.08 | 4.5 |
| 43-025 | STRIPED SHINER | I | | S | N | 13 | 26.0 | 3.42 | 74 | 0.07 | 2.8 |
| 43-032 | SPOTFIN SHINER | I | | M | N | 3 | 6.0 | 0.79 | 14 | 0.01 | 2.3 |
| 43-034 | SAND SHINER | I | M | M | N | 6 | 12.0 | 1.58 | 16 | 0.01 | 1.3 |
| 43-043 | BLUNTNOSE MINNOW | O | T | C | N | 21 | 42.0 | 5.53 | 64 | 0.06 | 1.5 |
| 43-044 | CENTRAL STONEROLLER | H | | N | N | 7 | 14.0 | 1.84 | 30 | 0.03 | 2.1 |
| 47-002 | CHANNEL CATFISH | | | C | F | 1 | 2.0 | 0.26 | 2600 | 2.31 | 1300.0 |
| 47-007 | FLATHEAD CATFISH | P | | C | F | 1 | 2.0 | 0.26 | 10 | 0.01 | 5.0 |
| 70-001 | BROOK SILVERSIDE | I | M | M | | 5 | 10.0 | 1.32 | 10 | 0.01 | 1.0 |
| 77-002 | BLACK CRAPPIE | I | | C | S | 1 | 2.0 | 0.26 | 360 | 0.32 | 180.0 |
| 77-004 | SMALLMOUTH BASS | C | M | C | F | 7 | 14.0 | 1.84 | 2480 | 2.21 | 177.1 |
| 77-006 | LARGEMOUTH BASS | C | | C | F | 6 | 12.0 | 1.58 | 1040 | 0.93 | 86.6 |
| 77-009 | BLUEGILL SUNFISH | I | P | C | S | 12 | 24.0 | 3.16 | 20 | 0.02 | 0.8 |
| 77-010 | ORANGESPOTTED SUNFISH | I | | C | S | 1 | 2.0 | 0.26 | 6 | 0.01 | 3.0 |
| 77-011 | LONGEAR SUNFISH | I | M | C | S | 2 | 4.0 | 0.53 | 80 | 0.07 | 20.0 |
| 77-012 | REDEAR SUNFISH | I | | C | E | 12 | 24.0 | 3.16 | 180 | 0.16 | 7.5 |
| 77-015 | GREEN SF X BLUEGILL SF | | | | | 1 | 2.0 | 0.26 | 160 | 0.14 | 80.0 |
| 80-002 | WALLEYE | P | | S | F | 1 | 2.0 | 0.26 | 600 | 0.53 | 300.0 |
| 80-005 | BLACKSIDE DARTER | I | | S | D | 4 | 8.0 | 1.05 | 8 | 0.01 | 1.0 |
| 80-011 | LOGPERCH | I | M | S | D | 15 | 30.0 | 3.95 | 120 | 0.11 | 4.0 |
| 80-014 | JOHNNY DARTER | I | | C | D | 1 | 2.0 | 0.26 | 2 | 0.00 | 1.0 |
| 80-015 | GREENSIDE DARTER | I | M | S | D | 1 | 2.0 | 0.26 | 2 | 0.00 | 1.0 |
| 80-016 | BANDED DARTER | I | I | S | D | 5 | 10.0 | 1.32 | 10 | 0.01 | 1.0 |
| 80-022 | RAINBOW DARTER | I | M | S | D | 11 | 22.0 | 2.89 | 24 | 0.02 | 1.0 |
| 80-026 | SAUGER X WALLEYE | P | | | E | 1 | 2.0 | 0.26 | 3000 | 2.67 | 1500.0 |

No Species: 33 **Nat. Species:** 30 **Hybrids:** 2 **Total Counted:** 380 **Total Rel. Wt. :** 112330
IBI: 50.0 **MIwb:** 10.2

Appendix Table A-3. Midwest Biodiversity Institute Fish Species List

Site ID: River: 14-001 Great Miami River RM: 81.80 Date: 10/08/2018
 Time Fished: 2154 Distance: 0.500 Drainge (sq mi): 1860.0 Depth: 0
 Location: Dst. I-75 Lat: 39.77129 Long: -84.18925

| Species Code: | Species Name: | Feed Guild | Tolerance | Breed Guild | IBI Group | No. Fish | Rel. No. | % by No. | Rel. Wt. | % by Wt. | Av. Wt. |
|---------------|----------------------|------------|-----------|-------------|-----------|----------|----------|----------|----------|----------|---------|
| 20-003 | GIZZARD SHAD | O | | M | | 66 | 132.0 | 15.71 | 720 | 0.77 | 5.4 |
| 40-005 | QUILLBACK CARPSUCKER | O | | M | C | 4 | 8.0 | 0.95 | 5800 | 6.24 | 725.0 |
| 40-009 | BLACK REDHORSE | I | I | S | R | 24 | 48.0 | 5.71 | 2560 | 2.75 | 53.3 |
| 40-010 | GOLDEN REDHORSE | I | M | S | R | 161 | 322.0 | 38.33 | 44700 | 48.10 | 138.8 |
| 40-013 | RIVER REDHORSE | I | I | S | R | 3 | 6.0 | 0.71 | 8020 | 8.63 | 1336.6 |
| 40-015 | NORTHERN HOG SUCKER | I | M | S | R | 39 | 78.0 | 9.29 | 4600 | 4.95 | 58.9 |
| 40-023 | SMALLMOUTH REDHORSE | I | M | S | R | 33 | 66.0 | 7.86 | 3780 | 4.07 | 57.2 |
| 43-001 | COMMON CARP | O | T | M | G | 2 | 4.0 | 0.48 | 6000 | 6.46 | 1500.0 |
| 43-021 | SILVER SHINER | I | I | S | N | 3 | 6.0 | 0.71 | 20 | 0.02 | 3.3 |
| 43-025 | STRIPED SHINER | I | | S | N | 3 | 6.0 | 0.71 | 12 | 0.01 | 2.0 |
| 43-032 | SPOTFIN SHINER | I | | M | N | 1 | 2.0 | 0.24 | 6 | 0.01 | 3.0 |
| 43-034 | SAND SHINER | I | M | M | N | 1 | 2.0 | 0.24 | 4 | 0.00 | 2.0 |
| 43-035 | MIMIC SHINER | I | I | M | N | 3 | 6.0 | 0.71 | 10 | 0.01 | 1.6 |
| 43-043 | BLUNTNOSE MINNOW | O | T | C | N | 20 | 40.0 | 4.76 | 160 | 0.17 | 4.0 |
| 70-001 | BROOK SILVERSIDE | I | M | M | | 1 | 2.0 | 0.24 | 2 | 0.00 | 1.0 |
| 77-003 | ROCK BASS | C | | C | S | 2 | 4.0 | 0.48 | 50 | 0.05 | 12.5 |
| 77-004 | SMALLMOUTH BASS | C | M | C | F | 10 | 20.0 | 2.38 | 11650 | 12.54 | 582.5 |
| 77-006 | LARGEMOUTH BASS | C | | C | F | 1 | 2.0 | 0.24 | 280 | 0.30 | 140.0 |
| 77-009 | BLUEGILL SUNFISH | I | P | C | S | 6 | 12.0 | 1.43 | 24 | 0.03 | 2.0 |
| 77-011 | LONGEAR SUNFISH | I | M | C | S | 4 | 8.0 | 0.95 | 340 | 0.37 | 42.5 |
| 77-012 | REDEAR SUNFISH | I | | C | E | 10 | 20.0 | 2.38 | 300 | 0.32 | 15.0 |
| 80-005 | BLACKSIDE DARTER | I | | S | D | 4 | 8.0 | 0.95 | 16 | 0.02 | 2.0 |
| 80-011 | LOGPERCH | I | M | S | D | 3 | 6.0 | 0.71 | 20 | 0.02 | 3.3 |
| 80-014 | JOHNNY DARTER | I | | C | D | 2 | 4.0 | 0.48 | 4 | 0.00 | 1.0 |
| 80-015 | GREENSIDE DARTER | I | M | S | D | 8 | 16.0 | 1.90 | 40 | 0.04 | 2.5 |
| 80-016 | BANDED DARTER | I | I | S | D | 3 | 6.0 | 0.71 | 6 | 0.01 | 1.0 |
| 80-026 | SAUGER X WALLEYE | P | | | E | 3 | 6.0 | 0.71 | 3800 | 4.09 | 633.3 |

No Species: 26 **Nat. Species:** 24 **Hybrids:** 1 **Total Counted:** 420 **Total Rel. Wt. :** 92924

IBI: 52.0 **MIwb:** 9.4

APPENDIX B: Macroinvertebrate Assemblage Data

Appendix Table A-1. ICI metrics and values for the Great Miami River sampled between RM 75 and 84 from 1980 to 2018.

| Site_ID | River Mile | Drainage | | Number of | | | | Percent: | | | | | Qual. EPT | ICI or Narrative |
|--------------------------------|------------|--------------|------------|-------------|----------------|---------------|----------|-------------|-------------|---------------|--------------------|-------|-----------|------------------|
| | | Area (sq mi) | Total Taxa | Mayfly Taxa | Caddisfly Taxa | Dipteran Taxa | Mayflies | Caddisflies | Tanytarsini | Other Dipt/NI | Tolerant Organisms | | | |
| Bearwallow Run (14-001) | | | | | | | | | | | | | | |
| Year: 2018 | | | | | | | | | | | | | | |
| GMRB25 | 81.60 | 1853.0 | 47(6) | 10(6) | 9(6) | 19(6) | 47.5(6) | 36.6(6) | 0.4(2) | 14.1(4) | 0.2(6) | 26(6) | 54 | |
| GMRB24 | 81.10 | 2511.0 | 47(6) | 12(6) | 6(4) | 19(6) | 79.7(6) | 12.7(2) | 0.4(2) | 6.2(6) | 0.9(6) | 13(4) | 48 | |
| H09W72 | 79.80 | 2583.0 | 49(6) | 9(6) | 8(6) | 19(6) | 39.8(6) | 39.4(6) | 0.2(2) | 18.6(4) | 0.4(6) | 19(6) | 54 | |
| H09W02 | 77.80 | 2600.0 | 38(6) | 12(6) | 8(6) | 12(6) | 42.3(6) | 46.4(6) | 0.1(2) | 10.4(6) | 0.1(6) | 19(6) | 56 | |
| GMRB23 | 77.00 | 2591.0 | 41(6) | 9(6) | 7(6) | 8(4) | 64.4(6) | 17.5(2) | 0.1(2) | 15.1(4) | 2.6(2) | 7(2) | 40 | |
| Year: 2010 | | | | | | | | | | | | | | |
| 610060 | 80.60 | 2511.0 | | | | | | | | | | 21 | E | |
| H09W02 | 78.85 | | 39(6) | 10(6) | 7(6) | 13(2) | 41.8(6) | 18.9(6) | 9.5(4) | 28.0(6) | 1.7(6) | 16(6) | 54 | |
| H09W08 | 77.24 | | 47(6) | 13(6) | 9(6) | 16(4) | 22.1(4) | 17.4(6) | 15.7(4) | 44.5(4) | 4.5(6) | 21(6) | 52 | |
| H09W73 | 75.70 | 2594.0 | 40(6) | 11(6) | 9(6) | 14(6) | 15.6(4) | 30.1(4) | 29.4(6) | 24.7(2) | 0.7(6) | 12(4) | 50 | |
| Year: 2009 | | | | | | | | | | | | | | |
| GMRB25 | 82.10 | 1851.0 | 40(6) | 7(4) | 5(4) | 16(6) | 11.3(4) | 13.6(2) | 6.7(2) | 67.7(0) | 14.0(0) | 18(6) | 34 | |
| Year: 1999 | | | | | | | | | | | | | | |
| H05W33 | 83.80 | 1174.0 | 14(2) | 3(2) | 0(0) | 2(0) | 0.6(2) | 0.0(0) | 0.0(0) | 99.3(0) | 12.3(0) | 5(0) | 6 | |
| Year: 1995 | | | | | | | | | | | | | | |
| GMRB25 | 82.00 | 1852.0 | 35(6) | 8(6) | 6(4) | 11(6) | 7.1(2) | 6.0(2) | 70.4(6) | 16.3(4) | 5.5(0) | 16(6) | 42 | |
| 610060 | 80.70 | 2511.0 | 33(6) | 10(6) | 6(4) | 7(4) | 9.6(4) | 4.7(0) | 65.8(6) | 19.6(4) | 13.0(0) | 11(4) | 38 | |
| GMRB24 | 80.00 | 2583.0 | 47(6) | 11(6) | 7(6) | 16(6) | 24.5(6) | 16.3(2) | 42.3(6) | 16.0(4) | 1.6(4) | 15(6) | 52 | |
| GMRB24 | 80.00 | 2583.0 | 49(6) | 10(6) | 9(6) | 18(6) | 9.0(2) | 6.6(2) | 52.4(6) | 31.4(0) | 20.6(0) | 12(4) | 38 | |
| GMRB23 | 76.40 | 2592.0 | 47(6) | 12(6) | 8(6) | 14(6) | 31.8(6) | 41.2(6) | 15.5(4) | 11.0(6) | 2.0(4) | 19(6) | 56 | |
| GMRB23 | 76.40 | 2592.0 | 36(6) | 11(6) | 6(4) | 12(6) | 11.1(4) | 17.5(2) | 58.0(6) | 12.9(4) | 3.8(0) | 16(6) | 44 | |
| H09S37 | 76.00 | 2594.0 | 41(6) | 9(6) | 8(6) | 12(6) | 12.1(4) | 19.2(2) | 41.9(6) | 26.5(2) | 8.5(0) | 13(4) | 42 | |
| H09W73 | 75.70 | 2594.0 | 43(6) | 9(6) | 9(6) | 14(6) | 7.1(2) | 18.9(2) | 49.9(6) | 24.0(2) | 2.6(2) | 13(4) | 42 | |
| Year: 1989 | | | | | | | | | | | | | | |
| 610060 | 80.60 | 2511.0 | 42(6) | 10(6) | 7(6) | 16(6) | 25.2(6) | 18.4(2) | 36.6(6) | 19.3(4) | 2.6(2) | 16(6) | 50 | |
| GMRB24 | 80.00 | 2583.0 | 33(6) | 8(6) | 5(4) | 12(6) | 33.8(6) | 14.2(2) | 34.6(6) | 16.2(4) | 5.8(0) | 16(6) | 46 | |
| GMRB23 | 76.50 | 2592.0 | 29(4) | 8(6) | 8(6) | 8(4) | 12.3(4) | 50.7(6) | 17.6(6) | 18.5(4) | 1.5(4) | 16(6) | 50 | |
| H09W73 | 75.80 | 2594.0 | 30(4) | 8(6) | 7(6) | 8(4) | 18.6(6) | 27.9(4) | 34.2(6) | 18.0(4) | 0.6(6) | 12(4) | 50 | |
| Year: 1980 | | | | | | | | | | | | | | |
| GMRB25 | 82.00 | 1852.0 | 30(4) | 7(4) | 6(4) | 11(6) | 16.1(4) | 18.8(4) | 33.4(6) | 31.7(0) | 3.5(2) | 2(0) | 34 | |
| 610060 | 80.70 | 2511.0 | 32(4) | 7(4) | 8(6) | 8(4) | 43.9(6) | 22.9(4) | 4.1(2) | 28.3(0) | 7.9(0) | 7(2) | 32 | |
| H09W02 | 78.00 | 2589.0 | 27(4) | 6(4) | 2(2) | 10(6) | 17.3(4) | 0.8(0) | 26.6(6) | 55.0(0) | 14.9(0) | 4(0) | 26 | |
| H09W67 | 77.30 | 2590.0 | 28(4) | 6(4) | 6(4) | 9(6) | 62.8(6) | 12.8(2) | 9.2(4) | 14.7(4) | 1.6(4) | 9(2) | 40 | |
| GMRB23 | 76.50 | 2592.0 | 26(4) | 6(4) | 7(6) | 7(4) | 49.9(6) | 19.5(4) | 13.9(4) | 16.5(4) | 0.6(6) | 13(4) | 46 | |

Appendix Table A-1. ICI metrics and values for the Great Miami River sampled between RM 75 and 84 from 1980 to 2018.

| Site_ID | River Mile | Drainage | | Number of | | | Percent: | | | | | | Qual. EPT | ICI or Narrative |
|---------|------------|--------------|------------|-------------|----------------|---------------|----------|-------------|-------------|---------------|--------------------|------|-----------|------------------|
| | | Area (sq mi) | Total Taxa | Mayfly Taxa | Caddisfly Taxa | Dipteran Taxa | Mayflies | Caddisflies | Tanytarsini | Other Dipt/NI | Tolerant Organisms | | | |
| H09W55 | 75.20 | 2597.0 | 24(4) | 7(4) | 5(4) | 6(4) | 31.3(6) | 47.7(6) | 8.9(4) | 11.8(6) | 0.9(6) | 9(2) | 46 | |

Table B-2. Macroinvertebrate data at sites in the Great Miami River in 2018.

| River Code: 14-001 | | River: | | Coll. Date: <i>10/10/2018</i> | | RM: 81.60 | | | |
|---------------------------|----------------------------------|-----------|------|-------------------------------|---------------------------|-----------------------------------|----------------|------|---------|
| Site ID: GMRB25 | | Location: | | Sample: | | | | | |
| Taxa Code | Taxa | CWH Taxa | Tol. | Qt./Ql. | Taxa Code | Taxa | CWH Taxa | Tol. | Qt./Ql. |
| 01801 | Turbellaria | F | | 240 | | N. (N.) "rectinervis" | | | |
| 03360 | Plumatella sp | F | | 4 | 81460 | Orthocladius (O.) sp | F | | 3 + |
| 03600 | Oligochaeta | T | | 2 + | 82141 | Thienemanniella xena | F | | 1 |
| 06201 | Hyalella azteca | F | | + | 82220 | Tvetenia discoloripes group | MI | | 3 |
| 06700 | Crangonyx sp | MT | | + | 83040 | Dicrotendipes neomodestus | F | | 1 + |
| 08601 | Hydrachnidia | F | | + | 84450 | Polypedilum (Uresipedilum) flavum | F | | 7 |
| 11020 | Acerpenna pygmaea | MI | | 22 | 84470 | Polypedilum (P.) illinoense | T | | 1 + |
| 11119 | Plauditus dubius or P. virilis | I | | 31 + | 84700 | Stenochironomus sp | F | | 11 + |
| 11130 | Baetis intercalaris | F | | 7 + | 85615 | Rheotanytarsus pellucidus | MI | | 2 |
| 11650 | Procloeon sp (w/ hindwing pads) | MI | | + | 85625 | Rheotanytarsus sp | F | | 9 + |
| 11670 | Procloeon viridoculare | MI | | + | 85814 | Tanytarsus glabrescens group | F | | 1 |
| 12200 | Isonychia sp | MI | | 356 + | 87540 | Hemerodromia sp | F | | 16 |
| 13400 | Stenacron sp | F | | 127 + | 93900 | Elimia sp | MI | | 103 + |
| 13510 | Maccaffertium exiguum | MI | | 3 | 18100 | Anthopotamus sp | MI | | + |
| 13540 | Maccaffertium mediopunctatum | MI | | 74 + | 13100 | Nixe sp | MI | | + |
| 13561 | Maccaffertium pulchellum | MI | | 300 + | 18600 | Ephemera sp | MI | | + |
| 13570 | Maccaffertium terminatum | MI | | 96 + | 26700 | Macromia sp | MI | | + |
| 16700 | Tricorythodes sp | MI | | 358 + | 60400 | Gyrinus sp | F | | + |
| 17200 | Caenis sp | F | | + | 11200 | Callibaetis sp | MT | | + |
| 21001 | Calopterygidae | F | | + | 34605 | Perlinella drymo | MI | | + |
| 21300 | Hetaerina sp | F | | + | 59510 | Oecetis avara | I | | + |
| 22300 | Argia sp | F | | 3 | 59415 | Nectopsyche exquisita | MI | | + |
| 50315 | Chimarra obscura | MI | | 2 | 59407 | Nectopsyche candida | MI | | + |
| 50804 | Lype diversa | MI | | 1 | 11123 | Labiobaetis dardanus | MI | | + |
| 51300 | Neureclipsis sp | MI | | 3 + | 52510 | Hydropsyche aerata | MI | | 3 |
| 51600 | Polycentropus sp | MI | | 3 | 84960 | Pseudochironomus sp | F | | 1 |
| 52200 | Cheumatopsyche sp | F | | 978 + | 83158 | Endochironomus nigricans | MT | | + |
| 52430 | Ceratopsyche morosa group | MI | | 50 + | 84040 | Parachironomus frequens | F | | 2 |
| 52570 | Hydropsyche simulans | MI | | 1 | 78750 | Rheopelopia paramaculipennis | MI | | 1 |
| 53400 | Protophila sp | I | | + | 82130 | Thienemanniella similis | MI | | 2 |
| 53800 | Hydroptila sp | F | | 19 | | | | | |
| 58505 | Helicopsyche borealis | MI | | + | No. Quantitative Taxa: 46 | | Total Taxa; 72 | | |
| 59300 | Mystacides sp | MI | | + | No. Qualitative Taxa: 46 | | ICI: 54 | | |
| 59970 | Petrophila sp | MI | | 27 + | Number of Organisms: 2893 | | Qual EPT: 26 | | |
| 68075 | Psephenus herricki | MI | | + | | | | | |
| 68601 | Ancyronyx variegata | F | | 2 | | | | | |
| 68901 | Macronychus glabratus | F | | 6 | | | | | |
| 69400 | Stenelmis sp | F | | 1 + | | | | | |
| 74100 | Simulium sp | F | | + | | | | | |
| 80310 | Cardiocladius obscurus | MI | | + | | | | | |
| 80420 | Cricotopus (C.) bicinctus | T | | 4 | | | | | |
| 80440 | Cricotopus (C.) trifascia | F | | 2 | | | | | |
| 81231 | Nanocladius (N.) crassicornus or | F | | 4 | | | | | |

Table B-2. Macroinvertebrate data at sites in the Great Miami River in 2018.

River Code: **14-001** River: **Great Miami River** Coll. Date: **10/12/2018** RM: **81.10**

Site ID: **GMRB24** Location: *dst. Main Street* Sample:

| Taxa Code | Taxa | CWH Taxa | Tol. | Qt./Ql. | Taxa Code | Taxa | CWH Taxa | Tol. | Qt./Ql. |
|-----------|---|----------|------|---------|------------------------|---|-------------|------|---------|
| 01320 | Hydra sp | F | | 4 | | N. (N.) "rectinervis" | | | |
| 01801 | Turbellaria | F | | 21 + | 82710 | Chironomus (C.) sp | MT | | + |
| 03360 | Plumatella sp | F | | 3 | 83000 | Dicrotendipes sp | F | | 2 |
| 03600 | Oligochaeta | T | | 16 + | 83040 | Dicrotendipes neomodestus | F | | 2 + |
| 06201 | Hyalella azteca | F | | + | 83300 | Glyptotendipes (G.) sp | MT | | 13 |
| 08601 | Hydrachnidia | F | | + | 84300 | Phaenopsectra obediens group | F | | 2 |
| 11020 | Acerpenna pygmaea | MI | | 5 | 84450 | Polypedilum (Uresipedilum) flavum | F | | 1 |
| 11119 | Plauditus dubius or P. virilis | I | | 5 | 84470 | Polypedilum (P.) illinoense | T | | + |
| 11650 | Proclleon sp (w/ hindwing pads) | MI | | + | 84540 | Polypedilum (Tripodura) scalaenum group | F | | 2 |
| 11651 | Proclleon sp (w/o hindwing pads) | MI | | + | 84700 | Stenochironomus sp | F | | 6 |
| 12200 | Isonychia sp | MI | | 32 | 84790 | Tribelos fuscicorne | F | | 3 |
| 13000 | Leucrocota sp | MI | | + | 85615 | Rheotanytarsus pellucidus | MI | | 1 |
| 13400 | Stenacron sp | F | | 597 + | 85625 | Rheotanytarsus sp | F | | 8 |
| 13510 | Maccaffertium exiguum | MI | | 1 | 85800 | Tanytarsus sp | F | | + |
| 13521 | Stenonema femoratum | F | | 24 | 87540 | Hemerodromia sp | F | | 2 |
| 13540 | Maccaffertium mediopunctatum | MI | | 8 | 93900 | Elimia sp | MI | | 30 + |
| 13561 | Maccaffertium pulchellum | MI | | 344 + | 95100 | Physella sp | T | | 1 + |
| 13570 | Maccaffertium terminatum | MI | | 64 + | 18700 | Hexagenia sp | F | | + |
| 16700 | Tricorythodes sp | MI | | 550 + | 18100 | Anthopotamus sp | MI | | 5 + |
| 17200 | Caenis sp | F | | 16 + | 05900 | Lirceus sp | MT | | + |
| 21300 | Hetaerina sp | F | | + | 59415 | Nectopsyche exquisita | MI | | + |
| 22001 | Coenagrionidae | T | | + | 26700 | Macromia sp | MI | | + |
| 22300 | Argia sp | F | | 3 + | 11200 | Callibaetis sp | MT | | + |
| 24900 | Gomphus sp | F | | + | 85230 | Cladotanytarsus mancus group | F | | + |
| 51300 | Neureclipsis sp | MI | | 10 | 51206 | Cyrnellus fraternus | F | | 9 |
| 51600 | Polycentropus sp | MI | | 3 + | | | | | |
| 52200 | Cheumatopsyche sp | F | | 225 | | | | | |
| 52430 | Ceratopsyche morosa group | MI | | 15 | No. Quantitative Taxa: | 47 | Total Taxa; | 66 | |
| 59580 | Oecetis persimilis | MI | | 1 | No. Qualitative Taxa: | 33 | ICI: | 48 | |
| 59970 | Petrophila sp | MI | | + | Number of Organisms: | 2071 | Qual EPT: | 13 | |
| 68075 | Psephenus herricki | MI | | + | | | | | |
| 68601 | Ancyronyx variegata | F | | 3 | | | | | |
| 68901 | Macronychus glabratus | F | | 13 | | | | | |
| 69400 | Stenelmis sp | F | | 1 | | | | | |
| 77120 | Ablabesmyia mallochi | F | | 1 | | | | | |
| 77750 | Hayesomyia senata or Thienemannimyia norena | F | | 3 | | | | | |
| 77800 | Helopelopia sp | F | | 2 | | | | | |
| 78140 | Labrundinia pilosella | F | | 4 | | | | | |
| 78450 | Nilotanypus fimbriatus | F | | 2 | | | | | |
| 80370 | Corynoneura lobata | F | | 6 | | | | | |
| 80420 | Cricotopus (C.) bicinctus | T | | 1 + | | | | | |
| 81231 | Nanocladius (N.) crassicornus or | F | | 1 | | | | | |

Table B-2. Macroinvertebrate data at sites in the Great Miami River in 2018.

River Code: **14-001** River: **Great Miami River** Coll. Date: **10/10/2018** RM: **79.80**

Site ID: **H09W72** Location: Sample:

| Taxa Code | Taxa | CWH Taxa | Tol. | Qt./Ql. | Taxa Code | Taxa | CWH Taxa | Tol. | Qt./Ql. |
|-----------|--------------------------------|----------|------|---------|---------------------------|-------------------------|----------------|------|---------|
| 01801 | Turbellaria | F | | 596 + | 97601 | Corbicula fluminea | F | | 8 + |
| 03600 | Oligochaeta | T | | 4 + | 42700 | Belostoma sp | T | | + |
| 06201 | Hyalella azteca | F | | + | 18100 | Anthopotamus sp | MI | | + |
| 11119 | Plauditus dubius or P. virilis | I | | 20 + | 05900 | Lirceus sp | MT | | + |
| 11130 | Baetis intercalaris | F | | 18 + | 59415 | Nectopsyche exquisita | MI | | + |
| 11670 | Proclleon viridoculare | MI | | + | 11200 | Callibaetis sp | MT | | + |
| 12200 | Isonychia sp | MI | | 634 + | 01900 | Nemertea | F | | 2 |
| 13400 | Stenacron sp | F | | 81 + | 04930 | Erpobdella sp | MT | | + |
| 13521 | Stenonema femoratum | F | | 7 + | 69225 | Optioservus fastiditus | MI | | + |
| 13540 | Maccaffertium mediopunctatum | MI | | 94 + | 25510 | Stylogomphus albistylus | MI | | + |
| 13561 | Maccaffertium pulchellum | MI | | 518 + | 52510 | Hydropsyche aerata | MI | | 4 |
| 13570 | Maccaffertium terminatum | MI | | 86 + | 52801 | Potamyia flava | MI | | 1 |
| 16700 | Tricorythodes sp | MI | | 252 + | | | | | |
| 21300 | Hetaerina sp | F | | + | No. Quantitative Taxa: 33 | | Total Taxa; 55 | | |
| 22001 | Coenagrionidae | T | | + | No. Qualitative Taxa: 45 | | ICI: 48 | | |
| 22300 | Argia sp | F | | 1 + | Number of Organisms: 4244 | | Qual EPT: 19 | | |
| 50315 | Chimarra obscura | MI | | 8 | | | | | |
| 51600 | Polycentropus sp | MI | | + | | | | | |
| 52200 | Cheumatopsyche sp | F | | 1239 + | | | | | |
| 52430 | Ceratopsyche morosa group | MI | | 429 + | | | | | |
| 52530 | Hydropsyche depravata group | F | | + | | | | | |
| 52570 | Hydropsyche simulans | MI | | 2 | | | | | |
| 53400 | Protophila sp | I | | 2 + | | | | | |
| 53501 | Hydroptilidae | F | | 8 | | | | | |
| 58505 | Helicopsyche borealis | MI | | + | | | | | |
| 59970 | Petrophila sp | MI | | 42 + | | | | | |
| 68075 | Psephenus herricki | MI | | 1 + | | | | | |
| 68601 | Ancyronyx variegata | F | | 12 | | | | | |
| 68700 | Dubiraphia sp | F | | + | | | | | |
| 68901 | Macronychus glabratus | F | | 13 | | | | | |
| 69200 | Optioservus sp | MI | | 1 | | | | | |
| 69400 | Stenelmis sp | F | | 18 + | | | | | |
| 70600 | Antocha sp | MI | | 11 | | | | | |
| 74100 | Simulium sp | F | | + | | | | | |
| 78655 | Procladius (Holotanypus) sp | MT | | + | | | | | |
| 80420 | Cricotopus (C.) bicinctus | T | | + | | | | | |
| 80430 | Cricotopus (C.) tremulus group | MT | | + | | | | | |
| 80440 | Cricotopus (C.) trifascia | F | | 31 + | | | | | |
| 81460 | Orthocladius (O.) sp | F | | + | | | | | |
| 82220 | Tvetenia discoloripes group | MI | | 6 + | | | | | |
| 93200 | Hydrobiidae | F | | + | | | | | |
| 93900 | Elimia sp | MI | | 83 + | | | | | |
| 96900 | Ferrissia sp | F | | 12 + | | | | | |

Table B-2. Macroinvertebrate data at sites in the Great Miami River in 2018.

| River Code: 14-001 | | River: Great Miami River | | Coll. Date: 10/10/2018 | | RM: 77.80 | | | |
|---------------------------|-----------------------------------|---------------------------------|------|-------------------------------|---------------------------|---------------------------------------|----------|------|----------------|
| Site ID: H09W02 | | Location: | | Sample: | | | | | |
| Taxa Code | Taxa | CWH Taxa | Tol. | Qt./Ql. | Taxa Code | Taxa | CWH Taxa | Tol. | Qt./Ql. |
| 01320 | Hydra sp | F | | + | 84470 | Polypedilum (P.) illinoense | T | | + |
| 01801 | Turbellaria | F | 271 | + | 85625 | Rheotanytarsus sp | F | | 3 |
| 03600 | Oligochaeta | T | | + | 87540 | Hemerodromia sp | F | | 4 |
| 04964 | Erpobdella microstoma | MT | | + | 93900 | Elimia sp | MI | | 50 + |
| 06201 | Hyalella azteca | F | | + | 95100 | Physella sp | T | | + |
| 11119 | Plauditus dubius or P. virilis | I | 40 | + | 97601 | Corbicula fluminea | F | | + |
| 11130 | Baetis intercalaris | F | 42 | + | 18100 | Anthopotamus sp | MI | | + |
| 11670 | Proclleon viridoculare | MI | | + | 18600 | Ephemera sp | MI | | + |
| 12200 | Isonychia sp | MI | 453 | + | 05900 | Lirceus sp | MT | | + |
| 13400 | Stenacron sp | F | 133 | + | 52510 | Hydropsyche aerata | MI | | 9 + |
| 13510 | Maccaffertium exiguum | MI | 83 | | 11200 | Callibaetis sp | MT | | + |
| 13521 | Stenonema femoratum | F | 2 | | 43570 | Neoplea sp | F | | + |
| 13540 | Maccaffertium mediopunctatum | MI | | + | 11645 | Proclleon sp | MI | | + |
| 13550 | Maccaffertium mexicanum integrum | MI | 2 | | 00401 | Spongillidae | F | | + |
| 13561 | Maccaffertium pulchellum | MI | 181 | + | 08250 | Orconectes (Procericambarus) rusticus | F | | + |
| 13570 | Maccaffertium terminatum | MI | 106 | + | 92615 | Cipangopaludina japonica | MT | | + |
| 16700 | Tricorythodes sp | MI | 418 | + | 59950 | Parapoynx sp | MI | | + |
| 17200 | Caenis sp | F | | + | 11014 | Acentrella turbida | I | | 2 |
| 21300 | Hetaerina sp | F | 4 | + | 80740 | Eukiefferiella claripennis group | MT | | 1 |
| 22001 | Coenagrionidae | T | | + | 82130 | Thienemanniella similis | MI | | 1 |
| 22300 | Argia sp | F | | + | | | | | |
| 51600 | Polycentropus sp | MI | 1 | + | No. Quantitative Taxa: 37 | | | | Total Taxa; 62 |
| 52200 | Cheumatopsyche sp | F | 937 | + | No. Qualitative Taxa: 44 | | | | ICI: 56 |
| 52430 | Ceratopsyche morosa group | MI | 631 | + | Number of Organisms: 3508 | | | | Qual EPT: 19 |
| 52530 | Hydropsyche depravata group | F | 24 | | | | | | |
| 52560 | Hydropsyche orris | MI | 24 | | | | | | |
| 52570 | Hydropsyche simulans | MI | 5 | | | | | | |
| 53501 | Hydroptilidae | F | 14 | + | | | | | |
| 59970 | Petrophila sp | MI | 18 | + | | | | | |
| 60900 | Peltodytes sp | MT | | + | | | | | |
| 68201 | Scirtidae | F | | + | | | | | |
| 68901 | Macronychus glabratus | F | 7 | + | | | | | |
| 69400 | Stenelmis sp | F | 1 | + | | | | | |
| 70600 | Antocha sp | MI | 6 | | | | | | |
| 74100 | Simulium sp | F | 4 | + | | | | | |
| 78655 | Procladius (Holotanypus) sp | MT | | + | | | | | |
| 80310 | Cardiocladius obscurus | MI | 2 | | | | | | |
| 80420 | Cricotopus (C.) bicinctus | T | 4 | | | | | | |
| 80440 | Cricotopus (C.) trifascia | F | 3 | | | | | | |
| 81460 | Orthocladius (O.) sp | F | 1 | | | | | | |
| 82220 | Tvetenia discoloripes group | MI | 17 | | | | | | |
| 84450 | Polypedilum (Uresipedilum) flavum | F | 4 | | | | | | |

Table B-2. Macroinvertebrate data at sites in the Great Miami River in 2018.

| River Code: 14-001 | | River: Great Miami River | | Coll. Date: 10/10/2018 | | RM: 77.00 | | | |
|---------------------------|---|---------------------------------------|------|-------------------------------|---------------------------|---------------------------------------|----------------|------|---------|
| Site ID: GMRB23 | | Location: <i>dst Dam removal site</i> | | Sample: | | | | | |
| Taxa Code | Taxa | CWH Taxa | Tol. | Qt./Ql. | Taxa Code | Taxa | CWH Taxa | Tol. | Qt./Ql. |
| 01801 | Turbellaria | F | | 65 + | 26700 | Macromia sp | MI | | + |
| 03600 | Oligochaeta | T | | 53 + | 08250 | Orconectes (Procericambarus) rusticus | F | | + |
| 06201 | Hyalella azteca | F | | + | 05900 | Lirceus sp | MT | | 2 + |
| 06700 | Crangonyx sp | MT | | 2 | 18600 | Ephemera sp | MI | | + |
| 11020 | Acerpenna pygmaea | MI | | 2 | 68130 | Helichus sp | F | | + |
| 12200 | Isonychia sp | MI | | 54 | 11200 | Callibaetis sp | MT | | + |
| 13400 | Stenacron sp | F | | 385 + | 59415 | Nectopsyche exquisita | MI | | 5 + |
| 13521 | Stenonema femoratum | F | | 16 | 04683 | Placobdella multilineata | F | | + |
| 13540 | Maccaffertium mediopunctatum | MI | | 3 | 96930 | Laevapex fuscus | MT | | 1 + |
| 13561 | Maccaffertium pulchellum | MI | | 170 + | 51206 | Cynellus fraternus | F | | 3 |
| 13570 | Maccaffertium terminatum | MI | | 79 + | 01900 | Nemertea | F | | 19 |
| 16700 | Tricorythodes sp | MI | | 670 + | | | | | |
| 17200 | Caenis sp | F | | 3 | | | | | |
| 21300 | Hetaerina sp | F | | 2 + | No. Quantitative Taxa: 41 | | Total Taxa; 52 | | |
| 22001 | Coenagrionidae | T | | + | No. Qualitative Taxa: 26 | | ICI: 40 | | |
| 22300 | Argia sp | F | | 1 + | Number of Organisms: 2145 | | Qual EPT: 7 | | |
| 24900 | Gomphus sp | F | | + | | | | | |
| 50804 | Lype diversa | MI | | 1 | | | | | |
| 51600 | Polycentropus sp | MI | | 3 | | | | | |
| 52200 | Cheumatopsyche sp | F | | 342 | | | | | |
| 52430 | Ceratopsyche morosa group | MI | | 17 | | | | | |
| 53501 | Hydroptilidae | F | | 4 | | | | | |
| 59970 | Petrophila sp | MI | | 3 + | | | | | |
| 68601 | Ancyronyx variegata | F | | 2 | | | | | |
| 68700 | Dubiraphia sp | F | | 3 | | | | | |
| 68901 | Macronychus glabratus | F | | 36 | | | | | |
| 69400 | Stenelmis sp | F | | 15 | | | | | |
| 77120 | Ablabesmyia mallochi | F | | 1 | | | | | |
| 77500 | Conchapelopia sp | F | | 1 | | | | | |
| 77750 | Hayesomyia senata or Thienemannimyia norena | F | | 4 | | | | | |
| 80420 | Cricotopus (C.) bicinctus | T | | 2 | | | | | |
| 84300 | Phaenopsectra obediens group | F | | 4 | | | | | |
| 84470 | Polypedilum (P.) illinoense | T | | + | | | | | |
| 84540 | Polypedilum (Tripodura) scalaenum group | F | | 1 | | | | | |
| 85625 | Rheotanytarsus sp | F | | 1 | | | | | |
| 85821 | Tanytarsus glabrescens group sp 7 | F | | 1 | | | | | |
| 93200 | Hydrobiidae | F | | + | | | | | |
| 93900 | Elimia sp | MI | | 152 + | | | | | |
| 95100 | Physella sp | T | | 1 + | | | | | |
| 97601 | Corbicula fluminea | F | | 15 + | | | | | |
| 98200 | Pisidium sp | MT | | 1 | | | | | |

Station ID _____ Sheet ID _____ Date Collected 40 10-10-18
Q1 10-17-18

Project _____ Sampler Type Qnt/Q1 # HDs 5 Collected By JL BP

ALP _____ RM 81.6 Data _____ Comments _____ Date Analyzed _____

Lat./Long. _____ Analyzed By _____

Stream Great Miami River Location Ust. Mad River

Flow _____ Temp. C) _____ HDs - Current Set (fps) 0.8 Ret. (fps) 1.1 Q1. Time Sampled (min.) 120

Sampling Method: HD(No. 5) - DN/HP - Surber - Grab (Type _____) - Other _____

HD Sampler Site: Depth 2.0 Canopy Open Current (Set) 0.8

Current(Ret) 1.1

HD Condition: Disturbed Yes/No Yes/No Comment: _____
Debris Yes/No Yes/No Comment: _____

Silt/Solids None - Slight - Moderate - Heavy
DN/HP Sampling: Total Time 9:40-10:40 Habitats: Pool Riffle Run - Margin - Backwater

Physical Characteristics

Flow Condition: Flood - Above Normal - Normal - Low - Interstitial - Intermittent - Dry
Current Velocity: Fast - Moderate - Slow - ND
Channel Morphology: Natural - Channelized - Channelized (Recovered) - Impounded Leveed
Bank Erosion: Extensive - Moderate - Slight - None
Riffle Development: Extensive - Moderate - Sparse - Absent
Riffle Quality: Good - Fair - Poor Embedded: Yes/No
Clarity: Clear S/A - Murky - Turbid Temp: _____
Color: None - Green - Brown - Grey - Other (_____)
Canopy: Open - 75% - 50% - 25% - Closed

Predominant Land Use (L,R,B)

| | | |
|------------|----------------------------|---------|
| Forest | Open Pasture | Wetland |
| Shrub | Closed Pasture | Other |
| Old Field | <u>Urban B</u> | () |
| Rowcrop | Residential/ <u>Park B</u> | |
| Industrial | Mining/Construction | |

Predominant Riparian Vegetation Width

| Left | Right | Type |
|---------------|---------------|-------------|
| _____ | _____ | Large Trees |
| _____ | _____ | Small Trees |
| _____ | _____ | Shrubs |
| <u>X 100+</u> | <u>X 100+</u> | Grass/Weeds |
| _____ | _____ | None |

| | <u>Substrate Characteristics</u> | | |
|-------------------|----------------------------------|---------------|-------------|
| | <u>Pool</u> | <u>Riffle</u> | <u>Run</u> |
| Bedrock() | _____ | _____ | _____ |
| Boulder() | _____ | _____ | _____ |
| Rubble() | <u>XX</u> | <u>XX</u> | <u>XX</u> |
| Coarse Gravel | <u>X</u> | <u>X</u> | <u>X</u> |
| Fine Gravel | _____ | _____ | _____ |
| Sand | <u>XX</u> | <u>X</u> | <u>X</u> |
| Silt | _____ | _____ | _____ |
| Clay/Hardpan | _____ | _____ | _____ |
| Detritus | _____ | _____ | _____ |
| Peat | _____ | _____ | _____ |
| Muck | _____ | _____ | _____ |
| Other() | _____ | _____ | _____ |
| Macrophytes | _____ | _____ | _____ |
| Algae() | <u>✓</u> | <u>✓</u> | <u>✓</u> |
| Artifacts() | _____ | _____ | _____ |
| Compaction(F,M,S) | <u>F</u> | <u>F</u> | <u>F</u> |
| Depth(Average) | <u>36"</u> | <u>8"</u> | <u>24"</u> |
| Width(Average) | <u>100'</u> | <u>20'</u> | <u>200'</u> |

Adj Run

Margin Habitat

| | |
|--|---------------------|
| Undercut Banks | Root Mats |
| Grass | <u>Water Willow</u> |
| <u>Shallows</u> | Clay/Hardpan |
| Rip Rap | Bulkhead |
| Other() | |
| Margin Quality: <u>Good</u> <u>Fair</u> - Poor | |

Biological Characteristics:

Riffle:

Predominant

Organisms: Isomyia, Heptageniids

Other Common Organisms:

Midges, Baetis, Hydropsychids, Pterophila

Density: High - ~~Moderate~~ - Low

Diversity: High - ~~Moderate~~ - Low

Anthopotamus

Run:

Predominant Organisms:

Elmia, Pterophila, Anthopotamus

Other Common Organisms:

Isomyia, Heptageniids, Hydropsychid

Density: High - Moderate - Low

Diversity: High - Moderate - Low

Proteptila

Pool:

Predominant Organisms:

Anthopotamus, Elmia

Other Common Organisms:

Leptocerids, Heptageniids

Density: High - Moderate - Low

Diversity: High - Moderate - Low

Helicopsyche

Margin:

Predominant Organisms:

Amphipods ~~Trichoptera~~, Damselflies

Other Common Organisms:

Caddis, Midges, Baetids

Density: High - ~~Moderate~~ - Low

Diversity: High - ~~Moderate~~ - Low

Leptocerids

Other Notable

Collections: B. Psychomyia (?), Water Penny

Potential Pollution

Sources:

Evidence of

Pollution: Algae & stimeg diatom (?) deposits on top of rocks

Photo

Numbers:

Other Comments:

Generally run/slow run habitat split by rubble bar island and lined with water willow. Diverse, good quality organisms predominated by Elmia, Pterophila and mayflies

Station ID _____ Sheet ID _____ Date Collected 40: 10-10-18
Q1 10-17-18

Project _____ Sampler Type Qnt./Q1 # HDs 5 Collected By JJ, BP

ALP _____ RM 8/1 Data _____ Date Analyzed _____

Comments _____ Analyzed By _____

Lat./Long. _____

Stream Great Miami R. Location Dst. Mad River

Flow Up = 1' Temp. C. 5 (HDs) Current Set (fps) 0.3 Ret. (fps) 0.2 QI. Time Sampled (min.) 11:05 - 11:50

Sampling Method: HD(No. 5) - DN/HP - Surber - Grab (Type _____) - Other _____

HD Sampler Site: Depth 2, 3 Canopy Open Current (Set) 0.3

Current(Ret) 0.2

HD Condition: Disturbed Yes/No No Comment: _____

Debris Yes/No No Comment: Saw Algae

Silt/Solids None - Slight - Moderate - Heavy

DN/HP Sampling: Total Time 90 min Habitats: Pool - Riffle - Run - Margin Backwater

Physical Characteristics

Flow Condition: Flood - ~~Above Normal~~ - ~~Normal~~ - Low - Interstitial - Intermittent - Dry

Current Velocity: Fast - Moderate - Slow - ND

Channel Morphology: Natural - Channelized - Channelized (Recovered) - Impounded Slight

Bank Erosion: Extensive - Moderate - Slight - None

Riffle Development: Extensive - Moderate - Sparse - Absent

Riffle Quality: Good - Fair - Poor Embedded: Yes/No

Clarity: Clear - ~~Murky~~ Turbid Temp: _____

Color: None - ~~Green~~ Brown - Grey - Other (_____)

Canopy: Open - 75% - 50% - 25% - Closed

Predominant Land Use (L,R,B)

| | Substrate Characteristics | | |
|-------------------|---------------------------|----------------|-----|
| | Pool | Riffle | Run |
| Bedrock() | | | |
| Boulder() | | | |
| Rubble() | ✓ | | |
| Coarse Gravel | XXX | XXX | |
| Fine Gravel | | | |
| Sand | XXX | XXX | |
| Silt | | | |
| Clay/Hardpan | | | |
| Detritus | ✓ | | |
| Peat | | | |
| Muck | | | |
| Other() | | | |
| Macrophytes | | | |
| Algae() | ✓ | | |
| Artifacts() | | | |
| Compaction(F,M,S) | F | | |
| Depth(Average) | 36 + " | | |
| Width(Average) | 250' | | |

| | | |
|------------|---------------------|---------|
| Forest | Open Pasture | Wetland |
| Shrub | Closed Pasture | Other |
| Old Field | <u>Urban B</u> | () |
| Rowcrop | Residential/Park | |
| Industrial | Mining/Construction | |

Predominant Riparian Vegetation Width

| Left | Right | Type |
|----------------|----------------|-----------------|
| | | Large Trees |
| | | Small Trees |
| | | Shrubs |
| <u>X 100 +</u> | <u>X 100 +</u> | Grass/Weeds |
| <u>X 50'</u> | | None / Bulkhead |

Margin Habitat

| | |
|-----------------|---------------------------|
| Undercut Banks | Root Mats |
| Grass | <u>Water Willow</u> |
| <u>Shallows</u> | Clay/Hardpan |
| Rip Rap | Bulkhead |
| Other() | |
| Margin Quality: | Good - <u>Fair</u> - Poor |

Biological Characteristics:

Riffle:

Predominant

Organisms: _____

Other Common Organisms:

Density: High - Moderate - Low

Diversity: High - Moderate - Low

Run:

Predominant Organisms:

Other Common Organisms:

Density: High - Moderate - Low

Diversity: High - Moderate - Low

Pool:

Predominant Organisms:

Elmia, Anflipotamus

Other Common Organisms:

Heptageniids, Burrowers, Angia, Leptocerids

Density: High - ~~Moderate~~ - ~~Low~~

Diversity: High - ~~Moderate~~ - Low

Polycentropus

Caenis

Baetids, Pterophila, Water Pennies

Margin:

Predominant Organisms:

Caenis, Scuds, Damsel flies

Other Common Organisms:

Leptoceridae, ~~Caenis~~

Density: High - Moderate (O) Low

Diversity: High - Moderate (O) Low

Other Notable

Collections: _____

Potential Pollution

Sources: _____ *Levees, urban*

Evidence of

Pollution: _____

Photo

Numbers: _____ *11:55*

Other Comments:

Site almost all pool with monotonous sand + gravel substrates. Good quality organisms considering marginal habitat + substrate conditions.

Station ID _____ Sheet ID _____ Date Collected 10-10-18
Q1 10-17-18

Project _____ Sampler Type Q1/Q1- # HDs 5 Collected By JZ BP

ALP _____ RM 79.8 Data _____ Date Analyzed _____
Comments _____

Lat./Long. _____ Analyzed By _____

Stream Great Miami R Location Dst Wolf Cr @ RR Trestle 1:00

Flow Up 1/2' Temp. (C) _____ HDs - Current Set (fps) _____ Ret. (fps) _____ QI. Time Sampled (min.) 1:50

Sampling Method: HD(No. 5) - DN/HP - Surber - Grab (Type _____) - Other _____

HD Sampler Site: Depth 1.7 Canopy Open Current (Set) _____
Current (Ret) 0.7

HD Condition: Disturbed Yes/No _____ Comment: No
Debris Yes/No _____ Comment: No (Lots of Algae)

DN/HP Sampling: Silt/Solids None - Slight - Moderate - Heavy
Total Time 100 min Habitats: Pool - Riffle - Run - Margin - Backwater
✓ Limited

Physical Characteristics

Flow Condition: Flood - Above Normal - Normal - Low - Interstitial - Intermittent - Dry
Current Velocity: Fast - Moderate - Slow - ND
Channel Morphology: Natural - Channelized - Channelized (Recovered) - Impounded Leveed
Bank Erosion: Extensive - Moderate - Slight - None
Riffle Development: Extensive - Moderate - Sparse - Absent
Riffle Quality: Good - Fair - Poor Embedded: Yes/No
Clarity: Clear - Murky - Turbid Temp: _____
Color: None - Green - Brown - Grey - Other (_____)
Canopy: Open - 75% - 50% - 25% - Closed

Substrate Characteristics

| | Pool | Riffle | Run |
|-------------------|------------|------------|--------------|
| Bedrock() | _____ | _____ | _____ |
| Boulder() | _____ | _____ | _____ |
| Rubble() | <u>X</u> | <u>XX</u> | <u>X</u> |
| Coarse Gravel | <u>X</u> | <u>XXX</u> | <u>XX</u> |
| Fine Gravel | _____ | _____ | _____ |
| Sand | <u>XX</u> | <u>X</u> | <u>XX</u> |
| Silt | <u>X</u> | _____ | _____ |
| Clay/Hardpan | _____ | _____ | _____ |
| Detritus | _____ | _____ | _____ |
| Peat | _____ | _____ | _____ |
| Muck | _____ | _____ | _____ |
| Other() | _____ | _____ | _____ |
| Macrophytes | _____ | _____ | _____ |
| Algae() | <u>✓</u> | <u>✓</u> | <u>✓</u> |
| Artifacts() | _____ | _____ | _____ |
| Compaction(F,M,S) | <u>18"</u> | <u>10"</u> | <u>30"</u> |
| Depth(Average) | <u>F</u> | <u>F</u> | <u>F</u> |
| Width(Average) | <u>20'</u> | <u>80'</u> | <u>300+'</u> |

Adj Run

Predominant Land Use (L,R,B)

| | | |
|------------|---------------------|---------|
| Forest | Open Pasture | Wetland |
| Shrub | Closed Pasture | Other |
| Old Field | Urban | () |
| Rowcrop | Residential/Park | |
| Industrial | Mining/Construction | |

Predominant Riparian Vegetation Width

| Left | Right | Type |
|-------|-------|-------------|
| _____ | _____ | Large Trees |
| _____ | _____ | Small Trees |
| _____ | _____ | Shrubs |
| _____ | _____ | Grass/Weeds |
| _____ | _____ | None |

Margin Habitat

| | |
|-----------------|--------------------|
| Undercut Banks | Root Mats |
| Grass | Water Willow |
| Shallows | Clay/Hardpan |
| Rip Rap | Bulkhead |
| Other() | |
| Margin Quality: | Good - Fair - Poor |

Biological Characteristics:

Riffle:

Predominant

Organisms:

Baetis Isonychia

Other Common Organisms:

Petropoda, Hydropsychids, Heptageniids, Anteloponarthrus, Riffle Beetles

Density: High - Moderate - Low

Diversity: High - Moderate - Low

Run:

Predominant Organisms:

Etmia, Petrophila, Tricorythodes

Other Common Organisms:

Isonychia, Hydropsychids, Heptageniids, Riffle Beetles

Density: High - Moderate - Low

Diversity: High - Moderate - Low

Pool:

Predominant Organisms:

Limited

Other Common Organisms:

Etmia
Turbellans, Leptoacrids, Heptagenid, Water Lemmes

Density: High - Moderate - Low

Diversity: High - Moderate - Low

Margin:

Predominant Organisms:

Damselflies

Other Common Organisms:

Scuds

Density: High - Moderate - Low

Diversity: High - Moderate - Low

Heptageniids
Margin Baetis

Other Notable

Collections:

Potential Pollution

Sources:

W of G., Urban

Evidence of

Pollution:

Masses of plastic trash littering river right banks -

Photo

Numbers:

high water deposits? 1:55

Other Comments:

Site is primarily a large riffle divided by water willow island and wide run nr. RR tracks + AD site. More hydropsychids + baetis associated with riffle but might not be as diverse as some upstream sites (1 margin Baetis)

Station ID _____ Sheet ID _____ Date Collected 40/10-10-18

Project _____ Sampler Type Qnt/01 # HDs 5 Collected By JF, BP

ALP _____ RM 778 Comments _____ Date Analyzed _____

Lat./Long. _____ Analyzed By _____

Stream Great Miami River Location Just Tait Dam - Cotillion Tower

Flow _____ Temp. (C) _____ HDs - Current Set (fps) _____ Ret. (fps) 1.4 QI. Time Sampled (min.) 2:25-3:30

Sampling Method: HD(No. 5) - DN/HP - Surber - Grab (Type _____) - Other _____

HD Sampler Site: Depth 2.0 Canopy Open Current (Set) _____
Current (Ret) 1.4

HD Condition: Disturbed Yes/No Yes Comment: _____
Debris Yes/No Yes Comment: A couple leaves, lots of Algae growing on HDs
Set B Silt/Solids None - Slight - Moderate - Heavy

DN/HP Sampling: Total Time 130 Habitats: Pool - Riffle - Run - Margin - Backwater

Physical Characteristics

Flow Condition: Flood - Above Normal - Normal - Low - Interstitial - Intermittent - Dry
Current Velocity: Fast - Moderate - Slow - ND
Channel Morphology: Natural - Channelized - Channelized (Recovered) - Impounded (Formerly), Leveed
Bank Erosion: Extensive - Moderate - Slight - None
Riffle Development: Extensive - Moderate - Sparse - Absent
Riffle Quality: Good - Fair - Poor Embedded: Yes/No No
Clarity: Clear - 5/11 - Murky - Turbid Temp: 21.5
Color: None - Green - Brown - Grey - Other (_____)
Canopy: Open - 75% - 50% - 25% - Closed

Predominant Land Use (L,R,B)

| | | |
|------------|----------------------------|---------|
| Forest | Open Pasture | Wetland |
| Shrub | Closed Pasture | Other |
| Old Field | <u>Urban B</u> | () |
| Rowcrop | Residential/ <u>Park B</u> | |
| Industrial | Mining/Construction | |

Predominant Riparian Vegetation Width

| Left | Right | Type |
|---------------|----------------|-------------|
| _____ | _____ | Large Trees |
| _____ | _____ | Small Trees |
| _____ | _____ | Shrubs |
| <u>X 200'</u> | <u>X 200+'</u> | Grass/Weeds |
| _____ | _____ | None |

Margin Habitat

| | |
|-----------------|--------------------|
| Undercut Banks | Root Mats |
| Grass | Water Willow |
| Shallows | Clay/Hardpan |
| Rip Rap | Bulkhead |
| Other() | |
| Margin Quality: | Good - Fair - Poor |

Substrate Characteristics

| | Pool | Riffle | Run |
|-------------------|-------|-------------|----------------|
| Bedrock() | _____ | _____ | _____ |
| Boulder() | _____ | _____ | _____ |
| Rubble() | _____ | <u>X</u> | <u>X</u> |
| Coarse Gravel | _____ | <u>XX</u> | <u>XXX</u> |
| Fine Gravel | _____ | <u>✓</u> | <u>✓</u> |
| Sand | _____ | <u>✓</u> | <u>X</u> |
| Silt | _____ | _____ | _____ |
| Clay/Hardpan | _____ | _____ | _____ |
| Detritus | _____ | _____ | _____ |
| Peat | _____ | _____ | _____ |
| Muck | _____ | _____ | _____ |
| Other() | _____ | _____ | _____ |
| Macrophytes | _____ | _____ | _____ |
| Algae() | _____ | <u>✓</u> | <u>✓</u> |
| Artifacts() | _____ | _____ | _____ |
| Compaction(F,M,S) | _____ | <u>F</u> | <u>F</u> |
| Depth(Average) | _____ | <u>5-11</u> | <u>30"</u> |
| Width(Average) | _____ | <u>20'</u> | <u>100 yds</u> |

Biological Characteristics:

Riffle: / Swift Run

Predominant

Organisms: Isonychia, Heptageniids

Other Common Organisms:

Baetids, Pterophila, Turbellaria, Hydropsychids, Hydroptille

Density: High - ~~Moderate~~ - Low

Diversity: ~~High~~ - ~~Moderate~~ - Low

Unusual Black + Black spotted Mayflies / Baetids

Run:

Predominant Organisms:

Heptageniids, Tricorythodes

Other Common Organisms:

Riffle Baetids, Pterophila, Hydropsychids, Crayfish, Etmus

Density: High - ~~Moderate~~ - Low

Diversity: High - ~~Moderate~~ - Low

Pool:

Predominant Organisms:

Other Common Organisms:

Density: High - Moderate - Low

Diversity: High - Moderate - Low

Margin: Shallows / W. Willow

Predominant Organisms:

Other Common Organisms:

Heptageniids, Damselflies, Etmus

Density: High - ~~Moderate~~ - Low

Diversity: ~~High~~ - ~~Moderate~~ - Low

Plant Green faced Caddis ? Tricorythodes / Caenos

Other Notable

Collections: Polycentropid

Anthopotamus, Burrower

Potential Pollution

Sources:

Evidence of

Pollution: - Fair amount of algae on rocks

Photo

Numbers: @ 3:35

Other Comments:

Site is upstream of Vait Dam removal. Outside bend is generally all run with short stretch of riffle adjacent to river left. Auto Diverse, predominated by mayflies. Habitat fairly monotonous run / swift run along outside bend.

Station ID _____ Sheet ID _____ Date Collected 10-10-18
 Project _____ Sampler Type Int/Qual # HDs 5 Collected By J.T. BP
 ALP _____ RM 77.0 Data _____
 Comments _____ Date Analyzed _____
 Lat./Long. _____ Analyzed By _____
 Stream Great Miami Location Dot. Dayton WWP
 Flow Slow Temp. (C) _____ HDs - Current Set (fps) _____ Ret. (fps) _____ Ql. Time Sampled (min.) 1:10-2:00

Sampling Method: HD(No. 5) - DN/HP - Surber - Grab (Type _____) -
 Other _____
 HD Sampler Site: Depth 2.6 Canopy Open Current (Set) 0.4/0.35
 Current(Ret) 0.4
 HD Condition: Disturbed Yes/No Yes Comment: Dragged under water to shallower spot to
 Debris Yes/No Yes Comment: cut off samplers
 Sand/Silt/Solids Sand/Silt/Solids None - Slight - Moderate - Heavy
 DN/HP Sampling: Total Time 100 Habitats: Pool - Riffle - Run - Margin - Backwater
Slow Run

Physical Characteristics

Flow Condition: Flood - Above Normal - Normal - Low - Interstitial - Intermittent - Dry
 Current Velocity: Fast - Moderate - Slow - ND
 Channel Morphology: Natural - Channelized - Channelized (Recovered) - Impounded ?
 Bank Erosion: Extensive - Moderate - Slight - None
 Riffle Development: Extensive - Moderate - Sparse - Absent
 Riffle Quality: Good - Fair - Poor Embedded: Yes/No
 Clarity: Clear - Set Murky - Turbid Temp: _____
 Color: None - Green - Brown - Grey - Other (_____)
 Canopy: Open - 75% - 50% - 25% - Closed

Predominant Land Use (L,R,B)

| | | |
|------------|---------------------------|----------------------------|
| Forest | Open Pasture | Wetland |
| Shrub | Closed Pasture | Other |
| Old Field | <u>Urban B</u> | (<u>Hay/Grass/Levee</u>) |
| Rowcrop | Residential <u>Park L</u> | |
| Industrial | Mining/Construction | |

Predominant Riparian Vegetation Width

| Left | Right | Type |
|---------------|--------------|-------------|
| _____ | <u>X 80'</u> | Large Trees |
| _____ | _____ | Small Trees |
| _____ | _____ | Shrubs |
| <u>X 150'</u> | _____ | Grass/Weeds |
| _____ | _____ | None |

Margin Habitat

| | |
|-----------------|-------------------------|
| Undercut Banks | Root Mats |
| Grass | <u>Water Willow</u> |
| Shallows | Clay/Hardpan |
| Rip Rap | Bulkhead |
| Other(_____) | |
| Margin Quality: | Good <u>Fair</u> - Poor |

Substrate Characteristics

| | Pool | Riffle | Run |
|-------------------|----------------|--------|-------|
| Bedrock() | _____ | _____ | _____ |
| Boulder() | _____ | _____ | _____ |
| Rubble() | <u>✓</u> | _____ | _____ |
| Coarse Gravel | <u>X</u> | _____ | _____ |
| Fine Gravel | <u>XX</u> | _____ | _____ |
| Sand | <u>XX</u> | _____ | _____ |
| Silt | <u>X</u> | _____ | _____ |
| Clay/Hardpan | _____ | _____ | _____ |
| Detritus | <u>✓</u> | _____ | _____ |
| Peat | _____ | _____ | _____ |
| Muck | _____ | _____ | _____ |
| Other() | _____ | _____ | _____ |
| Macrophytes | _____ | _____ | _____ |
| Algae() | _____ | _____ | _____ |
| Artifacts() | _____ | _____ | _____ |
| Compaction(F,M,S) | <u>F/M</u> | _____ | _____ |
| Depth(Average) | <u>36.4"</u> | _____ | _____ |
| Width(Average) | <u>150 yds</u> | _____ | _____ |

Biological Characteristics:

Riffle:

Predominant

Organisms: _____

Other Common Organisms:

Density: High - Moderate - Low

Diversity: High - Moderate - Low

Run:

Predominant Organisms:

Other Common Organisms:

Density: High - Moderate - Low

Diversity: High - Moderate - Low

Pool:

Predominant Organisms:

Caenis / Tricorythodes

Other Common Organisms:

Heptageniids, Turbellaria, Burrows, Pterophyta, Etmia

Density: High - Moderate - Low

Diversity: High - Moderate - Low

Leptocerids

Margin:

Predominant Organisms:

Amphipods

Other Common Organisms:

Phycella, Etmia, Psephenus

Density: High - Moderate - Low

Diversity: High - Moderate - Low

*Margin Bacteria
Gonolids*

Other Notable

Collections: *Macronia*

Potential Pollution

Sources:

Evidence of

Pollution: _____

Photo

Numbers: _____

Other Comments:

Site is long, wide, pool/slow run - may be start of impoundment influence downstream. Despite marginal substrates and habitat, numerous mayflies and Leptocerids. Community looks Good/V Good considering limitations.

APPENDIX C: Habitat Data

Appendix D-1. QHEI metric scores for sites in Great Miami River during 2018.

| River Mile | QHEI | QHEI Metrics: | | | | | | Gradient & Score | Narrative |
|---------------------------|--------------|----------------|---------|----------|------|--------|-----|------------------|------------------|
| | | SubstrateCover | Channel | Riparian | Pool | Riffle | | | |
| (14001) Great Miami River | | | | | | | | | |
| Year:2018 | | | | | | | | | |
| 81.80 | 77.00 | 18.0 | 13.0 | 15.0 | 4.00 | 10.0 | 7.0 | 1.67 - (10) | Excellent |
| 81.10 | 72.50 | 16.0 | 14.0 | 14.0 | 4.00 | 9.0 | 5.5 | 2.67 - (10) | Good |
| 79.50 | 80.00 | 18.0 | 13.0 | 17.0 | 3.00 | 12.0 | 7.0 | 3.86 - (10) | Excellent |
| 77.90 | 79.00 | 20.0 | 13.0 | 15.0 | 3.00 | 11.0 | 7.0 | 3.17 - (10) | Excellent |
| 76.80 | 74.50 | 15.0 | 13.0 | 15.0 | 4.50 | 10.0 | 7.0 | 1.94 - (10) | Good |

Stream & Location: Great Miami River Dist 1-75 RM: 81.8 Date: 8/27/8

CMB25 Ust Mad River Scorers Full Name & Affiliation: MAS MBZ

River Code: 14-001- STORET #: Lat./Long.: 39.7714 184.1886 Office verified location

1] SUBSTRATE Check ONLY Two substrate TYPE BOXES; estimate % or note every type present

Substrate assessment grid with categories: BEST TYPES, OTHER TYPES, POOL RIFFLE, ORIGIN, QUALITY. Includes checkboxes for BLDR/SLABS, BOULDER, COBBLE, GRAVEL, SAND, BEDROCK, etc.

Comments

2] INSTREAM COVER Indicate presence 0 to 3: 0-Absent; 1-Very small amounts or if more common of marginal quality; 2-Moderate amounts, but not of highest quality or in small amounts of highest quality; 3-Highest quality in moderate or greater amounts

Instream Cover assessment grid with categories: UNDERCUT BANKS, OVERHANGING VEGETATION, SHALLOWS, ROOTMATS, POOLS, ROOTWADS, BOULDERS, OXBOWS, AQUATIC MACROPHYTES, LOGS OR WOODY DEBRIS.

Comments

3] CHANNEL MORPHOLOGY Check ONE in each category (Or 2 & average)

Channel Morphology assessment grid with categories: SINUOSITY, DEVELOPMENT, CHANNELIZATION, STABILITY. Includes checkboxes for HIGH, MODERATE, LOW, NONE.

Comments

4] BANK EROSION AND RIPARIAN ZONE Check ONE in each category for EACH BANK (Or 2 per bank & average)

Bank Erosion and Riparian Zone assessment grid with categories: EROSION, RIPARIAN WIDTH, FLOOD PLAIN QUALITY. Includes checkboxes for NONE/LITTLE, MODERATE, HEAVY/SEVERE.

Comments

5] POOL / GLIDE AND RIFFLE / RUN QUALITY

Pool/Glide and Riffle/Run Quality assessment grid with categories: MAXIMUM DEPTH, CHANNEL WIDTH, CURRENT VELOCITY. Includes checkboxes for > 1m, 0.7-1m, etc.

Comments

Indicate for functional riffles; Best areas must be large enough to support a population of riffle-obligate species: Check ONE (Or 2 & average). [] NO RIFFLE [metric=0]

Riffle/Run Quality assessment grid with categories: RIFFLE DEPTH, RUN DEPTH, RIFFLE / RUN SUBSTRATE, RIFFLE / RUN EMBEDDEDNESS. Includes checkboxes for BEST AREAS > 10cm, etc.

Comments

6] GRADIENT (1.67 ft/mi) DRAINAGE AREA (1860 mi^2) %POOL: %GLIDE: %RUN: %RIFFLE: Gradient Maximum 10

AJ SAMPLED REACH

Check ALL that apply

Comment RE: Reach consistency/ Is reach typical of stream?, Recreation/ Observed - Inferred, Other/ Sampling observations, Concerns, Access directions, etc.

METHOD

- BOAT
- WADE
- L. LINE
- OTHER

STAGE

- 1st-sample pass-- 2nd
- HIGH
 - UP
 - NORMAL
 - LOW
 - DRY

DISTANCE

- 0.5 Km
- 0.2 Km
- 0.15 Km
- 0.12 Km
- OTHER

CLARITY

- < 20 cm
- 20-40 cm
- 40-70 cm
- > 70 cm/ CTB
- SECCHI DEPTH

meters

CANOPY

- > 85%- OPEN
- 55%-<85%
- 30%-<55%
- 10%-<30%
- <10%- CLOSED

B/AESTHETICS

- NUISANCE ALGAE
- INVASIVE MACROPHYTES
- EXCESS TURBIDITY
- DISCOLORATION
- FOAM / SCUM
- OIL SHEEN
- TRASH / LITTER
- NUISANCE ODOR
- SLUDGE DEPOSITS
- CSOs/SSOs/OUTFALLS

AREA DEPTH
POOL: >100ft² >3ft

D/ MAINTENANCE

- PUBLIC / PRIVATE / BOTH / NA
- ACTIVE / HISTORIC / BOTH / NA
- YOUNG-SUCCESSION-OLD
- SPRAY / SNAG / REMOVED
- MODIFIED / DIPPED OUT / NA
- LEVEED / ONE SIDED
- RELOCATED / CUTOFFS
- MOVING-BEDLOAD-STABLE
- ARMoured / SLUMPS
- ISLANDS / SCoured
- IMPOUNDED / DESICCATED
- FLOOD CONTROL / DRAINAGE

E/ ISSUES

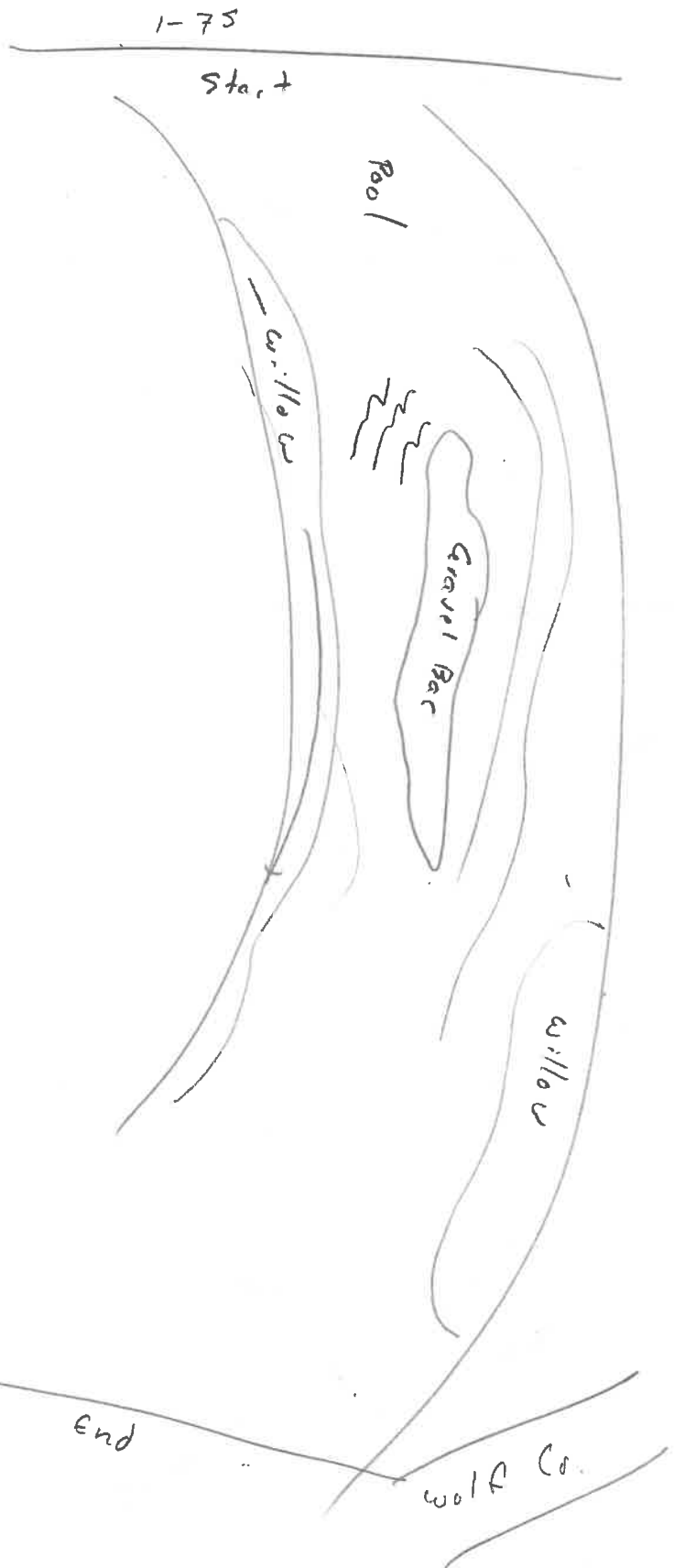
- WWTP / CSO / NPDES / INDUSTRY
- HARDENED / URBAN / DIRT&GRIME
- CONTAMINATED / LANDFILL
- BMPs-CONSTRUCTION-SEDIMENT
- LOGGING / IRRIGATION / COOLING
- BANK / EROSION / SURFACE
- FALSE BANK / MANURE / LAGOON
- WASH H₂O / TILE / H₂O TABLE
- ACID / MINE / QUARRY / FLOW
- NATURAL / WETLAND / STAGNANT
- PARK / GOLF / LAWN / HOME
- ATMOSPHERE / DATA PAUCITY

F/ MEASUREMENTS

- \bar{x} width
- \bar{x} depth
- max. depth
- \bar{x} bankfull width
- bankfull \bar{x} depth
- W/D ratio
- bankfull max. depth
- floodprone \bar{x}^2 width
- entrench. ratio

C/ RECREATION

Stream Drawing:



Stream & Location: Great Miami River Dst Main St. RM: 81.1 Date: 8/27/88

Dst Mad River QMRB24 Scorers Full Name & Affiliation: MAS MBT

River Code: 14-001 - STORET#: Lat/Long: 39.7646 184.1932 Office verified location

1] SUBSTRATE Check ONLY Two substrate TYPE BOXES; estimate % or note every type present

Substrate assessment section with categories: BEST TYPES, OTHER TYPES, POOL RIFFLE, ORIGIN, and QUALITY. Includes checkboxes for various substrate types and a score box containing '16'.

2] INSTREAM COVER Indicate presence 0 to 3: 0-Absent; 1-Very small amounts or if more common of marginal quality; 2-Moderate amounts, but not of highest quality or in small amounts of highest quality; 3-Highest quality in moderate or greater amounts

Instream Cover assessment section with categories: UNDERCUT BANKS, OVERHANGING VEGETATION, SHALLOWS, ROOTMATS, POOLS, ROOTWADS, BOULDERS, OXBOWS, BACKWATERS, AQUATIC MACROPHYTES, LOGS OR WOODY DEBRIS. Includes checkboxes and a score box containing '14'.

3] CHANNEL MORPHOLOGY Check ONE in each category (Or 2 & average)

Channel Morphology assessment section with categories: SINUOSITY, DEVELOPMENT, CHANNELIZATION, and STABILITY. Includes checkboxes and a score box containing '14'.

4] BANK EROSION AND RIPARIAN ZONE Check ONE in each category for EACH BANK (Or 2 per bank & average)

Bank Erosion and Riparian Zone assessment section with categories: EROSION, RIPARIAN WIDTH, FLOOD PLAIN QUALITY, and CONSERVATION TILLAGE. Includes checkboxes and a score box containing 'A'.

5] POOL / GLIDE AND RIFFLE / RUN QUALITY

Pool / Glide and Riffle / Run Quality assessment section with categories: MAXIMUM DEPTH, CHANNEL WIDTH, CURRENT VELOCITY, and Recreation Potential. Includes checkboxes and a score box containing '9'.

Indicate for functional riffles; Best areas must be large enough to support a population of riffle-obligate species:

Riffle and Run Quality assessment section with categories: RIFFLE DEPTH, RUN DEPTH, RIFFLE / RUN SUBSTRATE, and RIFFLE / RUN EMBEDDEDNESS. Includes checkboxes and a score box containing '5.5'.

6] GRADIENT (2.67 ft/mi) DRAINAGE AREA (2510 mi^2) %POOL: %GLIDE: %RUN: %RIFFLE: Gradient Maximum 10

Comment RE: Reach consistency/ Is reach typical of stream?, Recreation/ Observed - Inferred, Other/ Sampling observations, Concerns, Access directions, etc.

AJ SAMPLED REACH
Check ALL that apply

METHOD

- BOAT
 - WADE
 - L. LINE
 - OTHER
- STAGE**
- 1st --sample pass-- 2nd
 - HIGH
 - UP
 - NORMAL
 - LOW
 - DRY

DISTANCE

- 0.5 Km
- 0.2 Km
- 0.15 Km
- 0.12 Km
- OTHER

CLARITY

- 1st --sample pass-- 2nd
- < 20 cm
- 20-40 cm
- 40-70 cm
- > 70 cm/ CTB
- SECCHI DEPTH

meters

CANOPY

- > 85%- OPEN
- 55%-<85%
- 30%-<55%
- 10%-<30%
- <10%- CLOSED

- 1st cm
- 2nd cm

CJ RECREATION

- AREA >100ft² >3ft
- DEPTH >100ft² >3ft

BJ AESTHETICS

- NUISANCE ALGAE
- INVASIVE MACROPHYTES
- EXCESS TURBIDITY
- DISCOLORATION
- FOAM / SCUM
- OIL SHEEN
- TRASH / LITTER
- NUISANCE ODOR
- SLUDGE DEPOSITS
- CSOs/SSOs/OUTFALLS

DJ MAINTENANCE

- PUBLIC / PRIVATE / BOTH / NA
- ACTIVE / HISTORIC / BOTH / NA
- YOUNG-SUCCESSION-OLD
- SPRAY / SNAG / REMOVED
- MODIFIED / DIPPED OUT / NA
- LEVEED / ONE SIDED
- RELOCATED / CUTOFFS
- MOVING-BEDLOAD-STABLE
- ARMoured / SLUMPS
- ISLANDS / SCoured
- IMPOUNDED / DESICCATED
- FLOOD CONTROL / DRAINAGE

EJ ISSUES

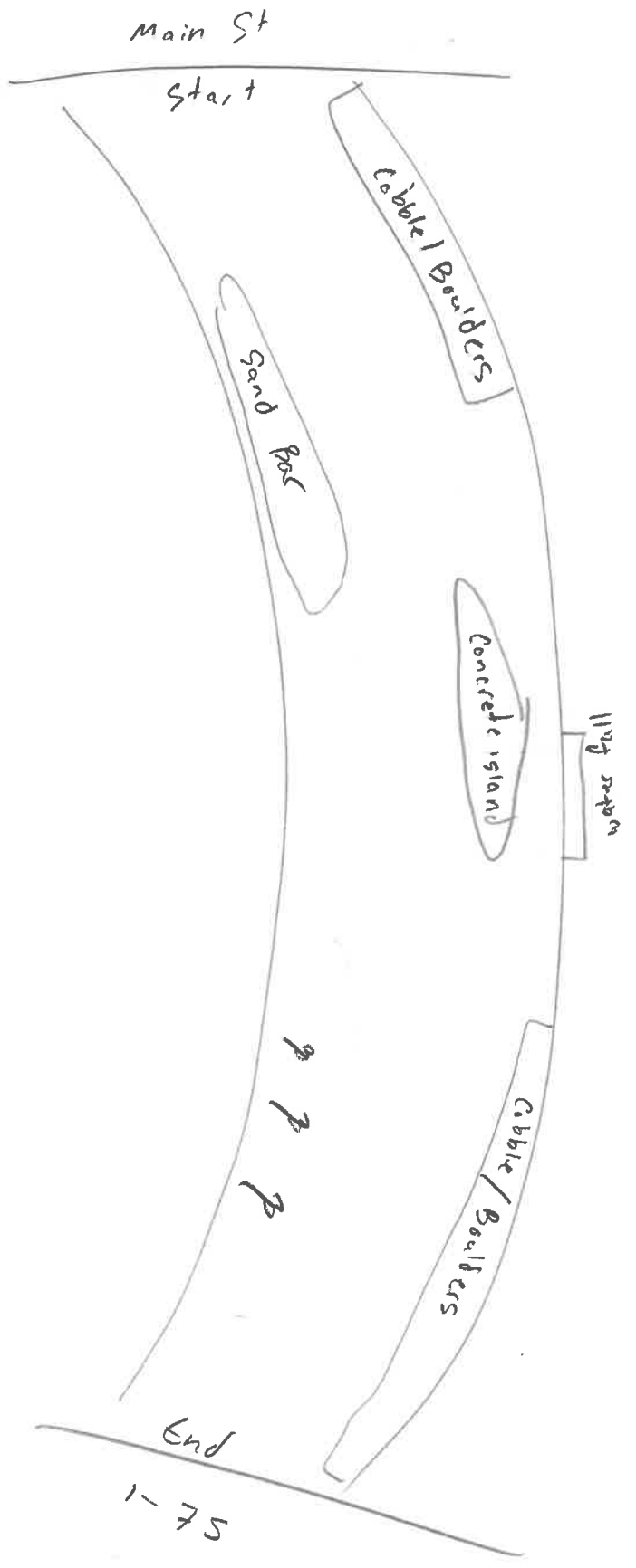
- WWTP / CSO / NPDES / INDUSTRY
- HARDENED / URBAN / DIRT&GRIME
- CONTAMINATED / LANDFILL
- BMPs-CONSTRUCTION-SEDIMENT
- LOGGING / IRRIGATION / COOLING
- BANK / EROSION / SURFACE
- FALSE BANK / MANURE / LAGOON
- WASH H₂O / TILE / H₂O TABLE
- ACID / MINE / QUARRY / FLOW
- NATURAL / WETLAND / STAGNANT
- PARK / GOLF / LAWN / HOME
- ATMOSPHERE / DATA PAUCITY

FJ MEASUREMENTS

- \bar{x} width
- \bar{x} depth
- max. depth
- \bar{x} bankfull width
- bankfull \bar{x} depth
- W/D ratio
- bankfull max. depth
- floodprone \bar{x}^2 width
- entrench. ratio

Legacy Tree:

Stream Drawing:



Stream & Location: Great Miami River / DST Wolf Creek RM: 79.5 Date: 08/27/18

Scorers Full Name & Affiliation: Lou Herlihy - MBS

River Code: 14-001 STORET#: Lat/Long: 39.7518 84.1999 Office verified location

1] SUBSTRATE Check ONLY Two substrate TYPE BOXES; estimate % or note every type present. Check ONE (Or 2 & average). BEST TYPES: BLDR/SLABS [10], BOULDER [9], COBBLE [8], GRAVEL [7], SAND [6], BEDROCK [5]. OTHER TYPES: HARDPAN [4], DETRITUS [3], MUCK [2], SILT [2], ARTIFICIAL [0]. ORIGIN: LIMESTONE [1], FILLS [1], WETLANDS [0], HARDPAN [0], SANDSTONE [0], RIP/RAP [0], LACUSTURINE [0], SHALE [-1], COAL FINES [-2]. QUALITY: HEAVY [-2], MODERATE [-1], NORMAL [0], FREE [1], EXTENSIVE [-2], MODERATE [-1], NORMAL [0], NONE [1].

2] INSTREAM COVER Indicate presence 0 to 3: 0-Absent; 1-Very small amounts or if more common of marginal quality; 2-Moderate amounts, but not of highest quality or in small amounts of highest quality; 3-Highest quality in moderate or greater amounts. AMOUNT: Check ONE (Or 2 & average). UNDERCUT BANKS [1], OVERHANGING VEGETATION [1], SHALLOWS (IN SLOW WATER) [1], ROOTMATS [1]. POOLS > 70cm [2], ROOTWADS [1], BOULDERS [1]. OXBOWS, BACKWATERS [1], AQUATIC MACROPHYTES [1], LOGS OR WOODY DEBRIS [1].

3] CHANNEL MORPHOLOGY Check ONE in each category (Or 2 & average). SINUOSITY: HIGH [4], MODERATE [3], LOW [2], NONE [1]. DEVELOPMENT: EXCELLENT [7], GOOD [5], FAIR [3], POOR [1]. CHANNELIZATION: NONE [6], RECOVERED [4], RECOVERING [3], RECENT OR NO RECOVERY [1]. STABILITY: HIGH [3], MODERATE [2], LOW [1].

4] BANK EROSION AND RIPARIAN ZONE Check ONE in each category for EACH BANK (Or 2 per bank & average). RIVER RIGHT LOOKING DOWNSTREAM. EROSION: NONE/LITTLE [3], MODERATE [2], HEAVY/SEVERE [1]. RIPARIAN WIDTH: WIDE > 50m [4], MODERATE 10-50m [3], NARROW 5-10m [2], VERY NARROW < 5m [1], NONE [0]. FLOOD PLAIN QUALITY: FOREST, SWAMP [3], SHRUB OR OLD FIELD [2], RESIDENTIAL, PARK, NEW FIELD [1], FENCED PASTURE [1], OPEN PASTURE, ROWCROP [0]. CONSERVATION TILLAGE [1], URBAN OR INDUSTRIAL [0], MINING/CONSTRUCTION [0].

5] POOL/GLIDE AND RIFFLE/RUN QUALITY MAXIMUM DEPTH: > 1m [6], 0.7-<1m [4], 0.4-<0.7m [2], 0.2-<0.4m [1], < 0.2m [0]. CHANNEL WIDTH: POOL WIDTH > RIFFLE WIDTH [2], POOL WIDTH = RIFFLE WIDTH [1], POOL WIDTH < RIFFLE WIDTH [0]. CURRENT VELOCITY: TORRENTIAL [-1], VERY FAST [1], FAST [1], MODERATE [1], SLOW [1], INTERSTITIAL [-1], INTERMITTENT [-2], EDDIES [1]. Recreation Potential: Primary Contact, Secondary Contact.

Indicate for functional riffles; Best areas must be large enough to support a population of riffle-obligate species. Check ONE (Or 2 & average). RIFFLE DEPTH: BEST AREAS > 10cm [2], BEST AREAS 5-10cm [1], BEST AREAS < 5cm [metric=0]. RUN DEPTH: MAXIMUM > 50cm [2], MAXIMUM < 50cm [1]. RIFFLE/RUN SUBSTRATE: STABLE (e.g., Cobble, Boulder) [2], MOD. STABLE (e.g., Large Gravel) [1], UNSTABLE (e.g., Fine Gravel, Sand) [0]. RIFFLE/RUN EMBEDDEDNESS: NONE [2], LOW [1], MODERATE [0], EXTENSIVE [-1].

6] GRADIENT (3.86 ft/mi) DRAINAGE AREA (2590 mi²). VERY LOW - LOW [2-4], MODERATE [6-10], HIGH - VERY HIGH [10-6]. %POOL: %GLIDE: %RUN: %RIFFLE:

AJ SAMPLED REACH

Check ALL that apply

METHOD

- BOAT
 - WADE
 - L. LINE
 - OTHER
- DISTANCE**
- 0.5 Km
 - 0.2 Km
 - 0.15 Km
 - 0.12 Km
 - OTHER

STAGE

- HIGH
- MP
- NORMAL
- LOW
- DRY

CLARITY

- 1st --sample pass-- 2nd
- <20 cm
- 20-<40 cm
- 40-70 cm
- > 70 cm/ CTB
- SECCHI DEPTH

meters

CANOPY

- > 85%- OPEN
- 55%-<85%
- 30%-<55%
- 10%-<30%
- <10%- CLOSED

B/AESTHETICS

- NUISANCE ALGAE
- INVASIVE MACROPHYTES
- EXCESS TURBIDITY
- DISCOLORATION
- FOAM / SCUM
- OIL SHEEN
- TRASH / LITTER
- NUISANCE ODOR
- SLUDGE DEPOSITS
- CSOs/ISSOs/OUTFALLS

C/J RECREATION

AREA DEPTH POOL: >100R² >3ft

D/J MAINTENANCE

- PUBLIC / PRIVATE / BOTH / NA
- ACTIVE / HISTORIC / BOTH / NA
- YOUNG-SUCCESSION-OLD
- SPRAY / SNAG / REMOVED
- MODIFIED / DIPPED OUT / NA
- LEVEED / ONE SIDED
- RELOCATED / CUTOFFS
- MOVING-BEDLOAD-STABLE
- ARMoured / SLUMPS
- ISLANDS / SCOURED
- IMPOUNDED / DESICCATED
- FLOOD CONTROL / DRAINAGE

E/J ISSUES

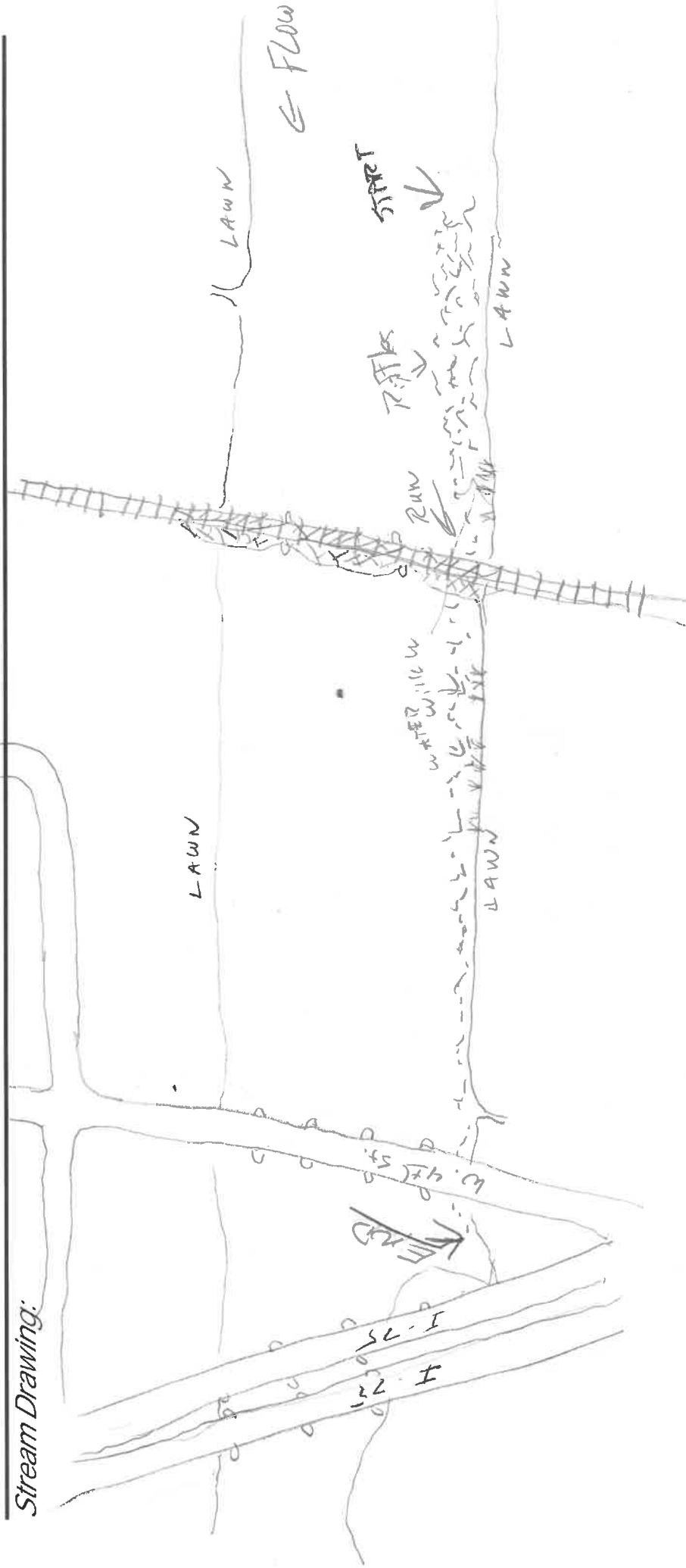
- WWTP / CSO / NPDES / INDUSTRY
- HARDENED / URBAN / DIRT&GRIME
- CONTAMINATED / LANDFILL
- BMPs-CONSTRUCTION-SEDIMENT
- LOGGING / IRRIGATION / COOLING
- BANK / EROSION / SURFACE
- FALSE BANK / MANURE / LAGOON
- WASH H₂O / TILE / H₂O TABLE
- ACID / MINE / QUARRY / FLOW
- NATURAL / WETLAND / STAGNANT
- PARK / GOLF / LAWN / HOME
- ATMOSPHERE / DATA PAUCITY

F/I MEASUREMENTS

- \bar{x} width
- \bar{x} depth
- max. depth
- \bar{x} bankfull width
- bankfull \bar{x} depth
- W/D ratio
- bankfull max. depth
- floodprone \bar{x}^2 width
- entrench. ratio

Legacy Tree:

Stream Drawing:



Stream & Location: Great Miami River / US1 Dam Removal RM: 77.9 Date: 8/27/18

Hoar 02

Scorers Full Name & Affiliation: Lon Hurler MBI

River Code: 14-001

STORET #:

Lat./Long.: 39.7304184, 20.19

Office verified location

1) SUBSTRATE Check ONLY Two substrate TYPE BOXES; estimate % or note every type present

Check ONE (Or 2 & average)

Substrate assessment grid with categories: BEST TYPES, OTHER TYPES, ORIGIN, and QUALITY. Includes checkboxes for various substrate types and a score box for the number of best types (scored 4).

2) INSTREAM COVER Indicate presence 0 to 3: 0-Absent; 1-Very small amounts or if more common of marginal quality; 2-Moderate amounts, but not of highest quality or in small amounts of highest quality; 3-Highest quality in moderate or greater amounts (e.g., very large boulders in deep or fast water, large diameter log that is stable, well developed rootwad in deep / fast water, or deep, well-defined, functional pools.

AMOUNT Check ONE (Or 2 & average)

Instream cover assessment grid with categories: UNDERCUT BANKS, OVERHANGING VEGETATION, SHALLOWS, ROOTMATS, POOLS, ROOTWADS, BOULDERS, OXBOWS, BACKWATERS, AQUATIC MACROPHYTES, LOGS OR WOODY DEBRIS. Includes checkboxes for cover types and a score box for the amount (scored 3).

3) CHANNEL MORPHOLOGY Check ONE in each category (Or 2 & average)

Channel morphology assessment grid with categories: SINUOSITY, DEVELOPMENT, CHANNELIZATION, and STABILITY. Includes checkboxes for various channel characteristics and a score box for the channel morphology (scored 15).

4) BANK EROSION AND RIPARIAN ZONE Check ONE in each category for EACH BANK (Or 2 per bank & average)

Bank erosion and riparian zone assessment grid with categories: EROSION, RIPARIAN WIDTH, FLOOD PLAIN QUALITY, and CONSERVATION TILLAGE. Includes checkboxes for various bank and riparian characteristics and a score box for the riparian zone (scored 3).

5) POOL / GLIDE AND RIFFLE / RUN QUALITY

Pool/glide and riffle/run quality assessment grid with categories: MAXIMUM DEPTH, CHANNEL WIDTH, CURRENT VELOCITY, and Recreation Potential. Includes checkboxes for various flow characteristics and a score box for the pool/glide/run quality (scored 11).

Indicate for functional riffles; Best areas must be large enough to support a population of riffle-obligate species:

Riffle/run quality assessment grid with categories: RIFFLE DEPTH, RUN DEPTH, RIFFLE / RUN SUBSTRATE, and RIFFLE / RUN EMBEDDEDNESS. Includes checkboxes for various riffle/run characteristics and a score box for the riffle/run quality (scored 1).

Gradient and drainage area assessment section with fields for Gradient (3.17 ft/mi), Drainage Area (2600 mi²), and percentage of pool and riffle. Includes a score box for the gradient (scored 10).

AJ SAMPLED REACH

Check ALL that apply

METHOD

- BOAT
 - WADE
 - L. LINE
 - OTHER
- STAGE**
- 1st - sample pass - 2nd
- HIGH
 - MP
 - NORMAL
 - LOW
 - DRY

DISTANCE

- 0.5 Km
- 0.2 Km
- 0.15 Km
- 0.12 Km
- OTHER

CLARITY

- 1st -- sample pass -- 2nd
- < 20 cm
 - 20 - 40 cm
 - 40 - 70 cm
 - > 70 cm / CTB
 - SECCHI DEPTH

meters

CANOPY

- > 85% - OPEN
- 55% - < 85%
- 30% - < 55%
- 10% - < 30%
- < 10% - CLOSED

CJ RECREATION

AREA DEPTH POOL: > 100ft² > 3ft

BJ AESTHETICS

- NUISANCE ALGAE
- INVASIVE MACROPHYTES
- EXCESS TURBIDITY
- DISCOLORATION
- FOAM / SCUM
- OIL SHEEN
- TRASH / LITTER
- NUISANCE ODOR
- SLUDGE DEPOSITS
- CSOs/ISSOs/OUTFALLS

DJ MAINTENANCE

- PUBLIC / PRIVATE / BOTH / NA
- ACTIVE / HISTORIC / BOTH / NA
- YOUNG-SUCCESSION-OLD
- SPRAY / SNAG / REMOVED
- MODIFIED / DIPPED OUT / NA
- LEVEED / ONE SIDED
- RELOCATED / CUTOFFS
- MOVING-BEDLOAD-STABLE
- ARMOURED / SLUMPS
- ISLANDS / SCoured
- IMPOUNDED / DESICCATED
- FLOOD CONTROL / DRAINAGE

EJ ISSUES

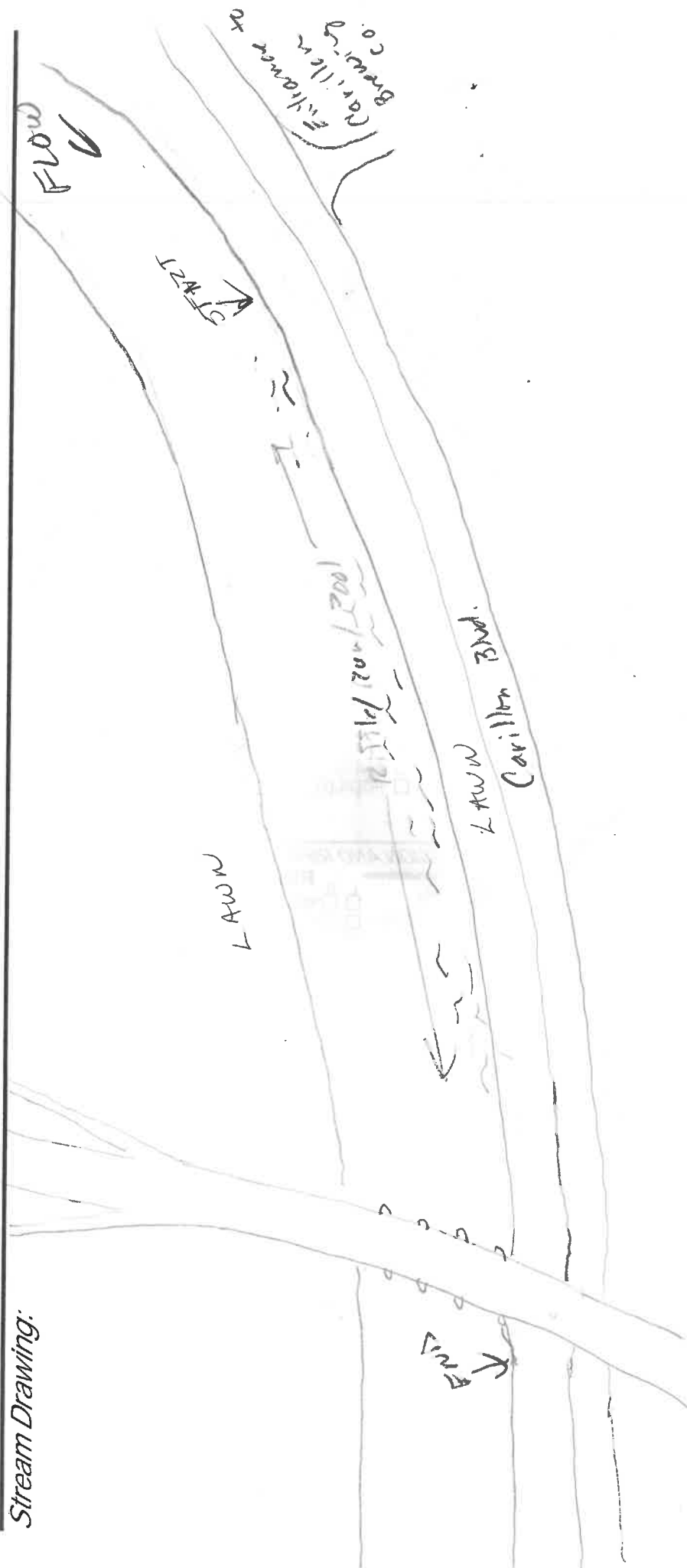
- WWTP / CSO / NPDES / INDUSTRY
- HARDENED / URBAN / DIRT & GRIME
- CONTAMINATED / LANDFILL
- BMPs-CONSTRUCTION-SEDIMENT
- LOGGING / IRRIGATION / COOLING
- BANK / EROSION / SURFACE
- FALSE BANK / MANURE / LAGOON
- WASH H₂O / TILE / H₂O TABLE
- ACID / MINE / QUARRY / FLOW
- NATURAL / WETLAND / STAGNANT
- PARK / GOLF / LAWN / HOME
- ATMOSPHERE / DATA PAUCITY

FJ MEASUREMENTS

- \bar{x} width
- \bar{x} depth
- max. depth
- \bar{x} bankfull width
- bankfull \bar{x} depth
- W/D ratio
- bankfull max. depth
- floodprone \bar{x}^2 width
- entrench. ratio

Legacy Tree:

Stream Drawing:





Qualitative Habitat Evaluation Index and Use Assessment Field Sheet

QHEI Score: **74.5**

Stream & Location: G.M.R - Across From Courtyard Marriott RM: 76.8 Date 08/27/18

G.M.R 1323 Scorers Full Name & Affiliation: Leon Nevska MIST

River Code: 14-001- STORET#: _____ Lat./Long.: 39.7269184.2252 Office verified location

1) **SUBSTRATE** Check ONLY Two substrate TYPE BOXES; estimate % or note every type present

| | | | | | | | |
|--|--------------------------------------|---|--|---------------------------------------|--------------------------|--|---|
| BEST TYPES | | POOL RIFFLE | OTHER TYPES | | POOL RIFFLE | ORIGIN | QUALITY |
| <input type="checkbox"/> BLDR /SLABS [10] | <input type="checkbox"/> BOULDER [9] | <input checked="" type="checkbox"/> | <input type="checkbox"/> HARDPAN [4] | <input type="checkbox"/> DETRITUS [3] | <input type="checkbox"/> | <input type="checkbox"/> LIMESTONE [1] | <input type="checkbox"/> HEAVY [-2] |
| <input type="checkbox"/> COBBLE [8] | <input checked="" type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> MUCK [2] | <input checked="" type="checkbox"/> | <input type="checkbox"/> | <input checked="" type="checkbox"/> SILT [1] | <input type="checkbox"/> MODERATE [-1] |
| <input checked="" type="checkbox"/> GRAVEL [7] | <input checked="" type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> SILT [2] | <input checked="" type="checkbox"/> | <input type="checkbox"/> | <input checked="" type="checkbox"/> WETLANDS [0] | <input checked="" type="checkbox"/> NORMAL [0] |
| <input checked="" type="checkbox"/> SAND [6] | <input checked="" type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> ARTIFICIAL [0] | <input checked="" type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> HARDPAN [0] | <input type="checkbox"/> FREE [1] |
| <input type="checkbox"/> BEDROCK [5] | <input type="checkbox"/> | <input type="checkbox"/> | (Score natural substrates; ignore sludge from point-sources) | | <input type="checkbox"/> | <input type="checkbox"/> SANDSTONE [0] | <input type="checkbox"/> EXTENSIVE [-2] |
| NUMBER OF BEST TYPES: | | <input checked="" type="checkbox"/> 4 or more [2] | | | <input type="checkbox"/> | <input type="checkbox"/> RIP/RAP [0] | <input checked="" type="checkbox"/> MODERATE [-1] |
| | | <input type="checkbox"/> 3 or less [0] | | | <input type="checkbox"/> | <input type="checkbox"/> LACUSTURINE [0] | <input type="checkbox"/> NORMAL [0] |
| <i>Comments</i> | | | | | <input type="checkbox"/> | <input type="checkbox"/> SHALE [-1] | <input type="checkbox"/> NONE [1] |
| | | | | | <input type="checkbox"/> | <input type="checkbox"/> COAL FINES [-2] | |

Substrate Maximum 20 **15**

2) **INSTREAM COVER** Indicate presence 0 to 3: 0-Absent; 1-Very small amounts or if more common of marginal quality; 2-Moderate amounts, but not of highest quality or in small amounts of highest quality; 3-Highest quality in moderate or greater amounts (e.g., very large boulders in deep or fast water, large diameter log that is stable, well developed rootwad in deep / fast water, or deep, well-defined, functional pools.

| | | | |
|--|--|--|---|
| <input checked="" type="checkbox"/> UNDERCUT BANKS [1] | <input checked="" type="checkbox"/> POOLS > 70cm [2] | <input type="checkbox"/> OXBOWS, BACKWATERS [1] | AMOUNT |
| <input checked="" type="checkbox"/> OVERHANGING VEGETATION [1] | <input type="checkbox"/> ROOTWADS [1] | <input type="checkbox"/> AQUATIC MACROPHYTES [1] | Check ONE (Or 2 & average) |
| <input checked="" type="checkbox"/> SHALLOWS (IN SLOW WATER) [1] | <input checked="" type="checkbox"/> BOULDERS [1] | <input checked="" type="checkbox"/> LOGS OR WOODY DEBRIS [1] | <input type="checkbox"/> EXTENSIVE >75% [11] |
| <input type="checkbox"/> ROOTMATS [1] | | | <input checked="" type="checkbox"/> MODERATE 25-75% [7] |
| | | | <input type="checkbox"/> SPARSE 5-<25% [3] |
| | | | <input type="checkbox"/> NEARLY ABSENT <5% [1] |

Cover Maximum 20 **13**

3) **CHANNEL MORPHOLOGY** Check ONE in each category (Or 2 & average)

| | | | |
|--|--|--|--|
| SINUOSITY | DEVELOPMENT | CHANNELIZATION | STABILITY |
| <input type="checkbox"/> HIGH [4] | <input type="checkbox"/> EXCELLENT [7] | <input type="checkbox"/> NONE [6] | <input checked="" type="checkbox"/> HIGH [3] |
| <input checked="" type="checkbox"/> MODERATE [3] | <input checked="" type="checkbox"/> GOOD [5] | <input checked="" type="checkbox"/> RECOVERED [4] | <input type="checkbox"/> MODERATE [2] |
| <input type="checkbox"/> LOW [2] | <input type="checkbox"/> FAIR [3] | <input type="checkbox"/> RECOVERING [3] | <input type="checkbox"/> LOW [1] |
| <input type="checkbox"/> NONE [1] | <input type="checkbox"/> POOR [1] | <input type="checkbox"/> RECENT OR NO RECOVERY [1] | |

Channel Maximum 20 **15**

4) **BANK EROSION AND RIPARIAN ZONE** Check ONE in each category for EACH BANK (Or 2 per bank & average)

| | | |
|--|--|--|
| EROSION | RIPARIAN WIDTH | FLOOD PLAIN QUALITY |
| <input type="checkbox"/> NONE / LITTLE [3] | <input type="checkbox"/> WIDE > 50m [4] | <input type="checkbox"/> FOREST, SWAMP [3] |
| <input checked="" type="checkbox"/> MODERATE [2] | <input checked="" type="checkbox"/> MODERATE 10-50m [3] | <input type="checkbox"/> SHRUB OR OLD FIELD [2] |
| <input type="checkbox"/> HEAVY / SEVERE [1] | <input type="checkbox"/> NARROW 5-10m [2] | <input type="checkbox"/> RESIDENTIAL, PARK, NEW FIELD [1] |
| | <input checked="" type="checkbox"/> VERY NARROW < 5m [1] | <input type="checkbox"/> FENCED PASTURE [1] |
| | <input type="checkbox"/> NONE [0] | <input type="checkbox"/> OPEN PASTURE, ROWCROP [0] |
| | | <input checked="" type="checkbox"/> CONSERVATION TILLAGE [1] |
| | | <input checked="" type="checkbox"/> URBAN OR INDUSTRIAL [0] |
| | | <input type="checkbox"/> MINING / CONSTRUCTION [0] |

Riparian Maximum 10 **4.5**

5) **POOL / GLIDE AND RIFFLE / RUN QUALITY**

| | | | |
|--|---|--|----------------------------------|
| MAXIMUM DEPTH | CHANNEL WIDTH | CURRENT VELOCITY | Recreation Potential |
| Check ONE (ONLY!) | Check ONE (Or 2 & average) | Check ALL that apply | Primary Contact |
| <input checked="" type="checkbox"/> > 1m [6] | <input checked="" type="checkbox"/> POOL WIDTH > RIFFLE WIDTH [2] | <input type="checkbox"/> TORRENTIAL [-1] | Secondary Contact |
| <input type="checkbox"/> 0.7-<1m [4] | <input type="checkbox"/> POOL WIDTH = RIFFLE WIDTH [1] | <input checked="" type="checkbox"/> SLOW [1] | (circle one and comment on back) |
| <input type="checkbox"/> 0.4-<0.7m [2] | <input type="checkbox"/> POOL WIDTH < RIFFLE WIDTH [0] | <input type="checkbox"/> VERY FAST [1] | |
| <input type="checkbox"/> 0.2-<0.4m [1] | | <input type="checkbox"/> FAST [1] | |
| <input type="checkbox"/> < 0.2m [0] | | <input checked="" type="checkbox"/> MODERATE [1] | |
| | | <input type="checkbox"/> INTERSTITIAL [-1] | |
| | | <input type="checkbox"/> INTERMITTENT [-2] | |
| | | <input checked="" type="checkbox"/> EDDIES [1] | |

Pool / Current Maximum 12 **10**

Indicate for functional riffles; Best areas must be large enough to support a population of riffle-obligate species: Check ONE (Or 2 & average)

| | | | |
|---|--|--|---|
| RIFFLE DEPTH | RUN DEPTH | RIFFLE / RUN SUBSTRATE | RIFFLE / RUN EMBEDDEDNESS |
| <input checked="" type="checkbox"/> BEST AREAS > 10cm [2] | <input checked="" type="checkbox"/> MAXIMUM > 50cm [2] | <input checked="" type="checkbox"/> STABLE (e.g., Cobble, Boulder) [2] | <input type="checkbox"/> NONE [2] |
| <input type="checkbox"/> BEST AREAS 5-10cm [1] | <input type="checkbox"/> MAXIMUM < 50cm [1] | <input type="checkbox"/> MOD. STABLE (e.g., Large Gravel) [1] | <input checked="" type="checkbox"/> LOW [1] |
| <input type="checkbox"/> BEST AREAS < 5cm [metric=0] | | <input type="checkbox"/> UNSTABLE (e.g., Fine Gravel, Sand) [0] | <input type="checkbox"/> MODERATE [0] |
| | | | <input type="checkbox"/> EXTENSIVE [-1] |

Riffle / Run Maximum 8 **7**

6) **GRADIENT** (1.94 ft/mi) VERY LOW - LOW [2-4] %POOL: %GLIDE:
DRAINAGE AREA (2600 mi²) MODERATE [6-10] %RUN: %RIFFLE:
 HIGH - VERY HIGH [10-6] Gradient Maximum 10 **10**

A) SAMPLED REACH

Check ALL that apply

METHOD

- BOAT
- WADE
- L. LINE
- OTHER

DISTANCE

- 0.5 Km
- 0.2 Km
- 0.15 Km
- 0.12 Km
- OTHER

CLARITY

- 1st sample pass-- 2nd
- < 20 cm
- 20-40 cm
- 40-70 cm
- > 70 cm / CTB
- SECCHI DEPTH

500 meters

CANOPY

- > 85% - OPEN
- 55% - < 85%
- 30% - < 55%
- 10% - < 30%
- < 10% - CLOSED

CJ RECREATION

- POOL
- > 100ft²
- > 3ft

BI/AESTHETICS

- NUISANCE ALGAE
- INVASIVE MACROPHYTES
- EXCESS TURBIDITY
- DISCOLORATION
- FOAM / SCUM
- OIL SHEEN
- TRASH / LITTER
- NUISANCE ODOR
- SLUDGE DEPOSITS
- CSOs/ISSOs/OUTFALLS

DI MAINTENANCE

- PUBLIC / PRIVATE / BOTH / NA
- ACTIVE / HISTORIC / BOTH / NA
- YOUNG SUCCESSION-OLD
- SPRAY / SNAG / REMOVED
- MODIFIED / DIPPED OUT / NA
- LEVEED / ONE SIDED
- RELOCATED / CUTOFFS
- MOVING-BEDLOAD-STABLE
- ARMoured / SLUMPS
- ISLANDS / SCoured
- IMPOUNDED / DESICATED
- FLOOD CONTROL / DRAINAGE

E/ISSUES

- WWTP / CSO / NPDES / INDUSTRY
- HARDENED / URBAN / DIRT & GRIME
- CONTAMINATED / LANDEILL
- BMPs - CONSTRUCTION / SEDIMENT
- LOGGING / IRRIGATION / COOLING
- BANK / EROSION / SURFACE
- FALSE BANK / MANURE / LAGOON
- WASH H₂O / TILE / H₂O TABLE
- ACID / MINE / QUARRY / FLOW
- NATURAL / WETLAND / STAGNANT
- PARK / GOLF / LAWN / HOME
- ATMOSPHERE / DATA PAUCITY

FJ MEASUREMENTS

- \bar{x} width
- \bar{x} depth
- max. depth
- \bar{x} bankfull width
- bankfull \bar{x} depth
- W/D ratio
- bankfull max. depth
- floodprone \bar{x} width
- entrench. ratio

Legacy Tree:

Stream Drawing:

