



## STILLWATER RIVER – WEST MILTON DAM PROJECT

### River Habitat

Physical habitat is evaluated using the Qualitative Habitat Evaluation Index (QHEI) developed by the Ohio EPA for streams and rivers in Ohio. Various attributes of the habitat are scored based on their overall importance to the establishment of diverse aquatic populations. Evaluations of type and quality of substrate, amount of instream cover, channel morphology, extent of riparian canopy, pool, run, and riffle development and quality, and stream gradient are among the metrics used to evaluate the characteristics of a stream segment, not just the characteristics of a single sampling site. Individual sites may have much poorer physical habitat due to a localized disturbance yet still support aquatic communities closely resembling those sampled at adjacent sites with better habitat, provided water quality conditions are similar. QHEI scores from hundreds of segments around the state have indicated that values higher than 60 are generally conducive to the establishment of warmwater faunas while those which scored in excess of 75-80 often typify habitat conditions which have the ability to support exceptional aquatic populations.

Physical habitat was assessed at each fish sampling location. Physical habitat was measured using the Qualitative Habitat Evaluation Index (QHEI); scores are detailed in Appendix Table 1. At the two free-flowing stations sampled in the Stillwater River (upstream and downstream from the West Milton dam impoundment), excellent physical habitat conditions were present. These excellent conditions included well developed riffles, runs, and pools, high quality bottom substrates of cobble, gravel, and boulders, and moderate amounts of instream fish cover. The sampling site located in the impounded section of river (river mile 19.4) had only fair habitat conditions due to the lack of riffle and run areas, smaller-sized substrates of sand and gravel, and sparse instream fish cover. During the fish sampling events, current velocities in the impounded section of river were slow or non-existent. The substrates in the impounded section of river where fish sampling occurred were extensively embedded with silts. Fine grained sediment, such as silt, constitutes a major environmental factor in the degradation of stream fisheries (Waters 1995).

### Biological Communities

Three sites were sampled biologically (fish and macroinvertebrates) in the Stillwater River to assess the West Milton dam during summer and fall, 2010. The most upstream (river mile 20.2) and downstream (river mile 18.0) sites were in free-flowing sections, while the impounded site (river mile 19.4) was located within the West Milton dam pool.

Monitoring of fish and macroinvertebrate (primarily aquatic insects) communities in Ohio waters forms the basis for determining compliance with the Clean Water Act goal of restoring and maintaining biological integrity in waterways. Use attainment status is a term describing the degree to which fish and macroinvertebrate indicators are either above or below criteria specified by the Ohio Water Quality Standards (WQS; Ohio Administrative Code 3745-1). Assessing aquatic use attainment status involves a primary reliance on the Ohio EPA biological criteria (OAC 3745-1-07; Table 7-15). These apply to rivers and streams. Numerical biological criteria are based on multimetric biological indices including the Index of Biotic Integrity (IBI) and modified Index of Well-Being (MIwb), indices measuring the response of the fish community, and the Invertebrate Community Index (ICI), which indicates the response of the macroinvertebrate community. Three attainment status results are possible at each sampling location - full, partial, or non-attainment. Full attainment means that all of the applicable indices meet the biocriteria. Partial attainment means that one or more of the applicable indices fails to meet the biocriteria. Non-attainment means that none of the applicable indices meet the biocriteria or one of the organism groups reflects poor or very poor performance. All biological results were compared to the Exceptional Warmwater Habitat (EWH) biocriteria, based on the existing EWH use designation for the Stillwater River.

Fish community diversity and abundance were indicative of exceptional conditions at the upstream and downstream free-flowing sections of the Stillwater River. High quality sucker species (black redhorse, golden redhorse, river redhorse, smallmouth redhorse, and northern hog sucker) were very abundant at the free-flowing sites, with relative numbers of 610 and 680 fish per kilometer, respectively, at RMs 20.2 and 18.0. Both free-flowing sections of the Stillwater River had fish communities fully achieving the EWH fish biocriteria. A very good to exceptional fish community was documented in the impounded reach at RM 19.4. The impounded fish community results were fully achieving the EWH biocriteria. Noteworthy differences between the free-flowing sites and impounded site were lower abundance of high quality sucker species (140 fish per kilometer) in the impoundment, along with lower fish species diversity, and lower number and abundance of pollution sensitive (intolerant) fish species.

FISH COMMUNITY RESULTS – STILLWATER RIVER			
Sampling Site River Mile	High Quality Suckers (#/km)	Pollution Intolerant Species	Intolerant Abundance (#/km)
20.2	610	7	436
19.4 - Impounded	140	3	58
18.0	680	6	366

The macroinvertebrate communities from sampling locations within the free-flowing portion of the river upstream and downstream from the West Milton dam and one location within the impounded dam pool were evaluated in 2010. The quantitative multi-plate artificial substrate sampler at the upstream sampling location was vandalized and removed from the river, so the macroinvertebrate community evaluation was based on the qualitative, natural substrate sample results only. The macroinvertebrate community from the upstream site within the free-flowing portion of the river was evaluated as exceptional and in attainment of the EWH use based on the qualitative sampling results. Results were comparable to sampling in 2001 at a nearby site where an ICI score of 50 was achieved. The macroinvertebrate community from the impounded site within the dam pool was evaluated as fair based on an ICI score of 18 for the quantitative sample. The quantitative sample from the site downstream from the West Milton dam was evaluated as very good with an ICI score of 42 and in attainment of the EWH use based on a non-significant departure from the EWH criterion.

The macroinvertebrate sample from the dam pool was typical for an impounded site. When compared to free-flowing sites, the dam pool community had reduced diversity and abundance of mayflies and caddisflies and a high abundance of enrichment tolerant midges of the genus *Glyptotendipes*. The macroinvertebrate community from the free-flowing site downstream from the dam, though performing near the exceptional threshold, was not as diverse as the site upstream from the dam pool. The qualitative sample from the upstream site had 69 taxa, 22 EPT taxa and 31 sensitive taxa, while the downstream site had 48 taxa, 17 EPT taxa, and 29 sensitive taxa. These results reflected minor nearfield changes in macroinvertebrate community structure and function (primarily high densities of filter feeding taxa), a not uncommon occurrence observed in free-flowing reaches immediately downstream from significant impoundments.

Based on the combined results of the fish and macroinvertebrate sampling in the Stillwater River, the free-flowing sites (RMs 20.2 and 18.0) were fully attaining the Exceptional Warmwater Habitat biological criteria listed in the Ohio Water Quality Standards. The impounded sampling site on the Stillwater River was partially attaining the EWH biological criteria, due to decreased quality of the macroinvertebrate community.

**AQUATIC LIFE USE ATTAINMENT – STILLWATER RIVER 2010.**

The Index of Biotic Integrity (IBI) and Invertebrate Community Index (ICI) scores are based on the performance of the biological community. The Qualitative Habitat Evaluation Index (QHEI) is a measure of the ability of the physical habitat to support a biological community. Stream sites are located in the Eastern Corn Belt Plains (ECBP) ecoregion. In the Ohio Water Quality Standards, this section of the Stillwater River is designated Exceptional Warmwater Habitat (EWH). This verified EWH designation should be maintained.

Sample Site River Mile	Attainment Status	IBI	Mlwb	ICI <sup>a</sup>	QHEI	Biological Assessment
20.2	<b>FULL</b>	58	10.3	E	83.5 (excellent)	Exceptional
19.4	<b>PARTIAL</b>	53	9.3 <sup>ns</sup>	18*	55.0 (fair)	Fair to Exceptional
18.0	<b>FULL</b>	54	10.0	42 <sup>ns</sup>	79.5 (excellent)	Very Good to Exceptional

Ecoregion Biocriteria: Eastern Corn Belt Plains (ECBP)		
INDEX – SITE TYPE	WWH	EWH
<b>IBI:</b> Boat	42	48
<b>Mlwb:</b> Boat	8.5	9.6
<b>ICI</b>	36	46

<sup>ns</sup> Nonsignificant departure from biocriterion (≤4 IBI or ICI units, ≤0.5 Mlwb units).

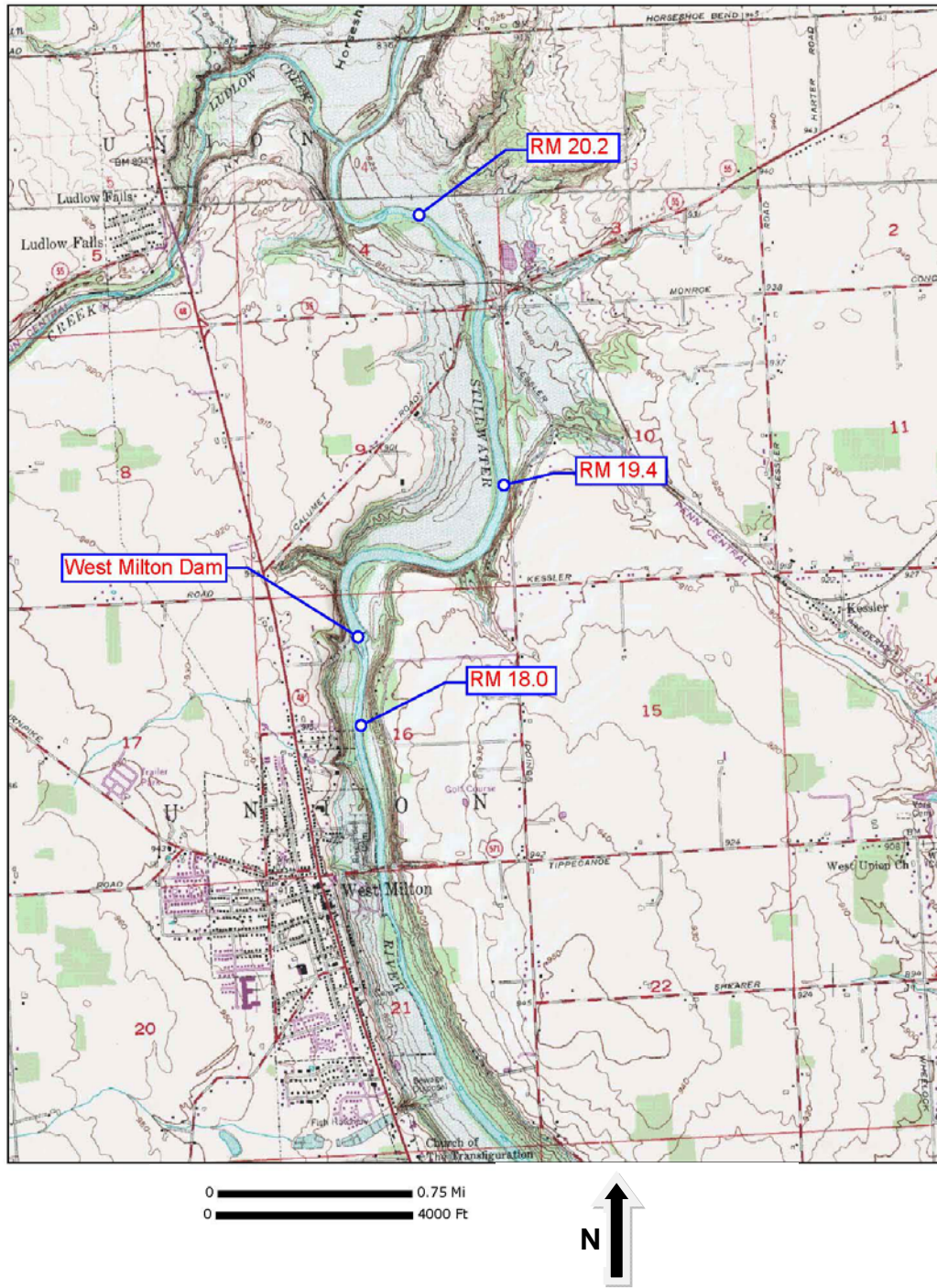
\* Significant departure from biocriterion (>4 IBI or ICI units, >0.5 Mlwb units).

<sup>a</sup> Narrative evaluation used in lieu of ICI (G= Good, VG=Very Good, E=Exceptional).

*Sampling locations in the Stillwater River, 2010.*

River Mile	Latitude	Longitude	Landmark
20.2	39.9981	84.3183	Upstream State Route 55: free-flowing river
19.4	39.9853	84.3146	West Milton dam pool: impounded
18.0	39.9733	84.3250	Downstream dam/upstream SR 571: free-flowing river

Stillwater River sampling sites, 2010



## **APPENDICES – STILLWATER RIVER/ WEST MILTON DAM PROJECT**

Appendix Table 1. Qualitative Habitat Evaluation Index (QHEI) scores for the Stillwater River, 2010.

Appendix Table 2. Index of Biotic Integrity (IBI) scores and metrics for the Stillwater River, 2010.

Appendix Table 3. Ohio EPA fish results for the Stillwater River, 2010.

Appendix Table 4. Invertebrate Community Index (ICI) scores and metrics for the Stillwater River, 2010.

Appendix Table 5. Ohio EPA macroinvertebrate results for the Stillwater River, 2010.