BEFORE THE ILLINOIS POLLUTION CONTROL BOARD

In the Matter of:

SIERRA CLUB, ENVIRONMENTAL LAW AND POLICY CENTER, PRAIRIE RIVERS NETWORK, and CITIZENS AGAINST RUINING THE ENVIRONMENT

Complainants,

v.

MIDWEST GENERATION, LLC,

Respondent.

PCB 2013-015
(Enforcement – Water)

NOTICE OF FILING

TO: Don Brown, Clerk
Illinois Pollution Control Board
60 E. Van Buren St., Ste. 630
Chicago, Illinois 60605

Attached Service List

PLEASE TAKE NOTICE that I have filed today with the Illinois Pollution Control Board, Midwest Generation, LLC's Motion to Incorporate the Pre-filed Testimony of G. Allen Burton into the PCB 13-15 Docket, a copy of which is hereby served upon you.

MIDWEST GENERATION, LLC

By: /s/ Jennifer T. Nijman

Dated: April 20, 2023

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CERTIFICATE OF SERVICE

The undersigned, an attorney, certifies that a true copy of the foregoing Notice of Filing, Certificate of Service for Midwest Generation, LLC's Motion to Incorporate the Pre-filed Testimony of G. Allen Burton into the PCB 13-15 Docket, a copy of which is hereby served upon you and filed on April 20, 2023 with the following:

Don Brown, Clerk
Illinois Pollution Control Board
James R. Thompson Center
60 E. Van Buren St., Ste. 630
Chicago, Illinois 60605

and that true copies of the pleading were emailed on April 20, 2023 to the parties listed on the foregoing Service List.

/s/ Jennifer T. Nijman

BEFORE THE ILLINOIS POLLUTION CONTROL BOARD

In the Matter of:

SIERRA CLUB, ENVIRONMENTAL LAW AND POLICY CENTER, PRAIRIE RIVERS NETWORK, and CITIZENS AGAINST RUINING THE ENVIRONMENT

Complainants,

v.

MIDWEST GENERATION, LLC,

Respondent.

PCB 2013-015
(Enforcement – Water)

MIDWEST GENERATION, LLC'S MOTION TO INCORPORATE THE PRE-FILED TESTIMONY OF G. ALLEN BURTON INTO THE PCB 13-15 DOCKET

Pursuant to 35 Ill. Admin. Code § 101.500 and § 101.306, Midwest Generation, LLC's ("MWG") request that the Hearing Officer enter an Order granting their Motion to Incorporate the Pre-filed Testimony of G. Allen Burton and the exhibits attached because these documents are authentic, credible, and relevant to this proceeding.[1] In support of this Motion, MWG states as follows:

1. Board Rule 101.306(a) provides:

> Upon the separate written request of any person or on its own initiative, the Board or hearing officer may incorporate materials from the record of another Board docket into any proceeding. The person seeking incorporation must file the material to be incorporated with the Board in accordance with Section 101.302(h). The person seeking incorporation must demonstrate to the Board or the hearing officer that the material to be incorporated is authentic, credible, and relevant to the proceeding. Notice of the request must be given to all identified participants or parties by the person seeking incorporation. 35 Ill. Adm. Code 101.302(a).

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[1] MWG requested Complainants agree to admission of the Pre-filed Testimony of G. Allen Burton, and Complainants requested that MWG file a motion to incorporate under Rule 101.302(a).

2. On October 26, 2007, the Illinois Environmental Protection Agency ("IEPA") initiated a rulemaking before the Illinois Pollution Control Board (the "Board"). The IEPA proposed a rule of general applicability to update "both the designation of uses for specified waters and establishment of numeric and narrative criteria intended to protect these designated uses." *In the Matter of Water Quality Standards and Effluent Limitations for the Chicago Area Waterway System and the Lower Des Plaines River: Proposed Amendments to 35 Ill. Adm. Code Parts 301, 302, 303 and 304*, R08-09, Statement of Reasons at 3, October 26, 2007 (the "Rulemaking"). The Rulemaking focused on the Use Attainability Analysis factors and the numeric criteria intended to protect the designated uses for the Chicago Area Waterway System and the Lower Des Plaines River, collectively referred to as the Upper Illinois Waterway ("UIW"). *Id*. at 16-17. MWG's Stations, including the Joliet 29 Station, are on the UIW. *In the Matter of Water Quality Standards and Effluent Limitations for the Chicago Area Waterway System and the Lower Des Plaines River: Proposed Amendments to 35 Ill. Adm. Code Parts 301, 302, 303 and 304*, R08-09, Pre-filed Testimony of G. Allen Burton, p. 8, September 8, 2008.

3. Dr. G. Allen Burton submitted pre-filed testimony in the Rulemaking on behalf of MWG. His testimony focused on the chemical, biological, and physical stressors in the UIW, the role of these stressors in biological impairment, and the interrelationship with other key watershed factors that affect heavily human-dominated, effluent dominant waterway such as the UIW. *Id*. at 2. In support of his testimony, he relied upon and incorporated a Sediment Chemistry Study of the Upper Illinois Waterway, Dresden and Lower Brandon Pools prepared by EA Engineering, Science, and Technology. *Id.* Appen. C.

4. Dr. Burton's pre-filed testimony and the attachments are authentic. MWG retrieved the Pre-filed Testimony of G. Allen Burton from the Board website.[2]

5. Dr. Burton's pre-filed testimony and the attachments are credible. Dr. Burton was the Director of NOAA's Cooperative Institute for Limnology and Ecosystems Research and a Professor in the School of Natural Resources and Environment at the University of Michigan at the time of his testimony. Pre-filed Testimony of G. Allen Burton, p. 1. The Sediment Chemistry Survey was an extensive physical and chemical survey, including 35 sediment samples that were analyzed for grain size, metals, and PAHs. *Id.* at 7. The Hearing Officer in the Rulemaking admitted Dr. Burton's testimony as Exhibit 369, and also admitted an enlarged Figure 2 of the Sediment Chemistry Study as Exhibit 378. *See* List of Exhibits #369 through 381 from Hearings Held January 13 and 14, 2010, attached as Exhibit A.

6. Parties to the Rulemaking, including one of the Complainants in this matter, the Environmental Law and Policy represented by Albert Ettinger, cross-examined Dr. Burton on his pre-filed testimony by answers to pre-filed questions and oral examination.[3]

7. Dr. Burton's pre-filed testimony and the attachments are relevant. Two of the factors the Board considers when determining a remedy are "the character and degree of injury to, or interference with the protection of the health, general welfare and physical property of the people" and "the technical practicability and economic reasonableness of reducing or eliminating the emissions, discharges or deposits resulting from such pollution source." 415 ILCS 5/33(c)(i) and (iv). Dr. Burton's discussion about the analysis of the sediments in the Des Plaines River near the

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[2] *In the Matter of Water Quality Standards and Effluent Limitations for the Chicago Area Waterway System and the Lower Des Plaines River: Proposed Amendments to 35 Ill. Adm. Code Parts 301, 302, 303 and 304,* R08-09, Pre-filed Testimony of G. Allen Burton, September 8, 2008, at https://pcb.illinois.gov/documents/dsweb/Get/Document-62432.

[3] *In the Matter of Water Quality Standards and Effluent Limitations for the Chicago Area Waterway System and the Lower Des Plaines River: Proposed Amendments to 35 Ill. Adm. Code Parts 301, 302, 303 and 304, R08-09,* Transcripts of January 13, 2010 hearings, a.m and p.m.

Joliet Generating Station is directly relevant to whether there is interference with the "protection of the health, general welfare and physical property of the people" and the "technical practicability and economic reasonableness of reducing" the pollutants.

8. When material from another docket is relevant, a motion to incorporate should be granted. *ExxonMobil Oil Corp. v. IEPA, 2011 WL 4615015*, PCB 11-86, at *1 (Sept. 29, 2011). The Hearing Officer has previously granted the Complainants' Motion to Incorporate Certain Documents from a rulemaking because the Board "may find that the rulemaking . . . assists them in determining a remedy." *Sierra Club, et. al. v. Midwest Generation, LLC*, PCB 13-15, H. O. Order, p. 20 (July 13, 2022). Here, the Pre-Filed Testimony of G. Allen Burton, that was subject to cross examination, will assist the Board in determining a potential remedy.

9. MWG has included a copy of the Pre-Filed Testimony of G. Allen Burton as Exhibit B.

WHEREFORE, Midwest Generation, LLC respectfully requests the Hearing Officer order the Pre-filed Testimony of G. Allen Burton filed in *In the Matter of Water Quality Standards and Effluent Limitations for the Chicago Area Waterway System and the Lower Des Plaines River: Proposed Amendments to 35 Ill. Adm. Code Parts 301, 302, 303 and 304,* R08-09 on September 8, 2008 to be incorporated into the docket for this matter.

Respectfully submitted,

MIDWEST GENERATION, LLC.

By ____/s/ Jennifer T. Nijman_________
One of Its Attorneys

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EXHIBIT A

RECEIVED
CLERK'S OFFICE
JAN 14 2010
STATE OF ILLINOIS
Pollution Control Board

R08-9 Exhibit List

Exhibit 369	Prefiled testimony and attachments of Dr. G. Allen Burton
Exhibit 370	Two CD ROMs, CD #1 Titled "Final Report Aquatic Ecological Study of the Upper Illinois Waterway" CD #2 untitled
Exhibit 371	Index of Exhibits [Exhibit 370] for G. Allen Burton Testimony
Exhibit 372	"The Upper Illinois Waterway Study Summary Report Sediment Contamination Assessment" Prepared for Commonwealth Edison Company, Prepared by G. Allen Burton, Jr. The Institute for Environmental Quality Wright State University December 18, 1995
Exhibit 373	"Reviews of the Literature Concerning: 1. Effects of Temperature on Freshwater Fish, 2. Effects on Freshwater Biota from Interactions of Temperature and Chemicals, and 3. Effects of Turbidity and Barge-Traffic on Aquatic Ecosystems" Prepared for Commonwealth Edison Company, Prepared by Institute for Environmental Quality Wright State University December 18, 1995
Exhibit 374	"Illinois Integrated Water Quality Report and Section 303(d) List -2008" Illinois Environmental Protection Agency August 2008
Exhibit 375	Printed pages from USEPA web site with "Section 303(d) List Fact sheet for Watershed Des Plaines" in bold at top
Exhibit 376	Printed pages from USEPA web site with "Total Maximum Daily Loads" "Listed Water Information Cycle: 2006"
Exhibit 377	Oversized Map identified at bottom as EA Figure 3 "Concentrations of Total PAHs and Total PCBs that Exceed Sediment Quality Guidelines"
Exhibit 378	Oversized Map identified at bottom as EA Figure 2 "Concentrations of Metals that Exceed Sediment Quality Guidelines"
Exhibit 379	Picture of Barge on River with tanks along river
Exhibit 380	Photograph Depicting Dense Mat of Algae/Duckweed at Midwest Generation Fish Sampling Location 408 (mouth of Jackson Creek embayment, RM 278.3) Located just upstream of the I-55 Bridge September 10, 2008
Exhibit 381	Figure 2a Des Plaines River Watershed 303d Listed Waters (2002)

EXHIBIT B

BEFORE THE ILLINOIS POLLUTION CONTROL BOARD

IN THE MATTER OF:)
)
WATER QUALITY STANDARDS AND) R08-9
EFFLUENT LIMITATIONS FOR THE) (Rulemaking – Water)
CHICAGO AREA WATERWAY SYSTEM)
AND LOWER DES PLAINES RIVER)
PROPOSED AMENDMENTS TO 35 ILL.)
ADM. CODE 301, 302, 303, and 304)

NOTICE OF FILING

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SERVICE LIST

PLEASE TAKE NOTICE that I have electronically filed today with the Office of the Clerk of the Pollution Control Board PRE-FILED TESTIMONY OF G. ALLEN BURTON AND GREG SEEGERT, by Midwest Generation, a copy of which is herewith served upon you.

MIDWEST GENERATION, L.L.C.

Susan M. Franzetti

Susan M. Franzetti

Date: September 8, 2008

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CERTIFICATE OF SERVICE

I, the undersigned, certify that on this 8th day of September, 2008, have caused to be filed electronically the attached PRE-FILED TESTIMONY OF G. ALLEN BURTON AND GREG SEEGERT, by Midwest Generation, and NOTICE OF FILING upon the following person:

John Therriault, Clerk
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James R. Thompson Center
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by personal delivery to the following person:

Marie Tipsord, Hearing Officer
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AND the participants listed on the attached SERVICE LIST via CD Disc.

Susan M. Franzetti

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BEFORE THE ILLINOIS POLLUTION CONTROL BOARD

IN THE MATTER OF:	)	
	)	
WATER QUALITY STANDARDS AND	)	
EFFLUENT LIMITATIONS FOR THE	)	R08-9
CHICAGO AREA WATERWAY SYSTEM	)	(Rulemaking - Water)
AND THE LOWER DES PLAINES RIVER:	)	
PROPOSED AMENDMENTS TO 35 Ill.	)	
Adm. Code Parts 301, 302, 303 and 304	)	

PRE-FILED TESTIMONY OF G. ALLEN BURTON

Good morning, my name is Allen Burton. I currently serve as the Director of NOAA's Cooperative Institute for Limnology and Ecosystems Research and a Professor in the School of Natural Resources and Environment at the University of Michigan. Prior to joining the University of Michigan in August of this year, I was a Professor and Chair of the Department of Earth and Environmental Sciences at Wright State University in Columbus, Ohio. Over the past 30 years, my research has focused on developing effective methods for identifying significant effects and stressors in aquatic systems where sediment and storm water contamination is a concern. I serve on the U.S. EPA Science Advisory Board committees, a National Research Council committee (in 2007), and am the "Immediate Past President" of the Society of Environmental Toxicology & Chemistry, and have served on numerous national and international scientific committees, review panels, councils and editorial boards with more than 200 publications. I have an M.S. and Ph.D. from the University of Texas, where I focused on aquatic toxicology. My resume can be found at Attachment 1, Appendix A.

I have been retained by Midwest Generation ("MWGen") to provide technical support in the evaluation of the Illinois EPA Water Quality Standards and Effluent Limitations for the Chicago Area Waterway System and the Lower Des Plaines River: Proposed Amendments to 35 Ill. Adm. Code Parts 301, 302, 303 and 304 (the "Proposed UAA Rules") and supporting documentation provided to the Illinois Pollution Control Board (the "Board") in the rule-making docketed as R08-09. The focus of my testimony is contained in my written report and assessment of the Illinois EPA's Proposed UAA Rules attached hereto as Attachment 1, which includes supporting tables, citations, and appendices.

My area of expertise is in the evaluation of freshwater ecosystem stressor effects, particularly focusing on the role of sediment and storm water quality. In the mid-1990's, on behalf of Commonwealth Edison (the former owner of the MWGen electric generating stations), I was asked to lead an evaluation of sediment quality on the Des Plaines River in support of the Upper Illinois Waterway ("UIW") Task Force process. My work entailed, among other things, an evaluation of sediment contamination and toxicity, review of the literature on temperature, turbidity and barge traffic effects, *in situ* toxicity evaluations around MWGen's Joliet generating stations, and laboratory evaluations of temperature effects.

My testimony will focus on the chemical, biological, and physical stressors in the UIW, the role of these stressors in biological impairment, and the interrelationship with other key watershed factors that affect heavily human-dominated, effluent dominant waterway such as the UIW. My testimony will also identify what I consider to be fundament flaws relating to the Illinois Environmental Protection Agency's ("Illinois EPA") overall approach to the Proposed UAA Rules, including the Agency's failure to consider the dominant physical, chemical, and biological factors affecting the UIW and the interplay of those stressors with indigenous populations, and the Agency's failure to rely upon peer-reviewed and quantitative approaches that would support the proposal. Unfortunately, as I have concluded, and as set forth more fully below and in my detailed report, it is my position that these flaws are fatal to certain aspects of the aquatic life use designations in the Illinois EPA's Proposed UAA Rules, particularly for the proposed Upper Dresden Island Pool aquatic life use designation, which are not supported by the facts or weight of evidence in this proceeding.

1. The Des Plaines Watershed Is One Of The Most Heavily Urbanized And Polluted Rivers In The State And, Due To The Many Significant Stressors, Certain Segments Will Not Achieve CWA Aquatic Life Goals.

The Des Plaines River is like many watersheds in highly urbanized areas in that it is heavily dominated by human activities that result in significant stressors on the aquatic ecosystem. The river flow itself is dominated by discharges of municipal wastewater, which account for more than 70% of the flow during low flow periods. As documented by the Illinois EPA in its recent integrated water quality assessment reports submitted to the U.S. Environmental Protection Action ("U.S. EPA"), the Des Plaines River is heavily polluted and ranks among the most impaired water bodies in Illinois. Pollutants such as organic chemicals, nutrients, metals, pathogens, ammonia, sedimentation/siltation, total dissolved and suspended solids, chlorides, and dissolved oxygen, are ubiquitous. In 2004, Illinois EPA identified more than 800 causes and sources of impairments. The most common sources of impairment are municipal point source discharges, combined sewer overflows ("CSO"), urban runoff/storm sewers, contaminated sediments, channelization, flow regulation, hydro-modification, and habitat alteration. Importantly, thermal modification has never been identified by the Illinois EPA as a cause of impairment.

The upper part of the UIW, known as the Chicago Area Waterway System ("CAWS"), consists of 78 miles of engineered canals and modified river channels, and flow has been significantly altered by a series of regulated locks and dams. The CAWS was created to drain urban runoff, treated wastewater and support commercial navigation. The heavily human-dominated nature of this waterway and the attendant stressors that shape the aquatic ecosystem will not change. Until the stressors causing the beneficial use impairments are reduced significantly, there will be ongoing risks to the aquatic biota and to humans that consume fish in the CAWS and Des Plaines River.

The Upper Dresden Pool ("UDP") area just like many areas in the Des Plaines watershed has multiple causes and sources of use impairment. Dominant stressors for the UDP include contaminated sediments, metals, nutrients, synthetic organics (*e.g.,* pesticides, carcinogenic polycyclic aromatic hydrocarbons ("PAHs"), pharmaceuticals and personal care products ("PPCPs")), and flow regime alteration and degraded habitats. The lower area of Hickory Creek, nearest to the Brandon tailwaters, does not support aquatic life or primary recreation uses due to impairments such as fecal coliforms, chloride, alteration to streamside or littoral vegetation, flow alterations, sedimentation/siltation, total dissolved and suspended solids, zinc, nitrogen, phosphorus and algae. It is important to understand that with many urbanized watersheds, such as the Des Plaines, the removal of one stressor alone will not be sufficient to restore a watershed to beneficial use attainment.

2. Wet Weather Impacts In The UIW Are Significant And Will Continue To Cause Significant Loadings From Sewage And Other Contaminants.

Although water quality in the UIW has improved somewhat since the 1970s, there is no documented evidence of significant improvement in beneficial use attainment. Despite reductions of untreated discharges of sewage from the Metropolitan Water Reclamation District of Greater Chicago's ("MWRDGC") tunnel and reservoir plan ("TARP"), significant loadings of raw sewage with associated solids, nutrients and chemical contaminants will continue into the foreseeable future. In addition, significant loadings and associated pollutants from both urban characterization. The extensive EA 2008 Sediment Survey conducted this past May (2008) documented exceedances of sediment guidelines for metals, PAHs and PCBs at almost every sample location. Table 11 of the 2008 Sediment Survey provides a comparison of sediment concentrations for organics and metals for samples collected this year with those collected by me in 1994 and 1995. The organic contaminants for the vast majority of sediments sampled between 1994 and 2008 in the UIW (CSSC to the Dresden Pool) exceed sediment quality guidelines ("SQGs") for probable adverse biological effects.[1] The fact that both the Upper Dresden and the Lower Brandon Pools had high concentrations of both metals and organic constituents indicates that large portions of these pools are of poor sediment quality and include the higher quality habitats of the Brandon Lock & Dam tailwaters.

Although some of the sediment contamination of the Des Plaines River is attributable to historical discharges and human activities, much of it is on-going and will continue to persist due to the existing point and nonpoint sources discussed above. There are no known plans to remove contaminated sediments in the UDP area. Such a removal would be one of the largest in the United States, likely costing hundreds of millions of dollars due to the spatial extent of the extreme contamination. However, even the removal of significantly contaminated and acutely toxic sediments from depositional areas identified would only provide temporary improvement, as the continued loadings of a broad array of chemicals from point and nonpoint sources would result in the re-accumulation of contaminated sediments. Further, the fact that the 2008 Sediment Survey reveals highly contaminated sediments similar to what I observed in the mid-90's, strongly suggests that depositional sediments remain significantly degraded and are not

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[1] SQGs are commonly accepted benchmarks and have been widely used in the U.S. for many years to establish "clean-up" levels for federal and state remediation activities and to determine which sediments are toxic and thus represent a threat to aquatic biota.

being reduced, contrary to the Illinois EPA's assumption that sediment quality in the CSSC and UDP is improving.

Based on my experience, most depositional sediments that are acutely toxic are located in areas suitable as fish habitat, not in high current areas, such as the main channel. Indeed, the prime habitat for spawning in this study area are the shallow waters below Brandon Lock & Dam where sediments are contaminated and exceed sediment quality guidelines. Shallow waters, including those throughout the UIW, are prone to a phenomenon known as photoinduced-toxicity due to the presence of even ug/L (ppb) levels of PAHs, which is toxic to zooplankton, benthic macroinvertebrates, fish and amphibians in surficial layers of waters. In addition to photoinduced PAH toxicity in overlying waters, the concentrations of PAHs found in the sediments (parts per million) are high enough to cause acute toxicity without UV stimulation and exceed Probable Effect Concentrations ("PECs") by up to 30-fold.

A recent study by the U.S. Geological Survey ("USGS") found that total PAHs in the sediments of the Upper Illinois River Basin are among the highest for sites nationwide, and nearby sites in Western Springs and Riverside, tributaries upstream from the UDP, are among the highest 5% in the nation, exceeding probable effect levels for adverse effects on aquatic life. The USGS study also revealed that concentrations of DDT, PCBs, methyl mercury, and dieldrin in fish and sediments in the Upper Des Plaines and its tributaries are among the highest concentrations observed nationwide. The USGS findings are consisting with the results of the 2008 Sediment Survey, which revealed significant concentrations of PAHs throughout the Dresden and Lower Brandon Pools. *See* Tables 7 – 10, 2008 Sediment Survey.

4. Suspended Sediments And Turbidity Are Significant Stressors.

Studies have shown that turbidity is a major stressor in both the CSSC and the UDP. Turbidity is due to eroded soils and resuspended sediments, both of which contribute during high flow events. Turbidity during low flow events is primarily a result of resuspension of bedded sediments, which in the UIW often occurs from barge traffic. A study that I conducted in 1998 showed that *Ceriodaphnia dubia* survival was affected by turbidity. As well, filter feeding zooplankton are known to be sensitive to suspended solids at levels of 50-100 mg/L (*e.g.*, IEQ 1995). This dominant stressor of the UIW, aggravated by barge and navigation traffic, is likely to impact zooplankton populations throughout the waterway.

5. Nutrient Enrichment And Ammonia Are Significant Stressors.

Nutrients, such as nitrogen and phosphorus, are a common pollutant of human dominated watersheds, disrupting aquatic ecosystems by increasing biological productivity, leading to increased bacterial respiration (and thus anoxia), increased algae and nuisance weeds, and thus a switch to less desirable fish and invertebrate species. Nutrient loading from sources such as municipal sewage and agricultural runoff contribute to eutrophic conditions, impair beneficial uses, and reduce oxygen levels that favor pollution tolerant species. As documented in the Lower Des Plaines UAA Report and elsewhere, the waters of the UIW from above Chicago through the Dresden Pool exhibit high levels of nitrogen and phosphorus. When nitrogen is elevated, another stressor of particular concern is ammonia, which can be particularly toxic to certain aquatic species. In fact, studies have found ammonia to be a primary sediment stressor in the UIW and Brandon Pool area, and it is significantly correlated with sediment acute toxicity, particle size and organic contaminants.

Recent USGS studies have documented phosphorus concentrations exceeding U.S. EPA desired goals to prevent excessive growth of algae and other nuisance plants in every water sample collected from urban or mixed land-use watersheds in the UIW. These studies have also found the concentration of ammonia in the CSSC at Romeoville as the highest measured in the Upper Illinois River Basin, the fourth highest of 109 streams and rivers measured nationwide by the USGS, and among the highest in the Mississippi River basin. The USGS has attributed the primary degradation of the UIW to elevated concentrations of ammonia and phosphorus, and the presence of organic wastewater contaminants such as disinfectants, pharmaceuticals and steroids, insecticides, and organochlorines. These USGS studies also found that water quality conditions in the UIW have resulted in decreased numbers and diversity of pollution-sensitive species of fish and benthic invertebrates.

6. Municipal Wastewater Plants Will Continue To Discharge Endocrine Disruptors And Other Emerging Contaminants.

The UIW and the UDP are also adversely impacted by organic compounds collectively referred to as "emerging contaminants," which include endocrine-disrupting compounds (EDCs) found in many pharmaceutical and personal care products (PPCPs) and veterinarian and livestock operations. Numerous studies have found that fish downstream of municipal wastewaters suffer from exposures to estrogenic chemicals with extreme reproductive disruption and feminization.

Recent studies by U.S. EPA of effluent dominated streams and other water bodies, including the North Shore Channel in Chicago, identified numerous pharmaceutical compounds in fish tissues, of which antihistamines and antidepressants were most frequent. A recent lake study conducted in Canada found that fish exposed to levels commonly found in both untreated and treated municipal wastewaters (5 – 6 ng/L) resulted in feminization of males and ultimately a near extinction of the fathead minnow species from the lake. Other studies, including segments of the Potomac River Basin, where 80 to 100% of the male smallmouth bass are intersex, have identified EDCs at concentrations significantly in excess of those that can result in male feminization. These finding are of serious concern for the sustainability of wild fish populations in waterways receiving municipal wastewaters, such as the UIW.

7. The Illinois EPA Has Never Identified Temperature As A Limiting Factor To Attainment of Beneficial Uses.

As noted earlier, despite the many causes of impairment to the Des Plaines River, thermal modification has never been identified by the Illinois EPA as a cause of impairment. While temperature in some cases can be a stressor, studies have shown that warm and cold temperatures can be both advantageous and detrimental to aquatic biota. Although it was not discussed in the Lower Des Plaines River UAA Report (hereafter referred to as the "LDR UAA Report"), another concern regarding temperature is that there are winter maximum temperatures which are impacted by municipal wastewater effluents and may impede some fish reproductive processes. The sections of the LDR UAA Report titled "Selection of the Temperature Standard" and "Critique of the Current Secondary Contact and Indigenous Aquatic Life Standard" contain inaccurate statements regarding temperature effects on riverine species and ecosystem processes. High and low temperatures may or may not be detrimental to aquatic life that reside in the UIW. The authors of the LDR UAA Report incorrectly imply and over-generalize that high temperatures are always detrimental. Moreover, as discussed below, the LDR UAA Report inaccurately presents my prior work on the UIW in several ways. Contrary to the LDR UAA Report, there is no simple relationship between temperature and aquatic toxicity. Both low and high temperatures can increase and decrease toxicity due to exposures from other chemical stressors, such as those found in the UIW. Toxicity is dependent upon species, presence of other toxicants, toxicant type and concentration. The LDR UAA Report's over-simplification that high temperatures increase toxicity is simply incorrect and misleading. Nitrification is also inhibited by cold temperatures and ammonia is not always consumed in the upper sediment layers. Nitrification, which is the biological oxidation of ammonia, is very sensitive to toxicants, which abound in the UIW's depositional sediments.

The former study that I directed while at Wright State University (the "Wright State Study") did not attempt to establish temperature limits for the UIW. The LDR UAA Report's discussion of the Wright State Study is misleading, leaving out key portions of the conclusions and misinterpreting others. The Wright State Study findings substantiated previous studies by my laboratory and others. These key findings documented that acute toxicity exists in short-term exposures for multiple species in waters and sediments of the UIW without any water temperature elevation. Toxic sediments abound in most tributary mouth, tailwater, and pool depositional areas, which generally provide better habitats for fish. These same habitats are typically shallow waters which are subject to rapid mortality as a result of photoinduced toxicity of PAHs, as discussed above. Both cold and hot temperatures accentuate toxicity originating from UIW waters and sediments. Statistically significant correlations between sediment ammonia and fluorene concentrations and toxicity were also observed. Ammonia was also significantly correlated to depositional sediments and the presence of high concentrations of organics. These correlations were based on sediment data collected from throughout the UIW. Outside the thermal discharge plume, temperature was not observed as a factor of *in situ* toxicity.

The laboratory toxicity test results produced by the Wright State Study further document the role of sediment toxicity and how it increases in the presence of temperature extremes. The Toxicity Identification Evaluation Phase I experiments further substantiate the findings of the Chemical Screening Risk Assessment and the ammonia correlations with toxicity, suggesting that ammonia is a primary system stressor to benthic and epibenthic species. However, these seven day, static renewal experiments do not adequately mimic dynamic, *in situ* conditions where light, temperature, turbidity, water quality and food conditions change over minutes to hours. The most reliable indicator of *in situ* conditions are the indigenous communities actually present in the waterway. These are the most reliable data for evaluations of thermal impacts.

8. Several UAA Factors Are Met, Based On Severity And Prevalence Of Sediment Contamination And Continued Chemical And Biological Stressors From Human Dominated Activities.

Based on my professional opinion, at least three of the six UAA Factors set forth at 40 C.F.R. 131.10 apply in the present case, demonstrating that the UIW (including the CSSC and UDP) does not meet CWA aquatic life goals. I did not evalute UAA Factor 2, as flow alterations were not part of my evaluation. Moreover, it is my opinion that it is not feasible to correct these factors or limitations sufficient to attain CWA goals.[2] The application of these three UAA Factors does not support the upgrading of use designations under the Proposed UAA Rules. Moreover, under U.S. EPA's rules, a determination that any one of these Factors applies would support the downgrading of the use designations. The UAA factors that apply include:

Factor 3. *Human caused conditions or sources of pollution prevent the attainment of the use and cannot be remedied or would cause more environmental damage to correct than to leave*

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[2] An evaluation of the potential applicability of the other UAA Factors, such as Factor 2 related to flow conditions, was outside the scope of my review.

in place. Human caused conditions or sources of pollution prevent both the CSSC and the Lower Des Plaines River from attaining the Clean Water Act's aquatic life goals. It is the primary reason supporting not upgrading the use designation for either waterway to Clean Water Act "fishable" use designations. The evidence of excessive impairments is clear from the results of sediment surveys, including the 2008 Sediment Survey. A multitude of physical and chemical impairment causes and sources exist throughout the watershed as discussed and documented above. The sources will not be removed due to the human dominated nature of the watershed and the connectivity between the UDP and the UIW. *In-situ* remediation of contaminated sediments would likely cost hundreds of millions of dollars or more based on the costs of remediating other similar systems.

Factor 4. *Dams, diversions or other hydrologic modifications preclude the attainment of the use, and it is not feasible to restore the water body to its original conditions or to operate such modifications in a way that would result in the attainment of the use.* The UIW habitat is heavily and permanently modified. Barge traffic is a major protected use and will continue to result in degraded habitat and resuspended contaminated sediments.

Factor 5. *Physical conditions associated with the natural features of the water body, such as the lack of proper substrate, cover, flow, depth, pools, riffles and the like, unrelated to quality preclude attainment of aquatic life protection uses.* The rationale for Factor 4 above applies here as well. Due to the many stressors, habitat is of poor quality throughout most of the UIW and cannot be feasibly corrected.

Conclusion

The rationales used and conclusions reached by the Illinois EPA to support its Proposed UAA Rules are in my view detrimentally flawed. Illinois EPA's presentation of data, data interpretation, and supporting statements are often biased, and fail to provide a scientifically-balanced representation of previous UIW studies, peer-reviewed literature, and accepted approaches that reflect state-of-the-science. Multiple lines of evidence clearly establish that the CSSC, as well as the UDP, is a highly modified, effluent-dominated waterway that receives massive amounts of pollutants from various regulated and unregulated discharges and is generally poor habitat. Acute toxicity of water and sediments, unrelated to temperature, is and will remain a major limitation on the potential of this water body to achieve CWA aquatic life goals. Major nonpoint source loadings of solids, nutrients, metals, and organics will continue from growing urban areas, sewers, construction, and agriculture in this human-dominated watershed and therefore will continue to contaminate waters, sediments, and the food of aquatic biota throughout the UIW. Modified and limited habitats (channelization, barge traffic, lock and dams), extreme turbidity and siltation, and stressor loadings will not improve in the foreseeable future and will continue to dominate water quality conditions and use impairments. Consequently, development of new, modified standards, including thermal standards, will not address the key issue of excessive and pervasive pollution sources, excessive use impairments and limited habitats in this watershed.

Thank for the opportunity to testify before the Board.

G.A. Burton

BY: ____________________________
G. Allen Burton, Ph.D.

Attachment 1

Review of the Illinois EPA Water Quality Standards and Effluent Limitations for the Chicago Area Waterway System and the Lower Des Plaines River: Proposed Amendments to 35 Ill. Adm. Code Parts 301, 302, 303, and 304

Review of the Illinois EPA Water Quality Standards and Effluent Limitations for the Chicago Area Waterway System and the Lower Des Plaines River: Proposed Amendments to 35 Ill. Adm.Code Parts 301, 302, 303 and 304.

by

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September 4, 2008

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I. Introduction

I have been asked by Midwest Generation to review and comment on the Illinois EPA Water Quality Standards and Effluent Limitations for the Chicago Area Waterway System and the Lower Des Plaines River: Proposed Amendments to 35Ill. Adm. Code Parts 301, 302, 303 and 304 (the "Proposed UAA Rules") and supporting documentation provided to the Illinois Pollution Control Board (the "IPCB") in the rule-making docketed as R08-09.

In the mid-1990's, I lead evaluations of sediment quality on the Des Plaines River for Commonwealth Edison in support of the Upper Illinois Waterway (UIW) Task Force process (Burton, 1995, 1998; Burton and Brown 1995). These studies involved evaluations of sediment contamination and toxicity on the upper ~55 miles of the UIW, reviews of the literature on temperature, turbidity and barge traffic effects, *in situ* toxicity evaluations around the Joliet power stations, and laboratory evaluations of temperature effects. My area of expertise is in the evaluation of freshwater ecosystem stressor effects, particularly focusing on the role of sediment and storm water quality (Appendix A). Therefore, this review deals with the stressors in the UIW, their role in biological impairment, and interrelationships with other key watershed factors.

Effective management of aquatic ecosystem quality requires a comprehensive, watershed based framework, because upstream inputs affect downstream ecosystems. This process is well understood and was the foundation for the U.S. EPA's TMDL approach. Each aquatic ecosystem is both unique and complex. Protective management approaches such as NPDES permit limits, water and sediment quality standards, and Best Management Practices have numerous assumptions and uncertainties that confound the ability to ensure they are effective. Determining what will be effective requires an interdisciplinary approach and understanding of how dominant physical, chemical and biological factors interact. This dictates that state-of-the-science approaches be used that generate an adequate level of quality data and that the associated uncertainties and assumptions be clearly understood and stated. The current consensus is that reliable "weight-of-evidence" based approaches are necessary in environmental quality assessments, providing for sound decision-making (*e.g.,* Burton *et al.* 2002ab; Wenning *et al.* 2005, USEPA 2000). These approaches should characterize *and link* the key "exposure" (*i.e.,* stressor) components with indigenous biological "effect" components using reliable, peer-reviewed, and quantitative approaches where reference conditions, dominant stressors (including their spatial and temporal patterns), and, finally, associated risk is clearly defined. Unfortunately, this important process has not been followed in the supporting documentation for the Proposed UAA Rules, as explained below.

II. Overview of the Des Plaines Watershed and its Impairments

A wealth of information exists on the Des Plaines River and its watershed. It is clearly a watershed that is heavily dominated by human activities, with no pristine waters. It drains nearly 855,000 acres in Lake, Cook, DuPage and Will counties (Appendix B). The majority of Chicago's metropolitan area drains into the Des Plaines River and its tributaries. Much of the current data has been summarized by the Illinois EPA (IEPA 2004, 2008). This human-dominated watershed is characterized primarily by urban and agricultural land uses (AquaNova

& Hey 2003; CDM 2007; Groschen *et al.* 2004). The river is effluent dominated, receiving municipal wastewaters from many cities, including the 3rd largest in the nation. Municipal wastewater constitutes more than 70% of the flow during low flow periods (CDM 2007 – Attachment B to Illinois EPA Statement of Reasons). The Illinois EPA 2004 303(d) List report on Illinois water quality for 2004 identified a large number of possible causes of beneficial use impairment in this system (IEPA 2004). The 2004 303(d) List included the following list of causes of impairments: organic chemicals, nutrients, metals, pathogens, ammonia, sedimentation/siltation, total dissolved and suspended solids, chlorides, flow alterations, dissolved oxygen, flow and habitat alteration, combined sewer overflow, urban runoff/storm sewers, and fish consumption advisories. Surprisingly, in the Illinois EPA 2008 Integrated Water Quality Report and Section 303(d) List, Final Draft dated June 30, 2008, many of the 2004 303(d) List causes and sources of impairment were deleted from this most recent Illinois EPA report (IEPA 2008). While the Illinois EPA's reasons for deleting certain of the 2004-listed causes and sources of impairments are not explained in the 2008 Final Draft Integrated Report, some of its reasons are provided and show that the deletion of the causes and sources of impairments is not due to their having ceased being impairments to the system. Rather, these deletions are due to changes in the "criteria" that the Illinois EPA uses to identify such impairments. For example, with respect to total nitrogen and dissolved oxygen causes of impairments, the Illinois EPA states:

> *We have stopped using total nitrogen, as a cause of impairment for aquatic life use. Total nitrogen appeared as nitrogen (total) on previous 303(d) lists. We do not have a standard for total nitrogen related to aquatic life. In streams, we typically do not have total nitrogen data. The methods, criteria and the manner in which nitrogen was reported as a cause of impairment of aquatic life use have changed many times over previous assessment cycles. These criteria had never been shown to be related to aquatic life use impairment in any scientific study and had never been used or proposed as water quality standards. Illinois now believes that the criteria by which it placed total nitrogen on previous 303(d) lists were not scientifically valid. Illinois does not believe that a scientifically valid criterion currently exists for determining when nitrogen is causing an impairment of aquatic life use in this state.*
>
> *Dissolved oxygen (which is a cause of impairment used to indicate low dissolved oxygen) has been changed from a pollutant to a nonpollutant cause of impairment. Although low dissolved oxygen may be caused by pollutants, the impairment does not result from the discharge of dissolved oxygen into the water. Furthermore, federal regulations in CWA Section 502(6) do not define dissolved oxygen or low dissolved oxygen as a pollutant. Because only pollutant causes of impairment appear on the 303(d) List this means that all entries of dissolved oxygen have been delisted.*

Thus, while the Illinois EPA's 2008 draft list of causes and sources of impairments may be shorter than the UIW 2004 list of impairments, it does not appear to reflect any real improvements in the quality of the subject waterway.

The quality of the Des Plaines River ranks among the worst in the state (and likely the nation), in number of impaired reaches (USEPA 303d Fact Sheet). Every reach of the Des Plaines River reported in the Illinois EPA 2008 Integrated Report had multiple causes (*i.e.*, stressors) and sources that contributed to non-attainment of beneficial uses. (In the 2004 303(d) List, a total of more than 800 causes and sources of impairments were identified). Of the Illinois EPA-identified impairments, the most common sources of impairment on many reaches are municipal point sources, contaminated sediments, channelization, flow regulation, hydro-modification, combined sewer overflow (CSO), and urban runoff/storm sewers. In the Illinois EPA 2002 305b Report, "thermal modification" was listed as a possible cause of impairment, although it was not identified as a stressor for the Des Plaines River in 2002. The more recent Illinois EPA 2004, 2006 and 2008, Integrated 305b/303d reports do not list thermal modification as a possible cause of impairment in the Des Plaines River. The Upper Dresden Pool (UDP) area has multiple causes and sources of use impairment identified by the Illinois EPA (Appendix B-1 of IEPA 2006 305(b) Report). The causes include: DDT, flow regime alterations, phosphorus, mercury, PCBs, total suspended solids, and sedimentation/siltation. The sources of impairment identified include: urban runoff, municipal point sources, contaminated sediments, and impacts from hydrostructure/flow regulation/modification.

The upper part of the UIW is known as the Chicago Area Waterway System (CAWS) consisting of 78 miles of man-made canals and modified river channels. These were created to drain urban runoff, treated wastewater and support commercial navigation (CDM 2007). All of this artificial and modified system is further altered by five structures (*i.e.*, engineered locks) that control flow. With no high quality habitat and the continual presence of contaminants that spike to high levels during periodic events, no pollution sensitive aquatic life is expected. Unfortunately, water flows downstream and the contaminants identified as causes of impairment also travel great distances affecting downstream areas. Indeed, the growing incidence of hypoxia in the Gulf of Mexico is largely due to nitrogen inputs from agricultural runoff in the upper Midwest (*e.g.*, Scavia and Donnelly 2007), while the UDP area is only a few miles downstream of the CAWS. The Illinois EPA has found the Chicago Sanitary and Ship Canal (CSSC) has 7 causes of impairments originating from 8 major source categories (IEPA 2006, 2008). Because most of the water (approximately 70%) is municipal wastewater effluent (with additional contributions from urban runoff) it contains significant loadings of stressors that will impact the lower reaches. In addition, the flow alterations upstream will impact downstream flows. Some of the stressors are more likely to be transported long distances downstream, such as fine solids, metals, and the more problematic organic chemicals (such as, larger polycyclic aromatic hydrocarbons, pyrethroid and chlorinated pesticides). This is evidenced by the high levels of contaminants in depositional sediments in the UDP, as discussed further below.

Further downstream from the CSSC, there are four significant tributaries that empty into the upper Des Plaines River. Each of these key tributaries provide the potential for a refuge for fish from the Des Plaines, a source of aquatic life, and correspondingly a source of pollution. Unfortunately, these waterways have several causes and sources of impairment. Hickory Creek discharges directly into the Brandon Road Lock & Dam tailwaters which have good quality habitat. However, according to the Illinois EPA's Integrated Reports, the lower areas nearest to the Brandon tailwaters (GG02 and 06) do not support aquatic life or primary recreation uses due to the following impairments: fecal coliforms, chloride, alteration to streamside or littoral vegetation, flow alterations, sedimentation/siltation, total dissolved and suspended solids, zinc, nitrogen, phosphorus and algae. The sources of these 11 causes of impairments are thought to be combined sewer overflows, municipal point source discharges, urban runoff, channelization, flow regulation structures and land development (IEPA 2006, 2008). Grant Creek does not support aquatic life due to unknown impairment sources (IEAP 2006, 2008). Jackson Creek does not support aquatic life due to altered flow, phosphorus and aquatic plants (IEPA 2006, 2008). Finally, DuPage River segments do not support aquatic life, fish consumption and primary contact beneficial uses due to altered flow, sedimentation/siltation, silver, phosphorus, aquatic plants, PCBs, chloride, DDT, hexachlorobenzene, nitrogen, fecal coliforms, and dissolved oxygen. These 12 causes of impairment were stated to originate from 6 sources, including hydrostructures, land development, upstream impoundments, urban runoff, municipal point sources, and contaminated sediments (IEPA 2006, 2008) which are documented to be accumulating at the mouth of the DuPage River in the Des Plaines River (see below).

The high degree of impairment and the multiple causes and sources are to be expected, based on the dominance of human activities and the limited nonpoint source runoff controls in the watershed. In fact, these dominant stressors and the resulting biological impairments are similar to other waterways that are human dominated (*e.g.*, Burton *et al.* 2000; Burton and Pitt 2001).

The unique, human-dominated nature of this watershed makes the critically important issue of reference waterway selection difficult. The reality is that the Des Plaines watershed is one of the most heavily human-dominated waterways in the nation. This will not change. While the quality of the Des Plaines can be improved via a comprehensive watershed management program, it will always be a heavily modified waterway. Until the stressors that dominate as causes of the beneficial use impairments (identified above) are reduced significantly, there will be risks to the aquatic biota and to humans that consume fish and recreate in the UDP.

In the following discussion, evidence will be presented that supports the findings of the recent Illinois EPA 305(b) Reports on the primary causes of beneficial use impairments in the UDP and why these stressors and impairments will persist in the foreseeable future. These dominant stressors include: contaminated sediments, metals, synthetic organic chemicals (including pesticides, PAHs and pharmaceuticals and personal care products (PPCPs), nutrients, flow regime alteration and degraded habitats. Unless the great majority of these stressors (and their sources) are removed, the CSSC and UDP will continue to be impaired.

III. Wet Weather Impacts in the UIW

While water quality in the UIW has improved since the 1970s, the recent Illinois EPA 305(b) Reports found no significant changes in beneficial use attainment. This is despite the MWRDGC improvements (including TARP) to reduce the impacts from wet weather events to the waterway. The lack of improvement is likely the result of two key factors. First, there will be continuing, significant inputs from many large CSOs (Appendix B) that provide large loadings of raw sewage with associated solids, nutrients and chemical contaminants. Based on MWRDGC data, during the period from January 1, 2007 through August 6, 2008, there were 117 CSO events at 4 major CSO stations (www.mwrdgc.dst.il.us/CSO/display_only.aspx). Second, there will continue to be significant nonpoint source inputs from both urban and, to a lesser extent, agricultural runoff given the nature of the watershed and its continued development (Appendix B). A press release by the University of Illinois –Urbana Champaign (August 1, 2007) reported that "flood peaks in the Chicago metropolitan area are higher than they used to be, and they are also higher than estimates currently used by water managers, according to an Illinois-Indiana Sea Grant study….the steady increase in flood discharges in small streams over the past 100 years is due to increases in urbanization and precipitation, with urbanization playing the major role…Between 1954 and 1999, urbanization, on average, increased from about 11 percent to 52 percent in the 12 Chicago watersheds… the 10 largest historical storms have occurred since 1950, and these storms were much larger than any in the previous 50 years." These urbanization trends are also reflected in data through 2006 shown in Appendix B, showing changes in land use, development, population, and housing from the USGS, Chicago Metropolitan Agency for Planning, and U.S. Census Bureau. It is apparent that the Des Plaines watershed's trait of being human dominated is increasing steadily with time and will likely continue long-term, despite the recent economic slow-down. This finding is also reflected in the recent comprehensive USGS study and US Census Bureau data (Groschen et al 2004). Growth has been greatest in the counties surrounding Chicago (ranging from 14 to 42 percent: Du Page 16%, Grundy 25%, Lake 25%, Kane 27%, Kendall 38%, McHenry 42%, Will 41%).

Agricultural runoff is contributing four groups of stressors: clay/silt sediments, nutrients (from fertilizers and livestock), metals (a common contaminant of fertilizers), pathogens (from livestock), pesticides, and pharmaceuticals (from livestock). The recently banned insecticide Diazinon (toxic in the part per trillion range) is still being marketed and used. It was frequently found in the Des Plaines River watershed (93% of samples). In agricultural parts of the watershed, Atrazine was found in every sample (Groschen *et al.* 2004).

While the recent and near-future improvements from TARP are noteworthy, this will continue to be a highly impacted waterway, being effluent-dominated and receiving large amounts of untreated nonpoint source (NPS) runoff containing a wide range of nutrients, pathogens, metals, petroleum products, "new-age" pesticides and pharmaceutical and personal care products (PPCP) which are often referred to as emerging contaminants. Many of these chemicals are known to be toxic at the part-per-trillion level and/or hormone disruptors (Burton and Pitt 2001; Burton *et al.* 2000). Urban and agricultural storm waters in streams are often acutely toxic (Burton *et al.* 2000; Burton and Pitt 2001; Hatch and Burton 1999; Tucker and Burton 1999). In addition to the chemicals, solids erode from urban, construction and agricultural lands and constitute the number one pollutant of river systems (USEPA 2002; Burton and Pitt 2001). Many of the above stressors have been identified by the Illinois EPA as the primary causes of impairment on the Des Plaines (IEPA 2004, 2006, 2008); the others are known to be common in human-dominated waterways as discussed above and below.

The above NPS inputs will continue for many years, likely decades, and will continue to adversely impact the downstream ecosystems. The sheer magnitude of urbanization and agriculture in the watershed (Appendix B) and lack of effective NPS controls dictates that NPS-related degradation will be the dominant source of impairment for the foreseeable future. This is not surprising, because NPS runoff is the leading cause of water quality problems in the U.S. (USEPA 2002).

IV. Sediment Quality

It is well known that chemicals (nutrients, synthetic organics and metals) and pathogens tend to associate with solids due to polar and non-polar binding affinities (Burton 1992). Therefore, those sediments that have greatest surface areas (clays, silts, colloids) will accumulate the greatest concentrations, and thus serve as both a sink and a source of contamination. Indeed, contaminated sediments are the cause of use impairment of 41 of 42 Great Lakes Areas of Concern and the dominant cause for Superfund site designation in our waterways. Depositional sediments are not stationary and continue to contaminate resident organisms and downstream waters *via* common fate processes, such as resuspension, advection, bioturbation and diffusion. All of these fate processes exist on the Des Plaines River and vary spatially and temporally. In cases, for example, where overlying water quality may be relatively good (*i.e.*, meet water quality standards), contaminant concentrations will steadily increase in depositional sediments and provide an environment for bioaccumulation in benthic organisms (*e.g.*, Burton *et al.* 1992; Wenning *et al.* 2005). The U.S. Environmental Protection Agency (USEPA) has shown dramatic correlations between fish tissue consumption advisories and the levels of sediment contamination. On the Des Plaines, most of the reaches assessed in the Illinois EPA 305(b) Reports have fish consumption advisories and the levels of mercury and PCBs found in sediments suggest a substantial risk exists to those consuming fish from the Des Plaines River.

There have been several studies of sediment chemical contamination and toxicity in the UIW, from the CSSC downstream through the Dresden Pool since the 1990s (Burton *et al.* 1995; Groschen *et al.* 2004; MWRDGC 2008, EA Engineering, Science, and Technology 2008). The most recent study by EA (2008) was conducted in the Dresden Pool and the lower portion of the Brandon Pool between May 6 -9, 2008. This extensive physical and chemical survey included 35 sediment samples (31 in the Dresden Pool and four in the Lower Brandon Pool). Analyses included total organic carbon, total solids (percent moisture), grain size (sieve and hydrometer), arsenic, silver, cadmium, chromium, copper, lead, mercury, nickel, zinc, polycyclic aromatic hydrocarbons (PAHs), and polychlorinated biphenyls (PCB congeners).

These studies have documented that the depositional sediments (clays and silts) have been and continue to be severely contaminated with metals, synthetic organics and nutrients throughout the UIW (from northern Chicago to the Dresden Island Lock and Dam). The depositional sediments are often acutely or chronically toxic to benthic invertebrates (Table 1 below; Tables 9-11 Appendix C). All have shown typical high degrees of riverine spatial heterogeneity (*i.e.*, natural variation across the river and longitudinally). This high degree of spatial heterogeneity makes determinations of improvement through time extremely difficult. Indeed, high levels of sediment contamination and exceedances of internationally accepted sediment quality guidelines (SQGs) are as common now as in the early 1990s.

Contamination of the Des Plaines River sediments is not only historical but is on-going due to the point and nonpoint sources discussed above. Nutrients, metals, pathogens and synthetic organics (primarily polycyclic aromatic hydrocarbons (PAHs) and new age pesticides such as pyrethroids) are common constituents today of both point and nonpoint source loadings in waterways such as the Des Plaines (Burton and Pitt 2002; USGS 1999). Although there are no known plans to dredge sediment locations in the UPD area, even the removal of significantly contaminated and acutely toxic sediments from depositional areas identified throughout the UIW (Burton 1995) would provide but a temporary improvement. The hydrologic conditions and continued point and nonpoint source loadings would eventually result in contaminated sediments re-accumulating because the myriad of sources will not be removed. The Illinois EPA-identified problems associated with TSS, siltation and contaminated sediments (IEPA 2004, 2008) suggest widespread watershed sources of these major stressors.

Indeed, sediment sampling in the UIW (CSSC to Dresden Island Lock and Dam) between 1994 and 2008 showed that the concentrations of organic contaminants in the depositional sediments of the UIW exceed widely used sediment quality guidelines (SQGs) for probable adverse biological effects (Appendix C) (Burton 1995, USEPA 2001, MWRDGC 2008, EA Engineering, Science, and Technology 2008). SQGs are widely used to determine which sediments are toxic and thus represent a threat to the aquatic biota (Wenning *et al.* 2005). They have been used in Superfund, RCRA and State investigations for many years and are frequently used to establish "clean-up" levels for remediation activities (Wenning *et al.* 2005). One of the biological-effects approaches that has been widely used to assess sediment quality relative to the potential for adverse effects on benthic organisms in freshwater ecosystems is the Threshold Effects Concentration (TEC)/Probable Effects Concentration (PEC) (MacDonald *et al.* 1996) approach. TECs typically represent concentrations below which adverse biological effects are not expected to occur, while PECs typically represent concentrations in the middle of the effects range and above which effects are expected to occur more often than not. (MacDonald *et al.* 2000).

Comparing the analytical results of sediment sampling to the SQGs, the Burton, U.S. EPA, and MWRDGC surveys all document that these sediments are highly contaminated and are likely to cause adverse biological effects (*e.g.*, Buchman 1999; McDonald *et al.* 2000ab, Wenning *et al.* 2005). Recent studies by the MWRDGC (2007) and EA Engineering, Science, and Technology (2008) found that Brandon Road and both upper and lower Dresden Pool sediments continue to be highly contaminated with nutrients, cyanide, metals, and synthetic organic chemicals. Sediments from a majority of the sampling locations had both an odor and a sheen indicative of petroleum products.

A sediment survey was conducted in the Upper Dresden Pool and the lower portion of the Brandon Pool between May 6 -9, 2008 by EA Engineering, Science & Technology ("EA 2008 Sediment Survey"). A copy of the report prepared by EA on the EA 2008 Sediment Survey is attached as Appendix C. In the EA 2008 Sediment Survey, 35 sediment samples, 31 in the Upper Dresden Pool and four in the Lower Brandon Pool, were collected for physical and chemical characterization. The physical composition of the sediment was determined by total organic carbon, total solids (percent moisture) and grain size (sieve and hydrometer) analysis.

The target analytes for identifying the chemical composition of the sediments included arsenic, silver, cadmium, chromium, copper, lead, mercury, nickel, zinc, polycyclic aromatic hydrocarbons (PAHs), polychlorinated biphenyls (PCB congeners). The extensive EA 2008 Sediment Survey conducted this past May (2008) documented exceedances of sediment guidelines for metals, PAHs and PCBs at almost every sample location (Tables 9 and 10, Appendix C). A majority of the sampling locations had both an odor and a sheen, both of which are indications of sediment contamination. (Appendix C at p. 10).

As explained in the EA 2008 Sediment Survey report (Appendix C at p. 9), one of the biological-effects approaches that have been used to assess sediment quality relative to the potential for adverse effects on benthic organisms in freshwater ecosystems is the Threshold Effects Concentration (TEC)/Probable Effects Concentration (PEC) (MacDonald et al. 1996) approach. The TEC and PEC concentrations are sediment guidelines used to identify potential adverse biological effects associated with contaminated sediments. TECs typically represent concentrations below which adverse biological effects are not expected to occur, while PECs typically represent concentrations in the middle of the effects range and above which effects are expected to occur more often than not. (MacDonald et. al. 2000)

In the Lower Brandon Pool, metals concentrations of the sediments, with limited exceptions, exceeded the PEC values. The total PAH and PCB concentrations exceeded the PEC values in all four samples (Appendix C at p.11). In the UDP, concentrations of metals, PAHs and PCB congeners were elevated. Metals concentrations exceeded the PEC values at several locations. Total PAH concentrations exceeded PEC concentrations at 61% of the locations sampled (19 locations) and total PCB concentrations exceeded PEC values at 29% of the locations sampled (8 locations). (Figures 2 and 3, Appendix C). The fact that both the Upper Dresden and the Lower Brandon Pools had high concentrations of both metals and organic constituents indicates that large portions of these pools are of poor sediment quality. This includes the higher quality habitats of the Brandon Road Lock & Dam tailwaters.

Many of these areas had extremely high levels of sediment contamination, greatly exceeding SQGs. For example, at the lower end of the Dresden Pool, near Bay Hill Marina, 96% of the metal and organic SQGs were exceeded with 75% exceeding the PECs (Appendix C, Table 9); while upstream near the DuPage River, I-55 and Jackson Creek Dam (stations DR-13, 15, and 16) between 79 and 100% of the PECs were exceeded. Remarkably at DR-13 the PAH PEC was exceeded by nearly 30 fold and Benzo-a-pyrene (a potent human carcinogen) exceeded the PEC by 50-fold. All 35 stations exceeded the SQGs for total PAHs, showing pervasive and extreme sediment contamination indicative of urban-dominated watersheds. Of the 35 stations, 80% exceeded the PECs (up to 30-fold).

Because the U.S. EPA's 2001 sediment survey and recent surveys by MWRDGC (2007) and the EA 2008 Sediment Survey all found highly contaminated depositional sediments similar to the levels we found in the mid-90's UIW work (Burton 1995), it is likely that depositional sediments are not being cleaned out, capped, or significantly degraded. Further, contrary to statements made by Illinois EPA that sediment quality is improving, there are no reliable data establishing a trend of improving sediment quality. In fact, it appears that there has been no improvement in sediment contaminant levels, as evidenced by the recent 2008 EA Sediment Survey (Appendix

C). The 2008 EA Sediment Survey results were compared to the results of sediment sampling from the same study area in 1994-1995 (Burton 1995) and to metals data compiled previously by the MWRDGC (2007). Eighteen of the 1994-95 sediment study locations were re-sampled in the EA 2008 Sediment Survey. For the detected metals, the majority of the detected concentrations from the 2008 EA Sediment Survey are either higher or within a factor of two or less, indicating that overall, the sediment quality has remained the same or has degraded in several areas (*see* Table 11 to EA 2008 Sediment Study Report). A comparison of the results for PAHs and PCBs was more difficult because the 1994-95 study generally had higher detection limits than did the EA 2008 study. However, concentrations of both total PAHs and total PCBs were elevated in both studies, indicating no basis to support the Illinois EPA opinion that sediment quality is improving. The results indicate that sediment quality remains poor in both the Dresden and Brandon Pools.

As discussed above, surficial sediments are being routinely contaminated from urban, residential, transportation and agricultural runoff and a wide variety of small to large point sources. These sources will continue to contaminate the depositional sediments and, as these sediments are resuspended, they will continue to contaminate the more biologically sensitive and productive lower reaches of the UIW system along with the Brandon tailwaters and UDP.

The main channel of the UDP, a relatively well scoured area, contains large grained sediments that are non-toxic (Burton 1995). However, most depositional sediments showed acute toxicity and lie in the limited habitat areas for fish (Burton 1995). The main channel is not primary habitat and not suitable for spawning. Indeed, one of the prime habitat for spawning in this study area is the tail waters below Brandon Road Lock & Dam where sediments are contaminated (Burton 1995, EA 2008). PAH SQGs were exceeded and greatly exceed levels known to be acutely toxic to aquatic life, particularly in the presence of sunlight. These shallow areas allow for photoinduced-toxicity of low ug/L (ppb) levels of PAHs. The photoinduced PAHs will be toxic to zooplankton, benthic macroinvertebrates, fish and amphibians in surficial layers of waters throughout the UIW. This phenomenon is well established in the peer-reviewed literature (*e.g.,* Hatch and Burton 1998, 1999; Ireland *et al.* 1996). Portions of the UIW have significant areas that are shallow (<1m depth) and thus subject to photoinduced PAH toxicity. In addition, the levels found in the sediments (parts per million) are high enough to cause acute toxicity without UV stimulation, with or without carbon loadings, based on accepted SQGs (EA 2008). Station DR-29 at the end of the tailwaters even exceeded the PEC guidelines.

A recent USGS study (Groschen *et al.* 2004) did an extensive water quality evaluation of the Upper Illinois River Basin. It found that total PAHs in the sediments of the upper Illinois River Basin were among the highest 25% of all sites nationwide and sites in Western Springs and Riverside were among the highest 5% of the nation, exceeding probable effect levels for adverse effects on aquatic life. The lowest concentrations at Milford were still ranked in the top 55% of the nation (Groschen *et al.* 2004). These PAH loadings originate from nonpoint sources and will not decline as there are no management practices in place to reduce these nonpoint source loadings. Sediment concentrations of total DDT, PAHs and PCBs were related to urban sources in the Chicago metropolitan area. Concentrations of DDD and DDT in Western Springs were among the top 3% nationwide and concentrations in fish increase being among the highest concentrations found nationwide. Methyl mercury concentrations in fish and sediment were also the highest nationwide on the Des Plaines at Russell. Fish in this system also have exceedingly high levels of PCBs, DDT and dieldrin in fish tissue. Cadmium and nickel have also been implicated as causing fish impairment. (*See* Groschen *et al.* 2004 for additional information.) These recent findings soundly document that this is one of the most (if not the most) impaired watersheds in the nation. The Illinois EPA has not considered the important results and findings of the USGS Study. These study results demonstrate that the Illinios EPA has ignored these multiple chemical stressors that should be taken into account in determining the use designations for the CSSC and the UDP.

TABLE 1. Sediment Quality Guideline Exceedances in Des Plaines River (Brandon Road Pool to Dresden Pool) in 2006 (MWRDGC 2007)

Station 2 Brandon Road Pool RM 290.5

Date	Cd mg/Kg	Cr mg/Kg	Cu mg/Kg	Pb mg/Kg	Hg mg/Kg	Ni mg/Kg	Zn mg/Kg
Oct-84	27	263	226	299	4.9	216	1595
Oct-85	NA	NA	NA	NA	NA	NA	NA
Oct-86	3	18	35	127	<0.1	65	246
Oct-87	NA	NA	NA	NA	NA	NA	NA
Oct-88	NA	NA	NA	NA	NA	NA	NA
Oct-89	17	185	192	290	1	80	870
Oct-90	5	50	78	254	0.03	52	340
Oct-91	38	323	234	336	2.3	86	1196
Oct-92	5.1	75	79	205	0.6	32	383
Oct-93	2	20	42	170	0.02	23	168
Oct-94	4	36	62	292	<0.1	40	190
Oct-95	3	40	71	280	0.2	34	280
Oct-96	3.6	146	60	223	0.5	39	290
Oct-99	2.5	65	66	236	<0.1	45	242
Oct-00	2	26	57	106	0.3	19	178
Oct-02	11.6	180	161	536	0.64	214	719
Oct-03	23.6	234	233	465	1.78	258	1124
Oct-04	16.7	189	313	439	0.93	221	961
Oct-05	10.4	155	213	469	0.21	184	902
Oct-06	1.3	26	21	211	0.71	420	166
Oct-07	1.1	24	78	295	0.11	46	138

Station 5 Des Plaines River Upper Dresden Island Pool RM 285

Sep-83	2.8	16	25	49	0.6	47	163
Oct-84	4	23	37	66	<0.1	66	199
Oct-85	7	37	39	100	0.2	66	311
Oct-86	1	NA	NA	NA	<0.1	NA	NA
Oct-87	29	321	307	306	0.2	110	990
Oct-88	2	433	27	23	<0.1	40	170
Oct-89	10	93	81	154	0.6	70	540
Oct-90	4	55	19	51	<0.1	28	135
Oct-91	1	19	27	94	0.2	21	162
Oct-92	0.9	11	37	33	<0.1	18	107
Oct-93	2	15	14	28	<0.1	28	138
Oct-94	3	35	47	137	<0.1	40	200
Oct-95	5	72	74	101	0.3	36	383
Oct-96	2.2	106	51	77	0.4	28	215
Oct-99	1.1	31	27	70	0.5	27	149

Oct-00	0.5	19	23	180	<0.1	22	75
7-Oct-02	0.3	27	10	275	0.1	99	86
6-Oct-03	1.8	37	92	333	0.12	78	206
4-Oct-04	4.2	133	58	284	0.35	65	278
3-Oct-05	1.2	30	29	285	0.62	60	151
2-Oct-06	2.3	41	48	295	0.83	124	237
1-Oct-07	1.8	30	26	231	0.16	31	148

Station 8 Des Plaines River		Dresden Island Pool (to Lock)		RM 278			
Sep-83	5.1	32	46	67	3.4	63	309
Oct-84	4	28	38	38	0.1	73	262
Oct-85	3	23	20	32	0.2	53	253
Oct-86	5	41	69	132	0.3	42	300
Oct-87	3	25	21	45	0.1	50	220
Oct-88	48	10	430	15	6.9	110	1680
Oct-89	3	24	16	20	0.1	40	160
Oct-90	30	384	478	249	2.4	113	1747
Oct-91	1	29	91	284	2.6	26	375
Oct-92	7.6	90	99	101	0.7	36	494
Oct-93	5	61	66	226	0.5	42	474
Oct-94	6	60	84	102	0.1	40	380
Oct-95	3	49	62	74	0.2	46	399
Oct-96	17	211	158	217	3	44	784
Oct-99	2.5	41	44	82	0.7	40	322
Oct-00	5	65	82	105	0.5	30	407
7-Oct-02	1.4	50	38	361	0.39	47	219
6-Oct-03	1.5	30	20	290	0.19	34	201
4-Oct-04	0.8	28	37	226	0.13	22	110
3-Oct-05	6.3	98	135	546	0.67	118	555
2-Oct-06	2.2	35	38	385	1.97	64	222
1-Oct-07	5.7	84	104	530	0.85	103	474

	Cd	Cr	Cu	Pb	Hg	Ni	Zn	
Yellow = Threshold Effects Concentration	0.99	43.4	31.6	35.8	0.18	22.7	121	
Red = Probable Effects Concentration	5	111	149	128	1.1	49	459	

V. Suspended Sediments in the CSSC and UDP

Prior studies have shown that turbidity has and continues to be a stressor in both the CSSC and the UDP. Turbidity is due to eroded soils and resuspended sediments, both of which contribute during high flow events. Turbidity during low flow events is primarily a result of resuspension of bedded sediments, which in the UIW often occurs from barge traffic. *Ceriodaphnia dubia* survival was adversely affected by turbidity (86-100% mortality) as would be expected (Burton 1995). Filter feeding zooplankton are known to be sensitive to suspended solids at levels of 50-100 mg/L (*e.g.*, IEQ 1995). This dominant stressor of the UIW likely impacts zooplankton populations throughout the waterway and is aggravated by barge and navigation traffic.

VI. Nutrients

Nutrients are a common contaminant of human-dominated watersheds, disrupting aquatic ecosystems by increasing biological productivity, leading to increased bacterial respiration (thus anoxia), increased algae and nuisance weeds, and thus a switch to less desirable fish and invertebrate species. Nutrient rich waters become eutrophic, impair beneficial uses, and experience oxygen declines that favor pollution tolerant species. The waters of the UIW from above Chicago through the Dresden Pool have high levels of nitrogen and phosphorus (MWRDGC 2007). It is not until below Dresden Pool that levels drop significantly for nitrogen, ammonia, phosphorus and fecal coliforms. When nitrogen is elevated, a stressor of particular concern is ammonia. Ammonium is typically considered to be the ionic form, while the term ammonia is inclusive of both the ionic (dominant form) and unionized (NH_4OH) forms. The unionized form is more toxic to some species, such as rainbow trout, but not others (*e.g., Hyalella azteca*). The U.S. EPA is currently considering revising their ammonia criteria as recent evidence has found it is not protective of freshwater mussels and snails. Criteria continuous concentrations for chronic protection of unionid mussels were 0.3 to 1.0 mg/L (Augspurger *et al.* 2003). More than half the nearly 300 species of mussels are in decline in North America. These findings suggest that levels commonly found in the UIW are toxic and may explain their absence from the UDP.

Previous studies found ammonia to be a primary sediment stressor in the UIW and Brandon Pool area. It was significantly correlated with sediment acute toxicity, particle size and organic contaminants (Burton 1995; Groschen *et al.* 2004). The 1999-2001 USGS study found phosphorus concentrations exceeded U.S. EPA desired goals to prevent excessive growth of algae and other nuisance plants in every water sample collected from urban or mixed land-use watersheds in the UIW (Groschen *et al.* 2004).
In the recent USGS study (Groschen *et al.* 2004) of the Upper Illinois River Basin, the flow-weighted mean of ammonia in the Chicago Sanitary and Ship Canal (CSSC) at Romeoville was the highest measured in the Upper Illinois River Basin, the fourth highest of 109 streams and rivers measured nationwide by the USGS, and among the highest in the Mississippi River basin. The USGS study findings state that the primary causes of degradation of the UIW are elevated concentrations of ammonia and phosphorus and the presence of organic wastewater contaminants such as disinfectants, pharmaceuticals and steroids, insecticides, and organochlorines. The USGS Study also found that these water quality conditions have resulted in decreased numbers and diversity of pollution-sensitive species of fish and benthic invertebrates.

Recently, environmental groups from states bordering the Mississippi River have filed a petition with the U.S. EPA to take aggressive action (including numeric nutrient limits) to address the growing problem of hypoxia in the Gulf of Mexico that originates from nutrient loadings. It is believed that nitrogen and phosphorus pollution alone prevents waters from attaining "fishable-swimmable" goals. Illinois is the largest contributor to the Gulf dead zone with 16.8% of the total nitrogen and 12.9% of the phosphorus. "Toxic algal blooms in Illinois have closed lakes to swimming and fishing and burdened water suppliers with increased treatment costs. These blooms have killed livestock, pets and, tragically, a teenager in Wisconsin in 2002." (Environmental Lay & Policy Center 2008; National Research Council 2008). Despite the removal of nutrients by the Illinois EPA as a cause of impairment in its 2008 Integrated Report – it is obviously a major cause based on the above studies, and is not surprising given the high loadings from both point and nonpoint sources.

Toxicity Identification Evaluation (TIE) results (Lower Brandon Pool and Tailwaters) also suggested ammonia and PAHs as primary toxicants (Burton 1998). While ammonia is reduced by nitrification, this microbial process is greatly inhibited in undisturbed sediments because oxygen is typically low or absent (Wetzel 1983). So as long as there continues to be high loadings of natural organic compounds and suspended solids, there will be ideal environments in the UIW for ammonia production by heterotrophic bacteria. There are at least 3 lines of evidence (chemistry, TIE testing, laboratory toxicity tests) showing ammonia is a major stressor throughout the UIW.

VII. Emerging Contaminants

The term "emerging contaminants" has become common and refers to more recently identified organic compounds that have been found to be relatively common in the environment and are of concern because they accumulate in wildlife and humans, cause endocrine-hormone disruption resulting in loss of male species and population collapses (Ankley *et al.* 2007). Examples of these compounds include endocrine disrupting compounds (EDCs, such as 17 alpha-ethymylestradiol (EES) found in birth control pills), many pharmaceutical and personal care products (PPCPs) which have been identified often in waters below municipal wastewater outfalls and livestock operations, and some of the newer pesticides that have replaced banned pesticides in recent years. Numerous European and US studies have found that fish downstream of municipal wastewater plants suffer from exposures to estrogenic chemicals with extreme reproductive disruption and feminization (Vajda *et al.* 2008; http://toxics.usgs.gov/regional/emc/ estrogenicity.html and http://toxics.usgs.gov/highlights/wastewater-fish.html).

A 1999-2000 nationwide survey (139 streams in 30 states) by the USGS of pharmaceuticals, hormones, and other organic wastewater contaminants focused on streams downstream of intense urbanization and livestock production. These compounds were found in 80% of the streams. The compounds originate from a wide range of residential, industrial and agricultural sources with 82 of the 95 analyzed being detected. The most frequently detected were coprostanol (fecal steroid), cholesterol (plant and animal steroid), *N,N*-diethytoluamide (insect repellant), caffeine, triclosan (antimicrobial disinfectant), tri(20chloroethyl) phosphate (fire retardant), and 4-nonylphenol (nonionic detergent metabolite) (Kolpin *et al.* 2002). Some of these compounds are noted EDCs. A survey was also conducted by the U.S. EPA in 2006 of 5 states in effluent dominated streams (Stahl *et al.* 2007). Eight of 24 pharmaceutical compounds were detected in fish tissues, of which antihistamines and antidepressants were most frequent. One of these sites was the North Shore Channel in Chicago where 24 largemouth bass were sampled

A more recent similar study was conducted by the USGS in the UIW. It found 5 of 45 compounds typically found in domestic and industrial wastewater in waters that drained more than 25% urban areas (Groschen *et al.* 2004).

A recent 7 year whole lake study in Canada exposed fish to levels commonly found in both untreated and treated municipal wastewaters (5 – 6 ng/L). The chronic exposure resulted in feminization of males and ultimately a near extinction of the fathead minnow species from the lake. This finding is of grave concern for the sustainability of wild fish populations in waterways receiving municipal wastewaters. Levels in the Potomac Basin stormwaters of 90-370 ng estradiol/L have been detected from agricultural areas.

Levels as low a 1 ng/L can result in male feminization (Jobling *et al.* 2006). In the Potomac Basin 80 to 100% of the male smallmouth bass are intersex (www.mawaterquality.org).

For purposes of the UAA waterways at issue, these studies have shown that urban waters, like the Chicago Area Waterway System and the Lower Des Plaines River, are impacted by these "emerging contaminants." This is particularly true of highly urbanized waters, like the Chicago Sanitary and Ship Canal and the Upper Dresden Pool, which are effluent-dominated. The presence of these emerging contaminants is another stressor that will adversely affect the aquatic community.

VIII. Temperature

It is noteworthy that thermal modifications have not been identified as one of the 23 impairment causes on the Des Plaines River (IEPA 2002, 2006, 2008). While temperature can certainly be a stressor, a literature review found that warm temperatures can be both advantageous and detrimental to aquatic biota (IEQ 1995). Another concern not discussed in the Lower Des Plaines River UAA Report is that there are winter maximum temperatures which are impacted by municipal wastewater effluents and may impede some fish reproductive processes. The "Selection of the Temperature Standard" and "Critique of the Current Secondary Contact and Indigenous Aquatic Life Standard" sections have inaccurate statements regarding temperature effects on riverine species and ecosystem processes. High and low temperatures may or may not be detrimental to aquatic life that resides in the UIW. There is not a simple relationship, as noted from many past studies (*e.g.,* Cairns *et al.* 1973; Cairns *et al.* 1978; review by Burton and Brown 1995). Both low and high temperatures can increase and decrease toxicity due to exposures from other chemical stressors, such as found in the UIW, and these relationships are both species and toxicant type and concentration dependent. The Lower Des Plaines River UAA Report's over-simplification that high temperatures increase toxicity is simply incorrect. Nitrification is also inhibited by cold temperatures and ammonia is not always consumed in the upper sediment layers. Nitrification is very sensitive to toxicants, which abound in the UIW's depositional sediments. As further discussed below, the authors of the Lower Des Plaines River UAA Report incorrectly imply and over-generalize that high temperatures are always detrimental.

One of the negative effects of high temperatures cited in the Lower Des Plaines River Report is the creation of blue green algae blooms in waterways. However, the authors fail to note that blue green algae are not a concern on the UIW due to its flow conditions. Toxic cyanobacterial blooms do not apply to the UIW, yet their presentation in the Lower Des Plaines River UAA Report implies that they do.

Similarly, the Lower Des Plaines River UAA Report also inaccurately presents my prior work on the UIW. On p. 2-97 of the Report, the subsection title is "Experiments by Wright University to Establish Temperature Limits". This study, which I directed while at Wright State University, did not attempt to establish temperature limits for the UIW (the "Wright State Study"). The UAA Report's discussion of the Wright State Study is misleading, leaving out key portions of the conclusions and misinterpreting others. The Wright State Study findings substantiated previous studies by my laboratory and others. The key findings documented that acute toxicity exists in short-term exposures for multiple species in waters and sediments of the UIW without any water temperature elevation. Toxic sediments abound in most tributary mouth, tailwater, and pool depositional areas, which include the better (but limited) habitats for fish. These same habitats are typically shallow waters which are subject to rapid mortality as a result of photoinduced toxicity of PAHs, as discussed above. Both cold and hot temperatures accentuated toxicity originating from UIW waters and sediments. Statistically significant correlations between sediment ammonia and fluorene concentrations and toxicity were observed. Ammonia was also significantly correlated to depositional sediments and the presence of high concentrations of organics. These correlations were based on sediment data collected from throughout the UIW. *In situ* toxicity was not observed due to temperature outside the thermal discharge plume.

The laboratory toxicity test results produced by the Wright State Study further document the role of sediment toxicity and how it is increased in the presence of temperature extremes. The Toxicity Identification Evaluation Phase I experiments further substantiate the findings of the Chemical Screening Risk Assessment and the ammonia correlations with toxicity, suggesting that ammonia is a primary system stressor to benthic and epibenthic species. However, these 7 day, static renewal experiments do not adequately mimic dynamic, *in situ* conditions where light, temperature, turbidity, water quality and food conditions change over minutes to hours. The most reliable indicator of *in situ* conditions are the indigenous communities present in the waterway. These are the most reliable data to use for evaluations of thermal impacts.

IX. Review of the UAA Factors[1]

The current and future status of this watershed and the relevant data clearly show that several UAA factors are met in the CSSC and UDP. The rationale supporting the statements below are provided in the text above and literature citations; and through a weight-of-evidence based, decision-making process involving the following 12 lines-of-evidence: magnitude of SQG exceedances, prevalence of sediment contamination, likelihood of continuing sediment contamination, extreme degraded status of waterway compared to others in the nation, human dominance of watershed, profuse NPS inputs, excessive habitat modification and degradation, human risk from pathogens and fish consumption, toxicity levels in water and sediment, correlations of toxicity with chemical stressors, indigenous biotic indices, and excessive numbers of use impairments throughout the watershed.

A. UAA Factor 3. Human caused conditions or sources of pollution prevent the attainment of the use and cannot be remedied or would cause more environmental damage to correct than to leave in place:

Human caused conditions or sources of pollution prevent both the CSSC and the Upper Dresden Island Pool from attaining the Clean Water Act's aquatic life goals. It is the primary reason that upgrading the use designation for either waterway to Clean Water Act "fishable" use designations is not appropriate. The evidence of excessive impairments is clear from the results of recent Illinois EPA efforts (IEPA 305(b) and 303(d) reports) and surveys by the MWRDGC. A multitude of physical and chemical impairment causes and sources exist throughout the watershed as discussed and documented above. The sources will not be removed due to the human-dominated nature of the watershed and the connectivity between the UDP and the UIW. In-situ remediation of contaminated sediments would likely take hundreds of millions of dollars based on the costs of remediating other similar systems (NRC 2007).

B. UAA Factor 4. Dams, diversions or other hydrologic modifications preclude the attainment of the use, and it is not feasible to restore the water body to its original conditions or to operate such modifications in a way that would result in the attainment of the use.

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[1] UAA Factor 2 not considered as the impacts of altered regimes were not part of this review.

The CSSC and UDP habitat is heavily and permanently modified. Barge traffic will continue to be a protected use and will continue to result in degraded habitat, resuspended contaminated sediments and a physical hazard to recreational users.

C. UAA Factor 5. Physical conditions associated with the natural features of the water body, such as the lack of proper substrate, cover, flow, depth, pools, riffles and the like, unrelated to quality preclude attainment of aquatic life protection uses.

See rationale for Factor 4 above. Habitat is of poor quality through most of the UIW and cannot be feasibly corrected.

Conclusions

An extensive database exists on the UIW (including the CSSC and UDP) concerning its physical, chemical, biological and toxicity characteristics. These multiple lines-of-evidence clearly establish this is a highly modified waterway that has poor riverine habitat, is effluent dominated and receives significant amounts of untreated, nonpoint source runoff. Primary stressors to the aquatic biota in the CSSC and the UDP are: metal and synthetic organic chemical contaminated sediments, elevated nutrients and ammonia, pharmaceuticals and personal care products, unnaturally altered flow regimes, lack of pools and riffles and generally poor substrates and habitat conditions. These stressors have been documented via multiple studies that quantitatively measured their presence recently and showed adverse biological effects result through on-site studies and peer-reviewed literature. This included studies that documented acute toxicity of waters and sediments in the UDP unrelated to temperature. Other research by Cairns *et al.,* (1973, 1978) showed the complexity of temperature and chemical interactions in organisms which refute the simplistic conclusions of the UAA report. Laboratory-based results require extrapolation to field conditions and indigenous benthic and fish communities, which have been thoroughly characterized in the UIW and are the most important line-of-evidence. Depositional sediments throughout the UIW are contaminated with levels of multiple contaminants that, in many locations, pose a hazard to aquatic biota, wildlife and humans. Major nonpoint source loadings of solids, nutrients, metals, and organics will continue from small to major urban areas, sewers, construction, and agriculture in this human-dominated watershed and therefore will continue to contaminate waters, sediments and the food of aquatic biota throughout the UIW. Modified and limited habitats (channelization, barge traffic, lock and dams), extreme turbidity and siltation, and stressor loadings will not improve in the foreseeable future and will continue to dominate water quality conditions and use impairments. Development of new, modified standards will not address the key issue of excessive and pervasive pollution sources, excessive use impairments and limited habitats in this watershed.

The conclusions and the rationales used by Illinois EPA (*i.e.*, proposed Illinois EPA Water Quality Standards and Effluent Limitations for the Chicago Area Waterway System and the Lower Des Plaines River: Proposed Amendments to 35Ill. Adm. Code Parts 301, 302, 303 and 304) are flawed. The presentation of data, data interpretation, and supporting statements are often biased, and fail to provide a scientifically-balanced representation of previous Upper Illinois Waterway studies, peer-reviewed literature and accepted approaches that are the state-of-the-science.

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APPENDIX A

Resume
G. Allen Burton

Dr. Burton recently began as Director of NOAA's Cooperative Institute of Limnology and Ecosystem Research, and is a Professor in the School of Natural Resources and Environment at the University of Michigan. Previously, he was Professor and Chair of the Earth & Environmental Sciences Department at Wright State University, in Dayton, Ohio. While at WSU he directed the Institute for Environmental Quality, started the PhD program in Environmental Sciences, and was the Brage Golding Distinguished Professor of Research. His research on aquatic ecosystem stressors has taken him to all seven continents and Visiting Scientist positions in New Zealand, Italy and Portugal. Recently he was the President of the international Society of Environmental Toxicology & Chemistry and served on National Research Council and U.S. EPA Science Advisory Board committees. He has served on numerous national and international boards and panels with over 200 publications.

Education

Ouachita Baptist University	B.S.	1976	Biology & Chemistry
Auburn University	M.S.	1978	Microbiology
University of Texas @ Dallas	M.S.	1981	Environmental Sciences
University of Texas @ Dallas	Ph.D.	1984	Env. Sci. (Aquatic Toxicology)

Professional Positions:

1980-1984. Life Scientist. U.S. Environmental Protection Agency, Dallas, Texas
1984-1985. Visiting Fellow. NOAA's Cooperative Institute for Research in Environmental Sciences, University of Colorado.
1985-1990. Assistant Professor, Dept. of Biological Sciences, Wright St. Univ.
1990-1996. Associate Professor, Dept. of Biological Sciences, Wright St. Univ.
1985-present. Coordinator, Environmental Health Sciences Program, WSU.
1994-2006, Director, Institute for Environmental Quality, WSU.
1996-present. Professor. Dept. of Biological Sciences, Wright St. Univ.
2000-2003. Brage Golding Distinguished Professor of Research, WSU.
2002-2003. Director, Environmental Sciences Ph.D. Program, WSU.
2003-2005. Associate Director, Environmental Sci. Ph.D. Program, WSU.
2005. Interim Chair, Geological Sciences Department, WSU.
2006-2008. Chair, Department of Earth & Environmental Sciences, WSU.
2008-present. Professor, School of Natural Resources & Environment, University of Michigan
Director, Cooperative Institute of Limnology & Ecosystem Research

Awards and Other Professional Activities (Select):

1992-1999. U.S. EPA National Freshwater Sediment Toxicity Methods Committee
1994, 2001. Visiting Senior Scientist, Italian Institute for Hydrobiology.
1994, 1995, 1998, 1999. External Review Panel. Environmental Biology Research Program. Exploratory Research. Office of Research and Development, U.S. EPA.
1996. Visiting Senior Scientist, New Zealand Inst. of Water and Atmospheric Research.
1994-1997. NATO Senior Research Fellow, University of Coimbra, Portugal.
1993-1996. Board of Directors, Soc. of Environmental Toxicology and Chemistry
2002. Meeting Chair. 5th International Symposium on Sediment Quality Assessment.
1999-2001. U.S. EPA Scientific Advisory Panel, Office of Pesticide Programs
2001-2004, Editorial Board, Aquatic Ecosystem Health & Management and Chemosphere.
2000-2003. Brage Golding Distinguished Professor of Research.
2003-2006. World Council, Society of Environmental Toxicology & Chemistry (SETAC)

2006. Vice President, World Council, SETAC
2007. President. Society of Environmental Toxicology & Chemistry
2005-2009. U.S. EPA Science Advisory Board Committees (2).
2006-2007. National Research Council Committee on Sediment Dredging at Superfund Megasites.
2008. Past President, Society of Environmental Toxicology and Chemistry.

Recent Research Projects ($7,655,912 total; Select since 2005):

1. U.S. Environmental Protection Agency STAR Grant Program. Defining and Predicting PCB Fluxes and Their Ecological Effects in River Systems for Risk Characterizations. March 2005- February 2008. $325,000.
2. City of Dayton. Great Miami River Water Quality vs. Stormwater Inputs. 2005. $56,382.
3. U.S. Environmental Protection Agency, Cooperative Research and Development Agreement. Toxicity Evaluation of Ground Water/Surface Water Interactions. EPA No. 304-04. 2005-2006. $56,090.
4. Bayer CropScience and BASF. An Assessment of Fipronil Effects on Benthic Invertebrates in Freshwater Ecosystems. 2005-2006. $325,295.
5. Copper Development Association, RioTinto, and International Copper Association. An Assessment of Copper Effects on Benthic Invertebrates in Freshwater Ecosystems. 2005-2007. $80,884.
6. RIVM, the Netherlands. Weight-of-Evidence based GIS System for Stressor Detection. QERAS Project. $10,000. 2006.
7. European Copper Association. 2006. An Assessment of Copper Effects on Benthic Invertebrates in Freshwater Ecosystems, Project Amendment. $36,575.
8. Nickel Producers Environmental Research Association. Comparison of Nickel Sensitivity in Cultured and Field Collected *Ceriodaphnia* spp. 2006-2007. $27,122.
9. Strategic Environmental Restoration and Demonstration Program (SERDP). USDOD, USDOE, USEPA. Sediment Ecosystem Assessment Protocol (SEAP): An Accurate and Integrated Weight-of-Evidence Based System. Feb 2007-Jan 2010. $903,000.
10. Copper Development Association. Copper and Sediments: Defining the State-of-the-Science and Key Data Gaps. $36,000. 2007.
11. International Copper Association, Dissolved Organic Carbon Dynamics in Brandenberg Pond, Ohio. $2,700. 2007.
12. International Zinc Association. Zinc and Sediments: Defining the State-of-the-Science and Key Data Gaps. $12,000. 2007.
13. City of Dayton. Stormwater Effects on the Mad River, Ohio. $66,997 ($50,000 to WSU). 2007.
14. Nickel Producers Environmental Research Association. Determining Realistic Sediment Toxicity Threshold Effect Levels for Freshwater Species. $131,206. 2007-2008
15. Wright State University Research Challenge. Seed grant for Center of Excellence: Nanoscale Science & Engineering of Multi-functional Materials. (Co-PI) 2007-2008. $60,000 (AB - $30,000)
16. International Copper Association and Copper Development Association. An Assessment of Copper Effects on Benthic Invertebrates in Freshwater Ecosystems, Project Amendment. $19,278. 2007-2008.
17. Environment Agency – United Kingdom. A Quantitative Approach for Scientifically-Based Decision Making: Linking Physical and Chemical Factors with Ecosystem Responses. $20,900. 2007-2008.

Publications (144 excluding technical reports; Select since 2005):

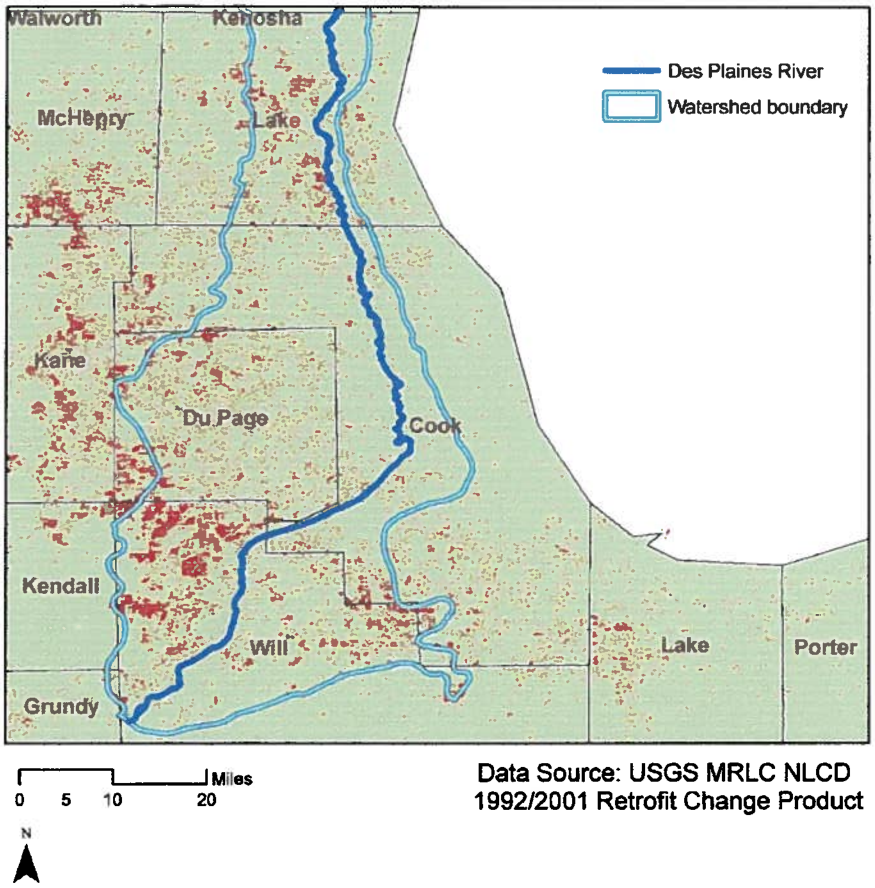
1. Burton GA Jr., Greenberg MS, Rowland CD, Irvine CA, Lavoie DR, Brooker JA, Eggert LM, Raymer DFN, McWilliam RA. 2005. *In situ* exposures using caged organisms: a multi-compartment approach to detect aquatic toxicity and bioaccumulation. Environ. Pollut. 134:133-144.
2. Burton GA Jr, Nguyen LTH, Janssen C, Baudo R, McWilliam R, Bossuyt B, Beltrami M, Green A. 2005. Field validation of sediment zinc toxicity. Environ Toxicol. Chem 24:541-553.
3. Kapo, K., Burton GA. 2006. A GIS based weight of evidence approach for identifying aquatic impairment. Environ. Toxicol. Chem. 25:2237-2249.
4. Custer KW, Burton GA, Coleho R, Smith P. 2006. Determining stressor presence in streams receiving urban and agriculture runoff: development of a benthic in situ toxicity identification evaluation (BiTIE) Method. Environ Toxicol Chem 25:2299-2305

5. Burton, GA,Green A, Baudo R, Forbes V, Nguyen LTH, Janssen CR, Kukkonen J, Leppanen M, Maltby L, Soares A, Kapo K, Smith P, Dunning J. 2007. Characterizing sediment acid volatile sulfide concentrations in European stream. Environ Toxicol Chem 26:1-12.
6. Baird, DJ, Burton GA, Culp JM, Maltby L. 2007. Summary and recommendations from a SETAC Pellston Workshop on in situ measures of ecological effects. Integr Environ Asseess Mgmt 3:275-278.
7. Crane M, G. Allen Burton, Joseph Culp, Marc S. Greenberg, Kelly R. Munkittrick, Rui G.L.G. Ribeiro, Michael H. Salazar and Sylvie D. St-Jean. 2007. Review of In Situ Approaches for Stressor and Effect Diagnosis. Integr Environ Assess Mgmt. 3:234-245.
8. Custer KW, Burton GA Jr. 2007. *Isonychia* spp. and macroinvertebrate community responses to stressors in streams utilizing the benthic in situ toxicity identification evaluation (BiTIE) method. Environ Pollut. 151:101-109.
9. National Research Council (A. Burton coauthor). 2007. Sediment Dredging at Superfund Megasites: Assessing the Effectiveness. National Academies Press. Washington DC.

APPENDIX B

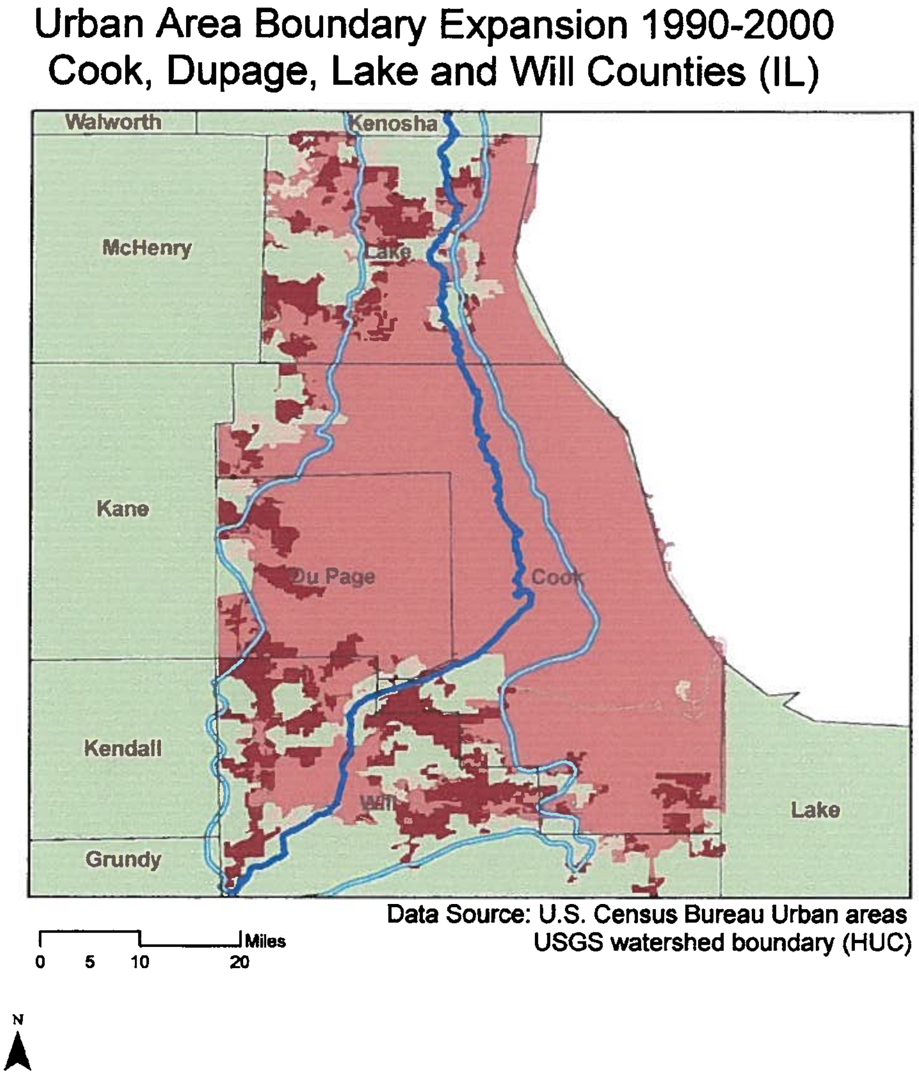
Land Use and Recent Development in the Des Plaines Watershed

Area Converted to Urban Land Use 1992-2001



Data Source: USGS MRLC NLCD 1992/2001 Retrofit Change Product

Figure B-1. Estimated land converted to urban land use between 1992 and 2001 based on a comparison of the NLCD 1992 and 2001 datasets (USGS, MRLC NLCD 1992/2001 Retrofit Change Product).



Urban Area Boundary Expansion 1990-2000
Cook, Dupage, Lake and Will Counties (IL)

Data Source: U.S. Census Bureau Urban areas
USGS watershed boundary (HUC)

Figure B-2. U.S. Census urban boundary change between 1990 and 2000 census for Cook, Du Page, Lake, and Will counties in Illinois.

The following three figures are from the Chicago Metropolitan Agency for Planning (CMAP) Data Bulletin: 2001 Land Use Inventory for Northeastern Illinois, September 2006 (www.cmap.illinois.gov).

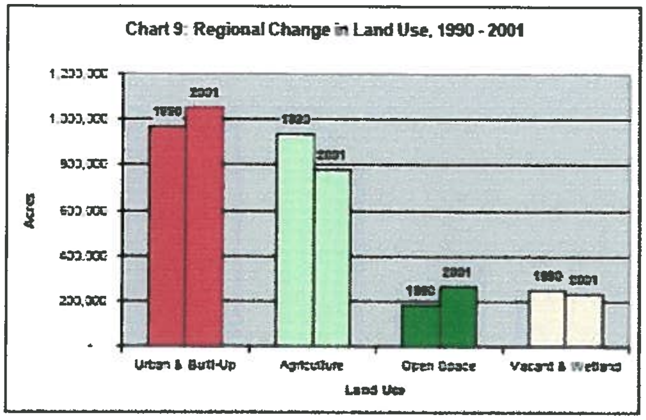


Figure B-3. Regional change in land use from 1990-2001.

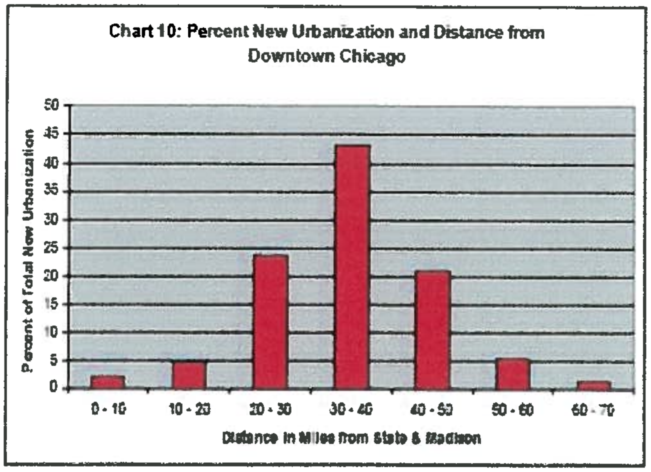


Figure B-4. Percent new urbanization and distance from downtown Chicago.

Map 10: "Urbanized" Lands (2001) Classified as "Agriculture" or "Vacant" in 1990

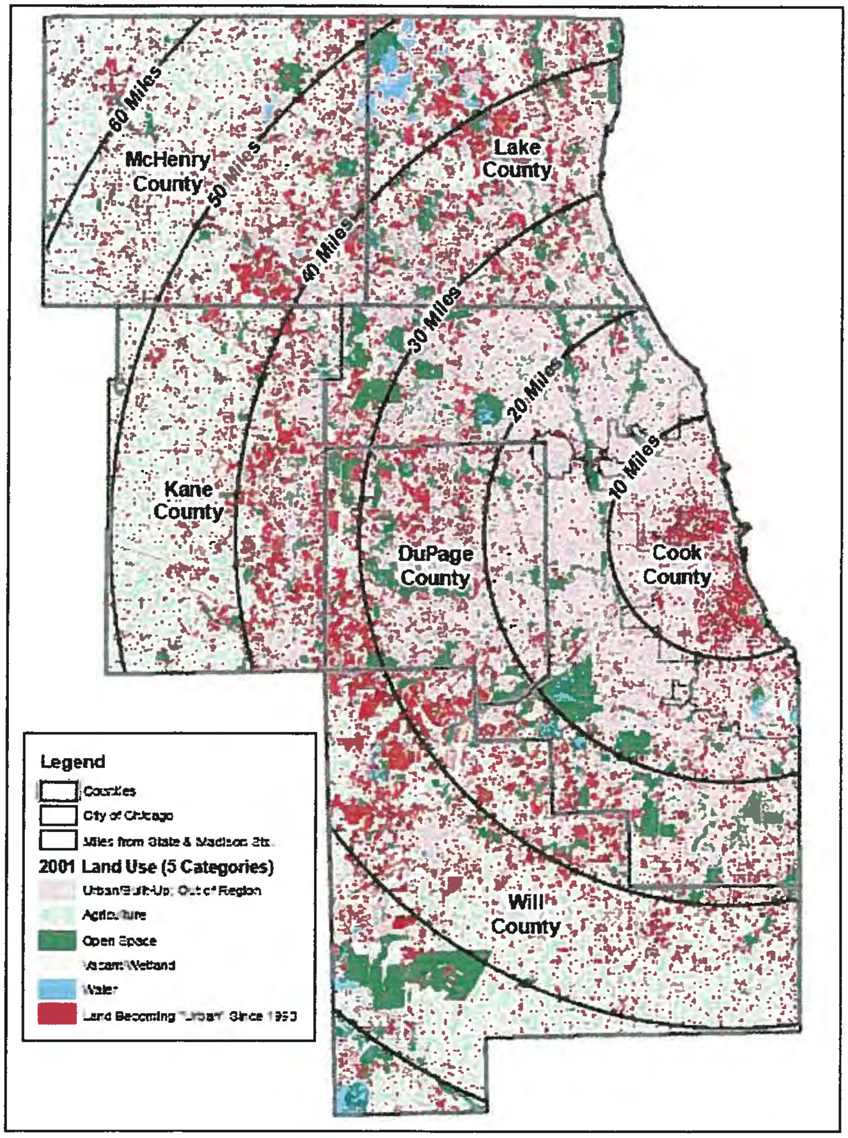
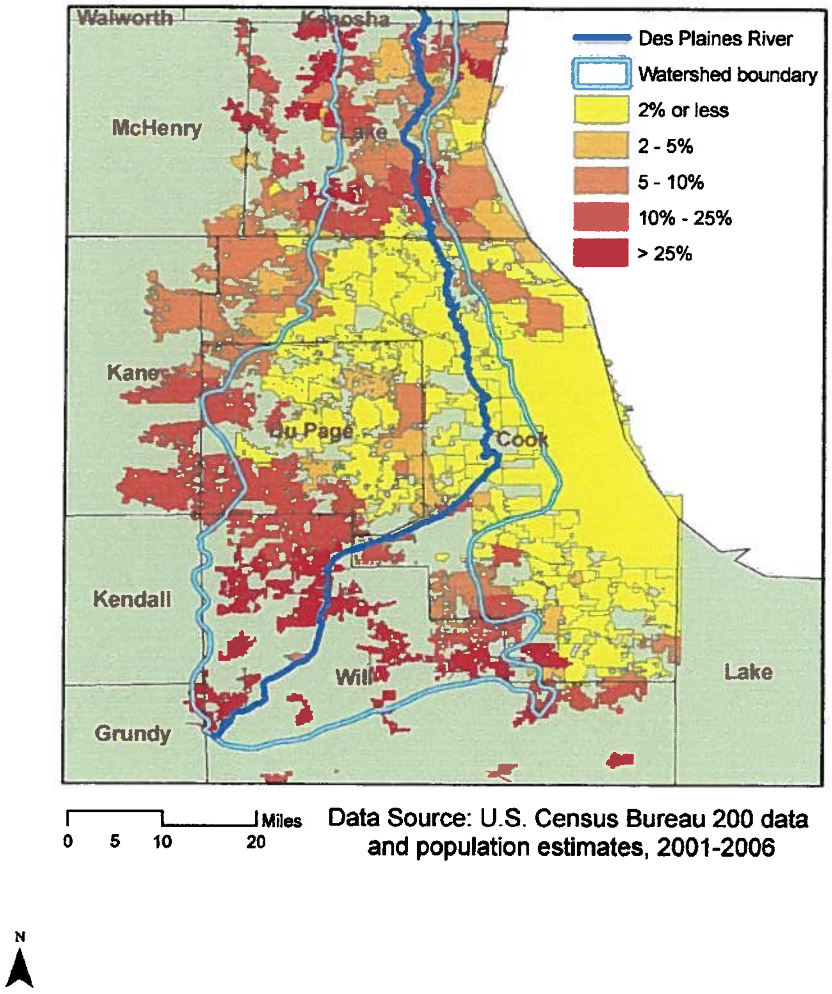


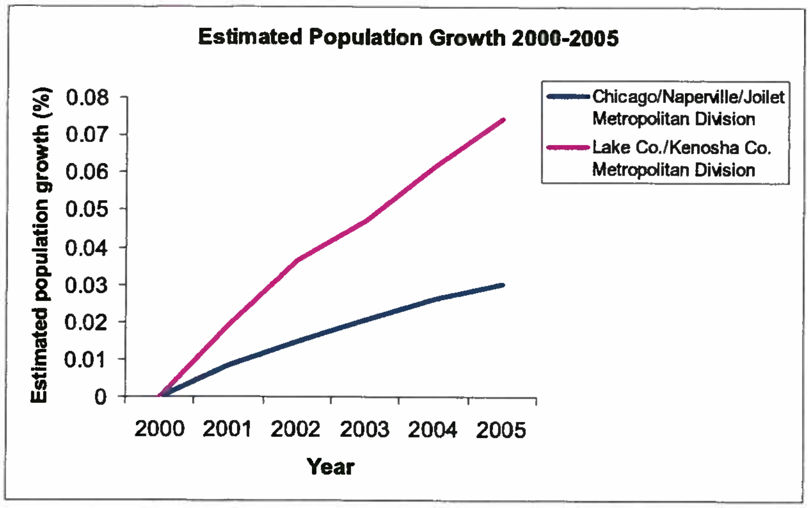
Figure B-5. Urban lands in 2001 that were agricultural or vacant in 1990. The 2001 land use data was compiled from interpretation of aerial photography and other sources).



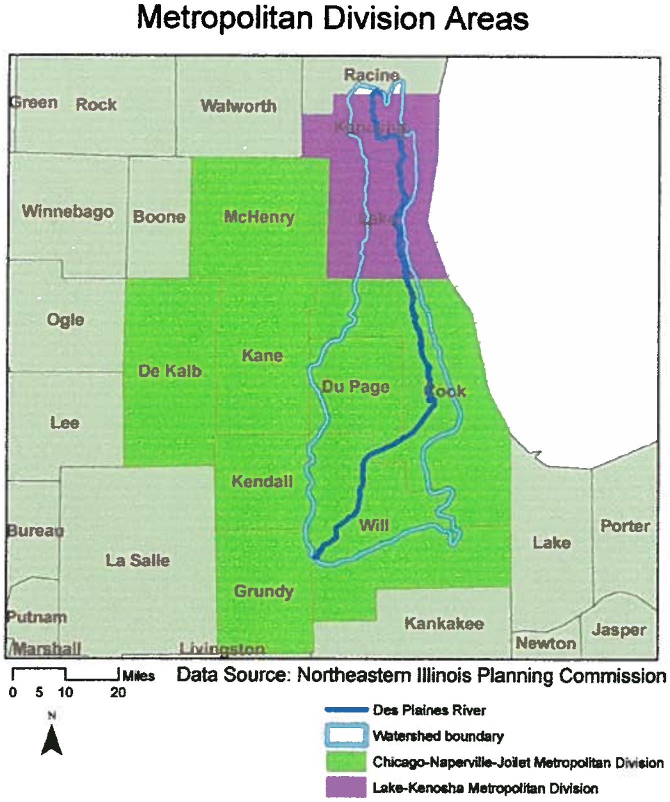
% Population Increase in Municipalities 2000-2006

Data Source: U.S. Census Bureau 200 data and population estimates, 2001-2006

Figure B-6. U.S. Census estimated population increase (%) in municipalities from year 2000 to 2006.

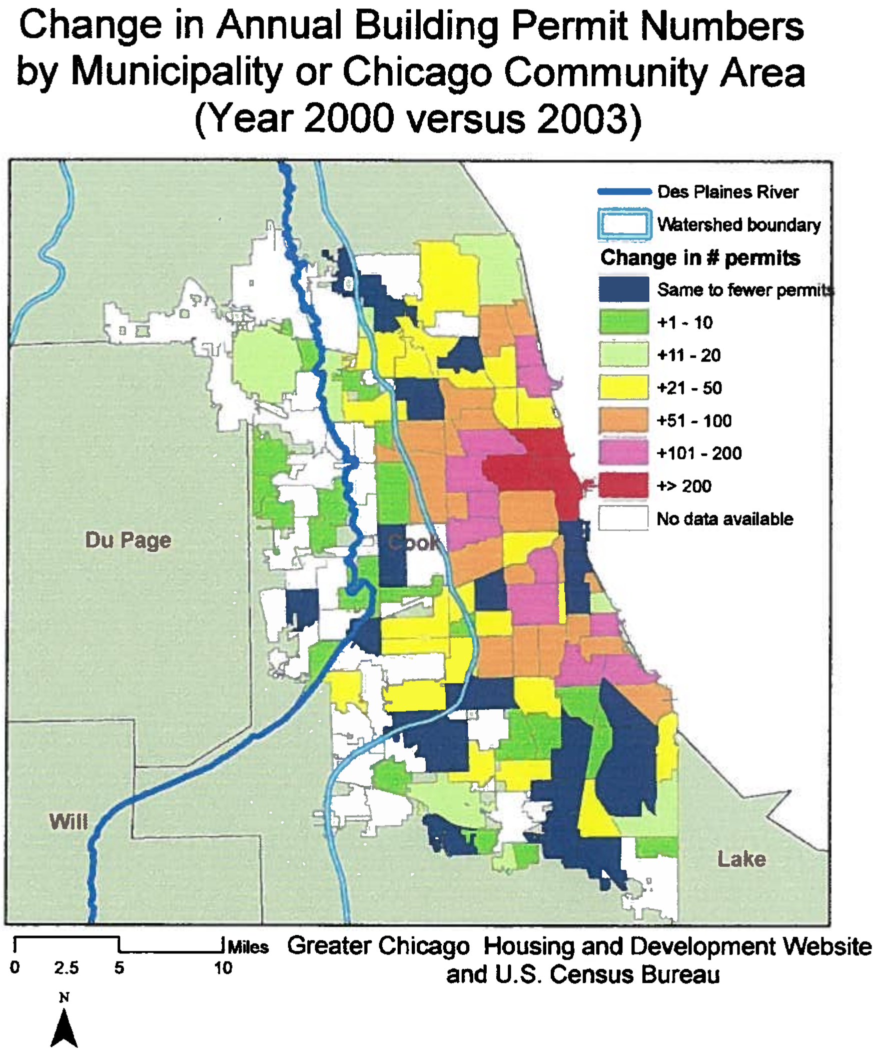


** See metropolitan divisions in figure below*



Data Source: Northeastern Illinois Planning Commission

Figure B-7 (a+b). Estimated population growth (2000-2005, U.S. Census Bureau) by Metropolitan Division (Northeastern Illinois Planning Commission).



Change in Annual Building Permit Numbers by Municipality or Chicago Community Area (Year 2000 versus 2003)

Greater Chicago Housing and Development Website and U.S. Census Bureau

Figure B-8. Change in number of annual building permits (year 2000 versus 2003) for municipalities and communities of the Greater Chicago area.

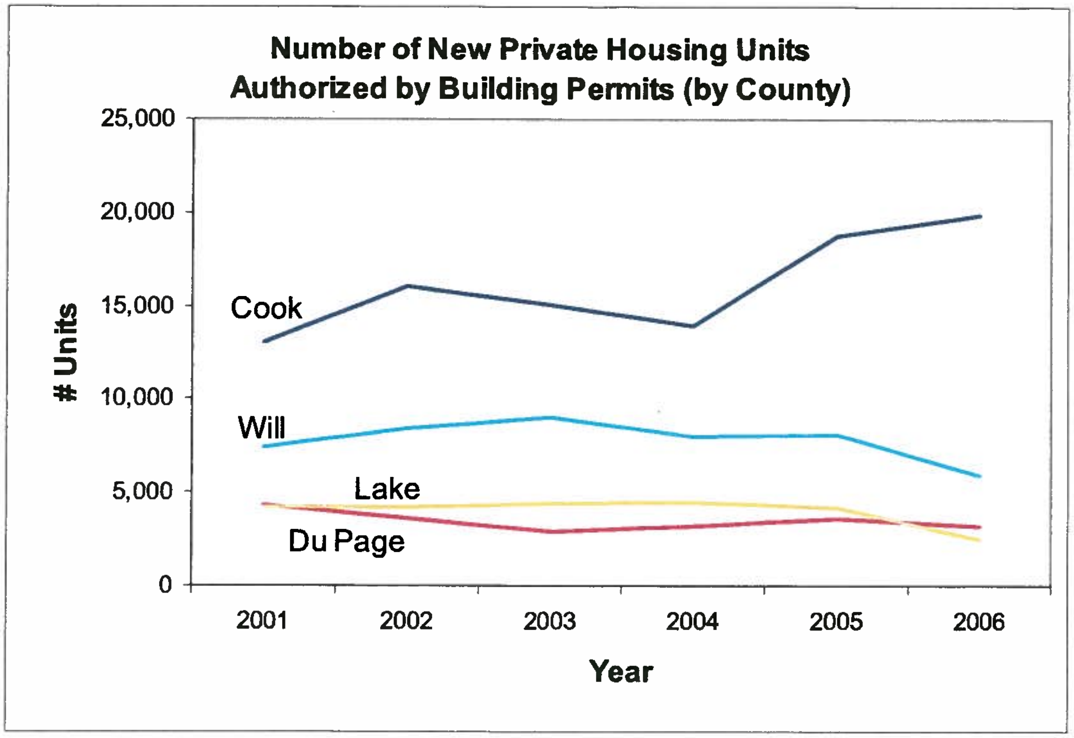


Figure B-9. Number of new private housing units authorized by building permits (2001-2006) for Cook, Du Page, Lake, and Will Counties (U.S. Census Bureau).

Combined Sewer Overflow Figures:
According to the Metropolitan Water Reclamation District of Greater Chicago, from January 1, 2006 to June 13, 2008 (latest MWRD data update), there were a combined total of 117 combined sewer overflows reported at the four major pumping stations of North Branch, Racine Ave., Westchester, and 125th St. There have been 17 system-wide CSO events (multiple stations per event) this summer (June 3 – August 6, 2008).

Individual maps of reaches with CSO events by date for 2008 to the present can be accessed at www.mwrdgc.dst.il.us/CSO/display_only.aspx These maps are updated the day following an overflow event. The seven most current daily maps are retained online with the oldest being deleted when a new map is added.

APPENDIX C

EA Engineering, Science, and Technology Report on Sediment Chemistry

SEDIMENT CHEMISTRY STUDY

UPPER ILLINOIS WATERWAY, DRESDEN AND LOWER BRANDON POOLS

Prepared for

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September 2008

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SEDIMENT CHEMISTRY STUDY

UPPER ILLINOIS WATERWAY, DRESDEN AND LOWER BRANDON POOLS

EA Engineering, Science, and Technology conducted a sediment study in Dresden Pool and the lower portion of Brandon Pool, which includes the Des Plaines, Kankakee, and Illinois Rivers (i.e., the study area) (**Figure 1**). The purpose of this project was to determine if the sediment chemistry of the study area may preclude the attainment of a higher aquatic life use. Results of this sediment analysis were compared to sediment benchmarks and previous sediment sampling efforts in the same study area. Sampling locations were targeted in areas adjacent to the main channel of the river that would potentially provide suitable aquatic habitat. Therefore, sampling locations tended to be in shallow areas with lower water velocities and the potential for higher rates of fine-grained sediment deposition.

Thirty-five (35) sediment samples — 31 in the Dresden Pool and four in the Lower Brandon Pool — were collected for physical and chemical characterization (**Figure 1**). The physical composition of the sediment was described by total organic carbon, total solids (percent moisture), and grain size (sieve and hydrometer). The target analytes for the chemical determination of the sediment were: arsenic, silver, cadmium, chromium, copper, lead, mercury, nickel, zinc, polycyclic aromatic hydrocarbons (PAHs), and polychlorinated biphenyls (PCB congeners).

1. FIELD SAMPLING

Sediment samples were collected using a petite, stainless steel Ponar grab sampler. At each location, five discrete grab samples were collected, combined in a stainless steel container, and gently homogenized using a stainless steel spoon/spatula. General observations of the sediment, including color and odor, were noted in the field log book (**Appendix A**), and digital photographs (**Appendix B**) and GPS coordinates (**Table 1**) were collected at each location.

Sediment samples were collected from 31 sites in the Dresden Pool and four in the Lower Brandon Pool between 6 May and 9 May 2008. Two field duplicate samples were collected – one from location DR08-11 and one from location DR08-28 – and submitted for chemical analysis. Multiple grabs (five) were collected at each location and homogenized to form one sample for each site. Each sample was homogenized in a stainless steel bowl using a stainless steel spoon until the sediment was thoroughly mixed and of uniform consistency. When compositing was completed, sub-samples of sediment were removed for bulk chemistry testing.

The homogenized material was transferred into appropriate labeled containers and each container was sealed with a custody seal. Once sealed, the sample containers were placed in a cooler on wet ice and documented on a chain of custody form. All equipment that came in contact with the sediment was decontaminated between each location (see **Section 2.4**). Sediment samples were kept in a cooled, insulated cooler onboard the workboat during each work day. At the end of each day, coolers were appropriately packed, iced, and shipped by overnight courier to the laboratory with chain of custody (COC) documentation.

Sediment samples were shipped via overnight delivery to the analytical laboratory, TestAmerica–Pittsburgh, on the day of collection. The sample containers, preservatives, and holding time requirements for sediment samples are provided in **Table 2-1**. Holding times for the sediment samples began when the sediment was collected, homogenized, and placed in the appropriate sample containers.

Sample Documentation

A log of field activities, sampling location coordinates, site observations, and sediment recoveries were recorded in a permanently bound, dedicated field logbook (**Appendix A**). Personnel names, local weather conditions, and other information that may impact the field sampling program were also recorded. Each page of the logbook was numbered and dated by the personnel entering information.

A sample numbering system was used to communicate between the field crew and the analytical laboratory. Sampling locations and samples were numbered as follows:

Example: DR08-01

The first two letters denote the site designation (DR=Dresden Reach; BR=Brandon Reach), the next two digits denote the sampling year (08=year 2008), and the last two digits indicate the sampling location number.

Table 1. Sediment Sampling Locations in the Dresden and Lower Brandon Pools

Sample ID	Date Sampled	Northing (m)	Easting (m)
		Illinois East NAD83	
DRESDEN POOL			
DR08-01	5/6/2008	525571.56	304526.11
DR08-02	5/6/2008	525297.55	305069.83
DR08-03	5/6/2008	524167.37	306199.93
DR08-04	5/6/2008	523905.67	307041.08
DR08-05	5/6/2008	524149.62	307200.08
DR08-06	5/6/2008	524200.28	308708.26
DR08-07	5/6/2008	524024.17	308799.00
DR08-08	5/6/2008	525951.89	309184.50
DR08-09	5/6/2008	525848.05	309429.79
DR08-10	5/6/2008	525895.80	309742.74
DR08-11	5/6/2008	527391.25	310137.04
DR08-12	5/6/2008	527559.48	310717.80
DR08-13	5/6/2008	527437.18	311063.46
DR08-14	5/7/2008	527750.97	311542.61
DR08-15	5/7/2008	528202.60	312423.72
DR08-16	5/7/2008	528301.38	312425.35
DR08-17	5/7/2008	529093.41	313371.70
DR08-18	5/7/2008	529752.25	314044.20
DR08-19	5/7/2008	530313.47	314050.10
DR08-20	5/7/2008	530791.69	313816.52
DR08-21	5/7/2008	530828.70	314066.66
DR08-22	5/7/2008	532283.21	313855.07
DR08-23	5/7/2008	533534.28	314667.19
DR08-24	5/7/2008	533613.87	315436.00
DR08-25	5/8/2008	534546.85	316278.60
DR08-26	5/8/2008	534824.74	316663.47
DR08-27	5/8/2008	535537.06	317628.58
DR08-28	5/8/2008	536176.57	318479.56
DR08-29	5/9/2008	536667.62	319046.21
DR08-30	5/9/2008	536568.31	319522.71
DR08-31	5/9/2008	536567.16	319485.10
LOWER BRANDON POOL			
BR08-01	5/8/2008	537485.12	320111.97
BR08-02	5/8/2008	537246.47	319934.34
BR08-03	5/8/2008	537195.15	319237.12
BR08-04	5/8/2008	537352.76	319435.33

Equipment Blanks

Equipment blanks were collected to determine the extent of contamination, if any, from the sampling equipment used as part of the project. Four equipment blanks were collected for the project, one during each day of the sampling. Equipment blanks are collected by pouring deionized water, which was provided by EA's Ecotoxicology Laboratory, over the petit Ponar grab sampler that was decontaminated using the procedure outlined in **Section 2.4**. The rinsate water was placed in laboratory-prepared containers, submitted to TestAmerica–Pittsburgh via overnight delivery, and tested for the same chemical parameters as the sediments.

Equipment Decontamination Procedures

Equipment that came into direct contact with sediment during sampling was decontaminated prior to deployment in the field to minimize cross-contamination. This included the petit Ponar sampler and stainless steel processing equipment (spoons, knives, and bowls). Any equipment that was reused in the field was decontaminated on-board the sampling boat between sample locations. While performing the decontamination procedure, phthalate-free nitrile gloves were used to prevent phthalate contamination of the sampling equipment or the samples.

The decontamination procedure utilized is described below:

- Rinse equipment using site water
- Rinse with 10 percent nitric acid (HNO_3)
- Rinse with distilled or de-ionized water
- Rinse with methanol followed by hexane
- Rinse with distilled or de-ionized water
- Air dry (in area not adjacent to the decontamination area)

Waste liquids produced during decontamination procedures were contained at the areas of decontamination. Decontamination waste liquid produced on-board the boat were collected in 5-gallon buckets with lids and returned to EA's warehouse facility for proper disposal.

Table 2. Required Containers, Preservation Techniques, and Holding Times for Sediment Samples [(a)]

Parameter	Volume Required [(b)]	Container[(c)]	Preservative	Holding Time
Inorganics				
Metals (including Mercury)	8 oz.	G	4°C	6 months (28 days for Hg)
Physical Parameters				
Grain Size and Total Solids	32 oz	P,G	4°C	6 months
Organics				
Total Organic Carbon	(d)	G	4°C	14 days
PCB Congeners	4 oz.	G	4°C	14 days until extraction, 40 days from extraction to analysis
PAHs	(d)	G	4°C	14 days until extraction, 40 days from extraction to analysis

Source: USEPA/USACE 1995

(a) From time of sample collection.

(b) Additional volume will be provided for samples designated as MS/MSDs.

(c) P = plastic; G = glass.

(d) Sufficient volume is provided from the 8 oz noted under Metals.

Table 3. Required Containers, Preservation Techniques, and Holding Times for Aqueous Samples (Equipment Blanks) [(a)]

Parameter	Volume Required [(b)]	Container[(c)]	Preservative	Holding Time
Inorganics				
Metals (including Mercury)	1 Liter	P	pH<2 with HNO3 Cool, 4°C	6 months (28 days for Hg)
Organics				
Total Organic Carbon	3- 40mLs	G, teflon lined, speta cap	H_2SO_4 or HCl to pH<2; Cool, 4°C	28 days
PAHs and PCB Congeners	4 Liters	G, Teflon lined cap	Cool, 4°C	7 days until extraction, 40 days from extraction to analysis

Source: USEPA/USACE 1995

(a) From time of sample collection.

(b) Additional volume will need to be provided for samples designated as MS/MSD/MDs

(c) P = plastic; G = glass.

2. ANALYTICAL TESTING PROGRAM

Samples collected during the field effort were tested for target analytes using analytical methods listed in **Table 4** as described in the laboratory's analytical standard operating procedures (SOP). Sediment samples were tested for the following analytes:

- Metals (arsenic, cadmium, chromium, copper, lead, mercury, nickel, silver, and zinc)
- PAHs,
- PCB congeners,
- total organic carbon (TOC),
- grain size, and
- total solids.

Table 4. Analytical Methods for Sediment Analysis

Analyte	Analytical Method
Sediment	
Metals	SW846 6020
Mercury	SW846 7471A
Polynuclear Aromatic Hydrocarbons (PAHs)	SW846 8270C SIM
Polychlorinated Biphenyls (PCB) Congeners	SW846 8082
Total Organic Carbon	Lloyd Khan
Grain Size	ASTM D422
Total Solids	SM 2540B

To meet program-specific regulatory requirements for chemicals of concern, all methods/SOPs were followed as stated with some specific requirements noted below:

PCB Congeners

PCBs for this project were analyzed and quantified as individual congeners by SW846 Method 8082. Twenty-six (26) PCB congeners were determined in the various matrices. These 26 congeners include all of the "summation" and "highest priority" congeners, plus several of the "secondary priority" congeners.

Total Organic Carbon (TOC)

TOC in sediments was determined using the 1988 EPA Region II combustion oxidation procedure (referred to as the Lloyd Kahn procedure).

Polynuclear Aromatic Hydrocarbons – PAHs

To achieve the target detection limits (TDLs) referenced in QA/QC Guidance for Sampling and Analysis of Sediments, Water, and Tissues for Dredged Material Evaluations - Chemical Evaluations (EPA 823-B-95-001, April 1995), the PAHs were determined utilizing SW846 Method 8270C using Selective Ion Monitoring (SIM).

Metals

Metals were determined utilizing Inductively Coupled Plasma (ICP) or Inductively Coupled Plasma/Mass Spectrometry (ICP/MS) according to the SW846 Method 6020, with the exception of mercury. For mercury, samples will be analyzed by Cold Vapor Atomic Absorption (CVAA) method [SW846 7470A (aqueous) or 7471A (sediment)].

2.1 Laboratory Quality Control Samples

Project specific [matrix spike (MS) / matrix spike duplicates (MSD)] and internal laboratory QA/QC samples (including method blanks, laboratory control samples, and surrogates) were analyzed. Quality control samples were analyzed at the frequency stated in **Table 5**. Standard Reference Materials (SRMs) were obtained from the National Institute of Standards and Technology (NIST) or a comparable source, if available.

Table 5. Laboratory QC Samples

QC Sample	Frequency
Standard Reference Material	1 per analytical batch of 1-20 samples, where available
Method Blanks	1 per analytical batch of 1-20 samples
Laboratory Control Sample	1 per analytical batch of 1-20 samples
Surrogates	Spiked into all field and QC samples (Organic Analyses)
Sample Duplicates	1 per analytical batch of 1-20 samples (Inorganic Analyses)
Matrix Spike/Matrix Spike Duplicate	1 per analytical batch of 1-20 samples

The following internal laboratory QA/QC samples were analyzed for this project:

- **Standard reference materials** (SRMs) represent performance-based QA/QC. A standard reference material is a soil/solution with a certified concentration that is analyzed as a sample and is used to monitor analytical accuracy. SRMs were analyzed for the PCB congeners and PAHs in sediment. Control criteria apply only to those analytes having SRM true values greater than 10 times the MDL established for the method.

- The **method (reagent) blank** was used to monitor laboratory contamination. The method blank is usually a sample of laboratory reagent water processed through the same analytical procedure as the sample (i.e., digested, extracted, distilled). One method blank was analyzed at a frequency of one per every analytical preparation batch of 20 or fewer samples.

- The **Laboratory Control Sample** (LCS) is a fortified method blank consisting of reagent water or solid fortified with the analytes of interest for single-analyte methods or selected analytes for multi-analyte methods according to the appropriate analytical method. LCS's were prepared and analyzed with each analytical batch, and analyte recoveries were used to monitor analytical accuracy and precision.

- A **sample duplicate** is a second aliquot of a field sample that is analyzed to monitor analytical precision associated with that particular sample. Sample duplicates were performed for every batch of 20 or fewer samples.

- **Surrogates** are organic compounds that are similar to analytes of interest in chemical composition, extraction, and chromatography, but are not normally found in environmental samples. These compounds were spiked into all blanks, standards, samples, and spiked samples prior to analysis for organic parameters. Generally, surrogates are not used for inorganic analyses. Percent recoveries were calculated for each surrogate. Surrogates were spiked into samples according to the requirements of the reference analytical method. Surrogate spike recoveries were evaluated against the standard laboratory acceptance criteria limits, and were used to assess method performance and sample measurement bias. If sample dilution caused the surrogate concentration to fall below the quantitation limit, surrogate recoveries were not calculated.

2.2 Detection Limits

The detection limit is a statistical concept that corresponds to the minimum concentration of an analyte above which the net analyte signal can be distinguished with a specified probability from the signal because of the noise inherent in the analytical system. The method detection limit (MDL) was developed by USEPA and is defined as "the minimum concentration of a substance that can be measured and reported with 99% confidence that the analyte concentration is greater than zero" (40 CFR 136, Appendix B). The reporting limit (RL) is the lowest concentration at which an analyte can be detected in a sample and its concentration can be reported with a reasonable degree of accuracy and precision. The RL is typically three to five times higher than the MDL and is determined based on corrections necessary for sample dilutions, percent moisture in the sample (for sediments), and sample weight.

Samples collected during the field effort were tested for target analytes using analytical methods and target detection limits (TDLs) for sediment and water (equipment blanks) listed in in the *QA/QC Guidance for Sampling and Analysis of Sediments, Water, and Tissues for Dredged Material Evaluations - Chemical Evaluations* (EPA 823-B-95-001, April 1995). All analytical parameters, except total organic carbon (TOC), were quantified to the MDL. All detected values greater than or equal to the MDL, but less than the laboratory RL, were qualified as estimated. TOC samples were quantified to the laboratory RL. For sediment analyses, sample weights were adjusted for percent moisture (up to 50% moisture), where appropriate, prior to analysis to achieve the lowest possible reporting limits.

3. DATA ANALYSIS

3.1 Calculation of Total PCBs and Total PAHs

For each sample, total PCB concentrations were determined by summing the concentrations of the 18 summation congeners and multiplying the total by a factor of two. Multiplying by a factor of two estimated the total PCB concentration and accounted for additional congeners that were not tested as part of this program. These determinations were based upon testing of specific congeners recommended in the Inland Testing Manual (ITM) (USEPA/USACE 1998) and upon the National Oceanic and Atmospheric Administration (NOAA 1993) approach for total PCB determinations.

Total PAH concentrations were determined for each sample by summing the concentrations of the individual PAHs. For both the total PCB and total PAH concentrations, two values were reported, each representing the following methods for treating concentrations below the analytical detection limit:

- Non-detects = 0 (ND=0)
- Non-detects = 1/2 of the method detection limit (ND=½MDL)

Substituting one-half the method detection limit for non-detects (ND=½MDL) provides a conservative estimate of the concentration. This method, however, tends to produce results that are biased high, especially in data sets where the majority of samples are non-detects. This overestimation is important to consider when comparing the calculated total values to criteria values.

3.2 Comparison to Sediment Benchmarks

Sediment quality guidelines are numerical chemical concentrations intended to either be protective of biological resources or predictive of adverse effects to those resources, or both (Wenning and Ingersoll 2002). The SQGs were developed as informal (non-regulatory) guidelines for use in interpreting chemical data from analyses of sediments. One of the biological-effects approaches that have been used to assess sediment quality relative to the potential for adverse effects on benthic organisms in freshwater ecosystems is the Threshold Effects Concentration (TEC) / Probable Effects Concentration (PEC) approach (MacDonald et al. 1996). These sediment quality guidelines were used to identify potential adverse biological effects associated with contaminated sediments. TECs typically represent concentrations below which adverse biological effects are not expected to occur, while PECs typically represent concentrations in the middle of the effects range and above which effects are expected to occur more often than not (Macdonald et al. 2000). Concentrations that are between the TEC and PEC represent the concentrations at which adverse biological effects occasionally occur.

4. VISUAL OBSERVATIONS OF SEDIMENT

At each sampling location, the sediment was photograph and described, and any noticeable petroleum odors or sheens in the sediment were recorded in the logbook (**Appendix A**). The results of the field observations indicated that the sediments were comprised of a mixture of fine grained sands, silts, and clays. Sediment from the majority of the sampling locations had both sheen and an odor, as summarized in **Table 6**.

Table 6. Summary of field observations of the sediment in the Dresden and Lower Brandon Pools.

LOCATION	WATER DEPTH (ft)	SEDIMENT FIELD DESCRIPTION	SHEEN	ODOR
DR08-01	4.9	Dark brown to gray silt	X	X
DR08-02	4.1	Dark to light gray silt with sand and clay	X	--
DR08-03	2.8	Light gray sand with silt	--	--
DR08-04	3.9	Light gray silt with sand	X	X
DR08-05	2.6	Light gray with fine-grained sands	X	X
DR08-06	4.8	Light gray clayey silt	--	X
DR08-07	4.8	Dark gray to black fine grained silt with clay	--	--
DR08-08	3.3	Light gray fine-grained silt	--	--
DR08-09	6.2	Gray silt with fine-grained sand	--	--
DR08-10	2.3	Dark brown sandy silt	X	X
DR08-11	3.8	Dark brown sandy silt	X	X
DR08-12	1.7	Dark gray silty sand	--	X
DR08-13	4.2	Dark gray clayey silt	X	X
DR08-14	3.1	Dark gray sandy silt	X	X
DR08-15	5.7	Gray clayey silt	X	X
DR08-16	3.8	Dark gray to black clayey silt	X	X
DR08-17	3.4	Dark gray silt with fine grained sands	X	X
DR08-18	4.1	Black silt	X	X
DR08-19	3.1	Dark brown silt with medium grained sands	--	--
DR08-20	1.1	Dark gray sandy silt	X	X
DR08-21	2.1	Dark brown to gray sandy silt	X	X
DR08-22	2.3	Dark brown sandy silt	X	X
DR08-23	5.2	Dark brown sandy silt	X	X
DR08-24	2.8	Dark brown sandy silt	X	X
DR08-25	1.8	Dark brown sandy silt	X	X
DR08-26	2.0	Dark brown sandy silt	X	X
DR08-27	2.3	Dark brown sandy silt	X	X
DR08-28	1.9	Dark gray sandy silt	X	X
DR08-29	0.8	Dark gray sandy silt	X	X
DR08-30	2.2	Dark gray sandy silt	X	X
DR08-31	0.9	Dark gray sandy silt	--	X
BR08-01	3.6	Dark gray silt with fine-grained sands	X	X
BR08-02	4.7	Dark gray silt	X	X
BR08-03	1.6	Dark gray silt	X	X
BR08-04	2.1	Dark gray silt with fine-grained sands	X	X

5. SEDIMENT CHEMISTRY RESULTS

The results of the physical and chemical analysis of samples from Dresden pool are summarized in **Table 7**, and the results for samples from the Lower Brandon pool are summarized in **Table 8**. The target analytes for the physical and chemical description of the sediment were total organic carbon, total solids (percent moisture), grain size, metals (arsenic, silver, cadmium, chromium, copper, lead, mercury, nickel, and zinc), PAHs, and PCB congeners. Sample weights were adjusted for percent moisture (up to 50 percent moisture) prior to analysis to achieve the lowest possible detection limits. Analytical results are reported on a dry weight basis.

Analytical results and definitions of organic and inorganic data qualifiers are provided in **Tables 7 and 8**. Values for detected chemical constituents are shaded and bolded in the data tables, and RLs/MDLs are presented for non-detected chemical constituents. Analytical narratives that included an evaluation of laboratory quality assurance/quality control results and copies of final raw data sheets (Form I's) were provided by the laboratory. TestAmerica–Pittsburgh will retain and archive the results of these analyses for seven years from the date of issuance of the final results.

Concentrations of tested metals, PAHs, and PCB congeners were elevated in the sediments collected in both the Dresden and the Lower Brandon pools, and comparisons to TECs and PECs indicated that detected concentrations of metals, PAHs, and total PCBs had concentrations between the TEC and the PEC at almost every sampling location (**Tables 9 and 10**). In the Dresden pool, detected concentrations for the metals exceeded PEC values at several locations (**Table 9**): cadmium – 12 locations (39 percent); chromium – 6 locations (19 percent); copper – 4 locations (13 percent); lead – 9 locations (29 percent); mercury - 4 locations (13 percent); nickel – 9 locations (29 percent); and zinc – 9 locations (29 percent). For the tested organic constituents in the Dresden pool, total PAH concentrations (ND=1/2MDL) exceeded PEC concentrations at a total of 19 locations (61 percent) and total PCB concentrations (ND=1/2MDL) exceeded PEC concentrations at a total of 8 locations (26 percent) (**Table 9**).

In the Lower Brandon pool, detected concentrations of each of the metals, with the exception of arsenic, copper, and mercury, and the total PAH and total PCB concentrations (ND=1/2MDL) exceeded PEC values in each of the four samples (**Table 10**).

The sediment chemical analysis indicated that both the Dresden and the Lower Brandon pools had high concentrations of metals (Figure 2) and tested organic constituents (Figure 3), indicating that large portions of the Dresden and Lower Brandon Pools are of poor sediment quality. Detected concentrations were frequently higher than the PEC value, which is the concentration above which adverse biological effects are expected to occur more often than not (MacDonald et al. 2000). These data indicate that the sediment quality in this portion of the Dresden Pool and the lower portion of Brandon Pool would overall be characterized as poor.

For metals (**Figure 2**), only two sampling locations did not exceed the TEC for the suit of eight metals evaluated (DR08-02 and DR08-03). All other sample locations exceeded at least the TEC for a minimum of five metals and many exceeded the PEC for a majority of the eight metals evaluated (**Tables 9 and 10**). There is a clustering of sediments with elevated metal concentrations (concentrations that exceed the PEC) at three groups of locations - locations BR08-01 through BR08-04; locations DR08-13, DR08-15, and DR08-16; and locations DR08-24 through DR08-26 (**Figure 2**).

Lower quality sediments as determined by exceeding the TECs and PECs for total PAHs and total PCBs were observed at all sample locations for PAHs and all but one sample location (DR08-03) for PCBs (**Figure 3**). Similar to the metals data, a clustering of the sample locations with the poorest sediment quality (concentrations that exceed the PEC for both PAHs and PCBs) were observed at three groups of locations – locations BR08-01 through BR08-04; locations DR08-04, DR08-15, and DR08-16; and locations DR08-18, DR08-20 and DR08-21 (**Figure 3**).

6. COMPARISON TO HISTORICAL DATA

Data from this study was compared to the results of sediment sampling conducted in the same study area in 1994-1995 (Burton 1995) and metals data from three locations as compiled by MWRDGC (2007). Sampling locations in this study were targeted in areas adjacent to the main channel of the river that would potentially provide suitable aquatic habitat. Therefore, sampling locations tended to be in shallow areas with lower water velocities and higher rates of fine-grained sediment deposition. Most chemicals in the environment, including metals, PAHs, and PCBs, tend to be particle reactive, binding to sediment particles in the water column and are subsequently deposited along with the sediment particles, predominately in areas where water velocities decrease, allowing for increased rates of deposition and organic matter accumulation.

Similar to previous studies (Burton et al. 1995, MWRDGC 2007), this study also indicates that the sediments in the Dresden and the Lower Brandon pools have poor sediment quality. To determine whether the sediment quality at specific locations has improved since the 1994-1995, 18 of those locations were re-sampled in this study, and the detected concentrations of metals and PAHs were compared (**Table 11**). Sediment samples in most riverine systems have a high degree of spatial heterogeneity, making it often difficult to make absolute determinations of sediment quality improvement over time when comparing samples from different sampling events. The results of the sampling effort during the 2008 study in comparison to the 1994-1995 study are provided as a weight of evidence type approach and should be considered as the total system rather than simply focusing on specific sampling locations.

For the detected metals, the majority of the detected concentrations from the 2008 study are either higher or within a factor of two or less, indicating that overall, the sediment quality has essentially remained the same or has degraded in several areas (**Table 11**). When environmental samples are compared using the weight of evidence approach, a factor of two is a general rule of thumb to determine if sample concentrations are similar when compared. For sediment samples with metal concentrations that exceeded either the TEC or the PEC, the concentrations in the 2008 study were often less than a factor of two compared to the results of the 1994-1995 study.

A direct comparison of the PAH and PCB data between the 2008 study and the 1994-1995 study is complicated by the vast improvements in instrumentation commercially available and techniques for detecting specific PAHs and PCBs. Many of the individual organic parameters had considerably higher detection limits in the 1994-1995 study than in the 2008 study. Based on the results in **Table 11**, it is our opinion that the differences are not improvement of the sediment quality, but rather improvements in detection limits and are most likely similar between the two sampling periods. Regardless of this discrepancy, concentrations of total PAHs and total PCBs were elevated in both studies, with concentrations that commonly exceeded TEC and PEC values, further evidence that the overall sediment quality in the Dresden and the Lower Brandon pools is poor.

This comparison indicates that, overall, the metals concentrations were generally comparable between the two sampling efforts, and concentrations of total PAHs and total PCBs were elevated in both years. While given the fact that the sampling efforts for both the 1994-1995 and 2008 studies were not set up with an experimental design to allow trend analysis or statistical analysis, there was no clear trend to indicate that the sediment quality of the Dresden and Lower Brandon pools was either greatly improving or degrading between the 1994-1995 study and the 2008 study. However, the results do indicate that the sediment quality remains poor, as evidenced by the high number of sampling locations that exceeded the PECs for many of the metals (**Figure 2**), and total PAHs and total PCBs (**Figure 3**); and that almost all sampling locations had concentrations that were between the TEC and the PEC. It is our opinion that the system has not substantially improved with regards to sediment quality over the last 13 years.

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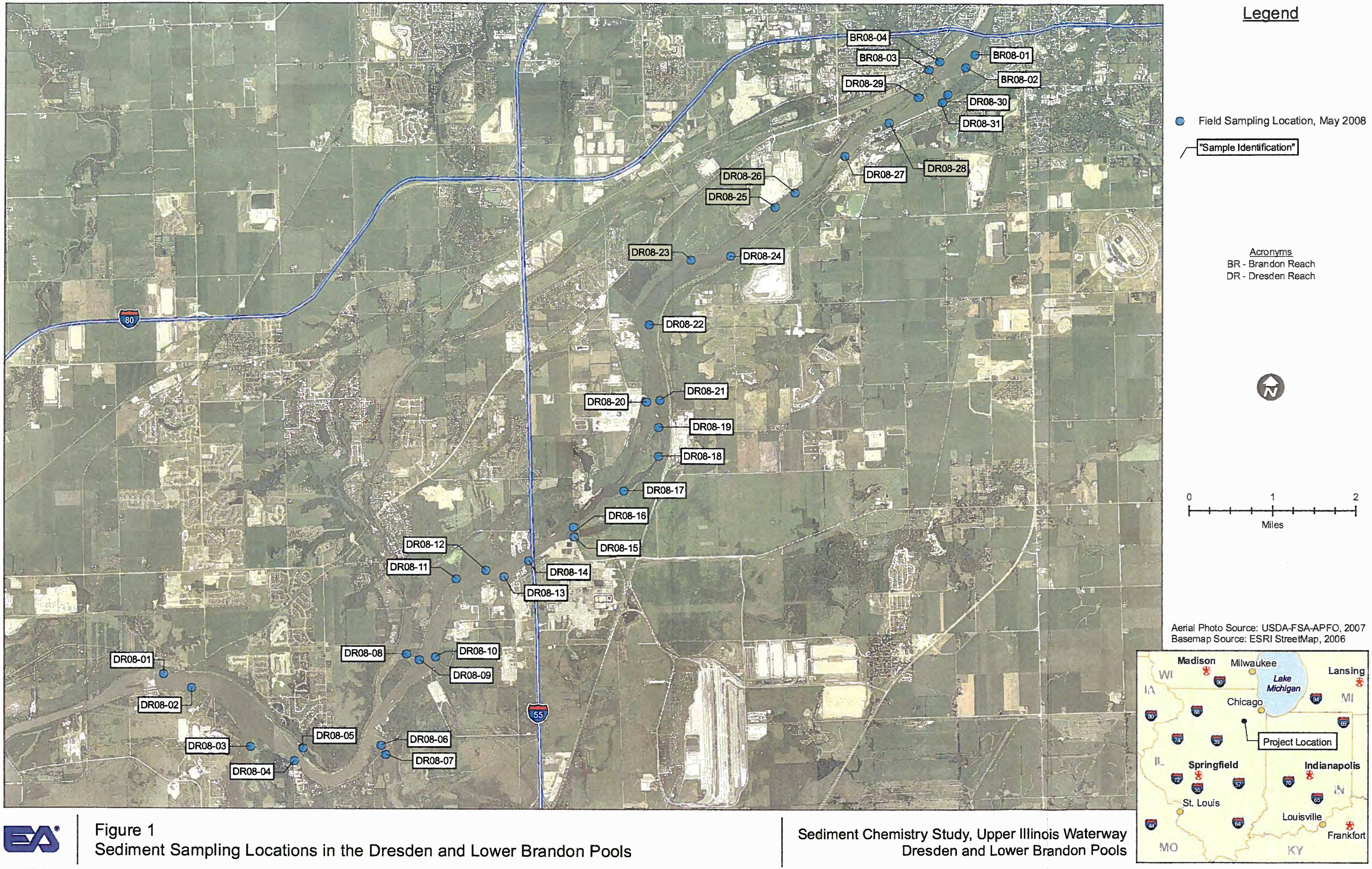

Aerial Photo Source: USDA-FSA-APFO, 2007
Basemap Source: ESRI StreetMap, 2006

Figure 1
Sediment Sampling Locations in the Dresden and Lower Brandon Pools

Sediment Chemistry Study, Upper Illinois Waterway
Dresden and Lower Brandon Pools

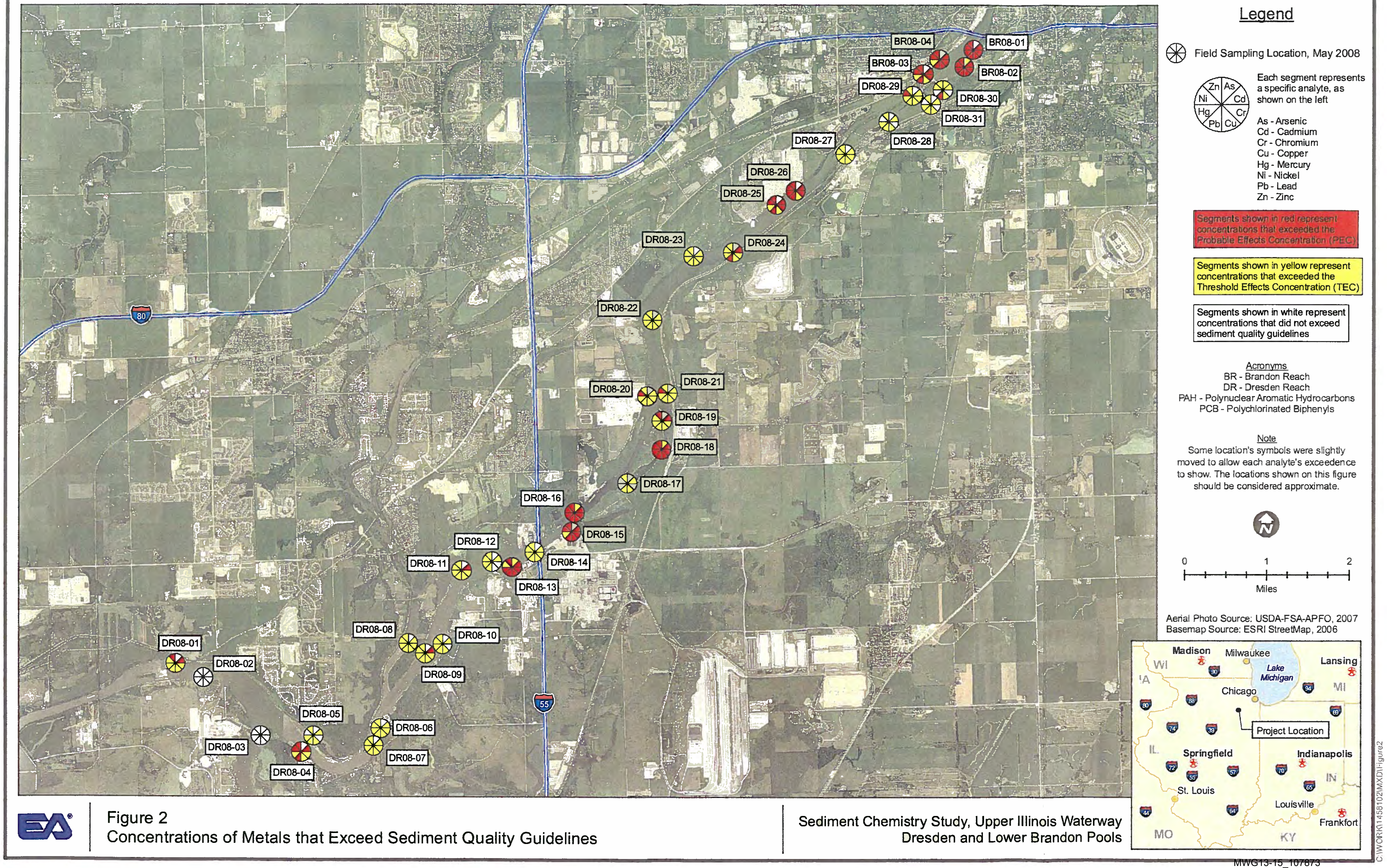

Figure 2
Concentrations of Metals that Exceed Sediment Quality Guidelines

Sediment Chemistry Study, Upper Illinois Waterway
Dresden and Lower Brandon Pools

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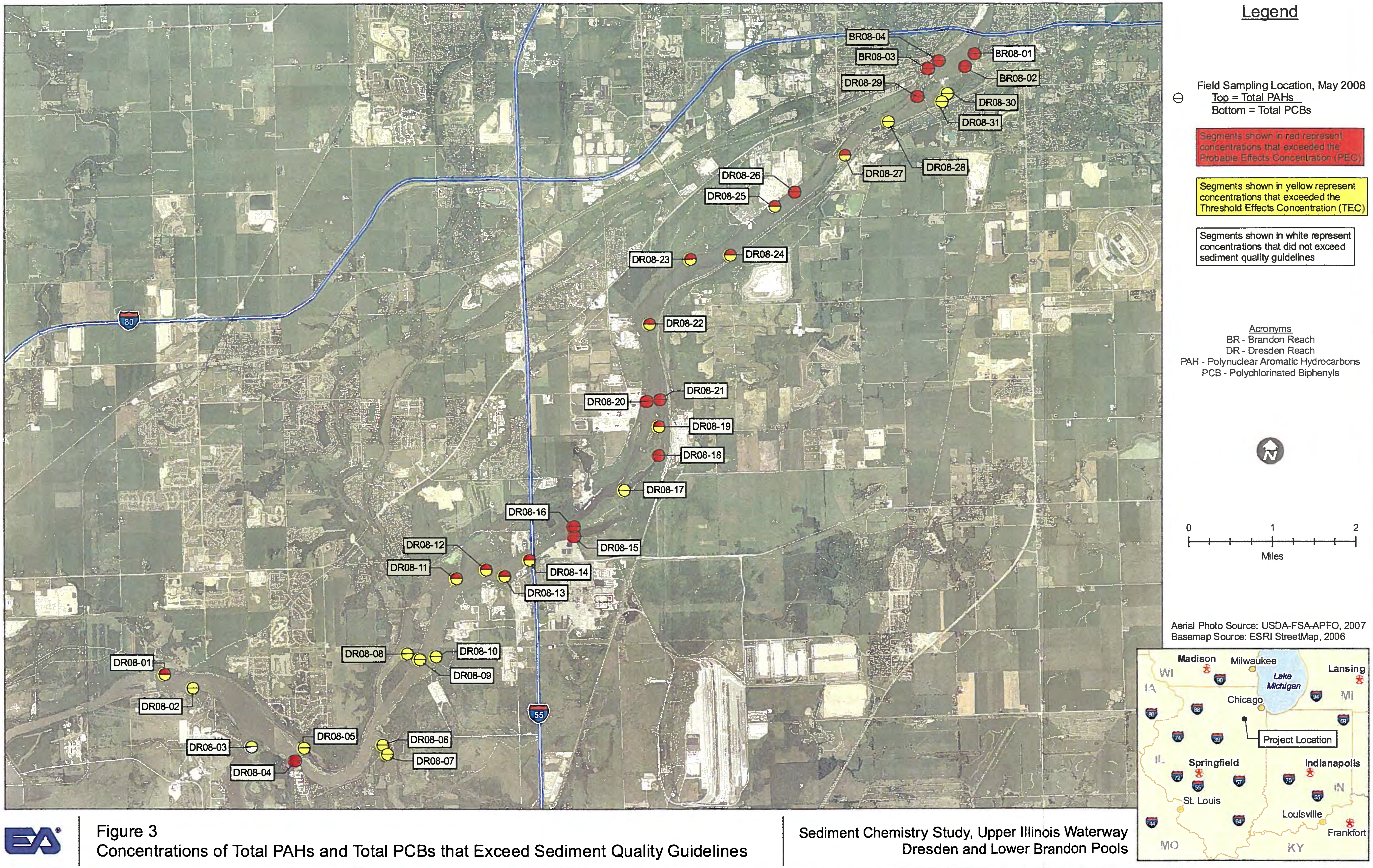

Aerial Photo Source: USDA-FSA-APFO, 2007
Basemap Source: ESRI StreetMap, 2006

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Figure 3
Concentrations of Total PAHs and Total PCBs that Exceed Sediment Quality Guidelines

Sediment Chemistry Study, Upper Illinois Waterway
Dresden and Lower Brandon Pools

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TABLE 7A. CONCENTRATIONS OF TARGET ANALYTES IN SEDIMENT

DRESDEN POOL, MAY 2008

ANALYTE	UNITS	RL	TEC*	PEC*	DR08-01	DR08-02	DR08-03	DR08-04	DR08-05	DR08-06	DR08-07	DR08-08	DR08-09	DR08-10	DR08-11	DR08-11FD	DR08-12	DR08-13	DR08-14	DR08-15	DR08-16
TOTAL ORGANIC CARBON	MG/KG	0.90	--	--	41,400	24,400	6,700	28,700	21,800	26,500	33,200	15,700	23,700	14,500	23,600	16,600	13,200	29,400	13,300	26,300	28,300
PERCENT SOLIDS	%	--	--	--	32.8	45.9	66.9	39	54.6	31.1	32.7	41.3	46.2	57.5	53.5	53.1	66.9	43.3	54.8	35.9	36.4
GRAVEL	%	--	--	--	0.0	0.0	0.0	0.7	0.7	0.0	0.0	0.0	0.4	0.1	0.1	0.7	0.0	2.9	1.5	0.0	0.8
SAND	%	--	--	--	16.3	50.3	73.1	25.1	51.1	2.2	4.3	6.2	49.5	67.4	62.3	60.1	88.2	39.9	61.7	9.9	21.0
COARSE SAND	%	--	--	--	0.2	0.3	0.1	1.0	2.2	0.0	0.0	0.1	0.3	0.3	3.1	2.8	1.0	0.4	1.4	0.0	1.8
MEDIUM SAND	%	--	--	--	0.6	2.7	3.5	4.0	4.4	0.1	0.2	0.5	3.8	3.3	11.7	11.3	14.4	6.5	9.1	1.7	6.0
FINE SAND	%	--	--	--	15.5	47.3	69.5	20.1	44.5	2.1	4.1	5.6	45.4	63.8	47.5	46.0	72.8	33.0	51.2	8.2	13.2
SILT	%	--	--	--	64.4	27.4	21.0	58.4	38.6	69.8	73.3	75.1	36.0	22.8	28.7	28.7	6.6	30.2	26.4	61.8	47.2
CLAY	%	--	--	--	19.2	22.3	6.0	15.8	9.6	28.1	22.4	18.7	14.0	9.7	8.9	10.6	5.2	27.1	10.4	28.3	31.0
SILT+CLAY	%	--	--	--	83.6	49.7	27.0	74.2	48.2	97.9	95.7	93.8	50.0	32.5	37.6	39.3	11.8	57.3	36.8	90.1	78.2
ARSENIC	MG/KG	0.11	9.79	33	8	4	2	6	3	3	4	4	5	3	5	5	3	26	4	6	13
CADMIUM	MG/KG	0.11	0.99	4.98	7.5	0.91	0.49	7.4	2.9	4.5	2.8	3.6	5.2	3	9.1	4.1	1.3	17.3	3.1	12.7	29.3
CHROMIUM	MG/KG	0.22	43.4	111	93.4 J	16.6 J	7.5 J	106 J	34.6 J	59.2 J	45.9 J	46.4 J	59.5 J	34 J	56.2 J	54.5 J	27.2 J	196 J	51.9 J	158 J	301 J
COPPER	MG/KG	0.22	31.6	149	112	19.1	7.5	123	43.8	67.8	52	62.3	72.9	42.5	56.9	60	28.7	185	64	161	214
LEAD	MG/KG	0.11	35.8	128	125	22.2	10.1	143	54.4	85.7	72.3	65.8	97.8	67.3	90.5	90.8	46.8	311	110	176	312
MERCURY	MG/KG	0.05	0.18	1.06	0.72	0.12	0.031	0.63	0.24	0.56	0.27	0.29	0.45	0.44	0.56	0.45	0.72	3.1	0.3	0.79	1.5
NICKEL	MG/KG	0.11	22.7	48.6	37.2	12.2	7.5	50.5	22.7	24.3	29.3	29	37.5	23.8	41.1	45	27.2	36.3	25	64.7	106
SILVER	MG/KG	0.11	--	--	2.3	0.35	0.062	2.7	0.97	2.1	1.2	1.3	1.3	0.82	0.94	0.83	0.36	4.5	1.1	4.3	7
ZINC	MG/KG	0.54	121	459	519 J	84.7 J	44 J	611 J	213 J	264 J	225 J	296 J	455 J	267 J	354 J	356 J	204 J	836 J	314 J	655 J	1280 J
ACENAPHTHENE	UG/KG	204	--	--	300	130 J	130 U	320	220	210 J	160 J	160	250	210	490	400	250	3,000	390	220	800
ACENAPHTHYLENE	UG/KG	204	--	--	700	360	140	770	340	380	240	290	710	710	1,700	1,400	840	7,900	2,400	830	1,200
ANTHRACENE	UG/KG	204	57	845	820	390	140	870	410	440	270	320	650	650	1,500	1,300	740	14,000	2,300	910	1,700
BENZO(A)ANTHRACENE	UG/KG	204	108	1,050	2,000	1,900	57 J	2,300	1,000	770	210	740	1,900	1,800	5,300	5,300	3,200	84,000	9,500	2,600	6,300
BENZO(A)PYRENE	UG/KG	204	150	1,450	2,700	1,900	130	2,900	1,200	1,000	360	1,100	2,500	2,400	7,000	6,300	3,900	73,000	11,000	3,400	4,900
BENZO(B)FLUORANTHENE	UG/KG	204	--	--	3,100	2,200	210	3,500	1,400	1,400	560	1,400	2,700	2,700	6,500	6,500	4,000	74,000	16,000	5,200	7,800
BENZO(GHI)PERYLENE	UG/KG	204	--	--	2,100	1,200	61 J	2,200	840	840	220	880	1,900	1,800	4,700	4,300	2,600	36,000	8,900	3,000	4,300
BENZO(K)FLUORANTHENE	UG/KG	204	--	--	1,300	770	41 J	1,200	550	430	140 J	510	1,100	820	3,400	2,700	1,300	35,000	130 U	47 U	92 U
CHRYSENE	UG/KG	204	166	1,290	2,700	2,200	70 J	2,800	1,300	920	280	1,100	2,300	2,300	6,100	5,600	3,900	83,000	11,000	3,600	7,200
DIBENZO(A,H)ANTHRACENE	UG/KG	204	33	--	620	410	130 U	650	250	230	77 J	210	550	500	1,300	1,200	680	9,000	2,400	590	950
FLUORANTHENE	UG/KG	204	423	2,230	3,100	1,500	340	3,300	1,800	1,400	720	1,400	2,500	2,300	5,200	4,900	2,600	110,000	9,800	5,100	15,000
FLUORENE	UG/KG	204	77	536	680	390	130 U	590	400	560	200 U	430	490	460	750	620	430	5,800	620	340	1,100
INDENO(1,2,3-CD)PYRENE	UG/KG	204	--	--	1,900	1,200	70 J	1,900	790	740	250	820	1,600	1,600	4,200	3,900	2,400	35,000	7,600	2,500	3,200
NAPHTHALENE	UG/KG	204	176	561	240	38 J	130 U	200	89 J	87 J	200 U	69 J	130 J	140	370	370	110 J	990 J	470	380	390
PHENANTHRENE	UG/KG	204	204	1,170	1,200	410	100 J	1,300	470	520	200	490	880	810	2,000	1,700	690	12,000	3,000	1,600	1,400
PYRENE	UG/KG	204	195	1,520	2,900	1,200	98 J	3,100	1,700	1,200	330	1,400	2,200	2,000	4,400	3,900	2,100	90,000	7,200	3,800	11,000
TOTAL PAHs (ND=0)	UG/KG	---	1,610	22,800	26,360	16,198	1,457	27,900	12,759	11,127	4,017	11,319	22,360	21,200	54,910	50,390	29,740	672,690	92,580	34,070	67,240
TOTAL PAHs (ND=1/2RL)	UG/KG	---	1,610	22,800	26,360	16,198	1,717	27,900	12,759	11,127	4,217	11,319	22,360	21,200	54,910	50,390	29,740	672,690	92,645	34,094	67,286
TOTAL PAHs (ND=RL)	UG/KG	---	1,610	22,800	26,360	16,198	1,977	27,900	12,759	11,127	4,417	11,319	22,360	21,200	54,910	50,390	29,740	672,690	92,710	34,117	67,332

**Source* : MacDonald et al. 2000. Development and Evaluation of Consensus-Based Sediment Quality Guidelines for Freshwater Ecosystems. Arch. Environ. Contam. Toxicol. 39: 20-31.

NOTE: Shaded and bold values indicate parameters for detected constituents. Values not shaded or bold represent non-detected concentrations reported at the RL/MDL.
Physical parameters (ie., grain size and TOC) are reported as percent total sample.

RL = average reporting limit
TEC = Threshold Effect Concentration
PEC = Probable Effect Concentration
FD = field duplicate
COL = more than 40% difference between initial and confirmation results; the lower result is reported
EST = estimated value

B (organic) = detected in the laboratory method blank
J (organic) = compound was detected, but below the reporting limit (value is estimated)
J (inorganic) = detected in the laboratory method blank
U = compound was analyzed, but not detected

TABLE 7A. CONCENTRATIONS OF TARGET ANALYTES IN SEDIMENT

DRESDEN POOL, MAY 2008

ANALYTE	UNITS	RL	TEC*	PEC*	DR08-17	DR08-18	DR08-19	DR08-20	DR08-21	DR08-22	DR08-23	DR08-24	DR08-25	DR08-26	DR08-27	DR08-28	DR08-28FD	DR08-29	DR08-30	DR08-31
TOTAL ORGANIC CARBON	MG/KG	0.90	--	--	15,100	43,900	25,600	70,800	15,100	47,400	37,000	37,500	33,500	73,000	24,800	21,400	26,300	83,500	45,000	21,500
PERCENT SOLIDS	%	--	--	--	47.7	39.8	40.1	61.3	58.6	58.3	57.7	49.4	57	50.6	57.3	67.3	66.2	54	57.8	59.7
GRAVEL	%	--	--	--	5.3	0.0	1.7	0.6	0.0	1.0	0.4	0.0	0.0	0.0	2.8	1.1	1.3	0.6	0.0	0.2
SAND	%	--	--	--	28.4	32.5	53.2	85.2	80.9	74.4	71.9	55.6	62.7	44.9	67.2	80.8	79.4	63.3	41.5	41.9
COARSE SAND	%	--	--	--	0.6	0.6	1.9	1.8	1.1	2.3	3.3	0.5	0.8	0.2	2.3	3.7	5.6	3.6	1.1	4.1
MEDIUM SAND	%	--	--	--	3.0	2.4	8.4	14.8	9.0	16.9	15.8	2.8	4.6	2.4	11.0	21.2	20.0	18.1	7.9	11.3
FINE SAND	%	--	--	--	24.8	29.5	42.9	68.6	70.8	55.2	52.8	52.3	57.3	42.3	53.9	55.9	53.8	41.6	32.5	26.5
SILT	%	--	--	--	50.6	44.3	34.3	10.0	13.4	16.8	21.8	34.5	32.5	48.1	24.9	14.8	15.5	22.8	43.0	40.1
CLAY	%	--	--	--	15.6	23.2	10.9	4.2	5.7	7.7	5.9	10.0	4.7	7.1	5.1	3.3	3.9	13.3	15.4	17.8
SILT+CLAY	%	--	--	--	66.2	67.5	45.2	14.2	19.1	24.5	27.7	44.5	37.2	55.2	30.0	18.1	19.4	36.1	58.4	57.9
ARSENIC	MG/KG	0.11	9.79	33	4	17	6	5	4	4	3	8	4	6	4	3	3	6	10	9
CADMIUM	MG/KG	0.11	0.99	4.98	1.5	41.3	5	4.9	3.9	3.4	3.7	7.3	5.5	7.9	4.4	1.7	1.7	3.7	2.2	2
CHROMIUM	MG/KG	0.22	43.4	111	28 J	355 J	77.3 J	79.1 J	55.3 J	47.4 J	57.3 J	71.3 J	125 J	147 J	56.5 J	34.1 J	33.1 J	57.2 J	19.8 J	33.2 J
COPPER	MG/KG	0.22	31.6	149	37.4	284	87	57.7	58.5	48.5	73.1	81.7	97.5	140	68.4	38.2	32.7	49.6	103	47.2
LEAD	MG/KG	0.11	35.8	128	39.8	366	127	100	92.3	83.9	86.9	138	222	215	89.9	51.1	56.7	98.7	241	105
MERCURY	MG/KG	0.05	0.18	1.06	0.13	3.3	0.58	0.48	0.66	0.51	0.32	0.87	0.97	2.6	0.3	0.24	0.13	0.29	0.15	0.24
NICKEL	MG/KG	0.11	22.7	48.6	18.2	90.6	38	77.2	49.4	45.7	35.3	29.1	57.2	56.4	34.1	21.5	21.7	55.1	32.1	22.7
SILVER	MG/KG	0.11	--	--	0.6	8.4	1.5	0.97	0.81	0.79	1.1	2.2	1.3	2.1	0.96	0.46	0.41	0.64	0.38	0.61
ZINC	MG/KG	0.54	121	459	145 J	1450 J	491 J	342 J	374 J	312 J	335 J	305 J	547 J	757 J	330 J	158 J	172 J	429 J	333 J	383 J
ACENAPHTHENE	UG/KG	204	--	--	51	2,600	340	1,700	910	1,600	580	670	1,600	910	410	130	130	620	47	36
ACENAPHTHYLENE	UG/KG	204	--	--	130	3,000	1,500	10,000	4,000	12,000	3,500	1,400	1,900	2,700	1,300	250	340	3,200	37	160
ANTHRACENE	UG/KG	204	57	845	140	6,600	1,300	5,800	4,200	11,000	6,900	1,400	4,000	3,000	1,200	590	420	3,000	140	130
BENZO(A)ANTHRACENE	UG/KG	204	108	1,050	500	18,000	4,600	43,000	13,000	93,000	25,000	5,200	16,000	12,000	5,800	1,900	1,200	12,000	590	570
BENZO(A)PYRENE	UG/KG	204	150	1,450	580	15,000	5,400	45,000	15,000	86,000	22,000	4,800	18,000	15,000	7,200	1,400	1,300	12,000	590	600
BENZO(B)FLUORANTHENE	UG/KG	204	--	--	720	17,000	8,000	45,000	19,000	92,000	22,000	6,100	25,000	13,000	9,600	2,100	1,900	16,000	880	820
BENZO(GHI)PERYLENE	UG/KG	204	--	--	520	11,000	3,000	31,000	12,000	55,000	14,000	3,700	13,000	11,000	4,500	730	510	9,300	360	380
BENZO(K)FLUORANTHENE	UG/KG	204	--	--	320	5,300	42 U	17,000	130 U	34,000	13,000	68 U	320 U	10,000	64 U	32 U	33 U	310 U	32 U	34 U
CHRYSENE	UG/KG	204	166	1,290	610	21,000	5,700	41,000	14,000	94,000	25,000	6,600	18,000	14,000	7,100	1,700	1,500	12,000	570	590
DIBENZO(A,H)ANTHRACENE	UG/KG	204	33	--	90	2,900	1,300	2,700	4,300	5,500	3,500	1,000	2,500	3,100	1,500	190	170	2,700	89	120
FLUORANTHENE	UG/KG	204	423	2,230	960	45,000	6,700	43,000	21,000	130,000	43,000	10,000	44,000	23,000	9,100	4,400	2,600	16,000	1,500	1,000
FLUORENE	UG/KG	204	77	536	64	4,800	430	1,500	1,100	2,000	940	920	1,800	1,200	460	210	160	570	51	57
INDENO(1,2,3-CD)PYRENE	UG/KG	204	--	--	450	8,400	3,000	27,000	11,000	50,000	13,000	3,000	12,000	10,000	4,600	730	550	8,200	360	340
NAPHTHALENE	UG/KG	204	176	561	50	1,100	390	1,100	870	1,400	570	270	970	1,300	460	94	120	720	29 J	38
PHENANTHRENE	UG/KG	204	204	1,170	300	10,000	2,000	3,900	5,600	7,700	11,000	1,500	19,000	8,100	2,200	1,600	760	2,900	510	400
PYRENE	UG/KG	204	195	1,520	700	32,000	4,200	32,000	12,000	85,000	28,000	6,300	24,000	13,000	5,000	2,200	1,400	8,900	710	640
TOTAL PAHs (ND=0)	UG/KG	---	1,610	22,800	6,185	203,700	47,860	350,700	137,980	760,200	231,990	52,860	201,770	141,310	60,430	18,224	13,060	108,110	6,463	5,881
TOTAL PAHs (ND=1/2RL)	UG/KG	---	1,610	22,800	6,185	203,700	47,881	350,700	138,045	760,200	231,990	52,894	201,930	141,310	60,462	18,240	13,077	108,265	6,479	5,898
TOTAL PAHs (ND=RL)	UG/KG	---	1,610	22,800	6,185	203,700	47,902	350,700	138,110	760,200	231,990	52,928	202,090	141,310	60,494	18,256	13,093	108,420	6,495	5,915

**Source*: MacDonald et al. 2000. Development and Evaluation of Consensus-Based Sediment Quality Guidelines for Freshwater Ecosystems. Arch. Environ. Contam. Toxicol. 39: 20-31.

NOTE: Shaded and bold values represent detected concentrations.

Physical parameters (ie., grain size and TOC) are reported as percent total sample.

RL = average reporting limit	**B** (organic) = detected in the laboratory method blank
TEC = Threshold Effect Concentration	**J** (organic) = compound was detected, but below the reporting limit (value is estimated)
PEC = Probable Effect Concentration	**J** (inorganic) = detected in the laboratory method blank
FD = field duplicate	**U** = compound was analyzed, but not detected

COL = more than 40% difference between initial and confirmation results; the lower result is reported

EST = estimated value

TABLE 7B. CONCENTRATIONS OF TARGET ANALYTES IN SEDIMENT

DRESDEN POOL, MAY 2008

ANALYTE	UNITS	RL	TEC*	PEC*	DR08-01	DR08-02	DR08-03	DR08-04	DR08-05	DR08-06	DR08-07	DR08-08	DR08-09	DR08-10	DR08-11	DR08-11FD	DR08-12	DR08-13	DR08-14	DR08-15	DR08-16
PCB 8 *	UG/KG	1.42	--	--	3.9	1.1 U	0.97 U	5.5 COL	1.9	2.2 EST	1.5 U	1.6 COL	2.5 COL	2.9	4.4 EST	4.9	2.3	1.8	3.7 EST	5.5 COL	2.8 COL
PCB 18 *	UG/KG	1.42	--	--	13	1.6	0.97 U	23	8.1	7	2.6	6.6	10	11	18	18	8.5	6.8	11	26	25 COL
PCB 28 *	UG/KG	14.18	--	--	28	3.2 J	0.7 J	38	16	19	6.8 J	14	19	21	29	29	16	9.6 J	23	51	38
PCB 44 *	UG/KG	1.42	--	--	27	2.8	0.81 J	37	15	17	6.3	15	19	19	26	25	14	9.8	19	49	53
PCB 49	UG/KG	1.42	--	--	25	2.8 COL	0.87 J	33	12	17	6.1	13	16	16	21	20	11	11	17	46	46
PCB 52 *	UG/KG	1.42	--	--	33	3.4	0.86 J	43	17	21	7.7	17	23	21	29	27	15	13	23	58	73
PCB 66 *	UG/KG	1.42	--	--	26	2.7	0.71 J	30	13	17	6.7	13	16	16	22	21	12	7.5	17	41	48
PCB 77 *	UG/KG	1.42	--	--	4.6	0.36 J COL	0.97 U	5.3	2.1 COL	2.9 COL	1.1 J COL	2.4 COL	2.9 COL	2.6	0.93 U	3.2	1.6	1.5 COL	2.8 COL	6.6 COL	7.4 COL
PCB 87	UG/KG	1.42	--	--	11 COL	1.3 COL	0.36 J COL	12 COL	5.5 COL	7.9 COL	3.1 COL	6.1 COL	7.9 COL	6.2 COL	7.9 COL	7.4 COL	4.3 COL	5.4 COL	6.7 COL	19 COL	33 COL
PCB 90	UG/KG	1.42	--	--	1.5 U	1.1 U	0.97 U	1.3 U	1 U	1.6 U	1.5 U	1.2 U	1.1 U	0.96 U	0.93 U	0.94 U	0.97 U	1.2 U	1 U	1.4 U	2.8 U
PCB 101 *	UG/KG	1.42	--	--	33 EST	3.4 EST	0.86 J EST	37 EST	15 EST	23 EST	8.4 EST	18 EST	23 EST	18 EST	22 COL	21 COL	11 EST	14 EST	19 COL	56 COL	86 EST
PCB 105 *	UG/KG	1.42	--	--	9.2	1.1	0.97 U	9.4	4.5	6.6	2.6	4.5	6.5	5.4	6.6	6.5	3.8	4.3	5.5	14	23
PCB 118 *	UG/KG	1.42	--	--	22	2.3	0.64 J	25	10	16	6	11	16	12	15	15	8.2	10	13	36	65
PCB 126 *	UG/KG	1.42	--	--	1.5 U	1.1 U	0.97 U	1.3 U	1 U	1.6 U	1.5 U	1.2 U	1.1 U	0.96 U	0.93 U	0.94 U	0.97 U	1.2 U	1 U	1.4 U	2.8 U
PCB 128 *	UG/KG	1.42	--	--	4.6	0.61 J	0.2 J	4.9	1.9	3.6	1.5	2.4	3.3	2.4	2.4	2.4	1.2	2.3	2.3	8.4	15
PCB 138 *	UG/KG	1.42	--	--	23	2.6 EST	0.65 J EST	23	9.3	17	6.7 EST	11	16	11	12	12	6.3	10	13	36	66
PCB 153 *	UG/KG	1.42	--	--	24	2.7	0.65 J COL	24	9.4	19	6.7	12	16	12	11	12	6.1	9.2	14	40	68
PCB 156	UG/KG	1.42	--	--	2.4	0.27 J	0.97 U	2.5	0.98 J	1.9	0.73 J	1.2	1.7	1.2	1.3	1.3	0.74 J	1.2	1.2	3.7	7.4
PCB 169 *	UG/KG	1.42	--	--	1.5 U	1.1 U	0.97 U	1.3 U	1 U	1.6 U	1.5 U	1.2 U	1.1 U	0.96 U	0.93 U	0.94 U	0.97 U	1.2 U	1 U	1.4 U	2.8 U
PCB 170 *	UG/KG	1.42	--	--	9.2 EST	1.1 EST	0.3 J EST	8.6 EST	3.2 EST	7.1 EST	2.6 EST	4.4 EST	6 EST	4.2 EST	3.8 EST	3.9 EST	1.9 EST	3.2 EST	5 EST	14 EST	22 EST
PCB 180 *	UG/KG	1.42	--	--	17	1.7	0.97 U	16	5.5	13	4.7	7.6	10	7.2	6.2	6.4	3.1	5.5	8.4	25	42
PCB 183	UG/KG	1.42	--	--	4.5	0.47 J	0.97 U	4.3	1.5	3.5	1.2 J	2.1	2.8	2.1	1.8	1.9	0.9 J	1.5	2.4	7	11
PCB 184	UG/KG	1.42	--	--	0.75 J COL	1.1 U	0.97 U	1.3 U	1 U	0.54 J COL	1.5 U	1.2 U	1.1 U	0.39 J COL	0.93 U	0.94 U	0.97 U	1.2 U	COL	1.1 J COL	2.8 U
PCB 187 *	UG/KG	1.42	--	--	9.6	1.2	0.26 J	9.3	3.4	7.8	2.8	4.8	6.3	4.6	4.1	4.3	2	3.8	5.4	15	23
PCB 195	UG/KG	1.42	--	--	2.2 EST	0.31 T COL	0.97 U	1.9	0.75 J EST	1.7 EST	0.62 J EST	0.97 J	1.2	0.95 J EST	0.88 COL	0.9 COL	0.41 J EST	1.2 COL	1.2	2.9 T COL	4.9
PCB 206	UG/KG	1.42	--	--	3.3	0.54 J	0.15 J	3.1	0.86 J	2.7	0.88 J	1.3	2.1	1.6	3	2.6	0.38 J	15	1.2	3.8	8.2
PCB 209	UG/KG	1.42	--	--	3.8	0.6 J	0.97 U	2.9	0.79 J	2.5	0.85 J	1.3	1.8	1.5	2.8	2.5	0.97 U	16	1	4	10
TOTAL PCBs (ND=0)	UG/KG	---	59.8	676	574.2	61.54	13.28	678	270.6	398.4	146.4	290.6	391	340.6	423	423.2	226	224.6	370.2	963	1314.4
TOTAL PCBs (ND=1/2RL)	UG/KG	---	59.8	676	577.2	64.84	20.07	680.6	272.6	401.6	150.9	293	393.2	342.52	425.79	425.08	227.94	227	372.2	965.8	1320
TOTAL PCBs (ND=RL)	UG/KG	---	59.8	676	580.2	68.14	26.86	683.2	274.6	404.8	155.4	295.4	395.4	344.44	428.58	426.96	229.88	229.4	374.2	968.6	1325.6

******Source*: MacDonald et al. 2000. Development and Evaluation of Consensus-Based Sediment Quality Guidelines for Freshwater Ecosystems. Arch. Environ. Contam. Toxicol. 39: 20-31.

NOTE: Shaded and bold values indicate detected concentrations. Values not shaed or bold indicated non-detected concentrations represented by the average RL.

RL = average reporting limit

TEC = Threshold Effect Concentration

PEC = Probable Effect Concentration

FD = field duplicate

COL = more than 40% difference between initial and confirmation results; the lower result is reported

EST = estimated value

B (organic) = detected in the laboratory method blank

J (organic) = compound was detected, but below the reporting limit (value is estimated)

J (inorganic) = detected in the laboratory method blank

U = compound was analyzed, but not detected

TABLE 7B. CONCENTRATIONS OF TARGET ANALYTES IN SEDIMENT

DRESDEN POOL, MAY 2008

ANALYTE	UNITS	RL	TEC*	PEC*	DR08-17	DR08-18	DR08-19	DR08-20	DR08-21	DR08-22	DR08-23	DR08-24	DR08-25	DR08-26	DR08-27	DR08-28	DR08-28FD	DR08-29	DR08-30	DR08-31
PCB 8 *	UG/KG	1.42	--	--	1 U	**3.1 J COL**	**4.9 EST**	**19**	**6.6 EST**	**7 EST**	**6**	**3**	**7**	**14 EST**	**7**	**5.9**	**4.7**	**8.7 EST**	0.95 U	1 U
PCB 18 *	UG/KG	1.42	--	--	**2.8**	**19**	**16**	**97**	**31**	**26**	**18**	**8.9**	**20**	**35**	**19**	**25**	**20**	**39**	0.95 U	**1.5**
PCB 28 *	UG/KG	14.18	--	--	**6.4 J**	**26 J**	**32**	**120**	**56**	**39**	**31**	**15**	**35**	**70**	**31**	**28**	**23**	**51**	**15**	**2.7 J COL**
PCB 44 *	UG/KG	1.42	--	--	**6.6**	**65**	**27**	**110**	**45**	**30**	**24**	**12**	**25**	**49**	**24**	**29**	**24**	**51**	**15**	**3**
PCB 49	UG/KG	1.42	--	--	**6 COL**	**52**	**25**	**85**	**36**	**24**	**21**	**9.6 COL**	**22**	**41**	**20 COL**	**23**	**19**	**41**	**13**	**3 COL**
PCB 52 *	UG/KG	1.42	--	--	**8**	**110**	**32**	**120**	**49**	**34**	**27**	**13**	**29**	**52**	**27**	**33**	**26**	**53**	**19**	**4.1**
PCB 66 *	UG/KG	1.42	--	--	**5.7**	**51**	**23**	**87**	**38**	**23**	**21**	**10**	**22**	**48**	**20**	**17**	**14**	**39**	**5.5**	**3.1**
PCB 77 *	UG/KG	1.42	--	--	**1.1 COL**	3.8 U	**4.2**	**9.6**	**5.3**	**3.7**	**3.2 COL**	**1.3 COL**	**4**	**7.2**	**3.2 COL**	**3.1**	**2.4**	1.9 U	0.95 U	1 U
PCB 87	UG/KG	1.42	--	--	**3.1 COL**	**68 COL**	**9.6 COL**	**26 COL**	**13 COL**	**8.1 COL**	**7.8 COL**	**4.2 COL**	**9.7 COL**	**15 COL**	**7.6 COL**	**8.4 COL**	**7.1 COL**	**12 COL**	**8.5 COL**	**2.9 COL**
PCB 90	UG/KG	1.42	--	--	1 U	3.8 U	1.2 U	2.9 U	2.8 U	0.94 U	0.95 U	1 U	0.96 U	3 U	0.96 U	0.97 U	0.98 U	1.9 U	0.95 U	1 U
PCB 101 *	UG/KG	1.42	--	--	**8.1 EST**	**140 COL**	**28 COL**	**74 EST**	**32 EST**	**21 COL**	**22 COL**	**11 COL**	**26 COL**	**39 COL**	**21 COL**	**25 EST**	**21 EST**	**33 EST**	**18 EST**	**6 EST**
PCB 105 *	UG/KG	1.42	--	--	**2.5 COL**	**45**	**8**	**21**	**10**	**6.3**	**6.4**	**3.4**	**8.8**	**13**	**6.2**	**6.1**	**4.8**	**10**	**6**	**2.1**
PCB 118 *	UG/KG	1.42	--	--	**5**	**130**	**18**	**49**	**22**	**14**	**15**	**7.5**	**20**	**27**	**14**	**15**	**12**	**22**	**15**	**4.7**
PCB 126 *	UG/KG	1.42	--	--	1 U	3.8 U	1.2 U	2.9 U	2.8 U	0.94 U	0.95 U	1 U	0.96 U	3 U	0.96 U	0.97 U	0.98 U	1.9 U	0.95 U	1 U
PCB 128 *	UG/KG	1.42	--	--	**1.2**	**30**	**3.5**	**6.8**	**3.2**	**1.7 COL**	**2.7**	**1.5**	**4.9 B**	**4.8 B**	**2.5 B**	**2.9 B**	**2.3 B**	**3.2 B**	**5.1 B**	**3 B**
PCB 138 *	UG/KG	1.42	--	--	**6.2**	**110**	**18**	**30**	**17**	**11**	**14**	**6.7**	**21**	**24**	**13**	**13**	**11**	**17**	**19**	**11**
PCB 153 *	UG/KG	1.42	--	--	**6.4**	**110**	**19**	**29**	**17**	**11**	**14**	**6.6**	**21**	**23**	**13**	**14**	**11**	**18**	**18**	**10**
PCB 156	UG/KG	1.42	--	--	**0.61 J**	**15**	**1.8**	**3.3**	**1.7 J**	**1.2**	**1.5**	**0.75 J**	**2.5**	**2.6 J**	**1.3**	**1.4**	**1.1**	**1.8 J**	**2**	**0.77 J**
PCB 169 *	UG/KG	1.42	--	--	1 U	3.8 U	1.2 U	2.9 U	2.8 U	0.94 U	0.95 U	1 U	0.96 U	3 U	0.96 U	0.97 U	0.98 U	1.9 U	0.95 U	1 U
PCB 170 *	UG/KG	1.42	--	--	**2.6 EST**	**30 EST**	**6.7 EST**	**8.9 EST**	**5.7 EST**	**3.4 EST**	**5.1 EST**	**2.5 EST**	**8.6 EST**	**9.1 EST**	**4.5 EST**	**4.8 EST**	**3.3 EST**	**5.9 EST**	**6.1 EST**	**4.5 EST**
PCB 180 *	UG/KG	1.42	--	--	**4.5**	**51**	**12**	**15**	**9.1**	**5.2**	**8.5**	**3.7**	**14**	**14**	**7.6**	**9.2**	**6**	**9.4**	**13**	**7.9**
PCB 183	UG/KG	1.42	--	--	**1.1**	**14**	**3.3**	**4.1**	**2.6 J**	**1.7**	**2.5**	**1.1**	**3.7**	**4**	**2.2**	**2.4**	**1.7**	**2.7**	**3.6**	**2.2**
PCB 184	UG/KG	1.42	--	--	1 U	3.8 U	1.2 U	2.9 U	2.8 U	0.94 U	0.95 U	1 U	0.96 U	3 U	**1.2**	0.97 U	0.98 U	1.9 U	0.95 U	1 U
PCB 187 *	UG/KG	1.42	--	--	**2.8**	**27**	**7.1**	**9.6**	**5.9**	**3.7**	**5.5**	**2.4**	**7.9**	**9.1**	**4.8**	**5.6**	**3.7**	**6.4**	**8.5**	**4.7**
PCB 195	UG/KG	1.42	--	--	**0.57 COL**	**6.3**	**1.5 EST**	**1.8 J EST**	**1.2 J**	**0.95 EST**	**1.1 EST**	**0.68 J EST**	**1.7**	3 U	**0.97 EST**	0.97 U	**0.76 T COL**	**1.1 T COL**	**1.9**	**0.94 J EST**
PCB 206	UG/KG	1.42	--	--	**0.59 J**	**13**	**1.7**	**2.1 J**	**1 J**	**0.59 J**	**1.1**	**1.7**	**1.5**	**1.8 J**	**0.94 J**	**1.9**	**1.1**	**1.3 J**	**5.3**	**1.7 COL**
PCB 209	UG/KG	1.42	--	--	**0.54 J**	**18**	**1.5**	**1.9 J PE**	**1.2 J PE**	0.94 U	**0.7 J COL**	**1.9**	**2.1**	**1.6 J**	**1.2 PE**	**0.47 J**	**0.7 J**	**1.1 J**	**2.3**	**1.7**
TOTAL PCBs (ND=0)	UG/KG	---	59.8	676	**139.8**	**1894.2**	**518.8**	**1611.8**	**705.6**	**480**	**446.8**	**217**	**548.4**	**876.4**	**435.6**	**473.2**	**378.4**	**733.2**	**326.4**	**136.6**
TOTAL PCBs (ND=1/2RL)	UG/KG	---	59.8	676	**142.8**	**1905.6**	**521.2**	**1617.6**	**711.2**	**481.88**	**448.7**	**219**	**550.32**	**882.4**	**437.52**	**475.14**	**380.36**	**738.9**	**331.15**	**140.6**
TOTAL PCBs (ND=RL)	UG/KG	---	59.8	676	**145.8**	**1917**	**523.6**	**1623.4**	**716.8**	**483.76**	**450.6**	**221**	**552.24**	**888.4**	**439.44**	**477.08**	**382.32**	**744.6**	**335.9**	**144.6**

**Source* : MacDonald et al. 2000. Development and Evaluation of Consensus-Based Sediment Quality Guidelines for Freshwater Ecosystems. Arch. Environ. Contam. Toxicol. 39: 20-31.

NOTE: Shaded and bold values indicate detected concentrations. Values not shaded or bold indicated non-detected concentrations represented by the average RL.

RL = average reporting limit	**B** (organic) = detected in the laboratory method blank
TEC = Threshold Effect Concentration	**J** (organic) = compound was detected, but below the reporting limit (value is estimated)
PEC = Probable Effect Concentration	**J** (inorganic) = detected in the laboratory method blank
FD = field duplicate	**U** = compound was analyzed, but not detected

COL = more than 40% difference between initial and confirmation results; the lower result is reported
EST = estimated value

TABLE 8. CONCENTRATIONS OF TARGET ANALYTES IN SEDIMENT

LOWER BRANDON POOL, MAY 2008

ANALYTE	UNITS	RL	TEC**	PEC**	BR08-01	BR08-02	BR08-03	BR08-04
TOTAL ORGANIC CARBON	%	--	--	--	4.23	6.61	5.28	4.80
PERCENT SOLIDS	%	--	--	--	53.9	39.5	45.2	50.3
GRAVEL	%	--	--	--	3.5	0.0	0.0	0.5
SAND	%	--	--	--	54.7	19.2	19.4	58.0
COARSE SAND	%	--	--	--	2.2	0.1	0.0	4.4
MEDIUM SAND	%	--	--	--	4.6	0.7	0.8	12.6
FINE SAND	%	--	--	--	47.9	18.4	18.6	41.0
SILT	%	--	--	--	29.2	64.4	68.6	24.0
CLAY	%	--	--	--	12.5	16.4	11.9	17.5
SILT+CLAY	%	--	--	--	41.7	80.8	80.5	41.5
SILVER	MG/KG	0.11	9.79	33	**9**	**11**	**6**	**8**
CADMIUM	MG/KG	0.11	0.99	4.98	**21**	**23.3**	**8.4**	**18.4**
CHROMIUM	MG/KG	0.22	43.4	111	**274 J**	**282 J**	**125 J**	**244 J**
COPPER	MG/KG	0.22	31.6	149	**235**	**264**	**146**	**177**
LEAD	MG/KG	0.11	35.8	128	**456**	**322**	**196**	**315**
MERCURY	MG/KG	0.04	0.18	1.06	**1.4**	**2**	**0.84**	**0.83**
NICKEL	MG/KG	0.11	22.7	48.6	**163**	**109**	**50.3**	**129**
SILVER	MG/KG	0.11	--	--	**6.8**	**6.8**	**3**	**5.2**
ZINC	MG/KG	0.54	121	459	**933 J**	**1,170 J**	**642 J**	**800 J**
ACENAPHTHENE	UG/KG	361	--	--	**3,000**	**2,000**	**520**	**2,400**
ACENAPHTHYLENE	UG/KG	361	--	--	**10,000**	**5,300**	**1,500**	**8,200**
ANTHRACENE	UG/KG	361	57.2	845	**7,100**	**6,300**	**1,800**	**10,000**
BENZO(A)ANTHRACENE	UG/KG	361	108	1,050	**35,000**	**16,000**	**6,100**	**40,000**
BENZO(A)PYRENE	UG/KG	361	150	1,450	**35,000**	**21,000**	**6,900**	**38,000**
BENZO(B)FLUORANTHENE	UG/KG	361	--	--	**47,000**	**27,000**	**9,500**	**53,000**
BENZO(GHI)PERYLENE	UG/KG	361	--	--	**29,000**	**15,000**	**3,900**	**18,000**
BENZO(K)FLUORANTHENE	UG/KG	361	--	--	620 U	420 U	74 U	330 U
CHRYSENE	UG/KG	361	166	1,290	**38,000**	**26,000**	**6,400**	**47,000**
DIBENZO(A,H)ANTHRACENE	UG/KG	361	33.0	--	**9,500**	**4,600**	**990**	**6,700**
FLUORANTHENE	UG/KG	361	423	2,230	**45,000**	**36,000**	**11,000**	**65,000**
FLUORENE	UG/KG	361	77.4	536	**2,900**	**2,800**	**720**	**2,800**
INDENO(1,2,3-CD)PYRENE	UG/KG	361	--	--	**26,000**	**14,000**	**3,900**	**21,000**
NAPHTHALENE	UG/KG	361	176	561	**1,900**	**6,600**	**840**	**3,700**
PHENANTHRENE	UG/KG	361	204	1,170	**6,600**	**11,000**	**3,300**	**12,000**
PYRENE	UG/KG	361	195	1,520	**26,000**	**23,000**	**6,700**	**32,000**
TOTAL PAHs (ND=0)	UG/KG	---	1,610	22,800	**322,000**	**216,600**	**64,070**	**359,800**
TOTAL PAHs (ND=1/2RL)	UG/KG	---	1,610	22,800	**322,310**	**216,810**	**64,107**	**359,965**
TOTAL PAHs (ND=RL)	UG/KG	---	1,610	22,800	**322,620**	**217,020**	**64,144**	**360,130**
PCB 8 *	UG/KG	6.93	--	--	**60**	**24 COL**	**11 EST**	**47 COL**
PCB 18 *	UG/KG	6.93	--	--	**240**	**120**	**38**	**200**
PCB 28 *	UG/KG	69.3	--	--	**290**	**160**	**76**	**270**
PCB 44 *	UG/KG	6.93	--	--	**280**	**190**	**59**	**240**
PCB 49	UG/KG	6.93	--	--	**210**	**140**	**52**	**190**
PCB 52 *	UG/KG	6.93	--	--	**300**	**210**	**66**	**270**
PCB 66 *	UG/KG	6.93	--	--	**200**	**140**	**52**	**190**
PCB 77 *	UG/KG	6.93	--	--	**23 COL**	**18 COL**	**8.9**	**21 COL**
PCB 87	UG/KG	6.93	--	--	**80 COL**	**72 COL**	**20 COL**	**65 COL**
PCB 90	UG/KG	6.93	--	--	9.3 U	6.3 U	2.2 U	9.9 U
PCB 101 *	UG/KG	6.93	--	--	**COL**	**190 EST**	**57 EST**	**190 EST**
PCB 105 *	UG/KG	6.93	--	--	**56**	**53**	**16**	**48**
PCB 118 *	UG/KG	6.93	--	--	**140**	**120**	**39**	**130**
PCB 126 *	UG/KG	6.93	--	--	9.3 U	6.3 U	2.2 U	9.9 U
PCB 128 *	UG/KG	6.93	--	--	**23 B**	**23 B**	**7.2 B**	**20 B**
PCB 138 *	UG/KG	6.93	--	--	**110**	**110**	**36**	**93**
PCB 153 *	UG/KG	6.93	--	--	**100**	**110**	**38**	**90**
PCB 156	UG/KG	6.93	--	--	**12**	**12**	**3.8**	**10**
PCB 169 *	UG/KG	6.93	--	--	9.3 U	6.3 U	2.2 U	9.9 U
PCB 170 *	UG/KG	6.93	--	--	**31 EST**	**39 EST**	**14 EST**	**29 EST**
PCB 180 *	UG/KG	6.93	--	--	**55**	**72**	**26**	**49**
PCB 183	UG/KG	6.93	--	--	**16**	**19**	**6.8**	**14**
PCB 184	UG/KG	6.93	--	--	9.3 U	6.3 U	**1 J COL**	9.9 U
PCB 187 *	UG/KG	6.93	--	--	**34**	**40**	**15**	**29**
PCB 195	UG/KG	6.93	--	--	**5.4 J EST**	**8.3 EST**	**2.7 EST**	9.9 U
PCB 206	UG/KG	6.93	--	--	**6.6 J**	**8**	**2.9**	**5.9 J**
PCB 209	UG/KG	6.93	--	--	**8.7 J**	**11**	**2.1 J**	**9.3 J**
TOTAL PCBs (ND=0)	UG/KG	---	59.8	676	**4,324**	**3,238**	**1,118**	**3,832**
TOTAL PCBs (ND=1/2RL)	UG/KG	---	59.8	676	**4,343**	**3,251**	**1,123**	**3,852**
TOTAL PCBs (ND=RL)	UG/KG	---	59.8	676	**4,361**	**3,263**	**1,127**	**3,872**

* PCB congeners used for Total PCB summation, as per Table 9-3 of the ITM (USEPA/USACE 1998)

***Source* : MacDonald et al. 2000. Development and Evaluation of Consensus-Based Sediment Quality Guidelines for Freshwater Ecosystems. Arch. Environ. Contam. Toxicol. 39: 20-31.

NOTE: Shaded and bold values indicate detected concentrations. Values not shaed or bold indicated non-detected concentrations represented by the average RL.

RL = average reporting limit
B (organic) = detected in the laboratory method blank
TEC = Threshold Effect Concentration
J (organic) = compound was detected, but below the reporting limit (value is estimated)
PEC = Probable Effect Concentration
J (inorganic) = detected in the laboratory method blank
COL = more than 40% difference between initial and confirmation results; the lower result is reported
EST = estimated value
U = compound was analyzed, but not detected

TABLE 9. CONCENTRATIONS OF TARGET ANALYTES THAT EXCEEDED SEDIMENT QUALITY GUIDELINES

DRESDEN POOL, MAY 2008

ANALYTE	UNITS	RL	TEC*	PEC*	DR08-01	DR08-02	DR08-03	DR08-04	DR08-05	DR08-06	DR08-07	DR08-08	DR08-09	DR08-10	DR08-11	DR08-11FD	DR08-12	DR08-13	DR08-14	DR08-15	DR08-16
ARSENIC	MG/KG	0.109	9.79	33	--	--	--	--	--	--	--	--	--	--	--	--	--	26	--	--	13
CADMIUM	MG/KG	0.109	0.99	4.98	7.5	--	--	7.4	2.9	4.5	2.8	3.6	5.2	3.0	9.1	4.1	1.3	17.3	3.1	12.7	29.3
CHROMIUM	MG/KG	0.218	43.4	111	93.4 J	--	--	106 J	--	59.2 J	45.9 J	46.4 J	59.5 J	--	56.2 J	54.5 J	--	196 J	51.9 J	158 J	301 J
COPPER	MG/KG	0.218	31.6	149	112	--	--	123	44	68	52	62	73	43	57	60	--	185	64	161	214
LEAD	MG/KG	0.109	35.8	128	125	--	--	143	54	86	72	66	98	67	91	91	47	311	110	176	312
MERCURY	MG/KG	0.050	0.18	1.06	0.72	--	--	0.63	0.24	0.56	0.27	0.29	0.45	0.44	0.56	0.45	0.72	3.10	0.30	0.79	1.50
NICKEL	MG/KG	0.109	22.7	48.6	37	--	--	51	--	24	29	29	38	24	41	45	27	36	25	65	106
ZINC	MG/KG	0.544	121	459	519 J	--	--	611 J	213 J	264 J	225 J	296 J	455 J	267 J	354 J	356 J	204 J	836 J	314 J	655 J	1280 J
ANTHRACENE	UG/KG	204	57.2	845	820	390	140	870	410	440	270	320	650	650	1,500	1,300	740	14,000	2,300	910	1,700
BENZO(A)ANTHRACENE	UG/KG	204	108	1,050	2,000	1,900	--	2,300	1,000	770	210	740	1,900	1,800	5,300	5,300	3,200	84,000	9,500	2,600	6,300
BENZO(A)PYRENE	UG/KG	204	150	1,450	2,700	1,900	--	2,900	1,200	1,000	360	1,100	2,500	2,400	7,000	6,300	3,900	73,000	11,000	3,400	4,900
CHRYSENE	UG/KG	204	166	1,290	2,700	2,200	--	2,800	1,300	920	280	1,100	2,300	2,300	6,100	5,600	3,900	83,000	11,000	3,600	7,200
DIBENZO(A,H)ANTHRACENE	UG/KG	204	33	--	620	410	--	650	250	230	77 J	210	550	500	1,300	1,200	680	9,000	2,400	590	950
FLUORANTHENE	UG/KG	204	423	2,230	3,100	1,500	--	3,300	1,800	1,400	720	1,400	2,500	2,300	5,200	4,900	2,600	110,000	9,800	5,100	15,000
FLUORENE	UG/KG	204	77.4	536	680	390	--	590	400	560	--	430	490	460	750	620	430	5,800	620	340	1,100
NAPHTHALENE	UG/KG	204	176	561	240	--	--	200	--	--	--	--	--	--	370	370	--	990 J	470	380	390
PHENANTHRENE	UG/KG	204	204	1,170	1,200	410	--	1,300	470	520	--	490	880	810	2,000	1,700	690	12,000	3,000	1,600	1,400
PYRENE	UG/KG	204	195	1,520	2,900	1,200	--	3,100	1,700	1,200	330	1,400	2,200	2,000	4,400	3,900	2,100	90,000	7,200	3,800	11,000
TOTAL PAHs (ND=0)	UG/KG	--	1,610	22,800	26,360	16,198	--	27,900	12,759	11,127	4,017	11,319	22,360	21,200	54,910	50,390	29,740	672,690	92,580	34,070	67,240
TOTAL PAHs (ND=1/2RL)	UG/KG	--	1,610	22,800	26,360	16,198	1,717	27,900	12,759	11,127	4,217	11,319	22,360	21,200	54,910	50,390	29,740	672,690	92,645	34,094	67,286
TOTAL PAHs (ND=RL)	UG/KG	--	1,610	22,800	26,360	16,198	1,977	27,900	12,759	11,127	4,417	11,319	22,360	21,200	54,910	50,390	29,740	672,690	92,710	34,117	67,332
TOTAL PCBs (ND=0)	UG/KG	--	59.8	676	574	62	--	678	271	398	146	291	391	341	423	423	226	225	370	963	1,314
TOTAL PCBs (ND=1/2RL)	UG/KG	--	59.8	676	577	65	--	681	273	402	151	293	393	343	426	425	228	227	372	966	1,320
TOTAL PCBs (ND=RL)	UG/KG	--	59.8	676	580	68	--	683	275	405	155	295	395	344	429	427	230	229	374	969	1,326

**Source* : MacDonald et al. 2000. Development and Evaluation of Consensus-Based Sediment Quality Guidelines for Freshwater Ecosystems. Arch. Environ. Contam. Toxicol. 39: 20-31.

RL = average reporting limit

TEC = Threshold Effect Concentration

PEC = Probable Effect Concentration

FD = field duplicate

J (inorganic) = detected in the laboratory method blank

concentration exceeds TEC

concentration exceeds PEC

TABLE 9. CONCENTRATIONS OF TARGET ANALYTES THAT EXCEED SEDIMENT QUALITY GUIDELINES

DRESDEN POOL, MAY 2008

ANALYTE	UNITS	RL	TEC*	PEC*	DR08-17	DR08-18	DR08-19	DR08-20	DR08-21	DR08-22	DR08-23	DR08-24	DR08-25	DR08-26	DR08-27	DR08-28	DR08-28FD	DR08-29	DR08-30	DR08-31
ARSENIC	MG/KG	0.109	9.79	33	--	17	--	--	--	--	--	--	--	--	--	--	--	--	10	--
CADMIUM	MG/KG	0.109	0.99	4.98	1.5	41.3	6.0	4.9	3.9	3.4	3.7	7.3	5.5	7.9	4.4	1.7	1.7	3.7	2.2	2.0
CHROMIUM	MG/KG	0.218	43.4	111	--	355 J	77.3 J	79.1 J	55.3 J	47.4 J	57.3 J	71.3 J	125 J	147 J	56.5 J	--	--	57.2 J	--	--
COPPER	MG/KG	0.218	31.6	149	37	284	87	58	59	49	73	82	98	140	68	38	33	50	103	47
LEAD	MG/KG	0.109	35.8	128	40	366	127	100	92	84	87	138	222	215	90	51	57	99	241	105
MERCURY	MG/KG	0.050	0.18	1.06	--	3.30	0.58	0.48	0.66	0.51	0.32	0.87	0.97	2.60	0.30	0.24	--	0.29	--	0.24
NICKEL	MG/KG	0.109	22.7	48.6	--	91	38	77	49	46	35	29	57	56	34	--	--	55	32	--
ZINC	MG/KG	0.544	121	459	145 J	1450 J	491 J	342 J	374 J	312 J	335 J	305 J	547 J	757 J	330 J	158 J	172 J	429 J	333 J	383 J
ANTHRACENE	UG/KG	204	57.2	845	140	6,600	1,300	5,800	4,200	11,000	6,900	1,400	4,000	3,000	1,200	590	420	3,000	140	130
BENZO(A)ANTHRACENE	UG/KG	204	108	1,050	500	18,000	4,600	43,000	13,000	93,000	25,000	5,200	16,000	12,000	5,800	1,900	1,200	12,000	590	570
BENZO(A)PYRENE	UG/KG	204	150	1,450	580	15,000	5,400	45,000	15,000	86,000	22,000	4,800	18,000	15,000	7,200	1,400	1,300	12,000	590	600
CHRYSENE	UG/KG	204	166	1,290	610	21,000	5,700	41,000	14,000	94,000	25,000	6,600	18,000	14,000	7,100	1,700	1,500	12,000	570	590
DIBENZO(A,H)ANTHRACENE	UG/KG	204	33	--	90	2,900	1,300	2,700	4,300	5,500	3,500	1,000	2,500	3,100	1,500	190	170	2,700	89	120
FLUORANTHENE	UG/KG	204	423	2,230	960	45,000	6,700	43,000	21,000	130,000	43,000	10,000	44,000	23,000	9,100	4,400	2,600	16,000	1,500	1,000
FLUORENE	UG/KG	204	77.4	536	--	4,800	430	1,500	1,100	2,000	940	920	1,800	1,200	460	210	160	570	--	--
NAPHTHALENE	UG/KG	204	176	561	--	1,100	390	1,100	870	1,400	570	270	970	1,300	460	--	--	720	--	--
PHENANTHRENE	UG/KG	204	204	1,170	300	10,000	2,000	3,900	5,600	7,700	11,000	1,500	19,000	8,100	2,200	1,600	760	2,900	510	400
PYRENE	UG/KG	204	195	1,520	700	32,000	4,200	32,000	12,000	85,000	28,000	6,300	24,000	13,000	5,000	2,200	1,400	8,900	710	640
TOTAL PAHs (ND=0)	UG/KG	--	1,610	22,800	6,185	203,700	47,860	350,700	137,980	760,200	231,990	52,860	201,770	141,310	60,430	18,224	13,060	108,110	6,463	5,881
TOTAL PAHs (ND=1/2RL)	UG/KG	--	1,610	22,800	6,185	203,700	47,881	350,700	138,045	760,200	231,990	52,894	201,930	141,310	60,462	18,240	13,077	108,265	6,479	5,898
TOTAL PAHs (ND=RL)	UG/KG	--	1,610	22,800	6,185	203,700	47,902	350,700	138,110	760,200	231,990	52,928	202,090	141,310	60,494	18,256	13,093	108,420	6,495	5,915
TOTAL PCBs (ND=0)	UG/KG	--	59.8	676	140	1,894	519	1,612	706	480	447	217	548	876	436	473	378	733	326	137
TOTAL PCBs (ND=1/2RL)	UG/KG	--	59.8	676	143	1,906	521	1,618	711	482	449	219	550	882	438	475	380	739	331	141
TOTAL PCBs (ND=RL)	UG/KG	--	59.8	676	146	1,917	524	1,623	717	484	451	221	552	888	439	477	382	745	336	145

**Source* : MacDonald et al. 2000. Development and Evaluation of Consensus-Based Sediment Quality Guidelines for Freshwater Ecosystems. Arch. Environ. Contam. Toxicol. 39: 20-31.

RL = average reporting limit
TEC = Threshold Effect Concentration
PEC = Probable Effect Concentration
FD = field duplicate
J (inorganic) = detected in the laboratory method blank

🟨 **concentration exceeds TEC**
🟥 concentration exceeds PEC

TABLE 10. CONCENTRATIONS OF TARGET ANALYTES THAT EXCEED SEDIMENT QUALITY GUIDELINES

LOWER BRANDON POOL, MAY 2008

ANALYTE	UNITS	RL	TEC*	PEC*	BR08-01	BR08-02	BR08-03	BR08-04
ARSENIC	MG/KG	0.108	9.79	33	--	10.5	-	--
CADMIUM	MG/KG	0.108	0.99	4.98	21	23	8.4	18
CHROMIUM	MG/KG	0.215	43.4	111	274 J	282 J	125 J	244 J
COPPER	MG/KG	0.215	31.6	149	235	264	146	177
LEAD	MG/KG	0.108	35.8	128	456	322	196	315
MERCURY	MG/KG	0.0355	0.18	1.06	1.4	2.0	0.84	0.83
NICKEL	MG/KG	0.108	22.7	48.6	163	109	50	129
ZINC	MG/KG	0.535	121	459	933 J	1,170 J	642 J	800 J
ANTHRACENE	UG/KG	361	57.2	845	7,100	6,300	1,800	10,000
BENZO(A)ANTHRACENE	UG/KG	361	108	1050	35,000	16,000	6,100	40,000
BENZO(A)PYRENE	UG/KG	361	150	1450	35,000	21,000	6,900	38,000
CHRYSENE	UG/KG	361	166	1290	38,000	26,000	6,400	47,000
DIBENZO(A,H)ANTHRACENE	UG/KG	361	33	--	9,500	4,600	990	6,700
FLUORANTHENE	UG/KG	361	423	2,230	45,000	36,000	11,000	65,000
FLUORENE	UG/KG	361	77.4	536	2,900	2,800	720	2,800
NAPHTHALENE	UG/KG	361	176	561	1,900	6,600	840	3,700
PHENANTHRENE	UG/KG	361	204	1,170	6,600	11,000	3,300	12,000
PYRENE	UG/KG	361	195	1,520	26,000	23,000	6,700	32,000
TOTAL PAHs (ND=0)	UG/KG	--	1,610	22,800	322,000	216,600	64,070	359,800
TOTAL PAHs (ND=1/2RL)	UG/KG	--	1,610	22,800	322,310	216,810	64,107	359,965
TOTAL PAHs (ND=RL)	UG/KG	--	1,610	22,800	322,620	217,020	64,144	360,130
TOTAL PCBs (ND=0)	UG/KG	--	59.8	676	4,324	3,238	1,118	3,832
TOTAL PCBs (ND=1/2RL)	UG/KG	--	59.8	676	4,343	3,251	1,123	3,852
TOTAL PCBs (ND=RL)	UG/KG	--	59.8	676	4,361	3,263	1,127	3,872

*Source: MacDonald et al. 2000. Development and Evaluation of Consensus-Based Sediment Quality Guidelines for Freshwater Ecosystems. Arch. Environ. Contam. Toxicol. 39: 20-31.

RL = average reporting limit

TEC = Threshold Effect Concentration

PEC = Probable Effect Concentration

J (organic) = compound was detected, but below the reporting limit (value is estimated)

🟨 **concentration exceeds TEC**

🟥 concentration exceeds PEC

TABLE 11. COMPARISON OF SEDIMENT CONCENTRATIONS TO HISTORICAL DATA*
DRESDEN AND LOWER BRANDON POOLS, MAY 2008

	DR08-01		DR08-03		DR08-05		DR08-06		
Year	1994/1995	2008	1994/1995	2008	1994/1995	2008	1994/1995	1994/1995	2008
River Mile	271.6	271.6	273.0	273.0	273.6	273.6	274.8	274.8	274.8
ARSENIC	6.44	7.90	8.25	2.20	5.94	3.40	6.92	6.36	3.20
CADMIUM	8.84	7.50	0.831	0.490	8.43	2.90	2.88	3.1	4.5
CHROMIUM	110	93.4 J	12.2	7.5 J	96.3	34.6 J	54.6	55	59.2 J
COPPER	112	112	17	8	102	44	53.1	54.5	67.8
LEAD	153	125	21.2	10.1	123	54	75.1	73	85.7
MERCURY	0.958	0.720	0.076	0.031	0.596	0.240	<0.040	0.24	0.56
NICKEL	54.5	37.2	14.4	7.5	48.7	22.7	38.4	42.9	24.3
ZINC	587	519 J	82.2	44 J	543	213 J	297	321	264 J
ACENAPHTHENE	<7,500	300	<5,900	130 U	<6,500	220	<6,700	<6,900	210 J
ACENAPHTHYLENE	<7,500	700	<5,900	140	<6,500	340	<6,700	<6,900	380
ANTHRACENE	<740	820	96	140	660	410	83	92	440
BENZO(A)ANTHRACENE	3,200	2,000	340	57 J	3,300	1,000	390	460	770
BENZO(A)PYRENE	4,300	2,700	580	130	3,300	1,200	680	770	1,000
BENZO(B)FLUORANTHENE	8,800	3,100	980	210	3,500	1,400	1,100	1,100	1,400
BENZO(GHI)PERYLENE	7,100	2,100	1,100	61 J	4,900	840	1,200	1,100	840
BENZO(K)FLUORANTHENE	2,200	1,300	190	41 J	1,600	550	320	330	430
CHRYSENE	6,600	2,700	440	70 J	61,000	1,300	700	770	920
DIBENZO(A,H)ANTHRACENE	5,300	620	1,400	130 U	3,400	250	1,200	1,600	230
FLUORENE	<1,600	680	<1,200	130 U	<1,400	400	<1,400	<1,500	560
INDENO(1,2,3-CD)PYRENE	3,200	1,900	430	70 J	2,500	790	560	600	740
NAPHTHALENE	<7,500	240	<5,900	130 U	<6,500	89 J	<6,700	<6,900	87 J
PHENANTHRENE	2,600	1,200	720	100 J	1,800	470	1,410	550	520
PYRENE	6,200	2,900	1,400	98 J	5,700	1,700	1,400	1,500	1,200

	DR08-07		DR08-08		DR08-09		DR08-11		DR08-15	
Year	1994/1995	2008	1994/1995	2008	1994/1995	2008	1994/1995	2008	1994/1995	2008
River Mile	274.8	274.8	276.0	276.0	276.0	276.0	276.9	276.9	278.3	278.3
ARSENIC	5.52	4.40	5.43	3.90	5.88	5.20	11.7	4.7	7.59	6.30
CADMIUM	3.07	2.80	3.85	3.60	4.49	5.20	24.7	9.1	23.3	12.7
CHROMIUM	48.9	45.9 J	55.6	46.4 J	67.6	59.5 J	205	56.2 J	217	158 J
COPPER	47	52	69.5	62.3	68.8	72.9	176	57	188	161
LEAD	73	72	78	66	97.7	97.8	222	91	232	176
MERCURY	0.238	0.270	0.256	0.290	0.268	0.450	0.856	0.560	0.951	0.790
NICKEL	33.9	29.3	37.8	29.0	50.5	37.5	61.2	41.1	84.9	64.7
ZINC	217	225 J	345	296 J	477	455 J	1,020	354 J	1,070	655 J
ACENAPHTHENE	<7,700	160 J	<7,800	160	<7,700	250	<7,000	490	<8,700	220
ACENAPHTHYLENE	<7,700	240	<7,800	290	<7,700	710	<7,000	1,700	<8,700	830
ANTHRACENE	<76	270	130	320	270	650	1,100	1,500	840	910
BENZO(A)ANTHRACENE	260	210	650	740	2,000	1,900	6,300	5,300	4,300	2,600
BENZO(A)PYRENE	440	360	1,300	1,100	3,100	2,500	4,800	7,000	4,800	3,400
BENZO(B)FLUORANTHENE	1,100	560	2,000	1,400	4,300	2.700	8,500	6,500	8,600	5,200
BENZO(GHI)PERYLENE	740	220	2,500	880	4,100	1,900	6,600	4,700	6,400	3,000
BENZO(K)FLUORANTHENE	200	140 J	640	510	1,500	1,100	2,200	3,400	2,600	47 U
CHRYSENE	480	280	1,100	1,100	2,700	2,300	11,000	6,100	11,000	3,600
DIBENZO(A,H)ANTHRACENE	1,000	77 J	1,500	210	<77	550	4,900	1,300	6,100	590
FLUORENE	<1,600	200 U	<1,600	430	<1,600	490	<1,500	750	<1,800	340
INDENO(1,2,3-CD)PYRENE	370	250	1,400	820	1,400	1,600	3,300	4,200	2,700	2,500
NAPHTHALENE	<7,700	200 U	<7,800	69 J	<7,700	130 J	<7,000	370	<8,700	380
PHENANTHRENE	270	200	730	490	1,100	880	3,800	2,000	2,800	1,600
PYRENE	910	330	2.400	1.400	3,500	2,200	11,000	4,400	9,200	3,800

	DR08-17		DR08-20		DR08-25		DR08-27		DR08-29		DR08-30	
Year	1994/1995	2008	1994/1995	2008	1994/1995	2008	1994/1995	2008	1994/1995	2008	1994/1995	2008
River Mile	279.2	279.2	280.4	280.4	283.6	283.6	284.5	284.5	285.6	285.7	285.8	285.8
ARSENIC	4.44	4.40	8.12	4.60	6.02	4.30	2.03	4.20	8.92	6.00	6.31	9.80
CADMIUM	1.2	1.5	6.77	4.90	8.99	5.50	0.76	4.40	3.9	3.7	<0.034	2.2
CHROMIUM	19.7	28 J	106	79.1 J	148	125 J	21.1	56.5 J	90.1	57.2 J	26.7	19.8 J
COPPER	22.2	37.4	112	58	120	98	13.5	68.4	61.9	49.6	26.2	103.0
LEAD	30.1	39.8	169	100	212	222	115	90	119	99	47.7	241.0
MERCURY	<0.034	0.13	0.475	0.480	1.11	0.97	0.111	0.300	0.215	0.290	0.235	0.150
NICKEL	13.8	18.2	59.6	77.2	59.2	57.2	20.6	34.1	42.3	55.1	17.3	32.1
ZINC	115	145 J	578	342 J	868	547 J	119	330 J	346	429 J	122	333 J
ACENAPHTHENE	<5,700	51	<8,500	1,700	<7,000	1,600	<4,900	410	<5,900	620	<5,500	47
ACENAPHTHYLENE	<5,700	130	<8,500	10,000	<7,000	1,900	<4,900	1,300	<5,900	3,200	<5,500	37
ANTHRACENE	57	140	1,300	5,800	2,000	4,000	940	1,200	450	3,000	550	140
BENZO(A)ANTHRACENE	360	500	7,100	43,000	19,000	16,000	5,400	5,800	1,600	12,000	2,000	590
BENZO(A)PYRENE	610	580	9,800	45,000	20,000	18,000	6,400	7,200	2,300	12,000	2,900	590
BENZO(B)FLUORANTHENE	670	720	14,000	45,000	28,000	25,000	9,200	9,600	3,100	16,000	4,100	880
BENZO(GHI)PERYLENE	1,200	520	14,000	31,000	28,000	13,000	8,100	4,500	3,700	9,300	4,000	360
BENZO(K)FLUORANTHENE	260	320	4,300	17,000	9,800	320 U	2,800	64 U	1,000	310 U	1,300	32 U
CHRYSENE	580	610	9,200	41,000	24,000	18,000	7,300	7.100	250	12,000	2,500	570
DIBENZO(A,H)ANTHRACENE	920	90	14,000	2,700	27,000	2,500	6,800	1,500	1,500	2,700	2,400	89
FLUORENE	<1,200	64	<1,800	1,500	1,600	1,800	<1,000	460	<1,300	570	<1,200	51
INDENO(1,2,3-CD)PYRENE	650	450	7,500	27,000	17,000	12,000	4,200	4,600	2,300	8,200	2,500	360
NAPHTHALENE	<5,700	50	<8,500	1,100	<7,000	970	<4900	460	<5,900	720	<5,500	29 J
PHENANTHRENE	290	300	3,100	3,900	4,000	19,000	2,500	2,200	1,100	2,900	920	510
PYRENE	880	700	12,000	32,000	20,000	24,000	7,800	5,000	3,500	8.900	4,000	710

	BR08-01		BR08-02		BR08-03	
Year	1994/1995	2008	1994/1995	2008	1994/1995	2008
River Mile	286.4	286.4	286.2	286.2	286.0	286.0
ARSENIC	12.6	8.7	11.6	10.5	9.97	5.90
CADMIUM	27.3	21.0	10.5	23.3	12.8	8.4
CHROMIUM	323	274 J	149	282 J	192	125 J
COPPER	314	235	154	264	201	146
LEAD	423	456	272	322	284	196
MERCURY	1.1	1.4	0.985	2.00	0.093	0.840
NICKEL	199	163	82.5	109.0	75.4	50.3
ZINC	1420	933 J	841	1.170 J	1010	642 J
ACENAPHTHENE	71,000	3,000	84,000	2,000	<45,000	520
ACENAPHTHYLENE	<3,7000	10,000	<43,000	5,300	<45,000	1,500
ANTHRACENE	7,800	7,100	13,000	6,300	1,400	1,800
BENZO(A)ANTHRACENE	30,000	35,000	25.000	16,000	5,000	6,100
BENZO(A)PYRENE	30,000	35,000	23,000	21,000	4,600	6,900
BENZO(B)FLUORANTHENE	43,000	47,000	38,000	27,000	7,200	9,500
BENZO(GHI)PERYLENE	40,000	29,000	30,000	15,000	6,600	3,900
BENZO(K)FLUORANTHENE	17,000	620 U	12,000	420 U	2,300	74 U
CHRYSENE	36,000	38,000	35,000	26,000	6,800	6,400
DIBENZO(A,H)ANTHRACENE	22,000	9,500	19,000	4,600	9,200	990
FLUORENE	<7,800	2,900	<9,200	2,800	<9,600	720
INDENO(1,2,3-CD)PYRENE	23,000	26,000	15,000	14,000	2,700	3.900
NAPHTHALENE	<37,000	1,900	<43,000	6,600	<45,000	840
PHENANTHRENE	14,000	6,600	22,000	11,000	3,800	3,300
PYRENE	15,000	26.000	38,000	23,000	12,000	6.700

🟩	2008 concentrations that exceed 1994-1995 concentrations
🟨	2008 concentrations that are within a factor of two lower than 1994-1995 concentrations

**Source*: Burton, GA. 1995. The Upper Illinois Waterway Study, 1994-1995 Sediment Contamination Assessment. Prepared for Commonwealth Edison Company, Chicago, Illinois.

J (organic) = compound was detected, but below the reporting limit (value is estimated)

J (inorganic) = detected in the laboratory method blank

U = compound was analyzed, but not detected

APPENDIX A

FIELD LOGBOOK

Location

Date 5/6/08

Project / Client Nijman - Franzetti Sediment
14581.02

STATE PLANE
ILLINOIS EAST
NAD83

0634 arrive Dresden Lock + Dam
on board: Joe Vondruska + Karin Olson
load boat
clear, sunny, warm

0730 DR08-01
525632.78 N
304501.6 E
no sample recovered

- 1st attempt failed; moved location further out into river b/c dense macrophyte ~~[illegible]~~ roots impeded sample recovery

* new location 78 m from right descending bank (RDB)
188 m upstream of lock + dam
water depth 4.9 ft

525570.11 N
304526.87 E
new location

⇒

Location

Date 5/6/08

Project / Client Nijman - Franzetti Sediment 14581.02

DR08-01 (cont)

* material was dark brown to grey silty; lots of water + visible sheen; area sampled had dense macrophyte ~~[illegible]~~ roots + root mass

slight petroleum odor

08:24 DR08-02 - on location

- ~~50~~ 52 m downstream 2nd mooring cell
- 13 m from shore left descending bank (LDB)

525297.67 N

305066.82 E

Water depth = 4.1 ft

0834 - sample collected

* material is dark to light grey, primarily silt w/ some sand + clay clumps; some leaf debris visible; sheen visible at surface of sediment in pot

Location

Date 5/6/08

Project / Client Nijman - Franzetti Sediment 14581.02

0911 DR08-03

- 189 m upstream from mouth - Kankakee River
- 62 m from RDB from point that forms downstream end of backwater

524168.22 N

306200.37 E

water depth 2.8 ft

- Material is light grey, primarily sand with some silts graing with visible sand grains

0948 DR08-04

Bay Hill Marina

- 45 m out from boat ramp
- 19 m from back of No Wake sign (b/w shore + sign)

Location
Date 5/6/08
Project / Client Nijman-Franzetti Sediment
14581.02

DR08-04 (cont)

523907.42 N
307041.19 E

water depth = 3.9 ft

light gray silt w/ some sand; visible sand grains; visible sheen noticable odor of ~~product~~ petroleum EAO

1021 DR08-05

524150.12 N
307200.20 E

water depth = 2.6 ft

- 30 m from mouth of I+M Canal
- 30 m from RDB

- light gray silt w/ some fine grained sands (touch, only ~~none~~ visible grains) organic matter (leaves, sticks) + some large gravel

---

Location
Date 5/6/08
Project / Client Nijman-Franzetti Sediment
14581.02

DR08-05 (cont)

- noticable odor of ~~product~~ petroleum EAO and slight oil sheen
- Corbicula present in sediment at location

1117 DR08-06

34 m from LDB
60 m from marina pier

524200.45 N
308708.11 E

Water depth = 4.8 ft

- noticable odor of ~~product~~ petroleum EAO
light gray clayey silt, very fine grained (no sand grains)
low water content

Location
Date 5/6/08
Project / Client Nijman - Franzetti Sediment
14581.02

1140 DR08 - 07

- 57 m upstream of road
(Grant Creek cutoff)
- 53 m from LDB

- water depth = 4.8 ft
3 CAO
524024.91 N
308797.68 E

- dk. gray / black fine grained silt w/
some clay, low H2O content
no petroleum odor, no visible sheen

1221 DR08 - 08 and DR08-08MS

- 22 m from SW tip of Bear / Moose
Island
- 44 m downstream from orange
painted post; start of electrofish
location 414
525952.64 N
309184.43 E

Location
Date 5/6/08

Project / Client Nijman - Franzetti Sediment
14581.02

DR08-08 (cont)

- water depth = 3.3 ft

- location for MS / MSD

- light gray to brown fine -
grained silt, low water content
no visible sheen, no odor

1305 DR08-09
[illegible]
~~- 66 m SE of duck blind~~ CAO
~~- 57 m from SE tip of Bear / Moose~~
~~Island, towards main channel~~

~~- water depth = 4.3 ft~~

~~525840.57 N~~
~~309393.20 E~~

* location unsuccessful
b/c of no recovery
rocks + large gravel →
moved further offshore
→

Location
Date 5/4/08
Project / Client Nijman-Franzetti Sediment
14581.02

1310 DR08-09
- 94 m from SE tip of Bear / Moose Island, 70 m due E of duck blind

Water depth = 6.2 ft

525548.18 N
309429.70 E

- grey silt w/ some fine-grained sand (no visible grains), some organic matter (sticks + leaves) no odor, no visible sheen

1403 DR08-10
* location added by Joe VonDruska
- water depth = 2.3 ft

525895.87 N
309742.79 E

- dark brown sandy silt; visible sand grains; petroleum odor and visible sheen

---

Location
Date 5/6/08
Project / Client Nijman-Franzetti Sediment
14581.02

RM = river mile

DR08-10 (cont)
- 94 m downstream of the RM 276.1 day mark
- 55 m from LDB
228 m upstream of Dow Chemicals barge loading dock / terminal

1451 DR08-11 + DR08-11 FD
- 480 m SE of Dow Chemical's gravel boat ramp
247 m NW of barge terminal
171 m NE of duck blind
near mouth (~500 m) from Du Page River

527391.13 N
310137.07 E

- water depth = 3.8 ft

- 1453 field duplicate collected

Location

Date 5/6/08

Project / Client Nijman - Franzetti Sediment
14581.02

DR08 - 11 (cont)

- dark brown sandy silt with visible medium grained sands, organic matter petroleum odor; visible sheen some medium ~~[illegible]~~ ~~[illegible]~~ grained gravel

1538 DR08-12

KAO - 245 ~~195~~ m Northwest of Dow Chemical barge terminal
195 ~~245~~ m north East of duck blind
590 m downstream from point located downstream of I-55 bridge (downstream of Du Page River delta point)

527560.20 N
310717.47 E

- industrial facilities on left bank
no development on right bank

Location

Date 5/6/08

Project / Client Nijman - Franzetti Sediment
14581.02

DR08 - 12 (cont)

- dark grey silty sand; visible medium grained sands slight odor of ~~product~~ petroleum KAO; no visible sheen

- water depth = 1.7 ft

1615 DR08- 13

- water depth = 4.2 ft

- 247 m upstream of Dow Chemical barge terminal
- 340 m downstream of BASF barge terminal
- 45 m from LDB

527436.31 N
311064.39 E

Location
Date 5/6/08
Project / Client Nijman-~~Franzetti~~ Sediment
14581.02

DR08-13 (cont)

- dark gray clayey silt; organic matter (leaf debris) substantial petroleum odor and visible sheen

1721 EQBDAY 1

- equipment blank for petit ponar
- 7 jars total

* 2 coolers sent to TestAmerica - Pitt
tracking # J213 161 8998
J213 161 9004

Location
Date 5/7/08
Project / Client Nijman-~~Franzetti~~ Sediment
14581.02

0722 arrive marina
- on board: Joe Vondruska and Karin Olsen
- overcast and raining

0826 DR08-14

- 125 m downstream of Exxon Mobile furthest downstream docking cell
- 62 m downstream of I-55
- 154 m upstream of BASF barge terminal
- 35 m from LDB

527749.38 N
311541.77 E

* station added by Joe

water depth = 3.1 ft

dark gray sandy silt; visible fine grained sands; visible oil sheen, noticeable petroleum odor

Location ______ Date 5/7/08

Project / Client Nijman-Franzetti Sediment
14581.02

0906 DR08-15

528202.28 N
312424.05 E

water depth = 5.7 ft

-84 m downstream of Jackson Creek dam
-24 m from LDB
-36 m upstream of Exxon-Mobile intake

gray clayey silt, low H_2O content, visible oil sheen, noticeable petroleum odor

0925 DR08-16

528301.02 N
312425.64 E

Location ______ Date 5/7/08

Project / Client Nijman-Franzetti Sediment
14581.02

DR08-16 (cont)

water depth = 3.8 ft

-24 m from RDB
-73 m downstream from Jackson Creek dam
-dark gray to black clayey silt, visible sheen, strong petroleum odor

1012 DR08-17

- 70 m downstream of mouth of Jackson Creek diversion channel
-75 m from LDB
-96 m from downstream tip of treats Island

592093.11 N
313372.95 E

water depth = 3.4 ft

- dark gray silt w/ fine grained sands (not visible, only touch),

⇒

Location

Date 5/7/08

Project / Client Nijman-Fran~~zetti~~ Sediment
14581.02

DR08-17 (cont)

- visible sheen, strong petroleum odor
- recovery difficult b/c sticks and leaves on bottom

1058 DR08-18

EAO

- 11 m ~~down~~ up stream of powerline pole and ~~[illegible]~~ abutment
- 16 m from RDB

- water depth = 4.1 ft

529757.65 N
314045.21 E

- black silt, high H_2O content, visible sheen, strong petroleum odor

Location

Date 5/7/08

Project / Client Nijman-Franzetti Sediment
14581.02

1142 DR08-19

- 21 m from LDB
- 71 m upstream from mouth of Cedar Creek
- 206 m downstream from Stepan Chem barge terminal

530312.49 N
314049.81 E

water depth = 3.1 ft

- dark brown silt w/ some medium grained sand (visible), high H_2O content

1205-1225
MBI site RM 279.5

- potential sediment sampling site; investigated both banks; conditions predominated coarse grained gravels w/o sed. deposition

⟹

Location ____ Date 5/7/08

Project / Client Nijman - ~~Franzetti~~ Sediment
14581.02

MB1 site RM 279.5 (cont)

no Ponar attempts made b/c no suitable substrates were identified

1248 DR08 - 20

-12 m from RDB

-34 m from furthest downstream Amoco chemical docking cell

- water depth = 1.1 ft

530791.69 N
313816.77 E

- very strong petroleum odor and visible sheen (persistent & pronounced), some corbicula in sample

- sandy silt, dark gray medium grained sands (visible); high H_2O content

Location ____ Date 5/7/08

Project / Client Nijman - ~~Franzetti~~ Sediment
14581.02

1326 DR08-21

- water depth = 2.1 ft

-132 m downstream of Cedar Creek RM 280.4 daymark

-50 m from LDB

530829.91 N
314067.50 E

- dark brown to gray sandy silt, visible medium grained sands, slight petroleum odor, minor sheen, high H_2O content

1422 DR08-22

-50 m from LDB

(E40) - ~~277~~ 312 m across river from ~~Sulfur~~ canal Barge Co. terminal (E40)

- water depth = 2.3 ft

⟹

Location
Date 5/7/08
Project / Client Nijman-Franzetti Sediment
14581.02

DR08-22
533283.54 N
313854.45 E

- dark brown sandy silt w/ visible medium grained sands; slight petroleum odor, minimal sheen, sticks and Corbicula in sample

1453 DR08-23

- water depth = 5.2 ft

- 28 m upstream of Rock ~~b~~ Run daymark
- 47 m from RDB

533533.85 N
314666.77 E

- dark brown sandy silt, visible medium grain sands, slight sheen, slight petroleum odor

---

Location
Date 5/7/08
Project / Client Nijman - Franzetti Sediment
14581.02

1522 DR08-24

- 28 m from LDB
- 122 m downstream of ~~red~~ Santa Fe Light and ~~D~~ daymark 282.8 RM

- water depth = 2.8 ft

533613.56 N
315436.18 E

- dark brown sandy silt; sand grains not visible (touch only); slight petroleum odor, slight sheen

1614 EQBDAY2

1725 2 coolers to TestAmerica
tracking # J213 161 9193
J213 161 9184

Location

Date 5/8/07

Project / Client Nijman-~~Franzetti~~ Sediment
14581.02

0705 arrive marina + load boat
- on board: Joe Vondruska + Karin Olsen
- overcast, cool (low 50s), breezy

0742 DR08-16
take site photos; not collected yesterday b/c driving rains during sample collection

0754 DR08-18
take site photos; not collected yesterday b/c driving rains during sample collection

0843 DR08-25
- ~495 m upstream from Empress casino
40 m from RDB; directly off from ~84 in stormH₂O outfall
- water depth = 1.8 ft

Location

Date 5/8/07

Project / Client Nijman-~~Franzetti~~ Sediment
14581.02

DR08-25 (cont)
534548.22 N
316278.61 E

- dark brown sandy silt w/ some medium grained sands, visible sheen, slight petroleum odor

0910 DR08-26 and DR08-26MS
- 10 m upstream Caterpillar 42 in outfall
- 30 m from RDB
- outfall ~150 m upstream of onshore settling basin
- water depth = 2.0 ft
- 534825.44 N
316661.89 E
- dark brown sandy silt w/ medium grained sands visible, slight odor of petroleum, slight sheen

Location
Date 5/8/07
Project / Client Nijman-Franzetti Sediment
14581.02

0941 DR08-27

- 32 m from LDB
- 27 m from head of cove

- Water depth = 2.3 ft

535536.41 N
317629.03 E

- dark brown sandy silt w/ visible medium grained sands; slight petroleum odor, minor sheen, some Coribucula and organic matter (sticks, leaves) visible in sample

~~1012 DR08 28~~

~~• 31 m from LDB~~
~~- 90 m from head of cove.~~
~~- 40 m upstream of main channel LDB~~
~~- 267 m SW of pennisula dividing channel from tailwaters~~

KAO

Location
Date 5/8/07
Project / Client Nijman-Franzetti Sediment
14581.02

~~DR08 28 (cont)~~

KAO

~~Water depth = 4.3 ft~~

~~536177.89 N~~
~~318483.37 E~~ no sample recovered

1022 DR08-28 → new location and DR08-28FD
Water depth = 1.9 ft

- wind moved boat off location, moved, reanchor, and set new location

- 1025 DR08-28 FD (field duplicate) collected

536176.84 N
318479.48 E

- dark gray sandy silt with medium to coarse grained sands
- Corbicula and organic matter & (mostly sticks)

Location

Date 5/8/08

Project / Client Nijman-Franzetti Sediment

14581.02

BR08-28 (cont)

- noticeable petroleum odor; moderate sheen

-31 m from LDB
81 m from head of cove
35 from LDB of main channel
275 SW of peninsula dividing channel from tailwaters

1105 pull boat from Big Basin Marina and move to boat ramp located above Brandon Lock

1203 put boat in above Brandon Lock (b/w I-80 + Lock); check in with USACE

1226 BR08-01

-10 m from LDB
385 m downstream of I-80 bridge
432 m upstream of Brandon Lock and Dam

Location

Date 5/8/08

Project / Client Nijman-Franzetti Sediment

14581.02

537484.68 N
KAE ~~320112. 72E~~
320112.72

water depth = 3.6 ft

- dark gray silt w/ fine grained sands (not visible, touch only) noticeable, pervasive petroleum odor; persistent moderate sheen; organic matter (mostly sticks)

1258 BR08-02

- end of 309 electrofishing area
- 175 m upstream of Brandon Lock + Dam
- 16 m from LDB

537246.52 N
319934.23 E

water depth = 4.7 ft

Location ______ Date 5/8/08

Project / Client Nijman-Franzotti Sediment
14581.02

BR08-02 (cont)

- dark gray silt with noticeable petroleum odor and moderate sheen
  organic matter (mostly sticks)

1324 BR08-03

- 17 m from I+M outlet
  43 m from RDB

- water depth = 1.6 ft

537194.82 N
319237.50 E

- dark gray silt w/ noticeable odor
  and slight sheen; few Corbicula
  and some organic matter

Location ______ Date 5/8/08

Project / Client Nijman-Franzotti Sediment
14581.02

1402 BR08-04

537348.62 N
319438.30 E

~190 m upstream from ~~Brandon~~ access bridges
~~dam~~ to from → ~~eastern portion~~ floating marina
~10 m ~~for~~ RDB

- water depth = 2.1 ft

- dark gray silt w/ fine grained
  sands (not visible, touch only)
  some organic matter (mostly
  sticks); noticeable petroleum odor
  and moderate sheen

1452 EQBDAY3

1535 2 coolers to Test America
tracking # J213 161 9013
J213 161 9219

Location

Date 5/9/08

Project / Client Nijman-Franzetti Sediment
14581.02

0755 arrive Brandon Lock + Dam and
check in with USACE
on board: Joe Vondruska + Karin Olsen
sunny, cool (upper 50s), light breeze

KAO

0924 DR08-30

water depth = 2.2 ft

536568.91N
319522.52 E

- dark gray sandy silt, medium
grained sands visible, some
organic matter (mostly roots
and sticks); minor sheen,
slight petroleum odor; some clay clumps

- ~5 m from left descending bank
of Sugar Run
- ~58 m upstream of mouth

Location

Date

Project / Client Nijman + Franzetti Sediment
14581.02

1005 DR08-31

Water depth = 0.9 ft

536566.62 N
319485.27 E

- mouth of Sugar Run, ~2 m
from RDB

- dark gray sandy silt with
medium to coarse grained
sands, some organic matter,
(mostly sticks) some gravel
pieces; slight odor, no sheen

1118 DR08-29

Water depth = 0.8 ft

536667.48 N
319046.56 E

Location

Date 5/9/08

Project / Client Nijman-Franzetti Sediment
14581.02

DEQ08-29 (cont)

- dark gray sandy silt; medium to coarse grained sands w/ some gravel; some organic matter (mostly sticks and roots); algae on bottom slight odor, minor sheen

- 17 m from RDB
  39 m from head of cove
  27 m upstream of duck blind

1210 EQBDAY 4

1 cooler to Test America
tracking # J213 161 902 2
→ for Saturday delivery

Location

Date

Project / Client

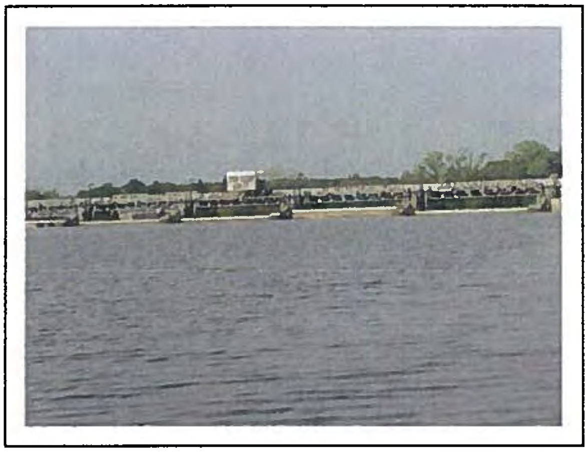
APPENDIX B

SAMPLING PHOTOGRAPHS

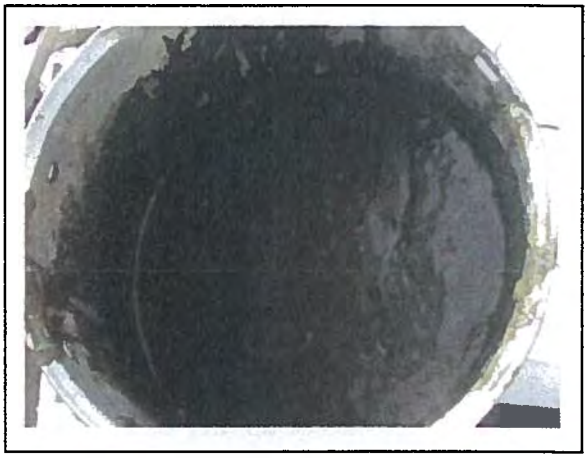
EA Engineering, Science, and Technology, Inc.

Photographic Record

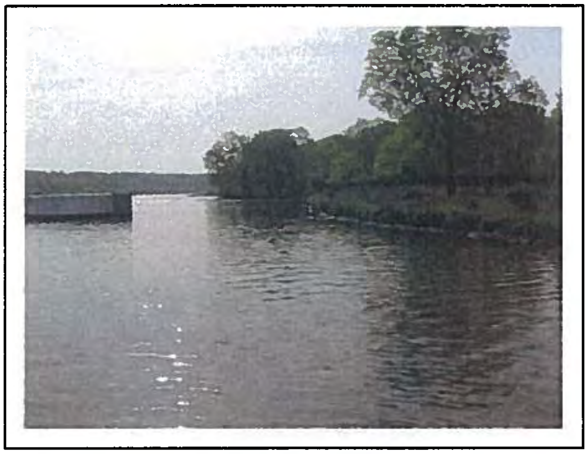
Dresden Pool
May 6-9, 2008



Location DR08-01

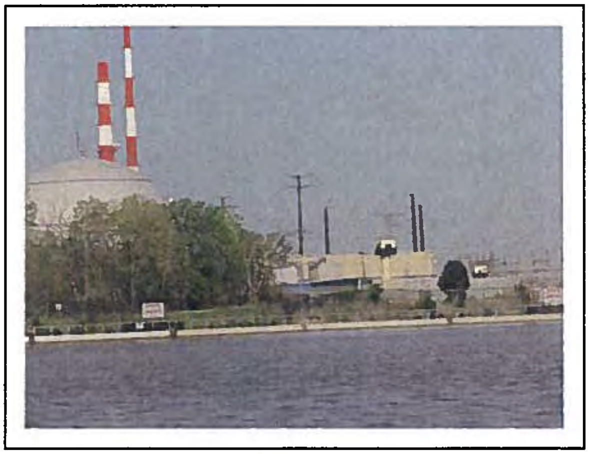


Location DR08-01



Location DR08-02

Location DR08-02



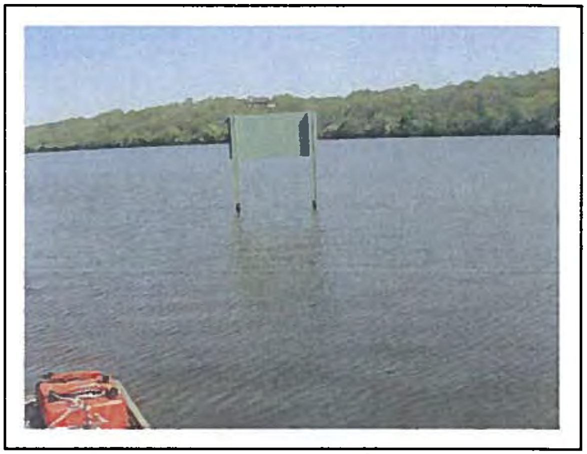
Location DR08-03

Location DR08-03

Photographic Record

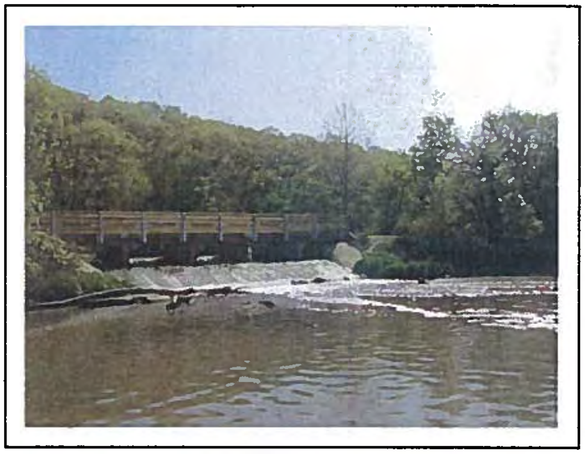
Dresden Pool
May 6-9, 2008

Location DR08-04

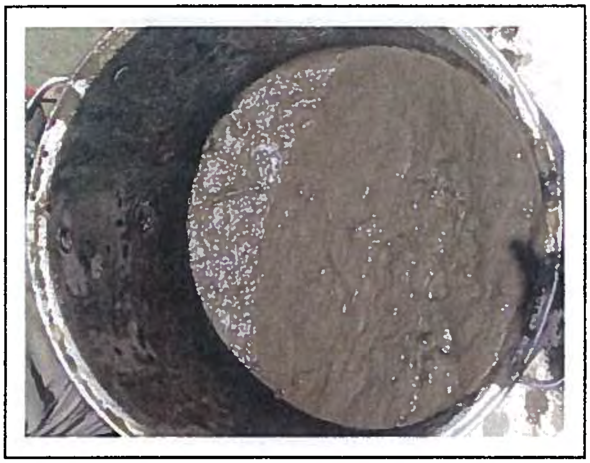


Location DR08-04

Location DR08-04



Location DR08-05



Location DR08-05

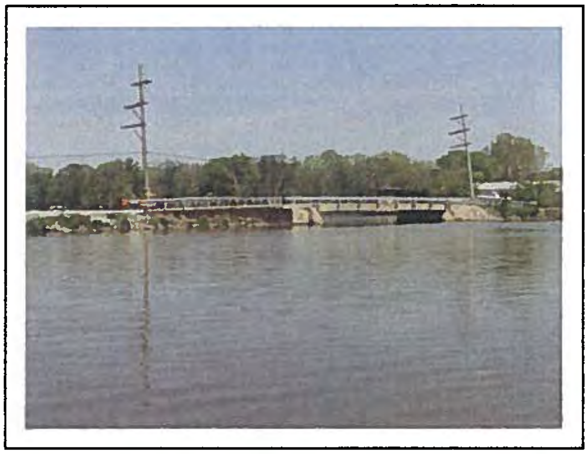
Location DR08-06

Photographic Record

Dresden Pool
May 6-9, 2008

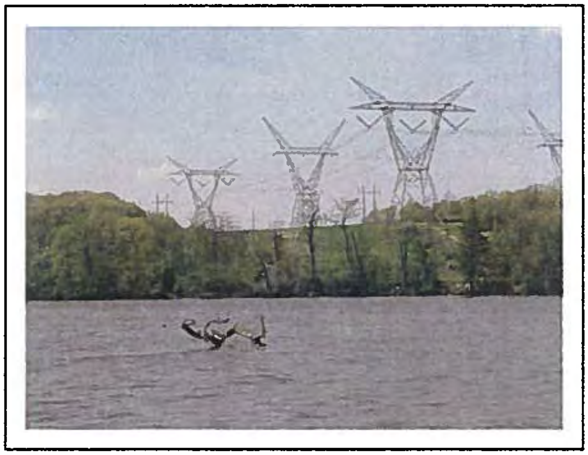
Location DR08-06

Location DR08-06



Location DR08-07

Location DR08-07



Location DR08-08

Location DR08-08

Photographic Record

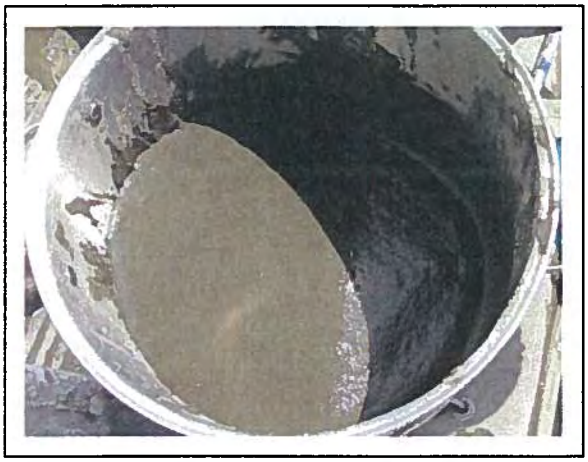
Dresden Pool
May 6-9, 2008

Location DR08-09

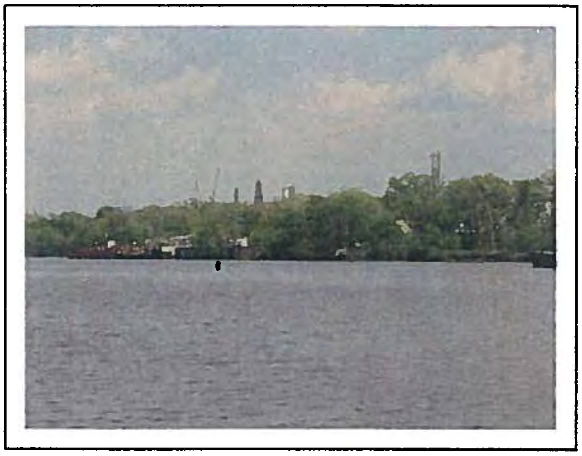
Location DR08-09

Location DR08-10

Location DR08-10



Location DR08-10



Location DR08-11

Photographic Record

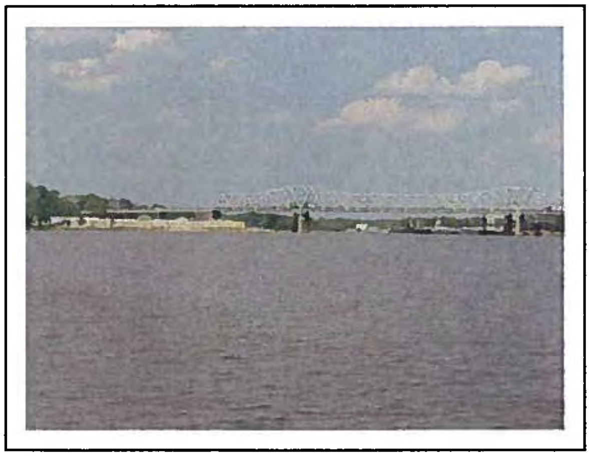
Dresden Pool
May 6-9, 2008

Location DR08-11

Location DR08-11

Location DR08-11

Location DR08-12

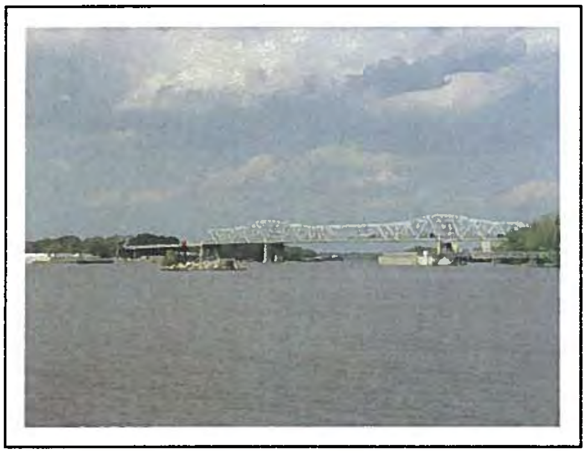


Location DR08-12

Location DR08-12

Photographic Record

Dresden Pool
May 6-9, 2008



Location DR08-13

Location DR08-13

Location DR08-14

Location DR08-14

Location DR08-14

Location DR08-15

EA Engineering, Science, and Technology, Inc.

Photographic Record

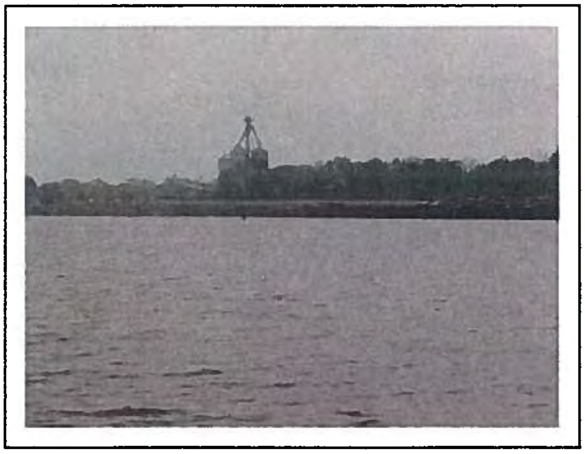
Dresden Pool
May 6-9, 2008

Location DR08-15

Location DR08-15

Location DR08-16

Location DR08-16



Location DR08-17

Location DR08-17

EA Engineering, Science, and Technology, Inc.

Photographic Record

Dresden Pool
May 6-9, 2008

Location DR08-18

Location DR08-18

Location DR08-19

Location DR08-19

Location DR08-20

Location DR08-20

Photographic Record

Dresden Pool
May 6-9, 2008

Location DR08-21

Location DR08-21

Location DR08-22

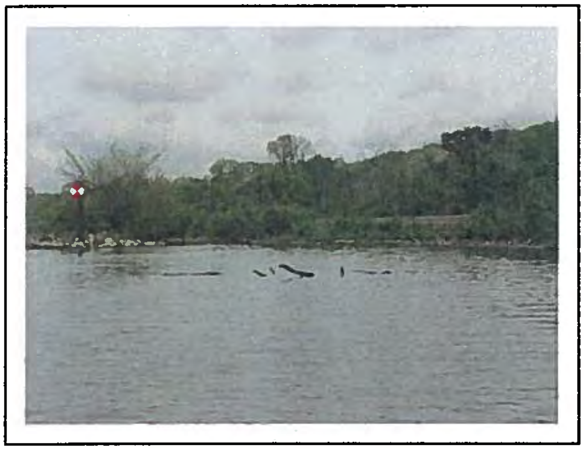
Location DR08-22

Location DR08-23

Location DR08-23

Photographic Record

Dresden Pool
May 6-9, 2008

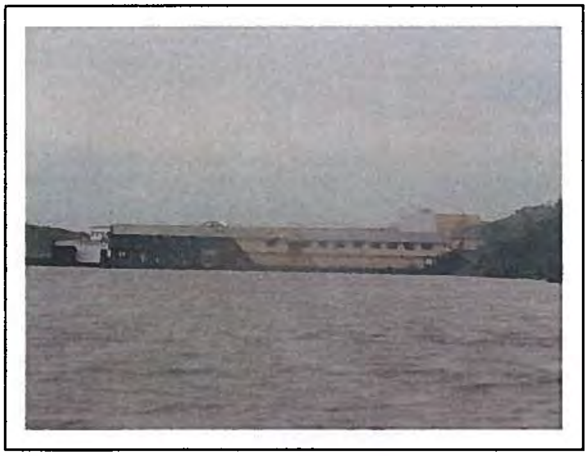


Location DR08-24

Location DR08-24

Location DR08-24

Location DR08-25

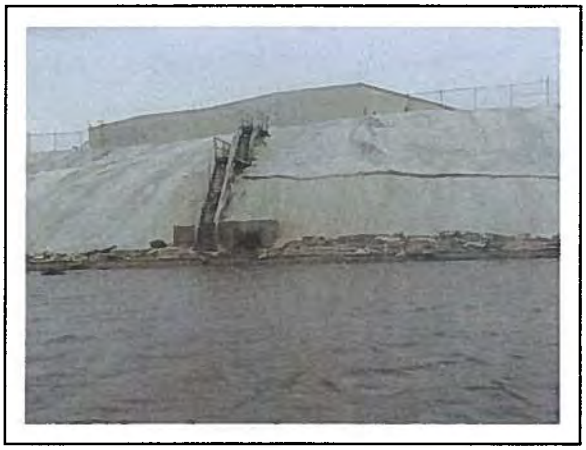


Location DR08-25

Location DR08-25

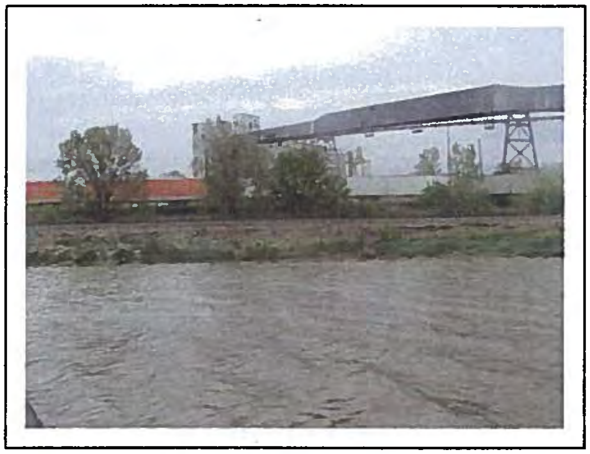
Photographic Record

Dresden Pool
May 6-9, 2008



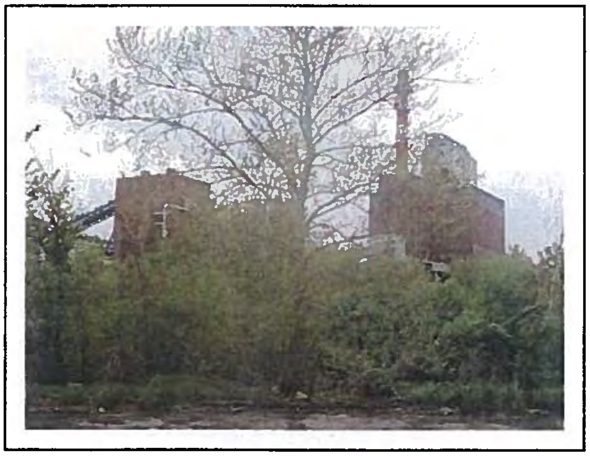
Location DR08-26

Location DR08-26



Location DR08-27

Location DR08-27



Location DR08-28

Location DR08-28

Photographic Record

Dresden Pool
May 6-9, 2008

Location DR08-29

Location DR08-29

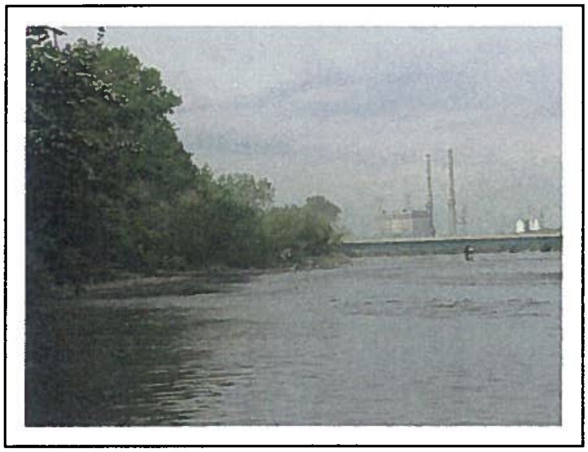
Location DR08-29

Location DR08-30

Location DR08-30

Photographic Record

Dresden Pool
May 6-9, 2008



Location DR08-31

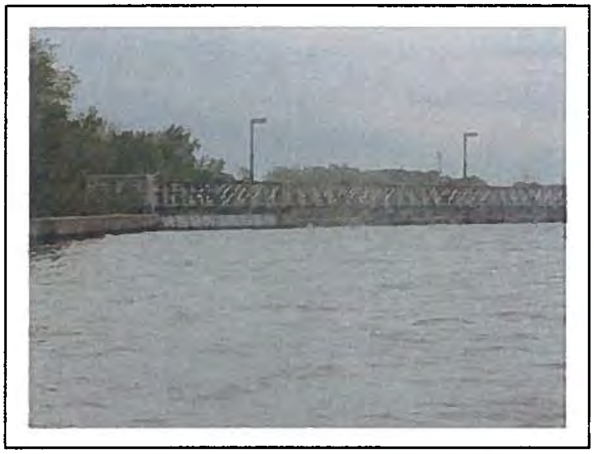
Location DR08-31

Photographic Record

Lower Brandon Pool
May 6-9, 2008

Location BR08-01

Location BR08-01



Location BR08-02

Location BR08-02

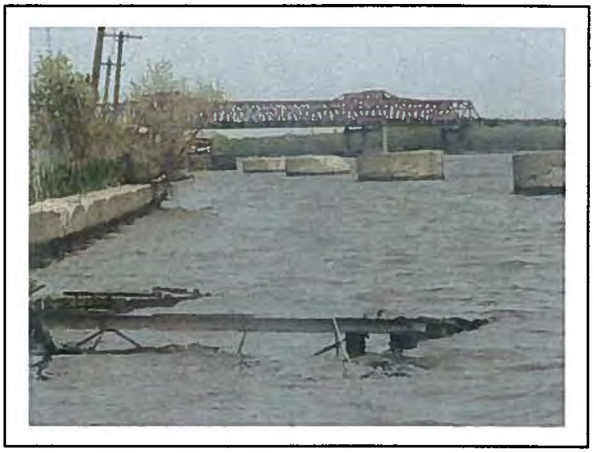
Location BR08-02

Location BR08-03

Photographic Record

Lower Brandon Pool
May 6-9, 2008

Location BR08-03



Location BR08-04

BEFORE THE ILLINOIS POLLUTION CONTROL BOARD

IN THE MATTER OF:)
)
WATER QUALITY STANDARDS AND)
EFFLUENT LIMITATIONS FOR THE) R08-9
CHICAGO AREA WATERWAY SYSTEM) (Rulemaking - Water)
AND THE LOWER DES PLAINES RIVER:)
PROPOSED AMENDMENTS TO 35 Ill.)
Adm. Code Parts 301, 302, 303 and 304)

PRE-FILED TESTIMONY OF GREG SEEGERT

Good morning, my name is Greg Seegert. I am employed as a Senior Scientist and Chief Ichthyologist with EA Engineering, Science, and Technology ("EA Engineering"). I have been employed with EA Engineering since 1982 and have over 35 years of experience in the areas of aquatic ecology and ichthyology. I have a Bachelor and Master of Science in Zoology from the University of Wisconsin. I have attached my *curriculum vita* hereto as Exhibit 1.

I have extensive involvement in aquatic life field studies in the Upper Illinois Waterway ("UIW") for many years and am very familiar with the physical and biological conditions of this waterway. I have been engaged by Midwest Generation ("MWGen" or Midwest Generation) to review and analyze relevant information and data to assess the use designation issues relating to aquatic life goals for the Chicago Area Waterways ("CAWS") and the Lower Des Plaines River ("LDR"), as these relate to Illinois Environmental Protection Agency's ("Illinois EPA" or "IEPA") Proposed UAA Rules.

My testimony will focus on the following items: (1) a review of the regulatory requirements applicable to use attainability analysis ("UAA") pursuant to 40 C.F.R. §131.10(g) used in assessing whether certain waters can attain the Clean Water Act ("CWA") goals for aquatic life uses; (2) an assessment of whether CWA aquatic life uses are attainable in the South Branch of the Chicago River and Chicago Sanitary Ship Canal (collectively referred to herein as the "CSSC") and the LDR, as well as an assessment of the UAA factors applicable to the CSSC and LDR; (3) a review of the aquatic habitat suitability for the CSSC and Upper Dresden Island Pool ("UDP") directly relevant to Illinois EPA's Proposed UAA Rules; and (4) a review of fish and qualitative habitat evaluation index ("QHEI") surveys conducted in the UDP.

As I will testify, and as set forth in greater detail in the attached EA Engineering report (Exhibit 2, *Report on the Aquatic Life Use Attainability Analysis for the South Branch of the Chicago River, the Chicago Sanitary and Ship Canal and the Upper Dresden Island Pool*), the Illinois EPA failed to adequately consider and assess the unique aspects of the CSSC and UDP in determining whether these water bodies are capable of attaining CWA aquatic life goals. Due to the limiting physical and biological conditions of these water bodies (conditions wholly unrelated to thermal discharges), the present fish community in the CSSC and the UDP is limited in diversity and quality and does not represent a balanced population. Therefore, it is my professional opinion, based on extensive experience and firsthand knowledge of these waters, that the limiting conditions adversely affecting them preclude the attainment of CWA aquatic life goals.

1. A Minimum of Four of Six UAA Factors Apply to the CSSC and LDR, Thus Precluding Attainment of CWA Aquatic Life Use Goals.

Under U.S. EPA's rules, the existence of any one of the six UAA factors alone is sufficient to demonstrate that a water body is not capable of meeting CWA aquatic life use goals. I have assessed the potential applicability of the UAA factors (excluding Factor 6, widespread economic and social impacts) to the CSSC and LDR with respect to aquatic life uses, and it is my professional opinion, that UAA factors 2, 3, 4, and 5 are all applicable.

UAA Factor 2 – Flow Conditions

Factor 2 applies in the event that natural, ephemeral, intermittent or low flow conditions or water levels prevent use attainment, unless such conditions may be mitigated by the discharge of sufficient volumes of effluent discharges without violating state water quality standards. 40 C.F.R. §131.10(g)(2). Flows in the CAWS are highly variable and do not follow a normal seasonal cycle which is necessary to support a balanced aquatic community. As discussed in Exhibit 2, the CAWS is specifically designed and managed to regulate and minimize peak flows attributable to flooding and combined sewer overflow input in order to facilitate barge traffic. The Illinois EPA acknowledged that it did not consider whether extreme flow changes occurred and what negative impact such changes may have on aquatic life. *See* March 10, 2008, Hearing Transcript, p. 193. It is well known that high flow regimes such as those in the CAWS can adversely affect fish by causing nest abandonment and displacement of recently hatched fry (juvenile fish) and causing sediment deposition to bury and suffocate eggs. Similarly, low flow regulation, which is controlled by the U.S. Army Corps of Engineers in anticipation of flooding, can also adversely affect fish by exposing fish nests and eggs to ambient air and causing stranding in shallow areas, which leads to increased predation on fish. These artificially controlled flow conditions, which are a necessary part of the navigation on the CAWS, constitute a significant factor that prevents use attainment. Therefore, in my opinion, Factor 2 is clearly met.

UAA Factor 3 – Barge Traffic and Sedimentation

Factor 3 applies where use attainment of a water body cannot be met due to human caused conditions or sources of pollution that cannot be remedied or, if attempted to be remedied, would cause greater environmental harm than leaving in place. 40 C.F.R. §131.10(g)(3). The heavy barge traffic and navigation, protected uses in the CSSC and UDP, have a direct, adverse impact on the aquatic ecosystem. For example, barge traffic can adversely affect aquatic organisms through physical injury, stranding, disrupting spawning, uprooting aquatic vegetation used as habitat, increasing turbidity, and increasing mortality through the re-suspension of sediments, both contaminated and uncontaminated. As noted in Exhibit 2, several surveys have documented direct mortality of fish as a result of propeller strikes. Additionally, moving barges produce wakes or waves that push water into the backwater channels, causing rapid changes in water levels and stirring up harmful sediment.

In addition to barge traffic, a key limiting factor to the CAWS aquatic ecosystem is the physical and chemical makeup of the river sediments and how sediments are dispersed and accumulated in the river. Despite Illinois EPA agreeing that sediment could limit suitable habitat quality, the Agency acknowledged that it evaluated the impact of sediment resuspension only in a very "cursory" manner (and only then for assessing compliance with the cadmium chronic water quality standard). *See* March 11, 2008, Hearing Transcript, pp. 143-144, 148-149. Based on EA's extensive studies in the CAWS, the fine, silty, and organic nature of sediments in the CSSC and LDR are not suitable for many higher quality fish species which require hard, clean substrate for spawning and reproduction. Excess sediment can fill interstitial spaces of spawning gravels, impair fish food sources, fill rearing pools, and reduce beneficial habitat structure. Studies, including those conducted by Mr. Chris Yoder, have documented that streams in highly urbanized areas typically do not achieve CWA's "fishable/swimmable" goals due to the multiple stressors and physical limitations. Even the removal of one limiting factor, such as sediments, would not improve aquatic habitat, as the urban nature of the CAWS and the many sources of pollutants would continue to cause additional fine, silty sediments to be deposited, thus preventing the improvement of aquatic life habitat. Deleterious sedimentation in the CAWS is both unpreventable and irreversible and will remain a major impediment to biological improvements. In a 2003 evaluation of the Dresden Pool, EA Engineering found that sedimentation was moderate to severe in 70% of the areas where QHEI scores were assessed. Our recent July 2008 habitat survey of the UDP again found that much of the area was heavily silted. *See Exhibit 2, Attachment 2.*

Contaminated sediments are also a significant limiting factor to the CAWS. *See* Allen Burton Pre-Filed Testimony and Report. Toward this end, extensive studies have found that contaminated sediments occur in all three navigational pools (Brandon, Dresden, and Lockport), but predominantly in the side-channels and backwater areas. Despite these extensive studies, the Illinois EPA failed to consider whether contaminated sediments in the Brandon and Upper Dresden Pools precluded these waters from attaining CWA aquatic life goals. *See* March 10, 2008, Hearing Transcript, p. 164.

Consequently, because of the direct physical harm and serious habitat degradation that has occurred and will continue to occur as a result of ongoing barge traffic and sedimentation (both toxic and otherwise), it is my opinion that UAA factor 3 for the CSSC and the UDP is met.

UAA Factor 4 – Dams and Other Hydrologic Modifications

Factor 4 applies in situations where dams, diversions, or other types of hydrologic modifications preclude use attainment, and restoration is not feasible. 40 C.F.R. §131.10(g)(4). As mentioned previously, the CAWS is specifically designed and operated to facilitate barge traffic and to convey massive quantities of storm water and municipal wastewater. The CSSC and LDR are a series of large pools separated by locks and dams to control water flow. These impoundments have a significant effect on the fish communities by transforming the river from a lotic (flowing waters) to a lentic (lake-like) system.

Impoundments adversely affect lotic fish species by eliminating riffles, reducing stream velocity, increasing sedimentation, interrupting fish migration, reducing insects that provide a food source, and reducing overall habitat complexity and biological integrity. Fish species that are habitat generalists, such as the common carp, gizzard shad, and channel catfish, as well as pelagic species, such as emerald shiner and freshwater drum, do quite well within impounded systems. Whereas, fish species, such as fluvial specialists, including most darters and madtoms and some suckers, are adversely impacted. Others, such as simple lithophils, which include species such as the redhorse and most darters, which require clean, hard substrates, are also adversely impacted. As described in greater detail in Exhibit 2, it is well documented that impounded river systems, such as the CSSC and UDP, have correspondingly lower indices of biological integrity ("IBI") scores upstream of each dam. For example, extensive studies of the nearby Fox River, funded in part by U.S. EPA, documented significant and widespread adverse impacts on the aquatic communities due to the effects of impounding. *See* Exhibit 2, Attachment 3. Notably, only about 50% of the Fox River is impounded relative to the Brandon and Dresden Pools, which are 100% and 93% impounded, respectively. The impoundments exclude or reduce large groups or classes of fishes, including species that are obligate riffle dwellers (*e.g.*, most darters and madtoms and some minnows) and other species that prefer fast moving water and hard substrates (*e.g.*, many sucker species, and some minnows and sunfish).

The dams and locks in the CSSC and UDP currently function as originally designed and constructed and their impact on aquatic communities is unmistakable and irreversible. Therefore, I have concluded that UAA factor 4 equally applies.

UAA Factor 5 – Physical Features

Factor 5 applies to water bodies where there is a lack of natural features such as proper substrate, cover, flow, depth, pools, riffles, and the like, unrelated to water quality, that preclude attainment of aquatic life protection uses. 40 C.F.R. §131.10(g)(5). The physical factors that characterize the CSSC and LDR, some of which have already been discussed, are limiting to aquatic communities. These factors include excessive siltation, lack of suitable substrate, minimal instream cover, lack of riffles, and lack of fast moving water. These unalterable limits in the physical condition and habitat features of the LDR, even without consideration of severity of sediment contamination, preclude the attainment of aquatic life uses consistent with the General Use requirements. Based on these physical limitations alone, I have concluded that UAA Factor 5 applies as well.

The UAA analysis also entails consideration of potential remedial efforts that, if taken, may facilitate achievement of CWA goals. In this case, the one remedial option that could have the most significant influence of helping the CAWS and UDP achieve CWA aquatic life goals would be to remove the locks and dams entirely. However, the locks and dams are essential to navigation, which is a protected use within this waterway; and no one has seriously suggested that navigational use in the CAWS will be discontinued in the foreseeable future.

2. Habitat Conditions in the CSSC, Including the UDP, are Degraded and Irreversible and Preclude Attainment of CWA Aquatic Life Goals.

The qualitative habitat evaluation index ("QHEI") is a measure of habitat suitability. Most experts, including Mr. Edward Rankin, the developer of the QHEI system, conclude that streams with QHEI scores greater than 60 generally are capable of supporting balanced indigenous fish populations that are consistent with the goals of the CWA. Scores between 45 and 60 must be examined more closely to determine whether or not balanced fish populations are supportable.

Between 1993 and 2008, EA Engineering has collected habitat data and derived QHEI scores for over 100 sites for the CSSC and LDR, including the UDP, as part of studies conducted in 1993-1994, in 2003, and most recently in July 2008. *See Exhibit 2*. In 1993 and 1994, QHEI scores were derived at 169 locations in the Lockport, Brandon Road, and Dresden Pools, and were, on average, found to be low (mean scores in the 40s), demonstrating that habitat generally was of poor quality. The low QHEI scores were attributed to the lack of riffle/run habitat, lack of clean, hard substrates (*i.e.*, gravel/cobble), excessive siltation, channelization, poor quality riparian and floodplain areas, and lack of cover. Habitat was found to be poorest in the Lockport Pool, marginally better in the Brandon Pool, and better still in the Dresden Pool; but QHEI scores were still well below 60 in most of the Dresden Pool.

With respect to the UDP, specifically, QHEI data subsequently collected by EA in 2003 and in July 2008, confirm that the average score in the UDP is generally between 45 to 50, which is at the lower end of the range of habitat that may have the potential to support CWA aquatic life goals.[1] These low scores are a strong indication that the majority of habitat in the UDP is not

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[1] EA Engineering compared its 2008 QHEI scores to scores calculated by MBI in 2006 for three sites that appear to be in close proximity. *See* Exhibit 2. While the score for one of the sites appears to be comparable and within an acceptable range of difference, scores calculated by MBI for the other two sites were substantially inflated relative

sufficient to support CWA aquatic life goals. As documented in Exhibit 2, Attachment 2, there is very little "good" quality habitat present in the UDP and a much greater abundance of "poor" habitat. Relative to the Brandon or Lockport Pools in the CSSC, habitat in the UDP is "less poor" than that in the CSSC, but is still poor nonetheless.

As documented in Exhibit 2, Attachment 2, the July 2008 survey of UDP conducted by myself and my associate, Mr. Vondruska, is particularly relevant to the issue of habitat quality in UDP. During the July 2008 QHEI field survey of the UDP, the entire linear distance of each bank was surveyed separately. We established a series of contiguous, 500 meter zones along each shore of the UDP. Over a two-day period, we evaluated 50 such zones, which is significantly more than the two or three evaluated by MBI or Mr. Rankin. The extensive and contiguous nature of the 50-site QHEI survey by EA eliminated potential bias that may arise from the selection and scoring of only a limited number of QHEI site locations. QHEI scores were calculated using two scoring procedures: the standard Ohio EPA QHEI scoring procedure used by Mr. Rankin and the "MBI-modified procedure." The MBI-modified procedure is MBI's recently developed version of the QHEI that takes into account the impounding of a waterway and which was used by MBI during their 2006 assessment of the CAWS and UDP.

The UDP 2008 QHEI study results clearly support my opinion that the UDP is not capable of attaining the Clean Water Act aquatic life goals because:

➢ **Almost all of the QHEI scores are below 60.**

Based on the Ohio EPA scoring procedure, 45 of the 50 (90%) QHEI scores were <60, and 49 of 50 (98%) of the scores were <60 using the Modified MBI procedure.

➢ **Approximately Half of the QHEI scores were <45.**

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to EA's scores (*e.g.*, 69 v. 54 and 81.5 v. 67.5). The scores for these two sites are not within the acceptable range of difference. Further analysis of MBI's scoring as discussed in Exhibit 2 confirm that MBI's scores are simply too high and are not supported by the facts.

Based on the Ohio EPA procedure, 20 of the 50 (40%) scores were <45 and well over half (32 of 50 or 64%) of the scores using the MBI procedure were <45.

➢ **The mean QHEI score is closer to 45 than to 60.**

The mean QHEI scores were 47.4 and 42.0 for the Ohio EPA and MBI protocols, respectively. Thus, on average, the QHEI scores are well below the "good" cutoff of 60, regardless of the QHEI scoring procedure used. Moreover, these scores are closer to the 45-point cutoff that, under Ohio EPA's use classification protocol, would automatically qualify the UDP as a limited or modified use category that is intended for waters that cannot attain the Clean Water Act aquatic life goal. (*See* discussion below in Section 4 regarding Ohio EPA's use classification protocol).

Furthermore, the spatial distribution of QHEI scores (Exhibit 2, Attachment 2f) clearly shows that, except for the Brandon tailwaters, the vast majority of habitat in UDP is poor or occasionally fair.

Consistent with Ohio EPA protocols, the area within the navigational channel was not evaluated. However, due to a lack of cover and constant disturbance due to barge traffic, the navigational channel, which comprises roughly 50% of the UDP, certainly would have scored well below 45 had it been evaluated. This further accentuates the limited amount of good habitat available within the UDP. Roughly half of the UDP is within the navigational channel, which is unsuitable, poor habitat and the remaining half is characterized by poor to fair quality habitat, with only a very limited area of good habitat.

Balanced indigenous fish populations that are consistent with CWA aquatic life goals must have suitable habitat, including, for example, sufficient riffles, boulder/cobble substrates, and fast water areas to spawn and reproduce. Such physical features, however, are lacking from the UDP, except for the Brandon tailwater area, which accounts for only a small fraction (around 7 percent) of the entire Dresden Pool. Although the Brandon tailwater may technically qualify as good habitat, it is isolated and surrounded by predominantly poor to fair habitat in the Dresden Pool. The Illinois EPA appears to be giving significant weight to the existence of this very limited area of good habitat and speculating that, based on the availability of this habitat, that the entire Dresden Pool can minimally attain CWA goals. However, this assumption is refuted by the overwhelming evidence to the contrary and indicates a fundamental misunderstanding of aquatic ecosystems and how they function. Illinois EPA has acknowledged that it did not consider whether this very limited "good" habitat was usable by the fish community due to the presence of legacy pollutants and sediments. *See* March 11, 2008, Hearing Transcript, p. 74.

As detailed in Exhibit 2, the adverse effects of dams on aquatic life in river systems, such as the nearby Fox River, are well documented. Impounded systems such as the CSSC and UDP do not function as natural river systems, whose predictable, seasonal flows serve to flush accumulated sediments downstream and trigger migratory movements of certain fish species. These adverse effects of dams include, for example, lower Index of Biotic Integrity (IBI) scores, significantly lower QHEI scores in impounded areas, poor macroinvertebrate populations dominated by pollution-tolerant species due to increased volumes of sediments and lower sediment quality, lack of species dependent on riffle/run habitats, and fragmented fish populations characterized by much lower species richness. The influence of the dams in the CSSC and the UDP are expected to be even more profound than those observed in the Fox River, due to height of the dams, the greater extent of impounding, and the erratic and highly variable flow levels in the CSSC and UDP.

The areas in the UDP most adversely impacted by the effects of impounded and erratic flows are the shallow areas, such as the Brandon tailwaters. *See* Julia Wozniak Pre-Filed Testimony, Attachment 5 (Flow Graphs). These tailwaters offer all of the riffle habitat in the UDP and, therefore, are important for potential spawning of obligate riffle species, such as darters and madtoms. As previously described, however, the adverse effects of the erratic and drastic flow fluctuations include increased stranding of nests, larvae and adult fish during low flows and, conversely, the sweeping away of nests, eggs, and larvae during increased flows.

Due to its permanent and irreversible habitat limitations, the Dresden Pool is not capable of supporting viable populations of certain fishes such as most darters, walleye and sauger, some suckers (including redhorse and white sucker), most madtoms, and certain minnow and centrarchids (*e.g.*, smallmouth bass). The species that are thriving in the Dresden Pool are habitat generalists. The absence or low abundance of many minnows, darters, and suckers – the most diverse groups of fish species in Illinois – does not reflect a balanced indigenous population consistent with the CWA goals. The poor habitat structure and limitations in the Dresden Pool, such as heavy siltation and the lack of riffles and fast water, are fixed and irreversible and thus the Dresden Pool will not support habitat specialists, despite proposed changes to water quality standards.

EA also conducted a review of MBI's 2006 IBI metric values and scores presented as Attachment S to the Illinois EPA Statement of Reasons. As discussed in Exhibit 2, numerous, substantive mistakes were identified in MBI's 2006 report, some of which were acknowledged by Mr. Yoder in his pre-filed testimony, and inaccurately raised the IBI scores for the CSSC and UDP. These mistakes included, for example, misidentification of several fish species, inaccurate or improper tallying of fish species, incorrect assignment to breeding guilds, arbitrary assignment of drainage area, the use of defective pH and dissolved oxygen probes which resulted in seriously erroneous entries made in the field notebooks, and the failure to revise clearly flawed data and scores, all of which call into question the reliability of MBI's IBI scores and incorrectly portray a higher biological integrity than actually exists in the UDP.

3. Much of the Data Relied Upon by IEPA to Establish Uses in the LDR are Significantly Flawed.

IEPA relied heavily on fish (*i.e.*, IBI) and especially habitat data provided by MBI. However, my review of those data indicates that much of those were flawed.

QHEI Scores

First, the MBI QHEI scores were calculated from a very small (3 locations) and non-representative portion of the UDP. Second, as documented in Exhibit 2, Attachment 2, many of the QHEI scores provided by MBI, including those from the UDP, are wrong. In some cases, these mistakes were due to multiple math errors, which could and should be corrected. However, they also made a number of methodological errors such as incorrectly interpreting current speed, ignoring the obviously impounded nature of sites, not properly accounting for channelization, over-scoring cover types and amounts, incorrectly assessing riparian width, and erroneously considering some areas to possess at least some sinuosity when they possessed none. Although individually some of the necessary scoring changes would be relatively small, collectively they result in systematic scoring inflation that wrongly gives the impression that habitat in the UDP (and elsewhere) is better than it really is.

IBI Scores

MBI also made mistakes in calculating IBI scores at numerous locations including those within the UDP. These mistakes included misidentifying species, incorrectly assigning species to breeding guilds, using one drainage area for all their locations, including exotic species (which, according to their protocols should have been excluded) in the total species richness metric, incorrectly tallying sunfish species, and incorrectly tallying the number of fish caught. The large number of errors on the metrics result in many, perhaps most of the IBI scores being wrong.

The various QHEI and IBI errors occurred despite the fact that MBI submitted revised data sets that were supposed to address these issues, many of which had already been brought to their attention. The fact that even after being brought to their attention, many errors remain indicates that MBI's QA/QC procedures are fundamentally flawed and therefore the data they provide should be disregarded or, at a minimum, limited in their consideration as questionable or non-credible data.

4. Comparison of UDP and CSSC to Ohio Use Classification System Categories.

The Illinois EPA's proposed use designation rule for the UDP assigns a site-specific, use designation that, by the Agency's own description, is intended to be "unique," while also contending that the UDP shares characteristics with Illinois General Use waters that enable it to attain CWA aquatic use goals. The comparison to Illinois General Use waters is misleading and misguided, as General Use waters do not have the combination of channelization, impoundment, commercial navigation, irregular flows, and significant inputs from urban storm water and wastewater discharges that characterize the UDP. The Illinois EPA's proposed use designation for the UDP is not an appropriate designation and is not scientifically supportable.

With respect to the CSSC, the Illinois EPA agrees that it cannot attain the CWA's aquatic use goal and has proposed a lower aquatic life use referred to as "Aquatic Life Use B." The

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Illinois EPA further agrees that the CSSC has poor habitat and that the aquatic community suffers adversely from the artificially controlled flow conditions and heavily industrialized nature of this waterway, including the high volume of barge traffic. What is less clear is whether the proposed language of the "Aquatic Life Use B" use classification accurately classifies highly-modified streams that are characterized by poor habitat, heavily industrialized use and very limited aquatic community aquatic life potential.

In this regard, a review of the Ohio EPA's use classification approach of describing categories of streams, such as "Limited Warm Water," "Modified Warm Water" and its use of subclassifications, such as "Impounded"(I), for streams like the CSSC, shows that the Ohio use classification approach would serve as a better and clearer model on which to expand the current Illinois use classification system. While I agree with the Illinois EPA's attempt to expand and refine the existing Illinois use classification system, its proposed language does not provide a sound and clearly articulated basis for doing so. In my opinion, the more generic descriptions of use classifications used by the Ohio EPA, which still identify the key stream characteristics that qualify a waterbody for a given use classification, is a more scientifically credible approach to establishing a multi-tiered use classification under state water quality regulations.

In 2004, Mr. Rankin recommended to Illinois EPA that the Ohio Modified Warmwater Habitat Use for impounded rivers (MWH-I) would be the most appropriate use category for UDP (See Attachment R to Illinois EPA's Statement of Reasons). Despite Illinois EPA agreeing with Mr. Rankin's conclusion, the Agency without explanation has completely ignored Mr. Rankin's recommendation and instead determined that the UDP can attain the CWA aquatic life goals. It is important to note that Ohio's MWH-I use designation applies to waters that are not capable of attaining the CWA's aquatic life goals, due to the limiting factors inherent to impounded waters.

Mr. Rankin reached this conclusion based largely on the physical habitat limitations he observed as a result of systematic alteration and urbanization. The extensive biological data collected by EA Engineering supports Mr. Rankin's assessment. Because the impounded nature of a waterbody has such a significant effect on the aquatic life uses that it can attain, a use classification description that recognizes the "impounded" attribute of certain waterbodies serves as a reliable and helpful tool in crafting scientifically sound use categories within a state's use classification system.

Although no single attribute separates limited use from modified use, several factors have been identified as being particularly important. According to Rankin (See Attachment R to Illinois EPA's Statement of Reasons), factors that have a high influence are:

- Channelized or no Recovery from Channelization
- Silt/Muck substrates
- No sinuosity
- No or sparse cover

Based on these and other QHEI attributes associated with "lower" aquatic life uses, particularly moderate to heavy silt, fair/poor riffle/pool development, the absence of riffles, and the amount of embeddedness, Mr. Rankin recommended various uses for the CAWS and LDR. Of particular relevance is the fact that Rankin did not recommend any of the segments subject to this Rule-Making be classified as warmwater habitat, an aquatic life use consistent with CWA goals. Instead, he recommended modified or limited resource water for each and every segment he evaluated. For example, he recommended Limited Resource Water for most of the CSSC, but noted that a portion of it might be able to support a Modified-Channelized category of fauna.

For the LDR, he recommended the category Modified-Impounded, the same category that EA believes is appropriate for the UDP (Exhibit 2, Attachment 2).

EA Engineering has compared the attributes of the UDP using attributes of Ohio's use designation classification system. The UDP has far more in common with Ohio's <u>modified</u> warm water use designation (which does not meet CWA goals) than Ohio's warm water habitat use designation (which does meet CWA goals). Both Messrs. Rankin and Yoder have concluded in at least one published report that as the predominance of modified habitat attributes relative to warm water attributes increases to a ratio of greater than 1.0 to 1.5 to 1, the likelihood of having IBI scores consistent with warm water habitat use declines. For comparison purposes, the ratio for the Dresden Pool is 4:1, which is significantly greater than the 1.5:1 threshold recommended by both Rankin and Yoder. Therefore, based on Messrs. Yoder's and Rankin's own assessment guidelines, the Dresden Pool is more akin to a modified warm water system not capable of achieving CWA goals.

5. Extensive Fish Surveys Confirm that the CSSC, Including the UDP, is Dominated by Pollutant Tolerant Species, Reflecting Degraded Habitat Conditions.

EA Engineering has been conducting fish surveys in the Upper Illinois Waterway ("UIW") and CAWS since 1980. A brief summary of our results as well as an overview of what they mean is appropriate because these results clearly demonstrate that the fish community in the CSSC and the UDP is a result of the habitat limitations discussed above. Since 1993, EA Engineering has made a total of 3,159 collections from the Dresden, Brandon, and Lockport Pools to assess the resident fish populations. This compares to only 22 collections made by MBI from these pools, only six of which were collected from the UDP, and all of which were collected during a single year (2006). A more detailed discussion of these fish surveys is attached to the EA Engineering report. *See* Exhibit 2, Attachment 1.

Larval Fish

In 1994, EA collected fish eggs and larvae at 16 locations in the UIW, including six locations in Lockport Pool, one in Brandon Pool, one in the Upper Des Plaines River, and eight in Dresden Pool. Over the course of the study, tens of thousands of eggs and larval and young-of-the-year (YOY) fish were collected. Among the larval and YOY fish collected, the six most commonly collected species or taxa during this study (*Lepomis* spp., gizzard shad, common carp, bluntnose minnow, unidentified *Pimephales* spp., and emerald shiner) share early life history characteristics that appear to be most successful in this system. These include adaptations that allow eggs and/or larvae to tolerate low dissolved oxygen concentrations and have minimal contact with the sediment. Collectively, these six species or taxa accounted for more than 86% of all larvae/YOY collected.

Juvenile and Adult Fish

In 1993 and 1994, EA Engineering conducted fish sampling along a 53-mile stretch of the UIW, including 18 locations in Lockport Pool, six in Brandon Pool, one in the Upper Des Plaines River, 22 in Dresden Pool, and six downstream of Dresden Island Lock and Dam. Fish were collected by electrofishing, gillnetting, and seining, and most locations were sampled both years. This two-year study resulted in the capture of 25,349 adult and juvenile fish representing 82 species. Numerically dominant species were bluntnose minnow (20.0%), gizzard shad (19.4%), common carp (11.3%), and emerald shiner (10.5%). Thus, the UIW was dominated by a combination of prolific pelagic species (*e.g.*, gizzard shad and emerald shiner) and highly tolerant species (*e.g.*, bluntnose minnow and common carp). Thus, at all life stages from egg through adult, the UIW fish community is dominated by highly tolerant and pelagic fishes; a clear response to the severe habitat limitations within the system.

The most common and consistent trends in the UIW were spatial. These spatial patterns were:

- A very poor native fish assemblage was present in Lockport Pool. The assemblage in Lockport Pool was characterized by low native fish abundance (catch rates typically <50 fish/km), low species richness, and domination by highly tolerant species.
- The community was marginally better in Brandon Pool but was still very poor.
- The fish communities in the Upper Dresden Pool and the 5-mile Stretch, Dresden Pool downstream of the Kankakee River, and downstream of Dresden Lock and Dam were relatively similar to each other and noticeably better than those upstream of Brandon Lock and Dam.
- Results at thermally-influenced sampling stations were comparable to those at other stations.

Based on biological criteria established by Ohio EPA, the fish community in the five areas would be classified as follows:

Lockport Pool	very poor
Brandon Pool	very poor
Upper Dresden Pool and the 5-mile Stretch	poor
Dresden Pool downstream of the Kankakee River	poor
Downstream Dresden Lock and Dam	fair

As discussed in greater detail in Attachment 1 of Exhibit 2, the highest incidence of diseased fish as measured by abnormalities such as deformities, erosion, lesions, and tumors ("DELTs") were observed in the upper three segments of the study area (*i.e.*, Lockport Pool, Brandon Pool and Upper Dresden Pool). DELT percentage rates ranged from a low of 7.5%

(downstream of Dresden Dam) to a high of 14.6% (Brandon Pool). DELT anomalies were greatest among bottom feeders such as carp, channel catfish, and redhorse species. For large rivers like the UIW, any site with >3% DELT anomalies receives the lowest possible IBI metric score. DELT anomalies exhibited by fish in the UIW are 2-5 times higher than the Ohio EPA's criterion for the lowest metric score.

The following conclusions were reached, based on the 1993-1994 surveys:

- Habitat severely limited the fish community.
- Fish diversity and abundance followed clear-cut patterns, with conditions being poorest in Lockport Pool and generally improving in a downstream direction.
- The spatial pattern appeared to be unrelated to operation of the ComEd power plants.
- Growth and condition of most species were generally within expected ranges, except for smallmouth bass.
- The incidence of diseased fish is very high in the UIW.
- Reproduction in the upper portion of the study area is primarily limited to a few tolerant or pelagic fishes.
- None of the measures used in this study to evaluate individual or community health indicated that ComEd power plants were contributing to the poor fauna observed in much of the UIW.
- Based on the lack of impacts and habitat-imposed constraints, it was concluded that the aquatic community of the UIW would essentially be the same as it is currently if ComEd plants were load-restricted or even taken off line.

In 1995, EA conducted additional fish studies within the same study area, the results of which closely paralleled those of the 1993-1994 study. A detailed discussion of the 1995 study and fish surveys conducted annually from 1997 to present are provided in Exhibit 2.

Species Composition (1993-2005)

The fish surveys conducted from 1993 through 2005 for the UPD and the 5-mile Stretch, produced 143,156 fish representing 82 species and four hybrids. The ten most abundant species collected during this period were, in descending order of abundance, bluntnose minnow (22.2%), gizzard shad (+ *Dorosoma* spp.) (20.4%), bluegill (17.2%), green sunfish (7.0%), emerald shiner (6.6%), orangespotted sunfish (4.4%), largemouth bass (3.4%), common carp (2.8%), bullhead minnow (2.3%), and spottail shiner (1.9%). These same species were also the ten most abundant collected during both the period before the AS96-10 Adjusted Standard went into effect (*i.e.*, 1993-1995) and after that (*i.e.*, 1997-2005). For all years combined, 16 moderately and highly tolerant species (plus two other taxa) composed 52.8% of the catch. Conversely, only 1.7% of the fish collected were intolerant or moderately intolerant. This species assemblage does not reflect a balanced indigenous population. And although there has been a modest improvement in the UDP in the terms of fish abundance since 1993, the same ten species continue to dominate the community of the UPD and the 5-mile Stretch and remained unchanged since before the Adjusted Standard went into effect. In conclusion, it is my professional opinion that the preponderance of moderately tolerant and highly tolerant fishes reflects the degraded habitat of Dresden Pool, and not the effects of thermal discharges. It also reflects the limited availability of good quality habitat that is necessary to attain a balanced, indigenous species that equates to the attainment of the CWA aquatic use goals.

Conclusion

It is my professional opinion, based on many years of experience and firsthand knowledge of the CAWS and the UDP, that irreversible physical and biological factors limit the biological potential of the CSSC and UDP (conditions wholly unrelated to thermal effects) and prevent these waters from attaining CWA aquatic life use goals. It is also my opinion that the Illinois EPA in developing the UAA Proposed Rules has completely ignored many attributes, constraints and habitat limitations of the UDP that prevent this waterway from attaining CWA aquatic use goals. Limiting habitat conditions such as channelization, impoundment, commercial navigation (a protected use), lack of riffles and fast water, irregular and extreme water flows, excessive sedimentation and siltation, toxic sediments, and significant inputs from urban storm water and wastewater discharges will continue to prevent the occurrence of balanced indigenous fish populations. These are irreversible conditions with unmistakable negative impacts on the aquatic community which the UAA Proposed Rules will not and cannot change to the extent necessary to attain the CWA aquatic use goals.

Greg Seegert

Greg Seegert

EXHIBIT 1

Resume for Mr. Greg Seegert of EA Engineering, Science, and Technology, Inc.

Gregory L. Seegert
Chief Aquatic Biologist

Mr. Seegert is a senior scientist at EA's office in Deerfield, Illinois as well as Chief Ichthyologist at EA. His areas of special expertise are aquatic ecology and aquatic toxicology. In his 35 years of experience in these areas, Mr. Seegert has conducted studies throughout the Midwest and much of the East and Southeast. He is a recognized expert on biocriteria and biological sampling methods to assess impacts to aquatic life. He works regularly with the private sector and regulatory agencies in designing and implementing bioassay and aquatic biological studies. He has designed and directed numerous studies investigating the effects of water intakes and discharges on aquatic life. Issues regularly addressed by Mr. Seegert include factors affecting the abundance and distribution of fishes, entrainment at hydroelectric facilities, 316(a) and (b), aquatic toxicology, bioaccumulation, endangered species, and ecological risk.

Qualifications

Education
M.S.; University of Wisconsin–Milwaukee; Zoology; 1973
B.S.; University of Wisconsin–Madison; Zoology; 1970

Specialized Training
SEAK Expert Witness Training; 2007
EA Project Manager Training; 1997
EA Expert Witness Training; 1990
EA Toxicity Reduction Evaluation Training; 1989

Professional Affiliations/Appointments
American Fisheries Society National Society and three State Chapters
American Society of Ichthyologists and Herpetologists
Wisconsin Society of Ornithology

Professional Experience

Aquatic Ecology—Designed, conducted, managed, and reviewed aquatic studies throughout the East, South, and Midwest. Recognized expert on the distribution of fishes and fish taxonomy, biocriteria, and Index of Biotic Integrity (IBI) theory and implementation. Worked on small streams, wetlands, large rivers (e.g., Ohio, Wabash, Mississippi), ponds, reservoirs, and the Great Lakes. Worked with numerous utilities in studying the effects of thermal discharges on aquatic life. Evaluated impingement and entrainment losses of aquatic organisms and the effects of construction and flow alterations on salmonids. Annually directs a large fish study that covers most of the Ohio River. Regularly conducts surveys of endangered fishes. Instructor at several workshops on fish identification.

Habitat Evaluation—Used a variety of qualitative and quantitative techniques (e.g., Ohio Environmental Protection Agency's [EPA's] Qualitative Habitat Evaluation Index, ORSANCO Habitat Class) to evaluate the suitability of waterbodies for fishes. Using correlation analysis, determined which habitat (e.g., amounts of cover, silt, cobble, ORSANCO class) or physical (e.g., river flow, depth, temperature) variables significantly affected biological variables (e.g., catch-per-unit-effort, Index of Well Being mod scores, IBI scores, fish biomass, diversity). Determined how fish communities in the Upper Illinois Waterway responded to habitat quality as measured by the Qualitative Habitat Evaluation Index. Determined how changes in physical variables (current velocity, depth) and the amount of useable habitat would affect fish and macroinvertebrate in the Red River of the North as a result of planned water diversions.

Clean Water Act Section 316(a)—Designed and conducted field studies in 1995 and 2000 as part of 316(a) demonstrations at a paper mill on the Pigeon River in North Carolina. Also prepared all associated reports. Prepared 316(a) demonstrations for the WE-Energies Oak Creek/Elm Road project and the Point Beach Nuclear Plant, both on Lake Michigan, as well as demonstrations for plants on the Wabash and Muskingum Rivers. Used EA-collected biological data to develop alternative thermal limits for the Lower DesPlaines River.

Clean Water Act Section 316(b)—From 1998 through 2003, served as a principal advisor to Utility Water Act Group (UWAG) on freshwater issues and has worked with them and various industry representatives in developing comments on EPA's 316(b) Phase I and II rules. During this period, attended various workshops, conferences, and meetings representing UWAG and various utilities. On behalf of a group of Ohio River users, developed and submitted comments regarding EPA's Ohio River Case Study Example. On behalf of the American Petroleum

Institute, developed a position paper relative to establishment of the Calculation Baseline and various related issues. Based on these reviews, has made numerous presentations at various industry forums. Has managed or directed entrainment and/or impingement studies at approximately 50 plant sites. These include studies on lakes, reservoirs, small rivers, large rivers, and Lake Michigan. For Electric Power Research Institute, was project director on impingement studies at 15 power plants on the Ohio River. Also managed impingement and entrainment studies at 5 American Electric Power plants on smaller Midwestern rivers.

Environmental Toxicology—Conducted numerous acute and life cycle bioassays to determine the effects of effluents and of numerous individual organic and inorganic chemicals on aquatic organisms. These tests involved a wide variety of freshwater and marine fish and macroinvertebrates. Determined the upper thermal tolerance of smallmouth redhorse and golden redhorse. On behalf of Cincinnati Gas and Electric, evaluated the effects of ash pond and cooling tower blowdown on aquatic organisms. Designed and conducted laboratory and field studies at two Ashland Oil refineries. For the Minnesota Pollution Control Board, evaluated the effects of chlororganics from the St. Regis paper plant at Sartell on aquatic life and human health. Directed two 28-day dioxin biouptake studies at a Champion International paper mill in Quinnesec, Michigan. At this same site, directed a long-term research and development effort to assess and mitigate impairment of the flavor of fish in the receiving waterbody.

Critical Reviews—On behalf of various companies and trade associations (e.g., American Petroleum Institute), conducted detailed reviews of various state and federal technical and regulatory documents. Several of these reviews have led to extensive revisions in the subject document. Chlorine-related literature is an area of particular expertise and, as a result, Mr. Seegert's expertise has been solicited regularly by EPA, various states, and numerous industrial clients. For American Petroleum Institute, reviewed the status of biocriteria development in the United States. Also reviewed several ecoregion IBI reports in Indiana.

Mining Studies—Directed all aquatic and water quality activities associated with a 2-year, $1 million study designed to assess the impacts of New Source coal mining in West Virginia. In conjunction with this study, developed a unique system of ranking the biological resources of each waterbody, developed detailed methodologies to monitor the aquatic environment before, during, and after mining, and ranked all the fishes of West Virginia with regard to their susceptibility to coal mining. Directed a five-year study of issues related to effluent quality, sedimentation, tissue contamination, loss of spawning habitat, alterations in flows, and rates of recolonization at the site of a proposed copper/zinc mine in Wisconsin. Directed and managed a long term study to evaluate biological recovery following the pumpout of a flooded coal mine in Ohio.

Hydropower Development—Evaluated effects of hydropower development on aquatic life at numerous sites throughout the Midwest and Southeast. Designed and conducted population surveys of various fish species to evaluate impacts on these species. Measured entrainment rates and entrainment mortality at various sites and assessed the impact of these losses on resident and migratory warmwater and coldwater fishes. Evaluated effects of flow alterations and flow reductions on stream fishes.

Selected Publications and Presentations

Organizer and moderator of a national workshop on evaluating large river fish communities.

Seegert, G.L. (B.M. Burr, D.J. Eisenhour, K. M. Cook, C.A. Taylor, R.W. Sauer, E.R. Atwood, co-authors). 1996. Nonnative fishes in Illinois waters: What do the records reveal? *Trans. Ill. Acad. Sci.* 89:73-91.

Seegert, G.L. (B.M. Burr, K. M. Cook, D.J. Eisenhour, K.R. Piller, W.J. Poly, R.W. Sauer, C.A. Taylor, E.R. Atwood, co-authors). 1996. Selected Illinois fishes in jeopardy: New records and status evaluations. *Trans. Ill. Acad. Sci.* 89:169-186.

Seegert, G.L. 1986. Rediscovery of the greater redhorse in Illinois. *Trans. Ill. Acad. Sci.* 79:293-294

Seegert, G.L. 1984. Fisheries studies of Pool 5A of the Upper Mississippi River, 1982, in Proc. 40th Upper Mississippi River Conservation Committee. UMRCC, Rock Island, Illinois.

Seegert, G.L. (J. Fava and P. Cumbie, co-authors). 1983. How representative are the data sets used to derive national water quality criteria?, in Proc. Seventh Aquatic Toxicological Symposium. ASTM, Philadelphia.

Seegert, G.L. (R.B. Bogardus, co-author). 1980. Ecological and environmental factors to be considered in developing chlorine criteria, in Water Chlorination: Environmental Impact and Health Effects, Vol. 3 (R.L. Jolley, ed.). Ann Arbor Science, Ann Arbor, Michigan.

Seegert, G.L. (A.S. Brooks, J. Vande Castle, and K. Gradall, co-authors). 1979. The effects of monochloramine on selected riverine fishes. Trans. Am. Fish. Soc. 108:88-96.

The fish community of the Chippewa River and Dells Pond near Eau Claire, Wisconsin. Presented at WI AFS meeting. 1998. Eau Claire, WI. January.

Entrainment and impingement studies at two power plants on the Wabash River in Indiana. 1998. Presented at Electric Power Research Institute Clean Water Act Section 316(b) Technical Workshop. Berkeley Springs, West Virginia. September.

Status and application of biocriteria. 1998. Presented at the TAPPI Environmental Conference. Vancouver, British Columbia. April.

Improvements to the Pigeon River following modernization of the Champion International Mill. 1997. Presented at the TAPPI Environmental Conference. Minneapolis, Minnesota. May.

Improvements to the Pigeon River following modernization of the Champion International Mill. 1997. Presented at the TAPPI Biological Symposium. San Francisco, California. October.

Geographic and historic changes in Ohio River Fish Communities. 1997. Presented at the Ohio River Fisheries Conference. Cincinnati, Ohio. January.

Small mammals of the Ohio River floodplain in western Kentucky and adjacent Illinois. 1982. Trans. Kentucky Acad. Sci. Co-authored by R.K. Rose.

Factors in the design of chlorine toxicological research. 1982. In: R.L. Jolley, ed. Water chlorination: environmental impact and health effects, Vol. 4, Ann Arbor Science, Ann Arbor, Michigan. Co-authored by J.A. Fava.

Low level chlorine analysis by amperometric titration. 1979. J. Water Poll. cont. Fed. 51:2636-2640. Co-authored by A.S. Brooks.

WAPORA, Inc. 1978. Review of the Mattic and Zittel paper: site-specific evaluation of power plant chlorination. Project 218. Submitted to Edison Electric Institute, Washington, D.C.

A preliminary look at the effects of intermittent chlorination on selected warmwater fishes. 1978. Pages 95-110. In: R.L. Jolley, H. Gorchev, and M. Hamilton eds., Water chlorination: environmental impact and health effects, Vol. 2. Ann Arbor Science. Ann Arbor, Michigan. Co-authored by A.S. Brooks.

The effects of intermittent chlorination on coho salmon, alewife, spottail shiner, and rainbow smelt. 1978. Trans. Am. Fish. Soc. 107:346-353. Co-authored by A.S. Brooks.

Dechlorination of water for fish cultures: a comparison of the activated carbon, sulfite reduction, and photochemical methods. 1978. J. Fish. Res. Bd. Can. 35:88-92. Co-authored by A.S. Brooks.

Diel variations in sensitivity of fishes to potentially lethal stimuli. 1977. Prog. Fish. Cult. 39:144-147. Co-authored by R.E. Speiler and T.A. Noeske.

The effects of intermittent chlorination of rainbow trout and yellow perch. 1977. Trans. Am. Fish. Soc. 106:278-286. Co-authored by A.S. Brooks.

The effects of intermittent chlorination of the biota of Lake Michigan. 1977. Special Report #31, Center for Great Lakes Studies, University of Wisconsin. Milwaukee, Wisconsin. Co-authored by A.S. Brooks.

The effects of a 30-minute exposure of selected Lake Michigan fishes and invertebrates to residual chlorine. 1977. Pages 91-99. In: L.D. Jensen, ed. Biofouling control procedures: technology and ecological effects, Marcel Dekker, Inc., New York, New York. Co-authored by A.S. Brooks.

The effects of intermittent chlorination on selected warm water fishes. 1977. Presented at the Conf. on Water Chlorination: Environmental Impact and Health Effects. 31 October – 4 November 1977. Gatlinburg, Tennessee. Co-authored by A.S. Brooks.

The effects of intermittent chlorination on selected Great Lakes fishes. 1977. Presented at the 38th Midwest Fish & Wildlife Conf. 5-8 December 1975. Dearborn, Michigan. Co-authored by A.S. Brooks.

Toxicity of chlorine to freshwater organisms under varying environmental conditions. 1976. Pages 277-298. In: R.L. Jolley, ed. Proceedings of the Conference on Environmental Impact of Water Chlorination, 22-24 October 1975, Conference 761096. Oak Ridge National Laboratory. Oak Ridge, Tennessee. Co-authored by A.S. Brooks.

The Beaver Dam River. 1976. Pages 210-213. In: D.D. Tessen, ed. Wisconsin's favorite bird haunts. Wisconsin Society for Ornithology. Green Bay, Wisconsin..

The effects of heat on plasma potassium levels, hematocrit, and cardiac activity in the alewife, common shiner, and two other teleosts. 1973. Presented at the 16th Conf. on Great Lakes Research. 16-18 April. Huron, Ohio. Co-authored by C.R. Norden.

The effects of lethal heating on plasma potassium levels, hematocrit and cardiac activity in the alewife (Alosa pseudoharengus) compared with three other teleosts. Pages 154-162. In: Proceedings of the 16th Conf. Great Lakes Res. International Association Great Lakes Res.

Numerous presentations at state, division, and national American Fisheries Society Meetings. Topics have included:

- Effects of power plant intakes
- General fish surveys
- Threatened and endangered species surveys
- Thermal assessments
- IBI protocols
- Large river sampling methods
- Toxicity studies
- Use attainability
- Biological variability
- Habitat assessment

Professional Recognition

Chief Instructor for several fish identification workshops sponsored by the Indiana American Fisheries Society, Co-Instructor for two, 3-day fish identification workshops sponsored by the Wisconsin American Fisheries Society.

Candidate for President, Wisconsin Chapter of American Fisheries Society. 1998 and 2008.

Chairperson, Fish Physiology Section, American Society of Ichthyologists and Herpetologists, 1997 Annual Meeting. Seattle, Washington.

Member, Endangered Species Committee, American Fisheries Society. 1996 and 1998.

Invited speaker at various seminars and workshops.

EXHIBIT 2

EA Engineering, Science, and Technology's Report on the Aquatic Life Use Attainability Analysis for the South Branch of the Chicago River, the Chicago Sanitary and Ship Canal, and the Upper Dresden Island Pool

Aquatic Life Use Attainability Analysis for the South Branch of the Chicago River, the Chicago Sanitary and Ship Canal, and the Upper Dresden Island Pool

Prepared for:

Nijman Franzetti, LLP
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Prepared by:

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September 2008

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REPORT ON THE AQUATIC LIFE USE ATTAINABILITY ANALYSIS FOR THE SOUTH BRANCH OF THE CHICAGO RIVER, THE CHICAGO SANITARY AND SHIP CANAL, AND THE UPPER DRESDEN ISLAND POOL

I. INTRODUCTION

EA Engineering, Science, and Technology, Inc. (EA) is a national environmental company, with offices located across the nation, including its EA Midwest office in Deerfield, Illinois. EA provides a variety of environmental services, including expertise in aquatic ecology, habitat assessment, stream hydrology, and water quality. EA Midwest specializes in aquatic studies. Our senior staff collectively has over 150 years of experience in this area. EA Midwest's work in the area of aquatic studies is extensive. EA Midwest has conducted aquatic studies at numerous industrial facilities. These aquatic studies have been performed at approximately 100 power plants and at sites with similar issues (e.g., paper mills, steel mills, wastewater treatment plants, etc.). EA also has reviewed the use attainment and non-attainment status of several streams in Ohio and provided input to various clients as to which UAA factors were relevant and applicable at a particular site.

EA has studied aquatic habitat throughout the United States. These studies have involved a variety of qualitative and quantitative methods for evaluating/measuring habitat. Some of the methods used include:

- Montana Method and PHABSIM (Physical Habitat Simulation), qualitative and quantitative methods, respectively for determining how water flow affects fishes;
- Methods used by ORSANCO and the states of Ohio, Wisconsin, Michigan, Illinois, and North Carolina to measure habitat quality in biological sampling reaches;
- A Delphi approach to assessing habitat quality in the Osage River, Missouri
- Methods approved by the U.S. EPA, including the Rapid Bioassessment Protocol; and
- Habitat Suitability Index Curves

EA also has extensive experience in the use of Qualitative Habitat Evaluation Index (QHEI) procedures to assess the quality of aquatic habitat. Soon after the QHEI was first developed nearly 20 years ago, EA was involved in a project to assess several streams in Northwestern Ohio to determine the replicability of QHEI scores reported by Ohio EPA. Since then, EAs has used the QHEI to evaluate many streams and rivers in Illinois, Indiana, Ohio, and elsewhere, including in the Lower Des Plaines River (LDR).

EA biologists have been studying the Upper Illinois Waterway (UIW), including the Des Plaines River (DPR) and the Chicago Sanitary and Ship Canal (CSSC) since the company first came to the Chicago area in the late 1970's. EA has conducted studies of the DPR and the CSSC on a nearly annual basis since that time. EA biologists have made literally thousands of fish collections from the waterway. A summary of the fish and habitat studies conducted by EA from 1993 through 2006 is provided as Attachment 1.

Several years ago, Midwest Generation (MWGen) retained EA to review and comment on the LDR and the Chicago Area Waterway System (CAWS) Use Attainability Analyses being conducted by the Illinois Environmental Protection Agency (Illinois EPA or Agency). As part of its work for MWGen, EA reviewed and analyzed relevant information and data to assess use designation issues related to aquatic life goals for the CAWS and the LDR. EA, through the services of Greg Seegert, also participated in several Illinois EPA stakeholder meetings. Mr. Seegert served as a biological expert on the Biological Committee established by Illinois EPA as part of the LDR UAA process.

For this report, MWGen requested that EA evaluate the regulatory requirements in 40 CFR §131.10 (g), known as the UAA factors, to determine whether the Clean Water Act goals for aquatic life are attainable for the South Branch of the Chicago River, the CSSC and the LDR, which are the areas in the UIW where the MWGen electrical generating stations are located. For the LDR, our review focused on the Upper Dresden Island Pool (UDP) area as defined in the proposed UAA rules by the Illinois EPA. EA's review was limited to evaluating the attainability of aquatic life goals under the Clean Water Act by applying the first five UAA factors. EA's review did not include a review of the applicability of UAA Factor 6 relating to widespread economic and social harm. This report presents the results of EA's review and evaluation of the UAA factors as applied to the aforesaid areas of the CAWS and LDR.

II. EXECUTIVE SUMMARY

Based on EA's evaluation and application of the UAA factors, it was found that the South Branch of the Chicago River, the CSSC, and the UDP are not capable of attaining the Clean Water Act aquatic life goals. For purposes of this report, references to the CSSC include that portion of the South Branch of the Chicago River on which the MWGen Fisk Generating Station is located and which is immediately upstream of the CSSC. EA concluded that at least one of the UAA factors applied to each of these areas.

The present fish community in the CSSC and the LDR, including the UDP, is of limited diversity and quality. It does not represent a balanced population. It is the result of the following conditions, which satisfy the referenced UAA factors, none of which are reversible in the foreseeable future:

- **Artificial, controlled flow conditions (UAA Factor 2)**: The flow in the CAWS does not follow a normal seasonal cycle which is necessary to support a balanced aquatic community. The flow is artificially controlled to support the navigational use of the system and to manage the periodic peak flows. Peak flows, in particular, adversely affect certain fish by causing nest abandonment and/or displacement of recently hatched fry and by mobilizing fine sediments and then depositing them over their eggs, leading to suffocation of the eggs or reduced hatching success. Flow controls in the CAWS also result in fast, significant drops in water levels, which can strand fish in shallow areas, especially backwaters, leading to direct mortality or increased predation. Such conditions can also lead to nests and eggs randomly distributed on the bottom being exposed to the air.

- **Barge Traffic (UAA Factor 3):** Barge traffic adversely affects fish directly by propeller strikes and indirectly by a variety of mechanisms, especially by re-suspension of sediments. Barge traffic causes some direct mortality, constantly re-suspends soft sediments that can bury bottom organisms and fish eggs, contributes to toxicity which negatively impacts those types of organisms, and causes temporary changes in water levels.

- **Sedimentation (UAA Factor 3):** Sedimentation is a result of the impounding of the CSSC and the UDP and also the result of the urban character of the watershed, including the existence of Combined Sewer Overflows (CSOs) and non-point source or run-off pollution that flows into the waterway. Sedimentation causes burial of eggs and limits the availability of clean substrates needed to support a balanced, diverse fish population.

- **Dams/Impoundment (UAA Factors 2 and 4):** The presence of dams and the impounding effect they cause limit fish populations in many ways, but particularly by eliminating certain types of good habitats, such as riffles and fast water, and impairing existing habitat by causing excessive siltation. Simply put, the dams on the CSSC and the LDR have changed the waterway from a river to a lake and the fish community has responded (or been impaired) accordingly.

- **Lack of Adequate Habitat (UAA Factor 5):** Various key habitat types (*e.g.*, riffles and fast water) are lacking. Further, overall habitat is only fair to poor thus precluding attainment of CWA aquatic life goals. The lack of quality habitats in UDP was recently documented by EA through an intensive habitat study of the UDP performed in July 2008.

- **Urbanization (UAA Factor 5):** The degree of urbanization in the CSSC and the UDP precludes attainment of CWA aquatic life goals. Urbanization not only contributes to increased sediment loads, but also leads to CSO overflows, changes in the natural flow pattern and a variety of factors that are not well understood but whose collective influence is widely accepted.

With respect to the CSSC, the Illinois EPA agrees that it can not attain the Clean Water Act's aquatic use goal and has proposed a lower aquatic life use referred to as "Aquatic Life Use B". The Illinois EPA further agrees that the CSSC has poor habitat and that the aquatic community suffers adversely from the artificially controlled flow conditions and heavily industrialized nature of this waterway, including the high volume of barge traffic. What is less clear is whether the proposed language of the "Aquatic Life Use B" use classification accurately classifies highly-modified streams that are characterized by poor habitat, heavily industrialized use, and limited aquatic life potential. In this regard, the Ohio EPA's use classification approach of describing categories of streams, such as "Limited Warm Water", "Modified Warm Water" and its use of subclassifications, such as "Impounded", for streams like the CSSC, is a more workable and clearer approach to establishing a multi-tiered use classification under state water quality regulations. Also, to the extent that there are other waterways in the state that may share these same stream characteristics, an approach that describes categories and subcategories of use classifications would allow similar waterways to be similarly classified, thereby eliminating the need or risk of having to continually develop new use classification categories because the Illinois EPA's currently proposed aquatic life use designations are effectively site-specific use descriptions rather than classifications of aquatic life uses.

With respect to the UDP, the Illinois EPA's conclusion that the UDP is capable of "minimally attaining" the Clean Water Act's aquatic life goals is not supported by the weight of the relevant evidence. As documented by EA's July 2008 50-site QHEI/Habitat Study and its prior 2003 QHEI/Habitat Study of the UDP, there is little good quality habitat (*i.e.*, areas with QHEI scores greater than 60) present and there is a considerable amount of poor habitat (*i.e.*, areas with scores below 45) present. Roughly half of the UDP is navigational channel area that is unsuitable, poor habitat and the remaining half is characterized by poor to fair quality habitat, with only a very limited area of good habitat. As acknowledged in EA's QHEI Study of the UDP in 2003 (EA 2003), habitat is marginally better in the UDP as compared to Brandon Pool or Lockport Pool in the CSSC. More accurately stated, habitat in UDP is "less poor" than that in the CSSC, but it is still poor nonetheless. The only place where many "natural" features are evident is in the very limited area of the Brandon tailwaters. This is an isolated pocket of good, not great, habitat surrounded by miles of fair to poor habitat.

EA's July 2008 Study confirmed that siltation/sedimentation remains a significant problem in the UDP and will prevent certain better quality fish species from spawning and living in the UDP. The UDP is located in an urbanized area. Several studies have demonstrated that biological measures consistently decline significantly as urbanization increases. These declines occurred regardless of site-specific habitat quality. The amount of impervious cover in the Des Plaines Basin is significant, ranging from 30-56% (US Army Corps of Engineers 1997), which studies have shown results in significant declines in biological quality measured by such indices as the Index of Biological Integrity (IBI). The Pre-filed Testimony of Mr. Richard Lanyon (at page 6), General Superintendent, Metropolitan Water Reclamation District of Greater Chicago (MWRDGC), cites a similar percentage (42%) of impervious area for Cook County. Further, the UDP does not resemble an Illinois General Use water – the current use designation for streams that are capable of attaining the Clean Water Act goals. Other General Use waters in Illinois do not have the combination of commercial navigation, receipt of wastewater from a city of three million people, a much altered winter temperature regime because of those wastewater inputs, extensive urbanization, channelization, reversal of flow, periodic but irregular flow alterations, an electric barrier, extensive sedimentation, and an almost complete loss of riffles and fast water. The Illinois EPA has acknowledged the uniqueness of the waterway and justified its site-specific use classification approach (*e.g.*, "Upper Dresden Island Pool" use designation) on the basis that these waters are unique. The UDP certainly is unique as compared to General Use Waters. It clearly does not have the extent of good or great habitat that is characteristic of General Use

Waters and it will not in the foreseeable future.

The possibility of remediation actions in the UDP to address UAA factors that are preventing attainment of Clean Water Act goals must be considered whenever a proposed use designation falls below the Clean Water Act goals. Here, the main limiting factor in this waterway system is the impoundments. To remediate the impounded nature of the waterway would require removing or greatly modifying the locks and dams now present. However, such remediation would in turn severely impair or prevent the existing navigational use for which this waterway was intended, and which is also a protected use of the CAWS and the UDP under the Clean Water Act.

Short of removing or greatly modifying the existing locks and dams on the waterway, some more limited types of remediation could be implemented (*e.g.*, the amount of instream cover potentially could be increased). However, due to the extensive amount of habitat area that would need to be successfully improved by such measures in order to have any measureable effect on fish populations and species, they would have to occur on an unprecedented scale. Illinois EPA has acknowledged that there are no such plans for remediation at the scale required here. Moreover, unless the dams themselves are removed, the factors that are most severely limiting (*i.e.*, lack of riffles, fast water, clean cobble/boulder areas, and impoundment) will continue to limit the system by preventing the species that depend on such areas from establishing viable populations.

III. THE ARTIFICIAL, CONTROLLED FLOW CONDITIONS IN THE CAWS AND UDP SATISFY UAA FACTOR 2

The second of the six UAA factors ("UAA Factor 2") provides as follows:

> Natural, ephemeral, intermittent, or low flow conditions or water levels prevent the attainment of the use, unless these conditions may be compensated for by the discharge of sufficient volume of effluent discharges without violating State water conservation requirements to enable uses to be met. (40 CFR §131.10(g)(2))

For the reasons stated below, the flow conditions present in the CSSC and the UDP satisfy the requirements of UAA Factor 2.

Rather than being managed to optimize, or to at least accommodate aquatic life, flows in the CSSC and the UDP are managed to provide minimum flows/levels to accommodate barge traffic and handle periodic flow peaks, including flow peaks that are amplified by CSO inputs. Riverine fishes are adapted to handle occasional high flows and the attendant changes in water levels. However, these fish adaptations are based the flow of the river following a normal seasonal cycle (*i.e.*, generally highest in the late winter and spring and lowest in the late summer and early fall). Thus, most fishes, including those species present in the CAWS, spawn from May through July when flows should be more stable (EA 316b Study). However, the flow in the CAWS does not follow a normal seasonal cycle. It cannot due to the flow management system necessary to support the navigational use of the system and to manage periodic storm event and runoff flows. Because of its constrained nature, the water level alterations described herein are most pronounced in the CSSC, but they are also a significant factor in the UDP.

In a natural system, high spring flows result in a flushing effect which is then followed by relatively constant flows through the course of the summer. However, in the LDR there is no seasonality to these flushing events; they occur any time there is significant rainfall in the Metropolitan Chicago area because the CSSC cannot accommodate the large volumes of runoff water that result from a heavy rainfall. In a natural system, these spring flows flush out accumulated sediment and trigger migratory movement of certain big river fishes. The managed but unpredictable flow regimes in the CSSC may not provide the necessary flushing or provide migratory cues at the proper time. Collectively, the random fluctuations in flows in the CSSC are detrimental to the fishes in the CAWS because they do not follow the expected seasonal pattern and thus, may occur when fishes, especially larval fishes, are most vulnerable. Also, because of the artificial nature of the CAWS, flow fluctuations are more pronounced and much more frequent than in a natural system.

Depending on the species, high flows can adversely affect fish by causing nest abandonment and/or displacement of recently hatched fry. High flows can also adversely affect fish by mobilizing fine sediments and then depositing them over their eggs, which can lead to suffocation of the eggs or reduced hatching success. It has previously been determined that the species faring best in the CAWS and UDP are those that have special adaptations, which allow their eggs to survive better under the silty conditions prevalent in most of the CAWS and UDP (ComEd 1996).

At the other end of the flow variation spectrum in the CAWS are occasional precipitous drops in water levels, which are done in anticipation of high CSO discharges and rainfall inputs. When water levels drop fast enough, fishes can be stranded in shallow areas, especially backwaters. This can lead to direct mortality of stranded fishes or increased predation by avian or mammalian predators. It can also lead to nests and eggs that are distributed on the bottom being exposed to the air, which can result in either predation or dessication. EA biologists personally experienced such extreme flow fluctuations while conducting field work in the CAWS. A sudden and significant drop in the water level resulted in the EA biologists' boat being literally left "high and dry" in the Lockport Pool. As was noted in the testimony of Illinois EPA witnesses in the UAA Rule-Making Proceeding, R08-09, extreme water level variations of four to six feet within only a twenty-four hour period occur in the CSSC (See UAA Hearing 1/31/08 Transcript at p. 227; see also flow diagrams in Pre-filed Testimony of Julia Wozniak, Midwest Generation, Attachment 4). It was agreed that the adverse effects of such extreme variations in water level on habitat, by disrupting fish spawning and feeding, are greater than the potential effects of temperature (UAA hearing 1/31/08 at p. 227).

Similarly, in the UDP, extremely low water levels were encountered during fish surveys recently conducted by EA in the Brandon tailwaters during July 2008. Shallow areas will be most affected by these sudden flow/level changes because, on a proportional basis, depth will change most in shallow areas. To the extent they occur, flow fluctuations are felt most severely in the Brandon tailwaters. This area offers the only riffle habitat in UDP and therefore is crucial to the spawning success of species that spawn exclusively in such areas; particularly darters, madtoms, and other obligate riffle species. Flow fluctuations in this area will adversely affect these and other species by:

- stranding larvae, possibly even adult fish,
- reducing hatching success of eggs,
- sweeping away larvae if flows increase suddenly, which could cause direct mortality or subject them to increased predation, and
- conversely, extremely low water levels would expose eggs, larvae, and adults to predators, including avian and mammalian predators.

As was observed by Mr. Rankin during the QHEI survey conducted in the UDP during late March 2004, "*the lack of flow throughout much of the reach we boated through would limit species and taxa dependent on flow*" (See Attachment R to Illinois EPA Statement of Reasons, at section entitled "Des Plaines River [Recommended Category: MWH-I, Other]"). With regard to fluctuations in flow, it is probable that all of the fish species that the Illinois EPA has identified on its Representative Aquatic Species (RAS) list for the UDP (the "Modified RAS") would benefit from a more stable flow regime if one existed in the UDP. Those species that would likely benefit most would be the nest builders, such as the various catfishes and sunfishes. Based on EA field data from the Ohio River, gizzard shad also seem to reproduce best (*i.e.*, have the strongest year classes) when flows during the spawning season (May-July) are fairly low and stable. So long as water levels remain fairly constant, the species on the Modified RAS list should be able to reproduce in the system, but the absence of natural flow conditions will prevent establishment of a community consistent with the Clean Water Act aquatic life goals.

Because commercial navigation is and will continue to be a protected use in the CSSC and the UDP, the random and extreme flow fluctuations will continue because they are necessary to maintain navigation and to provide flood control. The Agency agrees that the navigational use and flow management control constraints for the UDP will continue and are not reversible for the foreseeable future (UAA January 29, 2008 Hearing Transcript at pp. 41 and 43). Because of how the water (flow) management system is operated by the Army Corps of Engineers and MWRDGC, these conditions cannot be countered or compensated for by the discharge of any sufficient volume of effluent discharge. Thus, these artificial flow conditions satisfy the requirements of UAA Factor 2.

IV. BARGE TRAFFIC AND SEDIMENTATION PRESENT IN THE CSSC AND UDP SATISFY UAA FACTOR 3

The third of the six UAA factors ("UAA Factor 3") provides as follows:

> Human-caused conditions or sources of pollution prevent the attainment of the use and cannot be remedied or would cause more environmental damage to correct than to leave in place. (40 CFR §131.10(g)(3))

UAA Factor 3 focuses on the effect of "human caused conditions and sources of pollution" in the waterway. Both the CSSC and the UDP satisfy UAA Factor 3, primarily due to the adverse effects of barge traffic and sedimentation upon the aquatic life community. As noted above, because barge traffic is part of the protected navigational use of the CSSC and UDP, these adverse effects are not reversible. Similarly, there are no known plans for reducing sedimentation in either waterbody and the contributing sources will continue to add sediment to the waterway.

A. Barge Traffic in the CSSC and UDP Limits the Quality of Aquatic Life Attainable

The constant barge traffic through the CSSC and UDP adversely affect aquatic organisms, particularly macroinvertebrates, mussels, and fishes, by:

- physically injuring or stranding fishes;
- disrupting or disturbing spawning habitat;
- uprooting aquatic vegetation;
- increasing turbidity via re-suspension of bottom materials; and
- enhancing toxicity by re-suspending and dispersing the fine-grained sediments shown to be associated with toxic compounds.

The net effect of barge traffic on the CSSC and UDP is to make the main channel and channel border areas a less hospitable environment for most aquatic life.

Direct mortality to the aquatic community due to barge traffic has been well-documented. A joint study by the United States Geological Survey (USGS) and the Illinois Natural History Survey (INHS) documented direct mortality to aquatic life caused by towboats. Gutreuter *et al.* (2003) found that various medium to large fish were killed as a result of propeller strikes in Pool 26 of the Mississippi River, as well as the lower portion of the Illinois River. They estimated that 790,000 gizzard shad were killed in this area alone as a result of propeller strikes. The number of fish killed was a function of the number of fish killed per kilometer times the amount of barge traffic (kilometers traveled). On a large river such as the Mississippi, at least some fish will be able to move away and avoid oncoming barge traffic (Lowery 1987, Todd *et al.* 1989). In a smaller, narrower river like the Des Plaines, and in the confined, narrow CSSC, propeller avoidance would likely be more difficult, so it is reasonable to assume that the mortality rate estimated for the Mississippi River and the lower Illinois River will at least be as high and likely higher in the CSSC and the UDP.

Another effect of barge traffic is short-term but significant changes in river levels. As a barge approaches, it pushes water into adjacent backwaters, then, as it passes, this water is sucked out of the backwater, which causes rapid changes in water levels. The surge effects likely displace fish eggs and larvae from their nests. Barge traffic also stirs up sediment. The props from the barges stir up and re-suspend fine particulate matter. Aside from any toxic properties these sediments may possess, the re-suspended sediment can exert harmful effects by burying invertebrates and fish eggs.

In addition to constant barge traffic through the system, the section of the river in the UDP from the I-55 Bridge upstream for about 1 mile is a major barge fleeting area. Barges are often tied up one after the other, often two abreast, throughout this mile-long stretch (See EA photographs taken July 10, 2008 attached as Attachment 2a). These barges are located in close proximity to the shoreline, which is an area of better habitat for fish than is the main channel. The presence of this major barge fleeting area, with the attendant adverse effects on fish, further diminishes the quality of the shoreline habitat in this area for aquatic life. However, as noted by the Illinois EPA, the commercial activity that is a protected use under the proposed use designation for the UDP includes barge fleeting (UAA January 19, 2008 Hearing Transcript at p. 24). Hence, the adverse effects caused by barge fleeting in the UDP are a protected use and are not reversible.

B. Adverse, Physical Aspects of Sedimentation in the CSSC and UDP Significantly Limit the Quality of Aquatic Life Attainable.

A key limiting factor to improved biological conditions in the CSSC and UDP is the physical characteristics of the sediment itself (*i.e.*, fine, silty, organic). The fine, silty, and organic nature of the sediments are not suitable for many higher quality fish species which need a hard, clean substrate for spawning. Even if the stream could be remediated and the existing sediment (contaminated or not) removed, the urban nature of the waterway itself (*e.g.*, impounded) would ensure that additional fine, silty sediment (whether clean or contaminated) would continue to be deposited, thereby preventing an improved habitat for better quality aquatic life (UAA February 1, 2008 Hearing Transcript at p. 41, Testimony of C. Yoder "So in excessive amounts, [silt] can be detrimental. A lot of nonpoint source problems when you hear nonpoint due to sedimentation affects, due to excessive siltation."). The unpreventable and irreversible accumulation and physical quality of the sediments that will always be present in the system is limiting further biological improvements in the CSSC and UDP, with existing, depositional area sediment contamination exacerbating the fundamental siltation problem.

The July 2002 draft guidance by the U.S. EPA on non-point source pollution identified many detrimental effects on aquatic life caused by excessive sedimentation from urban runoff (U.S. EPA, July 2002, p. 26-31). Sediment, whether contaminated or not, was found to be the leading cause of impairment, accounting for 38% of the impaired waters in the nation. More recently, the US EPA reported that "[s]edimentation and siltation problems account for more identified water quality impairments of US waters than any other pollutant" (U.S. EPA, August 2003). Excessive erosion, transport, and deposition of sediment in surface waters are significant forms of pollution. Sediment imbalances impair many waters' designated uses. Excessive sediment can impair aquatic life by filling interstitial spaces of spawning gravels, impairing fish food sources, filling rearing pools, and reducing beneficial habitat structure in stream channels. Yoder *et al.* 2000 found that streams in highly urbanized areas -- which the CSSC and the UDP certainly are -- typically do not achieve Clean Water Act goals.

The extensive studies performed by ComEd in the mid-90's (Burton 1995a, 1995b, 1998, and 1999) found that contaminated sediments occur in all three navigational pools (*i.e.*, Lockport, Brandon and the Upper Dresden Pools) and are present primarily in side-channels and backwater areas. Sediment inputs from local drainages appear to have covered the historically contaminated sediments in some areas, especially along the lower reaches of Dresden Pool.

However, substantial deposits of fine-grained and potentially contaminated materials remain throughout the UIW, including in the limited habitat areas in the UAA area, posing a permanent impediment to significant improvement of overall ecological integrity in the system. In the 2003 habitat evaluation of the Dresden Pool conducted by EA, it was found that sedimentation was moderate to severe in many (23 out of 34, or 70%) of the areas where QHEI scores were calculated (EA 2003). During the July 2008 QHEI survey, sediment was rated as moderate or severe at 33 out of 50 locations (66%). Based on the observations of EA field crews during the 2003 and 2008 Upper Dresden Pool field surveys, sedimentation appears to have gotten worse over the past 5-10 years in some areas (*e.g.*, DuPage Delta).

V. DAMS AND OTHER HYDROLOGIC MODIFICATIONS IN THE CSSC AND UDP PRECLUDE ATTAINMENT OF AQUATIC LIFE GOALS UNDER UAA FACTOR 4

The fourth of the UAA factors ("UAA Factor 4") provides as follows:

> Dams, diversions, or other types of hydrologic modifications preclude the attainment of use, and it is not feasible to restore the water body to its original condition or to operate such modification in a way that would result in attainment of the use. (40 CFR §131.10(g)(4))

Both the CSSC and the UDP satisfy UAA Factor 4 because of the adverse effects of the dams present in these waterways, particularly the impounded pool areas formed by these dams and the water level manipulations that accompany their presence. As further discussed below, studies of similarly impounded Illinois waters support the finding that their adverse effects preclude the attainment of the Clean Water Act aquatic life goals.

The entire CSSC and LDR is basically a series of pools separated by locks and dams. Flow in the system is controlled entirely by diversions from Lake Michigan, effluents from large POTWs, and water level manipulation to accommodate barge traffic. It is the impounding effect caused by these dams that has the greatest effect on the fish community. This impounding changes most of the system from its original lotic (riverine) nature to its current, modified lentic (lake-like) condition. As the Illinois EPA's witness Mr. Yoder agreed, the locks along the various reaches of the CSSC could have an effect more significant than temperature on the aquatic community (UAA January 31, 2008 Hearing Transcript at p. 228). Similarly, in Dresden Pool, only 1 mile out of a 15-mile long pool is not impounded. Such profound changes in habitat conditions adversely affect the fish community.

Fish species most affected by the impounded nature of the CSSC and LDR are so-called fluvial specialists (*e.g.*, mostly darters, many suckers, etc.), whereas habitat generalists (*e.g.*, common carp, gizzard shad, channel catfish), and pelagic species (*e.g.*, emerald shiner, freshwater drum) do quite well under impounded conditions. Similarly, simple lithophiles (*e.g.*, redhorse and most darters), which require clean, hard substrates, do poorly in impounded waters because of increased siltation, while those that are nest builders (*e.g.*, centrarchids) or have modified spawning strategies (*e.g.*, bluntnose minnow) do quite well under the same set of circumstances.

Dams adversely affect many lotic species by:

- eliminating riffles;
- reducing the amount of fast water;
- increasing sedimentation;
- interrupting migration;
- reducing the number and variety of aquatic insects such as mayflies and stoneflies that serve as prey for many lotic fishes; and
- reducing habitat complexity. (Santucci *et al.* 2005, Poff *et al.* 1997, American Rivers 2002).

The result of the adverse effects of dams is a simplified habitat that can support only a simplified (*i.e.*, less diverse) fish community (Santucci *et al.* 2005, Guenther and Spacie 2006, Edds *et al.* 2005). Such a simplified fish community does not, and cannot due to the limited quality of the habitat, attain the Clean Water Act's aquatic life goals.

Studies have shown that the reductions in the diversity of the fish community are greatest where the spacing between dams is least, such as is the case in the CSSC and the LDR (Lyons *et al.* 2001). Studies on the Fox River in Illinois sponsored by U.S. EPA clearly demonstrated these impacts as shown by declines in IBI scores upstream of each dam (Santucci and Gephard 2003). The adverse impacts on aquatic communities caused by dams are well-recognized by other Region V states. For example, Wisconsin and Michigan are actively promoting dam removal. Ohio has a separate use classification that recognizes effects from dams, as reflected by the subcategory of their Modified Warmwater Habitat (MWH) designation described as applicable to waters that are "impounded". In addition, Ohio also retains a MWH subcategory for "Channel-Modified" conditions (*See* Table 7-15 of Ohio Administrative Code, Chapter 3745-1, effective July 7, 2003).

The impounding effect of dams in the CSSC and UDP is pervasive and irreversible. Its effect is particularly severe because it eliminates or greatly reduces large groups or classes of fishes, including all species that are obligate riffle dwellers (*e.g.*, most darters and madtoms, some minnows) and other species that, though not obligate riffle dwellers, spend much of their life in fast water areas and/or over hard substrates (*e.g.,* many sucker species, as well as some minnows, darters, and sunfish). With large segments of the fish community reduced or eliminated, maintenance of a fish community consistent with the goals of the CWA is not possible. Further documentation on the adverse effects of dams on riverine fish communities is provided below.

A. The Adverse Effects of Dams on Aquatic Life

It is well established that dams reduce the abundance and diversity of aquatic life in riverine systems (American Rivers 2002, Santucci *et al.* 2005, Guenther and Spacie 2006, Edds *et al.* 2005). Dams do this by:

- interrupting or eliminating migration (American Rivers 2002, Guenther and Spacie 2006);

- altering natural flow regimes (Poff *et al.* 1997);
- impounding the river, thereby inundating riffle/run areas (Santucci *et al.* 2005, Eley *et al.* 1981);
- reducing current speeds throughout the area impounded (Poff *et al.* 1997, Santucci *et al.* 2005); and
- allowing sediment to build up behind them as well as interrupting the normal sediment flow (Poff *et al.* 1997).

The degree to which dams cause these adverse effects and associated changes in the quality of fish communities depends on the degree of fragmentation (Lyons *et al.* 2001). Rivers that have dams close to one another such that a large percentage of the area between adjacent dams was impounded are affected more than rivers on which dams are widely spaced (Lyons *et al.* 2001). Similarly, dams that are high and have no mechanism to pass fish would be expected to have a greater impact than low head dams that are frequently overtopped during high water or those that have fish ladders that allow fish to move from one pool to the other. For example, the Federal Energy Regulatory Commission (FERC) typically prescribes fish ladders whenever hydro licenses are up for renewal.

In recognition of the adverse effects that dams have on fish communities, Ohio has adopted a use classification called "Modified-Impounded", specifically to deal with dam-affected rivers and to recognize that such rivers typically do not attain the Clean Water Act aquatic life goals. The Modified-Impounded designation is the designation Mr. Rankin opined was the most appropriate category for the Upper Dresden Pool. (*See* Attachment R to Illinois EPA Statement of Reasons, section entitled "Des Plaines River [Recommended Category; MWH-I, Other"). For the same reason, Wisconsin and Michigan are actively promoting dam removal. The American Fisheries Society recently held a symposium devoted to the effects of dams on aquatic life and the subject of dam removal. Studies on a medium-size, warmwater river in Wisconsin showed that the fish community improved noticeably following removal of a dam (Kanehl *et al.* 1997).

B. The Fox River Studies of the Adverse Effects of Dams.

The adverse effects of dams on aquatic life also have been documented on the nearby Fox River in northeastern Illinois. The Fox River studies, which were partially funded by U.S. EPA Region V, evaluated fish and macroinvertebrate communities in free-flowing, mid-reach, and above-dam (*i.e.,* impounded) sections of the Fox River. The authors noted that 55% of the river's surface area and 47% of its length within the study reach was impounded. As a result of impoundment, they found the following adverse impacts:

- lower IBI scores in the impounded reaches;
- poorer macroinvertebrate scores in the impounded reaches;
- the macroinvertebrate community in open water areas of the impounded reaches was dominated almost exclusively by pollution-tolerant worms and midges;
- QHEI scores were significantly lower in the impounded reaches;
- fish species richness was lower in impounded reaches;

- dams fragmented the fish community; and
- wider dissolved oxygen and pH fluctuations were found in the impounded reaches compared to the free-flowing reaches.

The authors concluded that *"low-head dams adversely affect warmwater stream fish and macroinvertebrate communities by degrading habitat and water quality and fragmenting the river landscape"* (See "Effects of Multiple Low-Head Dams on Fish, Macroinvertebrates, Habitat, and Water Quality in the Fox River, Illinois" attached to this report as Attachment 3). The authors also reported that the fish species most adversely affected by impoundment were darters, suckers, and intolerants, the same species described here as adversely affected by similar conditions in the CAWS and UDP. Also, as expected, the Fox River studies found that tolerant species abundance increased in impounded segments, whereas the number of harvestable-sized sport fish decreased. The study findings noted that it was habitat quality that was *"an important factor affecting aquatic biota in the Fox River"* and emphasized "*the importance of habitat quality to lotic fish and macroinvertebrate communities*". The authors explained the correlation between habitat quality and aquatic life quality as follows:

> *We found strong correlations between habitat quality and fish and invertebrate community quality, and index scores were consistently higher in free-flowing reaches than in impoundments. Differences in habitat quality reflected differences in habitat diversity between free-flowing and impounded areas. Free-flowing areas were made up of a variety of physical features (i.e., riffles, runs, and natural pools) that provided a wide array of water depths, current velocities, substrate types, and cover characteristics. In contrast, impoundment habitat was more homogenous and typically consisted of extensive, deeper open-water areas; lower and more uniform current velocities; and substrates dominated by deposited fine silts and sands (Attachment 3 at p. 987).*

The Fox River study found that the effects of impoundments in the waterway were not limited to the area in the immediate vicinity of each dam, but rather the adverse effects of the dams were more wide-ranging. The study reported the following assessment of these adverse effects:

> *[L]ow-head dams adversely affected the biotic integrity of the Fox River on local and landscape scales. Local effects were largely related to the impoundments that formed upstream of each dam, whereas landscape-level effects rose from fragmentation of the river basin and restricted movements of fish. [They] found that the use of impoundments by important macroinvertebrate and fish taxa was limited by degraded habitat and poor summer water quality conditions. Abundance, richness, and biotic integrity of fish and invertebrate assemblages were consistently lower in impoundments than in the free-flowing river. Degraded habitat, water quality,*

> *and biotic communities were found throughout impoundments, not just in the most impacted areas immediately above dams. Conversely, good habitat quality, water quality, macroinvertebrate assemblages, and sport fish and nongame fish communities occurred throughout free-flowing reaches, not just in areas immediately below dams (Attachment 3 at p. 986).*

The conditions in the CAWS and the UDP strongly parallel those in the nearby Fox River. The influence of dams in the CSSC and UDP is likely to be greater than in the Fox River because the dams in the CSSC portion of the CAWS are "high" dams rather than the low-head dams found in the Fox River. Similarly, Brandon Pool is 100% impounded and Dresden Pool is 93% impounded, compared to the roughly 50% impounded areas in the Fox River. Thus, if anything, adverse impacts due to impoundment should be greater in the CAWS and the UDP than those found in the Fox River.

The Fox River study confirms and corroborates the conclusion that fluvial specialists (e.g., most darters, many suckers) and simple lithophiles (e.g., redhorse and most darters), which require clean, hard substrates, do poorly in impounded situations because of the increased siltation, and conversely, habitat generalists (e.g., common carp, gizzard shad, channel catfish) and pelagic species (e.g., emerald shiner, freshwater drum) do quite well under impounded conditions. Nest builders (e.g., centrarchids) or those having modified spawning strategies (e.g., bluntnose minnow) also do quite well under impounded conditions.

In summary, dams prevent the attainment of CWA aquatic life goals in the CSSC and the UDP for the following reasons:

- the impounding nature of these multiple dams has changed the system from a river to a series of lakes;
- riffles have been eliminated except in the Brandon tailwaters;
- the amount of fast water has been reduced;
- migration has been interrupted; and
- habitat complexity has been reduced.

The resultant simplified habitat has lead to a simplified fish community, one in which fish habitat generalists can persist, but habitat specialists are eliminated or greatly reduced. The effects are pervasive and irreversible, meaning that the aquatic communities of the CSSC and the UDP currently do not meet CWA aquatic life goals, nor are they capable of attaining those goals in the future.

VI. THE "NATURAL" FEATURES OF THE CAWS AND UDP PRECLUDE ATTAINMENT OF AQUATIC LIFE USES UNDER UAA FACTOR 5

The fifth of the UAA factors ("UAA Factor 5") provides as follows:

> Physical conditions related to the natural features of the water body, such as the lack of proper substrate, cover, flow, depth, pools, riffles, and the like, unrelated to water quality, preclude attainment of aquatic life protection uses. (40 CFR §131.10(g)(5))

As discussed in greater detail in the section of this report on QHEI scores (*See* Section A2 below), many habitat features required for a balanced fish community are lacking or greatly reduced in the CSSC and UDP. The physical factors in these portions of the UIW that adversely affect the abundance and variety of fishes are:

- excessive amounts of silt;
- insufficient amounts of hard substrates such as cobble and boulder;
- minimal instream cover except for rooted macrophytes;
- lack of riffles; and
- lack of fast water.

These unalterable limitations in the physical conditions/habitat features of the waterbody, even without the presence of contamination, preclude the attainment of aquatic life protection uses consistent with General Use requirements. The presence of these physical conditions in the CSSC and the UDP satisfy the conditions described in UAA Factor 5 and prevent these waters from attaining the Clean Water Act aquatic life goals.

Some might argue that because the predominant physical features of the CAWS and UDP are "man-made", they do not equate to the "natural features" of the waterway referenced in UAA Factor 5 and instead are addressed by their evaluation in the context of UAA Factors 2 and 3 above. There is almost nothing "natural" about the CSSC and UDP areas when that term is used to mean areas that have not been modified. But the unique characteristics of the CSSC and, to a lesser extent, the UDP may well be considered for UAA purposes as "natural features" for this waterway. For the CSSC, it is largely a man-made and artificially controlled waterway created for navigational purposes and to convey wastewater away from Lake Michigan. Its "natural features" are in essence the concrete, sheet-piling or rock-lined, steep walls, but for whose construction this waterway would not exist and which are responsible for its inability to attain Clean Water Act goals. For the UDP, the features addressed here (*e.g.*, riffles, fast water) are natural. The factors that caused these natural features to be limited stem from the purpose to which this area was dedicated many years ago. The waterway became what it is based on societal decisions regarding what purposes the CSSC and the LDR would serve; namely, serving as a conduit for commercial barge traffic and a means of transporting wastewater, treated and otherwise, away from Lake Michigan. Until those value judgments are reversed, the system will operate under the same set of habitat constraints as are currently in place. Regardless of their characterization as either "natural" or "man-made" features, and as further discussed below, these features, or the lack thereof, are not reversible to the extent necessary to support an aquatic community that meets the Clean Water Act's goals.

A. Habitat Conditions in the CAWS and UDP are Inadequate to Support a Balanced Fish Population

Large amounts of silt prevent an adequate exchange of oxygen in bottom materials. Many species of fish lay their eggs on the bottom or bury them in the bottom substrates. When silt loads are high, eggs are smothered and hatching success is eliminated or greatly reduced (U.S. EPA 1986). Many "high quality" invertebrates (*e.g.*, mayflies and stoneflies) also have high oxygen demands that cannot be met when siltation is excessive. These organisms are prey for many of the fishes necessary to achieve a balanced fish community (*e.g.*, redhorse, darters, madtoms, and certain minnows). Without adequate food resources, viable populations of such fishes can not develop. Many fish species need cobble/boulder substrates to spawn (this includes the group Ohio EPA calls the "simple lithophils"). Various small to medium size fishes (*e.g.*, darters, madtoms, and some minnows) use the cover within the interstitial spaces as cover to avoid predation. Many of these same species as well as others (*e.g.*, redhorse, small channel catfish) also feed extensively in such areas on the mayflies, stoneflies, and caddisflies (collectively referred to as "EPT") that are the common invertebrate inhabitants of such areas. Large amounts of silt embed the hard substrates making them unavailable to fishes and macroinvertebrates. Given the number and severity of these limitations in the CAWS and the UDP, establishment of a fish community consistent with the CWA aquatic life goals is not possible, regardless of what numeric or narrative standards are established for the various water quality parameters, including thermal water quality standards.

EA has been studying the aquatic community in the CSSC and the UDP since 1993. A detailed summary of the results of these studies is presented in Attachment 1 to this report. EA made 1361 fish collections in 1993-1995, 1310 collections from Dresden Pool alone during 1997-2005, and 488 more collections from Brandon and Lockport Pools in 1997-2005, for a total of 3159 collections from 1993-2005. This compares to 22 collections made by MBI from these pools, with all collections confined to a single year, 2006. The most significant findings from these extensive studies of the waterway merit a brief discussion here before presenting the most recent study, a QHEI field survey of the UDP conducted by EA in July 2008.

The contention that lowering the ambient temperature of the CSSC and UDP will significantly improve the quality of the aquatic community is simply not supported by the results of the fish surveys conducted from 1993 to the present. Some may contend that because these studies have shown the presence of spawning activity in the CSSC and UDP, this translates to the conclusion that better water quality conditions in these waters will result in an aquatic community that attains the Clean Water Act aquatic life goals. A close review of the data shows that this is not an accurate conclusion. The evidence of spawning is predominantly associated with fish species/taxa that have the ability to lay eggs that have minimal contact with sediment, can tolerate low dissolved oxygen concentrations, and do not require the coarse or hard substrates that are rare in much of this system. The study results suggest a complex but highly stressed and habitat-limited fishery that is heavily dependent for its diversity on: 1) species adapted to contaminated conditions, 2) a few critical spawning and nursery areas, primarily in UDP, and 3) immigration from Lake Michigan and tributary drainages.

Turning to the quality of the fish community in these waters, the most common and consistent trends during the 1993-1995 studies were spatial. These spatial patterns were:

1. A very poor native fish assemblage was present in Lockport Pool. The assemblage in Lockport Pool was characterized by low native fish abundance (catch rates typically <50 fish/km), low species richness, and domination by highly tolerant species. Using the IWBmod criteria established by Ohio EPA, the Lockport Pool would be classified as very poor.

2. The community was marginally better in Brandon Pool but was still very poor.

3. The fish communities in the Upper Dresden Pool and the 5-mile Stretch, Dresden Pool downstream of the Kankakee River, and downstream of Dresden Lock and Dam were relatively similar to each other. While the fish community in the Upper Dresden Pool was better than in the Brandon Pool, it still fell into the "poor" classification under the IWBmod criteria.

4. Results at thermally-influenced sampling stations were comparable to those at other stations. The spatial pattern appeared unrelated to the operation of the electric generating stations. None of the measures used in the studies to evaluate individual or community health of fish species indicated that the electric generating stations were contributing to the poor fish communities observed in much of the UIW.

5. The incidence of diseased fish was (and continues to be) very high in the UIW.

6. Habitat severely limited the fish community

7. Based on the lack of impacts and habitat-imposed constraints, it was concluded that the aquatic community of the UIW would essentially be the same as it is currently if ComEd plants were load-restricted or even taken off line.

For the Upper Dresden Pool and the 5-mile Stretch, electrofishing and seining during the 12 study years produced 143,156 fish representing 82 species and four hybrids. Only ten species collectively represented 85-90% of the fish community. The 10 most abundant species collected were, in descending order of abundance: bluntnose minnow (22.2%), gizzard shad (+ *Dorosoma* spp.) (20.4%), bluegill (17.2%), green sunfish (7.0%), emerald shiner (6.6%), orangespotted sunfish (4.4%), largemouth bass (3.4%), common carp (2.8%), bullhead minnow (2.3%), and spottail shiner (1.9%). These same species were also the 10 most abundant collected during each period (i.e., 1993-1995 and 1997-2005):

Species	**1993-1995**			**1997-2005**		
	No.	**Rank**	**%**	**No.**	**Rank**	**%**
Bluntnose minnow	3,626	1	27.8	28,170	1	21.7
Gizzard shad (+ *Dorosoma*)	2,924	2	22.4	26,220	2	20.2
Bluegill	327	10	2.5	24,283	3	18.7
Green Sunfish	413	7	3.2	9,544	4	7.3
Emerald shiner	853	3	6.5	8,568	5	6.6
Orangespotted sunfish	373	8	2.9	5,872	6	4.5
Largemouth bass	760	5	5.8	4,050	7	3.1
Common carp	796	4	6.1	3,217	8	2.5
Bullhead minnow	345	9	2.6	2,916	9	2.2
Spottail shiner	689	6	5.3	2,068	10	1.6
			85.1			88.3

The fact that the same 10 species dominated the area before the current ComEd/MWGen Adjusted Standard went into effect as have dominated after it went into effect indicates that the slightly higher thermal standards allowed by the Adjusted Standard did not affect fish populations.

Ohio EPA (1987, plus 2006 update) classifies fish based on their tolerance to environmental perturbations such as decreasing water and habitat quality. Of the 82 species collected from Dresden Pool, eight species are classified as intolerant and another eight species classified as moderately intolerant. For the twelve study years combined, the 16 moderately and highly tolerant species (plus two other taxa) composed 52.8% of the catch. The 42 intermediately tolerant species (plus six other taxa) composed 42.4% of the catch. At the other end of the spectrum are the intolerant and moderately intolerant fishes, which exhibit a distinct and rapid decreasing trend in abundance with decreasing habitat and/or water quality. Only 1.7% of the fish collected were intolerant or moderately intolerant. The preponderance of moderately tolerant and highly tolerant fishes reflects the degraded habitat of Dresden Pool.

In summary, the present fish community in UDP is somewhat more abundant, has slightly more species, and generally has higher IWBmod scores compared to 1993-1995. However, the community continues to be dominated by species at the high end of the tolerance scale and the community dominants have not changed over the period.

1. QHEI Scoring Process and Support Categories

The Qualitative Habitat Evaluation Index (QHEI) was developed by Mr. Ed Rankin, who at the time of its development was employed by the Ohio EPA. The QHEI is a simple but fairly robust method of evaluating the physical habitat in streams (Rankin 1989). The index is composed of six components (often referred to as "metrics"):

- Substrate
- Instream cover
- Channel morphology
- Bank erosion and riparian zone

- Pool/run/riffle quality
- Stream gradient

Within each metric, scoring criteria are established for each possibility for that metric. For example, in the substrate metric, boulders are assigned a score of 10, while muck and silt substrates rate only a 2. The sum of the metric scores equals the QHEI score.

Rankin (1989) found that there was a direct relationship between QHEI scores and the quality of the fish community. Based on examination of QHEI scores from many streams, Rankin (1989) concluded that streams with QHEI scores > 60 were capable of supporting fish communities that were consistent with CWA goals, while streams with scores <45 typically did not support such communities. According to Rankin (1989), streams with scores between 45 and 60 need to be examined closely to determine whether they can or cannot support balanced fish populations. He emphasizes that the QHEI at a single site does not accurately reflect the potential of that stream, rather "general basin characteristics and overall habitat quality influence stream fish communities more than does site-specific habitat".

2. The July 2008 EA QHEI Field Survey of the UDP

Within the CAWS, there seems to be uniform agreement that habitat quality in the South Branch of the Chicago River and the CSSC is poor and will not support Clean Water Act aquatic life goals (*See, e.g.*, UAA January 29, 2008 Hearing Transcript at p. 108-9 [Sulski Testimony] and Attachment R [2004 Rankin Report] to the Illinois EPA Statement of Reasons). There seems to be wide-spread agreement as well that conditions in the UDP are marginal. The Illinois EPA, however, speculates, with little or no supporting evidence, that the UDP can "marginally attain" the Clean Water Act goals. However, the weight of the evidence shows that attainment of these goals in the UDP will not occur, absent extensive and wide-ranging improvements to the waterway, the most significant of which would be the removal of the dams and locks and cessation of barge traffic. As discussed in greater detail below, this conclusion is supported by the following facts:

- the preponderance of QHEIs are below 60;
- many QHEI score are below 45 – the accepted threshold that represents an inability to attain the Clean Water Act aquatic life goal;
- the mean of all the QHEI scores calculated using Ohio EPA protocols is about 47, much closer to 45 than to 60;
- the mean of all the QHEI scores calculated using MBI's protocol is 42, below the accepted threshold of 45;
- certain key habitat types (*e.g.*, riffles, fast water, hard substrates) are greatly reduced;
- siltation is excessive; and
- urbanization is high within the watershed.

When Mr. Rankin, the developer of the QHEI, visited the area in 2004, he concluded that the appropriate classification for the UDP would be "Modified Warmwater Habitat, Impounded", using the use classification terminology of the Ohio EPA for a stream that does not attain Clean Water Act aquatic life goals (*See* Attachment R to Illinois EPA Statement of Reasons). In contrast, when MBI visited the UDP not long after, in 2006, it concluded that although the area was impaired, it could marginally meet CWA aquatic life goals (*See* Attachment S to Illinois EPA Statement of Reasons: Aquatic Life and Habitat Data Collected in 2006 on the Illinois and Des Plaines Rivers. Midwest Biodiversity Institute, prepared for U.S. EPA Region 5 [2006]). However, the evaluations performed by both Mr. Rankin and MBI were based on a very limited and not necessarily representative subset of the UDP area. In each visit, only two and three locations within the UDP, respectively, were scored for QHEI values.

EA has now much more extensively sampled the UDP than was done during either Mr. Rankin's or the MBI's visit to the area. In 2003, EA conducted a QHEI field survey of the Dresden Pool that included 34 sites (EA 2003). Based on the 2003 QHEI field survey, EA calculated QHEI scores similar to those reported by Rankin in 2004 and lower than those reported by MBI in 2006. To consider whether EA's 2003 QHEI scores were still representative, EA senior biologists, Greg Seegert and Joe Vondruska, surveyed the entire UDP from the Brandon tailwaters to the I-55 Bridge in July 2008. Both Messrs. Seegert and Vondruska have years of experience working in the UDP and in conducting QHEIs. Mr. Vondruska is a certified data collector based on training provided by Ohio EPA. Mr. Seegert has used the QHEI methodology to evaluate habitats at many sites in several states.

During the July 2008 QHEI field survey of the UDP, each bank of the UDP was surveyed separately. The entire linear distance was surveyed except where barges or other obstructions (*e.g.*, the Empress Casino) blocked access to the shore. EA established a series of contiguous, 500 meter zones along each shore of the UDP. Over a two-day period on July 10-11, 2008, EA evaluated 50 such zones, far more than the two or three evaluated by MBI or Mr. Rankin. The extensive and contiguous nature of the 50-site QHEI survey by EA eliminated any potential bias that may arise from the selection and scoring of only a limited number of QHEI site locations.

The latest guidance from Ohio EPA (OEPA 2006) was used to score each QHEI metric. EA obtained a series of aerial photos to assess floodplain and riparian zone quality accurately, as recommended by Mr. Yoder. Except for the two tailwater zones, substrate composition was obtained by slowly motoring the boat through each 500 m zone and using a metal pole to regularly probe the bottom. At the two shallower tailwater zones, both biologists walked much of the zone to assess substrate conditions. The start and end of each zone was marked with GPS coordinates and a photo log that included three to four photos for each zone was compiled (*See* Attachment 2b). Also, the area evaluated at each location was marked on aerial photos (*See* Attachment 2c).

A spreadsheet showing for each zone the value for each QHEI metric and the QHEI total score was prepared (*See* Attachment 2d). QHEI scores were calculated using two QHEI scoring procedures: the standard Ohio EPA QHEI scoring procedure (OEPA 2006) used by Rankin and the "MBI-modified procedure." The MBI-modified procedure is the MBI's recently developed version of the QHEI that takes impounding of waterways into account and which was used by

MBI during their 2006 assessment of the CAWS. The QHEI scores under both the Ohio EPA and MBI-modified QHEI procedures for the EA July 2008 QHEI field survey are presented in Attachment 2e to this report.

The findings set forth below are based on the EA 2008 QHEI field survey results. The UDP 2008 QHEI scores clearly support the conclusion that the UDP is not capable of attaining the Clean Water Act aquatic life goals.

- **Almost all of the QHEI scores are below 60.**

Based on the Ohio EPA scoring procedure, 45 of the 50 (90%) QHEI scores were <60, and 49 of 50 (98%) of the scores were <60 using the Modified MBI procedure (Attachment 2d).

- **Approximately Half of the QHEI scores were <45.**

Based on the Ohio EPA procedure, 20 (40%) of the scores were <45 and well over half (32 of 50 = 64%) of the scores using the MBI procedure were <45 (Attachment 2d).

- **The mean QHEI score is closer to 45 than to 60.**

The mean QHEI scores were 47.4 and 42.0 for the OEPA and MBI protocols, respectively. Thus, on average, the QHEI scores are far below the "good" cutoff of 60 and, depending on the QHEI scoring procedure used, either near or below the 45 cutoff that automatically pushes an area into Ohio EPA's limited or modified use category that is intended for waters that cannot attain the Clean Water Act aquatic life goal.

The spatial distribution of QHEI scores in the UDP is visually depicted in the charts contained in Attachment 2f to this report. All of the charts show that little good quality habitat (*i.e.*, areas with QHEI scores ≥60) is present, that a considerable amount of poor habitat (*i.e.*, areas with scores <45) is present, and that, on average, UDP habitat is of poor to fair quality.

Consistent with Ohio EPA protocols, the area within the navigational channel was not evaluated. However, due to a lack of cover and constant disturbance due to barge traffic, the navigational channel area, which comprises roughly 50% of the UDP, certainly would have scored well below 45 had it been evaluated. This further accentuates the limited amount of good habitat available within the UDP. Roughly half of the UDP is navigational channel area that is unsuitable, poor habitat and the remaining half is characterized by poor to fair quality habitat, with only a very limited area of good habitat.

3. Comparison of EA 2008 QHEI Scores and MBI 2006 QHEI Scores

EA compared the 2008 QHEI scores it calculated at three sites that appear to be located in the vicinity of the three sites scored by MBI in 2006 (Attachment S). At one of the three locations (MBI RM 283.9), the scores calculated by EA and MBI were within a couple of points (*i.e.*, 36 [EA] v. 33.5 [MBI]), well within the range expected for scores obtained at the same site by different investigators. However, at MBI RM 279.5, located in the UDP approximately 1.6 mi upstream of I55, MBI scored the site as having a QHEI of 69 versus the EA QHEI score of 54.

Similarly, in the Brandon tailwaters (RM 285.8), MBI scored the site at 81.5 versus the EA score of 67.5. The differences at the latter two sites are not within the acceptable range of difference. Based on EA's review, the MBI QHEI scores for these two sites are too high based on actual site conditions. As discussed below, these differences simply cannot be explained by potential temporal or seasonal changes to the waterway that may have occurred since MBI conducted its evaluation in 2006.

(a) QHEIs for UDP RM 279.5

RM 279.5 was described by MBI as its "Power Line Crossing" location. The MBI and EA RM 279.5 QHEI scores for the individual metrics are provided and compared below:

	Metric Score	
Metric	MBI	EA
Substrate	19	20
Cover	17	8
Channel Morphology	7	4
Erosion/Riparian	10	10
Pool/Velocity	8	6
Riffle Quality	0	0
Gradient	8	6
	69	54

The MBI and EA QHEI scores for the substrate, erosion/riparian, and riffle quality metrics are identical or comparable. The difference of 15 points between MBI and EA's metric scores is attributable to the other four metrics. The biggest difference is for the cover metric, 17 by MBI and 8 by EA. MBI listed the following five cover types that EA did not find at this location in July 2008: undercut banks, shallows in slow water, root mats, root wads, and aquatic macrophytes. MBI considered cover to be "moderate" while EA considered it "sparse". Shallows in slow water is somewhat subjective, but is typically considered only adjacent to riffle/run habitat. It might vary depending on river stage but this area does not have undercut banks, root mats, root wads, or aquatic macrophytes. Similarly, habitat quantity was clearly sparse in July 2008. The same conditions should have existed when MBI visited the site. The lack of cover in terms of quantity coupled with four cover types being absent indicates that the MBI cover score was at least 8 points too high.

The difference in the channel morphology metric score is due to MBI's finding that sinuosity was "low" (as opposed to "none" by EA) and that development was "fair" (as opposed to "poor" by EA). Sinuosity is a term indicating the amount of curvature in a wateway. According to Ohio EPA QHEI scoring guidance:

> *No sinuosity is a straight channel. Low sinuosity is a channel with only 1 or 2 poorly defined outside bends in a sampling reach, or perhaps slight meandering within modified banks.*

The LDR at this location is straight; it has no bends, poorly defined or otherwise (*See* Attachment 2c).

According to the same Ohio EPA document in regard to development:

> *poor means riffles are absent, or if present, shallow with sand and fine gravel substrates; pools, if present are shallow. Glide habitats, if predominant, receive a Poor rating.*

MBI's own form acknowledges that no riffle is present at this location. The entire area is clearly a glide, as defined by Ohio EPA (2006). Thus, this metric should be scored a 4, not a 7.

Lastly, MBI indicates in Exhibit 6 that the gradient at this location is 1.0 ft/mi. EA calculated it to be about 0.1 ft/mi (the difference between the headwater stage at the Dresden Island Dam and the tailwater stage at the Brandon Road Lock and Dam). Given that the gradient at the location upstream of this one (*i.e.*, RM 283.9) was considered by MBI to be 0.1 ft/mi and RM 279.5 is closer to the dam, EA does not believe the MBI 1.0 ft/mi gradient value is correct for RM 279.5.

In summary, the MBI score for this location is at least 10 points too high and probably as much as 12 to 13 points too high.

(b) QHEIs for UDP RM 285.5 (Brandon Tailwaters)

MBI created an "excellent" score of 81.5 for RM 285.5 located in the Brandon Tailwaters, whereas Rankin (2004) and EA (2008) gave it "good" scores of 69.5 and 67.5, respectively. EA and MBI had identical scores for the cover and pool/current velocity metrics, but MBI scored the other five metrics higher than EA. The biggest difference was for substrate, which MBI scored a 17.5 and EA a 12.5. MBI considered the dominant substrates to be cobble and gravel. EA agreed that cobble was a dominant substrate but determined that hardpan was the second dominant substrate. EA knew this to be the case based on our long-time familiarity with this location. This was confirmed by walking through much of the zone. The distinction between clean hard substrates and hard substrates embedded in hardpan is difficult to make unless the investigator either has considerable experience in probing the bottom or unless part of the zone is waded. It does not appear that MBI waded any portion of the zone. The substrate distinction would not likely be evident if the QHEI substrate score was based only on a standard electrofishing run through the area, which apparently is what MBI did (*See* Attachment S).

MBI also inflated or "over-scored" several other metrics at this location. For example, it indicated that sinuosity was "low" even though no bends were present. It considered development to be "good". Development is good in the upper half of the zone but poor in the lower half. MBI acknowledges as much as their drawing of the site (Exhibit 7) shows muck and slow water in the lower portion of the zone. Clearly the EA characterization of development within the zone as good/poor is more accurate than the uniformly good rating given by MBI. MBI's higher riparian zone score is largely the result of its considering the riparian zone to be "wide". However, the left bank is within a few feet of a railroad track and the right bank is narrow. Because of the hardpan present throughout much of the area, EA correctly characterized the riffles as being "moderately" embedded whereas MBI erroneously believed that embeddedness was "low". Lastly, the gradient used by MBI is too high. The correct value for the gradient metric should be 6 instead of 8.

It is also important to consider that Mr. Rankin, the developer of the QHEI, scored this area as 69.5, within 2 points of EA's score. Despite what Mr. Yoder may have speculated during his UAA hearing testimony, the magnitude of the difference between Mr. Rankin's score and the MBI score cannot be explained by the fact that Mr. Rankin viewed the area in March, whereas MBI visited the site during the summer; this seasonal difference would account for, at most, a difference of 3 points (*See* UAA February 1, 2008 Hearing Transcript at pp. 143-146).

The correctness of EA's scores for the various QHEI metrics is supported by Mr. Rankin's Report (Attachment R to the Statement of Reasons). MBI indicated that there was no channelization, that sinuosity was low, and that some fast water was present at the one or both of the non-tailwater locations (i.e., RM 279.5 and 283.9) they sampled in UDP. However, like EA, Mr. Rankin found that UDP was channelized, had no sinuosity, and, except for the Brandon tailwaters, had no fast water. The fact that MBI did not score the QHEI correctly also means that Exhibit 6, which compares warmwater and modified warmwater attributes, is seriously flawed and should be disregarded.

In summary, MBI and EA QHEI scores were similar at only one of the three locations scored by MBI. At the other two locations, MBI scored the sites 14-15 points higher than did EA. However, for the reasons discussed above, the QHEI scores reported by EA are more reflective of actual conditions than are the higher scores reported by MBI.

According to Mr. Yoder's testimony, the QHEI scores in Attachment S were wrong because the impounded nature of the CSSC and UDP was not taken into account. It is difficult to understand how the MBI field crew somehow overlooked the fact that the area they were sampling was almost entirely impounded. Also incredible is the fact that according to the hand written notes on the field data sheets (*See* Exhibit 7), this significant error was not recognized and corrected until almost two years later in January 2008 when Mr. Yoder prepared to testify in these proceedings. It appears that the original entry for the two relevant metrics was erased and the box "Impounded" was checked instead. In most cases, this resulted in the QHEI score dropping by 10 points. MBI produced Exhibit 5, which was designed to correct the scoring errors in Attachment S. Although the impoundment scoring error has been corrected, Exhibit 5 unfortunately still contains numerous errors, mostly related to tallying the final QHEI score. In fact, all the "revised" scores were tallied incorrectly. Provided below are examples of these errors:

- Grant Creek--- Based on the boxes checked on the field data sheet (*See* Exhibit 7), the correct score for the Channel Morphology metric is 6, but a score of 13 is reported by MBI on Exhibit 5. Mr. Yoder was asked about this error during his February 1, 2008 UAA hearing testimony and could not explain it. The Pool metric at the Grant Creek location adds up to 6 in Exhibit 7, but a score of 9 is shown on Exhibit 5. Collectively, these two errors result the QHEI score for Grant Creek being inflated by 10 points.

- RM 268.0--- According to the boxes checked on the data sheet for this location (*See* Exhibit 7), the correct score for the Pool/Glide metric is 6, but the score shown in Exhibit 5 for this metric is 9. Thus, the MBI QHEI score for this location should be 57, not 60.
- RM 271.1--- Again, two scoring mistakes were made; the Riparian score should be 10 not 9 and the Pool score should be 12 not 13. The latter mistake is particularly odd, because according to MBI's own data sheet, the maximum possible score for this metric is 12.[1]

MBI's 2006 QHEI scores at 17 locations were changed from their values presented in Attachment S to the "revised" values presented in Exhibit 5 to account for "overlooking" impoundment initially. However, in every case, the new, revised, and supposedly corrected values are still wrong, sometimes by a little, sometimes by a lot (*e.g.*, Grant Creek). The 100% failure rate to supply correct revised values casts further doubts on MBI's QA/QC procedures.[2]

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[1] The following thirteen locations all had erroneous values presented in Exhibit 5 due to various math errors: RMs 242.1, 243.3, 246.5, 247.8, 251.4, 256.1, 265.0, 274.0, 276.4, 276.5, 279.5, 283.9, and 290.0.

[2] The MBI field crew's lack of attention to QA/QC procedures was also evident in the MBI 2006 fish survey work. In his February 1, 2008 UAA hearing testimony, Mr. Yoder acknowledged that the MBI field crew had used defective pH and DO probes. What is particularly troubling is that no one on MBI's field crew recognized this obvious problem until well after the field work had been completed. According to the fish field data sheets (Exhibit 20), a pH of 11.2 was recorded at RM 290.1 on the first day (7/21/06) that sampling began in the Des Plaines River/CSSC system. Such an absurdly high pH would have told an experienced crew leader that either the meter or the probe was defective. This obviously defective meter/probe was used by MBI throughout the remainder of the July 2006 sampling trip. During this time, several nonsensical pH values of 2.62, 10.95, 9.96, and 10.25 were recorded and reported without question by the three MBI crew members (Exhibit 20). Moreover, the defective equipment problem remained undetected and continued through the September 2006 MBI field work when a series of even more bizarre pH values were "measured" and dutifully recorded. For example, on September 7, 2006, MBI reported a pH of 12.95 at RM 276.4 (Exhibit 20). Anyone with even a passing familiarity of pH values would recognize that this value was wrong. On the next sampling day, September 9, 2006, an even more stunning series of events occurred. At RM 297.0, MBI reported the pH to be 15.19 and at RM 298.3, 14.08, both of which are difficult to do given that the pH scale for "natural" substances only goes to 14. For example, the pH of household ammonia is about 11.5, bleach is about 12.5, and liquid drain cleaner is about 14. pH values in natural waters, even water-quality challenged ones like this, rarely if ever exceed about 9. MBI continued to report numerous erroneous pH values (e.g., ranging from 11 to 14) for an additional week of sampling that should have raised QA/QC questions for an additional week of sampling.

4. The MBI 2006 IBI Metric Values and Scores Also Are Unreliable

Among the data that the Illinois EPA is relying on to support its proposed use designations is the IBI study performed by MBI/Yoder in 2006 and memorialized in a report marked as Attachment S to the Illinois EPA Statement of Reasons. During Mr. Yoder's UAA hearing testimony, he acknowledged several mistakes in how IBI scores were originally calculated by MBI in its 2006 Report. These mistakes included erroneously considering emerald shiner to be a simple lithophil, including an erroneously identified silver shiner, and erroneously including round goby and other exotic species in the species total (UAA February 1, 2008 Hearing Transcript at pp. 135-139).

In response to these acknowledged mistakes, the MBI replaced the Attachment S IBI values with the IBI values in Exhibit 21 (*Id.* at p. 156), which supposedly corrected the original, erroneous values. However, a spot check of the data in Exhibit 21 revealed that all of the previous identified errors are still present. Exotic species such as round goby and oriental weatherfish continue to be erroneously included in the species richness metric.[3] A check of five sampling locations (RMs 290.1, 289 [2 passes], 285.8, and 274.0) to confirm that emerald shiner had been removed from the simple lithophil count showed that it had not. In all five cases, it was still erroneously included, which in some cases, resulted in inflated IBI scores.[4] No data sheets were provided for the nine locations in the Illinois River. Given the fact that 15 of the 18 passes on the Illinois River resulted in scores for the simple lithophil metric being either 5 or 3, declines of two or four IBI units would be expected if this metric is scored correctly.

Another problem with the simple lithophil metric scores is that MBI arbitrarily assigned a drainage area of 1000 mi^2 to all 23 sites they sampled. EA could not obtain a drainage area for Grant Creek, the smallest drainage sampled, but the other sites ranged in size from 740 mi^2 for the CSSC at Ruby St. to 8529 mi^2 for the Illinois River at Marseilles. Because the IBI scoring criteria for this metric vary according to drainage area, many of the IBI scores presented by MBI are likely still wrong in Exhibit 21 due to the inaccurate draining area values used (this is true even if the emerald shiner mis-classification issue was corrected).

During the course of reviewing only about 10% of the MBI data sheets to determine whether the mistakes acknowledged by Mr. Yoder had been corrected, EA found a variety of other errors. First, the sunfish metric was often incorrectly scored. MBI did not include crappies in the sunfish count, which it should have, and included redear sunfish, which it should not have. In several cases, the total native species richness totals were wrong but the cause of the errors could not be identified. Often, the relative number minus tolerants was wrong; typically because exotics or hybrids were erroneously included.

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[3] For example, the field data sheet for RM 287.9 in July 2006 (Exhibit 20) lists only five species, one of which was round goby. The species richness metric for this location on Exhibit 21 shows a total of five species, so round goby was still erroneously included. A similar situation occurred at RM 290.1 in July where both oriental weatherfish and round goby are still erroneously included in the species total shown on Exhibit 21.

[4] For example, at RM 285.8, the percent simple lithophiles would drop from 26% to 8% if emerald shiner was excluded and the metric score would go from 5 to 1. Thus, the IBI should be 26 rather than 30 as reported in Exhibit 21.

There are similar Quality Assurance/Quality Control (QA/QC) problems identified in the information presented in Exhibit 32. This exhibit contains a plot of QHEI scores collected by various investigators over a number of years. However, Exhibit 32 is of limited value because the methods for calculating the QHEI have changed (*e.g.,* MBI accounts for impoundment whereas no previous investigators took this into account directly). Also, it is not clear whether the MBI values in this plot came from Attachment S or Exhibit 5. If the MBI values came from Attachment S, they contain significant errors that overstate the QHEI values. If the MBI values came from Exhibit 5, most are still wrong; admittedly somewhat less wrong, but still wrong. Given the number of mistakes found in data sheets from only 5 of 46 MBI site collections, it is clear that proper QA/QC procedures were not followed by MBI. EA submits that the presence of the extensive amount of errors in Attachment S, and Exhibits 20 and 21 renders the accuracy and credibility of the MBI data set highly suspect. EA submits that the Board should disregard the data presented by MBI in Attachment S and Exhibits 20 and 21 until and unless a corrected and accurate set of data is provided. Further, EA cautions that the usefulness of the QHEI data in Exhibit 32 is minimal due to differing methods of how QHEI values were calculated and the use of erroneous MBI-calculated QHEI values.

5. Key Habitat Types required for a Balanced Fish Community are Lacking

To have a fish community consistent with Clean Water Act aquatic life goals, a variety of habitat types must not only be present, but present in amounts sufficient to support viable populations of various fishes. However, in the UDP, riffles and fast water areas are essentially confined to the Brandon tailwater area. This area is roughly one mile long and represents about 7% of the area within Dresden Pool (Note: Dresden Pool is the appropriate basis for comparison because the "UDP" is a regulatory construct proposed by the Illinois EPA that is not recognized by the fish populations that have access to the entire pool). Boulder/cobble substrates, though not confined to the tailwater area, occur in appreciable amounts in only a few of the other 48 zones EA evaluated. The small and few areas of good habitat located in the Brandon tailwater area are overwhelmed by the large preponderance of poor to fair habitat that characterizes the UDP. Species-groups that need these key habitat types in order to flourish include:

- most darters,
- walleye and sauger,
- many suckers, including redhorse, northern hog sucker, and white sucker (this group of species is often referred to as the "round-bodied" suckers and is highly valued in rivers),
- most madtoms,
- some minnows (e.g., longnose dace, stonerollers, hornyhead chub, suckermouth minnow, and rosyface shiner), and
- some centrarchids, especially smallmouth bass.

Minnows, darters, and suckers are the most diverse groups in Illinois. Having the number of species in these groups reduced or eliminated makes it essentially impossible to have a balanced fish community. The reduction in round-bodied suckers results in lower IBI scores, also indicative of unbalanced fish communities. The species that are doing well in the UDP are habitat generalists, those with a high tolerance to silt, and those preferring lentic rather than lotic conditions. Regardless of how well those species do, the community will remain unbalanced and will not attain Clean Water Act goals because of a lack of habitat specialists like the species listed above. These habitat limitations are fixed and will not improve regardless of whether and how the water quality standards are changed.

In this discussion of the types of fish species that can and cannot reasonably be expected to be present in the CSSC and CAWS, it is important to include a review of the fish survey data presented in the UAA Rule-Making through the testimony of Mr. Yoder because of the presence of clear errors in fish identification that these data contain. During the January 2008 UAA hearings, Mr. Yoder was questioned concerning the MBI's 2006 fish identification results for the LDR. He agreed that the silver shiner identified by MBI was actually an emerald shiner. (UAA February 1, 2008 Hearing Transcript at p. 128) He further agreed that the specimen MBI had identified as a blacknose shiner was more likely a pallid shiner. (*Id.*) Mr. Yoder testified that he had "full confidence" in the identification of the other three fish species (brown bullhead, highfin carpsucker, and black redhorse) in the 2006 MBI survey that were questioned by Midwest Generation.

Subsequently, in the document introduced by Illinois EPA as Exhibit 37, the MBI provided photographs of these three questioned fish species. EA has reviewed the photographs of these fish. Two photographs of what MBI called a brown bullhead are instead photos of a yellow bullhead. MWGen also requested documentation from Illinois EPA regarding the MBI's alleged identification of highfin carpsucker, because of the large number MBI reportedly found in the Illinois River. In Exhibit 37, MBI provided two photos of what EA agrees is a highfin carpsucker. However, the specimen in question is from the Vermillion River, which is clearly not part of the CAWS, the LDR, or the Illinois River. Therefore, a specimen from the Vermillion River does not address the question of whether specimens reported by MBI as highfin carpsuckers from the Illinois River were properly identified. Therefore, the MBI reports of highfin carpsuckers are questionable and unconfirmed by either field specimens or photographs. With regard to the third species, black redhorse, MBI again provided two photographs. One specimen is from Raccoon Creek in Ohio and is, therefore, irrelevant with regard to these proceedings. The other specimen, which appears to be a black redhorse, is labeled as Kankakee River or Des Plaines River, so this specimen may or may not be from a waterway that is the subject of these hearings. In summary, MBI misidentified three species (silver shiner, blacknose shiner, and brown bullhead) and provided inappropriate documentation regarding two others. EA cautions that the fish identification data and numbers reported by MBI in this proceeding are not reliable for these species.[5]

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[5] EA also notes that MWGen had requested copies of all field fish data sheets from the Illinois EPA for the July and September 2006 fish study performed by the MBI/Yoder. According to the information in Exhibit 21 in the UAA proceeding, all locations in the Des Plaines River, the CSSC, and Grant Creek were allegedly sampled twice, once in July and once in September. However, in Exhibit 20, which contains the data sheets for this 2006 study, there are no data sheets for sampling sites located at River Mile (RM) 273.5, 274.0 and Grant Greek during the July sampling. Hence, either this sampling was not performed or the accuracy of the July fish sampling at these locations has not been documented by the completion and submission of field data sheets.

Miltner *et al.* 2000). The range for percent urban area (8-50%) is broader but the negative effect of urbanization is still plainly evident (Steedman 1988, Wang *et al.* 1997, Yoder *et al.* 1999, and Groschen *et al.* 2004).

In 1990, 58.7% of the area in the Des Plaines subbasin was classified as urban (NAWQA 1998) and, given the extensive development that has occurred since 1990 in the Joliet area, that percentage is likely higher now. Even the 58.7% figure equals or exceeds all reported thresholds for significant effects. The Chicago Army Corps of Engineers in their 1997 Annual Report indicated that the percent impervious area for the Des Plaines Basin ranged from 30.1-56.4%; again well above all reported thresholds.

The studies cited above demonstrate that biological measures consistently decline significantly as urbanization increases. This phenomenon has been demonstrated in the CAWS and LDR as well as in nearby Midwestern states. Groschen *et al.* 2004 noted that fish and benthic communities declined at levels of 15-25% urbanization in the Fox and Des Plaines River Basins. In fact, as support for the decline in the fish community, they reference a written communication from Illinois EPA witness, Mr. Roy Smogor. Mr. Yoder, another witness appearing on behalf of Illinois EPA in these proceedings, has reached similar conclusions. In a 1996 paper (Yoder and Rankin 1996), Mr. Yoder reported that 85% of urban sites sampled had poor or very poor (*i.e.*, non-attaining) biological index scores. In a 1999 paper (Yoder *et al.* 1999), he reported that threshold levels for percent urban land use ranged from 8-33%. In this same paper, Mr. Yoder discussed the inability of urban streams to attain a use classification that meet the Clean Water Act aquatic life goals, which is called the "Warm Water Habitat" or "WWH" use under Ohio's use classification system. Mr. Yoder concluded that:

> *[T]he recent finding that no urban headwater stream sites in the Ohio EPA database attain the WWH biocriteria (Yoder and Rankin 1997) only serves to further the notion that the degree of watershed urbanization can preclude the WWH use regardless of the site specific habitat quality.* (Yoder *et al.* 1999 at p. 25)

In a subsequent paper (Yoder *et al.* 2000 at p. 32), Mr. Yoder similarly found that:

> *Only a very few sites exhibited attainment at urban land uses between 40-60% and none occurred above 60%. These former sites had either an intact, wooded riparian zone, a continuous influx of groundwater, and/or the relatively recent onset of urbanization. These results indicate that it might be possible to mitigate the negative effects of urbanization by preserving or enhancing near and instream habitats, particularly the quality of the riparian buffer zone. The results also suggest that there is a threshold of watershed urbanization (e.g., >60%) beyond which attainment of warmwater habitat is unlikely.*

With regard to the threshold of watershed urbanization above which attainment of Clean Water Act aquatic goals is unlikely, the Des Plaines River watershed was already 59% urbanized in

1990, right at the threshold of 60% cited in the Yoder *et al.* studies described above. In a later paper (Miltner, White, and Yoder 2004), IBI values in the watersheds studied "*declined significantly when the amount of urban land use measured as imperious cover exceeded 13.8%, and fell below expectations consistent with the Clean Water Act goals when impervious cover exceeded 27.1%*". According to the Army Corps of Engineers, the amount of impervious cover in the Des Plaines Basin is 30-56%.

Similar results have been observed in nearby Wisconsin where Wang *et al.* (1997 at p. 9) noted that:

> *Watersheds with more than 20% urban land invariably had IBI scores < 30 (poor-very poor), although their habitat scores varied from 5 (very poor) to 70 (good). There appeared to be a sharp threshold between 10% and 20% urban land use across which IBI scores declined dramatically.*

Clearly, the severe negative consequences on the quality of aquatic life communities caused by urbanization have been well-documented in these and other studies. It is important to note that the declines noted by these studies occurred regardless of site-specific habitat quality. In other words, in highly urbanized areas, even streams with good habitat (*i.e.*, high QHEI scores) often fail to attain CWA goals. Given the high percentage of urban land use and impervious area within the CSSC and the UDP, it is clear that even in the absence of the poor habitat quality and the other limiting factors discussed above, the CSSC and the UDP would not likely achieve attainment of the Clean Water Act aquatic life goals due to the high levels of urbanization in this area.

C. Remediation to Address Habitat Limitations is not Feasible in the Caws and UDP

The possibility of remediation to address UAA factors that are preventing attainment of Clean Water Act goals must be considered whenever a proposed use designation falls below the Clean Water Act goals. Here, the main limiting factor in this waterway system is the impoundments. To remediate the impounded nature of the waterway would require removing or greatly modifying the locks and dams now present. However, such remediation would in turn severely impair or prevent the existing navigational use for which this waterway was intended, and which is also a protected use of the CAWS and the UDP under the Clean Water Act.

Further, the system now has a series of flow controls in place that are specifically designed to send Chicago's wastewater to the Illinois River rather than to Lake Michigan. Even if navigation were no longer deemed a protected use, which the Illinois EPA acknowledges will not occur, the City of Chicago and Illinois EPA would still be faced with the problem of how to dispose of wastewater from a city of three million people. Clearly, impounding from the dams and the attendant problems it causes (*e.g.*, lack of riffles and fast water, increased siltation, etc.) cannot be remediated over the foreseeable future (*i.e.*, the next 10-20 years).

Short of removing or greatly modifying the existing locks and dams on the waterway, some more limited types of remediation could be implemented (*e.g.,* the amount of instream cover could be increased). However, due to the extensive amount of habitat area that would need to be improved by such measures in order to have any measureable effect on fish populations and species, they would have to occur on an unprecedented scale. Illinois EPA has acknowledged that there are no such plans for remediation at the scale required here. Moreover, unless the dams themselves are removed, the factors that are most severely limiting (*i.e*., lack of riffles, fast water, and clean cobble/boulder areas) will continue to limit the system by preventing the species that depend on such areas from establishing viable populations.

VII. APPROPRIATE USE DESIGNATION FOR UPPER DRESDEN POOL

Illinois EPA has proposed to assign the UDP its own use designation. While admitting that the UDP is somewhat impaired, Illinois EPA suggests that it has the potential to "marginally meet" CWA goals. However, the above analysis and review of stream data, facts and recognized studies, along with the additional support cited below, show that the extent of the impairments in the UDP prevent it from attaining the Clean Water Act aquatic life goals.

With regard to the UDP, Mr. Rankin of the CABB/MBI advised the Illinois EPA "*we suggest that the Ohio Modified Warmwater Habitat Use for impounded rivers (MWH-I) would be the most appropriate category.*" This Ohio use designation category applies to waterbodies that are not capable of attaining the Clean Water Act's aquatic life goals. This conclusion acknowledged the existence of and took into account the presence of the limited area of better habitat in the Brandon tailwaters. Mr. Rankin correctly noted that the tailwater area was isolated, which could influence its potential. He also acknowledged the impounded nature of the UDP and that it was subject to barge traffic. Finally, he noted that "*systematic alteration and urbanization also contributes to the physical limitations we observed*". Mr. Rankin's independent opinion as to the appropriate use designation for the UDP, as the developer of the QHEI system (Rankin 1989) relied on by the Illinois EPA, should be given significant weight. He notes that he did not have access to the biological data at the time of his assessment. Toward that end, the extensive, long-term biological data sets collected by EA from this area show the fish community, both existing and potential, to be consistent with the MWH-Impounded Use classification, thus supporting Mr. Rankin's findings and recommendation.

A. Upper Dresden Pool Has Most of Ohio's Modified Warmwater Habitat Streams Characteristics and Almost None of Ohio's Warmwater Habitat Characteristics

In a prior submittal by Midwest Generation to Illinois EPA (EA 2003) as part of the UAA Stakeholder process for the LDR, EA applied to the UDP each of the attributes of each use type established by Ohio EPA for its use designation system. EA found that the UDP possessed only one characteristic (max depth >40 cm) of the Warm Water Habitat Use that under Ohio's use classification system meets the Clean Water Act aquatic life goals. In comparison, the UDP possessed seven characteristics of the Modified Warmwater Habitat Use that under Ohio's system does not meet the Clean Water Act aquatic life goals. Comparison of these characteristics in this manner is a standard analysis technique used by Ohio EPA to determine the proper aquatic life use for a particular water body.

With regard to this approach, Yoder and Rankin (1996), both then with Ohio EPA, stated that "*as the predominance of modified habitat attributes increase to a modified warmwater ratio of greater than 1.0-1.5, the likelihood of having IBI scores consistent with WWH use declines*". In Dresden Pool, the ratio is 4:1, far greater than the 1.5:1 trigger point suggested by Messrs. Yoder and Rankin. Thus, it is clear, based on this well-established methodology, that the UDP is not capable of attaining a Warmwater (*i.e.*, General) Use, which meets the Clean Water Act aquatic life goals. Clearly, a lower aquatic life use classification is warranted.

B. The Habitat in the UDP Generally Will Not Support an Aquatic Life Use Consistent with CWA Goals.

An alternative way of looking at the question of what aquatic life use the UDP can support is to consider how little good habitat there is:

1. The only area of good habitat is confined to a roughly 1-mile long section in the Brandon tailwaters. Given that Dresden Pool is about 15 miles long, this area of good habitat represents only about 7% of the linear distance of the Pool, and even this small area may be of limited value because of toxic sediments that cannot reasonably be remediated.

2. Based on 2003 data, the average QHEI in UDP was about 45 (EA 2003). The average score in this same area in July 2008 was about 47 using Ohio EPA scoring procedures and only 42 using the MBI version of the QHEI (Attachment 2d). The figures in Attachment 2f provide a visual depiction of how QHEI scores vary spatially over the UDP. It is clear from these figures that QHEI scores in most of the 7-8 mile reach comprising the UDP were well below the accepted cutoff of 60. In fact, they are, on average, much closer to the cutoff of 45 for limited warmwater habitat (LWH) under the Ohio Use Classification System.

3. The version of the QHEI currently being used by Mr. Yoder and MBI includes an automatic deduction of up to 10 points for all areas that are impounded. This represents a clear acknowledgement that impounding a river not only affects individual QHEI metrics, but also has a cumulative and pervasive effect on the quality of the aquatic life within such areas. It is this scoring adjustment that causes the scores in the UDP calculated using the MBI version of the QHEI to be about five points lower than the Ohio EPA version.

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ATTACHMENT 1

Detailed Summary of EA Engineering, Science, and Technology's Stream Surveys for the Upper Illinois Waterway (UIW), 1993–2006

Detailed Summary of EA Engineering Stream Surveys for the Upper Illinois Waterway (UIW) 1993–2006

I. Overview

EA Engineering, Science, and Technology (EA) has conducted annual stream surveys in the Upper Illinois Waterway (UIW) since 1993, with the exception of only 1996. The studies conducted in the 1993-1995 time period by EA and other contractors for Commonwealth Edison (ComEd) were subsequently relied upon by the Illinois Pollution Control Board (IPCB) to grant ComEd an Adjusted Standard regarding thermal water quality standards in the A96-10 proceeding. The studies subsequently conducted on an annual basis beginning in 1997 to the present have been performed by EA at the request of ComEd (through 1999) or Midwest Generation EME (since 2000). These studies are not required by the terms of the IPCB Order granting the adjusted standard in AS96-10 or in any NPDES permits issued to the subject electrical generation stations formerly owned by ComEd and now owned by MWGen. These annual studies have been performed on a voluntary basis in order to monitor conditions in the UIW and to continue to confirm that compliance with the alternate thermal water quality standards granted in AS96-10 is not having an adverse impact on the aquatic community. These annual stream surveys have been submitted to the Illinois EPA upon their completion. Due to the voluminous nature of these stream survey reports, this detailed summary has been prepared to present the key data and findings contained therein which are relevant to the UAA R08-09 rule-making proceeding.

II. EA 1993-1994 Studies

By the terms of the NPDES permits issued to the Joliet 9 & 29, Will County, Fisk, and Crawford Stations, in the early 1990's, ComEd, then the owner of those plants, was required to undertake a comprehensive aquatic study of the combined thermal impacts of these facilities on receiving waterways. Specifically, ComEd was to:

> "prepare a comprehensive thermal impact demonstration assessing the effects of cooling water discharges from [each power plant] in conjunction with its other generating facilities on the Chicago Sanitary and Ship Canal and on the Des Plaines River. The study [was to include]:
>
> (a) assessment of the physical characteristics of the affected waters relative to their ability to support and sustain aquatic life;
>
> (b) assessment of the thermal environment of the affected waters and the effects of the various heat inputs, and documentation of compliance with water quality standards;

> (c) assessment of waters, sediments, and organisms for toxic materials to determine the extent to which these materials may limit aquatic life; and
>
> (d) assessment of current populations of macrophytes, macroinvertebrates, and fishes."

In addition, the NPDES permits required a preliminary assessment related to §316(b) of the Clean Water Act that consists of "limited biological studies near the cooling water intake to document whether previous conclusions (i.e., lack of fish species diversity and early life stages due to poor water quality) remain valid."

To address these requirements, EA classified and evaluated habitat to address (a) above, and along with other ComEd experts assessed the impact of the thermal environment on aquatic life (a and b above), assessed current fish populations (Item d), and did a larval fish study to address the §316(b) concerns as cited above.

The studies were conducted over the period from 1993 to 1994. The study area included the following portions of the UIW: Lockport Pool, Brandon Pool, Upper Dresden Island Pool, which are all part of the current UAA rule-making proceeding. The UIW study area also included portions of the Lower Des Plaines River downstream of the I-55 Bridge which are not part of the UAA rule-making proceeding, including the area referred to as the "Five Mile Stretch" of the Lower Des Plaines River below the I-55 Bridge. The studies were subject to the oversight of a Task Force of experts that reviewed and approved all study plans. The Task Force included representatives from IEPA, USEPA Region V, MWRD, and several stakeholder groups. The studies conducted were extensive and the resultant reports, even in summary form (ComEd 1996) are voluminous. Therefore, we have presented a summary of the results below.

A. HABITAT

Habitats within the Upper Illinois Waterway (UIW) were initially classified on a broad scale according to mesohabitat type. Percentages of each mesohabitat in the UIW were: main channel (51.6%), main channel border (22.4%), backwaters (10.4%), tributary delta (7.0%), tailwater (4.6%), tributary mouth (3.0%), and intake/discharge (1.0%).

Habitat quality at individual sampling locations on the UIW was assessed using the Qualitative Habitat Evaluation Index (QHEI) to determine to what extent habitat was limiting the aquatic biota of the UIW. It was found that QHEI scores varied depending on mesohabitat type. Mean QHEI scores were lowest in main channel habitats, the dominant mesohabitat in the UIW. Conversely, mean QHEI scores were best in tailwaters, one of the least available mesohabitats in the UIW representing only 4.6% of the UIW study area.

In 1993 and 1994, QHEI scores were derived at 169 locations[1] in the Lockport, Brandon Road, and Dresden Pools. Roughly half of these scores (85 locations) were calculated by EA with the other half (84 locations) calculated by other ComEd contractors (ComEd 1996). This level of coverage is far greater than that of the QHEI survey work performed in 2006 by MBI (Yoder) or in 2004 by the CABB (Rankin). All of the ComEd contractors reported similar scores in the study area, evidencing a good degree of consistency in how the different contractors performed the QHEI scoring work.

QHEI scores in the UIW were, on average, found to be low (mean scores in the 40s). Thus, habitat generally is poor. The low QHEI scores are the result of a lack of riffle/run habitat, lack of clean, hard substrates (i.e., gravel/cobble), excessive siltation, channelization, poor quality riparian and floodplain areas, and lack of cover. Habitat was found to be poorest in Lockport Pool, marginally better in Brandon Pool, and better still in Dresden Pool; but mean QHEI scores were still <60 in Dresden Pool.

Other factors, notably low dissolved oxygen concentrations, constant barge traffic, and toxics, especially in the sediments, were also found to likely limit the aquatic biota of the UIW. These factors and the habitat limitations identified previously are largely irreversible and cannot practically be mitigated.

B. LARVAL FISH

During the spring and summer of 1994, fish eggs and larvae were collected at 16 locations in the UIW. This included six locations in Lockport Pool, one in Brandon Pool, one in the Upper Des Plaines River, and eight in Dresden Pool. Fish were collected by net tows, benthic pumping, dipnetting, stationary netting, light trapping, seining, and the physical examination of vegetation. A total of 1240 samples were collected.

The purpose of the study was to determine what portion of the fish community found in the Illinois River drainage is currently using this physically limited and impacted subunit of the system as a spawning or nursery area, as well as when and where those uses occur. The study was not intended to quantify the extent or success of spawning activity or make quantitative comparisons with reproductive performance in other systems.

Over the course of the study, about 29,400 fish eggs and about 21,800 larval and young-of-the-year (YOY) fish were collected. Most of the eggs that could be identified were found to be those of common carp. Among the larval and YOY fish collected, the six most commonly collected species or taxa during this study (*Lepomis* spp., gizzard shad, common carp, bluntnose minnow, unidentified *Pimephales* spp., and emerald shiner) share early life history characteristics that appear to be most successful in this system. These include adaptations that allow eggs and/or

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[1] Eight of these locations were in the Illinois River just downstream of Dresden Island Lock and Dam

larvae to tolerate low dissolved oxygen concentrations and have minimal contact with the sediment. Collectively, these species or taxa accounted for more than 86% of all larvae/YOY collected. The first five species/taxa have either adhesive or buoyant eggs, a characteristic that isolates their eggs from the contaminants and high oxygen demand of the substrate. They are spawning "generalists" that release eggs over a wide variety of substrates and specifically do not require the coarse or hard substrates (gravel or cobble) so rare in this system. They prefer to spawn in slack water or protected areas and the larvae tend to reside in similar areas. The larvae of some of these species or taxa are pelagic or have cement glands such that they can attach to vegetation or local structure and remain off the substrate. Most of these species or taxa have well-developed respiratory structures or have parents that fan the eggs and early larvae, thus reducing the problem of low dissolved oxygen levels near the sediment surface. The last species, emerald shiner, shares many of these characteristics and it is extremely prolific as well. Adults of all six species or taxa are moderately or highly tolerant.

The results suggest a complex but highly stressed and habitat-limited fishery that is heavily dependent for its diversity on: 1) species adapted to contaminated conditions; 2) a few critical spawning and nursery areas, primarily in Upper Dresden Pool and the 5-mile Stretch; and 3) immigration from Lake Michigan and tributary drainages.

C. JUVENILE AND ADULT FISH

Fish sampling was conducted along 53 miles of the UIW (RM 270.2 – RM 323.4) at 46 locations in 1993 and at 42 locations in 1994. Most locations were sampled both years. This includes 18 locations in Lockport Pool, six in Brandon Pool, one in the Upper Des Plaines River, 22 in Dresden Pool, and six downstream of Dresden Island Lock and Dam. Fish were collected by AC 3-phase electrofishing (EF) at 40-45 locations depending on year, gillnetting at 31-38 locations each year, and seining at 26-27 locations each year. In all, 968 fish collections (398 EF, 322 gill net, 248 seine) were made during the 1993-1994 study. As had been the case in previous years, electrofishing was conducted for 15 minutes in an upstream direction during 1993. However, to be consistent with the techniques being used by other researchers, each electrofishing zone in 1994 was 500 meters long and was fished in a downstream direction. The 500 meter long zone, downstream approach has been continued in all subsequent monitoring of the system by EA. Sampling was conducted in May, August, and October/November of both years; in July and September at all plants in 1993; in June both years near the Dresden Station; and all the plants in June 1994. Since 1994, sampling in the study area has typically been conducted from May through September.

The 1993-1994 programs resulted in the capture of 25,349 adult and juvenile fish representing 82 species. Numerically dominant species were bluntnose minnow (20.0%), gizzard shad (19.4%), common carp (11.3%), and emerald shiner (10.5%). Thus, the UIW was dominated by a combination of prolific pelagic species (i.e., gizzard shad and emerald shiner) and highly tolerant species (i.e., bluntnose minnow and common carp). Although all fish collected were processed, exotic species were not included in most analyses because of the confounding influence they exert. Exotic species often do not follow expected trends with regard to water quality. Similarly, highly tolerant fishes (as defined by Ohio EPA) were excluded from certain analyses (e.g., modified Index of Well-Being [IWBmod])

Although various seasonal (i.e., spring vs. summer vs. fall) and habitat differences were noted, most of these were either not statistically significant or were not consistent. The most common and consistent trends were spatial. These spatial patterns were:

1. A very poor native fish assemblage was present in Lockport Pool. The assemblage in Lockport Pool was characterized by low native fish abundance (catch rates typically <50 fish/km), low species richness, and domination by highly tolerant species.

2. The community was marginally better in Brandon Pool but was still very poor.

3. The fish communities in the Upper Dresden Pool and the 5-mile Stretch, Dresden Pool downstream of the Kankakee River, and downstream of Dresden Lock and Dam were relatively similar to each other and noticeably better than those upstream of Brandon Lock and Dam.[2]

4. Results at thermally-influenced sampling stations were comparable to those at other sampling stations.

Mean IWBmod (an index of fish community health) scores were:

Lockport Pool	1.4
Brandon Pool	2.8
Upper Dresden Pool and the 5-mile Stretch	5.2
Dresden Pool downstream of the Kankakee River	5.3
Downstream Dresden Lock and Dam	6.5

Using IWBmod criteria established by Ohio EPA, each segment would be classified as follows:

Lockport Pool	very poor
Brandon Pool	very poor
Upper Dresden Pool and the 5-mile Stretch	poor
Dresden Pool downstream of the Kankakee River	poor
Downstream Dresden Lock and Dam	fair

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[2] Historically, Upper Dresden Pool has been used in our reports to denote Dresden Pool upstream of the Kankakee River and Lower Dresden Pool denoted the Illinois River (i.e., the portion of Dresden Pool below the confluence with the Kankakee). To avoid confusion, we herein refer to the old Upper Dresden Pool area as Upper Dresden Pool and 5-mile Stretch. If we use the term Upper Dresden Pool, we are referring only to the portion of the pool upstream of I-55, consistent with its usage during this rule-making.

During the two-year study period, 5,104 young-of-the-year (YOY) fish (24.2% of the catch) representing 39 species were collected:

Species	**Total**	**Percent**
Gizzard shad	3,130	61.3
Bluntnose minnow	506	9.9
Emerald shiner	161	3.2
Largemouth bass	141	2.8
Unidentified *Lepomis*	128	2.5
White sucker	126	2.5
Bullhead minnow	126	2.5
All other species	786	15.4

The seven most abundant species or taxa accounted for 85% of the YOYs collected. Gizzard shad alone accounted for 61% of the YOYs, with the highly tolerant bluntnose minnow being the next most abundant (10%). As judged by the presence of YOYs, reproductive success in Lockport Pool and Brandon Pool was confined almost entirely to gizzard shad and highly tolerant species like bluntnose minnow and fathead minnow. A few (25) white sucker YOY were collected in Brandon Pool, however, most, probably all of these drifted in from the Upper Des Plaines River. This conclusion is supported by the fact that no white sucker larvae were collected from Brandon Pool during the 1994 ichthyoplankton study but they were found in the Upper Des Plaines River (EA 1995a), and the fact that nearly four times as many (91) YOY were collected from the single sampling location on the Upper Des Plaines River as the four (1993) to six (1994) locations sampled in Brandon Pool (EA 1994 and 1995b). Drift is a common dispersal mechanism for stream fishes, so it is not surprising to find a few white sucker YOY in Brandon Pool that would have been hatched elsewhere.

A total of 2,128 fish were tagged in the UIW; however, only 18 tagged fish were recaptured, and only two of these fish moved an appreciable distance. A largemouth bass moved ~4 miles upstream in 11 months and a white crappie moved ~11.5 miles downstream. Although data are sparse, they suggest that fishes in the Upper Illinois Waterway exhibit limited movement.

Percentages of fish afflicted with some sort of abnormality in each pool were as follows:

Lockport Pool	17.1%
Brandon Pool	22.1%
Upper Dresden Pool and the 5-mile Stretch	15.8%
Dresden Pool downstream of the Kankakee River	8.7%
Downstream Dresden Lock and Dam	10.0%

Thus, the incidence of abnormalities was highest in the upper three segments. DELT (Deformities, Erosion, Lesions, and Tumors) anomalies are of particular concern because they are strongly correlated with water quality. A summary of DELT anomalies throughout the Upper Illinois Waterway is presented below:

Lockport Pool (%)	Brandon Pool (%)	Upper Dresden Pool and the 5-mile Stretch (%)	Dresden Pool downstream of the Kankakee River (%)	Downstream of Dresden Dam (%)
10.9	14.6	12.6	8.0	7.5

As was the case with total anomalies, DELT anomalies were also highest in the three upstream segments. Eighty percent of all DELT anomalies were the result of fin erosion. The percent of DELT anomalies was greatest among bottom feeders such as common carp, channel catfish, and redhorse species. A high incidence of DELT anomalies is an indication of stress caused by a variety of environmental factors, including chemically contaminated substrates. For large river sites like the UIW, Ohio EPA gives any site with >3% DELT anomalies the lowest possible IBI (Index of Biotic Integrity) metric score. Thus, depending on the segment, DELT anomalies percentages exhibited by fish in the UIW are 2-5 times higher than the 3% criterion established by Ohio EPA for the lowest metric score.

In summary, it was found that during 1993-1994:

- Habitat severely limited the fish community.
- Fish diversity and abundance followed clear-cut patterns, with conditions being poorest in Lockport Pool and generally improving in a downstream direction.
- The spatial pattern appeared to be unrelated to operation of the ComEd power plants.
- Growth and condition of most species were generally within expected ranges, except for smallmouth bass. W_r values for smallmouth bass (typically <90) were consistently below optimum values. For several species, W_r values were highest in Lockport Pool and decreased in a downstream direction.
- The incidence of diseased fish is very high in the UIW.
- Reproduction in the upper portion of the study area is primarily limited to a few tolerant or pelagic fishes.
- None of the measures used in this study to evaluate individual or community health indicated that ComEd power plants were contributing to the poor fauna observed in much of the UIW.
- Based on the lack of impacts and habitat-imposed constraints, it was concluded that the aquatic community of the UIW would essentially be the same as it is currently if ComEd plants were load-restricted or even taken off line.

III. 1995 Study

The 1995 study (EA 1996) was very similar to the 1993-1994 studies in terms of the area covered, the sampling gears used, and the level of effort expended. In 1995, a total of 393 collections were made. When coupled with the effort in 1993 and 1994, a total of 1361 fish collections were used to support the ComEd Petition to the IPCB for the Adjusted Standard regarding thermal standards. The spatial patterns seen in 1995 closely tracked those observed in 1993-1994 (ComEd 1996). Most trends or observations noted in 1993-1994 were also apparent in 1995, namely:

- Habitat was poor at most locations.
- DO values were typically lower in Brandon and Lockport Pools compared to Dresden Pool.
- Numerically dominant species were bluntnose minnow (29.8%), emerald shiner (13.2%), common carp (8.9%), and gizzard shad (8.2%). Thus, the UIW was dominated by a combination of prolific pelagic species (i.e., gizzard shad and emerald shiner) and highly tolerant species (i.e., bluntnose minnow and common carp). These same four species dominated catches in 1993 and 1994.
- A very poor fish assemblage was present in Lockport Pool. The assemblage in Lockport Pool was characterized by low fish abundance and domination by highly tolerant species.
- The community was marginally better in Brandon Pool but was still very poor.
- The fish communities in Upper Dresden Pool and the 5-mile Stretch below the I-55 Bridge, Lower Dresden Pool, and downstream of Dresden Lock and Dam were relatively similar to each other and noticeably better than those upstream of Brandon Lock and Dam but still considered to represent a limited aquatic community.
- IWBmod scores were:

Lockport Pool	2.9
Brandon Pool	2.7
Upper Dresden Pool and the 5-mile Stretch	5.5
Lower Dresden Pool	5.4
Downstream Dresden Dam	6.7

Using IWBmod criteria established by Ohio EPA, each segment would be classified as follows:

Lockport Pool	very poor
Brandon Pool	very poor
Upper Dresden Pool and the 5-mile Stretch	poor
Lower Dresden Pool	poor
Downstream Dresden Dam	fair

- Highly tolerant and pelagic species composed 42% of the YOY catch.
- The percentage of fish with DELT anomalies was high throughout the study area.

IV. 1997-2005 Annual Surveys

At the request of ComEd (1997-1999) and subsequently by MWGen, EA has conducted annual adult fish monitoring in the lower Des Plaines River, between the Brandon Road Lock and Dam and its confluence with the Kankakee River (i.e., Upper Dresden Pool and the 5-mile Stretch below the I-55 Bridge) since 1997. Provided below is a summary of the methodologies and findings from the 1997-2005 studies. The annual fish monitoring conducted by EA included areas that are a part of the pending UAA proceeding or immediately downstream. Those areas are the Brandon Pool, the Lockport Pool, the Upper Dresden Pool and the 5-mile Stretch of the Lower Des Plaines River immediately downstream of the Upper Dresden Pool. Although a considerable amount of work has been conducted in the Brandon and Lockport Pools during this period, the majority of the effort has focused on Upper Dresden Pool and the 5-mile Stretch. Thus, this section only discusses work in the Upper Dresden Pool and the 5-mile Stretch.

For some of the analyses below, study results from what was historically called Upper Dresden Pool have been segregated into and compared between two segments: 1) Upstream I-55 (the secondary contact waters of the lower Des Plaines River from the I-55 bridge upstream to the Brandon Road Lock and Dam, i.e., Upper Dresden Pool as defined in the UAA rule-making proceeding) and 2) Downstream I-55 (the General Use waters of the lower Des Plaines River from the I-55 bridge downstream to its confluence with the Kankakee River, referred to as the 5-mile Stretch in this hearing.)

Electrofishing was conducted each year using a boat-mounted system energized by a 230-volt, 5,000-watt, three-phase AC generator. In 1993, electrofishing was based on time (15 minutes per location) and was conducted in an upstream location. Since 1993, electrofishing has been based on distance (500 meters per location) and conducted in a downstream direction, which is consistent with other researchers' methodologies, such as the Ohio EPA and the Midwest Biodiversity Institute (MBI). Due to the change in electrofishing methods, data from 1993 are excluded from certain analyses and comparisons. EA has made 727 electrofishing collections in Upper Dresden Pool and the 5-mile Stretch since 1995.

Seining was conducted each year using a straight seine that was 25 feet (7.6 m) long by 6 feet (1.8 m) deep with 3/16 inch (4.8 mm) Ace mesh. The effort consisted of a single haul at each sampling location. EA has made 583 seine collections from Upper Dresden Pool and the 5-mile Stretch since 1995.

Experimental gillnetting was conducted only during 1993-1995. Therefore, those data are excluded from the following analyses.

In summary, EA made 1361 fish collections in 1993-1995, 1310 collections from Dresden Pool alone during 1997-2005, and 488 more collections from Brandon and Lockport Pools in 1997-2005, a total of 3159 collections from 1993-2005. This compares to 11 collections made by MBI from these pools, with all collections confined to a single year, 2006.

A. TAXONOMIC COMPOSITION AND ABUNDANCE - Upper Dresden Pool and the 5-mile Stretch

Electrofishing and seining during the 12 study years produced 143,156 fish representing 82 species and four hybrids (Table 1). The 10 most abundant species collected were, in descending order of abundance: bluntnose minnow (22.2%), gizzard shad (+ *Dorosoma* spp.) (20.4%), bluegill (17.2%), green sunfish (7.0%), emerald shiner (6.6%), orangespotted sunfish (4.4%), largemouth bass (3.4%), common carp (2.8%), bullhead minnow (2.3%), and spottail shiner (1.9%). These same species were also the 10 most abundant collected during each period (i.e., 1993-1995 and 1997-2005):

Species	**1993-1995**			**1997-2005**		
	No.	**Rank**	**%**	**No.**	**Rank**	**%**
Bluntnose minnow	3,626	1	27.8	28,170	1	21.7
Gizzard shad (+ *Dorosoma*)	2,924	2	22.4	26,220	2	20.2
Bluegill	327	10	2.5	24,283	3	18.7
Green Sunfish	413	7	3.2	9,544	4	7.3
Emerald shiner	853	3	6.5	8,568	5	6.6
Orangespotted sunfish	373	8	2.9	5,872	6	4.5
Largemouth bass	760	5	5.8	4,050	7	3.1
Common carp	796	4	6.1	3,217	8	2.5
Bullhead minnow	345	9	2.6	2,916	9	2.2
Spottail shiner	689	6	5.3	2,068	10	1.6
			85.1			88.3

Collectively, these 10 species composed remarkably similar percentages of the catches during these two periods (85.1% vs. 88.3%) and, individually, the percentages were also quite similar between periods for bluntnose minnow, gizzard shad (+ *Dorosoma* spp.), emerald shiner, orangespotted sunfish, largemouth bass, and bullhead minnow. In fact, bluegill was the only dominant species that exhibited an appreciable difference between these two periods: 2.5% of the catch during 1993-1995 compared to 18.7% during the period of 1997-2005. Therefore, with the exception of some "re-shuffling" among the ranks, the fish community of Upper Dresden Pool and the 5-mile Stretch continues to be dominated by the same species that dominated the community during the period of 1993-1995. The fact that the same 10 species dominated the area before the Adjusted Standard went into effect as have dominated after it went into effect indicates that the slightly higher thermal standards allowed by the Adjusted Standard did not affect fish populations.

B. TOLERANCE OF FISHES – Dresden Pool

Ohio EPA (1987, plus 2006 updates) classifies fish based on their tolerance to environmental perturbations such as decreasing water and habitat quality. At the high end of the spectrum are the intolerant and moderately intolerant fishes, which exhibit a distinct and rapid decreasing trend in abundance with decreasing habitat and/or water quality. Of the 82 species collected from Dresden Pool, eight species are classified as intolerant and another eight species classified as moderately intolerant. At the other end of the spectrum are the highly tolerant and moderately tolerant fishes that can become a predominant component of the fish community in areas with degraded habitat and/or water quality. In Dresden Pool, nine highly tolerant species and seven moderately tolerant species have been collected. Therefore, an equal number of intolerant and moderately intolerant species (16) and highly tolerant and moderately tolerant species (16) have been collected. However, for years combined and for both periods, the relative abundances of moderately and highly tolerant fishes have been markedly higher than those of the intolerant and moderately intolerant fishes. Of the remaining 50 species, 42 are classified as having intermediate tolerance and eight (mostly exotics) are unclassified.

Ohio EPA Tolerance Classification	1993-1995		1997-2005		Years Combined	
	No.	%	No.	%	No.	%
Intolerant	18	0.1	158	0.1	176	0.1
Moderately Intolerant	346	2.7	2,000	1.5	2,346	1.6
Intermediate Tolerance	6,012	46.1	54,647	42.0	60,659	42.4
Moderately Tolerant	1,275	9.8	27,515	21.2	28,790	20.1
Highly Tolerant	5,156	39.5	41,724	32.1	46,880	32.8

For years combined, the 16 moderately and highly tolerant species (plus two other taxa) composed 52.8% of the catch. The 42 intermediately tolerant species (plus six other taxa) composed 42.4% of the catch. The preponderance of moderately tolerant and highly tolerant fishes reflects the degraded habitat of Dresden Pool. For years combined, only 1.7% of the fish collected were intolerant or moderately intolerant.

The relative abundances of all tolerance classifications, except for the moderately tolerant fishes, were similar between the two periods. The relative abundance of moderately tolerant fishes was markedly higher for the period of 1997-2005 than for the period of 1993-1995, due solely to the increased abundance of bluegill.

V. Summary of Fish Community Changes from 1993-2006

Although the fish community in both the pre- and post-Adjusted Standard periods was dominated by the same 10 species and the community continues to be dominated by moderately and highly tolerant species, there has been a modest improvement in Upper Dresden Pool in some measures (EA 2008). In Upper Dresden Pool, electrofishing catch rates (CPEs) for all native fishes combined have consistently been higher during the post-Adjusted Standard period (EA 2008). IWBmod scores during the post-Adjusted Standard period have consistently been as high or higher compared to the pre-Adjusted Standard period; however, the difference has been statistically significant in only two of the 10 post Adjustment Standard years (EA 2008). Native species richness during the post-Adjusted Standard period has also usually been as high or higher as during the pre-Adjusted Standard period. For this measure, the difference was statistically significant in three of 10 years.

In summary, the present fish community in Upper Dresden Pool is somewhat more abundant, has slightly more species, and generally has higher IWBmod scores compared to 1993-1995. However, the community continues to be dominated by species at the high end of the tolerance scale and the community dominants have <u>not</u> changed over the period.

VI. List of References

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Ohio Environmental Protection Agency. 1987 (and 2006 updates). Biological criteria for the protection of aquatic life: Volume II: User's manual for biological field assessment of Ohio surface waters. Ohio EPA, Division of Water Quality Planning and Assessment, Columbus, Ohio. 125 pp. plus appendices.

Electronic Filing - Received, Clerk's Office, September 8, 2008

ATTACHMENT 2

Qualitative Habitat Evaluation Index (QHEI) Study of Upper Dresden Island Pool, July 2008

Electronic Filing - Received, Clerk's Office, September 8, 2008

ATTACHMENT 2A

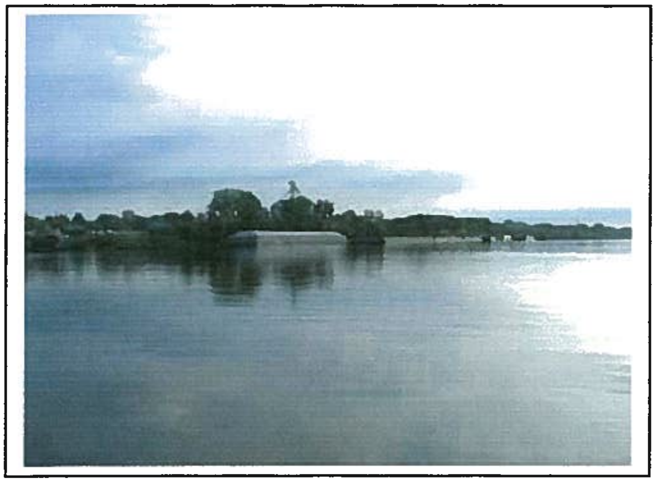
Photographs of barge fleeting area along the right bank of the lower Des Plaines River between RM 278.0 (I-55 bridge) and RM 279.1.

Barge fleeting area along right bank of lower Des Plaines River between RM 278.0 (I-55 bridge) and RM 279.1.

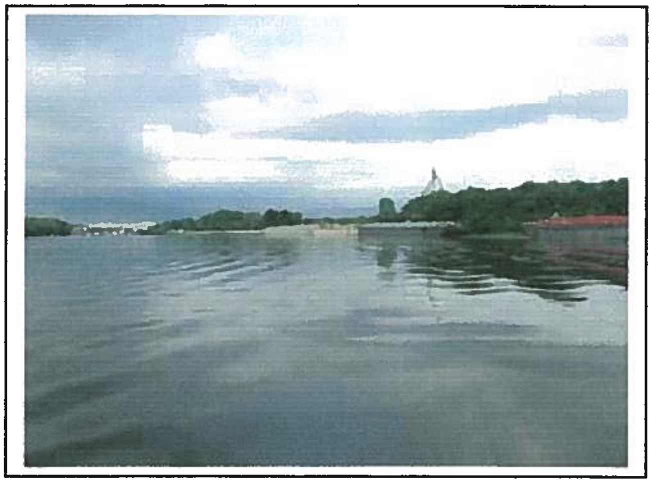
Facing upstream.

Facing upstream.

Facing downstream.



Facing upstream.



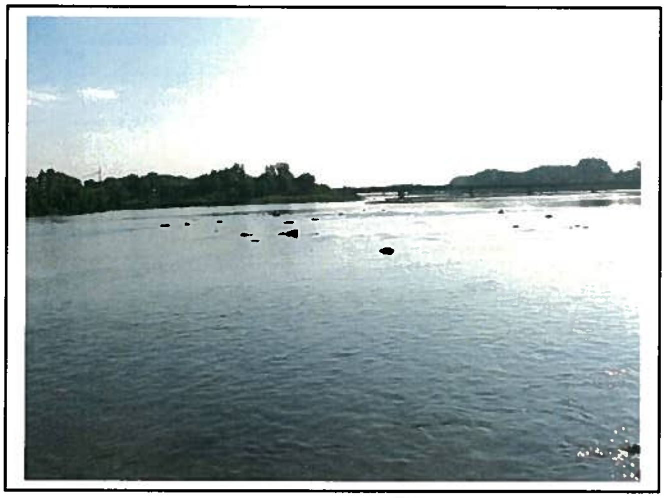
Facing downstream.

Electronic Filing - Received, Clerk's Office, September 8, 2008

ATTACHMENT 2B

Photograph documentation log for the July 2008 QHEI study

Brandon Road Lock and Dam Tailwater



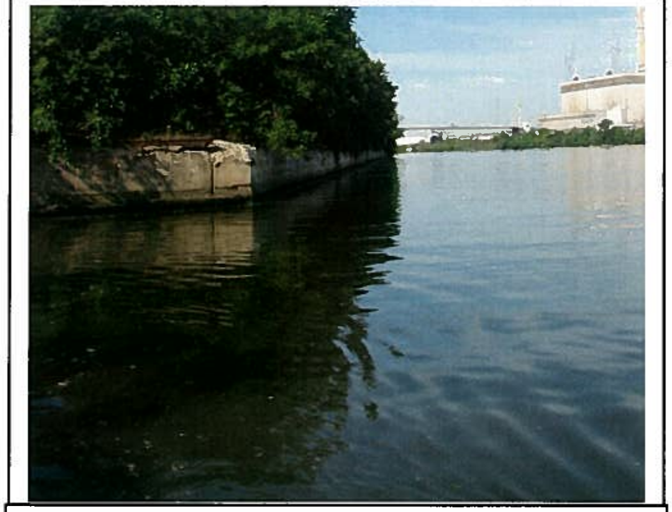
Near mid-point of MBI's Site RM "285.8" facing upstream.

Near mid-point of MBI's Site RM "285.8" facing downstream and left bank.

Near mid-point of MBI's Site RM "285.8" facing upstream and right bank.

Near mid-point of MBI's Site RM "285.8" facing downstream and right bank.

RM 285.1 Left Bank



Upstream end facing downstream.

Middle of zone facing upstream.

Middle of zone facing downstream.

Downstream end facing upstream.

RM 285.0 Right Bank

Upstream end facing downstream.

Middle of zone facing upstream.

Middle of zone facing downstream.

Downstream end facing upstream.

RM 284.8 Left Bank

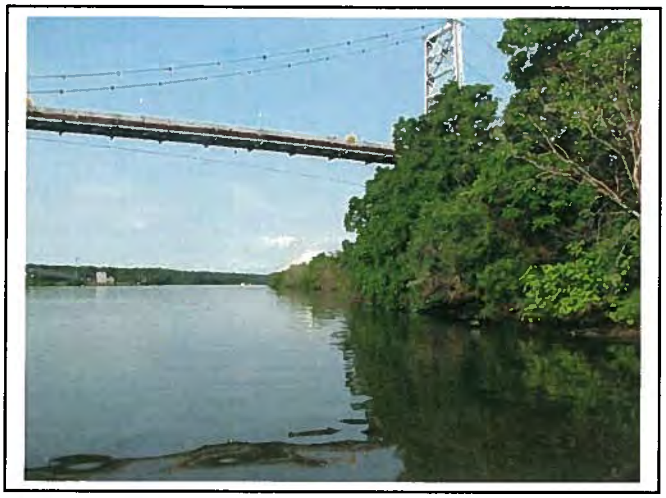
Upstream end facing downstream.

Middle of zone facing upstream.

Middle of zone facing downstream.

Downstream end facing upstream.

RM 284.7 Right Bank



Upstream end facing downstream.

Middle of zone facing upstream.

Middle of zone facing downstream.

Downstream end facing upstream.

RM 284.5 Left Bank

Upstream end facing downstream.

Middle of zone facing upstream.

Middle of zone facing downstream.

Downstream end facing upstream.

RM 284.4 Right Bank

Upstream end facing downstream.

Middle of zone facing upstream.

Middle of zone facing downstream.

Downstream end facing upstream.

RM 284.2 Left Bank

Upstream end facing downstream.

Middle of zone facing upstream.

Middle of zone facing downstream.

Downstream end facing upstream.

RM 284.1 Right Bank

Upstream end facing downstream.

Middle of zone facing upstream.

Middle of zone facing downstream.

Downstream end facing upstream.

RM 283.9 Left Bank

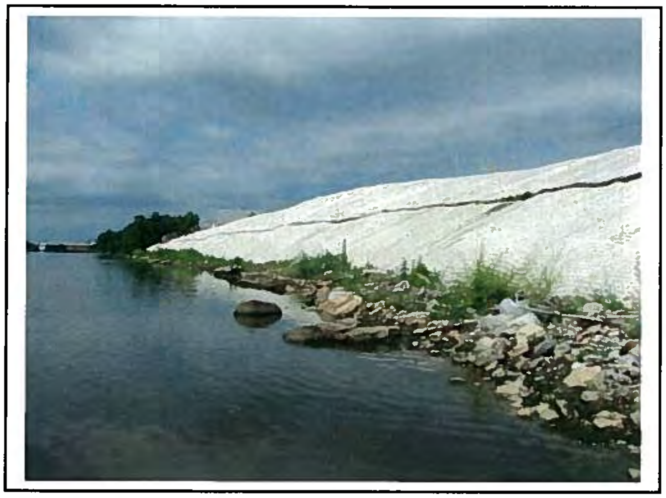
Upstream end facing downstream.

Middle of zone facing upstream.

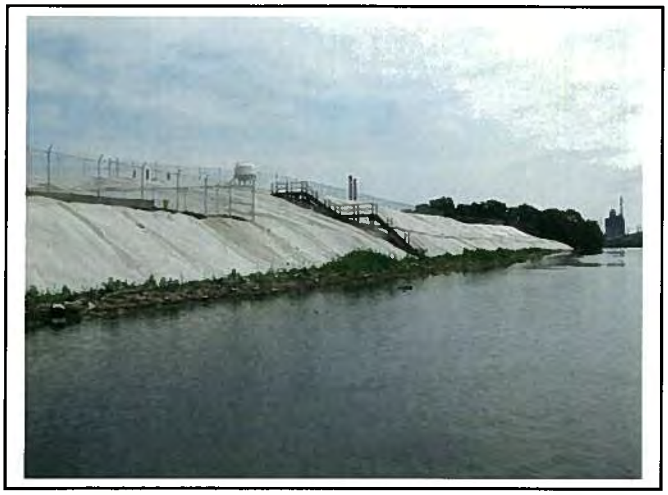
Middle of zone facing downstream.

Downstream end facing upstream (no photo).

RM 283.8 Right Bank



Upstream end facing downstream.



Middle of zone facing upstream.

Middle of zone facing downstream.

Downstream end facing upstream.

RM 283.6 Left Bank

Upstream end facing downstream.

Middle of zone facing upstream.

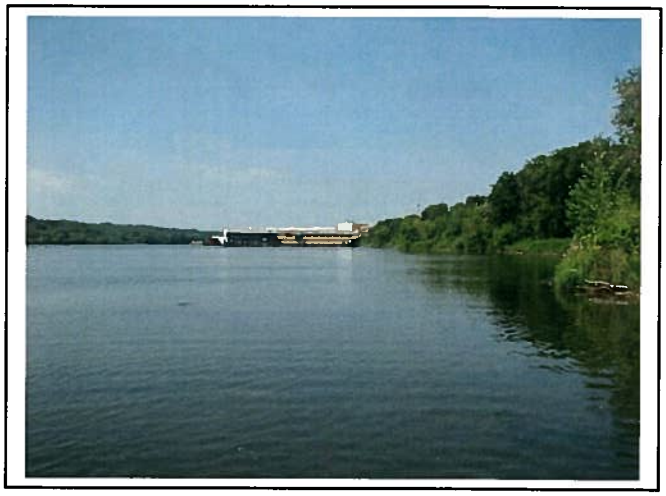
Middle of zone facing downstream.

Downstream end facing upstream.

RM 283.5 Right Bank

Upstream end facing downstream.

Middle of zone facing upstream.



Middle of zone facing downstream.

Downstream end facing upstream.

RM 283.3 Left Bank

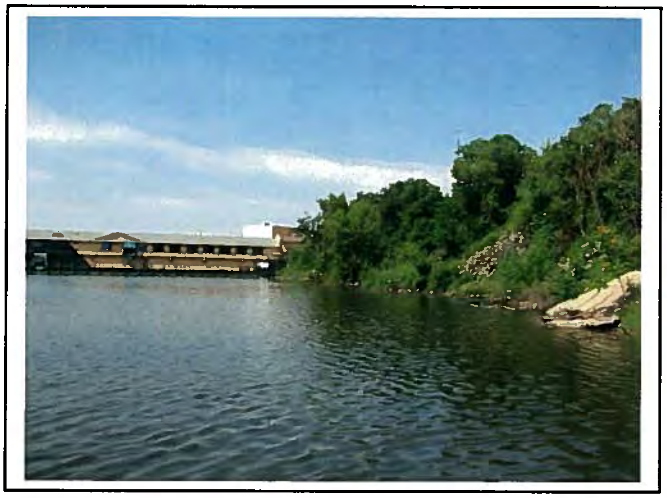
Upstream end facing downstream.

Middle of zone facing upstream.

Middle of zone facing downstream.

Downstream end facing upstream.

RM 283.2 Right Bank



Upstream end facing downstream.

Middle of zone facing upstream.

Middle of zone facing downstream.

Downstream end facing upstream.

RM 283.0 Left Bank

Upstream end facing downstream.

Middle of zone facing upstream.

Middle of zone facing downstream.

Downstream end facing small backwater.

RM 282.9 Right Bank

Upstream end facing downstream.

Middle of zone facing upstream.

Middle of zone facing downstream.

Downstream end facing upstream.

RM 282.6 Left Bank

Upstream end facing downstream.

Middle of zone facing upstream.

Middle of zone facing downstream.

Downstream end facing upstream.

RM 282.5 Right Bank

Upstream end facing downstream.

Middle of zone facing upstream.

Middle of zone facing downstream.

Downstream end facing upstream.

Construction activities adjacent to this location.

RM 282.3 Left Bank

Upstream end facing downstream.

Middle of zone facing upstream.

Middle of zone facing downstream.

Downstream end facing upstream.

RM 282.2 Right Bank

Upstream end facing downstream.

Middle of zone facing upstream.

Middle of zone facing downstream.

Downstream end facing upstream.

RM 282.0 Left Bank

Upstream end facing downstream.

Middle of zone facing upstream.

Middle of zone facing downstream.

Downstream end facing upstream.

RM 281.9 Right Bank

Upstream end facing downstream.

Middle of zone facing upstream.

Middle of zone facing downstream.

Downstream end facing upstream.

RM 281.7 Left Bank

Upstream end facing downstream.

Middle of zone facing upstream.

Middle of zone facing downstream.

Downstream end facing upstream.

RM 281.6 Right Bank

Upstream end facing downstream.

Middle of zone facing upstream.

Middle of zone facing downstream.

Downstream end facing upstream.

RM 281.3 Left Bank

Upstream end facing downstream.

Middle of zone facing upstream.

Middle of zone facing downstream.

Downstream end facing upstream.

RM 281.3 Right Bank

Upstream end facing downstream.

Middle of zone facing upstream.

Middle of zone facing downstream.

Downstream end facing upstream.

RM 281.0 Right Bank

Upstream end facing downstream.

Middle of zone facing upstream.

Middle of zone facing downstream.

Downstream end facing upstream.

RM 280.9 Left Bank

Upstream end facing downstream.

Middle of zone facing upstream.

Middle of zone facing downstream.

Downstream end facing upstream.

RM 280.7 Right Bank

Upstream end facing downstream.

Middle of zone facing upstream.

Middle of zone facing downstream.

Downstream end facing upstream.

RM 280.6 Left Bank

Upstream end facing downstream.

Middle of zone facing upstream.

Middle of zone facing downstream.

Downstream end facing upstream.

RM 280.4 Right Bank

Upstream end facing downstream.

Middle of zone facing upstream.

Middle of zone facing downstream.

Downstream end facing upstream.

RM 280.3 Left Bank

Upstream end facing downstream.

Middle of zone facing upstream.

Middle of zone facing downstream.

Downstream end facing upstream.

RM 280.0 Right Bank

Upstream end facing downstream.

Middle of zone facing upstream.

Middle of zone facing downstream.

Downstream end facing upstream.

RM 279.8 Left Bank

Upstream end facing downstream.

Middle of zone facing upstream.

Middle of zone facing downstream.

Downstream end facing upstream.

RM 279.7 Right Bank

Upstream end facing downstream.

Middle of zone facing upstream.

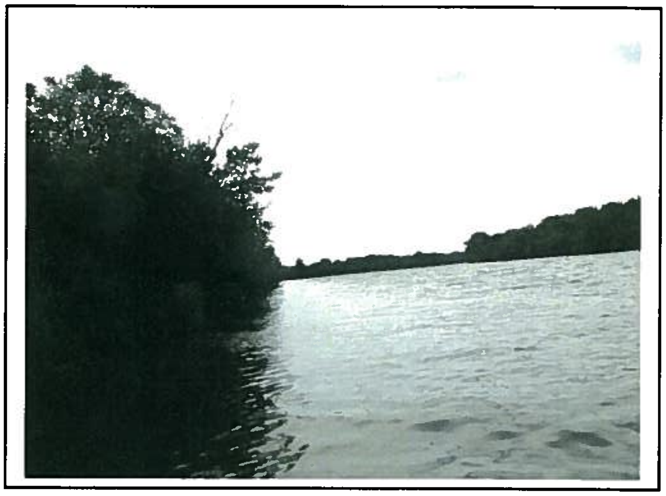
Middle of zone facing downstream.

Downstream end facing upstream.

RM 279.5 Left Bank

Upstream end facing downstream.

Middle of zone facing upstream.



Middle of zone facing downstream.

Downstream end facing upstream.

RM 279.4 Right Bank

Upstream end facing downstream.

Middle of zone facing upstream.

Middle of zone facing downstream.

Downstream end facing upstream.

RM 279.1 Left Bank

Upstream end facing downstream.

Downstream tip of Treats Island facing upstream.

Mouth of Treats Island side channel facing downstream.

Downstream end facing upstream.

RM 279.1 Right Bank

Upstream end facing downstream.

Middle of zone facing upstream.

Middle of zone facing downstream.

Downstream end facing upstream.

RM 278.9 Right Bank

Upstream end facing downstream.

Middle of zone facing upstream.

Middle of zone facing downstream.

Downstream end facing upstream.

RM 278.7 Left Bank

Upstream end facing downstream.

Middle of zone facing upstream.

Middle of zone facing downstream.

Downstream end facing upstream.

RM 278.7 Right Bank

Upstream end facing downstream.

Middle of zone facing upstream.

Middle of zone facing downstream.

Downstream end facing upstream (no photo).

RM 278.4 Left Bank

Upstream end facing downstream.

Middle of zone facing upstream.

Middle of zone facing downstream.

Downstream end facing upstream (no photo).

RM 278.3 Right Bank

Upstream end facing downstream.

Middle of zone facing upstream.

Middle of zone facing downstream.

Downstream end facing upstream.

RM 278.0 Left Bank

Upstream end facing downstream.

Middle of zone facing upstream.

Middle of zone facing downstream.

Downstream end facing upstream.

Downstream end.

RM 278.0 Right Bank

Upstream end facing downstream.

Middle of zone facing upstream.

Middle of zone facing downstream.

Downstream end facing upstream.

Moored barges along right bank from RM 278.0 to RM 279.1.

Facing upstream.

Facing upstream.

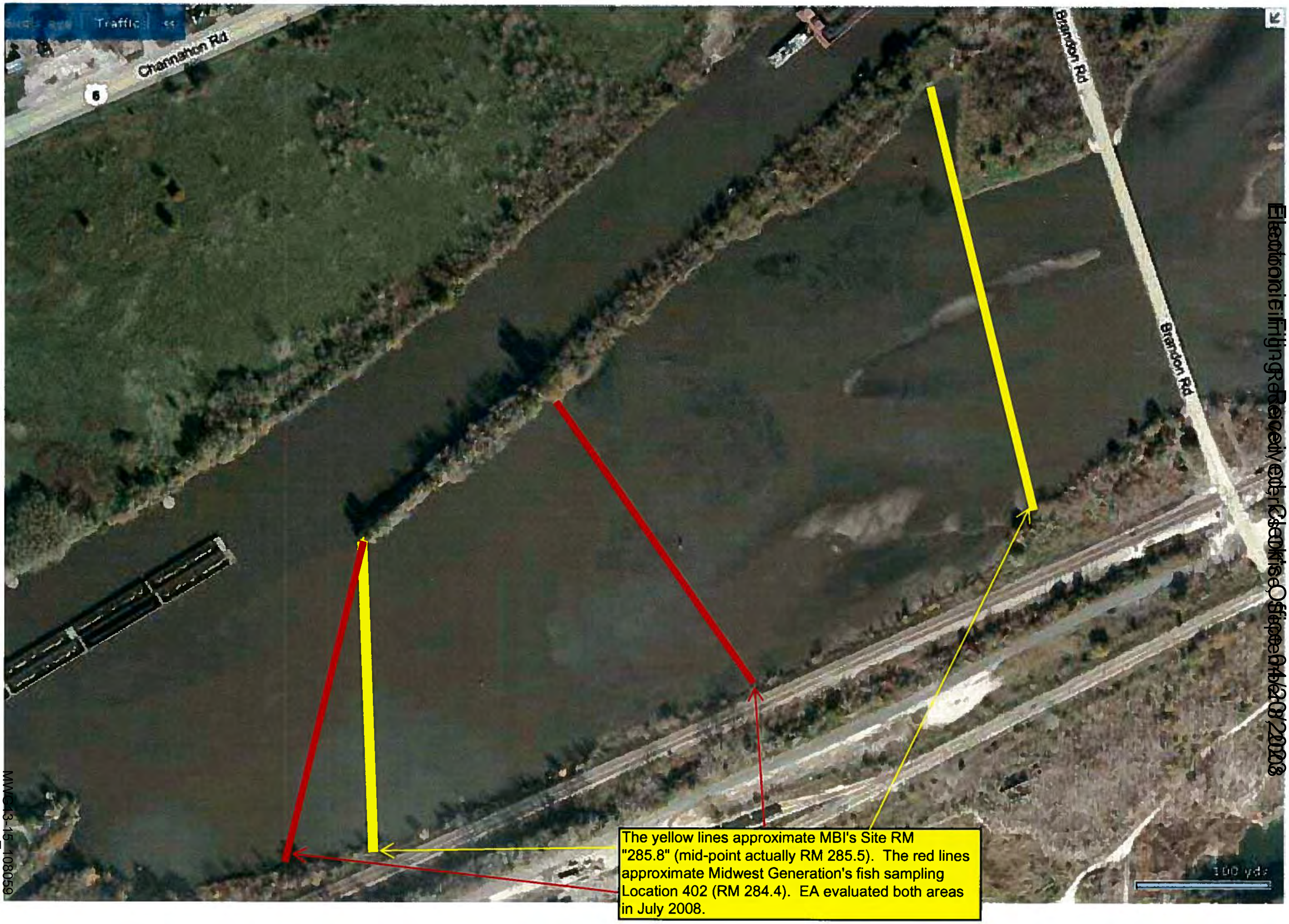
Facing downstream.

Facing upstream.

Facing downstream.

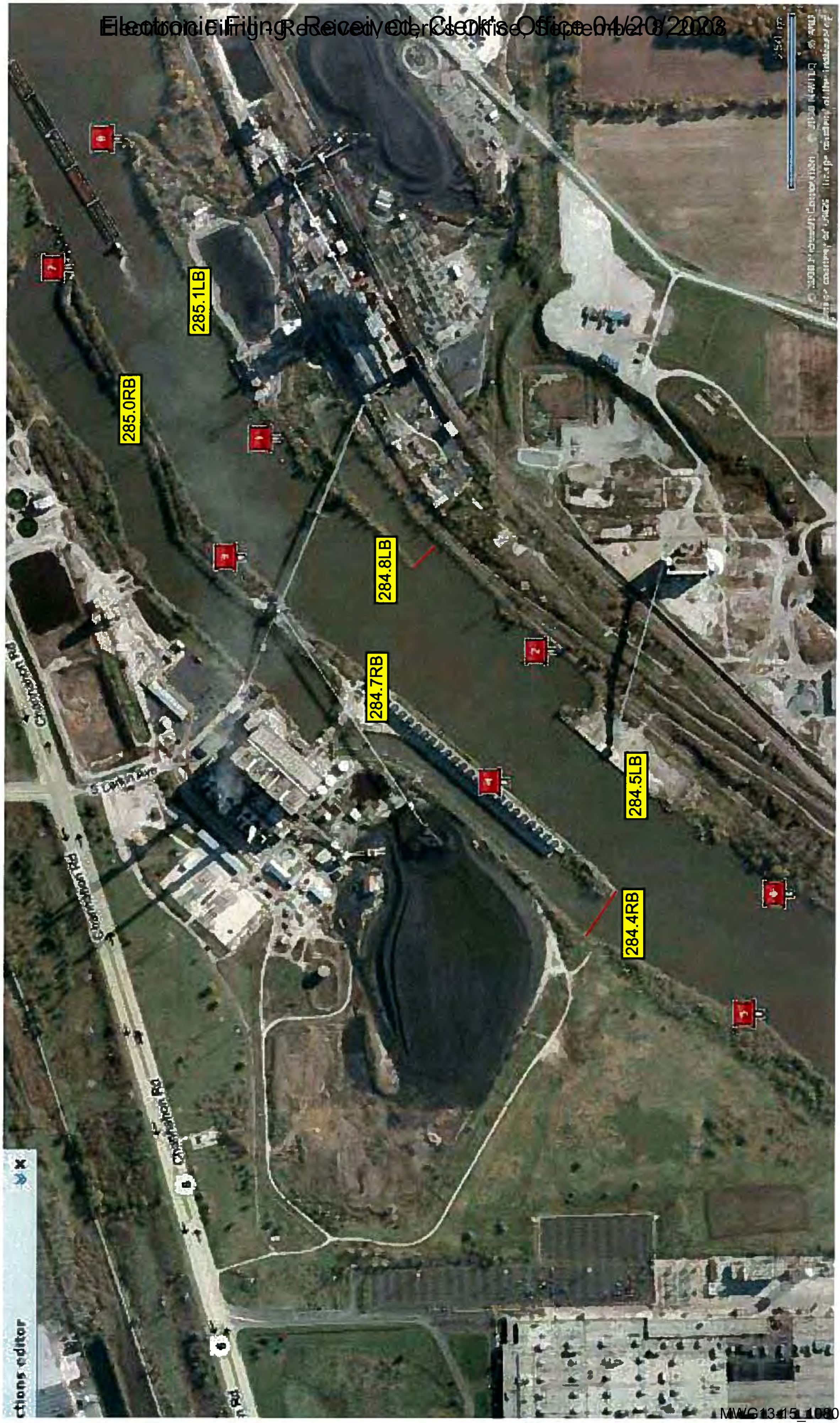
ATTACHMENT 2C

Aerial photographs showing the sites evaluated during the July 2008 QHEI study

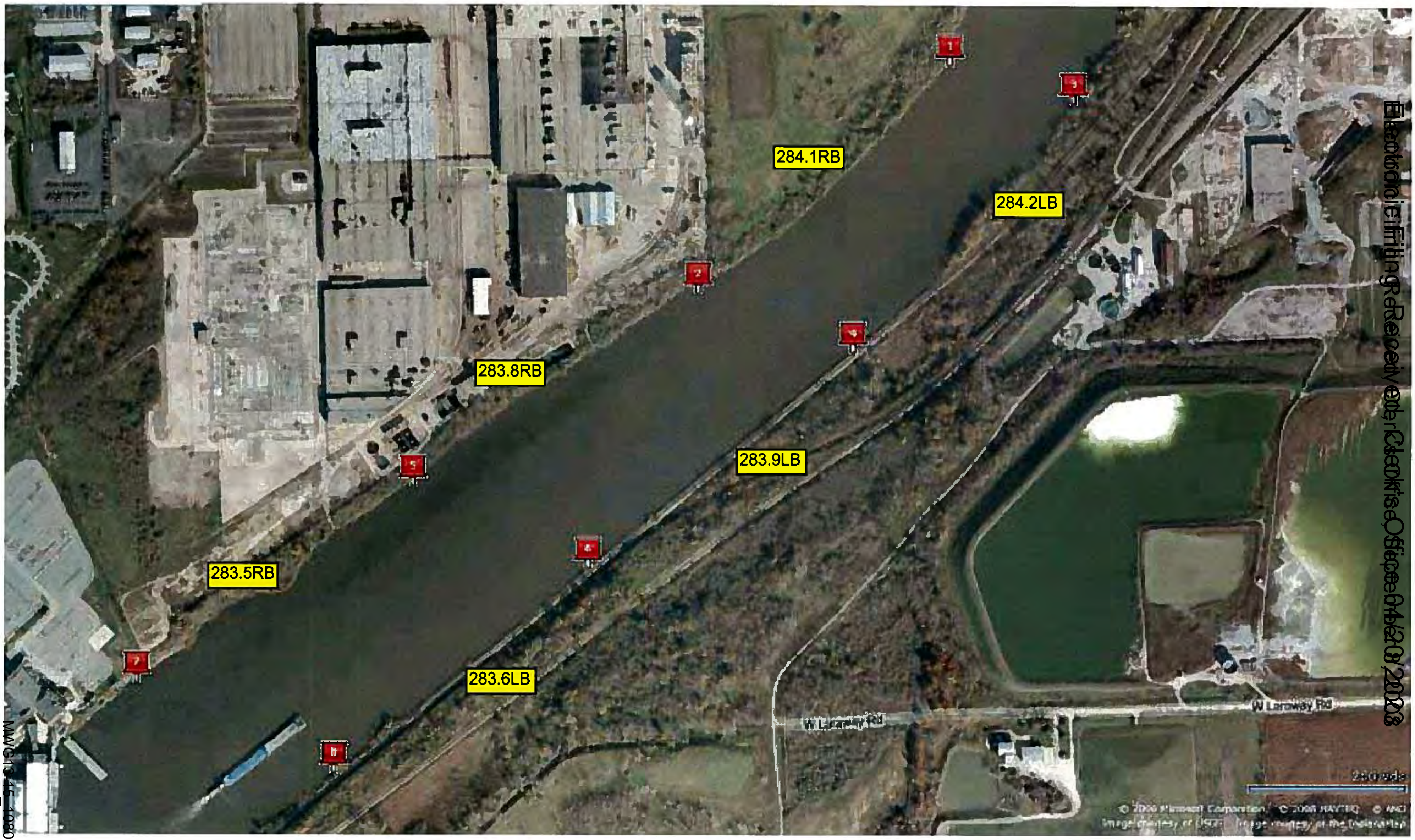


The yellow lines approximate MBI's Site RM "285.8" (mid-point actually RM 285.5). The red lines approximate Midwest Generation's fish sampling Location 402 (RM 284.4). EA evaluated both areas in July 2008.

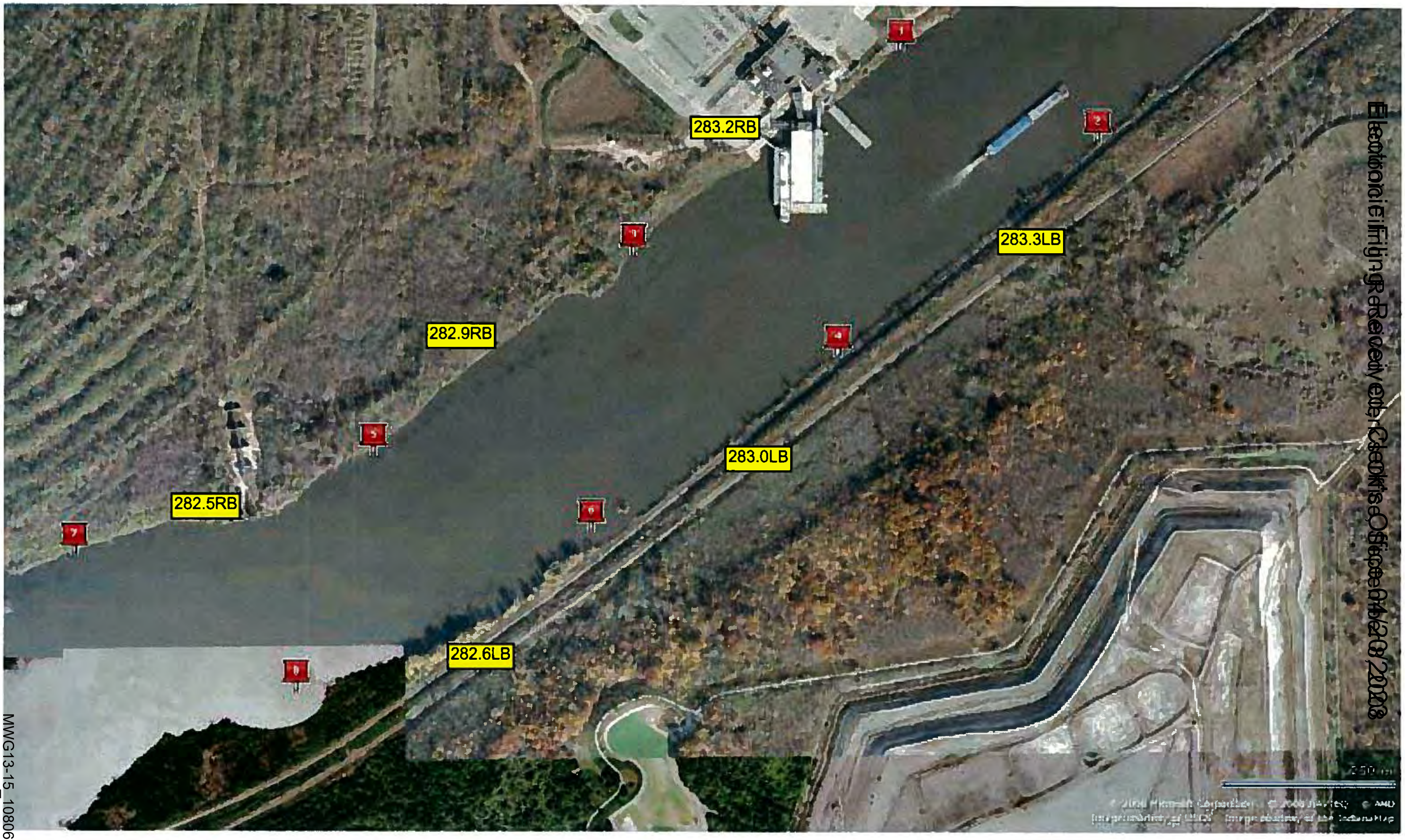
Areas within the Brandon Road Lock and Dam tailwater that were assessed with the QHEI during July 2008.



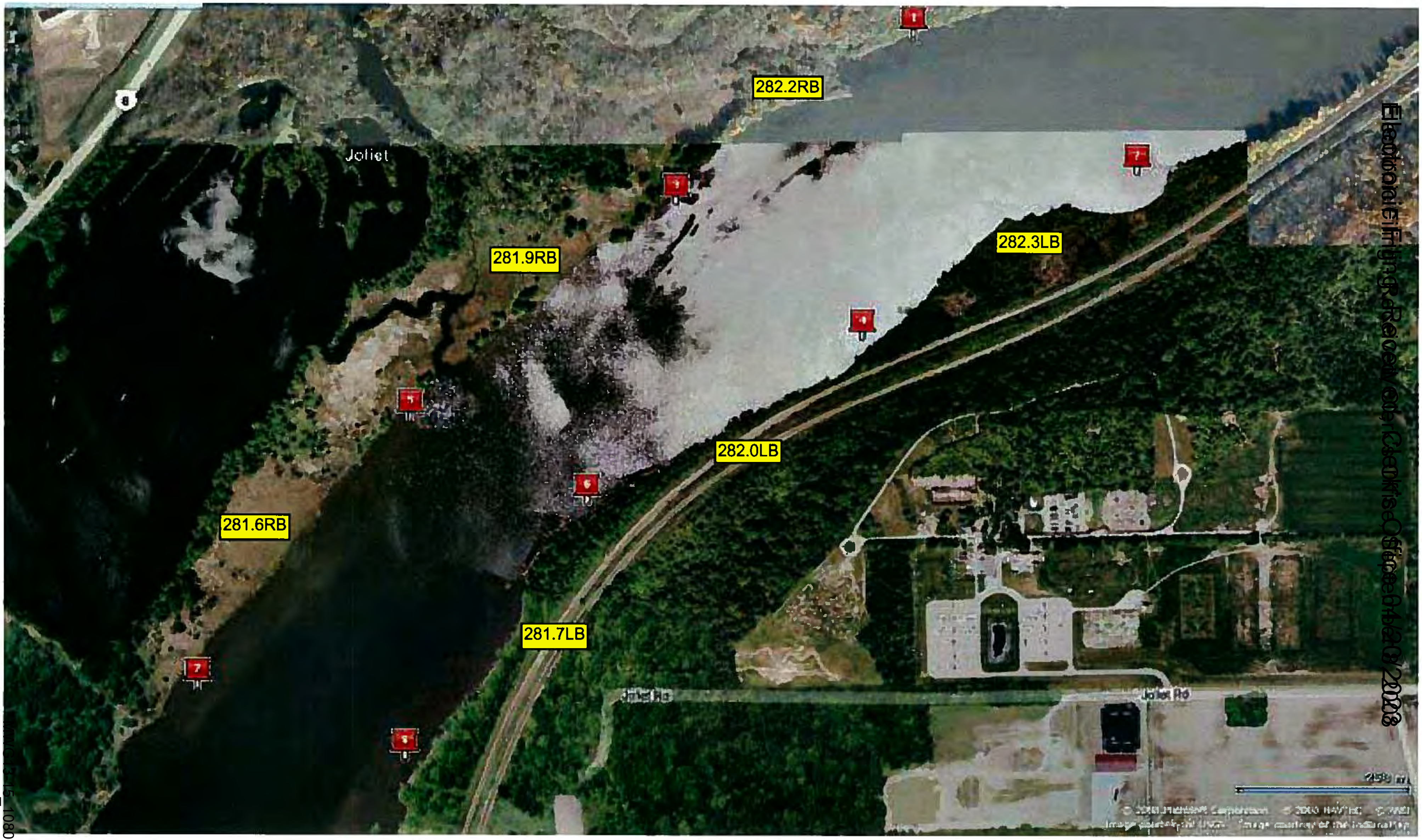
Areas assessed with the QHEI between River Miles 284.4 and 285.1 during July 2008.



Areas assessed with the QHEI between River Miles 283.5 and 284.2 during July 2008.



Areas assessed with the QHEI between River Miles 282.5 and 283.3 during July 2008.



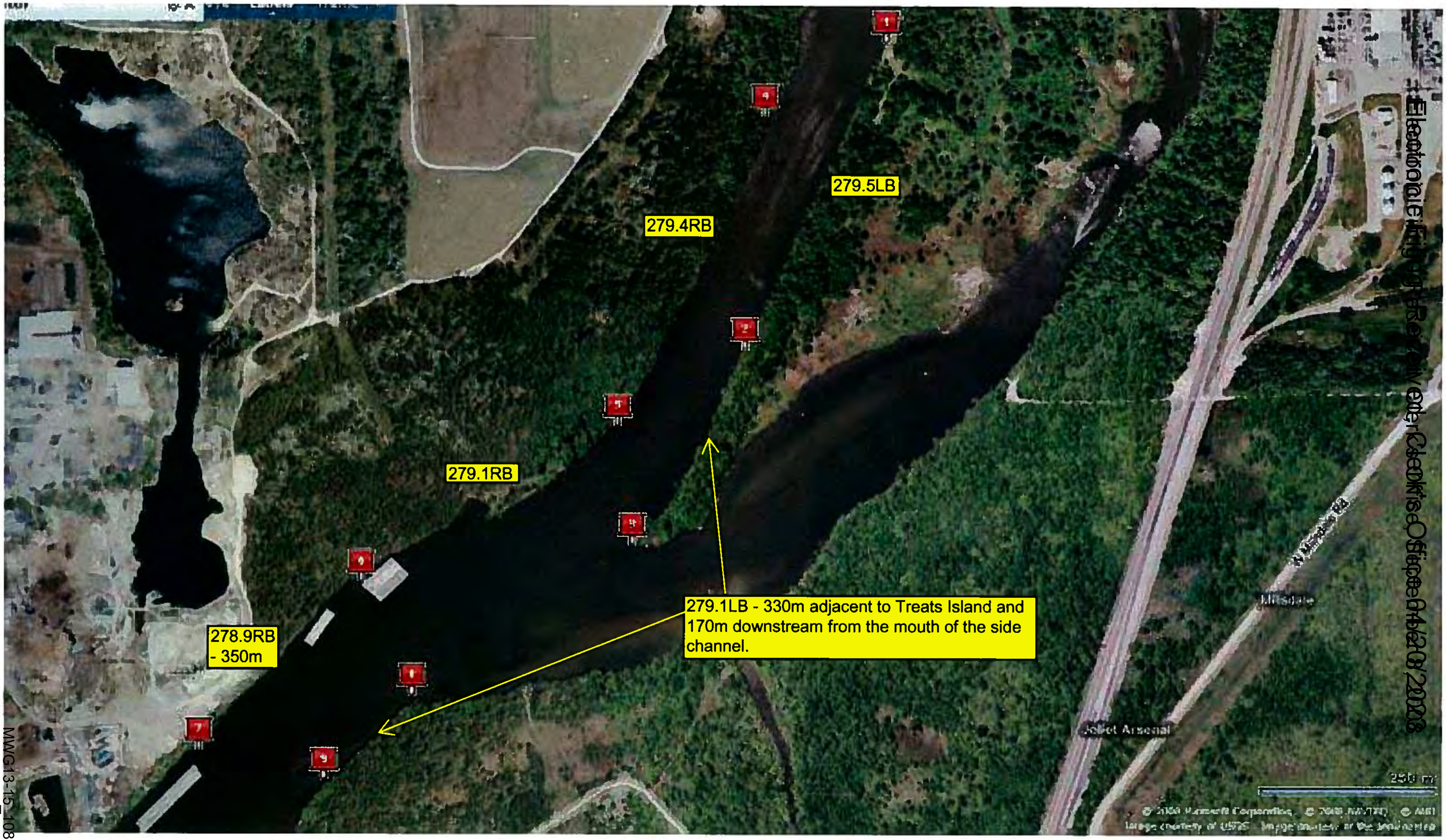
Areas assessed with the QHEI between River Miles 281.6 and 282.3 during July 2008.

Areas assessed with the QHEI between River Miles 280.9 and 281.3 during July 2008.

Areas assessed with the QHEI between River Miles 280.3 and 280.7 during July 2008.

Areas assessed with the QHEI between River Miles 279.7 and 280.0 during July 2008.

Electronic Filing - Received, Clerk's Office, September 8, 2008



279.1LB - 330m adjacent to Treats Island and 170m downstream from the mouth of the side channel.

Areas assessed with the QHEI between River Miles 278.9 and 279.5 during July 2008.

Area within the Treats Island Side Channel that was assessed with the QHEI during July 2008.


Mouth of Jackson Creek (RM 278.3) - The red arrows denote Midwest Generation's fish sampling Location 408.

Areas within the Mouth of Jackson Creek that were assessed with the QHEI during July 2008.

Areas assessed with the QHEI between River Miles 278.0 and 278.7 during July 2008.

Electronic Filing - Received, Clerk's Office, September 8, 2008

ATTACHMENT 2D

Summary of QHEI metrics and scores for the July 2008 QHEI study

Summary of QHEI Metrics and Scores for Upper Dresden Pool, July 2008.

River Mile & Bank	Substrate	Instream Cover	Channel Morphology Ohio EPA	Channel Morphology MBI Modified	Bank Erosion & Riparian Zone	Pool/Glide & Riffle/Run Quality Pool/Current Ohio EPA	Pool/Glide & Riffle/Run Quality Pool/Current MBI Modified	Pool/Glide & Riffle/Run Quality Riffle/Run	Gradient	QHEI Score Ohio EPA	QHEI Score MBI Modified
285.5 Brandon Road Lock & Dam Tailwater[a]	12.5	13	13	13	5.5	12	12	5.5	6	67.5	67.5
285.4 Brandon Road Lock & Dam Tailwater[b]	11.5	12	11	11	5.5	10	10	0	6	56	56
285.1 LB[c]	17	7	6	4	3.5	8	6	0	6	47.5	43.5
285.0 RB	18	9	8	4	4	10	8	0	6	55	49
284.8 LB	8.5	8	6	3	3.5	8	6	0	6	40	35
284.7 RB	17	7	7	4	4	10	8	0	6	51	46
284.5 LB	10.5	9	6	3	4	8	6	0	6	43.5	38.5
284.4 RB	18	8	7	4	5	11	9	0	6	55	50
284.2 LB	6.5	11	6	2	5.5	8	6	0	6	43	37
284.1 RB	17	9	8	4	8.5	8	6	0	6	56.5	50.5
283.9 LB	7.5	9	5	3	4.5	8	6	0	6	40	36
283.8 RB	0	10	5	2	7.5	8	6	0	6	36.5	31.5
283.6 LB	14	6	6	4	6	8	6	0	6	46	42
283.5 RB	2	12	6	2	6.5	8	6	0	6	40.5	34.5
283.3 LB	17	5	6	4	4.5	8	6	0	6	46.5	42.5
283.2 RB	4	15	6	3	6.5	8	6	0	6	45.5	40.5
283.0 LB	16	10	5	3	4.5	8	6	0	6	49.5	45.5
282.9 RB	0	11	6	2	9.5	8	6	0	6	40.5	34.5
282.6 LB	0.5	14	6	2	9	8	6	0	6	43.5	37.5
282.5 RB	0	10	5	2	6.5	8	6	0	6	35.5	30.5
282.3 LB	4	12	6	2	9	8	6	0	6	45	39
282.2 RB	8	15	5	2	6.5	8	6	0	6	48.5	43.5
282.0 LB	0	11	5	2	6	8	6	0	6	36	31
281.9 RB	0	11	6	2	6.5	8	6	0	6	37.5	31.5
281.7 LB	0	8	7	3	8	8	6	0	6	37	31
281.6 RB	0	12	6	2	6	8	6	0	6	38	32
281.3 LB	0	9	7	3	9	8	6	0	6	39	33
281.3 RB	8.5	11	6.5	3.5	5	8	6	0	6	45	40
281.0 RB	13	4	5	3	2.5	8	6	0	6	38.5	34.5
280.9 LB	6	8	6	2	9	8	6	0	6	43	37

Summary of QHEI Metrics and Scores for Upper Dresden Pool, July 2008 (cont.)

River Mile & Bank	Substrate	Instream Cover	Channel Morphology Ohio EPA	Channel Morphology MBI Modified	Bank Erosion & Riparian Zone	Pool/Glide & Riffle/Run Quality			Gradient	QHEI Score Ohio EPA	QHEI Score MBI Modified
						Pool/Current Ohio EPA	Pool/Current MBI Modified	Riffle/Run			
280.7 RB	8.5	8	7	3	8	8	6	0	6	45.5	39.5
280.6 LB	6	8	6	2	9.5	8	6	0	6	43.5	37.5
280.4 RB	0	8	6	2	6.5	8	6	0	6	34.5	28.5
280.3 LB	6	12	6	2	9.5	8	6	0	6	47.5	41.5
280.0 RB	10.5	11	7	3	8.5	8	6	0	6	51	45
279.8 LB	19	7	8	4	9.5	9	7	0	6	58.5	52.5
279.7 RB	19	9	8	4	8	10	8	0	6	60	54
279.5 LB	19	9	8	4	9.5	9	7	0	6	60.5	54.5
279.4 RB	20	8	8	4	10	8	6	0	6	60	54
279.4 Treats Island Side Channel[d]	8.5	14	10	3	8.5	8	6	0	6	55	46
279.1 LB	18	11	8	4	9.5	9	7	0	6	61.5	55.5
279.1 RB	15	10	7	3	10	8	6	0	6	56	50
278.9 RB (350m)	10	5	6	3	6.5	8	6	0	6	41.5	36.5
278.7 LB	12.5	10	7	3	10	8	6	0	6	53.5	47.5
278.7 RB	13	8	6	3	6.5	8	6	0	6	47.5	42.5
278.4 LB (390m)	14	11	7	3	10	8	6	0	6	56	50
278.3 RB	14	7	7	3	10	8	6	0	6	52	46
278.3 Mouth of Jackson Creek[e]	10.5	10	10	3	8.25	8	6	0	6	52.75	43.75
278.0 LB (510m)	9.5	8	5	3	3	8	6	0	6	39.5	35.5
278.0 RB (420m)	8	11	6	3	6.5	8	6	0	6	45.5	40.5
Mean Score	**9.6**	**9.6**	**6.7**	3.3	**7.0**	**8.4**	6.4	**0.1**	**6.0**	**47.4**	42.0
Minimum Score	**0**	**4**	**5**	2	**2.5**	**8**	6	**0**	**6**	**34.5**	28.5
Maximum Score	**20**	**15**	**13**	13	**10**	**12**	12	**5.5**	**6**	**67.5**	67.5

(a) MBI's fish sampling site RM "285.8".
(b) Midwest Generation's fish sampling Location 402.
(c) All zones 500m in length unless otherwise noted. River mile designations represent the mid-point of each zone. Bank desigations based on facing downstream. LB=left descending bank. RB=right descending bank.
(d) Midwest Generation's fish sampling Location 405.
(e) Midwest Generation's fish sampling Location 408.

ATTACHMENT 2E

QHEI field data sheets (both Ohio EPA and MBI-modified) from the July 2008 QHEI study

Qualitative Habitat Evaluation Index and Use Assessment Field Sheet

QHEI Score: 67.5

Stream & Location: Des Plaines River - Brandon Tailwater - MBI **RM:** 285.5 **Date:** 07/10/08

Scorers Full Name & Affiliation: Joe Vondruska CA Engineering

River Code: __-__-__ **STORET #:** ____ **Lat./Long.:** (NAD 83 - decimal °) __.____ /8_.____ 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
☐ ☐	BLDR /SLABS [10]	✓		☑ ☐	HARDPAN [4]	✓	✓
☐ ☐	BOULDER [9]	✓		☐ ☐	DETRITUS [3]	✓	
☑ ☐	COBBLE [8]	✓	✓	☐ ☐	MUCK [2]		
☐ ☐	GRAVEL [7]	✓	✓	☐ ☐	SILT [2]	✓	
☐ ☐	SAND [6]	✓		☐ ☐	ARTIFICIAL [0]		
☐ ☐	BEDROCK [5]						

(Score natural substrates; ignore sludge from point-sources)

NUMBER OF BEST TYPES: ☑ 4 or more [2] ☐ 3 or less [0]

Comments (14)

Check ONE (Or 2 & average)

ORIGIN
- ☐ LIMESTONE [1]
- ☑ TILLS [1]
- ☐ WETLANDS [0]
- ☑ HARDPAN [0]
- ☐ SANDSTONE [0]
- ☐ RIP/RAP [0]
- ☐ LACUSTRINE [0]
- ☐ SHALE [-1]
- ☐ COAL FINES [-2]

(0.5)

QUALITY (-1)

SILT
- ☑ HEAVY [-2]
- ☐ MODERATE [-1]
- ☑ NORMAL [0]
- ☐ FREE [1]

EMBEDDEDNESS
- ☐ EXTENSIVE [-2]
- ☑ MODERATE [-1]
- ☐ NORMAL [0]
- ☐ NONE [1]

(-1)

Substrate Maximum 20: 12.5

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.

	UNDERCUT BANKS [1]	1	POOLS > 70cm [2]	1	OXBOWS, BACKWATERS [1]
1	OVERHANGING VEGETATION [1]		ROOTWADS [1]	2	AQUATIC MACROPHYTES [1]
2	SHALLOWS (IN SLOW WATER) [1]	1	BOULDERS [1]	1	LOGS OR WOODY DEBRIS [1]
	ROOTMATS [1]				

AMOUNT Check ONE (Or 2 & average)
- ☐ EXTENSIVE >75% [11]
- ☑ MODERATE 25-75% [7]
- ☑ SPARSE 5-<25% [3]
- ☐ NEARLY ABSENT <5% [1]

Comments (8) (5)

Cover Maximum 20: 13

3] CHANNEL MORPHOLOGY

Check ONE in each category (Or 2 & average)

SINUOSITY	DEVELOPMENT	CHANNELIZATION	STABILITY
☐ HIGH [4]	☐ EXCELLENT [7]	☑ NONE [6]	☑ HIGH [3]
☐ MODERATE [3]	☑ GOOD [5]	☐ RECOVERED [4]	☐ MODERATE [2]
☐ LOW [2]	☐ FAIR [3]	☐ RECOVERING [3]	☐ LOW [1]
☑ NONE [1]	☑ POOR [1]	☐ RECENT OR NO RECOVERY [1]	
(1)	(3)	(6)	(3)

Comments

Channel Maximum 20: 13

4] BANK EROSION AND RIPARIAN ZONE

Check ONE in each category for EACH BANK (Or 2 per bank & average)

River right looking downstream

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

Indicate predominant land use(s) past 100m riparian.

Comments (3) 0.5+2=2.5/2=(1.25) ~~2+1.5=3.5/(1.75)~~ 1+1.5=2.5/2 (1.25)

→ adjacent to RR track

Riparian Maximum 10: 5.5

5] POOL / GLIDE AND RIFFLE / RUN QUALITY

MAXIMUM DEPTH Check ONE (ONLY!)
- ☑ > 1m [6]
- ☐ 0.7-<1m [4]
- ☐ 0.4-<0.7m [2]
- ☐ 0.2-<0.4m [1]
- ☐ < 0.2m [0]

CHANNEL WIDTH Check ONE (Or 2 & average)
- ☑ POOL WIDTH > RIFFLE WIDTH [2]
- ☐ POOL WIDTH = RIFFLE WIDTH [1]
- ☐ POOL WIDTH < RIFFLE WIDTH [0]

CURRENT VELOCITY Check ALL that apply
- ☐ TORRENTIAL [-1]
- ☐ VERY FAST [1]
- ☑ FAST [1]
- ☑ MODERATE [1]
- ☑ SLOW [1]
- ☐ INTERSTITIAL [-1]
- ☐ INTERMITTENT [-2]
- ☑ EDDIES [1]

Indicate for reach - pools and riffles.

Recreation Potential
Primary Contact
Secondary Contact
(circle one and comment on back)

Comments

Pool / Current Maximum 12: 12

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 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]

(1.5)

RIFFLE / RUN EMBEDDEDNESS
- ☐ NONE [2]
- ☐ LOW [1]
- ☑ MODERATE [0]
- ☐ EXTENSIVE [-1]

Comments

Riffle / Run Maximum 8: 5.5

6] GRADIENT (<0.1 ft/mi)

DRAINAGE AREA (>1,500 mi²)

- ☐ VERY LOW - LOW [2-4]
- ☐ MODERATE [6-10]
- ☐ HIGH - VERY HIGH [10-6]

%POOL: 20 %GLIDE: 50

%RUN: 15 %RIFFLE: 15

Gradient Maximum 10: 6

EPA 4520 Proofed KC 7/16/08 06/11/08

OhioEPA

Qualitative Habitat Evaluation Index and Use Assessment Field Sheet

QHEI Score: 56

Stream & Location: Des Plaines River - Brandon Tollwater - EA **RM:** 285.4 **Date:** 07/1 0/ 08

Scorers Full Name & Affiliation: Joe Vondruska - EA Engineering

River Code: ___-___-___ **STORET #:** ______ **Lat./ Long.:** (NAD 83 - decimal °) __.____ /8_.____ Office verified location ☐

1] SUBSTRATE

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

BEST TYPES	POOL	RIFFLE
☐ ☐ BLDR /SLABS [10]	✓	
☐ ☐ BOULDER [9]	✓	
☐ ☐ COBBLE [8]	✓	
☒ ☐ GRAVEL [7]	✓	
☐ ☐ SAND [6]	✓	
☐ ☐ BEDROCK [5]		

OTHER TYPES	POOL	RIFFLE
☒ ☐ HARDPAN [4]	✓	
☐ ☐ DETRITUS [3]	✓	
☐ ☐ MUCK [2]		
☐ ☐ SILT [2]	✓	
☐ ☐ ARTIFICIAL [0]		

(Score natural substrates; ignore sludge from point-sources)

NUMBER OF BEST TYPES: ☒ 4 or more [2] ☐ 3 or less [0]

Comments (13)

Check ONE (*Or 2 & average*)

ORIGIN
- ☐ LIMESTONE [1]
- ☒ TILLS [1]
- ☐ WETLANDS [0]
- ☒ HARDPAN [0]
- ☐ SANDSTONE [0]
- ☐ RIP/RAP [0]
- ☐ LACUSTRINE [0]
- ☐ SHALE [-1]
- ☐ COAL FINES [-2]

(0.5)

QUALITY (-1)

SILT
- ☒ HEAVY [-2]
- ☐ MODERATE [-1]
- ☒ NORMAL [0]
- ☐ FREE [1]

EMBEDDEDNESS
- ☐ EXTENSIVE [-2]
- ☒ MODERATE [-1]
- ☐ NORMAL [0]
- ☐ NONE [1]

(-1)

Substrate 11.5 Maximum 20

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.

__	UNDERCUT BANKS [1]	1	POOLS > 70cm [2]	__	OXBOWS, BACKWATERS [1]
1	OVERHANGING VEGETATION [1]	__	ROOTWADS [1]	2	AQUATIC MACROPHYTES [1]
2	SHALLOWS (IN SLOW WATER) [1]	1	BOULDERS [1]	1	LOGS OR WOODY DEBRIS [1]
__	ROOTMATS [1]				

AMOUNT

Check ONE (*Or 2 & average*)
- ☐ EXTENSIVE >75% [11]
- ☒ MODERATE 25-75% [7]
- ☒ SPARSE 5-<25% [3]
- ☐ NEARLY ABSENT <5% [1]

Comments (7) (5)

Cover 12 Maximum 20

3] CHANNEL MORPHOLOGY

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

SINUOSITY	DEVELOPMENT	CHANNELIZATION	STABILITY
☐ HIGH [4]	☐ EXCELLENT [7]	☒ NONE [6]	☒ HIGH [3]
☐ MODERATE [3]	☐ GOOD [5]	☐ RECOVERED [4]	☐ MODERATE [2]
☐ LOW [2]	☐ FAIR [3]	☐ RECOVERING [3]	☐ LOW [1]
☒ NONE [1]	☒ POOR [1]	☐ RECENT OR NO RECOVERY [1]	

Comments

Channel 11 Maximum 20

4] BANK EROSION AND RIPARIAN ZONE

Check ONE in each category for *EACH BANK* (*Or 2 per bank & average*)

River right looking downstream

L	R	EROSION
☒	☒	NONE / LITTLE [3]
☐	☐	MODERATE [2]
☐	☐	HEAVY / SEVERE [1]

L	R	RIPARIAN WIDTH
☐	☐	WIDE > 50m [4]
☐	☐	MODERATE 10-50m [3]
☐	☒	NARROW 5-10m [2]
☒	☐	VERY NARROW < 5m [1]
☒	☐	NONE [0]

L	R	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]

Indicate predominant land use(s) past 100m riparian.

Comments (3) ↳ adjacent to RR track 0.5+2 = 2.5/2 = (1.25) (1.25)

Riparian 5.5 Maximum 10

5] POOL / GLIDE AND RIFFLE / RUN QUALITY

MAXIMUM DEPTH

Check ONE (*ONLY!*)
- ☒ > 1m [6]
- ☐ 0.7-<1m [4]
- ☐ 0.4-<0.7m [2]
- ☐ 0.2-<0.4m [1]
- ☐ < 0.2m [0]

CHANNEL WIDTH

Check ONE (*Or 2 & average*)
- ☒ POOL WIDTH > RIFFLE WIDTH [2]
- ☒ POOL WIDTH = RIFFLE WIDTH [1]
- ☐ POOL WIDTH < RIFFLE WIDTH [0]

CURRENT VELOCITY

Check ALL that apply
- ☐ TORRENTIAL [-1]
- ☐ VERY FAST [1]
- ☐ FAST [1]
- ☒ MODERATE [1]
- ☒ SLOW [1]
- ☐ INTERSTITIAL [-1]
- ☐ INTERMITTENT [-2]
- ☒ EDDIES [1]

Indicate for reach - pools and riffles.

Recreation Potential
Primary Contact
Secondary Contact
(circle one and comment on back)

Comments

Pool / Current 10 Maximum 12

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 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]

Comments

Riffle / Run 0 Maximum 8

6] GRADIENT

GRADIENT (<0.1 ft/ml)

DRAINAGE AREA (71500 mi²)

- ☐ VERY LOW - LOW [2-4]
- ☐ MODERATE [6-10]
- ☐ HIGH - VERY HIGH [10-6]

%POOL: 20 %GLIDE: 80

%RUN: %RIFFLE:

Gradient 6 Maximum 10

EPA 4520

Proofed KC 7/16/08 06/11/08

OhioEPA

Qualitative Habitat Evaluation Index and Use Assessment Field Sheet

QHEI Score: 47.5

Stream & Location: Des Plaines R. 285.1 LB **RM:** 285.1 **Date:** 07/10/08

Scorers Full Name & Affiliation: Joe Vandyke EA Engineering

River Code: ___-___-___ **STORET #:** ______ **Lat./ Long.:** (NAD 83 - decimal °) 41.4955 /88.1153 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
☐	☐	BLDR /SLABS [10]	✓		☐	☐	HARDPAN [4]		
☐	☐	BOULDER [9]	✓		☐	☐	DETRITUS [3]	✓	
☒	☐	COBBLE [8]	✓		☐	☐	MUCK [2]		
☒	☐	GRAVEL [7]	✓		☐	☐	SILT [2]	✓	
☐	☐	SAND [6]	✓		☐	☐	ARTIFICIAL [0]		
☐	☐	BEDROCK [5]							

(Score natural substrates; ignore sludge from point-sources)

NUMBER OF BEST TYPES: ☒ 4 or more [2] ☐ 3 or less [0]

Comments

17

Check ONE (Or 2 & average)

ORIGIN
- ☐ LIMESTONE [1]
- ☒ TILLS [1]
- ☐ WETLANDS [0]
- ☐ HARDPAN [0]
- ☐ SANDSTONE [0]
- ☐ RIP/RAP [0]
- ☐ LACUSTRINE [0]
- ☐ SHALE [-1]
- ☐ COAL FINES [-2]

1

QUALITY -0.5

SILT
- ☐ HEAVY [-2]
- ☒ MODERATE [-1]
- ☒ NORMAL [0]
- ☐ FREE [1]

EMBEDDEDNESS
- ☐ EXTENSIVE [-2]
- ☒ MODERATE [-1]
- ☒ NORMAL [0]
- ☐ NONE [1]

-1 -0.5

Substrate 17 Maximum 20

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.

___ UNDERCUT BANKS [1]
___ OVERHANGING VEGETATION [1]
___ SHALLOWS (IN SLOW WATER) [1]
___ ROOTMATS [1]
1 POOLS > 70cm [2]
___ ROOTWADS [1]
2 BOULDERS [1]
___ OXBOWS, BACKWATERS [1]
1 AQUATIC MACROPHYTES [1]
___ LOGS OR WOODY DEBRIS [1]

AMOUNT
Check ONE (Or 2 & average)
- ☐ EXTENSIVE >75% [11]
- ☐ MODERATE 25-75% [7]
- ☒ SPARSE 5-<25% [3]
- ☐ NEARLY ABSENT <5% [1]

Comments

4 3

Cover 7 Maximum 20

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]

Comments

Channel 6 Maximum 20

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

River right looking downstream

L	R	EROSION
☒	☐	NONE / LITTLE [3]
☐	☐	MODERATE [2]
☐	☐	HEAVY / SEVERE [1]

L	R	RIPARIAN WIDTH
☐	☐	WIDE > 50m [4]
☐	☐	MODERATE 10-50m [3]
☐	☐	NARROW 5-10m [2]
☒	☐	VERY NARROW < 5m [1]
☒	☐	NONE [0]

L	R	FLOOD PLAIN QUALITY	L	R	
☐	☐	FOREST, SWAMP [3]	☐	☐	CONSERVATION TILLAGE [1]
☐	☐	SHRUB OR OLD FIELD [2]	☒	☐	URBAN OR INDUSTRIAL [0]
☐	☐	RESIDENTIAL, PARK, NEW FIELD [1]	☐	☐	MINING / CONSTRUCTION [0]
☐	☐	FENCED PASTURE [1]			
☐	☐	OPEN PASTURE, ROWCROP [0]			

Indicate predominant land use(s) past 100m riparian.

Comments 3 0.5 0

Riparian 3.5 Maximum 10

5] POOL / GLIDE AND RIFFLE / RUN QUALITY

MAXIMUM DEPTH
Check ONE (ONLY!)
- ☒ > 1m [6]
- ☐ 0.7-<1m [4]
- ☐ 0.4-<0.7m [2]
- ☐ 0.2-<0.4m [1]
- ☐ < 0.2m [0]

CHANNEL WIDTH
Check ONE (Or 2 & average)
- ☐ POOL WIDTH > RIFFLE WIDTH [2]
- ☒ POOL WIDTH = RIFFLE WIDTH [1]
- ☐ POOL WIDTH < RIFFLE WIDTH [0]

CURRENT VELOCITY
Check ALL that apply
- ☐ TORRENTIAL [-1]
- ☐ VERY FAST [1]
- ☐ FAST [1]
- ☐ MODERATE [1]
- ☒ SLOW [1]
- ☐ INTERSTITIAL [-1]
- ☐ INTERMITTENT [-2]
- ☐ EDDIES [1]

Indicate for reach - pools and riffles.

Recreation Potential
Primary Contact
Secondary Contact
(circle one and comment on back)

Comments

Pool / Current 8 Maximum 12

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 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]

Comments

Riffle / Run 0 Maximum 8

6] GRADIENT (<0.1 ft/mi)
DRAINAGE AREA (>1,500 mi²)
- ☐ VERY LOW - LOW [2-4]
- ☐ MODERATE [6-10]
- ☐ HIGH - VERY HIGH [10-6]

%POOL: 100 %GLIDE: ___
%RUN: ___ %RIFFLE: ___

Gradient 6 Maximum 10

EPA 4520 Prepped KC 7/16/08 06/11/08

Qualitative Habitat Evaluation Index and Use Assessment Field Sheet

QHEI Score: 55

Stream & Location: Des Plaines River - 285.0 RB **RM:** 285.0 **Date:** 07/11/08

river stage ~6" higher than 7/10 **Scorers Full Name & Affiliation:** Joe Vondruska EA Engineering

River Code: ___-___-___ **STORET #:** ______ **Lat./Long.:** (NAD 83 - decimal °) 41.4961 / 88.1174 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
☐ ☐	BLDR /SLABS [10]	✓		☐ ☐	HARDPAN [4]		
☐ ☐	BOULDER [9]	✓		☐ ☐	DETRITUS [3]	✓	
☒ ☒	COBBLE [8]	✓		☐ ☐	MUCK [2]		
☐ ☐	GRAVEL [7]	✓		☐ ☐	SILT [2]		
☐ ☐	SAND [6]	✓		☐ ☐	ARTIFICIAL [0]		
☐ ☐	BEDROCK [5]						

(Score natural substrates; ignore sludge from point-sources)

NUMBER OF BEST TYPES: ☒ 4 or more [2] ☐ 3 or less [0]

Comments 16 2

Check ONE (Or 2 & average)

ORIGIN		QUALITY
☐ LIMESTONE [1]		☐ HEAVY [-2]
☒ TILLS [1]	SILT	☒ MODERATE [-1]
☐ WETLANDS [0]		☒ NORMAL [0]
☐ HARDPAN [0]		☐ FREE [1]
☐ SANDSTONE [0]	EMBEDDEDNESS	☐ EXTENSIVE [-2]
☐ RIP/RAP [0]		☒ MODERATE [-1]
☐ LACUSTRINE [0]		☒ NORMAL [0]
☐ SHALE [-1]		☐ NONE [1]
☐ COAL FINES [-2]		

-0.5

-0.5

1 -1

Substrate 18 Maximum 20

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.

___	UNDERCUT BANKS [1]	/	POOLS > 70cm [2]	___	OXBOWS, BACKWATERS [1]
2	OVERHANGING VEGETATION [1]	___	ROOTWADS [1]	/	AQUATIC MACROPHYTES [1]
___	SHALLOWS (IN SLOW WATER) [1]	/	BOULDERS [1]	/	LOGS OR WOODY DEBRIS [1]
___	ROOTMATS [1]				

AMOUNT Check ONE (Or 2 & average)

☐ EXTENSIVE >75% [11]
☐ MODERATE 25-75% [7]
☒ SPARSE 5-<25% [3]
☐ NEARLY ABSENT <5% [1]

Comments 6 3

Cover 9 Maximum 20

3] CHANNEL MORPHOLOGY

Check ONE in each category (Or 2 & average)

SINUOSITY	DEVELOPMENT	CHANNELIZATION	STABILITY
☐ HIGH [4]	☐ EXCELLENT [7]	☐ NONE [6]	☒ HIGH [3]
☐ MODERATE [3]	☐ GOOD [5]	☐ RECOVERED [4]	☐ MODERATE [2]
☐ LOW [2]	☐ FAIR [3]	☒ RECOVERING [3]	☐ LOW [1]
☒ NONE [1]	☒ POOR [1]	☐ RECENT OR NO RECOVERY [1]	

Comments

Channel 8 Maximum 20

4] BANK EROSION AND RIPARIAN ZONE

Check ONE in each category for EACH BANK (Or 2 per bank & average)

River right looking downstream

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

Indicate predominant land use(s) past 100m riparian.

Comments 3 1 adjacent to generating station 0

Riparian 4 Maximum 10

5] POOL / GLIDE AND RIFFLE / RUN QUALITY

MAXIMUM DEPTH Check ONE (ONLY!)	CHANNEL WIDTH Check ONE (Or 2 & average)	CURRENT VELOCITY Check ALL that apply	
☒ > 1m [6]	☐ POOL WIDTH > RIFFLE WIDTH [2]	☐ TORRENTIAL [-1]	☒ SLOW [1]
☐ 0.7-<1m [4]	☒ POOL WIDTH = RIFFLE WIDTH [1]	☐ VERY FAST [1]	☐ INTERSTITIAL [-1]
☐ 0.4-<0.7m [2]	☐ POOL WIDTH < RIFFLE WIDTH [0]	☐ FAST [1]	☐ INTERMITTENT [-2]
☐ 0.2-<0.4m [1]		☒ MODERATE [1]	☒ EDDIES [1]
☐ < 0.2m [0]			

Indicate for reach - pools and riffles.

Recreation Potential
Primary Contact
Secondary Contact
(circle one and comment on back)

Comments

Pool / Current 10 Maximum 12

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

Comments

Riffle / Run 0 Maximum 8

6] GRADIENT

GRADIENT (<0.1 ft/mi)
DRAINAGE AREA (>1,502 mi²)

☐ VERY LOW - LOW [2-4]
☐ MODERATE [6-10]
☐ HIGH - VERY HIGH [10-6]

%POOL: ___ %GLIDE: 100
%RUN: ___ %RIFFLE: ___

Gradient 6 Maximum 10

EPA 4520 proofed KC 7/16/08 06/11/08

Electronic Filing - Received, Clerk's Office, September 8, 2023

OhioEPA

Qualitative Habitat Evaluation Index and Use Assessment Field Sheet

QHEI Score: 40

Stream & Location: Des Plaines 284.82B **RM:** 284.8 **Date:** 07/10/08

Scorers Full Name & Affiliation: Joe Vondruska EA Engineering

River Code: ___-___-___ **STORET #:** ______ **Lat./Long.:** (NAD 83 - decimal °) 41.4928 / 88.1200 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
☐ ☐	BLDR /SLABS [10]			☐ ☐	HARDPAN [4]		
☐ ☐	BOULDER [9]	✓		☐ ☐	DETRITUS [3]	✓	
☐ ☐	COBBLE [8]	✓		☐ ☐	MUCK [2]		
☐ ☐	GRAVEL [7]	✓		☑ ☐	SILT [2]	✓	
☑ ☐	SAND [6]	✓		☐ ☐	ARTIFICIAL [0]		
☐ ☐	BEDROCK [5]						

(Score natural substrates; ignore sludge from point-sources)

NUMBER OF BEST TYPES: ☑ 4 or more [2] ☐ 3 or less [0]

Comments (10)

Check ONE (*Or 2 & average*)

ORIGIN
- ☐ LIMESTONE [1]
- ☑ TILLS [1]
- ☐ WETLANDS [0]
- ☑ HARDPAN [0]
- ☐ SANDSTONE [0]
- ☐ RIP/RAP [0]
- ☐ LACUSTRINE [0]
- ☐ SHALE [-1]
- ☐ COAL FINES [-2]

(0.5)

QUALITY (-1)

SILT
- ☑ HEAVY [-2]
- ☐ MODERATE [-1]
- ☑ NORMAL [0]
- ☐ FREE [1]

EMBEDDEDNESS
- ☑ EXTENSIVE [-2]
- ☐ MODERATE [-1]
- ☑ NORMAL [0]
- ☐ NONE [1]

(-1)

(-2)

Substrate 8.5 Maximum 20

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.

___	UNDERCUT BANKS [1]	1	POOLS > 70cm [2]	___	OXBOWS, BACKWATERS [1]
___	OVERHANGING VEGETATION [1]	___	ROOTWADS [1]	1	AQUATIC MACROPHYTES [1]
___	SHALLOWS (IN SLOW WATER) [1]	1	BOULDERS [1]	1	LOGS OR WOODY DEBRIS [1]
___	ROOTMATS [1]				

Comments (5)

AMOUNT

Check ONE (*Or 2 & average*)
- ☐ EXTENSIVE >75% [11]
- ☐ MODERATE 25-75% [7]
- ☑ SPARSE 5-<25% [3]
- ☐ NEARLY ABSENT <5% [1]

(3)

Cover 8 Maximum 20

3] CHANNEL MORPHOLOGY

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

SINUOSITY	DEVELOPMENT	CHANNELIZATION	STABILITY
☐ HIGH [4]	☐ EXCELLENT [7]	☐ NONE [6]	☑ HIGH [3]
☐ MODERATE [3]	☐ GOOD [5]	☐ RECOVERED [4]	☐ MODERATE [2]
☐ LOW [2]	☐ FAIR [3]	☑ RECOVERING [3]	☑ LOW [1]
☑ NONE [1]	☑ POOR [1]	☑ RECENT OR NO RECOVERY [1]	
(1)	(1)	(2)	(2)

Comments

Channel 6 Maximum 20

4] BANK EROSION AND RIPARIAN ZONE

Check ONE in each category for *EACH BANK* (*Or 2 per bank & average*)

River right looking downstream

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

Indicate predominant land use(s) past 100m riparian.

Comments (3) (0.5) (0)

Riparian 3.5 Maximum 10

5] POOL / GLIDE AND RIFFLE / RUN QUALITY

MAXIMUM DEPTH

Check ONE (*ONLY!*)
- ☑ > 1m [6]
- ☐ 0.7-<1m [4]
- ☐ 0.4-<0.7m [2]
- ☐ 0.2-<0.4m [1]
- ☐ < 0.2m [0]

CHANNEL WIDTH

Check ONE (*Or 2 & average*)
- ☐ POOL WIDTH > RIFFLE WIDTH [2]
- ☑ POOL WIDTH = RIFFLE WIDTH [1]
- ☐ POOL WIDTH < RIFFLE WIDTH [0]

CURRENT VELOCITY

Check ALL that apply
- ☐ TORRENTIAL [-1]
- ☐ VERY FAST [1]
- ☐ FAST [1]
- ☐ MODERATE [1]
- ☑ SLOW [1]
- ☐ INTERSTITIAL [-1]
- ☐ INTERMITTENT [-2]
- ☐ EDDIES [1]

Indicate for reach - pools and riffles.

Recreation Potential
Primary Contact
Secondary Contact
(circle one and comment on back)

Comments

Pool / Current 8 Maximum 12

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

Comments

Riffle / Run 0 Maximum 8

6] GRADIENT (<0.1 ft/mi)

DRAINAGE AREA (>1,502 mi²)

- ☐ VERY LOW - LOW [2-4]
- ☐ MODERATE [6-10]
- ☐ HIGH - VERY HIGH [10-6]

%POOL: 100 %GLIDE:
%RUN: %RIFFLE:

Gradient 6 Maximum 10

EPA 4520

Proof KC 7/16/08

06/11/08

OhioEPA

Qualitative Habitat Evaluation Index and Use Assessment Field Sheet

QHEI Score: 51

Stream & Location: Des Plaines River – 284.7RB **RM:** 284.7 **Date:** 07/11/08

Scorers Full Name & Affiliation: Joe Vondruska CH Engineering

River Code: ___-___-___ **STORET #:** ______ **Lat./ Long.:** (NAD 83 - decimal °) 41.4932 / 88.1219 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
☐	☐	BLDR /SLABS [10]			☐	☐	HARDPAN [4]		
☐	☐	BOULDER [9]	✓		☐	☐	DETRITUS [3]	✓	
☑	☑	COBBLE [8]	✓		☐	☐	MUCK [2]		
☐	☐	GRAVEL [7]	✓		☐	☐	SILT [2]	✓	
☐	☐	SAND [6]	✓		☐	☐	ARTIFICIAL [0]		
☐	☐	BEDROCK [5]							

(Score natural substrates; ignore sludge from point-sources)

NUMBER OF BEST TYPES: ☑ 4 or more [2] ☐ 3 or less [0]

Comments 16 2

Check ONE (Or 2 & average)

ORIGIN
- ☐ LIMESTONE [1]
- ☑ TILLS [1]
- ☐ WETLANDS [0]
- ☐ HARDPAN [0]
- ☐ SANDSTONE [0]
- ☐ RIP/RAP [0]
- ☐ LACUSTRINE [0]
- ☐ SHALE [-1]
- ☐ COAL FINES [-2]

(1)

QUALITY -1

SILT
- ☑ HEAVY [-2]
- ☐ MODERATE [-1]
- ☑ NORMAL [0]
- ☐ FREE [1]

EMBEDDEDNESS
- ☑ EXTENSIVE [-2]
- ☐ MODERATE [-1]
- ☑ NORMAL [0]
- ☐ NONE [1]

-1 (-2)

Substrate 17 Maximum 20

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.

- __ UNDERCUT BANKS [1]
- 1 OVERHANGING VEGETATION [1]
- __ SHALLOWS (IN SLOW WATER) [1]
- __ ROOTMATS [1]
- 1 POOLS > 70cm [2]
- __ ROOTWADS [1]
- 1 BOULDERS [1]
- __ OXBOWS, BACKWATERS [1]
- 1 AQUATIC MACROPHYTES [1]
- __ LOGS OR WOODY DEBRIS [1]

AMOUNT

Check ONE (Or 2 & average)
- ☐ EXTENSIVE >75% [11]
- ☐ MODERATE 25-75% [7]
- ☑ SPARSE 5-<25% [3]
- ☑ NEARLY ABSENT <5% [1]

Comments 5 2

Cover Maximum 20 7

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]

Comments 1 1 2 3

Channel Maximum 20 7

4] BANK EROSION AND RIPARIAN ZONE

Check ONE in each category for EACH BANK (Or 2 per bank & average)

River right looking downstream

EROSION (L R)
- ☐ ☑ NONE / LITTLE [3]
- ☐ ☐ MODERATE [2]
- ☐ ☐ HEAVY / SEVERE [1]

RIPARIAN WIDTH (L R)
- ☐ ☐ WIDE > 50m [4]
- ☐ ☐ MODERATE 10-50m [3]
- ☐ ☐ NARROW 5-10m [2]
- ☐ ☑ VERY NARROW < 5m [1]
- ☐ ☐ NONE [0]

FLOOD PLAIN QUALITY (L R)
- ☐ ☐ 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]

Indicate predominant land use(s) past 100m riparian.

Comments 3 1 adjacent to generating station + helper towers 0

Riparian Maximum 10 4

5] POOL / GLIDE AND RIFFLE / RUN QUALITY

MAXIMUM DEPTH

Check ONE (ONLY!)
- ☑ > 1m [6]
- ☐ 0.7-<1m [4]
- ☐ 0.4-<0.7m [2]
- ☐ 0.2-<0.4m [1]
- ☐ < 0.2m [0]

CHANNEL WIDTH

Check ONE (Or 2 & average)
- ☐ POOL WIDTH > RIFFLE WIDTH [2]
- ☑ POOL WIDTH = RIFFLE WIDTH [1]
- ☐ POOL WIDTH < RIFFLE WIDTH [0]

CURRENT VELOCITY

Check ALL that apply
- ☐ TORRENTIAL [-1]
- ☐ VERY FAST [1]
- ☐ FAST [1]
- ☑ MODERATE [1]
- ☑ SLOW [1]
- ☐ INTERSTITIAL [-1]
- ☐ INTERMITTENT [-2]
- ☑ EDDIES [1]

Indicate for reach - pools and riffles.

Recreation Potential
Primary Contact
Secondary Contact
(circle one and comment on back)

Comments

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).

☑ NO RIFFLE [metric=0]

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]

Comments

Riffle / Run Maximum 8 0

6] GRADIENT (<0.1 ft/mi)

DRAINAGE AREA (>4,500 mi^2)

- ☐ VERY LOW - LOW [2-4]
- ☐ MODERATE [6-10]
- ☐ HIGH - VERY HIGH [10-6]

%POOL: [illegible] %GLIDE: 100

%RUN: %RIFFLE:

Gradient Maximum 10 6

EPA 4520 Proofed KC 7/16/08 06/11/08

Qualitative Habitat Evaluation Index and Use Assessment Field Sheet

QHEI Score: 43.5

Stream & Location: Des Plaines River - 284.5 EB **RM:** 284.5 **Date:** 07/10/08

Scorers Full Name & Affiliation: Joe Vondruska EA Engineering

River Code: __-__-__ **STORET #:** ____ **Lat./ Long.:** (NAD 83 - decimal °) 41.4899 / 88.1236 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
☐☐	BLDR /SLABS [10]	✓		☐☐	HARDPAN [4]		
☐☐	BOULDER [9]	✓		☐☐	DETRITUS [3]	✓	
☑☐	COBBLE [8]	✓		☐☐	MUCK [2]		
☐☐	GRAVEL [7]	✓		☑☐	SILT [2]	✓	
☐☐	SAND [6]	✓		☐☐	ARTIFICIAL [0]		
☐☐	BEDROCK [5]						

(Score natural substrates; ignore sludge from point-sources)

NUMBER OF BEST TYPES: ☑ 4 or more [2] ☐ 3 or less [0]

Comments (12)

Check ONE (Or 2 & average)

ORIGIN
- ☐ LIMESTONE [1]
- ☑ TILLS [1]
- ☐ WETLANDS [0]
- ☑ HARDPAN [0]
- ☐ SANDSTONE [0]
- ☐ RIP/RAP [0]
- ☐ LACUSTRINE [0]
- ☐ SHALE [-1]
- ☐ COAL FINES [-2]

(0.5)

QUALITY (1)

SILT
- ☑ HEAVY [-2]
- ☐ MODERATE [-1]
- ☑ NORMAL [0]
- ☐ FREE [1]

EMBEDDEDNESS
- ☑ EXTENSIVE [-2]
- ☐ MODERATE [-1]
- ☑ NORMAL [0]
- ☐ NONE [1]

(-2) (-1)

Substrate 10.5 Maximum 20

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.

__ UNDERCUT BANKS [1]
__ OVERHANGING VEGETATION [1]
__ SHALLOWS (IN SLOW WATER) [1]
__ ROOTMATS [1]
1 POOLS > 70cm [2]
__ ROOTWADS [1]
1 BOULDERS [1]
2 OXBOWS, BACKWATERS [1]
1 AQUATIC MACROPHYTES [1]
1 LOGS OR WOODY DEBRIS [1]

AMOUNT Check ONE (Or 2 & average)
- ☐ EXTENSIVE >75% [11]
- ☐ MODERATE 25-75% [7]
- ☑ SPARSE 5-<25% [3]
- ☐ NEARLY ABSENT <5% [1]

Comments small 2 nice/BW areas (6) (3)

Cover 9 Maximum 20

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]

Comments (1) (1) (2) (2)

Channel 6 Maximum 20

4] BANK EROSION AND RIPARIAN ZONE

Check ONE in each category for EACH BANK (Or 2 per bank & average)

River right looking downstream

EROSION (L R)
- ☑☐ NONE / LITTLE [3]
- ☐☐ MODERATE [2]
- ☐☐ HEAVY / SEVERE [1]

RIPARIAN WIDTH (L R)
- ☐☐ WIDE > 50m [4]
- ☐☐ MODERATE 10-50m [3]
- ☑☐ NARROW 5-10m [2]
- ☐☐ VERY NARROW < 5m [1]
- ☑☐ NONE [0]

FLOOD PLAIN QUALITY (L R)
- ☐☐ 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]

Indicate predominant land use(s) past 100m riparian.

Comments (3) (1) (0)

Riparian 4 Maximum 10

5] POOL / GLIDE AND RIFFLE / RUN QUALITY

MAXIMUM DEPTH Check ONE (ONLY!)
- ☑ > 1m [6]
- ☐ 0.7-<1m [4]
- ☐ 0.4-<0.7m [2]
- ☐ 0.2-<0.4m [1]
- ☐ < 0.2m [0]

CHANNEL WIDTH Check ONE (Or 2 & average)
- ☐ POOL WIDTH > RIFFLE WIDTH [2]
- ☑ POOL WIDTH = RIFFLE WIDTH [1]
- ☐ POOL WIDTH < RIFFLE WIDTH [0]

CURRENT VELOCITY Check ALL that apply
- ☐ TORRENTIAL [-1]
- ☐ VERY FAST [1]
- ☐ FAST [1]
- ☐ MODERATE [1]
- ☑ SLOW [1]
- ☐ INTERSTITIAL [-1]
- ☐ INTERMITTENT [-2]
- ☐ EDDIES [1]

Indicate for reach - pools and riffles.

Recreation Potential
Primary Contact
Secondary Contact
(circle one and comment on back)

Comments

Pool / Current 8 Maximum 12

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 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]

Comments

Riffle / Run 0 Maximum 8

6] GRADIENT (<0.1 ft/mi)

DRAINAGE AREA (~~[illegible]~~ mi2) 71,502

- ☐ VERY LOW - LOW [2-4]
- ☐ MODERATE [6-10]
- ☐ HIGH - VERY HIGH [10-6]

%POOL: 100 %GLIDE: __ %RUN: __ %RIFFLE: __

Gradient 6 Maximum 10

Proofed KC 7/16/08

Qualitative Habitat Evaluation Index and Use Assessment Field Sheet

QHEI Score: 55

Stream & Location: Des Plaines River - 284.4 RB **RM:** 284.4 **Date:** 07/11/08

Scorers Full Name & Affiliation: Joe Vondruska EA Engineering

River Code: __ - __ - __ **STORET #:** __ **Lat./ Long.:** (NAD 83 - decimal °) 41.4899 /88.1256 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
☐	☐	BLDR /SLABS [10]	✓		☐	☐	HARDPAN [4]		
☐	☐	BOULDER [9]	✓		☐	☐	DETRITUS [3]	✓	
☑	☑	COBBLE [8]	✓		☐	☐	MUCK [2]		
☐	☐	GRAVEL [7]	✓		☐	☐	SILT [2]	✓	
☐	☐	SAND [6]	✓		☐	☐	ARTIFICIAL [0]		
☐	☐	BEDROCK [5]							

(Score natural substrates; ignore sludge from point-sources)

NUMBER OF BEST TYPES: ☑ 4 or more [2] ☐ 3 or less [0]

Check ONE (Or 2 & average)

ORIGIN
- ☑ LIMESTONE [1]
- ☑ TILLS [1]
- ☐ WETLANDS [0]
- ☐ HARDPAN [0]
- ☐ SANDSTONE [0]
- ☐ RIP/RAP [0]
- ☐ LACUSTRINE [0]
- ☐ SHALE [-1]
- ☐ COAL FINES [-2]

QUALITY 0.5

SILT
- ☐ HEAVY [-2]
- ☑ MODERATE [-1]
- ☑ NORMAL [0]
- ☐ FREE [1]

EMBEDDEDNESS
- ☐ EXTENSIVE [-2]
- ☑ MODERATE [-1]
- ☑ NORMAL [0]
- ☐ NONE [1]

0.5

Comments small limestone bluff 16 2 1 (-1)

Substrate 18 Maximum 20

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.

	UNDERCUT BANKS [1]	1	POOLS > 70cm [2]		OXBOWS, BACKWATERS [1]
1	OVERHANGING VEGETATION [1]		ROOTWADS [1]	1	AQUATIC MACROPHYTES [1]
1	SHALLOWS (IN SLOW WATER) [1]	1	BOULDERS [1]		LOGS OR WOODY DEBRIS [1]
	ROOTMATS [1]				

AMOUNT Check ONE (Or 2 & average)
- ☐ EXTENSIVE >75% [11]
- ☐ MODERATE 25-75% [7]
- ☑ SPARSE 5-<25% [3]
- ☑ NEARLY ABSENT <5% [1]

Comments from influence of discharge flow 6 2

Cover 8 Maximum 20

3] CHANNEL MORPHOLOGY

Check ONE in each category (Or 2 & average)

SINUOSITY	DEVELOPMENT	CHANNELIZATION	STABILITY
☐ HIGH [4]	☐ EXCELLENT [7]	☐ NONE [6]	☑ HIGH [3]
☐ MODERATE [3]	☐ GOOD [5]	☐ RECOVERED [4]	☐ MODERATE [2]
☐ LOW [2]	☐ FAIR [3]	☑ RECOVERING [3]	☐ LOW [1]
☑ NONE [1]	☑ POOR [1]	☑ RECENT OR NO RECOVERY [1]	

Comments 2

Channel 7 Maximum 20

4] BANK EROSION AND RIPARIAN ZONE

Check ONE in each category for EACH BANK (Or 2 per bank & average)

River right looking downstream

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

Indicate predominant land use(s) past 100m riparian.

Comments 3 2 adjacent to generating station + holpeer towers 0 a coal pile

Riparian 5 Maximum 10

5] POOL / GLIDE AND RIFFLE / RUN QUALITY

MAXIMUM DEPTH Check ONE (ONLY!)
- ☑ > 1m [6]
- ☐ 0.7-<1m [4]
- ☐ 0.4-<0.7m [2]
- ☐ 0.2-<0.4m [1]
- ☐ < 0.2m [0]

CHANNEL WIDTH Check ONE (Or 2 & average)
- ☐ POOL WIDTH > RIFFLE WIDTH [2]
- ☑ POOL WIDTH = RIFFLE WIDTH [1]
- ☐ POOL WIDTH < RIFFLE WIDTH [0]

CURRENT VELOCITY Check ALL that apply

☐ TORRENTIAL [-1]	☑ SLOW [1]
☐ VERY FAST [1]	☐ INTERSTITIAL [-1]
☑ FAST [1]	☐ INTERMITTENT [-2]
☑ MODERATE [1]	☑ EDDIES [1]

Indicate for reach - pools and riffles.

Recreation Potential
Primary Contact
Secondary Contact
(circle one and comment on back)

Comments influence of discharge flow

Pool / Current 11 Maximum 12

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 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]

Comments

Riffle / Run 0 Maximum 8

6] GRADIENT (<0.1 ft/mi)

DRAINAGE AREA (~~[illegible]~~ mi²) 71,502

- ☐ VERY LOW - LOW [2-4]
- ☐ MODERATE [6-10]
- ☐ HIGH - VERY HIGH [10-6]

%POOL: 50 %GLIDE: 50
%RUN: %RIFFLE:

Gradient 6 Maximum 10

EPA 4520 Proofed KC 7/16/08 06/11/08

OhioEPA

Qualitative Habitat Evaluation Index and Use Assessment Field Sheet

QHEI Score: 43

Stream & Location: Des Plaines River 284.2 LB **RM:** 284.2 **Date:** 07/10/08

Scorers Full Name & Affiliation: Joe Vondruska EA Engineering

River Code: __-___-___ **STORET #:** ______ **Lat./ Long.:** (NAD 83 - decimal °) 41.4866 /88.1273 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
☐ ☐ BLDR /SLABS [10]			☐ ☐ HARDPAN [4]		
☐ ☐ BOULDER [9]	✓		☐ ☐ DETRITUS [3]	✓	
☐ ☐ COBBLE [8]	✓		☐ ☐ MUCK [2]		
☐ ☐ GRAVEL [7]	✓		☑ ☐ SILT [2]	✓	
☑ ☐ SAND [6]	✓		☐ ☐ ARTIFICIAL [0]		
☐ ☐ BEDROCK [5]					

(Score natural substrates; ignore sludge from point-sources)

NUMBER OF BEST TYPES: ☑ 4 or more [2] ☑ 3 or less [0]

Comments (10)

Check ONE (*Or 2 & average*)

ORIGIN
- ☐ LIMESTONE [1]
- ☑ TILLS [1]
- ☐ WETLANDS [0]
- ☑ HARDPAN [0]
- ☐ SANDSTONE [0]
- ☐ RIP/RAP [0]
- ☐ LACUSTRINE [0]
- ☐ SHALE [-1]
- ☐ COAL FINES [-2]

(0.5)

QUALITY

SILT
- ☑ HEAVY [-2]
- ☐ MODERATE [-1]
- ☐ NORMAL [0]
- ☐ FREE [1]

EMBEDDEDNESS
- ☑ EXTENSIVE [-2]
- ☐ MODERATE [-1]
- ☐ NORMAL [0]
- ☐ NONE [1]

(-4)

Substrate 6.5 Maximum 20

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.

__	UNDERCUT BANKS [1]	1	POOLS > 70cm [2]	__	OXBOWS, BACKWATERS [1]
__	OVERHANGING VEGETATION [1]	__	ROOTWADS [1]	2	AQUATIC MACROPHYTES [1]
__	SHALLOWS (IN SLOW WATER) [1]	__	BOULDERS [1]	1	LOGS OR WOODY DEBRIS [1]
__	ROOTMATS [1]				

AMOUNT
Check ONE (*Or 2 & average*)
- ☐ EXTENSIVE >75% [11]
- ☑ MODERATE 25-75% [7]
- ☐ SPARSE 5-<25% [3]
- ☐ NEARLY ABSENT <5% [1]

Comments (4) (7)

Cover Maximum 20: 11

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

SINUOSITY	DEVELOPMENT	CHANNELIZATION	STABILITY
☐ HIGH [4]	☐ EXCELLENT [7]	☐ NONE [6]	☐ HIGH [3]
☐ MODERATE [3]	☐ GOOD [5]	☐ RECOVERED [4]	☐ MODERATE [2]
☐ LOW [2]	☐ FAIR [3]	☑ RECOVERING [3]	☑ LOW [1]
☑ NONE [1]	☑ POOR [1]	☐ RECENT OR NO RECOVERY [1]	

Comments

Channel Maximum 20: 6

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

River right looking downstream

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

Indicate predominant land use(s) past 100m riparian.

Comments (3) (1.5) ↳ adjacent to RR track (1)

Riparian Maximum 10: 5.5

5] POOL / GLIDE AND RIFFLE / RUN QUALITY

MAXIMUM DEPTH
Check ONE (*ONLY!*)
- ☑ > 1m [6]
- ☐ 0.7-<1m [4]
- ☐ 0.4-<0.7m [2]
- ☐ 0.2-<0.4m [1]
- ☐ < 0.2m [0]

CHANNEL WIDTH
Check ONE (*Or 2 & average*)
- ☐ POOL WIDTH > RIFFLE WIDTH [2]
- ☑ POOL WIDTH = RIFFLE WIDTH [1]
- ☐ POOL WIDTH < RIFFLE WIDTH [0]

CURRENT VELOCITY
Check ALL that apply
- ☐ TORRENTIAL [-1]
- ☐ VERY FAST [1]
- ☐ FAST [1]
- ☐ MODERATE [1]
- ☑ SLOW [1]
- ☐ INTERSTITIAL [-1]
- ☐ INTERMITTENT [-2]
- ☐ EDDIES [1]

Indicate for reach - pools and riffles.

Recreation Potential
Primary Contact
Secondary Contact
(circle one and comment on back)

Comments

Pool / Current Maximum 12: 8

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 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]

Comments

Riffle / Run Maximum 8: 0

6] GRADIENT (<0.1 ft/mi) ☐ VERY LOW - LOW [2-4]
DRAINAGE AREA (~~2240~~ mi²) ☐ MODERATE [6-10] ☐ HIGH - VERY HIGH [10-6]

%POOL: 100 %GLIDE:
%RUN: %RIFFLE:

Gradient Maximum 10: 6

EPA 4520 >1,502 Proofed KC 7/16/08 06/11/08

OhioEPA

Qualitative Habitat Evaluation Index and Use Assessment Field Sheet

QHEI Score: 56.5

Stream & Location: Des Moines River - 284.1RB **RM:** 284.1 **Date:** 07/11/08

Scorers Full Name & Affiliation: Joe Vondruska" EA Engineering

River Code: ___-___-___ **STORET #:** ______ **Lat./ Long.:** (NAD 83 - decimal °) 41.48655/88.1298 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
☐ ☐	BLDR /SLABS [10]	✓		☐ ☐	HARDPAN [4]		
☐ ☐	BOULDER [9]	✓		☐ ☐	DETRITUS [3]	✓	
☑ ☑	COBBLE [8]	✓		☐ ☐	MUCK [2]		
☐ ☐	GRAVEL [7]	✓		☐ ☐	SILT [2]	✓	
☐ ☐	SAND [6]	✓		☐ ☐	ARTIFICIAL [0]		
☐ ☐	BEDROCK [5]						

(Score natural substrates; ignore sludge from point-sources)

NUMBER OF BEST TYPES: ☑ 4 or more [2] ☐ 3 or less [0]

Check ONE (*Or 2 & average*)

ORIGIN
- ☐ LIMESTONE [1]
- ☑ TILLS [1]
- ☐ WETLANDS [0]
- ☐ HARDPAN [0]
- ☐ SANDSTONE [0]
- ☐ RIP/RAP [0]
- ☐ LACUSTRINE [0]
- ☐ SHALE [-1]
- ☐ COAL FINES [-2]

QUALITY -1

SILT
- ☑ HEAVY [-2]
- ☐ MODERATE [-1]
- ☑ NORMAL [0]
- ☐ FREE [1]

EMBEDDEDNESS
- ☑ EXTENSIVE [-2]
- ☐ MODERATE [-1]
- ☑ NORMAL [0]
- ☐ NONE [1]

-1

Comments 16 2 1 -2

Substrate 17 Maximum 20

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.

___ UNDERCUT BANKS [1]
2 OVERHANGING VEGETATION [1]
___ SHALLOWS (IN SLOW WATER) [1]
___ ROOTMATS [1]
1 POOLS > 70cm [2]
___ ROOTWADS [1]
2 BOULDERS [1]
___ OXBOWS, BACKWATERS [1]
1 AQUATIC MACROPHYTES [1]
1 LOGS OR WOODY DEBRIS [1]

AMOUNT
Check ONE (*Or 2 & average*)
- ☐ EXTENSIVE >75% [11]
- ☐ MODERATE 25-75% [7]
- ☑ SPARSE 5-<25% [3]
- ☐ NEARLY ABSENT <5% [1]

Comments 6 3

Cover 9 Maximum 20

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]

Comments

Channel 8 Maximum 20

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

River right looking downstream

EROSION (L R)
- ☐ ☑ NONE / LITTLE [3]
- ☐ ☐ MODERATE [2]
- ☐ ☐ HEAVY / SEVERE [1]

RIPARIAN WIDTH (L R)
- ☐ ☑ WIDE > 50m [4]
- ☐ ☐ MODERATE 10-50m [3]
- ☐ ☐ NARROW 5-10m [2]
- ☐ ☐ VERY NARROW < 5m [1]
- ☐ ☐ NONE [0]

FLOOD PLAIN QUALITY (L R)
- ☐ ☑ FOREST, SWAMP [3]
- ☐ ☐ SHRUB OR OLD FIELD [2]
- ☐ ☐ RESIDENTIAL, PARK, NEW FIELD [1]
- ☐ ☐ FENCED PASTURE [1]
- ☐ ☐ OPEN PASTURE, ROWCROP [0]

(L R)
- ☐ ☐ CONSERVATION TILLAGE [1]
- ☐ ☑ URBAN OR INDUSTRIAL [0]
- ☐ ☐ MINING / CONSTRUCTION [0]

Indicate predominant land use(s) past 100m riparian.

Comments 3 4 between generating station + Caterpillar 1.5

Riparian 8.5 Maximum 10

5] POOL / GLIDE AND RIFFLE / RUN QUALITY

MAXIMUM DEPTH
Check ONE (*ONLY!*)
- ☑ > 1m [6]
- ☐ 0.7-<1m [4]
- ☐ 0.4-<0.7m [2]
- ☐ 0.2-<0.4m [1]
- ☐ < 0.2m [0]

CHANNEL WIDTH
Check ONE (*Or 2 & average*)
- ☐ POOL WIDTH > RIFFLE WIDTH [2]
- ☑ POOL WIDTH = RIFFLE WIDTH [1]
- ☐ POOL WIDTH < RIFFLE WIDTH [0]

CURRENT VELOCITY
Check ALL that apply
- ☐ TORRENTIAL [-1]
- ☐ VERY FAST [1]
- ☐ FAST [1]
- ☐ MODERATE [1]
- ☑ SLOW [1]
- ☐ INTERSTITIAL [-1]
- ☐ INTERMITTENT [-2]
- ☐ EDDIES [1]

Indicate for reach - pools and riffles.

Recreation Potential
Primary Contact
Secondary Contact
(circle one and comment on back)

Comments

Pool / Current 8 Maximum 12

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 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]

Comments

Riffle / Run 0 Maximum 8

6] GRADIENT (20.1 ft/mi)
DRAINAGE AREA (~~>2,240~~ mi²)
- ☐ VERY LOW - LOW [2-4]
- ☐ MODERATE [6-10]
- ☐ HIGH - VERY HIGH [10-6]

%POOL: 100 %GLIDE:
%RUN: %RIFFLE:

Gradient 6 Maximum 10

EPA 4520 >1,502 Proofed KC 7/16/08 06/11/08

OhioEPA

Qualitative Habitat Evaluation Index and Use Assessment Field Sheet

QHEI Score: 40

Stream & Location: Des Plaines River - 283.9 LB **RM:** 283.9 **Date:** 07/10/08

Scorers Full Name & Affiliation: Joe Vondruska EA Engineering

River Code: ___-___-___ **STORET #:** 414874 **Lat./Long.:** (NAD 83 - decimal °) 41.4834 /88.1312 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
☐ ☐ BLDR /SLABS [10]			☐ ☐ HARDPAN [4]	✓	
☐ ☐ BOULDER [9]			☐ ☐ DETRITUS [3]	✓	
☐ ☐ COBBLE [8]	✓		☐ ☐ MUCK [2]		
☑ ☐ GRAVEL [7]	✓		☑ ☐ SILT [2]	✓	
☐ ☐ SAND [6]	✓		☐ ☐ ARTIFICIAL [0]		
☐ ☐ BEDROCK [5]					

(Score natural substrates; ignore sludge from point-sources)

NUMBER OF BEST TYPES: ☐ 4 or more [2] ☑ 3 or less [0]

Comments (9)

Check ONE (Or 2 & average)

ORIGIN
- ☐ LIMESTONE [1]
- ☑ TILLS [1]
- ☐ WETLANDS [0]
- ☑ HARDPAN [0]
- ☐ SANDSTONE [0]
- ☐ RIP/RAP [0]
- ☐ LACUSTRINE [0]
- ☐ SHALE [-1]
- ☐ COAL FINES [-2]

(0.5)

QUALITY (-1)

SILT
- ☑ HEAVY [-2]
- ☐ MODERATE [-1]
- ☑ NORMAL [0]
- ☐ FREE [1]

EMBEDDEDNESS
- ☑ EXTENSIVE [-2]
- ☐ MODERATE [-1]
- ☑ NORMAL [0]
- ☐ NONE [1]

(-1) (-2)

Substrate 7.5 Maximum 20

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.

___ UNDERCUT BANKS [1]
___ OVERHANGING VEGETATION [1]
___ SHALLOWS (IN SLOW WATER) [1]
___ ROOTMATS [1]
1 POOLS > 70cm [2]
___ ROOTWADS [1]
___ BOULDERS [1]
___ OXBOWS, BACKWATERS [1]
2 AQUATIC MACROPHYTES [1]
1 LOGS OR WOODY DEBRIS [1]

AMOUNT
Check ONE (Or 2 & average)
- ☐ EXTENSIVE >75% [11]
- ☑ MODERATE 25-75% [7]
- ☑ SPARSE 5-<25% [3]
- ☐ NEARLY ABSENT <5% [1]

Comments (4) (5)

Cover Maximum 20 9

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

SINUOSITY	DEVELOPMENT	CHANNELIZATION	STABILITY
☐ HIGH [4]	☐ EXCELLENT [7]	☐ NONE [6]	☑ HIGH [3]
☐ MODERATE [3]	☐ GOOD [5]	☐ RECOVERED [4]	☐ MODERATE [2]
☐ LOW [2]	☐ FAIR [3]	☐ RECOVERING [3]	☑ LOW [1]
☑ NONE [1]	☑ POOR [1]	☑ RECENT OR NO RECOVERY [1]	

Comments (2)

Channel Maximum 20 5

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

River right looking downstream

EROSION (L R)
- ☑ ☐ NONE / LITTLE [3]
- ☐ ☐ MODERATE [2]
- ☐ ☐ HEAVY / SEVERE [1]

RIPARIAN WIDTH (L R)
- ☐ ☐ WIDE > 50m [4]
- ☐ ☐ MODERATE 10-50m [3]
- ☐ ☐ NARROW 5-10m [2]
- ☐ ☐ VERY NARROW < 5m [1]
- ☑ ☐ NONE [0]

FLOOD PLAIN QUALITY (L R)
- ☑ ☐ 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]

Indicate predominant land use(s) past 100m riparian.

Comments (3) (0) ↳ adjacent to RR track (1.5)

Riparian Maximum 10 4.5

5] POOL / GLIDE AND RIFFLE / RUN QUALITY

MAXIMUM DEPTH
Check ONE (ONLY!)
- ☑ > 1m [6]
- ☐ 0.7-<1m [4]
- ☐ 0.4-<0.7m [2]
- ☐ 0.2-<0.4m [1]
- ☐ < 0.2m [0]

CHANNEL WIDTH
Check ONE (Or 2 & average)
- ☐ POOL WIDTH > RIFFLE WIDTH [2]
- ☑ POOL WIDTH = RIFFLE WIDTH [1]
- ☐ POOL WIDTH < RIFFLE WIDTH [0]

CURRENT VELOCITY
Check ALL that apply
- ☐ TORRENTIAL [-1]
- ☐ VERY FAST [1]
- ☐ FAST [1]
- ☐ MODERATE [1]
- ☑ SLOW [1]
- ☐ INTERSTITIAL [-1]
- ☐ INTERMITTENT [-2]
- ☐ EDDIES [1]

Indicate for reach - pools and riffles.

Recreation Potential
Primary Contact
Secondary Contact
(circle one and comment on back)

Comments

Pool / Current Maximum 12 8

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 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]

Comments

Riffle / Run Maximum 8 0

6] GRADIENT (<0.1 ft/mi)
DRAINAGE AREA (~~2240~~ mi²) 71,502

- ☐ VERY LOW - LOW [2-4]
- ☐ MODERATE [6-10]
- ☐ HIGH - VERY HIGH [10-6]

%POOL: 100 %GLIDE: ___
%RUN: ___ %RIFFLE: ___

Gradient Maximum 10 6

EPA 4520 06/11/08

Proofed KC 7/16/08

OhioEPA

Qualitative Habitat Evaluation Index and Use Assessment Field Sheet

QHEI Score: 36.5

Stream & Location: Des Plaines River - 283.8 RB **RM:** 283.8 **Date:** 07/11/08

Scorers Full Name & Affiliation: Joe Vondruska EA Engineering

River Code: ___-___-___ **STORET #:** ______ **Lat./Long.:** (NAD 83 - decimal °) 41.4840 / 88.1346 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
☐ ☐ BLDR /SLABS [10]			☐ ☐ HARDPAN [4]		
☐ ☐ BOULDER [9]			☐ ☐ DETRITUS [3]	✓	
☐ ☐ COBBLE [8]			☐ ☐ MUCK [2]		
☐ ☐ GRAVEL [7]			☒ ☒ SILT [2]	✓	
☐ ☐ SAND [6]	✓		☐ ☐ ARTIFICIAL [0]		
☐ ☐ BEDROCK [5]					

(Score natural substrates; ignore sludge from point-sources)

NUMBER OF BEST TYPES: ☐ 4 or more [2] ☒ 3 or less [0]

Check ONE (Or 2 & average)

ORIGIN
- ☐ LIMESTONE [1]
- ☐ TILLS [1]
- ☐ WETLANDS [0]
- ☒ HARDPAN [0]
- ☒ SANDSTONE [0]
- ☐ RIP/RAP [0]
- ☐ LACUSTRINE [0]
- ☐ SHALE [-1]
- ☐ COAL FINES [-2]

QUALITY

SILT
- ☒ HEAVY [-2]
- ☐ MODERATE [-1]
- ☐ NORMAL [0]
- ☐ FREE [1]

EMBEDDEDNESS
- ☒ EXTENSIVE [-2]
- ☐ MODERATE [-1]
- ☐ NORMAL [0]
- ☐ NONE [1]

Comments 4 0 0 -4

Substrate 0 Maximum 20

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.

- ___ UNDERCUT BANKS [1]
- 1 OVERHANGING VEGETATION [1]
- ___ SHALLOWS (IN SLOW WATER) [1]
- ___ ROOTMATS [1]
- 1✓ POOLS > 70cm [2]
- ___ ROOTWADS [1]
- ___ BOULDERS [1]
- ___ OXBOWS, BACKWATERS [1]
- 1✓ AQUATIC MACROPHYTES [1]
- 1 LOGS OR WOODY DEBRIS [1]

AMOUNT Check ONE (Or 2 & average)
- ☐ EXTENSIVE >75% [11]
- ☒ MODERATE 25-75% [7]
- ☒ SPARSE 5-<25% [3]
- ☐ NEARLY ABSENT <5% [1]

Comments 5 5

Cover 10 Maximum 20

3] CHANNEL MORPHOLOGY

Check ONE in each category (Or 2 & average)

SINUOSITY	DEVELOPMENT	CHANNELIZATION	STABILITY
☐ HIGH [4]	☐ EXCELLENT [7]	☐ NONE [6]	☐ HIGH [3]
☐ MODERATE [3]	☐ GOOD [5]	☐ RECOVERED [4]	☐ MODERATE [2]
☐ LOW [2]	☐ FAIR [3]	☒ RECOVERING [3]	☒ LOW [1]
☒ NONE [1]	☒ POOR [1]	☒ RECENT OR NO RECOVERY [1]	

Comments 2 ↳ recent (2007) canopy removal

Channel 5 Maximum 20

4] BANK EROSION AND RIPARIAN ZONE

Check ONE in each category for EACH BANK (Or 2 per bank & average)

River right looking downstream

EROSION (L R)
- ☐ ☒ NONE / LITTLE [3]
- ☐ ☐ MODERATE [2]
- ☐ ☐ HEAVY / SEVERE [1]

RIPARIAN WIDTH (L R)
- ☐ ☐ WIDE > 50m [4]
- ☐ ☒ MODERATE 10-50m [3]
- ☐ ☐ NARROW 5-10m [2]
- ☐ ☐ VERY NARROW < 5m [1]
- ☐ ☐ NONE [0]

FLOOD PLAIN QUALITY (L R)
- ☐ ☒ 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]

Indicate predominant land use(s) past 100m riparian.

Comments 3 3 adjacent to Caterpillar 1.5

Riparian 7.5 Maximum 10

5] POOL / GLIDE AND RIFFLE / RUN QUALITY

MAXIMUM DEPTH Check ONE (ONLY!)
- ☒ > 1m [6]
- ☐ 0.7-<1m [4]
- ☐ 0.4-<0.7m [2]
- ☐ 0.2-<0.4m [1]
- ☐ < 0.2m [0]

CHANNEL WIDTH Check ONE (Or 2 & average)
- ☐ POOL WIDTH > RIFFLE WIDTH [2]
- ☒ POOL WIDTH = RIFFLE WIDTH [1]
- ☐ POOL WIDTH < RIFFLE WIDTH [0]

CURRENT VELOCITY Check ALL that apply
- ☐ TORRENTIAL [-1]
- ☐ VERY FAST [1]
- ☐ FAST [1]
- ☐ MODERATE [1]
- ☒ SLOW [1]
- ☐ INTERSTITIAL [-1]
- ☐ INTERMITTENT [-2]
- ☐ EDDIES [1]

Indicate for reach - pools and riffles.

Recreation Potential
Primary Contact
Secondary Contact
(circle one and comment on back)

Comments

Pool / Current 8 Maximum 12

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 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]

Comments

Riffle / Run 0 Maximum 8

6] GRADIENT (<0.1 ft/mi)

DRAINAGE AREA (~~2,240~~ mi²) >1,502

- ☐ VERY LOW - LOW [2-4]
- ☐ MODERATE [6-10]
- ☐ HIGH - VERY HIGH [10-6]

%POOL: 100 %GLIDE: ___
%RUN: ___ %RIFFLE: ___

Gradient 6 Maximum 10

Proofed KC 7/16/08

OhioEPA

Qualitative Habitat Evaluation Index and Use Assessment Field Sheet

QHEI Score: 46

Stream & Location: Des Plaines River 283.6LB **RM:** 283.6 **Date:** 07/10/08

Scorers Full Name & Affiliation: Joe Vondruska EA Engineering

River Code: ___-___-___ **STORET #:** ______ **Lat./Long.:** (NAD 83 - decimal °) 41.4806 / 88.1358 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
☐ ☐	BLDR /SLABS [10]			☐ ☐	HARDPAN [4]		
☐ ☐	BOULDER [9]			☐ ☐	DETRITUS [3]	-	
☐ ☐	COBBLE [8]	✓		☐ ☐	MUCK [2]		
☒ ☒	GRAVEL [7]	✓		☐ ☐	SILT [2]	✓	
☐ ☐	SAND [6]	✓		☐ ☐	ARTIFICIAL [0]		
☐ ☐	BEDROCK [5]						

(Score natural substrates; ignore sludge from point-sources)

NUMBER OF BEST TYPES: ☐ 4 or more [2] ☒ 3 or less [0]

Comments (14)

Check ONE (Or 2 & average)

ORIGIN
- ☐ LIMESTONE [1]
- ☒ TILLS [1]
- ☐ WETLANDS [0]
- ☐ HARDPAN [0]
- ☐ SANDSTONE [0]
- ☐ RIP/RAP [0]
- ☐ LACUSTRINE [0]
- ☐ SHALE [-1]
- ☐ COAL FINES [-2]

(1)

QUALITY 0.5

SILT
- ☐ HEAVY [-2]
- ☒ MODERATE [-1]
- ☒ NORMAL [0]
- ☐ FREE [1]

EMBEDDEDNESS
- ☐ EXTENSIVE [-2]
- ☒ MODERATE [-1]
- ☒ NORMAL [0]
- ☐ NONE [1]

(-1) (-0.5)

Substrate 14 Maximum 20

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.

___ UNDERCUT BANKS [1]
___ OVERHANGING VEGETATION [1]
___ SHALLOWS (IN SLOW WATER) [1]
___ ROOTMATS [1]
1 POOLS > 70cm [2]
___ ROOTWADS [1]
___ BOULDERS [1]
___ OXBOWS, BACKWATERS [1]
1 AQUATIC MACROPHYTES [1]
1 LOGS OR WOODY DEBRIS [1]

AMOUNT
Check ONE (Or 2 & average)
- ☐ EXTENSIVE >75% [11]
- ☐ MODERATE 25-75% [7]
- ☒ SPARSE 5-<25% [3]
- ☒ NEARLY ABSENT <5% [1]

Comments (4) (2)

Cover 6 Maximum 20

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]

Comments

Channel 6 Maximum 20

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

River right looking downstream

EROSION (L R)
- ☒ ☐ NONE / LITTLE [3]
- ☐ ☐ MODERATE [2]
- ☐ ☐ HEAVY / SEVERE [1]

RIPARIAN WIDTH (L R)
- ☐ ☐ WIDE > 50m [4]
- ☐ ☐ MODERATE 10-50m [3]
- ☐ ☐ NARROW 5-10m [2]
- ☒ ☐ VERY NARROW < 5m [1]
- ☒ ☐ NONE [0]

FLOOD PLAIN QUALITY (L R)
- ☒ ☐ 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]

Indicate predominant land use(s) past 100m riparian.

Comments (3) (0.5) adjacent to RR track (2.5)

Riparian 6 Maximum 10

5] POOL / GLIDE AND RIFFLE / RUN QUALITY

MAXIMUM DEPTH
Check ONE (ONLY!)
- ☒ > 1m [6]
- ☐ 0.7-<1m [4]
- ☐ 0.4-<0.7m [2]
- ☐ 0.2-<0.4m [1]
- ☐ < 0.2m [0]

CHANNEL WIDTH
Check ONE (Or 2 & average)
- ☐ POOL WIDTH > RIFFLE WIDTH [2]
- ☒ POOL WIDTH = RIFFLE WIDTH [1]
- ☐ POOL WIDTH < RIFFLE WIDTH [0]

CURRENT VELOCITY
Check ALL that apply
- ☐ TORRENTIAL [-1]
- ☐ VERY FAST [1]
- ☐ FAST [1]
- ☐ MODERATE [1]
- ☒ SLOW [1]
- ☐ INTERSTITIAL [-1]
- ☐ INTERMITTENT [-2]
- ☐ EDDIES [1]

Indicate for reach - pools and riffles.

Recreation Potential
Primary Contact
Secondary Contact
(circle one and comment on back)

Comments

Pool / Current 8 Maximum 12

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 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]

Comments

Riffle / Run 0 Maximum 8

6] GRADIENT (<0.1 ft/mi)
DRAINAGE AREA (~~2240~~ mi²) 71,502
- ☐ VERY LOW - LOW [2-4]
- ☐ MODERATE [6-10]
- ☐ HIGH - VERY HIGH [10-6]

%POOL: 100 %GLIDE:
%RUN: ~~0~~ %RIFFLE:

Gradient 6 Maximum 10

EPA 4520 Proofed KC 7/16/08 06/11/08

OhioEPA

Qualitative Habitat Evaluation Index and Use Assessment Field Sheet

QHEI Score: 40.5

Stream & Location: Des Plaines River - 283.5 RB **RM:** 283.5 **Date:** 07/11/08

Scorers Full Name & Affiliation: Joe Vondruska EA Engineering

River Code: ___-___-___ **STORET #:** ______ **Lat./ Long.:** (NAD 83 - decimal °) 41.4812/88.1392 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
☐ ☐	BLDR /SLABS [10]			☐ ☐	HARDPAN [4]		
☐ ☐	BOULDER [9]			☐ ☐	DETRITUS [3]	✓	
☐ ☐	COBBLE [8]	✓		☐ ☐	MUCK [2]		
☐ ☐	GRAVEL [7]	✓		☑ ☑	SILT [2]	✓	
☐ ☐	SAND [6]	✓		☐ ☐	ARTIFICIAL [0]		
☐ ☐	BEDROCK [5]						

(Score natural substrates; ignore sludge from point-sources)

NUMBER OF BEST TYPES: ☐ 4 or more [2] ☑ 3 or less [0]

Check ONE (*Or 2 & average*)

ORIGIN
☐ LIMESTONE [1]
☐ TILLS [1]
☐ WETLANDS [0]
☑ HARDPAN [0]
☑ SANDSTONE [0]
☐ RIP/RAP [0]
☐ LACUSTRINE [0]
☐ SHALE [-1]
☐ COAL FINES [-2]

QUALITY -1

SILT	☑ HEAVY [-2]
	☐ MODERATE [-1]
	☑ NORMAL [0]
	☐ FREE [1]
EMBEDDEDNESS	☑ EXTENSIVE [-2]
	☐ MODERATE [-1]
	☑ NORMAL [0]
	☐ NONE [1]

-1

Comments

4 0 0 -2

Substrate 2 Maximum 20

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.

___	UNDERCUT BANKS [1]	1 ✓	POOLS > 70cm [2]	___	OXBOWS, BACKWATERS [1]
1 ✓	OVERHANGING VEGETATION [1]	___	ROOTWADS [1]	2 ✓	AQUATIC MACROPHYTES [1]
___	SHALLOWS (IN SLOW WATER) [1]	___	BOULDERS [1]	1 ✓	LOGS OR WOODY DEBRIS [1]
___	ROOTMATS [1]				

AMOUNT

Check ONE (*Or 2 & average*)

☐ EXTENSIVE >75% [11]
☑ MODERATE 25-75% [7]
☐ SPARSE 5-<25% [3]
☐ NEARLY ABSENT <5% [1]

Comments

5 7

Cover Maximum 20 12

3] CHANNEL MORPHOLOGY

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

SINUOSITY	DEVELOPMENT	CHANNELIZATION	STABILITY
☐ HIGH [4]	☐ EXCELLENT [7]	☐ NONE [6]	☐ HIGH [3]
☐ MODERATE [3]	☐ GOOD [5]	☐ RECOVERED [4]	☐ MODERATE [2]
☐ LOW [2]	☐ FAIR [3]	☑ RECOVERING [3]	☑ LOW [1]
☑ NONE [1]	☑ POOR [1]	☐ RECENT OR NO RECOVERY [1]	

Comments

Channel Maximum 20 6

4] BANK EROSION AND RIPARIAN ZONE

Check **ONE** in each category for *EACH BANK* (*Or 2 per bank & average*)

River right looking downstream

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

Indicate predominant land use(s) past 100m riparian.

Comments 3 2 adjacent to Caterpillar + Empress Casino 1.5

Riparian Maximum 10 6.5

5] POOL / GLIDE AND RIFFLE / RUN QUALITY

MAXIMUM DEPTH Check ONE (*ONLY!*)	CHANNEL WIDTH Check ONE (*Or 2 & average*)	CURRENT VELOCITY Check ALL that apply	
☑ > 1m [6]	☐ POOL WIDTH > RIFFLE WIDTH [2]	☐ TORRENTIAL [-1]	☑ SLOW [1]
☐ 0.7-<1m [4]	☑ POOL WIDTH = RIFFLE WIDTH [1]	☐ VERY FAST [1]	☐ INTERSTITIAL [-1]
☐ 0.4-<0.7m [2]	☐ POOL WIDTH < RIFFLE WIDTH [0]	☐ FAST [1]	☐ INTERMITTENT [-2]
☐ 0.2-<0.4m [1]		☐ MODERATE [1]	☐ EDDIES [1]
☐ < 0.2m [0]			

Indicate for reach - pools and riffles.

Recreation Potential
Primary Contact
Secondary Contact
(circle one and comment on back)

Comments

Pool / Current Maximum 12 8

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

Comments

Riffle / Run Maximum 8 0

6] GRADIENT

GRADIENT (<0.1 ft/mi)
DRAINAGE AREA (~~[illegible]~~ mi²)
>1,502

☐ VERY LOW - LOW [2-4]
☐ MODERATE [6-10]
☐ HIGH - VERY HIGH [10-6]

%POOL: 100 %GLIDE:
%RUN: %RIFFLE:

Gradient Maximum 10 6

EPA 4520 06/11/08

Proofed KC 7/16/08

OhioEPA

Qualitative Habitat Evaluation Index and Use Assessment Field Sheet

QHEI Score: 46.5

Stream & Location: Des Plaines River 283.3 LB **RM:** 283.3 **Date:** 07/10/08

Scorers Full Name & Affiliation: Joe Vondruska EA Engineering

River Code: ___-___-___ **STORET #:** ______ **Lat./Long.: (NAD 83 - decimal °)** 41.4776 / 88.1404 **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
☐ ☐ BLDR /SLABS [10]			☐ ☐ HARDPAN [4]		
☐ ☐ BOULDER [9]	✓		☐ ☐ DETRITUS [3]		
☑ ☐ COBBLE [8]	✓		☐ ☐ MUCK [2]		
☑ ☐ GRAVEL [7]	✓		☐ ☐ SILT [2]		
☐ ☐ SAND [6]			☐ ☐ ARTIFICIAL [0]		
☐ ☐ BEDROCK [5]					

(Score natural substrates; ignore sludge from point-sources)

NUMBER OF BEST TYPES: ☐ 4 or more [2] ☑ 3 or less [0] (15)

Comments

Check ONE (Or 2 & average)

ORIGIN
- ☐ LIMESTONE [1]
- ☑ TILLS [1]
- ☐ WETLANDS [0]
- ☐ HARDPAN [0]
- ☐ SANDSTONE [0]
- ☐ RIP/RAP [0]
- ☐ LACUSTRINE [0]
- ☐ SHALE [-1]
- ☐ COAL FINES [-2]

(1)

QUALITY (0.5)

SILT
- ☐ HEAVY [-2]
- ☐ MODERATE [-1]
- ☑ NORMAL [0]
- ☑ FREE [1]

EMBEDDEDNESS
- ☐ EXTENSIVE [-2]
- ☐ MODERATE [-1]
- ☑ NORMAL [0]
- ☑ NONE [1]

(0.5)

(1)

Substrate 17 Maximum 20

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.

__	UNDERCUT BANKS [1]	1	POOLS > 70cm [2]	__	OXBOWS, BACKWATERS [1]
__	OVERHANGING VEGETATION [1]	__	ROOTWADS [1]	1	AQUATIC MACROPHYTES [1]
__	SHALLOWS (IN SLOW WATER) [1]	1	BOULDERS [1]	__	LOGS OR WOODY DEBRIS [1]
__	ROOTMATS [1]				

(4)

AMOUNT

Check ONE (Or 2 & average)
- ☐ EXTENSIVE >75% [11]
- ☐ MODERATE 25-75% [7]
- ☐ SPARSE 5-<25% [3]
- ☑ NEARLY ABSENT <5% [1]

(1)

Comments

Cover 5 Maximum 20

3] CHANNEL MORPHOLOGY

Check ONE in each category (Or 2 & average)

SINUOSITY	DEVELOPMENT	CHANNELIZATION	STABILITY
☐ HIGH [4]	☐ EXCELLENT [7]	☐ NONE [6]	☑ HIGH [3]
☐ MODERATE [3]	☐ GOOD [5]	☐ RECOVERED [4]	☐ MODERATE [2]
☐ LOW [2]	☐ FAIR [3]	☐ RECOVERING [3]	☐ LOW [1]
☑ NONE [1]	☑ POOR [1]	☑ RECENT OR NO RECOVERY [1]	

Comments

Channel 6 Maximum 20

4] BANK EROSION AND RIPARIAN ZONE

Check ONE in each category for EACH BANK (Or 2 per bank & average)

River right looking downstream

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

Indicate predominant land use(s) past 100m riparian.

Comments (3) (0) → bank adjacent to RL track (1.5)

Riparian 4.5 Maximum 10

5] POOL / GLIDE AND RIFFLE / RUN QUALITY

MAXIMUM DEPTH

Check ONE (ONLY!)
- ☑ > 1m [6]
- ☐ 0.7-<1m [4]
- ☐ 0.4-<0.7m [2]
- ☐ 0.2-<0.4m [1]
- ☐ < 0.2m [0]

CHANNEL WIDTH

Check ONE (Or 2 & average)
- ☐ POOL WIDTH > RIFFLE WIDTH [2]
- ☑ POOL WIDTH = RIFFLE WIDTH [1]
- ☐ POOL WIDTH < RIFFLE WIDTH [0]

CURRENT VELOCITY

Check ALL that apply

☐ TORRENTIAL [-1]	☑ SLOW [1]
☐ VERY FAST [1]	☐ INTERSTITIAL [-1]
☐ FAST [1]	☐ INTERMITTENT [-2]
☐ MODERATE [1]	☐ EDDIES [1]

Indicate for reach - pools and riffles.

Recreation Potential
Primary Contact
Secondary Contact
(circle one and comment on back)

Comments

Pool / Current 8 Maximum 12

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 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]

Comments

Riffle / Run 0 Maximum 8

6] GRADIENT

GRADIENT (<0.1 ft/mi)
DRAINAGE AREA (52240 mi²)

- ☐ VERY LOW - LOW [2-4]
- ☐ MODERATE [6-10]
- ☐ HIGH - VERY HIGH [10-6]

%POOL: 100 **%GLIDE:**
%RUN: **%RIFFLE:**

Gradient 6 Maximum 10

EPA 4520 74,502 Proofed KC 7/16/08 06/11/08

OhioEPA

Qualitative Habitat Evaluation Index and Use Assessment Field Sheet

QHEI Score: 45.5

Stream & Location: Des Plaines River ~ 283.2 RB **RM:** 283.2 **Date:** 07/11/08
Adjacent to Empress Casino **Scorers Full Name & Affiliation:** Joe Vavrusha - EA Engineering
River Code: __-__-__ **STORET #:** ______ **Lat./Long.:** (NAD 83 - decimal °) 41.4790 / 88.1442 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
☐☐ BLDR/SLABS [10]			☐☐ HARDPAN [4]		
☐☐ BOULDER [9]	✓		☐☐ DETRITUS [3]	✓	
☐☐ COBBLE [8]	✓		☐☐ MUCK [2]		
☐☐ GRAVEL [7]	✓		☒☒ SILT [2]	✓	
☐☐ SAND [6]	✓		☐☐ ARTIFICIAL [0]		
☐☐ BEDROCK [5]					

(Score natural substrates; ignore sludge from point-sources)

NUMBER OF BEST TYPES: ☒ 4 or more [2] ☐ 3 or less [0]

Check ONE (*Or 2 & average*)

ORIGIN
☐ LIMESTONE [1]
☐ TILLS [1]
☐ WETLANDS [0]
☒ HARDPAN [0]
☒ SANDSTONE [0]
☐ RIP/RAP [0]
☐ LACUSTRINE [0]
☐ SHALE [-1]
☐ COAL FINES [-2]

QUALITY -1

SILT
☒ HEAVY [-2]
☐ MODERATE [-1]
☒ NORMAL [0]
☐ FREE [1]

EMBEDDEDNESS
☒ EXTENSIVE [-2]
☐ MODERATE [-1]
☒ NORMAL [0]
☐ NONE [1]
-1

Comments (4) (2) (0) (-2)
Bould/cobble associated with bank modifications @ casino

Substrate Maximum 20: 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.

__ UNDERCUT BANKS [1]
__ OVERHANGING VEGETATION [1]
__ SHALLOWS (IN SLOW WATER) [1]
__ ROOTMATS [1]
2 POOLS > 70cm [2]
__ ROOTWADS [1]
3 BOULDERS [1]
1 OXBOWS, BACKWATERS [1]
2 AQUATIC MACROPHYTES [1]
1 LOGS OR WOODY DEBRIS [1]

AMOUNT
Check ONE (*Or 2 & average*)
☒ EXTENSIVE >75% [11]
☒ MODERATE 25-75% [7]
☐ SPARSE 5-<25% [3]
☐ NEARLY ABSENT <5% [1]

Comments
↳ associated with bank modifications (6) (9)
↳ casino formed deep near shore pool adjacent to boulder cobble

Cover Maximum 20: 15

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]

Comments 1 1 2 2

Channel Maximum 20: 6

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

EROSION (L R)
☐☒ NONE / LITTLE [3]
☐☐ MODERATE [2]
☐☐ HEAVY / SEVERE [1]

RIPARIAN WIDTH (L R)
☐☒ WIDE > 50m [4]
☐☐ MODERATE 10-50m [3]
☐☐ NARROW 5-10m [2]
☐☐ VERY NARROW < 5m [1]
☐☒ NONE [0]

FLOOD PLAIN QUALITY (L R)
☐☒ 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]

Indicate predominant land use(s) past 100m riparian.

Comments 3 2 1.5

Riparian Maximum 10: 6.5

5] POOL / GLIDE AND RIFFLE / RUN QUALITY

MAXIMUM DEPTH
Check ONE (*ONLY!*)
☒ > 1m [6]
☐ 0.7-<1m [4]
☐ 0.4-<0.7m [2]
☐ 0.2-<0.4m [1]
☐ < 0.2m [0]

CHANNEL WIDTH
Check ONE (*Or 2 & average*)
☐ POOL WIDTH > RIFFLE WIDTH [2]
☒ POOL WIDTH = RIFFLE WIDTH [1]
☐ POOL WIDTH < RIFFLE WIDTH [0]

CURRENT VELOCITY
Check ALL that apply
☐ TORRENTIAL [-1]
☐ VERY FAST [1]
☐ FAST [1]
☐ MODERATE [1]
☒ SLOW [1]
☐ INTERSTITIAL [-1]
☐ INTERMITTENT [-2]
☐ EDDIES [1]
Indicate for reach - pools and riffles.

Recreation Potential
Primary Contact
Secondary Contact
(circle one and comment on back)

Comments

Pool / Current Maximum 12: 8

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 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]

Comments

Riffle / Run Maximum 8: 0

6] GRADIENT (<0.1 ft/mi)
DRAINAGE AREA (~~22,140~~ mi²) >1,502

☐ VERY LOW - LOW [2-4]
☐ MODERATE [6-10]
☐ HIGH - VERY HIGH [10-6]

%POOL: 100 **%GLIDE:**
%RUN: **%RIFFLE:**

Gradient Maximum 10: 6

EPA 4520 Proofed KC 7/16/08 06/11/08

OhioEPA

Qualitative Habitat Evaluation Index and Use Assessment Field Sheet

QHEI Score: 49.5

Stream & Location: Des Plaines 283.0 LB **RM:** 283.0 **Date:** 07/10/08

Scorers Full Name & Affiliation: Joe Vavrusko EA Engineering

River Code: ___-____-___ **STORET #:** ______ **Lat./Long.:** (NAD 83 - decimal °) 41.4749 /88.1450 Office verified location ☐

1] SUBSTRATE

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

	BEST TYPES	POOL	RIFFLE
☐ ☐	BLDR /SLABS [10]		
☐ ☐	BOULDER [9]	✓	
☑ ☐	COBBLE [8]	✓	
☑ ☐	GRAVEL [7]	✓	
☐ ☐	SAND [6]	✓	
☐ ☐	BEDROCK [5]		

	OTHER TYPES	POOL	RIFFLE
☐ ☐	HARDPAN [4]		
☐ ☐	DETRITUS [3]	✓	
☐ ☐	MUCK [2]		
☐ ☐	SILT [2]	✓	
☐ ☐	ARTIFICIAL [0]		

(Score natural substrates; ignore sludge from point-sources)

NUMBER OF BEST TYPES: ☑ 4 or more [2]
☐ 3 or less [0]

Comments (17)

Check ONE (Or 2 & average)

ORIGIN
- ☐ LIMESTONE [1]
- ☑ TILLS [1]
- ☐ WETLANDS [0]
- ☐ HARDPAN [0]
- ☐ SANDSTONE [0]
- ☐ RIP/RAP [0]
- ☐ LACUSTRINE [0]
- ☐ SHALE [-1]
- ☐ COAL FINES [-2]

(1)

QUALITY (-1)

SILT
- ☑ HEAVY [-2]
- ☐ MODERATE [-1]
- ☐ NORMAL [0]
- ☑ FREE [1]

EMBEDDEDNESS
- ☑ EXTENSIVE [-2]
- ☐ MODERATE [-1]
- ☐ NORMAL [0]
- ☑ NONE [1]

(-1) -2

Substrate 16 Maximum 20

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.

	UNDERCUT BANKS [1]	1	POOLS > 70cm [2]		OXBOWS, BACKWATERS [1]
1	OVERHANGING VEGETATION [1]		ROOTWADS [1]	2	AQUATIC MACROPHYTES [1]
	SHALLOWS (IN SLOW WATER) [1]	1	BOULDERS [1]	1	LOGS OR WOODY DEBRIS [1]
	ROOTMATS [1]				

Comments (6)

AMOUNT
Check ONE (Or 2 & average)
- ☐ EXTENSIVE >75% [11]
- ☑ MODERATE 25-75% [7]
- ☐ SPARSE 5-<25% [3]
- ☑ NEARLY ABSENT <5% [1]

(4)

Cover 10 Maximum 20

3] CHANNEL MORPHOLOGY

Check ONE in each category (Or 2 & average)

SINUOSITY	DEVELOPMENT	CHANNELIZATION	STABILITY
☐ HIGH [4]	☐ EXCELLENT [7]	☐ NONE [6]	☑ HIGH [3]
☐ MODERATE [3]	☐ GOOD [5]	☐ RECOVERED [4]	☐ MODERATE [2]
☐ LOW [2]	☐ FAIR [3]	☐ RECOVERING [3]	☑ LOW [1]
☑ NONE [1]	☑ POOR [1]	☑ RECENT OR NO RECOVERY [1]	(2)

Comments

Channel 5 Maximum 20

4] BANK EROSION AND RIPARIAN ZONE

Check ONE in each category for EACH BANK (Or 2 per bank & average)

River right looking downstream

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

Indicate predominant land use(s) past 100m riparian.

Comments (3) (0) ↳ adjacent to RR track (1.5)

Riparian 4.5 Maximum 10

5] POOL / GLIDE AND RIFFLE / RUN QUALITY

MAXIMUM DEPTH
Check ONE (ONLY!)
- ☑ > 1m [6]
- ☐ 0.7-<1m [4]
- ☐ 0.4-<0.7m [2]
- ☐ 0.2-<0.4m [1]
- ☐ < 0.2m [0]

CHANNEL WIDTH
Check ONE (Or 2 & average)
- ☐ POOL WIDTH > RIFFLE WIDTH [2]
- ☑ POOL WIDTH = RIFFLE WIDTH [1]
- ☐ POOL WIDTH < RIFFLE WIDTH [0]

CURRENT VELOCITY
Check ALL that apply

☐ TORRENTIAL [-1]	☑ SLOW [1]
☐ VERY FAST [1]	☐ INTERSTITIAL [-1]
☐ FAST [1]	☐ INTERMITTENT [-2]
☐ MODERATE [1]	☐ EDDIES [1]

Indicate for reach - pools and riffles.

Recreation Potential
Primary Contact
Secondary Contact
(circle one and comment on back)

Comments

Pool / Current 8 Maximum 12

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

Comments

Riffle / Run 0 Maximum 8

6] GRADIENT (<0.1 ft/mi)

DRAINAGE AREA (~~22~~240 mi^2)

- ☐ VERY LOW - LOW [2-4]
- ☐ MODERATE [6-10]
- ☐ HIGH - VERY HIGH [10-6]

%POOL: 100 %GLIDE:
%RUN: %RIFFLE:

Gradient 6 Maximum 10

EPA 4520 >1,502 Proofed KC 7/16/08 06/11/08

OhioEPA

Qualitative Habitat Evaluation Index and Use Assessment Field Sheet

QHEI Score: 40.5

Stream & Location: Des Plaines River — 282.9 RB **RM:** 282.9 **Date:** 07/11/08

Scorers Full Name & Affiliation: Joe Vondruska EA Engineering

River Code: __ - __ - __ **STORET #:** ______ **Lat./Long.:** (NAD 83 - decimal °) 41.476 / 88.1489 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
☐ ☐ BLDR /SLABS [10]			☐ ☐ HARDPAN [4]		
☐ ☐ BOULDER [9]			☐ ☐ DETRITUS [3]	✓	
☐ ☐ COBBLE [8]			☐ ☐ MUCK [2]		
☐ ☐ GRAVEL [7]			☑ ☑ SILT [2]	✓	
☐ ☐ SAND [6]	✓		☐ ☐ ARTIFICIAL [0]		
☐ ☐ BEDROCK [5]					

(Score natural substrates; ignore sludge from point-sources)

NUMBER OF BEST TYPES: ☐ 4 or more [2] ☑ 3 or less [0] (0)

Comments (4)

bank predominated by limestone outcrops

Check ONE (Or 2 & average)

ORIGIN		QUALITY
☐ LIMESTONE [1]		☑ HEAVY [-2]
☐ TILLS [1]	SILT	☐ MODERATE [-1]
☐ WETLANDS [0]		☐ NORMAL [0]
☑ HARDPAN [0]		☐ FREE [1]
☑ SANDSTONE [0]	EMBEDDEDNESS	☑ EXTENSIVE [-2]
☐ RIP/RAP [0]		☐ MODERATE [-1]
☐ LACUSTRINE [0]		☐ NORMAL [0]
☐ SHALE [-1]		☐ NONE [1]
☐ COAL FINES [-2]		
(0)		(-4)

Substrate Maximum 20: 0

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.

___	UNDERCUT BANKS [1]	1 ✓	POOLS > 70cm [2]	___	OXBOWS, BACKWATERS [1]
___	OVERHANGING VEGETATION [1]	___	ROOTWADS [1]	2 ✓	AQUATIC MACROPHYTES [1]
___	SHALLOWS (IN SLOW WATER) [1]	___	BOULDERS [1]	1 ✓	LOGS OR WOODY DEBRIS [1]
___	ROOTMATS [1]				

AMOUNT
Check ONE (Or 2 & average)
☐ EXTENSIVE >75% [11]
☑ MODERATE 25-75% [7]
☐ SPARSE 5-<25% [3]
☐ NEARLY ABSENT <5% [1]

Comments (4) (7)

Cover Maximum 20: 11

3] CHANNEL MORPHOLOGY

Check ONE in each category (Or 2 & average)

SINUOSITY	DEVELOPMENT	CHANNELIZATION	STABILITY
☐ HIGH [4]	☐ EXCELLENT [7]	☐ NONE [6]	☐ HIGH [3]
☐ MODERATE [3]	☐ GOOD [5]	☐ RECOVERED [4]	☐ MODERATE [2]
☐ LOW [2]	☐ FAIR [3]	☑ RECOVERING [3]	☑ LOW [1]
☑ NONE [1]	☑ POOR [1]	☐ RECENT OR NO RECOVERY [1]	

Comments

Channel Maximum 20: 6

4] BANK EROSION AND RIPARIAN ZONE

Check **ONE** in each category for **EACH BANK** (Or 2 per bank & average)

River right looking downstream

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

Indicate predominant land use(s) past 100m riparian.

Comments (2.5) (4) (3)

Riparian Maximum 10: 9.5

5] POOL / GLIDE AND RIFFLE / RUN QUALITY

MAXIMUM DEPTH Check ONE (ONLY!)	CHANNEL WIDTH Check ONE (Or 2 & average)	CURRENT VELOCITY Check ALL that apply	
☑ > 1m [6]	☐ POOL WIDTH > RIFFLE WIDTH [2]	☐ TORRENTIAL [-1]	☑ SLOW [1]
☐ 0.7-<1m [4]	☑ POOL WIDTH = RIFFLE WIDTH [1]	☐ VERY FAST [1]	☐ INTERSTITIAL [-1]
☐ 0.4-<0.7m [2]	☐ POOL WIDTH < RIFFLE WIDTH [0]	☐ FAST [1]	☐ INTERMITTENT [-2]
☐ 0.2-<0.4m [1]		☐ MODERATE [1]	☐ EDDIES [1]
☐ < 0.2m [0]			

Indicate for reach - pools and riffles.

Recreation Potential
Primary Contact
Secondary Contact
(circle one and comment on back)

Comments

Pool / Current Maximum 12: 8

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

Comments

Riffle / Run Maximum 8: 0

6] GRADIENT (<0.1 ft/mi)

DRAINAGE AREA (~~224~~0 mi^2)

☐ VERY LOW - LOW [2-4]
☐ MODERATE [6-10]
☐ HIGH - VERY HIGH [10-6]

%POOL: ( ) %GLIDE: ( )
%RUN: ( ) %RIFFLE: ( )

Gradient Maximum 10: 6

EPA 4520 71,502 Proofed KC 7/16/08 06/11/08

OhioEPA

Qualitative Habitat Evaluation Index and Use Assessment Field Sheet

QHEI Score: 43.5

Stream & Location: Des Plaines River 282.6 LB **RM:** 282.6 **Date:** 07/10/08

Scorers Full Name & Affiliation: Joe Vondruska EA Engineering

River Code: __-__-__ **STORET #:** ______ **Lat./Long.:** (NAD 83 - decimal °) 41.4723/88.1498 Office verified location ☐

1] SUBSTRATE

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

	BEST TYPES	POOL	RIFFLE
☐ ☐	BLDR /SLABS [10]		
☐ ☐	BOULDER [9]		
☐ ☐	COBBLE [8]		
☐ ☐	GRAVEL [7]	✓	
☑ ☐	SAND [6]	✓	
☐ ☐	BEDROCK [5]		

	OTHER TYPES	POOL	RIFFLE
☐ ☐	HARDPAN [4]		
☐ ☐	DETRITUS [3]		
☐ ☐	MUCK [2]		
☑ ☑	SILT [2]	✓	
☐ ☐	ARTIFICIAL [0]		

(Score natural substrates; ignore sludge from point-sources)

NUMBER OF BEST TYPES: ☐ 4 or more [2] ☑ 3 or less [0]

Comments (4) (0)

Check ONE (Or 2 & average)

ORIGIN
- ☐ LIMESTONE [1]
- ☑ TILLS [1]
- ☐ WETLANDS [0]
- ☑ HARDPAN [0]
- ☐ SANDSTONE [0]
- ☐ RIP/RAP [0]
- ☐ LACUSTRINE [0]
- ☐ SHALE [-1]
- ☐ COAL FINES [-2]

(0.5)

QUALITY

SILT
- ☑ HEAVY [-2]
- ☐ MODERATE [-1]
- ☐ NORMAL [0]
- ☐ FREE [1]

EMBEDDEDNESS
- ☑ EXTENSIVE [-2]
- ☐ MODERATE [-1]
- ☐ NORMAL [0]
- ☐ NONE [1]

(-4)

Substrate 0.5 Maximum 20

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.

___ UNDERCUT BANKS [1]
___ OVERHANGING VEGETATION [1]
___ SHALLOWS (IN SLOW WATER) [1]
___ ROOTMATS [1]
1 POOLS > 70cm [2]
1 ROOTWADS [1]
___ BOULDERS [1]
___ OXBOWS, BACKWATERS [1]
2 AQUATIC MACROPHYTES [1]
1 LOGS OR WOODY DEBRIS [1]

AMOUNT

Check ONE (Or 2 & average)
- ☑ EXTENSIVE >75% [11]
- ☑ MODERATE 25-75% [7]
- ☐ SPARSE 5-<25% [3]
- ☐ NEARLY ABSENT <5% [1]

Comments (5) (9)

Cover 14 Maximum 20

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]

Comments

Channel 6 Maximum 20

4] BANK EROSION AND RIPARIAN ZONE

Check ONE in each category for EACH BANK (Or 2 per bank & average)

River right looking downstream

EROSION (L R)
- ☑ ☐ NONE / LITTLE [3]
- ☐ ☐ MODERATE [2]
- ☐ ☐ HEAVY / SEVERE [1]

RIPARIAN WIDTH (L R)
- ☑ ☐ WIDE > 50m [4]
- ☑ ☐ MODERATE 10-50m [3]
- ☐ ☐ NARROW 5-10m [2]
- ☐ ☐ VERY NARROW < 5m [1]
- ☐ ☐ NONE [0]

FLOOD PLAIN QUALITY (L R)
- ☑ ☐ 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]

Indicate predominant land use(s) past 100m riparian.

Comments (3) (3.5) (2.5)

Riparian 9 Maximum 10

5] POOL / GLIDE AND RIFFLE / RUN QUALITY

MAXIMUM DEPTH

Check ONE (ONLY!)
- ☑ > 1m [6]
- ☐ 0.7-<1m [4]
- ☐ 0.4-<0.7m [2]
- ☐ 0.2-<0.4m [1]
- ☐ < 0.2m [0]

CHANNEL WIDTH

Check ONE (Or 2 & average)
- ☐ POOL WIDTH > RIFFLE WIDTH [2]
- ☑ POOL WIDTH = RIFFLE WIDTH [1]
- ☐ POOL WIDTH < RIFFLE WIDTH [0]

CURRENT VELOCITY

Check ALL that apply
- ☐ TORRENTIAL [-1]
- ☐ VERY FAST [1]
- ☐ FAST [1]
- ☐ MODERATE [1]
- ☑ SLOW [1]
- ☐ INTERSTITIAL [-1]
- ☐ INTERMITTENT [-2]
- ☐ EDDIES [1]

Indicate for reach - pools and riffles.

Recreation Potential
Primary Contact
Secondary Contact
(circle one and comment on back)

Comments

Pool / Current 8 Maximum 12

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 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]

Comments

Riffle / Run 0 Maximum 8

6] GRADIENT

GRADIENT (<0.1 ft/mi)
DRAINAGE AREA (~~2,040~~ mi²)

- ☐ VERY LOW - LOW [2-4]
- ☐ MODERATE [6-10]
- ☐ HIGH - VERY HIGH [10-6]

%POOL: ___ %GLIDE: ___
%RUN: 100 %RIFFLE: ___

Gradient 6 Maximum 10

EPA 4520 >1,502

Proofed KC 7/16/08

06/11/08

Electronic Filing: Received, Clerk's Office 04/20/2023

Electronic Filing - Received, Clerk's Office, September 8, 2023

Qualitative Habitat Evaluation Index and Use Assessment Field Sheet

QHEI Score: 35.5

Stream & Location: Des Plaines River - 282.5RB **RM:** 282.5 **Date:** 07/11/08

Scorers Full Name & Affiliation: Joe Vondruska EA Engineering

River Code: __-__-__ **STORET #:** ____ **Lat./ Long.:** (NAD 83 - decimal °) 41.4736 188.15385 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
☐ ☐ BLDR /SLABS [10]	✓		☐ ☐ HARDPAN [4]		
☐ ☐ BOULDER [9]			☐ ☐ DETRITUS [3]	✓	
☐ ☐ COBBLE [8]			☐ ☐ MUCK [2]		
☐ ☐ GRAVEL [7]			☒ ☒ SILT [2]	✓	
☐ ☐ SAND [6]	✓		☐ ☐ ARTIFICIAL [0]		
☐ ☐ BEDROCK [5]					

(Score natural substrates; ignore sludge from point-sources)

NUMBER OF BEST TYPES: ☐ 4 or more [2] ☒ 3 or less [0]

Check ONE (*Or 2 & average*)

ORIGIN	QUALITY
☐ LIMESTONE [1]	SILT ☒ HEAVY [-2]
☐ TILLS [1]	SILT ☐ MODERATE [-1]
☐ WETLANDS [0]	SILT ☐ NORMAL [0]
☒ HARDPAN [0]	SILT ☐ FREE [1]
☒ SANDSTONE [0]	EMBEDDEDNESS ☒ EXTENSIVE [-2]
☐ RIP/RAP [0]	EMBEDDEDNESS ☐ MODERATE [-1]
☐ LACUSTRINE [0]	EMBEDDEDNESS ☐ NORMAL [0]
☐ SHALE [-1]	EMBEDDEDNESS ☐ NONE [1]
☐ COAL FINES [-2]	

Comments (4) (0) (0) (-4)

Substrate 0 *Maximum* 20

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.

___ UNDERCUT BANKS [1]
___ OVERHANGING VEGETATION [1]
___ SHALLOWS (IN SLOW WATER) [1]
___ ROOTMATS [1]

1 POOLS > 70cm [2]
___ ROOTWADS [1]
1 BOULDERS [1]

___ OXBOWS, BACKWATERS [1]
2 AQUATIC MACROPHYTES [1]
1 LOGS OR WOODY DEBRIS [1]

AMOUNT Check ONE (*Or 2 & average*)

☐ EXTENSIVE >75% [11]
☒ MODERATE 25-75% [7]
☒ SPARSE 5-<25% [3]
☐ NEARLY ABSENT <5% [1]

Comments (5) (5)

Cover *Maximum* 20 10

3] CHANNEL MORPHOLOGY

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

SINUOSITY	DEVELOPMENT	CHANNELIZATION	STABILITY
☐ HIGH [4]	☐ EXCELLENT [7]	☐ NONE [6]	☐ HIGH [3]
☐ MODERATE [3]	☐ GOOD [5]	☐ RECOVERED [4]	☐ MODERATE [2]
☐ LOW [2]	☐ FAIR [3]	☒ RECOVERING [3]	☒ LOW [1]
☒ NONE [1]	☒ POOR [1]	☒ RECENT OR NO RECOVERY [1]	

Comments (2) ↳ old concrete mooring structure @ midpoint

Channel *Maximum* 20 5

4] BANK EROSION AND RIPARIAN ZONE

Check **ONE** in each category for **EACH BANK** (*Or 2 per bank & average*)

River right looking downstream

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

Indicate predominant land use(s) past 100m riparian.

Comments (3) (2) ↳ land clearing & grading in flood plain (1.5) silt fence near mid-point

Riparian *Maximum* 10 6.5

5] POOL / GLIDE AND RIFFLE / RUN QUALITY

MAXIMUM DEPTH Check ONE (*ONLY!*)

☒ > 1m [6]
☐ 0.7-<1m [4]
☐ 0.4-<0.7m [2]
☐ 0.2-<0.4m [1]
☐ < 0.2m [0]

CHANNEL WIDTH Check ONE (*Or 2 & average*)

☐ POOL WIDTH > RIFFLE WIDTH [2]
☒ POOL WIDTH = RIFFLE WIDTH [1]
☐ POOL WIDTH < RIFFLE WIDTH [0]

CURRENT VELOCITY Check ALL that apply

☐ TORRENTIAL [-1]	☒ SLOW [1]
☐ VERY FAST [1]	☐ INTERSTITIAL [-1]
☐ FAST [1]	☐ INTERMITTENT [-2]
☐ MODERATE [1]	☐ EDDIES [1]

Indicate for reach - pools and riffles.

Recreation Potential
Primary Contact
Secondary Contact
(circle one and comment on back)

Comments

Pool / Current *Maximum* 12 8

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

Comments

Riffle / Run *Maximum* 8 0

6] GRADIENT

GRADIENT (<0.1 ft/ml) ☐ VERY LOW - LOW [2-4]

DRAINAGE AREA (~~>1,290~~ mi²) ☐ MODERATE [6-10]

>1,502 ☐ HIGH - VERY HIGH [10-6]

%POOL: 100 %GLIDE:
%RUN: %RIFFLE:

Gradient *Maximum* 10 6

EPA 4520

Proofed KE 7/16/08

06/11/08

OhioEPA

Qualitative Habitat Evaluation Index and Use Assessment Field Sheet

QHEI Score: 45

Stream & Location: Des Plaines River 282.3LB **RM:** 282.3 **Date:** 07/10/08

Scorers Full Name & Affiliation: Joe Vrtiska EA Engineering

River Code: ___-___-___ **STORET #:** ______ **Lat./Long.:** (NAD 83 - decimal °) 41.4710 / 88.1555 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
☐ ☐ BLDR /SLABS [10]			☐ ☐ HARDPAN [4]		
☐ ☐ BOULDER [9]			☐ ☐ DETRITUS [3]		
☐ ☐ COBBLE [8]			☐ ☐ MUCK [2]		
☐ ☐ GRAVEL [7]			☒ ☐ SILT [2]	✓	
☒ ☐ SAND [6]	✓		☐ ☐ ARTIFICIAL [0]		
☐ ☐ BEDROCK [5]					

(Score natural substrates; ignore sludge from point-sources)

NUMBER OF BEST TYPES: ☐ 4 or more [2] ☒ 3 or less [0]

Check ONE (Or 2 & average)

ORIGIN
☐ LIMESTONE [1]
☐ TILLS [1]
☐ WETLANDS [0]
☒ HARDPAN [0]
☒ SANDSTONE [0]
☐ RIP/RAP [0]
☐ LACUSTRINE [0]
☐ SHALE [-1]
☐ COAL FINES [-2]

QUALITY
SILT
☒ HEAVY [-2]
☐ MODERATE [-1]
☐ NORMAL [0]
☐ FREE [1]
EMBEDDEDNESS
☒ EXTENSIVE [-2]
☐ MODERATE [-1]
☐ NORMAL [0]
☐ NONE [1]

Comments

(8) (0) (0) (-4)

Substrate 4 Maximum 20

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.

__ 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]

AMOUNT
Check ONE (Or 2 & average)
☐ EXTENSIVE >75% [11]
☒ MODERATE 25-75% [7]
☐ SPARSE 5-<25% [3]
☐ NEARLY ABSENT <5% [1]

Comments 5 7

Cover Maximum 20: 12

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

SINUOSITY	DEVELOPMENT	CHANNELIZATION	STABILITY
☐ HIGH [4]	☐ EXCELLENT [7]	☐ NONE [6]	☐ HIGH [3]
☐ MODERATE [3]	☐ GOOD [5]	☐ RECOVERED [4]	☐ MODERATE [2]
☐ LOW [2]	☐ FAIR [3]	☒ RECOVERING [3]	☒ LOW [1]
☒ NONE [1]	☒ POOR [1]	☐ RECENT OR NO RECOVERY [1]	

Comments

Channel Maximum 20: 6

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

River right looking downstream

EROSION (L R)	RIPARIAN WIDTH (L R)	FLOOD PLAIN QUALITY (L R)	(L R)
☒ ☐ NONE / LITTLE [3]	☒ ☐ WIDE > 50m [4]	☒ ☐ FOREST, SWAMP [3]	☐ ☐ CONSERVATION TILLAGE [1]
☐ ☐ MODERATE [2]	☒ ☐ MODERATE 10-50m [3]	☒ ☐ SHRUB OR OLD FIELD [2]	☐ ☐ URBAN OR INDUSTRIAL [0]
☐ ☐ HEAVY / SEVERE [1]	☐ ☐ NARROW 5-10m [2]	☐ ☐ RESIDENTIAL, PARK, NEW FIELD [1]	☐ ☐ MINING / CONSTRUCTION [0]
	☐ ☐ VERY NARROW < 5m [1]	☐ ☐ FENCED PASTURE [1]	
	☐ ☐ NONE [0]	☐ ☐ OPEN PASTURE, ROWCROP [0]	

Indicate predominant land use(s) past 100m riparian.

Comments (3) (3.5) (2.5)

Riparian Maximum 10: 9

5] POOL / GLIDE AND RIFFLE / RUN QUALITY

MAXIMUM DEPTH
Check ONE (ONLY!)
☒ > 1m [6]
☐ 0.7-<1m [4]
☐ 0.4-<0.7m [2]
☐ 0.2-<0.4m [1]
☐ < 0.2m [0]

CHANNEL WIDTH
Check ONE (Or 2 & average)
☐ POOL WIDTH > RIFFLE WIDTH [2]
☒ POOL WIDTH = RIFFLE WIDTH [1]
☐ POOL WIDTH < RIFFLE WIDTH [0]

CURRENT VELOCITY
Check ALL that apply
☐ TORRENTIAL [-1]
☐ VERY FAST [1]
☐ FAST [1]
☐ MODERATE [1]
☒ SLOW [1]
☐ INTERSTITIAL [-1]
☐ INTERMITTENT [-2]
☐ EDDIES [1]
Indicate for reach - pools and riffles.

Recreation Potential
Primary Contact
Secondary Contact
(circle one and comment on back)

Comments

Pool / Current Maximum 12: 8

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 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]

Comments

Riffle / Run Maximum 8: 0

6] GRADIENT
(<0.1 ft/mi)
DRAINAGE AREA (~~>2,240~~ mi²)

☐ VERY LOW - LOW [2-4]
☐ MODERATE [6-10]
☐ HIGH - VERY HIGH [10-6]

%POOL: 100 %GLIDE:
%RUN: %RIFFLE:

Gradient Maximum 10: 6

EPA 4520 >1,502 Proofed RE 7/16/08 06/11/08

OhioEPA

Qualitative Habitat Evaluation Index and Use Assessment Field Sheet

QHEI Score: 48.5

Stream & Location: Des Plaines River - 282.2 RB **RM:** 282.2 **Date:** 07/11/08

Scorers Full Name & Affiliation: Joe Vondruska EA Engineering

River Code: __-__-__ **STORET #:** ____ **Lat./ Long.:** (NAD 83 - decimal °) 41.4722 / 88.1587 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
☐ ☐	BLDR /SLABS [10]	✓		☐ ☐	HARDPAN [4]		
☐ ☐	BOULDER [9]	✓		☐ ☐	DETRITUS [3]	✓	
☐ ☐	COBBLE [8]	✓		☐ ☐	MUCK [2]		
☐ ☐	GRAVEL [7]	✓		☑ ☐	SILT [2]	✓	
☑ ☐	SAND [6]	✓		☐ ☐	ARTIFICIAL [0]		
☐ ☐	BEDROCK [5]				(Score natural substrates; ignore sludge from point-sources)		

NUMBER OF BEST TYPES: ☑ 4 or more [2] ☐ 3 or less [0]

Comments ⑧ ②

Check ONE (Or 2 & average)

ORIGIN
- ☐ LIMESTONE [1]
- ☐ TILLS [1]
- ☐ WETLANDS [0]
- ☑ HARDPAN [0]
- ☑ SANDSTONE [0]
- ☐ RIP/RAP [0]
- ☐ LACUSTRINE [0]
- ☐ SHALE [-1]
- ☐ COAL FINES [-2]

(0)

QUALITY

SILT
- ☑ HEAVY [-2]
- ☐ MODERATE [-1]
- ☑ NORMAL [0]
- ☐ FREE [1]

-1

EMBEDDEDNESS
- ☑ EXTENSIVE [-2]
- ☐ MODERATE [-1]
- ☑ NORMAL [0]
- ☐ NONE [1]

-1

(-2)

Substrate 8 Maximum 20

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.

1	UNDERCUT BANKS [1]	1	POOLS > 70cm [2]	2	OXBOWS, BACKWATERS [1]
	OVERHANGING VEGETATION [1]	1	ROOTWADS [1]	2	AQUATIC MACROPHYTES [1]
	SHALLOWS (IN SLOW WATER) [1]	1	BOULDERS [1]	2	LOGS OR WOODY DEBRIS [1]
	ROOTMATS [1]				

AMOUNT

Check ONE (Or 2 & average)
- ☐ EXTENSIVE >75% [11]
- ☑ MODERATE 25-75% [7]
- ☐ SPARSE 5-<25% [3]
- ☐ NEARLY ABSENT <5% [1]

Comments 8 7

→ good amounts in Rock Run Dayworth BW & downstream of it

Cover 15 Maximum 20

3] CHANNEL MORPHOLOGY

Check ONE in each category (Or 2 & average)

SINUOSITY	DEVELOPMENT	CHANNELIZATION	STABILITY
☐ HIGH [4]	☐ EXCELLENT [7]	☐ NONE [6]	☐ HIGH [3]
☐ MODERATE [3]	☐ GOOD [5]	☐ RECOVERED [4]	☐ MODERATE [2]
☐ LOW [2]	☐ FAIR [3]	☑ RECOVERING [3]	☑ LOW [1]
☑ NONE [1]	☑ POOR [1]	☑ RECENT OR NO RECOVERY [1]	

Comments (2)

→ on bank construction + dirt-moving

Channel 5 Maximum 20

4] BANK EROSION AND RIPARIAN ZONE

Check ONE in each category for EACH BANK (Or 2 per bank & average)

River right looking downstream

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

Indicate predominant land use(s) past 100m riparian.

Comments ③ ② (1.5)

Riparian 6.5 Maximum 10

5] POOL / GLIDE AND RIFFLE / RUN QUALITY

MAXIMUM DEPTH

Check ONE (ONLY!)
- ☑ > 1m [6]
- ☐ 0.7-<1m [4]
- ☐ 0.4-<0.7m [2]
- ☐ 0.2-<0.4m [1]
- ☐ < 0.2m [0]

CHANNEL WIDTH

Check ONE (Or 2 & average)
- ☐ POOL WIDTH > RIFFLE WIDTH [2]
- ☑ POOL WIDTH = RIFFLE WIDTH [1]
- ☐ POOL WIDTH < RIFFLE WIDTH [0]

CURRENT VELOCITY

Check ALL that apply

☐ TORRENTIAL [-1]	☑ SLOW [1]
☐ VERY FAST [1]	☐ INTERSTITIAL [-1]
☐ FAST [1]	☐ INTERMITTENT [-2]
☐ MODERATE [1]	☐ EDDIES [1]

Indicate for reach - pools and riffles.

Recreation Potential
Primary Contact
Secondary Contact
(circle one and comment on back)

Comments

Pool / Current 8 Maximum 12

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

Comments

Riffle / Run 0 Maximum 8

6] GRADIENT (<0.1 ft/mi)

DRAINAGE AREA (~~>2,240~~ mi²) >1,502

- ☐ VERY LOW - LOW [2-4]
- ☐ MODERATE [6-10]
- ☐ HIGH - VERY HIGH [10-6]

%POOL: 100 %GLIDE:
%RUN: %RIFFLE:

Gradient 6 Maximum 10

EPA 4520

Proofed KC 7/16/08

06/11/08

OhioEPA

Qualitative Habitat Evaluation Index and Use Assessment Field Sheet

QHEI Score: 36

Stream & Location: Des Plaines River 282.0 LB **RM:** 282.0 **Date:** 07/10/08

Scorers Full Name & Affiliation: Joe Vondruska EA Engineering

River Code: __-___-___ **STORET #:** ______ **Lat./Long.:** (NAD 83 - decimal °) 41.4682 / 88.1599 Office verified location ☐

1] SUBSTRATE

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

BEST TYPES POOL RIFFLE
- ☐ ☐ BLDR /SLABS [10] __ __
- ☐ ☐ BOULDER [9] __ __
- ☐ ☐ COBBLE [8] __ __
- ☐ ☐ GRAVEL [7] __ __
- ☐ ☐ SAND [6] ✓ __
- ☐ ☐ BEDROCK [5] __ __

OTHER TYPES POOL RIFFLE
- ☐ ☐ HARDPAN [4] __ __
- ☐ ☐ DETRITUS [3] __ __
- ☐ ☐ MUCK [2] __ __
- ☒ ☒ SILT [2] ✓ __
- ☐ ☐ ARTIFICIAL [0] __ __

(Score natural substrates; Ignore sludge from point-sources)

NUMBER OF BEST TYPES: ☐ 4 or more [2] ☒ 3 or less [0]

Check ONE (Or 2 & average)

ORIGIN
- ☐ LIMESTONE [1]
- ☐ TILLS [1]
- ☐ WETLANDS [0]
- ☒ HARDPAN [0]
- ☒ SANDSTONE [0]
- ☐ RIP/RAP [0]
- ☐ LACUSTRINE [0]
- ☐ SHALE [-1]
- ☐ COAL FINES [-2]

QUALITY

SILT
- ☒ HEAVY [-2]
- ☐ MODERATE [-1]
- ☐ NORMAL [0]
- ☐ FREE [1]

EMBEDDEDNESS
- ☒ EXTENSIVE [-2]
- ☐ MODERATE [-1]
- ☐ NORMAL [0]
- ☐ NONE [1]

Comments (sunken barge) ④ ⓪ ⓪ (-4)

Substrate 0 Maximum 20

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.

- __ UNDERCUT BANKS [1]
- __ OVERHANGING VEGETATION [1]
- __ SHALLOWS (IN SLOW WATER) [1]
- __ ROOTMATS [1]
- 1 POOLS > 70cm [2]
- __ ROOTWADS [1]
- __ BOULDERS [1]
- __ OXBOWS, BACKWATERS [1]
- 2 AQUATIC MACROPHYTES [1]
- 1 LOGS OR WOODY DEBRIS [1]

AMOUNT Check ONE (Or 2 & average)
- ☐ EXTENSIVE >75% [11]
- ☒ MODERATE 25-75% [7]
- ☐ SPARSE 5-<25% [3]
- ☐ NEARLY ABSENT <5% [1]

Comments ④ ⑦

Cover 11 Maximum 20

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]

Comments ②

Channel 5 Maximum 20

4] BANK EROSION AND RIPARIAN ZONE

Check ONE in each category for EACH BANK (Or 2 per bank & average)

River right looking downstream

EROSION L R
- ☒ ☐ NONE / LITTLE [3]
- ☐ ☐ MODERATE [2]
- ☐ ☐ HEAVY / SEVERE [1]

RIPARIAN WIDTH L R
- ☐ ☐ WIDE > 50m [4]
- ☒ ☐ MODERATE 10-50m [3]
- ☐ ☐ NARROW 5-10m [2]
- ☐ ☐ VERY NARROW < 5m [1]
- ☒ ☐ NONE [0]

FLOOD PLAIN QUALITY L R
- ☒ ☐ 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]

Indicate predominant land use(s) past 100m riparian.

Comments ③ (1.5) (1.5)

Riparian 6 Maximum 10

5] POOL / GLIDE AND RIFFLE / RUN QUALITY

MAXIMUM DEPTH Check ONE (ONLY!)
- ☒ > 1m [6]
- ☐ 0.7-<1m [4]
- ☐ 0.4-<0.7m [2]
- ☐ 0.2-<0.4m [1]
- ☐ < 0.2m [0]

CHANNEL WIDTH Check ONE (Or 2 & average)
- ☐ POOL WIDTH > RIFFLE WIDTH [2]
- ☒ POOL WIDTH = RIFFLE WIDTH [1]
- ☐ POOL WIDTH < RIFFLE WIDTH [0]

CURRENT VELOCITY Check ALL that apply
- ☐ TORRENTIAL [-1]
- ☐ VERY FAST [1]
- ☐ FAST [1]
- ☐ MODERATE [1]
- ☒ SLOW [1]
- ☐ INTERSTITIAL [-1]
- ☐ INTERMITTENT [-2]
- ☐ EDDIES [1]

Indicate for reach - pools and riffles.

Recreation Potential
Primary Contact
Secondary Contact
(circle one and comment on back)

Comments

Pool / Current 8 Maximum 12

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 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]

Comments

Riffle / Run 0 Maximum 8

6] GRADIENT (<0.1 ft/mi)

DRAINAGE AREA (~~>2,140~~ mi²) >1,502

- ☐ VERY LOW - LOW [2-4]
- ☐ MODERATE [6-10]
- ☐ HIGH - VERY HIGH [10-6]

%POOL: 100 %GLIDE: __
%RUN: __ %RIFFLE: __

Gradient 6 Maximum 10

EPA 4520 Proofed KE 7/16/08 06/11/08

OhioEPA

Qualitative Habitat Evaluation Index and Use Assessment Field Sheet

QHEI Score: 37.5

Stream & Location: Des Plaines River - 281.9 RB **RM:** 281.9 **Date:** 07/11/08

Scorers Full Name & Affiliation: Joe Vondruska EA Engineering

River Code: ___-___-___ **STORET #:** ______ **Lat./Long.:** (NAD 83 - decimal °) 41.4694 / 88.1633 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
☐ ☐ BLDR /SLABS [10]			☐ ☐ HARDPAN [4]		
☐ ☐ BOULDER [9]			☐ ☐ DETRITUS [3]	✓	
☐ ☐ COBBLE [8]			☐ ☐ MUCK [2]		
☐ ☐ GRAVEL [7]			☑ ☑ SILT [2]	✓	
☐ ☐ SAND [6]	✓		☐ ☐ ARTIFICIAL [0]		
☐ ☐ BEDROCK [5]					

(Score natural substrates; ignore sludge from point-sources)

NUMBER OF BEST TYPES: ☐ 4 or more [2] ☑ 3 or less [0]

Check ONE (Or 2 & average)

ORIGIN		QUALITY
☐ LIMESTONE [1]	SILT	☑ HEAVY [-2]
☐ TILLS [1]		☐ MODERATE [-1]
☐ WETLANDS [0]		☐ NORMAL [0]
☑ HARDPAN [0]		☐ FREE [1]
☑ SANDSTONE [0]	EMBEDDEDNESS	☑ EXTENSIVE [-2]
☐ RIP/RAP [0]		☐ MODERATE [-1]
☐ LACUSTRINE [0]		☐ NORMAL [0]
☐ SHALE [-1]		☐ NONE [1]
☐ COAL FINES [-2]		

Comments ④ ⓪ ⓪ (-4)

Substrate 0 Maximum 20

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.

__	UNDERCUT BANKS [1]	1	POOLS > 70cm [2]	__	OXBOWS, BACKWATERS [1]
__	OVERHANGING VEGETATION [1]	__	ROOTWADS [1]	2	AQUATIC MACROPHYTES [1]
__	SHALLOWS (IN SLOW WATER) [1]	__	BOULDERS [1]	1	LOGS OR WOODY DEBRIS [1]
__	ROOTMATS [1]				

AMOUNT
Check ONE (Or 2 & average)
☐ EXTENSIVE >75% [11]
☑ MODERATE 25-75% [7]
☐ SPARSE 5-<25% [3]
☐ NEARLY ABSENT <5% [1]

Comments ④ ⑦

Cover 11 Maximum 20

3] CHANNEL MORPHOLOGY

Check ONE in each category (Or 2 & average)

SINUOSITY	DEVELOPMENT	CHANNELIZATION	STABILITY
☐ HIGH [4]	☐ EXCELLENT [7]	☐ NONE [6]	☐ HIGH [3]
☐ MODERATE [3]	☐ GOOD [5]	☐ RECOVERED [4]	☐ MODERATE [2]
☐ LOW [2]	☐ FAIR [3]	☑ RECOVERING [3]	☑ LOW [1]
☑ NONE [1]	☑ POOR [1]	☐ RECENT OR NO RECOVERY [1]	

Comments

Channel 6 Maximum 20

4] BANK EROSION AND RIPARIAN ZONE

Check ONE in each category for EACH BANK (Or 2 per bank & average)

River right looking downstream

EROSION (L R)	RIPARIAN WIDTH (L R)	FLOOD PLAIN QUALITY (L R)	(L R)
☐ ☑ NONE / LITTLE [3]	☐ ☐ WIDE > 50m [4]	☐ ☑ FOREST, SWAMP [3]	☐ ☐ CONSERVATION TILLAGE [1]
☐ ☐ MODERATE [2]	☐ ☐ MODERATE 10-50m [3]	☐ ☐ SHRUB OR OLD FIELD [2]	☐ ☐ URBAN OR INDUSTRIAL [0]
☐ ☐ HEAVY / SEVERE [1]	☐ ☐ NARROW 5-10m [2]	☐ ☐ RESIDENTIAL, PARK, NEW FIELD [1]	☐ ☐ MINING / CONSTRUCTION [0]
	☐ ☑ VERY NARROW < 5m [1]	☐ ☐ FENCED PASTURE [1]	
	☐ ☑ NONE [0]	☐ ☐ OPEN PASTURE, ROWCROP [0]	

Indicate predominant land use(s) past 100m riparian.

Comments ③ 0.5 ↳ adjacent to quarry ③

Riparian 6.5 Maximum 10

5] POOL / GLIDE AND RIFFLE / RUN QUALITY

MAXIMUM DEPTH Check ONE (ONLY!)	CHANNEL WIDTH Check ONE (Or 2 & average)	CURRENT VELOCITY Check ALL that apply	
☑ > 1m [6]	☐ POOL WIDTH > RIFFLE WIDTH [2]	☐ TORRENTIAL [-1]	☑ SLOW [1]
☐ 0.7-<1m [4]	☑ POOL WIDTH = RIFFLE WIDTH [1]	☐ VERY FAST [1]	☐ INTERSTITIAL [-1]
☐ 0.4-<0.7m [2]	☐ POOL WIDTH < RIFFLE WIDTH [0]	☐ FAST [1]	☐ INTERMITTENT [-2]
☐ 0.2-<0.4m [1]		☐ MODERATE [1]	☐ EDDIES [1]
☐ < 0.2m [0]			

Indicate for reach - pools and riffles.

Recreation Potential
Primary Contact
Secondary Contact
(circle one and comment on back)

Comments

Pool / Current 8 Maximum 12

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

Comments

Riffle / Run 0 Maximum 8

6] GRADIENT (<0.1 ft/ml)

DRAINAGE AREA (~~>2,740~~ mi²)

☐ VERY LOW - LOW [2-4]
☐ MODERATE [6-10]
☐ HIGH - VERY HIGH [10-6]

%POOL: 100 %GLIDE:
%RUN: %RIFFLE:

Gradient 6 Maximum 10

EPA 4520 >1,502

Proofed KE 7/16/08

06/11/08

OhioEPA

Qualitative Habitat Evaluation Index and Use Assessment Field Sheet

QHEI Score: 37

Stream & Location: Des Plaines River 281.7 LB **RM:** 281.7 **Date:** 07/10/08

Scorers Full Name & Affiliation: Joe Vondruska EA Engineering

River Code: ___-___-___ **STORET #:** ______ **Lat./ Long.:** (NAD 83 - decimal °) 41.4654 /88.1641 Office verified location ☐

1] SUBSTRATE

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

	BEST TYPES	POOL	RIFFLE
☐ ☐	BLDR /SLABS [10]		
☐ ☐	BOULDER [9]		
☐ ☐	COBBLE [8]	✓	
☐ ☐	GRAVEL [7]	✓	
☐ ☐	SAND [6]	✓	
☐ ☐	BEDROCK [5]		

	OTHER TYPES	POOL	RIFFLE
☐ ☐	HARDPAN [4]		
☐ ☐	DETRITUS [3]		
☐ ☐	MUCK [2]		
☑ ☑	SILT [2]	✓	
☐ ☐	ARTIFICIAL [0]		

(Score natural substrates; ignore sludge from point-sources)

NUMBER OF BEST TYPES: ☐ 4 or more [2] ☑ 3 or less [0]

Check ONE (Or 2 & average)

ORIGIN
- ☐ LIMESTONE [1]
- ☐ TILLS [1]
- ☐ WETLANDS [0]
- ☑ HARDPAN [0]
- ☑ SANDSTONE [0]
- ☐ RIP/RAP [0]
- ☐ LACUSTRINE [0]
- ☐ SHALE [-1]
- ☐ COAL FINES [-2]

QUALITY

SILT
- ☑ HEAVY [-2]
- ☐ MODERATE [-1]
- ☐ NORMAL [0]
- ☐ FREE [1]

EMBEDDEDNESS
- ☑ EXTENSIVE [-2]
- ☐ MODERATE [-1]
- ☐ NORMAL [0]
- ☐ NONE [1]

Comments (sunken barges) ④ ⓪ ⓪ (-4)

Substrate 0 Maximum 20

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.

___	UNDERCUT BANKS [1]	1	POOLS > 70cm [2]	___	OXBOWS, BACKWATERS [1]
___	OVERHANGING VEGETATION [1]	___	ROOTWADS [1]	2	AQUATIC MACROPHYTES [1]
___	SHALLOWS (IN SLOW WATER) [1]	___	BOULDERS [1]	___	LOGS OR WOODY DEBRIS [1]
___	ROOTMATS [1]				

AMOUNT Check ONE (Or 2 & average)
- ☐ EXTENSIVE >75% [11]
- ☑ MODERATE 25-75% [7]
- ☑ SPARSE 5-<25% [3]
- ☐ NEARLY ABSENT <5% [1]

Comments ③ ⑤

Cover Maximum 20: 8

3] CHANNEL MORPHOLOGY

Check ONE in each category (Or 2 & average)

SINUOSITY	DEVELOPMENT	CHANNELIZATION	STABILITY
☐ HIGH [4]	☐ EXCELLENT [7]	☐ NONE [6]	☐ HIGH [3]
☐ MODERATE [3]	☐ GOOD [5]	☐ RECOVERED [4]	☐ MODERATE [2]
☑ LOW [2]	☐ FAIR [3]	☑ RECOVERING [3]	☑ LOW [1]
☐ NONE [1]	☑ POOR [1]	☐ RECENT OR NO RECOVERY [1]	

Comments

Channel Maximum 20: 7

4] BANK EROSION AND RIPARIAN ZONE

Check ONE in each category for EACH BANK (Or 2 per bank & average)

River right looking downstream

L	R	EROSION
☑	☐	NONE / LITTLE [3]
☐	☐	MODERATE [2]
☐	☐	HEAVY / SEVERE [1]

L	R	RIPARIAN WIDTH
☑	☐	WIDE > 50m [4]
☑	☐	MODERATE 10-50m [3]
☐	☐	NARROW 5-10m [2]
☐	☐	VERY NARROW < 5m [1]
☐	☐	NONE [0]

L	R	FLOOD PLAIN QUALITY	L	R	
☑	☐	FOREST, SWAMP [3]	☐	☐	CONSERVATION TILLAGE [1]
☐	☐	SHRUB OR OLD FIELD [2]	☑	☐	URBAN OR INDUSTRIAL [0]
☐	☐	RESIDENTIAL, PARK, NEW FIELD [1]	☐	☐	MINING / CONSTRUCTION [0]
☐	☐	FENCED PASTURE [1]			
☐	☐	OPEN PASTURE, ROWCROP [0]			

Indicate predominant land use(s) past 100m riparian.

Comments ③ (3.5) (1.5)

Riparian Maximum 10: 8

5] POOL / GLIDE AND RIFFLE / RUN QUALITY

MAXIMUM DEPTH Check ONE (ONLY!)
- ☑ > 1m [6]
- ☐ 0.7-<1m [4]
- ☐ 0.4-<0.7m [2]
- ☐ 0.2-<0.4m [1]
- ☐ < 0.2m [0]

CHANNEL WIDTH Check ONE (Or 2 & average)
- ☐ POOL WIDTH > RIFFLE WIDTH [2]
- ☑ POOL WIDTH = RIFFLE WIDTH [1]
- ☐ POOL WIDTH < RIFFLE WIDTH [0]

CURRENT VELOCITY Check ALL that apply

☐ TORRENTIAL [-1]	☑ SLOW [1]
☐ VERY FAST [1]	☐ INTERSTITIAL [-1]
☐ FAST [1]	☐ INTERMITTENT [-2]
☐ MODERATE [1]	☐ EDDIES [1]

Indicate for reach - pools and riffles.

Recreation Potential
Primary Contact
Secondary Contact
(circle one and comment on back)

Comments

Pool / Current Maximum 12: 8

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 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]

Comments

Riffle / Run Maximum 8: 0

6] GRADIENT (<0.1 ft/mi)

DRAINAGE AREA (~~>2,240~~ mi²) >1,502

- ☐ VERY LOW - LOW [2-4]
- ☐ MODERATE [6-10]
- ☐ HIGH - VERY HIGH [10-6]

%POOL: 100 **%GLIDE:**
%RUN: **%RIFFLE:**

Gradient Maximum 10: 6

EPA 4520 Proofed RC 7/16/08 06/11/08

OhioEPA

Qualitative Habitat Evaluation Index and Use Assessment Field Sheet

QHEI Score: 38

Stream & Location: Des Plaines River — 281.6 RB **RM:** 281.6 **Date:** 07/11/08

Scorers Full Name & Affiliation: Joe Vondruska EA Engineering

River Code: ___-___-___ **STORET #:** ______ **Lat./Long.:** (NAD 83 - decimal °) 41.4664 188.1676 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
☐ ☐ BLDR/SLABS [10]			☐ ☐ HARDPAN [4]		
☐ ☐ BOULDER [9]			☐ ☐ DETRITUS [3]	✓	
☐ ☐ COBBLE [8]			☐ ☐ MUCK [2]		
☐ ☐ GRAVEL [7]			☑ ☑ SILT [2]	✓	
☐ ☐ SAND [6]	✓		☐ ☐ ARTIFICIAL [0]		
☐ ☐ BEDROCK [5]					

(Score natural substrates; ignore sludge from point-sources)

NUMBER OF BEST TYPES: ☐ 4 or more [2] ☑ 3 or less [0]

Comments (4) (0)

Check ONE (Or 2 & average)

ORIGIN	QUALITY
☐ LIMESTONE [1]	SILT ☑ HEAVY [-2]
☐ TILLS [1]	☐ MODERATE [-1]
☐ WETLANDS [0]	☐ NORMAL [0]
☑ HARDPAN [0]	☐ FREE [1]
☑ SANDSTONE [0]	EMBEDDEDNESS ☑ EXTENSIVE [-2]
☐ RIP/RAP [0]	☐ MODERATE [-1]
☐ LACUSTRINE [0]	☐ NORMAL [0]
☐ SHALE [-1]	☐ NONE [1]
☐ COAL FINES [-2]	
(0)	(-4)

Substrate 0 Maximum 20

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.

__	UNDERCUT BANKS [1]	1	POOLS > 70cm [2]	__	OXBOWS, BACKWATERS [1]
__	OVERHANGING VEGETATION [1]	__	ROOTWADS [1]	2	AQUATIC MACROPHYTES [1]
__	SHALLOWS (IN SLOW WATER) [1]	__	BOULDERS [1]	__	LOGS OR WOODY DEBRIS [1]
__	ROOTMATS [1]				

AMOUNT Check ONE (Or 2 & average)
- ☑ EXTENSIVE >75% [11]
- ☑ MODERATE 25-75% [7]
- ☐ SPARSE 5-<25% [3]
- ☐ NEARLY ABSENT <5% [1]

Comments (3) (9)

Cover 12 Maximum 20

3] CHANNEL MORPHOLOGY

Check ONE in each category (Or 2 & average)

SINUOSITY	DEVELOPMENT	CHANNELIZATION	STABILITY
☐ HIGH [4]	☐ EXCELLENT [7]	☐ NONE [6]	☐ HIGH [3]
☐ MODERATE [3]	☐ GOOD [5]	☐ RECOVERED [4]	☐ MODERATE [2]
☐ LOW [2]	☐ FAIR [3]	☑ RECOVERING [3]	☑ LOW [1]
☑ NONE [1]	☑ POOR [1]	☐ RECENT OR NO RECOVERY [1]	

Comments

Channel 6 Maximum 20

4] BANK EROSION AND RIPARIAN ZONE

Check ONE in each category for EACH BANK (Or 2 per bank & average)

River right looking downstream

EROSION (L R)	RIPARIAN WIDTH (L R)	FLOOD PLAIN QUALITY (L R)	(L R)
☐ ☑ NONE / LITTLE [3]	☐ ☐ WIDE > 50m [4]	☐ ☑ FOREST, SWAMP [3]	☐ ☐ CONSERVATION TILLAGE [1]
☐ ☐ MODERATE [2]	☐ ☐ MODERATE 10-50m [3]	☐ ☐ SHRUB OR OLD FIELD [2]	☐ ☐ URBAN OR INDUSTRIAL [0]
☐ ☐ HEAVY / SEVERE [1]	☐ ☐ NARROW 5-10m [2]	☐ ☐ RESIDENTIAL, PARK, NEW FIELD [1]	☐ ☐ MINING / CONSTRUCTION [0]
	☐ ☐ VERY NARROW < 5m [1]	☐ ☐ FENCED PASTURE [1]	
	☐ ☑ NONE [0]	☐ ☐ OPEN PASTURE, ROWCROP [0]	

Indicate predominant land use(s) past 100m riparian.

Comments ↳ fragmites adjacent to quarry

Riparian 6 Maximum 10

5] POOL / GLIDE AND RIFFLE / RUN QUALITY

MAXIMUM DEPTH Check ONE (ONLY!)	CHANNEL WIDTH Check ONE (Or 2 & average)	CURRENT VELOCITY Check ALL that apply	
☑ > 1m [6]	☐ POOL WIDTH > RIFFLE WIDTH [2]	☐ TORRENTIAL [-1]	☑ SLOW [1]
☐ 0.7-<1m [4]	☑ POOL WIDTH = RIFFLE WIDTH [1]	☐ VERY FAST [1]	☐ INTERSTITIAL [-1]
☐ 0.4-<0.7m [2]	☐ POOL WIDTH < RIFFLE WIDTH [0]	☐ FAST [1]	☐ INTERMITTENT [-2]
☐ 0.2-<0.4m [1]		☐ MODERATE [1]	☐ EDDIES [1]
☐ < 0.2m [0]			

Indicate for reach - pools and riffles.

Recreation Potential
Primary Contact
Secondary Contact
(circle one and comment on back)

Comments

Pool / Current 8 Maximum 12

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

Comments

Riffle / Run 0 Maximum 8

6] GRADIENT

GRADIENT (<0.1 ft/mi)
DRAINAGE AREA (~~>2,240~~ mi²) >1,502

- ☐ VERY LOW - LOW [2-4]
- ☐ MODERATE [6-10]
- ☐ HIGH - VERY HIGH [10-6]

%POOL: 100 **%GLIDE:**
%RUN: **%RIFFLE:**

Gradient 6 Maximum 10

EPA 4520 Proofed KC 7/16/08 06/11/08

OhioEPA

Qualitative Habitat Evaluation Index and Use Assessment Field Sheet

QHEI Score: 39

Stream & Location: Des Plaines River 281.3 LB **RM:** 281.3 **Date:** 07/10/08

Scorers Full Name & Affiliation: Joe Vondruska EA Engineering

River Code: ___-___-___ **STORET #:** ______ **Lat./Long.:** (NAD 83 - decimal °) 41.4616 188.1671 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
☐ ☐ BLDR /SLABS [10]			☐ ☐ HARDPAN [4]		
☐ ☐ BOULDER [9]			☐ ☐ DETRITUS [3]		
☐ ☐ COBBLE [8]			☐ ☐ MUCK [2]		
☐ ☐ GRAVEL [7]			☒ ☒ SILT [2]	✓	
☐ ☐ SAND [6]	✓		☐ ☐ ARTIFICIAL [0]		
☐ ☐ BEDROCK [5]					

(Score natural substrates; ignore sludge from point-sources)

NUMBER OF BEST TYPES: ☐ 4 or more [2] ☒ 3 or less [0]

Check ONE (Or 2 & average)

ORIGIN
- ☐ LIMESTONE [1]
- ☐ TILLS [1]
- ☐ WETLANDS [0]
- ☒ HARDPAN [0]
- ☒ SANDSTONE [0]
- ☐ RIP/RAP [0]
- ☐ LACUSTRINE [0]
- ☐ SHALE [-1]
- ☐ COAL FINES [-2]

QUALITY

SILT
- ☒ HEAVY [-2]
- ☐ MODERATE [-1]
- ☐ NORMAL [0]
- ☐ FREE [1]

EMBEDDEDNESS
- ☒ EXTENSIVE [-2]
- ☐ MODERATE [-1]
- ☐ NORMAL [0]
- ☐ NONE [1]

Comments (4) (0) (0) (-4)

Substrate 0 Maximum 20

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.

___ UNDERCUT BANKS [1]
___ OVERHANGING VEGETATION [1]
___ SHALLOWS (IN SLOW WATER) [1]
___ ROOTMATS [1]
1 POOLS > 70cm [2]
___ ROOTWADS [1]
___ BOULDERS [1]
1 OXBOWS, BACKWATERS [1]
1 AQUATIC MACROPHYTES [1]
___ LOGS OR WOODY DEBRIS [1]

AMOUNT
Check ONE (Or 2 & average)
- ☐ EXTENSIVE >75% [11]
- ☒ MODERATE 25-75% [7]
- ☒ SPARSE 5-<25% [3]
- ☐ NEARLY ABSENT <5% [1]

Comments (4) (5)

Cover 9 Maximum 20

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

SINUOSITY	DEVELOPMENT	CHANNELIZATION	STABILITY
☐ HIGH [4]	☐ EXCELLENT [7]	☐ NONE [6]	☐ HIGH [3]
☐ MODERATE [3]	☐ GOOD [5]	☐ RECOVERED [4]	☐ MODERATE [2]
☒ LOW [2]	☐ FAIR [3]	☒ RECOVERING [3]	☒ LOW [1]
☐ NONE [1]	☒ POOR [1]	☐ RECENT OR NO RECOVERY [1]	

Comments

Channel 7 Maximum 20

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

River right looking downstream

EROSION (L R)	RIPARIAN WIDTH (L R)	FLOOD PLAIN QUALITY (L R)	(L R)
☒ ☐ NONE / LITTLE [3]	☒ ☐ WIDE > 50m [4]	☒ ☐ FOREST, SWAMP [3]	☐ ☐ CONSERVATION TILLAGE [1]
☐ ☐ MODERATE [2]	☒ ☐ MODERATE 10-50m [3]	☒ ☐ SHRUB OR OLD FIELD [2]	☐ ☐ URBAN OR INDUSTRIAL [0]
☐ ☐ HEAVY / SEVERE [1]	☐ ☐ NARROW 5-10m [2]	☐ ☐ RESIDENTIAL, PARK, NEW FIELD [1]	☐ ☐ MINING / CONSTRUCTION [0]
	☐ ☐ VERY NARROW < 5m [1]	☐ ☐ FENCED PASTURE [1]	
	☐ ☐ NONE [0]	☐ ☐ OPEN PASTURE, ROWCROP [0]	

Indicate predominant land use(s) past 100m riparian.

Comments (3) (3.5) (2.5)

Riparian 9 Maximum 10

5] POOL / GLIDE AND RIFFLE / RUN QUALITY

MAXIMUM DEPTH Check ONE (ONLY!)
- ☒ > 1m [6]
- ☐ 0.7-<1m [4]
- ☐ 0.4-<0.7m [2]
- ☐ 0.2-<0.4m [1]
- ☐ < 0.2m [0]

CHANNEL WIDTH Check ONE (Or 2 & average)
- ☐ POOL WIDTH > RIFFLE WIDTH [2]
- ☒ POOL WIDTH = RIFFLE WIDTH [1]
- ☐ POOL WIDTH < RIFFLE WIDTH [0]

CURRENT VELOCITY Check ALL that apply
- ☐ TORRENTIAL [-1]
- ☐ VERY FAST [1]
- ☐ FAST [1]
- ☐ MODERATE [1]
- ☒ SLOW [1]
- ☐ INTERSTITIAL [-1]
- ☐ INTERMITTENT [-2]
- ☐ EDDIES [1]

Indicate for reach - pools and riffles.

Recreation Potential
Primary Contact
Secondary Contact
(circle one and comment on back)

Comments

Pool / Current 8 Maximum 12

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 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]

Comments

Riffle / Run 0 Maximum 8

6] GRADIENT (20.1 ft/mi)
DRAINAGE AREA (~~2240~~ mi²)

- ☐ VERY LOW - LOW [2-4]
- ☐ MODERATE [6-10]
- ☐ HIGH - VERY HIGH [10-6]

%POOL: 100 %GLIDE: ___
%RUN: ___ %RIFFLE: ___

Gradient 6 Maximum 10

EPA 4520 71,502 Proofed KC 7/16/08 06/11/08

OhioEPA

Qualitative Habitat Evaluation Index and Use Assessment Field Sheet

QHEI Score: 45

Stream & Location: Des Plaines River - 281.3 RB **RM:** 281.3 **Date:** 07/11/08

Scorers Full Name & Affiliation: Joe Vondruska EA Engineering

River Code: ___-___-___ **STORET #:** ______ **Lat./ Long.:** (NAD 83 - decimal °) 41.4629 / 88.1712 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
☐ ☐ BLDR /SLABS [10]	✓		☐ ☐ HARDPAN [4]		
☐ ☐ BOULDER [9]	✓		☐ ☐ DETRITUS [3]	✓	
☐ ☐ COBBLE [8]	✓		☐ ☐ MUCK [2]		
☑ ☐ GRAVEL [7]	✓		☑ ☐ SILT [2]	✓	
☐ ☐ SAND [6]	✓		☐ ☐ ARTIFICIAL [0]		
☐ ☐ BEDROCK [5]					

(Score natural substrates; ignore sludge from point-sources)

NUMBER OF BEST TYPES: ☑ 4 or more [2] ☐ 3 or less [0]

Check ONE (Or 2 & average)

ORIGIN
- ☐ LIMESTONE [1]
- ☑ TILLS [1]
- ☐ WETLANDS [0]
- ☑ HARDPAN [0]
- ☐ SANDSTONE [0]
- ☐ RIP/RAP [0]
- ☐ LACUSTRINE [0]
- ☐ SHALE [-1]
- ☐ COAL FINES [-2]

QUALITY -1.5

SILT
- ☑ HEAVY [-2]
- ☑ MODERATE [-1]
- ☐ NORMAL [0]
- ☐ FREE [1]

EMBEDDEDNESS
- ☑ EXTENSIVE [-2]
- ☑ MODERATE [-1]
- ☐ NORMAL [0]
- ☐ NONE [1]

-1.5

Comments (9) (2) (0.5) (-3)

Substrate 8.5 Maximum 20

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.

___	UNDERCUT BANKS [1]	2	POOLS > 70cm [2]	2	OXBOWS, BACKWATERS [1]
___	OVERHANGING VEGETATION [1]	___	ROOTWADS [1]	2	AQUATIC MACROPHYTES [1]
___	SHALLOWS (IN SLOW WATER) [1]	1	BOULDERS [1]	1	LOGS OR WOODY DEBRIS [1]
___	ROOTMATS [1]				

AMOUNT
Check ONE (Or 2 & average)
- ☐ EXTENSIVE >75% [11]
- ☑ MODERATE 25-75% [7]
- ☑ SPARSE 5-<25% [3]
- ☐ NEARLY ABSENT <5% [1]

Comments (6) (5)

Cover 11 Maximum 20

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

SINUOSITY	DEVELOPMENT	CHANNELIZATION	STABILITY
☐ HIGH [4]	☐ EXCELLENT [7]	☐ NONE [6]	☑ HIGH [3]
☐ MODERATE [3]	☐ GOOD [5]	☐ RECOVERED [4]	☑ MODERATE [2]
☑ LOW [2]	☐ FAIR [3]	☑ RECOVERING [3]	☑ LOW [1]
☐ NONE [1]	☑ POOR [1]	☑ RECENT OR NO RECOVERY [1]	

Comments (2) (1.5)
→ adjacent to quarry + industry

Channel 6.5 Maximum 20

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

River right looking downstream

EROSION (L R)	RIPARIAN WIDTH (L R)	FLOOD PLAIN QUALITY (L R)	(L R)
☐ ☑ NONE / LITTLE [3]	☐ ☐ WIDE > 50m [4]	☐ ☑ FOREST, SWAMP [3]	☐ ☐ CONSERVATION TILLAGE [1]
☐ ☐ MODERATE [2]	☐ ☐ MODERATE 10-50m [3]	☐ ☐ SHRUB OR OLD FIELD [2]	☐ ☑ URBAN OR INDUSTRIAL [0]
☐ ☐ HEAVY / SEVERE [1]	☐ ☐ NARROW 5-10m [2]	☐ ☐ RESIDENTIAL, PARK, NEW FIELD [1]	☐ ☐ MINING / CONSTRUCTION [0]
	☐ ☑ VERY NARROW < 5m [1]	☐ ☐ FENCED PASTURE [1]	
	☐ ☑ NONE [0]	☐ ☐ OPEN PASTURE, ROWCROP [0]	

Indicate predominant land use(s) past 100m riparian.

Comments (3) (0.5) (1.5)

Riparian 5 Maximum 10

5] POOL / GLIDE AND RIFFLE / RUN QUALITY

MAXIMUM DEPTH
Check ONE (ONLY!)
- ☑ > 1m [6]
- ☐ 0.7-<1m [4]
- ☐ 0.4-<0.7m [2]
- ☐ 0.2-<0.4m [1]
- ☐ < 0.2m [0]

CHANNEL WIDTH
Check ONE (Or 2 & average)
- ☐ POOL WIDTH > RIFFLE WIDTH [2]
- ☑ POOL WIDTH = RIFFLE WIDTH [1]
- ☐ POOL WIDTH < RIFFLE WIDTH [0]

CURRENT VELOCITY
Check ALL that apply
- ☐ TORRENTIAL [-1]
- ☐ VERY FAST [1]
- ☐ FAST [1]
- ☐ MODERATE [1]
- ☑ SLOW [1]
- ☐ INTERSTITIAL [-1]
- ☐ INTERMITTENT [-2]
- ☐ EDDIES [1]

Indicate for reach - pools and riffles.

Recreation Potential
Primary Contact
Secondary Contact
(circle one and comment on back)

Comments

Pool / Current 8 Maximum 12

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

Comments

Riffle / Run 0 Maximum 8

6] GRADIENT
(<0.1 ft/mi)
DRAINAGE AREA (~~22,240~~ mi²)

- ☐ VERY LOW - LOW [2-4]
- ☐ MODERATE [6-10]
- ☐ HIGH - VERY HIGH [10-6]

%POOL: 100 %GLIDE: ___
%RUN: ___ %RIFFLE: ___

Gradient 6 Maximum 10

EPA 4520 >1,502

Proofed KC 8/16/08 06/11/08

OhioEPA

Qualitative Habitat Evaluation Index and Use Assessment Field Sheet

QHEI Score: 38.5

Stream & Location: Des Plaines River – 281.0RB **RM:** 281.0 **Date:** 07/11/08
Barge terminal – Canal Barge Co. & CF Industries **Scorers Full Name & Affiliation:** Joe Vondruska EA Engineering
River Code: __-___-___ **STORET #:** ______ **Lat./ Long.:** (NAD 83 - decimal °) 41.45865 / 88.1698 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
☐ ☐	BLDR /SLABS [10]			☐ ☐	HARDPAN [4]		
☐ ☐	BOULDER [9]			☐ ☐	DETRITUS [3]	✓	
☐ ☐	COBBLE [8]	✓		☐ ☐	MUCK [2]		
☒ ☐	GRAVEL [7]	✓		☐ ☐	SILT [2]	✓	
☐ ☒	SAND [6]	✓		☐ ☐	ARTIFICIAL [0]		
☐ ☐	BEDROCK [5]						

(Score natural substrates; ignore sludge from point-sources)

NUMBER OF BEST TYPES: ☐ 4 or more [2] ☒ 3 or less [0] (0)

Check ONE (Or 2 & average)

ORIGIN
- ☐ LIMESTONE [1]
- ☒ TILLS [1]
- ☐ WETLANDS [0]
- ☐ HARDPAN [0]
- ☐ SANDSTONE [0]
- ☐ RIP/RAP [0]
- ☐ LACUSTRINE [0]
- ☐ SHALE [-1]
- ☐ COAL FINES [-2]

QUALITY -0.5

SILT
- ☐ HEAVY [-2]
- ☒ MODERATE [-1]
- ☒ NORMAL [0]
- ☐ FREE [1]

EMBEDDEDNESS
- ☐ EXTENSIVE [-2]
- ☒ MODERATE [-1]
- ☒ NORMAL [0]
- ☐ NONE [1]

-0.5 (-1)

Substrate 13 Maximum 20

Comments (13) Coal fines present adjacent to barge terminal (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 (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.

	UNDERCUT BANKS [1]	1	POOLS > 70cm [2]		OXBOWS, BACKWATERS [1]
	OVERHANGING VEGETATION [1]		ROOTWADS [1]	1	AQUATIC MACROPHYTES [1]
	SHALLOWS (IN SLOW WATER) [1]		BOULDERS [1]		LOGS OR WOODY DEBRIS [1]
	ROOTMATS [1]				

AMOUNT Check ONE (Or 2 & average)
- ☐ EXTENSIVE >75% [11]
- ☐ MODERATE 25-75% [7]
- ☐ SPARSE 5-<25% [3]
- ☒ NEARLY ABSENT <5% [1]

Comments (3) (1)

Cover Maximum 20: 4

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

SINUOSITY	DEVELOPMENT	CHANNELIZATION	STABILITY
☐ HIGH [4]	☐ EXCELLENT [7]	☐ NONE [6]	☐ HIGH [3]
☐ MODERATE [3]	☐ GOOD [5]	☐ RECOVERED [4]	☒ MODERATE [2]
☐ LOW [2]	☐ FAIR [3]	☐ RECOVERING [3]	☐ LOW [1]
☒ NONE [1]	☒ POOR [1]	☒ RECENT OR NO RECOVERY [1]	

Comments ↳ industrial

Channel Maximum 20: 5

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

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

Indicate predominant land use(s) past 100m riparian.

Comments (2.5) (0) 0

Riparian Maximum 10: 2.5

5] POOL / GLIDE AND RIFFLE / RUN QUALITY

MAXIMUM DEPTH Check ONE (ONLY!)
- ☒ > 1m [6]
- ☐ 0.7-<1m [4]
- ☐ 0.4-<0.7m [2]
- ☐ 0.2-<0.4m [1]
- ☐ < 0.2m [0]

CHANNEL WIDTH Check ONE (Or 2 & average)
- ☐ POOL WIDTH > RIFFLE WIDTH [2]
- ☒ POOL WIDTH = RIFFLE WIDTH [1]
- ☐ POOL WIDTH < RIFFLE WIDTH [0]

CURRENT VELOCITY Check ALL that apply

☐ TORRENTIAL [-1]	☒ SLOW [1]
☐ VERY FAST [1]	☐ INTERSTITIAL [-1]
☐ FAST [1]	☐ INTERMITTENT [-2]
☐ MODERATE [1]	☐ EDDIES [1]

Indicate for reach - pools and riffles.

Recreation Potential
Primary Contact
Secondary Contact
(circle one and comment on back)

Comments

Pool / Current Maximum 12: 8

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

Comments

Riffle / Run Maximum 8: 0

6] GRADIENT (<0.1 ft/mi)
DRAINAGE AREA (~~22,140~~ mi²)
- ☐ VERY LOW - LOW [2-4]
- ☐ MODERATE [6-10]
- ☐ HIGH - VERY HIGH [10-6]

%POOL: 100 %GLIDE:
%RUN: %RIFFLE:

Gradient Maximum 10: 6

EPA 4520 71,502 Proofed KC 7/16/08 06/11/08

OhioEPA

Qualitative Habitat Evaluation Index and Use Assessment Field Sheet

QHEI Score: 43

Stream & Location: Des Plaines River 280.9LB **RM:** 280.9 **Date:** 07/10/08

Scorers Full Name & Affiliation: Joe Vondruska EA Engineering

River Code: __-__-__ **STORET #:** ______ **Lat./Long.:** (NAD 83 - decimal °) 41.4572 188.1668 Office verified location ☐

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

BEST TYPES — POOL RIFFLE
- ☐ ☐ BLDR /SLABS [10]
- ☐ ☐ BOULDER [9]
- ☐ ☐ COBBLE [8]
- ☐ ☐ GRAVEL [7]
- ☑ ☐ SAND [6] — ✓
- ☐ ☐ BEDROCK [5]

NUMBER OF BEST TYPES: ☐ 4 or more [2] ☑ 3 or less [0]

OTHER TYPES — POOL RIFFLE
- ☐ ☐ HARDPAN [4]
- ☐ ☐ DETRITUS [3]
- ☐ ☐ MUCK [2]
- ☑ ☐ SILT [2] — ✓
- ☐ ☐ ARTIFICIAL [0]

(Score natural substrates; ignore sludge from point-sources)

Check ONE (Or 2 & average)

ORIGIN
- ☐ LIMESTONE [1]
- ☐ TILLS [1]
- ☐ WETLANDS [0]
- ☑ HARDPAN [0]
- ☑ SANDSTONE [0]
- ☐ RIP/RAP [0]
- ☐ LACUSTRINE [0]
- ☐ SHALE [-1]
- ☐ COAL FINES [-2]

QUALITY

SILT
- ☑ HEAVY [-2]
- ☐ MODERATE [-1]
- ☑ NORMAL [0]
- ☐ FREE [1]

EMBEDDEDNESS
- ☑ EXTENSIVE [-2]
- ☐ MODERATE [-1]
- ☑ NORMAL [0]
- ☐ NONE [1]

-1 -1

Comments (8) (0) (0) (-2)

Substrate 6 Maximum 20

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.

- __ UNDERCUT BANKS [1]
- __ OVERHANGING VEGETATION [1]
- __ SHALLOWS (IN SLOW WATER) [1]
- __ ROOTMATS [1]
- 1 POOLS > 70cm [2]
- __ ROOTWADS [1]
- __ BOULDERS [1]
- __ OXBOWS, BACKWATERS [1]
- 2 AQUATIC MACROPHYTES [1]
- __ LOGS OR WOODY DEBRIS [1]

AMOUNT Check ONE (Or 2 & average)
- ☐ EXTENSIVE >75% [11]
- ☑ MODERATE 25-75% [7]
- ☑ SPARSE 5-<25% [3]
- ☐ NEARLY ABSENT <5% [1]

Comments (3) (5)

Cover Maximum 20: 8

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]

Comments

Channel Maximum 20: 6

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

River right looking downstream

EROSION (L R)
- ☑ ☐ NONE / LITTLE [3]
- ☐ ☐ MODERATE [2]
- ☐ ☐ HEAVY / SEVERE [1]

RIPARIAN WIDTH (L R)
- ☑ ☐ WIDE > 50m [4]
- ☑ ☐ MODERATE 10-50m [3]
- ☐ ☐ NARROW 5-10m [2]
- ☐ ☐ VERY NARROW < 5m [1]
- ☐ ☐ NONE [0]

FLOOD PLAIN QUALITY (L R)
- ☑ ☐ 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]

Indicate predominant land use(s) past 100m riparian.

Comments (3) (3.5) (2.5)

Riparian Maximum 10: 9

5] POOL / GLIDE AND RIFFLE / RUN QUALITY

MAXIMUM DEPTH Check ONE (ONLY!)
- ☑ > 1m [6]
- ☐ 0.7-<1m [4]
- ☐ 0.4-<0.7m [2]
- ☐ 0.2-<0.4m [1]
- ☐ < 0.2m [0]

CHANNEL WIDTH Check ONE (Or 2 & average)
- ☐ POOL WIDTH > RIFFLE WIDTH [2]
- ☑ POOL WIDTH = RIFFLE WIDTH [1]
- ☐ POOL WIDTH < RIFFLE WIDTH [0]

CURRENT VELOCITY Check ALL that apply
- ☐ TORRENTIAL [-1]
- ☐ VERY FAST [1]
- ☐ FAST [1]
- ☐ MODERATE [1]
- ☑ SLOW [1]
- ☐ INTERSTITIAL [-1]
- ☐ INTERMITTENT [-2]
- ☐ EDDIES [1]

Indicate for reach - pools and riffles.

Recreation Potential
Primary Contact
Secondary Contact
(circle one and comment on back)

Comments

Pool / Current Maximum 12: 8

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

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]

Comments

Riffle / Run Maximum 8: 0

6] GRADIENT
(<0.1 ft/mi)

DRAINAGE AREA (~~>1,140~~ mi²) >1,502

- ☐ VERY LOW - LOW [2-4]
- ☐ MODERATE [6-10]
- ☐ HIGH - VERY HIGH [10-6]

%POOL: 100 %GLIDE: __ %RUN: __ %RIFFLE: __

Gradient Maximum 10: 6

EPA 4520 Proofed KC 7/16/08 06/11/08

OhioEPA

Qualitative Habitat Evaluation Index and Use Assessment Field Sheet

QHEI Score: 45.5

Stream & Location: Des Plaines River - 280.7 RB **RM:** 280.7 **Date:** 07/11/08

Scorers Full Name & Affiliation: Joe Vondruska GH Engineering

River Code: ___-___-___ **STORET #:** ______ **Lat./ Long.:** (NAD 83 - decimal °) 41.4544 / 88.1679 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
☐ ☐ BLDR /SLABS [10]	✓		☐ ☐ HARDPAN [4]	✓	
☐ ☐ BOULDER [9]	✓		☐ ☐ DETRITUS [3]	✓	
☐ ☐ COBBLE [8]	✓		☐ ☐ MUCK [2]		
☐ ☐ GRAVEL [7]	✓		☑ ☐ SILT [2]	✓	
☑ ☐ SAND [6]	✓		☐ ☐ ARTIFICIAL [0]		
☐ ☐ BEDROCK [5]					

(Score natural substrates; ignore sludge from point-sources)

NUMBER OF BEST TYPES: ☑ 4 or more [2] ☐ 3 or less [0]

Check ONE (Or 2 & average)

ORIGIN
- ☐ LIMESTONE [1]
- ☑ TILLS [1]
- ☐ WETLANDS [0]
- ☑ HARDPAN [0]
- ☐ SANDSTONE [0]
- ☐ RIP/RAP [0]
- ☐ LACUSTRINE [0]
- ☐ SHALE [-1]
- ☐ COAL FINES [-2]

QUALITY

SILT
- ☑ HEAVY [-2] -1
- ☐ MODERATE [-1]
- ☑ NORMAL [0]
- ☐ FREE [1]

EMBEDDEDNESS
- ☑ EXTENSIVE [-2]
- ☐ MODERATE [-1]
- ☑ NORMAL [0]
- ☐ NONE [1] -1

Comments ⑧ ② (0.5) (-2)

upper 160 m clear gravel/cobble; then ~100 hardpan; rest silt + sand

Substrate 8.5 Maximum 20

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.

___ UNDERCUT BANKS [1]	1✓ POOLS > 70cm [2]	1✓ OXBOWS, BACKWATERS [1]
___ OVERHANGING VEGETATION [1]	___ ROOTWADS [1]	1✓ AQUATIC MACROPHYTES [1]
___ SHALLOWS (IN SLOW WATER) [1]	1✓ BOULDERS [1]	1✓ LOGS OR WOODY DEBRIS [1]
___ ROOTMATS [1]		

AMOUNT

Check ONE (Or 2 & average)
- ☐ EXTENSIVE >75% [11]
- ☐ MODERATE 25-75% [7]
- ☑ SPARSE 5-<25% [3]
- ☑ NEARLY ABSENT <5% [1]

Comments ⑥ ②

Cover Maximum 20: 8

3] CHANNEL MORPHOLOGY

Check ONE in each category (Or 2 & average)

SINUOSITY	DEVELOPMENT	CHANNELIZATION	STABILITY
☐ HIGH [4]	☐ EXCELLENT [7]	☐ NONE [6]	☑ HIGH [3]
☐ MODERATE [3]	☐ GOOD [5]	☐ RECOVERED [4]	☐ MODERATE [2]
☐ LOW [2]	☐ FAIR [3]	☑ RECOVERING [3]	☑ LOW [1]
☑ NONE [1]	☑ POOR [1]	☐ RECENT OR NO RECOVERY [1]	

Comments ②

Channel Maximum 20: 7

4] BANK EROSION AND RIPARIAN ZONE

Check ONE in each category for EACH BANK (Or 2 per bank & average)

River right looking downstream

EROSION (L R)	RIPARIAN WIDTH (L R)	FLOOD PLAIN QUALITY (L R)	(L R)
☐ ☑ NONE / LITTLE [3]	☐ ☑ WIDE > 50m [4]	☐ ☑ FOREST, SWAMP [3]	☐ ☐ CONSERVATION TILLAGE [1]
☐ ☐ MODERATE [2]	☐ ☐ MODERATE 10-50m [3]	☐ ☑ SHRUB OR OLD FIELD [2]	☐ ☑ URBAN OR INDUSTRIAL [0]
☐ ☐ HEAVY / SEVERE [1]	☐ ☐ NARROW 5-10m [2]	☐ ☐ RESIDENTIAL, PARK, NEW FIELD [1]	☐ ☐ MINING / CONSTRUCTION [0]
	☐ ☐ VERY NARROW < 5m [1]	☐ ☐ FENCED PASTURE [1]	
	☐ ☐ NONE [0]	☐ ☐ OPEN PASTURE, ROWCROP [0]	

Indicate predominant land use(s) past 100m riparian.

Comments ③ ④ ①

Riparian Maximum 10: 8

5] POOL / GLIDE AND RIFFLE / RUN QUALITY

MAXIMUM DEPTH

Check ONE (ONLY!)
- ☑ > 1m [6]
- ☐ 0.7-<1m [4]
- ☐ 0.4-<0.7m [2]
- ☐ 0.2-<0.4m [1]
- ☐ < 0.2m [0]

CHANNEL WIDTH

Check ONE (Or 2 & average)
- ☐ POOL WIDTH > RIFFLE WIDTH [2]
- ☑ POOL WIDTH = RIFFLE WIDTH [1]
- ☐ POOL WIDTH < RIFFLE WIDTH [0]

CURRENT VELOCITY

Check ALL that apply

☐ TORRENTIAL [-1]	☑ SLOW [1]
☐ VERY FAST [1]	☐ INTERSTITIAL [-1]
☐ FAST [1]	☐ INTERMITTENT [-2]
☐ MODERATE [1]	☐ EDDIES [1]

Indicate for reach - pools and riffles.

Recreation Potential
Primary Contact
Secondary Contact
(circle one and comment on back)

Comments

Pool / Current Maximum 12: 8

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

Comments

Riffle / Run Maximum 8: 0

6] GRADIENT (<0.1 ft/mi)

DRAINAGE AREA (~~79,240~~ mi²) >1,502

- ☐ VERY LOW - LOW [2-4]
- ☐ MODERATE [6-10]
- ☐ HIGH - VERY HIGH [10-6]

%POOL: 100 %GLIDE:

%RUN: %RIFFLE:

Gradient Maximum 10: 6

EPA 4520

Proofed KC 7/16/08

06/11/08

OhioEPA

Qualitative Habitat Evaluation Index and Use Assessment Field Sheet

QHEI Score: 43.5

Stream & Location: Des Plaines River - 280.6LB **RM:** 280.6 **Date:** 07/10/08

Scorers Full Name & Affiliation: Joe Vondruska EA Engineering

River Code: ___-___-___ **STORET #:** ______ **Lat./Long.:** (NAD 83 - decimal °) 41.4529 / 88.1652 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
☐ ☐ BLDR /SLABS [10]			☐ ☐ HARDPAN [4]		
☐ ☐ BOULDER [9]			☐ ☐ DETRITUS [3]		
☐ ☐ COBBLE [8]			☐ ☐ MUCK [2]		
☐ ☐ GRAVEL [7]			☑ ☐ SILT [2]	✓	
☑ ☐ SAND [6]	✓		☐ ☐ ARTIFICIAL [0]		
☐ ☐ BEDROCK [5]					

(Score natural substrates; ignore sludge from point-sources)

NUMBER OF BEST TYPES: ☐ 4 or more [2] ☑ 3 or less [0]

Comments ⑧ ⓪

Check ONE (*Or 2 & average*)

ORIGIN
- ☐ LIMESTONE [1]
- ☐ TILLS [1]
- ☐ WETLANDS [0]
- ☑ HARDPAN [0]
- ☑ SANDSTONE [0]
- ☐ RIP/RAP [0]
- ☐ LACUSTRINE [0]
- ☐ SHALE [-1]
- ☐ COAL FINES [-2]

⓪

QUALITY ①

SILT
- ☑ HEAVY [-2]
- ☐ MODERATE [-1]
- ☑ NORMAL [0]
- ☐ FREE [1]

EMBEDDEDNESS
- ☑ EXTENSIVE [-2]
- ☐ MODERATE [-1]
- ☑ NORMAL [0]
- ☐ NONE [1]

(-1)

(-2)

Substrate 6 Maximum 20

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.

___	UNDERCUT BANKS [1]	1	POOLS > 70cm [2]	___	OXBOWS, BACKWATERS [1]
___	OVERHANGING VEGETATION [1]	___	ROOTWADS [1]	1½	AQUATIC MACROPHYTES [1]
___	SHALLOWS (IN SLOW WATER) [1]	___	BOULDERS [1]	___	LOGS OR WOODY DEBRIS [1]
___	ROOTMATS [1]				

AMOUNT

Check ONE (*Or 2 & average*)
- ☐ EXTENSIVE >75% [11]
- ☑ MODERATE 25-75% [7]
- ☑ SPARSE 5-<25% [3]
- ☐ NEARLY ABSENT <5% [1]

Comments ③ ⑤

Cover 8 Maximum 20

3] CHANNEL MORPHOLOGY

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

SINUOSITY	DEVELOPMENT	CHANNELIZATION	STABILITY
☐ HIGH [4]	☐ EXCELLENT [7]	☐ NONE [6]	☐ HIGH [3]
☐ MODERATE [3]	☐ GOOD [5]	☐ RECOVERED [4]	☐ MODERATE [2]
☐ LOW [2]	☐ FAIR [3]	☑ RECOVERING [3]	☑ LOW [1]
☑ NONE [1]	☑ POOR [1]	☐ RECENT OR NO RECOVERY [1]	

Comments

Channel 6 Maximum 20

4] BANK EROSION AND RIPARIAN ZONE

Check **ONE** in each category for ***EACH BANK*** (*Or 2 per bank & average*)

River right looking downstream

EROSION (L R)	RIPARIAN WIDTH (L R)	FLOOD PLAIN QUALITY (L R)	(L R)
☑ ☐ NONE / LITTLE [3]	☑ ☐ WIDE > 50m [4]	☑ ☐ FOREST, SWAMP [3]	☐ ☐ CONSERVATION TILLAGE [1]
☐ ☐ MODERATE [2]	☐ ☐ MODERATE 10-50m [3]	☑ ☐ SHRUB OR OLD FIELD [2]	☐ ☐ URBAN OR INDUSTRIAL [0]
☐ ☐ HEAVY / SEVERE [1]	☐ ☐ NARROW 5-10m [2]	☐ ☐ RESIDENTIAL, PARK, NEW FIELD [1]	☐ ☐ MINING / CONSTRUCTION [0]
	☐ ☐ VERY NARROW < 5m [1]	☐ ☐ FENCED PASTURE [1]	
	☐ ☐ NONE [0]	☐ ☐ OPEN PASTURE, ROWCROP [0]	

Indicate predominant land use(s) past 100m riparian.

Comments ③ ④ (2.5)

Riparian 9,5 Maximum 10

5] POOL / GLIDE AND RIFFLE / RUN QUALITY

MAXIMUM DEPTH

Check ONE (*ONLY!*)
- ☑ > 1m [6]
- ☐ 0.7-<1m [4]
- ☐ 0.4-<0.7m [2]
- ☐ 0.2-<0.4m [1]
- ☐ < 0.2m [0]

CHANNEL WIDTH

Check ONE (*Or 2 & average*)
- ☐ POOL WIDTH > RIFFLE WIDTH [2]
- ☑ POOL WIDTH = RIFFLE WIDTH [1]
- ☐ POOL WIDTH < RIFFLE WIDTH [0]

CURRENT VELOCITY

Check ALL that apply

☐ TORRENTIAL [-1]	☑ SLOW [1]
☐ VERY FAST [1]	☐ INTERSTITIAL [-1]
☐ FAST [1]	☐ INTERMITTENT [-2]
☐ MODERATE [1]	☐ EDDIES [1]

Indicate for reach - pools and riffles.

Recreation Potential
Primary Contact
Secondary Contact
(circle one and comment on back)

Comments

Pool / Current 8 Maximum 12

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

Comments

Riffle / Run 0 Maximum 8

6] GRADIENT

(<0.1 ft/mi)

DRAINAGE AREA (~~>2,240~~ mi²) >1,502

- ☐ VERY LOW - LOW [2-4]
- ☐ MODERATE [6-10]
- ☐ HIGH - VERY HIGH [10-6]

%POOL: ___ **%GLIDE:** ___

%RUN: 100 **%RIFFLE:** ___

Gradient 6 Maximum 10

EPA 4520 Proofed KC 7/16/08 06/11/08

OhioEPA

Qualitative Habitat Evaluation Index and Use Assessment Field Sheet

QHEI Score: 34.5

Stream & Location: Des Plaines River - 280.4 RB **RM:** 280.4 **Date:** 07/11/08
adjacent to Amoco Chemical **Scorers Full Name & Affiliation:** Joe Vondruska EA Engineering
River Code: ___-___-___ **STORET #:** ______ **Lat./Long.:** (NAD 83 - decimal °) 41.4500 / 88.1673 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
☐ ☐ BLDR /SLABS [10]			☐ ☐ HARDPAN [4]		
☐ ☐ BOULDER [9]			☐ ☐ DETRITUS [3]	✓	
☐ ☐ COBBLE [8]			☐ ☐ MUCK [2]		
☐ ☐ GRAVEL [7]			☑ ☑ SILT [2]	✓	
☐ ☐ SAND [6]	✓		☐ ☐ ARTIFICIAL [0]		
☐ ☐ BEDROCK [5]			(Score natural substrates; ignore sludge from point-sources)		

NUMBER OF BEST TYPES: ☐ 4 or more [2] ☑ 3 or less [0]

Check ONE (*Or 2 & average*)

ORIGIN	SILT / EMBEDDEDNESS	QUALITY
☐ LIMESTONE [1]	SILT	☑ HEAVY [-2]
☐ TILLS [1]		☐ MODERATE [-1]
☐ WETLANDS [0]		☐ NORMAL [0]
☑ HARDPAN [0]		☐ FREE [1]
☑ SANDSTONE [0]	EMBEDDEDNESS	☑ EXTENSIVE [-2]
☐ RIP/RAP [0]		☐ MODERATE [-1]
☐ LACUSTRINE [0]		☐ NORMAL [0]
☐ SHALE [-1]		☐ NONE [1]
☐ COAL FINES [-2]		

Comments "oily" sediments (4) (0) (0) (-4)

Substrate Maximum 20: 0

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.

___	UNDERCUT BANKS [1]	1 ✓	POOLS > 70cm [2]	___	OXBOWS, BACKWATERS [1]
___	OVERHANGING VEGETATION [1]	___	ROOTWADS [1]	2 ✓	AQUATIC MACROPHYTES [1]
___	SHALLOWS (IN SLOW WATER) [1]	___	BOULDERS [1]	___	LOGS OR WOODY DEBRIS [1]
___	ROOTMATS [1]				

AMOUNT
Check ONE (*Or 2 & average*)
- ☐ EXTENSIVE >75% [11]
- ☑ MODERATE 25-75% [7]
- ☑ SPARSE 5-<25% [3]
- ☐ NEARLY ABSENT <5% [1]

Comments (3) (5)

Cover Maximum 20: 8

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

SINUOSITY	DEVELOPMENT	CHANNELIZATION	STABILITY
☐ HIGH [4]	☐ EXCELLENT [7]	☐ NONE [6]	☐ HIGH [3]
☐ MODERATE [3]	☐ GOOD [5]	☐ RECOVERED [4]	☐ MODERATE [2]
☐ LOW [2]	☐ FAIR [3]	☑ RECOVERING [3]	☑ LOW [1]
☒ NONE [1]	☑ POOR [1]	☐ RECENT OR NO RECOVERY [1]	

Comments

Channel Maximum 20: 6

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

L R EROSION	L R RIPARIAN WIDTH	L R FLOOD PLAIN QUALITY	L R
☐ ☑ NONE / LITTLE [3]	☐ ☑ WIDE > 50m [4]	☐ ☐ FOREST, SWAMP [3]	☐ ☐ CONSERVATION TILLAGE [1]
☐ ☐ MODERATE [2]	☐ ☐ MODERATE 10-50m [3]	☐ ☑ SHRUB OR OLD FIELD [2]	☐ ☑ URBAN OR INDUSTRIAL [0]
☐ ☐ HEAVY / SEVERE [1]	☐ ☐ NARROW 5-10m [2]	☐ ☐ RESIDENTIAL, PARK, NEW FIELD [1]	☐ ☐ MINING / CONSTRUCTION [0]
	☐ ☑ VERY NARROW < 5m [1]	☐ ☐ FENCED PASTURE [1]	*Indicate predominant land use(s) past 100m riparian.*
	☐ ☐ NONE [0]	☐ ☐ OPEN PASTURE, ROWCROP [0]	

Comments (3) (2.5) (1)

Riparian Maximum 10: 6.5

5] POOL / GLIDE AND RIFFLE / RUN QUALITY

MAXIMUM DEPTH Check ONE (*ONLY!*)	CHANNEL WIDTH Check ONE (*Or 2 & average*)	CURRENT VELOCITY Check ALL that apply	
☑ > 1m [6]	☐ POOL WIDTH > RIFFLE WIDTH [2]	☐ TORRENTIAL [-1]	☑ SLOW [1]
☐ 0.7-<1m [4]	☑ POOL WIDTH = RIFFLE WIDTH [1]	☐ VERY FAST [1]	☐ INTERSTITIAL [-1]
☐ 0.4-<0.7m [2]	☐ POOL WIDTH < RIFFLE WIDTH [0]	☐ FAST [1]	☐ INTERMITTENT [-2]
☐ 0.2-<0.4m [1]		☐ MODERATE [1]	☐ EDDIES [1]
☐ < 0.2m [0]		*Indicate for reach - pools and riffles.*	

Recreation Potential
Primary Contact
Secondary Contact
(circle one and comment on back)

Comments

Pool / Current Maximum 12: 8

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

Comments

Riffle / Run Maximum 8: 0

6] GRADIENT
GRADIENT (<0.1 ft/mi) **DRAINAGE AREA** (~~72,240~~ mi²)
- ☐ VERY LOW - LOW [2-4]
- ☐ MODERATE [6-10]
- ☐ HIGH - VERY HIGH [10-6]

%POOL: ~~100~~ **%GLIDE:**
%RUN: **%RIFFLE:**

Gradient Maximum 10: 6

EPA 4520 >1,502 Proofed KC 7/16/08 06/11/08

OhioEPA

Qualitative Habitat Evaluation Index and Use Assessment Field Sheet

QHEI Score: 47.5

Stream & Location: Des Plaines River 280.3 LB **RM:** 280.3 **Date:** 07/10/08

Scorers Full Name & Affiliation: Joe Vondruska EA Engineering

River Code: ___-___-___ **STORET #:** ______ **Lat./Long.:** (NAD 83 - decimal °) 41.4486 / 88.1648 Office verified location ☐

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

BEST TYPES — POOL RIFFLE
- ☐ ☐ BLDR /SLABS [10] ___ ___
- ☐ ☐ BOULDER [9] ___ ___
- ☐ ☐ COBBLE [8] ___ ___
- ☐ ☐ GRAVEL [7] ✓ ___
- ☑ ☐ SAND [6] ✓ ___
- ☐ ☐ BEDROCK [5] ___ ___

NUMBER OF BEST TYPES: ☐ 4 or more [2] ☑ 3 or less [0]

OTHER TYPES — POOL RIFFLE
- ☐ ☐ HARDPAN [4] ✓ ___
- ☐ ☐ DETRITUS [3] ✓ ___
- ☐ ☐ MUCK [2] ___ ___
- ☑ ☐ SILT [2] ✓ ___
- ☐ ☐ ARTIFICIAL [0] ___ ___

(Score natural substrates; ignore sludge from point-sources)

Check ONE (Or 2 & average)

ORIGIN
- ☐ LIMESTONE [1]
- ☐ TILLS [1]
- ☐ WETLANDS [0]
- ☑ HARDPAN [0]
- ☑ SANDSTONE [0]
- ☐ RIP/RAP [0]
- ☐ LACUSTRINE [0]
- ☐ SHALE [-1]
- ☐ COAL FINES [-2]

QUALITY -1

SILT
- ☑ HEAVY [-2]
- ☐ MODERATE [-1]
- ☑ NORMAL [0]
- ☐ FREE [1]

EMBEDDEDNESS
- ☑ EXTENSIVE [-2]
- ☐ MODERATE [-1]
- ☑ NORMAL [0]
- ☐ NONE [1]

-1

Comments (8) (0) (0) (-2)

Substrate 6 Maximum 20

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.

- ___ UNDERCUT BANKS [1]
- ___ OVERHANGING VEGETATION [1]
- ___ SHALLOWS (IN SLOW WATER) [1]
- ___ ROOTMATS [1]
- 1 POOLS > 70cm [2]
- ___ ROOTWADS [1]
- ___ BOULDERS [1]
- ___ OXBOWS, BACKWATERS [1]
- 2 AQUATIC MACROPHYTES [1]
- ___ LOGS OR WOODY DEBRIS [1]

AMOUNT
Check ONE (Or 2 & average)
- ☑ EXTENSIVE >75% [11]
- ☑ MODERATE 25-75% [7]
- ☐ SPARSE 5-<25% [3]
- ☐ NEARLY ABSENT <5% [1]

Comments (3) (9)

Cover Maximum 20: 12

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]

Comments

Channel Maximum 20: 6

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

River right looking downstream

EROSION (L R)
- ☑ ☐ NONE / LITTLE [3]
- ☐ ☐ MODERATE [2]
- ☐ ☐ HEAVY / SEVERE [1]

RIPARIAN WIDTH (L R)
- ☑ ☐ WIDE > 50m [4]
- ☐ ☐ MODERATE 10-50m [3]
- ☐ ☐ NARROW 5-10m [2]
- ☐ ☐ VERY NARROW < 5m [1]
- ☐ ☐ NONE [0]

FLOOD PLAIN QUALITY (L R)
- ☑ ☐ 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]

Indicate predominant land use(s) past 100m riparian.

Comments (3) (4) (2.5)

Riparian Maximum 10: 9.5

5] POOL / GLIDE AND RIFFLE / RUN QUALITY

MAXIMUM DEPTH
Check ONE (ONLY!)
- ☑ > 1m [6]
- ☐ 0.7-<1m [4]
- ☐ 0.4-<0.7m [2]
- ☐ 0.2-<0.4m [1]
- ☐ < 0.2m [0]

CHANNEL WIDTH
Check ONE (Or 2 & average)
- ☐ POOL WIDTH > RIFFLE WIDTH [2]
- ☑ POOL WIDTH = RIFFLE WIDTH [1]
- ☐ POOL WIDTH < RIFFLE WIDTH [0]

CURRENT VELOCITY
Check ALL that apply
- ☐ TORRENTIAL [-1]
- ☐ VERY FAST [1]
- ☐ FAST [1]
- ☐ MODERATE [1]
- ☑ SLOW [1]
- ☐ INTERSTITIAL [-1]
- ☐ INTERMITTENT [-2]
- ☐ EDDIES [1]

Indicate for reach - pools and riffles.

Recreation Potential
Primary Contact
Secondary Contact
(circle one and comment on back)

Comments

Pool / Current Maximum 12: 8

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 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]

Comments

Riffle / Run Maximum 8: 0

6] GRADIENT (<0.1 ft/mi)
DRAINAGE AREA (~~72,240~~ mi²) >1,502

- ☐ VERY LOW - LOW [2-4]
- ☐ MODERATE [6-10]
- ☐ HIGH - VERY HIGH [10-6]

%POOL: 100 %GLIDE: ___
%RUN: ___ %RIFFLE: ___

Gradient Maximum 10: 6

EPA 4520 Proofed KC 7/16/08 06/11/08

Qualitative Habitat Evaluation Index and Use Assessment Field Sheet

QHEI Score: 51

Stream & Location: Des Plaines River - 280.0RB **RM:** 280.0 **Date:** 07/ 11 / 08

adj to Amoco Chemical; Loc 404A EF **Scorers Full Name & Affiliation:** Joe Vondruska EA Engineering

River Code: __ - __ - __ **STORET #:** __ **Lat./ Long.:** (NAD 83 - decimal °) 41.44565 / 88.1684 **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
☐ ☐ BLDR /SLABS [10]			☐ ☐ HARDPAN [4]	✓	
☐ ☐ BOULDER [9]	✓		☐ ☐ DETRITUS [3]	✓	
☑ ☐ COBBLE [8]	✓		☐ ☐ MUCK [2]		
☐ ☐ GRAVEL [7]	✓		☑ ☐ SILT [2]	✓	
☐ ☐ SAND [6]	✓		☐ ☐ ARTIFICIAL [0]		
☐ ☐ BEDROCK [5]					

(Score natural substrates; ignore sludge from point-sources)

NUMBER OF BEST TYPES: ☑ 4 or more [2] ☐ 3 or less [0] (10) (2)

Check ONE (Or 2 & average)

ORIGIN
- ☐ LIMESTONE [1]
- ☑ TILLS [1]
- ☐ WETLANDS [0]
- ☑ HARDPAN [0]
- ☐ SANDSTONE [0]
- ☐ RIP/RAP [0]
- ☐ LACUSTRINE [0]
- ☐ SHALE [-1]
- ☐ COAL FINES [-2]

(0.5)

QUALITY

SILT
- ☑ HEAVY [-2] -1
- ☐ MODERATE [-1]
- ☑ NORMAL [0]
- ☐ FREE [1]

EMBEDDEDNESS
- ☑ EXTENSIVE [-2]
- ☐ MODERATE [-1]
- ☑ NORMAL [0]
- ☐ NONE [1] -4

(-2)

Substrate 10.5 Maximum 20

Comments upper ½ silt dominated; lower ½ cobble dominated

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.

__ UNDERCUT BANKS [1]
1 OVERHANGING VEGETATION [1]
__ SHALLOWS (IN SLOW WATER) [1]
__ ROOTMATS [1]
2 ✓ POOLS > 70cm [2]
__ ROOTWADS [1]
1 BOULDERS [1]
__ OXBOWS, BACKWATERS [1]
1 ✓ AQUATIC MACROPHYTES [1]
1 LOGS OR WOODY DEBRIS [1]

(6)

AMOUNT Check ONE (Or 2 & average)
- ☐ EXTENSIVE >75% [11]
- ☑ MODERATE 25-75% [7]
- ☑ SPARSE 5-<25% [3]
- ☐ NEARLY ABSENT <5% [1]

(5)

Cover 11 Maximum 20

Comments

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]

(2)

Channel 7 Maximum 20

Comments

4] BANK EROSION AND RIPARIAN ZONE

Check ONE in each category for EACH BANK (Or 2 per bank & average)

River right looking downstream

EROSION (L R)
- ☐ ☑ NONE / LITTLE [3]
- ☐ ☐ MODERATE [2]
- ☐ ☐ HEAVY / SEVERE [1]

RIPARIAN WIDTH (L R)
- ☐ ☑ WIDE > 50m [4]
- ☐ ☐ MODERATE 10-50m [3]
- ☐ ☐ NARROW 5-10m [2]
- ☐ ☐ VERY NARROW < 5m [1]
- ☐ ☐ NONE [0]

FLOOD PLAIN QUALITY (L R)
- ☐ ☑ FOREST, SWAMP [3]
- ☐ ☐ SHRUB OR OLD FIELD [2]
- ☐ ☐ RESIDENTIAL, PARK, NEW FIELD [1]
- ☐ ☐ FENCED PASTURE [1]
- ☐ ☐ OPEN PASTURE, ROWCROP [0]

(L R)
- ☐ ☐ CONSERVATION TILLAGE [1]
- ☐ ☑ URBAN OR INDUSTRIAL [0]
- ☐ ☐ MINING / CONSTRUCTION [0]

Indicate predominant land use(s) past 100m riparian.

Riparian 8.5 Maximum 10

Comments (3) (4) (1.5)

5] POOL / GLIDE AND RIFFLE / RUN QUALITY

MAXIMUM DEPTH Check ONE (ONLY!)
- ☑ > 1m [6]
- ☐ 0.7-<1m [4]
- ☐ 0.4-<0.7m [2]
- ☐ 0.2-<0.4m [1]
- ☐ < 0.2m [0]

CHANNEL WIDTH Check ONE (Or 2 & average)
- ☐ POOL WIDTH > RIFFLE WIDTH [2]
- ☑ POOL WIDTH = RIFFLE WIDTH [1]
- ☐ POOL WIDTH < RIFFLE WIDTH [0]

CURRENT VELOCITY Check ALL that apply
- ☐ TORRENTIAL [-1]
- ☐ VERY FAST [1]
- ☐ FAST [1]
- ☐ MODERATE [1]
- ☑ SLOW [1]
- ☐ INTERSTITIAL [-1]
- ☐ INTERMITTENT [-2]
- ☐ EDDIES [1]

Indicate for reach - pools and riffles.

Recreation Potential
Primary Contact
Secondary Contact
(circle one and comment on back)

Pool / Current 8 Maximum 12

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 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]

Riffle / Run 0 Maximum 8

Comments

6] GRADIENT (<0.1 ft/mi)

DRAINAGE AREA (~~72,240~~ mi²)

- ☐ VERY LOW - LOW [2-4]
- ☐ MODERATE [6-10]
- ☐ HIGH - VERY HIGH [10-6]

%POOL: ~~[illegible]~~ 50 %GLIDE: 50
%RUN: %RIFFLE:

Gradient 6 Maximum 10

EPA 4520 >1,502 Proofed KC 7/16/08 06/11/08

Ohio EPA

Qualitative Habitat Evaluation Index and Use Assessment Field Sheet

QHEI Score: 58.5

Stream & Location: Des Plaines River - 279.8LB **RM:** 279.8 **Date:** 07/10/08

Scorers Full Name & Affiliation: Joe Vondruska EA Engineering

River Code: ___-___-___ **STORET #:** ______ **Lat./ Long.:** (NAD 83 - decimal °) 41.4420 / 88.1682 Office verified location ☐

1] SUBSTRATE

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

BEST TYPES			POOL	RIFFLE
☐	☐	BLDR /SLABS [10]		
☐	☐	BOULDER [9]	✓	
☒	☐	COBBLE [8]	✓	
☒	☐	GRAVEL [7]	✓	
☐	☐	SAND [6]	✓	
☐	☐	BEDROCK [5]		

OTHER TYPES			POOL	RIFFLE
☐	☐	HARDPAN [4]		
☐	☐	DETRITUS [3]		
☐	☐	MUCK [2]		
☐	☐	SILT [2]		
☐	☐	ARTIFICIAL [0]		

(Score natural substrates; ignore sludge from point-sources)

NUMBER OF BEST TYPES: ☒ 4 or more [2] ☐ 3 or less [0]

Check ONE (*Or 2 & average*)

ORIGIN
- ☐ LIMESTONE [1]
- ☒ TILLS [1]
- ☐ WETLANDS [0]
- ☐ HARDPAN [0]
- ☐ SANDSTONE [0]
- ☐ RIP/RAP [0]
- ☐ LACUSTRINE [0]
- ☐ SHALE [-1]
- ☐ COAL FINES [-2]

QUALITY 0.5

SILT
- ☐ HEAVY [-2]
- ☐ MODERATE [-1]
- ☒ NORMAL [0]
- ☒ FREE [1]

EMBEDDEDNESS
- ☐ EXTENSIVE [-2]
- ☐ MODERATE [-1]
- ☒ NORMAL [0]
- ☒ NONE [1] 0.5

Comments (15) (2) (1) (1)

Substrate 19 Maximum 20

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.

___	UNDERCUT BANKS [1]	1	POOLS > 70cm [2]	___	OXBOWS, BACKWATERS [1]
___	OVERHANGING VEGETATION [1]	___	ROOTWADS [1]	1	AQUATIC MACROPHYTES [1]
___	SHALLOWS (IN SLOW WATER) [1]	2	BOULDERS [1]	___	LOGS OR WOODY DEBRIS [1]
___	ROOTMATS [1]				

AMOUNT

Check ONE (*Or 2 & average*)
- ☐ EXTENSIVE >75% [11]
- ☐ MODERATE 25-75% [7]
- ☒ SPARSE 5-<25% [3]
- ☐ NEARLY ABSENT <5% [1]

Comments (4) (3)

Cover 7 Maximum 20

3] CHANNEL MORPHOLOGY

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

SINUOSITY	DEVELOPMENT	CHANNELIZATION	STABILITY
☐ HIGH [4]	☐ EXCELLENT [7]	☐ NONE [6]	☒ HIGH [3]
☐ MODERATE [3]	☐ GOOD [5]	☐ RECOVERED [4]	☐ MODERATE [2]
☐ LOW [2]	☐ FAIR [3]	☒ RECOVERING [3]	☐ LOW [1]
☒ NONE [1]	☒ POOR [1]	☐ RECENT OR NO RECOVERY [1]	

Comments

Channel 8 Maximum 20

4] BANK EROSION AND RIPARIAN ZONE

Check **ONE** in each category for ***EACH BANK*** (*Or 2 per bank & average*)

River right looking downstream

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

Indicate predominant land use(s) past 100m riparian.

Comments (3) (4) (2.5)

Riparian 9.5 Maximum 10

5] POOL / GLIDE AND RIFFLE / RUN QUALITY

MAXIMUM DEPTH

Check ONE (*ONLY!*)
- ☒ > 1m [6]
- ☐ 0.7-<1m [4]
- ☐ 0.4-<0.7m [2]
- ☐ 0.2-<0.4m [1]
- ☐ < 0.2m [0]

CHANNEL WIDTH

Check ONE (*Or 2 & average*)
- ☐ POOL WIDTH > RIFFLE WIDTH [2]
- ☒ POOL WIDTH = RIFFLE WIDTH [1]
- ☐ POOL WIDTH < RIFFLE WIDTH [0]

CURRENT VELOCITY

Check ALL that apply

☐ TORRENTIAL [-1]	☒ SLOW [1]
☐ VERY FAST [1]	☐ INTERSTITIAL [-1]
☐ FAST [1]	☐ INTERMITTENT [-2]
☒ MODERATE [1]	☐ EDDIES [1]

Indicate for reach - pools and riffles.

Recreation Potential
Primary Contact
Secondary Contact
(circle one and comment on back)

Comments

Pool / Current 9 Maximum 12

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

Comments

Riffle / Run 0 Maximum 8

6] GRADIENT

GRADIENT (<0.1 ft/mi)
DRAINAGE AREA (~~2,240~~ mi²) >1,502

- ☐ VERY LOW - LOW [2-4]
- ☐ MODERATE [6-10]
- ☐ HIGH - VERY HIGH [10-6]

%POOL: ____ **%GLIDE:** 100
%RUN: ____ **%RIFFLE:** ____

Gradient 6 Maximum 10

EPA 4520

Proofed KC 7/16/08

06/11/08

OhioEPA

Qualitative Habitat Evaluation Index and Use Assessment Field Sheet

QHEI Score: 60

Stream & Location: Des Plaines River - 279.7 RB **RM:** 279.7 **Date:** 07/11/08

Scorers Full Name & Affiliation: Joe Vondruska EA Engineering

River Code: ___-___-___ **STORET #:** ______ **Lat./ Long.:** (NAD 83 - decimal °) 41.4414 / 88.1700 Office verified location ☐

1] SUBSTRATE

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

BEST TYPES (POOL RIFFLE)
- ☐ ☐ BLDR /SLABS [10] ✓
- ☐ ☐ BOULDER [9] ✓
- ☑ ☐ COBBLE [8] ✓
- ☐ ☑ GRAVEL [7] ✓
- ☐ ☐ SAND [6]
- ☐ ☐ BEDROCK [5]

NUMBER OF BEST TYPES: ☑ 4 or more [2] ☐ 3 or less [0]

OTHER TYPES (POOL RIFFLE)
- ☐ ☐ HARDPAN [4]
- ☐ ☐ DETRITUS [3]
- ☐ ☐ MUCK [2]
- ☐ ☐ SILT [2]
- ☐ ☐ ARTIFICIAL [0]

(Score natural substrates; ignore sludge from point-sources)

Check ONE (Or 2 & average)

ORIGIN
- ☐ LIMESTONE [1]
- ☑ TILLS [1]
- ☐ WETLANDS [0]
- ☐ HARDPAN [0]
- ☐ SANDSTONE [0]
- ☐ RIP/RAP [0]
- ☐ LACUSTRINE [0]
- ☐ SHALE [-1]
- ☐ COAL FINES [-2]

QUALITY 0.5

SILT
- ☐ HEAVY [-2]
- ☐ MODERATE [-1]
- ☑ NORMAL [0]
- ☑ FREE [1]

EMBEDDEDNESS
- ☐ EXTENSIVE [-2]
- ☐ MODERATE [-1]
- ☑ NORMAL [0]
- ☑ NONE [1]

0.5

Comments (15) (2) (1) (1)

Substrate 19 Maximum 20

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.

- ___ UNDERCUT BANKS [1]
- 1 OVERHANGING VEGETATION [1]
- ___ SHALLOWS (IN SLOW WATER) [1]
- ___ ROOTMATS [1]
- 2 ✓ POOLS > 70cm [2]
- ___ ROOTWADS [1]
- 2 ✓ BOULDERS [1]
- ___ OXBOWS, BACKWATERS [1]
- 1 ✓ AQUATIC MACROPHYTES [1]
- 1 ✓ LOGS OR WOODY DEBRIS [1]

AMOUNT

Check ONE (Or 2 & average)
- ☐ EXTENSIVE >75% [11]
- ☐ MODERATE 25-75% [7]
- ☑ SPARSE 5-<25% [3]
- ☐ NEARLY ABSENT <5% [1]

Comments (6) (3)

Cover 9 Maximum 20

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]

Comments

Channel 8 Maximum 20

4] BANK EROSION AND RIPARIAN ZONE

Check ONE in each category for EACH BANK (Or 2 per bank & average)

River right looking downstream

EROSION (L R)
- ☐ ☑ NONE / LITTLE [3]
- ☐ ☑ MODERATE [2]
- ☐ ☐ HEAVY / SEVERE [1]

RIPARIAN WIDTH (L R)
- ☐ ☑ WIDE > 50m [4]
- ☐ ☐ MODERATE 10-50m [3]
- ☐ ☐ NARROW 5-10m [2]
- ☐ ☐ VERY NARROW < 5m [1]
- ☐ ☐ NONE [0]

FLOOD PLAIN QUALITY (L R)
- ☐ ☑ FOREST, SWAMP [3]
- ☐ ☐ SHRUB OR OLD FIELD [2]
- ☐ ☐ RESIDENTIAL, PARK, NEW FIELD [1]
- ☐ ☐ FENCED PASTURE [1]
- ☐ ☐ OPEN PASTURE, ROWCROP [0]

(L R)
- ☐ ☐ CONSERVATION TILLAGE [1]
- ☐ ☑ URBAN OR INDUSTRIAL [0]
- ☐ ☐ MINING / CONSTRUCTION [0]

Indicate predominant land use(s) past 100m riparian.

Comments (2.5) (4) (1.5)

Riparian 8 Maximum 10

5] POOL / GLIDE AND RIFFLE / RUN QUALITY

MAXIMUM DEPTH

Check ONE (ONLY!)
- ☑ > 1m [6]
- ☐ 0.7-<1m [4]
- ☐ 0.4-<0.7m [2]
- ☐ 0.2-<0.4m [1]
- ☐ < 0.2m [0]

CHANNEL WIDTH

Check ONE (Or 2 & average)
- ☐ POOL WIDTH > RIFFLE WIDTH [2]
- ☑ POOL WIDTH = RIFFLE WIDTH [1]
- ☐ POOL WIDTH < RIFFLE WIDTH [0]

CURRENT VELOCITY

Check ALL that apply
- ☐ TORRENTIAL [-1]
- ☐ VERY FAST [1]
- ☐ FAST [1]
- ☑ MODERATE [1]
- ☑ SLOW [1]
- ☐ INTERSTITIAL [-1]
- ☐ INTERMITTENT [-2]
- ☑ EDDIES [1]

Indicate for reach - pools and riffles.

Recreation Potential
Primary Contact
Secondary Contact
(circle one and comment on back)

Comments

Pool / Current 10 Maximum 12

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 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]

Comments

Riffle / Run 0 Maximum 8

6] GRADIENT

(<0.1 ft/mi)

DRAINAGE AREA (~~72,240~~ mi²) >1,502

- ☐ VERY LOW - LOW [2-4]
- ☐ MODERATE [6-10]
- ☐ HIGH - VERY HIGH [10-6]

%POOL: [illegible] %GLIDE: 100
%RUN: %RIFFLE:

Gradient 6 Maximum 10

Proofed KC 7/16/08

Electronic Filing: Received, Clerk's Office 04/20/2023

Electronic Filing - Received, Clerk's Office, September 8, 2008

OhioEPA

Qualitative Habitat Evaluation Index and Use Assessment Field Sheet

QHEI Score: 60.5

Stream & Location: Des Plaines River 279.5 LB (coincides w/ MBI's 279.5 zone)

RM: 279.5 **Date:** 07/10/08

Scorers Full Name & Affiliation: Joe Vondruska EA Engineering

River Code: ___-___-___ **STORET #:** ______

Lat./Long.: (NAD 83 - decimal °) 41.4379 / 88.1707

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
☐☐ BLDR/SLABS [10]			☐☐ HARDPAN [4]		
☐☐ BOULDER [9]	✓		☐☐ DETRITUS [3]		
☑☐ COBBLE [8]	✓		☐☐ MUCK [2]		
☑☐ GRAVEL [7]	✓		☐☐ SILT [2]		
☐☐ SAND [6]	✓		☐☐ ARTIFICIAL [0]		
☐☐ BEDROCK [5]					

(Score natural substrates; ignore sludge from point-sources)

NUMBER OF BEST TYPES: ☑ 4 or more [2] ☐ 3 or less [0]

Comments (15) (2)

Check ONE (Or 2 & average)

ORIGIN
- ☐ LIMESTONE [1]
- ☑ TILLS [1]
- ☐ WETLANDS [0]
- ☐ HARDPAN [0]
- ☐ SANDSTONE [0]
- ☐ RIP/RAP [0]
- ☐ LACUSTRINE [0]
- ☐ SHALE [-1]
- ☐ COAL FINES [-2]

(1)

QUALITY

SILT
- ☐ HEAVY [-2]
- ☐ MODERATE [-1]
- ☑ NORMAL [0]
- ☑ FREE [1]

0.5

EMBEDDEDNESS
- ☐ EXTENSIVE [-2]
- ☐ MODERATE [-1]
- ☑ NORMAL [0]
- ☑ NONE [1]

0.5

(1)

Substrate 19 Maximum 20

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.

__	UNDERCUT BANKS [1]	1	POOLS > 70cm [2]	__	OXBOWS, BACKWATERS [1]
1	OVERHANGING VEGETATION [1]	__	ROOTWADS [1]	1	AQUATIC MACROPHYTES [1]
__	SHALLOWS (IN SLOW WATER) [1]	1	BOULDERS [1]	1	LOGS OR WOODY DEBRIS [1]
__	ROOTMATS [1]				

AMOUNT

Check ONE (Or 2 & average)
- ☐ EXTENSIVE >75% [11]
- ☐ MODERATE 25-75% [7]
- ☑ SPARSE 5-<25% [3]
- ☐ NEARLY ABSENT <5% [1]

Comments (6) (3)

Cover 9 Maximum 20

3] CHANNEL MORPHOLOGY

Check ONE in each category (Or 2 & average)

SINUOSITY	DEVELOPMENT	CHANNELIZATION	STABILITY
☐ HIGH [4]	☐ EXCELLENT [7]	☐ NONE [6]	☑ HIGH [3]
☐ MODERATE [3]	☐ GOOD [5]	☐ RECOVERED [4]	☐ MODERATE [2]
☐ LOW [2]	☐ FAIR [3]	☑ RECOVERING [3]	☐ LOW [1]
☑ NONE [1]	☑ POOR [1]	☐ RECENT OR NO RECOVERY [1]	

Comments

Channel 8 Maximum 20

4] BANK EROSION AND RIPARIAN ZONE

Check ONE in each category for EACH BANK (Or 2 per bank & average)

River right looking downstream

EROSION (L R)	RIPARIAN WIDTH (L R)	FLOOD PLAIN QUALITY (L R)	
☑☐ NONE / LITTLE [3]	☑☐ WIDE > 50m [4]	☑☐ FOREST, SWAMP [3]	☐☐ CONSERVATION TILLAGE [1]
☐☐ MODERATE [2]	☐☐ MODERATE 10-50m [3]	☑☐ SHRUB OR OLD FIELD [2]	☐☐ URBAN OR INDUSTRIAL [0]
☐☐ HEAVY / SEVERE [1]	☐☐ NARROW 5-10m [2]	☐☐ RESIDENTIAL, PARK, NEW FIELD [1]	☐☐ MINING / CONSTRUCTION [0]
	☐☐ VERY NARROW < 5m [1]	☐☐ FENCED PASTURE [1]	
	☐☐ NONE [0]	☐☐ OPEN PASTURE, ROWCROP [0]	

Indicate predominant land use(s) past 100m riparian.

Comments (3) (4) (2.5)

Riparian 9.5 Maximum 10

5] POOL / GLIDE AND RIFFLE / RUN QUALITY

MAXIMUM DEPTH Check ONE (ONLY!)	CHANNEL WIDTH Check ONE (Or 2 & average)	CURRENT VELOCITY Check ALL that apply	
☑ > 1m [6]	☐ POOL WIDTH > RIFFLE WIDTH [2]	☐ TORRENTIAL [-1]	☑ SLOW [1]
☐ 0.7-<1m [4]	☑ POOL WIDTH = RIFFLE WIDTH [1]	☐ VERY FAST [1]	☐ INTERSTITIAL [-1]
☐ 0.4-<0.7m [2]	☐ POOL WIDTH < RIFFLE WIDTH [0]	☐ FAST [1]	☐ INTERMITTENT [-2]
☐ 0.2-<0.4m [1]		☑ MODERATE [1]	☐ EDDIES [1]
☐ < 0.2m [0]			

Indicate for reach - pools and riffles.

Recreation Potential
Primary Contact
Secondary Contact
(circle one and comment on back)

Comments

Pool / Current 9 Maximum 12

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

Comments

Riffle / Run 0 Maximum 8

6] GRADIENT (<0.1 ft/mi)

DRAINAGE AREA (~~>2,140~~ mi²) >1,502

- ☐ VERY LOW - LOW [2-4]
- ☐ MODERATE [6-10]
- ☐ HIGH - VERY HIGH [10-6]

%POOL: ~~100~~ %GLIDE: 100

%RUN: %RIFFLE:

Gradient 6 Maximum 10

EPA 4520

Proofed KC 7/16/08

06/11/08

OhioEPA

Qualitative Habitat Evaluation Index and Use Assessment Field Sheet

QHEI Score: 60

Stream & Location: Des Plaines River 279.4 RB **RM:** 279.4 **Date:** 07/11/08

Scorers Full Name & Affiliation: Joe Vavrauska EA Engineering

River Code: ___-___-___ **STORET #:** ______ **Lat./ Long.:** (NAD 83 - decimal °) 41.4373 /88.1724 Office verified location ☐

1] SUBSTRATE

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

BEST TYPES POOL RIFFLE

☐ ☐ BLDR /SLABS [10] ✓
☐ ☐ BOULDER [9] ✓
☑ ☑ COBBLE [8] ✓
☐ ☐ GRAVEL [7] ✓
☐ ☐ SAND [6]
☐ ☐ BEDROCK [5] ✓

NUMBER OF BEST TYPES: ☑ 4 or more [2] ☐ 3 or less [0]

OTHER TYPES POOL RIFFLE

☐ ☐ HARDPAN [4]
☐ ☐ DETRITUS [3]
☐ ☐ MUCK [2]
☐ ☐ SILT [2]
☐ ☐ ARTIFICIAL [0]

(Score natural substrates; ignore sludge from point-sources)

Check ONE (Or 2 & average)

ORIGIN

☐ LIMESTONE [1]
☑ TILLS [1]
☐ WETLANDS [0]
☐ HARDPAN [0]
☐ SANDSTONE [0]
☐ RIP/RAP [0]
☐ LACUSTRINE [0]
☐ SHALE [-1]
☐ COAL FINES [-2]

QUALITY (0.5)

SILT

☐ HEAVY [-2]
☐ MODERATE [-1]
☑ NORMAL [0]
☑ FREE [1]

EMBEDDEDNESS

☐ EXTENSIVE [-2]
☐ MODERATE [-1]
☑ NORMAL [0]
☑ NONE [1]

(0.5)

Comments (16) (2) ① ①

Substrate 20 Maximum 20

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.

___ UNDERCUT BANKS [1]
1 ✓ OVERHANGING VEGETATION [1]
___ SHALLOWS (IN SLOW WATER) [1]
___ ROOTMATS [1]
2 ✓ POOLS > 70cm [2]
___ ROOTWADS [1]
3 ✓ BOULDERS [1]
___ OXBOWS, BACKWATERS [1]
___ AQUATIC MACROPHYTES [1]
1 ✓ LOGS OR WOODY DEBRIS [1]

AMOUNT

Check ONE (Or 2 & average)

☐ EXTENSIVE >75% [11]
☐ MODERATE 25-75% [7]
☑ SPARSE 5-<25% [3]
☐ NEARLY ABSENT <5% [1]

Comments (5) (3)

Cover 8 Maximum 20

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]

Comments

Channel 8 Maximum 20

4] BANK EROSION AND RIPARIAN ZONE

Check ONE in each category for EACH BANK (Or 2 per bank & average)

River right looking downstream

EROSION L R

☐ ☑ NONE / LITTLE [3]
☐ ☐ MODERATE [2]
☐ ☐ HEAVY / SEVERE [1]

RIPARIAN WIDTH L R

☐ ☑ WIDE > 50m [4]
☐ ☐ MODERATE 10-50m [3]
☐ ☐ NARROW 5-10m [2]
☐ ☐ VERY NARROW < 5m [1]
☐ ☐ NONE [0]

FLOOD PLAIN QUALITY L R

☐ ☑ FOREST, SWAMP [3]
☐ ☐ SHRUB OR OLD FIELD [2]
☐ ☐ RESIDENTIAL, PARK, NEW FIELD [1]
☐ ☐ FENCED PASTURE [1]
☐ ☐ OPEN PASTURE, ROWCROP [0]

L R

☐ ☐ CONSERVATION TILLAGE [1]
☐ ☐ URBAN OR INDUSTRIAL [0]
☐ ☐ MINING / CONSTRUCTION [0]

Indicate predominant land use(s) past 100m riparian.

Comments (3) (4) (3)

Riparian 10 Maximum 10

5] POOL / GLIDE AND RIFFLE / RUN QUALITY

MAXIMUM DEPTH

Check ONE (ONLY!)

☑ > 1m [6]
☐ 0.7-<1m [4]
☐ 0.4-<0.7m [2]
☐ 0.2-<0.4m [1]
☐ < 0.2m [0]

CHANNEL WIDTH

Check ONE (Or 2 & average)

☐ POOL WIDTH > RIFFLE WIDTH [2]
☑ POOL WIDTH = RIFFLE WIDTH [1]
☐ POOL WIDTH < RIFFLE WIDTH [0]

CURRENT VELOCITY

Check ALL that apply

☐ TORRENTIAL [-1]
☐ VERY FAST [1]
☐ FAST [1]
☐ MODERATE [1]
☑ SLOW [1]
☐ INTERSTITIAL [-1]
☐ INTERMITTENT [-2]
☐ EDDIES [1]

Indicate for reach - pools and riffles.

Recreation Potential
Primary Contact
Secondary Contact
(circle one and comment on back)

Comments

Pool / Current 8 Maximum 12

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 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]

Comments

Riffle / Run 0 Maximum 8

6] GRADIENT

GRADIENT (<0.1 ft/mi)
DRAINAGE AREA (~~>2,240~~ mi^2)

☐ VERY LOW - LOW [2-4]
☐ MODERATE [6-10]
☐ HIGH - VERY HIGH [10-6]

%POOL: %GLIDE: 100
%RUN: %RIFFLE:

Gradient 6 Maximum 10

EPA 4520 >1,502 Proofed KC 7/16/08 06/11/08

MBI MODIFIED

OhioEPA

Qualitative Habitat Evaluation Index and Use Assessment Field Sheet

QHEI Score: 37

Stream & Location: Des Moines River – 284.2 LB RM: 284.2 Date: 07/10/08

Scorers Full Name & Affiliation:

River Code: __ - ___ - ___ STORET #: ______ Lat./ Long.: (NAD 83 - decimal °) __ . ____ /8_ . ____ 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
☐ ☐ BLDR /SLABS [10]			☐ ☐ HARDPAN [4]		
☐ ☐ BOULDER [9]			☐ ☐ DETRITUS [3]		
☐ ☐ COBBLE [8]			☐ ☐ MUCK [2]		
☐ ☐ GRAVEL [7]			☐ ☐ SILT [2]		
☐ ☐ SAND [6]			☐ ☐ ARTIFICIAL [0]		
☐ ☐ BEDROCK [5]					

(Score natural substrates; ignore sludge from point-sources)

NUMBER OF BEST TYPES: ☐ 4 or more [2] ☐ 3 or less [0]

Comments

Check ONE (Or 2 & average)

ORIGIN
- ☐ LIMESTONE [1]
- ☐ TILLS [1]
- ☐ WETLANDS [0]
- ☐ HARDPAN [0]
- ☐ SANDSTONE [0]
- ☐ RIP/RAP [0]
- ☐ LACUSTRINE [0]
- ☐ SHALE [-1]
- ☐ COAL FINES [-2]

QUALITY

SILT
- ☐ HEAVY [-2]
- ☐ MODERATE [-1]
- ☐ NORMAL [0]
- ☐ FREE [1]

EMBEDDEDNESS
- ☐ EXTENSIVE [-2]
- ☐ MODERATE [-1]
- ☐ NORMAL [0]
- ☐ NONE [1]

Substrate 6.5 Maximum 20

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.

___ 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]

AMOUNT
Check ONE (Or 2 & average)
- ☐ EXTENSIVE >75% [11]
- ☐ MODERATE 25-75% [7]
- ☐ SPARSE 5-<25% [3]
- ☐ NEARLY ABSENT <5% [1]

Comments

Cover 11 Maximum 20

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]
- ☒ Impounded [-1]

STABILITY
- ☐ HIGH [3]
- ☐ MODERATE [2]
- ☒ LOW [1]

Comments

Channel 2 Maximum 20

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

River right looking downstream

EROSION (L R)
- ☐ ☐ NONE / LITTLE [3]
- ☐ ☐ MODERATE [2]
- ☐ ☐ HEAVY / SEVERE [1]

RIPARIAN WIDTH (L R)
- ☐ ☐ WIDE > 50m [4]
- ☐ ☐ MODERATE 10-50m [3]
- ☐ ☐ NARROW 5-10m [2]
- ☐ ☐ VERY NARROW < 5m [1]
- ☐ ☐ NONE [0]

FLOOD PLAIN QUALITY (L R)
- ☐ ☐ 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]

Indicate predominant land use(s) past 100m riparian.

Comments

Riparian 5.5 Maximum 10

5] POOL / GLIDE AND RIFFLE / RUN QUALITY

MAXIMUM DEPTH
Check ONE (ONLY!)
- ☒ > 1m [6]
- ☐ 0.7-<1m [4]
- ☐ 0.4-<0.7m [2]
- ☐ 0.2-<0.4m [1]
- ☐ < 0.2m [0]

CHANNEL WIDTH
Check ONE (Or 2 & average)
- ☐ POOL WIDTH > RIFFLE WIDTH [2]
- ☐ POOL WIDTH = RIFFLE WIDTH [1]
- ☐ POOL WIDTH < RIFFLE WIDTH [0]
- ☒ Impounded [-1]

CURRENT VELOCITY
Check ALL that apply
- ☐ TORRENTIAL [-1]
- ☐ VERY FAST [1]
- ☐ FAST [1]
- ☐ MODERATE [1]
- ☒ SLOW [1]
- ☐ INTERSTITIAL [-1]
- ☐ INTERMITTENT [-2]
- ☐ EDDIES [1]

Indicate for reach - pools and riffles

Recreation Potential
Primary Contact
Secondary Contact
(circle one and comment on back)

Comments

Pool / Current 6 Maximum 12

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 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]

Comments

Riffle / Run 0 Maximum 8

6] GRADIENT (____ ft/mi) DRAINAGE AREA (____ mi²)

- ☐ VERY LOW - LOW [2-4]
- ☐ MODERATE [6-10]
- ☐ HIGH - VERY HIGH [10-6]

%POOL: ___ %GLIDE: ___
%RUN: ___ %RIFFLE: ___

Gradient 6 Maximum 10

EPA 4520 06/11/08

Proof'd KC 7/16/08

MBI MODIFIED

OhioEPA

Qualitative Habitat Evaluation Index and Use Assessment Field Sheet

QHEI Score: 50

Stream & Location: Des Plaines River - 284.4 RB **RM:** 284.4 **Date:** 07/11/08
Scorers Full Name & Affiliation: Joe Vondruska EA Engineering
River Code: __ - ___ - __ **STORET #:** ______ **Lat./ Long.:** (NAD 83 - decimal °) __ . ____ /8_ . ____ 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
☐ ☐ BLDR /SLABS [10]			☐ ☐ HARDPAN [4]		
☐ ☐ BOULDER [9]			☐ ☐ DETRITUS [3]		
☐ ☐ COBBLE [8]			☐ ☐ MUCK [2]		
☐ ☐ GRAVEL [7]			☐ ☐ SILT [2]		
☐ ☐ SAND [6]			☐ ☐ ARTIFICIAL [0]		
☐ ☐ BEDROCK [5]					

(Score natural substrates; ignore sludge from point-sources)

NUMBER OF BEST TYPES: ☐ 4 or more [2] ☐ 3 or less [0]

Comments

Check ONE (Or 2 & average)

ORIGIN
- ☐ LIMESTONE [1]
- ☐ TILLS [1]
- ☐ WETLANDS [0]
- ☐ HARDPAN [0]
- ☐ SANDSTONE [0]
- ☐ RIP/RAP [0]
- ☐ LACUSTRINE [0]
- ☐ SHALE [-1]
- ☐ COAL FINES [-2]

QUALITY

SILT
- ☐ HEAVY [-2]
- ☐ MODERATE [-1]
- ☐ NORMAL [0]
- ☐ FREE [1]

EMBEDDEDNESS
- ☐ EXTENSIVE [-2]
- ☐ MODERATE [-1]
- ☐ NORMAL [0]
- ☐ NONE [1]

Substrate 18 Maximum 20

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.

_____ 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]

AMOUNT

Check ONE (Or 2 & average)
- ☐ EXTENSIVE >75% [11]
- ☐ MODERATE 25-75% [7]
- ☐ SPARSE 5-<25% [3]
- ☐ NEARLY ABSENT <5% [1]

Comments

Cover 8 Maximum 20

3] CHANNEL MORPHOLOGY

Check ONE in each category (Or 2 & average)

SINUOSITY	DEVELOPMENT	CHANNELIZATION	STABILITY
☐ HIGH [4]	☐ EXCELLENT [7]	☐ NONE [6]	☑ HIGH [3]
☐ MODERATE [3]	☐ GOOD [5]	☐ RECOVERED [4]	☐ MODERATE [2]
☐ LOW [2]	☐ FAIR [3]	☐ RECOVERING [3]	☐ LOW [1]
☑ NONE [1]	☑ POOR [1]	☐ RECENT OR NO RECOVERY [1]	
		☑ Impounded [-1]	

Comments

Channel 4 Maximum 20

4] BANK EROSION AND RIPARIAN ZONE

Check ONE in each category for EACH BANK (Or 2 per bank & average)

River right looking downstream

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

Indicate predominant land use(s) past 100m riparian.

Comments

Riparian 5 Maximum 10

5] POOL / GLIDE AND RIFFLE / RUN QUALITY

MAXIMUM DEPTH

Check ONE (ONLY!)
- ☑ > 1m [6]
- ☐ 0.7-<1m [4]
- ☐ 0.4-<0.7m [2]
- ☐ 0.2-<0.4m [1]
- ☐ < 0.2m [0]

CHANNEL WIDTH

Check ONE (Or 2 & average)
- ☐ POOL WIDTH > RIFFLE WIDTH [2]
- ☐ POOL WIDTH = RIFFLE WIDTH [1]
- ☐ POOL WIDTH < RIFFLE WIDTH [0]
- ☑ Impounded [-1]

CURRENT VELOCITY

Check ALL that apply
- ☐ TORRENTIAL [-1]
- ☐ VERY FAST [1]
- ☑ FAST [1]
- ☑ MODERATE [1]
- ☑ SLOW [1]
- ☐ INTERSTITIAL [-1]
- ☐ INTERMITTENT [-2]
- ☑ EDDIES [1]

Indicate for reach - pools and riffles.

Recreation Potential
Primary Contact
Secondary Contact
(circle one and comment on back)

Comments influence of discharge flow

Pool / Current 9 Maximum 12

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

Comments

Riffle / Run 0 Maximum 8

6] GRADIENT

GRADIENT (______ ft/mi)
DRAINAGE AREA (______ mi²)

- ☐ VERY LOW - LOW [2-4]
- ☐ MODERATE [6-10]
- ☐ HIGH - VERY HIGH [10-6]

%POOL: ( ) %GLIDE: ( )
%RUN: ( ) %RIFFLE: ( )

Gradient 6 Maximum 10

EPA 4520

Proofed KC 7/16/08

06/11/08

MBI MODIFIED

OhioEPA

Qualitative Habitat Evaluation Index and Use Assessment Field Sheet

QHEI Score: 38.5

Stream & Location: Des Plaines River - 284.5 LB RM: 284.5 Date: 07/10/08

Scorers Full Name & Affiliation: Joe Vandiver EA Engineering

River Code: __ - __ - __ STORET #: ______ Lat./Long.: (NAD 83 - decimal °) __ . ____ /8 __ . ____ 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
☐☐ BLDR /SLABS [10]			☐☐ HARDPAN [4]		
☐☐ BOULDER [9]			☐☐ DETRITUS [3]		
☐☐ COBBLE [8]			☐☐ MUCK [2]		
☐☐ GRAVEL [7]			☐☐ SILT [2]		
☐☐ SAND [6]			☐☐ ARTIFICIAL [0]		
☐☐ BEDROCK [5]			(Score natural substrates; ignore sludge from point-sources)		

NUMBER OF BEST TYPES: ☐ 4 or more [2] ☐ 3 or less [0]

Comments

Check ONE (Or 2 & average)

ORIGIN
- ☐ LIMESTONE [1]
- ☐ TILLS [1]
- ☐ WETLANDS [0]
- ☐ HARDPAN [0]
- ☐ SANDSTONE [0]
- ☐ RIP/RAP [0]
- ☐ LACUSTRINE [0]
- ☐ SHALE [-1]
- ☐ COAL FINES [-2]

QUALITY

SILT
- ☐ HEAVY [-2]
- ☐ MODERATE [-1]
- ☐ NORMAL [0]
- ☐ FREE [1]

EMBEDDEDNESS
- ☐ EXTENSIVE [-2]
- ☐ MODERATE [-1]
- ☐ NORMAL [0]
- ☐ NONE [1]

Substrate 10.5 Maximum 20

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.

____ 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]

AMOUNT
Check ONE (Or 2 & average)
- ☐ EXTENSIVE >75% [11]
- ☐ MODERATE 25-75% [7]
- ☐ SPARSE 5-<25% [3]
- ☐ NEARLY ABSENT <5% [1]

Comments

Cover 9 Maximum 20

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

SINUOSITY	DEVELOPMENT	CHANNELIZATION	STABILITY
☐ HIGH [4]	☐ EXCELLENT [7]	☐ NONE [6]	☒ HIGH [3]
☐ MODERATE [3]	☐ GOOD [5]	☐ RECOVERED [4]	☐ MODERATE [2]
☐ LOW [2]	☐ FAIR [3]	☐ RECOVERING [3]	☒ LOW [1]
☒ NONE [1]	☒ POOR [1]	☐ RECENT OR NO RECOVERY [1]	
		☒ Impounded [-1]	(2)

Comments

Channel 3 Maximum 20

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

River right looking downstream

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

Indicate predominant land use(s) past 100m riparian.

Comments

Riparian 4 Maximum 10

5] POOL / GLIDE AND RIFFLE / RUN QUALITY

MAXIMUM DEPTH
Check ONE (ONLY!)
- ☑ > 1m [6]
- ☐ 0.7-<1m [4]
- ☐ 0.4-<0.7m [2]
- ☐ 0.2-<0.4m [1]
- ☐ < 0.2m [0]

CHANNEL WIDTH
Check ONE (Or 2 & average)
- ☐ POOL WIDTH > RIFFLE WIDTH [2]
- ☐ POOL WIDTH = RIFFLE WIDTH [1]
- ☐ POOL WIDTH < RIFFLE WIDTH [0]
- ☑ Impounded [-1]

CURRENT VELOCITY
Check ALL that apply
- ☐ TORRENTIAL [-1]
- ☐ VERY FAST [1]
- ☐ FAST [1]
- ☐ MODERATE [1]
- ☑ SLOW [1]
- ☐ INTERSTITIAL [-1]
- ☐ INTERMITTENT [-2]
- ☐ EDDIES [1]

Indicate for reach - pools and riffles.

Recreation Potential
Primary Contact
Secondary Contact
(circle one and comment on back)

Comments

Pool / Current 6 Maximum 12

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

Comments

Riffle / Run 0 Maximum 8

6] GRADIENT
(______ ft/mi) DRAINAGE AREA (______ mi²)
- ☐ VERY LOW - LOW [2-4]
- ☐ MODERATE [6-10]
- ☐ HIGH - VERY HIGH [10-6]

%POOL: ____ %GLIDE: ____
%RUN: ____ %RIFFLE: ____

Gradient 6 Maximum 10

EPA 4520 06/11/06

Proofed KC 7/15/08

MBI MODIFIED

Ohio EPA

Qualitative Habitat Evaluation Index and Use Assessment Field Sheet

QHEI Score: 46

Stream & Location: Des Plaines River - 284.7 RB **RM:** 284.7 **Date:** 07/11/08

Scorers Full Name & Affiliation: Joe Vandeyke EA Engineering

River Code: __-___-___ **STORET #:** ______ **Lat./ Long.:** (NAD 83 - decimal °) __.____ /8_.____ 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
☐ ☐ BLDR /SLABS [10]			☐ ☐ HARDPAN [4]		
☐ ☐ BOULDER [9]			☐ ☐ DETRITUS [3]		
☐ ☐ COBBLE [8]			☐ ☐ MUCK [2]		
☐ ☐ GRAVEL [7]			☐ ☐ SILT [2]		
☐ ☐ SAND [6]			☐ ☐ ARTIFICIAL [0]		
☐ ☐ BEDROCK [5]			(Score natural substrates; ignore sludge from point-sources)		

NUMBER OF BEST TYPES: ☐ 4 or more [2] ☐ 3 or less [0]

Comments

Check ONE (Or 2 & average)

ORIGIN
- ☐ LIMESTONE [1]
- ☐ TILLS [1]
- ☐ WETLANDS [0]
- ☐ HARDPAN [0]
- ☐ SANDSTONE [0]
- ☐ RIP/RAP [0]
- ☐ LACUSTRINE [0]
- ☐ SHALE [-1]
- ☐ COAL FINES [-2]

QUALITY

SILT
- ☐ HEAVY [-2]
- ☐ MODERATE [-1]
- ☐ NORMAL [0]
- ☐ FREE [1]

EMBEDDEDNESS
- ☐ EXTENSIVE [-2]
- ☐ MODERATE [-1]
- ☐ NORMAL [0]
- ☐ NONE [1]

Substrate 17 Maximum 20

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.

- ____ 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]

AMOUNT

Check ONE (Or 2 & average)
- ☐ EXTENSIVE >75% [11]
- ☐ MODERATE 25-75% [7]
- ☐ SPARSE 5-<25% [3]
- ☐ NEARLY ABSENT <5% [1]

Comments

Cover 7 Maximum 20

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

SINUOSITY	DEVELOPMENT	CHANNELIZATION	STABILITY
☐ HIGH [4]	☐ EXCELLENT [7]	☐ NONE [6]	☒ HIGH [3]
☐ MODERATE [3]	☐ GOOD [5]	☐ RECOVERED [4]	☐ MODERATE [2]
☐ LOW [2]	☐ FAIR [3]	☐ RECOVERING [3]	☐ LOW [1]
☒ NONE [1]	☒ POOR [1]	☐ RECENT OR NO RECOVERY [1]	
		☒ Impounded [-1]	

Comments

Channel 4 Maximum 20

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

River right looking downstream

L R EROSION	L R RIPARIAN WIDTH	L R FLOOD PLAIN QUALITY	L R
☐ ☐ NONE / LITTLE [3]	☐ ☐ WIDE > 50m [4]	☐ ☐ FOREST, SWAMP [3]	☐ ☐ CONSERVATION TILLAGE [1]
☐ ☐ MODERATE [2]	☐ ☐ MODERATE 10-50m [3]	☐ ☐ SHRUB OR OLD FIELD [2]	☐ ☐ URBAN OR INDUSTRIAL [0]
☐ ☐ HEAVY / SEVERE [1]	☐ ☐ NARROW 5-10m [2]	☐ ☐ RESIDENTIAL, PARK, NEW FIELD [1]	☐ ☐ MINING / CONSTRUCTION [0]
	☐ ☐ VERY NARROW < 5m [1]	☐ ☐ FENCED PASTURE [1]	Indicate predominant land use(s) past 100m riparian.
	☐ ☐ NONE [0]	☐ ☐ OPEN PASTURE, ROWCROP [0]	

Comments

Riparian 4 Maximum 10

5] POOL / GLIDE AND RIFFLE / RUN QUALITY

MAXIMUM DEPTH Check ONE (ONLY!)	CHANNEL WIDTH Check ONE (Or 2 & average)	CURRENT VELOCITY Check ALL that apply	
☒ > 1m [6]	☐ POOL WIDTH > RIFFLE WIDTH [2]	☐ TORRENTIAL [-1]	☒ SLOW [1]
☐ 0.7-<1m [4]	☐ POOL WIDTH = RIFFLE WIDTH [1]	☐ VERY FAST [1]	☐ INTERSTITIAL [-1]
☐ 0.4-<0.7m [2]	☐ POOL WIDTH < RIFFLE WIDTH [0]	☐ FAST [1]	☐ INTERMITTENT [-2]
☐ 0.2-<0.4m [1]		☒ MODERATE [1]	☒ EDDIES [1]
☐ < 0.2m [0]	☒ Impounded [-1]	Indicate for reach - pools and riffles.	

Recreation Potential
Primary Contact
Secondary Contact
(circle one and comment on back)

Comments

Pool / Current 8 Maximum 12

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

Comments

Riffle / Run 0 Maximum 8

6] GRADIENT (____ ft/mi) ☐ VERY LOW - LOW [2-4]

DRAINAGE AREA (____ mi²) ☐ MODERATE [6-10] ☐ HIGH - VERY HIGH [10-6]

%POOL: ( ) %GLIDE: ( )

%RUN: ( ) %RIFFLE: ( )

Gradient 6 Maximum 10

EPA 4520

Purged KC 7/16/08

06/11/08

MBI MODIFIED

OhioEPA

Qualitative Habitat Evaluation Index and Use Assessment Field Sheet

QHEI Score: 35

Stream & Location: Des Plaines River - 284.8 LB RM: 284.8 Date: 07/10/08

Scorers Full Name & Affiliation: Joe Vondruska EA Engineering

River Code: __ - __ - __ STORET #: ______ Lat./Long.: (NAD 83 - decimal °) __ . ____ /8_ . ____ 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
☐☐ BLDR /SLABS [10]			☐☐ HARDPAN [4]		
☐☐ BOULDER [9]			☐☐ DETRITUS [3]		
☐☐ COBBLE [8]			☐☐ MUCK [2]		
☐☐ GRAVEL [7]			☐☐ SILT [2]		
☐☐ SAND [6]			☐☐ ARTIFICIAL [0]		
☐☐ BEDROCK [5]					

(Score natural substrates; ignore sludge from point-sources)

NUMBER OF BEST TYPES: ☐ 4 or more [2] ☐ 3 or less [0]

Comments

Check ONE (Or 2 & average)

ORIGIN
- ☐ LIMESTONE [1]
- ☐ TILLS [1]
- ☐ WETLANDS [0]
- ☐ HARDPAN [0]
- ☐ SANDSTONE [0]
- ☐ RIP/RAP [0]
- ☐ LACUSTRINE [0]
- ☐ SHALE [-1]
- ☐ COAL FINES [-2]

QUALITY

SILT
- ☐ HEAVY [-2]
- ☐ MODERATE [-1]
- ☐ NORMAL [0]
- ☐ FREE [1]

EMBEDDEDNESS
- ☐ EXTENSIVE [-2]
- ☐ MODERATE [-1]
- ☐ NORMAL [0]
- ☐ NONE [1]

Substrate 8.5 Maximum 20

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.

- ____ 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]

AMOUNT
Check ONE (Or 2 & average)
- ☐ EXTENSIVE >75% [11]
- ☐ MODERATE 25-75% [7]
- ☐ SPARSE 5-<25% [3]
- ☐ NEARLY ABSENT <5% [1]

Comments

Cover 8 Maximum 20

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

SINUOSITY	DEVELOPMENT	CHANNELIZATION	STABILITY
☐ HIGH [4]	☐ EXCELLENT [7]	☐ NONE [6]	☒ HIGH [3]
☐ MODERATE [3]	☐ GOOD [5]	☐ RECOVERED [4]	☐ MODERATE [2]
☐ LOW [2]	☐ FAIR [3]	☐ RECOVERING [3]	☒ LOW [1]
☒ NONE [1]	☒ POOR [1]	☐ RECENT OR NO RECOVERY [1]	
		☒ Impounded [-1]	(2)

Comments

Channel 3 Maximum 20

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

River right looking downstream

EROSION (L R)
- ☐☐ NONE / LITTLE [3]
- ☐☐ MODERATE [2]
- ☐☐ HEAVY / SEVERE [1]

RIPARIAN WIDTH (L R)
- ☐☐ WIDE > 50m [4]
- ☐☐ MODERATE 10-50m [3]
- ☐☐ NARROW 5-10m [2]
- ☐☐ VERY NARROW < 5m [1]
- ☐☐ NONE [0]

FLOOD PLAIN QUALITY (L R)
- ☐☐ 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]

Indicate predominant land use(s) past 100m riparian.

Comments

Riparian 3.5 Maximum 10

5] POOL / GLIDE AND RIFFLE / RUN QUALITY

MAXIMUM DEPTH
Check ONE (ONLY!)
- ☒ > 1m [6]
- ☐ 0.7-<1m [4]
- ☐ 0.4-<0.7m [2]
- ☐ 0.2-<0.4m [1]
- ☐ < 0.2m [0]

CHANNEL WIDTH
Check ONE (Or 2 & average)
- ☐ POOL WIDTH > RIFFLE WIDTH [2]
- ☐ POOL WIDTH = RIFFLE WIDTH [1]
- ☐ POOL WIDTH < RIFFLE WIDTH [0]
- ☒ Impounded [-1]

CURRENT VELOCITY
Check ALL that apply
- ☐ TORRENTIAL [-1]
- ☐ VERY FAST [1]
- ☐ FAST [1]
- ☐ MODERATE [1]
- ☒ SLOW [1]
- ☐ INTERSTITIAL [-1]
- ☐ INTERMITTENT [-2]
- ☐ EDDIES [1]

Indicate for reach - pools and riffles.

Recreation Potential
Primary Contact
Secondary Contact
(circle one and comment on back)

Comments

Pool / Current 6 Maximum 12

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 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]

Comments

Riffle / Run 0 Maximum 8

6] GRADIENT
(______ ft/mi)

DRAINAGE AREA (______ mi²)

- ☐ VERY LOW - LOW [2-4]
- ☐ MODERATE [6-10]
- ☐ HIGH - VERY HIGH [10-6]

%POOL: ____ %GLIDE: ____
%RUN: ____ %RIFFLE: ____

Gradient 6 Maximum 10

EPA 4520 Proofed 7/16/08 KC 06/11/08

MBI MODIFIED

Ohio EPA

Qualitative Habitat Evaluation Index and Use Assessment Field Sheet

QHEI Score: 49

Stream & Location: Des Plaines River - 2850 RB   RM: 285.0 Date: 07/11/08

Scorers Full Name & Affiliation:

River Code: __ - ___ - ___ STORET #: ______ Lat./ Long.: (NAD 83 - decimal °) __ . _____ /8_ . ____ Office verified location ☐

1] SUBSTRATE

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

BEST TYPES POOL RIFFLE

☐☐ BLDR /SLABS [10] ____ ____
☐☐ BOULDER [9] ____ ____
☐☐ COBBLE [8] ____ ____
☐☐ GRAVEL [7] ____ ____
☐☐ SAND [6] ____ ____
☐☐ BEDROCK [5] ____ ____

NUMBER OF BEST TYPES: ☐ 4 or more [2] ☐ 3 or less [0]

OTHER TYPES POOL RIFFLE

☐☐ HARDPAN [4] ____ ____
☐☐ DETRITUS [3] ____ ____
☐☐ MUCK [2] ____ ____
☐☐ SILT [2] ____ ____
☐☐ ARTIFICIAL [0] ____ ____
(Score natural substrates; ignore sludge from point-sources)

Check ONE (Or 2 & average)

ORIGIN

☐ LIMESTONE [1]
☐ TILLS [1]
☐ WETLANDS [0]
☐ HARDPAN [0]
☐ SANDSTONE [0]
☐ RIP/RAP [0]
☐ LACUSTRINE [0]
☐ SHALE [-1]
☐ COAL FINES [-2]

QUALITY

SILT
☐ HEAVY [-2]
☐ MODERATE [-1]
☐ NORMAL [0]
☐ FREE [1]

EMBEDDEDNESS
☐ EXTENSIVE [-2]
☐ MODERATE [-1]
☐ NORMAL [0]
☐ NONE [1]

Comments

Substrate 18 Maximum 20

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.

____ 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]

AMOUNT
Check ONE (Or 2 & average)
☐ EXTENSIVE >75% [11]
☐ MODERATE 25-75% [7]
☐ SPARSE 5-<25% [3]
☐ NEARLY ABSENT <5% [1]

Comments

Cover 9 Maximum 20

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]
☒ Impounded [-1]

STABILITY
☒ HIGH [3]
☐ MODERATE [2]
☐ LOW [1]

Comments

Channel 4 Maximum 20

4] BANK EROSION AND RIPARIAN ZONE

Check ONE in each category for EACH BANK (Or 2 per bank & average)

River right looking downstream

EROSION (L R)
☐☐ NONE / LITTLE [3]
☐☐ MODERATE [2]
☐☐ HEAVY / SEVERE [1]

RIPARIAN WIDTH (L R)
☐☐ WIDE > 50m [4]
☐☐ MODERATE 10-50m [3]
☐☐ NARROW 5-10m [2]
☐☐ VERY NARROW < 5m [1]
☐☐ NONE [0]

FLOOD PLAIN QUALITY (L R)
☐☐ 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]

Indicate predominant land use(s) past 100m riparian.

Comments

Riparian 4 Maximum 10

5] POOL / GLIDE AND RIFFLE / RUN QUALITY

MAXIMUM DEPTH
Check ONE (ONLY!)
☒ > 1m [6]
☐ 0.7-<1m [4]
☐ 0.4-<0.7m [2]
☐ 0.2-<0.4m [1]
☐ < 0.2m [0]

CHANNEL WIDTH
Check ONE (Or 2 & average)
☐ POOL WIDTH > RIFFLE WIDTH [2]
☐ POOL WIDTH = RIFFLE WIDTH [1]
☐ POOL WIDTH < RIFFLE WIDTH [0]
☒ Impounded [-1]

CURRENT VELOCITY
Check ALL that apply
☐ TORRENTIAL [-1]
☐ VERY FAST [1]
☐ FAST [1]
☒ MODERATE [1]
☒ SLOW [1]
☐ INTERSTITIAL [-1]
☐ INTERMITTENT [-2]
☒ EDDIES [1]
Indicate for reach - pools and riffles.

Recreation Potential
Primary Contact
Secondary Contact
(circle one and comment on back)

Comments

Pool / Current 8 Maximum 12

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 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]

Comments

Riffle / Run 0 Maximum 8

6] GRADIENT (____ ft/mi)

DRAINAGE AREA (____ mi²)

☐ VERY LOW - LOW [2-4]
☐ MODERATE [6-10]
☐ HIGH - VERY HIGH [10-6]

%POOL: ____ %GLIDE: ____
%RUN: ____ %RIFFLE: ____

Gradient 6 Maximum 10

EPA 4520   Pumped KC 7/16/08   06/11/08

MBI MODIFIED

OhioEPA

Qualitative Habitat Evaluation Index and Use Assessment Field Sheet

QHEI Score: 43.5

Stream & Location: Des Plaines River - 285.1 LB **RM:** 285.1 **Date:** 07/10/08

Scorers Full Name & Affiliation: Joe Vondruska CA Engineering

River Code: __ - ___ - ___ **STORET #:** ______ **Lat./ Long.:** (NAD 83 - decimal °) __.____ /8_.____ 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
☐ ☐ BLDR /SLABS [10]			☐ ☐ HARDPAN [4]		
☐ ☐ BOULDER [9]			☐ ☐ DETRITUS [3]		
☐ ☐ COBBLE [8]			☐ ☐ MUCK [2]		
☐ ☐ GRAVEL [7]			☐ ☐ SILT [2]		
☐ ☐ SAND [6]			☐ ☐ ARTIFICIAL [0]		
☐ ☐ BEDROCK [5]					

(Score natural substrates; ignore sludge from point-sources)

NUMBER OF BEST TYPES: ☐ 4 or more [2] ☐ 3 or less [0]

Comments

Check ONE (Or 2 & average)

ORIGIN
- ☐ LIMESTONE [1]
- ☐ TILLS [1]
- ☐ WETLANDS [0]
- ☐ HARDPAN [0]
- ☐ SANDSTONE [0]
- ☐ RIP/RAP [0]
- ☐ LACUSTRINE [0]
- ☐ SHALE [-1]
- ☐ COAL FINES [-2]

QUALITY

SILT
- ☐ HEAVY [-2]
- ☐ MODERATE [-1]
- ☐ NORMAL [0]
- ☐ FREE [1]

EMBEDDEDNESS
- ☐ EXTENSIVE [-2]
- ☐ MODERATE [-1]
- ☐ NORMAL [0]
- ☐ NONE [1]

Substrate 17 Maximum 20

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.

___ 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]

AMOUNT
Check ONE (Or 2 & average)
- ☐ EXTENSIVE >75% [11]
- ☐ MODERATE 25-75% [7]
- ☐ SPARSE 5-<25% [3]
- ☐ NEARLY ABSENT <5% [1]

Comments

Cover 7 Maximum 20

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

SINUOSITY	DEVELOPMENT	CHANNELIZATION	STABILITY
☐ HIGH [4]	☐ EXCELLENT [7]	☐ NONE [6]	☒ HIGH [3]
☐ MODERATE [3]	☐ GOOD [5]	☐ RECOVERED [4]	☐ MODERATE [2]
☐ LOW [2]	☐ FAIR [3]	☐ RECOVERING [3]	☐ LOW [1]
☒ NONE [1]	☒ POOR [1]	☐ RECENT OR NO RECOVERY [1]	
		☒ Impounded [-1]	

Comments

Channel 4 Maximum 20

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

River right looking downstream

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

Indicate predominant land use(s) past 100m riparian.

Comments

Riparian 3.5 Maximum 10

5] POOL / GLIDE AND RIFFLE / RUN QUALITY

MAXIMUM DEPTH Check ONE (ONLY!)	CHANNEL WIDTH Check ONE (Or 2 & average)	CURRENT VELOCITY Check ALL that apply	
☒ > 1m [6]	☐ POOL WIDTH > RIFFLE WIDTH [2]	☐ TORRENTIAL [-1]	☒ SLOW [1]
☐ 0.7-<1m [4]	☐ POOL WIDTH = RIFFLE WIDTH [1]	☐ VERY FAST [1]	☐ INTERSTITIAL [-1]
☐ 0.4-<0.7m [2]	☐ POOL WIDTH < RIFFLE WIDTH [0]	☐ FAST [1]	☐ INTERMITTENT [-2]
☐ 0.2-<0.4m [1]		☐ MODERATE [1]	☐ EDDIES [1]
☐ < 0.2m [0]	☒ Impounded [-1]		

Indicate for reach - pools and riffles.

Recreation Potential
Primary Contact
Secondary Contact
(circle one and comment on back)

Comments

Pool / Current 6 Maximum 12

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

Comments

Riffle / Run 0 Maximum 8

6] GRADIENT
(_____ ft/mi) ☐ VERY LOW - LOW [2-4]
DRAINAGE AREA ☐ MODERATE [6-10]
(_____ mi²) ☐ HIGH - VERY HIGH [10-6]

%POOL: ____ %GLIDE: ____
%RUN: ____ %RIFFLE: ____

Gradient 6 Maximum 10

EPA 4520 06/11/08

Proofed KC 7/16/08

MBI MODIFIED

Qualitative Habitat Evaluation Index and Use Assessment Field Sheet

QHEI Score: 56

Stream & Location: Des Plaines River – Brandon Tailwater – EA *RM:* 285.4 *Date:* 07/10/08

Scorers Full Name & Affiliation: Joe Vandenberg EA Engineering

River Code: __ - ___ - ___ *STORET #:* ______ *Lat./Long.:* (NAD 83 - decimal °) __.____ /8_.____ 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
☐ ☐ BLDR /SLABS [10]			☐ ☐ HARDPAN [4]		
☐ ☐ BOULDER [9]			☐ ☐ DETRITUS [3]		
☐ ☐ COBBLE [8]			☐ ☐ MUCK [2]		
☐ ☐ GRAVEL [7]			☐ ☐ SILT [2]		
☐ ☐ SAND [6]			☐ ☐ ARTIFICIAL [0]		
☐ ☐ BEDROCK [5]					

(Score natural substrates; ignore sludge from point-sources)

NUMBER OF BEST TYPES: ☐ 4 or more [2] ☐ 3 or less [0]

Comments

Check ONE (*Or 2 & average*)

ORIGIN
- ☐ LIMESTONE [1]
- ☐ TILLS [1]
- ☐ WETLANDS [0]
- ☐ HARDPAN [0]
- ☐ SANDSTONE [0]
- ☐ RIP/RAP [0]
- ☐ LACUSTRINE [0]
- ☐ SHALE [-1]
- ☐ COAL FINES [-2]

QUALITY

SILT
- ☐ HEAVY [-2]
- ☐ MODERATE [-1]
- ☐ NORMAL [0]
- ☐ FREE [1]

EMBEDDEDNESS
- ☐ EXTENSIVE [-2]
- ☐ MODERATE [-1]
- ☐ NORMAL [0]
- ☐ NONE [1]

Substrate 11.5 *Maximum 20*

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.

- ____ 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]

AMOUNT

Check ONE (*Or 2 & average*)
- ☐ EXTENSIVE >75% [11]
- ☐ MODERATE 25-75% [7]
- ☐ SPARSE 5-<25% [3]
- ☐ NEARLY ABSENT <5% [1]

Comments

Cover 12 *Maximum 20*

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

SINUOSITY	DEVELOPMENT	CHANNELIZATION	STABILITY
☐ HIGH [4]	☐ EXCELLENT [7]	☐ NONE [6]	☐ HIGH [3]
☐ MODERATE [3]	☐ GOOD [5]	☐ RECOVERED [4]	☐ MODERATE [2]
☐ LOW [2]	☐ FAIR [3]	☐ RECOVERING [3]	☐ LOW [1]
☐ NONE [1]	☐ POOR [1]	☐ RECENT OR NO RECOVERY [1]	
		☐ Impounded [-1]	

Comments

Channel 11 *Maximum 20*

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

River right looking downstream

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

Indicate predominant land use(s) past 100m riparian.

Comments

Riparian 5.5 *Maximum 10*

5] POOL / GLIDE AND RIFFLE / RUN QUALITY

MAXIMUM DEPTH

Check ONE (*ONLY!*)
- ☐ > 1m [6]
- ☐ 0.7-<1m [4]
- ☐ 0.4-<0.7m [2]
- ☐ 0.2-<0.4m [1]
- ☐ < 0.2m [0]

CHANNEL WIDTH

Check ONE (*Or 2 & average*)
- ☐ POOL WIDTH > RIFFLE WIDTH [2]
- ☐ POOL WIDTH = RIFFLE WIDTH [1]
- ☐ POOL WIDTH < RIFFLE WIDTH [0]
- ☐ Impounded [-1]

CURRENT VELOCITY

Check ALL that apply
- ☐ TORRENTIAL [-1]
- ☐ VERY FAST [1]
- ☐ FAST [1]
- ☐ MODERATE [1]
- ☐ SLOW [1]
- ☐ INTERSTITIAL [-1]
- ☐ INTERMITTENT [-2]
- ☐ EDDIES [1]

Indicate for reach - pools and riffles.

Recreation Potential

Primary Contact

Secondary Contact

(circle one and comment on back)

Comments

Pool / Current 10 *Maximum 12*

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

Comments

Riffle / Run 0 *Maximum 8*

6] GRADIENT
(____ ft/mi) ☐ VERY LOW - LOW [2-4]

DRAINAGE AREA ☐ MODERATE [6-10]

(____ mi²) ☐ HIGH - VERY HIGH [10-6]

%POOL: ( ) %GLIDE: ( )

%RUN: ( ) %RIFFLE: ( )

Gradient 6 *Maximum 10*

EPA 4520

Proofed KE 7/16/08

06/11/08

MBI MODIFIED

OhioEPA

Qualitative Habitat Evaluation Index and Use Assessment Field Sheet

QHEI Score: 67.5

Stream & Location: Des Plaines River - Brandon Tailwater - MBE RM: 285.5 Date: 07/10/08

Scorers Full Name & Affiliation: Joe Vondruska EA Engineering

River Code: __-___-___ STORET #: ______ Lat./Long.: (NAD 83 - decimal °) __.____ /8_.____ 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
☐☐ BLDR /SLABS [10]			☐☐ HARDPAN [4]		
☐☐ BOULDER [9]			☐☐ DETRITUS [3]		
☐☐ COBBLE [8]			☐☐ MUCK [2]		
☐☐ GRAVEL [7]			☐☐ SILT [2]		
☐☐ SAND [6]			☐☐ ARTIFICIAL [0]		
☐☐ BEDROCK [5]			(Score natural substrates; ignore sludge from point-sources)		

NUMBER OF BEST TYPES: ☐ 4 or more [2] ☐ 3 or less [0]

Comments

Check ONE (Or 2 & average)

ORIGIN
- ☐ LIMESTONE [1]
- ☐ TILLS [1]
- ☐ WETLANDS [0]
- ☐ HARDPAN [0]
- ☐ SANDSTONE [0]
- ☐ RIP/RAP [0]
- ☐ LACUSTRINE [0]
- ☐ SHALE [-1]
- ☐ COAL FINES [-2]

QUALITY

SILT
- ☐ HEAVY [-2]
- ☐ MODERATE [-1]
- ☐ NORMAL [0]
- ☐ FREE [1]

EMBEDDEDNESS
- ☐ EXTENSIVE [-2]
- ☐ MODERATE [-1]
- ☐ NORMAL [0]
- ☐ NONE [1]

Substrate 12.5 Maximum 20

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.

- ____ 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]

AMOUNT

Check ONE (Or 2 & average)
- ☐ EXTENSIVE >75% [11]
- ☐ MODERATE 25-75% [7]
- ☐ SPARSE 5-<25% [3]
- ☐ NEARLY ABSENT <5% [1]

Comments

Cover 13 Maximum 20

3] CHANNEL MORPHOLOGY

Check ONE in each category (Or 2 & average)

SINUOSITY	DEVELOPMENT	CHANNELIZATION	STABILITY
☐ HIGH [4]	☐ EXCELLENT [7]	☐ NONE [6]	☐ HIGH [3]
☐ MODERATE [3]	☐ GOOD [5]	☐ RECOVERED [4]	☐ MODERATE [2]
☐ LOW [2]	☐ FAIR [3]	☐ RECOVERING [3]	☐ LOW [1]
☐ NONE [1]	☐ POOR [1]	☐ RECENT OR NO RECOVERY [1]	
		☐ Impounded [-1]	

Comments

Channel 13 Maximum 20

4] BANK EROSION AND RIPARIAN ZONE

Check ONE in each category for EACH BANK (Or 2 per bank & average)

River right looking downstream

L R EROSION	L R RIPARIAN WIDTH	L R FLOOD PLAIN QUALITY	L R
☐☐ NONE / LITTLE [3]	☐☐ WIDE > 50m [4]	☐☐ FOREST, SWAMP [3]	☐☐ CONSERVATION TILLAGE [1]
☐☐ MODERATE [2]	☐☐ MODERATE 10-50m [3]	☐☐ SHRUB OR OLD FIELD [2]	☐☐ URBAN OR INDUSTRIAL [0]
☐☐ HEAVY / SEVERE [1]	☐☐ NARROW 5-10m [2]	☐☐ RESIDENTIAL, PARK, NEW FIELD [1]	☐☐ MINING / CONSTRUCTION [0]
	☐☐ VERY NARROW < 5m [1]	☐☐ FENCED PASTURE [1]	Indicate predominant land use(s) past 100m riparian.
	☐☐ NONE [0]	☐☐ OPEN PASTURE, ROWCROP [0]	

Comments

Riparian 5.5 Maximum 10

5] POOL / GLIDE AND RIFFLE / RUN QUALITY

MAXIMUM DEPTH Check ONE (ONLY!)	CHANNEL WIDTH Check ONE (Or 2 & average)	CURRENT VELOCITY Check ALL that apply	
☐ > 1m [6]	☐ POOL WIDTH > RIFFLE WIDTH [2]	☐ TORRENTIAL [-1]	☐ SLOW [1]
☐ 0.7-<1m [4]	☐ POOL WIDTH = RIFFLE WIDTH [1]	☐ VERY FAST [1]	☐ INTERSTITIAL [-1]
☐ 0.4-<0.7m [2]	☐ POOL WIDTH < RIFFLE WIDTH [0]	☐ FAST [1]	☐ INTERMITTENT [-2]
☐ 0.2-<0.4m [1]		☐ MODERATE [1]	☐ EDDIES [1]
☐ < 0.2m [0]	☐ Impounded [-1]	Indicate for reach - pools and riffles.	

Recreation Potential
Primary Contact
Secondary Contact
(circle one and comment on back)

Comments

Pool / Current 12 Maximum 12

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

Comments

Riffle / Run 5.5 Maximum 8

6] GRADIENT

GRADIENT (______ft/mi) DRAINAGE AREA (______mi²)
- ☐ VERY LOW - LOW [2-4]
- ☐ MODERATE [6-10]
- ☐ HIGH - VERY HIGH [10-6]

%POOL: ( ) %GLIDE: ( )
%RUN: ( ) %RIFFLE: ( )

Gradient 6 Maximum 10

EPA 4520

Proofread KL 7/16/08

06/11/08

OhioEPA

Qualitative Habitat Evaluation Index and Use Assessment Field Sheet

QHEI Score: 45.5

Stream & Location: Des Plaines River - 278.0RB 420 m **RM:** 278.0 **Date:** 07/11/08

Scorers Full Name & Affiliation: Joe Vondruska EA Engineering

River Code: __-__-__ **STORET #:** ______ **Lat./ Long.:** (NAD 83 - decimal °) 41.4237 / 88.19205 Office verified location ☐

1] SUBSTRATE

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

BEST TYPES	POOL	RIFFLE
☐ ☐ BLDR /SLABS [10]	✓	
☐ ☐ BOULDER [9]	✓	
☐ ☐ COBBLE [8]	✓	
☐ ☐ GRAVEL [7]	✓	
☒ ☐ SAND [6]	✓	
☐ ☐ BEDROCK [5]		

OTHER TYPES	POOL	RIFFLE
☐ ☐ HARDPAN [4]		
☐ ☐ DETRITUS [3]	✓	
☐ ☐ MUCK [2]		
☒ ☐ SILT [2]	✓	
☐ ☐ ARTIFICIAL [0]		

(Score natural substrates; ignore sludge from point-sources)

NUMBER OF BEST TYPES: ☒ 4 or more [2] ☐ 3 or less [0]

Comments ⑧ ②

Check ONE (*Or 2 & average*)

ORIGIN
- ☐ LIMESTONE [1]
- ☐ TILLS [1]
- ☐ WETLANDS [0]
- ☒ HARDPAN [0]
- ☒ SANDSTONE [0]
- ☐ RIP/RAP [0]
- ☐ LACUSTRINE [0]
- ☐ SHALE [-1]
- ☐ COAL FINES [-2]

(0)

QUALITY

SILT
- ☒ HEAVY [-2] -1
- ☐ MODERATE [-1]
- ☒ NORMAL [0]
- ☐ FREE [1]

EMBEDDEDNESS
- ☒ EXTENSIVE [-2]
- ☐ MODERATE [-1]
- ☒ NORMAL [0]
- ☐ NONE [1] -1

(-2)

Substrate 8 Maximum 20

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.

__ UNDERCUT BANKS [1]	1 ✓ POOLS > 70cm [2]	2 OXBOWS, BACKWATERS [1]
2 OVERHANGING VEGETATION [1]	__ ROOTWADS [1]	1 ✓ AQUATIC MACROPHYTES [1]
__ SHALLOWS (IN SLOW WATER) [1]	__ BOULDERS [1]	2 LOGS OR WOODY DEBRIS [1]
__ ROOTMATS [1]		

AMOUNT Check ONE (*Or 2 & average*)
- ☐ EXTENSIVE >75% [11]
- ☒ MODERATE 25-75% [7]
- ☒ SPARSE 5-<25% [3]
- ☐ NEARLY ABSENT <5% [1]

Comments * barge slip (creative) + near shore BW created by sunken barges ⑥ ⑤

Cover 11 Maximum 20

3] CHANNEL MORPHOLOGY

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

SINUOSITY	DEVELOPMENT	CHANNELIZATION	STABILITY
☐ HIGH [4]	☐ EXCELLENT [7]	☐ NONE [6]	☐ HIGH [3]
☐ MODERATE [3]	☐ GOOD [5]	☐ RECOVERED [4]	☒ MODERATE [2]
☐ LOW [2]	☐ FAIR [3]	☒ RECOVERING [3]	☐ LOW [1]
☒ NONE [1]	☒ POOR [1]	☒ RECENT OR NO RECOVERY [1]	

Comments ②

Channel 6 Maximum 20

4] BANK EROSION AND RIPARIAN ZONE

Check ONE in each category for *EACH BANK* (*Or 2 per bank & average*)

River right looking downstream

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

Indicate predominant land use(s) past 100m riparian.

Comments ③ ② (1.5)

Riparian 6.5 Maximum 10

5] POOL / GLIDE AND RIFFLE / RUN QUALITY

MAXIMUM DEPTH Check ONE (*ONLY!*)
- ☒ > 1m [6]
- ☐ 0.7-<1m [4]
- ☐ 0.4-<0.7m [2]
- ☐ 0.2-<0.4m [1]
- ☐ < 0.2m [0]

CHANNEL WIDTH Check ONE (*Or 2 & average*)
- ☐ POOL WIDTH > RIFFLE WIDTH [2]
- ☒ POOL WIDTH = RIFFLE WIDTH [1]
- ☐ POOL WIDTH < RIFFLE WIDTH [0]

CURRENT VELOCITY Check ALL that apply
- ☐ TORRENTIAL [-1]
- ☐ VERY FAST [1]
- ☐ FAST [1]
- ☐ MODERATE [1]
- ☒ SLOW [1]
- ☐ INTERSTITIAL [-1]
- ☐ INTERMITTENT [-2]
- ☐ EDDIES [1]

Indicate for reach - pools and riffles.

Recreation Potential
Primary Contact
Secondary Contact
(circle one and comment on back)

Comments

Pool / Current 8 Maximum 12

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 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]

Comments

Riffle / Run 0 Maximum 8

6] GRADIENT

GRADIENT (<0.1 ft/mi)
DRAINAGE AREA (~~>2,240~~ mi²)
71,502

- ☐ VERY LOW - LOW [2-4]
- ☐ MODERATE [6-10]
- ☐ HIGH - VERY HIGH [10-6]

%POOL: 100 %GLIDE:
%RUN: %RIFFLE:

Gradient 6 Maximum 10

EPA 4520 Proofed KC 7/16/08 06/11/08

OhioEPA

Qualitative Habitat Evaluation Index and Use Assessment Field Sheet

QHEI Score: 39.5

Stream & Location: Des Plaines River - 278.0 LB **RM:** 278.0 **Date:** 07/10/08

All along ~~[illegible]~~ Exxon/Mobil 510m **Scorers Full Name & Affiliation:** Joe Vondruska EA Engineering

River Code: ___-___-___ **STORET #:** ______ **Lat./ Long.:** (NAD 83 - decimal °) 41.4223 / 88.1918 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
☐ ☐ BLDR /SLABS [10]	✓		☐ ☐ HARDPAN [4]	✓	
☐ ☐ BOULDER [9]			☐ ☐ DETRITUS [3]	✓	
☑ ☐ COBBLE [8]	✓		☐ ☐ MUCK [2]		
☐ ☐ GRAVEL [7]	✓		☑ ☐ SILT [2]	✓	
☐ ☐ SAND [6]	✓		☐ ☐ ARTIFICIAL [0]		
☐ ☐ BEDROCK [5]					

(Score natural substrates; ignore sludge from point-sources)

NUMBER OF BEST TYPES: ☑ 4 or more [2] ☐ 3 or less [0] (10) (2)

Check ONE (*Or 2 & average*)

ORIGIN
- ☐ LIMESTONE [1]
- ☑ TILLS [1]
- ☐ WETLANDS [0]
- ☑ HARDPAN [0]
- ☐ SANDSTONE [0]
- ☐ RIP/RAP [0]
- ☐ LACUSTRINE [0]
- ☐ SHALE [-1]
- ☐ COAL FINES [-2]

(0.5)

QUALITY -1.5

SILT
- ☑ HEAVY [-2]
- ☑ MODERATE [-1]
- ☐ NORMAL [0]
- ☐ FREE [1]

EMBEDDEDNESS
- ☑ EXTENSIVE [-2]
- ☑ MODERATE [-1]
- ☐ NORMAL [0]
- ☐ NONE [1]

-1.5 (-3)

Substrate 9.5 Maximum 20

Comments

sediment based on 150m of probing due to presence of moored barges

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.

___	UNDERCUT BANKS [1]	1	POOLS > 70cm [2]	2	OXBOWS, BACKWATERS [1]
___	OVERHANGING VEGETATION [1]	___	ROOTWADS [1]	1	AQUATIC MACROPHYTES [1]
___	SHALLOWS (IN SLOW WATER) [1]	1	BOULDERS [1]	___	LOGS OR WOODY DEBRIS [1]
___	ROOTMATS [1]				

AMOUNT

Check ONE (*Or 2 & average*)
- ☐ EXTENSIVE >75% [11]
- ☐ MODERATE 25-75% [7]
- ☑ SPARSE 5-<25% [3]
- ☐ NEARLY ABSENT <5% [1]

Comments 5 3

Cover 8 Maximum 20

3] CHANNEL MORPHOLOGY

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

SINUOSITY	DEVELOPMENT	CHANNELIZATION	STABILITY
☐ HIGH [4]	☐ EXCELLENT [7]	☐ NONE [6]	☑ HIGH [3]
☐ MODERATE [3]	☐ GOOD [5]	☐ RECOVERED [4]	☐ MODERATE [2]
☐ LOW [2]	☐ FAIR [3]	☐ RECOVERING [3]	☑ LOW [1]
☑ NONE [1]	☑ POOR [1]	☑ RECENT OR NO RECOVERY [1]	

Comments (2)

Channel 5 Maximum 20

4] BANK EROSION AND RIPARIAN ZONE

Check **ONE** in each category for **EACH BANK** (*Or 2 per bank & average*)

River right looking downstream

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

Indicate predominant land use(s) past 100m riparian.

Comments (3) (0) (0)

Riparian 3 Maximum 10

5] POOL / GLIDE AND RIFFLE / RUN QUALITY

MAXIMUM DEPTH

Check **ONE** (*ONLY!*)
- ☑ > 1m [6]
- ☐ 0.7-<1m [4]
- ☐ 0.4-<0.7m [2]
- ☐ 0.2-<0.4m [1]
- ☐ < 0.2m [0]

CHANNEL WIDTH

Check ONE (*Or 2 & average*)
- ☐ POOL WIDTH > RIFFLE WIDTH [2]
- ☑ POOL WIDTH = RIFFLE WIDTH [1]
- ☐ POOL WIDTH < RIFFLE WIDTH [0]

CURRENT VELOCITY

Check ALL that apply
- ☐ TORRENTIAL [-1]
- ☐ VERY FAST [1]
- ☐ FAST [1]
- ☐ MODERATE [1]
- ☑ SLOW [1]
- ☐ INTERSTITIAL [-1]
- ☐ INTERMITTENT [-2]
- ☐ EDDIES [1]

Indicate for reach - pools and riffles.

Recreation Potential
Primary Contact
Secondary Contact
(circle one and comment on back)

Comments

Pool / Current 8 Maximum 12

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 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]

Comments

Riffle / Run 0 Maximum 8

6] GRADIENT

GRADIENT (<0.1 ft/mi)
DRAINAGE AREA (~~22,240~~ mi²)

- ☐ VERY LOW - LOW [2-4]
- ☐ MODERATE [6-10]
- ☐ HIGH - VERY HIGH [10-6]

%POOL: 100 %GLIDE: ___
%RUN: ___ %RIFFLE: ___

Gradient 6 Maximum 10

EPA 4520 >1,502 Proofed KC 7/16/08 06/11/08

OhioEPA

Qualitative Habitat Evaluation Index and Use Assessment Field Sheet

QHEI Score: 52.75

Stream & Location: Des Plaines River ~ 408- Mouth at Jackson Crk. **RM:** 278.3 **Date:** 07/ 09/ 08

Scorers Full Name & Affiliation: Joe Vondruska EA Engineering

River Code: ___-___-___ **STORET #:** ______ **Lat./ Long.:** (NAD 83 - decimal °) __.______ /8_.____ Office verified location ☐

1] SUBSTRATE

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

		BEST TYPES	POOL	RIFFLE
☐	☐	BLDR /SLABS [10]	✓	
☐	☐	BOULDER [9]	✓	
☒	☐	COBBLE [8]	✓	
☐	☐	GRAVEL [7]	✓	
☐	☐	SAND [6]	✓	
☐	☐	BEDROCK [5]		

		OTHER TYPES	POOL	RIFFLE
☐	☐	HARDPAN [4]		
☐	☐	DETRITUS [3]	✓	
☐	☐	MUCK [2]	✓	
☒	☐	SILT [2]	✓	
☐	☐	ARTIFICIAL [0]		

(Score natural substrates; ignore sludge from point-sources)

NUMBER OF BEST TYPES: ☒ 4 or more [2] ☐ 3 or less [0]

Check ONE (Or 2 & average)

ORIGIN
- ☐ LIMESTONE [1]
- ☒ TILLS [1]
- ☐ WETLANDS [0]
- ☒ HARDPAN [0]
- ☐ SANDSTONE [0]
- ☐ RIP/RAP [0]
- ☐ LACUSTRINE [0]
- ☐ SHALE [-1]
- ☐ COAL FINES [-2]

QUALITY -1

SILT
- ☒ HEAVY [-2]
- ☐ MODERATE [-1]
- ☒ NORMAL [0]
- ☐ FREE [1]

EMBEDDEDNESS
- ☒ EXTENSIVE [-2]
- ☐ MODERATE [-1]
- ☒ NORMAL [0]
- ☐ NONE [1] -1

(10) (2) (0.5) (-2)

Comments
oily muck/silt sediments present; patchy macrophytes w/ algae + duckweed mats

Substrate Maximum 20: 10.5

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.

___ UNDERCUT BANKS [1]
___ OVERHANGING VEGETATION [1]
___ SHALLOWS (IN SLOW WATER) [1]
___ ROOTMATS [1]
1 POOLS > 70cm [2]
___ ROOTWADS [1]
2 BOULDERS [1]
___ OXBOWS, BACKWATERS [1]
1 AQUATIC MACROPHYTES [1]
1 LOGS OR WOODY DEBRIS [1]

AMOUNT
Check ONE (Or 2 & average)
- ☐ EXTENSIVE >75% [11]
- ☒ MODERATE 25-75% [7]
- ☒ SPARSE 5-<25% [3]
- ☐ NEARLY ABSENT <5% [1]

Comments 5 + 5

Cover Maximum 20: 10

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]

Comments

Channel Maximum 20: 10

4] BANK EROSION AND RIPARIAN ZONE

Check ONE in each category for EACH BANK (Or 2 per bank & average)

River right looking downstream

L	R	EROSION
☒	☒	NONE / LITTLE [3]
☐	☐	MODERATE [2]
☐	☐	HEAVY / SEVERE [1]

L	R	RIPARIAN WIDTH
☒	☒	WIDE > 50m [4]
☐	☐	MODERATE 10-50m [3]
☐	☐	NARROW 5-10m [2]
☐	☐	VERY NARROW < 5m [1]
☒	☐	NONE [0]

L	R	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]

Indicate predominant land use(s) past 100m riparian.

Comments (3) 2+4/2= (3). 1.5 +3= 4.5/2= 2.25

Riparian Maximum 10: 8.25

5] POOL / GLIDE AND RIFFLE / RUN QUALITY

MAXIMUM DEPTH
Check ONE (ONLY!)
- ☒ > 1m [6]
- ☐ 0.7-<1m [4]
- ☐ 0.4-<0.7m [2]
- ☐ 0.2-<0.4m [1]
- ☐ < 0.2m [0]

CHANNEL WIDTH
Check ONE (Or 2 & average)
- ☐ POOL WIDTH > RIFFLE WIDTH [2]
- ☒ POOL WIDTH = RIFFLE WIDTH [1]
- ☐ POOL WIDTH < RIFFLE WIDTH [0]

CURRENT VELOCITY
Check ALL that apply
- ☐ TORRENTIAL [-1]
- ☐ VERY FAST [1]
- ☐ FAST [1]
- ☐ MODERATE [1]
- ☒ SLOW [1]
- ☐ INTERSTITIAL [-1]
- ☐ INTERMITTENT [-2]
- ☐ EDDIES [1]

Indicate for reach - pools and riffles.

Recreation Potential
Primary Contact
Secondary Contact
(circle one and comment on back)

Comments

Pool / Current Maximum 12: 8

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 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]

Comments

Riffle / Run Maximum 8: 0

6] GRADIENT

GRADIENT (<0.1 ft/mi)
DRAINAGE AREA (~~[illegible]~~ mi²) >1,502

- ☐ VERY LOW - LOW [2-4]
- ☐ MODERATE [6-10]
- ☐ HIGH - VERY HIGH [10-6]

%POOL: ___ %GLIDE: ___
%RUN: ___ %RIFFLE: ___

Gradient Maximum 10: 6

Proofed KC 7/16/08

OhioEPA

Qualitative Habitat Evaluation Index and Use Assessment Field Sheet

QHEI Score: 52

Stream & Location: Des Plaines River - 278.3 RB **RM:** 278.3 **Date:** 07/11/08

Scorers Full Name & Affiliation: Joe Vondruska EA Engineering

River Code: ___-___-___ **STORET #:** ______ **Lat./ Long.:** (NAD 83 - decimal °) 41.42635 / 88.1878 **Office verified location** ☐

1] SUBSTRATE

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

Check ONE (*Or 2 & average*)

BEST TYPES POOL RIFFLE

☐ ☐ BLDR /SLABS [10] ____ ____
☐ ☐ BOULDER [9] ____ ____
☐ ☐ COBBLE [8] ✓ ____
☒ ☒ GRAVEL [7] ✓ ____
☐ ☐ SAND [6] ✓ ____
☐ ☐ BEDROCK [5] ____ ____

OTHER TYPES POOL RIFFLE

☐ ☐ HARDPAN [4] ____ ____
☐ ☐ DETRITUS [3] ✓ ____
☐ ☐ MUCK [2] ____ ____
☐ ☐ SILT [2] ✓ ____
☐ ☐ ARTIFICIAL [0] ____ ____

(Score natural substrates; ignore sludge from point-sources)

ORIGIN

☐ LIMESTONE [1]
☒ TILLS [1]
☐ WETLANDS [0]
☐ HARDPAN [0]
☐ SANDSTONE [0]
☐ RIP/RAP [0]
☐ LACUSTRINE [0]
☐ SHALE [-1]
☐ COAL FINES [-2]

QUALITY -0.5

SILT

☐ HEAVY [-2]
☒ MODERATE [-1]
☒ NORMAL [0]
☐ FREE [1]

EMBEDDEDNESS

☐ EXTENSIVE [-2]
☒ MODERATE [-1]
☒ NORMAL [0]
☐ NONE [1] -0.5

NUMBER OF BEST TYPES: ☐ 4 or more [2] ☒ 3 or less [0]

Comments ⑭ (0) (1) (-1)

Substrate 14 Maximum 20

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.

____ UNDERCUT BANKS [1]
____ OVERHANGING VEGETATION [1]
____ SHALLOWS (IN SLOW WATER) [1]
____ ROOTMATS [1]
1 ✓ POOLS > 70cm [2]
____ ROOTWADS [1]
____ BOULDERS [1]
____ OXBOWS, BACKWATERS [1]
1 ✓ AQUATIC MACROPHYTES [1]
1 ✓ LOGS OR WOODY DEBRIS [1]

AMOUNT

Check ONE (*Or 2 & average*)

☐ EXTENSIVE >75% [11]
☐ MODERATE 25-75% [7]
☒ SPARSE 5-<25% [3]
☐ NEARLY ABSENT <5% [1]

Comments

Cover Maximum 20: 7

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]

Comments

Channel Maximum 20: 7

4] BANK EROSION AND RIPARIAN ZONE

Check **ONE** in each category for *EACH BANK* (*Or 2 per bank & average*)

River right looking downstream

EROSION (L R)

☐ ☒ NONE / LITTLE [3]
☐ ☐ MODERATE [2]
☐ ☐ HEAVY / SEVERE [1]

RIPARIAN WIDTH (L R)

☐ ☒ WIDE > 50m [4]
☐ ☐ MODERATE 10-50m [3]
☐ ☐ NARROW 5-10m [2]
☐ ☐ VERY NARROW < 5m [1]
☐ ☐ NONE [0]

FLOOD PLAIN QUALITY (L R)

☐ ☒ FOREST, SWAMP [3]
☐ ☐ SHRUB OR OLD FIELD [2]
☐ ☐ RESIDENTIAL, PARK, NEW FIELD [1]
☐ ☐ FENCED PASTURE [1]
☐ ☐ OPEN PASTURE, ROWCROP [0]

(L R)

☐ ☐ CONSERVATION TILLAGE [1]
☐ ☐ URBAN OR INDUSTRIAL [0]
☐ ☐ MINING / CONSTRUCTION [0]

Indicate predominant land use(s) past 100m riparian.

Comments ③ ④ ③

Riparian Maximum 10: 10

5] POOL / GLIDE AND RIFFLE / RUN QUALITY

MAXIMUM DEPTH

Check ONE (*ONLY!*)

☒ > 1m [6]
☐ 0.7-<1m [4]
☐ 0.4-<0.7m [2]
☐ 0.2-<0.4m [1]
☐ < 0.2m [0]

CHANNEL WIDTH

Check ONE (*Or 2 & average*)

☐ POOL WIDTH > RIFFLE WIDTH [2]
☒ POOL WIDTH = RIFFLE WIDTH [1]
☐ POOL WIDTH < RIFFLE WIDTH [0]

CURRENT VELOCITY

Check ALL that apply

☐ TORRENTIAL [-1]
☐ VERY FAST [1]
☐ FAST [1]
☐ MODERATE [1]
☒ SLOW [1]
☐ INTERSTITIAL [-1]
☐ INTERMITTENT [-2]
☐ EDDIES [1]

Indicate for reach - pools and riffles.

Recreation Potential
Primary Contact
Secondary Contact
(circle one and comment on back)

Comments

Pool / Current Maximum 12: 8

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 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]

Comments

Riffle / Run Maximum 8: 0

6] GRADIENT

(<0.1 ft/mi)

DRAINAGE AREA (≥2,240 mi²)

☐ VERY LOW - LOW [2-4]
☐ MODERATE [6-10]
☐ HIGH - VERY HIGH [10-6]

%POOL: 100 **%GLIDE:** ____
%RUN: ____ **%RIFFLE:** ____

Gradient Maximum 10: 6

EPA 4520 >1,502 Proofed KE 7/16/08 06/11/08

OhioEPA

Qualitative Habitat Evaluation Index and Use Assessment Field Sheet

QHEI Score: 56

Stream & Location: Des Plaines River – 278.4LB 390m **RM:** 278.4 **Date:** 07/10/08

Scorers Full Name & Affiliation: Joe Vondruska EA Engineering

River Code: __-___-___ **STORET #:** ______ **Lat./ Long.:** (NAD 83 - decimal °) 41.4262 / 88.1857 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
☐☐ BLDR /SLABS [10]			☐☐ HARDPAN [4]		
☐☐ BOULDER [9]			☐☐ DETRITUS [3]	✓	
☐☐ COBBLE [8]			☐☐ MUCK [2]		
☒☒ GRAVEL [7]	✓		☐☐ SILT [2]	✓	
☐☐ SAND [6]	✓		☐☐ ARTIFICIAL [0]		
☐☐ BEDROCK [5]					

(Score natural substrates; ignore sludge from point-sources)

NUMBER OF BEST TYPES: ☐ 4 or more [2] ☒ 3 or less [0]

Comments (14) (0)

ORIGIN — Check ONE (Or 2 & average)
- ☐ LIMESTONE [1]
- ☒ TILLS [1]
- ☐ WETLANDS [0]
- ☐ HARDPAN [0]
- ☐ SANDSTONE [0]
- ☐ RIP/RAP [0]
- ☐ LACUSTRINE [0]
- ☐ SHALE [-1]
- ☐ COAL FINES [-2]

(1)

QUALITY -0.5

SILT
- ☐ HEAVY [-2]
- ☒ MODERATE [-1]
- ☒ NORMAL [0]
- ☐ FREE [1]

EMBEDDEDNESS
- ☐ EXTENSIVE [-2]
- ☒ MODERATE [-1]
- ☒ NORMAL [0]
- ☐ NONE [1]

-0.5

(-1)

Substrate 14 Maximum 20

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.

__	UNDERCUT BANKS [1]	1	POOLS > 70cm [2]	__	OXBOWS, BACKWATERS [1]
__	OVERHANGING VEGETATION [1]	__	ROOTWADS [1]	2	AQUATIC MACROPHYTES [1]
__	SHALLOWS (IN SLOW WATER) [1]	__	BOULDERS [1]	1	LOGS OR WOODY DEBRIS [1]
__	ROOTMATS [1]				

AMOUNT — Check ONE (Or 2 & average)
- ☐ EXTENSIVE >75% [11]
- ☒ MODERATE 25-75% [7]
- ☐ SPARSE 5-<25% [3]
- ☐ NEARLY ABSENT <5% [1]

Comments (4) (7)

Cover 11 Maximum 20

3] CHANNEL MORPHOLOGY

Check ONE in each category (Or 2 & average)

SINUOSITY	DEVELOPMENT	CHANNELIZATION	STABILITY
☐ HIGH [4]	☐ EXCELLENT [7]	☐ NONE [6]	☐ HIGH [3]
☐ MODERATE [3]	☐ GOOD [5]	☐ RECOVERED [4]	☒ MODERATE [2]
☐ LOW [2]	☐ FAIR [3]	☒ RECOVERING [3]	☐ LOW [1]
☒ NONE [1]	☒ POOR [1]	☐ RECENT OR NO RECOVERY [1]	

Comments

Channel 7 Maximum 20

4] BANK EROSION AND RIPARIAN ZONE

Check ONE in each category for EACH BANK (Or 2 per bank & average)

River right looking downstream

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

Indicate predominant land use(s) past 100m riparian.

Comments (3) (4) (3)

Riparian 10 Maximum 10

5] POOL / GLIDE AND RIFFLE / RUN QUALITY

MAXIMUM DEPTH — Check ONE (ONLY!)
- ☒ > 1m [6]
- ☐ 0.7-<1m [4]
- ☐ 0.4-<0.7m [2]
- ☐ 0.2-<0.4m [1]
- ☐ < 0.2m [0]

CHANNEL WIDTH — Check ONE (Or 2 & average)
- ☐ POOL WIDTH > RIFFLE WIDTH [2]
- ☒ POOL WIDTH = RIFFLE WIDTH [1]
- ☐ POOL WIDTH < RIFFLE WIDTH [0]

CURRENT VELOCITY — Check ALL that apply
- ☐ TORRENTIAL [-1]
- ☐ VERY FAST [1]
- ☐ FAST [1]
- ☐ MODERATE [1]
- ☒ SLOW [1]
- ☐ INTERSTITIAL [-1]
- ☐ INTERMITTENT [-2]
- ☐ EDDIES [1]

Indicate for reach - pools and riffles.

Recreation Potential
Primary Contact
Secondary Contact
(circle one and comment on back)

Comments

Pool / Current 8 Maximum 12

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

Comments

Riffle / Run 0 Maximum 8

6] GRADIENT

GRADIENT (<0.1 ft/mi) ☐ VERY LOW - LOW [2-4]

DRAINAGE AREA (~~2,240~~ mi²) >1,502 ☐ MODERATE [6-10] ☐ HIGH - VERY HIGH [10-6]

%POOL: 100 %GLIDE: __ %RUN: __ %RIFFLE: __

Gradient 6 Maximum 10

EPA 4520

Proofed KC 7/16/08

06/11/08

OhioEPA

Qualitative Habitat Evaluation Index and Use Assessment Field Sheet

QHEI Score: 47.5

Stream & Location: Des Plaines River - 278.7RB **RM:** 278.7 **Date:** 07/11/08

Scorers Full Name & Affiliation: Joe Vandusko EA Engineering

River Code: __-__-__ **STORET #:** ______ **Lat./ Long.:** (NAD 83 - decimal °) 41.42935 / 88.1834 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
☐ ☐ BLDR /SLABS [10]			☐ ☐ HARDPAN [4]		
☐ ☐ BOULDER [9]			☐ ☐ DETRITUS [3]	✓	
☐ ☐ COBBLE [8]	✓		☐ ☐ MUCK [2]		
☑ ☐ GRAVEL [7]	✓		☐ ☐ SILT [2]	✓	
☑ ☐ SAND [6]	✓		☐ ☐ ARTIFICIAL [0]		
☐ ☐ BEDROCK [5]					

(Score natural substrates; ignore sludge from point-sources)

NUMBER OF BEST TYPES: ☐ 4 or more [2] ☑ 3 or less [0]

Comments (13) (0)

Check ONE (Or 2 & average)

ORIGIN
- ☐ LIMESTONE [1]
- ☑ TILLS [1]
- ☐ WETLANDS [0]
- ☐ HARDPAN [0]
- ☐ SANDSTONE [0]
- ☐ RIP/RAP [0]
- ☐ LACUSTRINE [0]
- ☐ SHALE [-1]
- ☐ COAL FINES [-2]

(1)

QUALITY -0.5

SILT
- ☐ HEAVY [-2]
- ☑ MODERATE [-1]
- ☑ NORMAL [0]
- ☐ FREE [1]

EMBEDDEDNESS
- ☐ EXTENSIVE [-2]
- ☑ MODERATE [-1]
- ☑ NORMAL [0]
- ☐ NONE [1]

-0.5

(-1)

Substrate 13 Maximum 20

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.

___	UNDERCUT BANKS [1]	1 ✓	POOLS > 70cm [2]	1	OXBOWS, BACKWATERS [1]
1 ✓	OVERHANGING VEGETATION [1]	___	ROOTWADS [1]	2	AQUATIC MACROPHYTES [1]
___	SHALLOWS (IN SLOW WATER) [1]	___	BOULDERS [1]	___	LOGS OR WOODY DEBRIS [1]
___	ROOTMATS [1]				

→ barge slip

AMOUNT

Check ONE (Or 2 & average)
- ☐ EXTENSIVE >75% [11]
- ☐ MODERATE 25-75% [7]
- ☑ SPARSE 5-<25% [3]
- ☐ NEARLY ABSENT <5% [1]

Comments (5) (3)

Cover Maximum 20: 8

3] CHANNEL MORPHOLOGY

Check ONE in each category (Or 2 & average)

SINUOSITY	DEVELOPMENT	CHANNELIZATION	STABILITY
☐ HIGH [4]	☐ EXCELLENT [7]	☐ NONE [6]	☐ HIGH [3]
☐ MODERATE [3]	☐ GOOD [5]	☐ RECOVERED [4]	☑ MODERATE [2]
☐ LOW [2]	☐ FAIR [3]	☑ RECOVERING [3]	☐ LOW [1]
☑ NONE [1]	☑ POOR [1]	☑ RECENT OR NO RECOVERY [1]	

Comments (2)

Channel Maximum 20: 6

4] BANK EROSION AND RIPARIAN ZONE

Check ONE in each category for EACH BANK (Or 2 per bank & average)

River right looking downstream

EROSION (L R)	RIPARIAN WIDTH (L R)	FLOOD PLAIN QUALITY (L R)	(L R)
☐ ☑ NONE / LITTLE [3]	☐ ☑ WIDE > 50m [4]	☐ ☑ FOREST, SWAMP [3]	☐ ☐ CONSERVATION TILLAGE [1]
☐ ☐ MODERATE [2]	☐ ☐ MODERATE 10-50m [3]	☐ ☐ SHRUB OR OLD FIELD [2]	☐ ☑ URBAN OR INDUSTRIAL [0]
☐ ☐ HEAVY / SEVERE [1]	☐ ☐ NARROW 5-10m [2]	☐ ☐ RESIDENTIAL, PARK, NEW FIELD [1]	☐ ☐ MINING / CONSTRUCTION [0]
	☐ ☐ VERY NARROW < 5m [1]	☐ ☐ FENCED PASTURE [1]	
	☐ ☑ NONE [0]	☐ ☐ OPEN PASTURE, ROWCROP [0]	

Indicate predominant land use(s) past 100m riparian.

Comments (3) (2) (1.5)

Riparian Maximum 10: 6.5

5] POOL / GLIDE AND RIFFLE / RUN QUALITY

MAXIMUM DEPTH

Check ONE (ONLY!)
- ☑ > 1m [6]
- ☐ 0.7-<1m [4]
- ☐ 0.4-<0.7m [2]
- ☐ 0.2-<0.4m [1]
- ☐ < 0.2m [0]

CHANNEL WIDTH

Check ONE (Or 2 & average)
- ☐ POOL WIDTH > RIFFLE WIDTH [2]
- ☑ POOL WIDTH = RIFFLE WIDTH [1]
- ☐ POOL WIDTH < RIFFLE WIDTH [0]

CURRENT VELOCITY

Check ALL that apply
- ☐ TORRENTIAL [-1]
- ☐ VERY FAST [1]
- ☐ FAST [1]
- ☐ MODERATE [1]
- ☑ SLOW [1]
- ☐ INTERSTITIAL [-1]
- ☐ INTERMITTENT [-2]
- ☐ EDDIES [1]

Indicate for reach - pools and riffles.

Recreation Potential
Primary Contact
Secondary Contact
(circle one and comment on back)

Comments

Pool / Current Maximum 12: 8

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

Comments

Riffle / Run Maximum 8: 0

6] GRADIENT (<0.1 ft/mi)

DRAINAGE AREA (>2,240 mi²)

- ☐ VERY LOW - LOW [2-4]
- ☐ MODERATE [6-10]
- ☐ HIGH - VERY HIGH [10-6]

%POOL: 100 %GLIDE: ___
%RUN: ___ %RIFFLE: ___

Gradient Maximum 10: 6

EPA 4520 71,502 Proofed ICE 7/16/08 06/11/08

OhioEPA

Qualitative Habitat Evaluation Index and Use Assessment Field Sheet

QHEI Score: 53.5

Stream & Location: Des Plaines River 278.7 LB **RM:** 278.7 **Date:** 07/10/08

Scorers Full Name & Affiliation: Joe Vondruska EA Engineering

River Code: ___-___-___ **STORET #:** ______ **Lat./Long.:** (NAD 83 - decimal °) 41.4286 /88.1814 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
☐ ☐ BLDR /SLABS [10]			☐ ☐ HARDPAN [4]		
☐ ☐ BOULDER [9]			☐ ☐ DETRITUS [3]	✓	
☐ ☐ COBBLE [8]			☐ ☐ MUCK [2]		
☑ ☐ GRAVEL [7]	✓		☐ ☐ SILT [2]	✓	
☑ ☐ SAND [6]	✓		☐ ☐ ARTIFICIAL [0]		
☐ ☐ BEDROCK [5]					

(Score natural substrates; Ignore sludge from point-sources)

NUMBER OF BEST TYPES: ☐ 4 or more [2] ☑ 3 or less [0]

Check ONE (Or 2 & average)

ORIGIN
- ☐ LIMESTONE [1]
- ☑ TILLS [1]
- ☐ WETLANDS [0]
- ☐ HARDPAN [0]
- ☑ SANDSTONE [0]
- ☐ RIP/RAP [0]
- ☐ LACUSTRINE [0]
- ☐ SHALE [-1]
- ☐ COAL FINES [-2]

QUALITY -0.5

SILT
- ☐ HEAVY [-2]
- ☑ MODERATE [-1]
- ☑ NORMAL [0]
- ☐ FREE [1]

EMBEDDEDNESS
- ☐ EXTENSIVE [-2]
- ☑ MODERATE [-1]
- ☑ NORMAL [0]
- ☐ NONE [1]

-13.5

Comments (13) (0) (0.5) (-1)

Substrate 12.5 Maximum 20

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.

___ UNDERCUT BANKS [1]
___ OVERHANGING VEGETATION [1]
___ SHALLOWS (IN SLOW WATER) [1]
___ ROOTMATS [1]
1 POOLS > 70cm [2]
___ ROOTWADS [1]
___ BOULDERS [1]
___ OXBOWS, BACKWATERS [1]
2 AQUATIC MACROPHYTES [1]
___ LOGS OR WOODY DEBRIS [1]

AMOUNT

Check ONE (Or 2 & average)
- ☐ EXTENSIVE >75% [11]
- ☑ MODERATE 25-75% [7]
- ☐ SPARSE 5-<25% [3]
- ☐ NEARLY ABSENT <5% [1]

Comments (3) (7)

Cover Maximum 20 10

3] CHANNEL MORPHOLOGY

Check ONE in each category (Or 2 & average)

SINUOSITY	DEVELOPMENT	CHANNELIZATION	STABILITY
☐ HIGH [4]	☐ EXCELLENT [7]	☐ NONE [6]	☐ HIGH [3]
☐ MODERATE [3]	☐ GOOD [5]	☐ RECOVERED [4]	☑ MODERATE [2]
☐ LOW [2]	☐ FAIR [3]	☑ RECOVERING [3]	☐ LOW [1]
☑ NONE [1]	☑ POOR [1]	☐ RECENT OR NO RECOVERY [1]	

Comments

Channel Maximum 20 7

4] BANK EROSION AND RIPARIAN ZONE

Check **ONE** in each category for **EACH BANK** (Or 2 per bank & average)

River right looking downstream

EROSION (L R)	RIPARIAN WIDTH (L R)	FLOOD PLAIN QUALITY (L R)	(L R)
☑ ☐ NONE / LITTLE [3]	☑ ☐ WIDE > 50m [4]	☑ ☐ FOREST, SWAMP [3]	☐ ☐ CONSERVATION TILLAGE [1]
☐ ☐ MODERATE [2]	☐ ☐ MODERATE 10-50m [3]	☐ ☐ SHRUB OR OLD FIELD [2]	☐ ☐ URBAN OR INDUSTRIAL [0]
☐ ☐ HEAVY / SEVERE [1]	☐ ☐ NARROW 5-10m [2]	☐ ☐ RESIDENTIAL, PARK, NEW FIELD [1]	☐ ☐ MINING / CONSTRUCTION [0]
	☐ ☐ VERY NARROW < 5m [1]	☐ ☐ FENCED PASTURE [1]	
	☐ ☐ NONE [0]	☐ ☐ OPEN PASTURE, ROWCROP [0]	

Indicate predominant land use(s) past 100m riparian.

Comments (3) (4) (3)

Riparian Maximum 10 10

5] POOL / GLIDE AND RIFFLE / RUN QUALITY

MAXIMUM DEPTH

Check ONE (ONLY!)
- ☑ > 1m [6]
- ☐ 0.7-<1m [4]
- ☐ 0.4-<0.7m [2]
- ☐ 0.2-<0.4m [1]
- ☐ < 0.2m [0]

CHANNEL WIDTH

Check ONE (Or 2 & average)
- ☐ POOL WIDTH > RIFFLE WIDTH [2]
- ☑ POOL WIDTH = RIFFLE WIDTH [1]
- ☐ POOL WIDTH < RIFFLE WIDTH [0]

CURRENT VELOCITY

Check ALL that apply
- ☐ TORRENTIAL [-1]
- ☐ VERY FAST [1]
- ☐ FAST [1]
- ☐ MODERATE [1]
- ☑ SLOW [1]
- ☐ INTERSTITIAL [-1]
- ☐ INTERMITTENT [-2]
- ☐ EDDIES [1]

Indicate for reach - pools and riffles.

Recreation Potential
Primary Contact
Secondary Contact
(circle one and comment on back)

Comments

Pool / Current Maximum 12 8

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 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]

Comments

Riffle / Run Maximum 8 0

6] GRADIENT (<0.1 ft/mi)

DRAINAGE AREA (~~2,140~~ mi²)

- ☐ VERY LOW - LOW [2-4]
- ☐ MODERATE [6-10]
- ☐ HIGH - VERY HIGH [10-6]

%POOL: 100 %GLIDE: ___
%RUN: ___ %RIFFLE: ___

Gradient Maximum 10 6

EPA 4520 >1,502 Proofed 7/16/08 KC 06/11/08

OhioEPA

Qualitative Habitat Evaluation Index and Use Assessment Field Sheet

QHEI Score: 41.5

Stream & Location: Des Plaines River - 278.9 RB **RM:** 278.9 **Date:** 07/11/08
350m **Scorers Full Name & Affiliation:** Joe Vondruska CA Engineering
River Code: __-__-__ **STORET #:** ____ **Lat./Long.:** (NAD 83 - decimal °) 41.4324 / 88.1791 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
☐ ☐	BLDR /SLABS [10]			☐ ☐	HARDPAN [4]		
☐ ☐	BOULDER [9]			☐ ☐	DETRITUS [3]	✓	
☐ ☐	COBBLE [8]			☐ ☐	MUCK [2]		
☐ ☐	GRAVEL [7]	✓		☐ ☐	SILT [2]	✓	
☑ ☑	SAND [6]	✓		☐ ☐	ARTIFICIAL [0]		
☐ ☐	BEDROCK [5]						

(Score natural substrates; ignore sludge from point-sources)

NUMBER OF BEST TYPES: ☐ 4 or more [2] ☑ 3 or less [0]

Comments (12) (0)

Check ONE (Or 2 & average)

ORIGIN
☐ LIMESTONE [1]
☐ TILLS [1]
☐ WETLANDS [0]
☑ HARDPAN [0]
☑ SANDSTONE [0]
☐ RIP/RAP [0]
☐ LACUSTRINE [0]
☐ SHALE [-1]
☐ COAL FINES [-2]

(0)

QUALITY
SILT
☑ HEAVY [-2] -1
☐ MODERATE [-1]
☑ NORMAL [0]
☐ FREE [1]
EMBEDDEDNESS
☑ EXTENSIVE [-2]
☐ MODERATE [-1]
☑ NORMAL [0]
☐ NONE [1] -1

(-2)

Substrate 10 Maximum 20

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.

__ UNDERCUT BANKS [1]
__ OVERHANGING VEGETATION [1]
__ SHALLOWS (IN SLOW WATER) [1]
__ ROOTMATS [1]
1 POOLS > 70cm [2]
__ ROOTWADS [1]
__ BOULDERS [1]
__ OXBOWS, BACKWATERS [1]
1 AQUATIC MACROPHYTES [1]
__ LOGS OR WOODY DEBRIS [1]

AMOUNT
Check ONE (Or 2 & average)
☐ EXTENSIVE >75% [11]
☐ MODERATE 25-75% [7]
☑ SPARSE 5-<25% [3]
☑ NEARLY ABSENT <5% [1]

Comments (3) (2)

Cover 5 Maximum 20

3] CHANNEL MORPHOLOGY

Check ONE in each category (Or 2 & average)

SINUOSITY	DEVELOPMENT	CHANNELIZATION	STABILITY
☐ HIGH [4]	☐ EXCELLENT [7]	☐ NONE [6]	☐ HIGH [3]
☐ MODERATE [3]	☐ GOOD [5]	☐ RECOVERED [4]	☑ MODERATE [2]
☐ LOW [2]	☐ FAIR [3]	☑ RECOVERING [3]	☐ LOW [1]
☑ NONE [1]	☑ POOR [1]	☑ RECENT OR NO RECOVERY [1]	

Comments (2)

Channel 6 Maximum 20

4] BANK EROSION AND RIPARIAN ZONE

Check ONE in each category for EACH BANK (Or 2 per bank & average)

River right looking downstream

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

Indicate predominant land use(s) past 100m riparian.

Comments (3) (2) (1.5)

Riparian 6.5 Maximum 10

5] POOL / GLIDE AND RIFFLE / RUN QUALITY

MAXIMUM DEPTH
Check ONE (ONLY!)
☑ > 1m [6]
☐ 0.7-<1m [4]
☐ 0.4-<0.7m [2]
☐ 0.2-<0.4m [1]
☐ < 0.2m [0]

CHANNEL WIDTH
Check ONE (Or 2 & average)
☐ POOL WIDTH > RIFFLE WIDTH [2]
☑ POOL WIDTH = RIFFLE WIDTH [1]
☐ POOL WIDTH < RIFFLE WIDTH [0]

CURRENT VELOCITY
Check ALL that apply
☐ TORRENTIAL [-1]
☐ VERY FAST [1]
☐ FAST [1]
☐ MODERATE [1]
☑ SLOW [1]
☐ INTERSTITIAL [-1]
☐ INTERMITTENT [-2]
☐ EDDIES [1]
Indicate for reach - pools and riffles.

Recreation Potential
Primary Contact
Secondary Contact
(circle one and comment on back)

Comments

Pool / Current 8 Maximum 12

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 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]

Comments

Riffle / Run 0 Maximum 8

6] GRADIENT

GRADIENT (<0.1 ft/mi) DRAINAGE AREA (~~>2,240~~ mi²) >1,502
☐ VERY LOW - LOW [2-4]
☐ MODERATE [6-10]
☐ HIGH - VERY HIGH [10-6]

%POOL: 100 %GLIDE:
%RUN: %RIFFLE:

Gradient 6 Maximum 10

EPA 4520 Proofed KC 7/16/08 06/11/08

OhioEPA

Qualitative Habitat Evaluation Index and Use Assessment Field Sheet

QHEI Score: 56

Stream & Location: Des Plaines River - 279.1RB **RM:** 279.1 **Date:** 07/11/08

Scorers Full Name & Affiliation: Joe Vondruska EA Engineering

River Code: _ _ - _ _ _ - _ _ _ **STORET #:** _ _ _ _ _ _ **Lat./ Long.:** (NAD 83 - decimal °) 41.4338 / 88.1758 **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
☐ ☐	BLDR /SLABS [10]			☐ ☐	HARDPAN [4]	✓	
☐ ☐	BOULDER [9]	✓		☐ ☐	DETRITUS [3]	✓	
☑ ☐	COBBLE [8]	✓		☐ ☐	MUCK [2]		
☐ ☐	GRAVEL [7]	✓		☐ ☐	SILT [2]	✓	
☐ ☑	SAND [6]	✓		☐ ☐	ARTIFICIAL [0]		
☐ ☐	BEDROCK [5]	✓					

(Score natural substrates; ignore sludge from point-sources)

NUMBER OF BEST TYPES: ☑ 4 or more [2] ☐ 3 or less [0]

Comments (14) (2)

Check ONE (Or 2 & average)

ORIGIN
- ☐ LIMESTONE [1]
- ☑ TILLS [1]
- ☐ WETLANDS [0]
- ☐ HARDPAN [0]
- ☐ SANDSTONE [0]
- ☐ RIP/RAP [0]
- ☐ LACUSTRINE [0]
- ☐ SHALE [-1]
- ☐ COAL FINES [-2]

(1)

QUALITY

SILT
- ☑ HEAVY [-2]
- ☐ MODERATE [-1]
- ☐ NORMAL [0]
- ☑ FREE [1]

(-1)

EMBEDDEDNESS
- ☑ EXTENSIVE [-2]
- ☐ MODERATE [-1]
- ☐ NORMAL [0]
- ☑ NONE [1]

(-1)

(-2)

Substrate 15 Maximum 20

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.

__ UNDERCUT BANKS [1]
1 OVERHANGING VEGETATION [1]
__ SHALLOWS (IN SLOW WATER) [1]
__ ROOTMATS [1]
2 ✓ POOLS > 70cm [2]
__ ROOTWADS [1]
2 ✓ BOULDERS [1]
1 OXBOWS, BACKWATERS [1]
1 AQUATIC MACROPHYTES [1]
1 ✓ LOGS OR WOODY DEBRIS [1]

AMOUNT

Check ONE (Or 2 & average)
- ☐ EXTENSIVE >75% [11]
- ☐ MODERATE 25-75% [7]
- ☑ SPARSE 5-<25% [3]
- ☐ NEARLY ABSENT <5% [1]

Comments 7 3

Cover 10 Maximum 20

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]

Comments (2)

Channel 7 Maximum 20

4] BANK EROSION AND RIPARIAN ZONE

Check ONE in each category for EACH BANK (Or 2 per bank & average)

River right looking downstream

EROSION (L R)
- ☐ ☑ NONE / LITTLE [3]
- ☐ ☐ MODERATE [2]
- ☐ ☐ HEAVY / SEVERE [1]

RIPARIAN WIDTH (L R)
- ☐ ☑ WIDE > 50m [4]
- ☐ ☐ MODERATE 10-50m [3]
- ☐ ☐ NARROW 5-10m [2]
- ☐ ☐ VERY NARROW < 5m [1]
- ☐ ☐ NONE [0]

FLOOD PLAIN QUALITY (L R)
- ☐ ☑ FOREST, SWAMP [3]
- ☐ ☐ SHRUB OR OLD FIELD [2]
- ☐ ☐ RESIDENTIAL, PARK, NEW FIELD [1]
- ☐ ☐ FENCED PASTURE [1]
- ☐ ☐ OPEN PASTURE, ROWCROP [0]

(L R)
- ☐ ☐ CONSERVATION TILLAGE [1]
- ☐ ☐ URBAN OR INDUSTRIAL [0]
- ☐ ☐ MINING / CONSTRUCTION [0]

Indicate predominant land use(s) past 100m riparian.

Comments (3) (4) (3)

Riparian 10 Maximum 10

5] POOL / GLIDE AND RIFFLE / RUN QUALITY

MAXIMUM DEPTH

Check ONE (ONLY!)
- ☑ > 1m [6]
- ☐ 0.7-<1m [4]
- ☐ 0.4-<0.7m [2]
- ☐ 0.2-<0.4m [1]
- ☐ < 0.2m [0]

CHANNEL WIDTH

Check ONE (Or 2 & average)
- ☐ POOL WIDTH > RIFFLE WIDTH [2]
- ☑ POOL WIDTH = RIFFLE WIDTH [1]
- ☐ POOL WIDTH < RIFFLE WIDTH [0]

CURRENT VELOCITY

Check ALL that apply
- ☐ TORRENTIAL [-1]
- ☐ VERY FAST [1]
- ☐ FAST [1]
- ☐ MODERATE [1]
- ☑ SLOW [1]
- ☐ INTERSTITIAL [-1]
- ☐ INTERMITTENT [-2]
- ☐ EDDIES [1]

Indicate for reach - pools and riffles.

Recreation Potential
Primary Contact
Secondary Contact
(circle one and comment on back)

Comments

Pool / Current 8 Maximum 12

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 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]

Comments

Riffle / Run 0 Maximum 8

6] GRADIENT (<0.1 ft/mi)

DRAINAGE AREA (~~>2,240~~ mi²) >1,502

- ☐ VERY LOW - LOW [2-4]
- ☐ MODERATE [6-10]
- ☐ HIGH - VERY HIGH [10-6]

%POOL: 50 %GLIDE: 50
%RUN: %RIFFLE:

Gradient 6 Maximum 10

EPA 4520

Proofed KC 7/16/08

06/11/08

OhioEPA

Qualitative Habitat Evaluation Index and Use Assessment Field Sheet

QHEI Score: 61.5

Stream & Location: Des Plaines River - 279.1 LB **RM:** 279.1 **Date:** 07/10/08
330m Port along Treats Island u/s mouth + port **Scorers Full Name & Affiliation:** Joe Vondruska EA Engineering
River Code: __-___-___ **STORET #:** d/s of mouth 270 m **Lat./ Long.:** (NAD 83 - decimal °) 41.4333 / 88.1739 U/S END **Office verified location** ☐
41.4331 88.1779 D/S Start

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

	BEST TYPES	POOL	RIFFLE		OTHER TYPES	POOL	RIFFLE
☐ ☐	BLDR /SLABS [10]	✓		☐ ☐	HARDPAN [4]		
☐ ☐	BOULDER [9]	✓		☐ ☐	DETRITUS [3]	✓	
☒ ☐	COBBLE [8]	✓		☐ ☐	MUCK [2]		
☒ ☐	GRAVEL [7]	✓		☐ ☐	SILT [2]	✓	
☐ ☐	SAND [6]	✓		☐ ☐	ARTIFICIAL [0]		
☐ ☐	BEDROCK [5]						

(Score natural substrates; ignore sludge from point-sources)

NUMBER OF BEST TYPES: ☒ 4 or more [2] ☐ 3 or less [0]

ORIGIN Check ONE (Or 2 & average)
- ☐ LIMESTONE [1]
- ☒ TILLS [1]
- ☐ WETLANDS [0]
- ☐ HARDPAN [0]
- ☐ SANDSTONE [0]
- ☐ RIP/RAP [0]
- ☐ LACUSTRINE [0]
- ☐ SHALE [-1]
- ☐ COAL FINES [-2]

QUALITY

SILT
- ☐ HEAVY [-2]
- ☒ MODERATE [-1]
- ☒ NORMAL [0]
- ☒ FREE [1]

EMBEDDEDNESS
- ☐ EXTENSIVE [-2]
- ☒ MODERATE [-1]
- ☒ NORMAL [0]
- ☒ NONE [1]

0 0

Comments (15) (2) (1) (0)

Substrate 18 Maximum 20

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.

__	UNDERCUT BANKS [1]	1	POOLS > 70cm [2]	__	OXBOWS, BACKWATERS [1]
1	OVERHANGING VEGETATION [1]	__	ROOTWADS [1]	1	AQUATIC MACROPHYTES [1]
__	SHALLOWS (IN SLOW WATER) [1]	1	BOULDERS [1]	1	LOGS OR WOODY DEBRIS [1]
__	ROOTMATS [1]				

AMOUNT Check ONE (Or 2 & average)
- ☐ EXTENSIVE >75% [11]
- ☒ MODERATE 25-75% [7]
- ☒ SPARSE 5-<25% [3]
- ☐ NEARLY ABSENT <5% [1]

Comments (6) (5)

Cover 11 Maximum 20

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

SINUOSITY	DEVELOPMENT	CHANNELIZATION	STABILITY
☐ HIGH [4]	☐ EXCELLENT [7]	☐ NONE [6]	☒ HIGH [3]
☐ MODERATE [3]	☐ GOOD [5]	☐ RECOVERED [4]	☐ MODERATE [2]
☐ LOW [2]	☐ FAIR [3]	☒ RECOVERING [3]	☐ LOW [1]
☒ NONE [1]	☒ POOR [1]	☐ RECENT OR NO RECOVERY [1]	

Comments

Channel 8 Maximum 20

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

River right looking downstream

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

Indicate predominant land use(s) past 100m riparian.

Comments (3) (4) (2.5)

Riparian 9.5 Maximum 10

5] POOL / GLIDE AND RIFFLE / RUN QUALITY

MAXIMUM DEPTH Check ONE (*ONLY!*)
- ☒ > 1m [6]
- ☐ 0.7-<1m [4]
- ☐ 0.4-<0.7m [2]
- ☐ 0.2-<0.4m [1]
- ☐ < 0.2m [0]

CHANNEL WIDTH Check ONE (*Or 2 & average*)
- ☐ POOL WIDTH > RIFFLE WIDTH [2]
- ☒ POOL WIDTH = RIFFLE WIDTH [1]
- ☐ POOL WIDTH < RIFFLE WIDTH [0]

CURRENT VELOCITY Check ALL that apply
- ☐ TORRENTIAL [-1]
- ☐ VERY FAST [1]
- ☐ FAST [1]
- ☒ MODERATE [1]
- ☒ SLOW [1]
- ☐ INTERSTITIAL [-1]
- ☐ INTERMITTENT [-2]
- ☐ EDDIES [1]

Indicate for reach - pools and riffles.

Recreation Potential
Primary Contact
Secondary Contact
(circle one and comment on back)

Comments

Pool / Current 9 Maximum 12

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

Comments

Riffle / Run 0 Maximum 8

6] GRADIENT
(<0.1 ft/mi) **DRAINAGE AREA** (~~>2,140~~ mi²)
- ☐ VERY LOW - LOW [2-4]
- ☐ MODERATE [6-10]
- ☐ HIGH - VERY HIGH [10-6]

%POOL: 34 **%GLIDE:** 66
%RUN: **%RIFFLE:**

Gradient 6 Maximum 10

EPA 4520 >1,502 Propped Ice 5/16/08 06/11/08

OhioEPA

Qualitative Habitat Evaluation Index and Use Assessment Field Sheet

QHEI Score: 55

Stream & Location: Des Plaines River, 405 - Treats Island side channel **RM:** 279.4 **Date:** 07/08/08

Scorers Full Name & Affiliation: Joe Vondruska EA Engineering

River Code: ___-___-___ **STORET #:** ______ **Lat./Long.:** (NAD 83 - decimal °) 41.4370 / 88.1663 **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
☐ ☐	BLDR /SLABS [10]			☐ ☐	HARDPAN [4]		
☐ ☐	BOULDER [9]			☐ ☐	DETRITUS [3]	✓	
☑ ☐	COBBLE [8]	✓		☐ ☐	MUCK [2]		
☐ ☐	GRAVEL [7]	✓		☑ ☐	SILT [2]	✓	
☐ ☐	SAND [6]	✓		☐ ☐	ARTIFICIAL [0]		
☐ ☐	BEDROCK [5]						

(Score natural substrates; ignore sludge from point-sources)

NUMBER OF BEST TYPES: ☐ 4 or more [2] ☑ 3 or less [0]

Comments (10) (0)

Check ONE (Or 2 & average)

ORIGIN
- ☐ LIMESTONE [1]
- ☑ TILLS [1]
- ☐ WETLANDS [0]
- ☑ HARDPAN [0]
- ☑ SANDSTONE [0]
- ☐ RIP/RAP [0]
- ☐ LACUSTRINE [0]
- ☐ SHALE [-1]
- ☐ COAL FINES [-2]

(0.5)

QUALITY -1

SILT
- ☑ HEAVY [-2]
- ☐ MODERATE [-1]
- ☑ NORMAL [0]
- ☐ FREE [1]

EMBEDDEDNESS
- ☑ EXTENSIVE [-2]
- ☐ MODERATE [-1]
- ☑ NORMAL [0]
- ☐ NONE [1]

(-2)

Substrate 8.5 Maximum 20

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.

___	UNDERCUT BANKS [1]	2	POOLS > 70cm [2]	___	OXBOWS, BACKWATERS [1]
1	OVERHANGING VEGETATION [1]	___	ROOTWADS [1]	3	AQUATIC MACROPHYTES [1]
___	SHALLOWS (IN SLOW WATER) [1]	___	BOULDERS [1]	1	LOGS OR WOODY DEBRIS [1]
___	ROOTMATS [1]				

AMOUNT

Check ONE (Or 2 & average)
- ☑ EXTENSIVE >75% [11]
- ☑ MODERATE 25-75% [7]
- ☐ SPARSE 5-<25% [3]
- ☐ NEARLY ABSENT <5% [1]

5 + 9

Comments extensive macrophyte growth (primarily eelgrass) near shore w/ mats of algae + duckweed

Cover Maximum 20: 14

3] CHANNEL MORPHOLOGY

Check ONE in each category (Or 2 & average)

SINUOSITY	DEVELOPMENT	CHANNELIZATION	STABILITY
☐ HIGH [4]	☐ EXCELLENT [7]	☑ NONE [6]	☐ HIGH [3]
☐ MODERATE [3]	☐ GOOD [5]	☐ RECOVERED [4]	☑ MODERATE [2]
☐ LOW [2]	☐ FAIR [3]	☐ RECOVERING [3]	☐ LOW [1]
☑ NONE [1]	☑ POOR [1]	☐ RECENT OR NO RECOVERY [1]	

Comments

Channel Maximum 20: 10

4] BANK EROSION AND RIPARIAN ZONE

Check ONE in each category for EACH BANK (Or 2 per bank & average)

River right looking downstream

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

Indicate predominant land use(s) past 100m riparian.

Comments (3) (4) (1.5)

Riparian Maximum 10: 8.5

5] POOL / GLIDE AND RIFFLE / RUN QUALITY

MAXIMUM DEPTH

Check ONE (ONLY!)
- ☑ > 1m [6]
- ☐ 0.7-<1m [4]
- ☐ 0.4-<0.7m [2]
- ☐ 0.2-<0.4m [1]
- ☐ < 0.2m [0]

CHANNEL WIDTH

Check ONE (Or 2 & average)
- ☐ POOL WIDTH > RIFFLE WIDTH [2]
- ☑ POOL WIDTH = RIFFLE WIDTH [1]
- ☐ POOL WIDTH < RIFFLE WIDTH [0]

CURRENT VELOCITY

Check ALL that apply
- ☐ TORRENTIAL [-1]
- ☐ VERY FAST [1]
- ☐ FAST [1]
- ☐ MODERATE [1]
- ☑ SLOW [1]
- ☐ INTERSTITIAL [-1]
- ☐ INTERMITTENT [-2]
- ☐ EDDIES [1]

Indicate for reach - pools and riffles.

Recreation Potential
Primary Contact
Secondary Contact
(circle one and comment on back)

Comments

Pool / Current Maximum 12: 8

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

Comments

Riffle / Run Maximum 8: 0

6] GRADIENT

(<0.1 ft/mi)

DRAINAGE AREA (~~>2,240~~ mi²) >1,502

- ☐ VERY LOW - LOW [2-4]
- ☐ MODERATE [6-10]
- ☐ HIGH - VERY HIGH [10-6]

%POOL: 100 **%GLIDE:**

%RUN: **%RIFFLE:**

Gradient Maximum 10: 6

Proofed KC 7/16/08

MBI MODIFIED

OhioEPA

Qualitative Habitat Evaluation Index and Use Assessment Field Sheet

QHEI Score: 50.5

Stream & Location: Des Plaines River – 284.1 RB *RM:* 284.1 *Date:* 07/11/08

Scorers Full Name & Affiliation: Joe Vondruska EA Engineering

River Code: __ - __ - __ *STORET #:* ______ *Lat./ Long.:* (NAD 83 - decimal °) __ . ____ /8_ . ____ 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
☐ ☐ BLDR /SLABS [10]			☐ ☐ HARDPAN [4]		
☐ ☐ BOULDER [9]			☐ ☐ DETRITUS [3]		
☐ ☐ COBBLE [8]			☐ ☐ MUCK [2]		
☐ ☐ GRAVEL [7]			☐ ☐ SILT [2]		
☐ ☐ SAND [6]			☐ ☐ ARTIFICIAL [0]		
☐ ☐ BEDROCK [5]			(Score natural substrates; ignore sludge from point-sources)		

NUMBER OF BEST TYPES: ☐ 4 or more [2] ☐ 3 or less [0]

Comments

Check ONE (*Or 2 & average*)

ORIGIN
- ☐ LIMESTONE [1]
- ☐ TILLS [1]
- ☐ WETLANDS [0]
- ☐ HARDPAN [0]
- ☐ SANDSTONE [0]
- ☐ RIP/RAP [0]
- ☐ LACUSTRINE [0]
- ☐ SHALE [-1]
- ☐ COAL FINES [-2]

QUALITY

SILT
- ☐ HEAVY [-2]
- ☐ MODERATE [-1]
- ☐ NORMAL [0]
- ☐ FREE [1]

EMBEDDEDNESS
- ☐ EXTENSIVE [-2]
- ☐ MODERATE [-1]
- ☐ NORMAL [0]
- ☐ NONE [1]

Substrate 17 *Maximum* 20

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.

____ UNDERCUT BANKS [1]	____ POOLS > 70cm [2]	____ OXBOWS, BACKWATERS [1]
____ OVERHANGING VEGETATION [1]	____ ROOTWADS [1]	____ AQUATIC MACROPHYTES [1]
____ SHALLOWS (IN SLOW WATER) [1]	____ BOULDERS [1]	____ LOGS OR WOODY DEBRIS [1]
____ ROOTMATS [1]		

AMOUNT
Check ONE (*Or 2 & average*)
- ☐ EXTENSIVE >75% [11]
- ☐ MODERATE 25-75% [7]
- ☐ SPARSE 5-<25% [3]
- ☐ NEARLY ABSENT <5% [1]

Comments

Cover 9 *Maximum* 20

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

SINUOSITY	DEVELOPMENT	CHANNELIZATION	STABILITY
☐ HIGH [4]	☐ EXCELLENT [7]	☐ NONE [6]	☑ HIGH [3]
☐ MODERATE [3]	☐ GOOD [5]	☐ RECOVERED [4]	☐ MODERATE [2]
☐ LOW [2]	☐ FAIR [3]	☐ RECOVERING [3]	☐ LOW [1]
☑ NONE [1]	☑ POOR [1]	☐ RECENT OR NO RECOVERY [1]	
		☑ Impounded [-1]	

Comments

Channel 4 *Maximum* 20

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

River right looking downstream

EROSION (L R)	RIPARIAN WIDTH (L R)	FLOOD PLAIN QUALITY (L R)	(L R)
☐ ☐ NONE / LITTLE [3]	☐ ☐ WIDE > 50m [4]	☐ ☐ FOREST, SWAMP [3]	☐ ☐ CONSERVATION TILLAGE [1]
☐ ☐ MODERATE [2]	☐ ☐ MODERATE 10-50m [3]	☐ ☐ SHRUB OR OLD FIELD [2]	☐ ☐ URBAN OR INDUSTRIAL [0]
☐ ☐ HEAVY / SEVERE [1]	☐ ☐ NARROW 5-10m [2]	☐ ☐ RESIDENTIAL, PARK, NEW FIELD [1]	☐ ☐ MINING / CONSTRUCTION [0]
	☐ ☐ VERY NARROW < 5m [1]	☐ ☐ FENCED PASTURE [1]	*Indicate predominant land use(s) past 100m riparian.*
	☐ ☐ NONE [0]	☐ ☐ OPEN PASTURE, ROWCROP [0]	

Comments

Riparian 8.5 *Maximum* 10

5] POOL / GLIDE AND RIFFLE / RUN QUALITY

MAXIMUM DEPTH	CHANNEL WIDTH	CURRENT VELOCITY	
Check ONE (*ONLY!*)	Check ONE (*Or 2 & average*)	Check ALL that apply	
☑ > 1m [6]	☐ POOL WIDTH > RIFFLE WIDTH [2]	☐ TORRENTIAL [-1]	☑ SLOW [1]
☐ 0.7-<1m [4]	☐ POOL WIDTH = RIFFLE WIDTH [1]	☐ VERY FAST [1]	☐ INTERSTITIAL [-1]
☐ 0.4-<0.7m [2]	☐ POOL WIDTH < RIFFLE WIDTH [0]	☐ FAST [1]	☐ INTERMITTENT [-2]
☐ 0.2-<0.4m [1]		☐ MODERATE [1]	☐ EDDIES [1]
☐ < 0.2m [0]	☑ Impounded [-1]	*Indicate for reach - pools and riffles.*	

Recreation Potential
Primary Contact
Secondary Contact
(circle one and comment on back)

Comments

Pool / Current 6 *Maximum* 12

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

Comments

Riffle / Run 0 *Maximum* 8

6] GRADIENT (______ ft/mi) ☐ VERY LOW - LOW [2-4]
DRAINAGE AREA (______ mi²) ☐ MODERATE [6-10]
☐ HIGH - VERY HIGH [10-6]

%POOL: ( ) %GLIDE: ( )
%RUN: ( ) %RIFFLE: ( )

Gradient 6 *Maximum* 10

EPA 4520 06/11/08

Proofed KC 7/16/08

MBI MODIFIED

OhioEPA

Qualitative Habitat Evaluation Index and Use Assessment Field Sheet

QHEI Score: 36

Stream & Location: Des Plaines River - 283.9 LB

RM: 283.9 Date: 07/10/08

Scorers Full Name & Affiliation: Joe Vondruska EA Engineering

River Code: _ _ - _ _ _ - _ _ _ STORET #: _ _ _ _ _ _ Lat./Long.: (NAD 83 - decimal °) _ _ . _ _ _ _ /8_ . _ _ _ _ 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
☐ ☐ BLDR /SLABS [10]			☐ ☐ HARDPAN [4]		
☐ ☐ BOULDER [9]			☐ ☐ DETRITUS [3]		
☐ ☐ COBBLE [8]			☐ ☐ MUCK [2]		
☐ ☐ GRAVEL [7]			☐ ☐ SILT [2]		
☐ ☐ SAND [6]			☐ ☐ ARTIFICIAL [0]		
☐ ☐ BEDROCK [5]			(Score natural substrates; ignore sludge from point-sources)		

NUMBER OF BEST TYPES: ☐ 4 or more [2] ☐ 3 or less [0]

Comments

Check ONE (Or 2 & average)

ORIGIN
- ☐ LIMESTONE [1]
- ☐ TILLS [1]
- ☐ WETLANDS [0]
- ☐ HARDPAN [0]
- ☐ SANDSTONE [0]
- ☐ RIP/RAP [0]
- ☐ LACUSTRINE [0]
- ☐ SHALE [-1]
- ☐ COAL FINES [-2]

QUALITY

SILT
- ☐ HEAVY [-2]
- ☐ MODERATE [-1]
- ☐ NORMAL [0]
- ☐ FREE [1]

EMBEDDEDNESS
- ☐ EXTENSIVE [-2]
- ☐ MODERATE [-1]
- ☐ NORMAL [0]
- ☐ NONE [1]

Substrate 7.5 Maximum 20

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.

___ 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]

AMOUNT

Check ONE (Or 2 & average)
- ☐ EXTENSIVE >75% [11]
- ☐ MODERATE 25-75% [7]
- ☐ SPARSE 5-<25% [3]
- ☐ NEARLY ABSENT <5% [1]

Comments

Cover 9 Maximum 20

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

SINUOSITY	DEVELOPMENT	CHANNELIZATION	STABILITY
☐ HIGH [4]	☐ EXCELLENT [7]	☐ NONE [6]	☑ HIGH [3]
☐ MODERATE [3]	☐ GOOD [5]	☐ RECOVERED [4]	☐ MODERATE [2]
☐ LOW [2]	☐ FAIR [3]	☐ RECOVERING [3]	☑ LOW [1]
☑ NONE [1]	☑ POOR [1]	☐ RECENT OR NO RECOVERY [1]	
		☑ Impounded [-1]	2

Comments

Channel 3 Maximum 20

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

River right looking downstream

EROSION (L R)
- ☐ ☐ NONE / LITTLE [3]
- ☐ ☐ MODERATE [2]
- ☐ ☐ HEAVY / SEVERE [1]

RIPARIAN WIDTH (L R)
- ☐ ☐ WIDE > 50m [4]
- ☐ ☐ MODERATE 10-50m [3]
- ☐ ☐ NARROW 5-10m [2]
- ☐ ☐ VERY NARROW < 5m [1]
- ☐ ☐ NONE [0]

FLOOD PLAIN QUALITY (L R)
- ☐ ☐ FOREST, SWAMP [3]
- ☐ ☐ SHRUB OR OLD FIELD [2]
- ☐ ☐ RESIDENTIAL, PARK, NEW FIELD [1]
- ☐ ☐ FENCED PASTURE [1]
- ☐ ☐ OPEN PASTURE, ROWCROP [0]

(L R)
- ☐ ☐ CONSERVATION TILLAGE [1]
- ☐ ☐ URBAN OR INDUSTRIAL [0]
- ☐ ☐ MINING / CONSTRUCTION [0]

Indicate predominant land use(s) past 100m riparian.

Comments

Riparian 4.5 Maximum 10

5] POOL / GLIDE AND RIFFLE / RUN QUALITY

MAXIMUM DEPTH

Check ONE (ONLY!)
- ☑ > 1m [6]
- ☐ 0.7-<1m [4]
- ☐ 0.4-<0.7m [2]
- ☐ 0.2-<0.4m [1]
- ☐ < 0.2m [0]

CHANNEL WIDTH

Check ONE (Or 2 & average)
- ☐ POOL WIDTH > RIFFLE WIDTH [2]
- ☐ POOL WIDTH = RIFFLE WIDTH [1]
- ☐ POOL WIDTH < RIFFLE WIDTH [0]
- ☑ Impounded [-1]

CURRENT VELOCITY

Check ALL that apply
- ☐ TORRENTIAL [-1]
- ☐ VERY FAST [1]
- ☐ FAST [1]
- ☐ MODERATE [1]
- ☑ SLOW [1]
- ☐ INTERSTITIAL [-1]
- ☐ INTERMITTENT [-2]
- ☐ EDDIES [1]

Indicate for reach - pools and riffles.

Recreation Potential
Primary Contact
Secondary Contact
(circle one and comment on back)

Comments

Pool / Current 6 Maximum 12

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 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]

Comments

Riffle / Run 0 Maximum 8

6] GRADIENT
(___ ft/mi)

DRAINAGE AREA (___ mi²)

- ☐ VERY LOW - LOW [2-4]
- ☐ MODERATE [6-10]
- ☐ HIGH - VERY HIGH [10-6]

%POOL: ___ %GLIDE: ___

%RUN: ___ %RIFFLE: ___

Gradient 6 Maximum 10

EPA 4520 06/11/08

Proofed FC 7/16/08

MBI MODIFIED

OhioEPA

Qualitative Habitat Evaluation Index and Use Assessment Field Sheet

QHEI Score: 31.5

Stream & Location: Des Plaines River - 283.8 RB *RM:* 283.8 *Date:* 07/11/08

Scorers Full Name & Affiliation: Joe Vondruska EA Engineering

River Code: __ - ___ - ___ *STORET #:* ______ *Lat./ Long.:* (NAD 83 - decimal °) __ . ____ /8_ . ____ 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
☐ ☐ BLDR /SLABS [10]			☐ ☐ HARDPAN [4]		
☐ ☐ BOULDER [9]			☐ ☐ DETRITUS [3]		
☐ ☐ COBBLE [8]			☐ ☐ MUCK [2]		
☐ ☐ GRAVEL [7]			☐ ☐ SILT [2]		
☐ ☐ SAND [6]			☐ ☐ ARTIFICIAL [0]		
☐ ☐ BEDROCK [5]					

(Score natural substrates; ignore sludge from point-sources)

NUMBER OF BEST TYPES: ☐ 4 or more [2] ☐ 3 or less [0]

Comments

Check ONE (*Or 2 & average*)

ORIGIN
- ☐ LIMESTONE [1]
- ☐ TILLS [1]
- ☐ WETLANDS [0]
- ☐ HARDPAN [0]
- ☐ SANDSTONE [0]
- ☐ RIP/RAP [0]
- ☐ LACUSTRINE [0]
- ☐ SHALE [-1]
- ☐ COAL FINES [-2]

QUALITY

SILT
- ☐ HEAVY [-2]
- ☐ MODERATE [-1]
- ☐ NORMAL [0]
- ☐ FREE [1]

EMBEDDEDNESS
- ☐ EXTENSIVE [-2]
- ☐ MODERATE [-1]
- ☐ NORMAL [0]
- ☐ NONE [1]

Substrate 0 *Maximum* 20

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.

____ 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]

AMOUNT
Check ONE (*Or 2 & average*)
- ☐ EXTENSIVE >75% [11]
- ☐ MODERATE 25-75% [7]
- ☐ SPARSE 5-<25% [3]
- ☐ NEARLY ABSENT <5% [1]

Comments

Cover 10 *Maximum* 20

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

SINUOSITY	DEVELOPMENT	CHANNELIZATION	STABILITY
☐ HIGH [4]	☐ EXCELLENT [7]	☐ NONE [6]	☐ HIGH [3]
☐ MODERATE [3]	☐ GOOD [5]	☐ RECOVERED [4]	☐ MODERATE [2]
☐ LOW [2]	☐ FAIR [3]	☐ RECOVERING [3]	☒ LOW [1]
☒ NONE [1]	☒ POOR [1]	☐ RECENT OR NO RECOVERY [1]	
		☒ Impounded [-1]	

Comments

Channel 2 *Maximum* 20

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

River right looking downstream

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

Indicate predominant land use(s) past 100m riparian.

Comments

Riparian 7.5 *Maximum* 10

5] POOL / GLIDE AND RIFFLE / RUN QUALITY

MAXIMUM DEPTH
Check ONE (*ONLY!*)
- ☒ > 1m [6]
- ☐ 0.7-<1m [4]
- ☐ 0.4-<0.7m [2]
- ☐ 0.2-<0.4m [1]
- ☐ < 0.2m [0]

CHANNEL WIDTH
Check ONE (*Or 2 & average*)
- ☐ POOL WIDTH > RIFFLE WIDTH [2]
- ☐ POOL WIDTH = RIFFLE WIDTH [1]
- ☐ POOL WIDTH < RIFFLE WIDTH [0]
- ☒ Impounded [-1]

CURRENT VELOCITY
Check ALL that apply
- ☐ TORRENTIAL [-1]
- ☐ VERY FAST [1]
- ☐ FAST [1]
- ☐ MODERATE [1]
- ☒ SLOW [1]
- ☐ INTERSTITIAL [-1]
- ☐ INTERMITTENT [-2]
- ☐ EDDIES [1]

Indicate for reach - pools and riffles.

Recreation Potential
Primary Contact
Secondary Contact
(circle one and comment on back)

Comments

Pool / Current 6 *Maximum* 12

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

Comments

Riffle / Run 0 *Maximum* 8

6] GRADIENT
(______ ft/mi) DRAINAGE AREA (______ mi²)
- ☐ VERY LOW - LOW [2-4]
- ☐ MODERATE [6-10]
- ☐ HIGH - VERY HIGH [10-6]

%POOL: ____ %GLIDE: ____
%RUN: ____ %RIFFLE: ____

Gradient 6 *Maximum* 10

EPA 4520

Proofed 7/16/08 KC

06/11/08

MBI MODIFIED

OhioEPA

Qualitative Habitat Evaluation Index and Use Assessment Field Sheet

QHEI Score: 42

Stream & Location: Des Plaines River - 283.6 LB RM: 283.6 Date: 07/10/08

Scorers Full Name & Affiliation: Joe Vondruska EA Engineering

River Code: __ - __ - __ STORET #: ______ Lat./Long.: (NAD 83 - decimal °) __ . ____ /8_ . ____ 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
☐ ☐ BLDR /SLABS [10]			☐ ☐ HARDPAN [4]		
☐ ☐ BOULDER [9]			☐ ☐ DETRITUS [3]		
☐ ☐ COBBLE [8]			☐ ☐ MUCK [2]		
☐ ☐ GRAVEL [7]			☐ ☐ SILT [2]		
☐ ☐ SAND [6]			☐ ☐ ARTIFICIAL [0]		
☐ ☐ BEDROCK [5]			(Score natural substrates; ignore sludge from point-sources)		

NUMBER OF BEST TYPES: ☐ 4 or more [2] ☐ 3 or less [0]

Comments

Check ONE (Or 2 & average)

ORIGIN
- ☐ LIMESTONE [1]
- ☐ TILLS [1]
- ☐ WETLANDS [0]
- ☐ HARDPAN [0]
- ☐ SANDSTONE [0]
- ☐ RIP/RAP [0]
- ☐ LACUSTRINE [0]
- ☐ SHALE [-1]
- ☐ COAL FINES [-2]

QUALITY

SILT
- ☐ HEAVY [-2]
- ☐ MODERATE [-1]
- ☐ NORMAL [0]
- ☐ FREE [1]

EMBEDDEDNESS
- ☐ EXTENSIVE [-2]
- ☐ MODERATE [-1]
- ☐ NORMAL [0]
- ☐ NONE [1]

Substrate 14 Maximum 20

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.

___ 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]

AMOUNT
Check ONE (Or 2 & average)
- ☐ EXTENSIVE >75% [11]
- ☐ MODERATE 25-75% [7]
- ☐ SPARSE 5-<25% [3]
- ☐ NEARLY ABSENT <5% [1]

Comments

Cover 6 Maximum 20

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

SINUOSITY	DEVELOPMENT	CHANNELIZATION	STABILITY
☐ HIGH [4]	☐ EXCELLENT [7]	☐ NONE [6]	☒ HIGH [3]
☐ MODERATE [3]	☐ GOOD [5]	☐ RECOVERED [4]	☐ MODERATE [2]
☐ LOW [2]	☐ FAIR [3]	☐ RECOVERING [3]	☐ LOW [1]
☒ NONE [1]	☒ POOR [1]	☐ RECENT OR NO RECOVERY [1]	
		☒ Impounded [-1]	

Comments

Channel 4 Maximum 20

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

River right looking downstream

L R EROSION	L R RIPARIAN WIDTH	L R FLOOD PLAIN QUALITY	L R
☐ ☐ NONE / LITTLE [3]	☐ ☐ WIDE > 50m [4]	☐ ☐ FOREST, SWAMP [3]	☐ ☐ CONSERVATION TILLAGE [1]
☐ ☐ MODERATE [2]	☐ ☐ MODERATE 10-50m [3]	☐ ☐ SHRUB OR OLD FIELD [2]	☐ ☐ URBAN OR INDUSTRIAL [0]
☐ ☐ HEAVY / SEVERE [1]	☐ ☐ NARROW 5-10m [2]	☐ ☐ RESIDENTIAL, PARK, NEW FIELD [1]	☐ ☐ MINING / CONSTRUCTION [0]
	☐ ☐ VERY NARROW < 5m [1]	☐ ☐ FENCED PASTURE [1]	Indicate predominant land use(s) past 100m riparian.
	☐ ☐ NONE [0]	☐ ☐ OPEN PASTURE, ROWCROP [0]	

Comments

Riparian 6 Maximum 10

5] POOL / GLIDE AND RIFFLE / RUN QUALITY

MAXIMUM DEPTH Check ONE (ONLY!)	CHANNEL WIDTH Check ONE (Or 2 & average)	CURRENT VELOCITY Check ALL that apply	
☒ > 1m [6]	☐ POOL WIDTH > RIFFLE WIDTH [2]	☐ TORRENTIAL [-1]	☒ SLOW [1]
☐ 0.7-<1m [4]	☐ POOL WIDTH = RIFFLE WIDTH [1]	☐ VERY FAST [1]	☐ INTERSTITIAL [-1]
☐ 0.4-<0.7m [2]	☐ POOL WIDTH < RIFFLE WIDTH [0]	☐ FAST [1]	☐ INTERMITTENT [-2]
☐ 0.2-<0.4m [1]		☐ MODERATE [1]	☐ EDDIES [1]
☐ < 0.2m [0]	☒ Impounded [-1]	Indicate for reach - pools and riffles.	

Recreation Potential
Primary Contact
Secondary Contact
(circle one and comment on back)

Comments

Pool / Current 6 Maximum 12

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

Comments

Riffle / Run 0 Maximum 8

6] GRADIENT
(____ ft/mi) DRAINAGE AREA (____ mi²)
- ☐ VERY LOW - LOW [2-4]
- ☐ MODERATE [6-10]
- ☐ HIGH - VERY HIGH [10-6]

%POOL: ( ) %GLIDE: ( )
%RUN: ( ) %RIFFLE: ( )

Gradient 6 Maximum 10

EPA 4520 Project KC 7/16/08 06/11/08

MBI MODIFIED

OhioEPA

Qualitative Habitat Evaluation Index and Use Assessment Field Sheet

QHEI Score: 34.5

Stream & Location: Des Plaines River ~ 283.5 RB **RM:** 283.5 **Date:** 07/11/08

Scorers Full Name & Affiliation: Joe Vondruska EA Engineering

River Code: __ - ___ - ___ **STORET #:** ______ **Lat./ Long.:** (NAD 83 - decimal°) __ . ____ /8_ . ____ Office verified location ☐

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

BEST TYPES POOL RIFFLE

- ☐ ☐ BLDR /SLABS [10] ___ ___
- ☐ ☐ BOULDER [9] ___ ___
- ☐ ☐ COBBLE [8] ___ ___
- ☐ ☐ GRAVEL [7] ___ ___
- ☐ ☐ SAND [6] ___ ___
- ☐ ☐ BEDROCK [5] ___ ___

NUMBER OF BEST TYPES: ☐ 4 or more [2] ☐ 3 or less [0]

OTHER TYPES POOL RIFFLE

- ☐ ☐ HARDPAN [4] ___ ___
- ☐ ☐ DETRITUS [3] ___ ___
- ☐ ☐ MUCK [2] ___ ___
- ☐ ☐ SILT [2] ___ ___
- ☐ ☐ ARTIFICIAL [0] ___ ___

(Score natural substrates; ignore sludge from point-sources)

Check ONE (*Or 2 & average*)

ORIGIN

- ☐ LIMESTONE [1]
- ☐ TILLS [1]
- ☐ WETLANDS [0]
- ☐ HARDPAN [0]
- ☐ SANDSTONE [0]
- ☐ RIP/RAP [0]
- ☐ LACUSTRINE [0]
- ☐ SHALE [-1]
- ☐ COAL FINES [-2]

QUALITY

SILT

- ☐ HEAVY [-2]
- ☐ MODERATE [-1]
- ☐ NORMAL [0]
- ☐ FREE [1]

EMBEDDEDNESS

- ☐ EXTENSIVE [-2]
- ☐ MODERATE [-1]
- ☐ NORMAL [0]
- ☐ NONE [1]

Comments

Substrate 2 *Maximum 20*

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.

___ 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]

AMOUNT
Check ONE (*Or 2 & average*)

- ☐ EXTENSIVE >75% [11]
- ☐ MODERATE 25-75% [7]
- ☐ SPARSE 5-<25% [3]
- ☐ NEARLY ABSENT <5% [1]

Comments

Cover Maximum 20 12

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]
- ☑ Impounded [-1]

STABILITY

- ☐ HIGH [3]
- ☐ MODERATE [2]
- ☑ LOW [1]

Comments

Channel Maximum 20 2

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

River right looking downstream

EROSION L R

- ☐ ☐ NONE / LITTLE [3]
- ☐ ☐ MODERATE [2]
- ☐ ☐ HEAVY / SEVERE [1]

RIPARIAN WIDTH L R

- ☐ ☐ WIDE > 50m [4]
- ☐ ☐ MODERATE 10-50m [3]
- ☐ ☐ NARROW 5-10m [2]
- ☐ ☐ VERY NARROW < 5m [1]
- ☐ ☐ NONE [0]

FLOOD PLAIN QUALITY L R

- ☐ ☐ FOREST, SWAMP [3]
- ☐ ☐ SHRUB OR OLD FIELD [2]
- ☐ ☐ RESIDENTIAL, PARK, NEW FIELD [1]
- ☐ ☐ FENCED PASTURE [1]
- ☐ ☐ OPEN PASTURE, ROWCROP [0]

L R

- ☐ ☐ CONSERVATION TILLAGE [1]
- ☐ ☐ URBAN OR INDUSTRIAL [0]
- ☐ ☐ MINING / CONSTRUCTION [0]

Indicate predominant land use(s) past 100m riparian.

Comments

Riparian Maximum 10 6.5

5] POOL / GLIDE AND RIFFLE / RUN QUALITY

MAXIMUM DEPTH
Check ONE (*ONLY!*)

- ☑ > 1m [6]
- ☐ 0.7-<1m [4]
- ☐ 0.4-<0.7m [2]
- ☐ 0.2-<0.4m [1]
- ☐ < 0.2m [0]

CHANNEL WIDTH
Check ONE (*Or 2 & average*)

- ☐ POOL WIDTH > RIFFLE WIDTH [2]
- ☐ POOL WIDTH = RIFFLE WIDTH [1]
- ☐ POOL WIDTH < RIFFLE WIDTH [0]
- ☑ Impounded [-1]

CURRENT VELOCITY
Check ALL that apply

- ☐ TORRENTIAL [-1]
- ☐ VERY FAST [1]
- ☐ FAST [1]
- ☐ MODERATE [1]
- ☑ SLOW [1]
- ☐ INTERSTITIAL [-1]
- ☐ INTERMITTENT [-2]
- ☐ EDDIES [1]

Indicate for reach - pools and riffles.

Recreation Potential
Primary Contact
Secondary Contact
(circle one and comment on back)

Comments

Pool / Current Maximum 12 6

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 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]

Comments

Riffle / Run Maximum 8 0

6] GRADIENT
(___ ft/mi)

DRAINAGE AREA (___ mi²)

- ☐ VERY LOW - LOW [2-4]
- ☐ MODERATE [6-10]
- ☐ HIGH - VERY HIGH [10-6]

%POOL: ___ %GLIDE: ___
%RUN: ___ %RIFFLE: ___

Gradient Maximum 10 6

EPA 4520 06/11/08

Proofed KR 7/10/08

MBI MODIFIED

OhioEPA

Qualitative Habitat Evaluation Index and Use Assessment Field Sheet

QHEI Score: 42.5

Stream & Location: Des Plaines River - 283.3 LB RM: 283.3 Date: 07/19/08

Scorers Full Name & Affiliation: Joe Vondruska EA Engineering

River Code: __ - ___ - ___ STORET #: ______ Lat./ Long.: (NAD 83 - decimal °) __ . ____ /8_ . ____ 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
☐ ☐ BLDR /SLABS [10]			☐ ☐ HARDPAN [4]		
☐ ☐ BOULDER [9]			☐ ☐ DETRITUS [3]		
☐ ☐ COBBLE [8]			☐ ☐ MUCK [2]		
☐ ☐ GRAVEL [7]			☐ ☐ SILT [2]		
☐ ☐ SAND [6]			☐ ☐ ARTIFICIAL [0]		
☐ ☐ BEDROCK [5]			(Score natural substrates; ignore sludge from point-sources)		

NUMBER OF BEST TYPES: ☐ 4 or more [2] ☐ 3 or less [0]

Comments

Check ONE (Or 2 & average)

ORIGIN
- ☐ LIMESTONE [1]
- ☐ TILLS [1]
- ☐ WETLANDS [0]
- ☐ HARDPAN [0]
- ☐ SANDSTONE [0]
- ☐ RIP/RAP [0]
- ☐ LACUSTRINE [0]
- ☐ SHALE [-1]
- ☐ COAL FINES [-2]

QUALITY

SILT
- ☐ HEAVY [-2]
- ☐ MODERATE [-1]
- ☐ NORMAL [0]
- ☐ FREE [1]

EMBEDDEDNESS
- ☐ EXTENSIVE [-2]
- ☐ MODERATE [-1]
- ☐ NORMAL [0]
- ☐ NONE [1]

Substrate Maximum 20: 17

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.

- ____ 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]

AMOUNT

Check ONE (Or 2 & average)
- ☐ EXTENSIVE >75% [11]
- ☐ MODERATE 25-75% [7]
- ☐ SPARSE 5-<25% [3]
- ☐ NEARLY ABSENT <5% [1]

Comments

Cover Maximum 20: 5

3] CHANNEL MORPHOLOGY

Check ONE in each category (Or 2 & average)

SINUOSITY	DEVELOPMENT	CHANNELIZATION	STABILITY
☐ HIGH [4]	☐ EXCELLENT [7]	☐ NONE [6]	☒ HIGH [3]
☐ MODERATE [3]	☐ GOOD [5]	☐ RECOVERED [4]	☐ MODERATE [2]
☐ LOW [2]	☐ FAIR [3]	☐ RECOVERING [3]	☐ LOW [1]
☒ NONE [1]	☒ POOR [1]	☐ RECENT OR NO RECOVERY [1]	
		☒ Impounded [-1]	

Comments

Channel Maximum 20: 4

4] BANK EROSION AND RIPARIAN ZONE

Check ONE in each category for EACH BANK (Or 2 per bank & average)

River right looking downstream

L R EROSION	L R RIPARIAN WIDTH	L R FLOOD PLAIN QUALITY	L R
☐ ☐ NONE / LITTLE [3]	☐ ☐ WIDE > 50m [4]	☐ ☐ FOREST, SWAMP [3]	☐ ☐ CONSERVATION TILLAGE [1]
☐ ☐ MODERATE [2]	☐ ☐ MODERATE 10-50m [3]	☐ ☐ SHRUB OR OLD FIELD [2]	☐ ☐ URBAN OR INDUSTRIAL [0]
☐ ☐ HEAVY / SEVERE [1]	☐ ☐ NARROW 5-10m [2]	☐ ☐ RESIDENTIAL, PARK, NEW FIELD [1]	☐ ☐ MINING / CONSTRUCTION [0]
	☐ ☐ VERY NARROW < 5m [1]	☐ ☐ FENCED PASTURE [1]	Indicate predominant land use(s) past 100m riparian.
	☐ ☐ NONE [0]	☐ ☐ OPEN PASTURE, ROWCROP [0]	

Comments

Riparian Maximum 10: 4.5

5] POOL / GLIDE AND RIFFLE / RUN QUALITY

MAXIMUM DEPTH Check ONE (ONLY!)	CHANNEL WIDTH Check ONE (Or 2 & average)	CURRENT VELOCITY Check ALL that apply	
☒ > 1m [6]	☐ POOL WIDTH > RIFFLE WIDTH [2]	☐ TORRENTIAL [-1]	☒ SLOW [1]
☐ 0.7-<1m [4]	☐ POOL WIDTH = RIFFLE WIDTH [1]	☐ VERY FAST [1]	☐ INTERSTITIAL [-1]
☐ 0.4-<0.7m [2]	☐ POOL WIDTH < RIFFLE WIDTH [0]	☐ FAST [1]	☐ INTERMITTENT [-2]
☐ 0.2-<0.4m [1]		☐ MODERATE [1]	☐ EDDIES [1]
☐ < 0.2m [0]	☒ Impounded [-1]	Indicate for reach - pools and riffles.	

Recreation Potential
Primary Contact
Secondary Contact
(circle one and comment on back)

Comments

Pool / Current Maximum 12: 6

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

Comments

Riffle / Run Maximum 8: 0

6] GRADIENT

GRADIENT (______ ft/mi) DRAINAGE AREA (______ mi²)
- ☐ VERY LOW - LOW [2-4]
- ☐ MODERATE [6-10]
- ☐ HIGH - VERY HIGH [10-6]

%POOL: ( ) %GLIDE: ( )
%RUN: ( ) %RIFFLE: ( )

Gradient Maximum 10: 6

EPA 4520 06/11/08

Proofed KC 7/15/08

MBI MODIFIED

OhioEPA

Qualitative Habitat Evaluation Index and Use Assessment Field Sheet

QHEI Score: 40.5

Stream & Location: Des Plaines River - 283.2 RB **RM:** 283.2 **Date:** 07/11/08

Scorers Full Name & Affiliation: Joe Vavrusha EA Engineering

River Code: __ - __ - __ **STORET #:** ______ **Lat./ Long.:** (NAD 83 - decimal °) __ . ____ /8_ . ____ 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
☐☐ BLDR /SLABS [10]			☐☐ HARDPAN [4]		
☐☐ BOULDER [9]			☐☐ DETRITUS [3]		
☐☐ COBBLE [8]			☐☐ MUCK [2]		
☐☐ GRAVEL [7]			☐☐ SILT [2]		
☐☐ SAND [6]			☐☐ ARTIFICIAL [0]		
☐☐ BEDROCK [5]			(Score natural substrates; ignore sludge from point-sources)		

NUMBER OF BEST TYPES: ☐ 4 or more [2] ☐ 3 or less [0]

Comments

Check ONE (Or 2 & average)

ORIGIN
- ☐ LIMESTONE [1]
- ☐ TILLS [1]
- ☐ WETLANDS [0]
- ☐ HARDPAN [0]
- ☐ SANDSTONE [0]
- ☐ RIP/RAP [0]
- ☐ LACUSTRINE [0]
- ☐ SHALE [-1]
- ☐ COAL FINES [-2]

QUALITY

SILT
- ☐ HEAVY [-2]
- ☐ MODERATE [-1]
- ☐ NORMAL [0]
- ☐ FREE [1]

EMBEDDEDNESS
- ☐ EXTENSIVE [-2]
- ☐ MODERATE [-1]
- ☐ NORMAL [0]
- ☐ NONE [1]

Substrate Maximum 20: 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.

____ 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]

AMOUNT
Check ONE (Or 2 & average)
- ☐ EXTENSIVE >75% [11]
- ☐ MODERATE 25-75% [7]
- ☐ SPARSE 5-<25% [3]
- ☐ NEARLY ABSENT <5% [1]

Comments

Cover Maximum 20: 15

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

SINUOSITY	DEVELOPMENT	CHANNELIZATION	STABILITY
☐ HIGH [4]	☐ EXCELLENT [7]	☐ NONE [6]	☒ HIGH [3]
☐ MODERATE [3]	☐ GOOD [5]	☐ RECOVERED [4]	☐ MODERATE [2]
☐ LOW [2]	☐ FAIR [3]	☐ RECOVERING [3]	☒ LOW [1]
☒ NONE [1]	☒ POOR [1]	☐ RECENT OR NO RECOVERY [1]	
		☐ Impounded [-1]	(2)

Comments

Channel Maximum 20: 3

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

River right looking downstream

EROSION (L R)
- ☐☐ NONE / LITTLE [3]
- ☐☐ MODERATE [2]
- ☐☐ HEAVY / SEVERE [1]

RIPARIAN WIDTH (L R)
- ☐☐ WIDE > 50m [4]
- ☐☐ MODERATE 10-50m [3]
- ☐☐ NARROW 5-10m [2]
- ☐☐ VERY NARROW < 5m [1]
- ☐☐ NONE [0]

FLOOD PLAIN QUALITY (L R)
- ☐☐ 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]

Indicate predominant land use(s) past 100m riparian.

Comments

Riparian Maximum 10: 6.5

5] POOL / GLIDE AND RIFFLE / RUN QUALITY

MAXIMUM DEPTH
Check ONE (ONLY!)
- ☒ > 1m [6]
- ☐ 0.7-<1m [4]
- ☐ 0.4-<0.7m [2]
- ☐ 0.2-<0.4m [1]
- ☐ < 0.2m [0]

CHANNEL WIDTH
Check ONE (Or 2 & average)
- ☐ POOL WIDTH > RIFFLE WIDTH [2]
- ☐ POOL WIDTH = RIFFLE WIDTH [1]
- ☐ POOL WIDTH < RIFFLE WIDTH [0]
- ☒ Impounded [-1]

CURRENT VELOCITY
Check ALL that apply
- ☐ TORRENTIAL [-1]
- ☐ VERY FAST [1]
- ☐ FAST [1]
- ☐ MODERATE [1]
- ☒ SLOW [1]
- ☐ INTERSTITIAL [-1]
- ☐ INTERMITTENT [-2]
- ☐ EDDIES [1]

Indicate for reach - pools and riffles.

Recreation Potential
Primary Contact
Secondary Contact
(circle one and comment on back)

Comments

Pool / Current Maximum 12: 6

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 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]

Comments

Riffle / Run Maximum 8: 0

6] GRADIENT
(____ ft/mi)

DRAINAGE AREA (____ mi²)

- ☐ VERY LOW - LOW [2-4]
- ☐ MODERATE [6-10]
- ☐ HIGH - VERY HIGH [10-6]

%POOL: ( ) %GLIDE: ( )
%RUN: ( ) %RIFFLE: ( )

Gradient Maximum 10: 6

EPA 4520 Proofed KC 7/16/08 06/11/08

MBI MODIFIED

Qualitative Habitat Evaluation Index and Use Assessment Field Sheet

QHEI Score: 45.5

Stream & Location: Des Plaines River - 283.0 LB RM: 283.0 Date: 07/10/08

Scorers Full Name & Affiliation: Joe Vondruska EA Engineering

River Code: __ - ___ - __ STORET #: _____ Lat./Long.: (NAD 83 - decimal °) __ . ____ /8_ . ____ 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
☐ ☐ BLDR /SLABS [10]			☐ ☐ HARDPAN [4]		
☐ ☐ BOULDER [9]			☐ ☐ DETRITUS [3]		
☐ ☐ COBBLE [8]			☐ ☐ MUCK [2]		
☐ ☐ GRAVEL [7]			☐ ☐ SILT [2]		
☐ ☐ SAND [6]			☐ ☐ ARTIFICIAL [0]		
☐ ☐ BEDROCK [5]			(Score natural substrates; ignore sludge from point-sources)		

NUMBER OF BEST TYPES: ☐ 4 or more [2] ☐ 3 or less [0]

Comments

Check ONE (Or 2 & average)

ORIGIN
- ☐ LIMESTONE [1]
- ☐ TILLS [1]
- ☐ WETLANDS [0]
- ☐ HARDPAN [0]
- ☐ SANDSTONE [0]
- ☐ RIP/RAP [0]
- ☐ LACUSTRINE [0]
- ☐ SHALE [-1]
- ☐ COAL FINES [-2]

QUALITY

SILT
- ☐ HEAVY [-2]
- ☐ MODERATE [-1]
- ☐ NORMAL [0]
- ☐ FREE [1]

EMBEDDEDNESS
- ☐ EXTENSIVE [-2]
- ☐ MODERATE [-1]
- ☐ NORMAL [0]
- ☐ NONE [1]

Substrate 16 Maximum 20

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.

___ 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]

AMOUNT

Check ONE (Or 2 & average)
- ☐ EXTENSIVE >75% [11]
- ☐ MODERATE 25-75% [7]
- ☐ SPARSE 5-<25% [3]
- ☐ NEARLY ABSENT <5% [1]

Comments

Cover 10 Maximum 20

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]
- ☒ Impounded [-1]

STABILITY
- ☒ HIGH [3]
- ☐ MODERATE [2]
- ☒ LOW [1]

②

Comments

Channel 3 Maximum 20

4] BANK EROSION AND RIPARIAN ZONE

Check ONE in each category for EACH BANK (Or 2 per bank & average)

River right looking downstream

EROSION (L R)
- ☐ ☐ NONE / LITTLE [3]
- ☐ ☐ MODERATE [2]
- ☐ ☐ HEAVY / SEVERE [1]

RIPARIAN WIDTH (L R)
- ☐ ☐ WIDE > 50m [4]
- ☐ ☐ MODERATE 10-50m [3]
- ☐ ☐ NARROW 5-10m [2]
- ☐ ☐ VERY NARROW < 5m [1]
- ☐ ☐ NONE [0]

FLOOD PLAIN QUALITY (L R)
- ☐ ☐ 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]

Indicate predominant land use(s) past 100m riparian.

Comments

Riparian 4.5 Maximum 10

5] POOL / GLIDE AND RIFFLE / RUN QUALITY

MAXIMUM DEPTH

Check ONE (ONLY!)
- ☒ > 1m [6]
- ☐ 0.7-<1m [4]
- ☐ 0.4-<0.7m [2]
- ☐ 0.2-<0.4m [1]
- ☐ < 0.2m [0]

CHANNEL WIDTH

Check ONE (Or 2 & average)
- ☐ POOL WIDTH > RIFFLE WIDTH [2]
- ☐ POOL WIDTH = RIFFLE WIDTH [1]
- ☐ POOL WIDTH < RIFFLE WIDTH [0]
- ☒ Impounded [-1]

CURRENT VELOCITY

Check ALL that apply
- ☐ TORRENTIAL [-1]
- ☐ VERY FAST [1]
- ☐ FAST [1]
- ☐ MODERATE [1]
- ☒ SLOW [1]
- ☐ INTERSTITIAL [-1]
- ☐ INTERMITTENT [-2]
- ☐ EDDIES [1]

Indicate for reach - pools and riffles.

Recreation Potential
Primary Contact
Secondary Contact
(circle one and comment on back)

Comments

Pool / Current 6 Maximum 12

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 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]

Comments

Riffle / Run 0 Maximum 8

6] GRADIENT

GRADIENT (____ ft/mi)
DRAINAGE AREA (____ mi²)

- ☐ VERY LOW - LOW [2-4]
- ☐ MODERATE [6-10]
- ☐ HIGH - VERY HIGH [10-6]

%POOL: ____ %GLIDE: ____
%RUN: ____ %RIFFLE: ____

Gradient 6 Maximum 10

EPA 4520 06/11/08

Proofed KC 7/16/08

MBI MODIFIED

OhioEPA

Qualitative Habitat Evaluation Index and Use Assessment Field Sheet

QHEI Score: 34.5

Stream & Location: Des Plaines River - 282.9 RB   RM: 282.9 Date: 07/ 11 / 08

Scorers Full Name & Affiliation: Joe Vondrak EA Engineering

River Code: __ - __ - __ STORET #: __ Lat./ Long.: (NAD 83 - decimal °) __ . __ /8_ . __ Office verified location ☐

1] SUBSTRATE

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

BEST TYPES POOL RIFFLE
- ☐ ☐ BLDR /SLABS [10] __ __
- ☐ ☐ BOULDER [9] __ __
- ☐ ☐ COBBLE [8] __ __
- ☐ ☐ GRAVEL [7] __ __
- ☐ ☐ SAND [6] __ __
- ☐ ☐ BEDROCK [5] __ __

NUMBER OF BEST TYPES: ☐ 4 or more [2] ☐ 3 or less [0]

OTHER TYPES POOL RIFFLE
- ☐ ☐ HARDPAN [4] __ __
- ☐ ☐ DETRITUS [3] __ __
- ☐ ☐ MUCK [2] __ __
- ☐ ☐ SILT [2] __ __
- ☐ ☐ ARTIFICIAL [0] __ __

(Score natural substrates; ignore sludge from point-sources)

Comments

Check ONE (Or 2 & average)

ORIGIN
- ☐ LIMESTONE [1]
- ☐ TILLS [1]
- ☐ WETLANDS [0]
- ☐ HARDPAN [0]
- ☐ SANDSTONE [0]
- ☐ RIP/RAP [0]
- ☐ LACUSTRINE [0]
- ☐ SHALE [-1]
- ☐ COAL FINES [-2]

QUALITY

SILT
- ☐ HEAVY [-2]
- ☐ MODERATE [-1]
- ☐ NORMAL [0]
- ☐ FREE [1]

EMBEDDEDNESS
- ☐ EXTENSIVE [-2]
- ☐ MODERATE [-1]
- ☐ NORMAL [0]
- ☐ NONE [1]

Substrate 0 Maximum 20

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.

- __ 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]

AMOUNT

Check ONE (Or 2 & average)
- ☐ EXTENSIVE >75% [11]
- ☐ MODERATE 25-75% [7]
- ☐ SPARSE 5-<25% [3]
- ☐ NEARLY ABSENT <5% [1]

Comments

Cover 11 Maximum 20

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]
- ☑ Impounded [-1]

STABILITY
- ☐ HIGH [3]
- ☐ MODERATE [2]
- ☑ LOW [1]

Comments

Channel 2 Maximum 20

4] BANK EROSION AND RIPARIAN ZONE

Check ONE in each category for EACH BANK (Or 2 per bank & average)

River right looking downstream

EROSION L R
- ☐ ☐ NONE / LITTLE [3]
- ☐ ☐ MODERATE [2]
- ☐ ☐ HEAVY / SEVERE [1]

RIPARIAN WIDTH L R
- ☐ ☐ WIDE > 50m [4]
- ☐ ☐ MODERATE 10-50m [3]
- ☐ ☐ NARROW 5-10m [2]
- ☐ ☐ VERY NARROW < 5m [1]
- ☐ ☐ NONE [0]

FLOOD PLAIN QUALITY L R
- ☐ ☐ FOREST, SWAMP [3]
- ☐ ☐ SHRUB OR OLD FIELD [2]
- ☐ ☐ RESIDENTIAL, PARK, NEW FIELD [1]
- ☐ ☐ FENCED PASTURE [1]
- ☐ ☐ OPEN PASTURE, ROWCROP [0]

L R
- ☐ ☐ CONSERVATION TILLAGE [1]
- ☐ ☐ URBAN OR INDUSTRIAL [0]
- ☐ ☐ MINING / CONSTRUCTION [0]

Indicate predominant land use(s) past 100m riparian.

Comments

Riparian 9.5 Maximum 10

5] POOL / GLIDE AND RIFFLE / RUN QUALITY

MAXIMUM DEPTH

Check ONE (ONLY!)
- ☑ > 1m [6]
- ☐ 0.7-<1m [4]
- ☐ 0.4-<0.7m [2]
- ☐ 0.2-<0.4m [1]
- ☐ < 0.2m [0]

CHANNEL WIDTH

Check ONE (Or 2 & average)
- ☐ POOL WIDTH > RIFFLE WIDTH [2]
- ☐ POOL WIDTH = RIFFLE WIDTH [1]
- ☐ POOL WIDTH < RIFFLE WIDTH [0]
- ☑ Impounded [-1]

CURRENT VELOCITY

Check ALL that apply
- ☐ TORRENTIAL [-1]
- ☐ VERY FAST [1]
- ☐ FAST [1]
- ☐ MODERATE [1]
- ☑ SLOW [1]
- ☐ INTERSTITIAL [-1]
- ☐ INTERMITTENT [-2]
- ☐ EDDIES [1]

Indicate for reach - pools and riffles.

Recreation Potential
Primary Contact
Secondary Contact
(circle one and comment on back)

Comments

Pool / Current 6 Maximum 12

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 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]

Comments

Riffle / Run 0 Maximum 8

6] GRADIENT

GRADIENT (__ ft/mi)
DRAINAGE AREA (__ mi²)
- ☐ VERY LOW - LOW [2-4]
- ☐ MODERATE [6-10]
- ☐ HIGH - VERY HIGH [10-6]

%POOL: __ %GLIDE: __
%RUN: __ %RIFFLE: __

Gradient 6 Maximum 10

EPA 4520 06/11/08

Proofed KC 7/[illegible]

MBI MODIFIED

OhioEPA

Qualitative Habitat Evaluation Index and Use Assessment Field Sheet

QHEI Score: 37.5

Stream & Location: Des Plaines River - 282.6 LB *RM:* 282.6 *Date:* 07/10/08

Scorers Full Name & Affiliation: Joe Vavrlanka EA Engineering

River Code: __ - ___ - ___ *STORET #:* ______ *Lat./Long.:* (NAD 83 - decimal °) __.____ /8_.____ 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
☐☐ BLDR /SLABS [10]			☐☐ HARDPAN [4]		
☐☐ BOULDER [9]			☐☐ DETRITUS [3]		
☐☐ COBBLE [8]			☐☐ MUCK [2]		
☐☐ GRAVEL [7]			☐☐ SILT [2]		
☐☐ SAND [6]			☐☐ ARTIFICIAL [0]		
☐☐ BEDROCK [5]			(Score natural substrates; ignore sludge from point-sources)		

NUMBER OF BEST TYPES: ☐ 4 or more [2] ☐ 3 or less [0]

Comments

Check ONE (Or 2 & average)

ORIGIN
- ☐ LIMESTONE [1]
- ☐ TILLS [1]
- ☐ WETLANDS [0]
- ☐ HARDPAN [0]
- ☐ SANDSTONE [0]
- ☐ RIP/RAP [0]
- ☐ LACUSTRINE [0]
- ☐ SHALE [-1]
- ☐ COAL FINES [-2]

QUALITY

SILT
- ☐ HEAVY [-2]
- ☐ MODERATE [-1]
- ☐ NORMAL [0]
- ☐ FREE [1]

EMBEDDEDNESS
- ☐ EXTENSIVE [-2]
- ☐ MODERATE [-1]
- ☐ NORMAL [0]
- ☐ NONE [1]

Substrate 0.5 Maximum 20

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.

_____ 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]

AMOUNT
Check ONE (Or 2 & average)
- ☐ EXTENSIVE >75% [11]
- ☐ MODERATE 25-75% [7]
- ☐ SPARSE 5-<25% [3]
- ☐ NEARLY ABSENT <5% [1]

Comments

Cover 14 Maximum 20

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

SINUOSITY	DEVELOPMENT	CHANNELIZATION	STABILITY
☐ HIGH [4]	☐ EXCELLENT [7]	☐ NONE [6]	☐ HIGH [3]
☐ MODERATE [3]	☐ GOOD [5]	☐ RECOVERED [4]	☐ MODERATE [2]
☐ LOW [2]	☐ FAIR [3]	☐ RECOVERING [3]	☒ LOW [1]
☒ NONE [1]	☒ POOR [1]	☐ RECENT OR NO RECOVERY [1]	
		☒ Impounded [-1]	

Comments

Channel 2 Maximum 20

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

River right looking downstream

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

Indicate predominant land use(s) past 100m riparian.

Comments

Riparian 9 Maximum 10

5] POOL / GLIDE AND RIFFLE / RUN QUALITY

MAXIMUM DEPTH
Check ONE (ONLY!)
- ☒ > 1m [6]
- ☐ 0.7-<1m [4]
- ☐ 0.4-<0.7m [2]
- ☐ 0.2-<0.4m [1]
- ☐ < 0.2m [0]

CHANNEL WIDTH
Check ONE (Or 2 & average)
- ☐ POOL WIDTH > RIFFLE WIDTH [2]
- ☐ POOL WIDTH = RIFFLE WIDTH [1]
- ☐ POOL WIDTH < RIFFLE WIDTH [0]
- ☒ Impounded [-1]

CURRENT VELOCITY
Check ALL that apply
- ☐ TORRENTIAL [-1]
- ☐ VERY FAST [1]
- ☐ FAST [1]
- ☐ MODERATE [1]
- ☒ SLOW [1]
- ☐ INTERSTITIAL [-1]
- ☐ INTERMITTENT [-2]
- ☐ EDDIES [1]

Indicate for reach - pools and riffles.

Recreation Potential
Primary Contact
Secondary Contact
(circle one and comment on back)

Comments

Pool / Current 6 Maximum 12

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

Comments

Riffle / Run 0 Maximum 8

6] GRADIENT
(______ ft/mi)

DRAINAGE AREA (______ mi²)

- ☐ VERY LOW - LOW [2-4]
- ☐ MODERATE [6-10]
- ☐ HIGH - VERY HIGH [10-6]

%POOL: ______ %GLIDE: ______
%RUN: ______ %RIFFLE: ______

Gradient 6 Maximum 10

EPA 4520

Proofed KC 7/16/08

06/11/08

MBI MODIFIED

OhioEPA

Qualitative Habitat Evaluation Index and Use Assessment Field Sheet

QHEI Score: 30.5

Stream & Location: Des Plaines River - 282.5 RB RM: 282.5 Date: 07/11/08

Scorers Full Name & Affiliation: Joe Vondruska CTE Engineering

River Code: __-___-___ STORET #: ______ Lat./ Long.: (NAD 83 - decimal °) __.______ /8_.______ 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
☐☐ BLDR /SLABS [10]			☐☐ HARDPAN [4]		
☐☐ BOULDER [9]			☐☐ DETRITUS [3]		
☐☐ COBBLE [8]			☐☐ MUCK [2]		
☐☐ GRAVEL [7]			☐☐ SILT [2]		
☐☐ SAND [6]			☐☐ ARTIFICIAL [0]		
☐☐ BEDROCK [5]			(Score natural substrates; ignore sludge from point-sources)		

NUMBER OF BEST TYPES: ☐ 4 or more [2] ☐ 3 or less [0]

Comments

Check ONE (Or 2 & average)

ORIGIN
- ☐ LIMESTONE [1]
- ☐ TILLS [1]
- ☐ WETLANDS [0]
- ☐ HARDPAN [0]
- ☐ SANDSTONE [0]
- ☐ RIP/RAP [0]
- ☐ LACUSTRINE [0]
- ☐ SHALE [-1]
- ☐ COAL FINES [-2]

QUALITY

SILT
- ☐ HEAVY [-2]
- ☐ MODERATE [-1]
- ☐ NORMAL [0]
- ☐ FREE [1]

EMBEDDEDNESS
- ☐ EXTENSIVE [-2]
- ☐ MODERATE [-1]
- ☐ NORMAL [0]
- ☐ NONE [1]

Substrate 0 Maximum 20

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.

____ 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]

AMOUNT
Check ONE (Or 2 & average)
- ☐ EXTENSIVE >75% [11]
- ☐ MODERATE 25-75% [7]
- ☐ SPARSE 5-<25% [3]
- ☐ NEARLY ABSENT <5% [1]

Comments

Cover 10 Maximum 20

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

SINUOSITY	DEVELOPMENT	CHANNELIZATION	STABILITY
☐ HIGH [4]	☐ EXCELLENT [7]	☐ NONE [6]	☐ HIGH [3]
☐ MODERATE [3]	☐ GOOD [5]	☐ RECOVERED [4]	☐ MODERATE [2]
☐ LOW [2]	☐ FAIR [3]	☐ RECOVERING [3]	☒ LOW [1]
☒ NONE [1]	☒ POOR [1]	☐ RECENT OR NO RECOVERY [1]	
		☒ Impounded [-1]	

Comments

Channel 2 Maximum 20

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

River right looking downstream

L R EROSION	L R RIPARIAN WIDTH	L R FLOOD PLAIN QUALITY	L R
☐☐ NONE / LITTLE [3]	☐☐ WIDE > 50m [4]	☐☐ FOREST, SWAMP [3]	☐☐ CONSERVATION TILLAGE [1]
☐☐ MODERATE [2]	☐☐ MODERATE 10-50m [3]	☐☐ SHRUB OR OLD FIELD [2]	☐☐ URBAN OR INDUSTRIAL [0]
☐☐ HEAVY / SEVERE [1]	☐☐ NARROW 5-10m [2]	☐☐ RESIDENTIAL, PARK, NEW FIELD [1]	☐☐ MINING / CONSTRUCTION [0]
	☐☐ VERY NARROW < 5m [1]	☐☐ FENCED PASTURE [1]	Indicate predominant land use(s) past 100m riparian.
	☐☐ NONE [0]	☐☐ OPEN PASTURE, ROWCROP [0]	

Comments

Riparian 65 Maximum 10

5] POOL / GLIDE AND RIFFLE / RUN QUALITY

MAXIMUM DEPTH
Check ONE (ONLY!)
- ☒ > 1m [6]
- ☐ 0.7-<1m [4]
- ☐ 0.4-<0.7m [2]
- ☐ 0.2-<0.4m [1]
- ☐ < 0.2m [0]

CHANNEL WIDTH
Check ONE (Or 2 & average)
- ☐ POOL WIDTH > RIFFLE WIDTH [2]
- ☐ POOL WIDTH = RIFFLE WIDTH [1]
- ☐ POOL WIDTH < RIFFLE WIDTH [0]
- ☒ Impounded [-1]

CURRENT VELOCITY
Check ALL that apply
- ☐ TORRENTIAL [-1]
- ☐ VERY FAST [1]
- ☐ FAST [1]
- ☐ MODERATE [1]
- ☒ SLOW [1]
- ☐ INTERSTITIAL [-1]
- ☐ INTERMITTENT [-2]
- ☐ EDDIES [1]

Indicate for reach - pools and riffles.

Recreation Potential
Primary Contact
Secondary Contact
(circle one and comment on back)

Comments

Pool / Current 6 Maximum 12

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 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]

Comments

Riffle / Run 0 Maximum 8

6] GRADIENT (______ ft/mi) ☐ VERY LOW - LOW [2-4]
DRAINAGE AREA (______ mi²) ☐ MODERATE [6-10]
☐ HIGH - VERY HIGH [10-6]

%POOL: ____ %GLIDE: ____
%RUN: ____ %RIFFLE: ____

Gradient 6 Maximum 10

EPA 4520 06/11/08

Proofed KC 7/16/08

MBI MODIFIED

OhioEPA

Qualitative Habitat Evaluation Index and Use Assessment Field Sheet

QHEI Score: 39

Stream & Location: Des Plaines River - 282.3 LB
RM: 282.3 Date: 07/10/08
Scorers Full Name & Affiliation: Joe Vondruska CA Engineering
River Code: __ - __ - __ STORET #: ______ Lat./ Long.: (NAD 83 - decimal °) __ . ____ /8_ . ____ 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
☐ ☐ BLDR /SLABS [10]			☐ ☐ HARDPAN [4]		
☐ ☐ BOULDER [9]			☐ ☐ DETRITUS [3]		
☐ ☐ COBBLE [8]			☐ ☐ MUCK [2]		
☐ ☐ GRAVEL [7]			☐ ☐ SILT [2]		
☐ ☐ SAND [6]			☐ ☐ ARTIFICIAL [0]		
☐ ☐ BEDROCK [5]					

(Score natural substrates; ignore sludge from point-sources)

NUMBER OF BEST TYPES: ☐ 4 or more [2] ☐ 3 or less [0]

Comments

Check ONE (Or 2 & average)

ORIGIN
☐ LIMESTONE [1]
☐ TILLS [1]
☐ WETLANDS [0]
☐ HARDPAN [0]
☐ SANDSTONE [0]
☐ RIP/RAP [0]
☐ LACUSTRINE [0]
☐ SHALE [-1]
☐ COAL FINES [-2]

QUALITY
SILT
☐ HEAVY [-2]
☐ MODERATE [-1]
☐ NORMAL [0]
☐ FREE [1]
EMBEDDEDNESS
☐ EXTENSIVE [-2]
☐ MODERATE [-1]
☐ NORMAL [0]
☐ NONE [1]

Substrate 4 Maximum 20

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.

____ 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]

AMOUNT
Check ONE (Or 2 & average)
☐ EXTENSIVE >75% [11]
☐ MODERATE 25-75% [7]
☐ SPARSE 5-<25% [3]
☐ NEARLY ABSENT <5% [1]

Comments

Cover 12 Maximum 20

3] CHANNEL MORPHOLOGY

Check ONE in each category (Or 2 & average)

SINUOSITY	DEVELOPMENT	CHANNELIZATION	STABILITY
☐ HIGH [4]	☐ EXCELLENT [7]	☐ NONE [6]	☐ HIGH [3]
☐ MODERATE [3]	☐ GOOD [5]	☐ RECOVERED [4]	☐ MODERATE [2]
☐ LOW [2]	☐ FAIR [3]	☐ RECOVERING [3]	☒ LOW [1]
☒ NONE [1]	☒ POOR [1]	☐ RECENT OR NO RECOVERY [1]	
		☒ Impounded [-1]	

Comments

Channel 2 Maximum 20

4] BANK EROSION AND RIPARIAN ZONE

Check ONE in each category for EACH BANK (Or 2 per bank & average)

River right looking downstream

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

Indicate predominant land use(s) past 100m riparian.

Comments

Riparian 9 Maximum 10

5] POOL / GLIDE AND RIFFLE / RUN QUALITY

MAXIMUM DEPTH Check ONE (ONLY!)	CHANNEL WIDTH Check ONE (Or 2 & average)	CURRENT VELOCITY Check ALL that apply	
☒ > 1m [6]	☐ POOL WIDTH > RIFFLE WIDTH [2]	☐ TORRENTIAL [-1]	☒ SLOW [1]
☐ 0.7-<1m [4]	☐ POOL WIDTH = RIFFLE WIDTH [1]	☐ VERY FAST [1]	☐ INTERSTITIAL [-1]
☐ 0.4-<0.7m [2]	☐ POOL WIDTH < RIFFLE WIDTH [0]	☐ FAST [1]	☐ INTERMITTENT [-2]
☐ 0.2-<0.4m [1]		☐ MODERATE [1]	☐ EDDIES [1]
☐ < 0.2m [0]	☒ Impounded [-1]		

Indicate for reach - pools and riffles.

Recreation Potential
Primary Contact
Secondary Contact
(circle one and comment on back)

Comments

Pool / Current 6 Maximum 12

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

Comments

Riffle / Run 0 Maximum 8

6] GRADIENT

GRADIENT (______ ft/mi)
DRAINAGE AREA (______ mi²)
☐ VERY LOW - LOW [2-4]
☐ MODERATE [6-10]
☐ HIGH - VERY HIGH [10-6]

%POOL: ( ) %GLIDE: ( )
%RUN: ( ) %RIFFLE: ( )

Gradient 6 Maximum 10

EPA 4520

Proofed KC 7/16/08

06/11/08

MBI MODIFIED

OhioEPA

Qualitative Habitat Evaluation Index and Use Assessment Field Sheet

QHEI Score: 43.5

Stream & Location: Des Plaines River - 282.2 RB **RM:** 282.2 **Date:** 07/11/08

Scorers Full Name & Affiliation: Joe Vondruska EA Engineering

River Code: __ - ___ - ___ **STORET #:** ______ **Lat./Long.:** (NAD 83 - decimal °) __ . ____ /8_ . ____ 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
☐☐ BLDR /SLABS [10]			☐☐ HARDPAN [4]		
☐☐ BOULDER [9]			☐☐ DETRITUS [3]		
☐☐ COBBLE [8]			☐☐ MUCK [2]		
☐☐ GRAVEL [7]			☐☐ SILT [2]		
☐☐ SAND [6]			☐☐ ARTIFICIAL [0]		
☐☐ BEDROCK [5]			(Score natural substrates; ignore sludge from point-sources)		

NUMBER OF BEST TYPES: ☐ 4 or more [2] ☐ 3 or less [0]

Comments

Check ONE (Or 2 & average)

ORIGIN		QUALITY
☐ LIMESTONE [1]	SILT	☐ HEAVY [-2]
☐ TILLS [1]		☐ MODERATE [-1]
☐ WETLANDS [0]		☐ NORMAL [0]
☐ HARDPAN [0]		☐ FREE [1]
☐ SANDSTONE [0]	EMBEDDEDNESS	☐ EXTENSIVE [-2]
☐ RIP/RAP [0]		☐ MODERATE [-1]
☐ LACUSTRINE [0]		☐ NORMAL [0]
☐ SHALE [-1]		☐ NONE [1]
☐ COAL FINES [-2]		

Substrate 8 Maximum 20

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.

____ 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]

AMOUNT Check ONE (Or 2 & average)

☐ EXTENSIVE >75% [11]
☐ MODERATE 25-75% [7]
☐ SPARSE 5-<25% [3]
☐ NEARLY ABSENT <5% [1]

Comments

Cover 15 Maximum 20

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

SINUOSITY	DEVELOPMENT	CHANNELIZATION	STABILITY
☐ HIGH [4]	☐ EXCELLENT [7]	☐ NONE [6]	☐ HIGH [3]
☐ MODERATE [3]	☐ GOOD [5]	☐ RECOVERED [4]	☐ MODERATE [2]
☐ LOW [2]	☐ FAIR [3]	☐ RECOVERING [3]	☒ LOW [1]
☒ NONE [1]	☒ POOR [1]	☐ RECENT OR NO RECOVERY [1]	
		☒ Impounded [-1]	

Comments

Channel 2 Maximum 20

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

River right looking downstream

EROSION (L R)	RIPARIAN WIDTH (L R)	FLOOD PLAIN QUALITY (L R)	(L R)
☐☐ NONE / LITTLE [3]	☐☐ WIDE > 50m [4]	☐☐ FOREST, SWAMP [3]	☐☐ CONSERVATION TILLAGE [1]
☐☐ MODERATE [2]	☐☐ MODERATE 10-50m [3]	☐☐ SHRUB OR OLD FIELD [2]	☐☐ URBAN OR INDUSTRIAL [0]
☐☐ HEAVY / SEVERE [1]	☐☐ NARROW 5-10m [2]	☐☐ RESIDENTIAL, PARK, NEW FIELD [1]	☐☐ MINING / CONSTRUCTION [0]
	☐☐ VERY NARROW < 5m [1]	☐☐ FENCED PASTURE [1]	Indicate predominant land use(s) past 100m riparian.
	☐☐ NONE [0]	☐☐ OPEN PASTURE, ROWCROP [0]	

Comments

Riparian 6.5 Maximum 10

5] POOL / GLIDE AND RIFFLE / RUN QUALITY

MAXIMUM DEPTH Check ONE (ONLY!)	CHANNEL WIDTH Check ONE (Or 2 & average)	CURRENT VELOCITY Check ALL that apply	
☒ > 1m [6]	☐ POOL WIDTH > RIFFLE WIDTH [2]	☐ TORRENTIAL [-1]	☒ SLOW [1]
☐ 0.7-<1m [4]	☐ POOL WIDTH = RIFFLE WIDTH [1]	☐ VERY FAST [1]	☐ INTERSTITIAL [-1]
☐ 0.4-<0.7m [2]	☐ POOL WIDTH < RIFFLE WIDTH [0]	☐ FAST [1]	☐ INTERMITTENT [-2]
☐ 0.2-<0.4m [1]		☐ MODERATE [1]	☐ EDDIES [1]
☐ < 0.2m [0]	☒ Impounded [-1]	Indicate for reach - pools and riffles.	

Recreation Potential
Primary Contact
Secondary Contact
(circle one and comment on back)

Comments

Pool / Current 6 Maximum 12

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

Comments

Riffle / Run 0 Maximum 8

6] GRADIENT (____ ft/mi) ☐ VERY LOW - LOW [2-4]
DRAINAGE AREA (____ mi²) ☐ MODERATE [6-10] ☐ HIGH - VERY HIGH [10-6]

%POOL: ____ %GLIDE: ____
%RUN: ____ %RIFFLE: ____

Gradient 6 Maximum 10

EPA 4520 06/11/08

Proofed K.C. 7/16/08

MBI MODIFIED

OhioEPA

Qualitative Habitat Evaluation Index and Use Assessment Field Sheet

QHEI Score: 31

Stream & Location: Des Plaines River 282.0 LB RM: 282.0 Date: 07/10/08

Scorers Full Name & Affiliation: Joe Vondruska EA Engineering

River Code: __ - ___ - ___ STORET #: ______ Lat./Long.: (NAD 83 - decimal °) __ . ____ /8_ . ____ 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
☐ ☐ BLDR /SLABS [10]			☐ ☐ HARDPAN [4]		
☐ ☐ BOULDER [9]			☐ ☐ DETRITUS [3]		
☐ ☐ COBBLE [8]			☐ ☐ MUCK [2]		
☐ ☐ GRAVEL [7]			☐ ☐ SILT [2]		
☐ ☐ SAND [6]			☐ ☐ ARTIFICIAL [0]		
☐ ☐ BEDROCK [5]			(Score natural substrates; ignore sludge from point-sources)		

NUMBER OF BEST TYPES: ☐ 4 or more [2] ☐ 3 or less [0]

Comments

Check ONE (Or 2 & average)

ORIGIN
- ☐ LIMESTONE [1]
- ☐ TILLS [1]
- ☐ WETLANDS [0]
- ☐ HARDPAN [0]
- ☐ SANDSTONE [0]
- ☐ RIP/RAP [0]
- ☐ LACUSTRINE [0]
- ☐ SHALE [-1]
- ☐ COAL FINES [-2]

QUALITY

SILT
- ☐ HEAVY [-2]
- ☐ MODERATE [-1]
- ☐ NORMAL [0]
- ☐ FREE [1]

EMBEDDEDNESS
- ☐ EXTENSIVE [-2]
- ☐ MODERATE [-1]
- ☐ NORMAL [0]
- ☐ NONE [1]

Substrate 0 Maximum 20

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.

___ 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]

AMOUNT
Check ONE (Or 2 & average)
- ☐ EXTENSIVE >75% [11]
- ☐ MODERATE 25-75% [7]
- ☐ SPARSE 5-<25% [3]
- ☐ NEARLY ABSENT <5% [1]

Comments

Cover 11 Maximum 20

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

SINUOSITY	DEVELOPMENT	CHANNELIZATION	STABILITY
☐ HIGH [4]	☐ EXCELLENT [7]	☐ NONE [6]	☐ HIGH [3]
☐ MODERATE [3]	☐ GOOD [5]	☐ RECOVERED [4]	☐ MODERATE [2]
☐ LOW [2]	☐ FAIR [3]	☐ RECOVERING [3]	☒ LOW [1]
☒ NONE [1]	☒ POOR [1]	☐ RECENT OR NO RECOVERY [1]	
		☒ Impounded [-1]	

Comments

Channel 2 Maximum 20

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

River right looking downstream

L R EROSION	L R RIPARIAN WIDTH	L R FLOOD PLAIN QUALITY	L R
☐ ☐ NONE / LITTLE [3]	☐ ☐ WIDE > 50m [4]	☐ ☐ FOREST, SWAMP [3]	☐ ☐ CONSERVATION TILLAGE [1]
☐ ☐ MODERATE [2]	☐ ☐ MODERATE 10-50m [3]	☐ ☐ SHRUB OR OLD FIELD [2]	☐ ☐ URBAN OR INDUSTRIAL [0]
☐ ☐ HEAVY / SEVERE [1]	☐ ☐ NARROW 5-10m [2]	☐ ☐ RESIDENTIAL, PARK, NEW FIELD [1]	☐ ☐ MINING / CONSTRUCTION [0]
	☐ ☐ VERY NARROW < 5m [1]	☐ ☐ FENCED PASTURE [1]	Indicate predominant land use(s) past 100m riparian.
	☐ ☐ NONE [0]	☐ ☐ OPEN PASTURE, ROWCROP [0]	

Comments

Riparian 6 Maximum 10

5] POOL / GLIDE AND RIFFLE / RUN QUALITY

MAXIMUM DEPTH Check ONE (ONLY!)	CHANNEL WIDTH Check ONE (Or 2 & average)	CURRENT VELOCITY Check ALL that apply	
☒ > 1m [6]	☐ POOL WIDTH > RIFFLE WIDTH [2]	☐ TORRENTIAL [-1]	☒ SLOW [1]
☐ 0.7-<1m [4]	☐ POOL WIDTH = RIFFLE WIDTH [1]	☐ VERY FAST [1]	☐ INTERSTITIAL [-1]
☐ 0.4-<0.7m [2]	☐ POOL WIDTH < RIFFLE WIDTH [0]	☐ FAST [1]	☐ INTERMITTENT [-2]
☐ 0.2-<0.4m [1]		☐ MODERATE [1]	☐ EDDIES [1]
☐ < 0.2m [0]	☒ Impounded [-1]	Indicate for reach - pools and riffles.	

Recreation Potential
Primary Contact
Secondary Contact
(circle one and comment on back)

Comments

Pool / Current 6 Maximum 12

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

Comments

Riffle / Run 0 Maximum 8

6] GRADIENT
(____ ft/mi) ☐ VERY LOW - LOW [2-4]
DRAINAGE AREA ☐ MODERATE [6-10]
(____ mi²) ☐ HIGH - VERY HIGH [10-6]

%POOL: ____ %GLIDE: ____
%RUN: ____ %RIFFLE: ____

Gradient 6 Maximum 10

EPA 4520

Proofed KC 7/16/08

06/11/06

MBI MODIFIED

Qualitative Habitat Evaluation Index and Use Assessment Field Sheet

QHEI Score: 31.5

Stream & Location: Des Moines River - 281.9 RB **RM:** 281.9 **Date:** 07/11/08

Scorers Full Name & Affiliation: Joe Vondruska EA Engineering

River Code: __ - __ - __ **STORET #:** ______ **Lat./ Long.:** (NAD 83 - decimal °) __ . ____ /8_ . ____ Office verified location ☐

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

BEST TYPES POOL RIFFLE
- ☐ ☐ BLDR /SLABS [10] ___ ___
- ☐ ☐ BOULDER [9] ___ ___
- ☐ ☐ COBBLE [8] ___ ___
- ☐ ☐ GRAVEL [7] ___ ___
- ☐ ☐ SAND [6] ___ ___
- ☐ ☐ BEDROCK [5] ___ ___

NUMBER OF BEST TYPES: ☐ 4 or more [2] ☐ 3 or less [0]

OTHER TYPES POOL RIFFLE
- ☐ ☐ HARDPAN [4] ___ ___
- ☐ ☐ DETRITUS [3] ___ ___
- ☐ ☐ MUCK [2] ___ ___
- ☐ ☐ SILT [2] ___ ___
- ☐ ☐ ARTIFICIAL [0] ___ ___

(Score natural substrates; ignore sludge from point-sources)

Check ONE (Or 2 & average)

ORIGIN
- ☐ LIMESTONE [1]
- ☐ TILLS [1]
- ☐ WETLANDS [0]
- ☐ HARDPAN [0]
- ☐ SANDSTONE [0]
- ☐ RIP/RAP [0]
- ☐ LACUSTRINE [0]
- ☐ SHALE [-1]
- ☐ COAL FINES [-2]

QUALITY

SILT
- ☐ HEAVY [-2]
- ☐ MODERATE [-1]
- ☐ NORMAL [0]
- ☐ FREE [1]

EMBEDDEDNESS
- ☐ EXTENSIVE [-2]
- ☐ MODERATE [-1]
- ☐ NORMAL [0]
- ☐ NONE [1]

Comments

Substrate 0 Maximum 20

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.

- ___ 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]

AMOUNT
Check ONE (Or 2 & average)
- ☐ EXTENSIVE >75% [11]
- ☐ MODERATE 25-75% [7]
- ☐ SPARSE 5-<25% [3]
- ☐ NEARLY ABSENT <5% [1]

Comments

Cover 11 Maximum 20

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]
- ☒ Impounded [-1]

STABILITY
- ☐ HIGH [3]
- ☐ MODERATE [2]
- ☒ LOW [1]

Comments

Channel 2 Maximum 20

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

River right looking downstream

EROSION (L R)
- ☐ ☐ NONE / LITTLE [3]
- ☐ ☐ MODERATE [2]
- ☐ ☐ HEAVY / SEVERE [1]

RIPARIAN WIDTH (L R)
- ☐ ☐ WIDE > 50m [4]
- ☐ ☐ MODERATE 10-50m [3]
- ☐ ☐ NARROW 5-10m [2]
- ☐ ☐ VERY NARROW < 5m [1]
- ☐ ☐ NONE [0]

FLOOD PLAIN QUALITY (L R)
- ☐ ☐ 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]

Indicate predominant land use(s) past 100m riparian.

Comments

Riparian 6.5 Maximum 10

5] POOL / GLIDE AND RIFFLE / RUN QUALITY

MAXIMUM DEPTH
Check ONE (ONLY!)
- ☒ > 1m [6]
- ☐ 0.7-<1m [4]
- ☐ 0.4-<0.7m [2]
- ☐ 0.2-<0.4m [1]
- ☐ < 0.2m [0]

CHANNEL WIDTH
Check ONE (Or 2 & average)
- ☐ POOL WIDTH > RIFFLE WIDTH [2]
- ☐ POOL WIDTH = RIFFLE WIDTH [1]
- ☐ POOL WIDTH < RIFFLE WIDTH [0]
- ☒ Impounded [-1]

CURRENT VELOCITY
Check ALL that apply
- ☐ TORRENTIAL [-1]
- ☐ VERY FAST [1]
- ☐ FAST [1]
- ☐ MODERATE [1]
- ☒ SLOW [1]
- ☐ INTERSTITIAL [-1]
- ☐ INTERMITTENT [-2]
- ☐ EDDIES [1]

Indicate for reach - pools and riffles.

Recreation Potential
Primary Contact
Secondary Contact
(circle one and comment on back)

Comments

Pool / Current 6 Maximum 12

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 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]

Comments

Riffle / Run 0 Maximum 8

6] GRADIENT (___ ft/mi)
DRAINAGE AREA (___ mi²)

- ☐ VERY LOW - LOW [2-4]
- ☐ MODERATE [6-10]
- ☐ HIGH - VERY HIGH [10-6]

%POOL: ___ %GLIDE: ___
%RUN: ___ %RIFFLE: ___

Gradient 6 Maximum 10

EPA 4520 06/11/08

Proofed KC 7/15/08

Electronic Filing - Received, Clerk's Office, September 8, 2008

MBI MODIFIED

OhioEPA

Qualitative Habitat Evaluation Index and Use Assessment Field Sheet

QHEI Score: 31

Stream & Location: Des Plaines River - 281.7 LB
RM: 281.7 Date: 07/10/08
Scorers Full Name & Affiliation: Joe Vondruska CA Engineering
River Code: __ . __ . __ STORET #: ______ Lat./ Long.: (NAD 83 - decimal °) __ . ____ /8_ . ____ 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
☐ ☐ BLDR /SLABS [10]	____	____	☐ ☐ HARDPAN [4]	____	____
☐ ☐ BOULDER [9]	____	____	☐ ☐ DETRITUS [3]	____	____
☐ ☐ COBBLE [8]	____	____	☐ ☐ MUCK [2]	____	____
☐ ☐ GRAVEL [7]	____	____	☐ ☐ SILT [2]	____	____
☐ ☐ SAND [6]	____	____	☐ ☐ ARTIFICIAL [0]	____	____
☐ ☐ BEDROCK [5]	____	____	(Score natural substrates; ignore sludge from point-sources)		

NUMBER OF BEST TYPES: ☐ 4 or more [2] ☐ 3 or less [0]

Comments

Check ONE (Or 2 & average)

ORIGIN
☐ LIMESTONE [1]
☐ TILLS [1]
☐ WETLANDS [0]
☐ HARDPAN [0]
☐ SANDSTONE [0]
☐ RIP/RAP [0]
☐ LACUSTRINE [0]
☐ SHALE [-1]
☐ COAL FINES [-2]

QUALITY
SILT
☐ HEAVY [-2]
☐ MODERATE [-1]
☐ NORMAL [0]
☐ FREE [1]

EMBEDDEDNESS
☐ EXTENSIVE [-2]
☐ MODERATE [-1]
☐ NORMAL [0]
☐ NONE [1]

Substrate 0 Maximum 20

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.

____ 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]

AMOUNT
Check ONE (Or 2 & average)
☐ EXTENSIVE >75% [11]
☐ MODERATE 25-75% [7]
☐ SPARSE 5-<25% [3]
☐ NEARLY ABSENT <5% [1]

Comments

Cover Maximum 20 8

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

SINUOSITY	DEVELOPMENT	CHANNELIZATION	STABILITY
☐ HIGH [4]	☐ EXCELLENT [7]	☐ NONE [6]	☐ HIGH [3]
☐ MODERATE [3]	☐ GOOD [5]	☐ RECOVERED [4]	☐ MODERATE [2]
☒ LOW [2]	☐ FAIR [3]	☐ RECOVERING [3]	☒ LOW [1]
☐ NONE [1]	☒ POOR [1]	☐ RECENT OR NO RECOVERY [1]	

Comments
☒ Impounded [-1]

Channel Maximum 20 3

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

River right looking downstream

EROSION (L R)
☐ ☐ NONE / LITTLE [3]
☐ ☐ MODERATE [2]
☐ ☐ HEAVY / SEVERE [1]

RIPARIAN WIDTH (L R)
☐ ☐ WIDE > 50m [4]
☐ ☐ MODERATE 10-50m [3]
☐ ☐ NARROW 5-10m [2]
☐ ☐ VERY NARROW < 5m [1]
☐ ☐ NONE [0]

FLOOD PLAIN QUALITY (L R)
☐ ☐ 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]

Indicate predominant land use(s) past 100m riparian.

Comments

Riparian Maximum 10 8

5] POOL / GLIDE AND RIFFLE / RUN QUALITY

MAXIMUM DEPTH
Check ONE (ONLY!)
☒ > 1m [6]
☐ 0.7-<1m [4]
☐ 0.4-<0.7m [2]
☐ 0.2-<0.4m [1]
☐ < 0.2m [0]

CHANNEL WIDTH
Check ONE (Or 2 & average)
☐ POOL WIDTH > RIFFLE WIDTH [2]
☐ POOL WIDTH = RIFFLE WIDTH [1]
☐ POOL WIDTH < RIFFLE WIDTH [0]
☒ Impounded [-1]

CURRENT VELOCITY
Check ALL that apply
☐ TORRENTIAL [-1]
☐ VERY FAST [1]
☐ FAST [1]
☐ MODERATE [1]
☒ SLOW [1]
☐ INTERSTITIAL [-1]
☐ INTERMITTENT [-2]
☐ EDDIES [1]
Indicate for reach - pools and riffles.

Recreation Potential
Primary Contact
Secondary Contact
(circle one and comment on back)

Comments

Pool / Current Maximum 12 6

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 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]

Comments

Riffle / Run Maximum 8 0

6] GRADIENT (____ ft/mi) ☐ VERY LOW - LOW [2-4]
DRAINAGE AREA (____ mi²) ☐ MODERATE [6-10]
☐ HIGH - VERY HIGH [10-6]

%POOL: ____ %GLIDE: ____
%RUN: ____ %RIFFLE: ____

Gradient Maximum 10 6

EPA 4520 06/11/08

Proofed KC 7/16/08

MBI MODIFIED

OhioEPA

Qualitative Habitat Evaluation Index and Use Assessment Field Sheet

QHEI Score: 32

Stream & Location: Des Plaines River - 281.6 RB **RM:** 281.6 **Date:** 07/11/08

Scorers Full Name & Affiliation: Joe Vondruska EA Engineering

River Code: __ - __ - __ **STORET #:** ______ **Lat./ Long.:** (NAD 83 - decimal °) __ . ____ /8_ . ____ 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
☐☐ BLDR /SLABS [10]			☐☐ HARDPAN [4]		
☐☐ BOULDER [9]			☐☐ DETRITUS [3]		
☐☐ COBBLE [8]			☐☐ MUCK [2]		
☐☐ GRAVEL [7]			☐☐ SILT [2]		
☐☐ SAND [6]			☐☐ ARTIFICIAL [0]		
☐☐ BEDROCK [5]			(Score natural substrates; ignore sludge from point-sources)		

NUMBER OF BEST TYPES: ☐ 4 or more [2] ☐ 3 or less [0]

Comments

Check ONE (Or 2 & average)

ORIGIN
- ☐ LIMESTONE [1]
- ☐ TILLS [1]
- ☐ WETLANDS [0]
- ☐ HARDPAN [0]
- ☐ SANDSTONE [0]
- ☐ RIP/RAP [0]
- ☐ LACUSTRINE [0]
- ☐ SHALE [-1]
- ☐ COAL FINES [-2]

QUALITY

SILT
- ☐ HEAVY [-2]
- ☐ MODERATE [-1]
- ☐ NORMAL [0]
- ☐ FREE [1]

EMBEDDEDNESS
- ☐ EXTENSIVE [-2]
- ☐ MODERATE [-1]
- ☐ NORMAL [0]
- ☐ NONE [1]

Substrate 0 Maximum 20

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.

___ 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]

AMOUNT

Check ONE (Or 2 & average)
- ☐ EXTENSIVE >75% [11]
- ☐ MODERATE 25-75% [7]
- ☐ SPARSE 5-<25% [3]
- ☐ NEARLY ABSENT <5% [1]

Comments

Cover 12 Maximum 20

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]
- ☑ Impounded [-1]

STABILITY
- ☐ HIGH [3]
- ☐ MODERATE [2]
- ☑ LOW [1]

Comments

Channel 2 Maximum 20

4] BANK EROSION AND RIPARIAN ZONE

Check ONE in each category for EACH BANK (Or 2 per bank & average)

River right looking downstream

EROSION (L R)
- ☐☐ NONE / LITTLE [3]
- ☐☐ MODERATE [2]
- ☐☐ HEAVY / SEVERE [1]

RIPARIAN WIDTH (L R)
- ☐☐ WIDE > 50m [4]
- ☐☐ MODERATE 10-50m [3]
- ☐☐ NARROW 5-10m [2]
- ☐☐ VERY NARROW < 5m [1]
- ☐☐ NONE [0]

FLOOD PLAIN QUALITY (L R)
- ☐☐ 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]

Indicate predominant land use(s) past 100m riparian.

Comments

Riparian 6 Maximum 10

5] POOL / GLIDE AND RIFFLE / RUN QUALITY

MAXIMUM DEPTH

Check ONE (ONLY!)
- ☑ > 1m [6]
- ☐ 0.7-<1m [4]
- ☐ 0.4-<0.7m [2]
- ☐ 0.2-<0.4m [1]
- ☐ < 0.2m [0]

CHANNEL WIDTH

Check ONE (Or 2 & average)
- ☐ POOL WIDTH > RIFFLE WIDTH [2]
- ☐ POOL WIDTH = RIFFLE WIDTH [1]
- ☐ POOL WIDTH < RIFFLE WIDTH [0]
- ☑ Impounded [-1]

CURRENT VELOCITY

Check ALL that apply
- ☐ TORRENTIAL [-1]
- ☐ VERY FAST [1]
- ☐ FAST [1]
- ☐ MODERATE [1]
- ☑ SLOW [1]
- ☐ INTERSTITIAL [-1]
- ☐ INTERMITTENT [-2]
- ☐ EDDIES [1]

Indicate for reach - pools and riffles.

Recreation Potential
Primary Contact
Secondary Contact
(circle one and comment on back)

Comments

Pool / Current 6 Maximum 12

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 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]

Comments

Riffle / Run 0 Maximum 8

6] GRADIENT (______ ft/mi)

DRAINAGE AREA (______ mi²)
- ☐ VERY LOW - LOW [2-4]
- ☐ MODERATE [6-10]
- ☐ HIGH - VERY HIGH [10-6]

%POOL: %GLIDE:
%RUN: %RIFFLE:

Gradient 6 Maximum 10

EPA 4520 06/11/08

proofed KC 7/16/08

MBI MODIFIED

Ohio EPA

Qualitative Habitat Evaluation Index and Use Assessment Field Sheet

QHEI Score: 33

Stream & Location: Des Plaines River - 281.3 LB
RM: 281.3 Date: 07/10/08
Scorers Full Name & Affiliation: Joe Vachuska EA Engineering
River Code: __ - ___ - ___ STORET #: ______ Lat./ Long.: (NAD 83 - decimal °) __ . ____ 18 . ____ 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
☐ ☐ BLDR /SLABS [10]			☐ ☐ HARDPAN [4]		
☐ ☐ BOULDER [9]			☐ ☐ DETRITUS [3]		
☐ ☐ COBBLE [8]			☐ ☐ MUCK [2]		
☐ ☐ GRAVEL [7]			☐ ☐ SILT [2]		
☐ ☐ SAND [6]			☐ ☐ ARTIFICIAL [0]		
☐ ☐ BEDROCK [5]			(Score natural substrates; ignore sludge from point-sources)		

NUMBER OF BEST TYPES: ☐ 4 or more [2] ☐ 3 or less [0]

Comments

Check ONE (Or 2 & average)

ORIGIN
- ☐ LIMESTONE [1]
- ☐ TILLS [1]
- ☐ WETLANDS [0]
- ☐ HARDPAN [0]
- ☐ SANDSTONE [0]
- ☐ RIP/RAP [0]
- ☐ LACUSTRINE [0]
- ☐ SHALE [-1]
- ☐ COAL FINES [-2]

QUALITY

SILT
- ☐ HEAVY [-2]
- ☐ MODERATE [-1]
- ☐ NORMAL [0]
- ☐ FREE [1]

EMBEDDEDNESS
- ☐ EXTENSIVE [-2]
- ☐ MODERATE [-1]
- ☐ NORMAL [0]
- ☐ NONE [1]

Substrate 0 Maximum 20

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.

- ____ 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]

AMOUNT
Check ONE (Or 2 & average)
- ☐ EXTENSIVE >75% [11]
- ☐ MODERATE 25-75% [7]
- ☐ SPARSE 5-<25% [3]
- ☐ NEARLY ABSENT <5% [1]

Comments

Cover 9 Maximum 20

3] CHANNEL MORPHOLOGY

Check ONE in each category (Or 2 & average)

SINUOSITY	DEVELOPMENT	CHANNELIZATION	STABILITY
☐ HIGH [4]	☐ EXCELLENT [7]	☐ NONE [6]	☐ HIGH [3]
☐ MODERATE [3]	☐ GOOD [5]	☐ RECOVERED [4]	☐ MODERATE [2]
☑ LOW [2]	☐ FAIR [3]	☐ RECOVERING [3]	☑ LOW [1]
☐ NONE [1]	☑ POOR [1]	☐ RECENT OR NO RECOVERY [1]	
		☑ Impounded [-1]	

Comments

Channel 3 Maximum 20

4] BANK EROSION AND RIPARIAN ZONE

Check ONE in each category for EACH BANK (Or 2 per bank & average)

River right looking downstream

EROSION (L R)	RIPARIAN WIDTH (L R)	FLOOD PLAIN QUALITY (L R)	
☐ ☐ NONE / LITTLE [3]	☐ ☐ WIDE > 50m [4]	☐ ☐ FOREST, SWAMP [3]	☐ ☐ CONSERVATION TILLAGE [1]
☐ ☐ MODERATE [2]	☐ ☐ MODERATE 10-50m [3]	☐ ☐ SHRUB OR OLD FIELD [2]	☐ ☐ URBAN OR INDUSTRIAL [0]
☐ ☐ HEAVY / SEVERE [1]	☐ ☐ NARROW 5-10m [2]	☐ ☐ RESIDENTIAL, PARK, NEW FIELD [1]	☐ ☐ MINING / CONSTRUCTION [0]
	☐ ☐ VERY NARROW < 5m [1]	☐ ☐ FENCED PASTURE [1]	Indicate predominant land use(s) past 100m riparian.
	☐ ☐ NONE [0]	☐ ☐ OPEN PASTURE, ROWCROP [0]	

Comments

Riparian 9 Maximum 10

5] POOL / GLIDE AND RIFFLE / RUN QUALITY

MAXIMUM DEPTH	CHANNEL WIDTH	CURRENT VELOCITY	
Check ONE (ONLY!)	Check ONE (Or 2 & average)	Check ALL that apply	
☑ > 1m [6]	☐ POOL WIDTH > RIFFLE WIDTH [2]	☐ TORRENTIAL [-1]	☑ SLOW [1]
☐ 0.7-<1m [4]	☐ POOL WIDTH = RIFFLE WIDTH [1]	☐ VERY FAST [1]	☐ INTERSTITIAL [-1]
☐ 0.4-<0.7m [2]	☐ POOL WIDTH < RIFFLE WIDTH [0]	☐ FAST [1]	☐ INTERMITTENT [-2]
☐ 0.2-<0.4m [1]		☐ MODERATE [1]	☐ EDDIES [1]
☐ < 0.2m [0]	☑ Impounded [-1]	Indicate for reach - pools and riffles.	

Recreation Potential
Primary Contact
Secondary Contact
(circle one and comment on back)

Comments

Pool / Current 6 Maximum 12

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

Comments

Riffle / Run 0 Maximum 8

6] GRADIENT

GRADIENT (____ ft/mi) ☐ VERY LOW - LOW [2-4]
DRAINAGE AREA (____ mi²) ☐ MODERATE [6-10]
☐ HIGH - VERY HIGH [10-6]

%POOL: ____ %GLIDE: ____
%RUN: ____ %RIFFLE: ____

Gradient 6 Maximum 10

EPA 4520

Proofed KR 7/16/08

06/11/06

MBI MODIFIED

OhioEPA

Qualitative Habitat Evaluation Index and Use Assessment Field Sheet

QHEI Score: 40

Stream & Location: Des Plaines River - 281.3 RB **RM:** 281.3 **Date:** 07/11/08

Scorers Full Name & Affiliation: Joe Vondruska EA Engineering

River Code: __ - __ - __ **STORET #:** ______ **Lat./ Long.:** (NAD 83 - decimal °) __ . ____ /8 __ . ____ 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
☐ ☐ BLDR /SLABS [10]			☐ ☐ HARDPAN [4]		
☐ ☐ BOULDER [9]			☐ ☐ DETRITUS [3]		
☐ ☐ COBBLE [8]			☐ ☐ MUCK [2]		
☐ ☐ GRAVEL [7]			☐ ☐ SILT [2]		
☐ ☐ SAND [6]			☐ ☐ ARTIFICIAL [0]		
☐ ☐ BEDROCK [5]			(Score natural substrates; ignore sludge from point-sources)		

NUMBER OF BEST TYPES: ☐ 4 or more [2] ☐ 3 or less [0]

Comments

Check ONE (Or 2 & average)

ORIGIN
- ☐ LIMESTONE [1]
- ☐ TILLS [1]
- ☐ WETLANDS [0]
- ☐ HARDPAN [0]
- ☐ SANDSTONE [0]
- ☐ RIP/RAP [0]
- ☐ LACUSTRINE [0]
- ☐ SHALE [-1]
- ☐ COAL FINES [-2]

QUALITY

SILT
- ☐ HEAVY [-2]
- ☐ MODERATE [-1]
- ☐ NORMAL [0]
- ☐ FREE [1]

EMBEDDEDNESS
- ☐ EXTENSIVE [-2]
- ☐ MODERATE [-1]
- ☐ NORMAL [0]
- ☐ NONE [1]

Substrate 8.5 Maximum 20

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.

___ 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]

AMOUNT

Check ONE (Or 2 & average)
- ☐ EXTENSIVE >75% [11]
- ☐ MODERATE 25-75% [7]
- ☐ SPARSE 5-<25% [3]
- ☐ NEARLY ABSENT <5% [1]

Comments

Cover 11 Maximum 20

3] CHANNEL MORPHOLOGY

Check ONE in each category (Or 2 & average)

SINUOSITY	DEVELOPMENT	CHANNELIZATION	STABILITY
☐ HIGH [4]	☐ EXCELLENT [7]	☐ NONE [6]	☐ HIGH [3]
☐ MODERATE [3]	☐ GOOD [5]	☐ RECOVERED [4]	☒ MODERATE [2]
☒ LOW [2]	☐ FAIR [3]	☐ RECOVERING [3]	☒ LOW [1]
☐ NONE [1]	☒ POOR [1]	☐ RECENT OR NO RECOVERY [1]	
		☒ Impounded [-1]	

Comments

1.5

Channel 3.5 Maximum 20

4] BANK EROSION AND RIPARIAN ZONE

Check ONE in each category for EACH BANK (Or 2 per bank & average)

River right looking downstream

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

Indicate predominant land use(s) past 100m riparian.

Comments

Riparian 5 Maximum 10

5] POOL / GLIDE AND RIFFLE / RUN QUALITY

MAXIMUM DEPTH

Check ONE (ONLY!)
- ☒ > 1m [6]
- ☐ 0.7-<1m [4]
- ☐ 0.4-<0.7m [2]
- ☐ 0.2-<0.4m [1]
- ☐ < 0.2m [0]

CHANNEL WIDTH

Check ONE (Or 2 & average)
- ☐ POOL WIDTH > RIFFLE WIDTH [2]
- ☐ POOL WIDTH = RIFFLE WIDTH [1]
- ☐ POOL WIDTH < RIFFLE WIDTH [0]
- ☒ Impounded [-1]

CURRENT VELOCITY

Check ALL that apply
- ☐ TORRENTIAL [-1]
- ☐ VERY FAST [1]
- ☐ FAST [1]
- ☐ MODERATE [1]
- ☒ SLOW [1]
- ☐ INTERSTITIAL [-1]
- ☐ INTERMITTENT [-2]
- ☐ EDDIES [1]

Indicate for reach - pools and riffles.

Recreation Potential
Primary Contact
Secondary Contact
(circle one and comment on back)

Comments

Pool / Current 6 Maximum 12

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

Comments

Riffle / Run 0 Maximum 8

6] GRADIENT

GRADIENT (____ ft/mi) DRAINAGE AREA (____ mi²)

- ☐ VERY LOW - LOW [2-4]
- ☐ MODERATE [6-10]
- ☐ HIGH - VERY HIGH [10-6]

%POOL: ____ %GLIDE: ____
%RUN: ____ %RIFFLE: ____

Gradient 6 Maximum 10

EPA 4520

Proofed KC 7/16/08

06/11/08

MBI MODIFIED

OhioEPA

Qualitative Habitat Evaluation Index and Use Assessment Field Sheet

QHEI Score: 34.5

Stream & Location: Des Plaines River - 281.0 RB
RM: 281.0 Date: 07/11/08
Scorers Full Name & Affiliation: Joe Vondruska EA Engineering
River Code: __-___-___ STORET #: ______ Lat./Long.: (NAD 83 - decimal °) __.____ /8_.____ 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
☐ ☐ BLDR /SLABS [10]			☐ ☐ HARDPAN [4]		
☐ ☐ BOULDER [9]			☐ ☐ DETRITUS [3]		
☐ ☐ COBBLE [8]			☐ ☐ MUCK [2]		
☐ ☐ GRAVEL [7]			☐ ☐ SILT [2]		
☐ ☐ SAND [6]			☐ ☐ ARTIFICIAL [0]		
☐ ☐ BEDROCK [5]			(Score natural substrates; ignore sludge from point-sources)		

NUMBER OF BEST TYPES: ☐ 4 or more [2] ☐ 3 or less [0]

Comments

Check ONE (Or 2 & average)

ORIGIN
- ☐ LIMESTONE [1]
- ☐ TILLS [1]
- ☐ WETLANDS [0]
- ☐ HARDPAN [0]
- ☐ SANDSTONE [0]
- ☐ RIP/RAP [0]
- ☐ LACUSTRINE [0]
- ☐ SHALE [-1]
- ☐ COAL FINES [-2]

QUALITY

SILT
- ☐ HEAVY [-2]
- ☐ MODERATE [-1]
- ☐ NORMAL [0]
- ☐ FREE [1]

EMBEDDEDNESS
- ☐ EXTENSIVE [-2]
- ☐ MODERATE [-1]
- ☐ NORMAL [0]
- ☐ NONE [1]

Substrate 13 Maximum 20

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.

___ 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]

AMOUNT

Check ONE (Or 2 & average)
- ☐ EXTENSIVE >75% [11]
- ☐ MODERATE 25-75% [7]
- ☐ SPARSE 5-<25% [3]
- ☐ NEARLY ABSENT <5% [1]

Comments

Cover 4 Maximum 20

3] CHANNEL MORPHOLOGY

Check ONE in each category (Or 2 & average)

SINUOSITY	DEVELOPMENT	CHANNELIZATION	STABILITY
☐ HIGH [4]	☐ EXCELLENT [7]	☐ NONE [6]	☐ HIGH [3]
☐ MODERATE [3]	☐ GOOD [5]	☐ RECOVERED [4]	☒ MODERATE [2]
☐ LOW [2]	☐ FAIR [3]	☐ RECOVERING [3]	☐ LOW [1]
☒ NONE [1]	☒ POOR [1]	☐ RECENT OR NO RECOVERY [1]	
		☒ Impounded [-1]	

Comments

Channel 3 Maximum 20

4] BANK EROSION AND RIPARIAN ZONE

Check ONE in each category for EACH BANK (Or 2 per bank & average)

River right looking downstream

EROSION (L R)	RIPARIAN WIDTH (L R)	FLOOD PLAIN QUALITY (L R)	
☐ ☐ NONE / LITTLE [3]	☐ ☐ WIDE > 50m [4]	☐ ☐ FOREST, SWAMP [3]	☐ ☐ CONSERVATION TILLAGE [1]
☐ ☐ MODERATE [2]	☐ ☐ MODERATE 10-50m [3]	☐ ☐ SHRUB OR OLD FIELD [2]	☐ ☐ URBAN OR INDUSTRIAL [0]
☐ ☐ HEAVY / SEVERE [1]	☐ ☐ NARROW 5-10m [2]	☐ ☐ RESIDENTIAL, PARK, NEW FIELD [1]	☐ ☐ MINING / CONSTRUCTION [0]
	☐ ☐ VERY NARROW < 5m [1]	☐ ☐ FENCED PASTURE [1]	Indicate predominant land use(s) past 100m riparian.
	☐ ☐ NONE [0]	☐ ☐ OPEN PASTURE, ROWCROP [0]	

Comments

Riparian 2.5 Maximum 10

5] POOL / GLIDE AND RIFFLE / RUN QUALITY

MAXIMUM DEPTH

Check ONE (ONLY!)
- ☒ > 1m [6]
- ☐ 0.7-<1m [4]
- ☐ 0.4-<0.7m [2]
- ☐ 0.2-<0.4m [1]
- ☐ < 0.2m [0]

CHANNEL WIDTH

Check ONE (Or 2 & average)
- ☐ POOL WIDTH > RIFFLE WIDTH [2]
- ☐ POOL WIDTH = RIFFLE WIDTH [1]
- ☐ POOL WIDTH < RIFFLE WIDTH [0]
- ☒ Impounded [-1]

CURRENT VELOCITY

Check ALL that apply
- ☐ TORRENTIAL [-1]
- ☒ SLOW [1]
- ☐ VERY FAST [1]
- ☐ INTERSTITIAL [-1]
- ☐ FAST [1]
- ☐ INTERMITTENT [-2]
- ☐ MODERATE [1]
- ☐ EDDIES [1]

Indicate for reach - pools and riffles.

Recreation Potential
Primary Contact
Secondary Contact
(circle one and comment on back)

Comments

Pool / Current 6 Maximum 12

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

Comments

Riffle / Run 0 Maximum 8

6] GRADIENT

GRADIENT (____ ft/mi)
DRAINAGE AREA (____ mi²)
- ☐ VERY LOW - LOW [2-4]
- ☐ MODERATE [6-10]
- ☐ HIGH - VERY HIGH [10-6]

%POOL: ____ %GLIDE: ____
%RUN: ____ %RIFFLE: ____

Gradient 6 Maximum 10

EPA 4520 06/11/08

Proofed KC 7/16/08

MBI MODIFIED

OhioEPA

Qualitative Habitat Evaluation Index and Use Assessment Field Sheet

QHEI Score: 37

Stream & Location: Des Plaines River - 280.9 LB **RM:** 280.9 **Date:** 07/10/08

Scorers Full Name & Affiliation: Joe Vandeske EA Engineering

River Code: __ - ___ - ___ **STORET #:** ______ **Lat./ Long.:** (NAD 83 - decimal °) __ . ____ /8 . ____ 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
☐ ☐ BLDR /SLABS [10]			☐ ☐ HARDPAN [4]		
☐ ☐ BOULDER [9]			☐ ☐ DETRITUS [3]		
☐ ☐ COBBLE [8]			☐ ☐ MUCK [2]		
☐ ☐ GRAVEL [7]			☐ ☐ SILT [2]		
☐ ☐ SAND [6]			☐ ☐ ARTIFICIAL [0]		
☐ ☐ BEDROCK [5]					

(Score natural substrates; ignore sludge from point-sources)

NUMBER OF BEST TYPES: ☐ 4 or more [2] ☐ 3 or less [0]

Comments

Check ONE (*Or 2 & average*)

ORIGIN
- ☐ LIMESTONE [1]
- ☐ TILLS [1]
- ☐ WETLANDS [0]
- ☐ HARDPAN [0]
- ☐ SANDSTONE [0]
- ☐ RIP/RAP [0]
- ☐ LACUSTRINE [0]
- ☐ SHALE [-1]
- ☐ COAL FINES [-2]

QUALITY

SILT
- ☐ HEAVY [-2]
- ☐ MODERATE [-1]
- ☐ NORMAL [0]
- ☐ FREE [1]

EMBEDDEDNESS
- ☐ EXTENSIVE [-2]
- ☐ MODERATE [-1]
- ☐ NORMAL [0]
- ☐ NONE [1]

Substrate 6 Maximum 20

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.

____ 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]

AMOUNT
Check ONE (*Or 2 & average*)
- ☐ EXTENSIVE >75% [11]
- ☐ MODERATE 25-75% [7]
- ☐ SPARSE 5-<25% [3]
- ☐ NEARLY ABSENT <5% [1]

Comments

Cover 8 Maximum 20

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

SINUOSITY	DEVELOPMENT	CHANNELIZATION	STABILITY
☐ HIGH [4]	☐ EXCELLENT [7]	☐ NONE [6]	☐ HIGH [3]
☐ MODERATE [3]	☐ GOOD [5]	☐ RECOVERED [4]	☐ MODERATE [2]
☐ LOW [2]	☐ FAIR [3]	☐ RECOVERING [3]	☑ LOW [1]
☑ NONE [1]	☑ POOR [1]	☐ RECENT OR NO RECOVERY [1]	
		☑ Impounded [-1]	

Comments

Channel 2 Maximum 20

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

River right looking downstream

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

Indicate predominant land use(s) past 100m riparian.

Comments

Riparian 9 Maximum 10

5] POOL / GLIDE AND RIFFLE / RUN QUALITY

MAXIMUM DEPTH Check ONE (*ONLY!*)	CHANNEL WIDTH Check ONE (*Or 2 & average*)	CURRENT VELOCITY Check ALL that apply	
☑ > 1m [6]	☐ POOL WIDTH > RIFFLE WIDTH [2]	☐ TORRENTIAL [-1]	☑ SLOW [1]
☐ 0.7-<1m [4]	☐ POOL WIDTH = RIFFLE WIDTH [1]	☐ VERY FAST [1]	☐ INTERSTITIAL [-1]
☐ 0.4-<0.7m [2]	☐ POOL WIDTH < RIFFLE WIDTH [0]	☐ FAST [1]	☐ INTERMITTENT [-2]
☐ 0.2-<0.4m [1]		☐ MODERATE [1]	☐ EDDIES [1]
☐ < 0.2m [0]	☑ Impounded [-1]		

Indicate for reach - pools and riffles

Recreation Potential
Primary Contact
Secondary Contact
(circle one and comment on back)

Comments

Pool / Current 6 Maximum 12

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

Comments

Riffle / Run 0 Maximum 8

6] GRADIENT
(______ ft/mi) DRAINAGE AREA (______ mi²)
- ☐ VERY LOW - LOW [2-4]
- ☐ MODERATE [6-10]
- ☐ HIGH - VERY HIGH [10-6]

%POOL: ( ) %GLIDE: ( )
%RUN: ( ) %RIFFLE: ( )

Gradient 6 Maximum 10

EPA 4520 Proofed KC 7/16/08 06/11/08

MBI MODIFIED

OhioEPA

Qualitative Habitat Evaluation Index and Use Assessment Field Sheet

QHEI Score: 39.5

Stream & Location: Des Plaines River - 280.7 RB

RM: 280.7 Date: 07/11/08

Scorers Full Name & Affiliation: Joe Vandruska [illegible]

River Code: __-___-___ STORET #: ______ Lat./Long.: (NAD 83 - decimal °) __.______ /8_.______ Office verified location ☐

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

BEST TYPES POOL RIFFLE
- ☐ ☐ BLDR /SLABS [10] ____ ____
- ☐ ☐ BOULDER [9] ____ ____
- ☐ ☐ COBBLE [8] ____ ____
- ☐ ☐ GRAVEL [7] ____ ____
- ☐ ☐ SAND [6] ____ ____
- ☐ ☐ BEDROCK [5] ____ ____

NUMBER OF BEST TYPES: ☐ 4 or more [2] ☐ 3 or less [0]

OTHER TYPES POOL RIFFLE
- ☐ ☐ HARDPAN [4] ____ ____
- ☐ ☐ DETRITUS [3] ____ ____
- ☐ ☐ MUCK [2] ____ ____
- ☐ ☐ SILT [2] ____ ____
- ☐ ☐ ARTIFICIAL [0] ____ ____

(Score natural substrates; ignore sludge from point-sources)

Check ONE (Or 2 & average)

ORIGIN
- ☐ LIMESTONE [1]
- ☐ TILLS [1]
- ☐ WETLANDS [0]
- ☐ HARDPAN [0]
- ☐ SANDSTONE [0]
- ☐ RIP/RAP [0]
- ☐ LACUSTRINE [0]
- ☐ SHALE [-1]
- ☐ COAL FINES [-2]

QUALITY

SILT
- ☐ HEAVY [-2]
- ☐ MODERATE [-1]
- ☐ NORMAL [0]
- ☐ FREE [1]

EMBEDDEDNESS
- ☐ EXTENSIVE [-2]
- ☐ MODERATE [-1]
- ☐ NORMAL [0]
- ☐ NONE [1]

Comments

Substrate 8.5 Maximum 20

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.

- ____ 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]

AMOUNT
Check ONE (Or 2 & average)
- ☐ EXTENSIVE >75% [11]
- ☐ MODERATE 25-75% [7]
- ☐ SPARSE 5-<25% [3]
- ☐ NEARLY ABSENT <5% [1]

Comments

Cover 8 Maximum 20

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]
- ☑ Impounded [-1]

STABILITY
- ☑ HIGH [3]
- ☐ MODERATE [2]
- ☑ LOW [1]

(2)

Comments

Channel 3 Maximum 20

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

River right looking downstream

EROSION L R
- ☐ ☐ NONE / LITTLE [3]
- ☐ ☐ MODERATE [2]
- ☐ ☐ HEAVY / SEVERE [1]

RIPARIAN WIDTH L R
- ☐ ☐ WIDE > 50m [4]
- ☐ ☐ MODERATE 10-50m [3]
- ☐ ☐ NARROW 5-10m [2]
- ☐ ☐ VERY NARROW < 5m [1]
- ☐ ☐ NONE [0]

FLOOD PLAIN QUALITY L R
- ☐ ☐ 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]

Indicate predominant land use(s) past 100m riparian.

Comments

Riparian 8 Maximum 10

5] POOL / GLIDE AND RIFFLE / RUN QUALITY

MAXIMUM DEPTH
Check ONE (ONLY!)
- ☑ > 1m [6]
- ☐ 0.7-<1m [4]
- ☐ 0.4-<0.7m [2]
- ☐ 0.2-<0.4m [1]
- ☐ < 0.2m [0]

CHANNEL WIDTH
Check ONE (Or 2 & average)
- ☐ POOL WIDTH > RIFFLE WIDTH [2]
- ☐ POOL WIDTH = RIFFLE WIDTH [1]
- ☐ POOL WIDTH < RIFFLE WIDTH [0]
- ☑ Impounded [-1]

CURRENT VELOCITY
Check ALL that apply
- ☐ TORRENTIAL [-1]
- ☐ VERY FAST [1]
- ☐ FAST [1]
- ☐ MODERATE [1]
- ☑ SLOW [1]
- ☐ INTERSTITIAL [-1]
- ☐ INTERMITTENT [-2]
- ☐ EDDIES [1]

Indicate for reach - pools and riffles.

Recreation Potential
Primary Contact
Secondary Contact
(circle one and comment on back)

Comments

Pool / Current 6 Maximum 12

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 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]

Comments

Riffle / Run 0 Maximum 8

6] GRADIENT (____ ft/mi)
DRAINAGE AREA (____ mi²)

- ☐ VERY LOW - LOW [2-4]
- ☐ MODERATE [6-10]
- ☐ HIGH - VERY HIGH [10-6]

%POOL: ____ %GLIDE: ____
%RUN: ____ %RIFFLE: ____

Gradient 6 Maximum 10

EPA 4520 06/11/08

Proposal KC 7/16/08

MBI MODIFIED

OhioEPA

Qualitative Habitat Evaluation Index and Use Assessment Field Sheet

QHEI Score: 37.5

Stream & Location: Des Plaines River - 280.6 LB RM: 280.6 Date: 07/10/08

Scorers Full Name & Affiliation: Joe Vondruska EA Engineering

River Code: __ - ___ - ___ STORET #: ______ Lat./Long.: (NAD 83 - decimal °) __ . _____ /8_ . _____ 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
☐ ☐ BLDR /SLABS [10]			☐ ☐ HARDPAN [4]		
☐ ☐ BOULDER [9]			☐ ☐ DETRITUS [3]		
☐ ☐ COBBLE [8]			☐ ☐ MUCK [2]		
☐ ☐ GRAVEL [7]			☐ ☐ SILT [2]		
☐ ☐ SAND [6]			☐ ☐ ARTIFICIAL [0]		
☐ ☐ BEDROCK [5]					

(Score natural substrates; ignore sludge from point-sources)

NUMBER OF BEST TYPES: ☐ 4 or more [2] ☐ 3 or less [0]

Comments

Check ONE (Or 2 & average)

ORIGIN
☐ LIMESTONE [1]
☐ TILLS [1]
☐ WETLANDS [0]
☐ HARDPAN [0]
☐ SANDSTONE [0]
☐ RIP/RAP [0]
☐ LACUSTRINE [0]
☐ SHALE [-1]
☐ COAL FINES [-2]

QUALITY

SILT
☐ HEAVY [-2]
☐ MODERATE [-1]
☐ NORMAL [0]
☐ FREE [1]

EMBEDDEDNESS
☐ EXTENSIVE [-2]
☐ MODERATE [-1]
☐ NORMAL [0]
☐ NONE [1]

Substrate 6
Maximum 20

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.

____ 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]

AMOUNT
Check ONE (Or 2 & average)
☐ EXTENSIVE >75% [11]
☐ MODERATE 25-75% [7]
☐ SPARSE 5-<25% [3]
☐ NEARLY ABSENT <5% [1]

Comments

Cover 8
Maximum 20

3] CHANNEL MORPHOLOGY

Check ONE in each category (Or 2 & average)

SINUOSITY	DEVELOPMENT	CHANNELIZATION	STABILITY
☐ HIGH [4]	☐ EXCELLENT [7]	☐ NONE [6]	☐ HIGH [3]
☐ MODERATE [3]	☐ GOOD [5]	☐ RECOVERED [4]	☐ MODERATE [2]
☐ LOW [2]	☐ FAIR [3]	☐ RECOVERING [3]	☒ LOW [1]
☒ NONE [1]	☒ POOR [1]	☐ RECENT OR NO RECOVERY [1]	
		☒ Impounded [-1]	

Comments

Channel 2
Maximum 20

4] BANK EROSION AND RIPARIAN ZONE

Check ONE in each category for EACH BANK (Or 2 per bank & average)

River right looking downstream

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

Indicate predominant land use(s) past 100m riparian.

Comments

Riparian 9.5
Maximum 10

5] POOL / GLIDE AND RIFFLE / RUN QUALITY

MAXIMUM DEPTH Check ONE (ONLY!)	CHANNEL WIDTH Check ONE (Or 2 & average)	CURRENT VELOCITY Check ALL that apply	
☒ > 1m [6]	☐ POOL WIDTH > RIFFLE WIDTH [2]	☐ TORRENTIAL [-1]	☒ SLOW [1]
☐ 0.7-<1m [4]	☐ POOL WIDTH = RIFFLE WIDTH [1]	☐ VERY FAST [1]	☐ INTERSTITIAL [-1]
☐ 0.4-<0.7m [2]	☐ POOL WIDTH < RIFFLE WIDTH [0]	☐ FAST [1]	☐ INTERMITTENT [-2]
☐ 0.2-<0.4m [1]		☐ MODERATE [1]	☐ EDDIES [1]
☐ < 0.2m [0]	☒ Impounded [-1]		

Indicate for reach - pools and riffles.

Recreation Potential
Primary Contact
Secondary Contact
(circle one and comment on back)

Comments

Pool / Current 6
Maximum 12

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

Comments

Riffle / Run 0
Maximum 8

6] GRADIENT

GRADIENT (_____ ft/mi)
DRAINAGE AREA (_____ mi²)

☐ VERY LOW - LOW [2-4]
☐ MODERATE [6-10]
☐ HIGH - VERY HIGH [10-6]

%POOL: ____ %GLIDE: ____
%RUN: ____ %RIFFLE: ____

Gradient 6
Maximum 10

EPA 4520

Pumped ice 7/16/08

06/11/08

MBI MODIFIED

OhioEPA

Qualitative Habitat Evaluation Index and Use Assessment Field Sheet

QHEI Score: 28.5

Stream & Location: Des Plaines River - 280.4 RB *RM:* 280.4 *Date:* 07/11/08

Scorers Full Name & Affiliation: Joe Vondruska EA Engineering

River Code: __ - __ - __ *STORET #:* ______ *Lat./ Long.:* (NAD 83 - decimal °) __ . ____ /8_ . ____ 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
☐ ☐ BLDR /SLABS [10]			☐ ☐ HARDPAN [4]		
☐ ☐ BOULDER [9]			☐ ☐ DETRITUS [3]		
☐ ☐ COBBLE [8]			☐ ☐ MUCK [2]		
☐ ☐ GRAVEL [7]			☐ ☐ SILT [2]		
☐ ☐ SAND [6]			☐ ☐ ARTIFICIAL [0]		
☐ ☐ BEDROCK [5]			(Score natural substrates; ignore sludge from point-sources)		

NUMBER OF BEST TYPES: ☐ 4 or more [2] ☐ 3 or less [0]

Comments

Check ONE (*Or 2 & average*)

ORIGIN
- ☐ LIMESTONE [1]
- ☐ TILLS [1]
- ☐ WETLANDS [0]
- ☐ HARDPAN [0]
- ☐ SANDSTONE [0]
- ☐ RIP/RAP [0]
- ☐ LACUSTRINE [0]
- ☐ SHALE [-1]
- ☐ COAL FINES [-2]

QUALITY

SILT
- ☐ HEAVY [-2]
- ☐ MODERATE [-1]
- ☐ NORMAL [0]
- ☐ FREE [1]

EMBEDDEDNESS
- ☐ EXTENSIVE [-2]
- ☐ MODERATE [-1]
- ☐ NORMAL [0]
- ☐ NONE [1]

Substrate 0 *Maximum 20*

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.

____ 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]

AMOUNT

Check ONE (*Or 2 & average*)
- ☐ EXTENSIVE >75% [11]
- ☐ MODERATE 25-75% [7]
- ☐ SPARSE 5-<25% [3]
- ☐ NEARLY ABSENT <5% [1]

Comments

Cover 8 *Maximum 20*

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]
- ☑ Impounded [-1]

STABILITY
- ☐ HIGH [3]
- ☐ MODERATE [2]
- ☑ LOW [1]

Comments

Channel 2 *Maximum 20*

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

River right looking downstream

EROSION (L R)
- ☐ ☐ NONE / LITTLE [3]
- ☐ ☐ MODERATE [2]
- ☐ ☐ HEAVY / SEVERE [1]

RIPARIAN WIDTH (L R)
- ☐ ☐ WIDE > 50m [4]
- ☐ ☐ MODERATE 10-50m [3]
- ☐ ☐ NARROW 5-10m [2]
- ☐ ☐ VERY NARROW < 5m [1]
- ☐ ☐ NONE [0]

FLOOD PLAIN QUALITY (L R)
- ☐ ☐ 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]

Indicate predominant land use(s) past 100m riparian.

Comments

Riparian 6.5 *Maximum 10*

5] POOL / GLIDE AND RIFFLE / RUN QUALITY

MAXIMUM DEPTH

Check ONE (*ONLY!*)
- ☑ > 1m [6]
- ☐ 0.7-<1m [4]
- ☐ 0.4-<0.7m [2]
- ☐ 0.2-<0.4m [1]
- ☐ < 0.2m [0]

CHANNEL WIDTH

Check ONE (*Or 2 & average*)
- ☐ POOL WIDTH > RIFFLE WIDTH [2]
- ☐ POOL WIDTH = RIFFLE WIDTH [1]
- ☐ POOL WIDTH < RIFFLE WIDTH [0]
- ☑ Impounded [-1]

CURRENT VELOCITY

Check ALL that apply
- ☐ TORRENTIAL [-1]
- ☐ VERY FAST [1]
- ☐ FAST [1]
- ☐ MODERATE [1]
- ☑ SLOW [1]
- ☐ INTERSTITIAL [-1]
- ☐ INTERMITTENT [-2]
- ☐ EDDIES [1]

Indicate for reach - pools and riffles.

Recreation Potential
Primary Contact
Secondary Contact
(circle one and comment on back)

Comments

Pool / Current 6 *Maximum 12*

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 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]

Comments

Riffle / Run 0 *Maximum 8*

6] GRADIENT (____ ft/mi) ☐ VERY LOW - LOW [2-4]

DRAINAGE AREA (____ mi²) ☐ MODERATE [6-10] ☐ HIGH - VERY HIGH [10-6]

%POOL: ____ %GLIDE: ____

%RUN: ____ %RIFFLE: ____

Gradient 6 *Maximum 10*

EPA 4520 Proofed KC 7/16/08 06/11/06

MBI MODIFIED

Ohio EPA Qualitative Habitat Evaluation Index and Use Assessment Field Sheet

QHEI Score: 41.5

Stream & Location: Des Plaines River - 280.3 CD **RM:** 280.3 **Date:** 07/11/08

Scorers Full Name & Affiliation: Joe Vanbruke EA Engineering

River Code: __ - __ - __ **STORET #:** ______ **Lat./ Long.:** (NAD 83 - decimal °) __.____ /8_.____ 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
☐ ☐ BLDR /SLABS [10]			☐ ☐ HARDPAN [4]		
☐ ☐ BOULDER [9]			☐ ☐ DETRITUS [3]		
☐ ☐ COBBLE [8]			☐ ☐ MUCK [2]		
☐ ☐ GRAVEL [7]			☐ ☐ SILT [2]		
☐ ☐ SAND [6]			☐ ☐ ARTIFICIAL [0]		
☐ ☐ BEDROCK [5]			(Score natural substrates; ignore sludge from point-sources)		

NUMBER OF BEST TYPES: ☐ 4 or more [2] ☐ 3 or less [0]

Comments

Check ONE (Or 2 & average)

ORIGIN
- ☐ LIMESTONE [1]
- ☐ TILLS [1]
- ☐ WETLANDS [0]
- ☐ HARDPAN [0]
- ☐ SANDSTONE [0]
- ☐ RIP/RAP [0]
- ☐ LACUSTRINE [0]
- ☐ SHALE [-1]
- ☐ COAL FINES [-2]

QUALITY

SILT
- ☐ HEAVY [-2]
- ☐ MODERATE [-1]
- ☐ NORMAL [0]
- ☐ FREE [1]

EMBEDDEDNESS
- ☐ EXTENSIVE [-2]
- ☐ MODERATE [-1]
- ☐ NORMAL [0]
- ☐ NONE [1]

Substrate 6 Maximum 20

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.

_____ 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]

AMOUNT
Check ONE (Or 2 & average)
- ☐ EXTENSIVE >75% [11]
- ☐ MODERATE 25-75% [7]
- ☐ SPARSE 5-<25% [3]
- ☐ NEARLY ABSENT <5% [1]

Comments

Cover 12 Maximum 20

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

SINUOSITY	DEVELOPMENT	CHANNELIZATION	STABILITY
☐ HIGH [4]	☐ EXCELLENT [7]	☐ NONE [6]	☐ HIGH [3]
☐ MODERATE [3]	☐ GOOD [5]	☐ RECOVERED [4]	☐ MODERATE [2]
☐ LOW [2]	☐ FAIR [3]	☐ RECOVERING [3]	☑ LOW [1]
☑ NONE [1]	☑ POOR [1]	☐ RECENT OR NO RECOVERY [1]	
		☑ Impounded [-1]	

Comments

Channel 2 Maximum 20

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

River right looking downstream

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

Indicate predominant land use(s) past 100m riparian.

Comments

Riparian 9.5 Maximum 10

5] POOL / GLIDE AND RIFFLE / RUN QUALITY

MAXIMUM DEPTH
Check ONE (ONLY!)
- ☑ > 1m [6]
- ☐ 0.7-<1m [4]
- ☐ 0.4-<0.7m [2]
- ☐ 0.2-<0.4m [1]
- ☐ < 0.2m [0]

CHANNEL WIDTH
Check ONE (Or 2 & average)
- ☐ POOL WIDTH > RIFFLE WIDTH [2]
- ☐ POOL WIDTH = RIFFLE WIDTH [1]
- ☐ POOL WIDTH < RIFFLE WIDTH [0]
- ☑ Impounded [-1]

CURRENT VELOCITY
Check ALL that apply
- ☐ TORRENTIAL [-1]
- ☐ VERY FAST [1]
- ☐ FAST [1]
- ☐ MODERATE [1]
- ☑ SLOW [1]
- ☐ INTERSTITIAL [-1]
- ☐ INTERMITTENT [-2]
- ☐ EDDIES [1]

Indicate for reach - pools and riffles.

Recreation Potential
Primary Contact
Secondary Contact
(circle one and comment on back)

Comments

Pool / Current 6 Maximum 12

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 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]

Comments

Riffle / Run 0 Maximum 8

6] GRADIENT (_____ ft/mi)
DRAINAGE AREA (_____ mi²)
- ☐ VERY LOW - LOW [2-4]
- ☐ MODERATE [6-10]
- ☐ HIGH - VERY HIGH [10-6]

%POOL: ____ %GLIDE: ____
%RUN: ____ %RIFFLE: ____

Gradient 6 Maximum 10

EPA 4520

Proofed KC 7/16/08

06/11/08

MBI MODIFIED

Ohio EPA

Qualitative Habitat Evaluation Index and Use Assessment Field Sheet

QHEI Score: 45

Stream & Location: Des Plaines River - 280.0 RB **RM:** 280.0 **Date:** 07/11/08

Scorers Full Name & Affiliation: Joe Vondruska EA Engineering

River Code: __ - __ - __ **STORET #:** ______ **Lat./ Long.:** (NAD 83 - decimal °) __.____ /8__.____ 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
☐ ☐ BLDR /SLABS [10]			☐ ☐ HARDPAN [4]		
☐ ☐ BOULDER [9]			☐ ☐ DETRITUS [3]		
☐ ☐ COBBLE [8]			☐ ☐ MUCK [2]		
☐ ☐ GRAVEL [7]			☐ ☐ SILT [2]		
☐ ☐ SAND [6]			☐ ☐ ARTIFICIAL [0]		
☐ ☐ BEDROCK [5]					

(Score natural substrates; ignore sludge from point-sources)

NUMBER OF BEST TYPES: ☐ 4 or more [2] ☐ 3 or less [0]

Comments

Check ONE (Or 2 & average)

ORIGIN
- ☐ LIMESTONE [1]
- ☐ TILLS [1]
- ☐ WETLANDS [0]
- ☐ HARDPAN [0]
- ☐ SANDSTONE [0]
- ☐ RIP/RAP [0]
- ☐ LACUSTRINE [0]
- ☐ SHALE [-1]
- ☐ COAL FINES [-2]

QUALITY

SILT
- ☐ HEAVY [-2]
- ☐ MODERATE [-1]
- ☐ NORMAL [0]
- ☐ FREE [1]

EMBEDDEDNESS
- ☐ EXTENSIVE [-2]
- ☐ MODERATE [-1]
- ☐ NORMAL [0]
- ☐ NONE [1]

Substrate 10.5 Maximum 20

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.

____ 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]

AMOUNT
Check ONE (Or 2 & average)
- ☐ EXTENSIVE >75% [11]
- ☐ MODERATE 25-75% [7]
- ☐ SPARSE 5-<25% [3]
- ☐ NEARLY ABSENT <5% [1]

Comments

Cover 11 Maximum 20

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

SINUOSITY	DEVELOPMENT	CHANNELIZATION	STABILITY
☐ HIGH [4]	☐ EXCELLENT [7]	☐ NONE [6]	☒ HIGH [3]
☐ MODERATE [3]	☐ GOOD [5]	☐ RECOVERED [4]	☐ MODERATE [2]
☐ LOW [2]	☐ FAIR [3]	☐ RECOVERING [3]	☒ LOW [1]
☒ NONE [1]	☒ POOR [1]	☐ RECENT OR NO RECOVERY [1]	
		☒ Impounded [-1]	2

Comments

Channel 3 Maximum 20

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

River right looking downstream

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

Indicate predominant land use(s) past 100m riparian.

Comments

Riparian 8.5 Maximum 10

5] POOL / GLIDE AND RIFFLE / RUN QUALITY

MAXIMUM DEPTH Check ONE (ONLY!)	CHANNEL WIDTH Check ONE (Or 2 & average)	CURRENT VELOCITY Check ALL that apply	
☒ > 1m [6]	☐ POOL WIDTH > RIFFLE WIDTH [2]	☐ TORRENTIAL [-1]	☒ SLOW [1]
☐ 0.7-<1m [4]	☐ POOL WIDTH = RIFFLE WIDTH [1]	☐ VERY FAST [1]	☐ INTERSTITIAL [-1]
☐ 0.4-<0.7m [2]	☐ POOL WIDTH < RIFFLE WIDTH [0]	☐ FAST [1]	☐ INTERMITTENT [-2]
☐ 0.2-<0.4m [1]		☐ MODERATE [1]	☐ EDDIES [1]
☐ < 0.2m [0]	☒ Impounded [-1]		

Indicate for reach - pools and riffles.

Recreation Potential
Primary Contact
Secondary Contact
(circle one and comment on back)

Comments

Pool / Current 6 Maximum 12

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

Comments

Riffle / Run 0 Maximum 8

6] GRADIENT
(____ ft/mi) DRAINAGE AREA (____ mi²)

- ☐ VERY LOW - LOW [2-4]
- ☐ MODERATE [6-10]
- ☐ HIGH - VERY HIGH [10-6]

%POOL: ____ %GLIDE: ____
%RUN: ____ %RIFFLE: ____

Gradient 6 Maximum 10

EPA 4520

Proofed KP 7/15/08

06/11/08

MBI MODIFIED

OhioEPA

Qualitative Habitat Evaluation Index and Use Assessment Field Sheet

QHEI Score: 52.5

Stream & Location: Des Plaines River - 279.8 LB *RM:* 279.8 *Date:* 07/10/08

Scorers Full Name & Affiliation: Joe Vandyke EA Engineering

River Code: __ - __ - __ *STORET #:* ____ *Lat./ Long.:* (NAD 83 - decimal °) __ . ____ /8_ . ____ 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
☐☐ BLDR /SLABS [10]			☐☐ HARDPAN [4]		
☐☐ BOULDER [9]			☐☐ DETRITUS [3]		
☐☐ COBBLE [8]			☐☐ MUCK [2]		
☐☐ GRAVEL [7]			☐☐ SILT [2]		
☐☐ SAND [6]			☐☐ ARTIFICIAL [0]		
☐☐ BEDROCK [5]			(Score natural substrates; ignore sludge from point-sources)		

NUMBER OF BEST TYPES: ☐ 4 or more [2] ☐ 3 or less [0]

Comments

Check ONE (*Or 2 & average*)

ORIGIN
- ☐ LIMESTONE [1]
- ☐ TILLS [1]
- ☐ WETLANDS [0]
- ☐ HARDPAN [0]
- ☐ SANDSTONE [0]
- ☐ RIP/RAP [0]
- ☐ LACUSTRINE [0]
- ☐ SHALE [-1]
- ☐ COAL FINES [-2]

QUALITY

SILT
- ☐ HEAVY [-2]
- ☐ MODERATE [-1]
- ☐ NORMAL [0]
- ☐ FREE [1]

EMBEDDEDNESS
- ☐ EXTENSIVE [-2]
- ☐ MODERATE [-1]
- ☐ NORMAL [0]
- ☐ NONE [1]

Substrate 19 *Maximum* 20

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.

- ____ 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]

AMOUNT
Check ONE (*Or 2 & average*)
- ☐ EXTENSIVE >75% [11]
- ☐ MODERATE 25-75% [7]
- ☐ SPARSE 5-<25% [3]
- ☐ NEARLY ABSENT <5% [1]

Comments

Cover 7 *Maximum* 20

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

SINUOSITY	DEVELOPMENT	CHANNELIZATION	STABILITY
☐ HIGH [4]	☐ EXCELLENT [7]	☐ NONE [6]	☒ HIGH [3]
☐ MODERATE [3]	☐ GOOD [5]	☐ RECOVERED [4]	☐ MODERATE [2]
☐ LOW [2]	☐ FAIR [3]	☐ RECOVERING [3]	☐ LOW [1]
☒ NONE [1]	☒ POOR [1]	☐ RECENT OR NO RECOVERY [1]	
		☒ Impounded [-1]	

Comments

Channel 4 *Maximum* 20

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

River right looking downstream

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

Indicate predominant land use(s) past 100m riparian.

Comments

Riparian 9.5 *Maximum* 10

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

MAXIMUM DEPTH Check ONE (*ONLY!*)	CHANNEL WIDTH Check ONE (*Or 2 & average*)	CURRENT VELOCITY Check ALL that apply	
☒ > 1m [6]	☐ POOL WIDTH > RIFFLE WIDTH [2]	☐ TORRENTIAL [-1]	☒ SLOW [1]
☐ 0.7-<1m [4]	☐ POOL WIDTH = RIFFLE WIDTH [1]	☐ VERY FAST [1]	☐ INTERSTITIAL [-1]
☐ 0.4-<0.7m [2]	☐ POOL WIDTH < RIFFLE WIDTH [0]	☐ FAST [1]	☐ INTERMITTENT [-2]
☐ 0.2-<0.4m [1]	☒ Impounded [-1]	☒ MODERATE [1]	☐ EDDIES [1]
☐ < 0.2m [0]		*Indicate for reach - pools and riffles.*	

Recreation Potential
Primary Contact
Secondary Contact
(circle one and comment on back)

Comments

Pool / Current 7 *Maximum* 12

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

Comments

Riffle / Run 0 *Maximum* 8

6] *GRADIENT* (____ ft/mi) DRAINAGE AREA (____ mi²)

- ☐ VERY LOW - LOW [2-4]
- ☐ MODERATE [6-10]
- ☐ HIGH - VERY HIGH [10-6]

%POOL: ( ) %GLIDE: ( )
%RUN: ( ) %RIFFLE: ( )

Gradient 6 *Maximum* 10

EPA 4520 Proofed KC 7/10/08 06/11/08

MBI MODIFIED

OhioEPA

Qualitative Habitat Evaluation Index and Use Assessment Field Sheet

QHEI Score: 54

Stream & Location: Des Plaines River - 279.7 RB RM: 279.7 Date: 07/11/08

Scorers Full Name & Affiliation: Joe Vandeyer CH Engineering

River Code: __ - __ __ - __ __ __ STORET #: __ __ __ __ __ __ Lat./ Long.: (NAD 83 - decimal °) __ __ . __ __ __ __ /8 __ . __ __ __ __ 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
☐ ☐ BLDR /SLABS [10]	___	___	☐ ☐ HARDPAN [4]	___	___
☐ ☐ BOULDER [9]	___	___	☐ ☐ DETRITUS [3]	___	___
☐ ☐ COBBLE [8]	___	___	☐ ☐ MUCK [2]	___	___
☐ ☐ GRAVEL [7]	___	___	☐ ☐ SILT [2]	___	___
☐ ☐ SAND [6]	___	___	☐ ☐ ARTIFICIAL [0]	___	___
☐ ☐ BEDROCK [5]	___	___	(Score natural substrates; ignore sludge from point-sources)		

NUMBER OF BEST TYPES: ☐ 4 or more [2] ☐ 3 or less [0]

Comments

Check ONE (*Or 2 & average*)

ORIGIN
- ☐ LIMESTONE [1]
- ☐ TILLS [1]
- ☐ WETLANDS [0]
- ☐ HARDPAN [0]
- ☐ SANDSTONE [0]
- ☐ RIP/RAP [0]
- ☐ LACUSTRINE [0]
- ☐ SHALE [-1]
- ☐ COAL FINES [-2]

QUALITY

SILT
- ☐ HEAVY [-2]
- ☐ MODERATE [-1]
- ☐ NORMAL [0]
- ☐ FREE [1]

EMBEDDEDNESS
- ☐ EXTENSIVE [-2]
- ☐ MODERATE [-1]
- ☐ NORMAL [0]
- ☐ NONE [1]

Substrate 19 *Maximum* 20

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.

___ 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]

AMOUNT

Check ONE (*Or 2 & average*)
- ☐ EXTENSIVE >75% [11]
- ☐ MODERATE 25-75% [7]
- ☐ SPARSE 5-<25% [3]
- ☐ NEARLY ABSENT <5% [1]

Comments

Cover 9 *Maximum* 20

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

SINUOSITY	DEVELOPMENT	CHANNELIZATION	STABILITY
☐ HIGH [4]	☐ EXCELLENT [7]	☐ NONE [6]	☒ HIGH [3]
☐ MODERATE [3]	☐ GOOD [5]	☐ RECOVERED [4]	☐ MODERATE [2]
☐ LOW [2]	☐ FAIR [3]	☐ RECOVERING [3]	☐ LOW [1]
☒ NONE [1]	☒ POOR [1]	☐ RECENT OR NO RECOVERY [1]	
		☒ Impounded [-1]	

Comments

Channel 4 *Maximum* 20

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

River right looking downstream

L R EROSION	L R RIPARIAN WIDTH	L R FLOOD PLAIN QUALITY	L R
☐ ☐ NONE / LITTLE [3]	☐ ☐ WIDE > 50m [4]	☐ ☐ FOREST, SWAMP [3]	☐ ☐ CONSERVATION TILLAGE [1]
☐ ☐ MODERATE [2]	☐ ☐ MODERATE 10-50m [3]	☐ ☐ SHRUB OR OLD FIELD [2]	☐ ☐ URBAN OR INDUSTRIAL [0]
☐ ☐ HEAVY / SEVERE [1]	☐ ☐ NARROW 5-10m [2]	☐ ☐ RESIDENTIAL, PARK, NEW FIELD [1]	☐ ☐ MINING / CONSTRUCTION [0]
	☐ ☐ VERY NARROW < 5m [1]	☐ ☐ FENCED PASTURE [1]	*Indicate predominant land use(s) past 100m riparian.*
	☐ ☐ NONE [0]	☐ ☐ OPEN PASTURE, ROWCROP [0]	

Comments

Riparian 8 *Maximum* 10

5] POOL / GLIDE AND RIFFLE / RUN QUALITY

MAXIMUM DEPTH Check ONE (ONLY!)	CHANNEL WIDTH Check ONE (Or 2 & average)	CURRENT VELOCITY Check ALL that apply	
☒ > 1m [6]	☐ POOL WIDTH > RIFFLE WIDTH [2]	☐ TORRENTIAL [-1]	☒ SLOW [1]
☐ 0.7-<1m [4]	☐ POOL WIDTH = RIFFLE WIDTH [1]	☐ VERY FAST [1]	☐ INTERSTITIAL [-1]
☐ 0.4-<0.7m [2]	☐ POOL WIDTH < RIFFLE WIDTH [0]	☐ FAST [1]	☐ INTERMITTENT [-2]
☐ 0.2-<0.4m [1]	☒ Impounded [-1]	☒ MODERATE [1]	☒ EDDIES [1]
☐ < 0.2m [0]		*Indicate for reach - pools and riffles.*	

Recreation Potential
Primary Contact
Secondary Contact
(circle one and comment on back)

Comments

Pool / Current 8 *Maximum* 12

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

Comments

Riffle / Run 0 *Maximum* 8

6] GRADIENT (_____ ft/mi) ☐ VERY LOW - LOW [2-4]
DRAINAGE AREA (_____ mi²) ☐ MODERATE [6-10] ☐ HIGH - VERY HIGH [10-6]

%POOL: ( ) %GLIDE: ( )
%RUN: ( ) %RIFFLE: ( )

Gradient 6 *Maximum* 10

EPA 4520 06/11/06

Proofed KC 7/11/08

MBI MODIFIED

Qualitative Habitat Evaluation Index and Use Assessment Field Sheet

QHEI Score: 54.5

Stream & Location: Des Plaines River - 279.5 LB RM: 279.5 Date: 07/10/08

Scorers Full Name & Affiliation: Joe Vondruska EA Engineering

River Code: __ - ___ - ___ STORET #: ______ Lat./Long.: (NAD 83 - decimal °) __ . ____ /8_ . ____ 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
☐ ☐ BLDR /SLABS [10]	___	___	☐ ☐ HARDPAN [4]	___	___
☐ ☐ BOULDER [9]	___	___	☐ ☐ DETRITUS [3]	___	___
☐ ☐ COBBLE [8]	___	___	☐ ☐ MUCK [2]	___	___
☐ ☐ GRAVEL [7]	___	___	☐ ☐ SILT [2]	___	___
☐ ☐ SAND [6]	___	___	☐ ☐ ARTIFICIAL [0]	___	___
☐ ☐ BEDROCK [5]	___	___			

(Score natural substrates; ignore sludge from point-sources)

NUMBER OF BEST TYPES: ☐ 4 or more [2] ☐ 3 or less [0]

Comments

Check ONE (Or 2 & average)

ORIGIN
- ☐ LIMESTONE [1]
- ☐ TILLS [1]
- ☐ WETLANDS [0]
- ☐ HARDPAN [0]
- ☐ SANDSTONE [0]
- ☐ RIP/RAP [0]
- ☐ LACUSTRINE [0]
- ☐ SHALE [-1]
- ☐ COAL FINES [-2]

QUALITY

SILT
- ☐ HEAVY [-2]
- ☐ MODERATE [-1]
- ☐ NORMAL [0]
- ☐ FREE [1]

EMBEDDEDNESS
- ☐ EXTENSIVE [-2]
- ☐ MODERATE [-1]
- ☐ NORMAL [0]
- ☐ NONE [1]

Substrate 19 Maximum 20

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.

___ 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]

AMOUNT

Check ONE (Or 2 & average)
- ☐ EXTENSIVE >75% [11]
- ☐ MODERATE 25-75% [7]
- ☐ SPARSE 5-<25% [3]
- ☐ NEARLY ABSENT <5% [1]

Comments

Cover 9 Maximum 20

3] CHANNEL MORPHOLOGY

Check ONE in each category (Or 2 & average)

SINUOSITY	DEVELOPMENT	CHANNELIZATION	STABILITY
☐ HIGH [4]	☐ EXCELLENT [7]	☐ NONE [6]	☒ HIGH [3]
☐ MODERATE [3]	☐ GOOD [5]	☐ RECOVERED [4]	☐ MODERATE [2]
☐ LOW [2]	☐ FAIR [3]	☐ RECOVERING [3]	☐ LOW [1]
☒ NONE [1]	☒ POOR [1]	☐ RECENT OR NO RECOVERY [1]	
		☒ Impounded [-1]	

Comments

Channel 4 Maximum 20

4] BANK EROSION AND RIPARIAN ZONE

Check ONE in each category for EACH BANK (Or 2 per bank & average)

River right looking downstream

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

Indicate predominant land use(s) past 100m riparian.

Comments

Riparian 9.5 Maximum 10

5] POOL / GLIDE AND RIFFLE / RUN QUALITY

MAXIMUM DEPTH Check ONE (ONLY!)	CHANNEL WIDTH Check ONE (Or 2 & average)	CURRENT VELOCITY Check ALL that apply	
☒ > 1m [6]	☐ POOL WIDTH > RIFFLE WIDTH [2]	☐ TORRENTIAL [-1]	☒ SLOW [1]
☐ 0.7-<1m [4]	☐ POOL WIDTH = RIFFLE WIDTH [1]	☐ VERY FAST [1]	☐ INTERSTITIAL [-1]
☐ 0.4-<0.7m [2]	☐ POOL WIDTH < RIFFLE WIDTH [0]	☐ FAST [1]	☐ INTERMITTENT [-2]
☐ 0.2-<0.4m [1]	☒ Impounded [-1]	☒ MODERATE [1]	☐ EDDIES [1]
☐ < 0.2m [0]			

Indicate for reach - pools and riffles.

Recreation Potential
Primary Contact
Secondary Contact
(circle one and comment on back)

Comments

Pool / Current 7 Maximum 12

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

Comments

Riffle / Run 0 Maximum 8

6] GRADIENT (____ ft/mi)

DRAINAGE AREA (____ mi²)

- ☐ VERY LOW - LOW [2-4]
- ☐ MODERATE [6-10]
- ☐ HIGH - VERY HIGH [10-6]

%POOL: ____ %GLIDE: ____
%RUN: ____ %RIFFLE: ____

Gradient 6 Maximum 10

EPA 4520

Proofed KC 7/16/08

06/11/08

MBI MODIFIED

OhioEPA **Qualitative Habitat Evaluation Index and Use Assessment Field Sheet** **QHEI Score:** 54

Stream & Location: Des Plaines River - 279.4 RD *RM:* 279.4 *Date:* 07/11/08

Scorers Full Name & Affiliation: Joe Vondruska EA Engineering

River Code: __ - ___ - ___ *STORET #:* ______ *Lat./ Long.:* (NAD 83 - decimal °) __ . ____ /8_ . ____ 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
☐ ☐ BLDR /SLABS [10]			☐ ☐ HARDPAN [4]		
☐ ☐ BOULDER [9]			☐ ☐ DETRITUS [3]		
☐ ☐ COBBLE [8]			☐ ☐ MUCK [2]		
☐ ☐ GRAVEL [7]			☐ ☐ SILT [2]		
☐ ☐ SAND [6]			☐ ☐ ARTIFICIAL [0]		
☐ ☐ BEDROCK [5]			(Score natural substrates; ignore sludge from point-sources)		

NUMBER OF BEST TYPES: ☐ 4 or more [2] ☐ 3 or less [0]

Comments

Check ONE (Or 2 & average)

ORIGIN
- ☐ LIMESTONE [1]
- ☐ TILLS [1]
- ☐ WETLANDS [0]
- ☐ HARDPAN [0]
- ☐ SANDSTONE [0]
- ☐ RIP/RAP [0]
- ☐ LACUSTRINE [0]
- ☐ SHALE [-1]
- ☐ COAL FINES [-2]

QUALITY

SILT
- ☐ HEAVY [-2]
- ☐ MODERATE [-1]
- ☐ NORMAL [0]
- ☐ FREE [1]

EMBEDDEDNESS
- ☐ EXTENSIVE [-2]
- ☐ MODERATE [-1]
- ☐ NORMAL [0]
- ☐ NONE [1]

Substrate 20 *Maximum 20*

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.

____ 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]

AMOUNT

Check ONE (Or 2 & average)
- ☐ EXTENSIVE >75% [11]
- ☐ MODERATE 25-75% [7]
- ☐ SPARSE 5-<25% [3]
- ☐ NEARLY ABSENT <5% [1]

Comments

Cover Maximum 20 8

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]
- ☑ Impounded [-1]

STABILITY
- ☑ HIGH [3]
- ☐ MODERATE [2]
- ☐ LOW [1]

Comments

Channel Maximum 20 4

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

River right looking downstream

EROSION (L R)
- ☐ ☐ NONE / LITTLE [3]
- ☐ ☐ MODERATE [2]
- ☐ ☐ HEAVY / SEVERE [1]

RIPARIAN WIDTH (L R)
- ☐ ☐ WIDE > 50m [4]
- ☐ ☐ MODERATE 10-50m [3]
- ☐ ☐ NARROW 5-10m [2]
- ☐ ☐ VERY NARROW < 5m [1]
- ☐ ☐ NONE [0]

FLOOD PLAIN QUALITY (L R)
- ☐ ☐ 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]

Indicate predominant land use(s) past 100m riparian.

Comments

Riparian Maximum 10 10

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

MAXIMUM DEPTH Check ONE (ONLY!)
- ☑ > 1m [6]
- ☐ 0.7-<1m [4]
- ☐ 0.4-<0.7m [2]
- ☐ 0.2-<0.4m [1]
- ☐ < 0.2m [0]

CHANNEL WIDTH Check ONE (Or 2 & average)
- ☐ POOL WIDTH > RIFFLE WIDTH [2]
- ☐ POOL WIDTH = RIFFLE WIDTH [1]
- ☐ POOL WIDTH < RIFFLE WIDTH [0]
- ☑ Impounded [-1]

CURRENT VELOCITY Check ALL that apply
- ☐ TORRENTIAL [-1]
- ☐ VERY FAST [1]
- ☐ FAST [1]
- ☐ MODERATE [1]
- ☑ SLOW [1]
- ☐ INTERSTITIAL [-1]
- ☐ INTERMITTENT [-2]
- ☐ EDDIES [1]

Indicate for reach - pools and riffles.

Recreation Potential
Primary Contact
Secondary Contact
(circle one and comment on back)

Comments

Pool / Current Maximum 12 6

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 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]

Comments

Riffle / Run Maximum 8 0

6] *GRADIENT* (_____ ft/mi)

DRAINAGE AREA (_____ mi²)

- ☐ VERY LOW - LOW [2-4]
- ☐ MODERATE [6-10]
- ☐ HIGH - VERY HIGH [10-6]

%POOL: ____ %GLIDE: ____
%RUN: ____ %RIFFLE: ____

Gradient Maximum 10 6

EPA 4520 06/11/08

Proofed KC 7/16/08

MBI MODIFIED

Qualitative Habitat Evaluation Index and Use Assessment Field Sheet

QHEI Score: 46

Stream & Location: Des Plaines River ; Loc 405 - Treats Island side channel **RM:** 279.4 **Date:** 07/08/08

Scorers Full Name & Affiliation: Joe Vondruska EA Engineering

River Code: __ __ - __ __ __ - __ __ __ **STORET #:** __ __ __ __ __ __ **Lat./ Long.:** (NAD 83 - decimal °) __ __ . __ __ __ __ /8 __ . __ __ __ __ 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
☐ ☐ BLDR /SLABS [10]			☐ ☐ HARDPAN [4]		
☐ ☐ BOULDER [9]			☐ ☐ DETRITUS [3]		
☐ ☐ COBBLE [8]			☐ ☐ MUCK [2]		
☐ ☐ GRAVEL [7]			☐ ☐ SILT [2]		
☐ ☐ SAND [6]			☐ ☐ ARTIFICIAL [0]		
☐ ☐ BEDROCK [5]			(Score natural substrates; ignore sludge from point-sources)		

NUMBER OF BEST TYPES: ☐ 4 or more [2] ☐ 3 or less [0]

Comments

Check ONE (Or 2 & average)

ORIGIN
- ☐ LIMESTONE [1]
- ☐ TILLS [1]
- ☐ WETLANDS [0]
- ☐ HARDPAN [0]
- ☐ SANDSTONE [0]
- ☐ RIP/RAP [0]
- ☐ LACUSTRINE [0]
- ☐ SHALE [-1]
- ☐ COAL FINES [-2]

QUALITY

SILT
- ☐ HEAVY [-2]
- ☐ MODERATE [-1]
- ☐ NORMAL [0]
- ☐ FREE [1]

EMBEDDEDNESS
- ☐ EXTENSIVE [-2]
- ☐ MODERATE [-1]
- ☐ NORMAL [0]
- ☐ NONE [1]

Substrate 8.5 Maximum 20

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.

____ 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]

AMOUNT
Check ONE (Or 2 & average)
- ☐ EXTENSIVE >75% [11]
- ☐ MODERATE 25-75% [7]
- ☐ SPARSE 5-<25% [3]
- ☐ NEARLY ABSENT <5% [1]

Comments

Cover 14 Maximum 20

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

SINUOSITY	DEVELOPMENT	CHANNELIZATION	STABILITY
☐ HIGH [4]	☐ EXCELLENT [7]	☐ NONE [6]	☐ HIGH [3]
☐ MODERATE [3]	☐ GOOD [5]	☐ RECOVERED [4]	☒ MODERATE [2]
☐ LOW [2]	☐ FAIR [3]	☐ RECOVERING [3]	☐ LOW [1]
☒ NONE [1]	☒ POOR [1]	☐ RECENT OR NO RECOVERY [1]	
		☒ Impounded [-1]	

Comments

Channel 3 Maximum 20

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

River right looking downstream

L R EROSION	L R RIPARIAN WIDTH	L R FLOOD PLAIN QUALITY	L R
☐ ☐ NONE / LITTLE [3]	☐ ☐ WIDE > 50m [4]	☐ ☐ FOREST, SWAMP [3]	☐ ☐ CONSERVATION TILLAGE [1]
☐ ☐ MODERATE [2]	☐ ☐ MODERATE 10-50m [3]	☐ ☐ SHRUB OR OLD FIELD [2]	☐ ☐ URBAN OR INDUSTRIAL [0]
☐ ☐ HEAVY / SEVERE [1]	☐ ☐ NARROW 5-10m [2]	☐ ☐ RESIDENTIAL, PARK, NEW FIELD [1]	☐ ☐ MINING / CONSTRUCTION [0]
	☐ ☐ VERY NARROW < 5m [1]	☐ ☐ FENCED PASTURE [1]	Indicate predominant land use(s) past 100m riparian.
	☐ ☐ NONE [0]	☐ ☐ OPEN PASTURE, ROWCROP [0]	

Comments

Riparian 8.5 Maximum 10

5] POOL / GLIDE AND RIFFLE / RUN QUALITY

MAXIMUM DEPTH
Check ONE (ONLY!)
- ☒ > 1m [6]
- ☐ 0.7-<1m [4]
- ☐ 0.4-<0.7m [2]
- ☐ 0.2-<0.4m [1]
- ☐ < 0.2m [0]

CHANNEL WIDTH
Check ONE (Or 2 & average)
- ☐ POOL WIDTH > RIFFLE WIDTH [2]
- ☐ POOL WIDTH = RIFFLE WIDTH [1]
- ☐ POOL WIDTH < RIFFLE WIDTH [0]
- ☒ Impounded [-1]

CURRENT VELOCITY
Check ALL that apply
- ☐ TORRENTIAL [-1]
- ☐ VERY FAST [1]
- ☐ FAST [1]
- ☐ MODERATE [1]
- ☒ SLOW [1]
- ☐ INTERSTITIAL [-1]
- ☐ INTERMITTENT [-2]
- ☐ EDDIES [1]

Indicate for reach - pools and riffles.

Recreation Potential
Primary Contact
Secondary Contact
(circle one and comment on back)

Comments

Pool / Current 6 Maximum 12

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

Comments

Riffle / Run 0 Maximum 8

6] GRADIENT (____ ft/mi) ☐ VERY LOW - LOW [2-4]
DRAINAGE AREA (____ mi²) ☐ MODERATE [6-10] ☐ HIGH - VERY HIGH [10-6]

%POOL: ____ %GLIDE: ____
%RUN: ____ %RIFFLE: ____

Gradient 6 Maximum 10

EPA 4520 06/11/08

Proofed KC 7/16/08

MBI MODIFIED

OhioEPA

Qualitative Habitat Evaluation Index and Use Assessment Field Sheet

QHEI Score: 55.5

Stream & Location: Des Moines River - 279.1 LB *RM:* 279.1 *Date:* 07/10/08

Scorers Full Name & Affiliation: Joe Vondruska EA Engineering

River Code: __ - ___ - ___ *STORET #:* ______ *Lat./Long.:* (NAD 83 - decimal °) __ . ____ /8_ . ____ Office verified location ☐

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

BEST TYPES POOL RIFFLE
- ☐ ☐ BLDR /SLABS [10] ____ ____
- ☐ ☐ BOULDER [9] ____ ____
- ☐ ☐ COBBLE [8] ____ ____
- ☐ ☐ GRAVEL [7] ____ ____
- ☐ ☐ SAND [6] ____ ____
- ☐ ☐ BEDROCK [5] ____ ____

NUMBER OF BEST TYPES: ☐ 4 or more [2] ☐ 3 or less [0]

OTHER TYPES POOL RIFFLE
- ☐ ☐ HARDPAN [4] ____ ____
- ☐ ☐ DETRITUS [3] ____ ____
- ☐ ☐ MUCK [2] ____ ____
- ☐ ☐ SILT [2] ____ ____
- ☐ ☐ ARTIFICIAL [0] ____ ____

(Score natural substrates; ignore sludge from point-sources)

Check ONE (Or 2 & average)

ORIGIN
- ☐ LIMESTONE [1]
- ☐ TILLS [1]
- ☐ WETLANDS [0]
- ☐ HARDPAN [0]
- ☐ SANDSTONE [0]
- ☐ RIP/RAP [0]
- ☐ LACUSTRINE [0]
- ☐ SHALE [-1]
- ☐ COAL FINES [-2]

QUALITY

SILT
- ☐ HEAVY [-2]
- ☐ MODERATE [-1]
- ☐ NORMAL [0]
- ☐ FREE [1]

EMBEDDEDNESS
- ☐ EXTENSIVE [-2]
- ☐ MODERATE [-1]
- ☐ NORMAL [0]
- ☐ NONE [1]

Comments

Substrate 18 *Maximum 20*

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.

- ____ 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]

AMOUNT
Check ONE (Or 2 & average)
- ☐ EXTENSIVE >75% [11]
- ☐ MODERATE 25-75% [7]
- ☐ SPARSE 5-<25% [3]
- ☐ NEARLY ABSENT <5% [1]

Comments

Cover 11 *Maximum 20*

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]
- ☒ Impounded [-1]

STABILITY
- ☒ HIGH [3]
- ☐ MODERATE [2]
- ☐ LOW [1]

Comments

Channel 4 *Maximum 20*

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

River right looking downstream

EROSION (L R)
- ☐ ☐ NONE / LITTLE [3]
- ☐ ☐ MODERATE [2]
- ☐ ☐ HEAVY / SEVERE [1]

RIPARIAN WIDTH (L R)
- ☐ ☐ WIDE > 50m [4]
- ☐ ☐ MODERATE 10-50m [3]
- ☐ ☐ NARROW 5-10m [2]
- ☐ ☐ VERY NARROW < 5m [1]
- ☐ ☐ NONE [0]

FLOOD PLAIN QUALITY (L R)
- ☐ ☐ FOREST, SWAMP [3]
- ☐ ☐ SHRUB OR OLD FIELD [2]
- ☐ ☐ RESIDENTIAL, PARK, NEW FIELD [1]
- ☐ ☐ FENCED PASTURE [1]
- ☐ ☐ OPEN PASTURE, ROWCROP [0]

(L R)
- ☐ ☐ CONSERVATION TILLAGE [1]
- ☐ ☐ URBAN OR INDUSTRIAL [0]
- ☐ ☐ MINING / CONSTRUCTION [0]

Indicate predominant land use(s) past 100m riparian.

Comments

Riparian 9.5 *Maximum 10*

5] POOL / GLIDE AND RIFFLE / RUN QUALITY

MAXIMUM DEPTH
Check ONE (ONLY!)
- ☒ > 1m [6]
- ☐ 0.7-<1m [4]
- ☐ 0.4-<0.7m [2]
- ☐ 0.2-<0.4m [1]
- ☐ < 0.2m [0]

CHANNEL WIDTH
Check ONE (Or 2 & average)
- ☐ POOL WIDTH > RIFFLE WIDTH [2]
- ☐ POOL WIDTH = RIFFLE WIDTH [1]
- ☐ POOL WIDTH < RIFFLE WIDTH [0]
- ☒ Impounded [-1]

CURRENT VELOCITY
Check ALL that apply
- ☐ TORRENTIAL [-1]
- ☐ VERY FAST [1]
- ☐ FAST [1]
- ☒ MODERATE [1]
- ☒ SLOW [1]
- ☐ INTERSTITIAL [-1]
- ☐ INTERMITTENT [-2]
- ☐ EDDIES [1]

Indicate for reach - pools and riffles.

Recreation Potential
Primary Contact
Secondary Contact
(circle one and comment on back)

Comments

Pool / Current 7 *Maximum 12*

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 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]

Comments

Riffle / Run 0 *Maximum 8*

6] GRADIENT
(____ ft/mi)

DRAINAGE AREA (____ mi²)

- ☐ VERY LOW - LOW [2-4]
- ☐ MODERATE [6-10]
- ☐ HIGH - VERY HIGH [10-6]

%POOL: ____ %GLIDE: ____

%RUN: ____ %RIFFLE: ____

Gradient 6 *Maximum 10*

EPA 4520

Proofed KC 7/15/08

06/11/08

MBI MODIFIED

Ohio EPA

Qualitative Habitat Evaluation Index and Use Assessment Field Sheet

QHEI Score: 50

Stream & Location: Des Plaines River - 279.1 RB **RM:** 279.1 **Date:** 07/11/08

Scorers Full Name & Affiliation: Joe Vondruska EA Engineering

River Code: __ - ___ - ___ **STORET #:** ______ **Lat./ Long.:** (NAD 83 - decimal °) __.____ /8_.____ Office verified location ☐

1] SUBSTRATE

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

BEST TYPES POOL RIFFLE
- ☐ ☐ BLDR /SLABS [10] ____ ____
- ☐ ☐ BOULDER [9] ____ ____
- ☐ ☐ COBBLE [8] ____ ____
- ☐ ☐ GRAVEL [7] ____ ____
- ☐ ☐ SAND [6] ____ ____
- ☐ ☐ BEDROCK [5] ____ ____

NUMBER OF BEST TYPES: ☐ 4 or more [2] ☐ 3 or less [0]

OTHER TYPES POOL RIFFLE
- ☐ ☐ HARDPAN [4] ____ ____
- ☐ ☐ DETRITUS [3] ____ ____
- ☐ ☐ MUCK [2] ____ ____
- ☐ ☐ SILT [2] ____ ____
- ☐ ☐ ARTIFICIAL [0] ____ ____

(Score natural substrates; ignore sludge from point-sources)

Check ONE (Or 2 & average)

ORIGIN
- ☐ LIMESTONE [1]
- ☐ TILLS [1]
- ☐ WETLANDS [0]
- ☐ HARDPAN [0]
- ☐ SANDSTONE [0]
- ☐ RIP/RAP [0]
- ☐ LACUSTRINE [0]
- ☐ SHALE [-1]
- ☐ COAL FINES [-2]

QUALITY

SILT
- ☐ HEAVY [-2]
- ☐ MODERATE [-1]
- ☐ NORMAL [0]
- ☐ FREE [1]

EMBEDDEDNESS
- ☐ EXTENSIVE [-2]
- ☐ MODERATE [-1]
- ☐ NORMAL [0]
- ☐ NONE [1]

Comments

Substrate 15 Maximum 20

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.

- ____ 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]

AMOUNT

Check ONE (Or 2 & average)
- ☐ EXTENSIVE >75% [11]
- ☐ MODERATE 25-75% [7]
- ☐ SPARSE 5-<25% [3]
- ☐ NEARLY ABSENT <5% [1]

Comments

Cover Maximum 20 10

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]
- ☑ Impounded [-1]

STABILITY
- ☑ HIGH [3]
- ☐ MODERATE [2]
- ☑ LOW [1]

(2)

Comments

Channel Maximum 20 3

4] BANK EROSION AND RIPARIAN ZONE

Check ONE in each category for EACH BANK (Or 2 per bank & average)

River right looking downstream

EROSION (L R)
- ☐ ☐ NONE / LITTLE [3]
- ☐ ☐ MODERATE [2]
- ☐ ☐ HEAVY / SEVERE [1]

RIPARIAN WIDTH (L R)
- ☐ ☐ WIDE > 50m [4]
- ☐ ☐ MODERATE 10-50m [3]
- ☐ ☐ NARROW 5-10m [2]
- ☐ ☐ VERY NARROW < 5m [1]
- ☐ ☐ NONE [0]

FLOOD PLAIN QUALITY (L R)
- ☐ ☐ FOREST, SWAMP [3]
- ☐ ☐ SHRUB OR OLD FIELD [2]
- ☐ ☐ RESIDENTIAL, PARK, NEW FIELD [1]
- ☐ ☐ FENCED PASTURE [1]
- ☐ ☐ OPEN PASTURE, ROWCROP [0]

(L R)
- ☐ ☐ CONSERVATION TILLAGE [1]
- ☐ ☐ URBAN OR INDUSTRIAL [0]
- ☐ ☐ MINING / CONSTRUCTION [0]

Indicate predominant land use(s) past 100m riparian.

Comments

Riparian Maximum 10 10

5] POOL / GLIDE AND RIFFLE / RUN QUALITY

MAXIMUM DEPTH

Check ONE (ONLY!)
- ☑ > 1m [6]
- ☐ 0.7-<1m [4]
- ☐ 0.4-<0.7m [2]
- ☐ 0.2-<0.4m [1]
- ☐ < 0.2m [0]

CHANNEL WIDTH

Check ONE (Or 2 & average)
- ☐ POOL WIDTH > RIFFLE WIDTH [2]
- ☐ POOL WIDTH = RIFFLE WIDTH [1]
- ☐ POOL WIDTH < RIFFLE WIDTH [0]
- ☑ Impounded [-1]

CURRENT VELOCITY

Check ALL that apply
- ☐ TORRENTIAL [-1]
- ☐ VERY FAST [1]
- ☐ FAST [1]
- ☐ MODERATE [1]
- ☑ SLOW [1]
- ☐ INTERSTITIAL [-1]
- ☐ INTERMITTENT [-2]
- ☐ EDDIES [1]

Indicate for reach - pools and riffles.

Recreation Potential
Primary Contact
Secondary Contact
(circle one and comment on back)

Comments

Pool / Current Maximum 12 6

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 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]

Comments

Riffle / Run Maximum 8 0

6] GRADIENT

GRADIENT (______ ft/mi)
DRAINAGE AREA (______ mi²)

- ☐ VERY LOW - LOW [2-4]
- ☐ MODERATE [6-10]
- ☐ HIGH - VERY HIGH [10-6]

%POOL: ____ %GLIDE: ____
%RUN: ____ %RIFFLE: ____

Gradient Maximum 10 6

EPA 4520

proofed KC 7/15/08

06/11/08

MBI MODIFIED

Qualitative Habitat Evaluation Index and Use Assessment Field Sheet

QHEI Score: 36.5

Stream & Location: Des Moines River - 278.9 RB RM: 278.9 Date: 07/11/08

Scorers Full Name & Affiliation: Joe [illegible]

River Code: __ - __ - __ STORET #: ______ Lat./ Long.: (NAD 83 - decimal °) __ . ____ /8_ . ____ 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
☐ ☐ BLDR /SLABS [10]			☐ ☐ HARDPAN [4]		
☐ ☐ BOULDER [9]			☐ ☐ DETRITUS [3]		
☐ ☐ COBBLE [8]			☐ ☐ MUCK [2]		
☐ ☐ GRAVEL [7]			☐ ☐ SILT [2]		
☐ ☐ SAND [6]			☐ ☐ ARTIFICIAL [0]		
☐ ☐ BEDROCK [5]			(Score natural substrates; ignore sludge from point-sources)		

NUMBER OF BEST TYPES: ☐ 4 or more [2] ☐ 3 or less [0]

Comments

Check ONE (Or 2 & average)

ORIGIN
- ☐ LIMESTONE [1]
- ☐ TILLS [1]
- ☐ WETLANDS [0]
- ☐ HARDPAN [0]
- ☐ SANDSTONE [0]
- ☐ RIP/RAP [0]
- ☐ LACUSTRINE [0]
- ☐ SHALE [-1]
- ☐ COAL FINES [-2]

QUALITY

SILT
- ☐ HEAVY [-2]
- ☐ MODERATE [-1]
- ☐ NORMAL [0]
- ☐ FREE [1]

EMBEDDEDNESS
- ☐ EXTENSIVE [-2]
- ☐ MODERATE [-1]
- ☐ NORMAL [0]
- ☐ NONE [1]

Substrate 10 Maximum 20

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.

- ____ 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]

AMOUNT
Check ONE (Or 2 & average)
- ☐ EXTENSIVE >75% [11]
- ☐ MODERATE 25-75% [7]
- ☐ SPARSE 5-<25% [3]
- ☐ NEARLY ABSENT <5% [1]

Comments

Cover 5 Maximum 20

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

SINUOSITY	DEVELOPMENT	CHANNELIZATION	STABILITY
☐ HIGH [4]	☐ EXCELLENT [7]	☐ NONE [6]	☐ HIGH [3]
☐ MODERATE [3]	☐ GOOD [5]	☐ RECOVERED [4]	☒ MODERATE [2]
☐ LOW [2]	☐ FAIR [3]	☐ RECOVERING [3]	☐ LOW [1]
☒ NONE [1]	☒ POOR [1]	☐ RECENT OR NO RECOVERY [1]	
		☒ Impounded [-1]	

Comments

Channel 3 Maximum 20

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

River right looking downstream

EROSION	RIPARIAN WIDTH	FLOOD PLAIN QUALITY	
L R	L R	L R	L R
☐ ☐ NONE / LITTLE [3]	☐ ☐ WIDE > 50m [4]	☐ ☐ FOREST, SWAMP [3]	☐ ☐ CONSERVATION TILLAGE [1]
☐ ☐ MODERATE [2]	☐ ☐ MODERATE 10-50m [3]	☐ ☐ SHRUB OR OLD FIELD [2]	☐ ☐ URBAN OR INDUSTRIAL [0]
☐ ☐ HEAVY / SEVERE [1]	☐ ☐ NARROW 5-10m [2]	☐ ☐ RESIDENTIAL, PARK, NEW FIELD [1]	☐ ☐ MINING / CONSTRUCTION [0]
	☐ ☐ VERY NARROW < 5m [1]	☐ ☐ FENCED PASTURE [1]	Indicate predominant land use(s) past 100m riparian.
	☐ ☐ NONE [0]	☐ ☐ OPEN PASTURE, ROWCROP [0]	

Comments

Riparian 6.5 Maximum 10

5] POOL / GLIDE AND RIFFLE / RUN QUALITY

MAXIMUM DEPTH
Check ONE (ONLY!)
- ☒ > 1m [6]
- ☐ 0.7-<1m [4]
- ☐ 0.4-<0.7m [2]
- ☐ 0.2-<0.4m [1]
- ☐ < 0.2m [0]

CHANNEL WIDTH
Check ONE (Or 2 & average)
- ☐ POOL WIDTH > RIFFLE WIDTH [2]
- ☐ POOL WIDTH = RIFFLE WIDTH [1]
- ☐ POOL WIDTH < RIFFLE WIDTH [0]
- ☒ Impounded [-1]

CURRENT VELOCITY
Check ALL that apply
- ☐ TORRENTIAL [-1]
- ☐ VERY FAST [1]
- ☐ FAST [1]
- ☐ MODERATE [1]
- ☒ SLOW [1]
- ☐ INTERSTITIAL [-1]
- ☐ INTERMITTENT [-2]
- ☐ EDDIES [1]

Indicate for reach - pools and riffles.

Recreation Potential
Primary Contact
Secondary Contact
(circle one and comment on back)

Comments

Pool / Current 6 Maximum 12

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 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]

Comments

Riffle / Run 0 Maximum 8

6] GRADIENT (____ ft/mi)
DRAINAGE AREA (____ mi²)

- ☐ VERY LOW - LOW [2-4]
- ☐ MODERATE [6-10]
- ☐ HIGH - VERY HIGH [10-6]

%POOL: ____ %GLIDE: ____
%RUN: ____ %RIFFLE: ____

Gradient 6 Maximum 10

EPA 4520

proofed KC 7/16/08

06/11/08

MBI MODIFIED

Qualitative Habitat Evaluation Index and Use Assessment Field Sheet

QHEI Score: 47.5

Stream & Location: Des Plaines River - 278.7 LB RM: 278.7 Date: 07/10/08

Scorers Full Name & Affiliation: Joe Vondruska EA Engineering

River Code: __ - __ - __ STORET #: ____ Lat./ Long.: (NAD 83 - decimal °) __ . ____ /8_ . ____ 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
☐ ☐ BLDR /SLABS [10]			☐ ☐ HARDPAN [4]		
☐ ☐ BOULDER [9]			☐ ☐ DETRITUS [3]		
☐ ☐ COBBLE [8]			☐ ☐ MUCK [2]		
☐ ☐ GRAVEL [7]			☐ ☐ SILT [2]		
☐ ☐ SAND [6]			☐ ☐ ARTIFICIAL [0]		
☐ ☐ BEDROCK [5]			(Score natural substrates; ignore sludge from point-sources)		

NUMBER OF BEST TYPES: ☐ 4 or more [2] ☐ 3 or less [0]

Comments

Check ONE (Or 2 & average)

ORIGIN
- ☐ LIMESTONE [1]
- ☐ TILLS [1]
- ☐ WETLANDS [0]
- ☐ HARDPAN [0]
- ☐ SANDSTONE [0]
- ☐ RIP/RAP [0]
- ☐ LACUSTRINE [0]
- ☐ SHALE [-1]
- ☐ COAL FINES [-2]

QUALITY

SILT
- ☐ HEAVY [-2]
- ☐ MODERATE [-1]
- ☐ NORMAL [0]
- ☐ FREE [1]

EMBEDDEDNESS
- ☐ EXTENSIVE [-2]
- ☐ MODERATE [-1]
- ☐ NORMAL [0]
- ☐ NONE [1]

Substrate 12.5 Maximum 20

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.

- ____ 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]

AMOUNT
Check ONE (Or 2 & average)
- ☐ EXTENSIVE >75% [11]
- ☐ MODERATE 25-75% [7]
- ☐ SPARSE 5-<25% [3]
- ☐ NEARLY ABSENT <5% [1]

Comments

Cover 10 Maximum 20

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]
- ☑ Impounded [-1]

STABILITY
- ☐ HIGH [3]
- ☑ MODERATE [2]
- ☐ LOW [1]

Comments

Channel 3 Maximum 20

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

River right looking downstream

EROSION (L R)
- ☐ ☐ NONE / LITTLE [3]
- ☐ ☐ MODERATE [2]
- ☐ ☐ HEAVY / SEVERE [1]

RIPARIAN WIDTH (L R)
- ☐ ☐ WIDE > 50m [4]
- ☐ ☐ MODERATE 10-50m [3]
- ☐ ☐ NARROW 5-10m [2]
- ☐ ☐ VERY NARROW < 5m [1]
- ☐ ☐ NONE [0]

FLOOD PLAIN QUALITY (L R)
- ☐ ☐ 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]

Indicate predominant land use(s) past 100m riparian.

Comments

Riparian 10 Maximum 10

5] POOL / GLIDE AND RIFFLE / RUN QUALITY

MAXIMUM DEPTH
Check ONE (ONLY!)
- ☑ > 1m [6]
- ☐ 0.7-<1m [4]
- ☐ 0.4-<0.7m [2]
- ☐ 0.2-<0.4m [1]
- ☐ < 0.2m [0]

CHANNEL WIDTH
Check ONE (Or 2 & average)
- ☐ POOL WIDTH > RIFFLE WIDTH [2]
- ☐ POOL WIDTH = RIFFLE WIDTH [1]
- ☐ POOL WIDTH < RIFFLE WIDTH [0]
- ☑ Impounded [-1]

CURRENT VELOCITY
Check ALL that apply
- ☐ TORRENTIAL [-1]
- ☐ VERY FAST [1]
- ☐ FAST [1]
- ☐ MODERATE [1]
- ☑ SLOW [1]
- ☐ INTERSTITIAL [-1]
- ☐ INTERMITTENT [-2]
- ☐ EDDIES [1]

Indicate for reach - pools and riffles.

Recreation Potential
Primary Contact
Secondary Contact
(circle one and comment on back)

Comments

Pool / Current 6 Maximum 12

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 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]

Comments

Riffle / Run 0 Maximum 8

6] GRADIENT
GRADIENT (____ ft/mi)
DRAINAGE AREA (____ mi²)
- ☐ VERY LOW - LOW [2-4]
- ☐ MODERATE [6-10]
- ☐ HIGH - VERY HIGH [10-6]

%POOL: ____ %GLIDE: ____
%RUN: ____ %RIFFLE: ____

Gradient 6 Maximum 10

EPA 4520 Proofed KC 7/16/08 06/11/08

MBI MODIFIED

OhioEPA

Qualitative Habitat Evaluation Index and Use Assessment Field Sheet

QHEI Score: 42.5

Stream & Location: Des Moines River - 278.7 RB RM: 278.7 Date: 07/11/08

Scorers Full Name & Affiliation: Joe Vondruska EA Engineering

River Code: __ - ___ - ___ STORET #: ______ Lat./ Long.: (NAD 83 - decimal °) __ . ____ /8 __ . ____ 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
☐ ☐ BLDR /SLABS [10]			☐ ☐ HARDPAN [4]		
☐ ☐ BOULDER [9]			☐ ☐ DETRITUS [3]		
☐ ☐ COBBLE [8]			☐ ☐ MUCK [2]		
☐ ☐ GRAVEL [7]			☐ ☐ SILT [2]		
☐ ☐ SAND [6]			☐ ☐ ARTIFICIAL [0]		
☐ ☐ BEDROCK [5]			(Score natural substrates; ignore sludge from point-sources)		

NUMBER OF BEST TYPES: ☐ 4 or more [2] ☐ 3 or less [0]

Comments

Check ONE (Or 2 & average)

ORIGIN
- ☐ LIMESTONE [1]
- ☐ TILLS [1]
- ☐ WETLANDS [0]
- ☐ HARDPAN [0]
- ☐ SANDSTONE [0]
- ☐ RIP/RAP [0]
- ☐ LACUSTRINE [0]
- ☐ SHALE [-1]
- ☐ COAL FINES [-2]

QUALITY

SILT
- ☐ HEAVY [-2]
- ☐ MODERATE [-1]
- ☐ NORMAL [0]
- ☐ FREE [1]

EMBEDDEDNESS
- ☐ EXTENSIVE [-2]
- ☐ MODERATE [-1]
- ☐ NORMAL [0]
- ☐ NONE [1]

Substrate 13 Maximum 20

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.

____ 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]

AMOUNT
Check ONE (Or 2 & average)
- ☐ EXTENSIVE >75% [11]
- ☐ MODERATE 25-75% [7]
- ☐ SPARSE 5-<25% [3]
- ☐ NEARLY ABSENT <5% [1]

Comments

Cover 8 Maximum 20

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

SINUOSITY	DEVELOPMENT	CHANNELIZATION	STABILITY
☐ HIGH [4]	☐ EXCELLENT [7]	☐ NONE [6]	☐ HIGH [3]
☐ MODERATE [3]	☐ GOOD [5]	☐ RECOVERED [4]	☑ MODERATE [2]
☐ LOW [2]	☐ FAIR [3]	☐ RECOVERING [3]	☐ LOW [1]
☑ NONE [1]	☑ POOR [1]	☐ RECENT OR NO RECOVERY [1]	

Comments

☑ Impounded [-1]

Channel 3 Maximum 20

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

River right looking downstream

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

Indicate predominant land use(s) past 100m riparian.

Comments

Riparian 6.5 Maximum 10

5] POOL / GLIDE AND RIFFLE / RUN QUALITY

MAXIMUM DEPTH
Check ONE (ONLY!)
- ☑ > 1m [6]
- ☐ 0.7-<1m [4]
- ☐ 0.4-<0.7m [2]
- ☐ 0.2-<0.4m [1]
- ☐ < 0.2m [0]

CHANNEL WIDTH
Check ONE (Or 2 & average)
- ☐ POOL WIDTH > RIFFLE WIDTH [2]
- ☐ POOL WIDTH = RIFFLE WIDTH [1]
- ☐ POOL WIDTH < RIFFLE WIDTH [0]

☑ Impounded [-1]

CURRENT VELOCITY
Check ALL that apply
- ☐ TORRENTIAL [-1]
- ☐ VERY FAST [1]
- ☐ FAST [1]
- ☐ MODERATE [1]
- ☑ SLOW [1]
- ☐ INTERSTITIAL [-1]
- ☐ INTERMITTENT [-2]
- ☐ EDDIES [1]

Indicate for reach - pools and riffles.

Recreation Potential
Primary Contact
Secondary Contact
(circle one and comment on back)

Comments

Pool / Current 6 Maximum 12

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

Comments

Riffle / Run 0 Maximum 8

6] GRADIENT
(____ ft/mi) DRAINAGE AREA (____ mi²)
- ☐ VERY LOW - LOW [2-4]
- ☐ MODERATE [6-10]
- ☐ HIGH - VERY HIGH [10-6]

%POOL: ____ %GLIDE: ____
%RUN: ____ %RIFFLE: ____

Gradient 6 Maximum 10

EPA 4520

Revised KC 7/16/08

06/11/08

MBI MODIFIED

Ohio EPA

Qualitative Habitat Evaluation Index and Use Assessment Field Sheet

QHEI Score: 50

Stream & Location: Des Plaines River - 278.4 LB **RM:** 278.4 **Date:** 07/10/08

Scorers Full Name & Affiliation: Joe Vondruska EA Engineering

River Code: __ - __ - __ **STORET #:** ______ **Lat./ Long.:** (NAD 83 - decimal °) __ . ____ /8_ . ____ 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
☐ ☐ BLDR /SLABS [10]			☐ ☐ HARDPAN [4]		
☐ ☐ BOULDER [9]			☐ ☐ DETRITUS [3]		
☐ ☐ COBBLE [8]			☐ ☐ MUCK [2]		
☐ ☐ GRAVEL [7]			☐ ☐ SILT [2]		
☐ ☐ SAND [6]			☐ ☐ ARTIFICIAL [0]		
☐ ☐ BEDROCK [5]					

(Score natural substrates; ignore sludge from point-sources)

NUMBER OF BEST TYPES: ☐ 4 or more [2] ☐ 3 or less [0]

Comments

Check ONE (*Or 2 & average*)

ORIGIN
- ☐ LIMESTONE [1]
- ☐ TILLS [1]
- ☐ WETLANDS [0]
- ☐ HARDPAN [0]
- ☐ SANDSTONE [0]
- ☐ RIP/RAP [0]
- ☐ LACUSTRINE [0]
- ☐ SHALE [-1]
- ☐ COAL FINES [-2]

QUALITY

SILT
- ☐ HEAVY [-2]
- ☐ MODERATE [-1]
- ☐ NORMAL [0]
- ☐ FREE [1]

EMBEDDEDNESS
- ☐ EXTENSIVE [-2]
- ☐ MODERATE [-1]
- ☐ NORMAL [0]
- ☐ NONE [1]

Substrate 14 *Maximum 20*

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.

- ____ 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]

AMOUNT

Check ONE (*Or 2 & average*)
- ☐ EXTENSIVE >75% [11]
- ☐ MODERATE 25-75% [7]
- ☐ SPARSE 5-<25% [3]
- ☐ NEARLY ABSENT <5% [1]

Comments

Cover Maximum 20 11

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]

☑ Impounded [-1]

STABILITY
- ☐ HIGH [3]
- ☑ MODERATE [2]
- ☐ LOW [1]

Comments

Channel Maximum 20 3

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

River right looking downstream

EROSION (L R)
- ☐ ☐ NONE / LITTLE [3]
- ☐ ☐ MODERATE [2]
- ☐ ☐ HEAVY / SEVERE [1]

RIPARIAN WIDTH (L R)
- ☐ ☐ WIDE > 50m [4]
- ☐ ☐ MODERATE 10-50m [3]
- ☐ ☐ NARROW 5-10m [2]
- ☐ ☐ VERY NARROW < 5m [1]
- ☐ ☐ NONE [0]

FLOOD PLAIN QUALITY (L R)
- ☐ ☐ 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]

Indicate predominant land use(s) past 100m riparian.

Comments

Riparian Maximum 10 10

5] POOL / GLIDE AND RIFFLE / RUN QUALITY

MAXIMUM DEPTH Check ONE (*ONLY!*)
- ☑ > 1m [6]
- ☐ 0.7-<1m [4]
- ☐ 0.4-<0.7m [2]
- ☐ 0.2-<0.4m [1]
- ☐ < 0.2m [0]

CHANNEL WIDTH Check ONE (*Or 2 & average*)
- ☐ POOL WIDTH > RIFFLE WIDTH [2]
- ☐ POOL WIDTH = RIFFLE WIDTH [1]
- ☐ POOL WIDTH < RIFFLE WIDTH [0]

☑ Impounded [-1]

CURRENT VELOCITY Check ALL that apply
- ☐ TORRENTIAL [-1]
- ☐ VERY FAST [1]
- ☐ FAST [1]
- ☐ MODERATE [1]
- ☑ SLOW [1]
- ☐ INTERSTITIAL [-1]
- ☐ INTERMITTENT [-2]
- ☐ EDDIES [1]

Indicate for reach - pools and riffles.

Recreation Potential
Primary Contact
Secondary Contact
(circle one and comment on back)

Comments

Pool / Current Maximum 12 6

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 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]

Comments

Riffle / Run Maximum 8 0

6] GRADIENT (______ ft/mi)
DRAINAGE AREA (______ mi²)
- ☐ VERY LOW - LOW [2-4]
- ☐ MODERATE [6-10]
- ☐ HIGH - VERY HIGH [10-6]

%POOL: ____ **%GLIDE:** ____
%RUN: ____ **%RIFFLE:** ____

Gradient Maximum 10 6

EPA 4520 Ranged KC 7/16/08 06/11/08

MBI MODIFIED

OhioEPA **Qualitative Habitat Evaluation Index and Use Assessment Field Sheet** QHEI Score: 46

Stream & Location: Des Plaines River - 278.3 RB RM: 278.3 Date: 07/11/08

Scorers Full Name & Affiliation: Joe Vondruska EA Engineering

River Code: __-___-___ STORET #: ______ Lat./Long.: (NAD 83 - decimal °) __.____ /8_.____ 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
☐ ☐ BLDR /SLABS [10]			☐ ☐ HARDPAN [4]		
☐ ☐ BOULDER [9]			☐ ☐ DETRITUS [3]		
☐ ☐ COBBLE [8]			☐ ☐ MUCK [2]		
☐ ☐ GRAVEL [7]			☐ ☐ SILT [2]		
☐ ☐ SAND [6]			☐ ☐ ARTIFICIAL [0]		
☐ ☐ BEDROCK [5]			(Score natural substrates; ignore sludge from point-sources)		

NUMBER OF BEST TYPES: ☐ 4 or more [2] ☐ 3 or less [0]

Comments

Check ONE (Or 2 & average)

ORIGIN
- ☐ LIMESTONE [1]
- ☐ TILLS [1]
- ☐ WETLANDS [0]
- ☐ HARDPAN [0]
- ☐ SANDSTONE [0]
- ☐ RIP/RAP [0]
- ☐ LACUSTRINE [0]
- ☐ SHALE [-1]
- ☐ COAL FINES [-2]

QUALITY

SILT
- ☐ HEAVY [-2]
- ☐ MODERATE [-1]
- ☐ NORMAL [0]
- ☐ FREE [1]

EMBEDDEDNESS
- ☐ EXTENSIVE [-2]
- ☐ MODERATE [-1]
- ☐ NORMAL [0]
- ☐ NONE [1]

Substrate 14 Maximum 20

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.

___ 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]

AMOUNT
Check ONE (Or 2 & average)
- ☐ EXTENSIVE >75% [11]
- ☐ MODERATE 25-75% [7]
- ☐ SPARSE 5-<25% [3]
- ☐ NEARLY ABSENT <5% [1]

Comments

Cover 7 Maximum 20

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

SINUOSITY	DEVELOPMENT	CHANNELIZATION	STABILITY
☐ HIGH [4]	☐ EXCELLENT [7]	☐ NONE [6]	☐ HIGH [3]
☐ MODERATE [3]	☐ GOOD [5]	☐ RECOVERED [4]	☑ MODERATE [2]
☐ LOW [2]	☐ FAIR [3]	☐ RECOVERING [3]	☐ LOW [1]
☑ NONE [1]	☑ POOR [1]	☐ RECENT OR NO RECOVERY [1]	
		☑ Impounded [-1]	

Comments

Channel 3 Maximum 20

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

River right looking downstream

L R EROSION	L R RIPARIAN WIDTH	L R FLOOD PLAIN QUALITY	L R
☐ ☐ NONE / LITTLE [3]	☐ ☐ WIDE > 50m [4]	☐ ☐ FOREST, SWAMP [3]	☐ ☐ CONSERVATION TILLAGE [1]
☐ ☐ MODERATE [2]	☐ ☐ MODERATE 10-50m [3]	☐ ☐ SHRUB OR OLD FIELD [2]	☐ ☐ URBAN OR INDUSTRIAL [0]
☐ ☐ HEAVY / SEVERE [1]	☐ ☐ NARROW 5-10m [2]	☐ ☐ RESIDENTIAL, PARK, NEW FIELD [1]	☐ ☐ MINING / CONSTRUCTION [0]
	☐ ☐ VERY NARROW < 5m [1]	☐ ☐ FENCED PASTURE [1]	Indicate predominant land use(s) past 100m riparian.
	☐ ☐ NONE [0]	☐ ☐ OPEN PASTURE, ROWCROP [0]	

Comments

Riparian 10 Maximum 10

5] POOL / GLIDE AND RIFFLE / RUN QUALITY

MAXIMUM DEPTH Check ONE (ONLY!)	CHANNEL WIDTH Check ONE (Or 2 & average)	CURRENT VELOCITY Check ALL that apply	
☑ > 1m [6]	☐ POOL WIDTH > RIFFLE WIDTH [2]	☐ TORRENTIAL [-1]	☑ SLOW [1]
☐ 0.7-<1m [4]	☐ POOL WIDTH = RIFFLE WIDTH [1]	☐ VERY FAST [1]	☐ INTERSTITIAL [-1]
☐ 0.4-<0.7m [2]	☐ POOL WIDTH < RIFFLE WIDTH [0]	☐ FAST [1]	☐ INTERMITTENT [-2]
☐ 0.2-<0.4m [1]		☐ MODERATE [1]	☐ EDDIES [1]
☐ < 0.2m [0]	☑ Impounded [-1]	Indicate for reach - pools and riffles.	

Recreation Potential
Primary Contact
Secondary Contact
(circle one and comment on back)

Comments

Pool / Current 6 Maximum 12

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

Comments

Riffle / Run 0 Maximum 5

6] GRADIENT (____ft/mi) ☐ VERY LOW - LOW [2-4]
DRAINAGE AREA (____mi²) ☐ MODERATE [6-10]
☐ HIGH - VERY HIGH [10-6]

%POOL: ( ) %GLIDE: ( )
%RUN: ( ) %RIFFLE: ( )

Gradient 6 Maximum 10

EPA 4520 06/11/08

Proofed KC 7/16/08

MBI MODIFIED

OhioEPA

Qualitative Habitat Evaluation Index and Use Assessment Field Sheet

QHEI Score: 43.75

Stream & Location: Des Plaines River - Loc. 408 Mouth of Jackson Creek **RM:** 278.3 **Date:** 07/09/08

Scorers Full Name & Affiliation: Joe Vondruska EA Engineering

River Code: __ - __ - __ **STORET #:** ____ **Lat./Long.:** (NAD 83 - decimal °) __ . __ /8 . __ Office verified location ☐

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

BEST TYPES POOL RIFFLE
- ☐ ☐ BLDR /SLABS [10] __ __
- ☐ ☐ BOULDER [9] __ __
- ☐ ☐ COBBLE [8] __ __
- ☐ ☐ GRAVEL [7] __ __
- ☐ ☐ SAND [6] __ __
- ☐ ☐ BEDROCK [5] __ __

NUMBER OF BEST TYPES: ☐ 4 or more [2] ☐ 3 or less [0]

OTHER TYPES POOL RIFFLE
- ☐ ☐ HARDPAN [4] __ __
- ☐ ☐ DETRITUS [3] __ __
- ☐ ☐ MUCK [2] __ __
- ☐ ☐ SILT [2] __ __
- ☐ ☐ ARTIFICIAL [0] __ __

(Score natural substrates; ignore sludge from point-sources)

Comments

Check ONE (Or 2 & average)

ORIGIN
- ☐ LIMESTONE [1]
- ☐ TILLS [1]
- ☐ WETLANDS [0]
- ☐ HARDPAN [0]
- ☐ SANDSTONE [0]
- ☐ RIP/RAP [0]
- ☐ LACUSTRINE [0]
- ☐ SHALE [-1]
- ☐ COAL FINES [-2]

QUALITY

SILT
- ☐ HEAVY [-2]
- ☐ MODERATE [-1]
- ☐ NORMAL [0]
- ☐ FREE [1]

EMBEDDEDNESS
- ☐ EXTENSIVE [-2]
- ☐ MODERATE [-1]
- ☐ NORMAL [0]
- ☐ NONE [1]

Substrate 10.5 Maximum 20

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.

- __ 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]

AMOUNT
Check ONE (Or 2 & average)
- ☐ EXTENSIVE >75% [11]
- ☐ MODERATE 25-75% [7]
- ☐ SPARSE 5-<25% [3]
- ☐ NEARLY ABSENT <5% [1]

Comments

Cover 10 Maximum 20

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]
- ☒ Impounded [-1]

STABILITY
- ☐ HIGH [3]
- ☑ MODERATE [2]
- ☐ LOW [1]

Comments

Channel 3 Maximum 20

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

River right looking downstream

EROSION L R
- ☐ ☐ NONE / LITTLE [3]
- ☐ ☐ MODERATE [2]
- ☐ ☐ HEAVY / SEVERE [1]

RIPARIAN WIDTH L R
- ☐ ☐ WIDE > 50m [4]
- ☐ ☐ MODERATE 10-50m [3]
- ☐ ☐ NARROW 5-10m [2]
- ☐ ☐ VERY NARROW < 5m [1]
- ☐ ☐ NONE [0]

FLOOD PLAIN QUALITY L R
- ☐ ☐ FOREST, SWAMP [3]
- ☐ ☐ SHRUB OR OLD FIELD [2]
- ☐ ☐ RESIDENTIAL, PARK, NEW FIELD [1]
- ☐ ☐ FENCED PASTURE [1]
- ☐ ☐ OPEN PASTURE, ROWCROP [0]

L R
- ☐ ☐ CONSERVATION TILLAGE [1]
- ☐ ☐ URBAN OR INDUSTRIAL [0]
- ☐ ☐ MINING / CONSTRUCTION [0]

Indicate predominant land use(s) past 100m riparian.

Comments

Riparian 8.25 Maximum 10

5] POOL / GLIDE AND RIFFLE / RUN QUALITY

MAXIMUM DEPTH
Check ONE (ONLY!)
- ☑ > 1m [6]
- ☐ 0.7-<1m [4]
- ☐ 0.4-<0.7m [2]
- ☐ 0.2-<0.4m [1]
- ☐ < 0.2m [0]

CHANNEL WIDTH
Check ONE (Or 2 & average)
- ☐ POOL WIDTH > RIFFLE WIDTH [2]
- ☐ POOL WIDTH = RIFFLE WIDTH [1]
- ☐ POOL WIDTH < RIFFLE WIDTH [0]
- ☒ Impounded [-1]

CURRENT VELOCITY
Check ALL that apply
- ☐ TORRENTIAL [-1]
- ☐ VERY FAST [1]
- ☐ FAST [1]
- ☐ MODERATE [1]
- ☑ SLOW [1]
- ☐ INTERSTITIAL [-1]
- ☐ INTERMITTENT [-2]
- ☐ EDDIES [1]

Indicate for reach - pools and riffles.

Recreation Potential
Primary Contact
Secondary Contact
(circle one and comment on back)

Comments

Pool / Current 6 Maximum 12

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 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]

Comments

Riffle / Run 0 Maximum 8

6] GRADIENT
(__ ft/mi)

DRAINAGE AREA (__ mi²)

- ☐ VERY LOW - LOW [2-4]
- ☐ MODERATE [6-10]
- ☐ HIGH - VERY HIGH [10-6]

%POOL: ( ) %GLIDE: ( )
%RUN: ( ) %RIFFLE: ( )

Gradient 6 Maximum 10

EPA 4520

Proofed KC 7/16/08

06/11/08

MBI MODIFIED

OhioEPA

Qualitative Habitat Evaluation Index and Use Assessment Field Sheet

QHEI Score: 355

Stream & Location: Des Moines River - 278.0 LB *RM:* 278.0 *Date:* 07/10/08

Scorers Full Name & Affiliation: Joe Vavruska EA Engineering

River Code: __ - ___ - ___ *STORET #:* ______ *Lat./Long.:* (NAD 83 - decimal °) __ . ____ /8_ . ____ 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
☐ ☐ BLDR /SLABS [10]			☐ ☐ HARDPAN [4]		
☐ ☐ BOULDER [9]			☐ ☐ DETRITUS [3]		
☐ ☐ COBBLE [8]			☐ ☐ MUCK [2]		
☐ ☐ GRAVEL [7]			☐ ☐ SILT [2]		
☐ ☐ SAND [6]			☐ ☐ ARTIFICIAL [0]		
☐ ☐ BEDROCK [5]					

(Score natural substrates; ignore sludge from point-sources)

NUMBER OF BEST TYPES: ☐ 4 or more [2] ☐ 3 or less [0]

Comments

Check ONE (*Or 2 & average*)

ORIGIN
- ☐ LIMESTONE [1]
- ☐ TILLS [1]
- ☐ WETLANDS [0]
- ☐ HARDPAN [0]
- ☐ SANDSTONE [0]
- ☐ RIP/RAP [0]
- ☐ LACUSTRINE [0]
- ☐ SHALE [-1]
- ☐ COAL FINES [-2]

QUALITY

SILT
- ☐ HEAVY [-2]
- ☐ MODERATE [-1]
- ☐ NORMAL [0]
- ☐ FREE [1]

EMBEDDEDNESS
- ☐ EXTENSIVE [-2]
- ☐ MODERATE [-1]
- ☐ NORMAL [0]
- ☐ NONE [1]

Substrate 9.5 *Maximum 20*

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.

_____ 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]

AMOUNT Check ONE (*Or 2 & average*)
- ☐ EXTENSIVE >75% [11]
- ☐ MODERATE 25-75% [7]
- ☐ SPARSE 5-<25% [3]
- ☐ NEARLY ABSENT <5% [1]

Comments

Cover 8 *Maximum 20*

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

SINUOSITY	DEVELOPMENT	CHANNELIZATION	STABILITY
☐ HIGH [4]	☐ EXCELLENT [7]	☐ NONE [6]	☑ HIGH [3]
☐ MODERATE [3]	☐ GOOD [5]	☐ RECOVERED [4]	☐ MODERATE [2]
☐ LOW [2]	☐ FAIR [3]	☐ RECOVERING [3]	☑ LOW [1]
☑ NONE [1]	☑ POOR [1]	☐ RECENT OR NO RECOVERY [1]	②
		☑ Impounded [-1]	

Comments

Channel 3 *Maximum 20*

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

River right looking downstream

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

Indicate predominant land use(s) past 100m riparian.

Comments

Riparian 3 *Maximum 10*

5] POOL / GLIDE AND RIFFLE / RUN QUALITY

MAXIMUM DEPTH Check ONE (ONLY!)	CHANNEL WIDTH Check ONE (*Or 2 & average*)	CURRENT VELOCITY Check ALL that apply	
☑ > 1m [6]	☐ POOL WIDTH > RIFFLE WIDTH [2]	☐ TORRENTIAL [-1]	☑ SLOW [1]
☐ 0.7-<1m [4]	☐ POOL WIDTH = RIFFLE WIDTH [1]	☐ VERY FAST [1]	☐ INTERSTITIAL [-1]
☐ 0.4-<0.7m [2]	☐ POOL WIDTH < RIFFLE WIDTH [0]	☐ FAST [1]	☐ INTERMITTENT [-2]
☐ 0.2-<0.4m [1]	☑ Impounded [-1]	☐ MODERATE [1]	☐ EDDIES [1]
☐ < 0.2m [0]			

Indicate for reach - pools and riffles.

Recreation Potential
Primary Contact
Secondary Contact
(circle one and comment on back)

Comments

Pool / Current 6 *Maximum 12*

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

Comments

Riffle / Run 0 *Maximum 8*

6] GRADIENT (_____ ft/mi) ☐ VERY LOW - LOW [2-4]
DRAINAGE AREA (_____ mi²) ☐ MODERATE [6-10]
☐ HIGH - VERY HIGH [10-6]

%POOL: ____ %GLIDE: ____
%RUN: ____ %RIFFLE: ____

Gradient 6 *Maximum 10*

EPA 4520 06/11/08

Proofed KC 7/16/08

MBI MODIFIED

OhioEPA

Qualitative Habitat Evaluation Index and Use Assessment Field Sheet

QHEI Score: 40.5

Stream & Location: Des Plaines River - 278.0 RB RM: 278.0 Date: 07/11/08

Scorers Full Name & Affiliation: Joe Vondruska EA Engineering

River Code: __-___-___ STORET #: ______ Lat./ Long.: (NAD 83 - decimal °) __.____ /8_.____ 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
☐ ☐ BLDR /SLABS [10]			☐ ☐ HARDPAN [4]		
☐ ☐ BOULDER [9]			☐ ☐ DETRITUS [3]		
☐ ☐ COBBLE [8]			☐ ☐ MUCK [2]		
☐ ☐ GRAVEL [7]			☐ ☐ SILT [2]		
☐ ☐ SAND [6]			☐ ☐ ARTIFICIAL [0]		
☐ ☐ BEDROCK [5]					

(Score natural substrates; ignore sludge from point-sources)

NUMBER OF BEST TYPES: ☐ 4 or more [2] ☐ 3 or less [0]

Comments

Check ONE (Or 2 & average)

ORIGIN
- ☐ LIMESTONE [1]
- ☐ TILLS [1]
- ☐ WETLANDS [0]
- ☐ HARDPAN [0]
- ☐ SANDSTONE [0]
- ☐ RIP/RAP [0]
- ☐ LACUSTRINE [0]
- ☐ SHALE [-1]
- ☐ COAL FINES [-2]

QUALITY

SILT
- ☐ HEAVY [-2]
- ☐ MODERATE [-1]
- ☐ NORMAL [0]
- ☐ FREE [1]

EMBEDDEDNESS
- ☐ EXTENSIVE [-2]
- ☐ MODERATE [-1]
- ☐ NORMAL [0]
- ☐ NONE [1]

Substrate 8 Maximum 20

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.

___ 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]

AMOUNT

Check ONE (Or 2 & average)
- ☐ EXTENSIVE >75% [11]
- ☐ MODERATE 25-75% [7]
- ☐ SPARSE 5-<25% [3]
- ☐ NEARLY ABSENT <5% [1]

Comments

Cover 11 Maximum 20

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]
- ☒ Impounded [-1]

STABILITY
- ☐ HIGH [3]
- ☒ MODERATE [2]
- ☐ LOW [1]

Comments

Channel 3 Maximum 20

4] BANK EROSION AND RIPARIAN ZONE

Check ONE in each category for EACH BANK (Or 2 per bank & average)

River right looking downstream

EROSION (L R)
- ☐ ☐ NONE / LITTLE [3]
- ☐ ☐ MODERATE [2]
- ☐ ☐ HEAVY / SEVERE [1]

RIPARIAN WIDTH (L R)
- ☐ ☐ WIDE > 50m [4]
- ☐ ☐ MODERATE 10-50m [3]
- ☐ ☐ NARROW 5-10m [2]
- ☐ ☐ VERY NARROW < 5m [1]
- ☐ ☐ NONE [0]

FLOOD PLAIN QUALITY (L R)
- ☐ ☐ 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]

Indicate predominant land use(s) past 100m riparian.

Comments

Riparian 6.5 Maximum 10

5] POOL / GLIDE AND RIFFLE / RUN QUALITY

MAXIMUM DEPTH

Check ONE (ONLY!)
- ☒ > 1m [6]
- ☐ 0.7-<1m [4]
- ☐ 0.4-<0.7m [2]
- ☐ 0.2-<0.4m [1]
- ☐ < 0.2m [0]

CHANNEL WIDTH

Check ONE (Or 2 & average)
- ☐ POOL WIDTH > RIFFLE WIDTH [2]
- ☐ POOL WIDTH = RIFFLE WIDTH [1]
- ☐ POOL WIDTH < RIFFLE WIDTH [0]
- ☒ Impounded [-1]

CURRENT VELOCITY

Check ALL that apply
- ☐ TORRENTIAL [-1]
- ☐ VERY FAST [1]
- ☐ FAST [1]
- ☐ MODERATE [1]
- ☒ SLOW [1]
- ☐ INTERSTITIAL [-1]
- ☐ INTERMITTENT [-2]
- ☐ EDDIES [1]

Indicate for reach - pools and riffles.

Recreation Potential
Primary Contact
Secondary Contact
(circle one and comment on back)

Comments

Pool / Current 6 Maximum 12

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 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]

Comments

Riffle / Run 0 Maximum 8

6] GRADIENT

GRADIENT (___ ft/mi)
DRAINAGE AREA (___ mi²)
- ☐ VERY LOW - LOW [2-4]
- ☐ MODERATE [6-10]
- ☐ HIGH - VERY HIGH [10-6]

%POOL: ___ %GLIDE: ___
%RUN: ___ %RIFFLE: ___

Gradient 6 Maximum 10

EPA 4520 Proofed KC 7/15/08 06/11/08

ATTACHMENT 2F

Figures showing QHEI score distributions for the July 2008 study

Figure 2F-1. Narrative Habitat Classifications for Upper Dresden Pool based on Ohio EPA QHEI Scores, July 2008.

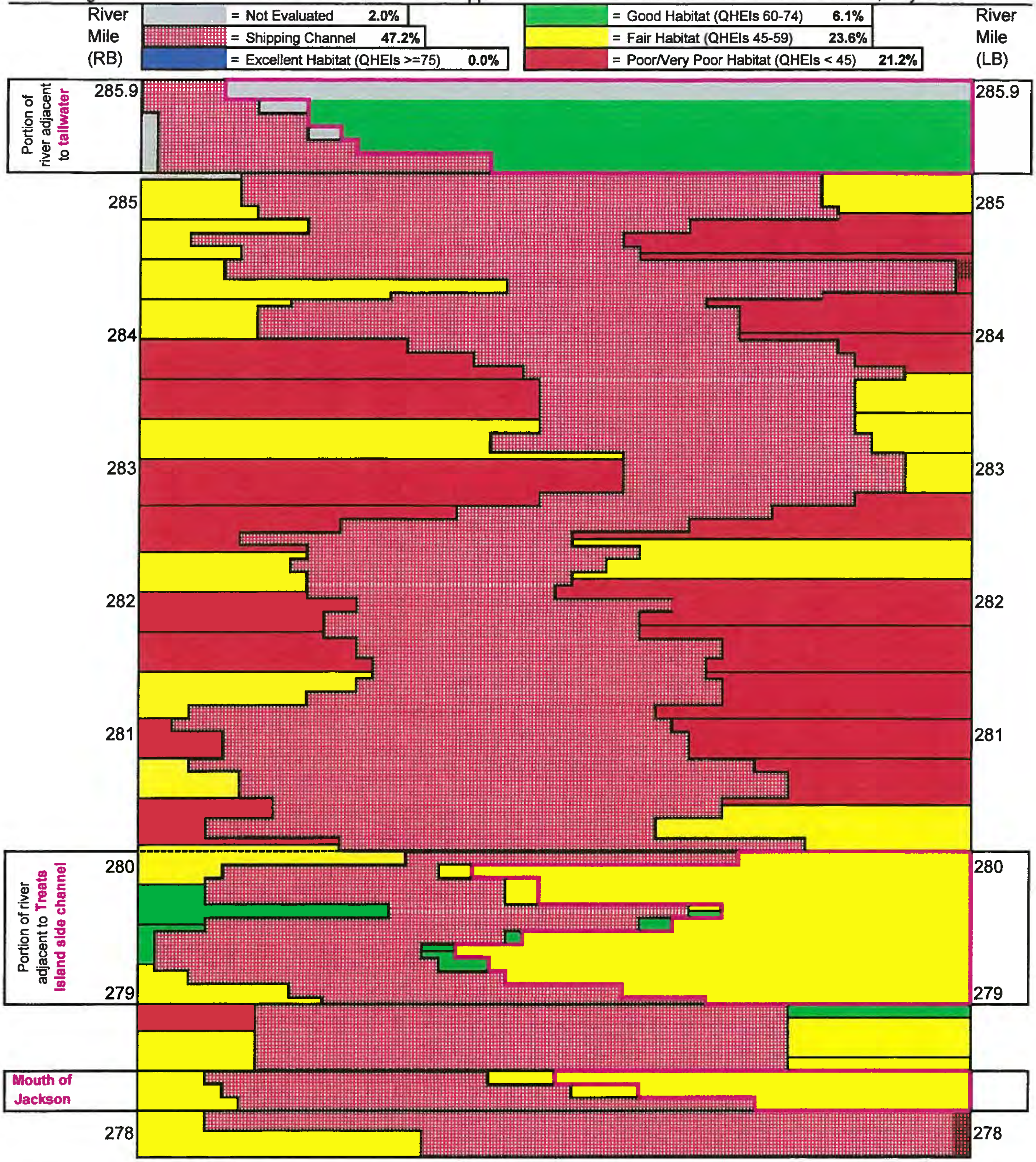
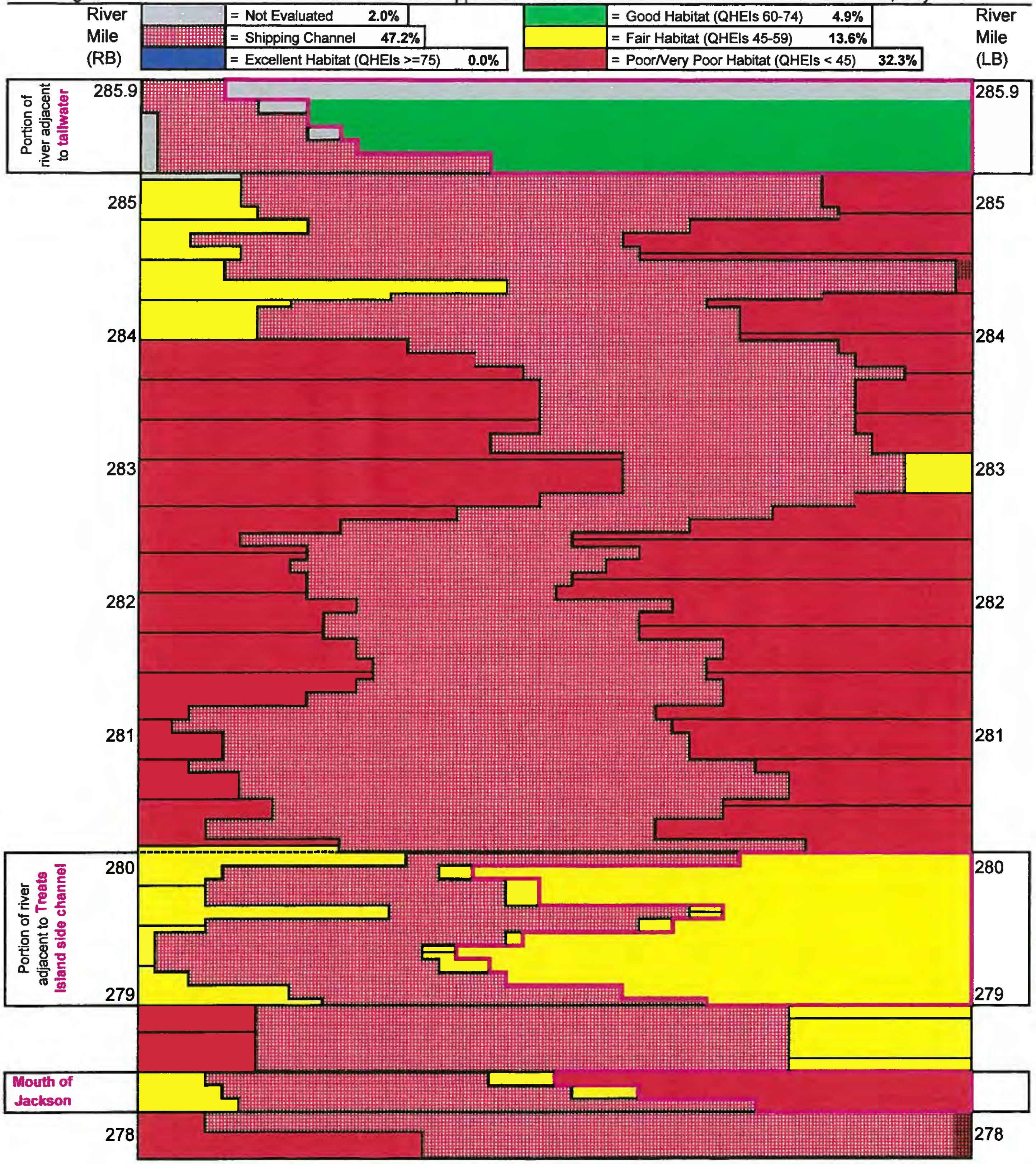


Figure 2F-2. Narrative Habitat Classifications for Upper Dresden Pool based on MBI-Modified QHEI Scores, July 2008.



Electronic Filing - Received, Clerk's Office, September 8, 2008

Figure 2F-3. Narrative Habitat/Attainment Classifications for Upper Dresden Pool based on Ohio EPA QHEI Scores, July 2008.

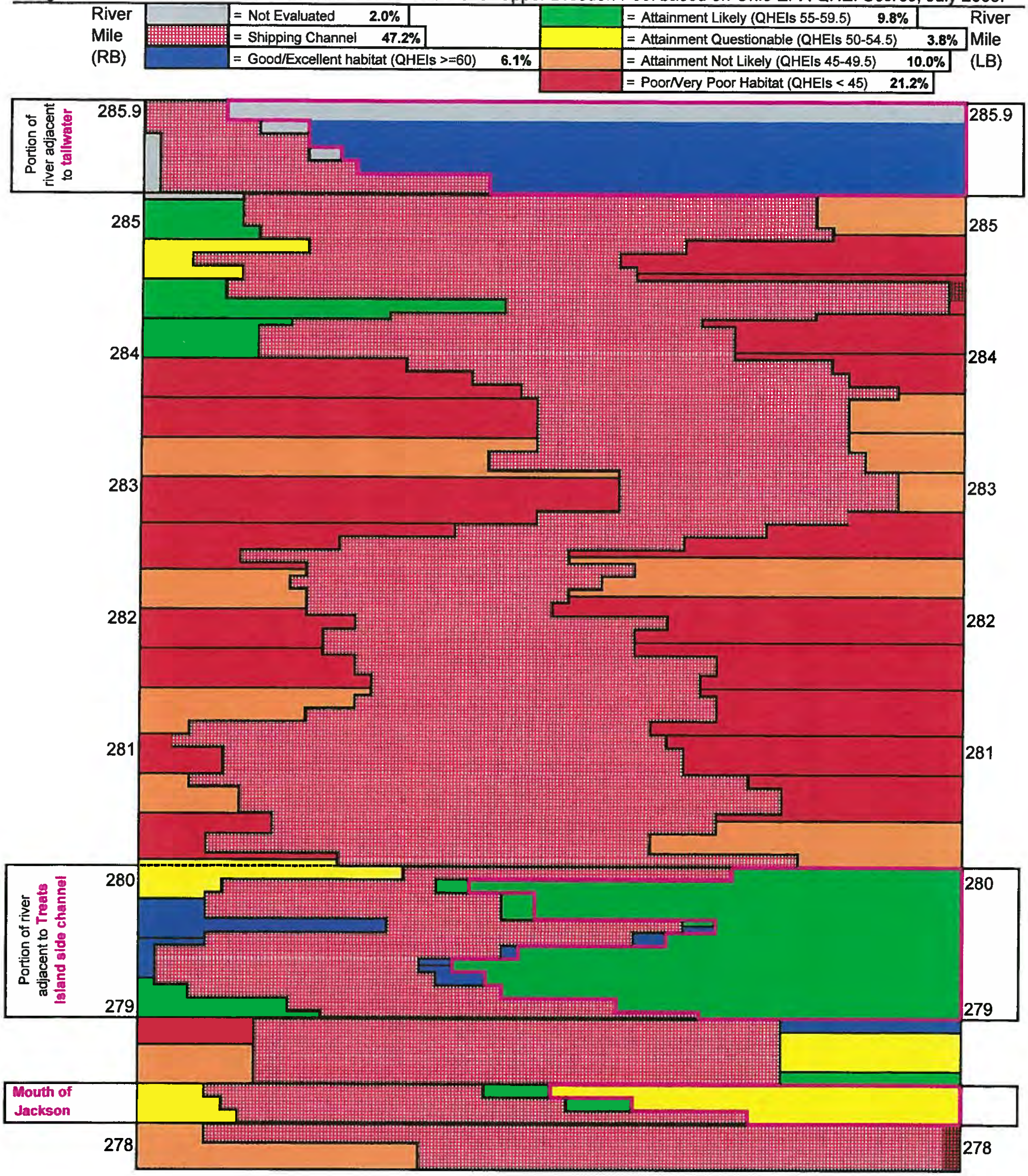


Figure 2F-5. Narrative Attainment Classifications for Upper Dresden Pool based on Ohio EPA QHEI Scores, July 2008.

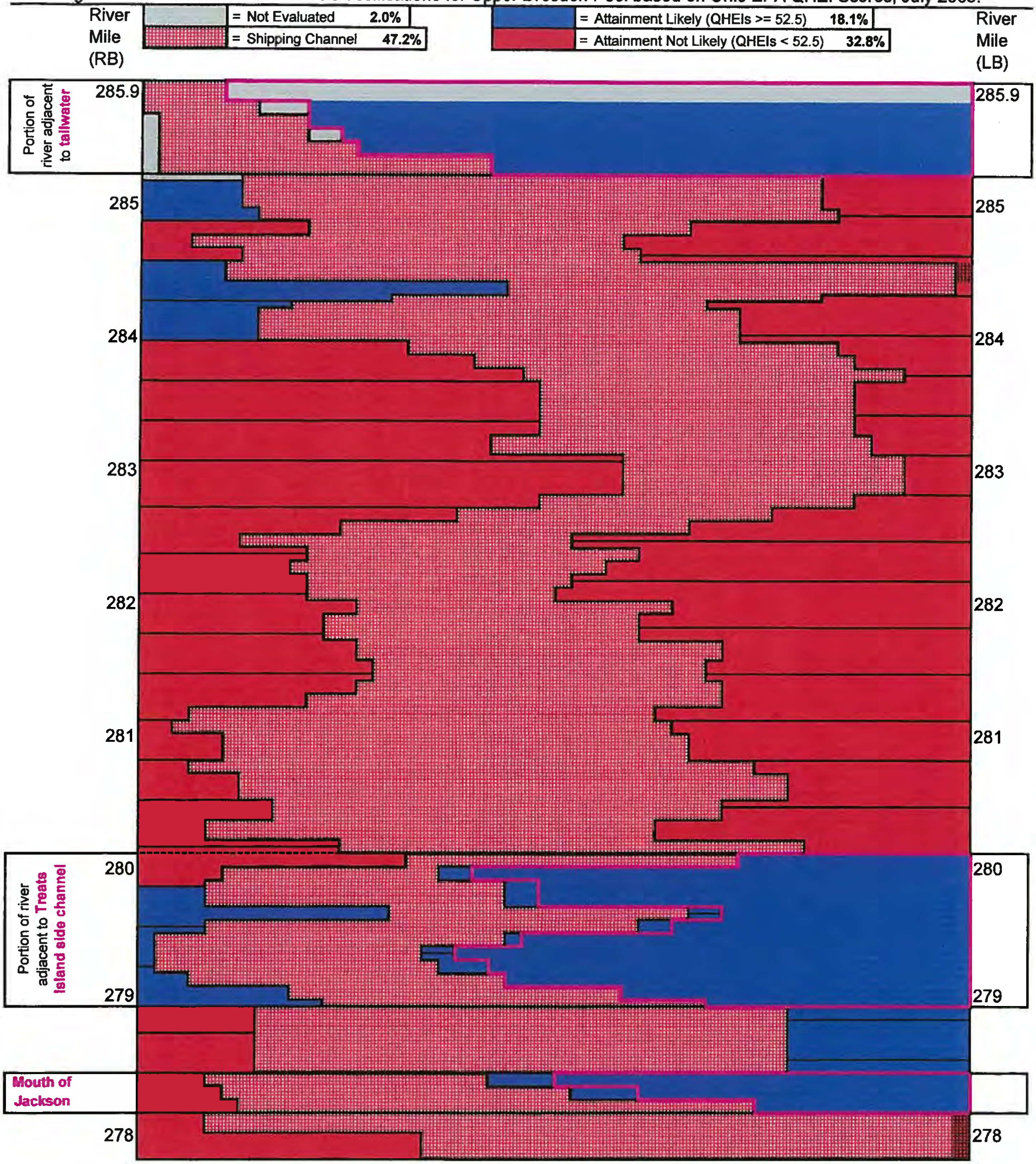
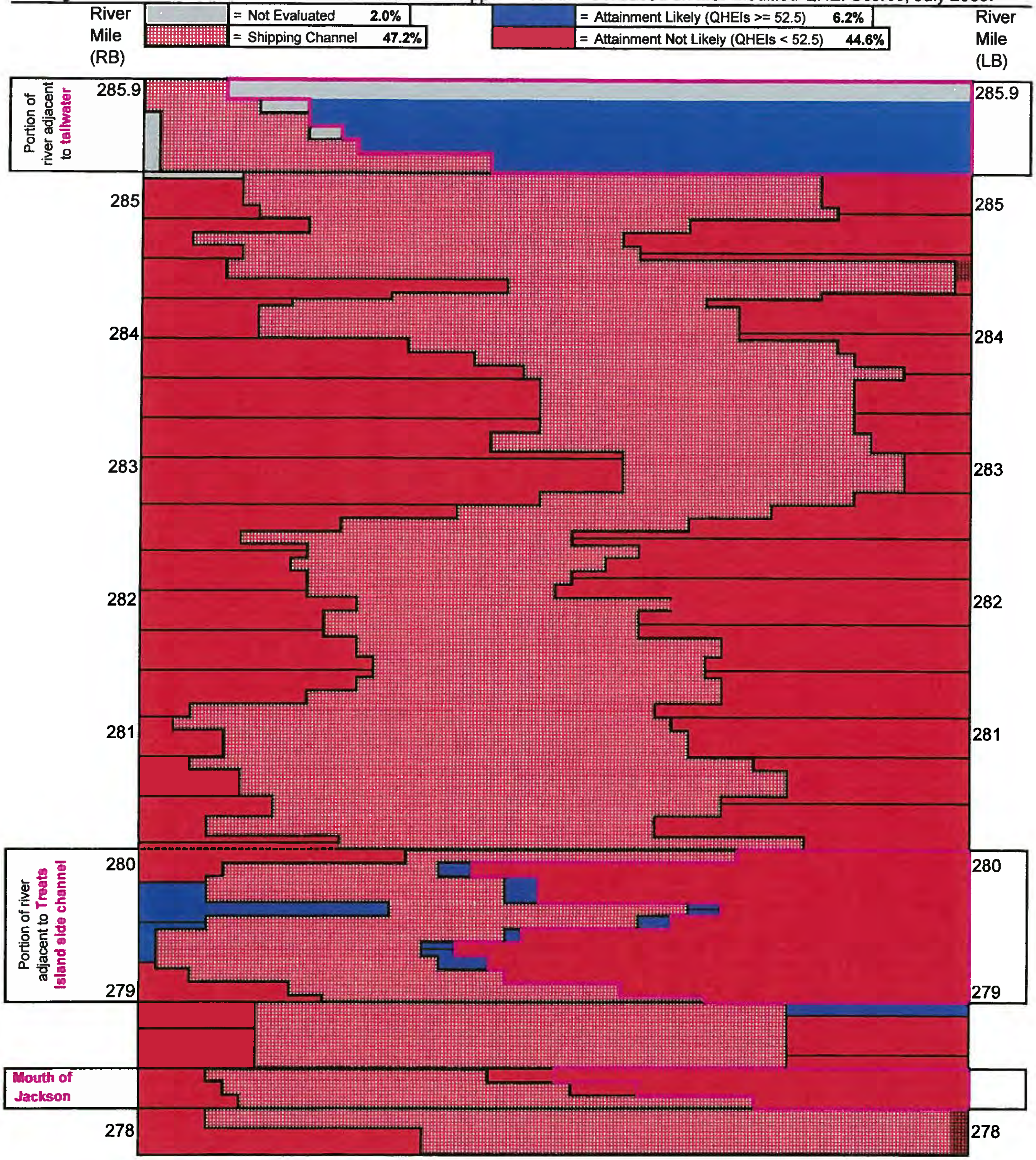


Figure 2F-6. Narrative Attainment Classifications for Upper Dresden Pool based on MBI-Modified QHEI Scores, July 2008.



ATTACHMENT 3

Santucci, V.J., S.R. Gephard, and S.M. Pescitelli. 2005. Effects of multiple low-head dams on fish, macroinvertebrates, habitat, and water quality in the Fox River, Illinois. North American Journal of Fisheries Management 25:975-992.

North American Journal of Fisheries Management 25:975–992, 2005

DOI: 10.1577/M03-216.1

[Article]

Effects of Multiple Low-Head Dams on Fish, Macroinvertebrates, Habitat, and Water Quality in the Fox River, Illinois

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Abstract.—We examined the effects of low-head dams on aquatic biota, habitat, and water quality in a 171-km reach of a midwestern warmwater river that was fragmented by 15 dams into a series of free-flowing and impounded habitats. Dams impounded 55% of the river's surface area within the study reach and influenced distributions of 30 species of fish by restricting upstream movements. Values for the Illinois index of biotic integrity (IBI) were higher in free-flowing areas (mean IBI = 46 out of a possible 60 at below-dam and midsegment free-flowing locations) than impounded areas (mean IBI < 31 for above-dam and midsegment impounded locations). Likewise, scores from a macroinvertebrate condition index (MCI) were higher at stations in free-flowing reaches (mean MCI > 415 out of a possible 700) than in nearshore areas of impounded reaches (mean MCI < 210). Ponar dredge samples taken only from open-water impounded areas showed an offshore invertebrate community that consisted almost entirely of tolerant oligochaetes and chironomid larvae. Qualitative habitat evaluation index (QHEI) scores indicated good-quality habitat in free-flowing areas (mean QHEI > 70 out of a possible 100) and severely degraded habitat at impounded sites (mean QHEI < 45). In impounded reaches, dissolved oxygen and pH showed wide daily fluctuations (2.5–18.0 mg/L and 7.0–9.4 units) and often failed to meet Illinois water quality standards. In free-flowing portions of river, fluctuations in these parameters were less extreme and water quality standards typically were met. We found little evidence of cumulative effects of dams; however, our data suggest that low-head dams adversely affect warmwater stream fish and macroinvertebrate communities by degrading habitat and water quality and fragmenting the river landscape. These results should aid river managers and stakeholders in determining appropriate restoration practices (i.e., dam removal versus fish passage structures) for warmwater rivers and streams that contain low-head dams.

Free-flowing rivers have been characterized as having a gradient of physical conditions that elicit gradual changes in biotic communities from headwaters to the river mouth (river continuum concept; Vannote et al. 1980). Due to disruptions in natural flow caused by dams and their associated impoundments, few U.S. rivers remain free flowing throughout their lengths (Ward and Stanford 1983). Past ecological research related to dams has focused on lotic reaches directly below dams (Ward and Stanford 1979; Bain et al. 1988; Ligon et al. 1995; De Merona and Albert 1999), mainstem reservoirs directly above dams (Ellis 1941; Hall 1971; Hall and Van Den Avyle 1986), fish communities upstream of impoundments (Martinez et al. 1994), fish and invertebrate migration (Clay 1995; Benstead et al. 1999; Pringle et al. 2000), and environmental impacts from hydroelectric development (Efford 1975; Baxter 1977). From this large body of work, we know that dams can have dramatic effects on rivers and aquatic biota by altering water quality and habitat, disrupting nutrient cycling and sediment transport, and blocking fish and invertebrate movements.

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However, past studies have typically examined large dams and impoundments on large riverine ecosystems that often supported coldwater salmonid species. Whereas the general effects of dams may remain the same for rivers of different sizes (i.e., conversion of lotic habitat to lentic habitat and the blocking of migration), the magnitude of the effect and the degree to which biotic communities are impacted may change with river size and temperature regime (Ward and Stanford 1983) or with dam size and function (Poff and Hart 2002).

The ecological consequences of low-head dams (<15 m) are poorly understood (Benstead et al. 1999), and few studies have examined their effects on smaller warmwater rivers and streams. Singh et al. (1995) found that high phytoplankton biomass and sediment oxygen demand in an impounded reach of a warmwater river produced substandard dissolved oxygen (DO) levels and may have reduced the river's natural waste assimilation capacity. Filter-feeding macroinvertebrates are abundant directly below surface-discharging dams in warmwater streams (Spence and Hynes 1971a; Parker and Voshell 1983), and these abundant invertebrates may influence food resources available to downstream communities (Parker and Voshell 1983). Dams may influence warmwater stream fishes by restricting movements (Porto et al. 1999), altering assemblages in impoundments and lotic reaches above impoundments (Spence and Hynes 1971b), and causing extirpation of species from the watershed upstream of dams (Winston et al. 1991). Although important, these studies were limited to evaluations of single dams and one or two ecological parameters (i.e., fish, invertebrates, habitat, or water quality). Evaluation of multiple dams and parameters concurrently within a river system may lead to additional understanding of the cumulative effects of dams and the dynamics of directional transport in rivers and streams (Ward and Stanford 1983).

Like other temperate-zone locales (Dynesius and Nilsson 1994), northeastern Illinois contains flowing waters where dams are prevalent; many of these dams are remnant or rebuilt milldams from the 1800s. Safety concerns and old age (many dams are > 50 years old) are driving a need for structural improvements at many dams in the region. However, most dams lack a present-day function, and those with a practical purpose (e.g., hydroelectric generation and drinking water supply) need functional fish passage facilities (Santucci and Gephard 2003). To make informed decisions regarding the repair, removal, or modification of dams that are publicly owned like many of those in northeastern Illinois, river managers and public stakeholders require information on the effects that these structures may have on river ecosystems (Smith et al. 2000).

We investigated the effects of 15 low-head dams on several biotic and abiotic components of the Fox River, a sixth-order warmwater river that drains portions of Wisconsin and Illinois. Fish, macroinvertebrates, and habitat quality were sampled concurrently at 40 stations located in free-flowing areas directly below dams, impounded areas directly above dams, and free-flowing or impounded midsegment areas between dams. Water quality was monitored at a subset of 22 biota–habitat stations. We compared water quality variables among stations from free-flowing and impounded habitats and across the upstream–downstream gradient to identify effects of low-head dams and assess whether effects of multiple dams were cumulative. Historic and current fisheries survey data also were examined to evaluate the effects of river fragmentation by dams on fish distribution patterns. Based on our results, we highlight the need for and benefits of potential dam-related river restoration practices to assist managers and stakeholders faced with dam repair, removal, or modification decisions.

Study Area

The Fox River flows in a southwestern direction for 298 km from its source near Waukesha, Wisconsin, to its confluence with the Illinois River at Ottawa, Illinois. It drains about 2,435 km^2 in southeastern Wisconsin and 4,453 km^2 in northeastern Illinois. The study area included 171 river kilometers (rkm) and 15 dams between the Chain of Lakes and Dayton, Illinois (Figure 1). Agricultural land (66%), urban or residential land (18%), woodlands (9.2%), wetlands (4.5%), and lakes and streams (2.3%) were the predominant land cover types in the Illinois portion of the watershed (IDNR 1998). The central region (Elgin to Montgomery) had the highest concentration of urban/residential land, whereas row crops and rural grasslands predominated in the more northerly and southerly areas. The river gradient is flat from Chain of Lakes to Algonquin (average slope = 0.06 m/km), steepest between St. Charles and Yorkville (0.85 m/km), and moderate from Algonquin to St. Charles (0.38 m/km) and downstream of Yorkville (0.51 m/km). Recent average daily flow (1980–2000) at Dayton, Illinois, ranged from

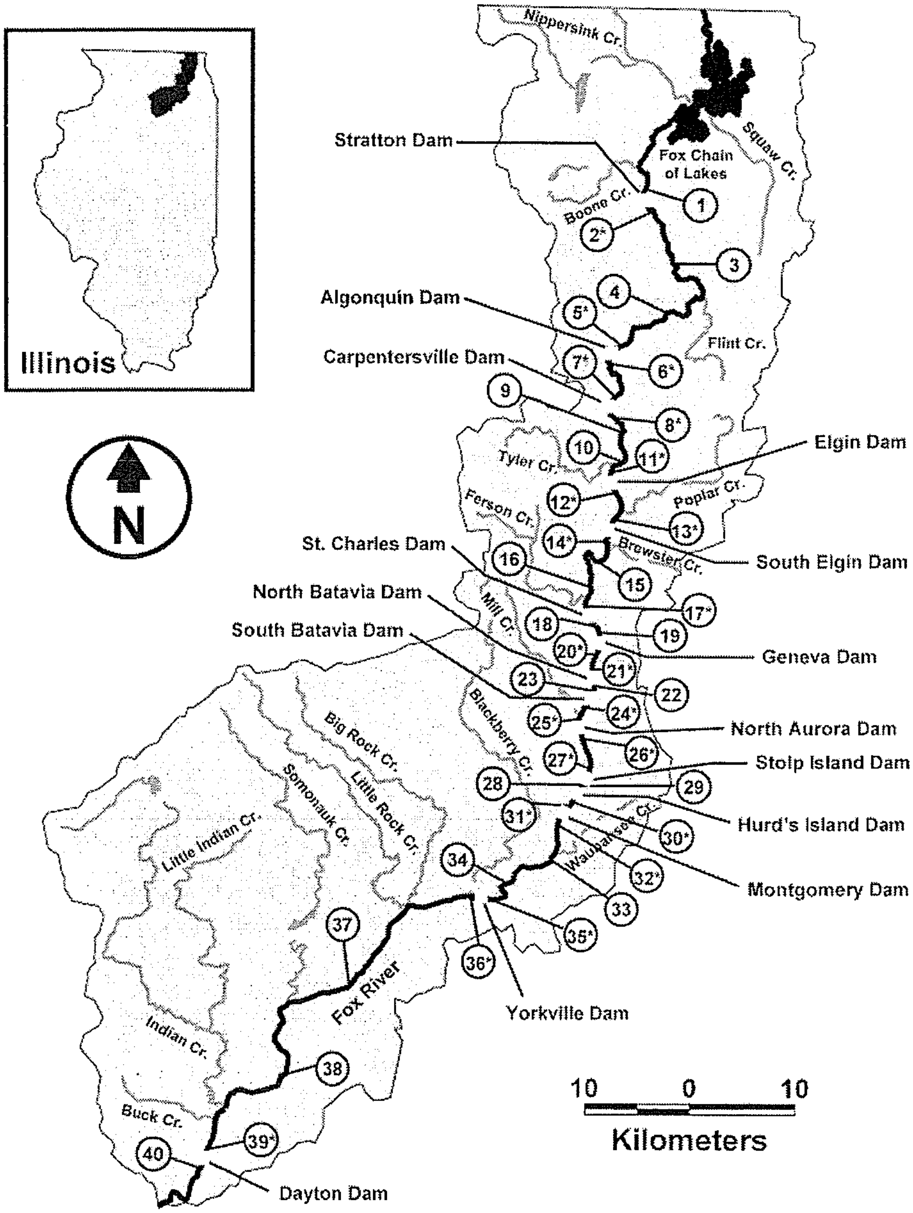

FIGURE 1.—Map of the Fox River watershed, Illinois, showing the locations of major tributaries (drainage area > 50 km²), main-stem and selected tributary dams (squares), and numbered stations that were sampled for fish, macroinvertebrates, and habitat during summer and fall 2000. Stations marked by asterisks were sampled for water quality during summer and fall 2001.

5.9 to 1,319 m^3/s (USGS 2001). River hydrology is typically dominated by winter snowfall and summer rainfall, but summer low flows are maintained by the controlled release of 2.7 m^3/s of water from the Chain of Lakes (Stratton Dam) and discharges of processed groundwater from numerous municipal wastewater treatment facilities (IDNR 1998).

All dams were run-of-river, low-head structures located in the main stem between 9.2 km (Dayton Dam) and 159.1 km (Stratton Dam) above the river mouth (Figure 1). Dams ranged from 44 to 183 m long and from 0.8 to 9.0 m high and impounded 47% of the river's length and 55% of its surface area within the study reach (Santucci and Gephard 2003). Impounded areas formed upstream of dams were small (2–346 ha), narrow (76–189 m; less than twice the width of adjacent free-flowing areas), and shallow (mean depths < 2.1 m), and their storage volume, turnover rate, and morphology were more similar to a those of a low-velocity canal than to those of a natural lake or large reservoir.

Methods

Fish, macroinvertebrates, and habitat quality.— We sampled fish and macroinvertebrate communities and evaluated habitat quality at 40 stations from mid-July through early September 2000 (Figure 1). Biota and habitat were sampled concurrently at each station, and stations were visited in consecutive order beginning with station 1. All stations were about 0.8 km in length and encompassed the entire width of the river and adjacent riparian areas. Thirty stations were located within 1 km of Fox River dams; 15 of these stations were sited upstream of dams in impounded areas, and 15 were sited downstream of dams in free-flowing areas. Safety considerations precluded sampling within 100 m of each dam. Ten additional stations were located in middle reaches of five between-dam river segments (two additional stations per segment). Midsegment stations were located at about 30% and 60% of total segment length in either free-flowing or impounded habitat.

Fish were sampled with a pulsed-DC boat electroshocker, a generator-powered backpack electroshocker, and a 3.2-mm-mesh bag seine (30.5 m long × 1.8 m deep). Boat electrofishing runs began at upstream boundaries of each station and proceeded downstream for 30 min along each bank of the river (total time = 1 h/station). We targeted wadable habitat (riffles, runs, and shoreline areas) with the backpack electroshocker and sampled these habitats in relative proportion to their abundance at each station for a total of 30 min/station. Seining took place at three locations within each station and sampled habitats of wadable depth with silt, sand, or gravel substrates. The seine was deployed in a single 30.5-m arc along the riverbank before being retrieved to shore. All fish larger than 200 mm total length (TL) were identified to species, measured (nearest mm TL), weighed (nearest g), and examined for anomalies in the field. Smaller fish were preserved in 10% buffered formalin and were returned to the laboratory for processing.

We characterized fish communities based on biological integrity and harvestable-sized sport fish abundance. Community integrity was estimated for each station with a version of the index of biotic integrity (IBI) developed for warmwater streams and rivers in Illinois (Karr 1981; Bertrand et al. 1996). The IBI has been shown to accurately reflect the biological integrity and ecological health of stream ecosystems (Fausch et al. 1990). Values for the IBI range from 12 to 60; higher scores indicate better biotic integrity. Illinois uses the IBI to classify stream segments into A (IBI scores = 51–60), B (41–50), C (31–40), D (21–30), and E (12–20) categories that represent unique, highly valued, moderate, limited, and restricted aquatic resources, respectively (Bertrand et al. 1996). To provide a measure of the relative availability of sport fish species to anglers, we estimated sport fish abundance for each station by summing boat electrofishing catch rates for all sport species larger than designated harvestable-size length minima (Bertrand et al. 1996). The index included top predators (percids *Sander* spp., yellow perch *Perca flavescens*, pikes *Esox* spp., black basses *Micropterus* spp., flathead catfish *Pylodictis olivaris*, catfishes *Ictalurus* spp., rock basses *Ambloplites* spp., crappies *Pomoxis* spp., and temperate basses *Morone* spp.), sunfishes *Lepomis* spp., bullheads *Ameiurus* spp., buffalo *Ictiobus* spp., redhorses *Moxostoma* spp., common carp *Cyprinus carpio*, and freshwater drum *Aplodinotus grunniens*.

Data from the present study and 14 other fish community surveys conducted between 1980 and 1999 were used to examine whether dams affected fish distributions by acting as barriers to upstream movement. Previous studies included periodic whole-basin surveys and bi-annual sampling of the river main stem by the Illinois Department of Natural Resources (IDNR; Bertrand et al. 1982; Sallee and Bergmann 1986; Day et al. 1992; Pescitelli and Rung, unpublished data) and site-specific research efforts (Heidinger 1993; Santucci 1994). Combined data from 112 Fox River main-stem and tributary sampling stations were used in the analysis. To identify species with distributions limited by dams, we first determined presence of species within each between-dam river segment (including tributaries) and then visually examined distribution patterns for the entire study area.

Macroinvertebrates were sampled from wadable habitats by kick-netting and hand picking for 1 collector-hour at each station. Kick nets were 250-mm × 457-mm rectangular steel frames fitted with 1.5-m handles and 500-μm-mesh bags. Nets were used to sample small substrates (silt, sand, and gravel), the water surface, and the water column. Forceps were used when picking invertebrates from arbitrarily selected submerged rocks and

TABLE 1.—Macroinvertebrate community index (MCI; maximum score = 700) and component metric scores for downstream free-flowing, midsegment free-flowing, midsegment impounded, and upstream impounded stations on the Fox River between McHenry and Dayton, Illinois. Macroinvertebrates were sampled by kick-netting and hand picking at 40 stations during July–September 2000. The MCI was developed with Fox River data based on USEPA rapid bioassessment procedures (Barbour et al. 1999). Values are means (SEs). For each comparison, ANOVA *F*-statistics and *P*-values are shown (df = 3, 36 for all tests). Different letters designate significant differences among station types for each metric (Tukey's multiple comparison test: $P < 0.05$).

	Station type					
Index and metrics	Downstream free-flowing	Midsegment free-flowing	Midsegment impounded	Upstream impounded	*F*	*P*
MCI	417.5 (28.6) z	473.5 (41.1) z	205.8 (42.5) y	203.0 (15.7) y	21.95	0.001
Richness measures (*N*)						
Taxa richness	27.7 (1.0)	33.0 (2.5)	25.5 (3.0)	25.8 (1.6)	2.86	0.05
EPT taxa[a]	6.4 (0.7) z	9.2 (1.3) z	2.2 (1.3) y	3.1 (0.6) y	11.36	0.001
Composition measures (%)						
EPT individuals[a]	44.2 (5.5) z	37.9 (4.6) z	3.6 (2.3) y	3.8 (1.0) y	25.28	0.001
Chironomidae	19.6 (3.8)	17.0 (3.0)	19.7 (4.5)	20.5 (3.3)	0.24	0.87
Tolerance measures						
Intolerant taxa (*N*)	5.5 (0.3) y	8.7 (1.3) z	3.0 (0.9) y	3.0 (0.4) y	14.81	0.001
Macroinvertebrate biotic index	6.3 (0.2) z	5.9 (0.2) z	6.7 (0.4) yz	7.3 (0.2) y	7.45	0.001
Habit measures (%)						
Clinger organisms	46.8 (5.8) z	42.0 (6.2) z	5.7 (0.9) y	4.3 (0.9) y	24.11	0.001

[a] Ephemeroptera, Plecoptera, and Trichoptera.

woody debris pulled from the water. We allocated sampling time to various macrohabitats (i.e., riffles, runs, and shoreline areas) based on visual estimates of the aerial coverage of these habitats within a station (except impounded stations). Because wading was limited to nearshore areas of impoundments, we sampled deeper, offshore habitat at most impoundment stations ($N = 16$) with a petite ponar dredge (152-mm × 152-mm opening) deployed from a canoe. Three impoundment stations were excluded from offshore sampling because they had large gravel and cobble substrates that were not sampled effectively with the ponar dredge. Five substrate grabs were taken along one upstream and one downstream transect at each station ($N = 10$ grabs/station). Transects ran perpendicular to the river's thalweg in water over 1.5 m deep. Grab contents were combined and washed through a sieve with a mesh size of 500 μm.

Samples from wadable and open-water habitats were preserved in 5% solutions of buffered formalin and were returned to the laboratory, where all organisms were sorted from sediments and debris prior to enumeration and identification. We identified all individuals in each sample (typically to genus) except for chironomid larvae (Diptera), which were subsampled for identification. We identified a minimum of one-third of the chironomids in samples with more than 15 individuals and all chironomids from samples containing 15 or fewer larvae by examining mouth parts and other body parts with a compound microscope. Identities were assigned to all chironomids in a sample based on the taxa proportions in the corresponding identified subsample.

A multimetric macroinvertebrate community index (MCI) was used to characterize macroinvertebrate communities sampled from wadable habitats. Illinois does not have a standardized community index for macroinvertebrates (a statewide index is currently in development), so we developed a seven-metric MCI for the Fox River based on Environmental Protection Agency (USEPA) rapid bioassessment protocols (Barbour et al. 1999; see Table 1 for a list of metrics). The intolerant taxa metric was made up of organisms with a tolerance rating of 4 or less (range = 0–11) based on the latest Illinois macroinvertebrate tolerance list (Hite and Brockamp 1992). The Illinois MBI, a version of the Hilsenhoff biotic index (Hilsenhoff 1987), provided an overall community tolerance rating based on the mean of tolerance values weighted by organism abundance (Hite and Brockamp 1992). Values of MBI greater than or equal to 7.5 represent limited or restricted aquatic resources and a benthic community with limited diversity, few intolerant forms, and a predominance of tolerant organisms (Bertrand et al. 1996). Clinger organisms were filter-feeding insects permanently attached to substrates and were consid-

TABLE 2.—Qualitative habitat evaluation index (QHEI; maximum score = 100) and component metric scores for downstream free-flowing, midsegment free-flowing, midsegment impounded, and upstream impounded stations on the Fox River between McHenry and Dayton, Illinois. Habitat was evaluated at 40 stations during July–September 2000. Values are means (SEs). For each comparison, ANOVA *F*-statistics and *P*-values are shown (df = 3, 36 for all tests). Different letters designate significant differences among station types for each metric (Tukey's multiple comparison test: $P < 0.05$).

	Station type					
Index and metrics	Downstream free-flowing	Midsegment free-flowing	Midsegment impounded	Upstream impounded	*F*	*P*
QHEI	71.9 (2.9) z	76.0 (4.1) z	42.9 (3.9) y	35.8 (2.1) y	45.92	0.001
Habitat rating	Good quality	Good quality	Severely degraded	Severely degraded		
Component metrics[a]						
Substrate (20)	16.9 (0.4) z	15.8 (0.6) zx	11.8 (1.4) yx	9.1 (0.8) y	28.82	0.001
Instream cover (20)	13.5 (0.9) zx	16.2 (0.9) z	10.8 (0.8) yx	8.8 (0.8) y	10.77	0.001
Channel morphology (20)	11.3 (0.9) zx	13.3 (1.2) z	7.2 (0.6) yx	5.4 (0.4) y	17.21	0.001
Riparian zone and bank erosion (10)	4.2 (0.5)	6.4 (0.7)	4.4 (0.9)	4.7 (0.5)	1.74	0.18
Pool–glide quality (12)	9.9 (0.4) z	9.5 (1.2) z	1.8 (0.2) y	1.6 (0.4) y	74.66	0.001
Riffle–run quality (8)	6.3 (0.5) z	4.8 (1.0) z	0.0 y	0.0 y	49.04	0.001
Gradient (10)	9.7 (0.3) z	10.0 (0.0) z	7.0 (1.0) y	6.1 (0.1) y	48.69	0.001

[a] Maximum scores.

ered intolerant of poor water quality conditions (Merritt and Cummins 1996; Barbour et al. 1999). The range of values for the MCI was 0–700, wherein higher scores indicated a higher-quality macroinvertebrate community. The MCI was not appropriate for making comparisons to other studies or gauging ecological health relative to other rivers because only Fox River data were used in its development. However, the index provided a useful measure for documenting relative differences in macroinvertebrate communities among Fox River sample stations. The MCI scores also were positively correlated with IBI scores (Pearson's product-moment correlation: $r = 0.83$, $P = 0.001$).

We assessed habitat quality with the qualitative habitat evaluation index (QHEI), a visual observation habitat index designed to provide empirical, quantified evaluations of lotic macrohabitat characteristics important to fish communities (OEPA 1989). The QHEI includes seven principal metrics (see Table 2) and a number of metric components, and it has been shown to generate scores that are strongly correlated with fisheries assessment data (Rankin 1989). We used the QHEI to evaluate habitat quality in impounded as well as free-flowing areas because impounded areas retained characteristics of a slow-flowing river, habitat indices are not yet available for impoundments, and free-flowing conditions will be restored if dam removal is selected as a river restoration alternative.

To enhance accuracy and precision, two crewmembers completed a 1-d QHEI training course before fieldwork began and followed developed protocols when evaluating habitat during the study (OEPA 1989). Each station was surveyed twice by canoeing or wading, first to draw a map of macrohabitat features and then to score individual metric components. Index scores greater than 60 (maximum score = 100) indicate good-quality habitat that typically supports diverse fish communities, whereas scores less than 46 indicate severely degraded habitat that typically supports poor-quality fish communities (E. Rankin, Ohio EPA, personal communication). Scores between 46 and 60 indicate degraded habitat that may or may not meet warmwater criteria for supporting aquatic life.

Water quality.—We used continuous, point, and grab sampling to monitor water quality at 11 downstream free-flowing stations and 11 upstream impounded stations (Figure 1). Sampling took place during August 6–17, 2001, when water temperatures were high (>20°C) and flow rates were low (<20 m^3/s at Algonquin). Continuous sampling with Hydrolab Datasonde water quality monitors measured temperature, DO, and pH every 15 min for 40 h at each station. Monitoring began at 1600 hours on the first day and concluded at about 0800 hours on the third day. Datasonde monitors were calibrated and deployed midchannel at depths ranging from 30 to 60 cm above the river bottom. During evening and early-morning extremes in the diel oxygen cycle (1800–2000 and 0600–0800 hours), we took point measurements with a calibrated Datasonde monitor from the surface, mid-depth, and near-bottom depth at midchannel (same as deployed Datasonde locations), left-of-center, and right-of-center sites along a cross-channel transect that bisected each station. Point measurements also were made at Datasonde monitoring depths when units were set and retrieved to assess instrument drift (none occurred) and at grab-sample depths to provide precise measures of temperature, DO, and pH for comparison with water chemistry data.

Grab samples (N = 44; one morning and one evening sample per station) were collected at each midchannel site and were analyzed for turbidity, total phosphorus (TP), total nitrogen (TN), and chlorophyll *a*. Two clean, 1.9-L plastic bottles were filled with water from a depth of 30 cm and placed on ice in a dark cooler. Within 30 min of collection, water samples either were processed in the field (turbidity and chlorophyll *a*) or were transferred to clean, pre-labeled polyethylene bottles and preserved for later laboratory analysis (TP and TN). Turbidity was measured in the field with a portable turbidimeter. Chlorophyll-*a* samples were filtered through glass microfiber filters that were wrapped in aluminum foil, labeled, and frozen before being transferred to the Illinois EPA laboratory for analysis. The USEPA Region 5 Central Regional Laboratory analyzed nutrient samples.

Effects of dams and impoundments were assessed by comparing individual water quality variables between free-flowing and impounded areas within river segments, across time periods, and among vertical and horizontal sample locations (temperature, DO, and pH only). Because we sampled 4–6 stations at one time, above–below dam comparisons were made for four dams (Algonquin, Elgin, North Aurora, and Yorkville) to assess the direct effects of these structures on river DO levels. In addition, we compared measured variables to accepted Illinois EPA ambient water standards (temperature, DO, and pH) or recommended guidelines (TP, TN, chlorophyll *a*, and turbidity; USEPA 2000; Robertson et al. 2001) for midwestern rivers and streams (see Table 3).

Statistical analyses.—We compared fish (IBI and harvestable-size sport fish abundance), macroinvertebrate (MCI), and habitat (QHEI) indices and individual metric scores among station types (i.e., downstream free-flowing, midsegment free-flowing, midsegment impounded, and upstream impounded) with one-way analysis of variance (ANOVA) and Tukey's multiple comparison test. An arcsine transformation was used on percentages to normalize the variance before statistical analysis (Steel and Torrie 1980). Pearson's product-moment correlation analysis was used to assess the relation between fish and macroinvertebrate communities and habitat quality. Repeated-measures ANOVA was used to compare water quality parameters between habitat types (free-flowing versus impounded) and among vertical (surface, mid-depth, and bottom) and horizontal (left, mid-, and right channel) sample locations. The model included habitat type (or location) and sample time period as main effects and a habitat type (or location) × time period interaction term. To assess whether effects of multiple dams were cumulative, we used linear regression to examine the relation between upstream–downstream distance (representing increasing numbers of dams) and several measured variables (IBI, MCI, QHEI, TP, TN, and chlorophyll *a*). A statistical significance level α of 0.05 was used for all analyses.

Results

Fish Communities

The quality of the fish community as determined by IBI score was higher in free-flowing reaches of river than in impounded areas above dams (Table 4), but communities did not differ within free-flowing (Tukey's multiple comparison test: P = 0.98) or impounded habitats (P = 0.96). On average, free-flowing reaches were characterized as highly valued B-quality streams and impounded reaches were characterized as limited-value, D-quality streams. Mean catch rates of harvestable-sized sport fish also were higher at downstream free-flowing and midsegment free-flowing stations than at midsegment impounded and upstream impounded stations (Table 4), and catches were similar within free-flowing (P = 0.40) and impounded areas (P = 0.48). Relative to impoundments, free-flowing areas had higher species richness, substantially higher overall and harvestable-sized sport fish abundance, and more sucker species and intolerant fish species (Table 4). Samples from free-flowing areas also contained a higher percentage of insectivorous minnows, such as spotfin shiners *Cyprinella spiloptera* and sand shiners *Notropis stramineus*. In contrast, stations in impounded areas had a predominance of tolerant and omnivorous species, such as the common carp, bluntnose minnow *Pimephales notatus*, quillback *Carpiodes cyprinus*, and green sunfish.

TABLE 3.—Water quality parameter means (SEs) and results of repeated-measures ANOVA (df = 1, 20 for all tests; α = 0.05) examining the effects of habitat type, time period, and habitat × time interactions on water quality in the Fox River between McHenry and Dayton, Illinois. Water samples were collected during August 6–17, 2001, in free-flowing and impounded habitats during morning (0600–0800 hours) and evening (1800–2000 hours) time periods. Illinois Environmental Protection Agency ambient water quality standards exist for temperature, dissolved oxygen, and pH, whereas guidelines have been developed for total P and total N (Robertson et al. 2001) and for chlorophyll *a* and turbidity (USEPA 2000).

Parameter	Standard or guideline	Habitat type			
		Free-flowing	Impounded	*F*	*P*
Temperature (°C)	≤33.7	26.2 (0.6)	26.2 (0.6)	0.01	0.98
Dissolved oxygen (mg/L)	≥5.0	7.4 (0.3)	8.0 (0.8)	0.75	0.40
pH (units)	6.5–9.0	8.6 (0.1)	8.7 (0.1)	0.39	0.54
Turbidity (NTU)[a]	9.9	43.2 (1.5)	40.5 (1.7)	1.14	0.30
Chlorophyll *a* (μg/L)	7.3	136.0 (9.0)	148.1 (9.7)	0.75	0.40
Total P (mg/L)	0.11	0.42 (0.03)	0.42 (0.03)	0.01	0.96
Total N (mg/L)	1.75	2.83 (0.12)	2.74 (0.12)	0.16	0.69

[a] Nephelometric turbidity units.

Dams appeared to have altered distributions of nearly one-third of Fox River fishes by acting as barriers to upstream movement. Fifteen species had truncated distributions, and another 15 species had discontinuous distributions (Figure 2). Species with truncated distributions were found only in the lower portions of the river. Ten species were not found above the lowermost dam in Dayton, Illinois, whereas five additional species, including the river redhorse *Moxostoma carinatum* (listed as threatened by the state of Illinois), had populations that persisted above the Dayton Dam but were limited to the lower Fox River in Illinois. Species with discontinuous distributions were found in the upper and lower river, but only occasionally or not at all in the central region between the St. Charles and Montgomery dams. This highly urbanized section of river has a high density of dams (eight dams in 22 rkm) compared to other parts of the Fox River in Illinois (one dam every 15.3 rkm).

Macroinvertebrate Communities

Free-flowing habitat supported higher-quality macroinvertebrate communities than did impounded waters above dams. Mean MCI scores were similar for stations within free-flowing (Tukey's multiple comparison test: $P = 0.59$) or impounded habitats ($P = 0.84$), but scores for downstream free-flowing and midsegment free-flowing stations were more than twice as high as scores from midsegment impounded and upstream impounded stations (Table 1). Samples from the free-flowing river had higher percentages of Ephemeroptera–Plecoptera–Trichoptera (EPT) individuals and clinger organisms and higher EPT taxa richness than the wadable portions of impounded areas. Overall taxa richness and percentages of chironomids were similar among station types (Table 1), whereas mean numbers of intolerant taxa were higher at midsegment free-flowing stations than at free-flowing stations closer to dams or at stations in impounded areas. Stations below dams often contained extremely high densities of filter feeders, such as certain chironomid taxa and hydropsychid caddisflies (Trichoptera). Stations in impounded areas typically had the highest MBI scores (indicating lower-quality communities), and 8 of 15 upstream impounded stations had scores of 7.5 or greater, indicating limited or restricted invertebrate assemblages. Macroinvertebrates were extremely limited in open-water impounded areas. Ponar samples showed an open-water community consisting of relatively few taxa ($N = 34$) and a numerical predominance (mean ± SE = 96.4% ± 0.8%) of tolerant oligochaetes and chironomid larvae.

Aquatic Habitat Quality

The quality of aquatic habitat available to fish and invertebrate communities differed substantially between free-flowing and impounded portions of river. Mean QHEI scores were higher at downstream free-flowing and midsegment free-flowing stations than midsegment impounded and upstream impounded stations (Table 2), but scores were similar within free-flowing (Tukey's multiple comparison test: $P = 0.74$) and impounded habitats ($P = 0.57$). Stations in free-flowing areas were characterized as having good habitat quality, whereas stations in impounded areas were characterized as severely degraded. Contributing to the severely degraded rating in impoundments was the

TABLE 3.—Extended.

	Time period				Habitat × time interaction	
Parameter	Morning	Evening	F	P	F	P
Temperature (°C)	25.3 (0.6)	27.1 (0.6)	75.00	0.001	0.01	0.92
Dissolved oxygen (mg/L)	5.9 (0.3)	9.4 (0.6)	46.15	0.001	7.24	0.01
pH (units)	8.5 (0.1)	8.8 (0.1)	70.66	0.001	0.35	0.56
Turbidity (NTU)[a]	42.4 (1.5)	41.3 (1.8)	0.27	0.61	0.02	0.90
Chlorophyll *a* (μg/L)	127.5 (6.3)	156.6 (10.9)	6.80	0.02	0.41	0.53
Total P (mg/L)	0.42 (0.03)	0.41 (0.03)	0.85	0.37	0.97	0.34
Total N (mg/L)	2.86 (0.12)	2.71 (0.12)	3.26	0.09	3.22	0.09

TABLE 4.—Illinois index of biotic integrity (IBI; maximum score = 60), biological stream characterization, harvestable-sized sport fish abundance, and IBI component metric scores for downstream free-flowing, midsegment free-flowing, midsegment impounded, and upstream impounded stations on the Fox River between McHenry and Dayton, Illinois. Fish were sampled by boat electrofishing, backpack electrofishing, and seining at 40 stations during July–September 2000. Values are means (SEs). For each comparison, ANOVA F-statistics and P-values are shown (df = 3, 36 for all tests). Different letters designate significant differences among station types for each metric (Tukey's multiple comparison test: $P < 0.05$).

	Station type					
Index and metrics	Downstream free-flowing	Midsegment free-flowing	Midsegment impounded	Upstream impounded	F	P
IBI	46.1 (1.2) z	46.0 (2.3) z	29.5 (2.5) y	30.8 (0.8) y	41.95	0.001
Biological stream characterization	B stream (highly valued resource)	B stream (highly valued resource)	D stream (limited resource)	D stream (limited resource)		
Harvestable-sized sport fish abundance (N/h)	86.8 (6.0) z	73.5 (3.1) z	38.8 (4.4) y	33.3 (3.9) y	26.26	0.001
			IBI component metrics			
Fish species composition (N)						
All species	28.9 (0.9) z	25.3 (2.1) z	16.2 (3.5) y	17.7 (0.9) y	21.93	0.001
Sucker species	4.5 (0.5) z	4.2 (0.8) z	1.2 (1.0) y	0.9 (0.2) y	16.74	0.001
Sunfish species	3.9 (0.3)	3.0 (0.8)	3.5 (0.6)	3.3 (0.3)	0.94	0.43
Darter species	3.0 (0.3) z	2.7 (0.7) z	1.5 (0.6) zx	0.7 (0.2) x	13.73	0.001
Intolerant species	7.3 (0.6) z	6.7 (1.1) z	3.2 (0.6) y	3.1 (0.3) y	14.70	0.001
Trophic composition (%)						
Green sunfish[a]	2.1 (0.3) z	4.0 (3.1) zy	5.5 (2.1) zy	12.5 (3.3) y	4.77	0.007
Omnivores	17.8 (2.4) z	19.7 (3.9) z	45.2 (6.7) y	25.5 (2.6) z	7.16	0.001
Insectivorous minnows	37.0 (4.7) z	43.7 (7.9) z	3.3 (0.8) y	10.8 (3.4) y	14.06	0.001
Top carnivores	15.0 (2.2) zy	11.7 (2.5) z	14.1 (1.8) zy	22.8 (2.3) y	3.81	0.001
Fish condition (%)						
Hybrids	0.6 (0.4)	0.1 (0.1)	0.6 (0.6)	1.3 (0.6)	0.89	0.46
DELT anomalies[b]	2.5 (0.5) zy	1.2 (0.3) z	4.7 (2.3) y	1.2 (0.3) z	4.04	0.014
Relative abundance (N/h)						
All fish species	821.6 (110.6) z	756.2 (181.2) z	137.0 (41.5) y	201.2 (26.0) y	12.28	0.001

[a] *Lepomis cyanellus.*

[b] Deformities, erosions, lesions, and tumors.

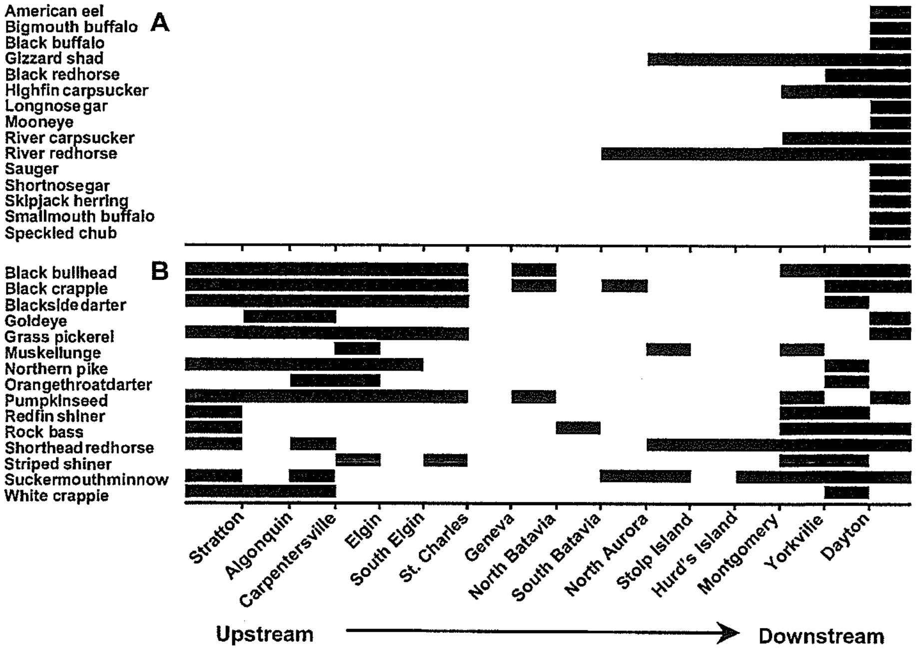

FIGURE 2.—Fox River (Illinois) fishes with (A) truncated distributions (restricted to the lower portion of the study area), namely American eel *Anguilla rostrata*, bigmouth buffalo *Ictiobus cyprinellus*, black buffalo *I. niger*, gizzard shad *Dorosoma cepedianum*, black redhorse *Moxostoma duquesnei*, highfin carpsucker *Carpiodes velifer*, longnose gar *Lepisosteus osseus*, mooneye *Hiodon tergisus*, river carpsucker *C. carpio*, river redhorse *M. carinatum*, sauger *Sander canadensis*, shortnose gar *L. platostomus*, skipjack herring *Alosa chrysochloris*, smallmouth buffalo *I. bubalus*, and speckled chub *Macrhybopsis aestivalis* and (B) discontinuous distributions (typically absent from the middle portion of the study area), namely, black bullhead *Ameiurus melas*, black crappie *Pomoxis nigromaculatus*, blackside darter *Percina maculata*, goldeye *H. alosoides*, grass (redfin) pickerel *Esox americanus*, muskellunge *E. masquinongy*, northern pike *E. lucius*, orangethroat darter *Etheostoma spectabile*, pumpkinseed *Lepomis gibbosus*, redfin shiner *Lythrurus umbratilis*, rock bass *Ambloplites rupestris*, shorthead redhorse *Moxostoma macrolepidotum*, striped shiner *Luxilus chrysocephalus*, suckermouth minnow *Phenacobius mirabilis*, and white crappie *Pomoxis annularis*. Data are from 112 main-stem and tributary stations sampled from 1980 through 2000 (Bertrand et al. 1982; Sallee and Bergmann 1986; Day et al. 1992; Heidinger 1993; Santucci 1994; Pescitelli and Rung, unpublished data; present study). Note that distances between dams are not to scale.

absence of important riffle and run habitat from these areas (Table 2). To account for the absence of riffles and runs, we recalculated the QHEI without the riffle/run metric and still found higher scores at downstream free-flowing (mean ± SE = 65.6 ± 2.6) and midsegment free-flowing (71.2 ± 3.2) stations than at midsegment impounded (42.9 ± 3.9) and upstream impounded stations (35.7 ± 2.2; ANOVA: $F_{3,36}$ = 38.46, P = 0.001). Good-quality instream habitat was typically available throughout free-flowing portions of the river, even in downtown areas, where banks often were stabilized with concrete and where riparian vegetation was degraded or absent.

Habitat quality was an important factor affecting aquatic biota in the Fox River. A strong positive relationship existed between QHEI and IBI scores (Pearson's product-moment correlation: r = 0.89, P = 0.001) and QHEI and MCI scores (r = 0.84, P = 0.001). These strong relations attest to the usefulness of QHEI as a subjective stream habitat assessment tool and underscore the importance of habitat quality to lotic fish and macroinvertebrate communities.

Water Quality

Dissolved oxygen and pH varied on a daily basis at all stations, but the magnitude of the daily oxygen fluctuations was higher at stations in impounded reaches than at those in free-flowing reaches (Figure 3). Dissolved oxygen ranged from 2.5 to 18 mg/L (>200% saturation) in impounded areas and from 5 to 10 mg/L in free-flowing areas. On average, DO maxima were higher in impounded areas (13.8 ± 0.8 mg/L) than in free-flowing areas (9.8 ± 0.4 mg/L) (repeated-measures

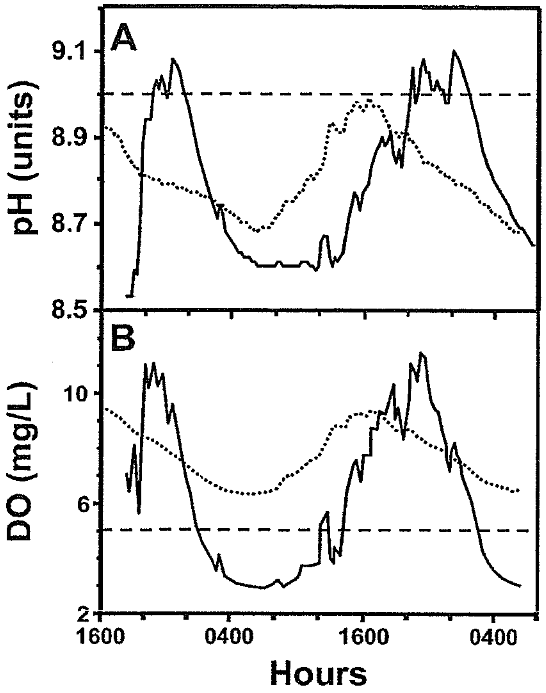

FIGURE 3.—Comparison of (A) pH and (B) dissolved oxygen (DO) between free-flowing (dotted lines) and impounded (solid lines) areas of the Fox River, Illinois, from the North Aurora Dam to the Stolp Island Dam. Similar patterns in DO and pH were observed between free-flowing and impounded reaches of 10 other between-dam river segments monitored during the study. Variables were measured with continuously recording Hydrolab Datasonde water quality monitors over a 40-h period in August 2001. Horizontal dashed lines represent Illinois Environmental Protection Agency ambient water quality standards.

ANOVA: $F_{1,10}$ = 26.13, P = 0.001), and DO minima were lower in impounded areas (4.2 ± 0.7 mg/L) than in free-flowing areas (5.7 ± 0.7 mg/L; $F_{1,10}$ = 6.88, P = 0.02). Mean maximum pH also was higher in impounded areas (9.0 ± 0.08 units) than in free-flowing areas (8.8 ± 0.07 mg/L) ($F_{1,10}$ = 7.35, P = 0.02), but minimum pH ($F_{1,10}$ = 0.03, P = 0.86), maximum temperature ($F_{1,10}$ = 0.40, P = 0.54), and minimum temperature ($F_{1,10}$ = 3.90, P = 0.54) were similar among impounded and free-flowing locations.

Effects of habitat type, time period, and the habitat × time period interaction varied among water quality variables. Dissolved oxygen was the only variable with a significant interaction effect (Table 3), which resulted because differences in DO between morning and evening sample periods were greater for stations in impoundments than for stations in free-flowing areas. Mean DO also decreased from surface to bottom in impounded areas (repeated-measures ANOVA: $F_{2,20}$ = 20.71, P = 0.001) but was similar among vertical locations (surface, middepth, and bottom) in free-flowing areas ($F_{2,20}$ = 2.14, P = 0.15) and among horizontal locations (left, mid-, and right channel) in free-flowing ($F_{2,20}$ = 1.30, P = 0.30) and impounded areas ($F_{2,20}$ = 2.92, P = 0.08). Temperature, pH, and chlorophyll *a* were higher in the evening than during the morning, but none of these variables showed significant habitat effects (Table 3). Turbidity, TP, and TN did not differ between habitat types or sample periods.

Substandard water quality conditions were common in the Fox River (Table 3). Total P and TN were elevated above recommended guidelines at all but the most upstream station (Stratton Dam), and TP was extremely high at all stations below Elgin, Illinois (>0.4 mg/L). High nutrient concentrations led to the development of excessive algal biomass, as indicated by chlorophyll-*a* and turbidity measures that were elevated above recommended guidelines (Table 3). Temperature did not exceed the Illinois water quality standard during the monitoring period, but DO and pH often failed to meet standards in impounded areas. Substandard DO and pH were recorded in 8 of 11 impounded areas, and these conditions often lasted for several hours in a 24-h period (>15 h for substandard DO at two stations). In contrast, DO and pH in free-flowing areas failed to meet standards at only two and one station, respectively.

Concurrent measurements upstream and downstream of dams showed that these structures moderated extremes in DO that developed in impoundments by the physical de- and re-aeration of water flowing over their spillways. Dams oxygenated the river at night, when DO was low in upstream impounded areas, but oxygen was released to the atmosphere during the day as oxygen-supersaturated waters from impoundments flowed over dams. For example, DO decreased by about 5 mg/L each day (1600–1800 hours) and increased by about 3 mg/L each night (0400–0600 hours) as water flowed over the North Aurora Dam (Figure 4). The overall effect of water flowing over dams during a 24-h period was a net reduction in DO from the river and a loss of surplus oxygen produced by daytime algal photosynthesis that then was unavailable to respiring algae at night.

Cumulative Effects of Dams

Patterns in biotic and habitat indices along the upstream–downstream gradient were examined

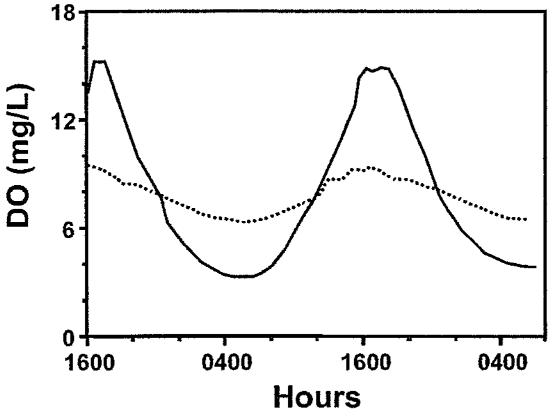

FIGURE 4.—Dissolved oxygen (DO) concentrations upstream (solid line) and downstream (dotted line) of the North Aurora Dam on the Fox River, Illinois. Similar patterns were observed at three additional dams monitored for DO. Concurrent upstream and downstream measurements were made with continuously recording Hydrolab Datasonde water quality monitors over a 40-h period in August 2001. Data were transformed based on point sampling to reflect surface concentrations.

separately for free-flowing and impounded areas because means for these variables varied between habitat types (Tables 1, 2, and 4). The variables TP, TN, and chlorophyll *a* were similar in free-flowing and impounded areas (Table 3), so we pooled data across habitat type for these variables. Scores for the IBI and QHEI did not vary significantly with increasing distance downstream for free-flowing (linear regression for IBI: $r = 0.38$, $P = 0.17$; QHEI: $r = 0.43, P = 0.11$) or impounded areas (IBI: $r = 0.02$, $P = 0.93$; QHEI: $r = 0.15$, $P = 0.60$; Figure 5). The absence of strong patterns in fish and habitat measures as downstream distance and numbers of dams increased indicates that effects of multiple low-head dams were not cumulative for these variables. The TP ($r = 0.68$, $P = 0.001$), TN ($r = 0.32$, $P = 0.03$), chlorophyll *a* ($r = 0.33$, $P = 0.03$), and MCI scores from impounded ($r = 0.62$, $P = 0.01$) and free-flowing ($r = 0.50$, $P = 0.06$) areas showed positive correlations with downstream distance. Although these positive relations could reflect the influence of multiple dams, patterns in the data relative to dam location and density (Figure 5) provided no strong evidence that the effects of dams were cumulative.

Discussion

Our results show that low-head dams adversely affected the biotic integrity of the Fox River on local and landscape scales. Local effects were largely related to the impoundments that formed upstream of each dam, whereas landscape-level effects arose from fragmentation of the river basin and restricted movements of fish. We found that the use of impoundments by important macroinvertebrate and fish taxa was limited by degraded habitat and poor summer water quality conditions. Abundance, richness, and biotic integrity of fish and invertebrate assemblages were consistently lower in impoundments than in the free-flowing river. Degraded habitat, water quality, and biotic communities were found throughout impoundments, not just in the most impacted areas immediately above dams. Conversely, good habitat quality, water quality, macroinvertebrate assemblages, and sport fish and nongame fish communities occurred throughout free-flowing reaches, not just in areas immediately below dams. Differences in fish and invertebrate assemblages might be expected between free-flowing and impounded river reaches, but the magnitude and consistency of differences that we observed indicate that even low-head dams with relatively small impoundments can have profound detrimental effects on the biotic integrity of warmwater rivers.

By impounding water and altering flow patterns, dams modify upstream habitats and elicit changes in the composition of aquatic biota (Hynes 1970; Baxter 1977). The absence of erosional benthic invertebrate taxa and the predominance of tolerant depositional forms (e.g., oligochaetes and chironomids) in Fox River impoundments are typical responses of aquatic invertebrates to impoundment in temperate rivers (Nursall 1952; Paterson and Fernando 1969; Stanley et al. 2002). Fish assemblages also change with impoundment, but unlike the Fox River many impoundment fisheries consist of abundant lake-adapted species that frequently produce high fish yields and exceptional sportfishing and commercial fishing (Ellis 1941; Baxter 1977). Low sport fish abundance in impoundments of the Fox River may reflect the quasi-riverine characteristics of these areas or degraded habitat and water quality conditions. Although the history of impoundment fisheries in the Fox River is not known, present degraded conditions suggest that major habitat restoration (e.g., renovation back to free-flowing conditions) will be necessary if these impoundments are to support high-quality fish assemblages and fishing in the future. Main-stem impoundments also are known to support large populations of facultative riverine species (e.g., gizzard shad *Dorosoma cepedianum*, common carp, and freshwater drum) that invade tributaries

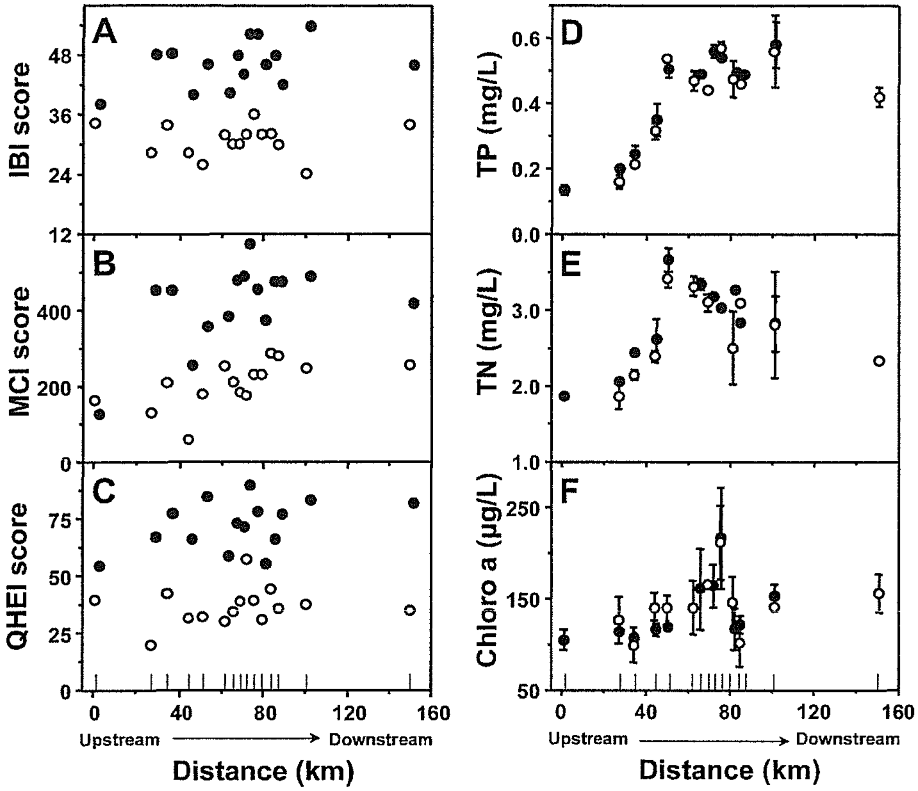

FIGURE 5.—Relations between upstream–downstream distance and (A) index of biotic integrity (IBI), (B) macroinvertebrate community index (MCI), (C) qualitative habitat evaluation index (QHEI), (D) total phosphorus (TP), (E) total nitrogen (TN), and (F) chlorophyll *a* (chloro *a*) for stations in free-flowing (solid circles) and impounded (open circles) areas in the Fox River, Illinois. Biota and habitat were sampled during July–September 2000, and water quality was sampled during August 2001. Values for chlorophyll *a*, TP, and TN are means ±SEs of morning and evening samples. Vertical lines above the *x*-axis indicate dam locations.

and upstream free-flowing reaches of rivers during spring and summer (Ellis 1941; Ruhr 1956; Rodriguez-Ruiz and Granado-Lorencio 1992). Common carp and freshwater drum were abundant at many stations in free-flowing and impounded reaches of the Fox River, possibly reflecting the abundance of impounded habitat created by numerous dams.

Habitat quality appeared to be an important variable in explaining differences in faunal assemblages between free-flowing and impounded areas. We found strong correlations between habitat quality and fish and invertebrate community quality, and index scores were consistently higher in free-flowing reaches than in impoundments. Differences in habitat quality reflected differences in habitat diversity between free-flowing and impounded areas. Free-flowing areas were made up of a variety of physical features (i.e., riffles, runs, and natural pools) that provided a wide array of water depths, current velocities, substrate types, and cover characteristics. In contrast, impoundment habitat was more homogeneous and typically consisted of extensive, deeper open-water areas; lower and more uniform current velocities; and substrates dominated by deposited fine silts and sands. Habitat heterogeneity is important to the conservation of aquatic biodiversity in rivers and streams because abundance and distribution of stream fishes (Rabeni and Jacobson 1993) and benthic invertebrates (Rabeni and Minshall 1977; Reice 1980) are strongly affected by individual or combinations of microhabitat variables. By creating impoundments with limited habitat heterogeneity, Fox River dams restricted the distributions of many fish and invertebrate taxa to free-flowing areas during the important summer–fall growing season. By impounding nearly half of the Fox River's length in

Illinois, the 15 dams likely had a negative effect on the abundance and diversity of aquatic biota in the river.

Little published literature is available on the ecological effects of impoundments formed by low-head dams, but there is existing evidence that our findings are not unique. Habitat quality and IBI scores were substantially lower in an impoundment than in free-flowing sections of the Milwaukee River, Wisconsin (Kanehl et al. 1997). Similarly, Stanley et al. (2002) found that macroinvertebrate communities in impoundments of another Wisconsin river were more degraded than those in free-flowing reaches. Impoundments formed by low-head dams in other northeastern Illinois rivers also have been shown to adversely affect aquatic habitat, fishes, and macroinvertebrates (Pescitelli and Rung 1998; Hammer and Linke 2003). Studies such as these indicate that adverse effects of low-head dams and impoundments may be common, at least for moderate-sized rivers in the Midwest. However, additional descriptive research and manipulative studies (e.g., dam removal studies) that include sampling over multiple seasons and years are necessary to further explain potential variation in the effects of dams within and among river systems and across seasons and years.

Impoundments may play an important role in the development of degraded water quality in rivers with low-head dams. Others have shown that algal abundance is positively related to TP and TN in aquatic systems (Soballe and Kimmel 1987) and that impoundments enhance phytoplankton development in rivers by reducing hydraulic flushing and algal washout and allowing more time for growth in suspension (Talling and Rzoska 1967; Soballe and Kimmel 1987; Lohman and Jones 1999). Phosphorus and nitrogen loading from numerous potential sources (e.g., municipal wastewater treatment plants, fertile native bed material, agricultural fertilizers, and nonpoint urban runoff) has made the Fox River below Elgin, Illinois, among the most enriched rivers in the Midwest (Robertson et al. 2001). In combination with the presence of numerous impoundments, high nutrient input has created an environment that supports excessive algal growth. Daily cycles of photosynthesis and respiration by abundant phytoplanktonic algae, in turn, produced large fluctuations in DO and pH that often resulted in substandard water quality conditions in impoundments.

Large dams and impoundments can have significant effects on the flow regime, geomorphology, and ecology of downstream reaches of rivers (Ward and Stanford 1979; Ligon et al. 1995; Poff et al. 1997). In some cases, changes in temperature and transported organic matter below large dams may reset environmental variables and invertebrate communities to conditions found in upstream tributaries or headwaters (Hauer and Stanford 1982; Soballe and Bachmann 1984). Although smaller low-head dams affected downstream areas in the Fox River by moderating the algae-induced extremes in DO that developed in impoundments, we found no evidence of a resetting of invertebrate assemblage structure to tributary or headwater conditions. On the contrary, small run-of-river dams contributed to higher turbidity (i.e., by continually releasing algae from upstream impoundments) and poorer invertebrate quality in downstream free-flowing areas than were found in free-flowing reaches away from dams. Invertebrate assemblages immediately below dams were influenced by high densities of a few tolerant filter-feeding taxa, such as the caddisflies *Cheumatopsyche* and *Hydropsyche* (Gordon and Wallace 1975), which probably were thriving on abundant algae and other suspended matter released from impoundments (Spence and Hynes 1971a; Parker and Voshell 1983).

It has been suggested that environmental variables respond differently when multiple dams and impoundments occur in a river (Ward and Stanford 1983). Because river transport is largely unidirectional, effects of impoundment might be expected to increase with downstream flow past consecutive dams. However, we found no evidence that multiple dams had cumulative effects (good or bad) on water quality or the quality of fishes, invertebrates, and habitat. In fact, dams affected these parameters in a remarkably similar fashion throughout the river. Current dam theory tells us that response among abiotic and biotic parameters will vary with dam size and function (storage versus run-of-river dams; Poff and Hart 2002) and location within a river system (e.g., low-order headwaters versus high-order alluvial river; Ward and Stanford 1983). The lack of variation in our results may be due to the size and function of the dams examined (i.e., small run-of-river structures with surface spillways and small, shallow impoundments) and the consistent stream order that occurred throughout the study area. When variation did occur, it appeared to be related more to site-specific morphology and habitat characteristics than to downstream location within the series of impoundments. For example, fish and invertebrate assemblages were more similar upstream and downstream of Stratton Dam, possibly because it was the only dam in the low-gradient northern section of river with generally similar habitat characteristics at above- and below-dam stations. The absence of cumulative effects suggests that low-head dams and impoundments may influence rivers more as localized perturbations than cumulative disruptors of downstream transport processes, even when dams are numerous and closely spaced.

Although downstream cumulative effects were lacking, multiple dams seemed to cause upstream cumulative effects on fish movement and distribution patterns within the drainage. Historical fisheries data indicated that dams currently maintain restricted distributions for nearly one-third of fish species known from the Fox River basin. Migration routes in the Fox River have been blocked for species including American eels *Anguilla rostrata*, buffalo, redhorses, carpsuckers *Carpiodes* spp., and skipjack herring *Alosa chrysochloris*. A number of species have isolated populations at the upstream-most reaches of their distributions because of dams, whereas several species may be functionally isolated by the long distance and numerous dams occurring between upstream and downstream populations. The Dayton Dam has isolated all fish populations in the Fox River watershed by preventing the influx of new genetic material from outside sources (e.g., other streams in the upper Illinois River watershed). The temporal and geographic scales at which genetic isolation by dams becomes detrimental to fish populations (i.e., through inbreeding depression) currently are not known, but theoretical population modeling of white sturgeon *Acipenser transmontanus* suggests that increased fragmentation by dams can substantially reduce the likelihood of persistence and can erode genetic diversity within and among surviving populations (Jager et al. 2001). In addition, by acting as barriers to movement, multiple dams prevented recolonization by fishes and freshwater mussels (through the connection between fish hosts and mussel glochidia; Watters 1992, 1996) to additional habitats that may allow for population growth and range expansion within the watershed.

Management Considerations

There is extensive evidence that fish need to move among a wide array of habitats during their life cycle (Schlosser 1991; Schlosser and Angermeier 1995; Pringle et al. 2000; Fausch et al. 2002), and recent studies suggest that directional movement is commonplace, even among species previously thought to be nonmigratory (Schmutz and Jungwirth 1999; Bunt et al. 2001). In their natural form, river ecosystems provide a spatially continuous mosaic of habitats available to specific species and life stages of fish and invertebrates (Fausch et al. 2002). The detrimental consequences of dam blockage of fish movements (i.e., risk of extinction and local extirpations) are well documented for hundreds of species of obligate riverine fishes and invertebrates throughout the Western Hemisphere (see individual species accounts in Pringle et al. 2000).

The widespread detrimental effects of multiple dams and impoundments on the Fox River suggest that the watershed would benefit from reconnection and restoration efforts aimed at removing or modifying main-stem and tributary dams. Options for reconnecting the river include removing dams completely, building rocky ramps at dams, constructing traditional fishways (e.g., Denil fishways), and constructing more natural fish and canoe bypass channels (Santucci and Gephard 2003). Dam removal is the best option when the ecological health of the river is of prime consideration, because it will eliminate barriers to migration for all types and life stages of fish, restore high-quality free-flowing habitat, and improve water quality. In addition, dam removal is less expensive than the other options presented, and it reduces safety risks (e.g., drownings) and maintenance costs by eliminating the structure (Born et al. 1998). The ramping of dams provides for reconnection of the river by allowing fish to pass upstream and downstream, but it does little to improve degraded water quality and habitat because the impoundment remains. Fishways and bypass channels will improve connectivity in the river by allowing many species and life stages of fish to navigate over or around dams (Bunt et al. 2001). However, these options will do nothing to improve habitat and water quality because, as with rocky ramps, the dam and impoundment remain. Fishways and bypass channels also have associated operational costs and maintenance requirements, and building them is more expensive than dam removal (Santucci and Gephard 2003). For these reasons, fishways and bypass channels should be considered only when dam removal is ruled out as a river restoration option.

By examining multiple low-head dams in the Fox River, we have provided clear evidence that these small structures may adversely affect many biotic and abiotic components of rivers and streams on local and landscape scales. Decisions regarding public dams are often complex, involving numerous stakeholder groups and a variety of economic, social, political, and environmental issues. Our results emphasize the importance of environmental concerns in this decision-making process and provide scientific data to river managers and other stakeholders entrusted with the choice of repairing, removing, or retrofitting existing dams with fish passage structures.

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