Midwest Biodiversity Institute
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Biological and Water Quality Study of the Lower DuPage River Watershed: Year 3 Rotation 2018

Will and DuPage Counties, Illinois

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Cover photo: A long, slow stretch of the Lower DuPage River, upstream from the 126th Street Bridge at RM 19.2 (Station LD10).

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Will and DuPage Counties, Illinois

FINAL REPORT

Technical Report MBI/2020-12-20

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FOREWORD

What is a Biological and Water Quality Survey?

A biological and water quality survey, or "bioassessment", is an interdisciplinary monitoring effort coordinated on a waterbody specific or watershed scale. This may involve a relatively simple setting focusing on one or two small streams, one or two principal stressors, and a handful of sampling sites or a much more complex effort including entire drainage basins, multiple and overlapping stressors, and tens of sites. The latter is the case with this study in that the Lower DuPage River watershed represents a defined watershed of approximately 168 square miles in drainage area that has a complex mix of overlapping stressors and sources in a developed suburban landscape. This assessment repeats similar biological and water quality surveys conducted in 2012 (MBI 2014) and 2015 (MBI 2018) and a fish survey of the DuPage River performed in 2007 (MBI file data). Previous surveys and assessments by Illinois EPA and DNR were done with less intense spatial detail. While the principal focus of a biosurvey is on the status of aquatic life uses, the status of other uses such as recreation and water supply, as well as human health concerns, may also be assessed.

Scope of the Lower DuPage River Watershed Biological and Water Quality Assessment

Standardized biological, chemical, and physical monitoring and assessment techniques were employed to meet three major objectives:

1. Determine the extent to which biological assemblages are impaired (using Illinois EPA guidelines);
2. Determine the categorical stressors and sources that are associated with those impairments; and,
3. Compare results to a similar 2012 and 2015 bioassessments of the Lower DuPage River watershed for trend analysis.

The data presented herein were processed, evaluated, and synthesized as a biological and water quality assessment of aquatic life use support status. The assessment made herein is directly comparable to those accomplished in East and West Branches of the DuPage River between 2006 and 2018, such that trends in status can be examined, and causes and sources of impairment can be confirmed, appended, or removed. This study contains a summary of major findings and recommendations for future monitoring, follow-up investigations, and any immediate actions that may be needed to resolve readily diagnosed impairments. It was not the role of this study to identify specific remedial actions on a site specific or watershed basis; however the data can be used to assess the efficacy of remedial actions and as a basis for assessing actions such as water quality trading (WQT).

The 2018 assessment is the first to utilize the analyses and outputs of the Northeastern Illinois Integrated Prioritization System (NE IL IPS; MBI 2020 draft). Specifically biological effect thresholds for five biological condition categories (i.e., excellent, good, fair, poor, and very poor) were developed for 87 chemical water quality, sediment chemistry, and habitat attributes that are more regionally relevant than what has been used previously. For nutrients, this

includes not only more refined thresholds for nutrient parameters, but a provisional nutrient ranking index (NRI) that synthesizes IPS variables into a more integrated measure of potential overall nutrient effects. The IPS also yields a Restorability factor for impaired sites, reaches, and watersheds and Threat/Susceptibility factors for attaining sites. In combination with better stressor thresholds and across five condition categories this has provided a more certain, a more graded, and a more comprehensive assignment of causes and sources of impairment and threats. By placing biological responses on the same numerical scale as stressors (0.1 best, 10 worst), the IPS should ease interpretation and ranking of identified stressors. The high density spatial monitoring design improves confidence in identifying key stressors (i.e., as they repeat among sites and between surveys) and informs assessment of cumulative impacts in a watershed.

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INTRODUCTION

A biological and water quality study of the Lower DuPage River and tributaries was conducted in 2018 to assess aquatic life condition status, identify proximate stressors, and examine chemical/ physical water quality and biological condition relative to publicly owned treatment works and other potential sources of stress and impact. The 2018 survey data were also used to assess trends relative to a fish and habitat survey of the mainstem conducted in 2007 and a more intensive chemical and biological watershed survey in 2012 (MBI 2014) and 2015 (MBI 2018). 14 tributary sites were sampled in 2015 and 2018. The 2007 fish and habitat data are from an MBI survey of Midwestern non-wadeable rivers (MBI 2008).

Data analyses and site selection for the 168 sq. mi. Lower DuPage watershed (excludes East and West Branches) was originally organized by the geometric survey design which displayed chemical and biological results by drainage area categories of 5, 11, 21, 42, 84, and 168 sq. mi. geometric panels. Additional sites that targeted discharges of specific interest or that filled gaps left by the geometric design in the mainstem were also included. MBI has employed the same survey design in the East and West Branch DuPage Rivers and Salt Creek during the period 2006-2016 (MBI 2006a, 2008, 2013, 2014, and 2017). However, the 2012 Lower DuPage survey found that stream sizes were clustered at the extremes of the range of geometric panels such that 90% of tributary sites were <12 sq. mi and all mainstem sites exceeded 200 sq. mi. For this reason, discussions of trends were simplified to follow a binary *mainstem* and *tributary* stratification.

SUMMARY

Aquatic Life Condition Assessment

In 2015, with the exception of the site at the mouth of the Lower DuPage mainstem below the Channahon Dam, the entire Lower DuPage River watershed was impaired for the Illinois General Use aquatic life category based on biological assemblages; in 2018 this has improved to three sites in full attainment (Figure 2). In addition, compared to the earliest data available at each site, five fish sites improve by greater than four points with no declines and 11 macroinvertebrate sites improved by greater than 5 points with 2 sites declining (Table 1). As in the prior Upper DuPage River surveys, smaller tributaries were oftentimes of the poorest quality and reflected the most direct impacts associated with urban runoff, nutrient and organic enrichment, and habitat alteration. No stream site draining less than 20 sq. mi. has fully attained the Illinois biological thresholds within the entire DuPage River basin or the adjacent Salt Creek watershed since the assessments were initiated in 2006. The cumulative results

reflect a consistent inability of small streams in the DuPage River basin as a whole to support assemblages consistent with the General Use for aquatic life (*i.e.,* good or better quality). Impairments in the Lower DuPage watershed appear primarily related to urban runoff and alterations of stream habitat and hydrology associated with channelization, hardening of the landscape, flashy, erratic flows, and impoundments. Elevated chlorides resulting from road salt application and near surface groundwater contamination remain problematic although at somewhat lower levels than in the upstream, more urbanized branches. The Lower DuPage watershed also has a higher amount of agricultural land uses than the Upper DuPage branches with attendant impacts associated with channelization, siltation, and nutrients in runoff. Biological performance and habitat quality at several tributary sites was also reduced due to wetland influenced lentic habitats.

Improvements in water chemistry and macroinvertebrates in 2018 was related to dilution by above normal flows in 2018 and 2015 especially compared to the low-flow conditions in 2012. The improvements, particularly between 2015 and 2018 are encouraging and indicative of incremental changes in watershed quality. The three surveys illustrate the ranges in performance under ranges of annual flow regime and flow effects on stressors. The general trends in biological performance, use attainment, and sources of impairment between surveys remained relatively consistent, but do show incremental progress particularly in the DuPage River mainstem.

Chemical water quality trends in the Lower DuPage watershed in 2018 were very similar to those in the 2018 West Branch DuPage R. survey and to previous surveys of the East and West branches except for some increases in ammonia that appear to originate in the East Branch DuPage River. Sharp increases in nutrient levels in the branches have been consistently observed beginning downstream from major municipal point sources with elevated concentrations extending into the Lower DuPage. Dilution associated with above normal base flows in 2018 resulted in an approximate 50% reduction in point source related nutrient concentrations in the West Branch mainstem and this extended into the Lower DuPage. However, even with the dilution, West Branch nutrients remained well above threshold levels and coincided with depressed dissolved oxygen (D.O.) levels and wide swings in daily D.O. that still exist in the lower DuPage River. A similar trend of lower but still elevated nutrients (particularly phosphorus) coupled with low D.O. levels were still observed in the Lower DuPage.

D.O. stresses in the Lower DuPage were not as severe as during the low-flow summer of 2012 or in the West Branch DuPage mainstem upstream. However, continuous D.O. monitors detected exceedances in the late spring and summer months. Very low springtime D.O. levels in the West and East Branches suggest a pattern similar to the Lower DuPage. DRSCW encountered a pattern of severe declines in D.O. following heavy rainfall events in both the East and West Branch mainstems. The phenomenon included West Branch measurements in 2015 that seemed to coincide with low levels downstream in the DuPage.

In 2018, biological performance in the DuPage River mainstem remained in the fair to good (for fish) and good (for macroinvertebrates) ranges. Impairment in the upper mainstem and

gradual declines in the biology coincide with a long, roughly 14-mile stretch of sluggish flow, abundant macrophytes (Figure 1), and a historically modified river channel. Chronic incidences of low D.O. levels still occurred in this reach despite improved biological performance; elevated nutrient contributions from the East and West Branches upstream likely contribute to this problem. In 2018, the fish assemblage declined to the fair range between the Plainfield and Jolliet Aux Sable WWTPs, a potential indication of a more pronounced D.O. sag; although the macroinvertebrates also declined they remained in the good range. As in earlier surveys, gradual downstream recovery was blunted by the Channahon Dam impoundment at sites at RMs 2.5 and 1.3. Full attainment occurred immediately downstream from the dam and immediately prior to the confluence with the Des Plaines River. The fIBI and mIBI values at the mouth are the highest recorded in the entire DuPage River basin and in northeast Illinois.

Another influence on mainstem fish assemblages are the impoundments formed immediately upstream from the Hammel Woods (RM 10.6) and Channahon (RM 1.05) low head dams. In addition to the elimination of riverine habitat within each pool, the structures are permanent barriers to fish movement, as evidenced by differences in fish species richness between the upstream and downstream reaches (see Table 17). Analysis of selected fish species indicated the Channahon Dam is especially effective at precluding several species from reaching the Upper DuPage Branches from the Lower Des Plaines River resulting in fIBI scores that are lower than that observed below the Channahon Dam. While they are not entirely responsible for the observed impairments, the dams may be an important contributing factor. For this reason, "migration barriers" continues to be assigned as a cause of impairment at sites where "fair" fIBI scores fail to attain the General Use biocriterion.

***Figure 1**. Extensive macrophyte growth in the Lower DuPage River at RM 21.6 in 2012.*

The results of both the 2012, 2015, and 2018 surveys largely confirmed the conclusions of the 2011 Lower DuPage River Basin Watershed Plan Final Technical Report (The Conservation Foundation 2011). The Technical Report found that point source discharges were responsible for the large majority of nutrient (nitrates, phosphorus) loadings in the watershed while nonpoint sources were the primary source of chlorides (from road salt), sediment (agriculture), and fecal coliform bacteria (sewage infrastructure). The 2012-2018 survey results supported similar conclusions as the highest nutrient levels were found downstream from point sources (including those located on the East and West Branches) while chlorides were particularly elevated in smaller tributaries.

Causes of aquatic life impairment for the Lower DuPage watershed were also reported by Illinois EPA in their most recent Integrated Report (IL EPA 2018). The 2018 attainment table includes both MBI and Illinois EPA causes of impairment (Table 1). The causes of aquatic life impairment identified in this report differs somewhat from was reported by Illinois in their most recent Integrated Report (IEPA 2018). IEPA did not sample many of the smaller streams in the watershed and the spatial density of sampling sites was lower. The effort reflected here is also reinforced by three intensive surveys conducted in the watershed from 2012-2018. Total phosphorus was listed as a cause of mainstem impairment by both MBI and IEPA, but MBI also listed nitrate. The Illinois methodology for assigning causes of impairment is based on non-standard thresholds that are the 85th percentile values of all sites statewide and are not effect based. MBI used effect-based total phosphorus and nitrate benchmarks developed in the latest NE IL IPS (MBI 2020, draft) to assign causes associated with aquatic life impairments. The effect-based thresholds identify concentrations associated with impaired conditions in a graded scale of fair, poor, or very poor depending on the magnitude of the actual value in relation to biological responses.

IEPA used exceedances of the Illinois water quality criterion of 500 mg/L to assign chloride as a cause of aquatic life impairment and only the middle reach (GB-11) was considered to be impaired by chloride. The MBI threshold, first developed as part of the DRSCW IPS (Miltner et al. 2010) and recently refined as part of the NE IL IPS analyses (MBI 2020 draft) both resulted in a lower threshold than the existing Illinois water quality criterion based on the relationship between elevated summer chloride concentrations, chloride-sensitive fish species and their link back to the Illinois fIBI benchmark. Chloride is assigned as an associated cause of impairment at all sites. The lower chloride threshold does not infer direct toxicity at 120 mg/L, but rather that an exceedance of that number is likely associated with toxic levels during winter and spring runoff periods, a pattern confirmed in a number of studies in northern waters (Kelly 2008; Kelly et al. 2012; Corsi et al. 2015; Kaushal et al. 2018).

The MBI data did not identify any exceedances of arsenic that IEPA listed as a cause of impairment. IEPA also listed methoxychlor, a pesticide, as a cause of impairment. The MBI sediment chemistry values for methoxychlor in 2015 and 2018 were all below detection levels. Similarly, IEPA identified PCBs as a cause of impairment. PCB cogener data in sediment from 2012, 2015, and 2018 at multiple sites in the DuPage mainstem were all below detection.

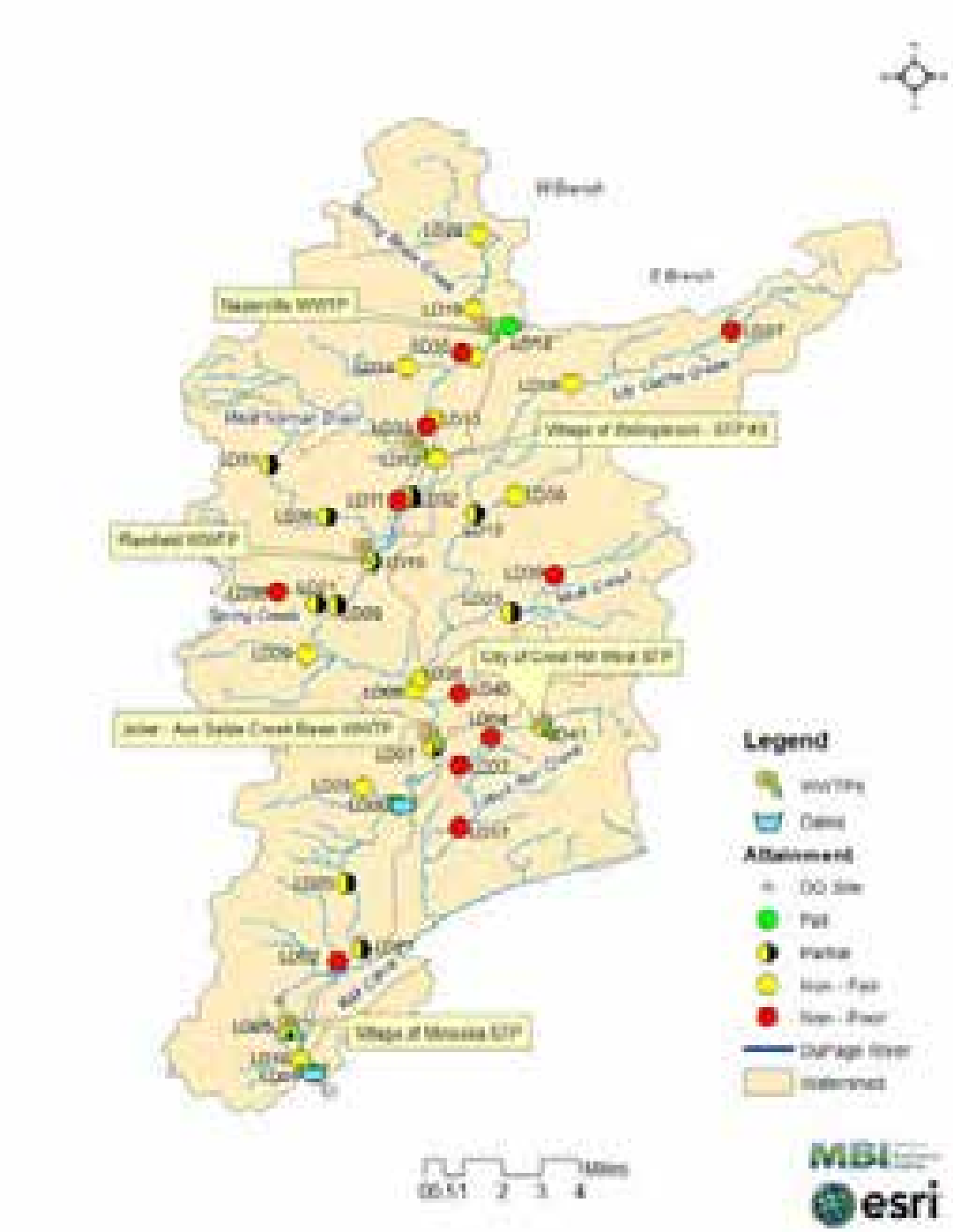

***Figure 2**. Aquatic life use attainment map for Lower DuPage River watershed biological sampling sites in 2018.*

Table 1. *Status of aquatic life use support for stream segments sampled in the Lower DuPage River watershed study area in 2018. All sites with one or more fair or poor index scores are in Non-attainment and categorized as follows: 1) sites with any poor biological performance [i.e., Non (Poor)] are shaded in red and poor scores are underlined; fair quality sites [i.e., Non (Fair)] are shaded in yellow; fair to good quality sites [i.e., Non (Fair/Good)] are shaded in orange and the "good" scores are bold; good quality sites (Full attainment) are shaded in green. MBI assigned causes associated with impaired fIBI and/or mIBIs are compared to previously IEPA assigned causes.*

Site ID	Stream Code	River Mile	Drainage Area (sq mi)	Attain-ment Status	fIBI	mIBI	QHEI	Very Poor	Poor	Fair or Threat	MBI Sources	Segment/Miles 2018 Illinois EPA Causes	IPS Restorability Score (0-100)	IPS Susceptibility Score (0-100)	IPS Threat Score (0-100)
Lower DuPage River - 2018															
LD45	666	26.70	212		DataSonde Only					Low DO, Max DO, DO Swing	WWTP, Urban Runoff	IL_GB-16 (11.31) Dissolved Oxygen, TP	89.0		
LD14	666	26.60	204	Full	41.0	50.2	80.5			TP; Nitrate; Chan; TDS; Chloride; DO; Migration Barrier				78.0	2.0
LD44	666	26.00	218		DataSonde Only					Low DO, Max DO, DO Swing	WWTP, Urban Runoff		89.0		
LD25	666	25.20	218	Partial	32.0	49.8	84.0	Sed: Cr.		TP; Nitrate; TDS; Chloride;Low DO; Migration Barrier	WWTP, Urban Runoff		80.8		
LD13	666	23.10	229	Partial	33.5	44.7	70.5			TP; BOD; Nitrate; Max DO; **QHEI;** Chan; TDS; Chloride; Migration Barrier	WWTP, Urban Runoff, Hydromodification		54.1		
LD12	666	22.00	236	Partial	31.5	48.3	67.5		Chan;	TP; Max DO; **QHEI;** TDS; Chloride; Migration Barrier	WWTP, Urban Runoff, Hydromodification		58.0		
LD11	666	20.80	236	Partial	32.0	46.6	68.0		Chan;	TP; Nitrate; Low DO, Max DO, DO Swing; **QHEI;** TDS; Chloride; Migration Barrier	WWTP, Urban Runoff, Hydromodification		56.2		
LD10	666	18.50	249	Partial	37.5	50.0	64.5			TP; Nitrate; Max DO; QHEI; Chan; TDS; Chloride; Migration Barrier	WWTP, Urban Runoff, Hydromodification		57.6		
LD09	666	17.00	250	Partial	34.5	49.3	73.5	Sed: Cr., Cu, Ni, Zn	Sed: Ba	TP; Nitrate; Low DO, Max DO, DO Swing; **QHEI;** Chan; TDS; Chloride; Migration Barrier	WWTP, Urban Runoff, Hydromodification		59.1		
LD08	666	13.40	314	Partial	33.5	55.1	71.0			TP; **QHEI;** Chan; Chloride; Low DO, Max DO, DO Swing, Migration Barrier	WWTP, Urban Runoff, Hydromodification	IL_GB-11 (10.07) Arsenic, Chloride, Methoxychlor, TP, PCBs, Sedimentation	71.8		
LD07	666	11.40	321	Partial	39.5	54.8	78.0		Sed: Cr	TP; Chan; Chloride; Migration Barrier	WWTP, Urban Runoff		72.3		
LD06	666	9.60	328	Full	43.5	64.9	73.5			TP; Low DO; Max DO; **QHEI;** Chan; Chloride; Turbidity; Migration Barrier				76.9	2.0
LD43	666	8.20	330		DataSonde Only					Low DO, Max DO, DO Swing		IL_GB-01 (8.14) TP	91.7		
LD03	666	7.00	333	Partial	40.5	55.2	75.3	Sed: Cr.	Sed: Zn	TP; Max DO; Chan; Chloride; Migration Barrier	WWTP, Urban Runoff		79.2		
LD02	666	4.70	335	Partial	40.5	53.5	82.5			TP; Max DO; Chloride; Migration Barrier	WWTP, Urban Runoff		84.7		
LD42	666	3.25	355		DataSonde Only					Low DO, Max DO, DO Swing			91.7		
LD05	666	2.50	346	Partial	37.5	64.3	70.0		Impoundment; Sed: Cr	TP; **QHEI;** Chan; Chloride; Migration Barrier	WWTP, Urban Runoff, Hydromodification		71.3		
LD16	666	1.50	348	Non - Fair	21.0	Not Sampled	43.0	**Chan;**	**QHEI; Substr;** Impoundment	TP; Low DO; Chloride; Turbidity; Sed. Metals; Migration Barrier	Hydromodification, WWTP, Urban Runoff,		59.6		
LD01	666	1.00	376	Full	57.5	68.9	84.8			TP; Chloride;				100.0	1.0
				FULL	≥50	>73	>84.5						Very High	Very High	Very High
				FULL	>41-49	41.8-72.9	>75.9						High	High	High
				Non-Fair	30-<41	30-41.7	<75.9						Moderate	Moderate	Moderate
				Non-Poor	>15-29	>15-29	<50.1						Low	Low	Low
				Non-Poor	≤15	≤15	<25.0						Very Low	Very Low	Very Low

***Table 1**. continued.*

Site ID	Stream Code	River Mile	Drainage Area (sq mi)	Attain-ment Status	fIBI	mIBI	QHEI	Very Poor	Poor	Fair or Threat	MBI Sources	Segment/Miles 2018 Illinois EPA Causes	IPS Restorability Score (0-100)	IPS Susceptibility Score (0-100)	IPS Threat Score (0-100)
West Norman Drain (Trib to DuPage R. at RM 20.2)															
LD31	661	5.10	2.4	Partial	26.0	46.7	61.5		Low DO; **Substr;**	**QHEI;** Chan;	Hydromodification, Urban Runoff		53.5		
LD26	661	2.20	6.2	Partial	29.0	62.4	58.0			**QHEI; Substr;** Chan;	Hydromodification, Urban Runoff		54.3		
Mink Creek (Trib to Lily Cache Creek at RM 1.9)															
LD39	662	3.20	4.1	Non - Poor	15.0	28.5	38.5	**Substr;**	Low DO; **QHEI;** Chan; Chloride; TSS;	Conduct; TDS;	Hydromodification, Urban Runoff		30.3		
LD23	662	1.80	8.8	Partial	27.0	47.2	62.0		**Substr;**	Low DO; QHEI; Chan; Chloride; Turbidity	Urban Runoff, Hydromodification		56.2		
Spring Creek (Trib to DuPage R. at RM 17.8)															
LD30	663	1.47	3.4	Non - Poor	17.0	36.1	39.5	**Substr;**	**QHEI;** Chan;	Max DO;	Hydromodification, Urban Runoff		47.5		
LD21	663	0.50	5.3	Partial	20.0	54.4	68.0		Low DO;	**QHEI; Substr;**	Urban Runoff, Hydromodification		75.1		
Springbrook Creek (Trib to DuPage R. at RM 27.1)															
LD19	664	16.30	12.3	Non - Fair	32.0	30.9	56.5			**QHEI; Substr;** Chan; Chloride;	Hydromodification, Urban Runoff		65.4		
LD24	664	4.80	8.9	Partial	29.0	46.7	77.0			**Substr;** Chloride;	Urban Runoff		88.6		
Rock Run Creek (Trib to IL-MI Canal at RM 9.0)															
LD41	665	7.90	5.0	Partial	24.0	43.7	38.0	**Substr;**	Low DO; QHEI;	Conduct; TDS; Chloride;	Hydromodification, Urban Runoff	GBAA-01 (9.64) Unknown	61.4		
LD04	665	6.50	5.0	Non - Poor	12.0	26.5	41.0	Low DO; **Substr;**	**QHEI;** Chan; TDS; Chloride;	TP; TKN; Conduct;	WWTP, Urban Runoff, Hydromodification		23.5		
LD22	665	5.70	5.5	Non - Poor	12.0	22.4	38.0	**Substr;**	**QHEI;** Chan;	TP; BOD; Conduct; TDS; Chloride;	WWTP, Urban Runoff, Hydromodification		41.5		
LD17	665	3.50	10.6	Non - Poor	17.0	29.1	73.0		**Substr;**	TP; TKN; BOD; QHEI; Chloride;	WWTP, Urban Runoff, Hydromodification		66.4		
Hammel Creek (Trib to DuPage R. at RM 10.6)															
LD28	667	1.19	10.7	Non - Fair	23.0	35.9	67.0			Low DO; BOD; QHEI; Substr; Turbidity;	Urban Runoff, Hydromodification		83.8		
				FULL	≥50	>73	>84.5						Very High	Very High	Very High
				FULL	>41-49	41.8-72.9	>75.9						High	High	High
				Non-Fair	30-<41	30-41.7	<75.9						Moderate	Moderate	Moderate
				Non-Poor	>15-29	>15-29	<50.1						Low	Low	Low
				Non-Poor	≤15	≤15	<25.0						Very Low	Very Low	Very Low

***Table 1**. continued.*

Site ID	Stream Code	River Mile	Drainage Area (sq mi)	Attain-ment Status	fIBI	mIBI	QHEI	Very Poor	Poor	Fair or Threat	MBI Sources	Segment/Miles 2018 Illinois EPA Causes	IPS Restorability Score (0-100)	IPS Susceptibility Score (0-100)	IPS Threat Score (0-100)
Lily Cache Creek (Trib to DuPage R. at RM 14.4)															
LD37	668	14.70	4.3	Non - Poor	16.0	30.9	57.8		Low DO; Chloride;	**QHEI; Substr;** Chan; Conduct; TDS; TSS;	Urban Runoff, Hydromodification	GBE-02 (10.05) Unknown	40.1		
LD18	668	11.20	11.1	Non - Fair	22.0	26.7	39.5		**QHEI; Substr;** Chan;	Chloride;	Hydromodification, Urban Runoff		50.8		
LD15	668	6.50	21.4	Partial	23.5	60.0	63.5			**QHEI; Substr;** Chan; Chloride;	Urban Runoff, Hydromodification		58.3		
LD20	668	0.36	46.0	Non - Fair	28.0	36.6	57.0	**Substr;**		Low DO; QHEI; Chan; Chloride; Turbidity	Urban Runoff, Hydromodification		68.2		
Trib #3 to DuPage R. at RM 13.9															
LD40	672	0.80	3.5	Non - Poor	12.0	37.2	42.8		**QHEI; Substr;** Chan; Chloride;	Conduct; TDS;	Hydromodification, Urban Runoff		56.5		
Trib #1 to Lily Chache Cr at RM 6.1															
LD38	673	0.84	5.3	Non - Fair	22.0	32.6	33.3	**Substr;** Chloride;	**QHEI;** Chan; TDS;	TKN; Conduct;	Hydromodification, Urban Runoff		30.4		
Trib #7 to DuPage R. at RM 25.9															
LD35	674	0.16	3.3	Non - Poor	Dry	54.5	Dry	BOD;	TKN;	Chloride; TSS;	Urban Runoff, Hydromodification		58.0		
Trib #6 to DuPage R. at RM 25.4															
LD34	675	1.00	4.7	Non - Fair	22.0	34.3	57.0			Low DO; TKN; **QHEI; Substr;** Chan; Chloride; Turbidity;	Urban Runoff, Hydromodification		47.5		
Wolf Creek (Trib to DuPage at RM 23.7)															
LD33	676	0.14	6.0	Non - Poor	Dry	Dry	Dry		TSS;	TKN; Chloride;	Urban Runoff, Hydromodification		72.5		
East Norman Drain Trib # 5 to Dupage R. at RM 20.5															
LD32	677	0.90	2.8	Non - Poor	18.0	45.5	33.0	BOD;	**QHEI; Substr;** Chan;	TKN; Conduct; TDS; Chloride;	Hydromodification, Urban Runoff		43.8		
Trib #4 to DuPage R. at RM 16.4															
LD29	678	0.60	2.4	Partial	29.0	36.5	59.5		Low DO;	**QHEI;** Chan; TSS;	Urban Runoff, Hydromodification		53.1		
Trib #1 to DuPage R. at RM 4.9															
LD27	679	0.15	2.8	Non - Poor	Dry	45.6	Dry			BOD; Nitrate; TSS;	Urban Runoff, Hydromodification		84.4		
				FULL	≥50	>73	>84.5						Very High	Very High	Very High
				FULL	>41-49	41.8-72.9	>75.9						High	High	High
				Non-Fair	30-<41	30-41.7	<75.9						Moderate	Moderate	Moderate
				Non-Poor	>15-29	>15-29	<50.1						Low	Low	Low
				Non-Poor	≤15	≤15	<25.0						Very Low	Very Low	Very Low

METHODS

Sampling sites (Table 2; Figure 3) were determined systematically using a geometric design that was supplemented by an intensive pollution survey design. The geometric site process starts at the downstream terminus of the watershed as the first site, and then continues by selecting additional "panels" at intervals of one-half the drainage area of the preceding level. Thus, the upstream drainage area of each succeeding level, as one moves upstream, decreases geometrically. While the entire DuPage River basin is 377 sq. mi., the section of the Lower DuPage watershed accounts for 168 sq. mi. (Conservation Foundation 2011) of this area. Subdividing this section resulted in six levels of drainage area, starting at 168 sq. mi., and continuing through drainage area panels of 84, 42, 21, 11, and 5 sq. mi., the smallest drainage area sampled. Additional sites that targeted stream reaches of particular interest such as those that are impacted by wastewater treatment plants (WWTPs), major stormwater sources, dams, and to fill gaps left by the geometric design in the larger mainstem reaches for a total of 41 sampling sites in 2018.

Each site was sampled for fish, stream habitat, macroinvertebrates and water quality, except for macroinvertebrates in the lower Channahon dam pool (LD16/ RM 1.3). Water quality parameters at all sites included nutrients (nitrates and phosphorus), indicators of organic enrichment (5-day biochemical oxygen demand, ammonia-nitrogen, total Kjeldahl nitrogen), indicators of ionic strength (chloride, conductivity, total dissolved solids), total suspended solids, dissolved oxygen (D.O.), pH and water temperature. Water column metals (Ca, Cd, Cu, Fe, Mg, Pb and Zn) were included at selected locations. In 2018, continuous D.O. monitoring was conducted at seven mainstem sites between the Naperville WWTP and Channahon dam pool (RM 21.5-1.3) with some of these sites also sampled in 2016 and 2017. A summary of the number of water and sediment parameters and samples collected in 2018 are found in Table 3.

Macroinvertebrate Assemblage

Macroinvertebrates were sampled using the Illinois EPA (IEPA) multi-habitat method (IEPA 2005) at all sites, except LD16 in the pool behind the Channahon dam. The IEPA method involves selection of a minimum 300 feet sampling reach with instream and riparian habitats typical of the assessment reach, flow conditions that approximate typical summer base flows, no highly influential tributary streams, and includes one riffle/pool sequence or analog (i.e., run/bend meander or alternate point-bar sequence). This method is applicable if conditions allow the collection of macroinvertebrates (i.e., to take samples with a dip net) in all bottom-zone and bank-zone habitat types that occur in a sampling reach. Habitat types are defined explicitly in Appendix E of the Quality Assurance Project Plan (QAPP) (MBI 2012). Conditions must also allow the sampler to apply the 11-transect habitat-sampling method, as described Appendix E of the QAPP[1] or to estimate with reasonable accuracy via visual or tactile cues the amount of each of several bottom-zone and bank-zone habitat types. If conditions (e.g., inaccessibility, water turbidity, or excessive water depths) prohibit the sampler from estimating with reasonable accuracy the composition of the bottom zone or bank zone throughout the

[1] https://www.drscw.org/wp-content/uploads/2019/01/DRSCWQA

Figure 3. *Sampling locations (black dots with associated "LD" station numbers), WWTP discharges (outfall symbols), and significant mainstem dam impoundments (blue impoundment symbols) in the Lower DuPage River watershed study area, 2018.*

***Table 2**. Biological sampling sites in the Lower DuPage River watershed study area, 2018. Chemical sampling was also conducted at each site, but may have been at slightly different river miles.*

Site ID	River	River Mile	Latitude/Longitude	Description
LD14	DuPage River	27.3	41.701220, -88.15102	Upstream Naperville WWTP
LD25	DuPage River	26.0	41.690520, -88.16622	Upstream Naperville Road
LD13	DuPage River	23.8	41.666330, -88.18291	Upstream 119th Street
LD12	DuPage River	22.7	41.652050, -88.18099	Upstream 127th Street
LD11	DuPage River	21.5	41.637180, -88.19077	Downstream 135th Street
LD10	DuPage River	19.2	41.612570, -88.20555	Upstream Rt 126 bridge
LD09	DuPage River	17.7	41.595740, -88.22119	Upstream Renwick Rd bridge
LD08	DuPage River	14.2	41.565380, -88.18916	Caton Farm Rd, dst. Joliet WWTP
LD07	DuPage River	12.2	41.540530, -88.18402	Ust. Black Rd, dst. Joliet WWTP
LD06	DuPage River	10.4	41.521450, -88.19507	Dst. dam at Hammel Woods
LD03	DuPage River	7.8	41.492360, -88.21564	South of Mound Road
LD02	DuPage River	5.5	41.467950, -88.20959	Shepley Rd along Canal Road
LD05	DuPage River	2.5	41.437460, -88.23685	Ust. Hwy 6, dst. Minooka WWTP
LD16	DuPage River	1.3	41.425800, -88.23264	Hwy 6 bridge, impoundment
LD01	DuPage River	0.8	41.420610, -88.22757	Channahon Parkway SP, dst. Channahon dam
LD31	W. Norman Drain (Trib to DuPage R., RM 20.2)	5.1	41.65102, -88.24396	Dst. 127th Street
LD26	W. Norman Drain (Trib to DuPage R., RM 20.2)	2.2	41.630110, -88.22234	Ust. Hwy 30/Lincoln Dr
LD39	Mink Creek (Trib to Lily Cache Creek at RM 1.9)	3.2	41.60797, -88.13737	Dst. Weber Rd.
LD23	Mink Creek (Trib to Lily Cache Creek at RM 1.9)	1.8	41.594010, -88.15345	Dst. Old Renwick Trail Road
LD30	Spring Creek (Trib to DuPage R. at RM 17.8)	1.47	41.60158, -88.24068	Ust. Drander Rd.
LD21	Spring Creek (Trib to DuPage R. at RM 17.8)	0.5	41.597190, -88.22653	Mather Woods foot bridge
LD24	Springbrook Creek (Trib to DuPage R. at RM 27.1)	4.5	41.735900, -88.16571	Dst. Book Rd
LD19	Springbrook Creek (Trib to DuPage R. at RM 27.1)	1.2	41.709200, -88.16875	Dst. 95th Street

***Table 2**. Biological sampling sites in the Lower DuPage River watershed study area, 2018. Chemical sampling was also conducted at each site, but may have been at slightly different river miles.*

Site ID	River	River Mile	Latitude/Longitude	Description
LD41	Rock Run Creek (Trib to IL-MI Canal at RM 9.0)	7.9	41.55166, -88.14163	Ust. Gaylord Dr.
LD04	Rock Run Creek (Trib to IL-MI Canal at RM 9.0)	6.5	41.547040, -88.16081	Ust. Essington Rd
LD22	Rock Run Creek (Trib to IL-MI Canal at RM 9.0)	5.4	41.536590, -88.17275	Ust. Black Rd
LD17	Rock Run Creek (Trib to IL-MI Canal at RM 9.0)	3.5	41.513020, -88.17262	Dst. McDonough Street
LD28	Hammel Creek (Trib to DuPage R. at RM 10.6)	1.19	41.52834, -88.2088	End of Ridge Dr.
LD37	Lily Cache Creek	14.7	41.69968, -88.07026	Dst. S.R. 58
LD18	Lily Cache Creek	10.9	41.67974, -88.13026	Dst. S Weber Rd.
LD15	Lily Cache Creek	6.3	41.632360, -88.16757	Dst. East Main Street
LD20	Lily Cache Creek	0.36	41.570090, -88.18614	Ust. Lily Cache Rd
LD40	Trib #3 to DuPage R., RM 13.9	0.8	41.56549, -88.1723	Ust. Caton Farm Rd
LD38	Trib #1 to Lily Cache, RM 6.1	0.84	41.63733, -88.15218	Dst. 135th Street
LD35	Trib #7 to DuPage R., RM 25.9	0.16	41.69127, -88.1718	Ust. Clearwater Lane
LD34	Trib #6 to DuPage R., RM 25.4	1.0	41.68615, -88.1927	Ust. Pradel Dr.
LD33	Wolf Cr, DuPage Trib RM 23.7	0.14	41.66394, -88.18475	Ust. Book Rd.
LD32	East Norman Drain Trib # 5 to DuPage R. at RM 20.5	0.9	41.6358, -88.1959	Dst. 135th Street
LD29	Trib #4 to DuPage R., RM 16.4	0.6	41.57804, -88.23008	Dst. S Drauden Rd.
LD27	Trib #1 to DuPage R., RM 4.9	0.15	41.46286, -88.2185	Dst. Canal St.

***Table 3**. Number of water chemistry parameters and samples collected in water column and sediment during 2018 in the lower DuPage River watershed.*

Parameters/Category	Water		Sediment	
	Parameters	Samples	Parameters	Samples
All	25	3630	140	846
Fecal Coliform	1	10	0	0
Field pH & Temperature	2	108	0	0
Demand[1]	2	276	0	0
Nutrients[2]	6	1141	0	0
Ionic Strength[3]	4	847	0	0
Suspended Materials[4]	1	222	0	0
Metals	8	1016	13	78
Organic Compounds	0	0	127	768

[1]Includes dissolved oxygen and turbidity; [2]Includes total ammonia, total phosphorus, total nitrate, TKN, , sestonic chlorophyll a (collected twice at mainstem stations only); [3]Includes total chloride, sodium, magnesium, and conductivity; [4]Includes total suspended solids

entire sampling reach, the multi-habitat method is not applicable. In most cases, if more than one-half of the wetted stream channel cannot be seen, touched, or otherwise reliably characterized by the sampler, reasonably accurate estimates of the bottom-zone and bank-zone habitat types are unlikely; thus, the multi-habitat method is not applicable. Multi-habitat samples were field preserved in 10% formalin. Upon delivery to the MBI lab in Hilliard, OH, the preserved samples were then transferred to 70% ethyl alcohol. Laboratory procedures generally followed the IEPA (2005) methodology. For the multi-habitat method, this requires the production of a 300-organism subsample from a gridded tray following a scan and pre-pick of large and/or rare taxa. Taxonomic resolution was performed at the lowest practicable resolution for the common macroinvertebrate assemblage groups such as mayflies, stoneflies, caddisflies, midges, and crustaceans. This goes beyond the genus level requirement of IEPA (2005); however, calculation of the macroinvertebrate IBI followed IEPA methods in using genera as the lowest level of taxonomy for mIBI calculation.

Fish Assemblage

Methods for the collection of fish at wadeable sites was performed using a tow-barge or long-line pulsed D.C. electrofishing apparatus utilizing a T&J 1736 DCV electrofishing unit described by MBI (2006). A Wisconsin DNR battery powered backpack electrofishing unit was used as an alternative to the long line in the smallest streams and in accordance with the restrictions described by Ohio EPA (1987b, 1989, 2015). A three-person crew carried out the sampling protocol for each type of wading equipment. Sampling effort was indexed to lineal distance and ranged from 150-200 meters in length. Non-wadeable sites were sampled with a raft-mounted pulsed D.C. electrofishing device. A Smith-Root 5.0 GPP unit was mounted on a 16' raft following the design of MBI (2012). Sampling effort was indexed to lineal distance and was 500 meters in length. A summary of the key aspects of each method appears in the project QAPP (MBI 2006). Sampling distance was measured with a GPS unit or laser range finder. Sampling locations were delineated using the GPS mechanism and indexed to latitude/longitude and UTM coordinates at the beginning, end, and mid-point of each site. The location of each sampling site was indexed by river mile (using river mile zero as the mouth of each stream). Sampling was conducted within a June 15-October 15 seasonal index period.

Samples from each site were processed by enumerating and recording weights by species and by life stage (y-o-y, juvenile, and adult). All captured fish were immediately placed in a live well, bucket, or live net for processing. Water was replaced and/or aerated regularly to maintain adequate D.O. levels in the water and to minimize mortality. Fish not retained for voucher or other purposes were released back into the water after they had been identified to species, examined for external anomalies, and weighed either individually or in batches. Weights were recorded at level 1-5 sites only. Larval fish were not included in the data and fish measuring less than 15-20 mm in length were generally excluded from the data as a matter of practice. The incidence of external anomalies was recorded following procedures outlined by Ohio EPA (1989, 2015) and refinements made by Sanders et al. (1999). While the majority of captured fish were identified to species in the field, any uncertainty about the field identification required their preservation for later laboratory identification. Fish were preserved for future identification in borax buffered 10% formalin and labeled by date, river or stream, and

geographic identifier (e.g., river mile and site number). Identification was made to the species level at a minimum and to the sub-specific level if necessary. A number of regional ichthyology keys were used including the Fishes of Illinois (Smith 1979) and updates available through the Illinois Natural History Survey (INHS). Vouchers were deposited and verified at The Ohio State University Museum of Biodiversity (OSUMB).

Habitat

Physical habitat was evaluated using the Qualitative Habitat Evaluation Index (QHEI) developed by the Ohio EPA for streams and rivers in Ohio (Rankin 1989, 1995; Ohio EPA 2006b) and as recently modified by MBI for specific attributes. Various attributes of the habitat are scored based on the overall importance of each to the maintenance of viable, diverse, and functional aquatic faunas. The type(s) and quality of substrates, amount and quality of instream cover, channel morphology, extent and quality of riparian vegetation, pool, run, and riffle development and quality, and gradient are some of the metrics used to determine the QHEI score which generally ranges from 20 to less than 100. The QHEI is used to evaluate the characteristics of a stream segment, as opposed to the characteristics of a single sampling site. As such, individual sites may have poorer physical habitat due to a localized disturbance yet still support aquatic communities closely resembling those sampled at adjacent sites with better habitat, provided water quality conditions are similar. QHEI scores from hundreds of segments in the Midwestern U.S. have indicated that values greater than 60 are *generally* conducive to the existence of warmwater faunas whereas scores less than 45 generally cannot support an assemblage consistent with baseline Clean Water Act goal expectations (e.g., the General Use in Illinois). QHEI scores greater than 75 often typify habitat conditions capable of supporting exceptional fish assemblages. These rules-of-thumb have been altered by the NE IL IPS analyses and the newer thresholds were used to assess habitat quality. The threshold for sites to achieve the General Aquatic Life Use in the IPS study area is higher at 75.9 which may be related to the need to have better habitat to offset higher background stressors based on the urban nature of many of the watersheds. The fair and poor QHEI ranges (50 and 25) are similar to narrative cutoffs in Ohio (45 and 30). In any case, degraded habitat features are a strong limiting stressor in many Midwest streams and rivers.

Nutrient Effects Assessment Procedure

A new methodology to assess the effects of nutrient enrichment was introduced in the 2017 Year 1 Upper Des Plaines assessment (MBI 2019). Modeled after the Stream Nutrient Assessment Procedure (SNAP) developed by Ohio EPA (2015b), it includes consideration of the width of the diel variation in continuously measured D.O. and the biomass of chlorophyll a in benthic algae (not available here) in addition to the concentration of total phosphorus and dissolved inorganic nitrogen (nitrates + nitrites). Other nutrient related parameters such as BOD_5, , turbidity, and total Kjeldahl nitrogen (TKN) were included when they were collected (Table 3). Datasondes were deployed long term in summer and early fall during times of low stream flow and elevated summer ambient temperatures (Hach Datasonde 5X). New to this analysis in 2018 is a Nutrient Ranking Index (NRI) that was also developed with IPS outputs (Appendix E). Together these results were used to determine five degrees of nutrient

enrichment (none, low, moderate, high, and severe). This represents the first attempt to use this methodology in the lower DuPage River mainstem, albeit without benthic chlorophyll data.

Data Management and Analysis

MBI employed the data storage, retrieval, and calculation routines available in the Ohio ECOS system as described in the project QAPP (MBI 2012). Fish and macroinvertebrate data were reduced to standard relative abundance and species/taxa richness and composition metrics. The Illinois Fish Index of Biotic Integrity (fIBI) was calculated with the fish data and the macroinvertebrate data were analyzed using the Illinois macroinvertebrate Index of Biotic Integrity (mIBI).

Determination of Causal Associations

Using the results, conclusions, and recommendations of this report requires an understanding of the methodology used to determine biological status (i.e., unimpaired or impaired, narrative ratings of quality) and assigning associated causes and sources of impairment utilizing the accompanying chemical/physical data and source information (e.g., point source loadings, land use). The identification of impairment in rivers and streams is straightforward - the numerical biological indices are the principal arbiter of aquatic life use attainment and impairment following the guidelines of Illinois EPA (2008). The rationale for using the biological results in the role as the principal arbiter within a weight of evidence framework has been extensively discussed elsewhere (Karr *et al.* 1986; Karr 1991; Ohio EPA 1987a,b; 2006a, 2015, Yoder 1989; Miner and Barton 1991; Yoder 1991; Yoder 1995). New in 2018 was the availability of outputs from the Northeastern Illinois Integrated Prioritization System (NE IL IPS; MBI 2020). These outputs included regionally derived stressor threshold for more than 80 chemical and habitat variables and Restorability rankings for impaired sites and Susceptibility and Threat rankings for sites that attained the Illinois General Use biological criteria.

Describing the causes and sources associated with observed biological impairments relies on an interpretation of multiple lines of evidence including water chemistry data, sediment data, habitat data, effluent data, biomonitoring results, land use data, and biological response signatures (Yoder and Rankin 1995; Yoder and DeShon 2003; MBI 2010). Thus the assignment of principal associated causes and sources of biological impairment in this report represents the association of impairments (based on response indicators) with stressor and exposure indicators using linkages to the biosurvey data based on previous experiences within the strata of analogous situations and impacts. Elevated stressor thresholds at sites in full attainment of the biological thresholds are considered potential threats to attainment. The reliability of the identification of associated causes and sources is increased where many such prior associations have been observed and in a dense monitoring design where the diagnosis is observed at multiple sites. This study also benefitted in having three intensive surveys in the area between 2012 and 2018.

For the NE IL IPS the derivation of “FIT” scores were used to examine the strength of predictions for parameter effects and the result of random forest (RF) analyses were as a “statistical control” procedure to weigh causal likelihood where parameters were well correlated This

process relies on multiple lines of evidence concerning the biological response which is the ultimate measure of success in water quality management. The NE IL IPS derived exceedance thresholds for chemical and habitat parameters used in the causal analyses were also used in the tabular and graphical presentation of the chemical water and sediment results. When combined with the Restorability and Susceptibility/Threat rankings this improved the certainty of the assignment of causes and sources to an observed biological impairment. Finally, future monitoring efforts in a rotating basin approach improves these analyses over time as certain stressors are removed, potentially revealing other parameters and strengthening identification of their roles as limiting factors.

The SI process itself is similar to making a medical diagnosis in which a doctor relies on multiple lines of evidence concerning patient health. Such diagnoses are based on previous research that experimentally or statistically links symptoms and test results to specific diseases or pathologies. Thus a doctor relies on previous experiences in interpreting symptoms (*i.e.,* multiple lines from test results) to establish a diagnosis, potential causes and/or sources of the malady, a prognosis, and a strategy for alleviating the symptoms of the disease or condition. As in medical science, where the ultimate arbiter of success is the eventual recovery and well-being of the patient, the ultimate measure of success in water resource management is the restoration of lost or damaged ecosystem attributes including assemblage structure and function. For example, the results of a blood panel are typically paired with "normal" or "elevated" ranges for parameters that represent risks to a patient's health (e.g., low, moderate, high risk).

Hierarchy of Water Indicators

A carefully conceived ambient monitoring approach, using cost-effective indicators comprised of ecological, chemical, and toxicological measures, can ensure that all relevant pollution sources are judged objectively based on environmental results. A tiered approach that links the results of administrative actions with true environmental measures was employed by our analyses. This integrated approach is outlined in Figure 4 and includes a hierarchical continuum, from administrative to true environmental indicators.

The six "levels" of indicators include:

1) actions taken by regulatory agencies (permitting, enforcement, grants, pollutant trading);
2) responses by the regulated community (treatment works, pollution prevention, stream restoration);
3) changes in discharged quantities (pollutant loadings);
4) changes in ambient conditions (water quality, habitat);
5) changes in uptake and/or assimilation (tissue contamination, biomarkers, assimilative capacity); and,
6) changes in health, ecology, or other effects (ecological condition, pathogens).

In this process, the results of administrative activities (levels 1 and 2) can be linked to efforts to improve water quality (levels 3, 4, and 5) which should translate into the environmental

"results" (level 6). An example is the aggregate effect of billions of dollars spent on water pollution control since the early 1970s that have been determined with quantifiable measures of environmental condition (Yoder et al. 2005). Superimposed on this hierarchy is the concept of stressor, exposure, and response indicators. *Stressor* indicators generally include activities which have the potential to degrade the aquatic environment such as pollutant discharges (permitted and unpermitted), land use effects, and habitat modifications. *Exposure* indicators measure the effects of stressors and can include whole effluent toxicity tests, tissue residues, and biomarkers. Each provides evidence of biological exposure to a stressor or bioaccumulative agent. *Response* indicators are generally composite measures of the cumulative effects of stress and exposure and include the more direct measures of community and population response

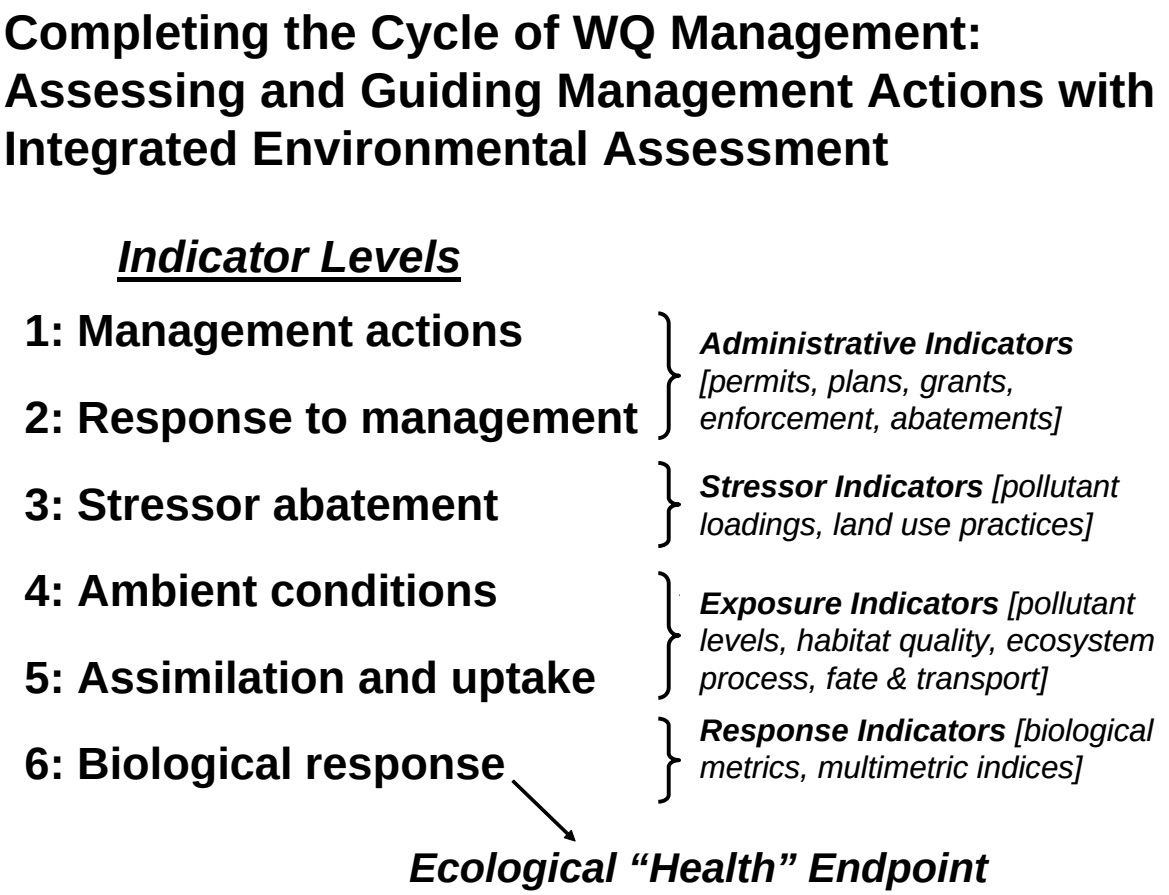

***Figure 4**. Hierarchy of administrative and environmental indicators that can be used for water quality management activities such as monitoring and assessment, reporting, and the evaluation of overall program effectiveness. This is patterned after a model developed by U.S. EPA (1995) and further enhanced by Karr and Yoder (2004).*

that are represented here by the biological indices which comprise the Illinois EPA biological endpoints. Other response indicators can include target assemblages, *i.e.,* rare, threatened, endangered, special status, and declining species or bacterial levels that serve as surrogates for the recreational uses. These indicators represent the essential technical elements for

watershed-based management approaches. The key, however, is to use the different indicators *within* the roles which are most appropriate for each (Yoder and Rankin 1998).

Illinois Water Quality Standards: Designated Aquatic Life Uses

The Illinois Water Quality Standards (WQS; IL Part 303.204-206) consist of designated uses and chemical criteria designed to represent measurable properties of the environment that are consistent with the goals specified by each use designation. Use designations consist of two broad categories, aquatic life and non-aquatic life uses. Chemical, physical, and/or biological criteria are generally assigned to each use designation in accordance with the broad goals defined by each use. The system of use designations employed in the Illinois WQS constitutes a general approach in that one or two levels of protection are provided and extended to all water bodies regardless of size or position in the landscape. In applications of state WQS to the management of water resource issues in rivers and streams, the aquatic life use criteria frequently result in the most stringent protection and restoration requirements, hence their emphasis in biological and water quality assessments. In addition, an emphasis on protecting for aquatic life generally results in water quality suitable for all other uses.

Aquatic life use support for a water body in Illinois is determined by examining all available biological and water quality information. Where information exists for both fish and macroinvertebrate indicators, and both indicators demonstrate full support, the water body is considered in full support independent of the water chemistry results. Where information for both biological indicators exists, and one indicator suggests full support while the other shows moderate impairment, a use decision of full support can be made if the water chemistry data show no indication of impairment. Where one biological indicator is severely impaired, non-support is demonstrated. If information for only one biological indicator exists, water chemistry information is used to inform the use support decision in that a biological result of full support can be overridden if the water chemistry results clearly demonstrate impairment. However, in the Lower DuPage River survey biological data was available for nearly every site.

STUDY AREA DESCRIPTION

The 2018 study area description and Table 4 (land use data) are reproduced from the 2012 survey report (MBI 2014). The watershed map (Figure 5) reflects the 2011 National Land Cover Dataset (NLCD) version. The DuPage River is formed by the confluence of the East and West Branch DuPage Rivers near the northern border of Will County in Naperville. The mainstem runs approximately 28 lineal miles with a drop of 121 feet before entering the Des Plaines River near Channahon in the I&M Canal State Park. Mean flow, measured at the USGS gage at U.S. Rt. 52 in Shorewood (station 05540500) between 2002 and 2012 was 527.5 cubic feet per second (cfs).

The entire DuPage River basin drains a total of 377 square miles, the largest tributary of the Des Plaines River. The upper watershed (*i.e.,* the East and West Branches) includes 209 square miles of highly urbanized land, which exerts a great influence on water quality conditions downstream. The Lower DuPage River watershed includes an additional 168 square miles of mostly urban land and some rural/agricultural land, primarily along the western edge of the watershed in northwestern Will County and small parts of DuPage and Grundy counties (Table ; Figure 5). The lower mainstem has two major tributaries (Spring Brook Creek and Lily Cache) five minor tributaries (Rock Run, Norman Drain, Spring Creek, Wolf Creek, and the I&M Canal) as well as numerous small un-named tributaries. The lower watershed includes all or part of 13 communities; five publicly owned treatment plants discharge treated effluent to the Lower DuPage mainstem between RMs 26.65 and 2.65 while the Crest Hill West WWTP discharges to the headwaters of Rock Run Creek at RM 7.65.

Table 4*. Land uses types by area and percent for the Lower DuPage River watershed. Percentages are based on total watershed area. Land use data is based on Chicago Metropolitan Agency for Planning (CMAP) 2005 land use data. [Note: the table is reproduced from the 2012 survey report (MBI 2014)]*

Land Use Category	Lower DuPage River Watershed	
	Area (acres)	Area (percent)
Residential	34,951	32.44
Commercial and Services	4,338	4.03
Institutional	2,916	2.71
Industrial, Warehousing, and Wholesale Trade	5,596	5.19
Transportation, Communication and Utilities	2,848	2.64
Sub Total Non-Residential Urban	**50,649**	**47.01**
Agricultural Land	28,786	26.72
Open Space	8,771	8.14
Vacant, Wetlands, or Under Construction	15,871	14.73
Water	3,652	3.39
Totals	**107,729**	**99.99**

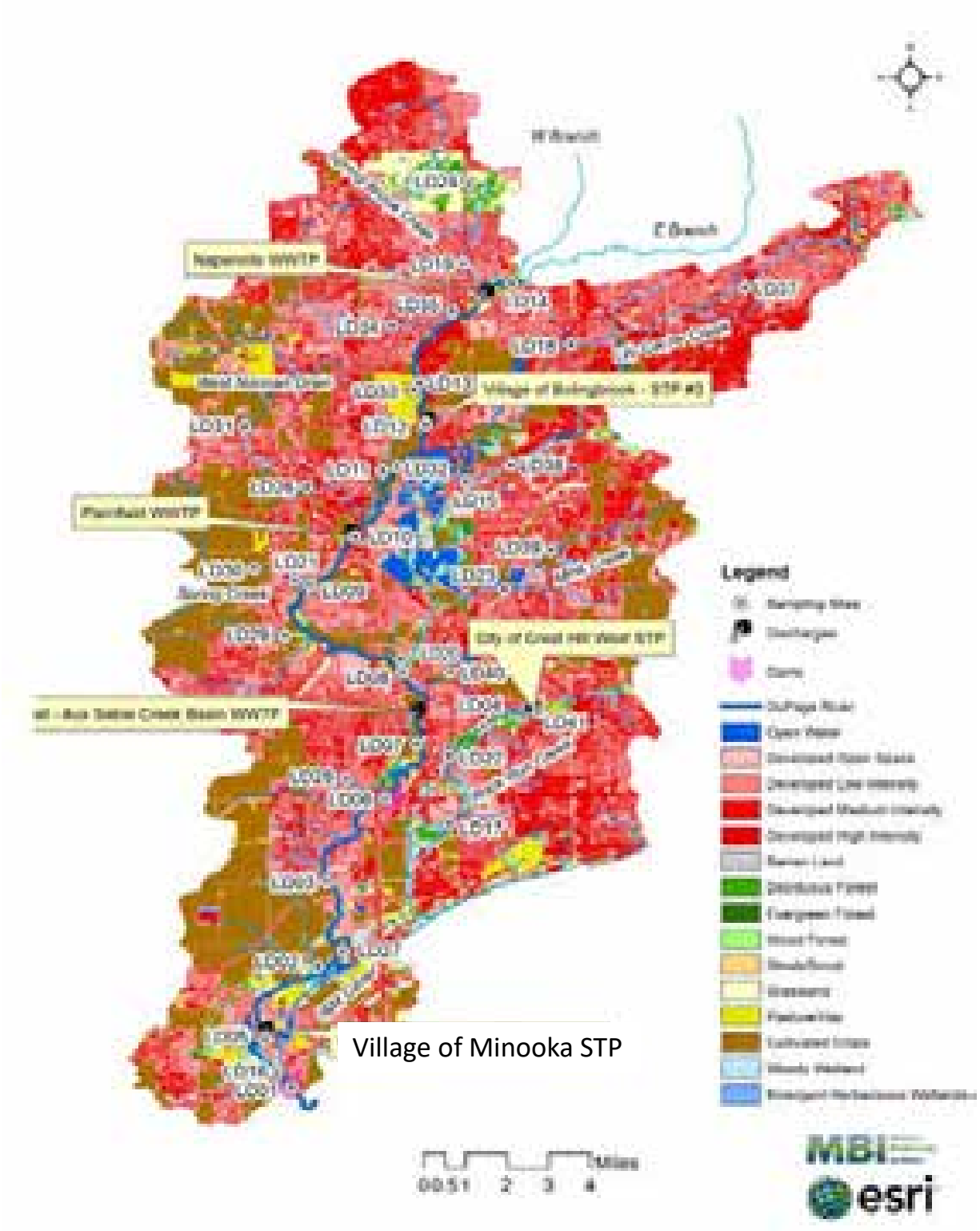

***Figure 5**. Land use types in the Lower DuPage River watershed based on 2011 National Land Cover Dataset (NLCD). http://www.mrlc.gov/nlcd2011.php*

Lower DuPage River Dams

A summary of the dams on the DuPage River appears in Table 5. The following descriptions are reproduced from the 2012 Lower DuPage River watershed survey report (MBI 2014).

Table 5*. Major dams or bed control structures on the DuPage River.*

Dam Name	Affected Waterway	River Mile	Impoundment Size (acres)	Impedes Fish Passage
a) Hammel Woods Dam	DuPage River	10.6	5.2	Y
b) Channahon Dam	DuPage River	1.1	75	Y

Hammel Woods Dam: The Hammel Woods Dam is owned by the Forest Preserve District of Will County (FPDDC) and located within their Hammel Woods Forest Preserve in Shorewood, IL. Spanning the river at River Mile 10.6, the dam is about 300 feet upstream from the IL Route 52 Bridge over the river. The dam is a run of the river structure constructed of quarried limestone with a concrete foundation. Original construction plans of the dam are not available. The dam is a straight, broad crest weir 110 feet across with a total height of about 4 feet and a hydraulic height of 2.3 feet (from spillway crest to tailwater elevation under average flow conditions).

The impoundment created by the Hammel Woods Dam is approximately 1600 feet in length. The surface area of the impoundment is about 5.2 acres. The FPDWC owns the property on either side of the dam as well as the riverbanks within the impoundment. (Adapted from: *Assessments Of The Impacts Of Dams On The Dupage River; Section 4 – Hammel Woods Dam, 2003*). ***This removal of this dam was completed in September 2021.***

Channahon Dam: The Channahon Dam is the first dam on the DuPage River, located 1.1 miles from the DuPage confluence with the Des Plaines River in the I&M Canal State Park in Channahon. The 9-foot high dam has effectively disconnected the DuPage River from the Des Plaines River from a biological standpoint. The impoundment behind the dam extends upstream 4.1 miles and covers an area of 75 acres. The environment within the impoundment is characterized as a deep channel with little or no diversity of flows and silty deposits over a rocky substrate. These conditions have resulted in a poor macroinvertebrate population and relatively low fish diversity (Adapted from: *Assessments Of The Impacts Of Dams On The Dupage River, 2003*). The site above the dam is the lowest scoring site for fish and macroinvertebrates in the mainstem.

In 1996, the dam was breached under extremely high flow conditions, but the damaged structure was fully rebuilt and the impoundment restored in 1998. While a few new species records were found in 2018, MBI sampling from 2007-18 continues to document limited migration (or persistence) of new fish species upstream from the dam during that brief period of unrestricted flow between 1996 and 1998 (see Table 17).

Point Source Discharges

Eighteen permitted point sources were identified within the Lower DuPage River watershed, but only six have significant loadings and pollutants of concern. Design flows and locations of each discharger are listed in Table while discharge volumes and estimated 3rd Quarter loadings of cBOD, TSS and NH3-N from five of the six major WWTPs are illustrated in Figure 6. Trends in 2016-2018 point source flows and loadings from the five point sources are tabulated in Table . The Naperville-Springbrook WRC remains, by far, the largest contributor to flow and thereby tends to dominate loadings. However, the Plainfield WWTP, at just a fraction of the size, contributed proportionately much higher loads of cBOD and TSS in 2016 - 2018 (Figure 6; Table 6).

Under late summer low-flow conditions, point source effluents from the East and West Branches can dominate flows and consequently, the Lower DuPage River can be similarly effluent dominated. For example, during September 2007, effluent composed approximately 76 percent of the flow in the East Branch of the DuPage River and as much as 89-92% in the West Branch during the very dry periods in 2009 and 2012. The phenomenon is most evident in the upper reaches of the mainstem as the large Naperville WRC is located only about a mile below the East and West Branch confluence. Point source influences tend to diminish downstream with increased stream size and comparatively smaller point source inputs. Based on wasteload allocations conducted in the Lower DuPage River Watershed Plan (The Conservation

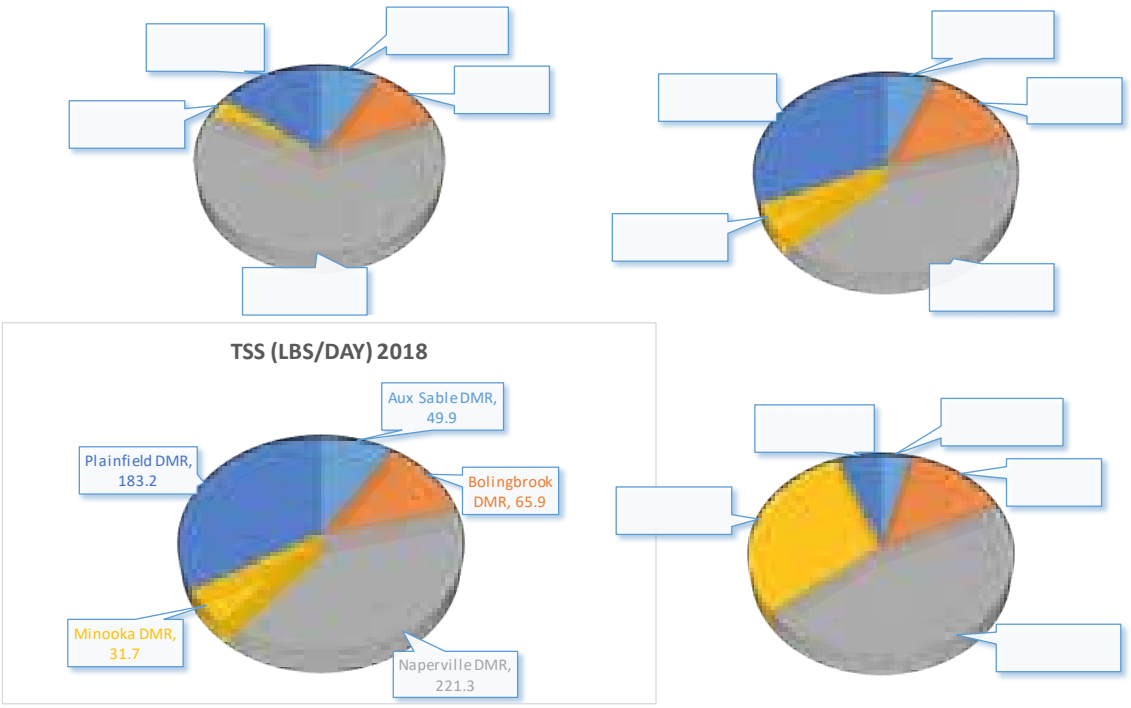

Figure 6*. Relative contributions of point source flow, cBOD, TSS and NH3-N loadings from four of the six major WWTPs in the Lower DuPage River watershed during the 3rd Quarter of 2018. Data was provided by Lower DuPage River Watershed Coalition.*

Table 6. *Municipal wastewater treatment plants located in the Lower DuPage River watershed. DAF = design average flow in million gallons per day (mgd); MDF = maximum design flow (mgd).*

NPDES	Name	DAF (mgd)	MDF (mgd)	Receiving Stream/ (~RM)	Latitude	Longitude
IL0034061	Naperville-Spring Brook WRC	30	55.13	L. DuPage R. (26.65)	41.7000	-88.163333
IL0069744	Bolingbrook WWTP #3	2.8	7.0	L. DuPage R. (22.85)	41.566176	-88.189756
IL0074373	Plainfield N WWTP	7.5	15.0	L. DuPage R. (19.40)	41.616667	-88.208333
IL0076414	Joliet Aux Sable Cr. WWTP	3.2	7.8	L. DuPage R. (13.10)	41.546944	-88.183333
IL0021121	Crest Hill West WWTP	1.3	3.0	Rock Run Cr. (7.65)	41.551667	-88.141667
IL0055913	Village of Minooka WWTP	2.2	5.8	L. DuPage R. (2.65)	41.438333	-88.236944

Table 7. *Third quarter daily loadings (lbs./day) of TSS, CBOD5, and NH_3N from five of six major WWTPs in the DuPage River watershed and mean average effluent flow in MGD (bottom) in 2016, 2017, and 2018.*

2016: Total for July-Sept						
Facility	**Flow (MGD)**	**CBOD (lbs/day)**	**TSS (lbs/day)**	**NH3N (lbs/day)**	**NO3 - N (lbs/day)**	**PHOS (lbs/day)**
Aux Sable DMR	3.0	38.6	68.7	3.9	175.7	61.7
Bolingbrook DMR	2.7	44.2	72.1	5.4	485.4	110.2
Naperville DMR	18.8	273.1	242.5	49.7	2417.0	437.4
Minooka DMR	1.2	20.3	45.9	2.5	170.7	3.5
Plainfield DMR	4.4	196.8	247.3	5.1	214.3	22.7
2017: Total for July-Sept						
Facility	**Flow (MGD)**	**CBOD (lbs/day)**	**TSS (lbs/day)**	**NH3N (lbs/day)**	**NO3 - N (lbs/day)**	**PHOS (lbs/day)**
Aux Sable DMR	2.6	30.2	49.5	6.4	142.2	59.6
Bolingbrook DMR	2.8	52.6	131.6	47.4	88.5	68.4
Naperville DMR	16.9	217.2	204.3	48.6	1973.7	445.9
Minooka DMR	0.9	18.5	25.6	2.2	26.2	1.9
Plainfield DMR	4.2	117.6	182.7	7.0	191.6	22.0
2018: Total for July-Sept						
Facility	**Flow (MGD)**	**CBOD (lbs/day)**	**TSS (lbs/day)**	**NH3N (lbs/day)**	**NO3 - N (lbs/day)**	**PHOS (lbs/day)**
Aux Sable DMR	2.3	24.6	49.9	2.7	277.3	60.4
Bolingbrook DMR	2.9	53.3	65.9	9.4	267.9	68.4
Naperville DMR	17.2	163.9	221.3	31.1	1944.4	399.4
Minooka DMR	0.9	19.0	31.7	20.1	13.2	6.2
Plainfield DMR	4.1	117.9	183.2	4.0	177.8	24.8

Foundation 2011) point sources are the major contributors to loadings of nitrogen and phosphorus. Unlike nonpoint sources, that typically discharge during runoff events, point source loadings persists at all flows and can have significant influences on aquatic life, particularly during periods of low flow.

Lower DuPage River flow Conditions

Measured at the USGS DuPage River gage in Shorewood, mainstem peak and daily average flows were generally elevated in 2018 with most flows above the long-term monthly average flows (Figure 7). From mid-May to October, 2015 and 2018 flows were almost entirely above monthly average while 2012 flows were almost entirely below average and sometimes approached $Q_{7,10}$ (Figure 7).

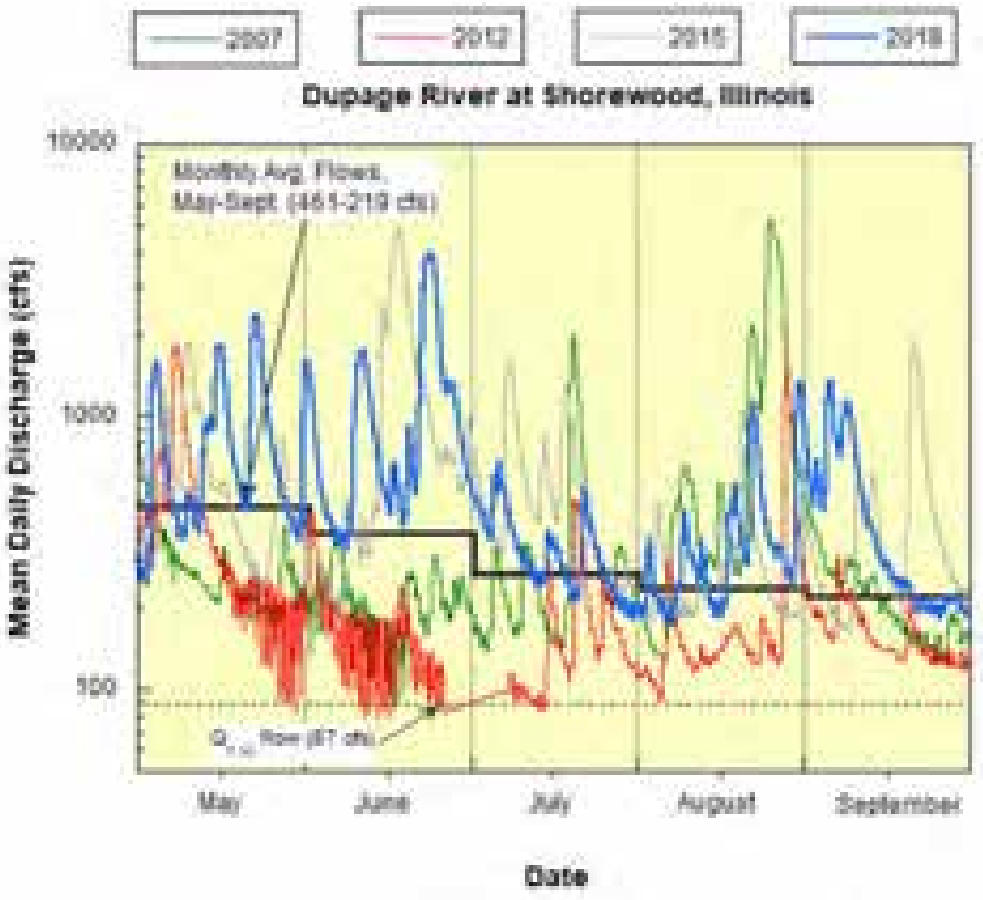

Figure 7*. Flow hydrograph for the Lower DuPage River near Shorewood, IL (USGS station # 05540500) during May-September 2007, 2012, 2015 and 2018.*

RESULTS

Lower DuPage River - Chemical Water Quality

As noted in the 2015 Lower DuPage report, summer base flows in the DuPage River are largely a product of the effluent dominated flows of the East and West Branches. As such, water quality is highly influenced by the concentrations and composition of chemical constituents in those effluents as well as runoff from the urban and developed land cover in those watersheds. In 2015 and 2018, Lower DuPage River water quality samples were collected at higher flows than in 2012, and the quality of treated effluent, with respect to regulated parameters (i.e., cBOD5, TSS, NH3-N), remained generally good, other than some exceedances of dissolved oxygen criteria. Effluents did not result directly in exceedances of water quality standards and rarely exceeded threshold levels considered protective of biological assemblages for these parameters. Mainstem nutrient levels at late summer flows are largely related to wastewater discharges, but were at lower concentrations (particularly for nitrates) in 2015 and 2018 than in 2012 due largely to higher river flows.

Trends in conventional water chemical parameters in the lower DuPage River mainstem and separately for its tributaries are summarized in Table 8. This table provides means of average values, median values, and maximum values of sites in the mainstem (top) and tributaries (bottom) with counts of increasing and declining trends (2015 to 2018) as well as counts of sites within the five narrative ranges of IPS thresholds for the 2018 data. Exceedances of chemical water quality criteria found at watershed sampling sites are listed in Table while D.O. exceedances from seven mainstem continuous monitoring locations are found in Table 10. In stark contrast to the 2012 results, other than for dissolved oxygen, no water quality criteria exceedances were detected in chemical grab sampling or field measurements in 2018. Broad patterns in conventional parameters showed increases in total ammonia, nitrite, and total phosphorus with a majority of sites in the poor-very poor ranges of the IPS thresholds (Table 8, top). Although total ammonia increased in the mainstem compared to 2015 and was elevated in terms of the IPS thresholds, this was not associated with exceedances of Illinois water quality criteria and major dischargers in the mainstem showed declines in 3rd quarter loadings of ammonia, nitrate and phosphorus. As will be discussed below, the increase in total ammonia in the mainstem appears to originate in the East Branch of the DuPage River.

Total ammonia and nitrite values also generally increased in the tributaries and at elevated levels relative to the IPS thresholds for these parameters (Table 8, bottom), but again not elevated above water quality standards. The source of ammonia could be stormwater related during because there were also increase in runoff related parameters (calcium, magnesium, chloride at a majority of sites) and a correlated decline in hardness which can be diluted during storm events. Flows in 2018 showed a series of peaks and were mostly above the monthly mean values and well above the $Q_{7,10}$ values.

Table 8. *Summary of conventional water column chemistry data and trends for mainstem lower DuPage River (top) and lower DuPage River tributaries (bottom) for selected parameters from 2015 vs. 2018. IPS threshold exceedances are presented for 2018 results. Highlighted parameters are those that show an increasing trend and have a majority of sites with median values above the IPS poor or very poor thresholds.*

Parameter Code	Analyte	Av. Samples per Site		Mean (of Means)		Trend (Means)		Mean (of Medians)		Trend (Medians)		Mean (of Max.)		Trend (Max.)		Threshold Exceedences (2018)					Good IPS Threshold
		2015	2018	2015	2018	Incr.	None or Decr.	2015	2018	Incr.	None or Decr.	2015	2018	Incr	None or Decr	Excellent	Good	Fair	Poor	Very Poor	
P310	BOD, 5-day (mg/L)	10	10	2.3	2.3	7	8	2.0	2.0	0	15	3.5	3.9	9	6	0		0	0	0	≤2.25 mg/L
P530	Total Suspended Solids (mg/L)	10	10	21.2	16.3	5	10	12.0	8.0	3	12	71.1	62.6	5	10	0		0	0	0	≤31.6 mg/L
																					≤0.10 mg/L
																					≤0.04 mg/L
P625	Nitrogen, Kjeldahl, Total (mg/L)	10	10	0.8	0.8	7	8	0.8	0.6	3	12	1.9	1.8	10	5		0	0	0	0	≤1.12 mg/L
P630	Nitrate + Nitrite at N (mg/L)	10	10	4.9	5.0	10	5	4.7	5.2	12	3	8.4	8.9	8	7				0	0	<5.05 mg/L
																					≤0.277 mg/L
P70300	Total Dissolved Solids (mg/L)	10	10	567.7	563.0	7	8	573.1	566.3	7	8	722.4	734.7	8	7				0		≤558 mg/L
P900	Hardness (As CaCO3) (mg/L)	5	5	258.8	222.5	0	15	260.0	271.0	11	4	302.3	334.7	12	3	0	0	0	0	0	
P916	Calcium (mg/L)	5	5	59.1	63.7	12	3	59.6	64.1	12	3	68.7	74.6	12	3		0	0	0	0	
P927	Magnesium (mg/L)	5	5	27.0	28.9	13	2	27.1	28.5	10	5	32.2	36.3	14	1	0	0	0	0	0	
P94	Specific Conductivity (uS/cm)	9	12	992.9	956.2	0	15	1008.5	981.7	2	13	1208.7	1093.8	0	15				0		< 1038 mS/cm
																					<120 mg/L
P299	Dissolved Oxygen	10	10	7.0	6.2	8	14	6.9	6.2	8	14	8.2	6.3	6	16		0				<9.25 mg/L
P310	BOD, 5-day (mg/L)	10	10	2.2	3.4	11	13	2.2	3.3	8	16	2.6	4.7	10	14	0			0		<2.25 mg/L
P400	pH, Field (S.U.)	10	10	7.9	7.7	6	16	7.9	7.7	5	17	8.1	7.7	2	20	0	0	0	0	0	<6.5 S.U.
P530	Total Suspended Solids (mg/L)	10	10	16.2	22.1	18	6	15.6	20.5	17	7	23.5	36.8	18	6						≤31.6 mg/L
																					≤0.10 mg/L
																					≤0.04 mg/L
P625	Nitrogen, Kjeldahl, Total (mg/L)	10	10	0.6	1.0	23	1	0.6	1.0	22	2	0.9	1.5	20	4						≤1.12 mg/L
P630	Nitrate + Nitrite at N (mg/L)	10	10	3.4	1.2	13	11	3.5	1.1	13	11	6.2	2.4	12	12	0			0	0	<5.05 mg/L
P665	Total Phosphorus (mg/L)	10	10	0.17	0.25	21	3	0.17	0.24	21	3	0.2	0.3	23	1	0	0			0	<0.277 mg/L
P70300	Total Dissolved Solids (mg/L)	10	10	492.3	559.0	15	9	494.9	557.9	14	10	569.6	658.3	16	8						≤558 mg/L
P900	Hardness (As CaCO3)	10	10	249.5	214.9	3	21	250.9	215.3	3	21	277.0	317.1	15	9	0	0	0	0	0	
P916	Calcium (mg/L)	10	10	55.4	60.1	14	10	55.5	60.0	14	10	62.0	68.5	14	10		0	0	0	0	
P927	Magnesium (mg/L)	10	10	27.0	31.0	19	5	27.1	30.9	19	5	30.3	37.5	20	4	0	0	0	0	0	
P94	Specific Conductivity (uS/cm)	10	10	918.4	953.8	16	9	911.9	911.2	12	13	1064.2	1159.6	16	9				0	0	< 1038 mS/cm
																					<120 mg/L

Continuous D.O. monitoring from 2015-2018 found mainstem diurnal D.O. exceedances including 7 day average, 7-day minimum and never-to-exceed values (Table 10). For several years the DuPage River Salt Creek Workgroup has detected incidents of very low late spring and early summer D.O.s, that may be common to, or effect, the Lower DuPage River. A pattern of severe drops in D.O. levels following rainfall events have been observed in both the East and West Branch mainstems and included 2018 measurements that roughly coincided with exceedances in the Lower DuPage. Although biological condition have improved in the Lower DuPage River since 2012, dissolved oxygen is likely a chronic stress in non-attaining sections of the river. Aquatic plants in the river can influence availability of phosphorus for sestonic and benthic algae. Submerged and emergent aquatic plants, through photosynthesis, add dissolved oxygen to the water during the day, but consume oxygen at night and contribute to diurnal variations in oxygen. The effect can vary by species of aquatic plants and a study on the Hudson River demonstrated that native aquatic macrophyte beds (e.g., *Vallisneria americana*) never lowered oxygen below 5 mg/L during summer months while an exotic species (*Trapa natans*) beds commonly resulted in DO values less than 2.5 mg/L (Carasco and Cole 2002). Although DO did exceed Illinois criteria on some occasions (See Table 10) it is possible that DO could vary spatially within reaches and in 2018 the recovery of all macroinvertebrate score to the good range in the mainstem suggests that DO was not severely limiting to macroinvertebrate assemblages in 2018.

Ammonia is one of the most toxic parameters that influence aquatic life in streams and rivers. The low ammonia IPS thresholds (generally lower than the ammonia WQ criteria) reflects conditions where points sources are absent or well controlled; elevated ammonia may indicate short term treatment upsets (i.e., episodic events) or conditions where pH may occasionally spike (e.g., from algal activity) making un-ionized forms or ammonia toxic for short periods. Mean ammonia concentrations were consistently below the 0.10 mg/L new “Good” IPS threshold of 0.10 in the Lower DuPage mainstem (Figure 8, top) in 2012 and 2015, but were substantially higher in 2018 and throughout most of the mainstem were entirely in the “Fair” range (>0.10-0.19 mg/L) with a few sites reaching the “Poor” range (0.19-0.28 mg/L). These concentrations are below any likely WQC exceedances (chromic criteria ~0.55 mg/L at 25C and pH 8.5 S.U.). Because this trend was observed throughout the mainstem it suggests an upstream source. A similar pattern of higher total ammonia in 2019 vs. 2011 and 2014 in the mainstem of the East Branch of the DuPage River (MBI, in preparation) supports an upstream source for the ammonia increase.

Phosphorus and nitrate levels throughout the Lower DuPage River in 2018 were similar to concentrations in 2015 and in the in the Fair range of the IPS thresholds. These values were consistently lower than in 2012 (Figure 9) when values were largely in the “Poor” IPS range. These concentrations represented a ~50% reduction in concentrations over 2012 when all sites exceeded 1.0 mg/l. Nitrates were similar to those in 2015 and were consistently lower than in 2012 and were in the “Fair” (upper river) to “Good” (lower river) IPS threshold range. In 2012 concentrations started in the “Very Poor” range for nitrate and then moved to the “Poor” and then the “Fair” IPS range in the lower ~12 miles of the DuPage River. The reduction in nutrients between the 2012 and 2015/2018 surveys is likely related to higher base flows (Figure 7);

***Table 9**. Chemical and field parameter concentration (mg/l) exceedances of Illinois water quality criteria in 2016-2018 (highlighted in yellow), 2015 (highlighted in pink) and 2012 (in red) from chemical grab samples and continuous DO Datasonde samples (2015-2018) collected in the Lower DuPage River watershed.*

Site ID	River Mile	Drainage Area (sq. mi)	Parameter Exceeded (Value)		
			2016-2018	2015	2012
Lower DuPage River					
LD14	27.3	212	--	--	D.O. (4.20)
LD45	26.7	213	D.O. cont. mon. (see Table in 2016 and 2017)		
LD44/LD25	26.6/26	219	D.O. cont. mon. (see Table in 2017 and 2018)	--	--
LD13	23.8	230	--	--	D.O. (4.68), (4.62)
LD12	22.7	235	--	--	D.O. (3.88)
LD11	21.5	240	D.O. cont. mon. (see Table in 2018)	D.O. cont. mon. (see Table in 2015 report)	D.O. (3.52)
LD10	19.2	253	--	--	--
LD09	17.7	260	D.O. cont. mon. (see Table in 2018)	D.O. cont. mon. (see Table in 2015 report	--
LD08	14.2	318	--	D.O. cont. mon. (see Table in 2015 report)	D.O. (4.20)
LD07	12	325	--	--	pH (9.08)
LD06	10.4	332	--	--	--
LD43	8.2	338	D.O. cont. mon. (see Table in 2018)	--	--
LD03	7.8	340	--	D.O. cont. mon. (see Table in 2015 report)	pH (9.02)
LD02	5.5	345	--	--	pH (9.02), (9.04), (9.14)
LD42	3.25	350	D.O. cont. mon. (see **Table** in 2016 and 2018)		
LD05	2.5	357	--	D.O. cont. mon. (see Table in 2015 report)	D.O. (4.95)

***Table 9**. Chemical and field parameter concentration (mg/l) exceedances of Illinois water quality criteria in 2016-2018 (highlighted in yellow), 2015 (highlighted in pink) and 2012 (in red) from chemical grab samples and continuous DO Datasonde samples (2015-2018) collected in the Lower DuPage River watershed.*

Site ID	River Mile	Drainage Area (sq. mi)	Parameter Exceeded (Value)		
			2016-2018	2015	2012
LD16	1.3	368	D.O. cont. mon. (see Table in 2016 and 2018)	D.O. cont. mon. (see **Table** in 2015 report)	D.O. (4.12); pH (9.04)
LD01	0.8	376.2	--	--	pH (9.18)
West Norman Drain (Trib to DuPage R. at RM 20.2)					
LD31	5.1	2.4	D.O. (2.89)	NA	
LD26	2.2	6.2	--	--	
Mink Creek (Trib to Lily Cache Creek at RM 1.9)					
LD39	3.2	4.1	--	NA	
LD23	1.8	8.8	--	--	
Spring Creek (Trib to DuPage R. at RM 17.8)					
LD30	1.47	3.4	--	--	
LD21	0.5	5.3	--	NA	
Springbrook Creek (Trib to DuPage R. at RM 27.1)					
LD24	4.5	8.9	--		Diss. Solids (2491.25)
LD19	1.2	12.3	--		D.O. (4.80), (4.16)
Rock Run Creek (Trib to IL-MI Canal at RM 9.0)					
LD41	7.9	3.2	D.O. (2.34)	NA	
LD04	6.5	4.9		D.O. (4.48)	NH3 (5.46, 4.98, 4.56, 5.38, 2.34, 3.02); Diss. Solids (3663.43); D.O. (2.72, 2.50, 3.40, 3.05)
LD22	5.4	5.5		D.O. (4.31)	NH3 (6.37); Diss. Solids (2978.0)
LD17	3.5	10.6		D.O. (4.91)	NH3 (3.69, 3.22), 4.76, 4.96); D.O. (3.29, 3.66, 2.66); Diss. Solids (2412.2);
Hammel Creek (Trib to DuPage R. at RM 10.6)					
LD28	1.19	1.6	--	NA	
Lily Cache Creek (Trib to DuPage R. at RM 14.4)					
LD37	14.7	7	--	NA	
LD18	10.9	11.1	--		Temp °C (34.1); pH (9.04)
LD15	6.3	21.4	--	--	

***Table 9**. Chemical and field parameter concentration (mg/l) exceedances of Illinois water quality criteria in 2016-2018 (highlighted in yellow), 2015 (highlighted in pink) and 2012 (in red) from chemical grab samples and continuous DO Datasonde samples (2015-2018) collected in the Lower DuPage River watershed.*

Site ID	River Mile	Drainage Area (sq. mi)	Parameter Exceeded (Value)		
			2016-2018	2015	2012
LD20	0.2	46	--	--	
Trib #3 to DuPage R. at RM 13.9					
LD40	0.8	3.5	--	NA	
Trib #1 to Lily Cache Cr at RM 6.1					
LD38	0.84	4	--	NA	
Trib #7 to DuPage R. at RM 25.9					
LD35	0.16	3.3	--	NA	
Trib #6 to DuPage R. at RM 25.4					
LD34	1	4.7	--	NA	
Wolf Creek (Trib to DuPage at RM 23.7)					
LD33	0.14	6	--	NA	
East Norman Drain Trib # 5 to DuPage R. at RM 20.5					
LD32	0.9	2.8	--	NA	
Trib #4 to DuPage R. at RM 16.4					
LD29	0.69	2.4	--	NA	
Trib #1 to DuPage R. at RM 4.9					
LD27	0.15	2.8	--	NA	

[a] Dissolved oxygen concentrations in 2012 below the 5 mg/l water quality standard associated with chemical grabs are listed but do not qualify as actual violations because of inadequate sampling frequency.

[b] NA designated sites were not sampled in 2012.

nutrient levels in the West Branch mainstem between 2012 and 2018 experienced very similar declines and trends. From the 2012 survey report, about 71% of phosphorus and 64% of nitrate loads in the Lower DuPage watershed originate from point source discharges (Conservation Foundation 2011) but as observed in 2012, the series of 5 municipal WWTPs between RMs 26.65 and 2.65 tend to sustain nutrient levels but downstream concentrations rarely increased. TKN is a measure of organic nitrogen and ammonia in a waterbody and typically provides a strong signal of organic enrichment. There are no criteria for TKN in Illinois, but elevated levels of TKN at or above the IPS Fair threshold can be used to infer enrichment. Lower DuPage River TKN levels were variable in 2018, but stayed in the "Excellent" range of the IL IPS threshold and did not show the spike to the poor IPS threshold range in the lower part of the river downstream of the Minooka WWTP observed in 2015 (Figure 8 - bottom).

Mainstem BOD_5 levels in 2018 and previous years were in the "Good" range of the IPS benchmark (<2.4 mg/L) except for one site in the Fair range and all fell well below a 3.0 mg/l eutrophication benchmark developed for southern Minnesota streams (Heiskary, et al. 2015). A similar BOD_5 trend was observed immediately upstream in the lower West Branch mainstem in 2012-19. Total suspended solids were largely below IPS threshold levels (Figure 10 - bottom) and in the Good or Excellent concentrations at most sites; these were higher than in 2012, but this is likely related to flow conditions in 2018. The Lower DuPage TSS trend also mirrored

***Table 10**. Dissolved oxygen (D.O.) concentrations (mg/l) in violation of Illinois water quality standards from the Lower DuPage River in Summer 2016 through 2018.*

Site ID	River Mile	Date(s)	Pollutant	Criteria	Standard Exceeded
2016					
LD45	26.7	July - # Days:20	D.O.	<5.0 mg/l	Not to exceed
LD45	26.7	7/23 - 7/31	D.O.	<6.0	7-day Average
LD45	26.7	7/ 1 - 7/ 5	D.O.	<6.0	7-day Average
LD44	26.6	July - # Days:11	D.O.	<5.0 mg/l	Not to exceed
LD44	26.6	7/ 7 - 7/27	D.O.	<6.0	7-day Average
LD42	3.25	7/30 - 7/31	D.O.	<6.0	7-day Average
LD42	3.25	7/22 - 7/26	D.O.	<6.0	7-day Average
LD16	1.5	Aug - # Days: 2	D.O.	<3.5 mg/l	Not to exceed
LD16	1.5	8/ 8 - 8/10	D.O.	<4.0 mg/l	7-day Minimum
LD16	1.5	7/30 - 7/31	D.O.	<6.0	7-day Average
2017					
LD45	26.7	June - # Days:11	D.O.	<5.0 mg/l	Not to exceed
LD45	26.7	July - # Days:12	D.O.	<5.0 mg/l	Not to exceed
LD45	26.7	Aug - # Days: 1	D.O.	<3.5 mg/l	Not to exceed
LD45	26.7	8/15 - 8/22	D.O.	<4.0 mg/l	7-day Minimum
LD45	26.7	9/25 - 9/27	D.O.	<4.0 mg/l	7-day Minimum
LD45	26.7	6/17 - 6/20	D.O.	<6.0	7-day Average
LD45	26.7	7/15 - 7/15	D.O.	<6.0	7-day Average
LD45	26.7	7/23 - 7/28	D.O.	<6.0	7-day Average
LD44	26	June - # Days:12	D.O.	<5.0 mg/l	Not to exceed
LD44	26	July - # Days:13	D.O.	<5.0 mg/l	Not to exceed
LD44	26	Sep - # Days: 7	D.O.	<3.5 mg/l	Not to exceed
LD44	26	Oct - 4	D.O.	<3.5 mg/l	Not to exceed
LD44	26	8/15 - 8/23	D.O.	<4.0 mg/l	7-day Minimum
LD44	26	9/16 - 10/10	D.O.	<4.0 mg/l	7-day Minimum
LD44	26	5/12 - 5/12	D.O.	<6.0	7-day Average
LD44	26	6/15 - 6/21	D.O.	<6.0	7-day Average
LD44	26	7/10 - 7/17	D.O.	<6.0	7-day Average
LD44	26	7/21 - 7/29	D.O.	<6.0	7-day Average
2018					
LD44	26	Sep - # Days: 4	D.O.	<3.5 mg/l	Not to exceed
LD44	26	Oct - 1	D.O.	<3.5 mg/l	Not to exceed
LD44	26	9/ 4 - 9/ 8	D.O.	<4.0 mg/l	7-day Minimum
LD44	26	9/17 - 10/ 5	D.O.	<4.0 mg/l	7-day Minimum
LD11	21.5	July - # Days:27	D.O.	<5.0 mg/l	Not to exceed
LD11	21.5	Aug - # Days: 1	D.O.	<3.5 mg/l	Not to exceed
LD11	21.5	8/ 9 - 8/14	D.O.	<4.0 mg/l	7-day Minimum

***Table 10**. Dissolved oxygen (D.O.) concentrations (mg/l) in violation of Illinois water quality standards from the Lower DuPage River in Summer 2016 through 2018.*

Site ID	River Mile	Date(s)	Pollutant	Criteria	Standard Exceeded
LD43	8.2	July - # Days: 2	D.O.	<5.0 mg/l	Not to exceed
LD43	8.2	Aug - # Days: 2	D.O.	<3.5 mg/l	Not to exceed
LD43	8.2	8/ 4 - 8/10	D.O.	<4.0 mg/l	7-day Minimum
LD43	8.2	7/ 3 - 7/ 7	D.O.	<6.0	7-day Average
LD42	3.25	July - # Days:20	D.O.	<5.0 mg/l	Not to exceed
LD42	3.25	Aug - # Days: 2	D.O.	<3.5 mg/l	Not to exceed
LD42	3.25	8/ 5 - 8/11	D.O.	<4.0 mg/l	7-day Minimum
LD42	3.25	7/2 - 7/20	D.O.	<6.0	7-day Average
LD16	1.5	June - # Days: 2	D.O.	<5.0 mg/l	Not to exceed
LD16	1.5	6/25 - 6/28	D.O.	<6.0	7-day Average

trends in the lower reaches of the West Branch. TSS levels are not considered to be an important contributor to aquatic life impairment.

Total dissolved solids (TDS) and chloride levels in the Lower DuPage mainstem remained remarkably consistent and steady in all years and generally fell in the Fair range for chloride and the Fair/Good range for TDS (Figure 11). For chloride, mean concentrations were well below Illinois WQS criteria but sites in the Fair IPS threshold range based on summer data could have more problematical concentrations during winter or early spring because of road salt runoff during snow melt and other storm events. Recent work on Northern urban areas, including Chicago, has shown the gradually increase in salinization over time, the link between urban land uses and chlorides, and the links between summer concentrations and concentrations exceeding water quality standards during winter and early spring (Corsi et al. 2015). Corsi et al. (2015) stated: “29% of sites studied exceeded the concentration for the USEPA chronic water quality criteria of 230 mg/L by an average of more than *100 individual days* per year during 2006–2011.” Because dissolved ions such as chloride are gradually and continually increasing over time these parameters are likely an emerging problem in most urban areas in northern climates.

Despite significant variation in stream flows between sampling years, trends in dissolved materials were very similar, both in the Lower DuPage River and the lower West Branch mainstem immediately upstream (not pictured). In fact, chloride and TDS levels measured in the Lower DuPage and the larger sections of both mainstem branches have been roughly consistent in each sampling year since 2009. Unlike nutrients, which were largely effluent sourced and tend to vary more with flow, TDS and chloride levels are influenced by non-point runoff and residual road salts that leech from watershed soils and groundwater, in addition to effluents. These persistent background levels, along with maintenance inputs from a series of large point source discharges, appear to keep the constituents at steady and relatively high levels in the larger drainages.

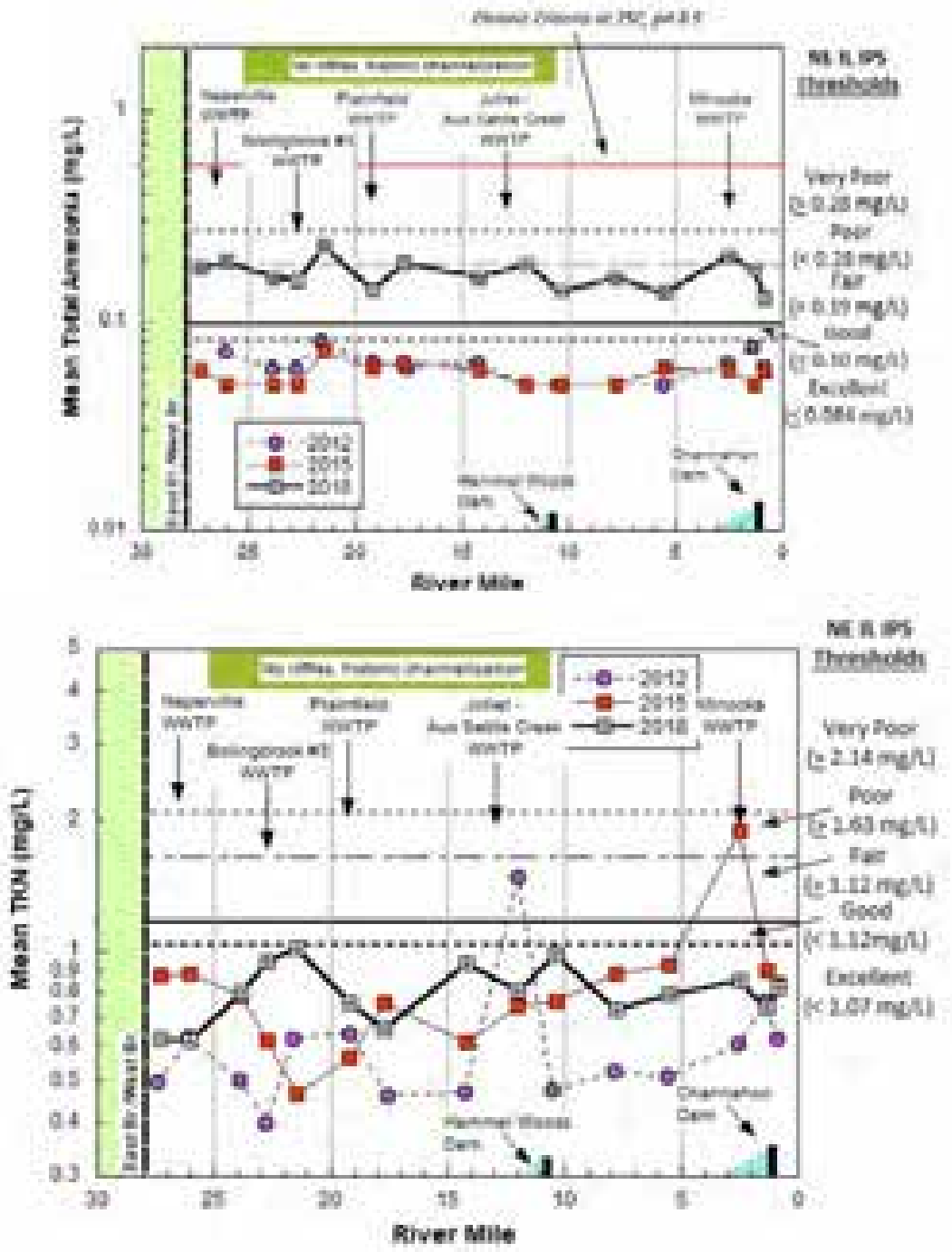

Figure 8*. Mean concentrations of ammonia nitrogen (top panel) and total Kjeldahl nitrogen (bottom panel) in the Lower DuPage River in 2012, 2015, and 2018. The approximate locations of municipal WWTP discharges and dams are noted. Dashed and solid lines represent IPS derived effect thresholds correlated with ranges of biological quality and as listed in Appendix Table A-1.*

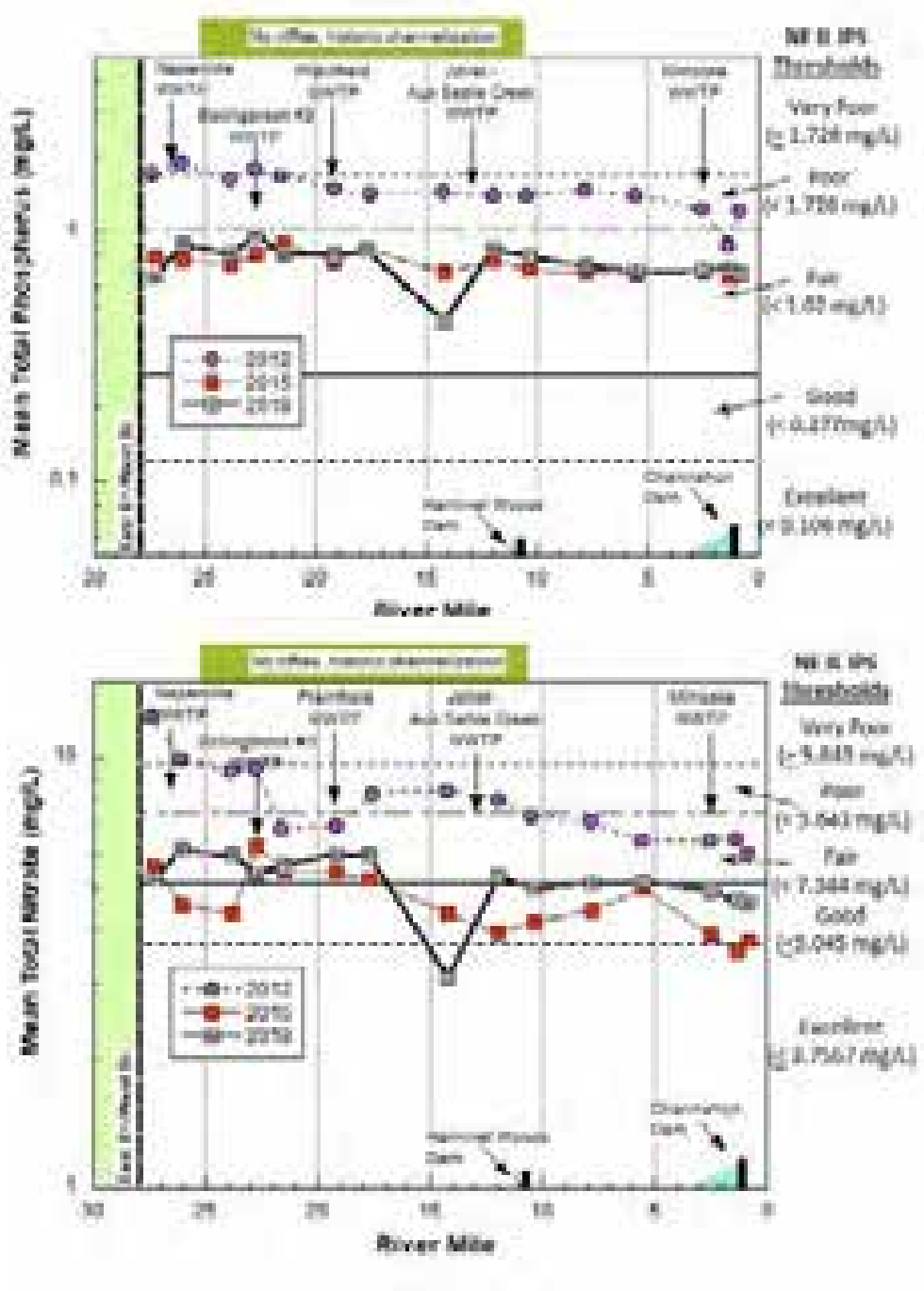

Figure 9. *Mean concentrations of total phosphorus (top panel) and total nitrate (bottom panel) in the Lower DuPage River in 2012, 2015, and 2018. The approximate locations of municipal WWTP discharges and dams are noted. Dashed and solid lines represent IPS derived effect thresholds correlated with ranges of biological quality and as listed in Appendix Table A-1.*

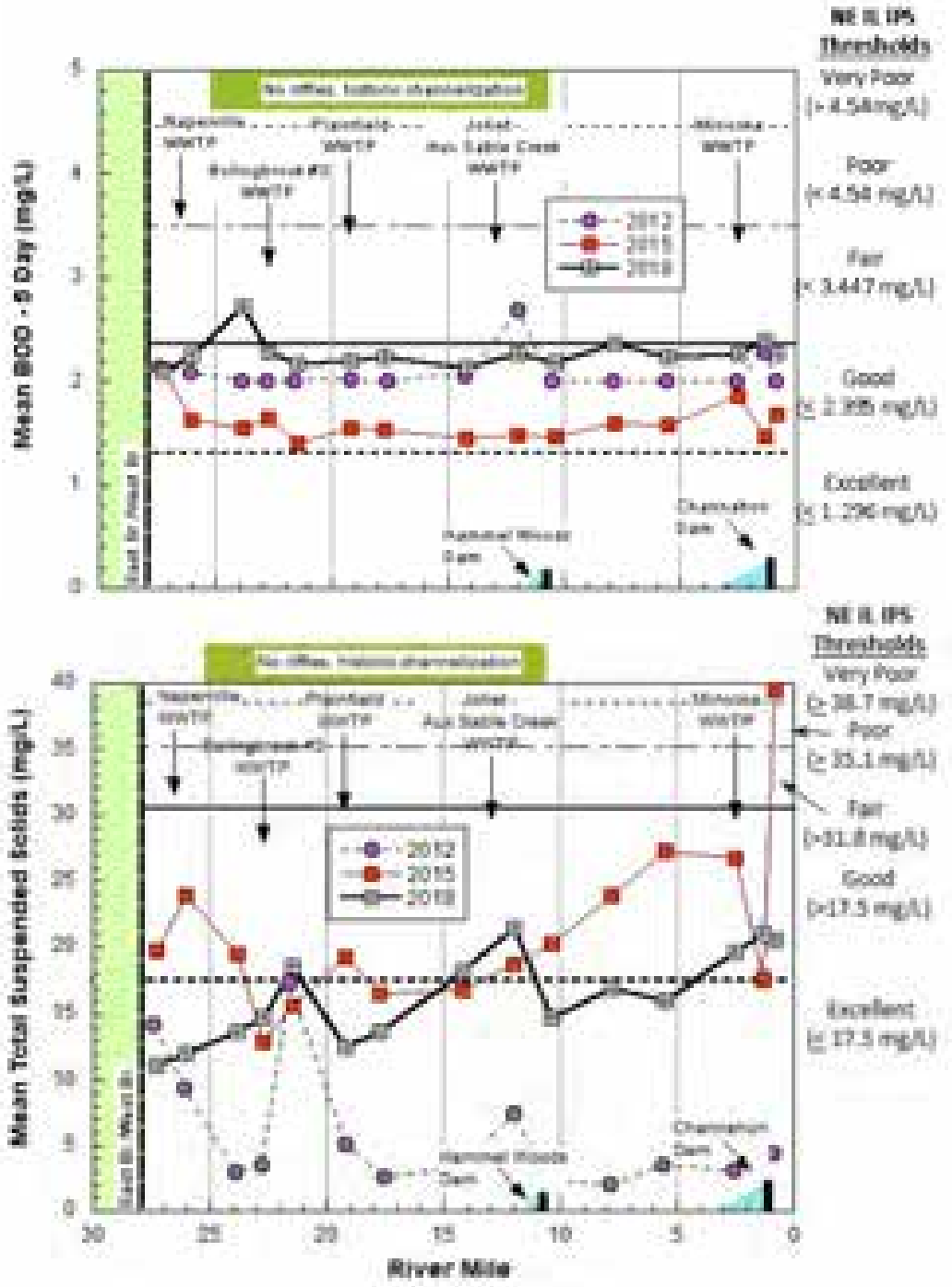

***Figure 10**. Mean concentration of 5-day biological oxygen demand (BOD_5; top panel) and total suspended solids (TSS; bottom panel) in the Lower DuPage River in 2012, 2015 and 2018. The approximate locations of municipal WWTP discharges and dams are noted Dashed and solid lines represent IPS derived effect thresholds correlated with ranges of biological quality and as listed in Appendix Table A-1.*

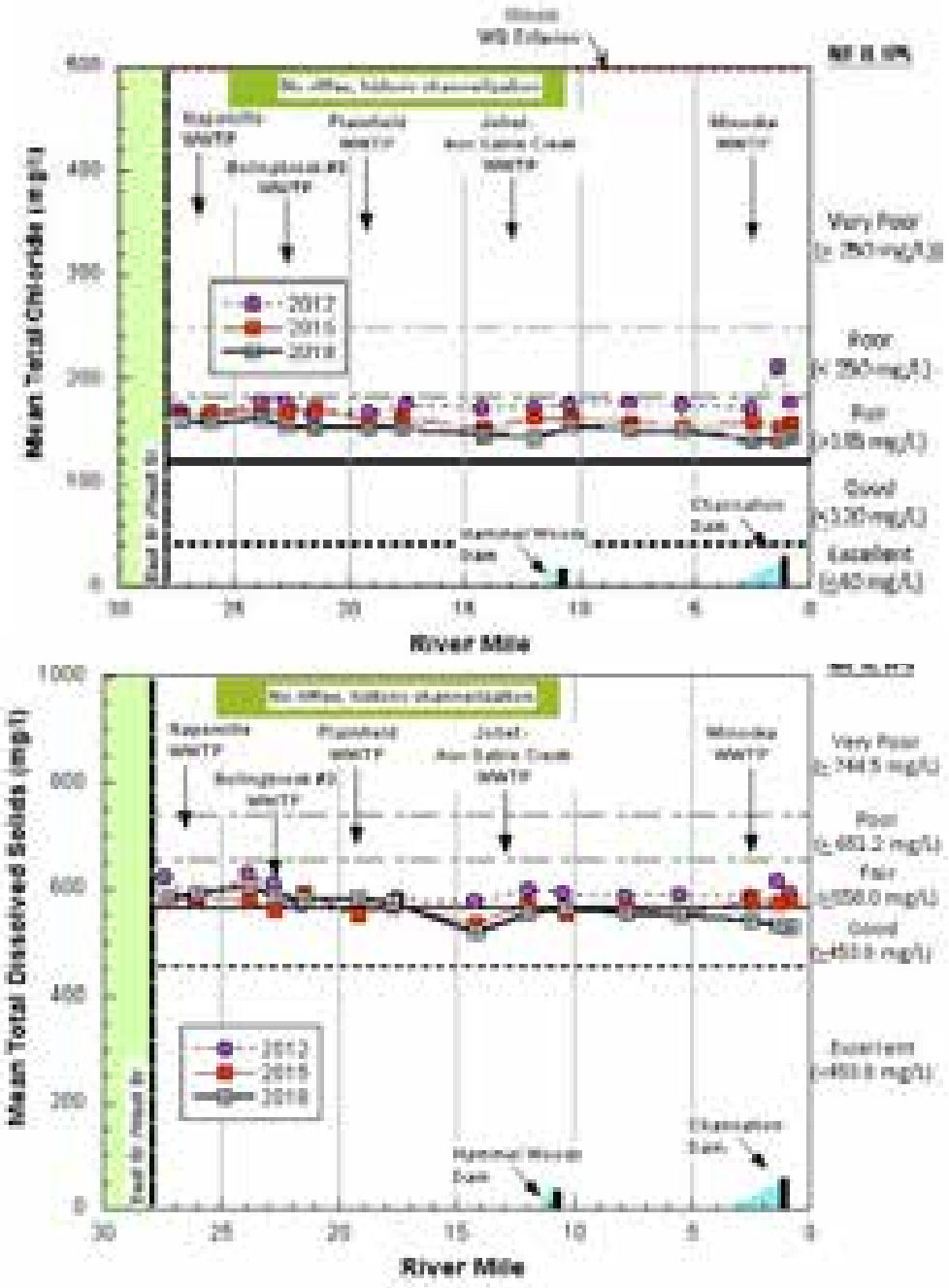

Figure 11*. Mean concentrations of total chloride (top panel) and total dissolved solids (bottom panel) in the Lower DuPage River in 2012, 2015, and 2018. The approximate locations of municipal WWTP discharges and dams are noted. Dashed and solid lines represent IPS derived effect thresholds correlated with ranges of biological quality and as listed in Appendix Table A-1.*

Lower DuPage River Watershed Tributaries

Concentrations of phosphorus, nitrate, chloride and BOD_5 from common 2012, 2015, and 2018 sampling sites were plotted and evaluated for trends (Figure 12) using box and whisker plots. Chlorides were reduced in 2015 and 2018 compared to 2012. Phosphorus and BOD_5 were also lower in 2015 and 2018 compared to 2012. Declines in phosphorus suggest a response to higher base flows in 2015 as a similar trend was observed in the adjacent West Branch watershed.

Summer nitrate levels in both the Lower DuPage and its adjacent watersheds are typically very low in urban drainages outside of WWTP influences (Rock Run Creek below the Crest Hill WWTP being an exception). The increase in nitrates between 2012 and 2015/2018 levels (Figure 12) is not surprising given the greater amount of precipitation and agricultural land use in the watershed. Nitrates in fertilizers tend to dissolve and leach through soils into field tiles and water tables as opposed to insoluble phosphorus, which tends to adhere to soil particles.

The nitrate levels in 2018 were mostly relatively low in the tributaries except for Rock Run below the Crest Hill West WWTP and some slightly elevated values (but still low) at sites likely influenced by runoff and infiltration associated with crop fertilization. Moderately elevated phosphorus levels remain almost entirely restricted to Rock Run Creek, downstream from the Crest Hill WWTP. Although there were no exceedances of WQC for ammonia in any of the tributary sites mean, median, and maximum values increased at most tributary sites (see Table 8). The reason for this trend is unclear; flows were generally similar in 2015 vs. 2018 although it is possible timing of sampling could coincide more closely with a runoff event from a storm. A similar pattern was seen in mainstem samples as well with no criteria exceedances, but increases in ammonia concentrations in 2018 vs. 2015 even though fish and macroinvertebrate assemblages improved.

Nutrient Conditions in the Lower DuPage River Watershed

The impacts of nutrients on aquatic life has been well documented (e.g., Allan 2004) but the derivation of criteria and their form and application are controversial. Unlike toxicants, the influence of nutrients on aquatic life responses is predominantly indirect through pathways such as the effect of algal respiration on dissolved oxygen or through the influence of decomposition on dissolved oxygen dynamics. In addition, nutrients can have effects on food sources for macroinvertebrates and fish and the response of aquatic life to nutrient concentrations can be influenced by habitat (e.g., substrate composition), stream flow and scouring, temperature and shading. Illinois is the leading state in terms of percent of load exported of nitrogen (16.8%) and phosphorus (12.9%) to the Gulf of Mexico (US EPA 2009) where a large anoxic zone has been created (EPA SAB 2008).

In Illinois, as in other states, efforts are underway to derive nutrient water quality criteria for aquatic life. The U.S. EPA Inspector General (IG) concluded that the U.S. EPA, with regard to nutrient criteria, failed to adequately monitor and measure progress and "would consider promulgating numeric nutrient standards for a State if it had not substantially completed adopting numeric nutrient criteria in accordance with its plan by the end of 2004 (US EPA

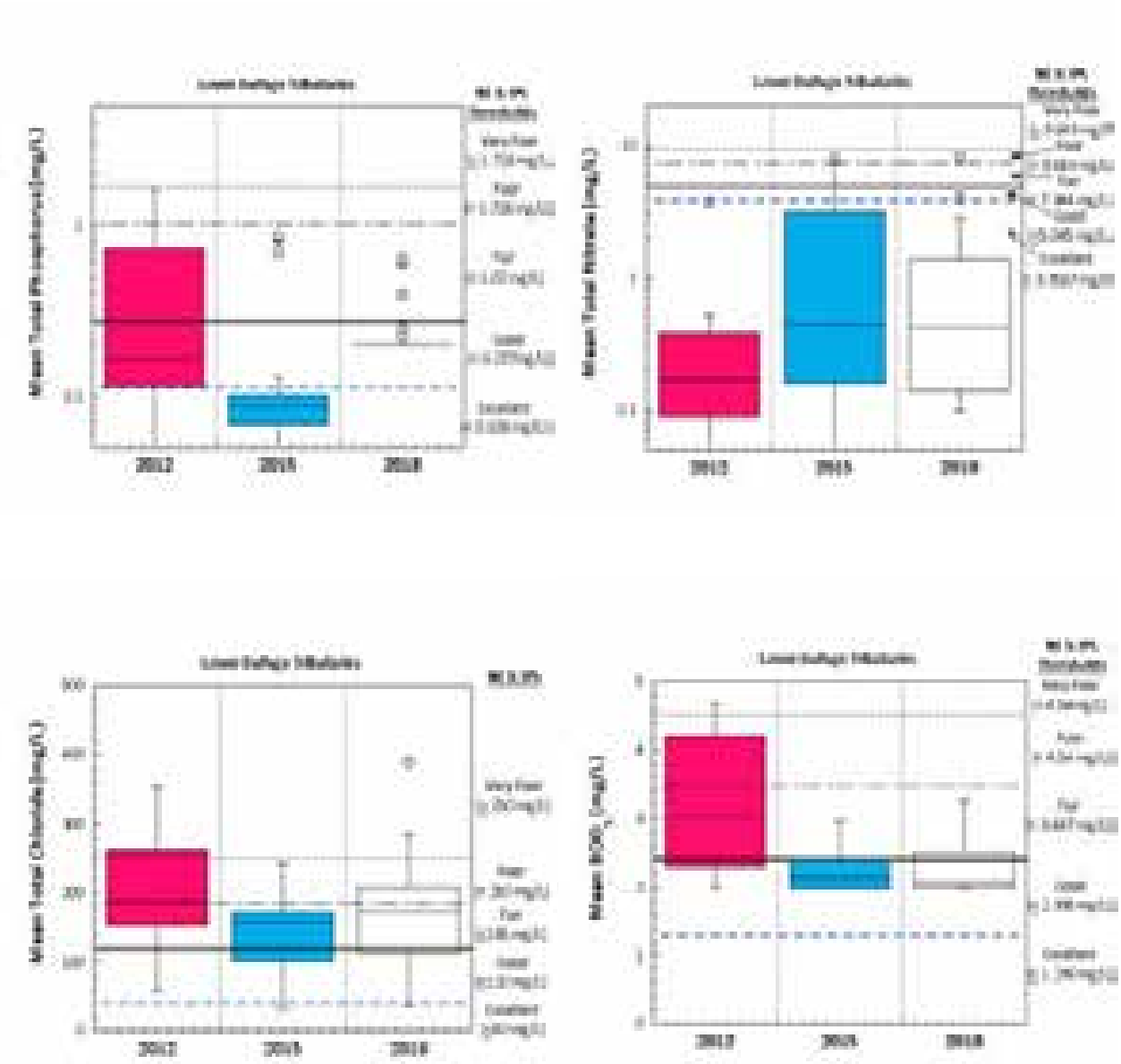

***Figure 12**. Box and whisker plots of total phosphorus, nitrate, chloride and BOD5 from similar tributary sampling sites in 2012, 2015, and 2018.*

2009).” The IG concluded that US EPA failed to sanction states who had not made progress and provided Illinois as an example because of Illinois EPA’s “apparent belief that it did not need numeric nutrient criteria” (USEPA 2009). In this section of the report, we present the results of a multi-parameter approach modified from the Ohio SNAP method (Ohio EPA 2015a) and the newer large rivers methodology (Miltner 2018) as described in the Methods section. It also includes Nutrient Ranking Index (NRI) that is part of the NE IL IPS outputs (MBI 2020; Appendix E). The NRI consists of a summed ranking of each of the individual nutrient or nutrient-related stressor parameters with each weighted based on a tightness of fit coefficient (FIT). At this point it is a standalone indicator that is compared to the modified SNAP outcome.

The results are detailed in a matrix that shows the fish and macroinvertebrate IBIs, the QHEI score, total P, nitrate-N, TKN, the maximum and minimum D.O. (based on continuous DO data), the width of the diel D.O. swing, an overall rating of the degree of nutrient enrichment based on the frequency and magnitude of exceedances of thresholds for the aforementioned indicators and parameters, and the NRI in the 2018 study area (Table 11).

There has been a wide range of approaches to deriving the targets used to assign nitrate a possible cause of impairment that was used in earlier reports. A 10 mg/l water quality criterion is essentially a human health criterion for drinking water consumption by susceptible groups (e.g., pregnant women or infants) that might have health issues with this concentration of nitrates. The Illinois EPA derived target number for nitrate is 7.8 mg/l. In contrast, U.S. EPA (2000) developed nutrient ecoregion targets (e.g., 25th percentile) which for Ecoregion 54 in Nutrient Ecoregion VI would be 1.78 mg/l. In their Lower DuPage River watershed plan, the Conservation Foundation (2011) used a value of 3.2 mg/l that was selected as middle to high values of the recommended Ecoregion ranges "due to the wastewater treatment contributions in the watershed." We consider the combination of the modified SNAP procedure (albeit without benthic chlorophyll data) and the NRI (Table 11) as an advance over the other targets, but still an incomplete assessment of the influence on nutrients on aquatic life in the lower DuPage watershed. Even though we do not have continuous DO or chlorophyll data from the tributaries, indicators such as TKN can identify potential threats from nutrients or enrichment.

As discussed previously, nutrient levels in the Lower DuPage River mainstem are heavily influenced by WWTP inputs from its sources upstream, the East and West Branches. In each Lower DuPage survey, phosphorus and nitrate levels have ranged from highly elevated to slightly elevated, depending largely on flow conditions and contributions from upstream point sources (, Figure 9). Concentrations have tended to be highest in the extreme upper mainstem, nearer to the confluence with the branches. Under very low-flows in 2012, nitrates routinely exceeded the 10 mg/l criterion in the upper reach and phosphorus was almost entirely above the recommended 1.0 mg/l effluent limit from headwaters to mouth. In both surveys, contributions from WWTPs along the Lower DuPage mainstem may have helped maintain nutrient levels but parameters experience minimal change downstream from the discharges. Both median and mean ammonia concentrations were near or below detection throughout the DuPage River mainstem in 2012 and 2015, but there was an increase in ammonia in 2018, albeit in the IPS fair range, but none were exceedances of water quality criteria that depend on temperature and pH (Figure 8, top)**.** This likely originated in the upper part of the watershed.

Table 11. *Results of applying an interim modified Stream Nutrient Assessment Procedure to sites in the 2018 DuPage River study area. Descriptions of how each result reflects the degree of nutrient enrichment effects and results in an assignment of enrichment status are at the bottom of the matrix along with the source of the narrative thresholds for each parameter. Biological sampling sites that lacked sufficient D.O., chemical, and chlorophyll a data are included for comparison of the biological and habitat results.*

Site ID	River Mile	Sample Type	Drainage Area	fIBI	Miwb	mIBI	Aq Life Status	TP	Nitr.	Max DO	Min DO	DO Swing	Swing Narrative	TSS	TKN	BOD-5	Sestonic Chlor.-a	Trophic Status	Nutrient Ranking Index (NRI)
95-666 - Lower DuPage River																			
LD45/LD14	26.70	P	204.0	41.0	8.01	50.2	Full	0.66	5.5	15.6[2016] 18.4[2017] 13.2[2018]	4.0[2016] 3.2[2017] 4.7[2018]	9.7[2016] 12.9[2017] 7.2[2018]	Wide[2016] Wide[2017] Wide[2018]	11.1	0.62	2.08	3.9	Threatened	17.5
LD44	26.00	-								10.6[2016] 13.5[2017] 10.9[2018]	4.8[2016] 2.8[2017] 0.6[2018]	4.9[2016] 9.7[2017] 6.4[2018]	Moder[2016] Wide[2017] High[2018]					Likely Nutrient	na
LD25	25.20	P	218.0	32.0	7.65	49.8	NON - Part	0.88	6.3	10.9[2018]	6.1[2018]	4.0[2018]	Low[2018]	12.0	0.62	2.25	4.2	Not Nutrients	18.2
LD13	23.10	P	229.0	33.5	7.51	44.7	NON - Part	0.81	6.1					13.7	0.80	2.72	4.3	Likely Nutrients	21.6
LD12	22.00	P	236.0	31.5	7.61	48.3	NON - Part	0.96	5.1					14.8	0.95	2.28	3.2	Likely Nutrients	21.7
LD11	20.80	P	236.0	32.0	7.64	46.6	NON - Part	0.82	5.5	23.6[2018]	2.2[2018]	20.6[2018]	Wide[2018]	18.5	1.02	2.17	3.9	Likely Nutrient	21.8
LD10	18.50	P	249.0	37.5	7.74	50.0	NON - Part	0.80	5.6					12.5	0.76	2.20	4.3	Likely Nutrients	23.2
LD09	17.00	P	250.0	34.5	8.04	49.3	NON - Part	0.85	5.6	17.1[2018]	4.0[2018]	11.6[2018]	Wide[2018]	13.6	0.66	2.23	4.6	Likely Nutrient	21.4
LD08	13.40	P	314.0	33.5	8.54	55.1	NON - Part	0.43	3.2					18.1	0.93	2.14	3.2	Likely Nutrient	17.3
LD07	11.40	P	321.0	39.5	8.71	54.8	NON - Part	0.86	5.0					21.4	0.81	2.27	3.2	Likely Nutrients	19.9
LD06	9.60	P	328.0	43.5	9.1	64.9	Full	0.79	5.0					14.7	0.98	2.18	4.3	Likely Nutrients	24.1
LD43	8.20		330.0							19.9[2018]	1.4[2018]	14.6[2018]	Wide[2018]					Likely Nutrient	na
LD03	7.00	P	333.0	40.5	8.01	55.2	NON - Part	0.73	4.7					16.9	0.73	2.36	3.9	Likely Nutrient	21.1
LD02/LD42	4.7/3.25	P	335.0	40.5	9.04	53.5	NON - Part	0.69	4.7	11.5[2016] 14.3[2018]	5.3[2016] 1.8[2018]	5.3[2016] 9.6[2018]	High[2016] Wide[2018]	16.0	0.79	2.23	3.2	Likely Nutrient	21.2
LD05	2.50	P	346.0	37.5	8.72	64.3	NON - Part	0.71	4.5					19.5	0.86	2.26	4.6	Likely Nutrient	17.8
LD16	1.50	P	348.0	21.0	6.93		NON - Fair	0.71	4.4	6.6[018]	1.9[2018]	4.1[2018]	Mod.[2018]	21.0	0.73	2.40	4.3	Likely Nutrient	19.6
LD01	1.00	P	376.0	57.5	11.25	68.9	Full	0.67	4.4					20.5	0.82	2.26	3.9	Likely Nutrient	17.6
			Excellent	≥50		>73	FULL	≤ 0.106	≤ 3.77	< 10.36	>6.9	< 2.0	Normal	≤17.50	<1.07	≤1.30	<2.5	Not Nutrients	<10
			Good	>41-49		41.8-72.9	FULL	0.106-0.27	>3.77-5.05	> 10.36-12.2	6-6.9	2.0-4.0	Low	>17.50	1.07-1.12	>1.30	>2.5-5.1	Not Nutrients	10-15
			Fair	30- <41		30-41.7	PARTIAL	>0.277-1.02	>5.05-7.34	> 12.2-14.2	4.0-5.9	4.0-5.0	Moderate	>31.60	1.12-1.63	>2.35	>5.1-13.8	Likely Nutrients	15-25
			Poor	>15-29		>15-29	NON-Fair	>1.02-1.726	>7.34-9.64	> 14.2-16.3	2.0-3.9	5.0-6.5	High	>35.15	1.63-2.14	>3.45	>13.8-28.9	Enriched	25-35
			Very Poor	<15		<15	Non-Poor	≥ 1.726	≥9.64	≥ 16.3	<2.0	>6.5	Wide	>38.69	>2.14	>4.54	>28.9	Highly Enriched	>35
			IPS	IEPA		IEPA	IPS	IPS	IPS	IPS	IPS	MBI/SNAP	MBI/SNAP	IPS	IPS	IPS	**MBI/NSAC**	MBI/SNAP	IPS

***Table 11**. Continued.*

Site ID	River Mile	Sample Type	Drainage Area	fIBI	Miwb	mIBI	Aq Life Status	TP	Nitr.	Max DO	Min DO	DO Swing	Swing Narra-tive	TSS	TKN	BOD-5	Sestonic Chlor.-a	Trophic Status	Nutrient Ranking Index (NRI)
95-661 - West Norman Drain (Trib to DuPage R. at RM 20.2)																			
LD31	5.10	F	2.4	26.0	na	46.7	NON - Part	0.20	2.8					22.0	0.64	2.00			17.6
LD26	2.20	F	6.2	29.0	na	62.4	NON - Part	0.20	1.5					14.7	0.75	2.05			13.6
95-662 - Mink Creek (Trib to Lily Cache Creek at RM 1.9)																			
LD39	3.20	D	4.1	15.0	na	28.5	NON - Poor	0.25	0.1					49.0	0.89	2.00			17.2
LD23	1.80	F	8.8	27.0	na	47.2	NON - Part	0.20	0.1					10.8	0.77	2.03			15.3
95-663 - Spring Creek (Trib to DuPage R. at RM 17.8)																			
LD30	1.47	F	3.4	17.0	na	36.1	NON - Poor												4.8
LD21	0.50	F	5.3	20.0	na	54.4	NON - Part	0.20	2.3					8.7	0.82	2.08			18.3
95-664 - Springbrook Creek (Trib to DuPage R. at RM 27.1)																			
LD24	4.80	F	8.9	29.0	na	46.7	NON - Part	0.20	0.2					14.5	0.83	2.08			14.6
LD19	1.40	E	12.3	32.0	na	30.9	NON - Fair	0.20	0.2					26.8	0.80	2.10			13.8
95-665 - Rock Run Creek (Trib to IL-MI Canal at RM 9.0)																			
LD41	7.90	F	5.0	24.0	na	43.7	NON - Part	0.20	0.1					20.8	0.66	2.00			17.1
LD04	6.50	F	5.0	12.0	na	26.5	NON - Poor	0.60	2.3					7.2	1.15	2.07	34.6		22.8
LD22	5.70	D	5.5	12.0	na	22.4	NON - Poor	0.39	1.0					13.5	1.13	2.75			16.1
LD17	3.50	F	10.6	17.0	na	29.1	NON - Poor	0.63	0.2					22.0	1.18	3.03			16.9
			Excellent	≥50		>73	FULL	≤ 0.106	≤ 3.77	< 10.36	>6.9	< 2.0	Normal	≤17.50	<1.07	≤1.30	<2.5	Not Nutrients	<10
			Good	>41-49		41.8-72.9	FULL	0.106-0.27	>3.77-5.05	> 10.36-12.2	6-6.9	2.0-4.0	Low	>17.50	1.07-1.12	>1.30	>2.5-5.1	Not Nutrients	10-15
			Fair	30- <41		30-41.7	PARTIAL	>0.277-1.02	>5.05-7.34	> 12.2-14.2	4.0-5.9	4.0-5.0	Moderate	>31.60	1.12-1.63	>2.35	>5.1-13.8	Likely Nutrients	15-25
			Poor	>15-29		>15-29	NON-Fair	>1.02-1.726	>7.34-9.64	> 14.2-16.3	2.0-3.9	5.0-6.5	High	>35.15	1.63-2.14	>3.45	>13.8-28.9	Enriched	25-35
			Very Poor	<15		<15	Non-Poor	≥ 1.726	≥ 9.64	≥ 16.3	<2.0	>6.5	Wide	>38.69	>2.14	>4.54	>28.9	Highly Enriched	>35
			IPS	IEPA		IEPA	IPS	IPS	IPS	IPS	IPS	MBI/SNAP	MBI/SNAP	IPS	IPS	IPS	**MBI/NSAC**	MBI/SNAP	IPS

Table 11. Continued.

Site ID	River Mile	Sample Type	Drainage Area	fIBI	Miwb	mIBI	Aq Life Status	TP	Nitr.	Max DO	Min DO	DO Swing	Swing Narra-tive	TSS	TKN	BOD-5	Sestonic Chlor.-a	Trophic Status	Nutrient Ranking Index (NRI)
95-667 - Hammel Creek (Trib to DuPage R. at RM 10.6)																			
LD28	1.19	F	10.7	23.0	na	35.9	NON - Fair	0.20	1.1					27.5	1.01	3.25			17.8
95-668 - Lily Cache Creek (Trib to DuPage R. at RM 14.4)																			
LD37	14.70	F	4.3	16.0	na	30.9	NON - Poor	0.20	0.1					34.0	0.64	2.05			15.8
LD18	11.20	E	11.1	22.0	na	26.7	NON - Fair	0.20	0.1					7.9	0.78	2.05			12.6
LD15	6.50	D	21.4	23.5	6.54	60.0	NON - Part	0.20	0.1					18.1	0.65	2.30			13.2
LD20	0.36	P	46.0	28.0	7.17	36.6	NON - Fair	0.20	0.3					13.5	0.76	2.00	5.3		15.3
95-672 - Trib #3 to DuPage R. at RM 13.9																			
LD40	0.80	F	3.5	12.0	na	37.2	NON - Poor	0.20	1.2					22.0	0.85	2.00			13.1
95-673 - Trib #1 to Lily Chache Cr at RM 6.1																			
LD38	0.84	E	5.3	22.0	na	32.6	NON - Fair	0.20	0.1					10.7	1.95	2.20			15.9
95-674 - Trib #7 to DuPage R. at RM 25.9																			
LD35	0.16	F	3.3	Dry	na		NON - Poor	0.23	0.6					36.3	2.50	8.50			20.7
95-675 - Trib #6 to DuPage R. at RM 25.4																			
LD34	1.00	F	4.7	22.0	na	34.3	NON - Fair	0.20	0.3					10.9	1.28	2.15			17.6
95-676 - Wolf Creek (Trib to DuPage at RM 23.7)																			
LD33	0.14	F	6.0	Dry	na	54.5	NON - Poor	0.20	0.9					54.0	1.28	2.00			11.2
95-677 - East Norman Drain Trib # 5 to Dupage R. at RM 20.5																			
LD32	0.90	F	2.8	18.0	na	45.5	NON - Poor	0.20	0.8					20.0	1.15	22.50			22.7
95-678 - Trib #4 to DuPage R. at RM 16.4																			
LD29	0.60	F	2.4	29.0	na	36.5	NON - Fair	0.20	4.0					34.0	0.85	2.25			20.1
95-679 - Trib #1 to DuPage R. at RM 4.9																			
LD27	0.15	F	2.8	Dry	na	45.6	NON - Poor	0.20	8.1					32.5	1.10	3.05			16.1
			Excellent	≥50		>73	FULL	≤ 0.106	≤ 3.77	< 10.36	>6.9	< 2.0	Normal	≤17.50	<1.07	≤1.30	<2.5	Not Nutrients	<10
			Good	>41-49		41.8-72.9	FULL	0.106-0.27	>3.77-5.05	> 10.36-12.2	6-6.9	2.0-4.0	Low	>17.50	1.07-1.12	>1.30	>2.5-5.1	Not Nutrients	10-15
			Fair	30- <41		30-41.7	PARTIAL	>0.277-1.02	>5.05-7.34	> 12.2-14.2	4.0-5.9	4.0-5.0	Moderate	>31.60	1.12-1.63	>2.35	>5.1-13.8	Likely Nutrients	15-25
			Poor	>15-29		>15-29	NON-Fair	>1.02-1.726	>7.34-9.64	> 14.2-16.3	2.0-3.9	5.0-6.5	High	>35.15	1.63-2.14	>3.45	>13.8-28.9	Enriched	25-35
			Very Poor	<15		<15	Non-Poor	≥ 1.726	≥ 9.64	≥ 16.3	<2.0	>6.5	Wide	>38.69	>2.14	>4.54	>28.9	Highly Enriched	>35
			IPS	IEPA		IEPA	IPS	IPS	IPS	IPS	IPS	MBI/SNAP	MBI/SNAP	IPS	IPS	IPS	**MBI/NSAC**	MBI/SNAP	IPS

Dissolved Materials in Urban Runoff

In 2018 total chloride levels in Lower DuPage River mainstem were universally elevated at the fair level above IPS targets. Chloride in the tributaries varied from very poor (Mink Creek LD39, Lily Cache Trib #1 LD38, and in Lily Cache Creek (LD37) at sites that were among the most urban, to the good IPS range at sites that were less urban and more agriculturally dominant such as West Norman Drain (LD26 and LD31) and Spring Creek (LD21 and LD30). Plots of total chloride vs. percent urban land use (Figure 13, right) or percent agriculture land use (Figure 13, left) illustrate the association between chloride concentration and watershed scale developed land uses that are sources for chloride runoff, largely from salt application during winter months.

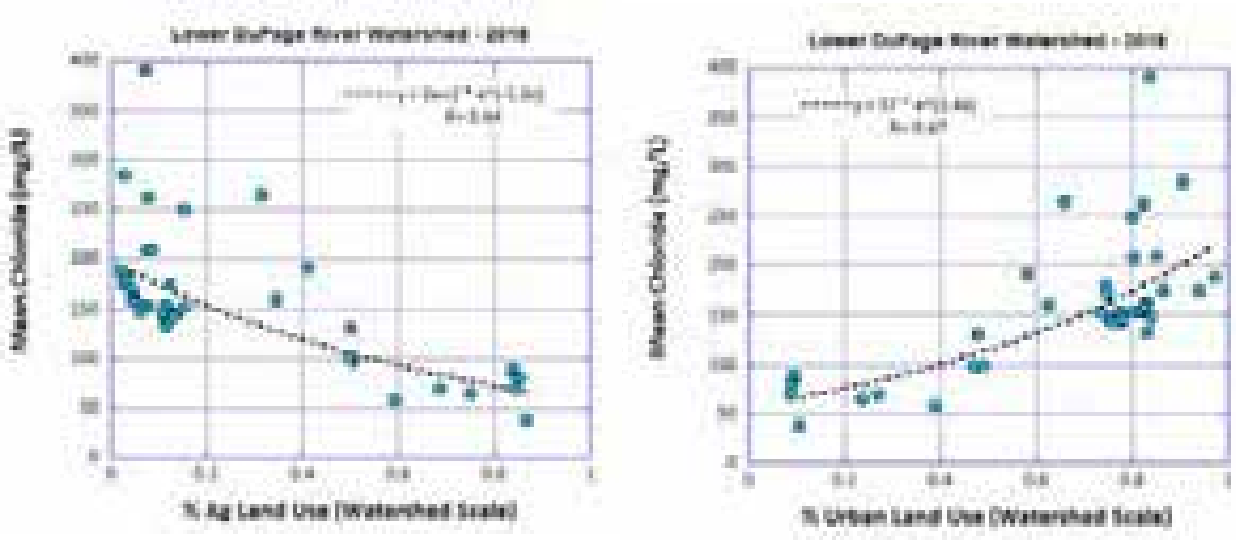

Figure 13*. Plots of % agricultural land use (left) and urban land use (right) vs. mean total chloride (mg/L) in streams of the lower DuPage study area in 2018.*

As discussed in previous DuPage River watershed reports and the Lower DuPage River report (MBI 2014), the basin has experienced increasingly higher levels of salts and dissolved materials related to urban runoff. Of particular concern in Northern climates is the concentration of chlorides from nonpoint sources related to road salt application. Work in Illinois and elsewhere has identified the increasing salinization of surface and groundwater from increased loadings of chlorides over time. The Illinois EPA conducted a total chloride TMDL for the East Branch DuPage River in 2004 (CH2MHill 2004) and identified road salt and WWTP effluents as two key sources in the watershed. Kelly et al. (2012) has demonstrated the recent increase in chloride concentrations in the Chicago area correlated with a pattern of increasing road salt applications, particularly over the past 20 years. Kelly et al. (2012) also identified a strong, steady increasing trend in chlorides in the Illinois River at Peoria where the median increased from about 20 mg/l in 1947 to nearly 100 mg/l in 2004 with high values in the 1940s of less than 40 and spikes in 2003 of greater than 300. Even higher values occur in small urban streams well above the 500 mg/l water quality criterion as evidenced by recent data from the E. and W. Branch DuPage watersheds. Winter conductivity data collected from the West Branch shows that the system regularly exceeds the state's water quality standard.

The 2018 Lower DuPage watershed survey shows most chlorides and dissolved materials in the mainstem tended to decline slightly compared to 2015 which had declined compared to 2012 (Figure 11, Table 12). In 2018 in the tributaries chloride seems to have increased on average compared to 2015 chlorides concentrations (Figure 14) with increases at 19 of 24 sites sampled (see Table 8). Tributary values are likely related to flows and dilution levels at specific sampling dates. Chloride concentrations could contribute to impairments or threats at all mainstem and 19 of 24 tributary locations (Table 8). Kelly (2008) stated that, rather than a simple runoff and export mode of effect, chlorides and similar salt constituents in urban settings accumulate in groundwater, soils, and land surfaces adjacent to the streams. Results from all years would seem to fit those findings as higher stream flows and a resultant higher, more dilute, ground water table would likely contribute to lower in-stream concentrations. It is clear that chloride and other dissolved materials should be watched closely to understand the potential for gradually increasing effects of ionic strength parameters such as chloride over time.

Metals concentrations of several metals sampled in 2018 (e.g., cadmium, lead, and mercury) were all below direction limits. Copper and zinc were mostly non-detects (Table 12) with only a few values above detection, although detection limits for copper (10 µg/L) and zinc (20 µg/L)

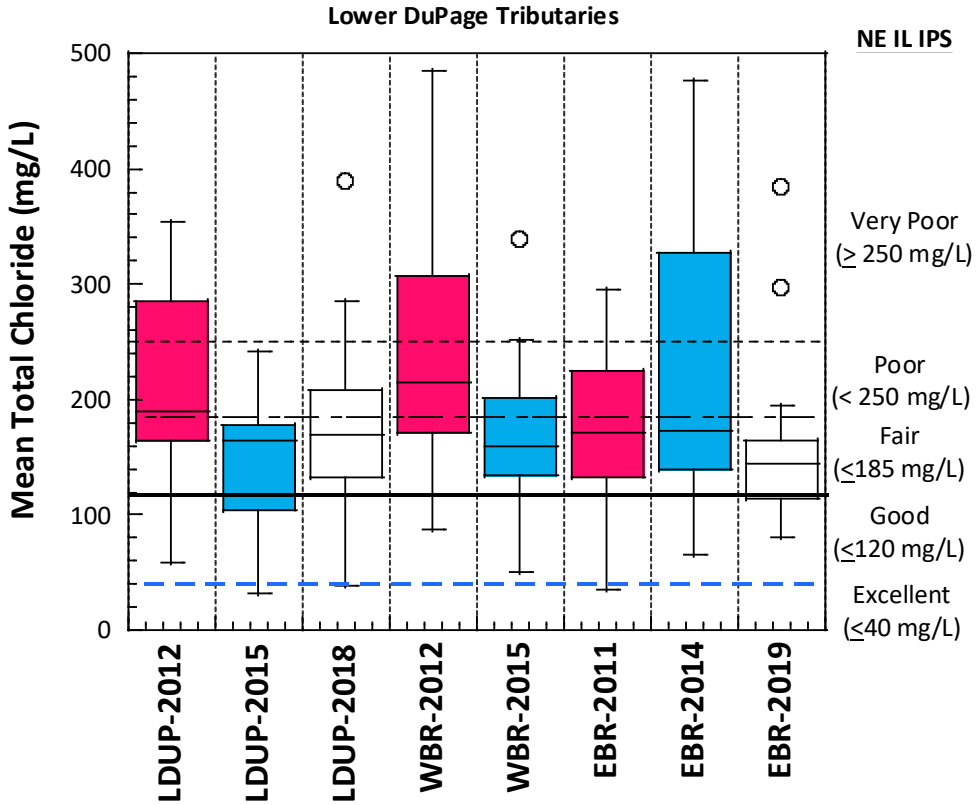

***Figure 14**. Box and whisker plots of chloride concentrations from urban tributaries (no upstream WWTPs) in the East Branch, West Branch and Lower DuPage River watersheds in 2011/2012 (pink), 2014/2015 (blue) and 2018/2019 (clear).*

Table 12. *Urban parameter sampling results in the Lower DuPage River watershed, summer 2018. Values are colored coded by the NE IL IPS narrative ranges (see at bottom of table).*

[a]

Site ID	River Mile	Drainage Area (sq. mi.)	Specific Conduct-ance (umhos/cm)	TSS (mg/L)	Chloride (mg/L)	TKN (mg/L)	Total Cu (µg/L)	Total Zn (µg/L)
DuPage River								
LD14	26.6	204	1003	6.1	170	0.72	ND	ND
LD25	25.2	218	1045	6.4	160	0.75	ND	ND
LD13	23.1	229	1035	7	170	0.96	ND	ND
LD12	22	236	1030	5.9	160	1.2	ND	0.022
LD11	20.8	236	1017	4.4	160	0.935	ND	0.022
LD10	18.5	249	1004	4.2	160	0.78	ND	ND
LD09	17	250	989	4.2	155	0.72	ND	ND
LD08	13.4	314	836	11	140	1	ND	ND
LD07	11.4	321	959	9.2	150	1.1	ND	ND
LD06	9.6	328	954	6.8	160	0.88	ND	ND
LD03	7	333	932	5.6	160	0.83	ND	ND
LD02	4.7	335	936	6.2	155	0.67	ND	ND
LD05	2.5	345.5	919	12	140	0.9	ND	ND
LD16	1.5	348	930	14.5	140	0.78	ND	ND
LD01	1	376	925	15.5	150	0.84	ND	ND
Springbrook Creek (Trib to DuPage R. at RM 27.1)								
LD24	4.8	8.9	949	3	175	1	ND	ND
LD19	1.4	12.3	954	26.5	190	0.91	ND	ND
Trib #7 to DuPage R. at RM 25.9								
LD35	0.16	3.3	863	36.3	187.5	2.495	ND	0.034
Trib #6 to DuPage R. at RM 25.4								
LD34	1	4.7	1020	10.9	175	1.275	ND	ND
Wolf Creek (Trib to DuPage at RM 23.7)								
LD33	0.14	6	829	54	130	1.28	ND	ND
East Norman Drain Trib # 5 to Dupage R. at RM 20.5								
LD32	0.9	2.8	1065	20	190	1.15	ND	ND
West Norman Drain (Trib to DuPage R. at RM 20.2)								
LD31	5.1	2.4	750	22	70	0.78	ND	ND
LD26	2.2	6.2	676	6	80	0.78	0.016	ND
Spring Creek (Trib to DuPage R. at RM 17.8)								
LD30	1.47	3.4	747	32.2	53	-	ND	ND
LD21	0.5	5.3	657	6.4	70	1.135	ND	ND
Trib #4 to DuPage R. at RM 16.4								
LD29	0.6	2.4	651	34	57.5	1.2	ND	ND
Mink Creek (Trib to Lily Cache Creek at RM 1.9)								
LD39	3.2	2.4	1173	49	265	0.89	ND	ND
LD23	1.8	6.2	904	13.8	160	1.25	ND	ND
Trib #1 to Lily Chache Cr at RM 6.1								
LD38	0.84	4	1540	10.7	390	1.95	ND	ND
		Excellent	≤739	≤17.50	≤40.00	≤1.07	--	≤7.47
		Good	≥739	>17.50	>40.00	>1.07	≤4.480	>7.47
		Fair	>1038	>31.60	>120.0	>1.12	>4.480	>9.78
		Poor	>1208	>35.15	>184.9	>1.63	>4.969	>11.00
		Very Poor	>1378	>38.69	>249.8	>2.14	>5.458	>12.22
			IPS	IPS	IPS	IPS	IPS	IPS

***Table 12**. continued.*

Site ID	River Mile	Drainage Area (sq. mi.)	Specific Conduct-ance (umhos/cm)	TSS (mg/L)	Chloride (mg/L)	TKN (mg/L)	Total Cu (µg/L)	Total Zn (µg/L)
Lily Cache Creek (Trib to DuPage R. at RM 14.4)								
LD20	14.7	7	884	7.6	140	0.99	ND	ND
LD15	11.2	11.1	663	12	140	0.73	ND	ND
LD18	6.5	21.4	769	6.8	190	0.76	ND	ND
LD37	0.36	46	1070	10	260	0.99	ND	ND
Trib #3 to DuPage R. at RM 13.9								
LD40	0.8	3.5	1277	22	250	0.845	ND	ND
Hammel Creek (Trib to DuPage R. at RM 10.6)								
LD28	1.19	1.6	598	30	100	0.72	ND	ND
Rock Run Creek (Trib to IL-MI Canal at RM 9.0)								
LD41	7.9	5	1265	20.8	210	0.66	ND	ND
LD04	6.5	4.95	1400	7	250	0.89	ND	0.029
LD22	5.7	5.5	1155	12.6	175	1.3	ND	ND
LD17	3.5	10.6	941	19.5	145	1.4	ND	ND
Trib #1 to DuPage R. at RM 4.9								
LD27	0.15	2.8	701	32.5	38	1.7	ND	ND
Big Rock Creek								
W-3	10.6	101.3	-	3.4	80	ND	ND	ND
W-1	3.4	113.5	-	2.2	70	ND	ND	ND
Forked Creek								
W-4	5.2	103.4	-	4.8	90	ND	ND	ND
W-2	2	109	-	6.2	85	ND	ND	ND
		Excellent	≤739	≤17.50	≤40.00	≤1.07	--	≤7.47
		Good	≥739	>17.50	>40.00	>1.07	≤4.480	>7.47
		Fair	>1038	>31.60	>120.0	>1.12	>4.480	>9.78
		Poor	>1208	>35.15	>184.9	>1.63	>4.969	>11.00
		Very Poor	>1378	>38.69	>249.8	>2.14	>5.458	>12.22
			IPS	IPS	IPS	IPS	IPS	IPS

were above the IPS narrative levels and higher than in 2015 (1 µg/L and 5 µg/L) making it difficult to compare ecological risk between surveys although no values would be above water quality criteria for metals. The data from the combined surveys suggest water column metals are not a significant water quality problem at low flow in the watershed. For this report analysis of sediment concentrations, which should integrate metals delivered during storm events, are likely more meaningful.

Lower DuPage River Sediment Chemistry Results

Sediment samples were analyzed for heavy metals, polycyclic aromatic hydrocarbons (PAHs), and pesticides in the Lower DuPage River mainstem in 2018 at six of the seven sites sampled in 2012, but other than metals and acetone all of the parameters were at or below detection levels. Concentrations of metals were evaluated against guidelines compiled by McDonald et al. (2000) and the Ontario Ministry of Environment (1993) that list ranges of contaminant values by probable toxicity to aquatic life (Table 13). Specifically, threshold effects levels (TEL) are those where toxicity is initially apparent and likely to affect only the most sensitive organisms. Probable effects levels (PEL) are those where toxicity is likely to be observed over a wider range organism tolerances. They were also compared to IPS thresholds developed for NE IL (Table 13).

Organic sediment sampling results in 2018 were all non-detects (except for acetone which was used to clean equipment and may be a "false" hit), but detection levels were higher in 2018 compared to 2012 and 2015 making comparisons more difficult. Acetone is a common solvent and is used in cosmetics and foods; EPA considers this volatile organic compound (VOC) to have "exempt" status in the United States because of negligible potential effects. Sediment metals in the Lower DuPage were for most parameters and most sites lower in 2018 than during the 2012 and 2015 surveys. No metals exceeded PEL thresholds (Table) and there were 4 TEL exceedances for copper, 5 for manganese, 1 for nickel and 2 for zinc. The manganese exceedance level is consider very low based on the IPS thresholds. Like sediment organics, the primary source of metals is likely from the upstream branches, although while the highest concentrations were found at LD14 (the most upstream site) in 2012 and 2015, in 2018 LD08 (RM 17.0) had the most parameters in the IPS very poor range. Common sources of metals include urban runoff from roads and highways as well as industrial and municipal sources. Compounds in the sediment such as metals and PAHs appear to be a greater threat in the East and West Branches than in the lower DuPage mainstem.

***Table 13**. Number and concentration of metals detections found in sediment samples from the Lower DuPage River in 2018. Highlighted cells indicate an exceedance of one or more of the IPS effect thresholds listed at the bottom; values also elevated above the TEC thresholds are in italics and underlined.*

Site ID	River Mile	Drainage Area (sq. mi.)	Arsenic (mg/kg)	Barium (mg/kg)	Chromium (mg/kg)	Copper (mg/kg)	Iron (mg/kg)	Lead (mg/kg)	Manganese (mg/kg)	Nickel (mg/kg)	Zinc (mg/kg)
DuPage River											
LD14	26.6	204	ND	27	11	8.2	5200	5.4	120	6.9	32
LD25	25.2	218	5	120	31	27	19000	21	*490*	20	97
LD09	17	250	4.8	160	40	*53*	25000	27	*740*	*28*	*180*
LD07	11.4	321	3.1	110	29	*36*	17000	17	*580*	19	120
LD03	7	333	3.1	130	31	*39*	20000	19	*840*	22	*140*
LD05	2.5	345.5	ND	110	27	*35*	17000	18	*580*	19	*130*
NE IL IPS		Excellent	--	--	≤20.53	≤19.00	--	≤15.50	≤841.0	--	≤75.00
		Good	≤8.65	≤141.0	>20.53	>19.00	--	>15.50	>841.0	<19.50	>75.00
		Fair	>8.65	>132.0	>23.30	>29.78	--	>24.80	>845.5	>19.50	>100.0
		Poor	>15.82	>150.3	>26.22	>40.45	--	>33.04	>996.8	>22.52	>133.9
		Very Poor	>23.67	>168.7	>29.15	>51.12	--	>41.27	>1148	>25.53	>167.8
MacDonald et al. (2000)		TEC	9.79	None	43.4	31.6	20000	35.8	460	22.7	121
		PEC	33	None	111	149	40000	128	1100	48.6	459
Short 1998		Elev.	7.2	145	37	37	26100	60	1100	26	170
		H. Elev	18	230	110	170	53000	245	2300	45	760

Lower DuPage River Watershed Physical Habitat Quality for Aquatic Life – QHEI

The physical habitat of a stream is a strong determinant of biological quality. Streams in the glaciated Midwest of moderate gradient, left in their natural state, typically possess riffle-pool-run sequences, moderate-high sinuosity, and well-developed channels with deep pools, heterogeneous substrates and cover in the form of woody debris, glacial tills, and aquatic macrophytes. Streams with naturally low gradients may lack the frequency of riffles, but still have complex pools and abundant cover. The Qualitative Habitat Evaluation Index (QHEI) categorically scores the basic components of stream habitat into ranks according to the degree to which those components are found in a natural state, or conversely, in an altered or modified state. QHEI scores and physical habitat attributes were recorded for sites in the DuPage River watershed where biological sampling occurred (Table).

As in previous surveys, 2018 DuPage River habitat quality varied by location but was more than adequate to support general use aquatic communities throughout most of its 27.8-mile length (Figure 16, Figure 16, Table 14). Upper mainstem habitats remained good-excellent, but continued to decline to the fair range in the sluggish, historically channelized reach between the Naperville WWTP and the Hammel Woods low-head dam (~ RMs 25-10.6). Compared to upstream, this long, sluggish reach was characterized by pooled or pool/run habitats, higher levels of siltation, finer substrates, lower sinuosity and development, and an abundance of aquatic macrophytes. Survey scores between sampling years were virtually identical at site scoring in the IPS good or excellent range, but showed a bit more variation in sites that were in the fair range of scores. Sites in the fair range reflect temporal variation in factors such as silt

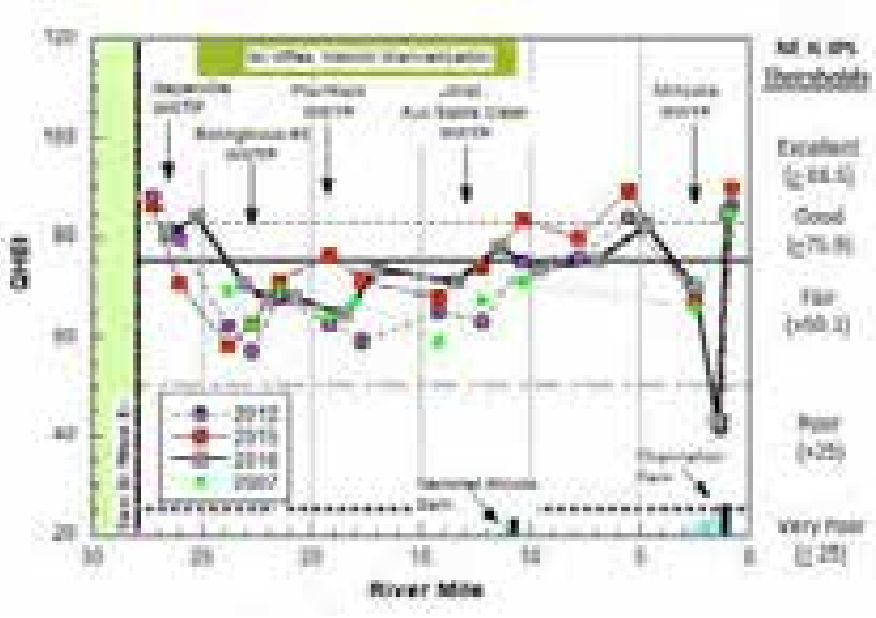

Figure 15*. Qualitative Habitat Evaluation Index (QHEI) scores and narrative ranges in the Lower DuPage River in 2007, 2012, 2015 and 2018 in relation to municipal WWTPs and existing low head dams (noted by bars adjoining the x-axis). QHEI scores less than 45 are often typical of highly modified channels or dam pools. The IPS narrative ranges of QHEI scores from excellent to very poor are indicated by solid and dashed lines.*

cover and sedimentation. Higher flows (in 2015 and 2018) also tend to inundate more habitat structures and cover types and increase current velocities, leading to temporally higher measurements than in 2012 (Figure 15). Overall, mainstem habitat conditions have remained stable since 2007. Poor habitat quality remains restricted to the impoundment directly behind the Channahon Dam (Figure 15).

Habitat in the Lower DuPage River Watershed Headwater (≤ 20 sq. mi.) and Wadeable Sites

Out of tributary stations sampled in 2018, all but the two lower sites on Lily Cache Creek were considered headwaters (catchments ≤ 20 sq. mi). Although sites at all stream sizes can achieve a high QHEI score, the most degraded sites (scores < 50) were generally in streams less than 10 sq. mi in size where land uses are most likely to encroach upon the stream corridor and streams are more readily modified. As noted in the 2012 and 2015 reports, habitat quality in Lower DuPage River tributaries varied substantially from *poor* habitat in sites with extensive, maintained channels, to *excellent* habitat in upper Spring Brook Creek, situated within an Illinois Natural Areas Inventory site. Extensively channelized and wetland or wetland-influenced streams tended to have the lowest QHEI scores. These included LD30 (upstream Spring Creek), LD32 (East Norman Drain), LD38 (LC Tributary. #1), LD40 (Tributary. #3), LD39 (Mink Creek) and upstream Rock Run Creek sites. Wetland influenced sites were often characteristic of more lentic than lotic environments with sluggish flow, few or no rifle habitats, soft muck and peat substrates and an abundance of algae and macrophytes. From Google Earth images, Mink Creek LD39 may have also been impounded by a beaver dam. Spring Brook Creek had the largest proportion of undeveloped land remaining in the watershed (Figure 5). In many places (where encroachment is not hardened by development), functional floodplains, riparian habitats and instream physical habitat may be feasible to restore. Restoration of ecologically active floodplains, riparian areas and instream habitats and banks can reduce sediment and phosphorous and can provide targets for nutrient trading from point sources or impaired stormwater reaches. It is also likely that protection or restoration of flood plain and riparian areas could reduce the runoff of other stressors such as sediment, dissolved parameters, and metals and PAHS that would otherwise accumulate in stream bottom sediments.

Elevated flow conditions can often result in improvements, albeit short-term, in stream habitat quality. Improved scores from elevated flows are typically related to increased depth, a greater range of current velocities, better substrate quality (*e.g.,* less fines and silt deposition), better cover (*i.e.,* more features inundated and less exposed) and better riffle-pool development compared to lower flow observations. The decline in QHEI scores at tributary sites in 2018 was most likely a result of lower flow conditions when sites were sampled in 2018 vs 2015. For example, three sites, LD27, LD33, and LD35 were sampled in 2015, but were dry or near dry in 2018. In many of the other sites that were sampled, maximum depths were mostly lower in 2018 vs. 2015 which affects pool scores, riffle scores, some cover scores and several other metrics.

Figure 16. *Lower DuPage River watershed QHEI scores in 2018 mapped by narrative range. Blue impoundment symbols denote dams and discharge pipes denote WWTP locations.*

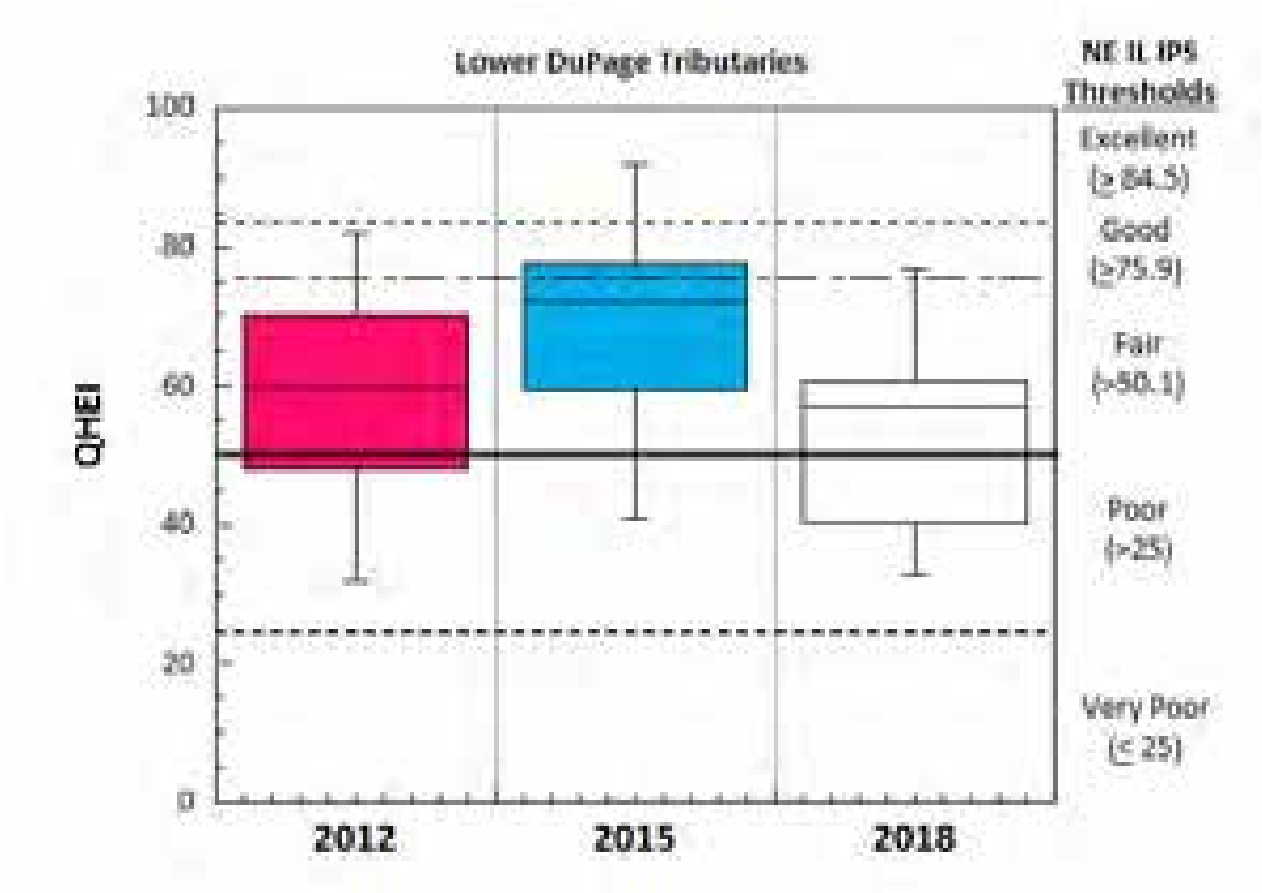

***Figure 17**. Box and whisker plot of QHEI scores from Lower DuPage River tributary (common) sites in 2012, 2015, and 2018.*

Degraded sites are more likely to vary between years (e.g., variable silt load, less stable channel characteristics) than very high quality sites where ecological factors are generally more stable. Streams with more natural habitat features and natural riparian and flood plains are more likely to have stable flow regimes.

Table 14. *Qualitative Habitat Evaluation Index (QHEI) scores showing Good and Modified Habitat attributes at sites in the Lower DuPage River watershed during 2015. (■- good habitat attribute; ● - high influence modified attribute; ● - moderate influence modified attribute).*

Site ID	River Mile	QHEI	Good Habitat Attributes											High Influence Modified Attributes						Moderate Influence Modified Attributes												Ratios	
			No Channelization	Boulder, Cobble, Gravel	Silt Free	Good-Excellent Development	Moderate-High Sinuosity	Moderate-Extensive Cover	Fast Flow w Eddies	Little to No Embeddedness	Max Depth > 40 cm	No Riffle Embeddedness	"Good" Habitat Attributes	Channelized or No Recovery	Silt/Muck Substrates	No Sinuosity	Sparse No Cover	Max Depths <40 cm	High Influence Poor Attributes	Recovering from Channelization	Mod-High Silt Cover	Sand Substrates (Boatable sites)	Hardpan Origin	Fair- Poor Development	Low Sinuosity	≤ 2 Cover Types	Intermittent Flow or Pools <20 cm	No Fast Current Types	Mod-Extensive Embeddedness	Mod-Extensive Riffle Embed.	No Riffle	Poor Habitat Attributes	Ratio of Poor (High) to Good	Ratio of Poor (All) to Good
West Norman Drain (Trib to DuPage R. at RM 20.2)																																	
LD31	5.1	**61.5**		■		■	■	■			■		5		●				1	●	●			●				●	●	●		6	0.2	1.4
LD26	2.2	**58.0**		■		■		■		■	■		5						0	●	●			●	●			●	●		●	7	0	1.4
Mink Creek (Trib to Lily Cache Creek at RM 1.9)																																	
LD39	3.2	**38.5**						■			■		2	●	●		●		3		●			●	●			●	●		●	6	1.5	4.5
LD23	1.8	**62.0**		■		■	■	■		■	■		6		●				1	●	●			●				●	●	●		6	0.17	1.17
Spring Creek (Trib to DuPage R. at RM 17.8)																																	
LD30	1.47	**39.5**						■			■		2	●	●	●			3		●		●	●				●	●		●	6	1.5	4.5
LD21	0.5	**68.0**	■	■		■	■	■			■		6						0		●							●	●		●	4	0	0.67
Springbrook Creek (Trib to DuPage R. at RM 27.1)																																	
LD24	4.8	**77.0**	■	■		■	■	■			■		6						0		●							●	●	●		4	0	0.67
LD19	1.4	**56.5**		■			■	■			■		4						0	●	●			●				●	●		●	6	0	1.5
Rock Run Creek (Trib to IL-MI Canal at RM 9.0)																																	
LD41	7.9	**38.0**	■				■	■					3		●			●	2		●			●				●	●		●	5	0.67	2.33
LD04	6.5	**41.0**						■			■		2	●	●		●		3		●			●	●	●		●	●		●	7	1.5	5
LD22	5.7	**38.0**					■	■					2	●	●		●	●	4		●			●				●	●		●	5	2	4.5
LD17	3.5	**73.0**	■	■		■	■	■	■		■		7		●				1		●							●	●	●		4	0.14	0.71

Site ID	River Mile	QHEI	Good Habitat Attributes											High Influence Modified Attributes						Moderate Influence Modified Attributes												Ratios	
			No Channelization	Boulder, Cobble, Gravel	Silt Free	Good-Excellent Development	Moderate-High Sinuosity	Moderate-Extensive Cover	Fast Flow w Eddies	Little to No Embeddedness	Max Depth > 40 cm	No Riffle Embeddedness	"Good" Habitat Attributes	Channelized or No Recovery	Silt/Muck Substrates	No Sinuosity	Sparse No Cover	Max Depths <40 cm	High Influence Poor Attributes	Recovering from Channelization	Mod-High Silt Cover	Sand Substrates (Boatable sites)	Hardpan Origin	Fair- Poor Development	Low Sinuosity	≤ 2 Cover Types	Intermittent Flow or Pools <20 cm	No Fast Current Types	Mod-Extensive Embeddedness	Mod-Extensive Riffle Embed.	No Riffle	Poor Habitat Attributes	Ratio of Poor (High) to Good	Ratio of Poor (All) to Good
Lower DuPage River																																		
LD25	26.6	**80.5**		■		■	■	■	■	■	■		7						0	●		●							●		3	0	0.43
LD13	25.2	**84.0**	■	■		■	■	■	■	■	■		8						0			●							●		2	0	0.25
LD13	23.1	**70.5**		■				■		■	■		4						0	●		●		●	●			●		●		6	0	1.5
LD12	22.0	**67.5**		■				■		■	■		4			●			1	●		●		●				●		●		5	0.25	1.5
LD11	20.8	**68.0**		■				■		■	■		4			●			1	●		●		●				●		●		5	0.25	1.5
LD10	18.5	**64.5**		■				■		■	■		4						0	●		●		●	●			●		●		6	0	1.5
LD09	17.0	**73.5**		■				■		■	■		4						0	●		●		●	●			●		●		6	0	1.5
LD08	13.4	**71.0**		■				■		■	■		4						0	●		●		●	●			●		●		6	0	1.5
LD07	11.4	**78.0**		■		■	■	■	■	■	■	■	8						0	●		●										2	0	0.25
LD06	9.6	**73.5**		■		■		■		■	■		5						0	●		●			●			●		●		5	0	1
LD03	7.0	**75.3**	■	■		■		■	■	■	■		7						0	●		●			●					●		4	0	0.57
LD02	4.7	**82.5**	■	■		■	■	■	■	■	■	■	9						0			●										1	0	0.11
LD05	2.5	**70.0**		■			■	■		■	■		5						0	●		●		●				●		●		5	0	1
LD16	1.5	**43.0**						■			■		2		●	●	●		3		●	●		●				●	●		●	6	1.5	4.5
LD01	1.0	**84.8**	■	■		■	■	■	■	■	■	■	9						0			●										1	0	0.11
Hammel Creek (Trib to DuPage R. at RM 10.6)																																		
LD28	1.19	**67.0**	■	■		■	■	■		■	■	■	8						0									●		●		2	0	0.25
Lily Cache Creek (Trib to DuPage R. at RM 14.4)																																		
LD37	14.7	**57.8**		■		■	■	■			■	■	6						0	●	●			●	●			●	●	●		7	0	1.17
LD18	11.2	**39.5**		■				■			■		3	●		●			2		●			●	●	●		●	●		●	7	0.67	3.00

Site ID	River Mile	QHEI	Good Habitat Attributes											High Influence Modified Attributes						Moderate Influence Modified Attributes												Ratios	
			No Channelization	Boulder, Cobble, Gravel	Silt Free	Good-Excellent Development	Moderate-High Sinuosity	Moderate-Extensive Cover	Fast Flow w Eddies	Little to No Embeddedness	Max Depth > 40 cm	No Riffle Embeddedness	"Good" Habitat Attributes	Channelized or No Recovery	Silt/Muck Substrates	No Sinuosity	Sparse No Cover	Max Depths <40 cm	High Influence Poor Attributes	Recovering from Channelization	Mod-High Silt Cover	Sand Substrates (Boatable sites)	Hardpan Origin	Fair- Poor Development	Low Sinuosity	≤ 2 Cover Types	Intermittent Flow or Pools <20 cm	No Fast Current Types	Mod-Extensive Embeddedness	Mod-Extensive Riffle Embed.	No Riffle	Poor Habitat Attributes	Ratio of Poor (High) to Good	Ratio of Poor (All) to Good
LD15	6.5	**63.5**		■			■	■					3					●	1	●	●			●				●	●	●		6	0.33	2.33
LD20	0.36	**57.0**	■				■	■			■		4		●				1		●	●		●				●	●		●	6	0.25	1.75
Trib #3 to DuPage R. at RM 13.9																																		
LD40	0.8	**42.8**		■						■			2	●		●	●	●	4		●			●	●			●			●	5	2	4.5
Trib #1 to Lily Cache Cr at RM 6.1																																		
LD38	0.84	**33.3**					■	■					2	●	●			●	3		|			|			|	|		|	5	1.5	4
Trib #6 to DuPage R. at RM 25.4																																		
LD34	1.0	**57.0**		■		■	■	■					4					●	1	●	●			●	●			●	●		●	7	0.25	2
East Norman Drain Trib # 5 to DuPage R. at RM 20.5																																		
LD32	0.9	**33.0**		■				■					2	●	●	●	●	●	5	●	●			●	●			●	●		●	7	2.5	6
Trib #4 to DuPage R. at RM 16.4																																		
LD29	0.6	**59.5**		■		■	■	■			■		5						0	●	●			●				●	●		●	6	0	1.2

Lower DuPage River Watershed Biological Communities – Macroinvertebrates

Macroinvertebrate assemblage performance in the lower DuPage River watershed (mainstem and tributaries) were all in the good range in 2018 an improvement over 2012 and 2015 (Figure 20); 7 sites were rated as fair in 2012 and 3 in 2015. Mainstem communities improved at almost all stations compared to 2012 and 2015 (Figure 18). The lower scoring sites (still in the good range) were in the long sluggish, historically channelized reach between the Naperville WWTP and Hammel Woods dam. The reach consists of mostly pooled or slow-run habitats with fine substrates and an abundance of macrophytes.

The highest scoring sites were below the Hammel Woods and at the mouth. Unlike the sluggish reach upstream, most of these sites had strong riffle/run habitats with coarse substrates. In addition, a number of pollution sensitive mayflies (e.g., the genera *Leucrocuta, Acerpenna,*

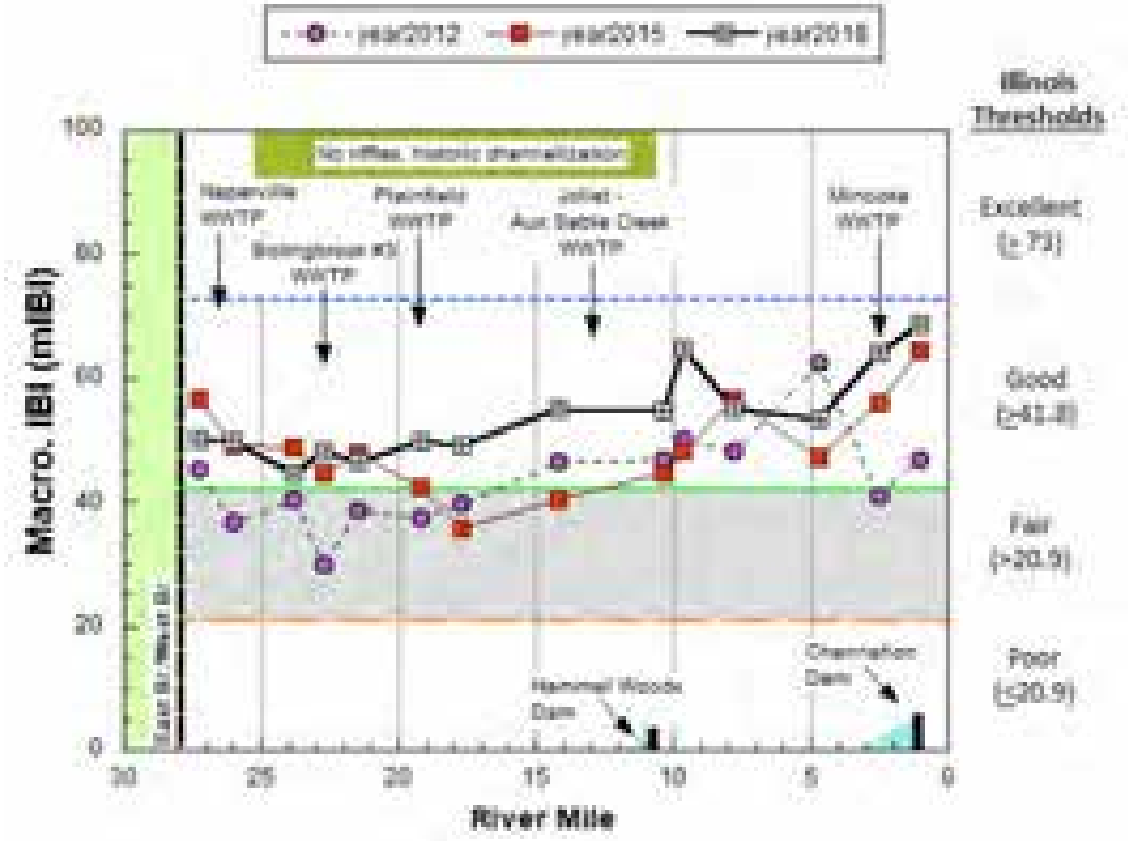

Figure 18. *Macroinvertebrate Index of Biotic Integrity (mIBI) scores for the Lower DuPage River in 2012, 2015, and 2018 in relation to municipal WWTPs and existing low head dams (noted by bars adjoining the x-axis). The shaded region demarcates the "fair" narrative range.*

Plauditus) were regularly collected between the dams and at the mouth that were nearly absent from the sluggish reaches upstream. Appendix Table C-3 is a report for the mainstem that illustrates the grand total taxa list by year (2012, 2015, 2018), and includes the number of times a taxa was collected in the year of sampling, and is ordered by the abundance of the taxa

in 2018. We extracted the intolerant, moderately intolerant, and tolerant taxa into Table 15 to examined trends in these taxa. Both Illinois and Ohio taxa tolerance rankings are provided. There is a trend of increasing abundance of certain (not all) intolerant and sensitive taxa between years. For example, the intolerant mayfly *Plauditus dubius* was absent in 2012, was found at four sites (15 individuals) in 2015 and eight sites (110 individuals) in 2018 (Table 15). There similar trends for many moderately intolerant taxa, especially when 2012 is compared to 2018. For many tolerant taxa there were declines between 2012 and 2018 and there were other tolerant taxa collected in 2012 that were not collected in 2018 (see Appendix Table C-3).

The degree of improvement in the macroinvertebrate assemblage can be seen in trends in the number of mayfly taxa between sites and years. The mayfly taxa richness increased with the distance downstream from the East and West Branches and also with year at most sites (Figure 19).

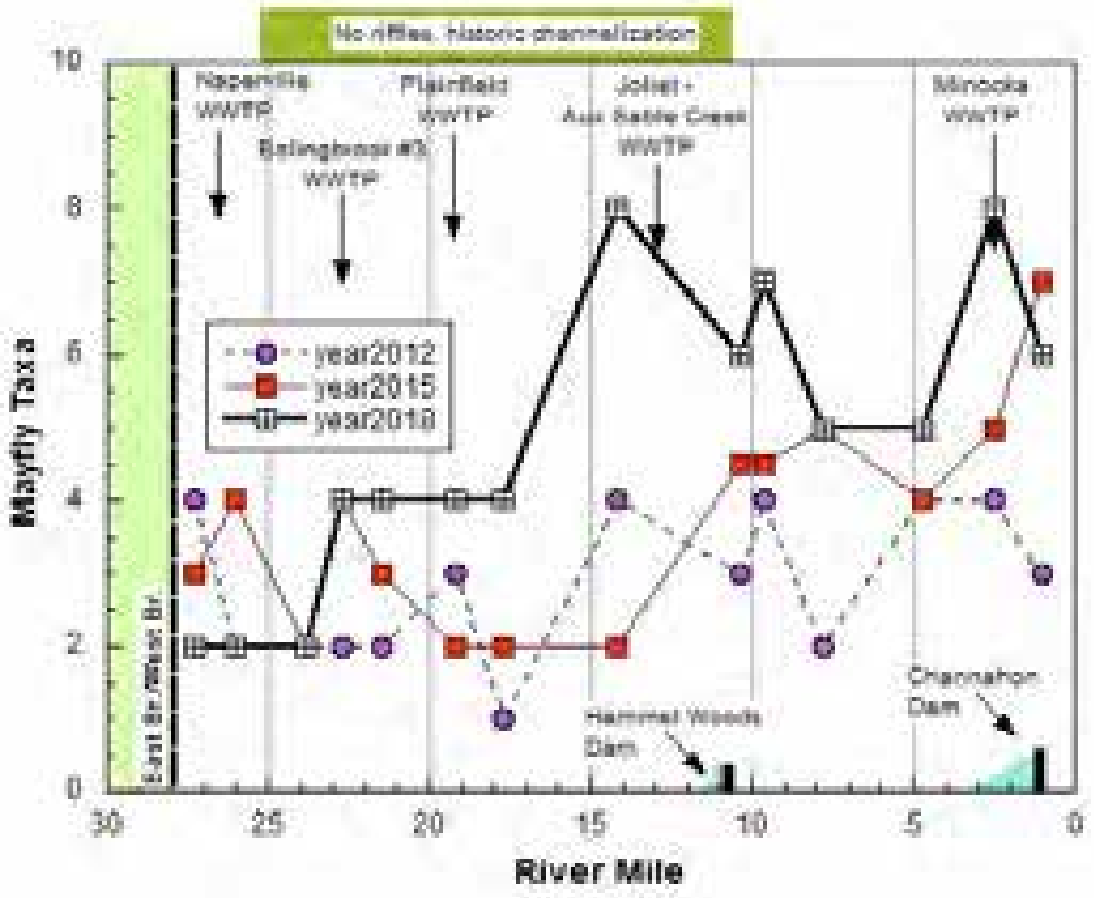

Figure 19. *Plot of mayfly taxa richness vs. river mile in the lower DuPage River in 2012, 2015, and 2018.*

Table 15. *Intolerant (I), moderately tolerant (NI), and tolerant (T) macroinvertebrate taxa summarized by year (2012, 2015, 2018) in order of number collected during 2018 within these groups. Data includes the number of sites that taxa was collected at and the total number counted and only includes taxa in these groups collected in 2018. See Appendix Table C-3 for complete list of taxa collected.*

Taxa Code	Taxa Name	Illinois Tolerance	Ohio Tolerance	2012		2015		2018	
				Sites	Number	Sites	Number	Sites	Number
Intolerant and Moderately Tolerant Taxa									
11119	Plauditus dubius or P. virilis	3	I	0	0	4	15	8	110
53400	Protoptila sp	1	I	2	2	0	0	4	19
11014	Acentrella turbida	4	I	0	0	1	2	0	0
16700	Tricorythodes sp	5	MI	16	1044	14	1017	10	402
93900	Elimia sp	6	MI	14	119	14	535	10	275
59410	Nectopsyche diarina	3	MI	5	9	5	6	7	37
52565	Hydropsyche phalerata	5	MI	0	0	2	8	7	34
13000	Leucrocuta sp	3	MI	0	0	6	40	6	20
52570	Hydropsyche simulans	5	MI	0	0	0	0	3	14
82220	Tvetenia discoloripes group	5	MI	0	0	5	7	3	7
11020	Acerpenna pygmaea	4	MI	5	56	3	10	3	7
11015	Acerpenna sp	4	MI	3	9	0	0	3	3
78750	Rheopelopia paramaculipennis	3	MI	0	0	0	0	2	2
85265	Cladotanytarsus vanderwulpi group sp	7	MI	0	0	0	0	1	1
83820	Microtendipes "caelum" (sensu Simps	6	MI	0	0	0	0	1	1
59970	Petrophila sp	5	MI	2	2	1	2	1	1
53300	Glossosoma sp	3.5	MI	0	0	0	0	1	1
Tolerant Taxa									
84470	Polypedilum (P.) illinoense	6	T	12	126	13	440	10	316
03600	Oligochaeta	10	T	16	364	14	177	8	80
80420	Cricotopus (C.) bicinctus	8	T	4	43	4	6	5	18
22001	Coenagrionidae	5.5	T	16	169	9	62	5	11
95100	Physella sp	9	T	15	243	6	10	1	8
80510	Cricotopus (Isocladius) sylvestris grou	8	T	1	1	0	0	3	4
05800	Caecidotea sp	6	T	3	13	11	19	1	3
82730	Chironomus (C.) decorus group	11	T	3	13	3	3	1	2
67800	Tropisternus sp	99.9	T	1	1	0	0	1	1
82770	Chironomus (C.) riparius group	11	T	0	0	1	1	0	0
79000	Tanypus sp	8	T	1	1	0	0	0	0
74501	Ceratopogonidae	5	T	3	9	0	0	0	0
72101	Psychodidae	11	T	1	1	0	0	0	0
04664	Helobdella stagnalis	8	T	3	4	2	3	0	0

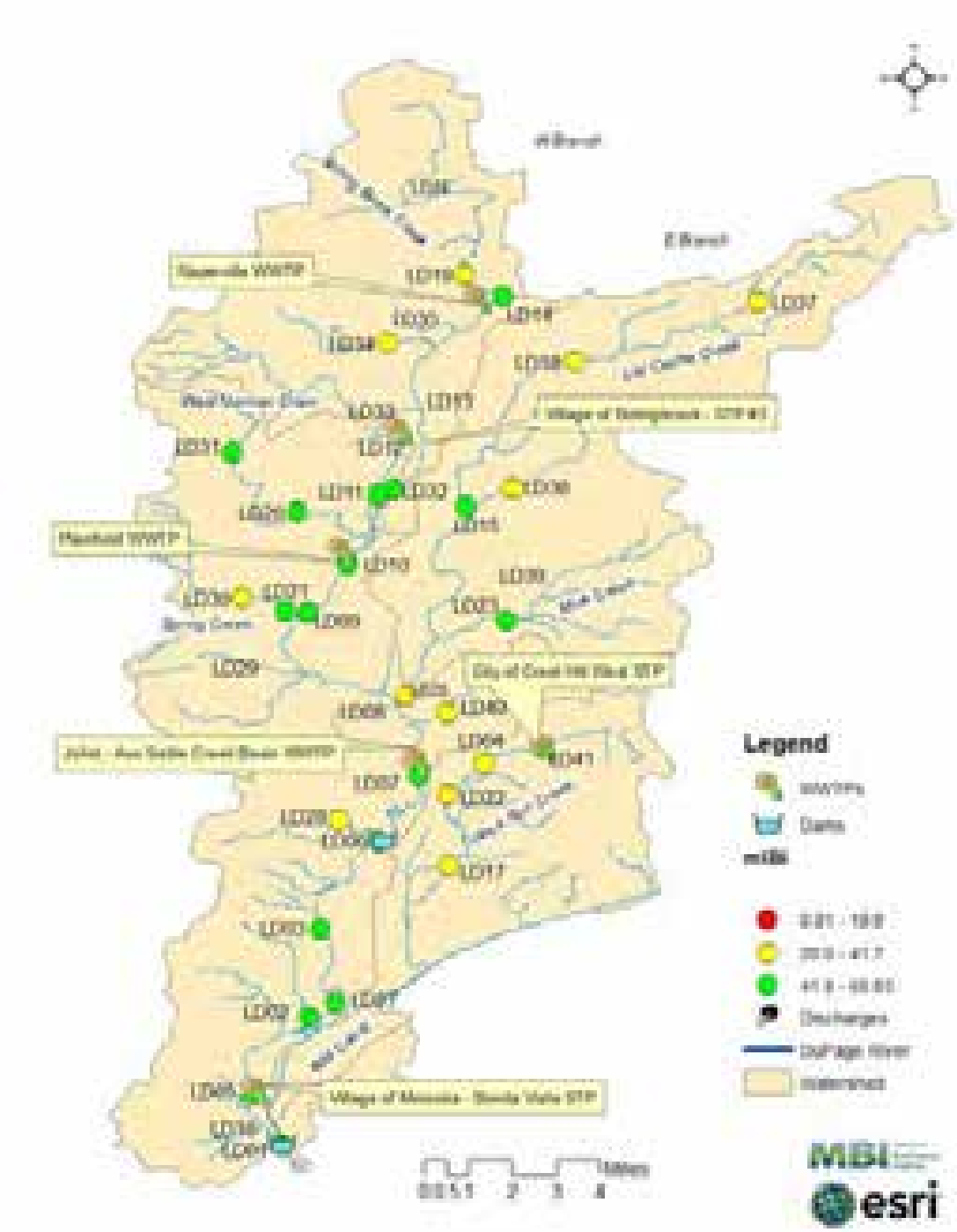

Figure 20. *Lower DuPage River watershed mIBI scores in 2018 mapped by Illinois EPA narrative ranges. Blue impoundment symbols denote dams and discharge pipes denote WWTP locations.*

Lower DuPage River Tributaries - Macroinvertebrates

Trends in macroinvertebrate performance from tributaries tended to be more positive than the fish, water chemistry and stream habitat results. Ten of the tributary sites exceeded the "good" performance threshold in 2018, versus eight sites in 2015 and only two "good" sites in 2012. Furthermore, there were no tributary sites in 2018 in the poor range (Figure 20). Mean mIBI scores at 2018 sites wear near identical to 2015 and improved by 7.4 points compared to the 2012 survey. Better mIBI scores generally coincided with more optimal habitat and flow conditions, lower silt and fines deposition and a lessening of low-flow stressors in 2015 and 2018. As a rule, sluggish, wetland influenced sites fell consistently below attainment thresholds in the fair range.

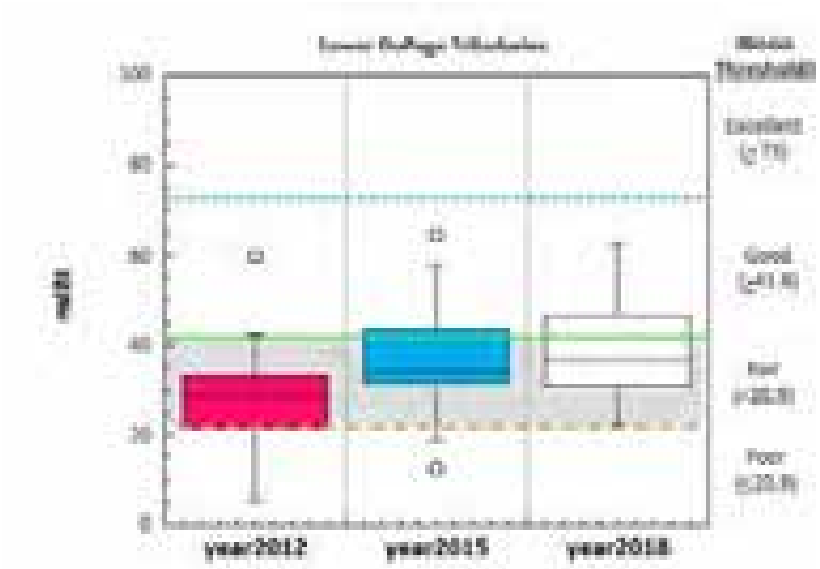

Figure 21. *Box and whisker plot of QHEI scores from Lower DuPage River tributary sites in 2012, 2015, and 2018.*

Portions of Lily Cache Creek (LD15 and LD18) and Spring Creek (LD21) were intermittent or completely dry during 2012 but each was consistently free flowing in 2015 and 2018. Lily Cache LD15 and Spring Creek LD 21 improved in 2015 and 2018 and the previously dry and unsampled LD15 was solidly in the good range (mIBI = 60) in 2018 (Figure 22, top). Results indicate macro-invertebrate communities can recover from the lack of flow although the upper portions of Lily Cache Creek may be more prone to desiccation than other, similar sized tributaries in the watershed. The upstream most site on Rock Run Creek attained the mIBI general use benchmark in 2018, and sites downstream of the Crest Hill West WWTP were improved in 2018 vs. 2012 and 2015 and outside of the poor range, but still impaired below the general use threshold Figure 22, bottom).

The western and southwestern edge of the watershed is unique in the predominance of agricultural lands as opposed to urban and suburban land use. Agricultural drainage was most noticeable at sites LD21 and LD30, and LD27, 28, 29, and 31 in Spring Creek, Tributary. #1, Hammel Creek, Tributary. #4, and West Norman Drain, respectively. Macroinvertebrates from these sites generally met or nearly met the good quality threshold, averaging 45.4 points in 2018 and a slight improvement from 42.1 points in 2015. Among lowest score in the group in 2018 (36.1) was from upper Spring Creek (LD30), which is extensively channelized and situated between large soybean fields of former wetland origin.

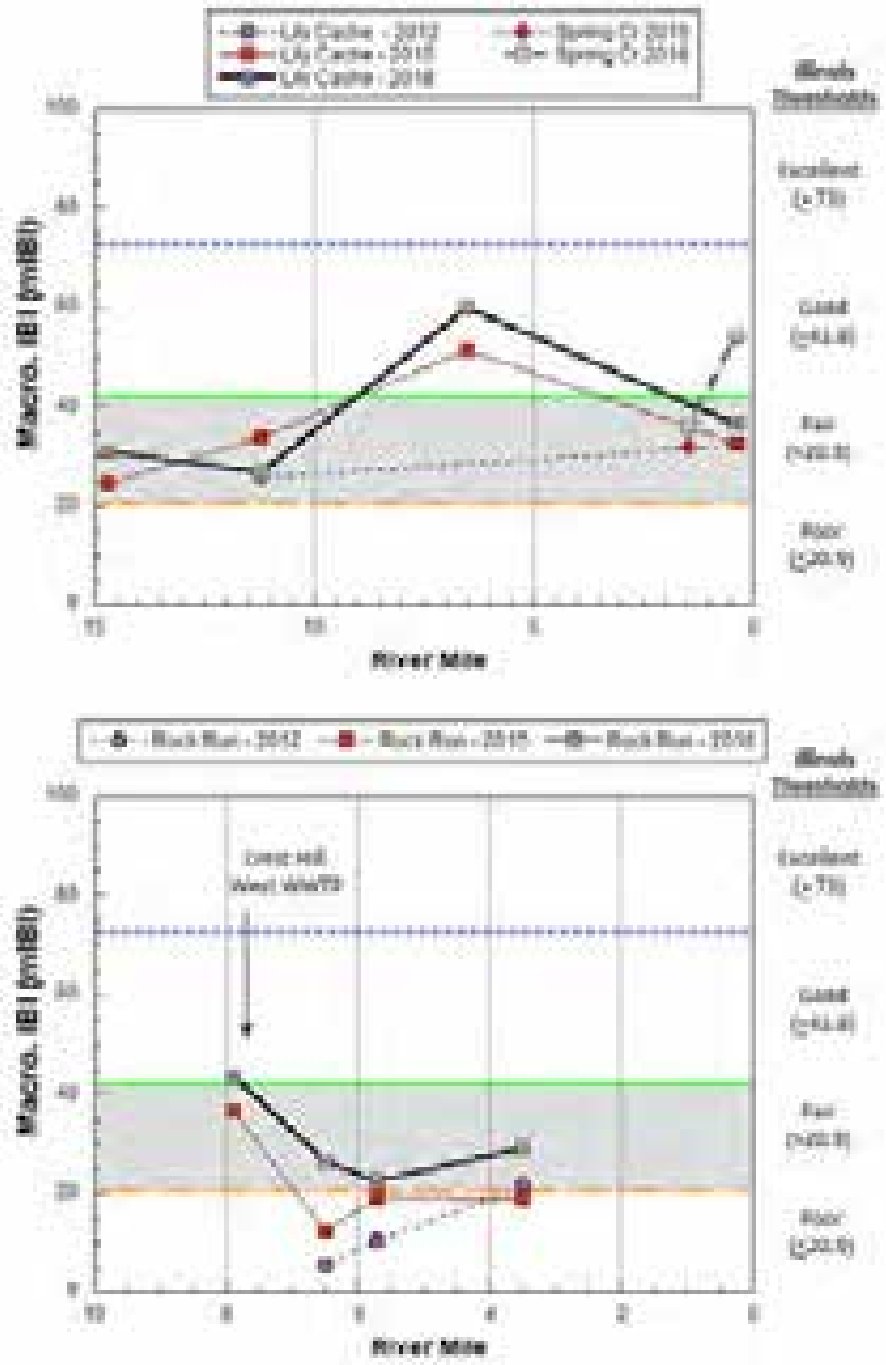

Figure 22*. Plots of mIBI vs. river mile for Lily Cache Creek and Spring Creek (top) and Rock Run Creek (bottom) from 2012-2018. Macro-invertebrate narrative and attainment benchmarks are denoted along the right side.*

Table 16. *Selected fish and macroinvertebrate assemblage attributes for sites sampled in the lower DuPage River watershed mainstem in 2018. Biological index scores are shaded by level of use support: Exceptional – blue; Good (fully supporting) - green; Fair (non-support) - yellow; Poor (non-support) – orange; Very Poor - red; key metrics as signatures of toxic or organic enrichment impacts are based on Yoder and DeShon (2003).*

			Fish Data							Macroinvertebrate Data								
Site ID	River Mile	Drainage Area (mi.^{2})	fIBI	Miwb	Native Sp.	% DELT	Intoler-ant sp.	%Mineral Spawners	Percent Tolerant	mIBI	Total Taxa	Intoler-ant Taxa	%Toler-ant Taxa	EPT Taxa	%EPT	MBI	%Toxic Tolerant Taxa	%Organic Enrich. Taxa
95-666 DuPage River																		
LD14	26.60/26.60	204	41	8.01	18	0.55	4	44.93	36.11	50.2	27	3	4.73	5	56.7	5	3.7	15.5
LD25	25.20/25.20	218	32	7.65	13.5	0.38	2	28.32	33.52	49.8	30	5	3.86	8	50.5	5.3	2.3	15.8
LD13	23.10/23.10	229	33.5	7.51	12	0	3	27.71	37.86	44.7	22	3	1.26	7	66.7	4.9	5.3	11.6
LD12	22.00/22.00	236	31.5	7.61	11.5	0	2.5	28.5	39.02	48.3	25	4	0.79	9	57.1	4.9	6.6	18
LD11	20.80/20.80	236	32	7.64	13	0.28	3	25.03	42.27	46.6	28	3	1.92	7	34.3	5.1	17.5	10.5
LD10	18.50/18.50	249	37.5	7.74	15.5	0	3.5	28.5	32.29	50.0	23	3	0.77	9	71.9	5	1.5	10.4
LD09	17.00/17.00	250	34.5	8.04	11.5	0.57	2.5	28.16	44.23	49.3	21	4	0.99	7	62.5	4.8	5.9	15.4
LD08	13.40/13.40	314	33.5	8.54	15	0.27	2.5	23.03	33.48	55.1	27	4	12.03	12	51.2	5.4	3	4.5
LD07	11.40/11.40	321	39.5	8.71	12.5	0.35	2.5	55.13	27.57	54.8	25	7	0.74	11	61.4	4.8	7.6	9.7
LD06	9.60/9.60	328	43.5	9.1	16.5	0.21	4.5	54.4	27.39	64.9	30	6	3.25	12	41.4	5.3	18.5	8.1
LD03	7.00/7.00	333	40.5	8.01	11	0	4	55.53	18.18	55.2	22	5	0.99	8	29.7	5.3	11.2	4.3
LD02	4.70/4.70	335	40.5	9.04	13.5	0	3.5	69.86	14.56	53.5	22	5	1.70	10	64.4	4.8	7.5	1.9
LD05	2.50/2.50	346	37.5	8.72	15.5	0	3	23.54	28.96	64.3	34	7	9.08	14	31.8	6	29.8	15.2
LD16	1.50/0.00	348	21	6.93	12	0.31	1	0.7	24.29									
LD01	1.00/1.00	376	57.5	11.25	36	0.07	5	34.83	11.11	68.9	26	6	1.79	10	76.2	4.8	1	2.6
95-661 West Norman Drain (Trib to DuPage R. at RM 20.2)																		
LD31	5.10/5.10	2.41	26	NA	10	0	0	0	50	46.7	27	5	4.49	5	11.0	5.4	0.8	24.5
LD26	2.20/2.20	6.18	29	NA	11	0	1	3.96	45.45	62.4	31	4	7.31	8	26.6	5.5	1	17.5
95-662 Mink Creek (Trib to Lily Cache Creek at RM 1.9)																		
LD39	3.20/3.20	4.13	15	NA	9	1.06	0	0	44.44	28.5	22	0	15.44	4	17.4	6.3	2.3	23.1
LD23	1.80/1.80	8.83	27	NA	12	0	0	2.45	50	47.2	35	5	7.35	9	27.4	5.6	6.2	8.8
	Excellent:		>50	>9.6	>29	0	≥ 5		≤16.1	**>65.0**							0	<5
	Good:		≥41	>8.5	>14	<1.3	≥4	>40.7	<30.3	**≥41.8**	≥23	≥3	≤7.5	≥3	>24.5	≤4.9	<5	<15
	Fair:		<41.8	>5.8	>12	<3.0	<3	<40.7	<40	**<41.8**	≤23	≥2	≤28	2	≥7.7	>4.9	<20	≥15
	Poor:		≤20	<5.8	>7	>10	≤1	<10	>50	**≤20.9**	<16	<2	>28.1	1	<7.7		≥35	≥35
	Very Poor			<4.0	≤7	>20		<0.8	≥70			0		0			<60	>60

Table 16. Continued.

Site ID	River Mile	Drainage Area ($mi.^2$)	Fish Data							Macroinvertebrate Data								
			fIBI	Miwb	Native Sp.	% DELT	Intoler-ant sp.	%Mineral Spawners	Percent Tolerant	mIBI	Total Taxa	Intoler-ant Taxa	%Toler-ant Taxa	EPT Taxa	%EPT	MBI	%Toxic Tolerant Taxa	%Organic Enrich. Taxa
95-663 Spring Creek (Trib to DuPage R. at RM 17.8)																		
LD30	1.47/1.47	3.39	17	NA	5	0	0	0	60	36.1	28	0	17.31	3	7.1	6.7	4.4	26.9
LD21	0.50/0.50	5.3	20	NA	11	2.25	0	3.37	45.45	54.4	35	3	12.17	6	23.4	6	3.6	16.9
95-664 Springbrook Creek (Trib to DuPage R. at RM 27.1)																		
LD24	4.80/4.80	8.91	29	NA	15	0	1	16.28	33.33	46.7	21	3	2.58	8	35.5	5.2	0	3.6
LD19	1.40/1.40	12.3	32	NA	18	2.46	2	15.48	27.78	30.9	29	1	3.74	5	0.8	4.5	0.9	5.3
95-665 Rock Run Creek (Trib to IL-MI Canal at RM 9.0)																		
LD41	7.90/7.90	5	24	NA	6	0	0	87.15	33.33	43.7	29	2	16.93	3	3.1	6.1	1.7	28.3
LD04	6.50/6.50	4.95	12	NA	2	0	0	0	0	26.5	19	1	11.53	3	16.2	6	5.7	18.3
LD22	5.70/5.70	5.5	12	NA	6	0.93	0	0	33.33	22.4	18	0	4.31	1	3.7	4.6	0.3	2.2
LD17	3.50/3.50	10.6	17	NA	10	0.8	0	0	50	29.1	23	2	12.17	4	2.0	6.1	5.7	31
95-667 Hammel Creek (Trib to DuPage R. at RM 10.6)																		
LD28	1.19/1.19	10.7	23	NA	10	0	0	17.98	50	35.9	22	2	3.99	2	8.0	5	4.6	12
95668 Lily Cache Creek (Trib to DuPage R. at RM 14.4)																		
LD37	14.70/14.70	4.33	16	NA	5	0	0	0	60	30.9	25	1	15.73	1	0.3	6.5	5.1	40.1
LD18	11.20/11.20	11.1	22	NA	10	0	1	0	60	26.7	18	1	9.03	3	1.3	5.4	3.9	21.6
LD15	6.50/6.50	21.4	23.5	6.54	14.5	0	1.5	5	30.95	60.0	32	4	12.39	9	40.2	5.3	0.3	7.4
LD20	0.36/0.36	46	28	7.17	16	1.3	1	3.65	25.1	36.6	29	4	28.92	6	8.8	7.7	5.9	51.3
	Excellent:		>50	>9.6	>29	0	≥ 5		≤16.1	**>65.0**							0	<5
	Good:		≥41	>8.5	>14	<1.3	≥4	>40.7	<30.3	**≥41.8**	≥23	≥3	≤7.5	≥3	>24.5	≤4.9	<5	<15
	Fair:		<41.8	>5.8	>12	<3.0	<3	<40.7	<40	**<41.8**	≤23	≥2	≤28	2	≥7.7	>4.9	<20	≥15
	Poor:		≤20	<5.8	>7	>10	≤1	<10	>50	**≤20.9**	<16	<2	>28.1	1	<7.7		≥35	≥35
	Very Poor			<4.0	≤7	>20		<0.8	≥70			0		0			<60	>60

***Table 16**. continued.*

Site ID	River Mile	Drainage Area ($mi.^2$)	Fish Data							Macroinvertebrate Data								
			fIBI	Miwb	Native Sp.	% DELT	Intoler-ant sp.	%Mineral Spawners	Percent Tolerant	mIBI	Total Taxa	Intoler-ant Taxa	%Toler-ant Taxa	EPT Taxa	%EPT	MBI	%Toxic Tolerant Taxa	%Organic Enrich. Taxa
95-672 Trib #3 to DuPage R. at RM 13.9																		
LD40	0.80/0.80	3.53	Dry	NA	2	0	0	0	50	37.2	29	3	15.57	2	2.3	6.6	1.9	55
95-673 Trib #1 to Lily Chache Cr at RM 6.1																		
LD38	0.84/0.84	5.3	22	NA	8	0	0	0.98	50	32.6	27	0	10.15	2	27.3	5.1	1.2	12
95-674 Trib #7 to DuPage R. at RM 25.9																		
LD35	0.16/0.00	3.3	Dry	NA	1	0	0	0	0									
95-675 Trib #6 to DuPage R. at RM 25.4																		
LD34	1.00/1.00	4.72	22	NA	6	0	0	0	33.33	34.3	25	1	10.81	7	6.8	6.1	0.3	43.9
95-676 Wolf Creek (Trib to DuPage at RM 23.7)																		
LD33	0.14/0.14	6	Dry	NA	1	0	0	0	0	54.5	31	3	19.6	8	22.8	6	1.9	12
95-677 East Norman Drain Trib # 5 to Dupage R. at RM 20.5																		
LD32	0.90/0.90	2.83	18	NA	7	0	0	0	71.43	45.5	29	2	5.73	6	6.2	5.8	1.5	24.2
95-678 Trib #4 to DuPage R. at RM 16.4																		
LD29	0.60/0.60	2.36	29	NA	11	0	1	0.95	63.64	36.5	26	2	5.81	4	3.4	5.6	0.3	9.2
95-679 Trib #1 to DuPage R. at RM 4.9																		
LD27	0.15/0.15	2.8	12	NA	1	0	0	0	0	45.6	24	4	6.03	5	6.8	5.8	1.6	3.6
	Excellent:		>50	>9.6	>29	0	≥ 5		≤16.1	**>65.0**							0	<5
	Good:		≥41	>8.5	>14	<1.3	≥4	>40.7	<30.3	**≥41.8**	≥23	≥3	≤7.5	≥3	>24.5	≤4.9	<5	<15
	Fair:		<41.8	>5.8	>12	<3.0	<3	<40.7	<40	**<41.8**	≤23	≥2	≤28	2	≥7.7	>4.9	<20	≥15
	Poor:		≤20	<5.8	>7	>10	≤1	<10	>50	**≤20.9**	<16	<2	>28.1	1	<7.7		≥35	≥35
	Very Poor			<4.0	≤7	>20		<0.8	≥70			0		0			<60	>60

Table 16 lists selected mIBI metrics and other macroinvertebrate assemblage attributes two of which are key biological response signatures associated with toxic impacts (% toxic tolerant taxa) and organic enrichment (% organic enrichment tolerant taxa; Yoder and DeShon 2003). Total taxa collected at each site ranged from 18-35 taxa. Only one site in the mainstem exceeded for the toxic threshold (29.8% at LD05 at RM 2.5) and none for the organic enrichment signature thresholds for poor or very poor. The five sites that were in the fair range were just barely into that range and mostly in the upper half of the mainstem, closest to the West and East Branch confluence. The number of EPT taxa in the mainstem ranged from 5-12 with all sites reflecting good conditions. In the tributaries, EPT taxa ranged from 1 (LD22, LD37) to 8 with 19 sites rated good, 3 sites rate fair, and 1 sites rated poor. The percent of EPT taxa in the mainstem ranged from 29.7% to 76.2% (mouth site) with all sites in the good quality range. In the tributaries the percent EPT taxa ranged from 0.3% (LD37, upstream site in Lily Cache Creek) to 40.2% (LD15, Lily Cache Creek) with 4 site rated good, 8 sites rated fair and 12 sites rated poor. In general, the tributaries showed more influence from organic enrichment than the mainstem with 4 poor sites and 10 sites with elevated % of organic enrichment individuals related to both urban and agricultural runoff and the WWTP on Rock Run.

Lower DuPage River Watershed Biological Communities – Fish Assemblage

As in previous studies, fish assemblages in the lower DuPage River watershed ranged from poor to good in 2015 (Figure 23), but in 2018 three sites in the mainstem fully attained the Illinois general aquatic life thresholds (LD01, LD06 and LD14). The only site with consistently good quality assemblages during all surveys is found in the Channahon Dam tailwaters, a short reach wedged in between the dam and the Des Plains River. Mainstem fish communities at most sites have improved since 2012 and 2015, and no sites were in the poor range in 2018. In contrast to the mainstem, conditions in the tributaries tended to improve from mostly poor, to mostly fair quality between 2012 and 2015, but regressed somewhat in 2018 (see Figure 266).

Mainstem fish community health in 2018 followed a similar pattern to 2007, 2012, and 2015 surveys although fish assemblages scores were generally improved compared to scores in the earlier studies (Figure 24). Longitudinal patterns in the fIBI follow tend to follow variations in stream habitat as measured by the QHEI (Figure 16). Although habitat is likely a primary limiting factor, the conditions of the assemblages (e.g., compared to reference expectations) are also influenced by upstream nutrient loadings, low dissolved oxygen levels, high dissolved constituents such as chloride, and the presence of the Channahon and Hammel Woods dams, which not only impound the river, but also restrict fish movements upstream.

Influence of Dams on the Illinois Fish IBI

A list of 2007-2015 lower DuPage River fish species in segments bracketing the Channahon and Hammel Woods dams from the MBI (2014) are updated with 2018 results in Table . Based on the update, out of 61 total fish species from the lower DuPage mainstem, 16 species and 1 hybrid were found only downstream from the Channahon dam. As discussed previously, while a few of these species are more strongly associated with the larger Des Plaines River, many would be expected to inhabit the DuPage River mainstem and move into the West and East Branches if flow was unrestricted. This was particularly true of the redhorse species and most

minnow and darter species that were restricted to the lowest reach. Again, the short-term breach of the Channahon dam in 1996 was not sufficient to establish viable populations of these species upstream. The MBI sampling results were considered to be in line with 2007 IDNR results in the DuPage mainstem and with their conclusion that the dams were significant obstructions to fish dispersal (The Conservation Foundation 2003).

A more detailed analysis of the mainstem dam influences was included in the 2012 report write-up (pp. 56-62). The report analyzed species richness and proportional metrics related to fish community composition in relation to their presence above and below the obstructions. In summary, the report concluded that water quality or other habitat could not be eliminated as factors in the quality of fish communities. However, the data did suggest the barriers play a significant role, in concert with habitat and water quality, in fish assemblage condition. The results point to all three factors influencing mainstem community performance but the exact proportion or ranking of each was difficult to discern. Overall, results pointed to a moderately degraded and enriched stretch of river experiencing both physical habitat and structural limitations associated with historical channelization and anthropogenic sources. With the planned removal of Hammel Woods dam, local fish assemblage conditions should improve further has upstream habitat improves, but is likely to be still limited by the Channahon dam.

***Figure 23**. Lower DuPage River watershed fIBI scores in 2018 mapped by Illinois EPA narrative range. Blue impoundment symbols denote dams and discharge pipes denote WWTP locations.*

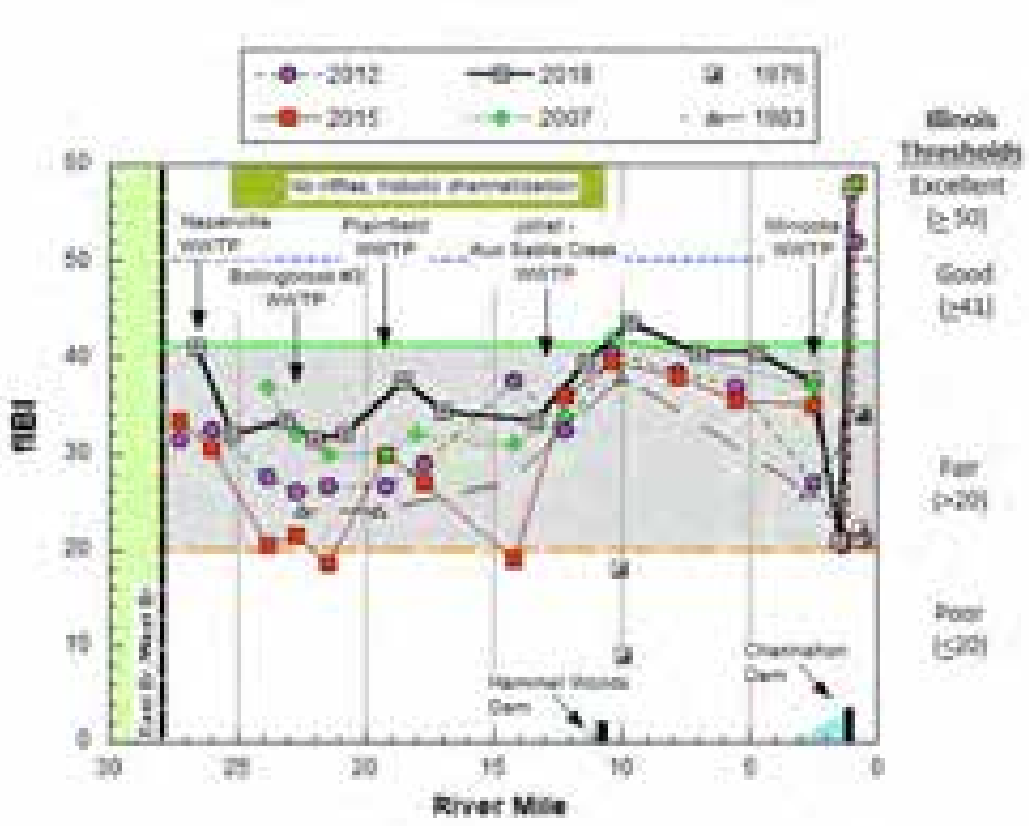

Figure 24. *Fish Index of Biotic Integrity (fIBI) scores for the Lower DuPage River from 1976-2018, in relation to municipal WWTPs and existing low head dams (noted by bars adjoining the x-axis). The shaded region demarcates the "fair" narrative range.*

***Table 17**. Fish species collected in 2007-15 from three Lower DuPage River segments: 1) Downstream Channahon Dam, 2) upstream Channahon Dam and downstream Hammel Woods dam and, 3) upstream Hammel Woods Dam. Species highlighted in yellow were only found downstream from the Channahon Dam; those in blue were found between the Channahon and Hammel Woods dam. Any changes in records based on 2015 sampling are highlighted in pink.*

Family Code	Species Code	Common Name	Latin Name	Dst. Channahon Dam	Upstream Channahon, Dst. Hammel Woods Dam	Ust. Hammel Woods Dam
05	001	SILVER AROWANA	*Osteoglossum bicirrhosum*		2018	
10	004	LONGNOSE GAR	*Lepisosteus osseus*	X		
20	003	GIZZARD SHAD	*Dorosoma cepedianum*	X	X	X
34	001	CENTRAL MUDMINNOW	*Umbra limi*		X	
37	001	GRASS PICKEREL	*Esox americanus*	X	2015	
40	004	SMALLMOUTH BUFFALO	*Ictiobus bubalus*	X		
40	005	QUILLBACK CARPSUCKER	*Carpiodes cyprinus*	X	X	X
40	006	RIVER CARPSUCKER	*Carpiodes carpio*	X	X	X
40	008	SILVER REDHORSE	*Moxostoma anisurum*	X		
40	009	BLACK REDHORSE	*Moxostoma duquesnei*	X		
40	010	GOLDEN REDHORSE	*Moxostoma erythrurum*	X	X	X
40	011	SHORTHEAD REDHORSE	*Moxostoma macrolepidotum*	X	X	X
40	013	RIVER REDHORSE	*Moxostoma carinatum*	X		
40	015	N. HOG SUCKER	*Hypentelium nigricans*	X	X	X
40	016	WHITE SUCKER	*Catostomus commersoni*	X	X	X
43	001	COMMON CARP	*Cyprinus carpio*	X	X	X
43	002	GOLDFISH	*Carassius auratus*	X	X	X
43	003	GOLDEN SHINER	*Notemigonus crysoleucas*	X	X	X
43	004	HORNYHEAD CHUB	*Nocomis biguttatus*	X	X	X
43	013	CREEK CHUB	*Semotilus atromaculatus*	X	X	X
43	015	SUCKERMOUTH MINNOW	*Phenacobius mirabilis*	X		
43	020	EMERALD SHINER	*Notropis atherinoides*	X		
43	022	ROSYFACE SHINER	*Notropis rubellus*	2015		
43	023	REDFIN SHINER	*Lythrurus umbratilis*	X	X	X
43	025	STRIPED SHINER	*Luxilus chrysocephalus*	X	X	X
43	026	COMMON SHINER	*Luxilus cornutus*		2015	X
43	028	SPOTTAIL SHINER	*Notropis hudsonius*	X		
43	032	SPOTFIN SHINER	*Cyprinella spiloptera*	X	X	X
43	033	BIGMOUTH SHINER	*Notropis dorsalis*	X	X	X
43	034	SAND SHINER	*Notropis stramineus*	X	X	X
43	035	MIMIC SHINER	*Notropis volucellus*	X	2018	
43	041	BULLHEAD MINNOW	*Pimephales vigilax*	X		
43	042	FATHEAD MINNOW	*Pimephales promelas*	X	X	X
43	043	BLUNTNOSE MINNOW	*Pimephales notatus*	X	X	X
43	044	CENTRAL STONEROLLER	*Campostoma anomalum*	X	X	X
43	045	COMMON CARP X GOLDFISH	HYBRID	X	X	X
43	048	RED SHINER	*Cyprinella lutrensis*	X		
47	002	CHANNEL CATFISH	*Ictalurus punctatus*	X	X	X
47	004	YELLOW BULLHEAD	*Ameiurus natalis*	X	X	X
47	006	BLACK BULLHEAD	*Ameiurus melas*		X	X

***Table 17**. Fish species collected in 2007-15 from three Lower DuPage River segments: 1) Downstream Channahon Dam, 2) upstream Channahon Dam and downstream Hammel Woods dam and, 3) upstream Hammel Woods Dam. Species highlighted in yellow were only found downstream from the Channahon Dam; those in blue were found between the Channahon and Hammel Woods dam. Any changes in records based on 2015 sampling are highlighted in pink.*

Family Code	Species Code	Common Name	Latin Name	Dst. Channahon Dam	Upstream Channahon, Dst. Hammel Woods Dam	Ust. Hammel Woods Dam
47	007	FLATHEAD CATFISH	*Pylodictis olivaris*	X	X	X
47	008	STONECAT MADTOM	*Noturus flavus*	X	X	X
47	013	TADPOLE MADTOM	*Noturus gyrinus*	X	X	X
54	002	BLACKSTRIPE TOPMINNOW	*Fundulus notatus*	X	X	X
57	001	WESTERN MOSQUITOFISH	*Gambusia affinis*	X		X
70	001	BROOK SILVERSIDE	*Labidesthes sicculus*	X		
74	001	WHITE BASS	*Morone chrysops*	X		
74	005	STR. BASS X WH. BASS	HYBRID	X		
74	006	YELLOW BASS	*Morone mississippiensis*		2015	
77	001	WHITE CRAPPIE	*Pomoxis annularis*	2018	2015	X
77	002	BLACK CRAPPIE	*Pomoxis nigromaculatus*	X	X	X
77	003	ROCK BASS	*Ambloplites rupestris*	X	X	X
77	004	SMALLMOUTH BASS	*Micropterus dolomieui*	X	X	X
77	006	LARGEMOUTH BASS	*Micropterus salmoides*	X	X	X
77	008	GREEN SUNFISH	*Lepomis cyanellus*	X	X	X
77	009	BLUEGILL SUNFISH	*Lepomis macrochirus*	X	X	X
77	010	ORANGESPOTTED SUNFISH	*Lepomis humilis*	X	2015/2018	X
77	011	LONGEAR SUNFISH	*Lepomis megalotis*	X	X	X
77	012	REDEAR SUNFISH	*Lepomis microlophus*		X	X
77	013	PUMPKINSEED SUNFISH	*Lepomis gibbosus*	X	X	
77	038	NORTHERN SUNFISH	*Lepomis peltastes*	2018	2018	
80	001	SAUGER	*Sander canadense*	2018		
80	002	WALLEYE	*Sander vitreus*	X		
80	003	YELLOW PERCH	*Perca flavescens*		X	X
80	005	BLACKSIDE DARTER	*Percina maculata*	X		
80	007	SLENDERHEAD DARTER	*Percina phoxocephala*	X	2015/2018	
80	011	LOGPERCH	*Percina caprodes*	X	X	
80	014	JOHNNY DARTER	*Etheostoma nigrum*	X	X	X
80	016	BANDED DARTER	*Etheostoma zonale*	X	X	2015/2018
85	001	FRESHWATER DRUM	*Aplodinotus grunniens*	X		
87	001	ROUND GOBY	*Neogobius melanostomus*	X	2018	2015/2018
61 Total Species				**18 species found only dst. dam**	**3 additional species only dst. dam**	**44 total species ust. dams**

Longitudinal Patterns in the MIwb

The Modified Index of Well-Being (MIwb) is a composite fish index that includes measures of diversity based on abundance and biomass as well as log-weighted factors related to the total biomass and abundance at a site. It is only applied in non-headwater (>20 sq. mi) streams and rivers. It ranges from zero to approximately 12, but a value of 8.0 would be a reasonable expectation score for a river such as the Lower DuPage. Values between 6.0 and 8.0 are considered fair and impaired relative to expected values. Values less than a 6.0 are typically considered poor and less than 4.0 very poor.

In 2012, Lower DuPage MIwb scores reflected a pattern where sites with good habitat reached a score of 8.0, but where habitat was less diverse or in dam pools, scores fell below threshold and sometimes approached the poor range (Figure 25). Stretches of lower habitat quality and impoundments tend to magnify enrichment impacts. A similar pattern was evident in 2015 but declines were even more pronounced and several sites fell into the poor range. Lowest scores were found below a series of waste treatment discharges and in the stretch of good, but declining habitat between Naperville and the Hammel Woods dam. By 2015, "good" MIwb

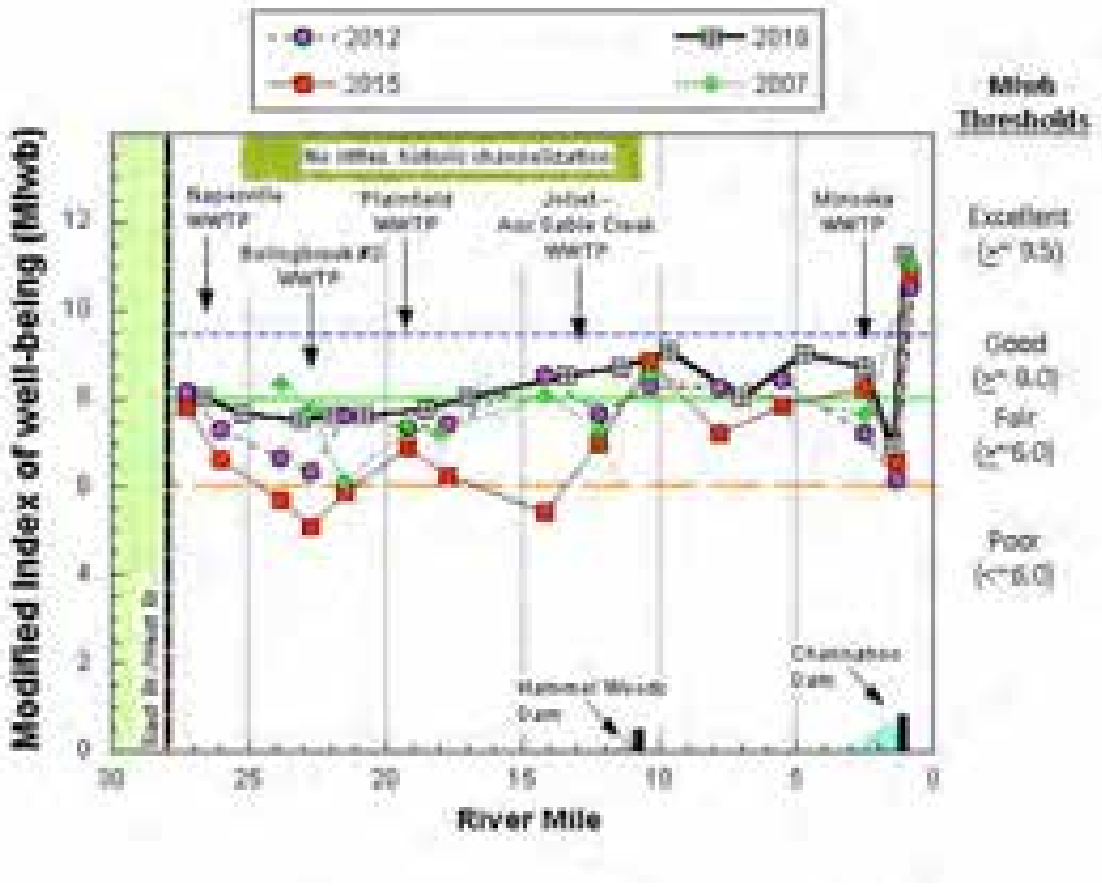

Figure 25*. Mean Modified Index of well-being (MIwb) scores in the Lower DuPage River in 2012, 2015, and 2018. The solid orange line represents a general threshold between good and fair ranges of the index. The dashed orange line represents a general threshold between fair and poor ranges.*

scores were generally restricted to the stream reaches with the highest habitat quality and dam tailwaters, where turbulent flow, re-oxygenation and the physical barriers imposed by the dams create unique habitats and localized, higher performance. The MIwb stressor signal was consistent with the fIBI trend and several of its metrics, suggesting sags in D.O. levels in portions of the mainstem. Conversely, in 2018 the MIwb scores were, at most sites, the highest of any year sampled. Flow conditions in 2018 were more similar to 2015 levels (generally greater than historical mean values) than in 2012 when they were very low, yet the MIwb performance was more similar to 2012 suggesting that 2015 MIwb values were more related to chemical or other stressors in the river. Hopefully, the improving trends in 2018 are indicative of a long-term positive trend in stressor levels in the river.

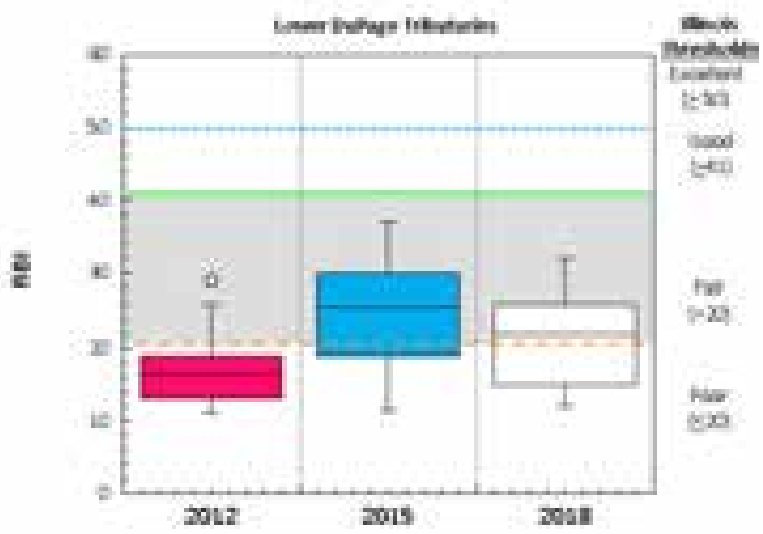

Figure 26. *Box and whisker plot of fIBI scores from Lower DuPage River tributary sites in 2012, 2015, and 2018.*

Lower DuPage River Tributaries – Fish Assemblage

Twenty-five Lower DuPage tributary sites were sampled in 2018 including 23 headwater sites (i.e., <20 sq. mi. drainage) and only two wading sites (> 20 sq. mi.) located in lower Lily Cache Creek. Fish IBI scores generally were better than in 2012, but declined somewhat from 2015 (Figure 26). As in 2012, no fish reached the Good performance range in 2015 or 2018 tributary sampling (in contrast to macroinvertebrate mIBI scores). Although fair quality collections outnumbered poor scores in 2015 vs. 2012 (18 to 7), the number of sites in the poor range increased in 2018 (11). Although *average* flow conditions were similar in 2015 and 2018, flow in tributaries when sampled were generally lower in 2018 compared to 2015 as evidenced by three "dry" sites (LD27, LD33 and LD35) that could not be sampled. Small streams with poor habitat and low base flows are generally more susceptible to swings in biological condition from year to year.

Poorest fish performance was usually found at sites with poorest habitat scores, particularly in relation to extensively channelized and wetland influenced stream reaches often with sluggish flow and soft bottoms. An example of the latter, both in 2015 and 2018, was LC Tributary #1 (LD38), a lentic, wetland environment bisected by a deep soft channel (fIBI 2015= 11.5, 2018=22). An example of the former is Spring Creek LD30 which consisted of a narrow, ditched and open channel flowing between large expanse of soy bean fields; the adjacent fields consisted of formerly drained wetlands and the extensively silted, predominantly muck and hardpan substrates reflected wetland sources (fIBI 2015=19; 2018 = 19). The most consistently

poor reach was found in Rock Run Creek, beginning in the wetland-influenced section upstream and extending four miles downstream from the Crest Hill WWTP. A poor score at the most downstream site (LD17, fIBI 2015=15.5, 2018=17) was measured despite good to excellent habitat quality (QHEI = 75), suggesting WWTP impacts over and above wetland influences further upstream. In 2012, Lily Cache Creek was largely intermittent at RM 10.9 (LD18; fIBI 2015=26.5, 2018=22) and completely dry and unsampled downstream at RM 6.3 (LD15 in 2012). Under free-flowing conditions in 2015, LD18 improved from poor to fair and the previously unsampled LD15 was solidly fair (fIBI = 33). During 2018 three small streams were dry when visited and could not be sampled for fish in 2018 (LD27, LD33, LD35). Frequent intermittency results in conditions when recolonization may be limited to pioneering, tolerant fish species and fluctuations in the fIBI in the poor and very poor ranges. Intermittency is increased by channelization in the watershed that is designed to move water downstream quickly to improve agricultural and urban drainage in areas near the stream. Protection of riparian and floodplain habitats reduces the need for drainage and promotes retention of water, sediment, and nutrients in these areas. Associated reductions in nutrients like phosphorus can make stream restoration BMPs useful for nutrient trading scenarios in watersheds. Because there are many more small streams than larger streams and because of greater surface area to water volumes opportunities to reduce nutrient delivery are greatest in small streams compared to larger waterbodies.

SYNTHESIS

The biological condition of the lower DuPage River is shaped by upstream water quality dischargers, developed land uses and urban runoff, altered physical stream habitat and two dams that inhibit migration from downstream aquatic species sources. Small streams in the entire DuPage River basin have been either altered directly or through impervious surfaces that have altered the hydrological regimes of these streams. An examination of the physical alterations to the tributaries (Table 14) shows either a lack of riffles or moderate-high riffle embeddedness at nearly all sites that is a product of the direct modification of habitat or a result of fines delivered via urban runoff and bank erosion.

The mainstem has shown gradual biological improvements since 2012, despite its flow being effluent dominated, to the extent that three fish sites and all the macroinvertebrate sites are achieving the general use biological thresholds in 2018. The high biological performance of the site at the mouth of the lower DuPage River, downstream of the Channahon Dam indicates that this barrier contributes to the fish assemblage lagging behind the macroinvertebrates in recovery, although there still are enough other stressors (e.g., dissolved oxygen, nutrients, chlorides) that may still limit full recovery of the mainstem.

Two new tools were applied in the 2018 Year 3 assessment and included the Area of Degradation and Area of Attainment Values (ADV/AAV; Yoder et al. 2005, 2019) to better visualize and quantify the extent and severity of biological impairment *and* the extent and sustainment of full attainment. This approach was used to determine the extent of changes that have taken place between the 2012, 2015, and 2018 lower DuPage River mainstem

bioassessments. Sufficient historical data was simply not available at enough locations along the longitudinal pollution continuum to include data prior to 2012, but there is little doubt that conditions were much worse in the 1980s and before which would have yielded even more negative ADV values. The ADV/AAV is calculated individually for each index and was done here for the fIBI and mIBI (Table 17).

The ADVs for both the fIBI and mIBI reveal the severity and extent of impairment of the General use for aquatic life in 2012 and 2015 in the lower DuPage River mainstem (Table 18). In 2018, there were more miles with partial attainment (20.9) and fewer miles in non-attainment in 2012 and 2015, largely because of the improvement in the macroinvertebrate assemblage (zero mIBI ADVs in 2018). The improvement in the macroinvertebrate assemblages can be seen in the increase in the AAV scores (the magnitude and extent of scores above the mIBI threshold, Table 18).

Table 18. *Area of Degradation Values (ADV) for fIBI and mIBI and Areas of Attainment Values (AAV) for site on the mainstem of the lower DuPage River during 2012, 2015, and 2018.*

					Aq. Life Attainment Status (miles)		
Year	fIBI ADV	fIBI AAV	mIBI ADV	mIBI AAV	Full	Partial	Non
2018	1584	28	0	3003	3.4	20.9	1.3
2015	4019	7	541	1557	0.1	9.4	17.0
2012	2792	3	697	1800	0.0	10.4	16.1

The macroinvertebrate AAVs nearly doubled between 2012/2015 and 2018 as the mIBI met the General Use biocriterion at all sites in 2018 (Table 18). Although three sites were meeting the fish IBI biocriterion in 2018 these sites were not adjacent and the AAV only increased slightly although the ADV was reduced by more than half from 2015 to 2018 as fIBI scores increased (Table 18). The lesser response of the fish assemblage vs. the macroinvertebrate assemblage may be partly related to the Channahon dam as a block to migration from the lowest reach of the DuPage and the Des Plaines River system although other stressors in the lower DuPage River are still elevated at levels that could affect fish assemblages (DO, nutrients, chlorides, and habitat). The pending removal of the Hammel Woods dam should improve habitat upstream of it and enhance fish movements within the lower DuPage River, but the Channahon dam will still be a major block to some key fish species (Table 17).

Newly derived IPS thresholds for water and sediment chemistry and physical habitat attributes were also available to assess causes of impairment. These thresholds provide a more refined stratification of these values for parameters that showed valid relationships with biological responses based on species and taxa level analyses and then correlated with the corresponding fish and macroinvertebrate IBIs (MBI 2020). These analyses produced thresholds across four or five narrative categories of quality (excellent, good, fair, poor, and very poor). This now replaces the formerly used binary (i.e., “pass/fail”) approach to evaluating exceedances of chemical and physical effect thresholds and criteria. Thus a more graded approach to the assignment of causes and sources of Illinois General Use biological impairments is now made possible. These new tools were integrated with the previously used tools and indicators to

assign associated causes to the biological impairments observed in 2018. The new IPS framework also offers the semblance of a tiered aquatic life use (TALU) stratification of goals that has been incorporated into all IPS outputs to support local restoration and protection efforts by the respective watershed groups and stakeholders.

The biological criteria for fish and macroinvertebrates used by Illinois EPA (2018) establish the thresholds by which impaired sites and reaches are determined. The assignment of causes in this analysis generally attempts to follow the overall intent of the Illinois Integrated Report assessment guidelines, but is supplemented by the more extensive biological effect thresholds provided by the newly updated IPS tools and indicators (MBI 2020). The delineation of causes and sources was based on integrating and synthesizing the preceding analyses of categorical and parameter-specific stressor threshold exceedances. The most influential of these in 2018 are included in Table 1 along with the fish and macroinvertebrate IBI scores. Habitat alteration is represented by the QHEI and the QHEI modified:good attributes ratio, D.O. includes the minimum measured by Datasondes, the effect of nutrient enrichment by the diel D.O. swing narrative, the nutrient enrichment effect status, the new IPS nutrient index, new IPS chemical threshold exceedances for water and sediment, and biological response signatures for organic enrichment and toxic tolerant indicators.

***Figure 27**. Schematic diagram illustrating the standardization of biological and stressor scores to the same 0-10 scale with 10 representing the worst biological and high stressor values and 0.1 representing the best biological and lowest stressor levels. A score of 4 represent the General aquatic life use level.*

The new IPS thresholds provide a measure of the severity of stressors by placing the values on the same biological assessment gradient that ranges from 10 for the worst biological and stressor conditions to 0.1 for the best biological and lowest stressor levels (Figure 27). In the following discussion of the predominant causes of impairment in the lower DuPage we can weight each stressor by severity of their values assigning a weight of 5 to stressors in the very poor range, 3 for stressors in the poor range or a weight of 1 for stressors in the fair range. The weighted percent is then the total score for that stressor divided by the grand total including the weights. The straight percentage is also valuable relative the general prevalence of a stressor. In table 19

we provide the weighted and straight percentages for each stressor separately for the mainstem and the tributaries.

***Table 19**. Key stressors in the lower DuPage River study area presented separately for the mainstem and tributaries.*

Key Stressors	Very Poor	Poor	Fair	Threat	Percent of Sites	Weighted Score	Weighted Percent
Lower DuPage River Mainstem							
Low Dissolved Oxgen			9		60.0	9	7.3
Max Dissolved Oxygen			12	1	80.0	12	9.7
DO Swing			7	1	46.7	7	5.6
Sed. Metals	3	3			40.0	24	19.5
Nitrate			5	1	33.3	5	3.9
TP			12	3	80.0	12	9.7
Chloride			12	3	80.0	12	9.7
Channel Score, Channelization or Impoundment	1	4	8	2	86.7	25	20.3
Total QHEI		1	6	1	46.7	9	7.3
Substrate/Silt		1			1.0	3	2.4
Migration Barrier			12	2	80.0	12	9.7
				Total:		130	
Lower DuPage River Tributaries							
Low/Max Dissolved Oxygen			3		12.5	3	1.7
TKN, BOD (Org. Enrich.)	2		7		37.5	17	9.7
Nitrate			1		4.0	1	0.6
TP			3		12.5	3	1.7
Chloride	1	4	13		72.0	30	17
Channel Score, Channelization or Impoundment		8	7		62.5	33	18.8
Total QHEI		6	9		62.5	27	15.3
Substrate/Silt	7	6	8		87.5	51	29
TSS/Turbidity		1	8		37.5	11	6.3
				Total:		176	

The rationale for listing the predominant causal categories in 2018 follows:

- **Organic Enrichment/Dissolved Oxygen** – ***Low DO*** – any low D.O. value, any TKN value of poor or very poor (TKN used as a proxy for BOD per Miltner 2018);
- **Macro Habitat Related** – any high influence *Channelized/No Recovery* or moderate influence *Recovering from Channelization* in the QHEI attributes matrix (Table 14) or a poor or very poor QHEI score. **QHEI** causes are bolded in Table 1 where channelization contributes to the low QHEI score.

- **PAH/Metals/Toxicity** – any sediment metal or PAH threshold exceedance in Table 13, *PEC or PEL* exceedance, or IEPA elevated thresholds and any toxic *Biological Response* in Table 14.
- **Siltation/Embeddedness**) – any high influence *Silt/Muck Substrate* and/or moderate-extensive embeddedness in the QHEI attributes matrix (Table 14). **Substr** (substrate) causes are bolded in Table 1 where silt/muck substrates or moderate-extensive embeddedness contributes to the low QHEI substrate score.
- **Nutrient Enrichment** - diel D.O. Swing narrative ratings of *High* or *Wide* and/or nutrient enrichment status of *Highly Enriched, Enriched, or Likely Nutrients* as described in Table 11. SNAP narrative ratings that were accompanied by high TKN and low total P and nitrate-N were also correlated the Organic Enrichment/Low D.O. cause category in the modified upper mainstem.
- **Chloride/TDS** – any chloride value >biological effect fair, poor, or very poor threshold in Table 1.

In the mainstem of the lower DuPage River, there is a fairly equal influence of habitat, dissolved oxygen, nutrients and the Channahon dam as a migration barrier likely contributing to the observed impairment (Table 19). Most stressors were only present at a "fair" severity level except for habitat in dam pool are of the Channahon dam and for some selected sediment metals that ranked highly based on the IPS thresholds, but which all were below the PEL benchmarks and not likely limiting in these reaches. The macroinvertebrate toxic indicator (Table 16) only reaches the poor range at one site suggesting that toxicants are not a severe problem in the lower DuPage watershed. The nutrient and dissolved oxygen stressors are likely influenced by the pooled habitats that are the result of the dams and the dense aquatic macrophytes that influence DO swings.

The tributaries were most strongly limited by poor habitat (62.5% of sites), silt and embedded substrates (87.5% of sites) and elevated chlorides (72% of sites) related to large areas of impervious land cover, particularly in the most urban areas of the watershed (Table 19). The impervious surface influence the altered hydrology throughout the DuPage River system that help to deliver chlorides and silts and fine sediments to the stream channels. Summer chloride values exceeding the IPS threshold indicating elevated chloride runoff during winter and early spring are the most widespread stressor in the watershed (72% of sites). Recent research indicates chloride and other ionic compounds (e.g., sodium, sulfate) build up on soils and in shallow groundwater and concentrations are increasing gradually over time. It is unclear whether these concentrations will level off, but they may become a larger problem over time. We identified the major sources of aquatic life impairment in the watershed, outside of point sources upstream in the West and East Branches as hydromodification and urban runoff. Impervious surfaces have been shown to limiting to aquatic life as they increase in a watershed. Numerous studies have identified, as urban areas are currently developed, the limiting relationship between impervious land cover and biological performance (Schueler et al. 2009). The key moving forward is to determine how and where to best mitigate the impacts associated with impervious cover and the complex links to hydrology and runoff (Shuster et al. 2005). Although we also know the influence of habitat features on aquatic life, as impervious cover

increases in urban areas the influence of habitat restoration must be combined with riparian and floodplain enhancements that help control altered hydrology and the chemical constituents that currently delivered with storm water flows and storm events. For example, a study on habitat restoration by installing regenerative stormwater conveyances alone without consideration of other urban impacts did not show substantial recovery of aquatic assemblages (Violin et al. 2011; Fanelli et al. 2019). The strength of the baseline and repeated studies in watersheds like the lower DuPage River is the ability to identify sites along a gradient of biological condition that can be prioritized and targeted for restoration and to follow what is successful or unsuccessful over time in these complex urban settings.

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APPENDIX A

IPS Derived Biological Effect Thresholds

A-1: Northeast IL IPS Derived Biological Effect Thresholds for Water Column Parameters
A-2: Northeast IL IPS Derived Biological Effect Thresholds for Sediment Chemistry Parameters
A-3: Northeast IL IPS Derived Biological Effect Thresholds for Habitat and Land Use Parameters

***Appendix Table A-1**. NE IL IPS derived biological effect thresholds for water column chemical parameters.*

Parameter Code	Variable Name	Units	Limiting Assemblage	Site Size	Sample N	Excellent	Good	Fair	Poor	Very Poor
P1007	Barium, Total	µg/L	Fish	Head-Wade	1464	≤74.1	>74.09	>84.88	>101.8	>118.6
P1027	Cadmium, Total	µg/L	Fish	Head-Wade	1464	≤0.937	>0.937	>0.974	>0.983	>0.991
P1034	Chromium, Total	µg/L	Fish	Head-Wade	1464	≤1.398	>1.398	>1.540	>2.682	>3.824
P1042	Copper, Total	µg/L	Fish	Head-Wade	1464	--	≤4.480	>4.480	>4.969	>5.458
P1082	Strontium	µg/L	Fish	Head-Wade	1464	≤169.1	>169.1	>190.8	>280.4	>370.1
P1092	Zinc, Total	µg/L	Fish	Head-Wade	1464	≤7.47	>7.47	>9.78	>11.00	>12.22
P1105	Aluminum, Total	µg/L	Fish	Head-Wade	1464	≤310.0	>310.0	>393.3	>560.2	>727.0
P530	Total Suspended Solids	mg/L	Fish	Head-Wade	1464	≤17.50	>17.50	>31.60	>35.15	>38.69
P549	Volatile Suspended Solids	mg/L	Fish	Head-Wade	1464	≤5.000	>5.000	>7.769	>9.825	>11.88
P630	Nitrate-N+Nitrite-N	mg/L	Fish	Head-Wade	1464	≤3.767	>3.767	>5.045	>7.344	>9.643
P665	Total Phosphorus	mg/L	Fish	Head-Wade	1464	≤0.106	>0.106	>0.277	>1.002	>1.726
P70300	Total Dissolved Solids	mg/L	Fish	Head-Wade	1464	≤453.8	>453.8	>558.0	>651.2	>744.5
P916	Calcium, Total	mg/L	Fish	Head-Wade	1464	≤84425	>84425	>86067	>86313	>86559
P929	Sodium, Total	mg/L	Fish	Head-Wade	1464	≤16275	>16275	>45000	>79056	>113112
P940	Chloride, Total	mg/L	Fish	Head-Wade	1464	≤40.00	>40.00	>120.0	>184.9	>249.8
P1002	Arsenic	µg/L	Macros	Head-Wade	985	--	≤3.616	>3.455	>5.029	>6.603
P1051	Lead, Total	µg/L	Macros	Head-Wade	985	≤2.851	>2.851	>3.335	>3.884	>4.434
P1055	Manganese, Total	µg/L	Macros	Head-Wade	985	≤53.71	>53.71	>77.03	>107.1	>137.2
P1067	Nickel, Total	µg/L	Macros	Head-Wade	985	--	≤3.470	>3.470	>9.585	>15.70
P299	Mean Dissolved Oxygen	mg/L	Macros	Head-Wade	985	≥9.42	<9.42	<9.25	<6.11	<3.05
P310	BOD (5-Day)	mg/L	Macros	Head-Wade	985	≤1.30	>1.30	>2.35	>3.45	>4.54
P610	Total Ammonia	mg/L	Macros	Head-Wade	985	≤0.084	>0.084	>0.100	>0.190	>0.280
P615	Nitrite	mg/L	Macros	Head-Wade	985	≤0.014	>0.014	>0.040	>0.068	>0.096
P625	Total Kjedhal Nitrogen	mg/L	Macros	Head-Wade	985	≤1.07	>1.07	>1.12	>1.63	>2.14
P720	Cyanide, Total	µg/L	Macros	Head-Wade	985	≤8	>8	>10	>10	>10
P937	Potassium, Total	mg/L	Macros	Head-Wade	985	≤3158	>3158	>6300	>7718	>9129
P945	Sulfate, Total	mg/L	Macros	Head-Wade	985	≤58.27	>58.27	>73.10	>83.45	>93.81
P82078	Turbidity	NTU	Macros	Head-Wade	985	--	≤19.3	>19.3	>25.9	>32.5
DO_MAX	Maximum DO	mg/L	Macros	Head-Wade	985	≤10.36	≥10.36	>12.21	>14.24	>16.28
DO_MIN	Minimum DO	mg/L	Macros	Head-Wade	985	--	≤8.47	>7.55	>8.19	>8.84
P94	Conductivity	µS/cm	Fish	Head-Wade	1464	≤739	≥739	>1038	>1208	>1378

31 variables

***Appendix Table A-2**. NE IL IPS derived biological effect thresholds for sediment chemical parameters.*

Parameter Code	Variable Name	Units	Limiting Assemblage	Site Size	Sample N	Excellent	Good	Fair	Poor	Very Poor
P1003	Arsenic	mg/kg	Macros	Head-Wade	985	--	≤8.65	>8.65	>15.82	>23.67
P1008	Barium	mg/kg	Macros	Head-Wade	985	--	≤141.0	>132.0	>150.3	>168.7
P1013	Beryllium	mg/kg	Macros	Head-Wade	985	--	≤0.411	>0.411	>0.496	>0.581
P1028	Cadmium	mg/kg	Macros	Head-Wade	985	--	≤0.933	>0.745	>1.354	>1.963
P1029	Chromium	mg/kg	Macros	Head-Wade	985	≤20.53	>20.53	>23.30	>26.22	>29.15
P1043	Copper	mg/kg	Macros	Head-Wade	985	≤19.00	>19.00	>29.78	>40.45	>51.12
P1052	Lead	mg/kg	Macros	Head-Wade	985	≤15.50	>15.50	>24.80	>33.04	>41.27
P1053	Manganese	mg/kg	Macros	Head-Wade	985	≤841.0	>841.0	>845.5	>996.8	>1148
P1068	Nickel	mg/kg	Macros	Head-Wade	985	--	<19.50	>19.50	>22.52	>25.53
P1078	Silver	mg/kg	Macros	Head-Wade	985	--	<0.483	>0.483	>1.261	>2.039
P1083	Strontium	mg/kg	Macros	Head-Wade	985	--	<81.80	>81.80	>106.8	>131.9
P1093	Zinc	mg/kg	Macros	Head-Wade	985	≤75.00	>75.00	>100.0	>133.9	>167.8
P1103	Tin	mg/kg	Macros	Head-Wade	985	--	< 11.00	>8.86	>16.73	>24.60
P1108	Aluminum	mg/kg	Macros	Head-Wade	985	--	<6480	>6480	>8272	>10064
P34203	Acenaphthylene	µg/kg	Macros	Head-Wade	985	--	<86.38	>86.38	>103.6	>120.9
P34208	Acenaphthene	µg/kg	Macros	Head-Wade	985	--	<84.25	>84.25	>104.8	>125.3
P34223	Anthracene	µg/kg	Macros	Head-Wade	985	--	<78.00	>78.00	>119.9	>161.8
P34233	Benzo(b)fluoranthene	µg/kg	Macros	Head-Wade	985	--	<520.8	>520.8	>1437	>2354
P34245	Benzo(k)fluoranthene	µg/kg	Macros	Head-Wade	985	--	<207.0	>207.0	>434.7	>662.4
P34250	Benzo(a)pyrene	µg/kg	Macros	Head-Wade	985	--	<230.0	>230.0	>798.3	>1367
P34262	Delta-BHC	µg/kg	Macros	Head-Wade	985	--	<2.098	>2.098	>6.19	>10.28
P34323	Chrysene	µg/kg	Macros	Head-Wade	985	--	<266.0	>266.0	>958.3	>1651
P34379	Fluoranthene	µg/kg	Macros	Head-Wade	985	--	<774.0	>774.0	>2432	>4091
P34384	Fluorene	µg/kg	Macros	Head-Wade	985	--	<84.25	>84.25	>104.8	>125.3
P34406	Indeno(1,2,3-cd)pyrene	µg/kg	Macros	Head-Wade	985	--	< 260.5	>260.5	>623.3	>986.2
P34445	Naphthalene	µg/kg	Macros	Head-Wade	985	--	< 86.38	>86.38	>103.6	>120.9
P34464	Phenanthrene	µg/kg	Macros	Head-Wade	985	--	< 243.5	>243.5	>803.3	>1363
P34472	Pyrene	µg/kg	Macros	Head-Wade	985	--	< 393.0	>393.0	>1570	>2747
P34524	Benzo(g,h,i)perylene	µg/kg	Macros	Head-Wade	985	--	< 335.0	>335.0	>792.1	>1249
P34529	Benzo[a]anthracene	µg/kg	Macros	Head-Wade	985	--	< 239.0	>239.0	>699.4	>1160
P34559	Dibenz(a,h)anthracene	µg/kg	Macros	Head-Wade	985	--	< 101.0	>101.0	>167.3	>233.7

31 variables

***Appendix Table A-3**. NE IL IPS derived biological effect thresholds for habitat attributes and land use variables.*

Parameter Code	Variable Name	Units	Limiting Assemblage	Site Size	Sample N	Excellent	Good	Fair	Poor	Very Poor
CHANNEL	Channel Score	QHEI Units	Fish	Head-Wade	1393	≥16.8	<16.8	<14.00	<9.2	<4.6
COVER	Cover Score	QHEI Units	Fish	Head-Wade	1393	≥16.0	<16.0	<14.0	<9.2	<4.6
CURRENT	Current Score	QHEI Units	Fish	Head-Wade	1393	≥7.0	>7.0	<7.0	<4.6	<2.3
DEPTH	Depth Score	QHEI Units	Fish	Head-Wade	1393	≥10.0	>10.0	<10.0	<6.6	<3.3
EMBEDDED	Embeddedness Score	QHEI Units	Fish	Head-Wade	1393	≤1.3	>1.3	>1.6	>2.4	>3.2
GRAD_S	Gradient Score	QHEI Units	Fish	Head-Wade	1393	≥10.0	>10.0	<10.0	<6.6	<3.3
GRADIENT	Gradient (ft/mi)	feet/mile	Fish	Head-Wade	1393	≥8.8	<8.8	<4.3	<2.8	<1.4
HYD_QHEI	Hydro-QHEI	QHEI Units	Fish	Head-Wade	1393	≥17.0	>17.0	<19.5	<12.9	<6.4
MWH_ATTR	Poor Habitat Attributes	Number	Fish	Head-Wade	1393	≤1	<1	>1	>3	>6
POOL	Pool Score	QHEI Units	Fish	Head-Wade	1393	≥11.3	<11.3	<10.0	<6.6	<3.3
QHEI	QHEI Score	QHEI Units	Fish	Head-Wade	1393	≥84.5	>75.9	<75.9	<50.1	<25.0
RIFFLE	Riff< Score	QHEI Units	Fish	Head-Wade	1393	≥5.8	≥5.8	<5.8	<3.9	<1.9
RIPARIAN	Riparian Score	QHEI Units	Fish	Head-Wade	1393	≥6.0	>6.0	<6.0	<4.0	<2.0
SILTCOVE	Silt Cover Scotre	QHEI Units	Fish	Head-Wade	1393	≤2.0	<2.0	>2.0	>2.7	>3.33
SUBSTRAT	Substrate Score	QHEI Units	Fish	Head-Wade	1393	≥16.0	<16.0	<15.0	<9.9	<5.0
WWH_ATTR	Good Habitat Attributes	Number	Fish	Head-Wade	1393	≥9	<9	<8	<5	<2
Develop	Developed (Ust. WS)	Wtd. %	Fish	Head-Wade	2657	≤9.1	>9.1	>45.6	>63.6	>81.5
Imperv	Impervious (30 m)	Wtd. %	Fish	Head-Wade	2657	≤18.3	>18.3	>30.5	>53.4	>76.4
Imperv	Impervious (30 m Clipped)	Wtd. %	Fish	Head-Wade	2657	≤13.4	>13.4	>26.7	>50.9	>75.1
Imperv	Impervious (500 m)	Wtd. %	Fish	Head-Wade	2657	≤5.6	>5.6	>12.5	>41.4	>70.3
Urban	Urban (Ust. WS)	Wtd. %	Fish	Head-Wade	2657	≤8.8	>8.8	>45.0	>63.2	>81.3
Ag	Agricultural (30 m)	Wtd. %	Macros	Head-Wade	3096	≤87.2	<87.2	>43.2	>61.9	>80.7
Ag	Agricultural (Ust. WS)	Wtd. %	Macros	Head-Wade	3096	≤87.1	<87.1	>62.1	>74.6	>87.1
Heavurb	Heavy Urban (Ust. WS)	Wtd. %	Macros	Head-Wade	3096	≤7.7	>7.7	>29.3	>52.6	>76.0
Imperv	Impervious (Ust. WS)	Wtd. %	Macros	Head-Wade	3096	≤5.6	>5.6	>13.2	>41.8	>70.5

25 variables

APPENDIX B

Lower DuPage River 2018 Fish Assemblage Data

B-1: Fish Index of Biotic Integrity (IBI) Metrics & Scores
B-2: Fish Species Grand (all sites combined)
B-3: Fish Species by Sampling Event

Appendix Table B-1. Fish IBI results for data collected in the lower DuPage River study area during 2020.

Site ID	River Mile	Type	Date	DA sq mi	Wetted Width (ft)	IL IBI Reg.	Number of: Native species	Sunfish species	Sucker species	Intolerant species	Benthic Invert. species	Minnow species	Percent: Mineral Substrate Spawners	Tolerant Fish (as Species)	Generalist Feeders	Specialized Benthic Invert-ivores	Rel.No. /(0.3km)	IBI	Modified Iwb
WEST NORMAN DRAIN (TRIB TO DUPAGE R. AT RM 20.2) - (95661)																			
Year: 2018																			
LD31	5.10	F	08/16/2018	2.4	11.8	3	10(2)	3(6)	1(3)	0(0)	2(2)	2(1)	0(0)	50(4)	52(6)	4(2)	510	26.0	6.4
LD26	2.20	F	08/15/2018	6.2	29.2	3	11(2)	3(5)	1(2)	1(1)	3(2)	3(2)	4(1)	45(4)	72(4)	15(6)	993	29.0	7.0
MINK CREEK (TRIB TO LILY CACHE CREEK AT RM 1.9) - (95662)																			
Year: 2018																			
LD39	3.20	D	08/17/2018	4.1	21.7	3	9(2)	4(6)	1(2)	0(0)	0(0)	0(0)	0(0)	44(4)	96(1)	0(0)	282	15.0	6.2
LD23	1.80	F	08/15/2018	8.8	35.7	3	12(3)	4(6)	1(2)	0(0)	2(2)	3(2)	2(1)	50(4)	76(4)	7(3)	654	27.0	6.0
SPRING CREEK (TRIB TO DUPAGE R. AT RM 17.8) - (95663)																			
Year: 2018																			
LD30	1.47	F	08/16/2018	3.4	18.2	3	5(1)	3(6)	0(0)	0(0)	0(0)	2(1)	0(0)	60(3)	55(6)	0(0)	98 *	17.0	4.3
LD21	0.50	F	08/15/2018	5.3	26.4	3	11(2)	3(5)	1(2)	0(0)	2(2)	3(2)	3(1)	45(4)	93(1)	1(1)	763	20.0	5.3
SPRINGBROOK CREEK (TRIB TO DUPAGE R. AT RM 27.1) - (95664)																			
Year: 2018																			
LD24	4.80	F	08/15/2018	8.9	35.9	3	15(3)	4(6)	1(2)	1(1)	3(2)	5(3)	16(2)	33(5)	80(3)	4(2)	1044	29.0	8.4
LD19	1.40	E	10/01/2018	12.3	41.8	3	18(4)	4(5)	1(1)	2(2)	4(3)	8(5)	15(2)	28(5)	83(3)	4(2)	814	32.0	8.1
ROCK RUN CREEK (TRIB TO IL-MI CANAL AT RM 9.0) - (95665)																			
Year: 2018																			
LD41	7.90	F	08/14/2018	0.0	25.3	3	6(1)	3(5)	0(0)	0(0)	0(0)	1(1)	87(6)	33(5)	3(6)	0(0)	1256	24.0	5.0
LD04	6.50	F	08/14/2018	4.9	25.3	3	2(0)	2(3)	0(0)	0(0)	0(0)	0(0)	0(0)	0(6)	83(3)	0(0)	20 * *	12.0	2.3
LD22	5.70	D	08/17/2018	5.5	27.0	3	6(1)	2(3)	0(0)	0(0)	0(0)	0(0)	0(0)	33(5)	83(3)	0(0)	162 *	12.0	5.6

na - Qualitative data, Modified Iwb not applicable.

X - IBI extrapolated

* - < 200 Total individuals in sample

** - < 50 Total individuals in sample

● - One or more species excluded from IBI calculation.

Appendix Table B-1. Fish IBI results for data collected in the lower DuPage River study area during 2020.

Site ID	River Mile	Type	Date	DA sq mi	Wetted Width (ft)	IL IBI Reg.	Number of: Native species	Sunfish species	Sucker species	Intolerant species	Benthic Invert. species	Minnow species	Percent: Mineral Substrate Spawners	Tolerant Fish (as Species)	Generalist Feeders	Specialized Benthic Invert-ivores	Rel.No. /(0.3km)		IBI	Modified Iwb
LD17	3.50	F	08/14/2018	10.6	39.1	3	10(2)	3(4)	1(1)	0(0)	1(1)	1(1)	0(0)	50(4)	79(3)	1(1)	250		17.0	6.5
DUPAGE RIVER - (95666)																				
Year: 2018																				
LD14	26.60	P	08/14/2018	204.0	93.4	3	18(4)	5(5)	2(2)	4(4)	4(3)	7(5)	43(6)	39(4)	24(6)	3(2)	288		41.0	8.0
LD14	26.60	P	09/26/2018	204.0	93.4	3	18(4)	5(5)	2(2)	4(4)	4(3)	7(5)	47(6)	33(5)	33(6)	3(1)	500		41.0	8.0
LD25	25.20	P	08/14/2018	214.7	94.6	3	13(2)	5(5)	1(1)	1(1)	3(2)	2(2)	20(4)	38(4)	51(6)	2(1)	264		28.0	6.9
LD25	25.20	P	09/26/2018	214.7	94.6	3	14(3)	5(5)	3(3)	3(3)	2(2)	3(2)	36(6)	29(5)	24(6)	1(1)	420		36.0	8.4
LD13	23.10	P	08/14/2018	0.0	95.5	3	14(3)	5(5)	2(2)	3(3)	2(2)	4(3)	21(4)	36(4)	54(6)	2(1)	254		33.0	7.4
LD13	23.10	P	09/28/2018	0.0	95.5	3	10(2)	5(5)	2(2)	3(3)	2(2)	2(2)	34(6)	40(4)	27(6)	4(2)	328		34.0	7.6
LD12	22.00	P	08/14/2018	0.0	96.1	3	12(2)	5(5)	2(2)	2(2)	2(2)	2(2)	28(5)	42(4)	49(6)	4(2)	240		32.0	7.8
LD12	22.00	P	09/28/2018	0.0	96.1	3	11(2)	5(5)	2(2)	3(3)	1(1)	3(2)	29(5)	36(4)	31(6)	1(1)	286		31.0	7.4
LD11	20.80	P	08/14/2018	236.0	96.1	3	12(2)	5(5)	2(2)	3(3)	1(1)	2(2)	29(5)	42(4)	42(6)	1(1)	202		31.0	7.1
LD11	20.80	P	09/28/2018	236.0	96.1	3	14(3)	5(5)	2(2)	3(3)	1(1)	5(4)	21(4)	43(4)	44(6)	1(1)	356		33.0	8.1
LD10	18.50	P	08/16/2018	249.0	97.1	3	16(3)	5(5)	3(2)	3(3)	4(3)	3(2)	16(3)	31(5)	30(6)	2(1)	270		33.0	7.2
LD10	18.50	P	09/26/2018	249.0	97.1	3	15(3)	5(5)	2(2)	4(4)	4(3)	3(2)	41(6)	33(5)	35(6)	15(6)	222		42.0	8.3
LD09	17.00	P	08/16/2018	250.0	97.1	3	10(2)	5(5)	2(2)	2(2)	2(2)	1(1)	27(5)	50(4)	34(6)	13(5)	166	*	34.0	7.3
LD09	17.00	P	09/26/2018	250.0	97.1	3	13(2)	6(6)	2(2)	3(3)	2(2)	1(1)	30(5)	38(4)	27(6)	9(4)	530		35.0	8.8
LD08	13.40	P	08/19/2018	314.0	101.3	3	14(3)	5(5)	3(2)	2(2)	1(1)	2(2)	21(4)	36(4)	54(6)	5(2)	190	*	31.0	8.3
LD08	13.40	P	09/25/2018	314.0	101.3	3	16(3)	6(6)	3(2)	3(3)	2(2)	2(2)	25(5)	31(5)	37(6)	4(2)	376		36.0	8.7
LD07	11.40	P	08/19/2018	321.0	101.7	3	13(2)	5(5)	4(3)	2(2)	3(2)	1(1)	46(6)	38(4)	22(6)	16(6)	284		37.0	9.0
LD07	11.40	P	09/25/2018	321.0	101.7	3	12(2)	5(5)	5(4)	3(3)	5(4)	0(0)	64(6)	17(6)	6(6)	40(6)	254		42.0	8.4

na - Qualitative data, Modified Iwb not applicable.

X - IBI extrapolated

* - < 200 Total individuals in sample

** - < 50 Total individuals in sample

● - One or more species excluded from IBI calculation.

Appendix Table B-1. Fish IBI results for data collected in the lower DuPage River study area during 2020.

Site ID	River Mile	Type	Date	DA sq mi	Wetted Width (ft)	IL IBI Reg.	Number of: Native species	Sunfish species	Sucker species	Intolerant species	Benthic Invert. species	Minnow species	Percent: Mineral Substrate Spawners	Tolerant Fish (as Species)	Generalist Feeders	Specialized Benthic Invert-ivores	Rel.No. /(0.3km)		IBI	Modified Iwb
LD06	9.60	P	08/20/2018	323.2	102.1	3	16(3)	5(5)	3(2)	4(4)	4(3)	3(2)	47(6)	31(5)	39(6)	19(6)	472		42.0	9.1
LD06	9.60	P	09/25/2018	323.2	102.1	3	17(3)	6(6)	3(2)	5(5)	5(4)	2(2)	61(6)	24(5)	25(6)	22(6)	476		45.0	9.1
LD03	7.00	P	08/16/2018	333.0	102.4	3	11(2)	5(5)	2(2)	4(4)	3(2)	2(2)	44(6)	27(5)	23(6)	23(6)	160	*	40.0	7.4
LD03	7.00	P	09/27/2018	333.0	102.4	3	11(2)	4(4)	3(2)	4(4)	5(4)	1(1)	67(6)	9(6)	11(6)	34(6)	318		41.0	8.6
LD02	4.70	P	08/20/2018	329.6	102.5	3	14(3)	5(5)	4(3)	4(4)	6(4)	0(0)	62(6)	21(5)	28(6)	17(6)	394		42.0	9.5
LD02	4.70	P	09/27/2018	329.6	102.5	3	13(2)	4(4)	3(2)	3(3)	4(3)	1(1)	78(6)	8(6)	13(6)	24(6)	288		39.0	8.6
LD05	2.50	P	08/15/2018	360.0	103.1	3	16(3)	6(6)	3(2)	3(3)	4(3)	2(2)	15(3)	31(5)	75(4)	7(3)	362		34.0	8.7
LD05	2.50	P	09/27/2018	360.0	103.1	3	15(3)	7(6)	3(2)	3(3)	5(4)	2(2)	32(6)	27(5)	57(6)	9(4)	398		41.0	8.8
LD16	1.50	P	08/15/2018	348.0	103.2	3	10(2)	8(6)	0(0)	1(1)	0(0)	0(0)	1(1)	20(5)	66(5)	0(0)	252		20.0	6.2
LD16	1.50	P	09/27/2018	348.0	103.2	3	14(3)	8(6)	0(0)	1(1)	1(1)	0(0)	1(1)	29(5)	74(4)	1(1)	326		22.0	7.6
LD01	1.00	P	08/15/2018	376.0	104.6	3	36(6)	7(6)	8(6)	5(5)	11(6)	9(6)	40(6)	11(6)	46(6)	29(6)	658		59.0	11.2
LD01	1.00	P	09/28/2018	376.0	104.6	3	36(6)	*(6)	6(4)	5(5)	10(6)	10(6)	30(5)	11(6)	37(6)	19(6)	1374		56.0	11.3
HAMMEL CREEK (TRIB TO DUPAGE R. AT RM 10.6) - (95667)																				
Year: 2018																				
LD28	1.19	F	08/14/2018	10.7	39.3	3	10(2)	4(5)	1(1)	0(0)	1(1)	3(2)	18(3)	50(4)	72(4)	1(1)	356		23.0	5.7
LILY CACHE CREEK (TRIB TO DUPAGE R. AT RM 14.4) - (95668)																				
Year: 2018																				
LD37	14.70	F	08/16/2018	7.0	22.5	3	5(1)	3(5)	0(0)	0(0)	0(0)	1(1)	0(0)	60(3)	47(6)	0(0)	212		16.0	4.1
LD18	11.20	E	10/01/2018	11.1	39.9	3	10(2)	3(4)	1(1)	1(1)	2(2)	2(2)	0(0)	60(3)	60(5)	5(2)	298		22.0	6.8
LD15	6.50	D	08/17/2018	21.4	52.0	3	15(3)	4(5)	1(1)	2(2)	3(2)	5(3)	4(1)	33(5)	90(2)	1(1)	455		25.0	6.7
LD15	6.50	D	09/30/2018	21.4	52.0	3	14(3)	3(4)	0(0)	1(1)	2(2)	5(3)	6(1)	29(5)	90(2)	0(1)	755		22.0	6.4

na - Qualitative data, Modified Iwb not applicable.

X - IBI extrapolated

* - < 200 Total individuals in sample

** - < 50 Total individuals in sample

● - One or more species excluded from IBI calculation.

Appendix Table B-1. Fish IBI results for data collected in the lower DuPage River study area during 2020.

Site ID	River Mile	Type	Date	DA sq mi	Wetted Width (ft)	IL IBI Reg.	Number of: Native species	Sunfish species	Sucker species	Intolerant species	Benthic Invert. species	Minnow species	Percent: Mineral Substrate Spawners	Tolerant Fish (as Species)	Generalist Feeders	Specialized Benthic Invert-ivores	Rel.No. /(0.3km)		IBI	Modified Iwb
LD20	0.36	P	08/16/2018	46.0	66.1	3	15(3)	4(5)	2(2)	0(0)	2(2)	0(0)	0(0)	27(5)	57(6)	3(2)	176	*	25.0	7.3
LD20	0.36	P	09/25/2018	46.0	66.1	3	17(4)	7(6)	1(1)	2(2)	3(2)	1(1)	7(2)	24(5)	45(6)	4(2)	274		31.0	7.1
TRIB #3 TO DUPAGE R. AT RM 13.9 - (95672)																				
Year: 2018																				
LD40	0.80	F	08/14/2018	3.5	18.7	3	2(0)	1(2)	0(0)	0(0)	0(0)	0(0)	0(0)	50(4)	17(6)	0(0)	24	* *	12.0	2.5
TRIB #1 TO LILY CHACHE CR AT RM 6.1 - (95673)																				
Year: 2018																				
LD38	0.84	E	09/30/2018	4.0	26.4	3	8(2)	3(5)	1(2)	0(0)	0(0)	2(2)	1(1)	50(4)	3(6)	0(0)	1226		22.0	4.3
TRIB #7 TO DUPAGE R. AT RM 25.9 - (95674)																				
Year: 2018																				
LD35	0.16	F	08/15/2018	3.3	17.7	3	1(0)	0(0)	0(0)	0(0)	0(0)	0(0)	0(0)	0(6)	0(6)	0(0)	0	* *	12.0	0.0
TRIB #6 TO DUPAGE R. AT RM 25.4 - (95675)																				
Year: 2018																				
LD34	1.00	F	08/15/2018	4.7	24.2	3	6(1)	1(2)	0(0)	0(0)	2(2)	1(1)	0(0)	33(5)	23(6)	14(5)	154	*	22.0	5.3
WOLF CREEK (TRIB TO DUPAGE AT RM 23.7) - (95676)																				
Year: 2018																				
LD33	0.14	F	08/15/2018	6.0	28.6	3	1(0)	0(0)	0(0)	0(0)	0(0)	0(0)	0(0)	0(6)	0(6)	0(0)	0	* *	12.0	0.0
EAST NORMAN DRAIN TRIB # 5 TO DUPAGE R. AT RM 20.5 - (95677)																				
Year: 2018																				
LD32	0.90	F	08/15/2018	2.8	14.6	3	7(1)	3(6)	1(2)	0(0)	1(1)	1(1)	0(0)	71(2)	80(3)	3(2)	118	*	18.0	5.5
TRIB #4 TO DUPAGE R. AT RM 16.4 - (95678)																				

na - Qualitative data, Modified Iwb not applicable.
X - IBI extrapolated
* - < 200 Total individuals in sample
** - < 50 Total individuals in sample
● - One or more species excluded from IBI calculation.

Appendix Table B-1. Fish IBI results for data collected in the lower DuPage River study area during 2020.

Site ID	River Mile	Type	Date	DA sq mi	Wetted Width (ft)	IL IBI Reg.	Number of: Native species	Sunfish species	Sucker species	Intolerant species	Benthic Invert. species	Minnow species	Percent: Mineral Substrate Spawners	Tolerant Fish (as Species)	Generalist Feeders	Specialized Benthic Invert-ivores	Rel.No. /(0.3km)	Modified IBI	Modified Iwb
Year: 2018																			
LD29	0.60	F	08/14/2018	2.4	11.8	3	11(3)	3(6)	1(3)	1(2)	1(1)	5(3)	1(1)	64(3)	54(6)	2(1)	420	29.0	6.2
TRIB #1 TO DUPAGE R. AT RM 4.9 - (95679)																			
Year: 2018																			
LD27	0.15	F	08/14/2018	2.8	14.6	3	1(0)	0(0)	0(0)	0(0)	0(0)	0(0)	0(0)	0(6)	0(6)	0(0)	0 * *	12.0	0.0

na - Qualitative data, Modified Iwb not applicable.
X - IBI extrapolated
* - < 200 Total individuals in sample
** - < 50 Total individuals in sample
● - One or more species excluded from IBI calculation.

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

Rivers: *West Norman Drain; Mink Creek; Spring Creek; Springbrook Creek; Rock Run Creek; DuPage River; Hammel Creek, trib to DuPage River; Lily Cashe Creek, trib to DuPage River; Trib #3; LC Trib #1; Trib #7; Trib #6*

Years: 2018

Number of Samples: 57 Data Sources: 99 Data Types: D; E; F; P

Species Code:	Species Name:	Feed Guild	Toler-ance	Breed Guild	IBI Group	No. Fish	Rel. No.	% by No.	Rel. Wt.	% by Wt.	Av. Wt.
05-001	SILVER AROWANA	P			E	1	0.1	0.01	65	0.19	1300.0
20-003	GIZZARD SHAD	O		M		107	1.6	0.95	53	0.52	33.3
34-001	CENTRAL MUDMINNOW	I	T	C		3	0.1	0.03	0	0.00	3.3
37-001	REDFIN PICKEREL	P	P	M		10	0.5	0.09	13	0.04	27.0
40-004	SMALLMOUTH BUFFALO	I		M	C	3	0.2	0.03	255	0.74	1700.0
40-005	QUILLBACK CARPSUCKER	O		M	C	13	0.7	0.11	952	2.75	1465.3
40-008	SILVER REDHORSE	I	M	S	R	4	0.2	0.04	290	0.84	1450.0
40-009	BLACK REDHORSE	I	I	S	R	1	0.1	0.01	0	0.00	10.0
40-010	GOLDEN REDHORSE	I	M	S	R	32	1.6	0.28	732	2.12	457.8
40-011	SHORTHEAD REDHORSE	I	M	S	R	107	5.4	0.95	1902	5.50	355.6
40-013	RIVER REDHORSE	I	I	S	R	2	0.1	0.02	137	0.40	1375.0
40-015	NORTHERN HOG SUCKER	I	M	S	R	358	17.9	3.16	3494	10.10	195.1
40-016	WHITE SUCKER	O	T	S	W	449	6.7	3.97	1099	10.60	163.2
43-001	COMMON CARP	O	T	M	G	197	3.0	1.74	2445	23.56	827.4
43-002	GOLDFISH	O	T	M	G	2	0.1	0.02	6	0.02	60.0
43-003	GOLDEN SHINER	I	T	M	N	4	0.2	0.04	4	0.01	20.5
43-004	HORNYHEAD CHUB	I	I	N	N	135	2.0	1.19	53	0.52	26.6
43-013	CREEK CHUB	G	T	N	N	475	7.1	4.20	105	1.02	14.8
43-015	SUCKERMOUTH MINNOW	I		S	N	16	0.8	0.14	3	0.01	4.0
43-020	EMERALD SHINER	I		M	N	81	4.1	0.72	12	0.04	3.0
43-025	STRIPED SHINER	I		S	N	63	1.0	0.56	20	0.20	22.0
43-026	COMMON SHINER	I		S	N	17	0.3	0.15	6	0.07	26.5
43-032	SPOTFIN SHINER	I		M	N	97	1.5	0.86	3	0.04	2.6
43-033	BIGMOUTH SHINER	I		M	N	6	0.1	0.05	0	0.00	0.6
43-034	SAND SHINER	I	M	M	N	397	19.9	3.51	14	0.04	0.7
43-035	MIMIC SHINER	I	I	M	N	13	0.7	0.11	1	0.00	2.3
43-042	FATHEAD MINNOW	O	T	C	N	5	0.3	0.04	0	0.00	2.0
43-043	BLUNTNOSE MINNOW	O	T	C	N	941	14.1	8.31	29	0.28	2.0
43-044	CENTRAL STONEROLLER	H		N	N	724	10.9	6.40	26	0.25	2.4
43-117	CARMINE SHINER	I	I	S	N	12	0.6	0.11	1	0.00	2.6
47-002	CHANNEL CATFISH			C	F	39	2.0	0.34	1958	5.66	1004.3
47-004	YELLOW BULLHEAD	I	T	C		189	2.8	1.67	132	1.28	46.7
47-006	BLACK BULLHEAD	I	P	C		20	0.3	0.18	22	0.21	74.0
47-007	FLATHEAD CATFISH	P		C	F	6	0.3	0.05	880	2.54	2933.3
47-008	STONECAT MADTOM	I	I	C		77	1.2	0.68	20	0.20	17.6
47-013	TADPOLE MADTOM	I		C		45	0.7	0.40	3	0.03	5.0
54-002	BLACKSTRIPE TOPMINNOW	I		M		163	2.5	1.44	2	0.03	1.1
57-001	WESTERN MOSQUITOFISH	I		N	E	601	9.0	5.31	0	0.01	0.0
70-001	BROOK SILVERSIDE	I	M	M		20	1.0	0.18	0	0.00	0.0

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

Rivers: *West Norman Drain; Mink Creek; Spring Creek; Springbrook Creek; Rock Run Creek; DuPage River; Hammel Creek, trib to DuPage River; Lily Cashe Creek, trib to DuPage River; Trib #3; LC Trib #1; Trib #7; Trib #6*

Years: 2018

Number of Samples: 57 Data Sources: 99 Data Types: D; E; F; P

Species Code:	Species Name:	Feed Guild	Toler-ance	Breed Guild	IBI Group	No. Fish	Rel. No.	% by No.	Rel. Wt.	% by Wt.	Av. Wt.
74-006	YELLOW BASS	P	P	M		4	0.2	0.04	3	0.01	15.0
77-001	WHITE CRAPPIE	I		C	S	1	0.1	0.01	25	0.07	500.0
77-002	BLACK CRAPPIE	I		C	S	13	0.2	0.11	23	0.23	122.4
77-003	ROCK BASS	C		C	S	455	22.8	4.02	1326	3.83	58.2
77-004	SMALLMOUTH BASS	C	M	C	F	771	11.6	6.81	1407	13.56	121.6
77-006	LARGEMOUTH BASS	C		C	F	999	15.0	8.83	384	3.71	25.6
77-008	GREEN SUNFISH	I	T	C	S	777	11.7	6.86	151	1.46	12.9
77-009	BLUEGILL SUNFISH	I	P	C	S	1753	26.3	15.49	377	3.64	14.3
77-010	ORANGESPOTTED SUNFISH	I		C	S	15	0.2	0.13	2	0.02	9.3
77-011	LONGEAR SUNFISH	I	M	C	S	5	0.3	0.04	3	0.01	12.0
77-012	REDEAR SUNFISH	I		C	E	22	1.1	0.19	41	0.12	37.3
77-013	PUMPKINSEED SUNFISH	I	P	C	S	20	0.3	0.18	6	0.06	21.8
77-015	GREEN SF X BLUEGILL SF					13	0.2	0.11	4	0.05	25.2
77-038	NORTHERN SUNFISH	I	M	C	S	11	0.6	0.10	8	0.02	15.4
78-001	ORIENTAL WEATHERFISH	I		C	E	13	0.2	0.11	1	0.02	9.8
80-001	SAUGER	P		S	F	1	0.1	0.01	50	0.14	1000.0
80-002	WALLEYE	P		S	F	5	0.3	0.04	265	0.77	1060.0
80-003	YELLOW PERCH			M		12	0.6	0.11	24	0.07	40.8
80-007	SLENDERHEAD DARTER	I	R	S	D	1	0.1	0.01	0	0.00	3.0
80-011	LOGPERCH	I	M	S	D	57	2.9	0.50	25	0.07	8.7
80-014	JOHNNY DARTER	I		C	D	143	2.2	1.26	1	0.02	0.8
80-016	BANDED DARTER	I	I	S	D	87	4.4	0.77	6	0.02	1.3
80-021	IOWA DARTER	I		M	D	23	0.4	0.20	0	0.00	0.9
85-001	FRESHWATER DRUM		P	M		3	0.2	0.03	260	0.75	1733.3
87-001	ROUND GOBY				E	680	34.0	6.01	532	1.54	15.6
99-997	Dry Site					0	0.0	0.00	0	0.00	*****.*

No Species: 65 **Nat. Species:** 57 **Hybrids:** 1 **Total Counted:** 11319 **Total Rel. Wt. :** 19683

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

Site ID: LD31 River: 95-661 West Norman Drain RM: 5.10 Date: 08/16/2018

Time Fished: 550 Distance: 0.150 Drainge (sq mi): 2.4 Depth: 0

Location: dst. 127th St. Lat: 41.64959 Long: -88.24391

Species Code:	Species Name:	Feed Guild	Toler-ance	Breed Guild	IBI Group	No. Fish	Rel. No.	% by No.	Rel. Wt.	% by Wt.	Av. Wt.
40-016	WHITE SUCKER	O	T	S	W	1	2.0	0.39	12	0.18	6.0
43-013	CREEK CHUB	G	T	N	N	3	6.0	1.18	160	2.35	26.6
43-043	BLUNTNOSE MINNOW	O	T	C	N	5	10.0	1.96	20	0.29	2.0
47-004	YELLOW BULLHEAD	I	T	C		3	6.0	1.18	320	4.70	53.3
47-006	BLACK BULLHEAD	I	P	C		3	6.0	1.18	200	2.94	33.3
47-013	TADPOLE MADTOM	I		C		1	2.0	0.39	14	0.21	7.0
77-006	LARGEMOUTH BASS	C		C	F	106	212.0	41.57	2620	38.50	12.3
77-008	GREEN SUNFISH	I	T	C	S	7	14.0	2.75	150	2.20	10.7
77-009	BLUEGILL SUNFISH	I	P	C	S	111	222.0	43.53	3070	45.11	13.8
77-015	GREEN SF X BLUEGILL SF					5	10.0	1.96	220	3.23	22.0
80-014	JOHNNY DARTER	I		C	D	10	20.0	3.92	20	0.29	1.0

No Species: 10 **Nat. Species:** 10 **Hybrids:** 1 **Total Counted:** 255 **Total Rel. Wt. :** 6806

IBI: 40.0 **MIwb:** N/A

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

Site ID: LD26 River: 95-661 West Norman Drain RM: 2.20 Date: 08/15/2018

Time Fished: 1226 Distance: 0.150 Drainge (sq mi): 6.1 Depth: 0

Location: Ust. US 30 Lat: 41.63005 Long: -88.22240

Species Code:	Species Name:	Feed Guild	Toler-ance	Breed Guild	IBI Group	No. Fish	Rel. No.	% by No.	Rel. Wt.	% by Wt.	Av. Wt.
40-016	WHITE SUCKER	O	T	S	W	109	218.0	22.71	826	16.99	3.7
43-013	CREEK CHUB	G	T	N	N	104	208.0	21.67	1830	37.64	8.8
43-043	BLUNTNOSE MINNOW	O	T	C	N	49	98.0	10.21	370	7.61	3.7
43-044	CENTRAL STONEROLLER	H		N	N	19	38.0	3.96	350	7.20	9.2
47-004	YELLOW BULLHEAD	I	T	C		5	10.0	1.04	60	1.23	6.0
47-013	TADPOLE MADTOM	I		C		10	20.0	2.08	60	1.23	3.0
77-006	LARGEMOUTH BASS	C		C	F	41	82.0	8.54	266	5.47	3.2
77-008	GREEN SUNFISH	I	T	C	S	39	78.0	8.13	620	12.75	7.9
77-009	BLUEGILL SUNFISH	I	P	C	S	40	80.0	8.33	392	8.06	4.9
80-014	JOHNNY DARTER	I		C	D	51	102.0	10.63	54	1.11	0.5
80-021	IOWA DARTER	I		M	D	13	26.0	2.71	34	0.70	1.3

No Species: 11 **Nat. Species:** 11 **Hybrids:** 0 **Total Counted:** 480 **Total Rel. Wt. :** 4862

IBI: 28.0 **MIwb:** N/A

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

Site ID: LD39 River: 95-662 Mink Creek RM: 3.20 Date: 08/17/2018

Time Fished: 830 Distance: 0.200 Drainge (sq mi): 4.1 Depth: 0

Location: Dst. Airport Lat: 41.60815 Long: -88.13714

Species Code:	Species Name:	Feed Guild	Toler-ance	Breed Guild	IBI Group	No. Fish	Rel. No.	% by No.	Rel. Wt.	% by Wt.	Av. Wt.
20-003	GIZZARD SHAD	O		M		14	21.0	7.45	600	6.83	28.5
40-016	WHITE SUCKER	O	T	S	W	2	3.0	1.06	900	10.24	300.0
43-001	COMMON CARP	O	T	M	G	4	6.0	2.13	2250	25.60	375.0
47-004	YELLOW BULLHEAD	I	T	C		2	3.0	1.06	255	2.90	85.0
47-006	BLACK BULLHEAD	I	P	C		3	4.5	1.60	390	4.44	86.6
54-002	BLACKSTRIPE TOPMINNOW	I		M		2	3.0	1.06	3	0.03	1.0
77-002	BLACK CRAPPIE	I		C	S	1	1.5	0.53	120	1.37	80.0
77-006	LARGEMOUTH BASS	C		C	F	5	7.5	2.66	1335	15.19	178.0
77-008	GREEN SUNFISH	I	T	C	S	2	3.0	1.06	36	0.41	12.0
77-009	BLUEGILL SUNFISH	I	P	C	S	153	229.5	81.38	2901	33.00	12.6

No Species: 10 **Nat. Species:** 9 **Hybrids:** 0 **Total Counted:** 188 **Total Rel. Wt. :** 8790

IBI: 34.0 **MIwb:** N/A

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

Site ID: LD23 River: 95-662 Mink Creek RM: 1.80 Date: 08/15/2018

Time Fished: 1150 Distance: 0.150 Drainge (sq mi): 8.8 Depth: 0

Location: dst. Old Renwick Rd. Lat: 41.59400 Long: -88.15343

Species Code:	Species Name:	Feed Guild	Toler-ance	Breed Guild	IBI Group	No. Fish	Rel. No.	% by No.	Rel. Wt.	% by Wt.	Av. Wt.
40-016	WHITE SUCKER	O	T	S	W	2	4.0	0.61	24	0.04	6.0
43-001	COMMON CARP	O	T	M	G	12	24.0	3.67	48010	88.38	2000.4
43-013	CREEK CHUB	G	T	N	N	9	18.0	2.75	160	0.29	8.8
43-043	BLUNTNOSE MINNOW	O	T	C	N	22	44.0	6.73	70	0.13	1.5
43-044	CENTRAL STONEROLLER	H		N	N	8	16.0	2.45	54	0.10	3.3
47-004	YELLOW BULLHEAD	I	T	C		2	4.0	0.61	1240	2.28	310.0
47-013	TADPOLE MADTOM	I		C		1	2.0	0.31	20	0.04	10.0
54-002	BLACKSTRIPE TOPMINNOW	I		M		11	22.0	3.36	52	0.10	2.3
77-006	LARGEMOUTH BASS	C		C	F	35	70.0	10.70	1020	1.88	14.5
77-008	GREEN SUNFISH	I	T	C	S	12	24.0	3.67	300	0.55	12.5
77-009	BLUEGILL SUNFISH	I	P	C	S	188	376.0	57.49	3280	6.04	8.7
77-013	PUMPKINSEED SUNFISH	I	P	C	S	2	4.0	0.61	28	0.05	7.0
77-015	GREEN SF X BLUEGILL SF					1	2.0	0.31	16	0.03	8.0
80-014	JOHNNY DARTER	I		C	D	22	44.0	6.73	50	0.09	1.1

No Species: 13 **Nat. Species:** 12 **Hybrids:** 1 **Total Counted:** 327 **Total Rel. Wt. :** 54324

IBI: 36.0 **MIwb:** N/A

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

Site ID: LD30 River: 95-663 Spring Creek RM: 1.47 Date: 08/16/2018

Time Fished: 1184 Distance: 0.150 Drainge (sq mi): 3.3 Depth: 0

Location: ust. Drauden Rd. Lat: 41.60157 Long: -88.24069

Species Code:	Species Name:	Feed Guild	Toler-ance	Breed Guild	IBI Group	No. Fish	Rel. No.	% by No.	Rel. Wt.	% by Wt.	Av. Wt.
43-013	CREEK CHUB	G	T	N	N	12	24.0	24.49	250	23.81	10.4
43-043	BLUNTNOSE MINNOW	O	T	C	N	1	2.0	2.04	2	0.19	1.0
77-006	LARGEMOUTH BASS	C		C	F	22	44.0	44.90	700	66.67	15.9
77-008	GREEN SUNFISH	I	T	C	S	5	10.0	10.20	60	5.71	6.0
77-009	BLUEGILL SUNFISH	I	P	C	S	9	18.0	18.37	38	3.62	2.1

No Species: 5 **Nat. Species:** 5 **Hybrids:** 0 **Total Counted:** 49 **Total Rel. Wt. :** 1050

IBI: 26.0 **MIwb:** N/A

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

Site ID: LD21 River: 95-663 Spring Creek RM: 0.50 Date: 08/15/2018

Time Fished: 1150 Distance: 0.140 Drainge (sq mi): 5.3 Depth: 0

Location: dst. footbridge in Mathes Woods Lat: 41.59729 Long: -88.22645

Species Code:	Species Name:	Feed Guild	Toler-ance	Breed Guild	IBI Group	No. Fish	Rel. No.	% by No.	Rel. Wt.	% by Wt.	Av. Wt.
40-016	WHITE SUCKER	O	T	S	W	16	34.3	4.49	1017	10.06	29.6
43-013	CREEK CHUB	G	T	N	N	103	220.7	28.93	5228	51.66	23.6
43-043	BLUNTNOSE MINNOW	O	T	C	N	3	6.4	0.84	10	0.11	1.6
43-044	CENTRAL STONEROLLER	H		N	N	12	25.7	3.37	192	1.91	7.5
47-004	YELLOW BULLHEAD	I	T	C		8	17.1	2.25	214	2.12	12.5
47-006	BLACK BULLHEAD	I	P	C		8	17.1	2.25	535	5.29	31.2
47-013	TADPOLE MADTOM	I		C		1	2.1	0.28	10	0.11	5.0
77-006	LARGEMOUTH BASS	C		C	F	8	17.1	2.25	222	2.20	13.0
77-008	GREEN SUNFISH	I	T	C	S	172	368.6	48.31	2515	24.86	6.8
77-009	BLUEGILL SUNFISH	I	P	C	S	21	45.0	5.90	128	1.27	2.8
78-001	ORIENTAL WEATHERFISH	I		C	E	1	2.1	0.28	32	0.32	15.0
80-014	JOHNNY DARTER	I		C	D	3	6.4	0.84	10	0.11	1.6

No Species: 12 **Nat. Species:** 11 **Hybrids:** 0 **Total Counted:** 356 **Total Rel. Wt. :** 10121

IBI: 24.0 **MIwb:** N/A

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

Site ID: LD24 River: 95-664 Springbrook Creek RM: 4.80 Date: 08/15/2018

Time Fished: 1346 Distance: 0.150 Drainge (sq mi): 8.9 Depth: 0

Location: dst. Naperville Rd. Lat: 41.73587 Long: -88.16570

Species Code:	Species Name:	Feed Guild	Toler-ance	Breed Guild	IBI Group	No. Fish	Rel. No.	% by No.	Rel. Wt.	% by Wt.	Av. Wt.
40-016	WHITE SUCKER	O	T	S	W	6	12.0	1.15	914	6.53	76.1
43-004	HORNYHEAD CHUB	I	I	N	N	42	84.0	8.05	1800	12.86	21.4
43-013	CREEK CHUB	G	T	N	N	18	36.0	3.45	1300	9.28	36.1
43-025	STRIPED SHINER	I		S	N	28	56.0	5.36	1000	7.14	17.8
43-043	BLUNTNOSE MINNOW	O	T	C	N	208	416.0	39.85	1330	9.50	3.2
43-044	CENTRAL STONEROLLER	H		N	N	15	30.0	2.87	700	5.00	23.3
47-004	YELLOW BULLHEAD	I	T	C		23	46.0	4.41	2300	16.43	50.0
47-006	BLACK BULLHEAD	I	P	C		3	6.0	0.57	760	5.43	126.6
47-008	STONECAT MADTOM	I	I	C		3	6.0	0.57	60	0.43	10.0
47-013	TADPOLE MADTOM	I		C		4	8.0	0.77	44	0.31	5.5
77-006	LARGEMOUTH BASS	C		C	F	20	40.0	3.83	960	6.86	24.0
77-008	GREEN SUNFISH	I	T	C	S	30	60.0	5.75	1150	8.21	19.1
77-009	BLUEGILL SUNFISH	I	P	C	S	104	208.0	19.92	1600	11.43	7.6
77-010	ORANGESPOTTED SUNFISH	I		C	S	3	6.0	0.57	40	0.29	6.6
80-014	JOHNNY DARTER	I		C	D	15	30.0	2.87	44	0.31	1.4

No Species: 15 **Nat. Species:** 15 **Hybrids:** 0 **Total Counted:** 522 **Total Rel. Wt. :** 14002

IBI: 32.0 **MIwb:** N/A

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

Site ID: LD19 River: 95-664 Springbrook Creek RM: 1.40 Date: 10/01/2018

Time Fished: 792 Distance: 0.150 Drainge (sq mi): 12.3 Depth: 0

Location: dst 95th street bridge at Park Lat: 41.70812 Long: -88.16788

Species Code:	Species Name:	Feed Guild	Toler-ance	Breed Guild	IBI Group	No. Fish	Rel. No.	% by No.	Rel. Wt.	% by Wt.	Av. Wt.
40-016	WHITE SUCKER	O	T	S	W	3	6.0	0.74	130	1.45	21.6
43-004	HORNYHEAD CHUB	I	I	N	N	23	46.0	5.65	664	7.39	14.4
43-013	CREEK CHUB	G	T	N	N	32	64.0	7.86	1500	16.70	23.4
43-025	STRIPED SHINER	I		S	N	14	28.0	3.44	320	3.56	11.4
43-026	COMMON SHINER	I		S	N	16	32.0	3.93	900	10.02	28.1
43-032	SPOTFIN SHINER	I		M	N	10	20.0	2.46	10	0.11	0.5
43-033	BIGMOUTH SHINER	I		M	N	6	12.0	1.47	18	0.20	1.5
43-043	BLUNTNOSE MINNOW	O	T	C	N	139	278.0	34.15	800	8.90	2.8
43-044	CENTRAL STONEROLLER	H		N	N	9	18.0	2.21	146	1.63	8.1
47-004	YELLOW BULLHEAD	I	T	C		16	32.0	3.93	1420	15.81	44.3
47-008	STONECAT MADTOM	I	I	C		1	2.0	0.25	20	0.22	10.0
47-013	TADPOLE MADTOM	I		C		3	6.0	0.74	6	0.07	1.0
54-002	BLACKSTRIPE TOPMINNOW	I		M		3	6.0	0.74	4	0.04	0.6
77-004	SMALLMOUTH BASS	C	M	C	F	1	2.0	0.25	100	1.11	50.0
77-006	LARGEMOUTH BASS	C		C	F	12	24.0	2.95	700	7.79	29.1
77-008	GREEN SUNFISH	I	T	C	S	47	94.0	11.55	1360	15.14	14.4
77-009	BLUEGILL SUNFISH	I	P	C	S	56	112.0	13.76	820	9.13	7.3
77-015	GREEN SF X BLUEGILL SF					1	2.0	0.25	40	0.45	20.0
80-014	JOHNNY DARTER	I		C	D	15	30.0	3.69	26	0.29	0.8

No Species: 18 **Nat. Species:** 18 **Hybrids:** 1 **Total Counted:** 407 **Total Rel. Wt. :** 8984

IBI: 28.0 **MIwb:** N/A

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

Site ID: LD41 River: 95-665 Rock Run Creek RM: 7.90 Date: 08/14/2018

Time Fished: 496 Distance: 0.150 Drainge (sq mi): 5.0 Depth: 0

Location: ust. Gaylord Dr. Lat: 41.55168 Long: -88.14162

Species Code:	Species Name:	Feed Guild	Toler-ance	Breed Guild	IBI Group	No. Fish	Rel. No.	% by No.	Rel. Wt.	% by Wt.	Av. Wt.
43-044	CENTRAL STONEROLLER	H		N	N	529	1058.0	87.15	1690	84.16	1.6
47-004	YELLOW BULLHEAD	I	T	C		10	20.0	1.65	24	1.20	1.2
57-001	WESTERN MOSQUITOFISH	I		N	E	47	94.0	7.74	76	3.78	0.8
77-006	LARGEMOUTH BASS	C		C	F	4	8.0	0.66	30	1.49	3.7
77-008	GREEN SUNFISH	I	T	C	S	5	10.0	0.82	20	1.00	2.0
77-009	BLUEGILL SUNFISH	I	P	C	S	6	12.0	0.99	40	1.99	3.3
78-001	ORIENTAL WEATHERFISH	I		C	E	6	12.0	0.99	128	6.37	10.6

No Species: 7 **Nat. Species:** 5 **Hybrids:** 0 **Total Counted:** 607 **Total Rel. Wt. :** 2008

IBI: 32.0 **MIwb:** N/A

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

Site ID: LD04 River: 95-665 Rock Run Creek RM: 6.50 Date: 08/14/2018

Time Fished: 550 Distance: 0.090 Drainge (sq mi): 4.9 Depth: 0

Location: ust. Essington Rd. Lat: 41.54704 Long: -88.16081

Species Code:	Species Name:	Feed Guild	Toler-ance	Breed Guild	IBI Group	No. Fish	Rel. No.	% by No.	Rel. Wt.	% by Wt.	Av. Wt.
77-006	LARGEMOUTH BASS	C		C	F	1	3.3	16.67	20	11.76	6.0
77-009	BLUEGILL SUNFISH	I	P	C	S	5	16.7	83.33	149	88.24	9.0

No Species: 2 **Nat. Species:** 2 **Hybrids:** 0 **Total Counted:** 6 **Total Rel. Wt. :** 169

IBI: 12.0 **MIwb:** N/A

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

Site ID: LD22 River: 95-665 Rock Run Creek RM: 5.70 Date: 08/17/2018

Time Fished: 1164 Distance: 0.200 Drainge (sq mi): 5.5 Depth: 0

Location: ust. Black St. Lat: 41.53649 Long: -88.17277

Species Code:	Species Name:	Feed Guild	Toler-ance	Breed Guild	IBI Group	No. Fish	Rel. No.	% by No.	Rel. Wt.	% by Wt.	Av. Wt.
34-001	CENTRAL MUDMINNOW	I	T	C		3	4.5	2.78	30	0.11	6.6
43-001	COMMON CARP	O	T	M	G	4	6.0	3.70	18150	64.39	3025.0
47-004	YELLOW BULLHEAD	I	T	C		5	7.5	4.63	1245	4.42	166.0
47-006	BLACK BULLHEAD	I	P	C		1	1.5	0.93	435	1.54	290.0
57-001	WESTERN MOSQUITOFISH	I		N	E	1	1.5	0.93	1	0.01	1.0
77-006	LARGEMOUTH BASS	C		C	F	13	19.5	12.04	5767	20.46	295.7
77-009	BLUEGILL SUNFISH	I	P	C	S	80	120.0	74.07	2550	9.05	21.2
78-001	ORIENTAL WEATHERFISH	I		C	E	1	1.5	0.93	7	0.03	5.0

No Species: 8 **Nat. Species:** 5 **Hybrids:** 0 **Total Counted:** 108 **Total Rel. Wt. :** 28186

IBI: 34.0 **MIwb:** N/A

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

Site ID: LD17 River: 95-665 Rock Run Creek RM: 3.50 Date: 08/14/2018

Time Fished: 1135 Distance: 0.150 Drainge (sq mi): 10.6 Depth: 0

Location: dst. McDonough St. Lat: 41.51316 Long: -88.17253

Species Code:	Species Name:	Feed Guild	Toler-ance	Breed Guild	IBI Group	No. Fish	Rel. No.	% by No.	Rel. Wt.	% by Wt.	Av. Wt.
40-016	WHITE SUCKER	O	T	S	W	4	8.0	3.20	428	10.60	53.5
43-001	COMMON CARP	O	T	M	G	7	14.0	5.60	270	6.69	19.2
43-043	BLUNTNOSE MINNOW	O	T	C	N	14	28.0	11.20	106	2.63	3.7
47-004	YELLOW BULLHEAD	I	T	C		14	28.0	11.20	890	22.05	31.7
47-006	BLACK BULLHEAD	I	P	C		1	2.0	0.80	400	9.91	200.0
54-002	BLACKSTRIPE TOPMINNOW	I		M		1	2.0	0.80	2	0.05	1.0
57-001	WESTERN MOSQUITOFISH	I		N	E	2	4.0	1.60	4	0.10	1.0
77-006	LARGEMOUTH BASS	C		C	F	21	42.0	16.80	250	6.19	5.9
77-008	GREEN SUNFISH	I	T	C	S	9	18.0	7.20	300	7.43	16.6
77-009	BLUEGILL SUNFISH	I	P	C	S	50	100.0	40.00	1350	33.45	13.5
78-001	ORIENTAL WEATHERFISH	I		C	E	1	2.0	0.80	34	0.84	17.0
80-014	JOHNNY DARTER	I		C	D	1	2.0	0.80	2	0.05	1.0

No Species: 12 **Nat. Species:** 9 **Hybrids:** 0 **Total Counted:** 125 **Total Rel. Wt. :** 4036

IBI: 30.0 **MIwb:** N/A

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

Site ID: LD14 River: 95-666 DuPage River RM: 26.60 Date: 08/14/2018

Time Fished: 1864 Distance: 0.500 Drainge (sq mi): 204.0 Depth: 0

Location: ust. Naperville WWTP Lat: 41.70122 Long: -88.15461

Species Code:	Species Name:	Feed Guild	Toler-ance	Breed Guild	IBI Group	No. Fish	Rel. No.	% by No.	Rel. Wt.	% by Wt.	Av. Wt.
40-015	NORTHERN HOG SUCKER	I	M	S	R	2	4.0	1.39	1680	4.08	420.0
40-016	WHITE SUCKER	O	T	S	W	8	16.0	5.56	2060	5.00	128.7
43-001	COMMON CARP	O	T	M	G	1	2.0	0.69	12200	29.64	6100.0
43-004	HORNYHEAD CHUB	I	I	N	N	18	36.0	12.50	742	1.80	20.6
43-013	CREEK CHUB	G	T	N	N	4	8.0	2.78	320	0.78	40.0
43-025	STRIPED SHINER	I		S	N	1	2.0	0.69	140	0.34	70.0
43-034	SAND SHINER	I	M	M	N	1	2.0	0.69	8	0.02	4.0
43-042	FATHEAD MINNOW	O	T	C	N	3	6.0	2.08	10	0.02	1.6
43-043	BLUNTNOSE MINNOW	O	T	C	N	2	4.0	1.39	12	0.03	3.0
43-044	CENTRAL STONEROLLER	H		N	N	1	2.0	0.69	80	0.19	40.0
47-004	YELLOW BULLHEAD	I	T	C		2	4.0	1.39	8	0.02	2.0
47-008	STONECAT MADTOM	I	I	C		2	4.0	1.39	100	0.24	25.0
47-013	TADPOLE MADTOM	I		C		2	4.0	1.39	2	0.00	0.5
77-003	ROCK BASS	C		C	S	2	4.0	1.39	420	1.02	105.0
77-004	SMALLMOUTH BASS	C	M	C	F	38	76.0	26.39	19320	46.93	254.2
77-006	LARGEMOUTH BASS	C		C	F	12	24.0	8.33	2580	6.27	107.5
77-008	GREEN SUNFISH	I	T	C	S	6	12.0	4.17	200	0.49	16.6
77-009	BLUEGILL SUNFISH	I	P	C	S	7	14.0	4.86	180	0.44	12.8
80-016	BANDED DARTER	I	I	S	D	1	2.0	0.69	4	0.01	2.0
87-001	ROUND GOBY				E	31	62.0	21.53	1100	2.67	17.7

No Species: 20 **Nat. Species:** 18 **Hybrids:** 0 **Total Counted:** 144 **Total Rel. Wt. :** 41166

IBI: 36.0 **MIwb:** 8.0

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

Site ID: LD14 River: 95-666 DuPage River RM: 26.60 Date: 09/26/2018

Time Fished: 1777 Distance: 0.500 Drainge (sq mi): 204.0 Depth: 0

Location: ust. Naperville WWTP Lat: 41.70122 Long: -88.15461

Species Code:	Species Name:	Feed Guild	Toler-ance	Breed Guild	IBI Group	No. Fish	Rel. No.	% by No.	Rel. Wt.	% by Wt.	Av. Wt.
40-015	NORTHERN HOG SUCKER	I	M	S	R	1	2.0	0.40	1000	0.72	500.0
40-016	WHITE SUCKER	O	T	S	W	8	16.0	3.20	3650	2.64	228.1
43-001	COMMON CARP	O	T	M	G	13	26.0	5.20	97200	70.27	3738.4
43-004	HORNYHEAD CHUB	I	I	N	N	19	38.0	7.60	1240	0.90	32.6
43-013	CREEK CHUB	G	T	N	N	12	24.0	4.80	740	0.53	30.8
43-025	STRIPED SHINER	I		S	N	12	24.0	4.80	860	0.62	35.8
43-032	SPOTFIN SHINER	I		M	N	1	2.0	0.40	2	0.00	1.0
43-034	SAND SHINER	I	M	M	N	1	2.0	0.40	2	0.00	1.0
43-043	BLUNTNOSE MINNOW	O	T	C	N	31	62.0	12.40	340	0.25	5.4
43-044	CENTRAL STONEROLLER	H		N	N	9	18.0	3.60	380	0.27	21.1
47-004	YELLOW BULLHEAD	I	T	C		2	4.0	0.80	280	0.20	70.0
47-008	STONECAT MADTOM	I	I	C		8	16.0	3.20	420	0.30	26.2
47-013	TADPOLE MADTOM	I		C		3	6.0	1.20	16	0.01	2.6
77-003	ROCK BASS	C		C	S	8	16.0	3.20	320	0.23	20.0
77-004	SMALLMOUTH BASS	C	M	C	F	68	136.0	27.20	28960	20.94	212.9
77-006	LARGEMOUTH BASS	C		C	F	13	26.0	5.20	1560	1.13	60.0
77-008	GREEN SUNFISH	I	T	C	S	1	2.0	0.40	20	0.01	10.0
77-009	BLUEGILL SUNFISH	I	P	C	S	1	2.0	0.40	90	0.07	45.0
80-016	BANDED DARTER	I	I	S	D	3	6.0	1.20	10	0.01	1.6
87-001	ROUND GOBY				E	36	72.0	14.40	1240	0.90	17.2

No Species: 20 **Nat. Species:** 18 **Hybrids:** 0 **Total Counted:** 250 **Total Rel. Wt. :** 138330

IBI: 32.0 **MIwb:** 8.0

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

Site ID: LD25 River: 95-666 DuPage River RM: 25.20 Date: 08/14/2018

Time Fished: 1813 Distance: 0.500 Drainge (sq mi): 218.0 Depth: 0

Location: dst. Plainfield Naperville Rd. Lat: 41.69032 Long: -88.16663

Species Code:	Species Name:	Feed Guild	Toler-ance	Breed Guild	IBI Group	No. Fish	Rel. No.	% by No.	Rel. Wt.	% by Wt.	Av. Wt.
20-003	GIZZARD SHAD	O		M		1	2.0	0.76	10	0.02	5.0
40-016	WHITE SUCKER	O	T	S	W	6	12.0	4.55	2040	4.22	170.0
43-001	COMMON CARP	O	T	M	G	3	6.0	2.27	29800	61.65	4966.6
43-042	FATHEAD MINNOW	O	T	C	N	1	2.0	0.76	4	0.01	2.0
43-044	CENTRAL STONEROLLER	H		N	N	3	6.0	2.27	30	0.06	5.0
47-004	YELLOW BULLHEAD	I	T	C		1	2.0	0.76	30	0.06	15.0
47-008	STONECAT MADTOM	I	I	C		2	4.0	1.52	200	0.41	50.0
47-013	TADPOLE MADTOM	I		C		1	2.0	0.76	20	0.04	10.0
77-003	ROCK BASS	C		C	S	7	14.0	5.30	800	1.66	57.1
77-004	SMALLMOUTH BASS	C	M	C	F	17	34.0	12.88	11740	24.29	345.2
77-006	LARGEMOUTH BASS	C		C	F	6	12.0	4.55	320	0.66	26.6
77-008	GREEN SUNFISH	I	T	C	S	40	80.0	30.30	1380	2.85	17.2
77-009	BLUEGILL SUNFISH	I	P	C	S	15	30.0	11.36	1040	2.15	34.6
80-014	JOHNNY DARTER	I		C	D	2	4.0	1.52	4	0.01	1.0
87-001	ROUND GOBY				E	27	54.0	20.45	920	1.90	17.0

No Species: 15 **Nat. Species:** 13 **Hybrids:** 0 **Total Counted:** 132 **Total Rel. Wt. :** 48338

IBI: 28.0 **MIwb:** 6.9

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

Site ID: LD25 River: 95-666 DuPage River RM: 25.20 Date: 09/26/2018

Time Fished: 1656 Distance: 0.500 Drainge (sq mi): 218.0 Depth: 0

Location: dst. Plainfield Naperville Rd. Lat: 41.69032 Long: -88.16663

Species Code:	Species Name:	Feed Guild	Toler-ance	Breed Guild	IBI Group	No. Fish	Rel. No.	% by No.	Rel. Wt.	% by Wt.	Av. Wt.
40-005	QUILLBACK CARPSUCKER	O		M	C	1	2.0	0.48	2800	2.90	1400.0
40-015	NORTHERN HOG SUCKER	I	M	S	R	3	6.0	1.43	2500	2.59	416.6
40-016	WHITE SUCKER	O	T	S	W	21	42.0	10.00	25020	25.96	595.7
43-001	COMMON CARP	O	T	M	G	3	6.0	1.43	19000	19.71	3166.6
43-004	HORNYHEAD CHUB	I	I	N	N	1	2.0	0.48	4	0.00	2.0
43-026	COMMON SHINER	I		S	N	1	2.0	0.48	2	0.00	1.0
43-044	CENTRAL STONEROLLER	H		N	N	3	6.0	1.43	100	0.10	16.6
47-004	YELLOW BULLHEAD	I	T	C		4	8.0	1.90	580	0.60	72.5
47-008	STONECAT MADTOM	I	I	C		11	22.0	5.24	660	0.68	30.0
54-002	BLACKSTRIPE TOPMINNOW	I		M		2	4.0	0.95	4	0.00	1.0
77-003	ROCK BASS	C		C	S	9	18.0	4.29	1780	1.85	98.8
77-004	SMALLMOUTH BASS	C	M	C	F	59	118.0	28.10	38280	39.71	324.4
77-006	LARGEMOUTH BASS	C		C	F	18	36.0	8.57	3140	3.26	87.2
77-008	GREEN SUNFISH	I	T	C	S	15	30.0	7.14	460	0.48	15.3
77-009	BLUEGILL SUNFISH	I	P	C	S	6	12.0	2.86	260	0.27	21.6
87-001	ROUND GOBY				E	53	106.0	25.24	1800	1.87	16.9

No Species: 16 **Nat. Species:** 14 **Hybrids:** 0 **Total Counted:** 210 **Total Rel. Wt. :** 96390

IBI: 36.0 **MIwb:** 8.4

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

Site ID: LD13 River: 95-666 DuPage River RM: 23.10 Date: 08/14/2018

Time Fished: 2025 Distance: 0.500 Drainge (sq mi): 229.0 Depth: 0

Location: dst. 119th St. Lat: 41.66616 Long: -88.18258

Species Code:	Species Name:	Feed Guild	Toler-ance	Breed Guild	IBI Group	No. Fish	Rel. No.	% by No.	Rel. Wt.	% by Wt.	Av. Wt.
40-015	NORTHERN HOG SUCKER	I	M	S	R	2	4.0	1.57	900	2.39	225.0
40-016	WHITE SUCKER	O	T	S	W	4	8.0	3.15	5400	14.32	675.0
43-001	COMMON CARP	O	T	M	G	3	6.0	2.36	19400	51.44	3233.3
43-004	HORNYHEAD CHUB	I	I	N	N	1	2.0	0.79	30	0.08	15.0
43-025	STRIPED SHINER	I		S	N	2	4.0	1.57	260	0.69	65.0
43-043	BLUNTNOSE MINNOW	O	T	C	N	24	48.0	18.90	200	0.53	4.1
43-044	CENTRAL STONEROLLER	H		N	N	1	2.0	0.79	6	0.02	3.0
47-002	CHANNEL CATFISH			C	F	1	2.0	0.79	4	0.01	2.0
47-004	YELLOW BULLHEAD	I	T	C		3	6.0	2.36	480	1.27	80.0
77-003	ROCK BASS	C		C	S	14	28.0	11.02	1870	4.96	66.7
77-004	SMALLMOUTH BASS	C	M	C	F	7	14.0	5.51	3100	8.22	221.4
77-006	LARGEMOUTH BASS	C		C	F	15	30.0	11.81	3320	8.80	110.6
77-008	GREEN SUNFISH	I	T	C	S	25	50.0	19.69	1240	3.29	24.8
77-009	BLUEGILL SUNFISH	I	P	C	S	7	14.0	5.51	880	2.33	62.8
80-014	JOHNNY DARTER	I		C	D	1	2.0	0.79	2	0.01	1.0
87-001	ROUND GOBY				E	17	34.0	13.39	620	1.64	18.2

No Species: 16 **Nat. Species:** 14 **Hybrids:** 0 **Total Counted:** 127 **Total Rel. Wt. :** 37712

IBI: 28.0 **MIwb:** 7.4

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

Site ID: LD13 River: 95-666 DuPage River RM: 23.10 Date: 09/28/2018

Time Fished: 1429 Distance: 0.500 Drainge (sq mi): 229.0 Depth: 0

Location: dst. 119th St. Lat: 41.66616 Long: -88.18258

Species Code:	Species Name:	Feed Guild	Toler-ance	Breed Guild	IBI Group	No. Fish	Rel. No.	% by No.	Rel. Wt.	% by Wt.	Av. Wt.
40-015	NORTHERN HOG SUCKER	I	M	S	R	6	12.0	3.66	6420	6.78	535.0
40-016	WHITE SUCKER	O	T	S	W	28	56.0	17.07	36930	39.02	659.4
43-001	COMMON CARP	O	T	M	G	2	4.0	1.22	25400	26.84	6350.0
43-004	HORNYHEAD CHUB	I	I	N	N	1	2.0	0.61	80	0.08	40.0
43-043	BLUNTNOSE MINNOW	O	T	C	N	5	10.0	3.05	30	0.03	3.0
47-013	TADPOLE MADTOM	I		C		1	2.0	0.61	30	0.03	15.0
77-003	ROCK BASS	C		C	S	18	36.0	10.98	2620	2.77	72.7
77-004	SMALLMOUTH BASS	C	M	C	F	31	62.0	18.90	20760	21.94	334.8
77-006	LARGEMOUTH BASS	C		C	F	10	20.0	6.10	540	0.57	27.0
77-008	GREEN SUNFISH	I	T	C	S	7	14.0	4.27	300	0.32	21.4
77-009	BLUEGILL SUNFISH	I	P	C	S	3	6.0	1.83	70	0.07	11.6
87-001	ROUND GOBY				E	52	104.0	31.71	1460	1.54	14.0

No Species: 12 **Nat. Species:** 10 **Hybrids:** 0 **Total Counted:** 164 **Total Rel. Wt. :** 94640

IBI: 30.0 **MIwb:** 7.6

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

Site ID: LD12 River: 95-666 DuPage River RM: 22.00 Date: 08/14/2018

Time Fished: 1960 Distance: 0.500 Drainge (sq mi): 236.0 Depth: 0

Location: dst. 127th St. Lat: 41.65184 Long: -88.18121

Species Code:	Species Name:	Feed Guild	Toler-ance	Breed Guild	IBI Group	No. Fish	Rel. No.	% by No.	Rel. Wt.	% by Wt.	Av. Wt.
40-015	NORTHERN HOG SUCKER	I	M	S	R	4	8.0	3.33	1880	2.75	235.0
40-016	WHITE SUCKER	O	T	S	W	18	36.0	15.00	18720	27.40	520.0
43-001	COMMON CARP	O	T	M	G	4	8.0	3.33	28400	41.57	3550.0
43-043	BLUNTNOSE MINNOW	O	T	C	N	1	2.0	0.83	8	0.01	4.0
43-044	CENTRAL STONEROLLER	H		N	N	14	28.0	11.67	240	0.35	8.5
47-002	CHANNEL CATFISH			C	F	1	2.0	0.83	4600	6.73	2300.0
47-004	YELLOW BULLHEAD	I	T	C		1	2.0	0.83	340	0.50	170.0
47-013	TADPOLE MADTOM	I		C		1	2.0	0.83	60	0.09	30.0
77-003	ROCK BASS	C		C	S	4	8.0	3.33	600	0.88	75.0
77-004	SMALLMOUTH BASS	C	M	C	F	12	24.0	10.00	10260	15.02	427.5
77-006	LARGEMOUTH BASS	C		C	F	17	34.0	14.17	1560	2.28	45.8
77-008	GREEN SUNFISH	I	T	C	S	16	32.0	13.33	500	0.73	15.6
77-009	BLUEGILL SUNFISH	I	P	C	S	18	36.0	15.00	990	1.45	27.5
87-001	ROUND GOBY				E	9	18.0	7.50	160	0.23	8.8

No Species: 14 **Nat. Species:** 12 **Hybrids:** 0 **Total Counted:** 120 **Total Rel. Wt. :** 68318

IBI: 28.0 **MIwb:** 7.8

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

Site ID: LD12 River: 95-666 DuPage River RM: 22.00 Date: 09/28/2018

Time Fished: 1549 Distance: 0.500 Drainge (sq mi): 236.0 Depth: 0

Location: dst. 127th St. Lat: 41.65184 Long: -88.18121

Species Code:	Species Name:	Feed Guild	Toler-ance	Breed Guild	IBI Group	No. Fish	Rel. No.	% by No.	Rel. Wt.	% by Wt.	Av. Wt.
40-015	NORTHERN HOG SUCKER	I	M	S	R	1	2.0	0.70	620	0.92	310.0
40-016	WHITE SUCKER	O	T	S	W	19	38.0	13.29	15800	23.48	415.7
43-001	COMMON CARP	O	T	M	G	9	18.0	6.29	30260	44.97	1681.1
43-004	HORNYHEAD CHUB	I	I	N	N	4	8.0	2.80	420	0.62	52.5
43-043	BLUNTNOSE MINNOW	O	T	C	N	4	8.0	2.80	12	0.02	1.5
43-044	CENTRAL STONEROLLER	H		N	N	5	10.0	3.50	200	0.30	20.0
57-001	WESTERN MOSQUITOFISH	I		N	E	1	2.0	0.70	2	0.00	1.0
77-003	ROCK BASS	C		C	S	10	20.0	6.99	2140	3.18	107.0
77-004	SMALLMOUTH BASS	C	M	C	F	21	42.0	14.69	14780	21.96	351.9
77-006	LARGEMOUTH BASS	C		C	F	9	18.0	6.29	720	1.07	40.0
77-008	GREEN SUNFISH	I	T	C	S	7	14.0	4.90	340	0.51	24.2
77-009	BLUEGILL SUNFISH	I	P	C	S	5	10.0	3.50	320	0.48	32.0
87-001	ROUND GOBY				E	48	96.0	33.57	1680	2.50	17.5

No Species: 13 **Nat. Species:** 10 **Hybrids:** 0 **Total Counted:** 143 **Total Rel. Wt. :** 67294

IBI: 28.0 **MIwb:** 7.4

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

Site ID: LD11 River: 95-666 DuPage River RM: 20.80 Date: 08/14/2018

Time Fished: 1707 Distance: 0.500 Drainge (sq mi): 236.0 Depth: 0

Location: dst. 135th St. Lat: 41.63715 Long: -88.19090

Species Code:	Species Name:	Feed Guild	Toler-ance	Breed Guild	IBI Group	No. Fish	Rel. No.	% by No.	Rel. Wt.	% by Wt.	Av. Wt.
40-015	NORTHERN HOG SUCKER	I	M	S	R	1	2.0	0.99	400	0.61	200.0
40-016	WHITE SUCKER	O	T	S	W	16	32.0	15.84	16440	25.25	513.7
43-001	COMMON CARP	O	T	M	G	7	14.0	6.93	35800	54.98	2557.1
43-004	HORNYHEAD CHUB	I	I	N	N	3	6.0	2.97	204	0.31	34.0
43-043	BLUNTNOSE MINNOW	O	T	C	N	2	4.0	1.98	10	0.02	2.5
47-004	YELLOW BULLHEAD	I	T	C		1	2.0	0.99	990	1.52	495.0
54-002	BLACKSTRIPE TOPMINNOW	I		M		2	4.0	1.98	6	0.01	1.5
77-003	ROCK BASS	C		C	S	17	34.0	16.83	4600	7.06	135.2
77-004	SMALLMOUTH BASS	C	M	C	F	8	16.0	7.92	3260	5.01	203.7
77-006	LARGEMOUTH BASS	C		C	F	9	18.0	8.91	2020	3.10	112.2
77-008	GREEN SUNFISH	I	T	C	S	9	18.0	8.91	300	0.46	16.6
77-009	BLUEGILL SUNFISH	I	P	C	S	7	14.0	6.93	680	1.04	48.5
80-003	YELLOW PERCH			M		1	2.0	0.99	120	0.18	60.0
87-001	ROUND GOBY				E	18	36.0	17.82	280	0.43	7.7

No Species: 14 **Nat. Species:** 12 **Hybrids:** 0 **Total Counted:** 101 **Total Rel. Wt. :** 65110

IBI: 26.0 **MIwb:** 7.1

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

Site ID: LD11 River: 95-666 DuPage River RM: 20.80 Date: 09/28/2018

Time Fished: 1565 Distance: 0.500 Drainge (sq mi): 236.0 Depth: 0

Location: dst. 135th St. Lat: 41.63715 Long: -88.19090

Species Code:	Species Name:	Feed Guild	Toler-ance	Breed Guild	IBI Group	No. Fish	Rel. No.	% by No.	Rel. Wt.	% by Wt.	Av. Wt.
40-015	NORTHERN HOG SUCKER	I	M	S	R	1	2.0	0.56	10	0.01	5.0
40-016	WHITE SUCKER	O	T	S	W	21	42.0	11.80	25500	25.75	607.1
43-001	COMMON CARP	O	T	M	G	8	16.0	4.49	43600	44.02	2725.0
43-003	GOLDEN SHINER	I	T	M	N	3	6.0	1.69	160	0.16	26.6
43-004	HORNYHEAD CHUB	I	I	N	N	2	4.0	1.12	400	0.40	100.0
43-032	SPOTFIN SHINER	I		M	N	3	6.0	1.69	6	0.01	1.0
43-034	SAND SHINER	I	M	M	N	12	24.0	6.74	24	0.02	1.0
43-043	BLUNTNOSE MINNOW	O	T	C	N	14	28.0	7.87	200	0.20	7.1
47-002	CHANNEL CATFISH			C	F	1	2.0	0.56	5000	5.05	2500.0
47-004	YELLOW BULLHEAD	I	T	C		1	2.0	0.56	360	0.36	180.0
77-003	ROCK BASS	C		C	S	19	38.0	10.67	2800	2.83	73.6
77-004	SMALLMOUTH BASS	C	M	C	F	16	32.0	8.99	17520	17.69	547.5
77-006	LARGEMOUTH BASS	C		C	F	26	52.0	14.61	1400	1.41	26.9
77-008	GREEN SUNFISH	I	T	C	S	8	16.0	4.49	360	0.36	22.5
77-009	BLUEGILL SUNFISH	I	P	C	S	8	16.0	4.49	800	0.81	50.0
87-001	ROUND GOBY				E	35	70.0	19.66	900	0.91	12.8

No Species: 16 **Nat. Species:** 14 **Hybrids:** 0 **Total Counted:** 178 **Total Rel. Wt. :** 99040

IBI: 26.0 **MIwb:** 8.1

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

Site ID: LD10 River: 95-666 DuPage River RM: 18.50 Date: 08/16/2018

Time Fished: 1388 Distance: 0.500 Drainge (sq mi): 249.0 Depth: 0

Location: ust. Lockport St. Lat: 41.61277 Long: -88.20569

Species Code:	Species Name:	Feed Guild	Toler-ance	Breed Guild	IBI Group	No. Fish	Rel. No.	% by No.	Rel. Wt.	% by Wt.	Av. Wt.
40-005	QUILLBACK CARPSUCKER	O		M	C	2	4.0	1.48	5400	19.07	1350.0
40-015	NORTHERN HOG SUCKER	I	M	S	R	1	2.0	0.74	600	2.12	300.0
40-016	WHITE SUCKER	O	T	S	W	9	18.0	6.67	3540	12.50	196.6
43-001	COMMON CARP	O	T	M	G	1	2.0	0.74	13800	48.74	6900.0
43-025	STRIPED SHINER	I		S	N	1	2.0	0.74	2	0.01	1.0
43-043	BLUNTNOSE MINNOW	O	T	C	N	1	2.0	0.74	6	0.02	3.0
43-044	CENTRAL STONEROLLER	H		N	N	8	16.0	5.93	80	0.28	5.0
47-004	YELLOW BULLHEAD	I	T	C		1	2.0	0.74	200	0.71	100.0
47-008	STONECAT MADTOM	I	I	C		1	2.0	0.74	60	0.21	30.0
47-013	TADPOLE MADTOM	I		C		1	2.0	0.74	20	0.07	10.0
54-002	BLACKSTRIPE TOPMINNOW	I		M		1	2.0	0.74	2	0.01	1.0
77-003	ROCK BASS	C		C	S	7	14.0	5.19	380	1.34	27.1
77-004	SMALLMOUTH BASS	C	M	C	F	4	8.0	2.96	1760	6.22	220.0
77-006	LARGEMOUTH BASS	C		C	F	17	34.0	12.59	680	2.40	20.0
77-008	GREEN SUNFISH	I	T	C	S	9	18.0	6.67	240	0.85	13.3
77-009	BLUEGILL SUNFISH	I	P	C	S	17	34.0	12.59	220	0.78	6.4
80-016	BANDED DARTER	I	I	S	D	1	2.0	0.74	4	0.01	2.0
87-001	ROUND GOBY				E	53	106.0	39.26	1320	4.66	12.4

No Species: 18 **Nat. Species:** 16 **Hybrids:** 0 **Total Counted:** 135 **Total Rel. Wt. :** 28314

IBI: 36.0 **MIwb:** 7.2

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

Site ID: LD10 River: 95-666 DuPage River RM: 18.50 Date: 09/26/2018

Time Fished: 1467 Distance: 0.500 Drainge (sq mi): 249.0 Depth: 0

Location: ust. Lockport St. Lat: 41.61277 Long: -88.20569

Species Code:	Species Name:	Feed Guild	Toler-ance	Breed Guild	IBI Group	No. Fish	Rel. No.	% by No.	Rel. Wt.	% by Wt.	Av. Wt.
20-003	GIZZARD SHAD	O		M		13	26.0	11.71	220	0.43	8.4
40-015	NORTHERN HOG SUCKER	I	M	S	R	8	16.0	7.21	4710	9.30	294.3
40-016	WHITE SUCKER	O	T	S	W	7	14.0	6.31	3620	7.15	258.5
43-001	COMMON CARP	O	T	M	G	3	6.0	2.70	24600	48.59	4100.0
43-004	HORNYHEAD CHUB	I	I	N	N	1	2.0	0.90	2	0.00	1.0
43-043	BLUNTNOSE MINNOW	O	T	C	N	4	8.0	3.60	8	0.02	1.0
43-044	CENTRAL STONEROLLER	H		N	N	6	12.0	5.41	100	0.20	8.3
47-004	YELLOW BULLHEAD	I	T	C		3	6.0	2.70	700	1.38	116.6
47-008	STONECAT MADTOM	I	I	C		4	8.0	3.60	400	0.79	50.0
77-003	ROCK BASS	C		C	S	18	36.0	16.22	2600	5.14	72.2
77-004	SMALLMOUTH BASS	C	M	C	F	13	26.0	11.71	9820	19.40	377.6
77-006	LARGEMOUTH BASS	C		C	F	13	26.0	11.71	3540	6.99	136.1
77-008	GREEN SUNFISH	I	T	C	S	4	8.0	3.60	40	0.08	5.0
77-009	BLUEGILL SUNFISH	I	P	C	S	5	10.0	4.50	240	0.47	24.0
80-014	JOHNNY DARTER	I		C	D	3	6.0	2.70	6	0.01	1.0
80-016	BANDED DARTER	I	I	S	D	6	12.0	5.41	18	0.04	1.5

No Species: 16 **Nat. Species:** 15 **Hybrids:** 0 **Total Counted:** 111 **Total Rel. Wt. :** 50624

IBI: 32.0 **MIwb:** 8.3

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

Site ID: LD09 River: 95-666 DuPage River RM: 17.00 Date: 08/16/2018

Time Fished: 1693 Distance: 0.500 Drainge (sq mi): 250.0 Depth: 0

Location: ust. Penwick Rd. Lat: 41.59680 Long: -88.21880

Species Code:	Species Name:	Feed Guild	Toler-ance	Breed Guild	IBI Group	No. Fish	Rel. No.	% by No.	Rel. Wt.	% by Wt.	Av. Wt.
40-015	NORTHERN HOG SUCKER	I	M	S	R	9	18.0	10.84	6440	14.89	357.7
40-016	WHITE SUCKER	O	T	S	W	11	22.0	13.25	11060	25.56	502.7
43-001	COMMON CARP	O	T	M	G	2	4.0	2.41	17200	39.76	4300.0
43-043	BLUNTNOSE MINNOW	O	T	C	N	1	2.0	1.20	4	0.01	2.0
47-004	YELLOW BULLHEAD	I	T	C		1	2.0	1.20	180	0.42	90.0
47-013	TADPOLE MADTOM	I		C		2	4.0	2.41	20	0.05	5.0
77-003	ROCK BASS	C		C	S	2	4.0	2.41	100	0.23	25.0
77-004	SMALLMOUTH BASS	C	M	C	F	11	22.0	13.25	6540	15.12	297.2
77-006	LARGEMOUTH BASS	C		C	F	15	30.0	18.07	340	0.79	11.3
77-008	GREEN SUNFISH	I	T	C	S	5	10.0	6.02	180	0.42	18.0
77-009	BLUEGILL SUNFISH	I	P	C	S	8	16.0	9.64	600	1.39	37.5
87-001	ROUND GOBY				E	16	32.0	19.28	600	1.39	18.7

No Species: 12 **Nat. Species:** 10 **Hybrids:** 0 **Total Counted:** 83 **Total Rel. Wt. :** 43264

IBI: 30.0 **MIwb:** 7.3

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

Site ID: LD09 River: 95-666 DuPage River RM: 17.00 Date: 09/26/2018

Time Fished: 1686 Distance: 0.500 Drainge (sq mi): 250.0 Depth: 0

Location: ust. Penwick Rd. Lat: 41.59680 Long: -88.21880

Species Code:	Species Name:	Feed Guild	Toler-ance	Breed Guild	IBI Group	No. Fish	Rel. No.	% by No.	Rel. Wt.	% by Wt.	Av. Wt.
20-003	GIZZARD SHAD	O		M		2	4.0	0.75	16	0.02	4.0
40-015	NORTHERN HOG SUCKER	I	M	S	R	24	48.0	9.06	18600	17.81	387.5
40-016	WHITE SUCKER	O	T	S	W	15	30.0	5.66	10980	10.51	366.0
43-001	COMMON CARP	O	T	M	G	13	26.0	4.91	37200	35.62	1430.7
43-043	BLUNTNOSE MINNOW	O	T	C	N	13	26.0	4.91	80	0.08	3.0
47-002	CHANNEL CATFISH			C	F	1	2.0	0.38	6000	5.75	3000.0
47-004	YELLOW BULLHEAD	I	T	C		3	6.0	1.13	720	0.69	120.0
77-003	ROCK BASS	C		C	S	29	58.0	10.94	4080	3.91	70.3
77-004	SMALLMOUTH BASS	C	M	C	F	26	52.0	9.81	17820	17.06	342.6
77-006	LARGEMOUTH BASS	C		C	F	32	64.0	12.08	5100	4.88	79.6
77-008	GREEN SUNFISH	I	T	C	S	5	10.0	1.89	100	0.10	10.0
77-009	BLUEGILL SUNFISH	I	P	C	S	19	38.0	7.17	1500	1.44	39.4
77-012	REDEAR SUNFISH	I		C	E	1	2.0	0.38	80	0.08	40.0
80-016	BANDED DARTER	I	I	S	D	1	2.0	0.38	2	0.00	1.0
87-001	ROUND GOBY				E	81	162.0	30.57	2160	2.07	13.3

No Species: 15 **Nat. Species:** 12 **Hybrids:** 0 **Total Counted:** 265 **Total Rel. Wt. :** 104438

IBI: 30.0 **MIwb:** 8.8

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

Site ID: LD08 River: 95-666 DuPage River RM: 13.40 Date: 08/19/2018

Time Fished: 1642 Distance: 0.500 Drainge (sq mi): 314.0 Depth: 0

Location: dst. Canton Farms Rd. Lat: 41.56493 Long: -88.18933

Species Code:	Species Name:	Feed Guild	Toler-ance	Breed Guild	IBI Group	No. Fish	Rel. No.	% by No.	Rel. Wt.	% by Wt.	Av. Wt.
40-005	QUILLBACK CARPSUCKER	O		M	C	2	4.0	2.11	7800	8.08	1950.0
40-015	NORTHERN HOG SUCKER	I	M	S	R	5	10.0	5.26	2560	2.65	256.0
40-016	WHITE SUCKER	O	T	S	W	14	28.0	14.74	16000	16.58	571.4
43-001	COMMON CARP	O	T	M	G	12	24.0	12.63	40070	41.52	1669.5
43-032	SPOTFIN SHINER	I		M	N	3	6.0	3.16	20	0.02	3.3
43-043	BLUNTNOSE MINNOW	O	T	C	N	1	2.0	1.05	12	0.01	6.0
47-002	CHANNEL CATFISH			C	F	2	4.0	2.11	12200	12.64	3050.0
47-004	YELLOW BULLHEAD	I	T	C		1	2.0	1.05	800	0.83	400.0
47-007	FLATHEAD CATFISH	P		C	F	1	2.0	1.05	13400	13.89	6700.0
54-002	BLACKSTRIPE TOPMINNOW	I		M		1	2.0	1.05	2	0.00	1.0
77-003	ROCK BASS	C		C	S	9	18.0	9.47	1000	1.04	55.5
77-004	SMALLMOUTH BASS	C	M	C	F	6	12.0	6.32	1120	1.16	93.3
77-006	LARGEMOUTH BASS	C		C	F	17	34.0	17.89	700	0.73	20.5
77-008	GREEN SUNFISH	I	T	C	S	3	6.0	3.16	70	0.07	11.6
77-009	BLUEGILL SUNFISH	I	P	C	S	13	26.0	13.68	520	0.54	20.0
87-001	ROUND GOBY				E	5	10.0	5.26	230	0.24	23.0

No Species: 16 **Nat. Species:** 14 **Hybrids:** 0 **Total Counted:** 95 **Total Rel. Wt. :** 96504

IBI: 28.0 **MIwb:** 8.3

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

Site ID: LD08 River: 95-666 DuPage River RM: 13.40 Date: 09/25/2018

Time Fished: 1748 Distance: 0.500 Drainge (sq mi): 314.0 Depth: 0

Location: dst. Canton Farms Rd. Lat: 41.56493 Long: -88.18933

Species Code:	Species Name:	Feed Guild	Toler-ance	Breed Guild	IBI Group	No. Fish	Rel. No.	% by No.	Rel. Wt.	% by Wt.	Av. Wt.
40-005	QUILLBACK CARPSUCKER	O		M	C	1	2.0	0.53	2600	3.21	1300.0
40-015	NORTHERN HOG SUCKER	I	M	S	R	5	10.0	2.66	2086	2.57	208.6
40-016	WHITE SUCKER	O	T	S	W	18	36.0	9.57	21520	26.54	597.7
43-001	COMMON CARP	O	T	M	G	9	18.0	4.79	21860	26.96	1214.4
43-043	BLUNTNOSE MINNOW	O	T	C	N	3	6.0	1.60	70	0.09	11.6
43-044	CENTRAL STONEROLLER	H		N	N	1	2.0	0.53	70	0.09	35.0
47-002	CHANNEL CATFISH			C	F	2	4.0	1.06	5920	7.30	1480.0
47-004	YELLOW BULLHEAD	I	T	C		2	4.0	1.06	360	0.44	90.0
47-007	FLATHEAD CATFISH	P		C	F	1	2.0	0.53	2000	2.47	1000.0
54-002	BLACKSTRIPE TOPMINNOW	I		M		1	2.0	0.53	2	0.00	1.0
77-002	BLACK CRAPPIE	I		C	S	1	2.0	0.53	360	0.44	180.0
77-003	ROCK BASS	C		C	S	21	42.0	11.17	3196	3.94	76.1
77-004	SMALLMOUTH BASS	C	M	C	F	20	40.0	10.64	14640	18.05	366.0
77-006	LARGEMOUTH BASS	C		C	F	21	42.0	11.17	1510	1.86	35.9
77-008	GREEN SUNFISH	I	T	C	S	5	10.0	2.66	220	0.27	22.0
77-009	BLUEGILL SUNFISH	I	P	C	S	29	58.0	15.43	3180	3.92	54.8
80-016	BANDED DARTER	I	I	S	D	3	6.0	1.60	20	0.02	3.3
87-001	ROUND GOBY				E	45	90.0	23.94	1480	1.83	16.4

No Species: 18 **Nat. Species:** 16 **Hybrids:** 0 **Total Counted:** 188 **Total Rel. Wt. :** 81094

IBI: 34.0 **MIwb:** 8.7

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

Site ID: LD07 River: 95-666 DuPage River RM: 11.40 Date: 08/19/2018

Time Fished: 1970 Distance: 0.500 Drainge (sq mi): 321.0 Depth: 0

Location: Ust. Black Rd. Lat: 41.54310 Long: -88.18262

Species Code:	Species Name:	Feed Guild	Toler-ance	Breed Guild	IBI Group	No. Fish	Rel. No.	% by No.	Rel. Wt.	% by Wt.	Av. Wt.
40-005	QUILLBACK CARPSUCKER	O		M	C	1	2.0	0.70	4200	6.12	2100.0
40-011	SHORTHEAD REDHORSE	I	M	S	R	1	2.0	0.70	4000	5.82	2000.0
40-015	NORTHERN HOG SUCKER	I	M	S	R	22	44.0	15.49	22400	32.62	509.0
40-016	WHITE SUCKER	O	T	S	W	5	10.0	3.52	6216	9.05	621.6
43-001	COMMON CARP	O	T	M	G	1	2.0	0.70	7000	10.19	3500.0
43-043	BLUNTNOSE MINNOW	O	T	C	N	3	6.0	2.11	16	0.02	2.6
47-002	CHANNEL CATFISH			C	F	1	2.0	0.70	4600	6.70	2300.0
47-004	YELLOW BULLHEAD	I	T	C		3	6.0	2.11	640	0.93	106.6
47-008	STONECAT MADTOM	I	I	C		8	16.0	5.63	572	0.83	35.7
77-003	ROCK BASS	C		C	S	20	40.0	14.08	3140	4.57	78.5
77-004	SMALLMOUTH BASS	C	M	C	F	23	46.0	16.20	13470	19.61	292.8
77-006	LARGEMOUTH BASS	C		C	F	16	32.0	11.27	440	0.64	13.7
77-008	GREEN SUNFISH	I	T	C	S	7	14.0	4.93	320	0.47	22.8
77-009	BLUEGILL SUNFISH	I	P	C	S	10	20.0	7.04	760	1.11	38.0
87-001	ROUND GOBY				E	21	42.0	14.79	900	1.31	21.4

No Species: 15 **Nat. Species:** 13 **Hybrids:** 0 **Total Counted:** 142 **Total Rel. Wt. :** 68674

IBI: 38.0 **MIwb:** 9.0

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

Site ID: LD07 River: 95-666 DuPage River RM: 11.40 Date: 09/25/2018

Time Fished: 1934 Distance: 0.500 Drainge (sq mi): 321.0 Depth: 0

Location: Ust. Black Rd. Lat: 41.54310 Long: -88.18262

Species Code:	Species Name:	Feed Guild	Toler-ance	Breed Guild	IBI Group	No. Fish	Rel. No.	% by No.	Rel. Wt.	% by Wt.	Av. Wt.
40-005	QUILLBACK CARPSUCKER	O		M	C	3	6.0	2.36	10300	10.28	1716.6
40-010	GOLDEN REDHORSE	I	M	S	R	1	2.0	0.79	3100	3.09	1550.0
40-011	SHORTHEAD REDHORSE	I	M	S	R	15	30.0	11.81	41800	41.71	1393.3
40-015	NORTHERN HOG SUCKER	I	M	S	R	34	68.0	26.77	32360	32.29	475.8
40-016	WHITE SUCKER	O	T	S	W	1	2.0	0.79	160	0.16	80.0
47-008	STONECAT MADTOM	I	I	C		4	8.0	3.15	280	0.28	35.0
77-003	ROCK BASS	C		C	S	15	30.0	11.81	2600	2.59	86.6
77-004	SMALLMOUTH BASS	C	M	C	F	16	32.0	12.60	7900	7.88	246.8
77-006	LARGEMOUTH BASS	C		C	F	5	10.0	3.94	220	0.22	22.0
77-008	GREEN SUNFISH	I	T	C	S	2	4.0	1.57	100	0.10	25.0
77-009	BLUEGILL SUNFISH	I	P	C	S	2	4.0	1.57	320	0.32	80.0
80-016	BANDED DARTER	I	I	S	D	1	2.0	0.79	4	0.00	2.0
87-001	ROUND GOBY				E	28	56.0	22.05	1060	1.06	18.9

No Species: 13 **Nat. Species:** 12 **Hybrids:** 0 **Total Counted:** 127 **Total Rel. Wt. :** 100204

IBI: 46.0 **MIwb:** 8.4

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

Site ID: LD06 River: 95-666 DuPage River RM: 9.60 Date: 08/20/2018

Time Fished: 1582 Distance: 0.500 Drainge (sq mi): 328.0 Depth: 0

Location: Dst. US 52 Lat: 41.52130 Long: -88.19566

Species Code:	Species Name:	Feed Guild	Toler-ance	Breed Guild	IBI Group	No. Fish	Rel. No.	% by No.	Rel. Wt.	% by Wt.	Av. Wt.
05-001	SILVER AROWANA	P			E	1	2.0	0.42	2600	2.73	1300.0
40-011	SHORTHEAD REDHORSE	I	M	S	R	2	4.0	0.85	5200	5.46	1300.0
40-015	NORTHERN HOG SUCKER	I	M	S	R	41	82.0	17.37	27140	28.48	330.9
40-016	WHITE SUCKER	O	T	S	W	2	4.0	0.85	2400	2.52	600.0
43-001	COMMON CARP	O	T	M	G	3	6.0	1.27	21200	22.24	3533.3
43-004	HORNYHEAD CHUB	I	I	N	N	1	2.0	0.42	40	0.04	20.0
43-032	SPOTFIN SHINER	I		M	N	2	4.0	0.85	20	0.02	5.0
43-043	BLUNTNOSE MINNOW	O	T	C	N	2	4.0	0.85	16	0.02	4.0
47-002	CHANNEL CATFISH			C	F	2	4.0	0.85	3800	3.99	950.0
47-004	YELLOW BULLHEAD	I	T	C		6	12.0	2.54	1480	1.55	123.3
47-008	STONECAT MADTOM	I	I	C		1	2.0	0.42	10	0.01	5.0
54-002	BLACKSTRIPE TOPMINNOW	I		M		1	2.0	0.42	2	0.00	1.0
77-003	ROCK BASS	C		C	S	17	34.0	7.20	4300	4.51	126.4
77-004	SMALLMOUTH BASS	C	M	C	F	51	102.0	21.61	21220	22.27	208.0
77-006	LARGEMOUTH BASS	C		C	F	1	2.0	0.42	700	0.73	350.0
77-008	GREEN SUNFISH	I	T	C	S	23	46.0	9.75	1420	1.49	30.8
77-009	BLUEGILL SUNFISH	I	P	C	S	51	102.0	21.61	3070	3.22	30.1
77-015	GREEN SF X BLUEGILL SF					2	4.0	0.85	120	0.13	30.0
80-016	BANDED DARTER	I	I	S	D	2	4.0	0.85	6	0.01	1.5
87-001	ROUND GOBY				E	25	50.0	10.59	560	0.59	11.2

No Species: 19 **Nat. Species:** 16 **Hybrids:** 1 **Total Counted:** 236 **Total Rel. Wt. :** 95304

IBI: 40.0 **MIwb:** 9.1

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

Site ID: LD06 River: 95-666 DuPage River RM: 9.60 Date: 09/25/2018

Time Fished: 1640 Distance: 0.500 Drainge (sq mi): 328.0 Depth: 0

Location: Dst. US 52 Lat: 41.52130 Long: -88.19566

Species Code:	Species Name:	Feed Guild	Toler-ance	Breed Guild	IBI Group	No. Fish	Rel. No.	% by No.	Rel. Wt.	% by Wt.	Av. Wt.
40-011	SHORTHEAD REDHORSE	I	M	S	R	7	14.0	2.94	20700	25.82	1478.5
40-015	NORTHERN HOG SUCKER	I	M	S	R	42	84.0	17.65	27120	33.83	322.8
40-016	WHITE SUCKER	O	T	S	W	2	4.0	0.84	2000	2.50	500.0
43-004	HORNYHEAD CHUB	I	I	N	N	3	6.0	1.26	440	0.55	73.3
43-043	BLUNTNOSE MINNOW	O	T	C	N	1	2.0	0.42	2	0.00	1.0
47-002	CHANNEL CATFISH			C	F	1	2.0	0.42	4800	5.99	2400.0
47-004	YELLOW BULLHEAD	I	T	C		13	26.0	5.46	3320	4.14	127.6
47-008	STONECAT MADTOM	I	I	C		1	2.0	0.42	40	0.05	20.0
54-002	BLACKSTRIPE TOPMINNOW	I		M		2	4.0	0.84	4	0.00	1.0
77-003	ROCK BASS	C		C	S	53	106.0	22.27	9500	11.85	89.6
77-004	SMALLMOUTH BASS	C	M	C	F	40	80.0	16.81	8880	11.08	111.0
77-006	LARGEMOUTH BASS	C		C	F	3	6.0	1.26	100	0.12	16.6
77-008	GREEN SUNFISH	I	T	C	S	19	38.0	7.98	1000	1.25	26.3
77-009	BLUEGILL SUNFISH	I	P	C	S	24	48.0	10.08	1240	1.55	25.8
77-012	REDEAR SUNFISH	I		C	E	1	2.0	0.42	60	0.07	30.0
80-007	SLENDERHEAD DARTER	I	R	S	D	1	2.0	0.42	6	0.01	3.0
80-016	BANDED DARTER	I	I	S	D	2	4.0	0.84	6	0.01	1.5
87-001	ROUND GOBY				E	23	46.0	9.66	940	1.17	20.4

No Species: 18 **Nat. Species:** 16 **Hybrids:** 0 **Total Counted:** 238 **Total Rel. Wt. :** 80158

IBI: 44.0 **MIwb:** 9.1

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

Site ID: LD03 River: 95-666 DuPage River RM: 7.00 Date: 08/16/2018

Time Fished: 1522 Distance: 0.500 Drainge (sq mi): 333.0 Depth: 0

Location: dst. Mound St. Lat: 41.49235 Long: -88.21516

Species Code:	Species Name:	Feed Guild	Toler-ance	Breed Guild	IBI Group	No. Fish	Rel. No.	% by No.	Rel. Wt.	% by Wt.	Av. Wt.
40-015	NORTHERN HOG SUCKER	I	M	S	R	11	22.0	13.75	7000	54.00	318.1
40-016	WHITE SUCKER	O	T	S	W	1	2.0	1.25	1000	7.71	500.0
43-004	HORNYHEAD CHUB	I	I	N	N	4	8.0	5.00	320	2.47	40.0
43-043	BLUNTNOSE MINNOW	O	T	C	N	1	2.0	1.25	4	0.03	2.0
47-008	STONECAT MADTOM	I	I	C		8	16.0	10.00	260	2.01	16.2
77-003	ROCK BASS	C		C	S	9	18.0	11.25	1300	10.03	72.2
77-004	SMALLMOUTH BASS	C	M	C	F	11	22.0	13.75	1000	7.71	45.4
77-006	LARGEMOUTH BASS	C		C	F	3	6.0	3.75	20	0.15	3.3
77-008	GREEN SUNFISH	I	T	C	S	2	4.0	2.50	50	0.39	12.5
77-009	BLUEGILL SUNFISH	I	P	C	S	14	28.0	17.50	1660	12.80	59.2
77-015	GREEN SF X BLUEGILL SF					1	2.0	1.25	120	0.93	60.0
80-016	BANDED DARTER	I	I	S	D	7	14.0	8.75	10	0.08	0.7
87-001	ROUND GOBY				E	8	16.0	10.00	220	1.70	13.7

No Species: 12 **Nat. Species:** 11 **Hybrids:** 1 **Total Counted:** 80 **Total Rel. Wt. :** 12964

IBI: 38.0 **MIwb:** 7.4

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

Site ID: LD03 River: 95-666 DuPage River RM: 7.00 Date: 09/27/2018

Time Fished: 1738 Distance: 0.500 Drainge (sq mi): 333.0 Depth: 0

Location: dst. Mound St. Lat: 41.49235 Long: -88.21516

Species Code:	Species Name:	Feed Guild	Toler-ance	Breed Guild	IBI Group	No. Fish	Rel. No.	% by No.	Rel. Wt.	% by Wt.	Av. Wt.
40-010	GOLDEN REDHORSE	I	M	S	R	1	2.0	0.63	3000	4.93	1500.0
40-011	SHORTHEAD REDHORSE	I	M	S	R	6	12.0	3.77	17120	28.12	1426.6
40-015	NORTHERN HOG SUCKER	I	M	S	R	31	62.0	19.50	23620	38.80	380.9
43-004	HORNYHEAD CHUB	I	I	N	N	7	14.0	4.40	700	1.15	50.0
47-004	YELLOW BULLHEAD	I	T	C		1	2.0	0.63	700	1.15	350.0
47-008	STONECAT MADTOM	I	I	C		3	6.0	1.89	100	0.16	16.6
77-003	ROCK BASS	C		C	S	28	56.0	17.61	4020	6.60	71.7
77-004	SMALLMOUTH BASS	C	M	C	F	34	68.0	21.38	9600	15.77	141.1
77-006	LARGEMOUTH BASS	C		C	F	4	8.0	2.52	180	0.30	22.5
77-009	BLUEGILL SUNFISH	I	P	C	S	17	34.0	10.69	1260	2.07	37.0
80-016	BANDED DARTER	I	I	S	D	16	32.0	10.06	80	0.13	2.5
87-001	ROUND GOBY				E	11	22.0	6.92	500	0.82	22.7

No Species: 12 **Nat. Species:** 11 **Hybrids:** 0 **Total Counted:** 159 **Total Rel. Wt. :** 60880

IBI: 44.0 **MIwb:** 8.6

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

Site ID: LD02 River: 95-666 DuPage River RM: 4.70 Date: 08/20/2018

Time Fished: 2516 Distance: 0.500 Drainge (sq mi): 335.0 Depth: 0

Location: dst. Shepley Lat: 41.46767 Long: -88.20964

Species Code:	Species Name:	Feed Guild	Toler-ance	Breed Guild	IBI Group	No. Fish	Rel. No.	% by No.	Rel. Wt.	% by Wt.	Av. Wt.
40-009	BLACK REDHORSE	I	I	S	R	1	2.0	0.51	20	0.02	10.0
40-010	GOLDEN REDHORSE	I	M	S	R	3	6.0	1.52	7000	6.81	1166.6
40-011	SHORTHEAD REDHORSE	I	M	S	R	6	12.0	3.05	13000	12.64	1083.3
40-015	NORTHERN HOG SUCKER	I	M	S	R	20	40.0	10.15	14260	13.87	356.5
43-001	COMMON CARP	O	T	M	G	2	4.0	1.02	8800	8.56	2200.0
47-002	CHANNEL CATFISH			C	F	4	8.0	2.03	12000	11.67	1500.0
47-004	YELLOW BULLHEAD	I	T	C		1	2.0	0.51	120	0.12	60.0
47-007	FLATHEAD CATFISH	P		C	F	3	6.0	1.52	17600	17.11	2933.3
47-008	STONECAT MADTOM	I	I	C		4	8.0	2.03	8	0.01	1.0
77-003	ROCK BASS	C		C	S	34	68.0	17.26	4460	4.34	65.5
77-004	SMALLMOUTH BASS	C	M	C	F	58	116.0	29.44	20200	19.64	174.1
77-006	LARGEMOUTH BASS	C		C	F	5	10.0	2.54	1500	1.46	150.0
77-008	GREEN SUNFISH	I	T	C	S	20	40.0	10.15	1200	1.17	30.0
77-009	BLUEGILL SUNFISH	I	P	C	S	28	56.0	14.21	2600	2.53	46.4
80-016	BANDED DARTER	I	I	S	D	4	8.0	2.03	10	0.01	1.2
87-001	ROUND GOBY				E	4	8.0	2.03	60	0.06	7.5

No Species: 16 **Nat. Species:** 14 **Hybrids:** 0 **Total Counted:** 197 **Total Rel. Wt. :** 102838

IBI: 40.0 **MIwb:** 9.5

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

Site ID: LD02 River: 95-666 DuPage River RM: 4.70 Date: 09/27/2018

Time Fished: 2082 Distance: 0.500 Drainge (sq mi): 335.0 Depth: 0

Location: dst. Shepley Lat: 41.46767 Long: -88.20964

Species Code:	Species Name:	Feed Guild	Toler-ance	Breed Guild	IBI Group	No. Fish	Rel. No.	% by No.	Rel. Wt.	% by Wt.	Av. Wt.
40-005	QUILLBACK CARPSUCKER	O		M	C	1	2.0	0.69	3200	4.08	1600.0
40-011	SHORTHEAD REDHORSE	I	M	S	R	2	4.0	1.39	5000	6.37	1250.0
40-015	NORTHERN HOG SUCKER	I	M	S	R	26	52.0	18.06	19640	25.02	377.6
43-044	CENTRAL STONEROLLER	H		N	N	1	2.0	0.69	60	0.08	30.0
47-002	CHANNEL CATFISH			C	F	4	8.0	2.78	9500	12.10	1187.5
47-007	FLATHEAD CATFISH	P		C	F	1	2.0	0.69	13200	16.82	6600.0
47-008	STONECAT MADTOM	I	I	C		2	4.0	1.39	8	0.01	2.0
54-002	BLACKSTRIPE TOPMINNOW	I		M		1	2.0	0.69	2	0.00	1.0
77-003	ROCK BASS	C		C	S	25	50.0	17.36	5050	6.43	101.0
77-004	SMALLMOUTH BASS	C	M	C	F	58	116.0	40.28	21970	27.99	189.4
77-008	GREEN SUNFISH	I	T	C	S	11	22.0	7.64	520	0.66	23.6
77-009	BLUEGILL SUNFISH	I	P	C	S	3	6.0	2.08	240	0.31	40.0
80-016	BANDED DARTER	I	I	S	D	6	12.0	4.17	18	0.02	1.5
87-001	ROUND GOBY				E	3	6.0	2.08	80	0.10	13.3

No Species: 14 **Nat. Species:** 13 **Hybrids:** 0 **Total Counted:** 144 **Total Rel. Wt. :** 78488

IBI: 42.0 **MIwb:** 8.6

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

Site ID: LD05 River: 95-666 DuPage River RM: 2.50 Date: 08/15/2018

Time Fished: 1611 Distance: 0.500 Drainge (sq mi): 346.0 Depth: 0

Location: dst. WWTP Lat: 41.43730 Long: -88.23703

Species Code:	Species Name:	Feed Guild	Toler-ance	Breed Guild	IBI Group	No. Fish	Rel. No.	% by No.	Rel. Wt.	% by Wt.	Av. Wt.
40-010	GOLDEN REDHORSE	I	M	S	R	2	4.0	1.10	4400	13.90	1100.0
40-015	NORTHERN HOG SUCKER	I	M	S	R	8	16.0	4.42	8000	25.27	500.0
40-016	WHITE SUCKER	O	T	S	W	1	2.0	0.55	1200	3.79	600.0
43-001	COMMON CARP	O	T	M	G	7	14.0	3.87	1300	4.11	92.8
43-034	SAND SHINER	I	M	M	N	11	22.0	6.08	40	0.13	1.8
43-043	BLUNTNOSE MINNOW	O	T	C	N	7	14.0	3.87	40	0.13	2.8
47-002	CHANNEL CATFISH			C	F	1	2.0	0.55	4200	13.27	2100.0
47-004	YELLOW BULLHEAD	I	T	C		2	4.0	1.10	204	0.64	51.0
47-013	TADPOLE MADTOM	I		C		2	4.0	1.10	40	0.13	10.0
54-002	BLACKSTRIPE TOPMINNOW	I		M		1	2.0	0.55	6	0.02	3.0
77-002	BLACK CRAPPIE	I		C	S	1	2.0	0.55	300	0.95	150.0
77-003	ROCK BASS	C		C	S	8	16.0	4.42	1380	4.36	86.2
77-004	SMALLMOUTH BASS	C	M	C	F	9	18.0	4.97	4460	14.09	247.7
77-006	LARGEMOUTH BASS	C		C	F	9	18.0	4.97	1600	5.05	88.8
77-008	GREEN SUNFISH	I	T	C	S	39	78.0	21.55	1100	3.48	14.1
77-009	BLUEGILL SUNFISH	I	P	C	S	67	134.0	37.02	3260	10.30	24.3
80-016	BANDED DARTER	I	I	S	D	1	2.0	0.55	2	0.01	1.0
87-001	ROUND GOBY				E	5	10.0	2.76	120	0.38	12.0

No Species: 18 **Nat. Species:** 16 **Hybrids:** 0 **Total Counted:** 181 **Total Rel. Wt. :** 31652

IBI: 38.0 **MIwb:** 8.7

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

Site ID: LD05 River: 95-666 DuPage River RM: 2.50 Date: 09/27/2018

Time Fished: 1415 Distance: 0.500 Drainge (sq mi): 346.0 Depth: 0

Location: dst. WWTP Lat: 41.43730 Long: -88.23703

Species Code:	Species Name:	Feed Guild	Toler-ance	Breed Guild	IBI Group	No. Fish	Rel. No.	% by No.	Rel. Wt.	% by Wt.	Av. Wt.
40-010	GOLDEN REDHORSE	I	M	S	R	2	4.0	1.01	3800	5.98	950.0
40-011	SHORTHEAD REDHORSE	I	M	S	R	2	4.0	1.01	180	0.28	45.0
40-015	NORTHERN HOG SUCKER	I	M	S	R	11	22.0	5.53	9440	14.87	429.0
43-001	COMMON CARP	O	T	M	G	6	12.0	3.02	22500	35.43	1875.0
43-002	GOLDFISH	O	T	M	G	1	2.0	0.50	160	0.25	80.0
43-035	MIMIC SHINER	I	I	M	N	7	14.0	3.52	30	0.05	2.1
43-043	BLUNTNOSE MINNOW	O	T	C	N	25	50.0	12.56	200	0.31	4.0
54-002	BLACKSTRIPE TOPMINNOW	I		M		3	6.0	1.51	4	0.01	0.6
77-002	BLACK CRAPPIE	I		C	S	2	4.0	1.01	660	1.04	165.0
77-003	ROCK BASS	C		C	S	27	54.0	13.57	3300	5.20	61.1
77-004	SMALLMOUTH BASS	C	M	C	F	22	44.0	11.06	15280	24.06	347.2
77-006	LARGEMOUTH BASS	C		C	F	7	14.0	3.52	5000	7.87	357.1
77-008	GREEN SUNFISH	I	T	C	S	25	50.0	12.56	740	1.17	14.8
77-009	BLUEGILL SUNFISH	I	P	C	S	49	98.0	24.62	1900	2.99	19.3
77-012	REDEAR SUNFISH	I		C	E	2	4.0	1.01	120	0.19	30.0
80-014	JOHNNY DARTER	I		C	D	2	4.0	1.01	4	0.01	1.0
80-016	BANDED DARTER	I	I	S	D	1	2.0	0.50	4	0.01	2.0
87-001	ROUND GOBY				E	5	10.0	2.51	180	0.28	18.0

No Species: 18 **Nat. Species:** 14 **Hybrids:** 0 **Total Counted:** 199 **Total Rel. Wt. :** 63502

IBI: 36.0 **MIwb:** 8.8

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

Site ID: LD16 River: 95-666 DuPage River RM: 1.50 Date: 08/15/2018

Time Fished: 1362 Distance: 0.500 Drainge (sq mi): 348.0 Depth: 0

Location: dst. US 6 Lat: 41.42581 Long: -88.23267

Species Code:	Species Name:	Feed Guild	Toler-ance	Breed Guild	IBI Group	No. Fish	Rel. No.	% by No.	Rel. Wt.	% by Wt.	Av. Wt.
43-001	COMMON CARP	O	T	M	G	5	10.0	3.97	16680	74.12	1668.0
54-002	BLACKSTRIPE TOPMINNOW	I		M		11	22.0	8.73	24	0.11	1.0
77-002	BLACK CRAPPIE	I		C	S	1	2.0	0.79	400	1.78	200.0
77-004	SMALLMOUTH BASS	C	M	C	F	1	2.0	0.79	1000	4.44	500.0
77-006	LARGEMOUTH BASS	C		C	F	17	34.0	13.49	2220	9.86	65.2
77-008	GREEN SUNFISH	I	T	C	S	18	36.0	14.29	500	2.22	13.8
77-009	BLUEGILL SUNFISH	I	P	C	S	60	120.0	47.62	1020	4.53	8.5
77-010	ORANGESPOTTED SUNFISH	I		C	S	3	6.0	2.38	100	0.44	16.6
77-011	LONGEAR SUNFISH	I	M	C	S	2	4.0	1.59	100	0.44	25.0
77-013	PUMPKINSEED SUNFISH	I	P	C	S	3	6.0	2.38	140	0.62	23.3
80-003	YELLOW PERCH			M		2	4.0	1.59	200	0.89	50.0
87-001	ROUND GOBY				E	3	6.0	2.38	120	0.53	20.0

No Species: 12 **Nat. Species:** 10 **Hybrids:** 0 **Total Counted:** 126 **Total Rel. Wt. :** 22504

IBI: 38.0 **MIwb:** 6.2

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

Site ID: LD16 River: 95-666 DuPage River RM: 1.50 Date: 09/27/2018

Time Fished: 1362 Distance: 0.500 Drainge (sq mi): 348.0 Depth: 0

Location: dst. US 6 Lat: 41.42581 Long: -88.23267

Species Code:	Species Name:	Feed Guild	Toler-ance	Breed Guild	IBI Group	No. Fish	Rel. No.	% by No.	Rel. Wt.	% by Wt.	Av. Wt.
20-003	GIZZARD SHAD	O		M		48	96.0	29.45	6200	18.12	64.5
43-001	COMMON CARP	O	T	M	G	5	10.0	3.07	15220	44.49	1522.0
43-002	GOLDFISH	O	T	M	G	1	2.0	0.61	80	0.23	40.0
47-002	CHANNEL CATFISH			C	F	1	2.0	0.61	1800	5.26	900.0
47-004	YELLOW BULLHEAD	I	T	C		3	6.0	1.84	200	0.58	33.3
47-013	TADPOLE MADTOM	I		C		1	2.0	0.61	2	0.01	1.0
54-002	BLACKSTRIPE TOPMINNOW	I		M		1	2.0	0.61	2	0.01	1.0
77-002	BLACK CRAPPIE	I		C	S	1	2.0	0.61	4	0.01	2.0
77-004	SMALLMOUTH BASS	C	M	C	F	1	2.0	0.61	180	0.53	90.0
77-006	LARGEMOUTH BASS	C		C	F	15	30.0	9.20	7520	21.98	250.6
77-008	GREEN SUNFISH	I	T	C	S	1	2.0	0.61	80	0.23	40.0
77-009	BLUEGILL SUNFISH	I	P	C	S	62	124.0	38.04	1380	4.03	11.1
77-012	REDEAR SUNFISH	I		C	E	12	24.0	7.36	880	2.57	36.6
77-013	PUMPKINSEED SUNFISH	I	P	C	S	1	2.0	0.61	120	0.35	60.0
77-038	NORTHERN SUNFISH	I	M	C	S	2	4.0	1.23	120	0.35	30.0
80-003	YELLOW PERCH			M		6	12.0	3.68	400	1.17	33.3
87-001	ROUND GOBY				E	2	4.0	1.23	20	0.06	5.0

No Species: 17 **Nat. Species:** 13 **Hybrids:** 0 **Total Counted:** 163 **Total Rel. Wt. :** 34208

IBI: 30.0 **MIwb:** 7.6

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

Site ID: LD01 River: 95-666 DuPage River RM: 1.00 Date: 08/15/2018

Time Fished: 2743 Distance: 0.500 Drainge (sq mi): 376.0 Depth: 0

Location: at W. Bridge St. Lat: 41.42072 Long: -88.22758

Species Code:	Species Name:	Feed Guild	Toler-ance	Breed Guild	IBI Group	No. Fish	Rel. No.	% by No.	Rel. Wt.	% by Wt.	Av. Wt.
20-003	GIZZARD SHAD	O		M		4	8.0	1.22	1140	0.92	142.5
40-004	SMALLMOUTH BUFFALO	I		M	C	2	4.0	0.61	5400	4.34	1350.0
40-005	QUILLBACK CARPSUCKER	O		M	C	1	2.0	0.30	1000	0.80	500.0
40-008	SILVER REDHORSE	I	M	S	R	3	6.0	0.91	11400	9.15	1900.0
40-010	GOLDEN REDHORSE	I	M	S	R	10	20.0	3.04	12080	9.70	604.0
40-011	SHORTHEAD REDHORSE	I	M	S	R	27	54.0	8.21	23560	18.92	436.3
40-013	RIVER REDHORSE	I	I	S	R	2	4.0	0.61	5520	4.43	1380.0
40-015	NORTHERN HOG SUCKER	I	M	S	R	16	32.0	4.86	7820	6.28	244.3
40-016	WHITE SUCKER	O	T	S	W	2	4.0	0.61	1420	1.14	355.0
43-001	COMMON CARP	O	T	M	G	3	6.0	0.91	6000	4.82	1000.0
43-004	HORNYHEAD CHUB	I	I	N	N	1	2.0	0.30	60	0.05	30.0
43-015	SUCKERMOUTH MINNOW	I		S	N	7	14.0	2.13	30	0.02	2.1
43-020	EMERALD SHINER	I		M	N	3	6.0	0.91	10	0.01	1.6
43-022	ROSYFACE SHINER	I	I	S	N	1	2.0	0.30	4	0.00	2.0
43-025	STRIPED SHINER	I		S	N	2	4.0	0.61	80	0.06	20.0
43-032	SPOTFIN SHINER	I		M	N	15	30.0	4.56	120	0.10	4.0
43-034	SAND SHINER	I	M	M	N	31	62.0	9.42	90	0.07	1.4
43-043	BLUNTNOSE MINNOW	O	T	C	N	26	52.0	7.90	184	0.15	3.5
43-044	CENTRAL STONEROLLER	H		N	N	7	14.0	2.13	40	0.03	2.8
47-002	CHANNEL CATFISH			C	F	4	8.0	1.22	11800	9.47	1475.0
47-004	YELLOW BULLHEAD	I	T	C		1	2.0	0.30	40	0.03	20.0
47-008	STONECAT MADTOM	I	I	C		3	6.0	0.91	80	0.06	13.3
54-002	BLACKSTRIPE TOPMINNOW	I		M		3	6.0	0.91	4	0.00	0.6
57-001	WESTERN MOSQUITOFISH	I		N	E	1	2.0	0.30	2	0.00	1.0
77-002	BLACK CRAPPIE	I		C	S	2	4.0	0.61	800	0.64	200.0
77-003	ROCK BASS	C		C	S	9	18.0	2.74	1060	0.85	58.8
77-004	SMALLMOUTH BASS	C	M	C	F	17	34.0	5.17	8530	6.85	250.8
77-006	LARGEMOUTH BASS	C		C	F	16	32.0	4.86	3820	3.07	119.3
77-009	BLUEGILL SUNFISH	I	P	C	S	60	120.0	18.24	3800	3.05	31.6
77-010	ORANGESPOTTED SUNFISH	I		C	S	2	4.0	0.61	20	0.02	5.0
77-011	LONGEAR SUNFISH	I	M	C	S	3	6.0	0.91	30	0.02	5.0
80-001	SAUGER	P		S	F	1	2.0	0.30	2000	1.61	1000.0
80-002	WALLEYE	P		S	F	3	6.0	0.91	8800	7.07	1466.6
80-011	LOGPERCH	I	M	S	D	25	50.0	7.60	380	0.31	7.6
80-014	JOHNNY DARTER	I		C	D	1	2.0	0.30	2	0.00	1.0
80-016	BANDED DARTER	I	I	S	D	11	22.0	3.34	10	0.01	0.4
85-001	FRESHWATER DRUM		P	M		1	2.0	0.30	7400	5.94	3700.0
87-001	ROUND GOBY				E	3	6.0	0.91	20	0.02	3.3

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

No Species:	38	**Nat. Species:**	35	**Hybrids:**	0	**Total Counted:**	329	**Total Rel. Wt. :**	124556
IBI:	54.0	**Mlwb:**	11.2						

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

Site ID: LD01 River: 95-666 DuPage River RM: 1.00 Date: 09/28/2018

Time Fished: 2756 Distance: 0.500 Drainge (sq mi): 376.0 Depth: 0

Location: at W. Bridge St. Lat: 41.42072 Long: -88.22758

Species Code:	Species Name:	Feed Guild	Toler-ance	Breed Guild	IBI Group	No. Fish	Rel. No.	% by No.	Rel. Wt.	% by Wt.	Av. Wt.
20-003	GIZZARD SHAD	O		M		20	40.0	2.91	6700	3.01	167.5
40-004	SMALLMOUTH BUFFALO	I		M	C	1	2.0	0.15	4800	2.16	2400.0
40-008	SILVER REDHORSE	I	M	S	R	1	2.0	0.15	4000	1.80	2000.0
40-010	GOLDEN REDHORSE	I	M	S	R	13	26.0	1.89	14200	6.38	546.1
40-011	SHORTHEAD REDHORSE	I	M	S	R	39	78.0	5.68	20020	9.00	256.6
40-015	NORTHERN HOG SUCKER	I	M	S	R	22	44.0	3.20	12520	5.63	284.5
40-016	WHITE SUCKER	O	T	S	W	1	2.0	0.15	1200	0.54	600.0
43-001	COMMON CARP	O	T	M	G	17	34.0	2.47	82360	37.03	2422.3
43-004	HORNYHEAD CHUB	I	I	N	N	4	8.0	0.58	280	0.13	35.0
43-015	SUCKERMOUTH MINNOW	I		S	N	9	18.0	1.31	100	0.04	5.5
43-020	EMERALD SHINER	I		M	N	78	156.0	11.35	480	0.22	3.0
43-022	ROSYFACE SHINER	I	I	S	N	11	22.0	1.60	60	0.03	2.7
43-025	STRIPED SHINER	I		S	N	3	6.0	0.44	200	0.09	33.3
43-032	SPOTFIN SHINER	I		M	N	29	58.0	4.22	200	0.09	3.4
43-034	SAND SHINER	I	M	M	N	4	8.0	0.58	20	0.01	2.5
43-035	MIMIC SHINER	I	I	M	N	6	12.0	0.87	30	0.01	2.5
43-043	BLUNTNOSE MINNOW	O	T	C	N	31	62.0	4.51	300	0.13	4.8
43-044	CENTRAL STONEROLLER	H		N	N	8	16.0	1.16	240	0.11	15.0
47-002	CHANNEL CATFISH			C	F	5	10.0	0.73	16600	7.46	1660.0
47-008	STONECAT MADTOM	I	I	C		8	16.0	1.16	214	0.10	13.3
54-002	BLACKSTRIPE TOPMINNOW	I		M		6	12.0	0.87	12	0.01	1.0
70-001	BROOK SILVERSIDE	I	M	M		20	40.0	2.91	82	0.04	2.0
77-001	WHITE CRAPPIE	I		C	S	1	2.0	0.15	1000	0.45	500.0
77-002	BLACK CRAPPIE	I		C	S	4	8.0	0.58	2360	1.06	295.0
77-003	ROCK BASS	C		C	S	14	28.0	2.04	1500	0.67	53.5
77-004	SMALLMOUTH BASS	C	M	C	F	47	94.0	6.84	24180	10.87	257.2
77-006	LARGEMOUTH BASS	C		C	F	58	116.0	8.44	9360	4.21	80.6
77-008	GREEN SUNFISH	I	T	C	S	7	14.0	1.02	260	0.12	18.5
77-009	BLUEGILL SUNFISH	I	P	C	S	131	262.0	19.07	6030	2.71	23.0
77-010	ORANGESPOTTED SUNFISH	I		C	S	2	4.0	0.29	20	0.01	5.0
77-013	PUMPKINSEED SUNFISH	I	P	C	S	14	28.0	2.04	600	0.27	21.4
77-015	GREEN SF X BLUEGILL SF					1	2.0	0.15	100	0.04	50.0
77-038	NORTHERN SUNFISH	I	M	C	S	9	18.0	1.31	220	0.10	12.2
80-002	WALLEYE	P		S	F	2	4.0	0.29	7500	3.37	1875.0
80-011	LOGPERCH	I	M	S	D	32	64.0	4.66	620	0.28	9.6
80-014	JOHNNY DARTER	I		C	D	1	2.0	0.15	2	0.00	1.0
80-016	BANDED DARTER	I	I	S	D	21	42.0	3.06	60	0.03	1.4
85-001	FRESHWATER DRUM		P	M		2	4.0	0.29	4000	1.80	1000.0
87-001	ROUND GOBY				E	5	10.0	0.73	10	0.00	1.0

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

No Species:	38	**Nat. Species:**	36	**Hybrids:**	1	**Total Counted:**	687	**Total Rel. Wt. :**	222440
IBI:	52.0	**Mlwb:**	11.3						

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

Site ID: LD28 River: 95-667 Hammel Creek, trib to DuPage River RM: 1.19 Date: 08/14/2018

Time Fished: 783 Distance: 0.150 Drainge (sq mi): 10.7 Depth: 0

Location: at end of Ridge Ave. Lat: 41.52834 Long: -88.20877

Species Code:	Species Name:	Feed Guild	Toler-ance	Breed Guild	IBI Group	No. Fish	Rel. No.	% by No.	Rel. Wt.	% by Wt.	Av. Wt.
40-016	WHITE SUCKER	O	T	S	W	2	4.0	1.12	76	2.27	19.0
43-013	CREEK CHUB	G	T	N	N	62	124.0	34.83	1500	44.75	12.1
43-043	BLUNTNOSE MINNOW	O	T	C	N	12	24.0	6.74	60	1.79	2.5
43-044	CENTRAL STONEROLLER	H		N	N	32	64.0	17.98	266	7.94	4.1
47-004	YELLOW BULLHEAD	I	T	C		4	8.0	2.25	400	11.93	50.0
47-013	TADPOLE MADTOM	I		C		1	2.0	0.56	28	0.84	14.0
77-006	LARGEMOUTH BASS	C		C	F	14	28.0	7.87	56	1.67	2.0
77-008	GREEN SUNFISH	I	T	C	S	33	66.0	18.54	840	25.06	12.7
77-009	BLUEGILL SUNFISH	I	P	C	S	15	30.0	8.43	64	1.91	2.1
77-012	REDEAR SUNFISH	I		C	E	1	2.0	0.56	22	0.66	11.0
77-015	GREEN SF X BLUEGILL SF					2	4.0	1.12	40	1.19	10.0

No Species: 10 **Nat. Species:** 9 **Hybrids:** 1 **Total Counted:** 178 **Total Rel. Wt. :** 3352

IBI: 24.0 **MIwb:** N/A

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

Site ID: LD37 River: 95-668 Lily Cashe Creek, trib to DuPage River RM: 14.70 Date: 08/16/2018

Time Fished: 920 Distance: 0.150 Drainge (sq mi): 4.3 Depth: 0

Location: St. Rte 58 Lat: 41.69954 Long: -88.07083

Species Code:	Species Name:	Feed Guild	Toler-ance	Breed Guild	IBI Group	No. Fish	Rel. No.	% by No.	Rel. Wt.	% by Wt.	Av. Wt.
43-013	CREEK CHUB	G	T	N	N	40	80.0	37.74	2224	75.54	27.8
47-004	YELLOW BULLHEAD	I	T	C		2	4.0	1.89	36	1.22	9.0
77-006	LARGEMOUTH BASS	C		C	F	56	112.0	52.83	620	21.06	5.5
77-008	GREEN SUNFISH	I	T	C	S	1	2.0	0.94	4	0.14	2.0
77-009	BLUEGILL SUNFISH	I	P	C	S	7	14.0	6.60	60	2.04	4.2

No Species: 5 **Nat. Species:** 5 **Hybrids:** 0 **Total Counted:** 106 **Total Rel. Wt. :** 2944

IBI: 26.0 **MIwb:** N/A

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

Site ID: LD18 River: 95-668 Lily Cashe Creek, trib to DuPage River RM: 11.20 Date: 10/01/2018

Time Fished: 751 Distance: 0.150 Drainge (sq mi): 11.1 Depth: 0

Location: adj. Lily Cashe Sports Complex Lat: 41.67981 Long: -88.13091

Species Code:	Species Name:	Feed Guild	Toler-ance	Breed Guild	IBI Group	No. Fish	Rel. No.	% by No.	Rel. Wt.	% by Wt.	Av. Wt.
40-016	WHITE SUCKER	O	T	S	W	8	16.0	5.37	400	4.05	25.0
43-001	COMMON CARP	O	T	M	G	14	28.0	9.40	4920	49.77	175.7
43-013	CREEK CHUB	G	T	N	N	1	2.0	0.67	140	1.42	70.0
43-043	BLUNTNOSE MINNOW	O	T	C	N	12	24.0	8.05	30	0.30	1.2
47-004	YELLOW BULLHEAD	I	T	C		2	4.0	1.34	20	0.20	5.0
54-002	BLACKSTRIPE TOPMINNOW	I		M		31	62.0	20.81	60	0.61	0.9
77-006	LARGEMOUTH BASS	C		C	F	21	42.0	14.09	1920	19.42	45.7
77-008	GREEN SUNFISH	I	T	C	S	20	40.0	13.42	500	5.06	12.5
77-009	BLUEGILL SUNFISH	I	P	C	S	32	64.0	21.48	1880	19.02	29.3
80-014	JOHNNY DARTER	I		C	D	3	6.0	2.01	6	0.06	1.0
80-021	IOWA DARTER	I		M	D	5	10.0	3.36	10	0.10	1.0

No Species: 11 **Nat. Species:** 10 **Hybrids:** 0 **Total Counted:** 149 **Total Rel. Wt. :** 9886

IBI: 32.0 **MIwb:** N/A

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

Site ID: LD15 River: 95-668 Lily Cashe Creek, trib to DuPage River RM: 6.50 Date: 08/17/2018

Time Fished: 1190 Distance: 0.200 Drainge (sq mi): 21.4 Depth: 0

Location: dst. Main St. Lat: 41.63169 Long: -88.16685

Species Code:	Species Name:	Feed Guild	Toler-ance	Breed Guild	IBI Group	No. Fish	Rel. No.	% by No.	Rel. Wt.	% by Wt.	Av. Wt.
40-016	WHITE SUCKER	O	T	S	W	2	3.0	0.66	15	0.40	5.0
43-013	CREEK CHUB	G	T	N	N	35	52.5	11.55	1015	26.87	19.3
43-032	SPOTFIN SHINER	I		M	N	6	9.0	1.98	45	1.19	5.0
43-034	SAND SHINER	I	M	M	N	134	201.0	44.22	195	5.16	0.9
43-043	BLUNTNOSE MINNOW	O	T	C	N	82	123.0	27.06	247	6.55	2.0
43-044	CENTRAL STONEROLLER	H		N	N	4	6.0	1.32	15	0.40	2.5
47-004	YELLOW BULLHEAD	I	T	C		5	7.5	1.65	90	2.38	12.0
47-008	STONECAT MADTOM	I	I	C		1	1.5	0.33	3	0.08	2.0
54-002	BLACKSTRIPE TOPMINNOW	I		M		4	6.0	1.32	6	0.16	1.0
77-004	SMALLMOUTH BASS	C	M	C	F	7	10.5	2.31	787	20.83	75.0
77-006	LARGEMOUTH BASS	C		C	F	13	19.5	4.29	1035	27.38	53.0
77-008	GREEN SUNFISH	I	T	C	S	1	1.5	0.33	22	0.60	15.0
77-009	BLUEGILL SUNFISH	I	P	C	S	7	10.5	2.31	300	7.94	28.5
80-014	JOHNNY DARTER	I		C	D	1	1.5	0.33	1	0.04	1.0
80-021	IOWA DARTER	I		M	D	1	1.5	0.33	1	0.04	1.0

No Species: 15 **Nat. Species:** 15 **Hybrids:** 0 **Total Counted:** 303 **Total Rel. Wt. :** 3780

IBI: 36.0 **MIwb:** 6.7

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

Site ID: LD15 River: 95-668 Lily Cashe Creek, trib to DuPage River RM: 6.50 Date: 09/30/2018

Time Fished: 514 Distance: 0.200 Drainge (sq mi): 21.4 Depth: 0

Location: dst. Main St. Lat: 41.63169 Long: -88.16685

Species Code:	Species Name:	Feed Guild	Toler-ance	Breed Guild	IBI Group	No. Fish	Rel. No.	% by No.	Rel. Wt.	% by Wt.	Av. Wt.
43-013	CREEK CHUB	G	T	N	N	31	46.5	6.16	1425	40.88	30.6
43-032	SPOTFIN SHINER	I		M	N	28	42.0	5.57	60	1.72	1.4
43-034	SAND SHINER	I	M	M	N	203	304.5	40.36	660	18.93	2.1
43-043	BLUNTNOSE MINNOW	O	T	C	N	180	270.0	35.79	675	19.36	2.5
43-044	CENTRAL STONEROLLER	H		N	N	21	31.5	4.17	108	3.10	3.4
47-002	CHANNEL CATFISH			C	F	5	7.5	0.99	22	0.65	3.0
47-004	YELLOW BULLHEAD	I	T	C		4	6.0	0.80	94	2.71	15.7
47-008	STONECAT MADTOM	I	I	C		2	3.0	0.40	7	0.22	2.5
54-002	BLACKSTRIPE TOPMINNOW	I		M		6	9.0	1.19	9	0.26	1.0
57-001	WESTERN MOSQUITOFISH	I		N	E	2	3.0	0.40	3	0.09	1.0
77-004	SMALLMOUTH BASS	C	M	C	F	11	16.5	2.19	255	7.31	15.4
77-006	LARGEMOUTH BASS	C		C	F	7	10.5	1.39	150	4.30	14.2
77-008	GREEN SUNFISH	I	T	C	S	2	3.0	0.40	15	0.43	5.0
80-014	JOHNNY DARTER	I		C	D	1	1.5	0.20	1	0.04	1.0

No Species: 14 **Nat. Species:** 13 **Hybrids:** 0 **Total Counted:** 503 **Total Rel. Wt. :** 3486

IBI: 26.0 **MIwb:** 6.4

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

Site ID: LD20 River: 95-668 Lily Cashe Creek, trib to DuPage River RM: 0.36 Date: 08/16/2018

Time Fished: 1779 Distance: 0.500 Drainge (sq mi): 46.0 Depth: 0

Location: ust. confluence with the DuPage River Lat: 41.56903 Long: -88.18694

Species Code:	Species Name:	Feed Guild	Toler-ance	Breed Guild	IBI Group	No. Fish	Rel. No.	% by No.	Rel. Wt.	% by Wt.	Av. Wt.
20-003	GIZZARD SHAD	O		M		5	10.0	5.68	1160	5.12	116.0
37-001	REDFIN PICKEREL	P	P	M		8	16.0	9.09	440	1.94	27.5
40-005	QUILLBACK CARPSUCKER	O		M	C	1	2.0	1.14	800	3.53	400.0
40-016	WHITE SUCKER	O	T	S	W	10	20.0	11.36	6420	28.31	321.0
43-001	COMMON CARP	O	T	M	G	3	6.0	3.41	10080	44.46	1680.0
47-002	CHANNEL CATFISH			C	F	3	6.0	3.41	6	0.03	1.0
47-004	YELLOW BULLHEAD	I	T	C		2	4.0	2.27	600	2.65	150.0
47-013	TADPOLE MADTOM	I		C		2	4.0	2.27	20	0.09	5.0
54-002	BLACKSTRIPE TOPMINNOW	I		M		3	6.0	3.41	6	0.03	1.0
74-006	YELLOW BASS	P	P	M		1	2.0	1.14	20	0.09	10.0
77-006	LARGEMOUTH BASS	C		C	F	13	26.0	14.77	1000	4.41	38.4
77-008	GREEN SUNFISH	I	T	C	S	10	20.0	11.36	400	1.76	20.0
77-009	BLUEGILL SUNFISH	I	P	C	S	16	32.0	18.18	1220	5.38	38.1
77-010	ORANGESPOTTED SUNFISH	I		C	S	1	2.0	1.14	20	0.09	10.0
80-003	YELLOW PERCH			M		2	4.0	2.27	180	0.79	45.0
80-014	JOHNNY DARTER	I		C	D	1	2.0	1.14	2	0.01	1.0
87-001	ROUND GOBY				E	7	14.0	7.95	300	1.32	21.4

No Species: 17 **Nat. Species:** 15 **Hybrids:** 0 **Total Counted:** 88 **Total Rel. Wt. :** 22674

IBI: 26.0 **MIwb:** 7.3

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

Site ID: LD20 River: 95-668 Lily Cashe Creek, trib to DuPage River RM: 0.36 Date: 09/25/2018

Time Fished: 1513 Distance: 0.500 Drainge (sq mi): 46.0 Depth: 0

Location: ust. confluence with the DuPage River Lat: 41.56903 Long: -88.18694

Species Code:	Species Name:	Feed Guild	Toler-ance	Breed Guild	IBI Group	No. Fish	Rel. No.	% by No.	Rel. Wt.	% by Wt.	Av. Wt.
37-001	REDFIN PICKEREL	P	P	M		2	4.0	1.46	100	0.49	25.0
40-015	NORTHERN HOG SUCKER	I	M	S	R	1	2.0	0.73	450	2.21	225.0
43-001	COMMON CARP	O	T	M	G	2	4.0	1.46	13804	67.76	3451.0
43-043	BLUNTNOSE MINNOW	O	T	C	N	2	4.0	1.46	8	0.04	2.0
47-004	YELLOW BULLHEAD	I	T	C		2	4.0	1.46	240	1.18	60.0
47-006	BLACK BULLHEAD	I	P	C		1	2.0	0.73	360	1.77	180.0
47-013	TADPOLE MADTOM	I		C		3	6.0	2.19	14	0.07	2.3
54-002	BLACKSTRIPE TOPMINNOW	I		M		8	16.0	5.84	30	0.15	1.8
74-006	YELLOW BASS	P	P	M		3	6.0	2.19	100	0.49	16.6
77-003	ROCK BASS	C		C	S	2	4.0	1.46	120	0.59	30.0
77-004	SMALLMOUTH BASS	C	M	C	F	7	14.0	5.11	1510	7.41	107.8
77-006	LARGEMOUTH BASS	C		C	F	35	70.0	25.55	760	3.73	10.8
77-008	GREEN SUNFISH	I	T	C	S	19	38.0	13.87	840	4.12	22.1
77-009	BLUEGILL SUNFISH	I	P	C	S	35	70.0	25.55	980	4.81	14.0
77-010	ORANGESPOTTED SUNFISH	I		C	S	4	8.0	2.92	80	0.39	10.0
77-012	REDEAR SUNFISH	I		C	E	5	10.0	3.65	570	2.80	57.0
78-001	ORIENTAL WEATHERFISH	I		C	E	2	4.0	1.46	42	0.21	10.5
80-003	YELLOW PERCH			M		1	2.0	0.73	80	0.39	40.0
80-014	JOHNNY DARTER	I		C	D	2	4.0	1.46	4	0.02	1.0
87-001	ROUND GOBY				E	1	2.0	0.73	280	1.37	140.0

No Species: 20 **Nat. Species:** 16 **Hybrids:** 0 **Total Counted:** 137 **Total Rel. Wt. :** 20372

IBI: 36.0 **MIwb:** 7.1

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

Site ID: LD40 River: 95-672 Trib #3 RM: 0.80 Date: 08/14/2018

Time Fished: 255 Distance: 0.150 Drainge (sq mi): 3.5 Depth: 0

Location: Ust. Caton Farms Rd. Lat: 41.56349 Long: -88.17289

Species Code:	Species Name:	Feed Guild	Toler-ance	Breed Guild	IBI Group	No. Fish	Rel. No.	% by No.	Rel. Wt.	% by Wt.	Av. Wt.
47-004	YELLOW BULLHEAD	I	T	C		2	4.0	16.67	10	20.00	2.5
77-006	LARGEMOUTH BASS	C		C	F	10	20.0	83.33	40	80.00	2.0

No Species: 2 **Nat. Species:** 2 **Hybrids:** 0 **Total Counted:** 12 **Total Rel. Wt. :** 50

IBI: 12.0 **MIwb:** N/A

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

Site ID: LD38 River: 95-673 LC Trib #1 RM: 0.84 Date: 09/30/2018

Time Fished: 1059 Distance: 0.150 Drainge (sq mi): 5.3 Depth: 0

Location: Dst. 135th St. Lat: 41.63757 Long: -88.15174

Species Code:	Species Name:	Feed Guild	Toler-ance	Breed Guild	IBI Group	No. Fish	Rel. No.	% by No.	Rel. Wt.	% by Wt.	Av. Wt.
40-016	WHITE SUCKER	O	T	S	W	3	6.0	0.49	60	5.67	10.0
43-001	COMMON CARP	O	T	M	G	8	16.0	1.31	340	32.14	21.2
43-043	BLUNTNOSE MINNOW	O	T	C	N	1	2.0	0.16	6	0.57	3.0
43-044	CENTRAL STONEROLLER	H		N	N	6	12.0	0.98	60	5.67	5.0
54-002	BLACKSTRIPE TOPMINNOW	I		M		41	82.0	6.69	80	7.56	0.9
57-001	WESTERN MOSQUITOFISH	I		N	E	547	1094.0	89.23	450	42.53	0.4
77-006	LARGEMOUTH BASS	C		C	F	1	2.0	0.16	20	1.89	10.0
77-008	GREEN SUNFISH	I	T	C	S	3	6.0	0.49	20	1.89	3.3
77-009	BLUEGILL SUNFISH	I	P	C	S	1	2.0	0.16	2	0.19	1.0
78-001	ORIENTAL WEATHERFISH	I		C	E	2	4.0	0.33	20	1.89	5.0

No Species: 10 **Nat. Species:** 7 **Hybrids:** 0 **Total Counted:** 613 **Total Rel. Wt. :** 1058

IBI: 38.0 **MIwb:** N/A

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

Site ID: LD35 River: 95-674 Trib #7 RM: 0.16 Date: 08/15/2018

Time Fished: 0 Distance: 0.150 Drainge (sq mi): 3.3 Depth: 0

Location: ust. Clearwater Lane Lat: 41.69127 Long: -88.17177

Species Code:	Species Name:	Feed Guild	Toler-ance	Breed Guild	IBI Group	No. Fish	Rel. No.	% by No.	Rel. Wt.	% by Wt.	Av. Wt.
99-997	Dry Site					0	0.0	***.**	0	0.00	*****.*

No Species: 1 **Nat. Species:** 1 **Hybrids:** 0 **Total Counted:** 0 **Total Rel. Wt. :** 0

IBI: 12.0 **MIwb:** N/A

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

Site ID: LD34 River: 95-675 Trib #6 RM: 1.00 Date: 08/15/2018

Time Fished: 355 Distance: 0.150 Drainge (sq mi): 4.7 Depth: 0

Location: Ust. Pradel Rd. Lat: 41.68613 Long: -88.19272

Species Code:	Species Name:	Feed Guild	Toler-ance	Breed Guild	IBI Group	No. Fish	Rel. No.	% by No.	Rel. Wt.	% by Wt.	Av. Wt.
43-043	BLUNTNOSE MINNOW	O	T	C	N	7	14.0	9.09	16	5.03	1.1
47-004	YELLOW BULLHEAD	I	T	C		11	22.0	14.29	44	13.84	2.0
47-013	TADPOLE MADTOM	I		C		3	6.0	3.90	20	6.29	3.3
54-002	BLACKSTRIPE TOPMINNOW	I		M		17	34.0	22.08	40	12.58	1.1
77-006	LARGEMOUTH BASS	C		C	F	31	62.0	40.26	180	56.60	2.9
80-014	JOHNNY DARTER	I		C	D	8	16.0	10.39	18	5.66	1.1

No Species: 6 **Nat. Species:** 6 **Hybrids:** 0 **Total Counted:** 77 **Total Rel. Wt. :** 318

IBI: 36.0 **MIwb:** N/A

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

Site ID: LD33 River: 95-676 Wolf Creek RM: 0.14 Date: 08/15/2018

Time Fished: 0 Distance: 0.150 Drainge (sq mi): 6.0 Depth: 0

Location: Book Rd. Lat: 41.66394 Long: -88.18475

Species Code:	Species Name:	Feed Guild	Toler-ance	Breed Guild	IBI Group	No. Fish	Rel. No.	% by No.	Rel. Wt.	% by Wt.	Av. Wt.
99-997	Dry Site					0	0.0	***.**	0	0.00	*****.*

No Species: 1 **Nat. Species:** 1 **Hybrids:** 0 **Total Counted:** 0 **Total Rel. Wt. :** 0

IBI: 12.0 **Mlwb:** N/A

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

Site ID: LD32 River: 95-677 East Norman Drain (Trib #5) RM: 0.90 Date: 08/15/2018

Time Fished: 376 Distance: 0.150 Drainge (sq mi): 2.8 Depth: 0

Location: dst. 135th St. Lat: 41.63582 Long: -88.19584

Species Code:	Species Name:	Feed Guild	Toler-ance	Breed Guild	IBI Group	No. Fish	Rel. No.	% by No.	Rel. Wt.	% by Wt.	Av. Wt.
40-016	WHITE SUCKER	O	T	S	W	5	10.0	8.47	84	11.54	8.4
43-001	COMMON CARP	O	T	M	G	1	2.0	1.69	120	16.48	60.0
43-013	CREEK CHUB	G	T	N	N	4	8.0	6.78	74	10.16	9.2
47-004	YELLOW BULLHEAD	I	T	C		1	2.0	1.69	4	0.55	2.0
47-013	TADPOLE MADTOM	I		C		2	4.0	3.39	16	2.20	4.0
77-006	LARGEMOUTH BASS	C		C	F	10	20.0	16.95	50	6.87	2.5
77-008	GREEN SUNFISH	I	T	C	S	13	26.0	22.03	220	30.22	8.4
77-009	BLUEGILL SUNFISH	I	P	C	S	23	46.0	38.98	160	21.98	3.4

No Species: 8 **Nat. Species:** 7 **Hybrids:** 0 **Total Counted:** 59 **Total Rel. Wt. :** 728

IBI: 34.0 **MIwb:** N/A

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

Site ID: LD29 River: 95-678 Trib #4 RM: 0.60 Date: 08/14/2018

Time Fished: 425 Distance: 0.150 Drainge (sq mi): 2.3 Depth: 0

Location: ust. Drauden Rd. Lat: 41.57804 Long: -88.23008

Species Code:	Species Name:	Feed Guild	Toler-ance	Breed Guild	IBI Group	No. Fish	Rel. No.	% by No.	Rel. Wt.	% by Wt.	Av. Wt.
40-016	WHITE SUCKER	O	T	S	W	38	76.0	18.10	430	21.52	5.6
43-003	GOLDEN SHINER	I	T	M	N	1	2.0	0.48	4	0.20	2.0
43-013	CREEK CHUB	G	T	N	N	5	10.0	2.38	230	11.51	23.0
43-042	FATHEAD MINNOW	O	T	C	N	1	2.0	0.48	6	0.30	3.0
43-043	BLUNTNOSE MINNOW	O	T	C	N	2	4.0	0.95	22	1.10	5.5
43-044	CENTRAL STONEROLLER	H		N	N	2	4.0	0.95	30	1.50	7.5
47-004	YELLOW BULLHEAD	I	T	C		10	20.0	4.76	20	1.00	1.0
77-006	LARGEMOUTH BASS	C		C	F	91	182.0	43.33	496	24.82	2.7
77-008	GREEN SUNFISH	I	T	C	S	8	16.0	3.81	102	5.11	6.3
77-009	BLUEGILL SUNFISH	I	P	C	S	48	96.0	22.86	650	32.53	6.7
80-021	IOWA DARTER	I		M	D	4	8.0	1.90	8	0.40	1.0

No Species: 11 **Nat. Species:** 11 **Hybrids:** 0 **Total Counted:** 210 **Total Rel. Wt. :** 1998

IBI: 42.0 **MIwb:** N/A

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

Site ID: LD27 River: 95-679 Trib #1 RM: 0.15 Date: 08/14/2018

Time Fished: 0 Distance: 0.150 Drainge (sq mi): 2.8 Depth: 0

Location: W. Canal St. Lat: 41.46286 Long: -88.21849

Species Code:	Species Name:	Feed Guild	Toler-ance	Breed Guild	IBI Group	No. Fish	Rel. No.	% by No.	Rel. Wt.	% by Wt.	Av. Wt.
99-997	Dry Site					0	0.0	***.**	0	0.00	*****.*

No Species: 1 **Nat. Species:** 1 **Hybrids:** 0 **Total Counted:** 0 **Total Rel. Wt. :** 0

IBI: 12.0 **Mlwb:** N/A

APPENDIX C

Lower DuPage River 2018 Macroinvertebrate Assemblage Data

C-1: Macroinvertebrate IBI Metrics and Scores
C-2: Macroinvertebrate Taxa by Site and Sample
C-3. Grand Totals for Macroinvertebrates from All Sites

Appendix Table C-1. Illinois Macroinvertebrate IBI metrics and values from the lower DuPage River study area in 2020.

River Mile	Site ID	Sample Date	Drainage Area (sq mi)	Sub-samp	Number of: Total Taxa	Number of: Coleoptera Taxa	Number of: Mayfly Taxa	Number of: Intolerant Taxa	MBI	Percent: Percent Scrapers	Percent: Percent EPT	MIBI
West Norman Drain (Trib to DuPage R. at RM 20.2) (95-661)												
Year: 2018												
5.10	LD31	07/29/2018	2.41		27(59.0)	1(20.0)	3(29.4)	5(55.6)	5.4(91.8)	16.7(56.5)	11.0(14.9)	46.7
2.20	LD26	07/28/2018	6.18		31(67.0)	3(60.0)	4(39.2)	4(44.4)	5.5(90.2)	29.9(100)	26.6(36.0)	62.4
Mink Creek (Trib to Lily Cache Creek at RM 1.9) (95-662)												
Year: 2018												
3.20	LD39	07/27/2018	4.13		22(48.0)	1(20.0)	3(29.4)	0(0.0)	6.3(77.1)	0.3(1.1)	17.4(23.6)	28.5
1.80	LD23	07/27/2018	8.83		35(76.0)	1(20.0)	4(39.2)	5(55.6)	5.6(88.5)	4.1(13.9)	27.4(37.0)	47.2
Spring Creek (Trib to DuPage R. at RM 17.8) (95-663)												
Year: 2018												
1.47	LD30	07/28/2018	3.39		28(61.0)	2(40.0)	2(19.6)	0(0.0)	6.7(70.5)	15.4(52.0)	7.1(9.6)	36.1
0.50	LD21	07/27/2018	5.30		35(76.0)	3(60.0)	3(29.4)	3(33.3)	6.0(82.0)	20.2(68.2)	23.4(31.7)	54.4
Springbrook Creek (Trib to DuPage R. at RM 27.1) (95-664)												
Year: 2018												
4.80	LD24	07/31/2018	8.91		21(46.0)	3(60.0)	3(29.4)	3(33.3)	5.2(95.1)	4.4(14.8)	35.5(47.9)	46.7
1.40	LD19	07/31/2018	12.30		29(63.0)	0(0.0)	4(39.2)	1(11.1)	4.5(100)	0.6(2.0)	0.8(1.1)	30.9
Rock Run Creek (Trib to IL-MI Canal at RM 9.0) (95-665)												
Year: 2018												
7.90	LD41	07/26/2018	5.00		29(63.0)	1(20.0)	2(19.6)	2(22.2)	6.1(80.3)	28.6(96.5)	3.1(4.2)	43.7
6.50	LD04	07/26/2018	4.95		19(41.0)	0(0.0)	2(19.6)	1(11.1)	6.0(82.0)	3.0(10.1)	16.2(21.9)	26.5
5.70	LD22	07/26/2018	5.50		18(39.0)	0(0.0)	1(9.8)	0(0.0)	4.6(100)	0.9(3.1)	3.7(5.0)	22.4
3.50	LD17	07/25/2018	10.60		23(50.0)	1(20.0)	2(19.6)	2(22.2)	6.1(80.3)	2.7(9.0)	2.0(2.7)	29.1

Appendix Table C-1. Illinois Macroinvertebrate IBI metrics and values from the lower DuPage River study area in 2020.

River Mile	Site ID	Sample Date	Drainage Area (sq mi)	Sub-samp	Number of				MBI	Percent:		MIBI
					Total Taxa	Coleoptera Taxa	Mayfly Taxa	Intolerant Taxa		Percent Scrapers	Percent EPT	
DuPage River (95-666)												
Year: 2018												
26.60	LD14	07/31/2018	204.00		27(59.0)	2(40.0)	2(19.6)	3(33.3)	5.0(98.4)	7.3(24.7)	56.7(76.6)	50.2
25.20	LD25	07/27/2018	218.00		30(65.0)	2(40.0)	2(19.6)	5(55.6)	5.3(93.4)	1.9(6.5)	50.5(68.2)	49.8
23.10	LD13	07/27/2018	229.00		22(48.0)	1(20.0)	2(19.6)	3(33.3)	4.9(100)	0.6(2.1)	66.7(90.1)	44.7
22.00	LD12	07/27/2018	236.00		25(54.0)	1(20.0)	4(39.2)	4(44.4)	4.9(100)	1.0(3.2)	57.1(77.2)	48.3
20.80	LD11	07/28/2018	236.00		28(61.0)	2(40.0)	4(39.2)	3(33.3)	5.1(96.7)	2.8(9.5)	34.3(46.3)	46.6
18.50	LD10	07/28/2018	249.00		23(50.0)	1(20.0)	4(39.2)	3(33.3)	5.0(98.4)	3.5(11.7)	71.9(97.2)	50.0
17.00	LD09	07/27/2018	250.00		21(46.0)	0(0.0)	4(39.2)	4(44.4)	4.8(100)	9.2(31.1)	62.5(84.5)	49.3
13.40	LD08	07/27/2018	314.00		27(59.0)	1(20.0)	8(78.4)	4(44.4)	5.4(91.8)	6.7(22.6)	51.2(69.1)	55.1
11.40	LD07	07/26/2018	321.00		25(54.0)	0(0.0)	6(58.8)	7(77.8)	4.8(100)	3.0(10.0)	61.4(82.9)	54.8
9.60	LD06	07/26/2018	328.00		30(65.0)	2(40.0)	7(68.6)	6(66.7)	5.3(93.4)	19.2(64.9)	41.4(55.9)	64.9
7.00	LD03	07/25/2018	333.00		22(48.0)	0(0.0)	5(49.0)	5(55.6)	5.3(93.4)	44.9(100)	29.7(40.1)	55.2
4.70	LD02	07/24/2018	335.00		22(48.0)	0(0.0)	5(49.0)	5(55.6)	4.8(100)	10.2(34.6)	64.4(87.0)	53.5
2.50	LD05	07/25/2018	346.00		34(74.0)	3(60.0)	8(78.4)	7(77.8)	6.0(82.0)	10.4(35.1)	31.8(43.0)	64.3
1.00	LD01	07/24/2018	376.00		26(57.0)	2(40.0)	6(58.8)	6(66.7)	4.8(100)	17.6(59.4)	76.2(100)	68.9
Hammel Creek (Trib to DuPage R. at RM 10.6) (95-667)												
Year: 2018												
1.19	LD28	07/26/2018	10.70		22(48.0)	2(40.0)	1(9.8)	2(22.2)	5.0(98.4)	6.4(21.8)	8.0(10.8)	35.9
Lily Cache Creek (Trib to DuPage R. at RM 14.4) (95-668)												
Year: 2018												
14.70	LD37	07/27/2018	4.33		25(54.0)	1(20.0)	1(9.8)	1(11.1)	6.5(73.8)	14.0(47.2)	0.3(0.4)	30.9
11.20	LD18	07/29/2018	11.10		18(39.0)	1(20.0)	2(19.6)	1(11.1)	5.4(91.8)	1.0(3.3)	1.3(1.7)	26.7
6.50	LD15	07/28/2018	21.40		32(70.0)	2(40.0)	5(49.0)	4(44.4)	5.3(93.4)	20.3(68.5)	40.2(54.3)	60.0

Appendix Table C-1. Illinois Macroinvertebrate IBI metrics and values from the lower DuPage River study area in 2020.

River Mile	Site ID	Sample Date	Drainage Area (sq mi)	Sub-samp	Number of				MBI	Percent:		MIBI
					Total Taxa	Coleoptera Taxa	Mayfly Taxa	Intolerant Taxa		Percent Scrapers	Percent EPT	
0.36	LD20	07/27/2018	46.00		29(63.0)	2(40.0)	4(39.2)	4(44.4)	7.7(54.1)	1.0(3.3)	8.8(11.9)	36.6
Trib #3 to DuPage R. at RM 13.9 (95-672)												
Year: 2018												
0.80	LD40	07/26/2018	3.53		29(63.0)	2(40.0)	1(9.8)	3(33.3)	6.6(72.1)	11.6(39.2)	2.3(3.1)	37.2
Trib #1 to Lily Chache Cr at RM 6.1 (95-673)												
Year: 2018												
0.84	LD38	07/28/2018	5.30		27(59.0)	0(0.0)	2(19.6)	0(0.0)	5.1(96.7)	4.7(15.9)	27.3(36.9)	32.6
Trib #6 to DuPage R. at RM 25.4 (95-675)												
Year: 2018												
1.00	LD34	07/29/2018	4.72		25(54.0)	2(40.0)	2(19.6)	1(11.1)	6.1(80.3)	7.7(26.2)	6.8(9.2)	34.3
Wolf Creek (Trib to DuPage at RM 23.7) (95-676)												
Year: 2018												
0.14	LD33	07/29/2018	6.00		31(67.0)	2(40.0)	3(29.4)	3(33.3)	6.0(82.0)	29.3(99.1)	22.8(30.9)	54.5
East Norman Drain Trib # 5 to Dupage R. at RM 20.5 (95-677)												
Year: 2018												
0.90	LD32	07/28/2018	2.83		29(63.0)	1(20.0)	3(29.4)	2(22.2)	5.8(85.3)	26.6(90.0)	6.2(8.4)	45.5
Trib #4 to DuPage R. at RM 16.4 (95-678)												
Year: 2018												
0.60	LD29	07/27/2018	2.36		26(57.0)	2(40.0)	2(19.6)	2(22.2)	5.6(88.5)	7.1(23.9)	3.4(4.6)	36.5
Trib #1 to DuPage R. at RM 4.9 (95-679)												
Year: 2018												
0.15	LD27	07/25/2018	2.80		24(52.0)	3(60.0)	3(29.4)	4(44.4)	5.8(85.3)	11.4(38.5)	6.8(9.2)	45.6

Appendix Table C-2. Macroinvertebrate taxa collected in the lower DuPage River study area during 2020.

Site: dst. 127th St.

Site ID: **LD31**

Subsample:

RM: 5.10

Collection Date 07/29/2018 River Code 95-661 River: West Norman Drain (Trib to DuPage R. at RM 20.2)

Taxa Code	Taxa	Taxa Grp	Tol.	Qt./Ql.
01801	Turbellaria		6.0	43
03600	Oligochaeta		10.0	17
04935	Erpobdella punctata punctata		8.0	1
05800	Caecidotea sp		6.0	15
06201	Hyalella azteca		4.0	6
08200	Orconectes sp		5.0	1
11020	Acerpenna pygmaea	MA	4.0	1
11120	Baetis flavistriga	MA	4.0	2
11200	Callibaetis sp	MA	4.0	1
21300	Hetaerina sp		3.0	1
22001	Coenagrionidae		5.5	12
53800	Hydroptila sp	CA	2.0	8
58505	Helicopsyche borealis	CA	2.0	15
68700	Dubiraphia sp	CO	5.0	5
68708	Dubiraphia vittata group	CO	5.0	20
77500	Conchapelopia sp		6.0	2
78600	Pentaneura inconspicua		3.0	1
78655	Procladius (Holotanypus) sp		8.0	2
80420	Cricotopus (C.) bicinctus		8.0	1
84155	Paralauterborniella nigrohalteralis		6.0	1
84210	Paratendipes albimanus or P. duplicatus		3.0	1
84470	Polypedilum (P.) illinoense		6.0	2
84750	Stictochironomus sp		5.0	1
85500	Paratanytarsus sp		6.0	2
85625	Rheotanytarsus sp		6.0	1
93200	Hydrobiidae		6.0	17
96900	Ferrissia sp		7.0	1
98001	Pisidiidae		5.0	64
98200	Pisidium sp		5.0	1

Taxa Code	Taxa	Feed Grp	Tol.	Qt./Ql.

No. Quantitative Taxa: 29 Total Taxa: 29

Number of Organisms: 245 mIBI: 46.74

Appendix Table C-2. Macroinvertebrate taxa collected in the lower DuPage River study area during 2020.

Site: Ust. US 30

Site ID: **LD26**

Subsample:

RM: 2.20

Collection Date 07/28/2018 River Code 95-661 River: West Norman Drain (Trib to DuPage R. at RM 20.2)

Taxa Code	Taxa	Taxa Grp	Tol.	Qt./Ql.
01801	Turbellaria		6.0	30
03600	Oligochaeta		10.0	10
04960	Erpobdella sp (= Mooreobdella)		8.0	1
05800	Caecidotea sp		6.0	1
06201	Hyalella azteca		4.0	13
11120	Baetis flavistriga	MA	4.0	35
11130	Baetis intercalaris	MA	4.0	3
13400	Stenacron sp	MA	4.0	5
16700	Tricorythodes sp	MA	5.0	1
17200	Caenis sp	MA	6.0	23
21300	Hetaerina sp		3.0	4
22001	Coenagrionidae		5.5	9
53800	Hydroptila sp	CA	2.0	3
58505	Helicopsyche borealis	CA	2.0	11
59500	Oecetis sp	CA	5.0	1
68700	Dubiraphia sp	CO	5.0	5
68708	Dubiraphia vittata group	CO	5.0	34
69200	Optioservus sp	CO	4.0	1
69400	Stenelmis sp	CO	7.0	23
74100	Simulium sp		6.0	2
77120	Ablabesmyia mallochi		6.0	1
77500	Conchapelopia sp		6.0	2
78600	Pentaneura inconspicua		3.0	5
82730	Chironomus (C.) decorus group		11.0	1
82820	Cryptochironomus sp		8.0	1
83040	Dicrotendipes neomodestus		6.0	1
84450	Polypedilum (Uresipedilum) flavum		6.0	2
84470	Polypedilum (P.) illinoense		6.0	3
84540	Polypedilum (Tripodura) scalaenum group		6.0	1
84750	Stictochironomus sp		5.0	1
85500	Paratanytarsus sp		6.0	1
85625	Rheotanytarsus sp		6.0	4
93200	Hydrobiidae		6.0	40
95100	Physella sp		9.0	9
98200	Pisidium sp		5.0	11
98600	Sphaerium sp		5.0	10

Taxa Code	Taxa	Feed Grp	Tol.	Qt./Ql.

No. Quantitative Taxa: 36 Total Taxa: 36

Number of Organisms: 308 mIBI: 62.40

Appendix Table C-2. Macroinvertebrate taxa collected in the lower DuPage River study area during 2020.

Site: Dst. Airport

Site ID: **LD39**

Subsample:

RM: 3.20

Collection Date 07/27/2018 River Code 95-662 River: Mink Creek (Trib to Lily Cache Creek at RM 1.9)

Taxa Code	Taxa	Taxa Grp	Tol.	Qt./Ql.
01801	Turbellaria		6.0	1
03600	Oligochaeta		10.0	69
06201	Hyalella azteca		4.0	93
11200	Callibaetis sp	MA	4.0	5
16700	Tricorythodes sp	MA	5.0	1
17200	Caenis sp	MA	6.0	46
22001	Coenagrionidae		5.5	22
52200	Cheumatopsyche sp	CA	6.0	1
60900	Peltodytes sp	CO	99.9	1
65010	Hydrocanthus sp		0.0	1
68201	Scirtidae		7.0	1
68708	Dubiraphia vittata group	CO	5.0	1
77140	Ablabesmyia peleensis		6.0	7
78130	Labrundinia neopilosella		4.0	8
78200	Larsia sp		6.0	4
78655	Procladius (Holotanypus) sp		8.0	6
79000	Tanypus sp		8.0	14
80420	Cricotopus (C.) bicinctus		8.0	2
81231	Nanocladius (N.) crassicornus or N. (N.) "rectinervis"		3.0	2
82800	Cladopelma sp		6.0	2
83002	Dicrotendipes modestus		6.0	3
83040	Dicrotendipes neomodestus		6.0	1
83051	Dicrotendipes simpsoni		6.0	1
83158	Endochironomus nigricans		6.0	8
84470	Polypedilum (P.) illinoense		6.0	6
85800	Tanytarsus sp		7.0	1

Taxa Code	Taxa	Feed Grp	Tol.	Qt./Ql.

No. Quantitative Taxa: 26 Total Taxa: 26

Number of Organisms: 307 mIBI: 28.45

Appendix Table C-2. Macroinvertebrate taxa collected in the lower DuPage River study area during 2020.

Site: dst. Old Renwick Rd.

Site ID: **LD23**

Subsample:

RM: 1.80

Collection Date 07/27/2018 River Code 95-662 River: Mink Creek (Trib to Lily Cache Creek at RM 1.9)

Taxa Code	Taxa	Taxa Grp	Tol.	Qt./Ql.
01801	Turbellaria		6.0	6
03600	Oligochaeta		10.0	14
04664	Helobdella stagnalis		8.0	1
04960	Erpobdella sp (= Mooreobdella)		8.0	2
05800	Caecidotea sp		6.0	3
06201	Hyalella azteca		4.0	45
11120	Baetis flavistriga	MA	4.0	19
11130	Baetis intercalaris	MA	4.0	11
11200	Callibaetis sp	MA	4.0	1
13400	Stenacron sp	MA	4.0	7
17200	Caenis sp	MA	6.0	48
22001	Coenagrionidae		5.5	12
52200	Cheumatopsyche sp	CA	6.0	2
53800	Hydroptila sp	CA	2.0	2
58505	Helicopsyche borealis	CA	2.0	1
59500	Oecetis sp	CA	5.0	2
68700	Dubiraphia sp	CO	5.0	2
74100	Simulium sp		6.0	8
77150	Ablabesmyia simpsoni		0.0	1
77500	Conchapelopia sp		6.0	8
78600	Pentaneura inconspicua		3.0	18
78655	Procladius (Holotanypus) sp		8.0	1
80410	Cricotopus (C.) sp		8.0	2
80420	Cricotopus (C.) bicinctus		8.0	23
81231	Nanocladius (N.) crassicornus or N. (N.) "rectinervis"		3.0	1
81825	Rheocricotopus (Psilocricotopus) robacki		6.0	1
82100	Thienemanniella sp		2.0	3
82141	Thienemanniella xena		2.0	2
82820	Cryptochironomus sp		8.0	2
82880	Cryptotendipes sp		6.0	2
84155	Paralauterborniella nigrohalteralis		6.0	1
84450	Polypedilum (Uresipedilum) flavum		6.0	2
84470	Polypedilum (P.) illinoense		6.0	21
85500	Paratanytarsus sp		6.0	21
85625	Rheotanytarsus sp		6.0	35
85800	Tanytarsus sp		7.0	2
85814	Tanytarsus glabrescens group		7.0	1
93200	Hydrobiidae		6.0	2
95100	Physella sp		9.0	2

Taxa Code	Taxa	Feed Grp	Tol.	Qt./Ql.
97601	Corbicula fluminea		4.0	2
98600	Sphaerium sp		5.0	1

No. Quantitative Taxa: 41 Total Taxa: 41

Number of Organisms: 340 mIBI: 47.17

Appendix Table C-2. Macroinvertebrate taxa collected in the lower DuPage River study area during 2020.

Site: ust. Drauden Rd.

Site ID: **LD30**

Subsample:

RM: 1.47

Collection Date 07/28/2018 River Code 95-663 River: Spring Creek (Trib to DuPage R. at RM 17.8)

Taxa Code	Taxa	Taxa Grp	Tol.	Qt./Ql.
03600	Oligochaeta		10.0	37
04664	Helobdella stagnalis		8.0	1
04935	Erpobdella punctata punctata		8.0	1
05800	Caecidotea sp		6.0	54
06201	Hyalella azteca		4.0	23
11200	Callibaetis sp	MA	4.0	22
17200	Caenis sp	MA	6.0	1
22001	Coenagrionidae		5.5	34
23600	Aeshna sp		4.0	1
52200	Cheumatopsyche sp	CA	6.0	1
68700	Dubiraphia sp	CO	5.0	5
68707	Dubiraphia quadrinotata	CO	5.0	7
68708	Dubiraphia vittata group	CO	5.0	4
69400	Stenelmis sp	CO	7.0	2
72700	Anopheles sp		6.0	2
77500	Conchapelopia sp		6.0	10
78140	Labrundinia pilosella		4.0	1
78500	Paramerina fragilis		6.0	1
78655	Procladius (Holotanypus) sp		8.0	7
80420	Cricotopus (C.) bicinctus		8.0	7
80510	Cricotopus (Isocladius) sylvestris group		8.0	5
82730	Chironomus (C.) decorus group		11.0	4
82820	Cryptochironomus sp		8.0	2
83040	Dicrotendipes neomodestus		6.0	1
84470	Polypedilum (P.) illinoense		6.0	15
84540	Polypedilum (Tripodura) scalaenum group		6.0	1
84750	Stictochironomus sp		5.0	11
85500	Paratanytarsus sp		6.0	23
85625	Rheotanytarsus sp		6.0	2
86100	Chrysops sp		7.0	1
95100	Physella sp		9.0	48
96900	Ferrissia sp		7.0	2
98200	Pisidium sp		5.0	2

Taxa Code	Taxa	Feed Grp	Tol.	Qt./Ql.

No. Quantitative Taxa: 33 Total Taxa: 33

Number of Organisms: 338 mIBI: 36.09

Appendix Table C-2. Macroinvertebrate taxa collected in the lower DuPage River study area during 2020.

Site: dst. footbridge in Mathes Woods

Site ID: **LD21**

Subsample:

RM: 0.50

Collection Date 07/27/2018 River Code 95-663 River: Spring Creek (Trib to DuPage R. at RM 17.8)

Taxa Code	Taxa	Taxa Grp	Tol.	Qt./Ql.
01801	Turbellaria		6.0	12
03600	Oligochaeta		10.0	40
04664	Helobdella stagnalis		8.0	1
04901	Erpobdellidae		8.0	2
05800	Caecidotea sp		6.0	22
06201	Hyalella azteca		4.0	21
11120	Baetis flavistriga	MA	4.0	19
11130	Baetis intercalaris	MA	4.0	9
11200	Callibaetis sp	MA	4.0	1
13400	Stenacron sp	MA	4.0	9
21300	Hetaerina sp		3.0	2
22001	Coenagrionidae		5.5	1
22300	Argia sp		5.0	1
52200	Cheumatopsyche sp	CA	6.0	34
58505	Helicopsyche borealis	CA	2.0	7
66200	Cymbiodyta sp		0.0	1
68201	Scirtidae		7.0	1
68700	Dubiraphia sp	CO	5.0	7
68707	Dubiraphia quadrinotata	CO	5.0	1
68708	Dubiraphia vittata group	CO	5.0	4
69200	Optioservus sp	CO	4.0	6
69400	Stenelmis sp	CO	7.0	21
77120	Ablabesmyia mallochi		6.0	5
77500	Conchapelopia sp		6.0	11
77750	Hayesomyia senata or Thienemannimyia norena		5.0	1
78655	Procladius (Holotanypus) sp		8.0	1
81825	Rheocricotopus (Psilocricotopus) robacki		6.0	1
82820	Cryptochironomus sp		8.0	6
82880	Cryptotendipes sp		6.0	6
83040	Dicrotendipes neomodestus		6.0	2
84300	Phaenopsectra obediens group		4.0	3
84315	Phaenopsectra flavipes		4.0	2
84450	Polypedilum (Uresipedilum) flavum		6.0	16
84460	Polypedilum (P.) fallax group		6.0	2
84470	Polypedilum (P.) illinoense		6.0	10
84540	Polypedilum (Tripodura) scalaenum group		6.0	3
84700	Stenochironomus sp		3.0	1
84750	Stictochironomus sp		5.0	5
84800	Tribelos jucundum		5.0	1
85625	Rheotanytarsus sp		6.0	1
85800	Tanytarsus sp		7.0	1
85814	Tanytarsus glabrescens group		7.0	2
85840	Tanytarsus sepp		7.0	7
93200	Hydrobiidae		6.0	19
98200	Pisidium sp		5.0	1
98600	Sphaerium sp		5.0	8

No. Quantitative Taxa:	46	Total Taxa:	46
Number of Organisms:	337	mIBI:	54.37

Appendix Table C-2. Macroinvertebrate taxa collected in the lower DuPage River study area during 2020.

Site: dst. Naperville Rd.

Site ID: **LD24**

Subsample:

RM: 4.80

Collection Date 07/31/2018 River Code 95-664 River: Springbrook Creek (Trib to DuPage R. at RM 27.1)

Taxa Code	Taxa	Taxa Grp	Tol.	Qt./Ql.
01801	Turbellaria		6.0	1
03600	Oligochaeta		10.0	6
05800	Caecidotea sp		6.0	1
06201	Hyalella azteca		4.0	41
11120	Baetis flavistriga	MA	4.0	7
11130	Baetis intercalaris	MA	4.0	20
13400	Stenacron sp	MA	4.0	2
17200	Caenis sp	MA	6.0	49
22001	Coenagrionidae		5.5	32
52200	Cheumatopsyche sp	CA	6.0	7
52530	Hydropsyche depravata group	CA	5.0	1
53800	Hydroptila sp	CA	2.0	1
58505	Helicopsyche borealis	CA	2.0	2
60900	Peltodytes sp	CO	99.9	1
68708	Dubiraphia vittata group	CO	5.0	58
68901	Macronychus glabratus	CO	2.0	2
69400	Stenelmis sp	CO	7.0	4
78655	Procladius (Holotanypus) sp		8.0	2
82880	Cryptotendipes sp		6.0	2
84450	Polypedilum (Uresipedilum) flavum		6.0	2
84540	Polypedilum (Tripodura) scalaenum group		6.0	2
93200	Hydrobiidae		6.0	2
97601	Corbicula fluminea		4.0	1
98600	Sphaerium sp		5.0	6

Taxa Code	Taxa	Feed Grp	Tol.	Qt./Ql.

No. Quantitative Taxa: 24 Total Taxa: 24

Number of Organisms: 252 mIBI: 46.65

Appendix Table C-2. Macroinvertebrate taxa collected in the lower DuPage River study area during 2020.

Site: dst 95th street bridge at Park

Site ID: **LD19**

Subsample:

RM: 1.40

Collection Date 07/31/2018 River Code 95-664 River: Springbrook Creek (Trib to DuPage R. at RM 27.1)

Taxa Code	Taxa	Taxa Grp	Tol.	Qt./Ql.
01801	Turbellaria		6.0	1
03600	Oligochaeta		10.0	36
04664	Helobdella stagnalis		8.0	2
04901	Erpobdellidae		8.0	2
05800	Caecidotea sp		6.0	8
06201	Hyalella azteca		4.0	702
11200	Callibaetis sp	MA	4.0	1
13400	Stenacron sp	MA	4.0	1
16700	Tricorythodes sp	MA	5.0	2
17200	Caenis sp	MA	6.0	2
22001	Coenagrionidae		5.5	12
52200	Cheumatopsyche sp	CA	6.0	1
77355	Clinotanypus pinguis		6.0	1
78130	Labrundinia neopilosella		4.0	1
78655	Procladius (Holotanypus) sp		8.0	9
79000	Tanypus sp		8.0	5
80510	Cricotopus (Isocladius) sylvestris group		8.0	1
82730	Chironomus (C.) decorus group		11.0	1
82800	Cladopelma sp		6.0	1
82880	Cryptotendipes sp		6.0	3
83040	Dicrotendipes neomodestus		6.0	1
84210	Paratendipes albimanus or P. duplicatus		3.0	23
84280	Phaenopsectra sp or Tribelos sp		4.0	3
84470	Polypedilum (P.) illinoense		6.0	8
84520	Polypedilum (Tripodura) halterale group		6.0	3
84540	Polypedilum (Tripodura) scalaenum group		6.0	5
84800	Tribelos jucundum		5.0	3
85500	Paratanytarsus sp		6.0	1
85625	Rheotanytarsus sp		6.0	1
85800	Tanytarsus sp		7.0	6
85840	Tanytarsus sepp		7.0	1
95100	Physella sp		9.0	1
98200	Pisidium sp		5.0	7

Taxa Code	Taxa	Feed Grp	Tol.	Qt./Ql.

No. Quantitative Taxa: 33 Total Taxa: 33

Number of Organisms: 855 mIBI: 30.91

Appendix Table C-2. Macroinvertebrate taxa collected in the lower DuPage River study area during 2020.

Site: ust. Gaylord Dr.

Site ID: **LD41**

Subsample:

RM: 7.90

Collection Date 07/26/2018 River Code 95-665 River: Rock Run Creek (Trib to IL-MI Canal at RM 9.0)

Taxa Code	Taxa	Taxa Grp	Tol.	Qt./Ql.
03600	Oligochaeta		10.0	2
05800	Caecidotea sp		6.0	1
06201	Hyalella azteca		4.0	104
11200	Callibaetis sp	MA	4.0	4
17200	Caenis sp	MA	6.0	6
22001	Coenagrionidae		5.5	60
23700	Anax sp		5.0	1
23909	Boyeria vinosa		3.0	1
27000	Corduliidae or Libellulidae		0.0	1
52200	Cheumatopsyche sp	CA	6.0	1
59970	Petrophila sp		5.0	1
60800	Haliplus sp	CO	99.9	3
68700	Dubiraphia sp	CO	5.0	8
68708	Dubiraphia vittata group	CO	5.0	4
72700	Anopheles sp		6.0	1
77120	Ablabesmyia mallochi		6.0	1
77500	Conchapelopia sp		6.0	2
78140	Labrundinia pilosella		4.0	2
78655	Procladius (Holotanypus) sp		8.0	11
80480	Cricotopus (Isocladius) sp		0.0	1
82820	Cryptochironomus sp		8.0	2
83040	Dicrotendipes neomodestus		6.0	1
84210	Paratendipes albimanus or P. duplicatus		3.0	2
84470	Polypedilum (P.) illinoense		6.0	6
84750	Stictochironomus sp		5.0	8
85500	Paratanytarsus sp		6.0	6
85625	Rheotanytarsus sp		6.0	1
85800	Tanytarsus sp		7.0	2
85840	Tanytarsus sepp		7.0	1
95100	Physella sp		9.0	97
95501	Planorbidae		6.5	1
96900	Ferrissia sp		7.0	1
98200	Pisidium sp		5.0	10

Taxa Code	Taxa	Feed Grp	Tol.	Qt./Ql.

No. Quantitative Taxa: 33 Total Taxa: 33

Number of Organisms: 353 mIBI: 43.70

Appendix Table C-2. Macroinvertebrate taxa collected in the lower DuPage River study area during 2020.

Site: ust. Essington Rd.

Site ID: **LD04**

Subsample:

RM: 6.50

Collection Date 07/26/2018 River Code 95-665 River: Rock Run Creek (Trib to IL-MI Canal at RM 9.0)

Taxa Code	Taxa	Taxa Grp	Tol.	Qt./Ql.
01801	Turbellaria		6.0	6
03600	Oligochaeta		10.0	37
04660	Helobdella sp		8.0	1
05800	Caecidotea sp		6.0	1
06201	Hyalella azteca		4.0	97
11200	Callibaetis sp	MA	4.0	11
17200	Caenis sp	MA	6.0	41
22001	Coenagrionidae		5.5	35
59500	Oecetis sp	CA	5.0	2
77120	Ablabesmyia mallochi		6.0	2
77140	Ablabesmyia peleensis		6.0	4
77500	Conchapelopia sp		6.0	10
78600	Pentaneura inconspicua		3.0	4
78655	Procladius (Holotanypus) sp		8.0	4
80420	Cricotopus (C.) bicinctus		8.0	4
80510	Cricotopus (Isocladius) sylvestris group		8.0	21
83002	Dicrotendipes modestus		6.0	5
83040	Dicrotendipes neomodestus		6.0	8
84470	Polypedilum (P.) illinoense		6.0	19
85500	Paratanytarsus sp		6.0	8
95100	Physella sp		9.0	10
98200	Pisidium sp		5.0	3
98600	Sphaerium sp		5.0	1

Taxa Code	Taxa	Feed Grp	Tol.	Qt./Ql.

No. Quantitative Taxa: 23 Total Taxa: 23

Number of Organisms: 334 mIBI: 26.52

Appendix Table C-2. Macroinvertebrate taxa collected in the lower DuPage River study area during 2020.

Site: ust. Black St.

Site ID: **LD22**

Subsample:

RM: 5.70

Collection Date 07/26/2018 River Code 95-665 River: Rock Run Creek (Trib to IL-MI Canal at RM 9.0)

Taxa Code	Taxa	Taxa Grp	Tol.	Qt./Ql.
01801	Turbellaria		6.0	1
03600	Oligochaeta		10.0	2
06201	Hyalella azteca		4.0	249
17200	Caenis sp	MA	6.0	12
22001	Coenagrionidae		5.5	21
72700	Anopheles sp		6.0	3
77130	Ablabesmyia rhamphe group		6.0	1
77500	Conchapelopia sp		6.0	1
78130	Labrundinia neopilosella		4.0	1
78655	Procladius (Holotanypus) sp		8.0	20
79000	Tanypus sp		8.0	1
80420	Cricotopus (C.) bicinctus		8.0	1
80510	Cricotopus (Isocladius) sylvestris group		8.0	1
83040	Dicrotendipes neomodestus		6.0	1
83158	Endochironomus nigricans		6.0	3
84470	Polypedilum (P.) illinoense		6.0	1
84960	Pseudochironomus sp		5.0	2
95100	Physella sp		9.0	3
98600	Sphaerium sp		5.0	1

Taxa Code	Taxa	Feed Grp	Tol.	Qt./Ql.

No. Quantitative Taxa: 19 Total Taxa: 19

Number of Organisms: 325 mIBI: 22.41

Appendix Table C-2. Macroinvertebrate taxa collected in the lower DuPage River study area during 2020.

Site: dst. McDonough St.

Site ID: **LD17**

Subsample:

RM: 3.50

Collection Date 07/25/2018 River Code 95-665 River: Rock Run Creek (Trib to IL-MI Canal at RM 9.0)

Taxa Code	Taxa	Taxa Grp	Tol.	Qt./Ql.
01801	Turbellaria		6.0	30
03600	Oligochaeta		10.0	63
04664	Helobdella stagnalis		8.0	1
04964	Erpobdella microstoma		8.0	1
05800	Caecidotea sp		6.0	22
06201	Hyalella azteca		4.0	99
11200	Callibaetis sp	MA	4.0	2
17200	Caenis sp	MA	6.0	2
22001	Coenagrionidae		5.5	32
52200	Cheumatopsyche sp	CA	6.0	1
53800	Hydroptila sp	CA	2.0	1
68708	Dubiraphia vittata group	CO	5.0	1
77130	Ablabesmyia rhamphe group		6.0	1
77500	Conchapelopia sp		6.0	2
78655	Procladius (Holotanypus) sp		8.0	5
78680	Procladius (Psilotanypus) bellus		8.0	1
80420	Cricotopus (C.) bicinctus		8.0	2
82100	Thienemanniella sp		2.0	1
83158	Endochironomus nigricans		6.0	1
84450	Polypedilum (Uresipedilum) flavum		6.0	2
84470	Polypedilum (P.) illinoense		6.0	17
85500	Paratanytarsus sp		6.0	2
85625	Rheotanytarsus sp		6.0	3
93200	Hydrobiidae		6.0	2
95900	Gyraulus sp		6.0	5
98600	Sphaerium sp		5.0	1

Taxa Code	Taxa	Feed Grp	Tol.	Qt./Ql.

No. Quantitative Taxa: 26 Total Taxa: 26

Number of Organisms: 300 mIBI: 29.13

Appendix Table C-2. Macroinvertebrate taxa collected in the lower DuPage River study area during 2020.

Site: ust. Naperville WWTP

Site ID: **LD14**

Subsample:

RM: 26.60

Collection Date 07/31/2018 River Code 95-666 River: DuPage River

Taxa Code	Taxa	Taxa Grp	Tol.	Qt./Ql.
01801	Turbellaria		6.0	3
03600	Oligochaeta		10.0	14
04901	Erpobdellidae		8.0	1
06201	Hyalella azteca		4.0	29
11120	Baetis flavistriga	MA	4.0	3
11130	Baetis intercalaris	MA	4.0	138
16700	Tricorythodes sp	MA	5.0	38
22001	Coenagrionidae		5.5	2
52200	Cheumatopsyche sp	CA	6.0	4
59410	Nectopsyche diarina	CA	3.0	3
68708	Dubiraphia vittata group	CO	5.0	1
69400	Stenelmis sp	CO	7.0	3
74100	Simulium sp		6.0	25
77500	Conchapelopia sp		6.0	1
77750	Hayesomyia senata or Thienemannimyia norena		5.0	1
78600	Pentaneura inconspicua		3.0	2
78655	Procladius (Holotanypus) sp		8.0	1
80430	Cricotopus (C.) tremulus group		8.0	1
80510	Cricotopus (Isocladius) sylvestris group		8.0	1
82100	Thienemanniella sp		2.0	1
82820	Cryptochironomus sp		8.0	1
83040	Dicrotendipes neomodestus		6.0	1
84450	Polypedilum (Uresipedilum) flavum		6.0	3
84470	Polypedilum (P.) illinoense		6.0	12
85265	Cladotanytarsus vanderwulpi group sp 5		7.0	1
85500	Paratanytarsus sp		6.0	2
85625	Rheotanytarsus sp		6.0	3
93900	Elimia sp		6.0	13
95100	Physella sp		9.0	8
97601	Corbicula fluminea		4.0	12

Taxa Code	Taxa	Feed Grp	Tol.	Qt./Ql.

No. Quantitative Taxa: 30 Total Taxa: 30

Number of Organisms: 328 mIBI: 50.24

Appendix Table C-2. Macroinvertebrate taxa collected in the lower DuPage River study area during 2020.

Site: dst. Plainfield Naperville Rd.

Site ID: **LD25**

Subsample:

RM: 25.20

Collection Date 07/27/2018 River Code 95-666 River: DuPage River

Taxa Code	Taxa	Taxa Grp	Tol.	Qt./Ql.
01801	Turbellaria		6.0	23
03600	Oligochaeta		10.0	15
04964	Erpobdella microstoma		8.0	4
06201	Hyalella azteca		4.0	17
06700	Crangonyx sp		4.0	1
06800	Gammarus sp		3.0	1
11120	Baetis flavistriga	MA	4.0	1
11130	Baetis intercalaris	MA	4.0	67
16700	Tricorythodes sp	MA	5.0	72
52200	Cheumatopsyche sp	CA	6.0	9
52430	Ceratopsyche morosa group	CA	4.0	1
52565	Hydropsyche phalerata	CA	5.0	1
53800	Hydroptila sp	CA	2.0	5
59400	Nectopsyche sp	CA	3.0	1
68708	Dubiraphia vittata group	CO	5.0	2
69400	Stenelmis sp	CO	7.0	1
74100	Simulium sp		6.0	5
77500	Conchapelopia sp		6.0	3
78600	Pentaneura inconspicua		3.0	3
80420	Cricotopus (C.) bicinctus		8.0	1
82130	Thienemanniella similis		2.0	1
82820	Cryptochironomus sp		8.0	1
83040	Dicrotendipes neomodestus		6.0	2
84450	Polypedilum (Uresipedilum) flavum		6.0	39
84470	Polypedilum (P.) illinoense		6.0	7
84540	Polypedilum (Tripodura) scalaenum group		6.0	4
84750	Stictochironomus sp		5.0	1
84960	Pseudochironomus sp		5.0	1
85230	Cladotanytarsus mancus group		7.0	2
85500	Paratanytarsus sp		6.0	2
85625	Rheotanytarsus sp		6.0	8
97601	Corbicula fluminea		4.0	7
98200	Pisidium sp		5.0	2
98600	Sphaerium sp		5.0	1

Taxa Code	Taxa	Feed Grp	Tol.	Qt./Ql.

No. Quantitative Taxa: 34 Total Taxa: 34

Number of Organisms: 311 mIBI: 49.76

Appendix Table C-2. Macroinvertebrate taxa collected in the lower DuPage River study area during 2020.

Site: dst. 119th St.

Site ID: **LD13**

Subsample:

RM: 23.10

Collection Date 07/27/2018 River Code 95-666 River: DuPage River

Taxa Code	Taxa	Taxa Grp	Tol.	Qt./Ql.
01801	Turbellaria		6.0	21
03600	Oligochaeta		10.0	6
11120	Baetis flavistriga	MA	4.0	8
11130	Baetis intercalaris	MA	4.0	83
16700	Tricorythodes sp	MA	5.0	78
22001	Coenagrionidae		5.5	4
23501	Aeshnidae		4.5	1
52200	Cheumatopsyche sp	CA	6.0	13
52565	Hydropsyche phalerata	CA	5.0	1
53800	Hydroptila sp	CA	2.0	2
59410	Nectopsyche diarina	CA	3.0	27
68708	Dubiraphia vittata group	CO	5.0	1
74100	Simulium sp		6.0	8
77500	Conchapelopia sp		6.0	5
77750	Hayesomyia senata or Thienemannimyia norena		5.0	1
78600	Pentaneura inconspicua		3.0	4
79100	Thienemannimyia group		6.0	1
80510	Cricotopus (Isocladius) sylvestris group		8.0	2
83040	Dicrotendipes neomodestus		6.0	1
84450	Polypedilum (Uresipedilum) flavum		6.0	11
84470	Polypedilum (P.) illinoense		6.0	17
84540	Polypedilum (Tripodura) scalaenum group		6.0	1
85500	Paratanytarsus sp		6.0	7
85625	Rheotanytarsus sp		6.0	10
97601	Corbicula fluminea		4.0	5

Taxa Code	Taxa	Feed Grp	Tol.	Qt./Ql.

No. Quantitative Taxa: 25 Total Taxa: 25

Number of Organisms: 318 mIBI: 44.74

Appendix Table C-2. Macroinvertebrate taxa collected in the lower DuPage River study area during 2020.

Site: dst. 127th St.

Site ID: **LD12**

Subsample:

RM: 22.00

Collection Date 07/27/2018 River Code 95-666 River: DuPage River

Taxa Code	Taxa	Taxa Grp	Tol.	Qt./Ql.
01801	Turbellaria		6.0	50
03600	Oligochaeta		10.0	1
04964	Erpobdella microstoma		8.0	1
06201	Hyalella azteca		4.0	4
11119	Plauditus dubius or P. virilis	MA	3.0	1
11120	Baetis flavistriga	MA	4.0	1
11130	Baetis intercalaris	MA	4.0	43
11200	Callibaetis sp	MA	4.0	1
16700	Tricorythodes sp	MA	5.0	65
22300	Argia sp		5.0	1
52200	Cheumatopsyche sp	CA	6.0	18
52565	Hydropsyche phalerata	CA	5.0	1
53800	Hydroptila sp	CA	2.0	1
59410	Nectopsyche diarina	CA	3.0	50
69400	Stenelmis sp	CO	7.0	1
74100	Simulium sp		6.0	6
77500	Conchapelopia sp		6.0	6
77750	Hayesomyia senata or Thienemannimyia norena		5.0	2
78600	Pentaneura inconspicua		3.0	3
84450	Polypedilum (Uresipedilum) flavum		6.0	19
84470	Polypedilum (P.) illinoense		6.0	21
85500	Paratanytarsus sp		6.0	1
85625	Rheotanytarsus sp		6.0	8
85821	Tanytarsus glabrescens group sp 7		7.0	1
87540	Hemerodromia sp		6.0	1
96900	Ferrissia sp		7.0	1
97601	Corbicula fluminea		4.0	9

Taxa Code	Taxa	Feed Grp	Tol.	Qt./Ql.

No. Quantitative Taxa: 27 Total Taxa: 27

Number of Organisms: 317 mIBI: 48.29

Appendix Table C-2. Macroinvertebrate taxa collected in the lower DuPage River study area during 2020.

Site: dst. 135th St.

Site ID: **LD11**

Subsample:

RM: 20.80

Collection Date 07/28/2018 River Code 95-666 River: DuPage River

Taxa Code	Taxa	Taxa Grp	Tol.	Qt./Ql.
01801	Turbellaria		6.0	19
06201	Hyalella azteca		4.0	32
11130	Baetis intercalaris	MA	4.0	70
11200	Callibaetis sp	MA	4.0	1
16700	Tricorythodes sp	MA	5.0	11
17200	Caenis sp	MA	6.0	1
22001	Coenagrionidae		5.5	5
23501	Aeshnidae		4.5	1
52200	Cheumatopsyche sp	CA	6.0	1
52565	Hydropsyche phalerata	CA	5.0	1
59410	Nectopsyche diarina	CA	3.0	13
68708	Dubiraphia vittata group	CO	5.0	1
69400	Stenelmis sp	CO	7.0	2
74100	Simulium sp		6.0	7
77500	Conchapelopia sp		6.0	13
77750	Hayesomyia senata or Thienemannimyia norena		5.0	3
78600	Pentaneura inconspicua		3.0	3
80420	Cricotopus (C.) bicinctus		8.0	6
80510	Cricotopus (Isocladius) sylvestris group		8.0	1
82730	Chironomus (C.) decorus group		11.0	2
83040	Dicrotendipes neomodestus		6.0	2
84450	Polypedilum (Uresipedilum) flavum		6.0	7
84470	Polypedilum (P.) illinoense		6.0	50
84700	Stenochironomus sp		3.0	1
84960	Pseudochironomus sp		5.0	1
85500	Paratanytarsus sp		6.0	10
85625	Rheotanytarsus sp		6.0	11
93200	Hydrobiidae		6.0	1
93900	Elimia sp		6.0	5
97601	Corbicula fluminea		4.0	5

Taxa Code	Taxa	Feed Grp	Tol.	Qt./Ql.

No. Quantitative Taxa: 30 Total Taxa: 30

Number of Organisms: 286 mIBI: 46.58

Appendix Table C-2. Macroinvertebrate taxa collected in the lower DuPage River study area during 2020.

Site: ust. Lockport St.

Site ID: **LD10**

Subsample:

RM: 18.50

Collection Date 07/28/2018 River Code 95-666 River: DuPage River

Taxa Code	Taxa	Taxa Grp	Tol.	Qt./Ql.
01801	Turbellaria		6.0	9
03600	Oligochaeta		10.0	3
11119	Plauditus dubius or P. virilis	MA	3.0	8
11130	Baetis intercalaris	MA	4.0	67
16700	Tricorythodes sp	MA	5.0	70
17200	Caenis sp	MA	6.0	1
52200	Cheumatopsyche sp	CA	6.0	32
52565	Hydropsyche phalerata	CA	5.0	2
53800	Hydroptila sp	CA	2.0	5
59410	Nectopsyche diarina	CA	3.0	1
59500	Oecetis sp	CA	5.0	1
68708	Dubiraphia vittata group	CO	5.0	1
74100	Simulium sp		6.0	3
77500	Conchapelopia sp		6.0	3
77750	Hayesomyia senata or Thienemannimyia norena		5.0	1
80440	Cricotopus (C.) trifascia		6.0	2
82820	Cryptochironomus sp		8.0	1
83040	Dicrotendipes neomodestus		6.0	9
84450	Polypedilum (Uresipedilum) flavum		6.0	14
84470	Polypedilum (P.) illinoense		6.0	4
84540	Polypedilum (Tripodura) scalaenum group		6.0	3
85625	Rheotanytarsus sp		6.0	7
93900	Elimia sp		6.0	4
97601	Corbicula fluminea		4.0	7
98600	Sphaerium sp		5.0	2

Taxa Code	Taxa	Feed Grp	Tol.	Qt./Ql.

No. Quantitative Taxa: 25 Total Taxa: 25

Number of Organisms: 260 mIBI: 49.97

Appendix Table C-2. Macroinvertebrate taxa collected in the lower DuPage River study area during 2020.

Site: ust. Penwick Rd.

Site ID: **LD09**

Subsample:

RM: 17.00

Collection Date 07/27/2018 River Code 95-666 River: DuPage River

Taxa Code	Taxa	Taxa Grp	Tol.	Qt./Ql.
01801	Turbellaria		6.0	16
03600	Oligochaeta		10.0	5
06201	Hyalella azteca		4.0	2
11015	Acerpenna sp	MA	4.0	1
11119	Plauditus dubius or P. virilis	MA	3.0	8
11130	Baetis intercalaris	MA	4.0	139
16700	Tricorythodes sp	MA	5.0	27
52200	Cheumatopsyche sp	CA	6.0	8
53800	Hydroptila sp	CA	2.0	2
59410	Nectopsyche diarina	CA	3.0	5
67800	Tropisternus sp	CO	99.9	1
74100	Simulium sp		6.0	25
77130	Ablabesmyia rhamphe group		6.0	1
77500	Conchapelopia sp		6.0	6
78600	Pentaneura inconspicua		3.0	1
84450	Polypedilum (Uresipedilum) flavum		6.0	3
84470	Polypedilum (P.) illinoense		6.0	18
84540	Polypedilum (Tripodura) scalaenum group		6.0	1
85500	Paratanytarsus sp		6.0	1
93200	Hydrobiidae		6.0	2
93900	Elimia sp		6.0	19
95900	Gyraulus sp		6.0	5
97601	Corbicula fluminea		4.0	8
98200	Pisidium sp		5.0	1

Taxa Code	Taxa	Feed Grp	Tol.	Qt./Ql.

No. Quantitative Taxa: 24 Total Taxa: 24

Number of Organisms: 305 mIBI: 49.32

Appendix Table C-2. Macroinvertebrate taxa collected in the lower DuPage River study area during 2020.

Site: dst. Canton Farms Rd.

Site ID: **LD08**

Subsample:

RM: 13.40

Collection Date 07/27/2018 River Code 95-666 River: DuPage River

Taxa Code	Taxa	Taxa Grp	Tol.	Qt./Ql.
01801	Turbellaria		6.0	2
06201	Hyalella azteca		4.0	8
08250	Orconectes (Procericambarus) rusticus		5.0	1
11020	Acerpenna pygmaea	MA	4.0	24
11119	Plauditus dubius or P. virilis	MA	3.0	4
11120	Baetis flavistriga	MA	4.0	3
11130	Baetis intercalaris	MA	4.0	100
11200	Callibaetis sp	MA	4.0	2
13000	Leucrocuta sp	MA	3.0	2
13400	Stenacron sp	MA	4.0	4
16700	Tricorythodes sp	MA	5.0	13
17200	Caenis sp	MA	6.0	3
22001	Coenagrionidae		5.5	4
52200	Cheumatopsyche sp	CA	6.0	1
59410	Nectopsyche diarina	CA	3.0	9
59570	Oecetis nocturna	CA	5.0	1
65800	Berosus sp	CO	99.9	1
67700	Paracymus sp	CO	99.9	1
68708	Dubiraphia vittata group	CO	5.0	3
74100	Simulium sp		6.0	2
77500	Conchapelopia sp		6.0	3
78600	Pentaneura inconspicua		3.0	1
80410	Cricotopus (C.) sp		8.0	3
80420	Cricotopus (C.) bicinctus		8.0	75
80440	Cricotopus (C.) trifascia		6.0	3
80510	Cricotopus (Isocladius) sylvestris group		8.0	2
83040	Dicrotendipes neomodestus		6.0	9
83050	Dicrotendipes lucifer		6.0	1
84450	Polypedilum (Uresipedilum) flavum		6.0	14
84470	Polypedilum (P.) illinoense		6.0	10
84540	Polypedilum (Tripodura) scalaenum group		6.0	1
85500	Paratanytarsus sp		6.0	1
85625	Rheotanytarsus sp		6.0	5
85821	Tanytarsus glabrescens group sp 7		7.0	1
93900	Elimia sp		6.0	17
97601	Corbicula fluminea		4.0	2

Taxa Code	Taxa	Feed Grp	Tol.	Qt./Ql.

No. Quantitative Taxa: 36 Total Taxa: 36

Number of Organisms: 336 mIBI: 55.06

Appendix Table C-2. Macroinvertebrate taxa collected in the lower DuPage River study area during 2020.

Site: Ust. Black Rd.

Site ID: **LD07**

Subsample:

RM: 11.40

Collection Date 07/26/2018 River Code 95-666 River: DuPage River

Taxa Code	Taxa	Taxa Grp	Tol.	Qt./Ql.
01801	Turbellaria		6.0	27
01900	Nemertea		99.9	2
03600	Oligochaeta		10.0	3
06201	Hyalella azteca		4.0	2
11020	Acerpenna pygmaea	MA	4.0	1
11119	Plauditus dubius or P. virilis	MA	3.0	44
11130	Baetis intercalaris	MA	4.0	62
13000	Leucrocuta sp	MA	3.0	1
16700	Tricorythodes sp	MA	5.0	51
17200	Caenis sp	MA	6.0	1
52200	Cheumatopsyche sp	CA	6.0	20
52565	Hydropsyche phalerata	CA	5.0	12
53400	Protoptila sp	CA	1.0	1
53800	Hydroptila sp	CA	2.0	4
59410	Nectopsyche diarina	CA	3.0	11
74100	Simulium sp		6.0	2
78600	Pentaneura inconspicua		3.0	7
80440	Cricotopus (C.) trifascia		6.0	5
82100	Thienemanniella sp		2.0	1
82220	Tvetenia discoloripes group		5.0	2
83040	Dicrotendipes neomodestus		6.0	1
84450	Polypedilum (Uresipedilum) flavum		6.0	38
84470	Polypedilum (P.) illinoense		6.0	26
85500	Paratanytarsus sp		6.0	1
85625	Rheotanytarsus sp		6.0	8
93900	Elimia sp		6.0	4
97601	Corbicula fluminea		4.0	4

Taxa Code	Taxa	Feed Grp	Tol.	Qt./Ql.

No. Quantitative Taxa: 27 Total Taxa: 27

Number of Organisms: 341 mIBI: 54.78

Appendix Table C-2. Macroinvertebrate taxa collected in the lower DuPage River study area during 2020.

Site: Dst. US 52

Site ID: **LD06**

Subsample:

RM: 9.60

Collection Date 07/26/2018 River Code 95-666 River: DuPage River

Taxa Code	Taxa	Taxa Grp	Tol.	Qt./Ql.
01801	Turbellaria		6.0	13
03600	Oligochaeta		10.0	7
04964	Erpobdella microstoma		8.0	4
06201	Hyalella azteca		4.0	4
11015	Acerpenna sp	MA	4.0	1
11119	Plauditus dubius or P. virilis	MA	3.0	16
11130	Baetis intercalaris	MA	4.0	54
11200	Callibaetis sp	MA	4.0	4
13000	Leucrocuta sp	MA	3.0	1
16700	Tricorythodes sp	MA	5.0	31
17200	Caenis sp	MA	6.0	1
22300	Argia sp		5.0	1
52200	Cheumatopsyche sp	CA	6.0	4
52565	Hydropsyche phalerata	CA	5.0	1
52570	Hydropsyche simulans	CA	5.0	5
53800	Hydroptila sp	CA	2.0	6
59410	Nectopsyche diarina	CA	3.0	3
65800	Berosus sp	CO	99.9	1
67750	Sperchopsis tesselata		0.0	1
68901	Macronychus glabratus	CO	2.0	1
69400	Stenelmis sp	CO	7.0	2
74100	Simulium sp		6.0	4
77120	Ablabesmyia mallochi		6.0	3
77500	Conchapelopia sp		6.0	5
78600	Pentaneura inconspicua		3.0	1
78655	Procladius (Holotanypus) sp		8.0	1
80420	Cricotopus (C.) bicinctus		8.0	4
80440	Cricotopus (C.) trifascia		6.0	3
82820	Cryptochironomus sp		8.0	1
84450	Polypedilum (Uresipedilum) flavum		6.0	15
84470	Polypedilum (P.) illinoense		6.0	57
84540	Polypedilum (Tripodura) scalaenum group		6.0	1
85625	Rheotanytarsus sp		6.0	1
93900	Elimia sp		6.0	50
97601	Corbicula fluminea		4.0	1

Taxa Code	Taxa	Feed Grp	Tol.	Qt./Ql.

No. Quantitative Taxa: 35 Total Taxa: 35

Number of Organisms: 308 mIBI: 64.94

Appendix Table C-2. Macroinvertebrate taxa collected in the lower DuPage River study area during 2020.

Site: dst. Mound St.

Site ID: **LD03**

Subsample:

RM: 7.00

Collection Date 07/25/2018 River Code 95-666 River: DuPage River

Taxa Code	Taxa	Taxa Grp	Tol.	Qt./Ql.
01801	Turbellaria		6.0	5
03600	Oligochaeta		10.0	3
05800	Caecidotea sp		6.0	3
11020	Acerpenna pygmaea	MA	4.0	3
11119	Plauditus dubius or P. virilis	MA	3.0	19
11130	Baetis intercalaris	MA	4.0	39
13000	Leucrocuta sp	MA	3.0	3
16700	Tricorythodes sp	MA	5.0	15
22001	Coenagrionidae		5.5	1
52565	Hydropsyche phalerata	CA	5.0	4
53400	Protoptila sp	CA	1.0	4
53800	Hydroptila sp	CA	2.0	3
74100	Simulium sp		6.0	5
77120	Ablabesmyia mallochi		6.0	1
78600	Pentaneura inconspicua		3.0	2
78655	Procladius (Holotanypus) sp		8.0	1
80420	Cricotopus (C.) bicinctus		8.0	2
82220	Tvetenia discoloripes group		5.0	2
84450	Polypedilum (Uresipedilum) flavum		6.0	19
84470	Polypedilum (P.) illinoense		6.0	34
85625	Rheotanytarsus sp		6.0	2
93900	Elimia sp		6.0	126
97601	Corbicula fluminea		4.0	7

Taxa Code	Taxa	Feed Grp	Tol.	Qt./Ql.

No. Quantitative Taxa: 23 Total Taxa: 23

Number of Organisms: 303 mIBI: 55.17

Appendix Table C-2. Macroinvertebrate taxa collected in the lower DuPage River study area during 2020.

Site: dst. Shepley

Site ID: **LD02**

Subsample:

RM: 4.70

Collection Date 07/24/2018 River Code 95-666 River: DuPage River

Taxa Code	Taxa	Taxa Grp	Tol.	Qt./Ql.
01801	Turbellaria		6.0	5
11119	Plauditus dubius or P. virilis	MA	3.0	11
11120	Baetis flavistriga	MA	4.0	1
11130	Baetis intercalaris	MA	4.0	100
13000	Leucrocuta sp	MA	3.0	2
16700	Tricorythodes sp	MA	5.0	27
17200	Caenis sp	MA	6.0	1
22001	Coenagrionidae		5.5	1
43300	Ranatra sp		99.9	1
52200	Cheumatopsyche sp	CA	6.0	7
52565	Hydropsyche phalerata	CA	5.0	13
53400	Protoptila sp	CA	1.0	3
53800	Hydroptila sp	CA	2.0	5
59970	Petrophila sp		5.0	1
77500	Conchapelopia sp		6.0	2
78655	Procladius (Holotanypus) sp		8.0	1
78750	Rheopelopia paramaculipennis		3.0	1
80410	Cricotopus (C.) sp		8.0	1
80420	Cricotopus (C.) bicinctus		8.0	3
80440	Cricotopus (C.) trifascia		6.0	1
80510	Cricotopus (Isocladius) sylvestris group		8.0	2
82220	Tvetenia discoloripes group		5.0	3
82820	Cryptochironomus sp		8.0	1
84450	Polypedilum (Uresipedilum) flavum		6.0	30
84470	Polypedilum (P.) illinoense		6.0	20
85625	Rheotanytarsus sp		6.0	1
93900	Elimia sp		6.0	16
97601	Corbicula fluminea		4.0	5

Taxa Code	Taxa	Feed Grp	Tol.	Qt./Ql.

No. Quantitative Taxa: 28 Total Taxa: 28

Number of Organisms: 265 mIBI: 53.45

Appendix Table C-2. Macroinvertebrate taxa collected in the lower DuPage River study area during 2020.

Site: dst. WWTP

Site ID: **LD05**

Subsample:

RM: 2.50

Collection Date 07/25/2018 River Code 95-666 River: DuPage River

Taxa Code	Taxa	Taxa Grp	Tol.	Qt./Ql.
01801	Turbellaria		6.0	3
01900	Nemertea		99.9	1
03600	Oligochaeta		10.0	41
06201	Hyalella azteca		4.0	9
11020	Acerpenna pygmaea	MA	4.0	3
11119	Plauditus dubius or P. virilis	MA	3.0	1
11130	Baetis intercalaris	MA	4.0	14
11200	Callibaetis sp	MA	4.0	2
13000	Leucrocuta sp	MA	3.0	9
13521	Stenonema femoratum	MA	4.0	7
16700	Tricorythodes sp	MA	5.0	42
17200	Caenis sp	MA	6.0	1
22001	Coenagrionidae		5.5	2
22300	Argia sp		5.0	2
52200	Cheumatopsyche sp	CA	6.0	7
52565	Hydropsyche phalerata	CA	5.0	1
52570	Hydropsyche simulans	CA	5.0	5
53300	Glossosoma sp	CA	3.5	1
53800	Hydroptila sp	CA	2.0	4
59410	Nectopsyche diarina	CA	3.0	1
68708	Dubiraphia vittata group	CO	5.0	1
68901	Macronychus glabratus	CO	2.0	1
69400	Stenelmis sp	CO	7.0	5
72700	Anopheles sp		6.0	2
74100	Simulium sp		6.0	1
77500	Conchapelopia sp		6.0	3
77750	Hayesomyia senata or Thienemannimyia norena		5.0	2
78600	Pentaneura inconspicua		3.0	1
78655	Procladius (Holotanypus) sp		8.0	6
80420	Cricotopus (C.) bicinctus		8.0	3
80440	Cricotopus (C.) trifascia		6.0	4
81825	Rheocricotopus (Psilocricotopus) robacki		6.0	1
82100	Thienemanniella sp		2.0	1
83040	Dicrotendipes neomodestus		6.0	1
83050	Dicrotendipes lucifer		6.0	1
84450	Polypedilum (Uresipedilum) flavum		6.0	14
84470	Polypedilum (P.) illinoense		6.0	92
93900	Elimia sp		6.0	6
97601	Corbicula fluminea		4.0	8

Taxa Code	Taxa	Feed Grp	Tol.	Qt./Ql.

No. Quantitative Taxa: 39 Total Taxa: 39

Number of Organisms: 309 mIBI: 64.33

Appendix Table C-2. Macroinvertebrate taxa collected in the lower DuPage River study area during 2020.

Site: at W. Bridge St.

Site ID: **LD01**

Subsample:

RM: 1.00

Collection Date 07/24/2018 River Code 95-666 River: DuPage River

Taxa Code	Taxa	Taxa Grp	Tol.	Qt./Ql.
01801	Turbellaria		6.0	4
03600	Oligochaeta		10.0	4
04901	Erpobdellidae		8.0	1
06201	Hyalella azteca		4.0	1
06800	Gammarus sp		3.0	1
11015	Acerpenna sp	MA	4.0	1
11119	Plauditus dubius or P. virilis	MA	3.0	3
11130	Baetis intercalaris	MA	4.0	102
13000	Leucrocuta sp	MA	3.0	4
16700	Tricorythodes sp	MA	5.0	90
17200	Caenis sp	MA	6.0	1
22300	Argia sp		5.0	1
52200	Cheumatopsyche sp	CA	6.0	17
52570	Hydropsyche simulans	CA	5.0	4
53400	Protoptila sp	CA	1.0	11
53800	Hydroptila sp	CA	2.0	1
68708	Dubiraphia vittata group	CO	5.0	2
69400	Stenelmis sp	CO	7.0	6
77120	Ablabesmyia mallochi		6.0	1
77500	Conchapelopia sp		6.0	1
77750	Hayesomyia senata or Thienemannimyia norena		5.0	2
78750	Rheopelopia paramaculipennis		3.0	1
83820	Microtendipes "caelum" (sensu Simpson & Bode, 1980)		6.0	1
84450	Polypedilum (Uresipedilum) flavum		6.0	5
84470	Polypedilum (P.) illinoense		6.0	3
93900	Elimia sp		6.0	32
97601	Corbicula fluminea		4.0	7

Taxa Code	Taxa	Feed Grp	Tol.	Qt./Ql.

No. Quantitative Taxa: 27 Total Taxa: 27

Number of Organisms: 307 mIBI: 68.85

Appendix Table C-2. Macroinvertebrate taxa collected in the lower DuPage River study area during 2020.

Site: at end of Ridge Ave.

Site ID: **LD28**

Subsample:

RM: 1.19

Collection Date 07/26/2018 River Code 95-667 River: Hammel Creek (Trib to DuPage R. at RM 10.6)

Taxa Code	Taxa	Taxa Grp	Tol.	Qt./Ql.
01801	Turbellaria		6.0	31
03600	Oligochaeta		10.0	2
04935	Erpobdella punctata punctata		8.0	1
05800	Caecidotea sp		6.0	43
06201	Hyalella azteca		4.0	132
08200	Orconectes sp		5.0	1
11120	Baetis flavistriga	MA	4.0	25
11130	Baetis intercalaris	MA	4.0	1
22001	Coenagrionidae		5.5	21
68700	Dubiraphia sp	CO	5.0	1
68708	Dubiraphia vittata group	CO	5.0	2
69400	Stenelmis sp	CO	7.0	12
72700	Anopheles sp		6.0	1
74100	Simulium sp		6.0	4
77500	Conchapelopia sp		6.0	4
78600	Pentaneura inconspicua		3.0	1
84210	Paratendipes albimanus or P. duplicatus		3.0	4
84470	Polypedilum (P.) illinoense		6.0	15
84540	Polypedilum (Tripodura) scalaenum group		6.0	1
85800	Tanytarsus sp		7.0	1
85821	Tanytarsus glabrescens group sp 7		7.0	2
85840	Tanytarsus sepp		7.0	7
93200	Hydrobiidae		6.0	7
93900	Elimia sp		6.0	1
95100	Physella sp		9.0	1
97601	Corbicula fluminea		4.0	2
98600	Sphaerium sp		5.0	3

Taxa Code	Taxa	Feed Grp	Tol.	Qt./Ql.

No. Quantitative Taxa: 27 Total Taxa: 27

Number of Organisms: 326 mIBI: 35.85

Appendix Table C-2. Macroinvertebrate taxa collected in the lower DuPage River study area during 2020.

Site: St. Rte 58

Site ID: **LD37**

Subsample:

RM: 14.70

Collection Date 07/27/2018 River Code 95-668 River: Lily Cache Creek (Trib to DuPage R. at RM 14.4)

Taxa Code	Taxa	Taxa Grp	Tol.	Qt./Ql.
01801	Turbellaria		6.0	42
03600	Oligochaeta		10.0	24
04666	Helobdella papillata		8.0	1
04935	Erpobdella punctata punctata		8.0	2
04964	Erpobdella microstoma		8.0	2
05800	Caecidotea sp		6.0	16
06201	Hyalella azteca		4.0	50
11200	Callibaetis sp	MA	4.0	1
22001	Coenagrionidae		5.5	38
23700	Anax sp		5.0	1
60900	Peltodytes sp	CO	99.9	2
65800	Berosus sp	CO	99.9	1
68707	Dubiraphia quadrinotata	CO	5.0	1
77120	Ablabesmyia mallochi		6.0	4
77500	Conchapelopia sp		6.0	6
78655	Procladius (Holotanypus) sp		8.0	12
79000	Tanypus sp		8.0	1
80420	Cricotopus (C.) bicinctus		8.0	6
82730	Chironomus (C.) decorus group		11.0	9
82820	Cryptochironomus sp		8.0	4
83040	Dicrotendipes neomodestus		6.0	22
83158	Endochironomus nigricans		6.0	2
84210	Paratendipes albimanus or P. duplicatus		3.0	1
84450	Polypedilum (Uresipedilum) flavum		6.0	4
84470	Polypedilum (P.) illinoense		6.0	17
85800	Tanytarsus sp		7.0	3
85814	Tanytarsus glabrescens group		7.0	1
93200	Hydrobiidae		6.0	10
95100	Physella sp		9.0	36
97601	Corbicula fluminea		4.0	1
98200	Pisidium sp		5.0	6
98600	Sphaerium sp		5.0	6

Taxa Code	Taxa	Feed Grp	Tol.	Qt./Ql.

No. Quantitative Taxa: 32 Total Taxa: 32

Number of Organisms: 332 mIBI: 30.90

Appendix Table C-2. Macroinvertebrate taxa collected in the lower DuPage River study area during 2020.

Site: adj. Lily Cashe Sports Complex

Site ID: **LD18**

Subsample:

RM: 11.20

Collection Date 07/29/2018 River Code 95-668 River: Lily Cache Creek (Trib to DuPage R. at RM 14.4)

Taxa Code	Taxa	Taxa Grp	Tol.	Qt./Ql.
01801	Turbellaria		6.0	9
03600	Oligochaeta		10.0	50
04935	Erpobdella punctata punctata		8.0	1
05800	Caecidotea sp		6.0	2
06201	Hyalella azteca		4.0	192
08200	Orconectes sp		5.0	1
11130	Baetis intercalaris	MA	4.0	1
17200	Caenis sp	MA	6.0	1
22001	Coenagrionidae		5.5	19
53800	Hydroptila sp	CA	2.0	2
69400	Stenelmis sp	CO	7.0	1
74100	Simulium sp		6.0	1
77120	Ablabesmyia mallochi		6.0	3
77130	Ablabesmyia rhamphe group		6.0	1
78100	Labrundinia sp		4.0	1
78655	Procladius (Holotanypus) sp		8.0	1
83000	Dicrotendipes sp		6.0	1
83040	Dicrotendipes neomodestus		6.0	7
83051	Dicrotendipes simpsoni		6.0	1
84470	Polypedilum (P.) illinoense		6.0	11
84500	Polypedilum (P.) trigonus		6.0	1
85800	Tanytarsus sp		7.0	2
85814	Tanytarsus glabrescens group		7.0	1

Taxa Code	Taxa	Feed Grp	Tol.	Qt./Ql.

No. Quantitative Taxa: 23 Total Taxa: 23

Number of Organisms: 310 mIBI: 26.65

Appendix Table C-2. Macroinvertebrate taxa collected in the lower DuPage River study area during 2020.

Site: dst. Main St.

Site ID: **LD15**

Subsample: RM: 6.50

Collection Date 07/28/2018 River Code 95-668 River: Lily Cache Creek (Trib to DuPage R. at RM 14.4)

Taxa Code	Taxa	Taxa Grp	Tol.	Qt./Ql.
01801	Turbellaria		6.0	2
01900	Nemertea		99.9	6
03000	Ectoprocta		99.9	1
03600	Oligochaeta		10.0	13
04664	Helobdella stagnalis		8.0	2
04960	Erpobdella sp (= Mooreobdella)		8.0	1
06201	Hyalella azteca		4.0	21
11015	Acerpenna sp	MA	4.0	1
11120	Baetis flavistriga	MA	4.0	6
11130	Baetis intercalaris	MA	4.0	42
13400	Stenacron sp	MA	4.0	6
16700	Tricorythodes sp	MA	5.0	48
17200	Caenis sp	MA	6.0	5
21300	Hetaerina sp		3.0	8
22001	Coenagrionidae		5.5	9
22300	Argia sp		5.0	2
52200	Cheumatopsyche sp	CA	6.0	3
58505	Helicopsyche borealis	CA	2.0	5
59410	Nectopsyche diarina	CA	3.0	1
68700	Dubiraphia sp	CO	5.0	1
68708	Dubiraphia vittata group	CO	5.0	37
69400	Stenelmis sp	CO	7.0	41
74100	Simulium sp		6.0	3
77500	Conchapelopia sp		6.0	2
77750	Hayesomyia senata or Thienemannimyia norena		5.0	1
78599	Pentaneura sp		3.0	2
80420	Cricotopus (C.) bicinctus		8.0	1
82820	Cryptochironomus sp		8.0	2
84450	Polypedilum (Uresipedilum) flavum		6.0	1
84470	Polypedilum (P.) illinoense		6.0	1
84520	Polypedilum (Tripodura) halterale group		6.0	2
84540	Polypedilum (Tripodura) scalaenum group		6.0	1
85230	Cladotanytarsus mancus group		7.0	1
85625	Rheotanytarsus sp		6.0	3
85821	Tanytarsus glabrescens group sp 7		7.0	2
87540	Hemerodromia sp		6.0	1
93200	Hydrobiidae		6.0	4
95100	Physella sp		9.0	3
97601	Corbicula fluminea		4.0	3

Taxa Code	Taxa	Feed Grp	Tol.	Qt./Ql.
98200	Pisidium sp		5.0	2
98600	Sphaerium sp		5.0	2

No. Quantitative Taxa: 41 Total Taxa: 41

Number of Organisms: 298 mIBI: 59.96

Appendix Table C-2. Macroinvertebrate taxa collected in the lower DuPage River study area during 2020.

Site: ust. confluence with the DuPage River

Site ID: **LD20**

Subsample: RM: 0.36

Collection Date 07/27/2018 River Code 95-668 River: Lily Cache Creek (Trib to DuPage R. at RM 14.4)

Taxa Code	Taxa	Taxa Grp	Tol.	Qt./Ql.
01801	Turbellaria		6.0	14
03600	Oligochaeta		10.0	124
04663	Helobdella papillata		8.0	1
04664	Helobdella stagnalis		8.0	2
06201	Hyalella azteca		4.0	12
11200	Callibaetis sp	MA	4.0	3
13400	Stenacron sp	MA	4.0	1
16700	Tricorythodes sp	MA	5.0	3
17200	Caenis sp	MA	6.0	18
22001	Coenagrionidae		5.5	25
22300	Argia sp		5.0	1
58505	Helicopsyche borealis	CA	2.0	1
59410	Nectopsyche diarina	CA	3.0	1
68700	Dubiraphia sp	CO	5.0	3
68708	Dubiraphia vittata group	CO	5.0	2
68901	Macronychus glabratus	CO	2.0	1
71900	Tipula sp		4.0	1
77120	Ablabesmyia mallochi		6.0	1
77130	Ablabesmyia rhamphe group		6.0	1
77500	Conchapelopia sp		6.0	1
78655	Procladius (Holotanypus) sp		8.0	5
82121	Thienemanniella lobapodema		2.0	1
82730	Chironomus (C.) decorus group		11.0	10
82880	Cryptotendipes sp		6.0	1
83000	Dicrotendipes sp		6.0	4
83040	Dicrotendipes neomodestus		6.0	6
83158	Endochironomus nigricans		6.0	2
83400	Harnischia sp		6.0	1
84450	Polypedilum (Uresipedilum) flavum		6.0	1
84470	Polypedilum (P.) illinoense		6.0	18
84520	Polypedilum (Tripodura) halterale group		6.0	1
84540	Polypedilum (Tripodura) scalaenum group		6.0	2
85500	Paratanytarsus sp		6.0	1
85800	Tanytarsus sp		7.0	28
85821	Tanytarsus glabrescens group sp 7		7.0	6
95100	Physella sp		9.0	1
98200	Pisidium sp		5.0	1
98600	Sphaerium sp		5.0	1

Taxa Code	Taxa	Feed Grp	Tol.	Qt./Ql.

No. Quantitative Taxa:	38	Total Taxa:	38
Number of Organisms:	306	mIBI:	36.57

Appendix Table C-2. Macroinvertebrate taxa collected in the lower DuPage River study area during 2020.

Site: Ust. Caton Farms Rd.

Site ID: **LD40**

Subsample:

RM: 0.80

Collection Date 07/26/2018 River Code 95-672 River: Trib #3 to DuPage R. at RM 13.9

Taxa Code	Taxa	Taxa Grp	Tol.	Qt./Ql.
01801	Turbellaria		6.0	92
01900	Nemertea		99.9	1
03600	Oligochaeta		10.0	62
04664	Helobdella stagnalis		8.0	2
05800	Caecidotea sp		6.0	20
06201	Hyalella azteca		4.0	35
06800	Gammarus sp		3.0	7
08200	Orconectes sp		5.0	1
17200	Caenis sp	MA	6.0	6
22001	Coenagrionidae		5.5	3
59500	Oecetis sp	CA	5.0	1
65800	Berosus sp	CO	99.9	2
68708	Dubiraphia vittata group	CO	5.0	1
69400	Stenelmis sp	CO	7.0	3
77120	Ablabesmyia mallochi		6.0	2
77130	Ablabesmyia rhamphe group		6.0	2
77500	Conchapelopia sp		6.0	3
78599	Pentaneura sp		3.0	1
78655	Procladius (Holotanypus) sp		8.0	4
82770	Chironomus (C.) riparius group		11.0	1
82820	Cryptochironomus sp		8.0	4
82880	Cryptotendipes sp		6.0	1
84210	Paratendipes albimanus or P. duplicatus		3.0	2
84470	Polypedilum (P.) illinoense		6.0	6
84540	Polypedilum (Tripodura) scalaenum group		6.0	1
85840	Tanytarsus sepp		7.0	1
92600	Cipangopaludina sp		0.0	1
93200	Hydrobiidae		6.0	15
94400	Fossaria sp		7.0	1
95100	Physella sp		9.0	16
95900	Gyraulus sp		6.0	1
97601	Corbicula fluminea		4.0	7
98200	Pisidium sp		5.0	1
98600	Sphaerium sp		5.0	7

Taxa Code	Taxa	Feed Grp	Tol.	Qt./Ql.

No. Quantitative Taxa: 34 Total Taxa: 34

Number of Organisms: 313 mIBI: 37.22

Appendix Table C-2. Macroinvertebrate taxa collected in the lower DuPage River study area during 2020.

Site: Dst. 135th St.

Site ID: **LD38**

Subsample:

RM: 0.84

Collection Date 07/28/2018 River Code 95-673 River: Trib #1 to Lily Chache Cr at RM 6.1

Taxa Code	Taxa	Taxa Grp	Tol.	Qt./Ql.
03600	Oligochaeta		10.0	20
04664	Helobdella stagnalis		8.0	1
04666	Helobdella papillata		8.0	1
06201	Hyalella azteca		4.0	98
11200	Callibaetis sp	MA	4.0	75
17200	Caenis sp	MA	6.0	6
22001	Coenagrionidae		5.5	13
23700	Anax sp		5.0	2
27000	Corduliidae or Libellulidae		0.0	2
42700	Belostoma sp		99.9	14
44501	Corixidae		99.9	1
63900	Laccophilus sp	CO	99.9	9
65800	Berosus sp	CO	99.9	1
67800	Tropisternus sp	CO	99.9	2
72700	Anopheles sp		6.0	5
77140	Ablabesmyia peleensis		6.0	5
78200	Larsia sp		6.0	2
78655	Procladius (Holotanypus) sp		8.0	2
79000	Tanypus sp		8.0	1
80420	Cricotopus (C.) bicinctus		8.0	1
80490	Cricotopus (Isocladius) intersectus group		8.0	1
80510	Cricotopus (Isocladius) sylvestris group		8.0	1
82800	Cladopelma sp		6.0	4
83040	Dicrotendipes neomodestus		6.0	16
83158	Endochironomus nigricans		6.0	2
83300	Glyptotendipes (G.) sp		10.0	1
84470	Polypedilum (P.) illinoense		6.0	4
84540	Polypedilum (Tripodura) scalaenum group		6.0	1
84750	Stictochironomus sp		5.0	1
84960	Pseudochironomus sp		5.0	2
85260	Cladotanytarsus vanderwulpi group		7.0	1
85500	Paratanytarsus sp		6.0	5
85800	Tanytarsus sp		7.0	3
85821	Tanytarsus glabrescens group sp 7		7.0	1
85840	Tanytarsus sepp		7.0	1
93200	Hydrobiidae		6.0	13
95100	Physella sp		9.0	1
98600	Sphaerium sp		5.0	5

Taxa Code	Taxa	Feed Grp	Tol.	Qt./Ql.

No. Quantitative Taxa:	38	Total Taxa:	38
Number of Organisms:	324	mIBI:	32.58

Appendix Table C-2. Macroinvertebrate taxa collected in the lower DuPage River study area during 2020.

Site: Ust. Pradel Rd.

Site ID: **LD34**

Subsample:

RM: 1.00

Collection Date 07/29/2018 River Code 95-675 River: Trib #6 to DuPage R. at RM 25.4

Taxa Code	Taxa	Taxa Grp	Tol.	Qt./Ql.
01801	Turbellaria		6.0	97
03600	Oligochaeta		10.0	36
04663	Helobdella papillata		8.0	13
04664	Helobdella stagnalis		8.0	4
04901	Erpobdellidae		8.0	2
05800	Caecidotea sp		6.0	6
06201	Hyalella azteca		4.0	21
06700	Crangonyx sp		4.0	8
11120	Baetis flavistriga	MA	4.0	3
11130	Baetis intercalaris	MA	4.0	7
13400	Stenacron sp	MA	4.0	3
22001	Coenagrionidae		5.5	2
22300	Argia sp		5.0	1
52200	Cheumatopsyche sp	CA	6.0	2
59500	Oecetis sp	CA	5.0	1
59520	Oecetis cinerascens	CA	5.0	4
59570	Oecetis nocturna	CA	5.0	1
68708	Dubiraphia vittata group	CO	5.0	1
69400	Stenelmis sp	CO	7.0	2
77130	Ablabesmyia rhamphe group		6.0	4
77500	Conchapelopia sp		6.0	3
78600	Pentaneura inconspicua		3.0	4
78655	Procladius (Holotanypus) sp		8.0	4
80410	Cricotopus (C.) sp		8.0	1
82820	Cryptochironomus sp		8.0	2
84450	Polypedilum (Uresipedilum) flavum		6.0	5
84470	Polypedilum (P.) illinoense		6.0	1
93200	Hydrobiidae		6.0	16
95100	Physella sp		9.0	3
97601	Corbicula fluminea		4.0	9
98600	Sphaerium sp		5.0	44

Taxa Code	Taxa	Feed Grp	Tol.	Qt./Ql.

No. Quantitative Taxa: 31 Total Taxa: 31

Number of Organisms: 310 mIBI: 34.34

Appendix Table C-2. Macroinvertebrate taxa collected in the lower DuPage River study area during 2020.

Site: Book Rd.

Site ID: **LD33**

Subsample:

RM: 0.14

Collection Date 07/29/2018 River Code 95-676 River: Wolf Creek (Trib to DuPage at RM 23.7)

Taxa Code	Taxa	Taxa Grp	Tol.	Qt./Ql.
01801	Turbellaria		6.0	2
03600	Oligochaeta		10.0	26
04964	Erpobdella microstoma		8.0	2
05800	Caecidotea sp		6.0	9
06201	Hyalella azteca		4.0	19
08200	Orconectes sp		5.0	2
11120	Baetis flavistriga	MA	4.0	37
11130	Baetis intercalaris	MA	4.0	17
13400	Stenacron sp	MA	4.0	1
16700	Tricorythodes sp	MA	5.0	1
22001	Coenagrionidae		5.5	2
52200	Cheumatopsyche sp	CA	6.0	13
52530	Hydropsyche depravata group	CA	5.0	2
58505	Helicopsyche borealis	CA	2.0	2
59410	Nectopsyche diarina	CA	3.0	1
68700	Dubiraphia sp	CO	5.0	2
68707	Dubiraphia quadrinotata	CO	5.0	6
68708	Dubiraphia vittata group	CO	5.0	29
69400	Stenelmis sp	CO	7.0	86
72700	Anopheles sp		6.0	1
77120	Ablabesmyia mallochi		6.0	1
77500	Conchapelopia sp		6.0	5
77750	Hayesomyia senata or Thienemannimyia norena		5.0	2
78140	Labrundinia pilosella		4.0	1
78655	Procladius (Holotanypus) sp		8.0	1
79000	Tanypus sp		8.0	1
82820	Cryptochironomus sp		8.0	5
82880	Cryptotendipes sp		6.0	2
84210	Paratendipes albimanus or P. duplicatus		3.0	1
84450	Polypedilum (Uresipedilum) flavum		6.0	19
84470	Polypedilum (P.) illinoense		6.0	6
84520	Polypedilum (Tripodura) halterale group		6.0	1
84540	Polypedilum (Tripodura) scalaenum group		6.0	5
85500	Paratanytarsus sp		6.0	1
95100	Physella sp		9.0	6
97601	Corbicula fluminea		4.0	5
98600	Sphaerium sp		5.0	2

Taxa Code	Taxa	Feed Grp	Tol.	Qt./Ql.

No. Quantitative Taxa:	37	Total Taxa:	37
Number of Organisms:	324	mIBI:	54.52

Appendix Table C-2. Macroinvertebrate taxa collected in the lower DuPage River study area during 2020.

Site: dst. 135th St.

Site ID: **LD32**

Subsample:

RM: 0.90

Collection Date 07/28/2018 River Code 95-677 River: East Norman Drain Trib # 5 to Dupage R. at RM 20.5

Taxa Code	Taxa	Taxa Grp	Tol.	Qt./Ql.
01801	Turbellaria		6.0	47
01900	Nemertea		99.9	1
03600	Oligochaeta		10.0	11
04663	Helobdella papillata		8.0	2
04664	Helobdella stagnalis		8.0	1
05800	Caecidotea sp		6.0	1
06201	Hyalella azteca		4.0	16
11020	Acerpenna pygmaea	MA	4.0	1
11120	Baetis flavistriga	MA	4.0	4
11130	Baetis intercalaris	MA	4.0	3
17200	Caenis sp	MA	6.0	1
52200	Cheumatopsyche sp	CA	6.0	8
59410	Nectopsyche diarina	CA	3.0	4
60900	Peltodytes sp	CO	99.9	4
68707	Dubiraphia quadrinotata	CO	5.0	1
74100	Simulium sp		6.0	3
77500	Conchapelopia sp		6.0	5
77750	Hayesomyia senata or Thienemannimyia norena		5.0	1
78655	Procladius (Holotanypus) sp		8.0	2
80420	Cricotopus (C.) bicinctus		8.0	1
82820	Cryptochironomus sp		8.0	5
83040	Dicrotendipes neomodestus		6.0	4
84210	Paratendipes albimanus or P. duplicatus		3.0	2
84450	Polypedilum (Uresipedilum) flavum		6.0	5
84470	Polypedilum (P.) illinoense		6.0	5
84540	Polypedilum (Tripodura) scalaenum group		6.0	11
85230	Cladotanytarsus mancus group		7.0	1
85400	Micropsectra sp		4.0	1
85500	Paratanytarsus sp		6.0	8
85625	Rheotanytarsus sp		6.0	4
85800	Tanytarsus sp		7.0	4
93200	Hydrobiidae		6.0	82
95100	Physella sp		9.0	7
96100	Menetus (Micromenetus) sp		6.5	1
98200	Pisidium sp		5.0	37
98600	Sphaerium sp		5.0	49

Taxa Code	Taxa	Feed Grp	Tol.	Qt./Ql.

No. Quantitative Taxa: 36 Total Taxa: 36

Number of Organisms: 343 mIBI: 45.46

Appendix Table C-2. Macroinvertebrate taxa collected in the lower DuPage River study area during 2020.

Site: ust. Drauden Rd.

Site ID: **LD29**

Subsample:

RM: 0.60

Collection Date 07/27/2018 River Code 95-678 River: Trib #4 to DuPage R. at RM 16.4

Taxa Code	Taxa	Taxa Grp	Tol.	Qt./Ql.
01801	Turbellaria		6.0	12
03600	Oligochaeta		10.0	10
04935	Erpobdella punctata punctata		8.0	1
05800	Caecidotea sp		6.0	131
06201	Hyalella azteca		4.0	68
06501	Gammaridae		4.0	7
11200	Callibaetis sp	MA	4.0	4
17200	Caenis sp	MA	6.0	4
22001	Coenagrionidae		5.5	11
27000	Corduliidae or Libellulidae		0.0	1
44501	Corixidae		99.9	1
52200	Cheumatopsyche sp	CA	6.0	1
53800	Hydroptila sp	CA	2.0	1
60800	Haliplus sp	CO	99.9	3
60900	Peltodytes sp	CO	99.9	1
65800	Berosus sp	CO	99.9	1
67700	Paracymus sp	CO	99.9	1
67800	Tropisternus sp	CO	99.9	1
68700	Dubiraphia sp	CO	5.0	3
69400	Stenelmis sp	CO	7.0	6
74501	Ceratopogonidae		5.0	1
77500	Conchapelopia sp		6.0	2
78655	Procladius (Holotanypus) sp		8.0	3
82730	Chironomus (C.) decorus group		11.0	1
84210	Paratendipes albimanus or P. duplicatus		3.0	6
84470	Polypedilum (P.) illinoense		6.0	1
85500	Paratanytarsus sp		6.0	1
85800	Tanytarsus sp		7.0	1
93200	Hydrobiidae		6.0	8
95100	Physella sp		9.0	5
95900	Gyraulus sp		6.0	1
98200	Pisidium sp		5.0	3
98600	Sphaerium sp		5.0	4

Taxa Code	Taxa	Feed Grp	Tol.	Qt./Ql.

No. Quantitative Taxa: 33 Total Taxa: 33

Number of Organisms: 305 mIBI: 36.54

Appendix Table C-2. Macroinvertebrate taxa collected in the lower DuPage River study area during 2020.

Site: W. Canal St.

Site ID: **LD27**

Subsample:

RM: 0.15

Collection Date 07/25/2018 River Code 95-679 River: Trib #1 to DuPage R. at RM 4.9

Taxa Code	Taxa	Taxa Grp	Tol.	Qt./Ql.
01801	Turbellaria		6.0	9
04935	Erpobdella punctata punctata		8.0	1
05800	Caecidotea sp		6.0	214
06800	Gammarus sp		3.0	8
08200	Orconectes sp		5.0	1
11120	Baetis flavistriga	MA	4.0	10
13521	Stenonema femoratum	MA	4.0	4
16700	Tricorythodes sp	MA	5.0	2
21300	Hetaerina sp		3.0	1
53800	Hydroptila sp	CA	2.0	2
58505	Helicopsyche borealis	CA	2.0	3
68201	Scirtidae		7.0	2
68700	Dubiraphia sp	CO	5.0	1
68708	Dubiraphia vittata group	CO	5.0	2
69200	Optioservus sp	CO	4.0	2
69400	Stenelmis sp	CO	7.0	21
72700	Anopheles sp		6.0	1
77500	Conchapelopia sp		6.0	2
78655	Procladius (Holotanypus) sp		8.0	1
82820	Cryptochironomus sp		8.0	1
83040	Dicrotendipes neomodestus		6.0	1
84460	Polypedilum (P.) fallax group		6.0	1
84470	Polypedilum (P.) illinoense		6.0	4
85800	Tanytarsus sp		7.0	3
85821	Tanytarsus glabrescens group sp 7		7.0	4
85840	Tanytarsus sepp		7.0	3
95100	Physella sp		9.0	1
97601	Corbicula fluminea		4.0	2

Taxa Code	Taxa	Feed Grp	Tol.	Qt./Ql.

No. Quantitative Taxa: 28 Total Taxa: 28

Number of Organisms: 307 mIBI: 45.55

Appendix Table C-3*. Grand total report for macroinvertebrate taxa collected in the lower DuPage River watershed by year from 2012 to 2018. In descending order based on numbers collected by taxa in 2018. Data includes number of sites collected at and total number collected for each survey year.*

Taxa Code	Taxa Name	Illinois Tolerance	Ohio Tolerance	2012		2015		2018	
				Sites	Number	Sites	Number	Sites	Number
11130	Baetis intercalaris	4	F	11	92	14	357	10	785
16700	Tricorythodes sp	5	MI	16	1044	14	1017	10	402
84470	Polypedilum (P.) illinoense	6	T	12	126	13	440	10	316
93900	Elimia sp	6	MI	14	119	14	535	10	275
84450	Polypedilum (Uresipedilum) flavum	6	F	13	59	9	57	10	148
11119	Plauditus dubius or P. virilis	3	I	0	0	4	15	8	110
01801	Turbellaria	6	F	16	535	14	280	10	104
52200	Cheumatopsyche sp	6	F	3	14	8	94	9	100
03600	Oligochaeta	10	T	16	364	14	177	8	80
06201	Hyalella azteca	4	F	16	808	14	178	7	79
74100	Simulium sp	6	F	2	36	10	255	8	72
97601	Corbicula fluminea	4	F	11	16	11	39	10	64
59410	Nectopsyche diarina	3	MI	5	9	5	6	7	37
77500	Conchapelopia sp	6	F	2	5	6	9	8	34
52565	Hydropsyche phalerata	5	MI	0	0	2	8	7	34
85625	Rheotanytarsus sp	6	F	15	65	10	45	7	33
53800	Hydroptila sp	2	F	7	32	2	2	8	30
13000	Leucrocuta sp	3	MI	0	0	6	40	6	20
53400	Protoptila sp	1	I	2	2	0	0	4	19
80420	Cricotopus (C.) bicinctus	8	T	4	43	4	6	5	18
69400	Stenelmis sp	7	F	10	34	11	39	5	18
78600	Pentaneura inconspicua	3	F	10	108	1	4	7	17
80440	Cricotopus (C.) trifascia	6	F	0	0	2	9	5	15
85500	Paratanytarsus sp	6	F	0	0	1	1	4	14
83040	Dicrotendipes neomodestus	6	F	6	28	1	1	5	14
52570	Hydropsyche simulans	5	MI	0	0	0	0	3	14
22001	Coenagrionidae	5.5	T	16	169	9	62	5	11
78655	Procladius (Holotanypus) sp	8	MT	5	11	1	1	5	10
77750	Hayesomyia senata or Thienemannimy	5	F	0	0	0	0	5	9
95100	Physella sp	9	T	15	243	6	10	1	8
82220	Tvetenia discoloripes group	5	MI	0	0	5	7	3	7
17200	Caenis sp	6	F	8	16	1	2	7	7
13521	Stenonema femoratum	4	F	0	0	0	0	1	7
11200	Callibaetis sp	4	MT	1	2	0	0	3	7
11020	Acerpenna pygmaea	4	MI	5	56	3	10	3	7
68708	Dubiraphia vittata group	5	F	3	5	2	4	5	6

***Appendix Table C-3**. continued.*

Taxa Code	Taxa Name	Illinois Tolerance	Ohio Tolerance	2012		2015		2018	
				Sites	Number	Sites	Number	Sites	Number
95900	Gyraulus sp	6	MT	4	16	1	1	1	5
84540	Polypedilum (Tripodura) scalaenum gr	6	F	3	11	1	1	3	5
77120	Ablabesmyia mallochi	6	F	0	0	3	3	3	5
82820	Cryptochironomus sp	8	F	1	1	2	2	4	4
80510	Cricotopus (Isocladius) sylvestris grou	8	T	1	1	0	0	3	4
22300	Argia sp	5	F	9	24	1	1	3	4
11120	Baetis flavistriga	4	F	0	0	10	70	2	4
04964	Erpobdella microstoma	8	MT	0	0	1	1	1	4
93200	Hydrobiidae	6	F	6	20	11	159	2	3
82100	Thienemanniella sp	2		0	0	1	1	3	3
11015	Acerpenna sp	4	MI	3	9	0	0	3	3
05800	Caecidotea sp	6	T	3	13	11	19	1	3
01900	Nemertea	99.9	F	0	0	3	7	2	3
98600	Sphaerium sp	5	F	3	16	0	0	1	2
82730	Chironomus (C.) decorus group	11	T	3	13	3	3	1	2
78750	Rheopelopia paramaculipennis	3	MI	0	0	0	0	2	2
72700	Anopheles sp	6	F	1	1	0	0	1	2
68901	Macronychus glabratus	2	F	3	4	2	6	2	2
04901	Erpobdellidae	8	MT	1	1	0	0	2	2
98200	Pisidium sp	5	MT	4	8	0	0	1	1
85265	Cladotanytarsus vanderwulpi group sp	7	MI	0	0	0	0	1	1
84960	Pseudochironomus sp	5	F	2	3	0	0	1	1
84700	Stenochironomus sp	3	F	0	0	1	1	1	1
83820	Microtendipes "caelum" (sensu Simps	6	MI	0	0	0	0	1	1
83050	Dicrotendipes lucifer	6	MT	0	0	0	0	1	1
81825	Rheocricotopus (Psilocricotopus) roba	6	F	0	0	0	0	1	1
80430	Cricotopus (C.) tremulus group	8	MT	0	0	0	0	1	1
80410	Cricotopus (C.) sp	8	F	1	2	1	1	1	1
77130	Ablabesmyia rhamphe group	6	MT	0	0	0	0	1	1
67800	Tropisternus sp	99.9	T	1	1	0	0	1	1
67750	Sperchopsis tesselata	0	F	0	0	0	0	1	1
65800	Berosus sp	99.9	MT	1	2	0	0	1	1
59970	Petrophila sp	5	MI	2	2	1	2	1	1
59500	Oecetis sp	5	F	6	11	1	1	1	1
53300	Glossosoma sp	3.5	MI	0	0	0	0	1	1
43300	Ranatra sp	99.9	F	0	0	0	0	1	1
23501	Aeshnidae	4.5		8	10	0	0	1	1
06800	Gammarus sp	3	F	0	0	0	0	1	1
98001	Pisidiidae	5		7	14	14	232	0	0
96900	Ferrissia sp	7	F	1	1	7	18	0	0
96801	Ancylidae	7	F	1	1	0	0	0	0
96100	Menetus (Micromenetus) sp	6.5		2	3	0	0	0	0

***Appendix Table C-3**. continued.*

Taxa Code	Taxa Name	Illinois Tolerance	Ohio Tolerance	2012		2015		2018	
				Sites	Number	Sites	Number	Sites	Number
95907	Gyraulus (Torquis) parvus	6	MT	1	5	0	0	0	0
95501	Planorbidae	6.5	MT	3	3	1	1	0	0
94400	Fossaria sp	7	MT	4	4	0	0	0	0
94201	Lymnaeidae	7		0	0	1	1	0	0
89601	Muscidae	8		0	0	1	1	0	0
89501	Ephydridae	8	F	1	2	0	0	0	0
87540	Hemerodromia sp	6	F	0	0	1	2	0	0
87250	Odontomyia (Odontomyiina) sp	10	MT	2	3	0	0	0	0
86501	Stratiomyidae	10		1	1	0	0	0	0
85840	Tanytarsus sepp	7	F	2	3	0	0	0	0
85821	Tanytarsus glabrescens group sp 7	7	F	2	3	0	0	0	0
85800	Tanytarsus sp	7	F	1	2	1	1	0	0
85615	Rheotanytarsus pellucidus	6	MI	2	2	0	0	0	0
85001	Tanytarsini	6		2	2	0	0	0	0
84750	Stictochironomus sp	5	F	1	2	0	0	0	0
84520	Polypedilum (Tripodura) halterale gro	6	MT	1	1	0	0	0	0
84400	Polypedilum sp	6		1	1	0	0	0	0
84210	Paratendipes albimanus or P. duplicat	3	F	0	0	2	4	0	0
83400	Harnischia sp	6	F	0	0	1	1	0	0
83300	Glyptotendipes (G.) sp	10	MT	0	0	1	1	0	0
83003	Dicrotendipes fumidus	6	F	1	1	0	0	0	0
83002	Dicrotendipes modestus	6	MT	1	4	0	0	0	0
82880	Cryptotendipes sp	6	F	0	0	1	1	0	0
82770	Chironomus (C.) riparius group	11	T	0	0	1	1	0	0
82710	Chironomus (C.) sp	11	MT	1	1	1	1	0	0
82141	Thienemanniella xena	2	F	2	2	0	0	0	0
82130	Thienemanniella similis	2	MI	4	9	2	4	0	0
82121	Thienemanniella lobapodema	2	F	2	5	0	0	0	0
82101	Thienemanniella taurocapita	2	MI	3	6	0	0	0	0
80740	Eukiefferiella claripennis group	4	MT	0	0	0	0	0	0
80490	Cricotopus (Isocladius) intersectus gro	8	MT	1	1	0	0	0	0
80400	Cricotopus sp	8	F	3	3	0	0	0	0
80350	Corynoneura sp	2		1	1	0	0	0	0
80001	Orthocladiinae	6		0	0	1	1	0	0
79000	Tanypus sp	8	T	1	1	0	0	0	0
78650	Procladius sp	8	MT	1	2	0	0	0	0
78601	Pentaneura inyoensis	3	F	1	8	0	0	0	0
78599	Pentaneura sp	3	F	2	8	5	11	0	0
78100	Labrundinia sp	4	F	0	0	1	1	0	0
77800	Helopelopia sp	4	F	1	1	0	0	0	0
77355	Clinotanypus pinguis	6	MT	1	2	0	0	0	0
77115	Ablabesmyia janta	6	F	1	1	0	0	0	0

***Appendix Table C-3**. continued.*

Taxa Code	Taxa Name	Illinois Tolerance	Ohio Tolerance	2012		2015		2018	
				Sites	Number	Sites	Number	Sites	Number
77100	Ablabesmyia sp	6		0	0	1	1	0	0
77001	Tanypodinae	6		3	4	1	1	0	0
76001	Chironomidae	6		9	15	0	0	0	0
74650	Atrichopogon sp	2	F	1	1	0	0	0	0
74501	Ceratopogonidae	5	T	3	9	0	0	0	0
73601	Simuliidae	6	F	1	1	0	0	0	0
72101	Psychodidae	11	T	1	1	0	0	0	0
70000	Diptera	10		4	5	0	0	0	0
69901	Curculionidae	99.9		4	6	0	0	0	0
68707	Dubiraphia quadrinotata	5	F	2	3	0	0	0	0
68700	Dubiraphia sp	5	F	2	4	8	15	0	0
68075	Psephenus herricki	4	MI	1	3	0	0	0	0
60900	Peltodytes sp	99.9	MT	1	1	0	0	0	0
60800	Haliplus sp	99.9	MT	0	0	1	1	0	0
59950	Parapoynx sp	99.9	MI	0	0	0	0	0	0
59911	Crambidae	99.9		1	3	0	0	0	0
59728	Triaenodes marginatus	3	F	1	6	0	0	0	0
59570	Oecetis nocturna	5	F	1	3	0	0	0	0
59550	Oecetis inconspicua complex sp A (ser	5	F	1	1	0	0	0	0
59520	Oecetis cinerascens	5	F	1	2	0	0	0	0
59407	Nectopsyche candida	3	MI	1	1	0	0	0	0
59150	Ceraclea resurgens group	0	F	0	0	1	1	0	0
58505	Helicopsyche borealis	2	MI	3	3	0	0	0	0
53501	Hydroptilidae	3.5	F	2	3	0	0	0	0
53201	Glossosomatidae	3.5	MI	1	2	0	0	0	0
52550	Hydropsyche frisoni	5	MI	0	0	1	1	0	0
52510	Hydropsyche aerata	5	MI	1	2	0	0	0	0
52001	Hydropsychidae	5.5		1	4	0	0	0	0
50000	Trichoptera	3.5		1	1	0	0	0	0
43570	Neoplea sp	99.9	F	1	1	0	0	0	0
27001	Corduliidae	4.5		1	1	0	0	0	0
23700	Anax sp	5	MT	1	1	0	0	0	0
23600	Aeshna sp	4	MT	3	7	0	0	0	0
21300	Hetaerina sp	3	F	5	5	0	0	0	0
21200	Calopteryx sp	4	F	1	1	0	0	0	0
21001	Calopterygidae	3.5	F	1	1	0	0	0	0
18100	Anthopotamus sp	4	MI	0	0	1	1	0	0
13570	Maccaffertium terminatum	4	MI	1	2	0	0	0	0
13400	Stenacron sp	4	F	2	2	5	14	0	0
12501	Heptageniidae	3.5		0	0	1	1	0	0
11100	Baetis sp	4	F	1	1	0	0	0	0
11018	Acerpenna macdunnoughi	4	MI	0	0	2	2	0	0

***Appendix Table C-3**. continued.*

Taxa Code	Taxa Name	Illinois Tolerance	Ohio Tolerance	2012		2015		2018	
				Sites	Number	Sites	Number	Sites	Number
11014	Acentrella turbida	4	I	0	0	1	2	0	0
11001	Baetidae	4		3	5	0	0	0	0
08200	Orconectes sp	5	F	1	1	4	6	0	0
06700	Crangonyx sp	4	MT	0	0	2	4	0	0
04935	Erpobdella punctata punctata	8	MT	0	0	1	1	0	0
04930	Erpobdella sp	8	MT	3	5	2	3	0	0
04666	Helobdella papillata	8	MT	1	1	2	2	0	0
04664	Helobdella stagnalis	8	T	3	4	2	3	0	0
04663	Helobdella papillata	8	MT	1	1	0	0	0	0
04660	Helobdella sp	8	MT	2	6	0	0	0	0
04601	Glossiphoniidae	8	MT	1	1	0	0	0	0
04510	Hirudinida	8	MT	1	1	0	0	0	0
02600	Nematomorpha	99.9	F	1	1	0	0	0	0

APPENDIX D

Lower DuPage River 2018 Habitat Data

D-1: Lower DuPage River 2018 QHEI Metrics and Scores
D-2: QHEI Field Sheets 2018

Appendix D-1. QHEI metric scores for sites in the lower DuPage River study area in 2018.

River Mile	QHEI	QHEI Metrics: Substrate	Cover	Channel	Riparian	Pool	Riffle	Gradient / Score	Narrative
95-661	*West Norman Drain (Trib to DuPage R. at RM 20.2)*								
	Year: **2018**								
5.10	**61.50**	8.0	15.0	12.0	5.5	8.0	3.0	21.30 - (10)	Fair
2.20	**58.00**	14.5	15.0	11.0	4.0	5.5	0.0	14.90 - (8)	Fair
95-662	*Mink Creek (Trib to Lily Cache Creek at RM 1.9)*								
	Year: **2018**								
3.20	**38.50**	0.0	13.0	5.0	7.5	3.0	0.0	18.30 - (10)	Poor
1.80	**62.00**	10.0	16.0	12.0	3.5	9.5	3.0	10.70 - (8)	Fair
95-663	*Spring Creek (Trib to DuPage R. at RM 17.8)*								
	Year: **2018**								
1.47	**39.50**	2.0	13.0	5.5	2.0	7.0	0.0	16.30 - (10)	Poor
0.50	**68.00**	11.5	13.0	16.5	10.0	9.0	0.0	14.30 - (8)	Fair
95-664	*Springbrook Creek (Trib to DuPage R. at RM 27.1)*								
	Year: **2018**								
4.80	**77.00**	13.5	19.0	18.0	6.5	10.0	4.0	5.20 - (6)	Good
1.40	**56.50**	13.5	12.0	11.0	5.0	5.0	0.0	6.10 - (10)	Fair
95-665	*Rock Run Creek (Trib to IL-MI Canal at RM 9.0)*								
	Year: **2018**								
7.90	**38.00**	0.0	14.0	15.0	6.0	1.0	0.0	1.00 - (2)	Poor
6.50	**41.00**	2.0	7.0	6.0	9.0	7.0	0.0	18.90 - (10)	Poor
5.70	**38.00**	2.0	10.0	6.0	8.0	2.0	0.0	15.10 - (10)	Poor
3.50	**73.00**	8.0	19.0	16.0	6.0	11.0	3.0	8.80 - (10)	Fair
95-666	*DuPage River*								
	Year: **2018**								
26.60	**80.50**	16.0	18.0	13.5	7.5	10.0	5.5	4.90 - (10)	Good
25.20	**84.00**	16.0	18.0	15.5	7.0	12.0	5.5	4.90 - (10)	Excellent
23.10	**70.50**	16.0	17.0	10.5	5.0	9.0	3.0	5.00 - (10)	Fair
22.00	**67.50**	16.0	16.0	9.0	4.5	9.0	3.0	5.10 - (10)	Fair
20.80	**68.00**	16.0	15.0	9.0	6.0	9.0	3.0	5.10 - (10)	Fair
18.50	**64.50**	16.0	14.0	10.0	6.0	5.0	3.5	5.00 - (10)	Fair
17.00	**73.50**	16.0	18.0	10.0	7.5	9.0	3.0	4.90 - (10)	Fair
13.40	**71.00**	16.0	17.0	10.0	7.0	8.0	3.0	4.80 - (10)	Fair
11.40	**78.00**	16.0	16.0	13.5	5.5	11.0	6.0	4.50 - (10)	Good
9.60	**73.50**	16.0	16.0	12.0	5.5	9.0	5.0	4.40 - (10)	Fair
7.00	**75.25**	16.0	15.0	13.5	4.7	11.0	5.0	4.20 - (10)	Fair
4.70	**82.50**	16.0	17.0	16.5	4.5	12.0	6.5	4.10 - (10)	Good
2.50	**70.00**	16.0	16.0	11.0	5.0	9.0	3.0	4.10 - (10)	Fair
1.50	**43.00**	6.0	12.0	2.0	7.0	6.0	0.0	4.20 - (10)	Poor
1.00	**84.75**	16.0	16.0	19.5	6.7	10.0	6.5	4.19 - (10)	Excellent
95-667	*Hammel Creek (Trib to DuPage R. at RM 10.6)*								

Appendix D-1. QHEI metric scores for sites in the lower DuPage River study area in 2018.

River Mile	QHEI	QHEI Metrics: Substrate	Cover	Channel	Riparian	Pool	Riffle	Gradient / Score	Narrative
	Year: **2018**								
1.19	**67.00**	14.0	15.0	16.5	4.5	6.0	3.0	10.70 - (8)	Fair
95-668	*Lily Cache Creek (Trib to DuPage R. at RM 14.4)*								
	Year: **2018**								
14.70	**57.75**	12.0	14.0	11.5	3.7	5.5	3.0	13.50 - (8)	Fair
11.20	**39.50**	9.5	9.0	5.0	5.0	1.0	0.0	11.80 - (10)	Poor
6.50	**63.50**	14.0	15.0	11.0	6.5	4.0	3.0	9.80 - (10)	Fair
0.36	**57.00**	5.0	16.0	12.0	7.0	7.0	0.0	8.30 - (10)	Fair
95-672	*Trib #3 to DuPage R. at RM 13.9*								
	Year: **2018**								
0.80	**42.75**	8.0	9.0	7.5	4.2	4.0	0.0	17.90 - (10)	Poor
95-673	*Trib #1 to Lily Chache Cr at RM 6.1*								
	Year: **2018**								
0.84	**33.25**	2.0	10.0	6.0	8.2	-1.0	0.0	12.90 - (8)	Poor
95-675	*Trib #6 to DuPage R. at RM 25.4*								
	Year: **2018**								
1.00	**57.00**	14.0	17.0	11.5	4.0	4.5	0.0	9.70 - (6)	Fair
95-677	*East Norman Drain Trib # 5 to Dupage R. at RM 20.5*								
	Year: **2018**								
0.90	**33.00**	6.0	9.0	7.0	0.0	3.0	0.0	13.30 - (8)	Poor
95-678	*Trib #4 to DuPage R. at RM 16.4*								
	Year: **2018**								
0.60	**59.50**	15.5	13.0	13.0	4.0	4.0	0.0	23.10 - (10)	Fair

Qualitative Habitat Evaluation Index Field Sheet

OHEI Score: 62.5

River Code: 20-915 | RM: 5.2 | Stream: Forked Creek
Site Code: 1-9 | Project Code: 12Delaware | Location: upst. Rte 104
Date: 7-17-12 | Scorer: MHS | Latitude: 40.2425 | Longitude: -82.9134

1) SUBSTRATE (Check ONLY Two Substrate TYPE BOXES; Estimate % percent)

TYPE	POOL	RIFFLE
☐ BEDROCK (10)		
☐ LIMESTONE BEDROCK (10)		
☐ BOULDER (9)		
☐ COBBLE (8)		
☐ GRAVEL (7)		
☑ SAND (6)		
☐ BEDROCK (5)		
☐ DETRITUS (3)		
☐ ARTIFICIAL (2)		
☐ SILT (1)		

	POOL	RIFFLE

SUBSTRATE ORIGIN (Check ONE OR 2 & AVERAGE)
- ☐ -LIMESTONE (1)
- ☑ -TILLS (1)
- ☐ -WETLANDS (0)
- ☐ -HARDPAN (0)
- ☐ -SANDSTONE (0)
- ☐ -ASP / RAP (0)
- ☐ -LACUSTRINE (0)
- ☐ -SHALE (-1)
- ☐ -COAL FINES (-2)

SUBSTRATE QUALITY (Check ONE OR 2 & AVERAGE)
- ☐ -SILT HEAVY (-2)
- ☑ -SILT MODERATE (-1)
- ☐ -SILT NORMAL (0)
- ☐ -SILT FREE (1)
- EMBEDDED: ☐ -EXTENSIVE (-2)
- NESS: ☑ -MODERATE (-1)
- ☐ -NORMAL (0)
- ☐ -NONE (1)

NUMBER OF SUBSTRATE TYPES (High Quality Only, Score 0 or 1): ☐ -3 or More (2) ☑ -2 or Less (0)

Substrate: 12 / Max 20

COMMENTS:

2) INSTREAM COVER (Give each cover type a score of 0 to 5; see back for instructions)

(Duration)	TYPE	Score All That Occur
1	UNDERCUT BANKS (1)	3 POOLS > 70 cm (2)
2	OVERHANGING VEGETATION (1)	1 ROOTWADS (1)
1	SHALLOWS (IN SLOW WATER) (1)	1 BOULDERS (1)
1	ROOTWAD (1)	0 SNAGS, BACKWATERS (1)
		0 AQUATIC MACROPHYTES (1)
		0 LOGS OR WOODY DEBRIS (1)

AMOUNT (Check ONE if one or check 2 and AVERAGE)
- ☐ -EXTENSIVE > 75% (11)
- ☑ -MODERATE 25 - 75% (7)
- ☐ -SPARSE 5 - 25% (3)
- ☐ -NEARLY ABSENT < 5% (1)

Cover: 15 / Max 20

COMMENTS:

3) CHANNEL MORPHOLOGY (CHECK ONLY one PER Category OR check 2 and AVERAGE)

SINUOSITY
- ☐ -HIGH (4)
- ☑ -MODERATE (2)
- ☑ -LOW (1)
- ☐ -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)

MODIFICATIONS / OTHER
- ☐ -SNAGGING
- ☐ -RELOCATION
- ☐ -CANOPY REMOVAL
- ☐ -DREDGING
- ☐ -IMPOUNDMENT
- ☐ -ISLAND
- ☐ -LEVEES
- ☐ -BANK [ARMORING]
- ☐ -ONE SIDE CHANNEL MODIFICATIONS

Channel: 14.5 / Max 20

COMMENTS:

4) RIPARIAN ZONE AND BANK EROSION (Check ONE box PER bank or check 2 and AVERAGE per bank)

River Right Looking Downstream

RIPARIAN WIDTH

L	R	(Per Bank)
☐	☐	-VERY WIDE > 100m (6)
☐	☐	-WIDE > 50m (4)
☐	☐	-MODERATE 10 - 50m (3)
☑	☐	-NARROW 5 - 10m (2)
☐	☐	-VERY NARROW < 5m (1)
☐	☐	-NONE (0)

FLOOD PLAIN QUALITY (FIRST 100 Meter RIPARIAN)

L	R	(Most Predominant Per Bank)
☑	☑	-FOREST, SWAMP (3)
☐	☐	-SHRUB OR OLD FIELD (2)
☐	☐	-RESIDENTIAL, PARK, NEW FIELD (1)
☐	☐	-FENCED PASTURE (1)
☐	☐	-CONSERVATION TILLAGE (1)
☐	☐	-URBAN OR INDUSTRIAL (0)
☐	☐	-OPEN PASTURE, ROWCROP (0)
☐	☐	-MINING / CONSTRUCTION (0)

BANK EROSION

L	R	(Per Bank)
☐	☐	-NONE / LITTLE (3)
☑	☑	-MODERATE (2)
☐	☐	-HEAVY / SEVERE (1)

Riparian: 4.5 / Max 10

COMMENTS:

5) POOL / GLIDE AND RIFFLE / RUN QUALITY

MAX DEPTH (Check 1 ONLY)
- ☑ -1m (6)
- ☐ -0.7m (4)
- ☐ -0.4 to 0.7m (2)
- ☐ -0.2 to 0.4m (1)
- ☐ -< 0.2m (POOL = 0)

MORPHOLOGY (Check 1 or 2 & AVERAGE)
- ☑ -POOL WIDTH > RIFFLE WIDTH (3)
- ☐ -POOL WIDTH = RIFFLE WIDTH (1)
- ☐ -POOL WIDTH < RIFFLE WIDTH (0)
- ☐ -IMPOUNDED (-1)

CURRENT VELOCITY (POOLS & RIFFLES) (Check All That Apply)
- ☐ -EDDIES (1)
- ☐ -FAST (1)
- ☑ -MODERATE (1)
- ☑ -SLOW (1)
- ☐ -NONE (-1)
- ☐ -TORRENTAL (-1)
- ☐ -INTERSTITIAL (-1)
- ☐ -INTERMITTENT (-2)
- ☐ -VERY FAST (1)

Pool / Current: 10 / Max 12

COMMENTS:

6) CHECK ONE OR CHECK 2 AND AVERAGE

RIFFLE DEPTH
- ☐ -Most Areas > 10cm (2)
- ☑ -Most Areas 5 - 10cm (1)
- ☐ -Most Areas < 5cm (0)
- ☐ -NO RIFFLE but RUNS present (0)
- ☐ -NO RIFFLE / NO RUN (Marsh = 0)

RUN DEPTH
- ☐ -MAX > 50 cm (2)
- ☑ -MAX < 50 cm (1)

RIFFLE / RUN SUBSTRATE
- ☑ -STABLE (e.g. Cobble, Boulder) (2)
- ☑ -MOD. STABLE (e.g. Large Gravel) (1)
- ☐ -UNSTABLE (Fine Gravel, Sand) (0)

RIFFLE / RUN EMBEDDEDNESS
- ☐ -NONE (2)
- ☑ -LOW (1)
- ☐ -MODERATE (0)
- ☐ -EXTENSIVE (-1)

Riffle / Run: 4.5 / Max 8

COMMENTS:

Gradient: 10 / Max 10

6) GRADIENT (ft / mi): 3.14 DRAINAGE AREA (sq.mi.): 103.4

% POOL: ____ % GLIDE: ____ % RIFFLE: ____ % RUN: ____

Gradient Score from Table 1 of User Manual based on gradient and drainage area

Max 10

Note: areas must be large enough to support a population of riffle obligate species

10 / 2.99 = 3.34 ft/mi

Is Sampling Reach Representative of the Stream? (Y/ N)

If Not, Explain:

Lat / Long (Beg):	
Lat / Long (Mid):	
Lat / Long (End):	
Lat / Long (X-Loc):	

Subjective Rating (1-10): 6

Aesthetic Rating (1-10): 6

Gradient: ☐ -Low ☐ -Moderate ☐ -High

First Sampling Pass	Gear:	Distance:	Water Clarity:	Water Stage:	Canopy: % open:
	D	200	Turbid	Normal	90

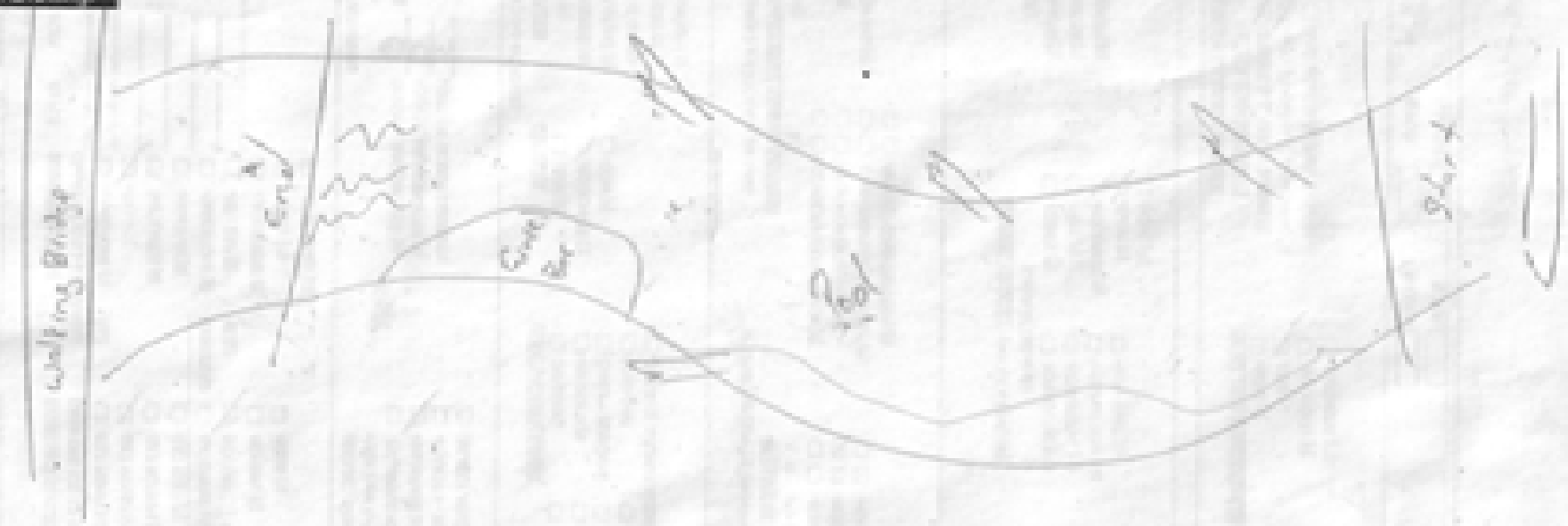
You Is:
- ☐ ☐ Is Stream Ephemeral (no pools, totally dry or only during spurts)?
- ☐ ☐ Is there water upstream? How far:
- ☐ ☐ Is there water close downstream? How far:
- ☐ ☐ Is Dry Channel mostly natural?

Major Suspected Sources of Impacts (Check All That Apply)

- ☐ None
- ☐ Industrial
- ☐ MWTP
- ☐ Agriculture
- ☐ Livestock
- ☐ Silviculture
- ☐ Construction
- ☐ Urban Runoff
- ☐ CSOs
- ☐ Suburban / Hydro
- ☐ Mining
- ☐ Channelization
- ☐ Riparian Removal
- ☐ Landfills
- ☐ Natural
- ☐ Dams
- ☐ Other Flow Alteration

Other:

Stream Drawing:



Instructions for scoring the alternate cover metric: Each cover type should receive a score of between 0 and 3, where: 0 = Cover type absent; 1 = cover type in very small amounts or if more common of marginal quality; 2 = cover type present in moderate amounts, but not of highest quality or in small amounts of highest quality; 3 = cover type of highest quality in moderate or greater amounts. Examples of highest quality include, very large boulders in deep or fast water, large diameter logs that are stable, well developed rootwads in deep / fast water, or deep, well-defined, functional pools.

Qualitative Habitat Evaluation Index Field Sheet

QHEI Score: 84

River Code: 05-087 | RM: 10.6 | Stream: Rush Run Creek
Site Code: 1-05-3 | Project Code: Cardinal EIS | Location: Rush Run RP
Date: 7-15-15 | Scorer: MMS | Latitude: 40.0 [illegible] | Longitude: -82.[illegible]

I. SUBSTRATE (Check ONLY Two Substrate Type BOXES; Estimate % percent)

TYPE	POOL	RIFFLE		POOL	RIFFLE
☐ ☐ BLDR/SLAB [10]			☐ ☑ GRAVEL [7]		
☐ ☐ Lg BOULD [10]			☑ ☐ SAND [6]		
☐ ☐ BOULDER [9]			☐ ☐ BEDROCK [5]		
☐ ☐ COBBLE [8]			☐ ☐ DETRITUS [3]		
☐ ☐ mx/SP/mm [4]			☐ ☐ ARTIFICIAL [0]		
☐ ☐ MUCK [2]			☐ ☐ SILT [2]		

SUBSTRATE ORIGIN (Check ONE OR 2 & AVERAGE): ☐ -LIMESTONE [1] ☑ -TILLS [1] ☐ -WETLANDS [0] ☐ -KARSTIC [0] ☐ -SANDSTONE [0] ☐ -ASP / RAP [0] ☐ -LACUSTRINE [0] ☐ -SHALE [-1] ☐ -COAL FINES [-2]

SUBSTRATE QUALITY (Check ONE OR 2 & AVERAGE): SILT: ☐ -SILT HEAVY [-2] ☐ -SILT MODERATE [-1] ☑ -SILT NORMAL [0] ☐ -SILT FREE [1]; EMBEDDED / NESS: ☐ -EXTENSIVE [-2] ☐ -MODERATE [-1] ☑ -NORMAL [0] ☐ -NONE [1]

NUMBER OF SUBSTRATE TYPES (High Quality Only, Score 0 or 1): ☑ -4 or More [0] ☐ -Five Less [0]

Substrate: 14 / Max 20

COMMENTS:

II. INSTREAM COVER (Give each cover type a score of 0 to 3, see back for instructions)

(Structure)
- 2 UNDERCUT BANKS [1]
- 1 OVERHANGING VEGETATION [1]
- 2 SHALLOWS (IN SLOW WATER) [1]
- 2 ROOTWAD [1]

TYPE: Score All That Occur
- 1 POOLS > 70 cm [2]
- 2 ROOTWADS [1]
- 1 BOULDERS [1]
- 1 OVERHANG. BACKWATERS [1]
- 2 AQUATIC MACROPHYTES [1]
- 2 LOGS OR WOODY DEBRIS [1]

AMOUNT (Check ONLY one or check 2 and AVERAGE): ☐ -EXTENSIVE > 75% [11] ☑ -MODERATE 25 - 75% [7] ☐ -SPARSE 5 - 25% [3] ☐ -NEARLY ABSENT < 5% [1]

Cover: 16 / Max 20

COMMENTS:

III. CHANNEL MORPHOLOGY (Check ONLY one POR category OR check 2 and AVERAGE)

SINUOSITY: ☐ -HIGH [4] ☐ -MODERATE [2] ☐ -LOW [1] ☐ -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]

MODIFICATIONS / OTHER: ☐ -SNAGGING ☐ -REGULATION ☐ -CANOPY REMOVAL ☐ -DREDGING ☐ -IMPOUNDMENT ☐ -ISLAND ☐ -LEVEE ☐ -BANK SHAPING ☐ -ONE SIDE CHANNEL MODIFICATIONS

Channel: 16 / Max 20

COMMENTS:

IV. RIPARIAN ZONE AND BANK EROSION (Check ONE box FOR bank or check 2 and AVERAGE per bank)

River Right Looking Downstream

RIPARIAN WIDTH (L / R, Per Bank):
- ☐ ☐ VERY WIDE > 100m [5]
- ☐ ☐ WIDE > 50m [4]
- ☐ ☐ MODERATE 10 - 50m [3]
- ☐ ☐ NARROW 5 - 10m [2]
- ☐ ☐ VERY NARROW < 5m [1]
- ☐ ☐ NONE [1]

FLOOD PLAIN QUALITY (PAST 100 Meter RIPARIAN) (L / R, Most Predominant Per Bank):
- ☐ ☐ FOREST, SWAMP [2]
- ☐ ☐ SHRUB OR OLD FIELD [2]
- ☑ ☑ RESIDENTIAL, PARK, NEW FIELD [1]
- ☐ ☐ FENCED PASTURE [1]
- ☐ ☐ -CONSERVATION TILLAGE [1]
- ☐ ☐ -URBAN OR INDUSTRIAL [0]
- ☐ ☐ -OPEN PASTURE, ROW CROP [0]
- ☐ ☐ -MINING / CONSTRUCTION [0]

BANK EROSION (L / R, Per Bank):
- ☐ ☐ -NONE / LITTLE [0]
- ☑ ☑ -MODERATE [2]
- ☐ ☐ -HEAVY / SEVERE [1]

Riparian: 4 / Max 10

COMMENTS:

V. POOL / GLIDE AND RIFFLE / RUN QUALITY

MAX DEPTH (Check 1 ONLY):
- ☑ - 1m [6]
- ☐ - 0.7m [4]
- ☐ - 0.4 to 0.7m [2]
- ☐ - 0.2 to 0.4m [1]
- ☐ - < 0.2m [POOL = 0]

MORPHOLOGY (Check 1 or 2 & AVERAGE):
- ☑ -POOL WIDTH > RIFFLE WIDTH [2]
- ☐ -POOL WIDTH = RIFFLE WIDTH [1]
- ☐ -POOL WIDTH < RIFFLE WIDTH [0]
- ☐ -IMPOUNDED [-1]

CURRENT VELOCITY (POOLS & RIFFLES) (Check All That Apply):
- ☑ -SWIFT [1]
- ☐ -FAST [1]
- ☑ -MODERATE [1]
- ☐ -SLOW [1]
- ☐ -NONE [-1]
- ☐ -TORRENTIAL [-1]
- ☐ -INTERSTITIAL [-1]
- ☐ -INTERMITTENT [-2]
- ☐ -VERY FAST [0]

Pool / Current: 11 / Max 12

COMMENTS:

VI. RIFFLE / RUN QUALITY

CHECK ONE OR 2 & AVERAGE

RIFFLE DEPTH:
- ☐ -Riffle Absent = 0cm [0]
- ☑ -Shallow (< 10cm) [1]
- ☐ -Good Depth (10 - 50cm) [2]
- ☐ -Deep (> 50cm) [1]
- ☐ -Shallow Pools Only [0]

RUN DEPTH:
- ☐ -MAX > 50 cm [2]
- ☐ -MAX < 50 cm [1]

RIFFLE / RUN SUBSTRATE:
- ☐ -STABLE (e.g., Cobble, Boulder) [2]
- ☑ -MOD. STABLE (e.g., Gravel) [1]
- ☐ -UNSTABLE (e.g., Sand, Silt) [0]

RIFFLE / RUN EMBEDDEDNESS:
- ☐ -NONE [2]
- ☑ -LOW [1]
- ☑ -MODERATE [0]
- ☐ -HIGH [-1]

Riffle / Run: 5 / Max 8

COMMENTS:

VII. GRADIENT

Gradient: 10

VII. GRADIENT (ft / mi): 5.9 | DRAINAGE AREA (sq mi): 101.3 | % POOL: | % GLIDE: | % RIFFLE: | % RUN:

Max 10

Stream size and quality must be large enough to support a population of warmwater species.

Is Sampling Reach Representative of the Stream? (Y/ N)

If Not, Explain:

Lat / Long (Beg):	
Lat / Long (Mid):	
Lat / Long (End):	
Lat / Long (X-Loc):	

Major Suspected Sources of Impacts (Check All That Apply):

- None ☐
- Industrial ☐
- WWTP ☐
- Agriculture ☐
- Livestock ☐
- Silviculture ☐
- Construction ☐
- Urban Runoff ☐
- CSOs ☐
- Suburban Impacts ☐
- Mining ☐
- Channelization ☐
- Riparian Removal ☐
- Landfills ☐
- Natural ☐
- Dams ☐
- Other Flow Alteration ☐

Other: _____

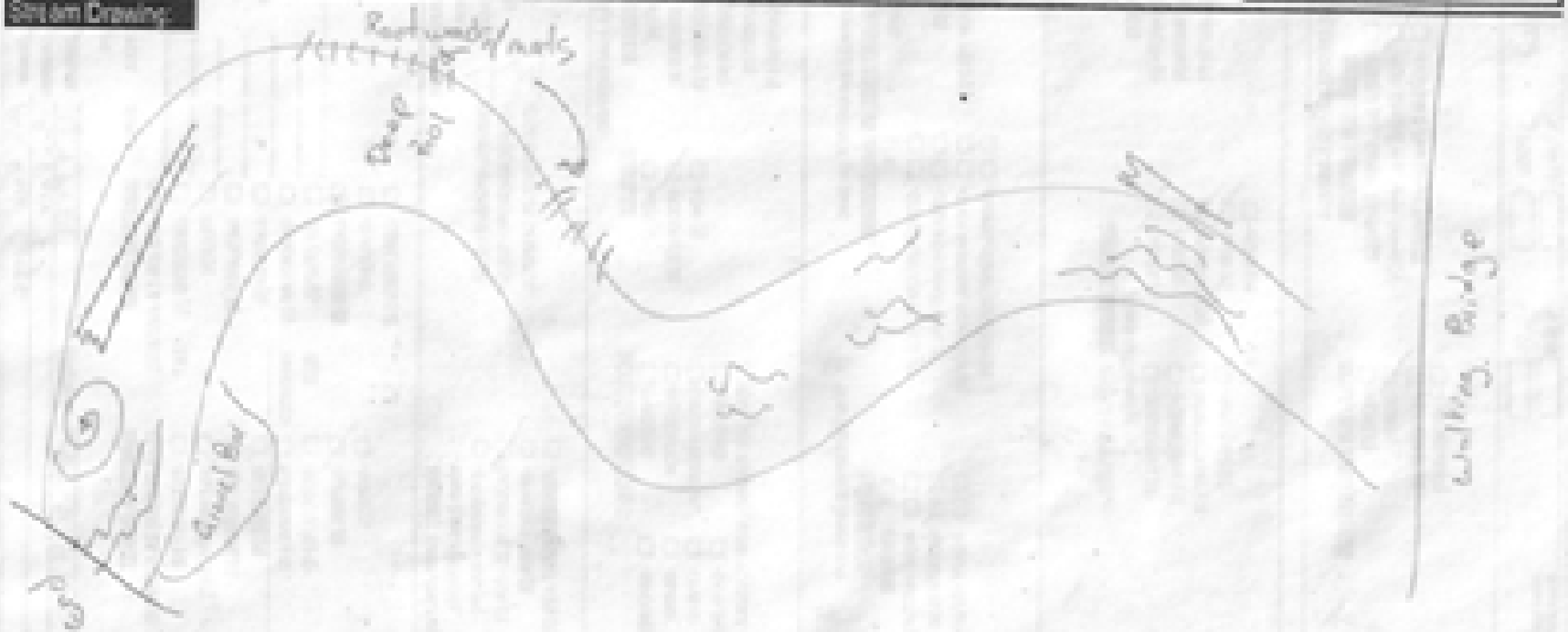
	Subjective Rating (1-10)	Aesthetic Rating (1-10)
	7	9

Gradient: ☐ -Low ☐ -Moderate ☐ -High

	Color:	Distance:	Water Clarity	Water Stage	Canopy: % Open
First Sampling Pass	D	Zoo	Clear	Normal	70

Yes	No	
☐	☐	Is Stream Ephemeral (no pools, totally dry of only damp spots)?
☐	☐	Is there water upstream? How far:
☐	☐	Is there water close downstream? How far:
☐	☐	Is Dry Channel mostly natural?

Stream Drawing:



Instructions for scoring the alternate cover metric: Each cover type should receive a score of between 0 and 3, where: 0 = Cover type absent; 1 = cover type in very small amounts or if more common of marginal quality; 2 = cover type present in moderate amounts, but not of highest quality or in small amounts of highest quality; 3 = cover type of highest quality in moderate of greater amounts. Examples of highest quality include, very large boulders in deep or fast water, large diameter logs that are stable, well-developed rootwads in deep / fast water, or deep, well-defined, functional pools.

Qualitative Habitat Evaluation Index Field Sheet

QHEI Score: 75

River Code: 33-985 RM: 2.0 Stream: Forked Creek
Site Code: [illegible] Project Code: [illegible] Location: [illegible]
Date: 8-17-11 Scorer: MAS Latitude: [illegible] Longitude: [illegible]

1) SUBSTRATE (Check ONLY Two Substrate TYPE BOXES; Estimate % percent)

TYPE	POOL	RIFFLE		POOL	RIFFLE
☐ ☐ BLDR/SLAB [10]			☑ ☐ GRAVEL [7]		
☐ ☐ Lg BOULD [10]			☐ ☐ SAND [6]		
☐ ☐ BOULDER [9]			☐ ☐ HARDPAN [5]		
☐ ☐ COBBLE [8]			☐ ☐ DETRITUS [3]		
☐ ☐ HARDPAN [8]			☐ ☐ ARTIFICIAL [0]		
☐ ☐ MUCK [2]			☐ ☐ SILT [2]		

SUBSTRATE ORIGIN (Check ONE OR 2 & AVERAGE)
☐ -LIMESTONE [1]
☐ -TILLS [1]
☐ -WETLANDS [0]
☐ -HARDPAN [0]
☐ -SANDSTONE [1]
☑ -RIP / RAP [0]
☐ -LACUSTRINE [0]
☐ -DUNES [+1]
☐ -COAL FINES [-2]

SILT:

EMBEDDED NESS:

SUBSTRATE QUALITY (Check ONE OR 2 & AVERAGE)
☐ -SILT HEAVY [-2]
☑ -SILT MODERATE [-1]
☐ -SILT NORMAL [0]
☐ -SILT FREE [1]
☐ -EXTENSIVE [+2]
☑ -MODERATE [1]
☐ -NORMAL [0]
☐ -NONE [1]

NUMBER OF SUBSTRATE TYPES (High Quality Only, Score 6 or +)
☑ -6 or More [2]
☐ -5 or Less [0]

Substrate: 14 Max 20

COMMENTS:

2) INSTREAM COVER (Use each cover type a score of 0 to 3, see back for instructions)

(Structure)	TYPE: Score All That Occur	
1 UNDERCUT BANKS [1]	3 POOLS > 75 cm [3]	2 OVERHANG VEGETATION [1]
2 OVERHANGING VEGETATION [1]	2 ROOTWADS [1]	2 AQUATIC MACROPHYTES [1]
1 SHALLOWS (IN SLOW WATER) [1]	2 BOULDERS [1]	1 LOGS OR WOODY DEBRIS [1]
1 ROOTWADS [1]		

AMOUNT (Check ONLY one or check 2 and AVERAGE)
☐ -EXTENSIVE > 75% [11]
☑ -MODERATE 25 - 75% [7]
☐ -SPARSE 5 - 25% [3]
☐ -NEARLY ABSENT < 5% [1]

Cover: 14 Max 20

COMMENTS:

3) CHANNEL MORPHOLOGY (Check ONLY one PER Category OR check 2 and AVERAGE)

SINUOSITY	DEVELOPMENT	CHANNELIZATION	STABILITY	MODIFICATIONS / OTHER
☐ -HIGH [4]	☐ -EXCELLENT [7]	☐ -NONE [6]	☐ -HIGH [3]	☐ DRAGGING ☐ -IMPOUNDMENT
☑ -MODERATE [3]	☑ -GOOD [5]	☐ -RECOVERED [4]	☑ -MODERATE [2]	☐ RELOCATION ☐ -ISLAND
☐ -LOW [2]	☐ -FAIR [3]	☑ -RECOVERING [3]	☐ -LOW [1]	☐ CANOPY REMOVAL ☐ -LEVEED
☐ -NONE [1]	☐ -POOR [1]	☐ -RECENT OR NO RECOVERY [1]		☑ DREDGING ☐ -BANK SHAPING
		☐ -IMPOUNDED [-1]		☐ ONE SIDE CHANNEL MODIFICATIONS

Channel: 10.5 Max 20

COMMENTS:

4) RIPARIAN ZONE AND BANK EROSION (check ONE box PER bank or check 2 and AVERAGE per bank)

River Right Looking Downstream

RIPARIAN WIDTH (Per Bank) L R	FLOOD PLAIN QUALITY (ONLY Use Water Adjacent) L R (Most Predominant Per Bank)	L R	BANK EROSION L R (Per Bank)
☐ ☐ -VERY WIDE > 100m [5]	☐ ☐ -FOREST, SWAMP [3]	☐ ☐ -CONSERVATION TILLAGE [1]	☐ ☐ -NONE / LITTLE [3]
☐ ☐ -WIDE > 50m [4]	☐ ☐ -SHRUB OR OLD FIELD [2]	☐ ☐ -URBAN OR INDUSTRIAL [0]	☑ ☑ -MODERATE [2]
☐ ☐ -MODERATE 10 - 50m [3]	☑ ☐ -RESIDENTIAL, PARK, NEW FIELD [1]	☐ ☑ -OPEN PASTURE, ROWCROP [0]	☐ ☐ -HEAVY / SEVERE [0]
☑ ☑ -NARROW 5 - 10m [2]	☐ ☐ -FENCED PASTURE [1]	☐ ☐ -MINING / CONSTRUCTION [0]	
☐ ☐ -VERY NARROW < 5m [1]			
☐ ☐ -NONE [0]			

COMMENTS:

Riparian: 4.5 Max 10

5) POOL / GLIDE AND RIFFLE / RUN QUALITY

MAX DEPTH (Check 1 ONLY)
☑ -1m [6]
☐ -0.7m [4]
☐ -0.4 to 0.7m [2]
☐ -0.2 to 0.4m [1]
☐ -< 0.2m [POOL = 0]

WIDTH/DEPTH (Check 1 or 2 & AVERAGE)
☑ -POOL WIDTH > RIFFLE WIDTH [2]
☐ -POOL WIDTH = RIFFLE WIDTH [1]
☐ -POOL WIDTH < RIFFLE WIDTH [0]
☐ -IMPOUNDED [-1]

CURRENT VELOCITY (POOLS & RIFFLES) (Check All That Apply)
☐ -EDDIES [1]
☐ -FAST [1]
☑ -MODERATE [1]
☑ -SLOW [1]
☐ -NONE [-1]
☐ -TORRENTAL [-1]
☐ -INTERSTITIAL [-1]
☐ -INTERMITTENT [-2]
☐ -VERY FAST [0]

Pool / Current: 10 Max 10

COMMENTS:

CHECK ONE OR CHECK 2 AND AVERAGE

RIFFLE DEPTH	RUN DEPTH	RIFFLE / RUN SUBSTRATE	RIFFLE / RUN EMBEDDEDNESS
☐ -Riffl Areas > 10cm [2]	☐ -MAX > 50 cm [2]	☑ -STABLE (e.g., Cobble, Boulder) [2]	☐ -NONE [2]
☑ -Riffl Areas 5 - 10cm [1]	☑ -MAX = 50 cm [1]	☑ -MOD. STABLE (e.g., Large Gravel) [1]	☑ -LOW [1]
☐ -Riffl Areas < 5cm [0]		☐ -UNSTABLE (Fine Gravel, Sand) [0]	☐ -MODERATE [0]
☐ -NO RIFFLE but RUNS present [0]			☐ -EXTENSIVE [-1]
☐ -NO RIFFLE / NO RUN [MARK = 0]			

Riffle / Run: 4.5 Max 8

COMMENTS:

Gradient: 10

6) GRADIENT (ft / mi): 6.02 DRAINAGE AREA (sq mi): 10.2 % POOL: % GLIDE: % RIFFLE: % RUN:

Gradient Score Must Be Taken From Table 2 of Users Manual based on gradient and drainage area. Max 10

*Riffl Areas must be large enough to support a population of riffle-obligate species

Is Sampling Reach Representative of the Stream? (Y / N)

If Not, Explain:

Lat / Long (Beg):	
Lat / Long (Mid):	
Lat / Long (End):	
Lat / Long (X-Loc):	

Major Suspected Sources of Impacts (Check All That Apply):

- None ☐
- Industrial ☐
- WWTP ☐
- Agriculture ☐
- Livestock ☐
- Silviculture ☐
- Construction ☐
- Urban Runoff ☐
- CSOs ☐
- Suburban Impacts ☐
- Mining ☐
- Channelization ☐
- Riparian Removal ☐
- Landfills ☐
- Natural ☐
- Dams ☐
- Other Flow Alteration ☐

Other:

Subjective Rating (1-10): 6

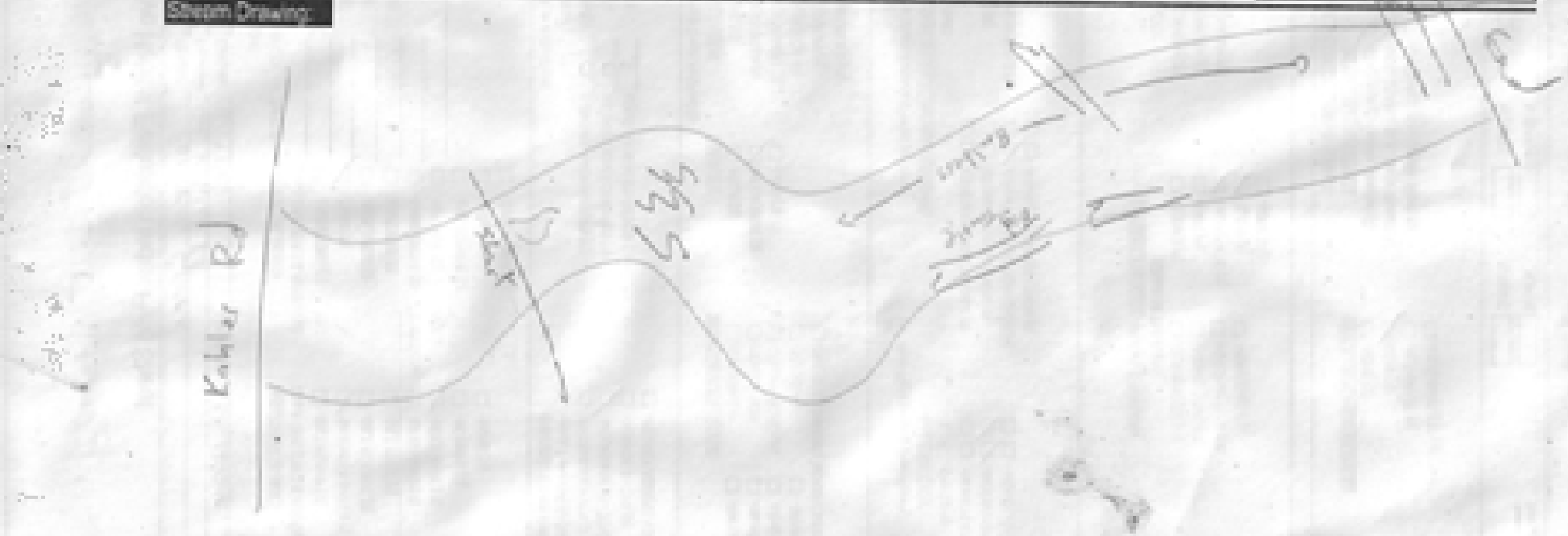
Aesthetic Rating (1-10): 6

Gradient: ☐ Low ☐ Moderate ☐ High

	Gauge	Distance	Water Clarity	Water Stage	Canopy: % open
First Sampling Pass	0	200	Turbid	Normal	85

Yes	No	
☐	☐	Is Stream Ephemeral (no pools, totally dry of only damp spots)?
☐	☐	Is there water upstream? How far:
☐	☐	Is there water close downstream? How far:
☐	☐	Is Dry Channel mostly natural?

Stream Drawing:



Instructions for scoring the alternate cover metric: Each cover type should receive a score of between 0 and 3, where: 0 = Cover type absent; 1 = cover type in very small amounts or if more common of marginal quality; 2 = cover type present in moderate amounts, but not of highest quality or in small amounts of highest quality; 3 = cover type of highest quality in moderate or greater amounts. Examples of highest quality include, very large boulders in deep or fast water, large diameter logs that are stable, well developed rootwads in deep / fast water, or deep, well-defined, functional pools.

Qualitative Habitat Evaluation Index Field Sheet

QHEI Score: 70

River Code: 05 020 [illegible] RM: 3.4 Stream: Big Darby Creek

Site Code: DBR-1 Project Code: Darby Basin Location: Rte. Main St.

Date: 6-15-05 Scorer: MMS Latitude: N 39.[illegible] Longitude: -83.[illegible]

1) SUBSTRATE (Check ONLY Two Substrate TYPE BOXES; Estimate % percent)

TYPE	POOL	RIFFLE		POOL	RIFFLE
☐ ☐ BEDROCK [10]			☐ ☐ GRAVEL [7]		
☐ ☐ Lg BOULD [10]			☐ ☐ SAND [6]		
☐ ☐ BOULDER [9]			☐ ☐ BEDROCK [5]		
☐ ☐ COBBLE [8]			☐ ☐ DETRITUS [3]		
☐ ☐ mixSDPWH [4]			☐ ☐ ARTIFICIAL [0]		
☐ ☐ MUCK [2]			☐ ☐ SILT [2]		

SUBSTRATE ORIGIN (Check ONE OR 2 & AVERAGE)

☐ -LIMESTONE [1] ☐ -TILLS [1] ☐ -WETLANDS [0] ☐ -KARSTIC [0] ☐ -SANDSTONE [0] ☐ -RIP / RAP [0] ☐ -LACUSTRINE [0] ☐ -DUNES [-1] ☐ -COAL FINES [-2]

SILT: ☐ -SILT HEAVY [-2] ☐ -SILT MODERATE [-1] ☐ -SILT NORMAL [0] ☐ -SILT FREE [1]

EMBEDDED / NESS: ☐ -EXTENSIVE [-2] ☐ -MODERATE [-1] ☐ -NORMAL [0] ☐ -NONE [1]

SUBSTRATE QUALITY (Check ONE OR 2 & AVERAGE)

Substrate 14 Max 20

NUMBER OF SUBSTRATE TYPES (High Quality Only, Score 6 or +): ☐ -4 or More [2] ☐ -3 or Less [0]

COMMENTS:

2) INSTREAM COVER (Give each cover type a score of 0 to 3; see back for instructions)

(Structure)
- 2 UNDERCUT BANKS [1]
- ___ OVERHANGING VEGETATION [1]
- ___ SHALLOWS (IN SLOW WATER) [1]
- ___ ROOTWADS [1]

TYPE: Score All That Occur
- 3 POOLS > 70 cm [2]
- ___ ROOTWADS [1]
- ___ BOULDERS [1]
- ___ OVERHANG. BANKWATERS [1]
- 2 AQUATIC MACROPHYTES [1]
- 2 LOGS OR WOODY DEBRIS [1]

AMOUNT (Check ONLY one or check 2 and AVERAGE)
- ☐ -EXTENSIVE > 75% [11]
- ☑ -MODERATE 25 - 75% [7]
- ☐ -SPARSE 5 - 25% [3]
- ☐ -NEARLY ABSENT < 5% [1]

Cover 7 Max 20

COMMENTS:

3) CHANNEL MORPHOLOGY (Check ONLY one POR Category OR check 2 and AVERAGE)

SINUOSITY
- ☑ -HIGH [4]
- ☐ -MODERATE [2]
- ☐ -LOW [1]
- ☐ -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]

MODIFICATIONS (Check ONLY one or check 2 and AVERAGE)
- ☐ -STRAIGHTENING
- ☐ -RIPRAP / GABIONS
- ☐ -CANOPY REMOVAL
- ☐ -DREDGING
- ☐ -IMPOUNDMENT
- ☐ -LEVEES
- ☐ -BANK SHAPING
- ☐ -ONE SIDE CHANNEL MODIFICATIONS

Channel 18 Max 20

COMMENTS:

4) RIPARIAN ZONE AND BANK EROSION (Check ONE box PER bank or check 2 and AVERAGE per bank)

Flow: Right Looking Downstream

RIPARIAN WIDTH (L R) (Per Bank)
- ☑ ☑ -VERY WIDE > 100m [5]
- ☐ ☐ -WIDE > 50m [4]
- ☐ ☐ -MODERATE 10 - 50m [3]
- ☑ ☑ -NARROW 5 - 10m [2]
- ☐ ☐ -VERY NARROW < 5m [1]
- ☐ ☐ -NONE [0]

FLOOD PLAIN QUALITY (PAST 100 Meter REACH) (L R) (Most Predominant Per Bank)
- ☐ ☐ -FOREST, SWAMP [3]
- ☐ ☐ -SHRUB OR OLD FIELD [2]
- ☑ ☑ -RESIDENTIAL, PARK, NEW FIELD [1]
- ☐ ☐ -FENCED PASTURE [1]
- ☐ ☐ -CONSERVATION TILLAGE [1]
- ☐ ☐ -URBAN OR INDUSTRIAL [0]
- ☐ ☐ -OPEN PASTURE, ROWCROP [0]
- ☐ ☐ -MINING / CONSTRUCTION [0]

BANK EROSION (L R) (Per Bank)
- ☑ ☑ -NONE / LITTLE [3]
- ☐ ☐ -MODERATE [2]
- ☐ ☐ -HEAVY / SEVERE [1]

Riparian 5.5 Max 10

COMMENTS:

5) POOL / GLIDE AND RIFFLE / RUN QUALITY

MAX DEPTH (Check 1 ONLY)
- ☑ -1m [6]
- ☐ -0.7m [4]
- ☐ -0.4 to 0.7m [2]
- ☐ -0.2 to 0.4m [1]
- ☐ -< 0.2m [POOL = 0]

MORPHOLOGY (Check 1 or 2 & AVERAGE)
- ☑ -POOL WIDTH > RIFFLE WIDTH [2]
- ☐ -POOL WIDTH = RIFFLE WIDTH [1]
- ☐ -POOL WIDTH < RIFFLE WIDTH [0]
- ☐ -IMPOUNDED [-1]

CURRENT VELOCITY (POOLS & RIFFLES) (Check All That Apply)
- ☑ -SWIFT [1]
- ☑ -MODERATE [1]
- ☑ -SLOW [1]
- ☐ -NONE [-1]
- ☐ -TORRENTIAL [-1]
- ☐ -INTERSTITIAL [-1]
- ☐ -INTERMITTENT [-2]
- ☐ -HIGH GRADIENT [1]

Pool / Current 12 Max 12

COMMENTS:

6) RIFFLE / RUN QUALITY (CHECK ONE OR CHECK 2 AND AVERAGE)

RIFFLE DEPTH
- ☑ -Riffle Areas > 10cm [2]
- ☐ -Riffle Areas 5 - 10cm [1]
- ☐ -Riffle Areas < 5cm [0]
- ☐ -NO RIFFLE but RUNS present [0]
- ☐ -NO RIFFLE / NO RUN (Interm. = 0) [0]

RUN DEPTH
- ☑ -MAX > 50 cm [2]
- ☐ -MAX < 50 cm [1]

RIFFLE / RUN SUBSTRATE
- ☑ -STABLE (e.g., Cobble, Boulder) [2]
- ☑ -MOD. STABLE (e.g., Large Gravel) [1]
- ☐ -UNSTABLE (Fine Gravel, Sand) [0]

RIFFLE / RUN EMBEDDEDNESS
- ☐ -NONE [2]
- ☑ -LOW [1]
- ☐ -MODERATE [0]
- ☐ -EXTENSIVE [-1]

Riffle / Run 1 Max 6

Gradient 10 Max 10

COMMENTS:

6.) GRADIENT (ft / mi): 9.9 DRAINAGE AREA (SQ MI): 113.5

% POOL: ___ % GLIDE: ___ % RIFFLE: ___ % RUN: ___

Stream must be large enough to support a population of site-obligate species

Gradient from Ohio Table 2 of Users Manual (used a gradient and drainage area)

Is Sampling Reach Representative of the Stream? (Y/ N)

If Not, Explain:

Lat / Long (Beg):	
Lat / Long (Mid):	
Lat / Long (End):	
Lat / Long (X-Loc):	

Subjective Rating (1-10): 8

Aesthetic Rating (1-10): 10

Gradient: ☐ Low ☐ Moderate ☐ High

First Sampling Pass	Color	Distance	Water Clarity	Water Stage	Canopy- % open
	0	Zero	Clear	normal	95

Flow Nr:

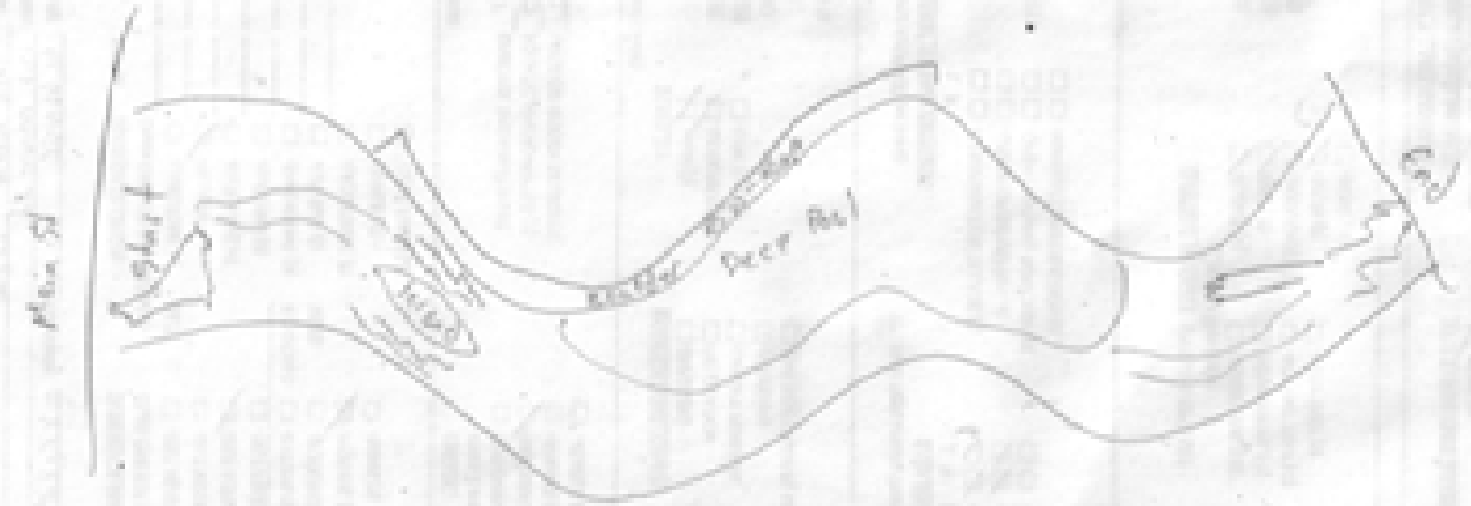
☐☐ Is Stream Ephemeral (no pools, totally dry of only damp spots)?
☐☐ Is there water upstream? How far:
☐☐ Is there water close downstream? How far:
☐☐ Is Dry Channel mostly natural?

Major Suspected Source(s) of Impacts (Check All That Apply)

- None ☐
- Industrial ☐
- WWTP ☐
- Agriculture ☐
- Livestock ☐
- Silviculture ☐
- Construction ☐
- Urban Runoff ☐
- CSOs ☐
- Suburban impacts ☐
- Mining ☐
- Channelization ☐
- Riparian Removal ☐
- Landfills ☐
- Natural ☐
- Dams ☐
- Other Flow Alteration ☐

Other:

Stream Drawing:



Instructions for scoring the alternate cover metric: Each cover type should receive a score of between 0 and 3, where: 0 = Cover type absent; 1 = cover type in very small amounts or if more common of marginal quality; 2 = cover type present in moderate amounts, but not of highest quality or in small amounts of highest quality; 3 = cover type of highest quality in moderate of greater amounts. Examples of highest quality include, very large boulders in deep or fast water, large diameter logs that are stable, well developed rootwads in deep / fast water, or deep, well-defined, functional pools.

Qualitative Habitat Evaluation Index Field Sheet

QHEI Score: 56

River Code: ____ Run: ____ Stream: ____

Site Code: ____ Project Code: ____ Location: ____

Date: 8-19-19 Scorer: ____ Latitude: ____ Longitude: ____

1) SUBSTRATE (Check ONLY Two Substrate TYPE BOXES; Estimate % percent)

TYPE	POOL	RIFFLE		POOL	RIFFLE
☐ ☐ BLDR/SLAB [10]			☐ ☐ GRAVEL [7]		
☐ ☐ Lg BOULD [10]			☐ ☐ SAND [6]		
☐ ☐ BOULDER [9]			☐ ☐ BEDROCK [5]		
☐ ☐ COBBLE [8]	30		☐ ☐ DETRITUS [3]		
☐ ☐ mmBDRK [4]	20		☐ ☐ ARTIFICIAL [0]		
☑ ☑ MUCK [2]	50		☐ ☐ SILT [2]		

NUMBER OF SUBSTRATE TYPES: ☐ 4 or More [2] ☑ 3 or Less [0]
(High Quality Only, Score 5 or +)

SUBSTRATE 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]

SUBSTRATE QUALITY
Check ONE (OR 2 & AVERAGE)
SILT:
☐ -SILT HEAVY [-2]
☐ -SILT MODERATE [-1]
☐ -SILT NORMAL [0]
☐ -SILT FREE [1]
EMBEDDED / NESS:
☑ -EXTENSIVE [-2]
☐ -MODERATE [-1]
☐ -NORMAL [0]
☐ -NONE [1]

Substrate: 0 Max 20

COMMENTS: ____

2) INSTREAM COVER (Use each cover type a score of 0 to 3; see Back for Instructions)
(Structure)
____ UNDERCUT BANKS [1]
1 OVERHANGING VEGETATION [1]
3 SHALLOWS (IN SLOW WATER) [1]
____ ROOTWADS [1]

TYPE: Score All That Occur
1 POOLS > 70 cm [2]
____ RIFFLES [1]
____ BOULDERS [1]
____ SNAGS, BRANCHTIPS [1]
3 AQUATIC MACROPHYTES [1]
____ LOGS OR WOODY DEBRIS [1]

AMOUNT: (Check ONLY one or choose 2 and AVERAGE)
☑ -EXTENSIVE > 75% [11]
☑ -MODERATE 25 - 75% [7]
☐ -SPARSE 5 - 25% [3]
☐ -NEARLY ABSENT < 5% [1]

Cover: 14 Max 20

COMMENTS: ____

3) CHANNEL MORPHOLOGY (Check ONLY ONE PER Category (Also check Feed) 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]

MODIFICATIONS (OTHER)
☐ -DIKE/DIG
☐ -RELOCATION
☐ -CANOPY REMOVAL
☐ -DREDGING
☐ -IMPOUNDMENT
☐ -ISLAND
☐ -LEVEES
☐ -BANK SHAPING
☐ -TILE/ DITCH/ CHANNEL MODIFICATIONS

Channel: 15 Max 20

COMMENTS: ____

4) RIPARIAN ZONE AND BANK EROSION (ENTER ONE box PER bank or check 2 and AVERAGE per bank)

River Right looking Downstream

RIPARIAN WIDTH
L R (Per Bank)
☐ ☐ -VERY WIDE > 100m [3]
☐ ☐ -WIDE > 50m [2]
☐ ☐ -MODERATE 10 - 50m [1]
☐ ☐ -NARROW 5 - 10m [0]
☐ ☐ -VERY NARROW < 5m [-1]
☑ ☑ -NONE [0]

FLOOD PLAIN QUALITY (FACT OR Make REMARK)
L R (Most Predominant Per Bank)
☑ ☑ -FOREST, SWAMP [3]
☐ ☐ -SHRUB OR OLD FIELD [2]
☐ ☐ -RESIDENTIAL, PARK, NEW FIELD [1]
☐ ☐ -FENCED PASTURE [1]
☐ ☐ -CONSERVATION TILLAGE [1]
☐ ☐ -URBAN OR INDUSTRIAL [0]
☐ ☐ -OPEN PASTURE, ROWCROP [0]
☐ ☐ -MINING / CONSTRUCTION [0]

BANK EROSION
L R (Per Bank)
☐ ☐ -NONE / LITTLE [3]
☐ ☐ -MODERATE [2]
☐ ☐ -HEAVY / SEVERE [1]

Riparian: 10 Max 10

COMMENTS: ____

5) POOL / GLIDE AND RIFFLE / RUN QUALITY

MAX DEPTH
(Check 1 ONLY)
☐ -1m [6]
☐ -0.7m [4]
☐ -0.4 to 0.7m [2]
☑ -0.3 to 0.4m [1]
☐ -< 0.3m [POOR = 0]

MORPHOLOGY
(Check 1 or 2 & AVERAGE)
☐ -POOL WIDTH > RIFFLE WIDTH [2]
☑ -POOL WIDTH = RIFFLE WIDTH [1]
☐ -POOL WIDTH < RIFFLE WIDTH [0]
☐ -IMPOUNDED [-1]

CURRENT VELOCITY (POOLS & RIFFLES)
(Check All That Apply)
☐ -EDDIES [1]
☐ -FAST [1]
☐ -MODERATE [1]
☑ -SLOW [0]
☑ -NONE [-1]
☐ -TORRENTIAL [-1]
☑ -INTERSTITIAL [-1]
☐ -INTERMITTENT [-2]
☐ -VERY FAST [-1]

Pool / Current: 1 Max 12

COMMENTS: Stream dry for most of pool in upper third

CHECK ONE OR CHECK 2 AND AVERAGE

RIFFLE DEPTH
☐ -Mod Areas > 10cm [2]
☐ -Most Areas 5 - 10cm [1]
☐ -Most Areas < 5cm [0]
☐ -NO RIFFLE But RUNS present [0]
☑ -NO RIFFLE / NO RUN [Marsh = 0]

RUN DEPTH
☐ -MAX > 50 cm [2]
☐ -MAX < 50 cm [1]

RIFFLE / RUN SUBSTRATE
☐ -STABLE (e.g., Cobble, Boulder) [2]
☐ -MOD. STABLE (e.g., Large Gravel) [1]
☐ -UNSTABLE (Fine Gravel, Sand) [0]

RIFFLE / RUN EMBEDDEDNESS
☐ -NONE [2]
☐ -LOW [1]
☐ -MODERATE [0]
☐ -EXTENSIVE [-1]

Riffle / Run: 0 Max 8

Gradient: 2 Max 10

6) GRADIENT (ft / mi): 10 DRAINAGE AREA (sq mi): 5.0 % POOL: ____ % GLIDE: ____ % RIFFLE: ____ % RUN: ____

*Reach length must be long enough to support a population of riffle/glide species

*Stream must be large enough to support a population of riffle/glide species

Is Sampling Reach Representative of the Stream? (Y/N)

If Not, Explain:

Lat / Long (Beg):	
Lat / Long (Mid):	
Lat / Long (End):	
Lat / Long (X-Loc):	

Subjective Rating (1-10)

Aesthetic Rating (1-10)

Gradient: ☐ -Low ☐ -Moderate ☐ -High

First Sampling Pass

Gear:	Distance:	Water Clarity:	Water Stage:	Canopy: % open:
E	150		low	90%

Yes/No

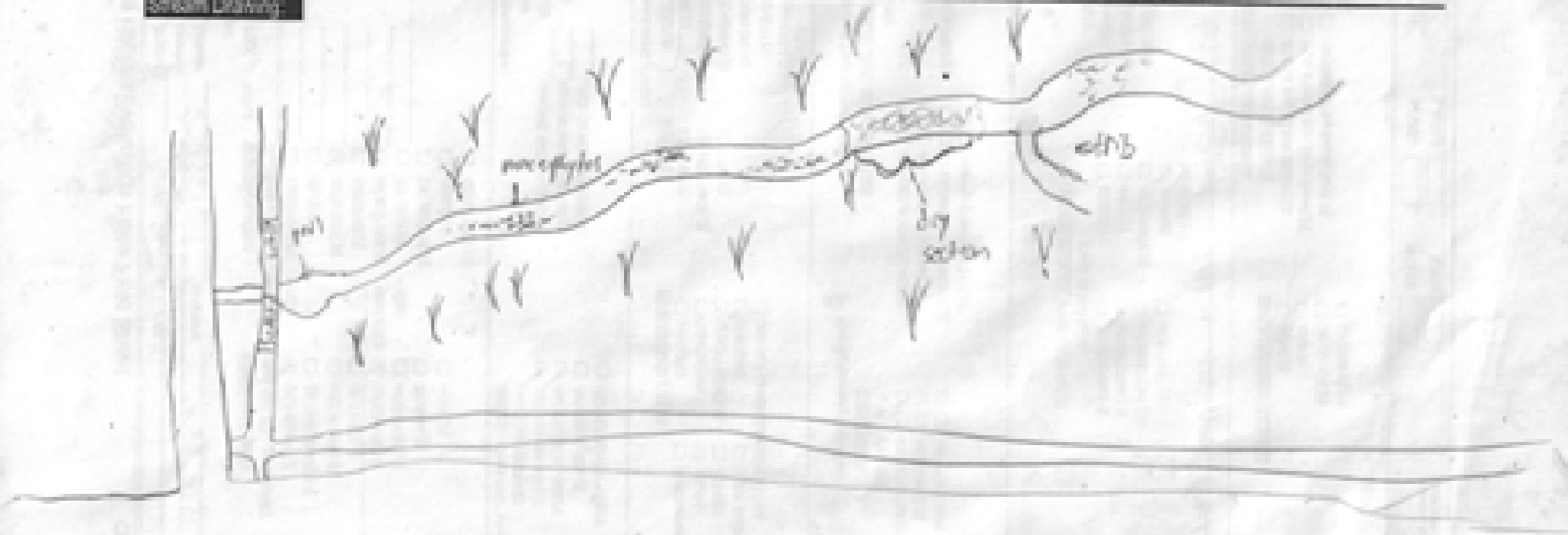
- ☐ ☐ Is Stream Ephemeral (no pools, totally dry or only damp spots)?
- ☐ ☐ Is there water upstream? How far:
- ☐ ☐ Is there water close downstream? How far:
- ☐ ☐ Dry Channel mostly natural?

Major Suspected Sources of Impacts (Check All That Apply):

- None ☐
- Industrial ☐
- WWTP ☐
- Agriculture ☐
- Livestock ☐
- Silviculture ☐
- Construction ☐
- Urban Runoff ☐
- CSOs ☐
- Suburban Impacts ☐
- Mining ☐
- Channelization ☐
- Riparian Removal ☐
- Landfills ☐
- Natural ☐
- Dams ☐
- Other Flow Alteration ☐

Other:

Stream Drawing:



Instructions for scoring the alternate cover metric: Each cover type should receive a score of between 0 and 3, where: 0 = Cover type absent; 1 = cover type in very small amounts or if more common of marginal quality; 2 = cover type present in moderate amounts, but not of highest quality or in small amounts of highest quality; 3 = cover type of highest quality in moderate or greater amounts. Examples of highest quality include, very large boulders in deep or fast water, large diameter logs that are stable, well developed rootwads in deep / fast water, or deep, well-defined, functional pools.

Qualitative Habitat Evaluation Index Field Sheet

QHEI Score: 42.5

River Code: 21-603 | RM: 10.8 | Stream: Tr. 5 #3

Site Code: 21 03 489 | Project Code: [illegible] | Location: [illegible]

Date: 8-15-18 | Scorer: [illegible] | Latitude: 41 56 [illegible] | Longitude: -[illegible]

1) SUBSTRATE (Check ONLY Two Substrate TYPE BOXES; Estimate % percent)

TYPE	POOL	RIFFLE		POOL	RIFFLE
☐ ☐ BLDR/SLAB [10]			☐ ☐ -BARVES [7]		
☐ ☐ Lg BOULD [10]			☐ ☐ -SAND [6]		
☐ ☐ BOULDER [9]			☐ ☐ -BEDROCK [5]		
☐ ☐ COBBLE [8]	4	1	☐ ☐ -DETRITUS [3]		
☐ ☐ HARDPAN [4]			☐ ☐ -ARTIFICIAL [0]	1	1
☐ ☐ -MUCK [2]			☐ ☐ -SILT [2]	1	1

SUBSTRATE 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]

SILT: ☐ -SILT HEAVY [-2] ☐ -SILT MODERATE [-1] ☐ -SILT NORMAL [0] ☐ -SILT FREE [1]

EMBEDDED / NESS: ☐ -EXTENSIVE [-2] ☐ -MODERATE [-1] ☐ -NORMAL [0] ☑ -NONE [1]

SUBSTRATE QUALITY (Check ONE (OR 2 & AVERAGE))

Substrate: 9 / Max 20

NUMBER OF SUBSTRATE TYPES (High Quality Only, Score 6 or +): ☐ -4 or More [2] ☑ -3 or Less [0]

COMMENTS: [illegible]

2) INSTREAM COVER (Give each cover type a score of 0 to 3; see back for instructions)

(Structure): 1 UNDERCUT BANKS [1]; 4 OVERHANGING VEGETATION [1]; 5 SHALLOWS (IN SLOW WATER) [1]; ___ ROOTWADS [1]

TYPE (Score All That Occur): ___ POOLS > 70 cm [2]; ___ ROOTWADS [1]; ___ BOULDERS [1]; ___ OXBOWS, BACKWATERS [1]; ___ AQUATIC MACROPHYTES [1]; ___ LOGS OR WOODY DEBRIS [1]

AMOUNT (Check ONLY one or check 2 and AVERAGE): ☐ -EXTENSIVE > 75% [11] ☐ -MODERATE 25 - 75% [7] ☑ -SPARSE 5 - 25% [3] ☐ -NEARLY ABSENT < 5% [1]

COMMENTS: [illegible]

Cover: 9 / Max 20

3) CHANNEL MORPHOLOGY (Check ONLY one POOR Category OR check 2 and 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]

MODIFICATIONS (Check): ☐ -SNAGGING ☐ -CHANNELIZATION ☐ -DREDGING ☐ -IMPOUNDMENT ☐ -ISLAND ☐ -LEVEED ☐ -BANK SHAPING ☐ -CANOPY REMOVAL ☐ ONE SIDE CHANNEL MODIFICATIONS

Channel: 4.5 / Max 20

COMMENTS: [illegible]

4) RIPARIAN ZONE AND BANK EROSION (Check ONE box PER bank or check 2 and AVERAGE per bank)

River Right Looking Downstream

RIPARIAN WIDTH (L R (Per Bank)): ☐ ☐ -VERY WIDE > 100m [3] ☐ ☐ -WIDE > 50m [8] ☐ ☐ -MODERATE 10 - 50m [5] ☐ ☐ -NARROW 5 - 10m [2] ☑ ☐ -VERY NARROW < 5m [1] ☑ ☐ -NONE [0]

FLOOD PLAIN QUALITY (WEST OF Meter REPEARS) (L R (Most Predominant Per Bank)): ☐ ☐ -FOREST, SWAMP [3] ☐ ☐ -SHRUB OR OLD FIELD [2] ☑ ☑ -RESIDENTIAL, PARK, NEW FIELD [1] ☐ ☐ -FENCED PASTURE [1] ☐ ☐ -CONSERVATION TILLAGE [1] ☐ ☐ -URBAN OR INDUSTRIAL [0] ☐ ☐ -OPEN PASTURE, ROWCROP [0] ☐ ☐ -MINING / CONSTRUCTION [0]

BANK EROSION (L R (Per Bank)): ☑ ☐ -NONE / LITTLE [2] ☐ ☑ -MODERATE [1] ☐ ☐ -HEAVY / SEVERE [0]

Riparian: 4.5 / Max 10

COMMENTS: [illegible]

5) POOL / GLIDE AND RIFFLE / RUN QUALITY

MAX DEPTH (Check 1 ONLY): ☐ - 1m [6] ☐ - 0.7m [4] ☐ - 0.4 to 0.7m [2] ☑ - 0.2 to 0.4m [1] ☐ - < 0.2m [POOL = 0]

MORPHOLOGY (Check 1 or 2 & AVERAGE): ☐ -POOL WIDTH > RIFFLE WIDTH [2] ☑ -POOL WIDTH = RIFFLE WIDTH [1] ☐ -POOL WIDTH < RIFFLE WIDTH [0] ☐ -IMPOUNDED [-1]

CURRENT VELOCITY (POOLS & RIFFLES) (Check All That Apply): ☐ -SWIFT [1] ☐ -MODERATE [1] ☑ -SLOW [1] ☐ -NONE [-1] ☐ -TORRENTIAL [-1] ☐ -INTERSTITIAL [-1] ☐ -INTERMITTENT [-2] ☐ -VERY FAST [1]

Pool / Current: 4 / Max 12

COMMENTS: [illegible]

6) RIFFLE / RUN QUALITY (CHECK ONE OR CHECK 2 AND AVERAGE)

RIFFLE DEPTH: ☐ -Riffle Areas > 10cm [2] ☐ -Riffle Areas 5 - 10cm [1] ☐ -Riffle Areas < 5cm [0] ☐ -NO RIFFLE but RUNS present [0] ☑ -NO RIFFLE / NO RUN [depth = 0]

RUN DEPTH: ☐ - MAX > 50 cm [2] ☐ - MAX < 50 cm [1]

RIFFLE / RUN SUBSTRATE: ☐ -STABLE (e.g., Cobble, Boulder) [2] ☐ -MOD. STABLE (e.g., Large Gravel) [1] ☐ -UNSTABLE (Fine Gravel, Sand) [0]

RIFFLE / RUN EMBEDDEDNESS: ☐ -NONE [2] ☐ -LOW [1] ☐ -MODERATE [0] ☐ -EXTENSIVE [-1]

Riffle / Run: 0 / Max 8

Gradient: 10 / Max 10

COMMENTS: [illegible]

6) GRADIENT (ft / mi): 17.9 DRAINAGE AREA (SQ MI): 3.53 | %POOL: | %GLIDE: | %RIFFLE: | %RUN:

Gradient Score Must Refer To Form Manual

"Best areas must be large enough to support a population of [illegible] species

Is Sampling Reach Representative of the Stream? (Y) N)

If Not, Explain: _____

Lat / Long (Beg):	
Lat / Long (Mid):	
Lat / Long (End):	
Lat / Long (X-Loc):	

Subjective Rating (1-10)

Aesthetic Rating (1-10)

Gradient: ☐ Low ☐ Moderate ☐ High

First Sampling Pass	Odor:	Distance:	Water Clarity:	Water Stage:	Canopy: % open:
				Very low	

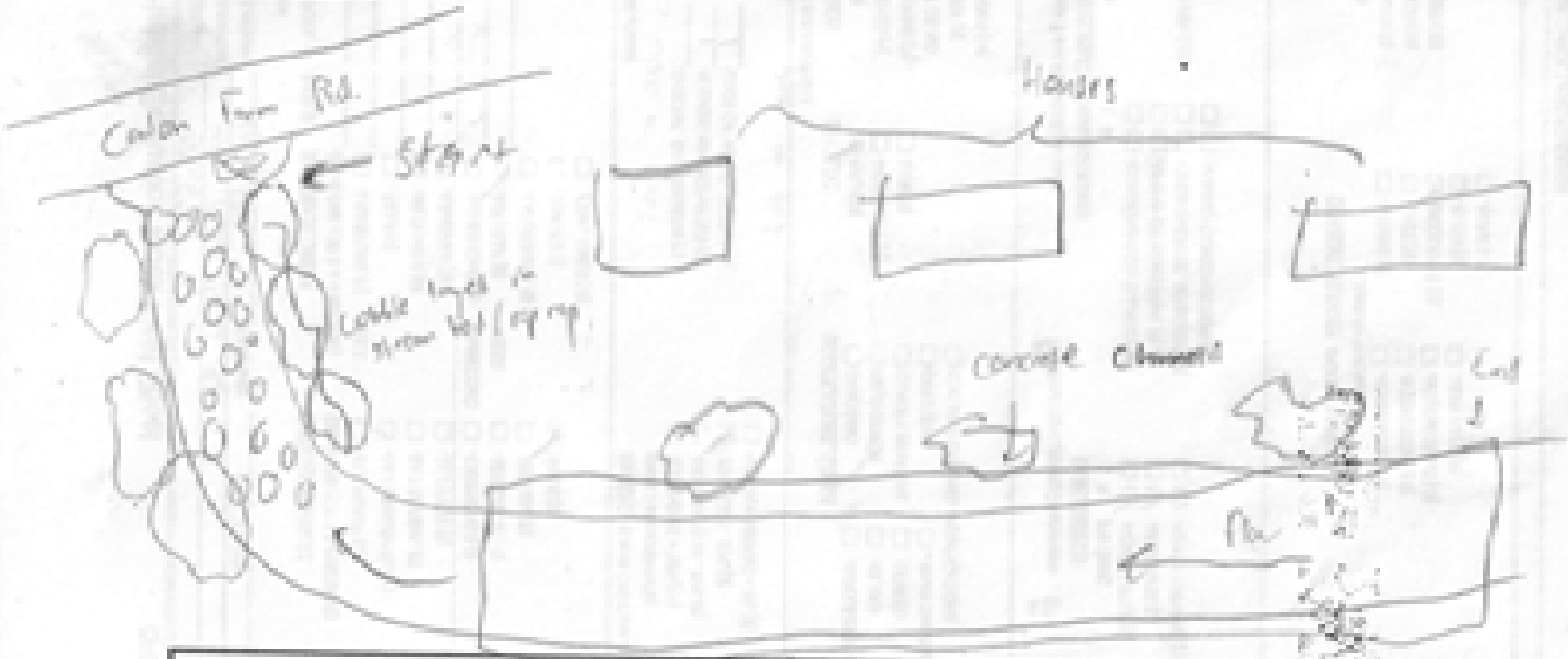
Yes	No	
☐	☐	Is Stream Ephemeral (no pools, totally dry or only damp spots)?
☐	☐	Is there water upstream? How far:
☐	☐	Is there water (now downstream? How far:
☐	☐	Is Dig Channel mostly natural?

Major Suspected Sources of Impacts (Check All That Apply):

- ☐ None
- ☐ Industrial
- ☐ WWTP
- ☐ Agriculture
- ☐ Livestock
- ☐ Silviculture
- ☐ Construction
- ☐ Urban Runoff
- ☐ CSOs
- ☐ Suburban Impacts
- ☐ Mining
- ☐ Channelization
- ☐ Riparian Removal
- ☐ Landfills
- ☐ Natural
- ☐ Dams
- ☐ Other Flow Alteration

Other: _____

Stream Drawing:



Instructions for scoring the alternate cover metric: Each cover type should receive a score of between 0 and 3, where: 0 = cover type absent; 1 = cover type in very small amounts or if more common of marginal quality; 2 = cover type present in moderate amounts, but not of highest quality; or in small amounts of highest quality; 3 = cover type of highest quality in moderate or greater amounts. Examples of highest quality include, very large boulders in deep or fast water; large diameter logs that are stable, well developed rootwads in deep / fast water, or deep, well-defined, functional pools.

Qualitative Habitat Evaluation Index Field Sheet

QHEI Score: 45

River Code: [illegible] RM: 4.2 Stream: Mud Creek

Site Code: MC 02 Project Code: Co. Ditch Location: Rt 127 Bridge

Date: 8-12-15 Scorer: M.A.S. Latitude: [illegible] Longitude: -84.19[illegible]

1. SUBSTRATE (Check ONLY Two Substrate Types BOXES; Estimate % present)

TYPE	POOL	RIFFLE	TYPE	POOL	RIFFLE
☐ ☐ BEDROCK [10]			☐ ☐ GRAVEL [7]		
☐ ☐ Lg BOULD [10]			☐ ☐ SAND [6]		
☐ ☐ BOULDER [9]			☐ ☐ HARDPAN [5]		
☐ ☐ COBBLE [8]			☐ ☐ DETRITUS [3]		
☐ ☐ HARDPAN [6]			☑ ☑ ARTIFICIAL [0]		
☑ ☑ MUCK [2]			☐ ☐ SILT [2]		

SUBSTRATE 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]

SILT / EMBEDDED / NEGS

SUBSTRATE QUALITY (Check ONE OR 2 & AVERAGE)
- ☑ -SILT HEAVY [-2]
- ☐ -SILT MODERATE [-1]
- ☐ -SILT NORMAL [0]
- ☐ -SILT FREE [1]
- ☑ -EXTENSIVE [-2]
- ☐ -MODERATE [-1]
- ☐ -NORMAL [0]
- ☐ -NONE [1]

Substrate: 0 Max 20

NUMBER OF SUBSTRATE TYPES: (High Quality Only, Score 6 or 1)
- ☐ -4 or More [2]
- ☑ -3 or Less [0]

COMMENTS:

2. INSTREAM COVER (Give each cover type a score of 0 to 3; see back for instructions)

[Structure]	TYPE: Score All That Occur	
1 UNDERCUT BANKS [1]	0 POOLS > 70 cm [2]	0 OVERHG. BACKWATERS [1]
3 OVERHANGING VEGETATION [1]	2 ROOTWADS [1]	0 AQUATIC MACROPHYTES [1]
2 SHALLOWS (IN SLOW WATER) [1]	1 BOULDERS [1]	1 LOGS OR WOODY DEBRIS [1]
1 ROOTWADS [1]		

AMOUNT (Check ONLY one or check 2 and AVERAGE)
- ☐ -EXTENSIVE > 75% [11]
- ☑ -MODERATE 25 - 75% [7]
- ☑ -SPARSE 5 - 25% [3]
- ☐ -NEARLY ABSENT < 5% [1]

Cover: 13 Max 20

COMMENTS:

3. CHANNEL MORPHOLOGY (Check ONLY one PER Category OR check 2 and AVERAGE)

SINUOSITY	DEVELOPMENT	CHANNELIZATION	STABILITY	MODIFICATIONS (Other)
☐ -HIGH [4]	☐ -EXCELLENT [7]	☐ -NONE [6]	☐ -HIGH [3]	☐ -DREDGING ☐ -IMPOUNDMENT
☑ -MODERATE [3]	☐ -GOOD [5]	☐ -RECOVERED [4]	☐ -MODERATE [2]	☐ -RELOCATION ☐ -ISLAND
☐ -LOW [2]	☐ -FAIR [3]	☐ -RECENT OR NO RECOVERY [2]	☑ -LOW [1]	☐ -SNAGGING ☐ -CHANNELIZED
☐ -NONE [1]	☐ -POOR [1]	☑ -MAINTAINED [1]		☐ -RIP-RAP ☐ -BANK SHAPING
		☐ -IMPOUNDED [-1]		☐ [ ] SIDE CHANNEL MODIFICATIONS

Channel: 5 Max 20

COMMENTS:

4. RIPARIAN ZONE AND BANK EROSION (Check ONE box PER bank or check 2 and AVERAGE per bank)

River Right Looking Downstream: R R

RIPARIAN WIDTH (L & R) (Per Bank)	FLOOD PLAIN QUALITY (PAST 100 Meter SEGMENT) (L & R) (Most Predominant Per Bank)		BANK EROSION (L & R) (Per Bank)
☐ ☐ -VERY WIDE > 100m [5]	☐ ☐ -FOREST, SWAMP [3]	☐ ☐ -CONSERVATION TILLAGE [1]	☑ ☑ -NONE / LITTLE [3]
☑ ☑ -WIDE > 50m [4]	☐ ☐ -SHRUB OR OLD FIELD [2]	☐ ☐ -URBAN OR INDUSTRIAL [0]	☐ ☐ -MODERATE [2]
☐ ☐ -MODERATE 10 - 50m [3]	☑ ☑ -RESIDENTIAL, PARK, NEW FIELD [1]	☐ ☐ -OPEN PASTURE, ROW CROP [0]	☐ ☐ -HEAVY / SEVERE [1]
☐ ☐ -NARROW 5 - 10m [2]	☐ ☐ -FENCED PASTURE [0]	☐ ☐ -MINING / CONSTRUCTION [0]	
☐ ☐ -VERY NARROW < 5m [1]			
☐ ☐ -NONE [0]			

Riparian: 4.5 Max 10

COMMENTS:

5. POOL / GLIDE AND RIFFLE / RUN QUALITY

MAX DEPTH (Check 1 ONLY)
- ☐ - 1m [6]
- ☐ - 0.7m [4]
- ☑ - 0.4 to 0.7m [2]
- ☐ - 0.2 to 0.4m [1]
- ☐ - < 0.2m [POOL = 0]

WIDTH/DEPTH (Check 1 or 2 & AVERAGE)
- ☐ -POOL WIDTH > RIFFLE WIDTH [2]
- ☑ -POOL WIDTH = RIFFLE WIDTH [1]
- ☐ -POOL WIDTH < RIFFLE WIDTH [0]
- ☐ -IMPOUNDED [-1]

CURRENT VELOCITY (POOLS & RIFFLES) (Check All That Apply)
- ☐ -TORRENTIAL [-1]
- ☐ -RAPID [1]
- ☐ -INTERSTITIAL [-1]
- ☐ -MODERATE [0]
- ☐ -INTERMITTENT [-2]
- ☑ -SLOW [0]
- ☐ -VERY FAST [1]
- ☐ -NONE [-1]

Pool / Current: 5 Max 10

COMMENTS:

CHECK ONE OR CHECK 2 AND AVERAGE

RIFFLE DEPTH
- ☐ -Max Depth > 10cm [2]
- ☐ -Max Depth 5 - 10cm [1]
- ☐ -Max Depth < 5cm [0]
- ☐ -NO RIFFLE but RUNS present [0]
- ☑ -NO RIFFLE / NO RUN [Marsh = 0]

RUN DEPTH
- ☐ -MAX > 50 cm [2]
- ☐ -MAX < 50 cm [1]

RIFFLE / RUN SUBSTRATE
- ☐ -STABLE (e.g., Cobble, Boulder) [2]
- ☐ -MOD. STABLE (e.g., Large Gravel) [1]
- ☐ -UNSTABLE (Fine Gravel, Sand) [0]

RIFFLE / RUN EMBEDDEDNESS
- ☐ -NONE [2]
- ☐ -LOW [1]
- ☐ -MODERATE [0]
- ☐ -EXTENSIVE [-1]

Riffle / Run: 0 Max 8

Gradient: 10 Max 10

6. GRADIENT (ft / mi): 18.5 DRAINAGE AREA (sq mi): 4.13 %POOL: %GLIDE: %RIFFLE: %RUN:

Gradient Score from Table 2 of Users Manual (based on gradient and drainage area)

*Best areas must be large enough to support a population of the aquatic species

Is Sampling Reach Representative of the Stream? (Y/ N)

If Not, Explain: _____

Lat / Long (Beg):	
Lat / Long (Mid):	
Lat / Long (End):	
Lat / Long (X-Loc):	

Subjective Rating (1-10): 4

Aesthetic Rating (1-10): 4

Gradient: ☐ -Low ☐ -Moderate ☐ -High

First Sampling Pass	Clear	Distance	Water Clarity	Water Stage	Canopy- % open
	D	200	Turbid	Normal	90

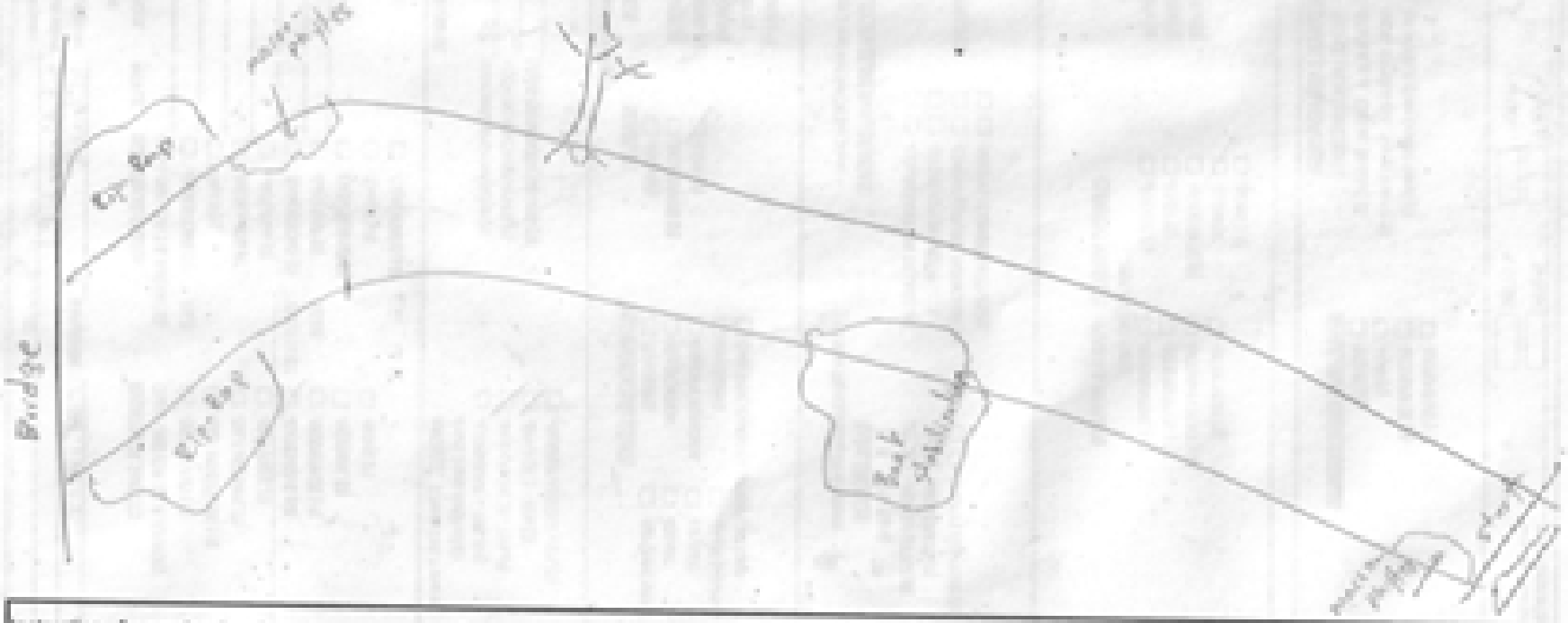
Yes	No	
☐	☐	Is Stream Ephemeral (no pools, totally dry of only Samp.reach)?
☐	☐	Is there water upstream? How far:
☐	☐	Is there water above downstream? How far:
☐	☐	Is Dry Channel mostly natural?

Major Suspected Sources of Impacts (Check All That Apply):

- ☐ None
- ☐ Industrial
- ☐ WWTP
- ☐ Agriculture
- ☐ Livestock
- ☐ Silviculture
- ☐ Construction
- ☐ Urban Runoff
- ☐ Citizen
- ☐ Suburban impacts
- ☐ Mining
- ☐ Channelization
- ☐ Riparian Removal
- ☐ Landfills
- ☐ Natural
- ☐ Dams
- ☐ Other Flow Alteration

Other: _____

Stream Drawing:



Instructions for scoring the alternate cover metric: Each cover type should receive a score of between 0 and 3, where: 0 = Cover type absent; 1 = cover type in very small amounts or if more common of marginal quality; 2 = cover type present in moderate amounts, but not of highest quality or in small amounts of highest quality; 3 = cover type of highest quality in moderate of greater amounts. Examples of highest quality include, very large boulders in deep or fast water, large diameter logs that are stable, well developed rootwads in deep / fast water, or deep, well-defined, functional pools.

Qualitative Habitat Evaluation Index Field Sheet

QHEI Score: 42.5

River Code: 05-170 | Rm: 0.84 | Stream: LC trib A RM 1
Site Code: 10038 | Project Code: LC Trib A RM 1 | Location: Rt 127 Nr Ft
Date: 9-20-18 | Scorer: MB S | Latitude: 39.3375 | Longitude: -83.1773

I. SUBSTRATE (Check ONLY Two Substrate TYPE BOXES; Estimate % present)

TYPE	RIFFLE	POOL	RIFFLE
☐ BLDR/SLABS [10]	☐ HARDPAN [0]		
☐ GRAVEL [7]	☐ MUCK [0]		
☐ BOULDER [9]	☐ SILT [0]		
☐ COBBLE [8]	☐ ARTIFICIAL [0]		
☐ HARDPAN [4]	☐ DETRITUS [0]		
☑ MUCK [0]	☐ BEDROCK [9]		

SUBSTRATE ORIGIN (Check ONE OR 2 & AVERAGE)
- ☐ LIMESTONE [1]
- ☐ TILLS [1]
- ☑ WETLANDS [0]
- ☐ HARDPAN [0]
- ☐ SANDSTONE [0]
- ☐ RIP / RAP [0]
- ☐ LACUSTRINE [0]
- ☐ ALLUVIAL [+1]
- ☐ COAL FINES [-2]

SUBSTRATE QUALITY (Check ONE OR 2 & AVERAGE)
- ☐ SILT HEAVY [-2]
- ☑ SILT MODERATE [-1]
- ☐ SILT NORMAL [0]
- ☐ SILT FREE [1]

EMBEDDED / NEGS
- ☐ EXTENSIVE [-2]
- ☑ MODERATE [-1]
- ☐ NORMAL [0]
- ☐ NONE [1]

NUMBER OF SUBSTRATE TYPES: (High-Quality Only, Score 5 or +)
- ☐ 4 or More [2]
- ☑ 3 or Less [0]

Substrate: 7 / Max 20

COMMENTS:

II. INSTREAM COVER (Use each cover type a score of 0 to 3; see back for instructions)

(Structure)
- 0 UNDERCUT BANKS [1]
- 1 OVERHANGING VEGETATION [1]
- 2 SHALLOWS (IN SLOW WATER) [1]
- 0 ROOTWADS [1]

TYPE: Score All That Occur
- 0 POOLS > 70 cm [2]
- 0 ROOTWADS [1]
- 0 BOULDERS [1]
- 0 SNAGS/LARGE WOODY DEBRIS [1]
- 0 AQUATIC MACROPHYTES [1]
- 0 LOGS OR WOODY DEBRIS [1]

AMOUNT: (Check ONLY one or check 2 and AVERAGE)
- ☐ EXTENSIVE > 75% [11]
- ☑ MODERATE 25 - 75% [7]
- ☐ SPARSE 5 - 25% [3]
- ☐ NEARLY ABSENT < 5% [1]

Cover: 10 / Max 20

COMMENTS:

III. CHANNEL MORPHOLOGY (Check ONLY one PER Category OR check 2 and 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]
- ☐ MODIFIED [-1]

STABILITY
- ☐ HIGH [3]
- ☐ MODERATE [2]
- ☑ LOW [1]

MODIFICATIONS / OTHER
- ☐ DRAGGING
- ☐ RELOCATION
- ☐ CANOPY REMOVAL
- ☐ DREDGING
- ☐ ONE SIDE CHANNEL MODIFICATIONS
- ☐ IMPOUNDMENT
- ☐ ISLAND
- ☐ LEVEED
- ☐ BANK SHAPING

Channel: 1 / Max 20

COMMENTS:

IV. RIPARIAN ZONE AND BANK EROSION (Check ONE box PER bank or check 2 and AVERAGE per bank)

River Right Looking Downstream

RIPARIAN WIDTH (L / R) (Per Bank)
- ☐ ☐ VERY WIDE > 100m [5]
- ☑ ☑ WIDE > 50m [4]
- ☐ ☐ MODERATE 10 - 50m [3]
- ☐ ☐ NARROW 5 - 10m [2]
- ☐ ☐ VERY NARROW < 5m [1]
- ☐ ☐ NONE [0]

FLOOD PLAIN QUALITY (FACT 100 Meter Assessment) (L / R) (Most Predominant Per Bank)
- ☑ ☑ FOREST, SWAMP [7]
- ☐ ☐ SHRUB OR OLD FIELD [5]
- ☑ ☐ RESIDENTIAL, PARK, NEW FIELD [1]
- ☐ ☐ FENCED PASTURE [1]
- ☐ ☐ CONSERVATION TILLAGE [1]
- ☐ ☑ URBAN OR INDUSTRIAL [0]
- ☐ ☐ OPEN PASTURE, ROWCROP [0]
- ☐ ☐ MINING / CONSTRUCTION [0]

BANK EROSION (L / R) (Per Bank)
- ☑ ☑ NONE / LITTLE [3]
- ☐ ☐ MODERATE [2]
- ☐ ☐ HEAVY / SEVERE [1]

Riparian: 3.5 / Max 10

COMMENTS:

V. POOL / GLIDE AND RIFFLE / RUN QUALITY

MAX DEPTH (ONLY ONE)
- ☐ < 1m [0]
- ☐ 0.7m [0]
- ☐ 0.7 to 0.7m [2]
- ☐ 0.7 to 0.4m [1]
- ☑ < 0.2m [POOL = 0]

WIDTH/DEPTH RATIO (Check 1 or 2 & AVERAGE)
- ☐ POOL WIDTH > RIFFLE WIDTH [2]
- ☐ POOL WIDTH = RIFFLE WIDTH [1]
- ☑ POOL WIDTH < RIFFLE WIDTH [0]
- ☐ IMPOUNDED [-1]

CURRENT VELOCITY (POOLS & RIFFLES) (Check All That Apply)
- ☐ EDDIES [1]
- ☐ FAST [1]
- ☐ MODERATE [1]
- ☐ SLOW [1]
- ☑ NONE [-1]
- ☐ TORRENTIAL [-1]
- ☐ INTERSTITIAL [-1]
- ☐ INTERMITTENT [-2]
- ☐ VERY FAST [-1]

Pool / Current: 1 / Max 12

COMMENTS:

VI. RIFFLE / RUN QUALITY (CHECK ONE OR CHECK 2 AND AVERAGE)

RIFFLE DEPTH
- ☐ >Mod. Areas = 10cm [2]
- ☐ >Mod. Areas 5 - 10cm [1]
- ☐ >Mod. Areas < 5cm [0]
- ☐ NO RIFFLE but RUNS present [0]
- ☑ NO RIFFLE / NO RUN [Marsh = 0]

SUBDEPTH
- ☐ > MAX = 50 cm [2]
- ☐ > MAX < 50 cm [1]

RIFFLE / RUN SUBSTRATE
- ☐ STABLE (e.g., Cobble, Boulder) [2]
- ☐ MOD. STABLE (e.g., Large Gravel) [1]
- ☐ UNSTABLE (Fine Gravel, Sand) [0]

RIFFLE / RUN EMBEDDEDNESS
- ☐ NONE [2]
- ☐ LOW [1]
- ☐ MODERATE [0]
- ☐ EXTENSIVE [-1]

Riffle / Run: 0 / Max 8

COMMENTS:

Gradient: 9 / Max 10

VII. GRADIENT (ft / mi): 12.9 DRAINAGE AREA (sq mi): 15.3

%POOL: | %GLIDE: | %RIFFLE: | %RUN:

Total area must be large enough to support a population of diverse/sensitive species

Gradient Score (from Table 3 of User's Manual based on gradient and drainage area)

Is Sampling Reach Representative of the Stream? (Y/ N)

If Not, Explain: _____

Lat / Long (Beg): _____

Lat / Long (Mid): _____

Lat / Long (End): _____

Lat / Long (X-Loc): _____

Major Suspected Sources of Impacts (Check All That Apply):

- None ☐
- Industrial ☐
- WWTP ☐
- Agriculture ☐
- Livestock ☐
- Silviculture ☐
- Construction ☐
- Urban Runoff ☐
- CSOs ☐
- Subsurface Impacts ☐
- Mining ☐
- Channelization ☐
- Riparian Removal ☐
- Landfills ☐
- Natural ☐
- Dams ☐
- Other Flow Alteration ☐

Other: _____

	Subjective Rating (1-10)	Aesthetic Rating (1-10)
	4	5

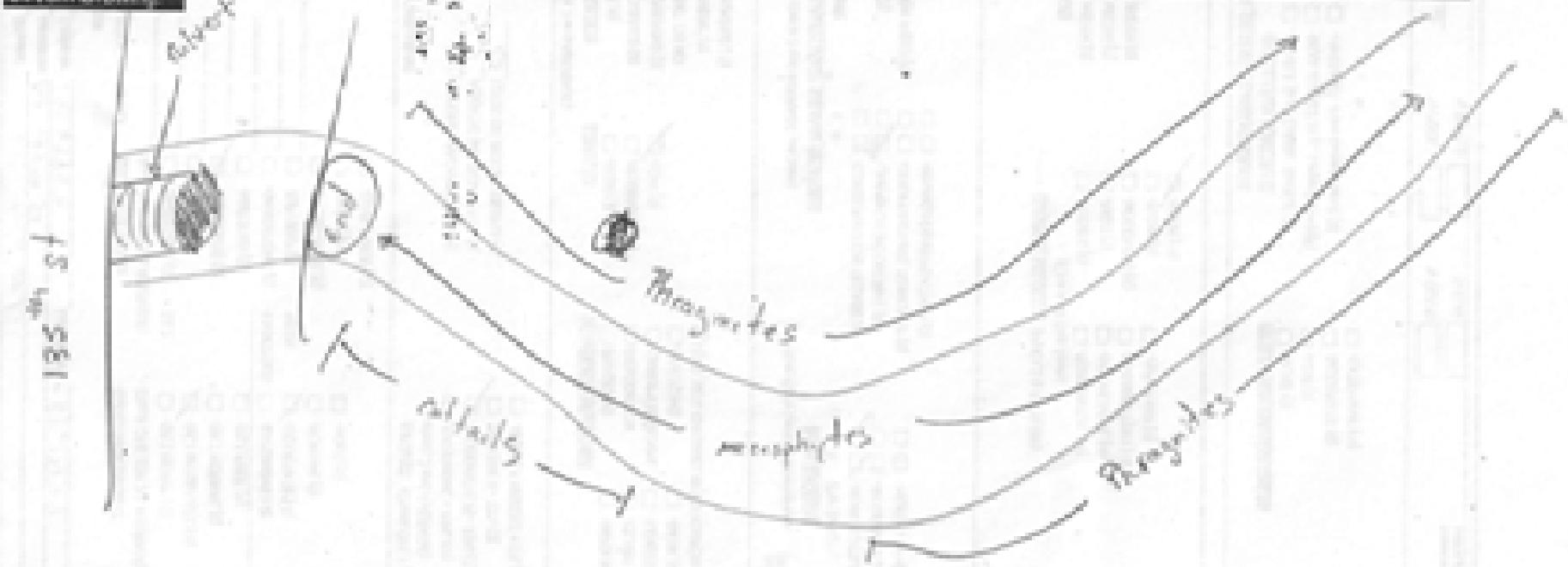
Gradient: ☐ -Low ☐ -Moderate ☐ -High

	Color:	Distance:	Water Clarity:	Water Stage:	Canopy % open:
First Sampling Pass	"E	150	Clear	Abnormal	100

How far:

- ☐ ☐ Is Stream Ephemeral (no pools, totally dry at any damp spots)?
- ☐ ☐ Is there water upstream? How far:
- ☐ ☐ Is there water above downstream? How far:
- ☐ ☐ Is Dry Channel mostly natural?

Stream Drawing:



Instructions for scoring the alternate cover metric: Each cover type should receive a score of between 0 and 3, where: 0 = Cover type absent; 1 = cover type in very small amounts or if more common of marginal quality; 2 = cover type present in moderate amounts, but not of highest quality or in small amounts of highest quality; 3 = cover type of highest quality in moderate or greater amounts. Examples of highest quality include, very large boulders in deep or fast water, large diameter logs that are stable, well developed rootwads in deep / fast water, or deep, well-defined, functional pools.

Qualitative Habitat Evaluation Index Field Sheet

MBI Bioassessment Institute

QHEI Score: 57.5

River Code: [illegible] RM: 19.7 Stream: Cold Creek

Site Code: CC-19.7 Project Code: Delaware Location: [illegible] Rd

Date: 9-16-17 Scorer: Zach Mills Latitude: 40.28854 Longitude: -83.07783

I. SUBSTRATE (Check ONLY Two Substrate Types, BOXES, Estimate Percent)

TYPE	POOL	RIFFLE	TYPE	POOL	RIFFLE
☐ BEDROCK [10]			☑ GRAVEL [7]		
☐ LARGE BOULDER [10]			☐ SAND [6]	1	1
☐ BOULDER [9]	1		☐ HARDPAN [5]		
☐ COBBLE [8]	2		☐ DETRITUS [3]		
☑ MUCK [4]	1	1	☐ ARTIFICIAL [0]		
☐ SILT [2]	1		☐ BEDROCK [9]		

SUBSTRATE ORIGIN (Check ONE OR 2 & AVERAGE): ☐ LIMESTONE [1] ☑ TILL [1] ☐ WETLANDS [0] ☐ HARDPAN [0] ☐ SANDSTONE [0] ☐ ASP / RAP [0] ☐ LACUSTRINE [0] ☐ SHALE [-1] ☐ COAL FINES [-2]

SUBSTRATE QUALITY (Check ONE OR 2 & AVERAGE): SILT: ☐ SILT HEAVY [-2] ☑ SILT MODERATE [-1] ☐ SILT NORMAL [0] ☐ SILT FREE [1]; EMBEDDED: ☐ EXTENSIVE [-2]; NESS: ☑ MODERATE [-1] ☐ NORMAL [0] ☐ NONE [1]

Substrate 17 Max 20

NUMBER OF SUBSTRATE TYPES (High Quality Only, Score 5 or 4): ☑ 4 or More [2] ☐ 3 or Less [0]

COMMENTS:

II. INSTREAM COVER (One each cover type a score of 0 to 3, see back for instructions)

(Structure)	TYPE: Score All That Occur	
1 UNDERCUT BANKS [1]	0 POOLS > 70 cm [2]	___ OVERHANGING BRANCH TIPS [1]
2 OVERHANGING VEGETATION [1]	___ ROOTWADS [1]	2 AQUATIC MACROPHYTES [1]
___ SHALLOWS (IN SLOW WATER) [1]	1 BOULDERS [1]	1 LOGS OR WOODY DEBRIS [1]
___ ROOTWAD [1]		

AMOUNT: (Check ONLY one or check 2 and AVERAGE): ☐ EXTENSIVE > 75% [11] ☑ MODERATE 25 - 75% [7] ☐ SPARSE 5 - 25% [3] ☐ NEARLY ABSENT < 5% [1]

Cover 14 Max 20

COMMENTS:

III. CHANNEL MORPHOLOGY (Check ONLY one PER Category OR check 2 and 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]	
		☐ MAXIMIZED [-1]	

MODIFICATIONS / OTHER: ☐ DRAGGING ☐ RELOCATION ☐ CANOPY REMOVAL ☐ DREDGING ☐ IMPOUNDMENT ☐ RIP-RAP ☐ LEVEED ☐ BANK SHAPING ☐ ONE SIDE CHANNEL MODIFICATIONS

Channel 10.5 Max 20

COMMENTS:

IV. RIPARIAN ZONE AND BANK EROSION (Check ONE box PER bank or check 2 and AVERAGE per bank)

River Right Looking Downstream

RIPARIAN WIDTH (L / R) (Per Bank)	FLOOD PLAIN QUALITY (PAST 100 Meter ZONE) (L / R) (Most Predominant Per Bank)	BANK EROSION (L / R) (Per Bank)
☐ ☐ VERY WIDE > 100m [5]	☐ ☐ FOREST, SWAMP [3]	☐ ☐ NONE / LITTLE [3]
☐ ☐ WIDE > 50m [4]	☐ ☐ SHRUB OR OLD FIELD [2]	☑ ☑ MODERATE [2]
☐ ☐ MODERATE 10 - 50m [3]	☑ ☑ RESIDENTIAL, PARK, NEW FIELD [1]	☐ ☐ HEAVY / SEVERE [1]
☑ ☐ NARROW 5 - 10m [2]	☐ ☐ FENCED PASTURE [1]	
☐ ☑ VERY NARROW < 5m [1]	☐ ☐ CONSERVATION TILLAGE [1]	
☑ ☐ NONE [0]	☐ ☐ URBAN OR INDUSTRIAL [0]	
	☐ ☐ OPEN PASTURE, ROWCROP [0]	
	☐ ☐ MINING / CONSTRUCTION [0]	

Riparian 3.5 Max 10

COMMENTS:

V. POOL / GLIDE AND RIFFLE / RUN QUALITY

MAX DEPTH (Check 1 ONLY): ☐ < 1m [6] ☐ 0.7m [4] ☑ 0.4 to 0.7m [2] ☐ 0.3 to 0.4m [1] ☐ < 0.3m [POOL = 0]

MORPHOLOGY (Check 1 or 2 & AVERAGE): ☑ POOL WIDTH > RIFFLE WIDTH [2] ☑ POOL WIDTH = RIFFLE WIDTH [1] ☐ POOL WIDTH < RIFFLE WIDTH [0] ☐ IMPOUNDED [-1]

CURRENT VELOCITY (POOLS & RIFFLES) (Check All That Apply): ☐ SWIFT [1] ☑ MODERATE [1] ☑ SLOW [1] ☐ NONE [-1]; ☐ TORRENTIAL [-1] ☐ INTERSTITIAL [-1] ☐ INTERMITTENT [-2] ☐ VERY FAST [1]

Pool / Current 4.5 Max 12

COMMENTS:

VI. RIFFLE / RUN QUALITY (CHECK ONE OR CHECK 2 AND AVERAGE)

RIFFLE DEPTH: ☐ Thick Areas > 10cm [2] ☑ Most Areas 5 - 10cm [1] ☐ Most Areas < 5cm [0] ☐ NO RIFFLE but RUNS present [0] ☐ NO RIFFLE / NO RUN [Metric = 0]

RUN DEPTH: ☐ MAX > 50 cm [2] ☑ MAX < 50 cm [1]

RIFFLE / RUN SUBSTRATE: ☐ STABLE [e.g., Cobble, Boulder] [2] ☑ MOD. STABLE [e.g., Large Gravel] [1] ☑ UNSTABLE [Fine Gravel, Sand] [0]

RIFFLE / RUN EMBEDDEDNESS: ☐ NONE [2] ☐ LOW [1] ☑ MODERATE [0] ☐ EXTENSIVE [-1]

Riffle / Run 5 Max 8

Gradient 8 Max 10

COMMENTS:

6) GRADIENT (ft / mi): 19.5 DRAWAGE AREA (sq mi): 4.33 % POOL: ___ % GLIDE: ___ % RIFFLE: ___ % RUN: ___

Stream must be large enough to support reproduction of intolerant species

Qualitative Score from Table 3 of User Manual based on gradient and drainage area

Is Sampling Reach Representative of the Stream? (Y/N)

If Not, Explain:

Lat / Long (Beg):	
Lat / Long (Mid):	
Lat / Long (End):	
Lat / Long (X-Loc):	

Subjective Rating (1-10)

Aesthetic Rating (1-10)

First Sampling Pass	Odor	Distance	Water Clarity	Water Stage	Canopy % open
	E	150	C+L	Mod	25%

Gradient: ☐ -Low ☐ -Moderate ☐ -High

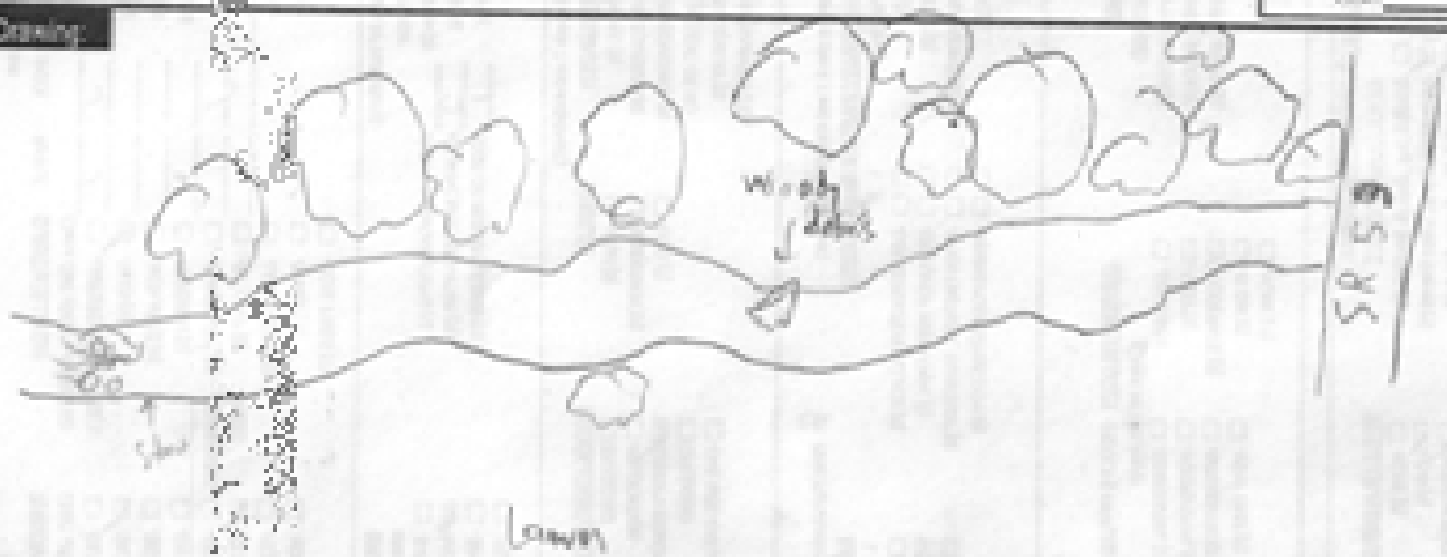
	Yes	No
Is Stream Ephemeral (no pools, totally dry of only damp spots)?	☐	☐
Is there water upstream? How far:	☐	☐
Is there water cross downstream? How far:	☐	☐
Is Dry Channel mostly natural?	☐	☐

Major Suspected Sources of Impacts (Check All That Apply):

- None ☐
- Industrial ☐
- WWTP ☐
- Agriculture ☐
- Livestock ☐
- Silviculture ☐
- Construction ☐
- Urban Runoff ☐
- CSOs ☐
- Subsurface Impacts ☐
- Mining ☐
- Channelization ☐
- Riparian Removal ☐
- Landfills ☐
- Natural ☐
- Dams ☐
- Other Flow Alteration ☐

Other:

Stream Drawing:



Instructions for scoring the alternate cover metric: Each cover type should receive a score of between 0 and 3, where: 0 = Cover type absent; 1 = cover type in very small amounts or if more common of marginal quality; 2 = cover type present in moderate amounts, but not of highest quality or in small amounts of highest quality; 3 = cover type of highest quality in moderate or greater amounts. Examples of highest quality include, very large boulders in deep or fast water, large diameter logs that are stable, well developed rootwads in deep / fast water or deep, well-defined, functional pools.

Qualitative Habitat Evaluation Index Field Sheet

QHEI Score:

River Code: | Rkt: | Stream:
Site Code: | Project Code: | Location:
Date: | Scorer: | Latitude: | Longitude:

1) SUBSTRATE (Check ONLY Two Substrate TYPE BOXES; Estimate % percent)

TYPE	POOL	RIFFLE		POOL	RIFFLE
☐ ☐ BLDR/SLAB [10]			☐ ☐ GRAVEL [7]		
☐ ☐ Lg BOULD [10]			☐ ☐ SAND [6]		
☐ ☐ BOULDER [9]			☐ ☐ BEDROCK [8]		
☐ ☐ COBBLE [8]			☐ ☐ DETRITUS [3]		
☐ ☐ HARDPAN [4]			☐ ☐ ARTIFICIAL [0]		
☐ ☐ MUCK [2]			☐ ☐ SILT [2]		

SUBSTRATE 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]

SUBSTRATE QUALITY (Check ONE OR 2 & AVERAGE)
SILT: ☐ -SILT HEAVY [-2] ☑ -SILT MODERATE [-1] ☐ -SILT NORMAL [0] ☐ -SILT FREE [1]
EMBEDDED: ☐ -EXTENSIVE [-2] ☑ -MODERATE [-1] ☐ -NORMAL [0] ☐ -NONE [1]

NUMBER OF SUBSTRATE TYPES: ☑ -4 or More [2] ☐ -3 or Less [0]
(High Quality Only, Score 6 or 7)

Substrate Max 20

COMMENTS:

2) INSTREAM COVER (Use each cover type & score of 0 to 3; see back for instructions)

AMOUNT (Check ONLY one or check 2 and AVERAGE)	TYPE: Score All That Occur
☐ -EXTENSIVE > 75% [7.5]	☐ -OVERHANGING VEGETATION [1]
☑ -MODERATE 25 - 75% [5]	☐ -UNDERCUT BANKS [1]
☐ -SPARSE 5 - 25% [3]	☐ -SHALLOWS (IN SLOW WATER) [1]
☐ -NEARLY ABSENT < 5% [1]	☐ -ROOTWADS [1]
	☐ -POOLS > 70 cm [2]
	☐ -ROOTWADS [1]
	☐ -BOULDERS [1]
	☐ -OXBOWS, BACKWATERS [1]
	☐ -AQUATIC MACROPHYTES [1]
	☐ -LOGS OR WOODY DEBRIS [1]

Cover Max 20

COMMENTS:

3) CHANNEL MORPHOLOGY (Check ONLY one PER Category OR check 2 and AVERAGE)

SINUOSITY	DEVELOPMENT	CHANNELIZATION	STABILITY	MODIFICATIONS (OTHER)
☐ -HIGH [4]	☐ -EXCELLENT [7]	☐ -NONE [6]	☐ -HIGH [3]	☐ -DAM(S) [0]
☑ -MODERATE [3]	☐ -GOOD [5]	☐ -RECOVERED [4]	☑ -MODERATE [2]	☐ -IMPOUNDMENT [0]
☐ -LOW [2]	☐ -FAIR [3]	☑ -RECOVERING [3]	☐ -LOW [1]	☐ -CHANNELIZATION [0]
☐ -NONE [1]	☐ -POOR [1]	☐ -RECENT OR NO RECOVERY [1]		☐ -ISLAND [0]
		☐ -IMPOUNDED [-1]		☐ -CANOPY REMOVAL [0]
				☐ -DREDGING [0]
				☐ -LEVEED [0]
				☐ -BANK SHAPING [0]
				☐ ONE SIDE CHANNEL MODIFICATIONS

Channel Max 20

COMMENTS:

4) RIPARIAN ZONE AND BANK EROSION (check ONE box PER bank or check 2 and AVERAGE per bank)

River Right Looking Downstream

RIPARIAN WIDTH (Per Bank)
L R
☐ ☐ -VERY WIDE > 100m [5]
☐ ☐ -WIDE > 50m [4]
☐ ☐ -MODERATE 10 - 50m [3]
☐ ☐ -NARROW 5 - 10m [2]
☑ ☐ -VERY NARROW < 5m [1]
☐ ☐ -NONE [0]

FLOOD PLAIN QUALITY (WEST OF Meter RIPARIAN)
L R (Most Predominant Per Bank)
☐ ☐ -FOREST, SWAMP [3]
☐ ☐ -SHRUB OR OLD FIELD [2]
☑ ☑ -RESIDENTIAL, PARK, NEW FIELD [1]
☐ ☐ -FENCED PASTURE [1]
L R
☐ ☐ -CONSERVATION TILLAGE [1]
☐ ☐ -URBAN OR INDUSTRIAL [0]
☐ ☐ -OPEN PASTURE, ROWCROP [0]
☐ ☐ -MINING / CONSTRUCTION [0]

BANK EROSION
L R (Per Bank)
☐ ☐ -NONE / LITTLE [2]
☐ ☐ -MODERATE [1]
☐ ☐ -HEAVY / SEVERE [0]

Riparian Max 10

COMMENTS:

5) POOL / GLIDE AND RIFFLE / RUN QUALITY

MAX DEPTH (Check 1 ONLY)
☐ - 1m [6]
☐ - 0.7m [4]
☐ - 0.4 to 0.7m [2]
☑ - 0.2 to 0.4m [1]
☐ - < 0.2m [POOL = 0]

MORPHOLOGY (Check 1 or 2 & AVERAGE)
☑ -POOL WIDTH > RIFFLE WIDTH [1]
☑ -POOL WIDTH = RIFFLE WIDTH [1]
☐ -POOL WIDTH < RIFFLE WIDTH [0]
☐ -IMPOUNDED [-1]

CURRENT VELOCITY (POOLS & RIFFLES) (Check All That Apply)
☐ -EDDIES [1]
☐ -FAST [1]
☑ -MODERATE [1]
☐ -SLOW [0]
☐ -NONE [-1]
☐ -TORRENTIAL [-1]
☐ -INTERSTITIAL [-1]
☐ -INTERMITTENT [-2]
☐ -VERY FAST [0]

Pool / Current Max 12

COMMENTS:

CHECK ONE OR CHECK 2 AND AVERAGE

RIFFLE DEPTH
☐ -Best Areas > 10cm [2]
☐ -Best Areas 5 - 10cm [1]
☑ -Best Areas < 5cm [0]
☐ -NO RIFFLE but RUNS present [0]
☐ -NO RIFFLE / NO RUN (Stacks = 0) [0]

RUN DEPTH
☐ - MAX > 50 cm [2]
☑ - MAX < 50 cm [1]

RIFFLE / RUN SUBSTRATE
☑ -STABLE (e.g., Cobble, Boulder) [2]
☐ -MOD. STABLE (e.g., Large Gravel) [1]
☐ -UNSTABLE (Fine Gravel, Sand) [0]

RIFFLE / RUN EMBEDDEDNESS
☐ -NONE [2]
☐ -LOW [1]
☑ -MODERATE [0]
☐ -EXTENSIVE [-1]

Riffle / Run Max 6

COMMENTS:

6) GRADIENT (ft / mi): 9.17 DRAINAGE AREA (sq mi): 4.72 % POOL: % GLIDE: % RIFFLE: % RUN:

Gradient Max 10

*Best area must be large enough to support a population of the target species

Is Sampling Reach Representative of the Stream? (Y / N)

If Not, Explain: _____

Lat / Long (Beg):	
Lat / Long (Mid):	
Lat / Long (End):	
Lat / Long (X-Loc):	

Major Suspected Sources of Impacts (Check All That Apply)

- None ☐
- Industrial ☐
- WWTP ☐
- Agriculture ☐
- Livestock ☐
- Silviculture ☐
- Construction ☐
- Urban Runoff ☐
- CSOs ☐
- Suburban Impacts ☐
- Mining ☐
- Channelization ☐
- Riparian Removal ☐
- Landfills ☐
- Natural ☐
- Dams ☐
- Other Flow Alteration ☐

Other: _____

Subjective Rating (1-10)

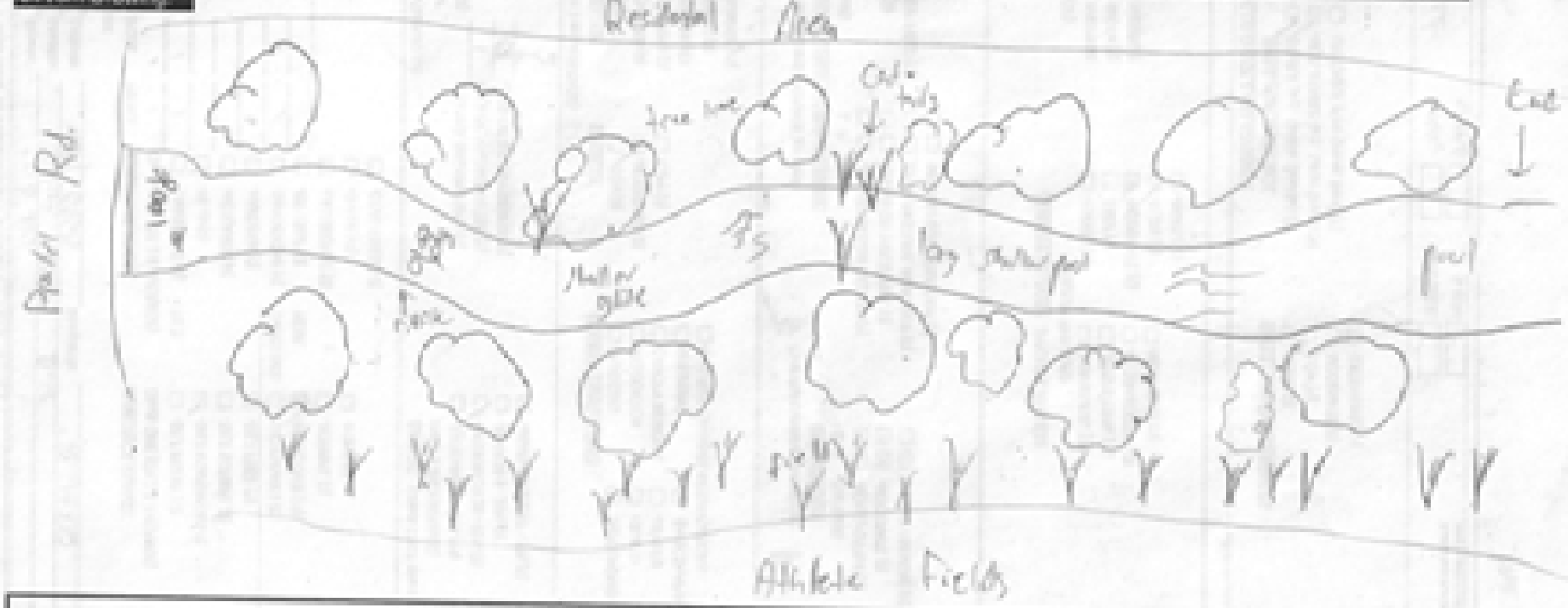
Aesthetic Rating (1-10)

Gradient: ☐ Low ☐ Moderate ☐ High

First Sampling Pass	Clear:	Distance:	Water Clarity:	Water Stage:	Canopy: % open:
	E	150	CTD	Very low	20%

Yes	No	
☐	☐	Is Stream Ephemeral (no pools, totally dry at only stamp spots)?
☐	☐	Is there water upstream? How far:
☐	☐	Is there water (flow downstream? How far:
☐	☐	Is Dry Channel mostly natural?

Stream Drawing:



Instructions for scoring the alternate cover metric: Each cover type should receive a score of between 0 and 3, where: 0 = Cover type absent; 1 = cover type in very small amounts or if more common of marginal quality; 2 = cover type present in moderate amounts, but not of highest quality or in small amounts of highest quality; 3 = cover type of highest quality in moderate or greater amounts. Examples of highest quality include, very large boulders in deep or fast water, large diameter logs that are stable, well developed rootwads in deep / fast water, or deep, well-defined, functional pools.

Qualitative Habitat Evaluation Index Field Sheet

QHEI Score:

River Code: _____ RM: 0.9 Stream: Big Alum Creek

Site Code: _____ Project Code: _____ Location: Rte 525

Date: 7/16/19 Scorer: _____ Latitude: _____ Longitude: _____

I. SUBSTRATE (Check ONLY Two Substrate TYPE BOXES; Estimate % present)

TYPE	POOL	RIFFLE
☐ BEDROCK (10)		
☐ Lg BOULDER (10)		
☐ BOULDER (9)		
☐ COBBLE (8)	1	1
☐ GRAVEL (7)		
☐ SAND (6)		
☐ BEDROCK (5)		
☐ DETRITUS (3)		
☐ ARTIFICIAL (2)		
☐ SILT (2)	1	

TYPE	POOL	RIFFLE
☐ GRAVEL (7)		1
☐ SAND (6)	1	1
☐ BEDROCK (5)		
☐ DETRITUS (3)		
☐ ARTIFICIAL (2)		
☐ SILT (2)	1	1

SUBSTRATE ORIGIN — Check ONE (OR 2 & AVERAGE)
- ☐ -LIMESTONE (1)
- ☐ -TILLS (1)
- ☐ -WETLANDS (1)
- ☐ -HARDPAN (0)
- ☐ -SANDSTONE (0)
- ☐ -RIP / RAP (0)
- ☐ -LACUSTRINE (0)
- ☐ -SHALE (-1)
- ☐ -COAL FINES (-2)

SILT — SUBSTRATE QUALITY — Check ONE (OR 2 & AVERAGE)
- ☐ -SILT HEAVY (-2)
- ☐ -SILT MODERATE (-1)
- ☐ -SILT NORMAL (0)
- ☐ -SILT FREE (1)

EMBEDDED / NEGS
- ☐ -EXTENSIVE (-2)
- ☐ -MODERATE (-1)
- ☐ -NORMAL (0)
- ☐ -NONE (1)

NUMBER OF SUBSTRATE TYPES (High Quality Only, Score 6 or +)
- ☐ -4 or More (2)
- ☐ -3 or Less (0)

Substrate: 1.0 Max 20

COMMENTS: _____

II. INSTREAM COVER (Give each cover type a score of 0 to 3; see back for instructions)

(Duration)	TYPE: Score All That Occur	
3 UNDERCUT BANKS (1)	____ POOLS > 70 cm (2)	____ OVERHANG. MACROPHYTES (1)
1 OVERHANGING VEGETATION (1)	____ ROOTWADS (1)	1 AQUATIC MACROPHYTES (1)
2 SHALLOWS (IN SLOW WATER) (1)	____ BOULDERS (1)	____ LOGS OR WOODY DEBRIS (1)
____ ROOTMATS (1)		

AMOUNT (Check ONLY one or check 2 adjs (AVERAGE))
- ☐ -EXTENSIVE > 75% (3)
- ☐ -MODERATE 25 - 75% (2)
- ☐ -SPARSE 5 - 25% (1)
- ☐ -NEARLY ABSENT < 5% (0)

Cover: 9 Max 20

COMMENTS: _____

III. CHANNEL MORPHOLOGY (Check ONLY one from Category OR check 2 and 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)	
		☐ -MAINTAINED (-1)	

MODIFICATIONS / OTHER
- ☐ -DRAINAGE
- ☐ -IMPOUNDMENT
- ☐ -RELOCATION
- ☐ -ISLAND
- ☑ -CANOPY REMOVAL
- ☐ -LEVEES
- ☐ -DREDGING
- ☑ -BANK SHAPING
- ☐ -ONE SIDE CHANNEL MODIFICATIONS

Channel: 7 Max 20

COMMENTS: _____

IV. RIPARIAN ZONE AND FLOODPLAIN QUALITY (Check ONE box (OR check 2 and AVERAGE) per bank)

Facing Downstream: Right

RIPARIAN WIDTH (Per Bank)	FLOODPLAIN QUALITY (Per Bank)	WATER EROSION (Per Bank)
☐ ☐ -VERY WIDE > 100m (5)	☐ ☐ -FOREST, SWAMP (3)	☐ ☐ -NONE / LITTLE (3)
☐ ☐ -WIDE > 50m (4)	☐ ☐ -SHRUB OR OLD FIELD (2)	☑ ☑ -MODERATE (2)
☐ ☐ -MODERATE 10 - 50m (3)	☑ ☑ -RESIDENTIAL, PARK, NEW FIELD (1)	☐ ☐ -HEAVY / SEVERE (1)
☐ ☐ -NARROW 5 - 10m (2)	☐ ☐ -FENCED PASTURE (1)	
☐ ☐ -VERY NARROW < 5m (1)	☐ ☐ -URBAN OR INDUSTRIAL (0)	
☑ ☑ -NONE (0)	☐ ☐ -OPEN PASTURE, ROW CROP (0)	
	☐ ☐ -MINING / CONSTRUCTION (0)	

Riparian: 0 Max 10

COMMENTS: _____

V. POOL / GLIDE AND RIFFLE / RUN QUALITY

MAX DEPTH (Check 1 ONLY)
- ☐ - 1m (6)
- ☐ - 0.7m (4)
- ☐ - 0.4 to 0.7m (2)
- ☑ - 0.2 to 0.4m (1)
- ☐ - < 0.2m (POOL = 0)

MORPHOLOGY (Check 1 or 2 & AVERAGE)
- ☐ -POOL WIDTH > RIFFLE WIDTH (2)
- ☐ -POOL WIDTH = RIFFLE WIDTH (1)
- ☐ -POOL WIDTH < RIFFLE WIDTH (0)
- ☐ -IMPOUNDED (-1)

CURRENT VELOCITY (POOLS & RIFFLES) (Check All That Apply)
- ☐ -SWIFT (1)
- ☐ -MODERATE (1)
- ☑ -SLOW (1)
- ☐ -NONE (-1)
- ☐ -INTERSTITIAL (-1)
- ☐ -INTERMITTENT (-2)
- ☐ -VERY FAST (1)

Pool / Current: 5 Max 12

COMMENTS: _____

VI. RIFFLE / RUN QUALITY (CHECK ONE OR CHECK 2 AND AVERAGE)

RIFFLE DEPTH
- ☐ -Deep Areas > 10cm (2)
- ☐ -Deep Areas 5 - 10cm (1)
- ☑ -Deep Areas < 5cm (0)
- ☐ -NO RIFFLE but RUNS present (0)
- ☐ -NO RIFFLE / NO RUN (Marsh = 0)

RUN DEPTH
- ☐ - MAX > 50 cm (2)
- ☑ - MAX < 50 cm (1)

RIFFLE / RUN SUBSTRATE
- ☑ -STABLE (e.g. Cobble, Boulder) (2)
- ☐ -MOD. STABLE (e.g. Large Gravel) (1)
- ☐ -UNSTABLE (Fine Gravel, Sand) (0)

RIFFLE / RUN EMBEDDEDNESS
- ☐ -NONE (2)
- ☐ -LOW (1)
- ☑ -MODERATE (0)
- ☑ -EXTENSIVE (-1)

Riffle / Run: 0 Max 8

Gradient: 9 Max 10

COMMENTS: _____

6.) GRADIENT (ft / mi): 13.5 DRAINAGE AREA (SQ MI): 2.23

% POOL: _____ % GLIDE: _____

% RIFFLE: _____ % RUN: _____

Stream must be large enough to support completion of site-relevant species

Is Sampling Reach Representative of the Stream? (Y / N)

If Not, Explain:

Lat / Long (Beg):	
Lat / Long (Mid):	
Lat / Long (End):	
Lat / Long (X-Loc):	

Major Suspected Sources of Impacts (Check All That Apply)

- None ☐
- Industrial ☐
- WWTP ☐
- Agriculture ☐
- Livestock ☐
- Silviculture ☐
- Construction ☐
- Urban Runoff ☐
- CSOs ☐
- Solution Impacts ☐
- Mining ☐
- Channelization ☐
- Riparian Removal ☐
- Landfills ☐
- Natural ☐
- Dams ☐
- Other Flow Alteration ☐

Other: _____

Subjective Rating (1-10)

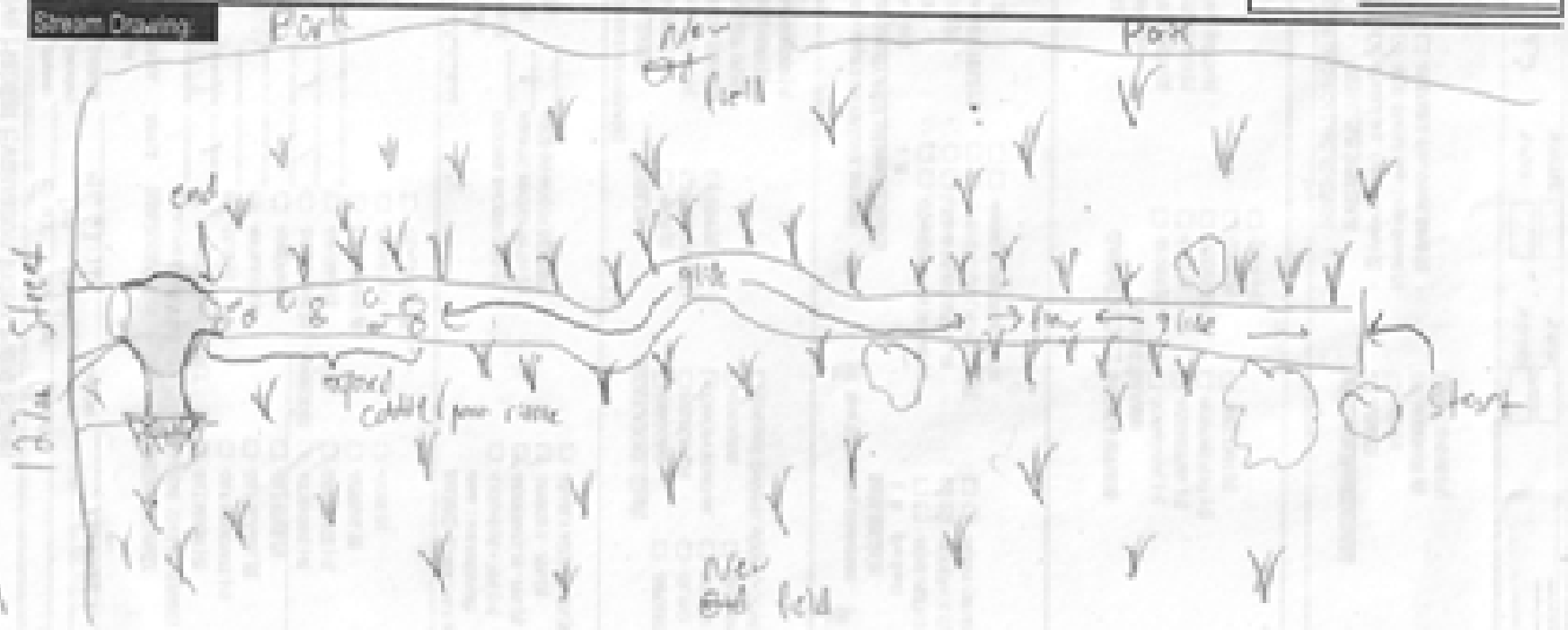
Aesthetic Rating (1-10)

Gradient: ☐ Low ☐ Moderate ☐ High

First Sampling Pass	Odor:	Oil on ss:	Water Clarity:	Water Depth:	Canopy: % Open:
	C	150	Cle3	low	100%

Yes	No	
☐	☐	Is Stream Ephemeral (no pools, totally dry of only damp spots)?
☐	☐	Is there water upstream? How far:
☐	☐	Is there water close downstream? How far:
☐	☐	Is Dry Channel mostly natural?

Stream Drawing:



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Pillow Cavern Creek very = top 2nd Count

Qualitative Habitat Evaluation Index Field Sheet

QHEI Score: 63

River Code: 21-160 | RM: 5.1 | Stream: Unnamed Trib to Cavern Creek
Site Code: CC-5.1 | Project Code: Effingham | Location: Dist. Twp.
Date: 7-16-18 | Scorer: JAC, MEP | Latitude: 39.12859 | Longitude: -88.54781

1) SUBSTRATE (Check ONLY Two Substrate TYPE BOXES; Estimate %/percent)

TYPE	POOL	RIFFLE		POOL	RIFFLE
☐ ☐ BLDR/SLAB (10)			☑ ☑ GRAVEL (7)	2	7
☐ ☐ Lg BOULD (10)			☐ ☐ SAND (6)	1	1
☐ ☐ BOULDER (9)			☐ ☐ BEDROCK (5)		
☐ ☐ COBBLE (8)	1		☐ ☐ DETRITUS (3)	1	
☐ ☐ HARDPAN (4)			☐ ☐ ARTIFICIAL (0)		
☐ ☐ MUCK (2)			☑ ☑ SILT (2)	1	1

SUBSTRATE ORIGIN — Check ONE (OR 2 & AVERAGE)
☐ -LIMESTONE (1)
☑ -TILLS (1)
☐ -WETLANDS (0)
☐ -HARDPAN (0)
☐ -SANDSTONE (0)
☐ -RIP / RAP (0)
☐ -LACUSTRINE (0)
☐ -DUNES (-1)
☐ -COAL FINES (-2)

SUBSTRATE QUALITY — Check ONE (OR 2 & AVERAGE)
SILT:
☐ -SILT HEAVY (-2)
☑ -SILT MODERATE (-1)
☐ -SILT NORMAL (0)
☐ -SILT FREE (1)
EMBEDDED / NESS:
☐ -EXTENSIVE (-2)
☑ -MODERATE (-1)
☐ -NORMAL (0)
☐ -NONE (1)

NUMBER OF SUBSTRATE TYPES (High Quality Only, Score 6 or 4):
☐ -4 or More (2)
☑ -3 or Less (0)

Substrate: 9 / Max 20

COMMENTS: Silt in pools very thick

2) INSTREAM COVER (Use each cover type a score of 0 to 3; see back for instructions)

(Structure)	TYPE: Score All That Occur	
3 UNDERCUT BANKS (1)	3 POOLS > 70 cm (2)	___ OVERHANG, BRUSH/TREES (1)
3 OVERHANGING VEGETATION (1)	3 ROOTWADS (1)	1 AQUATIC MACROPHYTES (1)
2 SHALLOWS (IN SLOW WATER) (1)	___ BOULDERS (1)	1 LOGS OR WOODY DEBRIS (1)
___ ROOTMATS (1)		

AMOUNT (Check ONLY one or check 2 and AVERAGE):
☐ -EXTENSIVE > 75% (11)
☑ -MODERATE 25 - 75% (7)
☐ -SPARSE 5 - 25% (3)
☐ -NEARLY ABSENT < 5% (1)

Cover: 16 / Max 32

COMMENTS:

3) CHANNEL MORPHOLOGY (Check ONLY one PER Category OR check 2 and AVERAGE)

SINUOSITY	DEVELOPMENT	CHANNELIZATION	STABILITY	MODIFICATIONS / OTHER
☐ -HIGH (4)	☐ -EXCELLENT (7)	☐ -NONE (6)	☐ -HIGH (3)	☐ -DRAGGING ☐ -IMPOUNDMENT
☑ -MODERATE (3)	☑ -GOOD (5)	☐ -RECOVERED (4)	☑ -MODERATE (2)	☐ -RELOCATION ☐ -ISLAND
☐ -LOW (2)	☑ -FAIR (3)	☑ -RECOVERING (3)	☐ -LOW (1)	☐ -CANOPY REMOVAL ☐ -LEVEED
☐ -NONE (1)	☐ -POOR (1)	☐ -RECENT OR NO RECOVERY (1)		☐ -DREDGING ☐ -BANK SHAPING
		☐ -IMPOUNDED (-1)		☐ -ONE SIDE CHANNEL MODIFICATIONS

Channel: 17 / Max 20

COMMENTS:

4) RIPARIAN ZONE AND BANK EROSION (Check ONE box PER bank or check 2 and AVERAGE per bank)

River Right Looking Downstream

RIPARIAN WIDTH (L / R) (Per Bank)	FLOODPLAIN QUALITY (L / R) (Most Predominant Per Bank)		BANK EROSION (L / R) (Per Bank)
☐ ☐ -VERY WIDE > 100m (5)	☐ ☐ -FOREST, SWAMP (3)	☐ ☐ -CONSERVATION TILLAGE (1)	☐ ☐ -NONE / LITTLE (3)
☐ ☐ -WIDE > 50m (4)	☑ ☑ -SHRUB OR OLD FIELD (2)	☐ ☐ -URBAN OR INDUSTRIAL (0)	☑ ☑ -MODERATE (2)
☐ ☐ -MODERATE 10 - 50m (3)	☐ ☐ -RESIDENTIAL, PARK, NEW FIELD (1)	☐ ☐ -OPEN PASTURE, ROWCROP (0)	☐ ☐ -HEAVY / SEVERE (1)
☑ ☑ -NARROW 5 - 10m (2)	☐ ☐ -FENCED PASTURE (1)	☐ ☐ -MINING / CONSTRUCTION (0)	
☐ ☐ -VERY NARROW < 5m (1)			
☐ ☐ -NONE (0)			

Riparian: 6.5 / Max 10

COMMENTS:

5) POOL / GLIDE AND RIFFLE / RUN QUALITY

MAX DEPTH (Check ONLY)
☐ -1m (6)
☑ -0.7m (4)
☐ -0.4 to 0.7m (2)
☐ -0.2 to 0.4m (1)
☐ -< 0.2m (POOL = 0)

MORPHOLOGY (Check 1 or 2 & AVERAGE)
☑ -POOL WIDTH > RIFFLE WIDTH (3)
☐ -POOL WIDTH = RIFFLE WIDTH (2)
☐ -POOL WIDTH < RIFFLE WIDTH (0)
☐ -IMPOUNDED (-1)

CURRENT VELOCITY (POOLS & RIFFLES) (Check All That Apply)
☐ -SWIFT (1)
☐ -FAST (1)
☑ -MODERATE (1)
☑ -SLOW (1)
☐ -NONE (-1)
☐ -TORRENTIAL (-1)
☐ -INTERSTITIAL (-1)
☐ -INTERMITTENT (-2)
☐ -VERY FAST (0)

Pool / Current: 9 / Max 12

COMMENTS:

6) RIFFLE / RUN QUALITY (CHECK ONE OR CHECK 2 AND AVERAGE)

RIFFLE DEPTH
☐ -Total Areas > 10cm (2)
☑ -Total Areas 5 - 10cm (1)
☐ -Total Areas < 5cm (0)
☐ -NO RIFFLE but RUNS present (0)
☐ -NO RIFFLE / NO RUN (Marsh) = 0

RUN DEPTH
☐ -MAX > 50 cm (2)
☑ -MAX = 50 cm (1)

RIFFLE / RUN SUBSTRATE
☐ -STABLE (e.g., Cobble, Boulder) (2)
☑ -MOD. STABLE (e.g., Large Gravel) (1)
☐ -UNSTABLE (Fine Gravel, Sand) (0)

RIFFLE / RUN EMBEDDEDNESS
☐ -NONE (2)
☐ -LOW (1)
☑ -MODERATE (0)
☐ -EXTENSIVE (-1)

Riffle / Run: 5 / Max 8

Gradient: 10

COMMENTS:

6) GRADIENT (ft / mi): 21.3 DRAINAGE AREA (sq mi): 2.41 % POOL: ___ % GLIDE: ___ % RIFFLE: ___ % RUN: ___

Gradient Score from Table 3 of Users Manual (based on gradient and drainage area)

Max 10

*Best areas must be large enough to support a population of riffle obligate species

Is Sampling Reach Representative of the Stream? (Y/ N)

If Not, Explain:

Lat / Long (Beg):	
Lat / Long (Mid):	
Lat / Long (End):	
Lat / Long (X-Loc):	

Major Suspected Sources of Impacts (Check All That Apply):

- None ☐
- Industrial ☐
- WWTP ☐
- Agriculture ☐
- Livestock ☐
- Silviculture ☐
- Construction ☐
- Urban Runoff ☐
- CSOs ☐
- Suburban impacts ☐
- Mining ☐
- Channelization ☐
- Riparian Removal ☐
- Landfills ☐
- Natural ☐
- Dams ☐
- Other Flow Alteration ☐

Other: _____

Subjective Rating (1-10)

Aesthetic Rating (1-10)

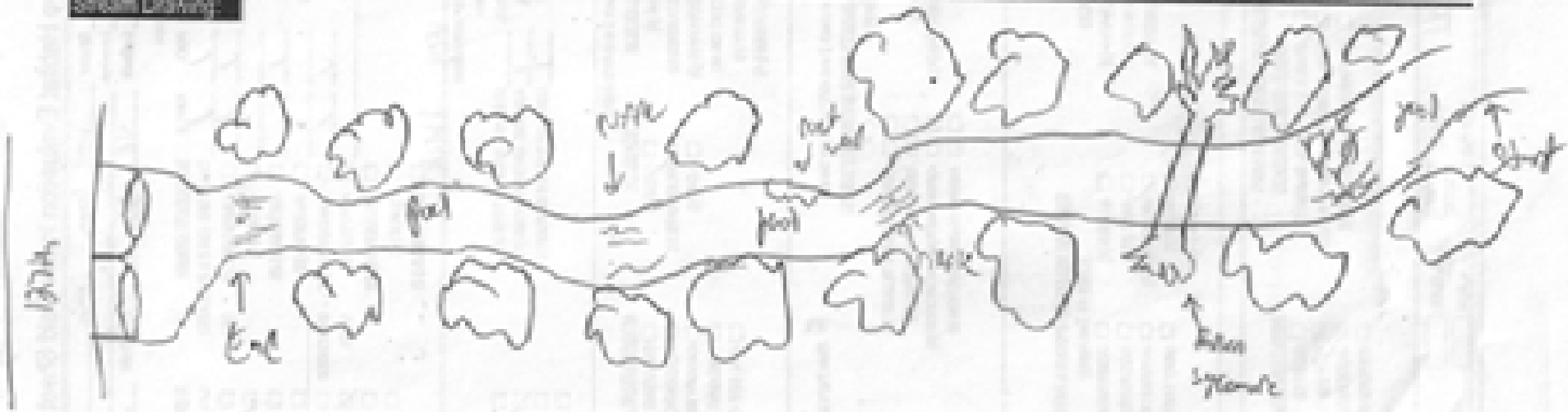
Gradient: ☐ -Low ☐ -Moderate ☐ -High

Field Sampling Pass	Gear	Distance	Water Clarity	Water Stage	Canopy: % open
	F	150	C to B	Low	35%

Yes / No

- ☐ ☐ Is Stream Ephemeral (no pools, totally dry of only damp spots)?
- ☐ ☐ Is there water upstream? How far:
- ☐ ☐ Is there water close downstream? How far:
- ☐ ☐ Dry Channel mostly natural?

Stream Drawing:



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Qualitative Habitat Evaluation Index Field Sheet

QHEI Score: 54.5

River Code: 95-163 | RM: 1.9 | Stream: Spring Creek

Site Code: 1-SCR | Project Code: Effingham | Location: SR 9 Bridge

Date: 8-16-16 | Scorer: Jacob Dye | Latitude: 41.4083 | Longitude: -87.5454

I. SUBSTRATE (Check ONLY Two Substrate TYPE BOXES; Estimate %; Optional)

TYPE	POOL	RIFFLE	TYPE	POOL	RIFFLE
☐ ☐ BLDR/SLAB (10)			☐ ☐ GRAVEL (7)		
☐ ☐ Lg BOULD (10)			☐ ☐ SAND (6)		
☐ ☐ BOULDER (9)			☐ ☐ BEDROCK (5)		
☐ ☐ COBBLE (8)	1		☐ ☐ DETRITUS (3)		
☐ ☑ HARDPAN (4)	1	1	☐ ☐ ARTIFICIAL (0)		
☐ ☑ MUCK (2)	1	1	☐ ☐ SILT (2)	1	1

SUBSTRATE 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)

SUBSTRATE QUALITY (Check ONE OR 2 & AVERAGE):

SILT:
- ☑ -SILT HEAVY (-2)
- ☐ -SILT MODERATE (-1)
- ☐ -SILT NORMAL (0)
- ☐ -SILT FREE (2)

EMBEDDED:
- ☑ -EXTENSIVE (-2)
- ☐ -MODERATE (-1)
- ☐ -NORMAL (0)
- ☐ -NONE (1)

NUMBER OF SUBSTRATE TYPES: (High Quality Only, Score 6 or 4)
- ☐ -4 or More (2)
- ☑ -3 or Less (0)

Substrate: 7 Max 20

COMMENTS:

II. INSTREAM COVER (Give each cover type a score of 0 to 3; see back for instructions)

(Structure):
- 1 UNDERCUT BANKS (1)
- 3 OVERHANGING VEGETATION (1)
- 1 SHALLOWS (IN SLOW WATER) (1)
- ____ ROOTWADS (1)

TYPE: Score All That Occur:
- 3 POOLS > 70 cm (2)
- ____ ROOTWADS (1)
- ____ BOULDERS (1)
- ____ SNAGS/LOGS/WOODY DEBRIS (1)
- ____ UNDERCUT BANKS/TERRESTRIAL VEGETATION (1)
- 2 AQUATIC MACROPHYTES (1)
- ____ LOGS OR WOODY DEBRIS (1)

AMOUNT: (Check ONLY one in check 2 and AVERAGE)
- ☐ EXTENSIVE > 75% (11)
- ☑ MODERATE 25 - 75% (7)
- ☐ SPARSE 5 - 25% (3)
- ☐ NEARLY ABSENT < 5% (1)

Cover: 13 Max 20

COMMENTS:

III. CHANNEL MORPHOLOGY (Check ONLY one PER Category OR check 2 and 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)

MODIFICATIONS / OTHER:
- ☐ -DRAGGING
- ☐ -IMPOUNDMENT
- ☐ -RELOCATION
- ☐ -JELLIES
- ☐ -CANOPY REMOVAL
- ☐ -GRAVEL
- ☐ -DREDGING
- ☐ -BANK SHAPING
- ☐ -ONE SIDE CHANNEL MODIFICATIONS

Channel: 6 Max 20

COMMENTS:

IV. RIPARIAN ZONE AND BANK EROSION (Check ONE box PER bank or check 2 and AVERAGE per bank)

River Right Looking Downstream

RIPARIAN WIDTH (L R, Per Bank):
- ☐ ☐ -VERY WIDE > 100m (3)
- ☐ ☐ -WIDE > 50m (2)
- ☐ ☐ -MODERATE 10 - 50m (2)
- ☐ ☐ -NARROW 5 - 10m (1)
- ☐ ☐ -VERY NARROW < 5m (1)
- ☑ ☐ -NONE (0)

FLOOD PLAIN QUALITY (PAST 100 Meter RIPARIAN) (L R, Most Predominant Per Bank):
- ☐ ☐ -FOREST, SWAMP (3)
- ☐ ☐ -SHRUB OR OLD FIELD (2)
- ☐ ☐ -RESIDENTIAL, PARK, NEW FIELD (1)
- ☐ ☐ -FENCED PASTURE (1)
- ☐ ☐ -CONSERVATION TILLAGE (1)
- ☐ ☐ -URBAN OR INDUSTRIAL (0)
- ☑ ☑ -OPEN PASTURE, ROWCROP (0)
- ☐ ☐ -MINING / CONSTRUCTION (0)

BANK EROSION (L R, Per Bank):
- ☐ ☐ -NONE / LITTLE (2)
- ☑ ☑ -MODERATE (1)
- ☐ ☐ -HEAVY / SEVERE (0)

Riparian: 4 Max 10

COMMENTS:

V. POOL / GLIDE AND RIFFLE / RUN QUALITY

MAX. DEPTH (Check 1 ONLY):
- ☑ - 1m (6)
- ☐ - 0.7m (4)
- ☐ - 0.4 to 0.7m (2)
- ☐ - 0.2 to 0.4m (1)
- ☐ - < 0.2m (POOL = 0)

MORPHOLOGY (Check 1 or 2 & AVERAGE):
- ☐ -POOL WIDTH > RIFFLE WIDTH (2)
- ☑ -POOL WIDTH = RIFFLE WIDTH (1)
- ☐ -POOL WIDTH < RIFFLE WIDTH (0)
- ☐ -IMPOUNDED (-1)

CURRENT VELOCITY (POOLS & RIFFLES) (Check All That Apply):
- ☐ -EDDIES (1)
- ☐ -FAST (1)
- ☐ -MODERATE (1)
- ☑ -SLOW (1)
- ☑ -NONE (-1)
- ☐ -TORRENTIAL (-1)
- ☑ -INTERSTITIAL (-1)
- ☐ -INTERMITTENT (-2)
- ☐ -VERY FAST (1)

Pool / Gradient: 4 Max 12

COMMENTS:

VI. RIFFLE / RUN QUALITY

CHECK ONE OR CHECK 2 AND AVERAGE

RIFFLE DEPTH:
- ☐ -Best Areas > 10cm (2)
- ☐ -Best Areas 5 - 10cm (1)
- ☐ -Best Areas < 5cm (0)
- ☐ -NO RIFFLE but RUNS present (0)
- ☑ -NO RIFFLE / NO RUN (Marsh = 0)

RUN DEPTH:
- ☐ - MAX > 50 cm (2)
- ☐ - MAX < 50 cm (1)

RIFFLE / RUN SUBSTRATE:
- ☐ -STABLE (e.g., Cobble, Boulder) (2)
- ☐ -MOD. STABLE (e.g., Large Gravel) (1)
- ☐ -UNSTABLE (Fine Gravel, Sand) (0)

RIFFLE / RUN EMBEDDEDNESS:
- ☐ -NONE (2)
- ☐ -LOW (1)
- ☐ -MODERATE (0)
- ☐ -EXTENSIVE (-1)

Riffle / Run: 0 Max 8

Gradient: 19 Max 10

COMMENTS:

VII. GRADIENT (ft / mi): 11.3 DRAINAGE AREA (sq.mi.): 3.39 %POOL: ____ %GLIDE: ____ %RIFFLE: ____ %RUN: ____

Gradient Score from Table 3 of User Manual (score or greatest area drainage area)

*Best areas must be large enough to support a population of diverse/highly sensitive species.

Is Sampling Reach Representative of the Stream? (Y) N

If Not, Explain: Dog ditch, water mud strong vinegar odor.

Lat / Long (Beg):	
Lat / Long (Mid):	
Lat / Long (End):	
Lat / Long (X-Loc):	

	Gauge	Distance	Water Clarity	Water Stage	Canopy % open
First Sampling Pass	F	1320'	0.5m	mod	100%

Subjective Rating (1-10)

Aesthetic Rating (1-10)

Gradient: ☐ -Low ☐ -Moderate ☐ -High

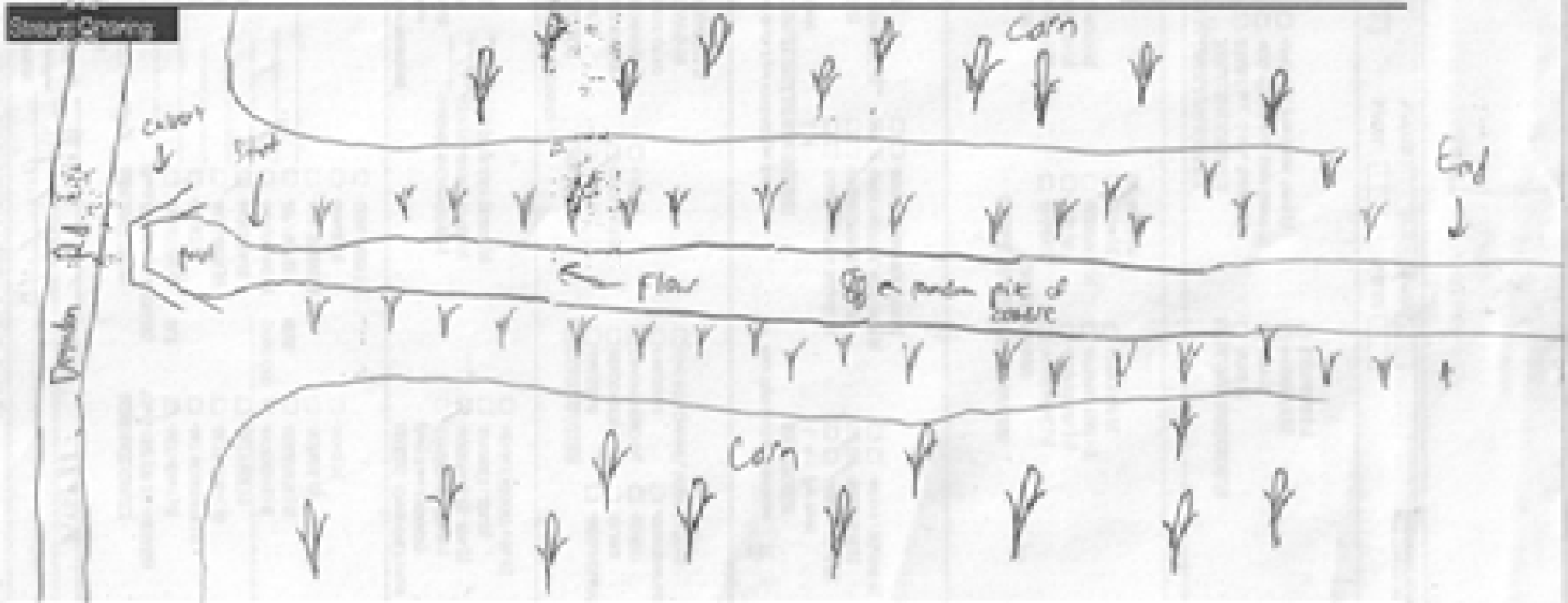
Yes	No	
☐	☐	Is riparian buffer present (no point, totally dry or only damp spots)?
☐	☐	Is strong water upstream? How far:
☐	☐	Is [illegible] down downstream? How far:
☐	☐	Is [illegible] mostly natural?

Major Suspected Sources of Impacts (Check All That Apply)

- ☐ None
- ☐ Industrial
- ☐ MWTP
- ☐ Agriculture
- ☐ Livestock
- ☐ Silviculture
- ☐ Construction
- ☐ Urban Runoff
- ☐ CSOs
- ☐ Suburban Impacts
- ☐ Mining
- ☐ Channelization
- ☐ Riparian Removal
- ☐ Landfills
- ☐ Natural
- ☐ Dams
- ☐ Other Flow Alteration

Other: _____

Stream Drawing



Instructions for scoring the alternate cover metric: Each cover type should receive a score of between 0 and 3, where: 0 = Cover type absent; 1 = cover type in very small amounts or if more common of marginal quality; 2 = cover type present in moderate amounts, but not of highest quality or in small amounts of highest quality; 3 = cover type of highest quality in moderate of greater amounts. Examples of highest quality include, very large boulders in deep or fast water, large diameter logs that are stable, well-developed rootwads in deep / fast water, or deep, well-defined, functional pools.

Qualitative Habitat Evaluation Index Field Sheet

QHEI Score:

River Code: | RM: | Stream:
Site Code: | Progam Letter: | Location:
Date: | Scorer: | Latitude: | Longitude:

I. SUBSTRATE (Check ONLY Two Substrate TYPE BOXES; Estimate % percent)

TYPE	POOL	RIFFLE		POOL	RIFFLE
☐ ☐ BEDROCK [10]			☐ ☐ GRAVEL [7]		
☐ ☐ sig BOULDER [10]			☐ ☐ SAND [6]		
☐ ☐ BOULDER [9]			☐ ☐ BEDROCK [5]		
☐ ☐ COBBLE [8]			☐ ☐ EXTINCT [3]		
☐ ☐ mixSP/mix [8]			☐ ☐ ARTIFICIAL [2]		
☐ ☐ MUCK [2]			☐ ☐ SILT [2]		

SUBSTRATE ORIGIN — Check ONE (OR 2 & AVERAGE)
☐ -LIMESTONE [1]
☐ -TILLS [1]
☐ -WETLANDS [0]
☐ -HARDPAN [0]
☐ -SANDSTONE [0]
☐ -SHP / RAP [0]
☐ -LACUSTRINE [0]
☐ -SHALE [-1]
☐ -COAL FINES [-2]

SILT: ☐ -SILT HEAVY [-2] ☐ -SILT MODERATE [-1] ☐ -SILT NORMAL [0] ☐ -SILT FREE [1]

EMBEDDED / NEGS: ☐ -EXTENSIVE [-2] ☐ -MODERATE [-1] ☐ -NORMAL [0] ☐ -NONE [1]

Substrate Max 20

NUMBER OF SUBSTRATE TYPES (High Quality Only, Score 0 or +): ☐ -4 or More [2] ☐ -3 or Less [0]

COMMENTS:

II. INSTREAM COVER (Give each cover type a score of 0 to 3, see back for instructions)

(Structure)	TYPE Score All That Occur	
UNDERCUT BANKS [1]	POOLS > 70 cm [2]	OVERHANG. MACROPHYTES [1]
OVERHANGING VEGETATION [1]	ROOTWADS [1]	AQUATIC MACROPHYTES [1]
SHALLOWS (IN SLOW WATER) [1]	BOULDERS [1]	WOOD DEBRIS/ SNAGS [1]
ROOTMATS [1]		

AMOUNT (Check ONLY one or check 2 and AVERAGE)
☐ -EXTENSIVE > 75% [11]
☐ -MODERATE 25 - 75% [7]
☐ -SPARSE 5 - 25% [3]
☐ -NEARLY ABSENT < 5% [1]

COMMENTS:

Cover Max 20

III. CHANNEL MORPHOLOGY (Check ONLY one RUN Category OR check 2 and AVERAGE)

SINUOSITY	DEVELOPMENT	CHANNELIZATION	STABILITY	MODIFICATIONS (OTHER)
☐ -HIGH [4]	☐ -EXCELLENT [7]	☐ -NONE [6]	☐ -HIGH [3]	☐ -DIKE/DIKING ☐ -IMPOUNDMENT
☐ -MODERATE [3]	☐ -GOOD [5]	☐ -RECOVERED [4]	☐ -MODERATE [2]	☐ -RELOCATION ☐ -ISLAND
☐ -LOW [2]	☐ -FAIR [3]	☐ -RECOVERING [3]	☐ -LOW [1]	☐ -CANOPY REMOVAL ☐ -LEVEED
☐ -NONE [1]	☐ -POOR [1]	☐ -RECENT OR NO RECOVERY [1]		☐ -DREDGING ☐ -BANK SHAPING
		☐ -IMPOUNDED [-1]		☐ ONE SIDE CHANNEL MODIFICATIONS

COMMENTS:

Channel Max 20

IV. RIPARIAN ZONE AND BANK EROSION (Check ONE box PER bank or check 2 and AVERAGE per bank)

River Right Looking Downstream

RIPARIAN WIDTH (L / R) (Per Bank)	FLOOD PLAIN QUALITY (EXCEPT 100 Meter RIPARIAN) (L / R) (Most Predominant Per Bank)	BANK EROSION (L / R) (Per Bank)
☐ ☐ -VERY WIDE > 100m [3]	☐ ☐ -FOREST, SWAMP [3]	☐ ☐ -NONE / LITTLE [3]
☐ ☐ -WIDE > 50m [2]	☐ ☐ -SHRUB OR OLD FIELD [2]	☐ ☐ -MODERATE [2]
☐ ☐ -MODERATE 10 - 50m [1]	☐ ☐ -RESIDENTIAL, PARK, NEW FIELD [1]	☐ ☐ -HEAVY / SEVERE [1]
☐ ☐ -NARROW 5 - 10m [0]	☐ ☐ -FENCED PASTURE [1]	
☐ ☐ -VERY NARROW < 5m [1]	☐ ☐ -CONSERVATION TILLAGE [1]	
☐ ☐ -NONE [0]	☐ ☐ -URBAN OR INDUSTRIAL [0]	
	☐ ☐ -OPEN PASTURE, ROWCROP [0]	
	☐ ☐ -MINING / CONSTRUCTION [0]	

COMMENTS:

Riparian Max 10

V. POOL / GLIDE AND RIFFLE / RUN QUALITY

MAX DEPTH (Check 1 ONLY)
☐ -1m [0]
☐ -0.5m [4]
☐ -0.4 to 0.7m [2]
☐ -0.2 to 0.4m [1]
☐ -< 0.2m [POOL = 0]

MORPHOLOGY (Check 1 or 2 & AVERAGE)
☐ -POOL WIDTH > RIFFLE WIDTH [2]
☐ -POOL WIDTH = RIFFLE WIDTH [1]
☐ -POOL WIDTH < RIFFLE WIDTH [0]
☐ -IMPOUNDED [-1]

CURRENT VELOCITY (POOLS & RIFFLES) (Check All That Apply)
☐ -SWIFT [1] ☐ -TORRENTIAL [-1]
☐ -FAST [1] ☐ -INTERSTITIAL [-1]
☐ -MODERATE [1] ☐ -INTERMITTENT [-2]
☐ -SLOW [1] ☐ -VERY FAST [1]
☐ -NONE [-1]

Pool / Current Max 12

COMMENTS:

VI. RIFFLE / RUN QUALITY (CHECK ONE OR CHECK 2 AND AVERAGE)

RIFFLE DEPTH
☐ -Riffle Absent = 0 [0]
☐ -Riffle Shallow 5 - 10cm [1]
☐ -Riffle Moderate > 10cm [2]
☐ -NO RIFFLE but RUNS present [0]
☐ -NO RIFFLE / NO RUN (Rapids = 0) [0]

RUN DEPTH
☐ -MAX > 50 cm [2]
☐ -MAX < 50 cm [1]

RIFFLE / RUN SUBSTRATE
☐ -STABLE (e.g., Cobble, Boulder) [2]
☐ -MOD. STABLE (e.g., Large Gravel) [1]
☐ -UNSTABLE (Fine Gravel, Sand) [0]

RIFFLE / RUN EMBEDDEDNESS
☐ -NONE [2]
☐ -LOW [1]
☐ -MODERATE [0]
☐ -EXTENSIVE [-1]

Riffle / Run Max 6

COMMENTS:

Gradient Max 10

GRADIENT (ft / mi): | DRAINAGE AREA (sq mi): | % POOL: | % GLIDE: | % RIFFLE: | % RUN:

*Reach length must be long enough to support a reproducing population of the obligate species.

Qualitative Stream Rank Table 2 of Users Manual (based on smallest and largest sites)

Is Sampling Reach Representative of the Stream? (Y) N

If Not, Explain: Of water flowing under

Lat / Long (Beg):

Lat / Long (Mid):

Lat / Long (End):

Lat / Long (X-Loc):

Major Suspected Sources of Impacts (Check All That Apply)

- None ☐
- Industrial ☐
- WWTP ☐
- Agriculture ☐
- Livestock ☐
- Silviculture ☐
- Construction ☐
- Urban Runoff ☐
- CSOs ☐
- Suburban Impacts ☐
- Mining ☐
- Channelization ☐
- Riparian Removal ☐
- Landfills ☐
- Natural ☐
- Dams ☐
- Other Flow Alteration ☐

Other:

First Sampling Pass	Color	Distance	Water Clarity	Water Stage	Canopy - % open
		130		very low	95%

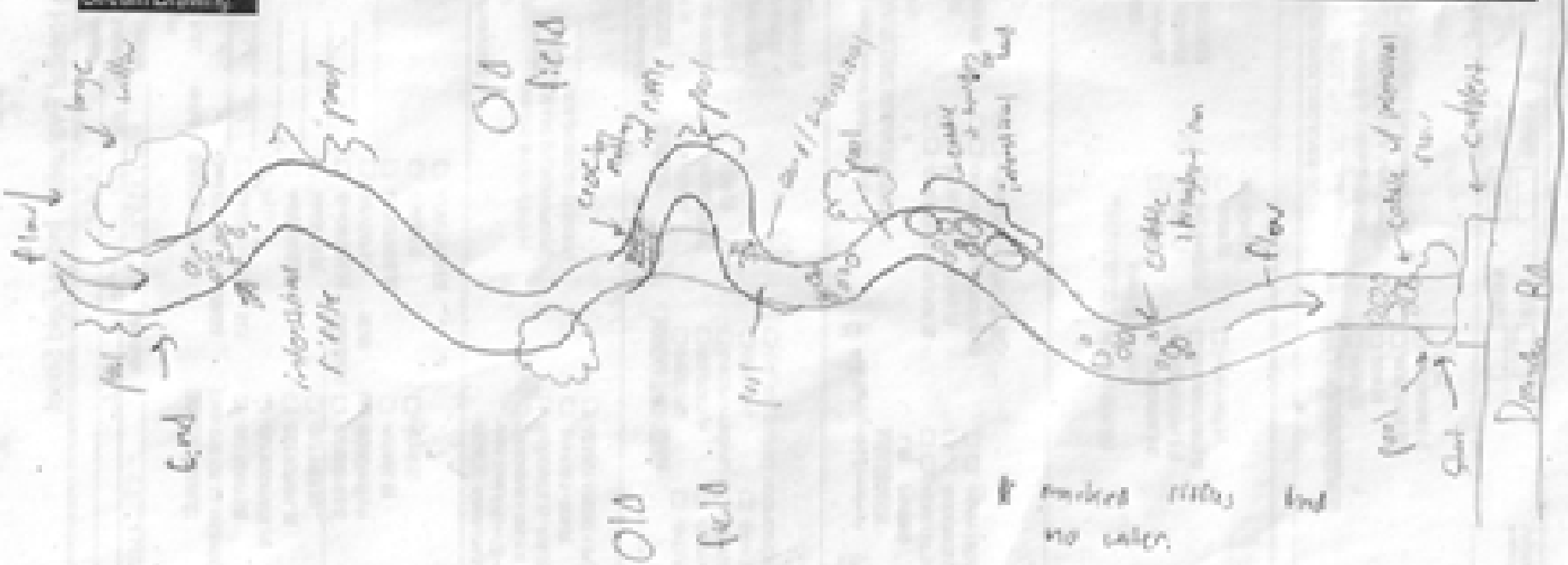
Subjective Rating (1-10)

Aesthetic Rating (1-10)

Gradient: ☐ Low ☐ Moderate ☐ High

You	No	
☐	☐	Is Stream Ephemeral (no pools, totally dry of only damp spots)?
☐	☐	Is there water upstream? How far:
☐	☐	Is there water done downstream? How far:
☐	☐	Is Dry Channel mostly natural?

Stream Drawing:



Instructions for scoring the alternate cover metric: Each cover type should receive a score of between 0 and 3, where: 0 = Cover type absent; 1 = cover type in very small amounts or if more common of marginal quality; 2 = cover type present in moderate amounts, but not of highest quality or in small amounts of highest quality; 3 = cover type of highest quality in moderate of greater amounts. Examples of highest quality include, very large boulders in deep or fast water, large diameter logs that are stable, well developed rootwads in deep / fast water, or deep, well-defined, functional pools.

Qualitative Habitat Evaluation Index Field Sheet

QHEI Score:

River Code: | RM: | Stream: | Longitude:
Site Code: | Project Code: | Location: | Latitude:
Date: | Scorer:

I. SUBSTRATE (Check ONLY Two Substrate TYPE BOXES; Estimate % percent)

TYPE	POOL	RIFFLE
BLDR/SLAB (10)		
Lg. ROCK (9)		
BOULDER (9)		
COBBLE (8)		
HARDPAN (4)		
MUCK (2)		
GRAVEL (7)		
SAND (6)		
BEDROCK (9)		
DETRITUS (3)		
ARTIFICIAL (0)		
SILT (2)		

	POOL	RIFFLE

SUBSTRATE 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)

SILT: (Check ONE OR 2 & AVERAGE)
- SILT HEAVY (-2)
- SILT MODERATE (-1)
- SILT NORMAL (0)
- SILT FREE (1)

EMBEDDED NESS:
- EXTENSIVE (-1)
- MODERATE (-1)
- NORMAL (0)
- NONE (1)

NUMBER OF SUBSTRATE TYPES: (High Quality Only, Score 5 or 1)
- 4 or More (2)
- 3 or Less (0)

Substrate Max 20

COMMENTS:

II. INSTREAM COVER (Give each cover type a score of 0 to 3; see back for instructions)

(Structure)
- UNDERCUT BANKS (1)
- OVERHANGING VEGETATION (1)
- SHALLOWS (in SLOW WATER) (1)
- ROOTWADS (1)

TYPE: Score All That Occur
- POOLS > 70 cm (2)
- BOULDERS (1)
- CHANNEL MACROPHYTES (1)
- AQUATIC MACROPHYTES (1)
- LOGS OR WOODY DEBRIS (1)

AMOUNT: (Check ONLY one or check 2 and AVERAGE)
- EXTENSIVE > 75% (11)
- MODERATE 25 - 75% (7)
- SPARSE 5 - 25% (3)
- NEARLY ABSENT < 5% (1)

Cover Max 20

COMMENTS:

III. CHANNEL MORPHOLOGY (Check ONLY one FOR Category OR check 2 and 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)

MODIFICATIONS / OTHER:
- DIKING
- REVETMENT
- CANOPY REMOVAL
- DREDGING
- ONE SIDE CHANNEL MODIFICATIONS
- IMPOUNDMENT
- SLAG
- LEVEES
- BANK SHAPING

Channel Max 20

COMMENTS:

IV. RIPARIAN ZONE AND FLOODPLAIN QUALITY (Check ONE box FOR each Column 2 and AVERAGE if you wish)

River Right Looking Downstream

RIPARIAN WIDTH:
- WIDE > 50m (4)
- MODERATE 10 - 50m (3)
- NARROW 5 - 10m (2)
- VERY NARROW < 5m (1)
- NONE (0)

L R (Best Pick Present Per Bank)
- FOREST, SWAMP (3)
- SHRUB OR OLD FIELD (2)
- RESIDENTIAL, PARK, NEW FIELD (1)
- FENCED PASTURE (1)

L R
- OPEN PASTURE, ROW CROP (0)
- MINING / CONSTRUCTION (0)

BANK EROSION
L R (Per Bank)
- NONE / LITTLE (2)
- MODERATE (1)
- HEAVY / SEVERE (0)

Riparian Max 10

COMMENTS:

V. POOL / GLIDE AND RIFFLE / RUN QUALITY

MAX DEPTH (Check 1 ONLY)
- > 1m (6)
- 0.7m (4)
- 0.4 to 0.7m (2)
- 0.2 to 0.4m (1)
- < 0.2m (POOL = 0)

MORPHOLOGY (Check 1 or 2 & AVERAGE)
- POOL WIDTH > RIFFLE WIDTH (2)
- POOL WIDTH = RIFFLE WIDTH (1)
- POOL WIDTH < RIFFLE WIDTH (0)
- IMPOUNDED (-1)

CURRENT VELOCITY (POOLS & RIFFLES) (Check All That Apply)
- TORRENTIAL (-1)
- INTERSTITIAL (-1)
- INTERMITTENT (-2)
- VERY FAST (1)
- FAST (1)
- MODERATE (1)
- SLOW (1)
- NONE (-1)

Pool / Current Max 12

COMMENTS:

CHECK ONE OR CHECK 2 AND AVERAGE

RIFFLE DEPTH
- Riffle Areas > 10cm (2)
- Riffle Areas 5 - 10cm (1)
- Riffle Areas < 5cm (0)
- NO RIFFLE but RUNS present (0)
- NO RIFFLE NOR RUN (poor habitat) (-1)

RUN DEPTH
- MAX > 50 cm (2)
- MAX < 50 cm (1)

RIFFLE / RUN SUBSTRATE
- STABLE (e.g., Cobble, Boulder) (2)
- MOD. STABLE (e.g., Large Gravel) (1)
- UNSTABLE (Fine Gravel, Sand) (0)

RIFFLE / RUN EMBEDDEDNESS
- NONE (2)
- LOW (1)
- MODERATE (0)
- EXTENSIVE (-1)

Riffle / Run Max 8

COMMENTS:

Gradient Max 10

VI. GRADIENT (ft / mi): | DRAINAGE AREA (sq mi):

% POOL: | % GLIDE:
% RIFFLE: | % RUN:

Gradient Score from Table (Lat and Long Method based on gradient and drainage area)

Your stream must be large enough to support a population of fifty sculpin species

Is Sampling Reach Representative of the Stream? (Y) N

If Not, Explain: _____

Lat / Long (Beg):	
Lat / Long (Mid):	
Lat / Long (End):	
Lat / Long (X-Loc):	

Subjective Rating (1-10)

Aesthetic Rating (1-10)

Gradient: ☐ -Low ☐ -Moderate ☐ -High

First Sampling Pass	Odor:	Oil/Sheen:	Water Clarity:	Water Stage:	Canopy: % open:

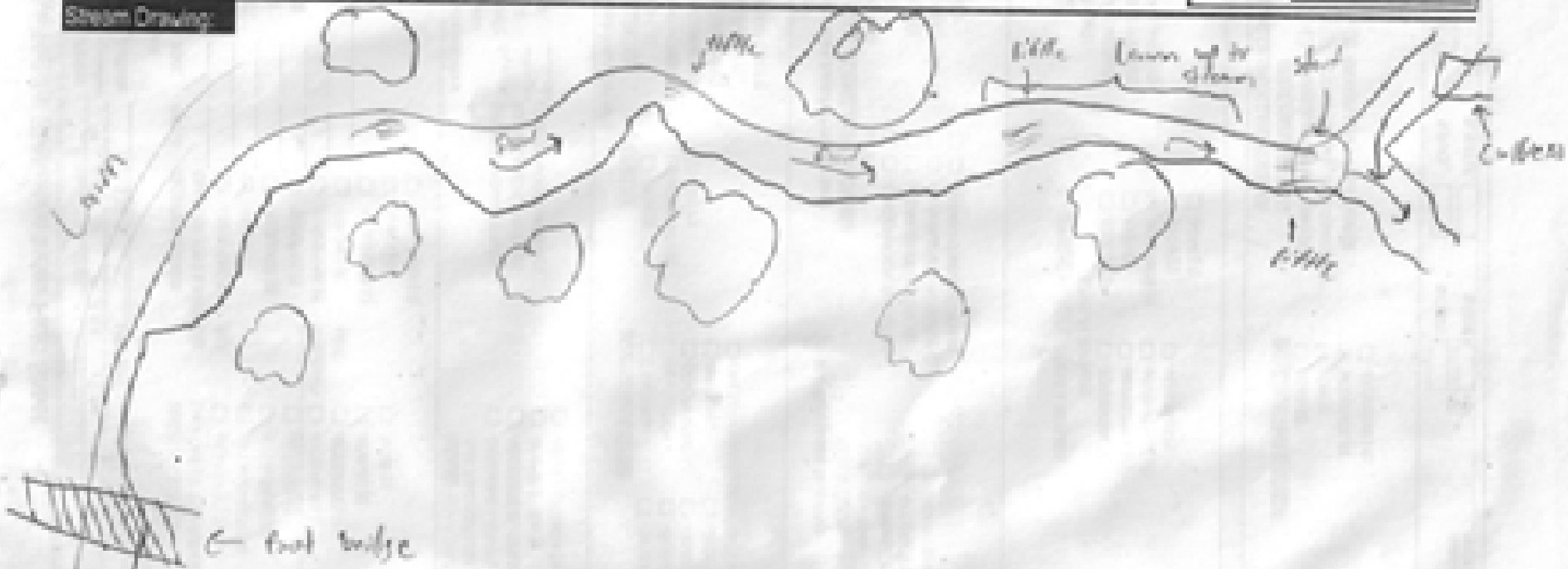
Yes	No	
☐	☐	Is Stream Ephemeral (no pools, totally dry at only damp spots)?
☐	☐	Is there water upstream? How far:
☐	☐	Is there water above downstream? How far:
☐	☐	Is Drip Channel mostly natural?

Major Suspected Sources of Impacts (Check All That Apply)

- None ☐
- Industrial ☐
- WWTP ☐
- Agriculture ☐
- Livestock ☐
- Silviculture ☐
- Construction ☐
- Urban Runoff ☐
- CSOs ☐
- Subsurface Impacts ☐
- Mining ☐
- Channelization ☐
- Riparian Removal ☐
- Landfills ☐
- Natural ☐
- Dams ☐
- Other Flow Alteration ☐

Other: _____

Stream Drawing:



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Qualitative Habitat Evaluation Index Field Sheet

QHEI Score: 69

River Code: 05-661 | Rkm: 12 | Stream: Unn Trib Indian
Site Code: 05UNT-12 | Project Code: 05UNT-12 | Location: Mid-Ck Rd
Date: 7-7-05 | Scorer: [illegible] | Latitude: 39° 23' 20.5" | Longitude: 84° 24' 42.2"

1) SUBSTRATE (Check ONLY Two Substrate TYPE BOXES; Estimate % percent)

TYPE	POOL	RIFFLE
☐ ☐ BLDR/SLAB [10]		
☐ ☐ Lg BOULD [9]		
☐ ☐ BOULDER [8]		
☐ ☐ COBBLE [7]	7	7
☐ ☐ HARDPAN [4]		
☐ ☐ MUCK [0]		
☐ ☐ GRAVEL [7]		
☐ ☐ SAND [6]		
☐ ☐ BEDROCK [5]		
☐ ☐ DETRITUS [3]		
☐ ☐ ARTIFICIAL [0]		
☐ ☐ SILT [2]		

	POOL	RIFFLE
	1	1
	1	1

SUBSTRATE ORIGIN — Check ONE (OR 2 & AVERAGE)
☐ -LIMESTONE [1]
☑ -TILLS [1]
☐ -WETLANDS [0]
☐ -HARDPAN [0]
☐ -SANDSTONE [0]
☐ -RIP / RAP [0]
☐ -LACUSTRINE [0]
☐ -GRAVEL [+1]
☐ -COAL FINES [-2]

SUBSTRATE QUALITY — Check ONE (OR 2 & AVERAGE)
SILT:
☐ -SILT HEAVY [-2]
☑ -SILT MODERATE [-1]
☐ -SILT NORMAL [0]
☐ -SILT FREE [1]
EMBEDDED / NEGR:
☐ -EXTENSIVE [-2]
☑ -MODERATE [-1]
☐ -NORMAL [0]
☐ -NONE [1]

NUMBER OF SUBSTRATE TYPES: ☑ -4 or More [2] ☐ -3 or Less [0]
(High Quality Only, Score 6 or +)

Substrate Max 20: 14.5

COMMENTS:

2) INSTREAM COVER (Give each cover type a score of 0 to 3; see back for instructions)

(Structure)	TYPE: Score All That Occur
1 UNDERCUT BANKS [1]	3 POOLS > 70 cm [2]
2 OVERHANGING VEGETATION [1]	ROOTWADS [1]
1 SHALLOWS (IN SLOW WATER) [1]	1 BOULDERS [1]
ROOTWAD [1]	SNAGS/LARGE WOODY DEBRIS [1]
	AQUATIC MACROPHYTES [1]
	LOGS OR WOODY DEBRIS [1]

AMOUNT (Check ONLY one or check 2 and AVERAGE)
☐ -EXTENSIVE > 75% [11]
☑ -MODERATE 25 - 75% [7]
☐ -SPARSE 5 - 25% [3]
☐ -NEARLY ABSENT < 5% [1]

Cover Max 20: 15

COMMENTS:

3) CHANNEL MORPHOLOGY (Check ONLY one PER Category OR check 2 and 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]

MODIFICATIONS / OTHER:
☐ DRAGGING
☐ RELOCATION
☑ CANOPY REMOVAL
☐ DREDGING
☐ -IMPOUNDMENT
☐ -ISLAND
☐ -LEVEES
☐ -BANK SHAPING
☐ ONE SIDE CHANNEL MODIFICATIONS

Channel Max 20: 11

COMMENTS:

4) RIPARIAN ZONE AND BANK EROSION (check ONE box PER bank or check 2 and AVERAGE per bank)

River Right Looking Downstream

RIPARIAN WIDTH
L R (Per Bank)
☐ ☐ -VERY WIDE > 100m [5]
☐ ☐ -WIDE > 50m [4]
☐ ☐ -MODERATE 10 - 50m [3]
☐ ☐ -NARROW 5 - 10m [2]
☑ ☐ -VERY NARROW < 5m [1]
☐ ☐ -NONE [0]

FLOOD PLAIN QUALITY (PAST 100 Meter RIPARIAN)
L R (Most Predominant Per Bank)
☐ ☐ -FOREST, Swamp [3]
☑ ☐ -SHRUB OR OLD FIELD [2]
☐ ☐ -RESIDENTIAL, PARK, NEW FIELD [1]
☐ ☐ -FENCED PASTURE [1]
☐ ☐ -CONSERVATION TILLAGE [1]
☐ ☐ -URBAN OR INDUSTRIAL [0]
☐ ☐ -OPEN PASTURE, ROWCROP [0]
☐ ☐ -MINING / CONSTRUCTION [0]

BANK EROSION
L R (Per Bank)
☐ ☐ -NONE / LITTLE [3]
☑ ☑ -MODERATE [2]
☐ ☐ -HEAVY / SEVERE [1]

Riparian Max 10: 4

COMMENTS:

5) POOL / GLIDE AND RIFFLE / RUN QUALITY

MAX DEPTH
(Check 1 ONLY)
☐ - 1m [6]
☐ - 0.7m [4]
☑ - 0.4 to 0.7m [2]
☐ - 0.2 to 0.4m [1]
☐ - < 0.2m [POOL = 0]

WIDTH/DEPTH
(Check 1 or 2 & AVERAGE)
☑ -POOL WIDTH > RIFFLE WIDTH [2]
☑ -POOL WIDTH = RIFFLE WIDTH [1]
☐ -POOL WIDTH < RIFFLE WIDTH [0]
☐ -IMPOUNDED [-1]

CURRENT VELOCITY (POOLS & RIFFLES)
(Check All That Apply)
☐ -SWIFT [1]
☐ -FAST [1]
☑ -MODERATE [1]
☑ -SLOW [1]
☐ -NONE [-1]
☐ -TORRENTIAL [-1]
☐ -INTERSTITIAL [-1]
☐ -INTERMITTENT [-2]
☑ -VERY FAST [1]

Pool / Current Max 12: 5.5

COMMENTS:

6) RIFFLE / RUN QUALITY

CHECK ONE OR CHECK 2 AND AVERAGE

RIFFLE DEPTH
☐ -Riffle Areas > 10cm [2]
☐ -Riffle Areas 5 - 10cm [1]
☑ -Riffle Areas < 5cm [0]
☐ -NO RIFFLE but RUNS present [0]
☐ -NO RIFFLE / NO RUN [Muck = 0]

RUN DEPTH
☐ - MAX > 50 cm [2]
☑ - MAX < 50 cm [1]

RIFFLE / RUN SUBSTRATE
☑ -STABLE (e.g., Cobble, Boulder) [2]
☑ MOD. STABLE (e.g., Large Gravel) [1]
☐ -UNSTABLE (Fine Gravel, Sand) [0]

RIFFLE / RUN EMBEDDEDNESS
☐ -NONE [2]
☐ -LOW [1]
☑ -MODERATE [0]
☐ -EXTENSIVE [-1]

Riffle / Run Max 8: 0

Gradient Max 10: 9

COMMENTS:

8) GRADIENT (ft / mi): 34.9 DRAINAGE AREA (sq mi): 2.618

% POOL: ____ % GLIDE: ____
% RIFFLE: ____ % RUN: ____

*Sites drainage must be large enough to support a population of riffle/slight species

Qualitative Habitat Evaluation Index (QHEI) Field Sheet Manual based on qualitative and ecological data

Is Sampling Reach Representative of the Stream? (Y) N)

If Not, Explain: _____

Lat / Long (Beg):	
Lat / Long (Mid):	
Lat / Long (End):	
Lat / Long (X-Loc):	

Major Suspected Sources of Impacts (Check All That Apply)

- None ☐
- Industrial ☐
- WWTP ☐
- Agriculture ☐
- Livestock ☐
- Silviculture ☐
- Construction ☐
- Urban Runoff ☐
- CSOs ☐
- Subsidence impacts ☐
- Mining ☐
- Channelization ☐
- Riparian Removal ☐
- Landfills ☐
- Natural ☐
- Dams ☐
- Other Flow Alteration ☐

Other: _____

Subjective J-Rating (1-10)

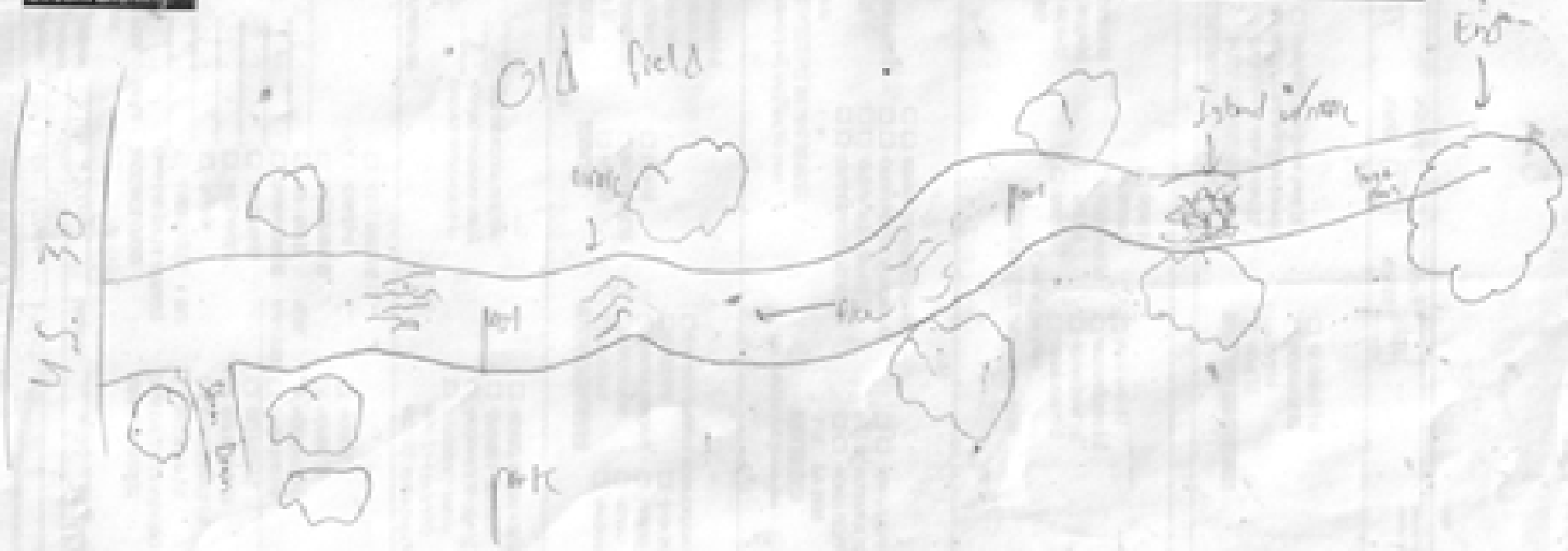
Aesthetic Rating (1-10)

Gradient: ☐ -Low ☐ -Moderate ☐ -High

	Color	Distance	Water Clarity	Water Stage	Canopy- % open
First Sampling Pass	F	[illegible]	C to B-	Low	

Yes	No	
☐	☐	Is Stream Ephemeral (no pools, totally dry during sampling)?
☐	☐	Is there water upstream? How far:
☐	☐	Is there water /flow downstream? How far:
☐	☐	Is Dry Channel mostly natural?

Stream Drawing:



Instructions for scoring the alternate cover metric: Each cover type should receive a score of between 0 and 3, where: 0 = Cover type absent; 1 = cover type in very small amounts or if more common of marginal quality; 2 = cover type present in moderate amounts, but not of highest quality or in small amounts of highest quality; 3 = cover type of highest quality in moderate or greater amounts. Examples of highest quality include, very large boulders in deep or fast water, large diameter logs that are stable, well developed rootwads in deep / fast water, or deep, well-defined, functional pools.

Qualitative Habitat Evaluation Index Field Sheet

QHEI Score: 84

River Code: 25-Little | RM: 25.2 | Stream: S. Fork Raccoon Creek
Site Code: 03 | Project Code: Lit Raccoon 18 | Location: Rt 1 Mini Creek
Date: 8-10-18 | Scorer: CHS | Latitude: 39.0881 | Longitude: -82.1606

I. SUBSTRATE (Check ONLY Two Substrate TYPE BOXES; Estimate % percent)

TYPE	POOL	RIFFLE
☐ BLDR/SLAB [10]		
☐ BOULDER [9]		
☐ COBBLE [8]		
☐ HARDPAN [4]		
☐ MUCK [2]		
☑ GRAVEL [7]		
☐ SAND [6]		
☐ BEDROCK [5]		
☐ DETRITUS [3]		
☐ ARTIFICIAL [0]		
☐ SILT [2]		

SUBSTRATE ORIGIN (Check ONE OR 2 & AVERAGE)	POOL	RIFFLE
☐ -LIMESTONE [1]		
☑ -TILLS [1]		
☐ -WETLANDS [0]		
☐ -HARDPAN [0]		
☐ -SANDSTONE [0]		
☐ -RIP / RAP [0]		
☐ -LACUSTRINE [0]		
☐ -DUNE [+1]		
☐ -COAL FINES [-2]		

SUBSTRATE QUALITY (Check ONE OR 2 & AVERAGE)	
SILT: ☐ -SILT HEAVY [-2]	
☐ -SILT MODERATE [-1]	
☑ -SILT NORMAL [0]	
☐ -SILT FREE [1]	
EMBEDDED: ☐ -EXTENSIVE [-2]	
☐ -MODERATE [-1]	
☑ -NORMAL [0]	
☐ -NONE [1]	

Substrate: 14 / Max 20

NUMBER OF SUBSTRATE TYPES: ☑ -4 or More [2] ☐ -3 or Less [0]
(High Quality Only, Score 6 or +)

COMMENTS:

II. INSTREAM COVER (Use each cover type a score of 0 to 3; see back for instructions)

(Duration)	TYPE: Score All That Occur	
1 UNDERCUT BANKS [1]	2 POOLS > 70 cm [2]	1 OVERHANGING BANK/ROOTS [1]
1 OVERHANGING VEGETATION [1]	1 ROOTWADS [1]	3 AQUATIC MACROPHYTES [1]
2 SHALLOWS (in SLOW WATER) [1]	1 BOULDERS [1]	1 LOGS OR WOODY DEBRIS [1]
1 RIFFLES [1]		

AMOUNT: (Check ONLY one or check 2 and AVERAGE)
☐ -EXTENSIVE > 75% [11]
☑ -MODERATE 25 - 75% [7]
☐ -SPARSE 5 - 25% [3]
☐ -NEARLY ABSENT < 5% [1]

Cover: 18 / Max 20

COMMENTS:

III. CHANNEL MORPHOLOGY (Check ONLY one PER Category OR check 2 and AVERAGE)

SINUOSITY	DEVELOPMENT	CHANNELIZATION	STABILITY	MODIFICATIONS (OTHER)	
☐ -HIGH [4]	☑ -EXCELLENT [7]	☐ -NONE [6]	☑ -HIGH [3]	☐ -DIKING	☐ -IMPOUNDMENT
☑ -MODERATE [2]	☑ -GOOD [5]	☑ -RECOVERED [4]	☐ -MODERATE [2]	☐ -RELOCATION	☐ -ISLAND
☐ -LOW [1]	☐ -FAIR [3]	☐ -RECOVERING [3]	☐ -LOW [1]	☐ -CANOPY REMOVAL	☐ -LEVEED
☐ -NONE [1]	☐ -POOR [1]	☐ -RECENT OR NO RECOVERY [1]		☐ -DREDGING	☐ -BANK SHAPING
		☐ -IMPOUNDED [-1]		☐ -ONE SIDE CHANNEL MODIFICATIONS	

Channel: 15.5 / Max 20

COMMENTS:

IV. RIPARIAN ZONE AND BANK EROSION (Check ONE box PER bank or check 2 and AVERAGE per bank)

River Right Looking Downstream: RR

RIPARIAN WIDTH (L R) (Per Bank)	FLOOD PLAIN QUALITY (PAST 100 Meter RIPARIAN) (L R) (Most Predominant Per Bank)		BANK EROSION (L R) (Per Bank)
☐ ☐ -VERY WIDE > 100m [5]	☐ ☐ -FOREST, SWAMP [3]	☐ ☐ -CONSERVATION TILLAGE [1]	☑ ☑ -NONE / LITTLE [3]
☑ ☑ -WIDE > 50m [4]	☐ ☐ -SHRUB OR OLD FIELD [2]	☑ ☐ -URBAN OR INDUSTRIAL [0]	☐ ☐ -MODERATE [2]
☑ ☐ -MODERATE 10 - 50m [3]	☑ ☑ -RESIDENTIAL, PARK, NEW FIELD [1]	☐ ☐ -OPEN PASTURE, ROWCROP [0]	☐ ☐ -HEAVY / SEVERE [1]
☐ ☐ -NARROW 5 - 10m [2]	☐ ☐ -FENCED PASTURE [1]	☐ ☐ -MINING / CONSTRUCTION [0]	
☐ ☐ -VERY NARROW < 5m [1]			
☐ ☐ -NONE [0]			

COMMENTS:

Riparian: 7 / Max 10

V. POOL / GLIDE AND RIFFLE / RUN QUALITY

MAX DEPTH (Check 1 ONLY)	MORPHOLOGY (Check 1 or 2 & AVERAGE)	CURRENT VELOCITY (POOLS & RIFFLES) (Check All That Apply)	
☑ - 1m [6]	☑ -POOL WIDTH > RIFFLE WIDTH [2]	☑ -EDDIES [1]	☐ -TORRENTIAL [-1]
☐ - 0.7m [4]	☐ -POOL WIDTH = RIFFLE WIDTH [1]	☑ -FAST [1]	☐ -INTERSTITIAL [-1]
☐ - 0.4 to 0.7m [2]	☐ -POOL WIDTH < RIFFLE WIDTH [0]	☑ -MODERATE [1]	☐ -INTERMITTENT [-2]
☐ - 0.3 to 0.4m [1]	☐ -IMPOUNDED [-1]	☐ -SLOW [1]	☐ -VERY FAST [1]
☐ - < 0.2m [POOL = 0]		☐ -NONE [-1]	

Pool / Current: 12 / Max 12

COMMENTS:

VI. RIFFLE / RUN / GRADIENT

CHECK ONE OR BOX OR 2 AND AVERAGE

RIFFLE DEPTH	RUN DEPTH	RIFFLE / RUN SUBSTRATE	RIFFLE / RUN EMBEDDEDNESS
☑ -Riffle Avrage > 10cm [2]	☑ - MAX > 50 cm [2]	☑ STABLE [e.g., Cobble, Boulder] [2]	☐ -NONE [2]
☐ -Riffle Average 5 - 10cm [1]	☐ - MAX < 50 cm [1]	☑ MOD. STABLE [e.g., Large Gravel] [1]	☐ -LOW [1]
☐ -Riffle Average < 5cm [0]		☐ -UNSTABLE [Fine Gravel, Sand] [0]	☑ MODERATE [0]
☐ -NO RIFFLE but RUNS present [0]			☐ -EXTENSIVE [-1]
☐ -NO RIFFLE / NO RUN [Marsh = 0]			

Riffle / Run: 5.5 / Max 8

COMMENTS:

Gradient: 10 / Max 10

6) GRADIENT (ft / mi): 47.7 DRAINAGE AREA (sq mi): 21.8 % POOL: % GLIDE: % RIFFLE: % RUN:

Stream must be large enough to support reproduction of intended species

Gradient Score: Gain / Loss (Check ONLY one) Gradient and Drainage Area

Is Sampling Reach Representative of the Stream? (Y/ N)

If Not, Explain:

Lat / Long (Beg):	
Lat / Long (Mid):	
Lat / Long (End):	
Lat / Long (X-Loc):	

Major Suspected Sources of Impairs (Check All That Apply)

- None ☐
- Industrial ☐
- WWTP ☐
- Agriculture ☐
- Livestock ☐
- Silviculture ☐
- Construction ☐
- Urban Runoff ☐
- CSOs ☐
- Solution Impacts ☐
- Mining ☐
- Channelization ☐
- Riparian Removal ☐
- Landfills ☐
- Natural ☐
- Dams ☐
- Other Flow Alteration ☐

Other: _____

Subjective Rating (1-10): 7

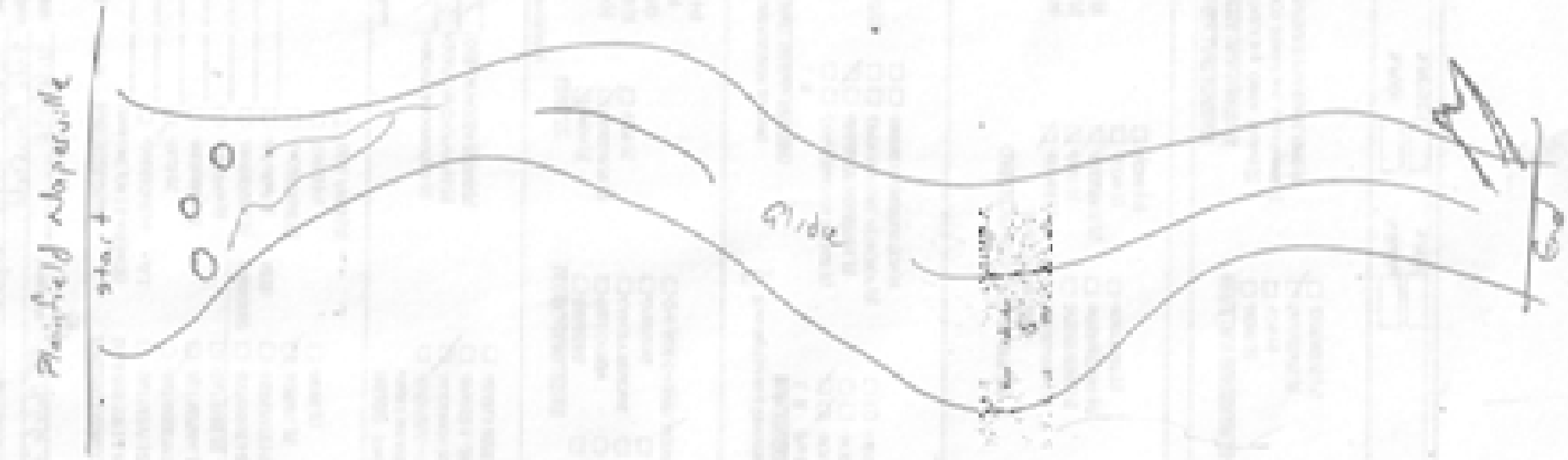
Aesthetic Rating (1-10): 7

Gradient: ☐ Low ☐ Moderate ☐ High

First Sampling Pass	Clear:	Distance:	Water Clarity:	Water Stage:	Canopy- % open:
	7	500	Clear	Normal	60%

Yes	No	
☐	☐	Is Stream Ephemeral (no pools, totally dry or only damp spots)?
☐	☐	Is there water upstream? How far?
☐	☐	Is there water close downstream? How far?
☐	☐	Is Dry Channel mostly natural?

Stream Drawing:



Instructions for scoring the alternate cover metric: Each cover type should receive a score of between 0 and 3, where: 0 = Cover type absent; 1 = cover type in very small amounts or if more common of marginal quality; 2 = cover type present in moderate amounts, but not of highest quality or in small amounts of highest quality; 3 = cover type of highest quality in moderate or greater amounts. Examples of highest quality include, very large boulders in deep or fast water; large diameter logs that are stable, well developed rootwads in deep / fast water; or deep, well-defined, functional pools.

Qualitative Habitat Evaluation Index Field Sheet

QHEI Score:

River Code: _____ Rkm: _____ Stream: _____

Site Code: _____ Project Code: _____ Location: _____

Date: _____ Scorer: _____ Latitude: _____ Longitude: _____

1) SUBSTRATE (Check ONLY Two Substrate TYPE BOXES; Estimate % percent)

TYPE	POOL	RIFFLE		POOL	RIFFLE
☐ ☐ -BLDR/SLAB [10]			☐ ☐ -CANAL [0]		
☐ ☐ -Lg BOULD [9]			☐ ☐ -SAND [6]		
☐ ☐ -BOULDER [8]			☐ ☐ -BEDROCK [5]		
☐ ☐ -COBBLE [7]			☐ ☐ -DETRITUS [3]		
☐ ☐ -HARDPAN [4]			☐ ☐ -ARTIFICIAL [0]		
☐ ☐ -MUCK [2]			☐ ☐ -SILT [2]		

SUBSTRATE ORIGIN (Check ONE OR 2 & AVERAGE)
- ☐ -LIMESTONE [1]
- ☐ -TILLS [1]
- ☐ -WETLANDS [0]
- ☐ -HARDPAN [0]
- ☐ -SANDSTONE [0]
- ☐ -RIP / RAP [0]
- ☐ -LACUSTRINE [0]
- ☐ -DUNES [-1]
- ☐ -COAL FINES [-2]

SILT

SUBSTRATE QUALITY (Check ONE OR 2 & AVERAGE)
- ☐ -SILT HEAVY [-2]
- ☐ -SILT MODERATE [-1]
- ☐ -SILT NORMAL [0]
- ☐ -SILT FREE [1]

EMBEDDEDNESS
- ☐ -EXTENSIVE [-2]
- ☐ -MODERATE [-1]
- ☐ -NORMAL [0]
- ☐ -NONE [1]

NUMBER OF SUBSTRATE TYPES: (High Quality Only; Score 6 or 4)
- ☐ -6 or More [2]
- ☐ -3 or Less [0]

Substrate Max 20

COMMENTS: _____

2) INSTREAM COVER (Give each cover type a score of 0 to 3; see back for instructions)

(Check/All)	Type) Score All That Occur	
___ UNDERCUT BANKS [1]	___ POOLS > 70 cm [2]	___ OVERHANG BRANCHES [1]
___ OVERHANGING VEGETATION [1]	___ ROOTWADS [1]	___ AQUATIC MACROPHYTES [1]
___ SHALLOWS (in SLOW WATER) [1]	___ BOULDERS [1]	___ LOGS OR WOODY DEBRIS [1]
___ ROOTWADS [1]		

AMOUNT (Check ONLY one or check 2 and AVERAGE)
- ☐ -EXTENSIVE > 75% [11]
- ☐ -MODERATE 25 - 75% [7]
- ☐ -SPARSE 5 - 25% [3]
- ☐ -NEARLY ABSENT < 5% [1]

Cover Max 20

COMMENTS: _____

3) CHANNEL MORPHOLOGY (Check ONLY one PER Category OR check 2 and AVERAGE)

VELOCITY
- ☐ -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]

MODIFICATIONS / OTHER
- ☐ DIKE/RIP
- ☐ RELOCATION
- ☐ CANOPY REMOVAL
- ☐ DREDGING
- ☐ -IMPOUNDMENT
- ☐ -CHANNEL
- ☐ -LEVEES
- ☐ -BANK SHAPING
- ☐ ONE SIDE CHANNEL MODIFICATIONS

Channel Max 20

COMMENTS: _____

4) RIPARIAN ZONE AND BANK EROSION (Check ONE box PER bank or check 2 and AVERAGE per bank) — River Right looking Downstream

RIPARIAN WIDTH

L	R	(Per Bank)
☐	☐	VERY WIDE > 100m [6]
☐	☐	WIDE > 50m [4]
☐	☐	MODERATE 10 - 50m [3]
☐	☐	NARROW 5 - 10m [2]
☐	☐	VERY NARROW < 5m [1]
☐	☐	NONE [0]

FLOOD PLAIN QUALITY (PAST 100 RMW REMOVED)

L	R	(Most Predominant Per Bank)
☐	☐	-FOREST, SWAMP [7]
☐	☐	-SHRUB OR OLD FIELD [2]
☐	☐	-RESIDENTIAL, PARK, NEW FIELD [1]
☐	☐	-FENCED PASTURE [1]
☐	☐	-CONSERVATION TILLAGE [1]
☐	☐	-URBAN OR INDUSTRIAL [0]
☐	☐	-OPEN PASTURE, ROWCROP [0]
☐	☐	-MINING / CONSTRUCTION [0]

BANK EROSION

L	R	(Per Bank)
☐	☐	-NONE / LITTLE [3]
☐	☐	-MODERATE [2]
☐	☐	-HEAVY / SEVERE [1]

Riparian Max 10

COMMENTS: _____

5) POOL / GLIDE AND RIFFLE / RUN QUALITY

MAX DEPTH (Check ONLY)
- ☐ - 1m [6]
- ☐ - 0.7m [4]
- ☐ - 0.4 to 0.7m [2]
- ☐ - 0.2 to 0.4m [1]
- ☐ - < 0.2m [POOL = 0]

MORPHOLOGY (Check 1 or 2 & AVERAGE)
- ☐ -POOL WIDTH > RIFFLE WIDTH [2]
- ☐ -POOL WIDTH = RIFFLE WIDTH [1]
- ☐ -POOL WIDTH < RIFFLE WIDTH [0]
- ☐ -IMPOUNDED [-1]

CURRENT VELOCITY (POOLS & RIFFLES) (Check All That Apply)
- ☐ -EDDIES [1]
- ☐ -FAST [1]
- ☐ -MODERATE [1]
- ☐ -SLOW [1]
- ☐ -NONE [-1]
- ☐ -TORRENTIAL [-1]
- ☐ -INTERSTITIAL [-1]
- ☐ -INTERMITTENT [-2]
- ☐ -VERY FAST [1]

Pool / Current Max 12

COMMENTS: _____

CHECK ONE OR CHECK 2 AND AVERAGE

RIFFLE DEPTH
- ☐ -Max Areas > 10cm [2]
- ☐ -Max Areas 5 - 10cm [1]
- ☐ -Max Areas < 5cm [0]
- ☐ -NO RIFFLE but RUNS present [0]
- ☐ -NO RIFFLE / NO RUN [Marsh] = 0]

RUN DEPTH
- ☐ -MAX > 50 cm [2]
- ☐ -MAX < 50 cm [1]

RIFFLE / RUN SUBSTRATE
- ☐ -STABLE (e.g. Cobble, Boulder) [2]
- ☐ -MOD. STABLE (e.g. Large Gravel) [1]
- ☐ -UNSTABLE (Fine Gravel, Sand) [0]

RIFFLE / RUN EMBEDDEDNESS
- ☐ -NONE [2]
- ☐ -LOW [1]
- ☐ -MODERATE [0]
- ☐ -EXTENSIVE [-1]

Riffle / Run Max 8

Gradient Max 10

COMMENTS: _____

6) GRADIENT (ft / mi): _____ DRAINAGE AREA (sq mi): _____ %POOL: _____ %GLIDE: _____

%RIFFLE: _____ %RUN: _____

Stream must be large enough to support a population of fifty adult species

Is Sampling Reach Representative of the Stream? (Y) N

If Not, Explain: Mix of trees & grassland

Lat / Long (Beg):	
Lat / Long (Mid):	
Lat / Long (End):	
Lat / Long (X-Loc):	

Subjective Rating (1-10)

Aesthetic Rating (1-10)

Gradient: ☐ -Low ☐ -Moderate ☐ -High

First Sampling Pass	Clear:	Distance:	Water Clarity:	Water Stage:	Canopy: % open:
	F	150	C to B-	Low	30

Yes/No

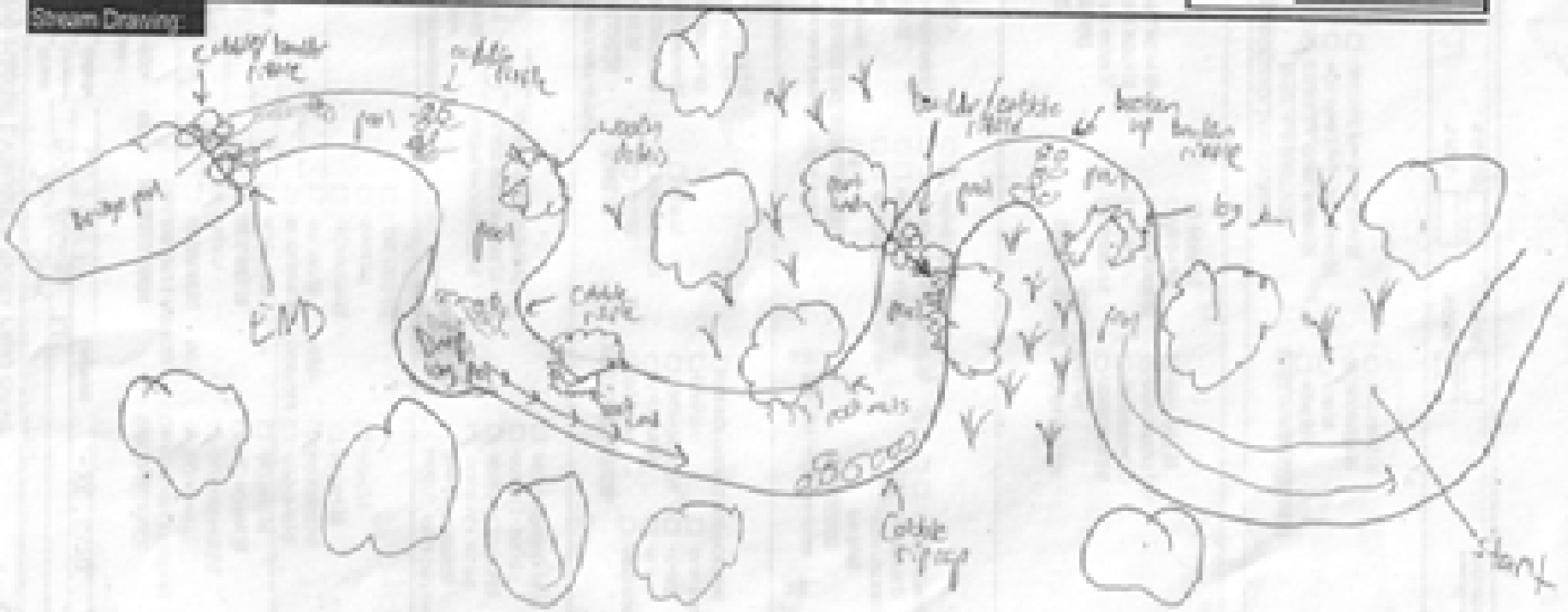
- ☐ ☐ Is Stream Ephemeral (no pools, totally dry of only damp spots)?
- ☐ ☐ Is there water upstream? How far:
- ☐ ☐ Is there water down downstream? How far:
- ☐ ☐ Dry Channel mostly natural?

Major Suspected Sources of Impacts (Check All That Apply)

- ☐ None
- ☐ Industrial
- ☐ MWTP
- ☐ Agriculture
- ☐ Livestock
- ☐ Silviculture
- ☐ Construction
- ☐ Urban Runoff
- ☐ CSOs
- ☐ Subdivision Impacts
- ☐ Mining
- ☐ Channelization
- ☐ Riparian Removal
- ☐ Landfills
- ☐ Natural
- ☐ Dams
- ☐ Other Flow Alteration

Other:

Stream Drawing:



Instructions for scoring the alternate cover metric: Each cover type should receive a score of between 0 and 3, where: 0 = Cover type absent; 1 = cover type in very small amounts or if more common of marginal quality; 2 = cover type present in moderate amounts, but not of highest quality or in small amounts of highest quality; 3 = cover type of highest quality in moderate of greater amounts. Examples of highest quality include, very large boulders in deep or fast water, large diameter logs that are stable, well developed rootwads in deep / fast water, or deep, well-defined, functional pools.

Qualitative Habitat Evaluation Index Field Sheet

QHEI Score:

River Code: _____ Rkt: _____ Stream: _____
Site Code: _____ Project Code: _____ Location: _____
Date: _____ Scorer: _____ Latitude: _____ Longitude: _____

I. SUBSTRATE (Check ONLY Two Substrate TYPE BOXES; Estimate % percent)

TYPE	POOL	RIFFLE
☐ ☐ -BLDR/SLAB [10]		
☐ ☐ -Lg. BOULD [10]		
☐ ☐ -BOULDER [9]		
☐ ☐ -COBBLE [8]		
☐ ☐ -GARDEN [8]		
☐ ☐ -MUCK [3]		
☐ ☐ -GRAVEL [7]		
☐ ☐ -SAND [6]		
☐ ☐ -BEDROCK [5]		
☐ ☐ -DETRITUS [3]		
☐ ☐ -ARTIFICIAL [3]		
☐ ☐ -SILT [2]		

SUBSTRATE ORIGIN (Check ONE OR 2 & AVERAGE)
☐ -LIMESTONE [1]
☐ -TILLS [1]
☐ -WETLANDS [0]
☐ -HARDPAN [0]
☐ -SANDSTONE [1]
☐ -RIP / RAP [0]
☐ -LACUSTRINE [1]
☐ -DUNES [-1]
☐ -COAL FINES [-2]

SUBSTRATE QUALITY (Check ONE OR 2 & AVERAGE)
SILT: ☐ -SILT HEAVY [-2] ☐ -SILT MODERATE [-1] ☐ -SILT NORMAL [0] ☐ -SILT FREE [1]
EMBEDDEDNESS: ☐ -EXTENSIVE [-2] ☐ -MODERATE [-1] ☐ -NORMAL [0] ☐ -NONE [1]

NUMBER OF SUBSTRATE TYPES: ☐ -4 or More [2] ☐ -3 or Less [0]
(High Quality Only, Score 6 or 7)

Substrate: _____ Max 20

COMMENTS: _____

II. INSTREAM COVER (Rate each cover type a score of 0 to 3 see back for INSTRUCTIONS)

TYPE (Check All That Occur)	
☐ -UNDERCUT BANKS [1]	☐ -BOULDERS [1]
☐ -OVERHANGING VEGETATION [1]	☐ -ROOTWADS [1]
☐ -SHALLOWS (IN SLOW WATER) [1]	☐ -POOLS > 70 cm [2]
☐ -ROOTWADS [1]	☐ -SWEEPERS, BRANCHTIPS [1]
	☐ -AQUATIC MACROPHYTES [1]
	☐ -LOGS OR WOODY DEBRIS [1]

AMOUNT (Check ONLY one or check 2 and AVERAGE)
☐ -EXTENSIVE > 75% [11]
☐ -MODERATE 25 - 75% [7]
☐ -SPARSE 5 - 25% [3]
☐ -NEARLY ABSENT < 5% [1]

Cover: _____ Max 20

COMMENTS: _____

III. CHANNEL MORPHOLOGY (Check ONLY one PER Category OR check 2 and 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]

MODIFICATIONS (OTHER)
☐ -DIKING
☐ -RELOCATION
☐ -CANOPY REMOVAL
☐ -DREDGING
☐ -IMPOUNDMENT
☐ -ISLAND
☐ -LEVEED
☐ -BANK SHAPING
☐ -ONE SIDE CHANNEL MODIFICATIONS

Channel: _____ Max 20

COMMENTS: _____

IV. RIPARIAN ZONE AND BANK EROSION (Check ONE box PER bank or Check 2 and AVERAGE per bank)

River Right Looking Downstream

RIPARIAN WIDTH

L	R	(Per Bank)
☐	☐	-VERY WIDE > 100m [6]
☐	☐	-WIDE > 50m [4]
☐	☐	-MODERATE 10 - 50m [3]
☐	☐	-NARROW 5 - 10m [2]
☐	☐	-VERY NARROW < 5m [1]
☐	☐	-NONE [0]

FLOOD PLAIN QUALITY (ONLY ON Wide RIPARIAN)

L	R	(Most Predominant Per Bank)
☐	☐	-FOREST, SWAMP [5]
☐	☐	-SHRUB OR OLD FIELD [3]
☐	☐	-RESIDENTIAL, PARK, NEW FIELD [1]
☐	☐	-FENCED PASTURE [1]
☐	☐	-CONSERVATION TILLAGE [1]
☐	☐	-URBAN OR INDUSTRIAL [0]
☐	☐	-OPEN PASTURE, ROWCROP [0]
☐	☐	-MINING / CONSTRUCTION [0]

BANK EROSION

L	R	(Per Bank)
☐	☐	-NONE / LITTLE [3]
☐	☐	-MODERATE [2]
☐	☐	-HEAVY / SEVERE [1]

Riparian: _____ Max 10

COMMENTS: _____

V. POOL / GLIDE AND RIFFLE / RUN QUALITY

MAX DEPTH (Check ONLY)
☐ - 1m [6]
☐ - 0.7m [4]
☐ - 0.4 to 0.7m [2]
☐ - 0.2 to 0.4m [1]
☐ - < 0.2m [POOL = 0]

MORPHOLOGY (Check 1 or 2 & AVERAGE)
☐ -POOL WIDTH > RIFFLE WIDTH [1]
☐ -POOL WIDTH = RIFFLE WIDTH [1]
☐ -POOL WIDTH < RIFFLE WIDTH [0]
☐ -IMPOUNDED [-1]

CURRENT VELOCITY (POOLS & RIFFLES) (Check All That Apply)
☐ -EDDIES [1]
☐ -FAST [1]
☐ -MODERATE [1]
☐ -SLOW [1]
☐ -NONE [-1]
☐ -TORRENTIAL [-1]
☐ -INTERSTITIAL [-1]
☐ -INTERMITTENT [-2]
☐ -VERY FAST [0]

Pool / Current: _____ Max 12

COMMENTS: _____

VI. RIFFLE / RUN QUALITY (CHECK ONE OR CHECK 2 AND AVERAGE)

RIFFLE DEPTH
☐ -Riffle Areas > 10cm [2]
☐ -Riffle Areas 5 - 10cm [1]
☐ -Riffle Areas < 5cm [0]
☐ -NO RIFFLE but RUNS present [0]
☐ -NO RIFFLE / NO RUN (Main) = 0

RUN DEPTH
☐ - MAX > 50 cm [2]
☐ - MAX < 50 cm [1]

RIFFLE / RUN SUBSTRATE
☐ -STABLE (e.g., Cobble, Boulder) [2]
☐ -MOD. STABLE (e.g., Large Gravel) [1]
☐ -UNSTABLE (Fine Gravel, Sand) [0]

RIFFLE / RUN EMBEDDEDNESS
☐ -NONE [2]
☐ -LOW [1]
☐ -MODERATE [0]
☐ -EXTENSIVE [-1]

Riffle / Run: _____ Max 8

Gradient: _____ Max 10

COMMENTS: _____

GRADIENT (ft / mi): _____ DRAINAGE AREA (sq mi): _____ % POOL: _____ % GLIDE: _____ % RIFFLE: _____ % RUN: _____

*Best area must be large enough to support a reproducing population of the obligate species

Is Sampling Reach Representative of the Stream? (Y) N

If Not, Explain: 50 ft upstream of [illegible]

Lat / Long (Beg):	
Lat / Long (Mid):	
Lat / Long (End):	
Lat / Long (X-Loc):	

Subjective Rating (1-50)

Aesthetic Rating (1-10)

Gradient: ☐ Low ☐ Moderate ☐ High

First Sampling Pass	Color:	Distance:	Water Clarity:	Water Stage:	Canopy: % open:
	F	150	C to B	low	100%

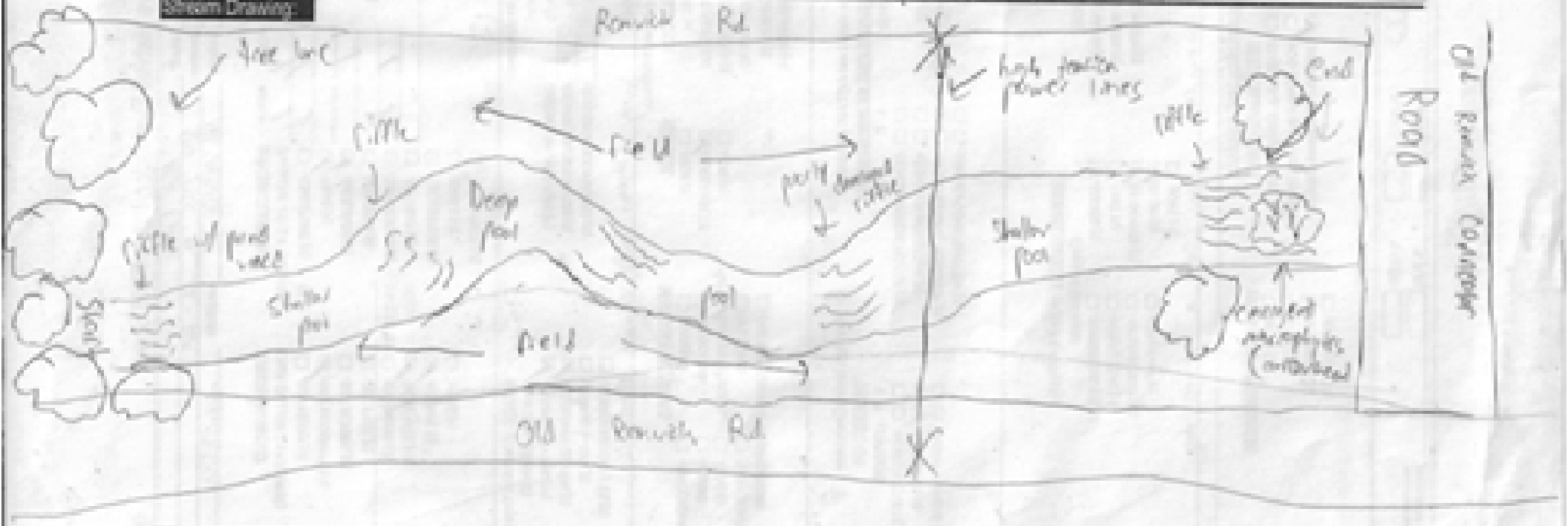
Yes	No	
☐	☐	Is Stream Ephemeral (no pools, totally dry or only damp spots)?
☐	☐	Is there water upstream? How far:
☐	☐	Is there water cross downstream? How far:
☐	☐	Is Dry Channel mostly natural?

Major Suspected Sources of Impacts (Check All That Apply)

None	☐
Industrial	☐
WWTP	☐
Agriculture	☐
Livestock	☐
Silviculture	☐
Construction	☐
Urban Runoff	☐
CSOs	☐
Subsurface Impacts	☐
Mining	☐
Channelization	☐
Riparian Removal	☐
Landfills	☐
Natural	☐
Dams	☐
Other Flow Alteration	☐

Other:

Stream Drawing:



Instructions for scoring the alternate cover metric: Each cover type should receive a score of between 0 and 3, where: 0 = Cover type absent; 1 = cover type in very small amounts or if more common of marginal quality; 2 = cover type present in moderate amounts, but not of highest quality or in small amounts of highest quality; 3 = cover type of highest quality in moderate or greater amounts. Examples of highest quality include, very large boulders in deep or fast water, large diameter logs that are stable, well developed rootwads in deep / fast water, or deep, well-defined, functional pools.

Qualitative Habitat Evaluation Index Field Sheet

MBI Bioassessment Institute

QHEI Score: 38

River Code: 95-115.5 RM: 5.7 Stream: Rock Run
Site Code: 10002 Project Code: Little Miami Location: RM 5.7, RT 3
Date: 8-19-09 Scorer: MC Latitude: 39.57578 Longitude: -83.77727

1) SUBSTRATE (Check ONLY Two Substrate TYPE BOXES; Estimate % percent)

TYPE	POOL	RIFFLE
☐ ☐ BOULDER [10]		
☐ ☐ Lg BOULD [10]		
☐ ☐ BOULDER [9]		
☐ ☐ COBBLE [8]		
☐ ☐ mixSPWN [4]		
☑ ☑ MUCK [2]		
☐ ☐ GRAVEL [7]		
☐ ☐ SAND [6]		
☐ ☐ BEDROCK [5]		
☐ ☐ DETRITUS [3]		
☐ ☐ ARTIFICIAL [0]		
☐ ☐ SILT [2]		

SUBSTRATE ORIGIN (Check ONE (OR 2 & AVERAGE))	
☐ -LIMESTONE [1]	SILT
☐ -TILLS [1]	
☑ -WETLANDS [0]	
☐ -HARDPAN [0]	
☐ -SANDSTONE [0]	EMBEDDED
☐ -RIP / RAP [0]	NESS
☐ -LACUSTRINE [0]	
☐ -SHALE [-1]	
☐ -COAL FINES [-2]	

SUBSTRATE QUALITY (Check ONE (OR 2 & AVERAGE))
☐ -SILT HEAVY [-2]
☑ -SILT MODERATE [-1]
☐ -SILT NORMAL [0]
☐ -SILT FREE [1]
☐ -EXTENSIVE [-2]
☑ -MODERATE [-1]
☐ -NORMAL [0]
☐ -NONE [1]

Substrate: 7 Max 20

NUMBER OF SUBSTRATE TYPES: (High Quality Only, Score 0 or 1)
☐ -4 or More [0]
☑ -3 or Less [0]

COMMENTS:

2) INSTREAM COVER (Give each cover type a score of 0 to 3; see back for instructions)

(Structure)	TYPE: Score All That Occur		AMOUNT (Check ONLY one or check 2 and AVERAGE)
1 UNDERCUT BANKS [1]	POOLS > 70 cm [2]	OVERHANGING VEGETATION [1]	☐ -EXTENSIVE > 75% [11]
3 OVERHANGING VEGETATION [1]	ROOTWADS [1]	AQUATIC MACROPHYTES [1]	☑ -MODERATE 25 - 75% [7]
3 SHALLOWS (IN SLOW WATER) [1]	BOULDERS [1]	LOGS OR WOODY DEBRIS [1]	☑ -SPARSE 5 - 25% [3]
2 ROOTWADS [1]			☐ -NEARLY ABSENT < 5% [1]

Cover: 10 Max 20

COMMENTS:

3) CHANNEL MORPHOLOGY (Check ONLY one PER Category OR check 2 and AVERAGE)

SINUOSITY	DEVELOPMENT	CHANNELIZATION	STABILITY	MODIFICATIONS (OTHER)
☐ -HIGH [4]	☐ -EXCELLENT [7]	☐ -NONE [6]	☐ -HIGH [3]	☐ -SNAGGING ☐ -IMPOUNDMENT
☑ -MODERATE [3]	☐ -GOOD [5]	☐ -RECOVERED [4]	☐ -MODERATE [2]	☐ -RELOCATION ☐ -ISLAND
☐ -LOW [2]	☐ -FAIR [3]	☐ -RECOVERING [3]	☑ -LOW [1]	☐ -CANOPY REMOVAL ☐ -LEVEED
☐ -NONE [1]	☑ -POOR [1]	☑ -RECENT OR NO RECOVERY [1]		☐ -DREDGING ☐ -BANK SHAPING
		☐ -IMPOUNDED [-1]		☐ -ONE SIDE CHANNEL MODIFICATIONS

Channel: 4 Max 20

COMMENTS:

4) RIPARIAN ZONE AND BANK EROSION (Check ONLY two PER bank or check 2 and AVERAGE per bank)

River Right Looking Downstream

RIPARIAN WIDTH (Per Bank)	FLOOD PLAIN QUALITY (EXCEPT 100 Meter FORESTED) (Most Predominant Per Bank)		BANK EROSION (Per Bank)	
L R	L R	L R	L R	
☐ ☐ -VERY WIDE > 100m [5]	☐ ☐ -FOREST, SWAMP [3]	☐ ☐ -CONSERVATION TILLAGE [1]	☑ ☑	-NONE / LITTLE [3]
☐ ☐ -WIDE > 50m [4]	☐ ☐ -SHRUB OR OLD FIELD [2]	☐ ☐ -URBAN OR INDUSTRIAL [0]	☐ ☐	-MODERATE [2]
☐ ☐ -MODERATE 10 - 50m [3]	☑ ☑ -RESIDENTIAL, PARK, NEW FIELD [1]	☐ ☐ -OPEN PASTURE, ROWCROP [0]	☐ ☐	-HEAVY / SEVERE [1]
☑ ☑ -NARROW 5 - 10m [2]	☐ ☐ -FENCED PASTURE [1]	☐ ☐ -MINING / CONSTRUCTION [0]		
☐ ☐ -VERY NARROW < 5m [1]				
☐ ☐ -NONE [0]				

Riparian: 8 Max 10

COMMENTS:

5) POOL / GLIDE AND RIFFLE / RUN QUALITY

MAX DEPTH (Check 1 ONLY)	MORPHOLOGY (Check 1 or 2 & AVERAGE)	CURRENT VELOCITY (POOLS & RIFFLES) (Check All That Apply)	
☐ -1m [6]	☐ -POOL WIDTH > RIFFLE WIDTH [2]	☐ -SWIFT [1]	☐ -TORRENTIAL [-1]
☐ -0.7m [4]	☐ -POOL WIDTH = RIFFLE WIDTH [1]	☐ -FAST [1]	☐ -INTERSTITIAL [-1]
☐ -0.4 to 0.7m [2]	☑ -POOL WIDTH < RIFFLE WIDTH [0]	☐ -MODERATE [1]	☐ -INTERMITTENT [-2]
☑ -0.2 to 0.4m [1]	☐ -IMPOUNDED [-1]	☑ -SLOW [1]	☐ -VERY FAST [1]
☐ -< 0.2m (POOL = 0)		☐ -NONE [-1]	

Pool / Current: 4 Max 12

COMMENTS:

CHECK ONE OR CHECK 2 AND AVERAGE

RIFFLE DEPTH	RUN DEPTH	RIFFLE / RUN SUBSTRATE	RIFFLE / RUN EMBEDDEDNESS
☐ -Most Areas > 10cm [2]	☐ -MAX > 50 cm [2]	☐ -STABLE (e.g., Cobble, Boulder) [2]	☐ -NONE [2]
☐ -Most Areas 5 - 10cm [1]	☐ -MAX < 50 cm [1]	☐ -MOD. STABLE (e.g., Large Gravel) [1]	☐ -LOW [1]
☐ -Most Areas < 5cm [0]		☐ -UNSTABLE (Fine Gravel, Sand) [0]	☐ -MODERATE [0]
☐ -NO RIFFLE but RUNS present [0]			☐ -EXTENSIVE [-1]
☑ -NO RIFFLE / NO RUN (Interm = 0)			

Riffle / Run: 0 Max 8

COMMENTS:

Gradient: 10

6) GRADIENT (ft / mi): 15.1 DRAINAGE AREA (SQ MI): 25.5 %POOL: %GLIDE: %RIFFLE: %RUN:

Gradient Score Must Agree With Table 3 of Users Manual

Stand alone gradient (optional)

Max 10

Total area must be large enough to support a population of site-indigenous species

Is Sampling Reach Representative of the Stream? (Y/ N)

If Not, Explain: _____

Lat: / Long (Beg):	
Lat / Long (Mid):	
Lat / Long (End):	
Lat / Long (X-Sect):	

Major Suspected Sources of Impacts (Check All That Apply):

- None ☐
- Industrial ☐
- WWTP ☐
- Agriculture ☐
- Livestock ☐
- Silviculture ☐
- Construction ☐
- Urban Runoff ☐
- CSOs ☐
- Subsurface Impacts ☐
- Mining ☐
- Channelization ☐
- Riparian Removal ☐
- Landfills ☐
- Natural ☐
- Dams ☐
- Other Flow Alteration ☐

Other: _____

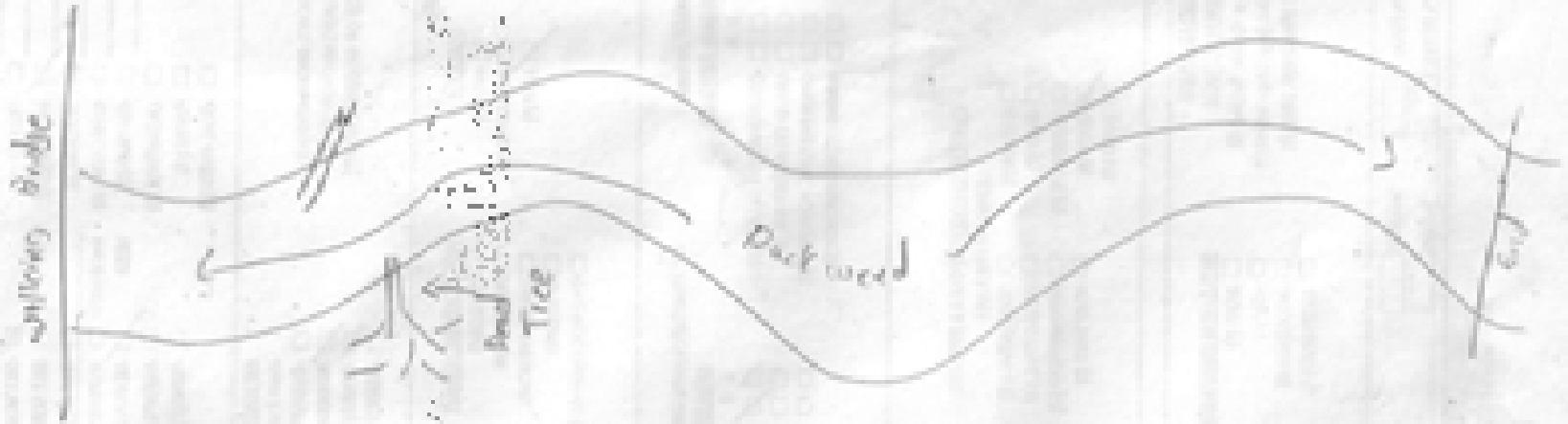
Subjective Rating (1-10)	Aesthetic Rating (1-10)
4	4

Gradient: ☐ -Low ☐ -Moderate ☐ -High

First Sampling Pass	Odour:	Oil Sheen:	Water Clarity:	Water Stage:	Canopy: % Open:
	None	Low	Clear	Normal	100

You	Me	
☐	☐	Is Stream Ephemeral (no pools, locally dry at very damp spots)?
☐	☐	Any culverts upstream? How far:
☐	☐	Any culverts close downstream? How far:
☐	☐	Is the stream mostly natural?

Stream Drawing:



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Qualitative Habitat Evaluation Index Field Sheet

QHEI Score: 63

River Code: 04-103 | RM: 0.1 | Stream: Twin Creek
Site Code: 110-01 | Project Code: Darlington | Location: RT 725 Twin Creek Rd in Martin Ford
Date: 9/18/03 | Scorer: Jen / MB | Latitude: 40.09221 | Longitude: -84.38625

1) SUBSTRATE (Check ONLY Two Substrate TYPE BOXES; Estimate % percent)

TYPE	POOL	RIFFLE
BEDROCK (slabs/ledges) (10)		
BOULDER (9)		
COBBLE (8)	2	2
GRAVEL (7)	2	1
SAND (6)		
SILT (5)	1	
HARDPAN (4)		
MUCK (3)		
DETRITUS (2)		
ARTIFICIAL (1)		

	POOL	RIFFLE
	1	3
	1	

SUBSTRATE ORIGIN (Check ONE OR 2 & AVERAGE)
- LIMESTONE (1)
- TILLS (1)
- WETLANDS (0)
- HARDPAN (0)
- SANDSTONE (1)
- RIP / RAP (0)
- LACUSTRINE (0)
- SHALE (-1)
- COAL FINES (-2)

SUBSTRATE QUALITY (Check ONE OR 2 & AVERAGE)
- SILT HEAVY (-2)
- SILT MODERATE (-1)
- SILT NORMAL (0)
- SILT FREE (1)

EMBEDDEDNESS
- EXTENSIVE (-2)
- MODERATE (-1)
- NORMAL (0)
- NONE (1)

NUMBER OF SUBSTRATE TYPES (High Quality Only, Score 0 or 1)
- 4 or More (0)
- 3 or Less (0)

Substrate: 10.5 / Max 20

COMMENTS:

2) INSTREAM COVER (Give each cover type a score of 0 to 3, see back for instructions)

(CHECK)	TYPE (Score All That Occur)	
UNDERCUT BANKS (1)	POOLS > 70 cm (2)	OVERHANG, BACKWATERS (1)
3 OVERHANGING VEGETATION (1)	ROOTWADS (1)	3 AQUATIC MACROPHYTES (1)
SHALLOWS (IN SLOW WATER) (1)	BOULDERS (1)	3 LOGS OR WOODY DEBRIS (1)
ROOTWADS (1)		

AMOUNT (Check ONLY one or check 2 and AVERAGE)
- EXTENSIVE > 75% (11)
- 3 MODERATE 25 - 75% (7)
- SPARSE 5 - 25% (3)
- NEARLY ABSENT < 5% (1)

Cover: 13 / Max 20

COMMENTS:

3) CHANNEL MORPHOLOGY (Check ONLY one POOR category OR check 2 and AVERAGE)

SINUOSITY	DEVELOPMENT	CHANNELIZATION	STABILITY	MODIFICATIONS / OTHER
3 HIGH (4)	EXCELLENT (7)	3 NONE (6)	HIGH (3)	DIKE(S) / IMPOUNDMENT
MODERATE (3)	3 GOOD (5)	RECOVERED (4)	3 MODERATE (2)	RELOCATION / ISLAND
LOW (2)	FAIR (3)	RECOVERING (3)	LOW (1)	CANOPY REMOVAL / LEVEED
NONE (1)	POOR (1)	RECENT OR NO RECOVERY (1)		DREDGING / BANK SHAPING
		IMPOUNDED (-1)		ONE SIDE CHANNEL MODIFICATIONS

Channel: 10.5 / Max 20

COMMENTS:

4) RIPARIAN ZONE AND BANK EROSION (Check ONE box FOR bank or check 2 and AVERAGE per bank)

Riparian: 10 / Max 10

Riparian Width (L & R, Per Bank)
- 3 VERY WIDE > 100m (3)
- WIDE > 50m (2)
- MODERATE 10 - 50m (1)
- 3 NARROW 5 - 10m (0)
- VERY NARROW < 5m (-1)
- NONE (0)

Floodplain Quality (L & R, Most Predominant Per Bank)
- 3 FOREST, SWAMP (3)
- SHRUB OR OLD FIELD (2)
- RESIDENTIAL, PARK, NEW FIELD (1)
- FENCED PASTURE (1)
- CONSERVATION TILLAGE (1)
- URBAN OR INDUSTRIAL (0)
- OPEN PASTURE, ROWCROP (0)
- MINING / CONSTRUCTION (0)

Bank Erosion (L & R, Per Bank)
- NONE / LITTLE (3)
- 3 MODERATE (2)
- HEAVY / SEVERE (1)

COMMENTS:

5) POOL / GLIDE AND RIFFLE / RUN QUALITY

Max Depth (Check ONE)
- 3 > 1m (6)
- 0.7m to 1m (4)
- 0.4m to 0.7m (2)
- 0.2m to 0.4m (1)
- < 0.2m (POOL = 0)

Morphology (Check 1 or 2 & AVERAGE)
- 3 POOL WIDTH > RIFFLE WIDTH (2)
- POOL WIDTH = RIFFLE WIDTH (1)
- POOL WIDTH < RIFFLE WIDTH (0)
- IMPOUNDED (-1)

Current Velocity (POOLS & RIFFLES) (Check All That Apply)
- SWIFT (1)
- FAST (1)
- MODERATE (1)
- 3 SLOW (1)
- NONE (-1)
- TORRENTIAL (-1)
- INTERSTITIAL (-1)
- INTERMITTENT (-2)
- VERY FAST (1)

Pool / Current: 9 / Max 12

COMMENTS: Pool ahead of bridge at the very big log

6) RIFFLE / RUN QUALITY (CHECK ONE OR CHECK 2 AND AVERAGE)

Riffle Depth
- Riffle Areas > 10cm (2)
- Riffle Areas 5 - 10cm (1)
- Riffle Areas < 5cm (0)
- NO RIFFLE but RUNS present (0)
- 3 NO RIFFLE / NO RUN (Score = 0)

Run Depth
- MAX > 50 cm (2)
- MAX < 50 cm (1)

Riffle / Run Substrate
- STABLE (e.g., Cobble, Boulder) (2)
- MOD. STABLE (e.g., Large Gravel) (1)
- UNSTABLE (Fine Gravel, Sand) (0)

Riffle / Run Embeddedness
- NONE (2)
- LOW (1)
- MODERATE (0)
- EXTENSIVE (-1)

Riffle / Run: 6 / Max 8

Gradient: 6 / Max 10

COMMENTS:

6) GRADIENT (ft / mi): 14.3 DRAINAGE AREA (sq mi): 5.3

% POOL: | % GLIDE: | % RIFFLE: | % RUN:

*Reach must be long enough to support population of target species

Is Sampling Reach Representative of the Stream? (Y/ N)

If Not, Explain: _____

Lat / Long (Beg):	
Lat / Long (Mid):	
Lat / Long (End):	
Lat / Long (X-Loc):	

Subjective Rating (0-50)

Aesthetic Rating (0-10)

Gradient: ☐ Low ☐ Moderate ☐ High

First Sampling Pass	Clear:	Distance:	Water Clarity:	Water Stage:	Canopy: % open:
	F	180	0.5m	very low	20

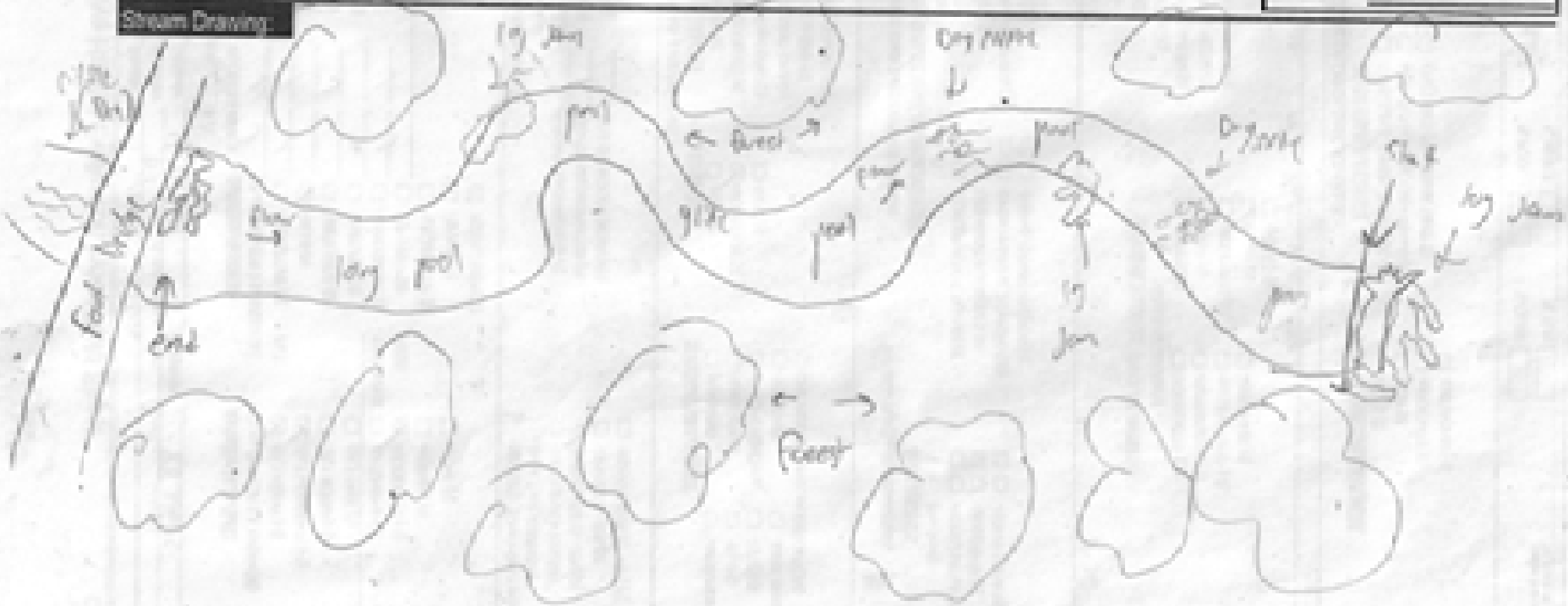
Yes	No	
☐	☐	Is Stream Ephemeral (no pools, totally dry or only damp spots)?
☐	☐	Is there water upstream? How far:
☐	☐	Is there water close downstream? How far:
☐	☐	Is Dry Channel mostly natural?

Major Suspected Sources of Impacts (Check All That Apply)

- None ☐
- Industrial ☐
- WWTP ☐
- Agriculture ☐
- Livestock ☐
- Silviculture ☐
- Construction ☐
- Urban Runoff ☐
- CSOs ☐
- Suburban Impacts ☐
- Mining ☐
- Channelization ☐
- Riparian Removal ☐
- Landfills ☐
- Natural ☐
- Dams ☐
- Other Flow Alteration ☐

Other: _____

Stream Drawing:



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Qualitative Habitat Evaluation Index Field Sheet

QHEI Score: 51

River Code: 95-008 | Mile: 0.36 | Stream: Dry Cedar Creek
Site Code: 11020 | Project Code: 10-Aug-18 | Location: Just Downstream of Dry Pond
Date: 8-16-18 | Scorer: AMS | Latitude: 41.30.503 | Longitude: -82.19.577

1) SUBSTRATE (Check ONLY Two Substrate TYPE BOXES; Estimate % percent)

TYPE	POOL	RIFFLE		POOL	RIFFLE
☐ ☐ BOULDER [10]			☐ ☐ GRAVEL [7]		
☐ ☐ Lg BOULD [10]			☑ ☐ SAND [6]		
☐ ☐ BOULDER [9]			☐ ☐ BEDROCK [5]		
☐ ☐ COBBLE [8]			☐ ☐ DETRITUS [3]		
☐ ☐ HARDPAN [4]			☐ ☐ ARTIFICIAL [0]		
☑ ☐ MUCK [2]			☐ ☐ SILT [2]		

SUBSTRATE 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]

SUBSTRATE QUALITY (Check ONE (OR 2 & AVERAGE)): ☐ SILT HEAVY [-2] ☑ SILT MODERATE [-1] ☐ SILT NORMAL [0] ☐ SILT FREE [1]

EMBEDDED / NESS: ☐ EXTENSIVE [-2] ☑ MODERATE [-1] ☐ NORMAL [0] ☐ NONE [1]

NUMBER OF SUBSTRATE TYPES (High Quality Only, Score 5 or 1): ☐ -4 or More [2] ☑ -3 or Less [0]

Substrate: 5 (Max 20)

COMMENTS:

2) INSTREAM COVER (Use each cover type a score of 0 to 3; see back for instructions)

(Structure)
1 UNDERCUT BANKS [1]
1 OVERHANGING VEGETATION [1]
2 SHALLOWS (IN SLOW WATERS) [1]
1 ROOTWADS [1]

TYPE: Score All That Occur
2 POOLS > 70cm [2]
1 ROOTWADS [1]
2 BOULDERS [2]
0 SNAGS, BRUSH PILES [1]
0 AQUATIC MACROPHYTES [1]
0 LOGS OR WOODY DEBRIS [1]

AMOUNT (Check ONLY one or check 2 and AVERAGE):
☐ -EXTENSIVE > 75% [11]
☑ -MODERATE 25 - 75% [7]
☐ -SPARSE 5 - 25% [3]
☐ -NEARLY ABSENT < 5% [1]

Cover: 14 (Max 20)

COMMENTS:

3) CHANNEL MORPHOLOGY (Check ONLY one PER Category OR Check 2 and AVERAGE)

SINUOSITY: ☑ -HIGH [4] ☐ -MODERATE [2] ☐ -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]

MODIFICATIONS / OTHER: ☐ -SNAGGING ☐ -RELOCATION ☐ -CANOPY REMOVAL ☐ -DREDGING ☐ -IMPOUNDMENT ☐ -ISLAND ☐ -LEVEES ☐ -BANK SHAPING ☐ ONE SIDE CHANNEL MODIFICATIONS

Channel: 17 (Max 20)

COMMENTS:

4) RIPARIAN ZONE AND BANK EROSION (Check ONE box PER bank or check 2 and AVERAGE per bank)

River Right looking Downstream: RT 10 LT 10

RIPARIAN WIDTH (L & R (Per Bank)):
☐ ☐ -VERY WIDE > 100m [5]
☑ ☑ -WIDE > 50m [4]
☐ ☐ -MODERATE 10 - 50m [3]
☐ ☐ -NARROW 5 - 10m [2]
☐ ☐ -VERY NARROW < 5m [1]
☐ ☐ -NONE [0]

FLOOD PLAIN QUALITY (MUST BE Wide RIPARIAN) (L & R (Most Predominant Per Bank)):
☐ ☐ -FOREST, SWAMP [3]
☐ ☐ -SHRUB OR OLD FIELD [2]
☑ ☑ -RESIDENTIAL, PARK, NEW FIELD [1]
☐ ☐ -FENCED PASTURE [1]
☐ ☐ -CONSERVATION TILLAGE [1]
☐ ☐ -URBAN OR INDUSTRIAL [0]
☐ ☐ -OPEN PASTURE, ROWCROP [0]
☐ ☐ -MINING / CONSTRUCTION [0]

BANK EROSION (L & R (Per Bank)):
☐ ☐ -NONE / LITTLE [3]
☑ ☑ -MODERATE [2]
☐ ☐ -HEAVY / SEVERE [1]

Riparian: 11 (Max 10)

COMMENTS:

5) POOL / GLIDE AND RIFFLE / RUN QUALITY

MAX DEPTH (Check 1 ONLY):
☑ - 1m [6]
☐ - 0.7m [4]
☐ - 0.4 to 0.7m [2]
☐ - 0.2 to 0.4m [1]
☐ - < 0.2m [POOL = 0]

MORPHOLOGY (Check 1 or 2 & AVERAGE):
☐ -POOL WIDTH > RIFFLE WIDTH [2]
☐ -POOL WIDTH = RIFFLE WIDTH [1]
☑ -POOL WIDTH < RIFFLE WIDTH [0]
☐ -IMPOUNDED [-1]

CURRENT VELOCITY (POOLS & RIFFLES) (Check All That Apply):
☐ -SWIFT [1]
☐ -MODERATE [1]
☑ -SLOW [1]
☐ -NONE [-1]
☐ -TORRENTIAL [-1]
☐ -INTERSTITIAL [-1]
☐ -INTERMITTENT [-2]
☐ -VERY FAST [1]

Pool / Current: 1 (Max 12)

COMMENTS:

6) RIFFLE / RUN QUALITY (CHECK ONE OR CHECK 2 AND AVERAGE)

RIFFLE DEPTH:
☐ -Riffle Areas > 10cm [2]
☐ -Best Areas 5 - 10cm [1]
☐ -Best Areas < 5cm [0]
☐ -NO RIFFLE but RUNS present [0]
☑ -NO RIFFLE / NO RUN [Marsh = 0]

RUN DEPTH:
☐ - MAX > 50 cm [2]
☐ - MAX < 50 cm [1]

RIFFLE / RUN SUBSTRATE:
☐ -STABLE (e.g., Cobble, Boulder) [2]
☐ -MOD. STABLE (e.g., Large Gravel) [1]
☐ -UNSTABLE (Fine Gravel, Sand) [0]

RIFFLE / RUN EMBEDDEDNESS:
☑ -NONE [2]
☐ -LOW [1]
☐ -MODERATE [0]
☐ -EXTENSIVE [-1]

Riffle / Run: 0 (Max 8)

COMMENTS:

7) GRADIENT (ft / mi): 8.3 DRAINAGE AREA (sq mi): 40.0

% POOL: ____ % GLIDE: ____ % RIFFLE: ____ % RUN: ____

Gradient: 10 (Max 10)

Stream size, such as large enough to support consumption of offered/gate species

Is Sampling Reach Representative of the Stream? (Y/ N)

If Not, Explain:

Lat / Long (Beg):	
Lat / Long (Mid):	
Lat / Long (End):	
Lat / Long (X-Loc):	

Major Suspected Sources of Impacts (Check All That Apply):

- None ☐
- Industrial ☐
- WWTP ☐
- Ag'culture ☐
- Livestock ☐
- Silviculture ☐
- Construction ☐
- Urban Runoff ☐
- CSOs ☐
- Solution / gases ☐
- Mining ☐
- Channelization ☐
- Riparian Removal ☐
- Landfills ☐
- Natural ☐
- Dams ☐
- Other Flow Alteration ☐

Other: _____

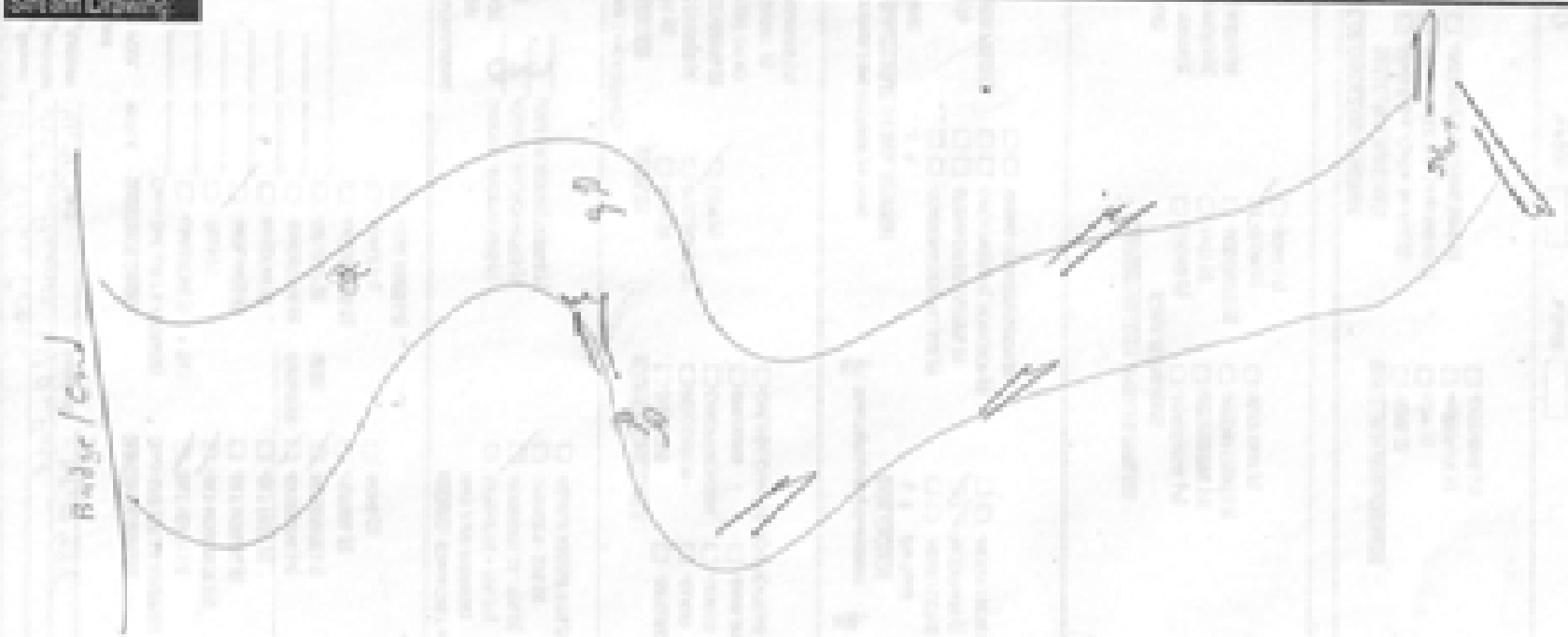
Subjective Rating (1-10)	Aesthetic Rating (1-10)
5	5

Gradient: ☐ Low ☐ Moderate ☐ High

	Gear:	Distance	Water Clarity	Water Stage	Canopy: % open:
First Sampling Pass	F	500	clear	normal-high	90

How far:	
☐	Is Stream Ephemeral (no pools, totally dry of only damp spots)?
☐	Is there water upstream? How far:
☐	Is there water dicta downstream? How far:
☐	Is Dry Channel mostly natural?

Stream Drawing:



Instructions for scoring the alternate cover metric: Each cover type should receive a score of between 0 and 3, where: 0 = Cover type absent; 1 = cover type in very small amounts or if more common of marginal quality; 2 = cover type present in moderate amounts, but not of highest quality or in small amounts of highest quality; 3 = cover type of highest quality in moderate of greater amounts. Examples of highest quality include, very large boulders in deep or fast water, large diameter logs that are stable, well-developed rootwads in deep / fast water, or deep, well-defined, functional pools.

Qualitative Habitat Evaluation Index Field Sheet

QHEI Score: 95

River Code: 95-227 | RM: 1.7 | Stream: Springbrook Creek
Site Code: [illegible] | Project Code: [illegible] | Location: [illegible]
Date: 09-7-16 | Scorer: [illegible] | Latitude: [illegible] | Longitude: [illegible]

1) SUBSTRATE (Check ONLY Two Substrate TYPE BOXES; Estimate % percent)

TYPE	POOL	RIFFLE
☐ ☐ -BEDROCK [10]		
☐ ☐ -Lg BOULD [10]		
☐ ☐ -BOULDER [9]	20	
☐ ☐ -COBBLE [8]	25	5
☐ ☐ -HARDPAN [4]		
☐ ☐ -MUCK [2]	15	10
☐ ☐ -GRAVEL [7]		
☑ ☐ -SAND [6]	40	
☐ ☐ -BEDROCK [9]		
☐ ☐ -DETRITUS [3]		
☐ ☐ -ARTIFICIAL [0]		
☐ ☐ -SILT [2]		

SUBSTRATE ORIGIN (Check ONE OR 2 & AVERAGE)	POOL	RIFFLE
☐ -LIMESTONE [1]	5	20
☐ -TILLS [1]		
☑ -WETLANDS [0]		
☐ -HARDPAN [0]		
☐ -SANDSTONE [0]		
☐ -RIP / RAP [0]		
☐ -LACUSTRINE [0]		
☐ -SHALE [-1]		
☐ -COAL FINES [-2]		

SUBSTRATE QUALITY (Check ONE OR 2 & AVERAGE)	
SILT: ☐ -SILT HEAVY [-2]	
☑ -SILT MODERATE [-1]	
☐ -SILT NORMAL [0]	
☐ -SILT FREE [1]	
EMBEDDED NESS: ☐ -EXTENSIVE [-2]	
☑ -MODERATE [-1]	
☐ -NORMAL [0]	
☐ -NONE [1]	

NUMBER OF SUBSTRATE TYPES: (High Quality Only, Score 5 or 1)
☑ -4 or More [2]
☐ -3 or Less [0]

Substrate: 15.5 Max 20

COMMENTS:

2) INSTREAM COVER (Use each cover type a score of 0 to 3; see back for instructions)

(Structure)
1 -UNDERCUT BANKS [1]
1 -OVERHANGING VEGETATION [1]
1 -SHALLOWS (IN SLOW WATER) [1]
1 -ROOTWADS [1]

TYPE: Score All That Occur
1 -POOLS > 75 cm [2]
1 -ROOTWADS [1]
1 -BOULDERS [1]
1 -SNAGS OR MACROPHYTES [1]
1 -AQUATIC MACROPHYTES [1]
1 -LOGS OR WOODY DEBRIS [1]

AMOUNT: (Check ONLY one or check 2 and AVERAGE)
☐ -EXTENSIVE > 75% [11]
☑ -MODERATE 25 - 75% [7]
☐ -SPARSE 5 - 25% [3]
☐ -NEARLY ABSENT < 5% [1]

Cover: 12 Max 20

COMMENTS:

3) CHANNEL MORPHOLOGY (Check ONLY one PER Category OR check 2 and 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 [2]	☐ -LOW [1]
☐ -NONE [1]	☐ -POOR [1]	☐ -RECENT OR NO RECOVERY [1]	
		☐ -IMPOUNDED [-1]	

MODIFICATIONS / OTHER

☐ -DRAGGING	☐ -IMPOUNDMENT
☐ -RELOCATION	☐ -ISLAND
☐ -CANOPY REMOVAL	☐ -LEVEES
☐ -DREDGING	☐ -BANK SHAPING
☐ -ONE SIDE CHANNEL MODIFICATIONS	

Channel: 11 Max 20

COMMENTS:

4) RIPARIAN ZONE AND BANK EROSION (check ONE box PER bank or check 2 and AVERAGE per bank)

Rip Right Looking Downstream Rip

RIPARIAN WIDTH	L R (Per Bank)
☐ ☑ -VERY WIDE > 100m [5]	
☐ ☐ -WIDE > 50m [4]	
☑ ☐ -MODERATE 10 - 50m [3]	
☐ ☐ -NARROW 5 - 10m [2]	
☑ ☐ -VERY NARROW < 5m [1]	
☐ ☐ -NONE [0]	

FLOOD PLAIN QUALITY (FOR 100 Meter REACH)	L R (Most Predominant Per Bank)
☐ ☐ -FOREST, SWAMP [3]	
☐ ☐ -SHRUB OR OLD FIELD [2]	
☑ ☑ -RESIDENTIAL, PARK, NEW FIELD [1]	
☐ ☐ -FENCED PASTURE [1]	
☐ ☐ -CONSERVATION TILLAGE [1]	
☐ ☐ -URBAN OR INDUSTRIAL [0]	
☐ ☐ -OPEN PASTURE, ROWCROP [0]	
☐ ☐ -MINING / CONSTRUCTION [0]	

BANK EROSION	L R (Per Bank)
☐ ☐ -NONE / LITTLE [3]	
☑ ☑ -MODERATE [2]	
☐ ☐ -HEAVY / SEVERE [1]	

Riparian: 6 Max 10

COMMENTS:

5) POOL / GLIDE AND RIFFLE / RUN QUALITY

MAX DEPTH (Check 1 ONLY)
☐ -1m [6]
☐ -0.7m [4]
☑ -0.4 to 0.7m [2]
☐ -0.2 to 0.4m [1]
☐ -< 0.2m [POOL = 0]

MORPHOLOGY (Check 1 or 2 & AVERAGE)
☐ -POOL WIDTH > RIFFLE WIDTH [3]
☑ -POOL WIDTH = RIFFLE WIDTH [2]
☐ -POOL WIDTH < RIFFLE WIDTH [0]
☐ -IMPOUNDED [-1]

CURRENT VELOCITY (POOLS & RIFFLES) (Check All That Apply)	
☐ -EDDIES [1]	☐ -TORRENTIAL [-1]
☐ -FAST [1]	☐ -INTERSTITIAL [-1]
☑ -MODERATE [1]	☐ -INTERMITTENT [-2]
☑ -SLOW [1]	☐ -VERY FAST [1]
☐ -NONE [-1]	

Pool / Current: 5 Max 12

COMMENTS:

CHECK ONE OR 2 BOXES & AVERAGE

RIFFLE DEPTH
☐ -Riffl Areas > 10cm [2]
☐ -Riffl Areas 5 - 10cm [1]
☑ -Riffl Areas < 5cm [0]
☐ -NO RIFFLE but RUNS present [0]
☐ -NO RIFFLE / NO RUN [Metric = 0]

RUN DEPTH
☐ -MAX > 50 cm [2]
☑ -MAX < 50 cm [1]

RIFFLE / RUN SUBSTRATE
☐ -STABLE [e.g., Cobble, Boulder] [2]
☑ -MOD. STABLE [e.g., Large Gravel] [1]
☐ -UNSTABLE [Fine Gravel, Sand] [0]

RIFFLE / RUN EMBEDDEDNESS
☐ -NONE [2]
☐ -LOW [1]
☑ -MODERATE [0]
☐ -EXTENSIVE [-1]

Riffle / Run: 6 Max 8

Gradient: 10 Max 10

6) GRADIENT (ft / mi): 6.1 DRAINAGE AREA (sq mi): 12.3

% POOL: % GLIDE:
% RIFFLE: % RUN:

Riffle areas must be large enough to support a population of riffle obligate species

Gradient Score from Table 2 of Users Manual based on gradient and drainage area

Max 10

Is Sampling Reach Representative of the Stream? (Y/ N)

If Not, Explain:

Lat / Long (Beg):	
Lat / Long (Mid):	
Lat / Long (End):	
Lat / Long (X-Sec):	

Major Impacted Sources of Impacts (Check All That Apply):

- None ☐
- Industrial ☐
- WWTP ☐
- Agriculture ☐
- Livestock ☐
- Silviculture ☐
- Construction ☐
- Urban Runoff ☐
- CSOs ☐
- Subsurface Impacts ☐
- Mining ☐
- Channelization ☐
- Riparian Removal ☐
- Landfills ☐
- Natural ☐
- Dams ☐
- Other Flow Alteration ☐

Other:

Subjective Rating (1-10): 5

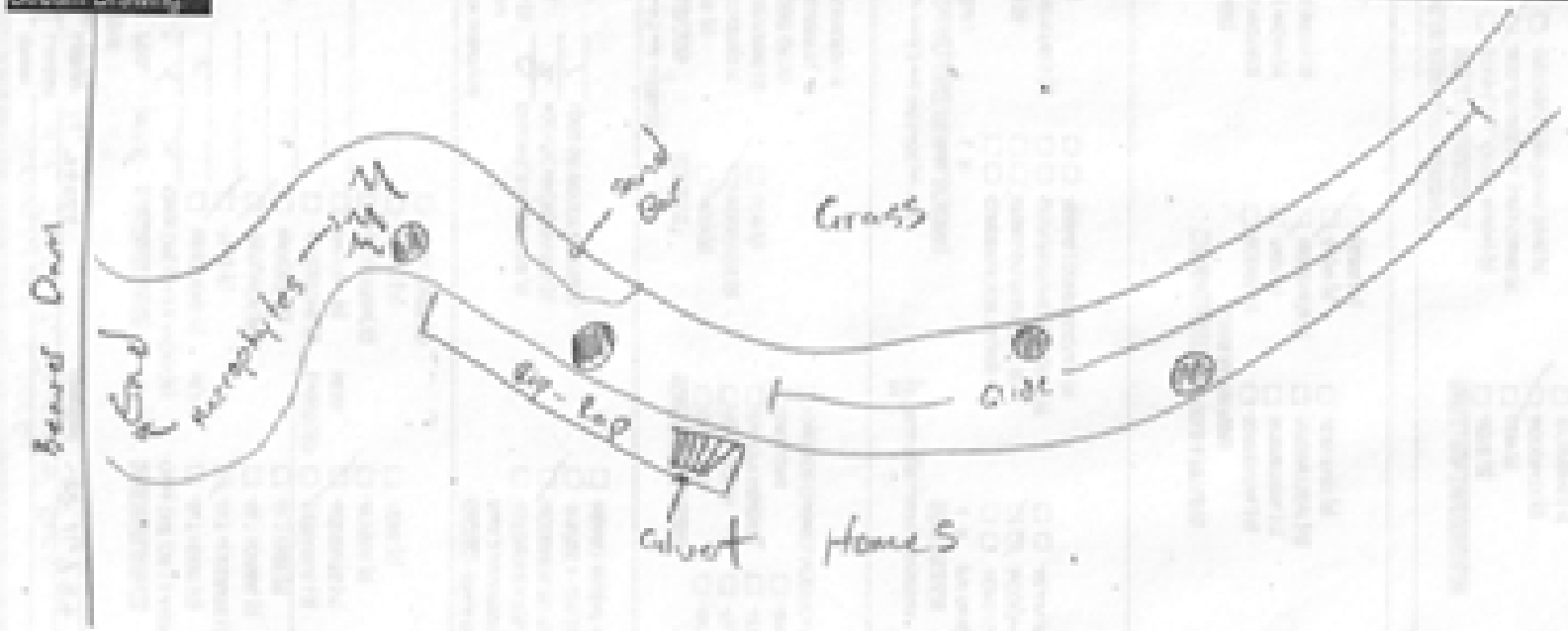
Aesthetic Rating (1-10): 5

Gradient: ☐ Low ☐ Moderate ☐ High

	Clear:	Distance:	Water Clarity:	Water Stage:	Canopy % Cover:
First Sampling Pass	E	150	Clear	Normal	100

Yes	No	
☐	☐	Is Stream Ephemeral (no pools, totally dry -if only damp specify)?
☐	☐	Is there water upstream? How far:
☐	☐	Is there water (pool downstream? How far:
☐	☐	Is Dry Channel mostly natural?

Stream Drawing:



Instructions for scoring the alternate cover metric: Each cover type should receive a score of between 0 and 3, where: 0 = Cover type absent; 1 = cover type in very small amounts or if more common of marginal quality; 2 = cover type present in moderate amounts, but not of highest quality or in small amounts of highest quality; 3 = cover type of highest quality in moderate or greater amounts. Examples of highest quality include, very large boulders in deep or fast water, large diameter logs that are stable, well developed rootwads in deep / fast water, or deep, well-defined, functional pools.

Qualitative Habitat Evaluation Index Field Sheet

QHEI Score: 65

River Code: 21-Lick RM: 11.8 Stream: Little Darby Creek
Site Code: LD11 Project Code: Lilly Creek Location: At Lilly Darby Sports Complex
Date: 10-1-08 Scorer: RHS Latitude: 39.99731 Longitude: -83.19491

I. SUBSTRATE (Check ONLY Two Substrate TYPE BOXES; Estimate % (pool/riffle))

TYPE	POOL	RIFFLE		POOL	RIFFLE
☐ ☐ BLDR/SLAB [10]			☐ ☐ GRAVEL [7]		
☐ ☐ Lg ROAD [10]			☐ ☐ SAND [6]		
☐ ☐ BOULDER [9]			☐ ☐ BEDROCK [5]		
☐ ☐ COBBLE [8]			☐ ☐ DETRITUS [3]		
☐ ☐ SLABS [10]			☐ ☐ ARTIFICIAL [2]		
☐ ☐ MUCK [2]			☐ ☐ SILT [2]		

SUBSTRATE/LOCATION: 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]

SUBSTRATE QUALITY: Check ONE (OR 2 & AVERAGE)
SILT: ☑ -SILT HEAVY [-2]; ☐ -SILT MODERATE [-1]; ☐ -SILT NORMAL [0]; ☐ -SILT FREE [1]
EMBEDDED/NESS: ☑ -EXTENSIVE [-2]; ☐ -MODERATE [-1]; ☐ -NORMAL [0]; ☐ -NONE [1]

Substrate: 9.5 / Max 20

NUMBER OF SUBSTRATE TYPES (High Quality Only, Score 0 or -1): ☐ -4 or More [0]; ☑ -3 or Less [-1]

COMMENTS:

II. INSTREAM COVER: (One each cover type a score of 0 to 3; see back for instructions)

(Structure)
☐ UNDERCUT BANKS [1]
☐ OVERHANGING VEGETATION [1]
☐ SHALLOWS (IN SLOW WATER) [1]
☐ ROOTWADS [1]

TYPE: Score All That Occur
☐ POOLS > 70 cm [2]
☐ ROOTWADS [1]
☐ BOULDERS [1]
☐ OXBOWS, BACKWATERS [1]
☐ AQUATIC MACROPHYTES [1]
☐ LOGS OR WOODY DEBRIS [1]

AMOUNT: (Check ONLY one or check 2 and AVERAGE)
☐ -EXTENSIVE > 75% [11]
☑ -MODERATE 25 - 75% [7]
☐ -SPARSE 5 - 25% [3]
☐ -NEARLY ABSENT < 5% [1]

Cover: 9 / Max 20

COMMENTS:

III. CHANNEL MORPHOLOGY: (CHECK ONLY one PER Category OR check 2 and 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]

MODIFICATIONS / OTHER
☐ -SNAGGING
☐ -RELOCATION
☐ -CANOPY REMOVAL
☐ -DREDGING
☐ -IMPOUNDMENT
☐ -ISLAND
☐ -LEVEES
☐ -BANK SHAPING
☐ ONE SIDE CHANNEL MODIFICATIONS

Channel: 6 / Max 20

COMMENTS:

IV. RIPARIAN ZONE AND BANK EROSION (Check ONE box PER bank or check 2 and AVERAGE per bank)

Facing Right Looking Downstream

RIPARIAN WIDTH
L R (Per Bank)
☐ ☐ -VERY WIDE > 100m [5]
☐ ☐ -WIDE > 50m [4]
☐ ☐ -MODERATE 10 - 50m [3]
☑ ☑ -NARROW 5 - 10m [2]
☐ ☐ -VERY NARROW < 5m [1]
☐ ☐ -NONE [0]

FLOOD PLAIN QUALITY (PAST 100 Meter RIPARIAN)
L R (Most Predominant Per Bank)
☐ ☐ -FOREST, SWAMP [3]
☐ ☐ -SHRUB OR OLD FIELD [2]
☑ ☑ -RESIDENTIAL, PARK, NEW FIELD [1]
☐ ☐ -FENCED PASTURE [1]
☐ ☐ -CONSERVATION TILLAGE [1]
☐ ☐ -URBAN OR INDUSTRIAL [0]
☐ ☐ -OPEN PASTURE, ROWCROP [0]
☐ ☐ -MINING / CONSTRUCTION [0]

BANK EROSION
L R (Per Bank)
☐ ☐ -NONE / LITTLE [3]
☑ ☑ -MODERATE [2]
☐ ☐ -HEAVY / SEVERE [1]

Riparian: 6 / Max 10

COMMENTS:

V. POOL / GLIDE AND RIFFLE / RUN QUALITY

MAX DEPTH (Check 1 ONLY)
☐ -1m [6]
☐ -0.7m [4]
☑ -0.4 to 0.7m [2]
☐ -0.2 to 0.4m [1]
☐ -< 0.2m [FQC = 0]

MORPHOLOGY (Check 1 or 2 & AVERAGE)
☐ -POOL WIDTH > RIFFLE WIDTH [2]
☐ -POOL WIDTH = RIFFLE WIDTH [1]
☑ -POOL WIDTH < RIFFLE WIDTH [0]
☐ -IMPOUNDED [-1]

CURRENT VELOCITY (POOLS & RIFFLES) (Check All That Apply)
☐ -EDDIES [1]
☐ -FAST [1]
☐ -MODERATE [1]
☐ -SLOW [1]
☑ -NONE [-1]
☐ -TORRENTIAL [-1]
☐ -INTERSTITIAL [-1]
☐ -INTERMITTENT [-2]
☐ -VERY FAST [-1]

Pool / Current: \ / Max 15

COMMENTS:

VI. RIFFLE / RUN QUALITY (CHECK ONE OR CHECK 2 AND AVERAGE)

RIFFLE DEPTH
☐ -Best Areas > 10cm [2]
☐ -Best Areas 5 - 10cm [1]
☐ -Best Areas < 5cm [0]
☐ -NO RIFFLE but RUNS present [0]
☑ -NO RIFFLE / NO RUN [depth = 0]

RUN DEPTH
☐ - MAX > 50 cm [2]
☐ - MAX < 50 cm [1]

RIFFLE / RUN SUBSTRATE
☐ -STABLE (e.g., Cobble, Boulder) [2]
☐ -MOD. STABLE (e.g., Large Gravel) [1]
☐ -UNSTABLE (Fine Gravel, Sand) [0]

RIFFLE / RUN EMBEDDEDNESS
☐ -NONE [2]
☐ -LOW [1]
☐ -MODERATE [0]
☐ -EXTENSIVE [-1]

Riffle / Run: 0 / Max 8

Gradient: 10 / Max 10

COMMENTS:

6) GRADIENT (ft / mi): 11.8 DRAINAGE AREA (sq mi): 11.1

% POOL: % GLIDE: % RIFFLE: % RUN:

Best areas must be large enough to support reproduction of rifle-obligate species

Is Sampling Reach Representative of the Stream? (Y/ N)

If Not, Explain:

Lat / Long (Beg):	
Lat / Long (Mid):	
Lat / Long (End):	
Lat / Long (X-Loc):	

Subjective Rating (1-10): 4

Aesthetic Rating (1-10): 4

First Sampling Pass	Clear:	Distance:	Water Clarity:	Water Stage:	Canopy: % open:
	E	150	Clear	Abnormal	100%

Gradient: ☐ -Low ☐ -Moderate ☐ -Hips

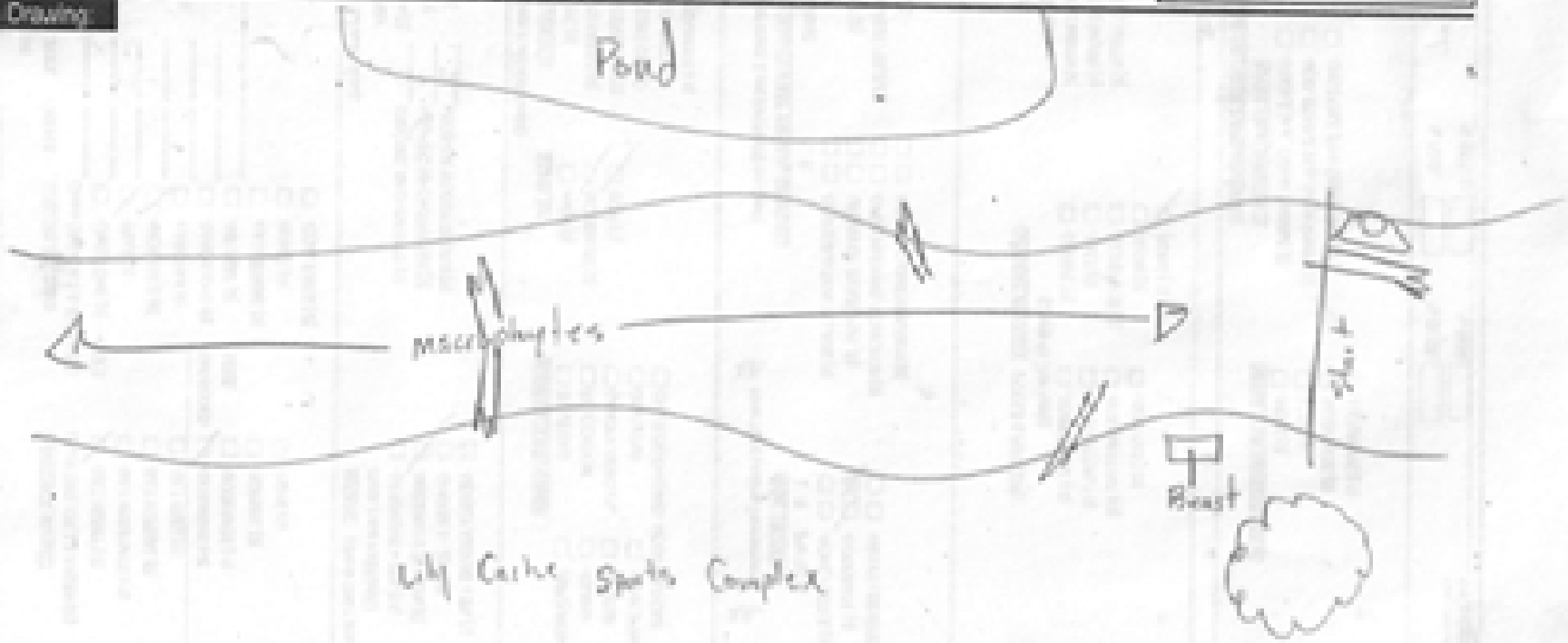
You	Me	
☐	☐	Is Stream Ephemeral (no pools, totally dry at only damp spots)?
☐	☐	Is there water upstream? How far:
☐	☐	Is there water 40cm downstream? How far:
☐	☐	Is Dry Channel mostly natural?

Major Suspected Sources of Impacts (Check All That Apply):

None	☐
Industrial	☐
WWTP	☐
Agriculture	☐
Livestock	☐
Silviculture	☐
Construction	☐
Urban Runoff	☐
CSOs	☐
Solution Impacts	☐
Mining	☐
Channelization	☐
Riparian Removal	☐
Landfills	☐
Natural	☐
Dams	☐
Other Flow Alteration	☐

Other:

Stream Drawing:



Instructions for scoring the alternate cover metric: Each cover type should receive a score of between 0 and 3, where: 0 = Cover type absent; 1 = cover type in very small amounts or if more common of marginal quality; 2 = cover type present in moderate amounts, but not of highest quality or in small amounts of highest quality; 3 = cover type of highest quality in moderate of greater amounts. Examples of highest quality include, very large boulders in deep or fast water, large diameter logs that are stable, well developed rootwads in deep / fast water, or deep, well-defined, functional pools.

Qualitative Habitat Evaluation Index Field Sheet

QHEI Score: 79

River Code: 05-665 | Rm: 5.5 | Stream: Rock R.
Site Code: LR-2 | Project Code: | Location: RT 61 Bridge SE
Date: 8/7/2002 | Scorer: Jack Rogers | Latitude: 40.9[illegible] | Longitude: -82.[illegible]

I. SUBSTRATE (Check ONLY Two Substrate TYPE BOXES; Estimate % percent)

TYPE	POOL	RIFFLE
BLDR/SLAB [10]		
Lg BOULD [10]		
BOULDER [9]		
COBBLE [8]		
HARDPAN [4]		
MUCK [2]	1	1
GRAVEL [7]		
SAND [6]		
BEDROCK [5]		
DETRITUS [3]	2	
ARTIFICIAL [0]		
SILT [2]	1	1

SUBSTRATE 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]

SUBSTRATE QUALITY — Check ONE (OR 2 & AVERAGE)
- SILT HEAVY [-2]
- SILT MODERATE [-1]
- SILT NORMAL [0]
- SILT FREE [1]

EMBEDDED — EXTENSIVE [-2]; MODERATE [-1]; NORMAL [0]; NONE [1]

NUMBER OF SUBSTRATE TYPES: (High Quality Only, Score 5 or +)
- 4 or More [2]
- 3 or Less [0]

COMMENTS:

Substrate: 9 / Max 20

II. INSTREAM COVER (Give each cover type a score of 0 to 3; see back for instructions)

(Structure)
- UNDERCUT BANKS [1]
- 2 OVERHANGING VEGETATION [1]
- 3 SHALLOWS (in SLOW WATER) [1]
- POOL/RIFFLE [1]

TYPE: Score All That Occur
- 3 POOLS > 70 cm [2]
- 1 ROOTWADS [1]
- BOULDERS [1]
- 1 SUBMERG. BRUSH/TREES [1]
- 2 AQUATIC MACROPHYTES [1]
- 3 LOGS OR WOODY DEBRIS [1]

AMOUNT (Check ONLY one or check 2 and AVERAGE)
- EXTENSIVE > 75% [11]
- MODERATE 25 - 75% [7]
- SPARSE 5 - 25% [3]
- NEARLY ABSENT < 5% [1]

COMMENTS:

Cover: 19 / Max 20

III. CHANNEL MORPHOLOGY (Check ONLY one PER Category OR check 2 and 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]	

MODIFICATIONS (OTHER)
- DRAGGING
- RELOCATION
- CANOPY REMOVAL
- DREDGING
- IMPOUNDMENT
- ISLAND
- LEVEED
- BANK SHAPING
- ONE SIDE CHANNEL MODIFICATIONS

COMMENTS:

Channel: 14 / Max 20

IV. RIPARIAN ZONE AND BANK EROSION (check ONE box PER bank or check 2 and AVERAGE per bank)

River Right Looking Downstream

RIPARIAN WIDTH

L. R. (Per Bank)
VERY WIDE > 100m [5]
WIDE > 50m [4]
MODERATE 10 - 50m [3]
NARROW 5 - 10m [2]
VERY NARROW < 5m [1]
NONE [0]

FLOOD PLAIN QUALITY (FACT THE Most Abundant)

L. R. (Most Predominant Per Bank)
FOREST, SWAMP [3]
SHRUB OR OLD FIELD [2]
RESIDENTIAL, PARK, NEW FIELD [1]
FENCED PASTURE [1]

L. R.
CONSERVATION TILLAGE [1]
URBAN OR INDUSTRIAL [0]
OPEN PASTURE, ROWCROP [0]
MINING / CONSTRUCTION [0]

BANK EROSION

L. R. (Per Bank)
NONE / LITTLE [3]
MODERATE [2]
HEAVY / SEVERE [1]

COMMENTS:

Riparian: 12 / Max 10

V. POOL / GLIDE AND RIFFLE / RUN QUALITY

MAX DEPTH (Check ONLY)
- > 1m [6]
- 0.7-1m [4]
- 0.4-0.7m [2]
- 0.2-0.4m [1]
- < 0.2m [POOL = 0]

MORPHOLOGY (Check 1 or 2 & AVERAGE)
- POOL WIDTH > RIFFLE WIDTH [2]
- POOL WIDTH = RIFFLE WIDTH [1]
- POOL WIDTH < RIFFLE WIDTH [0]
- IMPOUNDED [1]

CURRENT VELOCITY (POOLS & RIFFLES) (Check All That Apply)
- EDDIES [1]
- FAST [1]
- MODERATE [1]
- SLOW [1]
- NONE [-1]
- TORRENTIAL [-1]
- INTERSTITIAL [-1]
- INTERMITTENT [-2]
- VERY FAST [1]

COMMENTS:

Pool / Current: 11 / Max 12

VI. RIFFLE / RUN QUALITY (CHECK ONE OR CHECK 2 AND AVERAGE)

RIFFLE DEPTH
- > Riffle Areas > 10cm [2]
- Riffle Areas 5 - 10cm [1]
- Riffle Areas < 5cm [0]
- NO RIFFLE but RUNS present [1]
- NO RIFFLE / NO RUN [Marsh = 0]

RUN DEPTH
- MAX > 50 cm [2]
- MAX < 50 cm [1]

RIFFLE / RUN SUBSTRATE
- STABLE (e.g., Cobble, Boulder) [2]
- MOD. STABLE (e.g., Large Gravel) [1]
- UNSTABLE (Fine Gravel, Sand) [0]

RIFFLE / RUN EMBEDDEDNESS
- NONE [2]
- LOW [1]
- MODERATE [0]
- EXTENSIVE [-1]

COMMENTS:

Riffle / Run: 5 / Max 6

VII. GRADIENT (ft / mi): 5.5 DRAINAGE AREA (sq mi): 102.6

Gradient: 10 / Max 10

% POOL: | % GLIDE:
% RIFFLE: | % RUN:

Stream must be large enough to support a population of riffle/glide species

Gradient Score Must Make Full Use of Scale Allowed based on gradient and drainage area

Is Sampling Reach Representative of the Stream? (Y/ N)

If Not, Explain: _____

Lat / Long (Beg):	
Lat / Long (Mid):	
Lat / Long (End):	
Lat / Long (X-Loc):	

Major Suspected Sources of Impacts (Check All That Apply):

- None ☐
- Industrial ☐
- WWTP ☐
- Agriculture ☐
- Livestock ☐
- Silviculture ☐
- Construction ☐
- Urban Runoff ☐
- CSOs ☐
- Suburban impacts ☐
- Mining ☐
- Channelization ☐
- Riparian Removal ☐
- Landfills ☐
- Natural ☐
- Dams ☐
- Other Flow Alteration ☐

Other: _____

Subjective Rating (1-10)

Aesthetic Rating (1-10)

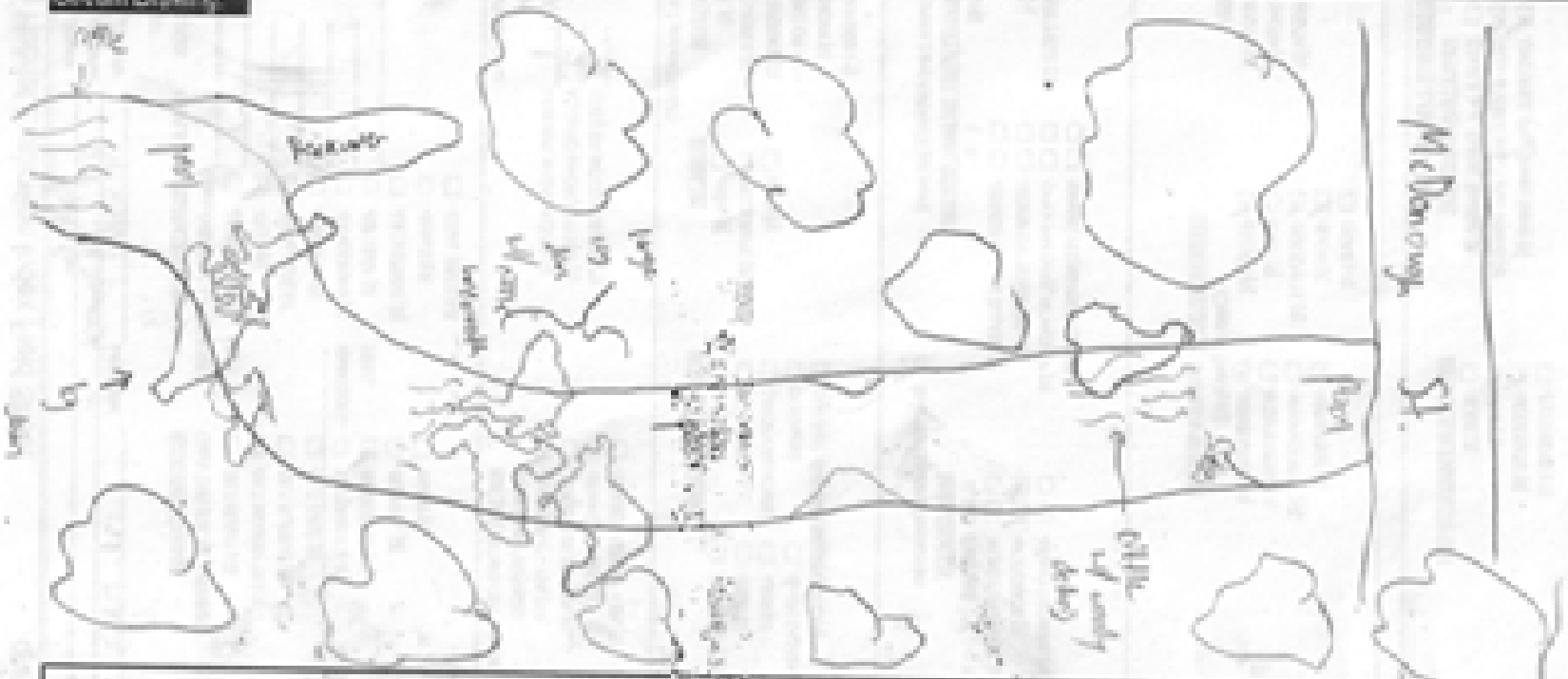
Gradient: ☐ -Low ☐ -Moderate ☐ -High

	Color	Distance	Water Clarity	Water Odors	Canopy- % open
First Sampling Pass					

Flow No:

- ☐☐☐☐ Is Stream Ephemeral (no pools, totally dry of only damp spots)?
- ☐☐☐☐ Is there water upstream? How far:
- ☐☐☐☐ Is there water close downstream? How far:
- ☐☐☐☐ Is Dry Channel mostly natural?

Stream Drawing:



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MBI Qualitative Habitat Evaluation Index Field Sheet

QHEI Score: 43

River Code: 36-122 RM: 2.3 Stream: Big Darby Creek

Site Desc: Conlin Project Code: 10-Darby-01 Location: Rt 42 Bridge

Date: 8-15-12 Scorer: MHS Latitude: 39.9359 Longitude: -83.1332

1) SUBSTRATE (Check ONLY Two Substrate TYPE BOXES; Estimate % (percent)

TYPE	POOL	RIFFLE		POOL	RIFFLE
☐ ☐ BLDR/SLAB [10]			☐ ☐ GRAVEL [7]		
☐ ☐ Lg ROCKS [9]			☐ ☑ SAND [6]		
☐ ☐ BOULDER [9]			☐ ☐ HARDPAN [5]		
☐ ☐ COBBLE [8]			☐ ☐ DETRITUS [3]		
☐ ☐ HARDPAN [4]			☐ ☐ ARTIFICIAL [0]		
☑ ☐ MUCK [2]			☐ ☐ SILT [2]		

SUBSTRATE 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]

SUBSTRATE QUALITY (Check ONE OR 2 & AVERAGE)
- SILT: ☐ -SILT HEAVY [-2]
- ☑ -SILT MODERATE [-1]
- ☐ -SILT NORMAL [0]
- ☐ -SILT FREE [1]
- EMBEDDED / NESS: ☐ -EXTENSIVE [-2]
- ☑ -MODERATE [-1]
- ☐ -NORMAL [0]
- ☐ -NONE [1]

Substrate Max 20: 18

NUMBER OF SUBSTRATE TYPES: (High Quality Only, Score 6 or 4)
- ☐ -4 or More [2]
- ☑ -3 or Less [0]

COMMENTS:

2) INSTREAM COVER (Type and % cover type a score of 0 to 3; see back for instructions)

(Structure)
- 0 UNDERCUT BANKS [1]
- 1 OVERHANGING VEGETATION [1]
- 2 SHALLOWS (IN SLOW WATER) [1]
- 0 ROOTWADS [1]

TYPE: Score All That Occur
- 2 POOLS > 70 cm [2]
- 0 ROOTWADS [1]
- 0 BOULDERS [1]
- 2 OVERHG. VEGETATION [1]
- 1 AQUATIC MACROPHYTES [1]
- 1 LOGS OR WOODY DEBRIS [1]

AMOUNT: (Check ONLY one or check 2 and AVERAGE)
- ☐ -EXTENSIVE > 75% [11]
- ☑ -MODERATE 25 - 75% [7]
- ☑ -SPARSE 5 - 25% [3]
- ☐ -NEARLY ABSENT < 5% [1]

Cover Max 20: 12

COMMENTS:

3) CHANNEL MORPHOLOGY (CHECK ONLY one PER Category OR check 2 and AVERAGE)

SINUOSITY
- ☐ -HIGH [4]
- ☐ -MODERATE [2]
- ☐ -LOW [1]
- ☑ -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]

MODIFICATIONS / OTHER
- ☐ -DIKING
- ☐ -RELOCATION
- ☐ -CANOPY REMOVAL
- ☐ -DREDGING
- ☐ -IMPOUNDMENT
- ☐ -ISLAND
- ☐ -LEVEED
- ☐ -BANK SHAPING
- ☐ -ONE SIDE CHANNEL MODIFICATIONS

Channel Max 20: 7

COMMENTS:

4) RIPARIAN ZONE AND BANK EROSION (check ONE box PER bank or check 2 and AVERAGE per bank)

River Right Looking Downstream

RIPARIAN WIDTH
- L R (Per Bank)
- ☐ ☐ -VERY WIDE > 100m [5]
- ☐ ☐ -WIDE > 50m [4]
- ☑ ☑ -MODERATE 10 - 50m [3]
- ☐ ☐ -NARROW 5 - 10m [2]
- ☐ ☐ -VERY NARROW < 5m [1]
- ☐ ☐ -NONE [0]

FLOOD PLAIN QUALITY (FIRST 100 Meter RIPARIAN)
- L R (Most Predominant Per Bank)
- ☐ ☐ -FOREST, SWAMP [3]
- ☐ ☐ -SHRUB OR OLD FIELD [2]
- ☑ ☑ -RESIDENTIAL, PARK, NEW FIELD [1]
- ☐ ☐ -FENCED PASTURE [1]
- ☐ ☐ -CONSERVATION TILLAGE [1]
- ☐ ☐ -URBAN OR INDUSTRIAL [0]
- ☐ ☐ -OPEN PASTURE, ROWCROP [0]
- ☐ ☐ -MINING / CONSTRUCTION [0]

BANK EROSION
- L R (Per Bank)
- ☑ ☑ -NONE / LITTLE [2]
- ☐ ☐ -MODERATE [1]
- ☐ ☐ -HEAVY / SEVERE [0]

Riparian Max 10: 7

COMMENTS:

5) POOL / GLIDE AND RIFFLE / RUN QUALITY

MAX DEPTH (Check 1 ONLY)
- ☑ - 1m [6]
- ☐ - 0.7m [4]
- ☐ - 0.4 to 0.7m [2]
- ☐ - 0.3 to 0.4m [1]
- ☐ - < 0.2m [POOL = 0]

MORPHOLOGY (Check 1 or 2 & AVERAGE)
- ☐ -POOL WIDTH > RIFFLE WIDTH [2]
- ☐ -POOL WIDTH = RIFFLE WIDTH [1]
- ☐ -POOL WIDTH < RIFFLE WIDTH [0]
- ☑ -IMPOUNDED [-1]

CURRENT VELOCITY (POOLS & RIFFLES) (Check All That Apply)
- ☐ -EDDIES [1]
- ☐ -FAST [1]
- ☐ -MODERATE [1]
- ☑ -SLOW [1]
- ☐ -NONE [-1]
- ☐ -TORRENTIAL [-1]
- ☐ -INTERSTITIAL [-1]
- ☐ -INTERMITTENT [-2]
- ☐ -VERY FAST [-1]

Pool / Current Max 12: 10

COMMENTS:

CHECK ONE OR CHECK 2 AND AVERAGE

RIFFLE DEPTH
- ☐ -Riffl Areas > 10cm [2]
- ☐ -Riffl Areas 5 - 10cm [1]
- ☐ -Riffl Areas < 5cm [0]
- ☐ -NO RIFFLE but RUNS present [0]
- ☑ -NO RIFFLE / NO RUN [Score = 0]

RUN DEPTH
- ☐ - MAX > 50 cm [2]
- ☐ - MAX < 50 cm [1]

RIFFLE / RUN SUBSTRATE
- ☐ -STABLE (e.g. Cobble, Boulder) [2]
- ☐ -MOD. STABLE (e.g. Large Gravel) [1]
- ☐ -UNSTABLE (Fine Gravel, Sand) [0]

RIFFLE / RUN EMBEDDEDNESS
- ☐ -NONE [2]
- ☐ -LOW [1]
- ☐ -MODERATE [0]
- ☐ -EXTENSIVE [-1]

Riffle / Run Max 8: 0

COMMENTS:

6) GRADIENT (ft / mi): 4.2 DRAINAGE AREA (sq mi): 544

Gradient Max 10: 10

Stream must be large enough to support a population of riffle/glide species

% POOL: % GLIDE: % RIFFLE: % RUN:

Gradient from Map / Table 3 of Ohio Manual based on gradient and drainage area

Is Sample Reach Representative of the Stream? (Y/ N)

If Not, Explain: _____

Lat / Long (Beg):	
Lat / Long (Mid):	
Lat / Long (End):	
Lat / Long (X-Loc):	

Major Suspected Sources of Impacts (Check All That Apply):

- None ☐
- Industrial ☐
- MWTP ☐
- Agriculture ☐
- Livestock ☐
- Silviculture ☐
- Construction ☐
- Urban Runoff ☐
- CSOs ☐
- Suburban Impacts ☐
- Mining ☐
- Channelization ☐
- Riparian Removal ☐
- Landfills ☐
- Natural ☐
- Dams ☐
- Other Flow Alteration ☐

Other: _____

	Subjective Rating (1-10)	Aesthetic Rating (1-10)
	5	5

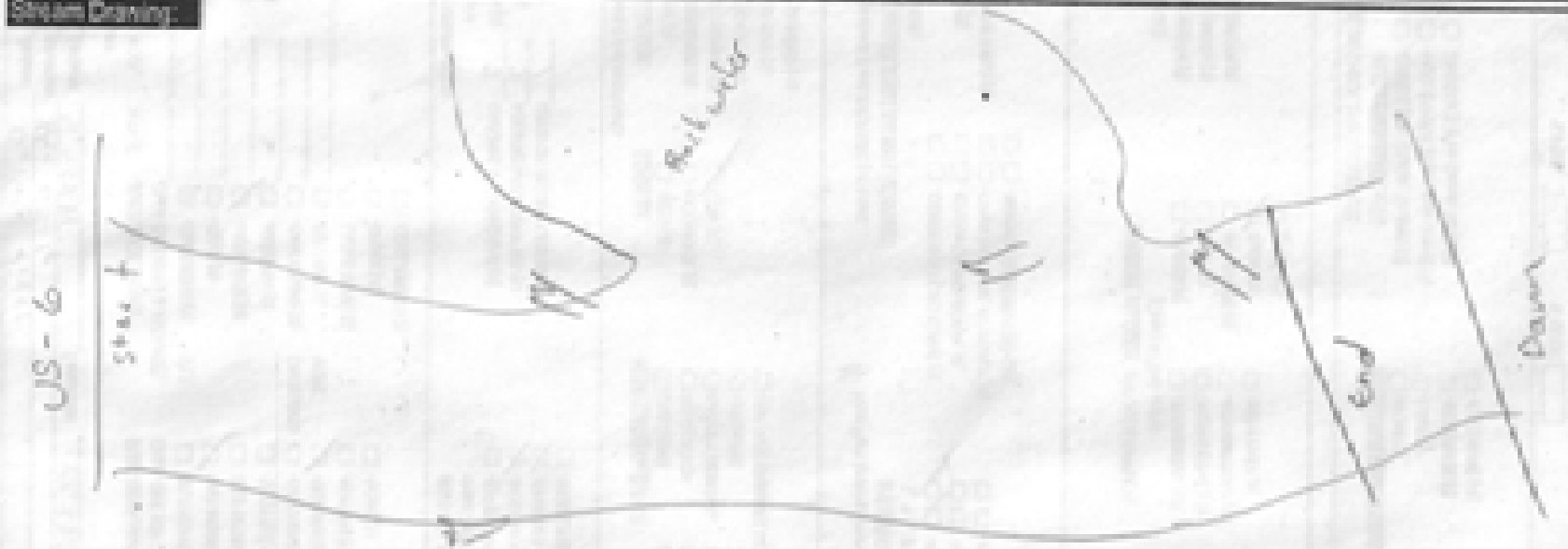
Gradient: ☐ -Low ☐ -Moderate ☐ -High

First Sampling Pass	Gear:	Distance:	Water Clarity:	Water Stage:	Canopy: % Open:
	8'	500	Clear	Normal	100

Yes/No:

- ☐ ☐ Is Stream Ephemeral (no pools, totally dry or only during spurts)?
- ☐ ☐ Is there water upstream? How far:
- ☐ ☐ Is there water close downstream? How far:
- ☐ ☐ Is Dry Channel mostly natural?

Stream Drawing:



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Qualitative Habitat Evaluation Index Field Sheet

QHEI Score: 35

River Code: 15-066-8 RM: 6.0 Stream: Wolf Creek Trib
Site Code: 15WC06 Project Code: 15-Basin-12 Location: 225 W. Main St.
Date: 8-14-18 Scorer: MHS Latitude: 41°03'19" Longitude: -81°06'55"

I. SUBSTRATE (Check ONLY Two Substrate TYPE BOXES; Estimate % percent)

TYPE	POOL	RIFFLE
☐ ☐ BLDR/SLAB (10)		
☐ ☐ Lg BOULD (10)		
☐ ☐ BOULDER (9)		
☐ ☐ COBBLE (8)		
☐ ☐ HARDPAN (4)		
☐ ☐ MUCK (2)		
☑ ☐ GRAVEL (7)		
☑ ☐ SAND (6)		
☐ ☐ BEDROCK (5)		
☐ ☐ DETRITUS (3)		
☐ ☐ ARTIFICIAL (3)		
☐ ☐ SILT (2)		

SUBSTRATE 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)

SUBSTRATE QUALITY (Check ONE OR 2 & AVERAGE)
SILT: ☐ -SILT HEAVY (-2) ☑ -SILT MODERATE (-1) ☐ -SILT NORMAL (0) ☐ -SILT FREE (1)
EMBEDDED-NESS: ☐ -EXTENSIVE (-2) ☑ -MODERATE (-1) ☐ -NORMAL (0) ☐ -NONE (1)

NUMBER OF SUBSTRATE TYPES (High Quality Only, Score 6 or 4): ☐ -4 or More (2) ☑ -3 or Less (0)

Substrate: 14 / Max 20

COMMENTS:

II. INSTREAM COVER (Use back cover type a score of 0 to 3; see back for instructions)

(Structure)	TYPE Score All That Occur	
2 UNDERCUT BANKS (1)	5 POOLS > 70 cm (2)	0 OVERHG. BRANCHES/TREES (1)
1 OVERHANGING VEGETATION (1)	1 ROOTWADS (1)	1 AQUATIC MACROPHYTES (1)
3 SHALLOWS (in SLOW WATER) (1)	1.5 BOULDERS (1)	1 LOGS OR WOODY DEBRIS (1)
1 ROOTMATS (1)		

ABUNDC (Check ONLY one or check 2 and AVERAGE)
☐ -EXTENSIVE > 75% (11)
☑ -MODERATE 25 - 75% (7)
☐ -SPARSE 5 - 25% (3)
☐ -NEARLY ABSENT < 5% (1)

Cover: 15 / Max 32

COMMENTS:

III. CHANNEL MORPHOLOGY (Check ONLY one POOR Category OR check 2 and AVERAGE)

SINUOSITY	DEVELOPMENT	CHANNELIZATION	STABILITY	MODIFICATIONS / OTHER	
☐ -HIGH (4)	☐ -EXCELLENT (7)	☐ -NONE (6)	☐ -HIGH (3)	☐ DIKE/DIKING	☐ -IMPOUNDMENT
☑ -MODERATE (3)	☐ -GOOD (5)	☐ -RECOVERED (4)	☑ -MODERATE (2)	☐ RELOCATION	☐ -ISLAND
☐ -LOW (2)	☑ -FAIR (3)	☑ -RECOVERING (3)	☐ -LOW (1)	☐ CANOPY REMOVAL	☐ -LEVEES
☐ -NONE (1)	☐ -POOR (1)	☐ -RECENT OR NO RECOVERY (1)		☐ DREDGING	☐ -BANK SHAPING
		☐ -IMPOUNDED (-1)		☐ -CHANNEL MODIFICATIONS	

Channel: 11 / Max 20

COMMENTS:

IV. RIPARIAN ZONE AND BANK EROSION (Check ONE box PER bank or check 2 and AVERAGE per bank)

River Right Looking Downstream

RIPARIAN WIDTH		FLOOD PLAIN QUALITY (EAST OH Mode: FORESTED)				BANK EROSION	
L	R (Per Bank)	L	R (Most Predominant Per Bank)	L	R	L	R (Per Bank)
☐	☐ -VERY WIDE > 100m (5)	☐	☐ -FOREST, SWAMP (3)	☐	☐ -CONSERVATION TILLAGE (1)	☐	☐ -NONE / LITTLE (3)
☑	☑ -WIDE > 50m (4)	☐	☐ -SHRUB OR OLD FIELD (2)	☐	☐ -URBAN OR INDUSTRIAL (0)	☑	☑ -MODERATE (2)
☑	☑ -MODERATE 10 - 50m (3)	☑	☑ -RESIDENTIAL, PARK, NEW FIELD (1)	☐	☐ -OPEN PASTURE, ROWCROP (0)	☐	☐ -HEAVY / SEVERE (1)
☐	☐ -NARROW 5 - 10m (2)	☐	☐ -FENCED PASTURE (1)	☐	☐ -MINING / CONSTRUCTION (0)		
☐	☐ -VERY NARROW < 5m (1)						
☐	☐ -NONE (0)						

Riparian: 6.5 / Max 10

COMMENTS:

V. POOL QUALITY AND RIFFLE / RUN QUALITY

MAX DEPTH (Check 1 ONLY)
☐ -1m (6)
☐ -0.7m (4)
☐ -0.4 to 0.7m (2)
☑ -0.2 to 0.4m (1)
☐ -< 0.2m (POOL = 0)

MORPHOLOGY (Check 1 or 2 & AVERAGE)
☐ -POOL WIDTH = RIFFLE WIDTH (1)
☑ -POOL WIDTH > RIFFLE WIDTH (1)
☐ -POOL WIDTH < RIFFLE WIDTH (0)
☐ -IMPOUNDED (-1)

CURRENT VELOCITY (POOLS & RIFFLES) (Check All That Apply)
☐ -TORRENTIAL (-1)
☐ -INTERSTITIAL (-1)
☐ -INTERMITTENT (-2)
☐ -VERY FAST (1)
☐ -FAST (1)
☑ -MODERATE (1)
☑ -SLOW (1)
☐ -NONE (-1)

Pool / Current: 5 / Max 12

COMMENTS:

VI. RIFFLE / RUN QUALITY (CHECK ONE OR CHECK 2 AND AVERAGE)

RIFFLE DEPTH
☐ -Best Areas > 10cm (2)
☑ -Best Areas 5 - 10cm (1)
☐ -Best Areas < 5cm (0)
☐ -NO RIFFLE but RUNS present (0)
☐ -NO RIFFLE / NO RUN (Marsh) = 0

RUN DEPTH
☐ -MAX > 50 cm (2)
☑ -MAX < 50 cm (1)

RIFFLE / RUN SUBSTRATE
☐ -STABLE (e.g., Cobble, Boulder) (2)
☑ -MOD. STABLE (e.g., Large Gravel) (1)
☐ -UNSTABLE (Fine Gravel, Sand) (0)

RIFFLE / RUN EMBEDDEDNESS
☐ -NONE (2)
☐ -LOW (1)
☑ -MODERATE (0)
☐ -EXTENSIVE (-1)

Riffle / Run: 5 / Max 8

COMMENTS:

VII. GRADIENT (Ft / mi): 7.8 DRAINAGE AREA (sq mi): 21.4

Gradient: 10 / Max 10

% POOL: ____ % GLIDE: ____
% RIFFLE: ____ % RUN: ____

"Best" areas must be large enough to support a population of riffle obligate species

Qualitative Score Sheet / Table 3 of Users Manual based on gradient and drainage area

Is Sampling Reach Representative of the Stream? (Y/ N)

If Not, Explain: _____

Lat / Long (Beg):	
Lat / Long (Mid):	
Lat / Long (End):	
Lat / Long (X-Loc):	

Major Suspected Sources of Impacts (Check All That Apply):

- None ☐
- Industrial ☐
- WWTP ☐
- Agriculture ☐
- Livestock ☐
- Silviculture ☐
- Construction ☐
- Urban Runoff ☐
- CSOs ☐
- Suburban Impacts ☐
- Mining ☐
- Channelization ☐
- Riparian Removal ☐
- Landfills ☐
- Natural ☐
- Dams ☐
- Other Flow Alteration ☐

Other: _____

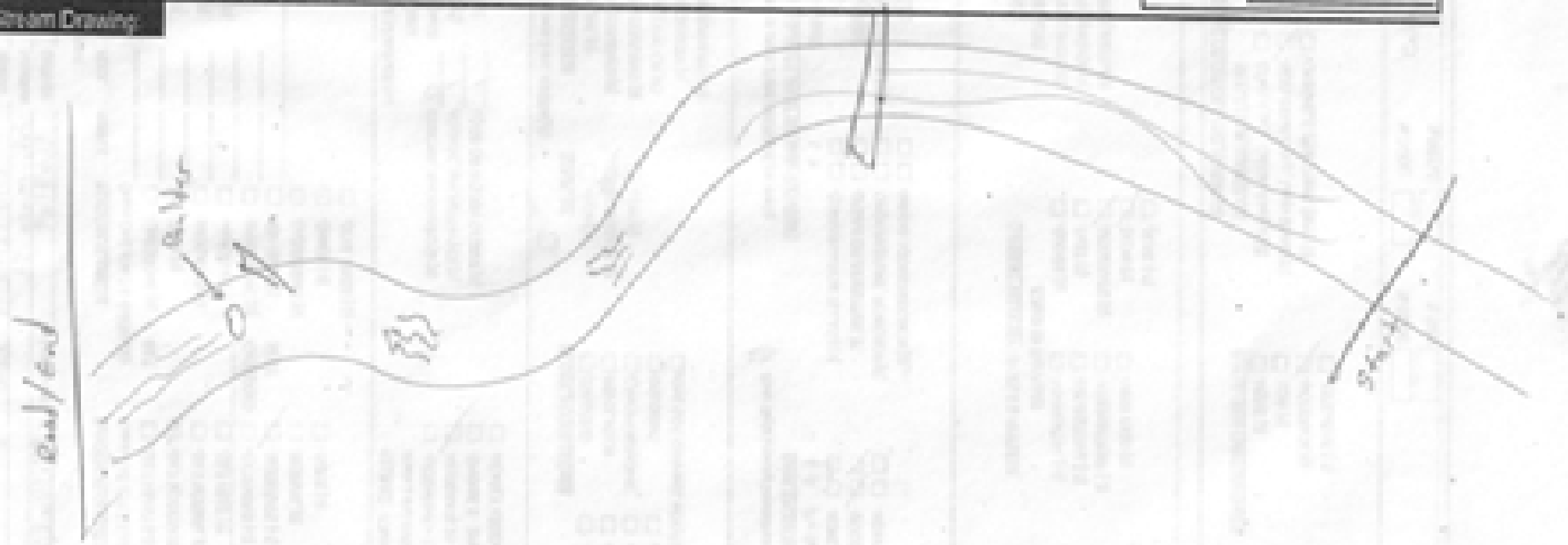
	Subjective Rating (1-10)	Aesthetic Rating (1-10)
	6	6

Gradient: ☐ -Low ☐ -Moderate ☐ -High

	Color:	Distance:	Water Clarity:	Water Stage:	Canopy: % open:
First Sampling Pass	D	200	Turbid	High	75

You	No	
☐	☐	Is Stream Ephemeral (no pools, totally dry of only damp spots)?
☐	☐	Is there water upstream? How far:
☐	☐	Is there water above downstream? How far:
☐	☐	Is Dry Channel mostly natural?

Stream Drawing:



Instructions for scoring the alternate cover metric: Each cover type should receive a score of between 0 and 3, where: 0 = Cover type absent; 1 = cover type in very small amounts or if more common of marginal quality; 2 = cover type present in moderate amounts, but not of highest quality or in small amounts of highest quality; 3 = cover type of highest quality in moderate of greater amounts. Examples of highest quality include, very large boulders in deep or fast water, large diameter logs that are stable, well developed rootwads in deep / fast water, or deep, well-defined, functional pools.

Qualitative Habitat Evaluation Index Field Sheet

QHEI Score: 105

River Code: 95-Little | Rkt: 21a.1a | Stream: Dunn River

Site Code: 12015 | Project Code: Windsor 18 | Location: Rte. Adamsville to SR

Date: 7-24-18 | Scorer: mh & | Latitude: 39.76993 | Longitude: -82.15761

1) SUBSTRATE (Check ONLY Two Substrate TYPE BOXES; Estimate % percent)

TYPE	POOL	RIFFLE
☐ ☐ BLDR/SLAB [10]		
☐ ☐ Lg BOULD [10]		
☐ ☐ BOULDER [9]		
☐ ☐ COBBLE [8]		
☐ ☐ HARDPAN [6]		
☐ ☐ MUCK [3]		
☑ ☐ GRAVEL [7]		
☐ ☑ SAND [6]		
☐ ☐ BEDROCK [5]		
☐ ☐ DETRITUS [3]		
☐ ☐ ARTIFICIAL [0]		
☐ ☐ SILT [2]		

SUBSTRATE ORIGIN	SUBSTRATE QUALITY
Check ONE (OR 2 & AVERAGE)	Check ONE (OR 2 & AVERAGE)
☐ -LIMESTONE [1]	SILT: ☐ -SILT HEAVY [-2]
☑ -TILLS [1]	☐ -SILT MODERATE [-1]
☐ -WETLANDS [0]	☑ -SILT NORMAL [0]
☐ -HARDPAN [0]	☐ -SILT FREE [1]
☐ -SANDSTONE [1]	EMBEDDED: ☐ -EXTENSIVE [-2]
☐ -RIP / RAP [0]	MOD: ☐ -MODERATE [-1]
☐ -LACUSTRINE [0]	☑ -NORMAL [0]
☐ -OTHER [-1]	☐ -NONE [1]
☐ -COAL FINES [-2]	

NUMBER OF SUBSTRATE TYPES: ☑ -4 or More [2] ☐ -3 or Less [0]
(High Quality Only, Score 0 or 1)

Substrate: 10 Max: 20

COMMENTS:

2) INSTREAM COVER (Use each cover type a score of 0 to 3; see back for instructions)

(Structure)	Type: Score All That Occur	
1 UNDERCUT BANKS [1]	3 POOLS > 70 cm [3]	1 OVERHANGING BOTTOM [1]
1 OVERHANGING VEGETATION [1]	1 ROOTWADS [1]	3 AQUATIC MACROPHYTES [1]
2 SHALLOWS (in SLOW WATER) [1]	2 BOULDERS [1]	1 LOGS OR WOODY DEBRIS [1]
1 ROOTWAPS [1]		

AMOUNT: (Check ONLY one or check 2 and AVERAGE)
☐ -EXTENSIVE > 75% [11]
☑ -MODERATE 25 - 75% [7]
☐ -SPARSE 5 - 25% [3]
☐ -NEARLY ABSENT < 5% [1]

Cover: 19 Max: 20

COMMENTS:

3) CHANNEL MORPHOLOGY (Check ONLY one PER Category OR check 2 and AVERAGE)

SINUOSITY	DEVELOPMENT	CHANNELIZATION	STABILITY	MODIFICATIONS / OTHER
☐ -HIGH [4]	☐ -EXCELLENT [7]	☐ -NONE [6]	☑ -HIGH [3]	☐ DRAGGING ☐ -IMPOUNDMENT
☑ -MODERATE [3]	☑ -GOOD [5]	☐ -RECOVERED [4]	☑ -MODERATE [2]	☐ RELOCATION ☐ -ISLAND
☐ -LOW [2]	☐ -FAIR [3]	☑ -RECOVERING [3]	☐ -LOW [1]	☐ CANOPY REMOVAL ☐ -LEVEES
☐ -NONE [1]	☐ -POOR [1]	☐ -RECENT OR NO RECOVERY [1]		☐ DREDGING ☐ -BANK SHAPING
		☐ -IMPOUNDED [-1]		☐ ONE SIDE CHANNEL MODIFICATIONS

Channel: 3.5 Max: 20

COMMENTS:

4) RIPARIAN ZONE AND BANK EROSION (Check ONE box PER bank or check 2 and AVERAGE per bank)

River Right Looking Downstream

RIPARIAN WIDTH	FLOOD PLAIN QUALITY (PAST 100 Meter AVERAGE)		BANK EROSION
L R (Per Bank)	L R (Most Predominant Per Bank)	L R	L R (Per Bank)
☐ ☐ -VERY WIDE > 100m [5]	☐ ☐ -FOREST, SWAMP [3]	☐ ☐ -CONSERVATION TILLAGE [1]	☑ ☑ -NONE / LITTLE [3]
☑ ☐ -WIDE > 50m [4]	☐ ☐ -SHRUB OR OLD FIELD [2]	☐ ☐ -URBAN OR INDUSTRIAL [0]	☐ ☐ -MODERATE [2]
☐ ☑ -MODERATE 10 - 50m [3]	☑ ☑ -RESIDENTIAL, PARK, NEW FIELD [1]	☐ ☐ -OPEN PASTURE, ROWCROP [0]	☐ ☐ -HEAVY / SEVERE [1]
☐ ☐ -NARROW 5 - 10m [2]	☐ ☐ -FENCED PASTURE [1]	☐ ☐ -MINING / CONSTRUCTION [0]	
☐ ☐ -VERY NARROW < 5m [1]			
☐ ☐ -NONE [0]			

Riparian: 4.5 Max: 10

COMMENTS:

5) POOL / GLIDE AND RUN QUALITY

MAX DEPTH (Check 1 ONLY)	MORPHOLOGY (Check 1 or 2 & AVERAGE)	CURRENT VELOCITY (POOLS & RIFFLES) (Check All That Apply)	
☐ -1m [6]	☑ -POOL WIDTH > RIFFLE WIDTH [1]	☑ -SWIFT [1]	☐ -TORRENTIAL [-1]
☑ -0.7m [4]	☐ -POOL WIDTH = RIFFLE WIDTH [0]	☑ -FAST [1]	☐ -INTERSTITIAL [-1]
☐ -0.4 to 0.7m [2]	☐ -POOL WIDTH < RIFFLE WIDTH [-1]	☑ -MODERATE [1]	☐ -INTERMITTENT [-2]
☐ -0.2 to 0.4m [1]	☐ -IMPOUNDED [-1]	☑ -SLOW [1]	☑ -VERY FAST [1]
☐ -< 0.2m (POOL = 0)		☐ -NONE [-1]	

Pool / Current: 10 Max: 12

COMMENTS:

6) RIFFLE / RUN QUALITY (CHECK ONE OR CHECK 2 AND AVERAGE)

RIFFLE DEPTH	RUN DEPTH	RIFFLE / RUN SUBSTRATE	RIFFLE / RUN EMBEDDEDNESS
☑ -Riffle Depth > 10cm [2]	☑ -MAX > 50 cm [2]	☑ -STABLE (e.g., Cobble, Boulder) [2]	☐ -NONE [2]
☐ -Riffle Depth 5 - 10cm [1]	☐ -MAX < 50 cm [1]	☑ -MOD. STABLE (e.g., Large Gravel) [1]	☐ -LOW [1]
☐ -Riffle Depth < 5cm [0]		☐ -UNSTABLE (Fine Gravel, Sand) [0]	☑ -MODERATE [0]
☐ -NO RIFFLE but RUNS present [0]			☐ -EXTENSIVE [-1]
☐ -NO RIFFLE / NO RUN (Marsh) [-1]			

Riffle / Run: 6.5 Max: 8

COMMENTS:

Gradient: 10 Max: 10

7) GRADIENT (ft / mi): 9.7 (DRAINAGE AREA (sq mi): 20.7)

% POOL: ____ % GLIDE: ____ % RIFFLE: ____ % RUN: ____

(Best areas must be large enough to support reproduction of riffle dependent species)

Gradient can be used to calculate Stream Power based on gradient and drainage area

Is Sampling Reach Representative of the Stream? (Y/ N)

If Not, Explain: _____

Lat / Long (Beg):	
Lat / Long (Mid):	
Lat / Long (End):	
Lat / Long (X-Loc):	

Subjective Rating (1-10): 7

Aesthetic Rating (1-10): 7

Gradient: ☐ Low ☐ Moderate ☐ High

First Sampling Pass	Color	Distance	Water Clarity	Water Stage	Canopy: % open
	T	500	Clear	Normal	100

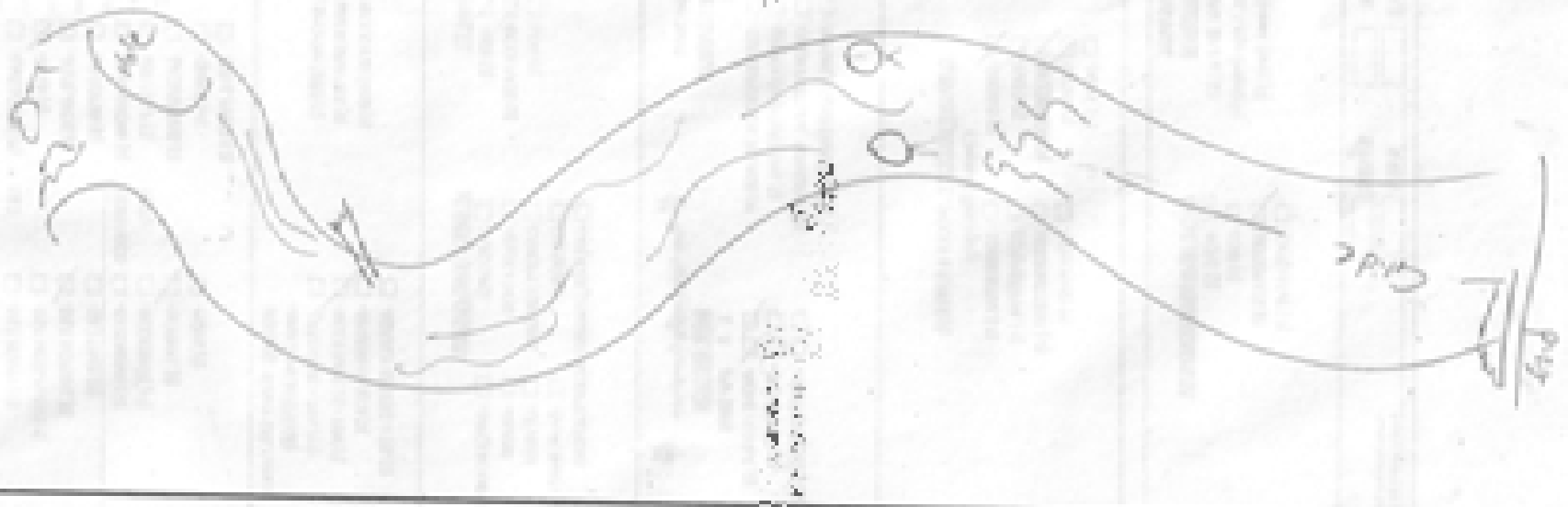
Yes	No	
☐	☐	Is Stream Ephemeral (no pools, totally dry of only flowing during rain)?
☐	☐	Is there water upstream? How far:
☐	☐	Is there water above downstream? How far:
☐	☐	Is Dry Channel mostly natural?

Map Evidence/Likely Sources of Impairment/Stress (All That Apply):

- ☐ None
- ☐ Industrial
- ☐ WWTP
- ☐ Agriculture
- ☐ Livestock
- ☐ Silviculture
- ☐ Construction
- ☐ Urban Runoff
- ☐ CSOs
- ☐ Subsurface Impacts
- ☐ Mining
- ☐ Channelization
- ☐ Riparian Removal
- ☐ Landfills
- ☐ Natural
- ☐ Dams
- ☐ Other Flow Alteration

Other: _____

Stream Drawing:



Instructions for scoring the alternate cover metric: Each cover type should receive a score of between 0 and 3, where: 0 = Cover type absent; 1 = cover type in very small amounts or if more common of marginal quality; 2 = cover type present in moderate amounts, but not of highest quality or in small amounts of highest quality; 3 = cover type of highest quality in moderate or greater amounts. Examples of highest quality include, very large boulders in deep or fast water, large diameter logs that are stable, well developed rootwads in deep / fast water, or deep, well-defined, functional pools.

Qualitative Habitat Evaluation Index Field Sheet

QHEI Score: 75

River Code: 95-[illegible] RM: 23.1 Stream: [illegible] River

Site Code: [illegible] Project Code: [illegible] Location: Rt 118 SR 51

Date: 8-30-18 Scorer: AMS Latitude: 39.[illegible] Longitude: -83.[illegible]

1) SUBSTRATE (Check ONLY Two Substrate TYPE BOXES; Estimate % present)

TYPE	POOL	RIFFLE		POOL	RIFFLE
☐ ☐ BLDR/SLAB [10]			☐ ☐ GRAVEL [7]		
☐ ☐ Lg BOULD [10]			☐ ☐ SAND [6]		
☐ ☐ BOULDER [9]			☐ ☐ BEDROCK [5]		
☐ ☐ COBBLE [8]			☐ ☐ DETRITUS [3]		
☐ ☐ mod/SP/HW [6]			☐ ☐ ARTIFICIAL [0]		
☐ ☐ MUCK [2]			☐ ☐ SILT [2]		

SUBSTRATE ORIGIN — Check ONE (OR 2 & AVERAGE)
☐ -LIMESTONE [1]
☑ -TILLS [1]
☐ -WETLANDS [0]
☐ -HARDPAN [0]
☐ -SANDSTONE [0]
☐ -ASP / BAP [0]
☐ -LACUSTRINE [0]
☐ -SHALE [-1]
☐ -COAL FINES [-2]

SUBSTRATE QUALITY — Check ONE (OR 2 & AVERAGE)
SILT:
☐ -SILT HEAVY [-2]
☐ -SILT MODERATE [-1]
☑ -SILT NORMAL [0]
☐ -SILT FREE [1]
EMBEDDED/NESS:
☐ -EXTENSIVE [-2]
☐ -MODERATE [-1]
☑ -NORMAL [0]
☐ -NONE [1]

NUMBER OF SUBSTRATE TYPES: (High Quality Only, Score 0 or +)
☑ -4 or More [2]
☐ -3 or Less [0]

Substrate: 9.5 Max 20

COMMENTS:

2) INSTREAM COVER (Give each cover type a score of 0 to 3; see back for instructions)

(Descriptor)	TYPE: Score All That Occur	
1 UNDERCUT BANKS [1]	1 POOLS > 70 cm [2]	0 OXBOWS, BACKWATERS [1]
3 OVERHANGING VEGETATION [1]	1 ROOTWADS [1]	3 AQUATIC MACROPHYTES [1]
1 SHALLOWS (IN SLOW WATER) [1]	1 BOULDERS [1]	1 LOGS OR WOODY DEBRIS [1]
1 ROOTWAD [1]		

AMOUNT: (Check ONLY one or check 2 and AVERAGE)
☐ -EXTENSIVE > 75% [11]
☑ -MODERATE 25 - 75% [7]
☐ -SPARSE 5 - 25% [3]
☐ -NEARLY ABSENT < 5% [1]

Cover: 11 Max 20

COMMENTS:

3) CHANNEL MORPHOLOGY (Check ONLY ONE PER Category OR check 2 and 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]

MODIFICATIONS (OTHER)
☐ DRAINING
☐ RELOCATION
☐ CANOPY REMOVAL
☐ DREDGING
☐ -IMPOUNDMENT
☐ -ISLAND
☐ -LEVEES
☐ -BANK SHAPING
☐ ONE SIDE CHANNEL MODIFICATIONS

Channel: 13.5 Max 20

COMMENTS:

4) RIPARIAN ZONE AND BANK EROSION (Check ONE box PER bank or check 2 and AVERAGE per bank)

River Right looking Downstream

RIPARIAN WIDTH
L R (Per Bank)
☐ ☐ -VERY WIDE > 100m [5]
☐ ☐ -WIDE > 50m [4]
☐ ☐ -MODERATE 10 - 50m [3]
☑ ☑ -NARROW 5 - 10m [2]
☐ ☐ -VERY NARROW < 5m [1]
☐ ☐ -NONE [0]

FLOOD PLAIN QUALITY (PAST 100 Meter REPEATER)
L R (Most Predominant Per Bank)
☐ ☐ -FOREST, SWAMP [3]
☐ ☐ -SHRUB OR OLD FIELD [2]
☑ ☑ -RESIDENTIAL, PARK, NEW FIELD [1]
☐ ☐ -FENCED PASTURE [1]
☐ ☐ -CONSERVATION TILLAGE [1]
☑ ☐ -URBAN OR INDUSTRIAL [0]
☑ ☑ -OPEN PASTURE, ROWCROP [0]
☐ ☐ -MINING / CONSTRUCTION [0]

BANK EROSION
L R (Per Bank)
☑ ☑ -NONE / LITTLE [3]
☐ ☐ -MODERATE [2]
☐ ☐ -HEAVY / SEVERE [1]

Riparian: 5 Max 10

COMMENTS:

5) POOL / GLIDE AND RIFFLE / RUN QUALITY

MAX DEPTH (Check ONLY ONE)
☑ -1m [6]
☐ -0.7m [4]
☐ -0.4 to 0.7m [2]
☐ -0.2 to 0.4m [1]
☐ -< 0.2m [POOL = 0]

MORPHOLOGY (Check 1 or 2 & AVERAGE)
☐ -POOL WIDTH > RIFFLE WIDTH [2]
☑ -POOL WIDTH = RIFFLE WIDTH [1]
☐ -POOL WIDTH < RIFFLE WIDTH [0]
☐ -IMPOUNDED [-1]

CURRENT VELOCITY (POOLS & RIFFLES) (Check All That Apply)
☐ -EDDIES [1]
☐ -FAST [1]
☑ -MODERATE [1]
☐ -SLOW [1]
☐ -NONE [-1]
☐ -TORRENTIAL [-1]
☐ -INTERSTITIAL [-1]
☐ -INTERMITTENT [-2]
☐ -VERY FAST [1]

Pool / Current: 9 Max 12

COMMENTS:

6) RIFFLE / RUN QUALITY (CHECK ONE OR CHECK 2 AND AVERAGE)

RIFFLE DEPTH
☐ -Best Areas > 10cm [2]
☐ -Best Areas 5 - 10cm [1]
☐ -Best areas < 5cm [0]
☑ -NO RIFFLE but RUNS present [0]
☐ -NO RIFFLE / NO RUN (MARK < 0)

RUN DEPTH
☑ - MAX > 50 cm [2]
☐ - MAX < 50 cm [1]

RIFFLE / RUN SUBSTRATE
☐ -STABLE (e.g., Cobble, Boulder) [2]
☑ -MOD. STABLE (e.g., Large Gravel) [1]
☐ -UNSTABLE (Fine Gravel, Sand) [0]

RIFFLE / RUN EMBEDDEDNESS
☐ -NONE [2]
☐ -LOW [1]
☑ -MODERATE [0]
☐ -EXTENSIVE [-1]

Riffle / Run: 5 Max 8

Gradient: 10

COMMENTS:

6) GRADIENT (ft / mi): 15.0 DRAINAGE AREA (sq mi): 227

% POOL: % GLIDE:
% RIFFLE: % RUN:

Gradient Score Here / Table 2 (Lower Manual) based on gradient and drainage area

Max 10

Is Sampling Reach Representative of the Stream? (Y/ N) _____ If Not, Explain: _____

Lat / Long (Beg):	
Lat / Long (Mid):	
Lat / Long (End):	
Lat / Long (X-Loc):	

Major Suspected Sources of Impacts (Check All That Apply)

- None ☐
- Industrial ☐
- WWTP ☐
- Agriculture ☐
- Livestock ☐
- Silviculture ☐
- Construction ☐
- Urban Runoff ☐
- CSOs ☐
- Suburban impacts ☐
- Mining ☐
- Channelization ☐
- Riparian Removal ☐
- Landfills ☐
- Natural ☐
- Dams ☐
- Other Flow Alteration ☐

Other: _____

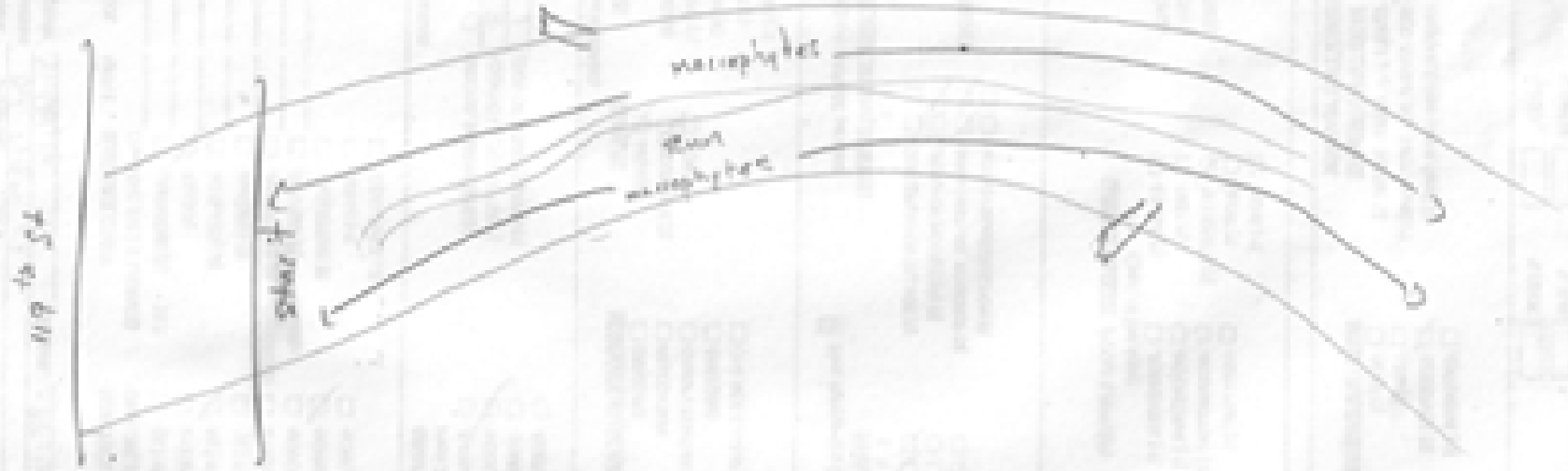
	Subjective Rating (1-10)	Aesthetic Rating (1-10)
	6	5

Gradient: ☐ Low ☐ Moderate ☐ High

	Clear:	Distance:	Water Clarity:	Water Stage:	Canopy: % open:
First Sampling Pass	P	5m	Clear	Normal	10%

Stop	Tag	
☐	☐	Is Stream Ephemeral (no pools, totally dry at only damp spots)?
☐	☐	Is there water upstream? How far:
☐	☐	Is there water close downstream? How far:
☐	☐	Is Dry Channel mostly natural?

Stream Drawing:



Instructions for scoring the alternate cover metric: Each cover type should receive a score of between 0 and 3, where: 0 = Cover type absent; 1 = cover type in very small amounts or if more common of marginal quality; 2 = cover type present in moderate amounts, but not of highest quality or in small amounts of highest quality; 3 = cover type of highest quality in moderate of greater amounts. Examples of highest quality include, very large boulders in deep or fast water, large diameter logs that are stable, well developed rootwads in deep / fast water or deep, well-defined, functional pools.

MBI Qualitative Habitat Evaluation Index Field Sheet

QHEI Score: 79

River Code: [illegible] RM: 12.0 Stream: Big Pine Creek

Site Code: 12012 Project Code: Big Pine 08 Location: Rt. 127 NE of

Date: 6-Aug-08 Scorer: MS/AS Latitude: 40.[illegible] Longitude: -83.[illegible]

1) SUBSTRATE (Check ONLY Two Substrate TYPE BOXES; Estimate % percent)

TYPE	POOL	RIFFLE		POOL	RIFFLE
☐ ☐ BLDR/SLAB [10]			☐ ☑ GRAVEL [7]		
☐ ☐ Lg ROAD [10]			☑ ☐ SAND [6]		
☐ ☐ BOULDER [9]			☐ ☐ BEDROCK [5]		
☐ ☐ COBBLE [8]			☐ ☐ DETRITUS [3]		
☐ ☐ MARL/FINE [4]			☐ ☐ ARTIFICIAL [0]		
☐ ☐ MUCK [2]			☐ ☐ SILT [2]		

SUBSTRATE 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]

SILT
EMBEDDED / NEW
SUBSTRATE QUALITY (Check ONE OR 2 & AVERAGE)
☐ -SILT HEAVY [-2]
☐ -SILT MODERATE [-1]
☑ -SILT NORMAL [0]
☐ -SILT FREE [1]
☐ -EXTENSIVE [-2]
☐ -MODERATE [-1]
☑ -NORMAL [0]
☐ -NONE [1]

NUMBER OF SUBSTRATE TYPES (High Quality Only, Score 0 or +):
☑ -4 or More [2]
☐ -3 or Less [0]

Substrate 14 Max 20

COMMENTS:

2) INSTREAM COVER: (Give each cover type a score of 0 to 3, see back for instructions)

(Structure)
2 UNDERCUT BANKS [1]
1 OVERHANGING VEGETATION [1]
1 SHALLOWS (IN SLOW WATER) [1]
1 ROOTWADS [1]

TYPE: Score All That Occur
1 POOLS > 70 cm [2]
1 ROOTWADS [1]
1 BOULDERS [1]
0 CYBOMOS, BACKWATERS [1]
0 AQUATIC MACROPHYTES [1]
2 LOGS OR WOODY DEBRIS [1]

AMOUNT: (Check ONLY one or check 2 and AVERAGE)
☐ -EXTENSIVE > 75% [11]
☑ -MODERATE 25 - 75% [7]
☐ -SPARSE 5 - 25% [3]
☐ -NEARLY ABSENT < 5% [1]

Cover 13 Max 20

COMMENTS:

3) CHANNEL MORPHOLOGY: (Check ONLY ONE PER Category OR check 2 and 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]

MODIFICATIONS / OTHER
☐ SNAGGING
☐ RELOCATION
☐ CANOPY REMOVAL
☐ DREDGING
☐ -IMPOUNDMENT
☐ -ISLAND
☐ -CHEXED
☐ -BANK SHAPING
☐ ONE SIDE CHANNEL MODIFICATIONS

Channel 9 Max 20

COMMENTS:

4) RIPARIAN ZONE AND BANK EROSION (Check ONE box PER bank or check 2 and AVERAGE per bank)

River Right Looking Downstream: R R

RIPARIAN WIDTH (L R) (Per Bank)
☐ ☐ -VERY WIDE > 100m [5]
☐ ☐ -WIDE > 50m [4]
☐ ☐ MODERATE 10 - 50m [3]
☑ ☑ -NARROW 5 - 10m [2]
☐ ☐ -VERY NARROW < 5m [1]
☐ ☐ -NONE [0]

FLOOD PLAIN QUALITY (PAST 100 Meter SEGMENT) (L R) (Most Predominant Per Bank)
☐ ☐ -FOREST, SWAMP [3]
☐ ☐ -SHRUB OR OLD FIELD [2]
☑ ☐ -RESIDENTIAL, PARK, NEW FIELD [1]
☐ ☐ -FENCED PASTURE [1]
☐ ☐ -CONSERVATION TILLAGE [1]
☐ ☐ -URBAN OR INDUSTRIAL [0]
☐ ☑ -OPEN PASTURE, ROW CROP [0]
☐ ☐ -MINING / CONSTRUCTION [0]

BANK EROSION (L R) (Per Bank)
☐ ☐ -NONE / LITTLE [0]
☑ ☑ -MODERATE [2]
☐ ☐ -HEAVY / SEVERE [1]

Riparian 4.5 Max 10

COMMENTS:

5) POOL / GLIDE AND RIFFLE / RUN QUALITY

MAX DEPTH (Check 1 ONLY)
☑ -1m [6]
☐ -0.7m [4]
☐ -0.4 to 0.7m [2]
☐ -0.2 to 0.4m [1]
☐ -< 0.2m [POOL = 0]

MORPHOLOGY (Check 1 or 2 & AVERAGE)
☐ -POOL WIDTH > RIFFLE WIDTH [2]
☑ -POOL WIDTH = RIFFLE WIDTH [1]
☐ -POOL WIDTH < RIFFLE WIDTH [0]
☐ -IMPOUNDED [-1]

CURRENT VELOCITY (POOLS & RIFFLES) (Check All That Apply)
☐ -SWIFT [1]
☑ -MODERATE [1]
☑ -SLOW [1]
☐ -NONE [-1]
☐ TORRENTIAL [-1]
☐ -INTERSTITIAL [-1]
☐ -INTERMITTENT [-2]
☐ -VERY FAST [1]

Pool / Current 9 Max 12

COMMENTS:

CHECK ONE OR CHECK 2 AND AVERAGE

RIFFLE DEPTH
☑ -Riffle Areas > 10cm [2]
☐ -Riffle Areas 5 - 10cm [1]
☐ -Riffle Areas < 5cm [0]
☑ -NO RIFFLE but RUNS present [0]
☐ -NO RIFFLE / NO RUN [MARL = 0]

RUN DEPTH
☑ - MAX > 50 cm [2]
☐ - MAX < 50 cm [1]

RIFFLE / RUN SUBSTRATE
☐ -STABLE (e.g., Cobble, Boulder) [2]
☑ -MOD. STABLE (e.g., Large Gravel) [1]
☐ -UNSTABLE (Fine Gravel, Sand) [0]

RIFFLE / RUN EMBEDDEDNESS
☐ -NONE [2]
☐ -LOW [1]
☑ -MODERATE [0]
☐ -EXTENSIVE [-1]

Riffle / Run 5 Max 8

Gradient 10 Max 10

6) GRADIENT (ft / mi): 5.1 DRAINAGE AREA (sq mi): 214.0

% POOL: % GLIDE: % RIFFLE: % RUN:

Riffle areas must be large enough to support a population of mile-obligate species

Is Sampling Reach Representative of the Stream? (Y / N)

If Not, Explain:

Lat / Long (Beg):

Lat / Long (Mid):

Lat / Long (End):

Lat / Long (Other):

Major Suspected Sources of Impacts (Check All That Apply)

- None
- Industrial
- WWTP
- Agriculture
- Livestock
- Silviculture
- Construction
- Urban Runoff
- CSOs
- Subsurface Inputs
- Mining
- Channelization
- Riparian Removal
- Landfills
- Natural
- Dams
- Other Flow Alteration

Other:

	Clear:	Distance	Water Clarity	Water Stage	Canopy % open:
First Sampling Pass	7	500	Clear	Abnormal	100

Subjective Rating (1-10): 6

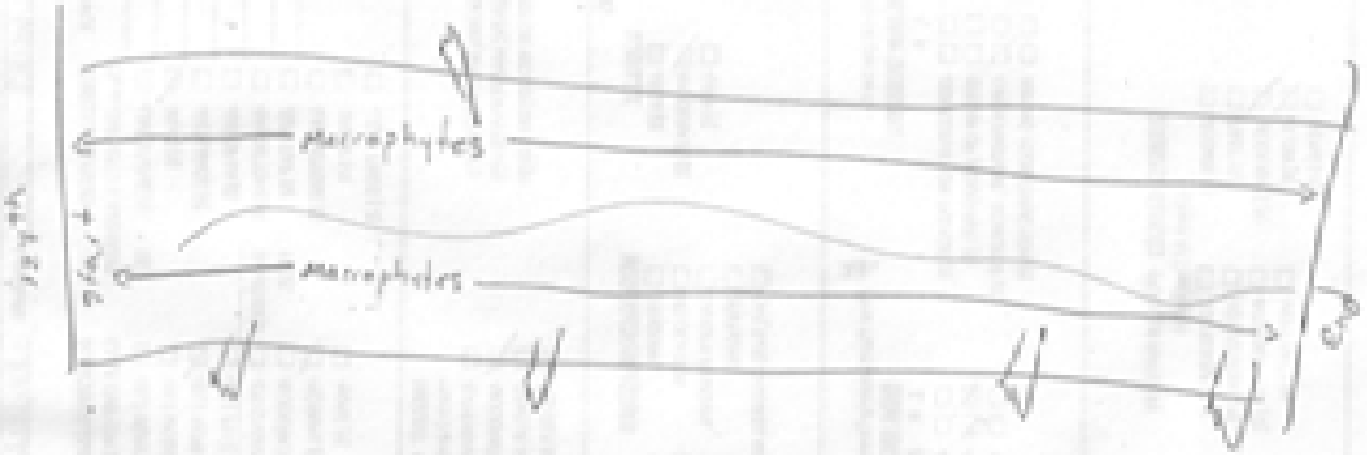
Aesthetic Rating (1-10): 5

Gradient: ☐ Low ☐ Moderate ☐ High

Flow Nr:

- Is Stream Ephemeral (no pools, totally dry at any Samp.spots)?
- Is there water upstream? How far:
- Is there water cross downstream? How far:
- Is Dry Channel mostly natural?

Stream Drawing:



Instructions for scoring the alternate cover metric: Each cover type should receive a score of between 0 and 3, where: 0 = Cover type absent; 1 = cover type in very small amounts or if more common of marginal quality; 2 = cover type present in moderate amounts, but not of highest quality or in small amounts of highest quality; 3 = cover type of highest quality in moderate or greater amounts. Examples of highest quality include, very large boulders in deep or fast water, large diameter logs that are stable, well developed rootwads in deep / fast water, or deep, well-defined, functional pools.

Qualitative Habitat Evaluation Index Field Sheet

QHEI Score: 73

River Code: 95-[illegible] RM: 20.5 Stream: Big Raccoon Creek

Site Code: 20 Project Code: Chicago-12 Location: SR 7 1.2 mi. SW

Date: 8-14-12 Scorer: BRS Latitude: 41.[illegible] Longitude: -82.[illegible]

I. SUBSTRATE (Check ONLY Two Substrate TYPE BOXES; Estimate % percent)

TYPE	POOL	RIFFLE
☐ BLDR/SLAB [10]		
☐ Lg BOULD [9]		
☐ BOULDER [8]		
☐ COBBLE [7]		
☐ mmSPWN [6]		
☐ MUCK [2]		
☑ GRAVEL [7]		
☐ SAND [6]		
☐ BEDROCK [5]		
☐ DETRITUS [3]		
☐ ARTIFICIAL [0]		
☐ SILT [2]		

SUBSTRATE ORIGIN (Check ONE OR 2 & AVERAGE)	POOL	RIFFLE
☐ -LIMESTONE [1]		
☑ -TILL [1]		
☐ -WETLAND [0]		
☐ -MARPHA [0]		
☐ -SANDSTONE [0]		
☐ -ASP / RAP [0]		
☐ -LACUSTRINE [0]		
☐ -DUNE [-1]		
☐ -COAL FINES [-2]		

SUBSTRATE QUALITY (Check ONE OR 2 & AVERAGE)	
SILT: ☐ -SILT HEAVY [-2]	
☐ -SILT MODERATE [-1]	
☑ -SILT NORMAL [0]	
☐ -SILT FREE [1]	
EMBEDDED-NESS: ☐ -EXTENSIVE [-2]	
☐ -MODERATE [-1]	
☑ -NORMAL [0]	
☐ -NONE [1]	

NUMBER OF SUBSTRATE TYPES: ☑ -4 or More [2] ☐ -3 or Less [0]
(High Quality Only, Score 0 or +)

COMMENTS:

Substrate Max 20: 14

II. INSTREAM COVER (Give each cover type a score of 0 to 3; see back for instructions)

(Structure)
- 0 UNDERCUT BANKS [1]
- 1 OVERHANGING VEGETATION [1]
- 0 SHALLOWS (IN SLOW WATER) [1]
- 1 ROOTWADS [1]

TYPE: Score All That Occur
- 3 POOLS > 70 cm [2]
- 1 ROOTWADS [1]
- 1 BOULDERS [1]
- 0 OVERHANG. MACROPHYTES [1]
- 0 AQUATIC MACROPHYTES [1]
- 2 LOGS OR WOODY DEBRIS [1]

AMOUNT: (Check ONLY one or check 2 and AVERAGE)
- ☐ -EXTENSIVE > 75% [11]
- ☑ -MODERATE 25 - 75% [7]
- ☐ -SPARSE 5 - 25% [3]
- ☐ -NEARLY ABSENT < 5% [1]

COMMENTS:

Cover Max 20: 15

III. CHANNEL MORPHOLOGY (Check ONLY ONE PER Category OR check 2 and AVERAGE)

SINUOSITY	DEVELOPMENT	CHANNELIZATION	STABILITY	MODIFICATIONS (OTHER)
☐ -HIGH [4]	☐ -EXCELLENT [7]	☐ -NONE [6]	☐ -HIGH [3]	☐ -DIKING
☐ -MODERATE [3]	☐ -GOOD [5]	☐ -RECOVERED [4]	☑ -MODERATE [2]	☐ -RELOCATION
☐ -LOW [2]	☑ -FAIR [3]	☑ -RECOVERING [3]	☐ -LOW [1]	☐ -CANOPY REMOVAL
☑ -NONE [1]	☐ -POOR [1]	☐ -RECENT OR NO RECOVERY [1]		☐ -DREDGING
		☐ -IMPOUNDED [-1]		☐ -ONE SIDE CHANNEL MODIFICATIONS

☐ -IMPOUNDMENT ☐ -ISLAND ☐ -CHANNELIZED ☐ -BANK SHAPING

COMMENTS:

Channel Max 20: 9

IV. RIPARIAN ZONE AND BANK EROSION (Check ONE box PER bank or check 2 and AVERAGE per bank)

River Right: Looking Downstream

RIPARIAN WIDTH (L / R) (Per Bank)	FLOOD PLAIN QUALITY (PAST 100 Meter SEGMENT) (L / R) (Most Predominant Per Bank)	BANK EROSION (L / R) (Per Bank)
☐ ☐ -VERY WIDE > 100m [5]	☐ ☐ -FOREST, SWAMP [3]	☐ ☐ -CONSERVATION TILLAGE [1]
☐ ☐ -WIDE > 50m [4]	☐ ☐ -SHRUB OR OLD FIELD [2]	☐ ☐ -URBAN OR INDUSTRIAL [0]
☐ ☐ -MODERATE 10 - 50m [3]	☑ ☑ -RESIDENTIAL, PARK, NEW FIELD [1]	☐ ☐ -OPEN PASTURE, ROWCROP [0]
☑ ☑ -NARROW 5 - 10m [2]	☐ ☐ -FENCED PASTURE [1]	☐ ☐ -MINING / CONSTRUCTION [0]
☐ ☐ -VERY NARROW < 5m [1]		☑ ☑ -NONE / LITTLE [3]
☐ ☐ -NONE [0]		☐ ☐ -MODERATE [2]
		☐ ☐ -HEAVY / SEVERE [1]

COMMENTS:

Riparian Max 10: 9

V. POOL / GLIDE AND RIFFLE / RUN QUALITY

MAX DEPTH (Check 1 ONLY)
- ☑ -1m [6]
- ☐ -0.7m [4]
- ☐ -0.4 to 0.7m [2]
- ☐ -0.2 to 0.4m [1]
- ☐ -< 0.2m [POOL = 0]

MORPHOLOGY (Check 1 or 2 & AVERAGE)
- ☐ -POOL WIDTH > RIFFLE WIDTH [2]
- ☑ -POOL WIDTH = RIFFLE WIDTH [1]
- ☐ -POOL WIDTH < RIFFLE WIDTH [0]
- ☐ -IMPOUNDED [-1]

CURRENT VELOCITY (POOLS & RIFFLES) (Check All That Apply)
- ☐ -TORRENTIAL [-1]
- ☐ -EDDIES [1]
- ☐ -FAST [1]
- ☐ -INTERSTITIAL [-1]
- ☑ -MODERATE [1]
- ☐ -INTERMITTENT [-2]
- ☑ -SLOW [1]
- ☐ -VERY FAST [1]
- ☐ -NONE [-1]

COMMENTS:

Pool / Current Max 12: 9

VI. RIFFLE / RUN QUALITY (CHECK ONE OR CHECK 2 AND AVERAGE)

RIFFLE DEPTH
- ☐ -Steel Areas > 10cm [2]
- ☐ -Steel Areas 5 - 10cm [1]
- ☐ -Steel Areas < 5cm [0]
- ☑ -NO RIFFLE but RUNS present [0]
- ☐ -NO RIFFLE / NO RUN (Marsh) [-2]

RUN DEPTH
- ☑ -MAX > 50 cm [2]
- ☐ -MAX < 50 cm [1]

RIFFLE / RUN SUBSTRATE
- ☐ -STABLE (e.g., Cobble, Boulder) [2]
- ☑ -MOD. STABLE (e.g., Large Gravel) [1]
- ☐ -UNSTABLE (Fine Gravel, Sand) [0]

RIFFLE / RUN EMBEDDEDNESS
- ☐ -NONE [2]
- ☐ -LOW [1]
- ☑ -MODERATE [0]
- ☐ -EXTENSIVE [-1]

COMMENTS:

Riffle / Run Max 8: 6

Gradient Max 10: 10

6.) GRADIENT (ft / mi): 5.1 DRAINAGE AREA (sq mi): 23.0 % POOL: % GLIDE: % RIFFLE: % RUN:

Stand waters must be large enough to support a population of mile-obligate species

Qualitative Score Form Table 2 of Ohio Manual based on gradient and drainage area

Is Sampling Reach Representative of the Stream? (Y/ N)

If Not, Explain:

Lat / Long (Beg):	
Lat / Long (Mid):	
Lat / Long (End):	
Lat / Long (X-Loc):	

Major Suspected Sources of Impacts (Check All That Apply)

- None ☐
- Industrial ☐
- WWTP ☐
- Agriculture ☐
- Livestock ☐
- Silviculture ☐
- Construction ☐
- Urban Runoff ☐
- CSOs ☐
- Suburban Impacts ☐
- Mining ☐
- Channelization ☐
- Riparian Removal ☐
- Landfills ☐
- Natural ☐
- Dams ☐
- Other Flow Alteration ☐
- Other: ☐

Subjective Rating (1-10): 4

Aesthetic Rating (1-10): 5

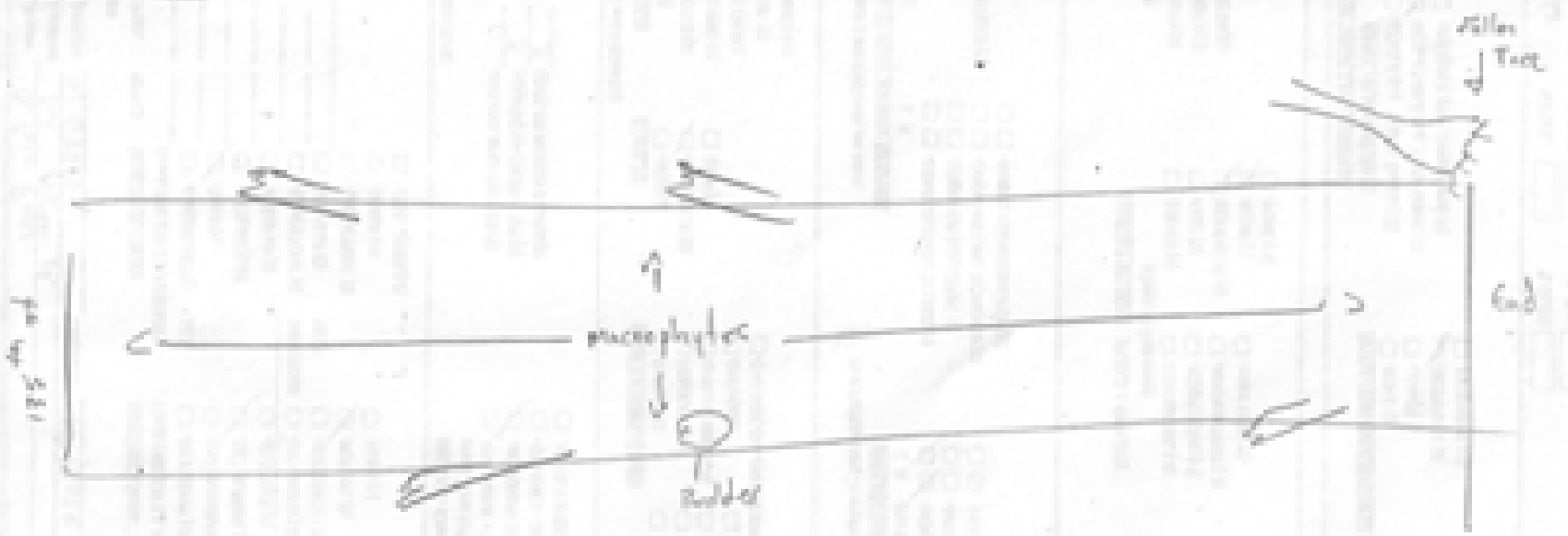
Gradient: ☐ Low ☐ Moderate ☐ High

	Gear:	Distance	Water Clarity	Water Stage	Canopy: % open:
First Sampling Pass	P	500	Clear	Normal	80

Flow To:

- ☐ ☐ Is Stream Ephemeral (no pools, totally dry at only damp spots)?
- ☐ ☐ Is there water upstream? How far:
- ☐ ☐ Is there water close downstream? How far:
- ☐ ☐ Is Dry Channel mostly natural?

Stream Drawing:



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Qualitative Habitat Evaluation Index Field Sheet

QHEI Score: 64.5

River Code: 22-000 | RM: 18.5 | Stream: Dukes Run
Site Code: 1010 | Project Code: Dukes 08 | Location: 1st Footbridge DS
Date: 7/16/08 | Scorer: MH | Latitude: 39.0777 | Longitude: -82.9564

1) SUBSTRATE (Check ONLY Two Substrate TYPE BOXES; Estimate % percent)

TYPE	POOL	RIFFLE
☐ BLDR/SLAB [10]		
☐ Lg BOULD [10]		
☐ BOULDER [9]		
☐ COBBLE [8]		
☐ mx BOPWR [7]		
☐ BEDROCK		
☐ GRAVEL [7]		
☑ SAND [6]		
☐ HARDPAN [5]		
☐ DETRITUS [3]		
☐ ARTIFICIAL [0]		
☐ SILT [2]		

SUBSTRATE ORIGIN — Check ONE (OR 2 & AVERAGE)
☐ -LIMESTONE [1]
☑ -TILLS [1]
☐ -WETLANDS [0]
☐ -HARDPAN [0]
☐ -SANDSTONE [0]
☐ -ANT / RAP [0]
☐ -LACUSTRINE [0]
☐ -SHALE [-1]
☐ -COAL FINES [-2]

SUBSTRATE QUALITY — Check ONE (OR 2 & AVERAGE)
SILT:
☐ -SILT HEAVY [-2]
☐ -SILT MODERATE [-1]
☑ -SILT NORMAL [0]
☐ -SILT FREE [1]
EMBEDDED / NESS:
☐ -EXTENSIVE [-2]
☐ -MODERATE [-1]
☑ -NORMAL [0]
☐ -NONE [1]

NUMBER OF SUBSTRATE TYPES (High Quality Only, Score 6 or +)
☑ -4 or More [2]
☐ -3 or Less [0]

Substrate 14 / Max 20

COMMENTS:

2) INSTREAM COVER (Use each cover type a score of 0 to 3; see back for instructions)

(Structure)
0 UNDERCUT BANKS [1]
2 OVERHANGING VEGETATION [1]
2 SHALLOWS (in SLOW WATER) [1]
1 POOL/RIFFLE [1]

TYPE (Score All That Occur)
0 POOLS > 70 cm [2]
1 RIFFLE/RUN [1]
1 BOULDERS [1]
0 SNAGS, BRUSH/TREES [1]
2 AQUATIC MACROPHYTES [1]
2 LOGS OR WOODY DEBRIS [1]

AMOUNT (Check ONLY one or check 2 and AVERAGE)
☐ -EXTENSIVE > 75% [11]
☑ -MODERATE 25 - 75% [7]
☐ -SPARSE 5 - 25% [3]
☐ -NEARLY ABSENT < 5% [1]

Cover 14 / Max 20

COMMENTS:

3) CHANNEL MORPHOLOGY (Check ONLY one PER Category OR Check 2 and 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]

MODIFICATIONS / OTHER
☐ DRAGGING
☐ RELOCATION
☐ CANOPY REMOVAL
☐ DREDGING
☐ IMPOUNDMENT
☐ -ISLAND
☐ -LEVEED
☐ -BANK SHAPING
☐ ONE SIDE CHANNEL MODIFICATIONS

Channel 10 / Max 20

COMMENTS:

4) RIPARIAN ZONE AND BANK EROSION (check ONE box PER bank or check 2 and AVERAGE per bank)

River Right Looking Downstream

RIPARIAN WIDTH
L R (Per Bank)
☐ ☐ -VERY WIDE > 100m [5]
☐ ☐ -WIDE > 50m [4]
☐ ☐ -MODERATE 10 - 50m [3]
☑ ☑ -NARROW 5 - 10m [2]
☐ ☐ -VERY NARROW < 5m [1]
☐ ☐ -NONE [0]

FLOOD PLAIN QUALITY (FIRST 100 Meter RIPARIAN)
L R (Most Predominant Per Bank)
☐ ☐ -FOREST, SWAMP [3]
☐ ☐ -SHRUB OR OLD FIELD [2]
☑ ☑ -RESIDENTIAL, PARK, NEW FIELD [1]
☐ ☐ -FENCED PASTURE [1]
☐ ☐ -CONSERVATION TILLAGE [1]
☐ ☐ -URBAN OR INDUSTRIAL [0]
☐ ☐ -OPEN PASTURE, ROWCROP [0]
☐ ☐ -MINING / CONSTRUCTION [0]

BANK EROSION
L R (Per Bank)
☑ ☑ -NONE / LITTLE [3]
☐ ☐ -MODERATE [2]
☐ ☐ -HEAVY / SEVERE [1]

Riparian 14 / Max 10

COMMENTS:

5) POOL / GLIDE AND RIFFLE / RUN QUALITY

MAX DEPTH
(Check 1 ONLY)
☐ - 1m [6]
☐ -0.7m [4]
☑ -0.4 to 0.7m [2]
☐ -0.2 to 0.4m [1]
☐ - < 0.2m [POOL = 0]

MORPHOLOGY
(Check 1 or 2 & AVERAGE)
☐ -POOL WIDTH > RIFFLE WIDTH [2]
☑ -POOL WIDTH = RIFFLE WIDTH [1]
☐ -POOL WIDTH < RIFFLE WIDTH [0]
☐ -IMPOUNDED [-1]

CURRENT VELOCITY (POOLS & RIFFLES)
(Check All That Apply)
☐ -SWIFT [1]
☐ -FAST [1]
☑ -MODERATE [1]
☐ -SLOW [1]
☐ -NONE [-1]
☐ -TORRENTIAL [-1]
☐ -INTERSTITIAL [-1]
☐ -INTERMITTENT [-2]
☐ -VERY FAST [0]

Pool / Current 5 / Max 10

COMMENTS:

6) RIFFLE / RUN QUALITY (CHECK ONE OR CHECK 2 AND AVERAGE)

RIFFLE DEPTH
☐ -Riffle Areas > 10cm [2]
☐ -Most Areas 5 - 10cm [1]
☐ -Most Areas < 5cm [0]
☑ -NO RIFFLE but RUNS present [0]
☐ NO RIFFLE / NO RUN [Warm = 0]

RUN DEPTH
☑ - MAX > 50 cm [2]
☐ - MAX < 50 cm [1]

RIFFLE / RUN SUBSTRATE
☑ -STABLE (e.g., Cobble, Boulder) [2]
☑ -MOD. STABLE (e.g., Large Gravel) [1]
☐ -UNSTABLE (Fine Gravel, Sand) [0]

RIFFLE / RUN EMBEDDEDNESS
☐ NONE [2]
☐ LOW [1]
☑ MODERATE [0]
☐ EXTENSIVE [-1]

Riffle / Run 5.5 / Max 8

Gradient 10 / Max 10

COMMENTS:

6) GRADIENT (ft / mi): 5.0 DRAINAGE AREA (sq mi): 2.2

% POOL: % GLIDE:
% RIFFLE: % RUN:

*Reach length must be long enough to support a population of silt-intolerant species.

Is Sampling Reach Representative of the Stream? (Y/ N)

If Not, Explain: _____

Lat / Long (Beg):	
Lat / Long (Mid):	
Lat / Long (End):	
Lat / Long (If Loc):	

Major Suspected Sources of Impacts (Check All That Apply):

- [ ] None
- [ ] Industrial
- [ ] WWTP
- [ ] Agriculture
- [ ] Livestock
- [ ] Silviculture
- [ ] Construction
- [ ] Urban Runoff
- [ ] CSOs
- [ ] Suburban Impacts
- [ ] Mining
- [ ] Channelization
- [ ] Riparian Removal
- [ ] Landfills
- [ ] Natural
- [ ] Dams
- [ ] Other Flow Alteration

Other: _____

Subjective Rating (1-10): 6

Aesthetic Rating (1-10): 5

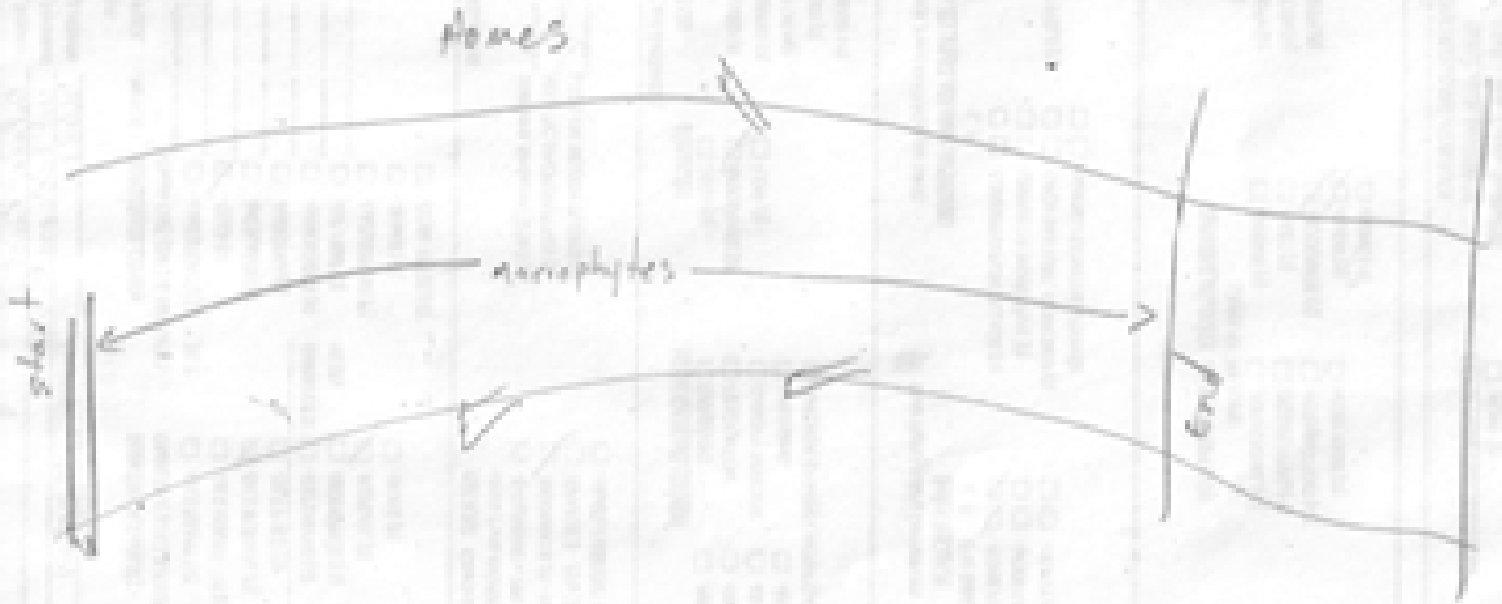
Gradient: ☐ -Low ☐ -Moderate ☐ -High

First Sampling Pass	Clear:	Distance:	Water Clarity:	Water Stage:	Canopy: % open:
	P	5m	Clear	Normal	100

Flow N:

- [ ] Is Stream Ephemeral (no pools, totally dry of only damp spots)?
- [ ] Is there water upstream? How far:
- [ ] Is there water close downstream? How far:
- [ ] Is Dry Channel mostly natural?

Stream Drawing:



Instructions for scoring the alternate cover metric: Each cover type should receive a score of between 0 and 3, where: 0 = Cover type absent; 1 = cover type in very small amounts or if more common of marginal quality; 2 = cover type present in moderate amounts, but not of highest quality or in small amounts of highest quality; 3 = cover type of highest quality in moderate of greater amounts. Examples of highest quality include, very large boulders in deep or fast water, large diameter logs that are stable, well developed rootwads in deep / fast water, or deep, well-defined, functional pools.

Qualitative Habitat Evaluation Index Field Sheet

QHEI Score:

River Code: _____ RM: 17.0 Stream: Pigeon River

Site Code: _____ Project Code: _____ Location: Rt. Summit Rd

Date: 9-16-19 Scorer: _____ Latitude: _____ Longitude: _____

I. SUBSTRATE (Check ONLY Two Substrate TYPE BOXES; Estimate % percent)

TYPE	POOL	RIFFLE
☐ BEDROCK [10]		
☐ Lg BOULDER [10]		
☐ BOULDER [9]		
☐ COBBLE [8]		
☐ GRAVEL [7]		
☐ SAND [6]		
☐ BEDROCK [5]		
☐ DETRITUS [3]		
☐ ARTIFICIAL [2]		
☐ SILT [1]		

	POOL	RIFFLE

SUBSTRATE ORIGIN — Check ONE (OR 2 & AVERAGE)

☐ -LIMESTONE [1]
☐ -TILLS [1]
☐ -WETLANDS [0]
☐ -MARIPAN [0]
☐ -SANDSTONE [0]
☐ -RIP / RAP [0]
☐ -LACUSTRINE [0]
☐ -SHALE [-1]
☐ -COAL FINES [-2]

SILT

SUBSTRATE QUALITY — Check ONE (OR 2 & AVERAGE)

☐ -SILT HEAVY [-2]
☐ -SILT MODERATE [-1]
☐ -SILT NORMAL [0]
☐ -SILT FREE [1]

EMBEDDED / NESS

☐ -EXTENSIVE [-2]
☐ -MODERATE [-1]
☐ -NORMAL [0]
☐ -NONE [1]

NUMBER OF SUBSTRATE TYPES: (High Quality Only, Score 0 or 1)

☐ -4 or More [0]
☐ -3 or Less [0]

Substrate: 14 / Max 20

COMMENTS: _____

II. INSTREAM COVER (Give each cover type a score of 0 to 3; see back for instructions)

(Duration)	TYPE: Score All That Occur	
1 UNDERCUT BANKS [1]	1 POOLS > 70 cm [2]	1 OVERHANGING MACROPHYTES [1]
2 OVERHANGING VEGETATION [1]	1 BOULDERS [1]	2 AQUATIC MACROPHYTES [1]
1 SHALLOWS (IN SLOW WATER) [1]	1 ROOTMASS [1]	2 LOGS OR WOODY DEBRIS [1]
1 ROOTMATS [1]		

AMOUNT (Check ONLY one or check 2 and AVERAGE)

☐ -EXTENSIVE > 75% [11]
☑ -MODERATE 25 - 75% [7]
☐ -SPARSE 5 - 25% [3]
☐ -NEARLY ABSENT < 5% [1]

Cover: 18 / Max 20

COMMENTS: _____

III. CHANNEL MORPHOLOGY (Check ONLY one POOR Category OR check 2 and AVERAGE)

STABILITY	CHANNELIZATION	CONDITION	MODIFICATIONS / OTHER	
☐ -HIGH [4]	☐ -NONE [0]	☐ -HIGH [3]	☐ -DRAGGING	☐ -IMPOUNDMENT
☐ -MODERATE [3]	☐ -RECTIFICATION [2]	☑ -MODERATE [2]	☐ -RELOCATION	☐ -ISLAND
☑ -LOW [2]	☑ -RECOVERING [1]	☐ -LOW [1]	☐ -CANOPY REMOVAL	☐ -LEVEED
☐ -NONE [1]	☐ -RECENT OR NO RECOVERY [0]		☐ -CHANNELIZED	☐ -BANK ARMORING
DEVELOPMENT	☐ -IMPOUNDED [-1]		☐ -ONE SIDE CHANNEL MODIFICATIONS	
☐ -EXCELLENT [7]				
☐ -GOOD [5]				
☑ -FAIR [3]				
☐ -POOR [1]				

Channel: 10 / Max 20

COMMENTS: _____

IV. RIPARIAN ZONE AND BANK EROSION (Check ONE box PER bank or check 2 and AVERAGE per bank)

River Right Looking Downstream

RIPARIAN WIDTH (L / R Per Bank)	FLOOD PLAIN QUALITY (PAST 100 Meter SEGMENT) (L / R Most Predominant Per Bank)		BANK EROSION (L / R Per Bank)
☐ ☐ -VERY WIDE > 100m [5]	☑ ☐ -FOREST, SWAMP [3]	☐ ☐ -CONSERVATION TILLAGE [1]	☑ ☐ -NONE / LITTLE [3]
☐ ☐ -WIDE 50m - 100m [4]	☐ ☐ -SHRUB OR OLD FIELD [2]	☐ ☐ -URBAN OR INDUSTRIAL [0]	☐ ☐ -MODERATE [2]
☑ ☑ -MODERATE 10m - 50m [3]	☐ ☐ -RESIDENTIAL, PARK, NEW FIELD [1]	☐ ☐ -CROP [0]	☐ ☐ -HEAVY / SEVERE [1]
☐ ☐ -NARROW 5m - 10m [2]	☐ ☐ -FENCED PASTURE [0]	☐ ☐ -MINING OR CONSTRUCTION [0]	
☐ ☐ -VERY NARROW < 5m [1]			
☐ ☐ -NONE [0]			

Riparian: 15 / Max 10

COMMENTS: _____

V. POOL / GLIDE AND RIFFLE / RUN QUALITY

MAX DEPTH (Check 1 ONLY)

☑ - 1m [6]
☐ - 0.7m [4]
☐ - 0.4 to 0.7m [2]
☐ - 0.2 to 0.4m [1]
☐ - < 0.2m [POOL = 0]

MORPHOLOGY (Check 1 or 2 & AVERAGE)

☐ -POOL WIDTH > RIFFLE WIDTH [2]
☑ -POOL WIDTH = RIFFLE WIDTH [1]
☐ -POOL WIDTH < RIFFLE WIDTH [0]
☐ -IMPOUNDED [-1]

CURRENT VELOCITY (POOLS & RIFFLES) (Check All That Apply)

☐ -SWIFT [1]
☐ -FAST [1]
☑ -MODERATE [1]
☑ -SLOW [1]
☐ -NONE [-1]
☐ -TORRENTIAL [-1]
☐ -INTERSTITIAL [-1]
☐ -INTERMITTENT [-2]
☐ -VERY FAST [0]

Pool / Current: 9 / Max 12

COMMENTS: _____

VI. RIFFLE / RUN QUALITY (CHECK ONE OR CHECK 2 AND AVERAGE)

RIFFLE DEPTH

☐ *Best Areas > 10cm [2]
☐ -Best Areas 5 - 10cm [1]
☐ -Best Areas < 5cm [0]
☑ -NO RIFFLE but RUNS present [0]
☐ -NO RIFFLE / NO RUN [MARK * 0]

RUN DEPTH

☑ - MAX > 50 cm [2]
☐ - MAX < 50 cm [1]

RIFFLE / RUN SUBSTRATE

☐ -STABLE (e.g., Cobble, Boulder) [2]
☑ -MOD. STABLE (e.g., Large Gravel) [1]
☐ -UNSTABLE (Fine Gravel, Sand) [0]

RIFFLE / RUN EMBEDDEDNESS

☐ -NONE [2]
☐ -LOW [1]
☑ -MODERATE [0]
☐ -EXTENSIVE [-1]

Riffle / Run: 5 / Max 8

Gradient: 10 / Max 10

COMMENTS: _____

6.) GRADIENT (ft / mi): 41.9 DRAINAGE AREA (SQ MI): 230

% POOL: _____ % GLIDE: _____

% RIFFLE: _____ % RUN: _____

*Best areas must be large enough to support a population of riffle obligate species

Gradient Score from Table 2 of Users Manual based on gradient and drainage area

Is Sampling Reach Representative of the Streams? (Y/ N)

If Not, Explain:

Lat / Long (Beg):	
Lat / Long (Mid):	
Lat / Long (End):	
Lat / Long (X-Loc):	

Major Suspected Sources of Impacts (Check All That Apply)

- None ☐
- Industrial ☐
- WWTP ☐
- Agriculture ☐
- Livestock ☐
- Silviculture ☐
- Construction ☐
- Urban Runoff ☐
- CSOs ☐
- Suburban Impacts ☐
- Mining ☐
- Channelization ☐
- Riparian Removal ☐
- Landfills ☐
- Natural ☐
- Dams ☐
- Other Flow Alteration ☐

Other: _____

Subjective Rating (1-10): 6

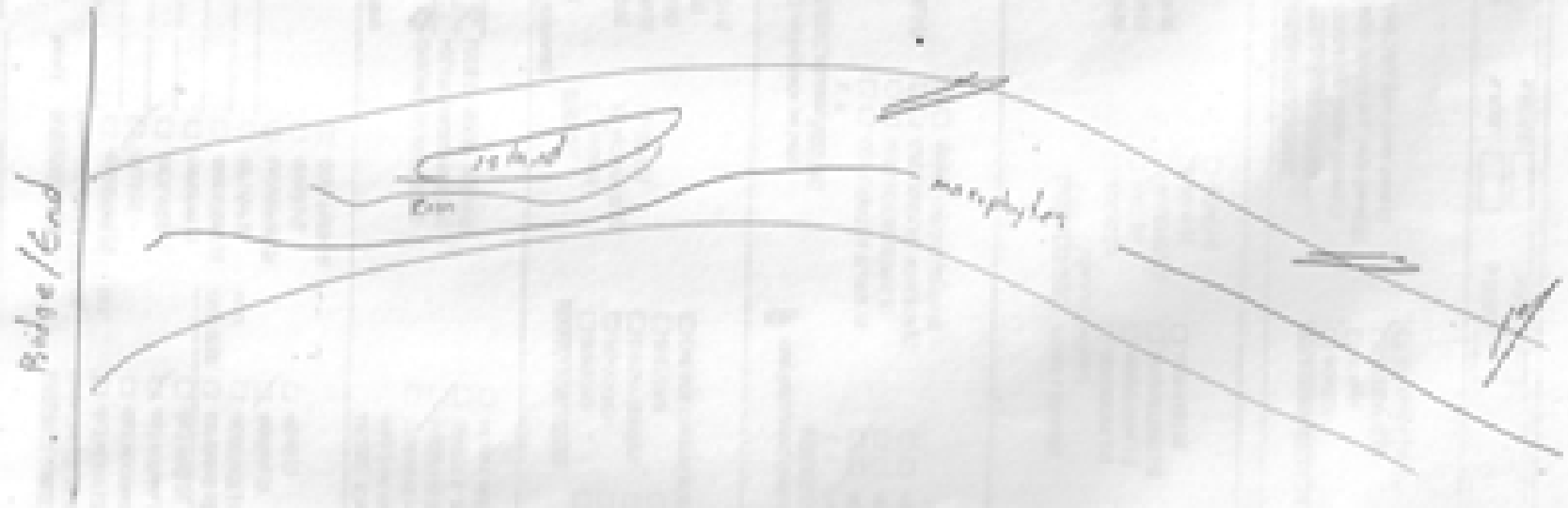
Aesthetic Rating (1-10): 6

Gradient: ☐ -Low ☐ -Moderate ☐ -High

First Sampling Pass	Color	Distance	Water Depth	Water Stage	Canopy: % open
	P	500	Clear	500	100

Yes	No	
☐	☐	Is Stream Ephemeral (no pools, totally dry at only damp spots)?
☐	☐	Is there water upstream? How far:
☐	☐	Is there water above downstream? How far:
☐	☐	Is Dry Channel mostly natural?

Stream Drawing:



Instructions for scoring the alternate cover metric: Each cover type should receive a score of between 0 and 3, where: 0 = Cover type absent; 1 = cover type in very small amounts or if more common of marginal quality; 2 = cover type present in moderate amounts, but not of highest quality or in small amounts of highest quality; 3 = cover type of highest quality in moderate of greater amounts. Examples of highest quality include, very large boulders in deep or fast water, large diameter logs that are stable, well-developed rootwads in deep / fast water, or deep, well-defined, functional pools.

Qualitative Habitat Evaluation Index Field Sheet

QHEI Score: 71

River Code: 98-[illegible] RM: 13.4 Stream: Butler River

Site Code: 1009 Project Code: Outage Location: dwn Linton Farms Rd

Date: 8-19-08 Scorer: MHS Latitude: 41.96993 Longitude: -82.68773

1) SUBSTRATE (Check ONLY Two Substrate TYPE BOXES; Estimate % (percent)

TYPE	POOL	RIFFLE
☐ ☐ BLDR/SLAB [10]		
☐ ☐ Lg BOULD [10]		
☐ ☐ BOULDER [9]		
☐ ☐ COBBLE [8]		
☐ ☐ mod/SPRK [4]		
☐ ☐ MUCK [2]		
☑ ☐ GRAVEL [7]		
☐ ☑ SAND [6]		
☐ ☐ HARDPAN [5]		
☐ ☐ DETRITUS [3]		
☐ ☐ ARTIFICIAL [0]		
☐ ☐ SILT [2]		

SUBSTRATE ORIGIN (Check ONE OR 2 & AVERAGE)
- ☐ -LIMESTONE [1]
- ☑ -TILLS [1]
- ☐ -WETLANDS [0]
- ☐ -HARDPAN [0]
- ☐ -SANDSTONE [0]
- ☐ -ASF / RAF [0]
- ☐ -LACUSTRINE [0]
- ☐ -SHALE [-1]
- ☐ -COAL FINES [-2]

SUBSTRATE QUALITY (Check ONE OR 2 & AVERAGE)
- SILT: ☐ -SILT HEAVY [-2]
- ☐ -SILT MODERATE [-1]
- ☑ -SILT NORMAL [0]
- ☐ -SILT FREE [1]
- EMBEDDED: ☐ -EXTENSIVE [-2]
- NESS: ☐ -MODERATE [-1]
- ☑ -NORMAL [0]
- ☐ -NONE [1]

NUMBER OF SUBSTRATE TYPES: (High Quality Only, Score 6 or 4)
- ☑ -4 or More [2]
- ☐ -3 or Less [0]

Substrate: 14 Max 20

COMMENTS:

2) INSTREAM COVER: (One each cover type a score of 0 to 3; see back for instructions)

(Structure)
- 1 UNDERCUT BANKS [1]
- 2 OVERHANGING VEGETATION [1]
- 1 SHALLOWS (IN SLOW WATER) [1]
- 1 ROOTWADS [1]

TYPE: Score All That Occur
- 3 POOLS > 70 cm [2]
- 1 ROOTWADS [1]
- 1 BOULDERS [1]
- 0 OXBOWS, BACKWATERS [1]
- 2 AQUATIC MACROPHYTES [1]
- 1 LOGS OR WOODY DEBRIS [1]

AMOUNT: (Check ONLY one or check 2 and AVERAGE)
- ☐ -EXTENSIVE > 75% [11]
- ☑ -MODERATE 25 - 75% [7]
- ☐ -SPARSE 5 - 25% [3]
- ☐ -NEARLY ABSENT < 5% [1]

Cover: 17 Max 20

COMMENTS:

3) CHANNEL MORPHOLOGY (Check ONLY one PER Category OR check 2 and 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]

MODIFICATIONS / OTHER
- ☐ DRAGGING
- ☐ RELOCATION
- ☐ CANOPY REMOVAL
- ☐ DREDGING
- ☐ -IMPOUNDMENT
- ☐ -ISLAND
- ☐ -LEVEED
- ☐ -BANK SHAPING
- ☐ ONE SIDE CHANNEL MODIFICATIONS

Channel: 10 Max 20

COMMENTS:

4) RIPARIAN ZONE AND BANK EROSION (Check ONE box PER bank or check 2 and AVERAGE per bank)

Floor Right Looking Downstream

RIPARIAN WIDTH
L R (Per Bank)
- ☐ ☐ -VERY WIDE > 100m [5]
- ☐ ☐ -WIDE > 50m [4]
- ☑ ☑ -MODERATE 10 - 50m [3]
- ☐ ☐ -NARROW 5 - 10m [2]
- ☐ ☐ -VERY NARROW < 5m [1]
- ☐ ☐ -NONE [0]

FLOOD PLAIN QUALITY (PAST 100 Meter SEGMENT)
L R (Most Predominant Per Bank)
- ☐ ☐ -FOREST, SWAMP [3]
- ☐ ☐ -SHRUB OR OLD FIELD [2]
- ☑ ☑ -RESIDENTIAL, PARK, NEW FIELD [1]
- ☐ ☐ -FENCED PASTURE [1]
- ☑ ☑ -CONSERVATION TILLAGE [1]
- ☐ ☐ -URBAN OR INDUSTRIAL [0]
- ☐ ☐ -OPEN PASTURE, ROWCROP [0]
- ☐ ☐ -MINING / CONSTRUCTION [0]

BANK EROSION
L R (Per Bank)
- ☑ ☑ -NONE / LITTLE [3]
- ☐ ☐ -MODERATE [2]
- ☐ ☐ -HEAVY / SEVERE [1]

Riparian: 7 Max 10

COMMENTS:

5) POOL / GLIDE AND RIFFLE / RUN QUALITY

MAX DEPTH (Check 1 ONLY)
- ☑ - 1m [6]
- ☐ - 0.5 to [4]
- ☐ - 0.4 to 0.7m [2]
- ☐ - 0.2 to 0.4m [1]
- ☐ - < 0.2m [POOL = 0]

MORPHOLOGY (Check 1 or 2 & AVERAGE)
- ☐ -POOL WIDTH > RIFFLE WIDTH [2]
- ☐ -POOL WIDTH = RIFFLE WIDTH [1]
- ☑ -POOL WIDTH < RIFFLE WIDTH [0]
- ☐ -IMPOUNDED [-1]

CURRENT VELOCITY (POOLS & RIFFLES) (Check All That Apply)
- ☐ -EDDIES [1]
- ☐ -FAST [1]
- ☑ -MODERATE [1]
- ☑ -SLOW [1]
- ☐ -NONE [-1]
- ☐ -TORRENTIAL [-1]
- ☑ -INTERSTITIAL [-1]
- ☐ -INTERMITTENT [-2]
- ☐ -VERY FAST [-1]

Pool / Current: 8 Max 12

COMMENTS:

6) RIFFLE / RUN QUALITY (CHECK ONE OR CHECK 2 AND AVERAGE)

RIFFLE DEPTH
- ☐ -Riffle Avrage > 10cm [2]
- ☐ -Riffle Avrage 5 - 10cm [1]
- ☐ -Riffle Avrage < 5cm [0]
- ☐ -NO RIFFLE but RUNS present [0]
- ☑ -NO RIFFLE / NO RUN [Score = 0]

RUN DEPTH
- ☑ - MAX > 50 cm [2]
- ☐ - MAX < 50 cm [1]

RIFFLE / RUN SUBSTRATE
- ☐ -STABLE (e.g., Cobble, Boulder) [2]
- ☑ -MOD. STABLE (e.g., Large Gravel) [1]
- ☐ -UNSTABLE (Fine Gravel, Sand) [0]

RIFFLE / RUN EMBEDDEDNESS
- ☐ -NONE [2]
- ☐ -LOW [1]
- ☑ -MODERATE [0]
- ☐ -EXTENSIVE [-1]

Rffle / Run: 5 Max 8

Gradient: 10 Max 10

6) GRADIENT (ft / mi): 4.8 DRAINAGE AREA (sq mi): 314

% POOL: % GLIDE: % RIFFLE: % RUN:

Stream must be large enough to support a population of fish-obligate species

Gradient from Map - Table 1 of Users Manual (used as gradient and drainage area)

Is Sampling Reach Representative of the Stream? (Y/ N)

If Not, Explain: _____

Lat / Long (Beg):	
Lat / Long (Mid):	
Lat / Long (End):	
Lat / Long (X-Loc):	

Major Suspected Sources of Impacts (Check All That Apply):

- None ☐
- Industrial ☐
- WWTP ☐
- Agriculture ☐
- Livestock ☐
- Silviculture ☐
- Construction ☐
- Urban Runoff ☐
- CSOs ☐
- Suburban Impacts ☐
- Mining ☐
- Channelization ☐
- Riparian Removal ☐
- Landfills ☐
- Natural ☐
- Dams ☐
- Other Flow Alteration ☐

Other: _____

	Subjective Rating (1-10)	Aesthetic Rating (1-10)
	6	6

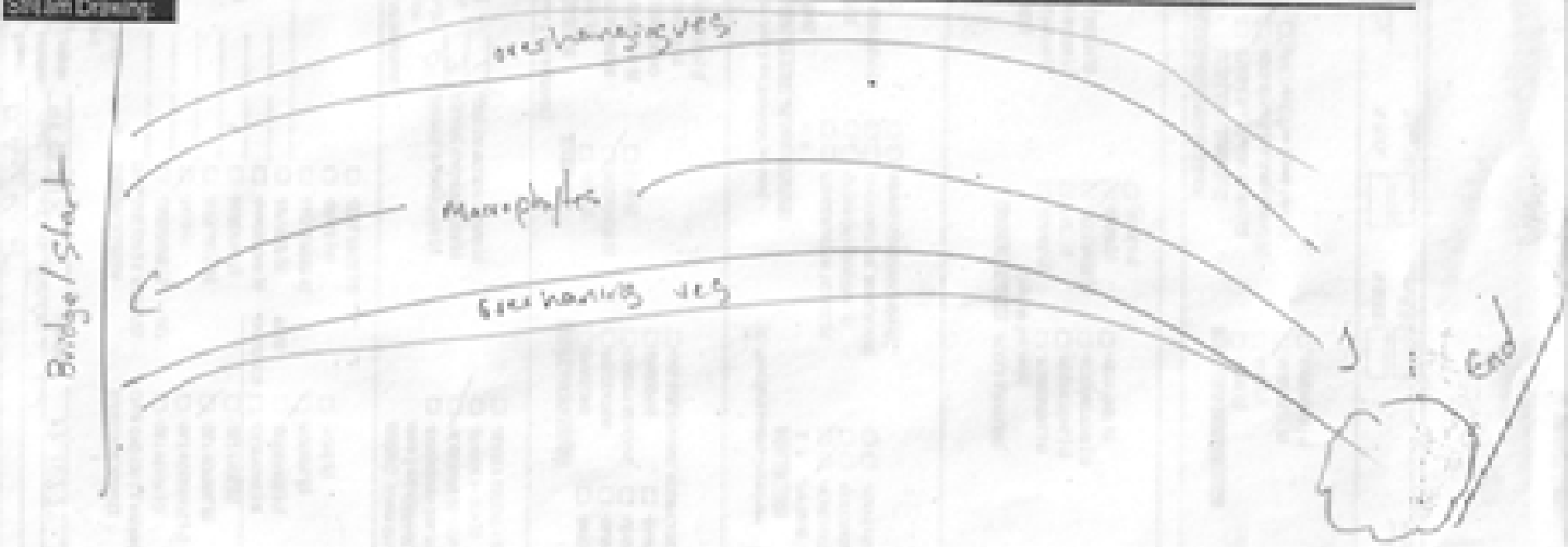
Gradient: ☐ -Low ☐ -Moderate ☐ -High

	Color	Distance	Water Clarity	Water Stage	Canopy- % Open
First Sampling Pass	B	500	Clear	Normal	100

Flow Nil:

- ☐ ☐ Is Stream Ephemeral (no pools, totally dry of only damp spots)?
- ☐ ☐ Is there water upstream? How far:
- ☐ ☐ Is there water (flow downstream? How far
- ☐ ☐ Is Dry Channel mostly natural?

Stream Drawing:



Instructions for scoring the alternate cover metric: Each cover type should receive a score of between 0 and 3, where: 0 = Cover type absent; 1 = cover type in very small amounts or if more common of marginal quality; 2 = cover type present in moderate amounts, but not of highest quality or in small amounts of highest quality; 3 = cover type of highest quality in moderate or greater amounts. Examples of highest quality include, very large boulders in deep or fast water, large diameter logs that are stable, well developed rootwads in deep / fast water, or deep, well-defined, functional pools.

Qualitative Habitat Evaluation Index Field Sheet

QHEI Score: 78

River Code: 02-[illegible] Run: [illegible] Stream: Dry Run Tributary

Site Code: [illegible] Project Code: [illegible] Location: Unt Mouth RM

Date: 29-JUL-10 Scorer: MWS Latitude: [illegible] Longitude: [illegible]

I. SUBSTRATE (Check ONLY Two Substrate TYPE BOXES; Estimate % percent)

TYPE	POOL	RIFFLE	TYPE	POOL	RIFFLE
☐ BLDR/SLAB [10]			☐ CANVEL [7]		
☐ Lg BOULD [10]			☐ SAND [6]		
☐ BOULDER [9]			☐ BEDROCK [5]		
☐ COBBLE [8]			☐ DETRITUS [3]		
☐ mn/DP/Am [4]			☐ ARTIFICIAL [0]		
☐ MUCK [2]			☐ SILT [2]		

SUBSTRATE ORIGIN (Check ONE OR 2 & AVERAGE)
- ☐ -LIMESTONE [1]
- ☑ -TILLS [1]
- ☐ -WETLANDS [0]
- ☐ -HARDPAN [0]
- ☐ -SANDSTONE [1]
- ☐ -RIP / RAP [0]
- ☐ -LACUSTRINE [0]
- ☐ -SHALE [-1]
- ☐ -COAL FINES [-2]

SUBSTRATE QUALITY (Check ONE OR 2 & AVERAGE)
- SILT: ☐ -SILT HEAVY [-2]
- ☐ -SILT MODERATE [-1]
- ☑ -SILT NORMAL [0]
- ☐ -SILT FREE [1]
- EMBEDDED: ☐ -EXTENSIVE [-2]
- MOSS: ☐ -MODERATE [-1]
- ☑ -NORMAL [0]
- ☐ -NONE [1]

Substrate: 14 / Max 20

NUMBER OF SUBSTRATE TYPES (High Quality Only, Score 6 or -1)
- ☑ -4 or More [2]
- ☐ -3 or Less [0]

COMMENTS:

II. INSTREAM COVER (Use each cover type a score of 0 to 3; see back for instructions)

(Structure)
- 0 UNDERCUT BANKS [1]
- 1 OVERHANGING VEGETATION [1]
- 0 SHALLOWS (IN SLOW WATER) [1]
- 1 ROOTWADS [1]

TYPE (Score All That Occur)
- 3 POOLS > 70 cm [2]
- 1 ROOTWADS [1]
- 3 BOULDERS [1]
- 0 OVERHANG. BRUSH/TREES [1]
- 0 AQUATIC MACROPHYTES [1]
- 1 LOGS OR WOODY DEBRIS [1]

AMOUNT (Check ONLY one or check 2 and AVERAGE)
- ☐ -EXTENSIVE > 75% [11]
- ☑ -MODERATE 25 - 75% [7]
- ☐ -SPARSE 5 - 25% [3]
- ☐ -NEARLY ABSENT < 5% [1]

Cover: 12 / Max 20

COMMENTS:

III. CHANNEL MORPHOLOGY (Check ONLY one PER Category OR check 2 and 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]

MODIFICATIONS / OTHER
- ☐ DRAGGING
- ☐ RELOCATION
- ☐ CANOPY REMOVAL
- ☐ DREDGING
- ☐ -IMPOUNDMENT
- ☐ -ISLAND
- ☐ -LEVEES
- ☐ -BANK SHAPING
- ☐ ONE SIDE CHANNEL MODIFICATIONS

Channel: 15 / Max 20

COMMENTS:

IV. RIPARIAN ZONE AND BANK EROSION (Check ONE box PER bank or check 2 and AVERAGE per bank)

River Right looking Downstream

RIPARIAN WIDTH

L R (Per Bank)
- ☐ ☐ -VERY WIDE > 100m [5]
- ☐ ☐ -WIDE > 50m [4]
- ☐ ☐ -MODERATE 10 - 50m [3]
- ☑ ☑ -NARROW 5 - 10m [2]
- ☐ ☐ -VERY NARROW < 5m [1]
- ☐ ☐ -NONE [0]

FLOOD PLAIN QUALITY (PAST 100 Meter REACH)

L R (Most Predominant Per Bank)
- ☐ ☐ -FOREST, SWAMP [3]
- ☐ ☐ -SHRUB OR OLD FIELD [2]
- ☑ ☑ -RESIDENTIAL, PARK, NEW FIELD [1]
- ☐ ☐ -FENCED PASTURE [1]

L R
- ☐ ☐ -CONSERVATION TILLAGE [1]
- ☐ ☐ -URBAN OR INDUSTRIAL [0]
- ☐ ☐ -OPEN PASTURE, ROWCROP [0]
- ☐ ☐ -MINING / CONSTRUCTION [0]

BANK EROSION

L R (Per Bank)
- ☑ ☐ -NONE / LITTLE [3]
- ☐ ☑ -MODERATE [2]
- ☐ ☐ -HEAVY / SEVERE [1]

Riparian: 6.5 / Max 10

COMMENTS:

V. POOL / GLIDE AND RIFFLE / RUN QUALITY

MAX DEPTH (Check ONLY ONE)
- ☐ -1m [6]
- ☑ -0.7m [4]
- ☐ -0.4 to 0.7m [2]
- ☐ -0.2 to 0.4m [1]
- ☐ -< 0.2m [POOL = 0]

MORPHOLOGY (Check 1 or 2 & AVERAGE)
- ☑ -POOL WIDTH > RIFFLE WIDTH [2]
- ☐ -POOL WIDTH = RIFFLE WIDTH [1]
- ☐ -POOL WIDTH < RIFFLE WIDTH [0]
- ☐ -IMPOUNDED [-1]

CURRENT VELOCITY (POOLS & RIFFLES) (Check All That Apply)
- ☐ -EDDIES [1]
- ☑ -FAST [1]
- ☑ -MODERATE [1]
- ☑ -SLOW [1]
- ☐ -NONE [-1]
- ☐ -TORRENTIAL [-1]
- ☐ -INTERSTITIAL [-1]
- ☐ -INTERMITTENT [-2]
- ☑ -VERY FAST [1]

Pool / Current: 11 / Max 12

COMMENTS:

VI. RIFFLE / RUN QUALITY (CHECK ONE OR CHECK 2 AND AVERAGE)

RIFFLE DEPTH
- ☑ -Riffle Areas > 10cm [2]
- ☐ -Most Areas 5 - 10cm [1]
- ☐ -Most Areas < 5cm [0]
- ☐ -NO RIFFLE but RUNS present [0]
- ☐ -NO RIFFLE / NO RUN [Warm = 0]

RUN DEPTH
- ☑ -MAX > 50 cm [2]
- ☐ -MAX < 50 cm [1]

RIFFLE / RUN SUBSTRATE
- ☐ -STABLE (e.g., Cobble, Boulder) [2]
- ☑ -MOD. STABLE (e.g., Large Gravel) [1]
- ☐ -UNSTABLE (Fine Gravel, Sand) [0]

RIFFLE / RUN EMBEDDEDNESS
- ☐ -NONE [2]
- ☐ -LOW [1]
- ☐ -MODERATE [0]
- ☐ -EXTENSIVE [-1]

Riffle / Run: 6 / Max 8

Gradient: 10 / Max 10

COMMENTS:

6) GRADIENT (ft / mi): 4.5 DRAINAGE AREA (sq mi): 3.21

% POOL: % GLIDE: % RIFFLE: % RUN:

*Reach length must be long enough to support reproduction of riffle-obligate species.

*Gradient Score from Table 3 of Ohio EPA Manual based on gradient and drainage area.

Is Sampling Reach Representative of the Stream? (Y/ N)

If Not, Explain:

Lat / Long (Beg):	
Lat / Long (Mid):	
Lat / Long (End):	
Lat / Long (X-Loc):	

Major Suspected Sources of Impacts (Check All That Apply):

- None ☐
- Industrial ☐
- NWTP ☐
- Agriculture ☐
- Livestock ☐
- Silviculture ☐
- Construction ☐
- Urban Runoff ☐
- CSOs ☐
- Suburban impacts ☐
- Mining ☐
- Channelization ☐
- Riparian Removal ☐
- Landfills ☐
- Natural ☐
- Dams ☐
- Other Flow Alteration ☐

Other: _____

Subjective Rating (1-10): 6

Aesthetic Rating (1-10): 7

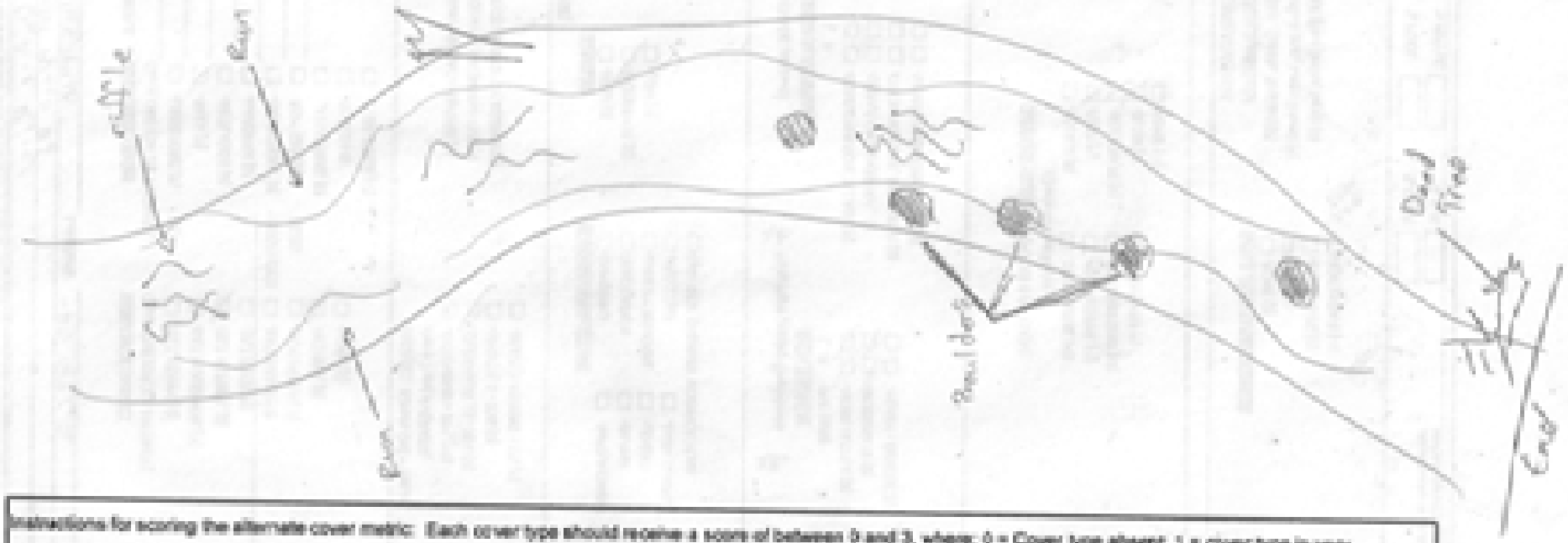
Gradient: ☐ -Low ☐ -Moderate ☐ -High

First Sampling Pass	Clear:	Distance:	Water Clarity:	Water Stage:	Canopy: % open:
	P	500	Clear	Normal	100

Yes No

- ☐ ☐ Is Stream Ephemeral (no pools, totally dry of only damp spots)?
- ☐ ☐ Is there water upstream? How far:
- ☐ ☐ Is there water close downstream? How far:
- ☐ ☐ Is Dry Channel mostly natural?

Stream Drawing:



Instructions for scoring the alternate cover metric: Each cover type should receive a score of between 0 and 3, where: 0 = Cover type absent; 1 = cover type in very small amounts or if more common of marginal quality; 2 = cover type present in moderate amounts, but not of highest quality or in small amounts of highest quality; 3 = cover type of highest quality in moderate of greater amounts. Examples of highest quality include, very large boulders in deep or fast water, large diameter logs that are stable, well developed rootwads in deep / fast water, or deep, well-defined, functional pools.

Qualitative Habitat Evaluation Index Field Sheet

QHEI Score: 71.5

River Code: 04-[illegible] | RM: [illegible] | Stream: [illegible]
Site Code: [illegible] | Project Code: [illegible] | Location: [illegible]
Date: 8-10-05 | Scorer: MRS | Latitude: [illegible] | Longitude: [illegible]

1) SUBSTRATE (Check ONLY Two Substrate TYPE BOXES; Estimate % percent)

TYPE	POOL	RIFFLE
☐ BEDROCK [10]		
☐ Lg BOULD [10]		
☐ BOULDER [9]		
☐ COBBLE [8]		
☐ mmSPWN [6]		
☐ MUCK [2]		
☐ GRAVEL [7]		
☑ SAND [6]		
☐ BEDROCK [5]		
☐ DETRITUS [3]		
☐ ARTIFICIAL [0]		
☐ SILT [2]		

SUBSTRATE 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]

SUBSTRATE QUALITY (Check ONE OR 2 & AVERAGE)
SILT: ☐ -SILT HEAVY [-2] ☐ -SILT MODERATE [-1] ☑ -SILT NORMAL [0] ☐ -SILT FREE [1]
EMBEDDED NESS: ☐ -EXTENSIVE [-2] ☐ -MODERATE [-1] ☑ -NORMAL [0] ☐ -NONE [1]

NUMBER OF SUBSTRATE TYPES (High Quality Only, Score 5 or +): ☑ 4 or More [2] ☐ 3 or Less [0]

Substrate: 14.5 / Max 20

COMMENTS:

2) INSTREAM COVER (Give each cover type a score of 0 to 3; see back for instructions)

(Structure)
1 UNDERCUT BANKS [1]
1 OVERHANGING VEGETATION [1]
0 SHALLOWS (IN SLOW WATER) [1]
1 ROOTWADS [1]

TYPE: Score All That Occur
2 POOLS > 70 cm [2]
1 ROOTWADS [1]
3 BOULDERS [1]
0 SWMMRS, MACROPHYTES [1]
0 AQUATIC MACROPHYTES [1]
2 LOGS OR WOODY DEBRIS [1]

AMOUNT: (Check ONLY one or check 2 and AVERAGE)
☐ -EXTENSIVE > 75% [11]
☑ -MODERATE 25 - 75% [7]
☐ -SPARSE 5 - 25% [3]
☐ -NEARLY ABSENT < 5% [1]

Cover: 12 / Max 20

COMMENTS:

3) CHANNEL MORPHOLOGY (Check ONLY one PER Category OR check 2 and 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]
MODIFICATIONS (OTHER): ☐ DIVERSION ☐ RELOCATION ☐ CANOPY REMOVAL ☐ DREDGING ☐ -IMPOUNDMENT ☐ -BANK SHAPING ☐ -ONE SIDE CHANNEL MODIFICATIONS

Channel: 12 / Max 20

COMMENTS:

4) RIPARIAN ZONE AND BANK EROSION (Check ONE box PER bank or check 2 and AVERAGE per bank)

River Right looking Downstream

RIPARIAN WIDTH (L R (Per Bank)):
☐ ☐ -VERY WIDE > 100m [5]
☐ ☐ -WIDE > 50m [4]
☐ ☐ -MODERATE 10 - 50m [3]
☑ ☑ -NARROW 5 - 10m [2]
☐ ☐ -VERY NARROW < 5m [1]
☐ ☐ -NONE [0]

FLOOD PLAIN QUALITY (PAST 100 yards) (L R (Most Predominant Per Bank)):
☐ ☐ -FOREST, SWAMP [3]
☐ ☐ -SHRUB OR OLD FIELD [2]
☑ ☑ -RESIDENTIAL, PARK, NEW FIELD [1]
☐ ☐ -FENCED PASTURE [1]
☐ ☐ -CONSERVATION TILLAGE [1]
☐ ☐ -URBAN OR INDUSTRIAL [0]
☐ ☐ -OPEN PASTURE, ROWCROP [0]
☐ ☐ -MINING / CONSTRUCTION [0]

BANK EROSION (L R (Per Bank)):
☐ ☐ -NONE / LITTLE [3]
☑ ☑ -MODERATE [2]
☐ ☐ -HEAVY / SEVERE [1]

COMMENTS:

Riparian: 5 / Max 10

5) POOL / GLIDE AND RIFFLE / RUN QUALITY

MAX DEPTH (Check 1 ONLY):
☑ - 1m [6]
☐ - 0.7m [4]
☐ - 0.4 to 0.7m [2]
☐ - 0.2 to 0.4m [1]
☐ - < 0.2m [POOL = 0]

WORK/ECOLOGY (Check 1 or 2 & AVERAGE):
☐ -POOL WIDTH > RIFFLE WIDTH [2]
☑ -POOL WIDTH = RIFFLE WIDTH [1]
☐ -POOL WIDTH < RIFFLE WIDTH [0]
☐ -IMPOUNDED [-1]

CURRENT VELOCITY (POOLS & RIFFLES) (Check All That Apply):
☐ -EDDIES [1]
☐ -FAST [1]
☑ -MODERATE [1]
☑ -SLOW [1]
☐ -NONE [-1]
☐ -TORRENTIAL [-1]
☐ -INTERSTITIAL [-1]
☐ -INTERMITTENT [-2]
☐ -VERY FAST [-1]

Pool / Current: 9 / Max 12

COMMENTS:

6) RIFFLE / RUN DEPTH (CHECK ONE OR CHECK 2 AND AVERAGE)

RIFFLE DEPTH:
☑ -Riffle Areas > 10cm [2]
☐ -Riffle Areas 5 - 10cm [1]
☐ -Riffle Areas < 5cm [0]
☐ -NO RIFFLE but RUNS present [0]
☐ NO RIFFLE / NO RUN [Score = 0]

RUN DEPTH:
☑ - MAX > 50 cm [2]
☐ - MAX < 50 cm [1]

RIFFLE / RUN SUBSTRATE:
☐ -STABLE (e.g., Cobble, Boulder) [2]
☑ -MOD. STABLE (e.g., Large Gravel) [1]
☐ -UNSTABLE (Fine Gravel, Sand) [0]

RIFFLE / RUN EMBEDDEDNESS:
☐ -NONE [2]
☐ -LOW [1]
☑ -MODERATE [0]
☐ -EXTENSIVE [-1]

Riffle / Run: 5 / Max 8

COMMENTS:

Gradient: 10 / Max 10

6) GRADIENT (ft / mi): 4.4 DRAINAGE AREA (SQ MI): 32.8

% POOL: ____ % GLIDE: ____
% RIFFLE: ____ % RUN: ____

Riffle/run area must be large enough to support a population of riffle/run species

Gradient score = Gradient (ft/mi) + Drainage area (sq mi)

Is Sampling Reach Representative of the Stream? (Y/ N)

If Not, Explain:

Lat / Long (Beg):	
Lat / Long (Mid):	
Lat / Long (End):	
Lat / Long (X-Loc):	

Major Suspected Sources of Impacts (Check All That Apply):

- None
- Industrial
- WWTP
- Agriculture
- Livestock
- Silviculture
- Construction
- Urban Runoff
- CSOs
- Suburban impacts
- Mining
- Channelization
- Riparian Removal
- Landfills
- Natural
- Dams
- Other Flow Alteration

Other:

Subjective Rating (1-10): 6

Aesthetic Rating (1-10): 6

Gradient: ☐ -Low ☐ -Moderate ☐ -High

First Sampling Pass	Color	Odor	Water Clarity	Water Stage	Canopy % open
	P	None	Clear	Normal	100

Flow Nr:

- ☐ ☐ Is Stream Ephemeral (no goods, totally dry of only damp spots)?
- ☐ ☐ Is there water upstream? How far:
- ☐ ☐ Is there water close downstream? How far:
- ☐ ☐ Is Dry Channel mostly natural?

Stream Drawing:

Instructions for scoring the alternate cover metric: Each cover type should receive a score of between 0 and 3, where: 0 = Cover type absent; 1 = cover type in very small amounts or if more common of marginal quality; 2 = cover type present in moderate amounts, but not of highest quality or in small amounts of highest quality; 3 = cover type of highest quality in moderate or greater amounts. Examples of highest quality include, very large boulders in deep or fast water, large diameter logs that are stable, well developed rootwads in deep / fast water, or deep, well-defined, functional pools.

Qualitative Habitat Evaluation Index Field Sheet

QHEI Score: 40

River Code: [illegible] RM: 2.5 Stream: S. Fork Rocky River

Site Code: 1003 Project Code: [illegible] Location:

Date: 8-21-12 Scorer: MRC Latitude: 41.3779 Longitude: -81.8773

1) SUBSTRATE (Check ONLY Two Substrate TYPE BOXES; Estimate % percent)

TYPE	POOL	RIFFLE		POOL	RIFFLE
☐ ☐ BLDR/SLAB [9]			☐ ☑ GRAVEL [7]		
☐ ☐ Lg BOULDER [8]			☑ ☐ SAND [6]		
☐ ☐ BOULDER [8]			☐ ☐ BEDROCK [5]		
☐ ☐ COBBLE [8]			☐ ☐ DETRITUS [3]		
☐ ☐ HARDPAN [4]			☐ ☐ ARTIFICIAL [0]		
☐ ☐ MUCK [2]			☐ ☐ SILT [2]		

SUBSTRATE 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]

SUBSTRATE QUALITY (Check ONE (OR 2 & AVERAGE)): SILT: ☐ -SILT HEAVY [-2] ☐ -SILT MODERATE [-1] ☑ -SILT NORMAL [0] ☐ -SILT FREE [1]; EMBEDDED: ☐ -EXTENSIVE [-2] ☐ -MODERATE [-1] ☑ -NORMAL [0] ☐ -NONE [1]

Substrate Max 20: 16

NUMBER OF SUBSTRATE TYPES (High Quality Only, Score 1 or 2): ☑ -4 or More [2] ☐ -3 or Less [0]

COMMENTS:

2) INSTREAM COVER (Give each cover type a score of 0 to 3 see back for instructions)

(Enclose)	TYPE (Score All That Occur)	
1 UNDERCUT BANKS [1]	3 POOLS > 70 cm [2]	0 OVERHANG VEGETATION [0]
2 OVERHANGING VEGETATION [1]	1 ROOTWADS [1]	2 AQUATIC MACROPHYTES [1]
1 SHALLOWS (IN SLOW WATER) [1]	1 BOULDERS [1]	1 LOGS OR WOODY DEBRIS [1]
1 ROOTWADS [1]		

AMOUNT (Check ONLY one or check 2 and AVERAGE): ☐ -EXTENSIVE > 75% [11] ☑ -MODERATE 25 - 75% [7] ☐ -SPARSE 5 - 25% [3] ☐ -NEARLY ABSENT < 5% [1]

Cover Max 20: 13

COMMENTS:

3) CHANNEL MORPHOLOGY (CHECK ONLY one PER Category OR check 2 and AVERAGE)

SINUOSITY	DEVELOPMENT	CHANNEL EROSION	STABILITY
☐ -HIGH [4]	☐ -EXCELLENT [7]	☐ -NONE [6]	☐ -HIGH [3]
☑ -MODERATE [2]	☐ -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]	

MODIFICATIONS (OTHER): ☐ -DRAGGING ☐ -RELOCATION ☐ -CANOPY REMOVAL ☐ -CHEMICAL ☐ -IMPOUNDMENT ☐ -ISLAND ☐ -LEVEE ☐ -BANK SHAPING ☐ -ONE SIDE CHANNEL MODIFICATIONS

Channel Max 20: 11

COMMENTS:

4) RIPARIAN ZONE AND BANK EROSION (check ONE box PER bank or check 2 and AVERAGE per bank)

River Right Looking Downstream

RIPARIAN WIDTH (L R (Per Bank))	FLOOD PLAIN QUALITY (PAST 100 Meter Riparian) (L R (Most Predominant Per Bank))	BANK EROSION (L R (Per Bank))
☐ ☐ -VERY WIDE > 100m [5]	☐ ☐ -FOREST, SWAMP [3]	☐ ☐ -CONSERVATION TILLAGE [1]
☐ ☐ -WIDE > 50m [4]	☐ ☐ -SHRUB OR OLD FIELD [2]	☐ ☐ -URBAN OR INDUSTRIAL [0]
☐ ☐ -MODERATE 10 - 50m [3]	☐ ☐ -RESIDENTIAL, PARK, NEW FIELD [1]	☐ ☐ -OPEN PASTURE, ROWCROP [0]
☑ ☐ -SHALLOW 5 - 10m [2]	☐ ☐ -FENCED PASTURE [0]	☐ ☐ -MINING / CONSTRUCTION [0]
☐ ☐ -VERY NARROW < 5m [1]		
☐ ☐ -NONE [0]		

☐ ☐ -NONE / LITTLE [3] ☑ ☑ -MODERATE [2] ☐ ☐ -HEAVY / SEVERE [1]

Riparian Max 10: 6

COMMENTS:

5) POOL / GLIDE AND RIFFLE / RUN QUALITY

MAX DEPTH (Check 1 ONLY): ☐ -1m [6] ☑ -0.7m [4] ☐ -0.4 to 0.7m [2] ☐ -0.2 to 0.4m [1] ☐ -<0.2m [0]

MORPHOLOGY (Check 1 or 2 & AVERAGE): ☐ -POOL WIDTH > RIFFLE WIDTH [3] ☑ -POOL WIDTH = RIFFLE WIDTH [2] ☐ -POOL WIDTH < RIFFLE WIDTH [1] ☐ -IMPOUNDED [-1]

CURRENT VELOCITY (POOLS & RIFFLES) (Check All That Apply): ☐ -EDDIES [1] ☐ -FAST [1] ☑ -MODERATE [1] ☑ -SLOW [1] ☐ -NONE [-1] ☐ -TORRENTIAL [-1] ☐ -INTERSTITIAL [-1] ☐ -INTERMITTENT [-2] ☐ -VERY FAST [-1]

Pool / Current Max 12: 9

COMMENTS:

6) RIFFLE / RUN QUALITY (CHECK 2 AND AVERAGE)

RIFFLE DEPTH: ☐ -Riffle Absent = 0cm [0] ☐ -Riffle Absent 5 - 10cm [1] ☐ -Riffle Absent > 5cm [2] ☑ -NO RIFFLE but RUNS present [1] ☐ -NO RIFFLE / NO RUN (Marsh) = 0 [0]

RUN DEPTH: ☑ -MAX > 50 cm [2] ☐ -MAX < 50 cm [1]

RIFFLE / RUN SUBSTRATE: ☐ -STABLE (e.g., Cobble, Boulder) [2] ☑ -MOD. STABLE (e.g., Large Gravel) [1] ☐ -UNSTABLE (Fine Gravel, Sand) [0]

RIFFLE / RUN EMBEDDEDNESS: ☐ -NONE [2] ☐ -LOW [1] ☑ -MODERATE [0] ☐ -EXTENSIVE [-1]

Riffle / Run Max 8: 5

COMMENTS:

7) GRADIENT (ft / mi): 9.1 DRAINAGE AREA (SQ MI): 17.6

% POOL: [ ] % GLIDE: [ ] % RIFFLE: [ ] % RUN: [ ]

Gradient Max 10: 10

*Stat area must be large enough to support completion of riffle/run sections

Is Sampling Reach Representative of the Stream? (Y/ N) ____ If Not, Explain: ____

Lat / Long (Beg):	
Lat / Long (Mid):	
Lat / Long (End):	
Lat / Long (X-Loc):	

Subjective Rating (1-10): 6

Aesthetic Rating (1-10): 5

First Sampling Pass	Gear:	Distance:	Water Clarity:	Water Stage:	Canopy % open:
	P	500	Clear	Normal	100

Gradient: ☐ -Low ☐ -Moderate ☐ -High

Yes	No	
☐	☐	Is Stream Ephemeral (no pools, totally dry or only damp spots)?
☐	☐	Is there water upstream? How far
☐	☐	Is there water close downstream? How far
☐	☐	Is Dry Channel mostly natural?

Major Suspected Sources of Impacts (Check All That Apply):

- None ☐
- Industrial ☐
- WWTP ☐
- Agriculture ☐
- Livestock ☐
- Silviculture ☐
- Construction ☐
- Urban Runoff ☐
- CSOs ☐
- Suburban Impacts ☐
- Mining ☐
- Channelization ☐
- Riparian Removal ☐
- Landfills ☐
- Natural ☐
- Dams ☐
- Other Flow Alteration ☐

Other: ____

Stream Drawing:

Instructions for scoring the alternate cover metric: Each cover type should receive a score of between 0 and 3, where: 0 = Cover type absent; 1 = cover type in very small amounts or if more common of marginal quality; 2 = cover type present in moderate amounts, but not of highest quality or in small amounts of highest quality; 3 = cover type of highest quality in moderate of greater amounts. Examples of highest quality include, very large boulders in deep or fast water, large diameter logs that are stable, well developed rootwads in deep / fast water, or deep, well-defined, functional pools.

end = 9th LDCHEI

Qualitative Habitat Evaluation Index Field Sheet

QHEI Score: 41

River Code: 35-666 RM: 6.5 Stream: Rock Run
Site Code: 11084 Project Code: 10 Rock 18 Location: upst Fairfield Rd
Date: 8-14-18 Scorer: JAL JMC Latitude: 39.[illegible] Longitude: -82.[illegible]

1) SUBSTRATE (Check ONLY Two Substrate TYPE BOXES; Estimate % percent)

TYPE	POOL	RIFFLE	TYPE	POOL	RIFFLE
☐ ☐ BLDR/SLAB [10]			☐ ☐ GRAVEL [7]		
☐ ☐ LG BOULD [10]			☐ ☐ SAND [6]		
☐ ☐ BOULDER [9]			☐ ☐ BEDROCK [5]		
☐ ☐ COBBLE [8]			☐ ☐ DETRITUS [3]		
☐ ☐ HARDPAN [4]			☐ ☐ ARTIFICIAL [0]		
☒ ☐ MUCK [0]	2	1	☐ ☐ SILT [0]	1	1

SUBSTRATE 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]

SILT
SUBSTRATE QUALITY (Check ONE OR 2 & AVERAGE)
☐ -SILT HEAVY [-2]
☐ -SILT MODERATE [-1]
☐ -SILT NORMAL [0]
☐ -SILT FREE [1]

EMBEDDED / NESS
☒ -EXTENSIVE [-2]
☐ -MODERATE [-1]
☐ -NORMAL [0]
☐ -NONE [1]

Substrate 7 Max 20

NUMBER OF SUBSTRATE TYPES (High Quality Only, Score 6 or 1)
☐ -4 or More [2]
☒ -3 or Less [0]

COMMENTS:

2) INSTREAM COVER (Use each cover type a score of 0 to 3; see back for instructions)

(Structure)	TYPE: Score All That Occur	
___ UNDERCUT BANKS [1]	___ POOLS > 75 cm [2]	___ CHANNEL MACROPHYTES [1]
1 OVERHANGING VEGETATION [1]	___ ROOTWADS [1]	___ AQUATIC MACROPHYTES [1]
1 SHALLOWS (IN SLOW WATER) [1]	___ BOULDERS [1]	___ LOGS OR WOODY DEBRIS [1]
___ ROOTMATS [1]		

AMOUNT (Check ONLY one or check 2 and AVERAGE)
☐ -EXTENSIVE > 75% [11]
☒ -MODERATE 25 - 75% [7]
☒ -SPARSE 5 - 25% [3]
☐ -NEARLY ABSENT < 5% [1]

Cover 1 Max 20

COMMENTS:

3) CHANNEL MORPHOLOGY (Check ONLY one PER Category OR check 2 and 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]	
		☐ -MAXIMIZED [-1]	

MODIFICATIONS (OTHER)
☐ -SNAGGING
☐ -RELOCATION
☐ -CANOPY REMOVAL
☐ -DREDGING
☐ -ONE SIDE CHANNEL MODIFICATIONS
☐ -IMPOUNDMENT
☐ -ISLAND
☐ -LEVEED
☐ -BANK (RIPRAP)

Channel 10 Max 20

COMMENTS:

4) RIPARIAN ZONE AND BANK EROSION (Check ONE box PER Bank or check 2 and AVERAGE per bank)

River Right Looking Downstream

RIPARIAN WIDTH (L R) (Per Bank)	FLOODPLAIN QUALITY (PAST 100 Meter REVIEW) (L R) (Most Predominant Per Bank)	BANK EROSION (L R) (Per Bank)
☒ ☒ -VERY WIDE > 100m [5]	☐ ☐ -FOREST, SWAMP [3]	☐ ☐ -CONSERVATION TILLAGE [1]	☒ ☒ -NONE / LITTLE [3]
☐ ☐ -WIDE > 50m [4]	☐ ☐ -SHRUB OR OLD FIELD [2]	☐ ☐ -URBAN OR INDUSTRIAL [0]	☐ ☐ -MODERATE [2]
☐ ☐ -MODERATE 10 - 50m [3]	☒ ☒ -RESIDENTIAL, PARK, NEW FIELD [1]	☐ ☐ -OPEN PASTURE, ROW CROP [0]	☐ ☐ -HEAVY / SEVERE [1]
☐ ☐ -NARROW 5 - 10m [2]	☐ ☐ -FENCED PASTURE [1]	☐ ☐ -MINING / CONSTRUCTION [0]	
☐ ☐ -VERY NARROW < 5m [1]			
☐ ☐ -NONE [0]			

COMMENTS:

Riparian 9 Max 10

5) POOL / GLIDE AND RIFFLE / RUN QUALITY

MAX DEPTH (Deepest ONLY)
☒ -1m [6]
☐ -0.7m [4]
☐ -0.4 to 0.7m [2]
☐ -0.2 to 0.4m [1]
☐ -< 0.2m [POOL = 0]

MORPHOLOGY (Check 1 or 2 & AVERAGE)
☐ -POOL WIDTH > RIFFLE WIDTH [3]
☒ -POOL WIDTH = RIFFLE WIDTH [1]
☐ -POOL WIDTH < RIFFLE WIDTH [0]
☐ -IMPOUNDED [-1]

CURRENT VELOCITY (POOLS & RIFFLES) (Check All That Apply)
☐ -SWIFT [1]
☐ -MODERATE [1]
☒ -SLOW [1]
☐ -INTERSTITIAL [-1]
☐ -INTERMITTENT [-2]
☐ -VERY FAST [1]
☐ -TORRENTIAL [-1]
☐ -NONE [-1]

Pool / Current 7 Max 12

COMMENTS:

6) RIFFLE / RUN QUALITY (CHECK ONE OR CHECK 2 AND AVERAGE)

RIFFLE DEPTH
☐ -Best Areas > 15cm [2]
☐ -Best Areas 5 - 15cm [1]
☐ -Best Areas < 5cm [0]
☐ -NO RIFFLE but RUN present [0]
☒ -NO RIFFLE / NO RUN (Stream) = 0]

RUN DEPTH
☐ -MAX > 50 cm [2]
☐ -MAX < 50 cm [1]

RIFFLE / RUN SUBSTRATE
☐ -STABLE (e.g. Cobble, Boulder) [2]
☒ -MOD. STABLE (e.g. Large Gravel) [1]
☐ -UNSTABLE (Fine Gravel, Sand) [0]

RIFFLE / RUN EMBEDDEDNESS
☐ -NONE [2]
☒ -LOW [1]
☐ -MODERATE [0]
☐ -EXTENSIVE [-1]

RIFL / Run 0 Max 2

Gradient 10

COMMENTS:

7) GRADIENT (ft / mi) 12.3 DRAINAGE AREA (sq mi) 6.15 % POOL % GLIDE % RIFFLE % RUN

Stream must be large enough to support a population of fifty adjacent species

Gradient Score from Table (Cell Score Attained based on gradient and drainage area) Max 10

Is Sampling Reach Representative of the Stream? (Y) (N)

If Not, Explain: bedrock - no substrate

Lat / Long (Beg): _____

Lat / Long (Mid): _____

Lat / Long (End): _____

Lat / Long (X-Loc): _____

Subjective Rating (1-10)

Aesthetic Rating (1-10)

Gradient: ☐ -Low ☐ -Moderate ☐ -High

	Time:	Distance:	Water Clarity:	Water Stage:	Canopy: % open:
First Sampling Pass					

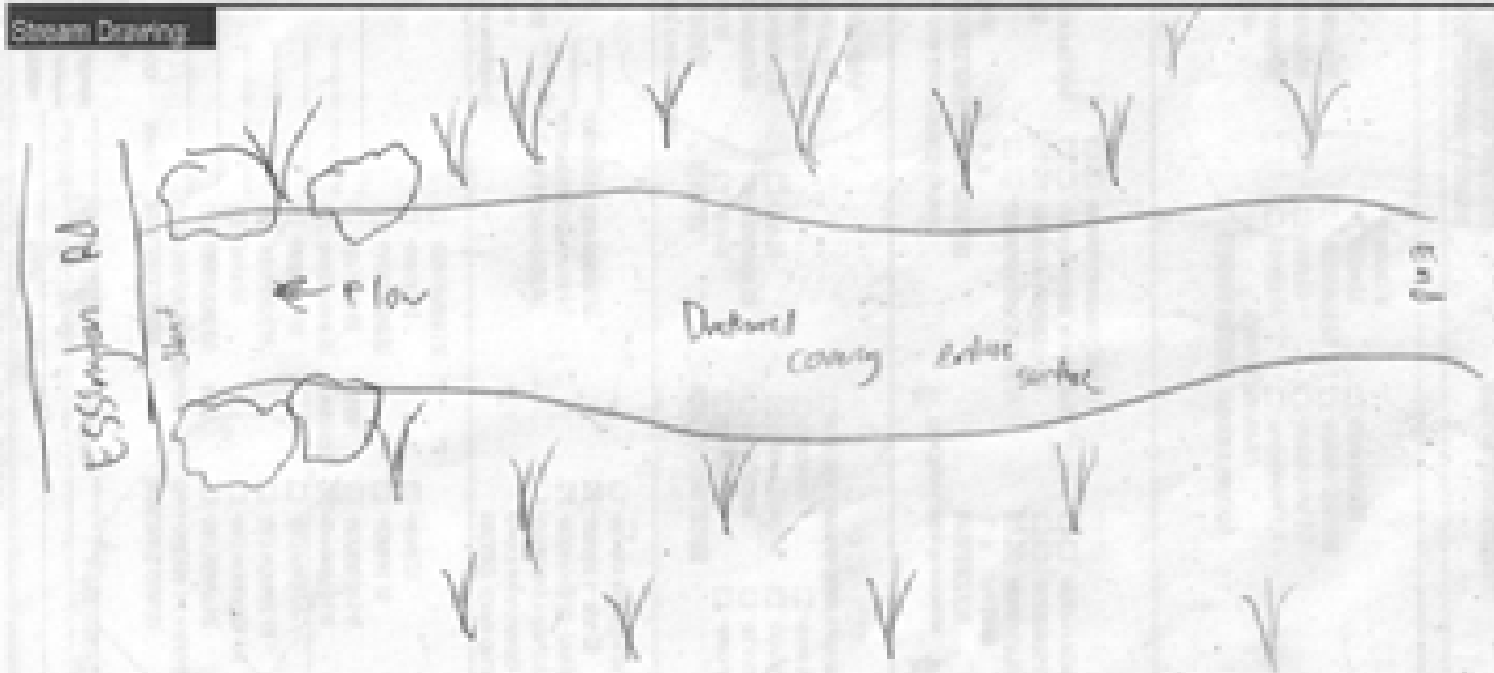
Yes	No	
☐	☐	Is Stream Ephemeral (no pools, totally dry at only damp spots)?
☐	☐	Is there water upstream? How far:
☐	☐	Is there water down stream? How far:
☐	☐	Is Dry Channel mostly natural?

Major Suspected Sources of Impacts (Check All That Apply)

- ☐ None
- ☐ Industrial
- ☐ WWTP
- ☐ Agriculture
- ☐ Livestock
- ☐ Silviculture
- ☐ Construction
- ☐ Urban Runoff
- ☐ CSOs
- ☐ Suburban Impacts
- ☐ Mining
- ☐ Channelization
- ☐ Riparian Removal
- ☐ Landfills
- ☐ Natural
- ☐ Dams
- ☐ Other Flow Alteration

Other: _____

Stream Drawing:



Instructions for scoring the alternate cover metric: Each cover type should receive a score of between 0 and 3, where: 0 = Cover type absent; 1 = cover type in very small amounts or if more common of marginal quality; 2 = cover type present in moderate amounts, but not of highest quality or in small amounts of highest quality; 3 = cover type of highest quality in moderate of greater amounts. Examples of highest quality include, very large boulders in deep or fast water, large diameter logs that are stable, well developed rootwads in deep / fast water, or deep, well-defined, functional pools.

Qualitative Habitat Evaluation Index Field Sheet

QHEI Score: 49.5

River Code: 33-Cedar | Rkt: 7.0 | Stream: Dutch Run
Site Code: CED7 | Project Code: CEDAR TP | Location: Rt. 83
Date: 7-16-13 | Scorer: MAS | Latitude: 41 [illegible] | Longitude: -81 [illegible]

I. SUBSTRATE (Check ONLY Two Substrate TYPE BOXES; Estimate % percent)

TYPE	POOL	RIFFLE
☐ ☐ BLDR/SLAB [10]		
☐ ☐ Lg BOULD [10]		
☐ ☐ BOULDER [9]		
☐ ☐ COBBLE [8]		
☐ ☐ HARDPAN [6]		
☐ ☐ MUCK [2]		
☑ ☐ GRAVEL [7]		
☐ ☑ SAND [6]		
☐ ☐ BEDROCK [9]		
☐ ☐ DETRITUS [3]		
☐ ☐ ARTIFICIAL [0]		
☐ ☐ SILT [2]		

SUBSTRATE ORIGIN — Check ONE (OR 2 & AVERAGE)
☐ -LIMESTONE [1]
☑ -TILLS [1]
☐ -WETLANDS [0]
☐ -HARDPAN [0]
☐ -SANDSTONE [0]
☐ -RIP / RAP [0]
☐ -LACUSTRINE [0]
☐ -DUNE [+1]
☐ -COAL FINES [-2]

SUBSTRATE QUALITY — Check ONE (OR 2 & AVERAGE)
SILT:
☐ -SILT HEAVY [-2]
☐ -SILT MODERATE [-1]
☑ -SILT NORMAL [0]
☐ -SILT FREE [1]
EMBEDDED:
☐ -EXTENSIVE [-2]
☑ -MODERATE [-1]
☐ -NORMAL [0]
☐ -NONE [1]

NUMBER OF SUBSTRATE TYPES: (High Quality Only; Score 0 or 1)
☑ -4 or More [2]
☐ -3 or Less [0]

Substrate: 11 / Max 20

COMMENTS:

II. INSTREAM COVER (Use each cover type & score of 0 to 3; see back for instructions)

(Enter)	TYPE: Score All That Occur	
0 UNDERCUT BANKS [1]	3 POOLS > 70 cm [2]	0 OVERHANGING VEGETATION [1]
0 OVERHANGING VEGETATION [1]	1 ROOTWADS [1]	1 AQUATIC MACROPHYTES [1]
1 SHALLOWS (in SLOW WATER) [1]	1 BOULDERS [1]	1 LOGS OR WOODY DEBRIS [1]
1 ROOTMATS [1]		

AMOUNT: (Check ONLY one or check 2 and AVERAGE)
☐ -EXTENSIVE > 75% [11]
☑ -MODERATE 25 - 75% [7]
☐ -SPARSE 5 - 25% [3]
☐ -NEARLY ABSENT < 5% [1]

Cover: 15 / Max 20

COMMENTS:

III. CHANNEL MORPHOLOGY (Check ONLY one PER Category OR check 2 and 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]	

MODIFICATIONS / OTHER
☐ DRAGGING
☐ RELOCATION
☐ CANOPY REMOVAL
☐ DREDGING
☐ -IMPOUNDMENT
☐ -ISLAND
☐ -LEVEED
☐ -BANK SHAPING
☐ ONE SIDE CHANNEL MODIFICATIONS

Channel: 19.5 / Max 20

COMMENTS:

IV. RIPARIAN ZONE AND BANK EROSION (Check ONE box PER bank or check 2 and AVERAGE per bank)

River Right Looking Downstream: RR

RIPARIAN WIDTH	FLOOD PLAIN QUALITY (PAST 100 Meter AVERAGE)		BANK EROSION
L R (Per Bank)	L R (Most Predominant Per Bank)	L R	L R (Per Bank)
☐ ☐ -VERY WIDE > 100m [5]	☐ ☐ -FOREST, SWAMP [3]	☐ ☐ -CONSERVATION TILLAGE [1]	☐ ☐ -NONE / LITTLE [3]
☐ ☐ -WIDE > 50m [4]	☐ ☐ -SHRUB OR OLD FIELD [2]	☐ ☐ -URBAN OR INDUSTRIAL [0]	☑ ☑ -MODERATE [2]
☐ ☐ -MODERATE 10 - 50m [3]	☑ ☑ -RESIDENTIAL, PARK, NEW FIELD [1]	☐ ☐ -OPEN PASTURE, ROWCROP [0]	☐ ☐ -HEAVY / SEVERE [1]
☑ ☑ -NARROW 5 - 10m [2]	☐ ☐ -FENCED PASTURE [1]	☐ ☐ -MINING / CONSTRUCTION [0]	
☐ ☐ -VERY NARROW < 5m [1]			
☐ ☐ -NONE [0]			

Riparian: 6.5 / Max 10

COMMENTS:

V. POOL / GLIDE AND RIFFLE / RUN QUALITY

MAX DEPTH (Check 1 ONLY)
☑ -1m [6]
☐ -0.7m [4]
☐ -0.4 to 0.7m [2]
☐ -0.2 to 0.4m [1]
☐ -< 0.2m [POOL = 0]

MORPHOLOGY (Check 1 or 2 & AVERAGE)
☑ -POOL WIDTH > RIFFLE WIDTH [2]
☐ -POOL WIDTH = RIFFLE WIDTH [1]
☐ -POOL WIDTH < RIFFLE WIDTH [0]
☐ -IMPOUNDED [-1]

CURRENT VELOCITY (POOLS & RIFFLES) (Check All That Apply)
☐ -EDDIES [1]
☑ -FAST [1]
☐ -MODERATE [1]
☑ -SLOW [1]
☐ -NONE [-1]
☐ TORRENTIAL [-1]
☐ -INTERSTITIAL [-1]
☐ -INTERMITTENT [-2]
☐ -VERY FAST [1]

Pool / Current: 11 / Max 12

COMMENTS:

VI. RIFFLE / RUN QUALITY (CHECK ONE OR CHECK 2 AND AVERAGE)

RIFFLE DEPTH
☑ -Best Areas > 10cm [2]
☐ -Best Areas 5 - 10cm [1]
☐ -Best Areas < 5cm [0]
☐ -NO RIFFLE but RUNS present [0]
☐ -Ach RIFFLE / NO RUN [Marsh = 0]

RUN DEPTH
☑ -MAX > 50 cm [2]
☐ -MAX < 50 cm [1]

RIFFLE / RUN SUBSTRATE
☐ -STABLE (e.g., Cobble, Boulder) [2]
☑ -MOD. STABLE (e.g., Large Gravel) [1]
☐ -UNSTABLE (Fine Gravel, Sand) [0]

RIFFLE / RUN EMBEDDEDNESS
☐ -NONE [2]
☐ -LOW [1]
☑ -MODERATE [0]
☐ -EXTENSIVE [-1]

Riffle / Run: 5 / Max 8

Gradient: 10 / Max 10

VII. GRADIENT (ft / mi): 9.2 DRAINAGE AREA (sq mi): 35.5

%POOL: ____ %GLIDE: ____
%RIFFLE: ____ %RUN: ____

*Best areas must be large enough to support a population of riffle obligate species

Gradient Score Chart, Tables, & Calculation Method found in guidance and training only

Is Sampling Reach Representative of the Stream? (Y/N):

If Not, Explain:

Lat / Long (Beg):	
Lat / Long (Mid):	
Lat / Long (End):	
Lat / Long (X-Loc):	

Subjective Rating (1-10): 6

Aesthetic Rating (1-10): 6

Gradient: ☐ -Low ☐ -Moderate ☐ -High

First Sampling Pass	Distance:	Water Clarity:	Water Stage:	Canopy: % open:
	500	Clear	Normal	100

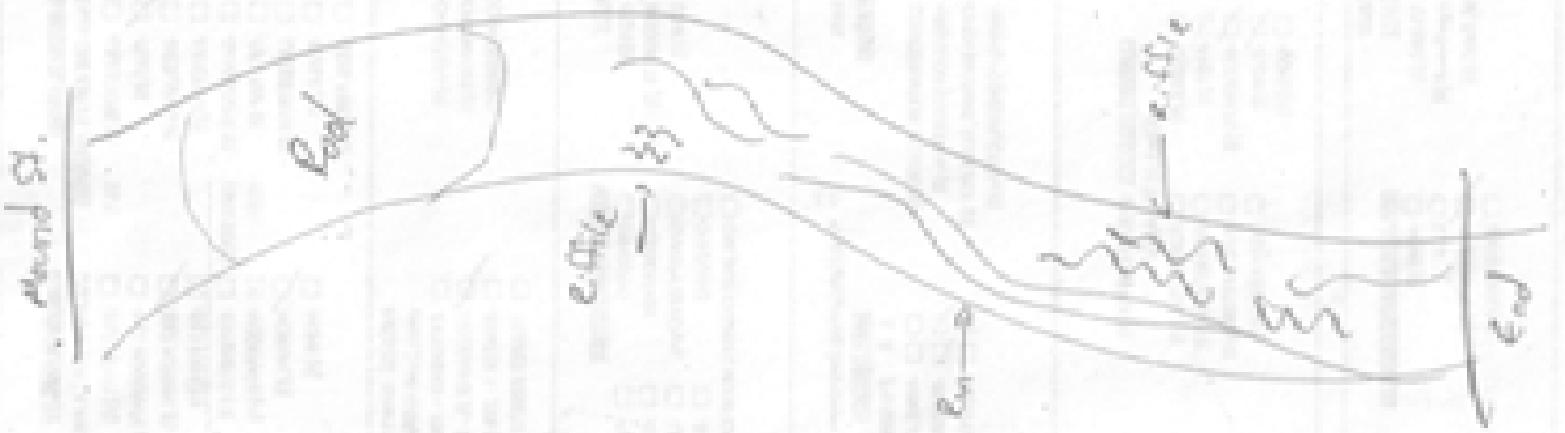
- ☐ Is Stream Ephemeral (no pools, totally dry or only damp spots)?
- ☐ Is there water upstream? How far:
- ☐ Is there water close downstream? How far:
- ☐ Is Dry Channel mostly natural?

Major Suspected Sources of Impacts (Check All That Apply):

- None ☐
- Industrial ☐
- WWTP ☐
- Agriculture ☐
- Livestock ☐
- Silviculture ☐
- Construction ☐
- Urban Runoff ☐
- CSOs ☐
- Suburban Impacts ☐
- Mining ☐
- Channelization ☐
- Riparian Removal ☐
- Landfills ☐
- Natural ☐
- Dams ☐
- Other Flow Alteration ☐

Other:

Stream Drawing:



Instructions for scoring the alternate cover metric: Each cover type should receive a score of between 0 and 3, where: 0 = Cover type absent; 1 = cover type in very small amounts or if more common of marginal quality; 2 = cover type present in moderate amounts, but not of highest quality or in small amounts of highest quality; 3 = cover type of highest quality in moderate or greater amounts. Examples of highest quality include, very large boulders in deep or fast water, large diameter logs that are stable, well developed rootwads in deep / fast water, or deep, well-defined, functional pools.

Qualitative Habitat Evaluation Index Field Sheet

QHEI Score: 75

River Code: 35-000 | RM: 9.7 | Stream: Indian River

Site Code: 1000 | Project Code: Ind. Proj. | Location: Ind. Cr. Parkway

Date: 8-30-16 | Scorer: MES | Latitude: 41.36.41.1 | Longitude: -81.50.19.7

I. SUBSTRATE (Check ONLY Two Substrate TYPE BOXES; Estimate % percent)

TYPE	POOL	RIFFLE
☐ ☐ BLDR/SLAB [10]		
☐ ☐ Lg ROCKS [10]		
☐ ☐ BOULDER [9]		
☐ ☐ COBBLE [8]		
☐ ☐ HARDPAN [4]		
☐ ☐ MUCK [2]		
☑ ☐ GRAVEL [7]		
☐ ☐ SAND [6]		
☐ ☐ BEDROCK [5]		
☐ ☐ DETRITUS [3]		
☐ ☐ ARTIFICIAL [0]		
☐ ☐ SILT [2]		

SUBSTRATE ORIGIN (Check ONE OR 2 & AVERAGE)	POOL	RIFFLE
☐ -LIMESTONE [1]		
☑ -TILLS [1]		
☐ -WETLANDS [0]		
☐ -HARDPAN [0]		
☐ -SANDSTONE [1]		
☐ -ASP / BAP [0]		
☐ -LACUSTRINE [0]		
☐ -DUNES [-1]		
☐ -COAL FINES [-2]		

SUBSTRATE QUALITY (Check ONE OR 2 & AVERAGE)	
SILT: ☐ -SILT HEAVY [-2]	
☐ -SILT MODERATE [-1]	
☑ -SILT NORMAL [0]	
☐ -SILT FREE [1]	
EMBEDDED: ☐ -EXTENSIVE [-2]	
☐ -MODERATE [-1]	
☑ -NORMAL [0]	
☐ -NONE [1]	

NUMBER OF SUBSTRATE TYPES: (High Quality Only, Score 6 or 4)
☑ -4 or More [2]
☐ -3 or Less [0]

COMMENTS:

Substrate 14.5 Max 20

II. INSTREAM COVER (Rate each cover type a score of 0 to 3; see back for instructions)

(Structure)	TYPE: Score All That Occur	
2 UNDERCUT BANKS [1]	3 POOLS > 70 cm [2]	0 OVERHANGING BRUSH/TREES [1]
1 OVERHANGING VEGETATION [1]	2 ROOTWADS [1]	0 AQUATIC MACROPHYTES [1]
1 SHALLOWS (IN SLOW WATER) [1]	1 BOULDERS [1]	1 LOGS OR WOODY DEBRIS [1]
1 ROOTWAD [1]		

AMOUNT: (Check ONLY one or check 2 and AVERAGE)
☐ -EXTENSIVE > 75% [11]
☑ -MODERATE 25 - 75% [7]
☐ -SPARSE 5 - 25% [3]
☐ -NEARLY ABSENT < 5% [1]

Cover 17 Max 20

COMMENTS:

III. CHANNEL MORPHOLOGY: (Check ONLY one PER Category OR check 2 and 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]	

MODIFICATIONS / OTHER
☐ -DIKE/DAM
☐ -RELOCATION
☐ -CANOPY REMOVAL
☐ -DREDGED
☐ -IMPOUNDMENT
☐ -ISLAND
☐ -LEVEED
☐ -BANK SHAPING
☐ -ONE SIDE CHANNEL MODIFICATIONS

Channel 14.5 Max 20

COMMENTS:

IV. RIPARIAN ZONE AND BANK EROSION (Check ONE box PER bank or check 2 and AVERAGE per bank)

River Right Looking Downstream: R L

RIPARIAN WIDTH	FLOOD PLAIN QUALITY (PAST 100 YRS REVISED)	BANK EROSION
L R (Per Bank)	L R (Most Predominant Per Bank)	L R (Per Bank)
☐ ☐ -VERY WIDE > 100m [4]	☐ ☐ -FOREST, SWAMP [3]	☐ ☐ -NONE / LITTLE [3]
☐ ☐ -WIDE > 50m [3]	☐ ☐ -SHRUB OR OLD FIELD [2]	☑ ☑ -MODERATE [2]
☑ ☐ -MODERATE 10 - 50m [2]	☐ ☐ -RESIDENTIAL, PARK, NEW FIELD [1]	☐ ☐ -HEAVY / SEVERE [1]
☐ ☑ -NARROW 5 - 10m [1]	☑ ☐ -FENCED PASTURE [1]	
☐ ☐ -VERY NARROW < 5m [1]	☐ ☐ -CONSERVATION TILLAGE [1]	
☐ ☐ -NONE [0]	☐ ☐ -URBAN OR INDUSTRIAL [0]	
	☐ ☐ -OPEN PASTURE, ROWCROP [0]	
	☐ ☐ -MINING / CONSTRUCTION [0]	

COMMENTS:

Riparian 14.5 Max 10

V. POOL / GLIDE AND RIFFLE / RUN QUALITY

MAX DEPTH (Check 1 ONLY)
☑ -1m [6]
☐ -0.7m [4]
☐ -0.4 to 0.7m [2]
☐ -0.2 to 0.4m [1]
☐ -< 0.2m [POOL = 0]

MORPHOLOGY (Check 1 or 2 & AVERAGE)
☑ -POOL WIDTH > RIFFLE WIDTH [1]
☐ -POOL WIDTH = RIFFLE WIDTH [1]
☐ -POOL WIDTH < RIFFLE WIDTH [0]
☐ -IMPOUNDED [-1]

CURRENT VELOCITY (POOLS & RIFFLES) (Check All That Apply)
☑ -EDDIES [1]
☑ -FAST [1]
☑ -MODERATE [1]
☑ -SLOW [1]
☐ -NONE [-1]
☐ -TORRENTIAL [-1]
☐ -INTERSTITIAL [-1]
☐ -INTERMITTENT [-2]
☐ -VERY FAST [1]

Pool / Current 17 Max 12

COMMENTS:

VI. RIFFLE / RUN QUALITY

CHECK ONLY ONE OR CHECK 2 AND AVERAGE

RIFFLE DEPTH
☑ -Riffle Areas > 10cm [2]
☐ -Riffle Areas 5 - 10cm [1]
☐ -Riffle Areas < 5cm [0]
☐ -NO RIFFLE but RUNS present [0]
☐ -NO RIFFLE / NO RUN [Marsh = 0]

RUN DEPTH
☑ - MAX > 50 cm [2]
☐ - MAX < 50 cm [1]

RIFFLE / RUN SUBSTRATE
☑ -STABLE (e.g., Cobble, Boulder) [2]
☑ -MOD. STABLE (e.g., Large Gravel) [1]
☐ -UNSTABLE (Fine Gravel, Sand) [0]

RIFFLE / RUN EMBEDDEDNESS
☐ -NONE [2]
☑ -LOW [1]
☐ -MODERATE [0]
☐ -EXTENSIVE [-1]

Riffle / Run 14.5 Max 8

Gradient 10 Max 10

COMMENTS:

6) GRADIENT (ft / mi): 9.1 (DRAINAGE AREA (sq mi): 77.6)

% POOL: % GLIDE:
% RIFFLE: % RUN:

Gradient Score from Table 2 of User Manual based on gradient and drainage area

Stream must be large enough to support a population of riffle obligate species

Is Sampling Reach Representative of the Stream? (Y/ N) _____ If Not, Explain: _____

Lat / Long (Beg):	
Lat / Long (Mid):	
Lat / Long (End):	
Lat / Long (X-Lac):	

Subjective Rating (1-10): 8

Aesthetic Rating (1-10): 8

Gradient: ☐ -Low ☐ -Moderate ☐ -High

First Sampling Pass	Clear:	Distance:	Water Clarity:	Water Stage:	Canopy: % open:
	P	600	Clear	Normal	100

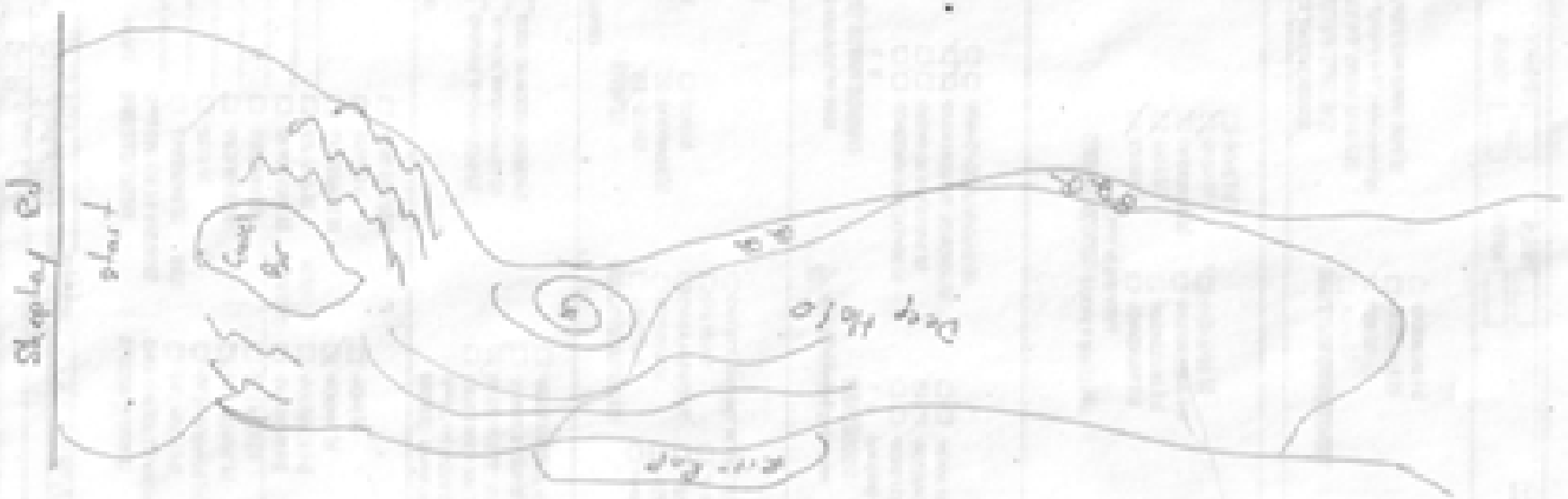
Yes	No	
☐	☐	Is Stream Ephemeral (no pools, totally dry or only damp spots)?
☐	☐	Is there water upstream? How far:
☐	☐	Is there water close downstream? How far:
☐	☐	Is Dry Channel mostly natural?

Major Suspected Sources of Impacts (Check All That Apply):

- None ☐
- Industrial ☐
- MWTP ☐
- Agriculture ☐
- Livestock ☐
- Silviculture ☐
- Construction ☐
- Urban Runoff ☐
- CSOs ☐
- Suburban Impacts ☐
- Mining ☐
- Channelization ☐
- Riparian Removal ☐
- Landfills ☐
- Natural ☐
- Dams ☐
- Other Flow Alteration ☐

Other: _____

Stream Drawing:



Instructions for scoring the alternate cover metric: Each cover type should receive a score of between 0 and 3, where: 0 = Cover type absent; 1 = cover type in very small amounts or if more common of marginal quality; 2 = cover type present in moderate amounts, but not of highest quality or in small amounts of highest quality; 3 = cover type of highest quality in moderate or greater amounts. Examples of highest quality include, very large boulders in deep or fast water, large diameter logs that are stable, well developed rootwads in deep / fast water, or deep, well-defined, functional pools.

Qualitative Habitat Evaluation Index Field Sheet

QHEI Score: 74.5

River Code: 33-[illegible] RM: 1.0 Stream: Paint River

Site Code: [illegible] Project Code: [illegible] Location: [illegible]

Date: 8-15-08 Scorer: AMS Latitude: [illegible] Longitude: [illegible]

I. SUBSTRATE (Check ONLY Two Substrate TYPE BOXES; Estimate % percent)

TYPE	POOL	RIFFLE		POOL	RIFFLE
☐ ☐ BLDR/SLAB [10]			☑ ☐ GRAVEL [7]		
☐ ☐ ½g RDY/LAT [10]			☐ ☑ SAND [6]		
☐ ☐ BOULDER [9]			☐ ☐ BEDROCK [5]		
☐ ☐ COBBLE [8]			☐ ☐ DETRITUS [3]		
☐ ☐ HARDPAN [4]			☐ ☐ ARTIFICIAL [2]		
☐ ☐ MUCK [2]			☐ ☐ SILT [2]		

SUBSTRATE ORIGIN (Check ONE (OR 2 & AVERAGE))
- ☐ -LIMESTONE [1]
- ☑ -TILLS [1]
- ☐ -WETLANDS [0]
- ☐ -HARDPAN [0]
- ☐ -SANDSTONE [0]
- ☐ -ASP / BAP [0]
- ☐ -LACUSTRINE [0]
- ☐ -SHALE [-1]
- ☐ -COAL FINES [-2]

SUBSTRATE QUALITY (Check ONE (OR 2 & AVERAGE))
- SILT: ☐ -SILT HEAVY [-2]
- SILT: ☐ -SILT MODERATE [-1]
- SILT: ☑ -SILT NORMAL [0]
- SILT: ☐ -SILT FREE [1]
- EMBEDDED: ☐ -EXTENSIVE [-2]
- EMBEDDED: ☐ -MODERATE [-1]
- EMBEDDED: ☑ -NORMAL [0]
- EMBEDDED: ☐ -NONE [1]

Substrate: 14 / Max 20

NUMBER OF SUBSTRATE TYPES: ☑ -4 or More [2] ☐ -3 or Less [0]
(High Quality Only, Score 5 or +)

COMMENTS:

II. INSTREAM COVER (Type and % coverage; Score all That Occur)

(Duration)
- 2 UNDERCUT BANKS [1]
- 1 OVERHANGING VEGETATION [1]
- ___ SHALLOWS (IN SLOW WATER) [1]
- ___ ROOTWADS [1]

TYPE (Score All That Occur)
- 3 POOLS > 70 cm [2]
- ___ ROOTWADS [1]
- ___ BOULDERS [1]
- ___ LOGS OR WOODY DEBRIS [1]
- ___ SNAGS, BAGS/RAFTS [1]
- ___ AQUATIC MACROPHYTES [1]
- ___ LOGS OR WOODY DEBRIS [1]

AMOUNT (Check ONLY one or check 2 and AVERAGE)
- ☐ -EXTENSIVE > 75% [11]
- ☑ -MODERATE 25 - 75% [7]
- ☐ -SPARSE 5 - 25% [3]
- ☐ -NEARLY ABSENT < 5% [1]

Cover: 11 / Max 20

COMMENTS:

III. CHANNEL MORPHOLOGY (CHECK ONLY one PER Category OR check 2 and AVERAGE)

SINUOSITY
- ☑ -HIGH [4]
- ☐ -MODERATE [2]
- ☐ -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]

MODIFICATIONS / OTHER
- ☐ -DRAGGING
- ☐ -RELOCATION
- ☐ -CANOPY REMOVAL
- ☐ -DREDGING
- ☐ -IMPOUNDMENT
- ☐ -ISLAND
- ☐ -LEVEES
- ☐ -BANK [-1=+1=0]
- ☐ -ONE-SIDE CHANNEL MODIFICATIONS

Channel: 14.5 / Max 20

COMMENTS:

IV. RIPARIAN ZONE AND BANK EROSION (check ONE box PER bank or check 2 and AVERAGE per bank)

River Right Looking Downstream: R: 5 L: 5

RIPARIAN WIDTH

L	R	(Per Bank)
☐	☐	-VERY WIDE > 100m [5]
☐	☐	-WIDE > 50m [4]
☑	☑	-MODERATE 10 - 50m [3]
☐	☐	-NARROW 5 - 10m [2]
☐	☐	-VERY NARROW < 5m [1]
☐	☐	-NONE [0]

FLOOD PLAIN QUALITY (PAST 100 Meter EXPOSURE)

L	R	(Most Predominant Per Bank)
☐	☐	-FOREST, SWAMP [3]
☐	☐	-SHRUB OR OLD FIELD [2]
☑	☑	-RESIDENTIAL, PARK, NEW FIELD [1]
☐	☐	-FENCED PASTURE [1]
☐	☐	-CONSERVATION TILLAGE [1]
☐	☐	-URBAN OR INDUSTRIAL [0]
☐	☐	-OPEN PASTURE, ROWCROP [0]
☐	☐	-MINING / CONSTRUCTION [0]

BANK EROSION

L	R	(Per Bank)
☑	☑	-NONE / LITTLE [3]
☐	☐	-MODERATE [2]
☐	☐	-HEAVY / SEVERE [1]

Riparian: 14.5 / Max 10

COMMENTS:

V. POOL / GLIDE AND RIFFLE / RUN QUALITY

MAX DEPTH (Check 1 ONLY)
- ☑ -1m [6]
- ☐ -0.7m [4]
- ☐ -0.4 to 0.7m [2]
- ☐ -0.2 to 0.4m [1]
- ☐ -< 0.2m [POOL = 0]

MORPHOLOGY (Check 1 or 2 & AVERAGE)
- ☐ -POOL WIDTH = RIFFLE WIDTH [1]
- ☑ -POOL WIDTH > RIFFLE WIDTH [1]
- ☑ -POOL WIDTH < RIFFLE WIDTH [0]
- ☐ -IMPOUNDED [-1]

CURRENT VELOCITY (POOLS & RIFFLES) (Check All That Apply)
- ☑ -EDDIES [1]
- ☑ -FAST [1]
- ☑ -MODERATE [1]
- ☑ -SLOW [1]
- ☐ -NONE [-1]
- ☐ -TORRENTAL [-1]
- ☐ -INTERSTITIAL [-1]
- ☐ -INTERMITTENT [-2]
- ☐ -VERY FAST [1]

Pool / Current: 10 / Max 12

COMMENTS:

VI. RIFFLE / RUN QUALITY

CHECK ONE OR CHECK 2 AND AVERAGE

RIFFLE DEPTH
- ☑ -Riffle Areas > 10cm [2]
- ☐ -Riffle Areas 5 - 10cm [1]
- ☐ -Riffle Areas < 5cm [0]
- ☐ -NO RIFFLE but RUNS present [1]
- ☐ -NO RIFFLE / NO RUN [Marsh = 0]

RUN DEPTH
- ☑ -MAX > 50 cm [2]
- ☐ -MAX < 50 cm [1]

RIFFLE / RUN SUBSTRATE
- ☑ -STABLE (e.g., Cobble, Boulder) [2]
- ☐ -MOD. STABLE (e.g., Large Gravel) [1]
- ☐ -UNSTABLE (Fine Gravel, Sand) [0]

RIFFLE / RUN EMBEDDEDNESS
- ☐ -NONE [2]
- ☑ -LOW [1]
- ☐ -MODERATE [0]
- ☐ -EXTENSIVE [-1]

Riffle / Run: 4.5 / Max 8

Gradient: 10 / Max 10

COMMENTS:

VII. GRADIENT (ft / mi): 4.16 DRAINAGE AREA (sq mi): 174.

% POOL: ___ % GLIDE: ___

% RIFFLE: ___ % RUN: ___

Gradient Score from Table 2 of User Manual based on gradient and drainage area

(reach length must be large enough to support a population of riffle obligate species)

Is Sampling Reach Representative of the Stream? (Y/ N)

If Not, Explain:

Lat / Long (Beg):

Lat / Long (Mid):

Lat / Long (End):

Lat / Long (X-Loc):

Major Suspected Sources of Impacts (Check All That Apply)

- None ☐
- Industrial ☐
- WWTP ☐
- Agriculture ☐
- Livestock ☐
- Silviculture ☐
- Construction ☐
- Urban Runoff ☐
- CSOs ☐
- Suburban Impacts ☐
- Mining ☐
- Channelization ☐
- Riparian Removal ☐
- Landfills ☐
- Natural ☐
- Dams ☐
- Other Flow Alteration ☐

Other:

Subjective Rating (1-10): 8

Aesthetic Rating (3-10): 8

Gradient: ☐ Low ☐ Moderate ☐ High

First Sampling Pass	Clear?	Distance:	Water Clarity:	Water Stage:	Canopy- % open:
	P	500	Clear	Normal	70

Yes/ No

- ☐ ☐ Is Stream Ephemeral (no pools, totally dry or only damp in spots)?
- ☐ ☐ Is there water upstream? How far:
- ☐ ☐ Is there water close downstream? How far:
- ☐ ☐ Is Dry Channel mostly natural?

Stream Drawing:

Instructions for scoring the alternate cover metric: Each cover type should receive a score of between 0 and 3, where: 0 = Cover type absent; 1 = cover type in very small amounts or if more common of marginal quality; 2 = cover type present in moderate amounts, but not of high heat quality or in small amounts of highest quality; 3 = cover type of highest quality in moderate of greater amounts. Examples of highest quality include: very large boulders in deep or fast water, large diameter logs that are stable, well developed rootwads in deep / fast water, or deep, well-defined, functional pools.

APPENDIX E

E-1: FIT Factors for Deriving Primary, Secondary, and Tertiary Causes of Impairment
E-2: Northeast Illinois IPS Nutrient Ranking Index

Development of FIT Factors for Deriving Primary, Secondary, and Tertiary Causes of Impairment

For the NE IL IPS thresholds were developed for the primary nutrient and nutrient-related parameters based on grab sample data. The thresholds were based on relationships between that data and stressor-specific sensitive fish species and macroinvertebrate taxa. The relationship between the sensitive species/taxa with the fIBI and mIBI supported benchmarking these thresholds to the General Use criteria and an "Excellent" level of biological performance.

The FIT weighting score influences the categories of narrative condition (i.e., very poor, poor, or fair) each cause of impairment is placed. Each stressor is ranked from 0.1 (excellent) to 10 (very poor) based on the respective relationships with the number of stressor-sensitive fish species or macroinvertebrate taxa as the response variable with a particular stressor. Where the association is very strong (i.e., FIT value < 0.1) it means there were few outliers and a stronger power of prediction. The weighting factor is 1 and stressors that scored as very poor are still considered to be predictive of very poor biological assemblages. As the FIT value increases (i.e., >0.1 to 0.3) it signals increased variability (more outliers are observed) the weighting factor declines to 0.8 and a stressor value of 9 (very poor) would be down weighted to a score of 7.2 (poor) because the stress:response relationship had more outliers, the ability to distinguish poor vs. very poor assemblages is reduced, but still reflects an impairment. A FIT value of >0.3-1 indicates a weaker causative relationship and has lower weighting factor (X 0.6). This would change a stressor score of 9 (very poor) to a score of 5.4 (fair). Parameters with FIT vales of >3 were not used to identify causes of impairment. A summary of FIT values for 69 variables is in Appendix Table E-2.

Appendix Table E-1. FIT weighting scores based on FIT coefficients.

FIT (< 0.10) X 1;
FIT (> 0.10 – <0.3) X 0.8
FIT (> 0.30 – < 1.0) X 0.6
FIT (> 1.00 – < 3.0) X 0.5
FIT (> 3.00 – < 10.0) X 0.2
FIT (> 10 0) X 0.1

Stressor relationships can become stronger as more data is added to the IPS databases hence the need for continued monitoring. Some parameters that have weak FIT scores are because of a lack of data along a complete stressor gradient. For example, there are fewer data points at excellent biological sites for parameters such as sediment PAHs and sediment metals. This weakens the FIT values for the excellent narrative range thus in these situations only a good narrative threshold is derived. There are other important variables (e.g., benthic chlorophyll a) where the current datasets are insufficient to develop a ranking thus highlighting the need to build up the dataset.

The severity of effect of some stressors (e.g., FIT Scores <0.1) could possibly mask the effects of other stressors. As more data is collected and as some of the more prevalent stressors are abated, the influence of masked stressors may become more evident. As such, the FIT values and scores could change in future iterations of the IPS. More data will also improve the accuracy of assigning species and taxa as sensitive or tolerant to a particular stressor.

Appendix Table E-2. *FIT values based on the deviation between ambient stressor rank vs. predicted stressor rank based on fish species or macroinvertebrate taxa for streams in the NE IL IPS study area. The algorithm for FIT calculation is summarized in the text. The cell shading is related to FIT weighting coefficients: 1.0; 0.8; 0.6; 0.5; 0.2.*

Stressor	FIT Value	Stressor	FIT Value
Impervious Land Use (500m)	0.01	Copper (Wat.)	1.75
QHEI Embeddedness Score	0.03	Lead (Wat.)	2.11
Urban Land Uses (WS)	0.03	Zinc (Sed.)	2.22
QHEI Overall Score	0.04	Benzo(g,h,i)perylene	2.32
QHEI Substrate Score	0.04	Indeno(1,2,3-cd)pyrene (Sed.)	2.41
QHEI Good Attributes	0.04	Copper (Sed.)	2.42
Total Phosphorus	0.04	Benzo(b)fluoranthene (Sed.)	2.51
Impervious Land Use (30m)	0.04	Turbidity	2.61
Impervious Land Use (30m Clipped)	0.04	Nickel (Sed.)	2.67
Conductivity	0.05	Manganese (Wat.)	2.74
QHEI Channel Score	0.07	Benzo(a)pyrene (Sed.)	2.85
QHEI Silt Cover Score	0.07	Pyrene (Sed.)	2.85
Developed Land Use (WS)	0.07	Voluble Suspended Solids	2.81
Minimum Dissolved Oxygen	0.10	Lead (Sed.)	3.01
Total Dissolved Solids	0.10	Nickel (Wat.)	3.26
Impervious Land Use (WS)	0.10	Benzo(a)anthracene (Sed.)	3.48
Hydro-QHEI Depth Score	0.11	Chrysene (Sed.)	3.51
QHEI Poor Habitat Attributes	0.12	Fluoranthene (Sed.)	3.91
Hydro-QHEI Overall Score	0.13	Strontium (Sed.)	4.44
Zinc (Wat.)	0.13	Dibenz(a,h)anthracene (Sed.)	4.57
Hydro-QHEI Current Score	0.14	Agricultural Land Use (WS)	4.82
TKN	0.14	Anthracene (Sed.)	5.10
QHEI Pool Score	0.15	Phenanthrene (Sed.)	5.10
Heavy Urban Land Use (WS)	0.17	Arsenic (Sed.)	6.21
Chloride	0.17	Chromium (Sed.)	6.29
QHEI Cover Score	0.17	Sulfate	6.49
BOD (5-Day)	0.21	Manganese (Sed.)	7.08
QHEI Riffle Score	0.27	Silver (Sed.)	7.11
Total Ammonia	0.28	Aluminum (Sed.)	8.26
Nitrate	0.29	Barium (Sed.)	8.88
Sodium	0.29	Arsenic (Wat.)	9.19
QHEI Gradient Score	0.31	Potassium (Wat.)	10.13
Total Suspended Solids	0.32	Cadmium (Sed.)	11.0
Maximum Dissolved Oxygen	0.94		
Cadmium (Wat.)	0.93		
Arsenic (Sed.)	1.26		

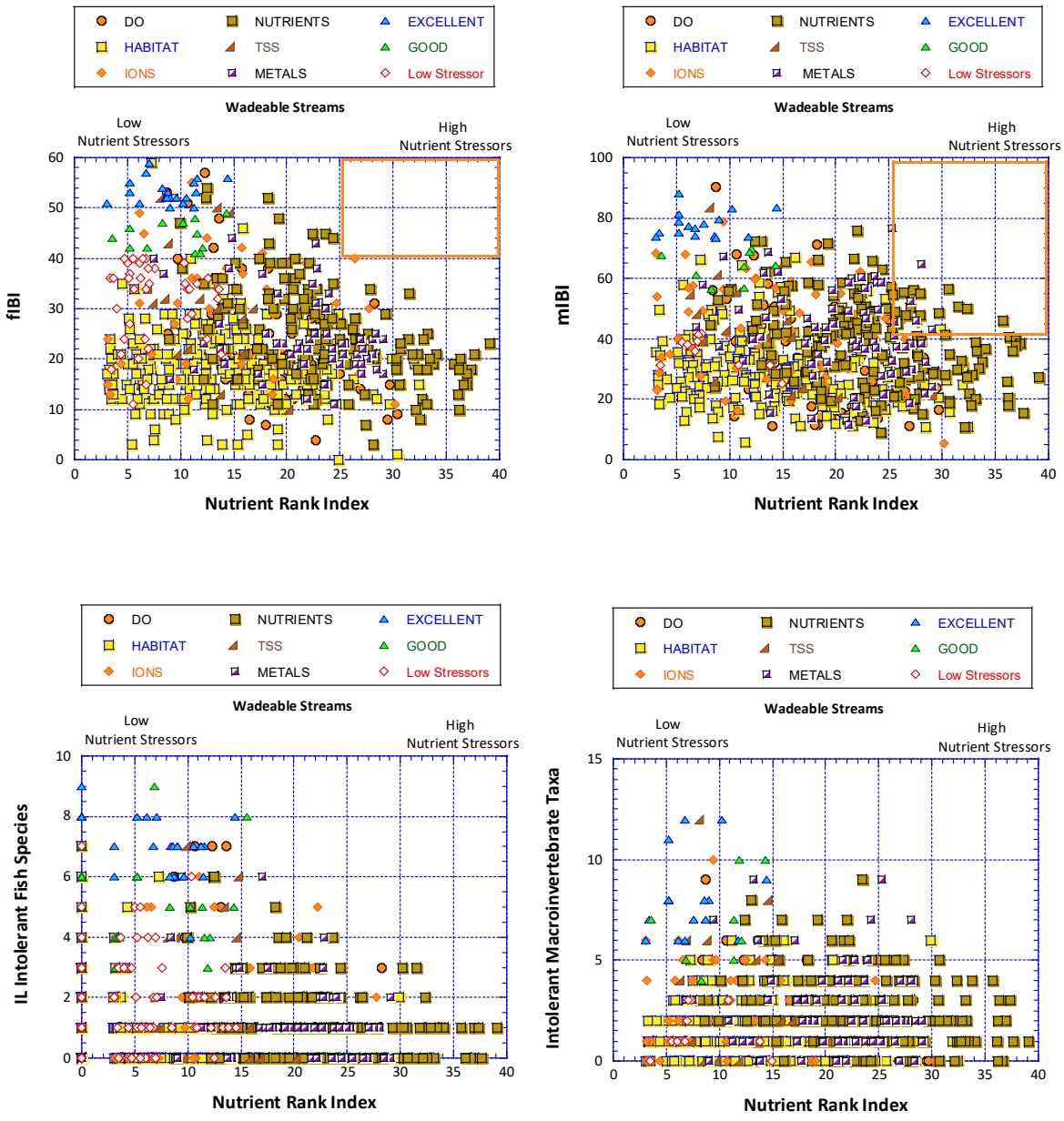
Northeast Illinois IPS Nutrient Ranking Index

With the emphasis on nutrients in NE Illinois a Nutrient Ranking Index (NRI) was developed by summing the ranking of each of the individual primary nutrient or nutrient-related parameters with each weighted based on the FIT coefficient (Appendix Table E-2). The equation is as follows:

Nutrient Rank Index = (TPR*1) + (Min. DOR*1) + (TKNR*0.8) + (BODR*0.8) + (NITRR*0.8) + (Max. DOR*0.6)

Where; TPR = Total Phosphorus Rank
Min. DOR = Minimum Dissolved Oxygen Rank
TKNR = Total Kjeldahl Nitrogen Rank
BODR = Biochemical Oxygen Demand (5-day) Rank
NITRR = Nitrate Rank
Max. DOR = Maximum Dissolved Oxygen Rank

Appendix Figure E-1 illustrates the correlation between the Nutrient Rank Index (NRI) and the fIBI (top, left), mIBI (top, right), the number of Illinois intolerant fish species (bottom, left) and the number of Illinois intolerant macroinvertebrate taxa (bottom, right). In these graphs points were coded to the strongest stressor rank for all categories of stressors (excluding land use parameters) and where the most limiting stressor rank was greater than a score of four (i.e., General Use benchmark). Boxes in the upper right corner reflect Nutrient Rank Index ranges where biological performance is clearly limited. In these plots fish appear a bit more limited than macroinvertebrates. We expect the relationship between the NRI and biological response variables to improve other indicators such as continuous dissolved oxygen-based maximum daily D.O. swings and algal indicators (benthic chlorophyll). Even so there is a strong enough relationship to make this indicator a useful marker for stressor identification efforts eutrophication in a study area. NRI values of > 25 and always associated with degraded fish assemblages and often associated with degraded macroinvertebrate indices (Figure E-1). Where a biological assemblage is of excellent quality NRI values are nearly always less than 15. The Power BI dashboard for nutrients will provide this data for all sites where it is available and will also provide individual parameter (e.g., TP, TKN, min D.O.) rankings for nutrients and other parameter categories as well. Such data can be matched to recent local data on continuous D.O., and benthic and sestonic chlorophyll where it exists. Sites with high NRI values and high D.O. swings from continuous data can be examined along with biological data responses to see if patterns of response are similar. The Power BI will also have NRI values, among other data, summarized at both the reach and Huc12 scale to determine whether nutrient signatures are rare or prevalent nearby and across the watershed. The goal for developing the NRI is to have a screening value that can then be matched to more site specific data to conduct a stressor identification analysis.



Appendix Figure E-1*. Correlation between the Nutrient Rank Index and the fIBI (top, left), mIBI (top, right), the number of Illinois intolerant fish species (bottom, left) and the number of Illinois intolerant macroinvertebrate taxa (bottom, right). In these graphs points are coded by the strongest stressor rank for all categories of stressors (excluding land use) and where the most limiting stressor rank was greater than a score of four (i.e., General Use benchmark).*