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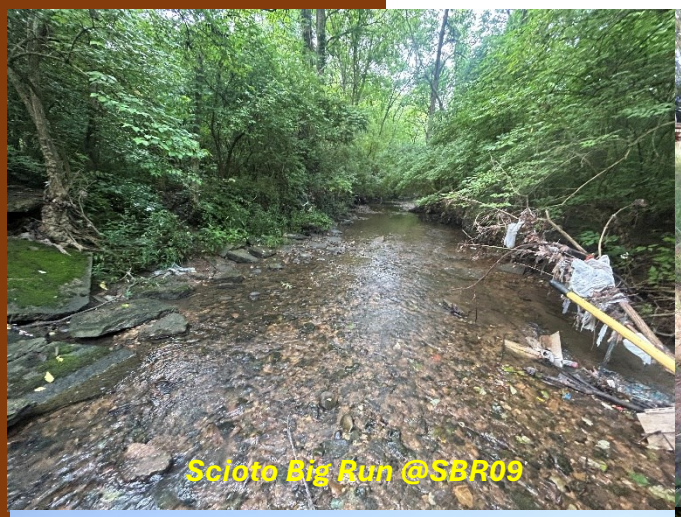
Biological and Water Quality Assessment of the Scioto Big Run, Grant Run, and Adjacent Subwatersheds 2025









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Biological and Water Quality Assessment of the Scioto Big Run, Grant Run, and Adjacent Subwatersheds 2025

Franklin County, Ohio

MBI Technical Report MBI 2026-7-10

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Glossary of Terms

Ambient Monitoring	Sampling and evaluation of receiving waters not necessarily associated with episodic perturbations.
Aquatic Assemblage	An association of interacting populations of organisms in a given waterbody, for example, the fish assemblage or the benthic macroinvertebrate assemblage.
Aquatic Community	An association of interacting assemblages in a given waterbody, the biotic component of an ecosystem.
Aquatic Life Use (ALU)	A beneficial use designation in which the waterbody provides suitable habitat for survival and reproduction of desirable fish, shellfish, and other aquatic organisms; classifications specified in State water quality standards relating to the level of protection afforded to the resident biological community by the custodial State agency.
Assemblage	Refers to all of the various species of a particular taxonomic grouping (e.g., fish, macroinvertebrates, algae, submergent aquatic plants, etc.) that exist in a particular habitat. Operationally this term is useful for defining biological assessment methods and their attendant assessment mechanisms, i.e., indices of biotic integrity (IBI), O/E models, or fuzzy set models.
Attainment Status	The state of condition of a waterbody as measured by chemical, physical, and biological indicators. Full attainment is the point at which measured indicators signify that a water quality standard has been met and it signifies that the designated use is both attained and protected. Non-attainment is when the designated use is not attained based on one or more of these indicators being below the required condition or state for that measure or parameter.
Attribute	A measurable part or process of a biological system.
Beneficial Uses	Desirable uses that acceptable water quality should support. Examples are drinking water supply, primary contact recreation (such as swimming), and aquatic life support.

Benthic Macroinvertebrates	Animals without backbones, living in or on the substrates, of a size large enough to be seen by the unaided eye, and which can be retained by a U.S. Standard No. 30 sieve (0.595 mm openings). Also referred to as benthos, infauna, or macrobenthos.
Best Management Practice	An engineered structure or management activity, or combination of these that eliminates or reduces an adverse environmental effect of a pollutant, pollution, or stressor effect.
Biological Assessment	An evaluation of the biological condition of a waterbody using surveys of the structure and function of a community of resident biota; also known as bioassessment. It also includes the interdisciplinary process of determining condition and relating that condition to chemical, physical, and biological factors that are measured along with the biological sampling.
Biological Criteria (Biocriteria)	Scientific meaning: quantified values representing the biological condition of a waterbody as measured by structure and function of the aquatic communities typically at reference condition; also known as biocriteria. Regulatory meaning: narrative descriptions or numerical values of the structure and function of aquatic communities in a waterbody necessary to protect a designated aquatic life use, implemented in, or through state water quality standards.
Biological Condition Gradient	A scientific model that describes the biological responses within an aquatic ecosystem to the increasing effects of stressors.
Biological Diversity	Refers to the variety and variability among living organisms and the ecological complexes in which they occur. Diversity can be defined as the number of different taxa and their relative frequencies. For biological diversity, these taxa are organized at many levels, ranging from complete ecosystems to the biochemical structures that are the molecular basis of heredity. Thus, the term encompasses different ecosystems, species, and genes; also known as biodiversity.

Biological Indicator	An organism, species, assemblage, or community characteristic of a particular habitat, or indicative of a particular set of environmental conditions; also known as a bioindicator.
Biological Integrity	The ability of an aquatic ecosystem to support and maintain a balanced, adaptive community of organisms having a species composition, diversity, and functional organization comparable to that of natural habitats within a region (after Karr and Dudley 1981).
Biological Monitoring	The use of a biological entity (taxon, species, assemblage) as a detector and its response as a measure of response to determine environmental conditions. Ambient biological surveys and toxicity tests are common biological monitoring methods; also known as biomonitoring.
Biological Survey	The collection, processing, and analysis of a representative portion of the resident aquatic community to determine its structural and/or functional characteristics and hence its condition using standardized methods.
Clean Water Act (CWA)	An act passed by the U.S. Congress to control water pollution (formally referred to as the Federal Water Pollution Control Act of 1972). Public Law 92-500, as amended. 33 U.S.C. 1251 et seq.; referred to herein as the CWA.
CWA Section 303(d)	This section of the Act requires States, territories, and authorized Tribes to develop lists of impaired waters for which applicable water quality standards are not being met, even after point sources of pollution have installed the minimum required levels of pollution control technology. The law requires that these jurisdictions establish priority rankings for waters on the lists and develop TMDLs for these waters. States, territories, and authorized Tribes are to submit their list of waters on April 1 in every even-numbered year.
CWA Section 305(b)	Biennial reporting required by the Act to describe the quality of the Nation's surface waters, to serve as an evaluation of progress made in maintaining and restoring water quality, and describe the extent of remaining problems.

Criteria	Limits on a particular pollutant or condition of a waterbody presumed to support or protect the designated use or uses of a waterbody. Criteria may be narrative or numeric and are commonly expressed as a chemical concentration, a physical parameter, or a biological assemblage endpoint.
DELT Anomalies	The percentage of Deformities, Erosions (e.g., fins, barbels), Lesions and Tumors on fish assemblages (DELT). An important fish assemblage attribute that is a commonly employed metric in fish IBIs.
Designated Uses	Those uses specified in state water quality standards for each waterbody or segment whether or not they are being attained.
Designed Sewer Relief	Points within the sanitary/combined collection system where sewage is diverted to relief pipes, and ultimately an outfall, during periods of heavy precipitation, pump failures, or other maintenance issues.
Disturbance	Any activity of natural or human causes that alters the natural state of the environment and its attributes and which can occur at or across many spatial and temporal scales.
Ecological integrity	The summation of chemical, physical, and biological integrity capable of supporting and maintaining a balanced, integrated adaptive community of organisms having a species composition, diversity, and functional organization comparable to that of natural habitats in the region.
Ecoregion	A relatively homogeneous geographical area defined by a similarity of climate, landform, soil, potential natural vegetation, hydrology, or other ecologically relevant variables; ecoregions are portioned at increasing levels of spatial detail from level I to level IV.
Existing Use	A use that was actually attained in a waterbody on or after November 28, 1975, whether or not they are included in the state water quality standards (November 28, 1975 is the date on which U.S. EPA promulgated its first water quality standards regulation in 40CFR Part 131). Existing uses must be maintained and cannot be removed.

Fractional Impervious (FrImp)	The fractional or percent surface area of a 30-meter map pixel that is covered with processed materials or structures (pavement, concrete, rooftops, and other constructed materials) that generate surface runoff that contains a variety of chemical pollutants.
Index of Biotic Integrity (IBI)	An integrative expression of site condition across multiple metrics comprised of attributes of a biological assemblage. It refers to the index developed by Karr (1981) and explained by Karr et al. (1986). It has been used to express the condition of fish, macroinvertebrate, algal, and terrestrial assemblages throughout the U.S. and in each of five major continents.
MIwb	The Modified Index of Well-Being (MIwb) is based on fish assemblage measures including numbers, biomass, and two diversity indices (Shannon Index) based on numbers and biomass. The numbers and biomass metrics exclude highly tolerant species. It reflects the overall productivity and diversity of the fish assemblage, and it frequently responds before the IBI to improvements in water quality and habitat.
Metric	A calculated term or enumeration representing an attribute of a biological assemblage, usually a structural aspect, that changes in a predictable manner with an increased effect of human disturbance.
Monitoring and Assessment	The entire process of collecting data from the aquatic environment using standardized methods and protocols, managing that data, analyzing that data to make assessments in support of multiple program objectives, and disseminating the assessments to stakeholders and the public.
Multimetric Index	An index that combines assemblage attributes, or metrics, into a single index value. Each metric is tested and calibrated to a scale and transformed into a unitless score prior to being aggregated into a multimetric index. Both the index and metrics are useful in assessing and diagnosing ecological condition.
Narrative Biocriteria	Written statements describing the narrative attributes of the structure and function of aquatic communities in a

	waterbody necessary to protect a designated aquatic life use.
Natural Condition	This includes the multiplicity of factors that determine the physical, chemical, or biological conditions that would exist in a waterbody in the absence of measurable impacts from human activity or influence.
Numeric Biocriteria	Specific quantitative and numeric measures of the structure and function of aquatic communities in a waterbody necessary to protect a designated aquatic life use.
Pollutant	The term "pollutant" means dredged spoil, solid waste, incinerator residue, sewage, garbage, sewage sludge, munitions, chemical wastes, biological materials, radioactive materials, heat, wrecked or discarded equipment, rock, sand, cellar dirt and industrial, municipal, and agricultural waste discharged into water.
Pollution	The (hu)man-made or (hu)man-induced alteration of the chemical, physical, biological, and radiological integrity of water.
Pump Station	A component of the sewerage collection system that lifts water from one elevation to a higher elevation.
Qualitative Habitat Evaluation Index	A qualitative habitat evaluation assessment tool that is applied to streams and rivers in Ohio and which is used to identify habitat variables that are important to attainment of the Ohio biological criteria.
Reference Condition	The condition that approximates natural, unimpacted, or best attainable conditions (biological, chemical, physical, etc.) for a waterbody. Reference condition is best determined by collecting measurements at a number of sites in a similar waterbody class or region under minimally or least disturbed conditions (by human activity), if they exist. Since undisturbed or minimally disturbed conditions may be difficult or impossible to find in some states, least disturbed conditions, combined with historical information, models or other methods may be used to approximate reference condition as long as the departure from natural or

	ideal is comprehended. Reference condition is used as a benchmark to establish numeric biocriteria.
Reference Site	A site selected to represent an approximation of reference condition and by comparison to other sites being assessed. For the purpose of assessing the ecological condition of other sites, a reference site is a specific locality on a waterbody that is minimally or least disturbed and is representative of the expected ecological condition of other localities on the same waterbody or nearby waterbodies.
Regional Reference Condition	A description of the chemical, physical, or biological condition based on an aggregation of data from reference sites that are representative of a waterbody type in an ecoregion, subregion, bioregion, or major drainage unit.
Sanitary Sewershed	Polygons that define a network of sanitary/combined pipe draining basins. Similar to a watershed, but defined by pipes, not by surface drainage characteristics.
Stressors	Physical, chemical, and biological factors that can adversely affect aquatic organisms. The effect of stressors is apparent in the biological responses.
Use Attainability Analysis (UAA)	A structured scientific assessment of the physical, chemical, biological or economic factors affecting attainment of the uses of waterbodies.
Use Classes	A broad capture of a designated use for general purposes such as recreation, water supply, and aquatic life.
Use Subclasses	A subcategorization of use classes into discrete and meaningful descriptions. For aquatic life this would include a hierarchy of warmwater, and cold water uses and additional stratification provided by different levels of warmwater uses and further stratification by waterbody types.
TALU Based Approach	This approach includes tiered aquatic life uses (TALU) based on numeric biological criteria and implementation via an adequate monitoring and assessment program that includes biological, chemical, and physical measures,

	parameters, indicators and a process for stressor identification.
Tiered Aquatic Life Uses (TALUs)	As defined: The structure of designated aquatic life uses that incorporates a hierarchy of use subclasses and stratification by natural divisions that pertain to geographical and waterbody class strata. TALUs are based on representative ecological attributes, and these should be reflected in the narrative description of each TALU tier and be embodied in the measurements that extend to expressions of that narrative through numeric biocriteria and by extension to chemical and physical indictors and criteria. As used: TALUs are assigned to water bodies based on the protection and restoration of ecological potential. This means that the assignment of a TALU tier to a specific waterbody is done with regard to reasonable restoration or protection expectations and attainability. Hence knowledge of the current condition of a waterbody and an accompanying and adequate assessment of stressors affecting that waterbody are needed to make these assignments.
Total Maximum Daily Load (TMDL)	The maximum amount of a pollutant that a body of water can receive while still meeting water quality standards. Alternatively, a TMDL is an allocation of a water pollutant deemed acceptable to attain the designated use assigned to the receiving water.
Water Quality Standards (WQS)	A law or regulation that consists of the designated use or uses of a waterbody, the narrative or numerical water quality criteria (including biocriteria) that are necessary to protect the use or uses of that particular waterbody, and an antidegradation policy.
Water Quality Management	A collection of management programs relevant to a water resource protection that includes problem identification, the need for and placement of best management practices, pollution abatement actions, and measuring the effectiveness of management actions.

List of Acronyms

AAV	Area of Attainment Value
ADV	Area of Degradation Value
ALU	Aquatic Life Use
BCG	Biological Condition Gradient
BMP	Best Management Practice
BNA	Base Neutral Acid Compound
CSO	Combined Sewer Overflow
CWA	Clean Water Act
CWP	Columbus Water and Power (formerly DPU)
DELT	Deformities, Erosions, Lesions, and Tumors (fish)
DWR	Division of Water Reclamation (formerly DOSD)
DOW	Division of Water
DPU	Department of Public Utilities (now CPW)
DSR	Designed Sewer Relief
ECOS	Ohio EPA database framework used by MBI
EPA	Environmental Protection Agency
EPT	Ephemeroptera, Plecoptera, Trichoptera
EWH	Exceptional Warmwater Habitat
FCSWCD	Franklin Co. Soil and Water Conservation District
FrImp	Fractional Impervious land cover
HD (or H-D)	Hester Dendy artificial substrate sampler

HHEI	Headwater Habitat Evaluation Index
HSTS	Home Sewage Treatment system
IBI	Index of Biotic Integrity for fish assemblages
ICI	Invertebrate Community Index
LOS	Level of Service
LOT	Lower Olentangy Tunnel
LIMS	Laboratory Information Management System
M&A	Monitoring and Assessment
MBI	Midwest Biodiversity Institute
MIwb	Modified Index of Well-Being
NPDES	National Pollutant Discharge Elimination System
OAC	Ohio Administrative Code
OARS	OSIS Augmentation Relief Sewer
OCDL	Ohio Credible Data Law
ORC	Ohio Revised Code
OSIS	Olentangy Scioto Interceptor Sewer
OWEA	Ohio Water Environment Association
PAH	Polycyclic Aromatic Hydrocarbon
PCR	Primary Contact Recreation
PSP	Project Study Plan
QAPP	Quality Assurance Program Plan
QDC	Qualified Data Collector

QHEI	Qualitative Habitat Evaluation Index
RDII	Rainfall Derived Inflow & Infiltration
SCR	Secondary Contact Recreation
SCPZ	Stream Corridor Protection Zones
STV	Statistical Threshold Value
SWIMS	Surface Water Information Management System
TALU	Tiered Aquatic Life Use
TMDL	Total Maximum Daily Load
UAA	Use Attainability Analysis
VOC	Volatile Organic Compound
WIB	Water In Basement
WLA	Waste Load Allocation
WQS	Water Quality Standards
WRP	Water Reclamation Plant (formerly WWTP)
WWH	Warmwater Habitat
WWMP	Wet Weather Management Plan
WWTP	Wastewater Treatment Plant (now WRP)

FOREWORD

What is a Biological and Water Quality Survey?

A biological and water quality survey, or "biosurvey", 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 subwatersheds, drainage basins, multiple and overlapping stressors, and tens of sites. The latter is the case with this study in that the streams in the 2025 study area include a mix of overlapping stressors and sources in a mosaic of varying intensities of urban and suburban land uses in the southwest side of Columbus including the south portion of the Hilltop area, Urbancrest, and Grove City and adjoining points south a west of the Scioto River mainstem. The 2025 assessment is the first comprehensive survey for most of the 26 sites, with historical data available in the Ohio EPA database (not published) for an aggregated total of 21 sites scattered across eight (8) years between 1992 and 2023.

Scope of the 2025 Subwatersheds Biological and Water Quality Assessment

The scope of the 2025 biological and water quality assessment included the Scioto Big Run, Republican Run, and Grant Run subwatersheds with Marsh Run, Gantz Run, and Plum Run as adjacent tributaries to the Scioto River. A portion of the Scioto Big Run subwatershed lies within a Blueprint Columbus[1] project area in the Hilltop neighborhood. This survey represents the second year accomplished under a regional monitoring plan that was developed in 2023-24 (MBI 2024a) with support from the Columbus Division of Water Reclamation (DWR). The *Central Ohio Watersheds Biological and Water Quality Assessment Plan*[2] was developed to implement a watershed based approach to assessing the quality and status of streams within DWR sewersheds, Blueprint Columbus areas, and the MS4 areas of Central Ohio to go beyond the previous surveys of the Scioto River and Olentangy River mainstems in 2020 and 2022 (MBI 2022, 2024b).

The overall objectives of the 2025 survey included:

1. Evaluate the appropriateness of existing aquatic life use designations and make recommendations for any changes to those designations;
2. Determine the aquatic life status of streams and rivers in quantitative terms including the spatial extent and severity of impairments and their respective departures from established criteria;
3. Determine causes and sources of aquatic life use impairments using the effect

[1] https://www.columbus.gov/Services/Columbus-Water-Power/About-Columbus-Water-Power/Sustainability-at-Columbus-Water-Power/Blueprint-Columbus

[2] https://mwbinst.com/publications/tech-reports/watershed-monitoring-and-bioassessment-plan-for-the-central-ohio-watersheds

thresholds available from the *Integrated Prioritization System (IPS) for Greater Central Ohio Rivers and Streams, Phase I: Technical Documentation and Atlas of Stressor Relationships* (MBI 2025b) that provides weighted exceedances of chemical, habitat, and land use parameters as fair, poor, and very poor;

4. Assessment of nutrient impacts using the Ohio EPA Stream Nutrient Assessment Procedure o "SNAP" methodology (Ohio EPA 2015a) that consists of a multiparameter, "combined" approach about nutrient effects conducted at seven (7) sites;
5. Provide baseline data for the assessment of streams that lie within a Blueprint Columbus project area in a portion of the Scioto Big Run subwatershed including the Stream Erosion Monitoring Task that includes stream bank stabilization to reduce sediment loadings and assess the need for Green Infrastructure;
6. Identify new or emerging threats to sites and reaches of full attainment;
7. Determine the effectiveness of best management practices and other restoration efforts within the surveyed subwatersheds;
8. Provide a general accounting of potential pollution sources including the novel use of the CWP GIS database about "sewer features" within the 2025 study area;
9. Provide updated data for the assessment of the subwatersheds last done by Ohio EPA in 2023 and prior years in relation to sanitary sewer system impacts, MS4 stormwater permitting, and issues of interest to local stakeholders.

The data presented herein were processed, evaluated, and synthesized as a biological and water quality assessment of aquatic life and recreational use attainment status. The 2025 bioassessment is spatially more comprehensive than prior assessments accomplished by Ohio EPA thus it fills important gaps left by those prior surveys. As a result assessing trends over time was limited to reach and site-specific comparisons. The 2025 bioassessment was conducted under a Level 3 Project Study Plan (PSP; MBI 2025a) submitted to and approved by the Ohio Credible Data Program. As such the results of the biological and habitat assessment can be used for purposes specified by the Ohio Credible Data Law and Regulations[3]. Each of the 26 monitoring sites (Table 1; Appendix A were sampled for biological assemblages (fish, macroinvertebrates, and salamanders when applicable), and habitat (QHEI/HHEI). Water quality (grab samples) and sediment chemistry was fully assessed at 25 sites, with seven (7) sites by continuous and grab sample data collected in accordance with the Ohio EPA SNAP methodology (Ohio EPA 2015a).

[3] Ohio Revised Code 6111.5 and Ohio Administrative Code 3745-4.

***Table 1**. Locations and specifications of sampling conducted for the biological, habitat, and water quality assessment of the Scioto Big Run, Republican Run, Grant Run, and Plum Run subwatersheds in 2025. Corresponding locations of prior Ohio EPA monitoring are shown alongside the MBI site codes with stream name, river mile, drainage area, and the geographical location description of each site. Specific methods used to collect fish, macroinvertebrate, and habitat along with the array of water quality sampling including grab and continuous samples are shown.*

MBI Site Code	Ohio EPA Site ID	Stream Name	River Mile	DA ($mi.^2$)	Location Description	Fish	Macro-inverts.	Habitat	Data-sonde	Field Chem.	Demand	Nutrients	Metals	Bacteria	Sediment Chemistry
Scioto Big Run Subwatershed															
SBR06	203386	Scioto Big Run	8.50	2.90	Ust. I-270 W. of Grove City - Cherry Creek Parkway	E,F	QL	QHEI		5	4	4	2	4	X
SBR05	203385	Scioto Big Run	7.10	5.80	Big Run Park	E,F	QL	QHEI	X	5	4	4	2	4	X
SBR04		Scioto Big Run	6.10	8.00	Demorest Rd.	E,F	QL	QHEI	X	5	4	4	2	4	X
SBR03	300968	Scioto Big Run	4.40	11.80	U.S. Rt. 62 - access from Big Run Rd.	D,E	HD	QHEI	X	5	4	4	2	4	X
SBR02	V07K11	Scioto Big Run	2.90	18.50	Hardy Parkway - Willow Creek Park	D,E	HD	QHEI	X	5	4	4	2	4	X
SBR01	V07P24	Scioto Big Run	0.80	19.00	Ust. Brown Run confluence - pull off of St. Rt. 104	D,E	HD	QHEI	X	5	4	4	2	4	X
SBR08		U.T. Scioto Big Run @6.66	1.50	1.57	Southwestern Rd.	E,F	QL,PHW	QHEI/HHEI		5	4	4	2	4	X
SBR07		U.T. Scioto Big Run @6.66	0.30	1.80	at River Bend Park	E,F	QL,PHW	QHEI/HHEI		5	4	4	2	4	X
SBR10		U.T. Scioto Big Run @3.59 (Early Run)	1.85	2.55	Eakin Rd. dst. SSO	E,F	QL	QHEI		5	4	4	2	4	X
SBR09		U.T. Scioto Big Run @3.59 (Early Run)	0.10	3.80	Ust. Gantz Rd. at Scioto Big Run confluence	E,F	QL	QHEI		5	4	4	2	4	X
SBR11		U.T. Scioto Big Run @0.70 (Brown Run)	0.10	3.00	St. Rt. 104 - pull off same as SBR01	E,F	QL	QHEI		5	4	4	2	4	X
MR02	203253	Marsh Run	2.00	2.20	Grove City - Gantz Park	E,F	QL	QHEI		5	4	4	2	4	X
MR01	V07P19	Marsh Run	0.20	3.10	Dst. St. Rt. 104	E,F	QL	QHEI		5	4	4	2	4	X
GTZ01		Gantz Run	1.00	0.78	Ust. St. Rt. 104 @Thrailkill Rd.	E,F	QL,PHW	QHEI/HHEI		5	4	4	2	4	X
Republican Run Subwatershed															
REP04		Republican Run	5.40	1.01	Berry Family Conservation Area near Beulah Park	E,F	QL,PHW	QHEI/HHEI		5	4	4	2	4	X
REP03		Republican Run	3.80	2.97	Swearingen Park - Grove City	E,F	QL	QHEI		5	4	4	2	4	X
REP02	V07P20	Republican Run	2.06	3.60	White Rd.	E,F	QL	QHEI		5	4	4	2	4	X
REP01	V07S21	Republican Run	0.20	7.00	Ust. St. Rt. 104 - at Bike Bridge	E,F	QL	QHEI		5	4	4	2	4	X
REP05	V07P21	S. Br. Republican Run	0.02	1.90	Briar Hill Dr.	E,F	QL,PHW	QHEI/HHEI		5	4	4	2	4	X
REP06		U.T. @RM 0.73 (Billy Joe Run)	0.10	0.88	Pinnacle Club Drive @Pinnacle Club Park	E,F	QL,PHW	QHEI/HHEI		5	4	4	2	4	X
Grant Run Subwatershed															
GRR03		Grant Run	4.30	2.00	Dst. Meadows Dr. @Mt. Carmel Grove City - restoration reach	E,F	QL	QHEI		5	4	4	2	4	X
GRR02		Grant Run	2.90	3.89	Borror Rd.	E,F	QL	QHEI		5	4	4	2	4	X
GRR01		Grant Run	0.80	13.80	Scioto Grove Metropark	D,E	HD	QHEI	X	5	4	4	2	4	X
GRR04	300645	U.T. to Grant Run @ RM 2.77	1.50	1.00	Ust. Hoover Rd.	E,F	QL,PHW	QHEI/HHEI		5	4	4	2	4	X
GRR05		U.T. to Grant Run @ RM 2.77	1.32	1.70	Meijer Store St. Rt. 665 frontage - overwide ditch restoration	E,F	QL,PHW	QHEI/HHEI	--	1	--	--	--	--	--
Plum Run Subwatershed															
PLM01	V07P23	Plum Run	0.72	7.80	St. Rt. 665 - predevelopment control	E,F	QL	QHEI	X	5	4	4	2	4	X
					Total Sites	**26**	**26**	**26**	**7**	**26**	**25**	**25**	**25**	**25**	**25**

Columbus Recreation & Parks (permit required)
Grove City Parks (no permit required)
Pinnacle Club Park (private)

Legend: DA - drainage area; D - roller barge; E - longline; F - backpack unit; QL - qualitative sample; PHW - Primary Headwater sample; QHEI - Qualitative Habitat Evaluation Index; HHEI - Headwater Habitat Evaluation Index.

SUMMARY AND CONCLUSIONS

Overview of the 2025 DWR Sponsored Monitoring and Assessment Program

The Columbus Water and Power (formerly Columbus Public Utilities) Division of Water Reclamation (DWR) sponsored a comprehensive biological and water quality assessment of the Scioto Big Run, Republican Run, and Grant Run subwatersheds, with Gantz Run and Plum Run included as adjacent tributaries to the Scioto River, during June-October 2025. The survey included a total of 26 sites including 13 in the Scioto Big Run subwatershed, six (6) in the Republican Run subwatershed, five (5) in the Grant Run subwatershed, and single sites in Gantz Run and Plum Run. The watershed areas at the sampling sites ranged between 0.78 and 19.0 square miles placing all in the headwater site type as defined by Ohio EPA. The northern portion of the Scioto Big Run subwatershed lies within a Blueprint Columbus project area with all others affected by MS4 stormwater permitting, the DWR sewer system, and other localized influences and interests. There are only four (4) minor NPDES permitted discharges in the 2025 study area.

Sampling was conducted for biological assemblages, stream habitat, water chemistry, and sediment chemistry. Chemical analyses were conducted for 26 laboratory analytes and four field parameters in water samples and seven (7) heavy metals and organic chemical compounds in both water and sediments. *E. coli* bacteria counts were used primarily to assess the status of the Primary Contact Recreational (PCR) use, but were also used as an indicator of organic pollution from sewerage and/or stormwater. Parameters consistent with the Ohio EPA SNAP methodology (Ohio EPA 2015a) were also collected including benthic chlorophyll a and continuous dissolved oxygen (D.O.), temperature, pH, and conductivity at five (5) locations in Scioto Big Run and single sites in lower Grant Run and lower Plum Run. Habitat quality was assessed with the Qualitative Habitat Evaluation Index (QHEI) and the biological assemblages included fish and macroinvertebrates consistent with Ohio EPA methods and the biological criteria for assessing the status of aquatic life use designations per the Ohio WQS (OAC 3745-1-07) at all sites. Sites draining less than 2.5 square miles were simultaneously assessed with the Ohio EPA Primary Headwater Habitat (PHWH) methodology (Ohio EPA 2020), but no sites were determined for that classification in the 2025 study area.

The 2025 biological and water quality assessment was focused on the following issues of importance to DWR and other stakeholders:

1. Evaluate the appropriateness of existing aquatic life use designations and make recommendations for any changes to those designations;
2. Determine the aquatic life status of streams and rivers in quantitative terms including the spatial extent and severity of impairments and their respective departures from established criteria;
3. Determine causes and sources of aquatic life use impairments using the effect thresholds available from the *Integrated Prioritization System (IPS) for Greater*

Central Ohio Rivers and Streams, Phase I: Technical Documentation and Atlas of Stressor Relationships (MBI 2025b) that provides weighted exceedances of chemical, habitat, and land use parameters as fair, poor, and very poor;
4. Determine the Restorability of impaired sites and the Susceptibility and Threats to attaining sites using the factors derived by the *Integrated Prioritization System (IPS) for Greater Central Ohio Rivers and Streams, Phase II Addendum: Restorability, Susceptibility, and Threat Measures and Application of Assessment Thresholds to Restore and Protect Central Ohio Streams and Rivers* (MBI 2026);
5. Assessment of nutrient impacts using the Ohio EPA SNAP methodology that consists of a multiparameter, "combined" approach about nutrient effects conducted at seven (7) sites;
6. Provide baseline data for the assessment of Blueprint Columbus in the portions of the Scioto Big Run subwatershed that lie within that project area;
7. Identify new or emerging threats to sites and reaches of full attainment;
8. Determine the effectiveness of best management practices and other restoration efforts within the surveyed subwatersheds;
9. Provide a general accounting of potential pollution sources included the novel use of the CWP GIS database about "sewer features" within the 2025 study area;
10. Provide updated data for the assessment of the subwatersheds last done by Ohio EPA in 2023 and prior years in relation to sanitary sewer system impacts, MS4 stormwater permitting, and issues of interest to local stakeholders.

The principal goal of the 2025 biological and water quality assessment was to assess aquatic life use attainment status using the quality of the fish and macroinvertebrate assemblages that are the principal determinant of that status. Another important goal is to track any changes through time. Surveys of the 2025 study area subwatersheds by Ohio EPA have been conducted at 12 of the 26 MBI sites dating back to 1991 with no more that six sites sampled in any single year (Appendix B). A total of six (6) sites were sampled by Ohio EPA in 2023 with two sites each in Scioto Big Run and Grant Run and one site each in Republican Run and Plum Run. Historically, two (2) sites each were sampled in Scioto Big Run in 2010 and 2008, 2005, and 1992 with four (4) sites in 2007 and a single site in 1994. Two sites were sampled in Republican Run in 1991 with a single site in 2010. Plum Run was sampled at a single site in 1997 and 2010. Marsh Run was sampled in 1994 (1 site), 1997 (4 sites), and 2007 (4 sites). The unnamed tributary to Grant Run at RM 2.77 was sampled at 2 sites in 2005 and 3 sites in 2008.

Aquatic Life Use Status Assessment

The 2025 DWR survey represents the most comprehensive baseline assessment done to date in terms of subwatershed coverage including 11 previously unsampled sites. Twenty-six (26) sites within the six (6) tributary subwatersheds that enter the Scioto River between RM 124.41 and RM 118.64 were sampled in 2025. Each subwatershed has varying intensities of urban/suburban, commercial, and industrial land uses with an

accompanying mosaic of water quality, hydrological, and habitat alterations, some of which pose difficult restoration and protection challenges.

Aquatic Life Use Attainment Status

Three (3) of the 26 sites sampled in the 2025 study area were in full attainment of the WWH use biological criteria (Table 2). These included the Unnamed Tributary to Scioto Big Run (@RM 6.66) at RM 0.30 (SBR07) at River Bend Park, Grant Run at RM 2.00 (GRR02) at Borror Rd., and Plum Run at RM 0.72 (PLM01) at St. Rt. 665. The Unnamed Tributary to Scioto Big Run (@RM 3.59), also known as Early Run (SBR10), was in non-attainment-very poor because of a very poor macroinvertebrate narrative evaluation. Six sites were non-attainment-poor with all except one site because of a poor macroinvertebrate narrative. The site in Republican Run at RM 3.80 (REP03) at Swearingen Park had a poor IBI score of 26 along with a low-fair narrative for the macroinvertebrate assemblage. Two sites were non-attainment-fair due to fair results for the fish IBI and the macroinvertebrate narrative. The remaining 14 sites were in partial attainment because of a just less than marginally good narrative for the macroinvertebrate assemblages excepting one site that had a fair IBI score and a very good macroinvertebrate narrative. At 12 of the 14 partially attaining sites the fish IBI was at least fully good ($\geq$40) at six (6) sites or exceptional (>50) at the other six (6) sites. This was the most consistent in the Scioto Big Run mainstem where the fish IBI was exceptional at five of the six sites. The macroinvertebrate narrative was high-fair at nine (9) of the partially attaining sites with good or exception IB1 scores, which means the macroinvertebrates were just below the marginally good narrative that would have resulted in full WWH attainment.

Causes and Sources of Impairment

Causes of impairment were based on the weighted thresholds used in the analysis of the chemical/physical and habitat data from the *Integrated Prioritization System (IPS) for Greater Central Ohio Rivers and Streams, Phase I: Technical Documentation and Atlas of Stressor Relationships* (MBI 2025b). Stressors are weighted for exceedances of very poor (highest weighted), poor, and fair (lowest weighted) thresholds (Table 3). These are reduced further to major causal categories including the following:

- **Habitat** (15 observations; weighted frequency of 15.4%): Composed of the QHEI score, IPS substrate score, QHEI modified: good ratio, number of poor attributes, IPS channel condition score, and number of high influence poor attributes.
- **Organic and Nutrient Enrichment/Effects** (39 observations; weighted frequency of 20.7%): Exceedances of IPS threshold for TKN, BOD, total phosphorus (TP), nitrate-N (Nitrate), and any organic enrichment biological response signature.
- **D.O. Related (**4 observations; weighted frequency of 5.3%): Any IPS or WQS low D.O. or maximum D.O. value or diel D.O. swing measured by Datasondes.
- **Ionic Strength/Demand** (53 observations; weighted frequency of 41.0%): Any exceedance of IPS thresholds for chloride, conductivity/TDS, or temperature, pH, or total suspended solids (TSS).

***Table 2**. Status of aquatic life use (AQLU) attainment at 26 sites in the 2025 study area based on verified existing and recommended uses. The Ohio biocriteria and other acronyms appear in the legend below. Abbreviations for causes and sources are continued on the next pages.*

MBI Site Code	Stream Name	River Mile (Fish/ Macro.)	DA (mi.^{2})	Location Description	AQLU Current/ Recom-mended	IBI	ICI/Qual. Narrative	QHEI	AQLU Attain-ment Status
Scioto Big Run and Direct Scioto R. Tributaries									
SBR06	Scioto Big Run	8.50/8.50	2.90	Ust. I-270 W. of Grove City - Cherry Creek Pkwy	WWH/WWH	40	HF*	75.5	**PARTIAL**
SBR05	Scioto Big Run	7.10/7.17	5.80	Big Run Park	WWH/WWH	54	LF*	84.0	**PARTIAL**
SBR04	Scioto Big Run	6.10/6.10	8.00	Demorest Rd.	WWH/WWH	50	HF*	76.8	**PARTIAL**
SBR03	Scioto Big Run	4.40/4.48	11.80	U.S. Rt. 62 - access from Big Run Rd.	WWH/WWH	54	HF*	64.5	**PARTIAL**
SBR02	Scioto Big Run	2.90/2.90	18.50	Hardy Parkway - Willow Creek Park	WWH/WWH	54	28*/HF*	86.5	**PARTIAL**
SBR01	Scioto Big Run	0.80/0.80	19.00	Ust. Brown Run confluence - pull off of St. Rt. 104	WWH/WWH	52	HF*	82.0	**PARTIAL**
SBR08	U.T. Scioto Big Run @RM 6.66	1.50/1.50	1.57	Southwestern Rd.	Undes./WWH	42	HF*	57.5	**PARTIAL**
SBR07	U.T. Scioto Big Run @RM 6.66	0.30/0.30	1.80	at River Bend Park	Undes./WWH	40	MG^{ns}	61.0	**FULL**
SBR10	U.T. Scioto Big Run @RM 3.59 (Early Run)	1.80/1.61	2.55	Eakin Rd. dst. SSO	Undes./WWH	44	VP*	67.0	**NON-V.Poor**
SBR09	U.T. Scioto Big Run @RM 3.59 (Early Run)	0.10/0.09	3.80	Ust. Gantz Rd. at Scioto Big Run confluence	Undes./WWH	40	P*	63.5	**NON-Poor**
SBR11	U.T. Scioto Big Run @RM 0.70 (Brown Run)	0.10/0.21	3.00	St. Rt. 104 - pull off same as SBR01	Undes./WWH	52	HF*	81.0	**PARTIAL**
MR02	Marsh Run	2.00/2.00	2.20	Grove City - Gantz Park	WWH/WWH	43	LF*	81.0	**PARTIAL**
MR01	Marsh Run	0.20/0.20	3.10	Dst. St. Rt. 104	WWH/WWH	40	HF*	52.3	**PARTIAL**
GTZ01	Gantz Run	1.00/1.00	0.78	Ust. St. Rt. 104 @Thrailkill Rd.	Undes./WWH	44	HF*	56.0	**PARTIAL**
Republican Run Subwatershed									
REP04	Republican Run	5.40/5.40	1.01	Berry Family Conservation Area Beulah Park	WWH/WWH	34*	LF*	73.5	**NON-Fair**
REP03	Republican Run	3.80/3.80	2.97	Swearingen Park - Grove City	WWH/WWH	26*	LF*	67.5	**NON-Poor**
REP02	Republican Run	1.38/1.38	3.60	White Rd.	WWH/WWH	30*	MG^{ns}	77.0	**PARTIAL**
REP01	Republican Run	0.20/0.25	7.00	Ust. St. Rt. 104 - at Bike Bridge	WWH/WWH	40	HF*	68.0	**PARTIAL**
REP05	S. Br. Republican Run	0.02/0.02	1.90	Briar Hill Dr.	LRW/WWH	32*	HF*	69.5	**NON-Fair**
REP06	U.T. @RM 0.73 (Billy Joe Run)	0.10/0.10	0.88	Pinnacle Club Drive @Pinnacle Club Park	Undes./WWH	50	P*	59.0	**NON-Poor**
Grant Run Subwatershed									
GRR03	Grant Run	4.30/4.30	2.00	Dst. Meadows Dr. - restoration reach	WWH/WWH	32*	P*	51.0	**NON-Poor**
GRR02	Grant Run	2.00/1.80	3.89	Borror Rd.	WWH/WWH	42	G	80.0	**FULL**
GRR01	Grant Run	0.80/0.20	13.80	Scioto Grove Metropark	WWH/WWH	34*	VG	66.5	**PARTIAL**
GRR04	U.T. to Grant Run @ RM 2.77	1.10/1.50	1.00	Ust. Hoover Rd.	Undes./WWH	42	P*	45.5	**NON-Poor**
GRR05	U.T. to Grant Run @ RM 2.77	1.32/1.32	1.70	St. Rt. 665 frontage - overwide ditch restoration	Undes./WWH	26*	P*	58.0	**NON-Poor**
Plum Run									
PLM01	Plum Run	0.72/0.72	7.80	St. Rt. 665 - predevelopment control	WWH/WWH	46	MG^{ns}	75.8	**FULL**

	Columbus Recreation & Parks	**Key to AQLU:**	DA - Drainage Area; AQLU - Aquatic Life Use; Undes. - undesignated; EWH - Exceptional Warmwater Habitat; WWH - Warmwater Habitat; MWH - Modified Warm-water Habitat; LRW - Limited Resource Waters.	**EWH**	≥50	≥46/E	≥65.0	**FULL**
	Grove City Parks			**WWH**	≥40	≥36/G	≥58.5	**FULL**
	Pinnacle Club Park			**MWH (Fair)**	≥28	≥14/F	≥45.0	**NON-Fair**
		Macro. Narratives	E - Exceptional; G - Good; MG - Marginally Good; F - Fair; HF - Hgh Fair; LF - Low Fair; P - Poor; VP - Very Poor	**LRW (Poor)**	≥18	≥8/P	≥31.5	**NON-Poor**
				Very Poor	<18	<6/VP	<31.5	**NON- V. Poor**

***Table 3**. Weighted causes of aquatic life impairment in the 2025 study area with sources based on causal thresholds derived in the Greater Central Ohio IPS Phase I (MBI 2025b) with Restorability factors for impaired sites and Threats, Susceptibility, and Threat factors for attaining sites derived in the Greater Central Ohio IPS Phase II (MBI 2026). Cause and source acronyms appear on the next page.*

MBI Site Code	Stream Name	River Mile (Fish/ Macro.)	Location Description	Causes (Very Poor)	Causes (Poor)	Causes (Fair)	Threats	Sources	Restor-ability	Threat	Suscept-ibility
Scioto Big Run and Direct Scioto R. Tributaries											
SBR06	Scioto Big Run	8.50/8.50	Ust. I-270 W. of Grove City - Cherry Creek Pkwy		TSS	BOD, TP,OP, Chloride, OrgEnrich, TKN		FrImpVP,USW,Sewage	68.6		
SBR05	Scioto Big Run	7.10/7.17	Big Run Park		PAH_{sed}	Chloride, PAH_{sed}		FrImpP,USW	72.4		
SBR04	Scioto Big Run	6.10/6.10	Demorest Rd.			Chloride,TSS,OrgEnrich		FrImpP,USW,Sewage	72.4		
SBR03	Scioto Big Run	4.40/4.48	U.S. Rt. 62 - access from Big Run Rd.		PAH_{sed}	Chloride,PAH_{sed},OrgEnrich, TKN		FrImpP,USW	69.0		
SBR02	Scioto Big Run	2.90/2.90	Hardy Parkway - Willow Creek Park		PAH_{sed}	TP,Chloride.PAH_{sed},OrgEnrich,ToxicTol		FrImpP,USW	69.0		
SBR01	Scioto Big Run	0.80/0.80	Ust. Brown Run confluence - off of St. Rt. 104		Cond,PAH_{sed}	Chloride, Cond,TDS,PAH_{sed},Zn_{sed},DELTs,OrgEnrich		FrImpP,USW	69.0		
SBR08	U.T. Scioto Big Run @RM 6.66	1.50/1.50	Southwestern Rd.			Chloride,TSS,OrgEnrich		FrImpP,USW	62.9		
SBR07	U.T. Scioto Big Run @RM 6.66	0.30/0.30	at River Bend Park				Chloride, TKN			59.0	56.3
SBR10	U.T. Scioto Big Run @RM 3.59 (Early Run)	1.80/1.61	Eakin Rd. dst. SSO		Pb_{sed}	T_{mean}, pH, TP, OP,Chloride,PAH_{sed},Zn_{sed},OrgEnrich		FrImpP,USW	64.8		
SBR09	U.T. Scioto Big Run @RM 3.59 (Early Run)	0.10/0.09	Ust. Gantz Rd. at Scioto Big Run confluence		PAH_{sed}, Pb_{sed}	Chloride,PAH_{sed},As_{sed},Zn_{sed},OrgEnrich		FrImpVP,USW	65.7		
SBR11	U.T. Scioto Big Run @RM 0.70 (Brown Run)	0.10/0.21	St. Rt. 104 - pull off same as SBR01		Chloride	Cond,OrgEnrich		FrImpP,USW	69.5		
MR02	Marsh Run	2.00/2.00	Grove City - Gantz Park	Pool, $QHEI_{poor\_attr}$	TKN,Chloride,Cond,TDS.PAH_{sed}, $QHEI_{ratio}$	TKN, Nitrate,TSS,PAH_{sed},DELTs,OrgEnrich		FrImpVP,USW,Hydro.	53.3		
MR01	Marsh Run	0.20/0.20	Dst. St. Rt. 104		Riffle, Chloride,Cu_{sed},Zn_{sed}	Cond, $QHEI_{poor\_attr}$,DELTs,OrgEnrich		FrImpP,USW,Hydro.	66.7		
GTZ01	Gantz Run	1.00/1.00	Ust. St. Rt. 104 @Thrailkill Rd.		Chloride,Cond,TDS,$QHEI_{poor\_attr}$			FrImpVP,USW,Hydro.	62.4		
Republican Run Subwatershed											
REP04	Republican Run	5.40/5.40	Berry Family Conservation Area Beulah Park		$DO_{avg.}$	BOD, TP,OP,OrgEnrich, TKN		FrImpF	67.6		
REP03	Republican Run	3.80/3.80	Swearingen Park - Grove City	PAH_{sed}		TP,Chloride,PAH_{sed},OrgEnrich		FrImpF,Sewage	63.8		
REP02	Republican Run	1.38/1.38	White Rd.		Chloride	Cond,TDS,OrgEnrich		FrImpP,USW	63.8		
REP01	Republican Run	0.20/0.25	Ust. St. Rt. 104 - at Bike Bridge			Chloride,Cond,TDS,Pb/Ni/Zn_{sed},OrgEnrich		FrImpP,USW	69.5		
REP05	S. Br. Republican Run	0.02/0.02	Briar Hill Dr.		Chloride,Cond,TDS	pH,TDS,OrgEnrich		FrImpP,USW	60.0		
REP06	U.T. @RM 0.73 (Billy Joe Run)	0.10/0.10	Pinnacle Club Drive @Pinnacle Club Park		Riffle	DO_{max},pH,Chloride,Cond,TDS		FrImpP,USW,Hydro.	68.1		
Grant Run Subwatershed											
GRR03	Grant Run	4.30/4.30	Dst. Meadows Dr. - restoration reach	Substr, DO_{min}	Riffle, TP, BOD,TKN.$QHEI_{poor\_attr}$	BOD,Chloride,Cond.TDS, $QHEI_{ratio}$,OrgEnrich		FrImpF, Hydro.	53.8		
GRR02	Grant Run	2.00/1.80	Borror Rd.				Cond., Chloride	FrImpF		55.8	60.1
GRR01	Grant Run	0.80/0.20	Scioto Grove Metropark		Riffle, Chloride,Cond,TDS	TSS,OrgEnrich		FrImpF,Hydro.	63.3		
GRR04	U.T. to Grant Run @ RM 2.77	1.10/1.50	Ust. Hoover Rd.		Cover, NH3,DO_{avg},TKN,$QHEI_{poor\_atttr}$	NH3,BOD,TKN,TP,OP,PAH_{sed},OrgEnrich,Channel,Pool		FrImpF,Hydro.	56.7		
GRR05	U.T. to Grant Run @ RM 2.77	1.32/1.32	St. Rt. 665 frontage - overwide ditch restoration			Substr, $QHEI_{poor\_attr}$,OrgEnrich		FrImpF,Hydro.	64.3		
Plum Run											
PLM01	Plum Run	0.72/0.72	St. Rt. 665 - predevelopment control				Cond., Chloride, OrgEnrich			51.3	59.8

	Columbus Recreation & Parks
	Grove City Parks
	Pinnacle Club Park

	Restor-ability	Threat	Suscept-ibility
Very High	**≥80**	**≥80**	**≥80**
High	**60-79**	**60-79**	**60-79**
Moderate	**40-59**	**40-59**	**40-59**
Low	**20-39**	**20-39**	**20-39**
Very Low	**<20**	**<20**	**<20**

Glossary of Causes used in Table 2B					
Acronym	**Description**	**Acronym**	**Description**	**Acronym**	**Description**
BOD	Five-day Biochemical Oxygen Demand	NH3	Elevated total ammonia-N	DELTs	Toxic response signature by fish
TP	Total phosphorus	PAH_{sed}	Polycyclic Aromatic Hydrocarbons in sediment	QHEI	Qualitative Habitat Evaluation Index (QHEI)
OP	Orthophosphorus	Cond.	Specific conductivity	QHEI Ratio	Ratio of Modified:Good QHEI attributes
TKN	Total Kjeldahl nitrogen	Cu_{sed}	Copper in sediment	Chan	Channel condition from QHEI
DO_{avg}	Low daily average D.O.	Pb_{sed}	Elevated lead in sediment	Substr	Substrate condition from QHEI
DO_{min}	Low daily minimum D.O.	Ni_{sed}	Elevated nickel in sediment	$QHEI_{poor\_attr}$	Elevated number of modified QHEI attributes
TDS	Total dissolved solids	Zn_{sed}	Zinc in sediment	Riffle	Low riffle score in QHEI
OrgEnrich	Organic enrichment	ToxicTol	Toxic response signature by macroinvertebrates	Pool	Low pool score in QHEI
Glossary of Sources used in Table 2B					
Acronym	**Description**	**Acronym**	**Description**	**Acronym**	**Description**
FrImpVP	Exceeds IPS very poor threshold	FrImpF	Exceeds IPS fair threshold	USW	Urban stormwater & runoff
FrImpP	Exceeds IPS poor threshold	FrImpG	Exceeds IPS good threshold	Hydro	Physical habitat alteration

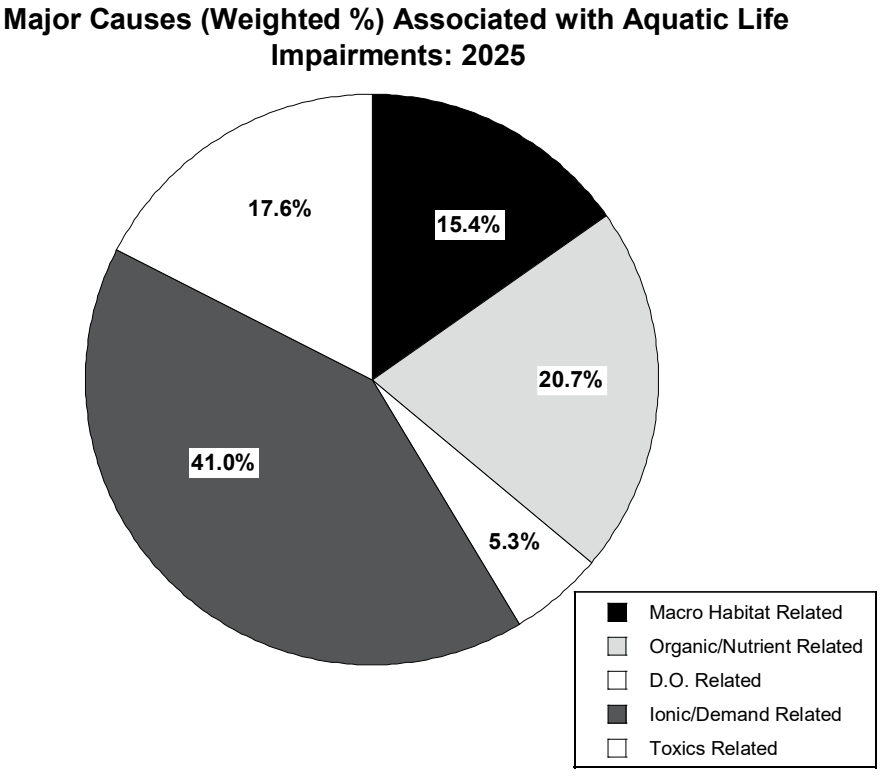
- **Toxics/Toxicity** (25 observations; weighted frequency of 17.6%): Any sediment or water column metal or PAH threshold exceedance, ammonia-N exceedances, and any toxic biological response by fish or macroinvertebrates.

At the watershed level, Ionic Strength/Demand dominated with a weighted frequency of 41.0% followed by Organic Enrichment/Nutrient enrichment at 20.7%, Habitat at 15.4%, Toxics/Toxicity at 17.6%, and D.O. Related at 5.3% and compared to un-weighted frequencies in Figure 1. The exceedances of IPS thresholds for the ionic strength/demand parameters is the leading causal issue in the 2025 study area. Although the Organic Enrichment/Nutrients category comprised the second highest proportion of weighted causes, the lack of nutrient effects in the SNAP assessment points to nonpoint sources as the principal source. Habitat was low compared to its usual predominance in these assessments. Other than some localized issues habitat is not widespread factor in the non-attainment in the 2025 study area. Toxics/Toxicity as expressed mostly by exceedances of sediment chemistry thresholds were relatively minor and not associated with severe aquatic life impairments.

Sources of Impairments

Four sources of impairments were identified in the 2025 study area (Table 3). A source generally produces multiple causes and most are broad measures of land use, nonpoint source runoff, pollution, and habitat with each related to an activity the ultimately results in an impairment. Not every source or even the same source produces one or more impairments in a watershed. Most of the sites in the 2025 study were influenced by urban land use, some of which is aged and some of which occurred only 2-3 decades ago.

The delineation of urban land uses has evolved and refined over the past 10-15 years. Land use in this study relied on the National Land Cover Database (NLCD) of 2011 via the USGS StreamStats application. The proportion of a watershed upstream of s site was expressed as impervious cover which in this case is specifically termed Fractional Impervious cover or “FrImp”. This measures the fractional or percent surface area of a 30-meter map pixel that is covered with processed materials or structures (pavement, concrete, rooftops, and other constructed materials) that generate surface runoff. It is more refined than land use indicators used 25-30 years ago such a developed land or even impervious cover which did not differentiate the fractions of impervious surfaces. FrImp thresholds derived from the Greater Central Ohio IPS Phase I (MBI 2025b) were used to label FrImp at a very poor, poor, fair, or good level of occurrence as a source. A very poor FrImp is the percentage that corresponds to very poor quality biological assemblages, poor corresponds to poor assemblages, fair to fair assemblages, and good to assemblage that attain their WWH biological criteria. However, using FrImp or any other land use variable as a “cause” is not endorsed as the levels of FrImp that correspond to WWH biological attainment can extend beyond the 75th percentile threshold derived by the IPS. What is more important are the pollutants and their exceedances of WQS and IPS thresholds that are generated by urban land uses. These are commonly contained in urban stormwater (USW) that is also listed as a



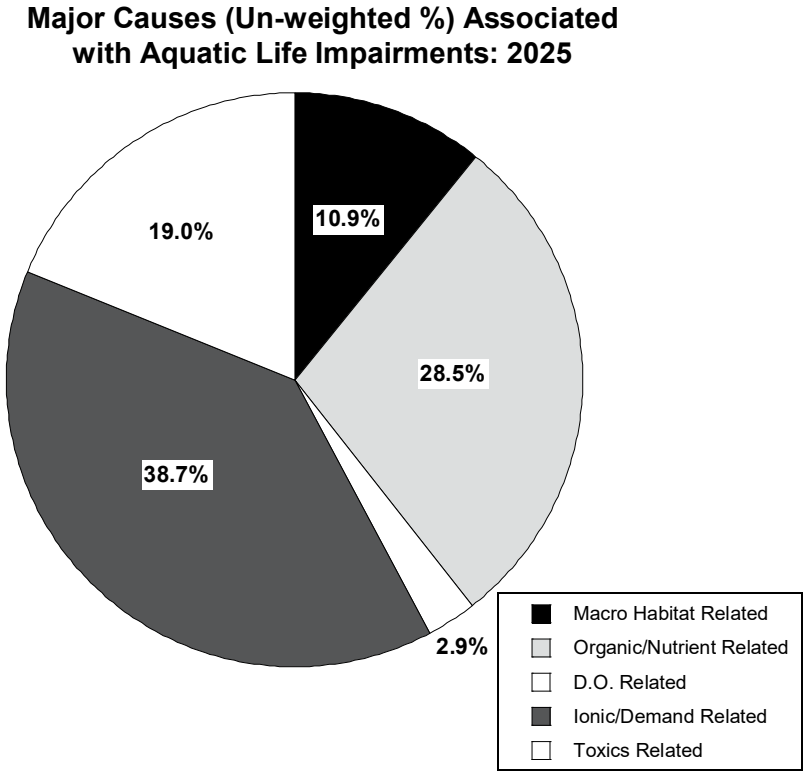


***Figure 1**. Major categorical causal groupings associated with aquatic life impairments weighted (upper) and un-weighted by severity in the 2025 DWR study area. Grouping percentages are calculated based on the number of causal observations and weighted based on the narrative rating of Greater Central Ohio IPS threshold exceedances (very poor = 5, poor = 3, and fair = 1).*

source. Generally, USW carries more pollutants and generated both habitat hydrological modifications as FrImp increases, but the magnitude of exceedances of pollutants and hydrological alterations can vary. Sewage was listed as a source primarily when *E. coli* levels exceed 5,000 cfu/100 mL, but this too is related to the degree of urbanization and the number and density of sewer features. Hydromodification ("Hydro") was listed as a source when habitat related causes were listed based on the QHEI and IPS habitat thresholds.

Restorability, Susceptibility, and Threats

Three factors generated by the Greater Central Ohio IPS Phase II (MBI 2026) were used to communicate the likelihood of restoring impaired sites and also to communicate the susceptibility of attaining sites and the degree of any threats to that status. The derivation of Restorability, Threat, and Susceptibility rankings on a scale of 0-100 by site, reach, and HUC12 watershed was done throughout the Greater Central Ohio IPS study area. Higher scores indicate a higher probability of achieving restoration of sites subjected to multiple impairments, the degree of susceptibility to degradation with increases in certain stressors at high quality attaining sites, and the imminence of threats to high quality waters. Each factor is listed in Table 2A for the 2025 study area.

Restorability scores were determined for the 23 impaired sites in 2025 (Table 2). All except three sites had "High" restorability scores, which means that readily available restoration actions have a higher than average chance of actually restoring the impairment. The challenge is in determining which actions need to be taken and which causes need to be rectified. The most severe (very poor) causes will need to be reduced first followed by the poor causes and then the fair causes. There were only five (5) very poor causes listed in Table 3 of which three were habitat related. More causes (44) were listed as poor exceedances with the remainder as fair. These findings can be used to determine course of action to rectify the observed aquatic life impairments. Two sites, each if which is a mitigation site, are localized in their scope and the remedy at each would be to wait and allow natural recovery processes to take place or intervene if no improvement are evident. Eleven (11) of the sites were impaired due a High-Fair narrative evaluation of the macroinvertebrates which is very close to that assemblage marginally attaining. All included a pollutant or response signature related to urban runoff with two including habitat deficiencies. All seem to be feasibly addressed with currently available watershed management or habitat enhancement or restoration practices. The sites with moderate restorability scores are only a few points below the high range, but they do have a higher number of associated causes of poor and very poor magnitude. The three attaining sites had high and moderate susceptibility scores and moderate threat scores with the same urban stormwater pollutants that were associated with the more extensive impairments at issue with the threatened status.

Trends Over Time

There was sufficient data at selected sites in the 2025 study area from prior Ohio EPA surveys between 1992 and 2023 to examine for trends over time for the fish and

macroinvertebrate assemblages. Comparisons of the fish IBI and selected metrics and the macroinvertebrate ICI or the qualitative narrative and selected metrics were made between sites with at least two years of data and several with three or more years of data. This consisted of four (4) sites across five (macroinvertebrates) and six (fish) years in Scioto Big Run, three sites across three years in Republican Run, Grant Run, and the Unnamed Tributary to Grant Run @RM 2.77, and Plum Run, and two sites across four (fish) and two (macroinvertebrates) years in Marsh Run. Most of the macroinvertebrate results showed net increases in condition in terms of the qualitative narrative, qualitative EPT taxa, and sensitive taxa. However, all of the gains were incremental and most falling short of full attainment of the WWH biocriteria. This was especially true in Scioto Big Run where gross pollution evidenced by the Poor narrative and zero sensitive taxa at the single site sampled in 1992 improved to mostly the Fair range with multiple High Fair values in 2025. Marginally Good conditions were observed by Ohio EPA at a single site in 2007 and 2023, but had declined to Low Fair in 2025. This type of variability is likely the result of varying conditions related to the urbanized character of the watershed and likely episodic, but localized pollution incidents as was observed by the MBI macroinvertebrate crew in Early Run in 2025.

The fish assemblage in Scioto Big Run was a showcase of improvement from Fair condition in 1992 and 1994 to Good condition in 2007 and 2010 to Very Good and Exceptional condition in 2023 and 2025. This was due in part to the good and excellent habitat that persists in the mainstem and contributed to the Good and Exceptional results against the backdrop of an otherwise urbanized watershed that this far has not precipitated major water quality issues. The improvement of the mainstem Scioto River over the same time period played a role in providing a pathway for the reinvasion of fish species many of which were virtually extirpated from most Central Scioto basin streams by the mid-20th century. Fish trends were less distinct in the other tributaries with multiple years of data and revealed localized issues including unsuccessful restoration projects in at least two instances and one of which precipitated water quality impacts that corresponded to a decline in fish assemblage condition in 2025.

Aquatic Life and Recreation Use Recommendations

Out of the 11 individual streams assessed in 2025, six (6) are currently designated in the Ohio WQS (OAC 3745-1-09; Table 9-1) while the remaining five (5) are unlisted and hence are undesignated. Table 4 lists the existing or recommended aquatic life and recreation uses for the 11 streams that comprise the 2025 study area. All are recommended as WWH including the South Branch of Republican Run which is presently designated as LRW for small drainageway maintenance. While the rationale for the LRW use is unknown, the 2025 results suggest at least the lower portion of that named stream be designated as WWH. All sites were evaluated against the PCR recreational use consistent with current Ohio EPA policy.

***Table 4**. Current and recommended use designations for 11 streams in the Scioto Big Run, Republican Run, Grant Run, Plum Run, and direct Scioto River tributary reaches and subwatersheds in the Columbus DWR 2025 study area. Recommendations are made for the current and recommended aquatic life and recreational uses only (WWH – Warmwater Habitat; LRW – Limited Resource Waters; PCR – Primary Contact Recreation, SCR – Secondary Contact Recreation).*

Water Body Segment	SRW	AQLU Designation				Water Supply		Recreation		Comments
		WWH	EWH	MWH	LRW	AWS	IWS	PCR	SCR	
Scioto Big Run		+				+	+	+		Designated Tributary to Scioto R.
Trib. to Scioto Big Run @RM 6.66		♦						+		Undesignated Tributary to Scioto Big Run
Trib. to Scioto Big Run @RM 3.59 (Early Run)		♦						+		Undesignated Tributary to Scioto Big Run
Trib. to Scioto Big Run @RM 0.70 (Brown Run)		♦						♦		Undesignated Tributary to Scioto Big Run
Marsh Run		+				+	+	+		Designated Tributary to Scioto Big Run
Gantz Run		♦						♦		Undesignated Tributary to Scioto Big Run
Republican Run		+				+	+	♦	+	Designated Tributary to Scioto R.
S. Br. Republican Run		♦			+	+	+	♦	+	Designated Tributary to Republican Run
Grant Run		+				+	+	+		Designated Tributary to Scioto R.
Trib. to Grant Run @RM 2.77		♦						+		Undesignated Tributary to Grant Run
Plum Run		+				+	+	+		Designated Tributary to Scioto R.

Legend: **+** - use designation verified by an Ohio EPA biological and habitat assessment; ♦ - recommended use based on Level 3 data collected in 2025; blue highlight - listed in current WQS; yellow highlight - currently unlisted in WQS.

Recreational Use Assessment

The assessment of recreational use attainment using mean and maximum *E. coli* results revealed consistent exceedances of the mean and Statistical Threshold Value criteria for Primary Contact Recreation (PCR) at every site sampled in 2025 (Table 5). Five (5) geometric mean values exceeded the STV the SCR criterion a result that amplifies the magnitude of the *E. coli* PCR exceedances. All except eight (8) of the maximum values exceeded the SCR criterion with the highest value of 14,000 cfu/100 mL at the uppermost site in Unnamed Tributary to Scioto Big Run at RM 3.59 (Early Run) which is affected by the only SSO in the study area. Generally the mean and STV exceedances were the highest and most consistent in the Scioto Big Run subwatershed with the maximum at all except two (2) sites exceeding the Secondary Contact Recreation (SCR) criterion and the geometric mean at all sites. The minimum at a site in Marsh Run (MR02) had a very low minimum value of 10 cfu/100 mL. These magnitude of the exceedances corresponds to the higher levels of urbanization in the Scioto Big Run subwatersheds compared to Republican Run, Grant Run, and Plum Run. The Republican Run subwatershed also had maximum value exceedances of the SCR criterion at all mainstem and the South Branch site, but at a lesser magnitude of exceedance compared to Scioto Big Run. With exception of a maximum value of 2300 in the Unnamed Tributary at RM 2.77 (GRR04) the other sites in Grant Run only one exceedance of the STV maximum at GRR01. The upstream site in Grant Run (GRR03) attained the PCR use by meeting both he geometric mean and the STV criteria. Plum Run failed to meet the geometric mean, but the maximum that was below the STV.

***Table 5**. E. coli values (cfu/100 mL) in the 2025 study area during June-October 2025. Yellow shaded values exceeded the 90-day geometric mean (126 cfu/100 mL) and orange shaded values exceeded the maximum STV (410 cfu/100 mL) Primary Contact Recreation (PCR) criteria. Red shaded values exceeded the Secondary Contact Recreation (SCR) use criterion.*

Site ID	River Mile	DA ($mi.^2$)	N	Date of Minimum	Minimum	Geometric Mean	Maximum	Date of Maximum
Scioto Big Run (Scioto River @RM 124.40)								
SBR06	8.50	2.90	4	9/22	300	2428	12000	6/30
SBR05	7.10	5.80	4	9/22	780	1599	2100	6/30; 7/21
SBR04	6.10	8.00	4	9/22	260	2291	7700	8/18
SBR03	4.40	11.80	4	9/22	150	649	1300	7/21; 8/18
SBR02	2.90	18.50	4	9/22	230	570	1400	7/21
SBR01	0.80	19.00	4	8/19	81	243	760	7/2
Unnamed Tributary to Scioto Big Run @RM 6.66								
SBR08	1.50	1.57	4	9/22	1100	1726	3600	6/30
SBR07	0.30	1.80	4	9/22	190	765	1800	6/30
Unnamed Tributary to Scioto Big Run @RM 3.59 (Early Run)								
SBR10	1.85	2.55	4	9/22	250	886	14000	6/30
SBR09	0.10	3.80	4	9/22	270	632	1300	7/21
Unnamed Tributary to Scioto Big Run @RM 0.70 (Brown Run)								
SBR11	0.10	3.00	4	8/20	80	337	1400	7/21
Marsh Run (Scioto Big Run @RM 1.48)								
MR02	2.00	2.20	4	6/30	10	163	1000	8/19
MR01	0.20	3.10	4	8/20	30	351	2100	7/21
Gantz Run (Scioto River @RM 124.31)								
GTZ01	1.00	0.78	4	8/20	110	412	1700	7/2
Republican Run (Scioto River @RM 123.11)								
REP04	5.40	1.01	4	8/19; 9/29	41	187	1700	7/7
REP03	3.80	2.97	4	9/22	450	1516	8200	6/30
REP02	1.30	5.70	4	8/19	140	524	1500	7/2
REP01	0.20	7.00	4	8/19	160	370	1400	7/2
South Branch Republican Run @RM 1.92								
REP05	0.02	1.90	4	8/19	180	544	1400	7/2
Unnamed Tributary to Republican Run @RM 0.73 (Billy Joe Run)								
REP06	0.10	0.88	4	9/29	230	416	910	7/2
Grant Run (Scioto River @RM 121.47)								
GRR03	4.30	2.00	4	8/19	>10	25	280	7/22
GRR02	2.00	7.80	4	8/19	180	250	390	9/29
GRR01	0.20	13.80	4	9/30	30	163	750	7/22
Unnamed Tributary to Grant Run @RM 2.77								
GRR04	1.50	1.00	4	7/22	180	862	2300	9/29
Plum Run (Scioto River @RM 118.64)								
PLM01	0.72	7.80	4	8/20	95	211	360	7/22
	Exccedance of Primary Contact Recreation (PCR) geometric mean criterion of 126 cfu/mL.							
	Exccedance of PCR Statistical Maximum Value (STN) criterion of 410 cfu/mL.							
	Exccedance of Secondary Contact Recreation (SCR) maximum criterion of 1030 cfu/mL.							

INTRODUCTION

The status of aquatic life and water quality in the 2025 Scioto Big Run, Republican Run, Grant Run, and Plum Run subwatersheds study area has direct implications for the City of Columbus of Water and Power (DWP), Division of Water Reclamation (DWR). The streams are the principal receiving waters of discharges from the DWR managed sewer system and stormwater discharges and runoff. It is therefore important to have an accurate understanding of the current status of biological condition, habitat, and water quality baseline in order to be able to relate it to abatement efforts and restoration projects that are planned or underway. This can critically affect our understanding of the efficacy of current regulations, the need for future regulations, and the capacity and operation of critical infrastructure to meet the challenges of a growing population and expanding human activities across Central Ohio. This survey is the second year of a rotation of surveys throughout the DWR service area under a long range monitoring plan that was developed in 2023-24 (MBI 2025a).

More recently U.S. EPA, trade organizations such as the Water Research Foundation (WRP), and major municipal water and wastewater utilities have been collaborating on an approach termed One Water. In a recent summary of One Water, Blueprint Columbus was cited as a prime example (Kent 2022):

> *"Integrated planning approaches, such as EPA's Framework for Integrated Planning for Municipal Stormwater and Wastewater, facilitate collaboration between multiple departments and agencies to implement shared solutions that meet multiple objectives. For example, Columbus Department of Public Utilities, in Ohio, is implementing Blueprint Columbus, a plan to redirect stormwater from the sanitary laterals and foundations on private property to public streets and to green infrastructure located in the right-of-way to reduce sanitary sewer overflows (SSO). This will reduce the amount of inflow and infiltration in the sewers, addressing the root cause of SSOs, without the need to build additional tunnels to handle the excess flow,* ***and improving water quality in streams.****"(emphasis added)*

It is documenting the *"improving water quality in streams"* in the vision for One Water that the DWR Monitoring Plan is intended to fulfill with biological, physical, and chemical data supporting an integrated analysis of causes and sources of impairment and threat. The recent availability of the *Integrated Prioritization System (IPS) for Greater Central Ohio Rivers and Streams, Phase I: Technical Documentation and Atlas of Stressor Relationships* (MBI 2025b) will enhance the execution of those integrated analyses.

Initiatives like One Water have historically been long on planning exercises and administrative measures, but weak to non-existent on demonstrating environmental results with sufficiently rigorous monitoring and assessment. With the exception of only a handful of

examples across the U.S. (e.g., the Southern California Stormwater Monitoring Coalition[4]), documenting improvements in water quality is largely an assumed outcome, much the same as it has been done over 50+ years of Clean Water Act (CWA) administration by U.S. EPA and the states. Through the execution of the Monitoring and Assessment (M&A) Plan, DWR will be a leader in completing the cycle of water quality management espoused by the U.S. EPA Environmental Indicators Initiatives of the 1990s (U.S. EPA 1995a,b), as described in the National Academy of Sciences (NAS) Committee on Science in TMDLs report (NRC 2001), and by Karr and Yoder (2004) as a follow on to the NAS effort. It will also meet a key recommendation of the National Academy of Sciences report on urban stormwater management in the United States (NRC 2009) that *". . . more comprehensive biological monitoring of waterbodies will be critical to better understanding the cumulative impacts of urbanization on stream condition."*

Prior surveys of streams in the 2025 study area have been restricted to an aggregation of site surveys during 1991-2023 by Ohio EPA at scattered sites in the 2025 study area. Hence the 2025 DWR survey is the first spatially comprehensive assessment of these subwatersheds within a single year. DWR has either made or is making substantial improvements to wastewater infrastructure by addressing urban sewage and stormwater infrastructure via Blueprint Columbus in portions of the Scioto Big Run subwatershed. Furthermore, use designations for aquatic life and recreation are lacking in the Ohio WQS for some of the 2025 study area streams. Making recommendations for attainable uses for aquatic life and recreation is one of the major objectives of this assessment.

In 2017-18 Ohio EPA reduced the intensity and frequency of watershed monitoring and assessment that had been a staple of that program for nearly 40 years. This was followed in 2018-19 by the agency proposing and implementing a new Two-Pronged strategy for statewide monitoring and assessment that reduces the acuity and relevance of prior assessments of mainstem rivers and watersheds and lessening the connection with historical trends by virtue of that reduction. An Ohio EPA survey in 2023 included only six (6) sites compared to 26 sites sampled in the 2025 DWR survey. It is therefore critical for DWR to have the most accurate and up to date knowledge at a level of detail that allows for better planning and responding to pending initiatives from Ohio EPA, U.S. EPA, and third parties. One such example is the recently proposed Ohio EPA Stream Nutrient Assessment Procedure that has implications for assessing the impacts of nutrients in the 2025 study area and from the sewer system itself and possibly MS4 requirements in the future. Addressing such issues independently and apart from a watershed-based monitoring and assessment design is not only imprudent, but could produce requirements that conflict with the realities of the current status of these urbanized and urbanizing subwatersheds resulting in potentially costly and unnecessary expenditures. This study includes an extensive inventory of sewer system features that were available in GIS coverages provided by Columbus Water and Power (CWP) and DWR in order to better inform the analysis of the chemical/physical, habitat, and biological data that was collected in 2025.

[4] https://socalsmc.org/about/organizational-goals/

METHODS

Monitoring Design

An intensive pollution survey design that employs a high density of sampling sites and paired biological, chemical, and physical indicators and parameters was followed in 2025 and as prescribed by the 2024 DWR Monitoring and Assessment Plan (MBI 2024a). The principal objectives of the 2025 assessment are to report aquatic life and recreational use attainment status, following the Ohio WQS and Ohio EPA practices, and determine associated causes and sources of impairments. To accomplish this monitoring sites were distributed across the subwatersheds to assess the impacts of sources of potential sewage releases and other contaminants, and major physical modifications to provide a "pollution assessment" of the streams in the 2025 study area. The result was a design that included chemical, physical, and biological sampling at 26 sites in the Scioto Big Run, Republican Run, Grant Run, and Plum Run subwatersheds. Each site was assigned a unique site code as depicted in Table 1 and in Appendix Table A-1. Fourteen (14) of the sites are "new" never having been sampled with Level 3 methods or by prior Ohio EPA surveys.

Biological and Water Quality Surveys

A biological and water quality survey, or "biosurvey", is an interdisciplinary monitoring effort coordinated on a water body specific or watershed scale. Biological, chemical, and physical monitoring and assessment techniques are employed in biosurveys to meet three major objectives:

1. Determine if use designations and/or goals set for or assigned to a given water body are appropriate and attainable;
2. Determine the extent to which use designations assigned in the state Water Quality Standards (WQS), or equivalent policies or procedures, are either attained or not attained; and,
3. Determine if any changes in ambient biological, chemical, or physical indicators have taken place over time, particularly before and after the implementation of point source pollution controls or best management practices.

The data were managed by MBI in a relational database that supports the integrated analysis of ambient chemical, physical, and biological data and pollution source information and characterization. The findings are analyzed and depicted in a written report with causes and sources of impairments being described as to their extent and severity along with any recommendations for their eventual resolution.

Measuring Incremental Changes

Incremental change is defined here to represent a measurable and technically defensible change in the condition of a water body within which it has been measured. Most commonly this is termed "incremental improvement" in which the condition of a water

body that does not yet fully meet all applicable water quality standards (WQS) can be tracked as to the direction or trajectory of any changes. The general principles of incremental change are defined as follows (after Yoder and Rankin 2008):

- ***Measurement of incremental change*** can be accomplished in different ways, provided the measurement method is scientifically sound, appropriately used, and sufficiently sensitive enough to generate data from which signal can be discerned from noise;
- ***Measurable parameters and indicators*** of incremental change include biological, chemical, and physical properties or attributes of an aquatic ecosystem or pollution source that can be used to reliably indicate a change in condition; and,
- ***A positive change in condition*** means a measurable improvement that is related to a reduction in a specific pollutant load, a reduction in the number of impairment causes, a reduction in an accepted non-pollutant measure of degradation, or an increase in an accepted measure of waterbody condition relevant to designated use support.

The ability to accomplish this was limited by a dearth of historical data of sufficient quantity. However, what historical data that does exist was utilized to assess for any apparent changes over time.

Biological Methods

All biological sampling methods are defined by the applicable protocols published by the Ohio EPA (1987a,b; 1989a,b; 2006, 2015a,b). These meet the specifications of the Ohio WQS and are used to assess aquatic life and recreational use designations, to determine the extent and severity of impairments, and to document incremental changes that result from pollution abatement actions.

Fish Assemblage Methods

Methods for the collection of fish at wadeable headwater sites was performed using either a bank set long-line pulsed D.C. electrofishing equipment using a Smith-Root 2.5 GPP electrofishing unit or an ETS AbP-3 battery powered backpack electrofishing unit that was used as an alternative to the long line in the smallest headwater streams and in accordance with the restrictions described by Ohio EPA (1989a). A three person crew carried out the sampling protocol over a lineal distance of 150 meters in length for headwater sites. Sampling distance was measured with a Global Positioning System (GPS) unit or laser range finder. Sampling locations were delineated using the GPS mechanism and indexed to latitude/longitude and Universal Transverse Mercator (UTM) coordinates at the beginning, end, and mid-point of each site. The location of each sampling site was indexed by river mile using the Ohio EPA River Mile Index (RMI) system[5]. Sampling was conducted during the June 16-October 15 seasonal index period once at all sites. Sampling

[5] https://data-oepa.opendata.arcgis.com/apps/river-miles-index/explore

was conducted in an upstream direction and in and adjacent to the most heterogeneous habitat. Stunned fish were collected by a primary and one secondary netter with the third crew member tending the electrofishing unit for the long line or the live net with the backpack unit.

Samples from each site were processed by enumerating and recording numbers by species and in some cases by life stage (y-o-y, juvenile, adult). All captured fish were immediately placed in in a floating live net (long line and backpack) for processing. Water was replaced and/or aerated regularly to maintain adequate dissolved oxygen levels in the water and to minimize handling 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 counted. Larval or post-larval stage individuals measuring less than 15-20 mm in length (excluding species with small size as adults) were generally not included in the data as a matter of practice except for species with small adult sizes.

The incidence of external anomalies was recorded following procedures outlined by Ohio EPA (1989a; 1996) 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 of individual fish required their preservation for later laboratory identification. Vouchers were preserved in borax buffered 10% formalin and labeled by date, river or stream, and geographic identifier (e.g., river mile). Identification was to the species level at a minimum and to the sub-specific level if necessary. A number of regional ichthyology keys were used and included the Fishes of Ohio (Trautman 1981). Vouchers were deposited at and verified by The Ohio State University Museum of Biodiversity (OSUMB). Data were recorded on water resistant data forms for entry into the MBI ECOS data management system with all entries proofread for accuracy.

Macroinvertebrate Assemblage Methods

Macroinvertebrates were sampled with artificial substrates set for six weeks at the four (4) sites draining >10 square miles. Out of these sites the artificial substrates were recovered at only one (1) site. A qualitative dip net/hand pick method was used as a standalone method at sites draining <10 square miles and where the artificial substrates were lost in accordance with Ohio EPA macroinvertebrate assessment procedures (Ohio EPA 1989a, 2015a). The qualitative samples were collected using a triangular frame dip net and hand picking with organisms initially preserved in 95% ethanol. Identifications were performed to the lowest taxonomic resolution possible for the commonly encountered orders and families, which is genus/species for most taxa. From these results, the richness of macroinvertebrates and general comments about their abundance were used to produce a narrative assessment of Exceptional, Very Good, Good, High Fair, Fair, Low Fair, Poor, or Very Poor for each sample in accordance with Ohio EPA practices (Ohio EPA 2015a).

Trajectories in Key Indicators

Developing an understanding of the temporal trajectory of the different indicators and

parameters that are provided by a spatially adequate monitoring design is important feedback to Columbus DWR, Ohio EPA, and stakeholders in Scioto Big Run, Republican Run, Grant Run, and Plum Run subwatersheds study area. The 2025 study area have a complex mosaic of watershed level and site-specific impacts the complexity of which makes being able to understand and then develop management responses to impairments an imperative. The documentation of incremental improvement as opposed to a singular focus on their full restoration allows program effectiveness to receive credit short of achieving full attainment. Furthermore, failing to recognize if waters are improving and on a positive trajectory can lead to erroneous conclusions about the attainability of CWA goals and the viability of restoration efforts. Simply put, a selective focus on individual and selected pollutants alone is insufficient in a complex setting like the 2025 study area. It is for these reasons that being able to detect, measure, and express incremental improvements in key indicators is important. Showing incremental progress not only provides confirmation that restoration efforts are working, but it also provides important feedback to those programs which because of uncertainties in their outcomes must be adaptive in order to succeed. As such, the type of monitoring and assessment that was employed in this survey was designed to provide results that could be used to demonstrate the degree and direction of incremental change over time.

The results of the bioassessment using the primary indices that comprise the Ohio biocriteria were used to quantify the degree to which overall aquatic life conditions have improved through time up to and including the 2025 survey. The limited amount of historic data in the 2025 study area precluded the use of quantitative tools such as the Area of Degradation (ADV) and Area of Attainment (AAV) methodology (Yoder et al. 2005). The ADV/AAV term is an expression of the degree to which one of the biological index values is either above or below the WWH biocriterion and the distance of the mainstem over which it occurs. As such it is a quantification of the “quantity” of biological attainment and impairment. When normalized to a standard distance (e.g., per mile) it can be an effective indicator of the degree of change which is taking place between river reaches and through time in the same river reach and between different rivers. For the 2025 survey this was reduced to simple comparisons of fish IBIs and macroinvertebrate qualitative narratives on a site-by-site basis where historical data existed. In the future the 2025 results will serve as the baseline against which future survey results in accordance with the DWR Monitoring and Assessment Plan (MBI 2024a) can be more completely assessed.

Habitat Assessment

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 2006). Various attributes of the habitat are scored based on the overall importance of each to the maintenance of viable, diverse, and functional aquatic assemblages. 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 realistically

ranges from 20 to less than 90 in Ohio. The QHEI is also used to evaluate the characteristics of a stream or river segment, as opposed to solely assessing the characteristics of a single sampling site. As such, certain 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 across Ohio headwater streams have indicated that values greater than 55 are generally conducive to the existence of warmwater faunas whereas scores less than 45 generally cannot support a warmwater assemblage (Ohio EPA 1989b, Rankin 1995) consistent with baseline CWA goal expectations (e.g., the WWH in the Ohio WQS). A QHEI matrix (Rankin 1989, 1995) that compares the number of good and modified attributes and their ratios was used as the principal method to evaluate aquatic life use suitability and attainability in the 2025 study area.

Chemical/Physical Methods

Chemical/physical sampling for the 2024 study area included the collection and analysis of water samples for chemical/physical and bacterial analysis and sediment samples for determining organic chemicals and metals levels. Methods for the collection of water column chemical/physical and bacterial samples followed the procedures of Ohio EPA (2023a,b). Sediment chemical sampling followed that described by Ohio EPA (2025a,b,c). All laboratory analyses except benthic chlorophyll *a* was performed by the Columbus DWR Surveillance Laboratory. Chlorophyll *a* biomass analysis was performed by Alloway Laboratories located in Marion, OH.

Water Column Chemical Quality

Water column chemical quality was determined by the collection and analysis of grab water samples, instantaneous measurements recorded with a water quality meter, and continuous measurements recorded at multiple day intervals at seven (7) sites in the major streams sampled in 2025.

Grab Sampling

Grab samples of water were collected with a stainless steel bucket from a location as close to the center point of the stream channel as possible by the MBI sampling crew. Samples were collected from the upper “12-24” of the surface and then transferred to sample containers in accordance with Ohio EPA (2025a,b) procedures. Sampling was conducted between mid-June and mid-October and under “normal” summer-fall low flows – elevated flows following precipitation events were avoided and sampling was delayed until the elevated flows subsided. The frequency of sampling was four (4) times at all sites. Instantaneous values for temperature (°C), conductivity (µS/cm), pH (S.U.), and dissolved oxygen (D.O.; mg/L) were recorded with a YSI Model 664 meter at the time of grab sample collection and with the fish/habitat sampling.

Continuous Recordings

Continuous readings of temperature (°C), conductivity (µS/cm), pH (S.U.), and dissolved oxygen (D.O.; mg/L) were recorded with YSI EXO 2 and EXO3 Sonde ("Datasonde") instruments at 32 Scioto and Olentangy mainstem locations. The Datasondes were set as close as possible to the Thalweg (i.e., deepest part of the stream channel) in a PVC enclosure that ensured no contact with the stream bottom or other solid objects. The Datasondes were positioned vertically where depth allowed by driving steel fence posts into the bottom and positioning the PVC enclosure in an upright position. Where the depth was too shallow or deep, the PVC enclosure was secured in a horizontal position in an area of the stream channel with continuous flow. All Datasondes were secured against theft or vandalism. "Short-term" deployments were made over 3-4 day continuous intervals during periods of maximum summer temperatures and normal summer flows. Readings were recorded at 15 minute intervals. At the time of retrieval data was downloaded to a YSI Model 650 Instrument with high memory capacity and then transferred to a PC for storage and later analysis. "Short term" deployments were made during July and August 2024 at seven(7) sites in Scioto Big Run (5 sites) and the lower reaches of Grant Run (1 site) and Plum Run (1 site).

Sediment Chemical Quality

Fine grain sediment samples were collected in the upper strata of bottom material at each sampling location using decontaminated stainless steel spoons and excavated using nitrile gloves. Decontamination of sediment sampling equipment followed the procedures outlined in the Ohio EPA sediment sampling guidance manual (Ohio EPA 2025c). Grab samples were homogenized as a composite in stainless steel pans (material for VOC analysis was not homogenized), transferred into glass jars with Teflon® lined lids, placed on ice (to 4°C) in a cooler, and delivered to the Columbus DWR Surveillance Lab. Sediment data was reported on a dry weight basis. Sediment samples were analyzed for a total analyte list of inorganics (metals), volatile organic compounds, semi-volatile organic compounds, PCBs, pesticides, and total petroleum hydrocarbons.

Determining Use Attainment Status

Use attainment status is a term which describes the degree to which environmental parameters or indicators are either above or below criteria specified by the Ohio Water Quality Standards (WQS; Ohio Administrative Code 3745-1). For the 2025 study area two use designations were evaluated, aquatic life and recreation in and on the water by humans. Hence the process herein is referred to as the determination of aquatic life and recreational status for each sampling site. The process was applied to data collected by ambient assessments and applies to ambient locations outside of discharger mixing zones.

Aquatic Life Use Attainment Status

Aquatic life use attainment status is determined by the Ohio EPA biological criteria (OAC 3745-1-07; Table 7-1). Numerical biological criteria are based on multimetric biological

indices which include the Index of Biotic Integrity (IBI) and modified Index of Well-Being (MIwb), which indicate the health and well-being of the fish assemblage, and the Invertebrate Community Index (ICI), which indicates the quality of the macroinvertebrate assemblage. The IBI and ICI are multimetric indices patterned after an original IBI described by Karr (1981), Fausch et al. (1984), and Karr et al. (1986) and subsequently modified by Ohio EPA (1987b) for application to Ohio rivers and streams. The ICI was developed by Ohio EPA (1987b) and was further described by DeShon (1995). The MIwb is a measure of fish community abundance and diversity using numbers and weight information and is a modification of the original Index of Well-Being originally applied to fish community information (Gammon 1976; Gammon et al. 1981). Numerical biocriteria are stratified by ecoregion, use designation, and stream or river size per OAC 3745-1-07(C). Since all except four (4) of the 26 sites in the study area were comprised of headwater streams draining <10 square miles the fish IBI and a narrative evaluation of the qualitative samples were used in lieu of an ICI. The MIwb for fish does not apply in headwater streams draining <20 square miles.

Three attainment status results are possible at each sampling location - full, partial, or non-attainment as follows:

- **FULL** attainment means that all of the indices meet the applicable biocriteria.
- **PARTIAL** attainment means that one or more of the indices fails to meet the applicable biocriteria.
- **NON**-attainment means that none of the indices meet the applicable biocriteria or one of the organism groups reflects poor or very poor quality.

An aquatic life use attainment table was constructed based on the sampling results and is arranged from upstream to downstream and includes the sampling locations indicated by site code, river mile, the applicable biological indices, the use attainment status (*i.e.,* full, partial, or non), the Qualitative Habitat Evaluation Index (QHEI) score, and pertinent comments and observations about each sampling location and proximity to sources of stress.

Recreation

Criteria for determining attainment of recreational uses are established in the Ohio Water Quality Standards (OAC 3745-1-07; Table 7-13) based upon the counts of fecal bacteria *(Escherichia coli)* present in the water column expressed as colony forming units (cfu) per 100 mL. *E. coli* bacteria are microscopic organisms that are normally present in the feces and intestinal tracts of humans and other warm-blooded animals. *E. coli* typically comprises approximately 97 percent of the organisms found in the fecal coliform bacteria of human feces (Dufour 1977). There is currently no easy way to differentiate between human and animal sources of fecal coliform bacteria in surface waters, although methodologies for this determination include DNA analysis. These microorganisms can enter water bodies where there is a direct discharge of human and/or animal wastes, or

they may enter water bodies via runoff from soils where such wastes have been deposited. Pathogenic (disease-causing) organisms can be present in stormwater in small amounts (Lee et al. 2020) plus it is impractical to directly monitor each specific type of pathogen in a general monitoring program. Fecal indicator bacteria by themselves, including *E. coli,* are generally not pathogenic. However, some strains of *E. coli* can be pathogenic and capable of causing serious illness. Although not necessarily agents of disease, fecal indicator bacteria such as *E. coli* may signal the *potential* presence of pathogenic organisms that can enter the aquatic environment via various same pathways. When *E. coli* are present in extremely high numbers in a water sample, it is generally means the water has received fecal matter from one or more sources of raw or partially treated sewage that are likely human in origin.

The Ohio WQS for recreational uses were revised in 2016 to reflect a more rigid adherence to any form of contact with surface waters as ensuing the same level of risk. This replaced a former framework that was stratified to account for the degree of body contact with three (3) subcategories of the Primary Contact Recreational (PCR) use as PCR-A, PCR-B, and PCR-C. Those subcategories are now merged into a single use. The application of the Secondary Contact Recreational (SCR) use was also changed to a more restrictive interpretation of the potential for human contact with surface waters. Existing SCR designations remain, but could potentially be reviewed and revised to PCR by Ohio EPA. Any new SCR recommendations would need to document that there is no human contact possible due to impermeable physical restrictions to access a surface water. As a result the evaluation of the recreational uses in the 2025 study area were done in accordance with the existing designations of PCR and SCR as applicable.

Streams in the 2025 basin are either designated as or assumed to be Primary Contact Recreation (PCR) in the Ohio WQS (OAC 3745-1- 09). Water bodies with a designated recreation use of PCR *". . . are suitable for one or more full-body contact recreation activities such as, but not limited to, wading, swimming, boating, water skiing, canoeing, kayaking, and scuba diving"* (OAC 3745-1- 07(B)(4)(b)). SCR includes waters that *". . . result in minimal exposure potential to water borne pathogens because the waters are; rarely used for water based recreation such as, but not limited to, wading; situated in remote, sparsely populated areas; have restricted access points; and have insufficient depth to provide full body immersion, thereby greatly limiting the potential for water based recreation activities."* What SCR designations that remain in the Ohio WQS were done years ago.

The *E. coli* criterion that applies to PCR is expressed as a 90-day geometric mean of ≤126 colony forming units (cfu)/100 mL with a Statistical Threshold Value of 410 cfu/100 mL[6]. The criterion that applies to SCR designated streams is ≤1,030 cfu/100 mL for both the 90-day geometric mean and the STV. An arithmetic mean based on two or more samples can be used as the basis for determining the attainment status of the PCR use.

[6] These criteria shall not be exceeded in more than ten per cent of the samples taken during any ninety-day period.

Determining Use Attainability

Use designation reviews and recommendations for revisions, whenever necessary, have been a consistent focus of prior Ohio EPA biological and water quality assessments conducted throughout the Scioto River basin. Given the status of 2025 data as Level 3 credible data, it is eligible to be used by Ohio EPA to revise certain use designations. The use attainment tables are based on the most applicable of the existing use designation or a recommended use designation, particularly for sites that are either attaining or show the potential to attain the recommended designation. Many of the outstanding use designation changes had been made following the Ohio EPA assessments of the 1980s and 1990s, but several streams in the 2025 study have not been designated hence that is a task of the data analysis herein. The determination of the appropriate and attainable use followed Ohio EPA practices.

Determining 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 per OAC 3745-1-07[C]. 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; Yoder 1991; Yoder 1995). Describing the causes and sources associated with observed biological impairments relies on an interpretation of multiple lines of evidence including the water chemistry data, sediment data, habitat data, effluent data, land use data, and biological response signatures (Yoder and Rankin 1995b; Yoder and DeShon 2003). Thus the assignment of associated causes and sources of biological impairment in this assessment represents the association of impairments (based on response indicators) with stressor and exposure indicators using linkages to the bioassessment data based on previous experiences within the experience with analogous situations and impacts. For example, exceedances of established chemical thresholds such as chronic and acute water quality criteria or sediment effect thresholds are grounds for listing such categories of parameters to include individual pollutants provided that they co-occur with a biological impairment. In 2025 this was enhanced by using the effect thresholds available from the *Integrated Prioritization System (IPS) for Greater Central Ohio Rivers and Streams, Phase I: Technical Documentation and Atlas of Stressor Relationships* (MBI 2025b) that provides the magnitude of exceedances of chemical and habitat parameters as fair, poor, and very poor. Land use was not included as a cause because it fills the role as a source level variable that drives certain causes if aquatic life impairment. It was used herein to determine the sources associated with aquatic life impairments.

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 pollution sources are judged objectively on the basis of environmental results. A tiered approach that links the results of administrative actions with environmental measures was employed in the causal analyses and within the limitations of the data that is available for certain sources. This integrated approach is outlined in Figure 2 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);
2. Responses by the regulated community (treatment works, pollution prevention);
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 changes in health, ecology, or other effects (ecological condition, pathogens).

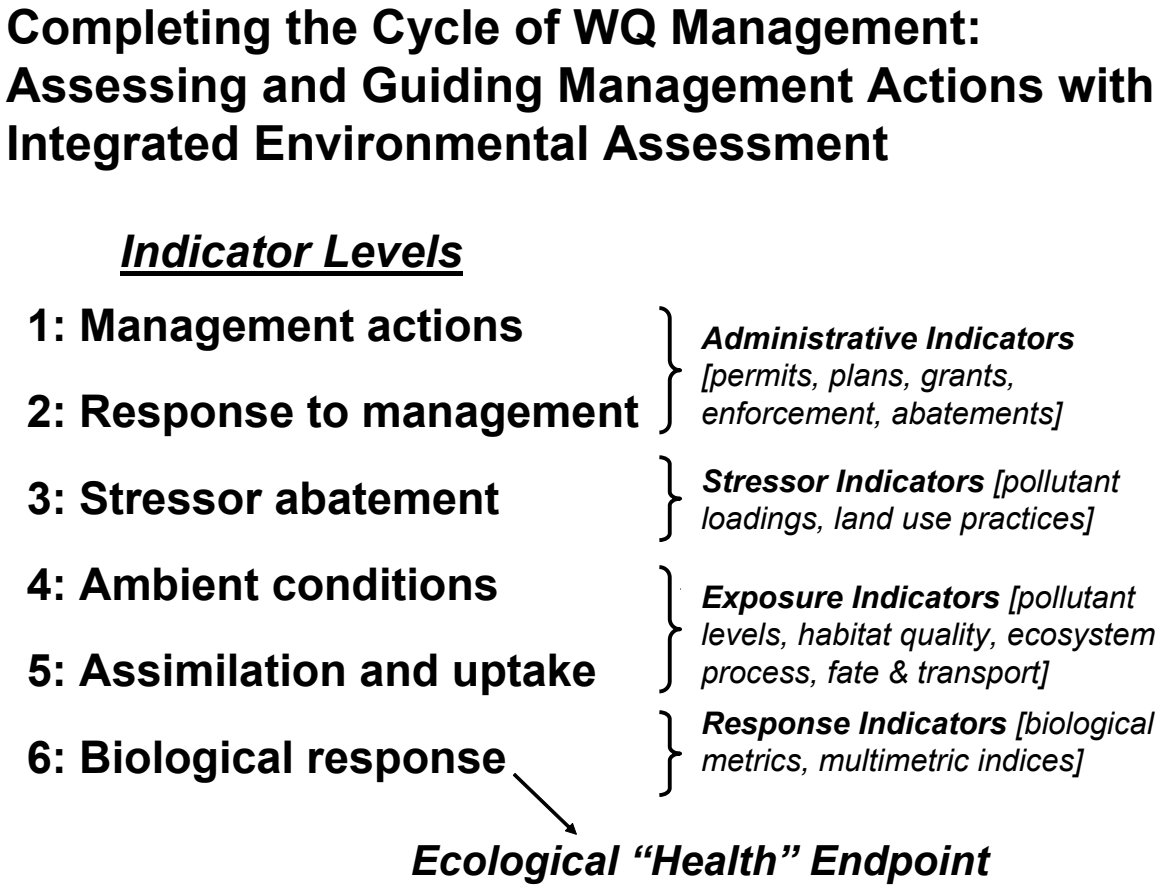


Figure 2*. Hierarchy of administrative and environmental indicators which can be used for water quality management activities such as monitoring and assessment, reporting, and the evaluation of overall program effectiveness. This is patterned after a model developed by U.S. EPA (1995a,b) and further enhanced by Karr and Yoder (2004).*

In this process the results of administrative activities (levels 1 and 2) aimed at improving water quality are sequentially linked to environmental stress and exposure (levels 3, 4, and 5) which translate to a response or the environmental "results" (level 6). An example is the aggregate effect of the CWA mandated water pollution controls since the early 1970s the effectiveness of which have since been determined with quantifiable measures of environmental condition in Ohio rivers and streams (Yoder et al. 2005; Yoder et al. 2019; MBI 2022; Ohio EPA 2023). 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 are those which measure the effects of stressors and can include whole effluent toxicity tests, tissue residues, and biomarkers, each of which 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 that are represented here by the biological indices which comprise the Ohio 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* a strict adherence to the roles which are most appropriate for each (Yoder and Rankin 1998).

STUDY AREA DESCRIPTION

The 2025 study area includes five tributaries to the Scioto River between RMs 124.40 (Scioto Big Run) and 118.64 (Plum Run), four of which consist of distinct watersheds with multiple tributaries and one with a single stream. The largest is Scioto Big Run located on the near west and southwest side of Columbus including portions of Galloway and the Hilltop and Urbancrest neighborhoods, and south into Grove City and outlying rural and suburban areas. These are in order from upstream to downstream Scioto Big Run, Gantz Run, Republican Run, Grant Run, and Plum Run all flowing into the Scioto River from the West. The watershed size, gradient, length, land uses, and low flow characteristics appear in Table 5.

A Description of the Major Streams and Pollution Sources

Land uses, pollution sources, and general stressors are typical for the mixed residential, commercial, and urban settings in the 2025 study area subwatersheds as described below. There are no active major permitted discharges of wastewater in any of the 2025 study area subwatersheds, but there are four (4) minor NPDES permitted discharges in the 2025 study area that include a mobile home park on an unnamed tributary to Scioto Big Run, two quarry operations located along Frank Rd. along Scioto Big Run and Marsh Run, and the SWACO (Solid Waste Authority of Central Ohio) Landfill in the headwaters of Grant Run. Designated uses in the WQS for aquatic life and recreation range from unlisted to designated for the WWH and LRW aquatic life uses and PCR and SCR for the recreation uses. Use designation recommendations were previously outlined in the Summary (Table 4).

Scioto Big Run

Scioto Big Run has the largest watershed and longest length in the 2025 study area and is a tributary to the Scioto River. It has several tributaries all of which except Marsh Run are unnamed and undesignated in the Ohio WQS. The watershed area is 25.1 square miles with a length of 12.1 miles according to the USGS StreamStats[7] database and tool (Table 6; USGS 2019). After decades of sustained urban development the current land uses are 86.1% developed land of which 34.7% is impervious surface, and 12.9% forested. The 30-day, 10-year ($Q_{30,10}$) low flows is 0.228 cfs with the 80th percentile at 3.370 cfs indicating a moderate degree of flow variability. The $Q_{30,10}$ low flow of 0.228 cfs is elevated for an urban stream indicating that groundwater inflows likely support higher low flows during periods of dry weather. Four tributaries were included in the 2025 sampling including Marsh Run from the west at RM 1.43 and three unnamed tributaries that enter Scioto Big Run, one from the south at RM 6.66, one from the northwest at RM 3.59 (locally known as Early Run), and the other from the west at RM 0.70 (locally known as Brown Run. Drainage areas ranged from 0.78 square miles for Marsh Run to 3.84 for the tributary at RM 3.59 (Early Run), which also had the highest developed land use at 98.9% and third highest impervious cover at 42.9%. Marsh Run had the highest impervious cover in the 2025 study area at

[7] https://streamstats.usgs.gov/ss/

***Table 6**. Physical stream and watershed, land use, and flow duration characteristics of the five individual subwatersheds within the 2025 Columbus DWR study area (DA – drainage area).*

Subwatershed	DA ($mi.^2$)	Length (mi.)	Gradient (ft./mi.)	%Developed Land	%Impervious	%Forest	$Q_{30,10}$ Flow (cfs)	80th %ile Flow (cfs)
Scioto Big Run (SBR)	25.10	12.10	21.80	86.1	34.7	12.9	0.2280	3.370
U.T. SBR @RM 6.66	1.98	4.29	35.55	73.3	28.5	9.9	0.0070	0.338
U.T. SBR @RM 3.59	3.84	5.31	27.64	98.9	42.9	6.9	0.0230	0.705
Marsh Run	0.78	3.10	47.70	84.8	50.8	15.6	0.0070	0.381
U.T. SBR @RM 0.70	2.98	7.10	30.20	74.6	29.5	9.2	0.0236	0.697
Gantz Run	0.44	1.51	68.14	77.2	47.3	11.4	0.0040	0.303
Republican Run	7.30	7.97	31.20	68.2	25.7	5.0	0.0860	1.460
S. Br. Republican Run	1.56	5.07	29.17	68.2	23.2	2.4	0.0142	0.513
U.T. @RM 0.73	0.89	2.83	42.66	59.7	20.9	6.3	0.0092	0.434
Grant Run	14.10	8.83	29.40	35.4	11.2	7.9	0.0400	2.410
U.T. @RM 2.77	1.74	4.66	27.49	35.7	16.1	5.5	0.0180	0.585
Plum Run	9.00	8.23	25.70	9.4	2.2	6.9	0.0329	1.840

50.8%. Even though the land use data in StreamStats relies on the 2011 National Land Cover Database it is likely that land use is largely unchanged since this is the oldest developed urban zone in the 2025 study area. The lower 1.4 miles of Scioto Big Run were channelized and straightened to accommodate the location of several commercial properties along Frank Rd. and for the construction of I-270.

Gantz Run

This is the smallest watershed in the 2025 study area draining 0.44 square miles and a length of 1.51 miles. It has the highest gradient at 68.14 ft./mi. and the second highest impervious cover at 47.3%. It also has the lowest $Q_{30,10}$ low flow of 0.004 cfs and 80th %ile flow of 0.303 cfs. Gantz Run enters the Scioto River next to Scioto Big Run at RM 124.31. Like Scioto Big Run the lower 0.5 miles were channelized and straightened to accommodate the construction of I-270.

Republican Run

Republican Run originates on the west side of Grove City and flows through the residential center exiting into less developed areas before it meets the Scioto River at RM 122.95. It has a drainage area of 7.30 square miles and a length of 7.97 miles. The gradient is high at 31.2 ft./mi. with developed land at 68.2% and impervious cover at 25.7%. Given that StreamStats relies on the 2011 National Land Cover Database it is likely that both developed and impervious land cover has increased since then. The $Q_{30,10}$ low flow of 0.0086 cfs and 80th %ile flow of 1.460 cfs are elevated relative to the most urbanized

streams and an indication of a degree of influence from ground water. Two tributaries were included in the 2025 assessment, the South Branch at RM 1.93 (locally named Mulberry Run) and an unnamed tributary at RM 0.70 that is locally known as Billy Joe Run. Both have drainage areas of 1.56 and 0.89 square miles, lengths of 5.07 and 2.83 miles, and high gradients of 29.17 and 42.66 ft./mi., respectively. Developed land use in each was an identical 68.2% with impervious cover of 23.2% and 20.9%, respectively. Like their parent stream the $Q_{30,10}$ low flow and 80th %ile flows are elevated relative to the most urbanized streams in the study area. It is likely that the StreamStats land developed and impervious land cover have increased since 2011. The unnamed tributary at RM 0.73 (Billy Joe Run) is now occupied by the Pinnacle Club which offers a golf course and low density housing with wider riparian setbacks than in the older urban area to the north.

Grant Run

Grant Run is the second largest of the 2025 subwatersheds at 14.1 square miles drainage area, a length of 8.83 miles, and a high gradient 29.4 ft./mi. entering the Scioto River at RM 121.47. Land use is 35,4% developed land of which 11.2% is impervious cover, and 7.9% forested. The $Q_{30,10}$ low flow of 0.040 cfs and 80th percentile of 2.410 cfs are likewise elevated relative to the most urbanized streams and is an indication of a positive influence from ground water. A single unnamed tributary at RM 2.77 was included with a drainage area of 0.89 square miles and a length of 2.83 miles with a high gradient of 29.4 ft./mi. Grant Run offers two stream habitat mitigation sites, one in Upper Grant Run (GRR03) at the Mt. Carmel Grove City campus and the other in upper extreme of the unnamed tributary at RM 2.77 at a complex of commercial establishments anchored by a Meijer store on St. Rt. 665. The GRR03 Mt. Carmel site is listed by Ohio EPA[8] as a Stream and Wetland Mitigation Site as a permittee responsible mitigation for the relocation of the stream to accommodate the construction of the Mt. Carmel campus beginning in 2015. The stream was reconstructed with meanders within a wide ditch and due to beaver activity with the stream channel obscured by a series of beaver ponds upstream and downstream from the Meadows Dr. location of the sampling site. The unnamed tributary at site GRR05 is not listed on the Ohio EPA web site and consists of an overwide ditch that was constructed in the mid-2000s to accommodate the Meijer store parking lot and adjacent retail establishments along St. Rt. 665. It is apparently maintained as evidenced by crew spraying for invasive plants in 2025.

Plum Run

Plum Run enters the Scioto River at RM 118.64 from the west south of Grove City and just opposite from the Columbus DWR Southerly Water Reclamation Facility (WRF). It drains 9.0 square miles, has length of 8.23 miles, and a high gradient of 25.7 ft./mi. It has 9.4% developed land, 2.2% impervious cover making it the least developed watershed in the 2025 study area. It is likely to be developed in the near future. The $Q_{30,10}$ low flow of 0.0329 cfs and 80th percentile of 1.840 cfs are likewise elevated relative to the most urbanized streams and is an indication of a positive influence from ground water.

[8] https://geo.epa.ohio.gov/portal/apps/experiencebuilder/experience

Current Pollution Sources and Other Stressors

Pollution sources and general stressors are typical for the varying degrees of urbanization and commercial development in the 2025 study area subwatersheds as just described. There are no active major permitted discharges of wastewater in the 2025 study area and only four minor permitted ones of which two occur in the downstream reaches of Scioto Big Run along St. Rt. 104. Sewer system related sources include a single sanitary sewer overflow (SSO) and unintentional releases from the sewer system. Stormwater discharges, home sewage treatment systems (HSTS), general urban runoff and the associated chemical pollution, hydrological alterations, and direct and indirect habitat alterations are all present in the 2025 study area.

Adding to the challenges of managing the largest pollution source in the form of the municipal sewerage system, the Columbus metropolitan area is experiencing the fastest population growth of any major city in the Midwest U.S. The population increased by more than 230,000 persons during 2010 to 2020, a 12.2% increase (U.S. Census Bureau 2020). The population is projected to grow by another 500,000 persons through 2050 under current trends. As would be expected this will place significant capacity demands on the sewerage system infrastructure and treatment facilities as well as demands on the remaining assimilative capacity of the receiving rivers and streams.

City of Columbus Collections System

The City of Columbus collects and treats residential and industrial sanitary wastewater from the city and most of the surrounding suburbs including the 2025 study area subwatersheds. Data about the collection system that conveys wastewater to one of the two major wastewater reclamation facilities (Jackson Pike or Southerly) was furnished by CPW in the form of GIS shapefiles that contained dimensional and locational information about 41 different features of the system, 21 of which were deemed a *potential* source of sewage or other pollutant releases to surface waters (Appendix F). The sanitary sewer system in the 2025 study area includes 2,768 miles of separate sanitary sewers that transport wastewater to the Jackson Pike Water Reclamation Plant (WRP) that serves the western half of Franklin County and the central portion of Columbus (Table 7). The stormwater system collects rain water and snow melt runoff that enter the storm sewer system through drainage ditches or via drains on curbed streets. Any materials on the surface of streets, roofs, sidewalks, and yards can be washed into the storm sewer system, which empties directly into nearby streams or rivers with no treatment. Table 7 lists 974 HSTS that, along with all other sewer features, are located mostly in the Scioto Big Run subwatershed. The Franklin Co. SWCD performed an inventory of conveyances to area streams based on walking each stream and recording the conveyances and their type (pipe type, swale) and assigned the term “illicit” for any discharges that showed visual or odorous evidence of carrying pollutants (FCSWCD 2007). A total of 9,056 of these conveyances are listed in Table 7 and are distributed across all of the 2025 subwatersheds as displayed in Figure 3. A description of a major initiative to abate pollution delivered by the sewer system is described as follows.

***Table 7**. An accounting of sewer system features in the 2025 study area provided by Columbus DPW that includes sewer mains, design relief structures (DSR), open channels, maintenance structures, pump stations, 10 year Level of Service data, HSTS, the Franklin Co. SWCD stream conveyance inventory any of which is a potential release of sewage or pollutants. There are no CSO discharges in the 2025 study area.*

MBI Site Code	Stream Name	Drainage Area ($mi.^2$)	River Mile	10yrLOS DSR (Count)	10yrLOS Flooded Manholes (Count)	10yrLOS WIB (Count)	FCSWD (Count)	HSTS (Count)	Sewer Blind Connect (Count)	Sewer Bulkhead (Count)	Sewer Clean Out (Count)	Sewer Flapgate (Count)	Sewer Inlet (Count)	Sewer Main Change (Count)	Sewer Manhole (Count)	Sewer Outfall (Count)	Sewer Pipe End (Count)	Sewer Pump Station (Count)	Sewer Structure (Count)	10YearLOS Conduits (m)	Sewer Main (m)	Sewer Open Channel (m)
Scioto Big Run																						
SBR06	Scioto Big Run	2.90	8.50	0	0	94	229	19	37	26	33	1	2451	112	2175	0	345	1	53	15810	200026	4363
SBR05	Scioto Big Run	5.80	7.10	0	1	264	521	42	59	50	81	1	3714	150	3268	0	652	1	100	26643	312435	7739
SBR04	Scioto Big Run	8.00	6.10	0	1	370	744	64	86	61	120	1	4620	205	3934	2	824	2	121	33459	377192	8505
SBR03	Scioto Big Run	11.80	4.40	0	1	370	1313	137	132	119	188	1	6971	285	5869	63	1351	2	187	52902	564666	15093
SBR02	Scioto Big Run	18.50	2.90	3	15	2463	1530	204	293	203	413	5	9760	403	9204	69	1638	3	333	156202	842892	17318
SBR01	Scioto Big Run	19.00	0.80	3	15	2463	1683	287	300	216	439	5	10310	415	10265	90	1743	6	347	169480	933133	18303
Unnamed Tributary to Scioto Big Run at RM 6.66																						
SBR08	U.T. Scioto Big Run @6.66	1.57	1.50	0	0	0	142	24	28	38	16	0	967	13	527	24	281	0	43	6124	72031	5444
SBR07	U.T. Scioto Big Run @6.66	1.80	0.30	0	0	0	201	39	28	40	26	0	1105	15	687	24	295	0	47	7435	85764	5848
Unnamed Tributary to Scioto Big Run at RM 3.59 (Early Run)																						
SBR10	U.T. Scioto Big Run @3.59 (Early Run)	2.55	1.85	3	14	2049	20	11	112	56	180	4	1474	79	1786	0	84	1	123	75331	154009	841
SBR09	U.T. Scioto Big Run @3.59 (Early Run)	3.80	0.10	3	14	2093	82	35	148	79	198	4	2118	93	2516	0	184	1	140	98045	214654	1770
Unnamed Tributary to Scioto Big Run at RM 0.70 (Brown Run)																						
SBR11	U.T. Scioto Big Run @0.70 (Brown Run)	3.00	0.10	0	0	0	64	8	3	8	32	0	132	8	691	0	38	2	6	8786	56843	486
Marsh Run																						
MR02	Marsh Run	2.20	2.00	0	0	0	22	3	2	6	23	0	231	4	568	0	42	1	2	5816	50218	364
MR01	Marsh Run	3.10	0.20	0	0	0	109	57	2	7	23	0	343	4	790	17	62	2	8	9050	68852	638
Gantz Run																						
GTZ01	Gantz Run	0.78	1.00	0	0	0	47	0	0	1	1	0	6	2	83	0	1	2	0	1253	5359	0
Republican Run																						
REP04	Republican Run	1.01	5.40	0	0	1	74	11	1	2	6	0	0	3	297	0	8	1	0	0	21847	0
REP03	Republican Run	2.97	3.80	0	0	1	74	11	3	7	14	0	0	8	584	0	8	1	0	3105	43603	0
REP02	Republican Run	5.70	1.38	0	0	7	160	11	8	14	24	0	0	12	1382	0	8	6	2	11875	98141	0
REP01	Republican Run	7.00	0.20	0	0	7	275	11	8	14	24	0	0	12	1748	0	8	6	2	17449	122880	0
South Branch Republican Run																						
REP05	S. Br. Republican Run (@ RM 1.92)	1.90	0.02	0	0	3	49	0	1	3	4	0	0	2	394	0	0	3	2	2313	27831	0
Unnamed Tributary to Republican Run at RM 0.73 (Billy Joe Run)																						
REP06	U.T. @RM 0.73 (Billy Joe Run)	0.88	0.10	0	0	0	41	0	0	0	0	0	0	0	224	0	0	0	0	2353	15218	0
Grant Run																						
GRR03	Grant Run	2.00	4.30	0	0	0	94	0	0	1	0	0	0	0	47	0	0	3	4	0	4136	0
GRR02	Grant Run	7.80	2.00	0	0	0	348	0	6	4	12	0	10	13	553	0	4	6	13	10897	48949	0
GRR01	Grant Run	13.80	0.20	0	0	0	711	0	6	7	14	0	10	17	1747	0	5	7	15	23509	129675	0
Unnamed Tributary to Grant Run at RM 2.77																						
GRR04	U.T. to Grant Run @ RM 2.77	1.00	1.50	0	0	0	88	0	4	2	8	0	10	8	79	0	3	2	8	1955	9947	0
GRR05	U.T. to Grant Run @ RM 2.77	1.70	1.32	0	0	0	74	0	4	2	8	0	10	8	71	0	3	2	8	1763	9408	0
Plum Run																						
PLM01	Plum Run	7.80	0.72	0	0	0	361	0	0	3	1	0	0	0	138	0	0	0	1	638	13302	0
Sewer Line Distance or Count of Structures at Pour Points				**12**	**61**	**10,185**	**9,056**	**974**	**1,271**	**969**	**1,888**	**22**	**44,242**	**1,871**	**49,627**	**289**	**7,587**	**61**	**1,565**	**461**	**2,786**	**54**
				Ct.	**Ct.**	**Ct.**	**Ct.**	**Ct.**	**Ct.**	**Ct.**	**Ct.**	**Ct.**	**Ct.**	**Ct.**	**Ct.**	**Ct.**	**Ct.**	**Ct.**	**Ct.**	**Mi.**	**Mi.**	**Mi.**

Legend: 10 yrLOS - 10 Year Level of Service capacity for highest rainfall event;CSO - combined sewer overflow; DSR - design relief structure, HSTS - Home Sewage Treatment System; FCSWCD - Franklin Co. Soil and Water Conservation District stream conveyance inventory; FCSWCD Illicit - observed illicit discharge of pollutants; WIB- water in basement event; all terms defined in Appendix F.

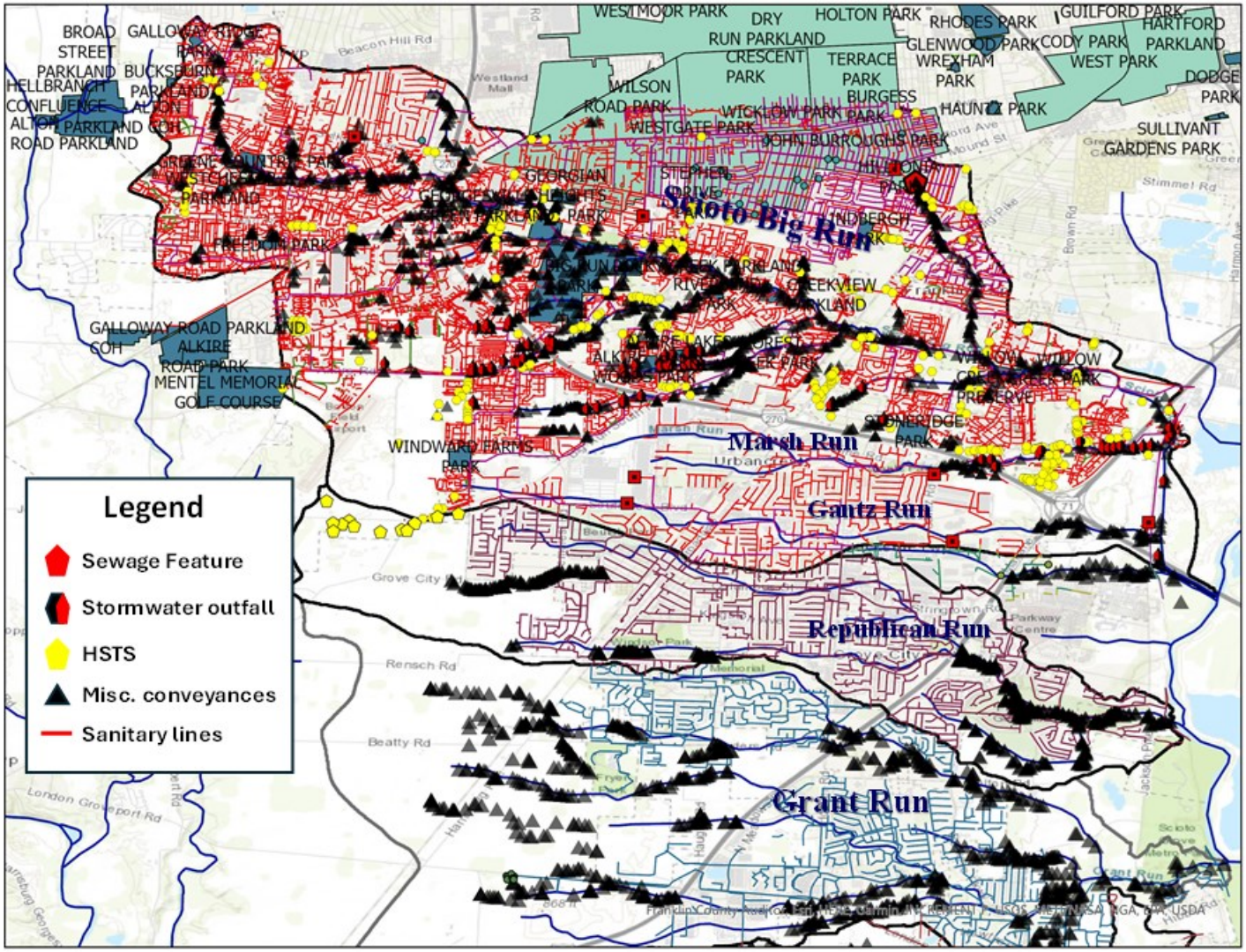


***Figure 3**. The 2025 Scioto Big Run, Republican Run, and Grant Run subwatersheds and adjacent direct tributaries to the Scioto River showing biological, habitat, water quality, and sediment chemistry sampling locations. The area of Blueprint Columbus within the upper portion of the 2025 study area is green shaded. The location and density of sewage features, stormwater outfalls, home septic treatment systems (HSTS), miscellaneous conveyances, and sewer lines the Scioto Big Run and Grant Run subwatersheds is also shown.*

Blueprint Columbus

The original WWMP submitted to the Ohio EPA in 2005 made use of the established technology of the time that called for deep underground tunnels to store and convey excessive wet weather flow or Rainfall Derived Inflow and Infiltration (RDII). When excessive RDII occurs, the amount of water entering the sanitary sewer system can exceed the capacity of the sanitary sewer system resulting in a sanitary sewer overflow or SSO. Over time, sewer pipes have developed cracks and leaky joints that allow the infiltration of storm water into the sanitary sewer, causing it to exceed capacity and overflow into streams and rivers or back-up into basements. Foundation drains that connect directly to the sanitary sewer also contribute to the problem of rain water getting into the sanitary sewer system. Blueprint Columbus employs current and emerging technology to address the source of the infiltration by keeping rain water and snow melt runoff out of the sanitary sewers and directing it into storm sewers. The goal is to prevent storm water from entering the sanitary sewer system through lateral lining, roof water redirection, and a voluntary sump pump program. Stormwater will instead be directed to green infrastructure where it can filter through layers of stone, soil, and plants before it slowly releases into the storm sewer system that empties into local rivers and streams.

To date several areas across the city have been identified for the application of the aforementioned best management practices. One of these areas, the Hilltop neighborhood, has been the focus of project implementation. The unnamed tributary to Scioto Big Run at RM 3.59 (Early Run) is the most affected receiving stream and portions of the subwatershed have a high density of sewer features and the single SSO locate din the study area. Blueprint Columbus is documented in more detail in the 2015 Wet Weather Management Plan (WWMP) Update Report (Columbus DWR 2015). This WWMP update was approved by Ohio EPA on December 1, 2015.

Nonpoint Sources and Subecoregion Characteristics

The 2025 study area lies entirely within the Loamy, High Lime Till Plains subregion (55b) of the Eastern Corn Belt Plains ecoregion (ECBP; Omernik 1987; Woods et al. 1998). The Level IV subregions offer more relevant detail about the four components of ecoregions; surficial geology, soils, potential natural vegetation, and land use (Woods et al. 1998) that affect the make-up and characteristics of nonpoint sources of pollution. The key characteristics of each subregion appears in Table 8.

Nonpoint sources within and upstream of the 2025 study area are typical of land form, soils, and land uses within the Loamy, High-Lime Till Plains subregions (55b) of the Eastern Corn Belt Plains ecoregion. These subregions are differentiated from the surrounding subregions by having loamy, high lime, late-Wisconsinan glacial till and also glacial outwash and scattered loess that overlies Paleozoic carbonates and shale. Both subregions are glaciated with level to rolling glacial till plains with end moraines and glacial outwash landforms. Originally, beech and oak-sugar maple forests predominated in the uplands with elm-ash swamp forests in poorly-drained valley bottoms and ground

***Table 8**. Level IV subregions of the 2024 study area and their key attributes (from Woods et al. 1998).*

Level IV Subregion	Physiography	Geology	Soils	Potential Natural Vegetation	Land Use/Land Cover
Clayey, High Lime Till Plains (55a)	Glaciated; broad nearly level glacial till plain; also basins and end moraines; low gradient streams.	Clayey, high lime, late-Wisconsinan glacial till, lacustrine deposits, and scattered loess overlie Paleozoic shales, carbonates, and sandstones.	Alfisols (Epiaqualfs, Hapludalfs), Mollisols (Argiaquolls, Endoaquolls)	Mostly beech forest; scatter-ed elm-ash swamp forest in lacustrine basins and poorly-drained areas; wet prairies behind end moraines in northern counties.	Extensive corn, soybean, wheat, livestock, and dairy farming on artificially drained soils; scattered pin oak-swamp, white oak wood-land, and beech-maple woodland.
Loamy, High Lime Till Plains (55b)	Glaciated; level to rolling glacial till plain with low gradient streams; also end moraines and glacial outwash landforms.	Loamy, high lime, late-Wisconsinan glacial till and also glacial outwash and scattered loess overlie Paleozoic carbonates and shale.	Alfisols (Hapludalfs, Epiaqualfs, Endoaqualfs) , Mollisols (Argiaquolls, Endoaquolls, Argiudolls), Entisols (Fluvaquents)	Mostly beech forest; also, oak-sugar maple forest, elm-ash swamp forest on poorly-drained valley bottoms and ground moraines.	Extensive corn, soybean, and livestock farming; also scattered beech-maple, pin oak-swamp, white oak woodlands. Urban-industrial activity in municipal areas.

moraines, and mixed oak forests on the Pickaway Plains south and west of Franklin Co. Predominant land uses include agricultural row cropping in the southern fringes of the study area. Moderate to heavy urban land uses are concentrated in the northern one-half of the study area. Lower intensity urban development is increasing in a southward direction and will replace agricultural land uses over the next several decades. The intensity of urban development is the highest in the Scioto Big Run and Gantz Run subwatersheds at present. This transitions to a southward gradient of urban and suburban land uses consisting of commercial developments such as warehouses and lower density residential development in the suburbs which are rapidly expanding all around Columbus. With it will come the installation of sewer features and impervious surfaces both of which increase the risk of pollutants such as BOD, TKN, nutrients, dissolved ions such as chlorides, and many as yet to be adequately measured chemicals and pathogens (Lee et al. 2020). The increase in impervious surfaces (i.e., parking lots, highways, driveways, rooftops, etc.) in the suburban and metropolitan areas has also altered the hydrology by

fostering flashy flows and increasing the delivery of pollutants to tributaries and the subwatershed mainstems. Still, most of the subwatersheds in 2025 retained good base flow characteristics despite the prevalence of urban land surfaces. An increased frequency of high flows can increase streambank erosion particularly those denuded of woody riparian vegetation by encroaching land uses, thus degrading habitat and contributing excess sediment to receiving streams and rivers. This, too, was evident in the 2025 study area (Figure 4) and tracked the degree of moderate to heavy urban land uses.



***Figure 4**. Visual symptoms of urban stormwater runoff resulting in heavy bank erosion and the delivery of urban debris transported by prior elevated flow events in the Unnamed Tributary to Scioto Big Run at RM 3.59 (Early Run) at Eakin Rd (SBR10; RM 1.61) in 2025.*

RESULTS AND DISCUSSION – 2025 STUDY AREA

Flow Regime

There are no direct or continuous measurements of flow in any of the subwatersheds that were sampled in 2025 nor adjacent ones. As headwater catchments the flow regime in each is subject to localized precipitation and runoff events. All of the tributaries have elevated to very high percentages of urban land use characteristics that can foster "flashy" flows that peak rapidly during runoff events interspersed with varying durations of low flow extremes during dry weather periods, in some cases including intermittent or ephemeral flows. These irregular flow conditions can also be exacerbated by direct habitat modifications. Almost all of the sites have moderately high to very high gradients. All of the streams receive stormwater from numerous storm sewers, other conveyances, and some of it apparently mixed with sewage. The weather pattern in 2025 was a slightly above average year in terms of rainfall being about five inches about the annual average by September 30, 2025. No site was recorded as having intermittent flows during the 2025 sampling period.

2025 Study Area Water Column Chemistry

Water quality was assessed by grab samples collected at all except one sampling location (GRR05) four times (meter parameters five times) during the summer-fall index period in 2025. Parameter groupings included field, demand, ionic strength, nutrients, and heavy metals. Sediment chemistry samples were collected at all locations in each stream. All of the data was analyzed in a tabular format with multiple sampling sites in the same stream arrayed from upstream to downstream in order to reveal pollution gradients. There is very little historic chemical water quality data from which to make comparisons with the 2025 results. Grab samples were collected four (4) times at each site during the summer-fall seasonal index period with select meter parameters sampled at each fish site.

The results were evaluated against the biological effect thresholds in the *Integrated Prioritization System (IPS) for Greater Central Ohio Rivers and Streams, Phase I: Technical Documentation and Atlas of Stressor Relationships* (MBI 2025b). This provides consistently derived effect thresholds for fish, macroinvertebrates, and mussels for four stream and river sizes. In this study the 75th %ile threshold was used to assess the chemical/physical mean and median results across a gradient of quality from excellent to very poor which corresponds to the same gradient of the biological criteria. This also allows for weighting of causes as very poor, poor, and fair for non-attaining sites. Before the IPS, chemical/ physical results were evaluated against percentiles of regional reference values from Ohio EPA (1999) and effect threshold derivations as they were available in the technical literature (e.g., Miltner 2018, 2021; Johnson et al. 2014; Pond et al. 2008; Pond 2010; Rankin 2010; U.S. EPA 2011). Some of these remain relevant and several are in close agreement with the IPS thresholds. Many chemical/physical parameters either do not have criteria in the Ohio WQS or they are outdated (e.g., chloride, total dissolved solids) when

compared to more recently derived thresholds in the scientific literature. However, the WQS were used as available and relevant in the evaluation of the 2025 results.

Conventional, Demand, and Nutrient Parameters

Conventional parameters include those that are the most commonly collected in water quality surveys such as temperature and pH, but these are discussed under urban parameters. Demand and nutrient related parameters consist of those related to the discharges of treated and untreated sewage, organic enrichment from point and nonpoint sources (ammonia-N, BOD, TKN), nutrient related parameters (phosphorus, nitrates) and their effects, dissolved oxygen (D.O.), and physical parameters such as total suspended solids, temperature, and pH. Median and mean values are reported in Table 9.

Temperature (°C)

Temperature is a critical factor in aquatic systems as it both directly and indirectly influences individual organism health and well-being and various physicochemical processes that also have direct and indirect effects. Fish will avoid lethal temperatures and will seek the temperature regime each species prefers. Temperature affects chemical rates and processes and the toxicity of certain pollutants (e.g., ammonia-N). While much of the concern with temperature has centered on discharges of heat, modifications and alterations to natural temperature regimes have received increased attention due to the effects of urbanization and climate change.

Temperature was measured at all 26 locations with the collection of each chemical grab sample and during each fish sampling event over the June-October index period. It is included as part of the conventional and demand parameters (Table 8) as it can be affected by the interaction of several facets of urban land uses such as hardened surfaces, flow intermittency, exposure of the stream channel to full sunlight, and permitted and unpermitted discharges via storm sewers and other releases. The results were compared to the criteria in the Ohio WQS and regional reference values for headwater streams in the ECBP ecoregion (Ohio EPA 1999a). All grab temperature values were within the regional reference threshold median + 2 inter quartile ranges above that value of 22.8°C. Two median values of 23.3°C at BARB04 and 22.9°C at TRB04 barely exceeded this threshold. No values approached the applicable Ohio WQS average criterion of 27.8°C.

Temperature was also measured continuously during July 28-31 at the seven (7) sites used to perform the Ohio EPA SNAP method for assessing nutrient effects. Like the grab data none of the median values approached the average criterion of 27.8°C (Figure 5). The downstream site in Scioto Big Run at SBR01 showed the highest maximum and widest fluctuations in temperature across the short-term Datasonde deployment ranging from 24.0-27.5°C, but with the maximum below the daily maximum criterion of 29.4°C. The cause of the wider flux at SBR01 is unknown, but the overall temperature regime is better than most urban watersheds likely due to groundwater influences. Plum Run had the coolest temperatures with a median of 22.0°C.

***Table 9**. Mean and median values for demand and nutrient related parameters in the 2025 study area. All values are color coded in accordance with the legend at the bottom that represents the 75th percentile effect thresholds in the Greater Central Ohio IPS Phase I. Ohio WQS criteria are also included as appropriate.*

Site ID	River Mile	DA (mi.^{2})	Field Temperature (^{o}C)		D.O. (mg/L)		Field pH (S.U.)		pH Lab (SU)		Ammonia-N (mg/L)		BOD 5-Day (mg/L)		Total Kjeldahl Nitrogen (mg/L)		Nitrate-N (mg/L)		Nitrite-N (mg/L)		Total Phosphorus (mg/L)		Phosphorus, Dissolved Orthophosphate (mg/L)	
			Median	Mean	Median	Mean	Median	Mean	Median	Mean	Median	Mean	Median	Mean	Median	Mean	Median	Mean	Median	Mean	Median	Mean	Median	Mean
Scioto Big Run (Scioto River @RM 124.40)																								
SBR06	8.50	2.90	23.0	21.9	6.7	6.6	7.9	7.5	8.0	8.0	0.025	0.041	1.70	2.13	0.49	0.58	0.77	0.71	0.012	0.013	0.125	0.153	0.118	0.107
SBR05	7.10	5.80	22.9	21.8	6.8	6.7	7.9	7.5	8.0	8.0	0.021	0.039	1.75	1.73	0.44	0.45	0.64	0.63	0.012	0.013	0.078	0.077	0.057	0.063
SBR04	6.10	8.00	23.0	22.0	6.5	6.0	7.9	7.5	8.1	8.0	ND	ND	2.00	2.05	0.50	0.47	0.46	0.50	0.012	0.013	0.076	0.081	0.035	0.044
SBR03	4.40	11.80	23.1	22.3	6.6	6.5	8.0	7.7	8.1	8.1	ND	ND	1.65	1.65	0.46	0.44	0.56	0.57	0.012	0.012	0.058	0.056	0.041	0.060
SBR02	2.90	18.50	23.3	22.7	7.4	7.0	7.9	7.7	8.1	8.1	ND	ND	ND	ND	0.52	0.55	0.72	0.74	0.012	0.012	0.133	0.406	0.101	0.103
SBR01	0.80	19.00	21.6	22.1	6.3	6.2	7.7	7.5	8.0	8.0	0.049	0.053	1.85	1.83	0.45	0.46	0.77	0.75	0.019	0.020	0.023	0.028	0.034	0.041
Unnamed Tributary to Scioto Big Run @RM 6.66																								
SBR08	1.50	1.57	22.6	21.7	6.9	6.0	7.9	7.5	8.1	8.0	ND	ND	1.95	1.88	0.55	0.51	0.56	0.55	ND	ND	0.096	0.114	0.044	0.081
SBR07	0.30	1.80	22.2	21.4	7.2	6.4	8.0	7.6	8.1	8.0	ND	ND	1.95	2.10	0.48	0.57	0.63	0.62	0.012	0.012	0.077	0.087	0.061	0.069
Unnamed Tributary to Scioto Big Run @RM 3.59 (Early Run)																								
SBR10	1.85	2.55	24.1	24.5	8.2	8.3	8.0	8.0	8.5	8.4	0.026	0.042	1.70	1.85	0.60	0.59	1.45	1.48	0.012	0.017	0.255	0.255	0.230	0.240
SBR09	0.10	3.80	23.1	22.6	6.9	6.6	7.9	7.6	8.2	8.1	ND	ND	ND	ND	0.37	0.37	0.65	0.64	ND	ND	0.090	0.120	0.104	0.114
Unnamed Tributary to Scioto Big Run @RM 0.70 (Brown Run)																								
SBR11	0.10	3.00	22.3	21.6	6.2	6.3	8.0	8.0	8.1	8.1	ND	ND	ND	ND	0.51	0.52	0.86	1.30	0.012	0.012	0.042	0.061	0.051	0.055
Marsh Run (Scioto Big Run @RM 1.48)																								
MR02	2.00	2.20	21.7	21.7	6.3	6.4	7.7	7.4	7.9	7.8	ND	ND	ND	ND	0.43	1.29	0.90	0.87	ND	ND	0.089	0.104	0.104	0.107
MR01	0.20	3.10	22.5	21.7	6.8	5.9	7.8	7.8	7.9	8.0	0.049	0.053	2.00	2.03	0.85	0.79	0.81	0.80	0.016	0.041	0.032	0.049	0.043	0.047
Gantz Run (Scioto River @RM 124.31)																								
GTZ01	1.00	0.78	21.2	20.5	5.4	5.3	7.8	7.8	8.0	8.0	0.020	0.038	ND	ND	0.28	0.33	0.44	0.44	ND	ND	0.043	0.044	0.043	0.043
Republican Run (Scioto River @RM 123.11)																								
REP04	5.40	1.01	23.7	23.3	4.1	4.2	7.6	7.6	7.9	7.8	0.024	0.041	2.20	2.57	0.60	0.62	0.33	0.33	0.012	0.018	0.085	0.082	0.058	0.056
REP03	3.80	2.97	21.7	21.5	6.2	6.3	7.8	7.5	8.1	8.0	0.057	0.078	ND	ND	0.52	0.56	0.71	0.68	0.012	0.013	0.150	0.165	0.125	0.120
REP02	1.30	5.70	21.7	21.3	6.7	6.4	8.1	8.1	8.2	8.2	ND	ND	ND	ND	0.54	0.52	1.03	1.00	ND	ND	0.115	0.121	0.107	0.110
REP01	0.20	7.00	21.2	21.5	7.5	7.3	8.1	8.1	8.2	8.2	ND	ND	ND	ND	0.43	0.40	0.65	0.65	ND	ND	0.023	0.037	0.040	0.043
South Branch Republican Run @RM 1.92																								
REP05	0.02	1.90	21.4	21.5	8.9	9.4	8.2	8.2	8.2	8.3	ND	ND	ND	ND	0.63	0.62	1.19	1.17	ND	ND	0.104	0.106	0.105	0.103
Unnamed Tributary to Republican Run @RM 0.73 (Billy Joe Run)																								
REP06	0.10	0.88	21.3	20.5	9.6	9.8	8.2	8.2	8.3	8.3	ND	ND	ND	ND	0.39	0.41	0.65	0.68	ND	ND	0.047	0.059	0.034	0.040
Grant Run (Scioto River @RM 121.47)																								
GRR03	4.30	2.00	23.9	23.2	0.8	0.8	7.3	7.2	7.6	7.7	ND	ND	2.80	4.50	1.55	1.49	0.30	0.44	ND	ND	0.235	0.328	0.060	0.087
GRR02	2.00	7.80	22.2	21.9	6.2	6.4	7.9	8.0	8.1	8.2	ND	ND	ND	ND	0.45	0.53	0.42	0.54	0.012	0.014	0.098	0.073	0.042	0.045
GRR01	0.20	13.80	22.2	21.5	4.7	4.7	7.8	7.8	8.1	8.0	ND	ND	ND	ND	0.53	0.56	0.53	0.54	ND	ND	0.087	0.111	0.065	0.089
Unnamed Tributary to Grant Run @RM 2.77																								
GRR04	1.50	1.00	22.4	21.6	4.3	4.6	7.8	7.8	8.0	8.0	0.191	0.190	2.20	2.47	0.87	1.05	1.15	1.26	0.012	0.028	0.265	0.270	0.185	0.208
Plum Run (Scioto River @RM 118.64)																								
PLM01	0.72	7.80	18.7	18.6	5.1	4.7	7.5	7.5	7.9	7.9	0.031	0.044	ND	ND	0.46	0.53	0.33	0.62	ND	ND	0.021	0.056	0.037	0.049
Headwater Sites IPS Thresholds	**Excellent**		<21.8		<7.6		≤7.8		≤8.0		<0.060		<2.00		<0.42		<1.27		<0.020		<0.080		<0.080	
	Good		<23.2		<8.0		>7.8		>8.0		<0.090		<2.42		<0.64		<1.81		<0.040		<0.140		<0.140	
	Fair		<24.2		<9.5		>8.1		>8.3		<0.330		<3.32		<1.01		<3.54		<0.080		<0.410		<0.410	
	Poor		<27.2		<13.9		<8.6		<8.6		<0.650		<5.97		<2.07		<8.75		<0.210		<1.220		<1.220	
	Very Poor		>27.2		>13.9		>8.6		>8.6		>0.650		>5.97		>2.07		>8.75		>0.210		>1.220		>1.220	
	Ohio WQS		>27.8		>4.0 min.	<5.0 mean	<6.5	>9.0	<6.5	>9.0	<0.600[a]		IPS		IPS		IPS		IPS		IPS		IPS	

Footnotes: [a] total ammonia at 23.0°C and pH = 8.3 S.U.; ND = not detected.

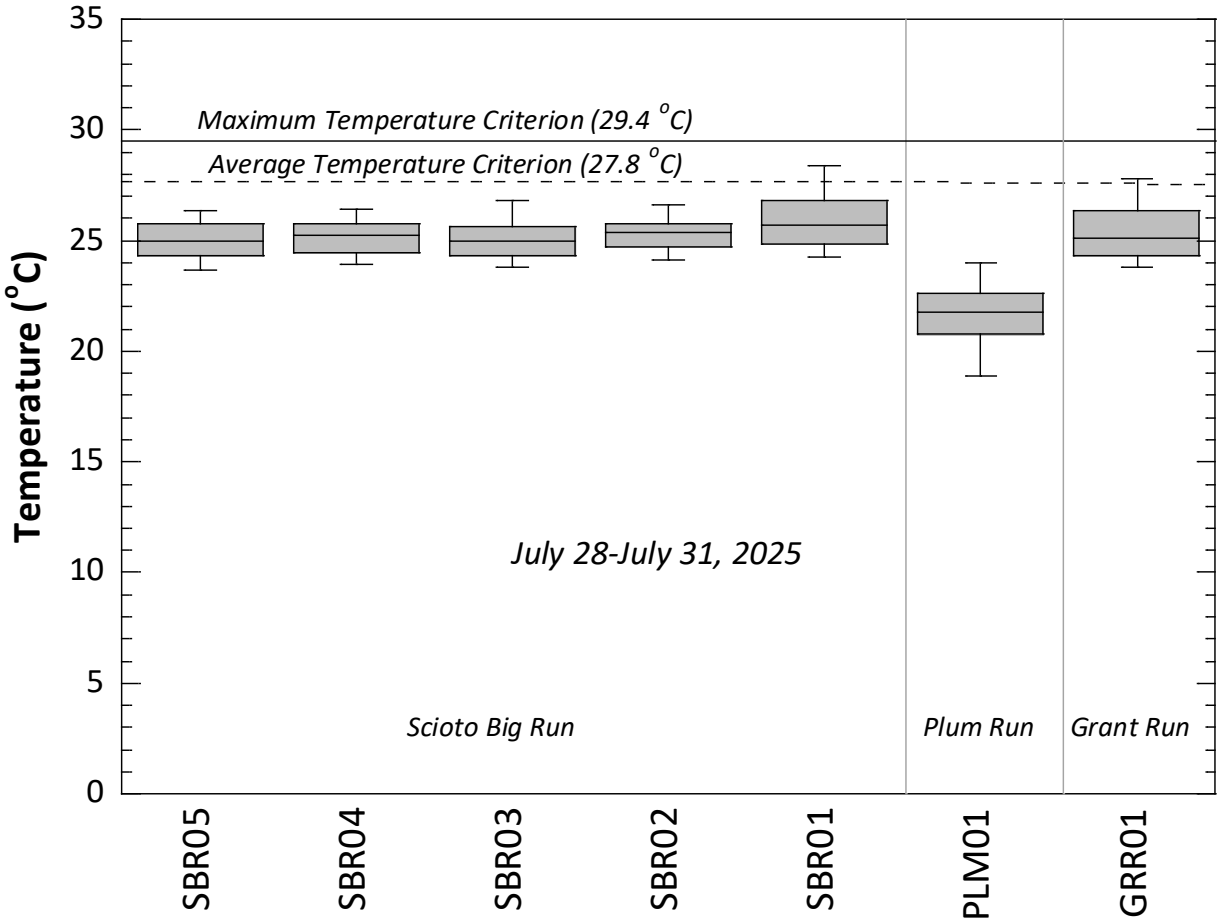


***Figure 5**. Continuously measured temperature results at seven (7) locations in the 2025 study area during July 28-31 in Scioto Big Run, Grant Run, and Plum Run. The Ohio water quality criteria for the summer period average is shown by a dashed line and the daily maximum by a solid line.*

pH (S.U.)

pH is a measure of how acidic/basic water is with a measurement range of 0 to 14. It is a measure of the relative amount of free hydrogen (acidic) and hydroxyl (basic) ions in the water. pH is measured on a logarithmic scale where each number represents a 10-fold change in the acidity or basicness of the water. For example, water with a pH of five is ten times more acidic than water having a pH of six. It is an important factor in how chemicals affect aquatic life and other biological processes. It determines the solubility (amount that can be dissolved in the water) and biological availability (amount that can be utilized by aquatic life) of chemical constituents such as nutrients (phosphorus, nitrogen, and carbon) and heavy metals (lead, copper, cadmium, etc.). For example, pH affects the amount of total ammonia-N that is present in the unionized and toxic form and along with temperature is part of the water quality criterion. At a temperature of 25°C, which is a maximum summer ambient temperatures in the study area, a change in pH from 8.5 S.U. to 9.0 S.U. changes the equivalent total ammonia-N criterion from 3.20 mg/L to 1.10 mg/L,

a decrease of almost 66%. It also affects how much and what form of phosphorus is most abundant in the water, and therefore affects how aquatic plants and animals can utilize it. As a result pH is responsive to algal photosynthesis and respiration similar to D.O. with a diel cycle of pH being higher in daytime and lower at night. Along with hardness it affects the degree to which heavy metals are soluble which determines their toxicity. Reference pH values for headwater streams in the ECBP ecoregion range between a median value of 7.9 S.U. and a statistical maximum of 8.2 S.U. (Ohio EPA 1999). The Ohio water quality criteria are expressed as a range of acceptable pH values between 6.5-9.0 S.U.

No pH values exceeded the Ohio WQS in 2025 and only one grab pH value exceeded the good IPS lab pH value 8.3 S.U. for both the median and mean at site SBR10 and only slightly so at 8.5 and 8.4 S.U., respectively (Table 9). Two sites in Republican Run had both median and mean exceedances of the field pH good threshold of 8.1 at the two Republican Run tributary sites REP05 and REP06 with slight exceedances of 8.2 S.U. Most pH values were well below the good and excellent lab and field mean and median values. Continuously during the July 28-31 short-term Datasonde deployments (Figure 6). All values including the median, maximum, and minimum values were well within the WQS

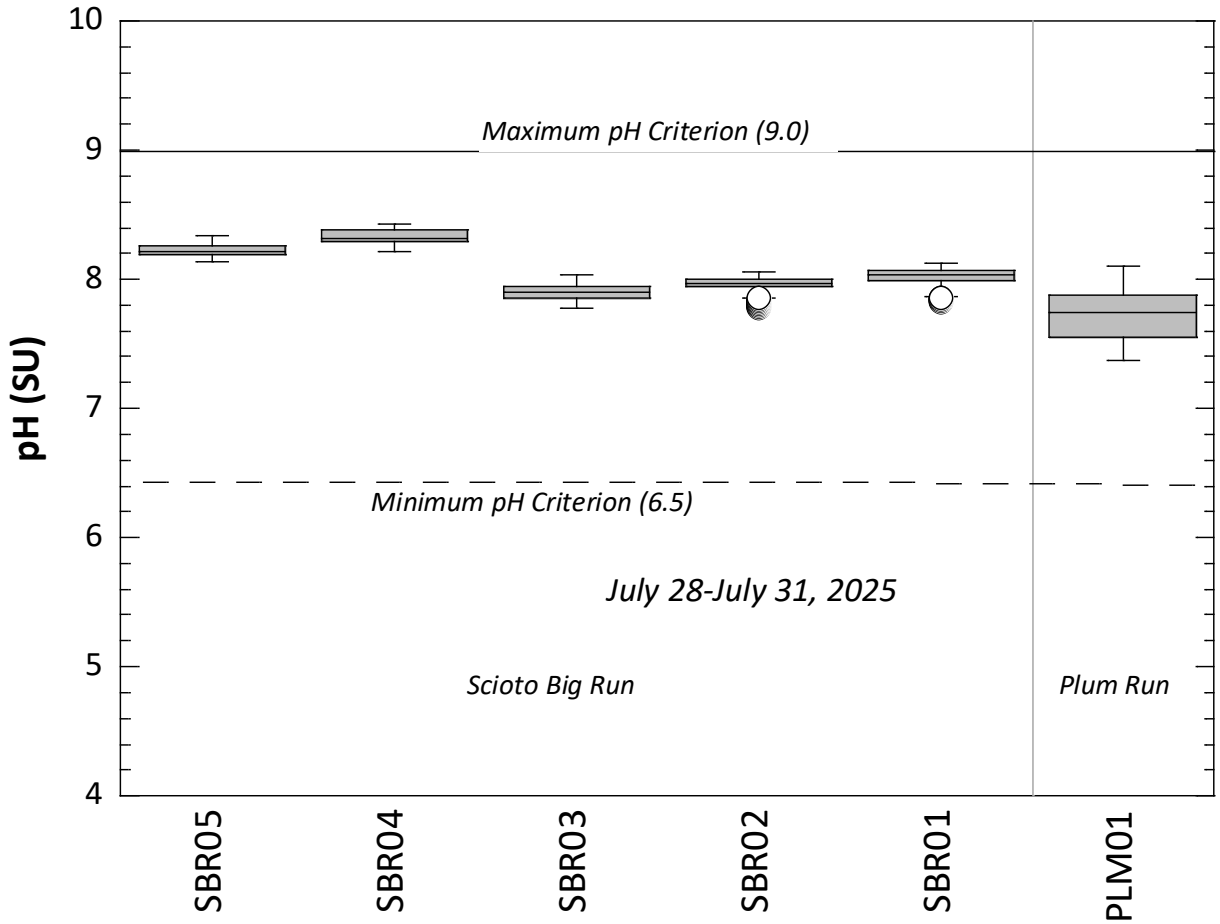


***Figure 6**. Continuously measured pH results at six (6) locations in the 2025 study area during July 28-31. The Ohio water quality criteria are shown by solid and dashed lines. and dashed lines.*

criteria of 6.5-9.0 S.U. and with very narrow fluctuations between the minimum and maximum values.

Dissolved Oxygen (D.O.)

Dissolved oxygen (D.O.) is essential for aerobic life including all higher forms of aquatic life (e.g., fish, macroinvertebrates, mussels, etc.). It is produced by aeration of the water and also by algal photosynthesis. The ability of the water to hold sufficient levels of D.O. to support healthy assemblages of aquatic life is affected by several factors including flow, temperature, the level of oxygen demanding materials that stimulate bacteria to utilize D.O., possibly lowering it to harmful levels including anerobic conditions under severe circumstances. It is one of the most critical parameters for water quality management including the discharge of organic wastewater and nutrient enrichment, the latter of which affects the minimum, maximum, and daily diel swings.

Grab data collected during daytime can trend toward higher values as part of the normal diel fluctuation as affected by algal photosynthesis during the day with respiration at night resulting in lower values. Most of the median and mean values in the 2025 study area were within the good and exceptional IPS thresholds, but there were exceptions for both the IPS daytime high values and exceedances of the Ohio WQS average and minimum values (Table 9). The median and mean values at SBR10 slightly exceeded the good threshold of 8.0 mg/L with values of 8.2 and 8.3 mg/L, respectively. Exceedances of this threshold at REP06 were greater at 9.6 and 9.8, respectively each indicating an effect from nutrient enrichment. Three sites had both median and mean daytime values below the daily average of 5.0 mg/L at REP04 (4.1 and 42 mg/L), GRR01 (4.7 and 4.7 mg/L), and GRR04 (4.3 mg/L and 4.6 mg/L). The mean at PLM01 (4.7 mg/L) was only slightly below the daily average as well. The restoration site at GRR03 had significant exceedances of the minimum WWH criterion of 4.0 mg/L with median and mean values of 0.8 and 0.8 mg/L, respectively. That site being inundated by beaver ponds that contributed to slow flows, heavily excessive filamentous algal growth, and organic muck deposited by dying submergent and emergent vegetation created a tremendous oxygen demand.

Exceedances of dissolved oxygen (D.O.) were also assessed with continuous data obtained from short term Datasonde deployments during July 28-31 at seven (7) locations (Figure 7). One of the primary purposes of the continuous D.O. monitoring was to support the SNAP assessment of nutrient effects at these sites (Ohio EPA 2015b). It also provides the data necessary for more fully evaluating the results against the D.O. criteria in the Ohio WQS. Exceedances of the 4.0 mg/L daily minimum dissolved oxygen (D.O.) criterion were observed at PLM01 with an aberrant low value of 1.30 mg/L, but a median above the 5.0 mg/L criterion. No exceedances of the 5.0 mg/L daily average were observed at any other site. The results of the analysis of the diel swings and maximum values related to indications of nutrient enrichment is discussed under the SNAP assessment later in the report.

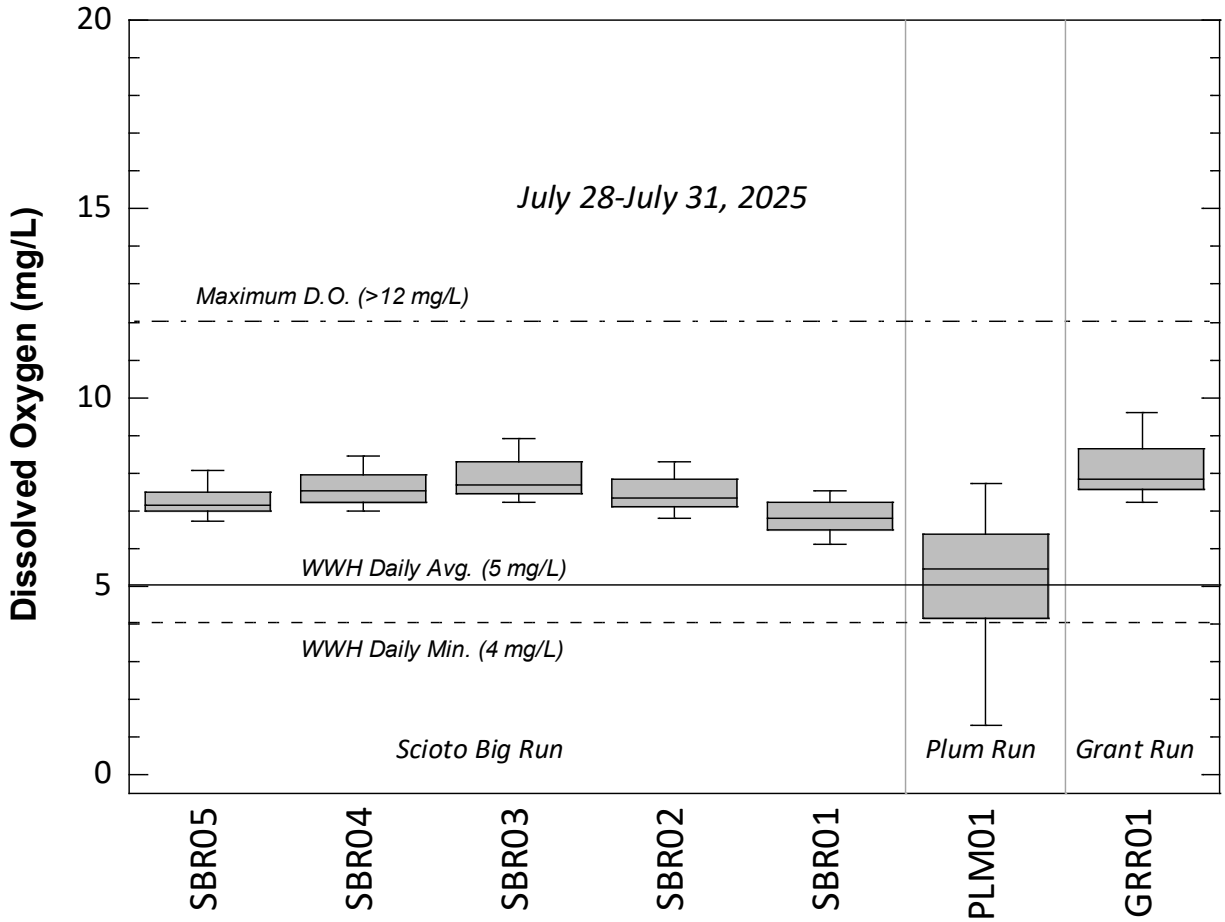


***Figure 7**. Continuously measured D.O. results at seven (7) locations used for the SNAP nutrient assessment in the 2025 study area during July 28-31. The Ohio water quality criteria for the WWH daily average and minimum are shown by solid and dashed lines, respectively.*

Ammonia-Nitrogen (N)

The Ohio water quality criteria are expressed as total ammonia-N with pH and temperature being the two variables used to determine how total ammonia-N corresponds to the toxic unionized fraction. For the analysis of compliance with the Ohio water quality criteria, a representative temperature of 23°C and a pH of 8.3 S.U. was used. This resulted in total ammonia-N criteria for the WWH use designation of 0.60 mg/L which is within the poor IPS threshold (Table 9). Most all of the grab median or mean values in the 2025 study area were well below this value with a median of 0.191 mg/L being the highest at GRR04. All other values except one mean of 0.078 at REP03 were below the excellent IPS threshold of the method detection limit (MDL). With the possible exception of GRR04 none of these results are an indication of intermittent sewage inputs to any of the receiving streams indicating that ammonia-N pollution is not a pollution issue.

Five-Day Biochemical Oxygen Demand (BOD_5)

Biochemical oxygen demand (BOD) measures the amount of oxygen consumption in

mg O_2/L by the aerobic oxidation and consumption of organic matter primarily by bacteria. The higher the BOD the more rapidly D.O. is depleted in the water. The principal sources of BOD in small streams are organic matter including sewage, leaves, soils high in organic matter, woody debris, and dead and decaying algae. Expressed here as the five-day biochemical oxygen demand (BOD_5), reduced levels of this parameter statewide has reflected the effectiveness of advanced wastewater treatment at WWTPs throughout Ohio particularly in larger streams and rivers. While elevated BOD can reflect excessive inputs by either point and nonpoint sources, the widespread control of this parameter by water quality based permitting and subsequent wastewater treatment has greatly reduced it as a major water quality concern in larger streams and rivers. In smaller headwater streams elevated BOD is mostly a result of nonpoint source inputs and the indirect effects of flow and habitat alteration that exacerbate the effects of particulate organic matter, nutrients, and algal dynamics as they are affected by excessive nutrient enrichment (McCabe et al. 2021). The BOD results in the 2025 study area indicated no issues with this source of organic enrichment on a sustained basis (Table 9). Most median and mean values were below the good and excellent IPS thresholds of 2.42 and 2.00 mg/L, respectively with 10 sites having values below the MDL. The sites at REP04 and GRR04 means that exceeded the good threshold of 4.42 mg/L with measured values of 2.57 and 2.47 mg/L, respectively, which are a minor excursions. The restoration site at GRR03 had more higher values with a median of 2.80 mg/L and a mean of 4.50 mg/L, the latter of which is poor and also an indication of temporal variability. This occurred at the restoration site that is inundated by beaver ponds that contributed to slow flows, heavily excessive filamentous algal growth, and organic muck deposited by dying submergent and emergent vegetation created a tremendous oxygen demand, so the BOD results fit that situation well.

Total Kjeldahl Nitrogen (TKN)

Total organic nitrogen as measured by Total Kjeldahl Nitrogen (TKN), an indicator of the living or recently dead fraction of sestonic algae, can be an indicator of organic enrichment. While TKN is not a direct effect parameter, it is indicative of the effects of organic enrichment by nitrogenous biomass. It has proven to be an effective indicator of excessive organic enrichment in runoff from urban and suburban nonpoint sources. Miltner (2018) recognized TKN as a “stand alone” indicator of organic enrichment alongside BOD. In terms of assessment thresholds Miltner (2018) considered a TKN value of $\geq$0.75 mg/L to be indicative of over enriched conditions in large rivers. MBI (2015) in a regional analysis of Southwest Ohio rivers and streams derived a TKN threshold of 0.51 mg/L for WWH and 0.38 for EWH headwater sites. Regional reference levels derived by Ohio EPA (1999a) for headwater streams in the ECBP ecoregion include a median of 0.40 mg/L and a statistical maximum of 0.80 mg/L. The majority of values in the 2025 study area were at or below the IPS good and excellent threhsolds of 0.64 and 0.42 mg/L, respectively (Table 9). Three mean and one median values exceeded the poor IPS threshold of 1.01 mg/L at MR02 (mean of 1.29 mg/L), GRR04 (mean of 1.05 mg/L), and GRR03 (median of 1.55 mg/L and mean of 1.49 mg/L) with exceedances of the fair threshold of 0.64 mg/L at MR01 (median of 0.85 mg/L and mean of 0.79 mg/L) and GRR04 (median of 0.87 mg/L). All of these sites are impacted by a range of urban land uses and are likely the result of urban

stormwater runoff. The GRR03 site had poor exceedances of both the median and mean which are yet another indication of the currently modified stream channel and the concentration of organic enrichment of that restoration site. The results at the remaining 22 sites indicate little nitrogenous enrichment with most values consistently within the good IPS threshold.

Nitrate-Nitrogen (NO_3-N)

Nitrate as nitrogen is generally expressed as nitrate-N and along with nitrite-N comprises dissolved inorganic nitrogen in water. The mean values reported herein are nitrate-N plus nitrite-N. Nitrates are not toxic to aquatic life under normal ambient concentrations, are a primary and essential plant nutrient, but can contribute to water quality problems in excessive amounts. Together with the other primary nutrient phosphorus, nitrates in excess amounts can stimulate excessive algal production leading and adverse effects to the D.O. regime that in turn can adversely affect aquatic life. Sources of nitrates in the 2025 study area include urban runoff and stormwater. Assessment thresholds for nitrate-N are available as regional reference values of 0.98 mg/L (median) and 3.50 mg/L (median +2 IQR or the statistical maximum) for headwater streams in the ECBP ecoregion. Ohio EPA TMDL targets are 1.00 mg/L for WWH and 0.50 mg/L for EWH streams (Ohio EPA 1999a). The good and excellent IPS thresholds for headwater streams are 1.81 mg/L and 1.27 mg/L, respectively. In the 2025 study area nitrate-N values were extremely low with most below the excellent IPS threshold and two sites with either the median or mean in the good range (Table 9).

Total Phosphorus (P)

Phosphorus (P) is both an essential and limiting nutrient for plant growth and animal life. It is the most limiting nutrient in freshwater systems primarily to algal growth and biomass. Elevated levels of phosphorus under certain conditions can result in excessive algal growth and activity that in turn affects the D.O. regime and consequently aquatic life. Elevated levels can also stimulate the production of toxic algae that can impact human health, recreation, and public water supplies. In flowing water bodies such as rivers and streams the adverse impacts of elevated P are indirect via how it impacts algal activity and ultimately the D.O. regime. Algal photosynthesis produces oxygen during daylight while algal respiration uses oxygen at night. The difference between daytime and nighttime D.O. value is termed the diel swing the width of which is indicative of nutrient stimulated algal activity. This cycle also impacts pH (high daytime, low nighttime values) which in turn can impact the toxicity of ammonia especially at higher pH levels (i.e., >8.0). Thus the management of P loads from both point and nonpoint sources is an emerging water quality management issue. Sources of phosphorus in the 2025 study area primarily included urban runoff and sewage inputs via stormwater discharges and a single SSO. The dynamics of how water quality and biological condition are affected by each is complex and related to physical factors such as flow (including retention time), habitat, and temperature (Ohio EPA 1999a; Miltner 2018). Assessment thresholds for total P are available as regional reference values of 0.025 mg/L (median) and 0.135 mg/L (statistical maximum) for

headwater streams in the ECBP ecoregion and TMDL targets of 0.08 mg/L for WWH and 0.05 mg/L for EWH headwater streams across Ohio (Ohio EPA 1999a), which are lower than the regional reference values. The IPS thresholds for good and excellent are 0.140 and 0.080 mg/L, respectively. In the 2025 study area the IPS thresholds were applied to both the total P and orthophosphate (dissolved P) results (Table 9). There were four sites (SBR10, REP03, GRR03, and GRR04) with both median and mean values and two sites (SBR01 and SBR03) with mean total P values that exceeded the good IPS threshold of 0.140 mg/L. Three sites (SBR06, SBR10, and GRR04) had exceedances for both total P and ortho P which indicates a specific source. SBR06 is in the extreme headwaters of Scioto Big Run so this may be an indication of a direct input either from stormwater or the sewer system itself. This site also had the second highest maximum *E. coli* value at 12,000 cfu/100 mL which is an indication of sewage enrichment. The site at SBR10 is downstream from the only SSO in the study area and it had the highest maximum *E. coli* value at 14,000 cfu/100 mL an indication of sewage enrichment. The site at GRR04 also had both total P and ortho P exceedances of the good IPS threshold, but with *E. coli* levels that were not indicative of sewage enrichment. This site did , however, have IPS exceedances of a number of enrichment related parameters such as marginal D.O. levels, total ammonia-N, BOD_5, and TKN.

Synthesis of Conventional, Demand, and Nutrient Parameters Results

At least seven (7) sites had exceedances of the IPS good thresholds for multiple parameters. The upstream most site in Scioto Big Run (SBR06) had exceedances of BOD_5 and both total and ortho P along with the second highest maximum *E. coli* value, all of which are an indication of excessive organic enrichment possibly by unknown releases of sewage. The upstream site in the Unnamed Tributary to Scioto Big Run @RM 3.59 (Early Run) has four (4) parameter exceedances of temperature, pH, total P, and ortho P in combination with the highest *E. coli* maximum in the study area. This site is downstream from the sole SSO in the study area and with the highest developed land and impervious cover in the 2025 study area. The site in March Run at MR01 had exceedances of TKN and mean nitrate-N. The upstream site at MR02 had a poor exceedance of TKN. This is indicative of stormwater runoff in a heavily urbanized subwatershed. The upstream most site in Republican Run (REP04) had marginal D.O. median and mean results of 4.1 and 4.2 mg/L, respectively and a fair exceedance for mean BOD_5. The area upstream from the site has been recently developed at the site of the former Beulah Park to a combination of large warehouses and condominiums. The site in the Unnamed Tributary to Republican Run at RM 0.73 (Billy Joe Run) had elevated D.O. values and fair pH values each of which are symptoms of mild nutrient enrichment. The upstream most site in Grant Run at GRR03 had the second highest number and greatest severity of exceedances for D.O., BOD5, TKN, and total P. This is a restoration site that that is inundated by beaver ponds that have contributed to slow flows, heavily excessive filamentous algal growth, and organic muck deposited by dying submergent and emergent vegetation. This has resulted in fair to very poor threshold exceedances that are a result of the lack of function in this now 10+ year old restoration reach. The site in Grant Run at GRR04 had the most parameter exceedances, including marginal D.O., elevated ammonia-N, BOD5, TKN, and both total

and other P. While this did not extend downstream into the next sampling site it suggests a localized impact from stormwater runoff and possibly a restoration reach in the form of an overwide ditch located less than 0.2 miles upstream.

Nutrient Effects Assessment

Stream Nutrient Assessment Procedure (SNAP)

The primary nutrients (phosphorus and nitrates) can pose a threat to aquatic life indirectly through the stimulation of excessive algal production and the corresponding effects that photosynthesis and respiration have on the minimum, maximum, and diel D.O. regime. The Ohio EPA SNAP procedure (Ohio EPA 2015b) was used to determine the extent, if any, of the effect of nutrients on aquatic life impairment at seven (7) selected sites in the larger reaches of Scioto Big Run (5 sites) and single sites in Grant Run and Plum Run. The SNAP clarifies the evaluation of total P concentration exceedance thresholds (e.g., Ohio EPA 1999) that were used to assess nutrients as a proximal cause of impairments prior to the development of SNAP. The SNAP was developed as a combined assessment of the *effects* of nutrient enrichment which goes beyond the prior reliance on concentration exceedances alone. The variables included in a SNAP assessment appear in Table 10 and include the aquatic life use attainment status based on the applicable biological criteria, total P, the diel D.O swing, and benthic chlorophyll a as the primary variables and several other supporting variables such as nitrate-N, TKN, BOD5, and TSS each of which can be affected by excessive nutrient enrichment. The QHEI is also included as stream habitat can be an important factor in how nutrients are processed by the aquatic ecosystem.

SNAP considers the actual effects of nutrients on aquatic life and aesthetics in lieu of strict compliance with numerical phosphorus and nitrogen criteria. Ohio EPA has been a leader in developing what are also referred to as “combined” nutrient criteria, first developing the Stream Nutrient Assessment Procedure (SNAP; Miltner 2010; Ohio EPA 2015b) and later with the large river nutrient assessment procedure (Miltner 2018). MBI has gained experience with conducting these types of assessments by using and modifying the SNAP procedure in Ohio and Illinois since 2013 and merging it with the large river procedure in the Scioto and Olentangy Rivers in 2020 and 2022. MBI also used SNAP in the 2024 assessment of the Roberts Millikin Ditch, Barbee Ditch, and Dry Run Subwatersheds (MBI 2025b).

The primary SNAP parameters include total phosphorus, nitrate-N, the diel D.O. swing, minimum D.O., and maximum D.O., all from continuous measurements over 3-4 days, plus sestonic and benthic chlorophyll a, the latter used alone in headwater streams. Secondary parameters that can be affected by nutrient enrichment include BOD_5, total suspended solids (TSS), and total Kjeldahl nitrogen (TKN). The status of aquatic life use attainment is also an important variable and can be the determining factor in the assignment of nutrient enrichment status and how specific sources are dealt with. For the 2025 SNAP assessment, non-attainment (partial) of the WWH aquatic life use was observed at all except one of the seven (7) SNAP sites (Table 10). In such cases the SNAP

***Table 10**. The results of the Ohio EPA Stream Nutrient Assessment Procedure (SNAP) at selected sites in the 2025 study area. Color shading is explained in the legend at the bottom of the table. DA – drainage area.*

Site ID	River Mile	DA (mi.^{2})	IBI	ICI/Qual. Narrative	AQLU Attain-ment Status	QHEI	Benthic Chla (mg/m^2)	TKN (mg/L)		TP (mg/L)		Nitrate (mg/L)		BOD_5 (mg/L)		TSS (mg/L)		Dissolved Oxygen (mg/L)			SNAP Status
								Mean	Median	Mean	Median	Mean	Median	Mean	Median	Mean	Median	Max.	Min.	Max. Daily D.O. Swing	
Scioto Big Run																					
SBR05	7.10	5.80	54	LF*	**PARTIAL**	84.0	116.0	0.45	0.44	0.08	0.08	0.63	0.64	1.73	1.75	12.3	12.0	8.08	6.73	1.30	Impaired Not Nutr.
SBR04	6.10	8.00	50	HF*	**PARTIAL**	76.8	147.0	0.47	0.50	0.08	0.08	0.50	0.46	2.05	2.00	25.5	12.0	8.46	6.98	1.39	Impaired Not Nutr.
SBR03	4.40	11.80	54	HF*	**PARTIAL**	64.5	88.1	0.44	0.46	0.06	0.06	0.57	0.56	1.65	1.65	12.0	12.0	8.92	7.23	1.61	Impaired Not Nutr.
SBR02	2.90	18.50	54	28*/HF*	**PARTIAL**	86.5	105.0	0.55	0.52	0.41	0.13	0.74	0.72	1.63	1.65	12.0	12.0	8.28	6.79	1.27	Impaired Not Nutr.
SBR01	0.80	19.00	52	HF*	**PARTIAL**	82.0	46.9	0.46	0.45	0.03	0.02	0.75	0.77	1.83	1.85	12.0	12.0	7.51	6.12	1.29	Impaired Not Nutr.
Grant Run																					
GRR01	0.80	13.80	34*	VG	**PARTIAL**	66.5	22.8	0.56	0.53	0.11	0.09	0.54	0.53	1.97	2.10	13.0	12.0	9.62	7.21	2.17	Impaired Not Nutr.
Plum Run																					
PLM01	0.72	7.80	46	MG	**FULL**	75.8	135.0	0.53	0.46	0.06	0.02	0.62	0.33	1.97	2.10	12.3	12.0	7.73	1.30	2.67	Attaining No Threat
Refrence			≥50	≥46/E	**FULL**	≥65.0		<0.42		<0.080		<1.27		<2.00		<8		<10	≥5.0		Attaining No Threat
Very Low Risk			≥40	≥36/G	**FULL**	≥58.5	≤182	<0.64		<0.140		<1.81		<2.42		<17		<12	≥4.0	≤6.5	Impaired Not Nutirents
Low Risk			≥28	≥14/F	**NON-Fair**	≥45.0	<320	<1.01		<0.410		<3.54		<3.32		<37		>12	≥3.0		Impaired Likely Nutirents
Moderate Risk			≥18	≥8/P	**NON-Poor**	≥31.5	>320	<2.07		<1.220		<8.75		<5.97		<87		>15	≥2.0	>6.5	Impaired Over-enriched
High Risk			<18	<6/VP	**NON-V. Poor**	<31.5		>2.07		>1.220		>8.75		>5.97		>87		>18	<2.0		Impaired Severe-enrich
Ohio SNAP			**Ohio WQS**			**IPS**	**SNAP**	**IPS**		**IPS**		**IPS**		**IPS**		**IPS**		**MBI**	**WQS**	**SNAP**	**SNAP**

indicators are examined for any adverse effects of nutrient enrichment based on exceedance thresholds established by Ohio EPA and the Greater Central Ohio IPS (Appendix E). All of the benthic chlorophyll a values were well within the very low risk threshold of 182 mg/m^3. All of the D.O indicators showed a very low potential for adverse impacts. A possible exception is the low D.O. minimum of 1.30 mg/L at PLM01, but this was likely not caused by nutrient enrichment. Allied parameters such as TKN, BOD_5, and TSS also showed very low risk values with most being below the IPS good and excellent thresholds. The lone exception was a median TSS value at SBR 04 that was of no concern against the backdrop of all other values being in the IPS excellent range. The six (6) impaired for aquatic life sites were evaluated as Impaired Not Nutrients and Plum Run as attaining and no threat.

Urban Parameters

Urban parameters include the common dissolved ion indicators of chloride, conductivity, total dissolved solids, and common heavy metals such as cadmium, copper, lead, and zinc. These parameters can become elevated in urbanized watersheds and are indicative of diverse sources and activities that exemplify urban land uses. Total suspended solids is included in this group because of its widespread use as an indicator of urban runoff and stormwater and for assigning credits for best management practices and affiliated restoration practices such as bank stabilization. The performance of TSS as a single parameter indicative of the performance of stormwater management is questionable given the role that other pollutants coupled with the role that flow regime and habitat also play in determining the overall health of aquatic life and recreation in urban streams. Phase II of the Greater Central Ohio IPS (MBI 2026) identified all of these parameters along with some other conventional, demand, and nutrient parameters as being the most important in terms of their relationship with increases in urban land uses, fractional impervious cover (FrImp) in particular. Employing a mosaic of such indicators undergirded by a biological assessment is a more complete and accurate approach to assess urban watershed as used herein.

Chlorides

In temperate climates such as exist in central Ohio, dissolved materials in the form of chlorides are an emerging problem because they accumulate in soils and shallow groundwater and have increasingly been documented to reach concentrations that can threaten and impair aquatic life (Miltner 2021). Of particular concern in urban areas with high road density is the concentration of chlorides from winter road salt applications and point source loadings from water treatment blowdown. Chlorides have been documented to be increasing steadily in freshwaters including large rivers (Mullaney et al. 2009; Kelly et al. 2012). Chlorides do not exhibit a simple runoff and export mode of effect, but rather accumulate in near surface groundwater (Kelly 2008), soils, and land surfaces adjacent to streams. Seasonal studies have shown that elevated summer concentrations are correlated with even higher, acute concentrations during late winter and spring (Kaushal et al. 2005). Research in New England (Kaushal et al. 2005) and Minnesota (Novotny et al.

2008) show that chlorides can accumulate in watersheds and that there is a strong association between high winter and elevated summer concentrations. Novotny et al. (2008) identified that 78% of the road salt applied in a Minnesota watershed accumulated in a given year and contributed to an increase in summer chloride concentrations.

Ohio does not have a chloride water quality criterion for the protection of aquatic life, although there is a maximum contaminant level of 250 mg/L that applies to public water supplies. States that did adopt a criterion for aquatic life have set it much higher than recent research suggests are safe levels. U.S. EPA (1988) recommends a water quality criterion of 230 mg/L for the protection of aquatic life. A more recent Ohio study that examined several decades of ambient water quality data against biological assemblage response (Miltner 2021) recommends a "hazard" level for chloride at 52 mg/L for the protection of high quality waters. This value is in line with field derived values of 52.6 mg/L for WWH and 21.9 mg/L for EWH attainment at headwater sites in Southwest Ohio (MBI 2015). Regional reference values ranged from 17 mg/L (median) to 108 mg/L (95th percentile) with the statistical maximum at 41 mg/L. The Greater Central Ohio IPS derived good and excellent values for headwater streams of 46 and 32 mg/L, respectively, that are close to these aforementioned effect thresholds.

Median and mean chloride values exceeded the good IPS threshold of 46 mg/L at all except one site in 2025 (Table 11). The upstream site at REP04 had median and mean values of 43 mg/L just under the good threshold. A total of 15 sites had median and mean values with the fair threshold, six (6) sites were within the poor threshold, and two (2) sites had a mix of the median within the fair threshold and the mean within the poor threshold. Exceedances of the Miltner (2021) hazard level of 52 mg/L occurred at all except two sites in the 2025 study area. Median values as high as 116 mg/L occurred at GRR04 at Hoover Rd. in southern Grove City which is affected by runoff from commercial properties that are subject to private contractor salt applications that are not always employed with best practices to minimize the amount of salt that is applied. The highest median and mean values occurred in the middle and southern portions of the study area. While Scioto Big Run is heavily urbanized it had the lowest chloride levels even though all except one site was within the fair range. Macroinvertebrates are especially susceptible to chlorides and tended to be the limiting factor in the numerous partial attainment sites in the Scioto Big Run subwatershed and both partial and non-poor non-attainment in the Republican and Grant Run subwatersheds.

Specific Conductance and Field Conductivity

Specific Conductance is a measure of how effectively water conducts an electrical current. Conductance increases with an increasing amount and mobility of ions and is well correlated with the dissolved solids content of water. The ions conduct electricity because they are negatively or positively charged when dissolved in water. As such conductance is an indirect measure of the concentration of dissolved ions in solution and is defined as the electrical conductance of 1 cubic centimeter (cm^3) of a solution at 25°C. The Ohio WQS have a specific conductance criterion of 2400 μS/cm that is equivalent to the TDS criterion

***Table 11**. Mean values for urban related parameters in the in the 2025 study area. Values are color coded in accordance with the legend at the bottom that represents the 75th percentile of values derived by the Greater Central Ohio IPS (MBI 2025b) and other thresholds including the Ohio WQS.*

MBI Site ID	River Mile	DA (mi.^{2})	Chloride (mg/L)		Conductance @25°C (µS/cm)		Field Conductivity (µS/cm)		Total Dissolved Solids (TDS) (mg/L)		Total Suspended Solids (TSS) (mg/L)		Cadmium (µg/L)		Copper (µg/L)		Lead (µg/L)		Zinc (µg/L)	
			Median	Mean	Median	Mean	Median	Mean	Median	Mean	Median	Mean	Median	Mean	Median	Mean	Median	Mean	Median	Mean
Scioto Big Run (Scioto River @RM 124.40)																				
SBR06	8.50	2.90	51	53	560	590	557	579	365	375	12	44	0.072	0.129	3.8	4.9	0.64	1.33	30.2	30.4
SBR05	7.10	5.80	63	62	600	618	598	606	370	373	12	12	ND	ND	3.3	3.0	ND	ND	ND	ND
SBR04	6.10	8.00	58	57	545	570	636	623	335	348	12	26	0.066	0.126	2.4	2.9	0.64	0.93	ND	ND
SBR03	4.40	11.80	61	62	590	628	588	621	340	375	12	12	ND	ND	2.7	2.6	ND	ND	ND	ND
SBR02	2.90	18.50	60	57	630	625	631	617	385	378	ND	ND	ND	ND	2.5	2.4	ND	ND	ND	ND
SBR01	0.80	19.00	73	82	770	835	767	819	460	488	ND	ND	ND	ND	2.0	2.0	ND	ND	ND	ND
Unnamed Tributary to Scioto Big Run @RM 6.66																				
SBR08	1.50	1.57	55	61	540	668	495	598	330	408	12	19	ND	ND	2.6	2.5	0.64	0.73	ND	ND
SBR07	0.30	1.80	63	70	575	668	573	656	325	398	ND	ND	ND	ND	2.5	2.5	ND	ND	ND	ND
Unnamed Tributary to Scioto Big Run @RM 3.59 (Early Run)																				
SBR10	1.85	2.55	55	52	680	633	666	628	415	395	12	15	ND	ND	1.7	2.8	0.64	1.23	68.8	73.8
SBR09	0.10	3.80	62	57	610	600	631	605	365	355	ND	ND	ND	ND	2.5	2.4	ND	ND	ND	ND
Unnamed Tributary to Scioto Big Run @RM 0.70 (Brown Run)																				
SBR11	0.10	3.00	100	97	770	763	743	742	435	435	ND	ND	ND	ND	2.4	2.5	ND	ND	ND	ND
Marsh Run (Scioto Big Run @RM 1.48)																				
MR02	2.00	2.20	98	103	890	853	869	840	530	505	12	17	ND	ND	2.1	2.9	ND	ND	ND	ND
MR01	0.20	3.10	71	72	685	693	644	624	420	423	ND	ND	ND	ND	4.2	7.0	ND	ND	30.2	79.2
Gantz Run (Scioto River @RM 124.31)																				
GTZ01	1.00	0.78	110	112	920	910	849	799	550	543	ND	ND	ND	ND	1.7	1.7	ND	ND	ND	ND
Republican Run (Scioto River @RM 123.11)																				
REP04	5.40	1.01	43	43	555	555	564	554	370	378	ND	ND	ND	ND	2.3	2.4	ND	ND	ND	ND
REP03	3.80	2.97	69	73	680	725	681	719	420	438	ND	ND	ND	ND	2.8	2.7	ND	ND	ND	ND
REP02	1.30	5.70	76	82	760	758	745	752	470	468	ND	ND	ND	ND	2.7	2.7	ND	ND	ND	ND
REP01	0.20	7.00	63	64	730	740	725	729	490	468	12	14	ND	ND	1.7	2.0	ND	ND	ND	ND
South Branch Republican Run @RM 1.92																				
REP05	0.02	1.90	90	99	840	843	828	853	500	520	ND	ND	ND	ND	2.4	2.4	ND	ND	ND	ND
Unnamed Tributary to Republican Run @RM 0.73 (Billy Joe Run)																				
REP06	0.10	0.88	65	65	780	783	750	742	470	475	ND	ND	ND	ND	1.7	2.0	ND	ND	ND	ND
Grant Run (Scioto River @RM 121.47)																				
GRR03	4.30	2.00	69	71	710	703	735	723	475	450	30	39	ND	ND	2.4	2.4	0.64	0.88	ND	ND
GRR02	2.00	7.80	110	100	890	823	884	817	550	518	14	17	ND	ND	2.7	2.7	0.64	0.68	ND	ND
GRR01	0.20	13.80	81	77	755	748	759	735	470	465	12	13	ND	ND	2.4	2.8	ND	ND	30.2	25.4
Unnamed Tributary to Grant Run @RM 2.77																				
GRR04	1.50	1.00	116	103	980	920	975	913	640	615	24	35	0.062	0.066	3.0	3.0	0.82	0.92	ND	ND
Plum Run (Scioto River @RM 118.64)																				
PLM01	0.72	7.80	68	62	780	733	859	792	545	485	12	12	ND	ND	1.7	1.9	ND	ND	ND	ND
Headwater Sites IPS Thresholds	**Excellent**		<32		<685		<574		<421		<8		<0.25		<6.0		<3.0		<6.0	
	Good		<46		<793		<665		<454		<17		<5.30		<25.0		<27.0		<301.0	
	Fair		<76		<909		<804		<529		<37									
	Poor		<166		<1385		<1114		<754		<87		<29.00		<80.0		<991.0		<611.0	
	Very Poor		>166		>1385		>1114		>754		>87									
	Ohio WQS		52[a]		**IPS**				>1500		**IPS**		**Ohio WQS[b]**							

Footnotes: [a] Miltner (2021); [b] metals outside mixing zone criteria at a hardness of 300 mg/L as $CaCO_3$.

of 1500 mg/L. Regional reference specific conductance values for headwater streams in the ECBP ecoregion are lower with a median of 500 µS/cm, a statistical maximum of 768 µS/cm, and a 95th percentile of 1,012 µS/cm. The Greater Central Ohio IPS thresholds for good are 793 for specific conductance and 665 for field (relative) conductivity (Table 11)

The 2025 results (Table 11) show a different pattern of exceedances than chloride with fewer values above the good threshold than for chloride. Four sites (SBR01, MR02, REP05, and GRR02) had fair specific conductance results. Two sites (GTZ01 and GRR04) had median and mean values in the poor range. Field conductivity showed more exceedances than dd specific conductance and were mor e frequent in the Republican Run, Grant Run, and Plum Run. By comparison, Scioto Big Run had fewer exceedances except the lowermost site (SBR01) and the lower tributaries (MR02, SBR11) that had both fair and poor values. These results are an indication of the widespread influence of urban runoff via stormwater via runoff.

The short-term Datasonde deployments included continuous specific conductance measurement during July 28-31 at seven (7) sites. All values were below the good IPS value except in Plum Run which had elevated conductivity into the IPS fair range compared to the other sites (Figure 8). The source of the elevated values in Plum Run are presently unknown. The trend in Scioto Big Run was for conductance to increase in a downstream direction with the highest values at SBR01 which is located close to St. Rt. 104.

Total Dissolved Solids

Total dissolved solids (TDS) is a measure of the dissolved content of all inorganic and organic substances present in water consisting of solids small enough to pass through 2-micron filter. While TDS is not generally considered to be a pollutant it can be useful as an aggregate indicator of the presence of an array of chemical pollutants. The most common chemical constituents are calcium, phosphates, nitrates, sodium, potassium, and chloride, each of which can emanate from nonpoint and point sources. Common nonpoint sources of TDS in receiving waters are agricultural and urban runoff with parent geology and soils being important co-factors. Point sources of both industrial and municipal wastewater also influence TDS levels. Total dissolved solids are differentiated from total suspended solids (TSS), in that the latter cannot pass through a 2 micron filter and are indefinitely suspended in solution.

The age and uncertain origin of the 1500 mg/L WQS raises concerns about its efficacy for regulatory or assessment purposes that have been known for at least 15 years. It is therefore regraded a being under protective of aquatic life based on recent research some of which is at least 15 years old. The detrimental effects of increased concentrations of TDS on the abundance of Ephemeroptera (Mayflies) and richness of Ephemeroptera taxa are well known (Kefford 2019). Studies in the Appalachian region of the U.S. have linked declines in mayflies to increased conductivity from coal mining operations that release dissolved ionic substances such as chlorides, magnesium, and sulfates (Pond et al. 2008,

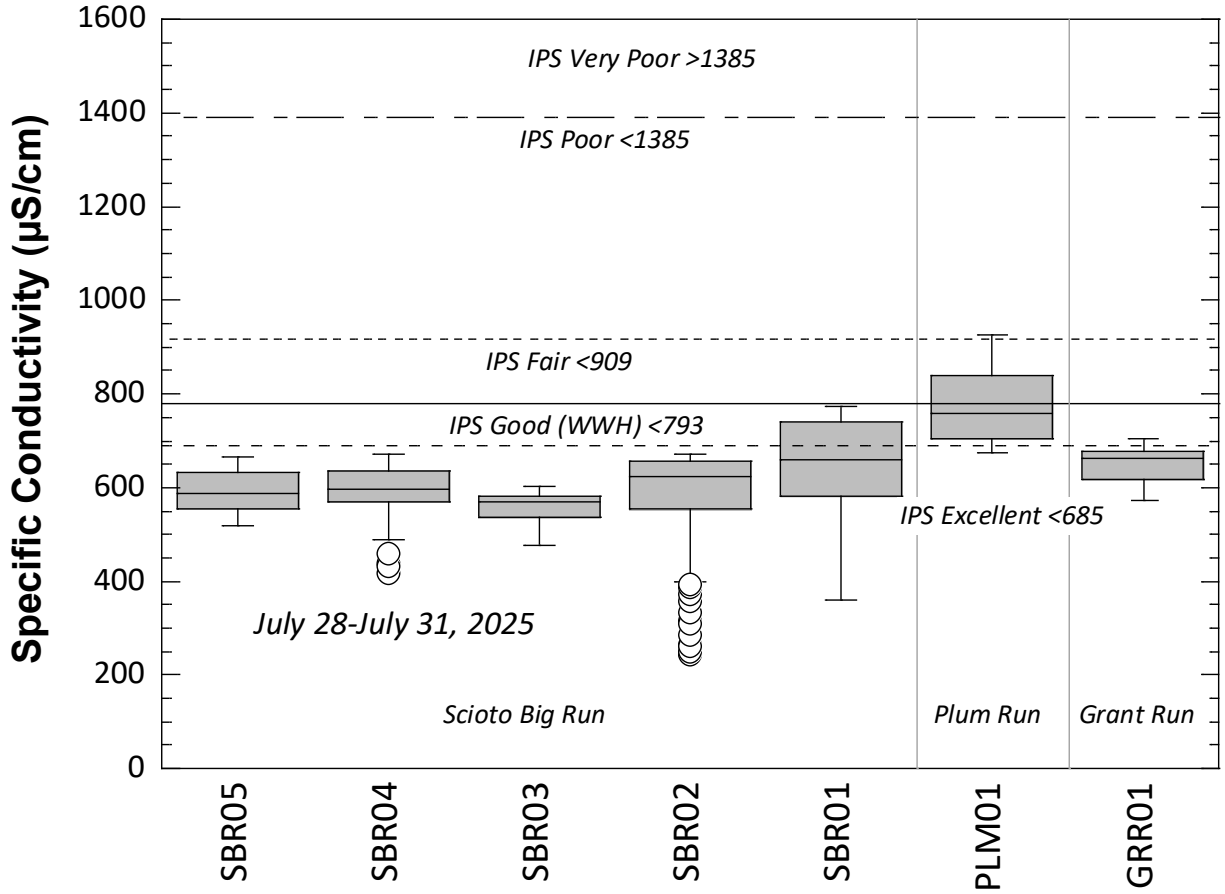


***Figure 8**. Continuously measured specific conductivity results at seven (7) locations in the 2025 study area during July 28-31. The Greater Central Ohio IPS thresholds for five narrative condition strata in headwater sites are shown by solid dashed lines. WWH corresponds to the good narrative and EWH corresponds to the Excellent narrative.*

2011; U.S. EPA 2011). Field studies have indicated that mayflies (Order Ephemeroptera) are particularly sensitive to high TDS with adverse effects occurring at equivalent conductivity values of 1500 µS/cm, which is well below the Ohio 1500 mg/L TDS equivalent of 2400 µS/cm, and an acutely toxic threshold of 2866 µS/cm (Johnson et al. 2014). Analyses by MBI with Ohio stream data observed that declines in sensitive mayflies (e.g., *Ephemerella*) begin to occur at conductivities of ~1000 µS/cm (Rankin 2010), a TDS equivalent of 625 mg/L and which is 40% of the current WQS for TDS. Brent et al. (2022) set acute and chronic TDS thresholds of 938 and 463 mg/L, respectively, and used for total maximum daily load development. Regional reference values for headwater streams in the ECBP are a median of 399 mg/L, a statistical maximum of 464 mg/L, and a 95th percentile value of 508 mg/L (Ohio EPA 1999).

The Greater Central Ohio IPS for good TDS levels in headwater streams is 454 mg/L, less than one-third of the current WQS. Only six (6) TDS median or mean values exceeded the statistical maximum reference threshold of 464 mg/L (Table 8). This threshold was

exceeded as a median and mean at 12 sites most of which tracked exceedances of the field conductivity thresholds. Poor TDS values were observed in March Run (MR02), Gantz Run (GTZ01), Grant Run (GRR02 and 04), and Plum Run all of which are likely for the same reasons field conductivity was elevated. Exceedances of the IPS good threshold were notably absent in Scioto Big Run with the exception of fair levels at SBR01.

Total Suspended Solids (TSS)

Total suspended solids (TSS) are particles that are larger than 2 microns that are suspended in the water column. Anything that can pass through a 2 micron average filter size is considered a dissolved solid. TSS can include any particles drifting in the water column to include inorganic sediment, silt, and sand and organic matter such as plankton and algae. At typical ambient concentrations under summer normal flows TSS has little or no direct effect on aquatic life. However, at extremely high concentrations that are rare in the natural environment, TSS can be harmful to fish and invertebrates by clogging gills and embedding substrates. The net effect of TSS is better communicated and analyzed via the substrate metrics of the QHEI. However, it is easy to measure and thus it is commonly employed as an almost singular indicator of nonpoint source pollution (e.g., MS4 stormwater permitting and crediting) despite its inherent variability and serious shortcomings as a reliable standalone indicator of aquatic life impairment. Miltner (2018) included it as a tertiary large river nutrient effects parameter, but in a restricted role as a proxy parameter with a screening level of >25 mg/L indicating enriched conditions when other indicators such as BOD_5 and TKN are not available. Regional reference TSS values for headwater streams in the ECBP ecoregion are a median of 7.0 mg/L, a statistical maximum of 21 mg/L, and a 95th percentile of 70 mg/L. The good IPS threshold for headwater streams is 17 mg/L (Table 11). Seven (7) sites had mean values that exceeded the good IPS 17 mg/L and only two corresponding median values exceed it. Poor median values >37 mg/L occurred at Sites SBR06 and GRR03, the latter being the restoration site at Meadows Drive. The remaining median and mean values were either in the good range or less than the MDL.

Heavy Metals

Cadmium, copper, lead, and zinc are heavy metals that are frequently detected in urbanized watersheds. Mean and median cadmium levels were mostly below the ECBP reference median value of 0.25 µg/L with median and mean values detected at SBR06, SBR04, and GRR04 with none exceeding the reference median (Table 11). The WWH WQS at an equivalent hardness of 300 mg/L as CaCO3 is 5.30 µg/L for which is many times higher than any 2025 cadmium values. Copper values were detected at all sites, but at concentrations less than the ECBP median reference value of 6.0 µg/L with the exception of MR01 at 7.0 µg/L. No value was close to the 25.0 µg/L WQS chronic criterion. Lead values were detected at seven (7) sites all well below the excellent IPS value of 3.0 µg/L. All other sites had results below the MDL. Mean and median zinc values were low with all except four (4) sites at non-detect levels. None of the detected values approached the WWH WQS chronic criterion of 301 µg/L.

Synthesis of Urban Parameters

At least 12 sites had exceedances of the IPS good thresholds for three or more urban parameters all of which had chloride exceedances accompanied by specific conductance, field conductivity, total dissolved solids, and scattered total suspended solids exceedances. With the exception of two sites in the Scioto Big Run subwatershed at SBR 01 and MR02, all occurred in Gantz Run, Republican Run, Grant Run, and Plum Run. Only one site in upper Republican Run (REP04) was within the good chloride threshold. Gantz Run (GTZ01) and three Grant Run sites (GRR01, GRR02, and GRR04) had poor range exceedances. Even though Scioto Big Run had the highest amount of urban land uses chloride was the only urban parameter that was consistently exceeded except at the downstream most site SBR01. One possible explanation is that the subwatersheds in Grove City and to the south have higher density of commercial properties that are generally treated for snow and ice by private contractors.

Sediment Chemistry

Sediment samples for chemical analysis were collected at each site in 2025 and analyzed for heavy metals and an array of organic compounds including volatile, semi-volatile, base neutral acid, polycyclic aromatic hydrocarbons, PCBs, and pesticide compounds that returned as detections in the laboratory analyses. Only compounds that were detected are reported herein.

Sediment Metals

Metals in sediment were analyzed for the eight (8) parameters and compared to the Probable Effect Concentration (PEC) and Threshold Effect Concentration (TEC) levels of MacDonald et al. (2000) and the Ohio EPA Sediment Reference Values (SRV; Ohio EPA 2008). The MacDonald (2000) PEC means that most species and taxa can be adversely affected whereas the TEC means that the most sensitive species and taxa are be affected. These can be used to evaluate the likelihood and degree to which adverse biological effects will occur as a result of exposure to elevated sediment contaminants. The Ohio SRVs are reference values at least impacted reference sites, and these values were very close to the TEC thresholds.

There were a total of 142 parameter detections at the 2025 sites with only four (4) exceedances of a PEC and 11 of a TEC (Table 12). The more serious PEC exceedances occurred at both sites (SBR10 and 09) in the Unnamed Tributary to Scioto Big Run at RM 3.59 (Early Run) for lead. This was accompanied by a TEC exceedance for zinc at both sites and a TEC exceedance of arsenic at SBR09. These results correspond to the heavily urbanized character of this subwatershed. Two PEC exceedances occurred at the lower site in Marsh Run at MR01 for copper and zinc. The remaining three (3) TEC exceedances occurred in Republican Run at REP01 for lead, nickel, and zinc. All of these results are typical of heavy to moderate urban development.

***Table 12**. Concentrations of selected heavy metals in bulk sediment samples collected at 25 ambient locations in the 2025 study area. The MacDonald et al. (2000) threshold effect (TEC) and probable effect (PEC) thresholds and Ohio EPA sediment reference values (SRV) are indicated at the bottom of the table (DA – drainage area). (DA – drainage area).*

Site ID	River Mile	DA (mi.^{2})	Arsenic (mg/kg)	Cadmium (mg/kg)	Chromium (mg/kg)	Copper (mg/kg)	Iron (mg/kg)	Lead (mg/kg)	Nickel (mg/kg)	Zinc (mg/kg)	Total Detect-ions	PEC Exceed-ances	TEC/SRV Exceed-ances
Scioto Big Run (Scioto River @RM 124.40)													
SBR06	8.50	2.90	16.0	ND	14.0	ND	20000	24.1	23.7	120.0	6	0	0
SBR05	7.10	5.80	--	--	--	--	--	--	--	--	0	0	0
SBR04	6.10	8.00	11.0	0.4	7.1	ND	16000	22.1	21.0	66.3	7	0	0
SBR03	4.40	11.80	8.9	ND	5.9	ND	11000	9.9	ND	56.0	5	0	0
SBR02	2.90	18.50	9.1	ND	8.2	ND	14000	15.4	ND	66.9	5	0	0
SBR01	0.80	19.00	9.6	ND	9.4	ND	15000	18.3	ND	256.0	5	0	1
Unnamed Tributary to Scioto Big Run @RM 6.66													
SBR08	1.50	1.57	8.8	ND	8.6	ND	15000	13.2	17.4	84.0	6	0	0
SBR07	0.30	1.80	14.0	ND	11.0	ND	21000	18.3	ND	79.8	5	0	0
Unnamed Tributary to Scioto Big Run @RM 3.59 (Early Run)													
SBR10	1.85	2.55	12.0	0.6	20.0	39.7	21000	69.8	27.3	430.0	8	1	2
SBR09	0.10	3.80	30.0	ND	24.0	ND	44000	65.3	ND	271.0	5	1	3
Unnamed Tributary to Scioto Big Run @RM 0.70 (Brown Run)													
SBR11	0.10	3.00	7.3	ND	9.3	ND	15000	9.8	14.2	64.6	6	0	0
Marsh Run (Scioto Big Run @RM 1.48)													
MR02	2.00	2.20	8.2	ND	9.4	ND	16000	9.7	ND	72.4	5	0	0
MR01	0.20	3.10	14.0	0.4	13.0	103.0	21000	16.6	22.4	903.0	8	2	2
Gantz Run (Scioto River @RM 124.31)													
GTZ01	1.00	0.78	8.9	ND	12.0	73.1	17000	12.3	18.6	76.0	7	0	0
Republican Run (Scioto River @RM 123.11)													
REP04	5.40	1.01	14.0	ND	12.0	ND	23000	17.6	27.6	129.0	6	0	0
REP03	3.80	2.97	5.9	ND	14.0	ND	11000	34.6	ND	75.8	5	0	0
REP02	1.30	5.70	9.9	ND	11.0	ND	16000	22.8	20.0	110.0	6	0	0
REP01	0.20	7.00	25.0	1.1	53.0	ND	41000	57.2	60.6	320.0	7	0	3
South Branch Republican Run @RM 1.92													
REP05	0.02	1.90	14.0	ND	11.0	ND	21000	21.9	30.3	160.0	6	0	0
Unnamed Tributary to Republican Run @RM 0.73 (Billy Joe Run)													
REP06	0.10	0.88	14.0	ND	12.0	ND	21000	16.1	ND	118.0	5	0	0
Grant Run (Scioto River @RM 121.47)													
GRR03	4.30	2.00	12.0	ND	17.0	ND	28000	15.0	ND	80.2	5	0	0
GRR02	2.00	7.80	11.0	ND	5.9	ND	13000	7.8	ND	47.9	5	0	0
GRR01	0.20	13.80	11.0	0.5	15.0	ND	23000	23.4	20.8	82.4	7	0	0
Unnamed Tributary to Grant Run @RM 2.77													
GRR04	1.50	1.00	12.0	ND	16.0	ND	24000	13.6	25.0	108.0	6	0	0
Plum Run (Scioto River @RM 118.64)													
PLM01	0.72	7.80	9.0	ND	8.2	ND	18000	9.5	13.2	69.3	6	0	0
MacDonald et al.(2000)		TEC	25.1	0.8	33.0	40.0	51000	49.0	47.0	170.0	142	4	11
		PEC	33.0	5.0	--	43.4	--	61.0	128.0	459.0			
Ohio EPA		SRVs	25.1	0.8	33.0	40.0	51000	61.0	47.0	170.0			

Sediment Organics

Organic chemicals in sediment were analyzed for volatile, semi-volatile, base neutral acid, polycyclic aromatic hydrocarbons, PCBs, and pesticide compounds that returned as detections in the laboratory analyses. The detected results were compared to the compared to the Probable Effect Concentration (PEC) and Threshold Effect Concentration (TEC) levels of MacDonald et al. (2000) and Persuad et al. 1993 thresholds, the latter of which used an SEL as the TEC equivalent of the LEL as the TEC equivalent. The organics that were detected and quantified included nine (9) PAH compounds and bis(2-Ethylhexyl)phthalate (Table 13). Polycyclic Aromatic Hydrocarbon (PAH) compounds are generally more commonly detected in sediment samples at sites with elevated urban land uses. PAH compounds are by products of coal tar, gasoline exhaust, and incomplete combustion and several are known carcinogens. Most of these compounds are not manufactured and are more commonly detected in urban rivers and streams with runoff from asphalt pavements and heavy automobile traffic as the primary sources. Out of 225 total PAH analytes, there 33 detections of which nine (9) exceeded the PEC/SEL thresholds 22 exceeded the TEC/LEL thresholds. The exceedances were the most concentrated in the Scioto Big Run subwatershed including three of the three of the four tributaries that were sampled in 2025. The Unnamed Tributary at RM 6.66 had no PAH detections. The remaining exceedances included three PEC and four TEC exceedances in Republican Run at REP03 the most of any single site in the 2025 study.

The plasticizer bis(2-Ethylhexyl)phthalate was the only other detected non-PAH organic compound exceeding the low risk guidelines of U.S EPA, Region III BTAG at two (2) locations in Scioto Big Run at SBR01 and the Unnamed Tributary to Scioto Big Run at RM 3.59 (Early Run). Most of these compounds are common by products of various manufacturing processes and the likely source is urban runoff from commercial facilities or as chemical degradates of plastics that are common as litter and trash in urban areas and flotsam in urban streams.

***Table 13**. Concentrations of organic compounds in bulk sediment samples collected at 25 ambient locations in the 2025 study area. ND values are below the MDL for each compound.*

Site ID	River Mile	DA (mi.^{2})	Benzo(a)Anthracene (mg/Kg)	Benzo(b)fluoranthene (mg/Kg)	Benzo(a)pyrene (mg/Kg)	bis(2-Ethylhexyl)phthalate (mg/Kg)	Chrysene (mg/Kg)	Di-n-butylphthalate (mg/Kg)	Fluoranthene (mg/Kg)	Indeno(1,2,3-c,d)pyrene (mg/Kg)	Phenanthrene (mg/Kg)	Pyrene (mg/Kg)	Total PAH (mg/Kg)	Total PAH Detections	Total PEC/SEL Exceedances	Total TEC/LEL Exceedances
Scioto Big Run (Scioto River @RM 124.40)																
SBR06	8.50/8.50	2.90	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	0.0	0	0	0
SBR05	7.10/7.17	5.80	ND	5.7	ND	5.29	ND	0.9	3.8	9.3	ND	2.5	27.5	4	1	3
SBR04	6.10/6.10	8.00	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	0.0	0	0	0
SBR03	4.40/4.48	11.80	ND	1.8	ND	2.75	ND	8.2	1.4	ND	1.6	1.5	17.3	4	1	4
SBR02	2.90/2.90	18.50	ND	3.3	ND	4.54	1.2	10.8	2.0	2.5	2.3	2.5	29.2	5	1	4
SBR01	0.80/0.80	19.00	ND	2.0	ND	4.23	ND	13.0	ND	ND	2.5	ND	21.7	2	1	1
Unnamed Tributary to Scioto Big Run @RM 6.66																
SBR08	1.50/1.50	1.57	ND	ND	ND	ND	ND	4.0	ND	ND	ND	ND	4.0	1	0	0
SBR07	0.30/0.30	1.80	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	0.0	0	0	0
Unnamed Tributary to Scioto Big Run @RM 3.59 (Early Run)																
SBR10	1.85/1.61	2.55	ND	11.80	ND	ND	ND	ND	12.60	ND	ND	14.70	39.1	3	1	2
SBR09	0.10/.09	3.80	ND	ND	ND	4.18	ND	1.5	ND	ND	ND	ND	5.7	0	0	1
Unnamed Tributary to Scioto Big Run @RM 0.70 (Brown Run)																
SBR11	0.10/0.21	3.00	ND	ND	ND	ND	ND	ND	ND	ND	ND	4.24	4.2	1	0	1
Marsh Run (Scioto Big Run @RM 1.48)																
MR02	2.00/2.00	2.20	ND	6.19	ND	ND	ND	ND	7.00	5.33	ND	8.64	27.2	4	1	3
MR01	0.20/0.20	3.10	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	0.0	0		
Gantz Run (Scioto River @RM 124.31)																
GTZ01	1.00/1.00	0.78	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	0.0	0	0	0
Republican Run (Scioto River @RM 123.11)																
REP04	5.40/5.40	1.01	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	0.0	0	0	0
REP03	3.80/3.80	2.97	3.89	6.28	5.14	ND	4.50	ND	8.20	ND	5.00	10.10	43.1	7	3	2
REP02	1.30/1.38	5.70	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	0.0	0	0	0
REP01	0.20/0.25	7.00	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	0.0	0	0	0
South Branch Republican Run @RM 1.92																
REP05	0.02/0.02	1.90	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	0.0	0	0	0
Unnamed Tributary to Republican Run @RM 0.73 (Billy Joe Run)																
REP06	0.10/0.10	0.88	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	0.0	0	0	0
Grant Run (Scioto River @RM 121.47)																
GRR03	4.30/4.30	2.00	ND	ND	ND	ND	ND	3.6	ND	ND	ND	ND	3.6	1	0	0
GRR02	2.00/1.80	7.80	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	0.0	0	0	0
GRR01	0.20/0.40	13.80	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	0.0	0	0	0
Unnamed Tributary to Grant Run @RM 2.77																
GRR04	1.50/1.50	1.00	ND	ND	ND	ND	ND	4.98	ND	ND	ND	ND	5.0	1	0	1
Plum Run (Scioto River @RM 118.64)																
PLM01	0.72/0.72	7.80	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	0.0	0	0	0
MacDonald et al. (2000)	**PEC**	≥1.050	--	--	--	>1.29		>2.230	--	>1.170	>1.520	--	33	9	22	
Thresholds	**TEC**	>0.108	--	--	--	>0.166		>0.423	--	>0.204	>0.195	--				
Persaud et al. (1993)	**SEL**	>1480	>1340	>1440	--	>460		>1020	>320	>950	>850	>10,000				
Thresholds	**LEL**	>0.320	>0.240	>0.370	--	>0.340		>0.750	>0.200	>0.560	>0.490	>4.000				
Other Literature	**High Risk**	--	--	--	--	--	[b]	--	--	--	--	--				
Thresholds	**Low Risk**	--	--	--	0.018[a]	--	[b]	--	--	--	--	--				

Footnotes: [a] EPA Region III BTAG, Freshwater Sediment Screening Benchmarks (Risk "Comparison Values), 8/2006; [b] ASTDR (2001) lists no sediment thhreshold, but lists 2.7 mg/L as a human health risk level.

Physical Habitat for Aquatic Life

The physical habitat of a stream or river is a primary determinant of biological quality and potential. Rivers and streams in the glaciated Midwest, left in their natural state, typically offer pool-run-riffle sequences, moderate to high sinuosity, and well-developed channels with deep pools, heterogeneous substrates, and cover in the form of woody debris, hard substrates, and aquatic macrophytes. The Qualitative Habitat Evaluation Index (QHEI) categorically scores basic components of stream and riverine habitat into ranks according to the degree to which those components are found compared to a natural state, or conversely, in an altered or modified state. In the middle Scioto River study area, QHEI scores and physical habitat attributes were recorded in conjunction with the fish sampling conducted at each site. QHEI scores >55 are generally regarded as having the potential to support attainment of the WWH aquatic life use designation and scores >70 indicate excellent habitat in headwater streams. Conversely scores less than 55 have an increasingly limited potential to support WWH and scores less than 43 indicate low or no ability to attain WWH, thus interventions to improve the QHEI scores would be needed. Rankin (1989, 1995) developed a matrix of QHEI attributes that includes good attributes that enhance physical habitat and modified attributes that deter the attainment of WWH. Generally ratios of modified to good attributes of >2.0 indicate that altered habitat is a deterrent to attaining WWH.

Physical Habitat Modifications and Hydrological Alterations

In small, urbanized headwater streams such as those in the 2025 study area, the principal impacts to instream and riparian habitat are from adjacent land uses, hydrological modifications including flashy flows and flow intermittency, and the direct modification of the stream channel, removal of instream cover, and substrate disturbances, the latter resulting from excessive embeddedness where fines such as clayey silts and sand can fill the interstices formed by larger substrate types such as large gravel, cobbles, and boulders.

2025 QHEI Results

Most streams in the 2025 study area had sufficient habitat to support the WWH use with a few exceptions. Based on the QHEI score most offered good to excellent small stream habitat (Table 14). All except three sites had fewer than four (4) poor habitat attributes with 18 having three or fewer. Modified attributes are subdivided between high and moderate influence as defined by Rankin (1989) based on an analysis of the Ohio statewide database. The analysis was detailed for the headwater site type, i.e., sites with drainage areas <20 $mi.^2$. All except six (6) sites had zero high influence modified attributes with maximum pool depths <40 cm being the most common. Two sites has sparse or no cover ad two has silt/muck substrates. The highest number of poor total attributes occurred in Marsh Run at site MR02 with seven (7) total and a high modified to good attributes ratio of 4.00. Gantz Run at site GTZ had six (6) total poor attributes as did the restoration site in Grant Run at GRR03. Marsh Run and Gantz Run are mostly subsumed by moderate to heavy urban development that has encroached on the riparian zones. As a result the QHEI

***Table 14**. Qualitative Habitat Evaluation Index (QHEI) scores showing good and modified habitat attributes at sites in the 2025 study area. Narrative ratings and color coding in legend at bottom of the table based on the headwater site type after analyses based on Rankin 1989 and Rankin 1995.*

			Good Habitat Attributes											High Influence Modified Attributes							Moderate Influence Modified Attributes																			
Site ID	River Mile	QHEI	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 Embeddedness	No Riffle	Poor Habitat Attributes	Ratio of Modified (High) to Good	Ratio of Modified (All) to Good
Scioto Big Run																																								
SBR06	8.50	**75.5**	■	■		■	■	■	■	■	■	■	**9**						**0**													**0**	**0.00**	**0.00**
SBR05	7.10	**84.0**	■	■		■	■	■	■	■	■	■	**9**						**0**													**0**	**0.00**	**0.00**
SBR04	6.10	**76.8**	■	■		■	■	■	■		■		**7**						**0**										●	●		**2**	**0.00**	**0.29**
SBR03	4.40	**64.5**	■		■	■	■	■	■	■	■	■	**9**						**0**													**0**	**0.00**	**0.00**
SBR02	2.90	**86.5**	■	■		■	■	■	■	■	■	■	**9**						**0**													**0**	**0.00**	**0.00**
SBR01	0.80	**82.0**		■	■	■		■	■	■	■	■	**8**						**0**	●					●							**2**	**0.00**	**0.25**
Unnamed Tributary Scioto Big Run @RM 6.66																																								
SBR08	1.50	**57.5**	■	■		■	■			■			**5**				●	●	**2**									●			●	**2**	**0.40**	**0.80**
SBR07	0.30	**61.0**		■		■	■	■	■	■		■	**7**					●	**1**	●												**1**	**0.14**	**0.29**
Unnamed Tributary Scioto Big Run @RM 3.59 (Early Run)																																								
SBR10	1.85	**67.0**	■	■		■	■	■	■		■		**7**						**0**						●				●	●		**3**	**0.00**	**0.43**
SBR09	0.10	**63.5**		■		■		■	■	■	■		**6**						**0**	●	●				●					●		**4**	**0.00**	**0.67**
Unnamed Tributary Scioto Big Run @RM 0.70 (Brown Run)																																								
SBR11	0.10	**81.0**	■	■	■	■	■	■	■	■	■	■	**10**						**0**													**0**	**0.00**	**0.00**
Marsh Run																																								
MR02	2.00	**50.0**		■				■					**2**					●	**1**	●				●	●	●		●	●		●	**7**	**0.50**	**4.00**
MR01	0.20	**64.5**		■		■		■	■	■			**5**					●	**1**	●	●				●					●		**4**	**0.20**	**1.00**
Gantz Run																																								
GTZ01	1.00	**56.0**		■				■			■		**3**						**0**	●				●	●			●	●		●	**6**	**0.00**	**2.00**
QHEI Narrative	**Excellent**	>70											≥8						0													≤1	<0.20	≤0.50
	Good	>55											≥6						0													≤4	<0.50	≤2.00
	Fair	>43											≥3						1													≤5	>1.00	>2.00
	Poor	>30											≥2						2													≥6	>2.00	>6.00
	Very Poor	<30											≤1						3													≥7	>4.00	>10.00

***Table 14**. continued.*

			Good Habitat Attributes											High Influence Modified Attributes						Moderate Influence Modified Attributes															
Site ID	River Mile	QHEI	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 Embeddedness	No Riffle	Poor Habitat Attributes	Ratio of Modified (High) to Good	Ratio of Modified (All) to Good
REP04	5.40	73.5	■	■		■	■	■	■	■	■		8						0											●		1	0.00	0.13
REP03	3.80	67.5		■		■		■	■	■	■	■	7						0	●	●				●							3	0.00	0.43
REP02	1.38	77.0	■	■	■	■	■	■		■	■		8						0									●			●	2	0.00	0.25
REP01	0.20	68.0	■	■		■	■	■	■	■	■		8						0											●		1	0.00	0.13
South Branch Republican Run																																		
REP05	0.02	69.5	■	■		■		■	■	■	■	■	8						0						●							1	0.00	0.13
Unnamed Tributary to Republican Run @RM 0.73 (Billy Joe Run)																																		
REP06	0.10	59.0	■	■	■	■	■	■		■			7					●	1									●			●	2	0.14	0.43
Grant Run																																		
GRR03	4.30	51.0					■	■			■		3		●				1	●	●			●				●	●		●	6	0.33	2.33
GRR02	2.00	80.0	■	■		■	■	■	■		■		7						0										●	●		2	0.00	0.29
GRR01	0.20	66.5	■	■		■	■	■	■		■		7						0										●		●	2	0.00	0.29
GRR04	1.10	45.5		■					■	■		■	4				●	●	2	●				●	●							3	0.50	1.25
Unnamed Tributary to Grant Run @RM RM 2.77																																		
GRR05	1.32	58.0		■		■	■	■	■	■	■	■	8		●				1	●												1	0.13	0.25
Plum Run																																		
PLM01	0.72	75.8	■	■		■	■	■	■	■	■	■	9						0													0	0.00	0.00
QHEI Narra-tive	Excellent	>70											≥8						0													≤1	<0.20	≤0.50
	Good	>55											≥6						0													≤4	<0.50	≤2.00
	Fair	>43											≥3						1													≤5	>1.00	>2.00
	Poor	>30											≥2						2													≥6	>2.00	>6.00
	Very Poor	<30											≤1						3													≥7	>4.00	>10.00

scores of 50.0 and 56.0 respectively were fair and marginally good with a resulting accumulation of modified habitat attributes.

The site in Grant Run at GRR03 also had a fair QHEI score of 51.0 and 6 poor attributes including one high influence attribute, silt and muck substrates, and a modified to good ratio of 2.33. This is a restoration site that that is now inundated by beaver ponds that have contributed to slow flows, heavy to excessive filamentous algal growth, and organic muck deposited by dying submergent and emergent vegetation (Figure 9). Grant Run was relocated in 2015 to accommodate the development of the Mt. Carmel Grove City campus and the attempt at mitigation included meandering the channel within a large overwide ditch. At the GRR03 sampling site the excavated stream channel was not in alluvium resulting in a substrate dominated by clay hardpan with silt and muck deposited on the substrate surface. The beaver ponds have widened and slowed the stream resulting in more of a wetland than stream environment. The lack of shading has resulted in thick growths of filamentous algae. Water quality issues related to the current character of the site were previously described.



***Figure 9**. The restoration site in Grant Run at site GRR03 upstream from Meadows Drive on the Mt. Carmel Grove City Medical campus showing extensive growths of filamentous algae and emergent aquatic vegetation such as small willows and cattails. The 100% pooled character of the stream is caused by beaver dams.*

In terms of QHEI scores only four sites were less than the good score of 55. The score of 45.5 in Grant Run at GRR04 was due to encroachment of commercial development and paved surfaces close to the stream. The next site upstream at GRR05 is another restoration site that was mitigated almost 20 years ago and with a current QHEI score of 58.0. This site consisted of an overwide ditch that is maintained to control invasive plants.

The South Branch of Republican Run (REP05), which is currently designated LRW, had a nearly excellent QHEI score of 69.5 which is not consistent with the LRW designation. It had eight (8) good attributes and only a single modified attribute, which is clearly characteristic of the WWH designation at a minimum and as recommended in Table 3.

Biological Assemblages – Fish

Sampling the fish assemblages in the 2025 study area have been conducted at 12 of the 26 MBI sites dating back to 1991 with no more that six sites sampled in any single year. Hence, the 2025 survey is the most comprehensive one conducted to date. This analysis focuses on the 2025 results and what the data adds to the understanding of the quality and condition of the fish assemblages in urban and suburban headwater streams. An assessment of historical trends was limited by the span of the historical data and the few sites that were previously assessed. Summarized and raw data tables for 2025 appear in Appendix A.

2025 Fish Assemblage Results

A total of 32 native species and one hybrid among 1,512 fish counted from the six (6) sites sampled in the Scioto Big Run mainstem in 2025 (Appendix B). Central Stoneroller *(Campostoma anomalum)* was the most common species comprising 28.8% by numbers. It was followed by Rainbow Darter *(Etheostoma caeruleum)* at 9.5%, Creek Chub (*Semotilus atromaculatus*) at 9.3%, White Sucker (*Catostomus commersonii*) at 7.9%, Stiped Shiner (Luxilus chrysocephalus) at 7.8%, Green Sunfish *(Lepomis cyanellus)* at 7.1%, Johhny Darter *(Etheostoma nigrum)* at 4.3%, and Emerald Shiner (Notropis atherinoides) at 4.2%. Of note was the occurrence of three intolerant species, Bigeye Chub (Hybopsis amblops), Rosyface Shiner *(Notropis rubellus)*, and Banded Darter *(Etheostoma zonale)* and six moderately tolerant species.

In the other subwatersheds and tributaries 32 native species, one non-native species, and two hybrids among 3,816 fish were counted from 19 sites. Here , too, Central Stoneroller *(Campostoma anomalum)* was the most common species comprising 20.9% by numbers. It was followed by Creek Chub (*Semotilus atromaculatus*) at 20.7%, Green Sunfish *(Lepomis cyanellus)* at 10.2%, Bluegill *(Lepomis macrochirus)* at 7.9%, White Sucker (*Catostomus commersonii*) at 7.4%, Spotfin Shiner *(Cyprinella spiloptera)* at 7.1%, and Western Blacknose Dace *(Rhinichthys obtusus)* at 5.1%. Also of note was the occurrence of three intolerant species, Bigeye Chub (Hybopsis amblops), Silver Shiner *(Notropis photogenis),* and Rosyface Shiner *(Notropis rubellus)* and four moderately intolerant species. The non-native Pond Loach *(Misgurnus anguillicaudatus)* was collected at four locations including the Unnamed Tributary to Grant Run @RM 2.77 (2 locations, 3 individuals), Marsh Run at RM 0.2 (single individual), and the Unnamed Tributary to Scioto Big Run @RM 3.59 (Early Run) with a single individual at RM 1.85. These records continue to document the recent spread of this species throughout the Central Scioto River basin.

To evaluate the overall quality of the fish assemblages and to gauge attainment of the numerical biological criteria the IBI derived and calibrated for headwater streams draining <20 mi.^{2} was used. Other fish metrics were also examined including the number of native species, %DELT anomalies, the number of sensitive fish species, the %simple lithophils, and %tolerant fish were also examined for each site to gauge the response types exhibited by the fish assemblage (Table 15).

***Table 15**. Fish assemblage response indicators in the 2024 study area. The results for each indicator are color coded in accordance with the key at the bottom of the table.*

Site ID	River Mile	DA (mi.^{2})	IBI	Number of Species	% DELTs	Sensitive Species	% Simple Lithophils	% Tolerant
Scioto Big Run								
SBR06	8.50	2.90	40	12	0	2	29.7	70.3
SBR05	7.10	5.80	54	19	0	5	44.2	30.8
SBR04	6.10	8.00	50	17	0	3	34.8	31.5
SBR03	4.40	11.80	54	20	0	6	28.0	8.1
SBR02	2.90	18.50	54	19	0	7	30.8	19.0
SBR01	0.80	19.00	52	24	0.89	9	35.4	24.8
Unnamed Tributary Scioto Big Run @RM 6.66								
SBR08	1.50	1.57	42	10	0	0	51.2	51.2
SBR07	0.30	1.80	40	11	0	1	45.9	74.4
Unnamed Tributary Scioto Big Run @RM 3.59 (Early Run)								
SBR10	1.85	2.55	44	14	0	1	11.7	37.6
SBR09	0.10	3.80	40	13	0	3	53.6	58.2
Unnamed Tributary Scioto Big Run @RM0.70 (Brown Run)								
SBR11	0.10	3.00	52	19	0	4	7.6	37.3
Marsh Run								
MR02	2.00	2.20	43	10	0.14	0	1.8	18.1
MR01	0.20	3.10	40	18	0.89	4	12.5	15.2
Gantz Run								
GTZ01	1.00	0.78	44	8	0	0	2.2	54.1
Republican Run								
REP04	5.40	1.01	34*	7	0	0	1.1	77.5
REP03	3.80	2.97	26*	6	0	0	31.0	83.5
REP02	1.38	5.70	30*	9	0	0	16.7	65.2
REP01	0.20	7.00	40	16	0	3	7.9	35.7
South Branch Republican Run								
REP05	0.02	1.90	32	8	0	0	22.1	79.9
Unnamed Tributary to Republican Run @RM 0.73 (Billy Joe Run)								
REP06	0.10	0.88	50	12	0	0	9.0	32.0
Grant Run								
GRR03	4.30	2.00	32*	8	0	0	33.3	58.3
GRR02	2.00	7.80	42	15	0	2	33.9	50.1
GRR01	0.20	13.80	34*	12	0	3	9.5	33.3
Unnamed Tributary to Grant Run @RM 2.77								
GRR04	1.10	1.46	42	9	0	0	2.2	52.2
GRR05	1.32	1.70	26*	7	0	0	10.1	85.3
Plum Run								
PLM01	0.72	7.80	46	13	0	1	31.1	31.6
Narrative Rating	**Excellent**	≥50	>25	0.00	>15	>30	<15
	Good	≥40	>14	<0.10	11-15	>20-30	>15-30
	Fair	≥28	>10	<1.30	3-10	>10-20	>30-50
	Poor	≥18	≥7	>10.0	1-2	>5-10	>50-70
	Very Poor	<18	<7	>20.0	0	<5	>70

IBI scores in Scioto Big Run in 2025 ranged from 40-54, with five sites in the excellent range all, easily met the WWH biocriterion. Ten (10) sites had good and very good IBI scores of 40-44. Of the remaining sites five were fair with IBI scores of 30-34 and two were in the poor range with IBI scores of 26. This pattern was tracked by the number of native species that was a high of 24 at SBR01 and a low of 7 (Very Poor) at REP03. DELT anomalies were zero at all except three sites (SBR01, MR02, and MR01) which had 0.14-0.89% DELTs. There were no sensitive species 11 sites mostly in Marsh Run, Republican Run, And the Frant Run restoration site and both sites in the Unnamed Tributary to Grant Run at RM 2.77. The percentage of simple lithophils was excellent or good at 13 sites including all except one site in the Scioto Big Run subwatershed. This metric, too, declined to very poor in Marsh Run, Gantz Run, and single sites in Republican Run and the Unnamed Tributary to Grant Run at RM 2.77. Tolerant species predominated by numbers in 2025 resulting in a consistent poor or very poor rating for this metric at 12 sites. The remaining sites were good (4 sites) or fair (8 sites). Overall the fish assemblage exhibited mixed results including attainment of the WWH IBI biocriterion at 16 sites and excellent status at seven (7) sites which is unusual against the backdrop of nearly all urbanized small stream sites in Ohio being impaired for WWH (Yoder et al. 2000).

Fish Assemblage Trends Over Time

Historical fish assemblage data was available at sites that were either close to or matched the sites sampled by MBI in 2025. The historical data was the most frequent for selected sites sampled by Ohio EPA in Scioto Big Run with data from 1992, 1994, 2007, 2010, and 2023 (Table 16). Data was also available for fewer years at matching sites in other study area streams consisting of two (2) to four (4) years of comparable data.

Scioto Big Run (1992-2025)

The general trend in the Scioto Big Run mainstem was for IBI scores at matching sites to improve from fair condition in 1992 and 1994 to good in 2007 and 2010 to very good and exceptional in 2023 and 2025 (Table 16). Species richness, number of sensitive species, and %tolerant species mostly tracked the IBI scores, but generally at narrative ranges less than the IBI scores which is likely due to the heavy urban influences. The very high IBI scores are a reflection of the good to excellent habitat in the mainstem despite the relatively high level of urban land uses. This also tracks the improvement in the Scioto River mainstem over the same time period allowing it to serve as a pathway for the return of several species to tributaries from which they were largely extirpated by the mid-20th century (Yoder et al. 2019; MBI 2022). Scioto Big Run lacks any significant barriers to upstream fish passage which has likely enhanced the recovery observed in 2023 and 2025.

Marsh Run (1994-2025)

The IBI scores in Marsh Run improved markedly from Poor condition in 1994, fair and Marginally Good in 1997, and Very Good and Exceptional in 2025. Species richness and %tolerant species closely tracked the IBI while the number of sensitive species was zero in

***Table 16**. Trends in fish IBI scores, species richness, sensitive species, and %tolerant species at sites in the 2025 study area with two or more years of data 1991-2025. Color coding corresponds to narrative categories at the bottom of the table.*

Site ID	River Mile	Sample Date	Sample Year	Drainage Area (sq. mi.)	IBI	Number of Species	No. of Sensitive Species	%Tolerant Species
Scioto Big Run 2025								
SBR06	8.50	7/2/2025	2025	2.9	40	12	2	70.3
SBR05	7.10	7/2/2025	2025	5.8	54	19	5	30.8
SBR03	4.40	9/29/2025	2025	11.8	54	20	6	8.1
SBR02	2.90	6/26/2025	2025	18.5	54	19	7	19.0
Scioto Big Run 2023								
203385	7.00	7/18/2023	2023	5.8	46	14	2	33.9
V07K11	2.90	7/18/2023	2023	17.6	54	20	7	28.1
Scioto Big Run 2010								
300968	4.50	7/9/2010	2010	11.8	46	15	4	23.7
V07K11	2.90	8/6/2010	2010	18.5	50	18	4	13.0
Scioto Big Run 2007								
203386	8.50	8/30/2007	2007	2.9	42	14	1	44.0
203385	7.00	8/9/2007	2007	5.8	44	16	0	25.2
300618	3.60	8/30/2007	2007	16.5	34	14	0	80.2
V07K11	2.80	8/30/2007	2007	17.6	46	18	5	12.0
Scioto Big Run 1994								
V07K12	3.50	10/13/1994	1994	14.3	30	13	2	60.0
Scioto Big Run 1992								
V07K11	2.80	10/21/1992	1992	18.5	28	9	1	72.6
Marsh Run 2025								
MR02	2.00	6/23/2025	2025	2.2	44	10	0	18.1
MR01	0.20	8/15/2025	2025	3.1	56	18	4	15.2
Marsh Run 2007								
46082	2.70	8/30/2007	2007	1.9	38	13	0	82.4
203253	2.00	8/2/2007	2007	2.1	40	16	0	58.8
Marsh Run 1997								
46082	2.60	7/18/1997	1997	1.5	36	6	0	89.1
203250	0.40	7/11/1997	1997	3.0	22	8	0	95.7
Marsh Run 1994								
203253	2.10	10/13/1994	1994	1.9	16	4	0	100.0
Republican Run 2025								
REP03	3.80	6/27/2025	2025	3.0	26	6	0	83.5
REP02	1.38	10/1/2025	2025	5.7	30	9	0	65.2
REP01	0.20	7/2/2025	2025	7.0	40	16	3	35.7

Narrative Rating					
	Excellent	≥50	>25	>15	<15
	Good	≥40	>14	11-15	>15-30
	Fair	≥28	>10	3-10	>30-50
	Poor	≥18	≥7	1-2	>50-70
	Very Poor	<18	<7	0	>70

***Table 16**. continued.*

Site ID	River Mile	Sample Date	Sample Year	Drainage Area (sq. mi.)	IBI	Number of Species	No. of Sensitive Species	%Tolerant Species
Republican Run 2023								
300969	1.38	7/19/2023	2023	5.7	46	17	2	48.2
V07S22	1.70	7/22/2010	2010	5.7	32	11	0	68.8
Republican Run 1991								
203257	3.40	8/9/1991	1991	1.0	40	7	0	66.0
V07S21	0.20	8/7/1991	1991	7.0	36	9	0	70.7
Grant Run 2025								
GRR02	2.00	6/25/2025	2025	7.8	42	15	2	50.1
GRR01	0.20	8/22/2025	2025	13.8	34	12	3	33.3
Grant Run 2023								
300803	2.00	7/19/2023	2023	7.8	54	16	3	27.7
300970	0.20	6/26/2023	2023	14.1	58	22	7	20.4
Grant Run 2010								
300803	2.00	7/23/2010	2010	7.8	48	17	2	40.6
300970	0.20	8/17/2010	2010	14.1	28	11	2	55.9
Grant Run 1991								
203264	0.70	7/2/1991	1991	10.4	42	17	2	51.0
Unnamed Tributary to Grant Run @RM 2.77- 2025								
GRR05	1.32	6/25/2025	2025	1.7	26	7	0	85.3
GRR04	1.10	6/25/2025	2025	1.5	42	9	0	52.2
Unnamed Tributary to Grant Run @RM 2.77 - 2008								
203383	1.70	9/19/2008	2008	1.3	38	10	0	81.9
300645	1.00	9/30/2008	2008	1.5	46	10	0	44.2
Unnamed Tributary to Grant Run @RM 2.77 - 2005								
203383	1.70	7/12/2005	2005	1.3	22	5	0	97.4
Plum Run 2025								
PLM01	0.72	6/23/2025	2025	7.8	46	13	1	31.6
Plum Run 2023								
V07P23	0.72	6/26/2023	2023	7.0	24	9	0	62.6
Plum Run 2010								
V07P23	0.70	7/16/2010	2010	7.0	44	18	2	66.8
Plum Run 1997								
V07P23	0.70	8/12/1997	1997	7.8	38	15	0	77.5
Narrative Rating		**Excellent**			≥50	>25	>15	<15
		Good			≥40	>14	11-15	>15-30
		Fair			≥28	>10	3-10	>30-50
		Poor			≥18	≥7	1-2	>50-70
		Very Poor			<18	<7	0	>70

Republican Run (1991, 2023, and 2025)

IBI scores in Republican Run were in the Marginally good to Good range in 1991, fair and very good in 2023, and regressing a bit to fair to good conditions in 2025. Species richness

was variable with little pattern evident between years as was the number of sensitive species which was zero in all except two sites in2023 and 2025. The %tolerant species was in the Poor and Very Poor range at all except two sites in 2023 and 2025 with no discernable pattern between years.

Grant Run (1991-2025)
IBI scores at the two sites included for Grant Run were generally Good and Very Good in 1991 and 2010 improving to exceptional in 2023. Scores declined to the Fair and Good range in 2025, possibly as a result of the degraded water quality discharged by the impoundment formed by a series of beaver dames in and downstream from the restoration site about two miles upstream. Sensitive species were present in all years and %tolerant were generally less than 50% (Poor).

Unnamed Tributary to Grant Run @RM 2.77 (2005, 2008, and 2025)
This includes pre- and post-restoration data at the upstream most site in the Unnamed Tributary. The Fair IBI in 2005 (pre-restoration) improved to Marginally Good in 2008 (post-restoration), but had declined to fair in 2025. The downstream site had very good IBI scores in 2008 and 2025. There were no sensitive species in any sample in any year and %tolerant was generally Poor and Very Poor.

Plum Run (1997-2025)
IBI scores fluctuated between years from Marginally Good in 1997 to Very Good in 2010, regressing to Fair in 2023, and improving to Very Good in 2025. Species richness and %tolerant tracked with the IBI scores. Sensitive species were variable with zero present in 1997 and 2023 and a high of two (2) in 2010.

2025 Macroinvertebrate Assemblage Results
A total of 80 macroinvertebrate taxa were collected in qualitative dip net, handpick samples from the sites in the 2025 Scioto Big Run subwatershed (Appendix C). The most commonly collected taxa in terms of site occurrences were the segmented worm Oligochaeta (20 samples), the flatworm Turbellaria (19 samples), the mayfly *Baetis flavistriga* (18 samples), the damselfly Coenagrionidae (16 samples), the darner *Argia sp.* (16 samples), the snail *Physella sp.* (17 samples), the mayfly *Baetis flavistriga* (17 samples), the blackfly *Simulium sp.* (14 samples), the mayfly *Stenonema femoratum* (12 samples), the damselfly *Calopteryx sp.* (11 samples), the caddisfly *Cheumatopsyche sp.* (11 samples), the caddisfly *Chimarra aterrima* (10 samples), the riffle beetle *Stenelmis sp.* (10 samples), and the mayfly *Baetis intercalaris* (10 samples). Of these most frequently occurring taxa one (1) is highly tolerant, one is moderately intolerant, and the remainder are all facultative in their tolerance rankings. In the remainder of the sites in the remaining subwatersheds to the south a total of 118 taxa were collected (Appendix C). The most commonly collected taxa in terms of site occurrences were the flatworm Turbellaria (20 samples), the segmented worm Oligochaeta (20 samples), the amphipod Hyalella sp. (20 samples), the caddisfly *Cheumatopsyche sp.* (20 samples), the mayfly *Baetis flavistriga* (18

samples), the caddisfly Hydropsyche depravata group (16 samples), the mayfly Baetis intercalaris (14 samples), the damselfly family Coenagrionidae (14 samples), the riffle beetle *Stenelmis sp.* (14 samples), and the flatworm Turbellaria (14 samples). Of these most frequently occurring taxa two (2) are highly tolerant and the remainder are all facultative in their tolerance rankings.

To evaluate the overall quality of macroinvertebrate assemblages and gauge attainment of the biological criteria, narrative ratings of the qualitative sample are used in lieu of the ICI are used in small headwater streams (Table 17). Other macroinvertebrate metrics and attributes were also examined including the total number of taxa, the number of sensitive taxa, the number of Mayfly taxa, the number of qualitative EPT taxa, the number of toxic tolerant taxa, and the number of organic tolerant taxa were also examined for each site to gauge the response types exhibited by the macroinvertebrate assemblage. The macroinvertebrate narrative ratings in the 2025 study area were Good in Grant Run at site GRR02 with two Marginally Good (marginally meets WWH) at two (2) sites, High Fair at 11 sites, Low Fair at four (4) sites, Poor at five (5) sites, and Very Poor at the SBR10 site in the Unnamed Tributary at RM 3.59, which is also known by its local name Early Run (Table 15). The field crew noted a heavy oil sheen emanating from the substrate at this site which is a symptom of illicit releases in heavily urbanized watersheds. Total taxa counts were good at three sites in Scioto Big Run, fair at 14 sites, and poor at nine (9) sites with no very poor values. Sensitive taxa were very poor at 10 sites of which six (6) had zero taxa, fair at two (2) sites, poor at seven (7) sites. Mayfly taxa were good at three (3) sites, fair at 13 sites, poor at five (5) sites, and absent or very poor at two (2) sites. The number of qualitative EPT taxa ranged from 0-17 being good at one (1) site, fair at 11 sites, poor at 13 sites, and very poor at two (2) sites. Toxic tolerant taxa numbered no more than 2 (fair) at one site, one (good) at seven (7) sites, and zero (excellent) at 18 sites. Organic enrichment taxa signifying the presence of organic enrichment sources and pollutants ranged from 0-5 taxa with 3-5 (fair) at 22 sites, with 1-2 taxa (good) at three (3) sites, zero taxa at one site. The numerous sites in the fair range signify the highest risk for organic pollution which is widespread in the 2025 study area based on this indicator.

Macroinvertebrate Assemblage Trends Over Time

As with the fish assemblage, historical data for macroinvertebrates was available at sites that were either close to or matched 2025 sites sampled by MBI. The data was the most frequent for selected sites sampled in in Scioto Big Run by Ohio EPA with data from 1992, 2007, 2010, and 2023 (Table 18). Data was available for fewer years at matching sites in other study area streams consisting of two or three years.

Scioto Big Run (1992-2025)

The general trend in the Scioto Big Run mainstem was for matching sites to range between Low Fair, Fair, High Fair, and Marginally Good between 2007 and 2025 with slight increases in qualitative EPT and sensitive taxa in 2010, 2023,and 2025. Although only a single site at RM 2.9 was sampled in 1992, it clearly was more degraded with a Poor narrative and only 1

***Table 17**. Macroinvertebrate assemblage response indicators in the 2025 study area. The results for each indicator are color coded in accordance with the key at the bottom of the table.*

Site ID	River Mile	DA (mi.^{2})	ICI/Qual. Narrative	Total Taxa	Sensitive Taxa	Mayfly Taxa	Qual EPT Taxa	Toxic Tolerant Taxa	Org. Enrich. Taxa
Scioto Big Run									
SBR06	8.50	2.90	HF*	20	2	1	4	0	4
SBR05	7.10	5.80	LF*	19	2	3	5	1	2
SBR04	6.10	8.00	HF*	22	4	3	9	0	4
SBR03	4.40	11.80	HF*	27	2	4	7	1	3
SBR02	2.90	18.50	28*/HF*	43	3	5	7	2	4
SBR01	0.80	19.00	HF*	23	4	7	9	0	3
Unnamed Tributary Scioto Big Run @RM 6.66									
SBR08	1.50	1.57	HF*	25	1	3	6	0	5
SBR07	0.30	1.80	MG^{ns}	28	4	3	7	0	4
Unnamed Tributary Scioto Big Run @RM 3.59 (Early Run)									
SBR10	1.85	2.55	VP*	9	0	0	0	0	3
SBR09	0.10	3.80	P*	12	1	1	3	0	4
Unnamed Tributary Scioto Big Run @RM0.70 (Brown Run)									
SBR11	0.10	3.00	HF*	15	0	3	5	0	3
Marsh Run									
MR02	2.00	2.20	LF*	19	0	2	4	0	3
MR01	0.20	3.10	HF*	27	3	4	7	0	4
Gantz Run									
GTZ01	1.00	0.78	HF*	16	2	1	4	0	0
Republican Run									
REP04	5.40	1.01	LF*	23	2	1	2	1	4
REP03	3.80	2.97	LF*	16	1	1	4	1	3
REP02	1.38	5.70	MG^{ns}	33	4	3	9	1	4
REP01	0.20	7.00	HF*	25	3	4	9	0	4
South Branch Republican Run									
REP05	0.02	1.90	HF*	19	4	1	6	1	3
Unnamed Tributary to Republican Run @RM 0.73 (Billy Joe Run)									
REP06	0.10	0.88	P*	16	0	1	2	0	2
Grant Run									
GRR03	4.30	2.00	P*	20	0	2	2	0	3
GRR02	2.00	7.80	G	29	8	5	11	0	5
GRR01	0.20	13.80	VG	38	10	10	17	0	2
Unnamed Tributary to Grant Run @RM 2.77									
GRR04	1.10	1.46	P*	22	1	4	4	0	4
GRR05	1.32	1.70	P*	12	0	0	1	0	3
Plum Run									
PLM01	0.72	7.80	MG^{ns}	37	2	2	6	1	3
Narrative Rating	**Excellent**	E	>60	>16	> 7	>15	0	0
	Good	G	>40	>11	>4	>11	1	≤2
	Fair	F	>20	>6	≥2	>6	≥2	≤5
	Poor	P	≥10	≥2	1	≥2	≥3	≤8
	Very Poor	VP	<10	<2	0	<2	≥4	≥9

***Table 18**. Trends in macroinvertebrate ICI or qualitative narrative ratings, total taxa, qualitative EPT taxa, and sensitive taxa at sites in the 2025 study area with two or more years of data 1992-2025. Color coding corresponds to narrative categories at the bottom of the table.*

Site ID	River Mile	Sample Date	Drainage Area (sq. mi.)	ICI/Qual. Narrative	Qual Taxa	Qual EPT Taxa	Sensitive Taxa
Scioto Big Run - 2025							
SBR06	8.50	7/29/2025	2.90	HF	20	4	2
SBR05	7.17	7/29/2025	5.80	LF	19	5	2
SBR03	4.48	9/2/2025	11.80	HF	27	7	2
SBR02	2.90	9/2/2025	18.50	28	22	7	3
Scioto Big Run - 2023							
203385	7.00	6/22/2023	5.80	MG	42	7	1
V07K11	2.90	8/3/2023	17.60	30	26	6	2
Scioto Big Run - 2010							
300968	4.40	8/10/2010	11.80	LF	30	5	3
V07K11	2.90	8/10/2010	18.50	F	33	7	1
Scioto Big Run - 2007							
203386	8.40	10/1/2007	2.90	LF	18	3	0
203385	7.10	10/1/2007	5.80	MG	30	6	1
V07K11	2.70	10/1/2007	18.50	HF	22	4	1
Scioto Big Run - 1992							
V07K11	2.90	10/23/1992	18.50	P	11	1	0
Marsh Run - 2025							
MR02	2.00	7/30/2025	2.10	LF	19	4	0
MR01	0.20	7/30/2025	3.10	HF	27	7	3
Marsh Run - 2007							
203253	2.20	10/2/2007	2.10	HF	21	3	0
V07P19	0.20	10/2/2007	3.10	P	4	0	1
Republican Run - 2025							
REP02	1.38	7/23/2025	5.70	MG	33	9	4
Republican Run - 2023							
300969	1.38	8/3/2023	5.70	F	31	6	0
Republican Run - 2010							
300969	1.38	8/10/2010	5.70	LF	27	4	1
Grant Run - 2025							
GRR02	1.80	7/31/2025	7.80	G	29	11	8
GRR01	0.40	9/3/2025	13.80	VG	38	17	11
Grant Run -2023							
300803	2.00	6/22/2023	7.80	MG	46	8	5
300970	0.20	6/22/2023	14.10	F	50	7	3

Narrative Rating					
	Excellent	E	>60	>15	>16
	Good	G	>40	>11	>11
	Fair	F	>20	>6	>6
	Poor	P	≥10	≥2	≥2
	Very Poor	VP	<10	<2	<2

***Table 18**. continued.*

Site ID	River Mile	Sample Date	Drainage Area (sq mi)	ICI/Qual. Narrative	Qual Taxa	Qual EPT Taxa	Sensitive Taxa
Grant Run -2010							
300803	2.00	8/12/2010	7.80	MG	43	10	6
300970	0.20	8/12/2010	14.10	MG	51	11	5
Unnamed Tributary to Grant Run (RM 2.77) - 2025							
GRR04	1.50	7/24/2025	1.46	P	12	1	0
GRR05	1.32	7/28/2025	1.70	P	22	4	1
Unnamed Tributary to Grant Run (RM 2.77) - 2008							
203383	1.60	10/3/2008	1.30	VP	13	0	0
300645	1.10	10/3/2008	1.50	LF	13	3	0
Plum Run - 2025							
PLM01	0.72	7/24/2025	7.80	MG	37	6	2
Plum Run - 2023							
V07P23	0.72	6/21/2023	7.00	LF	27	3	1
Plum Run - 2010							
V07P23	0.72	8/9/2010	7.80	F	46	6	6
Narrative Rating		**Excellent**		E	>60	>15	>16
		Good		G	>40	>11	>11
		Fair		F	>20	>6	>6
		Poor		P	≥10	≥2	≥2
		Very Poor		VP	<10	<2	<2

qualitative EPT taxa and no sensitive taxa. The narrative improved in 2007 as did the number of qualitative EPT and sensitive taxa. While the results in 2010, 2023, and 2025 seemed to improve slightly over 2007, the overall condition of the assemblage remained marginally at or below the WWH threshold of Good, likely a reflection of the urbanized character if the watershed precluding a more consistent attainment of a Good narrative.

Marsh Run (2007 and 2025)

Marsh Run was sampled at the two 2025 sites in 2007. A Poor narrative at RM 0.20 in 2007 improved to High Fair in 2025. This included seven (7) qualitative EPT taxa in 2025 compared to zero in 2007 and an increase in sensitive taxa. There was little change at the RM 2.00 site with High and Low Fair results in 2007 and 2025, respectively.

Republican Run (2010, 2023, and 2025)

A single site at RM 1.38 in Republican Run was sampled over three different years and showed a steady improvement from Low Fair in 2010 to Fair in 2023 and Marginally Good in 2025. The number of qualitative EPT increased from four (4) in 2010 to six (6) in 2023 to nine (9) in 2026 and from 1 and zero sensitive taxa in 2010 and 2023 to four (4) in 2025.

Grant Run (2010, 2023, 2025)
Grant Run had two sites at RM 0.20 and RM 2.00 sampled in 2010, 2023, and 2025. The narrative showed a modest improvement from Marginally Good at both sites in 2010, Fair and Marginally Good in 2023, and Good and Very Good in 2025.The number of qualitative EPT taxa ranged between seven (7) and eight (8) at both sites in 2023 to 10 and 11 at both sites in 2010 to a high of 17 at RM 0.40 in 2025. Sensitive taxa showed a similar pattern with a high if 11 at RM 0.40 in 2025.

Unnamed Tributary to Grant Run @RM 2.77 (2008 and 2025)
The principal tributary to Grant Run extends across the south side of suburban Grove City and includes an overwide ditch restoration site at RM 1.50. The macroinvertebrate narrative improved only slightly from Very Poor to Poor at this site while the downstream site at RM 1.10 in 2008 and RM 1.32 in 2025 declined slightly from Low Fair to Poor. A single qualitative EPT taxa was found in 2025 up from zero in 2008 at RM 1.50 with no sensitive taxa present in either year. The downstream sites had more EPT taxa with three (3) at RM 1.10 in 2008 and four (4) at RM 1.32 in 2025.

Plum Run (2010, 2023, and 2025)
The narrative at the single site samples in Plum Run at RM 0.72 improved from Fair in 2010 and Low Fair in 2023 to Marginally Good in 2025. The number of qualitative EPT taxa was a high of six (6) in 2010 and 2025 with a decline in sensitive taxa from six (6) in 2010 to one (1) in 2023 and two (2) in 2025.

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APPENDIX A: 2025 Site Characteristics and Location Data

***Appendix Table A-1**. Site location characteristics, indicators, and parameters at 26 sites sampled in the 2025 Scioto Big Run, Republican Run, and Grant Run study area.*

MBI Site Code	Ohio EPA Site ID	Basin Code	Stream Code	Stream Name	River Mile	Drainage Area (mi.^{2})	Location Description	Latitude	Longitude	Fish	Macro-inverts.	Habitat	Data-sonde	Field Chem.	Demand	Nutrients	Metals	Bacteria	Sediment Chemistry
Scioto Big Run Subwatershed																			
SBR06	203386	02	092	Scioto Big Run	8.50	2.90	Ust. I-270 W. of Grove City - Cherry Creek Parkway	39.937500	-83.125300	E,F	QL	QHEI		5	4	4	2	4	X
SBR05	203385	02	092	Scioto Big Run	7.10	5.80	Big Run Park	39.928600	-83.106600	E,F	QL	QHEI	X	5	4	4	2	4	X
SBR04		02	092	Scioto Big Run	6.10	8.00	Demorest Rd.	39.925724	-83.090987	E,F	QL	QHEI	X	5	4	4	2	4	X
SBR03	300968	02	092	Scioto Big Run	4.40	11.80	U.S. Rt. 62 - access from Big Run Rd.	39.915566	-83.064970	D,E	HD	QHEI	X	5	4	4	2	4	X
SBR02	V07K11	02	092	Scioto Big Run	2.90	18.50	Hardy Parkway - Willow Creek Park	39.911400	-83.041700	D,E	HD	QHEI	X	5	4	4	2	4	X
SBR01	V07P24	02	092	Scioto Big Run	0.80	19.00	Ust. Brown Run confluence - pull off of St. Rt. 104	39.889720	-83.025830	D,E	HD	QHEI	X	5	4	4	2	4	X
SBR08		02	852	U.T. Scioto Big Run @6.66	1.50	1.57	Southwestern Rd.	39.919642	-83.097091	E,F	QL,PHW	QHEI/HHEI		5	4	4	2	4	X
SBR07		02	852	U.T. Scioto Big Run @6.66	0.30	1.80	at River Bend Park	39.922031	-83.086808	E,F	QL,PHW	QHEI/HHEI		5	4	4	2	4	X
SBR10		02	853	U.T. Scioto Big Run @3.59 (Early Run)	1.85	2.55	Eakin Rd. dst. SSO	39.934291	-83.058416	E,F	QL	QHEI		5	4	4	2	4	X
SBR09		02	853	U.T. Scioto Big Run @3.59 (Early Run)	0.10	3.80	Ust. Gantz Rd. at Scioto Big Run confluence	39.913466	-83.051103	E,F	QL	QHEI		5	4	4	2	4	X
SBR11		02	854	U.T. Scioto Big Run @0.70 (Brown Run)	0.10	3.00	St. Rt. 104 - pull off same as SBR01	39.888629	-83.027731	E,F	QL	QHEI		5	4	4	2	4	X
MR02	203253	02	093	Marsh Run	2.00	2.20	Grove City - Gantz Park	39.898000	-83.061300	E,F	QL	QHEI		5	4	4	2	4	X
MR01	V07P19	02	093	Marsh Run	0.20	3.10	Dst. St. Rt. 104	39.900500	-83.028000	E,F	QL	QHEI		5	4	4	2	4	X
GTZ01		02	855	Gantz Run	1.00	0.78	Ust. St. Rt. 104 @Thrailkill Rd.	39.883683	-83.028011	E,F	QL,PHW	QHEI/HHEI		5	4	4	2	4	X
Republican Run Subwatershed																			
REP04		02	243	Republican Run	5.40	1.01	Berry Family Conservation Area near Beulah Park	39.886602	-83.094789	E,F	QL,PHW	QHEI/HHEI		5	4	4	2	4	X
REP03		02	243	Republican Run	3.80	2.97	Swearingen Park - Grove City	39.881015	-83.072366	E,F	QL	QHEI		5	4	4	2	4	X
REP02	V07P20	02	243	Republican Run	2.06	3.60	White Rd.	39.872220	-83.052220	E,F	QL	QHEI		5	4	4	2	4	X
REP01	V07S21	02	243	Republican Run	0.20	7.00	Ust. St. Rt. 104 - at Bike Bridge	39.864200	-83.027800	E,F	QL	QHEI		5	4	4	2	4	X
REP05	V07P21	02	244	S. Br. Republican Run	0.02	1.90	Briar Hill Dr.	39.871670	-83.053060	E,F	QL,PHW	QHEI/HHEI		5	4	4	2	4	X
REP06		02	856	U.T. @RM 0.73 (Billy Joe Run)	0.10	0.88	Pinnacle Club Drive @Pinnacle Club Park	39.862660	-83.037007	E,F	QL,PHW	QHEI/HHEI		5	4	4	2	4	X
Grant Run Subwatershed																			
GRR03		02	091	Grant Run	4.30	2.00	Dst. Meadows Dr. @Mt. Carmel Grove City - restoration reach	39.851256	-83.077668	E,F	QL	QHEI		5	4	4	2	4	X
GRR02		02	091	Grant Run	2.90	3.89	Borror Rd.	39.842371	-83.056751	E,F	QL	QHEI		5	4	4	2	4	X
GRR01		02	091	Grant Run	0.80	13.80	Scioto Grove Metropark	39.835995	-83.045325	D,E	HD	QHEI	X	5	4	4	2	4	X
GRR04	300645	02	256	U.T. to Grant Run @ RM 2.77	1.50	1.00	Ust. Hoover Rd.	39.838400	-83.073200	E,F	QL,PHW	QHEI/HHEI		5	4	4	2	4	X
GRR05		02	256	U.T. to Grant Run @ RM 2.77	1.32	1.70	Meijer Store St. Rt. 665 frontage - overwide ditch restoration	39.838501	-83.079034	E,F	QL,PHW	QHEI/HHEI	--	1	--	--	--	--	--
Plum Run Subwatershed																			
PLM01	V07P23	02	090	Plum Run	0.72	7.80	St. Rt. 665 - predevelopment control	39.824440	-83.024440	E,F	QL	QHEI	X	5	4	4	2	4	X
									Total Sites	**26**	**26**	**26**	**7**	**26**	**25**	**25**	**25**	**25**	**25**

Columbus Recreation & Parks (permit required)
Grove City Parks (no permit required)
Pinnacle Club Park (private)

Appendix Table A-1*. Legend.*

Indicator Groups & Parameters							
Fish		**Field**	**Demand**	**Nutrients**	**Metals**	**Bacteria**	**Sed. Metals**
D - Rollerbeast		Temp.	BOD5	NH3-N	Cu	E. coli	Cd
E - Longline		Conduct.	BOD5	NH3-N	Pb	*E. coli*	Cd
F - Backpack		D.O.	Chloride	NO3-N	Zn		Cu
Macroinvertebrates		pH	Sulfate	NO2-N			Pb
HD - artificial substrate			TDS	TKN			Zn
QL - Qualitative method			TSS	Total P			Ni
PHW - Primary Headwater method			Cond.	Ortho P			Fe
Habitat			pH	Ben. Chla			As
QHEI - Qualitative Habitat Evaluation Index							Ag
HHEI - Headwater Habitat Evaluation Index				Limited to 50 total samples			Cr
Datasonde - Short-term (4-5 days)				Only at 6 Datasonde locations			**Sed. Organics**
							BNAs
							VOCs
							PCBs
							PAHs
							Pesticides

APPENDIX B: 2025 FISH ASSEMBLAGE DATA

B-1: IBI Metrics and IBI Scores
B-2&3: Fish Species Grand Reports
B-4: Fish Species by Site and Sample

Appendix Table B-1. Headwater IBI scores and metrics for sites in the ColsDWR study area sampled in 2025.

Site ID	River Mile	Type	Date	Drainage area (sq mi)	Number of: Total species	Minnow species	Headwater species	Sensitive species	Darter & Sculpin species	Simple Lithophils	Percent of Individuals: Tolerant fishes	Omni-vores	Pioneering fishes	Insect-ivores	DELT anomalies	Rel.No. minus tolerants /(0.3km)	IBI
(02-092) - Scioto Big Run																	
Year: 2025																	
SBR06	8.50	E	07/02/2025	2.90	12(5)	5(5)	1(1)	2(3)	2(3)	5(5)	70(1)	21(3)	47(3)	30(3)	0.0(5)	98(3)	40
SBR05	7.10	E	07/02/2025	5.80	19(5)	9(5)	1(1)	5(5)	4(5)	10(5)	31(5)	12(5)	22(5)	53(5)	0.0(5)	526(3)	54
SBR04	6.10	E	10/01/2025	8.00	17(5)	8(5)	2(3)	3(3)	3(3)	6(5)	32(5)	10(5)	31(3)	52(5)	0.0(5)	252(3)	50
SBR03	4.40	E	09/29/2025	11.80	20(5)	12(5)	2(3)	6(5)	4(3)	10(5)	8(5)	6(5)	10(5)	50(5)	0.0(5)	683(3)	54
SBR02	2.90	D	06/26/2025	18.50	19(5)	9(5)	2(3)	7(5)	6(5)	9(5)	19(5)	3(5)	21(5)	46(3)	0.0(5)	453(3)	54
SBR01	0.80	E	08/22/2025	19.00	24(5)	8(5)	2(3)	9(5)	8(5)	10(5)	25(5)	7(5)	35(3)	87(5)	0.9(5)	170(1)	52
(02-852) - Unnamed Tributary Scioto Big Run @ RM 6.66																	
Year: 2025																	
SBR08	1.50	F	09/30/2025	1.57	10(5)	4(3)	1(1)	0(1)	2(5)	4(5)	51(3)	14(3)	50(3)	43(5)	0.0(5)	82(3) *	42
SBR07	0.30	F	06/26/2025	1.80	11(5)	5(5)	1(1)	1(1)	3(5)	4(5)	74(1)	12(3)	42(3)	17(3)	0.0(5)	106(3)	40
(02-853) - Unnamed Tributary Scioto Big Run @ RM 3.59 (Early Run)																	
Year: 2025																	
SBR10	1.85	E	10/01/2025	2.55	14(5)	8(5)	1(1)	1(1)	1(1)	4(5)	38(3)	9(5)	34(3)	57(5)	0.0(5)	362(5)	44
SBR09	0.10	F	06/27/2025	3.80	13(5)	8(5)	1(1)	3(3)	2(3)	7(5)	58(1)	16(3)	39(3)	36(5)	0.0(5)	92(1)	40
(02-854) - Unnamed Tributary Scioto Big Run @ RM 0.70 (Brown Run)																	
Year: 2025																	
SBR11	0.10	F	09/30/2025	3.00	19(5)	11(5)	3(3)	4(5)	4(5)	6(5)	37(3)	12(3)	34(3)	75(5)	0.0(5)	394(5)	52
(02-093) - Marsh Run																	
Year: 2025																	
MR02	2.00	E	06/23/2025	2.20	10(5)	4(3)	1(1)	0(1)	2(3)	3(3)	18(5)	2(5)	22(5)	18(3)	0.1(5)	1164(5)	44
MR01	0.20	E	08/15/2025	3.10	18(5)	9(5)	2(3)	4(5)	4(5)	4(5)	15(5)	3(5)	21(5)	63(5)	0.9(5)	190(3)	56
(02-855) - Gantz Run																	
Year: 2025																	

♦ - IBI is low end adjusted.

* - < 200 Total individuals in sample

** - < 50 Total individuals in sample

● - One or more species excluded from IBI calculation.

Appendix Table B-1. Headwater IBI scores and metrics for sites in the ColsDWR study area sampled in 2025.

Site ID	River Mile	Type	Date	Drainage area (sq mi)	Number of: Total species	Minnow species	Headwater species	Sensitive species	Darter & Sculpin species	Simple Lithophils	Percent of Individuals: Tolerant fishes	Omni-vores	Pioneering fishes	Insect-ivores	DELT anomalies	Rel.No. minus tolerants /(0.3km)	IBI
GTZ01	1.00	F	08/15/2025	0.78	8(5)	2(3)	1(1)	0(1)	2(5)	2(5)	54(3)	0(5)	66(1)	96(5)	0.0(5)	124(5)	44
(02-243) - Republican Run																	
Year: 2025																	
REP04	5.40	F	06/27/2025	1.01	7(5)	4(5)	1(1)	0(1)	0(1)	1(1)	78(1)	1(5)	67(1)	39(5)	0.0(5)	40(3) *	34
REP03	3.80	F	06/27/2025	2.97	6(3)	3(3)	1(1)	0(1)	1(1)	2(3)	84(1)	13(3)	64(1)	13(1)	0.0(5)	86(3)	26
REP02	1.38	E	10/01/2025	5.70	9(3)	4(3)	1(1)	0(1)	0(1)	3(3)	65(1)	12(5)	49(3)	26(3)	0.0(5)	46(1) *	30
REP01	0.20	D	07/02/2025	7.00	16(5)	9(5)	0(1)	3(3)	1(1)	4(3)	36(3)	22(3)	39(3)	41(5)	0.0(5)	180(3)	40
(02-244) - South Branch Republican Run																	
Year: 2025																	
REP05	0.02	F	08/15/2025	1.90	8(3)	4(3)	2(3)	0(1)	1(3)	3(3)	80(1)	1(5)	60(1)	8(1)	0.0(5)	102(3)	32
(02-856) - Unnamed Tributary @ RM 0.73 (Billy Joe Run)																	
Year: 2025																	
REP06	0.10	F	10/01/2025	0.88	12(5)	4(5)	1(1)	0(1)	3(5)	3(5)	32(5)	8(3)	25(5)	74(5)	0.0(5)	277(5)	50
(02-091) - Grant Run																	
Year: 2025																	
GRR03	4.30	E	07/03/2025	2.00	8(3)	3(3)	0(1)	0(1)	1(3)	2(3)	58(1)	29(1)	29(5)	29(5)	0.0(5)	20(1) * *	32
GRR02	2.00	F	06/25/2025	7.80	15(5)	7(5)	1(1)	2(1)	3(3)	5(3)	50(3)	24(3)	26(5)	45(5)	0.0(5)	386(3)	42
GRR01	0.20	E	08/22/2025	13.80	12(3)	4(3)	0(1)	3(3)	1(1)	3(1)	33(3)	17(5)	41(3)	71(5)	0.0(5)	56(1) *	34
(02-256) - Trib. To Grant Run (RM 2.77)																	
Year: 2025																	
GRR04	1.10	F	06/25/2025	1.46	9(5)	3(3)	1(1)	0(1)	2(5)	2(3)	52(3)	3(5)	53(3)	53(5)	0.0(5)	128(3)	42
GRR05	1.32	F	06/25/2025	1.70	7(3)	2(1)	0(1)	0(1)	2(5)	2(3)	85(1)	18(1)	82(1)	25(3)	0.0(5)	32(1)	26
(02-090) - Plum Run																	
Year: 2025																	
PLM01	0.72	E	06/23/2025	7.80	13(3)	6(5)	2(3)	1(1)	4(5)	5(3)	32(5)	18(3)	22(5)	53(5)	0.0(5)	308(3)	46

♦ - IBI is low end adjusted.

* - < 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: *Scioto Big Run*

Years: 2025

Number of Samples: 6 Data Sources: 99 Data Types: D; E

Species Code:	Species Name:	Feed Guild	Toler-ance	Breed Guild	IBI Group	No. Fish	Rel. No.	% by No.	Rel. Wt.	% by Wt.	Av. Wt.
40-004	Smallmouth Buffalo	I		M	C	3	1.0	0.20	1287	68.64	1316.6
40-015	Northern Hog Sucker	I	M	S	R	22	7.2	1.46	114	6.08	15.9
40-016	White Sucker	O	T	S	W	119	38.8	7.87	1	0.09	0.0
40-018	Spotted Sucker	I		S	R	1	0.3	0.07	0	0.00	0.0
43-007	Bigeye Chub	I	I	S	N	9	2.9	0.60	2	0.12	0.7
43-011	Western Blacknose Dace	G	T	S	N	24	7.8	1.59	0	0.00	0.0
43-013	Creek Chub	G	T	N	N	141	46.0	9.33	0	0.00	0.0
43-015	Suckermouth Minnow	I		S	N	4	1.3	0.26	0	0.00	0.0
43-020	Emerald Shiner	I		M	N	64	20.9	4.23	8	0.43	0.3
43-021	Silver Shiner	I	I	S	N	27	8.8	1.79	0	0.00	0.0
43-022	Rosyface Shiner	I	I	S	N	31	10.1	2.05	3	0.17	0.3
43-025	Striped Shiner	I		S	N	118	38.5	7.80	0	0.05	0.0
43-032	Spotfin Shiner	I		M	N	19	6.2	1.26	3	0.17	0.5
43-034	Sand Shiner	I	M	M	N	13	4.2	0.86	1	0.09	0.3
43-039	Silverjaw Minnow	I		M	N	25	8.2	1.65	0	0.00	0.0
43-043	Bluntnose Minnow	O	T	C	N	19	6.2	1.26	6	0.35	1.0
43-044	Central Stoneroller	H		N	N	436	142.1	28.84	9	0.52	0.0
47-002	Channel Catfish			C	F	1	0.3	0.07	309	16.51	950.0
47-004	Yellow Bullhead	I	T	C		4	1.3	0.26	0	0.00	0.0
70-001	Brook Silverside	I	M	M		1	0.3	0.07	0	0.03	2.0
77-005	Spotted Bass	C		C	F	1	0.3	0.07	11	0.61	35.0
77-006	Largemouth Bass	C		C	F	5	1.6	0.33	0	0.00	0.0
77-008	Green Sunfish	I	T	C	S	107	34.9	7.08	78	4.17	2.2
77-009	Bluegill	I	P	C	S	41	13.4	2.71	3	0.17	0.2
77-999	HYBRID X Sunfish					1	0.3	0.07	0	0.00	0.0
80-011	Logperch	I	M	S	D	1	0.3	0.07	2	0.14	8.0
80-014	Johnny Darter	I		C	D	65	21.2	4.30	3	0.21	0.1
80-015	Greenside Darter	I	M	S	D	10	3.3	0.66	3	0.17	1.0
80-016	Banded Darter	I	I	S	D	3	1.0	0.20	0	0.03	0.6
80-022	Rainbow Darter	I	M	S	D	143	46.6	9.46	6	0.35	0.1
80-023	Orangethroat Darter	I		S	D	7	2.3	0.46	3	0.17	1.4
80-024	Fantail Darter	I		C	D	17	5.5	1.12	0	0.02	0.0
90-002	Mottled Sculpin	I		C		30	9.8	1.98	13	0.70	1.3

No Species: 33 **Nat. Species:** 32 **Hybrids:** 1 **Total Counted:** 1512 **Total Rel. Wt. :** 1876

Appendix B-3: Midwest Biodiversity Institute
Fish Species List - Grand Totals

Rivers: *Plum Run; Grant Run; Marsh Run; Republican Run (Grove City); South Branch Republican Run; Trib. to Grant Run (RM 2.77); Unnamed Tributary to Scioto Big Run @ RM6.66; Unnamed Tributary to Scioto Big Run @ RM 3.59 (Early Run)*

Years: 2025

Number of Samples: 20 Data Sources: 99 Data Types: D; E; F

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	0.1	0.03	0	***.**	0.0
40-016	White Sucker	O	T	S	W	283	28.9	7.42	0	***.**	0.0
43-003	Golden Shiner	I	T	M	N	1	0.1	0.03	0	***.**	0.0
43-007	Bigeye Chub	I	I	S	N	12	1.2	0.31	0	***.**	0.0
43-011	Western Blacknose Dace	G	T	S	N	194	19.8	5.08	0	***.**	0.0
43-013	Creek Chub	G	T	N	N	790	80.6	20.70	0	***.**	0.0
43-015	Suckermouth Minnow	I		S	N	2	0.2	0.05	0	***.**	0.0
43-016	Southern Redbelly Dace	H		S	N	1	0.1	0.03	0	***.**	0.0
43-020	Emerald Shiner	I		M	N	27	2.8	0.71	0	***.**	0.0
43-021	Silver Shiner	I	I	S	N	9	0.9	0.24	0	***.**	0.0
43-022	Rosyface Shiner	I	I	S	N	9	0.9	0.24	0	***.**	0.0
43-025	Striped Shiner	I		S	N	83	8.5	2.18	0	***.**	0.0
43-032	Spotfin Shiner	I		M	N	270	27.5	7.08	0	***.**	0.0
43-034	Sand Shiner	I	M	M	N	3	0.3	0.08	0	***.**	0.0
43-039	Silverjaw Minnow	I		M	N	23	2.4	0.60	0	***.**	0.0
43-042	Fathead Minnow	O	T	C	N	16	1.6	0.42	0	***.**	0.0
43-043	Bluntnose Minnow	O	T	C	N	92	9.4	2.41	0	***.**	0.0
43-044	Central Stoneroller	H		N	N	799	81.5	20.94	0	***.**	0.0
47-004	Yellow Bullhead	I	T	C		20	2.0	0.52	0	***.**	0.0
47-006	Black Bullhead	I	P	C		1	0.1	0.03	0	***.**	0.0
57-001	Western Mosquitofish	I		N	E	17	1.7	0.45	0	***.**	0.0
77-005	Spotted Bass	C		C	F	1	0.1	0.03	0	***.**	0.0
77-006	Largemouth Bass	C		C	F	83	8.5	2.18	0	***.**	0.0
77-008	Green Sunfish	I	T	C	S	388	39.6	10.17	0	***.**	0.0
77-009	Bluegill	I	P	C	S	302	30.8	7.91	0	***.**	0.0
77-010	Orangespotted Sunfish	I		C	S	1	0.1	0.03	0	***.**	0.0
77-011	Longear Sunfish	I	M	C	S	3	0.3	0.08	0	***.**	0.0
77-015	Green X Bluegill					35	3.6	0.92	0	***.**	0.0
77-021	Green X Longear Sunfish					1	0.1	0.03	0	***.**	0.0
78-001	Pond Loach	I		C	E	5	0.5	0.13	0	***.**	0.0
80-014	Johnny Darter	I		C	D	120	12.2	3.14	0	***.**	0.0
80-022	Rainbow Darter	I	M	S	D	43	4.4	1.13	0	***.**	0.0
80-023	Orangethroat Darter	I		S	D	46	4.7	1.21	0	***.**	0.0
80-024	Fantail Darter	I		C	D	7	0.7	0.18	0	***.**	0.0
90-002	Mottled Sculpin	I		C		128	13.1	3.35	0	***.**	0.0

No Species: 35 **Nat. Species:** 31 **Hybrids:** 2 **Total Counted:** 3816 **Total Rel. Wt. :** 0

Appendix Table B-1. Midwest Biodiversity Institute
Fish Species List

Site ID: PLM01 River: 02-090 Plum Run RM: 0.72 Date: 06/23/2025

Time Fished: 2165 Distance: 0.150 Drainge (sq mi): 7.8 Depth: 0

Location: St. Rt. 665 - predevelopment control Lat: 39.82444 Long: -83.02444

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	31	62.0	13.78	0	0.00	0.0
43-011	Western Blacknose Dace	G	T	S	N	2	4.0	0.89	0	0.00	0.0
43-013	Creek Chub	G	T	N	N	23	46.0	10.22	0	0.00	0.0
43-025	Striped Shiner	I		S	N	27	54.0	12.00	0	0.00	0.0
43-032	Spotfin Shiner	I		M	N	4	8.0	1.78	0	0.00	0.0
43-043	Bluntnose Minnow	O	T	C	N	10	20.0	4.44	0	0.00	0.0
43-044	Central Stoneroller	H		N	N	39	78.0	17.33	0	0.00	0.0
77-008	Green Sunfish	I	T	C	S	5	10.0	2.22	0	0.00	0.0
77-009	Bluegill	I	P	C	S	3	6.0	1.33	0	0.00	0.0
80-014	Johnny Darter	I		C	D	5	10.0	2.22	0	0.00	0.0
80-022	Rainbow Darter	I	M	S	D	3	6.0	1.33	0	0.00	0.0
80-023	Orangethroat Darter	I		S	D	7	14.0	3.11	0	0.00	0.0
90-002	Mottled Sculpin	I		C		66	132.0	29.33	0	0.00	0.0

No Species: 13 **Nat. Species:** 13 **Hybrids:** 0 **Total Counted:** 225 **Total Rel. Wt. :** 0

IBI: 46.0 **MIwb:** N/A

Appendix Table B-1. Midwest Biodiversity Institute
Fish Species List

Site ID: GRR03 River: 02-091 Grant Run RM: 4.30 Date: 07/03/2025

Time Fished: 2200 Distance: 0.150 Drainge (sq mi): 2.0 Depth: 0

Location: Dst. Meadows Dr. @Mt. Carmel Grove City - restoration reach Lat: 39.85125 Long: -83.07766

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	7	14.0	29.17	0	0.00	0.0
43-003	Golden Shiner	I	T	M	N	1	2.0	4.17	0	0.00	0.0
43-013	Creek Chub	G	T	N	N	4	8.0	16.67	0	0.00	0.0
43-025	Striped Shiner	I		S	N	1	2.0	4.17	0	0.00	0.0
77-006	Largemouth Bass	C		C	F	6	12.0	25.00	0	0.00	0.0
77-008	Green Sunfish	I	T	C	S	2	4.0	8.33	0	0.00	0.0
77-009	Bluegill	I	P	C	S	2	4.0	8.33	0	0.00	0.0
80-014	Johnny Darter	I		C	D	1	2.0	4.17	0	0.00	0.0

No Species: 8 **Nat. Species:** 8 **Hybrids:** 0 **Total Counted:** 24 **Total Rel. Wt. :** 0

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

Appendix Table B-1. Midwest Biodiversity Institute
Fish Species List

Site ID: GRR02 River: 02-091 Grant Run RM: 2.00 Date: 06/25/2025

Time Fished: 2350 Distance: 0.150 Drainge (sq mi): 7.8 Depth: 0

Location: Buckeye Parkway/ Indian Trails Pike Lat: 39.83614 Long: -83.04558

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	90	180.0	23.26	0	0.00	0.0
43-013	Creek Chub	G	T	N	N	29	58.0	7.49	0	0.00	0.0
43-015	Suckermouth Minnow	I		S	N	1	2.0	0.26	0	0.00	0.0
43-021	Silver Shiner	I	I	S	N	2	4.0	0.52	0	0.00	0.0
43-025	Striped Shiner	I		S	N	30	60.0	7.75	0	0.00	0.0
43-039	Silverjaw Minnow	I		M	N	1	2.0	0.26	0	0.00	0.0
43-043	Bluntnose Minnow	O	T	C	N	3	6.0	0.78	0	0.00	0.0
43-044	Central Stoneroller	H		N	N	82	164.0	21.19	0	0.00	0.0
47-004	Yellow Bullhead	I	T	C		5	10.0	1.29	0	0.00	0.0
77-006	Largemouth Bass	C		C	F	6	12.0	1.55	0	0.00	0.0
77-008	Green Sunfish	I	T	C	S	67	134.0	17.31	0	0.00	0.0
77-009	Bluegill	I	P	C	S	30	60.0	7.75	0	0.00	0.0
77-015	Green X Bluegill					3	6.0	0.78	0	0.00	0.0
80-014	Johnny Darter	I		C	D	2	4.0	0.52	0	0.00	0.0
80-022	Rainbow Darter	I	M	S	D	8	16.0	2.07	0	0.00	0.0
90-002	Mottled Sculpin	I		C		28	56.0	7.24	0	0.00	0.0

No Species: 15 **Nat. Species:** 15 **Hybrids:** 1 **Total Counted:** 387 **Total Rel. Wt. :** 0

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

Appendix Table B-1. Midwest Biodiversity Institute
Fish Species List

Site ID: GRR01 River: 02-091 Grant Run RM: 0.20 Date: 08/22/2025

Time Fished: 1642 Distance: 0.150 Drainge (sq mi): 13.8 Depth: 0

Location: St. Rt. 104 Lat: 39.84348 Long: -83.02100

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	2.38	0	0.00	0.0
40-016	White Sucker	O	T	S	W	2	4.0	4.76	0	0.00	0.0
43-020	Emerald Shiner	I		M	N	2	4.0	4.76	0	0.00	0.0
43-021	Silver Shiner	I	I	S	N	1	2.0	2.38	0	0.00	0.0
43-032	Spotfin Shiner	I		M	N	2	4.0	4.76	0	0.00	0.0
43-043	Bluntnose Minnow	O	T	C	N	5	10.0	11.90	0	0.00	0.0
57-001	Western Mosquitofish	I		N	E	1	2.0	2.38	0	0.00	0.0
77-005	Spotted Bass	C		C	F	1	2.0	2.38	0	0.00	0.0
77-006	Largemouth Bass	C		C	F	4	8.0	9.52	0	0.00	0.0
77-008	Green Sunfish	I	T	C	S	7	14.0	16.67	0	0.00	0.0
77-009	Bluegill	I	P	C	S	10	20.0	23.81	0	0.00	0.0
77-011	Longear Sunfish	I	M	C	S	1	2.0	2.38	0	0.00	0.0
80-014	Johnny Darter	I		C	D	5	10.0	11.90	0	0.00	0.0

No Species: 13 **Nat. Species:** 12 **Hybrids:** 0 **Total Counted:** 42 **Total Rel. Wt. :** 0

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

Appendix Table B-1. Midwest Biodiversity Institute
Fish Species List

Site ID: SBR06 River: 02-092 Scioto Big Run RM: 8.50 Date: 07/02/2025

Time Fished: 2040 Distance: 0.150 Drainge (sq mi): 2.9 Depth: 0

Location: Ust. I-270 W. of Grove City - Cherry Creek Parkway Lat: 39.93750 Long: -83.12530

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	1.21	0	0.00	0.0
40-016	White Sucker	O	T	S	W	34	68.0	20.61	0	0.00	0.0
43-011	Western Blacknose Dace	G	T	S	N	10	20.0	6.06	0	0.00	0.0
43-013	Creek Chub	G	T	N	N	53	106.0	32.12	0	0.00	0.0
43-025	Striped Shiner	I		S	N	2	4.0	1.21	0	0.00	0.0
43-039	Silverjaw Minnow	I		M	N	1	2.0	0.61	0	0.00	0.0
43-044	Central Stoneroller	H		N	N	18	36.0	10.91	0	0.00	0.0
47-004	Yellow Bullhead	I	T	C		2	4.0	1.21	0	0.00	0.0
77-008	Green Sunfish	I	T	C	S	17	34.0	10.30	0	0.00	0.0
77-009	Bluegill	I	P	C	S	19	38.0	11.52	0	0.00	0.0
80-014	Johnny Darter	I		C	D	6	12.0	3.64	0	0.00	0.0
80-022	Rainbow Darter	I	M	S	D	1	2.0	0.61	0	0.00	0.0

No Species: 12 **Nat. Species:** 12 **Hybrids:** 0 **Total Counted:** 165 **Total Rel. Wt. :** 0

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

Appendix Table B-1. Midwest Biodiversity Institute
Fish Species List

Site ID: SBR05 River: 02-092 Scioto Big Run RM: 7.10 Date: 07/02/2025

Time Fished: 2270 Distance: 0.150 Drainge (sq mi): 5.8 Depth: 0

Location: Big Run Park Lat: 39.92860 Long: -83.10660

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	0.26	0	0.00	0.0
40-016	White Sucker	O	T	S	W	47	94.0	12.37	0	0.00	0.0
40-018	Spotted Sucker	I		S	R	1	2.0	0.26	0	0.00	0.0
43-007	Bigeye Chub	I	I	S	N	1	2.0	0.26	0	0.00	0.0
43-011	Western Blacknose Dace	G	T	S	N	12	24.0	3.16	0	0.00	0.0
43-013	Creek Chub	G	T	N	N	8	16.0	2.11	0	0.00	0.0
43-020	Emerald Shiner	I		M	N	6	12.0	1.58	0	0.00	0.0
43-021	Silver Shiner	I	I	S	N	2	4.0	0.53	0	0.00	0.0
43-025	Striped Shiner	I		S	N	44	88.0	11.58	0	0.00	0.0
43-032	Spotfin Shiner	I		M	N	1	2.0	0.26	0	0.00	0.0
43-039	Silverjaw Minnow	I		M	N	12	24.0	3.16	0	0.00	0.0
43-044	Central Stoneroller	H		N	N	107	214.0	28.16	0	0.00	0.0
77-006	Largemouth Bass	C		C	F	4	8.0	1.05	0	0.00	0.0
77-008	Green Sunfish	I	T	C	S	50	100.0	13.16	0	0.00	0.0
77-009	Bluegill	I	P	C	S	12	24.0	3.16	0	0.00	0.0
80-014	Johnny Darter	I		C	D	12	24.0	3.16	0	0.00	0.0
80-015	Greenside Darter	I	M	S	D	1	2.0	0.26	0	0.00	0.0
80-022	Rainbow Darter	I	M	S	D	56	112.0	14.74	0	0.00	0.0
80-023	Orangethroat Darter	I		S	D	3	6.0	0.79	0	0.00	0.0

No Species: 19 **Nat. Species:** 19 **Hybrids:** 0 **Total Counted:** 380 **Total Rel. Wt. :** 0

IBI: 54.0 **MIwb:** N/A

Appendix Table B-1. Midwest Biodiversity Institute
Fish Species List

Site ID: SBR04 River: 02-092 Scioto Big Run RM: 6.10 Date: 10/01/2025

Time Fished: 1925 Distance: 0.150 Drainge (sq mi): 8.0 Depth: 0

Location: Demorest Rd. Lat: 39.92570 Long: -83.09090

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	3.26	0	0.00	0.0
40-016	White Sucker	O	T	S	W	17	34.0	9.24	0	0.00	0.0
43-011	Western Blacknose Dace	G	T	S	N	1	2.0	0.54	0	0.00	0.0
43-013	Creek Chub	G	T	N	N	26	52.0	14.13	0	0.00	0.0
43-021	Silver Shiner	I	I	S	N	15	30.0	8.15	0	0.00	0.0
43-025	Striped Shiner	I		S	N	23	46.0	12.50	0	0.00	0.0
43-032	Spotfin Shiner	I		M	N	8	16.0	4.35	0	0.00	0.0
43-039	Silverjaw Minnow	I		M	N	4	8.0	2.17	0	0.00	0.0
43-043	Bluntnose Minnow	O	T	C	N	2	4.0	1.09	0	0.00	0.0
43-044	Central Stoneroller	H		N	N	40	80.0	21.74	0	0.00	0.0
47-004	Yellow Bullhead	I	T	C		1	2.0	0.54	0	0.00	0.0
77-006	Largemouth Bass	C		C	F	1	2.0	0.54	0	0.00	0.0
77-008	Green Sunfish	I	T	C	S	11	22.0	5.98	0	0.00	0.0
77-009	Bluegill	I	P	C	S	2	4.0	1.09	0	0.00	0.0
77-999	HYBRID X Sunfish					1	2.0	0.54	0	0.00	0.0
80-014	Johnny Darter	I		C	D	14	28.0	7.61	0	0.00	0.0
80-022	Rainbow Darter	I	M	S	D	2	4.0	1.09	0	0.00	0.0
80-024	Fantail Darter	I		C	D	10	20.0	5.43	0	0.00	0.0

No Species: 17 **Nat. Species:** 17 **Hybrids:** 1 **Total Counted:** 184 **Total Rel. Wt. :** 0

IBI: 50.0 **MIwb:** N/A

Appendix Table B-1. Midwest Biodiversity Institute
Fish Species List

Site ID: SBR03 River: 02-092 Scioto Big Run RM: 4.40 Date: 09/29/2025

Time Fished: 1315 Distance: 0.120 Drainge (sq mi): 11.8 Depth: 0

Location: U.S. Rt. 62 - access from Big Run Rd. Lat: 39.91556 Long: -83.06497

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	15.0	2.02	0	0.00	0.0
40-016	White Sucker	O	T	S	W	9	22.5	3.03	0	0.00	0.0
43-007	Bigeye Chub	I	I	S	N	2	5.0	0.67	0	0.00	0.0
43-011	Western Blacknose Dace	G	T	S	N	1	2.5	0.34	0	0.00	0.0
43-013	Creek Chub	G	T	N	N	1	2.5	0.34	0	0.00	0.0
43-015	Suckermouth Minnow	I		S	N	1	2.5	0.34	0	0.00	0.0
43-020	Emerald Shiner	I		M	N	49	122.5	16.50	0	0.00	0.0
43-021	Silver Shiner	I	I	S	N	8	20.0	2.69	0	0.00	0.0
43-022	Rosyface Shiner	I	I	S	N	17	42.5	5.72	0	0.00	0.0
43-025	Striped Shiner	I		S	N	30	75.0	10.10	0	0.00	0.0
43-032	Spotfin Shiner	I		M	N	4	10.0	1.35	0	0.00	0.0
43-039	Silverjaw Minnow	I		M	N	6	15.0	2.02	0	0.00	0.0
43-043	Bluntnose Minnow	O	T	C	N	9	22.5	3.03	0	0.00	0.0
43-044	Central Stoneroller	H		N	N	130	325.0	43.77	0	0.00	0.0
47-004	Yellow Bullhead	I	T	C		1	2.5	0.34	0	0.00	0.0
77-008	Green Sunfish	I	T	C	S	3	7.5	1.01	0	0.00	0.0
80-014	Johnny Darter	I		C	D	10	25.0	3.37	0	0.00	0.0
80-015	Greenside Darter	I	M	S	D	4	10.0	1.35	0	0.00	0.0
80-022	Rainbow Darter	I	M	S	D	5	12.5	1.68	0	0.00	0.0
80-024	Fantail Darter	I		C	D	1	2.5	0.34	0	0.00	0.0

No Species: 20 **Nat. Species:** 20 **Hybrids:** 0 **Total Counted:** 297 **Total Rel. Wt. :** 0

IBI: 54.0 **MIwb:** N/A

Appendix Table B-1. Midwest Biodiversity Institute
Fish Species List

Site ID: SBR02 River: 02-092 Scioto Big Run RM: 2.90 Date: 06/26/2025

Time Fished: 1893 Distance: 0.200 Drainge (sq mi): 18.5 Depth: 0

Location: Hardy Parkway - Willow Creek Park Lat: 39.91140 Long: -83.04170

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	6.0	1.07	0	0.00	0.0
40-016	White Sucker	O	T	S	W	11	16.5	2.95	0	0.00	0.0
43-013	Creek Chub	G	T	N	N	53	79.5	14.21	0	0.00	0.0
43-015	Suckermouth Minnow	I		S	N	3	4.5	0.80	0	0.00	0.0
43-021	Silver Shiner	I	I	S	N	2	3.0	0.54	0	0.00	0.0
43-022	Rosyface Shiner	I	I	S	N	7	10.5	1.88	0	0.00	0.0
43-025	Striped Shiner	I		S	N	18	27.0	4.83	0	0.00	0.0
43-034	Sand Shiner	I	M	M	N	11	16.5	2.95	0	0.00	0.0
43-039	Silverjaw Minnow	I		M	N	2	3.0	0.54	0	0.00	0.0
43-043	Bluntnose Minnow	O	T	C	N	1	1.5	0.27	0	0.00	0.0
43-044	Central Stoneroller	H		N	N	136	204.0	36.46	0	0.00	0.0
77-008	Green Sunfish	I	T	C	S	6	9.0	1.61	0	0.00	0.0
77-009	Bluegill	I	P	C	S	7	10.5	1.88	0	0.00	0.0
80-014	Johnny Darter	I		C	D	15	22.5	4.02	0	0.00	0.0
80-015	Greenside Darter	I	M	S	D	3	4.5	0.80	0	0.00	0.0
80-016	Banded Darter	I	I	S	D	1	1.5	0.27	0	0.00	0.0
80-022	Rainbow Darter	I	M	S	D	66	99.0	17.69	0	0.00	0.0
80-024	Fantail Darter	I		C	D	5	7.5	1.34	0	0.00	0.0
90-002	Mottled Sculpin	I		C		22	33.0	5.90	0	0.00	0.0

No Species: 19 **Nat. Species:** 19 **Hybrids:** 0 **Total Counted:** 373 **Total Rel. Wt. :** 0

IBI: 54.0 **MIwb:** N/A

Appendix Table B-1. Midwest Biodiversity Institute
Fish Species List

Site ID: SBR01 River: 02-092 Scioto Big Run RM: 0.80 Date: 08/22/2025

Time Fished: 1992 Distance: 0.150 Drainge (sq mi): 19.0 Depth: 0

Location: Ust. Brown Run confluence - pull off of St. Rt. 104 Lat: 39.88972 Long: -83.02583

Species Code:	Species Name:	Feed Guild	Toler-ance	Breed Guild	IBI Group	No. Fish	Rel. No.	% by No.	Rel. Wt.	% by Wt.	Av. Wt.
40-004	Smallmouth Buffalo	I		M	C	3	6.0	2.65	7900	68.49	1316.6
40-015	Northern Hog Sucker	I	M	S	R	3	6.0	2.65	700	6.07	116.6
40-016	White Sucker	O	T	S	W	1	2.0	0.88	10	0.09	5.0
43-007	Bigeye Chub	I	I	S	N	6	12.0	5.31	24	0.21	2.0
43-020	Emerald Shiner	I		M	N	9	18.0	7.96	50	0.43	2.7
43-022	Rosyface Shiner	I	I	S	N	7	14.0	6.19	20	0.17	1.4
43-025	Striped Shiner	I		S	N	1	2.0	0.88	6	0.05	3.0
43-032	Spotfin Shiner	I		M	N	6	12.0	5.31	20	0.17	1.6
43-034	Sand Shiner	I	M	M	N	2	4.0	1.77	10	0.09	2.5
43-043	Bluntnose Minnow	O	T	C	N	7	14.0	6.19	40	0.35	2.8
43-044	Central Stoneroller	H		N	N	5	10.0	4.42	60	0.52	6.0
47-002	Channel Catfish			C	F	1	2.0	0.88	1900	16.47	950.0
70-001	Brook Silverside	I	M	M		1	2.0	0.88	4	0.03	2.0
77-005	Spotted Bass	C		C	F	1	2.0	0.88	70	0.61	35.0
77-008	Green Sunfish	I	T	C	S	20	40.0	17.70	480	4.16	12.0
77-009	Bluegill	I	P	C	S	1	2.0	0.88	20	0.17	10.0
80-011	Logperch	I	M	S	D	1	2.0	0.88	16	0.14	8.0
80-014	Johnny Darter	I		C	D	8	16.0	7.08	24	0.21	1.5
80-015	Greenside Darter	I	M	S	D	2	4.0	1.77	20	0.17	5.0
80-016	Banded Darter	I	I	S	D	2	4.0	1.77	8	0.07	2.0
80-022	Rainbow Darter	I	M	S	D	13	26.0	11.50	50	0.43	1.9
80-023	Orangethroat Darter	I		S	D	4	8.0	3.54	20	0.17	2.5
80-024	Fantail Darter	I		C	D	1	2.0	0.88	2	0.02	1.0
90-002	Mottled Sculpin	I		C		8	16.0	7.08	80	0.69	5.0

No Species: 24 **Nat. Species:** 24 **Hybrids:** 0 **Total Counted:** 113 **Total Rel. Wt. :** 11534

IBI: 52.0 **MIwb:** N/A

Appendix Table B-1. Midwest Biodiversity Institute
Fish Species List

Site ID: MR02 River: 02-093 Marsh Run RM: 2.00 Date: 06/23/2025

Time Fished: 2090 Distance: 0.150 Drainge (sq mi): 2.2 Depth: 0

Location: Grove City - Gantz Park Lat: 39.89800 Long: -83.06130

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	0.28	0	0.00	0.0
43-011	Western Blacknose Dace	G	T	S	N	3	6.0	0.42	0	0.00	0.0
43-013	Creek Chub	G	T	N	N	34	68.0	4.78	0	0.00	0.0
43-042	Fathead Minnow	O	T	C	N	10	20.0	1.41	0	0.00	0.0
43-044	Central Stoneroller	H		N	N	504	1008.0	70.89	0	0.00	0.0
77-006	Largemouth Bass	C		C	F	30	60.0	4.22	0	0.00	0.0
77-008	Green Sunfish	I	T	C	S	80	160.0	11.25	0	0.00	0.0
77-009	Bluegill	I	P	C	S	18	36.0	2.53	0	0.00	0.0
77-021	Green X Longear Sunfish					1	2.0	0.14	0	0.00	0.0
80-014	Johnny Darter	I		C	D	21	42.0	2.95	0	0.00	0.0
80-023	Orangethroat Darter	I		S	D	8	16.0	1.13	0	0.00	0.0

No Species: 10 **Nat. Species:** 10 **Hybrids:** 1 **Total Counted:** 711 **Total Rel. Wt. :** 0

IBI: 44.0 **MIwb:** N/A

Appendix Table B-1. Midwest Biodiversity Institute
Fish Species List

Site ID: MR01 River: 02-093 Marsh Run RM: 0.20 Date: 08/15/2025

Time Fished: 1713 Distance: 0.150 Drainge (sq mi): 3.1 Depth: 0

Location: Dst. St. Rt. 104 Lat: 39.90050 Long: -83.02800

Species Code:	Species Name:	Feed Guild	Toler-ance	Breed Guild	IBI Group	No. Fish	Rel. No.	% by No.	Rel. Wt.	% by Wt.	Av. Wt.
43-007	Bigeye Chub	I	I	S	N	1	2.0	0.89	0	0.00	0.0
43-013	Creek Chub	G	T	N	N	3	6.0	2.68	0	0.00	0.0
43-020	Emerald Shiner	I		M	N	15	30.0	13.39	0	0.00	0.0
43-022	Rosyface Shiner	I	I	S	N	6	12.0	5.36	0	0.00	0.0
43-025	Striped Shiner	I		S	N	4	8.0	3.57	0	0.00	0.0
43-032	Spotfin Shiner	I		M	N	9	18.0	8.04	0	0.00	0.0
43-034	Sand Shiner	I	M	M	N	2	4.0	1.79	0	0.00	0.0
43-043	Bluntnose Minnow	O	T	C	N	3	6.0	2.68	0	0.00	0.0
43-044	Central Stoneroller	H		N	N	21	42.0	18.75	0	0.00	0.0
47-004	Yellow Bullhead	I	T	C		1	2.0	0.89	0	0.00	0.0
57-001	Western Mosquitofish	I		N	E	3	6.0	2.68	0	0.00	0.0
77-006	Largemouth Bass	C		C	F	15	30.0	13.39	0	0.00	0.0
77-008	Green Sunfish	I	T	C	S	10	20.0	8.93	0	0.00	0.0
77-009	Bluegill	I	P	C	S	5	10.0	4.46	0	0.00	0.0
77-011	Longear Sunfish	I	M	C	S	1	2.0	0.89	0	0.00	0.0
78-001	Pond Loach	I		C	E	1	2.0	0.89	0	0.00	0.0
80-014	Johnny Darter	I		C	D	4	8.0	3.57	0	0.00	0.0
80-023	Orangethroat Darter	I		S	D	3	6.0	2.68	0	0.00	0.0
80-024	Fantail Darter	I		C	D	3	6.0	2.68	0	0.00	0.0
90-002	Mottled Sculpin	I		C		2	4.0	1.79	0	0.00	0.0

No Species: 20 **Nat. Species:** 18 **Hybrids:** 0 **Total Counted:** 112 **Total Rel. Wt. :** 0

IBI: 56.0 **MIwb:** N/A

Appendix Table B-1. Midwest Biodiversity Institute
Fish Species List

Site ID: REP04 River: 02-243 Republican Run (Grove City) RM: 5.40 Date: 06/27/2025

Time Fished: 1488 Distance: 0.150 Drainge (sq mi): 1.0 Depth: 0

Location: Berry Family Conservation Area near Beulah Park Lat: 39.88660 Long: -83.09478

Species Code:	Species Name:	Feed Guild	Toler-ance	Breed Guild	IBI Group	No. Fish	Rel. No.	% by No.	Rel. Wt.	% by Wt.	Av. Wt.
43-011	Western Blacknose Dace	G	T	S	N	1	2.0	1.12	0	0.00	0.0
43-013	Creek Chub	G	T	N	N	38	76.0	42.70	0	0.00	0.0
43-042	Fathead Minnow	O	T	C	N	1	2.0	1.12	0	0.00	0.0
43-044	Central Stoneroller	H		N	N	7	14.0	7.87	0	0.00	0.0
47-004	Yellow Bullhead	I	T	C		8	16.0	8.99	0	0.00	0.0
77-008	Green Sunfish	I	T	C	S	21	42.0	23.60	0	0.00	0.0
77-009	Bluegill	I	P	C	S	6	12.0	6.74	0	0.00	0.0
77-015	Green X Bluegill					7	14.0	7.87	0	0.00	0.0

No Species: 7 **Nat. Species:** 7 **Hybrids:** 1 **Total Counted:** 89 **Total Rel. Wt. :** 0

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

Appendix Table B-1. Midwest Biodiversity Institute
Fish Species List

Site ID: REP03 River: 02-243 Republican Run (Grove City) RM: 3.80 Date: 06/27/2025

Time Fished: 1280 Distance: 0.150 Drainge (sq mi): 2.9 Depth: 0

Location: Swearington Park - Grove City Lat: 39.88101 Long: -83.07236

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	33	66.0	12.64	0	0.00	0.0
43-011	Western Blacknose Dace	G	T	S	N	48	96.0	18.39	0	0.00	0.0
43-013	Creek Chub	G	T	N	N	135	270.0	51.72	0	0.00	0.0
43-044	Central Stoneroller	H		N	N	12	24.0	4.60	0	0.00	0.0
77-008	Green Sunfish	I	T	C	S	2	4.0	0.77	0	0.00	0.0
80-014	Johnny Darter	I		C	D	31	62.0	11.88	0	0.00	0.0

No Species: 6 **Nat. Species:** 6 **Hybrids:** 0 **Total Counted:** 261 **Total Rel. Wt. :** 0

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

Appendix Table B-1. Midwest Biodiversity Institute
Fish Species List

Site ID: REP02 River: 02-243 Republican Run (Grove City) RM: 1.38 Date: 10/01/2025

Time Fished: 1662 Distance: 0.150 Drainge (sq mi): 5.7 Depth: 0

Location: Dst. Buckeye Parkway Lat: 39.86768 Long: -83.04537

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	12.12	0	0.00	0.0
43-011	Western Blacknose Dace	G	T	S	N	2	4.0	3.03	0	0.00	0.0
43-013	Creek Chub	G	T	N	N	26	52.0	39.39	0	0.00	0.0
43-025	Striped Shiner	I		S	N	1	2.0	1.52	0	0.00	0.0
43-044	Central Stoneroller	H		N	N	9	18.0	13.64	0	0.00	0.0
47-004	Yellow Bullhead	I	T	C		1	2.0	1.52	0	0.00	0.0
77-006	Largemouth Bass	C		C	F	3	6.0	4.55	0	0.00	0.0
77-008	Green Sunfish	I	T	C	S	6	12.0	9.09	0	0.00	0.0
77-009	Bluegill	I	P	C	S	9	18.0	13.64	0	0.00	0.0
77-015	Green X Bluegill					1	2.0	1.52	0	0.00	0.0

No Species: 9 **Nat. Species:** 9 **Hybrids:** 1 **Total Counted:** 66 **Total Rel. Wt. :** 0

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

Appendix Table B-1. Midwest Biodiversity Institute
Fish Species List

Site ID: REP01 River: 02-243 Republican Run (Grove City) RM: 0.20 Date: 07/02/2025

Time Fished: 1830 Distance: 0.150 Drainge (sq mi): 7.0 Depth: 0

Location: Ust. St. Rt. 104 - at Bike Bridge Lat: 39.86420 Long: -83.02780

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	1.43	0	0.00	0.0
43-007	Bigeye Chub	I	I	S	N	5	10.0	3.57	0	0.00	0.0
43-013	Creek Chub	G	T	N	N	8	16.0	5.71	0	0.00	0.0
43-020	Emerald Shiner	I		M	N	1	2.0	0.71	0	0.00	0.0
43-022	Rosyface Shiner	I	I	S	N	1	2.0	0.71	0	0.00	0.0
43-025	Striped Shiner	I		S	N	3	6.0	2.14	0	0.00	0.0
43-032	Spotfin Shiner	I		M	N	9	18.0	6.43	0	0.00	0.0
43-039	Silverjaw Minnow	I		M	N	5	10.0	3.57	0	0.00	0.0
43-043	Bluntnose Minnow	O	T	C	N	29	58.0	20.71	0	0.00	0.0
43-044	Central Stoneroller	H		N	N	40	80.0	28.57	0	0.00	0.0
77-006	Largemouth Bass	C		C	F	2	4.0	1.43	0	0.00	0.0
77-008	Green Sunfish	I	T	C	S	11	22.0	7.86	0	0.00	0.0
77-009	Bluegill	I	P	C	S	19	38.0	13.57	0	0.00	0.0
77-010	Orangespotted Sunfish	I		C	S	1	2.0	0.71	0	0.00	0.0
77-011	Longear Sunfish	I	M	C	S	1	2.0	0.71	0	0.00	0.0
77-015	Green X Bluegill					2	4.0	1.43	0	0.00	0.0
80-014	Johnny Darter	I		C	D	1	2.0	0.71	0	0.00	0.0

No Species: 16 **Nat. Species:** 16 **Hybrids:** 1 **Total Counted:** 140 **Total Rel. Wt. :** 0

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

Appendix Table B-1. Midwest Biodiversity Institute
Fish Species List

Site ID: REP05 River: 02-244 South Branch Republican Run RM: 0.02 Date: 08/15/2025

Time Fished: 657 Distance: 0.150 Drainge (sq mi): 1.9 Depth: 0

Location: Briar Hill Dr. Lat: 39.87167 Long: -83.05306

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	1.18	0	0.00	0.0
43-011	Western Blacknose Dace	G	T	S	N	52	104.0	20.47	0	0.00	0.0
43-013	Creek Chub	G	T	N	N	143	286.0	56.30	0	0.00	0.0
43-016	Southern Redbelly Dace	H		S	N	1	2.0	0.39	0	0.00	0.0
43-044	Central Stoneroller	H		N	N	32	64.0	12.60	0	0.00	0.0
77-008	Green Sunfish	I	T	C	S	5	10.0	1.97	0	0.00	0.0
77-009	Bluegill	I	P	C	S	11	22.0	4.33	0	0.00	0.0
77-015	Green X Bluegill					3	6.0	1.18	0	0.00	0.0
80-014	Johnny Darter	I		C	D	4	8.0	1.57	0	0.00	0.0

No Species: 8 **Nat. Species:** 8 **Hybrids:** 1 **Total Counted:** 254 **Total Rel. Wt. :** 0

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

Appendix Table B-1. Midwest Biodiversity Institute
Fish Species List

Site ID: GRR05 River: 02-256 Trib. to Grant Run (RM 2.77) RM: 1.32 Date: 06/25/2025

Time Fished: 1933 Distance: 0.150 Drainge (sq mi): 1.7 Depth: 0

Location: Meijer Store St. Rt. 665 frontage - overwide ditch restoration Lat: 39.83850 Long: -83.07903

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	9	18.0	8.26	0	0.00	0.0
43-013	Creek Chub	G	T	N	N	52	104.0	47.71	0	0.00	0.0
43-043	Bluntnose Minnow	O	T	C	N	11	22.0	10.09	0	0.00	0.0
77-006	Largemouth Bass	C		C	F	2	4.0	1.83	0	0.00	0.0
77-008	Green Sunfish	I	T	C	S	21	42.0	19.27	0	0.00	0.0
77-015	Green X Bluegill					8	16.0	7.34	0	0.00	0.0
78-001	Pond Loach	I		C	E	1	2.0	0.92	0	0.00	0.0
80-014	Johnny Darter	I		C	D	3	6.0	2.75	0	0.00	0.0
80-023	Orangethroat Darter	I		S	D	2	4.0	1.83	0	0.00	0.0

No Species: 8 **Nat. Species:** 7 **Hybrids:** 1 **Total Counted:** 109 **Total Rel. Wt. :** 0

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

Appendix Table B-1. Midwest Biodiversity Institute
Fish Species List

Site ID: GRR04 River: 02-256 Trib. to Grant Run (RM 2.77) RM: 1.10 Date: 06/25/2025

Time Fished: 1845 Distance: 0.150 Drainge (sq mi): 1.4 Depth: 0

Location: Ust. Hoover Rd. Lat: 39.83840 Long: -83.07320

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	0.75	0	0.00	0.0
43-013	Creek Chub	G	T	N	N	51	102.0	38.06	0	0.00	0.0
43-043	Bluntnose Minnow	O	T	C	N	3	6.0	2.24	0	0.00	0.0
43-044	Central Stoneroller	H		N	N	2	4.0	1.49	0	0.00	0.0
77-006	Largemouth Bass	C		C	F	1	2.0	0.75	0	0.00	0.0
77-008	Green Sunfish	I	T	C	S	15	30.0	11.19	0	0.00	0.0
77-009	Bluegill	I	P	C	S	23	46.0	17.16	0	0.00	0.0
77-015	Green X Bluegill					5	10.0	3.73	0	0.00	0.0
78-001	Pond Loach	I		C	E	2	4.0	1.49	0	0.00	0.0
80-023	Orangethroat Darter	I		S	D	2	4.0	1.49	0	0.00	0.0
90-002	Mottled Sculpin	I		C		29	58.0	21.64	0	0.00	0.0

No Species: 10 **Nat. Species:** 9 **Hybrids:** 1 **Total Counted:** 134 **Total Rel. Wt. :** 0

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

Appendix Table B-1. Midwest Biodiversity Institute
Fish Species List

Site ID: SBR08 River: 02-852 Unnamed Tributary to Scioto Big Run @ RM6.66 RM: 1.50 Date: 09/30/2025

Time Fished: 781 Distance: 0.150 Drainge (sq mi): 1.5 Depth: 0

Location: Southwestern Rd. Lat: 39.91964 Long: -83.09709

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	12	24.0	14.29	0	0.00	0.0
43-011	Western Blacknose Dace	G	T	S	N	11	22.0	13.10	0	0.00	0.0
43-013	Creek Chub	G	T	N	N	18	36.0	21.43	0	0.00	0.0
43-025	Striped Shiner	I		S	N	1	2.0	1.19	0	0.00	0.0
43-044	Central Stoneroller	H		N	N	1	2.0	1.19	0	0.00	0.0
77-006	Largemouth Bass	C		C	F	6	12.0	7.14	0	0.00	0.0
77-008	Green Sunfish	I	T	C	S	2	4.0	2.38	0	0.00	0.0
77-009	Bluegill	I	P	C	S	11	22.0	13.10	0	0.00	0.0
80-014	Johnny Darter	I		C	D	3	6.0	3.57	0	0.00	0.0
80-023	Orangethroat Darter	I		S	D	19	38.0	22.62	0	0.00	0.0

No Species: 10 **Nat. Species:** 10 **Hybrids:** 0 **Total Counted:** 84 **Total Rel. Wt. :** 0

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

Appendix Table B-1. Midwest Biodiversity Institute
Fish Species List

Site ID: SBR07 River: 02-852 Unnamed Tributary to Scioto Big Run @ RM6.66 RM: 0.30 Date: 06/26/2025

Time Fished: 1702 Distance: 0.150 Drainge (sq mi): 1.8 Depth: 0

Location: at River Bend Park Lat: 39.92203 Long: -83.08680

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	20	40.0	9.66	0	0.00	0.0
43-011	Western Blacknose Dace	G	T	S	N	59	118.0	28.50	0	0.00	0.0
43-013	Creek Chub	G	T	N	N	71	142.0	34.30	0	0.00	0.0
43-039	Silverjaw Minnow	I		M	N	3	6.0	1.45	0	0.00	0.0
43-042	Fathead Minnow	O	T	C	N	4	8.0	1.93	0	0.00	0.0
43-044	Central Stoneroller	H		N	N	15	30.0	7.25	0	0.00	0.0
77-006	Largemouth Bass	C		C	F	2	4.0	0.97	0	0.00	0.0
77-009	Bluegill	I	P	C	S	11	22.0	5.31	0	0.00	0.0
80-014	Johnny Darter	I		C	D	6	12.0	2.90	0	0.00	0.0
80-022	Rainbow Darter	I	M	S	D	14	28.0	6.76	0	0.00	0.0
80-023	Orangethroat Darter	I		S	D	2	4.0	0.97	0	0.00	0.0

No Species: 11 **Nat. Species:** 11 **Hybrids:** 0 **Total Counted:** 207 **Total Rel. Wt. :** 0

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

Appendix Table B-1. Midwest Biodiversity Institute
Fish Species List

Site ID: SBR10 River: 02-853 Unnamed Tributary to Scioto Big Run @ RM 3.59 (Early Run) RM: 1.85 Date: 10/01/2025

Time Fished:	Distance:	Drainge (sq mi):	Depth:
1623	0.150	2.5	0

Location:	Lat:	Long:
Eakin Rd. dst. SSO	39.93429	-83.05841

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	23	46.0	7.93	0	0.00	0.0
43-011	Western Blacknose Dace	G	T	S	N	3	6.0	1.03	0	0.00	0.0
43-013	Creek Chub	G	T	N	N	72	144.0	24.83	0	0.00	0.0
43-021	Silver Shiner	I	I	S	N	6	12.0	2.07	0	0.00	0.0
43-025	Striped Shiner	I		S	N	2	4.0	0.69	0	0.00	0.0
43-032	Spotfin Shiner	I		M	N	84	168.0	28.97	0	0.00	0.0
43-039	Silverjaw Minnow	I		M	N	12	24.0	4.14	0	0.00	0.0
43-043	Bluntnose Minnow	O	T	C	N	3	6.0	1.03	0	0.00	0.0
43-044	Central Stoneroller	H		N	N	20	40.0	6.90	0	0.00	0.0
47-004	Yellow Bullhead	I	T	C		2	4.0	0.69	0	0.00	0.0
77-006	Largemouth Bass	C		C	F	3	6.0	1.03	0	0.00	0.0
77-008	Green Sunfish	I	T	C	S	6	12.0	2.07	0	0.00	0.0
77-009	Bluegill	I	P	C	S	47	94.0	16.21	0	0.00	0.0
78-001	Pond Loach	I		C	E	1	2.0	0.34	0	0.00	0.0
80-014	Johnny Darter	I		C	D	6	12.0	2.07	0	0.00	0.0

No Species: 15 **Nat. Species:** 14 **Hybrids:** 0 **Total Counted:** 290 **Total Rel. Wt. :** 0

IBI: 44.0 **MIwb:** N/A

Appendix Table B-1. Midwest Biodiversity Institute
Fish Species List

Site ID: SBR09 River: 02-853 Unnamed Tributary to Scioto Big Run @ RM 3.59 (Early Run) RM: 0.10 Date: 06/27/2025

Time Fished: 1249 Distance: 0.150 Drainge (sq mi): 3.8 Depth: 0

Location: Ust. Gantz Rd. at Scioto Big Run confluence Lat: 39.91346 Long: -83.05110

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	32.0	14.55	0	0.00	0.0
43-007	Bigeye Chub	I	I	S	N	5	10.0	4.55	0	0.00	0.0
43-011	Western Blacknose Dace	G	T	S	N	11	22.0	10.00	0	0.00	0.0
43-013	Creek Chub	G	T	N	N	35	70.0	31.82	0	0.00	0.0
43-015	Suckermouth Minnow	I		S	N	1	2.0	0.91	0	0.00	0.0
43-022	Rosyface Shiner	I	I	S	N	1	2.0	0.91	0	0.00	0.0
43-025	Striped Shiner	I		S	N	8	16.0	7.27	0	0.00	0.0
43-042	Fathead Minnow	O	T	C	N	1	2.0	0.91	0	0.00	0.0
43-044	Central Stoneroller	H		N	N	6	12.0	5.45	0	0.00	0.0
77-008	Green Sunfish	I	T	C	S	1	2.0	0.91	0	0.00	0.0
77-009	Bluegill	I	P	C	S	1	2.0	0.91	0	0.00	0.0
77-015	Green X Bluegill					1	2.0	0.91	0	0.00	0.0
80-014	Johnny Darter	I		C	D	6	12.0	5.45	0	0.00	0.0
80-022	Rainbow Darter	I	M	S	D	17	34.0	15.45	0	0.00	0.0

No Species: 13 **Nat. Species:** 13 **Hybrids:** 1 **Total Counted:** 110 **Total Rel. Wt. :** 0

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

Appendix Table B-1. Midwest Biodiversity Institute
Fish Species List

Site ID: SBR11 River: 02-854 Unnamed Tributary to Scioto Big Run @ RM 0.70 (Brown Run) RM: 0.10 Date: 09/30/2025

Time Fished: 1422 Distance: 0.150 Drainge (sq mi): 3.0 Depth: 0

Location: St. Rt. 104 - pull off same as SBR01 Lat: 39.88862 Long: -83.02773

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	15	30.0	4.78	0	0.00	0.0
43-007	Bigeye Chub	I	I	S	N	1	2.0	0.32	0	0.00	0.0
43-011	Western Blacknose Dace	G	T	S	N	1	2.0	0.32	0	0.00	0.0
43-013	Creek Chub	G	T	N	N	24	48.0	7.64	0	0.00	0.0
43-020	Emerald Shiner	I		M	N	9	18.0	2.87	0	0.00	0.0
43-022	Rosyface Shiner	I	I	S	N	1	2.0	0.32	0	0.00	0.0
43-025	Striped Shiner	I		S	N	5	10.0	1.59	0	0.00	0.0
43-032	Spotfin Shiner	I		M	N	140	280.0	44.59	0	0.00	0.0
43-034	Sand Shiner	I	M	M	N	1	2.0	0.32	0	0.00	0.0
43-039	Silverjaw Minnow	I		M	N	2	4.0	0.64	0	0.00	0.0
43-043	Bluntnose Minnow	O	T	C	N	24	48.0	7.64	0	0.00	0.0
43-044	Central Stoneroller	H		N	N	9	18.0	2.87	0	0.00	0.0
77-006	Largemouth Bass	C		C	F	2	4.0	0.64	0	0.00	0.0
77-008	Green Sunfish	I	T	C	S	53	106.0	16.88	0	0.00	0.0
77-009	Bluegill	I	P	C	S	13	26.0	4.14	0	0.00	0.0
77-015	Green X Bluegill					3	6.0	0.96	0	0.00	0.0
80-014	Johnny Darter	I		C	D	4	8.0	1.27	0	0.00	0.0
80-022	Rainbow Darter	I	M	S	D	1	2.0	0.32	0	0.00	0.0
80-024	Fantail Darter	I		C	D	4	8.0	1.27	0	0.00	0.0
90-002	Mottled Sculpin	I		C		2	4.0	0.64	0	0.00	0.0

No Species: 19 **Nat. Species:** 19 **Hybrids:** 1 **Total Counted:** 314 **Total Rel. Wt. :** 0

IBI: 52.0 **MIwb:** N/A

Appendix Table B-1. Midwest Biodiversity Institute
Fish Species List

Site ID: GTZ01 River: 02-855 Gantz Run RM: 1.00 Date: 08/15/2025

Time Fished: 788 Distance: 0.150 Drainge (sq mi): 0.7 Depth: 0

Location: Ust. St. Rt. 104 @Thrailkill Rd. Lat: 39.86266 Long: -83.03700

Species Code:	Species Name:	Feed Guild	Toler-ance	Breed Guild	IBI Group	No. Fish	Rel. No.	% by No.	Rel. Wt.	% by Wt.	Av. Wt.
43-011	Western Blacknose Dace	G	T	S	N	1	2.0	0.74	0	0.00	0.0
43-013	Creek Chub	G	T	N	N	3	6.0	2.22	0	0.00	0.0
47-004	Yellow Bullhead	I	T	C		2	4.0	1.48	0	0.00	0.0
47-006	Black Bullhead	I	P	C		1	2.0	0.74	0	0.00	0.0
57-001	Western Mosquitofish	I		N	E	13	26.0	9.63	0	0.00	0.0
77-008	Green Sunfish	I	T	C	S	67	134.0	49.63	0	0.00	0.0
77-009	Bluegill	I	P	C	S	27	54.0	20.00	0	0.00	0.0
77-015	Green X Bluegill					2	4.0	1.48	0	0.00	0.0
80-014	Johnny Darter	I		C	D	17	34.0	12.59	0	0.00	0.0
80-023	Orangethroat Darter	I		S	D	2	4.0	1.48	0	0.00	0.0

No Species: 9 **Nat. Species:** 8 **Hybrids:** 1 **Total Counted:** 135 **Total Rel. Wt. :** 0

IBI: 44.0 **MIwb:** N/A

Appendix Table B-1. Midwest Biodiversity Institute
Fish Species List

Site ID: REP06 River: 02-856 Unnamed Tributary to Republican Run @ RM 0.73 (Billy Joe Run) RM: 0.10 Date: 10/01/2025

Time Fished: 319 Distance: 0.090 Drainge (sq mi): 0.8 Depth: 0

Location: Pinnacle Club Drive @Pinnacle Club Park Lat: 39.86266 Long: -83.03701

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	9	30.0	7.38	0	0.00	0.0
43-013	Creek Chub	G	T	N	N	21	70.0	17.21	0	0.00	0.0
43-025	Striped Shiner	I		S	N	1	3.3	0.82	0	0.00	0.0
43-032	Spotfin Shiner	I		M	N	22	73.3	18.03	0	0.00	0.0
43-043	Bluntnose Minnow	O	T	C	N	1	3.3	0.82	0	0.00	0.0
47-004	Yellow Bullhead	I	T	C		1	3.3	0.82	0	0.00	0.0
77-006	Largemouth Bass	C		C	F	1	3.3	0.82	0	0.00	0.0
77-008	Green Sunfish	I	T	C	S	7	23.3	5.74	0	0.00	0.0
77-009	Bluegill	I	P	C	S	56	186.7	45.90	0	0.00	0.0
80-014	Johnny Darter	I		C	D	1	3.3	0.82	0	0.00	0.0
80-023	Orangethroat Darter	I		S	D	1	3.3	0.82	0	0.00	0.0
90-002	Mottled Sculpin	I		C		1	3.3	0.82	0	0.00	0.0

No Species: 12 **Nat. Species:** 12 **Hybrids:** 0 **Total Counted:** 122 **Total Rel. Wt. :** 0

IBI: 50.0 **MIwb:** N/A

APPENDIX C: 2025 MACROINVERTEBRATE ASSEMBLAGE DATA

C-1: Qualitative Narrative Ratings
C-2&3: Macroinvertebrate Taxa Grand Reports
C-4: Macroinvertebrate Taxa by Site

Appendix Table C-1. *ICI and qualitative narrative ratings for the macroinvertebrate assemblage at 2025 sites sampled by MBI and comparable sites sampled by Ohio EPA 1992-2023*

Site ID	River Mile	Sample Date	Drainage Area (sq mi)	No. Coldwater Taxa	ICI/Qual. Narrative	Qual Taxa	Qual EPT Taxa	Sensitive Taxa
Scioto Big Run - 2025								
SBR06	8.50	7/29/2025	2.90	0	HF	20	4	2
SBR05	7.17	7/29/2025	5.80	0	LF	19	5	2
SBR04	6.10	7/29/2025	8.00	0	HF	22	9	4
SBR03	4.48	9/2/2025	11.80	2	HF	27	7	2
SBR02	2.90	9/2/2025	18.50	2	28	22	7	3
SBR01	0.80	9/2/2025	19.00	0	HF	23	9	4
Scioto Big Run - 2023								
203385	7.00	6/22/2023	5.80	2	MG	42	7	1
V07K11	2.90	8/3/2023	17.60	1	30	26	6	2
Scioto Big Run - 2010								
300968	4.40	8/10/2010	11.80	0	LF	30	5	3
V07K11	2.90	8/10/2010	18.50	0	F	33	7	1
Scioto Big Run - 2008								
300623	11.00	10/3/2008	0.70	0	LF	14	1	0
203350	10.80	10/3/2008	0.70	0	HF	16	1	1
Scioto Big Run - 2007								
203386	8.40	10/1/2007	2.90	0	LF	18	3	0
203385	7.10	10/1/2007	5.80	2	MG	30	6	1
300618	3.70	10/1/2007	16.50	1	HF	21	4	1
V07K11	2.70	10/1/2007	18.50	0	HF	22	4	1
V07P01	1.80	10/1/2007	18.80	0	MG	27	6	2
Scioto Big Run - 1994								
V07K12	3.50	9/30/1994	14.30	0	VP	13	0	0
Scioto Big Run - 1992								
V07K11	2.90	10/23/1992	18.50	0	P	11	1	0
V07P01	1.80	10/23/1992	18.80	0	F	23	2	0
Unnamed Tributary Scioto Big Run @RM 6.66 - 2025								
SBR08	1.50	7/23/2025	1.57	1	HF	25	6	1
SBR07	0.30	7/22/2025	1.80	2	MG	28	7	4
Unnamed Tributary Scioto Big Run @RM 3.59 (Early Run) - 2025								
SBR10	1.80	7/30/2025	2.55	0	VP	9	2	0
SBR09	0.09	7/30/2025	3.80	0	P	12	3	1
Unnamed Tributary Scioto Big Run @RM 0.70 (Brown Run) - 2025								
SBR11	0.21	7/30/2025	3.00	0	HF	15	5	0
Marsh Run - 2025								
MR02	2.00	7/30/2025	2.10	1	LF	19	4	0
MR01	0.20	7/30/2025	3.10	0	HF	27	7	3

Appendix Table C-1. *ICI and qualitative narrative ratings for the macroinvertebrate assemblage at 2025 sites sampled by MBI and comparable sites sampled by Ohio EPA 1992-2023*

Site ID	River Mile	Sample Date	Drainage Area (sq mi)	No. Coldwater Taxa	ICI/Qual. Narrative	Qual Taxa	Qual EPT Taxa	Sensitive Taxa
Marsh Run - 2007								
MAR01	2.70	10/1/2007	1.90	0	F	22	4	0
203253	2.20	10/2/2007	2.10	0	HF	21	3	0
203252	0.90	10/2/2007	2.80	0	VP	5	0	0
V07P19	0.20	10/2/2007	3.10	0	P	4	0	1
Gantz Run - 2025								
GTZ01	1.00	7/29/2025	0.78	0	HF	16	4	2
Republican Run - 2025								
REP04	5.40	7/29/2025	1.01	0	LF	23	2	2
REP03	3.80	7/24/2025	2.97	0	LF	16	4	1
REP02	1.38	7/23/2025	5.70	1	MG	33	9	4
REP01	0.25	7/23/2025	7.00	0	HF	25	9	3
Republican Run - 2023								
300969	1.38	8/3/2023	5.70	2	F	31	6	0
Republican Run - 2010								
300969	1.38	8/10/2010	5.70	0	LF	27	4	1
South Branch Republican Run - 2025								
REP05	0.02	7/28/2025	1.90	0	HF	19	6	4
Grant Run - 2025								
GRR03	4.30	7/31/2025	2.00	0	P	20	2	0
GRR02	1.80	7/31/2025	7.80	0	G	29	11	8
GRR01	0.40	9/3/2025	13.80	0	VG	38	17	11
Grant Run -2023								
300803	2.00	6/22/2023	7.80	1	MG	46	8	5
300970	0.20	6/22/2023	14.10	2	F	50	7	3
Grant Run -2010								
300803	2.00	8/12/2010	7.80	0	MG	43	10	6
300970	0.20	8/12/2010	14.10	0	MG	51	11	5
Unnamed Tributary to Grant Run (RM 2.77) - 2025								
GRR04	1.50	7/24/2025	1.46	0	P	12	1	0
GRR05	1.32	7/28/2025	1.70	0	P	22	4	1
Unnamed Tributary to Grant Run (RM 2.77) - 2008								
300646	1.80	10/3/2008	1.30	0	VP	11	0	0
203383	1.60	10/3/2008	1.30	0	VP	13	0	0
300645	1.10	10/3/2008	1.50	0	LF	13	3	0
Plum Run - 2025								
PLM01	0.72	7/24/2025	7.80	0	MG	37	6	2
Plum Run - 2023								
V07P23	0.72	6/21/2023	7.00	3	LF	27	3	1
Plum Run - 2010								
V07P23	0.72	8/9/2010	7.80	2	F	46	6	6

Appendix Table C-2 *. Macroinvertebrate grand total taxa report fo sites sampled in Scioto Big Run and its tributaries in 2025.*

Taxa Code	Taxa Name	Taxa Group	Ohio Tolerance	Samples Collected In
03600	*Oligochaeta*	N	T	17
11120	*Baetis flavistriga*	M	F	17
74100	*Simulium sp*	D	F	14
13521	*Stenonema femoratum*	M	F	12
21200	*Calopteryx sp*	O	F	11
52200	*Cheumatopsyche sp*	C	F	11
50301	*Chimarra aterrima*	C	MI	10
69400	*Stenelmis sp*	O	F	10
11130	*Baetis intercalaris*	M	F	10
04935	*Erpobdella punctata punctata*	N	MT	9
22001	*Coenagrionidae*	O	T	9
22300	*Argia sp*	O	F	9
84750	*Stictochironomus sp*	D	F	9
95100	*Physella sp*	N	T	8
77120	*Ablabesmyia mallochi*	D	F	8
82820	*Cryptochironomus sp*	D	F	8
50315	*Chimarra obscura*	C	MI	8
52530	*Hydropsyche depravata group*	C	F	8
01801	*Turbellaria*	N	F	8
84540	*Polypedilum (Tripodura) scalaenum group*	D	F	7
84700	*Stenochironomus sp*	D	F	5
84470	*Polypedilum (P.) illinoense*	D	T	5
77800	*Helopelopia sp*	D	F	5
06201	*Hyalella sp.*	N	F	5
08250	*Faxonius rusticus*	N	F	5
71900	*Tipula sp*	D	F	5
21300	*Hetaerina sp*	O	F	5
52430	*Ceratopsyche morosa group*	C	MI	4
23909	*Boyeria vinosa*	O	F	4
60900	*Peltodytes sp*	O	MT	4
04964	*Erpobdella microstoma*	N	MT	4
77500	*Conchapelopia sp*	D	F	4
81650	*Parametriocnemus sp*	D	F	4
84210	*Paratendipes albimanus or P. duplicatus*	D	F	4
84450	*Polypedilum (Uresipedilum) flavum*	D	F	4
85800	*Tanytarsus sp*	T	F	4
84300	*Phaenopsectra obediens group*	D	F	3
78401	*Natarsia species A (sensu Roback, 1978)*	D	T	2
79400	*Zavrelimyia sp*	D	F	2

Appendix Table C-2 *. Macroinvertebrate grand total taxa report fo sites sampled in Scioto Big Run and its tributaries in 2025.*

Taxa Code	Taxa Name	Taxa Group	Ohio Tolerance	Samples Collected In
06700	*Crangonyx sp*	N	MT	2
13000	*Leucrocuta sp*	M	MI	2
17200	*Caenis sp*	M	F	2
68901	*Macronychus glabratus*	O	F	2
23600	*Aeshna sp*	O	MT	2
97601	*Corbicula fluminea*	N	F	2
85625	*Rheotanytarsus sp*	T	F	2
98200	*Pisidium sp*	N	MT	1
51600	*Polycentropus group*	C	MI	1
68700	*Dubiraphia sp*	O	F	1
59310	*Mystacides sepulchralis*	C	MI	1
21001	*Calopterygidae*	O	F	1
16700	*Tricorythodes sp*	M	MI	1
11670	*Procloeon viridoculare*	M	MI	1
08200	*Faxonius sp*	N	F	1
04615	*Actinobdella inequiannulata*	N	MT	1
04660	*Helobdella sp*	N	MT	1
78140	*Labrundinia pilosella*	D	F	1
81825	*Rheocricotopus (Psilocricotopus) robacki*	D	F	1
78655	*Procladius (Holotanypus) sp*	D	MT	1
82401	*Chironominae*	D		1
83840	*Microtendipes pedellus group*	D	F	1
85500	*Paratanytarsus sp*	T	F	1
85615	*Rheotanytarsus pellucidus*	T	MI	1
96120	*Menetus (Micromenetus) dilatatus*	N	MT	1
85840	*Tanytarsus sepp*	T	F	1
87510	*Neoplasta sp*	D	MI	1
89601	*Muscidae*	D		1
96900	*Ferrissia sp*	N	F	1
85821	*Tanytarsus glabrescens group sp 7*	T	F	1
84315	*Phaenopsectra flavipes*	D	MT	1
84460	*Polypedilum (P.) fallax group*	D	F	1
83040	*Dicrotendipes neomodestus*	D	F	1
82121	*Thienemanniella lobapodema*	D	F	1
82141	*Thienemanniella xena*	D	F	1
78350	*Meropelopia sp*	D	F	1
80360	*Corynoneura floridaensis*	D	MI	1
80370	*Corynoneura lobata*	D	F	1
78450	*Nilotanypus fimbriatus*	D	F	1
01900	*Nemertea*	N	F	1
97710	*Dreissena polymorpha*	N	F	1

Appendix Table C-3 *. Macroinvertebrate Grand Total taxa report for sites sampled in Republican Run, Grant Run, Plum Run and tributaries from 2025.*

Taxa Code	Taxa Name	Taxa Group	Ohio Tolerance	Samples Collected In
01801	*Turbellaria*	N	F	20
03600	*Oligochaeta*	N	T	20
06201	*Hyalella sp.*	N	F	20
52200	*Cheumatopsyche sp*	C	F	20
11120	*Baetis flavistriga*	M	F	18
52530	*Hydropsyche depravata group*	C	F	16
11130	*Baetis intercalaris*	M	F	14
22001	*Coenagrionidae*	O	T	14
69400	*Stenelmis sp*	O	F	14
74100	*Simulium sp*	D	F	14
95100	*Physella sp*	N	T	13
60900	*Peltodytes sp*	O	MT	12
13521	*Stenonema femoratum*	M	F	11
17200	*Caenis sp*	M	F	11
50301	*Chimarra aterrima*	C	MI	11
77800	*Helopelopia sp*	D	F	11
84210	*Paratendipes albimanus or P. duplicatus*	D	F	11
52430	*Ceratopsyche morosa group*	C	MI	10
77500	*Conchapelopia sp*	D	F	10
06700	*Crangonyx sp*	N	MT	9
21200	*Calopteryx sp*	O	F	9
50315	*Chimarra obscura*	C	MI	9
77120	*Ablabesmyia mallochi*	D	F	9
04935	*Erpobdella punctata punctata*	N	MT	8
82820	*Cryptochironomus sp*	D	F	8
08250	*Faxonius rusticus*	N	F	7
22300	*Argia sp*	O	F	7
59720	*Triaenodes ignitus*	C	MI	7
11200	*Callibaetis sp*	M	MT	6
23600	*Aeshna sp*	O	MT	6
23909	*Boyeria vinosa*	O	F	6
84750	*Stictochironomus sp*	D	F	6
85500	*Paratanytarsus sp*	T	F	6
04666	*Helobdella papillata*	N	MT	5
04964	*Erpobdella microstoma*	N	MT	5
13000	*Leucrocuta sp*	M	MI	5
58505	*Helicopsyche borealis*	C	MI	5
65800	*Berosus sp*	O	MT	5
84470	*Polypedilum (P.) illinoense*	D	T	5
85800	*Tanytarsus sp*	T	F	5
68700	*Dubiraphia sp*	O	F	4

Appendix Table C-3 *. Macroinvertebrate Grand Total taxa report for sites sampled in Republican Run, Grant Run, Plum Run and tributaries from 2025.*

Taxa Code	Taxa Name	Taxa Group	Ohio Tolerance	Samples Collected In
68702	*Dubiraphia bivittata*	O	F	4
71900	*Tipula sp*	D	F	4
72700	*Anopheles sp*	D	F	4
85615	*Rheotanytarsus pellucidus*	T	MI	4
96120	*Menetus (Micromenetus) dilatatus*	N	MT	4
98600	*Sphaerium sp*	N	F	4
08601	*Hydrachnidia*	N	F	3
11020	*Acerpenna pygmaea*	M	MI	3
12200	*Isonychia sp*	M	MI	3
13100	*Nixe sp*	M	MI	3
13540	*Maccaffertium mediopunctatum*	M	MI	3
45400	*Trichocorixa sp*	O	MT	3
59310	*Mystacides sepulchralis*	C	MI	3
68075	*Psephenus herricki*	O	MI	3
68601	*Ancyronyx variegata*	O	F	3
68708	*Dubiraphia vittata group*	O	F	3
78600	*Pentaneura inconspicua*	D	F	3
81825	*Rheocricotopus (Psilocricotopus) robacki*	D	F	3
82730	*Chironomus (C.) decorus group*	D	T	3
84315	*Phaenopsectra flavipes*	D	MT	3
84520	*Polypedilum (Tripodura) halterale group*	D	MT	3
84700	*Stenochironomus sp*	D	F	3
85625	*Rheotanytarsus sp*	T	F	3
86100	*Chrysops sp*	D	F	3
87540	*Hemerodromia sp*	D	F	3
93200	*Hydrobiidae*	N	F	3
96900	*Ferrissia sp*	N	F	3
00401	*Spongillidae*	N	F	2
05900	*Lirceus sp*	N	MT	2
21001	*Calopterygidae*	O	F	2
21300	*Hetaerina sp*	O	F	2
23700	*Anax sp*	O	MT	2
51600	*Polycentropus group*	C	MI	2
53400	*Protoptila sp*	C	I	2
59970	*Petrophila sp*	O	MI	2
67800	*Tropisternus sp*	O	T	2
70600	*Antocha sp*	D	MI	2
78655	*Procladius (Holotanypus) sp*	D	MT	2
80410	*Cricotopus (C.) sp*	D	F	2
80420	*Cricotopus (C.) bicinctus*	D	T	2
81650	*Parametriocnemus sp*	D	F	2

Appendix Table C-3 *. Macroinvertebrate Grand Total taxa report for sites sampled in Republican Run, Grant Run, Plum Run and tributaries from 2025.*

Taxa Code	Taxa Name	Taxa Group	Ohio Tolerance	Samples Collected In
82824	*Cryptochironomus ponderosus*	D	F	2
83820	*Microtendipes "caelum" (sensu Simpson & Bode, 1980)*	D	MI	2
95907	*Gyraulus (Torquis) parvus*	N	MT	2
97601	*Corbicula fluminea*	N	F	2
98200	*Pisidium sp*	N	MT	2
03360	*Plumatella sp*	N	F	1
04664	*Helobdella stagnalis*	N	T	1
04686	*Placobdella papillifera*	N	MT	1
07800	*Cambarus sp*	N	NULL	1
07820	*Cambarus (Cambarus) sp A*	N	MT	1
11150	*Labiobaetis propinquus*	M	MI	1
27500	*Somatochlora sp*	O	MT	1
28208	*Erythemis simplicicollis*	O	MT	1
29000	*Sympetrum sp*	O	T	1
29100	*Tramea sp*	O	NULL	1
42700	*Belostoma sp*	O	T	1
44501	*Corixidae*	O	F	1
45900	*Notonecta sp*	O	T	1
53800	*Hydroptila sp*	C	F	1
59728	*Triaenodes marginatus*	C	F	1
68201	*Scirtidae*	O	F	1
68901	*Macronychus glabratus*	O	F	1
72900	*Culex sp*	D	T	1
77355	*Clinotanypus pinguis*	D	MT	1
78140	*Labrundinia pilosella*	D	F	1
78401	*Natarsia species A (sensu Roback, 1978)*	D	T	1
78680	*Procladius (Psilotanypus) bellus*	D	MT	1
78702	*Psectrotanypus dyari*	D	VT	1
80480	*Cricotopus (Isocladius) sp*	D	MT	1
82200	*Tvetenia bavarica group*	D	MI	1
83040	*Dicrotendipes neomodestus*	D	F	1
83158	*Endochironomus nigricans*	D	MT	1
83840	*Microtendipes pedellus group*	D	F	1
85840	*Tanytarsus sepp*	T	F	1
92615	*Cipangopaludina japonica*	N	MT	1
96280	*Planorbella (Pierosoma) trivolvis*	N	MT	1

Appendix Table C-4. Macroinvertebrate taxa report for sites in the ColsDWR srtudy area during 2025

River Code: **02-090** River: ***Plum Run*** Coll. Date: *07/24/2025* RM: **0.72**

Site ID: **PLM01** Location: *St. Rt. 665 - predevelopment control* Sample:

Taxa Code	Taxa	CWH Taxa	Tol.	Qt./Ql.
03600	Oligochaeta		T	+
04935	Erpobdella punctata punctata		MT	+
06201	Hyalella sp.		F	+
11120	Baetis flavistriga		F	+
11130	Baetis intercalaris		F	+
11200	Callibaetis sp		MT	+
21200	Calopteryx sp		F	+
22001	Coenagrionidae		T	+
22300	Argia sp		F	+
23600	Aeshna sp		MT	+
44501	Corixidae		F	+
45400	Trichocorixa sp		MT	+
45900	Notonecta sp		T	+
50301	Chimarra aterrima		MI	+
52200	Cheumatopsyche sp		F	+
52530	Hydropsyche depravata group		F	+
59310	Mystacides sepulchralis		MI	+
59728	Triaenodes marginatus		F	+
60900	Peltodytes sp		MT	+
68201	Scirtidae		F	+
69400	Stenelmis sp		F	+
71900	Tipula sp		F	+
72700	Anopheles sp		F	+
72900	Culex sp		T	+
77120	Ablabesmyia mallochi		F	+
77500	Conchapelopia sp		F	+
77800	Helopelopia sp		F	+
78140	Labrundinia pilosella		F	+
78655	Procladius (Holotanypus) sp		MT	+
82200	Tvetenia bavarica group		MI	+
82730	Chironomus (C.) decorus group		T	+
83840	Microtendipes pedellus group		F	+
84210	Paratendipes albimanus or P. duplicatus		F	+
84315	Phaenopsectra flavipes		MT	+
84470	Polypedilum (P.) illinoense		T	+
84700	Stenochironomus sp		F	+
85500	Paratanytarsus sp		F	+
85615	Rheotanytarsus pellucidus		MI	+
85625	Rheotanytarsus sp		F	+
85800	Tanytarsus sp		F	+
85840	Tanytarsus sepp		F	+
87540	Hemerodromia sp		F	+
95100	Physella sp		T	+
96900	Ferrissia sp		F	+

No. Quantitative Taxa:	0	Total Taxa;	44
No. Qualitative Taxa:	44	ICI:	MG
Number of Organisms:	0	Qual EPT:	6

River Code: **02-091** River: ***Grant Run*** Coll. Date: *09/03/2025* RM: **0.40**

Site ID: **GRR01** Location: Sample:

Taxa Code	Taxa	CWH Taxa	Tol.	Qt./Ql.
01801	Turbellaria		**F**	+
03600	Oligochaeta		**T**	+
06201	Hyalella sp.		**F**	+
08250	Faxonius rusticus		**F**	+
08601	Hydrachnidia		**F**	+
11020	Acerpenna pygmaea		**MI**	+
11120	Baetis flavistriga		**F**	+
11130	Baetis intercalaris		**F**	+
11200	Callibaetis sp		**MT**	+
12200	Isonychia sp		**MI**	+
13000	Leucrocuta sp		**MI**	+
13100	Nixe sp		**MI**	+
13521	Stenonema femoratum		**F**	+
13540	Maccaffertium mediopunctatum		**MI**	+
17200	Caenis sp		**F**	+
21200	Calopteryx sp		**F**	+
22001	Coenagrionidae		**T**	+
22300	Argia sp		**F**	+
23909	Boyeria vinosa		**F**	+
50301	Chimarra aterrima		**MI**	+
50315	Chimarra obscura		**MI**	+
52200	Cheumatopsyche sp		**F**	+
52430	Ceratopsyche morosa group		**MI**	+
52530	Hydropsyche depravata group		**F**	+
58505	Helicopsyche borealis		**MI**	+
59720	Triaenodes ignitus		**MI**	+
60900	Peltodytes sp		**MT**	+
68075	Psephenus herricki		**MI**	+
68601	Ancyronyx variegata		**F**	+
68702	Dubiraphia bivittata		**F**	+
69400	Stenelmis sp		**F**	+
72700	Anopheles sp		**F**	+
77800	Helopelopia sp		**F**	+
82820	Cryptochironomus sp		**F**	+
84210	Paratendipes albimanus or P. duplicatus		**F**	+
84520	Polypedilum (Tripodura) halterale group		**MT**	+
84750	Stictochironomus sp		**F**	+
86100	Chrysops sp		**F**	+

No. Quantitative Taxa:	0	Total Taxa;	38
No. Qualitative Taxa:	38	ICI:	VG
Number of Organisms:	0	Qual EPT:	17

River Code: **02-091** River: ***Grant Run*** Coll. Date: *07/31/2025* RM: **1.80**

Site ID: **GRR02** Location: *Buckeye Parkway/ Indian Trails Pike* Sample:

Taxa Code	Taxa	CWH Taxa	Tol.	Qt./Ql.
01801	Turbellaria		**F**	+
03600	Oligochaeta		**T**	+
06201	Hyalella sp.		**F**	+
08250	Faxonius rusticus		**F**	+
11120	Baetis flavistriga		**F**	+
11130	Baetis intercalaris		**F**	+
13000	Leucrocuta sp		**MI**	+
13521	Stenonema femoratum		**F**	+
17200	Caenis sp		**F**	+
22300	Argia sp		**F**	+
23700	Anax sp		**MT**	+
23909	Boyeria vinosa		**F**	+
50301	Chimarra aterrima		**MI**	+
50315	Chimarra obscura		**MI**	+
52200	Cheumatopsyche sp		**F**	+
52430	Ceratopsyche morosa group		**MI**	+
52530	Hydropsyche depravata group		**F**	+
53400	Protoptila sp		**I**	+
58505	Helicopsyche borealis		**MI**	+
59720	Triaenodes ignitus		**MI**	+
59970	Petrophila sp		**MI**	+
68708	Dubiraphia vittata group		**F**	+
69400	Stenelmis sp		**F**	+
70600	Antocha sp		**MI**	+
74100	Simulium sp		**F**	+
82730	Chironomus (C.) decorus group		**T**	+
82824	Cryptochironomus ponderosus		**F**	+
84210	Paratendipes albimanus or P. duplicatus		**F**	+
84750	Stictochironomus sp		**F**	+
87540	Hemerodromia sp		**F**	+
95100	Physella sp		**T**	+
96900	Ferrissia sp		**F**	+

No. Quantitative Taxa:	0	Total Taxa;	32
No. Qualitative Taxa:	32	ICI:	G
Number of Organisms:	0	Qual EPT:	11

River Code: **02-091** River: ***Grant Run*** Coll. Date: *07/31/2025* RM: **4.30**

Site ID: **GRR03** Location: *Dst. Meadows Dr. @Mt. Carmel Grove City - restoration reach* Sample:

Taxa Code	Taxa	CWH Taxa	Tol.	Qt./Ql.
01801	Turbellaria		**F**	+
03600	Oligochaeta		**T**	+
04666	Helobdella papillata		**MT**	+
04964	Erpobdella microstoma		**MT**	+
06201	Hyalella sp.		**F**	+
11200	Callibaetis sp		**MT**	+
17200	Caenis sp		**F**	+
22001	Coenagrionidae		**T**	+
28208	Erythemis simplicicollis		**MT**	+
29100	Tramea sp			+
42700	Belostoma sp		**T**	+
60900	Peltodytes sp		**MT**	+
65800	Berosus sp		**MT**	+
67800	Tropisternus sp		**T**	+
77355	Clinotanypus pinguis		**MT**	+
78401	Natarsia species A (sensu Roback, 1978)		**T**	+
95100	Physella sp		**T**	+
95907	Gyraulus (Torquis) parvus		**MT**	+
96280	Planorbella (Pierosoma) trivolvis		**MT**	+
98600	Sphaerium sp		**F**	+

No. Quantitative Taxa:	0	Total Taxa;	20
No. Qualitative Taxa:	20	ICI:	P
Number of Organisms:	0	Qual EPT:	2

River Code: **02-092** River: ***Scioto Big Run*** Coll. Date: *09/02/2025* RM: **0.80**

Site ID: **SBR01** Location: *Ust. Brown Run confluence - pull off of St. Rt. 104* Sample:

Taxa Code	Taxa	CWH Taxa	Tol.	Qt./Ql.
03600	Oligochaeta		**T**	+
04615	Actinobdella inequiannulata		**MT**	+
04964	Erpobdella microstoma		**MT**	+
08250	Faxonius rusticus		**F**	+
11120	Baetis flavistriga		**F**	+
11130	Baetis intercalaris		**F**	+
11670	Procloeon viridoculare		**MI**	+
13000	Leucrocuta sp		**MI**	+
13521	Stenonema femoratum		**F**	+
16700	Tricorythodes sp		**MI**	+
17200	Caenis sp		**F**	+
22300	Argia sp		**F**	+
50315	Chimarra obscura		**MI**	+
52200	Cheumatopsyche sp		**F**	+
74100	Simulium sp		**F**	+
77120	Ablabesmyia mallochi		**F**	+
77800	Helopelopia sp		**F**	+
78655	Procladius (Holotanypus) sp		**MT**	+
84540	Polypedilum (Tripodura) scalaenum group		**F**	+
84700	Stenochironomus sp		**F**	+
84750	Stictochironomus sp		**F**	+
85800	Tanytarsus sp		**F**	+
97601	Corbicula fluminea		**F**	+

No. Quantitative Taxa:	0	Total Taxa;	23
No. Qualitative Taxa:	23	ICI:	HF
Number of Organisms:	0	Qual EPT:	9

River Code: **02-092** River: ***Scioto Big Run*** Coll. Date: *09/02/2025* RM: **2.90**

Site ID: **SBR02** Location: *Hardy Parkway - Willow Creek Park* Sample:

Taxa Code	Taxa	CWH Taxa	Tol.	Qt./Ql.	
01801	Turbellaria		F	9	
01900	Nemertea		F	2	
03600	Oligochaeta		T	24	+
04964	Erpobdella microstoma		MT		+
08250	Faxonius rusticus		F		+
11120	Baetis flavistriga		F		+
11130	Baetis intercalaris		F	1	+
13000	Leucrocuta sp		MI		+
13521	Stenonema femoratum		F	27	+
21200	Calopteryx sp		F	2	+
22001	Coenagrionidae		T		+
22300	Argia sp		F	13	+
50315	Chimarra obscura		MI	3	+
52200	Cheumatopsyche sp		F	11	+
52430	Ceratopsyche morosa group		MI	1	+
69400	Stenelmis sp		F		+
77120	Ablabesmyia mallochi		F	7	+
77500	Conchapelopia sp		F	23	
77800	Helopelopia sp		F	11	+
78140	Labrundinia pilosella		F	4	+
78350	Meropelopia sp	X	F	3	
78450	Nilotanypus fimbriatus		F	6	
80360	Corynoneura floridaensis		MI	5	
80370	Corynoneura lobata		F	18	
81650	Parametriocnemus sp	X	F	3	
81825	Rheocricotopus (Psilocricotopus) robacki		F	7	
82121	Thienemanniella lobapodema		F	3	
82141	Thienemanniella xena		F	1	
82820	Cryptochironomus sp		F		+
83040	Dicrotendipes neomodestus		F	3	
84210	Paratendipes albimanus or P. duplicatus		F	10	
84315	Phaenopsectra flavipes		MT	7	
84460	Polypedilum (P.) fallax group		F	87	
84470	Polypedilum (P.) illinoense		T	14	+
84540	Polypedilum (Tripodura) scalaenum group		F	115	
84750	Stictochironomus sp		F		+
85500	Paratanytarsus sp		F	38	
85800	Tanytarsus sp		F	7	
85821	Tanytarsus glabrescens group sp 7		F	35	
89601	Muscidae				+
96900	Ferrissia sp		F	7	
97601	Corbicula fluminea		F	1	
97710	Dreissena polymorpha		F	5	

No. Quantitative Taxa:	34	Total Taxa;	43
No. Qualitative Taxa:	21	ICI:	HF
Number of Organisms:	513	Qual EPT:	7

Appendix Table C-4. Macroinvertebrate taxa report for sites in the ColsDWR srtudy area during 2025

River Code: **02-092** River: ***Scioto Big Run*** Coll. Date: *09/02/2025* RM: **4.48**

Site ID: **SBR03** Location: *U.S. Rt. 62 - access from Big Run Rd.* Sample:

Taxa Code	Taxa	CWH Taxa	Tol.	Qt./Ql.
03600	Oligochaeta		**T**	+
04935	Erpobdella punctata punctata		**MT**	+
11120	Baetis flavistriga		**F**	+
11130	Baetis intercalaris		**F**	+
13521	Stenonema femoratum		**F**	+
21200	Calopteryx sp		**F**	+
22300	Argia sp		**F**	+
50315	Chimarra obscura		**MI**	+
52200	Cheumatopsyche sp		**F**	+
52430	Ceratopsyche morosa group		**MI**	+
52530	Hydropsyche depravata group		**F**	+
68901	Macronychus glabratus		**F**	+
69400	Stenelmis sp		**F**	+
74100	Simulium sp		**F**	+
77120	Ablabesmyia mallochi		**F**	+
77500	Conchapelopia sp		**F**	+
77800	Helopelopia sp		**F**	+
79400	Zavrelimyia sp	**X**	**F**	+
81650	Parametriocnemus sp	**X**	**F**	+
82820	Cryptochironomus sp		**F**	+
84210	Paratendipes albimanus or P. duplicatus		**F**	+
84300	Phaenopsectra obediens group		**F**	+
84450	Polypedilum (Uresipedilum) flavum		**F**	+
84470	Polypedilum (P.) illinoense		**T**	+
84540	Polypedilum (Tripodura) scalaenum group		**F**	+
84750	Stictochironomus sp		**F**	+
85800	Tanytarsus sp		**F**	+

No. Quantitative Taxa:	0	Total Taxa;	27
No. Qualitative Taxa:	27	ICI:	HF
Number of Organisms:	0	Qual EPT:	7

Appendix Table C-4. Macroinvertebrate taxa report for sites in the ColsDWR srtudy area during 2025

River Code: **02-092** River: ***Scioto Big Run*** Coll. Date: *07/29/2025* RM: **6.10**

Site ID: **SBR04** Location: *Demorest Rd.* Sample:

Taxa Code	Taxa	CWH Taxa	Tol.	Qt./Ql.
01801	Turbellaria		**F**	+
03600	Oligochaeta		**T**	+
04964	Erpobdella microstoma		**MT**	+
06201	Hyalella sp.		**F**	+
08250	Faxonius rusticus		**F**	+
11120	Baetis flavistriga		**F**	+
11130	Baetis intercalaris		**F**	+
13521	Stenonema femoratum		**F**	+
21200	Calopteryx sp		**F**	+
21300	Hetaerina sp		**F**	+
50301	Chimarra aterrima		**MI**	+
50315	Chimarra obscura		**MI**	+
51600	Polycentropus group		**MI**	+
52200	Cheumatopsyche sp		**F**	+
52430	Ceratopsyche morosa group		**MI**	+
52530	Hydropsyche depravata group		**F**	+
69400	Stenelmis sp		**F**	+
74100	Simulium sp		**F**	+
77120	Ablabesmyia mallochi		**F**	+
82401	Chironominae			+
84750	Stictochironomus sp		**F**	+
95100	Physella sp		**T**	+

No. Quantitative Taxa:	0	Total Taxa;	22
No. Qualitative Taxa:	22	ICI:	HF
Number of Organisms:	0	Qual EPT:	9

River Code: **02-092** River: ***Scioto Big Run*** Coll. Date: *07/29/2025* RM: **7.17**

Site ID: **SBR05** Location: *Big Run Park* Sample:

Taxa Code	Taxa	CWH Taxa	Tol.	Qt./Ql.
03600	Oligochaeta		**T**	+
04935	Erpobdella punctata punctata		**MT**	+
11120	Baetis flavistriga		**F**	+
11130	Baetis intercalaris		**F**	+
13521	Stenonema femoratum		**F**	+
21200	Calopteryx sp		**F**	+
21300	Hetaerina sp		**F**	+
22001	Coenagrionidae		**T**	+
23909	Boyeria vinosa		**F**	+
50301	Chimarra aterrima		**MI**	+
50315	Chimarra obscura		**MI**	+
69400	Stenelmis sp		**F**	+
71900	Tipula sp		**F**	+
74100	Simulium sp		**F**	+
77120	Ablabesmyia mallochi		**F**	+
77500	Conchapelopia sp		**F**	+
82820	Cryptochironomus sp		**F**	+
84470	Polypedilum (P.) illinoense		**T**	+
84750	Stictochironomus sp		**F**	+

No. Quantitative Taxa:	0	Total Taxa;	19
No. Qualitative Taxa:	19	ICI:	LF
Number of Organisms:	0	Qual EPT:	5

River Code: **02-092** River: ***Scioto Big Run*** Coll. Date: *07/29/2025* RM: **8.50**

Site ID: **SBR06** Location: *Ust. I-270 W. of Grove City - Cherry Creek Parkway* Sample:

Taxa Code	Taxa	CWH Taxa	Tol.	Qt./Ql.
01801	Turbellaria		**F**	+
03600	Oligochaeta		**T**	+
04660	Helobdella sp		**MT**	+
04935	Erpobdella punctata punctata		**MT**	+
04964	Erpobdella microstoma		**MT**	+
06201	Hyalella sp.		**F**	+
08200	Faxonius sp		**F**	+
11120	Baetis flavistriga		**F**	+
13521	Stenonema femoratum		**F**	+
21200	Calopteryx sp		**F**	+
22001	Coenagrionidae		**T**	+
23600	Aeshna sp		**MT**	+
50301	Chimarra aterrima		**MI**	+
52530	Hydropsyche depravata group		**F**	+
59310	Mystacides sepulchralis		**MI**	+
74100	Simulium sp		**F**	+
78401	Natarsia species A (sensu Roback, 1978)		**T**	+
81825	Rheocricotopus (Psilocricotopus) robacki		**F**	+
82820	Cryptochironomus sp		**F**	+
84210	Paratendipes albimanus or P. duplicatus		**F**	+
84300	Phaenopsectra obediens group		**F**	+
95100	Physella sp		**T**	+
97601	Corbicula fluminea		**F**	+

No. Quantitative Taxa:	0	Total Taxa;	23
No. Qualitative Taxa:	23	ICI:	HF
Number of Organisms:	0	Qual EPT:	4

River Code: **02-093** River: ***Marsh Run*** Coll. Date: *07/30/2025* RM: **0.20**

Site ID: **MR01** Location: *Dst. St. Rt. 104* Sample:

Taxa Code	Taxa	CWH Taxa	Tol.	Qt./Ql.
01801	Turbellaria		**F**	+
03600	Oligochaeta		**T**	+
04935	Erpobdella punctata punctata		**MT**	+
04964	Erpobdella microstoma		**MT**	+
06201	Hyalella sp.		**F**	+
06700	Crangonyx sp		**MT**	+
08250	Faxonius rusticus		**F**	+
11120	Baetis flavistriga		**F**	+
11130	Baetis intercalaris		**F**	+
13521	Stenonema femoratum		**F**	+
17200	Caenis sp		**F**	+
21200	Calopteryx sp		**F**	+
22001	Coenagrionidae		**T**	+
52200	Cheumatopsyche sp		**F**	+
52430	Ceratopsyche morosa group		**MI**	+
52530	Hydropsyche depravata group		**F**	+
60900	Peltodytes sp		**MT**	+
71900	Tipula sp		**F**	+
74100	Simulium sp		**F**	+
77120	Ablabesmyia mallochi		**F**	+
77500	Conchapelopia sp		**F**	+
82820	Cryptochironomus sp		**F**	+
83820	Microtendipes "caelum" (sensu Simpson & Bode, 1980)		**MI**	+
85500	Paratanytarsus sp		**F**	+
85615	Rheotanytarsus pellucidus		**MI**	+
85800	Tanytarsus sp		**F**	+
95100	Physella sp		**T**	+
97601	Corbicula fluminea		**F**	+

No. Quantitative Taxa:	0	Total Taxa;	28
No. Qualitative Taxa:	28	ICI:	HF
Number of Organisms:	0	Qual EPT:	7

Appendix Table C-4. Macroinvertebrate taxa report for sites in the ColsDWR srtudy area during 2025

River Code: **02-093** River: ***Marsh Run*** Coll. Date: *07/30/2025* RM: **2.00**

Site ID: **MR02** Location: *Grove City - Gantz Park* Sample:

Taxa Code	Taxa	CWH Taxa	Tol.	Qt./Ql.
01801	Turbellaria		**F**	+
03600	Oligochaeta		**T**	+
06201	Hyalella sp.		**F**	+
06700	Crangonyx sp		**MT**	+
11120	Baetis flavistriga		**F**	+
11130	Baetis intercalaris		**F**	+
21200	Calopteryx sp		**F**	+
21300	Hetaerina sp		**F**	+
45400	Trichocorixa sp		**MT**	+
50301	Chimarra aterrima		**MI**	+
52200	Cheumatopsyche sp		**F**	+
52530	Hydropsyche depravata group		**F**	+
68700	Dubiraphia sp		**F**	+
69400	Stenelmis sp		**F**	+
74100	Simulium sp		**F**	+
77120	Ablabesmyia mallochi		**F**	+
81650	Parametriocnemus sp	**X**	**F**	+
81825	Rheocricotopus (Psilocricotopus) robacki		**F**	+
84210	Paratendipes albimanus or P. duplicatus		**F**	+
85800	Tanytarsus sp		**F**	+

No. Quantitative Taxa:	0	Total Taxa;	20
No. Qualitative Taxa:	20	ICI:	LF
Number of Organisms:	0	Qual EPT:	4

Appendix Table C-4. Macroinvertebrate taxa report for sites in the ColsDWR srtudy area during 2025

River Code: **02-243** River: ***Republican Run*** Coll. Date: *07/23/2025* RM: **0.25**

Site ID: **REP01** Location: *Ust. St. Rt. 104 - at Bike Bridge* Sample:

Taxa Code	Taxa	CWH Taxa	Tol.	Qt./Ql.
00401	Spongillidae		**F**	+
01801	Turbellaria		**F**	+
03600	Oligochaeta		**T**	+
06201	Hyalella sp.		**F**	+
11120	Baetis flavistriga		**F**	+
11130	Baetis intercalaris		**F**	+
13521	Stenonema femoratum		**F**	+
17200	Caenis sp		**F**	+
22001	Coenagrionidae		**T**	+
23600	Aeshna sp		**MT**	+
50315	Chimarra obscura		**MI**	+
52200	Cheumatopsyche sp		**F**	+
52430	Ceratopsyche morosa group		**MI**	+
52530	Hydropsyche depravata group		**F**	+
59720	Triaenodes ignitus		**MI**	+
65800	Berosus sp		**MT**	+
68700	Dubiraphia sp		**F**	+
69400	Stenelmis sp		**F**	+
74100	Simulium sp		**F**	+
77120	Ablabesmyia mallochi		**F**	+
77500	Conchapelopia sp		**F**	+
77800	Helopelopia sp		**F**	+
78600	Pentaneura inconspicua		**F**	+
84210	Paratendipes albimanus or P. duplicatus		**F**	+
95100	Physella sp		**T**	+

No. Quantitative Taxa:	0	Total Taxa;	25
No. Qualitative Taxa:	25	ICI:	HF
Number of Organisms:	0	Qual EPT:	9

River Code: **02-243** River: ***Republican Run*** Coll. Date: *07/23/2025* RM: **1.38**

Site ID: **REP02** Location: *Dst. Buckeye Parkway* Sample:

Taxa Code	Taxa	CWH Taxa	Tol.	Qt./Ql.
01801	Turbellaria		**F**	+
03360	Plumatella sp		**F**	+
03600	Oligochaeta		**T**	+
04664	Helobdella stagnalis		**T**	+
04964	Erpobdella microstoma		**MT**	+
05900	Lirceus sp		**MT**	+
06201	Hyalella sp.		**F**	+
06700	Crangonyx sp		**MT**	+
11120	Baetis flavistriga		**F**	+
11130	Baetis intercalaris		**F**	+
13521	Stenonema femoratum		**F**	+
21001	Calopterygidae		**F**	+
22001	Coenagrionidae		**T**	+
23600	Aeshna sp		**MT**	+
50315	Chimarra obscura		**MI**	+
51600	Polycentropus group		**MI**	+
52200	Cheumatopsyche sp		**F**	+
52430	Ceratopsyche morosa group		**MI**	+
52530	Hydropsyche depravata group		**F**	+
53800	Hydroptila sp		**F**	+
59310	Mystacides sepulchralis		**MI**	+
60900	Peltodytes sp		**MT**	+
67800	Tropisternus sp		**T**	+
69400	Stenelmis sp		**F**	+
74100	Simulium sp		**F**	+
77120	Ablabesmyia mallochi		**F**	+
77500	Conchapelopia sp		**F**	+
77800	Helopelopia sp		**F**	+
80410	Cricotopus (C.) sp		**F**	+
81825	Rheocricotopus (Psilocricotopus) robacki		**F**	+
82820	Cryptochironomus sp		**F**	+
84315	Phaenopsectra flavipes		**MT**	+
84470	Polypedilum (P.) illinoense		**T**	+
85500	Paratanytarsus sp		**F**	+
95100	Physella sp		**T**	+

No. Quantitative Taxa:	0	Total Taxa;	35
No. Qualitative Taxa:	35	ICI:	MG
Number of Organisms:	0	Qual EPT:	9

River Code: **02-243** River: ***Republican Run*** Coll. Date: *07/24/2025* RM: **3.80**

Site ID: **REP03** Location: *Swearington Park - Grove City* Sample:

Taxa Code	Taxa	CWH Taxa	Tol.	Qt./Ql.
01801	Turbellaria		**F**	+
03600	Oligochaeta		**T**	+
04666	Helobdella papillata		**MT**	+
04935	Erpobdella punctata punctata		**MT**	+
05900	Lirceus sp		**MT**	+
06201	Hyalella sp.		**F**	+
06700	Crangonyx sp		**MT**	+
07820	Cambarus (Cambarus) sp A		**MT**	+
11120	Baetis flavistriga		**F**	+
50301	Chimarra aterrima		**MI**	+
52200	Cheumatopsyche sp		**F**	+
52530	Hydropsyche depravata group		**F**	+
74100	Simulium sp		**F**	+
77500	Conchapelopia sp		**F**	+
84470	Polypedilum (P.) illinoense		**T**	+
84700	Stenochironomus sp		**F**	+
85625	Rheotanytarsus sp		**F**	+

No. Quantitative Taxa:	0	Total Taxa;	17
No. Qualitative Taxa:	17	ICI:	LF
Number of Organisms:	0	Qual EPT:	4

River Code: **02-243** River: ***Republican Run*** Coll. Date: *07/29/2025* RM: **5.40**

Site ID: **REP04** Location: *Berry Family Conservation Area near Beulah Park* Sample:

Taxa Code	Taxa	CWH Taxa	Tol.	Qt./Ql.
01801	Turbellaria		**F**	+
03600	Oligochaeta		**T**	+
04964	Erpobdella microstoma		**MT**	+
06201	Hyalella sp.		**F**	+
07800	Cambarus sp			+
17200	Caenis sp		**F**	+
29000	Sympetrum sp		**T**	+
52200	Cheumatopsyche sp		**F**	+
59310	Mystacides sepulchralis		**MI**	+
60900	Peltodytes sp		**MT**	+
65800	Berosus sp		**MT**	+
69400	Stenelmis sp		**F**	+
74100	Simulium sp		**F**	+
77500	Conchapelopia sp		**F**	+
78600	Pentaneura inconspicua		**F**	+
78655	Procladius (Holotanypus) sp		**MT**	+
78680	Procladius (Psilotanypus) bellus		**MT**	+
78702	Psectrotanypus dyari		**VT**	+
80480	Cricotopus (Isocladius) sp		**MT**	+
82820	Cryptochironomus sp		**F**	+
83040	Dicrotendipes neomodestus		**F**	+
84470	Polypedilum (P.) illinoense		**T**	+
92615	Cipangopaludina japonica		**MT**	+
95100	Physella sp		**T**	+
95907	Gyraulus (Torquis) parvus		**MT**	+
96120	Menetus (Micromenetus) dilatatus		**MT**	+

No. Quantitative Taxa:	0	Total Taxa;	26
No. Qualitative Taxa:	26	ICI:	LF
Number of Organisms:	0	Qual EPT:	2

River Code: **02-244** River: ***South Branch Republican Run*** Coll. Date: *07/28/2025* RM: **0.02**

Site ID: **REP05** Location: *Briar Hill Dr.* Sample:

Taxa Code	Taxa	CWH Taxa	Tol.	Qt./Ql.
01801	Turbellaria		**F**	+
03600	Oligochaeta		**T**	+
04935	Erpobdella punctata punctata		**MT**	+
06700	Crangonyx sp		**MT**	+
11120	Baetis flavistriga		**F**	+
21001	Calopterygidae		**F**	+
50301	Chimarra aterrima		**MI**	+
50315	Chimarra obscura		**MI**	+
51600	Polycentropus group		**MI**	+
52200	Cheumatopsyche sp		**F**	+
52530	Hydropsyche depravata group		**F**	+
71900	Tipula sp		**F**	+
74100	Simulium sp		**F**	+
77500	Conchapelopia sp		**F**	+
80420	Cricotopus (C.) bicinctus		**T**	+
84470	Polypedilum (P.) illinoense		**T**	+
85500	Paratanytarsus sp		**F**	+
85615	Rheotanytarsus pellucidus		**MI**	+
85625	Rheotanytarsus sp		**F**	+

No. Quantitative Taxa:	0	Total Taxa;	19
No. Qualitative Taxa:	19	ICI:	HF
Number of Organisms:	0	Qual EPT:	6

River Code: **02-256** River: ***Trib. To Grant Run (RM 2.77)*** Coll. Date: *07/28/2025* RM: **1.32**

Site ID: **GRR05** Location: *Meijer Store St. Rt. 665 frontage - overwide ditch restoration* Sample:

Taxa Code	Taxa	CWH Taxa	Tol.	Qt./Ql.
01801	Turbellaria		**F**	+
03600	Oligochaeta		**T**	+
04666	Helobdella papillata		**MT**	+
04935	Erpobdella punctata punctata		**MT**	+
06201	Hyalella sp.		**F**	+
11120	Baetis flavistriga		**F**	+
11130	Baetis intercalaris		**F**	+
11150	Labiobaetis propinquus		**MI**	+
11200	Callibaetis sp		**MT**	+
22001	Coenagrionidae		**T**	+
22300	Argia sp		**F**	+
60900	Peltodytes sp		**MT**	+
65800	Berosus sp		**MT**	+
68702	Dubiraphia bivittata		**F**	+
74100	Simulium sp		**F**	+
77120	Ablabesmyia mallochi		**F**	+
80410	Cricotopus (C.) sp		**F**	+
80420	Cricotopus (C.) bicinctus		**T**	+
85500	Paratanytarsus sp		**F**	+
93200	Hydrobiidae		**F**	+
95100	Physella sp		**T**	+
96120	Menetus (Micromenetus) dilatatus		**MT**	+
98600	Sphaerium sp		**F**	+

No. Quantitative Taxa:	0	Total Taxa;	23
No. Qualitative Taxa:	23	ICI:	P
Number of Organisms:	0	Qual EPT:	4

River Code: **02-256** River: ***Trib. To Grant Run (RM 2.77)*** Coll. Date: *07/24/2025* RM: **1.50**

Site ID: **GRR04** Location: *Ust. Hoover Rd.* Sample:

Taxa Code	Taxa	CWH Taxa	Tol.	Qt./Ql.
01801	Turbellaria		**F**	+
03600	Oligochaeta		**T**	+
04666	Helobdella papillata		**MT**	+
04935	Erpobdella punctata punctata		**MT**	+
06201	Hyalella sp.		**F**	+
22001	Coenagrionidae		**T**	+
52200	Cheumatopsyche sp		**F**	+
60900	Peltodytes sp		**MT**	+
77800	Helopelopia sp		**F**	+
93200	Hydrobiidae		**F**	+
95100	Physella sp		**T**	+
96120	Menetus (Micromenetus) dilatatus		**MT**	+
98200	Pisidium sp		**MT**	+
98600	Sphaerium sp		**F**	+

No. Quantitative Taxa:	0	Total Taxa;	14
No. Qualitative Taxa:	14	ICI:	P
Number of Organisms:	0	Qual EPT:	1

Appendix Table C-4. Macroinvertebrate taxa report for sites in the ColsDWR srtudy area during 2025

River Code: **02-852** River: ***Unnamed Tributary Scioto Big Run @ RM 6.66*** Coll. Date: *07/22/2025* RM: **0.30**

Site ID: **SBR07** Location: *at River Bend Park* Sample:

Taxa Code	Taxa	CWH Taxa	Tol.	Qt./Ql.
01801	Turbellaria		**F**	+
03600	Oligochaeta		**T**	+
04935	Erpobdella punctata punctata		**MT**	+
11120	Baetis flavistriga		**F**	+
11130	Baetis intercalaris		**F**	+
13521	Stenonema femoratum		**F**	+
21001	Calopterygidae		**F**	+
50301	Chimarra aterrima		**MI**	+
50315	Chimarra obscura		**MI**	+
52200	Cheumatopsyche sp		**F**	+
52530	Hydropsyche depravata group		**F**	+
69400	Stenelmis sp		**F**	+
71900	Tipula sp		**F**	+
74100	Simulium sp		**F**	+
77120	Ablabesmyia mallochi		**F**	+
77800	Helopelopia sp		**F**	+
78401	Natarsia species A (sensu Roback, 1978)		**T**	+
81650	Parametriocnemus sp	**X**	**F**	+
82820	Cryptochironomus sp		**F**	+
83840	Microtendipes pedellus group		**F**	+
84210	Paratendipes albimanus or P. duplicatus		**F**	+
84450	Polypedilum (Uresipedilum) flavum		**F**	+
84540	Polypedilum (Tripodura) scalaenum group		**F**	+
84700	Stenochironomus sp		**F**	+
85500	Paratanytarsus sp		**F**	+
85615	Rheotanytarsus pellucidus		**MI**	+
85625	Rheotanytarsus sp		**F**	+
87510	Neoplasta sp	**X**	**MI**	+

No. Quantitative Taxa:	0	Total Taxa;	28
No. Qualitative Taxa:	28	ICI:	MG
Number of Organisms:	0	Qual EPT:	7

Appendix Table C-4. Macroinvertebrate taxa report for sites in the ColsDWR srtudy area during 2025

River Code: **02-852** River: ***Unnamed Tributary Scioto Big Run @ RM 6.66*** Coll. Date: *07/23/2025* RM: **1.50**

Site ID: **SBR08** Location: *Southwestern Rd.* Sample:

Taxa Code	Taxa	CWH Taxa	Tol.	Qt./Ql.
01801	Turbellaria		**F**	+
03600	Oligochaeta		**T**	+
04935	Erpobdella punctata punctata		**MT**	+
11120	Baetis flavistriga		**F**	+
13521	Stenonema femoratum		**F**	+
17200	Caenis sp		**F**	+
23600	Aeshna sp		**MT**	+
50301	Chimarra aterrima		**MI**	+
52200	Cheumatopsyche sp		**F**	+
52530	Hydropsyche depravata group		**F**	+
60900	Peltodytes sp		**MT**	+
68700	Dubiraphia sp		**F**	+
69400	Stenelmis sp		**F**	+
74100	Simulium sp		**F**	+
81650	Parametriocnemus sp	**X**	**F**	+
82820	Cryptochironomus sp		**F**	+
84450	Polypedilum (Uresipedilum) flavum		**F**	+
84540	Polypedilum (Tripodura) scalaenum group		**F**	+
84700	Stenochironomus sp		**F**	+
85625	Rheotanytarsus sp		**F**	+
85800	Tanytarsus sp		**F**	+
85840	Tanytarsus sepp		**F**	+
95100	Physella sp		**T**	+
96120	Menetus (Micromenetus) dilatatus		**MT**	+
98200	Pisidium sp		**MT**	+

No. Quantitative Taxa:	0	Total Taxa;	25
No. Qualitative Taxa:	25	ICI:	HF
Number of Organisms:	0	Qual EPT:	6

River Code: **02-853** River: ***Unnamed Tributary Scioto Big Run @ RM 3.59 (Early*** Coll. Date: *07/30/2025* RM: **0.09**

Site ID: **SBR09** Location: *Ust. Gantz Rd. at Scioto Big Run confluence* Sample:

Taxa Code	Taxa	CWH Taxa	Tol.	Qt./Ql.
01801	Turbellaria		**F**	+
03600	Oligochaeta		**T**	+
11120	Baetis flavistriga		**F**	+
21200	Calopteryx sp		**F**	+
21300	Hetaerina sp		**F**	+
22001	Coenagrionidae		**T**	+
22300	Argia sp		**F**	+
50301	Chimarra aterrima		**MI**	+
52200	Cheumatopsyche sp		**F**	+
71900	Tipula sp		**F**	+
84540	Polypedilum (Tripodura) scalaenum group		**F**	+
84700	Stenochironomus sp		**F**	+
95100	Physella sp		**T**	+

No. Quantitative Taxa:	0	Total Taxa;	13
No. Qualitative Taxa:	13	ICI:	P
Number of Organisms:	0	Qual EPT:	3

River Code: **02-853** River: ***Unnamed Tributary Scioto Big Run @ RM 3.59 (Early*** Coll. Date: *07/30/2025* RM: **1.80**

Site ID: **SBR10** Location: Sample:

Taxa Code	Taxa	CWH Taxa	Tol.	Qt./Ql.
03600	Oligochaeta		**T**	+
06201	Hyalella sp.		**F**	+
11120	Baetis flavistriga		**F**	+
22001	Coenagrionidae		**T**	+
22300	Argia sp		**F**	+
60900	Peltodytes sp		**MT**	+
74100	Simulium sp		**F**	+
95100	Physella sp		**T**	+

Taxa Code	Taxa	CWH Taxa	Tol.	Qt./Ql.

No. Quantitative Taxa:	0	Total Taxa;	8
No. Qualitative Taxa:	8	ICI:	VP
Number of Organisms:	0	Qual EPT:	2

River Code: **02-854** River: ***Unnamed Tributary Scioto Big Run @ RM 0.70*** Coll. Date: *07/30/2025* RM: **0.21**

Site ID: **SBR11** Location: *St. Rt. 104 - pull off same as SBR01* Sample:

Taxa Code	Taxa	CWH Taxa	Tol.	Qt./Ql.
01801	Turbellaria		**F**	+
03600	Oligochaeta		**T**	+
04935	Erpobdella punctata punctata		**MT**	+
06700	Crangonyx sp		**MT**	+
08250	Faxonius rusticus		**F**	+
11120	Baetis flavistriga		**F**	+
11130	Baetis intercalaris		**F**	+
13521	Stenonema femoratum		**F**	+
21200	Calopteryx sp		**F**	+
23909	Boyeria vinosa		**F**	+
50301	Chimarra aterrima		**MI**	+
52200	Cheumatopsyche sp		**F**	+
52530	Hydropsyche depravata group		**F**	+
69400	Stenelmis sp		**F**	+
74100	Simulium sp		**F**	+
84750	Stictochironomus sp		**F**	+

No. Quantitative Taxa:	0	Total Taxa;	16
No. Qualitative Taxa:	16	ICI:	HF
Number of Organisms:	0	Qual EPT:	5

River Code: **02-855** River: ***Gantz Run*** Coll. Date: *07/29/2025* RM: **1.00**

Site ID: **GTZ01** Location: *Ust. St. Rt. 104 @Thrailkill Rd.* Sample:

Taxa Code	Taxa	CWH Taxa	Tol.	Qt./Ql.
04686	Placobdella papillifera		**MT**	+
06700	Crangonyx sp		**MT**	+
11120	Baetis flavistriga		**F**	+
13521	Stenonema femoratum		**F**	+
21200	Calopteryx sp		**F**	+
23600	Aeshna sp		**MT**	+
27500	Somatochlora sp		**MT**	+
50301	Chimarra aterrima		**MI**	+
52200	Cheumatopsyche sp		**F**	+
52530	Hydropsyche depravata group		**F**	+
68901	Macronychus glabratus		**F**	+
69400	Stenelmis sp		**F**	+
77800	Helopelopia sp		**F**	+
84210	Paratendipes albimanus or P. duplicatus		**F**	+
84700	Stenochironomus sp		**F**	+
84750	Stictochironomus sp		**F**	+

No. Quantitative Taxa:	0	Total Taxa;	16
No. Qualitative Taxa:	16	ICI:	HF
Number of Organisms:	0	Qual EPT:	4

Appendix Table C-4. Macroinvertebrate taxa report for sites in the ColsDWR srtudy area during 2025

River Code: **02-856** River: ***Unnamed Tributary @ RM 0.73 (Billy Joe Run)*** Coll. Date: *07/23/2025* RM: **0.10**

Site ID: **REP06** Location: *Pinnacle Club Drive @Pinnacle Club Park* Sample:

Taxa Code	Taxa	CWH Taxa	Tol.	Qt./Ql.
01801	Turbellaria		**F**	+
06201	Hyalella sp.		**F**	+
06700	Crangonyx sp		**MT**	+
11120	Baetis flavistriga		**F**	+
22001	Coenagrionidae		**T**	+
23600	Aeshna sp		**MT**	+
23909	Boyeria vinosa		**F**	+
52200	Cheumatopsyche sp		**F**	+
68708	Dubiraphia vittata group		**F**	+
69400	Stenelmis sp		**F**	+
74100	Simulium sp		**F**	+
77500	Conchapelopia sp		**F**	+
77800	Helopelopia sp		**F**	+
82820	Cryptochironomus sp		**F**	+
83158	Endochironomus nigricans		**MT**	+
84315	Phaenopsectra flavipes		**MT**	+

No. Quantitative Taxa:	0	Total Taxa;	16
No. Qualitative Taxa:	16	ICI:	P
Number of Organisms:	0	Qual EPT:	2

APPENDIX D-1: 2025 QHEI Scores and Metrics

APPENDIX D-2: 2025 QHEI and HHEI Field Sheets

Qualitative Habitat Evaluation Index and Use Assessment Field Sheet

OHEI Score: 82 ✓

Stream & Location: Scioto Big Run wit Brown Run Confluence RM: 0.8 Date: 08/22/2025

Scorers Full Name & Affiliation: Edward Hicks, MBS

River Code: 02-092- STORET #: SBRQ1 Lat./Long. (NAD 83 - decimal °): 39.8897 / 83.0258 Office verified location ☐

1] SUBSTRATE

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

BEST TYPES	POOL	RIFFLE	OTHER TYPES	POOL	RIFFLE
☐ ☐ BLDR /SLABS [10]			☐ ☐ HARDPAN [4]	5	
☐ ☑ BOULDER [9]	20	30	☐ ☐ DETRITUS [3]		
☐ ☐ COBBLE [8]	10	30	☐ ☐ MUCK [2]		
☐ ☐ GRAVEL [7]	10	20	☐ ☐ SILT [2]		
☐ ☑ SAND [6]	50	10	☐ ☐ ARTIFICIAL [0]		
☐ ☐ BEDROCK [5]	5	10	(Score natural substrates; ignore sludge from point-sources)		

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

Check ONE (Or 2 & average)

ORIGIN
- ☑ LIMESTONE [1]
- ☑ TILLS [1]
- ☐ WETLANDS [0]
- ☐ HARDPAN [0]
- ☐ SANDSTONE [0]
- ☐ RIP/RAP [0]
- ☐ LACUSTURINE [0]
- ☐ SHALE [-1]
- ☐ COAL FINES [-2]

QUALITY

SILT
- ☐ HEAVY [-2]
- ☐ MODERATE [-1]
- ☐ NORMAL [0]
- ☑ FREE [1]

EMBEDDEDNESS
- ☐ EXTENSIVE [-2]
- ☐ MODERATE [-1]
- ☑ NORMAL [0]
- ☐ NONE [1]

Substrate 19 / Maximum 20

Comments

2] INSTREAM COVER

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

2 UNDERCUT BANKS [1]	2 POOLS > 70cm [2]	0 OXBOWS, BACKWATERS [1]
0 OVERHANGING VEGETATION [1]	1 ROOTWADS [1]	0 AQUATIC MACROPHYTES [1]
1 SHALLOWS (IN SLOW WATER) [1]	3 BOULDERS [1]	1 LOGS OR WOODY DEBRIS [1]
1 ROOTMATS [1]		

AMOUNT

Check ONE (Or 2 & average)
- ☐ EXTENSIVE >75% [11]
- ☑ MODERATE 25-75% [7]
- ☐ SPARSE 5-<25% [3]
- ☐ NEARLY ABSENT <5% [1]

Cover Maximum 20: 15

Comments

3] CHANNEL MORPHOLOGY

Check ONE in each category (Or 2 & average)

SINUOSITY
- ☐ HIGH [4]
- ☐ MODERATE [3]
- ☑ LOW [2]
- ☐ NONE [1]

DEVELOPMENT
- ☑ EXCELLENT [7]
- ☐ GOOD [5]
- ☐ FAIR [3]
- ☐ POOR [1]

CHANNELIZATION
- ☐ NONE [6]
- ☐ RECOVERED [4]
- ☑ RECOVERING [3]
- ☐ RECENT OR NO RECOVERY [1]

STABILITY
- ☑ HIGH [3]
- ☐ MODERATE [2]
- ☐ LOW [1]

Channel Maximum 20: 15

Comments

4] BANK EROSION AND RIPARIAN ZONE

Check ONE in each category for EACH BANK (Or 2 per bank & average)

River right looking downstream

EROSION

L	R	
☑	☑	NONE / LITTLE [3]
☐	☐	MODERATE [2]
☐	☐	HEAVY / SEVERE [1]

RIPARIAN WIDTH

L	R	
☐	☐	WIDE > 50m [4]
☐	☐	MODERATE 10-50m [3]
☑	☑	NARROW 5-10m [2]
☐	☐	VERY NARROW < 5m [1]
☐	☐	NONE [0]

FLOOD PLAIN QUALITY

L	R	
☐	☐	FOREST, SWAMP [3]
☐	☐	SHRUB OR OLD FIELD [2]
☐	☐	RESIDENTIAL, PARK, NEW FIELD [1]
☐	☐	FENCED PASTURE [1]
☐	☐	OPEN PASTURE, ROWCROP [0]
☐	☐	CONSERVATION TILLAGE [1]
☐	☐	URBAN OR INDUSTRIAL [0]
☑	☑	MINING / CONSTRUCTION [0]

Indicate predominant land use(s) past 100m riparian.

Riparian Maximum 10: 5

Comments

5] POOL / GLIDE AND RIFFLE / RUN QUALITY

MAXIMUM DEPTH

Check ONE (ONLY!)
- ☑ > 1m [6]
- ☐ 0.7-<1m [4]
- ☐ 0.4-<0.7m [2]
- ☐ 0.2-<0.4m [1]
- ☐ < 0.2m [0]

CHANNEL WIDTH

Check ONE (Or 2 & average)
- ☑ POOL WIDTH > RIFFLE WIDTH [2]
- ☐ POOL WIDTH = RIFFLE WIDTH [1]
- ☐ POOL WIDTH < RIFFLE WIDTH [0]

CURRENT VELOCITY

Check ALL that apply
- ☐ TORRENTIAL [-1]
- ☐ VERY FAST [1]
- ☑ FAST [1]
- ☑ MODERATE [1]
- ☑ SLOW [1]
- ☐ INTERSTITIAL [-1]
- ☐ INTERMITTENT [-2]
- ☑ EDDIES [1]

Indicate for reach - pools and riffles.

Recreation Potential
Primary Contact
Secondary Contact
(circle one and comment on back)

Pool / Current Maximum 12: 12

Comments

Indicate for functional riffles; Best areas must be large enough to support a population of riffle-obligate species: ☐ NO RIFFLE [metric=0]

Check ONE (Or 2 & average).

RIFFLE DEPTH
- ☐ BEST AREAS > 10cm [2]
- ☑ BEST AREAS 5-10cm [1]
- ☐ BEST AREAS < 5cm [metric=0]

RUN DEPTH
- ☐ MAXIMUM > 50cm [2]
- ☑ MAXIMUM < 50cm [1]

RIFFLE / RUN SUBSTRATE
- ☑ STABLE (e.g., Cobble, Boulder) [2]
- ☐ MOD. STABLE (e.g., Large Gravel) [1]
- ☐ UNSTABLE (e.g., Fine Gravel, Sand) [0]

RIFFLE / RUN EMBEDDEDNESS
- ☑ NONE [2]
- ☐ LOW [1]
- ☐ MODERATE [0]
- ☐ EXTENSIVE [-1]

Riffle / Run Maximum 8: 6

Comments

6] GRADIENT

(8.69 ft/mi) ☐ VERY LOW - LOW [2-4] ☑ MODERATE [6-10] 10 ☐ HIGH - VERY HIGH [10-6]

DRAINAGE AREA (19.00 mi²)

%POOL: 30 %GLIDE: %RUN: 30 %RIFFLE: 40

Gradient Maximum 10: 10

06/16/06

EPA 4520

A] SAMPLED REACH

Check ALL that apply

METHOD

- ☐ BOAT
- ☐ WADE
- ☑ L. LINE
- ☐ OTHER

DISTANCE

- ☐ 0.5 Km
- ☐ 0.2 Km
- ☑ 0.15 Km
- ☐ 0.12 Km
- ☐ OTHER

meters

STAGE

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

CLARITY

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

CANOPY

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

pass 1st _____ cm

pass 2nd _____ cm

C] RECREATION

POOL ☐ AREA >100ft² ☐ DEPTH >3ft

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

Typical of post Jackson park reach. Very steep banks. Check in @ Shelley office.
Standard Rocky PPE required. Awesome substrate if a bit embedded

B] AESTHETICS

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

D] MAINTENANCE

Circle some & COMMENT

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

E] ISSUES

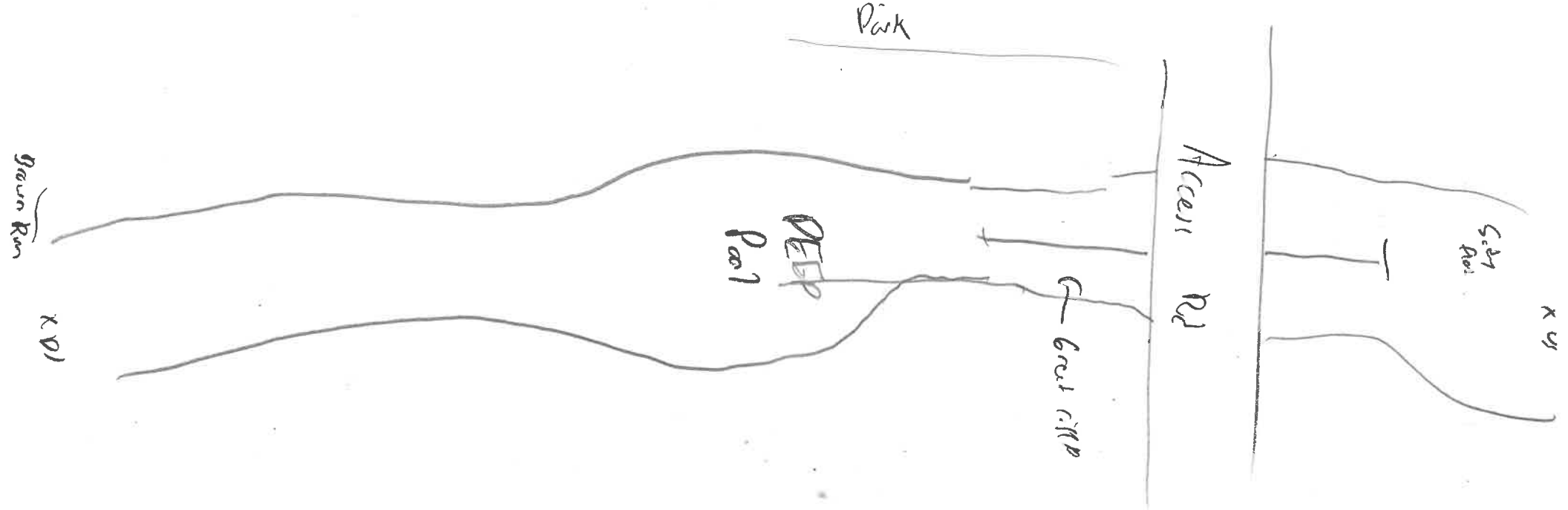
WWTP / CSO / NPDES / ~~INDUSTRY~~
HARDENED / URBAN / DIRT&GRIME
CONTAMINATED / LANDFILL
BMPs-CONSTRUCTION-SEDIMENT
LOGGING / IRRIGATION / COOLING
BANK / EROSION / SURFACE
FALSE BANK / MANURE / LAGOON
WASH H_20 / TILE / H_20 TABLE
ACID / ~~MINE~~ / ~~QUARRY~~ / FLOW
NATURAL / WETLAND / STAGNANT
PARK / GOLF / LAWN / HOME
ATMOSPHERE / DATA PAUCITY

F] MEASUREMEI

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

Legacy Tree:

Stream Drawing:



Qualitative Habitat Evaluation Index and Use Assessment Field Sheet

OHEI Score: 86.5

Stream & Location: Scioto Big Run @ Willow Creek Park RM: 2.9 Date: 06/26/25

Scorers Full Name & Affiliation: Edward Hicks, MBI

River Code: 02-092-___ STORET #: SBR02 Lat./Long.: 39.114018 3.0817 (NAD 83 - decimal °) Office verified location ☐

1] SUBSTRATE

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

BEST TYPES	POOL	RIFFLE	OTHER TYPES	POOL	RIFFLE
☐☐ BLDR /SLABS [10]			☐☐ HARDPAN [4]		
☐☐ BOULDER [9]	5	5	☐☐ DETRITUS [3]		
☐☐ COBBLE [8]	5	10	☐☐ MUCK [2]		
☐☑ GRAVEL [7]	35	65	☐☐ SILT [2]	10	
☑☐ SAND [6]	50	50	☐☐ ARTIFICIAL [0]		
☐☐ BEDROCK [5]			(Score natural substrates; ignore sludge from point-sources)		

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

Check ONE (Or 2 & average)

ORIGIN		QUALITY	
☑ LIMESTONE [1]		☐ HEAVY [-2]	
☐ TILLS [1]		☐ MODERATE [-1]	
☐ WETLANDS [0]	SILT	☑ NORMAL [0]	
☐ HARDPAN [0]		☐ FREE [1]	
☐ SANDSTONE [0]		☐ EXTENSIVE [-2]	
☐ RIP/RAP [0]	EMBEDDEDNESS	☐ MODERATE [-1]	
☐ LACUSTURINE [0]		☑ NORMAL [0]	
☐ SHALE [-1]		☐ NONE [1]	
☐ COAL FINES [-2]			

Substrate: 16 (Maximum 20)

Comments

2] INSTREAM COVER

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

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

Cover Maximum 20: 20

Comments

3] CHANNEL MORPHOLOGY

Check ONE in each category (Or 2 & average)

SINUOSITY	DEVELOPMENT	CHANNELIZATION	STABILITY
☑ HIGH [4]	☑ EXCELLENT [7]	☑ NONE [6]	☐ HIGH [3]
☐ MODERATE [3]	☐ GOOD [5]	☐ RECOVERED [4]	☑ MODERATE [2]
☐ LOW [2]	☐ FAIR [3]	☐ RECOVERING [3]	☐ LOW [1]
☐ NONE [1]	☐ POOR [1]	☐ RECENT OR NO RECOVERY [1]	

Channel Maximum 20: 19

Comments

4] BANK EROSION AND RIPARIAN ZONE

Check ONE in each category for EACH BANK (Or 2 per bank & average)

River right looking downstream

EROSION (L R)	RIPARIAN WIDTH (L R)	FLOOD PLAIN QUALITY (L R)	
☐☐ NONE / LITTLE [3]	☐☐ WIDE > 50m [4]	☐☐ FOREST, SWAMP [3]	☐☐ CONSERVATION TILLAGE [1]
☐☑ MODERATE [2]	☐☐ MODERATE 10-50m [3]	☐☐ SHRUB OR OLD FIELD [2]	☐☐ URBAN OR INDUSTRIAL [0]
☑☐ HEAVY / SEVERE [1]	☑☑ NARROW 5-10m [2]	☑☑ RESIDENTIAL, PARK, NEW FIELD [1]	☐☐ MINING / CONSTRUCTION [0]
1.5	☐☐ VERY NARROW < 5m [1]	☐☐ FENCED PASTURE [1]	
	☐☐ NONE [0]	☐☐ OPEN PASTURE, ROWCROP [0]	

Indicate predominant land use(s) past 100m riparian.

Riparian Maximum 10: 4.5

Comments

5] POOL / GLIDE AND RIFFLE / RUN QUALITY

MAXIMUM DEPTH	CHANNEL WIDTH	CURRENT VELOCITY	
Check ONE (ONLY!)	Check ONE (Or 2 & average)	Check ALL that apply	
☑ > 1m [6]	☐ POOL WIDTH > RIFFLE WIDTH [2]	☐ TORRENTIAL [-1]	☑ SLOW [1]
☐ 0.7-<1m [4]	☑ POOL WIDTH = RIFFLE WIDTH [1]	☑ VERY FAST [1]	☐ INTERSTITIAL [-1]
☐ 0.4-<0.7m [2]	☐ POOL WIDTH < RIFFLE WIDTH [0]	☑ FAST [1]	☐ INTERMITTENT [-2]
☐ 0.2-<0.4m [1]		☑ MODERATE [1]	☐ EDDIES [1]
☐ < 0.2m [0]		Indicate for reach - pools and riffles.	

Recreation Potential: Primary Contact / Secondary Contact (circle one and comment on back)

Pool / Current Maximum 12: 12

Comments

Indicate for functional riffles; Best areas must be large enough to support a population of riffle-obligate species: ☐ NO RIFFLE [metric=0]

RIFFLE DEPTH	RUN DEPTH	RIFFLE / RUN SUBSTRATE (Check ONE (Or 2 & average))	RIFFLE / RUN EMBEDDEDNESS
☐ BEST AREAS > 10cm [2]	☑ MAXIMUM > 50cm [2]	☐ STABLE (e.g., Cobble, Boulder) [2]	☐ NONE [2]
☑ BEST AREAS 5-10cm [1]	☐ MAXIMUM < 50cm [1]	☑ MOD. STABLE (e.g., Large Gravel) [1]	☑ LOW [1]
☐ BEST AREAS < 5cm [metric=0]		☐ UNSTABLE (e.g., Fine Gravel, Sand) [0]	☐ MODERATE [0]
			☐ EXTENSIVE [-1]

Riffle / Run Maximum 8: 5

Comments

6] GRADIENT

(15.38 ft/mi) ☐ VERY LOW - LOW [2-4] ☑ MODERATE [6-10] 10 ☑ HIGH - VERY HIGH [10-6]

DRAINAGE AREA (18.50 mi²)

%POOL: 30 %GLIDE: ___ %RUN: 10 %RIFFLE: 60

Gradient Maximum 10: 10

06/16/06

A] SAMPLED REACH

Check ALL that apply

METHOD

- ☐ BOAT
- ☑ WADE
- ☐ L. LINE
- ☐ OTHER

STAGE

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

DISTANCE

- ☐ 0.5 Km
- ☑ 0.2 Km
- ☐ 0.15 Km
- ☐ 0.12 Km
- ☐ OTHER

_____ meters

CLARITY

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

CANOPY

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

1st pass _____ cm

2nd _____ cm

C] RECREATION

POOL: ☐ AREA >100ft² ☐ DEPTH >3ft

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

Typical, Maybe a little better. Rec inferred. Columbus parks permit needed, will allow use of driving on bike path

B] AESTHETICS

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

D] MAINTENANCE

Circle some & COMMENT

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

E] ISSUES

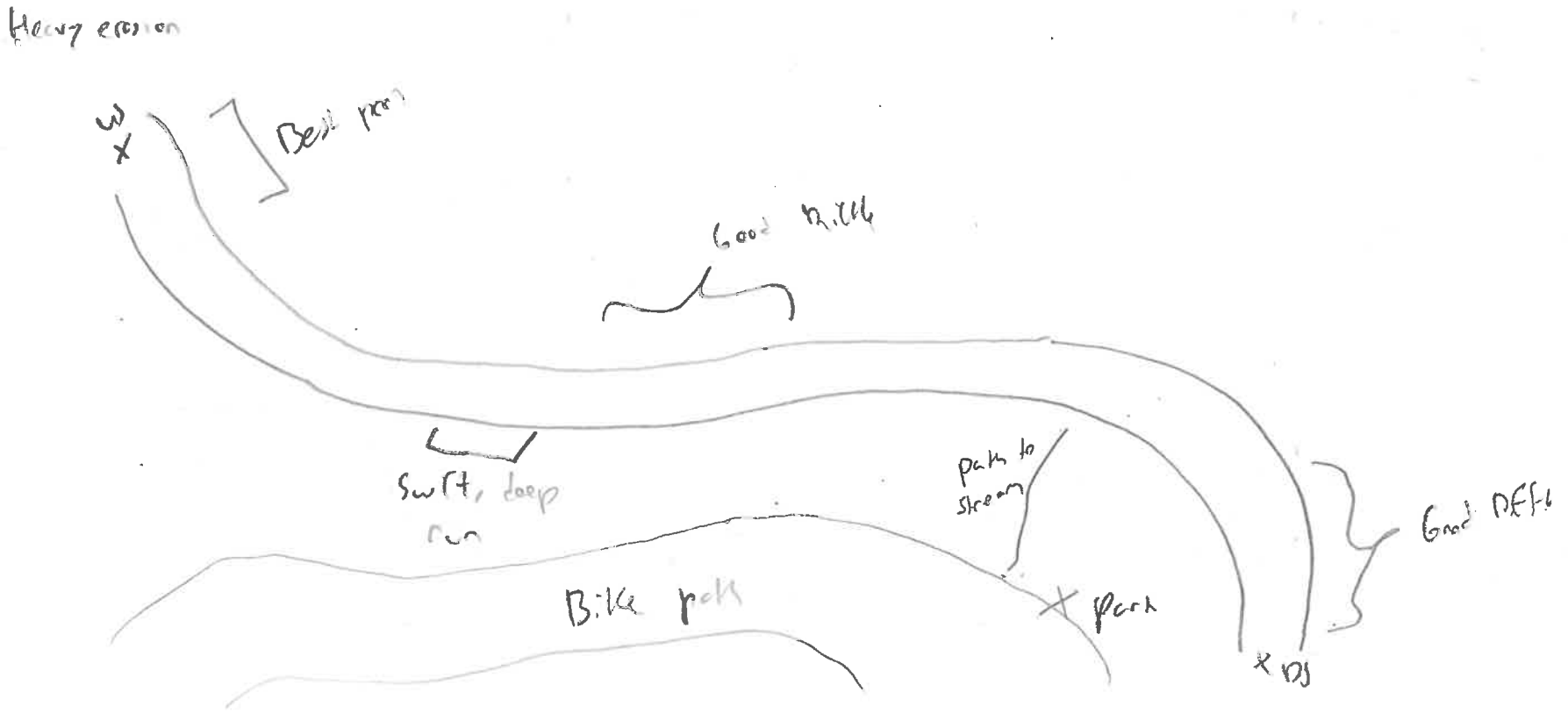
WWTP / CSO / NPDES / INDUSTRY
HARDENED / URBAN / DIRT&GRIME
CONTAMINATED / LANDFILL
BMPs-CONSTRUCTION-SEDIMENT
LOGGING / IRRIGATION / COOLING
BANK / EROSION / SURFACE
FALSE BANK / MANURE / LAGOON
WASH H_20 / TILE / H_20 TABLE
ACID / MINE / QUARRY / FLOW
NATURAL / WETLAND / STAGNANT
(PARK) GOLF / LAWN / HOME
ATMOSPHERE / DATA PAUCITY

F] MEASUREMENT

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

Legacy Tree:

Stream Drawing:



Qualitative Habitat Evaluation Index and Use Assessment Field Sheet

OHEI Score: 64.5 ✓

Stream & Location: Scioto Big Run at Big Run Rd RM: 4.4 Date: 09/29/25

Scorers Full Name & Affiliation: Edward Hicks, MBJ

River Code: 02-092-___ STORET #: SBR03 Lat./Long.: 39.91 56 183.06 50 (NAD 83 - decimal °) Office verified location ☐

1] SUBSTRATE

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

BEST TYPES	POOL	RIFFLE	OTHER TYPES	POOL	RIFFLE
☐☐ BLDR /SLABS [10]			☐☐ HARDPAN [4]		
☐☐ BOULDER [9]	5	10	☐☐ DETRITUS [3]		
☐☐ COBBLE [8]	5	15	☐☐ MUCK [2]		
☐☐ GRAVEL [7]	5	15	☐☐ SILT [2]		
☐☑ SAND [6]	50	10	☐☑ ARTIFICIAL [0]	35	50
☐☐ BEDROCK [5]			(Score natural substrates; ignore sludge from point-sources)		

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

Check ONE (Or 2 & average)

ORIGIN: ☐ LIMESTONE [1] ☐ TILLS [1] ☐ WETLANDS [0] ☐ HARDPAN [0] ☐ SANDSTONE [0] ☑ RIP/RAP [0] ☐ LACUSTURINE [0] ☐ SHALE [-1] ☐ COAL FINES [-2]

QUALITY: SILT: ☐ HEAVY [-2] ☐ MODERATE [-1] ☐ NORMAL [0] ☑ FREE [1]; EMBEDDEDNESS: ☐ EXTENSIVE [-2] ☐ MODERATE [-1] ☑ NORMAL [0] ☐ NONE [1]

Substrate: 9 / Maximum 20

Comments: lots of cement rip-rap acting as boulders

2] INSTREAM COVER

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

0	UNDERCUT BANKS [1]	0	POOLS > 70cm [2]	0	OXBOWS, BACKWATERS [1]
1	OVERHANGING VEGETATION [1]	0	ROOTWADS [1]	0	AQUATIC MACROPHYTES [1]
1	SHALLOWS (IN SLOW WATER) [1]	3	BOULDERS [1]	1	LOGS OR WOODY DEBRIS [1]
0	ROOTMATS [1]				

AMOUNT — Check ONE (Or 2 & average)

☐ EXTENSIVE >75% [11] ☑ MODERATE 25-75% [7] ☐ SPARSE 5-<25% [3] ☐ NEARLY ABSENT <5% [1]

Cover Maximum 20: 11

Comments

3] CHANNEL MORPHOLOGY

Check ONE in each category (Or 2 & average)

SINUOSITY: ☑ HIGH [4] ☐ MODERATE [3] ☐ LOW [2] ☐ NONE [1]

DEVELOPMENT: ☐ EXCELLENT [7] ☑ GOOD [5] ☐ FAIR [3] ☐ POOR [1]

CHANNELIZATION: 5 — ☑ NONE [6] ☑ RECOVERED [4] ☐ RECOVERING [3] ☐ RECENT OR NO RECOVERY [1]

STABILITY: ☑ HIGH [3] ☐ MODERATE [2] ☐ LOW [1]

Channel Maximum 20: 17

Comments: Channel clearly modified at some point (extensive rip-rap) but lacking typical hallmarks of [illegible]

4] BANK EROSION AND RIPARIAN ZONE

Check ONE in each category for EACH BANK (Or 2 per bank & average)

River right looking downstream

EROSION: L ☑ R ☑ NONE / LITTLE [3] ☐☐ MODERATE [2] ☐☐ HEAVY / SEVERE [1]

RIPARIAN WIDTH: L ☐ R ☐ WIDE > 50m [4] ☐☐ MODERATE 10-50m [3] ☐☐ NARROW 5-10m [2] L ☑ R ☑ VERY NARROW < 5m [1] ☐☐ NONE [0]

FLOOD PLAIN QUALITY: ☐☐ FOREST, SWAMP [3] ☐☐ SHRUB OR OLD FIELD [2] L ☑ R ☑ RESIDENTIAL, PARK, NEW FIELD [1] ☐☐ FENCED PASTURE [1] ☐☐ OPEN PASTURE, ROWCROP [0]

L R ☐☐ CONSERVATION TILLAGE [1] ☐☐ URBAN OR INDUSTRIAL [0] ☐☐ MINING / CONSTRUCTION [0]

Indicate predominant land use(s) past 100m riparian.

Riparian Maximum 10: 5

Comments

5] POOL / GLIDE AND RIFFLE / RUN QUALITY

MAXIMUM DEPTH — Check ONE (ONLY!): ☐ > 1m [6] ☐ 0.7-<1m [4] ☑ 0.4-<0.7m [2] ☐ 0.2-<0.4m [1] ☐ < 0.2m [0]

CHANNEL WIDTH — Check ONE (Or 2 & average): ☑ POOL WIDTH > RIFFLE WIDTH [2] ☐ POOL WIDTH = RIFFLE WIDTH [1] ☐ POOL WIDTH < RIFFLE WIDTH [0]

CURRENT VELOCITY — Check ALL that apply: ☐ TORRENTIAL [-1] ☑ SLOW [1] ☐ VERY FAST [1] ☐ INTERSTITIAL [-1] ☑ FAST [1] ☐ INTERMITTENT [-2] ☑ MODERATE [1] ☐ EDDIES [1]

Indicate for reach - pools and riffles.

Recreation Potential: Primary Contact / Secondary Contact (circle one and comment on back)

Pool / Current Maximum 12: 7

Comments

Indicate for functional riffles; Best areas must be large enough to support a population of riffle-obligate species: ☐ NO RIFFLE [metric=0]

RIFFLE DEPTH: ☐ BEST AREAS > 10cm [2] ☑ BEST AREAS 5-10cm [1] ☐ BEST AREAS < 5cm [metric=0]

RUN DEPTH: ☑ MAXIMUM > 50cm [2] ☐ MAXIMUM < 50cm [1]

RIFFLE / RUN SUBSTRATE — Check ONE (Or 2 & average): ☑ STABLE (e.g., Cobble, Boulder) [2] ☑ MOD. STABLE (e.g., Large Gravel) [1] ☐ UNSTABLE (e.g., Fine Gravel, Sand) [0]

1.5

RIFFLE / RUN EMBEDDEDNESS: ☐ NONE [2] ☑ LOW [1] ☐ MODERATE [0] ☐ EXTENSIVE [-1]

Riffle / Run Maximum 8: 5.5

Comments

6] GRADIENT (11.29 ft/mi)

DRAINAGE AREA (11.80 mi²)

☐ VERY LOW - LOW [2-4] ☑ MODERATE [6-10] ☑ HIGH - VERY HIGH [10-6]

10

%POOL: %GLIDE: %RUN: %RIFFLE:

Gradient Maximum 10: 10

06/16/06

EPA 4520

A] SAMPLED REACH

Check ALL that apply

METHOD

- ☐ BOAT
- ☐ WADE
- ☑ L. LINE
- ☐ OTHER

DISTANCE

- ☐ 0.5 Km
- ☐ 0.2 Km
- ☐ 0.15 Km
- ☑ 0.12 Km
- ☐ OTHER

Design .15 meters

STAGE

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

CLARITY

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

CANOPY

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

1st pass _____ cm

2nd _____ cm

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

Typical, but bank steep & armored. Rec inferred from angling seen. Abbreviated reach by 30 m for seer failure.

B] AESTHETICS

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

C] RECREATION

AREA DEPTH

POOL: ☐ >100ft² ☐ >3ft

D] MAINTENANCE

Circle some & COMMENT

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

E] ISSUES

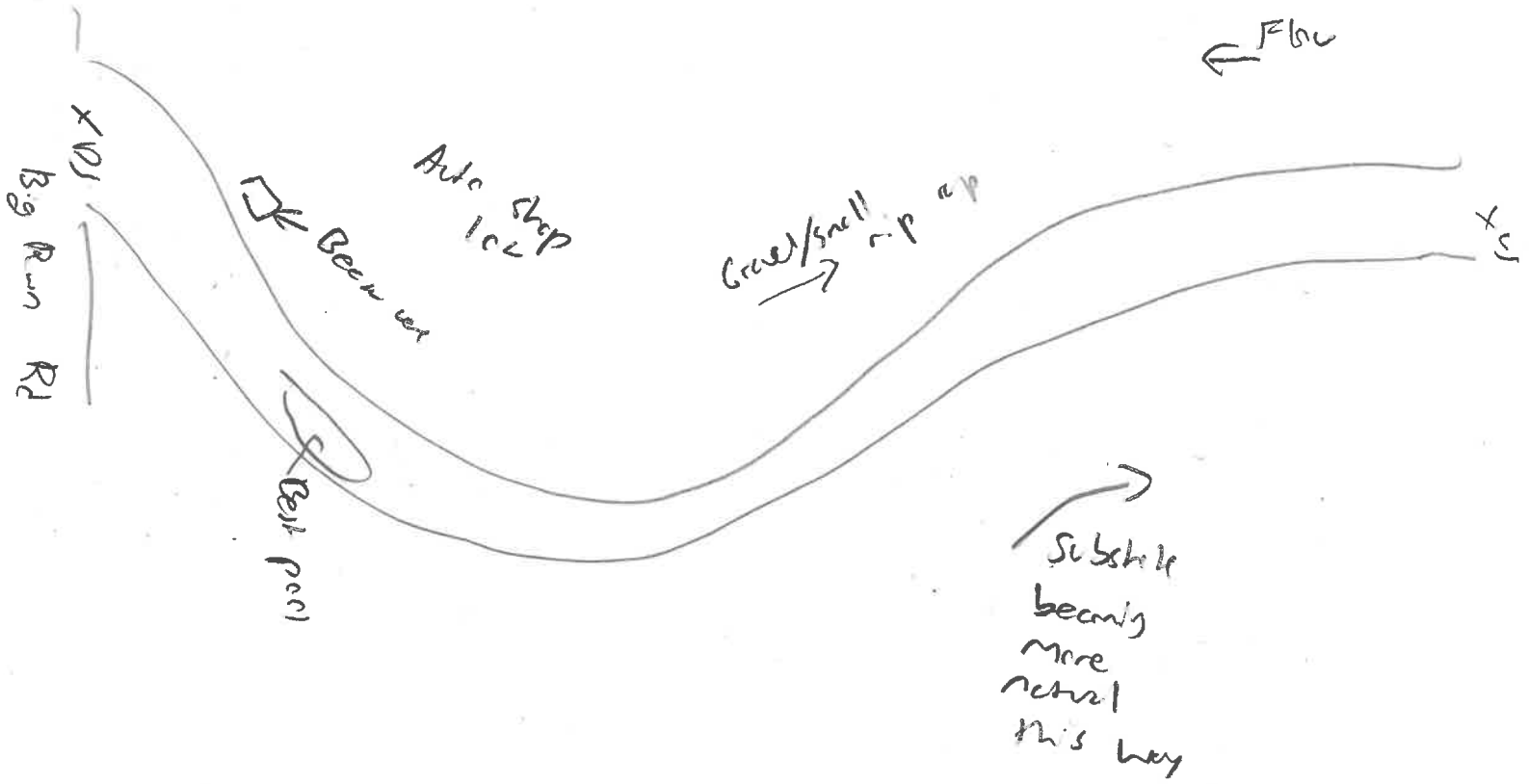
WWTP / CSO / NPDES / (INDUSTRY)
HARDENED / URBAN / DIRT&GRIME
CONTAMINATED / LANDFILL
BMPs-CONSTRUCTION-SEDIMENT
LOGGING / IRRIGATION / COOLING
(BANK) / EROSION / SURFACE
FALSE BANK / MANURE / LAGOON
WASH H_20 / TILE / H_20 TABLE
ACID / MINE / QUARRY / FLOW
NATURAL / WETLAND / STAGNANT
PARK / GOLF / LAWN / HOME
ATMOSPHERE / DATA PAUCITY

F] MEASUREMEN

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

Legacy Tree:

Stream Drawing:



Qualitative Habitat Evaluation Index and Use Assessment Field Sheet

OHEI Score: ~~73.75~~ 76.25

Stream & Location: Scioto Big Run at Dennett Rd RM: 6.10 Date: 10/01/25

Scorers Full Name & Affiliation: Edward Hicks

River Code: ___-02-092 STORET #: SBR04 Lat./Long. (NAD 83 - decimal °): 39.125718 3.021021 Office verified location ☐

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

BEST TYPES	POOL	RIFFLE	OTHER TYPES	POOL	RIFFLE
☐ ☐ BLDR /SLABS [10]			☐ ☐ HARDPAN [4]		
☐ ☐ BOULDER [9]	5	10	☐ ☐ DETRITUS [3]		
☐ ☐ COBBLE [8]	10	35	☐ ☐ MUCK [2]		
☐ ☑ GRAVEL [7]	20	50	☐ ☐ SILT [2]	5	
☐ ☑ SAND [6]	60	5	☐ ☐ ARTIFICIAL [0]		
☐ ☐ BEDROCK [5]			(Score natural substrates; ignore sludge from point-sources)		

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

Check ONE (Or 2 & average)

ORIGIN: ☐ LIMESTONE [1] ☑ TILLS [1] ☐ WETLANDS [0] ☐ HARDPAN [0] ☐ SANDSTONE [0] ☐ RIP/RAP [0] ☐ LACUSTURINE [0] ☐ SHALE [-1] ☐ COAL FINES [-2]

QUALITY: ☐ HEAVY [-2] ☐ MODERATE [-1] ☑ NORMAL [0] ☐ FREE [1]

SILT: ☐ EXTENSIVE [-2] ☑ MODERATE [-1] ☐ NORMAL [0] ☐ NONE [1]

EMBEDDEDNESS

Substrate: 15 (Maximum 20)

Comments

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

1 UNDERCUT BANKS [1]	2 POOLS > 70cm [2]	0 OXBOWS, BACKWATERS [1]	
1 OVERHANGING VEGETATION [1]	1 ROOTWADS [1]	0 AQUATIC MACROPHYTES [1]	
1 SHALLOWS (IN SLOW WATER) [1]	2 BOULDERS [1]	1 LOGS OR WOODY DEBRIS [1]	
3 ROOTMATS [1]			

AMOUNT (Check ONE (Or 2 & average))

☐ EXTENSIVE >75% [11] ☑ MODERATE 25-75% [7] ☐ SPARSE 5-<25% [3] ☐ NEARLY ABSENT <5% [1]

Comments

Cover Maximum 20: 16

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

SINUOSITY: ☑ HIGH [4] ☐ MODERATE [3] ☐ LOW [2] ☐ NONE [1]

DEVELOPMENT: ☐ EXCELLENT [7] ☑ GOOD [5] ☐ FAIR [3] ☐ POOR [1]

CHANNELIZATION: ☑ NONE [6] ☐ RECOVERED [4] ☐ RECOVERING [3] ☐ RECENT OR NO RECOVERY [1]

STABILITY: ☑ HIGH [3] ☑ MODERATE [2] ☐ LOW [1]

Comments

Channel Maximum 20: 17.5

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

River right looking downstream

EROSION 2.75

L	R	
☐	☑	NONE / LITTLE [3]
☑	☑	MODERATE [2]
☐	☐	HEAVY / SEVERE [1]

RIPARIAN WIDTH

L	R	
☐	☐	WIDE > 50m [4]
☐	☐	MODERATE 10-50m [3]
☐	☐	NARROW 5-10m [2]
☑	☑	VERY NARROW < 5m [1]
☐	☐	NONE [0]

FLOOD PLAIN QUALITY

L	R	
☐	☐	FOREST, SWAMP [3]
☐	☐	SHRUB OR OLD FIELD [2]
☑	☑	RESIDENTIAL, PARK, NEW FIELD [1]
☐	☐	FENCED PASTURE [1]
☐	☐	OPEN PASTURE, ROWCROP [0]

L	R	
☐	☐	CONSERVATION TILLAGE [1]
☐	☐	URBAN OR INDUSTRIAL [0]
☐	☐	MINING / CONSTRUCTION [0]

Indicate predominant land use(s) past 100m riparian.

Comments

Riparian Maximum 10: 4.75 → 4.25

5] POOL / GLIDE AND RIFFLE / RUN QUALITY

MAXIMUM DEPTH (Check ONE (ONLY!))

☑ > 1m [6] ☐ 0.7-<1m [4] ☐ 0.4-<0.7m [2] ☐ 0.2-<0.4m [1] ☐ < 0.2m [0]

CHANNEL WIDTH (Check ONE (Or 2 & average))

☑ POOL WIDTH > RIFFLE WIDTH [2] ☐ POOL WIDTH = RIFFLE WIDTH [1] ☐ POOL WIDTH < RIFFLE WIDTH [0]

CURRENT VELOCITY (Check ALL that apply)

☐ TORRENTIAL [-1] ☑ SLOW [1] ☐ VERY FAST [1] ☐ INTERSTITIAL [-1] ☑ FAST [1] ☐ INTERMITTENT [-2] ☑ MODERATE [1] ☐ EDDIES [1]

Indicate for reach - pools and riffles.

Recreation Potential: Primary Contact / Secondary Contact (circle one and comment on back)

Comments

Pool / Current Maximum 12: 9 → 11

Indicate for functional riffles; Best areas must be large enough to support a population of riffle-obligate species: ☐ NO RIFFLE [metric=0]

RIFFLE DEPTH: ☐ BEST AREAS > 10cm [2] ☑ BEST AREAS 5-10cm [1] ☐ BEST AREAS < 5cm [metric=0]

RUN DEPTH: ☐ MAXIMUM > 50cm [2] ☑ MAXIMUM < 50cm [1]

RIFFLE / RUN SUBSTRATE (Check ONE (Or 2 & average)): ☐ STABLE (e.g., Cobble, Boulder) [2] ☑ MOD. STABLE (e.g., Large Gravel) [1] ☐ UNSTABLE (e.g., Fine Gravel, Sand) [0]

RIFFLE / RUN EMBEDDEDNESS: ☐ NONE [2] ☐ LOW [1] ☑ MODERATE [0] ☐ EXTENSIVE [-1]

Comments

Riffle / Run Maximum 8: 3

6] GRADIENT (23.26 ft/mi) ☐ VERY LOW - LOW [2-4] ☐ MODERATE [6-10] ☑ HIGH - VERY HIGH [10-6]

DRAINAGE AREA (8.00 mi²) 8

%POOL: 60 %GLIDE: ___ %RUN: 20 %RIFFLE: 20

Gradient Maximum 10: 8

06/16/06

EPA 4520

A] SAMPLED REACH

Check ALL that apply

METHOD
- ☐ BOAT
- ☐ WADE
- ☑ L. LINE
- ☐ OTHER

STAGE (1st -sample pass- 2nd)
- ☐ HIGH ☐
- ☐ UP ☐
- ☑ NORMAL ☐
- ☐ LOW ☐
- ☐ DRY ☐

DISTANCE
- ☐ 0.5 Km
- ☐ 0.2 Km
- ☑ 0.15 Km
- ☐ 0.12 Km
- ☐ OTHER

_____ meters

CLARITY (1st --sample pass-- 2nd)
- ☐ < 20 cm ☐
- ☐ 20-<40 cm ☐
- ☑ 40-70 cm ☐
- ☐ > 70 cm/ CTB ☐
- ☐ SECCHI DEPTH ☐

CANOPY
- ☐ > 85%- OPEN
- ☐ 55%-<85%
- ☑ 30%-<55%
- ☐ 10%-<30%
- ☐ <10%- CLOSED

pass 1st _____ cm
pass 2nd _____ cm

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

Typical Took multiple attempts as Outfall @ U/S kept discharging. Park on Bank of and carry gear over. Rec inferred.

B] AESTHETICS

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

C] RECREATION

POOL: AREA ☐ >100ft² DEPTH ☐ >3ft

D] MAINTENANCE

Circle some & COMMENT

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

E] ISSUES

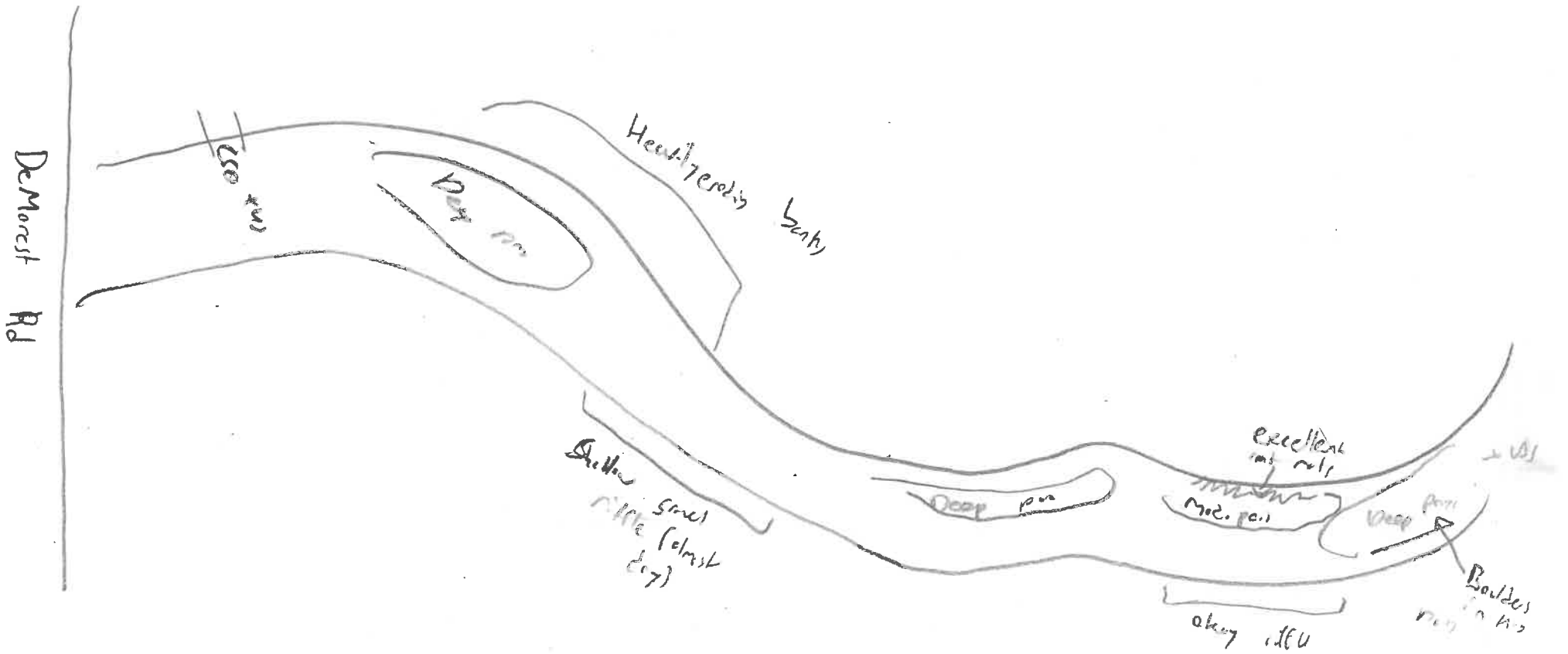
WWTP / CSO / NPDES / INDUSTRY
HARDENED / URBAN / DIRT&GRIME
CONTAMINATED / LANDFILL
BMPs-CONSTRUCTION-SEDIMENT
LOGGING / IRRIGATION / COOLING
BANK / EROSION / SURFACE
FALSE BANK / MANURE / LAGOON
WASH H_20 / TILE / H_20 TABLE
ACID / MINE / QUARRY / FLOW
NATURAL / WETLAND / STAGNANT
PARK / GOLF / LAWN / HOME
ATMOSPHERE / DATA PAUCITY

F] MEASUREMEI

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

Legacy Tree:

Stream Drawing:



Qualitative Habitat Evaluation Index and Use Assessment Field Sheet

OHEI Score: 84

Stream & Location: Scioto Big Run - Big Run Park RM: 7.1 Date: 07/02/25

Scorers Full Name & Affiliation: Edward Hicks, MBS

River Code: 02-092- STORET #: SBR05 Lat./Long. (NAD 83 - decimal °): 39.92863, -83.1066 Office verified location ☐

1] SUBSTRATE

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

BEST TYPES	POOL	RIFFLE	OTHER TYPES	POOL	RIFFLE
☐ ☐ BLDR /SLABS [10]			☐ ☐ HARDPAN [4]		
☐ ☐ BOULDER [9]			☐ ☐ DETRITUS [3]		
☐ ☐ COBBLE [8]		20	☐ ☐ MUCK [2]	10	
☑ ☐ GRAVEL [7]	20	70	☐ ☐ SILT [2]	10	
☐ ☑ SAND [6]	60	10	☐ ☐ ARTIFICIAL [0]		
☐ ☐ BEDROCK [5]			(Score natural substrates; ignore sludge from point-sources)		

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

Check ONE (Or 2 & average)

ORIGIN	SILT / EMBEDDEDNESS	QUALITY
☑ LIMESTONE [1]		☐ HEAVY [-2]
☑ TILLS [1]		☐ MODERATE [-1]
☐ WETLANDS [0]		☑ NORMAL [0]
☐ HARDPAN [0]		☐ FREE [1]
☐ SANDSTONE [0]		☐ EXTENSIVE [-2]
☐ RIP/RAP [0]		☐ MODERATE [-1]
☐ LACUSTURINE [0]		☑ NORMAL [0]
☐ SHALE [-1]		☐ NONE [1]
☐ COAL FINES [-2]		

Substrate: 14 / Maximum 20

Comments

2] INSTREAM COVER

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

2	UNDERCUT BANKS [1]	2	POOLS > 70cm [2]	0	OXBOWS, BACKWATERS [1]
2	OVERHANGING VEGETATION [1]	1	ROOTWADS [1]	0	AQUATIC MACROPHYTES [1]
1	SHALLOWS (IN SLOW WATER) [1]	0	BOULDERS [1]	2	LOGS OR WOODY DEBRIS [1]
1	ROOTMATS [1]				

AMOUNT (Check ONE (Or 2 & average))

☑ EXTENSIVE >75% [11] ☐ MODERATE 25-75% [7] ☐ SPARSE 5-<25% [3] ☐ NEARLY ABSENT <5% [1]

Cover Maximum 20: 19

Comments

3] CHANNEL MORPHOLOGY

Check ONE in each category (Or 2 & average)

SINUOSITY	DEVELOPMENT	CHANNELIZATION	STABILITY
☑ HIGH [4]	☑ EXCELLENT [7]	☐ NONE [6]	☑ HIGH [3]
☐ MODERATE [3]	☐ GOOD [5]	☑ RECOVERED [4]	☐ MODERATE [2]
☐ LOW [2]	☐ FAIR [3]	☐ RECOVERING [3]	☐ LOW [1]
☐ NONE [1]	☐ POOR [1]	☐ RECENT OR NO RECOVERY [1]	

Channel Maximum 20: 18

Comments

4] BANK EROSION AND RIPARIAN ZONE

Check ONE in each category for EACH BANK (Or 2 per bank & average)

River right looking downstream

EROSION (L / R)	RIPARIAN WIDTH (L / R)	FLOOD PLAIN QUALITY (L / R)
☐ ☐ NONE / LITTLE [3]	☐ ☐ WIDE > 50m [4]	☑ ☑ FOREST, SWAMP [3]
☑ ☑ MODERATE [2]	☑ ☑ MODERATE 10-50m [3]	☐ ☐ SHRUB OR OLD FIELD [2]
☐ ☐ HEAVY / SEVERE [1]	☐ ☐ NARROW 5-10m [2]	☑ ☑ RESIDENTIAL, PARK, NEW FIELD [1]
	☐ ☐ VERY NARROW < 5m [1]	☐ ☐ FENCED PASTURE [1]
	☐ ☐ NONE [0]	☐ ☐ OPEN PASTURE, ROWCROP [0]
		☐ ☐ CONSERVATION TILLAGE [1]
		☐ ☐ URBAN OR INDUSTRIAL [0]
		☐ ☐ MINING / CONSTRUCTION [0]

Indicate predominant land use(s) past 100m riparian.

Riparian Maximum 10: 7

Comments

5] POOL / GLIDE AND RIFFLE / RUN QUALITY

MAXIMUM DEPTH	CHANNEL WIDTH	CURRENT VELOCITY
Check ONE (ONLY!)	Check ONE (Or 2 & average)	Check ALL that apply
☑ > 1m [6]	☑ POOL WIDTH > RIFFLE WIDTH [2]	☐ TORRENTIAL [-1] ☑ SLOW [1]
☐ 0.7-<1m [4]	☐ POOL WIDTH = RIFFLE WIDTH [1]	☑ VERY FAST [1] ☐ INTERSTITIAL [-1]
☐ 0.4-<0.7m [2]	☐ POOL WIDTH < RIFFLE WIDTH [0]	☑ FAST [1] ☐ INTERMITTENT [-2]
☐ 0.2-<0.4m [1]		☑ MODERATE [1] ☑ EDDIES [1]
☐ < 0.2m [0]		Indicate for reach - pools and riffles.

Recreation Potential: Primary Contact / Secondary Contact (circle one and comment on back)

Pool / Current Maximum 12: 12

Comments

Indicate for functional riffles; Best areas must be large enough to support a population ☐ NO RIFFLE [metric=0]

Check ONE (Or 2 & average).

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

Riffle / Run Maximum 8: 4

Comments

6] GRADIENT

GRADIENT (17.24 ft/mi) ☐ VERY LOW - LOW [2-4] ☑ MODERATE [6-10] ☑ HIGH - VERY HIGH [10-6] 10

DRAINAGE AREA (5.80 mi²)

%POOL: 40 %GLIDE: %RUN: 30 %RIFFLE: 30

Gradient Maximum 10: 10

06/16/06

A] SAMPLED REACH

Check ALL that apply

METHOD
- ☐ BOAT
- ☐ WADE
- ☑ L. LINE
- ☐ OTHER

DISTANCE
- ☐ 0.5 Km
- ☐ 0.2 Km
- ☑ 0.15 Km
- ☐ 0.12 Km
- ☐ OTHER

_____ meters

STAGE (1st -sample pass- 2nd)
- ☐ HIGH ☐
- ☐ UP ☐
- ☑ NORMAL ☐
- ☐ LOW ☐
- ☐ DRY ☐

CLARITY (1st --sample pass-- 2nd)
- ☐ < 20 cm ☐
- ☐ 20-<40 cm ☐
- ☐ 40-70 cm ☐
- ☑ > 70 cm/ CTB ☐
- ☐ SECCHI DEPTH ☐

CANOPY
- ☐ > 85%- OPEN
- ☐ 55%-<85%
- ☐ 30%-<55%
- ☑ 10%-<30%
- ☐ <10%- CLOSED

pass: 1st _____ cm; 2nd _____ cm

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

Seems typical of stream in park. Rec inferred. Forest. Channel Morph. *Lots* of trash. We parked (39.92980, -83.10888) and hauled gear through woods. This was stupid. Park at church if possible. Columbus parks permit needed. Some pools really deep (not wadeable for me, and some with odorous soft sediment).

B] AESTHETICS

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

C] RECREATION

POOL: AREA ☐ >100ft² DEPTH ☐ >3ft

D] MAINTENANCE

Circle some & COMMENT

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

E] ISSUES

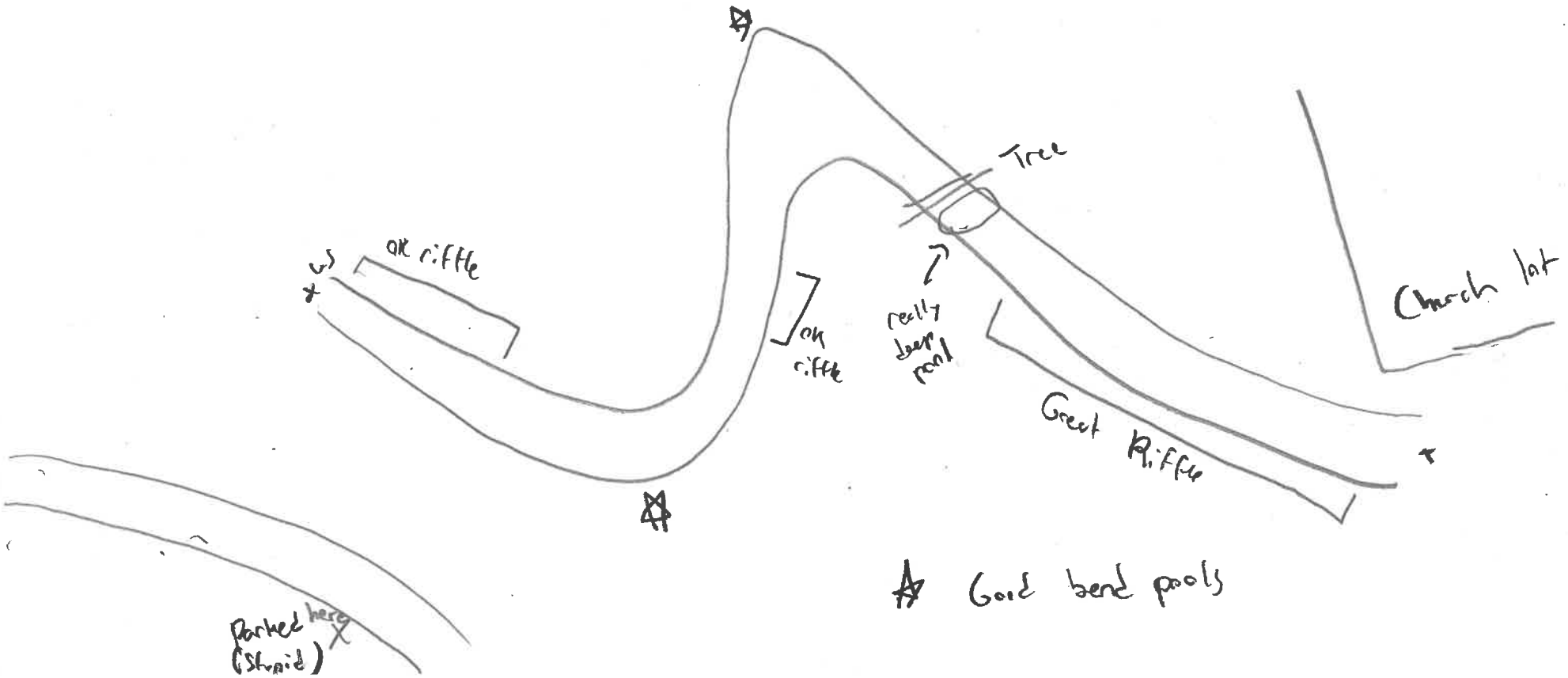
WWTP / CSO / NPDES / INDUSTRY
HARDENED / URBAN / DIRT&GRIME
CONTAMINATED / LANDFILL
BMPs-CONSTRUCTION-SEDIMENT
LOGGING / IRRIGATION / COOLING
BANK / EROSION / SURFACE
FALSE BANK / MANURE / LAGOON
WASH H_20 / TILE / H_20 TABLE
ACID / MINE / QUARRY / FLOW
NATURAL / WETLAND / STAGNANT
PARK / GOLF / LAWN / HOME
ATMOSPHERE / DATA PAUCITY

F] MEASUREMEN

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

Legacy Tree:

Stream Drawing:



Qualitative Habitat Evaluation Index and Use Assessment Field Sheet

OHEI Score: 75.5 ✓

Stream & Location: Scioto Big Run Ust. I-270 RM: 8.5 Date: 07/02/25

Scorers Full Name & Affiliation: Edward Mick, MBS

River Code: 02-092-___ STORET #: SBR06 Lat./Long. (NAD 83 - decimal °): 39.9275 / 83.1253 Office verified location ☐

1] SUBSTRATE

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

BEST TYPES	POOL	RIFFLE	OTHER TYPES	POOL	RIFFLE
☐ ☐ BLDR /SLABS [10]	___	___	☐ ☐ HARDPAN [4]	___	___
☐ ☐ BOULDER [9]	5	___	☐ ☐ DETRITUS [3]	___	___
☐ ☐ COBBLE [8]	10	5	☐ ☐ MUCK [2]	___	___
☐ ☑ GRAVEL [7]	35	65	☐ ☐ SILT [2]	5	___
☑ ☐ SAND [6]	40	30	☐ ☐ ARTIFICIAL [0]	5	___
☐ ☐ BEDROCK [5]	___	___	(Score natural substrates; ignore sludge from point-sources)		

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

Check ONE (Or 2 & average)

ORIGIN		QUALITY	
☑ LIMESTONE [1]	SILT	☐ HEAVY [-2]	Substrate
☐ TILLS [1]		☐ MODERATE [-1]	
☐ WETLANDS [0]		☑ NORMAL [0]	16
☐ HARDPAN [0]		☐ FREE [1]	
☐ SANDSTONE [0]	EMBEDDEDNESS	☐ EXTENSIVE [-2]	Maximum 20
☐ RIP/RAP [0]		☐ MODERATE [-1]	
☐ LACUSTURINE [0]		☑ NORMAL [0]	
☐ SHALE [-1]		☐ NONE [1]	
☐ COAL FINES [-2]			

Comments

2] INSTREAM COVER

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

1 UNDERCUT BANKS [1]	___ POOLS > 70cm [2]	0 OXBOWS, BACKWATERS [1]
2 OVERHANGING VEGETATION [1]	1 ROOTWADS [1]	0 AQUATIC MACROPHYTES [1]
0 SHALLOWS (IN SLOW WATER) [1]	1 BOULDERS [1]	2 LOGS OR WOODY DEBRIS [1]
1 ROOTMATS [1]		

AMOUNT (Check ONE (Or 2 & average))

☐ EXTENSIVE >75% [11]
☑ MODERATE 25-75% [7]
☐ SPARSE 5-<25% [3]
☐ NEARLY ABSENT <5% [1]

Comments

Cover Maximum 20: 15

3] CHANNEL MORPHOLOGY

Check ONE in each category (Or 2 & average)

SINUOSITY	DEVELOPMENT	CHANNELIZATION	STABILITY
☑ HIGH [4]	☐ EXCELLENT [7]	☐ NONE [6]	☐ HIGH [3]
☐ MODERATE [3]	☑ GOOD [5]	☑ RECOVERED [4]	☑ MODERATE [2]
☐ LOW [2]	☐ FAIR [3]	☐ RECOVERING [3]	☐ LOW [1]
☐ NONE [1]	☐ POOR [1]	☐ RECENT OR NO RECOVERY [1]	

Comments

Channel Maximum 20: 15

4] BANK EROSION AND RIPARIAN ZONE

Check ONE in each category for EACH BANK (Or 2 per bank & average)

River right looking downstream

EROSION (L / R)	RIPARIAN WIDTH (L / R)	FLOOD PLAIN QUALITY (L / R)
☐ ☐ NONE / LITTLE [3]	☐ ☐ WIDE > 50m [4]	☐ ☑ FOREST, SWAMP [3]
☐ ☑ MODERATE [2]	☐ ☑ MODERATE 10-50m [3]	☐ ☐ SHRUB OR OLD FIELD [2]
☑ ☐ HEAVY / SEVERE [1]	☑ ☐ NARROW 5-10m [2]	☑ ☑ RESIDENTIAL, PARK, NEW FIELD [1]
1.5	☐ ☐ VERY NARROW < 5m [1]	☐ ☐ FENCED PASTURE [1]
	☐ ☐ NONE [0] 2.5	☐ ☐ OPEN PASTURE, ROWCROP [0]
		1.5
		☐ ☐ CONSERVATION TILLAGE [1]
		☐ ☐ URBAN OR INDUSTRIAL [0]
		☐ ☐ MINING / CONSTRUCTION [0]

Indicate predominant land use(s) past 100m riparian.

Comments

Riparian Maximum 10: 5.5

5] POOL / GLIDE AND RIFFLE / RUN QUALITY

MAXIMUM DEPTH (Check ONE (ONLY!))

☐ > 1m [6]
☑ 0.7-<1m [4]
☐ 0.4-<0.7m [2]
☐ 0.2-<0.4m [1]
☐ < 0.2m [0]

CHANNEL WIDTH (Check ONE (Or 2 & average))

☑ POOL WIDTH > RIFFLE WIDTH [2]
☐ POOL WIDTH = RIFFLE WIDTH [1]
☐ POOL WIDTH < RIFFLE WIDTH [0]

CURRENT VELOCITY (Check ALL that apply)

☐ TORRENTIAL [-1]	☑ SLOW [1]
☐ VERY FAST [1]	☐ INTERSTITIAL [-1]
☑ FAST [1]	☐ INTERMITTENT [-2]
☑ MODERATE [1]	☑ EDDIES [1]

Indicate for reach - pools and riffles.

Recreation Potential
Primary Contact
Secondary Contact
(circle one and comment on back)

Comments

Pool / Current Maximum 12: 10

Indicate for functional riffles; Best areas must be large enough to support a population of riffle-obligate species: ☐ NO RIFFLE [metric=0]

Check ONE (Or 2 & average).

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

Comments

Riffle / Run Maximum 8: 4

6] GRADIENT (28.57 ft/mi)

DRAINAGE AREA (2.9 mi²)

☐ VERY LOW - LOW [2-4]
☐ MODERATE [6-10]
☑ HIGH - VERY HIGH [10-6]

10

%POOL: 30 %GLIDE: ___
%RUN: 10 %RIFFLE: 60

Gradient Maximum 10: 10

06/16/06

EPA 4520

A] SAMPLED REACH

Check ALL that apply

METHOD

- ☐ BOAT
- ☐ WADE
- ☑ L. LINE
- ☐ OTHER

STAGE

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

DISTANCE

- ☐ 0.5 Km
- ☐ 0.2 Km
- ☑ 0.15 Km
- ☐ 0.12 Km
- ☐ OTHER

____ meters

CLARITY

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

CANOPY

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

1st_____ cm

2nd_____ cm

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

Typical of stream in area. Rec. inferred, lots of trash. Access from Dyer's Mob. Home court (get permission in advance), park in back of lot, walk down through septic field to site

B] AESTHETICS

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

C] RECREATION

AREA DEPTH

POOL: ☐ >100ft² ☐ >3ft

D] MAINTENANCE

Circle some & COMMENT

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

E] ISSUES

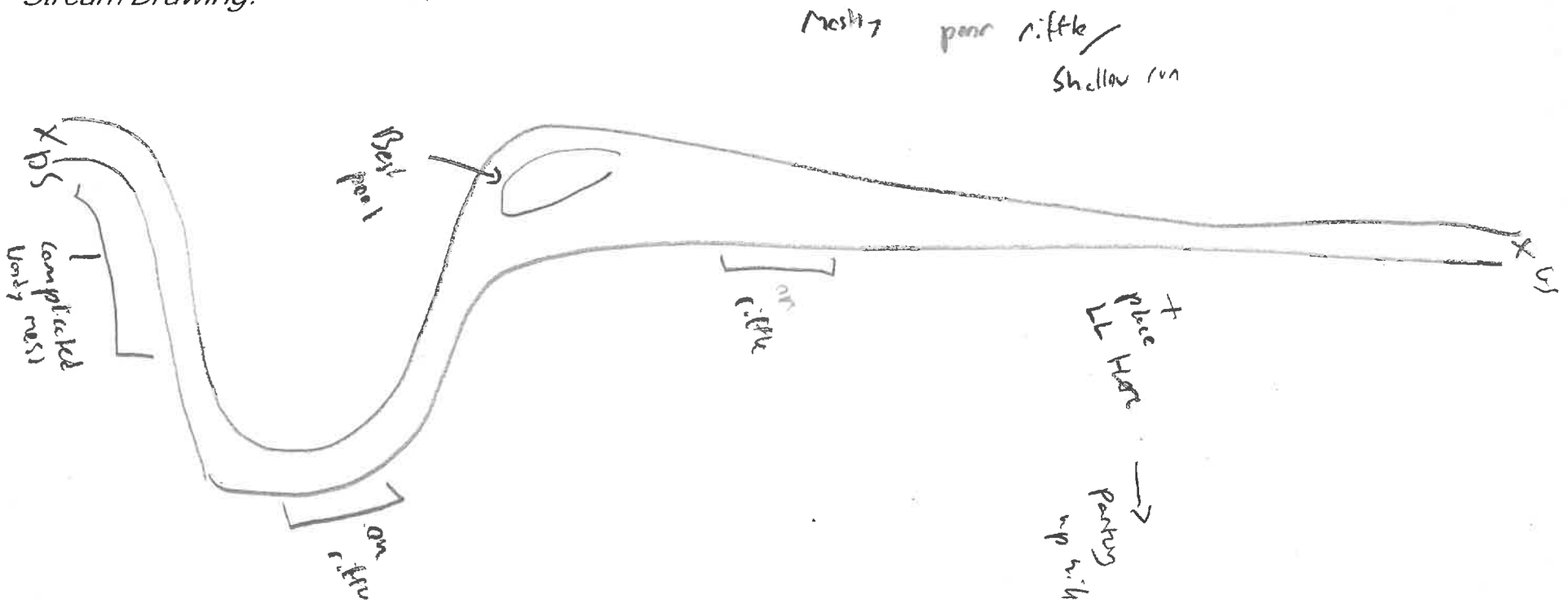
WWTP / (CSO) / NPDES / INDUSTRY
HARDENED / URBAN / DIRT&GRIME
CONTAMINATED / LANDFILL
BMPs-CONSTRUCTION-SEDIMENT
LOGGING / IRRIGATION / COOLING
BANK / EROSION / SURFACE
FALSE BANK / MANURE / LAGOON
WASH H_20 / TILE / H_20 TABLE
ACID / MINE / QUARRY / FLOW
NATURAL / WETLAND / STAGNANT
PARK / GOLF / LAWN / HOME
ATMOSPHERE / DATA PAUCITY

F] MEASUREMENT

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

Legacy Tree:

Stream Drawing:



Qualitative Habitat Evaluation Index and Use Assessment Field Sheet

QHEI Score: 61

Stream & Location: Unnamed Tributary to Scioto Big Run at Riverbend Park **RM:** 0.2 **Date:** 06/26/25

Scorers Full Name & Affiliation: Edward Hicks, MRS

River Code: 02-852- **STORET #:** SBR07 **Lat./Long.:** 39.9220 / 83.0868 (NAD 83 - decimal °) ☐ Office verified location

1] SUBSTRATE

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

BEST TYPES	POOL	RIFFLE	OTHER TYPES	POOL	RIFFLE
☐ ☐ BLDR /SLABS [10]			☐ ☐ HARDPAN [4]		
☐ ☐ BOULDER [9]	5	5	☐ ☐ DETRITUS [3]		
☐ ☐ COBBLE [8]	5	10	☐ ☐ MUCK [2]		
☑ ☐ GRAVEL [7]	60	70	☐ ☐ SILT [2]	10	
☐ ☑ SAND [6]	30	15	☐ ☐ ARTIFICIAL [0]		
☐ ☐ BEDROCK [5]			(Score natural substrates; ignore sludge from point-sources)		

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

Check ONE (Or 2 & average)

ORIGIN
- ☐ LIMESTONE [1]
- ☐ TILLS [1]
- ☐ WETLANDS [0]
- ☐ HARDPAN [0]
- ☐ SANDSTONE [0]
- ☑ RIP/RAP [0]
- ☐ LACUSTURINE [0]
- ☐ SHALE [-1]
- ☐ COAL FINES [-2]

QUALITY

SILT:
- ☐ HEAVY [-2]
- ☐ MODERATE [-1]
- ☑ NORMAL [0]
- ☐ FREE [1]

EMBEDDEDNESS:
- ☐ EXTENSIVE [-2]
- ☐ MODERATE [-1]
- ☑ NORMAL [0]
- ☐ NONE [1]

Substrate 15 (Maximum 20)

Comments

2] INSTREAM COVER

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

0 UNDERCUT BANKS [1]	0 POOLS > 70cm [2]	0 OXBOWS, BACKWATERS [1]
1 OVERHANGING VEGETATION [1]	0 ROOTWADS [1]	0 AQUATIC MACROPHYTES [1]
1 SHALLOWS (IN SLOW WATER) [1]	2 BOULDERS [1]	1 LOGS OR WOODY DEBRIS [1]
1 ROOTMATS [1]		

AMOUNT Check ONE (Or 2 & average)
- ☐ EXTENSIVE >75% [11]
- ☑ MODERATE 25-75% [7]
- ☐ SPARSE 5-<25% [3]
- ☐ NEARLY ABSENT <5% [1]

Cover 12 (Maximum 20)

Comments

3] CHANNEL MORPHOLOGY

Check ONE in each category (Or 2 & average)

SINUOSITY
- ☐ HIGH [4]
- ☑ MODERATE [3]
- ☐ LOW [2]
- ☐ NONE [1]

DEVELOPMENT
- ☐ EXCELLENT [7]
- ☑ GOOD [5]
- ☐ FAIR [3]
- ☐ POOR [1]

CHANNELIZATION
- ☐ NONE [6]
- ☐ RECOVERED [4]
- ☑ RECOVERING [3]
- ☐ RECENT OR NO RECOVERY [1]

STABILITY
- ☐ HIGH [3]
- ☑ MODERATE [2]
- ☐ LOW [1]

Channel 13 (Maximum 20)

Comments

4] BANK EROSION AND RIPARIAN ZONE

Check ONE in each category for EACH BANK (Or 2 per bank & average)

River right looking downstream

EROSION (L / R)
- ☐ ☐ NONE / LITTLE [3]
- ☑ ☑ MODERATE [2]
- ☐ ☐ HEAVY / SEVERE [1]

RIPARIAN WIDTH (L / R)
- ☐ ☐ WIDE > 50m [4]
- ☐ ☐ MODERATE 10-50m [3]
- ☑ ☑ NARROW 5-10m [2]
- ☐ ☐ VERY NARROW < 5m [1]
- ☐ ☐ NONE [0]

FLOOD PLAIN QUALITY (L / R)
- ☐ ☐ FOREST, SWAMP [3]
- ☐ ☐ SHRUB OR OLD FIELD [2]
- ☑ ☑ RESIDENTIAL, PARK, NEW FIELD [1]
- ☐ ☐ FENCED PASTURE [1]
- ☐ ☐ OPEN PASTURE, ROWCROP [0]
- ☐ ☐ CONSERVATION TILLAGE [1]
- ☐ ☐ URBAN OR INDUSTRIAL [0]
- ☐ ☐ MINING / CONSTRUCTION [0]

Indicate predominant land use(s) past 100m riparian.

Riparian 5 (Maximum 10)

Comments

5] POOL / GLIDE AND RIFFLE / RUN QUALITY

MAXIMUM DEPTH Check ONE (ONLY!)
- ☐ > 1m [6]
- ☐ 0.7-<1m [4]
- ☐ 0.4-<0.7m [2]
- ☑ 0.2-<0.4m [1]
- ☐ < 0.2m [0]

CHANNEL WIDTH Check ONE (Or 2 & average)
- ☐ POOL WIDTH > RIFFLE WIDTH [2]
- ☑ POOL WIDTH = RIFFLE WIDTH [1]
- ☐ POOL WIDTH < RIFFLE WIDTH [0]

CURRENT VELOCITY Check ALL that apply
- ☐ TORRENTIAL [-1]
- ☑ SLOW [1]
- ☑ VERY FAST [1]
- ☐ INTERSTITIAL [-1]
- ☑ FAST [1]
- ☐ INTERMITTENT [-2]
- ☑ MODERATE [1]
- ☑ EDDIES [1]

Indicate for reach - pools and riffles.

Recreation Potential
Primary Contact
Secondary Contact
(circle one and comment on back)

Pool / Current 7 (Maximum 12)

Comments

Indicate for functional riffles; Best areas must be large enough to support a population of riffle-obligate species: ☐ NO RIFFLE [metric=0]

Check ONE (Or 2 & average).

RIFFLE DEPTH
- ☑ BEST AREAS > 10cm [2]
- ☐ BEST AREAS 5-10cm [1]
- ☐ BEST AREAS < 5cm [metric=0]

RUN DEPTH
- ☐ MAXIMUM > 50cm [2]
- ☑ MAXIMUM < 50cm [1]

RIFFLE / RUN SUBSTRATE
- ☐ STABLE (e.g., Cobble, Boulder) [2]
- ☑ MOD. STABLE (e.g., Large Gravel) [1]
- ☐ UNSTABLE (e.g., Fine Gravel, Sand) [0]

RIFFLE / RUN EMBEDDEDNESS
- ☐ NONE [2]
- ☑ LOW [1]
- ☐ MODERATE [0]
- ☐ EXTENSIVE [-1]

Riffle / Run 5 (Maximum 8)

Comments

6] GRADIENT

(52.82 ft/mi)

DRAINAGE AREA (1.8 mi²)

- ☐ VERY LOW - LOW [2-4]
- ☐ MODERATE [6-10]
- ☑ HIGH - VERY HIGH [10-6]

4

%POOL: 15 %GLIDE:

%RUN: 15 %RIFFLE: 70

Gradient 4 (Maximum 10)

EPA 4520

06/16/06

A] SAMPLED REACH
Check ALL that apply

METHOD
- ☐ BOAT
- ☐ WADE
- ☐ L. LINE
- ☑ OTHER ADP-3

STAGE (1st-sample pass- 2nd)
- ☐ HIGH ☐
- ☐ UP ☐
- ☑ NORMAL ☐
- ☑ LOW ☐
- ☐ DRY ☐

DISTANCE
- ☐ 0.5 Km
- ☐ 0.2 Km
- ☑ 0.15 Km
- ☐ 0.12 Km
- ☐ OTHER

CLARITY (1st --sample pass-- 2nd)
- ☐ < 20 cm ☐
- ☐ 20-<40 cm ☐
- ☐ 40-70 cm ☐
- ☑ > 70 cm/ CTB ☐
- ☐ SECCHI DEPTH ☐

_____ meters

CANOPY
- ☐ > 85%- OPEN
- ☐ 55%-<85%
- ☐ 30%-<55%
- ☐ 10%-<30%
- ☑ <10%- CLOSED

1st pass _____ cm
2nd _____ cm

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

Typical. Rec inferred. Lots of trash, Septic overflow pipe. Park along Black Rd, walk across River Bend Park. Very incised.

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

C] RECREATION
AREA DEPTH
POOL: ☐ >100ft² ☐ >3ft

D] MAINTENANCE
Circle some & *COMMENT*

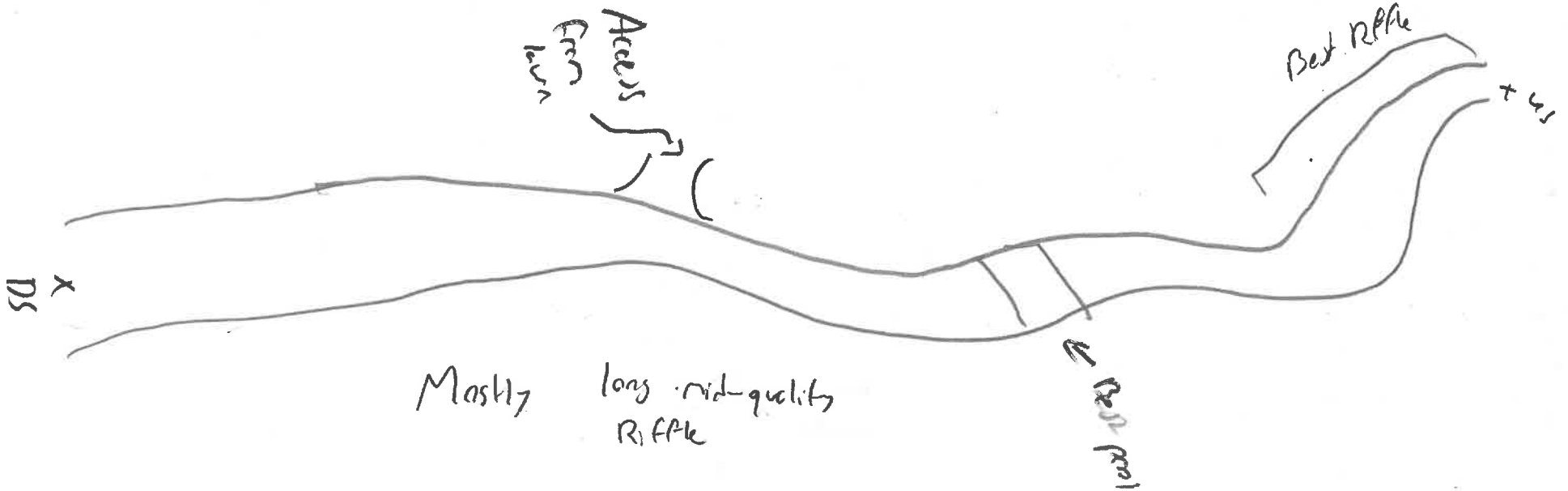
PUBLIC / PRIVATE / (BOTH) / NA
ACTIVE / HISTORIC / BOTH / NA
YOUNG-SUCCESSION-OLD
SPRAY / SNAG / REMOVED
MODIFIED / DIPPED OUT / NA
LEVEED / ONE SIDED
RELOCATED / CUTOFFS
MOVING-BEDLOAD-STABLE
ARMOURED / SLUMPS
ISLANDS / SCOURED
IMPOUNDED / DESICCATED
FLOOD CONTROL / DRAINAGE

E] ISSUES
WWTP / CSO / NPDES / INDUSTRY
HARDENED / URBAN / DIRT&GRIME
CONTAMINATED / LANDFILL
BMPs-CONSTRUCTION-SEDIMENT
LOGGING / IRRIGATION / COOLING
BANK / (EROSION) / SURFACE
FALSE BANK / MANURE / LAGOON
WASH H_20 / (TILE) H_20 TABLE
ACID / MINE / QUARRY / FLOW
NATURAL / WETLAND / STAGNANT
(PARK) / GOLF / LAWN / HOME
ATMOSPHERE / DATA PAUCITY

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

Legacy Tree:

Stream Drawing:



Qualitative Habitat Evaluation Index and Use Assessment Field Sheet

OHEI Score: 57.5

Stream & Location: Unnamed Tributary to Scioto Big Run @ RM 6.61 RM: 1.5 Date: 07/30/15

Dst Southwestern Rd Scorers Full Name & Affiliation: Edward Mills, MBS

River Code: 02 - 852 STORET #: SBR08 Lat./Long. (NAD 83 - decimal °): 39.91796 / 83.08971 Office verified location ☐

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

BEST TYPES	POOL	RIFFLE	OTHER TYPES	POOL	RIFFLE
☐ ☐ BLDR /SLABS [10]			☐ ☐ HARDPAN [4]		
☐ ☐ BOULDER [9]			☐ ☐ DETRITUS [3]		
☐ ☑ COBBLE [8]	30	40	☐ ☐ MUCK [2]		
☐ ☑ GRAVEL [7]	40	60	☐ ☐ SILT [2]	10	
☐ ☐ SAND [6]	20		☐ ☐ ARTIFICIAL [0]		
☐ ☐ BEDROCK [5]			(Score natural substrates; ignore sludge from point-sources)		

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

Check ONE (Or 2 & average)

ORIGIN		QUALITY
☐ LIMESTONE [1]		☐ HEAVY [-2]
☑ TILLS [1]	SILT	☐ MODERATE [-1]
☐ WETLANDS [0]		☑ NORMAL [0]
☐ HARDPAN [0]		☐ FREE [1]
☐ SANDSTONE [0]		☐ EXTENSIVE [-2]
☐ RIP/RAP [0]	EMBEDDEDNESS	☐ MODERATE [-1]
☐ LACUSTURINE [0]		☑ NORMAL [0]
☐ SHALE [-1]		☐ NONE [1]
☐ COAL FINES [-2]		

Substrate 16 / Maximum 20

Comments

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

1 UNDERCUT BANKS [1]	2 POOLS > 70cm [2]	0 OXBOWS, BACKWATERS [1]	AMOUNT (Check ONE (Or 2 & average))
1 OVERHANGING VEGETATION [1]	2 ROOTWADS [1]	0 AQUATIC MACROPHYTES [1]	☐ EXTENSIVE >75% [11]
2 SHALLOWS (IN SLOW WATER) [1]	☐ BOULDERS [1]	1 LOGS OR WOODY DEBRIS [1]	☐ MODERATE 25-75% [7]
1 ROOTMATS [1]			☑ SPARSE 5-<25% [3]
			☐ NEARLY ABSENT <5% [1]

Cover Maximum 20: 7

Comments

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

SINUOSITY	DEVELOPMENT	CHANNELIZATION	STABILITY
☐ HIGH [4]	☐ EXCELLENT [7]	☑ NONE [6]	☑ HIGH [3]
☑ MODERATE [3]	☑ GOOD [5]	☐ RECOVERED [4]	☐ MODERATE [2]
☐ LOW [2]	☐ FAIR [3]	☐ RECOVERING [3]	☐ LOW [1]
☐ NONE [1]	☐ POOR [1]	☐ RECENT OR NO RECOVERY [1]	

Channel Maximum 20: 17

Comments

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

River right looking downstream

EROSION (L / R)	RIPARIAN WIDTH (L / R)	FLOOD PLAIN QUALITY (L / R)
☐ ☐ NONE / LITTLE [3]	☐ ☐ WIDE > 50m [4]	☐ ☐ FOREST, SWAMP [3]
☑ ☑ MODERATE [2]	☐ ☐ MODERATE 10-50m [3]	☐ ☐ SHRUB OR OLD FIELD [2]
☐ ☐ HEAVY / SEVERE [1]	☑ ☐ NARROW 5-10m [2]	☑ ☑ RESIDENTIAL, PARK, NEW FIELD [1]
	☑ ☐ VERY NARROW < 5m [1]	☐ ☐ FENCED PASTURE [1]
	☐ ☐ NONE [0]	☐ ☐ OPEN PASTURE, ROWCROP [0]
	1.5	☐ ☐ CONSERVATION TILLAGE [1]
		☐ ☐ URBAN OR INDUSTRIAL [0]
		☐ ☐ MINING / CONSTRUCTION [0]

Indicate predominant land use(s) past 100m riparian.

Riparian Maximum 10: 4.5

Comments

5] POOL / GLIDE AND RIFFLE / RUN QUALITY

MAXIMUM DEPTH Check ONE (ONLY!)

- ☐ > 1m [6]
- ☐ 0.7-<1m [4]
- ☐ 0.4-<0.7m [2]
- ☑ 0.2-<0.4m [1]
- ☐ < 0.2m [0]

CHANNEL WIDTH Check ONE (Or 2 & average)

- ☑ POOL WIDTH > RIFFLE WIDTH [2]
- ☐ POOL WIDTH = RIFFLE WIDTH [1]
- ☐ POOL WIDTH < RIFFLE WIDTH [0]

CURRENT VELOCITY Check ALL that apply

☐ TORRENTIAL [-1]	☐ SLOW [1]
☐ VERY FAST [1]	☐ INTERSTITIAL [-1]
☐ FAST [1]	☐ INTERMITTENT [-2]
☑ MODERATE [1]	☐ EDDIES [1]

Indicate for reach - pools and riffles.

Recreation Potential: Primary Contact / Secondary Contact (circle one and comment on back)

Pool / Current Maximum 12: 5

Comments

Indicate for functional riffles; Best areas must be large enough to support a population of riffle-obligate species: ☐ NO RIFFLE [metric=0]

Check ONE (Or 2 & average).

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

Riffle / Run Maximum 8: 8

Comments

6] GRADIENT (33.33 ft/mi) DRAINAGE AREA (1.57 mi²)

☐ VERY LOW - LOW [2-4]
☐ MODERATE [6-10]
☒ HIGH - VERY HIGH [10-6]

8

%POOL: %GLIDE: %RUN: %RIFFLE:

Gradient Maximum 10: 8

06/16/06

EPA 4520

A] SAMPLED REACH

Check ALL that apply

METHOD

- [ ] BOAT
- [ ] WADE
- [ ] L. LINE
- [x] OTHER Avsp. ?

STAGE

1st -sample pass- 2nd

- [ ] HIGH [ ]
- [ ] UP [ ]
- [ ] NORMAL [ ]
- [x] LOW [ ]
- [ ] DRY [ ]

DISTANCE

- [ ] 0.5 Km
- [ ] 0.2 Km
- [x] 0.15 Km
- [ ] 0.12 Km
- [ ] OTHER

_____ meters

CLARITY

1st --sample pass-- 2nd

- [ ] < 20 cm [ ]
- [ ] 20-<40 cm [ ]
- [x] 40-70 cm [ ]
- [ ] > 70 cm/ CTB [ ]
- [ ] SECCHI DEPTH [ ]

1st pass _____ cm

2nd _____ cm

CANOPY

- [ ] > 85%- OPEN
- [ ] 55%-<85%
- [ ] 30%-<55%
- [ ] 10%-<30%
- [x] <10%- CLOSED

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

Typical. Rec inferred. Park on narrow southwestern rd shoulder

B] AESTHETICS

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

C] RECREATION

AREA DEPTH

POOL: [ ] >100ft² [ ] >3ft

D] MAINTENANCE

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

Circle some & COMMENT

E] ISSUES

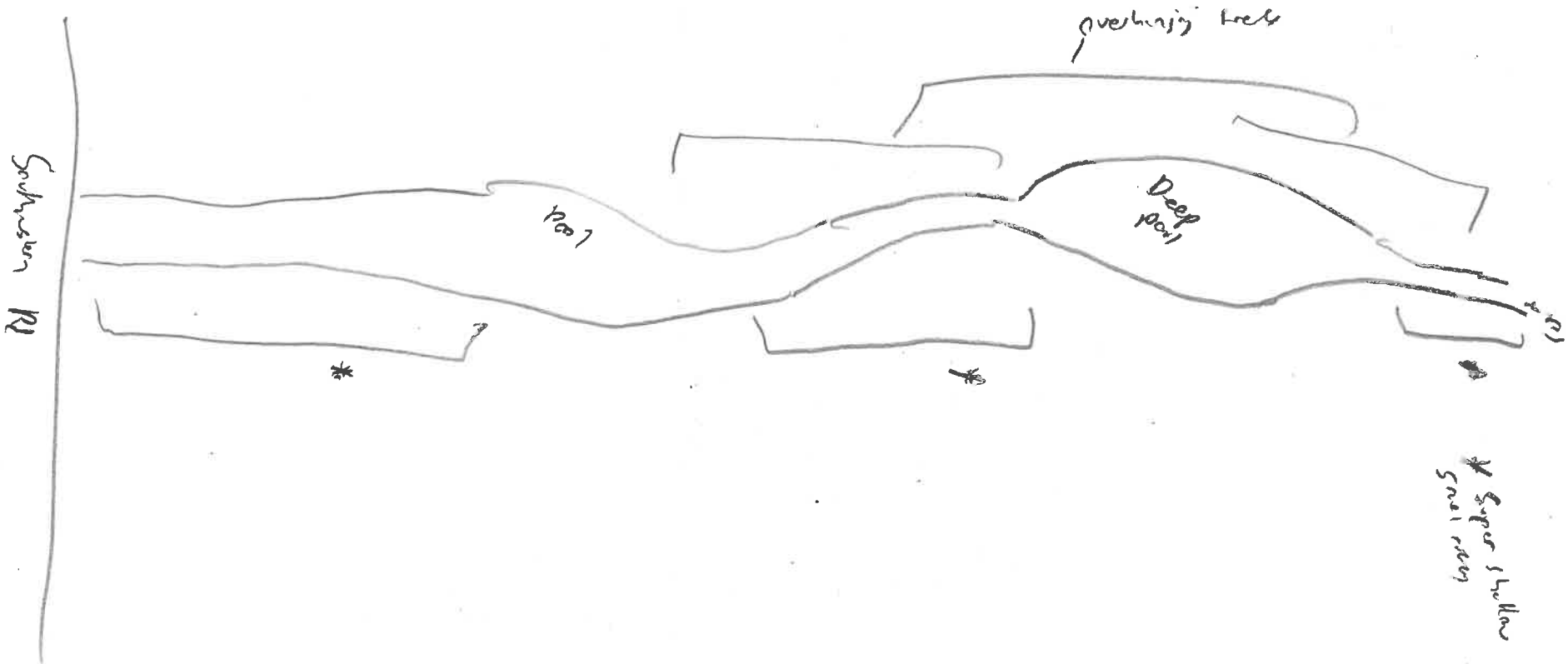
WWTP / CSO / NPDES / INDUSTRY
HARDENED / URBAN / DIRT&GRIME
CONTAMINATED / LANDFILL
BMPs-CONSTRUCTION-SEDIMENT
LOGGING / IRRIGATION / COOLING
BANK / EROSION / SURFACE
FALSE BANK / MANURE / LAGOON
WASH H_20 / TILE / H_20 TABLE
ACID / MINE / QUARRY / FLOW
NATURAL / WETLAND / STAGNANT
PARK / GOLF / LAWN / HOME
ATMOSPHERE / DATA PAUCITY

F] MEASUREMEN

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

Legacy Tree:

Stream Drawing:



Qualitative Habitat Evaluation Index and Use Assessment Field Sheet

OHEI Score: 63.5

Stream & Location: Unnamed Trib to Scioto Big Run (RM 7.59) RM: 0.1 Date: 08/27/25

Ust. County Rd / Confluence of

Scorers Full Name & Affiliation: Edward Hicks, MBI

River Code: QR-853-___ STORET #: SU009 Lat./Long.: (NAD 83 - decimal °) 39.913518 3.85111 Office verified location ☐

1] SUBSTRATE

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

Check ONE (Or 2 & average)

BEST TYPES	POOL	RIFFLE	OTHER TYPES	POOL	RIFFLE
☐☐ BLDR /SLABS [10]	___	___	☐☐ HARDPAN [4]	___	___
☐☐ BOULDER [9]	___	___	☐☐ DETRITUS [3]	___	___
☐☐ COBBLE [8]	___	<	☐☐ MUCK [2]	___	___
☐☑ GRAVEL [7]	20	60	☐☐ SILT [2]	40	___
☑☐ SAND [6]	80	20	☐☐ ARTIFICIAL [0]	___	___
☐☐ BEDROCK [5]	___	___	(Score natural substrates; ignore sludge from point-sources)		

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

ORIGIN: ☐ LIMESTONE [1] ☐ TILLS [1] ☑ WETLANDS [0] ☐ HARDPAN [0] ☐ SANDSTONE [0] ☐ RIP/RAP [0] ☐ LACUSTURINE [0] ☐ SHALE [-1] ☐ COAL FINES [-2]

QUALITY: SILT: ☐ HEAVY [-2] ☑ MODERATE [-1] ☐ NORMAL [0] ☐ FREE [1]

EMBEDDEDNESS: ☐ EXTENSIVE [-2] ☐ MODERATE [-1] ☑ NORMAL [0] ☐ NONE [1]

Substrate Maximum 20: 12

Comments

2] INSTREAM COVER

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

___ UNDERCUT BANKS [1]	___ POOLS > 70cm [2]	___ OXBOWS, BACKWATERS [1]
2 OVERHANGING VEGETATION [1]	1 ROOTWADS [1]	___ AQUATIC MACROPHYTES [1]
1 SHALLOWS (IN SLOW WATER) [1]	___ BOULDERS [1]	2 LOGS OR WOODY DEBRIS [1]
2 ROOTMATS [1]		

AMOUNT (Check ONE (Or 2 & average))

☐ EXTENSIVE >75% [11] ☑ MODERATE 25-75% [7] ☐ SPARSE 5-<25% [3] ☐ NEARLY ABSENT <5% [1]

Cover Maximum 20: 12

Comments

3] CHANNEL MORPHOLOGY

Check ONE in each category (Or 2 & average)

SINUOSITY	DEVELOPMENT	CHANNELIZATION	STABILITY
☐ HIGH [4]	☐ EXCELLENT [7]	☐ NONE [6]	☐ HIGH [3]
☐ MODERATE [3]	☑ GOOD [5]	☐ RECOVERED [4]	☑ MODERATE [2]
☑ LOW [2]	☐ FAIR [3]	☑ RECOVERING [3]	☐ LOW [1]
☐ NONE [1]	☐ POOR [1]	☐ RECENT OR NO RECOVERY [1]	

Channel Maximum 20: 12

Comments

4] BANK EROSION AND RIPARIAN ZONE

Check ONE in each category for EACH BANK (Or 2 per bank & average)

River right looking downstream

EROSION (L / R)	RIPARIAN WIDTH (L / R)	FLOOD PLAIN QUALITY (L / R)	
☐☐ NONE / LITTLE [3]	☐☑ WIDE > 50m [4]	☑☑ FOREST, SWAMP [3]	☐☐ CONSERVATION TILLAGE [1]
☑☐ MODERATE [2]	☑☐ MODERATE 10-50m [3]	☐☐ SHRUB OR OLD FIELD [2]	☐☐ URBAN OR INDUSTRIAL [0]
☐☐ HEAVY / SEVERE [1]	☐☐ NARROW 5-10m [2]	☑☑ RESIDENTIAL, PARK, NEW FIELD [1]	☐☐ MINING / CONSTRUCTION [0]
	☐☐ VERY NARROW < 5m [1]	☐☐ FENCED PASTURE [1]	
	☐☐ NONE [0] 3.5	☐☐ OPEN PASTURE, ROWCROP [0]	

Indicate predominant land use(s) past 100m riparian.

Riparian Maximum 10: 7.5

Comments

5] POOL / GLIDE AND RIFFLE / RUN QUALITY

MAXIMUM DEPTH (Check ONE (ONLY!))

☐ > 1m [6] ☐ 0.7-<1m [4] ☑ 0.4-<0.7m [2] ☐ 0.2-<0.4m [1] ☐ < 0.2m [0]

CHANNEL WIDTH (Check ONE (Or 2 & average))

☐ POOL WIDTH > RIFFLE WIDTH [2] ☑ POOL WIDTH = RIFFLE WIDTH [1] ☐ POOL WIDTH < RIFFLE WIDTH [0]

CURRENT VELOCITY (Check ALL that apply)

☐ TORRENTIAL [-1] ☑ SLOW [1] ☑ VERY FAST [1] ☐ INTERSTITIAL [-1] ☑ FAST [1] ☐ INTERMITTENT [-2] ☑ MODERATE [1] ☑ EDDIES [1]

Indicate for reach - pools and riffles.

Recreation Potential
Primary Contact
Secondary Contact
(circle one and comment on back)

Pool / Current Maximum 12: 8

Comments

Indicate for functional riffles; Best areas must be large enough to support a population of riffle-obligate species: ☐ NO RIFFLE [metric=0]

Check ONE (Or 2 & average).

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

Riffle / Run Maximum 8: 2

Comments

6] GRADIENT

GRADIENT (27.6 ft/mi) ☐ VERY LOW - LOW [2-4] ☐ MODERATE [6-10] ☒ HIGH - VERY HIGH [10-6]

DRAINAGE AREA (3.6 mi²)

%POOL: 15 %GLIDE: ___ %RUN: 60 %RIFFLE: 25

Gradient Maximum 10: 10

06/16/06

EPA 4520

A] SAMPLED REACH
Check ALL that apply

METHOD
- ☐ BOAT
- ☐ WADE
- ☐ L. LINE
- ☑ OTHER ABP-3

STAGE (1st -sample pass- 2nd)
- ☐ HIGH ☐
- ☐ UP ☐
- ☑ NORMAL ☐
- ☐ LOW ☐
- ☐ DRY ☐

DISTANCE
- ☐ 0.5 Km
- ☐ 0.2 Km
- ☑ 0.15 Km
- ☐ 0.12 Km
- ☐ OTHER

_____ meters

CLARITY (1st --sample pass-- 2nd)
- ☐ < 20 cm ☐
- ☐ 20-<40 cm ☐
- ☐ 40-70 cm ☐
- ☑ > 70 cm/ CTB ☐
- ☐ SECCHI DEPTH ☐

CANOPY
- ☐ > 85%- OPEN
- ☐ 55%-<85%
- ☐ 30%-<55%
- ☐ 10%-<30%
- ☑ <10%- CLOSED

pass 1st _____ cm
2nd _____ cm

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

Typical. Rec inferred. Lowest ~10 m a little big for F, but ABP-3 handled it fine, no runners and got a good sample. A lot of trash, and a lot of metal trash in particular. Honestly, assemblage seems more a reflection of proximity to SBR than anything else. Much too shallow to hold many fish. Park on Big Run Rd, walk on where SBR crosses Gantz Rd

B] AESTHETICS
- ☑ NUISANCE ALGAE
- ☐ INVASIVE MACROPHYTES
- ☐ EXCESS TURBIDITY
- ☐ DISCOLORATION
- ☐ FOAM / SCUM
- ☑ OIL SHEEN
- ☑ TRASH / LITTER A lot
- ☑ NUISANCE ODOR
- ☐ SLUDGE DEPOSITS
- ☐ CSOs/SSOs/OUTFALLS

C] RECREATION
POOL: AREA ☐ >100ft² DEPTH ☐ >3ft

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

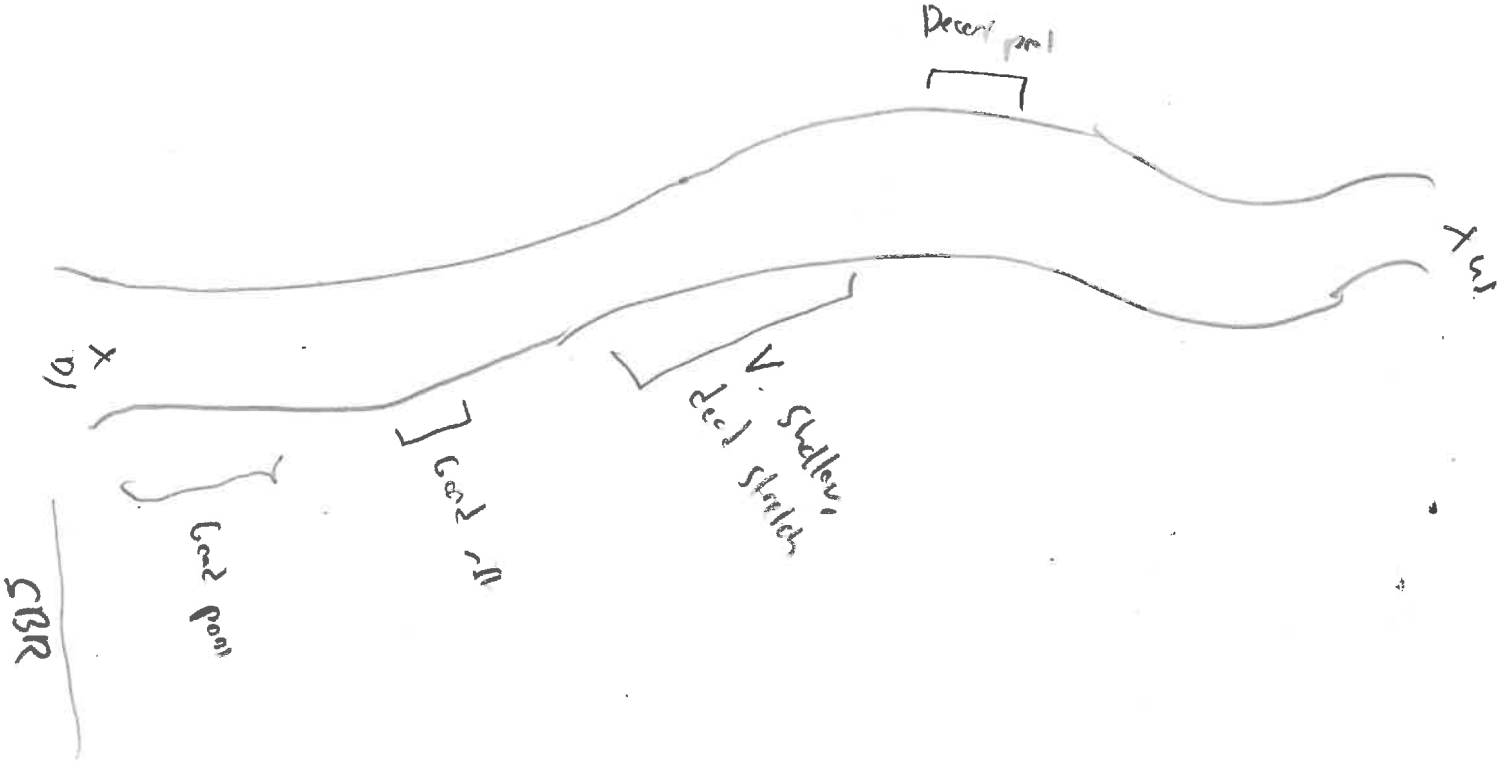
Circle some & COMMENT
School District property

E] ISSUES
WWTP / CSO / NPDES / INDUSTRY
HARDENED / URBAN / DIRT&GRIME
CONTAMINATED / LANDFILL
BMPs-CONSTRUCTION-SEDIMENT
LOGGING / IRRIGATION / COOLING
BANK / EROSION / SURFACE
FALSE BANK / MANURE / LAGOON
WASH H_20 / TILE / H_20 TABLE
ACID / MINE / QUARRY / FLOW
NATURAL / WETLAND / STAGNANT
PARK / GOLF / LAWN / HOME
ATMOSPHERE / DATA PAUCITY

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

Legacy Tree:

Stream Drawing:



Qualitative Habitat Evaluation Index and Use Assessment Field Sheet

OHEI Score: 67

Stream & Location: Perry Run d/s Eckhart Rd CSR RM: 1.85 Date: 10/01/25

Scorers Full Name & Affiliation: Edward Hicks, MBS

River Code: 02-853-___ STORET #: SPRI0 Lat./Long.: 39.9343 / 83.0584 (NAD 83 - decimal °) Office verified location ☐

1] SUBSTRATE

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

BEST TYPES	POOL	RIFFLE	OTHER TYPES	POOL	RIFFLE
☐☐ BLDR /SLABS [10]			☐☐ HARDPAN [4]		
☐☐ BOULDER [9]	5	15	☐☐ DETRITUS [3]		
☐☐ COBBLE [8]	15	45	☐☐ MUCK [2]		
☐☑ GRAVEL [7]	15	25	☐☐ SILT [2]	5	
☑☐ SAND [6]	50		☐☐ ARTIFICIAL [0]	10	15
☐☐ BEDROCK [5]			(Score natural substrates; ignore sludge from point-sources)		

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

Check ONE (Or 2 & average)

ORIGIN
- ☐ LIMESTONE [1]
- ☑ TILLS [1]
- ☐ WETLANDS [0]
- ☐ HARDPAN [0]
- ☐ SANDSTONE [0]
- ☐ RIP/RAP [0]
- ☐ LACUSTURINE [0]
- ☐ SHALE [-1]
- ☐ COAL FINES [-2]

QUALITY
- ☐ HEAVY [-2]
- ☐ MODERATE [-1]
- ☑ NORMAL [0]
- ☐ FREE [1]

SILT

EMBEDDEDNESS
- ☐ EXTENSIVE [-2]
- ☑ MODERATE [-1]
- ☐ NORMAL [0]
- ☐ NONE [1]

Comments

Substrate: 15 (Maximum 20)

2] INSTREAM COVER

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

1 UNDERCUT BANKS [1]	0 POOLS > 70cm [2]	0 OXBOWS, BACKWATERS [1]	
1 OVERHANGING VEGETATION [1]	1 ROOTWADS [1]	0 AQUATIC MACROPHYTES [1]	
1 SHALLOWS (IN SLOW WATER) [1]	2 BOULDERS [1]	1 LOGS OR WOODY DEBRIS [1]	
2 ROOTMATS [1]			

AMOUNT

Check ONE (Or 2 & average)
- ☐ EXTENSIVE >75% [11]
- ☑ MODERATE 25-75% [7]
- ☐ SPARSE 5-<25% [3]
- ☐ NEARLY ABSENT <5% [1]

Comments

Cover: 14 (Maximum 20)

3] CHANNEL MORPHOLOGY

Check ONE in each category (Or 2 & average)

SINUOSITY (2.5)
- ☐ HIGH [4]
- ☑ MODERATE [3]
- ☑ LOW [2]
- ☐ NONE [1]

DEVELOPMENT
- ☐ EXCELLENT [7]
- ☑ GOOD [5]
- ☐ FAIR [3]
- ☐ POOR [1]

CHANNELIZATION
- ☐ NONE [6]
- ☑ RECOVERED [4]
- ☐ RECOVERING [3]
- ☐ RECENT OR NO RECOVERY [1]

STABILITY
- ☐ HIGH [3]
- ☑ MODERATE [2]
- ☐ LOW [1]

Comments

Channel: 13.5 (Maximum 20)

4] BANK EROSION AND RIPARIAN ZONE

Check ONE in each category for EACH BANK (Or 2 per bank & average)

River right looking downstream

EROSION

L	R	
☐	☐	NONE / LITTLE [3]
☑	☑	MODERATE [2]
☐	☐	HEAVY / SEVERE [1]

RIPARIAN WIDTH

L	R	
☐	☐	WIDE > 50m [4]
☐	☐	MODERATE 10-50m [3]
☐	☐	NARROW 5-10m [2]
☑	☑	VERY NARROW < 5m [1]
☐	☐	NONE [0]

FLOOD PLAIN QUALITY

L	R	
☐	☐	FOREST, SWAMP [3]
☐	☐	SHRUB OR OLD FIELD [2]
☑	☑	RESIDENTIAL, PARK, NEW FIELD [1]
☐	☐	FENCED PASTURE [1]
☐	☐	OPEN PASTURE, ROWCROP [0]

L	R	
☐	☐	CONSERVATION TILLAGE [1]
☐	☐	URBAN OR INDUSTRIAL [0]
☐	☐	MINING / CONSTRUCTION [0]

Indicate predominant land use(s) past 100m riparian.

Comments

Riparian: 4 (Maximum 10)

5] POOL / GLIDE AND RIFFLE / RUN QUALITY

MAXIMUM DEPTH

Check ONE (ONLY!)
- ☐ > 1m [6]
- ☐ 0.7-<1m [4]
- ☑ 0.4-<0.7m [2]
- ☐ 0.2-<0.4m [1]
- ☐ < 0.2m [0]

CHANNEL WIDTH

Check ONE (Or 2 & average)
- ☑ POOL WIDTH > RIFFLE WIDTH [2]
- ☐ POOL WIDTH = RIFFLE WIDTH [1]
- ☐ POOL WIDTH < RIFFLE WIDTH [0]

CURRENT VELOCITY

Check ALL that apply
- ☐ TORRENTIAL [-1]
- ☐ VERY FAST [1]
- ☑ FAST [1]
- ☑ MODERATE [1]
- ☑ SLOW [1]
- ☐ INTERSTITIAL [-1]
- ☐ INTERMITTENT [-2]
- ☐ EDDIES [1]

Indicate for reach - pools and riffles.

Recreation Potential: ~~Primary Contact~~ Secondary Contact (circle one and comment on back)

Comments

Pool / Current: 7 (Maximum 12)

Indicate for functional riffles; Best areas must be large enough to support a population of riffle-obligate species: ☐ NO RIFFLE [metric=0]

Check ONE (Or 2 & average).

RIFFLE DEPTH
- ☐ BEST AREAS > 10cm [2]
- ☑ BEST AREAS 5-10cm [1]
- ☐ BEST AREAS < 5cm [metric=0]

RUN DEPTH
- ☑ MAXIMUM > 50cm [2]
- ☑ MAXIMUM < 50cm [1]

RIFFLE / RUN SUBSTRATE
- ☑ STABLE (e.g., Cobble, Boulder) [2]
- ☑ MOD. STABLE (e.g., Large Gravel) [1]
- ☐ UNSTABLE (e.g., Fine Gravel, Sand) [0]

RIFFLE / RUN EMBEDDEDNESS
- ☐ NONE [2]
- ☐ LOW [1]
- ☑ MODERATE [0]
- ☐ EXTENSIVE [-1]

Comments

Riffle / Run: 3.5 (Maximum 8)

6] GRADIENT (19.23 ft/mi)

DRAINAGE AREA (2.55 mi²)

- ☐ VERY LOW - LOW [2-4]
- ☒ MODERATE [6-10]
- ☐ HIGH - VERY HIGH [10-6]

10

%POOL: 30 %GLIDE: ___

%RUN: 60 %RIFFLE: 10

Gradient: 10 (Maximum 10)

06/16/06

EPA 4520

A] SAMPLED REACH

Check ALL that apply

METHOD

- ☐ BOAT
- ☐ WADE
- ☑ L. LINE
- ☐ OTHER

DISTANCE

- ☐ 0.5 Km
- ☐ 0.2 Km
- ☑ 0.15 Km
- ☐ 0.12 Km
- ☐ OTHER

_____ meters

STAGE

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

CLARITY

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

CANOPY

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

1st pass _____ cm

2nd _____ cm

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

Typical. Rea inferred. Gt permission from Apple Run Apartments. Service Entry at CSO. Excessive trash

B] AESTHETICS

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

C] RECREATION

POOL: AREA ☐ >100ft² DEPTH ☐ >3ft

D] MAINTENANCE

Circle some & COMMENT

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

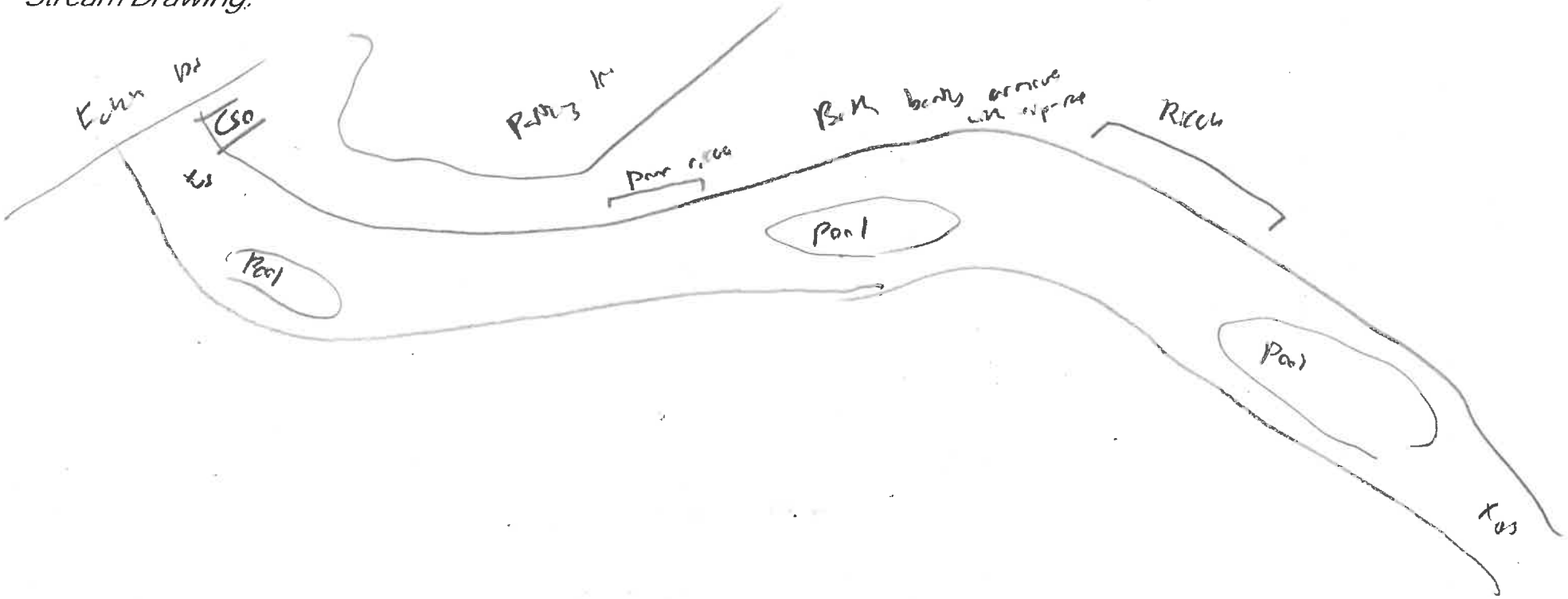
E] ISSUES

WWTP / CSO / NPDES / INDUSTRY
HARDENED / URBAN / DIRT&GRIME
CONTAMINATED / LANDFILL
BMPs-CONSTRUCTION-SEDIMENT
LOGGING / IRRIGATION / COOLING
BANK / EROSION / SURFACE
FALSE BANK / MANURE / LAGOON
WASH H_20 / TILE / H_20 TABLE
ACID / MINE / QUARRY / FLOW
NATURAL / WETLAND / STAGNANT
PARK / GOLF / LAWN / HOME
ATMOSPHERE / DATA PAUCITY

F] MEASUREMEN

$\bar{x}$ width
$\bar{x}$ depth
max. depth
$\bar{x}$ bankfull width
bankfull $\bar{x}$ depth
W/D ratio
bankfull max. depth
floodprone x^2 width
entrench. ratio
Legacy Tree:

Stream Drawing:



Ohio EPA Qualitative Habitat Evaluation Index and Use Assessment Field Sheet

OHEI Score: 81

Stream & Location: Brown Run ust Jackson Pike RM: 0.1 Date: 09/30/25

Scorers Full Name & Affiliation: Edward Hicks MBS

River Code: 02-854-___ STORET #: SBR11 Lat./Long.: (NAD 83 - decimal °) ___.____ 18.____ Office verified location ☐

1] SUBSTRATE

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

BEST TYPES	POOL	RIFFLE	OTHER TYPES	POOL	RIFFLE
☐ ☐ BLDR /SLABS [10]			☐ ☐ HARDPAN [4]		
☐ ☐ BOULDER [9]	20	25	☐ ☐ DETRITUS [3]		
☐ ☑ COBBLE [8]	20	25	☐ ☐ MUCK [2]		
☐ ☑ GRAVEL [7]	30	40	☐ ☐ SILT [2]		
☐ ☐ SAND [6]	30	10	☐ ☐ ARTIFICIAL [0]		
☐ ☐ BEDROCK [5]			(Score natural substrates; ignore sludge from point-sources)		

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

Check ONE (Or 2 & average)

ORIGIN	SILT	QUALITY
☐ LIMESTONE [1]		☐ HEAVY [-2]
☑ TILLS [1]		☐ MODERATE [-1]
☐ WETLANDS [0]		☐ NORMAL [0]
☐ HARDPAN [0]		☑ FREE [1]
☐ SANDSTONE [0]	EMBEDDEDNESS	☐ EXTENSIVE [-2]
☐ RIP/RAP [0]		☐ MODERATE [-1]
☐ LACUSTURINE [0]		☑ NORMAL [0]
☐ SHALE [-1]		☐ NONE [1]
☐ COAL FINES [-2]		

Substrate 19 Maximum 20

Comments

2] INSTREAM COVER

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

0	UNDERCUT BANKS [1]	1	POOLS > 70cm [2]	0	OXBOWS, BACKWATERS [1]
1	OVERHANGING VEGETATION [1]	0	ROOTWADS [1]	0	AQUATIC MACROPHYTES [1]
1	SHALLOWS (IN SLOW WATER) [1]	3	BOULDERS [1]	2	LOGS OR WOODY DEBRIS [1]
1	ROOTMATS [1]				

AMOUNT

Check ONE (Or 2 & average)

☐ EXTENSIVE >75% [11]
☑ MODERATE 25-75% [7]
☐ SPARSE 5-<25% [3]
☐ NEARLY ABSENT <5% [1]

Cover Maximum 20: 14

Comments

3] CHANNEL MORPHOLOGY

Check ONE in each category (Or 2 & average)

SINUOSITY	DEVELOPMENT	CHANNELIZATION	STABILITY
☑ HIGH [4]	☑ EXCELLENT [7]	☑ NONE [6]	☑ HIGH [3]
☐ MODERATE [3]	☐ GOOD [5]	☑ RECOVERED [4]	☐ MODERATE [2]
☐ LOW [2]	☐ FAIR [3]	☐ RECOVERING [3]	☐ LOW [1]
☐ NONE [1]	☐ POOR [1]	☐ RECENT OR NO RECOVERY [1]	

5

Channel Maximum 20: 19

Comments

Bank erosion in places indicative historical channelization, no real lasting traits otherwise

4] BANK EROSION AND RIPARIAN ZONE

Check ONE in each category for EACH BANK (Or 2 per bank & average)

River right looking downstream

EROSION (L / R)	RIPARIAN WIDTH (L / R)	FLOOD PLAIN QUALITY (L / R)
☑ ☑ NONE / LITTLE [3]	☐ ☐ WIDE > 50m [4]	☐ ☐ FOREST, SWAMP [3]
☐ ☐ MODERATE [2]	☐ ☐ MODERATE 10-50m [3]	☑ ☑ SHRUB OR OLD FIELD [2]
☐ ☐ HEAVY / SEVERE [1]	☐ ☐ NARROW 5-10m [2]	☐ ☐ RESIDENTIAL, PARK, NEW FIELD [1]
	☑ ☑ VERY NARROW < 5m [1]	☐ ☐ FENCED PASTURE [1]
	☐ ☐ NONE [0]	☐ ☐ OPEN PASTURE, ROWCROP [0]

1

☐ ☐ CONSERVATION TILLAGE [1]
☑ ☑ URBAN OR INDUSTRIAL [0]
☐ ☐ MINING / CONSTRUCTION [0]

Indicate predominant land use(s) past 100m riparian.

Riparian Maximum 10: 5

Comments

Surrounding filled landfill / abandoned golf course

5] POOL / GLIDE AND RIFFLE / RUN QUALITY

MAXIMUM DEPTH (Check ONE (ONLY!))

☐ >1m [6]
☑ 0.7-<1m [4]
☐ 0.4-<0.7m [2]
☐ 0.2-<0.4m [1]
☐ < 0.2m [0]

CHANNEL WIDTH (Check ONE (Or 2 & average))

☑ POOL WIDTH > RIFFLE WIDTH [2]
☐ POOL WIDTH = RIFFLE WIDTH [1]
☐ POOL WIDTH < RIFFLE WIDTH [0]

CURRENT VELOCITY (Check ALL that apply)

☐ TORRENTIAL [-1]
☑ FAST [1]
☑ MODERATE [1]
☑ SLOW [1]
☐ INTERSTITIAL [-1]
☐ INTERMITTENT [-2]
☐ EDDIES [1]

Indicate for reach - pools and riffles.

Recreation Potential
Primary Contact
Secondary Contact
(circle one and comment on back)

Pool / Current Maximum 12: 9

Comments

Indicate for functional riffles; Best areas must be large enough to support a population of riffle-obligate species: ☐ NO RIFFLE [metric=0]

RIFFLE DEPTH	RUN DEPTH	RIFFLE / RUN SUBSTRATE (Check ONE (Or 2 & average))	RIFFLE / RUN EMBEDDEDNESS
☐ BEST AREAS > 10cm [2]	☐ MAXIMUM > 50cm [2]	☑ STABLE (e.g., Cobble, Boulder) [2]	☐ NONE [2]
☑ BEST AREAS 5-10cm [1]	☑ MAXIMUM < 50cm [1]	☐ MOD. STABLE (e.g., Large Gravel) [1]	☑ LOW [1]
☐ BEST AREAS < 5cm [metric=0]		☐ UNSTABLE (e.g., Fine Gravel, Sand) [0]	☐ MODERATE [0]
			☐ EXTENSIVE [-1]

Riffle / Run Maximum 8: 5

Comments

6] GRADIENT

(18.18 ft/mi) DRAINAGE AREA (3.00 mi²)

☐ VERY LOW - LOW [2-4]
☑ MODERATE [6-10]
☐ HIGH - VERY HIGH [10-6]

10

%POOL: %GLIDE:
%RUN: %RIFFLE:

Gradient Maximum 10: 10

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A] SAMPLED REACH

Check ALL that apply

METHOD

- ☐ BOAT
- ☐ WADE
- ☐ L. LINE
- ☑ OTHER

STAGE

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

DISTANCE

- ☐ 0.5 Km
- ☐ 0.2 Km
- ☑ 0.15 Km
- ☐ 0.12 Km
- ☐ OTHER

CLARITY

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

_____ meters

CANOPY

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

1st pass _____ cm

2nd _____ cm

C] RECREATION POOL: AREA ☐ >100ft² DEPTH ☐ >3ft

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

Typical of stream; Perm outside SUACO sele. Access @ old GC Bridge. Notify SUACO. Rec inferred. Adj filled landfill, abandoned GC.

B] AESTHETICS

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

D] MAINTENANCE

Circle some & COMMENT

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

E] ISSUES

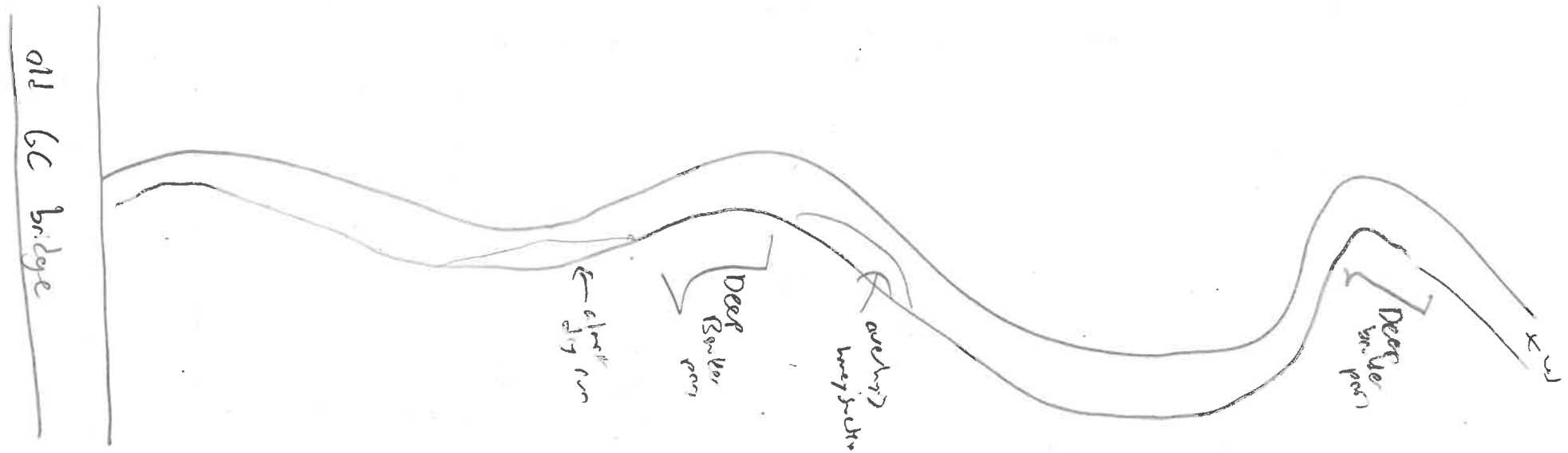
WWTP / CSO / NPDES / INDUSTRY
HARDENED / URBAN / DIRT&GRIME
CONTAMINATED / (LANDFILL)
BMPs-CONSTRUCTION-SEDIMENT
LOGGING / IRRIGATION / COOLING
BANK / EROSION / SURFACE
FALSE BANK / MANURE / LAGOON
WASH H_20 / TILE / H_20 TABLE
ACID / MINE / QUARRY / FLOW
NATURAL / WETLAND / STAGNANT
PARK / (GOLF) / LAWN / HOME
ATMOSPHERE / DATA PAUCITY

F] MEASUREMEN

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

Legacy Tree:

Stream Drawing:



Qualitative Habitat Evaluation Index and Use Assessment Field Sheet

OHEI Score: 64.5

Stream & Location: Marsh Run Dst St. Rt. 104 RM: 0.2 Date: 08/15/2025

Scorers Full Name & Affiliation: Edward Hicks, MBJ

River Code: 02-092 STORET #: MRQ1 Lat./Long.: 39.9805 / 83.0280 (NAD 83 - decimal °) Office verified location ☐

1] SUBSTRATE

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

BEST TYPES	POOL	RIFFLE
☐ ☐ BLDR /SLABS [10]		
☐ ☐ BOULDER [9]	5	5
☐ ☐ COBBLE [8]	5	25
☐ ☑ GRAVEL [7]	30	70
☐ ☑ SAND [6]	50	
☐ ☐ BEDROCK [5]		

OTHER TYPES	POOL	RIFFLE
☐ ☐ HARDPAN [4]		
☐ ☐ DETRITUS [3]		
☐ ☐ MUCK [2]		
☐ ☐ SILT [2]	10	
☐ ☐ ARTIFICIAL [0]		

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

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

Check ONE (Or 2 & average)

ORIGIN
- ☐ LIMESTONE [1]
- ☑ TILLS [1]
- ☐ WETLANDS [0]
- ☐ HARDPAN [0]
- ☐ SANDSTONE [0]
- ☐ RIP/RAP [0]
- ☐ LACUSTURINE [0]
- ☐ SHALE [-1]
- ☐ COAL FINES [-2]

QUALITY

SILT
- ☐ HEAVY [-2]
- ☑ MODERATE [-1]
- ☐ NORMAL [0]
- ☐ FREE [1]

EMBEDDEDNESS
- ☐ EXTENSIVE [-2]
- ☐ MODERATE [-1]
- ☑ NORMAL [0]
- ☐ NONE [1]

Substrate: 15 Maximum 20

Comments

2] INSTREAM COVER

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

1 UNDERCUT BANKS [1]	0 POOLS > 70cm [2]	0 OXBOWS, BACKWATERS [1]	
1 OVERHANGING VEGETATION [1]	2 ROOTWADS [1]	0 AQUATIC MACROPHYTES [1]	
2 SHALLOWS (IN SLOW WATER) [1]	1 BOULDERS [1]	2 LOGS OR WOODY DEBRIS [1]	
1 ROOTMATS [1]			

AMOUNT

Check ONE (Or 2 & average)
- ☐ EXTENSIVE >75% [11]
- ☑ MODERATE 25-75% [7]
- ☐ SPARSE 5-<25% [3]
- ☐ NEARLY ABSENT <5% [1]

Cover Maximum 20: 14

Comments

3] CHANNEL MORPHOLOGY

Check ONE in each category (Or 2 & average)

SINUOSITY
- ☐ HIGH [4]
- ☐ MODERATE [3]
- ☑ LOW [2]
- ☐ NONE [1]

DEVELOPMENT
- ☐ EXCELLENT [7]
- ☑ GOOD [5]
- ☐ FAIR [3]
- ☐ POOR [1]

CHANNELIZATION
- ☐ NONE [6]
- ☐ RECOVERED [4]
- ☑ RECOVERING [3]
- ☐ RECENT OR NO RECOVERY [1]

STABILITY
- ☐ HIGH [3]
- ☑ MODERATE [2]
- ☐ LOW [1]

Channel Maximum 20: 12

Comments

4] BANK EROSION AND RIPARIAN ZONE

Check ONE in each category for EACH BANK (Or 2 per bank & average)

River right looking downstream

EROSION

L	R	
☑	☑	NONE / LITTLE [3]
☐	☐	MODERATE [2]
☐	☐	HEAVY / SEVERE [1]

RIPARIAN WIDTH

L	R	
☐	☐	WIDE > 50m [4]
☐	☐	MODERATE 10-50m [3]
☑	☐	NARROW 5-10m [2]
☐	☑	VERY NARROW < 5m [1]
☐	☐	NONE [0]

1.5

FLOOD PLAIN QUALITY

L	R	
☐	☐	FOREST, SWAMP [3]
☐	☐	SHRUB OR OLD FIELD [2]
☐	☐	RESIDENTIAL, PARK, NEW FIELD [1]
☐	☐	FENCED PASTURE [1]
☐	☐	OPEN PASTURE, ROWCROP [0]
☐	☐	CONSERVATION TILLAGE [1]
☑	☑	URBAN OR INDUSTRIAL [0]
☐	☐	MINING / CONSTRUCTION [0]

Indicate predominant land use(s) past 100m riparian.

Riparian Maximum 10: 4.5

Comments

5] POOL / GLIDE AND RIFFLE / RUN QUALITY

MAXIMUM DEPTH

Check ONE (ONLY!)
- ☐ > 1m [6]
- ☐ 0.7-<1m [4]
- ☐ 0.4-<0.7m [2]
- ☑ 0.2-<0.4m [1]
- ☐ < 0.2m [0]

CHANNEL WIDTH

Check ONE (Or 2 & average)
- ☑ POOL WIDTH > RIFFLE WIDTH [2]
- ☐ POOL WIDTH = RIFFLE WIDTH [1]
- ☐ POOL WIDTH < RIFFLE WIDTH [0]

CURRENT VELOCITY

Check ALL that apply
- ☐ TORRENTIAL [-1]
- ☐ VERY FAST [1]
- ☑ FAST [1]
- ☑ MODERATE [1]
- ☑ SLOW [1]
- ☐ INTERSTITIAL [-1]
- ☐ INTERMITTENT [-2]
- ☐ EDDIES [1]

Indicate for reach - pools and riffles.

Recreation Potential
Primary Contact
Secondary Contact
(circle one and comment on back)

Pool / Current Maximum 12: 6

Comments

Indicate for functional riffles; Best areas must be large enough to support a population of riffle-obligate species: ☐ NO RIFFLE [metric=0]

RIFFLE DEPTH
- ☐ BEST AREAS > 10cm [2]
- ☑ BEST AREAS 5-10cm [1]
- ☐ BEST AREAS < 5cm [metric=0]

RUN DEPTH
- ☐ MAXIMUM > 50cm [2]
- ☑ MAXIMUM < 50cm [1]

RIFFLE / RUN SUBSTRATE (Check ONE (Or 2 & average))
- ☐ STABLE (e.g., Cobble, Boulder) [2]
- ☑ MOD. STABLE (e.g., Large Gravel) [1]
- ☐ UNSTABLE (e.g., Fine Gravel, Sand) [0]

RIFFLE / RUN EMBEDDEDNESS
- ☐ NONE [2]
- ☐ LOW [1]
- ☑ MODERATE [0]
- ☐ EXTENSIVE [-1]

Riffle / Run Maximum 8: 3

Comments

6] GRADIENT

(23.26 ft/mi)

DRAINAGE AREA (3.10 mi²)

- ☐ VERY LOW - LOW [2-4]
- ☐ MODERATE [6-10]
- ☑ HIGH - VERY HIGH [10-6]

10

%POOL: 15 %GLIDE: %RUN: 75 %RIFFLE: 10

Gradient Maximum 10: 10

06/16/06

EPA 4520

A] SAMPLED REACH

Check ALL that apply

METHOD

- ☐ BOAT
- ☐ WADE
- ☑ L. LINE
- ☐ OTHER

STAGE

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

DISTANCE

- ☐ 0.5 Km
- ☐ 0.2 Km
- ☑ 0.15 Km
- ☐ 0.12 Km
- ☐ OTHER

meters

CLARITY

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

1st pass _____ cm

2nd _____ cm

CANOPY

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

C] RECREATION

POOL: AREA ☐ >100ft² DEPTH ☐ >3ft

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

Typical. Perm off liberty tire pull off. Rec inferred. Dead above second riffle. Lots of trash, particularly tires. Leach zone from silty pool w/ woody debris.

B] AESTHETICS

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

D] MAINTENANCE

Circle some & *COMMENT*

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

E] ISSUES

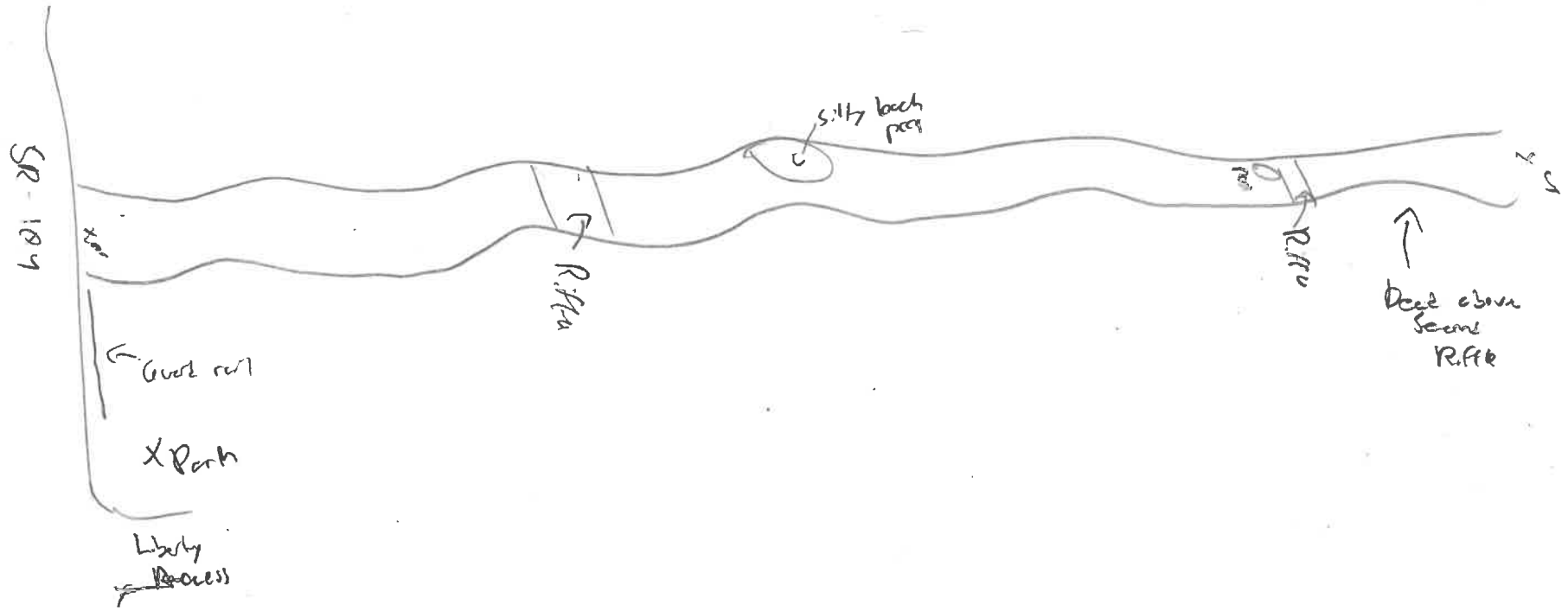
WWTP / CSO / NPDES / INDUSTRY
HARDENED / (URBAN) / DIRT&GRIME
CONTAMINATED / LANDFILL
BMPs-CONSTRUCTION-SEDIMENT
LOGGING / IRRIGATION / COOLING
BANK / EROSION / SURFACE
FALSE BANK / MANURE / LAGOON
WASH H_20 / TILE / H_20 TABLE
ACID / MINE / QUARRY / FLOW
NATURAL / WETLAND / STAGNANT
PARK / GOLF / LAWN / HOME
ATMOSPHERE / DATA PAUCITY

F] MEASUREMENT:

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

Legacy Tree:

Stream Drawing:



Qualitative Habitat Evaluation Index and Use Assessment Field Sheet

OHEI Score: 50

Stream & Location: March Run – Gantz Farm RM: 12.0 Date: 6/23/25

Scorers Full Name & Affiliation: Edward Hicks, MRS

River Code: 02-093-___ STORET #: MR02 Lat./Long. (NAD 83 - decimal °): 39.8980 183.0613 Office verified location ☐

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

BEST TYPES	POOL	RIFFLE	OTHER TYPES	POOL	RIFFLE
☐☐ BLDR /SLABS [10]			☐☐ HARDPAN [4]		
☐☑ BOULDER [9]	20		☐☐ DETRITUS [3]		
☐☐ COBBLE [8]	5		☐☐ MUCK [2]		
☐☐ GRAVEL [7]	10	70	☐☐ SILT [2]	5	
☑☐ SAND [6]	50	30	☐☐ ARTIFICIAL [0]		
☐☐ BEDROCK [5]			(Score natural substrates; ignore sludge from point-sources)		

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

Check ONE (Or 2 & average)

ORIGIN		QUALITY
☑ LIMESTONE [1]	SILT	☐ HEAVY [-2]
☐ TILLS [1]		☐ MODERATE [-1]
☐ WETLANDS [0]		☑ NORMAL [0]
☐ HARDPAN [0]		☐ FREE [1]
☐ SANDSTONE [0]	EMBEDDEDNESS	☐ EXTENSIVE [-2]
☐ RIP/RAP [0]		☑ MODERATE [-1]
☐ LACUSTURINE [0]		☐ NORMAL [0]
☐ SHALE [-1]		☐ NONE [1]
☐ COAL FINES [-2]		

Comments

Substrate: 17 (Maximum 20)

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

___ UNDERCUT BANKS [1]	___ POOLS > 70cm [2]	___ OXBOWS, BACKWATERS [1]
1 OVERHANGING VEGETATION [1]	___ ROOTWADS [1]	___ AQUATIC MACROPHYTES [1]
___ SHALLOWS (IN SLOW WATER) [1]	3 BOULDERS [1]	___ LOGS OR WOODY DEBRIS [1]
___ ROOTMATS [1]		

AMOUNT Check ONE (Or 2 & average)
☐ EXTENSIVE >75% [11]
☑ MODERATE 25-75% [7]
☐ SPARSE 5-<25% [3]
☐ NEARLY ABSENT <5% [1]

Comments

Cover Maximum 20: 9

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

SINUOSITY	DEVELOPMENT	CHANNELIZATION	STABILITY
☐ HIGH [4]	☐ EXCELLENT [7]	☐ NONE [6]	☐ HIGH [3]
☐ MODERATE [3]	☐ GOOD [5]	☐ RECOVERED [4]	☑ MODERATE [2]
☑ LOW [2]	☑ FAIR [3]	☑ RECOVERING [3]	☐ LOW [1]
☐ NONE [1]	☐ POOR [1]	☐ RECENT OR NO RECOVERY [1]	

Comments

Channel Maximum 20: 10

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

River right looking downstream

EROSION (L / R)	RIPARIAN WIDTH (L / R)	FLOOD PLAIN QUALITY (L / R)
☐ ☑ NONE / LITTLE [3]	☐ ☐ WIDE > 50m [4]	☐ ☐ FOREST, SWAMP [3]
☑ ☐ MODERATE [2]	☑ ☐ MODERATE 10-50m [3]	☐ ☐ SHRUB OR OLD FIELD [2]
☐ ☐ HEAVY / SEVERE [1]	☐ ☑ NARROW 5-10m [2]	☑ ☑ RESIDENTIAL, PARK, NEW FIELD [1]
2.5	☐ ☐ VERY NARROW < 5m [1]	☐ ☐ FENCED PASTURE [1]
	☐ ☐ NONE [0] 2.5	☐ ☐ OPEN PASTURE, ROWCROP [0]
		1

☐ ☐ CONSERVATION TILLAGE [1]
☐ ☐ URBAN OR INDUSTRIAL [0]
☐ ☐ MINING / CONSTRUCTION [0]

Indicate predominant land use(s) past 100m riparian.

Comments

Riparian Maximum 10: 6

5] POOL / GLIDE AND RIFFLE / RUN QUALITY

MAXIMUM DEPTH Check ONE (ONLY!)
☐ > 1m [6]
☐ 0.7-<1m [4]
☐ 0.4-<0.7m [2]
☐ 0.2-<0.4m [1]
☒ < 0.2m [0]

CHANNEL WIDTH Check ONE (Or 2 & average)
☐ POOL WIDTH > RIFFLE WIDTH [2]
☐ POOL WIDTH = RIFFLE WIDTH [1]
☑ POOL WIDTH < RIFFLE WIDTH [0]

CURRENT VELOCITY Check ALL that apply
☐ TORRENTIAL [-1] ☑ SLOW [1]
☐ VERY FAST [1] ☐ INTERSTITIAL [-1]
☑ FAST [1] ☐ INTERMITTENT [-2]
☑ MODERATE [1] ☐ EDDIES [1]
Indicate for reach - pools and riffles.

Recreation Potential
Primary Contact
Secondary Contact
(circle one and comment on back)

Comments: No pool

Pool / Current Maximum 12: 3 0

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

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

Comments

Riffle / Run Maximum 8: 0

6] GRADIENT
(38.96 ft/mi)

DRAINAGE AREA
(2.20 mi²)

☐ VERY LOW - LOW [2-4]
☐ MODERATE [6-10]
☒ HIGH - VERY HIGH [10-6]

8

%POOL: 0 %GLIDE: 0
%RUN: 90 %RIFFLE: 10

Gradient Maximum 10: 8

06/16/06

EPA 4520

A] SAMPLED REACH

Check ALL that apply

METHOD

- ☐ BOAT
- ☐ WADE
- ☑ L. LINE
- ☐ OTHER

STAGE

1st -sample pass- 2nd

- ☐ HIGH ☐
- ☐ UP ☐
- ☑ NORMAL ☐
- ☐ LOW ☐
- ☐ DRY ☐

DISTANCE

- ☐ 0.5 Km
- ☐ 0.2 Km
- ☑ 0.15 Km
- ☐ 0.12 Km
- ☐ OTHER

_____ meters

CLARITY

1st --sample pass-- 2nd

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

CANOPY

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

1st pass _____ cm

2nd _____ cm

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

Post restoration so not exactly typical of stream. Rec observed. Got Grove City parks permission, no permit req'd, but wanted data park in nearby lot, set up long-line near footbridge.

B] AESTHETICS

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

C] RECREATION

AREA DEPTH

POOL: ☐ >100ft² ☐ >3ft

D] MAINTENANCE

Circle some & COMMENT

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

E] ISSUES

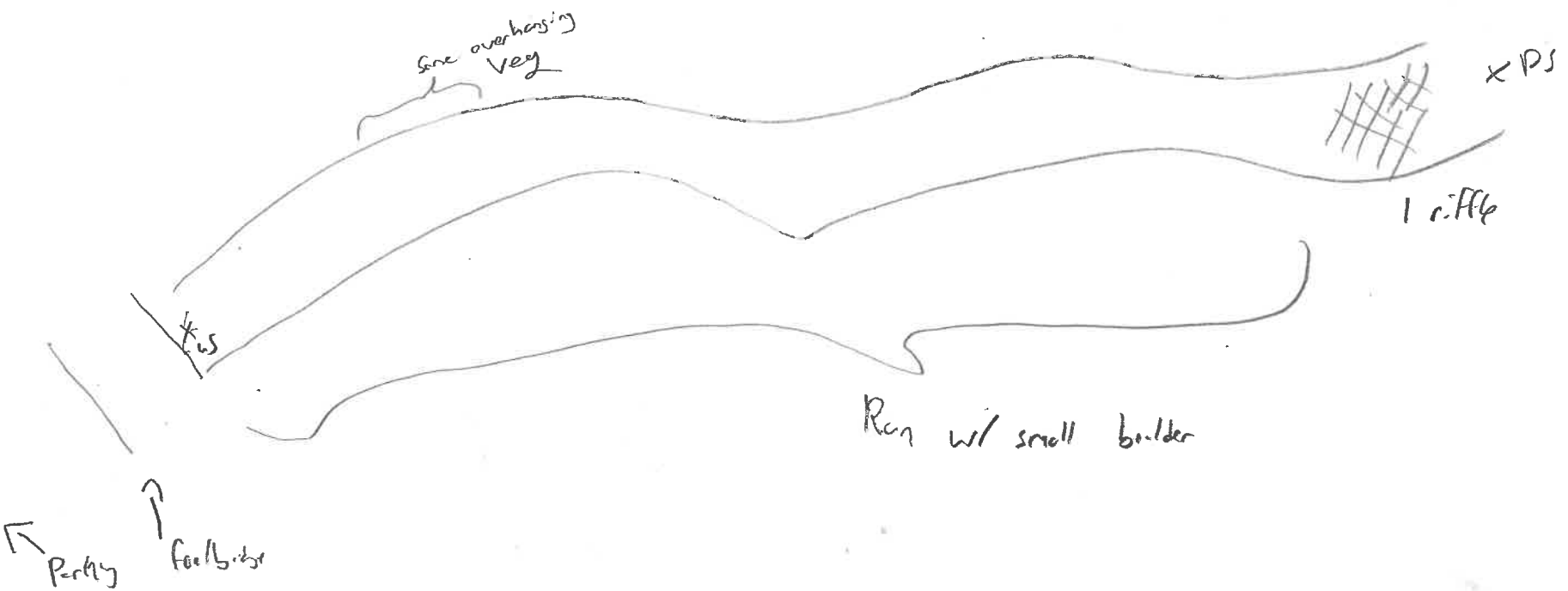
WWTP / CSO / NPDES / INDUSTRY
HARDENED / URBAN / DIRT&GRIME
CONTAMINATED / LANDFILL
BMPs-CONSTRUCTION-SEDIMENT
LOGGING / IRRIGATION / COOLING
BANK / EROSION / SURFACE
FALSE BANK / MANURE / LAGOON
WASH H_20 / TILE / H_20 TABLE
ACID / MINE / QUARRY / FLOW
NATURAL / WETLAND / STAGNANT
PARK / GOLF / LAWN / HOME
ATMOSPHERE / DATA PAUCITY

F] MEASUREMENT

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

Legacy Tree:

Stream Drawing:



Qualitative Habitat Evaluation Index and Use Assessment Field Sheet

OHEI Score: 56

Stream & Location: Gantz Run Ust St. Rte 104 RM: 1.0 Date: 08/15/2025

Scorers Full Name & Affiliation: Edward Hicks, MBI

River Code: 02-855-___ STORET #: GTZQ1 Lat./Long. (NAD 83 - decimal °): 39.8837 183.0280 Office verified location ☐

1] SUBSTRATE

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

BEST TYPES	POOL	RIFFLE	OTHER TYPES	POOL	RIFFLE
☐☐ BLDR /SLABS [10]			☐☐ HARDPAN [4]		
☐☐ BOULDER [9]			☐☐ DETRITUS [3]		
☐☐ COBBLE [8]			☐☐ MUCK [2]		
☐☑ GRAVEL [7]	30	50	☐☐ SILT [2]		
☑☐ SAND [6]	70	50	☐☐ ARTIFICIAL [0]		
☐☐ BEDROCK [5]			(Score natural substrates; ignore sludge from point-sources)		

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

Check ONE (Or 2 & average)

ORIGIN	SILT / EMBEDDEDNESS	QUALITY
☐ LIMESTONE [1]		☐ HEAVY [-2]
☑ TILLS [1]		☐ MODERATE [-1]
☐ WETLANDS [0]		☑ NORMAL [0]
☐ HARDPAN [0]		☐ FREE [1]
☐ SANDSTONE [0]		☐ EXTENSIVE [-2]
☐ RIP/RAP [0]		☑ MODERATE [-1]
☐ LACUSTURINE [0]		☐ NORMAL [0]
☐ SHALE [-1]		☐ NONE [1]
☐ COAL FINES [-2]		

Substrate: 13 / Maximum 20

Comments

2] INSTREAM COVER

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

2 UNDERCUT BANKS [1]	0 POOLS > 70cm [2]	0 OXBOWS, BACKWATERS [1]	AMOUNT (Check ONE (Or 2 & average))
1 OVERHANGING VEGETATION [1]	0 ROOTWADS [1]	0 AQUATIC MACROPHYTES [1]	☐ EXTENSIVE >75% [11]
2 SHALLOWS (IN SLOW WATER) [1]	1 BOULDERS [1]	1 LOGS OR WOODY DEBRIS [1]	☑ MODERATE 25-75% [7]
1 ROOTMATS [1]			☐ SPARSE 5-<25% [3]
			☐ NEARLY ABSENT <5% [1]

Cover Maximum 20: 13

Comments

3] CHANNEL MORPHOLOGY

Check ONE in each category (Or 2 & average)

SINUOSITY	DEVELOPMENT	CHANNELIZATION	STABILITY
☐ HIGH [4]	☐ EXCELLENT [7]	☐ NONE [6]	☐ HIGH [3]
☐ MODERATE [3]	☐ GOOD [5]	☐ RECOVERED [4]	☑ MODERATE [2]
☑ LOW [2]	☑ FAIR [3]	☑ RECOVERING [3]	☐ LOW [1]
☐ NONE [1]	☐ POOR [1]	☐ RECENT OR NO RECOVERY [1]	

Channel Maximum 20: 10

Comments

4] BANK EROSION AND RIPARIAN ZONE

Check ONE in each category for EACH BANK (Or 2 per bank & average)

River right looking downstream

EROSION (L / R)	RIPARIAN WIDTH (L / R)	FLOOD PLAIN QUALITY (L / R)
☐☐ NONE / LITTLE [3]	☐☐ WIDE > 50m [4]	☐☐ FOREST, SWAMP [3]
☑☑ MODERATE [2]	☐☑ MODERATE 10-50m [3]	☐☐ SHRUB OR OLD FIELD [2]
☐☐ HEAVY / SEVERE [1]	☑☐ NARROW 5-10m [2]	☐☑ RESIDENTIAL, PARK, NEW FIELD [1]
	☐☑ VERY NARROW < 5m [1]	☐☐ FENCED PASTURE [1]
	☐☐ NONE [0]	☐☐ OPEN PASTURE, ROWCROP [0]
	1.5	0.5

☐☐ CONSERVATION TILLAGE [1]
☐☐ URBAN OR INDUSTRIAL [0]
☑☐ MINING / CONSTRUCTION [0]

Indicate predominant land use(s) past 100m riparian.

Riparian Maximum 10: 4

Comments

5] POOL / GLIDE AND RIFFLE / RUN QUALITY

MAXIMUM DEPTH	CHANNEL WIDTH	CURRENT VELOCITY
Check ONE (ONLY!)	Check ONE (Or 2 & average)	Check ALL that apply
☐ > 1m [6]	☑ POOL WIDTH > RIFFLE WIDTH [2]	☐ TORRENTIAL [-1] ☑ SLOW [1]
☐ 0.7-<1m [4]	☐ POOL WIDTH = RIFFLE WIDTH [1]	☐ VERY FAST [1] ☐ INTERSTITIAL [-1]
☑ 0.4-<0.7m [2]	☐ POOL WIDTH < RIFFLE WIDTH [0]	☐ FAST [1] ☐ INTERMITTENT [-2]
☐ 0.2-<0.4m [1]		☑ MODERATE [1] ☐ EDDIES [1]
☐ < 0.2m [0]		Indicate for reach - pools and riffles.

Recreation Potential: Primary Contact / Secondary Contact (circle one and comment on back)

Pool / Current Maximum 12: 6

Comments

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

☐ NO RIFFLE [metric=0]

RIFFLE DEPTH	RUN DEPTH	RIFFLE / RUN SUBSTRATE (Check ONE (Or 2 & average))	RIFFLE / RUN EMBEDDEDNESS
☐ BEST AREAS > 10cm [2]	☐ MAXIMUM > 50cm [2]	☐ STABLE (e.g., Cobble, Boulder) [2]	☐ NONE [2]
☐ BEST AREAS 5-10cm [1]	☐ MAXIMUM < 50cm [1]	☐ MOD. STABLE (e.g., Large Gravel) [1]	☐ LOW [1]
☑ BEST AREAS < 5cm [metric=0]		☐ UNSTABLE (e.g., Fine Gravel, Sand) [0]	☐ MODERATE [0]
			☐ EXTENSIVE [-1]

Riffle / Run Maximum 8: 0

Comments

6] GRADIENT

(23.26 ft/mi) ☐ VERY LOW - LOW [2-4] ☐ MODERATE [6-10] ☒ HIGH - VERY HIGH [10-6] 10

%POOL: 20 %GLIDE: %RUN: 70 %RIFFLE: 10

Gradient Maximum 10: 10

DRAINAGE AREA (0.78 mi²)

06/16/06

EPA 4520

A] SAMPLED REACH

Check ALL that apply

METHOD

- ☐ BOAT
- ☐ WADE
- ☐ L. LINE
- ☑ OTHER F

STAGE

1st -sample pass- 2nd

- ☐ HIGH ☐
- ☐ UP ☐
- ☑ NORMAL ☐
- ☐ LOW ☐
- ☐ DRY ☐

DISTANCE

- ☐ 0.5 Km
- ☐ 0.2 Km
- ☑ 0.15 Km
- ☐ 0.12 Km
- ☐ OTHER

____ meters

CLARITY

1st --sample pass-- 2nd

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

CANOPY

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

pass 1st____ cm 2nd____ cm

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

Typical. Ree Inferred. Parked at adj. abandoned house

B] AESTHETICS

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

C] RECREATION

POOL: AREA ☐ >100ft² DEPTH ☐ >3ft

D] MAINTENANCE

Circle some & COMMENT

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

E] ISSUES

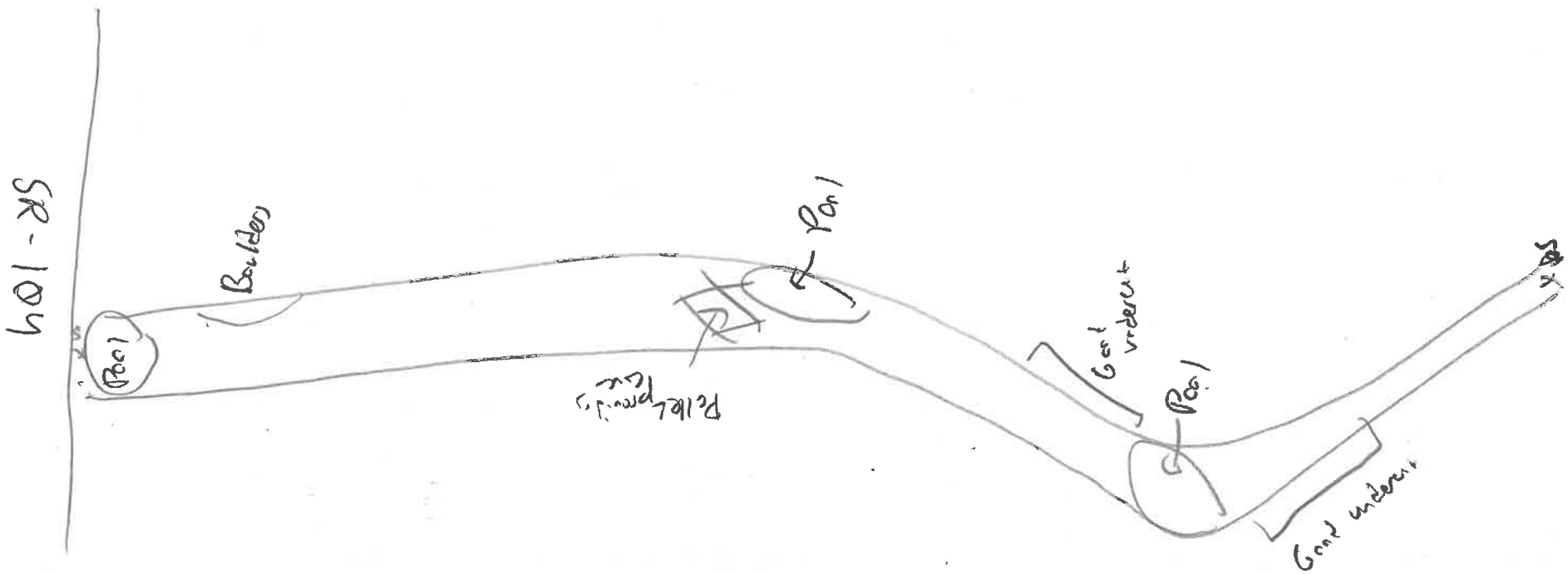
WWTP / CSO / NPDES / INDUSTRY
HARDENED / URBAN / DIRT&GRIME
CONTAMINATED / LANDFILL
BMPs-CONSTRUCTION-SEDIMENT
LOGGING / IRRIGATION / COOLING
BANK / EROSION / SURFACE
FALSE BANK / MANURE / LAGOON
WASH H_2O / TILE / H_2O TABLE
ACID / (MINE) / (QUARRY) / FLOW
NATURAL / WETLAND / STAGNANT
PARK / GOLF / LAWN / HOME
ATMOSPHERE / DATA PAUCITY

F] MEASUREMEN

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

Legacy Tree:

Stream Drawing:



Qualitative Habitat Evaluation Index and Use Assessment Field Sheet

QHEI Score: 68

Stream & Location: Republican Run Vst. OH 104 RM: 0.2 Date: 07/02/25

Scorers Full Name & Affiliation: Edward Hicks, MDS

River Code: 02-243- STORET #: REP01 Lat./Long. (NAD 83 - decimal °): 39.86423 / 83.02278 Office verified location ☐

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

Check ONE (Or 2 & average)

BEST TYPES	POOL	RIFFLE	OTHER TYPES	POOL	RIFFLE
☐ ☐ BLDR /SLABS [10]			☐ ☐ HARDPAN [4]		
☐ ☐ BOULDER [9]			☐ ☐ DETRITUS [3]		
☐ ☐ COBBLE [8]	5	5	☐ ☐ MUCK [2]		
☐ ☑ GRAVEL [7]	20	60	☐ ☐ SILT [2]	5	
☑ ☐ SAND [6]	70	35	☐ ☐ ARTIFICIAL [0]		
☐ ☐ BEDROCK [5]			(Score natural substrates; ignore sludge from point-sources)		

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

ORIGIN: ☑ LIMESTONE [1] ☑ TILLS [1] ☐ WETLANDS [0] ☐ HARDPAN [0] ☐ SANDSTONE [0] ☐ RIP/RAP [0] ☐ LACUSTURINE [0] ☐ SHALE [-1] ☐ COAL FINES [-2]

SILT / EMBEDDEDNESS

QUALITY: ☐ HEAVY [-2] ☐ MODERATE [-1] ☑ NORMAL [0] ☐ FREE [1] ☐ EXTENSIVE [-2] ☐ MODERATE [-1] ☑ NORMAL [0] ☐ NONE [1]

Substrate: 14 (Maximum 20)

Comments

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

1	UNDERCUT BANKS [1]	1	POOLS > 70cm [2]	0	OXBOWS, BACKWATERS [1]
1	OVERHANGING VEGETATION [1]	1	ROOTWADS [1]	0	AQUATIC MACROPHYTES [1]
0	SHALLOWS (IN SLOW WATER) [1]	0	BOULDERS [1]	1	LOGS OR WOODY DEBRIS [1]
2	ROOTMATS [1]				

AMOUNT (Check ONE (Or 2 & average)): ☐ EXTENSIVE >75% [11] ☑ MODERATE 25-75% [7] ☐ SPARSE 5-<25% [3] ☐ NEARLY ABSENT <5% [1]

Cover Maximum 20: 14

Comments

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

SINUOSITY: ☐ HIGH [4] ☑ MODERATE [3] ☐ LOW [2] ☐ NONE [1]

DEVELOPMENT: ☐ EXCELLENT [7] ☑ GOOD [5] ☐ FAIR [3] ☐ POOR [1]

CHANNELIZATION: ☐ NONE [6] ☑ RECOVERED [4] ☐ RECOVERING [3] ☐ RECENT OR NO RECOVERY [1]

STABILITY: ☐ HIGH [3] ☑ MODERATE [2] ☐ LOW [1]

Channel Maximum 20: 14

Comments

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

River right looking downstream

EROSION	L	R
NONE / LITTLE [3]	☐	☐
MODERATE [2]	☑	☑
HEAVY / SEVERE [1]	☐	☐

RIPARIAN WIDTH	L	R
WIDE > 50m [4]	☐	☐
MODERATE 10-50m [3]	☐	☐
NARROW 5-10m [2]	☑	☑
VERY NARROW < 5m [1]	☐	☐
NONE [0]	☐	☐

FLOOD PLAIN QUALITY	L	R
FOREST, SWAMP [3]	☐	☐
SHRUB OR OLD FIELD [2]	☐	☐
RESIDENTIAL, PARK, NEW FIELD [1]	☑	☑
FENCED PASTURE [1]	☐	☐
OPEN PASTURE, ROWCROP [0]	☐	☐
CONSERVATION TILLAGE [1]	☐	☐
URBAN OR INDUSTRIAL [0]	☐	☐
MINING / CONSTRUCTION [0]	☐	☐

Indicate predominant land use(s) past 100m riparian.

Riparian Maximum 10: 5

Comments

5] POOL / GLIDE AND RIFFLE / RUN QUALITY

MAXIMUM DEPTH (Check ONE (ONLY!)): ☐ > 1m [6] ☑ 0.7-<1m [4] ☐ 0.4-<0.7m [2] ☐ 0.2-<0.4m [1] ☐ < 0.2m [0]

CHANNEL WIDTH (Check ONE (Or 2 & average)): ☑ POOL WIDTH > RIFFLE WIDTH [2] ☐ POOL WIDTH = RIFFLE WIDTH [1] ☐ POOL WIDTH < RIFFLE WIDTH [0]

CURRENT VELOCITY (Check ALL that apply): ☐ TORRENTIAL [-1] ☑ SLOW [1] ☑ VERY FAST [1] ☐ INTERSTITIAL [-1] ☑ FAST [1] ☐ INTERMITTENT [-2] ☑ MODERATE [1] ☑ EDDIES [1]

Indicate for reach - pools and riffles.

Recreation Potential: Primary Contact / Secondary Contact (circle one and comment on back)

Pool / Current Maximum 12: 11

Comments

Indicate for functional riffles; Best areas must be large enough to support a population of riffle-obligate species: ☐ NO RIFFLE [metric=0]

Check ONE (Or 2 & average).

RIFFLE DEPTH: ☐ BEST AREAS > 10cm [2] ☑ BEST AREAS 5-10cm [1] ☐ BEST AREAS < 5cm [metric=0]

RUN DEPTH: ☐ MAXIMUM > 50cm [2] ☑ MAXIMUM < 50cm [1]

RIFFLE / RUN SUBSTRATE: ☐ STABLE (e.g., Cobble, Boulder) [2] ☐ MOD. STABLE (e.g., Large Gravel) [1] ☑ UNSTABLE (e.g., Fine Gravel, Sand) [0]

RIFFLE / RUN EMBEDDEDNESS: ☐ NONE [2] ☐ LOW [1] ☑ MODERATE [0] ☐ EXTENSIVE [-1]

Riffle / Run Maximum 8: 2

Comments

6] GRADIENT (32.25 ft/mi) DRAINAGE AREA (7.00 mi²)

☐ VERY LOW - LOW [2-4] ☐ MODERATE [6-10] ☒ HIGH - VERY HIGH [10-6]

8

%POOL: 10 %GLIDE: %RUN: 70 %RIFFLE: 20

Gradient Maximum 10: 8

06/16/06

EPA 4520

A] SAMPLED REACH

Check ALL that apply

METHOD

- ☐ BOAT
- ☑ WADE (See Comment)
- ☐ L. LINE
- ☐ OTHER

DISTANCE

- ☐ 0.5 Km
- ☐ 0.2 Km
- ☑ 0.15 Km
- ☐ 0.12 Km
- ☐ OTHER

_____ meters

STAGE

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

CLARITY

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

CANOPY

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

pass: 1st _____ cm; 2nd _____ cm

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

Typical of Stream. Rec observed during recon. Mostly poor run w/ some good riffle and pool. Park on Bell Classic Circle and take bike path to bridge. LL broke so shoe-horned beast down and in but not necessary. City of Grove City Property. Habitat should have had more darters. Golf effect plain.

B] AESTHETICS

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

C] RECREATION

POOL: AREA ☐ >100ft² DEPTH ☐ >3ft

D] MAINTENANCE

Circle some & COMMENT

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

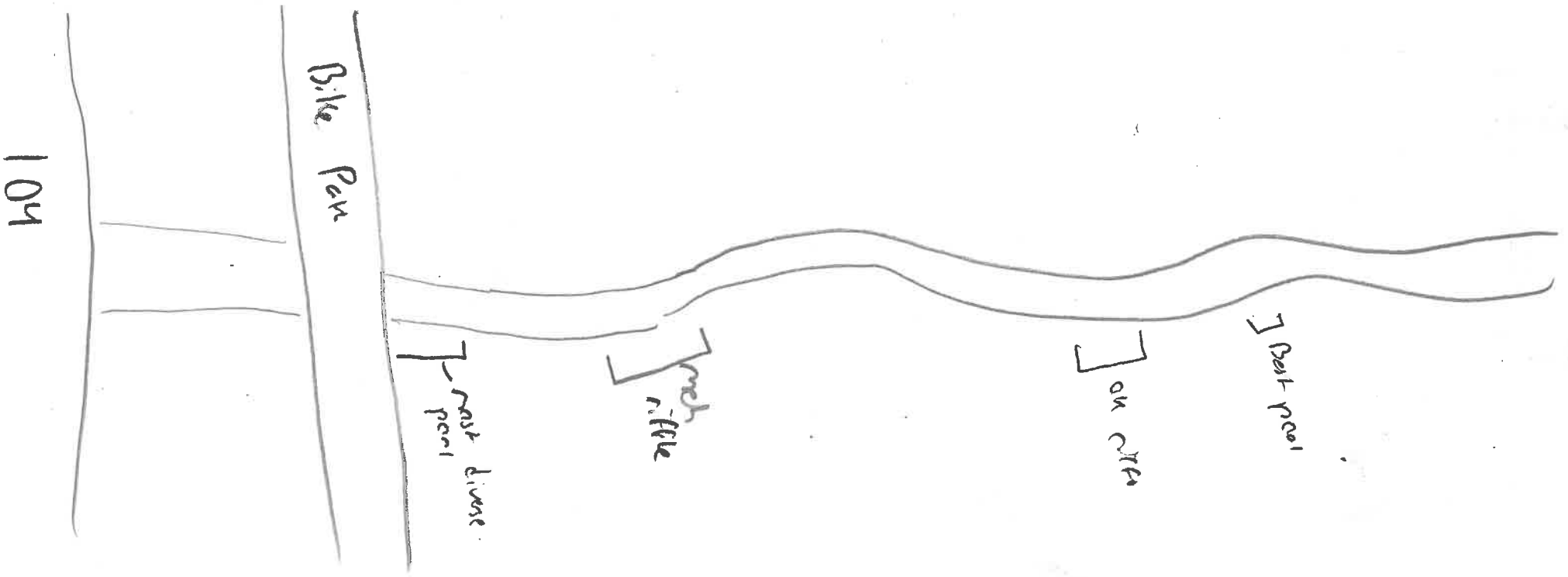
E] ISSUES

WWTP / CSO / NPDES / INDUSTRY
HARDENED / URBAN / DIRT&GRIME
CONTAMINATED / LANDFILL
BMPs-CONSTRUCTION-SEDIMENT
LOGGING / IRRIGATION / COOLING
BANK / EROSION / SURFACE
FALSE BANK / MANURE / LAGOON
WASH H_20 / TILE / H_20 TABLE
ACID / MINE / QUARRY / FLOW
NATURAL / WETLAND / STAGNANT
PARK / GOLF / LAWN / HOME
ATMOSPHERE / DATA PAUCITY

F] MEASUREMEN

$\bar{x}$ width
$\bar{x}$ depth
max. depth
$\bar{x}$ bankfull width
bankfull $\bar{x}$ depth
W/D ratio
bankfull max. depth
floodprone x^2 width
entrench. ratio
Legacy Tree:

Stream Drawing:



Qualitative Habitat Evaluation Index and Use Assessment Field Sheet

OHEI Score: 77

Stream & Location: Republican Run Dsl Buckeye Parkway RM: 1.3 Date: 10/01/25

Scorers Full Name & Affiliation: Edward Hicks, MBS

River Code: Q2-243- STORET #: REPQ2 Lat./Long.: 39.8676 183.0453 7 (NAD 83 - decimal °) Office verified location ☐

1] SUBSTRATE

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

BEST TYPES	POOL	RIFFLE	OTHER TYPES	POOL	RIFFLE
☐ ☐ BLDR /SLABS [10]			☐ ☐ HARDPAN [4]		
☐ ☐ BOULDER [9]	10	5	☐ ☐ DETRITUS [3]		
☐ ☐ COBBLE [8]	15	10	☐ ☐ MUCK [2]		
☐ ☑ GRAVEL [7]	15	60	☐ ☐ SILT [2]		
☐ ☑ SAND [6]	50	20	☐ ☐ ARTIFICIAL [0]	10	5
☐ ☐ BEDROCK [5]			(Score natural substrates; ignore sludge from point-sources)		

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

Check ONE (Or 2 & average)

ORIGIN		QUALITY	
☐ LIMESTONE [1]	SILT	☐ HEAVY [-2]	Substrate
☑ TILLS [1]		☐ MODERATE [-1]	
☐ WETLANDS [0]		☐ NORMAL [0]	
☐ HARDPAN [0]		☑ FREE [1]	17
☐ SANDSTONE [0]	EMBEDDEDNESS	☐ EXTENSIVE [-2]	
☐ RIP/RAP [0]		☐ MODERATE [-1]	Maximum 20
☐ LACUSTURINE [0]		☑ NORMAL [0]	
☐ SHALE [-1]		☐ NONE [1]	
☐ COAL FINES [-2]			

Comments

2] INSTREAM COVER

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

1	UNDERCUT BANKS [1]	2	POOLS > 70cm [2]	0	OXBOWS, BACKWATERS [1]
1	OVERHANGING VEGETATION [1]	1	ROOTWADS [1]	0	AQUATIC MACROPHYTES [1]
1	SHALLOWS (IN SLOW WATER) [1]	2	BOULDERS [1]	1	LOGS OR WOODY DEBRIS [1]
2	ROOTMATS [1]				

AMOUNT

Check ONE (Or 2 & average)

☐ EXTENSIVE >75% [11]
☑ MODERATE 25-75% [7]
☐ SPARSE 5-<25% [3]
☐ NEARLY ABSENT <5% [1]

Comments

Cover Maximum 20: 16

3] CHANNEL MORPHOLOGY

Check ONE in each category (Or 2 & average)

SINUOSITY	DEVELOPMENT	CHANNELIZATION	STABILITY
☑ HIGH [4]	☑ EXCELLENT [7]	☑ NONE [6]	☑ HIGH [3]
☐ MODERATE [3]	☐ GOOD [5]	☐ RECOVERED [4]	☐ MODERATE [2]
☐ LOW [2]	☐ FAIR [3]	☐ RECOVERING [3]	☐ LOW [1]
☐ NONE [1]	☐ POOR [1]	☐ RECENT OR NO RECOVERY [1]	

Comments

Channel Maximum 20: 20

4] BANK EROSION AND RIPARIAN ZONE

Check ONE in each category for EACH BANK (Or 2 per bank & average)

River right looking downstream

EROSION L	EROSION R	
☐	☐	NONE / LITTLE [3]
☑	☑	MODERATE [2]
☐	☐	HEAVY / SEVERE [1]

RIPARIAN WIDTH L	RIPARIAN WIDTH R	
☐	☐	WIDE > 50m [4]
☐	☐	MODERATE 10-50m [3]
☐	☐	NARROW 5-10m [2]
☑	☑	VERY NARROW < 5m [1]
☐	☐	NONE [0]

FLOOD PLAIN QUALITY L	FLOOD PLAIN QUALITY R	
☐	☐	FOREST, SWAMP [3]
☐	☐	SHRUB OR OLD FIELD [2]
☑	☑	RESIDENTIAL, PARK, NEW FIELD [1]
☐	☐	FENCED PASTURE [1]
☐	☐	OPEN PASTURE, ROWCROP [0]

☐	☐	CONSERVATION TILLAGE [1]
☐	☐	URBAN OR INDUSTRIAL [0]
☐	☐	MINING / CONSTRUCTION [0]

Indicate predominant land use(s) past 100m riparian.

Comments

Riparian Maximum 10: 4

5] POOL / GLIDE AND RIFFLE / RUN QUALITY

MAXIMUM DEPTH Check ONE (ONLY!)

☑ > 1m [6]
☐ 0.7-<1m [4]
☐ 0.4-<0.7m [2]
☐ 0.2-<0.4m [1]
☐ < 0.2m [0]

CHANNEL WIDTH Check ONE (Or 2 & average)

☑ POOL WIDTH > RIFFLE WIDTH [2]
☐ POOL WIDTH = RIFFLE WIDTH [1]
☐ POOL WIDTH < RIFFLE WIDTH [0]

CURRENT VELOCITY Check ALL that apply

☐ TORRENTIAL [-1]	☑ SLOW [1]
☐ VERY FAST [1]	☐ INTERSTITIAL [-1]
☐ FAST [1]	☐ INTERMITTENT [-2]
☑ MODERATE [1]	☐ EDDIES [1]

Indicate for reach - pools and riffles.

Recreation Potential
Primary Contact
Secondary Contact
(circle one and comment on back)

Comments

Pool / Current Maximum 12: 10

Indicate for functional riffles; Best areas must be large enough to support a population of riffle-obligate species: ☐ NO RIFFLE [metric=0]

Check ONE (Or 2 & average).

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

Comments

Riffle / Run Maximum 8: 8

6] GRADIENT

(26.32 ft/mi)

DRAINAGE AREA (5.70 mi²)

☐ VERY LOW - LOW [2-4]
☒ MODERATE [6-10]
☒ HIGH - VERY HIGH [10-6]

10

%POOL: %GLIDE:
%RUN: %RIFFLE:

Gradient Maximum 10: 10

06/16/06

A] SAMPLED REACH

Check ALL that apply

METHOD

- ☐ BOAT
- ☐ WADE
- ☐ L. LINE
- ☐ OTHER

STAGE

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

DISTANCE

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

_____ meters

CLARITY

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

CANOPY

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

pass: 1st _____ cm; 2nd _____ cm

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

Relatively atypical. See pics of large pool, looks like flow from upstream being lost due to low water table. almost interstitial. Rec inferred. (Golfers recovering gear, etc) Access w/ at least 2 days notice to Pinnacles olab.

B] AESTHETICS

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

C] RECREATION

POOL: AREA ☐ >100ft² DEPTH ☐ >3ft

D] MAINTENANCE

Circle some & COMMENT

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

E] ISSUES

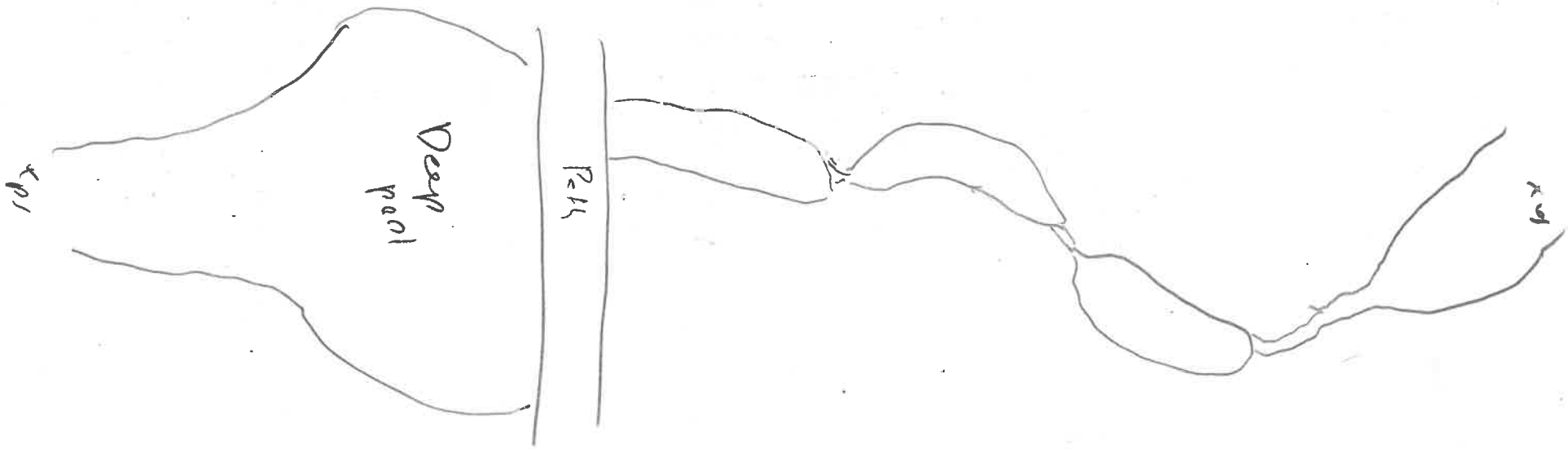
WWTP / CSO / NPDES / INDUSTRY
HARDENED / URBAN / DIRT&GRIME
CONTAMINATED / LANDFILL
BMPs-CONSTRUCTION-SEDIMENT
LOGGING / IRRIGATION / COOLING
BANK / EROSION / SURFACE
FALSE BANK / MANURE / LAGOON
WASH H_2O / TILE / H_2O TABLE
ACID / MINE / QUARRY / FLOW
NATURAL / WETLAND / STAGNANT
PARK / GOLF / LAWN / HOME
ATMOSPHERE / DATA PAUCITY

F] MEASUREMEN

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

Legacy Tree:

Stream Drawing:



Qualitative Habitat Evaluation Index and Use Assessment Field Sheet

OHEI Score: 67.5

Stream & Location: Republican Run @ Sweerington Pk RM: 3.8 Date: 06/27/25

Scorers Full Name & Affiliation: Edward Hicks, NBS

River Code: 02-243-___ STORET #: REPQ3 Lat./Long. (NAD 83 - decimal °): 39.8810 183.0724 Office verified location ☐

1] SUBSTRATE

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

BEST TYPES	POOL	RIFFLE
☐ ☐ BLDR /SLABS [10]	___	___
☐ ☐ BOULDER [9]	5	5
☐ ☐ COBBLE [8]	15	10
☐ ☑ GRAVEL [7]	20	50
☑ ☐ SAND [6]	40	35
☐ ☐ BEDROCK [5]	___	___

OTHER TYPES	POOL	RIFFLE
☐ ☐ HARDPAN [4]	___	___
☐ ☐ DETRITUS [3]	___	___
☐ ☐ MUCK [2]	___	___
☐ ☐ SILT [2]	30	___
☐ ☐ ARTIFICIAL [0]	___	___

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

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

Check ONE (Or 2 & average)

ORIGIN	SILT	QUALITY
☐ LIMESTONE [1]		☐ HEAVY [-2]
☐ TILLS [1]		☑ MODERATE [-1]
☐ WETLANDS [0]		☐ NORMAL [0]
☐ HARDPAN [0]		☐ FREE [1]
☐ SANDSTONE [0]		☐ EXTENSIVE [-2]
☑ RIP/RAP [0]	EMBEDDEDNESS	☐ MODERATE [-1]
☐ LACUSTURINE [0]		☑ NORMAL [0]
☐ SHALE [-1]		☐ NONE [1]
☐ COAL FINES [-2]		

Substrate: 14 / Maximum 20

Comments

2] INSTREAM COVER

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

1 UNDERCUT BANKS [1]	1 POOLS > 70cm [2]	___ OXBOWS, BACKWATERS [1]
2 OVERHANGING VEGETATION [1]	2 ROOTWADS [1]	___ AQUATIC MACROPHYTES [1]
___ SHALLOWS (IN SLOW WATER) [1]	1 BOULDERS [1]	3 LOGS OR WOODY DEBRIS [1]
2 ROOTMATS [1]		

AMOUNT

Check ONE (Or 2 & average)

☐ EXTENSIVE >75% [11]
☑ MODERATE 25-75% [7]
☐ SPARSE 5-<25% [3]
☐ NEARLY ABSENT <5% [1]

Cover Maximum 20: 15

Comments

3] CHANNEL MORPHOLOGY

Check ONE in each category (Or 2 & average)

SINUOSITY	DEVELOPMENT	CHANNELIZATION	STABILITY
☐ HIGH [4]	☐ EXCELLENT [7]	☐ NONE [6]	☑ HIGH [3]
☐ MODERATE [3]	☑ GOOD [5]	☐ RECOVERED [4]	☐ MODERATE [2]
☑ LOW [2]	☐ FAIR [3]	☑ RECOVERING [3]	☐ LOW [1]
☐ NONE [1]	☐ POOR [1]	☐ RECENT OR NO RECOVERY [1]	

Channel Maximum 20: 13

Comments

4] BANK EROSION AND RIPARIAN ZONE

Check ONE in each category for EACH BANK (Or 2 per bank & average)

River right looking downstream

EROSION (L / R)	RIPARIAN WIDTH (L / R)	FLOOD PLAIN QUALITY (L / R)
☐ ☑ NONE / LITTLE [3]	☐ ☐ WIDE > 50m [4]	☐ ☐ FOREST, SWAMP [3]
☐ ☐ MODERATE [2]	☐ ☐ MODERATE 10-50m [3]	☐ ☐ SHRUB OR OLD FIELD [2]
☑ ☐ HEAVY / SEVERE [1]	☐ ☐ NARROW 5-10m [2]	☐ ☑ RESIDENTIAL, PARK, NEW FIELD [1]
	☑ ☑ VERY NARROW < 5m [1]	☐ ☐ FENCED PASTURE [1]
	☐ ☐ NONE [0]	☐ ☐ OPEN PASTURE, ROWCROP [0]

☐ ☐	CONSERVATION TILLAGE [1]
☑ ☐	URBAN OR INDUSTRIAL [0]
☐ ☐	MINING / CONSTRUCTION [0]

Indicate predominant land use(s) past 100m riparian.

Riparian Maximum 10: 3.5

Comments

5] POOL / GLIDE AND RIFFLE / RUN QUALITY

MAXIMUM DEPTH (Check ONE (ONLY!))

☐ > 1m [6]
☑ 0.7-<1m [4]
☐ 0.4-<0.7m [2]
☐ 0.2-<0.4m [1]
☐ < 0.2m [0]

CHANNEL WIDTH (Check ONE (Or 2 & average))

☐ POOL WIDTH > RIFFLE WIDTH [2]
☑ POOL WIDTH = RIFFLE WIDTH [1]
☐ POOL WIDTH < RIFFLE WIDTH [0]

CURRENT VELOCITY (Check ALL that apply)

☐ TORRENTIAL [-1]	☑ SLOW [1]
☐ VERY FAST [1]	☐ INTERSTITIAL [-1]
☑ FAST [1]	☐ INTERMITTENT [-2]
☑ MODERATE [1]	☑ EDDIES [1]

Indicate for reach - pools and riffles.

Recreation Potential: ~~Primary Contact~~ Secondary Contact (circle one and comment on back)

Pool / Current Maximum 12: 9

Comments

Indicate for functional riffles; Best areas must be large enough to support a population of riffle-obligate species: ☐ NO RIFFLE [metric=0]

Check ONE (Or 2 & average).

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

Riffle / Run Maximum 8: 3

Comments

6] GRADIENT

(23.80 ft/mi)

DRAINAGE AREA (2.97 mi²)

☐ VERY LOW - LOW [2-4]
☐ MODERATE [6-10]
☒ HIGH - VERY HIGH [10-6]

10

%POOL: 20 %GLIDE: ___
%RUN: 30 %RIFFLE: 50

Gradient Maximum 10: 10

EPA 4520

06/16/06

A] SAMPLED REACH

Check ALL that apply

METHOD
- ☐ BOAT
- ☐ WADE
- ☐ L LINE
- ☑ OTHER A(3P-3

STAGE (1st -sample pass- 2nd)
- ☐ HIGH ☐
- ☐ UP ☐
- ☑ NORMAL ☐
- ☐ LOW ☐
- ☐ DRY ☐

DISTANCE
- ☐ 0.5 Km
- ☐ 0.2 Km
- ☑ 0.15 Km
- ☐ 0.12 Km
- ☐ OTHER

_____ meters

CLARITY (1st --sample pass-- 2nd)
- ☐ < 20 cm ☐
- ☐ 20-<40 cm ☐
- ☐ 40-70 cm ☐
- ☑ > 70 cm/ CTB ☐
- ☐ SECCHI DEPTH ☐

CANOPY
- ☐ > 85%- OPEN
- ☐ 55%-<85%
- ☐ 30%-<55%
- ☑ 10%-<30%
- ☐ <10%- CLOSED

1st pass _____ cm

2nd _____ cm

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

Appears typical. Rec inferred. Multiple pipes coming into stream, some of which had septic-like odors. Parked at Ark Motorsports. Run by Grove City before sampling (on permit, went data)

B] AESTHETICS

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

C] RECREATION

AREA DEPTH

POOL: ☐ >100ft² ☐ >3ft

D] MAINTENANCE

Circle some & COMMENT

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

E] ISSUES

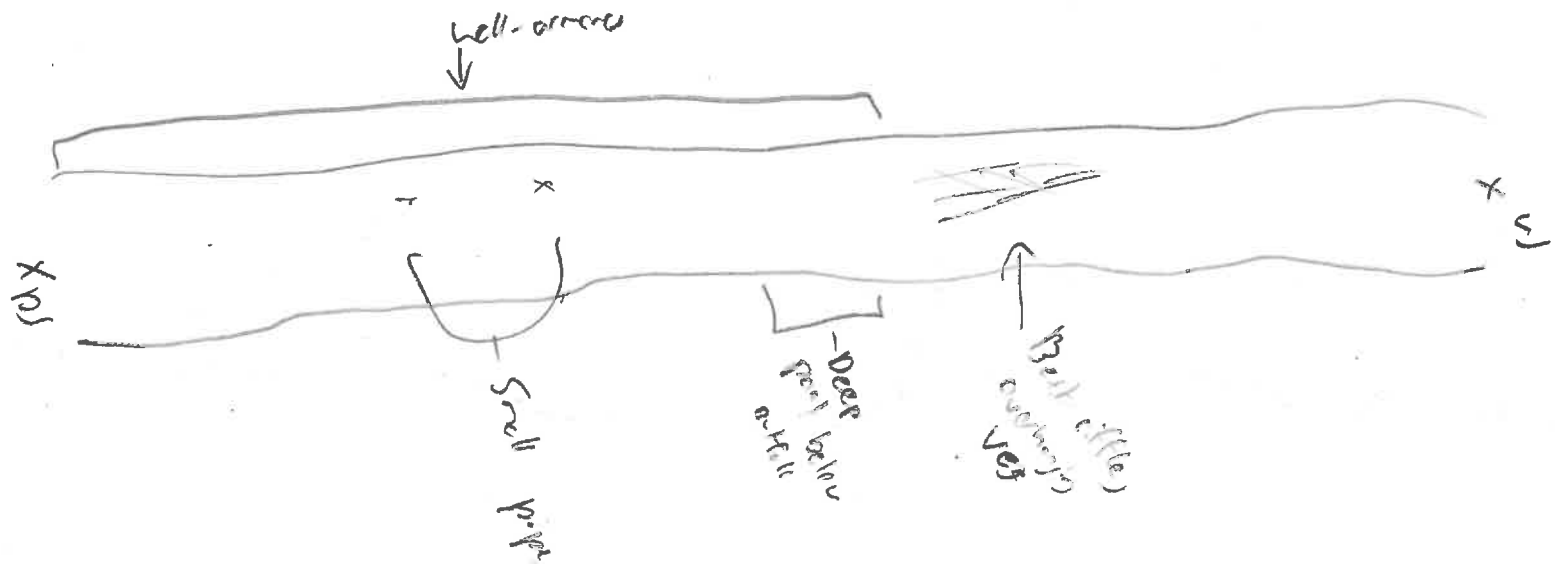
WWTP / CSO / NPDES / INDUSTRY
HARDENED / URBAN / DIRT&GRIME
CONTAMINATED / LANDFILL
BMPs-CONSTRUCTION-SEDIMENT
LOGGING / IRRIGATION / COOLING
BANK / EROSION / SURFACE
FALSE BANK / MANURE / LAGOON
WASH H_20 / TILE / H_20 TABLE
ACID / MINE / QUARRY / FLOW
NATURAL / WETLAND / STAGNANT
PARK / GOLF / LAWN / HOME
ATMOSPHERE / DATA PAUCITY

F] MEASUREMENT

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

Legacy Tree:

Stream Drawing:



Qualitative Habitat Evaluation Index and Use Assessment Field Sheet

OHEI Score: 73.5

Stream & Location: Republican Run @ Berry Family Conservancy RM: 5.4 Date: 6/27/25

Scorers Full Name & Affiliation: Edward Hicks, MBI

River Code: 02-243- STORET #: DEPOOL Lat./Long. (NAD 83 - decimal °): 39.8866 183.9948 Office verified location ☐

1] SUBSTRATE

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

BEST TYPES	POOL	RIFFLE	OTHER TYPES	POOL	RIFFLE
☐ ☐ BLDR /SLABS [10]			☐ ☐ HARDPAN [4]		
☐ ☐ BOULDER [9]	5		☐ ☐ DETRITUS [3]		
☐ ☐ COBBLE [8]	5	5	☐ ☐ MUCK [2]		
☐ ☑ GRAVEL [7]	20	75	☐ ☐ SILT [2]	40	5
☑ ☐ SAND [6]	30	15	☐ ☐ ARTIFICIAL [0]		
☐ ☐ BEDROCK [5]			(Score natural substrates; ignore sludge from point-sources)		

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

Check ONE (Or 2 & average)

ORIGIN		QUALITY	
☐ LIMESTONE [1]	SILT	☐ HEAVY [-2]	Substrate
☐ TILLS [1]		☐ MODERATE [-1]	
☑ WETLANDS [0]		☑ NORMAL [0]	15
☐ HARDPAN [0]		☐ FREE [1]	
☐ SANDSTONE [0]	EMBEDDEDNESS	☐ EXTENSIVE [-2]	Maximum 20
☐ RIP/RAP [0]		☐ MODERATE [-1]	
☐ LACUSTURINE [0]		☑ NORMAL [0]	
☐ SHALE [-1]		☐ NONE [1]	
☐ COAL FINES [-2]			

Comments

2] INSTREAM COVER

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

1 UNDERCUT BANKS [1]	___ POOLS > 70cm [2]	___ OXBOWS, BACKWATERS [1]
3 OVERHANGING VEGETATION [1]	1 ROOTWADS [1]	2 AQUATIC MACROPHYTES [1]
___ SHALLOWS (IN SLOW WATER) [1]	1 BOULDERS [1]	2 LOGS OR WOODY DEBRIS [1]
2 ROOTMATS [1]		

AMOUNT

Check ONE (Or 2 & average)

☑ EXTENSIVE >75% [11]
☐ MODERATE 25-75% [7]
☐ SPARSE 5-<25% [3]
☐ NEARLY ABSENT <5% [1]

Comments

Cover Maximum 20: 18

3] CHANNEL MORPHOLOGY

Check ONE in each category (Or 2 & average)

SINUOSITY	DEVELOPMENT	CHANNELIZATION	STABILITY
☐ HIGH [4]	☐ EXCELLENT [7]	☐ NONE [6]	☐ HIGH [3]
☑ MODERATE [3]	☑ GOOD [5]	☑ RECOVERED [4]	☑ MODERATE [2]
☐ LOW [2]	☐ FAIR [3]	☐ RECOVERING [3]	☐ LOW [1]
☐ NONE [1]	☐ POOR [1]	☐ RECENT OR NO RECOVERY [1]	

Comments

Channel Maximum 20: 14

4] BANK EROSION AND RIPARIAN ZONE

Check ONE in each category for EACH BANK (Or 2 per bank & average)

River right looking downstream

EROSION (L / R)	RIPARIAN WIDTH (L / R)	FLOOD PLAIN QUALITY (L / R)	
☑ ☑ NONE / LITTLE [3]	☐ ☑ WIDE > 50m [4]	☐ ☐ FOREST, SWAMP [3]	☐ ☐ CONSERVATION TILLAGE [1]
☐ ☐ MODERATE [2]	☑ ☐ MODERATE 10-50m [3]	☑ ☑ SHRUB OR OLD FIELD [2]	☐ ☐ URBAN OR INDUSTRIAL [0]
☐ ☐ HEAVY / SEVERE [1]	☐ ☐ NARROW 5-10m [2]	☐ ☐ RESIDENTIAL, PARK, NEW FIELD [1]	☐ ☐ MINING / CONSTRUCTION [0]
	☐ ☐ VERY NARROW < 5m [1]	☐ ☐ FENCED PASTURE [1]	
	☐ ☐ NONE [0] 3.5	☐ ☐ OPEN PASTURE, ROWCROP [0]	

Indicate predominant land use(s) past 100m riparian.

Comments

Riparian Maximum 10: 8.5

5] POOL / GLIDE AND RIFFLE / RUN QUALITY

MAXIMUM DEPTH	CHANNEL WIDTH	CURRENT VELOCITY	
Check ONE (ONLY!)	Check ONE (Or 2 & average)	Check ALL that apply	
☐ > 1m [6]	☑ POOL WIDTH > RIFFLE WIDTH [2]	☐ TORRENTIAL [-1]	☑ SLOW [1]
☐ 0.7-<1m [4]	☐ POOL WIDTH = RIFFLE WIDTH [1]	☐ VERY FAST [1]	☐ INTERSTITIAL [-1]
☑ 0.4-<0.7m [2]	☐ POOL WIDTH < RIFFLE WIDTH [0]	☑ FAST [1]	☐ INTERMITTENT [-2]
☐ 0.2-<0.4m [1]		☑ MODERATE [1]	☑ EDDIES [1]
☐ < 0.2m [0]		Indicate for reach - pools and riffles.	

Recreation Potential: Primary Contact / Secondary Contact (circle one and comment on back)

Comments

Pool / Current Maximum 12: 8

Indicate for functional riffles; Best areas must be large enough to support a population of riffle-obligate species: ☐ NO RIFFLE [metric=0]

Check ONE (Or 2 & average).

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

Comments

Riffle / Run Maximum 8: 2

6] GRADIENT (36.36 ft/mi)

DRAINAGE AREA (1.91 mi²)

☐ VERY LOW - LOW [2-4]
☐ MODERATE [6-10]
☒ HIGH - VERY HIGH [10-6]

8

%POOL: 15 %GLIDE: ___

%RUN: 35 %RIFFLE: 50

Gradient Maximum 10: 8

EPA 4520 06/16/06

A] SAMPLED REACH

Check ALL that apply

METHOD

- ☐ BOAT
- ☐ WADE
- ☐ L. LINE
- ☑ OTHER ASP-?

STAGE

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

DISTANCE

- ☐ 0.5 Km
- ☐ 0.2 Km
- ☑ 0.15 Km
- ☐ 0.12 Km
- ☐ OTHER

_____ meters

CLARITY

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

CANOPY

- ☐ ≥ 85%- OPEN
- ☑ 55%-<85%
- ☐ 30%-<55%
- ☐ 10%-<30%
- ☐ <10%- CLOSED

1st pass _____ cm

2nd pass _____ cm

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

Typical of conservancy reaches, not so much whole stream. Rec inferred. Park along Columbus St. Got city permission (No permit, just date). Weirdly few fish in lower half. Localized sewer fungus around fecer piles.

B] AESTHETICS

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

C] RECREATION

AREA DEPTH

POOL: ☐ >100ft² ☐ >3ft

D] MAINTENANCE

Circle some & COMMENT

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

E] ISSUES

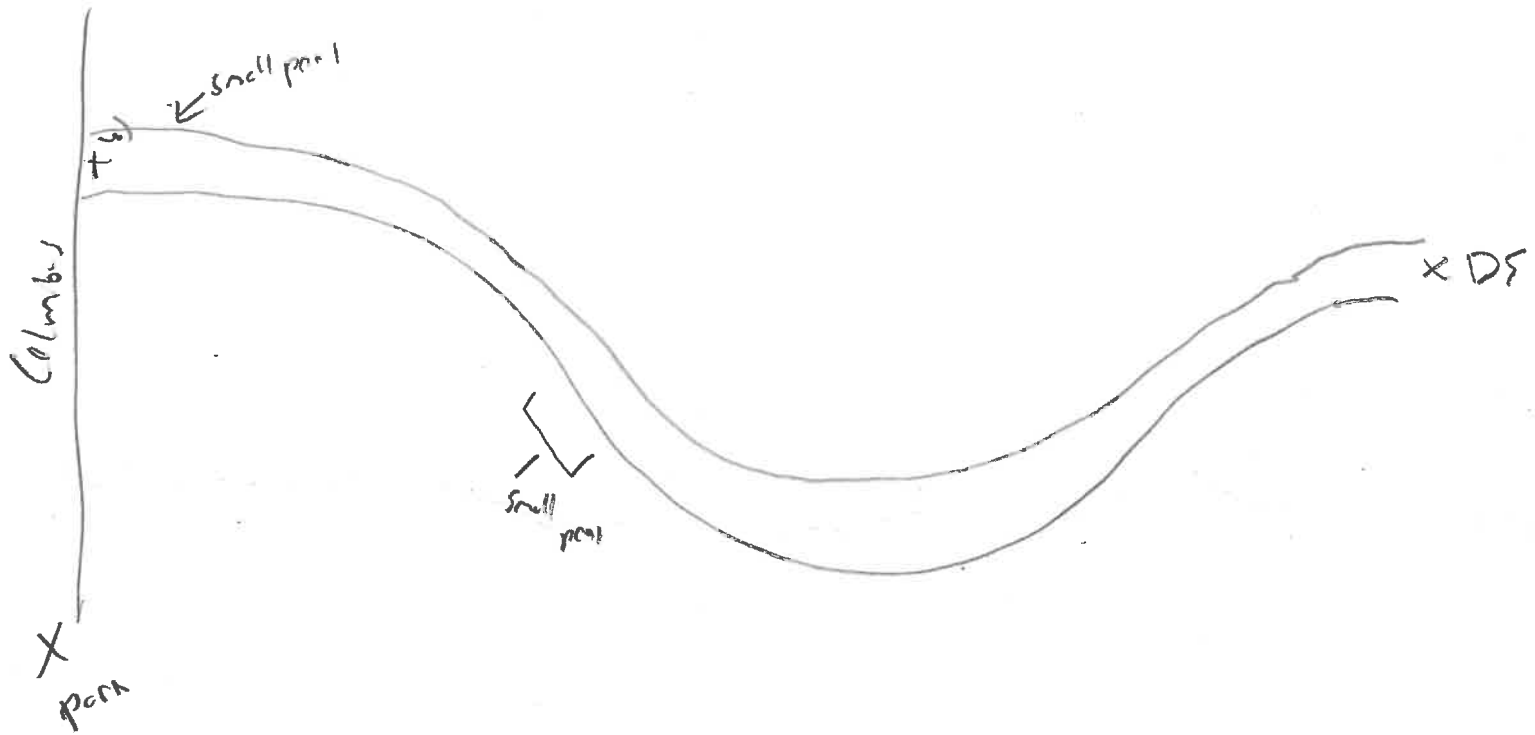
WWTP / CSO / NPDES / INDUSTRY
HARDENED / URBAN / DIRT&GRIME
CONTAMINATED / LANDFILL
BMPs-CONSTRUCTION-SEDIMENT
LOGGING / IRRIGATION / COOLING
BANK / EROSION / SURFACE
FALSE BANK / MANURE / LAGOON
WASH H_20 / TILE / H_20 TABLE
ACID / MINE / QUARRY / FLOW
NATURAL / WETLAND / STAGNANT
PARK / GOLF / LAWN / HOME
ATMOSPHERE / DATA PAUCITY

F] MEASUREMENT

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

Legacy Tree:

Stream Drawing:



Qualitative Habitat Evaluation Index and Use Assessment Field Sheet

OHEI Score: ~~68.5~~ 69.5

Stream & Location: South Branch Republican Run · RM: 0.02 Date: 08/15/2025

Brier Hill Rd · Scorers Full Name & Affiliation: Edward Hicks

River Code: 02-244-___ STORET #: REPQS Lat./Long. (NAD 83 - decimal °): 39.87177 183.0531 Office verified location ☐

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

BEST TYPES	POOL	RIFFLE
☐ ☐ BLDR /SLABS [10]		
☐ ☐ BOULDER [9]	15	20
☐ ☑ COBBLE [8]	15	30
☐ ☑ GRAVEL [7]	20	50
☐ ☐ SAND [6]	20	
☐ ☐ BEDROCK [5]		

OTHER TYPES	POOL	RIFFLE
☐ ☐ HARDPAN [4]		
☐ ☐ DETRITUS [3]		
☐ ☐ MUCK [2]		
☐ ☐ SILT [2]	15	
☐ ☐ ARTIFICIAL [0]	15	

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

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

Check ONE (Or 2 & average)

ORIGIN: ☐ LIMESTONE [1] ☑ TILLS [1] ☐ WETLANDS [0] ☐ HARDPAN [0] ☐ SANDSTONE [0] ☐ RIP/RAP [0] ☐ LACUSTURINE [0] ☐ SHALE [-1] ☐ COAL FINES [-2]

QUALITY — SILT: ☐ HEAVY [-2] ☐ MODERATE [-1] ☑ NORMAL [0] ☐ FREE [1]

QUALITY — EMBEDDEDNESS: ☐ EXTENSIVE [-2] ☐ MODERATE [-1] ☑ NORMAL [0] ☐ NONE [1]

Substrate: 18 / Maximum 20

Comments

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

1 UNDERCUT BANKS [1]	0 POOLS > 70cm [2]	1 OXBOWS, BACKWATERS [1]
1 OVERHANGING VEGETATION [1]	1 ROOTWADS [1]	1 AQUATIC MACROPHYTES [1]
2 SHALLOWS (IN SLOW WATER) [1]	3 BOULDERS [1]	1 LOGS OR WOODY DEBRIS [1]
1 ROOTMATS [1]		

AMOUNT — Check ONE (Or 2 & average)

☐ EXTENSIVE >75% [11] ☑ MODERATE 25-75% [7] ☐ SPARSE 5-<25% [3] ☐ NEARLY ABSENT <5% [1]

Cover Maximum 20: 16

Comments

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

SINUOSITY: ☐ HIGH [4] ☐ MODERATE [3] ☑ LOW [2] ☐ NONE [1]

DEVELOPMENT: ☐ EXCELLENT [7] ☑ GOOD [5] ☐ FAIR [3] ☐ POOR [1]

CHANNELIZATION: ☐ NONE [6] ☑ RECOVERED [4] ☐ RECOVERING [3] ☐ RECENT OR NO RECOVERY [1]

STABILITY: ☑ HIGH [3] ☐ MODERATE [2] ☐ LOW [1]

Channel Maximum 20: 14

Comments

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

River right looking downstream

EROSION	L	R
NONE / LITTLE [3]	☑	☑
MODERATE [2]	☐	☐
HEAVY / SEVERE [1]	☐	☐

RIPARIAN WIDTH	L	R
WIDE > 50m [4]	☐	☐
MODERATE 10-50m [3]	☐	☐
NARROW 5-10m [2]	☐	☐
VERY NARROW < 5m [1]	☑	☑
NONE [0] 0.5	☑	☑

FLOOD PLAIN QUALITY	L	R
FOREST, SWAMP [3]	☐	☐
SHRUB OR OLD FIELD [2]	☐	☐
RESIDENTIAL, PARK, NEW FIELD [1]	☑	☑
FENCED PASTURE [1]	☐	☐
OPEN PASTURE, ROWCROP [0]	☐	☐
CONSERVATION TILLAGE [1]	☐	☐
URBAN OR INDUSTRIAL [0]	☐	☐
MINING / CONSTRUCTION [0]	☐	☐

Indicate predominant land use(s) past 100m riparian.

Riparian Maximum 10: 4.5

Comments

5] POOL / GLIDE AND RIFFLE / RUN QUALITY

MAXIMUM DEPTH — Check ONE (ONLY!)

☐ > 1m [6] ☐ 0.7-<1m [4] ☑ 0.4-<0.7m [2] ☐ 0.2-<0.4m [1] ☐ < 0.2m [0]

CHANNEL WIDTH — Check ONE (Or 2 & average)

☑ POOL WIDTH > RIFFLE WIDTH [2] ☐ POOL WIDTH = RIFFLE WIDTH [1] ☐ POOL WIDTH < RIFFLE WIDTH [0]

CURRENT VELOCITY — Check ALL that apply

☐ TORRENTIAL [-1] ☑ SLOW [1] ☐ VERY FAST [1] ☐ INTERSTITIAL [-1] ☑ FAST [1] ☐ INTERMITTENT [-2] ☑ MODERATE [1] ☑ EDDIES [1]

Indicate for reach - pools and riffles.

Recreation Potential: ~~Primary Contact~~ Secondary Contact (circle one and comment on back)

Pool / Current Maximum 12: 8

Comments

Indicate for functional riffles; Best areas must be large enough to support a population of riffle-obligate species: ☐ NO RIFFLE [metric=0]

RIFFLE DEPTH: ☐ BEST AREAS > 10cm [2] ☑ BEST AREAS 5-10cm [1] ☐ BEST AREAS < 5cm [metric=0]

RUN DEPTH — Check ONE (Or 2 & average): ☐ MAXIMUM > 50cm [2] ☑ MAXIMUM < 50cm [1]

RIFFLE / RUN SUBSTRATE: ☑ STABLE (e.g., Cobble, Boulder) [2] ☐ MOD. STABLE (e.g., Large Gravel) [1] ☐ UNSTABLE (e.g., Fine Gravel, Sand) [0]

RIFFLE / RUN EMBEDDEDNESS: ☐ NONE [2] ☑ LOW [1] ☐ MODERATE [0] ☐ EXTENSIVE [-1]

Riffle / Run Maximum 8: 5

Comments

6] GRADIENT (100 ft/mi) DRAINAGE AREA (1.98 mi²)

☐ VERY LOW - LOW [2-4] ☐ MODERATE [6-10] ☑ HIGH - VERY HIGH [10-6] 4

%POOL: 20 %GLIDE: %RUN: 30 %RIFFLE: 50

Gradient Maximum 10: 4

06/16/06

EPA 4520

A] SAMPLED REACH

Check ALL that apply

METHOD

- ☐ BOAT
- ☐ WADE
- ☐ L. LINE
- ☑ OTHER F

STAGE

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

DISTANCE

- ☐ 0.5 Km
- ☐ 0.2 Km
- ☑ 0.15 Km
- ☐ 0.12 Km
- ☐ OTHER

_____ meters

CLARITY

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

CANOPY

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

pass: 1st _____ cm; 2nd _____ cm

C] RECREATION

POOL: AREA ☐ >100ft² DEPTH ☐ >3ft

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

Typical. Rec inferred. Perch on Brier Hill rd. Bluegill, Johnny Darter, Green Sunfish below culvert only. Faint septic smell near U.S. 0.1 sheen at culvert

B] AESTHETICS

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

D] MAINTENANCE

Circle some & COMMENT

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

E] ISSUES

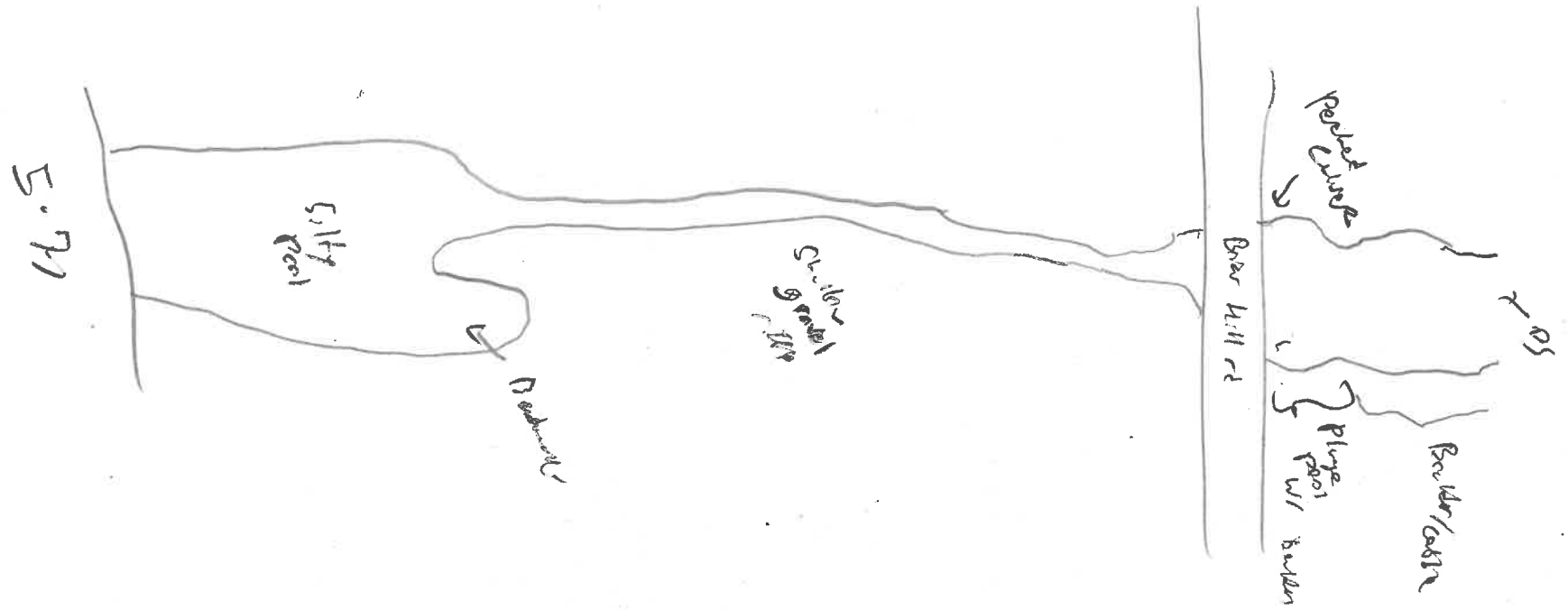
WWTP / CSO / NPDES / (INDUSTRY)
HARDENED / (URBAN) / DIRT&GRIME
CONTAMINATED / LANDFILL
BMPs-CONSTRUCTION-SEDIMENT
LOGGING / IRRIGATION / COOLING
BANK / EROSION / SURFACE
FALSE BANK / MANURE / LAGOON
WASH H_2O / TILE / H_2O TABLE
ACID / MINE / QUARRY / FLOW
NATURAL / WETLAND / STAGNANT
PARK / GOLF / (LAWN) / HOME
ATMOSPHERE / DATA PAUCITY

F] MEASUREMEN

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

Legacy Tree:

Stream Drawing:



Qualitative Habitat Evaluation Index and Use Assessment Field Sheet

OHEI Score: 59

Stream & Location: Billy Joe Run at Pinnacle Club RM: 0.1 Date: 10/11/25

Scorers Full Name & Affiliation: Edward Hicks, MBS

River Code: 02-856- STORET #: REP06 Lat./Long. (NAD 83 - decimal °): 39.86271 83.8378 Office verified location ☐

1] SUBSTRATE

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

BEST TYPES	POOL	RIFFLE
☐☐ BLDR /SLABS [10]		
☐☐ BOULDER [9]		
☐☐ COBBLE [8]		
☑☐ GRAVEL [7]	10	80
☐☐ SAND [6]	10	10
☐☐ BEDROCK [5]		

OTHER TYPES	POOL	RIFFLE
☐☑ HARDPAN [4]	80	
☐☐ DETRITUS [3]		
☐☐ MUCK [2]		
☐☐ SILT [2]		
☐☐ ARTIFICIAL [0]	10	10

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

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

Check ONE (Or 2 & average)

ORIGIN		QUALITY
☐ LIMESTONE [1]		☐ HEAVY [-2]
☑ TILLS [1]	SILT	☐ MODERATE [-1]
☐ WETLANDS [0]		☐ NORMAL [0]
☐ HARDPAN [0]		☑ FREE [1]
☐ SANDSTONE [0]	EMBEDDEDNESS	☐ EXTENSIVE [-2]
☐ RIP/RAP [0]		☐ MODERATE [-1]
☐ LACUSTURINE [0]		☑ NORMAL [0]
☐ SHALE [-1]		☐ NONE [1]
☐ COAL FINES [-2]		

Substrate: 13 / Maximum 20

Comments

2] INSTREAM COVER

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

2 UNDERCUT BANKS [1]	0 POOLS > 70cm [2]	0	OXBOWS, BACKWATERS [1]
3 OVERHANGING VEGETATION [1]	0 ROOTWADS [1]	0	AQUATIC MACROPHYTES [1]
1 SHALLOWS (IN SLOW WATER) [1]	0 BOULDERS [1]	1	LOGS OR WOODY DEBRIS [1]
0 ROOTMATS [1]			

AMOUNT

Check ONE (Or 2 & average)

☑ EXTENSIVE >75% [11]
☐ MODERATE 25-75% [7]
☐ SPARSE 5-<25% [3]
☐ NEARLY ABSENT <5% [1]

Comments

Cover Maximum 20: 15

3] CHANNEL MORPHOLOGY

Check ONE in each category (Or 2 & average)

SINUOSITY	DEVELOPMENT	CHANNELIZATION	STABILITY
☐ HIGH [4]	☑ EXCELLENT [7]	☑ NONE [6] 5	☐ HIGH [3]
☑ MODERATE [3]	☐ GOOD [5]	☑ RECOVERED [4]	☑ MODERATE [2]
☐ LOW [2]	☐ FAIR [3]	☐ RECOVERING [3]	☐ LOW [1]
☐ NONE [1]	☐ POOR [1]	☐ RECENT OR NO RECOVERY [1]	

Comments

Channel Maximum 20: 17

4] BANK EROSION AND RIPARIAN ZONE

Check ONE in each category for EACH BANK (Or 2 per bank & average)

River right looking downstream

EROSION	L	R
NONE / LITTLE [3]	☑	☑
MODERATE [2]	☐	☐
HEAVY / SEVERE [1]	☐	☐

RIPARIAN WIDTH	L	R
WIDE > 50m [4]	☐	☐
MODERATE 10-50m [3]	☐	☐
NARROW 5-10m [2]	☐	☐
VERY NARROW < 5m [1]	☑	☑
NONE [0]	☐	☐

FLOOD PLAIN QUALITY	L	R
FOREST, SWAMP [3]	☐	☐
SHRUB OR OLD FIELD [2]	☐	☐
RESIDENTIAL, PARK, NEW FIELD [1]	☑	☑
FENCED PASTURE [1]	☐	☐
OPEN PASTURE, ROWCROP [0]	☐	☐

	L	R
CONSERVATION TILLAGE [1]	☐	☐
URBAN OR INDUSTRIAL [0]	☐	☐
MINING / CONSTRUCTION [0]	☐	☐

Indicate predominant land use(s) past 100m riparian.

Comments

Riparian Maximum 10: 5

5] POOL / GLIDE AND RIFFLE / RUN QUALITY

MAXIMUM DEPTH (Check ONE (ONLY!))

☐ > 1m [6]
☐ 0.7-<1m [4]
☐ 0.4-<0.7m [2]
☑ 0.2-<0.4m [1]
☐ < 0.2m [0]

CHANNEL WIDTH (Check ONE (Or 2 & average))

☑ POOL WIDTH > RIFFLE WIDTH [2]
☐ POOL WIDTH = RIFFLE WIDTH [1]
☐ POOL WIDTH < RIFFLE WIDTH [0]

CURRENT VELOCITY (Check ALL that apply)

☐ TORRENTIAL [-1]	☑ SLOW [1]
☐ VERY FAST [1]	☐ INTERSTITIAL [-1]
☐ FAST [1]	☐ INTERMITTENT [-2]
☑ MODERATE [1]	☐ EDDIES [1]

Indicate for reach - pools and riffles.

Recreation Potential
Primary Contact
Secondary Contact
(circle one and comment on back)

Comments

Pool / Current Maximum 12: 5

Indicate for functional riffles; Best areas must be large enough to support a population of riffle-obligate species: ☐ NO RIFFLE [metric=0]

Check ONE (Or 2 & average).

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

Comments

Riffle / Run Maximum 8: 8

6] GRADIENT

GRADIENT (41.61 ft/mi) DRAINAGE AREA (0.88 mi²)

☐ VERY LOW - LOW [2-4]
☐ MODERATE [6-10]
☒ HIGH - VERY HIGH [10-6]

4

%POOL: %GLIDE:
%RUN: %RIFFLE:

Gradient Maximum 10: 4

06/16/06

EPA 4520

A] SAMPLED REACH

Check ALL that apply

METHOD

- ☐ BOAT
- ☐ WADE
- ☐ L. LINE
- ☑ OTHER ASP-3

STAGE (1st -sample pass- 2nd)

- ☐ HIGH ☐
- ☐ UP ☐
- ☐ NORMAL ☐
- ☑ LOW ☐
- ☐ DRY ☐

DISTANCE

- ☐ 0.5 Km
- ☐ 0.2 Km
- ☐ 0.15 Km
- ☐ 0.12 Km
- ☑ OTHER 0.99 Km meters

CLARITY (1st --sample pass-- 2nd)

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

CANOPY

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

1st pass: 1st _____ cm; 2nd _____ cm

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

Ree inferred. Typical. Abbreviated reach as stream is too small for more. Access - 2 days notice to pinnacle club.

1

B] AESTHETICS

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

C] RECREATION

POOL: AREA ☐ >100ft² DEPTH ☐ >3ft

D] MAINTENANCE

Circle some & *COMMENT*

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

E] ISSUES

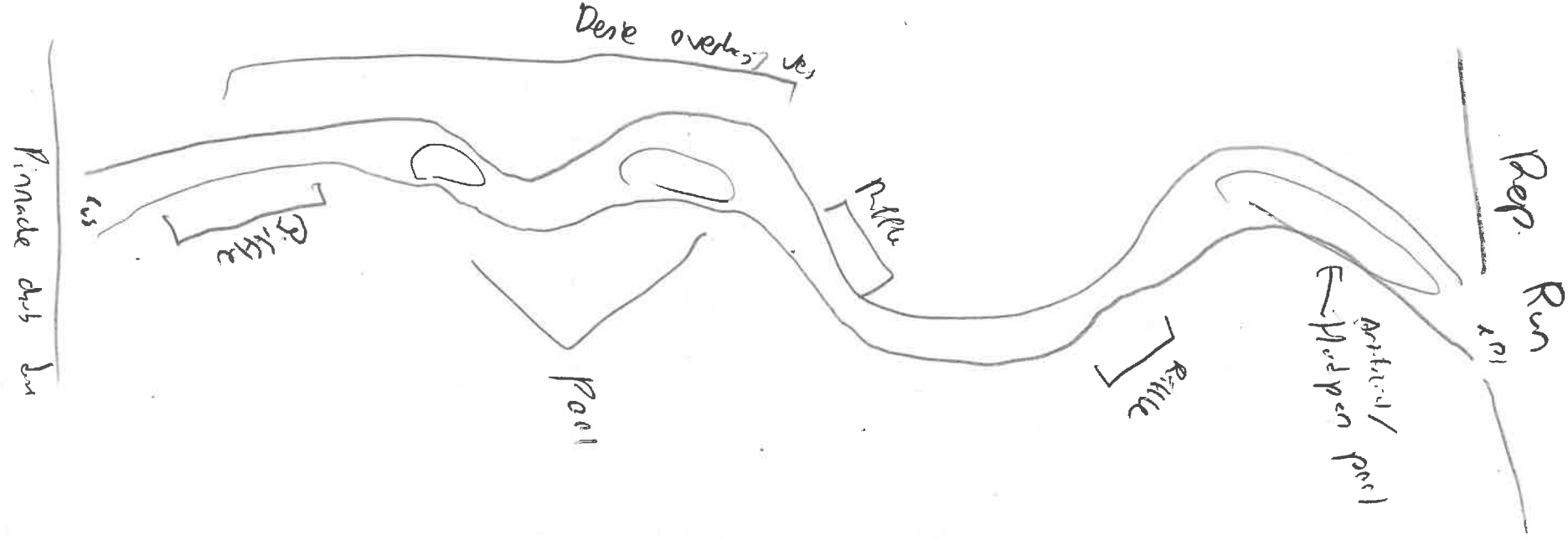
WWTP / CSO / NPDES / INDUSTRY
HARDENED / URBAN / DIRT&GRIME
CONTAMINATED / LANDFILL
BMPs-CONSTRUCTION-SEDIMENT
LOGGING / IRRIGATION / COOLING
BANK / EROSION / SURFACE
FALSE BANK / MANURE / LAGOON
WASH H_20 / TILE / H_20 TABLE
ACID / MINE / QUARRY / FLOW
NATURAL / WETLAND / STAGNANT
PARK / (GOLF) / LAWN / (HOME)
ATMOSPHERE / DATA PAUCITY

F] MEASUREMENT

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

Legacy Tree:

Stream Drawing:



Qualitative Habitat Evaluation Index and Use Assessment Field Sheet

OHEI Score: 66.5

Stream & Location: Grant Run Adj. Paul Talbott Circle RM: 0.2 Date: 08/27/2025

Scorers Full Name & Affiliation: Edward Hicks, MBS

River Code: 02-091-___ STORET #: GRR01 Lat./Long. (NAD 83 - decimal °): 39.8434 / 83.0210 Office verified location ☐

1] SUBSTRATE

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

BEST TYPES	POOL	RIFFLE	OTHER TYPES	POOL	RIFFLE
☐☐ BLDR /SLABS [10]			☐☐ HARDPAN [4]		
☐☐ BOULDER [9]			☐☐ DETRITUS [3]		
☐☐ COBBLE [8]			☐☐ MUCK [2]		
☐☑ GRAVEL [7]	40	100	☐☐ SILT [2]		
☐☑ SAND [6]	60		☐☐ ARTIFICIAL [0]		
☐☐ BEDROCK [5]			(Score natural substrates; ignore sludge from point-sources)		

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

Check ONE (Or 2 & average)

ORIGIN	SILT / EMBEDDEDNESS	QUALITY
☐ LIMESTONE [1]		☐ HEAVY [-2]
☑ TILLS [1]		☐ MODERATE [-1]
☐ WETLANDS [0]		☑ NORMAL [0]
☐ HARDPAN [0]		☐ FREE [1]
☐ SANDSTONE [0]		☐ EXTENSIVE [-2]
☐ RIP/RAP [0]		☑ MODERATE [-1]
☐ LACUSTURINE [0]		☐ NORMAL [0]
☐ SHALE [-1]		☐ NONE [1]
☐ COAL FINES [-2]		

Substrate: 13 / Maximum 20

Comments

2] INSTREAM COVER

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

1 UNDERCUT BANKS [1]	2 POOLS > 70cm [2]	0 OXBOWS, BACKWATERS [1]	2 LOGS OR WOODY DEBRIS [1]
2 OVERHANGING VEGETATION [1]	1 ROOTWADS [1]	2 AQUATIC MACROPHYTES [1]	
2 SHALLOWS (IN SLOW WATER) [1]	2 BOULDERS [1]		
1 ROOTMATS [1]			

AMOUNT (Check ONE (Or 2 & average))

☐ EXTENSIVE >75% [11] ☑ MODERATE 25-75% [7] ☐ SPARSE 5-<25% [3] ☐ NEARLY ABSENT <5% [1]

Cover Maximum 20: 14

Comments

3] CHANNEL MORPHOLOGY

Check ONE in each category (Or 2 & average)

SINUOSITY	DEVELOPMENT	CHANNELIZATION	STABILITY
☑ HIGH [4]	☐ EXCELLENT [7]	☐ NONE [6]	☐ HIGH [3]
☐ MODERATE [3]	☑ GOOD [5]	☑ RECOVERED [4]	☑ MODERATE [2]
☐ LOW [2]	☐ FAIR [3]	☐ RECOVERING [3]	☐ LOW [1]
☐ NONE [1]	☐ POOR [1]	☐ RECENT OR NO RECOVERY [1]	

Channel Maximum 20: 15

Comments

4] BANK EROSION AND RIPARIAN ZONE

Check ONE in each category for EACH BANK (Or 2 per bank & average)

River right looking downstream

EROSION (L / R)	RIPARIAN WIDTH (L / R)	FLOOD PLAIN QUALITY (L / R)
☐☐ NONE / LITTLE [3]	☐☐ WIDE > 50m [4] 3.5	☑☐ FOREST, SWAMP [3] 2
☑☑ MODERATE [2]	☐☑ MODERATE 10-50m [3]	☐☐ SHRUB OR OLD FIELD [2]
☐☐ HEAVY / SEVERE [1]	☐☐ NARROW 5-10m [2]	☐☑ RESIDENTIAL, PARK, NEW FIELD [1]
	☐☐ VERY NARROW < 5m [1]	☐☐ FENCED PASTURE [1]
	☐☐ NONE [0]	☐☐ OPEN PASTURE, ROWCROP [0]

☐☐ CONSERVATION TILLAGE [1] ☐☐ URBAN OR INDUSTRIAL [0] ☐☐ MINING / CONSTRUCTION [0]

Indicate predominant land use(s) past 100m riparian.

Riparian Maximum 10: 7.5

Comments

5] POOL / GLIDE AND RIFFLE / RUN QUALITY

MAXIMUM DEPTH	CHANNEL WIDTH	CURRENT VELOCITY
Check ONE (ONLY!)	Check ONE (Or 2 & average)	Check ALL that apply
☑ > 1m [6]	☑ POOL WIDTH > RIFFLE WIDTH [2]	☐ TORRENTIAL [-1] ☑ SLOW [1]
☐ 0.7-<1m [4]	☐ POOL WIDTH = RIFFLE WIDTH [1]	☐ VERY FAST [1] ☑ INTERSTITIAL [-1]
☐ 0.4-<0.7m [2]	☐ POOL WIDTH < RIFFLE WIDTH [0]	☑ FAST [1] ☐ INTERMITTENT [-2]
☐ 0.2-<0.4m [1]		☐ MODERATE [1] ☐ EDDIES [1]
☐ < 0.2m [0]		Indicate for reach - pools and riffles.

Recreation Potential: Primary Contact / Secondary Contact (circle one and comment on back)

Pool / Current Maximum 12: 9

Comments

Indicate for functional riffles; Best areas must be large enough to support a population

☐ NO RIFFLE [metric=0]

Check ONE (Or 2 & average).

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

Riffle / Run Maximum 8: 0

Comments

6] GRADIENT

(23.81 ft/mi) ☐ VERY LOW - LOW [2-4] ☐ MODERATE [6-10] ☒ HIGH - VERY HIGH [10-6]

DRAINAGE AREA (13.30 mi²)

8

%POOL: %GLIDE: %RUN: %RIFFLE:

Gradient Maximum 10: 8

06/16/06

EPA 4520

A] SAMPLED REACH

Check ALL that apply

METHOD

- [ ] BOAT
- [ ] WADE
- [x] L. LINE
- [ ] OTHER

DISTANCE

- [ ] 0.5 Km
- [ ] 0.2 Km
- [x] 0.15 Km
- [ ] 0.12 Km
- [ ] OTHER

_____ meters

STAGE

1st -sample pass- 2nd

- [ ] HIGH [ ]
- [ ] UP [ ]
- [ ] NORMAL [ ]
- [x] LOW [ ]
- [ ] DRY [ ]

CLARITY

1st --sample pass-- 2nd

- [ ] < 20 cm [ ]
- [ ] 20-<40 cm [ ]
- [ ] 40-70 cm [ ]
- [x] > 70 cm/ CTB [ ]
- [ ] SECCHI DEPTH [ ]

1st pass _____ cm

2nd _____ cm

CANOPY

- [ ] > 85%- OPEN
- [ ] 55%-<85%
- [ ] 30%-<55%
- [x] 10%-<30%
- [ ] <10%- CLOSED

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

Interstitial. able to find 1 sufficiently long pool. See access spreadsheet. Metropark permit needed, access from Paul Talbott circle.

B] AESTHETICS

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

C] RECREATION

AREA DEPTH

POOL: [ ] >100ft² [ ] >3ft

D] MAINTENANCE

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

Circle some & COMMENT

E] ISSUES

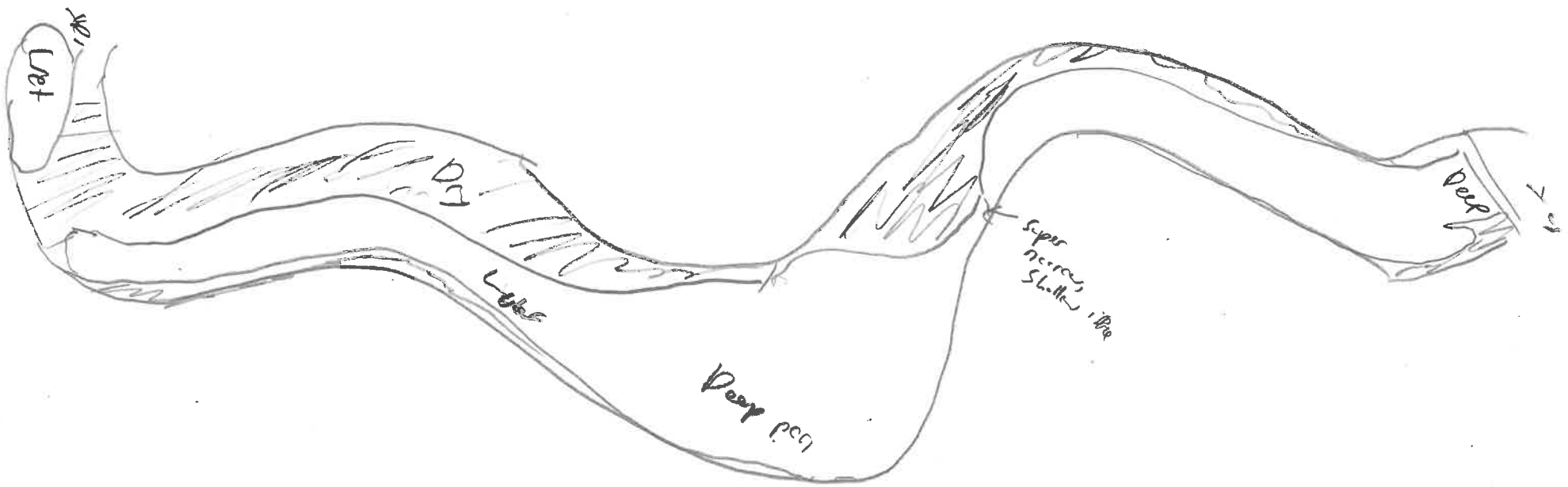
WWTP / CSO / NPDES / INDUSTRY
HARDENED / URBAN / DIRT&GRIME
CONTAMINATED / LANDFILL
BMPs-CONSTRUCTION-SEDIMENT
LOGGING / IRRIGATION / COOLING
BANK / EROSION / SURFACE
FALSE BANK / MANURE / LAGOON
WASH H_20 / TILE / H_20 TABLE
ACID / MINE / QUARRY / FLOW
NATURAL / WETLAND / STAGNANT
PARK / GOLF / LAWN / HOME
ATMOSPHERE / DATA PAUCITY

F] MEASUREMEN

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

Legacy Tree:

Stream Drawing:



Qualitative Habitat Evaluation Index and Use Assessment Field Sheet

OHEI Score: 80

Stream & Location: Grant Run @ Buckeye Parkway / Indian Trails Park RM: 2.0 Date: 08/25/25

Scorers Full Name & Affiliation: Edward Hicks, MBI

River Code: 02-021- STORET #: GRR02 Lat./Long. (NAD 83 - decimal °): 39.92864 / 83.1066 Office verified location ☐

1] SUBSTRATE

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

BEST TYPES	POOL	RIFFLE	OTHER TYPES	POOL	RIFFLE
☐☐ BLDR /SLABS [10]			☐☐ HARDPAN [4]		
☐☐ BOULDER [9]	5		☐☐ DETRITUS [3]		
☐☐ COBBLE [8]	10	5	☐☐ MUCK [2]		
☐☑ GRAVEL [7]	35	55	☐☐ SILT [2]	10	
☑☐ SAND [6]	40	40	☐☐ ARTIFICIAL [0]		
☐☐ BEDROCK [5]			(Score natural substrates; ignore sludge from point-sources)		

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

Check ONE (Or 2 & average)

ORIGIN		QUALITY
☐ LIMESTONE [1]	SILT	☐ HEAVY [-2]
☐ TILLS [1]		☐ MODERATE [-1]
☐ WETLANDS [0]		☑ NORMAL [0]
☐ HARDPAN [0]		☐ FREE [1]
☐ SANDSTONE [0]	EMBEDDEDNESS	☑ EXTENSIVE [-2]
☐ RIP/RAP [0]		☐ MODERATE [-1]
☐ LACUSTURINE [0]		☐ NORMAL [0]
☐ SHALE [-1]		☐ NONE [1]
☐ COAL FINES [-2]		

Substrate: 14 (Maximum 20)

Comments: See back comments

2] INSTREAM COVER

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

1 UNDERCUT BANKS [1]	2 POOLS > 70cm [2]	OXBOWS, BACKWATERS [1]	
2 OVERHANGING VEGETATION [1]	1 ROOTWADS [1]	AQUATIC MACROPHYTES [1]	
1 SHALLOWS (IN SLOW WATER) [1]	1 BOULDERS [1]	2 LOGS OR WOODY DEBRIS [1]	
2 ROOTMATS [1]			

AMOUNT (Check ONE (Or 2 & average))

☑ EXTENSIVE >75% [11] ☐ MODERATE 25-75% [7] ☐ SPARSE 5-<25% [3] ☐ NEARLY ABSENT <5% [1]

Comments

Cover Maximum 20: 20

3] CHANNEL MORPHOLOGY

Check ONE in each category (Or 2 & average)

SINUOSITY	DEVELOPMENT	CHANNELIZATION	STABILITY
☑ HIGH [4]	☑ EXCELLENT [7]	☐ NONE [6]	☐ HIGH [3]
☐ MODERATE [3]	☐ GOOD [5]	☑ RECOVERED [4]	☐ MODERATE [2]
☐ LOW [2]	☐ FAIR [3]	☐ RECOVERING [3]	☑ LOW [1]
☐ NONE [1]	☐ POOR [1]	☐ RECENT OR NO RECOVERY [1]	

Comments

Channel Maximum 20: 16

4] BANK EROSION AND RIPARIAN ZONE

Check ONE in each category for EACH BANK (Or 2 per bank & average)

River right looking downstream

EROSION (L R)	RIPARIAN WIDTH (L R)	FLOOD PLAIN QUALITY (L R)
☐☐ NONE / LITTLE [3]	☐☐ WIDE > 50m [4]	☐☐ FOREST, SWAMP [3]
☑☑ MODERATE [2]	☐☐ MODERATE 10-50m [3]	☐☐ SHRUB OR OLD FIELD [2]
☐☐ HEAVY / SEVERE [1]	☐☑ NARROW 5-10m [2]	☑☑ RESIDENTIAL, PARK, NEW FIELD [1]
	☐☐ VERY NARROW < 5m [1]	☐☐ FENCED PASTURE [1]
	☐☐ NONE [0]	☐☐ OPEN PASTURE, ROWCROP [0]

(L R)	
☐☐	CONSERVATION TILLAGE [1]
☐☐	URBAN OR INDUSTRIAL [0]
☐☐	MINING / CONSTRUCTION [0]

Indicate predominant land use(s) past 100m riparian.

Comments

Riparian Maximum 10: 6

5] POOL / GLIDE AND RIFFLE / RUN QUALITY

MAXIMUM DEPTH	CHANNEL WIDTH	CURRENT VELOCITY
Check ONE (ONLY!)	Check ONE (Or 2 & average)	Check ALL that apply
☑ > 1m [6]	☑ POOL WIDTH > RIFFLE WIDTH [2]	☐ TORRENTIAL [-1] ☑ SLOW [1]
☐ 0.7-<1m [4]	☐ POOL WIDTH = RIFFLE WIDTH [1]	☐ VERY FAST [1] ☐ INTERSTITIAL [-1]
☐ 0.4-<0.7m [2]	☐ POOL WIDTH < RIFFLE WIDTH [0]	☐ FAST [1] ☐ INTERMITTENT [-2]
☐ 0.2-<0.4m [1]		☐ MODERATE [1] ☑ EDDIES [1]
☐ < 0.2m [0]		Indicate for reach - pools and riffles.

Recreation Potential: Primary Contact / Secondary Contact (circle one and comment on back)

Comments

Pool / Current Maximum 12: 12

6] GRADIENT

Indicate for functional riffles; Best areas must be large enough to support a population of riffle-obligate species: ☐ NO RIFFLE [metric=0]

RIFFLE DEPTH	RUN DEPTH	RIFFLE / RUN SUBSTRATE (Check ONE (Or 2 & average))	RIFFLE / RUN EMBEDDEDNESS
☐ BEST AREAS > 10cm [2]	☑ MAXIMUM > 50cm [2]	☐ STABLE (e.g., Cobble, Boulder) [2]	☐ NONE [2]
☑ BEST AREAS 5-10cm [1]	☐ MAXIMUM < 50cm [1]	☐ MOD. STABLE (e.g., Large Gravel) [1]	☐ LOW [1]
☐ BEST AREAS < 5cm [metric=0]		☑ UNSTABLE (e.g., Fine Gravel, Sand) [0]	☐ MODERATE [0] ☑ EXTENSIVE [-1]

Comments

Riffle / Run Maximum 8: 2

GRADIENT (20.32 ft/mi) DRAINAGE AREA (7.8 mi²)

☐ VERY LOW - LOW [2-4] ☐ MODERATE [6-10] ☒ HIGH - VERY HIGH [10-6]

10

%POOL: 25 %GLIDE: %RUN: 45 %RIFFLE: 30

Gradient Maximum 10: 10

06/16/06

A] SAMPLED REACH
Check ALL that apply

METHOD
- ☐ BOAT
- ☐ WADE
- ☑ L. LINE
- ☐ OTHER

STAGE (1st -sample pass- 2nd)
- ☐ HIGH ☐
- ☐ UP ☐
- ☑ NORMAL ☐
- ☐ LOW ☐
- ☐ DRY ☐

DISTANCE
- ☐ 0.5 Km
- ☐ 0.2 Km
- ☑ 0.15 Km
- ☐ 0.12 Km
- ☐ OTHER

_____ meters

CLARITY (1st --sample pass-- 2nd)
- ☐ < 20 cm ☐
- ☐ 20-<40 cm ☐
- ☐ 40-70 cm ☐
- ☑ > 70 cm/ CTB ☐
- ☐ SECCHI DEPTH ☐

See comments

pass 1st _____ cm
2nd _____ cm

CANOPY
- ☐ > 85%- OPEN
- ☐ 55%-<85%
- ☐ 30%-<55%
- ☑ 10%-<30%
- ☐ <10%- CLOSED

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

Somewhat typical of stream. Rec inferred. Park at Indian Hills Park, walk to stream at bridge. Obtain city of grove city permission (no permit, but they want data). 2 days prior outfall US of bridge discharging very TSS heavy water, lots of easily disturbed fines today throughout reach.

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

C] RECREATION
POOL: AREA ☐ >100ft² DEPTH ☐ >3ft

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

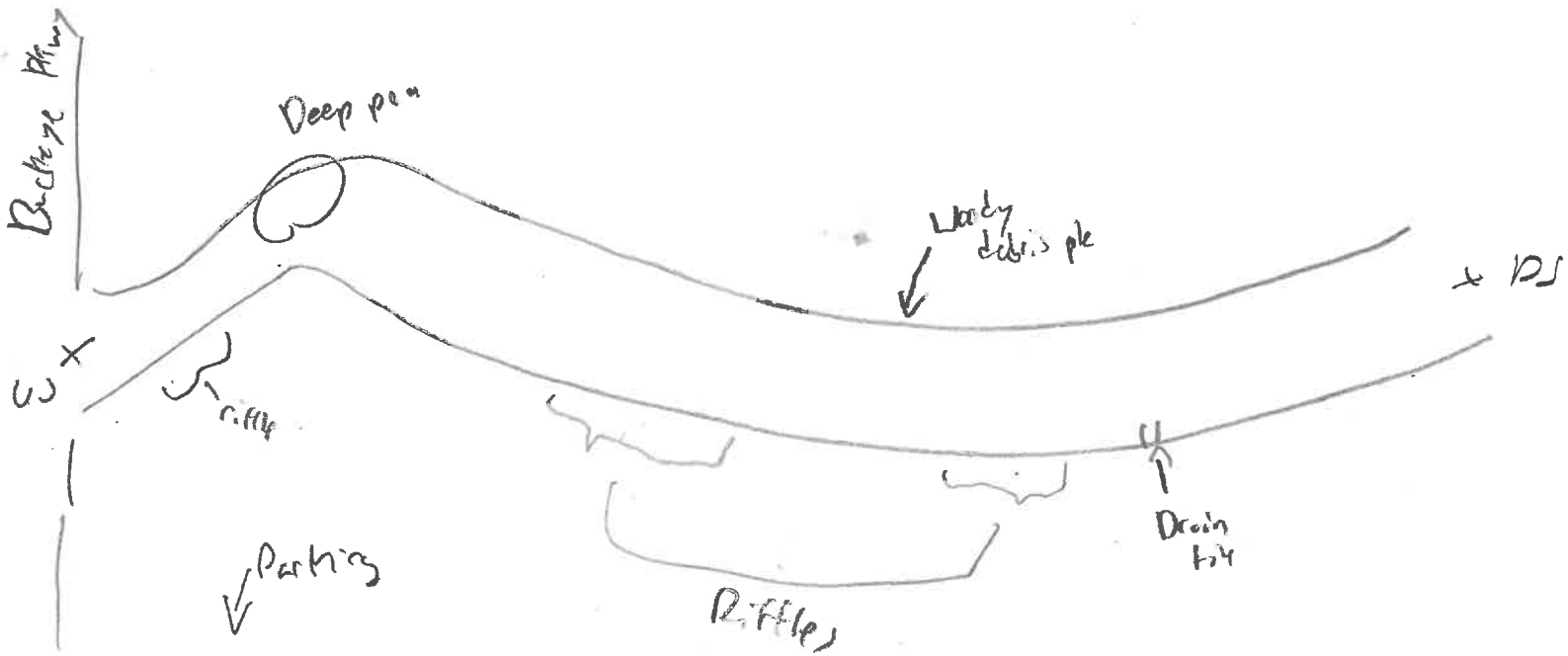
Circle some & COMMENT

E] ISSUES
WWTP / CSO / NPDES / INDUSTRY
HARDENED / URBAN / DIRT&GRIME
CONTAMINATED / LANDFILL
BMPs-CONSTRUCTION-SEDIMENT
LOGGING / IRRIGATION / COOLING
BANK / EROSION / SURFACE
FALSE BANK / MANURE / LAGOON
WASH H_20 / TILE / H_20 TABLE
ACID / MINE / QUARRY / FLOW
NATURAL / WETLAND / STAGNANT
PARK / GOLF / LAWN / HOME
ATMOSPHERE / DATA PAUCITY

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

Legacy Tree:

Stream Drawing:



Qualitative Habitat Evaluation Index and Use Assessment Field Sheet

OHEI Score: 52 53.0

Stream & Location: GRANT Run @ Mt. Carmel - Grase City RM: 4.3 Date: 07/03/2025

Scorers Full Name & Affiliation: CHRIS YODER - MBI

River Code: 02-021-___ STORET #: GRR03 Lat./Long.: 39.851318 3.0791 (NAD 83 - decimal °) Office verified location ☐

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

BEST TYPES	POOL	RIFFLE	OTHER TYPES	POOL	RIFFLE
☐☐ BLDR /SLABS [10]			☐☐ HARDPAN [4]	✓	
☐☐ BOULDER [9]			☐☐ DETRITUS [3]	✓	
☐☐ COBBLE [8]			☒☒ MUCK [2]	✓	
☐☐ GRAVEL [7]			☐☐ SILT [2]	✓	
☐☐ SAND [6]	✓		☐☐ ARTIFICIAL [0]		
☐☐ BEDROCK [5]			(Score natural substrates; ignore sludge from point-sources)		

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

Check ONE (Or 2 & average)

ORIGIN		QUALITY	
☐ LIMESTONE [1]	5	☒ HEAVY [-2]	3
☒ TILLS [1]		☐ MODERATE [-1]	
☐ WETLANDS [0]		☐ NORMAL [0]	
☐ HARDPAN [0]		☐ FREE [1]	
☐ SANDSTONE [0]		☒ EXTENSIVE [-2]	
☐ RIP/RAP [0]		☐ MODERATE [-1]	
☐ LACUSTURINE [0]		☐ NORMAL [0]	
☐ SHALE [-1]		☐ NONE [1]	
☐ COAL FINES [-2]			

SILT / EMBEDDEDNESS

Substrate 1 Maximum 20

Comments

Stream bed relocated on mostly clay soils - mostly clayey muck; stayed turbid after sampling

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

___ UNDERCUT BANKS [1]	3	POOLS > 70cm [2]	1	OXBOWS, BACKWATERS [1]	
3 OVERHANGING VEGETATION [1]	___	ROOTWADS [1]	2	AQUATIC MACROPHYTES [1]	
2 SHALLOWS (IN SLOW WATER) [1]	___	BOULDERS [1]	1	LOGS OR WOODY DEBRIS [1]	
1 ROOTMATS [1]					

AMOUNT (Check ONE (Or 2 & average))
☐ EXTENSIVE >75% [11]
☒ MODERATE 25-75% [7]
☐ SPARSE 5-<25% [3]
☐ NEARLY ABSENT <5% [1]

Cover Maximum 20: 15

Comments

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

SINUOSITY	DEVELOPMENT	CHANNELIZATION	STABILITY
☐ HIGH [4]	☐ EXCELLENT [7]	☐ NONE [6]	☒ HIGH [3]
☒ MODERATE [3]	☐ GOOD [5]	☐ RECOVERED [4]	☒ MODERATE [2]
☐ LOW [2]	☒ FAIR [3]	☒ RECOVERING [3]	☐ LOW [1]
☐ NONE [1]	☐ POOR [1]	☐ RECENT OR NO RECOVERY [1]	

Channel Maximum 20: 11.5

Comments

Reconstructed stream channel within over wide riparian channel - new

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

River right looking downstream

EROSION (L / R)	RIPARIAN WIDTH (L / R)	FLOOD PLAIN QUALITY (L / R)
☐ ☒ NONE / LITTLE [3]	☐ ☒ WIDE > 50m [4]	☐ ☐ FOREST, SWAMP [3]
☒ ☐ MODERATE [2]	☒ ☒ MODERATE 10-50m [3]	☐ ☐ SHRUB OR OLD FIELD [2]
☐ ☐ HEAVY / SEVERE [1]	☐ ☐ NARROW 5-10m [2]	☒ ☒ RESIDENTIAL, PARK, NEW FIELD [1]
	☐ ☐ VERY NARROW < 5m [1]	☐ ☐ FENCED PASTURE [1]
	☐ ☐ NONE [0]	☐ ☐ OPEN PASTURE, ROWCROP [0]
		☐ ☐ CONSERVATION TILLAGE [1]
		☐ ☐ URBAN OR INDUSTRIAL [0]
		☐ ☐ MINING / CONSTRUCTION [0]

Indicate predominant land use(s) past 100m riparian.

Riparian Maximum 10: 6.5 ✓

Comments

5] POOL / GLIDE AND RIFFLE / RUN QUALITY

MAXIMUM DEPTH (Check ONE (ONLY!))
☒ > 1m [6]
☐ 0.7-<1m [4]
☐ 0.4-<0.7m [2]
☐ 0.2-<0.4m [1]
☐ < 0.2m [0]

CHANNEL WIDTH (Check ONE (Or 2 & average))
☐ POOL WIDTH > RIFFLE WIDTH [2]
☐ POOL WIDTH = RIFFLE WIDTH [1]
☐ POOL WIDTH < RIFFLE WIDTH [0]
NO RIFFLE

CURRENT VELOCITY (Check ALL that apply)
☐ TORRENTIAL [-1] ☒ SLOW [1]
☐ VERY FAST [1] ☐ INTERSTITIAL [-1]
☐ FAST [1] ☐ INTERMITTENT [-2]
☐ MODERATE [1] ☐ EDDIES [1]
Indicate for reach - pools and riffles.

Barely perceptible

Recreation Potential
Primary Contact
Secondary Contact
(circle one and comment on back)

Pool / Current Maximum 12: 9 7

Comments

Indicate for functional riffles; Best areas must be large enough to support a population of riffle-obligate species: ☐ NO RIFFLE [metric=0]

Check ONE (Or 2 & average).

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

Riffle / Run Maximum 8: 0

Comments NO RIFFLES

6] GRADIENT (28.57 ft/mi) ☐ VERY LOW - LOW [2-4] ☐ MODERATE [6-10] ☒ HIGH - VERY HIGH [10-6] 10

DRAINAGE AREA (2.88 mi²)

%POOL: 100 %GLIDE: ___ %RUN: ___ %RIFFLE: ___

Gradient Maximum 10: 10

06/16/06

EPA 4520

A] SAMPLED REACH

Check ALL that apply

METHOD
- ☐ BOAT
- ☐ WADE
- ☒ L. LINE
- ☐ OTHER

STAGE (1st -sample pass- 2nd)
- ☐ HIGH ☐
- ☐ UP ☐
- ☒ NORMAL ☐
- ☐ LOW ☐
- ☐ DRY ☐

DISTANCE
- ☐ 0.5 Km
- ☐ 0.2 Km
- ☒ 0.15 Km
- ☐ 0.12 Km
- ☐ OTHER

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

_____ meters

CANOPY
- ☒ > 85%- OPEN
- ☐ 55%-<85%
- ☐ 30%-<55%
- ☐ 10%-<30%
- ☐ <10%- CLOSED

1st pass _____ cm
2nd _____ cm

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

Restored ~~channel~~ within 3rd wide channel – restored ~~vegetation~~ wetland vegetation; some macrophytes - narrow leaf pondweed;

B] AESTHETICS

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

C] RECREATION

POOL: AREA ☐ >100ft² DEPTH ☐ >3ft

D] MAINTENANCE

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

Circle some & COMMENT

E] ISSUES

WWTP / CSO / NPDES / INDUSTRY
HARDENED / URBAN / DIRT&GRIME
CONTAMINATED / LANDFILL
BMPs-CONSTRUCTION-SEDIMENT
LOGGING / IRRIGATION / COOLING
BANK / EROSION / SURFACE
FALSE BANK / MANURE / LAGOON
WASH H_20 / TILE / H_20 TABLE
ACID / MINE / QUARRY / FLOW
NATURAL / (WETLAND) / STAGNANT
(PARK) / GOLF / LAWN / HOME
ATMOSPHERE / DATA PAUCITY

Suburban
Constructed

F] MEASUREMENT

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

Legacy Tree:

Stream Drawing:



Qualitative Habitat Evaluation Index and Use Assessment Field Sheet

OHEI Score: 45.5

Stream & Location: Unnamed Trib to Great Run Upstream RM: 1.1 + .5 Date: 06/25/25

Hoover Rd Scorers Full Name & Affiliation: Edward Hicks, MBI

River Code: 02-256- STORET #: [illegible] Lat./Long. (NAD 83 - decimal °): 39.83584 / 83.07332 Office verified location ☐

1] SUBSTRATE

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

BEST TYPES	POOL	RIFFLE	OTHER TYPES	POOL	RIFFLE
☐ ☐ BLDR /SLABS [10]			☐ ☐ HARDPAN [4]		
☐ ☐ BOULDER [9]			☐ ☐ DETRITUS [3]		
☐ ☐ COBBLE [8]		5	☐ ☐ MUCK [2]		
☑ ☐ GRAVEL [7]	40	80	☐ ☐ SILT [2]	20	
☐ ☑ SAND [6]	40		☐ ☐ ARTIFICIAL [0]		
☐ ☐ BEDROCK [5]			(Score natural substrates; ignore sludge from point-sources)		

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

Check ONE (Or 2 & average)

ORIGIN	SILT	QUALITY
☐ LIMESTONE [1]		☐ HEAVY [-2]
☑ TILLS [1]		☐ MODERATE [-1]
☐ WETLANDS [0]		☑ NORMAL [0]
☐ HARDPAN [0]		☐ FREE [1]
☐ SANDSTONE [0]	EMBEDDEDNESS	☐ EXTENSIVE [-2]
☐ RIP/RAP [0]		☐ MODERATE [-1]
☐ LACUSTURINE [0]		☑ NORMAL [0]
☐ SHALE [-1]		☐ NONE [1]
☐ COAL FINES [-2]		

Substrate 14 / Maximum 20

Comments

2] INSTREAM COVER

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

___ UNDERCUT BANKS [1]	___ POOLS > 70cm [2]	___ OXBOWS, BACKWATERS [1]
3 OVERHANGING VEGETATION [1]	1 ROOTWADS [1]	___ AQUATIC MACROPHYTES [1]
___ SHALLOWS (IN SLOW WATER) [1]	___ BOULDERS [1]	2 LOGS OR WOODY DEBRIS [1]
___ ROOTMATS [1]		

AMOUNT

Check ONE (Or 2 & average)

☐ EXTENSIVE >75% [11]
☐ MODERATE 25-75% [7]
☑ SPARSE 5-<25% [3]
☐ NEARLY ABSENT <5% [1]

Cover Maximum 20: 6

Comments

3] CHANNEL MORPHOLOGY

Check ONE in each category (Or 2 & average)

SINUOSITY	DEVELOPMENT	CHANNELIZATION	STABILITY
☐ HIGH [4]	☐ EXCELLENT [7]	☐ NONE [6]	☐ HIGH [3]
☐ MODERATE [3]	☐ GOOD [5]	☐ RECOVERED [4]	☑ MODERATE [2]
☑ LOW [2]	☑ FAIR [3]	☑ RECOVERING [3]	☐ LOW [1]
☐ NONE [1]	☐ POOR [1]	☐ RECENT OR NO RECOVERY [1]	

Channel Maximum 20: 10

Comments

4] BANK EROSION AND RIPARIAN ZONE

Check ONE in each category for EACH BANK (Or 2 per bank & average)

River right looking downstream

EROSION (L / R)	RIPARIAN WIDTH (L / R)	FLOOD PLAIN QUALITY (L / R)
☐ ☐ NONE / LITTLE [3]	☐ ☐ WIDE > 50m [4]	☐ ☐ FOREST, SWAMP [3]
☑ ☑ MODERATE [2]	☐ ☐ MODERATE 10-50m [3]	☐ ☐ SHRUB OR OLD FIELD [2]
☐ ☐ HEAVY / SEVERE [1]	☐ ☐ NARROW 5-10m [2]	☑ ☐ RESIDENTIAL, PARK, NEW FIELD [1]
	☑ ☑ VERY NARROW < 5m [1]	☐ ☐ FENCED PASTURE [1]
	☐ ☐ NONE [0]	☐ ☐ OPEN PASTURE, ROWCROP [0]
		☐ ☐ CONSERVATION TILLAGE [1]
		☑ ☐ URBAN OR INDUSTRIAL [0]
		☐ ☐ MINING / CONSTRUCTION [0]

Indicate predominant land use(s) past 100m riparian.

Riparian Maximum 10: 3.5

Comments

5] POOL / GLIDE AND RIFFLE / RUN QUALITY

MAXIMUM DEPTH

Check ONE (ONLY!)

☐ > 1m [6]
☐ 0.7-<1m [4]
☐ 0.4-<0.7m [2]
☑ 0.2-<0.4m [1]
☐ < 0.2m [0]

CHANNEL WIDTH

Check ONE (Or 2 & average)

☐ POOL WIDTH > RIFFLE WIDTH [2]
☐ POOL WIDTH = RIFFLE WIDTH [1]
☑ POOL WIDTH < RIFFLE WIDTH [0]

CURRENT VELOCITY

Check ALL that apply

☐ TORRENTIAL [-1]
☐ VERY FAST [1]
☑ FAST [1]
☑ MODERATE [1]
☑ SLOW [1]
☐ INTERSTITIAL [-1]
☐ INTERMITTENT [-2]
☐ EDDIES [1]

Indicate for reach - pools and riffles.

Recreation Potential: Primary Contact / Secondary Contact (circle one and comment on back)

Pool / Current Maximum 12: 4

Comments

Indicate for functional riffles; Best areas must be large enough to support a population of riffle-obligate species: ☐ NO RIFFLE [metric=0]

Check ONE (Or 2 & average).

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

Riffle / Run Maximum 8: 4

Comments

6] GRADIENT

(93.99 ft/mi) ☐ VERY LOW - LOW [2-4] ☐ MODERATE [6-10] ☑ HIGH - VERY HIGH [10-6]

4

%POOL: 10 %GLIDE: ___ %RUN: 20 %RIFFLE: 70

Gradient Maximum 10: 4

DRAINAGE AREA 1.46 (1.00) mi²

06/16/06

EPA 4520

A] SAMPLED REACH

Check ALL that apply

METHOD

- ☐ BOAT
- ☐ WADE
- ☐ L. LINE
- ☒ OTHER — Drift

STAGE

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

DISTANCE

- ☐ 0.5 Km
- ☐ 0.2 Km
- ☑ 0.15 Km
- ☐ 0.12 Km
- ☐ OTHER

_____ meters

CLARITY

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

1st _____ cm

2nd _____ cm

CANOPY

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

C] RECREATION

POOL: AREA ☐ >100ft² DEPTH ☐ >3ft

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

Typical. Rec inferred. Perm on CVS across Rd 1 to Hoover Rd. Very shallow, mostly mid quality gravel riffle lots of trash. Some odor from outfall at bridge.

B] AESTHETICS

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

D] MAINTENANCE

Circle some & COMMENT

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

E] ISSUES

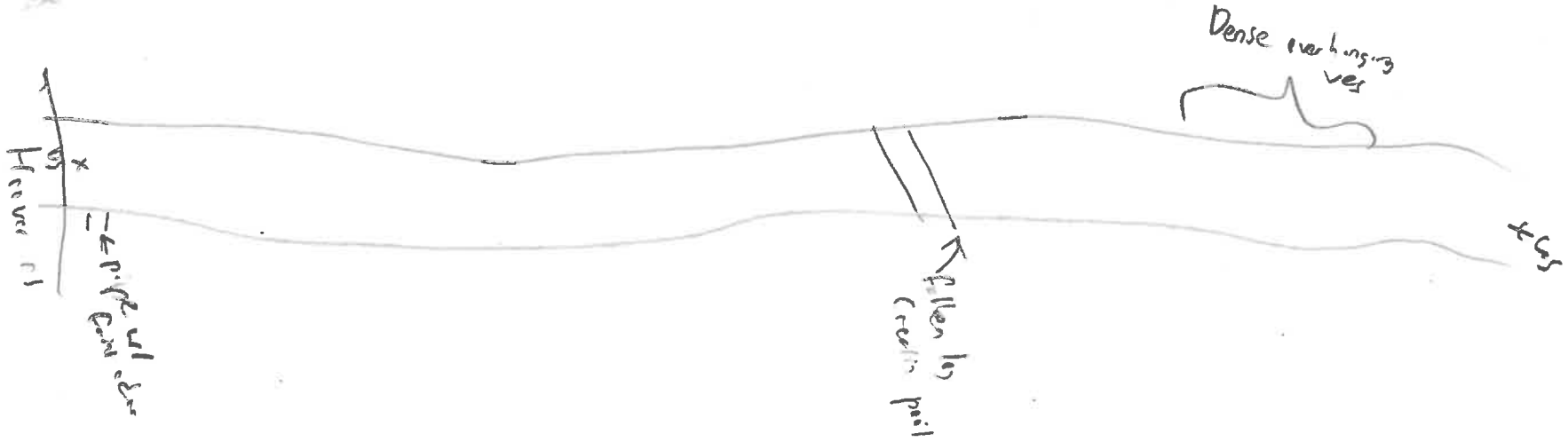
WWTP / CSO / NPDES / INDUSTRY
HARDENED / URBAN / DIRT&GRIME
CONTAMINATED / LANDFILL
BMPs-CONSTRUCTION-SEDIMENT
LOGGING / IRRIGATION / COOLING
BANK / EROSION / SURFACE
FALSE BANK / MANURE / LAGOON
WASH H_20 / TILE / H_20 TABLE
ACID / MINE / QUARRY / FLOW
NATURAL / WETLAND / STAGNANT
PARK / GOLF / LAWN / HOME
ATMOSPHERE / DATA PAUCITY

F] MEASUREMENT

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

Legacy Tree:

Stream Drawing:



Qualitative Habitat Evaluation Index and Use Assessment Field Sheet

OHEI Score: 58

Stream & Location: Unnamed Trib to Grant Run at Meijer RM: 3.2+.7 Date: 06/25/25

St. Rt. 665 overside ditch restoration Scorers Full Name & Affiliation: Edward Hicks MRS

River Code: 02 -256- ___ STORET #: GRR05 Lat./Long. (NAD 83 - decimal °): 39.838518 3.0790 Office verified location ☐

1] SUBSTRATE

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

BEST TYPES	POOL	RIFFLE	OTHER TYPES	POOL	RIFFLE
☐ ☐ BLDR /SLABS [10]			☐ ☐ HARDPAN [4]		
☐ ☐ BOULDER [9]			☐ ☐ DETRITUS [3]		
☐ ☐ COBBLE [8]			☑ ☐ MUCK [2]	30	5
☑ ☐ GRAVEL [7]	50	80	☐ ☐ SILT [2]	10	5
☐ ☐ SAND [6]	10	10	☐ ☐ ARTIFICIAL [0]		
☐ ☐ BEDROCK [5]			(Score natural substrates; ignore sludge from point-sources)		

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

Check ONE (Or 2 & average)

ORIGIN	QUALITY
☐ LIMESTONE [1]	☐ HEAVY [-2]
☐ TILLS [1]	☐ MODERATE [-1]
☑ WETLANDS [0]	☑ NORMAL [0]
☐ HARDPAN [0]	☐ FREE [1]
☐ SANDSTONE [0]	☐ EXTENSIVE [-2]
☐ RIP/RAP [0]	☐ MODERATE [-1]
☐ LACUSTURINE [0]	☑ NORMAL [0]
☐ SHALE [-1]	☐ NONE [1]
☐ COAL FINES [-2]	

SILT / EMBEDDEDNESS

Substrate Maximum 20: 9

Comments: Substrate V. good for this sort of site

2] INSTREAM COVER

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

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

Comments

Cover Maximum 20: 12

3] CHANNEL MORPHOLOGY

Check ONE in each category (Or 2 & average)

SINUOSITY	DEVELOPMENT	CHANNELIZATION	STABILITY
☐ HIGH [4]	☐ EXCELLENT [7]	☐ NONE [6]	☐ HIGH [3]
☑ MODERATE [3]	☑ GOOD [5]	☐ RECOVERED [4]	☑ MODERATE [2]
☐ LOW [2]	☐ FAIR [3]	☑ RECOVERING [3]	☐ LOW [1]
☐ NONE [1]	☐ POOR [1]	☐ RECENT OR NO RECOVERY [1]	

Comments

Channel Maximum 20: 13

4] BANK EROSION AND RIPARIAN ZONE

Check ONE in each category for EACH BANK (Or 2 per bank & average)

River right looking downstream

EROSION (L R)	RIPARIAN WIDTH (L R)	FLOOD PLAIN QUALITY (L R)	
☑ ☑ NONE / LITTLE [3]	☐ ☐ WIDE > 50m [4]	☐ ☐ FOREST, SWAMP [3]	☐ ☐ CONSERVATION TILLAGE [1]
☐ ☐ MODERATE [2]	☐ ☐ MODERATE 10-50m [3]	☐ ☐ SHRUB OR OLD FIELD [2]	☑ ☑ URBAN OR INDUSTRIAL [0]
☐ ☐ HEAVY / SEVERE [1]	☑ ☑ NARROW 5-10m [2]	☐ ☐ RESIDENTIAL, PARK, NEW FIELD [1]	☐ ☐ MINING / CONSTRUCTION [0]
	☐ ☐ VERY NARROW < 5m [1]	☐ ☐ FENCED PASTURE [1]	
	☐ ☐ NONE [0]	☐ ☐ OPEN PASTURE, ROWCROP [0]	

Indicate predominant land use(s) past 100m riparian.

Comments

Riparian Maximum 10: 5

5] POOL / GLIDE AND RIFFLE / RUN QUALITY

MAXIMUM DEPTH	CHANNEL WIDTH	CURRENT VELOCITY
Check ONE (ONLY!)	Check ONE (Or 2 & average)	Check ALL that apply
☐ > 1m [6]	☑ POOL WIDTH > RIFFLE WIDTH [2]	☐ TORRENTIAL [-1] ☑ SLOW [1]
☐ 0.7-<1m [4]	☐ POOL WIDTH = RIFFLE WIDTH [1]	☐ VERY FAST [1] ☐ INTERSTITIAL [-1]
☑ 0.4-<0.7m [2]	☐ POOL WIDTH < RIFFLE WIDTH [0]	☑ FAST [1] ☐ INTERMITTENT [-2]
☐ 0.2-<0.4m [1]		☑ MODERATE [1] ☑ EDDIES [1]
☐ < 0.2m [0]		Indicate for reach - pools and riffles.

Recreation Potential: Primary Contact / Secondary Contact (circle one and comment on back)

Comments

Pool / Current Maximum 12: 8

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

☐ NO RIFFLE [metric=0]

Check ONE (Or 2 & average).

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

Comments

Riffle / Run Maximum 8: 3

6] GRADIENT (38.44 ft/mi)

DRAINAGE AREA 1.7 (~~1.32~~ mi²)

☐ VERY LOW - LOW [2-4] ☐ MODERATE [6-10] ☐ HIGH - VERY HIGH [10-6]

8

%POOL: 20 %GLIDE: ___ %RUN: 70 %RIFFLE: 10

Gradient Maximum 10: 8

06/16/06

EPA 4520

A] SAMPLED REACH

Check ALL that apply

METHOD

- ☐ BOAT
- ☐ WADE
- ☐ L. LINE
- ☑ OTHER ASP-3

STAGE

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

DISTANCE

- ☐ 0.5 Km
- ☐ 0.2 Km
- ☑ 0.15 Km
- ☐ 0.12 Km
- ☐ OTHER

_____ meters

CLARITY

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

CANOPY

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

1st pass _____ cm

2nd _____ cm

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

Restored ditch in storm-sucker zone of Meijer outlet. Rec inferred. Park at Meijer, walk down. Site well exceeds quality of these sorts of restorations, by kudos to the engineers.

B] AESTHETICS

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

C] RECREATION

POOL: AREA ☐ >100ft² DEPTH ☐ >3ft

D] MAINTENANCE

Circle some & COMMENT

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

E] ISSUES

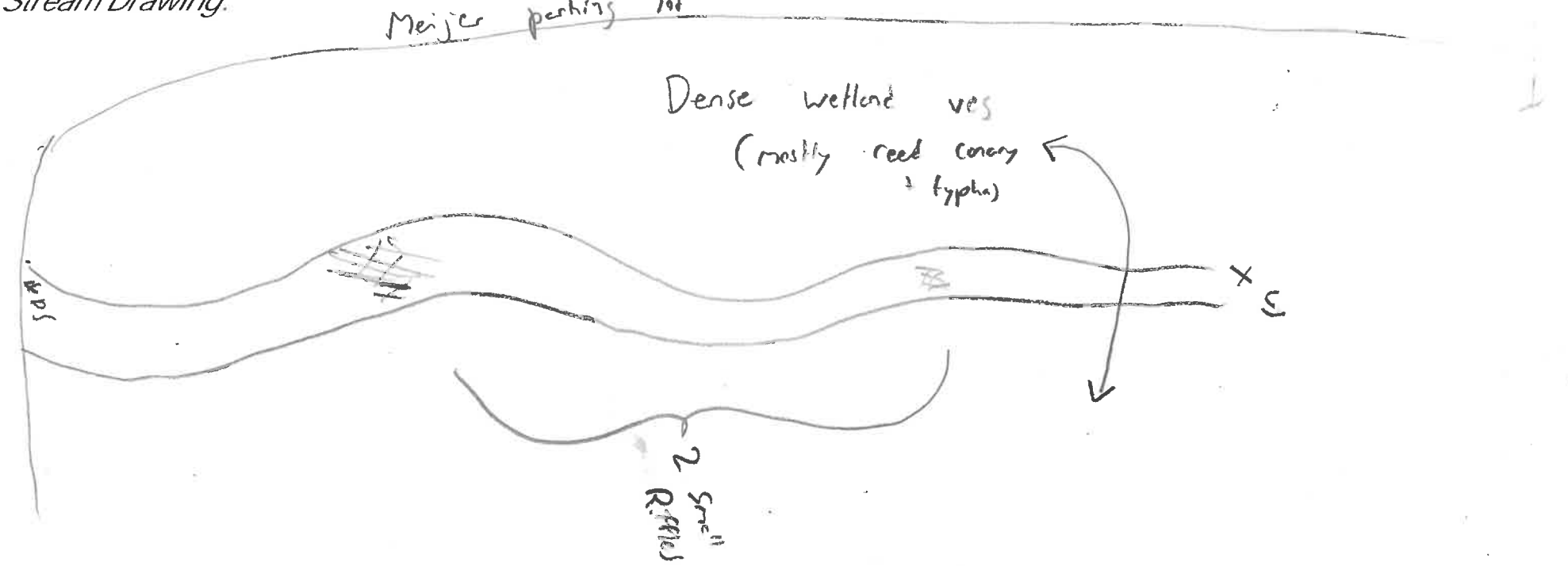
WWTP / CSO / NPDES / INDUSTRY
HARDENED / URBAN / DIRT&GRIME
CONTAMINATED / LANDFILL
BMPs-CONSTRUCTION-SEDIMENT
LOGGING / IRRIGATION / COOLING
BANK / EROSION / SURFACE
FALSE BANK / MANURE / LAGOON
WASH H_20 / TILE / H_20 TABLE
ACID / MINE / QUARRY / FLOW
NATURAL / WETLAND / STAGNANT
PARK / GOLF / LAWN / HOME
ATMOSPHERE / DATA PAUCITY

F] MEASUREMENT

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

Legacy Tree:

Stream Drawing:



Ohio EPA Qualitative Habitat Evaluation Index and Use Assessment Field Sheet

QHEI Score: 75.75 ✓

Stream & Location: Plum Run Upstrm St. Rt. 665 RM: 0.72 Date: 06/23/25

Scorers Full Name & Affiliation: Edward Hicks

River Code: 02-020-___ STORET #: PLM01 Lat./Long. (NAD 83 - decimal °): 39.82461 83.02455 Office verified location ☐

1] SUBSTRATE

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

BEST TYPES	POOL	RIFFLE	OTHER TYPES	POOL	RIFFLE
☐☐ BLDR /SLABS [10]	___	___	☐☐ HARDPAN [4]	___	___
☐☐ BOULDER [9]	___	___	☐☐ DETRITUS [3]	___	___
☐☐ COBBLE [8]	5	10	☐☐ MUCK [2]	___	___
☑☐ GRAVEL [7]	30	70	☐☐ SILT [2]	15	___
☐☑ SAND [6]	50	20	☐☐ ARTIFICIAL [0]	___	___
☐☐ BEDROCK [5]	___	___	(Score natural substrates; ignore sludge from point-sources)		

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

Check ONE (Or 2 & average)

ORIGIN		QUALITY	
☑ LIMESTONE [1]	SILT	☐ HEAVY [-2]	Substrate
☐ TILLS [1]		☐ MODERATE [-1]	
☐ WETLANDS [0]		☑ NORMAL [0]	
☐ HARDPAN [0]		☐ FREE [1]	
☐ SANDSTONE [0]	EMBEDDEDNESS	☐ EXTENSIVE [-2]	
☐ RIP/RAP [0]		☐ MODERATE [-1]	
☐ LACUSTURINE [0]		☑ NORMAL [0]	
☐ SHALE [-1]		☐ NONE [1]	
☐ COAL FINES [-2]			

Substrate: 14 Maximum 20

Comments

2] INSTREAM COVER

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

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

Comments

Cover Maximum 20: 18

3] CHANNEL MORPHOLOGY

Check ONE in each category (Or 2 & average)

SINUOSITY	DEVELOPMENT	CHANNELIZATION	STABILITY
☑ HIGH [4]	☐ EXCELLENT [7]	☑ NONE [6]	☐ HIGH [3]
☐ MODERATE [3]	☑ GOOD [5]	☐ RECOVERED [4]	☑ MODERATE [2]
☐ LOW [2]	☐ FAIR [3]	☐ RECOVERING [3]	☐ LOW [1]
☐ NONE [1]	☐ POOR [1]	☐ RECENT OR NO RECOVERY [1]	

Comments

Channel Maximum 20: 17

4] BANK EROSION AND RIPARIAN ZONE

Check ONE in each category for EACH BANK (Or 2 per bank & average)

River right looking downstream

EROSION (L R)	RIPARIAN WIDTH (L R)	FLOOD PLAIN QUALITY (L R)	
☑☑ NONE / LITTLE [3]	☐☐ WIDE > 50m [4]	☑☑ FOREST, SWAMP [3]	☐☐ CONSERVATION TILLAGE [1]
☐☐ MODERATE [2]	☑☐ MODERATE 10-50m [3]	☐☐ SHRUB OR OLD FIELD [2]	☐☐ URBAN OR INDUSTRIAL [0]
☐☐ HEAVY / SEVERE [1]	☐☑ NARROW 5-10m [2]	☐☐ RESIDENTIAL, PARK, NEW FIELD [1]	☐☐ MINING / CONSTRUCTION [0]
3	☐☐ VERY NARROW < 5m [1]	☐☐ FENCED PASTURE [1]	
	☐☐ NONE [0]	☑☑ OPEN PASTURE, ROWCROP [0]	
	2.5	2.25	

Indicate predominant land use(s) past 100m riparian.

Comments

Riparian Maximum 10: 7.75

5] POOL / GLIDE AND RIFFLE / RUN QUALITY

MAXIMUM DEPTH	CHANNEL WIDTH	CURRENT VELOCITY	
Check ONE (ONLY!)	Check ONE (Or 2 & average)	Check ALL that apply	
☐ >1m [6]	☑ POOL WIDTH > RIFFLE WIDTH [2]	☐ TORRENTIAL [-1]	☑ SLOW [1]
☑ 0.7-<1m [4]	☐ POOL WIDTH = RIFFLE WIDTH [1]	☑ VERY FAST [1]	☐ INTERSTITIAL [-1]
☐ 0.4-<0.7m [2]	☐ POOL WIDTH < RIFFLE WIDTH [0]	☑ FAST [1]	☐ INTERMITTENT [-2]
☐ 0.2-<0.4m [1]		☑ MODERATE [1]	☑ EDDIES [1]
☐ < 0.2m [0]		Indicate for reach - pools and riffles.	

Recreation Potential: (Primary Contact) Secondary Contact (circle one and comment on back)

Comments

Pool / Current Maximum 12: 11

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

☐ NO RIFFLE [metric=0]

Check ONE (Or 2 & average).

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

Comments

Riffle / Run Maximum 8: 4

6] GRADIENT (58.82 ft/mi)

DRAINAGE AREA (7.80 mi²)

☐ VERY LOW - LOW [2-4]
☐ MODERATE [6-10]
☑ HIGH - VERY HIGH [10-6]

4

%POOL: 30 %GLIDE: ___ %RUN: 25 %RIFFLE: 45

Gradient Maximum 10: 4

06/16/06

EPA 4520

A] SAMPLED REACH

Check ALL that apply

METHOD
- ☐ BOAT
- ☐ WADE
- ☑ L. LINE
- ☐ OTHER

DISTANCE
- ☐ 0.5 Km
- ☐ 0.2 Km
- ☑ 0.15 Km
- ☐ 0.12 Km
- ☐ OTHER

_____ meters

STAGE

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

CLARITY

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

CANOPY
- ☐ > 85%- OPEN
- ☐ 55%-<85%
- ☐ 30%-<55%
- ☐ 10%-<30%
- ☑ <10%- CLOSED

1st _____ cm
2nd _____ cm

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

Reach appears typical. Rec inferred. Park NE quadrant of bridge crossing, right of way. Shoulder narrow, exercise caution.

B] AESTHETICS

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

C] RECREATION

POOL: AREA ☐ >100ft² DEPTH ☐ >3ft

D] MAINTENANCE

Circle some & COMMENT

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

E] ISSUES

WWTP / CSO / NPDES / INDUSTRY
HARDENED / URBAN / DIRT&GRIME
CONTAMINATED / LANDFILL
BMPs-CONSTRUCTION-SEDIMENT
LOGGING / IRRIGATION / COOLING
BANK / EROSION / SURFACE
FALSE BANK / MANURE / LAGOON
WASH H_20 / TILE / H_20 TABLE
ACID / MINE / QUARRY / FLOW
NATURAL / WETLAND / STAGNANT
PARK / GOLF / LAWN / HOME
ATMOSPHERE / DATA PAUCITY

F] MEASUREMENT

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

Legacy Tree:

Stream Drawing:


Reach appears typical
Gas Pad
Gas Pad
Gas Pad

Headwater Habitat Evaluation Index Field Form

HHEI Score (sum of metrics 1+2+3) 76

SITE NAME/LOCATION U.T. to Sc. to Big Run
SITE NUMBER SBR07 RIVER BASIN _____ RIVER CODE _____ DRAINAGE AREA (mi²) 1.2
LENGTH OF STREAM REACH (ft) _____ LAT 39.92210 LONG 83.08069 RIVER MILE 0.3
DATE 7/22/25 SCORER RB, MB COMMENTS _____

NOTE: Complete All Items On This Form - Refer to "Headwater Habitat Evaluation Index Field Manual" for Instructions

STREAM CHANNEL MODIFICATIONS: ☒ NONE / NATURAL CHANNEL ☐ RECOVERED ☐ RECOVERING ☐ RECENT OR NO RECOVERY

1. SUBSTRATE (Estimate percent of every type present). Check *ONLY* two predominant substrate *TYPE* boxes. (Max of 32). Add total number of significant substrate types found (Max of 8). Final metric score is sum of boxes A & B

TYPE		PERCENT	TYPE		PERCENT
☐	BLDR SLABS [16 pts]		☒	SILT [3 pt]	5%
☒	BOULDER (>256 mm) [16 pts]	5%	☒	LEAF PACK/WOODY DEBRIS [3 pts]	10%
☐	BEDROCK [16 pts]		☐	FINE DETRITUS [3 pts]	
☒	COBBLE (65-256 mm) [12 pts]	25%	☐	CLAY or HARDPAN [0 pt]	
☒	GRAVEL (2-64 mm) [9 pts]	20%	☒	MUCK [0 pts]	2%
☒	SAND (<2 mm) [6 pts]	30%	☒	ARTIFICIAL [3 pts]	3%

Total of Percentages of Bldr Slabs, Boulder, Cobble, Bedrock 30% (A) 18 (B) 8

SCORE OF TWO MOST PREDOMINATE SUBSTRATE TYPES: 18 TOTAL NUMBER OF SUBSTRATE TYPES: 8

HHEI Metric Points — Substrate Max = 40: 26 (A + B)

2. Maximum Pool Depth (*Measure the maximum pool depth within the 61 meter (200 feet)* evaluation reach at the time of evaluation. Avoid plunge pools from road culverts or storm water pipes) (Check *ONLY* one box):

- ☒ > 30 centimeters [20 pts]
- ☐ > 22.5 - 30 cm [30 pts]
- ☐ > 10 - 22.5 cm [25 pts]
- ☐ 5 cm - 10 cm [15 pts]
- ☐ < 5 cm [5pts]
- ☐ NO WATER OR MOIST CHANNEL [0pts]

COMMENTS _____ MAXIMUM POOL DEPTH (centimeters): 37

Pool Depth Max = 30: 20

33,37, 33,37

3. BANK FULL WIDTH (Measured as the average of 3 - 4 measurements) (Check *ONLY* one box):

- ☒ > 4.0 meters (> 13') [30 pts]
- ☐ > 3.0 m - 4.0 m (> 9' 7" - 13') [25 pts]
- ☐ > 1.5 m - 3.0 m (> 4' 8" - 9' 7") [20 pts]
- ☐ > 1.0 m - 1.5 m (> 3' 3" - 4' 8") [15 pts]
- ☐ ≤ 1.0 m (≤ 3' 3") [5 pts]

5.2m 5.4m 5.5m

COMMENTS _____ AVERAGE BANKFULL WIDTH (meters): 5.4

Bankfull Width Max=30: 30

This information must also be completed

RIPARIAN ZONE AND FLOODPLAIN QUALITY * NOTE: River Left (L) and Right (R) as looking downstream *

RIPARIAN WIDTH (Per Bank) L	R		FLOODPLAIN QUALITY (Most Predominant per Bank) L	R		L	R	
☒	☒	Wide >10m	☐	☐	Mature Forest, Wetland	☐	☐	Conservation Tillage
☐	☐	Moderate 5-10m	☐	☐	Immature Forest, Shrub or Old Field	☐	☐	Urban or Industrial
☐	☐	Narrow <5m	☒	☒	Residential, Park, New Field	☐	☐	Open Pasture, Row Crop
☐	☐	None	☐	☐	Fenced Pasture	☐	☐	Mining or Construction

COMMENTS _____

FLOW REGIME (*At Time of Evaluation*) (Check *ONLY* one box):

- ☒ Stream Flowing
- ☐ Subsurface flow with isolated pools (interstitial)
- ☐ Moist Channel, isolated pools, no flow (intermittent)
- ☐ Dry channel, no water (ephemeral)

COMMENTS _____

SINUOSITY (Number of bends per 61 m (200 ft) of channel) (Check ONLY one box):

- ☐ None
- ☐ 0.5
- ☐ 1.0
- ☐ 1.5
- ☒ 2.0
- ☐ 2.5
- ☐ 3.0
- ☐ >3

STREAM GRADIENT ESTIMATE

☐ Flat (0.5 ft/100 ft) ☒ Flat to Moderate ☐ Moderate (2 ft/100 ft) ☐ Moderate to Severe ☐ Severe (10 ft/100 ft)

ADDITIONAL STREAM INFORMATION (This Information Must Also be Completed):

QHEI PERFORMED? ☐Yes ☐No QHEI Score _____ (If Yes, Attach Completed QHEI form)

DOWNSTREAM DESIGNATED USE(S)

☐ WWH Name: _____ Distance from Evaluated Stream _____
☐ CWH Name: _____ Distance from Evaluated Stream _____
☐ EWH Name: _____ Distance from Evaluated Stream _____

MAPPING: ATTACH COPIES OF MAPS, INCLUDING THE ENTIRE WATERSHED AREA. CLEARLY MARK THE SITE LOCATION.

USGS Quadrangle Name: _____ NRCS Soil Map Page: _____ NRCS Soil Map Stream Order: _____

County: _____ Township/City: _____

MISCELLANEOUS

Base Flow Conditions? (Y/N): _____ Date of last precipitation: _____ Quantity: _____

Photo-documentation Notes: _____

Elevated Turbidity? (Y/N): _____ Canopy (% open): _____

Were samples collected for water chemistry? (Y/N): _____ Lab Sample # or ID (attach results): _____

Field Measures: Temp (°C) _____ Dissolved Oxygen (mg/l) _____ pH (S.U.) _____ Conductivity (umhos/cm) _____

Is the sampling reach representative of the stream (Y/N) _____ If not, explain: _____

Additional comments/description of pollution impacts: _____

BIOLOGICAL OBSERVATIONS

(Record all observations below)

Fish Observed? (Y/N) Y Species observed (if known): _____

Frogs or Tadpoles Observed? (Y/N) N Species observed (if known): _____

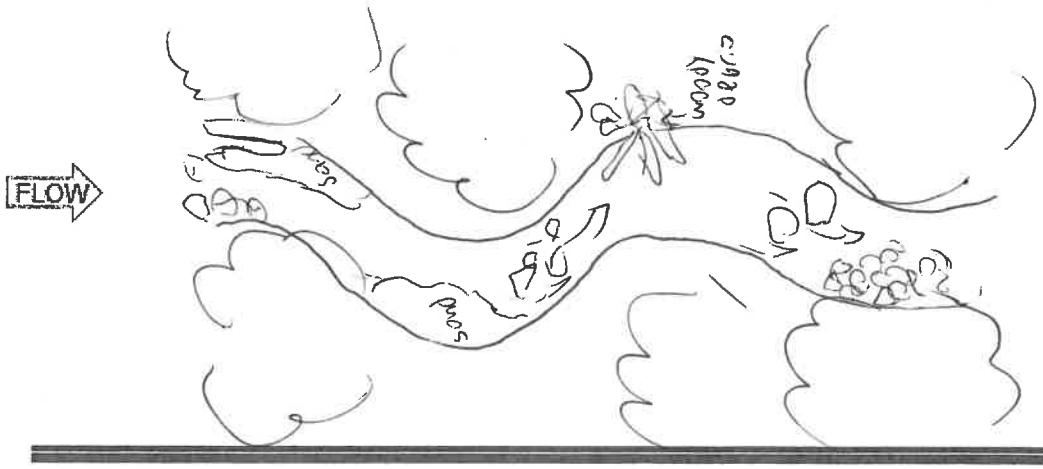
Salamanders Observed? (Y/N) N Species observed (if known): _____

Aquatic Macroinvertebrates Observed? (Y/N) Y Species observed (if known): See macro fieldsheet

Comments Regarding Biology: _____

DRAWING AND NARRATIVE DESCRIPTION OF STREAM REACH (This must be completed)

Include important landmarks and other features of interest for site evaluation and a narrative description of the stream's location



Headwater Habitat Evaluation Index Field Form

HHEI Score (sum of metrics 1+2+3) 74

SITE NAME/LOCATION ~~Southwestern Rd (US)~~ Southwestern Rd (US)
SITE NUMBER SBR08 RIVER BASIN _____ RIVER CODE _____ DRAINAGE AREA (mi²) 1.57
LENGTH OF STREAM REACH (ft) _____ LAT 39.9194 LONG 83.0976 RIVER MILE 1.5
DATE 7/22/25 SCORER RB COMMENTS _____

NOTE: Complete All Items On This Form - Refer to "Headwater Habitat Evaluation Index Field Manual" for Instructions

STREAM CHANNEL MODIFICATIONS: ☒ NONE / NATURAL CHANNEL ☐ RECOVERED ☐ RECOVERING ☐ RECENT OR NO RECOVERY

1. SUBSTRATE (Estimate percent of every type present). Check *ONLY* two predominant substrate *TYPE* boxes. (Max of 32). Add total number of significant substrate types found (Max of 8). Final metric score is sum of boxes A & B

TYPE		PERCENT	TYPE		PERCENT
☐	BLDR SLABS [16 pts]		☒	SILT [3 pt]	10%
☒	BOULDER (>256 mm) [16 pts]	10%	☒	LEAF PACK/WOODY DEBRIS [3 pts]	3%
☐	BEDROCK [16 pts]		☒	FINE DETRITUS [3 pts]	2%
☒	COBBLE (65-256 mm) [12 pts]	30%	☐	CLAY or HARDPAN [0 pt]	
☒	GRAVEL (2-64 mm) [9 pts]	30%	☒	MUCK [0 pts]	1%
☒	SAND (<2 mm) [6 pts]	10%	☒	ARTIFICIAL [3 pts]	3%

Total of Percentages of Bldr Slabs, Boulder, Cobble, Bedrock 40

SCORE OF TWO MOST PREDOMINATE SUBSTRATE TYPES: (A) 21 TOTAL NUMBER OF SUBSTRATE TYPES: (B) 8

HHEI Metric Points Substrate Max = 40: 29 (A + B)

2. Maximum Pool Depth (*Measure the maximum pool depth within the 61 meter (200 feet)* evaluation reach at the time of evaluation. Avoid plunge pools from road culverts or storm water pipes) (Check *ONLY* one box):

- ☒ > 30 centimeters [20 pts]
- ☐ > 22.5 - 30 cm [30 pts]
- ☐ > 10 - 22.5 cm [25 pts]
- ☐ 5 cm - 10 cm [15 pts]
- ☐ < 5 cm [5pts]
- ☐ NO WATER OR MOIST CHANNEL [0pts]

COMMENTS _____ MAXIMUM POOL DEPTH (centimeters): 48

Pool Depth Max = 30: 20

23
48
40

3. BANK FULL WIDTH (Measured as the average of 3 - 4 measurements) (Check *ONLY* one box):

- ☐ > 4.0 meters (> 13') [30 pts]
- ☒ > 3.0 m - 4.0 m (> 9' 7" - 13') [25 pts]
- ☐ > 1.5 m - 3.0 m (> 4' 8" - 9' 7") [20 pts]
- ☐ > 1.0 m - 1.5 m (> 3' 3" - 4' 8") [15 pts]
- ☐ ≤ 1.0 m (≤ 3' 3") [5 pts]

COMMENTS _____ AVERAGE BANKFULL WIDTH (meters): 3.7

Bankfull Width Max=30: 25

2.7
4.5
3.9

This information must also be completed

RIPARIAN ZONE AND FLOODPLAIN QUALITY * NOTE: River Left (L) and Right (R) as looking downstream *

RIPARIAN WIDTH (Per Bank) L	R	FLOODPLAIN QUALITY (Most Predominant per Bank) L	R	L	R
☐	☐ Wide >10m	☐	☐ Mature Forest, Wetland	☐	☐ Conservation Tillage
☐	☐ Moderate 5-10m	☐	☐ Immature Forest, Shrub or Old Field	☐	☐ Urban or Industrial
☒	☒ Narrow <5m	☒	☒ Residential, Park, New Field	☐	☐ Open Pasture, Row Crop
☐	☐ None	☐	☐ Fenced Pasture	☐	☐ Mining or Construction

COMMENTS _____

FLOW REGIME (*At Time of Evaluation*) (Check *ONLY* one box):

- ☒ Stream Flowing
- ☐ Subsurface flow with isolated pools (interstitial)
- ☐ Moist Channel, isolated pools, no flow (intermittent)
- ☐ Dry channel, no water (ephemeral)

COMMENTS _____

SINUOSITY (Number of bends per 61 m (200 ft) of channel) (Check ONLY one box):

- ☐ None
- ☒ 0.5
- ☐ 1.0
- ☒ 1.5
- ☐ 2.0
- ☐ 2.5
- ☐ 3.0
- ☐ >3

STREAM GRADIENT ESTIMATE

☒ Flat (0.5 ft/100 ft) ☐ Flat to Moderate ☐ Moderate (2 ft/100 ft) ☐ Moderate to Severe ☐ Severe (10 ft/100 ft)

ADDITIONAL STREAM INFORMATION (This Information Must Also be Completed):

QHEI PERFORMED? ☐ Yes ☐ No QHEI Score _____ (If Yes, Attach Completed QHEI form)

DOWNSTREAM DESIGNATED USE(S)

☐ WWH Name: _____ Distance from Evaluated Stream _____

☐ CWH Name: _____ Distance from Evaluated Stream _____

☐ EWH Name: _____ Distance from Evaluated Stream _____

MAPPING: ATTACH COPIES OF MAPS, INCLUDING THE ENTIRE WATERSHED AREA. CLEARLY MARK THE SITE LOCATION.

USGS Quadrangle Name: _____ NRCS Soil Map Page: _____ NRCS Soil Map Stream Order: _____

County: _____ Township/City: _____

MISCELLANEOUS

Base Flow Conditions? (Y/N): _____ Date of last precipitation: _____ Quantity: _____

Photo-documentation Notes: _____

Elevated Turbidity? (Y/N): _____ Canopy (% open): _____

Were samples collected for water chemistry? (Y/N): _____ Lab Sample # or ID (attach results): _____

Field Measures: Temp (°C) _____ Dissolved Oxygen (mg/l) _____ pH (S.U.) _____ Conductivity (umhos/cm) _____

Is the sampling reach representative of the stream (Y/N) _____ If not, explain: _____

_____

Additional comments/description of pollution impacts: _____

_____

BIOLOGICAL OBSERVATIONS

(Record all observations below)

Fish Observed? (Y/N) Y Species observed (if known): _____

Frogs or Tadpoles Observed? (Y/N) _____ Species observed (if known): _____

Salamanders Observed? (Y/N) _____ Species observed (if known): _____

Aquatic Macroinvertebrates Observed? (Y/N) _____ Species observed (if known): _____

Comments Regarding Biology: _____

_____

DRAWING AND NARRATIVE DESCRIPTION OF STREAM REACH (This must be completed)

Include important landmarks and other features of interest for site evaluation and a narrative description of the stream's location



Headwater Habitat Evaluation Index Field Form

HHEI Score (sum of metrics 1+2+3) 68

SITE NAME/LOCATION Gantz Run, US, SR 104
SITE NUMBER GT201 RIVER BASIN _____ RIVER CODE _____ DRAINAGE AREA (m²) _____
LENGTH OF STREAM REACH (ft) _____ LAT 39.93350 LONG -83.02821 RIVER MILE 1.0
DATE 07/29/25 SCORER RMB COMMENTS _____

NOTE: Complete All Items On This Form - Refer to "Headwater Habitat Evaluation Index Field Manual" for Instructions

STREAM CHANNEL MODIFICATIONS: ☒ NONE / NATURAL CHANNEL ☐ RECOVERED ☐ RECOVERING ☐ RECENT OR NO RECOVERY

1. SUBSTRATE (Estimate percent of every type present). Check *ONLY* two predominant substrate *TYPE* boxes. (Max of 32). Add total number of significant substrate types found (Max of 8). Final metric score is sum of boxes A & B

TYPE		PERCENT	TYPE		PERCENT
☐	BLDR SLABS [16 pts]		☒	SILT [3 pt]	7
☐	BOULDER (>256 mm) [16 pts]		☒	LEAF PACK/WOODY DEBRIS [3 pts]	2
☐	BEDROCK [16 pts]		☒	FINE DETRITUS [3 pts]	2
☒	COBBLE (65-256 mm) [12 pts]	10	☐	CLAY or HARDPAN [0 pt]	
☒	GRAVEL (2-64 mm) [9 pts]	25	☐	MUCK [0 pts]	
☒	SAND (<2 mm) [6 pts]	50	☐	ARTIFICIAL [3 pts]	1

Total of Percentages of Bldr Slabs, Boulder, Cobble, Bedrock _____

SCORE OF TWO MOST PREDOMINATE SUBSTRATE TYPES: (A) 15 TOTAL NUMBER OF SUBSTRATE TYPES: (B) 8

HHEI Metric Points — Substrate Max = 40: 23 (A + B)

2. Maximum Pool Depth (*Measure the maximum pool depth within the 61 meter (200 feet)* evaluation reach at the time of evaluation. Avoid plunge pools from road culverts or storm water pipes) (Check *ONLY* one box):

- ☒ > 30 centimeters [20 pts]
- ☐ > 22.5 - 30 cm [30 pts]
- ☐ > 10 - 22.5 cm [25 pts]
- ☐ 5 cm - 10 cm [15 pts]
- ☐ < 5 cm [5pts]
- ☐ NO WATER OR MOIST CHANNEL [0pts]

COMMENTS _____ MAXIMUM POOL DEPTH (centimeters): 46

Pool Depth Max = 30: 20

3. BANK FULL WIDTH (Measured as the average of 3 - 4 measurements) (Check *ONLY* one box):

- ☐ > 4.0 meters (> 13') [30 pts]
- ☒ > 3.0 m - 4.0 m (> 9' 7" - 13') [25 pts]
- ☐ > 1.5 m - 3.0 m (> 4' 8" - 9' 7") [20 pts]
- ☐ > 1.0 m - 1.5 m (> 3' 3" - 4' 8") [15 pts]
- ☐ ≤ 1.0 m (≤ 3' 3") [5 pts]

COMMENTS _____ AVERAGE BANKFULL WIDTH (meters): 3.5

Bankfull Width Max=30: 25

4.7
2.8
3.8
4.6
3.6
2.9
3.9
3.7

This information must also be completed

RIPARIAN ZONE AND FLOODPLAIN QUALITY * NOTE: River Left (L) and Right (R) as looking downstream*

RIPARIAN WIDTH (Per Bank) L	R	
☒	☒	Wide >10m
☐	☐	Moderate 5-10m
☐	☐	Narrow <5m
☐	☐	None

FLOODPLAIN QUALITY (Most Predominant per Bank) L	R	
☐	☐	Mature Forest, Wetland
☒	☒	Immature Forest, Shrub or Old Field
☐	☐	Residential, Park, New Field
☐	☐	Fenced Pasture
☐	☐	Conservation Tillage
☒	☒	Urban or Industrial
☐	☐	Open Pasture, Row Crop
☐	☐	Mining or Construction

COMMENTS _____

FLOW REGIME (*At Time of Evaluation*) (Check *ONLY* one box):

- ☒ Stream Flowing
- ☐ Subsurface flow with isolated pools (interstitial)
- ☐ Moist Channel, isolated pools, no flow (intermittent)
- ☐ Dry channel, no water (ephemeral)

COMMENTS _____

SINUOSITY (Number of bends per 61 m (200 ft) of channel) (Check ONLY one box):

- ☐ None
- ☐ 0.5
- ☐ 1.0
- ☐ 1.5
- ☐ 2.0
- ☐ 2.5
- ☐ 3.0
- ☒ >3

STREAM GRADIENT ESTIMATE

☐ Flat (0.5 ft/100 ft) ☐ Flat to Moderate ☒ Moderate (2 ft/100 ft) ☐ Moderate to Severe ☐ Severe (10 ft/100 ft)

ADDITIONAL STREAM INFORMATION (This Information Must Also be Completed):

QHEI PERFORMED? ☐ Yes ☐ No QHEI Score _____ (If Yes, Attach Completed QHEI form)

DOWNSTREAM DESIGNATED USE(S)

☐ WWH Name: _____ Distance from Evaluated Stream _____
☐ CWH Name: _____ Distance from Evaluated Stream _____
☐ EWH Name: _____ Distance from Evaluated Stream _____

MAPPING: ATTACH COPIES OF MAPS, INCLUDING THE ENTIRE WATERSHED AREA. CLEARLY MARK THE SITE LOCATION.

USGS Quadrangle Name: _____ NRCS Soil Map Page: _____ NRCS Soil Map Stream Order: _____

County: _____ Township/City: _____

MISCELLANEOUS

Base Flow Conditions? (Y/N): _____ Date of last precipitation: _____ Quantity: _____

Photo-documentation Notes: _____

Elevated Turbidity? (Y/N): _____ Canopy (% open): _____

Were samples collected for water chemistry? (Y/N): _____ Lab Sample # or ID (attach results): _____

Field Measures: Temp (°C) _____ Dissolved Oxygen (mg/l) _____ pH (S.U.) _____ Conductivity (umhos/cm) _____

Is the sampling reach representative of the stream (Y/N) ____ If not, explain: _____

Additional comments/description of pollution impacts: _____

BIOLOGICAL OBSERVATIONS

(Record all observations below)

Fish Observed? (Y/N) Y Species observed (if known): _____

Frogs or Tadpoles Observed? (Y/N) Y Species observed (if known): _____

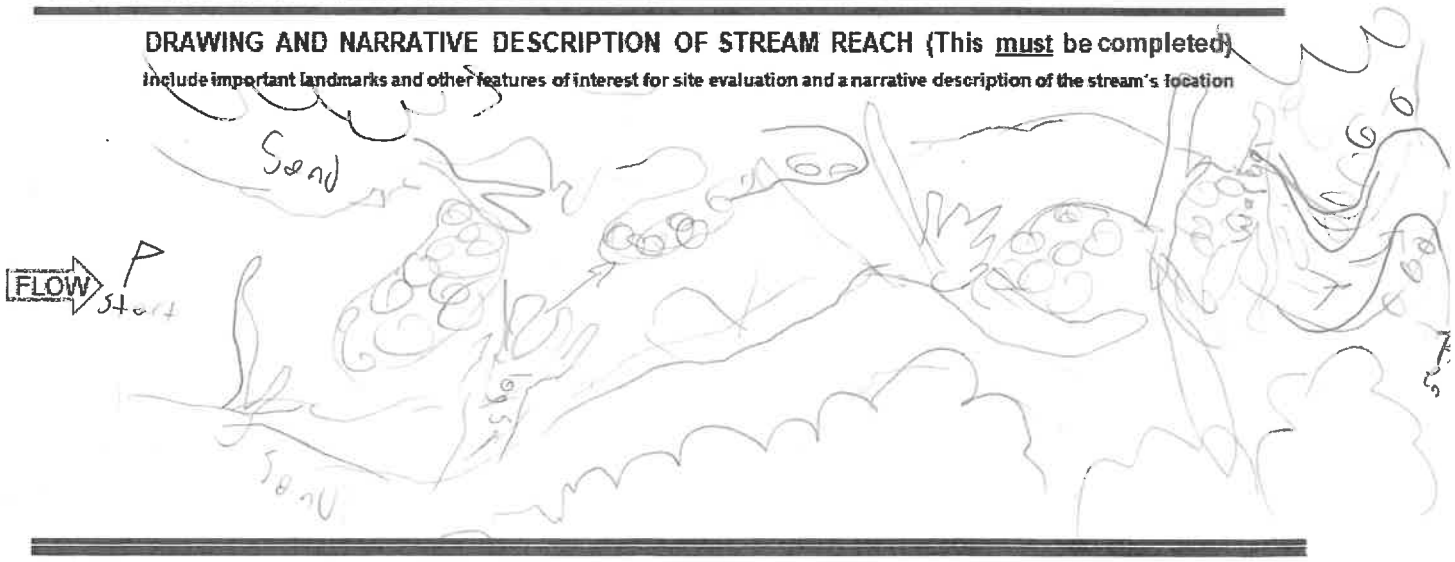
Salamanders Observed? (Y/N) N Species observed (if known): _____

Aquatic Macroinvertebrates Observed? (Y/N) Y Species observed (if known): _____

Comments Regarding Biology: _____

DRAWING AND NARRATIVE DESCRIPTION OF STREAM REACH (This must be completed)

Include important landmarks and other features of interest for site evaluation and a narrative description of the stream's location



Headwater Habitat Evaluation Index Field Form

HHEI Score (sum of metrics 1+2+3) 69

SITE NAME/LOCATION Republican Run Berry Family Conservation Area, DST Columbus?

SITE NUMBER REPG RIVER BASIN _____ RIVER CODE _____ DRAINAGE AREA (mi²) _____

LENGTH OF STREAM REACH (ft) _____ LAT 39.88667 LONG 83.0928° RIVER MILE 5.4

DATE 7/29/15 SCORER RMB COMMENTS _____

NOTE: Complete All Items On This Form - Refer to "Headwater Habitat Evaluation Index Field Manual" for Instructions

STREAM CHANNEL MODIFICATIONS: ☐ NONE / NATURAL CHANNEL ☒ RECOVERED ☒ RECOVERING ☐ RECENT OR NO RECOVERY

1. SUBSTRATE (Estimate percent of every type present). Check *ONLY* two predominant substrate *TYPE* boxes. (Max of 32). Add total number of significant substrate types found (Max of 8). Final metric score is sum of boxes A & B

TYPE		PERCENT	TYPE		PERCENT
☐	BLDR SLABS [16 pts]		☒	SILT [3 pt]	
☒	BOULDER (>256 mm) [16 pts]	5	☐	LEAF PACK/WOODY DEBRIS [3 pts]	
☐	BEDROCK [16 pts]		☒	FINE DETRITUS [3 pts]	
☒	COBBLE (65-256 mm) [12 pts]	20	☒	CLAY or HARDPAN [0 pt]	15
☒	GRAVEL (2-64 mm) [9 pts]	20	☒	MUCK [0 pts]	
☒	SAND (<2 mm) [6 pts]	15	☒	ARTIFICIAL [3 pts]	

Total of Percentages of Bldr Slabs, Boulder, Cobble, Bedrock _____ (A) 21

SCORE OF TWO MOST PREDOMINATE SUBSTRATE TYPES: 21 TOTAL NUMBER OF SUBSTRATE TYPES: (B) 8

HHEI Metric Points — Substrate Max = 40: 29 — A + B

2. Maximum Pool Depth (*Measure the maximum pool depth within the 61 meter (200 feet)* evaluation reach at the time of evaluation. Avoid plunge pools from road culverts or storm water pipes) (Check *ONLY* one box):

- ☒ > 30 centimeters [20 pts]
- ☐ > 22.5 - 30 cm [30 pts]
- ☐ > 10 - 22.5 cm [25 pts]
- ☐ 5 cm - 10 cm [15 pts]
- ☐ < 5 cm [5pts]
- ☐ NO WATER OR MOIST CHANNEL [0pts]

COMMENTS _____ MAXIMUM POOL DEPTH (centimeters): 43

Pool Depth Max = 30: 20

3. BANK FULL WIDTH (Measured as the average of 3 - 4 measurements) (Check *ONLY* one box):

- ☐ > 4.0 meters (> 13') [30 pts]
- ☐ > 3.0 m - 4.0 m (> 9' 7" - 13') [25 pts]
- ☒ > 1.5 m - 3.0 m (> 4' 8" - 9' 7") [20 pts]
- ☐ > 1.0 m - 1.5 m (> 3' 3" - 4' 8") [15 pts]
- ☐ ≤ 1.0 m (≤ 3' 3") [5 pts]

COMMENTS _____ AVERAGE BANKFULL WIDTH (meters): 1.9

Bankfull Width Max=30: 20

This information must also be completed

RIPARIAN ZONE AND FLOODPLAIN QUALITY * NOTE: River Left (L) and Right (R) as looking downstream *

RIPARIAN WIDTH (Per Bank) L	R		FLOODPLAIN QUALITY (Most Predominant per Bank) L	R		L	R	
☐	☒	Wide >10m	☐	☐	Mature Forest, Wetland	☐	☐	Conservation Tillage
☒	☐	Moderate 5-10m	☐	☐	Immature Forest, Shrub or Old Field	☐	☐	Urban or Industrial
☐	☐	Narrow <5m	☒	☒	Residential, Park, New Field	☐	☐	Open Pasture, Row Crop
☐	☐	None	☐	☐	Fenced Pasture	☐	☐	Mining or Construction

COMMENTS _____

FLOW REGIME (*At Time of Evaluation*) (Check *ONLY* one box):

- ☒ Stream Flowing
- ☐ Subsurface flow with isolated pools (interstitial)
- ☐ Moist Channel, isolated pools, no flow (intermittent)
- ☐ Dry channel, no water (ephemeral)

COMMENTS _____

SINUOSITY (Number of bends per 61 m (200 ft) of channel) (Check ONLY one box):

- ☐ None
- ☐ 0.5
- ☒ 1.0
- ☐ 1.5
- ☐ 2.0
- ☐ 2.5
- ☐ 3.0
- ☐ >3

STREAM GRADIENT ESTIMATE

☐ Flat (0.5 ft/100 ft) ☒ Flat to Moderate ☐ Moderate (2 ft/100 ft) ☐ Moderate to Severe ☐ Severe (10 ft/100 ft)

ADDITIONAL STREAM INFORMATION (This Information Must Also be Completed):

QHEI PERFORMED? ☐Yes ☐No QHEI Score _____ (If Yes, Attach Completed QHEI form)

DOWNSTREAM DESIGNATED USE(S)

☐ WWH Name: _____ Distance from Evaluated Stream _____
☐ CWH Name: _____ Distance from Evaluated Stream _____
☐ EWH Name: _____ Distance from Evaluated Stream _____

MAPPING: ATTACH COPIES OF MAPS, INCLUDING THE ENTIRE WATERSHED AREA. CLEARLY MARK THE SITE LOCATION.

USGS Quadrangle Name: _____ NRCS Soil Map Page: _____ NRCS Soil Map Stream Order: _____

County: _____ Township/City: _____

MISCELLANEOUS

Base Flow Conditions? (Y/N): N Date of last precipitation: 7/29/25 Quantity: _____

Photo-documentation Notes: _____

Elevated Turbidity? (Y/N): _____ Canopy (% open): _____

Were samples collected for water chemistry? (Y/N): _____ Lab Sample # or ID (attach results): _____

Field Measures: Temp (°C) _____ Dissolved Oxygen (mg/l) _____ pH (S.U.) _____ Conductivity (umhos/cm) _____

Is the sampling reach representative of the stream (Y/N) ____ If not, explain: _____

Additional comments/description of pollution impacts: _____

BIOLOGICAL OBSERVATIONS

(Record all observations below)

Fish Observed? (Y/N) _____ Species observed (if known): _____

Frogs or Tadpoles Observed? (Y/N) Y Species observed (if known): _____

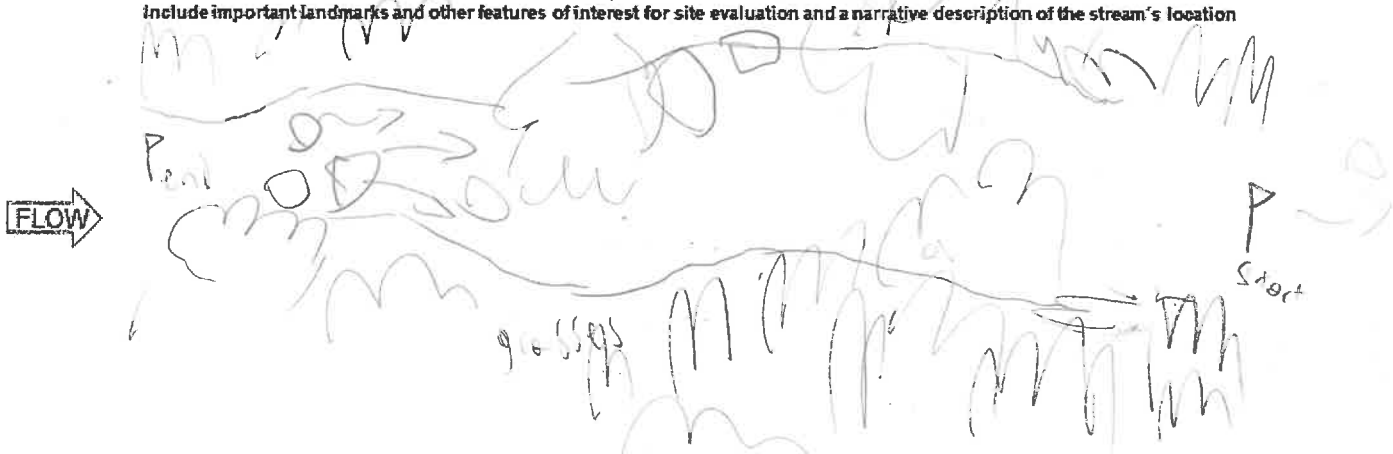
Salamanders Observed? (Y/N) N Species observed (if known): _____

Aquatic Macroinvertebrates Observed? (Y/N) Y Species observed (if known): _____

Comments Regarding Biology: _____

DRAWING AND NARRATIVE DESCRIPTION OF STREAM REACH (This must be completed)

Include important landmarks and other features of interest for site evaluation and a narrative description of the stream's location



Headwater Habitat Evaluation Index Field Form

HHEI Score (sum of metrics 1+2+3) 78

SITE NAME/LOCATION S. Br Republican Run @ Rm 1.92

SITE NUMBER REPQ5 RIVER BASIN _____ RIVER CODE _____ DRAINAGE AREA (mi²) _____

LENGTH OF STREAM REACH (ft) _____ LAT 39.87142 LONG 82.05277 RIVER MILE 0.02

DATE 7/28/25 SCORER _____ COMMENTS _____

NOTE: Complete All Items On This Form - Refer to "Headwater Habitat Evaluation Index Field Manual" for Instructions

STREAM CHANNEL MODIFICATIONS: ☐ NONE / NATURAL CHANNEL ☒ RECOVERED ☒ RECOVERING ☐ RECENT OR NO RECOVERY

1. SUBSTRATE (Estimate percent of every type present). Check *ONLY* two predominant substrate *TYPE* boxes. (Max of 32). Add total number of significant substrate types found (Max of 8). Final metric score is sum of boxes A & B

TYPE		PERCENT	TYPE		PERCENT
☐	BLDR SLABS [16 pts]		☐	SILT [3 pt]	5
☐	BOULDER (>256 mm) [16 pts]	15	☐	LEAF PACK/WOODY DEBRIS [3 pts]	10
☐	BEDROCK [16 pts]		☐	FINE DETRITUS [3 pts]	
☒	COBBLE (65-256 mm) [12 pts]	30	☐	CLAY or HARDPAN [0 pt]	
☒	GRAVEL (2-64 mm) [9 pts]	20	☐	MUCK [0 pts]	5
☐	SAND (<2 mm) [6 pts]	10	☒	ARTIFICIAL [3 pts]	

Total of Percentages of Bldr Slabs, Boulder, Cobble, Bedrock _____

SCORE OF TWO MOST PREDOMINATE SUBSTRATE TYPES: (A) 21 TOTAL NUMBER OF SUBSTRATE TYPES: (B) 7

HHEI Metric Points

Substrate Max = 40: 28

A + B

2. Maximum Pool Depth (*Measure the maximum pool depth within the 61 meter (200 feet)* evaluation reach at the time of evaluation. Avoid plunge pools from road culverts or storm water pipes) (Check *ONLY* one box):

- ☒ > 30 centimeters [20 pts]
- ☐ > 22.5 - 30 cm [30 pts]
- ☐ > 10 - 22.5 cm [25 pts]
- ☐ 5 cm - 10 cm [15 pts]
- ☐ < 5 cm [5pts]
- ☐ NO WATER OR MOIST CHANNEL [0pts]

COMMENTS _____ MAXIMUM POOL DEPTH (centimeters): 37

Pool Depth Max = 30: 20

3. BANK FULL WIDTH (Measured as the average of 3 - 4 measurements) (Check *ONLY* one box):

- ☒ > 4.0 meters (> 13') [30 pts]
- ☐ > 3.0 m - 4.0 m (> 9' 7" - 13') [25 pts]
- ☐ > 1.5 m - 3.0 m (> 4' 8" - 9' 7") [20 pts]
- ☐ > 1.0 m - 1.5 m (> 3' 3" - 4' 8") [15 pts]
- ☐ ≤ 1.0 m (≤ 3' 3") [5 pts]

COMMENTS _____ AVERAGE BANKFULL WIDTH (meters): 6.6

Bankfull Width Max=30: 30

This information must also be completed

RIPARIAN ZONE AND FLOODPLAIN QUALITY * NOTE: River Left (L) and Right (R) as looking downstream*

RIPARIAN WIDTH (Per Bank) L	R		FLOODPLAIN QUALITY (Most Predominant per Bank) L	R		L	R	
☒	☐	Wide >10m	☐	☐	Mature Forest, Wetland	☐	☐	Conservation Tillage
☐	☒	Moderate 5-10m	☐	☐	Immature Forest, Shrub or Old Field	☐	☐	Urban or Industrial
☐	☐	Narrow <5m	☒	☒	Residential, Park, New Field	☐	☐	Open Pasture, Row Crop
☐	☐	None	☐	☐	Fenced Pasture	☐	☐	Mining or Construction

COMMENTS _____

FLOW REGIME (*At Time of Evaluation*) (Check *ONLY* one box):

- ☒ Stream Flowing
- ☐ Subsurface flow with isolated pools (interstitial)
- ☐ Moist Channel, isolated pools, no flow (intermittent)
- ☐ Dry channel, no water (ephemeral)

COMMENTS _____

SINUOSITY (Number of bends per 61 m (200 ft) of channel) (Check ONLY one box):

☐ None	☐ 1.0	☐ 2.0	☐ 3.0
☐ 0.5	☐ 1.5	☒ 2.5	☐ >3

STREAM GRADIENT ESTIMATE

☒ Flat (0.5 ft/100 ft) ☐ Flat to Moderate ☐ Moderate (2 ft/100 ft) ☐ Moderate to Severe ☐ Severe (10 ft/100 ft)

ADDITIONAL STREAM INFORMATION (This Information Must Also be Completed):

QHEI PERFORMED? ☐Yes ☐No QHEI Score _____ (If Yes, Attach Completed QHEI form)

DOWNSTREAM DESIGNATED USE(S)

☐ WWH Name: _____ Distance fromEvaluated Stream _____
☐ CWH Name: _____ Distance fromEvaluated Stream _____
☐ EWH Name: _____ Distance fromEvaluated Stream _____

MAPPING: ATTACH COPIES OF MAPS, INCLUDING THE ENTIRE WATERSHED AREA. CLEARLY MARK THE SITE LOCATION.

USGS Quadrangle Name: _____ NRCS Soil Map Page: _____ NRCS Soil Map Stream Order: _____

County: _____ Township/City: _____

MISCELLANEOUS

Base Flow Conditions? (Y/N): _____ Date of last precipitation: _____ Quantity: _____

Photo-documentation Notes: _____

Elevated Turbidity?(Y/N): _____ Canopy (% open): _____

Were samples collected for water chemistry? (Y/N): _____ Lab Sample # or ID (attach results): _____

Field Measures:Temp (°C) _____ Dissolved Oxygen (mg/l) _____ pH (S.U.) _____ Conductivity (umhos/cm) _____

Is the sampling reach representative of the stream (Y/N) _____ If not, explain: _____

Additional comments/description of pollution impacts: _____

BIOLOGICAL OBSERVATIONS

(Record all observations below)

Fish Observed? (Y/N) Y Species observed (if known): _____

Frogs or Tadpoles Observed? (Y/N) N Species observed (if known): _____

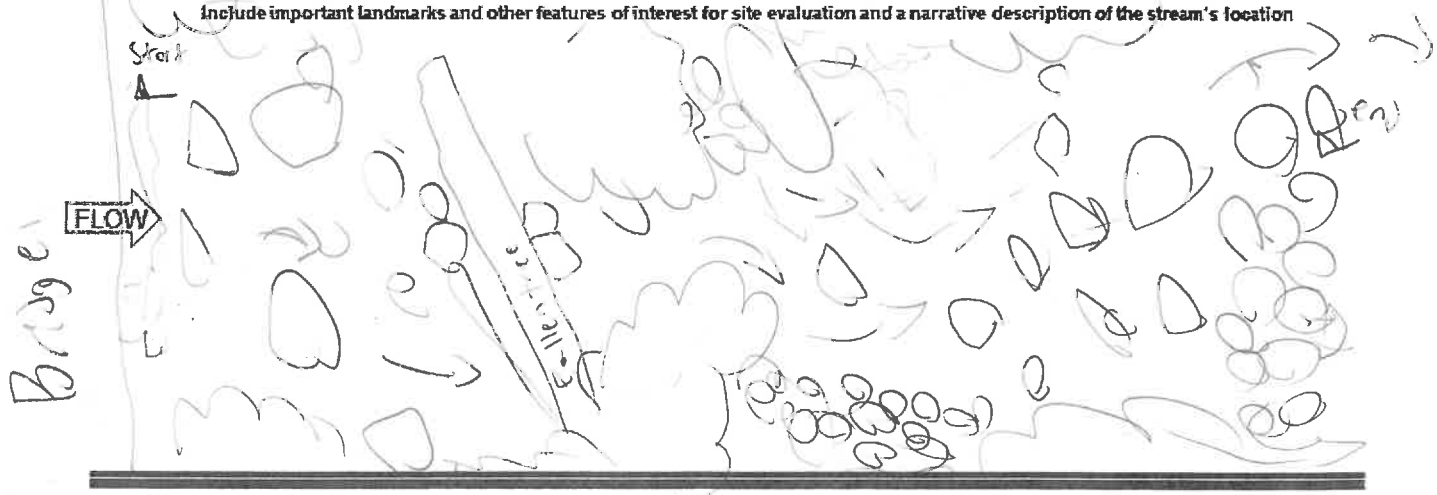
Salamanders Observed? (Y/N) N Species observed (if known): _____

Aquatic Macroinvertebrates Observed? (Y/N) N Species observed (if known): _____

Comments Regarding Biology: _____

DRAWING AND NARRATIVE DESCRIPTION OF STREAM REACH (This must be completed)

Include important landmarks and other features of interest for site evaluation and a narrative description of the stream's location



Headwater Habitat Evaluation Index Field Form

HHEI Score (sum of metrics 1+2+3) 62

SITE NAME/LOCATION UT to Republican Run

SITE NUMBER REP06 RIVER BASIN _____ RIVER CODE _____ DRAINAGE AREA (mi²) _____

LENGTH OF STREAM REACH (ft) _____ LAT 39.86208 LONG 83.05721 RIVER MILE _____

DATE 7/23/25 SCORER _____ COMMENTS _____

NOTE: Complete All Items On This Form - Refer to "Headwater Habitat Evaluation Index Field Manual" for Instructions

STREAM CHANNEL MODIFICATIONS: ☒ NONE / NATURAL CHANNEL ☒ RECOVERED ☐ RECOVERING ☐ RECENT OR NO RECOVERY

1. SUBSTRATE (Estimate percent of every type present). Check *ONLY* two predominant substrate *TYPE* boxes. (Max of 32). Add total number of significant substrate types found (Max of 8). Final metric score is sum of boxes A & B

TYPE		PERCENT	TYPE		PERCENT
☐	BLDR SLABS [16 pts]		☒	SILT [3 pt]	25
☐	BOULDER (>256 mm) [16 pts]	1	☐	LEAF PACK/WOODY DEBRIS [3 pts]	5
☐	BEDROCK [16 pts]		☐	FINE DETRITUS [3 pts]	1
☐	COBBLE (65-256 mm) [12 pts]	1	☒	CLAY or HARDPAN [0 pt]	20
☐	GRAVEL (2-64 mm) [9 pts]	20	☐	MUCK [0 pts]	2
☒	SAND (<2 mm) [6 pts]	30	☐	ARTIFICIAL [3 pts]	

Total of Percentages of Bldr Slabs, Boulder, Cobble, Bedrock _____ (A) 9

SCORE OF TWO MOST PREDOMINATE SUBSTRATE TYPES: (B) 8 TOTAL NUMBER OF SUBSTRATE TYPES:

HHEI Metric Points Substrate Max = 40: 17 (A + B)

2. Maximum Pool Depth (*Measure the maximum pool depth within the 61 meter (200 feet)* evaluation reach at the time of evaluation. Avoid plunge pools from road culverts or storm water pipes) (Check *ONLY* one box):

- ☒ > 30 centimeters [20 pts]
- ☐ > 22.5 - 30 cm [30 pts]
- ☐ > 10 - 22.5 cm [25 pts]
- ☐ 5 cm - 10 cm [15 pts]
- ☐ < 5 cm [5pts]
- ☐ NO WATER OR MOIST CHANNEL [0pts]

COMMENTS _____ MAXIMUM POOL DEPTH (centimeters): 66

Pool Depth Max = 30: 20

3. BANK FULL WIDTH (Measured as the average of 3 - 4 measurements) (Check *ONLY* one box):

- ☐ > 4.0 meters (> 13') [30 pts]
- ☒ > 3.0 m - 4.0 m (> 9' 7" - 13') [25 pts]
- ☐ > 1.5 m - 3.0 m (> 4' 8" - 9' 7") [20 pts]
- ☐ > 1.0 m - 1.5 m (> 3' 3" - 4' 8") [15 pts]
- ☐ ≤ 1.0 m (≤ 3' 3") [5 pts]

COMMENTS _____ AVERAGE BANKFULL WIDTH (meters): 3.2

Bankfull Width Max=30: 25

This information must also be completed

RIPARIAN ZONE AND FLOODPLAIN QUALITY * NOTE: River Left (L) and Right (R) as looking downstream*

RIPARIAN WIDTH (Per Bank) L	R		FLOODPLAIN QUALITY (Most Predominant per Bank) L	R		L	R	
☐	☒	Wide >10m	☐	☐	Mature Forest, Wetland	☐	☐	Conservation Tillage
☒	☐	Moderate 5-10m	☐	☐	Immature Forest, Shrub or Old Field	☐	☐	Urban or Industrial
☐	☐	Narrow <5m	☒	☒	Residential, Park, New Field	☐	☐	Open Pasture, Row Crop
☐	☐	None	☐	☐	Fenced Pasture	☐	☐	Mining or Construction

COMMENTS _____

FLOW REGIME (*At Time of Evaluation*) (Check *ONLY* one box):

- ☒ Stream Flowing
- ☐ Subsurface flow with isolated pools (interstitial)
- ☐ Moist Channel, isolated pools, no flow (intermittent)
- ☐ Dry channel, no water (ephemeral)

COMMENTS _____

SINUOSITY (Number of bends per 61 m (200 ft) of channel) (Check ONLY one box):

☐ None	☐ 1.0	☐ 2.0	☐ 3.0
☐ 0.5	☐ 1.5	☒ 2.5	☐ >3

STREAM GRADIENT ESTIMATE

☐ Flat (0.5 ft/100 ft) ☒ Flat to Moderate ☐ Moderate (2 ft/100 ft) ☐ Moderate to Severe ☐ Severe (10 ft/100 ft)

ADDITIONAL STREAM INFORMATION (This Information Must Also be Completed):

QHEI PERFORMED? ☐Yes ☐No QHEI Score _____ (If Yes, Attach Completed QHEI form)

DOWNSTREAM DESIGNATED USE(S)

☐ WWH Name: _____ Distance from Evaluated Stream _____
☐ CWH Name: _____ Distance from Evaluated Stream _____
☐ EWH Name: _____ Distance from Evaluated Stream _____

MAPPING: ATTACH COPIES OF MAPS, INCLUDING THE ENTIRE WATERSHED AREA. CLEARLY MARK THE SITE LOCATION.

USGS Quadrangle Name: _____ NRCS Soil Map Page: _____ NRCS Soil Map Stream Order: _____

County: _____ Township/City: _____

MISCELLANEOUS

Base Flow Conditions? (Y/N): _____ Date of last precipitation: _____ Quantity: _____

Photo-documentation Notes: _____

Elevated Turbidity? (Y/N): _____ Canopy (% open): _____

Were samples collected for water chemistry? (Y/N): _____ Lab Sample # or ID (attach results): _____

Field Measures: Temp (°C) _____ Dissolved Oxygen (mg/l) _____ pH (S.U.) _____ Conductivity (umhos/cm) _____

Is the sampling reach representative of the stream (Y/N) ____ If not, explain: _____

Additional comments/description of pollution impacts: _____

BIOLOGICAL OBSERVATIONS

(Record all observations below)

Fish Observed? (Y/N) Y Species observed (if known): _____

Frogs or Tadpoles Observed? (Y/N) N Species observed (if known): _____

Salamanders Observed? (Y/N) N Species observed (if known): _____

Aquatic Macroinvertebrates Observed? (Y/N) Y Species observed (if known): _____

Comments Regarding Biology: _____

DRAWING AND NARRATIVE DESCRIPTION OF STREAM REACH (This must be completed)

Include important landmarks and other features of interest for site evaluation and a narrative description of the stream's location



Headwater Habitat Evaluation Index Field Form

HHEI Score (sum of metrics 1+2+3) 69

SITE NAME/LOCATION [redacted] V.T. to Gantt Run, Dst Hoover Rd

SITE NUMBER GRR04 RIVER BASIN _____ RIVER CODE _____ DRAINAGE AREA (mi²) _____

LENGTH OF STREAM REACH (ft) _____ LAT 39.87850 LONG 83.07306 RIVER MILE [redacted] 2.77

DATE 7/24/25 SCORER _____ COMMENTS _____

NOTE: Complete All Items On This Form - Refer to "Headwater Habitat Evaluation Index Field Manual" for Instructions

STREAM CHANNEL MODIFICATIONS: ☐ NONE / NATURAL CHANNEL ☐ RECOVERED ☒ RECOVERING ☐ RECENT OR NO RECOVERY

1. SUBSTRATE (Estimate percent of every type present). Check *ONLY* two predominant substrate *TYPE* boxes. (Max of 32). Add total number of significant substrate types found (Max of 8). Final metric score is sum of boxes A & B

TYPE		PERCENT	TYPE		PERCENT
☐	BLDR SLABS [16 pts]		☒	SILT [3 pt]	15
☒	BOULDER (>256 mm) [16 pts]	10	☒	LEAF PACK/WOODY DEBRIS [3 pts]	5
☐	BEDROCK [16 pts]		☐	FINE DETRITUS [3 pts]	
☒	COBBLE (65-256 mm) [12 pts]	30	☒	CLAY or HARDPAN [0 pt]	15
☒	GRAVEL (2-64 mm) [9 pts]	20	☐	MUCK [0 pts]	
☒	SAND (<2 mm) [6 pts]		☒	ARTIFICIAL [3 pts]	5

Total of Percentages of Bldr Slabs, Boulder, Cobble, Bedrock 40 (A) 21 (B) 8

SCORE OF TWO MOST PREDOMINATE SUBSTRATE TYPES: 21 TOTAL NUMBER OF SUBSTRATE TYPES: 8

HHEI Metric Points — Substrate Max = 40: 29 — A + B

2. Maximum Pool Depth (*Measure the maximum pool depth within the 61 meter (200 feet)* evaluation reach at the time of evaluation. Avoid plunge pools from road culverts or storm water pipes) (Check *ONLY* one box):

- ☒ > 30 centimeters [20 pts]
- ☐ > 22.5 - 30 cm [30 pts]
- ☐ > 10 - 22.5 cm [25 pts]
- ☐ 5 cm - 10 cm [15 pts]
- ☐ < 5 cm [5pts]
- ☐ NO WATER OR MOIST CHANNEL [0pts]

COMMENTS _____ MAXIMUM POOL DEPTH (centimeters): 34

Pool Depth Max = 30: 20

31 34 23

3. BANK FULL WIDTH (Measured as the average of 3 - 4 measurements) (Check *ONLY* one box):

- ☐ > 4.0 meters (> 13') [30 pts]
- ☐ > 3.0 m - 4.0 m (> 9' 7" - 13') [25 pts]
- ☒ > 1.5 m - 3.0 m (> 4' 8" - 9' 7") [20 pts]
- ☐ > 1.0 m - 1.5 m (> 3' 3" - 4' 8") [15 pts]
- ☐ ≤ 1.0 m (≤ 3' 3") [5 pts]

COMMENTS _____ AVERAGE BANKFULL WIDTH (meters): 3.0

Bankfull Width Max=30: 20

3.0 3.7 2.7 2.6

This information must also be completed

RIPARIAN ZONE AND FLOODPLAIN QUALITY * NOTE: River Left (L) and Right (R) as looking downstream*

RIPARIAN WIDTH (Per Bank) L	R		FLOODPLAIN QUALITY (Most Predominant per Bank) L	R		L	R	
☐	☐	Wide >10m	☐	☐	Mature Forest, Wetland	☐	☐	Conservation Tillage
☐	☐	Moderate 5-10m	☐	☐	Immature Forest, Shrub or Old Field	☐	☐	Urban or Industrial
☒	☒	Narrow <5m	☒	☒	Residential, Park, New Field	☐	☐	Open Pasture, Row Crop
☐	☐	None	☐	☐	Fenced Pasture	☐	☐	Mining or Construction

COMMENTS _____

FLOW REGIME (*At Time of Evaluation*) (Check *ONLY* one box):

- ☒ Stream Flowing
- ☐ Subsurface flow with isolated pools (interstitial)
- ☐ Moist Channel, isolated pools, no flow (intermittent)
- ☐ Dry channel, no water (ephemeral)

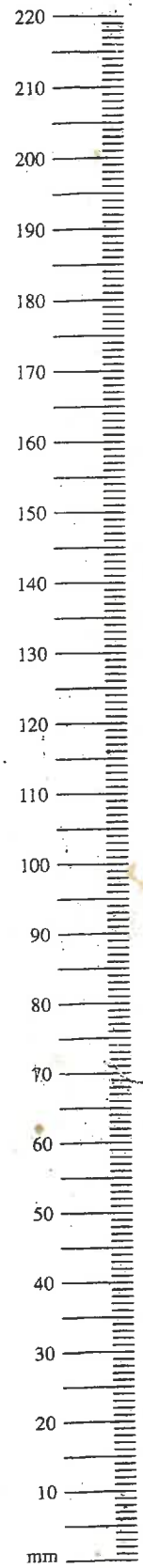
COMMENTS _____

SINUOSITY (Number of bends per 61 m (200 ft) of channel) (Check ONLY one box):

- ☒ None
- ☐ 0.5
- ☐ 1.0
- ☐ 1.5
- ☐ 2.0
- ☐ 2.5
- ☐ 3.0
- ☐ >3

STREAM GRADIENT ESTIMATE

☐ Flat (0.5 ft/100 ft) ☒ Flat to Moderate ☐ Moderate (2 ft/100 ft) ☐ Moderate to Severe ☐ Severe (10 ft/100 ft)



ADDITIONAL STREAM INFORMATION (This Information Must Also be Completed):

QHEI PERFORMED? ☐Yes ☐No QHEI Score _____ (If Yes, Attach Completed QHEI form)

DOWNSTREAM DESIGNATED USE(S)

☐ WWH Name: _____ Distance fromEvaluated Stream _____
☐ CWH Name: _____ Distance fromEvaluated Stream _____
☐ EWH Name: _____ Distance fromEvaluated Stream _____

MAPPING: ATTACH COPIES OF MAPS, INCLUDING THE ENTIRE WATERSHED AREA. CLEARLY MARK THE SITE LOCATION.

USGS Quadrangle Name: _____ NRCS Soil Map Page: _____ NRCS Soil Map Stream Order: _____

County: _____ Township/City: _____

MISCELLANEOUS

Base Flow Conditions? (Y/N): _____ Date of last precipitation: _____ Quantity: _____

Photo-documentation Notes: _____

Elevated Turbidity?(Y/N): _____ Canopy (% open): _____

Were samples collected for water chemistry? (Y/N): _____ Lab Sample # or ID (attach results): _____

Field Measures:Temp (°C) _____ Dissolved Oxygen (mg/l) _____ pH (S.U.) _____ Conductivity (umhos/cm) _____

Is the sampling reach representative of the stream (Y/N) _____ If not, explain: _____

_____

Additional comments/description of pollution impacts: _____

_____

BIOLOGICAL OBSERVATIONS

(Record all observations below)

Fish Observed? (Y/N) _____ Species observed (if known): _____

Frogs or Tadpoles Observed? (Y/N) _____ Species observed (if known): _____

Salamanders Observed? (Y/N) _____ Species observed (if known): _____

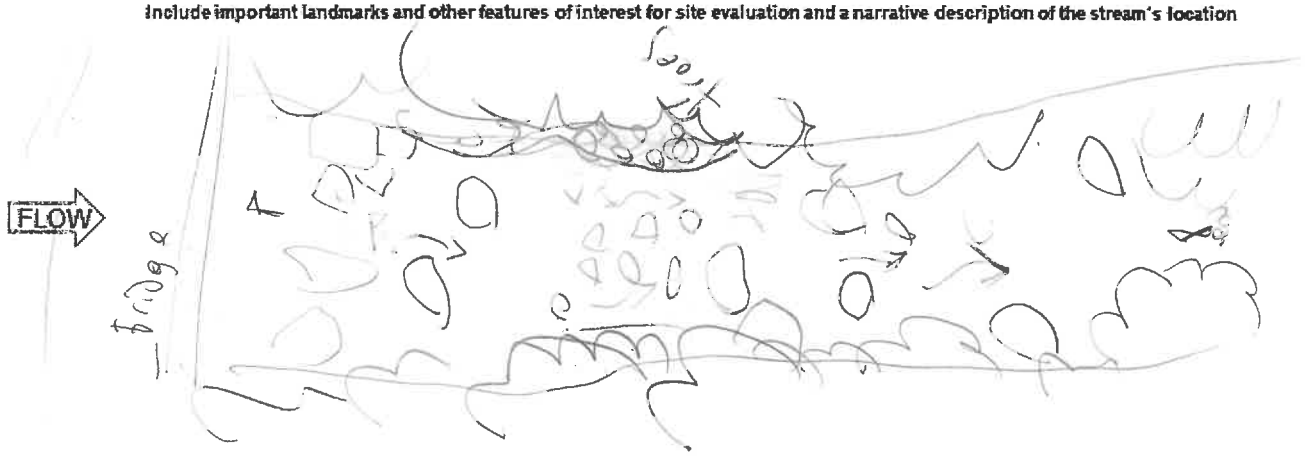
Aquatic Macroinvertebrates Observed? (Y/N) _____ Species observed (if known): _____

Comments Regarding Biology: _____

_____

DRAWING AND NARRATIVE DESCRIPTION OF STREAM REACH (This must be completed)

Include important landmarks and other features of interest for site evaluation and a narrative description of the stream's location



Headwater Habitat Evaluation Index Field Form

HHEI Score (sum of metrics 1+2+3) 56

SITE NAME/LOCATION GT Grant Run @ RM 2.77

SITE NUMBER GRUDS RIVER BASIN _____ RIVER CODE _____ DRAINAGE AREA (mi²) _____

LENGTH OF STREAM REACH (ft) _____ LAT 39.93854 LONG 83.07892 RIVER MILE 1.7

DATE 7/28/25 SCORER RMB COMMENTS _____

NOTE: Complete All Items On This Form - Refer to "Headwater Habitat Evaluation Index Field Manual" for Instructions

STREAM CHANNEL MODIFICATIONS: ☐ NONE / NATURAL CHANNEL ☐ RECOVERED ☒ RECOVERING ☐ RECENT OR NO RECOVERY

1. SUBSTRATE (Estimate percent of every type present). Check *ONLY* two predominant substrate *TYPE* boxes. (Max of 32). Add total number of significant substrate types found (Max of 8). Final metric score is sum of boxes A & B

TYPE		PERCENT	TYPE		PERCENT
☐ ☐	BLDR SLABS [16 pts]		☐ ☒	SILT [3 pt]	10
☐ ☐	BOULDER (>256 mm) [16 pts]		☐ ☒	LEAF PACK/WOODY DEBRIS [3 pts]	3
☐ ☐	BEDROCK [16 pts]		☐ ☒	FINE DETRITUS [3 pts]	7
☐ ☒	COBBLE (65-256 mm) [12 pts]	15	☒ ☒	CLAY or HARDPAN [0 pt]	20
☐ ☒	GRAVEL (2-64 mm) [9 pts]	20	☐ ☐	MUCK [0 pts]	
☐ ☒	SAND (<2 mm) [6 pts]	15	☐ ☐	ARTIFICIAL [3 pts]	

Total of Percentages of Bldr Slabs, Boulder, Cobble, Bedrock 15

SCORE OF TWO MOST PREDOMINATE SUBSTRATE TYPES: (A) 9 TOTAL NUMBER OF SUBSTRATE TYPES: (B) 7

HHEI Metric Points Substrate Max = 40: 16 (A + B)

2. Maximum Pool Depth (*Measure the maximum pool depth within the 61 meter (200 feet)* evaluation reach at the time of evaluation. Avoid plunge pools from road culverts or storm water pipes) (Check *ONLY* one box):

- ☒ > 30 centimeters [20 pts]
- ☐ > 22.5 - 30 cm [30 pts]
- ☐ > 10 - 22.5 cm [25 pts]
- ☐ 5 cm - 10 cm [15 pts]
- ☐ < 5 cm [5pts]
- ☐ NO WATER OR MOIST CHANNEL [0pts]

COMMENTS _____ MAXIMUM POOL DEPTH (centimeters): ☐

Pool Depth Max = 30: 20

32
30
22
40

3. BANK FULL WIDTH (Measured as the average of 3 - 4 measurements) (Check *ONLY* one box):

- ☐ > 4.0 meters (> 13') [30 pts]
- ☐ > 3.0 m - 4.0 m (> 9' 7" - 13') [25 pts]
- ☒ > 1.5 m - 3.0 m (> 4' 8" - 9' 7") [20 pts]
- ☐ > 1.0 m - 1.5 m (> 3' 3" - 4' 8") [15 pts]
- ☐ ≤ 1.0 m (≤ 3' 3") [5 pts]

COMMENTS _____ AVERAGE BANKFULL WIDTH (meters): 1.9

Bankfull Width Max=30: 20

1.9
2.0
1.9
2.0

This information must also be completed

RIPARIAN ZONE AND FLOODPLAIN QUALITY ★ NOTE: River Left (L) and Right (R) as looking downstream★

RIPARIAN WIDTH (Per Bank) L	R		FLOODPLAIN QUALITY (Most Predominant per Bank) L	R		L	R	
☒	☒	Wide >10m	☐	☐	Mature Forest, Wetland	☐	☐	Conservation Tillage
☐	☐	Moderate 5-10m	☐	☐	Immature Forest, Shrub or Old Field	☒	☐	Urban or Industrial
☐	☐	Narrow <5m	☐	☒	Residential, Park, New Field	☐	☐	Open Pasture, Row Crop
☐	☐	None	☐	☐	Fenced Pasture	☐	☐	Mining or Construction

COMMENTS _____

FLOW REGIME (*At Time of Evaluation*) (Check *ONLY* one box):

- ☒ Stream Flowing
- ☐ Subsurface flow with isolated pools (interstitial)
- ☐ Moist Channel, isolated pools, no flow (intermittent)
- ☐ Dry channel, no water (ephemeral)

COMMENTS _____

SINUOSITY (Number of bends per 61 m (200 ft) of channel) (Check ONLY one box):

- ☐ None
- ☐ 0.5
- ☐ 1.0
- ☐ 1.5
- ☐ 2.0
- ☐ 2.5
- ☐ 3.0
- ☒ >3

STREAM GRADIENT ESTIMATE

☐ Flat (0.5 ft/100 ft) ☒ Flat to Moderate ☐ Moderate (2 ft/100 ft) ☐ Moderate to Severe ☐ Severe (10 ft/100 ft)

220 210 200 190 180 170 160 150 140 130 120 110 100 90 80 70 60 50 40 30 20 10 mm

ADDITIONAL STREAM INFORMATION (This Information Must Also be Completed):

QHEI PERFORMED? ☐Yes ☐No QHEI Score _____ (If Yes, Attach Completed QHEI form)

DOWNSTREAM DESIGNATED USE(S)

☐ WWH Name: _____ Distance from Evaluated Stream _____
☐ CWH Name: _____ Distance from Evaluated Stream _____
☐ EWH Name: _____ Distance from Evaluated Stream _____

MAPPING: ATTACH COPIES OF MAPS, INCLUDING THE ENTIRE WATERSHED AREA. CLEARLY MARK THE SITE LOCATION.

USGS Quadrangle Name: _____ NRCS Soil Map Page: _____ NRCS Soil Map Stream Order: _____

County: _____ Township/City: _____

MISCELLANEOUS

Base Flow Conditions? (Y/N): _____ Date of last precipitation: _____ Quantity: _____

Photo-documentation Notes: _____

Elevated Turbidity? (Y/N): _____ Canopy (% open): _____

Were samples collected for water chemistry? (Y/N): _____ Lab Sample # or ID (attach results): _____

Field Measures: Temp (°C) _____ Dissolved Oxygen (mg/l) _____ pH (S.U.) _____ Conductivity (umhos/cm) _____

Is the sampling reach representative of the stream (Y/N) ____ If not, explain: _____

_____

Additional comments/description of pollution impacts: _____

_____

BIOLOGICAL OBSERVATIONS

(Record all observations below)

Fish Observed? (Y/N) N Species observed (if known): _____

Frogs or Tadpoles Observed? (Y/N) N Species observed (if known): _____

Salamanders Observed? (Y/N) N Species observed (if known): _____

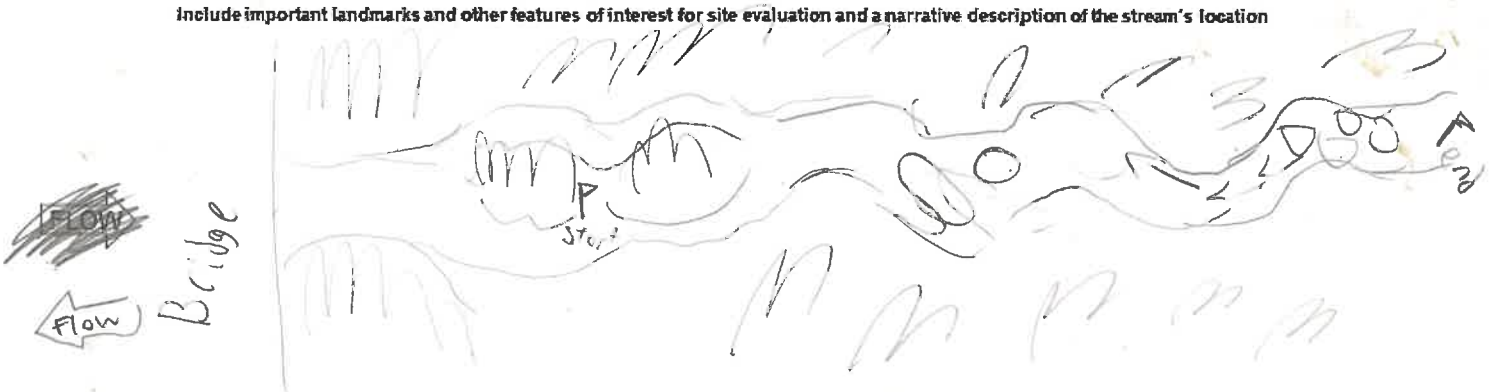
Aquatic Macroinvertebrates Observed? (Y/N) Y Species observed (if known): See Qual Sheet

Comments Regarding Biology: _____

_____

DRAWING AND NARRATIVE DESCRIPTION OF STREAM REACH (This must be completed)

Include important landmarks and other features of interest for site evaluation and a narrative description of the stream's location



Appendix E: Ohio EPA Stream Nutrient Assessment Procedure (SNAP) Matrix and Flow Chart

<table>
<tr><th colspan="5">Proposed Stream Nutrient Assessment Procedure (SNAP; Ohio EPA 2015b)</th></tr>
<tr><th>STEP 1</th><th>STEP 2</th><th>STEP 3</th><th colspan="2">STEP 4</th></tr>
<tr><th>Biological Criteria</th><th>Diel D.O. Swing[2]</th><th>Benthic Chlorophyll[3]</th><th colspan="2">Preliminary Assessment: Trophic Condition Status of Evaluated Segment or Waterbody</th></tr>
<tr><td rowspan="3">All indices attaining or in non-significant departure[1]</td><td rowspan="2">Normal or low swings (≤6.5 mg/l)</td><td>Low to moderate (≤320 mg/m^2)</td><td colspan="2">Attaining use / Not threatened</td></tr>
<tr><td>High (>320 mg/m^2)</td><td rowspan="2">Attaining use, but may be threatened</td><td rowspan="2">See Flow Chart A</td></tr>
<tr><td rowspan="2">Wide swings (>6.5 mg/l)</td><td>Low (≤182 mg/m^2)</td></tr>
<tr><td rowspan="3">Non-attaining (one or more indices below nonsignificant departure)</td><td rowspan="2">Normal or low swings (≤6.5 mg/l)</td><td>Moderate to high (>182 mg/m^2)</td><td>Impaired, but cause(s) other than nutrients</td><td>See Flow Chart B</td></tr>
<tr><td>Low to moderate (≤320 mg/m^2)</td><td rowspan="2">Impaired; likely nutrients over-enrichment</td><td rowspan="3">See Flow Chart C</td></tr>
<tr><td rowspan="2">Wide swings (>6.5 mg/l)</td><td>High (>320 mg/m^2)</td></tr>
<tr><td>Low (≤182 mg/m^2)</td><td>Impaired; Nutrients over-enrichment</td></tr>
</table>

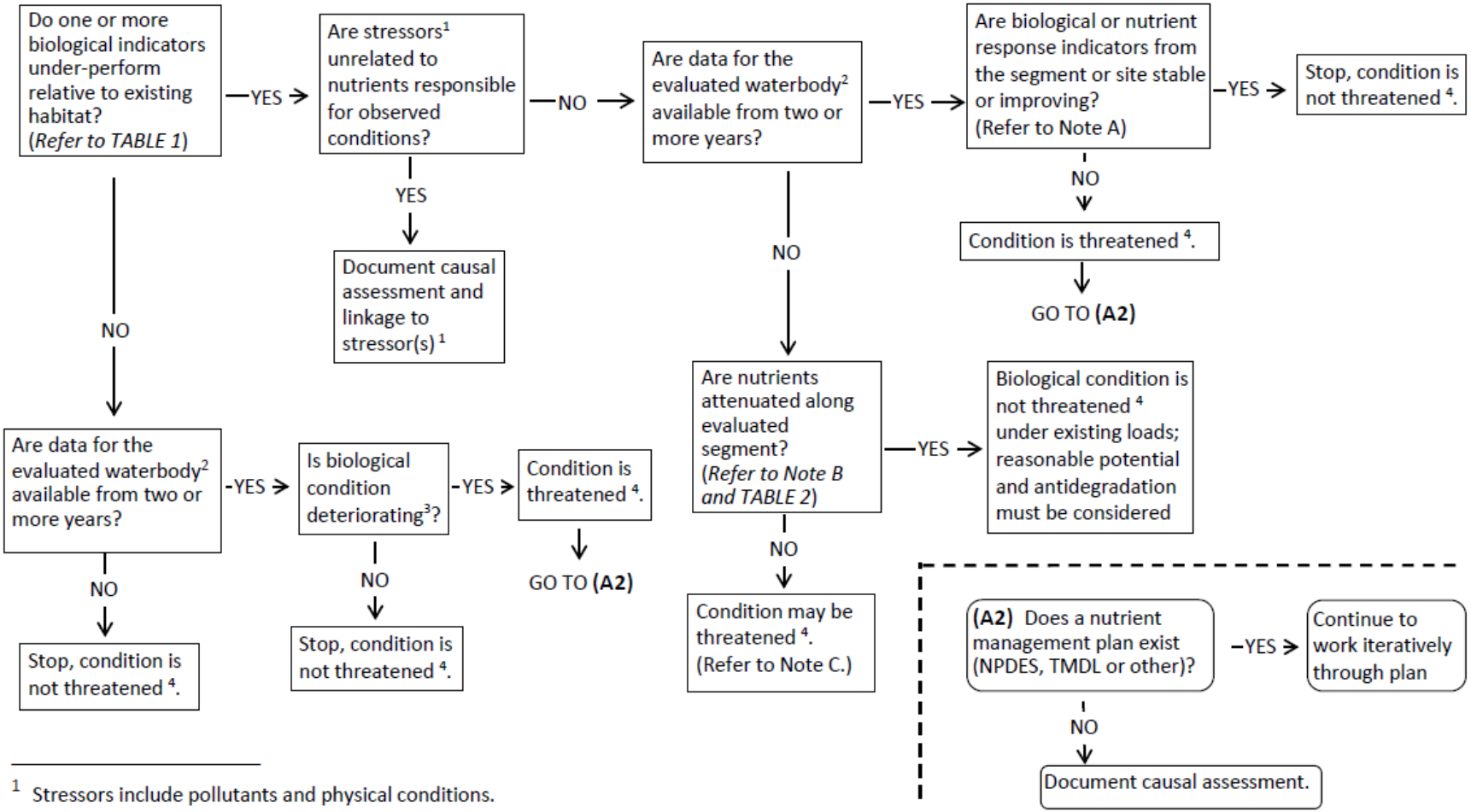
[1] Non-significant departure from biocriteria values accounts for background variability in measurements for biological indices. In accordance with "Biological Criteria for the Protection of Aquatic Life: Volume II: Users Manual for Biological Field Assessment of Ohio Surface Waters", Ohio EPA (1987, updated 2015b), non-significant departure is 4 points for IBI and ICI, and 0.5 point for MIwb.

[2] Threshold value for 24-hour DO swing based upon a change point of 6.5 mg/l between DO swing and minimum DO. "Low to normal" DO swing is ≤6.5 mg/l. "Wide" DO swing is >6.5 mg/l. Data used for analysis from Technical Support Document for Nutrient Water Quality Standards for Ohio Rivers and Streams, Ohio EPA (2011).

[3] Threshold values for benthic chlorophyll a are based upon change points between benthic chlorophyll a and DO swings or Invertebrate Community Index (ICI). "Low" chlorophyll a is ≤182 mg/m2. "Moderate" chlorophyll a is >182 and ≤320 mg/m2. "High" chlorophyll a is >320 mg/m2. Data used for analysis from Technical Support Document for Nutrient Water Quality Standards for Ohio Rivers and Streams, Ohio EPA (2011).

FLOW CHART A. – DECISION TREE FOR DETERMINING WHEN BIOLOGICALLY ATTAINING CONDITION STATUS IS THREATENED BY NUTRIENTS

For application when biological criteria are attaining, but one or both nutrient response indicators (DO swing or benthic chlorophyll) are elevated.



[1] Stressors include pollutants and physical conditions.

[2] The geographic scope or length of evaluated stream segments are defined in approved study plans.

[3] For a given location, a decrease of 5 or more IBI or ICI points, or 0.6 or more MIWb points between sampling years represents a significant change. Trends for waterbodies are formally evaluated in Biological and Water Quality Technical Support Documents.

[4] As recommended by US EPA in its integrated reporting guidance (*Guidance for 2006 Assessment, Listing and Reporting Requirements Pursuant to Sections 303(d), 305(b) and 314 of the Clean Water Act*), "threatened" waters are currently attaining WQSs but are expected to not meet WQSs by the next listing cycle (every two years). For example, a declining trend may indicate threatened status, whereas a stable or improving trend would not.

Appendix F: Columbus Department of Power and Water Sewer Features Class Descriptions

COLUMBUS WATER & POWER

Sewer Feature Class Descriptions CWP-GIS

SOP Number: GISS_1017		
Effective: 4/25/2013	**Updated:** 6/08/2023	**Reviewed:** 6/08/2023
Additional References, Attachments:		

Purpose: This document provides a general description of the feature classes within the DOSD GIS Enterprise Database. Feature classes that are not currently used have not been described.

- Blind Connect
  - A connection point between sewer mains without an above-ground access structure.
- Bulkhead
  - A plug installed on a sewer main.
  - Typically used during abandonments or at the upstream end of a line between project construction phases.
- Clean Out
  - A small feature at the upstream end of some lines that provides limited maintenance access to the sewer main.
- Customer Cleanout
  - Point feature representing a sewer customer location with a link to the utility billing system
- Customer Lateral
  - Line feature representing sewer laterals.
  - Contains a link to the utility billing system
  - Part of relationship class to the Sewer Permit table
- Customer Tap
  - Point feature representing service taps along main line sewers.
- Flap Gate
  - A device used to restrict the flow of water to one direction, similar to a check valve.
  - These are often installed where storm pipes drain to a water body.
  - They are also associated with designed sewer reliefs (DSRs).
  - Can be installed at the end of a pipe or inline.
  - Does not split a sewer main, but is represented 5’ upstream of the location along the protected sewer main.

- Flow Regulator
    - A key component of the collection system built to control the amount of liquid passed to downstream pipes.
    - Is also able to divert water to different downstream pipes depending on water elevation within the structure.
- Inlet
    - A structure that allows surface water to drain into the storm collection system.
    - Curb Inlet, Catch Basin, Lone, Stand Pipe, Riser Pipe, Trench Drain
- Main
    - Sewer pipe that transports stormwater and wastewater to outfalls or the treatment plant.
    - Gravity, Force, Siphon
- Main Change
    - A point that represents a change in the physical or non-physical structure of a sewer main.
    - Contract, Slope, Diameter, Material
- Manhole
    - A structure providing maintenance access to the collection system.
- Open Channel
    - A feature on the surface that directs storm water to a desired location.
    - Can be a concrete or earthen channel.
- Pipe End
    - A feature that signifies the end of a pipe. May be the upstream or downstream end of the line.
    - Plain, Headwall, Roof Drain, Unknown Line Upstream or Downstream.
- Pump Station
    - A key component of the collection system that lifts water from one elevation to a higher elevation.
    - Typically associated with force mains downstream of the station.
- Structure
    - This feature is used to represent structures that cannot be classified into the other primary feature types.
    - Includes a wide variety of features including multiple types of chambers and vaults, water quality control structures, shafts, valves, energy dissipation structures.
- Treatment Plant
    - Facilities that receive untreated sanitary and combined flows.
- DSR (Designed Sewer Relief)

    - Points with the sanitary/combined collection system where sewage is diverted to relief pipes, and ultimately an outfall, during periods of heavy precipitation pump failures, or other maintenance issues.
- CSO_SSO (Combined Sewer Overflow, Sanitary Sewer Overflow)
    - Outfalls downstream of DSR locations.
- CPH_DOSD_HSTS (Home Sewage Treatment Systems)
    - Locations of homes or businesses that treat their sanitary waste with aerators, septic systems, leach fields, waste hauling, etc.
- Project Dry Basement Valves
    - Locations of homes where a device has been installed to prevent water in basement (WIB) events.
- EPM_PowerCleaning
    - Sewer mains that require regular cleaning to remove debris, fats, oils, grease all of which can cause overflows or water in basements.
    - Segments in this layer are part of current WAM EPM benchmark work orders.
- Sanitary Sewershed
    - Polygons that define sanitary/combined pipe draining basins.
    - Similar to a watershed, but defined by pipes, not by surface drainage characteristics.
- SSES Study Area
    - Polygons defining the boundary of SSES project (I&I, IR)
- FCSWCD Data Points
    - GPS points captured by Franklin County Soil and Water Conservation District during field verification of the Stream Resource Geodatabase.
    - Each point has a photograph associated with it.
- Flow Meters
    - Devices installed in the collection system that measure flow depth and/or velocity.
- Maintenance Area
    - Areas where SMOC is responsible for maintenance of sanitary sewers.
- Contract Service Area
    - Areas where CWP has been contracted to accept sanitary flow from suburban or township entities.
- Sewer Main Historic ID
    - Lines that preserve old sewer main IDs when lines are split by new features.
    - Stores the historic id, and the current id.
    - This layer is populated by the DOSD GIS Asset ID tool but can also be modified manually in cases where the Asset ID tool is insufficient for proper tracking.

    - Currently used by the SCREAM CCTV integration.
- Rain Gauge
    - Location of rain gauges installed in Central Ohio.
- FPA
    - Facility Planning Area
- Pretreatment Industrial Customer
    - Customers subject to SRMS Pretreatment regulations
- Pretreatment Industrial Inspection Manhole
    - Manholes accessed by SRMS to monitor effluent from pretreatment customers
- Pretreatment Industrial Lateral Representation
    - Sewer lateral for pretreatment customers
- Atlas Grid
    - 5000' x 4000' grid system used for atlas map creation and asset id prefixes
- Suburban Sanitary Lines
    - Sanitary sewer mains obtained from suburban entities up
    - Last updated mid 2000's
- Suburban Sanitary Manholes
    - Sanitary sewer manholes obtained from suburban entities
    - Last updated mid 2000's
- BMP_and_GI
    - Represents stormwater quality and/or quantity control features
- BMP_and_GI_Facility_Extent
    - Polygon representations of select BMP_and_GI types
    - Examples include pervious pavement, detention basins, bioretention basins etc.
- SCPZ Mitigation
    - Stream Corridor Protection Zones
    - Areas defined by the Stormwater Drainage Manual to allow natural movement of streams, sufficient area for flood conveyance, protect water quality, and prevent erosion
    - Shown in GIS based on what is shown on plan drawings
- DOSD Odor Complaint
    - Represents odor complaints received by the Division of Sewerage and Drainage

Change Log:

1) 6/7/2017:
    a. Eliminated Sand Catch
    b. Renamed HSTS layer
    c. Added Sewer Customer layers
    d. Added Pretreatment Layers
    e. Added Facility Planning Area
2) 6/8/2017:
    a. Edited for clarity

3) 3/13/2019
    a. Added descriptions for suburban sanitary features, BMP related features, and Atlas Grid
4) 6/1/2021
    a. Added SCPZ Mitigation and DOSD Odor Complaint layers
5) 6/8/2023
    a. Removed Outfall and Sluice Gate descriptions, as they are no longer in the database.