2021

WATER SAMPLING

REPORT

FOR SELECTED

MS4 SITES

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IN-STREAM SAMPLING PROTOCOLS FOR MS4 SITES

Beginning the second week of May and ending the last week of September, the Environmental Health Division conducted surface water testing on a weekly basis throughout the county on ditches, creeks, lakes, and the Elkhart River. The sampling provides data to help prioritize sites with a high illicit discharge potential, characterizes water quality problems, helps determine critical areas for improvement, and documents the long term success of the illicit discharge and elimination program.

The sites are selected by storm water representatives from the MS4 Partnership which include the cities of Elkhart and Goshen, the town of Bristol, and Elkhart County agencies which meet annually to determine if changes need to be made to the locations. The standard procedure is to obtain a minimum of three years of data per site in order to identify any trends. The following is a list of the sites from the 2021 season:

Baugo Creek: CR 3
Rock Run Creek: CR 34
Yellow Creek: Concord High School and CR 138
Weaver Ditch: CR 13
Berlin Court Ditch: CR 15
Turkey Creek: CR 50 and CR 46
Dausman Ditch: CR 19
Swoveland Ditch: CR 19
Pine Creek: CR 18 and Wyland & Roske
Christiana Creek: CR 4
Elkhart River: Baintertown and Indiana Avenue (Goshen)
Heaton Lake: Ideal Beach and 22880 Lake Shore
Simonton Lake: 51093 Beach Drive and 51330 SR 19

The sampling form includes whether the sample was considered wet or dry. A wet weather event is defined as a rain event with precipitation greater than .1 inches of rain within a twenty-four hour period prior to collection. A dry weather event is defined as a sampling event with no precipitation twenty-four hours prior to collection. Monitoring during both types of events provides representative samples and helps identify how differences in land use impact water quality.

Data gathered for chlorides, dissolved oxygen, pH, temperature, and conductivity are obtained in the field by using a YSI Professional Plus Instrument Probe. Calibration of the instrument probe is done in accordance with the owner's manual. The instrument probe is lowered into the approximate center part of the waterway and placed below the surface of the water to obtain actual real time data. At the sites with piers (Heaton Lake and Simonton Lake) the instrument probe is lowered into the water at the end of the piers. For the site at Bainertown, sample collection is made from the edge of the river. According to the technical experts at YSI, this information is to be used for trending purposes only.

Tests for nitrates, phosphorus, total suspended solids, and E. coli are grab samples in which a single volume of water is obtained at a given point in time, placed in a prepared sample bottle, and then analyzed. Water samples were collected using one of two methods. For low flow sampling and sites with piers, a dipper was used. The dipper is rinsed three times at each site prior to collection to prevent cross contamination between samples sites. For high flow streams, a Van Dorn sampler is used. The device is lowered into the approximate center of the waterway and placed below the water surface for a

minimum of twenty seconds with the ends open to allow rinsing of the unit between sampling sites. A weight is then dropped on a line striking a triggering mechanism which tightly closes each end of the tube at the same time. This captures the free flowing water to be sampled. All samples are placed in pre-labeled and prepared sample bottles.

Nitrates and phosphorus samples are collected for analysis in the Elkhart County Health Department Laboratory using a Hach portable spectrophotometer. Chain of custody procedures are required and implemented. These include labeling the bottles with the sample site number and all other information as recorded on the water sampling form. Items on the water sampling form include the sampling site identification, sampling date and time, sampling number, dry or wet event, and "ECHD" as the agency that collected the sample.

Total suspended solids collected on Tuesday are analyzed at the Elkhart Public Works and Utilities Laboratory. On Thursday, total suspended solids are collected and submitted for analysis at the Goshen Wastewater Treatment Plant Laboratory. Total suspended solids are not collected at the lake sites. All E. coli samples are submitted to the Elkhart Public Works and Utilities Laboratory which provides the bottles and a pre-printed label. This label is filled out with the site number, location, collection date, who collected the sample, who transported and relinquished the sample. The label is attached to the sample bottle. Upon arrival at the Elkhart Public Works and Utilities Laboratory, time is also added to the label. The label includes a space to acknowledge who received the sample. For the total suspended solids analyzed at the Elkhart Laboratory, a label corresponding with the E. coli sample number is attached to the bottle. The Elkhart County Health Department's water sampling form is signed by an Elkhart laboratory representative with the time of sample delivery and a copy is made and kept for their laboratory records. This procedure is implemented to verify chain of custody. For the total suspended solids submitted to the Goshen Laboratory, the samples are collected and placed in pre-labeled containers with the site number, location, date, and collection time. Upon delivery to the Goshen Laboratory, an Elkhart County Health Department representative places the total suspended solids samples into a refrigerated unit to ensure proper temperature requirements before analysis.

All samples collected are immediately placed in a cooler with chill packs as soon as they are obtained in the field in order to maintain proper temperature requirements during transportation per standard methods protocol.

PARAMETER DEFINITIONS AND THEIR IMPORTANCE

CHLORIDES are found in groundwater, streams, and lakes and may be of natural mineral origin or from human or animal sewage, industrial process wastewaters, agricultural fields and roadway deicing salts. It is recommended if very high levels (500 mg/l or more) are found, further investigation should take place to locate the source.

CONDUCTIVITY (SpC) is a measure of how easily electricity flows through water. It is strongly correlated with total dissolved solids. It is useful as a general measure of water quality. Each water body has a fairly constant range of conductivity that can be used for baseline readings. Significant changes in conductivity may be an indicator that a discharge or some other source of pollution has entered the water way. If this occurs, it is recommended that further investigation should take place to locate the source.

DISSOLVED OXYGEN (DO) is considered to be one of the most important parameters of water quality in streams, rivers, and lakes. All aquatic organisms need dissolved oxygen in the water to survive. Stream systems produce and consume oxygen. If more oxygen is consumed than produced, dissolved oxygen levels decline and some organisms move away, weaken, or die. Higher concentrations of dissolved oxygen equate to better water quality. Aquatic life is stressed at levels below 5.0 mg/l and levels below 2 mg/l will not support fish. Dissolved oxygen is very sensitive to temperature. The solubility of oxygen in water decreases as temperature increases. A waste discharge can have a dramatic effect on the oxygen balance of a water body by raising water temperature or introducing pollutants which remove the dissolved oxygen. According to 327 IAC 2-1-6 and the US EPA, the recommended target value is > 6 mg/l and not > 9 mg/l.

E. COLI is a species of fecal coliform bacteria that is specific to fecal matter from humans and other warm-blooded animals. E. coli indicates the possible presence of pathogenic bacteria, viruses, and protozoa that also live in the digestive systems of humans and animals. Their presence in a water body indicate pathogens might be present and that swimming/full body contact recreation can be a health risk. As required by the United States Environmental Protection Agency, total maximum daily load (TMDL) calculations have been established by the Indiana Pollution Control Board (327 IAC 2-1-6 Section 6(d)) for E. coli using membrane filter count and are the following numeric standards:

> "Concentrations shall not exceed 125 cfu/100 ml as a geoemetric mean based on not less than five samples equally spaced over a 30-day period nor exceed 235 cfu/100 ml in any one sample in a 30-day period."

NITRATES (N03) are one of the four forms of nitrogen in the nitrogen cycle. They are essential plant nutrients but in excess amounts they can cause significant water quality problems. Together with phosphorus they can cause increase in plant growth and changes in the types of plants and animals that live in surface water. In turn this affects dissolved oxygen and temperature. Excess nutrients can cause hypoxia which is a condition characterized by low levels of dissolved oxygen when the plants decay. The natural level of nitrates in surface water is typically low, less than 1 mg/l. Sources of nitrates include failing onsite septic systems, runoff from animal manure storage areas, fertilizer runoff from lawns and cropland, wastewater treatment plants and industrial discharges that contain corrosion inhibitors. The US EPA reference level is < 1.5 mg/l.

pH The pH scale measures the logarithmic concentration of hydrogen and hydroxide ions which make up water. Pure water, equal ion concentrations, is neutral with a pH of 7.0. Below 7.0 the water is acidic and above 7.0 the water is alkaline. pH affects many chemical and biological processes in water. The majority of the aquatic organisms survive and thrive at a range of 6.5-8.0. pH outside of this range reduces the diversity of the water way because it stresses the physiological systems of most organisms and can reduce reproduction. Low pH also allows toxic elements and compounds to become soluble and available for uptake by aquatic plants and animals. Some industrial discharges contain very high 12-14 pH or very low 1-3 pH. pH is a good monitoring parameter and significant fluctuations need to be investigated. According to 327 IAC 2-1-6, the target value is > 6 or < 9.

PHOSPHORUS Like nitrogen, phosphorus is an essential nutrient for plants and animals that make up the aquatic food chain. Phosphorus in waterways accelerates plant growth and algae blooms and with their decomposition result in low dissolved oxygen and death of some fish, invertebrates and other aquatic species. There are many natural and human sources of phosphorus. These include soil and rocks, wastewater treatment plants, runoff from fertilized lawns and cropland, failing onsite septic systems, runoff from animal manure storage areas, disturbed land areas and commercial cleaning preparations. Phosphorus is the limiting nutrient in many aquatic environments and very small inputs greatly affect photosynthetic productivity and can initiate a massive bloom of plants and algae in slow moving streams and ponds. These blooms are not desired and have a deleterious effect on the aquatic environments where phosphorus has been enriched. The IDEM 303(d) listing criteria is < 0.3 mg/l.

TEMPERATURE is a very important water quality parameter and influences all biological and chemical reactions. Temperature influences the dissolved oxygen content of the water, the metabolism of all aquatic organisms, the rate of photosynthesis, and the sensitivity of organisms to pollutants such as toxic wastes and parasites. All aquatic organisms have optimal temperatures for their survival. Many factors affect temperature including stream flow, sunlight, shade, water depth, turbidity, bottom color and composition, soil erosion, storm water runoff, and seasonal changes. Temperature is measured in degrees Celsius.

TOTAL SUSPENDED SOLIDS (TSS) are particulates in water and can include many organic and inorganic sources such as silt, decaying plant and animal matter, sewage and industrial wastes. They cause the water to be milky or muddy looking due to the light scattering from very small particles in the water. This is called turbidity. Suspended solids can destroy fish habitat because they can settle to the bottom and smother the eggs of fish and aquatic insects and suffocate newly hatched insect larvae. High levels of suspended solids can clog the gills of fish and reduce their growth rates and reduce dissolved oxygen. Also, pollutants and contaminants adhere to the suspended solids. Total suspended solids are measured in mg/l. There are no numeric standards for total suspended solids however they must meet narrative standards which state in part: "all waters at all times and places, including the mixing zone, shall meet the minimum conditions of being free from substances, materials, floating debris, oil, or scum attributable to municipal, industrial, agricultural, and other land use practices, or other discharges which are in amounts sufficient to injure, be acutely toxic to, or otherwise produce serious adverse physiological responses in humans, animals, aquatic life or plants."

NOTE: The above information was obtained from the United States Environmental Protection Agency (US EPA), the Indiana Department of Environmental Management (IDEM), The Center for Watershed Protection, and Purdue University Department of Agricultural and Biological Engineering.

SAMPLING RESULTS, CHARTS AND MISCELLANEOUS INFORMATION

The sampling data results are in Appendix 1.

Appendix 2 contains the charts for E. coli and total suspended solids.

Appendix 3 contains the water quality targets.

SUMMARY AND CONCLUSIONS

According to the United States Environmental Protection Agency, "a water body is considered impaired when a water quality standard is violated, whether through exceedance of a numeric or narrative criterion, impairment of a designated use or violation of anti-degradation policy." The results of the 2021 sampling season continue to indicate E. coli levels in excess of the total maximum daily load of 235 cfu/100 ml at many of the sample sites.

Additionally, sediment transport continues in many waterways depositing sediment and contributing to flow restrictions especially after wet weather events. Visible impairments to the structure of the waterways, the stability of the banks and the clarity of the water were also observed.

All water bodies are capable of assimilating a certain amount of pollution without adverse effects because of the dilution and self-purification capabilities of natural processes. The ability of a water body to mitigate for an organic pollutant, such as E. coli is dependent on many factors such as stream flow, depth, dissolved oxygen, temperature, available sunlight, and time. However, the high levels of E. coli indicate these pathogens are being infused at a rate greater than can be mitigated through natural processes resulting in these higher than acceptable numbers. Results such as these are indicators of illicit discharges entering the water bodies requiring investigation to determine their source and enforce compliance with environmental regulations prohibiting these discharges.

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Special recognition goes to the laboratory staff at the Elkhart Public Works and Utilities and the Goshen Wastewater Treatment Plant. Their assistance and expertise was instrumental to this effort and is very much appreciated.

APPENDIX
1

ROCK RUN CREEK CR 34

DATE	TIME	TEMP	DO	SPC	PH	CHLORIDES	NITRATES	PHOSPHORUS	TSS	E. COLI	WET
5/11/2021	8:45						6.62	0.609	11	770	N
5/18/2021	8:40						4.59	0.164	3	770	N
5/25/2021	8:40	17.3	6.11	734	7.89	49.90	4.56	0.197	5	517	N
6/1/2021	8:40	13.3	7.15	740	7.97	52.69	4.62	0.182	2	770	N
6/8/2021	9:00	18.4	5.93	736	7.93	47.23	4.43	0.296	2	687	Y
6/15/2021	8:40	16.1	6.86	743	7.96	43.22	4.58	0.419	3	1203	N
6/22/2021	8:30	13.9	7.05	711	7.97	44.38	9.18	0.721	11	2481	N
6/29/2021	8:40	19.7	4.01	587	7.61	30.15	5.85	1.17	5	1112	Y
7/6/2021	8:40	18.2	6.74	748	7.97	41.41	4.55	0.32	6	1300	N
7/13/2021	8:35	17.1	6.64	740	7.96	45.87	4.83	0.494	4	2420	N
7/20/2021	8:40	16.1	6.95	749	8.02	45.12	4.44	0.21	4	1300	N
7/27/2021	8:30	17.4	6.80	755	7.92	36.97	4.33	0.421	4	2723	N
8/3/2021	8:25	15.6	7.14	745	8.12	44.51	4.31	0.312	3	1300	N
8/10/2021	8:40	20.1	6.07	528	7.80	43.14	4.40	1.94	41	241960	Y
8/17/2021	8:25	16.7	7.05	754	8.04	51.01	4.01	0.44	5	1187	N
8/24/2021	8:45	18.4	6.65	748	8.06	52.51	4.76	0.478	3	1120	N
8/31/2021	8:35	16.8	6.76	745	8.09	54.49	4.12	0.188	3	1259	N
9/7/2021	8:25	15.4	7.14	736	8.20	49.55	5.52	0.062	NS	NS	N
9/14/2021	8:40	18.2	6.58	742	8.14	50.04	5.97	0.25	4	2933	N
9/21/2021	8:40	18.7	6.65	742	8.13	59.61	5.14	0.260	3	1314	N
9/28/2021	8:40	14.7	7.33	767	8.15	59.09	4.99	0.287	5	1935	N

PINE CREEK CR 18

DATE	TIME	TEMP	DO	SPC	PH	CHLORIDES	NITRATES	PHOSPHORUS	TSS	E. COLI	WET
5/11/2021	9:05						4.00	0.609	18	687	N
5/18/2021	9:10						3.58	0.24	5	326	N
5/25/2021	9:00	17.8	7.76	691	8.26	59.97	3.35	0.3	7	727	N
6/1/2021	9:00	13.4	8.30	689	8.90	70.88	3.42	0.31	6	816	N
6/8/2021	9:25	18.5	7.34	664	8.18	62.37	2.99	0.362	1785	5	Y
6/15/2021	9:05	16.1	7.63	682	8.29	58.65	2.98	0.339	14	1300	N
6/22/2021	8:55	14.2	7.41	627	8.17	54.95	5.93	0.396	16	6488	N
6/29/2021	9:10	20.9	5.93	497	7.84	37.56	3.68	0.816	23	4106	Y
7/6/20201	9:00	19.6	6.83	599	8.13	53.30	3.28	0.475	46	1046	N
7/13/2021	9:00	17.0	7.58	674	8.20	53.42	3.72	0.401	13	1553	N
7/20/2021	9:05	16.5	7.52	695	8.23	64.58	3.78	0.229	8	1414	N
7/27/2021	8:55	17.5	7.41	684	8.21	47.89	3.43	0.261	11	2419	N
8/3/2021	8:05	15.7	7.56	686	8.31	58.68	3.12	0.215	12	980	N
8/10/2021	9:00	21.4	6.38	678	8.01	20.55	1.73	1.5	240	12033	Y
8/17/2021	8:50	17.3	7.38	653	8.29	63.31	1.54	0.263	11	613	N
8/24/2021	9:10	18.7	7.47	675	8.30	67.49	3.26	0.769	10	1120	N
8/31/2021	9:00	17.2	7.58	683	8.35	68.01	2.87	0.205	10	3448	N
9/7/2021	9:25	15.6	7.42	682	8.45	68.96	3.54	0.231	NS	NS	N
9/14/2021	9:05	18.3	7.34	680	8.43	74.91	3.44	0.26	4	649	N
9/21/2021	9:10	18.6	7.29	684	8.36	84.21	3.25	0.262	5	546	N
9/28/2021	9:10	15.3	7.70	688	8.30	68.03	3.75	0.28	6	462	N

PINE CREEK WYLAND & ROSKE

DATE	TIME	TEMP	DO	SPC	PH	CHLORIDES	NITRATES	PHOSPHORUS	TSS	E. COLI	WET
5/11/2021	9:20						spilled sample in lab		8	866	N
5/18/2021	9:25						2.99	0.168	4	365	N
5/25/2021	9:20	17.5	7.30	697	8.17	63.16	2.86	0.222	4	687	N
6/1/2021	9:15	13.1	7.36	695	8.21	77.66	2.75	0.219	3	517	N
6/8/2021	9:35	17.6	5.89	675	8.07	65.63	2.33	0.209	3	1246	Y
6/15/2021	9:20	15.1	6.54	696	8.11	68.55	2.26	0.616	16	1414	N
6/22/2021	9:05	14.0	5.83	635	8.13	63.58	4.10	0.475	15	7701	N
6/29/2021	9:20	20.8	5.10	496	7.88	41.28	3.29	0.856	27	488	Y
7/6/2021	9:15	18.7	5.86	620	8.13	59.91	2.59	0.351	19	816	N
7/13/2021	9:15	16.6	6.66	681	8.05	65.92	3.06	0.261	14	1414	N
7/20/2021	9:15	16.1	7.10	690	8.14	78.68	2.94	0.164	14	1986	N
7/27/2021	9:05	17.0	6.11	689	8.24	52.25	2.76	0.184	7	1120	N
8/3/2021	9:00	15.1	6.52	691	8.26	70.83	2.54	0.176	8	866	N
8/10/2021	9:15	20.9	5.75	278	8.10	31.64	2.16	1.97	318	20980	Y
8/17/2021	9:00	16.8	6.31	665	8.23	70.62	2.01	0.198	14	345	N
8/24/2021	9:30	18.1	6.84	686	8.24	81.34	2.57	0.13	7	921	N
8/31/2021	9:15	16.7	6.80	630	8.21	79.84	2.10	0.252	6	520	N
9/7/2021	9:35	15.3	6.51	693	8.40	74.93	2.80	0.136	NS	NS	N
9/14/2021	9:20	17.8	6.45	691	8.42	78.85	2.69	0.154	3	2481	N
9/21/2021	9:20	18.1	6.75	690	8.21	91.58	2.57	0.158	3	663	N
9/28/2021	9:25	15.0	7.16	694	8.19	84.70	2.99	0.233	4	448	N

HEATON LAKE IDEAL BEACH

DATE	TIME	TEMP	DO	SPC	PH	CHLORIDES	NITRATES	PHOSPHORUS	TSS	E. COLI	WET
5/11/2021	9:35						0.180	0.136		9	N
5/18/2021	9:40						0.176	0.073		73	N
5/25/2021	9:45	24.9	8.48	349.9	8.34	18.48	0.275	0.146		73	N
6/1/2021	9:30	19.0	8.67	331.3	8.55	24.75	0.198	0.102		12	N
6/8/2021	9:50	25.2	8.51	222.5	8.84	23.27	0.155	0.156		35	Y
6/15/2021	9:35	24.3	8.00	255.4	9.29	18.59	0.165	0.136		44	N
6/22/2021	9:20	22.7	6.72	248.1	9.06	21.27	0.209	0.122		61	N
6/29/2021	9:40	26.5	7.45	247.7	9.08	18.11	0.181	0.087		613	Y
7/6/2021	9:30	27.2	6.78	250.0	8.90	19.62	0.299	0.156		0	N
7/13/2021	9:30	23.4	4.30	254.2	8.13	20	0.229	0.116		26	N
7/20/2021		Site not accessible									
7/27/2021	9:20	26.7	6.37	287.7	8.36	15.42	0.264	0.192		326	N
8/3/2021		Site not accessible									
8/10/2021	9:30	25.8	7.01	277.4	8.55	23.8	0.261	0.164		76000	Y
8/17/2021	9:10	Site not accessible									
8/24/2021	9:45	28.4	6.78	303.9	8.56	20.91	0.296	0.056		4884	N
8/31/2021	9:35	27.1	6.08	284.4	8.47	21.66	0.281	0.048		129	N
9/7/2021	9:45	24.0	6.37	336.9	8.42	26.12	0.281	0.075		NS	N
9/14/2021	9:40	24.2	7.34	325.7	8.64	27.89	0.314	0.132		1376	N
9/21/2021	9:40	23.2	6.21	312.7	8.45	29.42	0.205	0.079		5199	N
9/28/2021	10:05	19.5	6.98	325.7	8.50	34.53	0.317	0.130		146	N

HEATON LAKE 22880 LAKE SHORE DRIVE

DATE	TIME	TEMP	DO	SPC	PH	CHLORIDES	NITRATES	PHOSPHORUS	TSS	E. COLI	WET
5/11/2021	9:45						0.177	0.122		1	N
5/18/2021	9:50						0.180	0.089		4	N
5/25/2021	9:55	24.2	8.71	361	8.57	19.21	0.242	0.109		17	N
6/1/2021	9:40	18.2	8.80	349.5	8.48	25.02	0.193	0.101		11	N
6/8/2021	10:00	24.5	7.44	283.9	8.87	21.96	0.148	0.352		8	Y
6/15/2021	9:45	23.7	6.90	307.5	8.35	22.09	0.142	0.727		4	N
6/22/2021	9:30	21.7	6.24	266.3	9.01	21.69	0.161	0.11		8	N
6/29/2021	9:50	25.5	5.84	269	8.47	17.39	0.192	0.099		10	Y
7/6/2021	9:40	26.8	8.49	259.1	8.88	17.66	0.295	0.086		13	N
7/13/2021	9:40	23.2	7.49	366	7.47	22.18	0.247	0.165		1	N
7/20/2021	9:30	24.9	4.28	321.16	8.09	20.55	0.257	0.096		3	N
7/27/2021		site not accessible									
8/3/2021	9:30	24.5	4.46	340.4	8.06	28.61	0.214	0.101		3	N
8/10/2021	9:35	24.6	4.61	429.5	7.86	30.52	0.259	0.127		722	Y
8/17/2021	9:20	25.0	6.15	622.6	8.36	23.07	0.208	0.071		10	N
8/24/2021	9:55	27.7	4.25	330.7	8.25	21.03	0.307	0.031		2	N
8/31/2021	9:45	27.0	5.36	327.8	8.48	23.44	0.274	0.062		3	N
9/7/2021	9:55	23.6	5.76	348.1	8.33	20.19	0.343	0.071		NS	N
9/14/2021	9:50	24.0	5.66	352	8.51	25.05	0.297	0.076		3	N
9/21/2021	9:55	22.9	4.72	342.1	8.34	26.13	0.205	0.058		5	N
9/28/2021	10:15	19.5	6.70	347.5	8.24	24.43	0.386	0.182		1	N

SIMONTON LAKE 51093 BEACH DRIVE

DATE	TIME	TEMP	DO	SPC	PH	CHLORIDES	NITRATES	PHOSPHORUS	TSS	E. COLI	WET
5/11/2021	10:00						0.166	0.116		53	N
5/18/2021	10:10						0.496	0.088		11	N
5/25/2021	10:10	25.5	6.67	393.2	8.25	28.73	0.363	0.106		4	N
6/1/2021	9:55	18.6	8.15	376.4	8.41	33.72	0.41	0.098		10	N
6/8/2021	10:15	25.5	5.67	368.3	8.40	29.95	0.131	0.126		6	Y
6/15/2021	10:00	24.4	6.31	360.7	8.49	29.17	0.147	2.35		14	N
6/22/2021	9:40	21.5	6.61	339.1	8.66	35.30	0.136	0.151		225	N
6/29/2021	10:05	26.2	6.73	318.6	8.60	28.52	0.179	0.094		20	Y
7/6/2021	9:55	26.8	7.05	329.5	8.66	29.66	0.258	0.224		32	N
7/13/2021	9:50	22.8	6.64	334.2	8.67	29.71	0.282	0.294		73	N
7/20/2021	9:50	25.8	6.90	331.6	8.75	30.82	0.281	0.084		15	N
7/27/2021	9:30	4:48	6.87	342.5	8.65	28.11	0.298	0.11		54	N
8/3/2021	9:35	24.2	6.61	344.0	8.67	36.89	0.254	0.101		10	N
8/10/2021	9:50	25.4	5.39	323.1	8.61	32.72	0.196	0.11		980	Y
8/17/2021	9:30	24.9	6.65	329.6	8.68	38.02	0.199	0.076		26	N
8/24/2021	10:10	27.7	6.41	349.5	8.57	33.11	0.26	0.021		135	N
8/31/2021	10:00	26.6	6.02	353.1	8.58	34.60	0.184	0.025		23	N
9/7/2021	10:10	22.4	6.28	34.53	8.74	30.52	0.168	0.058		NS	N
9/14/2021	10:05	24.1	7.88	345.0	8.84	43.82	0.209	0.097		30	N
9/21/2021	10:15	23.0	6.41	352.6	8.60	40.53	0.11	0.066		83	N
9/28/2021	10:30	19.2	7.32	342.2	8.72	452.90	0.221	0.071		15	N

SIMONTON LAKE 51330 SR 19

DATE	TIME	TEMP	DO	SPC	PH	CHLORIDES	NITRATES	PHOSPHORUS	TSS	E. COLI	WET
5/11/2021	10:10						0.473	0.125		10	N
5/18/2021	10:25						0.673	0.076		30	N
5/25/2021	10:25	23.6	5.64	417.2	8.08	29.23	0.632	0.075		23	N
6/1/2021	10:10	18.6	6.90	410.7	8.19	33.92	0.601	0.08		9	N
6/8/2021	10:30	24.2	6.81	407.5	8.25	30.58	0.129	0.108		49	Y
6/15/2021	10:10	24.7	6.82	405.8	8.35	31.00	0.341	0.198		3	N
6/22/2021	9:50	22.6	6.78	391.3	8.40	35.56	0.292	0.084		34	N
6/29/2021	10:20	25.4	8.10	371.5	8.58	35.33	0.276	0.064		84	Y
7/6/2021	10:05	26.1	6.49	366.8	8.44	32.25	0.785	0.084		41	N
7/13/2021	10:05	23.3	6.07	373.9	8.42	36.14	0.340	0.081		248	N
7/20/2021	10:00	25.0	6.37	366.0	8.55	34.90	0.306	0.056		12	N
7/27/2021	9:45	26.3	5.13	364.9	8.41	29.70	0.273	0.057		13	N
8/3/2021	9:50	24.6	7.04	361.7	8.47	38.00	0.254	0.061		22	N
8/10/2021	10:00	25.5	6.43	346.5	8.42	35.33	0.282	0.055		331	Y
8/17/2021	9:45	24.7	6.55	346.5	8.54	40.22	0.279	0.008		308	N
8/24/2021	10:20	27.5	7.81	344.1	8.71	36.02	0.358	0.013		238	N
8/31/2021	10:15	26.2	6.59	346.2	8.63	39.28	0.281	0.005		42	N
9/7/2021	10:30	23.2	6.93	348.5	8.73	40.61	0.223	0.056		NS	N
9/14/2021	10:25	24.2	7.16	340.0	8.12	41.42	0.220	0.045		82	N
9/21/2021	10:30	22.9	6.01	354.5	8.59	40.77	0.135	0.036		101	N
9/28/2021	10:40	18.3	8.14	346.8	8.65	43.18	0.255	0.105		63	N

CHRISTIANA CREEK CR 4

DATE	TIME	TEMP	DO	SPC	PH	CHLORIDES	NITRATES	PHOSPHORUS	TSS	E. COLI	WET
5/11/2021	10:20						0.416	0.110	2	61	N
5/18/2021	10:35						1.64	0.103	3	101	N
5/25/2021	10:50	22.6	7.73	459.0	8.24	19.58	1.63	0.094	3	137	N
6/1/2021	10:20	17.0	7.99	452.7	8.28	22.32	1.54	0.102	4	133	N
6/8/2021	10:40	25.2	6.95	436.0	8.14	19.14	1.5	0.142	6	276	Y
6/15/2021	10:25	21.7	7.23	427.4	8.18	19.35	1.38	0.185	13	210	N
6/22/2021	10:00	19.5	7.47	404.4	8.25	22.24	0.893	0.099	6	41	N
6/29/2021	10:30	24.3	6.41	380.2	8.28	18.58	0.599	0.082	8	326	Y
7/6/2021	10:15	25.3	6.55	369.3	8.07	20.97	0.816	0.112	4	114	N
7/13/2021	10:15	22.2	7.07	397.6	8.10	20.21	1.11	0.200	4	214	N
7/20/2021	10:10	23.2	6.97	403.1	8.22	20.29	0.987	0.081	NS	179	N
7/27/2021	9:55	24.5	6.56	403.9	8.23	16.43	0.888	0.099	4	150	N
8/3/2021	10:00	22.0	6.88	408.2	8.28	21.25	0.814	0.097	3	120	N
8/10/2021	10:10	23.7	6.99	356.7	8.16	20.44	0.787	0.093	6	1414	Y
8/17/2021	9:55	23.5	7.05	396.6	8.33	24.13	0.687	0.055	5	102	N
8/24/2021	10:30	25.3	6.53	415.2	8.32	23.41	0.949	0.046	3	291	N
8/31/2021	10:25	24.3	6.0	407.3	8.39	22.75	0.787	0.041	4	156	N
9/7/2021	10:40	21.1	7.31	422.6	8.42	23.83	1.04	0.062	NS	NS	N
9/14/2021	10:35	22.1	7.14	430.0	8.41	26.78	0.945	0.872	2	156	N
9/21/2021	10:40	21.4	5.93	438.4	8.40	29.80	1.21	0.017	2	248	N
9/28/2021	10:55	18.1	7.44	433.3	8.32	33.17	0.98	0.051	4	210	N

BAUGO CREEK CR 3

DATE	TIME	TEMP	DO	SPC	PH	CHLORIDES	NITRATES	PHOSPHORUS	TSS	E. COLI	WET
5/11/2021	10:04						18.30	0.634	18	4106	N
5/18/2021	11:00						11.60	0.283	4	210	N
5/25/2021	11:20	21.2	7.06	708	8.14	64.50	6.84	0.474	3	142	N
6/1/2021	10:50	15.3	7.10	749	8.33	74.60	8.99	0.504	1	291	N
6/8/2021	11:05	21.0	6.75	699	8.08	61.05	12.50	0.941	11	24196	Y
6/15/2021	10:55	19.8	5.83	676	8.26	65.40	5.12	0.792	3	308	N
6/22/2021	10:25	16.7	6.34	675	8.17	57.92	18.90	0.908	18	24196	N
6/29/2021	11:00	21.8	5.99	491	7.75	36.59	14.90	1.36	65	2359	Y
7/6/2021	10:40	22.9	6.38	622	8.16	58.83	7.58	0.89	5	461	N
7/13/2021	10:45	19.9	6.99	736	8.29	67.54	6.81	0.929	2	387	N
7/20/2021	10:40	20.5	7.85	676	8.31	71.57	4.94	0.603		579	N
7/27/2021	10:15	21.6	7.11	681	8.22	56.30	1.63	0.575	4	291	N
8/3/2021	10:30	18.4	5.73	711	8.21	84.68	1.98	0.612	2	260	N
8/10/2021	10:35	22.0	5.80	391	8.04	54.63	1.35	1.2	63	6488	Y
8/17/2021	10:00	19.8	5.88	654	0.24	72.92	1.42	1.17	7	548	N
8/24/2021	11:00	22.4	6.61	706	8.27	86.62	1.35	1.15	8	261	N
8/31/2021	10:50	20.8	5.59	696	8.32	94.55	1.21	1.59	4	178	N
9/7/2021	11:05	23.2	7.01	402	8.38	34.62	1.24	0.971	NS	NS	N
9/14/2021	11:05	20.4	6.93	729	8.56	97.25	1.17	0.124	2	150	N
9/21/2021	11:05	19.5	5.78	721	8.30	102.80	1.05	0.95	2	1635	N
9/28/2021	11:20	16.4	5.93	626	8.40	88.13	1.42	0.998	4	146	N

YELLOW CREEK CONCORD HIGH SCHOOL

DATE	TIME	TEMP	DO	SPC	PH	CHLORIDES	NITRATES	PHOSPHORUS	TSS	E. COLI	WET
5/13/2021	8:30						11.0	0.327	4.8	1047	N
5/20/2021	8:30	16.5	5.88	777	7.94	67.02	5.34	0.338	3.17	727	N
5/27/2021	8:40	16.2	5.42	798	7.92	82.43	temp not maintained		5.33	2420	N
6/3/2021	8:55	15.3	6.72	792	8.02	77.72	6.45	0.438	6.75	2755	N
6/10/2021	8:30	18.7	5.58	724	7.71	63.57	11.5	0.087	26.5	11199	N
6/17/2021	8:40	16.1	5.80	789	8.04	67.40	3.26	0.52	7.5	816	N
6/24/2021	8:25	16.3	6.68	786	8.07	67.72	11	0.563	12.22	2755	N
7/1/2021	8:40	20.9	5.21	577	7.62	52.75	8.7	1.58	25	579	Y
7/8/2021	8:30	20.1	5.93	684	7.80	69.84	6.23	0.985		5794	Y
7/15/2021	8:25	19.6	6.50	759	7.99	71.51	7.1	0.989	18	4106	N
7/22/2021	8:25	17.1	6.50	782	8.02	69.99	2.62	0.351	6.3	1086	N
7/29/2021	8:25	19.6	6.22	738	7.98	67.64	1.67	0.447	13	3654	Y
8/5/2021	8:40	17.0	6.33	784	8.03	65.35	1.41	0.37	15.3	921	N
8/12/2021	8:40	21.2	6.41	618	7.96	58.69	3.14	1.12	34.5	6131	Y
8/19/2021	8:25	18.7	6.45	777	8.04	74.18	1.76	0.421	9.6	1120	N
8/26/2021	8:35	20.4	5.66	728	7.99	78.72	1.38	0.559	10	NS	Y
9/2/2021	8:25	16.3	6.25	779	8.05	85.23	1.32	0.348	6.67	548	N
9/9/2021	8:20	15.8	6.37	780	8.06	173.31	1.27	0.392	12.8	435	N
9/16/2021	8:30	15.3	6.42	779	8.14	171.49	1.32	0.343	6.5	365	N
9/23/2021	8:40	13.0	6.85	737	8.06	103.54	2.190	0.811	10.5	17329	Y
9/30/2021	8:35	14.1	6.14	782	7.96	80.83	1.87	0.412	10.7	NS	N

YELLOW CREEK CR 138

DATE	TIME	TEMP	DO	SPC	PH	CHLORIDES	NITRATES	PHOSPHORUS	TSS	E. COLI	WET
5/13/2021	8:55						19.2	0.422	2.8	980	N
5/20/2021	8:55	15.5	4.87	921	7.76	98.83	16.7	0.412	1	921	N
5/27/2021	9:05	15.1	4.31	965	7.79	119.8	temp not maintained		2.57	76000	N
6/3/2021	9:20	15.1	5.64	956	7.88	96.9	16.6	0.634	14	4165	N
6/10/2021	9:00	19.2	4.11	961	7.90	97.58	14.9	0.598	2	3448	N
6/17/2021	9:10	15.6	5.35	1020	8.30	130.49	10.3	1.41	3.33	1733	N
6/24/2021	8:50	16.5	6.15	1075	7.96	132.83	19.9	0.763	5.13	2489	N
7/1/2021	9:05	21.6	4.37	635	7.42	62.95	14	1.61	17.7	1203	Y
7/8/2021	9:00	21.7	4.73	755	7.72	77.53	12	1.29	26.3	76000	Y
7/15/2021	8:50	20.9	5.9	902	7.86	105.95	12.4	1.27	7.75	2420	N
7/22/2021	8:45	18.4	5.1	917	8.08	104.15	8.98	1.2	8.3	2247	N
7/29/2021	8:55	21.4	4.68	820	7.88	121.86	5.5	1.67	9.5	76000	Y
8/5/2021	9:00	18.2	6.08	965	8.12	113.4	6.73	1.26	66.5	1935	N
8/12/2021	9:00	21.5	5.4	551	7.74	60.9	6.67	3.85	174	120980	Y
8/19/2021	8:50	20.5	4.22	1069	8.11	156.64	6.07	1.39	12.3	1986	N
8/26/2021	9:00	22.1	3.84	941	8.13	152.96	2.74	1.71	24	NS	Y
9/2/2021	8:45	17.0	4.22	1232	8.30	246.71	4.02	2	7.2	24196	N
9/9/2021	road closed by highway department, site not accessible										
9/16/2021	8:50	16.2	3.97	1230	8.22	147.76	3.98	2.44	133	411	N
9/23/2021	9:00	12.9	5.86	778	8.10	138.49	2.23	3.13	33.5	241960	Y
9/30/2021	9:00	15.0	2.80	1262	8.06	262.29	2.010	2.12	26	NS	N

WEAVER DITCH CR 13

DATE	TIME	TEMP	DO	SPC	PH	CHLORIDES	NITRATES	PHOSPHORUS	TSS	E. COLI	WET
5/13/2021	9:10						3.23	8.52	59	1299700	N
5/20/2021	9:20	11.6	2.75	1434	7.48	245.43	0.962	7.56	57	1732800	N
5/27/2021	9:25	13.3	2.90	1316	7.73	267.71	temp not maintained		866	651000	N
6/3/2021	9:35	14.1	3.10	238.9	7.31	469.12	1.01	11.2	283.3	1203300	N
6/10/2021	9:15		not enough water								
6/17/2021			not enough water								
6/24/2021	9:15	16.2	4.22	2155	7.61	412.54	4.08	TNTC	806.7	2406600	N
7/1/2021	9:20	18.7	2.84	1027	7.37	154.65	6.29	5.91	17.5	248900	Y
7/8/2021	9:20	19.6	2.70	1165	7.25	216.29	2.97	11.9	23	1299700	Y
7/15/2021	9:15	18.6	2.63	1197	7.56	236.96	4.12	6.12	432	920800	N
7/22/2021	9:00	17.8	2.53	1538	7.78	295.45	TNTC	TNTC	160	648800	N
7/29/2021	9:10		not enough water								
8/5/2021			not enough water								
8/12/2021	9:20	21.4	3.90	1185	7.15	265.46	TNTC	TNTC	610	3465800	Y
8/19/2021	9:05		site not accessible								
8/26/2021			site not accessible								
9/2/2021			site not accessible								
9/9/2021			site not accessible								
9/16/2021			site not accessible								
9/23/2021			site not accessible								
9/30/2021			site not accessible								

BERLIN COURT DITCH CR 15

DATE	TIME	TEMP	DO	SPC	PH	CHLORIDES	NITRATES	PHOSPHORUS	TSS	E. COLI	WET
5/13/2021	9:35						13.5	0.36	4.25	461	N
5/20/2021	9:45	17.1	7.20	875	7.78	113.76	10.4	0.302	0.9	291	N
5/27/2021	9:45	16.2	9.55	735	8.07	117.34	temp not maintained		0.88	411	N
6/3/2021	10:05	17.1	7.55	849	8.18	120.2	9.01	0.428	2.13	122	N
6/10/2021	9:40	21.5	5.43	765	7.63	92.67	11.4	0.512	2.25	249	N
6/17/2021	9:55	18.2	5.96	956	7.92	159.67	11.5	0.464	1.25	345	N
6/24/2021	9:40	17.3	6.08	811	7.96	112.77	10.5	0.508	1.13	2420	N
7/1/2021	9:40	21.5	5.12	502	7.41	57.6	8.87	1.17	17.7	649	Y
7/8/2021	9:45	21.6	4.62	338	7.57	45.12	5.04	1.15	33	76000	Y
7/15/2021	9:45	21.1	6.34	719	8.76	89.18	6.87	1.01	22.75	1203	N
7/22/2021	9:25	19.0	6.32	899	7.76	117.86	11.4	0.867	4	411	N
7/29/2021	9:30	23.0	5.71	856	7.94	121.04	12.6	0.607	8.75	2419	Y
8/5/2021	9:35	19.8	6.27	904	8.01	147.58	10.5	0.421	1.88	173	N
8/12/2021	9:45	23.0	5.90	295	8.01	45.34	2.39	1.65	2.55	86645	Y
8/19/2021	9:25	21.8	4.38	988	7.96	165.99	9.34	0.619	8.2	308	N
8/26/2021	9:30	23.3	4.01	543	8.01	105.89	4.61	0.866	4.25	NS	Y
9/2/2021	9:10	17.4	4.52	952	8.18	180.61	11.9	0.602	1.5	156	N
9/9/2021	9:10	17.0	2.57	906	8.04	148.55	7.49	0.474	2.25	131	N
9/16/2021	9:20	15.8	3.54	1020	8.11	151.11	8.12	0.442	3.25	70	N
9/23/2021	9:25	13.8	5.70	486	8.08	80.05	3.01	1.1	14.17	120980	Y
9/30/2021	9:30	14.1	4.81	1013	7.92	177.75	2.42	0.847	1.5	NS	N

TURKEY CREEK CR 50

DATE	TIME	TEMP	DO	SPC	PH	CHLORIDES	NITRATES	PHOSPHORUS	TSS	E. COLI	WET
5/13/2021	9:55						7.36	0.204	15.75	548	N
5/20/2021	10:10	16.9	6.57	640	7.94	41.83	2.76	0.133	4.14	308	N
5/27/2021	10:10	17.1	5.37	622	8.01	54.74	temp not maintained		7.86	649	N
6/3/2021	10:25	15.8	5.79	735	8.08	54.62	3.59	0.134	5	146	N
6/10/2021	10:00	20.9	5.71	624	7.89	50.77	6.43	0.149	14.5	1986	N
6/17/2021	10:20	18.1	6.84	719	8.08	54.54	2.37	0.177	6.75	345	N
6/24/2021	10:00	17.9	6.13	623	8.05	47.20	4.33	0.179	7.5	866	N
7/1/2021	10:00	20.9	6.05	552	7.55	41.92	8.88	0.732	21	687	Y
7/8/2021	10:05	21.7	4.99	424	7.72	39.83	4.84	0.776	52.5	17329	Y
7/15/2021	10:05	21.1	6.61	620	7.95	50.68	3.98	0.812	13	461	N
7/22/2021	9:40	19.7	5.79	620	8.11	53.50	2.44	0.312	10.75	435	N
7/29/2021	9:45	21.7	5.41	699	8.08	50.49	2.37	0.127	5.13	1120	Y
8/5/2021	9:50	19.4	6.65	747	8.12	54.96	2.46	0.133	2.33	365	N
8/12/2021	10:00	22.5	4.99	544	8.05	52.99	1.95	0.382	31.5	4940	Y
8/19/2021	9:50	22.4	6.38	589	8.11	53.29	1.67	0.143	4.8	345	N
8/26/2021	9:40	23.2	6.01	715	8.13	74.36	2.97	7.97	4	NS	Y
9/2/2021	9:30	18.4	6.02	730	8.28	73.26	2.09	0.152	3.38	108	N
9/9/2021	9:30	18.0	6.27	745	8.30	175.09	2.64	0.211	4.25	387	N
9/16/2021	9:40	17.2	6.80	784	8.26	173.61	2.12	0.151	5.5	387	N
9/23/2021	9:40	13.7	6.78	593	8.13	77.06	1.71	0.407	6.5	17329	Y
9/30/2021	9:50	16.0	6.54	724	8.23	63.52	1.01	0.512	2.13	NS	N

TURKEY CREEK CR 46

DATE	TIME	TEMP	DO	SPC	PH	CHLORIDES	NITRATES	PHOSPHORUS	TSS	E. COLI	WET
5/13/2021	10:15						8.07	0.242	14.5	308	N
5/20/2021	10:40	17.1	7.13	645	7.97	41.7	3.02	0.151	10.3	166	N
5/27/2021	10:35	17.5	6.00	639	8.00	58.67	temp not maintained		8.33	687	N
6/3/2021	11:00	16.0	5.65	736	8.14	55.22	4.11	0.169	5.17	179	N
6/10/2021	10:25	21.3	6.14	637	7.94	52.71	6.01	0.142	21.25	2420	N
6/17/2021	10:50	18.4	6.75	717	8.14	53.33	2.52	0.231	11.17	276	N
6/24/2021	10:15	18.0	4.90	590	8.19	42.79	4.56	0.228	6.13	1120	N
7/1/2021	10:20	21.0	3.97	554	7.64	43.14	9.36	0.784	21.5	770	Y
7/8/2021	10:30	21.5	5.54	445	7.73	38.65	3.6	1	51.5	76000	Y
7/15/2021	10:35	21.2	6.72	688	8.02	49.28	5.12	0.987	12	488	N
7/22/2021		Bridge closed									
7/29/2021	10:00	21.7	4.79	747	7.99	46.42	2.43	0.171	0.67	1414	Y
8/5/2021	10:15	18.9	6.12	737	8.12	58.66	2.57	0.135	1.75	387	N
8/12/2021	10:25	22.4	5.47	539	8.12	49.67	2.01	0.308	14.5	49020	Y
8/19/2021	10:25	22.4	6.48	598	8.14	52.69	1.78	0.152	5.2	387	N
8/26/2021	10:10	22.2	3.31	683	8.10	74.53	2.75	0.766	16.25	NS	Y
9/2/2021	10:00	17.7	6.84	708	8.25	58.46	1.76	0.188	3.63	308	N
9/9/2021	10:10	17.6	6.73	744	8.29	174.32	2.63	0.177	4.5	219	N
9/16/2021	10:10	17.0	6.78	830	8.29	172.12	2.41	0.146	3	179	N
9/23/2021	10:05	13.9	5.97	608	8.24	89.84	2.08	0.564	8.14	17240	Y
9/30/2021	10:20	15.8	6.74	727	8.23	78.92	2.14	0.612	1.88	NS	N

DAUSMAN DITCH CR 19

DATE	TIME	TEMP	DO	SPC	PH	CHLORIDES	NITRATES	PHOSPHORUS	TSS	E. COLI	WET
5/13/2021	10:05						26.3	0.438	8.2	727	N
5/20/2021	10:25	17.0	8.95	825	7.33	70.69	16.3	0.457	6.5	816	N
5/27/2021	10:20	15.9	8.23	820	7.82	79.52	temp not maintained		3.17	76000	N
6/3/2021	10:35	16.3	8.01	817	8.07	83.02	18	0.563	3.5	980	N
6/10/2021	10:10	19.6	6.91	828	7.87	81.55	17.4	0.592	6.13	1553	N
6/17/2021	10:30	15.4	6.79	776	7.84	66.55	6.27	0.517	9.17	770	N
6/24/2021	10:30	16.9	7.84	846	7.95	77.29	13.7	0.704	3.88	1780	N
7/1/2021	10:10	19.8	6.88	773	7.54	67.22	22	1.34	16	1986	Y
7/8/2021	10:20	19.9	5.80	726	7.53	62.12	18.3	2.09	32.5	76000	Y
7/15/2021	10:20	20.0	6.27	887	7.87	77.65	15.2	1.81	7.83	3446	N
7/22/2021	9:50	17.4	7.12	841	7.88	77.53	8.61	0.453	9.5	2420	N
7/29/2021	10:25	18.9	6.22	792	7.81	61.8	3.87	0.905	23	36350	Y
8/5/2021	10:00	15.1	6.38	817	7.74	68.89	4.74	0.832	17.8	1300	N
8/12/2021	10:10	20.4	4.50	824	7.84	94.46	2.84	3.7	91.3	60165	Y
8/19/2021	10:05	16.4	5.55	754	7.73	54.87	4.68	0.751	7	299	N
8/26/2021	9:55	21.6	4.29	451	7.77	73.29	4.07	5.39	44.5	NS	Y
9/2/2021	9:45	14.0	5.94	752	7.86	62.8	4.69	1.28	90	261	N
9/9/2021	9:45	13.5	4.82	727	7.85	181.5	4.77	0.337	7.25	1414	N
9/16/2021	9:55	13.1	4.84	711	7.76	184.49	3.98	0.531	7.5	980	N
9/23/2021	9:55	12.8	4.68	835	7.84	143.99	4.49	5.49	13.5	120980	Y
9/30/2021	10:05	13.0	5.53	819	7.83	81.4	3.54	0.612	15.5	NS	N

SWOVELAND DITCH CR 19

DATE	TIME	TEMP	DO	SPC	PH	CHLORIDES	NITRATES	PHOSPHORUS	TSS	E. COLI	WET
5/13/2021	10:25						23.4	0.631	4.3	1553	N
5/20/2021	10:50	16.7	6.21	829	7.97	65.98	19.8	0.734	2.5	1986	N
5/27/2021	11:25	16.9	5.66	1283	8.00	106.97	temp not maintained		3.83	76000	N
6/3/2021	11:30	17.5	7.91	855	8.00	77.71	22.1	0.951	3.25	1553	N
6/10/2021	10:40	20.7	4.92	911	7.73	76.72	21.4	0.969	2.25	1733	N
6/17/2021	11:30	17.5	6.61	914	8.04	97.5	18.3	1.31	15.7	1733	N
6/24/2021	10:45	18.0	6.84	857	8.05	74.44	18.2	1.25	4.25	1314	N
7/1/2021	10:30	20.0	7.61	760	7.61	60.466	22.3	0.997	10.3	1046	Y
7/8/2021	11:05	20.1	6.11	728	7.66	61.85	17	1.15	9.2	19863	Y
7/15/2021	11:10	21.1	5.24	947	7.89	76.34	19.1	0.999	3	2934	N
7/22/2021	10:25	18.6	4.72	843	7.95	79.09	14	0.706	11	1210	N
7/29/2021	10:10	21.4	4.73	756	7.59	80.49	7.74	0.724	21	5475	Y
8/5/2021	10:25	18.8	3.94	914	7.90	123.84	7.43	0.854	28	1733	N
8/12/2021	10:50	22.3	5.13	531	7.97	72.92	5.13	3.35	94	60165	Y
8/19/2021	10:35	21.2	3.08	847	7.91	102.58	5.92	1.16	20.5	2247	N
8/26/2021	10:20	23.0	4.25	1033	8.08	212.98	0.589	1.97	6.4	NS	Y
9/2/2021	10:30	18.4	4.97	792	8.08	102.9	0.665	1.44	27.5	1664	N
9/9/2021	10:00	17.4	4.22	895	8.04	160.73	0.384	0.738	21	6131	N
9/16/2021	10:20	17.6	4.07	842	7.98	165.98	0.398	0.914	33	121	N
9/23/2021	10:15	12.7	6.28	862	8.14	163.84	3.7	0.269	9.75	120980	Y
9/30/2021	11:00	14.3	4.92	982	8.10	140.29	0.401	0.312	17	NS	N

ELKHART RIVER BAINTERTOWN

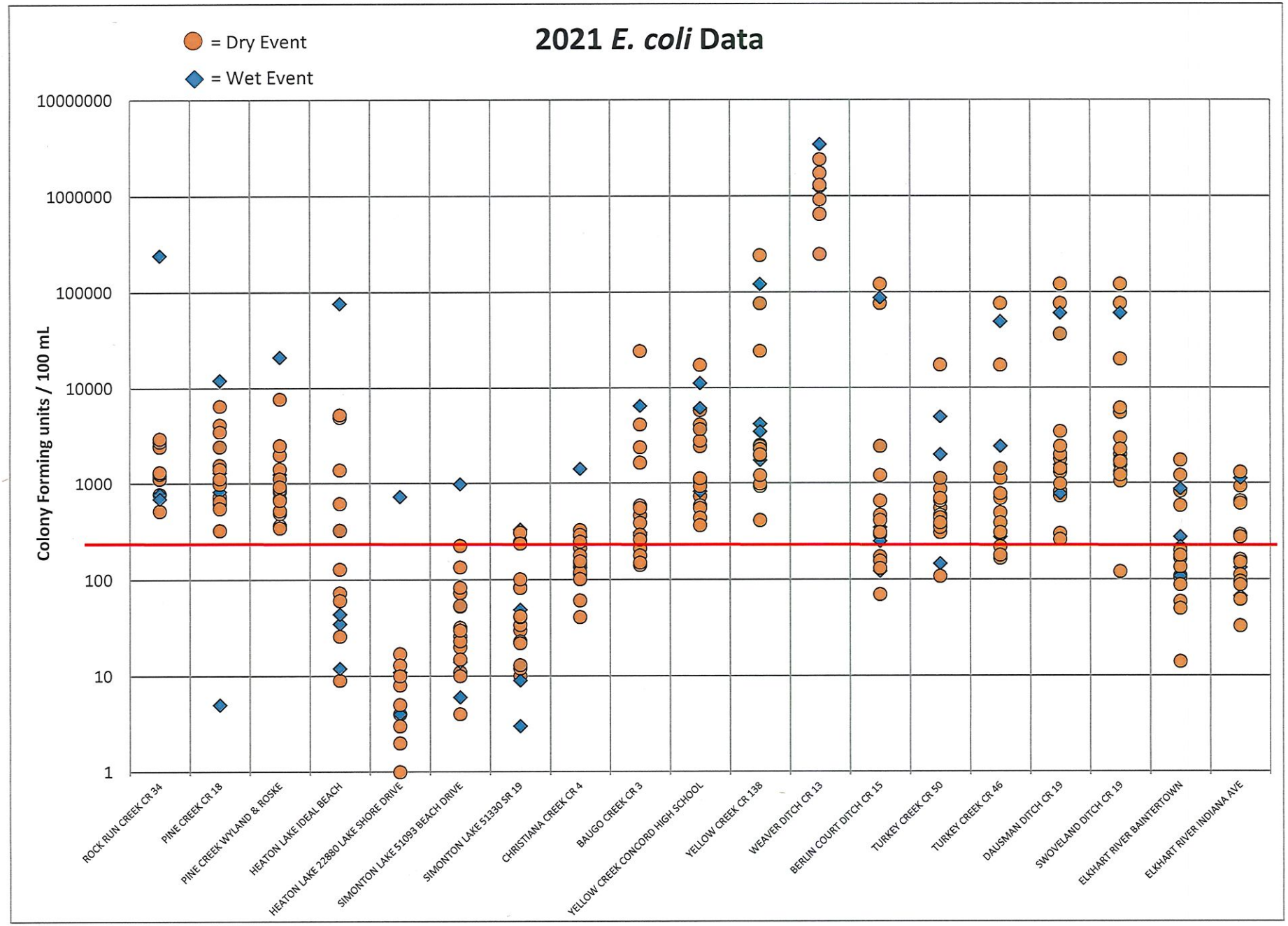
DATE	TIME	TEMP	DO	SPC	PH	CHLORIDES	NITRATES	PHOSPHORUS	TSS	E. COLI	WET
5/13/2021	10:40						2.84	0.189	6.5	104	N
5/20/2021	11:15	19.9	2.29	589	7.91	40.7	1.21	0.218	1.5	109	N
5/27/2021	11:00	19.5	4.1	597	7.86	49.46	temp not maintained		1.8	59	N
6/3/2021	11:10	18.1	3.36	607	7.89	42.2	1.28	0.334	3.6	108	N
6/10/2021	10:55	23.2	2.69	607	7.97	41.58	1.07	0.299	9.67	276	N
6/17/2021	11:10	20.8	2.90	623	7.96	40.4	1.44	0.276	4.8	219	N
6/24/2021	10:55	18.7	3.91	627	8.14	42.62	4.1	0.25	3.25	166	N
7/1/2021	10:40	22.1	6.31	512	7.97	42.56	3.45	0.676	7.5	1733	Y
7/8/2021	10:50	23.0	3.63	558	7.95	44.5	1.84	0.318	4.75	579	Y
7/15/2021	10:50	22.5	3.82	569	7.93	42.02	1.54	0.412	7	201	N
7/22/2021	10:30	21.5	5.31	563	8.15	48.8	1.45	0.384	4.8	135	N
7/29/2021	10:40	24.5	3.72	561	8.01	38.26	1.29	0.27	4.5	816	Y
8/5/2021	10:40	21.3	5.43	585	8.07	43.73	1.3	0.183	2.83	178	N
8/12/2021	10:35	23.6	3.30	547	8.11	41.94	1.68	0.249	6.17	866	Y
8/19/2021	10:45	22.7	4.31	542	8.16	45.27	1.43	0.222	10.6	88	N
8/26/2021	10:35	24.9	3.35	572	8.11	54.47	1.3	14.1	12	NS	Y
9/2/2021	10:10	20.4	3.13	569	8.08	56.6	1.47	0.956	11.8	1203	N
9/9/2021	10:30	19.1	2.84	589	8.04	175.7	1.1	0.176	25	50	N
9/16/2021	10:40	18.4	1.34	587	7.91	59.13	1.01	0.217	53	14	N
9/23/2021	10:30	14.4	5.57	489	8.18	62.63	1.09	5.05	164	1733	Y
9/30/2021	10:35	16.3	3.24	616	8.00	56.7	1.02	0.343	4.13	NS	N

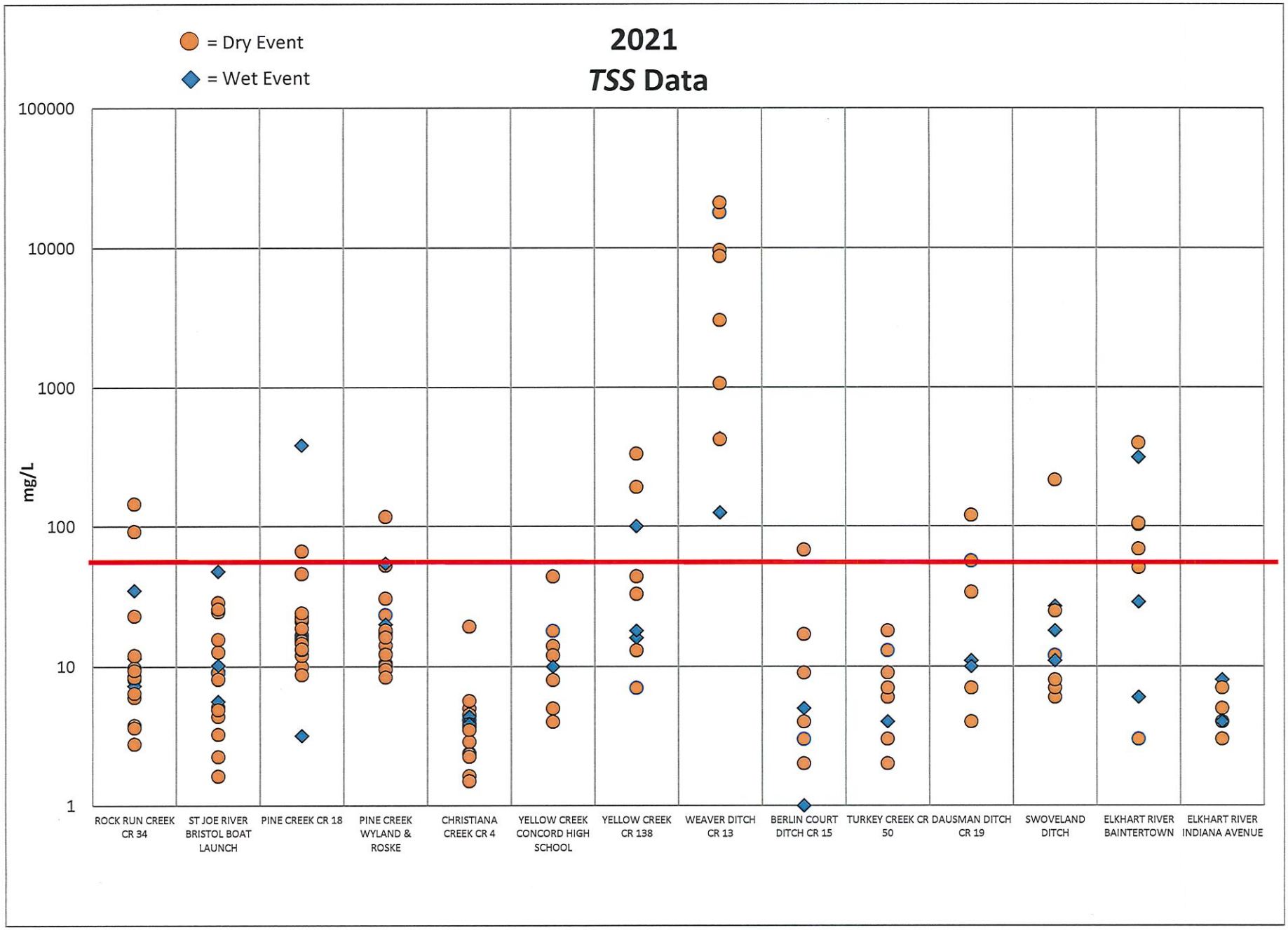
ELKHART RIVER INDIANA AVE (GOSHEN)

DATE	TIME	TEMP	DO	SPC	PH	CHLORIDES	NITRATES	PHOSPHORUS	TSS	E.COLI	WET
5/13/2021	11:00						5.72	0.216	5.5	161	N
5/20/2021	11:40	19.3	9.06	611	8.18	40.72	1.73	0.173	5	33	N
5/27/2021	12:00	20.9	7.56	629	8.13	50.3	temp not maintained		7	93	N
6/3/2021	11:50	18.7	8.38	618	8.22	49.77	1.93	0.237	8.8	67	N
6/10/2021	11:20	23.8	7.46	629	8.05	56.83	1.67	0.301	4.83	133	N
6/17/2021	11:45	21.6	6.69	648	8.24	52.31	1.86	0.302	6	93	N
6/24/2021	11:25	19.1	7.62	622	8.17	50.77	4.94	0.278	6.83	291	N
7/1/2021	11:10	22.2	6.37	556	7.92	54.14	6.68	0.596	10	921	Y
7/8/2021	11:30	23.1	6.91	580	8.06	53.21	2.01	0.295	7.5	649	Y
7/15/2021	11:35	22.4	7.58	585	8.13	54.71	2.01	0.312	9.75	276	N
7/22/2021	10:55	22.1	7.26	599	8.24	54.53	1.83	0.268	6.25	112	N
7/29/2021	11:20	24.7	7.94	602	8.24	50.97	1.51	0.236	3.5	649	Y
8/5/2021	11:00	21.4	7.87	620	8.27	55.85	1.31	0.187	2.17	96	N
8/12/2021	11:05	23.7	6.36	559	8.22	48.28	1.70	0.262	6	1120	Y
8/19/2021	11:15	23.1	7.45	578	8.28	56.44	1.53	0.224	4.3	88	N
8/26/2021	11:15	25.4	7.38	606	8.22	66.55	1.43	0.284	4.7	NS	Y
9/2/2021	10:55	20.5	6.63	624	8.22	74.34	1.21	0.258	8.6	613	N
9/9/2021	10:50	19.3	6.99	653	8.28	178.77	1.71	0.223	6.3	62	N
9/16/2021	11:05	19.2	7.08	672	8.28	177.25	1.54	0.210	4	152	N
9/23/2021	10:50	14.9	7.55	633	8.27	72.59	1.55	0.375	9.8	1300	Y
9/30/2021	11:20	17.0	7.49	638	8.28	65.11	1.45	0.302	10.83	NS	N

APPENDIX

2


2021 E. coli Data
= Dry Event
= Wet Event
Colony Forming units / 100 mL
10000000
1000000
100000
10000
1000
100
10
1
ROCK RUN CREEK CR 34
PINE CREEK CR 18
PINE CREEK WYLAND & ROSKE
HEATON LAKE IDEAL BEACH
HEATON LAKE 22880 LAKE SHORE DRIVE
SIMONTON LAKE 51093 BEACH DRIVE
SIMONTON LAKE 51330 SR 19
CHRISTIANA CREEK CR 4
BAUGO CREEK CR 3
YELLOW CREEK CONCORD HIGH SCHOOL
YELLOW CREEK CR 138
WEAVER DITCH CR 13
BERLIN COURT DITCH CR 15
TURKEY CREEK CR 50
TURKEY CREEK CR 46
DAUSMAN DITCH CR 19
SWOVELAND DITCH CR 19
ELKHART RIVER BAINTERTOWN
ELKHART RIVER INDIANA AVE


= Dry Event
= Wet Event
2021
TSS Data
100000
10000
1000
100
10
1
mg/L
ROCK RUN CREEK CR 34
ST JOE RIVER BRISTOL BOAT LAUNCH
PINE CREEK CR 18
PINE CREEK WYLAND & ROSKE
CHRISTIANA CREEK CR 4
YELLOW CREEK CONCORD HIGH SCHOOL
YELLOW CREEK CR 138
WEAVER DITCH CR 13
BERLIN COURT DITCH CR 15
TURKEY CREEK CR 50
DAUSMAN DITCH CR 19
SWOVELAND DITCH
ELKHART RIVER BAINTERTOWN
ELKHART RIVER INDIANA AVENUE

APPENDIX
3

Water Quality Targets

Parameter	Target	Source
Dissolved Oxygen	> 6 mg/L and not > 9 mg/L	327 IAC 2-1-6/US EPA recommendation
Temperature	40-85 degrees F (4.4 – 29.4 C)	MI – R.323.1075
Escherichia coli	< 235 CFU/100 ml per single sample and < 125 CFU/100 ml per the geometric mean of 5 equally spaced samples over a 30 day period	327 IAC 2-1.5-8
Turbidity	< 10.4 NTU	US EPA recommendation (2000)
Total Dissolved Solids	< 750 mg/L	MI – R.323.1051 / 327 IAC 2-1-6
Total Suspended Solids	< 25 mg/L	US EPA recommendation
Total Phosphorus	< 0.3 mg/L	IDEM 303d listing criteria
Nitrate	< 1.5 mg/L	US EPA reference level (2000)
Nitrate-Nitrite	< 1.5 mg/L	Dodds et al. (1998)
TKN	<0.076 mg/L	Dodds et al. (1998)
Biological Oxygen Demand	< 50%	Hoosier Riverwatch Protocol
pH	> 6 or < 9	327 IAC 2-1-6
macroinvertebrate Index of Biotic Integrity (mIBI)	>23 points / >36 points	Hoosier Riverwatch Protocol / IDEM (2008)
Qualitative Habitat Evaluation Index (QHEI)	> 51 pts	IDEM (2008)
Index of Biotic Integrity (IBI) (fish)	≥ 36 points	IDEM (2006)