

2025
WATER SAMPLING
REPORT
FOR SELECTED
MS4 SITES

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ENVIRONMENTAL DIVISION

IN-STREAM SAMPLING PROTOCOLS FOR MS4 SITES

Beginning May 20th and ending September 11th, the Environmental Health Division conducted surface water testing on a weekly basis throughout the county on creeks, ditches, lakes, the Elkhart River and the Little Elkhart River. The sampling provides data to help prioritize sites with 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 stormwater representatives from the MS4 Partnership which includes 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 to identify any trends. The following is a list of the sites from the 2025 sampling season:

Baugo Creek: CR 3
Rock Run Creek: CR 34
Yellow Creek: CR 32 and CR 138
Pine Creek: CR 27 and CR 117
Sheep Creek: CR 19
Christiana Creek: CR 4
Weaver Ditch: CR 13
Menges Ditch: CR 19
Sheep Creek: CR 19
Harverstick-Darkwood Ditch: CR 7
Wisler Ditch: CR 40
Heaton Lake: Ideal Beach and 22880 Lake Shore Drive
Simonton Lake: 51093 Beach Drive and 51330 SR 19
Elkhart River: Indiana Avenue, Goshen
Little Elkhart River: Warren Street, Middlebury

The sample form includes whether the sample was wet or dry. A wet weather event is defined as an accumulation of 0.8 inches or more as well as 72 hours after that limit is established. 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 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 lake sites, the instrument probe is lowered into the water at the end of piers. According to 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 is used. The dipper is rinsed three times at each site prior to

collection to prevent cross contamination between sample 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 the 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 analyzed. All samples are placed in pre-labeled and prepared sample bottles.

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

Total suspended solids collected on Tuesdays are analyzed at the Elkhart Public Works and Utilities Laboratory. On Thursdays, total suspended solids are submitted for analysis at the Goshen Wastewater Treatment 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 location, site number, collection date, who collected the sample, who transported and relinquished the sample. These labels are attached to the sample bottles. Upon arrival at the Elkhart Public Works and Utilities Laboratory, arrival time is also added to the label. The label also includes space to acknowledge which laboratory representative received the sample. The Environmental Health's water sampling form is also signed by an Elkhart laboratory representative with the time of sample delivery, and a copy is made and kept in their laboratory records. This procedure is implemented to verify chain of custody. For total suspended solids, the samples are collected and placed in pre-labeled containers with the site location, site number, date and who collected the sample. Upon delivery to the Goshen Wastewater Treatment Plant Laboratory, an Environmental Health representative places the samples in a refrigerator unit to ensure proper temperature requirements before analysis.

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 (NO₃) 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.

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 DATA, CHARTS, AND WATER QUALITY TARGETS

Appendix 1 contains the water sampling data.

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

Appendix 3 contains water quality targets.

NOTE: Some of the results for nitrates and phosphorus were not conducted due to issues with the Hach portable spectrophotometer. The unit was serviced and analysis for these parameters resumed.

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 2025 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.

The Elkhart County Regional Sewer District has completed the sewer utility expansion for the unincorporated areas of Tecumseh Acres, Foraker, and Southwest. The treatment services are provided by the town of Nappanee. This year's analysis showed nominal improvement. Years of sampling data from these areas have indicated unacceptable levels of E. coli entering adjacent waterways.

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.

Water quality is impacted by past and present land use. Various land uses contribute different contaminants to surface waters. As storm water flows across agricultural land, it can pick up pesticides, fertilizers, nutrients, pathogens, sediment, and manure and deposit them into surface waters. Some of these contaminants may infiltrate into the soil surface depending on the vegetation and the rate of transport. In urban areas storm water flows across parking lots and roads transporting motor oil, grease, transmission fluid, sediment and other contaminants which quickly flow to storm water drains discharging to surface waters without treatment. A review of the historic land types could provide further insight into the correlation between land use and surface water degradation.

All water bodies can assimilate 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.

ACKNOWLEDGEMENTS

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Also, the success of the sampling program would not be possible without the laboratory staff at the Elkhart Public Works and Utilities and the Goshen Wastewater Treatment Plant. Their assistance and expertise with the sample analysis was instrumental to the sampling program and is very much appreciated.

APPENDIX

1

PINE CREEK CR 117

DATE	TIME	TEMP	DO	SPC	PH	CHLORIDES	NITRATES	PHOSPHORUS	TSS	E. COLI	WET
5/20/2025	9:20	11.9	11.8	711	7.85	38.62	3.89	0.212	6	733	N
5/27/2025	9:40	13.8	9.3	716	8.37	34.45	4.13	0.223	7	393	N
6/3/2025	8:45	14.8	8.8	714	8.27	4.64	4.17	0.180	5	464	N
6/10/2025	8:50	14.2	9.35	690	8.35	58.41	3.75	0.272	6	750	N
6/17/2025	8:50	18.8	7.74	710	8.23	46.95	3.89	0.263	6	1782	N
6/24/2025	8:40	22.3	6.99	718	8.26	28.6	3.72	8.65	25	1250	N
7/1/2025	8:30	21.0	6.59	697	8.37	55.99			12	2909	N
7/8/2025	8:35	17.9	7.51	711	8.32	59.22			28	1789	N
7/15/2025	8:30	18.4	9.20	723	8.32	24.8			8	1106	N
7/22/2025	8:30	18.2	7.56	719	8.52	69.49			12	1296	N
7/29/2025	8:30	20.9	7.17	686	8.46	17.75			17	7620	Y
8/5/2025	8:30	17.0	8.90	740	8.57	20.19			15	1236	N
8/12/2025	9:00	20.9	7.1	718	8.33	194.21			13	1274	N
8/19/2025	8:40	20.0	7.41	556	8.15	180.80	2.36	0.395	325	15531	Y
8/26/2025	8:45	14.6	7.46	723	8.50	81.98	3.37	0.214	10	880	N
9/9/2025	8:28	11.6	11.09	718	8.52	80.78	3.93	0.197	11	1039	N
9/16/2025	8:47	15.6	8.90	716	8.33	36.43	3.29	0.281	28	1401	N

PINE CREEK CR 27

DATE	TIME	TEMP	DO	SPC	PH	CHLORIDES	NITRATES	PHOSPHORUS	TSS	E. COLI	WET
5/20/2025	8:30	11.1	12.00	742	7.70	28.30	5.52	0.164	19	1081	N
5/27/2025	8:50	12.7	10.88	747	8.22	27.06	5.55	0.096	14	605	N
6/3/2025	9:05	13.6	8.42	750	8.12	3.79	5.55	0.050	21	1374	N
6/10/2025	9:05	13.3	9.67	745	8.27	46.43	5.25	0.152	17	1565	N
6/17/2025	9:05	17.0	7.99	753	8.09	38.53	5.46	0.213	43	4106	N
6/24/2025	9:10	20.5	6.72	752	8.14	23.8	4.87	0.390	38	1829	N
7/1/2025	8:50	18.6	8.37	749	8.22	42.77			26	3873	N
7/8/2025	8:55	16.4	10.84	749	8.20	46.87			16	2187	N
7/15/2025	8:50	16.6	10.11	729	8.04	14.72			21	2481	N
7/22/2025	8:50	16.7	7.41	736	8.24	45.36			7	991	N
7/29/2025	8:50	20.0	6.48	724	8.26	8.47			10	6700	Y
8/5/2025	8:50	16.9	7.94	733	8.35	8.01			8	1106	N
8/12/2025	9:20	19.3	7.55	721	8.18	91.13			10	2098	N
8/19/2025	9:00	20.1	8.05	621	8.05	158.77	3.77	0.578	71	8664	Y
8/26/2025	9:07	14.6	8.59	746	8.43	72.16	5.03	0.066	7	1050	N
9/9/2025	8:50	11.6	11.26	739	8.57	65.68	4.86	0.087	9	1169	N
9/16/2025	9:08	15.4	8.21	735	8.17	20.82	3.97	0.081	7	1211	N

LITTLE ELKHART RIVER WARREN STREET

DATE	TIME	TEMP	DO	SPC	PH	CHLORIDES	NITRATES	PHOSPHORUS	TSS	E. COLI	WET
5/20/2025	8:55	12.6	11.16	732	7.63	23.95	2.75	0.258	5	1081	N
5/27/2025	9:15	13.9	10.61	738	8.50	22.21	2.77	0.087	5	1396	N
6/3/2025	9:25	15.0	7.71	732	8.17	3.14	2.47	0.070	8	1396	N
6/10/2025	9:30	14.8	9.05	720	8.12	41.75	3.01	0.175	6	7556	N
6/17/2025	9:30	18.2	7.31	732	8.15	32.09	2.55	0.091	6	1467	N
6/24/2025	9:30	21.9	6.83	787	8.11	19.10	2.33	0.480	4	1274	N
7/1/2025	9:10	20.3	7.83	707	8.19	34.93			11	1860	N
7/8/2025	9:20	17.9	8.70	736	8.19	40.99			5	1187	N
7/15/2025	9:15	18.4	7.53	740	8.13	14.64			9	1317	N
7/22/2025	9:10	18.4	6.44	732	8.29	43.01			30	1421	N
7/29/2025	9:10	20.5	7.01	665	8.24	4.99			23	15000	Y
8/5/2025	9:10	17.3	6.54	737	8.40	5.01			6	1223	N
8/12/2025	9:40	20.6	6.73	743	8.31	59.95			13	2014	N
8/19/2025	9:25	19.5	7.87	620	8.06	149.25	2.13	0.620	80	7701	Y
8/26/2025	9:30	14.7	8.07	741	8.38	47.84	2.39	0.101	9	1334	N
9/9/2025	9:15	12.3	11.74	734	8.38	30.27	2.19	0.109	7	1860	N
9/16/2025	9:36	16.2	8.96	744	8.20	17.70	2.14	0.113	4	813	N

MENGES DITCH CR 19

DATE	TIME	TEMP	DO	SPC	PH	CHLORIDES	NITRATES	PHOSPHORUS	TSS	E. COLI	WET
5/20/2025	9:35	10.6	11.52	611	7.75	23.00	3.96	0.036	5	1058	N
5/27/2025	9:55	13.5	10.87	614	8.29	13.78	3.88	0.001	3	364	N
6/3/20205	9:55	15.8	8.27	613	8.17	2.72	3.67	0.001	4	331	N
6/10/2025	10:00	14.4	9.03	625	8.19	34.55	3.31	0.042	237	295	N
6/17/2025	10:00	19.2	6.44	612	8.05	27.32	3.57	0.006	9	487	N
6/24/2025	10:00	21.8	7.43	614	8.00	15.71	2.38	0.107	3	770	N
7/1/2025	9:40	19.3	5.85	614	8.07	29.24			5	464	N
7/8/2025	9:50	17.0	8.23	618	8.01	33.66			3	1017	N
7/15/2025	9:45	17.1	7.96	635	7.97	12.44			16	836	N
7/22/2025	9:35	17.9	6.43	623	8.11	33.72			15	2098	N
7/29/2025	9:40	18.7	6.75	642	8.11	4.20			84	750	Y
8/5/2025	9:40	16.2	7.25	635	8.22	4.00			11	882	N
8/12/2025	10:10	21.1	5.60	642	8.10	39.04			15	2224	N
8/19/2025	9:55	17.7	4.55	562	7.71	107.51	1.12	0.091	51		Y
8/26/2025	10:05	14.9	8.27	623	8.33	39.61	1.82	0.034	21	631	N
9/9/2025	9:50	11.8	8.02	616	8.09	19.68	0.705	0.013	13	767	N
9/16/2025	10:27	14.8	6.86	602	7.93	15.57	0.704	0.038	18	2755	N

SHEEP CREEK CR 19

DATE	TIME	TEMP	DO	SPC	PH	CHLORIDES	NITRATES	PHOSPHORUS	TSS	E. COLI	WET
5/20/2025	9:50	12.5	13.60	617	7.71	25.00	2.86	0.022	9	521	N
5/27/2025	10:05	13.5	11.05	642	8.08	23.65	2.83	1.260	15	213	N
6/3/20205	10:10	14.9	8.86	627	8.15	2.90	2.66	0.015	13	420	N
6/10/2025	10:05	13.8	9.29	639	8.13	36.09	2.64	0.063	21	517	N
6/17/2025	10:20	18.2	6.62	614	8.06	30.69	2.60	0.010	6	573	N
6/24/2025	10:15	19.8	6.14	626	8.08	18.57	1.37	0.074	12	461	N
7/1/2025	9:50	18.1	7.87	617	8.11	30.82			11	906	N
7/8/2025	10:00	16.8	6.79	620	8.13	37.59			6	657	N
7/15/2025	9:55	16.9	7.50	636	8.02	14.56			8	3448	N
7/22/2025	9:50	16.9	6.62	640	8.19	37.30			18	19863	N
7/29/2025	9:55	17.8	7.34	633	8.21	4.49			9	730	Y
8/5/2025	10:00	15.5	7.65	620	8.24	3.71			20	932	N
8/12/2025	10:30	19.2	6.00	627	8.20	46.02			28	1631	N
8/19/2025	10:10	19.0	6.73	507	7.83	80.43	1.69	0.107	53	10462	Y
8/26/2025	10:25	14.4	7.85	634	8.17	45.59	2.01	0.003	13	602	N
9/9/2025	10:02	11.6	10.10	629	8.33	20.87	1.74	0.059	8	1374	N
9/16/2025	10:34	14.7	8.86	636	8.13	16.29	1.59	0.034	21	988	N

HEATON LAKE IDEAL BEACH

DATE	TIME	TEMP	DO	SPC	PH	CHLORIDES	NITRATES	PHOSPHORUS	TSS	E. COLI	WET
5/20/2025	10:10	16.5	16.15	362.0	7.92	16.8	0.273	0.061		54	N
5/27/2025	10:30	18.3	10.25	354.0	8.63	9.36	0.222	0.001		3	N
6/3/2025	10:30	20.3	9.15	336.8	8.79	1.34	0.197	0.003		29	N
6/10/2025	10:40	24.8	8.77	305.4	8.87	16.55	0.196	0.012		46	N
6/17/2025	10:55	25.4	9.84	279.2	9.04	13.53	0.308	0.006		102	N
6/24/2025	10:35	30.0	8.36	238.0	9.20	7.65	0.295	0.048		16	N
7/1/2025	10:50	28.7	6.00	260.9	8.94	12.35				68	N
7/8/2025	10:15	27.3	5.09	276.5	8.53	22.73				3	N
7/15/2025	10:15	27.9	7.35	266.4	8.90	5.96				56	N
7/22/2025	10:20	24.9	7.07	274.5	8.80	18.77				18	N
7/29/2025	10:15	28.2	6.81	262.1	8.98	4.24				48	Y
8/5/2025	10:20	24.7	6.82	265.8	9.06	2.36				15	N
8/12/2025	10:45	28.4	5.84	241.4	9.36	25.01				649	N
8/19/2025	10:30	26.4	7.04	227.2	9.13	38.09	0.120	0.032		7701	Y
8/26/2025	10:42	22.9	6.65	259.9	8.81	23.14	0.144	0.007		155	N
9/9/2025	10:20	19.4	5.36	282.3	8.34	10.49	0.178	0.040		16	N
9/16/2025	10:53	21.9	5.93	319.5	8.47	12.54	0.201	0.040		19	N

HEATON LAKE 22880 LAKE SHORE DRIVE

DATE	TIME	TEMP	DO	SPC	PH	CHLORIDES	NITRATES	PHOSPHORUS	TSS	E. COLI	WET
5/20/2025	10:20	17.7	10.30	360.5	7.96	11.32	0.254	0.065		24	N
5/27/2025	10:40	18.4	11.95	343.0	8.90	10.70	0.246	0.040		26	N
6/3/2025	10:40	20.6	9.55	333.3	8.83	1.43	0.238	0.022		56	N
6/10/2025	10:55	24.4	7.85	306.6	8.85	16.59	0.226	0.030		15	N
6/17/2025	11:05	26.1	8.74	272.8	9.03	16.49	0.302	0.011		14	N
6/24/2025	10:40	29.6	6.38	251.0	9.09	7.65	0.220	0.084		6	N
7/1/2025	11:10	28.7	4.98	271.1	8.65	12.54				16	N
7/8/2025	10:25	26.5	5.84	270.1	8.62	17.05				1	N
7/15/2025	10:20	27.3	7.62	273.2	8.85	5.91				6	N
7/22/2025	10:30	25.0	6.38	276.8	8.71	17.21				23	N
7/29/2025	10:20	27.8	6.83	247.1	9.11	2.15				10	Y
8/5/2025	10:25	29.5	6.31	278.6	9.22	2.41				5	N
8/12/2025	11:00	27.6	5.68	244.1	9.26	25.3				15	N
8/19/2025	10:40	26.3	5.21	236.7	8.88	34.91	0.167	0.017		10	Y
8/26/2025	10:55	22.1	5.02	261.6	8.72	20.33	0.138	0.029		1	N
9/9/2025	10:30	18.7	6.45	282.5	8.47	13.07	0.2033	0.021		7	N
9/16/2025	11:05	22.3	7.51	294.2	8.61	11.21	0.242	0.083		14	N

SIMONTON LAKE 51093 BEACH DRIVE

DATE	TIME	TEMP	DO	SPC	PH	CHLORIDES	NITRATES	PHOSPHORUS	TSS	E. COLI	WET
5/20/2025	10:30	16.5	10.00	397.5	7.96	23.71	0.376	0.041		12	N
5/27/2025	11:00	18.7	9.68	399.8	8.48	21.52	0.333	0.006		14	N
6/3/2025	10:55	21.3	7.75	400.9	8.48	2.82	0.253	0.013		40	N
6/10/2025	11:10	21.2	7.80	395.3	8.47	34.22	0.211	0.088		75	N
6/17/2025	11:15	25.6	7.76	392.0	8.45	30.04	0.305	0.014		161	N
6/24/2025	10:55	29.9	5.35	380.8	8.53	16.97	0.193	0.096		27	N
7/1/2025	11:20	29.1	6.84	368.3	8.66	27.77				63	N
7/8/2025	10:35	26.8	5.9	380.1	8.46	38.03				25	N
7/15/2025	10:35	27.5	6.89	390.6	8.55	13.21				27	N
7/22/2025	10:45	25.2	6.93	379.9	8.84	32.85				51	N
7/29/2025	10:30	28.3	6.53	385.1	8.79	5.23				31	Y
8/5/2025	10:40	24.4	6.40	381.0	8.95	4.01				58	N
8/12/2025	11:05	28.4	5.95	380.5	8.91	40.81				41	N
8/19/2025	10:55	25.7	5.28	363.9	8.66	74.03	0.139	0.049		84	Y
8/26/2025	11:07	21.2	7.77	367.1	8.94	52.16	0.129	0.006		3	N
9/9/2025	10:45	18.2	8.95	367.9	9.09	26.32	0.161	0.027		6	N
9/16/2025	11:18	22.6	8.56	387	8.95	21.39	0.210	0.005		6	N

SIMONTON LAKE 51330 SR 19

DATE	TIME	TEMP	DO	SPC	PH	CHLORIDES	NITRATES	PHOSPHORUS	TSS	E. COLI	WET
5/20/2025	10:40	15.5	10.3	399.5	8.04	25.25	0.623	0.05		1414	N
5/27/2025	11:10	18.6	9.0	403.0	8.45	20.68	0.520	0.021		119	N
6/3/2025	11:05	21.1	8.3	407.2	8.51	2.83	0.445	0.011		59	N
6/10/2025	11:25	21.8	8.95	404.8	8.62	31.68	0.380	0.017		88	N
6/17/2025	11:25	26.0	6.86	408.1	8.39	29.31	0.354	0.005		2419	N
6/24/2025	11:05	29.7	7.09	396.9	8.56	17.53	0.255	0.162		167	N
7/1/2025	11:30	29.2	9.55	38.14	9.94	31.95				689	N
7/8/2025	10:45	26.6	8.37	371.3	8.80	46.87				105	N
7/15/2025	10:45	27.7	6.64	395.0	8.55	13.60				23	N
7/22/2025	11:00	25.4	7.70	369.1	8.72	37.64				81	N
7/29/2025	10:45	27.7	5.70	376.3	8.71	4.81				10	Y
8/5/2025	10:50	24.6	6.50	370.1	8.91	3.70				18	N
8/12/2025	11:15	28.3	4.97	401.9	8.54	38.50				687	N
8/19/2025	11:00	26.4	5.92	361.9	8.63	53.56	0.153	0.019		461	Y
8/26/2025	11:19	22.4	6.99	367.1	8.71	46.13	0.121	0.015		36	N
9/9/2025	10:58	20.0	7.78	367.1	8.77	24.94	0.141	0.010		2	N
9/16/2025	11:28	22.4	6.50	385	8.64	19.24	0.199	0.137		194	N

CHRISTIANA CREEK CR 4

DATE	TIME	TEMP	DO	SPC	PH	CHLORIDES	NITRATES	PHOSPHORUS	TSS	E. COLI	WET
5/20/2025	10:50	15.3	12.1	469.0	7.91	13.09	1.560	0.038	8	186	N
5/27/2025	11:20	18.9	10.61	738.0	8.50	22.21	1.420	0.028	8	89	N
6/3/2025	11:20	18.8	8.25	465.0	8.31	1.64	1.240	0.031	30	147	N
6/10/2025	11:30	19.5	7.87	453.9	8.33	18.45	0.338	0.050	9	166	N
6/17/2025	11:35	23.7	8.00	457.3	8.22	18.63	1.38	0.008	5	285	N
6/24/2025	11:15	26.9	6.52	457.1	8.21	10.55	1.25	0.344	4	272	N
7/1/2025	11:40	26.7	7.32	440.3	8.33	15.87			5	261	N
7/8/2025	10:50	23.8	6.34	441.7	8.25	21.25			4	517	N
7/15/2025	11:00	24.5	8.04	435.9	8.21	6.57			5	649	N
7/22/2025	11:10	23.1	8.20	430.1	8.38	16.53			3	1733	N
7/29/2025	10:50	25.4	7.22	414.7	8.39	2.42			16	857	Y
8/5/2025	11:00	22.3	7.61	416.5	8.46	1.86			5	435	N
8/12/2025	11:30	20.3	7.55	431.3	8.38	20.92			3	210	N
8/19/2025	11:15	22.8	6.78	407.7	8.08	33.97	1.33	0.023	5	2420	Y
8/26/2025	11:30	19.8	7.32	430.2	8.34	21.84	1.12	0.027	4	125	N
9/9/2025	11:10	15.9	10.55	455.2	8.35	9.28	1.44	0.045	7	166	N
9/16/2025	11:43	19.5	9.42	453.0	8.32	7.32	1.34	0.036	5	435	N

ELKHART RIVER INDIANA AVENUE

DATE	TIME	TEMP	DO	SPC	PH	CHLORIDES	NITRATES	PHOSPHORUS	TSS	E. COLI	WET
5/22/2025	8:30	13.1	12.50	629	7.70	29.22	2.26	0.113	3.00	326	N
5/29/2025	8:40	15.7	8.73	639	8.13	2.09	1.98	0.087	5.90	108	Y
6/5/2025	8:50	19.5	8.18	624	8.09	9.10	1.40	0.115	3.88	261	Y
6/12/2025	8:45	20.5	7.66	611	8.07	40.35	2.71	0.210	6.00	153	N
6/19/2025	9:00	22.1	6.88	598	7.95	25.93	1.66	0.193			Y
6/26/2025	11:40	26.4	6.91	558	7.99	27.87	3.31	0.351	0.66	435	N
7/3/2025	8:50	24.5	7.49	616	8.15	42.55					N
7/10/2025	8:20	23.9	6.58	665	8.06	49.04			4.63	81	N
7/17/2025	8:30	24.6	5.61	652	8.02	6.55			0.50	91	Y
7/24/2025	8:25	23.9	6.35	633	8.16	7.11			0.25	155	N
7/31/2025	8:25	23.9	7.32	608	8.17	5.31			3.88	687	Y
8/7/2025	8:30	22.8	7.20	639	8.17	8.19			2.88	54	N
8/14/2025	8:30	24.0	6.30	660	8.13	94.08	1.26	0.203	0.25	50	N
8/21/2025	8:40	21.3	8.49	624	7.88	192.46	1.66	0.210	3.88	261	N
8/28/2025	8:49	18.0	7.38	682	8.04	55.84	1.45	0.158	1.67	75	Y
9/4/2025	8:40	18.5	8.01	681	7.96	18.79	1.35	0.187		228	Y
9/11/2025	8:40	16.6	7.65	709	8.02	29.26	1.37	0.111		102	N

ROCK RUN CR 34

DATE	TIME	TEMP	DO	SPC	PH	CHLORIDES	NITRATES	PHOSPHORUS	TSS	E. COLI	WET
5/22/2025	8:50	10.6	9.91	755	7.43	33.5	5.20	0.282	1.88	1722	N
5/29/2025	9:00	12.9	8.78	771	8.05	2.01	5.28	0.197	4.00	1291	Y
6/5/2025	9:10	16.7	9.08	572	7.93	8.95	10.5	2.620	14.20	241960	Y
6/12/2025	9:00	16.9	6.29	781	7.99	34.62	5.00	0.243	3.00	1203	N
6/19/2025	9:15	17.9	8.69	666	7.85	31.18	8.42	1.810			Y
6/26/2025	11:20	21.4	6.05	483	8.07	29.09	4.51	0.376	2.625	1541	N
7/3/2025	9:00	18.5	9.31	773	8.17	41.13					N
7/10/2025	8:35	18.7	6.59	757	8.02	37.57			53.9	162	N
7/17/2025	8:45	19.9	6.43	710	8.00	6.00			4.63	3654	Y
7/24/2025	8:40	21.1	8.80	754	8.15	4.6			3.125	2613	N
7/31/2025	8:40	17.9	10.2	753	8.24	4.8			6.57	5040	Y
8/7/2025	8:50	18.5	6.61	778	8.11	5.38			40.13	1296	N
8/14/2025	8:55	17.8	7.05	767	8.15	59.07	5.42	0.294	2.88	1789	N
8/21/2025	9:00	17.3	6.96	771	8.01	73.72					N
8/28/2025	9:07	15.4	7.71	766	8.05	47.5	6.24	0.201	75	3744	Y
9/4/2025	8:55	15.2	9.42	728	8.07	16.49	5.88	0.237		14136	Y
9/11/2025	9:05	13.6	6.50	756	8.05	24.45	5.93	0.124		789	N

YELLOW CREEK CR 32

DATE	TIME	TEMP	DO	SPC	PH	CHLORIDES	NITRATES	PHOSPHORUS	TSS	E. COLI	WET
5/22/2025	9:15	11.3	11.1	828	7.57	66.64	4.13	1.070	1.14	15531	N
5/29/2025	9:20	13.6	8.09	890	8.17	4.83	5.29	0.846	1.60	1396	Y
6/5/2025	9:35	16.8	6.80	753	7.91	16.83	6.25	2.840	18.00	241960	Y
6/12/2025	9:25	18.5	7.06	848	8.11	64.77	7.55	0.794	1.60	1120	N
6/19/2025	9:35	18.4	7.50	869	7.81	40.47	23.90	1.410			Y
6/26/2025	10:55	23.4	5.52	867	8.10	69.30	8.85	1.09	7.25	1597	N
7/3/2025	9:35	20.0	8.06	923	8.44	83.82					N
7/10/2025	9:00	19.6	6.41	882	8.09	79.66			8.1	1500	N
7/17/2025	9:10	20.5	3.63	924	8.11	12.82			4.13	12033	Y
7/24/2025	9:05	22.1	5.26	867	8.24	7.29			5.38	1019	N
7/31/2025	9:05	19.1	6.75	849	8.40	8.85			5.5	2880	Y
8/7/2025	9:10	19.5	5.90	891	8.20	8.21			2.63	650	N
8/14/2025	9:20	19.1	5.25	812	8.17	99.56	1.85	1.66	20.57	2755	N
8/21/2025	9:50	18.3	7.12	877	8.08	90.35	6.30	1.61			N
8/28/2025	9:34	15.6	8.06	909	8.13	101.75	3.42	1.00	26.5	1046	Y
9/4/2025	9:21	15.6	9.06	955	8.16	41.33	3.05	1.16		15531	Y
9/11/2025	9:35	13.5	8.01	844	8.12	46.83	2.30	0.803		1334	N

YELLOW CREEK CR 138

DATE	TIME	TEMP	DO	SPC	PH	CHLORIDES	NITRATES	PHOSPHORUS	TSS	E. COLI	WET
5/22/2025	9:30	11.1	9.67	885	7.52	81.93	8.32	0.75	1.38	6488	N
5/29/2025	9:40	13.3	7.65	982	8.08	5.93	10.40	0.655	3.10	2098	Y
6/5/2025	9:50	15.9	6.49	782	7.86	16.83	15.50	2.57	11.75	241960	Y
6/12/2025	9:40	19.3	5.00	875	7.99	82.30	9.88	0.598	1.70	3873	N
6/19/2025	9:45	18.5	9.20	956	7.86	63.80	18.9	1.420			Y
6/26/2025	10:40	23.9	4.14	915	7.96	71.15	13.2	0.667	2.25	1782	N
7/3/2025	9:45	20.5	6.01	1001	8.09	97.03					N
7/10/2025	9:20	20.3	5.01	1142	8.10	132.99			14	6488	N
7/17/2025	9:25	20.6	4.22	1023	7.94	16.84			27.5	68670	Y
7/24/2025	9:20	22.1	4.70	1084	8.17	9.81			14	1850	N
7/31/2025	9:20	19.1	6.5	940	8.3	8.94			5.75	2790	Y
8/7/2025	9:30	20.2	5.27	1154	8.18	12.35			5.29	1126	N
8/14/2025	9:30	19.4	5.05	1000	8.19	121.56	4.14	1.52	4.50	5794	N
8/21/2025	10:05	18.7	6.72	1150	8.03	154.86	11.0	1.57		3873	N
8/28/2025	9:57	15.9	7.43	1105	8.16	177.11	5.29	1.23	21.67	2359	Y
9/4/2025	9:35	15.6	8.09	705	8.02	47.45	2.09	1.17		24196	Y
9/11/2025	9:55	14.3	5.06	1291	8.19	152.00	4.21	1.24		441	N

WEAVER DITCH CR 13

DATE	TIME	TEMP	DO	SPC	PH	CHLORIDES	NITRATES	PHOSPHORUS	TSS	E. COLI	WET
5/22/2025	9:45	12.5	1.62	1712	7.00	391.87	0.905	11.5	7.3	579400	N
5/29/2025	9:55	13.5	1.50	1660	7.65	20.35	1.250	7.20	574	325500	Y
6/5/2025	10:10	15.1	5.53	1082	7.43	49.46	3.650	8.25	31.5	547500	Y
6/12/2025	9:50	15.0	2.20	2109	7.41	595.08	0.520	8.08	74.0	325500	N
6/19/2025	9:55	16.8	4.01	1242	7.53	920.62	4.52	9.00			Y
6/26/2025	10:15	17.9	4.00	1472	7.47	205.60	1.92	6.59	38.8	218700	N
7/3/2025	10:00	18.3	2.58	1852	7.60	456.57					N
7/10/2025	9:30	18.3	0.87	1993	7.62	521.9			26.8	461100	N
7/17/2025	9:40	18.5	0.37	2128	7.64	85.75			266.7	866400	Y
7/24/2025	9:30	20.3	1.70	17.93	7.56	22.44			37	2419600	N
7/31/2025	9:35	19.9	2.23	1266	7.59	11.14			32	920800	Y
8/7/2025	9:50	19.8	5.20	1922	7.50	31.15			8.67	547500	N
8/14/2025	9:50	19.8	7.3	2016	7.80	945.55	0.372	10.5	95	488400	N
8/21/2025	10:20	20.1	2.16	1415	7.48	189.43	0.713	9.86	16.7	461100	N
8/28/2025	10:22	19.1	6.02	1475	7.87	326.44	0.907	6.14	92	248100	Y
9/4/2025	9:55	18.7	6.19	1570	7.55	64.60	0.812	5.87		686700	Y
9/11/2025	10:10	18.6	0.56	2447	7.64	485.89	0.325	9.94		866400	N

HARVERSTICK-DARKWOOD DITCH CR 7

DATE	TIME	TEMP	DO	SPC	PH	CHLORIDES	NITRATES	PHOSPHORUS	TSS	E.COLI	WET
5/22/2025	10:10	11.6	11.00	854	7.44	100.85	5.99	0.482	19.00	1860	N
5/29/2025	10:20	15.1	9.70	976	8.04	8.54	5.40	0.662	25.70	816	Y
6/5/2025	10:35	16.0	7.85	840	7.55	17.17	10.20	1.60	6.25	3448	Y
6/12/2025	10:20	20.8	10.16	900	8.00	89.98	12.00	0.116	3.00	770	N
6/19/2025	10:15	17.5	7.46	898	7.29	61.40	24.21	0.615			Y
6/26/2025	10:00	22.3	6.58	528	7.30	40.70	16.4	1.43	49.5	24196	N
7/3/2025	10:25	22.9	7.35	525	7.83	87.17					N
7/10/2025	9:55	21.0	5.16	1195	7.94	218.99			82	1723	N
7/17/2025	10:10	21.2	1.56	1242	7.63	31.67			20	708	Y
7/24/2025	9:50	23.7	5.85	1121	7.96	13.71			21.5	1722	N
7/31/2025	9:55	20.6	8.07	1088	7.95	19.46			7.29	1320	Y
8/7/2025	10:15	21.4	5.33	1560	7.97	27.05			13.3	9840	N
8/14/2025					ROAD CLOSED CULVER REPLACEMENT						
8/21/2025	10:50	19.5	5.94	887	7.79	144.10	2.30	11.2	11.63	292	N
8/28/2025					ROAD CLOSED RESURFACING						
9/4/2025	10:20	16.9	4.73	792	7.66	51.55	1.46	1.94		24196	Y
9/11/2025	10:40	15.5	3.10	1430	7.68	225.61	0.761	3.54		345	N

WISLER DITCH CR 40

DATE	TIME	TEMP	DO	SPC	PH	CHLORIDES	NITRATES	PHOSPHORUS	TSS	E. COLI	WET
5/22/2025	10:35	8.4	13.66	860	7.70	81.2	9.16	1.30	3.3	241960	N
5/29/2025	10:45	14.5	9.30	881	8.33	4.67	13.7	0.779	4.9	750	Y
6/5/2025	10:55	16.8	8.37	740	7.92	19.30	12.7	1.790	29.6	57940	Y
6/12/2025	10:40	19.0	6.89	922	8.17	62.98	22.7	0.550	4.5	1460	N
6/19/2025	10:35	18.0	8.12	824	7.72	35.63	31.2	1.23			Y
6/26/2025	9:35	21.4	6.26	8.62	8.02	43.40	28.7	0.886	11.8	5120	N
7/3/2025	10:40	21.4	7.81	942	8.31	78.89					N
7/10/2025	10:20	21.3	6.19	894	8.21	85.22			9.87	16	N
7/17/2025	10:30	21.7	4.31	808	8.08	13.21			5.43	4140	Y
7/24/2025	10:10	23.6	5.61	8.84	8.30	7.07			5.875	1220	N
7/31/2025	10:20	19.7	7.10	843	8.27	7.69			5.25	6440	Y
8/7/2025	10:35	21.3	5.95	903	8.23	7.41			2.88	1610	N
8/14/2025	10:40	20.3	4.25	964	8.25	115.47	1.43	1.80	2.71	2990	N
8/21/2025	11:20	19.6	8.38	737	7.86	67.16	5.45	2.58		1658	N
8/28/2025	11:10	16.6	7.17	916	8.14	115.23	1.92	1.01	4.67	717	Y
9/4/2025	11:10	16.4	6.6	883	8.14	44.34	0.829	0.991		638	Y
9/11/2025	11:10	15.1	5.44	910	8.04	57.99	0.865	1.04		410	N

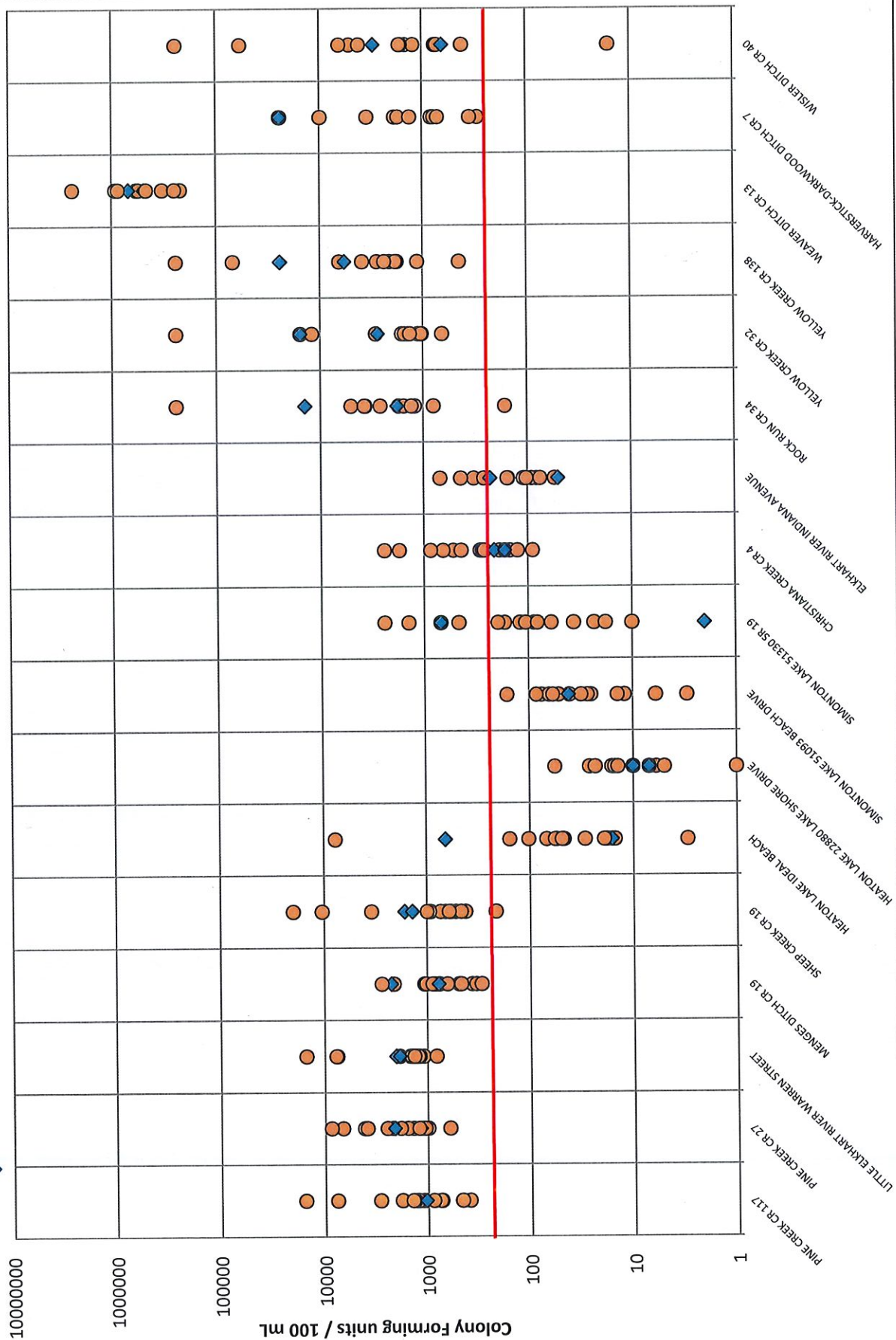
BAUGO CREEK CR 3

DATE	TIME	TEMP	DO	SPC	PH	CHLORIDES	NITRATES	PHOSPHORUS	TSS	E. COLI	WET
5/22/2025	11:00	12.1	12.3	659	7.78	56.42	7.54	0.399	2.88	1986	N
5/29/2025	11:05	14.7	8.93	739	8.17	3.84	7.28	0.321	1.90	291	Y
6/5/2025	11:20	17.5	7.41	689	8.09	19.98	7.60	0.687	8.67	24196	Y
6/12/2025	11:00	19.5	6.98	745	8.22	55.08	12.6	0.391	1.60	308	N
6/19/2025	11:00	19.3	6.28	588	7.77	30.71	19.3	0.917			Y
6/26/2025	9:15	22.9	6.61	696	8.08	3.57	19.7	0.909	17.25	46110	N
7/3/2025	11:05	21.8	7.41	751	8.33	61.36					N
7/10/2025	10:40	21.7	7.17	773	8.32	67.31			1.63	248	N
7/17/2025	11:00	22.3	6.00	742	8.25	11.23			4.13	1414	Y
7/24/2025	10:40	23.1	6.03	606	8.29	4.26			357.3	1220	N
7/31/2025	10:45	21.1	8.4	722	8.37	7.67			6.33	12033	Y
8/7/2025	10:55	21.3	7.15	737	8.39	6.16			5.63	387	N
8/14/2025	11:10	21.8	4.68	486	8.14	60.27	1.69	1.04	10.14	727	N
8/21/2025	11:45	20.0	8.72	564	8.17	52.01	4.21	6.01		2827	N
8/28/2025	11:34	16.9	8.72	758	8.33	77.86	2.22	0.597	2	363	Y
9/4/2025	11:35	16.6	8.82	756	8.25	30.28	1.35	0.645		488	Y
9/11/2025	11:45	16.4	8.75	751	8.31	37.27	1.37	0.468		579	N

APPENDIX

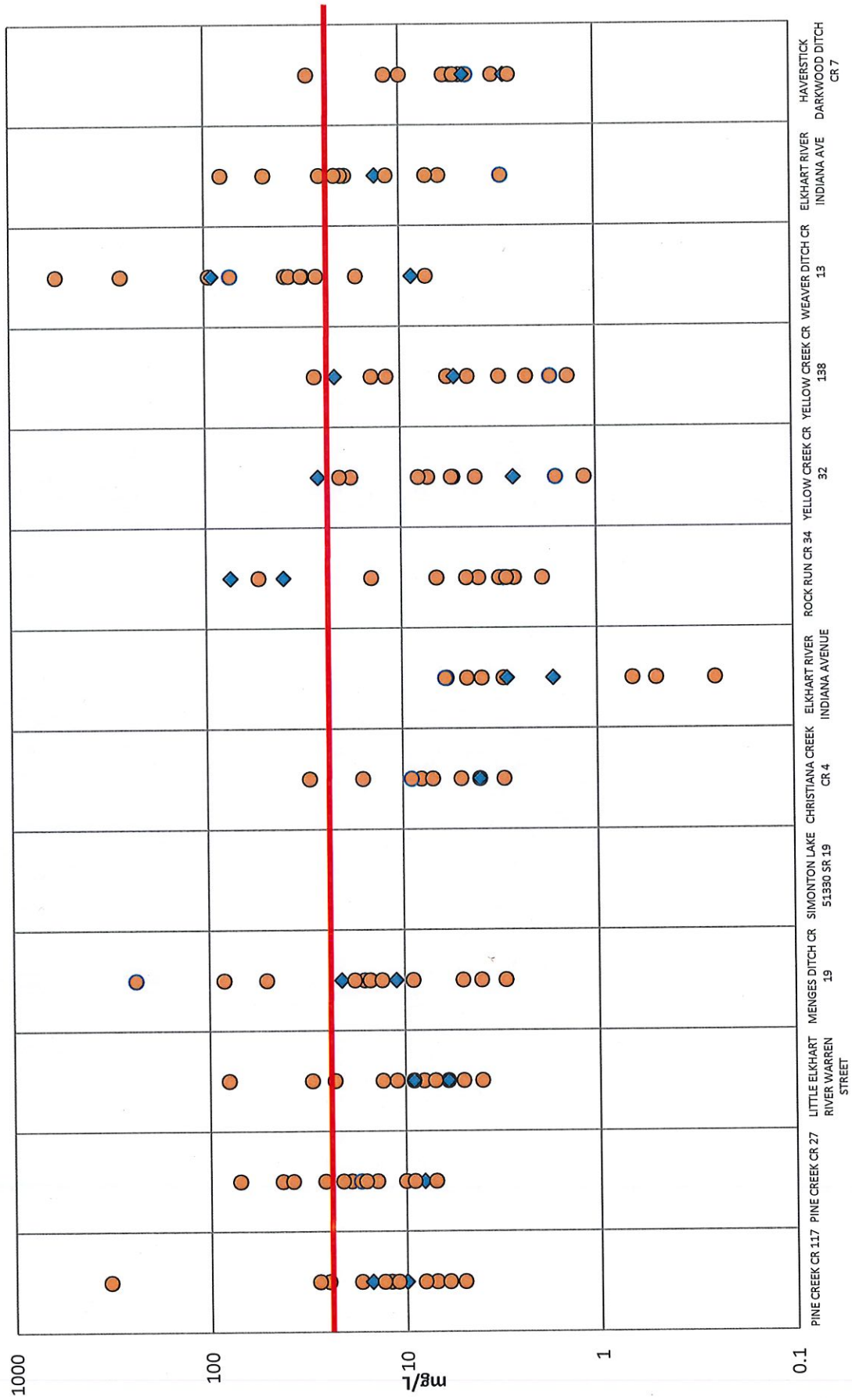
2

● = Dry Event
◆ = Wet Event



2025

◆ = Wet Event



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
<i>Escherichia coli</i>	< 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)