



*Aquatic Enhancement
& Survey, Inc.*

**Draft 2025 Water Quality Sampling Report
Steuben County Lakes Council
Steuben County, Indiana**

December 4, 2025



Aquatic Enhancement
& Survey, Inc.
P.O. Box 1036
Angola, IN 46703

1-888-867-5253
260-665-8226
www.aquaticenhancement.com

Acknowledgements

I would like to thank the following people for making possible the 2023 season sampling and the preparation of this report: Bill Schmidt, Cheri Stroh, and the membership of the Steuben County Lakes Council, the Anthony Wayne Council, Keith Chrysler, and Dean Rosener. Laboratory analysis for this work was performed by Sandhill Environmental, Waterloo Indiana. Field work and report preparation was performed by Scott Banfield, Beth Schroeder, Mary Vandenberg, Alec Gast, and Luke Campbell of Aquatic Enhancement & Survey, Inc.

DRAFT

Table of Contents

Page

1. Project Overview and Purpose	4
2. Methods	5
3. Results May Sampling	15
4. Results: July Sampling	15
5. Results: August Sampling	15
6. Conclusions	16

List of Figures

Figure 1 Project Location Map	4
Figure 2 Sampling Site Map	6

List of Tables

Table 1 Descriptions of numbered sampling sites	7
Table 2 May data for sites 1 through 39	8
Table 3 May/June data for sites 40 through 76	9
Table 4 July data for sites 1 through 39	10
Table 5 July data for sites 40 through 76	11
Table 6 August data for sites 1 through 39	12
Table 7 August data for sites 40 through 76	13
Table 8 Indiana Department of Environmental Quality Table of Water Quality Targets	14
Table 9 Average of IDEM-collected probabilistic Indiana stream data for the St Joseph River Watershed 2000-2005.	15

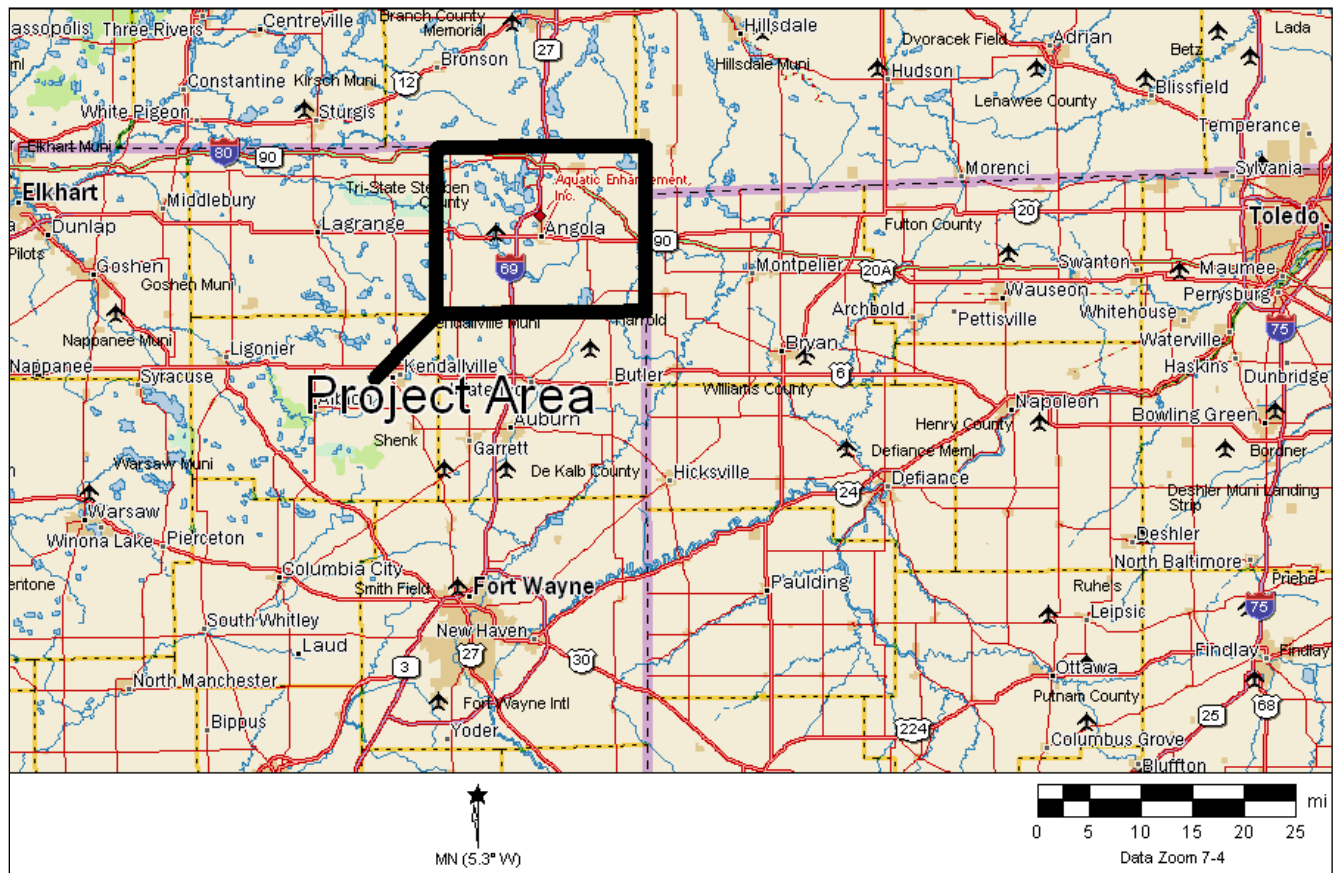


Figure 1 Project location map

1. Project Overview and Purpose:

This project was completed by Aquatic Enhancement & Survey, Inc. under contract with the Steuben County Lakes Council (SCLC) and Angola/Trine MS4. Also partnered with the SCLC in support of this work was the Steuben County Surveyor's Office, the Clear Lake Township Land Conservancy, and the Lake George Conservancy. Basic water quality data and stream flow (discharge) measurements were collected from 59 sites on several streams and lakes in Steuben County, Indiana, LaGrange County, Indiana, and Branch County, Michigan. Sampling reported in this work was completed in May, July, and August of 2025. Figure 2 (page 6) displays sampling locations and associated surface water features. For most sites, measured parameters included total phosphorus, total suspended solids, pH, dissolved oxygen, temperature, specific conductance, and E-coli. A basic measurement of stream flow-rate (discharge) at each sampling site was taken when conditions permitted.

Total phosphorus and total suspended solids loading figures were calculated for certain sites at which these measurements were detectable and at which a flow measurement was taken. The purpose of the sampling was to gain a basic understanding of the fate and source of contaminants in these systems with a goal of directing future sampling or directing remediation of watershed point and non-point pollution sources. Table 1 provides a site key showing brief written descriptions of each numbered sampling site. Collected data and calculated loading rates are provided in tables 1-6.

2. Methods:

All samples collected were grab samples. All samples were placed on ice immediately after collection. Measurements for temperature, dissolved oxygen, and specific conductance were taken in the field using a meter. Measurements of pH were taken in the field using a meter or measured in the laboratory. Meters were calibrated at the beginning of each sampling day. Where possible, stream flows were calculated using measurements of the stream cross-sectional area and stream velocity. Stream flow cross-sectional area was calculated by measuring stream width using a tape measure and calculating average stream depth by measuring depth at multiple equidistant points using a measuring staff or tape measure. Quality Assurance Procedures and EPA method codes for laboratory analysis are available upon request.

DRAFT

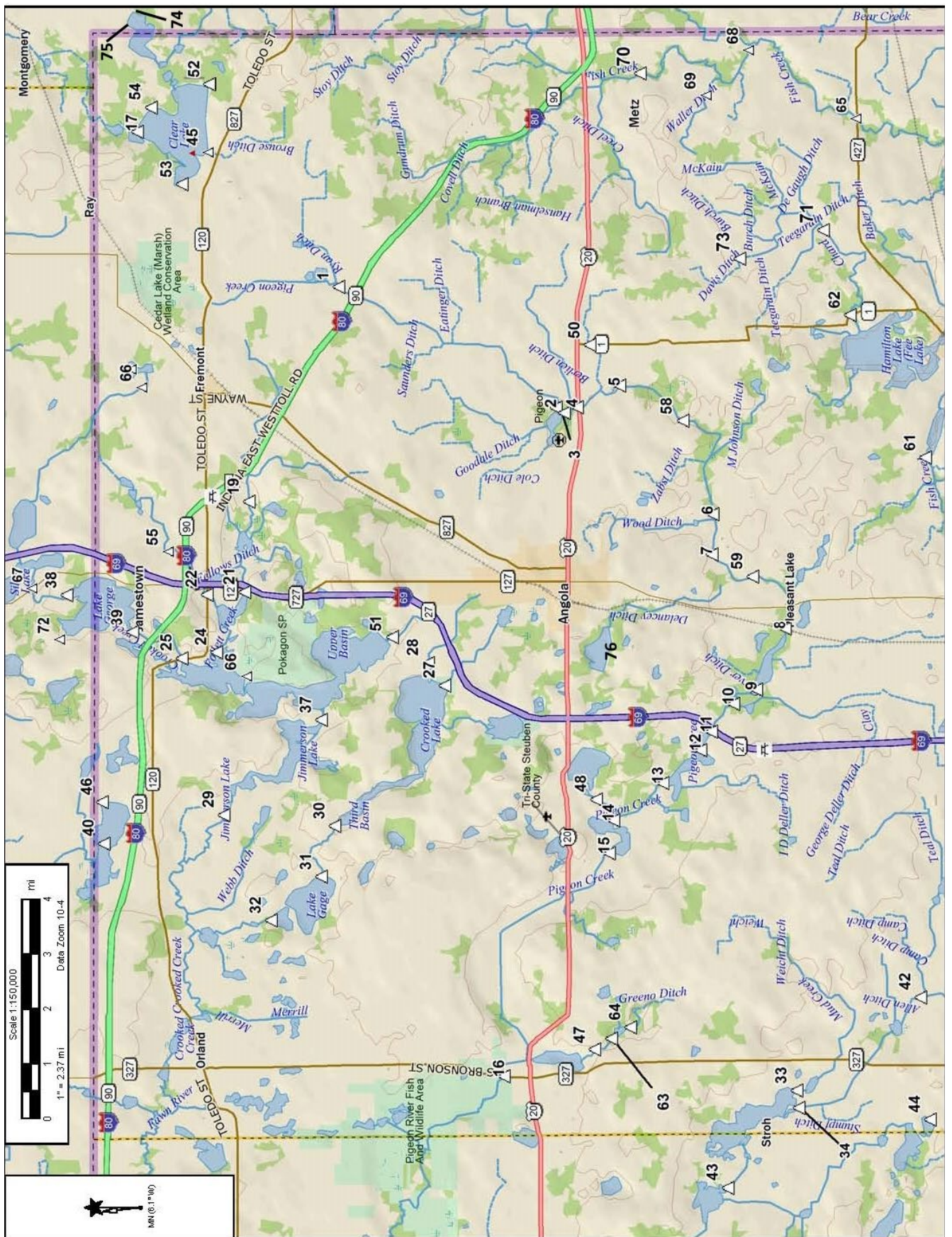


Figure 2 Sampling site map

Samp. Site	SCLC funded	At or near HUC 12 Outlet (10)	At or near HUC14 Outlet Site (13)	Steuben Surveyor Funding (6)	MS4 Funding (2 sites)	Clear Lake funding (2)	Harn. Funding (2)	George Funding (2)	Snow Funding (1)	Location Description
1.	yes		yes							Pigeon, East Ray Clark Road at culvert, below juncture with the Ryan Ditch.
2.	yes									Pigeon Creek, Pigeon Lake Inlet.
3.*	yes									Pigeon Creek, Pigeon Lake Outlet. *May only
4.	yes	yes	yes							Pigeon, U.S. 20 Bridge, Below juncture with Berlien Ditch.
5.	yes									Pigeon Creek, Metz Road.
7.					yes					Pigeon Creek, Meridian Road.
8.	yes									Pigeon Creek, Long Lake Inlet.
9.*	yes									Pigeon Creek, Long Lake Outlet. *May only
10.	yes	yes	yes							Pigeon Creek, Mud Lake Outlet just west of Long Lake, Johnson Ditch from Ashley.
11.*	yes									Pigeon Creek, Big Bower Lake Inlet. *May only
12.	yes									Pigeon Creek, Big Bower Lake Outlet/Golden Lake Inlet.
13.*	yes									Pigeon Creek, Golden Lake Outlet. *May only
14.	yes									Pigeon Creek, Hogback Lake Inlet.
15.	yes	yes	yes							Pigeon Creek, Hogback Lake Outlet.
16.	yes	yes*	yes*							Pigeon Creek at 327.
17.	yes		yes							Clear Lake Outlet.
19.	yes									Crane Marsh Outlet, (tributary to Marsh Lake).
21.	yes									Follet Creek, Little Otter Lake Inlet.
22.	yes									Walter's Lakes Drain (tributary to Big Otter Lake).
24.	yes									Follet Creek, Snow Lake Inlet.
25.	yes									Crooked Creek at 120 (Tributary to Snow Lake).
26.	yes									Carpenter Ditch (outlet from Center Lake)
27.	yes									Carpenter Ditch (Tributary to Crooked Lake).
28.	yes									Palfreyman Ditch (Tributary to Crooked Lake).
29.*	yes	yes*	yes*							Crooked Ck (Jimm. Outlet Nevada Mills). *May only
30.	yes									Concorde Creek (Outlet from Crooked Lake).
31.	yes									Concorde Creek (Inlet to Lake Gage).
32.	yes	yes*	yes*							Concorde Creek (Outlet from Lime Lake).
33.	yes									Dewitt Ditch (Tributary to Big Turkey Lake).
34.	yes									Turkey Creek (Tributary to Big Turkey Lake).
35.	yes									Fox Lake Outlet
37.	yes									Crooked Creek (James Outlet, Jimmerson Inlet at 4 corners).
38.	yes									Lake George NE tributary (from Silver Lake).
39.	yes									Crooked Creek (Lake George Outlet).
40.	yes									Lake Pleasant.
42.	yes	yes	yes							Turkey Ck at 700S east of 800W, below Little Turkey and Deetz Ditch juncture.
43.	yes	yes*	yes*							Big Turkey Outlet at 350S on curve north of Stroh or west of Turkey Lake Tavern.
44.	yes									Trib. To McClish Lake (east end).
45.	yes									Trib. To Clear Lake (Cyrus Brouse Ditch).
46.	yes									Trib. To Lake Pleasant (East End).
47.	yes									Trib. To West Otter (Between Arrowhead and Otter).
48.	yes									Trib. Between Silver and Hogback.
50.	yes									William Jack Ditch (at State Rd. 1).
51.	yes									Croxton Ditch (at West 275 North).
52.				yes						Clear Lake Trib. (Harry Teeters Ditch).
53.						yes				Clear Lake Trib. (Peter Smith Ditch).
54.						yes				Clear Lake Trib. (Alvin Patterson Ditch).
58.					yes					Pigeon Creek at Hanselman.
61.				yes						Tributary to Ball Lake.
62.				yes						Black Creek, Tributary to Hamilton Lake.
63.	yes									Tributary just downstream of Arrowhead Lake.
64.				yes						Tributary to Arrowhead Lake at south end of Arrowhead Lake
65.	yes									Fish Creek at 427
68.	yes									Fish Creek at E 400 S
69.	yes									Fish Creek at S 850 E (5/19/17 upstream of S 850 E)
70.	yes									Fish Creek at E Metz Rd.
72.							yes			Trib. to Lake George at 150 W, N. of launch
74*	yes									East Trib. to Little Long Lake
75*	yes									Trib. to Lit. Long Lake, Derr Drain
76.	yes									Fox Lake Beach

Table 1 Descriptions of numbered sampling sites

Site	Date	E-coli (CFU or colonies/100 ml)	CFM Discharge	Total Phos. (ppm)	Total Phos. Loading (kg/day)	TSS (ppm)	TSS Loading (kg/day)	D.O.	pH	Temp (F)	Specific Conductance	Post rain event *
1	5/21/25	1046.2	826.99	0.037	1.25	9.9	333.88	11.3	7.81	53.2	729	*
2	5/21/25	729.0	636.56	0.019	0.49	3.6	93.45	10.7	8.08	53.6	713	*
3	5/21/25	38.4	725.92	0.035	1.04	2.0	59.21	9.1	8.10	59.5	630	*
4	5/21/25	238.2	1067.83	0.019	0.83	2.6	113.22	9.1	7.95	58.4	652	*
5	5/21/25	214.3	769.50	0.030	0.94	5.7	178.87	8.8	8.05	58.7	678	*
7	5/21/25	1085.0	1996.07	0.133	10.83	25.0	2035.03	9.3	8.11	58.3	1110	*
8	5/21/25	613.1	1802.16	0.109	8.01	15.0	1102.40	10.3	8.15	57.9	813	*
9	5/23/25	44.1	nd	0.036	nd	4.0	nd	8.2	8.19	58.5	677	*
10	5/23/25	579.5	nd	0.068	nd	4.6	nd	7.5	7.85	56.1	749	*
11	5/23/25	248.1	nd	0.039	nd	3.6	nd	7.7	8.22	57.9	670	*
12	5/23/25	201.4	4623.15	0.028	5.28	3.0	565.61	7.3	8.02	56.9	678	*
13	5/23/25	7.4	nd	0.023	nd	3.7	nd	6.7	8.24	61.1	646	*
14	5/23/25	18.3	4013.63	0.027	4.42	3.3	540.14	7.8	7.97	59.6	650	*
15	5/23/25	1.0	3541.29	0.031	4.48	5.3	765.41	8.4	8.32	59.7	614	*
16	5/23/25	58.3	4883.49	0.022	4.38	4.0	796.61	9.6	8.21	59.4	549	*
17	5/30/25	17.5	nd	0.057	nd	<1.0	nd	11.4	8.69	64.7	401	
19	5/30/25	131.4	239.66	0.060	0.59	3.5	34.21	8.5	8.02	63.8	818	
21	5/29/25	18.7	641.87	0.056	1.47	<1.0	nd	12.1	8.44	62.1	638	
22	5/29/25	410.6	27.08	0.061	0.07	2.8	3.09	10.0	8.11	60.9	966	
24	5/30/25	298.7	nd	0.033	nd	4.3	nd	14.6	8.68	68.1	858	
25	5/29/25	107.6	279.34	0.017	0.19	1.9	21.64	7.8	8.11	63.1	471	
26	5/27/25	19.6	40.60	0.085	0.14	21.0	34.77	10.3	9.03	64.0	609	
27	5/27/25	166.4	63.60	0.094	0.24	19.0	49.28	9.3	8.16	59.7	715	
28	5/27/25	27.5	819.44	0.041	1.37	3.5	116.96	9.7	8.13	65.5	723	
29	5/29/25	35.9	2994.11	0.011	1.34	1.3	158.73	8.4	8.21	63.5	451	
30	5/27/25	45.0	131.81	0.017	0.09	2.3	12.36	9.6	8.04	67.3	618	
31	5/27/25	53.7	153.49	0.044	0.28	3.9	24.41	9.6	8.38	66.5	409	
32	5/27/25	13.4	257.41	0.011	0.12	<1.0	nd	9.7	8.39	67.1	615	
33	5/27/25	22.6	538.75	0.018	0.40	6.6	145.01	11.8	8.45	64.4	821	
34	5/27/25	35.0	1249.00	0.042	2.14	2.9	147.71	12.5	8.14	62.8	620	
35	5/27/25	5.2	64.74	0.040	0.11	4.1	10.82	11.2	8.78	62.4	443	
37	5/29/25	21.3	nd	<0.010	nd	2.5	nd	10.6	8.51	62.0	501	
38	5/29/25	119.8	212.52	0.018	0.16	1.4	12.13	6.1	7.65	63.3	427	
39	5/29/25	28.8	963.66	0.017	0.67	<1.0	nd	9.6	8.58	63.4	426	

Table 2 May data for sites 1 through 39. The notation “nd” denotes that no data was collected or calculated due to a result below lab detection limits or the constraints of field conditions. Data shaded exceeds certain water quality standards selected from those provided by IDEM (see corresponding shaded standards in table 8). An asterisk (*) in the post rain event column indicated sample collection occurred within 48 hours of .5 inches of rainfall or more.

Site	Date	E-coli (CFU or colonies/100 ml)	CFM Discharge	Total Phos. (ppm)	Total Phos. Loading (kg/day)	TSS (ppm)	TSS Loading (kg/day)	D.O.	pH	Temp (F)	Specific Conductance	Post rain event *
40	5/29/25	<1.0	nd	0.011	nd	<1.0	nd	10.1	8.65	62.8	450	
42	5/23/25	219.0	2021.42	0.043	3.54	5.5	453.39	10.8	8.21	58.4	545	
43	5/28/25	93.2	3963.69	0.025	4.04	3.0	484.93	9.9	8.39	63.2	723	
44	5/23/25	146.7	66.65	0.027	0.07	4.7	12.77	8.4	8.00	56.8	706	*
45	5/30/25	1841.6	27.05	0.125	0.14	6.0	6.62	8.9	7.97	58.2	650	
46	5/29/25	125.9	29.69	<0.010	nd	<1.0	nd	11.2	7.84	56.1	551	
47	5/28/25	108.1	106.70	0.031	0.13	2.6	11.31	8.4	8.32	62.0	480	
48	5/28/25	19.40	2.69	0.081	0.01	<2.0	nd	7.38	7.54	58.5	467	
50	5/28/25	1413.6	24.36	0.055	0.05	14.0	13.91	7.1	7.47	56.2	723	
51	5/27/25	248.1	57.98	0.015	0.04	1.8	4.26	9.2	8.02	59.4	1118	
52	5/30/25	127.6	30.57	0.113	0.14	5.7	7.11	8.1	7.97	61.3	864	
53	5/30/25	14.4	15.43	0.136	0.09	2.2	1.38	8.2	7.43	53.9	749	
54	5/30/25	98.7	nd	0.038	nd	1.0	nd	3.9	7.54	56.4	375.5	
58	5/28/25	148.8	1057.53	0.022	0.95	3.0	129.38	9.1	8.18	60.7	927	
61	5/28/25	816.4	242.68	0.177	1.75	6.7	66.31	8.5	8.10	56.6	545	
62	5/28/25	387.3	83.73	0.172	0.59	3.1	10.59	9.5	8.20	57.6	520	
64	5/28/25	456.9	47.10	0.088	0.17	7.8	14.98	8.3	8.03	58.0	816	
65	5/28/25	130.9	1427.41	0.061	3.55	3.3	192.10	8.9	8.26	58.6	622	
68	5/28/25	228.2	nd	0.051	nd	4.8	nd	10.0	8.28	58.4	629	
69	5/28/25	99.1	2245.01	0.051	4.67	2.2	201.42	9.4	8.29	58.8	608	
70	5/28/25	244.6	592.82	0.044	1.06	5.5	132.97	8.1	7.91	56.7	648	
72	5/29/25	19.6	5.67	0.044	0.01	6.4	1.48	12.0	7.74	61.7	731	
74	5/30/25	83.4	62.89	0.275	0.71	12.0	30.78	1.9	7.45	54.3	705	
75	5/30/25	34.2	nd	0.159	nd	2.4	nd	3.1	7.08	56.7	323	
76	5/28/25	5.2	nd	<0.010	nd	3.6	nd	10.4	8.74	62.4	522	

Table 3 May data for sites 40 through 76. The notation “nd” denotes that no data was collected or calculated due to a result below lab detection limits or the constraints of field conditions. Data shaded exceeds certain water quality standards selected from those provided by IDEM (see corresponding shaded standards in table 8). An asterisk (*) in the post rain event column indicated sample collection occurred within 48 hours of .5 inches of rainfall or more.

Site	Date	E-coli (CFU or colonies/100 ml)	CFM Discharge	Total Phos. (ppm)	Total Phos. Loading (kg/day)	TSS (ppm)	TSS Loading (kg/day)	D.O.	pH	Temp (F)	Specific Conductance	Post rain event *
1	7/16/25	524.7	123.18	0.073	0.37	34.0	170.79	7.83	7.81	67.0	802	
2	7/15/25	561.8	239.96	0.009	0.09	2.6	25.44	7.57	8.06	66.4	766	
4	7/14/25	275.5	550.26	0.036	0.81	7.1	159.32	5.77	7.91	78.0	943	
5	7/14/25	143.9	311.37	0.043	0.55	6.4	81.27	8.46	8.04	77.0	993	
7	7/14/25	969.7	724.20	0.077	2.27	4.0	118.13	6.80	8.06	75.6	1224	
8	7/21/25	435.2	1079.51	0.069	3.04	2.0	88.05	7.04	8.07	67.7	923	*
10	7/21/25	579.4	1249.60	0.047	2.40	8.4	428.06	5.95	8.10	74.6	715	*
12	7/15/25	20.1	87.61	0.049	0.18	6.8	24.30	11.03	8.37	81.7	743	
14	7/15/25	37.9	1764.55	0.029	2.09	<2.0	nd	6.85	7.66	79.7	682	
15	7/15/25	6.3	1926.82	0.052	4.09	14.0	1100.08	12.76	8.48	82.9	590	
16	7/15/25	150.0	2315.25	0.027	2.55	<2.0	nd	11.47	8.39	74.7	637	
17	7/16/25	396.8	nd	0.019	nd	8.8	nd	7.78	8.50	83.3	284	
19	7/16/25	2.0	174.77	0.076	0.54	13.0	92.65	5.75	7.95	81.5	2053	
21	7/16/25	88.2	287.50	0.016	0.19	<2.0	nd	7.33	7.92	81.5	957	
22	7/16/25	613.1	34.90	0.161	0.23	8.6	12.24	2.84	7.52	74.9	708	
24	7/16/25	222.4	nd	0.024	nd	5.6	nd	8.60	8.19	85.1	591	
25	7/16/25	2419.6	167.43	0.015	0.10	2.4	16.39	7.38	7.90	81.8	408	
26	7/17/25	2239.8	4.65	0.040	0.01	2.6	0.49	4.52	7.74	66.8	745	
27	7/17/25	1732.9	22.48	0.135	0.12	34.0	31.17	6.04	8.15	69.9	617	
28	7/17/25	488.4	nd	0.024	nd	3.4	nd	7.30	7.96	75.6	1014	
30	7/17/25	95.9	97.54	<0.007	nd	4.0	15.91	5.05	7.83	76.7	390	
31	7/17/25	1203.3	64.83	<0.007	nd	3.8	10.05	6.65	8.03	71.5	448	
32	7/17/25	57.3	103.80	<0.007	nd	2.8	11.85	6.12	8.34	80.1	619	
33	7/21/25	203.5	313.72	0.034	0.43	10.0	127.94	8.90	8.10	76.8	595	*
34	7/21/25	517.2	108.12	0.066	0.29	1.6	7.05	6.63	7.93	72.1	582	*
35	7/14/25	6049.0	5.99	0.263	0.06	23.0	5.62	3.73	7.32	70.7	695	
37	7/17/25	86.7	nd	<0.007	nd	31.0	nd	5.95	8.20	77.8	519	
38	7/16/25	90.6	36.75	0.039	0.06	<2.0	nd	1.73	7.38	79.7	340	
39	7/15/25	28.8	nd	0.025	nd	2.0	nd	7.87	8.55	86.1	352	

Table 4 July data for sites 1 through 39. The notation “nd” denotes that no data was collected or calculated due to a result below lab detection limits or the constraints of field conditions. Data shaded exceeds certain water quality standards selected from those provided by IDEM (see corresponding shaded standards in table 8). An asterisk (*) in the post rain event column indicated sample collection occurred within 48 hours of .5 inches of rainfall or more.

Site	Date	E-coli (CFU or colonies/100 ml)	CFM Discharge	Total Phos. (ppm)	Total Phos. Loading (kg/day)	TSS (ppm)	TSS Loading (kg/day)	D.O.	pH	Temp (F)	Specific Conductance	Post rain event *
40	7/15/25	<1.0	nd	0.008	nd	3.2	nd	6.93	8.63	84.7	369	
42	7/21/25	671.3	310.59	0.070	0.89	3.4	43.06	7.52	8.11	75.1	588	*
43	7/21/25	260.3	1214.86	0.037	1.83	6.2	307.17	7.10	8.16	78.4	448	*
44	7/21/25	1553.1	14.33	0.019	0.01	2.0	1.17	6.81	7.67	59.9	762	*
45	7/16/25	7068.0	nd	0.066	nd	9.7	nd	5.33	7.77	69.6	1118	
46	7/17/25	101.2	15.13	<0.007	nd	4.2	2.59	9.09	7.81	62.5	914	
47	7/17/25	1046.2	14.30	0.084	0.05	3.4	1.98	6.04	8.12	74.0	753	
48	7/17/25	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	
50	7/14/25	2415.6	14.96	0.134	0.08	40.0	24.40	8.20	7.84	70.0	1057	
51	7/17/25	1119.9	51.07	<0.007	nd	<2.0	nd	6.51	7.95	63.4	867	
52	7/16/25	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	
53	7/16/25	2.0	nd	0.032	nd	<2.0	nd	7.48	8.02	66.8	1085	
54	7/16/25	648.8	nd	0.271	nd	20.0	nd	2.81	7.27	74.9	471.0	
58	7/14/25	473.7	557.20	0.030	0.68	3.6	81.80	7.53	8.10	76.4	1013	
61	7/14/25	579.4	nd	0.148	nd	48.0	nd	9.54	8.11	69.0	936	
62	7/14/25	686.7	nd	0.086	nd	1.9	nd	8.89	7.96	71.2	1078	
64	7/17/25	866.4	8.21	0.138	0.05	5.2	1.74	7.18	8.10	72.6	898	
65	7/14/25	517.2	281.48	0.181	2.08	18.0	206.62	9.28	8.29	75.9	969	
68	7/14/25	613.1	25.02	0.101	0.10	3.4	3.47	9.44	8.25	77.2	687	
69	7/14/25	435.2	607.01	0.152	3.76	4.2	103.97	9.39	8.25	76.2	970	
70	7/14/25	616.7	270.48	0.042	0.46	2.5	27.58	8.55	7.90	71.5	992	
72	7/15/25	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	
74	7/16/25	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	
75	7/16/25	21.1	nd	0.105	nd	2.2	nd	3.00	7.19	68.5	440	
76	7/14/25	10.9	nd	<0.010	nd	6.2	nd	8.40	8.33	82.0	422	

Table 5 July data for sites 40 through 76. The notation “nd” denotes that no data was collected or calculated due to a result below lab detection limits or the constraints of field conditions. Data shaded exceeds certain water quality standards selected from those provided by IDEM (see corresponding shaded standards in table 8). An asterisk (*) in the post rain event column indicated sample collection occurred within 48 hours of .5 inches of rainfall or more. An asterisk (*) after the site number indicates volunteer collected data. An asterisk (*) on data indicates data is suspect, laboratory analysis was performed outside the hold period.

Site	Date	E-coli (CFU or colonies/100 ml)	CFM Discharge	Total Phos. (ppm)	Total Phos. Loading (kg/day)	TSS (ppm)	TSS Loading (kg/day)	D.O.	pH	Temp (F)	Specific Conductance	Post rain event *
1	8/19/25	1986.3	129.19	0.056	0.30	8.8	46.36	6.36	8.08	65.4	953	*
2	8/25/25	561.8	163.72	0.009	0.06	<2.0	nd	8.16	8.05	61.6	733	
4	8/19/25	1413.6	1366.90	0.045	2.51	7.2	401.35	6.40	7.95	72.4	606	*
5	8/19/25	290.9	333.17	0.047	0.64	6.4	86.96	7.74	8.00	77.4	662	*
7	8/19/25	1825.0	480.15	0.104	2.04	4.6	90.07	5.81	7.92	74.2	1193	*
8	8/18/25	579.4	293.56	0.049	0.59	<2.0	nd	7.12	7.89	68.6	906	
10	8/18/25	35.9	675.91	0.073	2.01	9.2	253.59	6.93	7.85	76.5	640	
12	8/25/25	8.5	555.52	<.021	nd	11.0	249.20	6.61	8.11	71.9	645	
14	8/25/25	37.9	660.16	0.029	0.78	<2.0	nd	5.93	7.86	70.2	563	
15	8/25/25	6.3	946.65	0.052	2.01	14.0	540.47	7.49	8.31	73.7	525	
16	8/21/25	77.1	892.27	0.043	1.56	2.2	nd	7.43	8.02	65.9	600	
17	8/20/25	21.0	nd	<0.019	nd	10.0	nd	7.80	8.69	78.2	268	*
19	8/20/25	6.7	57.64	0.077	0.18	5.6	13.16	6.82	8.25	76.5	1993	*
21	8/20/25	61.7	614.68	0.075	1.88	7.0	nd	3.25	7.70	72.8	671	*
22	8/20/25	362.0	2.79	0.064	0.01	2.0	0.23	2.80	7.54	67.4	921	*
24	8/20/25	444.3	nd	<0.017	nd	25.0	nd	6.34	8.23	75.2	524	*
25	8/20/25	185.3	55.22	<0.014	nd	<2	nd	4.71	7.75	67.9	491	*
26	8/20/25	2567.0	4.56	0.105	0.02	<2	nd	5.38	7.79	65.6	465	*
27	8/19/25	2419.6	50.64	0.076	0.16	3.2	6.61	7.13	8.09	71.2	388	*
28	8/20/25	416.7	116.00	0.145	nd	56.0	nd	4.98	7.79	70.9	560	*
30	8/21/25	138.0	36.02	0.088	nd	31.0	45.54	5.05	7.83	76.7	390	
31	8/21/25	1986.3	13.31	<0.019	nd	<2	nd	8.23	8.32	62.4	588	
32	8/21/25	5.0	147.67	<0.012	nd	<2	nd	6.03	8.33	74.2	357	
33	8/21/25	1149.3	244.51	0.039	0.39	3.4	33.90	5.81	7.99	72.6	470	
34	8/21/25	285.1	457.10	0.087	1.62	2.0	37.28	8.51	8.14	68.9	567	
35	8/18/25	118.3	0.81	0.166	0.01	59.0	1.95	4.17	7.95	76.8	444	
37	8/20/25	36.3	nd	<0.007	nd	<2	nd	5.86	8.29	76.3	645	*
38	8/20/25	230.3	339.86	0.053	0.73	4.6	nd	2.59	7.39	70.8	352	*
39	7/15/25	28.8	nd	0.025	nd	2.0	nd	nd	nd	nd	nd	*

Table 6 August data for sites 1 through 39. The notation “nd” denotes that no data was collected or calculated due to a result below lab detection limits or the constraints of field conditions. Data shaded exceeds certain water quality standards selected from those provided by IDEM (see corresponding shaded standards in table 8). An asterisk (*) in the post rain event column indicated sample collection occurred within 48 hours of .5 inches of rainfall or more.

Site	Date	E-coli (CFU or colonies/100 ml)	CFM Discharge	Total Phos. (ppm)	Total Phos. Loading (kg/day)	TSS (ppm)	TSS Loading (kg/day)	D.O.	pH	Temp (F)	Specific Conductance	Post rain event *
40	8/25/25	3.0	nd	<.018	nd	3.4	nd	7.01	8.47	73.5	353	
42	8/21/25	193.7	239.03	0.115	1.12	7.2	70.18	6.10	7.93	69.8	444	
43	8/21/25	23.1	559.33	0.029	0.66	2.8	63.87	6.11	8.04	74.3	573	
44	8/21/25	285.1	7.82	<0.02	nd	<2.0	nd	6.46	7.63	60.5	710	
45	8/20/25	1537.0	5.91	0.117	0.03	16.0	3.86	5.80	7.81	66.5	771	*
46	8/21/25	198.0	13.87	<0.015	nd	6.0	3.39	4.11	7.56	58.6	627	
47	8/21/25	613.1	29.81	0.090	0.11	<2.0	nd	6.96	8.20	57.8	406	
48	8/19/25	461.10	nd	0.126	nd	2.4	nd	2.93	7.41	72.0	524	*
50	8/19/25	>8065.3	9.24	0.350	0.13	67.0	25.25	6.07	7.82	66.7	565	*
51	8/20/25	1085	56.35	<0.011	nd	2.4	nd	6.34	7.91	63.5	1012	*
52	8/20/25	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	*
53	8/20/25	133.0	0.09	0.047	nd	<2.0	nd	8.85	8.44	66.8	929	*
54	8/20/25	648.8	nd	0.271	nd	20.0	nd	nd	nd	nd	nd	*
58	8/18/25	357.0	218.79	0.026	0.23	<2	nd	7.21	8.11	72.2	701	
61	8/18/25	1299.7	39.58	0.093	0.15	3.6	5.81	7.32	8.07	68.0	637	
62	8/18/25	579.4	22.21	0.095	0.09	4.0	3.62	8.45	7.98	70.8	817	
64	8/21/25	760.7	32.53	0.174	0.23	30.0	39.80	7.97	8.20	66.5	631	
65	8/19/25	>2419.6	328.53	0.266	3.56	12.0	160.77	6.88	8.22	71.8	565	*
68	8/19/25	>2419.6	252.80	0.158	1.63	7.4	76.29	7.13	8.27	77.1	607	*
69	8/19/25	>2419.6	501.36	0.218	4.46	9.0	184.01	7.08	8.25	72.0	570	*
70	8/19/25	3487.3	242.61	0.156	1.54	14.0	138.51	5.47	7.90	67.9	648	*
72	8/20/25	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	*
74	8/20/25	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	*
75	8/20/25	40.7	nd	0.127	nd	82.0	nd	2.59	7.36	64.9	715	*
76	7/14/25	4.1	nd	<0.007	nd	2.2	nd	7.41	8.46	83.1	431	

Table 7 August data for sites 40 through 76. The notation “nd” denotes that no data was collected or calculated due to a result below lab detection limits or the constraints of field conditions. Data shaded exceeds certain water quality standards selected from those provided by IDEM (see corresponding shaded standards in table 8). An asterisk (*) in the post rain event column indicated sample collection occurred within 48 hours of .5 inches of rainfall or more. An asterisk (*) after the site number indicates volunteer collected data. An asterisk (*) after E-coli data indicates data is suspect, laboratory analysis was performed outside the hold period. An asterisk (*) after T-phos. data indicates result below quantification limit, data is suspect.

Parameter	Target	Reference/other information
Temperature	Dependent on time of year and whether stream is designated as a coldwater fishery	Indiana Administrative Code (IAC)
Dissolved Oxygen (DO)	Min: 4.0 mg/L Max: 12.0 mg/L	Indiana Administrative Code (IAC)
	Min: 6.0 mg/L in cold water fishery streams	Indiana Administrative Code (IAC)
	Min: 7.0 mg/L in spawning areas of cold water fishery streams	Indiana Administrative Code (IAC)
E. coli	Max: 235 CFU/ 100mL in a single sample,	Indiana Administrative Code (IAC)
	Max: Geometric Mean of 125 CFU/ 100mL from 5 equally spaced samples over a 30-day period	
Total Phosphorus	Max: 0.076 mg/L	U.S. EPA recommendation
	0.07 mg/L	Dividing line between mesotrophic and eutrophic streams (Dodd et al. 1998)
	Max: 0.08 mg/L	Ohio EPA recommendation to protect aquatic biotic integrity in WWH
	Max: 0.3 mg/L	IDEM draft TMDL target
Total Suspended Solids (TSS)	Max: 80.0 mg/L	Wawasee Area Conservancy Foundation recommendation to protect aquatic life in lake systems
	Max: 30.0 mg/L	IDEM draft TMDL target
	Range: 25.0-80.0 mg/L	Concentrations within this range reduce fish concentrations (Waters, 1995)
	Max: 40.0 mg/L	New Jersey criteria for warm water streams
	Max: 46.0 mg/L	Minnesota TMDL criteria for protection of fish/macroinvertebrate health
Turbidity	Max: 10.4 NTU	U.S. EPA recommendation

Table 8 Indiana Department of Environmental Quality Table of Water Quality Targets. Standards shaded on results tables correspond to standards shaded in this table.

3. Results: May Sampling

May sampling was scheduled to include 60 sites, but only 59 sites were sampled. Site 63, just downstream of Lake Arrowhead was not sampled. We were unable to reach the landowner to obtain consent. May sampling results are listed in tables 2 and 3. The samples collected from sites 1-16 and site 44 were “rain event” samples. All others represented baseline-flow conditions. Table 8 contains a variety of stream water quality targets provided by the Indiana Department of Environmental Management (IDEM) for comparison with the 2025 season data. Also provided for comparison is table 9 containing averages of stream data from the IDEM probabilistic data set. The data used to calculate these averages was collected from Indiana Streams within the St. Joseph River watershed from year 2000 to 2005. Most of the collection sites included in the 2025 data are also within the St. Joseph River watershed and therefore represent somewhat similar soil types, topography, and land uses. This allows some amount of judgment to be made as to whether the 2025 samples were “below average”, “average” or “above average” in terms of northern Indiana stream water quality. In May 16 sites exceeded the E-coli standard of 235 MPN/100 ml and 13 sites exceeded the total phosphorus standard of .076 ppm.

Parameter	IDEM Mean Stream Data
	St. Joseph Watershed 2000-2005
pH	n/d
D.O. (ppm)	7.14
Temp. (deg C)	19.91
Specific conductance umho/cm	764.19
Total Suspended Solids (ppm)	36
Total Phosphorus (ppm)	0.382
E-coli (CFU/100ml)/(MPN)	1895.58

Table 9 Average of IDEM-collected probabilistic Indiana stream data for the St Joseph River Watershed 2000-2005

4. Results: July Sampling

July sampling was scheduled to include 55 sites, but only 50 sites were sampled. Site 63, just downstream of Lake Arrowhead, was not sampled. We were unable to reach the landowner to obtain consent. Sites 48, 52, 72, and 74 were not sampled because no flow was present due to dry conditions. A total of 7 samplings were considered “rain event” samples in July, with the remaining samples representing baseline-flow conditions. Sampling results are listed in tables 4 and 5. E-coli standards were exceeded at 31 sites. Total phosphorus standards were exceeded at 13 sites.

5. Results: August Sampling

August sampling was scheduled to include 55 sampling sites. Samples were collected at 51 sites. Site 63, just downstream of Lake Arrowhead, was not sampled. We were unable to reach the landowner to obtain consent. Sites 52, 72, and 74 were omitted due to “no flow” conditions. Sampling results are listed in tables 6 and 7. Sampling at 30 sites represented “rainfall event”

conditions while the remaining 21 sites represented “baseline” flow conditions. E-coli standards were exceeded at 28 sites while total phosphorus standards were exceeded at 21 sites.

6. Conclusions

Over several years the SCLC has built an extensive body of local water quality data. There are many ways to examine the statistical content of the data and glean information to assist in meeting the needs of local lake residents, government agencies, and land users. The SCLC is encouraged to continue to convey the water quality information through its website, meetings, and other outlets, fostering cooperative community water-quality improvement efforts and encouraging new input and ideas to direct future sampling and steps toward water quality improvement.

DRAFT