



*Aquatic Enhancement
& Survey, Inc.*

**2014 Water Quality Sampling Report
Steuben County Lakes Council
Steuben County, Indiana**

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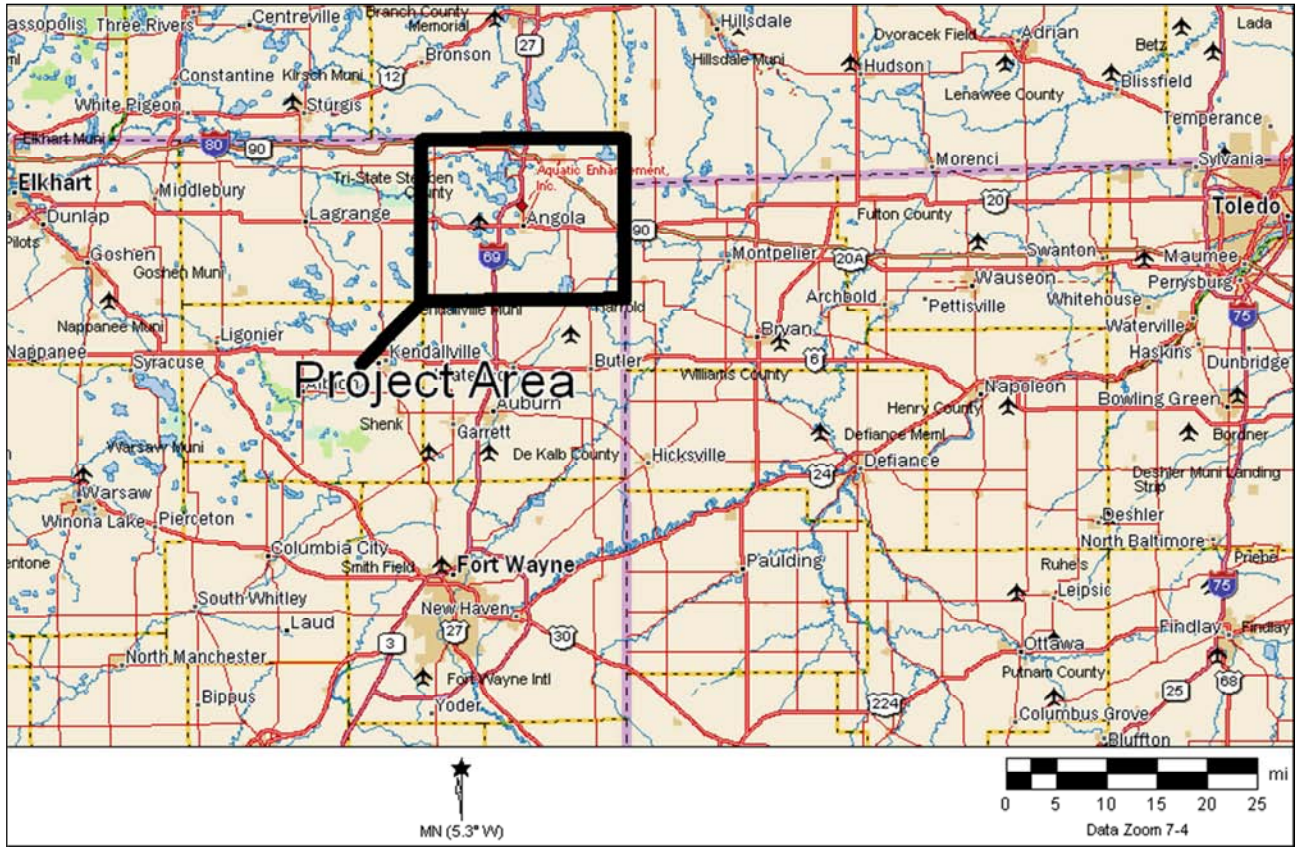


Figure 1 Project location map

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 Soil and Water Conservation District (SWCD) (working with the assistance of EPA 319 grant funding administered through the Indiana Department of Environmental Management), the Steuben County Surveyor's Office, and the Clear Lake Township Land Conservancy. Basic water quality data and stream flow (discharge) measurements were collected from a total of 56 sites on several streams and lakes in Steuben County, Indiana. One sampling site was located in LaGrange County Indiana (See figure 1 above for general project area location). The sampling reported in this work was completed in January through August of 2014. Figure 2 (page 6) displays sampling locations and associated surface water features. For all sites measured parameters included total phosphorus, total suspended solids, pH, dissolved oxygen, temperature, specific conductance, E-coli, and a basic measurement of stream flow-rate (discharge) at each sampling site having measurable flow. Sites 40-48, 50, 52, 58, 59, and 60-63 were sampled in May, July, and August. For sites 19, 21, 22, 24, 25, 27-32, 36-39, 51, 66, and 76 sampling took place in June, July, August, September, October, and November also including turbidity and nitrates. For sites 1-16, 33, and 34 nitrate + nitrite, and total Kjeldahl nitrogen (TKN) were also measured and sampling has been performed in January, February, May and August as part of 319 work on the Pigeon Creek.

Total phosphorus, total suspended solids, and nitrogen parameter 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 2-9.

2. Methods for Pigeon Creek and SCLC sites:

All samples collected were grab samples. Samples were placed on ice immediately after collection. All samples held overnight were refrigerated. Measurements for temperature and 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. Both 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 marked section of rope, tape measure, or laser rangefinder 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.

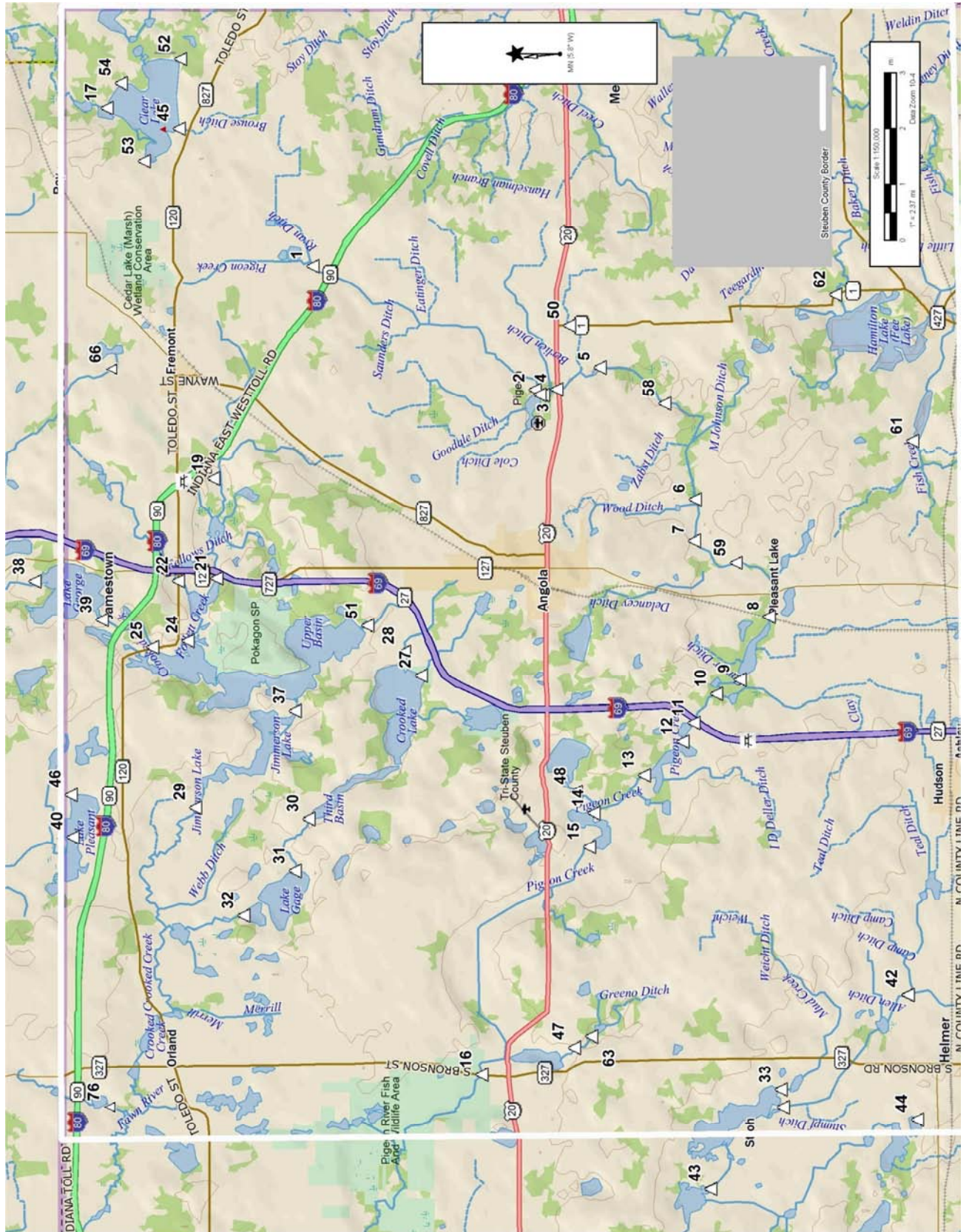


Figure 2 Sampling site map.

Sampling Site	Fawn River Funding (20)	At or near HUC 12 Outlet (10)	At or near HUC14 Outlet Site (13)	Steuben Surveyor Funding (3)	MS4 Funding (4 sites)	Pigeon 319 funded sites (16)	Clear Lake funding (2)	Included in 319 QAPP (18)	Location Description
1.			yes			yes		yes	Pigeon, East Ray Clark Road at culvert, below juncture with the Ryan Ditch.
2.						yes		yes	Pigeon Creek, Pigeon Lake Inlet.
3.						yes		yes	Pigeon Creek, Pigeon Lake Outlet.
4.		yes	yes			yes		yes	Pigeon, U.S. 20 Bridge, Below juncture with Berlien Ditch.
5.						yes		yes	Pigeon Creek, Metz Road.
6.		yes	yes		yes			yes	Pigeon Creek, Bill Deller Road.
7.					yes			yes	Pigeon Creek, Meridian Road.
8.						yes		yes	Pigeon Creek, Long Lake Inlet.
9.						yes		yes	Pigeon Creek, Long Lake Outlet.
10.		yes	yes			yes		yes	Pigeon Creek, Mud Lake Outlet just west of Long Lake, Johnson Ditch from Ashley.
11.						yes		yes	Pigeon Creek, Big Bower Lake Inlet.
12.						yes		yes	Pigeon Creek, Big Bower Lake Outlet/Golden Lake Inlet.
13.						yes		yes	Pigeon Creek, Golden Lake Outlet.
14.						yes		yes	Pigeon Creek, Hogback Lake Inlet.
15.		yes	yes			yes		yes	Pigeon Creek, Hogback Lake Outlet.
16.		yes*	yes*			yes		yes	Pigeon Creek at 327.
17.			yes						Clear Lake Outlet.
18.									Discontinued in 2013. Hamilton Lake.
19.	yes								Crane Marsh Outlet, (tributary to Marsh Lake).
20.	yes								Deller Ditch (Tributary to Marsh Lake).
21.	yes								Follet Creek, Little Otter Lake Inlet.
22.	yes								Walter's Lakes Drain (tributary to Big Otter Lake).
23.	yes								Follet Creek, Big Otter Lake Outlet.
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 Creek (Jimmerson outlet at Nevada Mills).
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.									Discontinued in 2011. Fox Lake Outlet.
36.	yes	yes	yes						Crooked Creek (Snow Lake outlet, Inlet to James).
37.	yes								Crooked Creek (James Outlet, Jimmerson Inlet at 4 corners).
38.	yes								Lake George NE tributary (from Silver Lake).
39.	yes		yes						Crooked Creek (Lake George Outlet).
40.									Lake Pleasant.
41.									Discontinued in 2013. Ball Lake.
42.		yes	yes						Turkey Ck at 700S east of 800W, below Little Turkey and Deetz Ditch juncture.
43.		yes*	yes*						Big Turkey Outlet at 350S on curve north of Stroh or west of Turkey Lake Tavern.
44.									Trib. To McClish Lake (east end).
45.									Trib. To Clear Lake (Cyrus Brouse Ditch).
46.									Trib. To Lake Pleasant (East End).
47.									Trib. To West Otter (Between Arrowhead and Otter).
48.									Trib. Between Silver and Hogback.
49.									Discontinued in 2013. Trib. To Snow Lake (Pokagon State Park).
50.									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).
55.	yes								Walter's Lake Drain at 660 North.
56.									Discontinued in 2013. Steuben Regional Waste District Effluent (Trib. to Pigeon).
57.									Discontinued in 2012 Crooked Lake Third Basin.
58.					yes				Pigeon Creek at Hanselman.
59.					yes				Pigeon Creek at 400 South.
60.									Discontinued in 2013. Fish Lake (Fremont).
61.				yes					Tributary to Ball Lake.
62.				yes					Black Creek, Tributary to Hamilton Lake.
63.									Tributary just downstream of Arrowhead Lake.
66.									Tributary Stream from Fish Lake at Fremont Road, just N of 700N
76.									Tributary Stream from Lime Lake at Lime Lk. Rd., W of 1025W

Table 1 Descriptions of numbered sampling sites.

Site	Sampling Date	E-coli	CFM	Total Phos.	TP Loading kg/day	Nitrogen	N Loading kg/day	TKN	TKN Loading kg/day	TSS	TSS	D.O.	pH	Temp (C)	Specific Conductance	Post rain event *
		(CFU or colonies/100 ml)		(ppm)		Nitrate +Nitrite (ppm)		(ppm)		Loading kg/day						
1	1/30/2014	44	316.40	0.026	0.34	4.87	62.84	<2.00	nd	4.0	51.61	14.28	7.70	1.9	855.42	
2	1/30/2014	26	669.55	0.019	0.52	4.62	126.15	<2.00	nd	3.0	81.91	16.03	7.85	2.0	807.38	
3	1/30/2014	56	nd	0.071	nd	7.2	nd	<2.00	nd	2.8	nd	13.13	7.78	1.4	733.2	
4	1/24/2014	56	962.85	0.064	2.51	6.95	272.90	<2.00	nd	2.4	94.24	13.07	7.74	1.9	756.28	
5	1/27/2014	20	979.69	0.044	1.76	5.93	236.92	<2.00	nd	<2.00	nd	15.69	7.67	1.9	763.61	
6	1/27/2014	70	nd	0.035	nd	5.09	nd	<2.00	nd	<2.00	nd	12.27	7.55	1.7	763.28	
7	1/27/2014	79	nd	0.038	nd	5.38	nd	<2.00	nd	<2.00	nd	10.79	7.57	1.7	875.72	
8	1/28/2014	35	2380.32	0.029	2.82	4.86	471.77	<2.00	nd	<2.00	nd	12.55	7.59	1.5	874.55	
9	1/28/2014	21	1494.74	0.050	3.05	5.99	365.13	<2.00	nd	<2.00	nd	8.98	7.68	0.7	842.37	
10	1/28/2014	83	nd	0.050	nd	5.58	nd	<2.00	nd	<2.00	nd	9.05	7.69	0.7	865.32	
11	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	
12	1/28/2014	20	3176.23	0.050	6.48	5.82	753.86	<2.00	nd	2.0	259.06	8.11	7.71	0.5	874.73	
13	1/29/2014	19	nd	0.051	nd	6.09	nd	<2.00	nd	<2.00	nd	10.41	7.70	0.8	813.53	
14	1/29/2014	65	2811.51	0.050	5.73	6.07	695.96	<2.00	nd	2.2	252.24	7.8	7.63	0.4	806.39	
15	1/29/2014	10	3644.97	0.047	6.99	5.15	765.52	<2.00	nd	<2.00	nd	7.8	7.68	0.5	812.89	
16	1/29/2014	56	5061.89	0.028	5.78	4.32	891.77	<2.00	nd	2.6	536.71	9.43	7.83	0.9	762.29	
17	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	
18	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	

Table 2 January data for the Pigeon Creek watershed. Sites 17 and 18 in this table correspond to SCLC sites 33 and 34 respectively. 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 10).

Site	Sampling Date	E-coli	CFM	Total Phos.	Nitrate	TSS	TDS	D.O.	pH	Temp (C)	Turbidity
		(CFU or colonies/100 ml)		(ppm)	(ppm)	(ppm)	(ppm)	(ppm)			(NTU)
19	1/23/2014	0	nd	0.07	0.8	2	909	10.05	7.98	4.1	1
21	1/23/2014	0	5.35	0.1	0.9	2.0	734	8.78	7.98	4.3	1
22	1/23/2014	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd
24	1/23/2014	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd
25	1/23/2014	0	2.01	0.0	0.7	0.0	439	10.34	8.21	4.1	0
27	1/23/2014	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd
28	1/23/2014	0	nd	0.1	0.6	4.0	509	10.88	7.64	4.6	3
29	1/23/2014	1	nd	0.1	0.5	1.0	484	11.21	8.13	4.9	1
30	1/23/2014	0	nd	0.1	0.5	3.0	498	8.55	7.51	4.5	1
31	1/23/2014	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd
32	1/23/2014	0	nd	0.0	0.7	2.0	479	10.67	7.91	4.7	1
37	1/23/2014	0.00	nd	0.0	0.50	0.0	507	10.14	7.93	5.9	0
38	1/23/2014	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd
39	1/23/2014	0	nd	0.0	1.1	1.0	375	10.56	8.23	3.9	1
51	1/23/2014	0	nd	0.1	0.6	4.0	761	10.45	7.99	5.1	3
66	1/23/2014	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd
76	1/22/2014	0	nd	0.12	2.6	3	535	11.09	8.41	4.2	2

Table 3 January data for the Fawn River watershed. An “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 10).

Site	Sampling Date	E-coli (CFU or colonies/100 ml)	CFM	Total Phos. (ppm)	T.P. Loading kg/day	Nitrogen, Nitrate +Nitrite (ppm)	N Loading kg/day	TKN (ppm)	TKN Loading kg/day	TSS (ppm)	TSS Loading kg/day	D.O.	pH	Temp (C)	Specific Conductance	Post rain event *
1	2/24/2014	360	2281.26	0.371	34.51	10.8	1004.74	2.89	268.86	17.6	1637.36	8.85	7.11	1.9	565.3	
2	2/24/2014	340	3614.94	0.232	34.20	9.14	1347.42	2.53	372.97	17.2	2535.63	10.46	7.44	1.5	547.8	
3	2/24/2014	350	nd	0.174	nd	7.67	nd	2.24	nd	12.8	nd	nd	7.46	2.5	507.0	
4	2/24/2014	380	nd	0.174	nd	7.52	nd	2.15	nd	12.0	nd	10.47	7.47	2.0	500.3	
5	2/24/2014	160	6776.15	0.16	44.21	8.04	2221.75	2.57	710.19	10.0	2763.37	9.85	7.46	1.6	532.0	
6	2/24/2014	178	nd	0.123	nd	7.14	nd	2.21	nd	4.4	nd	9.52	7.43	1.6	366.0	
7	2/24/2014	470	nd	0.127	nd	7.3	nd	7.3	nd	6.0	nd	10.2	7.46	2.2	nd	
8	2/24/2014	290	nd	0.134	nd	6.95	nd	2.03	nd	24.6	nd	11.35	7.55	2.3	559.0	
9	2/24/2014	220	nd	0.106	nd	6.31	nd	2.04	nd	7.2	nd	10.55	7.58	2.4	599.0	
10	2/24/2014	470	nd	0.116	nd	9.54	nd	<2.00	nd	8.3	nd	9.65	7.3	3.0	401.5	
11	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	
12	2/26/2014	214	nd	0.095	nd	6.73	nd	<2.00	nd	5.4	nd	10.38	7.58	0.6	621.4	
13	2/28/2014	167	nd	0.076	nd	5.86	nd	<2.00	nd	4.2	nd	10.82	7.61	1.6	693.1	
14	2/28/2014	145	12966.48	0.072	38.07	5.76	3045.79	<2.00	nd	3.8	2009.38	10.63	7.61	0.9	703.4	
15	2/28/2014	128	13927.68	0.078	44.30	4.92	2794.47	<2.00	nd	4.2	2385.52	10.45	7.67	0.9	749.3	
16	2/26/2014	129	nd	0.055	nd	4.32	nd	<2.00	nd	5.6	nd	10.84	7.82	2.1	678.5	
17	2/26/2014	196	nd	0.062	nd	7.5	nd	<2.00	nd	2.6	nd	11.77	7.78	1.7	592.1	
18	2/28/2014	91	2476.96	0.088	8.89	6	606.07	<2.00	nd	4.1	414.15	11.07	7.7	1.6	673.9	

Table 4 February data for the Pigeon Creek watershed. Sites 17 and 18 in this table correspond to SCLC sites 33 and 34 respectively. 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 10).

Site	Sampling Date	E-coli (CFU or colonies/100 ml)	CFM	Total Phos. (ppm)	Nitrate (ppm)	TSS (ppm)	TDS (ppm)	D.O. (ppm)	pH	Temp (C)	Turbidity (NTU)
19	2/26/2014	0	nd	0.05	0.1	1	894	10.21	8.13	3.9	1
21	2/26/2014	0	4.781	0.05	0.8	1	725	8.98	8.03	4.1	1
22	2/26/2014	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd
24	2/26/2014	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd
25	2/26/2014	0	1.978	0.04	0.5	0	467	10.44	8.19	3.1	0
27	2/26/2014	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd
28	2/26/2014	0	nd	0.06	0.6	2	494	10.88	7.59	4.1	3
29	2/26/2014	0	nd	0.03	0.5	1	487	11.32	8.15	3.9	1
30	2/26/2014	0	nd	0.03	0.5	3	499	9.13	7.49	3.5	1
31	2/26/2014	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd
32	2/26/2014	0	nd	0.03	0.6	3	487	10.88	7.89	4.1	1
37	2/26/2014	0	nd	0.03	0.4	0	501	10.27	7.87	4.4	0
38	2/26/2014	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd
39	2/26/2014	0	nd	0.04	0.9	1	375	10.65	8.21	3.8	1
51	2/26/2014	0	nd	0.04	0.6	3	787	10.41	8.00	4.5	3
66	2/26/2014	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd
76	2/25/2014	0	nd	0.11	2.5	4	549	11.09	8.39	4.3	2

Table 5 February data for the Fawn River watershed. An “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 10).

Site	Sampling Date	E-coli	CFM	Total Phos.	Nitrate	TSS	TDS	D.O.	pH	Temp (C)	Turbidity
		(CFU or colonies/100 ml)		(ppm)							(ppm)
19	3/20/2014	250	nd	0.17	2.5	15	491	11.1	7.86	2.6	8
21	3/20/2014	0	12.839	0.06	0.1	4	678	9.00	7.97	3.6	2
22	3/20/2014	100	nd	0.08	1.7	3	580	9.63	7.84	2	1
24	3/20/2014	0	nd	0.08	1.4	3	684	9.38	7.83	3.1	3
25	3/20/2014	100	5.604	0.1	1.5	0	415	10.56	7.98	4.2	0
27	3/20/2014	250	nd	0.09	2.3	4	412	10.76	7.6	2.8	0
28	3/20/2014	0	nd	0.08	0.9	4	500	10.32	7.83	3.8	3
29	3/20/2014	0	nd	0.05	1.2	2	508	10.65	8.03	3.8	2
30	3/20/2014	0	nd	0.06	1.0	4	447	9.27	7.79	4.5	1
31	3/20/2014	50	nd	0.06	1.1	2	446	11.15	7.88	3.8	2
32	3/20/2014	0	nd	0.04	1.5	1	405	10.72	8.08	4.1	1
37	3/20/2014	0	nd	0.04	1.4	1	523	10.31	7.93	3.3	2
38	3/20/2014	200	nd	0.08	1.1	0	406	10.56	7.86	3.2	1
39	3/20/2014	0	nd	0.08	1.4	1	402	11.37	7.95	4.2	1
51	3/20/2014	0	nd	0.05	1.2	5	856	10.68	7.53	4.4	3
66	3/20/2014	300	nd	0.19	2.1	10	234	10.67	8.15	3.6	9
76	3/20/2014	100	nd	0.16	3.5	6	587	10.97	8.28	5.5	3

Table 6 March data for the Fawn River watershed. An “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 10).

Site	Sampling Date	E-coli	CFM	Total Phos.	Nitrate	TSS	TDS	D.O.	pH	Temp (C)	Turbidity
		(CFU or colonies/100 ml)		(ppm)							(ppm)
19	4/22/2014	0	nd	0.2	1.8	8	684	8.63	8.07	13.4	1
21	4/22/2014	0	26.352	0.12	1.7	3	626	9.05	8.27	12.4	2
22	4/22/2014	0	nd	0.1	0.9	3	815	7	7.84	12.9	0
24	4/22/2014	0	nd	0.16	3	5	621	11.95	8.45	12.6	3
25	4/22/2014	0	11.397	0.15	1.6	4	416	9.72	8.42	13.2	2
27	4/22/2014	200	nd	0.3	1.9	17	499	7.85	7.85	12.7	8
28	4/22/2014	0	nd	0.13	1.8	11	793	8.24	7.83	13.5	2
29	4/22/2014	0	nd	0.10	1.9	4	499	10.30	8.33	14.1	1
30	4/22/2014	100	nd	0.14	1.5	8	400	8.59	7.91	14.5	2
31	4/22/2014	0	nd	0.15	1.3	7	408	8.57	7.96	14.3	5
32	4/22/2014	0	nd	0.06	0.8	7	858	9.41	7.87	14.2	0
37	4/22/2014	0	nd	0.19	1.1	4	532	10.17	8.29	10.0	1
38	4/22/2014	100	nd	0.13	1.4	5	385	7.36	8.13	13.7	1
39	4/22/2014	0	nd	0.09	0.9	1	396	10.32	8.42	11.9	0
51	4/22/2014	0	nd	0.16	1.4	7	860	8.20	8.00	12.3	5
66	4/22/2014	0	nd	0.18	1.9	9	362	6.88	8.37	13.3	4
76	4/21/2014	0	nd	0.14	2.3	4	577	10.17	8.14	12.4	2

Table 7 April data for the Fawn River watershed. An “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 10).

Site	Date	E-coli	CFM	Total Phos.	Total Phos.	Nitrogen, Nitrate +Nitrite	Nitrogen Loading	TKN	TKN Loading	TSS	TSS	D.O.	pH	Temp (C)	Specific Conductance	Post rain event *
		(CFU or colonies /100 ml)		(ppm)	Loading (kg/day)	(ppm)	(kg/day)	(ppm)	(kg/day)	(ppm)	Loading (kg/day)					
1	5/27/2014	260	33178	0.066	0.89	2.34	3166	0.970	13.12	21	284.14	8.79	7.7	19.4	730	*
2	5/27/2014	400	779.33	0.058	1.84	2.53	80.41	0.860	27.33	11	349.60	8.45	7.9	20.5	684	*
3	5/27/2014	33	1505.06	0.041	2.52	4.47	274.36	0.855	52.48	2.8	171.86	8.37	8	23.2	630	*
4	5/27/2014	176	657.07	0.06	1.61	3.96	106.11	0.912	24.44	10	267.96	8.68	8	23.5	679	*
5	5/27/2014	145	1647.44	0.05	3.36	3.76	252.61	0.905	60.80	4.6	309.05	8.41	8	23	680	*
6	5/27/2014	164	3639.82	0.062	9.20	3.46	153.58	0.925	137.30	6.9	1024.20	7.65	8	23.3	653	*
7	5/27/2014	273	2937.79	0.09	10.78	3.68	440.88	0.918	109.98	16	1916.89	7.86	7.9	23.3	751	*
8	5/27/2014	196	1188.42	0.08	3.88	3.3	159.93	0.885	42.89	10	484.65	8.29	8	23.2	724	*
9	5/29/2014	54	4161.40	0.039	6.62	3.6	610.94	0.872	147.98	7.6	1289.76	7.21	8.1	21.6	684	
10	5/29/2014	50	nd	0.051	nd	4.03	nd	0.908	nd	5.8	nd	7.2	8	21.1	735	
11	5/29/2014	78	nd	0.061	nd	3.73	nd	0.938	nd	6.5	nd	6.44	7.9	21.6	712	
12	5/29/2014	55	4004.25	0.067	10.94	3.73	609.10	0.945	154.32	3.6	587.87	7.34	8.1	22.1	703	
13	5/29/2014	6	nd	0.036	nd	4.09	nd	0.895	nd	<2.0	nd	7.44	8.1	22.7	666	
14	5/29/2014	46	3642.94	0.05	7.43	4.02	597.22	0.915	135.93	7	1039.93	6.95	8	22.6	664	
14D	5/29/2014	52	3286.56	0.062	8.31	3.99	534.77	0.892	119.55	7.8	1045.42	6.74	8	22.4	664	
15	5/29/2014	11	5874.10	0.057	13.65	3.3	790.52	0.705	168.88	2	479.10	7.85	8.3	23.9	644	
15D	5/29/2014	4	6258.03	0.032	8.17	3.28	837.08	0.712	181.71	2.2	561.46	7.87	8.3	23.9	644	
16	5/29/2014	37	8452.41	0.056	19.30	2.92	1006.51	0.702	241.98	4.2	1447.72	7.61	8.2	23.6	640	
17 SCLC	5/21/2014	4	707.62	0.012	0.35	nd	nd	nd	nd	<10	nd	9.28	8.4	21	339.8	*
33 (17-319)	5/29/2014	21	437.40	0.031	0.55	3.43	61.18	0.685	12.22	2.2	39.24	9.14	8.4	24.5	620	
34 (18-319)	5/29/2014	29	1496.49	0.042	2.56	3.44	209.94	0.615	37.53	2.6	158.67	11.8	8.5	24.2	668	
40	5/21/2014	2	lake site	0.016	nd	nd	nd	nd	nd	<2.0	nd	9.38	8.4	19	421.1	
42	5/30/2014	117	704.55	0.055	1.58	nd	nd	nd	nd	4.2	120.67	9.36	8.2	23.2	699	
43	5/30/2014	94	2396.32	0.026	2.54	nd	nd	nd	nd	<2.0	nd	7.83	8.3	27.1	585	
44	5/30/2014	108	35.65	0.03	0.04	nd	nd	nd	nd	3.6	5.23	7.45	7.7	19.8	737	
45	5/21/2014	160	nd	0.034	nd	nd	nd	nd	nd	3.2	nd	9.85	7.8	16	614	*
46	5/21/2014	1670	3148	0.013	0.02	nd	nd	nd	nd	<2.0	nd	7.25	7.4	13.5	609	*
47	5/21/2014	313	1169.96	0.044	2.10	nd	nd	nd	nd	3.4	162.22	9.34	8.2	22.3	497.7	*
48	5/21/2014	22	508.03	0.017	0.35	nd	nd	nd	nd	2.4	49.72	8.82	8.2	22.4	453	
50	5/21/2014	1203	259.28	0.645	6.82	nd	nd	nd	nd	61	644.99	6.78	7.4	17.7	459.7	*
52	5/21/2014	245	146.51	0.075	0.45	nd	nd	nd	nd	18	10.75	6.59	7.7	20.3	548	*
53	5/21/2014	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	*
54	5/21/2014	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	*
58	5/27/2014	176	1356.41	0.051	2.82	nd	nd	nd	nd	4.8	265.51	9.62	8.1	23	665	*
59	5/27/2014	220	1318.28	0.084	4.52	nd	nd	nd	nd	13	698.89	8.01	8	23.4	740	*
61	5/21/2014	>2419.6	1448.05	0.648	38.27	nd	nd	nd	nd	80	4724.21	8.54	7.6	17.8	384.2	*
61	5/23/2014	152	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	
62	5/21/2014	>2419.6	1044.50	0.557	23.73	nd	nd	nd	nd	120	5111.47	8.81	7.7	18.3	434.1	*
62	5/23/2014	453	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	
63	5/21/2014	220	nd	0.035	nd	nd	nd	nd	nd	2	nd	10.1	8.1	21.5	486.5	*

Table 8 May data for the Pigeon Creek watershed and other SCLC sites. An “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 10).

Site	Sampling Date	E-coli	CFM	Total Phos.	Nitrate	TSS	TDS	D.O.	pH	Temp (C)	Turbidity
		(CFU or colonies/100 ml)									
19	5/28/2014	200	nd	0.28	2.1	8	794	8.05	8.12	21.5	5
21	5/28/2014	0	6.21	0.21	1.7	0	668	8.02	8.14	22.9	2
22	5/28/2014	0	nd	0.32	1.1	4	677	3.92	7.76	21.7	2
24	5/28/2014	100	nd	0.16	1.2	1	640	8.73	8.17	24	3
25	5/28/2014	0	6.107	0.22	0.9	3	426	6.51	8.15	6.5	2
27	5/28/2014	1500	nd	0.41	1.8	16	496	7.2	7.94	21.3	8
28	5/28/2014	100	nd	0.34	1.6	9	700	9.65	8.25	21.9	9
29	5/28/2014	0	nd	0.13	0.8	0	509	8.51	8.26	24.2	2
30	5/28/2014	300	nd	0.29	1.1	7	438	6.72	7.98	23.8	3
31	5/28/2014	100	nd	0.26	0.9	6	445	7.7	8.17	23.2	6
32	5/28/2014	0	nd	0.11	1.6	3	430	7.97	8.26	24.0	3
37	5/28/2014	0	nd	0.13	0.9	3	525	10.03	8.44	21.8	2
38	5/28/2014	0	nd	0.17	0.8	3	388	6.43	7.85	24.9	1
39	5/28/2014	1.1	nd	0.35	1.1	10	3	3.97	8.28	23.3	100
51	5/28/2014	400	nd	0.23	1.2	1	803	10.12	8.28	18.7	4
66	5/28/2014	100	nd	0.37	1	8	354	6.49	8.03	24.9	3
76	5/28/2014	0	nd	0.13	4.1	37	489	8.26	7.96	23.0	15

Table 9 May data for the Fawn River watershed. An “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 10).

Site	Sampling Date	E-coli	CFM	Total Phos.	Nitrate	TSS	TDS	D.O.	pH	Temp (C)	Turbidity
		(CFU or colonies/100 ml)									
19	6/26/2014	100	nd	0.4	1.2	18	893	7.74	8	21.8	5
21	6/26/2014	0	17.487	0.05	0.9	4	689	11.88	8.23	25.0	2
22	6/26/2014	0	nd	0.56	0.9	6	740	4.33	7.85	21.7	3
24	6/26/2014	0	nd	0.18	1.2	10	692	9.45	8.37	25.6	5
25	6/26/2014	0	11.081	0.28	1.4	3	384	6.56	8.04	25.1	1
27	6/26/2014	300	nd	0.27	2.8	11	546	7.65	7.99	20.3	4
28	6/26/2014	100	nd	0.31	1.8	8	575	5.74	7.89	22.1	4
29	6/26/2014	0	nd	0.11	0.2	1	453	10.02	8.45	25.4	2
30	6/26/2014	100	nd	0.12	0.8	14	433	6.67	7.92	24.4	6
31	6/26/2014	100	nd	0.16	2.2	20	447	7.49	8.07	23.6	7
32	6/26/2014	300	nd	0.07	0.8	6	414	7.56	8.18	25.4	3
37	6/26/2014	100	nd	0.11	0.3	4	504	9.57	8.36	25.1	3
38	6/26/2014	0	nd	0.27	0.7	5	366	5.41	7.69	24.4	3
39	6/26/2014	0	nd	0.14	0.2	10	363	8.24	8.41	26.2	1
51	6/26/2014	150	nd	0.14	0.4	3	679	8.18	7.98	19.8	3
66	6/26/2014	800	nd	0.42	0.6	18	345	6.34	7.92	24.5	9
76	6/26/2014	0	nd	nd	nd	nd	548	8.19	8.13	25.1	4

Table 10 June data for the Fawn River watershed. An “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 10).

Site	Date	E-coli	CFM	Total Phos.	Total Phos.	Nitrogen, Nitrate +Nitrite	Nitrogen Loading	TKN	TKN Loading	TSS	TSS	D.O.	pH	Temp (C)	Specific Conductance
		(CFU or colonies/100 ml)		(ppm)	Loading					(ppm)	(kg/day)				
17	7/28/14	103.4	nd	0.018	nd	nd	nd	nd	nd	2.3	nd	7.39	8.72	23.3	303.3
33	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd
34	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd
40	7/29/14	1	lake site	0.015	nd	nd	nd	nd	nd	1.8	nd	7.19	8.55	23.1	400.1
42	7/29/14	373	202.42	0.057	0.47	nd	nd	nd	nd	2.3	18.99	10.61	8.21	17	742
43	7/29/14	34.4	583.59	0.031	0.74	nd	nd	nd	nd	1.8	42.84	8.44	8.21	22.8	523
44	7/29/14	306.6	17.89	0.019	0.01	nd	nd	nd	nd	1.7	1.24	9.91	7.8	15.8	755
45	7/28/14	3,534.00	nd	0.059	nd	nd	nd	nd	nd	8.2	nd	7.37	7.78	16.9	832
46	7/29/14	86.3	26.44	0.014	0.02	nd	nd	nd	nd	2.1	2.26	8.33	7.59	13.7	632
47	7/29/14	nd	no flow	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd
48	7/29/14	nd	no flow	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd
50	7/28/14	nd	no flow	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd
52	7/28/14	nd	no flow	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd
53	7/28/14	27	3.63	0.066	0.01	nd	nd	nd	nd	3.2	0.47	7.13	7.27	15.2	573
54	7/28/14	570.5	nd	0.103	nd	nd	nd	nd	nd	nd	nd	4.95	7.32	20.2	394.4
58	7/28/14	299.6	385.45	0.053	0.83	nd	nd	nd	nd	5.4	84.88	8.5	8.31	22.1	734
59	7/28/14	446.3	401.86	0.083	1.36	nd	nd	nd	nd	5.4	88.50	8.37	8.18	21.5	1143
61	7/28/14	278.1	93.41	0.049	0.19	nd	nd	nd	nd	2.2	8.38	8.48	8.19	18	669
62	7/28/14	338.5	4.75	0.059	0.01	nd	nd	nd	nd	2	0.39	8.5	8	18.9	725
63	7/29/14	nd	no flow	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd

Table 11 July data for SCLC sites. An “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 10).

Site	Sampling Date	E-coli	CFM	Total Phos.	Nitrate	TSS	TDS	D.O.	pH	Temp (C)	Turbidity
		(CFU or colonies/100 ml)		(ppm)	(ppm)	(ppm)	(ppm)	(ppm)			(NTU)
19	7/30/2014	400	nd	0.3	0.9	9	891	11.71	8.11	18.3	5
21	7/30/2014	0	12.164	0.17	0.2	3	733	9.27	8.04	20.5	2
22	7/30/2014	150	nd	0.22	0.9	4	727	4.48	7.89	18	2
24	7/30/2014	50	nd	0.08	0.6	3	659	10.38	8.07	22	2
25	7/30/2014	0	7.781	0.22	1.1	1	430	4.74	7.69	22.0	1
27	7/30/2014	300	nd	0.51	0.8	3	625	9.28	7.98	16.9	2
28	7/20/2014	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd
29	7/30/2014	50	nd	0.17	0.6	4	529	6.11	7.84	22.0	2
30	7/30/2014	250	nd	0.25	0.5	8	482	5.21	7.78	18.2	2
31	7/30/2014	250	nd	0.12	2.3	1	608	8.74	8.36	16.7	1
32	7/30/2014	0	nd	0.15	0.2	5	427	7.30	8.23	22.0	3
37	7/30/2014	50	nd	0.25	0.7	5	515	13.09	8.31	21.6	3
38	7/30/2014	400	nd	0.22	1.3	2	378	8.92	8.25	19.3	2
39	7/30/2014	0	nd	0.29	0.8	1	412	7.71	8.02	22.1	2
51	7/30/2014	100	nd	0.42	1.7	6	735	8.84	8.07	16.5	4
66	7/30/2014	500	nd	0.9	0.9	76	400	9.48	8.11	22	32
76	7/30/2014	0	nd	0.17	3.0	5	541	9.04	8.22	21.8	4

Table 12 July data for the Fawn River watershed. An “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 10).

Site	Date	E-coli (CFU or colonies/100 ml)	CFM	Total Phos. (ppm)	Total Phos. Loading (kg/day)	Nitrogen, Nitrate +Nitrite (ppm)	Nitrogen Loading (kg/day)	TKN (ppm)	TKN Loading (kg/day)	TSS (ppm)	TSS Loading (kg/day)	D.O.	pH	Temp (C)	Specific Conductance
1	8/26/14	390	149.79	0.044	0.27	0.529	3.23	0.628	3.84	5.8	35.43	7.73	7.89	19.0	815.0
2	8/26/14	230	124.49	0.029	0.15	0.51	2.59	0.673	3.42	2.6	13.20	7.29	8.02	20.9	810.0
3	8/26/14	46	260.41	0.037	0.39	0.339	3.60	1.03	10.94	6.8	72.21	8.19	8.38	26.3	582.0
4	8/26/14	90	242.93	0.056	0.55	0.402	3.98	1.16	11.49	5.1	50.53	5.42	7.77	25.0	662.0
5	8/26/14	72	241.18	0.061	0.60	0.292	2.87	1.06	10.43	4.4	43.28	9.18	8.02	25.1	671.0
6	8/26/14	843	378.64	0.064	0.99	0.519	8.01	1.22	18.84	5.8	89.56	5.95	8.1	23.9	685.0
7	8/26/14	1435	1032.47	0.111	4.67	3.38	142.31	1.03	43.37	13	547.36	5.73	8.01	24.4	1206.0
8	8/26/14	290	406.3	0.07	1.16	2.27	37.61	0.917	15.19	5.4	89.47	6.58	8.02	23.2	969.0
9	8/27/14	68	461.02	0.071	1.33	0.291	5.47	1.15	21.62	14	263.21	11.98	8.67	25.4	669.0
10	8/27/14	65	1205.63	0.069	3.39	0.32	15.73	0.973	47.84	9.6	472.00	8.82	8.24	25.2	719.0
11	8/27/14	70	nd	0.049	nd	0.432	nd	1.07	nd	3.2	nd	7.77	8.12	25.7	711.0
12	8/27/14	12	652.21	0.06	1.60	0.33	8.78	1.03	27.40	5.4	143.63	8.76	8.38	26.4	724.0
13	8/27/14	11	nd	0.063	nd	0.305	nd	0.972	nd	12	nd	12.9	8.88	27.4	604.0
14	8/27/14	147	774.46	0.061	1.93	0.436	13.77	0.98	30.95	3.8	120.02	6.98	8.03	26.3	617.0
15	8/27/14	16	1178.31	0.056	2.69	0.316	15.18	1.428	68.62	11	528.58	8.82	8.65	26.8	591.0
16	8/28/14	250	1912.69	0.031	2.42	0.151	11.78	0.71	55.69	2	156.00	7.8	8	19.9	657.0
17	8/25/14	15.8	131.9	0.024	0.13	nd	nd	nd	nd	2.6	13.99	6.72	8.22	24.8	343.7
33	8/28/14	47	low flow	0.026	nd	0.367	nd	0.697	nd	2.4	nd	8.33	8.25	24.5	556.0
34	8/28/14	520	374.87	0.094	1.44	1.36	20.79	0.58	8.87	2	30.57	7.86	8.02	21.6	655.0
40	8/28/14	12.9	lake site	0.015	nd	nd	nd	nd	nd	2.2	nd	nd	8.62	25.5	425.3
42	8/28/14	524.6	110.17	0.097	0.44	nd	nd	nd	nd	2.5	11.23	8.44	7.92	20.5	675
43	8/28/14	42.4	557.55	0.018	0.41	nd	nd	nd	nd	1.3	29.56	8.66	8.15	26.1	516
44	8/28/14	913.5	10.19	0.027	0.01	nd	nd	nd	nd	2.3	0.96	8.27	7.8	21.5	779
45	8/25/14	416	nd	0.044	nd	nd	nd	nd	nd	5.5	nd	7.53	7.72	18.3	881
46	8/28/14	126	15.61	0.018	0.01	nd	nd	nd	nd	1.6	1.02	5.77	7.58	15	657
47	8/28/14	nd	no flow	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd
48	8/28/14	nd	no flow	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd
50	8/25/14	nd	no flow	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd
52	8/25/14	nd	no flow	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd
53	8/25/14	21.5	2.29	0.076	0.01	nd	nd	nd	nd	3.2	0.30	7.64	7.23	15.3	591
54	8/25/14	nd	low flow	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd
58	8/26/14	620.2	398.72	0.072	1.17	nd	nd	nd	nd	7.6	123.58	7.28	8.25	24.1	675
59	8/26/14	391.2	394.72	0.093	1.50	nd	nd	nd	nd	6.8	109.46	5.83	7.96	24	1156
61	8/25/14	1625.1	73.66	0.129	0.39	nd	nd	nd	nd	6.7	20.13	7.63	8.07	20.9	707
62	8/25/14	1532.9	35.05	0.058	0.08	nd	nd	nd	nd	3.3	4.72	7.39	7.85	21	811
63	8/25/14	138.9	2.08	0.075	0.01	nd	nd	nd	nd	2	0.17	5.33	7.55	25.7	575

Table 13 August data for the Pigeon Creek watershed and other SCLC sites. An “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 10).

Site	Sampling Date	E-coli	CFM	Total Phos.	Nitrate	TSS	TDS	D.O.	pH	Temp (C)	Turbidity
		(CFU or colonies/100 ml)									
19	8/28/2014	300	nd	0.24	0.9	10	865	9.88	8.12	18.1	4
21	8/28/2014	50	6.721	0.09	0.5	3	729	8.45	7.99	19.8	2
22	8/28/2014	150	nd	0.22	0.7	4	721	4.01	7.87	17.8	2
24	8/28/2014	100	nd	0.11	0.6	3	651	9.57	8.07	22.1	2
25	8/28/2014	0	3.591	0.19	0.9	2	431	4.47	7.65	21.5	1
27	8/28/2014	300	nd	0.39	0.9	4	621	8.45	7.98	16.5	2
28	8/28/2014	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd
29	8/28/2014	50	nd	0.16	0.7	4	487	6.34	8.17	21.7	2
30	8/28/2014	250	nd	0.21	0.5	8	491	4.95	7.78	17.9	3
31	8/28/2014	300	nd	0.15	2.1	2	587	8.71	8.29	16.5	1
32	8/28/2014	0	nd	0.08	0.4	4	421	7.43	8.13	23.5	3
37	8/28/2014	50	nd	0.15	0.7	5	509	10.23	8.31	21.3	3
38	8/28/2014	200	nd	0.23	0.9	2	378	7.65	8.13	18.8	1
39	8/28/2014	0	nd	0.15	0.6	1	383	7.57	7.96	21.6	1
51	8/28/2014	150	nd	0.31	1.5	5	731	8.67	8.07	16.3	4
66	8/28/2014	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd
76	8/28/2014	0	nd	0.19	2.7	5	548	9.16	8.19	21.6	4

Table 14 August data for the Fawn River watershed. An “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 10).

Site	Sampling Date	E-coli	CFM	Total Phos.	Nitrate	TSS	TDS	D.O.	pH	Temp (C)	Turbidity
		(CFU or colonies/100 ml)									
19	9/26/2014	200	nd	0.22	0.7	9	874	10.36	8.09	15.5	4
21	9/26/2014	50	4.598	0.12	0.6	2	731	8.71	7.93	15.4	2
22	9/26/2014	100	nd	0.17	0.8	4	703	3.99	7.92	13.5	2
24	9/26/2014	50	nd	0.08	0.7	2	643	9.87	8.12	17.2	1
25	9/26/2014	0	0.099	0.19	1.1	2	478	4.21	7.59	15.1	1
27	9/26/2014	300	nd	0.25	1.1	3	618	8.31	7.89	14.5	2
28	9/26/2014	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd
29	9/26/2014	0	nd	0.09	0.6	3	493	7.47	8.15	17.3	2
30	9/26/2014	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd
31	9/26/2014	300	nd	0.15	2.1	2	572	9.56	8.12	11.7	1
32	9/26/2014	0	nd	0.05	0.6	3	425	7.39	8.05	16.2	3
37	9/26/2014	0	nd	0.09	0.4	5	505	9.56	8.23	17.1	3
38	9/26/2014	100	nd	0.18	0.8	2	372	7.12	8.24	15.1	1
39	9/26/2014	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd
51	9/26/2014	150	nd	0.19	1.1	5	746	8.57	7.92	10.8	4
66	9/26/2014	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd
76	9/26/2014	0	nd	0.17	2.7	5	554	9.22	8.13	18.7	3

Table 15 September data for the Fawn River watershed. An “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 10).

Site	Sampling Date	E-coli (CFU or colonies/100 ml)	CFM	Total Phos. (ppm)	Nitrate (ppm)	TSS (ppm)	TDS (ppm)	D.O. (ppm)	pH	Temp (C)	Turbidity (NTU)
19	10/28/2014	0	nd	0.23	0.6	9	921	10.45	8.04	7.6	4
21	10/28/2014	0	2.01	0.11	0.6	2	727	9.27	7.89	9.8	1
22	10/28/2014	0	nd	0.11	0.9	3	701	4.87	7.88	7.9	1
24	10/28/2014	0	nd	0.08	0.6	2	657	9.87	7.99	10.2	1
25	10/28/2014	0	0.078	0.11	0.9	1	483	7.09	7.77	7.6	1
27	10/28/2014	200	nd	0.17	1.1	3	597	8.57	7.81	5.8	2
28	10/28/2014	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd
29	10/28/2014	0	nd	0.09	0.5	2	497	8.49	8.12	9.5	1
30	10/28/2014	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd
31	10/28/2014	100	nd	0.15	1.9	1	599	9.89	8.08	6.6	1
32	10/28/2014	0	nd	0.05	0.6	2	441	7.21	7.87	7.9	2
37	10/28/2014	0		0.07	0.4	2	502	9.64	8.07	11.1	1
38	10/28/2014	0	nd	0.15	0.6	2	387	8.34	8.29	7.1	1
39	10/28/2014	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd
51	10/28/2014	100	nd	0.13	0.9	5	762	9.01	7.89	7.5	3
66	10/28/2014	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd
76	10/28/2014	0	nd	0.17	2.9	3	548	9.59	8.21	11.7	2

Table 16 October data for the Fawn River watershed. An “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 10).

Site	Sampling Date	E-coli (CFU or colonies/100 ml)	CFM	Total Phos. (ppm)	Nitrate (ppm)	TSS (ppm)	TDS (ppm)	D.O. (ppm)	pH	Temp (C)	Turbidity (NTU)
19	11/24/2014	100	nd	0.45	1.8	19	882	10.47	8.09	7.3	9
21	11/24/2014	0	21.017	0.23	0.9	11	719	9.13	7.95	9.4	6
22	11/24/2014	0	nd	0.23	1.4	10	729	7.72	7.83	7.3	8
24	11/24/2014	0	nd	0.07	0.6	1	649	9.93	7.95	7.6	1
25	11/24/2014	0	7.392	0.24	1.1	3	474	8.56	8.26	7.3	5
27	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd
28	11/24/2014	0	nd	0.43	2.1	39	734	8.45	7.73	6.1	15
29	11/24/2014	0	nd	0.09	0.5	1	483	9.21	8.15	7.9	0
30	11/24/2014	200	nd	0.26	0.8	7	487	7.62	7.59	5.8	3
31	11/24/2014	0	nd	0.15	2.1	6	581	10.12	7.94	6.3	4
32	11/24/2014	0	nd	0.04	0.6	2	437	10.69	7.96	6.8	2
37	11/24/2014	0	nd	0.05	0.4	1	517	9.73	8.11	10.3	0
38	11/24/2014	0	nd	0.11	0.6	2	385	8.77	8.27	6.7	3
39	11/24/2014	0	nd	0.09	0.6	2	361	10.67	8.12	6.1	2
51	11/24/2014	100	nd	0.21	1.4	11	757	9.33	7.83	6.9	6
66	11/24/2014	200	nd	0.61	2.1	45	383	6.81	8.17	5.7	19
76	11/24/2014	0	nd	0.14	2.7	2	542	9.56	8.27	7.9	1

Table 17 November data for the Fawn River watershed. An “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 10).

Parameter	Target	Reference/other information
Temperature	Dependent on time of year and whether stream is designated as a cold water 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 coldwater fishery streams	Indiana Administrative Code (IAC)
	Min: 7.0 mg/L in spawning areas of coldwater 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 18 Indiana Department of Environmental Quality Table of Water Quality Targets. Standards shaded on results tables correspond to standards shaded in this table.

3. Results: January Sampling

AES Inc. sampling in January occurred at 18 sites within the Pigeon Creek watershed. January sampling results are listed in table 2. Samples collected represented baseline flow conditions. Table 18 contains a variety of stream water quality targets provided by the Indiana Department of Environmental Management (IDEM) for comparison with the 2014 season data. Also provided for comparison is table 19 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 2014 SCLC 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 2014 samples were “below average”, “average” or “above average” in terms of Indiana stream water quality. In January measurements of all parameters were within ranges normally expected. All sites conformed to the standards listed in table 12.

Sampling in January within the Fawn River watershed occurred at 11 sites. A single site exceeded the total phosphorus standard of .076 listed in table 19.

Parameter	IDEM Mean Stream Data
	St. Joseph Wtrshd 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 19 Average of IDEM-collected probabilistic Indiana stream data for the St Joseph River Watershed 2000-2005

4. Results: February Sampling

In February sampling occurred at 18 sites within the Pigeon Creek watershed. Sampling results are listed in table 4. Samples collected in represented baseline flow conditions. E-coli standards were exceeded at 8 of the 18 sites sampled. Total phosphorus standards were exceeded at 13 of the 18 sites sampled.

Sampling in February within the Fawn River watershed occurred at 11 sites. Results are listed in table 5. A single site exceeded the total phosphorus standard of .076 listed in table 19.

5. Results: March Sampling

In March sampling occurred at 11 sites within Fawn River watershed. Sampling results are listed in table 6. E-coli standards were exceeded at 3 of the 11 sites sampled. Total phosphorus standards were exceeded at 10 of the 11 sites sampled.

6. Results: April Sampling

In April sampling occurred at 17 sites within Fawn River watershed. Sampling results are listed in table 7. Total phosphorus standards were exceeded at 16 of the 17 sites sampled.

7. Results: May Sampling

May sampling occurred at 38 sites within the Pigeon River watershed and other SCLC sampling locations. May sampling results for these sites are listed in table 8. Of the samples collected 21 represented rain-event conditions while the remaining 17 represented baseline flow conditions (last column, table 8). E-coli standards were exceeded at 11 of the 38 sites sampled. Total phosphorus standards were exceeded at 2 sites. All but one of the sites where standards were exceeded were rain-event collections highlighting the elevated nutrient, sediment, and bacterial loading that can occur in conjunction with significant rain run-off.

In May sampling occurred at 17 sites within Fawn River watershed. Sampling results are listed in table 9. E-coli standards were exceeded at 3 of the 17 sites sampled. Total phosphorus standards were exceeded at all 17 sites.

8. Results: June Sampling

June sampling occurred at 17 sites within Fawn River watershed. Sampling results are listed in table 10. E-coli standards were exceeded at 3 of the 17 sites sampled. Total phosphorus standards were exceeded at 14 of the 17 sites.

9. Results: July Sampling

Sampling in July occurred at 18 sampling sites with the Pigeon Creek watershed and other SCLC sampling sites. Results are listed in table 11. The samples collected represented baseline flow conditions. An E-coli standard of 235 was exceeded at 8 sites. No other standards were exceeded.

In July sampling occurred at 16 sites within Fawn River watershed. Sampling results are listed in table 12. E-coli standards were exceeded at 6 of the 16 sites sampled. Total phosphorus standards were exceeded at all 16 sites.

10. Results: August Sampling

Sampling in August occurred at 33 sampling sites within the Pigeon River watershed and other SCLC sampling locations. Five sites were not sampled due to low or zero flow conditions. Results are listed in table 13. All samples collected represented baseline flow conditions. An E-coli standard of 235 was exceeded at 13 sites. Total phosphorus standards were exceeded at 2 of the 33 sites.

In August sampling occurred at 15 sites within Fawn River watershed. Sampling results are listed in table 14. E-coli standards were exceeded at 4 of the 15 sites sampled. Total phosphorus standards were exceeded at all 15 sites.

11. Results: September Sampling

In September sampling occurred at 13 sites within Fawn River watershed. Sampling results are listed in table 15. E-coli standards were exceeded at 2 of the 13 sites sampled. Total phosphorus standards were exceeded at all 13 sites.

12. Results: October Sampling

In October sampling occurred at 13 sites within Fawn River watershed. Sampling results are listed in table 16. Total phosphorus standards were exceeded at all 11 of the 13 sites.

13. Results: November Sampling

In November sampling occurred at 16 sites within Fawn River watershed. Sampling results are listed in table 17. Total phosphorus standards were exceeded at 13 of the 16 sites.

14. Conclusions

A number of notable observations were made during the 2014 season sampling. In February flow rates were relatively high preventing the collection of discharge data at several sites. This was probably due to a partial snow melt-off. It is notable that during this event all but 3 of the Pigeon Creek sites tested well above the standard for phosphorus while 8 of the sites tested above the standard for E-coli despite cold temperatures. Water temperatures on the Pigeon at that time ranged between .9 C and 3 C. The presence of thick ice cover prevented sampling at one site. E-coli counts on the Upper Pigeon (sites 1-11 above Big Bower Lake) appeared to be less significant in 2014 compared to 2013. Of 44 samplings only 15 (34%) exceeded the IDEM E-coli bacteria standard of 235 CFU compared to 2013 when 41% of 88 measurements exceeded the standard. The highest E-coli count recorded on the upper Pigeon reach was 1435 from site 7 (Meridian Road) compared to a highest measurement of 9300 colonies at site 1 (Ray Clark Rd.) from 2013. For total phosphorus on the upper Pigeon 13 of 44 samplings (30%) exceeded a standard of .076 ppm similar to the 2013 season when 27 of 88 sites (31%) exceeded that standard.

Carpenter ditch near Crooked Lake remains somewhat notable with 7 of 9 E-coli samplings exceeding the 235 standard. The maximum count on Carpenter was 1500 on May 28. It is worth note however that a count of 300 was only exceeded on one sampling. None of the Carpenter ditch at Crooked Lake counts exceeded the probabilistic data average of 1895 CFU.