MISSOURI DEPARTMENT OF NATURAL RESOURCES

Biological Assessment Report

Hinkson Creek Macroinvertebrate Community Assessment
Year 3: Spring & Fall 2014

Boone County, Missouri

Prepared for:

Missouri Department of Natural Resources
Division of Environmental Quality
Water Protection Program
Water Pollution Branch

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1.0 Introduction

In 1998 the Missouri Department of Natural Resources (**MDNR**) placed approximately 14 miles of Hinkson Creek (**HC**) on its list of impaired waters designated under Section 303(d) of the Clean Water Act. In the Total Maximum Daily Load (**TMDL**) document prepared for this watershed, the pollutant(s) causing the impairment were listed as unknown, and the sources of this pollution were listed as "urban runoff" and "urban nonpoint source" (United States Environmental Protection Agency [**USEPA**] 2011). As an alternative to the strict adherence to the requirements outlined in the TMDL, a collaborative adaptive management plan was developed among the stakeholders that included the city of Columbia, Boone County, the University of Missouri-Columbia, Region VII of the USEPA, MDNR, and other entities. As a partner in the collaborative adaptive management process, MDNR agreed to conduct a three-year biological study of HC beginning in 2012. Because of the effects of drought, fall 2012 samples were not considered to be representative, and samples were not collected in fall 2013 due to drought. MDNR has agreed to extend the study to five years, concluding with the fall 2017 sample season, to allow additional opportunity for more representative summer and fall stream conditions.

Agricultural and urban land uses (separated by Interstate 70) predominate in the HC watershed. These land uses have likely resulted in increased sedimentation in the system, removal of riparian buffer vegetation, and alteration of the natural hydrology of the stream (Lenat and Crawford 1994; Paul and Meyer 2001). Several studies of the physical, chemical, and biological conditions of the creek have presented evidence of stream degradation in various segments of the stream (Tarr 1924; Parris 2000; MDNR 2002, 2004, 2005, 2006; Nichols 2012, Hooper 2015). In 34 macroinvertebrate samples collected from HC for MDNR assessments between fall 2001 and spring 2006, 14 were classified as only partially supporting of aquatic life (MDNR 2002, 2004, 2005, 2006). The majority of these (12 of 14, or 86%) were collected in the portion of the stream downstream of the Interstate 70 crossing to the Columbia city limit just downstream of the Scott Boulevard crossing. These samples represent the subset of the HC macroinvertebrate community considered to be within an urban setting; upstream of the Interstate 70 crossing the creek is within a rural (primarily agricultural) setting.

2.0 Study Area

HC is considered a Missouri Ozark border stream and is in the transitional zone between the Glaciated Plains to the north and the Ozark Highlands to the south (Thom and Wilson 1980). It is located in the Ozark/Moreau/Loutre ecological drainage unit (**EDU**). Thus, its bioassessment results were compared to reference streams considered to represent the best attainable biological conditions of this EDU.

In this study, the biological conditions of HC also were compared to those of Bonne Femme Creek (**BFC**). This stream is more similar in size to HC than the larger Ozark/Moreau/Loutre EDU biocriteria reference streams, and its watershed size is similar in area to the middle and upper segments of HC but with minimal urbanization. BFC originates southeast of Columbia in Boone County and flows in a southwesterly direction to its entrance into the Missouri River (Figure 1). Within the study area (Figure 2), it is classified as a permanent stream. Land use in its approximately 51-square-mile watershed is 3% urban, 22% cropland, 34% grassland, and 36% forest (MoRAP 2005).

The geographical relationship of HC, BFC, and their locations relative to the city of Columbia are illustrated in Figure 1. HC originates northeast of Hallsville in Boone County and flows approximately 26 miles in a southwesterly direction to its entrance into Perche Creek (Figure 1). It is classified as a permanent stream for the lower six miles and an intermittent stream upstream of the Highway 163 (Providence Road) crossing. Land use in the approximately 89-square-mile watershed is 20.7% urban, 11.5% cropland, 38.2% grassland, and 26.9% forest, with the remainder consisting of open water and barren surfaces (MoRAP 2005).

3.0 Site Descriptions

All of the following sample sites were in Boone County, Missouri (Figures 2 and 3).

HC Station #1 (SE ¼ sec. 29, T. 48 N., R. 13 W.) was located downstream of the Scott Boulevard bridge. Geographic coordinates at the upstream terminus of the station were UTME 551970, UTMN 4307414. Due to road construction on Scott Boulevard, this site was not sampled in spring 2014.

HC Station #2 (NW ¼ sec. 27, T. 48 N., R. 13 W.) was located upstream of the MKT Trail bridge in the vicinity of Twin Lakes Recreational Area. Geographic coordinates at the upstream terminus of this station were UTME 553966, UTMN 4308301.

HC Station #3 (NE ¼ sec. 27, T. 48 N., R. 13 W.) was located downstream of the Forum Boulevard bridge. Geographic coordinates of the upstream terminus of the station were UTME 555061, UTMN 4308249.

HC Station #3.5 (SW ¼ sec. 24, T. 48 N., R. 13 W.) was located upstream of the Recreation Drive culvert crossing (just east of Providence Road). Geographic coordinates of the downstream terminus of the station were UTME 557571, UTMN 4309043.

HC Station #4 (NW ¼ sec. 19, T. 48 N., R. 12 W.) was located downstream of the Rock Quarry Road bridge. Geographic coordinates of the downstream terminus of the station were UTME 558533, UTMN 4309388.

HC Station #5 (NW ¼ sec. 19 T. 48 N., R. 12 W.) was located upstream of the most upstream footbridge of Capen Park. Geographic coordinates of the upstream terminus of the station were UTME 559135, UTMN 4309518.

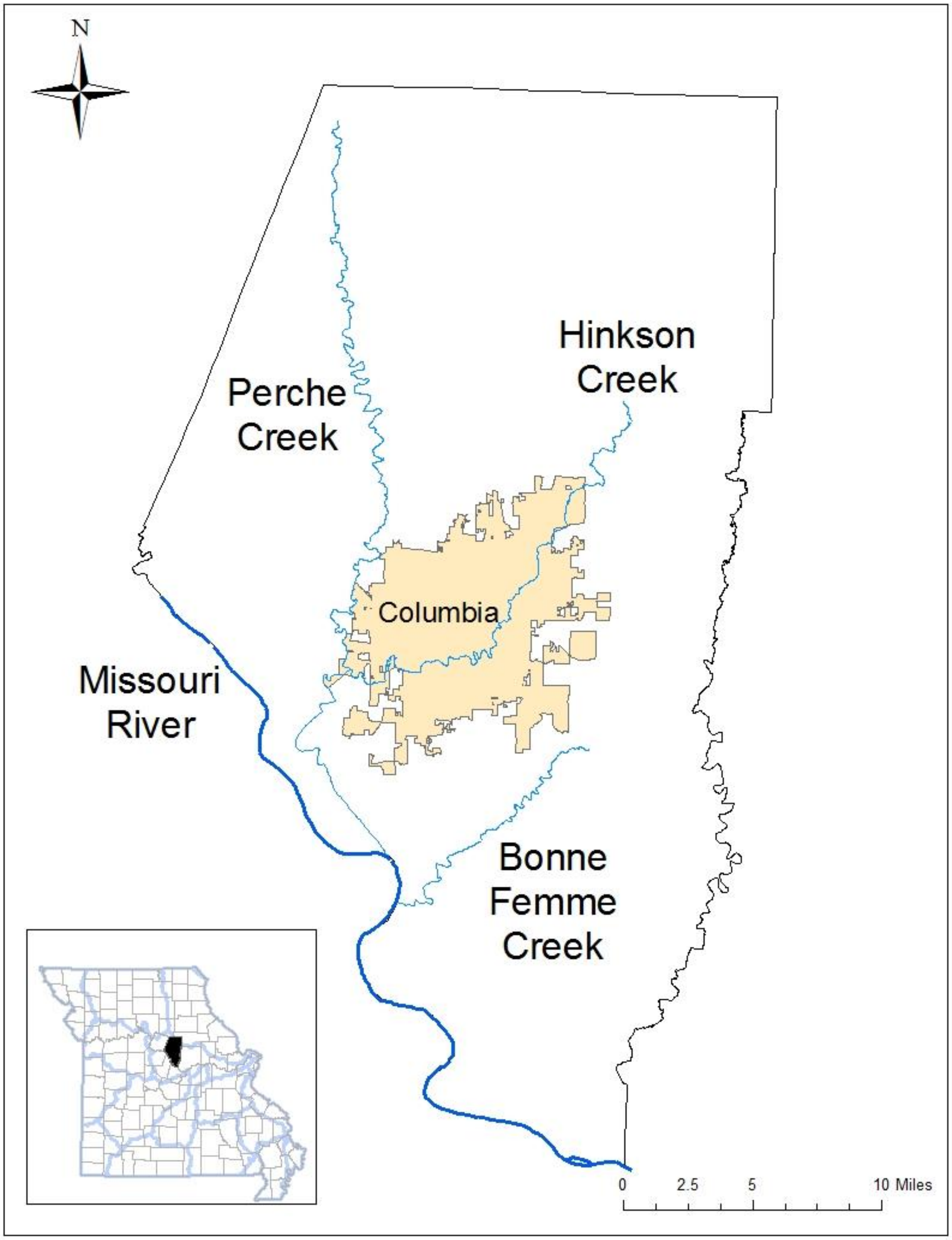

Figure 1. General study area.

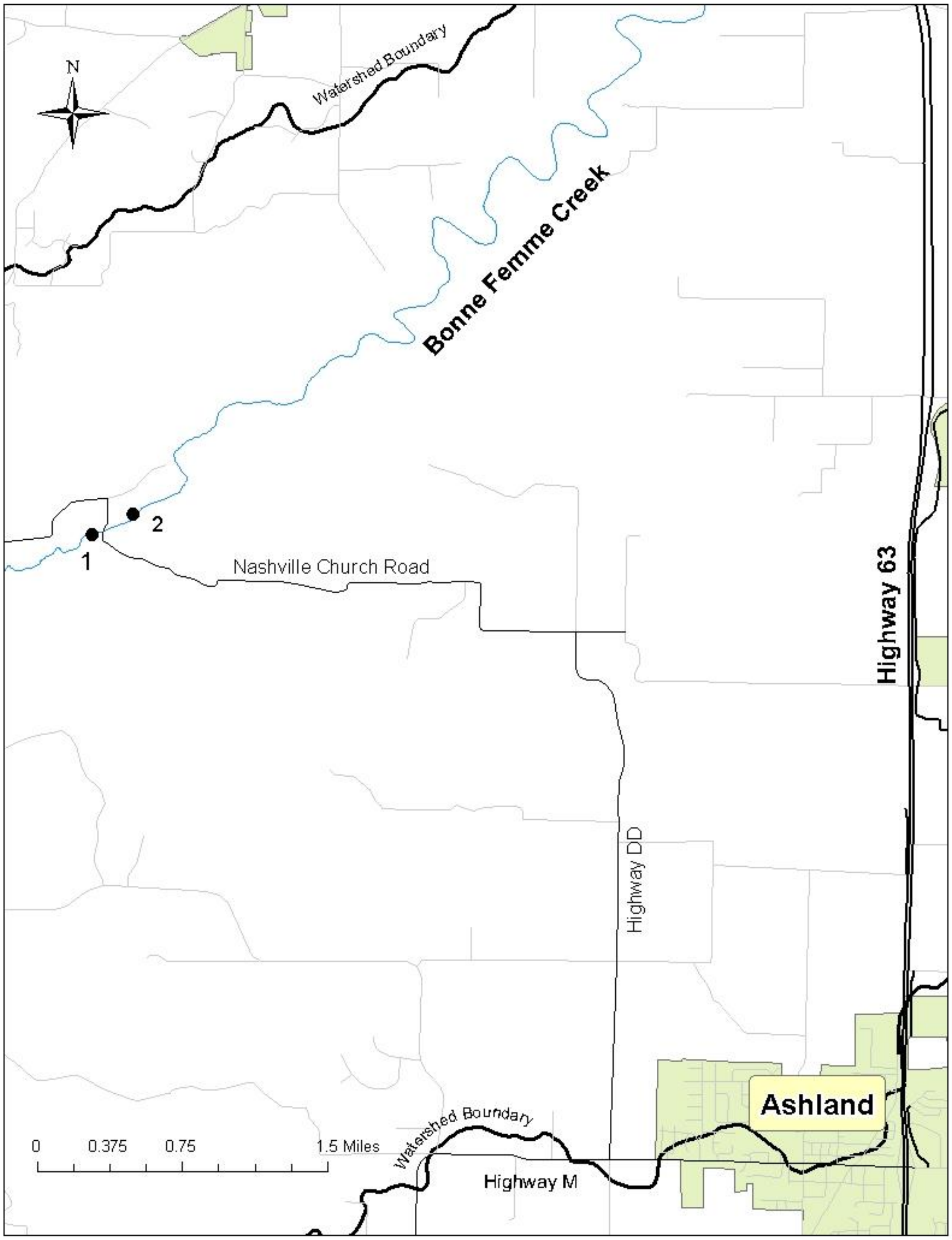

Figure 2. Bonne Femme Creek sampling stations for the 2014 study.

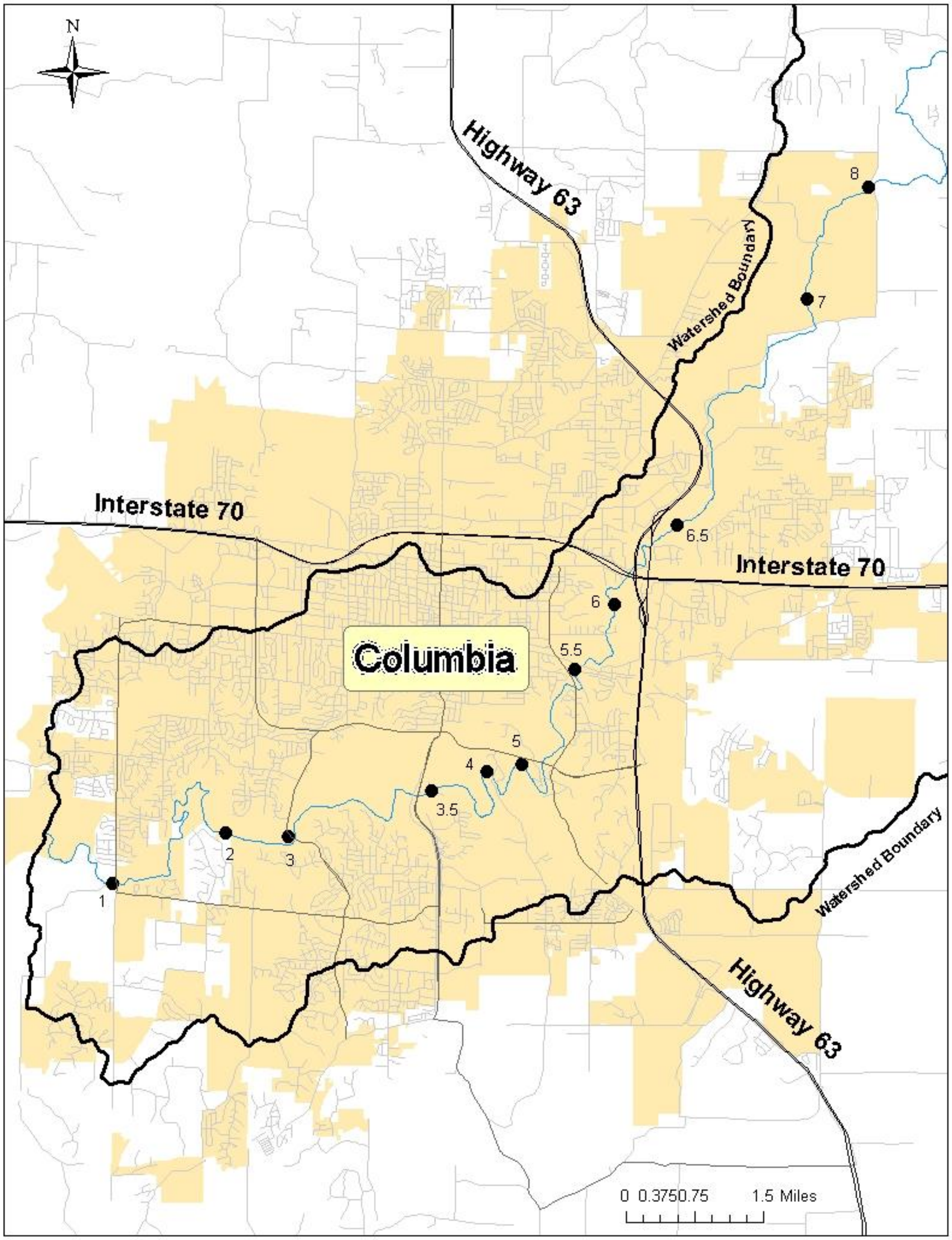

Figure 3. Hinkson Creek sampling stations for the 2014 study.

HC Station #5.5 (NE ¼ sec. 18, T. 48 N., R. 12 W.) was located downstream of the Green Valley Drive bridge (just south of Broadway Street). Geographic coordinates of the upstream terminus of the station were UTME 560081, UTMN 4311180.

HC Station #6 (SW ¼ sec. 8, T. 48 N., R. 12 W.) was located in the vicinity of the East Walnut Street bridge. Geographic coordinates near the upstream terminus of the station were UTME 560767, UTMN 4312309.

HC Station #6.5 (SE ¼ sec. 5, T. 48 N., R. 12 W.) was located upstream of the Highway 63 connector (upstream of the trailer park east of the connector and behind Home Depot). Geographic coordinates in the downstream portion of the station were UTME 561861, UTMN 4313714.

HC Station #7 (NW ¼ sec. 27, T. 49 N., R. 12 W.) was located upstream of the Hinkson Creek Road/Wyatt Lane bridge. Geographic coordinates at the upstream terminus of the station were UTME 564140, UTMN 4317670.

HC Station #8 (SE ¼ sec. 15, T. 49 N., R. 12 W.) was located downstream of the Rogers Road bridge. Geographic coordinates at the downstream terminus of the station were UTME 565212, UTMN 4319627.

BFC Station #1 (SE ¼ sec. 25, T. 47 N., R. 13 W.) was located downstream of the Nashville Church Road bridge (Figure 2). Geographic coordinates at the upstream terminus of the station were UTME 558176, UTMN 4297283.

BFC Station #2 (SW ¼ sec. 30, T. 47 N., R. 12 W.) was located upstream of the Nashville Church Road bridge. Geographic coordinates at the downstream terminus of the station were UTME 558519, UTMN 4297449.

4.0 Methods

4.1 Macroinvertebrate Collection and Analyses

Spring samples for this study were collected on two separate occasions. The two BFC stations and HC Stations 2-5 were sampled on April 1, 2014. During the early morning hours of April 2, heavy rains in the watershed resulted in the United States Geological Survey (**USGS**) gage at Providence Road (Gage #06910230) to increase from 10 cfs to 6,490 cfs at its peak on April 3 (Figure 4). The remaining samples (Stations 5.5-8) were collected on April 10, 2014. Carl Wakefield, Brandy Bergthold, and Dave Michaelson collected HC macroinvertebrate samples from Stations 2-5. Bergthold, Michaelson, and Raissa Espejo collected macroinvertebrate samples from Stations 5.5 and 6, and Robert Schaub replaced Michaelson in collecting at Stations 6.5-8. Mike Irwin collected water chemistry grab samples from all Hinkson Creek stations. Brian Nodine and Raissa Espejo collected macroinvertebrate samples from BFC, and Ken Lister collected the water chemistry samples.

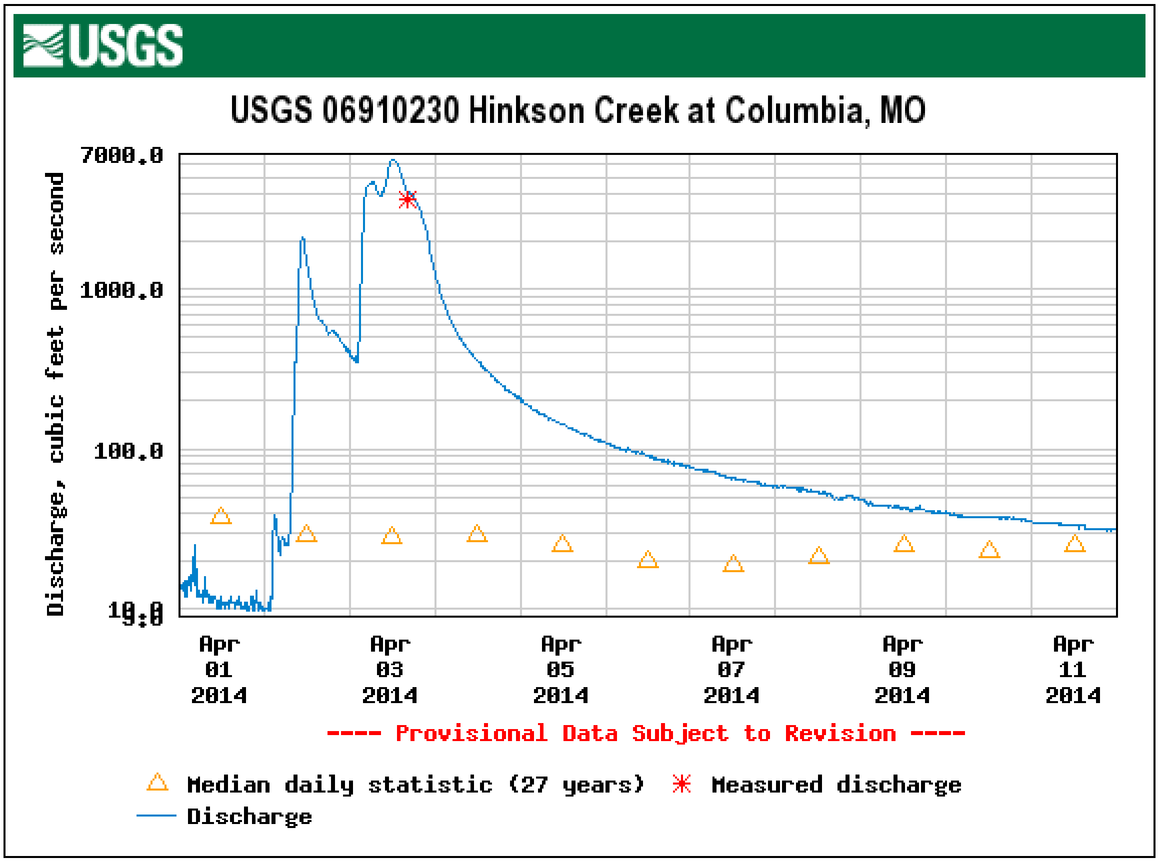

Figure 4. USGS gaging station hydrograph at Providence Road, April 1-11, 2014.

There were sufficient rains during the latter part of the summer that enabled HC to maintain adequate flows through riffle habitats during the summer to justify sample collection in fall 2014. During the week prior to fall sampling, the Columbia area received heavy rains, which resulted in HC discharge increasing from <1 cfs to 7,520 cfs within the span of 24 hours on October 1 and 2 (Figure 5). Raissa Espejo, Carl Wakefield, and Dave Michaelson collected macroinvertebrate samples and Mike Irwin collected water chemistry samples at all Hinkson Creek stations on October 7 and 8. Brandy Bergthold and Brian Nodine collected macroinvertebrates and Ken Lister collected water chemistry samples from the BFC stations on October 8, 2014.

A standardized sample collection procedure was followed as described in the *Semi-quantitative Macroinvertebrate Stream Bioassessment Project Procedure* (**SMSBPP**) (MDNR 2012a). Three standard habitats—flowing water over coarse substrate (riffles and runs), depositional substrate in non-flowing water (pools), and rootmat at the stream edge—were sampled at all locations when available.

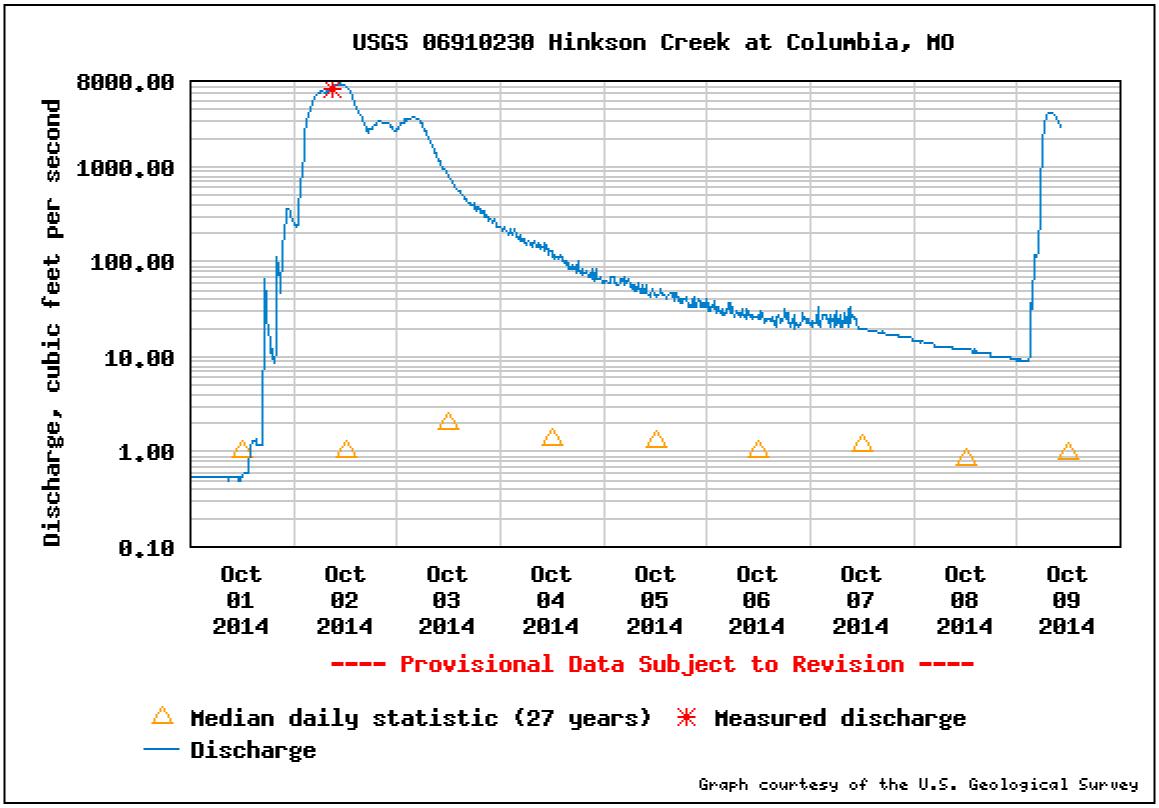

Figure 5. USGS gaging station hydrograph at Providence Road, October 1-9, 2014.

Laboratory processing was consistent with the description in the SMSBPP (MDNR 2012a). Each sample was processed under 10x magnification to remove a habitat-specific target number of individuals from debris. Individuals were identified to standard taxonomic levels (MDNR 2014d) and enumerated.

A standardized sample analysis procedure was followed as described in the SMSBPP. The following four metrics were used: 1) Taxa Richness (**TR**); 2) total number of taxa in the orders Ephemeroptera, Plecoptera, and Trichoptera (**EPTT**); 3) Biotic Index (**BI**); and 4) Shannon Diversity Index (**SDI**). These metrics were scored and combined to form the Macroinvertebrate Stream Condition Index (**MSCI**). MSCI scores of 16-20 qualify as fully supporting, 10-14 are partially supporting, and 4-8 are considered non-supporting of the protection of warm water aquatic life beneficial use designation as specified in the Missouri Water Quality Standards (MDNR 2014f). The macroinvertebrate data, separated by habitat, are included in Appendix A as laboratory bench sheets.

Macroinvertebrate data were examined in the following ways: 1) longitudinal comparisons were made among HC reaches to address differences between rural (Stations 6.5, 7, and 8) and urban (Stations 1-6) segments of the creek; 2) rural and urban HC stations were compared to BFC stations; and 3) data from HC stations sampled in 2014 were compared to those obtained from HC in previous years.

4.2 Physicochemical Data Collection and Analysis

During each survey period, *in situ* water quality measurements were collected at all stations or collected and returned for analysis at the Environmental Services Program's (**ESP**) Chemical Analysis Section (**CAS**). At BFC, measurements were taken at a single site between the two longitudinally adjacent macroinvertebrate survey stations. Temperature (^{o}C) (MDNR 2010b), pH (MDNR 2012b), specific conductance (μS/cm) (MDNR 2010c), and dissolved oxygen (mg/L) (MDNR 2012c) were measured in the field. Turbidity (NTU) (MDNR 2010a) was measured and recorded in the ESP Water Quality Monitoring Section (**WQMS**) biology laboratory. Water samples were analyzed by ESP's CAS for chloride, sulfate, hardness, calcium, magnesium, total phosphorus **(TP)**, ammonia-N (**NH_3-N**), nitrate+nitrite-N **(NO_3+NO_2-N)**, total nitrogen **(TN)**, and total suspended solids (**TSS**). All parameters are reported in mg/L. Procedures outlined in *Required/Recommended Containers, Volumes, Preservatives, Holding Times, and Special Sampling Considerations* (MDNR 2014b) and *Field Sheet and Chain-of-Custody Record* (MDNR 2014c) were followed when collecting water quality samples.

Stream velocity was measured at each station where practicable during the study using a SonTek® FlowTracker®. Discharge was calculated per the methods in *Flow Measurement in Open Channels* (MDNR 2013b).

Physicochemical data were summarized and presented in tabular form for comparison among HC stations and also for comparison between HC and BFC stations.

4.3 Quality Assurance/Quality Control (QA/QC)

4.3.1 Field Meters

All field meters used to collect water quality parameters were maintained in accordance with *Quality Control Procedures for Checking Water Quality Field Instruments* (MDNR 2010d).

4.3.2 Biological Samples

Steps to assure accuracy of organism removal from sample debris were performed consistent with those methods found in the SMSBPP document (MDNR 2012a).

4.3.3 Biological Data Entry

All macroinvertebrate data were entered into the WQMS macroinvertebrate database consistent with *Quality Control Procedures for Data Processing* (MDNR 2014e).

4.3.4 Duplicate Sample Collection

Duplicate samples were collected and analyzed for physicochemical parameters at HC Station 6 during the spring 2014 sampling season. Duplicate macroinvertebrate samples also are collected during each sample season from three randomly selected stations from all current biological study sites. No HC or BFC stations were chosen as duplicates in 2014.

5.0 Results

5.1 Physicochemical Data

Spring 2014 stream flow and *in situ* water quality data for this study are presented in Table 1. Samples were collected from BFC and HC Stations 1-5 prior to the heavy rains mentioned in Section 4.1. The remaining samples were collected over a week later after HC flows had diminished. A duplicate (**dup**) water quality sample was collected at Station 6. Because of the extreme nature of the flows that occurred roughly at the midpoint of sampling, no meaningful longitudinal trends among HC stations can be made for the spring water quality data except by bisecting the data between Station 5 (the end of sampling on April 1) and Station 5.5 (the beginning of sampling on April 10) and comparing within the two groups. A double line separates samples collected before and after the high flow event in Tables 1-3.

For both sets of *in situ* spring water quality data (pre- versus post-flood), flow tended to decrease while progressing upstream, whereas temperature and dissolved oxygen both increased in the upstream reaches, likely in relation to the time of day in which the samples were collected. Pre-flood conductivity was higher at Stations 2 and 3 than the remaining stations, all of which were similar to one another. For samples collected after the flood, conductivity was higher at the downstream site (Station 5.5), and gradually decreased as samples were collected higher in the watershed. Turbidity followed a similar trend, with the highest levels occurring at Station 1 and getting progressively lower in upstream samples. When comparing pre- versus post-flood *in situ* water quality parameters, conductivity and turbidity were the two that demonstrated the most notable differences. Before the flood, conductivity ranged between 811-878 µS/cm, whereas conductivity afterward was between 417-619 µS/cm. Most post-flood turbidity levels were at least twice as high as pre-flood.

Spring 2014 nutrient and chloride concentrations are presented in Table 2, with additional water quality parameters presented in Table 3. NH_3-N and TP were present in detectable concentrations at all stations both pre- and post-flood with two exceptions. Station 1 TP was below CAS Practical Quantitation Limits (**PQL**), and Station 8 NH_3-N was below detectable concentrations. TN, NO_3+NO_2-N, and TP concentrations were similar when grouped relative to the high flow event, but each of these parameters exhibited notable differences when compared pre- versus post-flood. NO_3+NO_2-N, TN, TP, and TSS all were at least slightly higher in post-flood samples. Conversely, chloride, NH_3-N, and hardness all tended to be lower at HC stations that were sampled after high flows. The difference in chloride concentrations were especially large, with the samples collected before the storm being several times higher. Sulfate was variable but mostly similar among HC stations, all of which were at least seven times higher than BFC. None of the NH_3-N or chloride concentrations exceeded Missouri's Water Quality Standards (MDNR 2014f).

Table 1
Spring 2014 Flow and *In situ* Water Quality Measurements

	Parameter					
Station	Flow (cfs)	Temperature (˚C)	Dissolved O_2 (mg/L)	Conductivity (µS/cm)	pH	Turbidity (NTU)
HC 8	5.3	15.5	12.49	417	8.5	16.3
HC 7	5.6	16.1	11.84	477	8.4	13.7
HC 6.5	8.2	14.7	11.61	559	8.3	10.5
HC 6	10.3	13.6	10.69	594	8.4	10.2
HC 6 (dup)	10.9	13.5	10.76	592	8.4	10.5
HC 5.5	10.3	12.3	10.36	619	8.4	10.1
HC 5	3.8	14.0	13.43	814	8.4	2.80
HC 4	4.4	14.1	14.25	812	8.3	2.25
HC 3.5	5.3	13.1	13.07	819	8.1	3.14
HC 3	6.9	11.1	10.88	868	8.2	5.55
HC 2	6.5	9.8	10.32	878	8.1	5.06
HC 1	7.7	10.2	9.67	811	8.1	7.71
BFC 1	3.4	8.0	10.01	483	8.0	4.35

Note: Double line in table separates samples collected prior to April 2, 2014 flooding (HC 1-5) and after (HC 5.5-8).

Table 2
Spring 2014 Nutrient and Chloride Concentrations

	Parameter (mg/L)				
Station	NH_3-N	NO_3+NO_2-N	Total Nitrogen	Total Phosphorus	Chloride
HC 8	<0.03*	0.36	0.86	0.051	14.4
HC 7	0.036	0.25	0.68	0.047	16.0
HC 6.5	0.045	0.15	0.56	0.043	25.6
HC 6	0.033	0.17	0.62	0.043	32.8
HC 6 (dup)	0.039	0.17	0.55	0.040	33.7
HC 5.5	0.038	0.16	0.57	0.043	38.0
HC 5	0.061	<0.008*	0.38	0.027	105
HC 4	0.060	<0.008*	0.34	0.025	112
HC 3.5	0.044	<0.008*	0.32	0.028	115
HC 3	0.018	<0.008*	0.33	0.038	142
HC 2	0.042	<0.008*	0.32	0.037	144
HC 1	0.075	0.0086**	0.38	0.04**	134
BFC 1	<0.03*	0.089	0.33	0.032	36.1

Note: Double line in table separates samples collected prior to April 2, 2014 flooding (HC 1-5) and after (HC 5.5-8).
*Below detectable limits; **Estimated value, detected below Practical Quantitation Limits

Table 3
Hinkson and Bonne Femme Creek Spring 2014 Water Chemistry Parameters

	Parameter (mg/L)				
Station	Calcium	Magnesium	Hardness	Sulfate	TSS
HC 8	58.2	9.24	183	77.3	7.00
HC 7	68.1	10.5	213	102*	8.00
HC 6.5	78.5	11.8	245	114*	5.00
HC 6	82.4	12.0	255	119*	7.00
HC 6 (dup)	81.3	11.9	252	114*	8.00
HC 5.5	84.1	11.8	259	120*	7.00
HC 5	112	16.7	348	149*	<5**
HC 4	110	16.1	341	141*	<5**
HC 3.5	110	15.5	338	141*	<5**
HC 3	107	15.2	330	124*	<5**
HC 2	104	14.8	321	119*	5.00
HC 1	96.3	12.9	294	100*	<5**
BFC 1	68.6	6.82	199	11.3	<5**

Note: Double line in table separates samples collected prior to April 2, 2014 flooding (HC 1-5) and after (HC 5.5-8).
*Sample was diluted during analysis; **Below detectable limits

Fall 2014 stream flow and *in situ* water quality data are presented in Table 4. Although a flood event occurred during the week preceding sampling, all sites were sampled under relatively similar conditions. HC discharge was in the midst of decreasing after the previous week's high flows, and turbidity was slightly elevated. Most of the incremental changes in flow presented in Table 4 correspond to the five named HC tributaries within the study reach (Figure 6). During the fall 2014 sample season, each of these tributaries contributed measurable flow to HC as presented in Table 4. One of the larger changes between stations, however, occurred between Stations 2 and 3. Despite having no major tributaries between these sites, discharge at Station 2 was 8.3 cfs greater than Station 3. Among Stations 1-4 both temperature and dissolved oxygen increased as samples were collected later in the day. Although temperature increased between Stations 5.5 and 6, there was not the incremental increase in temperature or dissolved oxygen over the course of the day among Stations 6-8. Conductivity was generally similar among all HC stations, with the exception that Stations 7 and 8 were notably lower than the remaining stations downstream. pH levels were similar among all sites except Station 1,which was somewhat lower. Turbidity was highest at Stations 1 and 2, and the remaining stations were all relatively similar to one another.

Nutrient and chloride concentrations for fall 2014 are presented in Table 5, and the remaining water chemistry data are included in Table 6. NH_3-N was present in detectable concentrations at all sites except Station 6.5, which had concentrations below the laboratory PQL. NH_3-N concentrations were highest at Stations 1, 3.5, and 4, and BFC had lower concentrations than any of the HC sites. All NH_3-N concentrations, however, were well below the pH and temperature dependent chronic toxicity threshold (MDNR

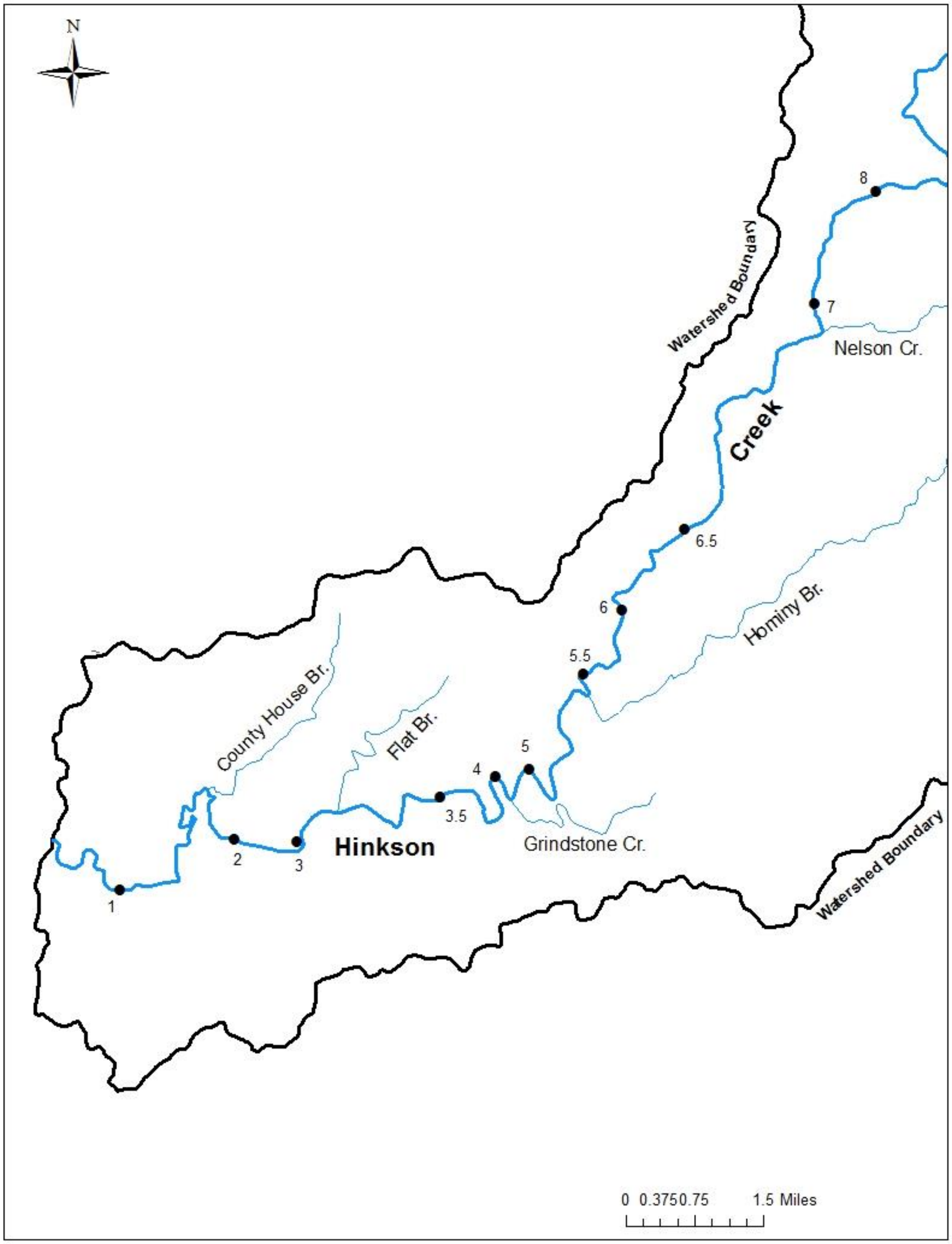

Figure 6. Hinkson Creek tributaries relative to study reach.

2014f). TN also was present in detectable concentrations at all stations. Stations 7 and 8 had the highest TN concentration, followed by Station 1; TN was similar among the remaining HC stations. The TN concentration at BFC was lower than any of the HC stations. TP was present in detectable concentrations among all BFC and HC stations except HC Stations 2 and 4, which had concentrations below detectable limits and the PQL, respectively. Although TP was present in detectable concentrations at nearly all stations, including BFC, no longitudinal trends were apparent. Chloride concentrations tended to be slightly higher among Stations 1, 2, and 3 than the remaining upstream stations. The lowest chloride concentrations were present at Stations 7 and 8, which were similar to BFC.

The remaining water quality parameters presented in Table 6 mostly were variable. Calcium concentrations tended to be slightly higher among stations downstream of the Flat Branch confluence (Stations 1-3) and lowest at Stations 7 and 8. Sulfate concentrations demonstrated no discernible pattern. Whereas the lowest concentrations occurred at Stations 1 and 8, it was present in similar concentrations among the remaining HC sites. As was the case with spring samples, BFC sulfate concentrations were a fraction of the lowest HC value. TSS was highest at Stations 1 and 2, slightly lower at Station 3, and nearly the same among the remaining stations upstream.

Seasonal differences in water quality parameters were variable due to the timing of flooding during both sample seasons. Spring nutrient concentrations in samples collected prior to flooding tended to be lower than fall, but increased concentrations after the spring flood made these concentrations more similar among seasons. Chloride concentrations in spring were much higher than fall, but only for those stations that were sampled before the flooding. Chloride concentrations among urban stations sampled after flooding were still higher in spring than fall, but only slightly. Spring chloride concentrations for BFC, which were collected before flooding, were much lower than HC samples. Chloride concentrations among urban HC samples collected after flooding were similar to BFC, but rural HC chloride concentrations were less than half of BFC. Other parameters that usually exhibit seasonal differences, such as dissolved oxygen, flow, and turbidity, were fairly similar among seasons in 2014.

Table 4
Fall 2014 Flow and *In situ* Water Quality Measurements

	Parameter					
Station	Flow (cfs)	Temperature (˚C)	Dissolved O_2 (mg/L)	Conductivity (µS/cm)	pH	Turbidity (NTU)
HC 8	4.2	16.0	9.47	353	7.9	9.71
HC 7	5.7	16.4	9.45	415	8.0	8.38
HC 6.5	9.2	15.7	9.54	479	8.0	8.54
HC 6	10.7	16.0	9.59	492	8.1	7.00
HC 5.5	9.2	14.9	9.57	504	8.1	6.51
HC 5	14.5	14.8	9.23	491	8.0	8.01
HC 4	27.0	18.4	9.13	476	8.1	9.14
HC 3.5	27.4	18.0	8.73	496	7.8	8.87
HC 3	31.7	17.4	8.42	550	7.8	8.41
HC 2	40.0	16.5	8.21	518	7.7	12.50
HC 1	43.3	16.0	7.76	511	7.4	19.90
BFC 1	3.8	15.0	7.33	405	7.6	2.79

Table 5
Fall 2014 Nutrient and Chloride Concentrations

	Parameter (mg/L)				
Station	NH_3-N	NO_2+NO_3-N	Total Nitrogen	Total Phosphorus	Chloride
HC 8	0.068	0.29	0.93	0.10	7.41
HC 7	0.067	0.23	0.77	0.098	8.21
HC 6.5	0.042**	0.15	0.60	0.075	14.7
HC 6	0.083	0.14	0.64	0.085	17.1
HC 5.5	0.051	0.14	0.63	0.074	18.3
HC 5	0.083	0.25	0.67	0.13	19.8
HC 4	0.28	0.18	0.65	0.020**	19.1
HC 3.5	0.10	0.19	0.65	0.086	20.2
HC 3	0.075	0.25	0.67	0.13	27.6
HC 2	0.099	0.20	0.70	<0.01*	22.6
HC 1	0.11	0.21	0.75	0.11	21.8
BFC 1	0.037**	0.31	0.54	0.078	7.11

*Below detectable limits
**Estimated value, detected below Practical Quantitation Limits

Table 6
Hinkson and Bonne Femme Creek Fall 2014 Water Chemistry Parameters

	Parameter (mg/L)				
Station	Calcium	Magnesium	Hardness	Sulfate	TSS
HC 8	54.3	8.21	169	44.3	7.00
HC 7	64.2	9.07	198	60.0	6.00
HC 6.5	73.0	10.2	224	68.2	5.00
HC 6	74.3	10.4	228	67.1	5.00
HC 5.5	74.7	10.4	229	67.6	6.00
HC 5	72.4	9.75	221	59.7	5.00
HC 4	69.7	9.20	212	54.5	6.00
HC 3.5	75.2	9.53	227	57.2	5.00
HC 3	82.9	10.4	250	57.3	10.0
HC 2	78.8	9.78	237	53.3	19.0
HC 1	78.4	9.61	235	47.8	28.0
BFC 1	72.4	7.33	211	5.21	<5.00*

*Below detectable limits

5.2 Biological Assessment

5.2.1 Hinkson Creek Longitudinal Comparison

Spring 2014

The Station 1 macroinvertebrate sample reach downstream of Scott Boulevard could not be considered representative during the spring 2014 season due to an ongoing construction project. Part of this work required the installation of a temporary culvert crossing just upstream of the historic sample reach. An attempt was made to complete the 11-station longitudinal survey by sampling upstream of Scott Boulevard, but coarse substrate habitat could not be found despite searching several hundred yards upstream of the bridge. Consequently, there is no spring 2014 Station 1 macroinvertebrate sample. A water quality sample, however, was collected at this site well upstream of any potential construction effects.

HC and BFC spring 2014 macroinvertebrate community metrics were calculated using biological criteria derived from reference streams in the Ozark/Moreau/Loutre EDU (Table 7). In spring 2014, four of the 10 stations had fully supporting MSCI scores of 16 (Table 8). There was no pattern relative to pre- versus post-flood or site location associated with fully supporting scores. Two of five stations sampled prior to the heavy rains (Stations 2-5) had fully supporting scores, and two of five sites sampled after flood waters subsided (Stations 5.5-8) also were fully supporting.

Table 7
Biological Criteria for Warm Water Reference Streams in the Ozark/Moreau/Loutre EDU, Spring

	Score = 5	Score = 3	Score = 1
TR	>71	71-35	<35
EPTT	>17	17-9	<9
BI	<6.4	8.2-6.4	>8.2
SDI	>2.80	2.80-1.40	<1.40

Table 8
Metric Values and Scores for Hinkson Creek and Bonne Femme Creek Stations, Spring 2014, Using Ozark/Moreau/Loutre Biological Criteria

Site	TR	EPTT	BI	SDI	MSCI	Support
HC 8	78	13	6.6	2.92		
	5	3	3	5	16	**Full**
HC 7	67	10	6.6	2.90		
	3	3	3	5	14	**Partial**
HC 6.5	85	14	6.5	2.70		
	5	3	3	3	14	**Partial**
HC 6	69	13	7.0	2.85		
	3	3	3	5	14	**Partial**
HC 5.5	87	17	6.8	2.86		
	5	3	3	5	16	**Full**
HC 5	69	8	6.6	3.06		
	3	1	3	5	12	**Partial**
HC 4	75	10	6.6	3.42		
	5	3	3	5	16	**Full**
HC 3.5	77	9	6.4	3.29		
	5	3	3	5	16	**Full**
HC 3	65	5	7.0	3.00		
	3	1	3	5	12	**Partial**
HC 2	64	5	7.1	2.96		
	3	1	3	5	12	**Partial**
HC 1	no samples collected due to Scott Boulevard road construction					
BFC 1	76	12	6.5	2.74		
	5	3	3	3	14	**Partial**
BFC 2	80	13	6.4	2.78		
	5	3	3	3	14	**Partial**

Stations with partially supporting scores tended to have suboptimal TR and EPTT metric scores. Only Station 6.5 had an optimal TR score but a partially supporting MSCI score; however, it was also the only HC station with a suboptimal SDI score. None of the HC or BFC stations had optimal EPTT or BI scores, and neither BFC site had optimal SDI scores. The three stations with MSCI scores of 12 (Stations 2, 3, and 5.5) each had the lowest possible individual metric score for EPTT.

The macroinvertebrate community composition among Stations 2-3.5 was similar to one another in terms of percent dominant taxa and relative abundance of certain taxa groups (Table 9). Stations 2 and 3.5 had the same top five dominant taxa in the same descending order of abundance, but Station 3.5 had more mayfly taxa then either Stations 2 or 3; mayflies were nearly absent at these two stations.

Chironomidae were the dominant taxa group among all HC and BFC spring 2014 samples, with the exception that chironomids were tied with Elmidae (riffle beetles) at Station 6.5. Chironomids were particularly abundant at Stations 2 and 5, where they made up 81.8 and 76.0 percent of samples, respectively. With the exception of Stations 6.5-8, chironomids made up over half of spring samples. Although the HC study reach had 57 chironomid taxa in aggregate, each station had 24 to 36 chironomid taxa. Three taxa groups accounted for the majority of specimens. *Cricotopus/Orthocladius* grp., *Tanytarsus*, and *Polypedilum* spp. made up between 68 percent (Station 2) and 36 percent (Station 4) of the samples. *Polypedilum* spp. was the dominant chironomid taxa group at Stations 2 and 3, but it was less abundant among the remaining stations. C*ricotopus/Orthocladius* grp. and *Tanytarsus* abundance was variable among stations. Other abundant chironomid taxa included *Ablabesmyia* and *Cladotanytarsus*.

The highest aquatic worm abundance occurred at Station 3, where Tubificidae and other aquatic worm taxa made up nearly 15 percent of the sample. Station 4 had the next highest aquatic worm abundance, where they made up almost 8 percent of the sample.

Mayflies were nearly absent from Stations 2 and 3, where only a single individual mayfly was found at each site. They were most abundant among Stations 5.5-7, where they made up between 22.6-31.2 percent of samples. With the exception of Stations 2 and 3, HC sites had between three and six mayfly taxa, with Station 5.5 having the greatest number of mayfly taxa. BFC stations had much lower mayfly abundance than HC Stations 5.5-8, being more similar to the lower percentages observed among HC Stations 3.5-5.

The greatest abundance of caddisflies occurred at Station 4 with *Cheumatopsyche* and *Helicopsyche* being the dominant taxa. Caddisfly abundance varied among HC stations but did not change in response to rural versus urban stations. BFC caddisfly percentages were similar to the lowest percentages among HC stations.

Stoneflies were absent among HC Stations 2-5, and the highest percentages making up samples occurred at Stations 7 and 8. Among HC stations that did have stoneflies

(Stations 5.5-8), only one or two taxa were present at each--*Amphinemura* and immature Perlidae that could not be definitively identified to genus. Although stoneflies were not notably more abundant among BFC stations, they did have more taxa present. Whereas no HC station had more than two stonefly taxa, both BFC stations had five taxa each.

Riffle beetles (Elmidae) were among the five most abundant taxa at all HC stations. *Stenelmis* was the most abundant riffle beetle by far, with *Dubiraphia* being second. Riffle beetles were more abundant among the rural HC stations, ranging from 20.0 percent at Station 7 to 29.1 percent at Station 6.5.

Table 9
Spring 2014 Hinkson and Bonne Femme Creek Macroinvertebrate Composition

↓Variable Station→	1	2	3	3.5	4	5	5.5	6	6.5	7	8	BFC1	BFC2
Taxa Richness		64	65	77	75	69	87	69	85	67	78	76	80
Number EPT Taxa		5	5	9	10	8	17	13	14	10	13	12	13
% Ephemeroptera		<0.1	<0.1	1.3	6.1	2.7	24.5	31.2	24.9	22.6	17.3	2.6	2.5
% Plecoptera		-	-	-	-	-	0.4	1.2	1.2	3.3	3.2	2.2	5.5
% Trichoptera		0.5	0.8	2.6	5.8	0.7	1.3	0.8	1.3	1.4	1.6	0.5	0.8
MSCI Score		12	12	16	16	12	16	14	14	14	16	14	14
% Dominant Families													
Chironomidae		**81.8**	**60.9**	**63.1**	**48.9**	**76.0**	**51.1**	**45.2**	**29.1**	**35.7**	**31.2**	**67.3**	**51.6**
Elmidae		**8.0**	**16.9**	**14.7**	**15.6**	**4.0**	**10.7**	**8.6**	**29.1**	**20.0**	**25.7**	**15.5**	**21.9**
Tubificidae		**3.3**	**14.6**	**3.9**	**7.5**	1.4	**2.0**	**3.0**	**4.0**	1.7	**3.7**	**5.4**	**5.1**
Arachnida		**2.1**	0.6	**3.0**	-	**5.6**	0.7	2.1	0.8	0.8	1.6	0.7	0.2
Coenagrionidae		**1.1**	0.4	**2.8**	2.2	**2.4**	1.4	1.7	0.7	2.0	0.2	<0.1	0.4
Ceratopogonidae		0.7	**1.8**	1.4	1.6	1.5	1.6	0.4	1.5	0.8	2.1	**1.4**	**2.7**
Planorbidae		0.1	**0.8**	0.8	-	1.4	0.2	0.1	<0.1	0.4	0.1	-	<0.1
Caenidae		-	-	0.4	**3.8**	**2.3**	**22.0**	**26.8**	**22.9**	**20.1**	**14.9**	**1.3**	1.3
Crangonyctidae		<0.1	-	-	<0.1	<0.1	<0.1	0.2	**1.6**	0.7	0.7	0.3	1.8
Pisidiidae		0.1	0.6	0.2	**5.1**	0.2	0.7	0.1	0.4	0.1	0.1	0.3	<0.1
Heptageniidae		<0.1	<0.1	0.7	1.5	0.2	**2.2**	**4.1**	**1.7**	2.2	2.0	**1.3**	0.8
Hyalellidae		-	-	-	-	-	1.5	0.7	-	**6.2**	**4.3**	0.3	2.5
Perlidae		-	-	-	-	-	0.3	1.2	1.1	**3.3**	**3.7**	**1.3**	**2.6**

Note: Double line in table separates samples collected prior to April 2, 2014 flooding (HC 1-5) and after (HC 5.5-8). BFC was sampled before flooding. Numbers in bold font indicate the five dominant taxa.

<u>Fall 2014</u>

Scoring criteria based on fall samples collected from Ozark/Moreau/Loutre reference streams are presented in Table 10. In fall 2014 eight of the 11 HC stations had fully supporting scores (Table 11). Unlike spring samples, in which all fully supporting scores were 16, only one fall sample (Station 2) had an MSCI score of 16; the remaining seven

Table 10
Biological Criteria for Warm Water Reference Streams in the Ozark/Moreau/Loutre EDU, Fall

	Score = 5	Score = 3	Score = 1
TR	>73	73-37	<37
EPTT	>15	15-7	<7
BI	<6.8	6.8-8.4	>8.4
SDI	>3.18	3.18-1.59	<1.59

Table 11
Metric Values and Scores for Hinkson Creek and Bonne Femme Creek Stations, Fall 2014, Using Ozark/Moreau/Loutre Biological Criteria

Site	TR	EPTT	BI	SDI	MSCI	Support
HC 8	93	17	6.5	3.16		
	5	5	5	3	18	**Full**
HC 7	97	16	6.1	3.20		
	5	5	5	5	20	**Full**
HC 6.5	89	19	6.4	3.14		
	5	5	5	5	18	**Full**
HC 6	87	18	6.2	3.38		
	5	5	5	5	20	**Full**
HC 5.5	90	17	6.8	3.32		
	5	5	3	5	18	**Full**
HC 5	83	16	6.6	3.33		
	5	5	5	5	20	**Full**
HC 4	77	15	6.5	3.43		
	5	3	5	5	18	**Full**
HC 3.5	88	10	6.9	3.12		
	5	3	3	3	14	**Partial**
HC 3	56	9	6.7	2.99		
	3	3	5	3	14	**Partial**
HC 2	88	13	6.9	3.40		
	5	3	3	5	16	**Full**
HC 1	81	11	7.8	2.87		
	5	3	3	3	14	**Partial**
BFC 1	66	9	6.3	2.87		
	3	3	5	3	14	**Partial**
BFC 2	84	13	6.9	3.22		
	5	3	3	5	16	**Full**

stations had scores of 18 or 20. Stations 1 and 3.5 each had partially supporting scores due to the EPTT, BI, and SDI biological metrics. Station 3 also had a partially supporting MSCI score, but it was due to low TR, EPTT, and SDI. Station 3 was the only site in fall 2014 to have a suboptimal TR score, which was 17 taxa below the threshold value. HC Stations 1, 2, and 3.5 had a similar macroinvertebrate community composition, with each station having nearly identical taxonomic families making up the top five dominant families. One notable difference among these three stations was with respect to riffle beetles. Whereas riffle beetles made up over 20 percent of Station 2 and 3.5 samples, they made up only 1.9 percent of the Station 1 sample, which was considerably lower than any other HC station.

Although Chironomidae taxa were either first or second in abundance at each station in fall, they tended to make up a lower percentage of samples compared to spring (Table 12). Station 3 had the highest percentage of chironomids (49.0 percent); the remaining stations ranged from 19.1 percent (Station 3.5) to 41.3 percent (Station 1). A total of 52 chironomid taxa were present in HC fall samples; however, among individual stations, the number of chironomid taxa tended to have a very narrow range. Station 4 had the fewest chironomid taxa with 29, and Station 6.5 had the most with 34. The genus *Polypedilum* made up most of the chironomid abundance in fall but, unlike spring samples, no other chironomid taxa were consistently dominant.

Riffle beetles were the dominant taxa group or second in dominance at all HC sites except Station 1 and Station 5.5, where they were third in abundance. Nearly all riffle beetles in HC were *Stenelmis* and, although *Dubiraphia* was second in abundance, this genus was not nearly as numerous.

Aquatic worms occurred in highest abundance at Station 1, where Tubificidae and other aquatic worm taxa made up nearly 38 percent of the sample. The remaining stations had less than half of the aquatic worm abundance than Station 1.

Mayfly abundance was variable among stations. The highest percentages of mayflies occurred at Stations 2 through 4, where they made up between 22.2 to 26.5 percent of samples. The remaining sites had mayflies in roughly comparable percentages, ranging between 8.4 to 14.2 percent of samples. Among HC stations there was little variation in the number of mayfly taxa, which ranged from 10 taxa (Stations 2 and 6.5) to six taxa (Station 4). The mayflies *Caenis latipennis* and *Stenonema femoratum* were the most abundant mayfly taxa among all stations. *C. latipennis* was the dominant mayfly taxon among Stations 2-3.5, and other taxa were present in varying abundance, relative to station. *Tricorythodes* was well represented among Stations 2 to 5 samples, but it was either absent or present as a single individual among stations upstream of Station 5.

Stoneflies were mostly absent from HC fall samples, with the exception that Stations 5.5, 6.5, and 8 each had a single immature Capniidae (a winter stonefly family).

Caddisflies were relatively rare and represented by few taxa at Stations 1-3.5. Whereas Stations 1-3.5 had between two and five caddisfly taxa, the remaining stations upstream ranged from seven to 11 taxa. *Cheumatopsyche* was the only caddisfly genus present among all stations and *Chimarra* was present at each site except Stations 1 and 8. *Cheumatopsyche* was rarest at Stations 1 and 2, but otherwise exhibited no longitudinal pattern with respect to its abundance.

Table 12
Fall 2014 Hinkson and Bonne Femme Creek Macroinvertebrate Composition

↓Variable	Station→	1	2	3	3.5	4	5	5.5	6	6.5	7	8	BFC1	BFC2
Taxa Richness		81	88	56	88	77	83	90	87	89	97	93	84	66
Number EPT Taxa		11	13	9	10	15	16	17	18	19	16	17	13	9
% Ephemeroptera		10.0	23.1	26.5	24.6	22.2	14.2	12.2	12.0	9.3	8.4	9.6	15.5	9.2
% Plecoptera		0.0	0.0	0.0	0.0	0.0	0.0	<0.1	0.0	<0.1	0.0	<0.1	<0.1	1.1
% Trichoptera		0.5	3.4	7.3	3.4	12.1	9.4	7.8	14.4	11.3	14.2	12.8	2.4	3.3
MSCI Score		14	16	14	14	18	20	18	20	18	20	18	16	14
% Dominant Families														
Chironomidae		**41.3**	**29.9**	**49.0**	**19.1**	**27.2**	**32.1**	**27.6**	**30.3**	**23.0**	**20.6**	**20.3**	**29.2**	**22.9**
Tubificidae		**37.3**	**7.4**	**17.2**	**14.7**	5.6	4.7	**14.8**	**4.5**	**6.8**	**10.5**	**6.9**	**13.5**	**9.6**
Caenidae		**5.1**	**13.5**	**13.5**	**13.8**	**6.2**	4.6	3.4	3.5	4.2	4..1	1.3	**8.4**	**4.4**
Heptageniidae		**4.1**	**5.6**	4.8	**6.7**	**8.9**	1.8	4.7	4.4	2.7	3.3	**5.6**	**6.0**	4.3
Arachnida		**3.5**	2.4	0.9	3.3	0.5	0.9	2.4	3.5	1.9	5.4	2.8	2.8	**4.6**
Elmidae		1.9	**20.2**	**19.2**	**21.8**	**19.9**	**14.8**	**13.9**	**19.8**	**32.5**	**24.0**	**29.4**	**19.6**	**33.5**
Hydropsychidae		0.3	2.9	5.7	2.6	**8.0**	**7.7**	5.7	**9.5**	**5.8**	3.6	**8.1**	1.2	2.1
Baetidae		0.6	2.0	4.2	1.7	2.1	3.9	4.1	4.2	2.2	0.8	2.2	1.0	0.4
Coenagrionidae		1.6	3.5	**5.9**	4.5	3.4	**9.7**	**6.6**	3.1	**6.2**	**5.7**	5.4	2.2	1.3
Simuliidae		-	0.2	2.0	1.6	3.2	**5.9**	**6.9**	**4.8**	2.2	2.0	0.6	1.1	1.1
Helicopsychidae		-	-	0.1	0.3	1.6	0.7	0.2	1.4	3.0	**8.8**	3.6	-	-

Note: Numbers in bold font indicate the five dominant taxa.

5.2.2 Comparison of Hinkson and Bonne Femme Creeks

<u>Spring 2014</u>

Both BFC stations had partially supporting MSCI scores of 14 in spring 2014 (Tables 8 and 9). Two of the three rural HC stations also had partially supporting scores of 14; only Station 8 had a fully supporting score of 16. Of the seven urban HC sites sampled in spring 2014, three had fully supporting MSCI scores, all of which were 16. Three of the remaining stations had partially supporting scores of 12, and the final site attained a score of 14. Rural HC and BFC mean taxa richness values were nearly equal (77 and 78, respectively) (Figure 7), and both were slightly higher than the urban HC reach (72). Mean EPTT also was similar between BFC (12.5) and rural HC (12.3), both of which were higher than the urban HC reach (9.6) (Figure 8). Mean BI values were similar among rural HC and BFC stations (6.6 vs. 6.5), both of which were lower than the urban HC reach (6.8). The urban HC stations had a higher mean SDI (3.1) than either the rural HC or BFC stations, both of which had a mean SDI of 2.8 (Figure 8).

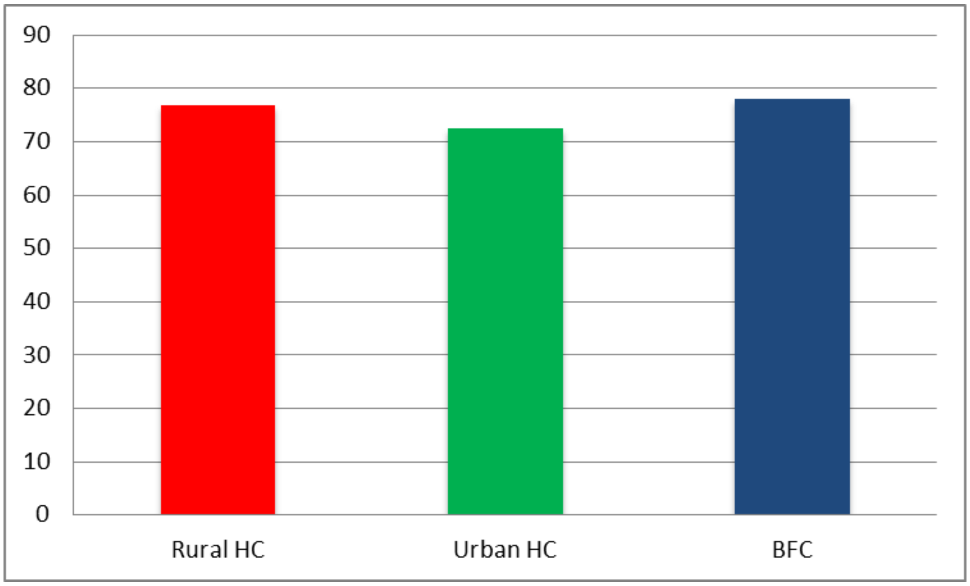

Figure 7. Mean Taxa Richness at Rural Hinkson Creek, Urban HC, and Bonne Femme Creek in Spring 2014 samples.

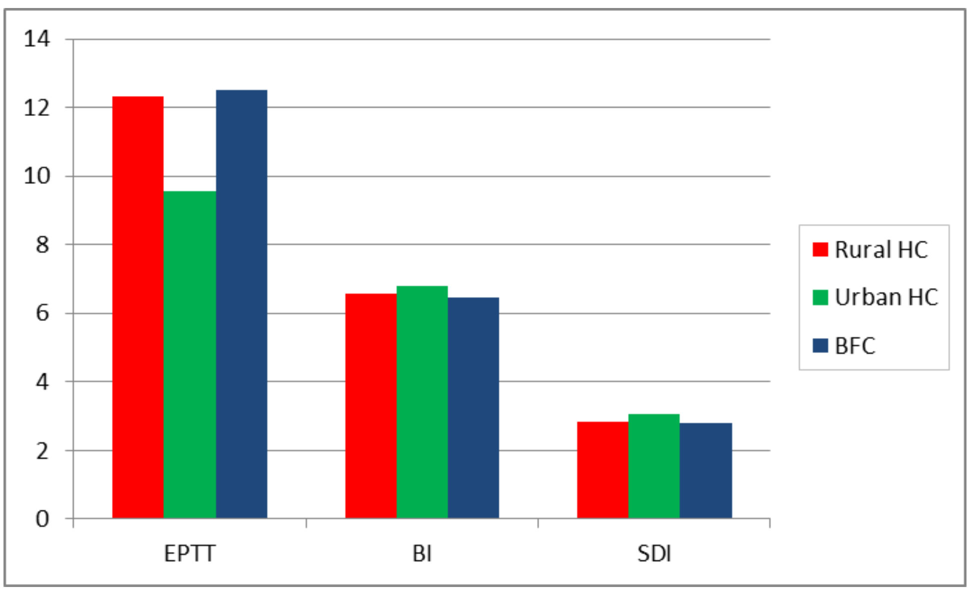

Figure 8. Mean EPTT Richness, Biotic Index, and Shannon Diversity Index values at Rural Hinkson Creek, Urban HC, and Bonne Femme Creek in Spring 2014 samples.

BFC and HC spring samples had a few dominant taxa groups in common. Chironomids were the dominant family at both BFC stations, and riffle beetles, primarily *Stenelmis*, were abundant in both systems. There were however, several differences as well. Whereas chironomid abundance in HC was generally split among three taxa groups--*Cricotopus/Orthocladius* grp., *Polypedilum* sp., and *Tanytarsus*--BFC had only one that was clearly dominant. For both BFC samples *Cricotopus/Orthocladius* grp. made up more than half of chironomids; no other chironomid taxa group was present in notable abundance. With the exception of HC Station 3, which had a much greater abundance of aquatic worms than the remaining HC stations, both BFC sites had slightly higher numbers of aquatic worms than most HC sites.

Mayflies were much less abundant among BFC samples than the rural HC reach or the upstream portion of the urban HC reach. The mayfly *C. latipennis* accounted for at least half of mayflies in both BFC samples. Stoneflies, however, were more diverse among BFC stations than HC sites. Stoneflies were only found among HC Stations 5.5-8, with more individuals being present at Stations 7 and 8. Whereas BFC stations each had five stonefly taxa present, each of the HC stations had at most two taxa. Despite the higher stonefly diversity in BFC, their relative abundance was not substantially higher than the rural HC stations.

Odonates (dragonflies and damselflies) were relatively rare among BFC samples, with BFC Station 1 having only a single individual present and Station 2 having eight individuals of three taxa. Although some HC stations also had few odonates present, only HC Station 3 had fewer individuals than BFC Station 2. The damselfly *Enallagma* was the only odonate taxon present among all HC and BFC stations, and it made up the majority of odonates at all stations except HC Station 2 where the dragonfly *Basiaeschna janata* was slightly more abundant.

Given the variability of caddisfly diversity and abundance among HC stations, no definitive comparison with respect to this taxa group can be drawn between the two systems.

<u>Fall 2014</u>
Only BFC Station 2 had a fully supporting MSCI score of 16 in fall 2014. BFC Station 1 had a considerably lower taxa richness value than Station 2 (18 fewer taxa), which was a contributor to its partially supporting score of 14. Each of the rural HC stations had fully supporting scores of 18 or 20, and five of the eight urban HC stations also had fully supporting scores. Two urban sites, Stations 5 and 6, attained the highest possible MSCI score of 20 and two others, Stations 4 and 5.5, had scores of 18. BFC mean TR (75) was lower than either the urban HC reach (81) or the rural reach (93). BFC Station 2 had only 66 taxa, which reduced the average; however, BFC Station 1, which had a TR of 84, was roughly similar to the majority of urban HC sites (Figure 9). Similarly, the mean EPTT value for BFC (11) was lower than either HC reach (Figure 10). Both BFC stations had considerably fewer EPTT than the rural HC reach, and several urban HC sites had higher EPTT values than the top BFC value (13). BFC Station 1, which had nine EPTT, tied

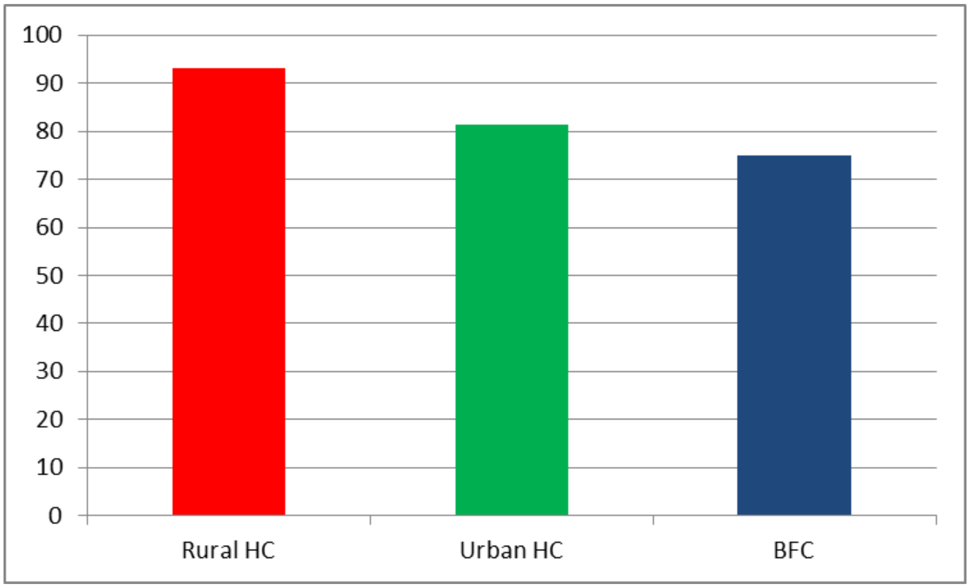

Figure 9. Mean Taxa Richness at Rural Hinkson Creek, Urban HC, and Bonne Femme Creek in Fall 2014 samples.

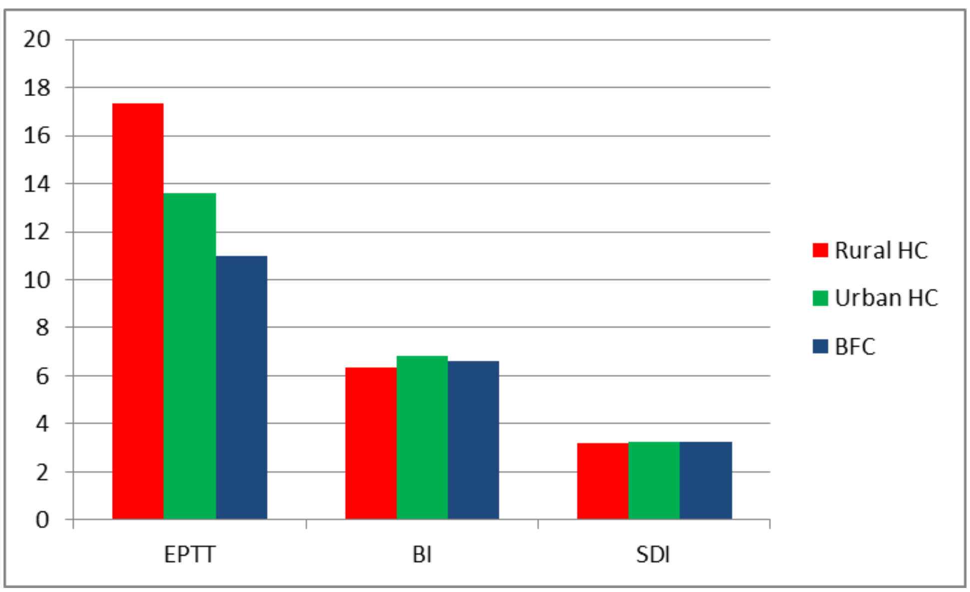

Figure 10. Mean EPTT Richness, Biotic Index, and Shannon Diversity Index values at Rural Hinkson Creek, Urban HC, and Bonne Femme Creek in Fall 2014 samples.

HC Station 3, which was the lowest among HC samples. Although the mean rural HC EPTT value (17) was higher than the mean for the urban reach (14), Stations 5, 5.5, and 6 each had EPTT values that were equal to rural reach stations. Mean BI values were lowest among rural HC station (6.3), and the mean BI for the urban reach (6.8) was tied with the fall fully supporting threshold value for this metric. The mean BI value for BFC (6.6) was only somewhat lower than the mean BI among urban HC stations. The urban

HC reach had the highest SDI in fall 2014 (3.23), followed by the rural HC reach (3.17) and BFC (3.05) (Figure 10).

In fall 2014, Chironomidae, Tubificidae, and Elmidae were three taxonomic families that were commonly among the top five dominant taxa in both HC and BFC systems. Taxa in the genus *Polypedilum* were the dominant chironomids among all HC and BFC sites and, although some taxa were locally abundant by station, no other chironomid taxa group exhibited a similar dominance. The number of chironomid taxa was generally similar among BFC and HC stations, ranging between 29 and 31taxa. BFC Station 2 was lower than the remaining sites, having 26 chironomid taxa.

BFC Station 2 had a similar percentage of mayflies present compared to the rural HC stations, but it had fewer taxa present. Whereas the rural HC stations had between seven and 10 mayfly taxa present, BFC Station 2 had only five. BFC Station 1, however, had a slightly higher percentage of mayflies making up the sample, but the number of mayfly taxa present was similar compared to rural HC. Several urban HC stations (Stations 2-4) had a higher percentage of mayflies compared to BFC and rural HC and also had comparable numbers of mayfly taxa. The mayflies *C. latipennis* and *Stenonema femoratum* tended to be dominant among both systems, but *Baetis* exhibited patchy abundance only among HC stations.

BFC Station 2 was the only site in fall 2014 with multiple capniid stoneflies. The remaining stations that had stoneflies present (BFC Station 1 and HC Stations 5.5, 6.5, and 8) had only a single individual in each sample.

Similar to spring samples, odonates were relatively rare among BFC stations. BFC Station 2 had only a single odonate taxon (*Enallagma*), and BFC Station 1 had five odonate taxa, which was similar to the lowest among HC stations (Station 3 had four and Station 4 had five odonate taxa).

Caddisflies tended to be more abundant and diverse among HC Stations 4-8. BFC stations tended to have fewer caddisfly taxa and individuals, and caddisfly trends among the two BFC stations were more similar to HC Stations 2, 3, and 3.5.

With the exception of HC Station 1, which had a higher abundance and diversity of aquatic worms than the remaining HC sites, BFC and HC had similar aquatic worm abundance and diversity.

5.2.3 Comparison of 2014 Data and Historical Data

This section builds on trends first discussed in the 2012 HC biological assessment (MDNR 2013a), which presented select macroinvertebrate data from fall 2001 to fall 2012. Subsequent reporting (MDNR 2014a) continued this analysis, which involves excluding samples that were likely affected by drought conditions and samples in which only two of three habitats were adequate (MDNR 2013a).

With respect to MSCI scores, the 2014 data set resulted in 16 of 19 (84 percent) rural samples and 23 of 48 (48 percent) urban samples that were fully supporting. Since 2012, the percentage of urban samples that attained fully supporting status has increased from 40 percent to 48 percent, whereas the rural percentage declined from 100 percent to 84 percent (Table 13).

Table 13
Hinkson Creek Percent Fully Supporting Scores

Land Use Segment	<2012		2012		2013		2014	
Rural	100	7/7	100	10/10	92.3	12/13	84.2	16/19
Urban	35.0	7/20	40.0	10/25	45.5	15/33	47.9	23/48

Note: Numbers in the shaded columns indicate the ratio of fully supporting to total number of samples

Although samples collected in 2014 did not show a clear distinction of urban versus rural in terms of impairment (Table 14), inclusion of the most recent data continues to show that the urban reach has a lower overall TR and fewer EPTT compared to the rural reach (Table 15). The information in Table 15 builds on the Year 1 and Year 2 assessments and includes spring and fall 2014 macroinvertebrate data. For comparison purposes, average metric values calculated from samples collected before 2012 are also included. Each of the values calculated for 2012, 2013, and 2014 are cumulative averages, which include data from each of the previous years. To maintain consistency with the previous analyses, samples affected by drought and missing or sparse habitat have been eliminated from consideration.

Metric averages for 2014 in Table 15 include 19 rural and 48 urban samples. The addition of the 2014 data increased the TR and EPTT metrics for both the urban and rural reach slightly, but the remaining metrics were roughly the same (Table 15). Small, if any, changes are observed when comparing biological metrics of the most recent samples with those collected prior to 2012. Mean TR is slightly higher in 2014 for both the rural and urban reaches. Mean EPTT for the rural reach is slightly lower in 2014 compared to earlier samples, but the urban reach has shown a slight increase. Mean BI and SDI values are the same or nearly the same in 2014 compared to pre-2012 values.

Tables 16 and 17 present biological metrics separated by season. Spring samples showed a very slight decrease in TR and EPTT from pre-2012 samples to 2014 in the rural reach, but the urban reach had a slight increase for these metrics. BI and SDI were unchanged, or nearly so, for both the rural and urban reaches during this time frame. Unlike the spring samples, fall samples tended to show an increase in TR between pre-2012 and 2014 in both the rural and urban reaches. Average fall EPTT values were roughly the same in the rural reach over time, but the urban reach averaged two more EPTT in 2014 than the pre-2012 samples. Both reaches had a slightly lower mean BI value in 2014, but the mean SDI value was mostly unchanged.

Table 14
MSCI Scores in Samples from All Stations on Hinkson Creek, Fall 2001-Fall 2014

Station	Land use segment	Fall 2001	Spring 2002	Fall 2003	Spring 2004	Spring 2005	Fall 2005	Spring 2006	Spring 2012	Fall 2012	Spring 2013	Spring 2014	Fall 2014
HC 8 – Rogers Rd.	Rural	~~12~~	16†						18		14	16	18
HC 7 – Hinkson Cr. Rd.	Rural	~~12~~	16†	18	16†	16	18		16		16	14	20
HC 6.5 – Hwy 63 Connector	Rural				16				16		16	14	18
HC 6 – E. Walnut St.	Urban	12	~~10~~†	16	14	18	16†		14	~~12~~	16	14	20
HC 5.5 – Broadway	Urban			14††	16	16	~~12~~†		16	~~16~~	16	16	18
HC 5 – Upstr. of Grindstone	Urban	~~16~~	~~10~~†						16	~~10~~	16	12	20
HC 4 – Dwnstr. of Grindstone	Urban	~~18~~	12†						16	~~12~~	16	16	18
HC 3.5 – Recreation Dr.	Urban					12†	12†		14	~~12~~	16	16	14
HC 3 – Forum Blvd.	Urban	16†	12†					16		~~12~~	10	12	14
HC 2 – Twin Lakes RA	Urban	14††	12†					12†		~~14~~	14	12	16
HC 1 – Scott Blvd.	Urban	14††	14					14††		~~14~~	12		14

Shaded cells indicate that the sample did not attain fully supporting status. Cross-hatched cells indicate that only two of three habitats were fully represented. Numbers that have been stricken through indicate those that were excluded due to drought or habitat limitation effects. Blank cells represent seasons/stations in which no samples were collected.

†MSCI scores that are lower than original bioassessment reports due to updated biological criteria for the Ozark/Moreau/Loutre EDU.

††Samples with MSCI scores that changed from fully supporting to partially supporting due to updated biological criteria.

Table 15
Mean Values for Individual MSCI Metrics at Hinkson Creek Stations for Combined Samples Seasons 2001-2014

Biological Metric	Rural (HC 6.5, 7, and 8)				Urban (HC 1 – 6)			
	<2012	2012	2013	2014	<2012	2012	2013	2014
Taxa Richness	78.6	78.2	77.4	79.7	73.1	72.9	73.7	74.8
EPTT Richness	15.4	14.5	14.1	14.3	9.5	9.7	9.6	10.3
Biotic Index	6.9	6.7	6.7	6.6	7.0	7.0	7.0	7.0
Shannon Diversity	3.10	3.11	3.12	3.09	3.10	3.11	3.08	3.10
Number of Samples	7	10	13	19	20	25	33	48

Table 16
Mean Values for Individual MSCI Metrics at Hinkson Creek Stations, Spring Samples 2002-2014

Biological Metric	Rural (HC 6.5, 7, and 8)				Urban (HC 1 – 6)			
	<2012	2012	2013	2014	<2012	2012	2013	2014
Taxa Richness	77.8	77.4	76.8	76.8	72.1	72.1	73.4	73.2
EPTT Richness	14.8	13.9	13.5	13.3	8.9	9.3	9.3	9.4
Biotic Index	6.7	6.6	6.6	6.6	7.0	7.0	7.0	7.0
Shannon Diversity	3.03	3.07	3.10	3.04	3.05	3.08	3.05	3.05
Number of Samples	5	8	11	14	12	17	25	32

Table 17
Mean Values for Individual MSCI Metrics at Hinkson Creek Stations, Fall Samples 2001-2014

Biological Metric	Rural (HC 6.5, 7, and 8)				Urban (HC 1 – 6)			
	<2012	2012	2013	2014	<2012	2012	2013	2014
Taxa Richness	81.5	*	*	88.4	75.6	*	*	78.4
EPTT Richness	17.0	*	*	17.2	10.5	*	*	12.1
Biotic Index	7.2	*	*	6.7	7.1	*	*	6.9
Shannon Diversity	3.27	*	*	3.22	3.19	*	*	3.21
Number of Samples	2	*	*	5	8	*	*	16

*Samples collected in fall 2012 were not included due to effects of drought conditions; samples were not collected in fall 2013 due to drought.

With the inclusion of the 2014 data there now tends to be a greater disparity in TR between the rural and urban reaches in the fall compared to spring samples (Tables 16 and 17). In spring there is a difference of 3.6 in mean TR between rural and urban, but in fall the difference is 10. Given the relatively low fall rural pre-2012 sample size, the high 2014 TR values among rural HC stations increased the average for this metric notably. There is a greater difference in mean EPTT between the rural and urban reach in fall. The rural mean EPTT was 3.9 higher than urban in spring, and 5.1 higher in the fall. The mean for the remaining metrics, BI and SDI, were not appreciably different when comparing rural versus urban or between seasons. Individual values for each of the four biological metrics making up the means presented in Tables 16 and 17 are presented in Appendix B.

6.0 Discussion

6.1 Physicochemical Data

Spring 2014 water quality samples were collected on two days separated by one week due to heavy rains and flooding that began on April 2, 2014. HC Stations 1-5 and both BFC stations were sampled on April 1, and Stations 5.5-8 were sampled on April 10, 2014. The fall 2014 sampling season also was affected by flooding, but all samples were collected a week after flows had peaked and, although elevated, were beginning to approach pre-flood conditions.

Turbidity was much higher among spring 2014 samples collected after flooding, with HC 7 and 8 having slightly higher turbidity than the remaining sites. Conductivity was considerably lower among samples collected after the flood event, which is common in streams after high flow events due to dilution of ionic compounds in the water. For example, chloride concentrations were much lower among samples collected after the flood. Other chemical constituents that occurred in lower concentrations after the flood included NH_3-N and hardness. NO_3+NO_2-N, TN, TSS and, to a lesser extent, TP were higher in samples collected after the flood, possibly due to agricultural runoff higher in the watershed.

With the exception of Station 8, sulfate concentrations were sufficiently high throughout the HC watershed that spring samples required dilution during laboratory analysis. Despite the April 2, 2014, flooding, sulfate concentrations did not differ notably among stations except that Station 8 was lower. Sulfate concentrations were much lower among fall samples, and none required dilution during analysis. Station 1 and 8 sulfate concentrations were similar to one another, with each of the remaining stations having concentrations that were higher. This observation differs from the 2013 biological assessment, in which the spring Station 1 sulfate concentration was more than twice as high as the remaining HC sites (MDNR 2014a). Sulfate concentrations among HC stations were roughly an order of magnitude higher than BFC samples during both sample seasons. These results, which are similar to those made in the Year 2 biological assessment (MDNR 2014a), may be due to past coal mining activities in the watershed.

The heavy rains preceding the fall sampling of HC provided an opportunity to observe the influence that each of the major tributaries had on HC discharge. Predictably, there were increases in HC flow downstream of each of these tributaries, but these increases did not correspond simply with the relative size of each tributary. For example Nelson Creek, which has a watershed size of 66.40 km^2 (Hooper 2015) resulted in an increase of 3.5 cfs at Station 6.5. By comparison Grindstone Creek, having a watershed size of 41.23 km^2 (Hooper 2015) resulted in an increase of 12.5 cfs at Station 4. One of the larger discharge increases measured *in situ* (8.3 cfs) occurred between Stations 2 and 3, where there are no tributaries to contribute flow. It is difficult to determine with certainty the factor(s) causing this observation. Possible factors include groundwater augmentation between Stations 2 and 3, sample timing that coincided with measuring the last remnants of storm water discharge in the lower HC stations, or the gravel load at Station 3 may result in more subsurface flow that could have resulted in an artificially low measured discharge.

6.2 Biological Assessment

6.2.1 Hinkson Creek Longitudinal Comparison

Flooding did not appear to be a major factor in MSCI scores among HC stations in spring 2014. Two of five stations sampled before the flood had fully supporting scores, as did two of five stations sampled afterward. Of the four fully supporting MSCI scores, three were urban stations and one was rural. EPTT were particularly rare among four of the seven urban HC stations sampled, having single digit values, and three of these stations attained the lowest possible score of 1 for this metric.

Although flooding did not appear to have an obvious effect on MSCI scores, there may have been some changes in the HC macroinvertebrate community in response. Each of the HC stations sampled after the flood (5.5-8) had much higher percentages of mayflies in samples than stations sampled before the flood (2-5). Also, whereas stoneflies were absent among HC stations sampled before the flood, they were at least present among all samples collected afterward.

Macroinvertebrate drift may have been a factor by way of two mechanisms. First, taxa from upstream stations may have drifted downstream, which could increase such biological metrics as TR and EPTT among downstream stations. Second, some taxa may be more able to move to velocity refugia or cling to substrate during floods while others drift downstream. Because MDNR protocols are based on processing samples to a fixed target number, relative proportions of samples may be affected by which organisms are able to stay in place versus those that become entrained in floodwaters within a specific sample reach. Although this second explanation would help to explain changes in the percent of, for example, mayflies that make up a sample, it would not explain increases in TR or EPTT observed following flood events. Fitz and Dodds (2004) discuss the effects that upstream refugia can have on colonizing downstream reaches. Although their study focused on Kansas streams that are perennial in the upper watershed and intermittent farther downstream, they observed that downstream recolonization after droughts as well as floods can occur as a result of drifting macroinvertebrates.

As an example, in spring 2004 HC Station 6.5 was sampled on March 25 and again on April 1 to determine whether flooding had any effect on the HC macroinvertebrate community. Shortly after March 25, 2004 samples were collected, a sizeable flood occurred in the HC watershed. USGS gage #06910230 was not in operation at this time to provide discharge measurements, but given the precipitation measured at the University of Missouri campus, discharge is likely to have been in the 5,000-6,000 cfs range (Missouri Historical Agricultural Weather Database available for query at http://aes.missouri.edu/sanborn/weather/sanborn.stm). Although both samples attained MSCI scores of 16, TR and EPTT were notably higher in the sample collected after the flood. TR increased from 79 to 86, and EPTT increased from 12 to 17. The percentage of mayfly taxa changed from 15.3 percent to 24.0 percent, stoneflies increased from 0.6 percent to 3.9 percent, and caddisflies increased from 0.6 percent to 1.1 percent after the flood. Robinson et al. (2004) found that the relative proportions of various taxa groups varied greatly in response to flooding. Mayflies, for example, tended to make up a greater proportion of samples in most habitat types following controlled flood events, but the proportion of chironomids decreased. Similarly, Holomuzki and Biggs (2000) and Fingerut et al. (2015) found that behavioral differences exist among select macroinvertebrate taxa in response to flow velocity. Although Holomuzki and Biggs (2000) went on to say that large scale drift did not occur until flow velocities were sufficient to dislodge the benthic substrate, Imbert and Perry (2000) observed notable increases in macroinvertebrates present in drift samples during non-scouring events. It is possible, therefore, that flooding had an effect on several macroinvertebrate community attributes observed among Stations 5.5-8, all of which were sampled after the April 2, 2014, flood.

Overall, HC stations had historically high biological metric values and MSCI scores in fall 2014. MSCI scores of 20 have never been recorded for either season in HC, but in fall 2014 three stations (two of them in the urban reach) attained this top score and four others achieved MSCI scores of 18 (also, two of them urban). For each of the four stations that had MSCI scores of 18, the suboptimal biological metric was equal to (Stations 4 and 5.5) or very close to (Stations 6.5 and 8) the respective scoring threshold values. The lowest MSCI scores occurred among downstream HC sites (Stations 1-3.5). Each of these stations had partially supporting MSCI scores of 14 except Station 2, which had a fully supporting score of 16.

As was the case with the spring sample season, flooding may have had an effect in these relatively high biological metric scores in the urban reach. Unlike the spring season, in which HC samples were collected before and after a flood, all fall samples were collected soon after a flood event, and macroinvertebrate drift may have been a factor in some of the metric numbers observed. Another factor that may have contributed to these high scores was that HC maintained at least minimal flow during the entire summer during

2014. Occasional rain through the summer months (http://aes.missouri.edu/sanborn/weather/sanborn.stm) resulted in the upstream reaches of HC having sufficient flows to collect macroinvertebrate samples. The timing of the October 2, 2014, flood was unfortunate, since it has led to uncertainty as to possible contributing factors for the high urban HC MSCI scores for the fall 2014 season.

Past reports have documented a higher percentage of worms and fewer stoneflies in the HC urban reach (MDNR 2002, 2004, 2005, 2006; Nichols 2012). The aquatic worm component of the spring 2014 data, however, are more similar to what was reported in the Year 2 bioassessment for spring 2013 data (MDNR 2014a). The Year 2 report noted that, although the highest percentage of tubificids did occur in samples collected in the urban reach, their abundance was variable among stations. Although the highest percentage of aquatic worms occurred among urban stations in fall 2014 (Stations 1 and 3) most urban HC stations had aquatic worm abundance that was similar to the rural HC reach or BFC. Three urban HC stations (4, 5, and 6) had aquatic worm abundance that was lower than the three rural HC stations. The fall samples, therefore, also demonstrate a variable distribution of aquatic worms among HC stations.

Stoneflies continue to be rarer in the urban HC reach compared to rural stations. In spring 2014, stoneflies were absent among HC Stations 2-5; present at Stations 5.5, 6, and 6.5; and their highest percentages were observed at Stations 7 and 8. Even among Stations 7 and 8, however, stoneflies were not present in large numbers. Although stoneflies were rare or absent among fall HC samples, they also tend to be very rare among fall samples in Ozark/Moreau/Loutre EDU reference streams. Of the 10 fall reference samples collected in this EDU between 1998 and 2011, only three had stoneflies present.

6.2.2 Comparison of Hinkson and Bonne Femme Creeks

Although only one of the three rural HC stations had a fully supporting MSCI score, neither of the BFC stations were fully supporting in spring 2014. BFC and rural HC stations had nearly equal mean TR and EPTT values, both of which were higher than the urban HC reach. Mean BI values for BFC and rural HC were lower than the urban HC reach, which suggests that the urban HC macroinvertebrate community is more tolerant of organic pollutants. SDI values, however, were higher in the urban HC reach than either the rural reach or the BFC stations.

Mayflies tended to be less abundant among BFC stations than the rural HC or upstream urban HC stations. As mentioned earlier, higher mayfly abundances among some urban HC stations may have been affected by flood-related drift. Nevertheless, the rural HC stations had a considerably higher percentage of mayflies than either BFC station. Unlike mayflies, stoneflies were more diverse among BFC stations, but they were not more abundant than HC stations. Although aquatic worms were not present in great numbers at BFC, they accounted for a higher percentage of spring samples than most HC sites. Chironomids also made up a higher percentage of BFC samples than the rural HC sites.

Given the aquatic worm and chironomid abundance among BFC stations and the relative scarcity of mayflies relative to rural HC stations, it appears that some subtle habitat or water quality factor negatively affected BFC spring samples.

In fall 2014, BFC Station 1 had 18 fewer taxa than BFC Station 2. With 66 taxa BFC Station 1 TR was lower than all except HC Station 3, which had 56 taxa. Because of the low TR value for BFC Station 1, the mean BFC TR was lower than both the mean TR values for the urban and rural HC reaches. BFC Station 1 also had fewer EPT taxa (9) than all but HC Station 3, which also had nine EPT taxa. As was the case with spring samples, mean BI values were lowest among rural HC stations in fall, highest among urban HC stations, and BFC stations were approximately midway between. Of the three reaches considered, therefore, the urban HC reach has a macroinvertebrate community that is most tolerant of organic pollutants. Mean fall SDI values followed the same pattern as spring samples, with the highest mean SDI occurring among urban HC stations. These SDI patterns imply that the urban HC stations tend to have macroinvertebrate communities represented by taxa that are more evenly distributed, with fewer individual taxa dominating samples.

6.2.3 Comparison of 2014 Data and Historical Data

With combined seasons, mean TR values calculated for samples collected in 2014 were higher for both the rural and urban HC reaches compared to the pooled data from 2001-2013. Average EPTT values also were slightly higher in both reaches in 2014. Despite these increases, the urban reach continues to have a lower running average for TR and EPTT than the rural reach. BI values were unchanged with the addition of 2014 sample data, and the mean SDI value for the rural reach was lower in 2014. SDI was slightly higher, however, in the urban reach.

By including the 2014 data from both seasons, the current percentage of fully supporting MSCI scores decreased for the rural HC reach, but the urban reach increased slightly. Given the relatively small sample size for the rural reach, the two partially supporting MSCI scores from spring 2014 had a notable effect on the percent of fully supporting samples for the rural reach. Despite the number of high fall MSCI scores in the urban HC reach, there was an insufficient number overall in 2014 to make a substantial increase in the running average.

Average biological metrics were separated by season to determine whether either season has a greater effect on differences observed in the pooled data. Differences in spring data were slight. The rural reach experienced a minor decline in mean TR and EPT over time, whereas the urban reach showed a slight increase for these two metrics. By comparison, differences in fall data were greater for rural mean TR as well as urban TR and EPTT. Average EPTT for the rural reach did not change substantially in the fall. BI declined in the rural reach for the fall season, but it decreased only slightly in the urban reach. Once again, sample size played a role in the relatively large difference observed in fall samples by the inclusion of 2014 data. Fall 2014 TR values and several urban EPTT values were much higher than fall samples collected prior to 2012. These new samples served to increase the mean of these metrics due to the low number of past samples.

7.0 Conclusions

1. Both 2014 sample seasons were affected by flooding. Spring sampling was suspended for a week after BFC and HC Stations 2-5 were sampled. Samples were collected from HC Stations 5.5-8 after flood waters receded. Fall samples also were collected after a flood, but all stations were sampled as HC approached pre-flood conditions.
2. Spring flooding resulted in higher turbidity, TN, TSS, NO_3+NO_2-N, and slightly higher TP. Conductivity, NH_3-N, chloride, and hardness however, were notably lower among stations sampled after the flood.
3. Among fall samples, turbidity was highest at HC Stations 1 and 2 but similar among the remaining stations.
4. Chloride concentrations were higher among HC Stations 1-3 and lowest at Stations 7 and 8 during both sample seasons.
5. The majority of HC stations had partially supporting MSCI scores in spring 2014. The urban HC reach had three of seven stations, and the rural reach had one of three stations with fully supporting scores.
6. Both BFC stations, which are located in a mostly rural watershed, had partially supporting MSCI scores in spring 2014. Mean values among individual biological metrics (TR, EPTT, BI and SDI) were similar between rural HC stations and BFC sites.
7. Rural HC and BFC stations had higher mean values for TR and EPT, but urban HC stations had higher mean SDI and BI values in spring 2014.
8. Spring flooding appears to have been a factor in mayfly and stonefly distribution among HC stations. Samples collected after flooding had higher percentages of both taxa groups than those collected before, likely due to macroinvertebrate drift.
9. The majority of fall HC samples had fully supporting scores. Eight of the 11 HC stations were fully supporting, and seven of those had MSCI scores $\geq$18.
10. One of the two BFC stations had a fully supporting MSCI score of 16 in fall 2014, compared to rural HC, in which all three stations had fully supporting scores that were $\geq$18.
11. Both the urban and rural HC sample reaches had higher mean TR and EPTT values than BFC in fall 2014. The urban HC reach had higher mean BI and SDI values than BFC or the rural HC reach. The mean BI value for BFC was only slightly lower than the urban HC reach in fall 2014.
12. Although BFC is sampled as a local control stream to evaluate potential effects of local climate on upstream HC stations from year to year, the rural HC stations overall tended to have higher biological metric values and a higher proportion of fully supporting MSCI scores. These differences are not attributed to stream drying; however, the influence of flooding may be a contributing factor in the 2014 study.

13. For the first time since studies began in 2001, the highest possible MSCI score of 20 was attained among some HC stations, two of which occurred in the urban reach. Flooding in days preceding fall sampling may have had confounding effects with these results.
14. With the inclusion of 2014 sample data, the running average for TR and EPTT both increased. Both of these metrics continue to be lower among urban HC stations compared to the rural reach.
15. The percentage of fully supporting scores among rural HC stations decreased, but the percentage among the urban stations increased slightly after including 2014 sample data.

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Appendix A

Spring 2014 Macroinvertebrate Taxa Lists

Fall 2014 Macroinvertebrate Taxa Lists

Hinkson Creek

Bonne Femme Creek

Aquid Invertebrate Database Bench Sheet Report
Hinkson Cr [149812], Station #2, Sample Date: 4/1/2014 11:30:00 AM
CS = Coarse; NF = Nonflow; RM = Rootmat; -99 = Presence

ORDER: TAXA	CS	NF	RM
"HYDRACARINA"			
Acarina		4	24
AMPHIPODA			
Crangonyx			1
BASOMMATOPHORA			
Ancylidae	7	1	
Lymnaeidae			1
Menetus	1	1	
Physella			1
COLEOPTERA			
Berosus	2	3	1
Dubiraphia			5
Macronychus glabratus			1
Stenelmis	96	4	1
DECAPODA			
Orconectes virilis			1
DIPTERA			
Ablabesmyia	1	32	28
Ceratopogoninae	4	5	1
Chironomidae	4	2	1
Chironomus	1	2	
Cladotanytarsus	27	14	1
Cricotopus bicinctus	17		6
Cricotopus/Orthocladius	138	1	7
Cryptochironomus	6	11	
Cryptotendipes		4	
Demicryptochironomus	1		
Dicrotendipes	26	3	5
Ephydridae		1	
Eukiefferiella	17		1
Hydrobaenus	8	3	3
Nanocladius	3	8	27
Nilotanypus	3		1
Nilothauma	1		
Paralauterborniella		1	
Paratanytarsus	4	1	8
Phaenopsectra	1		5
Polypedilum flavum	18		
Polypedilum halterale grp	3	71	1
Polypedilum illinoense grp	7		167
Polypedilum scalaenum grp	52	49	

Aquid Invertebrate Database Bench Sheet Report
Hinkson Cr [149812], Station #2, Sample Date: 4/1/2014 11:30:00 AM
CS = Coarse; NF = Nonflow; RM = Rootmat; -99 = Presence

ORDER: TAXA	CS	NF	RM
Pseudochironomus		1	
Rheotanytarsus	3		1
Saetheria	1		
Simulium	5		
Stempellinella	1		
Stenochironomus	1		
Stictochironomus	1	5	
Tanytarsus	189	19	26
Thienemanniella	1		
Thienemannimyia grp.	29	5	11
Tipula			-99
EPHEMEROPTERA			
Stenonema femoratum	-99	1	-99
MEGALOPTERA			
Sialis		-99	
ODONATA			
Argia	1	3	4
Calopteryx			1
Enallagma			7
Plathemis			-99
Progomphus obscurus		-99	
TRICHOPTERA			
Cheumatopsyche	3	-99	
Hydroptila			1
Limnephilidae			2
Oecetis			1
TUBIFICIDA			
Branchiura sowerbyi	1	3	
Enchytraeidae	1	2	
Limnodrilus claparedianus			1
Limnodrilus hoffmeisteri		4	3
Quistradrilus multisetosus		1	
Tubificidae	13	14	4
VENEROIDA			
Pisidiidae		2	

Aquid Invertebrate Database Bench Sheet Report
Hinkson Cr [149813], Station #3, Sample Date: 4/1/2014 12:50:00 PM
CS = Coarse; NF = Nonflow; RM = Rootmat; -99 = Presence

ORDER: TAXA	CS	NF	RM
"HYDRACARINA"			
Acarina	1	2	5
ARHYNCHOBDELLIDA			
Erpobdellidae		-99	1
BASOMMATOPHORA			
Ancylidae	1	1	2
Lymnaeidae		2	3
Menetus			11
Physella		1	4
COLEOPTERA			
Berosus	7	2	1
Stenelmis	237	1	2
DECAPODA			
Orconectes virilis			-99
Palaemonetes kadiakensis			-99
DIPTERA			
Ablabesmyia		17	25
Ceratopogoninae	2	16	7
Chironomus		1	
Cladotanytarsus	1	35	1
Cricotopus bicinctus	18	1	4
Cricotopus trifascia	1		
Cricotopus/Orthocladius	143	3	29
Cryptochironomus	4	19	
Cryptotendipes		7	
Dicrotendipes	9	14	6
Eukiefferiella	22		
Hydrobaenus	10	4	5
Labrundinia		1	1
Nanocladius	4	5	54
Nilotanypus	2		
Nilothauma		1	1
Ormosia		1	
Parakiefferiella		1	
Paralauterborniella		7	
Parametriocnemus	1		
Paratanytarsus	1		13
Paratendipes		1	
Phaenopsectra	1		3
Polypedilum fallax grp	1		
Polypedilum flavum	27		2

Aquid Invertebrate Database Bench Sheet Report
Hinkson Cr [149813], Station #3, Sample Date: 4/1/2014 12:50:00 PM
CS = Coarse; NF = Nonflow; RM = Rootmat; -99 = Presence

ORDER: TAXA	CS	NF	RM
Polypedilum halterale grp	3	52	
Polypedilum illinoense grp	16	4	21
Polypedilum scalaenum grp	17	42	
Procladius		1	1
Rheotanytarsus	2		1
Saetheria	1		
Simulium	3		2
Stempellinella		1	1
Stictochironomus		2	
Tanytarsus	65	30	65
Thienemannimyia grp.	18	2	16
EPHEMEROPTERA			
Stenonema femoratum	1		-99
ISOPODA			
Caecidotea			1
LUMBRICULIDA			
Lumbriculidae		1	
ODONATA			
Argia		1	
Enallagma			5
Progomphus obscurus		1	
RHYNCHOBDELLIDA			
Piscicolidae	1		
TRICHOPTERA			
Cheumatopsyche	8		
Chimarra	-99		
Hydropsyche	1		
Hydroptila			2
TUBIFICIDA			
Branchiura sowerbyi		3	4
Enchytraeidae	1		
Limnodrilus claparedianus		1	3
Limnodrilus hoffmeisteri	1	14	16
Limnodrilus udekemianus		1	
Tubificidae	17	103	45
VENEROIDA			
Corbicula	2		
Pisidiidae	1	5	3

Aquid Invertebrate Database Bench Sheet Report
Hinkson Cr [149814], Station #3.5, Sample Date: 4/1/2014 2:45:00 PM
CS = Coarse; NF = Nonflow; RM = Rootmat; -99 = Presence

ORDER: TAXA	CS	NF	RM
"HYDRACARINA"			
Acarina	1	1	39
ARHYNCHOBDELLIDA			
Erpobdellidae			-99
BASOMMATOPHORA			
Ancylidae	2		5
Lymnaeidae	2		4
Menetus			11
Physella			5
COLEOPTERA			
Berosus	2	5	5
Dubiraphia		1	22
Stenelmis	174	1	1
DECAPODA			
Orconectes virilis			-99
DIPTERA			
Ablabesmyia		7	15
Ceratopogoninae	6	3	10
Chironomidae	2	5	1
Chironomus		2	
Chrysops		-99	
Cladotanytarsus	12	98	5
Cricotopus bicinctus	5		2
Cricotopus trifascia	2		
Cricotopus/Orthocladius	216	6	16
Cryptochironomus	2	5	
Cryptotendipes		26	3
Dicrotendipes	4	10	4
Eukiefferiella	22		3
Glyptotendipes	1		4
Hemerodromia	1		
Hexatoma	1		
Hydrobaenus	4	4	4
Labrundinia			5
Nanocladius			6
Parakiefferiella		1	
Paralauterborniella			1
Paratanytarsus			22
Paratendipes		1	2
Phaenopsectra	1		8
Polypedilum fallax grp	1		

Aquid Invertebrate Database Bench Sheet Report
Hinkson Cr [149814], Station #3.5, Sample Date: 4/1/2014 2:45:00 PM
CS = Coarse; NF = Nonflow; RM = Rootmat; -99 = Presence

ORDER: TAXA	CS	NF	RM
Polypedilum flavum	17		
Polypedilum halterale grp		32	2
Polypedilum illinoense grp	5		20
Polypedilum scalaenum grp	13	8	
Procladius		8	1
Rheotanytarsus	53		14
Simulium	1		
Stempellinella	1	14	3
Stenochironomus			1
Stictochironomus		5	
Tabanus	1		
Tanytarsus	19	42	22
Thienemanniella		1	
Thienemannimyia grp.	16	3	13
Tipula	1		
Tokunagaia	1		
Tribelos			1
Zavrelimyia	1		
EPHEMEROPTERA			
Caenis latipennis		3	3
Stenacron	1		
Stenonema femoratum	9	-99	
Tricorythodes	1		1
ISOPODA			
Caecidotea	1	-99	2
LUMBRICINA			
Lumbricina	3		1
MEGALOPTERA			
Sialis		-99	-99
ODONATA			
Argia	2		3
Enallagma			33
Progomphus obscurus		2	-99
TRICHOPTERA			
Cheumatopsyche	27	-99	
Chimarra	2		
Helicopsyche	1		
Hydroptila			4
Mystacides		1	
TRICLADIDA			
Planariidae	2		
TUBIFICIDA			

Aquid Invertebrate Database Bench Sheet Report
Hinkson Cr [149814], Station #3.5, Sample Date: 4/1/2014 2:45:00 PM
CS = Coarse; NF = Nonflow; RM = Rootmat; -99 = Presence

ORDER: TAXA	CS	NF	RM
Aulodrilus		17	6
Branchiura sowerbyi		4	1
Enchytraeidae	2		
Limnodrilus claparedianus		1	
Limnodrilus hoffmeisteri	1	1	1
Tubificidae	4	8	9
VENEROIDA			
Corbicula	10	20	4
Pisidiidae	1	1	1

Aquid Invertebrate Database Bench Sheet Report
Hinkson Cr [149815], Station #4, Sample Date: 4/1/2014 3:30:00 PM
CS = Coarse; NF = Nonflow; RM = Rootmat; -99 = Presence

ORDER: TAXA	CS	NF	RM
AMPHIPODA			
Crangonyx		-99	
BASOMMATOPHORA			
Ancylidae			2
Lymnaeidae	10	1	11
Physella	-99	1	2
COLEOPTERA			
Berosus	18	3	16
Dubiraphia		3	31
Helichus basalis			1
Stenelmis	138	14	6
DECAPODA			
Orconectes virilis	1	-99	
DIPTERA			
Ablabesmyia		28	28
Ceratopogoninae	2	12	6
Chironomidae	1		1
Chironomus		1	
Cladotanytarsus	28	19	1
Clinocera	1	1	
Corynoneura			1
Cricotopus bicinctus	2		2
Cricotopus trifascia	1		
Cricotopus/Orthocladius	85	19	12
Cryptochironomus	6	6	
Dicrotendipes	4	5	3
Eukiefferiella	13		
Hydrobaenus	1	2	1
Labrundinia			2
Microtendipes		1	
Nanocladius			3
Nilotanypus	2		
Nilothauma			1
Paratanytarsus	2	1	3
Paratendipes		1	1
Phaenopsectra		1	6
Polypedilum flavum	11		
Polypedilum halterale grp		7	2
Polypedilum illinoense grp	5	3	17
Polypedilum scalaenum grp	13	7	1
Procladius		4	1

Aquid Invertebrate Database Bench Sheet Report
Hinkson Cr [149815], Station #4, Sample Date: 4/1/2014 3:30:00 PM
CS = Coarse; NF = Nonflow; RM = Rootmat; -99 = Presence

ORDER: TAXA	CS	NF	RM
Rheotanytarsus	33	1	2
Simulium	1		
Stempellinella	4	8	9
Stenochironomus			1
Stictochironomus	2	61	1
Tabanus	1		
Tanytarsus	23	3	12
Thienemannimyia grp.	50	18	10
Tipula	1		
EPHEMEROPTERA			
Caenis latipennis	14	20	13
Stenacron	1		
Stenonema femoratum	4	13	
Tricorythodes	10		
ISOPODA			
Caecidotea	1		
MEGALOPTERA			
Sialis		-99	-99
ODONATA			
Argia	5		3
Boyeria			-99
Calopteryx			2
Enallagma			19
Gomphidae			-99
Libellula			-99
Progomphus obscurus	1	-99	
TRICHOPTERA			
Cheumatopsyche	32	-99	1
Helicopsyche	26		
Hydroptila	3		
Oecetis	3	1	2
Polycentropus		2	
Triaenodes			1
TRICLADIDA			
Planariidae		1	
TUBIFICIDA			
Aulodrilus	1	5	9
Branchiura sowerbyi		8	
Enchytraeidae	2		
Limnodrilus cervix		2	
Limnodrilus claparedianus		5	3
Limnodrilus hoffmeisteri	1	5	

Aquid Invertebrate Database Bench Sheet Report
Hinkson Cr [149815], Station #4, Sample Date: 4/1/2014 3:30:00 PM
CS = Coarse; NF = Nonflow; RM = Rootmat; -99 = Presence

ORDER: TAXA	CS	NF	RM
Tubificidae	1	38	15
UNIONIDA			
Unionidae	1		
VENEROIDA			
Corbicula	6	3	
Pisidiidae	34	15	14

Aquid Invertebrate Database Bench Sheet Report
Hinkson Cr [149816], Station #5, Sample Date: 4/1/2014 4:45:00 PM
CS = Coarse; NF = Nonflow; RM = Rootmat; -99 = Presence

ORDER: TAXA	CS	NF	RM
"HYDRACARINA"			
Acarina		4	64
AMPHIPODA			
Stygobromus			-99
ARHYNCHOBDELLIDA			
Erpobdellidae	-99		
BASOMMATOPHORA			
Ancylidae	5	5	4
Gyraulus			4
Lymnaeidae	1	1	8
Menetus			13
Physella	2	1	5
COLEOPTERA			
Berosus	3	2	4
Dubiraphia		2	5
Peltodytes		1	
Stenelmis	36	5	
DECAPODA			
Orconectes virilis	-99		
DIPTERA			
Ablabesmyia	1	27	19
Ceratopogoninae	6	9	3
Chironomus		4	
Cladotanytarsus	16	30	4
Corynoneura	11		1
Cricotopus bicinctus	8		1
Cricotopus trifascia	1		
Cricotopus/Orthocladius	302	6	43
Cryptochironomus	4	9	
Dicrotendipes	6	4	1
Diptera	1		
Eukiefferiella	20		3
Glyptotendipes			1
Hydrobaenus	13	4	6
Nanocladius	9	1	36
Nilotanypus	1		
Nilothauma	1	2	
Paracricotopus	1		
Paralauterborniella		1	
Paraphaenocladius	1		1
Paratanytarsus	3		14

Aquid Invertebrate Database Bench Sheet Report
Hinkson Cr [149816], Station #5, Sample Date: 4/1/2014 4:45:00 PM
CS = Coarse; NF = Nonflow; RM = Rootmat; -99 = Presence

ORDER: TAXA	CS	NF	RM
Phaenopsectra	1		13
Polypedilum flavum	2		
Polypedilum halterale grp		2	
Polypedilum illinoense grp	6	1	12
Polypedilum scalaenum grp	15	3	
Procladius		8	4
Pseudochironomus		2	
Pseudodiamesa	1		
Rheotanytarsus	39		3
Simulium	2		
Stempellinella	23	30	3
Stictochironomus		9	
Tabanus	-99		
Tanytarsus	37	14	23
Thienemanniella			2
Thienemannimyia grp.	34	9	3
Zavrelimyia	1		
EPHEMEROPTERA			
Caenis latipennis		27	1
Stenacron	2		
Stenonema femoratum	-99		
Tricorythodes			2
LUMBRICINA			
Lumbricina		1	
ODONATA			
Argia	4	1	
Calopteryx			1
Enallagma			24
TRICHOPTERA			
Cheumatopsyche	2		
Helicopsyche	4		-99
Hydroptila	1		
Polycentropus		2	
TUBIFICIDA			
Aulodrilus		1	
Branchiura sowerbyi		3	
Limnodrilus claparedianus		1	
Tubificidae	1	4	7
VENEROIDA			
Corbicula	1		
Pisidiidae			3

Aquid Invertebrate Database Bench Sheet Report
Hinkson Cr [149817], Station #5.5, Sample Date: 4/10/2014 9:30:00 AM
CS = Coarse; NF = Nonflow; RM = Rootmat; -99 = Presence

ORDER: TAXA	CS	NF	RM
"HYDRACARINA"			
Acarina	2		7
AMPHIPODA			
Crangonyx			1
Hyalella azteca		1	19
ARHYNCHOBDELLIDA			
Erpobdellidae	-99		
BASOMMATOPHORA			
Ancylidae	2		
Lymnaeidae		2	1
Menetus		1	2
Physella		1	2
BRANCHIOBDELLIDA			
Branchiobdellida	7		
COLEOPTERA			
Berosus	3		1
Dubiraphia	1	2	2
Stenelmis	101	26	10
Tropisternus			1
DECAPODA			
Orconectes virilis	1		
DIPTERA			
Ablabesmyia	2	9	4
Allognosta	1		
Ceratopogoninae	3	18	
Chironomus		9	
Cladopelma		1	
Cladotanytarsus	6	26	
Clinocera	4	1	
Cricotopus bicinctus	16	1	6
Cricotopus trifascia	2		
Cricotopus/Orthocladius	284	4	29
Cryptochironomus	2	1	
Cryptotendipes		1	
Demicryptochironomus	1		
Diamesa	1		
Dicrotendipes	9	3	1
Diptera		2	1
Eukiefferiella	12	2	
Hydrobaenus	9	6	8
Nanocladius			4
Nemotelus	1		

Aquid Invertebrate Database Bench Sheet Report
Hinkson Cr [149817], Station #5.5, Sample Date: 4/10/2014 9:30:00 AM
CS = Coarse; NF = Nonflow; RM = Rootmat; -99 = Presence

ORDER: TAXA	CS	NF	RM
Nilotanypus			1
Paratanytarsus	3		5
Paratendipes	2		
Phaenopsectra		1	3
Polypedilum flavum	3		
Polypedilum halterale grp		28	
Polypedilum illinoense grp	1		1
Polypedilum scalaenum grp	8	3	1
Polypedilum trigonum	1		
Procladius		1	
Pseudochironomus		1	
Rheotanytarsus	1		1
Simulium	2		
Stempellinella		3	
Stictochironomus	3	43	
Tabanus	-99		
Tanytarsus	22	17	12
Thienemannimyia grp.	32	4	15
Tipula	-99		
Tribelos		1	
EPHEMEROPTERA			
Acerpenna	1		
Caenis latipennis	78	54	159
Centroptilum		1	2
Leptophlebia			1
Stenacron	5		
Stenonema femoratum	20	1	3
HAPLOTAXIDA			
Haplotaxis	1		
ODONATA			
Argia	1		2
Basiaeschna janata			-99
Calopteryx			1
Enallagma		2	13
Gomphus			-99
Libellula		1	3
Progomphus obscurus		1	
Somatochlora	1		
PLECOPTERA			
Amphinemura			1
Perlidae	3	1	
TRICHOPTERA			

Aquid Invertebrate Database Bench Sheet Report
Hinkson Cr [149817], Station #5.5, Sample Date: 4/10/2014 9:30:00 AM
CS = Coarse; NF = Nonflow; RM = Rootmat; -99 = Presence

ORDER: TAXA	CS	NF	RM
Cheumatopsyche	3		
Helicopsyche	3		2
Hydroptila	3		
Nyctiophylax	1		
Oecetis		2	
Ptilostomis			-99
Pycnopsyche			1
Rhyacophila	1		
Triaenodes			1
TUBIFICIDA			
Branchiura sowerbyi	3		
Enchytraeidae	8		
Limnodrilus hoffmeisteri	4		
Limnodrilus udekemianus		1	
Tubificidae	16	3	
VENEROIDA			
Corbicula	1	1	
Pisidiidae	1	6	2

Aquid Invertebrate Database Bench Sheet Report
Hinkson Cr [149818], Station #6, Sample Date: 4/10/2014 11:15:00 AM
CS = Coarse; NF = Nonflow; RM = Rootmat; -99 = Presence

ORDER: TAXA	CS	NF	RM
"HYDRACARINA"			
Acarina	1	15	5
AMPHIPODA			
Crangonyx	2		
Hyalella azteca		1	6
BASOMMATOPHORA			
Menetus	1		
Physella	2		2
COLEOPTERA			
Berosus	1		
Dubiraphia	1	2	5
Sperchopsis		1	
Stenelmis	59	12	6
DECAPODA			
Orconectes virilis	1		-99
DIPTERA			
Ablabesmyia	1	15	6
Ceratopogoninae	1	3	
Chaoborus	2		
Chironomidae	1		
Chironomus		1	
Cladotanytarsus	6	14	
Clinocera	5	3	
Cricotopus bicinctus	1	2	
Cricotopus/Orthocladius	84	19	49
Cryptochironomus		3	
Dicrotendipes	2	4	1
Eukiefferiella	4		
Gonomyia			1
Hydrobaenus	16	28	9
Nanocladius	1		
Paratanytarsus		2	4
Paratendipes	2		
Phaenopsectra		1	5
Polypedilum flavum	4		
Polypedilum halterale grp		4	
Polypedilum illinoense grp	3	1	2
Polypedilum scalaenum grp	2		
Pseudochironomus	3	1	
Simulium	4		
Stempellinella			1

Aquid Invertebrate Database Bench Sheet Report
Hinkson Cr [149818], Station #6, Sample Date: 4/10/2014 11:15:00 AM
CS = Coarse; NF = Nonflow; RM = Rootmat; -99 = Presence

ORDER: TAXA	CS	NF	RM
Stictochironomus	1	53	
Tanytarsus	13	12	31
Thienemannimyia grp.	8	17	5
Tipula	3	1	1
Tokunagaia	1		
Tvetenia bavarica grp	1		
EPHEMEROPTERA			
Acentrella	1		
Acerpenna	2		1
Caenis latipennis	41	103	119
Stenacron	1		
Stenonema femoratum	13	26	
HAPLOTAXIDA			
Haplotaxis	4		
ISOPODA			
Caecidotea		1	1
ODONATA			
Argia		2	1
Basiaeschna janata			-99
Enallagma		3	11
Gomphus		-99	
Libellula	1	2	-99
Progomphus obscurus		3	
Somatochlora			-99
PLECOPTERA			
Perlidae	7	4	1
TRICHOPTERA			
Cheumatopsyche	2		
Hydroptila			1
Ironoquia			1
Leptocerus americanus	1		
Oecetis		2	
Polycentropus		-99	1
Pycnopsyche			-99
TUBIFICIDA			
Enchytraeidae		2	2
Limnodrilus claparedianus	1	1	
Limnodrilus hoffmeisteri	6	5	
Tubificidae	6	9	1
VENEROIDA			
Corbicula	2		
Pisidiidae	1		

Aquid Invertebrate Database Bench Sheet Report
Hinkson Cr [149819], Station #6.5, Sample Date: 4/10/2014 12:50:00 PM
CS = Coarse; NF = Nonflow; RM = Rootmat; -99 = Presence

ORDER: TAXA	CS	NF	RM
"HYDRACARINA"			
Acarina		9	1
AMPHIPODA			
Crangonyx	1		18
Stygobromus			1
ARHYNCHOBDELLIDA			
Erpobdellidae			1
BASOMMATOPHORA			
Lymnaeidae			3
Menetus			1
Physella			1
COLEOPTERA			
Berosus	1	1	3
Dubiraphia		2	7
Helichus basalis			3
Stenelmis	327	5	12
DECAPODA			
Orconectes			1
DIPTERA			
Ablabesmyia		9	5
Caloparyphus			1
Ceratopogoninae	1	15	2
Chironomidae	1		
Chironomus		1	
Chrysops			1
Cladotanytarsus	4	29	3
Clinocera	5	1	
Cricotopus/Orthocladius	40	12	47
Cryptochironomus		5	
Culicidae		1	1
Demicryptochironomus	2		
Dicrotendipes	1	4	2
Diplocladius	1		
Diptera	1	1	2
Eukiefferiella	10		
Hemerodromia	1		
Hydrobaenus	7	17	7
Larsia	1		
Parakiefferiella	1		
Paratanytarsus			4
Paratendipes	7	2	

Aquid Invertebrate Database Bench Sheet Report
Hinkson Cr [149819], Station #6.5, Sample Date: 4/10/2014 12:50:00 PM
CS = Coarse; NF = Nonflow; RM = Rootmat; -99 = Presence

ORDER: TAXA	CS	NF	RM
Pericoma			1
Phaenopsectra		1	6
Polypedilum flavum	2		
Polypedilum halterale grp			1
Polypedilum illinoense grp			1
Polypedilum scalaenum grp		1	
Pseudochironomus	1	2	
Rhamphomyia		1	
Simulium	3		1
Stegopterna	2		
Stempellinella		5	
Stictochironomus		14	
Stratiomys			1
Tabanus	3		
Tanytarsus	6	34	38
Thienemannimyia grp.	1	8	4
Tipula	1		1
Tokunagaia	2		1
Tvetenia bavarica grp	1		1
Zavrelimyia			1
EPHEMEROPTERA			
Baetidae	2		
Caenis latipennis	27	91	160
Leptophlebiidae			1
Stenonema femoratum	10	8	3
HEMIPTERA			
Belostoma			1
ISOPODA			
Caecidotea			3
MEGALOPTERA			
Sialis			1
ODONATA			
Basiaeschna janata			1
Calopteryx			1
Dromogomphus			1
Enallagma		1	7
Gomphidae		1	
Libellula			1
Progomphus obscurus		1	
PLECOPTERA			
Amphinemura	2		
Perlidae	10		3

Aquid Invertebrate Database Bench Sheet Report
Hinkson Cr [149819], Station #6.5, Sample Date: 4/10/2014 12:50:00 PM
CS = Coarse; NF = Nonflow; RM = Rootmat; -99 = Presence

ORDER: TAXA	CS	NF	RM
TRICHOPTERA			
Helicopsyche	1	1	
Leptocerus americanus	1		
Nectopsyche		2	
Oecetis		1	
Ptilostomis			1
Pycnopsyche			7
Rhyacophila	1		
Triaenodes		1	
TUBIFICIDA			
Aulodrilus			2
Branchiura sowerbyi	1		
Enchytraeidae	2		8
Limnodrilus hoffmeisteri	2		
Limnodrilus udekemianus			1
Tubificidae	11	24	7
VENEROIDA			
Pisidiidae		2	3

Aquid Invertebrate Database Bench Sheet Report
Hinkson Cr [149820], Station #7, Sample Date: 4/10/2014 2:25:00 PM
CS = Coarse; NF = Nonflow; RM = Rootmat; -99 = Presence

ORDER: TAXA	CS	NF	RM
"HYDRACARINA"			
Acarina		6	1
AMPHIPODA			
Crangonyx			6
Hyalella azteca		1	51
ARHYNCHOBDELLIDA			
Erpobdellidae			1
BASOMMATOPHORA			
Ancylidae	3		
Menetus			3
COLEOPTERA			
Berosus			1
Dubiraphia		1	7
Helichus basalis			1
Peltodytes			1
Stenelmis	145	10	6
Tropisternus			1
DECAPODA			
Orconectes virilis			1
DIPTERA			
Ablabesmyia			7
Ceratopogoninae		7	
Chaoborus	1		
Chironomidae	2		1
Cladotanytarsus	19	11	1
Clinocera	10		
Cricotopus/Orthocladius	45	2	36
Cryptochironomus	1	1	
Demicryptochironomus	2		
Dicrotendipes	2	1	4
Endochironomus			1
Eukiefferiella	4		
Glyptotendipes			1
Gonomyia	1		
Hexatoma	1		
Hydrobaenus	12	8	7
Nanocladius			1
Paratanytarsus			12
Paratendipes	2		
Phaenopsectra			1
Polypedilum halterale grp	2	27	

Aquid Invertebrate Database Bench Sheet Report
Hinkson Cr [149820], Station #7, Sample Date: 4/10/2014 2:25:00 PM
CS = Coarse; NF = Nonflow; RM = Rootmat; -99 = Presence

ORDER: TAXA	CS	NF	RM
Polypedilum scalaenum grp	3	1	
Pseudochironomus	2	1	
Simulium	1		
Stempellinella		1	1
Stictochironomus	3	47	
Stratiomyidae	1		
Tabanus	5		
Tanytarsus	10	1	12
Thienemannimyia grp.			2
Tipula			1
Tokunagaia	3		
Zavrelimyia			2
EPHEMEROPTERA			
Baetidae	1		
Caenis latipennis	26	14	130
Leptophlebiidae			1
Stenonema femoratum	19		
HAPLOTAXIDA			
Haplotaxis	1		
ODONATA			
Argia			1
Basiaeschna janata			1
Enallagma			16
Hagenius brevistylus			1
Libellula			1
PLECOPTERA			
Perlidae	16		12
TRICHOPTERA			
Helicopsyche	2		
Ptilostomis			1
Pycnopsyche			6
Rhyacophila	2		
Triaenodes			1
TUBIFICIDA			
Branchiura sowerbyi		1	
Enchytraeidae	1		1
Limnodrilus hoffmeisteri	1		
Tubificidae	5	6	1
VENEROIDA			
Pisidiidae		1	

Aquid Invertebrate Database Bench Sheet Report

Hinkson Cr [149821], Station #8, Sample Date: 4/10/2014 3:40:00 PM
CS = Coarse; NF = Nonflow; RM = Rootmat; -99 = Presence

ORDER: TAXA	CS	NF	RM
"HYDRACARINA"			
Acarina	2	17	2
AMPHIPODA			
Crangonyx		3	7
Hyalella azteca		2	56
ARHYNCHOBDELLIDA			
Erpobdellidae		1	1
BASOMMATOPHORA			
Ancylidae			2
Lymnaeidae		1	3
Menetus			2
Physella		1	2
BRANCHIOBDELLIDA			
Branchiobdellida	1		
COLEOPTERA			
Berosus			1
Dubiraphia		2	9
Helichus basalis	1		3
Neoporus		1	3
Peltodytes		1	
Stenelmis	309	23	1
Tropisternus			1
DECAPODA			
Orconectes virilis	1		
DIPTERA			
Ablabesmyia		4	2
Ceratopogoninae	11	13	4
Chaoborus		4	1
Chironomus		1	
Chrysops		1	1
Cladotanytarsus	20	6	
Clinocera	19	14	
Cricotopus/Orthocladius	93	11	73
Cryptochironomus		4	
Dicrotendipes	2	3	3
Diptera		1	1
Eukiefferiella	10		
Glyptotendipes			1
Gonomyia	2	5	
Hexatoma	1		
Hydrobaenus	36	15	16
Microtendipes	1		1
Paracladopelma		1	

Aquid Invertebrate Database Bench Sheet Report
Hinkson Cr [149821], Station #8, Sample Date: 4/10/2014 3:40:00 PM
CS = Coarse; NF = Nonflow; RM = Rootmat; -99 = Presence

ORDER: TAXA	CS	NF	RM
Paraphaenocladius	1		
Paratanytarsus	2		8
Paratendipes	4		
Pericoma		1	
Phaenopsectra			2
Polypedilum illinoense grp			3
Polypedilum scalaenum grp	5		
Pseudochironomus	8	1	1
Simulium	6		
Stegopterna	2		
Stempellinella			3
Stictochironomus	5	37	
Tabanus	3		
Tanytarsus	5	7	9
Thienemannimyia grp.		4	4
Tipula	1		
Tribelos			3
Tvetenia bavarica grp	2		
Zavrelimyia			1
EPHEMEROPTERA			
Baetidae		3	
Caenis latipennis	34	96	70
Leptophlebiidae		1	1
Stenonema femoratum	18	8	1
LUMBRICINA			
Lumbricina		1	
ODONATA			
Enallagma		1	2
Gomphidae		4	3
Libellula		1	1
Progomphus obscurus		1	
PLECOPTERA			
Amphinemura			3
Perlidae			40
TRICHOPTERA			
Ironoquia			2
Oecetis	2	1	
Polycentropus		1	
Ptilostomis			1
Pycnopsyche			1
Rhyacophila	3		
Triaenodes			10

Aquid Invertebrate Database Bench Sheet Report
Hinkson Cr [149821], Station #8, Sample Date: 4/10/2014 3:40:00 PM
CS = Coarse; NF = Nonflow; RM = Rootmat; -99 = Presence

ORDER: TAXA	CS	NF	RM
TRICLADIDA			
Planariidae	1		
TUBIFICIDA			
Branchiura sowerbyi		1	
Enchytraeidae	7		2
Limnodrilus hoffmeisteri	2	2	9
Tubificidae	15	17	4
VENEROIDA			
Pisidiidae	2		

Aquid Invertebrate Database Bench Sheet Report
Bonne Femme Cr [149806], Station #1, Sample Date: 4/1/2014 8:40:00 AM
CS = Coarse; NF = Nonflow; RM = Rootmat; -99 = Presence

ORDER: TAXA	CS	NF	RM
"HYDRACARINA"			
Acarina	2	2	3
AMPHIPODA			
Crangonyx	4	-99	
Hyalella azteca			3
ARHYNCHOBDELLIDA			
Erpobdellidae	-99		
BASOMMATOPHORA			
Ancylidae	1	1	2
Lymnaeidae	1	2	3
BRANCHIOBDELLIDA			
Branchiobdellida		1	2
COLEOPTERA			
Stenelmis	180	2	3
DECAPODA			
Orconectes virilis		-99	-99
DIPTERA			
Ablabesmyia		7	1
Ceratopogoninae	2	14	1
Chironomus		13	
Cladotanytarsus	1	9	
Clinocera	3		
Corynoneura		4	2
Cricotopus/Orthocladius	226	20	159
Cryptotendipes		1	
Demicryptochironomus	4	1	
Dicrotendipes		3	19
Diplocladius	1		1
Diptera		1	
Eukiefferiella	11		2
Glyptotendipes	1	1	11
Hemerodromia	2		1
Hexatoma	1		
Hydrobaenus		12	13
Kiefferulus			1
Microtendipes		8	1
Nanocladius			2
Nilothauma		1	
Parakiefferiella		2	
Parametriocnemus	4		
Paratanytarsus	1	2	44

Aquid Invertebrate Database Bench Sheet Report
Bonne Femme Cr [149806], Station #1, Sample Date: 4/1/2014 8:40:00 AM
CS = Coarse; NF = Nonflow; RM = Rootmat; -99 = Presence

ORDER: TAXA	CS	NF	RM
Paratendipes		79	3
Phaenopsectra	1	1	1
Polypedilum fallax grp			1
Polypedilum flavum	1	2	
Polypedilum halterale grp		2	
Polypedilum illinoense grp	2		4
Polypedilum scalaenum grp	1	2	
Procladius		4	
Rheotanytarsus	4		4
Simulium	1		2
Stempellinella	2	3	
Stenochironomus			1
Stictochironomus		1	
Tabanus	3		
Tanypus		1	
Tanytarsus	6	45	9
Thienemannimyia grp.	20	4	7
Tipula	1		
Zavrelimyia	1		
EPHEMEROPTERA			
Caenis latipennis	3	9	4
Stenacron		5	
Stenonema femoratum	6	3	1
HEMIPTERA			
Belostoma		-99	
ISOPODA			
Lirceus	3	2	1
LUMBRICINA			
Lumbricina	5	-99	
MEGALOPTERA			
Sialis		-99	
ODONATA			
Enallagma			1
PLECOPTERA			
Allocapnia	5		1
Amphinemura	1		
Chloroperlidae	3		
Perlidae	15		
Perlinella drymo	1		
TRICHOPTERA			
Chimarra	3		
Polycentropodidae	1		

Aquid Invertebrate Database Bench Sheet Report
Bonne Femme Cr [149806], Station #1, Sample Date: 4/1/2014 8:40:00 AM
CS = Coarse; NF = Nonflow; RM = Rootmat; -99 = Presence

ORDER: TAXA	CS	NF	RM
Pycnopsyche			1
Rhyacophila	1		
TRICLADIDA			
Planariidae	1		
TUBIFICIDA			
Branchiura sowerbyi		5	
Enchytraeidae		1	1
Limnodrilus claparedianus		1	1
Limnodrilus hoffmeisteri		4	1
Tubificidae	1	48	3
VENEROIDA			
Pisidiidae	1	1	1

Aquid Invertebrate Database Bench Sheet Report
Bonne Femme Cr [149807], Station #2, Sample Date: 4/1/2014 10:10:00 AM
CS = Coarse; NF = Nonflow; RM = Rootmat; -99 = Presence

ORDER: TAXA	CS	NF	RM
"HYDRACARINA"			
Acarina	1		2
AMPHIPODA			
Crangonyx	4		22
Hyalella azteca			35
BASOMMATOPHORA			
Ancylidae	3	1	
Lymnaeidae	3		13
Menetus			1
Physella			6
BRANCHIOBDELLIDA			
Branchiobdellida			2
COLEOPTERA			
Dubiraphia		1	
Dytiscidae			1
Helichus basalis	1		
Stenelmis	300	9	2
DECAPODA			
Orconectes virilis			-99
DIPTERA			
Ablabesmyia		18	1
Ceratopogoninae	5	32	1
Chironomidae		2	1
Chironomus		3	1
Cladotanytarsus		15	
Clinocera	10		
Corynoneura		3	6
Cricotopus bicinctus	2		
Cricotopus/Orthocladius	242	23	174
Cryptochironomus	1		
Cryptotendipes		2	
Demicryptochironomus	1	1	
Dicrotendipes	1	14	8
Diptera	1		
Eukiefferiella	8		
Hemerodromia		1	
Hexatoma	-99	-99	
Hydrobaenus	9	6	4
Microtendipes		14	
Nanocladius	2		
Natarsia		3	1

Aquid Invertebrate Database Bench Sheet Report
Bonne Femme Cr [149807], Station #2, Sample Date: 4/1/2014 10:10:00 AM
CS = Coarse; NF = Nonflow; RM = Rootmat; -99 = Presence

ORDER: TAXA	CS	NF	RM
Parametriocnemus	1		
Paratanytarsus	2	2	11
Paratendipes		10	
Phaenopsectra			9
Polypedilum aviceps	2		
Polypedilum fallax grp			1
Polypedilum flavum	10		2
Polypedilum illinoense grp	1		5
Polypedilum scalaenum grp	9	1	
Procladius		12	
Rheotanytarsus	1		
Simulium	3		
Stempellinella		2	
Stictochironomus		5	
Tabanus	2		
Tanytarsus	13	36	13
Thienemanniella			1
Thienemannimyia grp.	12	1	8
Tipula	1		
undescribed Empididae		2	
Zavrelimyia	1		
EPHEMEROPTERA			
Caenis latipennis	6	12	5
Centroptilum		1	
Stenonema femoratum	10	2	
ISOPODA			
Caecidotea		-99	1
Caecidotea (Blind & Unpigmented)		11	
MEGALOPTERA			
Sialis		1	
ODONATA			
Calopteryx			2
Enallagma			4
Ischnura			2
PLECOPTERA			
Allocapnia	3		1
Amphinemura	2		
Chloroperlidae	2		
Isoperla	31		2
Perlidae	37		
TRICHOPTERA			

Aquid Invertebrate Database Bench Sheet Report
Bonne Femme Cr [149807], Station #2, Sample Date: 4/1/2014 10:10:00 AM
CS = Coarse; NF = Nonflow; RM = Rootmat; -99 = Presence

ORDER: TAXA	CS	NF	RM
Cheumatopsyche	4		
Chimarra	1		
Ironoquia	1		
Pycnopsyche		-99	1
Rhyacophila	4		
TUBIFICIDA			
Branchiura sowerbyi		2	
Enchytraeidae			5
Limnodrilus claparedianus		3	
Limnodrilus hoffmeisteri		5	3
Tubificidae	11	47	2
VENEROIDA			
Pisidiidae		1	

Aquid Invertebrate Database Bench Sheet Report
Hinkson Cr [14972], Station #1, Sample Date: 10/7/2014 9:45:00 AM
CS = Coarse; NF = Nonflow; RM = Rootmat; -99 = Presence

ORDER: TAXA	CS	NF	RM
"HYDRACARINA"			
Acarina	4	24	23
AMPHIPODA			
Crangonyx			1
Gammarus			2
ARHYNCHOBDELLIDA			
Erpobdellidae	-99		
BASOMMATOPHORA			
Lymnaeidae			1
Physella			1
BRANCHIOBDELLIDA			
Branchiobdellida			2
COLEOPTERA			
Berosus		1	3
Dubiraphia		2	7
Dytiscidae			1
Peltodytes			1
Stenelmis	16	2	1
DECAPODA			
Palaemonetes kadiakensis			-99
DIPTERA			
Ablabesmyia	13	23	24
Axarus		1	
Ceratopogoninae	1	10	6
Chaoborus		1	
Chironomus		15	3
Cladotanytarsus	71	7	1
Corynoneura	2	1	4
Cryptochironomus	40	12	
Cryptotendipes		4	
Dicrotendipes	11	6	4
Endochironomus			1
Forcipomyiinae			1
Glyptotendipes	2	1	
Labrundinia		4	27
Microtendipes	5	3	1
Nilotanypus			1
Parachironomus		1	1
Paracladopelma	1	4	1
Paratanytarsus			3
Phaenopsectra	2	3	5

Aquid Invertebrate Database Bench Sheet Report
Hinkson Cr [14972], Station #1, Sample Date: 10/7/2014 9:45:00 AM
CS = Coarse; NF = Nonflow; RM = Rootmat; -99 = Presence

ORDER: TAXA	CS	NF	RM
Polypedilum flavum	4	1	1
Polypedilum halterale grp	14	24	1
Polypedilum illinoense grp	3	24	40
Polypedilum scalaenum grp	18	1	
Procladius	1	37	2
Pseudochironomus	3	2	
Rheotanytarsus	3		2
Stempellinella	1	1	1
Stenochironomus		1	
Stictochironomus	8	3	
Tanytarsus	20	18	37
Thienemanniella	2		1
Thienemannimyia grp.	6	1	15
Tipula			2
Tribelos		5	2
EPHEMEROPTERA			
Acerpenna			1
Apobaetis		3	
Baetis	1		
Caenis latipennis	6	16	54
Centroptilum		2	2
Hexagenia limbata		1	
Stenonema femoratum	43	6	11
Tricorythodes	2		
HEMIPTERA			
Neoplea			1
Palmacorixa			2
Trichocorixa			1
ISOPODA			
Caecidotea	1		
LUMBRICINA			
Lumbricina			2
MEGALOPTERA			
Sialis		-99	1
ODONATA			
Argia		5	7
Basiaeschna janata			1
Enallagma			10
Epitheca (Epicordulia)		-99	-99
Ischnura			2
Libellula		1	-99
Progomphus obscurus		1	

Aquid Invertebrate Database Bench Sheet Report
Hinkson Cr [14972], Station #1, Sample Date: 10/7/2014 9:45:00 AM
CS = Coarse; NF = Nonflow; RM = Rootmat; -99 = Presence

ORDER: TAXA	CS	NF	RM
RHYNCHOBDELLIDA			
Glossiphoniidae	-99		
TRICHOPTERA			
Cheumatopsyche	4		1
Oecetis		1	
Triaenodes			1
TUBIFICIDA			
Branchiura sowerbyi	24	2	1
Enchytraeidae	2		4
Limnodrilus claparedianus		1	
Limnodrilus hoffmeisteri		1	
Quistradrilus multisetosus		1	1
Tubificidae	428	80	12
VENEROIDA			
Corbicula	6		
Pisidiidae			1

Aquid Invertebrate Database Bench Sheet Report
Hinkson Cr [14973], Station #2, Sample Date: 10/7/2014 11:30:00 AM
CS = Coarse; NF = Nonflow; RM = Rootmat; -99 = Presence

ORDER: TAXA	CS	NF	RM
"HYDRACARINA"			
Acarina	2	20	6
AMPHIPODA			
Hyalella azteca			7
ARHYNCHOBDELLIDA			
Erpobdellidae	-99		2
BASOMMATOPHORA			
Ancylidae	2	1	1
Menetus			4
COLEOPTERA			
Berosus	2	2	6
Dubiraphia	3	7	7
Dytiscidae		2	
Hydrophilidae	1	1	1
Macronychus glabratus	1	2	2
Paracymus			1
Stenelmis	177	14	20
DECAPODA			
Orconectes luteus			1
Orconectes virilis		-99	
Palaemonetes kadiakensis			-99
DIPTERA			
Ablabesmyia	1	19	11
Ceratopogoninae	2	7	2
Chaoborus		1	
Chironomidae	3	1	
Chironomus	1	14	
Cladotanytarsus	3	3	
Corynoneura	1		1
Cricotopus bicinctus			1
Cricotopus/Orthocladius	1	4	
Cryptochironomus	9	11	
Dicrotendipes	5	5	3
Diptera		9	1
Dolichopodidae		1	
Ephydridae		1	
Labrundinia			10
Microtendipes	5	3	4
Muscidae		1	
Nilotanypus	1		
Nilothauma	1		

Aquid Invertebrate Database Bench Sheet Report
Hinkson Cr [14973], Station #2, Sample Date: 10/7/2014 11:30:00 AM
CS = Coarse; NF = Nonflow; RM = Rootmat; -99 = Presence

ORDER: TAXA	CS	NF	RM
Ormosia		1	
Paratanytarsus	4	1	4
Paratendipes			1
Pericoma		1	
Phaenopsectra		1	1
Polypedilum fallax grp	1		
Polypedilum flavum	12		2
Polypedilum halterale grp	12	18	1
Polypedilum illinoense grp	1	2	4
Polypedilum scalaenum grp	7		
Procladius		7	
Pseudochironomus	1	1	
Pseudosmittia		1	
Rheotanytarsus	6		13
Simulium	2		
Stempellinella		2	
Stenochironomus	3		
Stictochironomus	6	10	
Tanytarsus	18	6	13
Thienemannimyia grp.	12	4	10
Tipula	1		1
Tribelos	2	27	10
EPHEMEROPTERA			
Acerpenna	1		1
Apobaetis		1	
Baetis	14		
Caenis latipennis	52	40	64
Callibaetis		1	
Centroptilum		2	
Procloeon			3
Stenacron	4	2	1
Stenonema femoratum	42	7	9
Tricorythodes	20	2	1
HEMIPTERA			
Corixidae		3	
Microvelia			1
ISOPODA			
Caecidotea		1	1
LUMBRICINA			
Lumbricina	4		2
MEGALOPTERA			
Corydalus		1	

Aquid Invertebrate Database Bench Sheet Report
Hinkson Cr [14973], Station #2, Sample Date: 10/7/2014 11:30:00 AM
CS = Coarse; NF = Nonflow; RM = Rootmat; -99 = Presence

ORDER: TAXA	CS	NF	RM
Sialis		1	3
ODONATA			
Argia	2	2	4
Enallagma		1	30
Erythemis		-99	
Gomphus		-99	
Hetaerina			1
Ischnura			1
Somatochlora		1	
TRICHOPTERA			
Cheumatopsyche	30	2	2
Chimarra	4		
Nectopsyche		1	
TUBIFICIDA			
Branchiura sowerbyi	5	3	3
Enchytraeidae		2	1
Limnodrilus hoffmeisteri	2		
Tubificidae	51	14	7
VENEROIDA			
Corbicula	11	3	
Pisidiidae	15		1

Aquid Invertebrate Database Bench Sheet Report
Hinkson Cr [14974], Station #3, Sample Date: 10/7/2014 2:15:00 PM
CS = Coarse; NF = Nonflow; RM = Rootmat; -99 = Presence

ORDER: TAXA	CS	NF	RM
"HYDRACARINA"			
Acarina	1	3	4
ARHYNCHOBDELLIDA			
Erpobdellidae	2		
BASOMMATOPHORA			
Ancylidae	4		2
Menetus		1	1
Physella			2
COLEOPTERA			
Berosus	2		6
Dubiraphia	2	1	2
Dytiscidae		1	1
Peltodytes			1
Stenelmis	157	1	6
DECAPODA			
Orconectes virilis			-99
DIPTERA			
Ablabesmyia			3
Ceratopogoninae		4	2
Chironomus	5		
Cladotanytarsus	27	3	
Corynoneura	5		1
Cricotopus bicinctus			1
Cricotopus/Orthocladius	4		
Cryptochironomus	7	19	
Dicrotendipes	1	1	1
Glyptotendipes	1		1
Labrundinia			12
Micropsectra	1		
Microtendipes	2		2
Nanocladius			1
Ormosia	11	1	1
Paracladopelma		3	
Paratanytarsus			8
Paratendipes	8		
Pericoma		1	
Phaenopsectra			1
Polypedilum flavum	78		4
Polypedilum halterale grp	30	21	
Polypedilum illinoense grp	1		10
Polypedilum scalaenum grp	51	3	

Aquid Invertebrate Database Bench Sheet Report
Hinkson Cr [14974], Station #3, Sample Date: 10/7/2014 2:15:00 PM
CS = Coarse; NF = Nonflow; RM = Rootmat; -99 = Presence

ORDER: TAXA	CS	NF	RM
Procladius		1	
Pseudochironomus		1	
Rheotanytarsus	5	1	18
Saetheria	1		
Simulium	18		
Stictochironomus	19	29	
Tanytarsus	8		12
Telopelopia	1		
Thienemanniella	1		
Thienemannimyia grp.	5		11
Tipula			1
Tribelos	1	1	
EPHEMEROPTERA			
Acerpenna	1		3
Baetis	31		1
Caenis latipennis	6	15	98
Leptophlebiidae			1
Procloeon			1
Stenacron	2		4
Stenonema femoratum	23	4	9
Tricorythodes	28	1	5
LUMBRICINA			
Lumbricina	1		
ODONATA			
Argia		1	7
Calopteryx			3
Enallagma			44
Progomphus obscurus		1	
TRICHOPTERA			
Cheumatopsyche	41		9
Chimarra	9		1
Helicopsyche	1		
Oecetis			2
Triaenodes			1
TUBIFICIDA			
Branchiura sowerbyi	7	3	
Enchytraeidae		1	1
Limnodrilus hoffmeisteri	2	1	
Quistradrilus multisetosus		2	
Tubificidae	107	24	5
VENEROIDA			
Corbicula	7	3	

Aquid Invertebrate Database Bench Sheet Report
Hinkson Cr [14974], Station #3, Sample Date: 10/7/2014 2:15:00 PM
CS = Coarse; NF = Nonflow; RM = Rootmat; -99 = Presence

ORDER: TAXA	CS	NF	RM
Pisidiidae	-99	3	1

Aquid Invertebrate Database Bench Sheet Report
Hinkson Cr [14975], Station #3.5, Sample Date: 10/7/2014 3:30:00 PM
CS = Coarse; NF = Nonflow; RM = Rootmat; -99 = Presence

ORDER: TAXA	CS	NF	RM
"HYDRACARINA"			
Acarina		18	28
AMPHIPODA			
Crangonyx	2	-99	3
Hyalella azteca			9
BASOMMATOPHORA			
Ancylidae	3		
Menetus			2
Physella	2	3	4
COLEOPTERA			
Berosus	4	2	11
Dubiraphia	1	5	13
Macronychus glabratus			5
Neoporus			1
Peltodytes			1
Scirtidae			1
Stenelmis	255	16	11
DECAPODA			
Orconectes virilis			-99
DIPTERA			
Ablabesmyia			3
Ceratopogoninae	2	3	
Chaoborus		1	
Chrysops	-99		
Cladotanytarsus	3	1	
Clinotanypus			1
Corynoneura		2	6
Cricotopus bicinctus			1
Cricotopus/Orthocladius	3		1
Cryptochironomus	6	5	
Cryptotendipes			2
Dicrotendipes	1	7	4
Diptera		1	
Endochironomus			1
Eukiefferiella	1		
Forcipomyiinae	1		3
Hemerodromia	2		
Labrundinia			14
Mesosmittia	1		
Microtendipes	1		
Muscidae			1

Aquid Invertebrate Database Bench Sheet Report
Hinkson Cr [14975], Station #3.5, Sample Date: 10/7/2014 3:30:00 PM
CS = Coarse; NF = Nonflow; RM = Rootmat; -99 = Presence

ORDER: TAXA	CS	NF	RM
Nanocladius			2
Ormosia	1	1	1
Paratanytarsus	1	2	7
Paratendipes	1		
Polypedilum flavum	31		10
Polypedilum halterale grp	4	6	1
Polypedilum illinoense grp	1	1	6
Polypedilum scalaenum grp	13	1	2
Procladius		3	
Pseudochironomus	2	3	
Rheotanytarsus	18		19
Simulium	17		6
Stempellinella		2	1
Stictochironomus	6	16	1
Tabanus	-99		
Tanytarsus	4	5	11
Thienemanniella			5
Thienemannimyia grp.	3		10
Tipula			-99
Tribelos	1	5	1
EPHEMEROPTERA			
Apobaetis		1	
Baetis	20		
Caenis latipennis	24	73	97
Centroptilum		1	2
Stenacron	3		2
Stenonema femoratum	59	21	9
Tricorythodes	31	2	1
HAPLOTAXIDA			
Haplotaxis		1	
HEMIPTERA			
Palmacorixa			-99
ISOPODA			
Caecidotea	2		-99
LUMBRICINA			
Lumbricina	1		1
LUMBRICULIDA			
Lumbriculidae		1	
ODONATA			
Argia	4	3	6
Basiaeschna janata			-99
Calopteryx			1

Aquid Invertebrate Database Bench Sheet Report
Hinkson Cr [14975], Station #3.5, Sample Date: 10/7/2014 3:30:00 PM
CS = Coarse; NF = Nonflow; RM = Rootmat; -99 = Presence

ORDER: TAXA	CS	NF	RM
Enallagma		3	46
Epitheca (Epicordulia)			-99
Erythrodiplax			-99
Hetaerina			2
Ischnura			1
Libellula			-99
Macromia		1	
Nasiaeschna pentacantha			-99
TRICHOPTERA			
Cheumatopsyche	31		6
Chimarra	7		
Helicopsyche	3		1
TRICLADIDA			
Planariidae	4		
TUBIFICIDA			
Branchiura sowerbyi	1	23	1
Enchytraeidae	2		1
Limnodrilus hoffmeisteri	1		
Tubificidae	124	53	3
VENEROIDA			
Corbicula	8	4	
Pisidiidae		1	3

Aquid Invertebrate Database Bench Sheet Report
Hinkson Cr [14976], Station #4, Sample Date: 10/7/2014 4:30:00 PM
CS = Coarse; NF = Nonflow; RM = Rootmat; -99 = Presence

ORDER: TAXA	CS	NF	RM
"HYDRACARINA"			
Acarina	3		3
AMPHIPODA			
Crangonyx	1	1	2
Hyalella azteca			3
BASOMMATOPHORA			
Ancylidae	2		2
Menetus			5
Physella		1	
COLEOPTERA			
Berosus	4	1	3
Dubiraphia	5	5	22
Stenelmis	138	40	32
DIPTERA			
Ablabesmyia	2	3	
Caloparyphus	1		
Ceratopogoninae		4	2
Chironomus		1	
Chrysops		-99	
Cladotanytarsus		6	
Corynoneura		6	
Cricotopus bicinctus			5
Cricotopus/Orthocladius	2	3	2
Cryptochironomus	3	20	1
Cryptotendipes		2	
Dicrotendipes	2	3	6
Diptera		2	
Dolichopodidae		2	
Ephydridae		3	
Forcipomyiinae	2		1
Glyptotendipes	1		
Hemerodromia	3	1	
Labrundinia		1	2
Microtendipes	3	7	6
Nanocladius		1	
Natarsia		1	
Nilotanypus	1		
Ormosia		2	
Paratanytarsus		1	6
Pericoma		2	
Phaenopsectra	4	4	1

Aquid Invertebrate Database Bench Sheet Report
Hinkson Cr [14976], Station #4, Sample Date: 10/7/2014 4:30:00 PM
CS = Coarse; NF = Nonflow; RM = Rootmat; -99 = Presence

ORDER: TAXA	CS	NF	RM
Polypedilum flavum	28		6
Polypedilum halterale grp	4	38	1
Polypedilum illinoense grp	3	1	2
Polypedilum scalaenum grp	1	7	2
Pseudochironomus	4	3	4
Rheotanytarsus	16	2	8
Simuliidae	21		18
Stenochironomus			2
Stictochironomus	2	20	2
Tabanus	4		
Tanytarsus	6	12	7
Thienemanniella	2	1	
Thienemannimyia grp.	5	8	7
Tipula	2	2	1
Tribelos			21
EPHEMEROPTERA			
Apobaetis		1	
Baetis	22	1	1
Caenis latipennis	48	27	
Stenacron	18	3	
Stenonema femoratum	69	18	1
Tricorythodes	60	1	
ODONATA			
Argia	12	2	1
Calopteryx			2
Enallagma		2	24
Erythemis		1	-99
Somatochlora			1
TRICHOPTERA			
Ceraclea	3		
Cheumatopsyche	78	4	16
Chimarra	9		3
Helicopsyche	13	1	6
Hydroptila	1		1
Mystacides		3	
Oecetis	1		1
Polycentropus	2	1	
Triaenodes			4
TRICLADIDA			
Planariidae	1		
TUBIFICIDA			
Branchiura sowerbyi	6	7	2

Aquid Invertebrate Database Bench Sheet Report
Hinkson Cr [14976], Station #4, Sample Date: 10/7/2014 4:30:00 PM
CS = Coarse; NF = Nonflow; RM = Rootmat; -99 = Presence

ORDER: TAXA	CS	NF	RM
Limnodrilus hoffmeisteri			3
Tubificidae	19	13	18
VENEROIDA			
Corbicula			-99
Pisidiidae	4	4	2

Aquid Invertebrate Database Bench Sheet Report
Hinkson Cr [14977], Station #5, Sample Date: 10/8/2014 9:45:00 AM
CS = Coarse; NF = Nonflow; RM = Rootmat; -99 = Presence

ORDER: TAXA	CS	NF	RM
"HYDRACARINA"			
Acarina			10
AMPHIPODA			
Hyalella azteca		1	18
BASOMMATOPHORA			
Ancylidae	3	1	3
Menetus			3
Physella		1	8
COLEOPTERA			
Berosus	2		3
Dubiraphia	1	3	15
Dytiscidae		1	
Peltodytes			2
Stenelmis	103	36	11
DECAPODA			
Orconectes virilis			1
DIPTERA			
Ablabesmyia			4
Ceratopogoninae	2	1	
Chironomidae	2	3	1
Chrysops		1	
Cladotanytarsus	2	4	
Corynoneura	6	2	10
Cricotopus bicinctus	1		
Cricotopus/Orthocladius	3	1	
Cryptochironomus	1	18	1
Dicrotendipes	4	1	1
Eukiefferiella	2		
Forcipomyiinae	1		
Glyptotendipes	1		2
Hydrobaenus			1
Labrundinia			5
Microtendipes	2		1
Natarsia		2	
Ormosia		2	
Paracladopelma		1	
Paratanytarsus			2
Polypedilum flavum	113		2
Polypedilum halterale grp	2	41	1
Polypedilum illinoense grp	1		4
Polypedilum scalaenum grp	1	1	

Aquid Invertebrate Database Bench Sheet Report
Hinkson Cr [14977], Station #5, Sample Date: 10/8/2014 9:45:00 AM
CS = Coarse; NF = Nonflow; RM = Rootmat; -99 = Presence

ORDER: TAXA	CS	NF	RM
Procladius		1	
Pseudochironomus		2	
Rheotanytarsus	28	2	3
Saetheria	1		
Simulium	67		
Stictochironomus	2	24	
Tabanus	1		
Tanytarsus	10	7	6
Thienemanniella	8	1	
Thienemannimyia grp.	7	1	4
Tipula	1		2
Tribelos		3	5
Zavrelimyia			1
EPHEMEROPTERA			
Baetis	40	1	
Caenis latipennis	5	14	33
Callibaetis			1
Centroptilum			1
Procloeon		1	
Stenacron		1	
Stenonema femoratum	10	6	3
Tricorythodes	42	3	1
HEMIPTERA			
Belostoma			-99
Microvelia			11
LUMBRICINA			
Lumbricina		1	
ODONATA			
Argia			5
Basiaeschna janata			-99
Calopteryx			1
Dromogomphus			-99
Enallagma		2	101
Epitheca (Epicordulia)			-99
Erythemis			3
Hagenius brevistylus		1	
Ischnura			3
Libellula			-99
TRICHOPTERA			
Cheumatopsyche	87		1
Chimarra	5		
Helicopsyche	4	1	3

Aquid Invertebrate Database Bench Sheet Report
Hinkson Cr [14977], Station #5, Sample Date: 10/8/2014 9:45:00 AM
CS = Coarse; NF = Nonflow; RM = Rootmat; -99 = Presence

ORDER: TAXA	CS	NF	RM
Hydroptila	1		
Mystacides		1	
Oecetis		2	
Polycentropus		1	
Triaenodes			1
TUBIFICIDA			
Branchiura sowerbyi		2	
Enchytraeidae	2	1	2
Ilyodrilus templetoni		1	
Tubificidae	24	18	8
VENEROIDA			
Corbicula		3	
Pisidiidae	2	4	5

Aquid Invertebrate Database Bench Sheet Report
Hinkson Cr [14978], Station #5.5, Sample Date: 10/8/2014 11:00:00 AM
CS = Coarse; NF = Nonflow; RM = Rootmat; -99 = Presence

ORDER: TAXA	CS	NF	RM
"HYDRACARINA"			
Acarina	3	29	6
AMPHIPODA			
Hyalella azteca			14
ARHYNCHOBDELLIDA			
Erpobdellidae	1		-99
BASOMMATOPHORA			
Ancylidae	8		3
Lymnaeidae			2
Menetus			1
Physella		5	9
COLEOPTERA			
Berosus		1	6
Dubiraphia		8	17
Helichus basalis			1
Paracymus			1
Stenelmis	147	33	19
DECAPODA			
Orconectes virilis	1		-99
DIPTERA			
Ablabesmyia		4	1
Ceratopogoninae	1	1	5
Chironomidae	1		
Chironomus		2	
Chrysops			2
Cladotanytarsus	2	2	
Corynoneura	2	1	5
Cricotopus bicinctus	3		6
Cricotopus/Orthocladius	14	2	1
Cryptochironomus	2	13	
Dicrotendipes	2	1	
Diptera		1	
Dolichopodidae	1		
Endochironomus			1
Eukiefferiella	1		
Forcipomyiinae			1
Hemerodromia	1	1	1
Hexatoma		1	1
Labrundinia			2
Micropsectra			1
Microtendipes	2	1	

Aquid Invertebrate Database Bench Sheet Report
Hinkson Cr [14978], Station #5.5, Sample Date: 10/8/2014 11:00:00 AM
CS = Coarse; NF = Nonflow; RM = Rootmat; -99 = Presence

ORDER: TAXA	CS	NF	RM
Nanocladius			1
Natarsia		1	
Nilotanypus	1		
Paratanytarsus			9
Polypedilum aviceps	2		
Polypedilum flavum	151		4
Polypedilum halterale grp	28		
Polypedilum illinoense grp	5		8
Polypedilum scalaenum grp	1	24	2
Procladius		4	
Pseudochironomus		2	1
Rheotanytarsus	39	1	2
Simulium	109	2	
Stictochironomus		23	
Tabanus	-99		
Tanytarsus	8	1	4
Thienemanniella	4		9
Thienemannimyia grp.	5	10	16
Tipula			3
Tribelos	1	2	3
EPHEMEROPTERA			
Acerpenna	2		
Apobaetis		1	
Baetis	54		2
Caenis latipennis	6	29	19
Centroptilum		1	2
Procloeon		3	1
Stenacron	4	13	
Stenonema femoratum	34	23	2
GORDIOIDEA			
Chordodidae			1
HEMIPTERA			
Belostoma			1
Ranatra nigra			1
MEGALOPTERA			
Sialis		-99	
ODONATA			
Argia	10	4	7
Basiaeschna janata			2
Calopteryx			1
Enallagma		2	83
Hagenius brevistylus		1	

Aquid Invertebrate Database Bench Sheet Report
Hinkson Cr [14978], Station #5.5, Sample Date: 10/8/2014 11:00:00 AM
CS = Coarse; NF = Nonflow; RM = Rootmat; -99 = Presence

ORDER: TAXA	CS	NF	RM
Libellula			1
Macromia			-99
PLECOPTERA			
Capniidae			1
RHYNCHOBDELLIDA			
Glossiphoniidae			1
TRICHOPTERA			
Cheumatopsyche	75	5	10
Chimarra	18		
Helicopsyche	4		
Hydropsyche	1		
Hydroptila	5		1
Mystacides		2	
Oecetis		3	1
Triaenodes			1
TRICLADIDA			
Planariidae		1	1
TUBIFICIDA			
Branchiura sowerbyi	2	13	
Enchytraeidae			4
Limnodrilus claparedianus		2	
Tubificidae	23	187	11
VENEROIDA			
Corbicula	16	3	4
Pisidiidae	5	2	7

Aquid Invertebrate Database Bench Sheet Report
Hinkson Cr [14979], Station #6, Sample Date: 10/8/2014 1:00:00 PM
CS = Coarse; NF = Nonflow; RM = Rootmat; -99 = Presence

ORDER: TAXA	CS	NF	RM
"HYDRACARINA"			
Acarina	5	41	
AMPHIPODA			
Gammarus			6
ARHYNCHOBDELLIDA			
Erpobdellidae	-99		
BASOMMATOPHORA			
Ancylidae	1	1	1
Lymnaeidae			5
Physella	1		6
COLEOPTERA			
Berosus	2	1	2
Dubiraphia	13	7	10
Dytiscidae		1	
Stenelmis	179	26	22
Tropisternus			1
DECAPODA			
Orconectes virilis			-99
DIPTERA			
Ablabesmyia	1	2	
Ceratopogoninae			1
Chaoborus	1	1	
Chironomidae	3	2	1
Chrysops	1		
Cladotanytarsus	10	3	2
Corynoneura	3		5
Cricotopus bicinctus	4		8
Cricotopus/Orthocladius	5	1	1
Cryptochironomus	3	11	
Cryptotendipes		3	
Dicrotendipes	1	3	2
Glyptotendipes		1	
Hemerodromia	4		2
Microtendipes	2		
Nanocladius			1
Nilotanypus	1		
Ormosia	1	17	1
Parakiefferiella			1
Parametriocnemus	1		
Paratanytarsus		2	4
Paratendipes	1		

Aquid Invertebrate Database Bench Sheet Report
Hinkson Cr [14979], Station #6, Sample Date: 10/8/2014 1:00:00 PM
CS = Coarse; NF = Nonflow; RM = Rootmat; -99 = Presence

ORDER: TAXA	CS	NF	RM
Phaenopsectra	1		
Polypedilum flavum	112		7
Polypedilum halterale grp	2	8	
Polypedilum illinoense grp	3	2	8
Polypedilum scalaenum grp	20	1	
Pseudochironomus	2	4	
Rheotanytarsus	28		17
Saetheria	1		
Simulium	59		3
Stictochironomus	4	35	
Tanytarsus	5	6	11
Thienemanniella	5		7
Thienemannimyia grp.	8	1	4
Tipula	1		1
Tribelos		4	
EPHEMEROPTERA			
Acerpenna			1
Apobaetis		2	
Baetis	40		5
Caenis latipennis	5	11	29
Centroptilum		5	1
Stenacron	2	1	2
Stenonema femoratum	29	23	
HEMIPTERA			
Microvelia			2
ISOPODA			
Caecidotea	2		1
LUMBRICINA			
Lumbricina		1	
LUMBRICULIDA			
Lumbriculidae	1		
ODONATA			
Argia	1	1	
Basiaeschna janata			3
Calopteryx			1
Enallagma		2	36
Epitheca (Tetragoneuria)		-99	
Erythemis			1
Hagenius brevistylus			-99
Hetaerina			1
Libellula		-99	-99
Progomphus obscurus			2

Aquid Invertebrate Database Bench Sheet Report
Hinkson Cr [14979], Station #6, Sample Date: 10/8/2014 1:00:00 PM
CS = Coarse; NF = Nonflow; RM = Rootmat; -99 = Presence

ORDER: TAXA	CS	NF	RM
TRICHOPTERA			
Cheumatopsyche	96	3	14
Chimarra	29		
Cyrnellus fraternus	1		
Helicopsyche	17	1	
Hydropsyche	10		
Hydroptila			2
Mystacides		6	
Nectopsyche exquisita	1		
Nyctiophylax	1	1	
Polycentropus		1	
Triaenodes			4
TRICLADIDA			
Planariidae	2		
TUBIFICIDA			
Branchiura sowerbyi		2	
Enchytraeidae	2	2	1
Tubificidae	37	19	1
VENEROIDA			
Corbicula	5	2	2
Pisidiidae	4	3	2

Aquid Invertebrate Database Bench Sheet Report
Hinkson Cr [14980], Station #6.5, Sample Date: 10/8/2014 2:30:00 PM
CS = Coarse; NF = Nonflow; RM = Rootmat; -99 = Presence

ORDER: TAXA	CS	NF	RM
"HYDRACARINA"			
Acarina		22	
ARHYNCHOBDELLIDA			
Erpobdellidae	-99		
BASOMMATOPHORA			
Ancylidae	8	2	1
Lymnaeidae		3	
Menetus			1
Physella		2	5
COLEOPTERA			
Berosus		1	3
Dubiraphia		6	49
Neoporus		1	1
Peltodytes			5
Scirtidae			2
Stenelmis	297	8	17
DIPTERA			
Ablabesmyia		2	3
Ceratopogoninae		1	2
Chaoborus		2	
Chironomus	1	2	
Cladotanytarsus	1	1	
Clinotanypus			1
Corynoneura	3	3	1
Cricotopus bicinctus	2		
Cricotopus/Orthocladius		1	
Cryptochironomus	2	4	
Culex			1
Dicrotendipes	4	2	1
Diptera	1	1	
Eukiefferiella	1		
Glyptotendipes	1		1
Goeldichironomus			2
Hemerodromia	1	1	
Hydrobaenus	2		
Labrundinia			1
Microtendipes	2		
Nanocladius			1
Parachironomus			1
Paratanytarsus			2
Paratendipes	1	1	

Aquid Invertebrate Database Bench Sheet Report
Hinkson Cr [14980], Station #6.5, Sample Date: 10/8/2014 2:30:00 PM
CS = Coarse; NF = Nonflow; RM = Rootmat; -99 = Presence

ORDER: TAXA	CS	NF	RM
Phaenopsectra			2
Polypedilum aviceps	5		
Polypedilum flavum	68		
Polypedilum halterale grp		29	1
Polypedilum illinoense grp	3	1	1
Polypedilum scalaenum grp	8		
Procladius		3	1
Pseudochironomus	4		
Rheotanytarsus	4		2
Simulium	25	1	
Stictochironomus	3	36	
Tabanus	3		
Tanytarsus	9	1	5
Thienemanniella	1		
Thienemannimyia grp.	4		7
Tribelos		13	4
Zavrelimyia			1
EPHEMEROPTERA			
Apobaetis		3	
Baetis	16	1	
Caenis latipennis	3	15	31
Callibaetis			3
Centroptilum		1	1
Hexagenia limbata		1	
Procloeon			1
Stenacron	3		
Stenonema femoratum	20	3	5
Tricorythodes	1		
HEMIPTERA			
Belostoma		-99	1
Neoplea			1
ISOPODA			
Caecidotea			5
ODONATA			
Argia			14
Basiaeschna janata			4
Enallagma		1	55
Erythemis			2
Gomphidae		-99	
Ischnura			2
Somatochlora			1
PLECOPTERA			

Aquid Invertebrate Database Bench Sheet Report
Hinkson Cr [14980], Station #6.5, Sample Date: 10/8/2014 2:30:00 PM
CS = Coarse; NF = Nonflow; RM = Rootmat; -99 = Presence

ORDER: TAXA	CS	NF	RM
Capniidae	1		
TRICHOPTERA			
Cheumatopsyche	67		
Chimarra	18		
Helicopsyche	23	6	6
Hydroptila	1		1
Mystacides		2	
Nectopsyche	1	2	
Oecetis	2	1	
Triaenodes			1
TRICLADIDA			
Planariidae	1		2
TUBIFICIDA			
Branchiura sowerbyi		1	1
Enchytraeidae	2	2	
Limnodrilus hoffmeisteri	1	1	
Tubificidae	46	26	3
VENEROIDA			
Corbicula			1
Pisidiidae	4		3

Aquid Invertebrate Database Bench Sheet Report
Hinkson Cr [14981], Station #7, Sample Date: 10/8/2014 3:30:00 PM
CS = Coarse; NF = Nonflow; RM = Rootmat; -99 = Presence

ORDER: TAXA	CS	NF	RM
"HYDRACARINA"			
Acarina		53	24
AMPHIPODA			
Hyalella azteca			34
ARHYNCHOBDELLIDA			
Erpobdellidae	1		-99
BASOMMATOPHORA			
Ancylidae	6	1	1
Helisoma			1
Lymnaeidae			3
Menetus			2
Physella		3	4
BRANCHIOBDELLIDA			
Branchiobdellida			1
COLEOPTERA			
Berosus		1	4
Dubiraphia		4	30
Dytiscidae		1	
Helichus basalis			1
Helichus lithophilus			1
Peltodytes			1
Scirtidae			1
Stenelmis	262	26	17
Tropisternus			1
DECAPODA			
Orconectes virilis			-99
Palaemonetes kadiakensis			-99
DIPTERA			
Ablabesmyia		1	4
Ceratopogoninae	1	12	4
Chaoborus	3		
Chironomidae	2	2	1
Chrysops	1		
Cladotanytarsus	14	3	
Corynoneura	2	1	6
Cryptochironomus	2	9	1
Dicrotendipes	3	3	3
Eukiefferiella	1		
Glyptotendipes	1		1
Hemerodromia	2		
Hexatoma	-99		

Aquid Invertebrate Database Bench Sheet Report
Hinkson Cr [14981], Station #7, Sample Date: 10/8/2014 3:30:00 PM
CS = Coarse; NF = Nonflow; RM = Rootmat; -99 = Presence

ORDER: TAXA	CS	NF	RM
Hydrobaenus			2
Labrundinia			3
Microtendipes	1	4	2
Nanocladius			2
Ormosia	1	1	
Paracladopelma	1		
Parakiefferiella	1		1
Paratanytarsus		1	9
Paratendipes	2		
Phaenopsectra	1		
Pilaria		1	
Polypedilum flavum	54		
Polypedilum halterale grp	5	36	2
Polypedilum illinoense grp	1		5
Polypedilum scalaenum grp	13	1	1
Pseudochironomus	1	5	
Rheotanytarsus	2		1
Simulium	28		
Stenochironomus	1		
Stictochironomus	10	39	2
Tabanus	7		-99
Tanytarsus	5	2	2
Thienemanniella	1		
Thienemannimyia grp.	1		5
Tipula	2		2
Tribelos		2	1
Zavrelimyia			3
EPHEMEROPTERA			
Baetis	8		
Caenis latipennis	1	13	44
Centroptilum			3
Leptophlebiidae			2
Stenacron	1	1	5
Stenonema femoratum	15	16	9
Tricorythodes	1		
HEMIPTERA			
Corixidae		1	
Trepobates		-99	
Trichocorixa			1
ODONATA			
Argia			4
Basiaeschna janata			-99

Aquid Invertebrate Database Bench Sheet Report
Hinkson Cr [14981], Station #7, Sample Date: 10/8/2014 3:30:00 PM
CS = Coarse; NF = Nonflow; RM = Rootmat; -99 = Presence

ORDER: TAXA	CS	NF	RM
Calopteryx			1
Enallagma		5	69
Epitheca (Epicordulia)			-99
Erythemis			1
Gomphus		-99	-99
Hagenius brevistylus		1	
Ischnura		2	
Macromia		-99	
Nasiaeschna pentacantha			-99
Somatochlora			-99
RHYNCHOBDELLIDA			
Glossiphoniidae			1
TRICHOPTERA			
Cheumatopsyche	48		3
Chimarra	2		
Helicopsyche	101	3	21
Hydroptila			3
Limnephilidae		1	1
Mystacides		2	
Nyctiophylax		2	1
Oecetis		1	
Triaenodes			12
TUBIFICIDA			
Aulodrilus	1		
Branchiura sowerbyi	2	5	
Enchytraeidae	1	1	1
Tubificidae	50	85	5
VENEROIDA			
Pisidiidae	7	7	2

Aquid Invertebrate Database Bench Sheet Report
Hinkson Cr [14982], Station #8, Sample Date: 10/8/2014 4:40:00 PM
CS = Coarse; NF = Nonflow; RM = Rootmat; -99 = Presence

ORDER: TAXA	CS	NF	RM
"HYDRACARINA"			
Acarina		27	8
AMPHIPODA			
Hyalella azteca	1		24
ARHYNCHOBDELLIDA			
Erpobdellidae	1		3
BASOMMATOPHORA			
Ancylidae	5	1	4
Helisoma	-99		
Lymnaeidae			1
Menetus			4
Physella	2	6	22
Planorbella		1	
COLEOPTERA			
Berosus		1	4
Dubiraphia		15	38
Neoporus			1
Scirtidae			1
Stenelmis	284	25	9
Tropisternus			-99
DECAPODA			
Orconectes virilis			1
DIPTERA			
Ablabesmyia		2	
Ceratopogoninae	1	11	1
Chaoborus		3	
Chironomus		4	
Chrysops		1	
Cladotanytarsus		4	
Corynoneura		4	1
Cricotopus bicinctus			1
Cricotopus/Orthocladius	1	2	
Cryptochironomus	2	5	
Cryptotendipes		2	
Dicrotendipes		5	3
Diptera		4	
Djalmabatista		1	
Endochironomus			1
Forcipomyiinae	1	1	1
Glyptotendipes			2
Hemerodromia	1		1

Aquid Invertebrate Database Bench Sheet Report
Hinkson Cr [14982], Station #8, Sample Date: 10/8/2014 4:40:00 PM
CS = Coarse; NF = Nonflow; RM = Rootmat; -99 = Presence

ORDER: TAXA	CS	NF	RM
Hydrobaenus		1	1
Labrundinia			5
Microtendipes	1	1	2
Nanocladius			2
Ormosia	2	2	2
Paratanytarsus		2	8
Paratendipes		1	
Polypedilum flavum	4		
Polypedilum halterale grp	4	26	1
Polypedilum illinoense grp	1		1
Polypedilum scalaenum grp	1	5	
Polypedilum trigonum			1
Pseudochironomus	10	5	
Psychodidae		1	
Simulium	6		1
Stictochironomus	14	73	1
Tanytarsus	1	7	1
Thienemanniella			2
Thienemannimyia grp.	1	1	5
Tipula			1
Tribelos		15	11
Zavrelimyia			1
EPHEMEROPTERA			
Acerpenna	2		
Baetis	22		
Caenis latipennis	9	8	
Centroptilum		1	1
Hexagenia limbata		1	
Leptophlebiidae		2	2
Procloeon		2	
Stenacron	6	2	1
Stenonema femoratum	30	26	6
LUMBRICINA			
Lumbricina			1
ODONATA			
Argia			3
Basiaeschna janata			1
Calopteryx			-99
Enallagma		3	60
Epitheca (Epicordulia)			-99
Erythemis		-99	
Gomphus			-99

Aquid Invertebrate Database Bench Sheet Report
Hinkson Cr [14982], Station #8, Sample Date: 10/8/2014 4:40:00 PM
CS = Coarse; NF = Nonflow; RM = Rootmat; -99 = Presence

ORDER: TAXA	CS	NF	RM
Ischnura			2
Nasiaeschna pentacantha			-99
Pachydiplax longipennis	1		
Plathemis			1
Progomphus obscurus		1	
Somatochlora		1	-99
PLECOPTERA			
Capniidae	1		
RHYNCHOBDELLIDA			
Glossiphoniidae		1	
TRICHOPTERA			
Cheumatopsyche	101	1	
Helicopsyche	39	1	5
Limnephilidae	1		
Nyctiophylax	1	1	
Oecetis	1	1	2
Rhyacophila		1	
Triaenodes			7
TUBIFICIDA			
Aulodrilus		2	
Branchiura sowerbyi	2		
Enchytraeidae	1	3	
Tubificidae	57	22	4
VENEROIDA			
Pisidiidae	12	5	11

Aquid Invertebrate Database Bench Sheet Report
Bonne Femme Cr [14927], Station #1, Sample Date: 10/8/2014 10:00:00 AM
CS = Coarse; NF = Nonflow; RM = Rootmat; -99 = Presence

ORDER: TAXA	CS	NF	RM
"HYDRACARINA"			
Acarina	2	22	9
AMPHIPODA			
Crangonyx	16	8	5
Gammarus			1
Hyalella azteca			14
ARHYNCHOBDELLIDA			
Erpobdellidae		-99	
BASOMMATOPHORA			
Ancylidae	1		1
Menetus			6
Physella			3
COLEOPTERA			
Berosus			1
Dubiraphia			4
Ectopria nervosa		1	
Helichus basalis			5
Helichus lithophilus			1
Neoporus			1
Peltodytes			1
Stenelmis	187	13	26
Tropisternus			-99
DIPTERA			
Ablabesmyia		3	1
Caloparyphus	1		
Ceratopogoninae	8	1	
Chironomus		5	
Chrysops	1		
Cladotanytarsus	1	1	
Corynoneura	1	4	20
Cricotopus bicinctus	1		5
Cricotopus/Orthocladius	1		1
Cryptochironomus	1	2	
Demicryptochironomus	1		
Dicrotendipes	1	4	13
Diptera	1	1	
Glyptotendipes		3	9
Hemerodromia			1
Hexatoma	8		
Hydrobaenus	2	1	2
Labrundinia			4

Aquid Invertebrate Database Bench Sheet Report
Bonne Femme Cr [14927], Station #1, Sample Date: 10/8/2014 10:00:00 AM
CS = Coarse; NF = Nonflow; RM = Rootmat; -99 = Presence

ORDER: TAXA	CS	NF	RM
Microtendipes	3	54	8
Nanocladius			2
Paracladopelma		1	
Parametriocnemus	1		
Paratanytarsus	1		9
Paratendipes	26	2	
Polypedilum aviceps	34		5
Polypedilum flavum	30		1
Polypedilum halterale grp	1	4	
Polypedilum illinoense grp			6
Polypedilum scalaenum grp	2	3	
Rheotanytarsus	2		3
Simulium	12		1
Stictochironomus		2	
Tabanus	-99		
Tanytarsus	11	3	13
Thienemanniella	9		4
Thienemannimyia grp.	3		7
Tipula	1		1
Tribelos		2	
Tvetenia bavarica grp	1		1
Zavrelimyia		1	
EPHEMEROPTERA			
Acerpenna	2		1
Baetis	5		
Caenis latipennis	5	23	70
Centroptilum		1	2
Leptophlebiidae			1
Procloeon			1
Stenacron	1	1	
Stenonema femoratum	28	29	11
HEMIPTERA			
Neoplea			1
Sigara			1
ISOPODA			
Caecidotea	33	2	8
LUMBRICINA			
Lumbricina	19	2	
ODONATA			
Argia			1
Basiaeschna janata			-99
Calopteryx			-99

Aquid Invertebrate Database Bench Sheet Report
Bonne Femme Cr [14927], Station #1, Sample Date: 10/8/2014 10:00:00 AM
CS = Coarse; NF = Nonflow; RM = Rootmat; -99 = Presence

ORDER: TAXA	CS	NF	RM
Enallagma			25
Nasiaeschna pentacantha			-99
PLECOPTERA			
Capniidae	1		
TRICHOPTERA			
Cheumatopsyche	12		2
Chimarra	9		
Polycentropus		1	
Triaenodes			4
TRICLADIDA			
Planariidae	2		
TUBIFICIDA			
Branchiura sowerbyi		1	
Enchytraeidae		1	1
Limnodrilus hoffmeisteri		3	
Tubificidae	62	92	

Aquid Invertebrate Database Bench Sheet Report
Bonne Femme Cr [14928], Station #2, Sample Date: 10/8/2014 11:00:00 AM
CS = Coarse; NF = Nonflow; RM = Rootmat; -99 = Presence

ORDER: TAXA	CS	NF	RM
"HYDRACARINA"			
Acarina	2	45	
AMPHIPODA			
Crangonyx	30	9	5
Hyalella azteca			16
BASOMMATOPHORA			
Ancylidae			1
Menetus		2	
Physella	2		
COLEOPTERA			
Dubiraphia		2	2
Peltodytes		1	4
Stenelmis	289	41	5
DECAPODA			
Orconectes virilis	2		-99
DIPTERA			
Ablabesmyia		1	
Caloparyphus	1		
Ceratopogoninae		1	
Chironomidae	3	3	
Chironomus		2	
Cladotanytarsus		1	
Corynoneura	2	1	1
Cricotopus bicinctus			1
Cricotopus/Orthocladius	2		
Cryptochironomus		15	
Demicryptochironomus	1	2	
Dicrotendipes	1	12	2
Diptera		1	
Eukiefferiella	1		
Hemerodromia	3		
Hexatoma	14	1	
Hydrobaenus	1		
Larsia		1	
Mesosmittia			1
Microtendipes	2	38	2
Natarsia		1	
Ormosia	2		
Paratanytarsus	1	1	
Paratendipes	8	4	1
Polypedilum aviceps	49		

Aquid Invertebrate Database Bench Sheet Report
Bonne Femme Cr [14928], Station #2, Sample Date: 10/8/2014 11:00:00 AM
CS = Coarse; NF = Nonflow; RM = Rootmat; -99 = Presence

ORDER: TAXA	CS	NF	RM
Polypedilum flavum	34		1
Polypedilum illinoense grp	4	1	1
Polypedilum scalaenum grp		1	
Procladius		3	
Rheotanytarsus	2		1
Simulium	11		
Tabanus	1		
Tanytarsus	7	7	2
Thienemanniella	6		
Tipula	2		
Tribelos			1
undescribed Empididae	3		
EPHEMEROPTERA			
Acerpenna	1		
Baetis	2		
Caenis latipennis	4	31	10
Procloeon			1
Stenonema femoratum	20	22	2
HEMIPTERA			
Neoplea			1
ISOPODA			
Caecidotea	23	2	3
LUMBRICINA			
Lumbricina	1		
ODONATA			
Enallagma			13
PLECOPTERA			
Capniidae	11		
TRICHOPTERA			
Cheumatopsyche	21		
Chimarra	10		
Oecetis	1	1	
TRICLADIDA			
Planariidae	2	1	
TUBIFICIDA			
Aulodrilus		1	
Branchiura sowerbyi		15	
Enchytraeidae		2	
Tubificidae	14	65	2
VENEROIDA			
Pisidiidae	1		

Appendix B

Biological Metric Values Fall 2001- Fall 2014

Taxa Richness

EPT Taxa

Biotic Index

Shannon Diversity Index

(shaded cells indicate values that are less than the fully supporting threshold)

Taxa Richness (Fully Supporting Values: Fall >73; Spring >71)													
Station	Land use segment	Fall 2001	Spring 2002	Fall 2003	Spring 2004	Spring 2005	Fall 2005	Spring 2006	Spring 2012	Fall 2012	Spring 2013	Spring 2014	Fall 2014
HC 8 – Rogers Rd.	Rural	63	78						77		66	78	93
HC 7 – Hinkson Cr. Rd.	Rural	63	81	85	81	70	78		72		77	67	97
HC 6.5 – Hwy 63 Connector	Rural				79				81		83	85	89
HC 6 – E. Walnut St.	Urban	68	62	81	67	76	78		72	60	75	69	87
HC 5.5 – Broadway	Urban			72	81	76	69		75	76	77	87	90
HC 5 – Upstr. of Grindstone	Urban	64	58						73	59	82	69	83
HC 4 – Dwnstr. of Grindstone	Urban	76	73						74	63	79	75	77
HC 3.5 – Recreation Dr.	Urban					69	72		67	64	81	77	88
HC 3 – Forum Blvd.	Urban	90	70					73		71	67	65	56
HC 2 – Twin Lakes RA	Urban	79	70					69		77	83	64	88
HC 1 – Scott Blvd.	Urban	65	66					75		67	66		81

EPT Taxa (Fully Supporting Values: Fall >15; Spring >17)													
Station	Land use segment	Fall 2001	Spring 2002	Fall 2003	Spring 2004	Spring 2005	Fall 2005	Spring 2006	Spring 2012	Fall 2012	Spring 2013	Spring 2014	Fall 2014
HC 8 – Rogers Rd.	Rural	10	15						15		12	13	17
HC 7 – Hinkson Cr. Rd.	Rural	9	17	18	16	14	16		10		13	10	16
HC 6.5 – Hwy 63 Connector	Rural				12				12		13	14	19
HC 6 – E. Walnut St.	Urban	9	7	13	9	13	11		12	10	9	13	18
HC 5.5 – Broadway	Urban			9	12	10	10		10	14	12	17	17
HC 5 – Upstr. of Grindstone	Urban	13	7						10	3	12	8	16
HC 4 – Dwnstr. of Grindstone	Urban	10	8						10	11	11	10	15
HC 3.5 – Recreation Dr.	Urban					8	9		9	13	13	9	10
HC 3 – Forum Blvd.	Urban	12	7					10		12	7	5	9
HC 2 – Twin Lakes RA	Urban	8	7					6		13	4	5	13
HC 1 – Scott Blvd.	Urban	13	10					7		11	7		11

Biotic Index (Fully Supporting Values: Fall <6.8; Spring <6.4)													
Station	Land use segment	Fall 2001	Spring 2002	Fall 2003	Spring 2004	Spring 2005	Fall 2005	Spring 2006	Spring 2012	Fall 2012	Spring 2013	Spring 2014	Fall 2014
HC 8 – Rogers Rd.	Rural	7.3	6.9						6.2		6.4	6.6	6.5
HC 7 – Hinkson Cr. Rd.	Rural	7.3	6.8	7.2	7.3	5.9	7.1		6.4		6.9	6.6	6.1
HC 6.5 – Hwy 63 Connector	Rural				6.9				6.7		6.8	6.5	6.4
HC 6 – E. Walnut St.	Urban	7.2	7.1	7.4	7.2	5.9	7.0		6.4	7.4	7.2	7.0	6.2
HC 5.5 – Broadway	Urban			7.1	6.9	6.6	7.3		6.9	8.0	7.1	6.8	6.8
HC 5 – Upstr. of Grindstone	Urban	6.6	7.0						6.9	7.4	6.9	6.6	6.6
HC 4 – Dwnstr. of Grindstone	Urban	6.7	7.1						6.7	7.5	7.0	6.6	6.5
HC 3.5 – Recreation Dr.	Urban					7.0	7. 5		7.3	7.2	7.0	6.4	6.9
HC 3 – Forum Blvd.	Urban	6.9	7.3					7.1		7.5	7.4	7.0	6.7
HC 2 – Twin Lakes RA	Urban	7.0	7.2					7.3		7.3	8.0	7.1	6.9
HC 1 – Scott Blvd.	Urban	6.7	7.2					7.3		7.0	6.9		7.8

Shannon Diversity Index (Fully Supporting Values: Fall >3.18; Spring >2.80)													
Station	Land use segment	Fall 2001	Spring 2002	Fall 2003	Spring 2004	Spring 2005	Fall 2005	Spring 2006	Spring 2012	Fall 2012	Spring 2013	Spring 2014	Fall 2014
HC 8 – Rogers Rd.	Rural	2.68	2.89						3.04		3.23	2.92	3.16
HC 7 – Hinkson Cr. Rd.	Rural	2.58	2.93	3.26	3.06	2.99	3.29		3.09		3.23	2.90	3.20
HC 6.5 – Hwy 63 Connector	Rural				3.26				3.30		3.04	2.70	3.14
HC 6 – E. Walnut St.	Urban	2.97	2.59	3.26	3.10	2.84	3.32		2.75	2.51	3.18	2.85	3.38
HC 5.5 – Broadway	Urban			3.31	3.40	2.82	2.88		3.05	3.19	3.10	2.86	3.32
HC 5 – Upstr. of Grindstone	Urban	3.44	2.63						3.36	3.01	3.07	3.06	3.33
HC 4 – Dwnstr. of Grindstone	Urban	3.20	2.61						3.34	2.58	2.84	3.42	3.43
HC 3.5 – Recreation Dr.	Urban					2.98	2.91		3.21	2.90	2.95	3.29	3.12
HC 3 – Forum Blvd.	Urban	3.38	3.20					3.00		2.82	2.80	3.00	2.99
HC 2 – Twin Lakes RA	Urban	3.19	3.16					3.22		3.05	3.12	2.96	3.40
HC 1 – Scott Blvd.	Urban	3.17	2.97					3.27		3.38	2.82		2.87