SUSQUEHANNA LARGE RIVER ASSESSMENT PROJECT

Publication 245 *August 2006*

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Printed on recycled paper

This report is prepared in cooperation with the U.S. Environmental Protection Agency under Contract No. 1-093392-02.

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**Statutory Citations: Federal - Pub. L. 91-575, 84 Stat. 1509 (December 1970); Maryland - Natural Resources Sec. 8-301 (Michie 1974); New York - ECL Sec. 21-1301 (McKinney 1973); and Pennsylvania - 32 P.S. 820.1 (Supp. 1976).*

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Jennifer L. R. Hoffman, Section Chief, Monitoring and Assessment

ABSTRACT

In 2002, the Susquehanna River Basin Commission (SRBC) conducted a pilot study to determine appropriate methods for assessing the biology of the large rivers in the Susquehanna River Basin. Based on the results of the pilot study, SRBC determined that a combination of sampling with rock baskets and traditional Rapid Bioassessment Protocol (RBP) methods was the most efficient and consistent collection method to sample the Susquehanna River. Accordingly, SRBC applied the combined methods for the 2005 Susquehanna Large River Assessment Project.

Biological and water chemistry data were collected at 25 stations during August through October 2005 on the mainstem Susquehanna River and at the mouths of the three major tributaries: the West Branch Susquehanna River, the Juniata River, and the Chemung River. Ten macroinvertebrate samples were collected at each station, using five rock baskets and five kick nets, when possible. A total of 102 rock basket samples and 125 kick net samples were collected during the survey.

Six of the stations were designated moderately impaired, while 19 of the stations were designated slightly impaired. Only 79 out of 950 laboratory and field water quality data points exceeded standards or levels of tolerance for aquatic life, indicating that the Susquehanna River contains fairly good water quality.

For future projects, SRBC plans to re-evaluate the need for both rock basket samplers and traditional RBP methods to collect biological data. Staff also will be considering alternative methods for assessing physical habitat and determining ways to assess the reservoir system at the lower end of the Susquehanna River.

INTRODUCTION

SRBC has been assessing stream biology throughout the Susquehanna River Basin since the late 1970s. SRBC relied exclusively on the U.S. Environmental Protection Agency's (USEPA's) RBP methods (Plafkin and others, 1989 and Barbour and others, 1999) for assessments, most notably for its interstate stream monitoring program and its rotating subbasin surveys. However, when it came to assessing large rivers, SRBC questioned whether the RBP method accurately depicted the biological integrity of the Susquehanna River Basin's large rivers: the mainstem Susquehanna, Chemung, West Branch, and Juniata Rivers.

To determine proper methods for biologically assessing the large rivers, in 2002, SRBC initiated a pilot project. From this pilot project, staff determined that a combination of rock basket samplers and traditional RBP methods was the most effective and consistent collection methods for sampling the Susquehanna River (Hoffman, 2003). Implementation of the combined methods on the large rivers, however, was delayed until 2005 because high river flows in the summers of 2003 and 2004 prevented

sampling. In summer 2005, low to normal flows allowed SRBC to initiate the large river sampling project.

SRBC staff collected biological and water quality data at 25 stations on the mainstem Susquehanna River and at the mouth of the major tributaries (Figure 1). The information collected will be used in future years to select and calculate metrics for a benthic macroinvertebrate index of biotic integrity (IBI) to assess the biological conditions in the basin's rivers. The data also will be used in SRBC's Integrated Listing assessments and to complement state assessment efforts.

Benthic macroinvertebrates were used to assess biological conditions for several reasons. They are sensitive to a wide range of stressors, have a large range of documented pollution tolerances, and are found in a variety of habitats throughout lotic systems (Flotemersch and others, 2001a). With two decades of conducting subbasin surveys and interstate streams monitoring, SRBC has compiled significant macroinvertebrate data from various sites on the large rivers. Additionally, SRBC's member states, New York, Pennsylvania, and Maryland, rely heavily on macroinvertebrate data for wadeable streams assessments.

Basin Geography

The Susquehanna River Basin is the largest watershed on the east coast of the United States, draining 27,510 square miles. The Susquehanna River originates at Otsego Lake, N.Y., and flows 444 miles through New York, Pennsylvania, and Maryland to the Chesapeake Bay at Havre de Grace, Md. SRBC has identified six subbasins in the Susquehanna River Basin: the Upper Susquehanna Subbasin, the Chemung Subbasin, the West Branch Susquehanna Subbasin, the Middle Susquehanna Subbasin, the Juniata Subbasin, and the Lower Susquehanna Subbasin (Figure 2).

The study area for this survey stretched from Sidney, N.Y., to Marietta, Pa., and encompassed every subbasin in the Susquehanna River watershed. Seven of the sites were located in the Upper Susquehanna; one site was at the mouth of the Chemung River; nine stations were in the Middle Susquehanna subbasin; one station was at the mouth of the West Branch Susquehanna River; five stations were in the Lower Susquehanna Subbasin; and one station was located at the mouth of the Juniata River. Downstream of Marietta, Pa., the river flows through a series of impoundments created by hydroelectric dams and could not be sampled using the methods in this study.

METHODS

Field and Laboratory Methods

Data collection

During July 5-28, 2005, SRBC staff placed rock basket samplers in the mainstem Susquehanna River from Sidney, N.Y., to Marietta, Pa., and at the mouths of its major tributaries for a six-week colonization period. Staff collected the rock basket samplers as well as traditional RBP kick-net samples from August 29 through October 6, 2005. Field chemistry measurements were taken at five locations across the river channel. Water quality samples also were collected for chemical laboratory analysis.

Samples were labeled with the site number, the date, the type of equipment used (RB for rock basket sampler and KS for kick screen), and the location of the sampler with relation to the site (sampler one at the left bank and sampler five at the right bank). For example, a rock basket sampler collected at JUNR 2 in the middle of the river on August 31, 2005, would be designated as JUNR2 RB3 8/31/05.

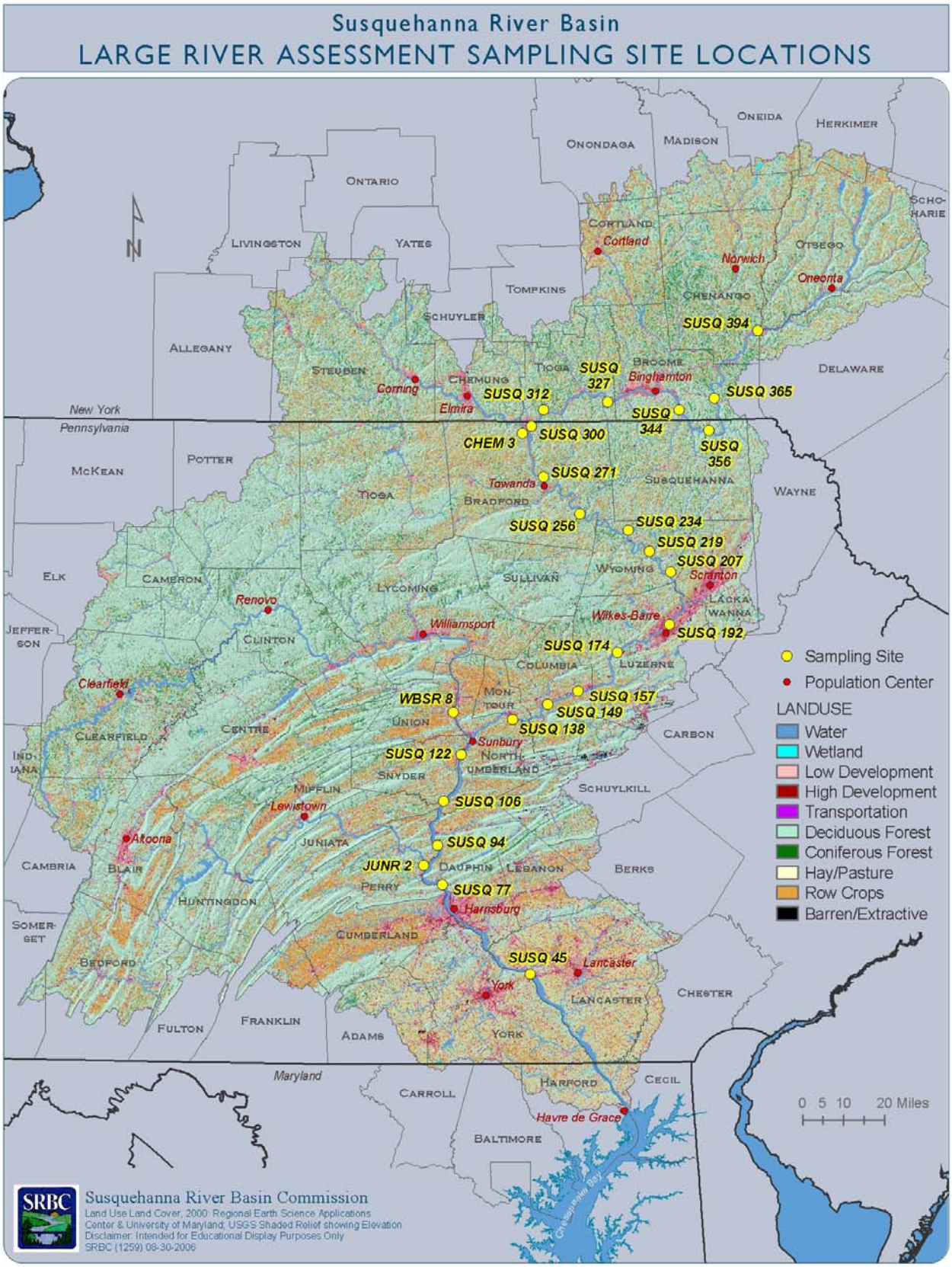

Figure 1. Large River Assessment Sampling Site Locations

Table 1. Susquehanna River Station Locations

Station Number	County/State	USGS Quad	Latitude	Longitude	Site Description
SUSQ 394	Chenango/N.Y.	Sidney, N.Y.	42.3113	-75.4199	Susquehanna River near Sidney, N.Y.
SUSQ 365	Broome/N.Y.	Windsor, N.Y.	42.0747	-75.6351	Susquehanna River at Windsor, N.Y.
SUSQ 356	Susquehanna/Pa.	Great Bend, Pa.	41.9612	-75.6620	Susquehanna River near Oakland, Pa.
SUSQ 344	Broome/N.Y.	Binghamton East, N.Y.	42.0347	-75.8017	Susquehanna River at Kirkwood, N.Y.
SUSQ 327	Tioga/N.Y.	Apalachin, N.Y.	42.0653	-76.1426	Susquehanna River near Apalachin, N.Y.
SUSQ 312	Tioga/N.Y.	Barton, N.Y.	42.0400	-76.4464	Susquehanna River at Barton, N.Y.
SUSQ 300	Bradford/Pa.	Sayre, Pa.	41.9819	-76.5065	Susquehanna River at Sayre, Pa.
SUSQ 271	Bradford/Pa.	Towanda, Pa.	41.7627	-76.4393	Susquehanna River at Towanda, Pa.
SUSQ 256	Bradford/Pa.	Wyalusing, Pa.	41.6705	-76.2786	Susquehanna River near Wyalusing, Pa.
SUSQ 234	Wyoming/Pa.	Meshoppen, Pa.	41.6099	-76.0509	Susquehanna River near Meshoppen, Pa.
SUSQ 219	Wyoming, Pa.	Tunkhannock, Pa.	41.5351	-75.9502	Susquehanna River near Tunkhannock, Pa.
SUSQ 207	Wyoming/Pa.	Ransom, Pa.	41.4594	-75.8524	Susquehanna River near West Falls, Pa.
SUSQ 192	Luzerne/Pa.	Kingston, Pa.	41.2500	-75.8845	Susquehanna River near Wilkes-Barre, Pa.
SUSQ 174	Luzerne/Pa.	Nanticoke, Pa.	41.1774	-76.1085	Susquehanna River near Shickshinny, Pa.
SUSQ 157	Columbia/Pa.	Mifflinville, Pa.	41.0405	-76.2945	Susquehanna River near Berwick, Pa.
SUSQ 149	Columbia/Pa.	Catawissa, Pa.	40.9935	-76.4369	Susquehanna River near Bloomsburg, Pa.
SUSQ 138	Northumberland/Pa.	Danville, Pa.	40.9422	-76.6011	Susquehanna River near Danville, Pa.
SUSQ 122	Snyder/Pa.	Sunbury, Pa.	40.8182	-76.8420	Susquehanna River at Hummels Wharf, Pa.
SUSQ 106	Snyder/Pa.	Dalmatia, Pa.	40.6517	-76.9226	Susquehanna River at McKees Half Falls, Pa.
SUSQ 94	Dauphin/Pa.	Halifax, Pa.	40.4958	-76.9516	Susquehanna River at Montgomery Ferry, Pa.
SUSQ 77	Dauphin/Pa.	Harrisburg West, Pa.	40.3358	-76.9125	Susquehanna River at Fort Hunter, Pa.
SUSQ 45	Lancaster/Pa.	Columbia West, Pa.	40.0365	-76.5239	Susquehanna River at Marietta, Pa.
JUNR 2	Perry/Pa.	Duncannon, Pa.	40.4258	-77.0159	Juniata River at Amity Hall, Pa.
CHEM 3	Bradford/Pa.	Sayre, Pa.	41.9607	-76.5324	Chemung River at Athens, Pa.
WBSR 8	Northumberland/Pa.	Lewisburg, Pa.	40.9679	-76.8797	West Branch Susquehanna River at Lewisburg, Pa.

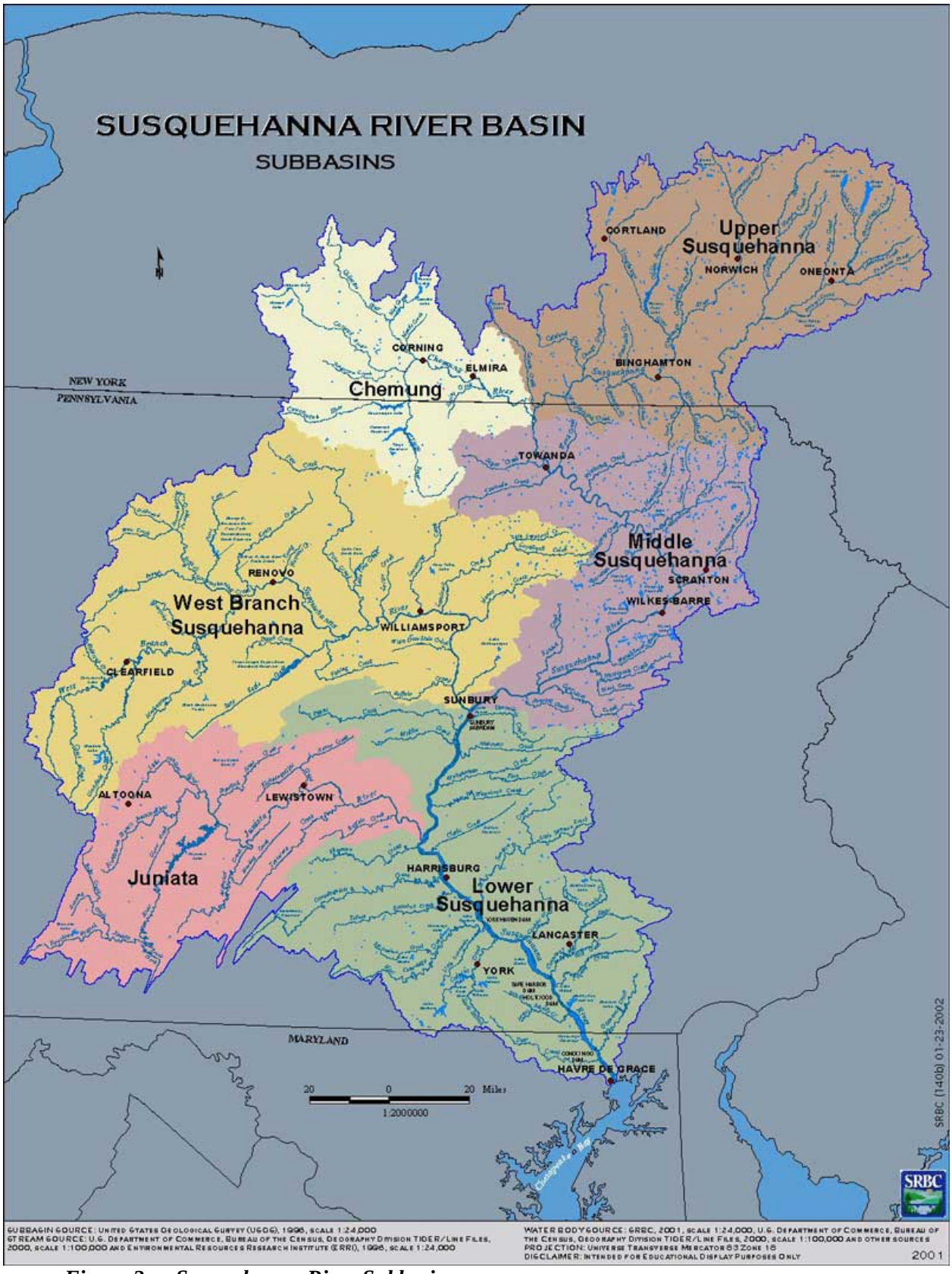

Figure 2. Susquehanna River Subbasins

Chemical water quality

Water samples were collected at each sampling site and analyzed to determine nutrient and metal concentrations in the river. Measurements were made in the field to determine water temperature, dissolved oxygen, conductivity, and pH. Temperature was measured in degrees Celsius with a field thermometer. Dissolved oxygen was measured with a YSI 55 meter that was calibrated at the beginning of every day when samples were collected, and conductivity was measured with a Cole-Parmer Model 1481 meter. A Cole-Parmer Model 5996 meter that was calibrated at the beginning of each sampling day and randomly checked throughout the day was used to measure pH. Field water quality measurements were taken at five points across the river, co-located with the rock basket samplers.

A list of laboratory parameters is located in Table 2. Laboratory samples consisted of one 500-ml bottle of raw water and two 250-ml bottles of acidified water. One of the 250-ml bottles was acidified with nitric acid for metal analyses. The other 250-ml bottle was acidified with sulfuric acid for nutrient analyses. Samples were iced and shipped to Pennsylvania Department of Environmental Protection, Bureau of Laboratories, Harrisburg, Pa., for analysis.

Table 2. Parameters for Laboratory Analysis

Parameter	
Alkalinity, mg/l[a]	Total Suspended Solids, mg/l
Total Nitrogen, mg/l	Total Sodium, mg/l
Total Nitrite, mg/l	Total Chloride, mg/l
Total Nitrate, mg/l	Total Sulfate, mg/l
Total Phosphorus, mg/l	Total Iron, µg/l[b]
Total Orthophosphate, mg/l	Total Manganese, µg/l
Total Organic Carbon, mg/l	Total Aluminum, µg/l
Total Hardness, mg/l	Turbidity, NTU[c]
Total Magnesium, mg/l	Total Calcium, mg/l

[a] mg/l = milligrams per liter
[b] µg/l = micrograms per liter
[c] nephelometric turbidity units

Macroinvertebrates

Benthic macroinvertebrates (organisms that live on the stream bottom, including aquatic insects, crayfish, clams, snails, and worms) were collected for analysis during this survey. Staff collected benthic macroinvertebrate samples using two separate methodologies, rock basket samplers and traditional RBP kick-net methods, based on the results of the 2002 pilot study. Each methodology is described in detail below.

Rock Basket Samplers

Rock basket samplers (Figure 2) are useful in assessing areas that are too deep to sample with traditional RBP methods (Merritt and others, 1996). A wire basket filled with natural river rocks from the sampling area was placed in a riffle/run area, where possible, to ensure a constant flow of water running through the sampler. Before the baskets were placed in the river, they were attached to a concrete block for stabilization and a float for marking the sampler location. Five such baskets were located on a transect across the river and left in place for at least six weeks to allow colonization. Samplers were placed by hand during July 5 - 28, 2005. Sites were chosen across the transect based on depth, velocity,

substrate, and cover within the transect. To retrieve the substrates, the baskets were separated from the concrete blocks and the floats and were placed in a collecting net while still under water. The rock basket and net were placed in a large, plastic bucket and brought to shore, where all macroinvertebrates were rinsed from the substrate and the net and placed in a jar labeled with site information and method of collection. The jar was filled with 95 percent ethanol so that the final concentration was at least 70 percent ethanol. The capped sample bottles were taken back to the laboratory to await analysis.

Figure 3. Rock Baskets Used in Large River Assessment Project

Modified Rapid Bioassessment Protocol (RBP)

SRBC has used this procedure for sampling throughout the basin since 1992. Including this methodology provides a link to past assessments in the river. The USEPA RBP III methodology (Barbour and others, 1999) was used in riffle/run areas, where present. When no riffle/run area was present, this methodology was used along the banks of the river and around the edges of islands. In riffle/run areas, samples were collected at both sides of the river and at three internal sites for a total of five sites across the riffle/run area, where possible.

Sampling was conducted by placing a one meter square kick screen perpendicular to the current and disrupting the substrate so dislodged macroinvertebrates were carried into the screen. All collected specimens were preserved in 95 percent ethanol and returned to SRBC offices for identification and enumeration.

Subsampling and sorting procedures were based on the 1999 RBP document (Barbour and others, 1999). In the laboratory, composite samples were sorted into 200-organism subsamples, when possible, using a gridded pan and a random numbers table. The organisms contained in the subsamples were identified to genus (except Chironomidae and Oligochaeta), when possible, and enumerated. Benthic macroinvertebrates were identified by professional biologists**,** with a minimum of a Master of Science degree in biology, skilled at recognizing most benthos to the family level by sight, and to the genus level with appropriate keys.

After sampling was completed at a given site, all equipment that came in contact with the sample was rinsed thoroughly, examined carefully and picked free of algae or debris before sampling at the next site. Additional organisms that were found on examination were placed into the sample containers.

Data Analysis

Chemical water quality

Chemical water quality was assessed by examining field and laboratory parameters. Limit values were obtained for each parameter based on current state and federal regulations or references for aquatic life tolerances (Table 3 – from LeFevre, 2005).

Table 3. Water Quality Limits and References

Parameter	Limit	Reference Code	Reference Codes and References
Temperature	> 25°C	a,f	a: http://www.pacode.com/secure/data/025/chapter93/s93.7.html
Dissolved oxygen	< 4 mg/l	a,g	b: Hem (1970) – http://water.usgs.gov/pubs/wsp/wsp2254/
Conductivity	> 800 µmhos/cm	d	c: Gagen and Sharpe (1987) and Baker and Schofield (1982)
pH	6 – 9	c,f	d: http://www.uky.edu/WaterResources/Watershed/KRB_AR/wq_standards.htm
Alkalinity	< 20 mg/l	a,g	e: http://www.uky.edu/WaterResources/Watershed/KRB_AR/krww_parameters.htm
Nitrogen	>1.0 mg/l	j	f: http://www.hach.com/h2ou/h2wtrqual.htm
Nitrite	> 0.06 mg/l	f,n,i	g: http://sites.state.pa.us/PA_Exec/Fish_Boat/education/catalog/pondstream.pdf
Nitrate	> 1.0 mg/l	e,j	h: http://www.epa.gov/waterscience/criteria/sediment/appendix3.pdf
Phosphorus	> 0.1 mg/l	e,k	i: http://www.dec.state.ny.us/website/regs/part703.html
Orthophosphate	> 0.05 mg/l	l,f,j,k	j: http://water.usgs.gov/pubs/circ/circ1225/images/table.html
TOC	> 10 mg/l	b	k: http://water.usgs.gov/nawqa/circ-1136/h6.html#NIT
Hardness	> 300 mg/l	e	l: http://www.epa.gov/waterscience/criteria/goldbook.pdf
Magnesium	> 35 mg/l	i	m: based on archived data at SRBC
Calcium	> 100 mg/l	m	n. http://srmwww.gov/bc.ca/risc/pubs/aquatic/interp/
TSS	> 25 mg/l	h	
Sodium	> 20 mg/l	i	
Chloride	> 150 mg/l	a	
Sulfate	> 250 mg/l	a	
Iron	> 1,500 µg/l	a	
Manganese	> 1,000 µg/l	a	
Aluminum	> 200 µg/l	c	
Turbidity	> 150 NTU	h	

Macroinvertebrate analysis

A series of macroinvertebrate metrics was calculated for each sample, and assessments of the sites were performed. Benthic macroinvertebrate samples were assessed using procedures described by Barbour and others (1999), Klemm and others (1990), and Plafkin and others (1989). Using these methods, staff calculated a series of biological indexes for each type of sampler at each station. The metrics used in this survey are summarized in Table 4. Metric 2 (Shannon-Wiener Diversity Index) followed the methods described in Klemm and others (1990), and all other metrics were derived from Barbour and others (1999).

Table 4. Summary of Metrics Used to Evaluate the Overall Biological Integrity of River Benthic Macroinvertebrate Communities

Metric	Description
1. Taxonomic Richness (a)	The total number of taxa present in the 200-organism subsample. Number decreases with increasing disturbance or stress.
2. Shannon-Wiener Diversity Index (b)	A measure of biological community complexity based on number of equally or nearly equally abundant taxa in the community. Index value decreases with increasing stress.
3. Hilsenhoff Biotic Index (a)	A measure of the organic pollution tolerance of a benthic macroinvertebrate community. Index value increases with increasing stress.
4. EPT Index (a)	The total number of Ephemeroptera (mayfly), Plecoptera (stonefly), and Trichoptera (caddisfly) taxa present in the 200-organism subsample. The index decreases with increasing stress.
5. Percent Ephemeroptera (a)	The percentage of Ephemeroptera in a 200-organism subsample. Percentage decreases with increasing stress.
6. Percent Dominant Taxa (a)	A measure of community balance at the lowest positive taxonomic level. Percentage increases with increasing stress.
7. Percent Chironomidae (a)	The percentage of Chironomidae in a 200-organism subsample. Percentage increases with increasing stress.

Sources: (a) Barbour and others, 1999
(b) Klemm and others, 1990

A reference condition approach was used to determine impairment levels for each sample. This protocol entails determining the best score for each metric. The 200-organism subsample data were used to generate scores for each of the seven metrics. Scores for metrics 1-4 were converted to a biological condition score, based on the percent similarity of the metric score, relative to the best possible metric score. Scores for metrics 5-7 were based on set scoring criteria developed for the percentages (Plafkin and others, 1989; Ohio Environmental Protection Agency, 1987). The sum of the biological condition scores constituted the total biological score for the sample, and total biological scores were used to assign each discrete sample to a biological condition category (Table 5). The biological condition scores then were averaged to obtain an overall score and category for each site.

Additionally, descriptive statistics were calculated for each sampler type and metric; F tests were performed to determine if the variances of each metric were equal; and *t* tests were performed for each sampler type and metric to determine if the results were significantly different.

Table 5. Summary of Criteria Used to Classify the Biological Conditions of Sample Sites

SAMPLING AND ANALYSIS				
↓				
↓				
TOTAL BIOLOGICAL SCORE DETERMINATION				
Metric	**Biological Condition Scoring Criteria**			
	6	**4**	**2**	**0**
1. Taxonomic Richness (a)	> 80%	79-60%	59-40%	<40%
2. Shannon Diversity Index (a)	> 75%	74-50%	49-25%	<25%
3. Hilsenhoff Biotic Index (b)	> 85%	84-70%	69-50%	<50%
4. EPT Index (a)	> 90%	89-80%	79-70%	< 70%
5. Percent Ephemeroptera (c)	> 25%	10-25%	1-9%	< 1%
6. Percent Chironomidae (c)	< 5%	5-20%	21-35%	>35%
7. Percent Dominant Taxa (c)	< 20%	20-30%	31-40%	>40%
Total Biological Score (d)				
↓				
↓				

BIOASSESSMENT	
Percent Comparability of Study and Reference Site Total Biological Scores (e)	**Biological Condition Category**
>83%	Nonimpaired
79-54	Slightly Impaired
50-21	Moderately Impaired
<17%	Severely Impaired

(a) Score is study site value/reference site value X 100
(b) Score is reference site value/study site value X 100.
(c) Scoring Criteria evaluate actual percentage contribution, not percent comparability to the reference station.
(d) Total Biological Score = the sum of Biological Condition Scores assigned to each metric
(e) Values obtained that are intermediate to the indicated ranges will require subjective judgment as to the correct placement into a biological condition category.

RESULTS

Water Quality

During late summer 2005, water quality at most of the river sites met water quality standards (Appendices A and B). Limit values were exceeded for 79 out of 950 total water chemistry values (8.3 percent). Most of these exceedances were for total aluminum, sodium, nitrogen, temperature, and conductivity. The exceedances are listed in Table 6 and depicted in Figure 3.

Table 6. Summary of Exceedances of Water Quality Standards

Parameter	Limit Concentration	# of Exceedances	# of Data Points
Temperature	25 degrees Celsius	21	125
Conductivity	800 µmhos/cm	8	125
Total Aluminum	200 µg/l	25	25
Total Sodium	20 mg/l	17	25
Total Nitrogen	1.0 mg/l	6	25
Total Phosphorus	0.1 mg/l	1	25
Total Orthophosphate	0.05 mg/l	1	25

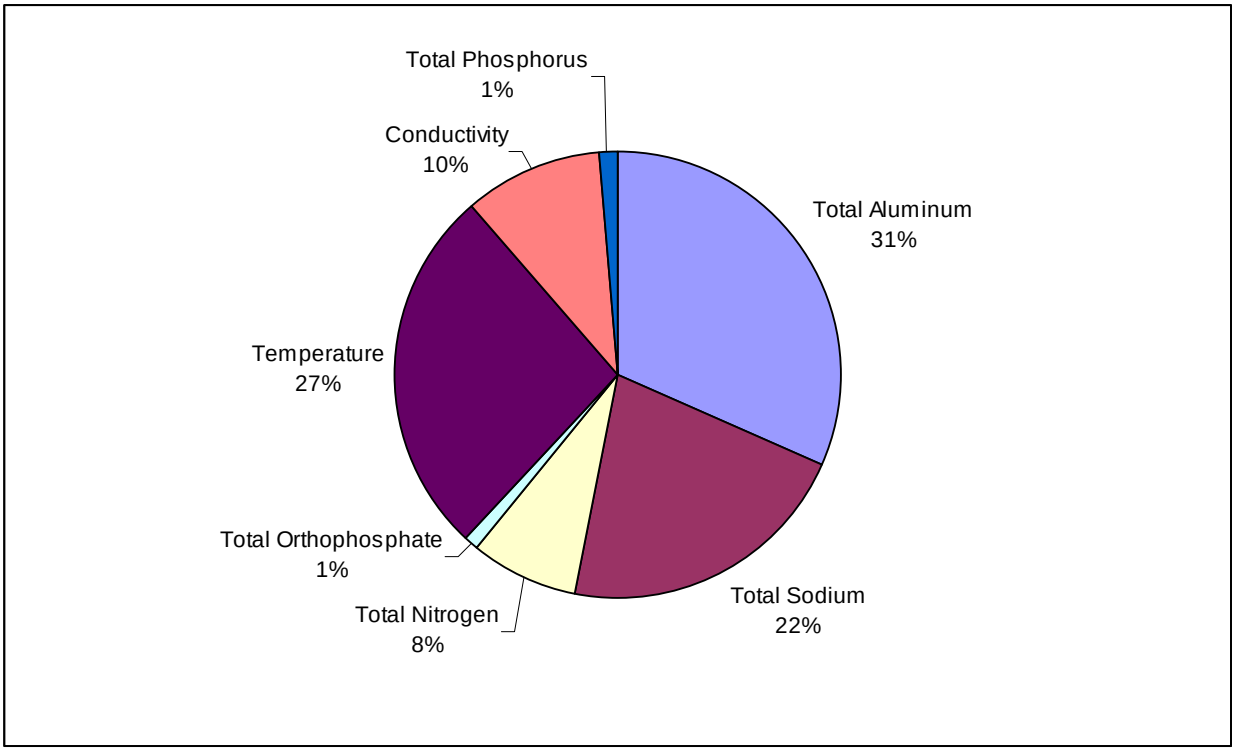

Figure 4. Parameters Exceeding Water Quality Standards

Biological Communities

Raw data for the benthic macroinvertebrate analysis can be found in Appendix C. The results of the metrics for the reference condition approach are found in Appendix D. A high RBP score indicates a low degree of impairment and a comparatively healthy macroinvertebrate community. Results of the data are summarized below for each site (Table 7). Table 7 shows the number of samples within each station that received a nonimpaired, slightly impaired, moderately impaired, or severely impaired designation for the reference condition analysis. The biological scores also were averaged to give an overall designation for each site (Table 7). All stations in this survey received either a slightly impaired or a moderately impaired designation.

Descriptive statistics (mean, median, mode, minimum, and maximum) were calculated for each sample type (from a rock basket or a kick net) and metric. Tables 8 and 9 detail the descriptive statistics for each metric for the rock basket and kick net samples, respectively. Additionally, two-tailed *t* tests were performed for each metric to determine if the results obtained from the samples for each sampler type were significantly different. As a part of these *t* tests, F tests also were performed to determine if the variances between the two samples were different. If the variances were different, a *t* test assuming unequal variances was performed; otherwise, a *t* test assuming equal variances was calculated. Statistical significance for these tests is assumed to be at the 95^{th} percentile level (p=0.05). Of the metrics used in this study, percent dominant taxa, number of EPT Taxa, and Shannon Wiener Diversity Index did not have equal variances. Based on the results of the *t* tests, it was determined that two of the metrics, number of EPT taxa and percent Chironomidae, were significantly different. Tables 10 and 11, respectively, depict the results from the F tests and *t* tests for each metric.

Table 7. Summary of Impairment Designations for Each Site

Station	Reference Condition				Overall Site Condition
	Nonimpaired	Slightly Impaired	Moderately Impaired	Severely Impaired	
SUSQ 394	3	6	1	0	Slightly Impaired
SUSQ 365	3	7	0	0	Slightly Impaired
SUSQ 356	2	5	3	0	Slightly Impaired
SUSQ 344	1	7	2	0	Slightly Impaired
SUSQ 327	0	0	6	1	Moderately Impaired
SUSQ 312	0	6	4	0	Slightly Impaired
SUSQ 300	0	7	2	0	Slightly Impaired
SUSQ 271	0	6	1	0	Slightly Impaired
SUSQ 256	0	3	4	0	Moderately Impaired
SUSQ 234	0	3	6	0	Moderately Impaired
SUSQ 219	0	8	1	0	Slightly Impaired
SUSQ 207	0	8	1	0	Slightly Impaired
SUSQ 192	0	6	1	0	Slightly Impaired
SUSQ 174	0	1	9	0	Moderately Impaired
SUSQ 157	0	4	6	0	Moderately Impaired
SUSQ 149	0	6	4	0	Slightly Impaired
SUSQ 138	1	4	5	0	Slightly Impaired
SUSQ 122	0	1	5	0	Moderately Impaired
SUSQ 106	0	7	2	0	Slightly Impaired
SUSQ 94	1	8	1	0	Slightly Impaired
SUSQ 77	0	7	3	0	Slightly Impaired
SUSQ 45	0	8	1	0	Slightly Impaired
CHEM 3	1	6	3	0	Slightly Impaired
WBSR 8	3	5	2	0	Slightly Impaired
JUNR 2	3	5	1	0	Slightly Impaired

Table 8. Summary of Descriptive Statistics for Rock Basket Samples for Each Metric

Statistic	Mean	Median	Mode	Minimum	Maximum
Number of Individuals	231.7	241.5	251	4	234
Taxa Richness	15.8	15	13	3	28
Hilsenhoff Biotic Index	4.21	4.23	5	1.91	6.03
Percent Ephemeroptera	45.1	44.3	NA	0	94.6
Percent Dominant Taxa	41.4	37.0	33.3	16.8	91.1
EPT Index	10.2	10	10	1	17
Percent Chironomidae	12.3	9.5	0	0	50
Shannon-Wiener Diversity Index	1.82	1.87	NA	0.48	2.55

Table 9. Summary of Descriptive Statistics for Kick Net Samples for Each Metric

Metric	Mean	Median	Mode	Minimum	Maximum
Number of Individuals	249.0	244	219	94	422
Taxa Richness	18.2	18	17	9	28
Hilsenhoff Biotic Index	4.62	4.60	NA	3.64	5.66
Percent Ephemeroptera	22.6	19.5	17.0	0.5	60.3
Percent Dominant Taxa	36.1	31.3	26.6	12.7	74.3
EPT Index	10.7	11	11	1	17
Percent Chironomidae	10.8	6.0	0	0	59.4
Shannon-Wiener Diversity Index	2.05	2.10	NA	1.15	2.70

Table 10. Summary of F test Results for Each Metric

Metric	F value	P (one-tail)	F critical value
Number of Individuals	1.811	8.370E-04	1.364
Taxa Richness	1.551	0.0100	1.364
Hilsenhoff Biotic Index	2.801	3.235E-08	1.364
Percent Ephemeroptera	2.951	7.104E-09	1.364
Percent Dominant Taxa	1.246	0.122	1.364
EPT Taxa	1.253	0.116	1.364
Percent Chironomidae	0.615	0.006	0.7294
Shannon-Wiener Diversity Index	1.175	0.195	1.364

Table 11. Summary of Two-tailed t test Results for Each Metric

Metric	*t* stat	P (two-tail)	*t* critical value
Number of Individuals	-2.729	0.007	1.971
Taxa Richness	-4.978	1.277E-06	1.971
Hilsenhoff Biotic Index	-5.309	2.634E-07	1.971
Percent Ephemeroptera	9.168	3.137E-17	1.971
Percent Dominant Taxa	2.581	0.0105	1.972
EPT Taxa	-1.467	0.144	1.972
Percent Chironomidae	0.972	0.332	1.971
Shannon-Wiener Diversity Index	-4.633	6.355E-06	1.971

DISCUSSION

Water Quality

A comparison of water quality from the present large river assessment project (August – October 2005) to water quality samples collected for the most recent interstate streams (Steffy and Sitlinger, 2006), Upper Susquehanna Subbasin Survey (Stoe, 1999), Middle Susquehanna Subbasin Survey (LeFevre, 2002), West Branch Subbasin Survey (LeFevre, 2003), Juniata River Subbasin Survey (LeFevre, 2005), and Lower Susquehanna Subbasin Survey (LeFevre, 2006) indicates that water quality conditions on the Susquehanna River between Sidney, N.Y., and Marietta, Pa., and at the mouths of its major tributaries, are stable and generally below limits, although temperatures were greater than 25 degrees Celsius in most of the August samples and aluminum exceeded levels of concern in all samples. From the data analysis, it appears that the Susquehanna River, in the stretch encompassed by this study, contains fairly good water quality, with some slightly elevated parameters.

Macroinvertebrate Communities

Upper Susquehanna River and the Chemung River

The section of the Susquehanna River from the headwaters at Cooperstown, N.Y., to the confluence with the Chemung River at Sayre, Pa., is in the Upper Susquehanna Subbasin. This survey included seven stations on the mainstem Susquehanna River from Sidney, N.Y., to Sayre, Pa. The river in this part of the Susquehanna basin flows through mostly agricultural and forested land with some small communities and one larger population center, Binghamton, N.Y. Overall, the sites at Sidney (SUSQ 394) and Windsor (SUSQ 365), N.Y., exhibited high taxa richness, EPT Index, and diversity. At Sidney,

two of the kick net samples and one of the rock basket samples indicated nonimpaired conditions at the site, while at Windsor, one of the kick net samples and two of the rock basket samples were nonimpaired. The station at Great Bend (SUSQ 356), Pa., where the Susquehanna River enters Pennsylvania briefly before flowing back into New York State, also had good biological conditions, with two rock basket samples designated nonimpaired. This site also had the highest number of taxa (28) of any river station. One kick net sample at Kirkwood (SUSQ 344), N.Y., was nonimpaired.

However, downstream of Binghamton, N.Y., conditions degraded slightly. At Apalachin (SUSQ 327), N.Y., six of the samples were rated as moderately impaired, with one sample designated severely impaired. This was the only severely impaired sample in the entire survey. Three of the rock basket samplers could not be found, possibly due to human interference, as the station was located just upstream of a fishing and boating access point. At Barton (SUSQ 312), N.Y., six stations were designated slightly impaired, with the remaining four moderately impaired. Overall, the number of EPT taxa was depressed at these two stations. The river seemed to improve as it reached Waverly (SUSQ 300), N.Y., as it contained seven slightly impaired samples and two moderately impaired samples. One sampler could not be found.

The Chemung River empties into the Susquehanna at Athens, Pa. At this point, the Chemung is nearly a third of the size of the Susquehanna. Staff sampled the Chemung River at Athens (CHEM 3), Pa., and found relatively good biological conditions. One sample was designated nonimpaired, with six slightly impaired, and three moderately impaired. One of the rock basket samplers appeared to have been disturbed.

Middle Susquehanna River and the West Branch Susquehanna River

The section of the Susquehanna River from the confluence with the Chemung River at Sayre, Pa., to the confluence with the West Branch Susquehanna River at Sunbury, Pa., is termed the Middle Susquehanna River. During this survey, 10 stations were sampled on the mainstem Susquehanna in this section of the river, in addition to a site on the West Branch Susquehanna at Lewisburg, Pa. This stretch of the river is very diverse with sections located in agricultural land, some sections flowing through forested hills, and some portions draining urban settings, particularly the Wilkes-Barre/Scranton, Pa. area. A large portion of this section of the watershed was heavily mined in the past.

Six samples at Towanda (SUSQ 271), Pa., were designated slightly impaired, with one of the rock basket samples designated moderately impaired. Staff could not find two of the rock baskets at SUSQ 271, one was not collected as it was entirely out-of-water, and another was approximately 50 percent out of water. At Wyalusing (SUSQ 256), Pa., three samples were designated slightly impaired, while four of them were rated moderately impaired. Staff could not find two of the samplers, while one was entirely out of water, and another had been disturbed as it was discovered at a significant distance from where it had been placed. At Meshoppen (SUSQ 234), Pa., three samples were designated slightly impaired, while six samples were rated moderately impaired. One of the rock baskets could not be found. The station at Tunkhannock (SUSQ 219), Pa., had eight slightly impaired samples and one moderately impaired sample. One of the rock baskets could not be found and another appeared to have been disturbed as it contained only 100 macroinvertebrates. At West Falls (SUSQ 207), Pa., eight samples were rated slightly impaired, while one rock basket sample was designated moderately impaired. One rock basket had been disturbed as it was found on the bank of the river. Six samples were rated slightly impaired at Wilkes-Barre (SUSQ 192), Pa., while one sample was designated moderately impaired. Three of the rock baskets were entirely out of water at the time of collection and were not included in the survey. At Shickshinny (SUSQ 174), Pa., one sample was designated slightly impaired, while the remaining nine samples were rated moderately impaired. Most of the rock basket samples at this station were impacted by low water levels; four of them contained fewer than 200 individual organisms for

analysis. The station at Berwick (SUSQ 157), Pa., contained four slightly impaired samples and six moderately impaired samples. At Bloomsburg (SUSQ 149), Pa., six of the samples were designated slightly impaired, with four moderately impaired samples. Two of the rock basket samplers had been disturbed, with one having fewer than 200 organisms in the sample. The station on the Susquehanna River near Danville (SUSQ 138), Pa., had one nonimpaired sample, four slightly impaired samples, and five moderately impaired samples. Two of the rock basket samplers had been cut loose from their anchors prior to collection.

Staff collected a sample near the mouth of the West Branch Susquehanna River at Lewisburg (WBSR 8), Pa. Three of the samples were designated nonimpaired, with very high taxa richness and a large number of EPT taxa. Five of the samples were rated slightly impaired, and one sample was designated moderately impaired.

Lower Susquehanna River and the Juniata River

The portion of the watershed from the confluence of the mainstem with the West Branch Susquehanna River at Sunbury, Pa., to the outlet of the Susquehanna River at Havre de Grace, Md., is termed the Lower Susquehanna River Subbasin. Staff sampled five stations on the mainstem Susquehanna River and one station on the Juniata River during this survey. This subbasin has extensive agricultural land uses and is the most populated with several large population centers, including Harrisburg, York, and Lancaster, Pa. The final 45 miles of river are ensconced in a series of reservoirs formed by hydroelectric dams and could not be sampled using the current protocols.

Staff sampled the biological conditions of the river downstream of Sunbury (SUSQ 122), Pa. One of the samples was designated slightly impaired, while five of the samples were rated moderately impaired. Four of the rock baskets could not be found, and the remaining one contained fewer than 200 organisms. At McKees Half Falls (SUSQ 106), Pa., seven of the samples were designated slightly impaired, with two samples rated moderately impaired. One rock basket could not be found. The river seemed to improve slightly at Halifax (SUSQ 94), Pa., with one sample rated nonimpaired, eight samples designated slightly impaired, and one sample rated moderately impaired. At Fort Hunter (SUSQ 77), Pa., seven samples were rated slightly impaired and three samples were rated moderately impaired. One of the rock basket samplers had been disturbed and was mostly out of water. Two of the rock baskets had fewer than 200 organisms. At Marietta (SUSQ 45), Pa., eight of the samples were rated slightly impaired, while one of the samples was designated moderately impaired. One of the samplers had been disturbed and was out of water.

A station was located near the mouth of the Juniata River near Duncannon (JUNR 2), Pa. Three of the samples were designated nonimpaired, with a large number of EPT taxa. Five of the samples were rated slightly impaired, and one sample was designated moderately impaired. One of the rock basket samplers could not be found.

Differences Between Sampler Types

In an ongoing effort to improve and expand SRBC's river assessment project, staff performed *t* tests to determine if the mean of each metric was significantly different ($p=0.05$) between the rock basket samplers and the traditional RBP methods. It was determined that the number of EPT taxa ($p=0.144$) and percent Chironomidae ($p=0.332$) metrics were significantly different between the two sampler types. The kick net samplers collected more EPT taxa while collecting a lesser percentage of Chironomidae.

Overall, both sampling methods worked well during the current survey. One hundred two rock basket samplers were retrieved out of a possible total of 125 (82 percent recovery), while staff was able to collect all 125 kick net samples. Water levels remained relatively low throughout this survey and, in some cases, negatively affected the rock basket samplers as areas which had been inundated during sampler placement were dry or nearly so during collection. Additionally, in some cases, the rock basket samplers had been displaced or entirely moved from their original location, presumably by human intervention. Conversely, at some stations, kick net samples were difficult to obtain due to the velocity and/or depth of the river.

Future Directions

SRBC will continue to sample the large rivers of the Susquehanna River Basin as flow conditions permit. During 2003, 2004, and 2006, river flows were too high to safely and effectively sample the river. Staff will continue to evaluate the current sampling protocol, including comparing data collected during the current survey to past biological surveys of the Susquehanna River and evaluating USEPA's large river protocols. Additionally, staff will be considering different ways to assess habitat in conjunction with the sampling effort and will work toward securing funding to determine a sampling protocol for the reservoir system that encompasses the final 45 miles of the river.

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APPENDIX A

FIELD WATER QUALITY DATA FOR LARGE RIVER SAMPLING SITES

Station	Sampler Location	Date	Time	Dissolved Oxygen	Temp	Conductivity	pH
SUSQ 45	1	8/29/05	1035	5.96	26.70	402.00	8.10
	2	8/29/05	1035	5.49	26.90	403.00	8.18
	3	8/29/05	1035	6.34	26.90	401.00	8.25
	4	8/29/05	1035	6.19	26.50	401.00	8.12
	5	8/29/05	1035	6.05	26.00	414.00	8.03
SUSQ 77	1	8/30/05	910	5.27	24.20	329.00	8.19
	2	8/30/05	910	4.71	24.30	313.00	8.09
	3	8/30/05	910	5.70	24.50	389.00	7.88
	4	8/30/05	910	5.82	24.60	394.00	7.85
	5	8/30/05	910	5.55	25.00	418.00	7.87
SUSQ 94	1	8/30/05	1425	7.20	25.20	393.00	8.53
	2	8/30/05	1425	6.37	25.10	866.00	8.14
	3	8/30/05	1425	6.98	25.30	862.00	8.28
	4	8/30/05	1425	6.45	25.50	947.00	8.46
	5	8/30/05	1425	7.03	25.40	1044.00	8.45
SUSQ 106	1	8/31/05	1040	5.13	25.00	827.00	6.76
	2	8/31/05	1040	5.48	25.30	79.30	6.74
	3	8/31/05	1040	5.19	24.60	819.00	6.75
	4	8/31/05	1040	5.17	24.60	875.00	6.69
	5	8/31/05	1040	5.41	24.20	1100.00	7.71
SUSQ 122	1	9/13/05	1100	5.37	28.00	313.00	7.10
	2	9/13/05	1100	6.45	25.60	336.00	7.50
	3	9/13/05	1100	5.85	23.50	353.00	7.40
	4	9/13/05	1100	5.98	23.30	360.00	7.90
	5	9/13/05	1100	5.11	22.50	372.00	7.70
SUSQ 138	1	9/7/05	1015	6.80	22.80	364.00	8.50
	2	9/7/05	1015	6.72	23.10	375.00	8.40
	3	9/7/05	1015	7.05	23.40	376.00	8.50
	4	9/7/05	1015	7.56	23.60	371.00	8.30
	5	9/7/05	1015	7.50	22.90	364.00	8.40
SUSQ 149	1	9/12/05	1100	7.08	22.30	398.00	8.25
	2	9/12/05	1100	6.94	22.00	399.00	8.30
	3	9/12/05	1100	7.30	22.30	396.00	8.35
	4	9/12/05	1100	7.04	22.30	396.00	8.10
	5	9/12/05	1100	6.14	19.60	400.00	7.95
SUSQ 157	1	9/26/05	1045	5.68	20.80	486.00	7.64
	2	9/26/05	1045	6.03	20.80	488.00	7.75
	3	9/26/05	1045	6.13	20.80	489.00	7.78
	4	9/26/05	1045	6.16	20.70	489.00	7.61
	5	9/26/05	1045	6.23	20.70	486.00	7.58
SUSQ 174	1	9/27/05	1015	5.87	20.40	507.00	6.95
	2	9/27/05	1015	5.93	20.40	507.00	7.22
	3	9/27/05	1015	6.08	20.70	490.00	7.48
	4	9/27/05	1015	6.23	20.30	490.00	7.76
	5	9/27/05	1015	5.68	19.80	354.00	7.30

Station	Sampler Location	Date	Time	Dissolved Oxygen	Temp	Conductivity	pH
SUSQ 192	1	9/28/05	1045	6.50	18.70	492.00	7.21
	2	9/28/05	1045	6.56	18.70	495.00	7.13
	3	9/28/05	1045	7.35	17.30	496.00	7.19
	4	9/28/05	1045	6.33	18.80	488.00	7.34
	5	9/28/05	1045	6.25	18.30	484.00	7.32
SUSQ 207	1	10/6/05	900	6.94	19.00	388.00	8.36
	2	10/6/05	900	6.99	19.00	390.00	8.36
	3	10/6/05	900	6.94	19.00	390.00	8.33
	4	10/6/05	900	7.03	19.00	390.00	8.30
	5	10/6/05	900	6.94	18.50	387.00	7.94
SUSQ 219	1	10/5/05	1415	8.88	19.50	374.00	8.61
	2	10/5/05	1415	7.28	20.80	375.00	8.73
	3	10/5/05	1415	9.52	20.50	374.00	8.74
	4	10/5/05	1415	8.30	20.00	372.00	8.64
	5	10/5/05	1415	8.62	19.70	374.00	8.63
SUSQ 234	1	10/5/05	900	7.23	18.60	402.00	8.25
	2	10/5/05	900	7.39	18.60	403.00	8.23
	3	10/5/05	900	6.58	18.50	403.00	8.16
	4	10/5/05	900	7.44	18.60	402.00	8.14
	5	10/5/05	900	7.46	18.40	406.00	7.89
SUSQ 256	1	10/4/05	1345	8.83	19.20	404.00	8.56
	2	10/4/05	1345	8.11	19.30	404.00	8.57
	3	10/4/05	1345	8.71	19.30	403.00	8.51
	4	10/4/05	1345	8.92	19.40	403.00	8.48
	5	10/4/05	1345	8.90	19.40	395.00	8.40
SUSQ 271	1	10/4/05	945	7.43	18.10	413.00	8.34
	2	10/4/05	945	7.04	18.10	429.00	8.27
	3	10/4/05	945	6.97	18.00	432.00	8.23
	4	10/4/05	945	7.14	18.10	430.00	8.16
	5	10/4/05	945	6.53	18.00	427.00	7.92
SUSQ 300	1	10/3/05	1500	9.50	19.10	353.00	8.66
	2	10/3/05	1500	10.02	19.30	351.00	8.62
	3	10/3/05	1500	9.90	19.00	351.00	8.66
	4	10/3/05	1500	9.92	19.20	353.00	8.61
	5	10/3/05	1500	10.03	19.30	356.00	8.55
SUSQ 312	1	10/3/05	1030	7.25	17.60	365.00	7.66
	2	10/3/05	1030	7.04	17.70	364.00	7.75
	3	10/3/05	1030	7.27	17.70	387.00	8.06
	4	10/3/05	1030	7.29	17.70	359.00	8.02
	5	10/3/05	1030	7.35	17.80	360.00	8.00
SUSQ 327	1	9/21/05	1530	4.67	24.30	380.00	7.58
	2	9/21/05	1530	4.45	24.00	380.00	7.54
	3	9/21/05	1530	4.84	24.40	387.00	7.45
	4	9/21/05	1530	4.90	24.60	390.00	7.57
	5	9/21/05	1530	5.37	25.00	391.00	7.62

Station	Sampler Location	Date	Time	Dissolved Oxygen	Temp	Conductivity	pH
SUSQ 344	1	9/19/05	1130	6.77	23.10	273.00	7.85
	2	9/19/05	1130	6.56	22.90	268.00	7.85
	3	9/19/05	1130	6.67	22.60	269.00	7.90
	4	9/19/05	1130	6.72	22.60	271.00	7.70
	5	9/19/05	1130	6.58	22.80	266.00	7.80
SUSQ 356	1	9/21/05	1100	5.93	20.30	266.00	7.39
	2	9/21/05	1100	5.82	20.50	262.00	7.60
	3	9/21/05	1100	5.91	20.60	260.00	7.68
	4	9/21/05	1100	6.06	20.70	253.00	7.79
	5	9/21/05	1100	5.90	20.40	255.00	7.75
SUSQ 365	1	9/20/05	830	5.51	20.80	278.00	7.70
	2	9/20/05	830	5.59	20.80	280.00	7.66
	3	9/20/05	830	5.62	20.80	279.00	7.63
	4	9/20/05	830	5.67	20.90	281.00	7.54
	5	9/20/05	830	5.63	20.80	284.00	7.48
SUSQ 394	1	9/20/05	1330	5.92	20.20	277.00	7.49
	2	9/20/05	1330	5.86	20.20	210.00	7.46
	3	9/20/05	1330	5.93	20.10	277.00	7.43
	4	9/20/05	1330	6.07	20.10	276.00	7.43
	5	9/20/05	1330	6.32	20.30	276.00	7.42
JUNR 2	1	8/31/05	1525	5.80	25.40	581.00	6.72
	2	8/31/05	1525	6.68	25.40	610.00	6.72
	3	8/31/05	1525	6.78	25.30	286.00	6.75
	4	8/31/05	1525	6.06	25.10	595.00	6.73
	5	8/31/05	1525	5.36	25.00	595.00	6.73
CHEM 3	1	9/22/05	1045	5.32	20.30	517.00	7.95
	2	9/22/05	1045	5.86	20.20	522.00	7.80
	3	9/22/05	1045	5.97	20.30	505.00	8.05
	4	9/22/05	1045	5.64	20.40	514.00	8.03
	5	9/22/05	1045	5.64	20.40	514.00	8.03
WBSR 8	1	9/6/05	1030	5.98	20.60	302.00	7.00
	2	9/6/05	1030	6.35	21.60	288.00	7.10
	3	9/6/05	1030	6.39	22.00	289.00	7.10
	4	9/6/05	1030	6.45	21.90	293.00	7.15
	5	9/6/05	1030	6.59	21.50	294.00	7.10

APPENDIX B

LABORATORY WATER QUALITY DATA FOR LARGE RIVER SAMPLING SITES

Parameter	Units	SUSQ 45	SUSQ 77	SUSQ 94	SUSQ 106	SUSQ 122	SUSQ 138	SUSQ 149	SUSQ 157
Date	yyyymmdd	20050829	20050830	20050830	20050831	20050913	20050907	20050912	20050926
Time	hhmm	1035	0910	1425	1040	1100	1015	1100	1045
Alkalinity	mg/l	74	59.2	51.4	49.8	52.6	74.4	76.2	83.6
Total Suspended Solids	mg/l	20	6	<2	18	<2	2	<2	<2
Total Nitrogen	mg/l	1.30	1.21	1.72	0.54	0.68	1.00	0.62	0.77
Total Nitrite	mg/l	<0.04	<0.04	<0.04	<0.04	<0.04	<0.04	<0.04	<0.04
Total Nitrate	mg/l	0.90	0.19	0.13	0.24	0.11	0.34	<0.04	0.28
Total Phosphorus	mg/l	0.037	0.017	0.018	0.026	0.035	0.043	0.042	0.034
Total Orthophosphate	mg/l	0.018	<0.01	<0.01	0.023	0.022	0.03	0.023	0.018
Total Organic Carbon	mg/l	3.12	2.78	2.81	2.7	3.58	4.6	4.65	3.73
Total Hardness	mg/l	145	132	148	155	108	116	119	170
Total Magnesium	mg/l	14	13.7	15.6	16.4	9.194	8.171	9.617	15.1
Total Calcium	mg/l	34.9	30.2	33.3	34.8	28	33	31.6	43
Total Sodium	mg/l	22.6	20	22.5	23.1	18.6	22.4	21.7	31.1
Total Chloride	mg/l	35.9	33.5	37.6	36.3	29.8	38.4	38.5	43
Total Sulfate	mg/l	69.8	75.5	97.2	99.4	54.4	34	48.7	76.9
Total Iron	µg/l	107	49	43	174	102	189	121	222
Total Manganese	µg/l	559	35	15.6	78	142	117	98	108
Total Aluminum	µg/l	305	224	209	353	298	316	278	272
Turbidity	NTU	2.46	1.76	1.69	7.31	6.3	6.99	4.45	4.16

Parameter	Units	SUSQ 174	SUSQ 192	SUSQ 207	SUSQ 219	SUSQ 234	SUSQ 256	SUSQ 271	SUSQ 300
Date	yyyymmdd	20050927	20050928	20051006	20051005	20051005	20051004	20051004	20051003
Time	hhmm	1015	1045	0900	1415	0900	1345	0945	1500
Alkalinity	mg/l	89.8	95.2	83.4	82	95	104	108	99.6
Total Suspended Solids	mg/l	<2	4	4	6	8	4	<2	<2
Total Nitrogen	mg/l	0.98	1.57	0.58	0.62	0.65	0.77	0.87	0.9
Total Nitrite	mg/l	<0.04	<0.04	<0.04	<0.04	<0.04	<0.04	<0.04	<0.04
Total Nitrate	mg/l	0.45	0.77	<0.04	<0.04	0.11	0.19	5.32	0.33
Total Phosphorus	mg/l	0.068	0.034	0.038	0.046	0.037	0.034	0.046	0.04
Total Orthophosphate	mg/l	0.034	0.026	0.035	0.045	0.029	0.019	0.025	0.027
Total Organic Carbon	mg/l	3.6	3.38	4.4	4.75	4.04	3.85	3.69	4.41
Total Hardness	mg/l	167	159	108	108	118	132	133	127
Total Magnesium	mg/l	14	13.1	7.458	7.614	8.084	8.29	8.8	7.65
Total Calcium	mg/l	43.6	42	31.1	30.7	34	39	38.7	38
Total Sodium	mg/l	32.9	32.2	30.5	30.8	29.1	29.9	28.4	21
Total Chloride	mg/l	49.8	49.6	48.9	49.6	48	48.7	48.1	39.2
Total Sulfate	mg/l	71.6	61.3	22.1	22.3	21.8	22.6	23	15.1
Total Iron	µg/l	640	483	101	93	120	110	140	137
Total Manganese	µg/l	716	186	43	39	42	39	40	52
Total Aluminum	µg/l	251	241	277	264	290	266	328	296
Turbidity	ntu	6.26	5.01	5.64	5.88	6.29	4.94	5.32	8.99

Parameter	Units	SUSQ 312	SUSQ 327	SUSQ 344	SUSQ 356	SUSQ 365	SUSQ 394	JUNR 2	CHEM 3	WBSR 8
Date	yyyymmdd	20051003	20050921	20050919	20050921	20050920	20050920	20050831	20050922	20050906
Time	hhmm	1030	1530	1130	1100	0830	1350	1525	1045	1030
Alkalinity	mg/l	105.6	100.6	70	76	83.6	78	92.2	125.8	29.4
Total Suspended Solids	mg/l	12	<2	<2	4	6	<2	<2	2	2
Total Nitrogen	mg/l	0.99	1.18	0.31	0.31	0.64	0.68	0.98	0.88	0.69
Total Nitrite	mg/l	<0.04	<0.04	<0.04	<0.04	<0.04	<0.04	<0.04	<0.04	<0.04
Total Nitrate	mg/l	0.4	0.52	<0.04	<0.04	0.41	0.54	0.71	0.64	0.49
Total Phosphorus	mg/l	0.039	0.091	0.038	0.029	0.025	0.031	0.032	0.107	0.023
Total Orthophosphate	mg/l	0.031	0.046	0.013	0.02	0.015	0.025	0.021	0.055	0.012
Total Organic Carbon	mg/l	4.16	3.89	3.32	3.26	2.49	2.41	2.78	2.95	2.34
Total Hardness	mg/l	125	115	87	96	103	99	123	158	108
Total Magnesium	mg/l	7.22	6.625	3.891	3.99	4.246	3.719	11.5	10.9	9.93
Total Calcium	mg/l	38.1	35.1	28.2	31.8	34.3	33.3	30.4	45.4	26.8
Total Sodium	mg/l	19.9	24.4	13	13.2	13.5	13.9	10.3	32.1	7.57
Total Chloride	mg/l	36.6	48	24.7	25.3	25.8	28.9	45.4	58.6	11.5
Total Sulfate	mg/l	14.9	17	13.5	12.7	13.1	10.8	25.1	30	74.4
Total Iron	µg/l	113	181	102	108	77	113	79	94	45
Total Manganese	µg/l	50	69	59	64	42	37	18	39	32
Total Aluminum	µg/l	258	275	262	337	256	259	242	266	217
Turbidity	ntu	4.84	3.93	3.51	3.59	2.05	2.91	2.92	3.6	<1

APPENDIX C

RAW MACROINVERTEBRATE DATA FOR LARGE RIVER SAMPLING SITES

Order	Family	*Genus*	SUSQ 45								
			KS1	KS2	KS3	KS4	KS5	RB1	RB2	RB3	RB4
Coleoptera	**Elmidae**	*Optioservus*	1								
		Stenelmis	21	44	87	66	62	2	5	3	4
	Psephenidae	*Psephenus*			1	1					
Diptera	**Chironomidae**		4	5	9	9	6	5	8	4	6
Ephemeroptera	**Baetidae**	*Acentrella*		1	1						
		Baetis	8	6	24	6	14	1		2	2
	Caenidae	*Caenis*				1					
	Heptagenidae	*Heptagenia*	5								
		Leucrocuta		1	3			4	8	6	
		Stenonema	5	7	1	4	1	15	23	9	6
	Isonychiidae	*Isonychia*	111	79	45	29	47	79	150	170	116
	Potamanthidae	*Anthopotamus*	3	4	5	3			1		1
	Tricorythidae	*Tricorythodes*	1	1		2		4		2	1
Lepidoptera	**Pyralidae**	*Petrophila*		2	1						
Megaloptera	**Corydalidae**	*Corydalus*	1		1		2	1		1	
Odonata	**Coenagrionidae**	*Argia*			1				1	1	
Plecoptera	**Perlidae**	*Acroneuria*							1		
		Agnetina		4	15	6		1	5	2	2
Trichoptera	**Hydropsychidae**	*Ceratopsyche*				2				1	
		Cheumatopsyche	5	13	12	7	10	5	4	6	1
		Hydropsyche	6	6	15	26	65	2	2	16	26
		Macrostemum	1	37	33	46	26		7	7	21
	Philopotamidae	*Chimarra*	55	24	38	68	39		5	3	37
Amphipoda	**Gammaridae**	*Gammarus*	1								
Gastropoda	**Pleuroceridae**	*Leptoxis*	1	7	6	5		101	10	7	5
		Pleurocera	2	6	2	2	2				
Pelecypoda	**Corbiculidae**	*Corbicula*					1	1	1		

Order	Family	*Genus*	SUSQ 77									
			KS1	KS2	KS3	KS4	KS5	RB1	RB2	RB3	RB4	RB5
Coleoptera	**Elmidae**	*Optioservus*	3	1	1							
		Stenelmis	67	70	83	118	108		10	15		2
	Psephenidae	*Psephenus*				1						
Diptera	**Chironomidae**		1	8	2	3			3	6	12	3
Ephemeroptera		*Baetis*	5	9	6	6	11	2	4	22	25	17
		Heterocloeon									11	4
	Caenidae	*Caenis*							1			
	Ephemerellidae	*Serratella*									1	1
	Heptagenidae	*Heptagenia*	3	3		2		1	1		6	1
		Leucrocuta	12	23	6	4	2	61	88	35	8	14
		Stenacron							7			
		Stenonema	2	11	5	3	1	6	23	6	8	5
	Isonychiidae	*Isonychia*	6	49	57	34	30		3	138	15	113
	Potamanthidae	*Anthopotamus*	44	17	21	7	6	2		8		
	Tricorythidae	*Tricorythodes*	3			1			1	1		
Megaloptera	**Corydalidae**	*Corydalus*		1	6	3	9				1	5
Odonata	**Coenagrionidae**	*Argia*						2		4		
Plecoptera	**Perlidae**	*Acroneuria*			2	1		1	1	1	7	
		Agnetina		1	4	13	5			1	1	1
		Paragnetina								1	1	1
Trichoptera	**Brachycentridae**	*Brachycentrus*							1			
	Hydropsychidae	*Ceratopsyche*			2	1	1					5
		Cheumatopsyche		18	12	21	10		2	16	31	16
		Hydropsyche		3	14	2	8			4	90	33
		Macrostemum	1	4	11	13	5					
	Philopotamidae	*Chimarra*	1	12	8	12	18		6			
Amphipoda	**Gammaridae**	*Gammarus*	7									
Decapoda	**Cambaridae**	*Orconectes*						2	3	2		
Gastropoda	**Ancylidae**	*Ferrissia*						1				
	Physidae	*Physella*	1									
	Pleuroceridae	*Leptoxis*		1			1	3		1	2	6
		Pleurocera	8									
Pelecypoda	**Corbiculidae**	*Corbicula*	16	2			4			3		

Order	Family	*Genus*	SUSQ 94									
			KS1	KS2	KS3	KS4	KS5	RB1	RB2	RB3	RB4	RB5
Coleoptera	**Elmidae**	*Optioservus*				1	2					
		Stenelmis	17	71	96	145	92	3	3	1	2	2
	Psephenidae	*Psephenus*			1	1						
Diptera	**Chironomidae**		36	17	4	6		52	4	1	1	3
Ephemeroptera	**Baetidae**	*Acentrella*	1									
		Baetis	11	5	6	7	14	18	21	2	11	29
		Heterocloeon	2			1						
	Caenidae	*Caenis*	3	4			1					
	Heptagenidae	*Heptagenia*	1	1	9		3	6	17	14	5	16
		Leucrocuta	13	32	10	3	4	23	24	6	28	53
		Stenonema	3	9	2	1	6	12	8	1	8	14
	Isonychiidae	*Isonychia*	23	37	70	23	46	49	8	178	137	68
	Potamanthidae	*Anthopotamus*	12	17	12	9	13					
	Tricorythidae	*Tricorythodes*	6	1			3	3	3			
Megaloptera	**Corydalidae**	*Corydalus*		1	3	2	2	1			1	
Odonata	**Coenagrionidae**	*Argia*		1	1		3				5	3
Plecoptera	**Perlidae**	*Acroneuria*			2	1		1	2	1	4	1
		Agnetina	1	3	10	6	9	2	2	1		
	Pteronarcyidae	*Pteronarcys*						1				
Trichoptera	**Hydropsychidae**	*Cheumatopsyche*	17	13	12	10	14	14	2	5	4	4
		Hydropsyche	5	2	8	18	7	27	18	4	2	1
		Macrostemum		1								
	Hydroptilidae	*Dibusa*	3			1		3				
	Philopotamidae	*Chimarra*	1	7	11	7	13					
Amphipoda	**Gammaridae**	*Gammarus*					1					
Decapoda	**Cambaridae**	*Orconectes*		1	2	1	1	1	1		1	1
Gastropoda	**Pleuroceridae**	*Leptoxis*	25	2	1			12	1			
		Pleurocera				1						
Pelecypoda	**Corbiculidae**	*Corbicula*	1	3	3	3	23					

Order	Family	*Genus*	SUSQ 106								
			KS1	KS2	KS3	KS4	KS5	RB2	RB3	RB4	RB5
Coleoptera	**Elmidae**	*Optioservus*	1	1							
		Stenelmis	28	66	89	121	137		1		3
	Psephenidae	*Psephenus*			1		2		65	3	
Diptera	**Chironomidae**		13	8	3	16	28	6	3	4	1
Ephemeroptera	**Baetidae**	*Baetis*	11	2	2	22	7	2	12	12	3
		Heterocloeon	15					4			
	Caenidae	*Caenis*			1		1				
	Ephemerellidae	*Ephemerella*	1								
	Heptagenidae	*Heptagenia*		1	2	1		1		1	
		Leucrocuta			5	12		4	32	8	5
		Stenacron							3		
		Stenonema			5	2	3	1	36	8	9
	Isonychiidae	*Isonychia*	70	112	69	37	4	163	2	184	139
	Potamanthidae	*Anthopotamus*	1	4	11	22	4				
	Tricorythidae	*Tricorythodes*							1		
Megaloptera	**Corydalidae**	*Corydalus*	4	3	2		10		3		1
Odonata	**Coenagrionidae**	*Argia*		1						3	
	Gomphidae	*Ophiogomphus*			1						
Plecoptera	**Perlidae**	*Acroneuria*	1	1	1			8	7		
		Agnetina	2	11	18	6	11			5	7
		Paragnetina	1					3			
Trichoptera	**Hydropsychidae**	*Ceratopsyche*	2								
		Cheumatopsyche	10	6	10	4	1	3	1	13	30
		Hydropsyche	22	10	1	2	1	24		2	6
		Macrostemum	6	16	2	1	14				4
	Philopotamidae	*Chimarra*	25	9	6	1	9	1			11
Amphipoda	**Gammaridae**	*Gammarus*			1		1		1		
Decapoda	**Cambaridae**	*Orconectes*	3	1							
Gastropoda	**Physidae**	*Physella*							5		
	Pleuroceridae	*Leptoxis*	1			2		7	5	2	5
Pelecypoda	**Corbiculidae**	*Corbicula*	3		3		3				

Order	Family	*Genus*	SUSQ 122					
			KS1	KS2	KS3	KS4	KS5	RB4
Coleoptera	**Elmidae**	*Dubiraphia*				13	1	4
		Stenelmis	3	167	183	24	8	4
	Psephenidae	*Psephenus*						1
Diptera	**Athericidae**	*Atherix*	1					
	Chironomidae		10	11	3	115	43	58
Ephemeroptera	**Baetidae**	*Baetis*	27		9			
		Centroptilum					6	
		Heterocloeon	5					
	Caenidae	*Caenis*				13	2	
	Ephemeridae	*Ephemera*					3	
		Hexagenia				1	1	1
	Heptagenidae	*Leucrocuta*					3	
		Stenacron				15	3	14
		Stenonema	10		2		12	
	Isonychiidae	*Isonychia*	114	15	1			
	Leptophlebiidae	*Paraleptophlebia*				2	3	
	Potamanthidae	*Anthopotamus*	2	10	7	2		
	Tricorythidae	*Tricorythodes*						2
Megaloptera	**Corydalidae**	*Corydalus*	13		2	1		
		Nigronia					1	
	Sialidae	*Sialis*					1	
Odonata	**Coenagrionidae**	*Argia*				1	3	19
	Gomphidae	*Gomphus*				1		
		Ophiogomphus					1	
		Stylogomphus						
	Macromiidae	*Macromia*				1		1
Plecoptera	**Perlidae**	*Agnetina*			3			
Trichoptera	**Hydropsychidae**	*Ceratopsyche*	1	1	1			
		Cheumatopsyche	4	4	3			
		Hydropsyche	7	5				
		Macrostemum	48	40	16	1		
	Philopotamidae	*Chimarra*	3	12	9	1		
Amphipoda	**Gammaridae**	*Gammarus*			1	14	1	14
Decapoda	**Cambaridae**	*Orconectes*					1	4
Gastropoda	**Ancylidae**	*Ferrissia*				1		
	Physidae	*Physella*						2
	Pleuroceridae	*Goniobasis*					1	
		Leptoxis		1				
Isopoda	**Asellidae**	*Caecidotea*						3
Pelecypoda	**Corbiculidae**	*Corbicula*	14		7	3		12

Order	Family	*Genus*	SUSQ 138									
			KS1	KS2	KS3	KS4	KS5	RB1	RB2	RB3	RB4	RB5
Coleoptera	**Elmidae**	*Optioservus*	7		1	1	3	2				
		Stenelmis	168	152	150	165	155	14	3	2	16	13
	Hydrophilidae	*Enochrus*						1				
	Psephenidae	*Psephenus*	4	1		1	2	3				
Diptera	**Chironomidae**		3	7	7	7	1	20	9		10	22
	Empididae	*Hemerodromia*			1							
	Simuliidae	*Simulium*						1	6		31	3
Ephemeroptera	**Baetidae**	*Baetis*	8	3	8	2	15	2	2	1	21	1
		Heterocloeon							1		2	
	Caenidae	*Caenis*			1	1						
	Heptagenidae	*Leucrocuta*		2		3	3	1			9	
		Stenacron									1	
		Stenonema				2		18	15	5	14	6
	Isonychiidae	*Isonychia*	20	3	12	15	30	80	173	204	69	87
	Potamanthidae	*Anthopotamus*	10	40	38	11	12				1	
	Tricorythidae	*Tricorythodes*	2	1	1		1	12	8	2	7	
Megaloptera	**Corydalidae**	*Corydalus*	2				1	1	1	1	1	5
Odonata	**Coenagrionidae**	*Argia*	1					5				
	Gomphidae	*Ophiogomphus*	1				1					
Plecoptera	**Perlidae**	*Acroneuria*			3			2	1			2
		Agnetina	3	7	17	7	5	2		2	9	
Trichoptera	**Hydropsychidae**	*Ceratopsyche*			2		1	1			3	2
		Cheumatopsyche	4	4	2	2		27	1	1	12	5
		Hydropsyche		2				11			9	5
		Macrostemum	17	22	13	3	28	10			4	84
	Leptoceridae	*Ceraclea*			1							
	Philopotamidae	*Chimarra*	1	3	9	8	1	1	1		8	7
Amphipoda	**Gammaridae**	*Gammarus*	9		1		1	3				
Decapoda	**Cambaridae**	*Orconectes*									1	
Gastropoda	**Physidae**	*Physella*	2					4	2	5		
	Pleuroceridae	*Goniobasis*	2					7				
		Leptoxis						2		1		
Pelecypoda	**Corbiculidae**	*Corbicula*	4				4					

Order	Family	*Genus*	SUSQ 149									
			KS1	KS2	KS3	KS4	KS5	RB1	RB2	RB3	RB4	RB5
Coleoptera	**Elmidae**	*Optioservus*					5					
		Stenelmis	115	156	84	197	151	3	8	2	1	13
	Psephenidae	*Psephenus*	9		8		1	1				1
Diptera	**Athericidae**	*Atherix*					7					
	Chironomidae		1	2	7	9	11	14	32	9	12	23
	Empididae	*Hemerodromia*						2				
	Simuliidae	*Simulium*	1	2		1						2
	Tipulidae	*Hexatoma*		1								
Ephemeroptera		*Baetis*	4	2	14	4	2		2		2	
		Heterocloeon	2		1	1						
	Caenidae	*Caenis*					1					
	Ephemerellidae	*Serratella*									1	
	Heptagenidae	*Leucrocuta*							1		17	
		Stenacron									5	
		Stenonema				1	4	1	2	1	6	
	Isonychiidae	*Isonychia*	14	8	15	5	3	79	63	92	33	37
	Potamanthidae	*Anthopotamus*	9	14	19	8	3		1			
	Tricorythidae	*Tricorythodes*	3		8	1		2		3	11	
Megaloptera	**Corydalidae**	*Corydalus*		1	2	3	4		1	1		1
Plecoptera	**Perlidae**	*Acroneuria*							1		5	1
		Agnetina		13	4	3	4	8	27	9	2	6
Trichoptera	**Hydropsychidae**	*Ceratopsyche*	4		3	1	2	3	2	3	2	7
		Cheumatopsyche	13	11	16	3	7	27	5	14	4	27
		Hydropsyche	17	14	16	6	2	53	64	15	27	48
		Macrostemum	15	27	8	16	54	10	12	23		39
	Hydroptilidae	*Dibusa*	2	1	1			1				
	Philopotamidae	*Chimarra*	32	8	9	3	18	23	3	52		22
	Polycentropodidae	*Neureclipsis*									1	
Amphipoda	**Gammaridae**	*Gammarus*			5			2				
Gastropoda	**Physidae**	*Physella*						1		2	4	
	Pleuroceridae	*Goniobasis*	4	1	2				1			
		Leptoxis	7	7	10	2		7	3	1	2	
Pelecypoda	**Corbiculidae**	*Corbicula*		1								
	Sphaeriidae	*Sphaerium*	1		1	14						

Order	Family	*Genus*	SUSQ 157									
			KS1	KS2	KS3	KS4	KS5	RB1	RB2	RB3	RB4	RB5
Coleoptera	**Elmidae**	*Optioservus*	7	5	3	9	2					
		Stenelmis	80	80	136	73	60	3	2	3	1	
Diptera	**Chironomidae**		59	31	21	31	31	49	87	37	37	42
	Empididae	*Hemerodromia*			1							
	Simuliidae	*Simulium*	12	6			2					
	Tipulidae	*Hexatoma*		1								
Ephemeroptera	**Baetidae**	*Baetis*	10	10	3	4	8	19		9	3	2
		Heterocloeon	8	3			2	2	2	3		
	Caenidae	*Caenis*					1					
	Ephemerellidae	*Ephemerella*	1	1						1		
	Heptagenidae	*Stenonema*				1	2	5	1	4	3	2
	Isonychiidae	*Isonychia*	3	8	3	5	7	85	33	58	79	27
	Potamanthidae	*Anthopotamus*	12	16	14	8						1
	Tricorythidae	*Tricorythodes*				1	1			1		
Megaloptera	**Corydalidae**	*Corydalus*	4	2	1		5			2	3	2
Plecoptera	**Perlidae**	*Acroneuria*									4	2
		Agnetina		1	4	6	2	4	9			5
Trichoptera	**Hydropsychidae**	*Ceratopsyche*	3			3	7	1	3	3	2	21
		Cheumatopsyche	3	6	3	6	5	12	46	8	3	12
		Hydropsyche	8	6	4	44	19	53	35	73	48	102
		Macrostemum	74	50	8	13	53	3	3	20	73	21
	Philopotamidae	*Chimarra*	13	8	3	2	4	9	71	11	5	1
Amphipoda	**Gammaridae**	*Gammarus*				2	5			1		1
Gastropoda	**Pleuroceridae**	*Goniobasis*				6	1					1
		Leptoxis	10	6	3	16		6	31	5	1	
Pelecypoda	**Sphaeriidae**	*Sphaerium*			8		1					
Tricladia	**Planariidae**	*Dugesia*							1			

Order	Family	*Genus*	SUSQ 174									
			KS1	KS2	KS3	KS4	KS5	RB1	RB2	RB3	RB4	RB5
Coleoptera	**Elmidae**	*Optioservus*	3	1	1	7	6					
		Stenelmis	87	120	56	94	115	1	1	1	2	3
	Psephenidae	*Psephenus*		1				2	1			
Diptera	**Ceratopogonidae**	*Bezzia*			1							
	Chironomidae		237	206	202	167	15	46	2	2	62	21
	Empididae	*Hemerodromia*		2							1	3
Ephemeroptera		*Baetis*	1	1								
		Centroptilum			1	2						
	Caenidae	*Caenis*	1	1	1	1						
	Ephemerellidae	*Ephemerella*						3				
	Heptagenidae	*Leucrocuta*			1	2	1	1				
		Stenacron	5	2	12	9	1	3			42	15
		Stenonema	6	13	29	18	8	11		1	45	26
	Isonychiidae	*Isonychia*	8	7	1		4	115			2	2
	Potamanthidae	*Anthopotamus*	33	40	30	44	47					1
	Tricorythidae	*Tricorythodes*		1	1							
Megaloptera	**Corydalidae**	*Corydalus*	2	1				1			1	
Odonata	**Coenagrionidae**	*Argia*						1				
Plecoptera	**Perlidae**	*Acroneuria*	1					3			2	1
		Agnetina	1	1	1		5	7			4	1
Trichoptera	**Hydropsychidae**	*Ceratopsyche*	1					4				
		Cheumatopsyche	3	6			15	28	1		3	2
		Hydropsyche				1	2	10			1	3
		Macrostemum	3	5	1	1		14				
	Lepidostomatidae	*Lepidostoma*									1	
	Leptoceridae	*Ceraclea*									1	
	Philopotamidae	*Chimarra*	6	1	2		3	15				
	Polycentropodidae	*Neureclipsis*			1		1	3			2	2
Amphipoda	**Gammaridae**	*Gammarus*	1	12			3	1			8	4
Gastropoda	**Physidae**	*Physella*									17	
	Pleuroceridae	*Leptoxis*						1				
		Pleurocera					1					
Pelecypoda	**Sphaeriidae**	*Sphaerium*		1	2				1			
Tricladia	**Planariidae**	*Dugesia*										1

Order	Family	*Genus*	SUSQ 192						
			KS1	KS2	KS3	KS4	KS5	RB3	RB4
Coleoptera	**Elmidae**	*Optioservus*	1			2	1		
		Stenelmis	64	32	42	30	57		
	Psephenidae	*Psephenus*		1					
Diptera	**Athericidae**	*Atherix*				1			
	Chironomidae		15	24	26	17	32	114	22
	Empididae	*Hemerodromia*					4		
	Simuliidae	*Simulium*	9	8	12				
Ephemeroptera	**Baetidae**	*Acentrella*							1
		Baetis	5	3	1	9	3		
		Heterocloeon	3	8	10	12	4	1	
	Caenidae	*Caenis*				1			
	Ephemerellidae	*Ephemerella*	1		1	1	3		
	Heptagenidae	*Stenonema*				3	1	13	4
	Isonychiidae	*Isonychia*	18	12	17	17	21	126	143
	Potamanthidae	*Anthopotamus*	25	19	13	13	11		
Odonata	**Coenagrionidae**	*Argia*				1			
Plecoptera	**Perlidae**	*Acroneuria*	3		1	1	1	6	2
		Agnetina	17	5	9	8	10	13	1
		Paragnetina	1	2	3		1		2
Trichoptera	**Hydropsychidae**	*Ceratopsyche*	11	3	4	4	3	7	5
		Cheumatopsyche	22	20	16	14	7	13	4
		Hydropsyche	10	10	18	11	5	20	16
		Macrostemum	38	51	44	60	52		37
	Philopotamidae	*Chimarra*	32	71	93	44	67	1	14
Gastropoda	**Physidae**	*Physella*						2	
	Pleuroceridae	*Leptoxis*					5		
Pelecypoda	**Sphaeriidae**	*Sphaerium*					1		
Tricladia	**Planariidae**	*Dugesia*					1		

Order	Family	*Genus*	SUSQ 207								
			KS1	KS2	KS3	KS4	KS5	RB1	RB2	RB3	RB5
Coleoptera	**Elmidae**	*Optioservus*	4	6	1	2	4				
		Stenelmis	22	21	35	4	26		1		1
	Psephenidae	*Psephenus*			2			1	2		1
Diptera	**Athericidae**	*Atherix*				1					
	Chironomidae		17	16	14	11	14	32	26	15	22
	Simuliidae	*Simulium*	1								
Ephemeroptera		*Baetis*	10	7	9	26	30	12	17	2	3
		Heterocloeon				4	4				
	Ephemerellidae	*Serratella*	1	1							
	Heptagenidae	*Heptagenia*			1		1	5			
		Stenacron	6						1		
		Stenonema	24	15	21	8	6	12	16	8	32
	Isonychiidae	*Isonychia*	61	45	49	38	76	84	68	161	95
	Potamanthidae	*Anthopotamus*	6	9	1	3	1				
	Tricorythidae	*Tricorythodes*							1		
Lepidoptera	**Pyralidae**	*Petrophila*	4	2	7	3	1				
Megaloptera	**Corydalidae**	*Corydalus*	2			2	6				
Plecoptera	**Perlidae**	*Acroneuria*	1	1		1	2	2	16	1	10
		Agnetina	1	6	1	3	4	10	1	4	
	Pteronarcyidae	*Pteronarcys*									1
Trichoptera	**Hydropsychidae**	*Ceratopsyche*	3		2		5	4	1	1	4
		Cheumatopsyche	32	29	22	24	21	14	7	5	16
		Hydropsyche	9	17	17	57	26	21	34	18	13
		Macrostemum	15	23	7	16	7				
	Hydroptilidae	*Dibusa*					1				
	Philopotamidae	*Chimarra*	5	5		8	6				2
Gastropoda	**Pleuroceridae**	*Leptoxis*	5	13	26	3	5	14	40	7	39
Pelecypoda	**Sphaeriidae**	*Sphaerium*			5	3	4				
Tricladia	**Planariidae**	*Dugesia*				2				1	

Order	Family	*Genus*	SUSQ 219								
			KS1	KS2	KS3	KS4	KS5	RB1	RB2	RB3	RB4
Coleoptera	**Elmidae**	*Dubiraphia*							1		
		Optioservus	9	29	13	5	5		2		
		Stenelmis	163	106	83	44	52	1	63		
	Hydrophilidae	*Berosus*						1	2		
	Psephenidae	*Psephenus*	5		9		4		8		
Diptera	**Chironomidae**		9	3	7	12	59	7	14	1	8
	Simuliidae	*Simulium*						3			
	Tipulidae	*Hexatoma*	2								
Ephemeroptera	**Baetidae**	*Baetis*	2			2	1	1			2
		Heterocloeon	4			2	2				1
	Caenidae	*Caenis*				1		1			
	Ephemerellidae	*Ephemerella*	1			1	1			3	2
	Heptagenidae	*Stenacron*						7	26		
		Stenonema	8		2		1	30	5	3	6
	Isonychiidae	*Isonychia*	21		5	34	9	9		127	108
	Potamanthidae	*Anthopotamus*	29	1	18	13	9				
	Tricorythidae	*Tricorythodes*						1			
Lepidoptera	**Pyralidae**	*Petrophila*								1	
Megaloptera	**Corydalidae**	*Corydalus*	7		1			1			
Odonata	**Coenagrionidae**	*Argia*			5				2	3	
	Gomphidae	*Gomphus*	1		1				1		
Plecoptera	**Perlidae**	*Acroneuria*	1		1		1	1		2	2
		Agnetina	5		3	2	3		2	2	3
	Pteronarcyidae	*Pteronarcys*			1					1	
Trichoptera	**Hydropsychidae**	*Ceratopsyche*				1	2	2	1		1
		Cheumatopsyche	12		2	16	7	13	7	27	15
		Hydropsyche	1		4	13	5	1	2	23	32
		Macrostemum	2		15	31	38			32	31
	Philopotamidae	*Chimarra*	7		7	12	1	14		22	2
Amphipoda	**Gammaridae**	*Gammarus*		30					47		
Decapoda	**Cambaridae**	*Orconectes*							1		
Gastropoda	**Physidae**	*Physella*		2	1			6	11		
	Planorbiidae	*Helisoma*									
	Pleuroceridae	*Goniobasis*	1	9				1		3	
		Leptoxis	2	31	29	31	13		4	5	16
Pelecypoda	**Sphaeriidae**	*Sphaerium*	1	4	5	5	1				
Tricladia	**Planariidae**	*Dugesia*							3		

Order	Family	*Genus*	SUSQ 234								
			KS1	KS2	KS3	KS4	KS5	RB1	RB2	RB4	RB5
Coleoptera	**Elmidae**	*Optioservus*		1				1			
		Promoresia									
		Stenelmis	16	21	6	23	2	2			1
	Psephenidae	*Psephenus*									14
Diptera	**Chironomidae**		51	54	65	66	47	34	45	29	39
	Empididae	*Hemerodromia*	2					1		1	1
Ephemeroptera	**Baetidae**	*Baetis*								1	
		Heterocloeon		1							
	Heptagenidae	*Heptagenia*						1			1
		Stenonema	3		1	2	4	4	1	4	4
	Isonychiidae	*Isonychia*	33	47	49	48	76	118	81	68	80
	Potamanthidae	*Anthopotamus*	2	1	5	7	1				
Lepidoptera	**Pyralidae**	*Petrophila*	2		1		5				2
Megaloptera	**Corydalidae**	*Corydalus*	2	4	3			2		1	1
	Sialidae	*Sialis*			1						
Odonata	**Coenagrionidae**	*Argia*	1	1	1	1	1	1			1
	Gomphidae	*Gomphus*									
		Lanthus					1				
Plecoptera	**Perlidae**	*Acroneuria*		1	1	1	2		1	1	1
		Agnetina	10	3	4	1	5	3	7	1	3
	Pteronarcyidae	*Pteronarcys*									1
Trichoptera	**Hydropsychidae**	*Ceratopsyche*		2			7	2	1	1	3
		Cheumatopsyche	22	12	16	21	13	28	18	30	16
		Hydropsyche	55	41	52	34	46	38	100	79	76
		Macrostemum	6	18	8	9	5	1	8	28	1
	Philopotamidae	*Chimarra*	2	2	1	1	4		1	5	2
Amphipoda	**Gammaridae**	*Gammarus*	1								
Gastropoda	**Physidae**	*Physella*									1
	Pleuroceridae	*Leptoxis*	6	3	5	7		11	5	2	3
Pelecypoda	**Sphaeriidae**	*Sphaerium*		7	7	9	4				

Order	Family	*Genus*	SUSQ 256						
			KS1	KS2	KS3	KS4	KS5	RB2	RB5
Coleoptera	**Elmidae**	*Optioservus*	3	10	6	7	13	1	2
		Stenelmis	7	59	37	41	48		
	Psephenidae	*Psephenus*	2	1	1	3	4	3	
Diptera	**Chironomidae**		108	43	44	59	53	69	37
	Empididae	*Hemerodromia*	1						
	Simuliidae	*Simulium*	2	1					
Ephemeroptera	**Baetidae**	*Baetis*	4						
	Heptagenidae	*Heptagenia*	2						
		Stenacron					1		1
		Stenonema	7		3	2	2	2	3
	Isonychiidae	*Isonychia*	12	24	28	11	32	40	49
	Potamanthidae	*Anthopotamus*		2					
Lepidoptera	**Pyralidae**	*Petrophila*	1	1					
Megaloptera	**Corydalidae**	*Corydalus*						1	
Odonata	**Coenagrionidae**	*Argia*					1		
	Gomphidae	*Stylogomphus*				1			
Plecoptera	**Perlidae**	*Acroneuria*			1		2		
		Agnetina	12	6	14	15	5	18	12
		Paragnetina						1	
	Pteronarcyidae	*Pteronarcys*				1			
Trichoptera	**Hydropsychidae**	*Ceratopsyche*	16	3		2		11	23
		Cheumatopsyche	11	21	30	13	17	23	9
		Hydropsyche	27	15	38	42	17	97	18
		Macrostemum		3	4	3	2	8	
	Philopotamidae	*Chimarra*			2	1	1	1	1
Gastropoda	**Pleuroceridae**	*Leptoxis*	1	1	5	7	10	4	42
Isopoda	**Asellidae**	*Caecidotea*	1						
	Sphaeriidae	*Sphaerium*		19	6	4	21		
Tricladia	**Planariidae**	*Dugesia*							2

Order	Family	Genus	SUSQ 271						
			KS1	KS2	KS3	KS4	KS5	RB4	RB5
Coleoptera	**Elmidae**	*Optioservus*	6	1	10	16	32		2
		Stenelmis	61	17	80	29	65		4
	Psephenidae	*Psephenus*	3	1	1	2	6		
Diptera	**Athericidae**	*Atherix*	2			1			
	Chironomidae		23	51	28	29	30	57	30
	Empididae	*Hemerodromia*					1		
Ephemeroptera	**Baetidae**	*Acentrella*			2	1			1
		Baetis		2	2	7	2	3	7
		Heterocloeon		2		1	1		
	Ephemerellidae	*Ephemerella*				1	3	2	6
	Heptagenidae	*Heptagenia*	1						
		Stenonema	2		4	3		2	3
	Isonychiidae	*Isonychia*	25	43	34	31	21	14	39
	Potamanthidae	*Anthopotamus*	9	2	8	2	12		
	Tricorythidae	*Tricorythodes*							2
Lepidoptera	**Pyralidae**	*Petrophila*	5	1	2	6	2		
Megaloptera	**Corydalidae**	*Corydalus*	3	2	5	3	3		
Odonata	**Coenagrionidae**	*Argia*	3			1			
Plecoptera	**Perlidae**	*Agnetina*	2		2	1	4	2	1
		Paragnetina						2	
Trichoptera	**Hydropsychidae**	*Ceratopsyche*	6	23	4	6	3	53	10
		Cheumatopsyche	25	24	36	47	16	13	13
		Hydropsyche	15	64	16	18	8	115	3
		Macrostemum	21	9	4	13	5	1	
	Philopotamidae	*Chimarra*	13	7	6	11	21		10
Gastropoda	**Physidae**	*Physella*							1
	Pleuroceridae	*Leptoxis*				8	12		2
		Pleurocera			1		1		1
Pelecypoda	**Sphaeriidae**	*Sphaerium*	4	3	11	5	11		1

Order	Family	*Genus*	SUSQ 300								
			KS1	KS2	KS3	KS4	KS5	RB1	RB2	RB3	RB5
Coleoptera	**Elmidae**	*Optioservus*	3	9	5	1	13				2
		Stenelmis	61	91	61	15	84	1		1	
	Psephenidae	*Ectopria*								2	
		Psephenus	1	1		1	36				
Diptera	**Chironomidae**		16	11	14	26	67	40	16	49	34
	Empididae	*Hemerodromia*							1	2	
Ephemeroptera	**Baetidae**	*Baetis*	9	17	5	4	14	1		1	2
		Heterocloeon	1			15		1	2	1	
	Ephemerellidae	*Ephemerella*		1	2	4				8	
	Heptagenidae	*Stenonema*	4		3	2	1	5		2	3
	Isonychiidae	*Isonychia*	33	37	11	9		60	83	51	38
	Potamanthidae	*Anthopotamus*	6	11	18	4	31				1
Lepidoptera	**Pyralidae**	*Petrophila*	5	6	8	13		1		1	1
Odonata	**Aeshnidae**	*Boyeria*									1
	Coenagrionidae	*Argia*					3				
Plecoptera	**Perlidae**	*Agnetina*	1	3	7	7		10	2	14	5
Trichoptera	**Brachycentridae**	*Brachycentrus*									2
	Hydropsychidae	*Ceratopsyche*	12	2	3	4	1	30	5	8	2
		Cheumatopsyche	48	12	49	38	9	47	71	32	43
		Hydropsyche	26	10	35	66		51	43	89	2
		Macrostemum	2	4	5	4	3		8	11	
	Philopotamidae	*Chimarra*	3	6	8	4	8	25	6	2	1
Amphipoda	**Gammaridae**	*Gammarus*					16	1			49
Gastropoda	**Ancylidae**	*Ferrissia*	1	1							
	Physidae	*Physella*					11				34
	Pleuroceridae	*Leptoxis*	2	2		1	1	4			4
Pelecypoda	**Sphaeriidae**	*Sphaerium*	5	3		5	5				
Tricladia	**Planariidae**	*Dugesia*					1				

Order	Family	Genus	SUSQ 312									
			KS1	KS2	KS3	KS4	KS5	RB1	RB2	RB3	RB4	RB5
Coleoptera	**Elmidae**	*Dubiraphia*	1									
		Optioservus	8	39	5	15	5					
		Stenelmis	50	58	38	94	47	3	2		1	2
	Hydrophilidae	*Berosus*	2					1				
	Psephenidae	*Psephenus*	39	3		1	4	47	4	12	9	11
Diptera	**Athericidae**	*Atherix*	1					1			1	
	Ceratopogonidae	*Bezzia*					1					
	Chironomidae		30	10	9	10	10	45	18	14	16	44
	Empididae	*Hemerodromia*	1			1						
	Simuliidae	*Simulium*		1								
	Tipulidae	*Hexatoma*				1						
Ephemeroptera	**Baetidae**	*Baetis*		2	1							1
		Heterocloeon					2				1	1
	Ephemerellidae	*Ephemerella*		2	1		1		3	2	4	3
	Heptagenidae	*Stenonema*	2		3			3		2	1	8
	Isonychiidae	*Isonychia*	16	9	14	2	25	5	25	43	68	77
	Potamanthidae	*Anthopotamus*	20	13	21	51	29					
	Tricorythidae	*Tricorythodes*										2
Lepidoptera	**Pyralidae**	*Petrophila*			1		4	1				
Odonata	**Coenagrionidae**	*Argia*	3					6				
Plecoptera	**Perlidae**	*Acroneuria*									1	
		Agnetina	1	3	3	5	15		4	5	4	3
Trichoptera	**Brachycentridae**	*Brachycentrus*			5	2		4	2	4		
	Hydropsychidae	*Ceratopsyche*	1	1	1		5		5		5	2
		Cheumatopsyche	16	27	75	10	35	22	104	91	79	76
		Hydropsyche	5	28	23	3	13	12	12	32	27	14
		Macrostemum	2	4	6	1	21		5	5	3	9
	Hydroptilidae	*Dibusa*		1								
	Leptoceridae	*Ceraclea*								1		
	Philopotamidae	*Chimarra*	31	2			1		10	3		9
	Polycentropodidae	*Neureclipsis*										1
Amphipoda	**Gammaridae**	*Gammarus*	18	1				63			1	4
Gastropoda	**Physidae**	*Physella*	11			2	2	29	1	7	2	3
	Pleuroceridae	*Leptoxis*		14	4	15	17	5	31	7	2	
Pelecypoda	**Sphaeriidae**	*Sphaerium*		14	13	11	7			1		
Tricladia	**Planariidae**	*Dugesia*	1	1				3				

Order	Family	Genus	SUSQ 327						
			KS1	KS2	KS3	KS4	KS5	RB3	RB4
Coleoptera	**Elmidae**	*Optioservus*	4	2	3	3	9		
		Promoresia					1		
		Stenelmis	123	78	48	85	73	2	4
	Psephenidae	*Ectopria*	1						
		Psephenus	8		4	2	10		5
Diptera	**Athericidae**	*Atherix*	21	4	2			1	2
	Chironomidae		29	28	14	26	172	51	54
	Simuliidae	*Simulium*	3						
Ephemeroptera	**Baetidae**	*Baetis*	14	2	4	7			
		Heterocloeon		1		1			
	Ephemerellidae	*Serratella*		1					
	Isonychiidae	*Isonychia*	2	2	1	2		16	20
	Potamanthidae	*Anthopotamus*	3		5	1	3		
	Tricorythidae	*Tricorythodes*							1
Lepidoptera	**Pyralidae**	*Petrophila*	4	14	16	3			
Megaloptera	**Corydalidae**	*Corydalus*	1			1		3	1
	Sialidae	*Sialis*			1	2	1		
Odonata	**Coenagrionidae**	*Argia*		1	1	5	6		1
Plecoptera	**Perlidae**	*Acroneuria*			1				
		Agnetina				1			
Trichoptera	**Hydropsychidae**	*Ceratopsyche*	2	2					1
		Cheumatopsyche	35	52	114	91	31	96	166
		Hydropsyche	16	40	16	4		86	26
		Macrostemum	18	13				9	4
	Philopotamidae	*Chimarra*			1	1			
Amphipoda	**Gammaridae**	*Gammarus*	1				7		1
Gastropoda	**Ancylidae**	*Ferrissia*			1	1			
	Physidae	*Physella*	1						1
Pelecypoda	**Sphaeriidae**	*Sphaerium*	2	29	2	2			
Tricladia	**Planariidae**	*Dugesia*	1				1		3

Order	Family	*Genus*	SUSQ 344									
			KS1	KS2	KS3	KS4	KS5	RB1	RB2	RB3	RB4	RB5
Coleoptera	**Elmidae**	*Optioservus*	6	25	16	23	29			1	2	1
		Promoresia		12	6	9	6		2	1	1	
		Stenelmis	62	91	139	126	136		3	14	11	5
	Psephenidae	*Psephenus*	16	6	2	4	5	6	7	5	3	2
Diptera	**Athericidae**	*Atherix*				1	2					
	Chironomidae		7	15	5	10	11	24	23	21	41	23
	Simuliidae	*Simulium*	3	2		1		2	3	4	18	
Ephemeroptera	**Baetidae**	*Acentrella*					1					
		Baetis	5	10		1	11	3	2	8	3	
		Heterocloeon	2	1	2		4					
	Ephemerellidae	*Ephemerella*	1					4	2		2	6
	Heptagenidae	*Stenonema*			1				1	4	3	
	Isonychiidae	*Isonychia*	44	30	5	9	13	96	118	114	41	149
	Potamanthidae	*Anthopotamus*	13	19	7	22	4		1	5		
Lepidoptera	**Pyralidae**	*Petrophila*		1						2		
Megaloptera	**Corydalidae**	*Corydalus*	1									
Plecoptera	**Perlidae**	*Acroneuria*	1			1					1	
		Agnetina	6	9	3	9	6	4	9	15	27	7
		Paragnetina	2		5	1	3				1	1
Trichoptera	**Brachycentridae**	*Brachycentrus*						1	1	1		
	Helicopsychidae	*Helicopsyche*							1			
	Hydropsychidae	*Ceratopsyche*	13	12	11	6	5	54	12	23	38	13
		Cheumatopsyche	10	5	1	1	6	8	13	5	4	22
		Hydropsyche	12	10	15	7	5	31	33	35	52	7
		Macrostemum	20	39	23	43	36	11	2	14	42	2
	Philopotamidae	*Chimarra*	25	19	5	4	7	9	12	8	20	3
Amphipoda	**Gammaridae**	*Gammarus*		1		1						
Gastropoda	**Ancylidae**	*Ferrissia*							1			
	Pleuroceridae	*Leptoxis*		2								1
Pelecypoda	**Sphaeriidae**	*Sphaerium*	5	1								

Order	Family	Genus	SUSQ 356									
			KS1	KS2	KS3	KS4	KS5	RB1	RB2	RB3	RB4	RB5
Coleoptera	**Elmidae**	*Dubiraphia*	3	2	1							4
		Macronychus		2			4					
		Optioservus	14	26	37	31	37				7	
		Promoresia		1					1		1	2
		Stenelmis	64	72	104	94	32	3	3	1	27	6
	Psephenidae	*Ectopria*								1		
		Psephenus	46	12	1	13	28	19	8	6	23	46
Diptera	**Athericidae**	*Atherix*							1	1		
	Chironomidae		20	29	21	114	43	37	13	9	80	33
	Simuliidae	*Simulium*						2				
Ephemeroptera	**Baetidae**	*Baetis*	1		1	2	1	8		2	1	
		Centroptilum	1					2			1	1
	Ephemerellidae	*Ephemerella*						1	1	2		1
	Heptagenidae	*Leucrocuta*						2		2	3	1
		Stenacron	4	4	1			2	5		18	1
		Stenonema	26	9	1	7	4	67	20	2	25	24
	Isonychiidae	*Isonychia*		3	5	1	1	31	125	161	1	52
	Leptophlebiidae	*Leptophlebia*	1									
	Potamanthidae	*Anthopotamus*	33	43	88	95	86				2	
	Tricorythidae	*Tricorythodes*									2	
Megaloptera	**Corydalidae**	*Corydalus*						3	1			1
		Nigronia	1								1	
	Sialidae	*Sialis*	1									1
Odonata	**Coenagrionidae**	*Argia*	9					17			6	6
	Gomphidae	*Gomphus*	1	1	1		2				2	
Plecoptera	**Perlidae**	*Acroneuria*						1	1		1	
		Agnetina	4	2	9	3	3		5	5	6	7
	Pteronarcyidae	*Pteronarcys*	1	1		2		1		1	4	
Trichoptera	**Brachycentridae**	*Brachycentrus*									17	
	Hydropsychidae	*Ceratopsyche*	1				8	4	20	5	1	23
		Cheumatopsyche	11	8	7	2	9	57	46	35	11	37
		Hydropsyche		1	3	1		3	5	10	5	8
		Macrostemum	1	2		2			2	3		2
	Leptoceridae	*Ceraclea*						1	9		4	
	Philopotamidae	*Chimarra*					1		3	1		5
	Polycentropodidae	*Neureclipsis*						11	3			18
		Polycentropus						5			2	
Amphipoda	**Gammaridae**	*Gammarus*	4	4		1		3			9	5
Decapoda	**Cambaridae**	*Orconectes*	1					1			1	1
Gastropoda	**Ancylidae**	*Ferrissia*						1			8	1
	Physidae	*Physella*						1				
Tricladia	**Planariidae**	*Dugesia*										1

Order	Family	*Genus*	SUSQ 365									
			KS1	KS2	KS3	KS4	KS5	RB1	RB2	RB3	RB4	RB5
Coleoptera	**Elmidae**	*Macronychus*										1
		Optioservus	55	43	59	27	30	8			3	
		Promoresia	4	1	1	4	4			1		
		Stenelmis	33	20	35	44	35	8			3	
	Psephenidae	*Psephenus*	35	40	16	12	36	12	11		9	21
Diptera	**Athericidae**	*Atherix*	12	8	11	20	15	1	5	3	6	1
	Chironomidae		3	7	20	15	12	32	12	26	13	4
	Simuliidae	*Simulium*		4	2							1
Ephemeroptera	**Baetidae**	*Baetis*	2		14	3	6		4	4	2	
		Heterocloeon					1					
	Ephemerellidae	*Ephemerella*					2	4	8	4	3	
	Heptagenidae	*Leucrocuta*						3			3	
		Stenacron										8
		Stenonema	1	2		4	3	9	3	4	15	8
	Isonychiidae	*Isonychia*	4	6	5	15	23	126	58	38	63	149
	Potamanthidae	*Anthopotamus*	14	5	43	7	13	1		1	2	
	Tricorythidae	*Tricorythodes*						2	1	1		
Lepidoptera	**Pyralidae**	*Petrophila*	1		1		1					
Megaloptera	**Corydalidae**	*Corydalus*				4	2				2	
Odonata	**Coenagrionidae**	*Argia*				1		1				3
Plecoptera	**Perlidae**	*Acroneuria*			1	2	1	6	7	6	5	1
		Agnetina	2	2	16	2	4	2	2		6	5
		Paragnetina					1	1	2	8	2	
Trichoptera	**Brachycentridae**	*Brachycentrus*	2					6	4	2	21	5
	Hydropsychidae	*Ceratopsyche*	2	4	3	5	3	7	31	41	8	
		Cheumatopsyche	1	4	3	3	9	7	6	3	18	2
		Hydropsyche	2	7	5	18	10	11	58	81	42	1
		Macrostemum	2	5	1	8	9		1	3	1	
	Hydroptilidae	*Dibusa*		2	1			1		2		
	Philopotamidae	*Chimarra*	1	6	37	3	18	13	20	15	5	2
Amphipoda	**Gammaridae**	*Gammarus*							2			1
Gastropoda	**Pleuroceridae**	*Leptoxis*	37	25	4	32	14	4	7	5	14	7
Tricladia	**Planariidae**	*Dugesia*								1	1	

Order	Family	Genus	SUSQ 394									
			KS1	KS2	KS3	KS4	KS5	RB1	RB2	RB3	RB4	RB5
Coleoptera	**Elmidae**	*Optioservus*	31	9	31	27	20			1	1	1
		Promoresia	23	36	20	9	10	5	2			2
		Stenelmis	30	14	27	14	14			3		
	Psephenidae	*Psephenus*	38	92	12	3	14	16	18		2	7
Diptera	**Athericidae**	*Atherix*	12	1	4	3						1
	Chironomidae		17	2	10	13	52	46	19	34	11	39
	Simuliidae	*Simulium*	1	1	2		1	1		2	3	
Ephemeroptera	**Baetidae**	*Baetis*	19	21	30	32	20	8	7	8	19	12
		Centroptilum						44	19			
		Heterocloeon		1		4	4			2	1	
	Caenidae	*Caenis*		1								1
	Ephemerellidae	*Ephemerella*	1	1	2	5	7			8	2	2
	Heptagenidae	*Leucrocuta*	2	2		2		10	4		1	5
		Stenacron		3				11	6	4	2	15
		Stenonema	6	8	3	5	12	66	36	5	11	25
	Isonychiidae	*Isonychia*	26	14	21	7	18	5	6	104	85	144
	Leptophlebiidae	*Paraleptophlebia*		1								
	Potamanthidae	*Anthopotamus*		2								
Lepidoptera	**Pyralidae**	*Petrophila*			2							
Megaloptera	**Corydalidae**	*Corydalus*	10		6	9	22	2	1	5	1	2
	Sialidae	*Sialis*		3								
Odonata	**Calopterygidae**	*Calopteryx*						1				
Plecoptera	**Perlidae**	*Acroneuria*	1		1					1	3	1
		Agnetina			3	4	1		2			4
		Paragnetina	1		2	1	5	1		5	8	2
Trichoptera	**Brachycentridae**	*Brachycentrus*										2
	Hydropsychidae	*Ceratopsyche*	16	3	18	11	13			42	43	2
		Cheumatopsyche	6	8	17	22	7	2	1	10	19	3
		Hydropsyche	3	1	3	7	3			10	8	
		Macrostemum	3		8	24	23			2	7	
	Hydroptilidae	*Leucotrichia*					1					
	Philopotamidae	*Chimarra*	39	10	21	72	66	3		75	32	1
	Polycentropodidae	*Polycentropus*							1			
	Psychomiidae	*Psychomyia*					1					
Amphipoda	**Gammaridae**	*Gammarus*		4	2			23	99			4
Decapoda	**Cambaridae**	*Orconectes*		1				1	2			
Gastropoda	**Ancylidae**	*Ferrissia*						1	3			2
	Pleuroceridae	*Leptoxis*						1	3			
Isopoda	**Asellidae**	*Caecidotea*						1				
Tricladia	**Planariidae**	*Dugesia*						2	2			

Order	Family	*Genus*	JUNR 2								
			KS1	KS2	KS3	KS4	KS5	RB1	RB2	RB3	RB4
Coleoptera	**Elmidae**	*Optioservus*	7	3	5	1	1				
		Stenelmis	73	28	51	29	17	2	2	1	
	Psephenidae	*Psephenus*	13	4	13	1	10	4	10	6	1
Diptera	**Chironomidae**		10	9	6	6	4	15	22	8	3
	Empididae	*Hemerodromia*						1			
Ephemeroptera	**Baetidae**	*Acentrella*			1	3	1				
		Baetis	6	17	20	17	30	6	32	1	9
		Heterocloeon							1		
	Ephemerellidae	*Serratella*		1	1		1		3	1	1
	Heptagenidae	*Heptagenia*			4		1	1	6		
		Leucrocuta	5	2	10	4	2	10	45	5	1
		Stenonema	7		6	1	2	1	14	10	
	Isonychiidae	*Isonychia*	49	112	49	111	12	153	38	124	170
	Potamanthidae	*Anthopotamus*	14	10	11	2	1				
	Tricorythidae	*Tricorythodes*	10	1	2				6		
Lepidoptera	**Pyralidae**	*Petrophila*	2	2	1		4		3		
Megaloptera	**Corydalidae**	*Corydalus*	11	1		4	42	8	2		4
Odonata	**Coenagrionidae**	*Argia*	7	1	2	1	4	1	6	3	
	Gomphidae	*Ophiogomphus*				1					
Plecoptera	**Perlidae**	*Acroneuria*		1		1			5	1	1
		Agnetina	2	2	5	2	1	1	3	5	6
	Pteronarcyidae	*Pteronarcys*			1			1	1		
Trichoptera	**Helicopsychidae**	*Helicopsyche*			1						
	Hydropsychidae	*Ceratopsyche*	1	4	2	5	1	2	5	1	2
		Cheumatopsyche	14	22	29	23	32	13	18	26	31
		Hydropsyche	24	29	21	22	61	32	27	32	32
		Macrostemum	1	6	1	3	1				
	Philopotamidae	*Chimarra*		5	1	11	5		1		1
Amphipoda	**Gammaridae**	*Gammarus*	4				1				
Gastropoda	**Ancylidae**	*Ferrissia*			1		1		1	1	
	Physidae	*Physella*						1			1
	Pleuroceridae	*Leptoxis*	1					1			
Pelecypoda	**Corbiculidae**	*Corbicula*				1	1				

Order	Family	*Genus*	CHEM 3									
			KS1	KS2	KS3	KS4	KS5	RB1	RB2	RB3	RB4	RB5
Coleoptera	**Elmidae**	*Dubiraphia*				1		5	1			2
		Optioservus		15	4	7	12					
		Stenelmis	13	74	36	35	31	10			4	3
	Hydrophilidae	*Berosus*						4				2
	Psephenidae	*Psephenus*	4	15	2	1	19	12	1		4	8
Diptera	**Athericidae**	*Atherix*	1	1	1							
	Chironomidae		26	25	8	16	21	56	109	21	101	64
	Empididae	*Hemerodromia*				1		1			1	1
	Simuliidae	*Simulium*	1		1	2						
Ephemeroptera	**Baetidae**	*Baetis*	25	5	11	6	14		6	7		
		Heterocloeon	2		1	4	2					
	Caenidae	*Caenis*		1				1			4	1
	Ephemerellidae	*Ephemerella*			4	5	3		1	2		
	Heptagenidae	*Heptagenia*							1			
		Stenacron		4				17			21	23
		Stenonema		9	3	3	1	6	6	1	25	16
	Isonychiidae	*Isonychia*	8	3	11	4	7	1	81	64	28	38
	Potamanthidae	*Anthopotamus*	3	41	8	8	9	3			3	1
	Tricorythidae	*Tricorythodes*		1				7			1	4
Lepidoptera	**Pyralidae**	*Petrophila*	4	5	7	4	7		1	2	1	
Megaloptera	**Corydalidae**	*Corydalus*	1		1	1	2			1	5	3
	Sialidae	*Sialis*			1							
Odonata	**Coenagrionidae**	*Argia*						2				
	Macromiidae	*Macromia*									1	
Plecoptera	**Perlidae**	*Acroneuria*		1	1							
		Agnetina	2	2	10	6	1	2	21	20	12	11
		Neoperla		1								
		Paragnetina			1		1		2	3		1
Trichoptera	**Hydropsychidae**	*Ceratopsyche*	21	2	14	17	26	1	35	48	1	12
		Cheumatopsyche	12	8	12	7	8	10	16	14	27	37
		Hydropsyche	13	2	21	30	18	4	28	44	7	16
		Macrostemum	3		6	2				2		1
	Philopotamidae	*Chimarra*	56	2	51	80	61		4	29		6
Gastropoda	**Physidae**	*Physella*									2	
Pelecypoda	**Sphaeriidae**	*Sphaerium*	28	4	27	18	13	66			2	1

Order	Family	*Genus*	WBSR 8									
			KS1	KS2	KS3	KS4	KS5	RB1	RB2	RB3	RB4	RB5
Coleoptera	**Elmidae**	*Dubiraphia*	1									
		Macronychus				1	1					
		Optioservus	2			2	3					
		Stenelmis	9	1	3	4			1			
	Gyrinidae	*Dineutus*	1									
	Hydrophilidae	*Berosus*		1			1					
		Enochrus	10	1			1	2				
	Psephenidae	*Psephenus*	4	6	2		1				3	3
Diptera	**Athericidae**	*Atherix*					1					
	Chironomidae		16	7	14	8	8	69	42	35	36	33
	Empididae	*Hemerodromia*				4					1	
	Simuliidae	*Simulium*		1		1	1		1	3	3	1
Ephemeroptera	**Baetidae**	*Acentrella*	1	1		2	1	1				
		Baetis	29	4	4	6		2	3	2	2	2
		Heterocloeon	3	4	4	1			1	5	3	3
	Caenidae	*Caenis*			1			1			1	
	Ephemeridae	*Ephemera*	1									
	Heptagenidae	*Heptagenia*				1						
		Leucrocuta	7	6	1	2		4	1			
		Stenacron			1			2				
		Stenonema	2	2	7	7	3	3	3	2	8	
	Isonychiidae	*Isonychia*	30	59	27	97	7	76	86	108	146	69
	Potamanthidae	*Anthopotamus*		1		1						
	Tricorythidae	*Tricorythodes*	6	2	1	1	1	36	9		3	14
Megaloptera	**Corydalidae**	*Corydalus*	1	5	6	14	1		7	6	4	
	Sialidae	*Sialis*	1	1								
Odonata	**Coenagrionidae**	*Argia*	1	4	1	3	4				1	1
Plecoptera	**Perlidae**	*Acroneuria*		1	2			6	2	2	4	1
		Paragnetina			1					3	1	
Trichoptera	**Brachycentridae**	*Brachycentrus*		1								
	Hydropsychidae	*Ceratopsyche*			11	4		1	22	7		
		Cheumatopsyche	9	10	100	34	4	12	24	49	27	3
		Hydropsyche		1	31	3			49	34	4	1
		Macrostemum		1	3	1				3	1	
	Hydroptilidae	*Dibusa*				4				4	3	
	Philopotamidae	*Chimarra*	2	8	8	1			9	9	3	1
Amphipoda	**Gammaridae**	*Gammarus*	1		1		165	1		1	1	107
Gastropoda	**Ancylidae**	*Ferrissia*	1	1			3				1	
	Physidae	*Physella*	10	8			3	3	2		1	2
	Planorbiidae	*Helisoma*		1				4				
	Pleuroceridae	*Goniobasis*	17	19	1		2	11	4			
Nematomorpha		*Gordius*	1					1				
Oligochaeta	**Lumbriculidae**		1									
Pelecypoda	**Corbiculidae**	*Corbicula*	40	53	2	9	11	2				

APPENDIX D

SUMMARY OF ASSESSMENT DESIGNATIONS FOR LARGE RIVER SAMPLING SITES

	SUSQ 45								
Metric Scores	**KS1**	**KS2**	**KS3**	**KS4**	**KS5**	**RB1**	**RB2**	**RB3**	**RB4**
Number of Individuals	231	247	300	283	275	221	231	240	228
Taxa Richness	17	17	19	17	12	13	15	16	13
Hilsenhoff Biotic Index	3.81	4.02	4.34	4.25	4.43	5.00	3.33	3.41	3.63
Percent Ephemeroptera	57.58	40.08	26.33	15.90	22.55	46.61	78.79	78.75	55.26
Percent Dominant Taxa	48.05	31.98	29.00	24.03	23.64	45.70	64.94	70.83	50.88
EPT Index	10	12	11	12	7	8	10	11	10
Percent Chironomidae	1.73	2.02	3.00	3.18	2.18	2.26	3.46	1.67	2.63
Shannon-Weiner Diversity Index	1.68	2.13	2.22	2.12	1.95	1.41	1.44	1.30	1.61
Percent of Reference									
Taxa Richness	60.71	60.71	67.86	60.71	42.86	46.43	53.57	57.14	46.43
Hilsenhoff Biotic Index	80.42	76.11	70.56	71.99	69.03	61.20	91.92	89.67	84.26
Percent Ephemeroptera	57.58	40.08	26.33	15.90	22.55	46.61	78.79	78.75	55.26
Percent Dominant Taxa	48.05	31.98	29.00	24.03	23.64	45.70	64.94	70.83	50.88
EPT Index	58.82	70.59	64.71	70.59	41.18	47.06	58.82	64.71	58.82
Percent Chironomidae	1.73	2.02	3.00	3.18	2.18	2.26	3.46	1.67	2.63
Shannon-Weiner Diversity Index	62.27	78.86	82.36	78.50	72.10	52.14	53.31	48.32	59.51
Biological Condition Scores									
Taxa Richness	4	4	4	4	2	2	2	2	2
Hilsenhoff Biotic Index	4	4	4	4	2	2	6	6	4
Percent Ephemeroptera	6	6	6	4	4	6	6	6	6
Percent Dominant Taxa	0	2	4	4	4	0	0	0	0
EPT Index	0	2	0	2	0	0	0	0	0
Percent Chironomidae	6	6	6	6	6	6	6	6	6
Shannon-Weiner Diversity Index	4	6	6	6	4	4	4	2	4
Total Biological Score									
Total Biological Score	24	30	30	30	22	20	24	22	22
Percent of Reference	63	79	79	79	58	53	63	58	58
Assessment Designation	Slightly	Slightly	Slightly	Slightly	Slightly	Moderately	Slightly	Slightly	Slightly

	SUSQ 77									
Metric Scores	**KS1**	**KS2**	**KS3**	**KS4**	**KS5**	**RB1**	**RB2**	**RB3**	**RB4**	**RB5**
Number of Individuals	180	233	240	245	219	81	154	264	219	227
Taxa Richness	16	17	16	18	15	10	15	17	15	16
Hilsenhoff Biotic Index	4.42	4.05	4.13	4.36	4.50	1.91	2.31	3.48	4.58	3.80
Percent Ephemeroptera	41.67	48.07	39.58	23.27	22.83	88.89	83.12	79.55	33.79	68.28
Percent Dominant Taxa	37.22	30.04	34.58	48.16	49.32	75.31	57.14	52.27	41.10	49.78
EPT Index	9	11	12	14	11	6	12	11	12	12
Percent Chironomidae	0.56	3.43	0.83	1.22	0.00	0.00	1.95	2.27	5.48	1.32
Shannon-Weiner Diversity Index	1.96	2.16	2.06	1.89	1.83	1.06	1.59	1.75	1.97	1.79
Percent of Reference										
Taxa Richness	57.14	60.71	57.14	64.29	53.57	35.71	53.57	60.71	53.57	57.14
Hilsenhoff Biotic Index	69.20	75.61	74.03	70.13	67.97	159.91	132.37	87.81	66.75	80.49
Percent Ephemeroptera	41.67	48.07	39.58	23.27	22.83	88.89	83.12	79.55	33.79	68.28
Percent Dominant Taxa	37.22	30.04	34.58	48.16	49.32	75.31	57.14	52.27	41.10	49.78
EPT Index	52.94	64.71	70.59	82.35	64.71	35.29	70.59	64.71	70.59	70.59
Percent Chironomidae	0.56	3.43	0.83	1.22	0.00	0.00	1.95	2.27	5.48	1.32
Shannon-Weiner Diversity Index	72.43	80.04	76.30	69.83	67.80	39.14	59.01	64.64	73.14	66.45
Biological Condition Scores										
Taxa Richness	2	4	2	4	2	0	2	4	2	2
Hilsenhoff Biotic Index	2	4	4	4	2	6	6	6	2	4
Percent Ephemeroptera	6	6	6	4	4	6	6	6	6	6
Percent Dominant Taxa	2	2	2	0	0	0	0	0	0	0
EPT Index	0	0	2	4	0	0	2	0	2	2
Percent Chironomidae	6	6	6	6	6	6	6	6	4	6
Shannon-Weiner Diversity Index	4	6	6	4	4	2	4	4	4	4
Total Biological Score										
Total Biological Score	22	28	28	26	18	20	26	26	20	24
Percent of Reference	58	74	74	68	47	53	68	68	53	63
Assessment Designation	Slightly	Slightly	Slightly	Slightly	Moderately	Moderately	Slightly	Slightly	Moderately	Slightly

Metric Scores	SUSQ 94									
	KS1	KS2	KS3	KS4	KS5	RB1	RB2	RB3	RB4	RB5
Number of Individuals	182	228	263	247	257	228	114	214	209	195
Taxa Richness	20	20	19	20	19	17	14	11	13	12
Hilsenhoff Biotic Index	4.88	4.07	4.10	4.66	4.33	4.41	3.82	3.15	3.06	3.17
Percent Ephemeroptera	41.21	46.49	41.44	17.81	35.02	48.68	71.05	93.93	90.43	92.31
Percent Dominant Taxa	19.78	31.14	36.50	58.70	35.80	22.81	21.05	83.18	65.55	34.87
EPT Index	15	13	11	12	12	12	10	9	8	8
Percent Chironomidae	19.78	7.46	1.52	2.43	0.00	22.81	3.51	0.47	0.48	1.54
Shannon-Weiner Diversity Index	2.47	2.21	2.03	1.68	2.17	2.24	2.19	0.76	1.32	1.74
Percent of Reference										
Taxa Richness	71.43	71.43	67.86	71.43	67.86	60.71	50.00	39.29	46.43	42.86
Hilsenhoff Biotic Index	62.72	75.18	74.59	65.67	70.59	69.35	80.01	97.16	100.08	96.55
Percent Ephemeroptera	41.21	46.49	41.44	17.81	35.02	48.68	71.05	93.93	90.43	92.31
Percent Dominant Taxa	19.78	31.14	36.50	58.70	35.80	22.81	21.05	83.18	65.55	34.87
EPT Index	88.24	76.47	64.71	70.59	70.59	70.59	58.82	52.94	47.06	47.06
Percent Chironomidae	19.78	7.46	1.52	2.43	0.00	22.81	3.51	0.47	0.48	1.54
Shannon-Weiner Diversity Index	91.49	81.99	75.25	62.31	80.55	82.84	81.21	28.26	48.95	64.27
Biological Condition Scores										
Taxa Richness	4	4	4	4	4	4	2	0	2	2
Hilsenhoff Biotic Index	2	4	4	2	4	2	4	6	6	6
Percent Ephemeroptera	6	6	6	4	6	6	6	6	6	6
Percent Dominant Taxa	6	2	2	0	2	4	4	0	0	2
EPT Index	4	2	0	2	2	2	0	0	0	0
Percent Chironomidae	4	4	6	6	6	2	6	6	6	6
Shannon-Weiner Diversity Index	6	6	6	4	6	6	6	2	2	4
Total Biological Score										
Total Biological Score	32	28	28	22	30	26	28	20	22	26
Percent of Reference	84	74	74	58	79	68	74	53	58	68
Assessment Designation	Non	Slightly	Slightly	Slightly	Slightly	Slightly	Slightly	Moderately	Slightly	Slightly

	SUSQ 106								
Metric Scores	**KS1**	**KS2**	**KS3**	**KS4**	**KS5**	**RB2**	**RB3**	**RB4**	**RB5**
Number of Individuals	220	252	233	249	237	227	177	245	224
Taxa Richness	20	16	20	14	17	13	15	12	13
Hilsenhoff Biotic Index	4.04	3.83	3.96	4.50	4.72	3.30	3.48	3.37	3.60
Percent Ephemeroptera	44.55	47.22	40.77	38.55	8.02	77.09	48.59	86.94	69.64
Percent Dominant Taxa	31.82	44.44	38.20	48.59	57.81	71.81	36.72	75.10	62.05
EPT Index	13	10	13	11	10	11	8	8	9
Percent Chironomidae	5.91	3.17	1.29	6.43	11.81	2.64	1.69	1.63	0.45
Shannon-Weiner Diversity Index	2.27	1.74	1.88	1.72	1.64	1.17	1.89	1.10	1.45
Percent of Reference									
Taxa Richness	71.43	57.14	71.43	50.00	60.71	46.43	53.57	42.86	46.43
Hilsenhoff Biotic Index	75.73	79.83	77.25	67.97	64.87	92.62	87.93	90.76	84.94
Percent Ephemeroptera	44.55	47.22	40.77	38.55	8.02	77.09	48.59	86.94	69.64
Percent Dominant Taxa	31.82	44.44	38.20	48.59	57.81	71.81	36.72	75.10	62.05
EPT Index	76.47	58.82	76.47	64.71	58.82	64.71	47.06	47.06	52.94
Percent Chironomidae	5.91	3.17	1.29	6.43	11.81	2.64	1.69	1.63	0.45
Shannon-Weiner Diversity Index	83.91	64.27	69.63	63.86	60.91	43.21	69.92	40.65	53.82
Biological Condition Scores									
Taxa Richness	4	2	4	2	4	2	2	2	2
Hilsenhoff Biotic Index	4	4	4	2	2	6	6	6	4
Percent Ephemeroptera	6	6	6	6	2	6	6	6	6
Percent Dominant Taxa	2	0	2	0	0	0	2	0	0
EPT Index	2	0	2	0	0	0	0	0	0
Percent Chironomidae	4	6	6	4	4	6	6	6	6
Shannon-Weiner Diversity Index	6	4	4	4	4	2	4	2	4
Total Biological Score									
Total Biological Score	28	22	28	18	16	22	26	22	22
Percent of Reference	74	58	74	47	42	58	68	58	58
Assessment Designation	Slightly	Slightly	Slightly	Moderately	Moderately	Slightly	Slightly	Slightly	Slightly

	SUSQ 122					
Metric Scores	**KS1**	**KS2**	**KS3**	**KS4**	**KS5**	**RB4**
Number of Individuals	262	266	247	209	94	139
Taxa Richness	15	10	14	17	18	14
Hilsenhoff Biotic Index	3.65	4.57	4.77	5.66	4.63	5.56
Percent Ephemeroptera	60.31	9.40	7.69	15.79	35.11	12.23
Percent Dominant Taxa	43.51	62.78	74.09	55.02	45.74	41.73
EPT Index	10	7	9	7	8	3
Percent Chironomidae	3.82	4.14	1.21	55.02	45.74	41.73
Shannon-Weiner Diversity Index	1.88	1.31	1.15	1.65	2.02	1.93
Percent of Reference						
Taxa Richness	53.57	35.71	50.00	60.71	64.29	50.00
Hilsenhoff Biotic Index	83.77	66.99	64.11	54.06	66.12	55.02
Percent Ephemeroptera	60.31	9.40	7.69	15.79	35.11	12.23
Percent Dominant Taxa	43.51	62.78	74.09	55.02	45.74	41.73
EPT Index	58.82	41.18	52.94	41.18	47.06	17.65
Percent Chironomidae	3.82	4.14	1.21	55.02	45.74	41.73
Shannon-Weiner Diversity Index	69.64	48.67	42.54	61.01	74.97	71.42
Biological Condition Scores						
Taxa Richness	2	0	2	4	4	2
Hilsenhoff Biotic Index	4	2	2	2	2	2
Percent Ephemeroptera	6	2	2	4	6	4
Percent Dominant Taxa	0	0	0	0	0	0
EPT Index	0	0	0	0	0	0
Percent Chironomidae	6	6	6	0	0	0
Shannon-Weiner Diversity Index	4	2	2	4	4	4
Total Biological Score						
Total Biological Score	22	12	14	14	16	12
Percent of Reference	58	32	37	37	42	32
Assessment Designation	Slightly	Moderately	Moderately	Moderately	Moderately	Moderately

	SUSQ 138									
Metric Scores	**KS1**	**KS2**	**KS3**	**KS4**	**KS5**	**RB1**	**RB2**	**RB3**	**RB4**	**RB5**
Number of Individuals	268	247	267	228	264	230	223	224	228	242
Taxa Richness	19	13	17	14	17	24	13	10	19	13
Hilsenhoff Biotic Index	4.64	4.55	4.45	4.64	4.42	4.06	3.34	3.18	4.18	3.57
Percent Ephemeroptera	14.93	19.84	22.47	14.91	23.11	49.13	89.24	94.64	54.39	38.84
Percent Dominant Taxa	62.69	61.54	56.18	72.37	58.71	34.78	77.58	91.07	30.26	35.95
EPT Index	8	10	12	10	9	12	8	6	14	9
Percent Chironomidae	1.12	2.83	2.62	3.07	0.38	8.70	4.04	0.00	4.39	9.09
Shannon-Weiner Diversity Index	1.60	1.36	1.63	1.20	1.53	2.36	0.99	0.48	2.37	1.70
Percent of Reference										
Taxa Richness	67.86	46.43	60.71	50.00	60.71	85.71	46.43	35.71	67.86	46.43
Hilsenhoff Biotic Index	65.92	67.18	68.71	65.88	69.28	75.35	91.59	96.27	73.13	85.61
Percent Ephemeroptera	14.93	19.84	22.47	14.91	23.11	49.13	89.24	94.64	54.39	38.84
Percent Dominant Taxa	62.69	61.54	56.18	72.37	58.71	34.78	77.58	91.07	30.26	35.95
EPT Index	47.06	58.82	70.59	58.82	52.94	70.59	47.06	35.29	82.35	52.94
Percent Chironomidae	1.12	2.83	2.62	3.07	0.38	8.70	4.04	0.00	4.39	9.09
Shannon-Weiner Diversity Index	59.10	50.41	60.28	44.47	56.53	87.34	36.61	17.70	87.94	63.00
Biological Condition Scores										
Taxa Richness	4	2	4	2	4	6	2	0	4	2
Hilsenhoff Biotic Index	2	2	2	2	2	4	6	6	4	6
Percent Ephemeroptera	4	4	4	4	4	6	6	6	6	6
Percent Dominant Taxa	0	0	0	0	0	2	0	0	2	2
EPT Index	0	0	2	0	0	2	0	0	4	0
Percent Chironomidae	6	6	6	6	6	4	6	6	6	4
Shannon-Weiner Diversity Index	4	4	4	2	4	6	2	0	6	4
Total Biological Score										
Total Biological Score	20	18	22	16	20	30	22	18	32	24
Percent of Reference	53	47	58	42	53	79	58	47	84	63
Assessment Designation	Moderately	Moderately	Slightly	Moderately	Moderately	Slightly	Slightly	Moderately	Non	Slightly

	SUSQ 149									
Metric Scores	**KS1**	**KS2**	**KS3**	**KS4**	**KS5**	**RB1**	**RB2**	**RB3**	**RB4**	**RB5**
Number of Individuals	253	269	233	278	279	237	228	227	135	227
Taxa Richness	18	17	20	18	17	17	17	14	17	13
Hilsenhoff Biotic Index	4.59	4.59	4.77	4.97	4.41	4.29	4.08	3.75	3.81	4.35
Percent Ephemeroptera	12.65	8.92	24.46	7.19	4.66	34.60	30.26	42.29	55.56	16.30
Percent Dominant Taxa	45.45	57.99	36.05	70.86	54.12	33.33	28.07	40.53	24.44	21.15
EPT Index	11	9	12	12	11	10	12	9	13	8
Percent Chironomidae	0.40	0.74	3.00	3.24	3.94	5.91	14.04	3.96	8.89	10.13
Shannon-Weiner Diversity Index	2.01	1.65	2.36	1.32	1.64	2.02	1.95	1.81	2.30	2.12
Percent of Reference										
Taxa Richness	64.29	60.71	71.43	64.29	60.71	60.71	60.71	50.00	60.71	46.43
Hilsenhoff Biotic Index	66.62	66.71	64.12	61.55	69.35	71.38	74.94	81.62	80.21	70.31
Percent Ephemeroptera	12.65	8.92	24.46	7.19	4.66	34.60	30.26	42.29	55.56	16.30
Percent Dominant Taxa	45.45	57.99	36.05	70.86	54.12	33.33	28.07	40.53	24.44	21.15
EPT Index	64.71	52.94	70.59	70.59	64.71	58.82	70.59	52.94	76.47	47.06
Percent Chironomidae	0.40	0.74	3.00	3.24	3.94	5.91	14.04	3.96	8.89	10.13
Shannon-Weiner Diversity Index	74.43	61.07	87.38	48.90	60.67	74.74	72.38	67.12	85.05	78.47
Biological Condition Scores										
Taxa Richness	4	4	4	4	4	4	4	2	4	2
Hilsenhoff Biotic Index	2	2	2	2	2	4	4	4	4	4
Percent Ephemeroptera	4	2	4	2	2	6	6	6	6	4
Percent Dominant Taxa	0	0	2	0	0	2	4	0	4	4
EPT Index	0	0	2	2	0	0	2	0	2	0
Percent Chironomidae	6	6	6	6	6	4	4	6	4	4
Shannon-Weiner Diversity Index	4	4	6	2	4	4	4	4	6	6
Total Biological Score										
Total Biological Score	20	18	26	18	18	24	28	22	30	24
Percent of Reference	53	47	68	47	47	63	74	58	79	63
Assessment Designation	Moderately	Moderately	Slightly	Moderately	Moderately	Slightly	Slightly	Slightly	Slightly	Slightly

	SUSQ 157									
Metric Scores	**KS1**	**KS2**	**KS3**	**KS4**	**KS5**	**RB1**	**RB2**	**RB3**	**RB4**	**RB5**
Number of Individuals	307	240	215	230	219	251	324	239	262	242
Taxa Richness	16	17	15	17	21	13	13	16	13	15
Hilsenhoff Biotic Index	4.63	4.58	5.01	4.87	4.54	4.52	5.06	4.47	3.88	4.68
Percent Ephemeroptera	11.07	15.83	9.30	8.26	9.59	44.22	11.11	31.80	32.44	13.22
Percent Dominant Taxa	26.06	33.33	63.26	31.74	27.40	33.86	26.85	30.54	30.15	42.15
EPT Index	10	10	8	11	12	10	9	11	9	11
Percent Chironomidae	19.22	12.92	9.77	13.48	14.16	19.52	26.85	15.48	14.12	17.36
Shannon-Weiner Diversity Index	2.11	2.11	1.50	2.17	2.20	1.87	1.95	2.00	1.73	1.82
Percent of Reference										
Taxa Richness	57.14	60.71	53.57	60.71	75.00	46.43	46.43	57.14	46.43	53.57
Hilsenhoff Biotic Index	66.11	66.82	61.03	62.90	67.35	67.73	60.49	68.41	78.83	65.36
Percent Ephemeroptera	11.07	15.83	9.30	8.26	9.59	44.22	11.11	31.80	32.44	13.22
Percent Dominant Taxa	26.06	33.33	63.26	31.74	27.40	33.86	26.85	30.54	30.15	42.15
EPT Index	58.82	58.82	47.06	64.71	70.59	58.82	52.94	64.71	52.94	64.71
Percent Chironomidae	19.22	12.92	9.77	13.48	14.16	19.52	26.85	15.48	14.12	17.36
Shannon-Weiner Diversity Index	78.07	78.14	55.39	80.28	81.38	69.39	72.04	74.23	64.03	67.24
Biological Condition Scores										
Taxa Richness	2	4	2	4	4	2	2	2	2	2
Hilsenhoff Biotic Index	2	2	2	2	2	2	2	2	4	2
Percent Ephemeroptera	4	4	2	2	2	6	4	6	6	4
Percent Dominant Taxa	4	2	0	2	4	2	4	2	2	0
EPT Index	0	0	0	0	2	0	0	0	0	0
Percent Chironomidae	4	4	4	4	4	4	2	4	4	4
Shannon-Weiner Diversity Index	6	6	4	6	6	4	4	4	4	4
Total Biological Score										
Total Biological Score	22	22	14	20	24	20	18	20	22	16
Percent of Reference	58	58	37	53	63	53	47	53	58	42
Assessment Designation	Slightly	Slightly	Moderately	Moderately	Slightly	Moderately	Moderately	Moderately	Slightly	Moderately

	SUSQ 174									
Metric Scores	**KS1**	**KS2**	**KS3**	**KS4**	**KS5**	**RB1**	**RB2**	**RB3**	**RB4**	**RB5**
Number of Individuals	399	422	343	346	227	270	6	4	195	86
Taxa Richness	17	19	17	11	15	20	5	3	17	15
Hilsenhoff Biotic Index	5.38	5.31	5.28	5.16	4.72	4.00	5.83	5.00	4.82	4.50
Percent Ephemeroptera	13.53	15.40	22.16	21.97	26.87	49.26	0.00	25.00	45.64	51.16
Percent Dominant Taxa	59.40	48.82	58.89	48.27	50.66	42.59	33.33	50.00	31.79	30.23
EPT Index	12	11	12	8	10	13	1	1	10	9
Percent Chironomidae	59.40	48.82	58.89	48.27	6.61	17.04	33.33	50.00	31.79	24.42
Shannon-Weiner Diversity Index	1.33	1.50	1.38	1.41	1.65	1.98	1.56	1.04	1.87	2.03
Percent of Reference										
Taxa Richness	60.71	67.86	60.71	39.29	53.57	71.43	17.86	10.71	60.71	53.57
Hilsenhoff Biotic Index	56.84	57.60	57.99	59.25	64.80	76.43	52.46	61.20	63.48	68.00
Percent Ephemeroptera	13.53	15.40	22.16	21.97	26.87	49.26	0.00	25.00	45.64	51.16
Percent Dominant Taxa	59.40	48.82	58.89	48.27	50.66	42.59	33.33	50.00	31.79	30.23
EPT Index	70.59	64.71	70.59	47.06	58.82	76.47	5.88	5.88	58.82	52.94
Percent Chironomidae	59.40	48.82	58.89	48.27	6.61	17.04	33.33	50.00	31.79	24.42
Shannon-Weiner Diversity Index	49.41	55.56	51.01	52.07	61.13	73.50	57.80	38.51	69.30	75.03
Biological Condition Scores										
Taxa Richness	4	4	4	0	2	4	0	0	4	2
Hilsenhoff Biotic Index	2	2	2	2	2	4	2	2	2	2
Percent Ephemeroptera	4	4	4	4	6	6	0	6	6	6
Percent Dominant Taxa	0	0	0	0	0	0	2	0	2	2
EPT Index	2	0	2	0	0	2	0	0	0	0
Percent Chironomidae	0	0	0	0	4	4	2	0	2	2
Shannon-Weiner Diversity Index	2	4	4	4	4	4	4	2	4	6
Total Biological Score										
Total Biological Score	14	14	16	10	18	24	10	10	20	20
Percent of Reference	37	37	42	26	47	63	26	26	53	53
Assessment Designation	Moderately	Moderately	Moderately	Moderately	Moderately	Slightly	Moderately	Moderately	Moderately	Moderately

	SUSQ 192						
Metric Scores	**KS1**	**KS2**	**KS3**	**KS4**	**KS5**	**RB3**	**RB4**
Number of Individuals	275	269	310	249	290	316	252
Taxa Richness	17	15	16	19	21	11	13
Hilsenhoff Biotic Index	4.27	4.22	4.19	4.00	4.21	4.31	3.51
Percent Ephemeroptera	18.91	15.61	13.55	22.49	14.83	44.30	58.73
Percent Dominant Taxa	23.27	26.39	30.00	24.10	23.10	39.87	56.75
EPT Index	13	11	13	14	14	9	12
Percent Chironomidae	5.45	8.92	8.39	6.83	11.03	36.08	8.73
Shannon-Weiner Diversity Index	2.34	2.22	2.22	2.37	2.25	1.53	1.48
Percent of Reference							
Taxa Richness	60.71	53.57	57.14	67.86	75.00	39.29	46.43
Hilsenhoff Biotic Index	71.74	72.46	73.03	76.42	72.68	71.00	87.23
Percent Ephemeroptera	18.91	15.61	13.55	22.49	14.83	44.30	58.73
Percent Dominant Taxa	23.27	26.39	30.00	24.10	23.10	39.87	56.75
EPT Index	76.47	64.71	76.47	82.35	82.35	52.94	70.59
Percent Chironomidae	5.45	8.92	8.39	6.83	11.03	36.08	8.73
Shannon-Weiner Diversity Index	86.55	82.15	82.35	87.79	83.23	56.71	54.88
Biological Condition Scores							
Taxa Richness	4	2	2	4	4	0	2
Hilsenhoff Biotic Index	4	4	4	4	4	4	6
Percent Ephemeroptera	4	4	4	4	4	6	6
Percent Dominant Taxa	4	4	4	4	4	2	0
EPT Index	2	0	2	4	4	0	2
Percent Chironomidae	4	4	4	4	4	0	4
Shannon-Weiner Diversity Index	6	6	6	6	6	4	4
Total Biological Score							
Total Biological Score	28	24	26	30	30	16	24
Percent of Reference	74	63	68	79	79	42	63
Assessment Designation	Slightly	Slightly	Slightly	Slightly	Slightly	Moderate	Slightly

	SUSQ 207								
Metric Scores	**KS1**	**KS2**	**KS3**	**KS4**	**KS5**	**RB1**	**RB2**	**RB3**	**RB5**
Number of Individuals	229	216	220	219	250	211	231	224	239
Taxa Richness	20	16	17	20	21	12	14	12	13
Hilsenhoff Biotic Index	4.28	4.38	4.77	4.60	4.42	4.28	4.46	3.59	4.19
Percent Ephemeroptera	47.16	35.65	36.82	36.07	47.20	53.55	44.59	76.34	54.39
Percent Dominant Taxa	26.64	20.83	22.27	26.03	30.40	39.81	29.44	71.88	39.75
EPT Index	13	11	10	11	14	9	10	8	9
Percent Chironomidae	7.42	7.41	6.36	5.02	5.60	15.17	11.26	6.70	9.21
Shannon-Weiner Diversity Index	2.42	2.43	2.33	2.35	2.37	1.95	2.02	1.14	1.86
Percent of Reference									
Taxa Richness	71.43	57.14	60.71	71.43	75.00	42.86	50.00	42.86	46.43
Hilsenhoff Biotic Index	71.43	69.87	64.11	66.55	69.17	71.50	68.63	85.25	72.99
Percent Ephemeroptera	47.16	35.65	36.82	36.07	47.20	53.55	44.59	76.34	54.39
Percent Dominant Taxa	26.64	20.83	22.27	26.03	30.40	39.81	29.44	71.88	39.75
EPT Index	76.47	64.71	58.82	64.71	82.35	52.94	58.82	47.06	52.94
Percent Chironomidae	7.42	7.41	6.36	5.02	5.60	15.17	11.26	6.70	9.21
Shannon-Weiner Diversity Index	89.51	90.06	86.17	87.06	87.90	72.09	74.75	42.36	68.73
Biological Condition Scores									
Taxa Richness	4	2	4	4	4	2	2	2	2
Hilsenhoff Biotic Index	4	2	2	2	2	4	2	6	4
Percent Ephemeroptera	6	6	6	6	6	6	6	6	6
Percent Dominant Taxa	4	4	4	4	2	2	4	0	2
EPT Index	2	0	0	0	4	0	0	0	0
Percent Chironomidae	4	4	4	4	4	4	4	4	4
Shannon-Weiner Diversity Index	6	6	6	6	6	4	4	2	4
Total Biological Score									
Total Biological Score	30	24	26	26	28	22	22	20	22
Percent of Reference	79	63	68	68	74	58	58	53	58
Assessment Designation	Slightly	Slightly	Slightly	Slightly	Slightly	Slightly	Slightly	Moderate	Slightly

	SUSQ 219								
Metric Scores	**KS1**	**KS2**	**KS3**	**KS4**	**KS5**	**RB1**	**RB2**	**RB3**	**RB4**
Number of Individuals	293	215	212	225	214	100	202	255	229
Taxa Richness	22	9	20	17	19	18	19	15	14
Hilsenhoff Biotic Index	4.54	5.18	4.90	4.70	4.80	4.33	5.33	3.62	3.84
Percent Ephemeroptera	22.18	0.47	11.79	23.56	10.75	49.00	15.35	52.16	51.97
Percent Dominant Taxa	55.63	49.30	39.15	19.56	27.57	30.00	31.19	49.80	47.16
EPT Index	12	1	10	12	13	11	6	10	12
Percent Chironomidae	3.07	1.40	3.30	5.33	27.57	7.00	6.93	0.39	3.49
Shannon-Weiner Diversity Index	1.82	1.51	2.18	2.35	2.10	2.26	2.12	1.70	1.75
Percent of Reference									
Taxa Richness	78.57	32.14	71.43	60.71	67.86	64.29	67.86	53.57	50.00
Hilsenhoff Biotic Index	67.46	59.11	62.44	65.08	63.76	70.67	57.39	84.63	79.63
Percent Ephemeroptera	22.18	0.47	11.79	23.56	10.75	49.00	15.35	52.16	51.97
Percent Dominant Taxa	55.63	49.30	39.15	19.56	27.57	30.00	31.19	49.80	47.16
EPT Index	70.59	5.88	58.82	70.59	76.47	64.71	35.29	58.82	70.59
Percent Chironomidae	3.07	1.40	3.30	5.33	27.57	7.00	6.93	0.39	3.49
Shannon-Weiner Diversity Index	67.25	55.85	80.79	86.98	77.85	83.61	78.51	63.01	64.71
Biological Condition Scores									
Taxa Richness	4	0	4	4	4	4	4	2	2
Hilsenhoff Biotic Index	2	2	2	2	2	4	2	4	4
Percent Ephemeroptera	4	0	4	4	4	6	4	6	6
Percent Dominant Taxa	0	0	2	6	4	4	2	0	0
EPT Index	2	0	0	2	2	0	0	0	2
Percent Chironomidae	6	6	6	4	2	4	4	6	6
Shannon-Weiner Diversity Index	4	4	6	6	6	6	6	4	4
Total Biological Score									
Total Biological Score	22	12	24	28	24	28	22	22	24
Percent of Reference	58	32	63	74	63	74	58	58	63
Assessment Designation	Slightly	Moderate	Slightly	Slightly	Slightly	Slightly	Slightly	Slightly	Slightly

	SUSQ 234								
Metric Scores	**KS1**	**KS2**	**KS3**	**KS4**	**KS5**	**RB1**	**RB2**	**RB3**	**RB4**
Number of Individuals	214	219	226	230	223	247	268	251	251
Taxa Richness	16	17	17	14	16	15	11	14	20
Hilsenhoff Biotic Index	4.86	4.72	4.88	4.98	4.43	4.30	4.50	4.41	4.44
Percent Ephemeroptera	17.76	22.37	24.34	24.78	36.32	49.80	30.60	29.08	33.86
Percent Dominant Taxa	25.70	24.66	28.76	28.70	34.08	47.77	37.31	31.47	31.87
EPT Index	8	10	9	9	10	8	9	10	11
Percent Chironomidae	23.83	24.66	28.76	28.70	21.08	13.77	16.79	11.55	15.54
Shannon-Weiner Diversity Index	2.08	2.09	1.98	2.02	1.92	1.65	1.57	1.78	1.85
Percent of Reference									
Taxa Richness	57.14	60.71	60.71	50.00	57.14	53.57	39.29	50.00	71.43
Hilsenhoff Biotic Index	63.03	64.81	62.75	61.47	69.07	71.17	68.00	69.44	68.95
Percent Ephemeroptera	17.76	22.37	24.34	24.78	36.32	49.80	30.60	29.08	33.86
Percent Dominant Taxa	25.70	24.66	28.76	28.70	34.08	47.77	37.31	31.47	31.87
EPT Index	47.06	58.82	52.94	52.94	58.82	47.06	52.94	58.82	64.71
Percent Chironomidae	23.83	24.66	28.76	28.70	21.08	13.77	16.79	11.55	15.54
Shannon-Weiner Diversity Index	77.00	77.33	73.29	74.77	71.26	61.04	58.08	65.93	68.58
Biological Condition Scores									
Taxa Richness	2	4	4	2	2	2	0	2	4
Hilsenhoff Biotic Index	2	2	2	2	2	4	2	2	2
Percent Ephemeroptera	4	4	4	4	6	6	6	6	6
Percent Dominant Taxa	4	4	4	4	2	0	2	2	2
EPT Index	0	0	0	0	0	0	0	0	0
Percent Chironomidae	2	2	2	2	2	4	4	4	4
Shannon-Weiner Diversity Index	6	6	4	4	4	4	4	4	4
Total Biological Score									
Total Biological Score	20	22	20	18	18	20	18	20	22
Percent of Reference	53	58	53	47	47	53	47	53	58
Assessment Designation	Moderate	Slightly	Moderate	Moderate	Moderate	Moderate	Moderate	Moderate	Slightly

	SUSQ 256						
Metric Scores	**KS1**	**KS2**	**KS3**	**KS4**	**KS5**	**RB2**	**RB5**
Number of Individuals	217	209	219	212	229	279	199
Taxa Richness	17	15	14	16	16	14	12
Hilsenhoff Biotic Index	5.22	5.19	4.89	5.02	5.17	4.77	4.95
Percent Ephemeroptera	11.52	12.44	14.16	6.13	15.28	15.05	26.63
Percent Dominant Taxa	49.77	28.23	20.09	27.83	23.14	34.77	24.62
EPT Index	8	7	8	9	9	9	8
Percent Chironomidae	49.77	20.57	20.09	27.83	23.14	24.73	18.59
Shannon-Weiner Diversity Index	1.85	2.08	2.15	2.09	2.20	1.83	1.97
Percent of Reference							
Taxa Richness	60.71	53.57	50.00	57.14	57.14	50.00	42.86
Hilsenhoff Biotic Index	58.61	59.00	62.57	60.97	59.23	64.14	61.82
Percent Ephemeroptera	11.52	12.44	14.16	6.13	15.28	15.05	26.63
Percent Dominant Taxa	49.77	28.23	20.09	27.83	23.14	34.77	24.62
EPT Index	47.06	41.18	47.06	52.94	52.94	52.94	47.06
Percent Chironomidae	49.77	20.57	20.09	27.83	23.14	24.73	18.59
Shannon-Weiner Diversity Index	68.64	77.21	79.45	77.44	81.32	67.74	73.01
Biological Condition Scores							
Taxa Richness	4	2	2	2	2	2	2
Hilsenhoff Biotic Index	2	2	2	2	2	2	2
Percent Ephemeroptera	4	4	4	2	4	4	6
Percent Dominant Taxa	0	4	4	4	4	2	4
EPT Index	0	0	0	0	0	0	0
Percent Chironomidae	0	4	4	2	2	2	4
Shannon-Weiner Diversity Index	4	6	6	6	6	4	4
Total Biological Score							
Total Biological Score	14	22	22	18	20	16	22
Percent of Reference	37	58	58	47	53	42	58
Assessment Designation	Moderate	Slightly	Slightly	Moderate	Moderate	Moderate	Slightly

	SUSQ 271						
Metric Scores	**KS1**	**KS2**	**KS3**	**KS4**	**KS5**	**RB4**	**RB5**
Number of Individuals	229	252	256	242	259	264	137
Taxa Richness	19	16	19	23	21	11	19
Hilsenhoff Biotic Index	4.65	4.85	4.92	4.89	4.83	5.06	4.55
Percent Ephemeroptera	16.16	19.44	19.53	19.01	15.06	7.95	43.07
Percent Dominant Taxa	26.64	25.40	31.25	19.42	25.10	43.56	28.47
EPT Index	10	9	11	13	11	10	12
Percent Chironomidae	10.04	20.24	10.94	11.98	11.58	21.59	21.90
Shannon-Weiner Diversity Index	2.42	2.09	2.25	2.56	2.48	1.54	2.26
Percent of Reference							
Taxa Richness	67.86	57.14	67.86	82.14	75.00	39.29	67.86
Hilsenhoff Biotic Index	65.80	63.05	62.22	62.60	63.40	60.42	67.29
Percent Ephemeroptera	16.16	19.44	19.53	19.01	15.06	7.95	43.07
Percent Dominant Taxa	26.64	25.40	31.25	19.42	25.10	43.56	28.47
EPT Index	58.82	52.94	64.71	76.47	64.71	58.82	70.59
Percent Chironomidae	10.04	20.24	10.94	11.98	11.58	21.59	21.90
Shannon-Weiner Diversity Index	89.55	77.34	83.25	94.94	91.96	57.01	83.55
Biological Condition Scores							
Taxa Richness	4	2	4	6	4	0	4
Hilsenhoff Biotic Index	2	2	2	2	2	2	2
Percent Ephemeroptera	4	4	4	4	4	2	6
Percent Dominant Taxa	4	4	2	6	4	0	4
EPT Index	0	0	0	2	0	0	2
Percent Chironomidae	4	4	4	4	4	2	2
Shannon-Weiner Diversity Index	6	6	6	6	6	4	6
Total Biological Score							
Total Biological Score	24	22	22	30	24	10	26
Percent of Reference	63	58	58	79	63	26	68
Assessment Designation	Slightly	Slightly	Slightly	Slightly	Slightly	Moderate	Slightly

	SUSQ 300								
Metric Scores	**KS1**	**KS2**	**KS3**	**KS4**	**KS5**	**RB1**	**RB2**	**RB3**	**RB5**
Number of Individuals	240	227	234	223	304	277	237	274	224
Taxa Richness	20	18	15	19	17	14	10	16	17
Hilsenhoff Biotic Index	4.98	4.70	4.87	4.83	5.21	4.67	4.53	4.55	5.56
Percent Ephemeroptera	22.08	29.07	16.67	17.04	15.13	24.19	35.86	22.99	19.64
Percent Dominant Taxa	25.42	40.09	26.07	29.60	27.63	21.66	35.02	32.48	21.88
EPT Index	11	10	11	12	7	9	8	11	10
Percent Chironomidae	6.67	4.85	5.98	11.66	22.04	14.44	6.75	17.88	15.18
Shannon-Weiner Diversity Index	2.26	2.10	2.21	2.31	2.16	2.04	1.61	1.95	2.04
Percent of Reference									
Taxa Richness	71.43	64.29	53.57	67.86	60.71	50.00	35.71	57.14	60.71
Hilsenhoff Biotic Index	61.40	65.04	62.81	63.30	58.69	65.50	67.59	67.24	55.01
Percent Ephemeroptera	22.08	29.07	16.67	17.04	15.13	24.19	35.86	22.99	19.64
Percent Dominant Taxa	25.42	40.09	26.07	29.60	27.63	21.66	35.02	32.48	21.88
EPT Index	64.71	58.82	64.71	70.59	41.18	52.94	47.06	64.71	58.82
Percent Chironomidae	6.67	4.85	5.98	11.66	22.04	14.44	6.75	17.88	15.18
Shannon-Weiner Diversity Index	83.79	77.90	81.72	85.64	79.99	75.42	59.73	72.21	75.72
Biological Condition Scores									
Taxa Richness	4	4	2	4	4	2	0	2	4
Hilsenhoff Biotic Index	2	2	2	2	2	2	2	2	2
Percent Ephemeroptera	4	6	4	4	4	4	6	4	4
Percent Dominant Taxa	4	0	4	4	4	4	2	2	4
EPT Index	0	0	0	2	0	0	0	0	0
Percent Chironomidae	4	6	4	4	2	4	4	4	4
Shannon-Weiner Diversity Index	6	6	6	6	6	6	4	4	6
Total Biological Score									
Total Biological Score	24	24	22	26	22	22	18	18	24
Percent of Reference	63	63	58	68	58	58	47	47	63
Assessment Designation	Slightly	Slightly	Slightly	Slightly	Slightly	Slightly	Moderate	Moderate	Slightly

	SUSQ 312									
Metric Scores	**KS1**	**KS2**	**KS3**	**KS4**	**KS5**	**RB1**	**RB2**	**RB3**	**RB4**	**RB5**
Number of Individuals	259	233	223	224	244	250	226	229	225	270
Taxa Richness	21	20	17	16	19	16	14	15	17	18
Hilsenhoff Biotic Index	4.85	5.05	5.12	4.96	4.68	5.63	5.36	4.94	4.62	4.64
Percent Ephemeroptera	14.67	11.16	17.94	23.66	23.36	3.20	12.39	20.52	32.89	34.07
Percent Dominant Taxa	19.31	24.89	33.63	41.96	19.26	25.20	46.02	39.74	35.11	28.52
EPT Index	9	11	11	7	10	5	9	10	10	13
Percent Chironomidae	11.58	4.29	4.04	4.46	4.10	18.00	7.96	6.11	7.11	16.30
Shannon-Weiner Diversity Index	2.44	2.33	2.15	1.85	2.48	2.12	1.85	1.92	1.81	2.01
Percent of Reference										
Taxa Richness	75.00	71.43	60.71	57.14	67.86	57.14	50.00	53.57	60.71	64.29
Hilsenhoff Biotic Index	63.15	60.58	59.75	61.70	65.44	54.37	57.11	61.90	66.27	65.99
Percent Ephemeroptera	14.67	11.16	17.94	23.66	23.36	3.20	12.39	20.52	32.89	34.07
Percent Dominant Taxa	19.31	24.89	33.63	41.96	19.26	25.20	46.02	39.74	35.11	28.52
EPT Index	52.94	64.71	64.71	41.18	58.82	29.41	52.94	58.82	58.82	76.47
Percent Chironomidae	11.58	4.29	4.04	4.46	4.10	18.00	7.96	6.11	7.11	16.30
Shannon-Weiner Diversity Index	90.53	86.33	79.50	68.69	91.85	78.42	68.33	71.08	67.19	74.40
Biological Condition Scores										
Taxa Richness	4	4	4	2	4	2	2	2	4	4
Hilsenhoff Biotic Index	2	2	2	2	2	2	2	2	2	2
Percent Ephemeroptera	4	4	4	4	4	2	4	4	6	6
Percent Dominant Taxa	6	4	2	0	6	4	0	2	2	4
EPT Index	0	0	0	0	0	0	0	0	0	2
Percent Chironomidae	4	6	6	6	6	4	4	4	4	4
Shannon-Weiner Diversity Index	6	6	6	4	6	6	4	4	4	4
Total Biological Score										
Total Biological Score	26	26	24	18	28	20	16	18	22	26
Percent of Reference	68	68	63	47	74	53	42	47	58	68
Assessment Designation	Slightly	Slightly	Slightly	Moderately	Slightly	Moderate	Moderately	Moderately	Slightly	Slightly

	SUSQ 327						
Metric Scores	**KS1**	**KS2**	**KS3**	**KS4**	**KS5**	**RB3**	**RB4**
Number of Individuals	289	269	234	238	314	264	290
Taxa Richness	20	15	17	18	11	8	15
Hilsenhoff Biotic Index	4.91	5.45	5.50	5.51	5.62	5.34	5.59
Percent Ephemeroptera	6.57	2.23	4.27	4.62	0.96	6.06	7.24
Percent Dominant Taxa	42.56	29.00	48.72	38.24	54.78	36.36	57.24
EPT Index	7	8	7	8	2	4	6
Percent Chironomidae	10.03	10.41	5.98	10.92	54.78	19.32	18.62
Shannon-Weiner Diversity Index	2.03	2.01	1.71	1.64	1.37	1.44	1.42
Percent of Reference							
Taxa Richness	71.43	53.57	60.71	64.29	39.29	28.57	53.57
Hilsenhoff Biotic Index	62.32	56.19	55.68	55.55	54.47	57.25	54.78
Percent Ephemeroptera	6.57	2.23	4.27	4.62	0.96	6.06	7.24
Percent Dominant Taxa	42.56	29.00	48.72	38.24	54.78	36.36	57.24
EPT Index	41.18	47.06	41.18	47.06	11.76	23.53	35.29
Percent Chironomidae	10.03	10.41	5.98	10.92	54.78	19.32	18.62
Shannon-Weiner Diversity Index	75.34	74.32	63.30	60.73	50.70	53.52	52.60
Biological Condition Scores							
Taxa Richness	4	2	4	4	0	0	2
Hilsenhoff Biotic Index	2	2	2	2	2	2	2
Percent Ephemeroptera	2	0	2	2	0	2	2
Percent Dominant Taxa	0	4	0	2	0	2	0
EPT Index	0	0	0	0	0	0	0
Percent Chironomidae	4	4	4	4	0	4	4
Shannon-Weiner Diversity Index	6	4	4	4	4	4	4
Total Biological Score							
Total Biological Score	18	16	16	18	6	14	14
Percent of Reference	47	42	42	47	16	37	37
Assessment Designation	Moderate	Moderate	Moderate	Moderate	Severe	Moderate	Moderate

	SUSQ 344									
Metric Scores	**KS1**	**KS2**	**KS3**	**KS4**	**KS5**	**RB1**	**RB2**	**RB3**	**RB4**	**RB5**
Number of Individuals	254	310	246	279	290	253	246	280	310	242
Taxa Richness	20	20	16	19	18	13	19	18	18	14
Hilsenhoff Biotic Index	4.25	4.25	4.45	4.25	4.37	4.11	3.92	3.94	4.25	3.72
Percent Ephemeroptera	25.59	19.35	6.10	11.47	11.38	40.71	50.41	46.79	15.81	64.05
Percent Dominant Taxa	24.41	29.35	56.50	45.16	46.90	37.94	47.97	40.71	16.77	61.57
EPT Index	13	10	11	11	12	10	13	11	12	9
Percent Chironomidae	2.76	4.84	2.03	3.58	3.79	9.49	9.35	7.50	13.23	9.50
Shannon-Weiner Diversity Index	2.45	2.40	1.72	1.94	1.99	1.87	1.89	2.12	2.35	1.48
Percent of Reference										
Taxa Richness	71.43	71.43	57.14	67.86	64.29	46.43	67.86	64.29	64.29	50.00
Hilsenhoff Biotic Index	71.97	72.03	68.75	71.98	69.98	74.37	78.09	77.68	71.97	82.28
Percent Ephemeroptera	25.59	19.35	6.10	11.47	11.38	40.71	50.41	46.79	15.81	64.05
Percent Dominant Taxa	24.41	29.35	56.50	45.16	46.90	37.94	47.97	40.71	16.77	61.57
EPT Index	76.47	58.82	64.71	64.71	70.59	58.82	76.47	64.71	70.59	52.94
Percent Chironomidae	2.76	4.84	2.03	3.58	3.79	9.49	9.35	7.50	13.23	9.50
Shannon-Weiner Diversity Index	90.77	88.76	63.58	71.96	73.77	69.44	70.06	78.43	86.93	54.66
Biological Condition Scores										
Taxa Richness	4	4	2	4	4	2	4	4	4	2
Hilsenhoff Biotic Index	4	4	2	4	2	4	4	4	4	4
Percent Ephemeroptera	6	4	2	4	4	6	6	6	4	6
Percent Dominant Taxa	4	4	0	0	0	2	0	0	6	0
EPT Index	2	0	0	0	2	0	2	0	2	0
Percent Chironomidae	6	6	6	6	6	4	4	4	4	4
Shannon-Weiner Diversity Index	6	6	4	4	4	4	4	6	6	4
Total Biological Score										
Total Biological Score	32	28	16	22	22	22	24	24	30	20
Percent of Reference	84	74	42	58	58	58	63	63	79	53
Assessment Designation	Non	Slightly	Moderate	Slightly	Slightly	Slightly	Moderately	Moderately	Slightly	Moderately

	SUSQ 356									
Metric Scores	**KS1**	**KS2**	**KS3**	**KS4**	**KS5**	**RB1**	**RB2**	**RB3**	**RB4**	**RB5**
Number of Individuals	248	223	280	368	259	283	272	247	269	287
Taxa Richness	22	19	14	14	14	25	19	17	28	25
Hilsenhoff Biotic Index	4.50	4.60	4.51	4.84	4.50	4.67	3.92	3.66	4.56	4.58
Percent Ephemeroptera	26.61	26.46	34.29	28.53	35.52	39.93	55.51	68.42	19.70	27.87
Percent Dominant Taxa	25.81	32.29	37.14	30.98	33.20	23.67	45.96	65.18	29.74	18.12
EPT Index	11	9	8	9	8	15	13	12	17	13
Percent Chironomidae	8.06	13.00	7.50	30.98	16.60	13.07	4.78	3.64	29.74	11.50
Shannon-Weiner Diversity Index	2.27	2.10	1.64	1.66	1.95	2.35	1.91	1.38	2.55	2.50
Percent of Reference										
Taxa Richness	78.57	67.86	50.00	50.00	50.00	89.29	67.86	60.71	100.00	89.29
Hilsenhoff Biotic Index	68.06	66.57	67.78	63.23	68.03	65.51	78.08	83.70	67.09	66.78
Percent Ephemeroptera	26.61	26.46	34.29	28.53	35.52	39.93	55.51	68.42	19.70	27.87
Percent Dominant Taxa	25.81	32.29	37.14	30.98	33.20	23.67	45.96	65.18	29.74	18.12
EPT Index	64.71	52.94	47.06	52.94	47.06	88.24	76.47	70.59	100.00	76.47
Percent Chironomidae	8.06	13.00	7.50	30.98	16.60	13.07	4.78	3.64	29.74	11.50
Shannon-Weiner Diversity Index	83.93	77.67	60.64	61.62	72.13	87.16	70.82	50.95	94.56	92.54
Biological Condition Scores										
Taxa Richness	4	4	2	2	2	6	4	4	6	6
Hilsenhoff Biotic Index	2	2	2	2	2	2	4	4	2	2
Percent Ephemeroptera	6	6	6	6	6	6	6	6	4	6
Percent Dominant Taxa	4	2	2	2	2	4	0	0	4	6
EPT Index	0	0	0	0	0	4	2	2	6	2
Percent Chironomidae	4	4	4	2	4	4	6	6	2	4
Shannon-Weiner Diversity Index	6	6	4	4	4	6	4	4	6	6
Total Biological Score										
Total Biological Score	26	24	20	18	20	32	26	26	30	32
Percent of Reference	68	63	53	47	53	84	68	68	79	84
Assessment Designation	Slightly	Slightly	Moderately	Moderately	Moderately	Non	Slightly	Slightly	Slightly	Non

	SUSQ 365									
Metric Scores	**KS1**	**KS2**	**KS3**	**KS4**	**KS5**	**RB1**	**RB2**	**RB3**	**RB4**	**RB5**
Number of Individuals	213	191	279	229	252	265	242	249	247	220
Taxa Richness	19	18	21	20	23	22	19	20	23	17
Hilsenhoff Biotic Index	4.53	4.53	4.24	4.52	4.19	3.66	4.05	4.35	3.81	3.34
Percent Ephemeroptera	9.86	6.81	22.22	12.66	19.05	54.72	30.58	20.88	35.63	75.00
Percent Dominant Taxa	25.82	22.51	21.15	19.21	14.29	47.55	23.97	32.53	25.51	67.73
EPT Index	11	10	12	11	14	15	14	15	15	9
Percent Chironomidae	1.41	3.66	7.17	6.55	4.76	12.08	4.96	10.44	5.26	1.82
Shannon-Weiner Diversity Index	2.15	2.36	2.40	2.56	2.70	2.07	2.29	2.16	2.52	1.37
Percent of Reference										
Taxa Richness	67.86	64.29	75.00	71.43	82.14	78.57	67.86	71.43	82.14	60.71
Hilsenhoff Biotic Index	67.61	67.57	72.17	67.64	72.95	83.51	75.56	70.35	80.24	91.72
Percent Ephemeroptera	9.86	6.81	22.22	12.66	19.05	54.72	30.58	20.88	35.63	75.00
Percent Dominant Taxa	25.82	22.51	21.15	19.21	14.29	47.55	23.97	32.53	25.51	67.73
EPT Index	64.71	58.82	70.59	64.71	82.35	88.24	82.35	88.24	88.24	52.94
Percent Chironomidae	1.41	3.66	7.17	6.55	4.76	12.08	4.96	10.44	5.26	1.82
Shannon-Weiner Diversity Index	79.75	87.50	88.83	94.99	99.84	76.85	84.71	79.93	93.45	50.92
Biological Condition Scores										
Taxa Richness	4	4	4	4	6	4	4	4	6	4
Hilsenhoff Biotic Index	2	2	4	2	4	4	4	4	4	6
Percent Ephemeroptera	2	2	4	4	4	6	6	4	6	6
Percent Dominant Taxa	4	4	4	6	6	0	4	2	4	0
EPT Index	0	0	2	0	4	4	4	4	4	0
Percent Chironomidae	6	6	4	4	6	4	6	4	4	6
Shannon-Weiner Diversity Index	6	6	6	6	6	6	6	6	6	4
Total Biological Score										
Total Biological Score	24	24	28	26	36	28	34	28	34	26
Percent of Reference	63	63	74	68	95	74	89	74	89	68
Assessment Designation	Slightly	Slightly	Slightly	Slightly	Non	Slightly	Non	Slightly	Non	Slightly

	SUSQ 394									
Metric Scores	**KS1**	**KS2**	**KS3**	**KS4**	**KS5**	**RB1**	**RB2**	**RB3**	**RB4**	**RB5**
Number of Individuals	288	241	245	274	315	251	231	321	259	277
Taxa Richness	22	25	22	20	22	22	18	18	19	22
Hilsenhoff Biotic Index	4.05	3.93	4.29	4.24	4.23	3.89	4.79	4.02	4.02	3.66
Percent Ephemeroptera	18.75	22.41	22.86	20.07	19.37	57.37	33.77	40.81	46.72	73.65
Percent Dominant Taxa	13.54	38.17	12.65	26.28	20.95	26.29	42.86	32.40	32.82	51.99
EPT Index	13	15	12	13	14	10	9	13	14	14
Percent Chironomidae	5.90	0.83	4.08	4.74	16.51	18.33	8.23	10.59	4.25	14.08
Shannon-Weiner Diversity Index	2.61	2.25	2.69	2.51	2.58	2.24	1.98	2.03	2.19	1.81
Percent of Reference										
Taxa Richness	78.57	89.29	78.57	71.43	78.57	78.57	64.29	64.29	67.86	78.57
Hilsenhoff Biotic Index	75.58	77.87	71.40	72.15	72.31	78.69	63.91	76.20	76.13	83.51
Percent Ephemeroptera	18.75	22.41	22.86	20.07	19.37	57.37	33.77	40.81	46.72	73.65
Percent Dominant Taxa	13.54	38.17	12.65	26.28	20.95	26.29	42.86	32.40	32.82	51.99
EPT Index	76.47	88.24	70.59	76.47	82.35	58.82	52.94	76.47	82.35	82.35
Percent Chironomidae	5.90	0.83	4.08	4.74	16.51	18.33	8.23	10.59	4.25	14.08
Shannon-Weiner Diversity Index	96.75	83.29	99.74	92.90	95.70	82.88	73.20	75.28	81.03	67.21
Biological Condition Scores										
Taxa Richness	4	6	4	4	4	4	4	4	4	4
Hilsenhoff Biotic Index	4	4	4	4	4	4	2	4	4	4
Percent Ephemeroptera	4	4	4	4	4	6	6	6	6	6
Percent Dominant Taxa	6	2	6	4	4	4	0	2	2	0
EPT Index	2	4	2	2	4	0	0	2	4	4
Percent Chironomidae	4	6	6	6	4	4	4	4	6	4
Shannon-Weiner Diversity Index	6	6	6	6	6	6	4	6	6	4
Total Biological Score										
Total Biological Score	30	32	32	30	30	28	20	28	32	26
Percent of Reference	79	84	84	79	79	74	53	74	84	68
Assessment Designation	Slightly	Non	Non	Slightly	Slightly	Slightly	Moderately	Slightly	Non	Slightly

	JUNR 2								
Metric Scores	**KS1**	**KS2**	**KS3**	**KS4**	**KS5**	**RB1**	**RB2**	**RB3**	**RB4**
Number of Individuals	261	260	244	249	236	253	251	225	263
Taxa Richness	20	20	24	21	24	18	22	15	14
Hilsenhoff Biotic Index	4.42	4.10	4.36	4.05	4.86	3.70	3.88	3.77	3.75
Percent Ephemeroptera	34.87	55.00	42.62	55.42	21.19	67.59	57.77	62.67	68.82
Percent Dominant Taxa	27.97	43.08	20.90	44.58	25.85	60.47	17.93	55.11	64.64
EPT Index	11	13	17	13	14	10	15	10	10
Percent Chironomidae	3.83	3.46	2.46	2.41	1.69	5.93	8.76	3.56	1.14
Shannon-Weiner Diversity Index	2.39	2.04	2.45	2.01	2.29	1.51	2.54	1.58	1.27
Percent of Reference									
Taxa Richness	71.43	71.43	85.71	75.00	85.71	64.29	78.57	53.57	50.00
Hilsenhoff Biotic Index	69.27	74.56	70.11	75.59	62.96	82.62	78.78	81.19	81.70
Percent Ephemeroptera	34.87	55.00	42.62	55.42	21.19	67.59	57.77	62.67	68.82
Percent Dominant Taxa	27.97	43.08	20.90	44.58	25.85	60.47	17.93	55.11	64.64
EPT Index	64.71	76.47	100.00	76.47	82.35	58.82	88.24	58.82	58.82
Percent Chironomidae	3.83	3.46	2.46	2.41	1.69	5.93	8.76	3.56	1.14
Shannon-Weiner Diversity Index	88.62	75.50	90.85	74.30	84.80	55.80	93.91	58.52	47.08
Biological Condition Scores									
Taxa Richness	4	4	6	4	6	4	4	2	2
Hilsenhoff Biotic Index	2	4	4	4	2	4	4	4	4
Percent Ephemeroptera	6	6	6	6	4	6	6	6	6
Percent Dominant Taxa	4	0	4	0	4	0	6	0	0
EPT Index	0	2	6	2	4	0	4	0	0
Percent Chironomidae	6	6	6	6	6	4	4	6	6
Shannon-Weiner Diversity Index	6	6	6	4	6	4	6	4	2
Total Biological Score									
Total Biological Score	28	28	38	26	32	22	34	22	20
Percent of Reference	74	74	100	68	84	58	89	58	53
Assessment Designation	Slightly	Slightly	Non	Slightly	Non	Slightly	Non	Slightly	Moderate

	CHEM 3									
Metric Scores	**KS1**	**KS2**	**KS3**	**KS4**	**KS5**	**RB1**	**RB2**	**RB3**	**RB4**	**RB5**
Number of Individuals	223	221	242	258	256	208	313	258	250	251
Taxa Richness	18	21	24	22	19	18	15	14	19	21
Hilsenhoff Biotic Index	5.21	4.70	4.78	4.70	4.76	6.03	4.61	4.22	4.88	4.67
Percent Ephemeroptera	17.04	28.96	15.70	11.63	14.06	16.83	30.35	28.68	32.80	33.07
Percent Dominant Taxa	25.11	33.48	21.07	31.01	23.83	31.73	34.82	24.81	40.40	25.50
EPT Index	10	14	14	12	12	10	11	11	10	13
Percent Chironomidae	11.66	11.31	3.31	6.20	8.20	26.92	34.82	8.14	40.40	25.50
Shannon-Weiner Diversity Index	2.35	2.21	2.60	2.38	2.48	2.09	1.84	2.07	2.05	2.35
Percent of Reference										
Taxa Richness	64.29	75.00	85.71	78.57	67.86	64.29	53.57	50.00	67.86	75.00
Hilsenhoff Biotic Index	58.72	65.09	64.00	65.14	64.32	50.72	66.42	72.56	62.65	65.53
Percent Ephemeroptera	17.04	28.96	15.70	11.63	14.06	16.83	30.35	28.68	32.80	33.07
Percent Dominant Taxa	25.11	33.48	21.07	31.01	23.83	31.73	34.82	24.81	40.40	25.50
EPT Index	58.82	82.35	82.35	70.59	70.59	58.82	64.71	64.71	58.82	76.47
Percent Chironomidae	11.66	11.31	3.31	6.20	8.20	26.92	34.82	8.14	40.40	25.50
Shannon-Weiner Diversity Index	87.09	81.80	96.40	88.28	92.00	77.40	68.25	76.75	76.05	87.19
Biological Condition Scores										
Taxa Richness	4	4	6	4	4	4	2	2	4	4
Hilsenhoff Biotic Index	2	2	2	2	2	2	2	4	2	2
Percent Ephemeroptera	4	6	4	4	4	4	6	6	6	6
Percent Dominant Taxa	4	2	4	2	4	2	2	4	0	4
EPT Index	0	4	4	2	2	0	0	0	0	2
Percent Chironomidae	4	4	6	4	4	2	2	4	0	2
Shannon-Weiner Diversity Index	6	6	6	6	6	6	4	6	6	6
Total Biological Score										
Total Biological Score	24	28	32	24	26	20	18	26	18	26
Percent of Reference	63	74	84	63	68	53	47	68	47	68
Assessment Designation	Slightly	Slightly	Non	Slightly	Slightly	Moderate	Moderately	Slightly	Moderately	Slightly

	WBSR 8									
Metric Scores	**KS1**	**KS2**	**KS3**	**KS4**	**KS5**	**RB1**	**RB2**	**RB3**	**RB4**	**RB5**
Number of Individuals	207	210	232	211	222	237	266	273	257	241
Taxa Richness	27	28	23	24	20	19	17	16	22	14
Hilsenhoff Biotic Index	4.28	3.64	4.97	4.04	5.64	4.19	4.38	4.30	3.91	4.93
Percent Ephemeroptera	38.16	37.62	19.83	55.92	5.41	52.74	38.72	42.86	63.42	36.51
Percent Dominant Taxa	19.32	28.10	43.10	45.97	74.32	32.07	32.33	39.56	56.81	44.40
EPT Index	10	14	15	15	5	11	11	12	13	8
Percent Chironomidae	7.73	3.33	6.03	3.79	3.60	29.11	15.79	12.82	14.01	13.69
Shannon-Weiner Diversity Index	2.61	2.37	2.08	2.06	1.24	1.92	2.04	1.90	1.66	1.51
Percent of Reference										
Taxa Richness	96.43	100.00	82.14	85.71	71.43	67.86	60.71	57.14	78.57	50.00
Hilsenhoff Biotic Index	71.49	84.00	61.57	75.78	54.22	73.11	69.81	71.22	78.33	62.08
Percent Ephemeroptera	38.16	37.62	19.83	55.92	5.41	52.74	38.72	42.86	63.42	36.51
Percent Dominant Taxa	19.32	28.10	43.10	45.97	74.32	32.07	32.33	39.56	56.81	44.40
EPT Index	58.82	82.35	88.24	88.24	29.41	64.71	64.71	70.59	76.47	47.06
Percent Chironomidae	7.73	3.33	6.03	3.79	3.60	29.11	15.79	12.82	14.01	13.69
Shannon-Weiner Diversity Index	96.82	87.67	76.87	76.35	45.82	71.18	75.48	70.40	61.40	56.05
Biological Condition Scores										
Taxa Richness	6	6	6	6	4	4	4	2	4	2
Hilsenhoff Biotic Index	4	4	2	4	2	4	2	4	4	2
Percent Ephemeroptera	6	6	4	6	2	6	6	6	6	6
Percent Dominant Taxa	6	4	0	0	0	2	2	2	0	0
EPT Index	0	4	4	4	0	0	0	2	2	0
Percent Chironomidae	4	6	4	6	6	2	4	4	4	4
Shannon-Weiner Diversity Index	6	6	6	6	2	4	6	4	4	4
Total Biological Score										
Total Biological Score	32	36	26	32	16	22	24	24	24	18
Percent of Reference	84	95	68	84	42	58	63	63	63	47
Assessment Designation	Non	Non	Slightly	Non	Moderate	Slightly	Slightly	Slightly	Slightly	Moderate