Biological Assessment of the Patapsco River Tributary Watersheds, Howard County, Maryland

Patuxtent River

Spring 2003 Index Period and Summary of Round One County-Wide Assessment

April, 2005
Final Report

UT to Patuxtent River

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Spring 2003 Index Period and Summary of Round One County-wide Assessment

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Acknowledgement

The principal authors of this report are Kristen L. Pavlik and James B. Stribling, both of Tetra Tech. They were also assisted by Erik W. Leppo. This document reports results from three of the six subwatersheds sampled during the Spring Index Period of the third year of biomonitoring by the Howard County Stormwater Management Division.

Fieldwork was conducted by Tetra Tech staff including Kristen Pavlik, Colin Hill, David Bressler, Jennifer Pitt, and Amanda Richardson. All laboratory sample processing was conducted by Carolina Gallardo, Shabaan Fundi, Curt Kleinsorg, Chad Bogues, Joey Rizzo, Elizabeth Yarborough, Jessica Garrish, Chris Hines, and Sara Waddell. Taxonomic identification was completed by Dr. R. Deedee Kathman and Todd Askegaard; Aquatic Resources Center (ARC). Hunt Loftin, Linda Shook, and Brenda Decker (Tetra Tech) assisted with budget tracking and clerical support.

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Abstract

Several indicators (benthic macroinvertebrates, physical habitat quality, sediment particle size distribution, and channel size/shape) were sampled or measured at 30 stream sites in the Patapsco Tributary (South Branch, Patapsco River Lower Branch A, Patapsco River Lower Branch B) subwatersheds (10 sites in each) in Howard County, Maryland during March 2003. Sampling site locations were selected at random and were pre-stratified by subwatershed and stream order. Benthic macroinvertebrates were collected using Maryland Biological Stream Survey (MBSS) methods (multihabitat, 20 ft^2).

This document reports the sampling and assessment results for all three Patapsco subwatersheds, as well as composite assessments for watershed-scale biological and habitat assessments from the previous two years of sampling (2001, 2002), and three other subwatersheds sampled in 2003 (Rocky Gorge, Hammond Branch, and Dorsey Run). Individual site assessments from the Patapsco River Tributary stream sites are also included. Watershed comparisons are made between all of the 15 subwatersheds located within Howard County.

The Patapsco watersheds are in “poor” biological condition (Mean BIBI=2.84), with only “partially supporting” physical habitat (Mean Habitat Score=123). One hundred fifty randomly selected sites were sampled, processed, and analyzed. Overall Howard County’s biological rating is “poor” (Mean BIBI=2.99), but is just under the cut-off for a “fair” narrative condition. In fact, there are almost exactly half “fair” (7) and “poor” (8) ratings across the County subwatersheds. However, the physical habitat seems to be responding more quickly to the rapid suburban sprawl and residual agricultural areas around the County, with an average “non-supporting” (56%, Mean Habitat Score=111.8) rating.

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Acronyms

ARC	Aquatic Resources Center
B-IBI	Benthic Index of Biotic Integrity
BMP	Best Management Practice
BRF	Biological Research Facility
DQO	Data Quality Objectives
DNR	Department of Natural Resources
DPW	Department of Public Works
DPZ	Department of Planning and Zoning
DRP	Department of Recreation and Parks
DS	Downstream
EDAS	Ecological Data Application System
EPT	Ephemeroptera, Plecoptera, Trichoptera
FLD	Field
MBSS	Maryland Biological Stream Survey
QA/QC	Quality Assurance/Quality Control
QAPP	Quality Assurance Project Plan
RBP	Rapid Biological Protocols
RPD	Relative Percent Difference
SD	Standard Deviation
SOP	Standard Operating Procedure
SWMD	Stormwater Management Division
TAC	Technical Advisory Committee
TCR	Taxonomic Certainty Rating
Tt	Tetra Tech
TV	Tolerance Value
USEPA	United State Environmental Protection Agency
US	Upstream
UT	Unnamed Tributary
WRD	Watershed Restoration Division

Executive Summary

In 2001, the Howard County Department of Public Works (DPW) Stormwater Management Division (SWMD) initiated biological monitoring for County streams and wadeable rivers on an annual, rotating basin cycle. The primary goal of this program is to assess the current status of the County's streams and watersheds and to establish a baseline for comparing future assessments. The program is designed to provide assessments at three geographic scales: stream-specific; watershed wide; and after the three-year sampling rotation is complete, county-wide. The Howard County Biomonitoring Program was designed to be comparable with the statewide Maryland Biological Stream Survey (MBSS) conducted by the Maryland Department of Natural Resources (DNR). Comparability allows a greater density of sampling locations with consistent interpretation. Watersheds sampled during the first two years of the program include: Little Patuxent River (2001), Cattail Creek (2001), Brighton Dam (2001), and Middle Patuxent River (2002). This report presents results of 2003 sampling in three subwatersheds of the Patapsco River watershed. It also contains county-wide comparisons of stream condition. The entire county has been sampled over the past three years with identical methods, allowing for these assessments.

Sampling occurred during the Spring Index Period and methods were identical to those used by the MBSS: benthic macroinvertebrates sampled using a D-frame net (595 µm mesh) in multiple habitats (20 ft^2), visual-based assessment of physical habitat quality, and selected field chemistry measurements. In addition to MBSS protocols, substrate particle size distribution and stream channel cross sectional area were also evaluated. Biological condition scores were derived using MBSS's Benthic Index of Biotic Integrity (B-IBI). The B-IBI was used to rate the biological condition of each site as good, fair, poor, or very poor. Assessment of physical habitat quality combined MBSS methods and USEPA's Rapid Bioassessment Protocols (RBPs). A rating scale based on the latter was assigned to each site, and used categories of: comparable, supporting, partially supporting, or non-supporting. MBSS measures were taken for additional qualitative information. Results of this study will be used to develop protection/restoration priorities across the County. The public will be able to access the yearly report via the County website, as well as through brochures highlighting specific watersheds.

All three Patapsco tributary subwatersheds received "partially-supporting" physical habitat ratings. All three of the subwatersheds were rated in "poor" biological condition. These three subwatersheds have a wide range of land uses. The South Branch Patapsco is dominated by pasture (78%), Patapsco Lower Branch A by forest (87%). Patapsco Lower Branch B has a more even land use pattern, however, forest is still the most common land use (47%).

I. PROGRAM OVERVIEW

Introduction

Background

The mission of the Howard County Stormwater Management Division (SWMD) is to improve the quality of life of the citizens of Howard County through managing the quality and quantity of County waters (Howard County SWMD 2003). Three years ago, the SWMD initiated a multi-year, rotating basin biomonitoring effort to assess the ecological condition of streams and watersheds throughout the County. This report includes results from three watersheds sampled during the Spring Index Period of 2003 (Patapsco River Tributaries), as well as comparisons of past sampling efforts (2001 – 2002).

Howard County is bounded on the southwest by the Patuxent River, and the Patapsco River to the north and east (Figure 1). Many of the sites sampled during this year of monitoring empty directly into the Patapsco River. Of the subwatersheds assessed in 2003, there are no large areas of urbanization (see Figure 3), although there are a number of potential stressor sources. These include the Alpha Ridge landfill, runoff from I-70, and farming activity.

The county is currently undergoing major changes in its land use patterns. Farming activity is quickly being replaced by suburban sprawl along the Baltimore-Washington DC corridor. This drastic change in land use/land cover creates changes in stream and watershed hydrology that cause acceleration of stream channel erosion. Encroachment on physical habitat through higher housing density, new roads and schools, and other urban-suburban developments cause increased runoff, sedimentation, destruction of riparian vegetation, and bank instability, leading to reduced overall habitat quality (Richards et al. 1996).

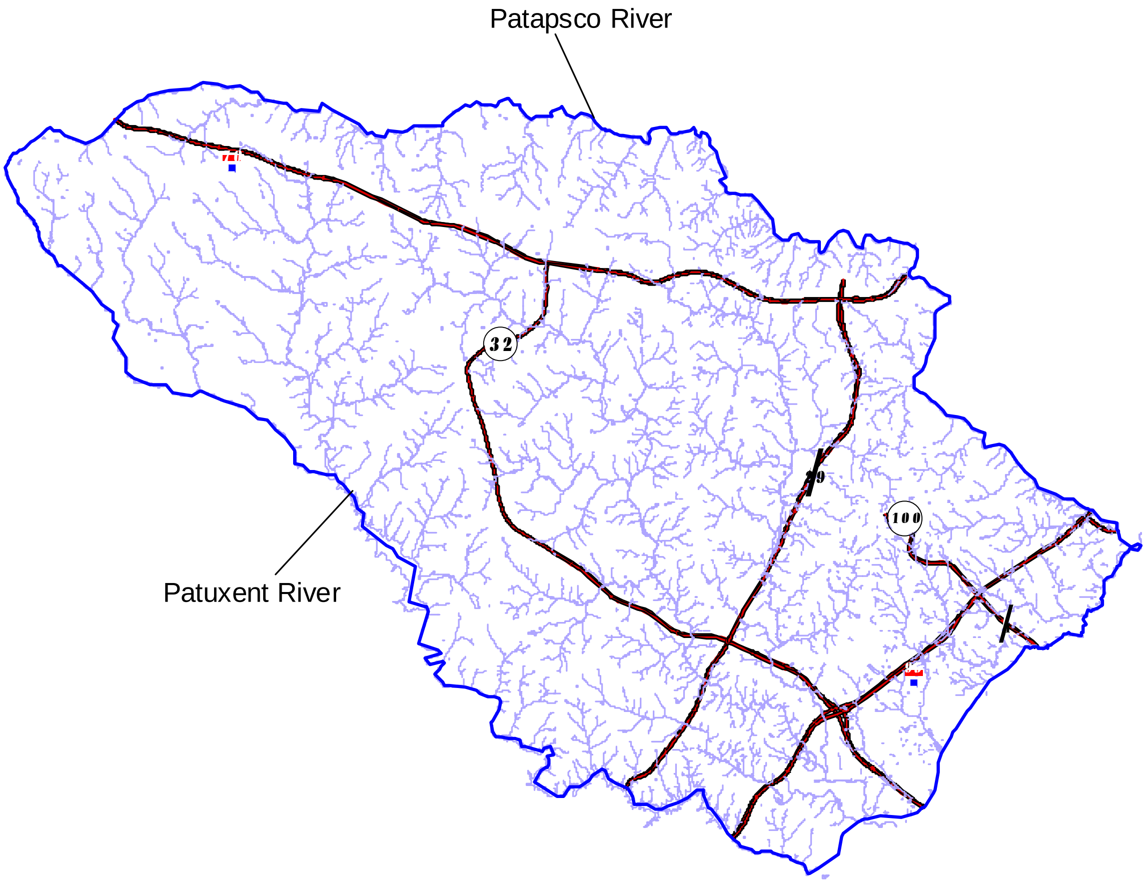

Figure 1. The Patapsco and Patuxent Rivers form the boundaries of Howard County.

Advantages of using benthic macroinvertebrates as the basis of biological assessments include that they often occur in large numbers; they respond to cumulative effects of physical habitat alteration, point source pollution, non-point source contaminants, and periodic contaminant spills; and they have a relative inability to quickly move away from such affected areas. Different aspects of the benthic assemblage change in response to stressed conditions (Barbour et al. 1999). For example, tolerant taxa are more dominant in streams that have degraded physical habitat, or an elevated intensity of physico-chemical stressors. A greater diversity of stressor-sensitive taxa typically are found in higher quality streams.

Purpose of Biological and Physical Habitat Assessment

Physical habitat quality is visually assessed at each site (Barbour 1999). Cross-sectional measurements and pebble counts are also completed to gain a better understanding of the composition of the streambed and to characterize the channel shape. A full physical assessment reflects the potential of a stream to support a dynamic biological community and to maintain normal hydrogeomorphic function.

While habitat alteration may lessen the ability of a stream to support a healthy biota, many other factors also affect the biological quality of any stream or watershed (Figure 2). Degraded habitat quality, interruption of natural hydrologic regimes, alterations in food/energy sources and water quality, and unnatural biologic interactions cause the biological condition of a stream to worsen (Karr et al. 1986). Potential stressors that cause this type of degradation include but are not limited to nutrient enrichment, toxic spills, flood control engineering, temperature extremes due to depletion of riparian zones or effluent discharge, elevated levels of suspended sediment due to animal access, clearing of riparian areas, and construction runoff. Sources of these stressors exist throughout Howard County and the state. Headwaters of many streams are outside the County, but they eventually flow into County watersheds and bring many pollutants in with them. Although biological monitoring is a critical tool for detecting impairment, it alone cannot identify specific causal relationships between stressors and stressor sources (Cormier et al. 2000). More specific chemical, physical, or hydrologic analyses may be necessary to fully diagnose the origins of stressors. This report examines the current biological and physical interactions that dictate the condition of the Patapsco Tributary watersheds, and provides possible explanations for those conditions.

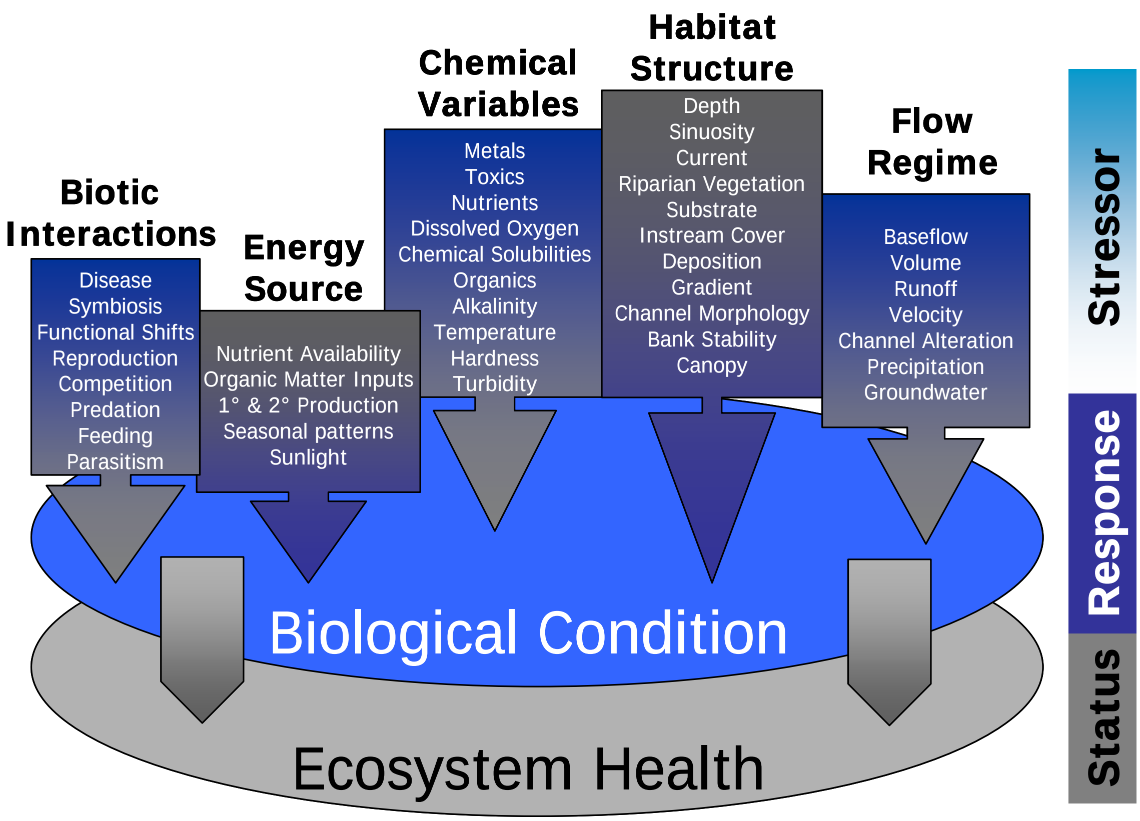

Figure 2. Five classes of environmental variables that affect water resource integrity and overall biological condition (modified from Karr et al. 1999).

Participating Agencies

Various County, State, and Regional personnel were and continue to be involved in the development of the County's ongoing biomonitoring program. Membership on the County's Technical Advisory Committee (TAC) includes Howard County Government (Stormwater Management Division (SWMD), the Department of Recreation and Parks (DRP), and the Department of Planning and Zoning (DPZ)), the State of Maryland Department of Natural Resources (DNR) Maryland Biological Stream Survey (MBSS), Montgomery County Department of Environmental Protection, and Region 3 United States Environmental Protection Agency. Selected TAC members (Howard County SWMD, DRP, DPZ; MBSS) reviewed earlier drafts of this report.

Methods

Network Design

Summary of Sampling Design

The measurement and data quality objectives (MQOs and DQOs) on which the Howard County biomonitoring program is based can be found in the *Quality Assurance Project Plan (QAPP) for Howard County Biological Monitoring and Assessment Program* (DPW 2001). The overall sampling design was developed to be directly comparable to the MBSS, and to allow the eventual sharing of data and assessments among agencies. The program is designed so that in any given year, 10 sites per subwatershed are sampled. A total of 15 subwatersheds were sampled during a span of three years. Specific details of the sampling design can be found in *Design of the Biological Monitoring and Assessment Program for Howard County Maryland* (Pavlik et al. 2000). Spatial allocation of the sampling segments was based on random selection within Strahler (1957) stream orders. For each subwatershed, the total stream channel distance was determined, and stratified by order (1^{st} – 4^{th}). The 10 sampling locations were proportionally allocated among the ordinal strata. Thus, final selection and placement of sampling segments was random, and stratified by subwatershed and stream order.

Site Selection

In 2003, the remaining six subwatersheds not yet sampled in the County were completed. The full sampling schedule (2001-2003) is detailed in Table 1. During Year 1, the Little Patuxent watershed was sampled by DNR's Watershed Restoration Division (WRD), as part of the statewide Watershed Restoration Action Strategy (WRAS) cooperative. The sites were randomly chosen by the County, therefore they are comparable with the remaining County samples. Figure 3 displays the watersheds and site locations sampled in 2003 that are covered in this report.

Table 1. Howard County sampling schedule by watershed. WRD indicates field sampling and laboratory processing of benthic samples performed by DNRs Watershed Restoration Division.

Year	Watershed Name or Surrogate	Subwatershed #	Primary Sampling Unit (PSU)
	Little Patuxent River	11	Upper Little Patuxent (10 sites, WRD)
		12	Mid Little Patuxent (10 sites, WRD)
1 (2001)	Brighton Dam	13	Lower Little Patuxent (10 sites, WRD)
		2	Upper Brighton Dam (10 sites)
	Cattail Creek	5	Lower Brighton Dam (10 sites)
		3	Cattail Creek (10 sites)
		6	Upper Middle Patuxent (10 sites)
2 (2002)	Middle Patuxent River	7	Mid Middle Patuxent (10 sites)
		8	Lower Middle Patuxent (10 sites)
		14	Hammond Branch (10 sites)
	Little Patuxent River	15	Dorsey Run (10 sites)
3 (2003)		9	Rocky Gorge (10 sites)
	Boundary Tributaries	10	S Branch Patapsco R Tribs (10 sites)
		1	Patapsco River L Branch A (10 sites)
		4	Patapsco River L Branch B (10 sites)

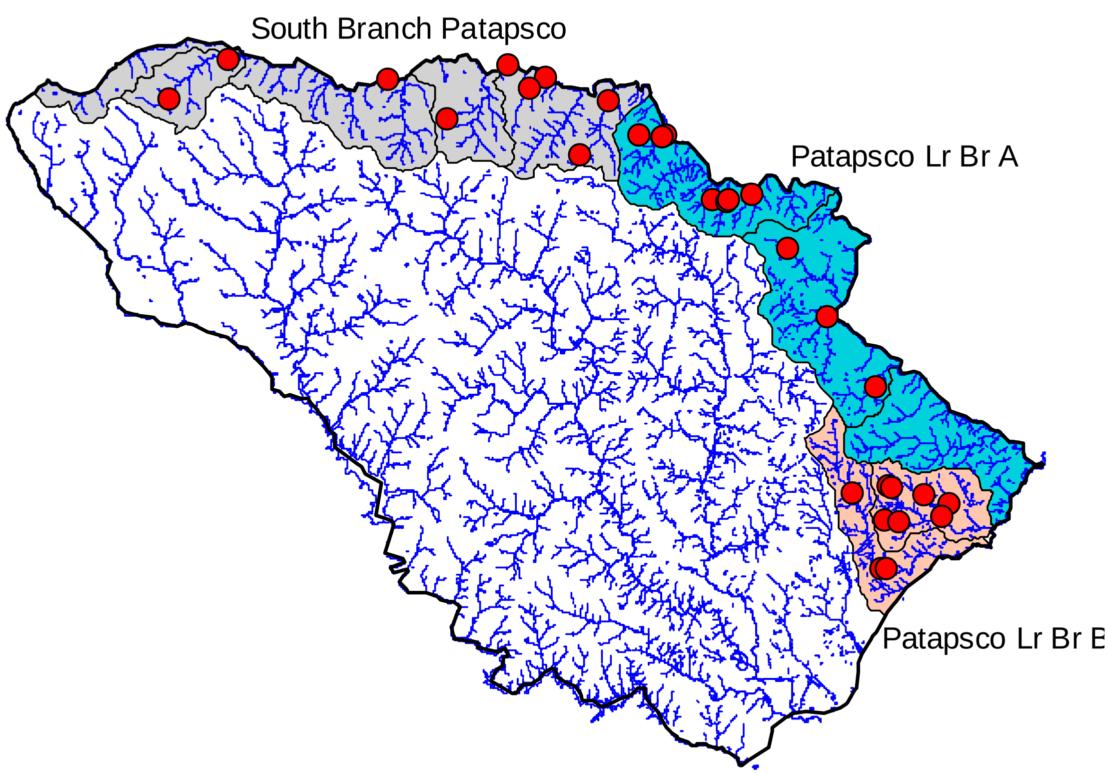

Figure 3. Location of sites sampled in the Patapsco River tributary subwatersheds in 2003.

Field Sampling and Laboratory Processing

Two two-person field teams completed sampling during the Spring 2003 Index Period. Benthic macroinvertebrates and physical habitat assessments are conducted in accordance with the Standard Operating Procedures (SOP FLD003/09.07.00; FLD005/02.27.01) contained within the Howard County QAPP (DPW 2001), as well as methods explained in the MBSS Sampling Manual (Kazyak 2000). *In-situ* water chemistry sampling, modified Wolman pebble count, and channel cross sectional measurements are conducted according to SOPs BRF050/07.07.97, FLD032/01.25.99, and FLD043/07.19.99, respectively. Laboratory sorting and subsampling are completed in accordance with SOP BRF004/02.23.01.

Benthic Sampling and Processing

At each site, benthic macroinvertebrates are collected from a 75m reach by sampling approximately 20ft² of surface area with a D-frame net (595 µm mesh), in proportion to the frequency of high quality habitat types (riffle/cobble; gravel, broken peat, clay; snags; undercut bank; SAV; and detrital/sandy bottom areas) found within the reach. All sampled material is then composited into a 595µm sieve bucket, placed in one or more one liter sample containers and preserved in a solution of 70-80% ethanol. Internal and external labels are completed for each container. Samples are tracked on chain-of-custody forms for each subwatershed. In the Tetra Tech Biological Research Facility (BRF), the composited samples are randomly subsampled to 100 organisms (±10%) (DPW 2001, Boward and Friedman 2000). In accordance with MBSS methods, samples containing <60 organisms are not given index scores and therefore are not included in overall watershed assessments (Boward personal communication 2001).

Duplicate (repeated) biological samples are taken at 10% of the overall number of sites. Since there are 10 sites in any given subwatershed, one additional quality control (QC) sample (biology, chemistry, and RBP habitat) is taken in each subwatershed. Duplicate sites are randomly chosen before the sampling event takes place.

Benthic Taxonomy

Benthic macroinvertebrates are identified primarily to genus level; early instars or individuals with damaged or missing diagnostic morphological features are identified at a higher taxonomic level, such as family. All identifications are performed by Aquatic Resources Center (ARC), College Grove, Tennessee (R.D. Kathman, principal). Taxonomic data are entered into the Ecological Data Application System, Version 3.0 (EDAS; Tetra Tech 1999). Functional feeding group, habitat, and tolerance value designations are assigned to each taxon according to Barbour et al. (1999), Merritt and Cummins (1996), and USEPA (1990). Tolerance of a taxon is based on its ability to survive short and long term exposure to physicochemical stressors that result from chemical pollution, hydrologic alteration, or habitat degradation (Stribling et al. 1998). Following Hilsenhoff's basic framework (1982), tolerance values are assigned to individual taxa on a scale of 0-10, with zero identifying taxa that are the most sensitive (least tolerant) to stressors, and 10, the least sensitive (tolerant) to stressors.

Physical Habitat Quality

Howard County performs all its biological sampling during the Spring Index Period, although the MBSS completes its habitat sampling in the summer, while sampling for fish. Since the County does not currently support a fish sampling program, the methods detailed by the US EPA in the Rapid Bioassessment Protocols (RBPs; Barbour et al. 1999) are followed for sampling Non-Coastal Plain physical habitat at each site (DPW 2001). Ten parameters describing physical habitat quality and stability are visually assessed at each site. These parameters are ranked as optimal, suboptimal, marginal, or poor based on a 20-point scale, with 20 being the best possible (optimal) conditions, and zero representing the worst (poor) conditions. The following 10 parameters are evaluated:

1. *Epifaunal substrate/available cover.* Includes the relative quantity and variety of natural structures in the stream, such as cobble (riffles), large rocks, fallen trees, logs and branches, and undercut banks, available as refuge, feeding, or sites for spawning and nursery functions of aquatic macrofauna.
2. *Embeddedness.* Refers to the extent to which rocks (gravel, cobble, and boulders) and snags are covered or sunken into the silt, or mud of the stream bottom.
3. *Velocity/depth regime.* The occurrence of flow patterns relates to the stream's ability to provide and maintain a stable aquatic environment.
4. *Sediment deposition.* Measures the amount of sediment that has accumulated in pools and the changes that have occurred to the stream bottom as a result of deposition.
5. *Channel flow status.* The degree to which a stream channel is filled with water.
6. *Channel alteration.* Measures (usually anthropogenic) changes in the shape of the stream channel.
7. *Frequency of riffles/bends.* Measures the heterogeneity occurring in a stream. Riffles are a source of high-quality habitat and diverse fauna. Therefore, increased frequency of occurrence greatly enhances the diversity of the stream community.
8. *Bank stability.* Measures whether the stream banks are eroded (or have potential for erosion).
9. *Vegetative protection.* Measures the amount of vegetative protection afforded to the stream bank and the near-stream portion of the riparian zone.
10. *Riparian vegetative zone width.* Measures the width of natural vegetation from the edge of the stream bank out through the riparian zone.

Parameters 8-10 evaluate each bank separately. The range of scores for each bank is 0 (poor) to 10 (optimal). Left and right banks are determined looking downstream. Example habitat forms can be found in the QAPP (SOP FLD005/02.27.01). Table 2 provides narrative ratings that correspond to physical habitat quality scores; these scores express the potential of a stream or watershed to support a healthy biological community (in essence, the biological potential of a site if physical conditions were the only stressor). Percentages and their narrative ratings were adapted from Plafkin et al. (1989).

Table 2. Total habitat scores as a percentage of maximum possible and corresponding ratings.

% of Maximum	Narrative Habitat Rating	Definition
>90.0	Comparable	Capable of maintaining biological conditions similar to reference streams
75.1-89.9	Supporting	Habitat of somewhat reduced condition, but often can support reference quality biology
60.1-75.0	Partially Supporting	Capable of supporting biological conditions of lower quality than reference conditions
<60.0	Non-Supporting	Not able to maintain healthy biological conditions

Habitat forms developed by MBSS are also completed at each site. These sheets evaluate land use/land cover designations, occurrence/severity of refuse, buffer breaks (storm drains, roads, pastures, etc.), and channelization. Information from these forms is described in the narrative watershed and site-by-site assessment sections of this report. The "percent of maximum" habitat values presented in the appendix are calculated by dividing the total habitat score by the total possible score represented on the habitat data sheets (method maximum), rather than a mean of field measurements or median from a set of reference sites. RBP habitat data sheets have a total possible score of 200.

Water Quality

Conductivity, dissolved oxygen, pH, and temperature are measured at each site using a YSI 600 QS Multi-Parameter Water Quality Monitor. This instrument is calibrated for each parameter at the start of each sampling day, and the readings are recorded in the calibration log book.

Modified Wolman Pebble Count

In addition to the qualitative habitat assessment, this physical habitat feature is measured for all stream sites. While not a part of the MBSS protocols, a modified Wolman pebble count is performed to obtain more specific data on stream bottom materials (Wolman 19 __). Ten transects are evenly distributed (approximately every 7.5m) through the site. Ten particles are selected starting at one bank at approximate bankfull level and spanning the width of the active channel. Each particle is chosen, measured, and recorded at evenly spaced intervals across the channel. Particles are defined as the size of inorganic substrate material within various classes: silt/clay, sand, gravel, cobble, boulder, and bedrock. Calipers and a sand card are used for particle measurement (DPW 2001, SOP FLD032/01.25.99; Harrelson et al. 1994).

Channel Cross-Section

Although not measured by MBSS, this characterization is included to provide a coarse description of channel cross-sectional area, shape, and changes to channel volume over time. After a thorough visual assessment of the site characteristics during the habitat assessment, a representative section is selected for the cross-section transect. A tape measure is drawn between pins that are set on each bank. The pins keep the tape taut during measurement. Height measurements are taken using a laser-level and top-setting survey rod (DPW 2001, SOP FLD043/07.19.99). The measurements are taken across the entire width of the channel, at transitional areas along the bank and streambed (e.g., bankfull, thalweg, edge of water, etc.).

Inability to Sample Stream Sites

In case access to a stream is denied by a landowner, or prohibited by any other means (fenced, inside small culvert, dammed, etc.), 10 alternate sampling sites are randomly chosen in each watershed. During this sampling year, five alternates were necessary in the three subwatersheds sampled. Each alternate is of the same stream order as the primary stream. Sites were relocated for access, safety, or water availability issues.

Data Analysis

Data Structure

Benthic macroinvertebrate, physical habitat, and water quality data were entered into EDAS Version 3.0 (Tetra Tech 1999). This relational database allows for the management of location and other metadata, taxonomic and count data, raw physical habitat scores, the calculation of metric values, physical habitat, and B-IBI values. All three years of sampling data and results are stored in EDAS.

Biological Index Rating (Methods for Calculation and Scoring)

The biological indicator used in this project is based on the Index of Biological Integrity (IBI; Karr et al. 1986) and uses characteristics of the benthic macroinvertebrate assemblage structure and function to assess the overall water resource condition. A benthic IBI was developed by the MBSS and calibrated for different geographic regions (Coastal Plain, Non-Coastal Plain) in Maryland (Stribling et al. 1998). The majority of Howard County lies in the non-Coastal plain, however, 10 sites (two in Rocky Gorge and eight in Dorsey Run) lie in the fall-zone between strictly Coastal plain and Non-Coastal Plain areas.

The benthic metrics used were those selected and calibrated by the MBSS (Stribling et al. 1998) for Maryland non-Coastal plain streams. The nine metrics calculated for each of the benthic macroinvertebrate samples were:

1. *Total number of taxa*. The taxa richness of a community is commonly used as a qualitative measure of stream water and habitat quality. Stream degradation generally causes a decresase in the total number of taxa (Resh and Grodhaus 1983).
2. *Number of EPT taxa*. Ephemeroptera (mayflies), Plecoptera (stoneflies), and Trichoptera (caddisflies) are generally sensitive to degraded stream conditions. A low number of taxa representing these orders is indicative of stream degradation (Lenat 1988).
3. *Number of Ephemeroptera taxa*. Mayflies are generally sensitive to pollution and the number of mayfly genera represented by individual in a sample can be a na indicator of stream conditions, generally decreasing with increasing stress.
4. *Number of Diptera taxa*. As an order, Dipterans are relatively diverse, as well as variable in their tolerance to stress. Many taxa, especially Chironomidae, have wide distributions and may occur even in highly polluted streams. However, a high diversity of Diptera taxa generally suggests good water and habitat quality.

5. *Percent Ephemeroptera*. The degree to which mayflies dominate the community can indicate the relative success of these generally pollution intolerant individuals in sustaining reproduction. The presence of stresses will reduce the abudndance of mayflies relative to other, more tolerant individuals; although, some mayfly groups, such as several genera of the family Baetidae, are known to increase in numbers in cases of nutrient enrichment.
6. *Percent Tanytarsini*. The tribe Tanytarsini is a relatively intolerant group of midges. A high percentage of Tanytarsini, proportional to the overall sample is taken to indicate lower levels of stress. This metric increases with high numbers of Tanytarsini and decreases with high numbers of non-Tanytarsini.
7. *Number of Intolerant taxa*. Intolerant taxa are the first to be eliminated by perturbations. Often, intolerant taxa are specialists and pertuvations can alter or eliminate specialized habitat or water quality requirements. Taxa with tolerance ratings from 0-3 were considered intolerant (Hilsenhoff 1987).
8. *Percent Tolerant*. As stressor intensity increase, tolerant individuals (tolerance values 7-10) tend to dominate samples. Values for this metric increase in cases of elevated stress. Intolerant individuals become less abudndant as stress increases, leading to more opportunity for tolerant taxa to colonize a stream (Hilsenhoff 1987).
9. *Percent Collectors*. Abundance of detritivores, which feed on fine particulate organic matter in deposits, typically decreases with increased disturbance. This ecological response may be highly represented by intolerant taxa.

Each metric was scored on a 5, 3, 1, basis (5 being the best, 1 being the worst) according to stream health. Metric scoring criteria are listed in Table 3. Overall biological index scores are obtained by summing of the nine metric scores for each site, and dividing by the number of metrics (9). Using the format established by MBSS, the resulting value is then compared to the index scoring criteria for translation into narrative categories (Table 4; Stribling et al 1998). Again, using the MBSS protocol, if the total number of organisms in a sample was less than 60, metrics were not calculated (D. Boward, personal communication) and they were assigned a rating of “very poor” unless there was evidence that the occurrence was natural (Stribling et al 1998).

Table 3. Metric scoring criteria for the Benthic IBI (Stribling et al. 1998).

Benthic Macroinvertebrate Metrics	Criteria		
	5	3	1
Total number of taxa	>22	16 - 22	<16
Number of EPT taxa	>12	5 - 12	<5
Number of Ephemeroptera taxa	>4	2 - 4	<2
Number of Diptera taxa	>9	6 - 9	<6
% Ephemeroptera	>20.3	5.7 - 20.3	<5.7
% Tanytarsini	>4.8	0.0 - 4.8	0.0
Number of intolerant taxa	>8	3 - 8	<3
% tolerant	<11.8	11.8 - 48.0	>48.0
% collectors	>31.0	13.5 - 31.0	<13.5

Table 4. Benthic IBI score ranges and corresponding narrative ratings.

Benthic IBI Score Range	Narrative Biological Rating
4.0 - 5.0	Good
3.0 - 3.9	Fair
2.0 - 2.9	Poor
1.0 - 1.9	Very Poor

Site Rating

A narrative explanation of the biological condition and physical habitat quality scores are given for each site. Important features recorded during sampling or found during subsampling such as a wide riparian zone, or the presence of salamanders or trash in a sample are used to further illustrate potential reasons for site rating. Tolerance values (t.v.) are used in the site descriptions to add information about the organisms collected, and how their tolerance to pollution affects the overall metric score. The mean and standard deviation for benthic macroinvertebrate metrics and physical habitat scores are calculated in MS Excel for each watershed.

Quality Assurance/Quality Control

Quality Assurance/Quality Control (QA/QC) activities are designed to ensure data quality and to document data characteristics. To this end, Howard County has:

- documented standard operating procedures (SOPs) for field sampling, laboratory processing, and completing chain-of-custody forms

The SOPs and procedures for these QC activities are documented in the Howard County Biological Monitoring and Assessment Program plan (DPW 2001). All SOPs are cited in the methods section of this report. Chain-of-custody and sample log sheets are maintained to track the inventory and processing status of all samples. Sample documentation forms are kept in three-ring binders in Tetra Tech's Biological Research Facility (BRF).

- held annual orientation sessions for field sampling

The County field orientation is held as a "refresher" for experienced samplers and as an introduction for new samplers. All two-person field teams are divided into Team Leader and Crew Member. Team Leaders are required to have completed at least one field season as a Crew Member. Crew Members have completed either the introductory or "refresher" field orientation. The orientation for this index period was held on February 25 and 28, 2003. This orientation covered field note requirements and procedural guidelines. The Team Leader from each field crew also attended the MBSS training session conducted by DNR staff, which was held on March 3, 2003, at Morgan Run Natural Environmental Area (Carroll County). The MBSS training session included both general direction and hands-on field training.

- conducted field audits

Each County field crew is visited on-site by an experienced field ecologist who is not involved in the fieldwork for the project. MBSS staff also conducts independent audits of the Howard County field teams. Field team procedures are observed for adherence to SOPs and consistency in completion of all data collection requirements including, field data sheets, sample preservation, and photo documentation. Results of field audits can be found in Appendix D.

- repeated continual training and QC checks for sample sorting and subsampling

All sorting and subsampling of samples is performed by the Tetra Tech BRF. Early sorting is checked by the biological QC officer to ensure that there are no (or only minimal) missed specimens in removed grid debris. Once a 90% sorting efficiency is attained, random checks are performed on approximately one out of 10 samples.

- used up-to-date and accepted technical taxonomic literature

The target level of taxonomic identification for benthic macroinvertebrates for this project is genus. State-of-the-science technical literature is used throughout and includes the references listed in Table 5.

Table 5. Taxonomic references used for organism identification.

Burch, J. B. 1989. *North American Freshwater Snails*. Malacological Publ., Hamburg, Michigan. 365p.
Burch, J. B. 1982. *Freshwater Snails (Mollusca: Gastropoda) of North America*. EPA-600/3-82-026, USEPA, Cincinnati, Ohio. 294 p.
Edmunds, G. F., Jr., Jensen, S. K. and Berner, L. 1976. *The Mayflies of North and Central America*. Univ. Minn. Press, Minneapolis. 330 p.
Epler, J. H. 1995. *Identification Manual for the Larval Chironomidae (Diptera) of Florida*. rev. ed. Dept. Environ. Prot., Tallahassee, FL. 9 sections.
Epler, J. H. 1996. *Identification Manual for the Water beetles of Florida (Coleoptera: Dryopidae, Dytiscidae, Elmidae, Gyrinidae, Haliplidae, Hydraenidae, Hydrophilidae, Noteridae, Psephenidae, Ptilodactylidae, Scirtidae).* Dept. Environ. Prot., Tallahassee. 15 sections.
Kathman, R. D. and Brinkhurst, R. O. 1998. *Guide to the Freshwater Oligochaetes of North America.* Aquatic Resources Center, College Grove, TN. 264 p.
McAlpine, J. F., Peterson, B. V., Shewell, G. E., Teskey, H. J., Vockeroth, J. R. and Wood, D. M. (Coords.) 1981. *Manual of Nearctic Diptera*. Vol. 1, Monogr. 27. Can. Govt. Publ. Centre, Hull, Quebec. 674p.
Merritt, R. W. and Cummins, K. W. 1996. *An Introduction to the Aquatic Insects of North America. 3rd, Edition.* Kendall/Hunt Publ. Co., Dubuque, Iowa. 862p.
Needham, J. G. and Westfall, M. J., Jr. 1954. *A Manual of the Dragonflies of North America (Anisoptera)*. Univ. Calif. Press, Berkeley. 615 p.
Oliver, D. R. and Dillon M. E. 1990. *A Catalog of Nearctic Chironomidae*. Research Branch, Agriculture Canada. Publ. 1857/B:1-89.
Westfall, M. T., Jr. and May, M. L. 1996. *Damselflies of North America*. Scientific Publishers, Gainesville, Florida. 649 p.
Wiederholm, T. (ed.) 1983. Chironomidae of the Holarctic region. Keys and diagnoses. Part l. Larvae. *Entomol. Scand. Suppl*. 19. 457 p.
Wiederholm, T. (ed.) 1986. Chironomidae of the Holarctic region. Keys and diagnoses. Part 2. Pupae. *Entomol. Scand. Suppl*. 28. 482 p.
Wiggins, G.B. 1996. *Larvae of North American Caddisfly Genera (Trichoptera), 2nd Ed.* University of Toronto Press, Toronto. 457 p.

- verified taxonomy for questionable invertebrate specimens by senior taxonomists or independent specialists

There are two principal sources of error that can cause uncertainty in some taxonomic identifications. One is that the specimens in question are of very early instars (juvenile) and lack morphological structures necessary for positive identification. Another is that specimens can have damaged or missing characteristics, such as gills, antennae, legs, caudal filaments rendering final, positive identification problematic. In addition, for midges or worms, inadequate mounting medium can make genus level identification nearly impossible. Depending on the condition of an organism, the taxonomist will either request a second opinion from an expert in that particular field (e.g., worms, midges, beetles, etc.) or will identify it to the next highest positive classification (i.e., family instead of genus).

- Created and maintained reference collection and voucher samples

During the first sampling year, Howard County created a taxonomic reference collection for benthic macroinvertebrates collected in the county. One or more specimens removed from samples are kept as representative of the taxonomist's concept of that taxon. As sampling continues, the reference collection will be updated with any new example specimens. All taxonomy (reference and non-reference) was performed by Aquatic Resources Center (ARC). Voucher samples (stored in ~ 75% ethanol) are kept from all sampling in Howard County for at least three years in the Tetra Tech BRF (Owings Mills, MD).

- standardized data entry and management system

All biological, physical habitat, chemical, and ancillary data are entered directly from field data sheets or Excel spreadsheets into EDAS. The data and analytical results from future sampling will be managed in this system.

- conducted independent QC checks of all data entry

One hundred percent of the data set, once entered, is checked by hand against the original, hand-written field sheets. If discrepancies are encountered, they are recorded and corrected in EDAS.

- collected duplicate samples for estimating precision using Relative Percent Difference (RPD)

Duplicate biological and physical habitat samples are taken at three sites (10% of the total sampled), one per subwatershed. Comparisons of the differences between the results from these sites provide estimates of the precision of the biological assessments and the consistency of sampling activity. Relative percent difference (RPD) provides an estimate of the difference between sample pairs. Table 6 illustrates RPD for biological metrics and Table 7 presents RPD for physical habitat scores.

- Checked performance of taxonomist

Performed reidentification of 10% of samples in two other projects. Rate of taxonomic error was 6.1% and 8.3%, using the same QC taxonomist.

Table 6. Relative Percent Difference (RPD) calculations of biological scores for sites in the Patapsco Tributary watersheds.

Station #	210	210QC	227	227QC	242	242QC
Stream Name	South Br. Patapsco R.	South Br. Patapsco R.	Patapsco R. Lower Br. A	Patapsco R. Lower Br. A	Patapsco R. Lower Br. B	Patapsco R. Lower Br. B
Location	~ 350m into woods from 11680 Old Frederick Road	~ 350m into woods from 11680 Old Frederick Road	approx. 200 m downhill into woods behind Greenhaven Court	approx. 200 m downhill into woods behind Greenhaven Court	Kara's Walk	Kara's Walk
Metric Score	2.33	2.33	2.33	2.33	3.00	3.22
Narrative Rating	Poor	Poor	Poor	Poor	Fair	Fair
Total Organisms	102	109	66	70	99	108
RPD (%)	0		0		7.07	

The measurement performance criteria outlined in the QAPP (DPW 2001) calls for RPD agreement of the overall bioassessment scores to be ≤ 5%. Since the metric scores are based on a 1, 3, 5 scale, and not a continuous scale (e.g., 0-100), a change in only one metric category (i.e., one "point") is enough to alter the overall score above the acceptable limit. The most likely reason that the QC sites score slightly different than the probability sites is that the QC sites are assigned to the probability sites before they are visited. Therefore, the QC site might not be a good representation of the probability site; tributaries could be entering the stream, bridges or roads could be built across the stream, drains could be entering the stream that would have different effects on the biota at the QC site than at the probability site.. There is also natural variability in the habitats available for sampling, and the biological composition of those habitats. In the case of site 242 and its QC, since the narrative ratings were both "fair," the specific metrics were not extremely different, the site was not considered too dissimilar to warrant not using the data.

Table 7. Relative Percent Difference (RPD) calculations of physical habitat scores for sites in the Patapsco Tributary watersheds.

Station #	210	210QC	227	227QC	242	242QC
Stream Name	South Br. Patapsco R.	South Br. Patapsco R.	Patapsco R. Lower Br. A	Patapsco R. Lower Br. A	Patapsco R. Lower Br. B	Patapsco R. Lower Br. B
Location	~ 350m into woods from 11680 Old Frederick Road	~ 350m into woods from 11680 Old Frederick Road	approx. 200 m downhill into woods behind Greenhaven Court	approx. 200 m downhill into woods behind Greenhaven Court	Kara's Walk	Kara's Walk
Total Score	121	127	134	151	124	129
% Compared to Maximum	60.5	63.5	67	75.5	62	64.5
Narrative Rating	Partially Supporting	Partially Supporting	Partially Supporting	Supporting	Partially Supporting	Partially Supporting
RPD (%)	4.84		11.93		3.95	

The measurement performance criteria outlined in the QAPP (DPW 2001) calls for RPD agreement of the overall physical habitat scores to the ≤ 20%. The QC sites in each subwatershed meet this criterion.

- Compared sample variation with design assumptions

The standard deviations from the Patapsco Tributary subwatersheds were compared to the standard deviations associated with MBSS samples (reference and test) collected in general non-Coastal plain proximity and in Howard County. In the program sampling design (Pavlik et al. 2001), the MBSS values were used to assign a target number (number of sites to sample) per subwatershed to meet specified data quality objectives (DQOs).

- Reference = 0.69
- MBSS Test = 0.83
- Patapsco Tributary Streams = 0.63

Since the SD from this dataset is 0.63, below the MBSS threshold for probability sites, the County's DQO is met.

II. Subwatershed Site Assessments

Subwatershed Results

General Overview

Each of these subwatersheds drain into the Patapsco River. Table 8 provides an overview of the mean scores and narrative characterizations for each subwatershed.

Table 8. Summary of quantitative and qualitative assessments for the Patapsco River tributaries.

Subwatershed	Biological Score	Biological Rating	Physical Habitat Score	Physical Habitat Rating
South Branch Patapsco River	2.73	Poor	124	Partially Supporting
Patapsco River Lower Branch A	2.85	Poor	124	Partially Supporting
Patapsco River Lower Branch B	2.95	Poor	122	Partially Supporting

Land use percentages were calculated for each subwatershed sampled this year (Table 9). South Branch Patapsco is mostly pasture, while Patapsco River Lower Branch A is dominated by forest. Patapsco River Lower Branch B also is largely forested land, but is more evenly distributed with other land uses.

Table 9. Percent land use type in the South Branch Patapsco, Patapsco Lower Branch and Patapsco Lower Branch B subwatersheds.

Land Use Type	S Br Patapsco	Patapsco Lr Br A	Patapsco Lr Br B
Commercial	0	1	21
Deciduous	21	87	47
Evergreen	0	0	1
High Density Residential	0	0	0
Herbaceous Wetlands	0	0	0
Low Density Residential	0	3	12
Mixed Forest	0	1	1
Open Water	0	0	0
Pasture	78	6	12
Quarries	0	0	1
Row Crops	1	1	5
Woody Wetlands	0	0	0

Biological integrity was compared to physical habitat condition for the subwatersheds sampled in the 2003 sampling period (Figure 4). The lack of positive correlation between biology and habitat could be attributed to effects of excess nutrients or other chemical pollutants that were not measured in this study. The two sites in the South Branch Patapsco watershed that had high habitat scores but low B-IBI scores (<2) (Group A, Figure 4) may be influenced by toxic chemical stressors that cause depressed benthic index scores. Conversely, the three sites in this watershed that have B-IBI scores above 3.6 (Group B, Figure 4) may be artificially elevated due to nutrient enrichment.

Figure 5 shows overall biological condition for the Patapsco Tributary watersheds. The South Branch Patapsco watershed had the highest variability in benthic conditions. In this waterhed, 60% of the stream miles have B-IBI scores ≤3.00 (i.e., rated as “poor” or worse). In the Patapsco Lr Br A and Lr Br B watersheds, 50 and 40% of the streams, respectively, had B-IBI scores of ≤3.00.

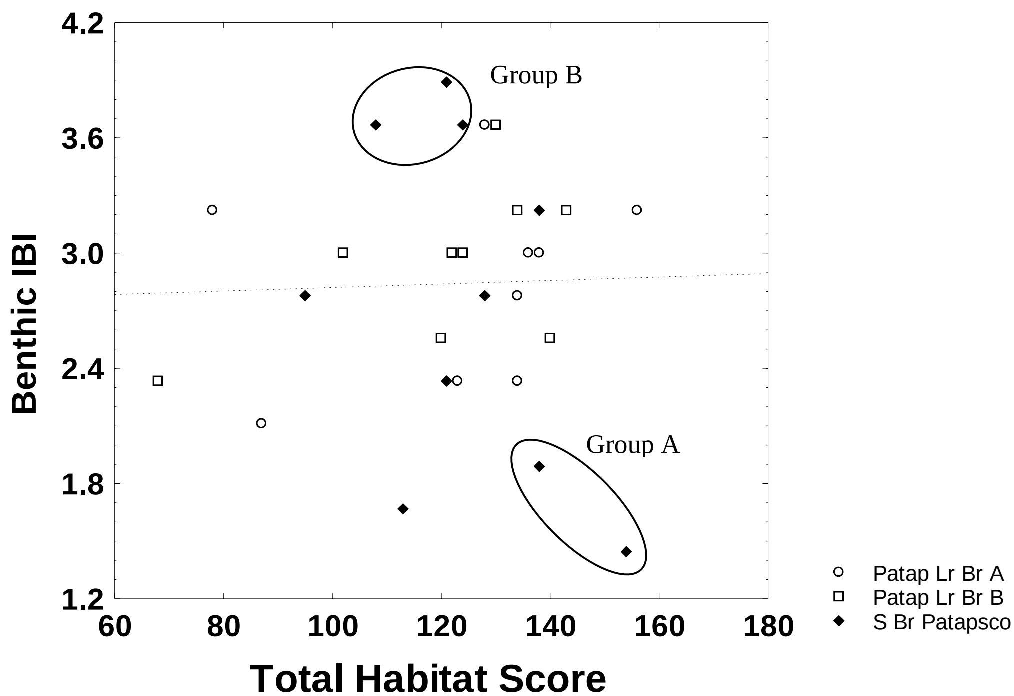

Figure 4. Scatterplot of the biological and physical habitat scores among the Patapsco Lower Branch A, Patapsco Lower Branch B and South Branch Patapsco subwatersheds.

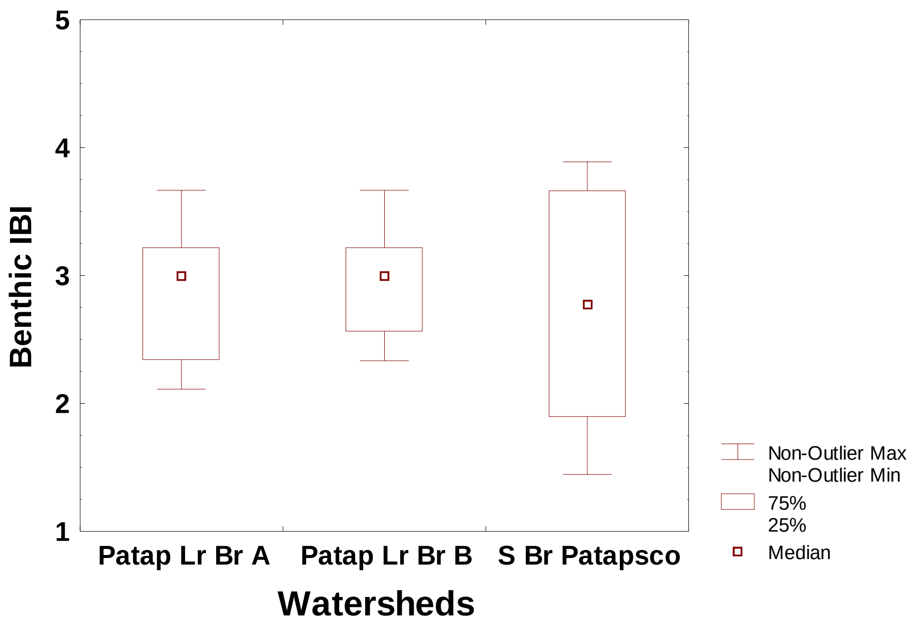

Figure 5. Biological scores in the Patapsco Lower Branch S, Patapsco Lower Branch B, South Branch Patapsco subwatersheds.

Site Specific Results

South Branch Patapsco River

Ten sites were sampled in this subwatershed for biological and physical habitat condition (Table 10). Four sites were rated as in "fair" biological condition. Three were in "poor" and the last three were rated as being in "very poor" condition. The average biological score in this subwatershed was 2.73 (± 0.88, n = 10), corresponding to a "poor" rating overall. Physical habitat condition for the subwatershed on the whole was rated as capable of "partially supporting" a healthy biota (62% of maximum). One site was rated as "supporting", six were "partially supporting", and the remaining three were "non-supporting" (Table 10).

Table 10. Summary of biological and habitat scores for each sampled site in the South Branch Patapsco River subwatershed.

Station ID	Benthic IBI Score	Biological Rating	Habitat Score	Habitat Rating	Stream Order
201	2.78	Poor	128	Partially Supporting	4
203	3.22	Fair	138	Partially Supporting	2
205	3.89	Fair	121	Partially Supporting	3
206	2.78	Poor	95	Non Supporting	1
207	1.89	Very Poor	138	Partially Supporting	1
208	1.44	Very Poor	154	Supporting	1
209	1.67	Very Poor	113	Non Supporting	1
210	2.33	Poor	121	Partially Supporting	1
215	3.67	Fair	108	Non Supporting	1
217	3.67	Fair	124	Partially Supporting	2

Site 201 – This site is on the mainstem of the South Branch of the Patapsco River (4^{th} order) (Figure 6). The site runs through Freedom Park. Biological condition was rated as "poor" (B-IBI = 2.78) (Figure 6). The most common organisms were *Cheumatopsyche* and *Hydropsyche* (Trichoptera: Hydropsychidae), both moderately tolerant caddisflies (t.v. = 5 and 6, respectively). There were only 16 total taxa present in this sample. The physical habitat at this site was rated as "partially supporting" (64% of maximum); in the absence of other stressors, this habitat quality is expected to support a biological condition no better than fair. There was a railroad on the left bank of the stream. Gravel associated with this railroad may affect substrate characteristics in the stream.. The lowest habitat scores were for vegetative protection and riparian zone width.

Site 203 – This second order section of Hay Meadow Branch is at the end of Paulowina Court. Biological condition was rated as "fair" (B-IBI = 3.22) (Figure 6). Thirty-one total taxa were found, nine of which were the generally pollution sensitive EPT (Ephermeroptera, Plecoptera, Trichoptera). However, the highest single organism found was a relatively highly pollution tolerant *Cricotopus* (Diptera: Chironomidae; t.v. = 7). Physical habitat was rated "partially supporting" (69% of maximum). Bank stability and vegetative protection for both banks were in the poor to marginal categories, most likely due to flow alterations caused by increased runoff associated with upstream anthropogenic land uses. Vegetative protection and bank stability are related in that the more vegetative protection along the streambank, the more stable that bank will be against potential erosion.

Site 205 – This third order section of South Branch Patapsco River is downstream of Hoods Mill electrical station. Biological condition was rated as “fair” (B-IBI = 3.89) (Figure 6). This was the highest biological score for the subwatershed. The highest total taxa count (47) was also found at this site. The most common organism found was *Clinocera* (Diptera: Empididae, t.v. = 6). Marginal bank stability and vegetative protection scores led to a “partially supporting” (60.5% of maximum) physical habitat rating at this site.

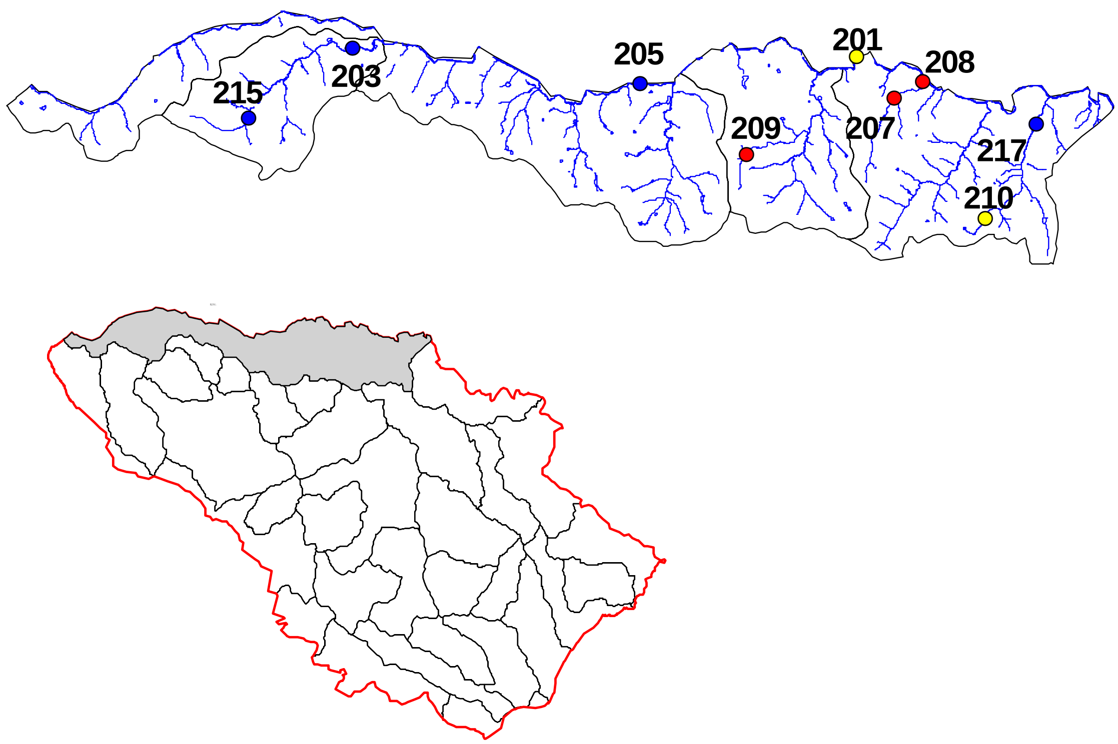

Figure 6. Color-coded biological ratings for the South Branch Patapsco River subwatershed. Green = good, blue = fair, yellow = poor, red = very poor. 201-217 indicate site numbers

Site 206 – This first order segment of the South Branch Patapsco River is located on the western most side of the county, where I-70 and MD Rte. 144 (Frederick Road) run in close proximity. Biological condition at this site was rated as “poor” (B-IBI = 2.78) (Figure 6). Twenty-four pollution-sensitive Ephemeroptera taxa were found. However, almost half the site (49%) included pollution tolerant taxa, such as *Prosimulium* (Diptera: Simuliidae, t.v. = 7). Physical habitat condition was rated “non-supporting” (47.5% of maximum). This was the lowest score in the subwatershed. Half of the reach flowed into a large concrete culvert that completely blocked any sunlight from the stream and provided no habitat for benthic macroinvertebrates to hide, or find food. Two storm drains (most likely coming from the highway) also emptied directly into the reach.

Site 207 – This unnamed tributary of the South Branch Patapsco River is off of the 700 block of River Road. Only 18 taxa were found in the subsample. This was one of three sites where no Tanytarsini, a relatively pollution sensitive midge-fly, were found. The most common organism was *Prosimulium*. Biological condition rated "very poor" (B-IBI = 1.89) (Figure 6). This site is located inside the Patapsco Valley State Park, offering it some measure of protection from encroaching development. The riparian width was relatively wide, however, the bank vegetation and stability, particularly along the right bank, were only marginal. Some severe erosional scarring led this site to only receive a "partially supporting" (69% of maximum) physical habitat rating.

Site 208 – This first order unnamed tributary of the South Branch Patapsco River is also located in the Patapsco Valley State Park. It is downstream of site 207, closer to the mainstem South Branch. It also received a "very poor" (B-IBI = 1.44) biological condition rating (Figure 6). Only 13 taxa were found at this site, the lowest total taxa in this subwatershed. No pollution sensitive Ephemeroptera (mayflies) were found. The highest number of pollution tolerant organisms were found at this site (87%). The most common organism found was again *Prosimulium*. Physical habitat at this site was uncharacteristically high for such poor biology. The only habitat modification adversely affecting the stream site was a beaver dam. There could also have been some undetected chemical inputs, although no drains or odors were noted on the field sheets. Physical habitat was rated "supporting" (77% of maximum), the highest rating in this subwatershed.

Site 209 – This site off of Day Road received a "very poor" (B-IBI = 1.67) biological condition rating (Figure 6). The unnamed tributary of the South Branch Patapsco River only had 15 total taxa, only one of which belonged to the sensitive EPT group (*Ironoquia*, Trichoptera: Limnephilidae, t.v. = 3). A large majority of the remainder of the sample (82%) was comprised of pollution tolerant taxa, such as *Enchytraeidae* (Tubificida, t.v. = 10) and *Limnodrilus hoffmeisteri* (Tubificida: Tubificidae, t.v. = 10). Physical habitat at this site was rated "non-supporting" (56.5% of maximum), matching the biological potential. The majority of the sample had to be taken from snag habitat, as there was not enough cobble/riffle habitat to sample 20 ft^2. Most of the rest of the habitat parameters scored in the suboptimal and marginal categories.

Site 210 – This site in the 11000 block of Old Frederick Road is on an unnamed tributary to the South Branch of the Patapsco River. It was rated in "poor" biological condition (B-IBI = 2.33) (Figure 6). Twenty-two total taxa were subsampled, 67% of which were pollution tolerant, such as *Stegopterna* (Diptera: Simuliidae, t.v. = 7). Physical habitat condition was rated as "partially supporting" (60.5% of maximum), again matching the biological potential. The lowest scores were in the bank stability and vegetative protection categories.

Site 215 – This site is located about 50 meters downstream of the 17000 block of Frederick Road. It is on an unnamed tributary to the Patapsco River. Biological condition was rated as “fair” (B-IBI = 3.67) (Figure 6). Of the 34 total taxa, 25 were dipterans, generally an indication of low stressors in a specific area. Close to 23% of the sample was also composed of Tanytarsini, a relatively pollution sensitive midge fly. The most common organism was *Parametriocnemus* (Diptera: Chironomidae, t.v. = 5). The physical condition of this stream was severely altered, resulting in a “non-supporting” rating (54% of maximum). Pasture surrounded the stream, and a storm drain also emptied into the stream on the right bank. The riparian zone was extremely narrow, allowing for increased runoff from the nearby road and pasture land. Sedimentation and embeddedness were high in this stream. Pebble count data revealed that 40% of the stream-bed was composed of silt-clay.

Site 217 – This second order unnamed tributary of the South Branch of the Patapsco River is off the 800 block of Marriotsville Road. It received a “fair” biological condition rating (B-IBI = 3.67) (Figure 6). The most common organism was *Prosimulium*. Physical habitat rated “partially supporting” (62% of maximum). Bank stability and vegetative protection received the lowest scores, but were in the marginal category. The riparian zone was scored in the optimal range, but due to the snow covering the ground, nearby houses, and few trees, it was difficult to tell if the area in between was mowed or naturally barren.

Patapsco River Lower Branch A

Five of the ten sites sampled in this watershed were rated as containing a “fair” biological community (Table 11) (Figure 7). One site was rated as “poor”, and the four remaining sites were in “very poor” biological condition. The average biological score in this subwatershed was 2.85 ± 0.51, n = 10). Only one site was rated as capable of “supporting” a healthy biological community. Seven other sites were rated as “partially supporting” and two were “non-supporting”. The average subwatershed physical condition rating was “partially supporting”.

Table 11. Summary of biological and habitat scores for each sampled site in the Patapsco River Lower Branch A subwatershed.

Station ID	Benthic IBI Score	Biological Rating	Habitat Score	Habitat Rating	Stream Order
221	3.67	Fair	128	Partially Supporting	4
222	2.78	Poor	134	Partially Supporting	1
223	3.22	Fair	156	Supporting	1
224	2.33	Poor	123	Partially Supporting	4
225	3.00	Fair	136	Partially Supporting	1
226	NA	Very Poor	123	Partially Supporting	1
227	2.33	Poor	134	Partially Supporting	1
228	3.22	Fair	78	Non Supporting	1
229	2.11	Poor	87	Non Supporting	2
230	3.00	Fair	138	Partially Supporting	1

Site 221 – This site was on the mainstem of the Patapsco River, where it is a fourth order stream (Figure 7). It received a “fair” (B-IBI = 3.67) biological rating, the highest of this subwatershed.

This is a substantial rating, because only the right bank could be sampled at this site, due to the depth. There were no riffles at this site, therefore, sampling effort was allocated to other habitats (e.g., undercut banks, snags). This site also had one of the highest total taxa sampled, 36. An effect of many taxa however, is the possibility of many pollution tolerant taxa, which this site also had the highest number of in the subwatershed, 63%. The most common organism was *Hydrobaenus* (Diptera: Chironomidae, t.v. = 8). Physical habitat received a "partially supporting" (64% of maximum) rating. However, on a stream of this size, the scale at which habitat is measured (75m), may be too small to evaluate the entire system. The scores in general were in the optimal and suboptimal categories, except for the embeddedness, velocity/depth regime, sediment deposition – all of which it is best to be in the middle of the stream to assess, which we were prevented from doing due to the depth of the water – and the frequency of riffles category – which on a stream of this size might better be assessed with an accurate topographic map or from a plane if possible.

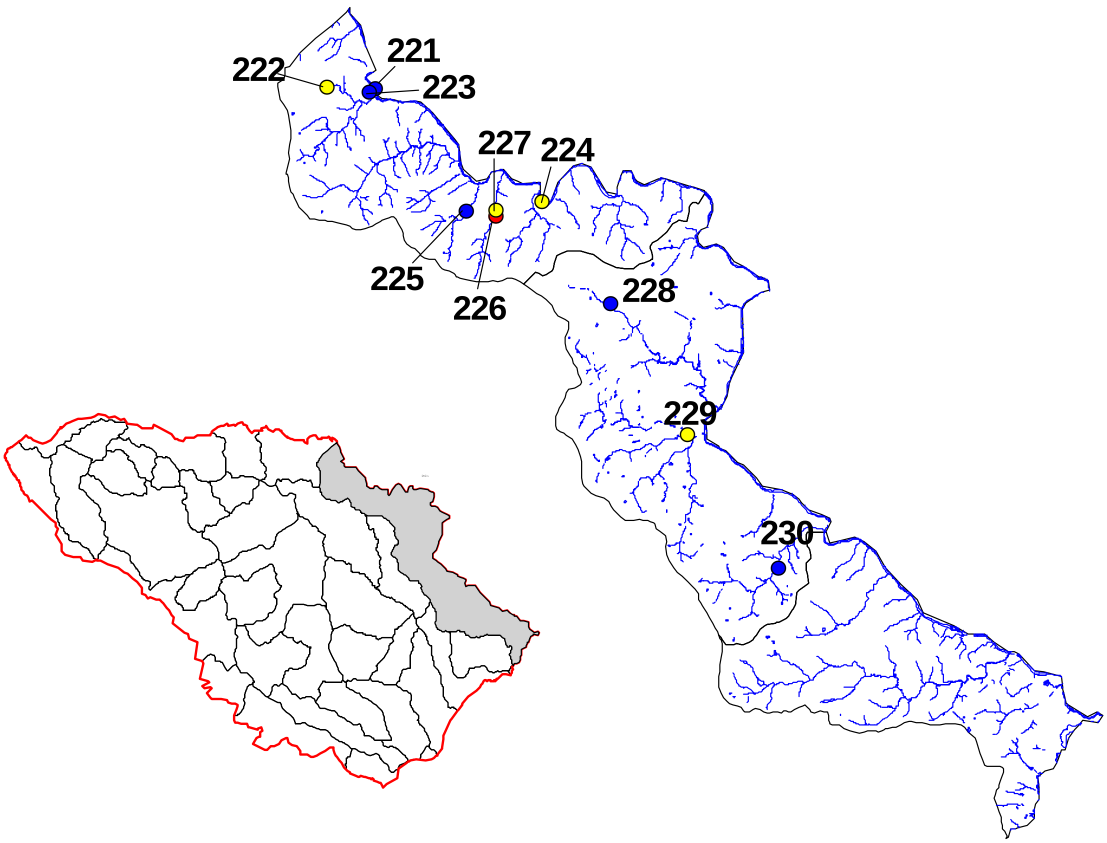

Figure 7. Color-coded biological condition ratings for the Patapsco River Lower Branch A subwatershed. Green = good, blue = fair, yellow = poor, red = very poor. 221-230 indicate site numbers.

Site 222 – This site on a first order unnamed tributary of the Patapsco River is in the Patapsco Valley State Park property off Driver's Lane. Biological condition was rated as "poor" (B-IBI =

2.78) (Figure 7). Twenty-four total taxa were found, however, none of them were of the pollution sensitive EPT category. The most common organism was *Stegopterna.* Physical habitat condition was rated “partially supporting” (67% of maximum), which would match the poor biological potential. The location of the site (in the park) lent it to an optimal riparian zone width score, however, bank stability and vegetative protection were still only marginal. Even with snow on the ground, erosional scarring was evident. Pebble count data revealed that 68% of the streambed was composed of fines (silt/clay and sand sized particles). These often fill the interstitial spaces in which organism prefer to live and feed.

Site 223 – Off Woodstock Road, this first order unnamed tributary of the Patapsco River received a “fair” (B-IBI = 3.22) biological condition rating (Figure 7). Of the 23 total taxa found, 11 were EPT, the highest EPT taxa in this subwatershed. However, the most common organism was the relatively pollution tolerant *Prosimulium* (t.v. = 7). Physical habitat at this site was rated as “supporting” (78% of maximum), not only the highest rating of the subwatershed, but the highest rating of the three subwatersheds this report focuses on, and supports the fair biological condition rating of the site. Although there was an area of the stream that was scoured to bedrock, the riparian zone was wide, both bank stability and vegetative protection (areas that are generally problematic) were good, epifaunal substrate, channel alteration, and frequency of riffles were all in the optimal category.

Site 224 – This site on the mainstem Patapsco River, in a section where the river is 4^{th} order, received a “poor” biological condition rating (B-IBI = 2.33) (Figure 7). Out of 20 total taxa, only 3 were pollution sensitive EPT, among the lowest in the subwatershed. However, some of this could be accounted for by the depth of the water, only allowing samplers to sample along the right bank of the river. Interestingly, the three intolerant taxa found were not all in the EPT category, they included *Dixella* (Diptera: Dixidae, t.v. = 1), *Ormosia* (Diptera: Tipulidae, t.v. = 3), *Ameletus* (Ephemeroptera: Ameletidae, t.v. = 0). Physical habitat rated “partially supporting” (61.5% of maximum), matching the potential of the biological condition. While the riparian zone was wide (inside Patapsco Valley State Park), the bank vegetation was rated as marginal. Looking across the river to the left bank, even if the samplers could cross, there was no vegetated bank habitat available to sample, not leaving much suitable area for organisms to colonize.

Site 225 – About 400 meters behind the cul-de-sac at Divers Field Lane, this site on an unnamed tributary of the Patapsco River was rated in “fair” biological condition (B-IBI = 3.00) (Figure 7). However, no Ephemeroptera (mayfly) or Tanytarsini (relatively pollution sensitive midge) taxa were found in this sample. While the most common organism was *Sympotthastia* (Diptera: Chironomidae, t.v. = 2), pollution tolerant organisms still made up 34% of the sample. Although the stream ran through Patapsco park property, it was very incised. A sewer line was placed near the stream, most likely that serviced the nearby houses on top of the hill. Physical habitat was rated as “partially supporting” (68% of maximum), again with the vegetative protection and bank stability being the areas most in need of improvement.

Site 226 – This site on an unnamed first order tributary of the Patapsco River did not have enough organisms in the sample to receive a biological index score. Therefore, it automatically is considered in “very poor” condition (Figure 7). All 30 grids of the Caton tray were picked, and only 29 total organisms were found. This appears to be the normal condition of the stream (to have a low density of organisms, see site 227). Although there were trees surrounding the stream, there also was a nearby area cleared for a sewer line, and an exposed manhole cover on the left bank. Physical habitat was rated as “partially supporting” (61.5% of maximum), with bank stability and vegetative protection scoring in the marginal category. Sediment deposition also scored in the mid-marginal category. Eighty-four percent of the bottom sediments were composed of fines (silt/clay and sand-sized particles).

Site 227 – Just downstream of site 226, site 227 had a slightly better biological condition rating of “poor” (B-IBI = 2.33) (Figure 7). Of the 16 total taxa, one of the lowest of the subwatershed, only three were EPT taxa, and none were Ephemeroptera taxa. Only 66 total organisms were found out of the 30 grids of the Caton tray at this site. Another sewer cover was on the right bank of this section of stream, and part of the left bank was severely eroded, to the point that many trees were tilting into the stream. Sediment deposition and velocity/depth regime were rated as marginal, along with bank stability and vegetative protection. Increased sediments would alter the water speed/depth schemes of the stream, more sediment would decrease the diversity of habitats available (e.g., fast/shallow, fast/deep, slow/shallow, slow/deep). Physical habitat rated “partially supporting” (67% of maximum).

Site 228 – This first order stream located under the 2700 block of Rogers Avenue, Sucker Branch, received a “fair” (B-IBI = 3.22) biological condition rating (Figure 7). It had 37 total taxa, the most diverse in this subwatershed. Unfortunately, none of those taxa were of the pollution sensitive Ephemeroptera (mayfly) order. However, there were 22 Dipteran taxa, and 8% of those were Tanytarsini, a relatively pollution sensitive midge fly. There were three Trichoptera taxa (*Cheumatopsyche, Potamyi, and Polycentropodidae*) and one Plecoptera taxon (*Allocapnia*), all of which were rare (less than three individuals). The most common organism found at this site was *Sympotthastia* (Diptera: Chironomidae, t.v. = 2). Half of this site ran under a road culvert, and was substantially altered from its natural state (Figure 8). Another quarter of it was filled with rip rap to support the streambed up to the three pipes that created the culvert (Figure 8).

Figure 8 Culvert under Rogers Ave. at Site 228.

This site was rated as “non-supporting” (39% of maximum). While the bank stability received a high score due to the rip rap, other categories were rated much lower, more indicative of an altered system, such as channel alteration, embeddedness, channel flow status, riparian zone width, and vegetative protection.

Site 229 – Tiber Branch, a second order stream, was sampled as it runs directly through Ellicott City. It received a “poor” biological condition rating (B-IBI = 2.11) (Figure 7). Only 16 total taxa were found. Three of those, however, were EPT taxa. Interestingly, they were not the same three Intolerant taxa that fulfilled the Intolerant taxa metric. *Hydropysche* (Trichoptera: Hydropyschidae, t.v. = 6), a caddisfly, was the most common organism. Physical habitat at this site was extremely altered. Running straight through a town, there was no riparian zone or bank vegetation to speak of, the banks were walled with concrete bricks, there were multiple storm drains that emptied into the stream, a bridge over part of the reach, rip rap in the stream, and concrete made up part of the steam bottom. It received a “non-supporting” (43.5% of maximum) rating.

Site 230 – This unnamed tributary of the Patapsco is located at the 4700 block of Bonnie Branch Road. The site is located on a first order section of stream. Biological condition rated as “fair” (B-IBI = 3.00) (Figure 7). While only six Diptera taxa were found at this site, almost 12% of the sample was composed of Ephemeroptera taxa, one of the higher compositions of this subwatershed. Physical habitat was rated “partially supporting” (69% of maximum). There was a steep incline along the right bank that was fairly close to Bonnie Branch road (within 6-12m). A sewer line also crossed the stream at the downstream end of the site.

Patapsco River Lower Branch B

This subwatershed had the highest number of sites in “fair” biological condition (6). One other site was rated as “poor” and the three others were in “very poor” biological condition (Table 12) (Figure 9). The average for the subwatershed was “poor” (2.95 ± 0.41, n = 10), a score very close to the “fair” condition range. Eight of the sites in this subwatershed were rated as “partially supporting” physical habitat condition. The other two sites received a “non-supporting” rating. The subwatershed average was “partially supporting”.

Table 12. Summary of biological and habitat scores for each sampled site in the Patapsco River Lower Branch B subwatershed.

Station ID	Benthic IBI Score	Biological Rating	Habitat Score	Habitat Rating	Stream Order
241	3.22	Fair	143	Partially Supporting	1
242	3.00	Fair	124	Partially Supporting	1
243	NA	Very Poor	132	Partially Supporting	1
244	3.00	Fair	102	Non Supporting	2
245	2.33	Poor	68	Non Supporting	1
247	2.56	Poor	140	Partially Supporting	2
248	3.00	Fair	122	Partially Supporting	2
252	3.67	Fair	130	Partially Supporting	1
253	3.22	Fair	134	Partially Supporting	1
254	2.56	Poor	120	Partially Supporting	1

Site 241 – Behind Old Hollow Court, this site on Deep Run received a “fair” (B-IBI = 3.22) biological condition score (Figure 9). Of the 34 total taxa, none were Ephemeroptera (mayflies). However, only 18% of the sample was composed of pollution tolerant taxa. The most common organism was a beetle, *Stenelmis* (Coleoptera: Elmidae, t.v. = 6). Physical habitat was rated as “partially supporting” (71.5% of maximum). The water was gray/green, turbid, and a foam was also observed in parts of the reach. Algae was growing on some of the rocks, possibly due to nutrient enrichment. Further testing (specific water quality grabs for nutrients and/or metals) should be taken at this site to help determine specific stressors.

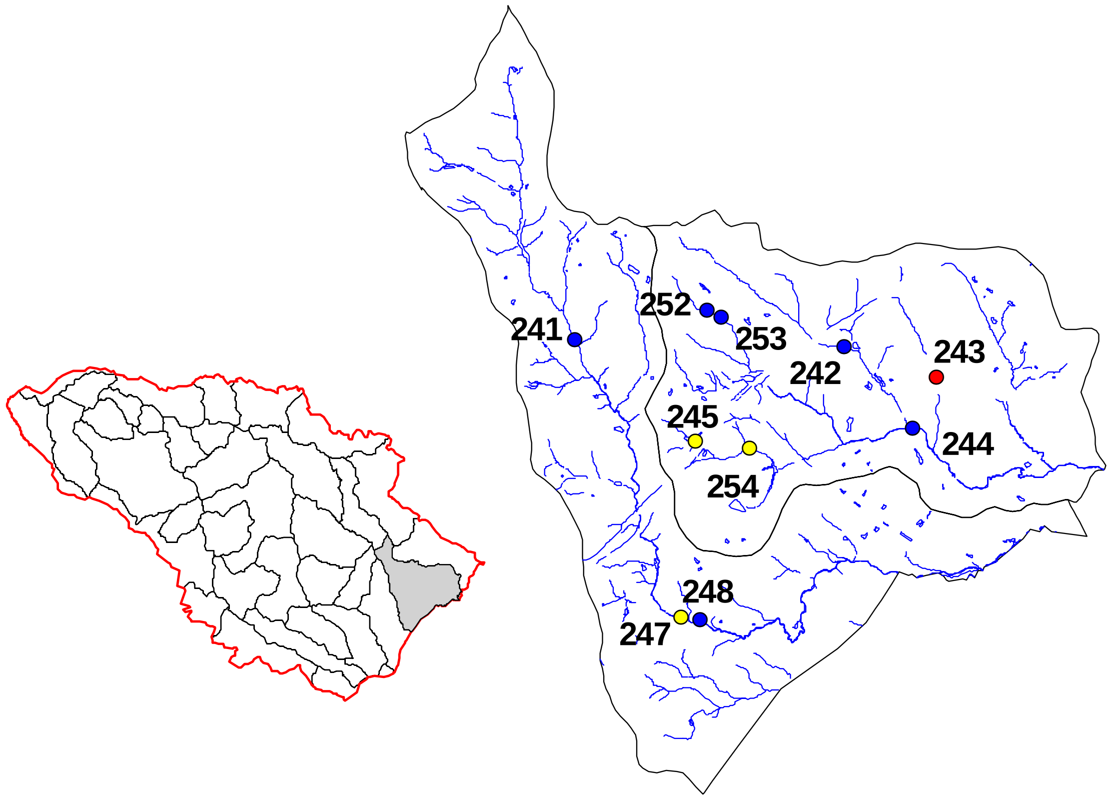

Figure 9. Color-coded biological condition ratings for the Patapsco River Lower Branch B subwatershed. Green = good, blue = fair, yellow = poor, red = very poor.

Site 242 – This first order unnamed tributary of the Patapsco River is behind Kara's Walk, and runs along the border of Troy Hill Corporate Center property. Biological condition was rated as "fair" (B-IBI = 3.00) (Figure 9). Twenty-five total taxa were found, eight of which were EPT. The most common organism was *Prostoia* (Plecoptera: Nemouridae). This organism does not have a specific tolerance value associated with it. However, since it is a stonefly, and most other stoneflies have relatively low pollution tolerances, we assumed that this organisms tolerance value is most likely not above four. Physical habitat was rated "partially supporting" (62% of maximum). Bank stability and vegetative protection were both poor, and the riparian zone, particularly along the right bank (which is the bank that borders Corporate Center property), was narrow (<5 meters).

Site 243 – This site is located on an unnamed tributary running between the Capital Mobile Park and Troy Industrial Center. All 30 grids of the Caton tray were picked and only 34 organisms were found, therefore, this sample was automatically given a "very poor" biological condition rating (Figure 9). Although the stream was situated in between two developed areas, it was able to remain fairly natural. Only the vegetative bank, bank stability, and riparian zone parameters scored in the marginal category, while the rest were suboptimal or optimal. Pebble count data revealed that the majority of the streambed was composed of gravel and cobble (63%). The "partially supporting" habitat rating along with the "very poor" benthic rating suggests that chemical inputs may be affecting the stream.

Site 244 – This second order section of an unnamed tributary of the Patapsco is on State Highway Authority property, across from Ducketts Lane. Biological condition rated "fair" (B-IBI = 3.00) (Figure 9). Twenty-four total taxa were found, none of them Ephemeroptera (mayflies). There were four Trichoptera taxa and two Plecoptera taxa found in the sample. Less than 1% of the sample was composed of pollution tolerant organisms, by far the lowest ratio of the subwatershed. The most common organism was *Stenelmis* (Coleoptera: Elmidae, t.v. = 6). Physical habitat was rated as "non-supporting" (51% of maximum). Surrounded by what was described by the field team as a junkyard, the narrow riparian zone offered little protection from runoff and trash that was found along the bank and in the stream itself. Additional sampling should be done at this site to uncover the reason for higher biological scores combined with low physical habitat support. A potential for nutrient enrichment from runoff exists and could possibly be determined through water chemistry grabs.

Site 245 – This first order unnamed tributary of the Patapsco river runs between Huntshire Road and I-95. Not including the site that did not have enough organisms to receive a biological condition score, this site had the lowest total taxa count, at 20. None of those were EPT. Over half of the sample 58%, was pollution tolerant organisms. The most common organisms were snails, *Physa* (Basommatophora: Physidae) and *Physidium* (Veneroida: Pisiidae, t.v. = 8). The situation of this reach, immediately downstream of a retention pond and in between a side street and a major highway make its physical habitat rating of "non-supporting" (34% of maximum) very predictable. The stream was severely altered and straightened, both banks were shored with cement and rip-rap, allowing for very little bank vegetation and therefore hardly any epifaunal substrate for organisms instream.

Site 247 – This second order portion of Deep Run was sampled behind Scooter's restaurant. Biological condition was rated "poor" (B-IBI = 2.56) (Figure 9). Twenty-eight total taxa were found, however, none of them were Ephemeroptera (mayflies). There were four Trichoptera taxa and two Plecoptera taxa found in the sample. Only 7 Diptera taxa were in the sample, the lowest total in this subwatershed. The most common organism was *Stenelmis* (Coleoptera: Elmidae, t.v. = 6). Physical habitat condition rated "partially supporting" (70% of maximum). The channel was straightened, but that allowed for higher bank stability scores. Embeddedness was also low at this site, which pebble count data confirmed that65% of the streambed was composed of gravel and cobble-sized particles.

Site 248 – Farther downstream along Deep Run, this site's biological condition rated as "fair" (B-IBI = 3.00) (Figure 9). Although 29 total taxa were found at this site, 15 Diptera taxa were found, and 4% of the sample was composed of Tanytarsini, a relatively pollution sensitive midge-fly. Both of theses differences were enough to heighten the ranking of site 248 into the "fair" range, just above the "poor" cutoff. Physical habitat at this site was also "partially supporting" (61% of maximum). While this section of the stream was more natural (not straightened), it did not have the benefit of the bank shoring that concrete provides, therefore it received a lower score.   Pebble count data at this site revealed that nearly half of the streambed, 47%, was composed of fines (silt/clay and sand-sized particles).

Site 252 – This site is on an unnamed tributary to the Patapsco River that runs southwest of Avalon Drive on the Timber at Troy Golf Course. Biological condition was rated as “fair” (B-IBI = 3.67) (Figure 9). This was the highest score in the subwatershed. Ten taxa that are intolerant of pollution were found at this site, the highest total in the subwatershed. This stream runs directly through golf course property, with a fairly narrow riparian zone. Bank stability and vegetative protection were also in the marginal category.

Site 253 – This site is downstream of 252, also on the Timber at Troy Golf Course. Biological condition was rated “fair” (B-IBI = 3.22) (Figure 9). Forty taxa were found at this site, 10 of which were EPT, and 19 were dipterans. All of these totals were the highest of their respective metrics in the subwatershed. *Stenelmis* was the most common organism. The narrow riparian zone was the lowest scored habitat parameter. There was also boulder-sized rip rap placed in the stream for added bank stability, as well as an open water pipeline that lowered the overall score. Physical habitat was rated as “partially supporting” (67% of maximum).

Site 254 – This first order unnamed tributary to the Patapsco River was sampled on Meadowridge Memorial Park property. Biological condition rated “poor” (B-IBI = 2.56) (Figure 9). Thirty-four total taxa were found, however none of them were Ephemeroptera (mayflies), Trichoptera, or Tanytarsini. Two Plecoptera taxa were found at the site and *Allocapnia* was relatively abundant (13 individuals). The most common organism was *Stegopterna* (Diptera: Simuliidae, t.v = 7), 39% of the sample was composed of pollution tolerant organisms. Marginal bank stability and vegetative protection, as well as a moderate amount of new sediment deposition and embeddedness of riffle areas (as shown in the pebble count), placed this site in the “partially supporting” physical habitat category (60% of maximum). Pebble count data revealed that 67% of the streambed was composed of fines (silt/clay and sand sized particles).

Watershed Comparisons

With the completion of the Patapsco River Tributaries, Howard County completed the firstrotation of all 15 of the County's subwatersheds. This rotation was completed in three years and serves as a baseline of current biological condition around the County. To look at overall County trends, i.e., how conditions change over time, continual monitoring on some scale would be required. However, the County can focus on specific watershed conditions, where state-wide monitoring does not allow for such local condition scale. For example, in the Cattail Creek/Brighton Dam watersheds the mean B-IBI rating was "fair," (3.60, ± 0.63, n = 27) (Table 13, Figure 10). However, the highest score in the three subwatersheds that make up those watersheds (Cattail Creek, Upper and Lower Brighton Dam) was 4.56 and the lowest was 2.33, "good" and "poor," respectively (Figure 10). These more specific scores are possible on a site-by-site basis due to the random sample design the County employed during the site selection process. It allows for both specific results on a community level, as well as overall results on a watershed scale.

Table 13. Summary of Howard County benthic and habitat scores and ratings by subwatershed.

Subwatershed	Mean BIBI Score	Mean Benthic Rating	Mean Habitat Score	% of Max	Mean Habitat Rating
Lower Mid Pax	3.22	Fair	117.40	58.70	Non-Supporting
Mid Mid Pax	3.58	Fair	105.60	52.80	Non-Supporting
Upper Mid Pax	3.39	Fair	109.13	54.56	Non-Supporting
Cattail Creek	3.60	Fair	107.20	53.60	Non-Supporting
Lower Brighton Dam	3.49	Fair	109.80	54.90	Non-Supporting
Lower Little Pax	2.06	Poor	102.83	51.42	Non-Supporting
Middle Little Pax	2.14	Poor	96.10	48.05	Non-Supporting
Upper Brighton Dam	3.82	Fair	121.30	60.65	Partially Supporting
Upper Little Pax	2.74	Poor	110.00	55.00	Non-Supporting
Rocky Gorge	3.29	Fair	114.30	57.15	Non-Supporting
Dorsey Run	2.51	Poor	100.30	50.15	Non-Supporting
Hammond Branch	2.84	Poor	115.10	57.55	Non-Supporting
S Br Patapsco	2.73	Poor	124.00	62.00	Partially Supporting
Patapsco River Lr Br A	2.67	Poor	123.70	61.85	Partially Supporting
Patapsco River Lr Br B	2.76	Poor	121.50	60.75	Partially Supporting
Howard County	2.99	Poor	111.88	55.94	Non-Supporting

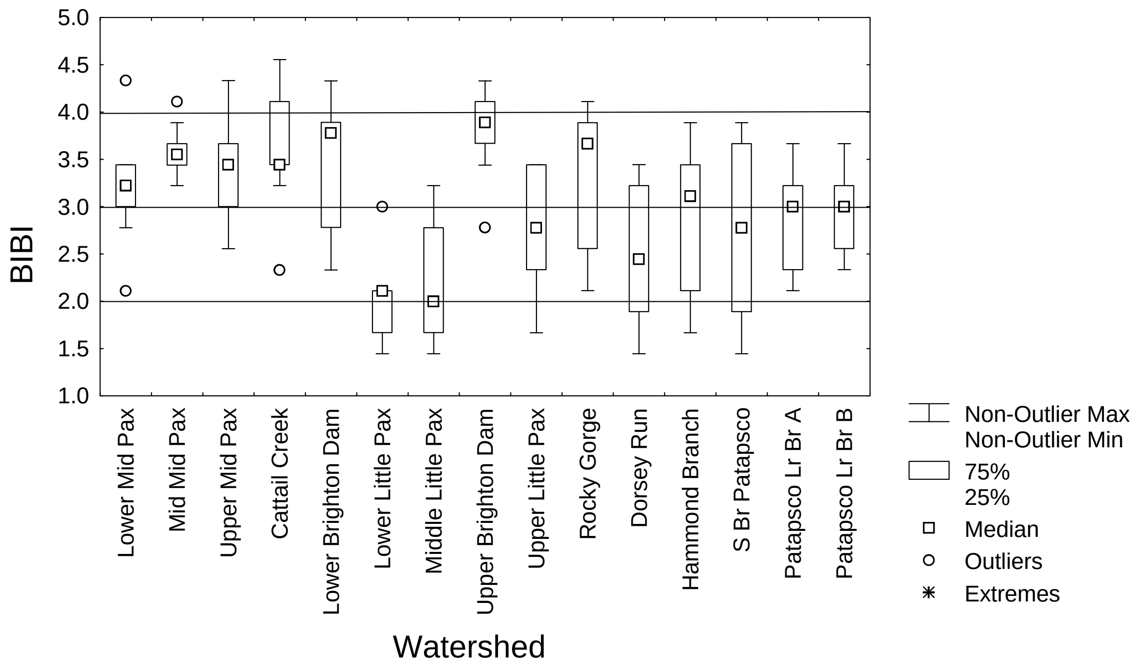

Figure 10. Benthic IBI scores for each of 15 sampled subwatersheds in Howard County.

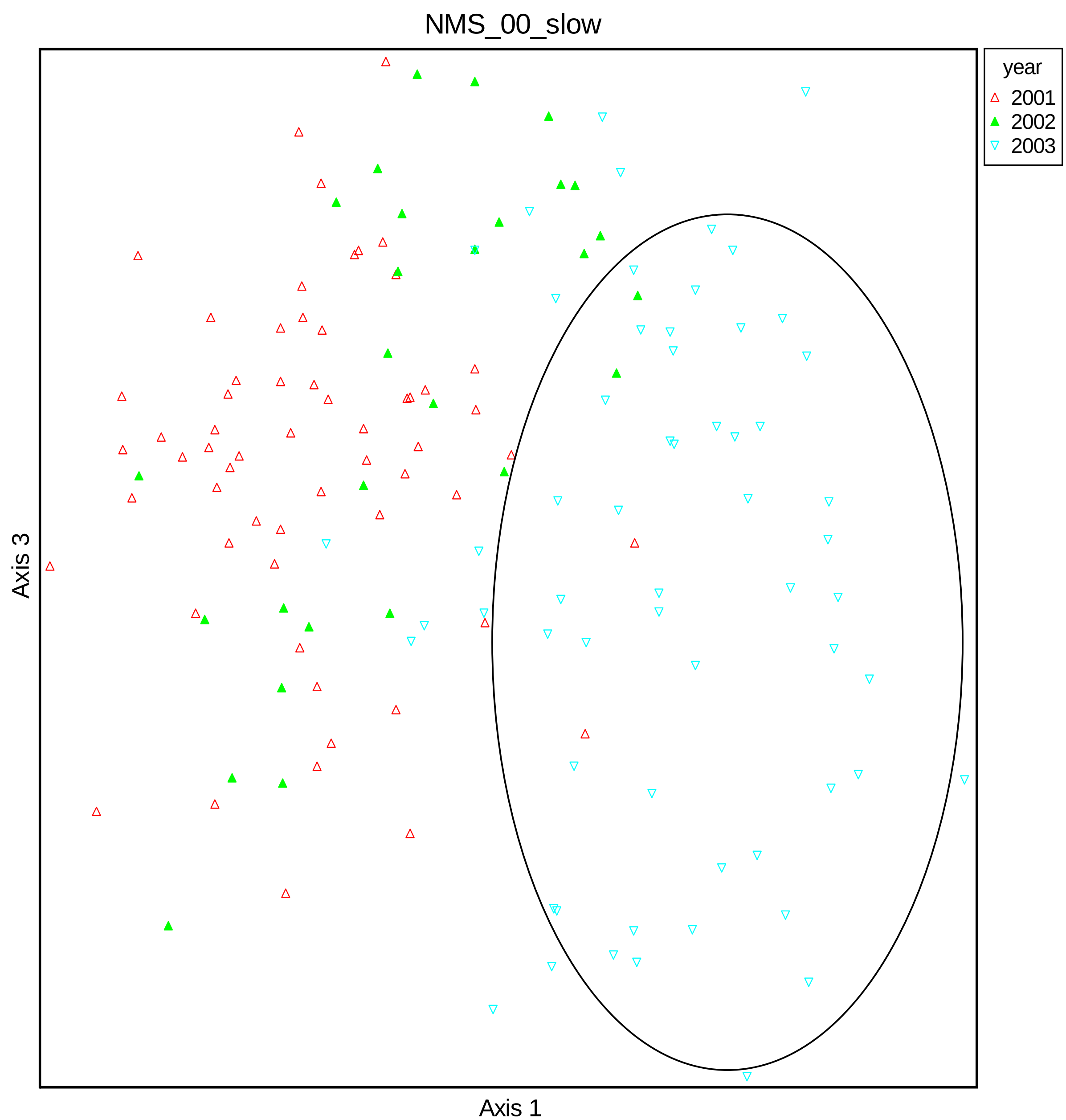

Figure 11. Non-metric multdinmensional scaling plot of benthic assemblage data for stream sites sampled in Howard County over 2001-2003.

Of the three years of data compiled, few strong relationships can be conclusively drawn between biology and physical habitat. Some other variables that showed potential associations were biological score and stream order, year of sampling, and Coastal Plain/Non-Coastal Plain location. Figure 11 describes variations in benthic assemblages for sample years 2001-2003. The farther sites are away from one another the greater are the differences in their benthic assemblages. The grouping of 2003 sites to the right (Figure 11, circled group) of 2001-2002 could be explained by the break in the 10-year state-wide drought. However, these data could be enhanced by state sampling, particularly over many years or with the addition of hydrographic/rainfall data.

III. Conclusions and Recommendations

The results of these biological assessments lead to the following general recommendations:

- Re-evaluate the County's watershed-based sampling design to decide if this scale gives valuable information and whether or not the program should continue as is or if it should be refined to better suit County needs.

The Patapsco River Tributaries assessed in this report represent the last three subwatersheds of the 15 sampled over the past three years by Tetra Tech for Howard County. It is recommended that the County continue its biomonitoring program, either under the original 5-year rotating basin plan, or some other combination that meets County watershed prioritization needs.

- Prioritize watersheds for protection and restoration activities

The County, along with the Center for Watershed Protection (CWP), concentrated on 10 small watersheds (Centennial Lake, Wilde Lake, Lower Rocky Gorge Reservoir, North Laurel, Little Patuxent below Lake Elkhorn, Deep Run Tributaries, Elkridge, Rockburn Branch, Plumtree Branch, and Font Hill tributaries) to prioritize those that were most in need of protection or restoration. The prioritization is based on land use/land cover designations. The County should utilize the biomonitoring results as a companion to the current watershed prioritizations. Biological monitoring results can also be used as a way to gauge restoration progressand success.

- Implement public outreach strategies

The final watershed reports are currently available through the County website. More reader-friendly brochures with color graphics can be created for each subwatershed sampled or for the entire County that details the condition of streams and watersheds in a short summary that would be easier for the public to understand. Brochures are just one way of developing community interest in County programs. A more interactive website that has links that allows users to click on sites sampled and see results in the form of scores or taxa lists could help to peak interest in the biomonitoring program. The County also currently sponsors many volunteer activities, such as tree plantings and park/stream clean-ups. Connecting the idea of stream health to these types of activities could potentially lead to a volunteer stream monitoring program that could engender more public interest in the County biomonitoring program.

- Maintain comparability with State methods

All field team leaders attend the yearly state-sponsored training offered by the Department of Natural Resources. The training serves both as a refresher of the state methods, as well as a way to keep informed of any updates the State might implement to their sampling protocols.

- Maintain and enhance quality assurance/quality control program (QA/QC), including documentation of performance characteristics

Measurement quality objectives (MQOs) should be established for each step of field-based assessments. While the current County QA/QC program covers field audits, checks of data entry and metric calculation, and relative percent difference (RPD) between QC sites, the program does not currently document each step. Developing a rigorous QA/QC program will improve the County's ability to compare its biomonitoring program with the MBSS as well as other County programs.

- Initiate routine for assessing taxonomic precision and comparability with MBSS database

Generally, taxonomic precision is calculated using 10% of any sample set for re-identification by a third party. This will provide the County with documentation of the accuracy of its sample and reference collection of benthic macroinvertebrates. It will also establish a level of agreement between County and State taxonomists.

- Develop research studies that can be enhanced by the addition of biological data

Howard County is unique in many ways. It is located primarily in the Piedmont physiographic region (a small portion [~5%] is Coastal Plain and has a history of agricultural land use that is quickly developing between the Baltimore, Washington D.C. metro corridor. Biological data can be used in comparisons of taxa richness in developed vs. rural land, or Non-Coastal Plain developed areas vs. Coastal Plain developed areas. Other potential studies include the importance of a wide riparian zone to overall stream health, and when a loss of a specific amount of riparian coverage due to increased impervious surface, crop, or pasture land has a negative affect on biology.

- Quantify the effects of nutrients on stream condition (i.e., specifically biology)

Pasture land use make up 78% of the land use designation for the South Branch Patapsco watershed alone. Nutrient inputs from farmland occasionally has a positive short-term effect on local stream biology. However, extended periods of nutrient input can lead to over-enrichment and eutrophication. Protecting streams from this end is a priority. Studies that include nutrient loading (especially nitrogen and phosphorus) could enhance the understanding of stream biological condition.

- Determine the critical point in which impervious surface imperils a stream or watershed

The County population is growing at an astronomical rate. Along with increased population, increases in roadways, parking lots, houses, driveways, schools, and shopping centers are increasing the amount of impervious surface within the County. Analyses in the second round of biomonitoring could be used to calculate watershed imperviousness levels and to evaluate relationships of these levels to benthic conditions.

- Target individual streams or subwatersheds for diagnostic stressor identification

Using biological condition as an indicator, specific streams or watersheds can be chosen for more intensive study to determine the potential cause for degradation (stressor). Knowledge of specific stressors will allow the County to better plan and implement restoration activities that will target and correct the main problem in a stream.

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V. APPENDICES

APPENDIX A: BENTHIC MACROINVERTBRATE TAXA LIST

StationID	FinalID	Phylum	Class	Order	Family	Tribe
201	Ancyronyx	Arthropoda	Insecta	Coleoptera	Elmidae	
201	Macronychus	Arthropoda	Insecta	Coleoptera	Elmidae	
201	Chironomus	Arthropoda	Insecta	Diptera	Chironomidae	
201	Cricotopus/Orthocladius	Arthropoda	Insecta	Diptera	Chironomidae	
201	Dicrotendipes	Arthropoda	Insecta	Diptera	Chironomidae	
201	Hydrobaenus	Arthropoda	Insecta	Diptera	Chironomidae	
201	Orthocladius	Arthropoda	Insecta	Diptera	Chironomidae	
201	Parachaetocladius	Arthropoda	Insecta	Diptera	Chironomidae	
201	Paraphaenocladius	Arthropoda	Insecta	Diptera	Chironomidae	
201	Thienemanniella	Arthropoda	Insecta	Diptera	Chironomidae	
201	Microtendipes	Arthropoda	Insecta	Diptera	Chironomic	Tanytarsini
201	Rheotanytarsus	Arthropoda	Insecta	Diptera	Chironomic	Tanytarsini
201	Antocha	Arthropoda	Insecta	Diptera	Tipulidae	
201	Isonychia	Arthropoda	Insecta	Ephemeroptera	Isonychiidae	
201	Cheumatopsyche	Arthropoda	Insecta	Trichoptera	Hydropsychidae	
201	Hydropsyche	Arthropoda	Insecta	Trichoptera	Hydropsychidae	
203	Enchytraeidae	Annelida	Oligochaet	Tubificida	Enchytraeidae	
203	Nais behningi	Annelida	Oligochaet	Tubificida	Naididae	
203	Macronychus	Arthropoda	Insecta	Coleoptera	Elmidae	
203	Oulimnius	Arthropoda	Insecta	Coleoptera	Elmidae	
203	Probezzia	Arthropoda	Insecta	Diptera	Ceratopogonidae	
203	Cricotopus	Arthropoda	Insecta	Diptera	Chironomidae	
203	Cricotopus/Orthocladius	Arthropoda	Insecta	Diptera	Chironomidae	
203	Diamesa	Arthropoda	Insecta	Diptera	Chironomidae	
203	Orthocladius	Arthropoda	Insecta	Diptera	Chironomidae	
203	Pagastia	Arthropoda	Insecta	Diptera	Chironomidae	
203	Parametriocnemus	Arthropoda	Insecta	Diptera	Chironomidae	
203	Paraphaenocladius	Arthropoda	Insecta	Diptera	Chironomidae	
203	Polypedilum	Arthropoda	Insecta	Diptera	Chironomidae	
203	Sympotthastia	Arthropoda	Insecta	Diptera	Chironomidae	
203	Thienemanniella	Arthropoda	Insecta	Diptera	Chironomidae	
203	Thienemannimyia	Arthropoda	Insecta	Diptera	Chironomidae	
203	Rheotanytarsus	Arthropoda	Insecta	Diptera	Chironomic	Tanytarsini
203	Prosimulium	Arthropoda	Insecta	Diptera	Simuliidae	
203	Simuliidae	Arthropoda	Insecta	Diptera	Simuliidae	
203	Ephemerellidae	Arthropoda	Insecta	Ephemeroptera	Ephemerellidae	
203	Calopteryx	Arthropoda	Insecta	Odonata	Calopterygidae	
203	Gomphidae	Arthropoda	Insecta	Odonata	Gomphidae	
203	Prostoia	Arthropoda	Insecta	Plecoptera	Nemouridae	
203	Acroneuria	Arthropoda	Insecta	Plecoptera	Perlidae	
203	Cheumatopsyche	Arthropoda	Insecta	Trichoptera	Hydropsychidae	
203	Hydropsyche	Arthropoda	Insecta	Trichoptera	Hydropsychidae	
203	Mystacides	Arthropoda	Insecta	Trichoptera	Leptoceridae	
203	Chimarra	Arthropoda	Insecta	Trichoptera	Philopotamidae	
203	Rhyacophila	Arthropoda	Insecta	Trichoptera	Rhyacophilidae	
203	Neophylax	Arthropoda	Insecta	Trichoptera	Uenoidae	
203	Ferrissia	Mollusca	Gastropoda	Basommatophora	Ancylidae	
205	Cognettia	Annelida	Clitellata	Haplotaxida	Enchytraeidae	
205	Sparganophilus	Annelida	Oligochaet	Haplotaxida	Sparganophilidae	
205	Enchytraeidae	Annelida	Oligochaet	Tubificida	Enchytraeidae	
205	Limnodrilus	Annelida	Oligochaet	Tubificida	Tubificidae	

205	Limnodrilus hoffmeisteri	Annelida	Oligochaeta	Tubificida	Tubificidae	
205	Tubificidae	Annelida	Oligochaeta	Tubificida	Tubificidae	
205	Hydrophilidae	Arthropoda	Insecta	Coleoptera	Hydrophilidae	
205	Culicoides	Arthropoda	Insecta	Diptera	Ceratopogonidae	
205	Mallochohelea	Arthropoda	Insecta	Diptera	Ceratopogo	Sphaeromi
205	Ablabesmyia	Arthropoda	Insecta	Diptera	Chironomidae	
205	Dicrotendipes	Arthropoda	Insecta	Diptera	Chironomidae	
205	Diplocladius	Arthropoda	Insecta	Diptera	Chironomidae	
205	Hydrobaenus	Arthropoda	Insecta	Diptera	Chironomidae	
205	Orthocladius	Arthropoda	Insecta	Diptera	Chironomidae	
205	Parametriocnemus	Arthropoda	Insecta	Diptera	Chironomidae	
205	Paraphaenocladius	Arthropoda	Insecta	Diptera	Chironomidae	
205	Pseudorthocladius	Arthropoda	Insecta	Diptera	Chironomidae	
205	Stictochironomus	Arthropoda	Insecta	Diptera	Chironomidae	
205	Stilocladius	Arthropoda	Insecta	Diptera	Chironomidae	
205	Sympotthastia	Arthropoda	Insecta	Diptera	Chironomidae	
205	Thienemannimyia	Arthropoda	Insecta	Diptera	Chironomidae	
205	Tribelos	Arthropoda	Insecta	Diptera	Chironomidae	
205	Zavrelimyia	Arthropoda	Insecta	Diptera	Chironomidae	
205	Micropsectra	Arthropoda	Insecta	Diptera	Chironomic	Tanytarsini
205	Rheotanytarsus	Arthropoda	Insecta	Diptera	Chironomic	Tanytarsini
205	Dixella	Arthropoda	Insecta	Diptera	Dixidae	
205	Dolichopodidae	Arthropoda	Insecta	Diptera	Dolichopodidae	
205	Clinocera	Arthropoda	Insecta	Diptera	Empididae	
205	Prosimulium	Arthropoda	Insecta	Diptera	Simuliidae	
205	Stegopterna	Arthropoda	Insecta	Diptera	Simuliidae	
205	Tipula	Arthropoda	Insecta	Diptera	Tipulidae	
205	Ameletus	Arthropoda	Insecta	Ephemeroptera	Ameletidae	
205	Baetidae	Arthropoda	Insecta	Ephemeroptera	Baetidae	
205	Caenis	Arthropoda	Insecta	Ephemeroptera	Caenidae	
205	Ephemerellidae	Arthropoda	Insecta	Ephemeroptera	Ephemerellidae	
205	Amphinemura	Arthropoda	Insecta	Plecoptera	Nemouridae	
205	Prostoia	Arthropoda	Insecta	Plecoptera	Nemouridae	
205	Taenionema	Arthropoda	Insecta	Plecoptera	Taeniopterygidae	
205	Cheumatopsyche	Arthropoda	Insecta	Trichoptera	Hydropsychidae	
205	Diplectrona	Arthropoda	Insecta	Trichoptera	Hydropsychidae	
205	Hydropsyche	Arthropoda	Insecta	Trichoptera	Hydropsychidae	
205	Chimarra	Arthropoda	Insecta	Trichoptera	Philopotamidae	
205	Lype diversa	Arthropoda	Insecta	Trichoptera	Psychomyiidae	
205	Neophylax	Arthropoda	Insecta	Trichoptera	Uenoidae	
205	Crangonyx	Arthropoda	Malacostra	Amphipoda	Crangonyctidae	
205	Physa	Mollusca	Gastropoda	Basommatophora	Physidae	
205	Nematoda	Nematoda	Nematoda	Nematoda	Nematoda	
206	Enchytraeidae	Annelida	Oligochaeta	Tubificida	Enchytraeidae	
206	Lumbricidae	Annelida	Oligochaeta	Tubificida	Lumbricidae	
206	Helichus	Arthropoda	Insecta	Coleoptera	Dytiscidae	
206	Hydrobius	Arthropoda	Insecta	Coleoptera	Hydrophilidae	
206	Anchytarsus bicolor	Arthropoda	Insecta	Coleoptera	Ptilodactylidae	
206	Diplocladius	Arthropoda	Insecta	Diptera	Chironomidae	
206	Hydrobaenus	Arthropoda	Insecta	Diptera	Chironomidae	
206	Orthocladius	Arthropoda	Insecta	Diptera	Chironomidae	
206	Parametriocnemus	Arthropoda	Insecta	Diptera	Chironomidae	

206	Sympotthastia	Arthropoda	Insecta	Diptera	Chironomidae	
206	Tvetenia	Arthropoda	Insecta	Diptera	Chironomidae	
206	Micropsectra	Arthropoda	Insecta	Diptera	Chironomic	Tanytarsini
206	Prosimulium	Arthropoda	Insecta	Diptera	Simuliidae	
206	Stegopterna	Arthropoda	Insecta	Diptera	Simuliidae	
206	Ameletus	Arthropoda	Insecta	Ephemeroptera	Ameletidae	
206	Nigronia	Arthropoda	Insecta	Megaloptera	Corydalidae	
206	Gomphidae	Arthropoda	Insecta	Odonata	Gomphidae	
206	Capniidae	Arthropoda	Insecta	Plecoptera	Capniidae	
206	Amphinemura	Arthropoda	Insecta	Plecoptera	Nemouridae	
206	Prostoia	Arthropoda	Insecta	Plecoptera	Nemouridae	
206	Diplectrona	Arthropoda	Insecta	Trichoptera	Hydropsychidae	
206	Pycnopsyche	Arthropoda	Insecta	Trichoptera	Limnephilidae	
206	Orconectes	Arthropoda	Malacostra	Decapoda	Cambaridae	
206	Nematoda	Nematoda	Nematoda	Nematoda	Nematoda	
207	Enchytraeidae	Annelida	Oligochaet	Tubificida	Enchytraeidae	
207	Lumbricidae	Annelida	Oligochaet	Tubificida	Lumbricidae	
207	Oulimnius	Arthropoda	Insecta	Coleoptera	Elmidae	
207	Ceratopogon	Arthropoda	Insecta	Diptera	Ceratopogonidae	
207	Cricotopus	Arthropoda	Insecta	Diptera	Chironomidae	
207	Eukiefferiella	Arthropoda	Insecta	Diptera	Chironomidae	
207	Orthocladius	Arthropoda	Insecta	Diptera	Chironomidae	
207	Parametriocnemus	Arthropoda	Insecta	Diptera	Chironomidae	
207	Sympotthastia	Arthropoda	Insecta	Diptera	Chironomidae	
207	Prosimulium	Arthropoda	Insecta	Diptera	Simuliidae	
207	Simuliidae	Arthropoda	Insecta	Diptera	Simuliidae	
207	Tipula	Arthropoda	Insecta	Diptera	Tipulidae	
207	Ephemerella	Arthropoda	Insecta	Ephemeroptera	Ephemerellidae	
207	Nigronia	Arthropoda	Insecta	Megaloptera	Corydalidae	
207	Diplectrona	Arthropoda	Insecta	Trichoptera	Hydropsychidae	
207	Rhyacophila	Arthropoda	Insecta	Trichoptera	Rhyacophilidae	
207	Neophylax	Arthropoda	Insecta	Trichoptera	Uenoidae	
207	Pisidium	Mollusca	Pelecypoda	Veneroida	Pisidiidae	
208	Enchytraeidae	Annelida	Oligochaet	Tubificida	Enchytraeidae	
208	Oulimnius	Arthropoda	Insecta	Coleoptera	Elmidae	
208	Cricotopus	Arthropoda	Insecta	Diptera	Chironomidae	
208	Diamesa	Arthropoda	Insecta	Diptera	Chironomidae	
208	Eukiefferiella	Arthropoda	Insecta	Diptera	Chironomidae	
208	Parametriocnemus	Arthropoda	Insecta	Diptera	Chironomidae	
208	Potthastia	Arthropoda	Insecta	Diptera	Chironomidae	
208	Sympotthastia	Arthropoda	Insecta	Diptera	Chironomidae	
208	Prosimulium	Arthropoda	Insecta	Diptera	Simuliidae	
208	Gomphus	Arthropoda	Insecta	Odonata	Gomphidae	
208	Allocapnia	Arthropoda	Insecta	Plecoptera	Capniidae	
208	Perlodidae	Arthropoda	Insecta	Plecoptera	Perlodidae	
208	Neophylax	Arthropoda	Insecta	Trichoptera	Uenoidae	
209	Enchytraeidae	Annelida	Oligochaet	Tubificida	Enchytraeidae	
209	Lumbricidae	Annelida	Oligochaet	Tubificida	Lumbricidae	
209	Aulodrilus japonicus	Annelida	Oligochaet	Tubificida	Tubificidae	
209	Limnodrilus	Annelida	Oligochaet	Tubificida	Tubificidae	
209	Limnodrilus hoffmeisteri	Annelida	Oligochaet	Tubificida	Tubificidae	
209	Ceratopogon	Arthropoda	Insecta	Diptera	Ceratopogonidae	

209	Chaetocladius	Arthropoda	Insecta	Diptera	Chironomidae	
209	Diplocladius	Arthropoda	Insecta	Diptera	Chironomidae	
209	Hydrobaenus	Arthropoda	Insecta	Diptera	Chironomidae	
209	Parametriocnemus	Arthropoda	Insecta	Diptera	Chironomidae	
209	Zavrelimyia	Arthropoda	Insecta	Diptera	Chironomidae	
209	Stegopterna	Arthropoda	Insecta	Diptera	Simuliidae	
209	Ironoquia	Arthropoda	Insecta	Trichoptera	Limnephilidae	
209	Physa	Mollusca	Gastropoda	Basommatophora	Physidae	
209	Pisidium	Mollusca	Pelecypoda	Veneroida	Pisidiidae	
210QC	Lumbricidae	Annelida	Oligochaeta	Tubificida	Lumbricidae	
210QC	Hydroporous (Heterosternuta)	Arthropoda	Insecta	Coleoptera	Dytiscidae	
210QC	Stenelmis	Arthropoda	Insecta	Coleoptera	Elmidae	
210QC	Chaetocladius	Arthropoda	Insecta	Diptera	Chironomidae	
210QC	Diplocladius	Arthropoda	Insecta	Diptera	Chironomidae	
210QC	Eukiefferiella	Arthropoda	Insecta	Diptera	Chironomidae	
210QC	Parametriocnemus	Arthropoda	Insecta	Diptera	Chironomidae	
210QC	Sympotthastia	Arthropoda	Insecta	Diptera	Chironomidae	
210QC	Zavrelimyia	Arthropoda	Insecta	Diptera	Chironomidae	
210QC	Corynoneura	Arthropoda	Insecta	Diptera	Chironomidae	Tanytarsini
210QC	Micropsectra	Arthropoda	Insecta	Diptera	Chironomidae	Tanytarsini
210QC	Prosimulium	Arthropoda	Insecta	Diptera	Simuliidae	
210QC	Simulium	Arthropoda	Insecta	Diptera	Simuliidae	
210QC	Stegopterna	Arthropoda	Insecta	Diptera	Simuliidae	
210QC	Pseudolimnophila	Arthropoda	Insecta	Diptera	Tipulidae	
210QC	Tipula	Arthropoda	Insecta	Diptera	Tipulidae	
210QC	Ameletus	Arthropoda	Insecta	Ephemeroptera	Ameletidae	
210QC	Nigronia	Arthropoda	Insecta	Megaloptera	Corydalidae	
210QC	Capniidae	Arthropoda	Insecta	Plecoptera	Capniidae	
210QC	Nemouridae	Arthropoda	Insecta	Plecoptera	Nemouridae	
210	Enchytraeidae	Annelida	Oligochaeta	Tubificida	Enchytraeidae	
210	Lumbricidae	Annelida	Oligochaeta	Tubificida	Lumbricidae	
210	Limnodrilus	Annelida	Oligochaeta	Tubificida	Tubificidae	
210	Limnodrilus hoffmeisteri	Annelida	Oligochaeta	Tubificida	Tubificidae	
210	Optioservus	Arthropoda	Insecta	Coleoptera	Elmidae	
210	Stenelmis	Arthropoda	Insecta	Coleoptera	Elmidae	
210	Hydrobius	Arthropoda	Insecta	Coleoptera	Hydrophilidae	
210	Anchytarsus bicolor	Arthropoda	Insecta	Coleoptera	Ptilodactylidae	
210	Eukiefferiella	Arthropoda	Insecta	Diptera	Chironomidae	
210	Parametriocnemus	Arthropoda	Insecta	Diptera	Chironomidae	
210	Stilocladius	Arthropoda	Insecta	Diptera	Chironomidae	
210	Sympotthastia	Arthropoda	Insecta	Diptera	Chironomidae	
210	Thienemannimyia	Arthropoda	Insecta	Diptera	Chironomidae	
210	Tribelos	Arthropoda	Insecta	Diptera	Chironomidae	
210	Zavrelimyia	Arthropoda	Insecta	Diptera	Chironomidae	
210	Corynoneura	Arthropoda	Insecta	Diptera	Chironomidae	Tanytarsini
210	Micropsectra	Arthropoda	Insecta	Diptera	Chironomidae	Tanytarsini
210	Prosimulium	Arthropoda	Insecta	Diptera	Simuliidae	
210	Stegopterna	Arthropoda	Insecta	Diptera	Simuliidae	
210	Tipula	Arthropoda	Insecta	Diptera	Tipulidae	
210	Ameletus	Arthropoda	Insecta	Ephemeroptera	Ameletidae	
210	Nemouridae	Arthropoda	Insecta	Plecoptera	Nemouridae	
215	Enchytraeidae	Annelida	Oligochaeta	Tubificida	Enchytraeidae	

215	Limnodrilus hoffmeisteri	Annelida	Oligochaet	Tubificida	Tubificidae	
215	Anchytarsus bicolor	Arthropoda	Insecta	Coleoptera	Ptilodactylidae	
215	Cricotopus/Orthocladius	Arthropoda	Insecta	Diptera	Chironomidae	
215	Diamesa	Arthropoda	Insecta	Diptera	Chironomidae	
215	Heterotrissocladius	Arthropoda	Insecta	Diptera	Chironomidae	
215	Orthocladius	Arthropoda	Insecta	Diptera	Chironomidae	
215	Orthocladius lignicola	Arthropoda	Insecta	Diptera	Chironomidae	
215	Parametriocnemus	Arthropoda	Insecta	Diptera	Chironomidae	
215	Paraphaenocladius	Arthropoda	Insecta	Diptera	Chironomidae	
215	Phaenopsectra	Arthropoda	Insecta	Diptera	Chironomidae	
215	Polypedilum	Arthropoda	Insecta	Diptera	Chironomidae	
215	Potthastia	Arthropoda	Insecta	Diptera	Chironomidae	
215	Sympotthastia	Arthropoda	Insecta	Diptera	Chironomidae	
215	Thienemanniella	Arthropoda	Insecta	Diptera	Chironomidae	
215	Thienemannimyia	Arthropoda	Insecta	Diptera	Chironomidae	
215	Corynoneura	Arthropoda	Insecta	Diptera	Chironomic	Tanytarsini
215	Micropsectra	Arthropoda	Insecta	Diptera	Chironomic	Tanytarsini
215	Microtendipes	Arthropoda	Insecta	Diptera	Chironomic	Tanytarsini
215	Paratanytarsus	Arthropoda	Insecta	Diptera	Chironomic	Tanytarsini
215	Rheotanytarsus	Arthropoda	Insecta	Diptera	Chironomic	Tanytarsini
215	Stempellinella	Arthropoda	Insecta	Diptera	Chironomic	Tanytarsini
215	Tanytarsus	Arthropoda	Insecta	Diptera	Chironomic	Tanytarsini
215	Pericoma	Arthropoda	Insecta	Diptera	Psychodidae	
215	Simuliidae	Arthropoda	Insecta	Diptera	Simuliidae	
215	Simulium	Arthropoda	Insecta	Diptera	Simuliidae	
215	Limnophila	Arthropoda	Insecta	Diptera	Tipulidae	
215	Tipula	Arthropoda	Insecta	Diptera	Tipulidae	
215	Baetidae	Arthropoda	Insecta	Ephemeroptera	Baetidae	
215	Eurylophella	Arthropoda	Insecta	Ephemeroptera	Ephemerellidae	
215	Stenonema	Arthropoda	Insecta	Ephemeroptera	Heptageniidae	
215	Diplectrona	Arthropoda	Insecta	Trichoptera	Hydropsychidae	
215	Hyalella	Arthropoda	Malacostra	Amphipoda	Hyalellidae	
215	Nematoda	Nematoda	Nematoda	Nematoda	Nematoda	
217	Nais bretscheri	Annelida	Clitellata	Haplotaxida	Naididae	
217	Optioservus	Arthropoda	Insecta	Coleoptera	Elmidae	
217	Oulimnius	Arthropoda	Insecta	Coleoptera	Elmidae	
217	Anchytarsus bicolor	Arthropoda	Insecta	Coleoptera	Ptilodactylidae	
217	Diamesa	Arthropoda	Insecta	Diptera	Chironomidae	
217	Orthocladius	Arthropoda	Insecta	Diptera	Chironomidae	
217	Orthocladius lignicola	Arthropoda	Insecta	Diptera	Chironomidae	
217	Parakiefferiella	Arthropoda	Insecta	Diptera	Chironomidae	
217	Parametriocnemus	Arthropoda	Insecta	Diptera	Chironomidae	
217	Polypedilum	Arthropoda	Insecta	Diptera	Chironomidae	
217	Sympotthastia	Arthropoda	Insecta	Diptera	Chironomidae	
217	Tvetenia	Arthropoda	Insecta	Diptera	Chironomidae	
217	Micropsectra	Arthropoda	Insecta	Diptera	Chironomic	Tanytarsini
217	Prosimulium	Arthropoda	Insecta	Diptera	Simuliidae	
217	Stegopterna	Arthropoda	Insecta	Diptera	Simuliidae	
217	Tipula	Arthropoda	Insecta	Diptera	Tipulidae	
217	Ephemerella	Arthropoda	Insecta	Ephemeroptera	Ephemerellidae	
217	Eurylophella	Arthropoda	Insecta	Ephemeroptera	Ephemerellidae	
217	Nigronia	Arthropoda	Insecta	Megaloptera	Corydalidae	

217	Amphinemura	Arthropoda	Insecta	Plecoptera	Nemouridae	
217	Prostoia	Arthropoda	Insecta	Plecoptera	Nemouridae	
217	Cheumatopsyche	Arthropoda	Insecta	Trichoptera	Hydropsychidae	
217	Hydropsyche	Arthropoda	Insecta	Trichoptera	Hydropsychidae	
217	Chimarra	Arthropoda	Insecta	Trichoptera	Philopotamidae	
217	Neophylax	Arthropoda	Insecta	Trichoptera	Uenoidae	
221	Lumbriculidae	Annelida	Oligochaet	Lumbriculida	Lumbriculidae	
221	Enchytraeidae	Annelida	Oligochaet	Tubificida	Enchytraeidae	
221	Limnodrilus	Annelida	Oligochaet	Tubificida	Tubificidae	
221	Limnodrilus hoffmeisteri	Annelida	Oligochaet	Tubificida	Tubificidae	
221	Curculionidae	Arthropoda	Insecta	Coleoptera	Curculionidae	
221	Lioporeus	Arthropoda	Insecta	Coleoptera	Dytiscidae	
221	Macronychus	Arthropoda	Insecta	Coleoptera	Elmidae	
221	Oulimnius	Arthropoda	Insecta	Coleoptera	Elmidae	
221	Hydrobius	Arthropoda	Insecta	Coleoptera	Hydrophilidae	
221	Sphaeriidae	Arthropoda	Insecta	Coleoptera	Sphaeriidae	
221	Probezzia	Arthropoda	Insecta	Diptera	Ceratopogonidae	
221	Cryptochironomus	Arthropoda	Insecta	Diptera	Chironomidae	
221	Dicrotendipes	Arthropoda	Insecta	Diptera	Chironomidae	
221	Hydrobaenus	Arthropoda	Insecta	Diptera	Chironomidae	
221	Orthocladius	Arthropoda	Insecta	Diptera	Chironomidae	
221	Parachaetocladius	Arthropoda	Insecta	Diptera	Chironomidae	
221	Phaenopsectra	Arthropoda	Insecta	Diptera	Chironomidae	
221	Procladius	Arthropoda	Insecta	Diptera	Chironomidae	
221	Corynoneura	Arthropoda	Insecta	Diptera	Chironomic	Tanytarsini
221	Prosimulium	Arthropoda	Insecta	Diptera	Simuliidae	
221	Stegopterna	Arthropoda	Insecta	Diptera	Simuliidae	
221	Ameletus	Arthropoda	Insecta	Ephemeroptera	Ameletidae	
221	Baetidae	Arthropoda	Insecta	Ephemeroptera	Baetidae	
221	Caenis	Arthropoda	Insecta	Ephemeroptera	Caenidae	
221	Ephemerellidae	Arthropoda	Insecta	Ephemeroptera	Ephemerellidae	
221	Isonychia	Arthropoda	Insecta	Ephemeroptera	Isonychiidae	
221	Leptophlebia	Arthropoda	Insecta	Ephemeroptera	Leptophlebiidae	
221	Capniidae	Arthropoda	Insecta	Plecoptera	Capniidae	
221	Nemouridae	Arthropoda	Insecta	Plecoptera	Nemouridae	
221	Limnephilidae	Arthropoda	Insecta	Trichoptera	Limnephilidae	
221	Ptilostomis	Arthropoda	Insecta	Trichoptera	Phryganeidae	
221	Crangonyx	Arthropoda	Malacostra	Amphipoda	Crangonyctidae	
221	Gammarus	Arthropoda	Malacostra	Amphipoda	Gammaridae	
221	Caecidotea	Arthropoda	Malacostra	Isopoda	Asellidae	
221	Physa	Mollusca	Gastropoda	Basommatophora	Physidae	
221	Pisidium	Mollusca	Pelecypoda	Veneroida	Pisidiidae	
222	Stenelmis	Arthropoda	Insecta	Coleoptera	Elmidae	
222	Hydrobius	Arthropoda	Insecta	Coleoptera	Hydrophilidae	
222	Bezzia/Palpomyia	Arthropoda	Insecta	Diptera	Ceratopogonidae	
222	Ceratopogon	Arthropoda	Insecta	Diptera	Ceratopogonidae	
222	Diamesa	Arthropoda	Insecta	Diptera	Chironomidae	
222	Heterotrissocladius	Arthropoda	Insecta	Diptera	Chironomidae	
222	Limnophyes	Arthropoda	Insecta	Diptera	Chironomidae	
222	Natarsia	Arthropoda	Insecta	Diptera	Chironomidae	
222	Parachaetocladius	Arthropoda	Insecta	Diptera	Chironomidae	
222	Parametriocnemus	Arthropoda	Insecta	Diptera	Chironomidae	

222	Paraphaenocladius	Arthropoda	Insecta	Diptera	Chironomidae	
222	Pseudorthocladius	Arthropoda	Insecta	Diptera	Chironomidae	
222	Stilocladius	Arthropoda	Insecta	Diptera	Chironomidae	
222	Thienemannimyia	Arthropoda	Insecta	Diptera	Chironomidae	
222	Zavrelimyia	Arthropoda	Insecta	Diptera	Chironomidae	
222	Micropsectra	Arthropoda	Insecta	Diptera	Chironomic	Tanytarsini
222	Prosimulium	Arthropoda	Insecta	Diptera	Simuliidae	
222	Stegopterna	Arthropoda	Insecta	Diptera	Simuliidae	
222	Tipula	Arthropoda	Insecta	Diptera	Tipulidae	
222	Diplectrona	Arthropoda	Insecta	Trichoptera	Hydropsychidae	
222	Ptilostomis	Arthropoda	Insecta	Trichoptera	Phryganeidae	
222	Rhyacophila	Arthropoda	Insecta	Trichoptera	Rhyacophilidae	
222	Neophylax	Arthropoda	Insecta	Trichoptera	Uenoidae	
222	Pisidium	Mollusca	Pelecypoda	Veneroida	Pisidiidae	
223	Ectopria	Arthropoda	Insecta	Coleoptera	Psephenidae	
223	Diamesa	Arthropoda	Insecta	Diptera	Chironomidae	
223	Limnophyes	Arthropoda	Insecta	Diptera	Chironomidae	
223	Parachaetocladius	Arthropoda	Insecta	Diptera	Chironomidae	
223	Stilocladius	Arthropoda	Insecta	Diptera	Chironomidae	
223	Stempellina	Arthropoda	Insecta	Diptera	Chironomic	Tanytarsini
223	Prosimulium	Arthropoda	Insecta	Diptera	Simuliidae	
223	Stegopterna	Arthropoda	Insecta	Diptera	Simuliidae	
223	Tipula	Arthropoda	Insecta	Diptera	Tipulidae	
223	Ameletus	Arthropoda	Insecta	Ephemeroptera	Ameletidae	
223	Ephemerellidae	Arthropoda	Insecta	Ephemeroptera	Ephemerellidae	
223	Eurylophella	Arthropoda	Insecta	Ephemeroptera	Ephemerellidae	
223	Nigronia	Arthropoda	Insecta	Megaloptera	Corydalidae	
223	Cordulegaster	Arthropoda	Insecta	Odonata	Cordulegastridae	
223	Allocapnia	Arthropoda	Insecta	Plecoptera	Capniidae	
223	Amphinemura	Arthropoda	Insecta	Plecoptera	Nemouridae	
223	Prostoia	Arthropoda	Insecta	Plecoptera	Nemouridae	
223	Acroneuria	Arthropoda	Insecta	Plecoptera	Perlidae	
223	Diplectrona	Arthropoda	Insecta	Trichoptera	Hydropsychidae	
223	Pycnopsyche	Arthropoda	Insecta	Trichoptera	Limnephilidae	
223	Rhyacophila	Arthropoda	Insecta	Trichoptera	Rhyacophilidae	
223	Neophylax	Arthropoda	Insecta	Trichoptera	Uenoidae	
223	Physa	Mollusca	Gastropoda	Basommatophora	Physidae	
224	Enchytraeidae	Annelida	Oligochaet	Tubificida	Enchytraeidae	
224	Limnodrilus	Annelida	Oligochaet	Tubificida	Tubificidae	
224	Limnodrilus hoffmeisteri	Annelida	Oligochaet	Tubificida	Tubificidae	
224	Dytiscidae	Arthropoda	Insecta	Coleoptera	Dytiscidae	
224	Lioporeus	Arthropoda	Insecta	Coleoptera	Dytiscidae	
224	Stenelmis	Arthropoda	Insecta	Coleoptera	Elmidae	
224	Probezzia	Arthropoda	Insecta	Diptera	Ceratopogonidae	
224	Hydrobaenus	Arthropoda	Insecta	Diptera	Chironomidae	
224	Orthocladius	Arthropoda	Insecta	Diptera	Chironomidae	
224	Micropsectra	Arthropoda	Insecta	Diptera	Chironomic	Tanytarsini
224	Dixella	Arthropoda	Insecta	Diptera	Dixidae	
224	Stegopterna	Arthropoda	Insecta	Diptera	Simuliidae	
224	Ormosia	Arthropoda	Insecta	Diptera	Tipulidae	
224	Ameletus	Arthropoda	Insecta	Ephemeroptera	Ameletidae	
224	Caenis	Arthropoda	Insecta	Ephemeroptera	Caenidae	

224	Stenonema	Arthropoda	Insecta	Ephemeroptera	Heptageniidae
224	Sialis	Arthropoda	Insecta	Megaloptera	Sialidae
224	Crangonyx	Arthropoda	Malacostra	Amphipoda	Crangonyctidae
224	Gammarus	Arthropoda	Malacostra	Amphipoda	Gammaridae
224	Pisidium	Mollusca	Pelecypoda	Veneroida	Pisidiidae
225	Enchytraeidae	Annelida	Oligochaet	Tubificida	Enchytraeidae
225	Oulimnius	Arthropoda	Insecta	Coleoptera	Elmidae
225	Stenelmis	Arthropoda	Insecta	Coleoptera	Elmidae
225	Cricotopus/Orthocladius	Arthropoda	Insecta	Diptera	Chironomidae
225	Diamesa	Arthropoda	Insecta	Diptera	Chironomidae
225	Orthocladius	Arthropoda	Insecta	Diptera	Chironomidae
225	Paraphaenocladius	Arthropoda	Insecta	Diptera	Chironomidae
225	Sympotthastia	Arthropoda	Insecta	Diptera	Chironomidae
225	Thienemannimyia	Arthropoda	Insecta	Diptera	Chironomidae
225	Prosimulium	Arthropoda	Insecta	Diptera	Simuliidae
225	Stegopterna	Arthropoda	Insecta	Diptera	Simuliidae
225	Antocha	Arthropoda	Insecta	Diptera	Tipulidae
225	Tipula	Arthropoda	Insecta	Diptera	Tipulidae
225	Nigronia	Arthropoda	Insecta	Megaloptera	Corydalidae
225	Gomphus	Arthropoda	Insecta	Odonata	Gomphidae
225	Prostoia	Arthropoda	Insecta	Plecoptera	Nemouridae
225	Cheumatopsyche	Arthropoda	Insecta	Trichoptera	Hydropsychidae
225	Diplectrona	Arthropoda	Insecta	Trichoptera	Hydropsychidae
225	Hydropsyche	Arthropoda	Insecta	Trichoptera	Hydropsychidae
225	Chimarra	Arthropoda	Insecta	Trichoptera	Philopotamidae
225	Dolophilodes	Arthropoda	Insecta	Trichoptera	Philopotamidae
225	Neophylax	Arthropoda	Insecta	Trichoptera	Uenoidae
225	Gammarus	Arthropoda	Malacostra	Amphipoda	Gammaridae
226	Nais bretscheri	Annelida	Clitellata	Haplotaxida	Naididae
226	Enchytraeidae	Annelida	Oligochaet	Tubificida	Enchytraeidae
226	Nais variabilis	Annelida	Oligochaet	Tubificida	Naididae
226	Limnodrilus	Annelida	Oligochaet	Tubificida	Tubificidae
226	Limnodrilus claparedeianus	Annelida	Oligochaet	Tubificida	Tubificidae
226	Carabidae	Arthropoda	Insecta	Coleoptera	Carabidae
226	Oulimnius	Arthropoda	Insecta	Coleoptera	Elmidae
226	Dasyhelea	Arthropoda	Insecta	Diptera	Ceratopogonidae
226	Phaenopsectra	Arthropoda	Insecta	Diptera	Chironomidae
226	Polypedilum	Arthropoda	Insecta	Diptera	Chironomidae
226	Trissopelopia	Arthropoda	Insecta	Diptera	Chironomidae
226	Chelifera	Arthropoda	Insecta	Diptera	Empididae
226	Tipula	Arthropoda	Insecta	Diptera	Tipulidae
226	Physa	Mollusca	Gastropoda	Basommatophora	Physidae
2247QC	Enchytraeidae	Annelida	Oligochaet	Tubificida	Enchytraeidae
2247QC	Lumbricidae	Annelida	Oligochaet	Tubificida	Lumbricidae
2247QC	Optioservus	Arthropoda	Insecta	Coleoptera	Elmidae
2247QC	Oulimnius	Arthropoda	Insecta	Coleoptera	Elmidae
2247QC	Cecidomyiidae	Arthropoda	Insecta	Diptera	Cecidomyiidae
2247QC	Diplocladius	Arthropoda	Insecta	Diptera	Chironomidae
2247QC	Eukiefferiella	Arthropoda	Insecta	Diptera	Chironomidae
2247QC	Parachaetocladius	Arthropoda	Insecta	Diptera	Chironomidae
2247QC	Phaenopsectra	Arthropoda	Insecta	Diptera	Chironomidae
2247QC	Pseudorthocladius	Arthropoda	Insecta	Diptera	Chironomidae

2247QC	Stilocladius	Arthropoda	Insecta	Diptera	Chironomidae	
2247QC	Chelifera	Arthropoda	Insecta	Diptera	Empididae	
2247QC	Limonia	Arthropoda	Insecta	Diptera	Tipulidae	
2247QC	Tipula	Arthropoda	Insecta	Diptera	Tipulidae	
2247QC	Cheumatopsyche	Arthropoda	Insecta	Trichoptera	Hydropsychidae	
2247QC	Hydropsyche	Arthropoda	Insecta	Trichoptera	Hydropsychidae	
2247QC	Physa	Mollusca	Gastropoda	Basommatophora	Physidae	
2247QC	Pisidium	Mollusca	Pelecypoda	Veneroida	Pisidiidae	
227	Enchytraeidae	Annelida	Oligochaeta	Tubificida	Enchytraeidae	
227	Lumbricidae	Annelida	Oligochaeta	Tubificida	Lumbricidae	
227	Nais variabilis	Annelida	Oligochaeta	Tubificida	Naididae	
227	Limnodrilus	Annelida	Oligochaeta	Tubificida	Tubificidae	
227	Oulimnius	Arthropoda	Insecta	Coleoptera	Elmidae	
227	Parachaetocladius	Arthropoda	Insecta	Diptera	Chironomidae	
227	Phaenopsectra	Arthropoda	Insecta	Diptera	Chironomidae	
227	Sympotthastia	Arthropoda	Insecta	Diptera	Chironomidae	
227	Thienemannimyia	Arthropoda	Insecta	Diptera	Chironomidae	
227	Tanytarsus	Arthropoda	Insecta	Diptera	Chironomidae	Tanytarsini
227	Chelifera	Arthropoda	Insecta	Diptera	Empididae	
227	Tipula	Arthropoda	Insecta	Diptera	Tipulidae	
227	Cheumatopsyche	Arthropoda	Insecta	Trichoptera	Hydropsychidae	
227	Diplectrona	Arthropoda	Insecta	Trichoptera	Hydropsychidae	
227	Hydropsyche	Arthropoda	Insecta	Trichoptera	Hydropsychidae	
227	Physa	Mollusca	Gastropoda	Basommatophora	Physidae	
228	Enchytraeidae	Annelida	Oligochaeta	Tubificida	Enchytraeidae	
228	Lumbricidae	Annelida	Oligochaeta	Tubificida	Lumbricidae	
228	Agabus	Arthropoda	Insecta	Coleoptera	Dytiscidae	
228	Helichus	Arthropoda	Insecta	Coleoptera	Dytiscidae	
228	Dubiraphia	Arthropoda	Insecta	Coleoptera	Elmidae	
228	Hydrobius	Arthropoda	Insecta	Coleoptera	Hydrophilidae	
228	Probezzia	Arthropoda	Insecta	Diptera	Ceratopogonidae	
228	Brillia	Arthropoda	Insecta	Diptera	Chironomidae	
228	Cricotopus	Arthropoda	Insecta	Diptera	Chironomidae	
228	Eukiefferiella	Arthropoda	Insecta	Diptera	Chironomidae	
228	Glyptotendipes	Arthropoda	Insecta	Diptera	Chironomidae	
228	Gymnometriocnemus	Arthropoda	Insecta	Diptera	Chironomidae	
228	Hydrobaenus	Arthropoda	Insecta	Diptera	Chironomidae	
228	Orthocladius	Arthropoda	Insecta	Diptera	Chironomidae	
228	Parametriocnemus	Arthropoda	Insecta	Diptera	Chironomidae	
228	Phaenopsectra	Arthropoda	Insecta	Diptera	Chironomidae	
228	Polypedilum	Arthropoda	Insecta	Diptera	Chironomidae	
228	Pseudorthocladius	Arthropoda	Insecta	Diptera	Chironomidae	
228	Sympotthastia	Arthropoda	Insecta	Diptera	Chironomidae	
228	Thienemannimyia	Arthropoda	Insecta	Diptera	Chironomidae	
228	Zavrelimyia	Arthropoda	Insecta	Diptera	Chironomidae	
228	Micropsectra	Arthropoda	Insecta	Diptera	Chironomidae	Tanytarsini
228	Paratanytarsus	Arthropoda	Insecta	Diptera	Chironomidae	Tanytarsini
228	Rheotanytarsus	Arthropoda	Insecta	Diptera	Chironomidae	Tanytarsini
228	Prosimulium	Arthropoda	Insecta	Diptera	Simuliidae	
228	Stegopterna	Arthropoda	Insecta	Diptera	Simuliidae	
228	Chrysops	Arthropoda	Insecta	Diptera	Tabanidae	
228	Tipula	Arthropoda	Insecta	Diptera	Tipulidae	

228	Nigronia	Arthropoda	Insecta	Megaloptera	Corydalidae
228	Climacia	Arthropoda	Insecta	Neuroptera	Sisyridae
228	Anax	Arthropoda	Insecta	Odonata	Aeshnidae
228	Boyeria	Arthropoda	Insecta	Odonata	Aeshnidae
228	Allocapnia	Arthropoda	Insecta	Plecoptera	Capniidae
228	Cheumatopsyche	Arthropoda	Insecta	Trichoptera	Hydropsychidae
228	Potamyia flava	Arthropoda	Insecta	Trichoptera	Hydropsychidae
228	Polycentropodidae	Arthropoda	Insecta	Trichoptera	Polycentropodidae
228	Fossaria	Mollusca	Gastropoda	Basommatophora	Lymnaeidae
229	Oulimnius	Arthropoda	Insecta	Coleoptera	Elmidae
229	Stenelmis	Arthropoda	Insecta	Coleoptera	Elmidae
229	Psephenus	Arthropoda	Insecta	Coleoptera	Psephenidae
229	Chironomus	Arthropoda	Insecta	Diptera	Chironomidae
229	Cricotopus	Arthropoda	Insecta	Diptera	Chironomidae
229	Cricotopus/Orthocladius	Arthropoda	Insecta	Diptera	Chironomidae
229	Eukiefferiella	Arthropoda	Insecta	Diptera	Chironomidae
229	Sympotthastia	Arthropoda	Insecta	Diptera	Chironomidae
229	Prosimulium	Arthropoda	Insecta	Diptera	Simuliidae
229	Antocha	Arthropoda	Insecta	Diptera	Tipulidae
229	Limonia	Arthropoda	Insecta	Diptera	Tipulidae
229	Tipula	Arthropoda	Insecta	Diptera	Tipulidae
229	Nigronia	Arthropoda	Insecta	Megaloptera	Corydalidae
229	Prostoia	Arthropoda	Insecta	Plecoptera	Nemouridae
229	Cheumatopsyche	Arthropoda	Insecta	Trichoptera	Hydropsychidae
229	Hydropsyche	Arthropoda	Insecta	Trichoptera	Hydropsychidae
230	Optioservus	Arthropoda	Insecta	Coleoptera	Elmidae
230	Psephenus	Arthropoda	Insecta	Coleoptera	Psephenidae
230	Parametriocnemus	Arthropoda	Insecta	Diptera	Chironomidae
230	Sympotthastia	Arthropoda	Insecta	Diptera	Chironomidae
230	Prosimulium	Arthropoda	Insecta	Diptera	Simuliidae
230	Simulium	Arthropoda	Insecta	Diptera	Simuliidae
230	Antocha	Arthropoda	Insecta	Diptera	Tipulidae
230	Tipula	Arthropoda	Insecta	Diptera	Tipulidae
230	Ephemerella	Arthropoda	Insecta	Ephemeroptera	Ephemerellidae
230	Eurylophella	Arthropoda	Insecta	Ephemeroptera	Ephemerellidae
230	Stenonema	Arthropoda	Insecta	Ephemeroptera	Heptageniidae
230	Nigronia	Arthropoda	Insecta	Megaloptera	Corydalidae
230	Gomphidae	Arthropoda	Insecta	Odonata	Gomphidae
230	Allocapnia	Arthropoda	Insecta	Plecoptera	Capniidae
230	Prostoia	Arthropoda	Insecta	Plecoptera	Nemouridae
230	Acroneuria	Arthropoda	Insecta	Plecoptera	Perlidae
230	Cheumatopsyche	Arthropoda	Insecta	Trichoptera	Hydropsychidae
230	Diplectrona	Arthropoda	Insecta	Trichoptera	Hydropsychidae
230	Hydropsyche	Arthropoda	Insecta	Trichoptera	Hydropsychidae
230	Neophylax	Arthropoda	Insecta	Trichoptera	Uenoidae
241	Helichus	Arthropoda	Insecta	Coleoptera	Dytiscidae
241	Lioporeus	Arthropoda	Insecta	Coleoptera	Dytiscidae
241	Dubiraphia	Arthropoda	Insecta	Coleoptera	Elmidae
241	Macronychus	Arthropoda	Insecta	Coleoptera	Elmidae
241	Optioservus	Arthropoda	Insecta	Coleoptera	Elmidae
241	Oulimnius	Arthropoda	Insecta	Coleoptera	Elmidae
241	Stenelmis	Arthropoda	Insecta	Coleoptera	Elmidae

241	Hydrobius	Arthropoda	Insecta	Coleoptera	Hydrophilidae	
241	Psephenus	Arthropoda	Insecta	Coleoptera	Psephenidae	
241	Dasyhelea	Arthropoda	Insecta	Diptera	Ceratopogonidae	
241	Brillia	Arthropoda	Insecta	Diptera	Chironomidae	
241	Cricotopus/Orthocladius	Arthropoda	Insecta	Diptera	Chironomidae	
241	Diamesa	Arthropoda	Insecta	Diptera	Chironomidae	
241	Dicrotendipes	Arthropoda	Insecta	Diptera	Chironomidae	
241	Eukiefferiella	Arthropoda	Insecta	Diptera	Chironomidae	
241	Hydrobaenus	Arthropoda	Insecta	Diptera	Chironomidae	
241	Orthocladius	Arthropoda	Insecta	Diptera	Chironomidae	
241	Pseudorthocladius	Arthropoda	Insecta	Diptera	Chironomidae	
241	Pseudosmittia	Arthropoda	Insecta	Diptera	Chironomidae	
241	Stictochironomus	Arthropoda	Insecta	Diptera	Chironomidae	
241	Sympotthastia	Arthropoda	Insecta	Diptera	Chironomidae	
241	Zavrelimyia	Arthropoda	Insecta	Diptera	Chironomidae	
241	Micropsectra	Arthropoda	Insecta	Diptera	Chironomic	Tanytarsini
241	Paratanytarsus	Arthropoda	Insecta	Diptera	Chironomic	Tanytarsini
241	Prosimulium	Arthropoda	Insecta	Diptera	Simuliidae	
241	Molophilus	Arthropoda	Insecta	Diptera	Tipulidae	
241	Tipula	Arthropoda	Insecta	Diptera	Tipulidae	
241	Nigronia	Arthropoda	Insecta	Megaloptera	Corydalidae	
241	Argia	Arthropoda	Insecta	Odonata	Coenagrionidae	
241	Capniidae	Arthropoda	Insecta	Plecoptera	Capniidae	
241	Prostoia	Arthropoda	Insecta	Plecoptera	Nemouridae	
241	Cheumatopsyche	Arthropoda	Insecta	Trichoptera	Hydropsychidae	
241	Mystacides	Arthropoda	Insecta	Trichoptera	Leptoceridae	
241	Chimarra	Arthropoda	Insecta	Trichoptera	Philopotamidae	
242QC	Enchytraeidae	Annelida	Oligochaet	Tubificida	Enchytraeidae	
242QC	Aulodrilus japonicus	Annelida	Oligochaet	Tubificida	Tubificidae	
242QC	Limnodrilus	Annelida	Oligochaet	Tubificida	Tubificidae	
242QC	Limnodrilus claparedeianus	Annelida	Oligochaet	Tubificida	Tubificidae	
242QC	Limnodrilus hoffmeisteri	Annelida	Oligochaet	Tubificida	Tubificidae	
242QC	Lioporeus	Arthropoda	Insecta	Coleoptera	Dytiscidae	
242QC	Ancyronyx	Arthropoda	Insecta	Coleoptera	Elmidae	
242QC	Dubiraphia	Arthropoda	Insecta	Coleoptera	Elmidae	
242QC	Anchytarsus bicolor	Arthropoda	Insecta	Coleoptera	Ptilodactylidae	
242QC	Diamesa	Arthropoda	Insecta	Diptera	Chironomidae	
242QC	Diplocladius	Arthropoda	Insecta	Diptera	Chironomidae	
242QC	Hydrobaenus	Arthropoda	Insecta	Diptera	Chironomidae	
242QC	Stictochironomus	Arthropoda	Insecta	Diptera	Chironomidae	
242QC	Stilocladius	Arthropoda	Insecta	Diptera	Chironomidae	
242QC	Sympotthastia	Arthropoda	Insecta	Diptera	Chironomidae	
242QC	Zavrelimyia	Arthropoda	Insecta	Diptera	Chironomidae	
242QC	Doithrix	Arthropoda	Insecta	Diptera	Chironomic	Orthocladii
242QC	Corynoneura	Arthropoda	Insecta	Diptera	Chironomic	Tanytarsini
242QC	Micropsectra	Arthropoda	Insecta	Diptera	Chironomic	Tanytarsini
242QC	Microtendipes	Arthropoda	Insecta	Diptera	Chironomic	Tanytarsini
242QC	Chelifera	Arthropoda	Insecta	Diptera	Empididae	
242QC	Prosimulium	Arthropoda	Insecta	Diptera	Simuliidae	
242QC	Stegopterna	Arthropoda	Insecta	Diptera	Simuliidae	
242QC	Eurylophella	Arthropoda	Insecta	Ephemeroptera	Ephemerellidae	
242QC	Stenonema	Arthropoda	Insecta	Ephemeroptera	Heptageniidae	

242QC	Nigronia	Arthropoda	Insecta	Megaloptera	Corydalidae	
242QC	Nemouridae	Arthropoda	Insecta	Plecoptera	Nemouridae	
242QC	Prostoia	Arthropoda	Insecta	Plecoptera	Nemouridae	
242QC	Cheumatopsyche	Arthropoda	Insecta	Trichoptera	Hydropsychidae	
242QC	Diplectrona	Arthropoda	Insecta	Trichoptera	Hydropsychidae	
242QC	Hydropsyche	Arthropoda	Insecta	Trichoptera	Hydropsychidae	
242QC	Chimarra	Arthropoda	Insecta	Trichoptera	Philopotamidae	
242QC	Neophylax	Arthropoda	Insecta	Trichoptera	Uenoidae	
242QC	Nematoda	Nematoda	Nematoda	Nematoda	Nematoda	
242	Enchytraeidae	Annelida	Oligochaet	Tubificida	Enchytraeidae	
242	Limnodrilus	Annelida	Oligochaet	Tubificida	Tubificidae	
242	Limnodrilus claparedeianus	Annelida	Oligochaet	Tubificida	Tubificidae	
242	Stenelmis	Arthropoda	Insecta	Coleoptera	Elmidae	
242	Anchytarsus bicolor	Arthropoda	Insecta	Coleoptera	Ptilodactylidae	
242	Ablabesmyia	Arthropoda	Insecta	Diptera	Chironomidae	
242	Diplocladius	Arthropoda	Insecta	Diptera	Chironomidae	
242	Hydrobaenus	Arthropoda	Insecta	Diptera	Chironomidae	
242	Orthocladiinae	Arthropoda	Insecta	Diptera	Chironomidae	
242	Parametriocnemus	Arthropoda	Insecta	Diptera	Chironomidae	
242	Stilocladius	Arthropoda	Insecta	Diptera	Chironomidae	
242	Sympotthastia	Arthropoda	Insecta	Diptera	Chironomidae	
242	Microtendipes	Arthropoda	Insecta	Diptera	Chironomic	Tanytarsini
242	Hemerodromia	Arthropoda	Insecta	Diptera	Empididae	
242	Prosimulium	Arthropoda	Insecta	Diptera	Simuliidae	
242	Stegopterna	Arthropoda	Insecta	Diptera	Simuliidae	
242	Antocha	Arthropoda	Insecta	Diptera	Tipulidae	
242	Eurylophella	Arthropoda	Insecta	Ephemeroptera	Ephemerellidae	
242	Stenonema	Arthropoda	Insecta	Ephemeroptera	Heptageniidae	
242	Prostoia	Arthropoda	Insecta	Plecoptera	Nemouridae	
242	Eccoptura	Arthropoda	Insecta	Plecoptera	Perlidae	
242	Cheumatopsyche	Arthropoda	Insecta	Trichoptera	Hydropsychidae	
242	Hydropsyche	Arthropoda	Insecta	Trichoptera	Hydropsychidae	
242	Chimarra	Arthropoda	Insecta	Trichoptera	Philopotamidae	
242	Neophylax	Arthropoda	Insecta	Trichoptera	Uenoidae	
243	Enchytraeidae	Annelida	Oligochaet	Tubificida	Enchytraeidae	
243	Limnodrilus	Annelida	Oligochaet	Tubificida	Tubificidae	
243	Limnodrilus hoffmeisteri	Annelida	Oligochaet	Tubificida	Tubificidae	
243	Stenelmis	Arthropoda	Insecta	Coleoptera	Elmidae	
243	Hydrobius	Arthropoda	Insecta	Coleoptera	Hydrophilidae	
243	Dicrotendipes	Arthropoda	Insecta	Diptera	Chironomidae	
243	Paraphaenocladius	Arthropoda	Insecta	Diptera	Chironomidae	
243	Phaenopsectra	Arthropoda	Insecta	Diptera	Chironomidae	
243	Pseudorthocladius	Arthropoda	Insecta	Diptera	Chironomidae	
243	Tipula	Arthropoda	Insecta	Diptera	Tipulidae	
243	Cheumatopsyche	Arthropoda	Insecta	Trichoptera	Hydropsychidae	
243	Fossaria	Mollusca	Gastropoda	Basommatophora	Lymnaeidae	
243	Physa	Mollusca	Gastropoda	Basommatophora	Physidae	
243	Pisidium	Mollusca	Pelecypoda	Veneroida	Pisidiidae	
244	Dubiraphia	Arthropoda	Insecta	Coleoptera	Elmidae	
244	Macronychus	Arthropoda	Insecta	Coleoptera	Elmidae	
244	Optioservus	Arthropoda	Insecta	Coleoptera	Elmidae	
244	Stenelmis	Arthropoda	Insecta	Coleoptera	Elmidae	

244	Psephenus	Arthropoda	Insecta	Coleoptera	Psephenidae	
244	Bezzia/Palpomyia	Arthropoda	Insecta	Diptera	Ceratopogonidae	
244	Cricotopus	Arthropoda	Insecta	Diptera	Chironomidae	
244	Parametriocnemus	Arthropoda	Insecta	Diptera	Chironomidae	
244	Thienemannimyia	Arthropoda	Insecta	Diptera	Chironomidae	
244	Rheotanytarsus	Arthropoda	Insecta	Diptera	Chironomic	Tanytarsini
244	Dolichopodidae	Arthropoda	Insecta	Diptera	Dolichopodidae	
244	Chelifera	Arthropoda	Insecta	Diptera	Empididae	
244	Antocha	Arthropoda	Insecta	Diptera	Tipulidae	
244	Nigronia	Arthropoda	Insecta	Megaloptera	Corydalidae	
244	Boyeria vinosa	Arthropoda	Insecta	Odonata	Aeshnidae	
244	Allocapnia	Arthropoda	Insecta	Plecoptera	Capniidae	
244	Prostoia	Arthropoda	Insecta	Plecoptera	Nemouridae	
244	Cheumatopsyche	Arthropoda	Insecta	Trichoptera	Hydropsychidae	
244	Hydropsyche	Arthropoda	Insecta	Trichoptera	Hydropsychidae	
244	Pycnopsyche	Arthropoda	Insecta	Trichoptera	Limnephilidae	
244	Chimarra	Arthropoda	Insecta	Trichoptera	Philopotamidae	
244	Crangonyx	Arthropoda	Malacostra	Amphipoda	Crangonyctidae	
244	Physa	Mollusca	Gastropoda	Basommatophora	Physidae	
244	Corbicula fluminea	Mollusca	Pelecypoda	Veneroida	Corbiculidae	
245	Enchytraeidae	Annelida	Oligochaet	Tubificida	Enchytraeidae	
245	Lumbricidae	Annelida	Oligochaet	Tubificida	Lumbricidae	
245	Slavina appendiculata	Annelida	Oligochaet	Tubificida	Naididae	
245	Limnodrilus	Annelida	Oligochaet	Tubificida	Tubificidae	
245	Limnodrilus claparedeianus	Annelida	Oligochaet	Tubificida	Tubificidae	
245	Limnodrilus hoffmeisteri	Annelida	Oligochaet	Tubificida	Tubificidae	
245	Tubificidae	Annelida	Oligochaet	Tubificida	Tubificidae	
245	Cricotopus	Arthropoda	Insecta	Diptera	Chironomidae	
245	Cricotopus/Orthocladius	Arthropoda	Insecta	Diptera	Chironomidae	
245	Eukiefferiella	Arthropoda	Insecta	Diptera	Chironomidae	
245	Hydrobaenus	Arthropoda	Insecta	Diptera	Chironomidae	
245	Orthocladius	Arthropoda	Insecta	Diptera	Chironomidae	
245	Parametriocnemus	Arthropoda	Insecta	Diptera	Chironomidae	
245	Rheocricotopus	Arthropoda	Insecta	Diptera	Chironomidae	
245	Thienemannimyia	Arthropoda	Insecta	Diptera	Chironomidae	
245	Micropsectra	Arthropoda	Insecta	Diptera	Chironomic	Tanytarsini
245	Limonia	Arthropoda	Insecta	Diptera	Tipulidae	
245	Ormosia	Arthropoda	Insecta	Diptera	Tipulidae	
245	Physa	Mollusca	Gastropoda	Basommatophora	Physidae	
245	Pisidium	Mollusca	Pelecypoda	Veneroida	Pisidiidae	
247	Enchytraeidae	Annelida	Oligochaet	Tubificida	Enchytraeidae	
247	Nais communis	Annelida	Oligochaet	Tubificida	Naididae	
247	Limnodrilus	Annelida	Oligochaet	Tubificida	Tubificidae	
247	Limnodrilus claparedeianus	Annelida	Oligochaet	Tubificida	Tubificidae	
247	Tubificidae	Annelida	Oligochaet	Tubificida	Tubificidae	
247	Helichus	Arthropoda	Insecta	Coleoptera	Dytiscidae	
247	Macronychus	Arthropoda	Insecta	Coleoptera	Elmidae	
247	Optioservus	Arthropoda	Insecta	Coleoptera	Elmidae	
247	Stenelmis	Arthropoda	Insecta	Coleoptera	Elmidae	
247	Psephenus	Arthropoda	Insecta	Coleoptera	Psephenidae	
247	Hydrobaenus	Arthropoda	Insecta	Diptera	Chironomidae	
247	Orthocladius	Arthropoda	Insecta	Diptera	Chironomidae	

247	Parametriocnemus	Arthropoda	Insecta	Diptera	Chironomidae	
247	Pseudorthocladius	Arthropoda	Insecta	Diptera	Chironomidae	
247	Prosimulium	Arthropoda	Insecta	Diptera	Simuliidae	
247	Stegopterna	Arthropoda	Insecta	Diptera	Simuliidae	
247	Tipula	Arthropoda	Insecta	Diptera	Tipulidae	
247	Nigronia	Arthropoda	Insecta	Megaloptera	Corydalidae	
247	Nemouridae	Arthropoda	Insecta	Plecoptera	Nemouridae	
247	Taeniopteryx	Arthropoda	Insecta	Plecoptera	Taeniopterygidae	
247	Cheumatopsyche	Arthropoda	Insecta	Trichoptera	Hydropsychidae	
247	Hydropsyche	Arthropoda	Insecta	Trichoptera	Hydropsychidae	
247	Triaenodes	Arthropoda	Insecta	Trichoptera	Leptoceridae	
247	Chimarra	Arthropoda	Insecta	Trichoptera	Philopotamidae	
247	Orconectes	Arthropoda	Malacostra	Decapoda	Cambaridae	
247	Ferrissia	Mollusca	Gastropoda	Basommatophora	Ancylidae	
247	Nemertea	Nemertea	Nemertea	Nemertea	Nemertea	
247	Planariidae	Platyhelmir	Turbellaria	Tricladida	Planariidae	
248	Enchytraeidae	Annelida	Oligochaeta	Tubificida	Enchytraeidae	
248	Limnodrilus	Annelida	Oligochaeta	Tubificida	Tubificidae	
248	Limnodrilus claparedeianus	Annelida	Oligochaeta	Tubificida	Tubificidae	
248	Limnodrilus hoffmeisteri	Annelida	Oligochaeta	Tubificida	Tubificidae	
248	Lioporeus	Arthropoda	Insecta	Coleoptera	Dytiscidae	
248	Dubiraphia	Arthropoda	Insecta	Coleoptera	Elmidae	
248	Macronychus	Arthropoda	Insecta	Coleoptera	Elmidae	
248	Optioservus	Arthropoda	Insecta	Coleoptera	Elmidae	
248	Stenelmis	Arthropoda	Insecta	Coleoptera	Elmidae	
248	Chaetocladius	Arthropoda	Insecta	Diptera	Chironomidae	
248	Chironomus	Arthropoda	Insecta	Diptera	Chironomidae	
248	Heterotrissocladius	Arthropoda	Insecta	Diptera	Chironomidae	
248	Orthocladius	Arthropoda	Insecta	Diptera	Chironomidae	
248	Parametriocnemus	Arthropoda	Insecta	Diptera	Chironomidae	
248	Paraphaenocladius	Arthropoda	Insecta	Diptera	Chironomidae	
248	Phaenopsectra	Arthropoda	Insecta	Diptera	Chironomidae	
248	Pseudorthocladius	Arthropoda	Insecta	Diptera	Chironomidae	
248	Stictochironomus	Arthropoda	Insecta	Diptera	Chironomidae	
248	Sympotthastia	Arthropoda	Insecta	Diptera	Chironomidae	
248	Micropsectra	Arthropoda	Insecta	Diptera	Chironomic	Tanytarsini
248	Paratanytarsus	Arthropoda	Insecta	Diptera	Chironomic	Tanytarsini
248	Pericoma	Arthropoda	Insecta	Diptera	Psychodidae	
248	Prosimulium	Arthropoda	Insecta	Diptera	Simuliidae	
248	Molophilus	Arthropoda	Insecta	Diptera	Tipulidae	
248	Baetidae	Arthropoda	Insecta	Ephemeroptera	Baetidae	
248	Nigronia	Arthropoda	Insecta	Megaloptera	Corydalidae	
248	Stylogomphus	Arthropoda	Insecta	Odonata	Gomphidae	
248	Cheumatopsyche	Arthropoda	Insecta	Trichoptera	Hydropsychidae	
248	Fossaria	Mollusca	Gastropoda	Basommatophora	Lymnaeidae	
252	Lumbricidae	Annelida	Oligochaeta	Tubificida	Lumbricidae	
252	Limnodrilus	Annelida	Oligochaeta	Tubificida	Tubificidae	
252	Dubiraphia	Arthropoda	Insecta	Coleoptera	Elmidae	
252	Optioservus	Arthropoda	Insecta	Coleoptera	Elmidae	
252	Stenelmis	Arthropoda	Insecta	Coleoptera	Elmidae	
252	Anchytarsus bicolor	Arthropoda	Insecta	Coleoptera	Ptilodactylidae	
252	Bezzia/Palpomyia	Arthropoda	Insecta	Diptera	Ceratopogonidae	

252	Culicoides	Arthropoda	Insecta	Diptera	Ceratopogonidae	
252	Diplocladius	Arthropoda	Insecta	Diptera	Chironomidae	
252	Eukiefferiella	Arthropoda	Insecta	Diptera	Chironomidae	
252	Parachaetocladius	Arthropoda	Insecta	Diptera	Chironomidae	
252	Parametriocnemus	Arthropoda	Insecta	Diptera	Chironomidae	
252	Paraphaenocladius	Arthropoda	Insecta	Diptera	Chironomidae	
252	Psilometriocnemus	Arthropoda	Insecta	Diptera	Chironomidae	
252	Stilocladius	Arthropoda	Insecta	Diptera	Chironomidae	
252	Thienemannimyia	Arthropoda	Insecta	Diptera	Chironomidae	
252	Zavrelimyia	Arthropoda	Insecta	Diptera	Chironomidae	
252	Micropsectra	Arthropoda	Insecta	Diptera	Chironomic	Tanytarsini
252	Prosimulium	Arthropoda	Insecta	Diptera	Simuliidae	
252	Stegopterna	Arthropoda	Insecta	Diptera	Simuliidae	
252	Antocha	Arthropoda	Insecta	Diptera	Tipulidae	
252	Tipula	Arthropoda	Insecta	Diptera	Tipulidae	
252	Ephemerella	Arthropoda	Insecta	Ephemeroptera	Ephemerellidae	
252	Eurylophella	Arthropoda	Insecta	Ephemeroptera	Ephemerellidae	
252	Boyeria vinosa	Arthropoda	Insecta	Odonata	Aeshnidae	
252	Gomphidae	Arthropoda	Insecta	Odonata	Gomphidae	
252	Stylogomphus	Arthropoda	Insecta	Odonata	Gomphidae	
252	Allocapnia	Arthropoda	Insecta	Plecoptera	Capniidae	
252	Nemouridae	Arthropoda	Insecta	Plecoptera	Nemouridae	
252	Eccoptura	Arthropoda	Insecta	Plecoptera	Perlidae	
252	Diplectrona	Arthropoda	Insecta	Trichoptera	Hydropsychidae	
252	Pycnopsyche	Arthropoda	Insecta	Trichoptera	Limnephilidae	
252	Chimarra	Arthropoda	Insecta	Trichoptera	Philopotamidae	
252	Lype diversa	Arthropoda	Insecta	Trichoptera	Psychomyiidae	
252	Fossaria	Mollusca	Gastropoda	Basommatophora	Lymnaeidae	
252	Pisidium	Mollusca	Pelecypoda	Veneroida	Pisidiidae	
253	Enchytraeidae	Annelida	Oligochaet	Tubificida	Enchytraeidae	
253	Helichus	Arthropoda	Insecta	Coleoptera	Dytiscidae	
253	Lioporeus	Arthropoda	Insecta	Coleoptera	Dytiscidae	
253	Ancyronyx	Arthropoda	Insecta	Coleoptera	Elmidae	
253	Optioservus	Arthropoda	Insecta	Coleoptera	Elmidae	
253	Oulimnius	Arthropoda	Insecta	Coleoptera	Elmidae	
253	Stenelmis	Arthropoda	Insecta	Coleoptera	Elmidae	
253	Anchytarsus bicolor	Arthropoda	Insecta	Coleoptera	Ptilodactylidae	
253	Bezzia/Palpomyia	Arthropoda	Insecta	Diptera	Ceratopogonidae	
253	Ceratopogon	Arthropoda	Insecta	Diptera	Ceratopogonidae	
253	Cricotopus	Arthropoda	Insecta	Diptera	Chironomidae	
253	Diplocladius	Arthropoda	Insecta	Diptera	Chironomidae	
253	Georthocladius	Arthropoda	Insecta	Diptera	Chironomidae	
253	Limnophyes	Arthropoda	Insecta	Diptera	Chironomidae	
253	Natarsia	Arthropoda	Insecta	Diptera	Chironomidae	
253	Parachaetocladius	Arthropoda	Insecta	Diptera	Chironomidae	
253	Parametriocnemus	Arthropoda	Insecta	Diptera	Chironomidae	
253	Paraphaenocladius	Arthropoda	Insecta	Diptera	Chironomidae	
253	Paratendipes	Arthropoda	Insecta	Diptera	Chironomidae	
253	Polypedilum	Arthropoda	Insecta	Diptera	Chironomidae	
253	Stilocladius	Arthropoda	Insecta	Diptera	Chironomidae	
253	Thienemannimyia	Arthropoda	Insecta	Diptera	Chironomidae	
253	Micropsectra	Arthropoda	Insecta	Diptera	Chironomic	Tanytarsini

253	Prosimulium	Arthropoda	Insecta	Diptera	Simuliidae
253	Stegopterna	Arthropoda	Insecta	Diptera	Simuliidae
253	Ormosia	Arthropoda	Insecta	Diptera	Tipulidae
253	Tipula	Arthropoda	Insecta	Diptera	Tipulidae
253	Eurylophella	Arthropoda	Insecta	Ephemeroptera	Ephemerellidae
253	Sialis	Arthropoda	Insecta	Megaloptera	Sialidae
253	Allocapnia	Arthropoda	Insecta	Plecoptera	Capniidae
253	Chloroperlidae	Arthropoda	Insecta	Plecoptera	Chloroperlidae
253	Eccoptura	Arthropoda	Insecta	Plecoptera	Perlidae
253	Cheumatopsyche	Arthropoda	Insecta	Trichoptera	Hydropsychidae
253	Diplectrona	Arthropoda	Insecta	Trichoptera	Hydropsychidae
253	Molanna	Arthropoda	Insecta	Trichoptera	Molannidae
253	Psilotreta	Arthropoda	Insecta	Trichoptera	Odontoceridae
253	Chimarra	Arthropoda	Insecta	Trichoptera	Philopotamidae
253	Neophylax	Arthropoda	Insecta	Trichoptera	Uenoidae
253	Fossaria	Mollusca	Gastropoda	Basommatophora	Lymnaeidae
253	Pisidium	Mollusca	Pelecypoda	Veneroida	Pisidiidae
254	Enchytraeidae	Annelida	Oligochaet	Tubificida	Enchytraeidae
254	Lumbricidae	Annelida	Oligochaet	Tubificida	Lumbricidae
254	Limnodrilus hoffmeisteri	Annelida	Oligochaet	Tubificida	Tubificidae
254	Helichus	Arthropoda	Insecta	Coleoptera	Dytiscidae
254	Hydroporus	Arthropoda	Insecta	Coleoptera	Dytiscidae
254	Lioporeus	Arthropoda	Insecta	Coleoptera	Dytiscidae
254	Dubiraphia	Arthropoda	Insecta	Coleoptera	Elmidae
254	Stenelmis	Arthropoda	Insecta	Coleoptera	Elmidae
254	Cymbiodyta	Arthropoda	Insecta	Coleoptera	Hydrophilidae
254	Hydrobius	Arthropoda	Insecta	Coleoptera	Hydrophilidae
254	Culicoides	Arthropoda	Insecta	Diptera	Ceratopogonidae
254	Cricotopus/Orthocladius	Arthropoda	Insecta	Diptera	Chironomidae
254	Diamesa	Arthropoda	Insecta	Diptera	Chironomidae
254	Diplocladius	Arthropoda	Insecta	Diptera	Chironomidae
254	Natarsia	Arthropoda	Insecta	Diptera	Chironomidae
254	Orthocladiinae	Arthropoda	Insecta	Diptera	Chironomidae
254	Parachaetocladius	Arthropoda	Insecta	Diptera	Chironomidae
254	Parametriocnemus	Arthropoda	Insecta	Diptera	Chironomidae
254	Phaenopsectra	Arthropoda	Insecta	Diptera	Chironomidae
254	Polypedilum	Arthropoda	Insecta	Diptera	Chironomidae
254	Thienemannimyia	Arthropoda	Insecta	Diptera	Chironomidae
254	Zavrelimyia	Arthropoda	Insecta	Diptera	Chironomidae
254	Prosimulium	Arthropoda	Insecta	Diptera	Simuliidae
254	Stegopterna	Arthropoda	Insecta	Diptera	Simuliidae
254	Chrysops	Arthropoda	Insecta	Diptera	Tabanidae
254	Dolichopeza	Arthropoda	Insecta	Diptera	Tipulidae
254	Pseudolimnophila	Arthropoda	Insecta	Diptera	Tipulidae
254	Tipula	Arthropoda	Insecta	Diptera	Tipulidae
254	Microvelia	Arthropoda	Insecta	Hemiptera	Veliidae
254	Calopteryx	Arthropoda	Insecta	Odonata	Calopterygidae
254	Allocapnia	Arthropoda	Insecta	Plecoptera	Capniidae
254	Nemouridae	Arthropoda	Insecta	Plecoptera	Nemouridae
254	Orconectes	Arthropoda	Malacostra	Decapoda	Cambaridae
254	Physa	Mollusca	Gastropoda	Basommatophora	Physidae

Genus	Species	Individuals	TolVal	FFG	Habit	Excluded Taxa
Ancyronyx		1	2	OM	Clinger	No
Macronychus		1	4	OM	Clinger	No
Chironomus		1	10	CG	Burrower	No
Cricotopus		2	6		Sprawler	No
Dicrotendipes		1	10	CG	Burrower	No
Hydrobaenus		3	8	SC	Sprawler	No
Orthocladius		3	6	CG	Sprawler	No
Parachaetocladius		1	2	CG	Sprawler	No
Paraphaenocladius		1	4	CG	Sprawler	No
Thienemanniella		1	6	CG	Sprawler	No
Microtendipes		1	6	CF	Clinger	No
Rheotanytarsus		28	6	CF	Clinger	No
Antocha		2	5	CG	Clinger	No
Isonychia		2	2	CF	Swimmer	No
Cheumatopsyche		36	5	CF	Clinger	No
Hydropsyche		23	6	CF	Clinger	No
Enchytraeidae		1	10	CG		No
Nais	behningi	1	6	CG		No
Macronychus		1	4	OM	Clinger	No
Oulimnius		2	2	CG	Clinger	No
Probezzia		1	6	PR	Burrower	No
Cricotopus		21	7	SH		No
Cricotopus		1	6		Sprawler	No
Diamesa		1	5	CG	Sprawler	No
Orthocladius		17	6	CG	Sprawler	No
Pagastia		1	1	CG		No
Parametriocnemus		4	5	CG	Sprawler	No
Paraphaenocladius		1	4	CG	Sprawler	No
Polypedilum		1	6	SH	Climber	No
Sympotthastia		6	2	CG	Sprawler	No
Thienemanniella		1	6	CG	Sprawler	No
Thienemannimyia		1	6	PR	Sprawler	No
Rheotanytarsus		2	6	CF	Clinger	No
Prosimulium		5	7	CF	Clinger	No
Simuliidae		3	7	CF	Clinger	No
Ephemerellidae		5	2	CG		No
Calopteryx		1	6	PR	Climber	No
Gomphidae		1	1	PR	Burrower	No
Prostoia		1		SH	Sprawler	No
Acroneuria		1	0	PR	Clinger	No
Cheumatopsyche		13	5	CF	Clinger	No
Hydropsyche		4	6	CF	Clinger	No
Mystacides		1	4	CG	Sprawler	No
Chimarra		3	4	CF	Clinger	No
Rhyacophila		1	1	PR	Clinger	No
Neophylax		2	3	SC	Clinger	No
Ferrissia		1	7	SC		No
Cognettia		1				No
Sparganophilus		1				No
Enchytraeidae		5	10	CG		No
Limnodrilus		5	10	CG		No

Limnodrilus	hoffmeister	2	10	CG		No
Tubificidae		1	10	CG		No
Hydrophilidae		1		PR	Swimmer	No
Culicoides		1	10	PR	Burrower	No
Mallochohelea		1				No
Ablabesmyia		1	8	CG	Sprawler	No
Dicrotendipes		4	10	CG	Burrower	No
Diplocladius		1	7	CG	Sprawler	No
Hydrobaenus		7	8	SC	Sprawler	No
Orthocladius		3	6	CG	Sprawler	No
Parametriocnemus		3	5	CG	Sprawler	No
Paraphaenocladius		1	4	CG	Sprawler	No
Pseudorthocladius		2	0	CG	Sprawler	No
Stictochironomus		1	9	OM	Burrower	No
Stilocladius		1		CG	Sprawler	No
Sympotthastia		4	2	CG	Sprawler	No
Thienemannimyia		1	6	PR	Sprawler	No
Tribelos		1	5	CG	Burrower	No
Zavrelimyia		1	8	PR	Sprawler	No
Micropsectra		1	7	CG	Climber	No
Rheotanytarsus		2	6	CF	Clinger	No
Dixella		2	1	CG		No
Dolichopodidae		1		PR		No
Clinocera		11	6	PR	Clinger	No
Prosimulium		4	7	CF	Clinger	No
Stegopterna		1	7	CF	Clinger	No
Tipula		3	4	SH	Burrower	No
Ameletus		1	0	CG	Swimmer	No
Baetidae		1	4	CG		No
Caenis		1	7	CG	Sprawler	No
Ephemerellidae		1	2	CG		No
Amphinemura		1	3	SH	Sprawler	No
Prostoia		2		SH	Sprawler	No
Taenionema		1		SC	Sprawler	No
Cheumatopsyche		12	5	CF	Clinger	No
Diplectrona		1	2	CF	Clinger	No
Hydropsyche		4	6	CF	Clinger	No
Chimarra		1	4	CF	Clinger	No
Lype	diversa	1	2	SC		No
Neophylax		1	3	SC	Clinger	No
Crangonyx		5	4	CG		No
Physa		1		SC		No
Nematoda	Nematoda	1		PA		No
Enchytraeidae		2	10	CG		No
Lumbricidae		6	10	CG		No
Helichus		1	5	SC	Clinger	No
Hydrobius		1	5	PR	Climber	No
Anchytarsu	bicolor	1		SH	Sprawler	No
Diplocladius		1	7	CG	Sprawler	No
Hydrobaenus		1	8	SC	Sprawler	No
Orthocladius		3	6	CG	Sprawler	No
Parametriocnemus		5	5	CG	Sprawler	No

Sympotthastia	19	2	CG	Sprawler	No
Tvetenia	4	5	CG	Sprawler	No
Micropsectra	1	7	CG	Climber	No
Prosimulium	31	7	CF	Clinger	No
Stegopterna	7	7	CF	Clinger	No
Ameletus	2	0	CG	Swimmer	No
Nigronia	2	0	PR	Clinger	No
Gomphidae	1	1	PR	Burrower	No
Capniidae	4	1	SH	Sprawler	No
Amphinemura	1	3	SH	Sprawler	No
Prostoia	2		SH	Sprawler	No
Diplectrona	1	2	CF	Clinger	No
Pycnopsyche	3	4	SH	Sprawler	No
Orconectes	1	6	SH;CG		No
Nematoda Nematoda	1		PA		No
Enchytraeidae	1	10	CG		No
Lumbricidae	2	10	CG		No
Oulimnius	3	2	CG	Clinger	No
Ceratopogon	1	6	PR	Burrower	No
Cricotopus	4	7	SH		No
Eukiefferiella	2	8	CG	Sprawler	No
Orthocladius	2	6	CG	Sprawler	No
Parametriocnemus	1	5	CG	Sprawler	No
Sympotthastia	6	2	CG	Sprawler	No
Prosimulium	67	7	CF	Clinger	No
Simuliidae	3	7	CF	Clinger	No
Tipula	1	4	SH	Burrower	No
Ephemerella	4	2	CG	Clinger	No
Nigronia	1	0	PR	Clinger	No
Diplectrona	1	2	CF	Clinger	No
Rhyacophila	3	1	PR	Clinger	No
Neophylax	2	3	SC	Clinger	No
Pisidium	1	8	CF		No
Enchytraeidae	1	10	CG		No
Oulimnius	1	2	CG	Clinger	No
Cricotopus	5	7	SH		No
Diamesa	1	5	CG	Sprawler	No
Eukiefferiella	1	8	CG	Sprawler	No
Parametriocnemus	1	5	CG	Sprawler	No
Potthastia	1	2	OM	Sprawler	No
Sympotthastia	2	2	CG	Sprawler	No
Prosimulium	95	7	CF	Clinger	No
Gomphus	1	5	PR	Burrower	No
Allocapnia	1	3	SH	Clinger	No
Perlodidae	1	2	PR	Clinger	No
Neophylax	6	3	SC	Clinger	No
Enchytraeidae	23	10	CG		No
Lumbricidae	1	10	CG		No
Aulodrilus	1	8	CG		No
Limnodrilus	14	10	CG		No
Limnodrilus hoffmeister	20	10	CG		No
Ceratopogon	3	6	PR	Burrower	No

Chaetocladius	1	6	CG	Sprawler	No
Diplocladius	1	7	CG	Sprawler	No
Hydrobaenus	3	8	SC	Sprawler	No
Parametriocnemus	1	5	CG	Sprawler	No
Zavrelimyia	4	8	PR	Sprawler	No
Stegopterna	15	7	CF	Clinger	No
Ironoquia	3	3	SH	Sprawler	No
Physa	12		SC		No
Pisidium	7	8	CF		No
Lumbricidae	3	10	CG		No
Hydroporous (Heteros	1	5		Swimmer	No
Stenelmis	1	6	SC	Clinger	No
Chaetocladius	1	6	CG	Sprawler	No
Diplocladius	1	7	CG	Sprawler	No
Eukiefferiella	3	8	CG	Sprawler	No
Parametriocnemus	12	5	CG	Sprawler	No
Sympotthastia	2	2	CG	Sprawler	No
Zavrelimyia	3	8	PR	Sprawler	No
Corynoneura	1	7	CG	Sprawler	No
Micropsectra	2	7	CG	Climber	No
Prosimulium	19	7	CF	Clinger	No
Simulium	1	7	CF	Clinger	No
Stegopterna	39	7	CF	Clinger	No
Pseudolimnophila	1	2	PR	Burrower	No
Tipula	1	4	SH	Burrower	No
Ameletus	1	0	CG	Swimmer	No
Nigronia	2	0	PR	Clinger	No
Capniidae	4	1	SH	Sprawler	No
Nemouridae	11	2	SH		No
Enchytraeidae	2	10	CG		No
Lumbricidae	1	10	CG		No
Limnodrilus	1	10	CG		No
Limnodrilus hoffmeister	1	10	CG		No
Optioservus	1	4	SC	Clinger	No
Stenelmis	1	6	SC	Clinger	No
Hydrobius	1	5	PR	Climber	No
Anchytarsu bicolor	1		SH	Sprawler	No
Eukiefferiella	2	8	CG	Sprawler	No
Parametriocnemus	1	5	CG	Sprawler	No
Stilocladius	1		CG	Sprawler	No
Sympotthastia	4	2	CG	Sprawler	No
Thienemannimyia	2	6	PR	Sprawler	No
Tribelos	1	5	CG	Burrower	No
Zavrelimyia	1	8	PR	Sprawler	No
Corynoneura	2	7	CG	Sprawler	No
Micropsectra	1	7	CG	Climber	No
Prosimulium	10	7	CF	Clinger	No
Stegopterna	47	7	CF	Clinger	No
Tipula	3	4	SH	Burrower	No
Ameletus	4	0	CG	Swimmer	No
Nemouridae	14	2	SH		No
Enchytraeidae	2	10	CG		No

Limnodrilus	hoffmeister	1	10	CG		No
Anchytarsu	bicolor	5		SH	Sprawler	No
Cricotopus		2	6		Sprawler	No
Diamesa		4	5	CG	Sprawler	No
Heterotrissocladius		1	0	CG	Sprawler	No
Orthocladius		12	6	CG	Sprawler	No
Orthocladiu	lignicola	2		CG	Sprawler	No
Parametriocnemus		13	5	CG	Sprawler	No
Paraphaenocladius		3	4	CG	Sprawler	No
Phaenopsectra		2	7	SC	Clinger	No
Polypedilum		2	6	SH	Climber	No
Potthastia		1	2	OM	Sprawler	No
Sympotthastia		1	2	CG	Sprawler	No
Thienemanniella		1	6	CG	Sprawler	No
Thienemannimyia		11	6	PR	Sprawler	No
Corynoneura		4	7	CG	Sprawler	No
Micropsectra		3	7	CG	Climber	No
Microtendipes		4	6	CF	Clinger	No
Paratanytarsus		1	6	CG	Sprawler	No
Rheotanytarsus		5	6	CF	Clinger	No
Stempellinella		1	4	CG	Climber	No
Tanytarsus		7	6	CF	Climber	No
Pericoma		1	4	CG	Burrower	No
Simuliidae		1	7	CF	Clinger	No
Simulium		1	7	CF	Clinger	No
Limnophila		1	4	PR	Burrower	No
Tipula		1	4	SH	Burrower	No
Baetidae		1	4	CG		No
Eurylophella		5	4	SC	Clinger	No
Stenonema		6	4	SC	Clinger	No
Diplectrona		3	2	CF	Clinger	No
Hyalella		1	6	CG		No
Nematoda	Nematoda	1		PA		No
Nais	bretscheri	1	6	CG		No
Optioservus		8	4	SC	Clinger	No
Oulimnius		2	2	CG	Clinger	No
Anchytarsu	bicolor	1		SH	Sprawler	No
Diamesa		1	5	CG	Sprawler	No
Orthocladius		2	6	CG	Sprawler	No
Orthocladiu	lignicola	1		CG	Sprawler	No
Parakiefferiella		1	4	CG	Sprawler	No
Parametriocnemus		9	5	CG	Sprawler	No
Polypedilum		1	6	SH	Climber	No
Sympotthastia		14	2	CG	Sprawler	No
Tvetenia		2	5	CG	Sprawler	No
Micropsectra		1	7	CG	Climber	No
Prosimulium		28	7	CF	Clinger	No
Stegopterna		4	7	CF	Clinger	No
Tipula		2	4	SH	Burrower	No
Ephemerella		4	2	CG	Clinger	No
Eurylophella		2	4	SC	Clinger	No
Nigronia		1	0	PR	Clinger	No

Amphinemura	9	3	SH	Sprawler	No
Prostoia	2		SH	Sprawler	No
Cheumatopsyche	1	5	CF	Clinger	No
Hydropsyche	3	6	CF	Clinger	No
Chimarra	1	4	CF	Clinger	No
Neophylax	2	3	SC	Clinger	No
Lumbriculidae	1	10	CG		No
Enchytraeidae	6	10	CG		No
Limnodrilus	2	10	CG		No
Limnodrilus hoffmeister	2	10	CG		No
Curculionidae	1		SH	Clinger	No
Lioporeus	3		PR	Swimmer	No
Macronychus	1	4	OM	Clinger	No
Oulimnius	1	2	CG	Clinger	No
Hydrobius	1	5	PR	Climber	No
Sphaeriidae	1	8	CF		No
Probezzia	1	6	PR	Burrower	No
Cryptochironomus	1	8	PR	Sprawler	No
Dicrotendipes	4	10	CG	Burrower	No
Hydrobaenus	20	8	SC	Sprawler	No
Orthocladius	1	6	CG	Sprawler	No
Parachaetocladius	1	2	CG	Sprawler	No
Phaenopsectra	1	7	SC	Clinger	No
Procladius	1	9	PR	Sprawler	No
Corynoneura	1	7	CG	Sprawler	No
Prosimulium	2	7	CF	Clinger	No
Stegopterna	1	7	CF	Clinger	No
Ameletus	5	0	CG	Swimmer	No
Baetidae	1	4	CG		No
Caenis	1	7	CG	Sprawler	No
Ephemerellidae	1	2	CG		No
Isonychia	1	2	CF	Swimmer	No
Leptophlebia	4	4	CG	Swimmer	No
Capniidae	1	1	SH	Sprawler	No
Nemouridae	1	2	SH		No
Limnephilidae	2	4	SH		No
Ptilostomis	3	5	SH	Climber	No
Crangonyx	4	4	CG		No
Gammarus	2	6	OM		No
Caecidotea	4	8	CG		No
Physa	1		SC		No
Pisidium	14	8	CF		No
Stenelmis	1	6	SC	Clinger	No
Hydrobius	1	5	PR	Climber	No
Bezzia/Palpomyia	1	6		Burrower	No
Ceratopogon	2	6	PR	Burrower	No
Diamesa	1	5	CG	Sprawler	No
Heterotrissocladius	1	0	CG	Sprawler	No
Limnophyes	2	8	CG	Sprawler	No
Natarsia	1	8	PR	Sprawler	No
Parachaetocladius	23	2	CG	Sprawler	No
Parametriocnemus	1	5	CG	Sprawler	No

Paraphaenocladius	12	4	CG	Sprawler	No
Pseudorthocladius	3	0	CG	Sprawler	No
Stilocladius	2		CG	Sprawler	No
Thienemannimyia	1	6	PR	Sprawler	No
Zavrelimyia	5	8	PR	Sprawler	No
Micropsectra	2	7	CG	Climber	No
Prosimulium	7	7	CF	Clinger	No
Stegopterna	51	7	CF	Clinger	No
Tipula	1	4	SH	Burrower	No
Diplectrona	1	2	CF	Clinger	No
Ptilostomis	2	5	SH	Climber	No
Rhyacophila	3	1	PR	Clinger	No
Neophylax	1	3	SC	Clinger	No
Pisidium	1	8	CF		No
Ectopria	1	5	SC	Clinger	No
Diamesa	1	5	CG	Sprawler	No
Limnophyes	1	8	CG	Sprawler	No
Parachaetocladius	1	2	CG	Sprawler	No
Stilocladius	1		CG	Sprawler	No
Stempellina	1	2	CG	Climber	No
Prosimulium	38	7	CF	Clinger	No
Stegopterna	23	7	CF	Clinger	No
Tipula	2	4	SH	Burrower	No
Ameletus	2	0	CG	Swimmer	No
Ephemerellidae	13	2	CG		No
Eurylophella	2	4	SC	Clinger	No
Nigronia	1	0	PR	Clinger	No
Cordulegaster	1	3	PR	Burrower	No
Allocapnia	3	3	SH	Clinger	No
Amphinemura	1	3	SH	Sprawler	No
Prostoia	3		SH	Sprawler	No
Acroneuria	1	0	PR	Clinger	No
Diplectrona	5	2	CF	Clinger	No
Pycnopsyche	2	4	SH	Sprawler	No
Rhyacophila	1	1	PR	Clinger	No
Neophylax	4	3	SC	Clinger	No
Physa	1		SC		No
Enchytraeidae	3	10	CG		No
Limnodrilus	4	10	CG		No
Limnodrilus hoffmeister	6	10	CG		No
Dytiscidae	1	5	PR		No
Lioporeus	2		PR	Swimmer	No
Stenelmis	1	6	SC	Clinger	No
Probezzia	2	6	PR	Burrower	No
Hydrobaenus	32	8	SC	Sprawler	No
Orthocladius	4	6	CG	Sprawler	No
Micropsectra	1	7	CG	Climber	No
Dixella	1	1	CG		No
Stegopterna	1	7	CF	Clinger	No
Ormosia	1	3	CG	Burrower	No
Ameletus	1	0	CG	Swimmer	No
Caenis	2	7	CG	Sprawler	No

Stenonema		1	4	SC	Clinger	No
Sialis		1	4	PR	Burrower	No
Crangonyx		2	4	CG		No
Gammarus		35	6	OM		No
Pisidium		7	8	CF		No
Enchytraeidae		2	10	CG		No
Oulimnius		1	2	CG	Clinger	No
Stenelmis		1	6	SC	Clinger	No
Cricotopus		1	6		Sprawler	No
Diamesa		4	5	CG	Sprawler	No
Orthocladius		1	6	CG	Sprawler	No
Paraphaenocladius		1	4	CG	Sprawler	No
Sympotthastia		47	2	CG	Sprawler	No
Thienemannimyia		1	6	PR	Sprawler	No
Prosimulium		26	7	CF	Clinger	No
Stegopterna		13	7	CF	Clinger	No
Antocha		1	5	CG	Clinger	No
Tipula		1	4	SH	Burrower	No
Nigronia		1	0	PR	Clinger	No
Gomphus		1	5	PR	Burrower	No
Prostoia		4		SH	Sprawler	No
Cheumatopsyche		6	5	CF	Clinger	No
Diplectrona		2	2	CF	Clinger	No
Hydropsyche		2	6	CF	Clinger	No
Chimarra		1	4	CF	Clinger	No
Dolophilodes		1	0	CG	Clinger	No
Neophylax		1	3	SC	Clinger	No
Gammarus		1	6	OM		No
Nais	bretscheri	1	6	CG		No
Enchytraeidae		4	10	CG		No
Nais	variabilis	2	10	CG		No
Limnodrilus		2	10	CG		No
Limnodrilus	claparedeia	1	10	CG		No
Carabidae		1		PR		No
Oulimnius		1	2	CG	Clinger	No
Dasyhelea		1		CG	Sprawler	No
Phaenopsectra		2	7	SC	Clinger	No
Polypedilum		1	6	SH	Climber	No
Trissopelopia		1	4	PR	Sprawler	No
Chelifera		1	3	CG		No
Tipula		9	4	SH	Burrower	No
Physa		2		SC		No
Enchytraeidae		8	10	CG		No
Lumbricidae		2	10	CG		No
Optioservus		1	4	SC	Clinger	No
Oulimnius		1	2	CG	Clinger	No
Cecidomyiidae		1				No
Diplocladius		1	7	CG	Sprawler	No
Eukiefferiella		1	8	CG	Sprawler	No
Parachaetocladius		1	2	CG	Sprawler	No
Phaenopsectra		6	7	SC	Clinger	No
Pseudorthocladius		1	0	CG	Sprawler	No

Stilocladius	1		CG	Sprawler	No
Chelifera	2	3	CG		No
Limonia	1	6	SH	Burrower	No
Tipula	36	4	SH	Burrower	No
Cheumatopsyche	2	5	CF	Clinger	No
Hydropsyche	2	6	CF	Clinger	No
Physa	2		SC		No
Pisidium	1	8	CF		No
Enchytraeidae	5	10	CG		No
Lumbricidae	2	10	CG		No
Nais variabilis	1	10	CG		No
Limnodrilus	1	10	CG		No
Oulimnius	2	2	CG	Clinger	No
Parachaetocladius	5	2	CG	Sprawler	No
Phaenopsectra	3	7	SC	Clinger	No
Sympotthastia	1	2	CG	Sprawler	No
Thienemannimyia	1	6	PR	Sprawler	No
Tanytarsus	1	6	CF	Climber	No
Chelifera	1	3	CG		No
Tipula	33	4	SH	Burrower	No
Cheumatopsyche	6	5	CF	Clinger	No
Diplectrona	2	2	CF	Clinger	No
Hydropsyche	1	6	CF	Clinger	No
Physa	1		SC		No
Enchytraeidae	1	10	CG		No
Lumbricidae	3	10	CG		No
Agabus	1	5	PR	Swimmer	No
Helichus	2	5	SC	Clinger	No
Dubiraphia	2	6	CG	Clinger	No
Hydrobius	2	5	PR	Climber	No
Probezzia	1	6	PR	Burrower	No
Brillia	1	5	SH		No
Cricotopus	1	7	SH		No
Eukiefferiella	1	8	CG	Sprawler	No
Glyptotendipes	1	10	CF	Burrower	No
Gymnometriocnemus	1	7	CG	Sprawler	No
Hydrobaenus	1	8	SC	Sprawler	No
Orthocladius	1	6	CG	Sprawler	No
Parametriocnemus	9	5	CG	Sprawler	No
Phaenopsectra	4	7	SC	Clinger	No
Polypedilum	2	6	SH	Climber	No
Pseudorthocladius	2	0	CG	Sprawler	No
Sympotthastia	23	2	CG	Sprawler	No
Thienemannimyia	10	6	PR	Sprawler	No
Zavrelimyia	1	8	PR	Sprawler	No
Micropsectra	1	7	CG	Climber	No
Paratanytarsus	3	6	CG	Sprawler	No
Rheotanytarsus	4	6	CF	Clinger	No
Prosimulium	1	7	CF	Clinger	No
Stegopterna	6	7	CF	Clinger	No
Chrysops	1	7	CG	Sprawler	No
Tipula	1	4	SH	Burrower	No

Nigronia	1	0	PR	Clinger	No
Climacia	1			Climber	No
Anax	1	5	PR	Climber	No
Boyeria	1	2	PR	Climber	No
Allocapnia	3	3	SH	Clinger	No
Cheumatopsyche	2	5	CF	Clinger	No
Potamyia flava	1	5	CF		No
Polycentropodidae	1	6	CF	Clinger	No
Fossaria	1	8	SC		No
Oulimnius	1	2	CG	Clinger	No
Stenelmis	2	6	SC	Clinger	No
Psephenus	2	4	SC	Clinger	No
Chironomus	1	10	CG	Burrower	No
Cricotopus	1	7	SH		No
Cricotopus	1	6		Sprawler	No
Eukiefferiella	3	8	CG	Sprawler	No
Sympotthastia	8	2	CG	Sprawler	No
Prosimulium	9	7	CF	Clinger	No
Antocha	3	5	CG	Clinger	No
Limonia	1	6	SH	Burrower	No
Tipula	2	4	SH	Burrower	No
Nigronia	1	0	PR	Clinger	No
Prostoia	6		SH	Sprawler	No
Cheumatopsyche	12	5	CF	Clinger	No
Hydropsyche	53	6	CF	Clinger	No
Optioservus	2	4	SC	Clinger	No
Psephenus	1	4	SC	Clinger	No
Parametriocnemus	1	5	CG	Sprawler	No
Sympotthastia	28	2	CG	Sprawler	No
Prosimulium	4	7	CF	Clinger	No
Simulium	1	7	CF	Clinger	No
Antocha	1	5	CG	Clinger	No
Tipula	2	4	SH	Burrower	No
Ephemerella	1	2	CG	Clinger	No
Eurylophella	10	4	SC	Clinger	No
Stenonema	2	4	SC	Clinger	No
Nigronia	1	0	PR	Clinger	No
Gomphidae	2	1	PR	Burrower	No
Allocapnia	2	3	SH	Clinger	No
Prostoia	42		SH	Sprawler	No
Acroneuria	1	0	PR	Clinger	No
Cheumatopsyche	2	5	CF	Clinger	No
Diplectrona	4	2	CF	Clinger	No
Hydropsyche	1	6	CF	Clinger	No
Neophylax	1	3	SC	Clinger	No
Helichus	1	5	SC	Clinger	No
Lioporeus	1		PR	Swimmer	No
Dubiraphia	10	6	CG	Clinger	No
Macronychus	1	4	OM	Clinger	No
Optioservus	6	4	SC	Clinger	No
Oulimnius	1	2	CG	Clinger	No
Stenelmis	16	6	SC	Clinger	No

Hydrobius	1	5	PR	Climber	No
Psephenus	1	4	SC	Clinger	No
Dasyhelea	1		CG	Sprawler	No
Brillia	1	5	SH		No
Cricotopus	1	6		Sprawler	No
Diamesa	1	5	CG	Sprawler	No
Dicrotendipes	1	10	CG	Burrower	No
Eukiefferiella	1	8	CG	Sprawler	No
Hydrobaenus	7	8	SC	Sprawler	No
Orthocladius	6	6	CG	Sprawler	No
Pseudorthocladius	3	0	CG	Sprawler	No
Pseudosmittia	1	6	CG	Sprawler	No
Stictochironomus	1	9	OM	Burrower	No
Sympotthastia	13	2	CG	Sprawler	No
Zavrelimyia	1	8	PR	Sprawler	No
Micropsectra	1	7	CG	Climber	No
Paratanytarsus	2	6	CG	Sprawler	No
Prosimulium	7	7	CF	Clinger	No
Molophilus	1		SH	Burrower	No
Tipula	3	4	SH	Burrower	No
Nigronia	1	0	PR	Clinger	No
Argia	1	8	PR	Clinger	No
Capniidae	1	1	SH	Sprawler	No
Prostoia	2		SH	Sprawler	No
Cheumatopsyche	14	5	CF	Clinger	No
Mystacides	2	4	CG	Sprawler	No
Chimarra	1	4	CF	Clinger	No
Enchytraeidae	2	10	CG		No
Aulodrilus	2	8	CG		No
Limnodrilus	4	10	CG		No
Limnodrilus claparedeia	2	10	CG		No
Limnodrilus hoffmeister	1	10	CG		No
Lioporeus	1		PR	Swimmer	No
Ancyronyx	1	2	OM	Clinger	No
Dubiraphia	1	6	CG	Clinger	No
Anchytarsu bicolor	1		SH	Sprawler	No
Diamesa	2	5	CG	Sprawler	No
Diplocladius	2	7	CG	Sprawler	No
Hydrobaenus	3	8	SC	Sprawler	No
Stictochironomus	1	9	OM	Burrower	No
Stilocladius	1		CG	Sprawler	No
Sympotthastia	2	2	CG	Sprawler	No
Zavrelimyia	1	8	PR	Sprawler	No
Doithrix	1				No
Corynoneura	1	7	CG	Sprawler	No
Micropsectra	2	7	CG	Climber	No
Microtendipes	2	6	CF	Clinger	No
Chelifera	1	3	CG		No
Prosimulium	3	7	CF	Clinger	No
Stegopterna	1	7	CF	Clinger	No
Eurylophella	1	4	SC	Clinger	No
Stenonema	4	4	SC	Clinger	No

Nigronia	2	0	PR	Clinger	No
Nemouridae	25	2	SH		No
Prostoia	17		SH	Sprawler	No
Cheumatopsyche	9	5	CF	Clinger	No
Diplectrona	1	2	CF	Clinger	No
Hydropsyche	2	6	CF	Clinger	No
Chimarra	3	4	CF	Clinger	No
Neophylax	5	3	SC	Clinger	No
Nematoda Nematoda	1		PA		No
Enchytraeidae	1	10	CG		No
Limnodrilus	1	10	CG		No
Limnodrilus claparedeia	1	10	CG		No
Stenelmis	1	6	SC	Clinger	No
Anchytarsu bicolor	5		SH	Sprawler	No
Ablabesmyia	1	8	CG	Sprawler	No
Diplocladius	1	7	CG	Sprawler	No
Hydrobaenus	2	8	SC	Sprawler	No
Orthocladiinae	1	6	CG	Burrower	No
Parametriocnemus	2	5	CG	Sprawler	No
Stilocladius	1		CG	Sprawler	No
Sympotthastia	1	2	CG	Sprawler	No
Microtendipes	2	6	CF	Clinger	No
Hemerodromia	1	6	PR	Sprawler	No
Prosimulium	3	7	CF	Clinger	No
Stegopterna	3	7	CF	Clinger	No
Antocha	3	5	CG	Clinger	No
Eurylophella	3	4	SC	Clinger	No
Stenonema	1	4	SC	Clinger	No
Prostoia	32		SH	Sprawler	No
Eccoptura	3	3		Clinger	No
Cheumatopsyche	19	5	CF	Clinger	No
Hydropsyche	4	6	CF	Clinger	No
Chimarra	2	4	CF	Clinger	No
Neophylax	5	3	SC	Clinger	No
Enchytraeidae	7	10	CG		No
Limnodrilus	5	10	CG		No
Limnodrilus hoffmeister	3	10	CG		No
Stenelmis	1	6	SC	Clinger	No
Hydrobius	1	5	PR	Climber	No
Dicrotendipes	1	10	CG	Burrower	No
Paraphaenocladius	2	4	CG	Sprawler	No
Phaenopsectra	2	7	SC	Clinger	No
Pseudorthocladius	3	0	CG	Sprawler	No
Tipula	4	4	SH	Burrower	No
Cheumatopsyche	1	5	CF	Clinger	No
Fossaria	1	8	SC		No
Physa	2		SC		No
Pisidium	1	8	CF		No
Dubiraphia	1	6	CG	Clinger	No
Macronychus	1	4	OM	Clinger	No
Optioservus	4	4	SC	Clinger	No
Stenelmis	51	6	SC	Clinger	No

Psephenus		8	4	SC	Clinger	No
Bezzia/Palpomyia		2	6		Burrower	No
Cricotopus		1	7	SH		No
Parametriocnemus		18	5	CG	Sprawler	No
Thienemannimyia		1	6	PR	Sprawler	No
Rheotanytarsus		1	6	CF	Clinger	No
Dolichopodidae		1		PR		No
Chelifera		1	3	CG		No
Antocha		2	5	CG	Clinger	No
Nigronia		1	0	PR	Clinger	No
Boyeria	vinosa	1	2	PR	Climber	No
Allocapnia		1	3	SH	Clinger	No
Prostoia		2		SH	Sprawler	No
Cheumatopsyche		10	5	CF	Clinger	No
Hydropsyche		5	6	CF	Clinger	No
Pycnopsyche		1	4	SH	Sprawler	No
Chimarra		2	4	CF	Clinger	No
Crangonyx		2	4	CG		No
Physa		1		SC		No
Corbicula	fluminea	2	4	CF		No
Enchytraeidae		3	10	CG		No
Lumbricidae		2	10	CG		No
Slavina	appendicul	4	6	CG		No
Limnodrilus		12	10	CG		No
Limnodrilus	claparedei	1	10	CG		No
Limnodrilus	hoffmeister	11	10	CG		No
Tubificidae		1	10	CG		No
Cricotopus		1	7	SH		No
Cricotopus		1	6		Sprawler	No
Eukiefferiella		2	8	CG	Sprawler	No
Hydrobaenus		1	8	SC	Sprawler	No
Orthocladius		2	6	CG	Sprawler	No
Parametriocnemus		3	5	CG	Sprawler	No
Rheocricotopus		1	6	CG	Sprawler	No
Thienemannimyia		5	6	PR	Sprawler	No
Micropsectra		2	7	CG	Climber	No
Limonia		2	6	SH	Burrower	No
Ormosia		3	3	CG	Burrower	No
Physa		18		SC		No
Pisidium		18	8	CF		No
Enchytraeidae		5	10	CG		No
Nais	communis	1	8	CG		No
Limnodrilus		3	10	CG		No
Limnodrilus	claparedei	1	10	CG		No
Tubificidae		1	10	CG		No
Helichus		1	5	SC	Clinger	No
Macronychus		1	4	OM	Clinger	No
Optioservus		1	4	SC	Clinger	No
Stenelmis		24	6	SC	Clinger	No
Psephenus		2	4	SC	Clinger	No
Hydrobaenus		3	8	SC	Sprawler	No
Orthocladius		2	6	CG	Sprawler	No

Parametriocnemus		1	5	CG	Sprawler	No
Pseudorthocladius		3	0	CG	Sprawler	No
Prosimulium		5	7	CF	Clinger	No
Stegopterna		1	7	CF	Clinger	No
Tipula		3	4	SH	Burrower	No
Nigronia		3	0	PR	Clinger	No
Nemouridae		6	2	SH		No
Taeniopteryx		1	2	SH	Sprawler	No
Cheumatopsyche		14	5	CF	Clinger	No
Hydropsyche		2	6	CF	Clinger	No
Triaenodes		1	6	MH	Swimmer	No
Chimarra		2	4	CF	Clinger	No
Orconectes		1	6	SH;CG		No
Ferrissia		1	7	SC		No
Nemertea	Nemertea	1		PR		No
Planariidae	Planariidae	1	1	OM		No
Enchytraeidae		1	10	CG		No
Limnodrilus		11	10	CG		No
Limnodrilus	claparedeia	2	10	CG		No
Limnodrilus	hoffmeisteri	3	10	CG		No
Lioporeus		1		PR	Swimmer	No
Dubiraphia		2	6	CG	Clinger	No
Macronychus		1	4	OM	Clinger	No
Optioservus		1	4	SC	Clinger	No
Stenelmis		4	6	SC	Clinger	No
Chaetocladius		1	6	CG	Sprawler	No
Chironomus		1	10	CG	Burrower	No
Heterotrissocladius		1	0	CG	Sprawler	No
Orthocladius		1	6	CG	Sprawler	No
Parametriocnemus		1	5	CG	Sprawler	No
Paraphaenocladius		1	4	CG	Sprawler	No
Phaenopsectra		2	7	SC	Clinger	No
Pseudorthocladius		18	0	CG	Sprawler	No
Stictochironomus		1	9	OM	Burrower	No
Sympotthastia		2	2	CG	Sprawler	No
Micropsectra		1	7	CG	Climber	No
Paratanytarsus		2	6	CG	Sprawler	No
Pericoma		1	4	CG	Burrower	No
Prosimulium		3	7	CF	Clinger	No
Molophilus		1		SH	Burrower	No
Baetidae		2	4	CG		No
Nigronia		1	0	PR	Clinger	No
Stylogomphus		1	0	PR	Burrower	No
Cheumatopsyche		3	5	CF	Clinger	No
Fossaria		1	8	SC		No
Lumbricidae		1	10	CG		No
Limnodrilus		1	10	CG		No
Dubiraphia		1	6	CG	Clinger	No
Optioservus		5	4	SC	Clinger	No
Stenelmis		12	6	SC	Clinger	No
Anchytarsus	bicolor	3		SH	Sprawler	No
Bezzia/Palpomyia		2	6		Burrower	No

Culicoides		1	10	PR	Burrower	No
Diplocladius		2	7	CG	Sprawler	No
Eukiefferiella		1	8	CG	Sprawler	No
Parachaetocladius		4	2	CG	Sprawler	No
Parametriocnemus		1	5	CG	Sprawler	No
Paraphaenocladius		3	4	CG	Sprawler	No
Psilometriocnemus		2		CG	Sprawler	No
Stilocladius		2		CG	Sprawler	No
Thienemannimyia		3	6	PR	Sprawler	No
Zavrelimyia		1	8	PR	Sprawler	No
Micropsectra		2	7	CG	Climber	No
Prosimulium		12	7	CF	Clinger	No
Stegopterna		1	7	CF	Clinger	No
Antocha		3	5	CG	Clinger	No
Tipula		1	4	SH	Burrower	No
Ephemerella		1	2	CG	Clinger	No
Eurylophella		5	4	SC	Clinger	No
Boyeria	vinosa	1	2	PR	Climber	No
Gomphidae		3	1	PR	Burrower	No
Stylogomphus		1	0	PR	Burrower	No
Allocapnia		5	3	SH	Clinger	No
Nemouridae		1	2	SH		No
Eccoptura		3	3		Clinger	No
Diplectrona		10	2	CF	Clinger	No
Pycnopsyche		2	4	SH	Sprawler	No
Chimarra		2	4	CF	Clinger	No
Lype	diversa	1	2	SC		No
Fossaria		1	8	SC		No
Pisidium		4	8	CF		No
Enchytraeidae		2	10	CG		No
Helichus		1	5	SC	Clinger	No
Lioporeus		2		PR	Swimmer	No
Ancyronyx		1	2	OM	Clinger	No
Optioservus		2	4	SC	Clinger	No
Oulimnius		6	2	CG	Clinger	No
Stenelmis		17	6	SC	Clinger	No
Anchytarsu	bicolor	6		SH	Sprawler	No
Bezzia/Palpomyia		2	6		Burrower	No
Ceratopogon		4	6	PR	Burrower	No
Cricotopus		1	7	SH		No
Diplocladius		2	7	CG	Sprawler	No
Georthocladius		3			Sprawler	No
Limnophyes		1	8	CG	Sprawler	No
Natarsia		1	8	PR	Sprawler	No
Parachaetocladius		4	2	CG	Sprawler	No
Parametriocnemus		2	5	CG	Sprawler	No
Paraphaenocladius		4	4	CG	Sprawler	No
Paratendipes		1	8	CG	Burrower	No
Polypedilum		1	6	SH	Climber	No
Stilocladius		2		CG	Sprawler	No
Thienemannimyia		2	6	PR	Sprawler	No
Micropsectra		1	7	CG	Climber	No

Prosimulium	8	7 CF	Clinger	No
Stegopterna	1	7 CF	Clinger	No
Ormosia	1	3 CG	Burrower	No
Tipula	2	4 SH	Burrower	No
Eurylophella	2	4 SC	Clinger	No
Sialis	2	4 PR	Burrower	No
Allocapnia	10	3 SH	Clinger	No
Chloroperlidae	2	PR	Clinger	No
Eccoptura	1	3	Clinger	No
Cheumatopsyche	1	5 CF	Clinger	No
Diplectrona	10	2 CF	Clinger	No
Molanna	1	6 SC	Sprawler	No
Psilotreta	2	0 SC	Sprawler	No
Chimarra	1	4 CF	Clinger	No
Neophylax	1	3 SC	Clinger	No
Fossaria	1	8 SC		No
Pisidium	1	8 CF		No
Enchytraeidae	5	10 CG		No
Lumbricidae	1	10 CG		No
Limnodrilus hoffmeister	1	10 CG		No
Helichus	2	5 SC	Clinger	No
Hydroporus	3	5 PR	Swimmer	No
Lioporeus	7	PR	Swimmer	No
Dubiraphia	1	6 CG	Clinger	No
Stenelmis	3	6 SC	Clinger	No
Cymbiodyta	1	5 CG	Burrower	No
Hydrobius	1	5 PR	Climber	No
Culicoides	1	10 PR	Burrower	No
Cricotopus	1	6	Sprawler	No
Diamesa	1	5 CG	Sprawler	No
Diplocladius	1	7 CG	Sprawler	No
Natarsia	2	8 PR	Sprawler	No
Orthocladiinae	1	6 CG	Burrower	No
Parachaetocladius	1	2 CG	Sprawler	No
Parametriocnemus	3	5 CG	Sprawler	No
Phaenopsectra	2	7 SC	Clinger	No
Polypedilum	3	6 SH	Climber	No
Thienemannimyia	3	6 PR	Sprawler	No
Zavrelimyia	3	8 PR	Sprawler	No
Prosimulium	2	7 CF	Clinger	No
Stegopterna	17	7 CF	Clinger	No
Chrysops	2	7 CG	Sprawler	No
Dolichopeza	2			No
Pseudolimnophila	1	2 PR	Burrower	No
Tipula	4	4 SH	Burrower	No
Microvelia	1	6 PR	Skater	No
Calopteryx	1	6 PR	Climber	No
Allocapnia	13	3 SH	Clinger	No
Nemouridae	2	2 SH		No
Orconectes	1	6 SH;CG		No
Physa	3	SC		No

APPENDIX B: BIOLOGICAL METRICS

StationID	Waterbody Name	Collection Date	Order	IBI Score	Narrative Rating	Total Taxa	Total Taxa Score	EPT Taxa	EPT Taxa Score	Ephemeroptera Taxa
201	S Branch Patapsco	3/17/2003	4	2.78	Poor	16	3	3	1	1
203	Hay Meadow Branch	3/18/2003	2	3.22	Fair	31	5	9	3	1
205	S. Branch Patapsco	3/5/2003	3	3.89	Fair	47	5	13	5	4
206	South Branch Patapsco	3/17/2003	1	2.78	Poor	24	5	6	3	1
207	UT to S Patapsco	3/18/2003	1	1.89	Very Poor	18	3	4	1	1
208	UT to Patapsco	3/18/2003	1	1.44	Very Poor	13	1	3	1	0
209	UT to S Patapsco	3/19/2003	1	1.67	Very Poor	15	1	1	1	0
210	UT to S Patapsco	3/5/2003	1	2.33	Poor	22	3	2	1	1
215	UT to Patapsco	3/17/2003	1	3.67	Fair	34	5	4	1	3
217	UT to S Br Patapsco	3/5/2003	2	3.67	Fair	25	5	8	3	2
221	Patapsco River	3/14/2003	4	3.67	Fair	36	5	10	3	6
222	UT to Patapsco River	3/14/2003	1	2.78	Poor	24	5	4	1	0
223	UT to Patapsco River	3/14/2003	1	3.22	Fair	23	5	11	3	3
224	Patapsco River	3/13/2003	4	2.33	Poor	20	3	3	1	3
225	Patapsco River	3/12/2003	1	3.00	Fair	23	5	7	3	0
226	UT to Patapsco	3/13/2003	1	NA	Very Poor	14	1	0	1	0
227	UT to Patapsco	3/13/2003	1	2.33	Poor	16	3	3	1	0
228	Sucker Branch	3/12/2003	1	3.22	Fair	37	5	4	1	0
229	Tiber Branch	3/17/2003	2	2.11	Poor	16	3	3	1	0
230	UT to Patapsco	3/12/2003	1	3.00	Fair	20	3	10	3	3
241	Deep Run	3/4/2003	1	3.22	Fair	34	5	5	3	0
242	UT to Patapsco	3/5/2003	1	3.00	Fair	25	5	8	3	2
243	UT to Patapsco River	3/6/2003	1	NA	Very Poor	14	1	1	1	0
244	UT to Patapsco	3/12/2003	2	3.00	Fair	24	5	6	3	0
245	UT to Patapsco	3/4/2003	1	2.33	Poor	20	3	0	1	0
247	Deep Run	3/7/2003	2	2.56	Poor	28	5	6	3	0
248	Deep Run	3/7/2003	2	3.00	Fair	29	5	2	1	1
252	UT to Patapsco	3/5/2003	1	3.67	Fair	36	5	9	3	2
253	UT to Patapsco	3/5/2003	1	3.22	Fair	40	5	10	3	1
254	UT to Patapsco	3/6/2003	1	2.56	Poor	34	5	2	1	0
210QC	UT to S Patapsco	3/5/2003	1	2.33	Poor	20	3	3	1	1
227QC	UT to Patapsco	3/13/2003	1	2.33	Poor	18	3	2	1	0
242QC	UT to Patapsco	3/5/2003	1	3.22	Fair	34	5	9	3	2

StationID	Ephemeroptera Taxa Score	Dipetera Taxa	Diptera Taxa Score	Percent Ephemeroptera	Percent Ephemeroptera Score	Percent Tanytarsini	Percent Tanytarsini Score	Intolerant Taxa	Intolerant Taxa Score	Percent Tolerant Taxa
201	1	11	5	1.87	1	27.1	5	3	3	4.67
203	1	15	5	4.76	1	1.9	3	8	3	29.52
205	3	24	5	3.67	1	2.75	3	9	5	33.03
206	1	9	3	1.98	1	0.99	3	7	3	48.51
207	1	9	3	3.81	1	0	1	7	3	76.19
208	1	7	3	0	1	0	1	6	3	87.18
209	1	7	3	0	1	0	1	1	1	81.65
210	1	12	5	3.92	1	2.94	3	3	3	66.67
215	3	25	5	10.91	3	22.73	5	4	3	12.73
217	3	12	5	5.83	3	0.97	3	6	3	32.04
221	5	11	5	13.27	3	1.02	3	7	3	63.27
222	1	17	5	0	1	1.59	3	6	3	54.76
223	3	8	3	15.6	3	0.92	3	12	5	56.88
224	3	7	3	3.7	1	0.93	3	3	3	51.85
225	1	10	5	0	1	0	1	6	3	34.17
226	1	6	3	0	1	0	1	2	1	37.93
227	1	7	3	0	1	1.52	3	5	3	18.18
228	1	22	5	0	1	8.08	5	5	3	24.24
229	1	9	3	0	1	0	1	3	3	13.21
230	3	6	3	11.93	3	0	1	8	3	4.59
241	1	18	5	0	1	2.68	3	5	3	17.86
242	3	12	5	4.04	1	2.02	3	3	3	13.13
243	1	5	1	0	1	0	1	1	1	58.82
244	1	8	3	0	1	0.83	3	4	3	0.83
245	1	11	5	0	1	2.15	3	1	1	58.06
247	1	7	3	0	1	0	1	5	3	23.08
248	1	15	5	2.82	1	4.23	3	5	3	36.62
252	3	16	5	5.77	3	1.92	3	10	5	25.96
253	1	19	5	1.74	1	0.87	3	9	5	17.39
254	1	18	5	0	1	0	1	4	3	38.54
210QC	1	13	5	0.92	1	2.75	3	6	3	66.06
227QC	1	10	5	0	1	0	1	4	3	27.14
242QC	3	14	5	4.63	1	4.63	3	7	3	23.15

StationID	Percent Tolerant Taxa Score	Percent Collectors	Percent Collectors Score	Total Individuals	Watershed Average	Standard Deviation
201	5	9.35	1	107		
203	3	39.05	5	105		
205	3	42.2	5	109		
206	1	42.57	5	101		
207	1	20	3	105		
208	1	5.98	1	117		
209	1	56.88	5	109		
210	1	20.59	3	102		
215	3	47.27	5	110		
217	3	36.89	5	103	2.73	0.88
221	1	39.8	5	98		
222	1	37.3	5	126		
223	1	18.35	3	109		
224	1	23.15	3	108		
225	3	48.33	5	120		
226	3	44.83	5	29		
227	3	27.27	3	66		
228	3	48.48	5	99		
229	3	15.09	3	106		
230	5	28.44	3	109	2.85	0.51
241	3	38.39	5	112		
242	3	13.13	1	99		
243	1	61.76	5	34		
244	5	20	3	120		
245	1	50.54	5	93		
247	3	18.68	3	91		
248	3	71.83	5	71		
252	3	23.08	3	104		
253	3	22.61	3	115		
254	3	18.75	3	96	2.95	0.41
210QC	1	23.85	3	109		
227QC	3	25.71	3	70		
242QC	3	21.3	3	108		

APPENDIX C: CHANNEL CROSS SECTIONAL AREA

StationID	CollDate	SampYear	DistanceFromLeft	DUnit	Elev/Depth	EUnit	XSRemarkCode	Comments
203	3/18/2003	2003	20	ft	9.14	1/10 ft		
203	3/18/2003	2003	33	ft	4.42	1/10 ft		
203	3/18/2003	2003	31.5	ft	4.6	1/10 ft		
203	3/18/2003	2003	31	ft	5.11	1/10 ft		Left Bankfull (2)
203	3/18/2003	2003	30	ft	6.4	1/10 ft	Left Bankfull	-1
203	3/18/2003	2003	29	ft	7.1	1/10 ft		
203	3/18/2003	2003	28	ft	7.69	1/10 ft		
203	3/18/2003	2003	27	ft	8.08	1/10 ft		
203	3/18/2003	2003	26	ft	8.4	1/10 ft		
203	3/18/2003	2003	25.33	ft	8.58	1/10 ft	Left Edge of Water	
203	3/18/2003	2003	25	ft	8.85	1/10 ft		
203	3/18/2003	2003	24	ft	8.9	1/10 ft		
203	3/18/2003	2003	23	ft	8.91	1/10 ft		
203	3/18/2003	2003	36	ft	4.58	1/10 ft	Left Bank	Pin
203	3/18/2003	2003	21	ft	9.1	1/10 ft		
203	3/18/2003	2003	18	ft	9.14	1/10 ft		
203	3/18/2003	2003	17	ft	9.24	1/10 ft		
203	3/18/2003	2003	14.25	ft	9.32	1/10 ft	Thalweg	
203	3/18/2003	2003	13.5	ft	8.54	1/10 ft	Right Edge of Water	
203	3/18/2003	2003	13	ft	8.24	1/10 ft		
203	3/18/2003	2003	12	ft	7.06	1/10 ft	Right Bankfull	
203	3/18/2003	2003	11.66	ft	5.44	1/10 ft		
203	3/18/2003	2003	11	ft	5.08	1/10 ft	Right Top of Bank	
203	3/18/2003	2003	9	ft	5.17	1/10 ft		
203	3/18/2003	2003	6	ft	5.06	1/10 ft		
203	3/18/2003	2003	3	ft	5.01	1/10 ft		
203	3/18/2003	2003	0	ft	4.83	1/10 ft	Right Bank	Pin
203	3/18/2003	2003	22	ft	8.98	1/10 ft		
203	3/18/2003	2003	16	ft	9.28	1/10 ft		
206	3/17/2003	2003	10.41	ft	5.26	1/10 ft		RTOB
206	3/17/2003	2003	24	ft	7.35	1/10 ft		
206	3/17/2003	2003	22	ft	7.48	1/10 ft		
206	3/17/2003	2003	20	ft	7.68	1/10 ft		
206	3/17/2003	2003	18.5	ft	8.01	1/10 ft		LEOW
206	3/17/2003	2003	17	ft	8.42	1/10 ft		
206	3/17/2003	2003	16	ft	8.82	1/10 ft		

StationID	CollDate	SampYear	DistanceFromLeft	DUnit	Elev/Depth	EUnit	XSRemarkCode	Comments
206	3/17/2003	2003	15	ft	8.95	1/10 ft		
206	3/17/2003	2003	14.5	ft	9.09	1/10 ft		TH
206	3/17/2003	2003	14	ft	9.08	1/10 ft		
206	3/17/2003	2003	13	ft	8.61	1/10 ft		
206	3/17/2003	2003	11.66	ft	8.07	1/10 ft		REOW
206	3/17/2003	2003	26	ft	7.17	1/10 ft		
206	3/17/2003	2003	10.58	ft	6.86	1/10 ft		RBF
206	3/17/2003	2003	28	ft	7.08	1/10 ft		
206	3/17/2003	2003	9	ft	4.9	1/10 ft		
206	3/17/2003	2003	6	ft	4.89	1/10 ft		
206	3/17/2003	2003	3	ft	5.03	1/10 ft		top of monument
206	3/17/2003	2003	30	ft	6.91	1/10 ft		
206	3/17/2003	2003	33	ft	6.71	1/10 ft		
206	3/17/2003	2003	36	ft	6.51	1/10 ft		
206	3/17/2003	2003	37.66	ft	6.49	1/10 ft		
206	3/17/2003	2003	55	ft	4.92	1/10 ft		LPIN
206	3/17/2003	2003	53	ft	5.01	1/10 ft		
206	3/17/2003	2003	50	ft	5.08	1/10 ft		
206	3/17/2003	2003	45	ft	4.97	1/10 ft		
206	3/17/2003	2003	42.5	ft	4.98	1/10 ft		LTOB
206	3/17/2003	2003	41	ft	5.34	1/10 ft		
206	3/17/2003	2003	11	ft	7.25	1/10 ft		
206	3/17/2003	2003	0	ft	5.08	1/10 ft		ground @ FPN
206	3/17/2003	2003	39	ft	6.04	1/10 ft		
207	3/18/2003	2003	16	ft	10.35	1/10 ft		
207	3/18/2003	2003	18	ft	10.62	1/10 ft		
207	3/18/2003	2003	17	ft	10.64	1/10 ft		
207	3/18/2003	2003	53	ft	5.11	1/10 ft		
207	3/18/2003	2003	51	ft	5.91	1/10 ft		
207	3/18/2003	2003	49	ft	6.54	1/10 ft		
207	3/18/2003	2003	46	ft	6.97	1/10 ft		
207	3/18/2003	2003	54	ft	4.87	1/10 ft	Left Monument	
207	3/18/2003	2003	16.25	ft	10.46	1/10 ft	Right Edge of Water	
207	3/18/2003	2003	22	ft	10.72	1/10 ft		
207	3/18/2003	2003	15	ft	9	1/10 ft	Right Bankfull	?
207	3/18/2003	2003	13	ft	6.54	1/10 ft		

StationID	CollDate	SampYear	DistanceFromLeft	DUnit	Elev/Depth	EUnit	XSRemarkCode	Comments
207	3/18/2003	2003	12	ft	6.06	1/10 ft	Right Top of Bank	
207	3/18/2003	2003	11	ft	5.6	1/10 ft		
207	3/18/2003	2003	9	ft	6.17	1/10 ft		
207	3/18/2003	2003	0	ft	4.86	1/10 ft	Bank Pin	
207	3/18/2003	2003	3	ft	4.85	1/10 ft		
207	3/18/2003	2003	43	ft	7.25	1/10 ft		
207	3/18/2003	2003	30	ft	10.69	1/10 ft		
207	3/18/2003	2003	36	ft	7.7	1/10 ft	Left Top of Bank	
207	3/18/2003	2003	40	ft	7.35	1/10 ft		
207	3/18/2003	2003	37	ft	7.41	1/10 ft		
207	3/18/2003	2003	6	ft	4.81	1/10 ft		
207	3/18/2003	2003	35	ft	9.67	1/10 ft		
207	3/18/2003	2003	34	ft	10.72	1/10 ft	Left Edge of Water	
207	3/18/2003	2003	33	ft	10.9	1/10 ft	Thalweg	
207	3/18/2003	2003	20	ft	10.74	1/10 ft		
207	3/18/2003	2003	31	ft	10.82	1/10 ft		
207	3/18/2003	2003	21	ft	10.66	1/10 ft		
207	3/18/2003	2003	29	ft	10.62	1/10 ft		
207	3/18/2003	2003	28	ft	10.67	1/10 ft		
207	3/18/2003	2003	27	ft	10.47	1/10 ft		
207	3/18/2003	2003	26	ft	10.33	1/10 ft		
207	3/18/2003	2003	25	ft	10.7	1/10 ft		
207	3/18/2003	2003	24	ft	10.67	1/10 ft		
207	3/18/2003	2003	35.5	ft	8.3	1/10 ft	Left Bankfull	
207	3/18/2003	2003	32	ft	10.85	1/10 ft		
208	3/18/2003	2003	24	ft	8.63	1/10 ft		
208	3/18/2003	2003	30	ft	7.73	1/10 ft		
208	3/18/2003	2003	37	ft	3.61	1/10 ft		approx. 3 ft below LTOB
208	3/18/2003	2003	36.16	ft	4.57	1/10 ft		
208	3/18/2003	2003	35	ft	5.63	1/10 ft		
208	3/18/2003	2003	33.5	ft	6.26	1/10 ft		
208	3/18/2003	2003	32.83	ft	7.3	1/10 ft		LBF (2)
208	3/18/2003	2003	22	ft	8.74	1/10 ft		TH
208	3/18/2003	2003	31	ft	7.51	1/10 ft		LBF (1)
208	3/18/2003	2003	0	ft	4.21	1/10 ft		ground @ PIN
208	3/18/2003	2003	29	ft	8.12	1/10 ft		

StationID	CollDate	SampYear	DistanceFromLeft	DUnit	Elev/Depth	EUnit	XSRemarkCode	Comments
208	3/18/2003	2003	28.25	ft	8.39	1/10 ft		LEOW
208	3/18/2003	2003	27	ft	8.51	1/10 ft		
208	3/18/2003	2003	25	ft	8.68	1/10 ft		
208	3/18/2003	2003	23	ft	8.64	1/10 ft		
208	3/18/2003	2003	21	ft	8.6	1/10 ft		
208	3/18/2003	2003	14	ft	7.05	1/10 ft		RBF (1)
208	3/18/2003	2003	6	ft	5.21	1/10 ft		
208	3/18/2003	2003	3	ft	4.68	1/10 ft		top of monument
208	3/18/2003	2003	32	ft	7.41	1/10 ft		
208	3/18/2003	2003	20	ft	8.48	1/10 ft		
208	3/18/2003	2003	9	ft	5.27	1/10 ft		
208	3/18/2003	2003	13	ft	6.28	1/10 ft		
208	3/18/2003	2003	14.25	ft	7.61	1/10 ft		RBF (2)
208	3/18/2003	2003	15	ft	8.04	1/10 ft		
208	3/18/2003	2003	16	ft	8.27	1/10 ft		
208	3/18/2003	2003	17	ft	8.39	1/10 ft		
208	3/18/2003	2003	17.5	ft	8.41	1/10 ft		REOW
208	3/18/2003	2003	18	ft	8.48	1/10 ft		
208	3/18/2003	2003	19	ft	8.42	1/10 ft		
208	3/18/2003	2003	12	ft	5.68	1/10 ft		RTOB
209	3/19/2003	2003	28	ft	4.87	1/10 ft		
209	3/19/2003	2003	19	ft	9.27	1/10 ft		
209	3/19/2003	2003	13	ft	9.2	1/10 ft		
209	3/19/2003	2003	14	ft	9.25	1/10 ft		
209	3/19/2003	2003	15	ft	9.45	1/10 ft	Thalweg	
209	3/19/2003	2003	12.66	ft	9.04	1/10 ft	Right Edge of Water	
209	3/19/2003	2003	17	ft	9.42	1/10 ft		
209	3/19/2003	2003	12	ft	8.79	1/10 ft		
209	3/19/2003	2003	19.83	ft	9.05	1/10 ft	Left Edge of Water	
209	3/19/2003	2003	20.5	ft	8.78	1/10 ft		
209	3/19/2003	2003	21	ft	8.65	1/10 ft		
209	3/19/2003	2003	21.5	ft	7.45	1/10 ft	Left Bankfull	-1
209	3/19/2003	2003	22	ft	7.25	1/10 ft		LBF (2)
209	3/19/2003	2003	25	ft	4.95	1/10 ft		
209	3/19/2003	2003	31	ft	4.96	1/10 ft		
209	3/19/2003	2003	35	ft	5.08	1/10 ft	Left Monument	

StationID	CollDate	SampYear	DistanceFromLeft	DUnit	Elev/Depth	EUnit	XSRemarkCode	Comments
209	3/19/2003	2003	16	ft	9.37	1/10 ft		
209	3/19/2003	2003	11.5	ft	8.4	1/10 ft		RBF (2)
209	3/19/2003	2003	23	ft	5.32	1/10 ft	Left Top of Bank	
209	3/19/2003	2003	18	ft	9.33	1/10 ft		
209	3/19/2003	2003	10	ft	7	1/10 ft		
209	3/19/2003	2003	9.33	ft	5.34	1/10 ft	Right Top of Bank	
209	3/19/2003	2003	9	ft	5.22	1/10 ft		
209	3/19/2003	2003	6	ft	5.18	1/10 ft		
209	3/19/2003	2003	3	ft	5.16	1/10 ft		
209	3/19/2003	2003	0	ft	5	1/10 ft	Bank Pin	
209	3/19/2003	2003	11	ft	7.85	1/10 ft	Right Bankfull	-1
210	3/5/2003	2003	23	ft	6.83	1/10 ft		
210	3/5/2003	2003	24.16	ft	6.75	1/10 ft	Left Edge of Water	
210	3/5/2003	2003	40	ft	2.16	1/10 ft	Left Monument	
210	3/5/2003	2003	21.5	ft	6.93	1/10 ft	Thalweg	
210	3/5/2003	2003	0	ft	2.75	1/10 ft	Bank Pin	
210	3/5/2003	2003	4.5	ft	4.08	1/10 ft		
210	3/5/2003	2003	18	ft	6.83	1/10 ft	Right Edge of Water	
210	3/5/2003	2003	0.1	ft	1.83	1/10 ft		tape
210	3/5/2003	2003	19.83	ft	6.92	1/10 ft		
215	3/17/2003	2003	24	ftg	11.18	1/10 ft		
215	3/17/2003	2003	36	ft	4.4	1/10 ft		LPIN
215	3/17/2003	2003	22	ft	11.07	1/10 ft		
215	3/17/2003	2003	25	ft	10.94	1/10 ft		
215	3/17/2003	2003	26	ft	10.62	1/10 ft		LEOW
215	3/17/2003	2003	20	ft	10.85	1/10 ft		
215	3/17/2003	2003	0	ft	5.19	1/10 ft		ground@PIN
215	3/17/2003	2003	21	ft	10.97	1/10 ft		
215	3/17/2003	2003	34	ft	4.44	1/10 ft		
215	3/17/2003	2003	33	ft	4.5	1/10 ft		
215	3/17/2003	2003	32.16	ft	4.91	1/10 ft		LTOB
215	3/17/2003	2003	31	ft	7.13	1/10 ft		
215	3/17/2003	2003	30	ft	7.9	1/10 ft		LBF
215	3/17/2003	2003	29	ft	8.95	1/10 ft		
215	3/17/2003	2003	28	ft	9.5	1/10 ft		
215	3/17/2003	2003	27	ft	10.19	1/10 ft		

StationID	CollDate	SampYear	DistanceFromLeft	DUnit	Elev/Depth	EUnit	XSRemarkCode	Comments
215	3/17/2003	2003	18	ft	10.64	1/10 ft		REOW
215	3/17/2003	2003	23	ft	11.19	1/10 ft		TH
215	3/17/2003	2003	15	ft	9.63	1/10 ft		
215	3/17/2003	2003	14	ft	8.05	1/10 ft		
215	3/17/2003	2003	13	ft	7.17	1/10 ft		RBF
215	3/17/2003	2003	9	ft	5.25	1/10 ft		
215	3/17/2003	2003	12	ft	6.24	1/10 ft		
215	3/17/2003	2003	16	ft	10.14	1/10 ft		
215	3/17/2003	2003	11	ft	5.54	1/10 ft		RTOB
215	3/17/2003	2003	6	ft	5.41	1/10 ft		
215	3/17/2003	2003	17	ft	10.51	1/10 ft		
215	3/17/2003	2003	19	ft	10.71	1/10 ft		
215	3/17/2003	2003	10	ft	5.33	1/10 ft		
215	3/17/2003	2003	3	ft	5.23	1/10 ft		top of monument
217	3/5/2003	2003	0	ft	4.25	1/10 ft	Bank Pin	
217	3/5/2003	2003	0.1	ft	3.41	1/10 ft		top of pin
217	3/5/2003	2003	10.83	ft	7.83	1/10 ft	Right Edge of Water	
217	3/5/2003	2003	21.83	ft	8.5	1/10 ft	Thalweg	
217	3/5/2003	2003	25.92	ft	7.75	1/10 ft	Left Edge of Water	
217	3/5/2003	2003	40.25	ft	3.41	1/10 ft	Left Top of Bank	
217	3/5/2003	2003	31	ft	6.92	1/10 ft		top of point bar
217	3/5/2003	2003	39	ft	5.83	1/10 ft		
217	3/5/2003	2003	34	ft	7.66	1/10 ft		dry side channel
217	3/5/2003	2003	43	ft	2.66	1/10 ft	Left Monument	
217	3/5/2003	2003	36	ft	7.16	1/10 ft	Left Bankfull	?
222	3/14/2003	2003	18	ft	10.25	1/10 ft		
222	3/14/2003	2003	23	ft	8.82	1/10 ft		
222	3/14/2003	2003	22	ft	9.13	1/10 ft	Right Bankfull	RBF
222	3/14/2003	2003	21	ft	9.53	1/10 ft		
222	3/14/2003	2003	20	ft	9.68	1/10 ft		
222	3/14/2003	2003	18.75	ft	10.11	1/10 ft	Right Edge of Water	REOW
222	3/14/2003	2003	17.41	ft	10.26	1/10 ft	Thalweg	TH
222	3/14/2003	2003	16.5	ft	10.18	1/10 ft		
222	3/14/2003	2003	19.5	ft	9.75	1/10 ft		
222	3/14/2003	2003	24	ft	8.57	1/10 ft		
222	3/14/2003	2003	28	ft	8.57	1/10 ft		

StationID	CollDate	SampYear	DistanceFromLeft	DUnit	Elev/Depth	EUnit	XSRemarkCode	Comments
222	3/14/2003	2003	30	ft	8.5	1/10 ft		
222	3/14/2003	2003	32	ft	8.26	1/10 ft		
222	3/14/2003	2003	34	ft	7.9	1/10 ft		
222	3/14/2003	2003	36	ft	7.44	1/10 ft	Right Top of Bank	snow on bank
222	3/14/2003	2003	38	ft	6.86	1/10 ft		
222	3/14/2003	2003	40	ft	6.5	1/10 ft		
222	3/14/2003	2003	44	ft	5.78	1/10 ft		
222	3/14/2003	2003	48	ft	5.08	1/10 ft	Right Monument	RPIN
222	3/14/2003	2003	15.92	ft	10.09	1/10 ft	Left Edge of Water	LEOW
222	3/14/2003	2003	26	ft	8.5	1/10 ft		
222	3/14/2003	2003	3.5	ft	5.51	1/10 ft		
222	3/14/2003	2003	17	ft	10.24	1/10 ft		
222	3/14/2003	2003	15.5	ft	9.9	1/10 ft		
222	3/14/2003	2003	0	ft	5.09	1/10 ft	Bank Pin	ground @ PIN
222	3/14/2003	2003	6	ft	5.8	1/10 ft		
222	3/14/2003	2003	8	ft	6.1	1/10 ft	Left Top of Bank	LTOB
222	3/14/2003	2003	9	ft	6.78	1/10 ft		
222	3/14/2003	2003	14	ft	9.15	1/10 ft		
222	3/14/2003	2003	15	ft	9.44	1/10 ft	Left Bankfull	LBF
222	3/14/2003	2003	10	ft	7.48	1/10 ft		
222	3/14/2003	2003	13	ft	9.06	1/10 ft		
222	3/14/2003	2003	12	ft	8.75	1/10 ft		
222	3/14/2003	2003	11	ft	8.12	1/10 ft		
223	3/14/2003	2003	40	ft	6.75	1/10 ft	Left Bankfull	LBF
223	3/14/2003	2003	33	ft	9.45	1/10 ft		
223	3/14/2003	2003	23.5	ft	10.51	1/10 ft	Thalweg	TH
223	3/14/2003	2003	22.83	ft	10.47	1/10 ft		
223	3/14/2003	2003	27	ft	9.9	1/10 ft		
223	3/14/2003	2003	29	ft	9.99	1/10 ft		
223	3/14/2003	2003	30	ft	10.03	1/10 ft		
223	3/14/2003	2003	31	ft	10.2	1/10 ft		
223	3/14/2003	2003	32	ft	9.94	1/10 ft	Left Edge of Water	LEOW
223	3/14/2003	2003	25	ft	10.43	1/10 ft		
223	3/14/2003	2003	34	ft	9.33	1/10 ft		
223	3/14/2003	2003	35	ft	9.14	1/10 ft		
223	3/14/2003	2003	36	ft	8.78	1/10 ft		

StationID	CollDate	SampYear	DistanceFromLeft	DUnit	Elev/Depth	EUnit	XSRemarkCode	Comments
223	3/14/2003	2003	37	ft	8.41	1/10 ft		
223	3/14/2003	2003	22	ft	10.33	1/10 ft		
223	3/14/2003	2003	39	ft	7.33	1/10 ft		
223	3/14/2003	2003	24	ft	10.47	1/10 ft		
223	3/14/2003	2003	41	ft	6.06	1/10 ft		
223	3/14/2003	2003	42	ft	5.79	1/10 ft	Left Top of Bank	LTOB
223	3/14/2003	2003	45	ft	5.6	1/10 ft		
223	3/14/2003	2003	48	ft	5.36	1/10 ft		
223	3/14/2003	2003	50	ft	5	1/10 ft	Bank Pin	BPIN
223	3/14/2003	2003	38	ft	7.93	1/10 ft		
223	3/14/2003	2003	9	ft	5.09	1/10 ft		
223	3/14/2003	2003	26	ft	10.02	1/10 ft		
223	3/14/2003	2003	0	ft	11.1	1/10 ft	Right Monument	ground@PIN
223	3/14/2003	2003	21	ft	10.19	1/10 ft		
223	3/14/2003	2003	6	ft	5.06	1/10 ft		
223	3/14/2003	2003	12	ft	5.5	1/10 ft		
223	3/14/2003	2003	13	ft	5.88	1/10 ft	Right Top of Bank	RTOB
223	3/14/2003	2003	14	ft	6.79	1/10 ft	Right Bankfull	RBF
223	3/14/2003	2003	15	ft	8.17	1/10 ft		
223	3/14/2003	2003	16	ft	8.77	1/10 ft		
223	3/14/2003	2003	17	ft	9.28	1/10 ft		
223	3/14/2003	2003	18	ft	9.61	1/10 ft		
223	3/14/2003	2003	19	ft	10	1/10 ft	Right Edge of Water	REOW
223	3/14/2003	2003	20	ft	10.12	1/10 ft		
223	3/14/2003	2003	3	ft	5.04	1/10 ft		
225	3/12/2003	2003	0	ft	4.67	1/10 ft	Bank Pin	ground@PIN
225	3/12/2003	2003	23.5	ft	13.97	1/10 ft		
225	3/12/2003	2003	21	ft	13.95	1/10 ft		
225	3/12/2003	2003	20	ft	13.49	1/10 ft	Left Edge of Water	LEOW
225	3/12/2003	2003	19.5	ft	12.3	1/10 ft		
225	3/12/2003	2003	17	ft	12.07	1/10 ft		
225	3/12/2003	2003	15	ft	11.95	1/10 ft		
225	3/12/2003	2003	13.83	ft	11.4	1/10 ft		
225	3/12/2003	2003	12.66	ft	10.9	1/10 ft		
225	3/12/2003	2003	11.5	ft	10.04	1/10 ft	Left Bankfull	LBF
225	3/12/2003	2003	10	ft	9.14	1/10 ft		

StationID	CollDate	SampYear	DistanceFromLeft	DUnit	Elev/Depth	EUnit	XSRemarkCode	Comments
225	3/12/2003	2003	9	ft	8.78	1/10 ft	Left Top of Bank	
225	3/12/2003	2003	25.5	ft	13.7	1/10 ft		
225	3/12/2003	2003	3	ft	8.23	1/10 ft		
225	3/12/2003	2003	49	ft	9.74	1/10 ft		
225	3/12/2003	2003	6	ft	8.33	1/10 ft		
225	3/12/2003	2003	45	ft	9.07	1/10 ft		
225	3/12/2003	2003	36.41	ft	14.82	1/10 ft		
225	3/12/2003	2003	37.5	ft	14.37	1/10 ft		
225	3/12/2003	2003	39.5	ft	14.44	1/10 ft		
225	3/12/2003	2003	40	ft	13.65	1/10 ft	Right Edge of Water	REOW and UC bank a 1 ft drop
225	3/12/2003	2003	40.33	ft	11.3	1/10 ft	Right Bankfull	RBF
225	3/12/2003	2003	42.5	ft	9.61	1/10 ft	Right Top of Bank	RTOB (snow)
225	3/12/2003	2003	27.5	ft	13.75	1/10 ft		
225	3/12/2003	2003	53	ft	9.88	1/10 ft	Right Monument	RPIN
225	3/12/2003	2003	35.5	ft	14.71	1/10 ft		
225	3/12/2003	2003	33.5	ft	14.11	1/10 ft		
225	3/12/2003	2003	32	ft	13.87	1/10 ft		
225	3/12/2003	2003	30	ft	13.75	1/10 ft		
225	3/12/2003	2003	28.58	ft	13.86	1/10 ft		
225	3/12/2003	2003	41.5	ft	10.31	1/10 ft		
226	3/13/2003	2003	20.5	ft	12.32	1/10 ft		
226	3/13/2003	2003	34.5	ft	11.41	1/10 ft		
226	3/13/2003	2003	41	ft	6.6	1/10 ft	Left Bankfull	LBF
226	3/13/2003	2003	29	ft	12.5	1/10 ft		
226	3/13/2003	2003	30	ft	12.55	1/10 ft		
226	3/13/2003	2003	31	ft	12.58	1/10 ft		
226	3/13/2003	2003	32	ft	12.54	1/10 ft		
226	3/13/2003	2003	26	ft	12.58	1/10 ft		
226	3/13/2003	2003	33	ft	12	1/10 ft		
226	3/13/2003	2003	25	ft	12.39	1/10 ft		
226	3/13/2003	2003	35	ft	10.94	1/10 ft		
226	3/13/2003	2003	36	ft	10.47	1/10 ft		
226	3/13/2003	2003	38	ft	8.86	1/10 ft		
226	3/13/2003	2003	39	ft	7.76	1/10 ft		
226	3/13/2003	2003	40	ft	7.44	1/10 ft		
226	3/13/2003	2003	0	ft	4.04	1/10 ft	Bank Pin	ground @ PIN

StationID	CollDate	SampYear	DistanceFromLeft	DUnit	Elev/Depth	EUnit	XSRemarkCode	Comments
226	3/13/2003	2003	32.25	ft	12.37	1/10 ft	Left Edge of Water	LEOW
226	3/13/2003	2003	16	ft	9.69	1/10 ft		
226	3/13/2003	2003	3	ft	3.78	1/10 ft	Right Monument	top of monument
226	3/13/2003	2003	6	ft	3.52	1/10 ft		
226	3/13/2003	2003	9	ft	3.47	1/10 ft		
226	3/13/2003	2003	11	ft	3.8	1/10 ft		
226	3/13/2003	2003	12	ft	4.36	1/10 ft	Right Top of Bank	RTOB
226	3/13/2003	2003	27	ft	12.65	1/10 ft		
226	3/13/2003	2003	15.25	ft	8.84	1/10 ft		
226	3/13/2003	2003	43	ft	5.77	1/10 ft		
226	3/13/2003	2003	16.5	ft	10.3	1/10 ft	Right Bankfull	RBF
226	3/13/2003	2003	17.5	ft	10.75	1/10 ft		
226	3/13/2003	2003	19	ft	11.4	1/10 ft		
226	3/13/2003	2003	20	ft	11.84	1/10 ft		
226	3/13/2003	2003	22	ft	12.37	1/10 ft		
226	3/13/2003	2003	24	ft	12.45	1/10 ft	Right Edge of Water	REOW
226	3/13/2003	2003	13	ft	4.73	1/10 ft		
226	3/13/2003	2003	46	ft	4.48	1/10 ft		
226	3/13/2003	2003	50	ft	3.07	1/10 ft		
226	3/13/2003	2003	52	ft	2.64	1/10 ft	Left Monument	LPIN (52 ft)
226	3/13/2003	2003	23	ft	12.15	1/10 ft		
226	3/13/2003	2003	40.5	ft	7.18	1/10 ft		
227	3/13/2003	2003	10.5	ft	5.74	1/10 ft	Right Top of Bank	RTOB(1)
227	3/13/2003	2003	14.75	ft	9.7	1/10 ft	Right Edge of Water	REOW
227	3/13/2003	2003	14	ft	9.27	1/10 ft		
227	3/13/2003	2003	13	ft	8.71	1/10 ft		
227	3/13/2003	2003	38	ft	5.72	1/10 ft		
227	3/13/2003	2003	12.1	ft	8.2	1/10 ft		RBF(2)
227	3/13/2003	2003	11	ft	5.88	1/10 ft		RTOB(2)
227	3/13/2003	2003	21	ft	10.16	1/10 ft		
227	3/13/2003	2003	9	ft	5.94	1/10 ft		
227	3/13/2003	2003	6.5	ft	6.04	1/10 ft		
227	3/13/2003	2003	3	ft	6.06	1/10 ft		
227	3/13/2003	2003	0	ft	6.31	1/10 ft	Bank Pin	ground@PIN
227	3/13/2003	2003	11.5	ft	6.52	1/10 ft	Right Bankfull	RBF(1)
227	3/13/2003	2003	17	ft	9.96	1/10 ft		

StationID	CollDate	SampYear	DistanceFromLeft	DUnit	Elev/Depth	EUnit	XSRemarkCode	Comments
227	3/13/2003	2003	20	ft	10.18	1/10 ft		
227	3/13/2003	2003	18	ft	10.06	1/10 ft		
227	3/13/2003	2003	22	ft	9.92	1/10 ft		
227	3/13/2003	2003	23	ft	9.77	1/10 ft	Left Edge of Water	LEOW
227	3/13/2003	2003	24	ft	9.51	1/10 ft		
227	3/13/2003	2003	25	ft	9.32	1/10 ft		
227	3/13/2003	2003	26	ft	9.02	1/10 ft		
227	3/13/2003	2003	27.16	ft	8.1	1/10 ft	Left Bankfull	LBF(1)
227	3/13/2003	2003	28	ft	7.15	1/10 ft		LBF(2)
227	3/13/2003	2003	29	ft	6.11	1/10 ft	Left Top of Bank	LTOB
227	3/13/2003	2003	30	ft	5.89	1/10 ft		
227	3/13/2003	2003	32	ft	5.68	1/10 ft		
227	3/13/2003	2003	35	ft	5.82	1/10 ft		
227	3/13/2003	2003	19	ft	10.11	1/10 ft		
227	3/13/2003	2003	15.5	ft	9.88	1/10 ft		
227	3/13/2003	2003	40	ft	5.62	1/10 ft	Left Monument	LPIN
228	3/12/2003	2003	18	ft	8.7	1/10 ft		
228	3/12/2003	2003	26	ft	9.91	1/10 ft		
228	3/12/2003	2003	25.25	ft	9.46	1/10 ft		
228	3/12/2003	2003	24.33	ft	9.46	1/10 ft		
228	3/12/2003	2003	22.83	ft	9.36	1/10 ft		
228	3/12/2003	2003	21	ft	9.24	1/10 ft		
228	3/12/2003	2003	10	ft	6.3	1/10 ft		
228	3/12/2003	2003	18.25	ft	9.11	1/10 ft	Right Edge of Water	REOW
228	3/12/2003	2003	17	ft	8.3	1/10 ft		
228	3/12/2003	2003	15.5	ft	8.07	1/10 ft		
228	3/12/2003	2003	14	ft	7.44	1/10 ft		
228	3/12/2003	2003	13	ft	7.8	1/10 ft		
228	3/12/2003	2003	12	ft	7.29	1/10 ft		
228	3/12/2003	2003	45	ft	4.63	1/10 ft		
228	3/12/2003	2003	19	ft	9.19	1/10 ft		
228	3/12/2003	2003	34.25	ft	7.87	1/10 ft		
228	3/12/2003	2003	46.5	ft	3.92	1/10 ft	Left Monument	BPIN
228	3/12/2003	2003	44	ft	5.12	1/10 ft		
228	3/12/2003	2003	43	ft	5.44	1/10 ft		
228	3/12/2003	2003	41	ft	5.36	1/10 ft		

StationID	CollDate	SampYear	DistanceFromLeft	DUnit	Elev/Depth	EUnit	XSRemarkCode	Comments
228	3/12/2003	2003	39.75	ft	6.51	1/10 ft	Left Bankfull	LBF rip rap
228	3/12/2003	2003	27	ft	10.02	1/10 ft	Thalweg	TH
228	3/12/2003	2003	37	ft	7.93	1/10 ft		
228	3/12/2003	2003	27.16	ft	9.01	1/10 ft		
228	3/12/2003	2003	33.5	ft	8.69	1/10 ft		
228	3/12/2003	2003	31.5	ft	8.92	1/10 ft		
228	3/12/2003	2003	30	ft	8.46	1/10 ft		
228	3/12/2003	2003	29	ft	9.04	1/10 ft	Left Edge of Water	LEOW
228	3/12/2003	2003	28.33	ft	9.4	1/10 ft		
228	3/12/2003	2003	8	ft	5.95	1/10 ft	Right Top of Bank	RTOB
228	3/12/2003	2003	38	ft	7.11	1/10 ft		
228	3/12/2003	2003	6	ft	5.69	1/10 ft		
228	3/12/2003	2003	3	ft	5.6	1/10 ft		
228	3/12/2003	2003	0	ft	5.57	1/10 ft	Bank Pin	ground @ PIN
228	3/12/2003	2003	11.5	ft	6.35	1/10 ft	Right Bankfull	RBF on rip rap
229	3/17/2003	2003	9	ft	5.66	1/10 ft		
229	3/17/2003	2003	17	ft	6.19	1/10 ft		
229	3/17/2003	2003	16	ft	6.4	1/10 ft		
229	3/17/2003	2003	15	ft	5.72	1/10 ft		
229	3/17/2003	2003	14	ft	5.85	1/10 ft		
229	3/17/2003	2003	13	ft	4.88	1/10 ft		
229	3/17/2003	2003	12	ft	6.08	1/10 ft		
229	3/17/2003	2003	10	ft	5.59	1/10 ft		
229	3/17/2003	2003	19	ft	6.41	1/10 ft		
229	3/17/2003	2003	8	ft	5.4	1/10 ft		
229	3/17/2003	2003	6	ft	4.79	1/10 ft		
229	3/17/2003	2003	3	ft	4.03	1/10 ft		
229	3/17/2003	2003	0	ft	3.39	1/10 ft	Bank Pin	ground@PIN and RBF
229	3/17/2003	2003	11.25	ft	5.82	1/10 ft	Right Edge of Water	REOW
229	3/17/2003	2003	27	ft	4.65	1/10 ft		
229	3/17/2003	2003	20	ft	6.66	1/10 ft	Thalweg	TH
229	3/17/2003	2003	21	ft	6.61	1/10 ft		
229	3/17/2003	2003	22	ft	6.33	1/10 ft		
229	3/17/2003	2003	23	ft	6.66	1/10 ft		
229	3/17/2003	2003	24.41	ft	6.12	1/10 ft	Left Edge of Water	LEOW
229	3/17/2003	2003	25	ft	5.16	1/10 ft		

StationID	CollDate	SampYear	DistanceFromLeft	DUnit	Elev/Depth	EUnit	XSRemarkCode	Comments
229	3/17/2003	2003	26	ft	5.06	1/10 ft		
229	3/17/2003	2003	31.5	ft	3.02	1/10 ft	Left Bankfull	LPIN, LBF
229	3/17/2003	2003	31	ft	3.05	1/10 ft		
229	3/17/2003	2003	30	ft	3.54	1/10 ft		
229	3/17/2003	2003	29	ft	4.35	1/10 ft		
229	3/17/2003	2003	28	ft	4.3	1/10 ft		
229	3/17/2003	2003	18	ft	5.9	1/10 ft		
230	3/12/2003	2003	18.58	ft	10.35	1/10 ft		
230	3/12/2003	2003	31.75	ft	8.36	1/10 ft		
230	3/12/2003	2003	16.66	ft	10.02	1/10 ft	Left Edge of Water	LEOW
230	3/12/2003	2003	26	ft	10.58	1/10 ft	Thalweg	TH
230	3/12/2003	2003	27	ft	10.38	1/10 ft		
230	3/12/2003	2003	28	ft	10.21	1/10 ft		
230	3/12/2003	2003	29.16	ft	9.95	1/10 ft	Right Edge of Water	REOW
230	3/12/2003	2003	24	ft	10.37	1/10 ft		
230	3/12/2003	2003	31	ft	9.06	1/10 ft		
230	3/12/2003	2003	23	ft	10.29	1/10 ft		
230	3/12/2003	2003	32.41	ft	7.32	1/10 ft	Right Bankfull	RBF
230	3/12/2003	2003	32.92	ft	5.36	1/10 ft		
230	3/12/2003	2003	34	ft	5.06	1/10 ft		
230	3/12/2003	2003	36	ft	4.63	1/10 ft		
230	3/12/2003	2003	38	ft	3.95	1/10 ft		
230	3/12/2003	2003	40	ft	3.75	1/10 ft	Right Monument	RPIN
230	3/12/2003	2003	30	ft	9.73	1/10 ft		
230	3/12/2003	2003	12	ft	8.53	1/10 ft		
230	3/12/2003	2003	3	ft	5.4	1/10 ft		
230	3/12/2003	2003	5	ft	5.57	1/10 ft	Left Top of Bank	LTOB
230	3/12/2003	2003	7.25	ft	6.28	1/10 ft		
230	3/12/2003	2003	8	ft	6.46	1/10 ft		
230	3/12/2003	2003	9	ft	6.83	1/10 ft	Left Bankfull	LBF
230	3/12/2003	2003	25	ft	10.57	1/10 ft		
230	3/12/2003	2003	11.16	ft	7.57	1/10 ft		
230	3/12/2003	2003	0	ft	5.29	1/10 ft	Bank Pin	ground@PIN
230	3/12/2003	2003	14	ft	9.32	1/10 ft		
230	3/12/2003	2003	15	ft	9.59	1/10 ft		
230	3/12/2003	2003	16	ft	9.76	1/10 ft		

StationID	CollDate	SampYear	DistanceFromLeft	DUnit	Elev/Depth	EUnit	XSRemarkCode	Comments
230	3/12/2003	2003	17.5	ft	10.18	1/10 ft		
230	3/12/2003	2003	20	ft	10.24	1/10 ft		
230	3/12/2003	2003	21	ft	10.17	1/10 ft		
230	3/12/2003	2003	22	ft	10.22	1/10 ft		
230	3/12/2003	2003	10	ft	7.21	1/10 ft		
241	3/4/2003	2003	9	ft	6.85	1/10 ft		
241	3/4/2003	2003	24	ft	6.66	1/10 ft		
241	3/4/2003	2003	44	ft	10.14	1/10 ft		hole
241	3/4/2003	2003	40	ft	9.79	1/10 ft		
241	3/4/2003	2003	38.8	ft	9.89	1/10 ft	Thalweg	TH
241	3/4/2003	2003	37	ft	9.66	1/10 ft		
241	3/4/2003	2003	33.9	ft	9.27	1/10 ft	Left Edge of Water	LEOW
241	3/4/2003	2003	32.2	ft	8.81	1/10 ft		
241	3/4/2003	2003	61.8	ft	4.54	1/10 ft	Right Monument	BPIN
241	3/4/2003	2003	27	ft	7.14	1/10 ft		
241	3/4/2003	2003	3	ft	4.85	1/10 ft		
241	3/4/2003	2003	21	ft	6.31	1/10 ft		
241	3/4/2003	2003	18	ft	6.54	1/10 ft		
241	3/4/2003	2003	15	ft	7.09	1/10 ft		
241	3/4/2003	2003	12	ft	7.11	1/10 ft		
241	3/4/2003	2003	6	ft	6.2	1/10 ft		
241	3/4/2003	2003	1	ft	4.09	1/10 ft	Bank Pin	ground@monument/LTOB
241	3/4/2003	2003	30	ft	7.87	1/10 ft		
241	3/4/2003	2003	52.9	ft	5.96	1/10 ft	Right Bankfull	RBF
241	3/4/2003	2003	54.8	ft	4.83	1/10 ft	Right Top of Bank	RTOB
241	3/4/2003	2003	50.3	ft	8.04	1/10 ft		
241	3/4/2003	2003	48.2	ft	9.21	1/10 ft	Right Edge of Water	REOW
242	3/5/2003	2003	18.5	ft	9.17	1/10 ft		
242	3/5/2003	2003	1	ft	4.63	1/10 ft	Bank Pin	ground@monument
242	3/5/2003	2003	4	ft	4.78	1/10 ft		
242	3/5/2003	2003	8	ft	5.88	1/10 ft	Right Top of Bank	RTOB
242	3/5/2003	2003	12	ft	7.53	1/10 ft		
242	3/5/2003	2003	14	ft	8.14	1/10 ft		
242	3/5/2003	2003	15	ft	9.06	1/10 ft	Right Edge of Water	REOW
242	3/5/2003	2003	16.3	ft	9.78	1/10 ft	Thalweg	TH
242	3/5/2003	2003	19.6	ft	9.02	1/10 ft	Left Edge of Water	LEOW

StationID	CollDate	SampYear	DistanceFromLeft	DUnit	Elev/Depth	EUnit	XSRemarkCode	Comments
242	3/5/2003	2003	21	ft	8.62	1/10 ft		
242	3/5/2003	2003	22	ft	8.33	1/10 ft		
242	3/5/2003	2003	24.5	ft	8.29	1/10 ft		
242	3/5/2003	2003	31	ft	4.17	1/10 ft	Left Top of Bank	LTOB
242	3/5/2003	2003	15.1	ft	9.58	1/10 ft		
242	3/5/2003	2003	28	ft	7.49	1/10 ft		
242	3/5/2003	2003	33	ft	4.22	1/10 ft		
242	3/5/2003	2003	38	ft	4.17	1/10 ft	Left Monument	LPIN
242	3/5/2003	2003	30.4	ft	5.77	1/10 ft	Left Bankfull	LBF
243	3/6/2003	2003	9	ft	5.32	1/10 ft		
243	3/6/2003	2003	4	ft	5.04	1/10 ft		
243	3/6/2003	2003	12.5	ft	5.76	1/10 ft	Left Top of Bank	LTOB
243	3/6/2003	2003	13.8	ft	6.56	1/10 ft	Left Bankfull	LBF
243	3/6/2003	2003	15.3	ft	7.69	1/10 ft	Left Edge of Water	LEOW
243	3/6/2003	2003	16.5	ft	8.35	1/10 ft		
243	3/6/2003	2003	19	ft	8.73	1/10 ft	Thalweg	TH
243	3/6/2003	2003	23.4	ft	8.26	1/10 ft		
243	3/6/2003	2003	23.5	ft	7.91	1/10 ft	Right Edge of Water	REOW
243	3/6/2003	2003	25.5	ft	5.95	1/10 ft	Right Bankfull	RBF
243	3/6/2003	2003	26.5	ft	4.61	1/10 ft	Right Top of Bank	RTOB
243	3/6/2003	2003	30	ft	4.19	1/10 ft		
243	3/6/2003	2003	33.8	ft	4.07	1/10 ft	Right Monument	RPIN
243	3/6/2003	2003	1	ft	4.05	1/10 ft	Bank Pin	ground@monument
243	3/6/2003	2003	22	ft	8.61	1/10 ft		
244	3/12/2003	2003	2	ft	5.04	1/10 ft	Bank Pin	ground@monument
244	3/12/2003	2003	14.4	ft	8.72	1/10 ft		
244	3/12/2003	2003	14.3	ft	8.58	1/10 ft	Left Edge of Water	LEOW
244	3/12/2003	2003	13	ft	7.6	1/10 ft		
244	3/12/2003	2003	18	ft	9.13	1/10 ft		
244	3/12/2003	2003	7	ft	4.74	1/10 ft		
244	3/12/2003	2003	41	ft	6.18	1/10 ft		
244	3/12/2003	2003	10	ft	6.11	1/10 ft	Left Bankfull	LTOB/LBF
244	3/12/2003	2003	22	ft	9.22	1/10 ft	Thalweg	TH
244	3/12/2003	2003	28	ft	9.02	1/10 ft		
244	3/12/2003	2003	34	ft	8.72	1/10 ft		
244	3/12/2003	2003	40	ft	7.25	1/10 ft		

StationID	CollDate	SampYear	DistanceFromLeft	DUnit	Elev/Depth	EUnit	XSRemarkCode	Comments
244	3/12/2003	2003	42	ft	4.85	1/10 ft		
244	3/12/2003	2003	45	ft	4.16	1/10 ft	Right Top of Bank	RTOB
244	3/12/2003	2003	47	ft	4.18	1/10 ft	Right Monument	RPIN
244	3/12/2003	2003	38.5	ft	8.55	1/10 ft	Right Edge of Water	REOW
245	3/4/2003	2003	37.8	ft	6.08	1/10 ft	Right Monument	RPIN
245	3/4/2003	2003	12	ft	8.12	1/10 ft		
245	3/4/2003	2003	6	ft	5.36	1/10 ft		
245	3/4/2003	2003	1	ft	4.65	1/10 ft	Bank Pin	ground@monument
245	3/4/2003	2003	35	ft	6.27	1/10 ft	Right Top of Bank	RTOB
245	3/4/2003	2003	9	ft	6.46	1/10 ft		
245	3/4/2003	2003	14	ft	9.49	1/10 ft		
245	3/4/2003	2003	15.6	ft	9.83	1/10 ft	Left Edge of Water	LEOW
245	3/4/2003	2003	17.7	ft	10.24	1/10 ft	Thalweg	TH
245	3/4/2003	2003	19.8	ft	9.65	1/10 ft	Right Edge of Water	REOW
245	3/4/2003	2003	22	ft	9.11	1/10 ft		
245	3/4/2003	2003	25	ft	9.74	1/10 ft		
245	3/4/2003	2003	28	ft	9.08	1/10 ft		
245	3/4/2003	2003	32	ft	7.47	1/10 ft		
245	3/4/2003	2003	7	ft	5.67	1/10 ft	Left Top of Bank	LTOB
247	3/7/2003	2003	35	ft	6.22	1/10 ft	Left Bankfull	LBF
247	3/7/2003	2003	7	ft	7.07	1/10 ft	Right Top of Bank	RTOB
247	3/7/2003	2003	6	ft	6.94	1/10 ft		
247	3/7/2003	2003	1	ft	6.6	1/10 ft	Bank Pin	ground@monument
247	3/7/2003	2003	8.4	ft	8.39	1/10 ft		
247	3/7/2003	2003	8.9	ft	8.69	1/10 ft	Right Edge of Water	REOW
247	3/7/2003	2003	14	ft	9.07	1/10 ft		
247	3/7/2003	2003	17.1	ft	9.28	1/10 ft	Thalweg	TH
247	3/7/2003	2003	24	ft	9.11	1/10 ft		
247	3/7/2003	2003	28	ft	9.15	1/10 ft		
247	3/7/2003	2003	31.2	ft	8.85	1/10 ft		
247	3/7/2003	2003	7.9	ft	7.3	1/10 ft		
247	3/7/2003	2003	33.2	ft	7.67	1/10 ft		
247	3/7/2003	2003	38.5	ft	4.66	1/10 ft	Left Monument	LPIN
247	3/7/2003	2003	31.3	ft	8.67	1/10 ft	Left Edge of Water	LEOW
248	3/7/2003	2003	14	ft	7.81	1/10 ft		
248	3/7/2003	2003	42.5	ft	7.06	1/10 ft		

StationID	CollDate	SampYear	DistanceFromLeft	DUnit	Elev/Depth	EUnit	XSRemarkCode	Comments
248	3/7/2003	2003	4.1	ft	6.32	1/10 ft		possible RBF - difficult to determine
248	3/7/2003	2003	11.5	ft	8.68	1/10 ft		
248	3/7/2003	2003	16.1	ft	9.26	1/10 ft	Right Edge of Water	REOW
248	3/7/2003	2003	37.5	ft	7.02	1/10 ft		
248	3/7/2003	2003	32	ft	7.93	1/10 ft		
248	3/7/2003	2003	26.8	ft	9.24	1/10 ft	Left Edge of Water	LEOW
248	3/7/2003	2003	23	ft	10.04	1/10 ft		
248	3/7/2003	2003	19.4	ft	10.18	1/10 ft	Thalweg	TH
248	3/7/2003	2003	8	ft	8.75	1/10 ft		
252	3/5/2003	2003	15	ft	9.19	1/10 ft		
252	3/5/2003	2003	19	ft	8.43	1/10 ft		
252	3/5/2003	2003	28	ft	7.17	1/10 ft	Right Monument	RPIN/RBF(?)
252	3/5/2003	2003	24	ft	7.28	1/10 ft		
252	3/5/2003	2003	21	ft	7.68	1/10 ft	Right Top of Bank	RTOB
252	3/5/2003	2003	16.5	ft	9.47	1/10 ft		
252	3/5/2003	2003	17.8	ft	9.15	1/10 ft	Right Edge of Water	REOW
252	3/5/2003	2003	12.7	ft	9.4	1/10 ft	Thalweg	TH
252	3/5/2003	2003	11.2	ft	9.21	1/10 ft		
252	3/5/2003	2003	1	ft	4.12	1/10 ft	Bank Pin	ground@monument
252	3/5/2003	2003	4	ft	4.51	1/10 ft		
252	3/5/2003	2003	11.1	ft	8.88	1/10 ft	Left Edge of Water	LEOW
252	3/5/2003	2003	7	ft	5.09	1/10 ft	Left Top of Bank	LTOB
252	3/5/2003	2003	9	ft	6.59	1/10 ft	Left Bankfull	LBF
253	3/5/2003	2003	14.2	ft	8.26	1/10 ft	Left Edge of Water	LEOW
253	3/5/2003	2003	25	ft	5.13	1/10 ft		
253	3/5/2003	2003	22	ft	5.33	1/10 ft		
253	3/5/2003	2003	21	ft	6.34	1/10 ft	Right Bankfull	RBF
253	3/5/2003	2003	20	ft	7.26	1/10 ft		
253	3/5/2003	2003	18.6	ft	8.31	1/10 ft	Right Edge of Water	REOW
253	3/5/2003	2003	17.5	ft	9.39	1/10 ft		
253	3/5/2003	2003	28	ft	4.98	1/10 ft	Right Monument	RPIN
253	3/5/2003	2003	14.3	ft	8.55	1/10 ft		
253	3/5/2003	2003	13	ft	7.91	1/10 ft		
253	3/5/2003	2003	10.2	ft	6.18	1/10 ft	Left Bankfull	LBF
253	3/5/2003	2003	9	ft	5.69	1/10 ft		
253	3/5/2003	2003	6	ft	4.73	1/10 ft	Left Top of Bank	LTOB

StationID	CollDate	SampYear	DistanceFromLeft	DUnit	Elev/Depth	EUnit	XSRemarkCode	Comments
253	3/5/2003	2003	4	ft	4.39	1/10 ft		
253	3/5/2003	2003	1	ft	4.19	1/10 ft	Bank Pin	ground@monument
253	3/5/2003	2003	16.7	ft	9.52	1/10 ft	Thalweg	TH
254	3/6/2003	2003	29.8	ft	10.16	1/10 ft	Thalweg	TH
254	3/6/2003	2003	16	ft	6.3	1/10 ft		
254	3/6/2003	2003	12	ft	4.83	1/10 ft	Left Top of Bank	LTOB
254	3/6/2003	2003	25	ft	9.52	1/10 ft		
254	3/6/2003	2003	17	ft	6.64	1/10 ft	Left Bankfull	LBF
254	3/6/2003	2003	32.1	ft	9.37	1/10 ft		
254	3/6/2003	2003	32.2	ft	8.77	1/10 ft	Right Edge of Water	REOW
254	3/6/2003	2003	33	ft	7.47	1/10 ft	Right Bankfull	RBF
254	3/6/2003	2003	34.2	ft	6.86	1/10 ft	Right Top of Bank	RTOB
254	3/6/2003	2003	38	ft	6.48	1/10 ft		
254	3/6/2003	2003	43.2	ft	6.67	1/10 ft		
254	3/6/2003	2003	20	7.ft	7.61	1/10 ft		
254	3/6/2003	2003	1	ft	4.41	1/10 ft	Bank Pin	ground@monument
254	3/6/2003	2003	21.7	ft	8.77	1/10 ft	Left Edge of Water	LEOW
254	3/6/2003	2003	6	ft	4.44	1/10 ft		

APPENDIX D: FIELD AUDIT REPORTS

29 October 2003

Memorandum

From: Dan Boward
Cc: Paul Kazyak
To: QC file; Ron Klauda
Subject: 2003 Spring Index Period QC audits with Tetra Tech field crew.

On 19 March 2003, I conducted field audits at two sites with Tetra Tech's Howard County crew (Kristen Pavlic and Colin Hill; Crew #2). Tetra Tech is using methods comparable to those of MBSS.

After a brief discussion with Kristen regarding the nature of their Howard County sampling program, we proceeded to the first site (Site 209) on a small (presumably first order) unnamed tributary to South Branch Patapsco River. The crew informed me that the single landowner who owns the land around the site and the access route had been contacted and that permission had been granted to access and sample the site.

I was pleased to see that Tetra Tech has reduced the impact on streamside trees by using small, permanent yellow plastic marking plates nailed (aluminum) to the tree. Previously, crews were removing a substantial amount of bark and spray painting the bare spot orange.

The crew took physico-chemical measurements (D.O., water temperature, pH, and conductivity) according to accepted protocols. I did not duplicate this effort. The crew records several parameters from the MBSS Spring Habitat Data Sheet and several from the Summer Habitat Data Sheet. Those not recorded include temperature logger location, QC label information, and fish sampling considerations (since they will not sample fish in the summer). The crew also records physical habitat data listed in the Rapid Bioassessment Protocol II Habitat Assessment Form, conducts pebble counts (10 counts per site/10 particles per count), measures stream cross section with a Spectra Precision Laser Level (also used for straight line distance). Most physical habitat data I recorded for the site was comparable to those recorded by the crew.

After the crew completed the physical habitat assessment and benthic sampling (comparable to MBSS methods), I collected a "replicate" benthic sample upstream of the Tetra Tech site. Results from this sample are pending from the DNR benthic lab. I also listed proportions of benthic habitats I would have sampled had I sampled within the Tetra Tech segment. My proportions were – 12 sq. ft. riffle, 5 sq. ft. rootwad/woody debris, 3 sq. ft. leaf pack, while the crew sampled less riffle and more rootwad/woody debris and leaf pack. I do, however, feel that the differences in habitats sampled will have little effect on benthic sample results.

Our second site (Site 184) was on an unnamed tributary to the Patuxent River. We had a little trouble finding the correct access road and there was some confusion around which landowners had been contacted for approval to access the site. A phone call to the Tetra Tech office cleared things up. Upon arrival at the site, we found that there was a fence traversing the sample segment. The landowner who owed the property upstream of the fence was not available to request permission to sample. Thus, new segment boundaries were established – the upstream boundary became the fence and just downstream of the segment was a road culvert. This adjustment could compromise the random nature of site selection, but I think the crew did a good job of adjusting to this unusual circumstance.

All procedures followed at Site 209 were repeated at this site and my most of my observations of physical habitat conditions were comparable to those measured by the crew. My estimates of benthic habitats to sample were also comparable to theirs. Unfortunately, I could not take a benthic sample at this site because I would have needed to do this downstream from the road culvert where landowner permission had not been acquired. In the future, it may be better to conduct field audits at sites that may not present such problems (e.g., one landowner with a large tract of land or sites on public property).

APPENDIX E: PHYSICAL HABITAT METRICS

StationID	CollDate	Order	Total Habitat Score	% Compared to Maximum	Narrative Category	Bank Stability (Left Bank)	Bank Stability (Right Bank)	Channel Alteration	Channel Flow Status	Embeddedness
201	3/17/2003	4	128	64	Partially Supporting	9	5	13	20	11
203	3/18/2003	2	138	69	Partially Supporting	4	2	20	16	13
205	3/5/2003	3	121	60.5	Partially Supporting	4	4	15	18	10
206	3/17/2003	1	95	47.5	Non Supporting	7	6	6	12	9
207	3/18/2003	1	138	69	Partially Supporting	6	4	20	14	12
208	3/18/2003	1	154	77	Supporting	6	6	20	15	14
209	3/19/2003	1	113	56.5	Non Supporting	4	3	18	11	11
210	3/5/2003	1	121	60.5	Partially Supporting	2	2	16	13	11
215	3/17/2003	1	108	54	Non Supporting	5	3	16	13	11
217	3/5/2003	2	124	62	Partially Supporting	4	4	18	14	11
221	3/14/2003	4	128	64	Partially Supporting	6	6	20	20	10
222	3/14/2003	1	134	67	Partially Supporting	5	5	19	13	11
223	3/14/2003	1	156	78	Supporting	7	7	20	15	14
224	3/13/2003	4	123	61.5	Partially Supporting	5	7	18	20	8
225	3/12/2003	1	136	68	Partially Supporting	5	6	16	13	14
226	3/13/2003	1	123	61.5	Partially Supporting	4	4	18	15	12
227	3/13/2003	1	134	67	Partially Supporting	5	7	18	14	14
228	3/12/2003	1	78	39	Non Supporting	9	9	4	10	7
229	3/17/2003	2	87	43.5	Non Supporting	10	10	5	13	6
230	3/12/2003	1	138	69	Partially Supporting	7	6	15	14	14
241	3/4/2003	1	143	71.5	Partially Supporting	6	4	18	17	12
242	3/5/2003	1	124	62	Partially Supporting	2	2	18	16	12
243	3/6/2003	1	132	66	Partially Supporting	4	4	18	17	13
244	3/12/2003	2	102	51	Non Supporting	5	3	13	15	11
245	3/4/2003	1	68	34	Non Supporting	9	9	2	5	18
247	3/7/2003	2	140	70	Partially Supporting	7	8	14	16	14
248	3/7/2003	2	122	61	Partially Supporting	3	3	18	13	11
252	3/5/2003	1	130	65	Partially Supporting	5	5	18	18	11
253	3/5/2003	1	134	67	Partially Supporting	8	8	14	17	11
254	3/6/2003	1	120	60	Partially Supporting	3	3	18	14	10
210QC	3/5/2003	1	127	63.5	Partially Supporting	4	3	16	13	13
227QC	3/13/2003	1	151	75.5	Supporting	8	8	18	14	14
242QC	3/5/2003	1	129	64.5	Partially Supporting	2	2	17	16	14

StationID	Epifaunal Substrate/ Available Cover	Frequency of Riffles (or bends)	Riparian Vegetative Zone Width (Left Bank)	Riparian Vegetative Zone Width (Right Bank)	Sediment Deposition	Vegetative Protection (Left Bank)	Vegetative Protection (Right Bank)	Velocity/ Depth Regime	Watershed Average	% Compared to Maximum	Standard Deviation
201	11	13	5	10	12	3	5	11			
203	14	16	10	10	14	4	2	13			
205	10	15	5	10	8	4	4	14			
206	9	11	8	8	8	2	2	7			
207	14	14	10	8	11	6	4	15			
208	15	18	10	10	14	6	5	15			
209	11	9	10	8	11	4	3	10			
210	13	14	9	10	12	2	2	15			
215	11	12	3	2	10	5	3	14			
217	13	7	9	8	12	4	4	16	124	62	16.81
221	13	6	10	9	10	6	6	6			
222	13	13	10	10	11	5	5	14			
223	16	17	10	10	13	6	6	15			
224	11	8	10	9	12	4	5	6			
225	15	15	8	9	11	4	5	15			
226	11	15	8	8	8	5	5	10			
227	14	16	8	8	10	5	5	10			
228	7	6	2	5	6	2	2	9			
229	9	13	0	0	6	1	1	13			
230	15	16	10	3	12	6	5	15	123.7	61.85	23.73
241	17	16	7	9	13	5	5	14			
242	15	18	5	3	13	2	2	16			
243	13	17	5	5	12	4	4	16			
244	10	15	3	2	7	5	4	9			
245	1	1	1	1	18	1	1	1			
247	15	17	5	3	15	7	7	12			
248	13	16	5	8	7	4	4	17			
252	15	18	4	4	12	3	3	14			
253	15	18	2	3	13	6	6	13			
254	11	16	9	6	8	3	3	16	121.5	60.75	22.10
210QC	13	16	10	10	13	3	3	10			
227QC	14	18	8	10	10	7	7	15			
242QC	16	18	7	3	14	2	2	16			

APPENDIX F: STATION LOCATIONS

StationID	Location	Latitude	Longitude
201	Approximately 270 m downhill into woods at back of Freedom Park	39.360028	-76.950417
203	~ 300m behind last house on Paulowina	39.361778	-77.083472
205	~ 300m DS of Hoods Mills Rd electrical station, along railroad tracks	39.354500	-77.007722
206	At culvert below Rt. 144 and I-70	39.356306	-77.140250
207	~ 200m from end of farm drive off River Road	39.351583	-76.940389
208	Approximately 80 m E along patch to woods from farm drive off River Road	39.354917	-76.933083
209	~ 200m through yard into woods off Day Road	39.340056	-76.979583
210	~ 350m into woods from 11680 Old Frederick Road	39.326944	-76.916472
215	17106 Frederick Road approximately 50 m DS of road	39.347556	-77.110778
217	~ 150m US from bridge on driveway @ 870 Marriotsville Road	39.346361	-76.902917
221	530 m N along RR tracks, stream 11	39.333944	-76.876194
222	Approx. 450 m into woods behind houses or park property off of Driver's Lane.	39.334194	-76.888278
223	Approx. 700 m into woods NNW from house at Woodstock Road	39.333167	-76.877722
224	Approx. 330 m down hill into woods behind	39.312056	-76.835056
225	culdesac at Divers approx. 390m (better access -see ADC)	39.310278	-76.853778
226	Approx. 250m into woods behind Greenhaven Court	39.309361	-76.846611
227	approx. 200 m downhill into woods behind Greenhaven Court	39.310528	-76.846417
228	off 2700 block of Rogers Avenue	39.292444	-76.818250
229	Approx. 50 m DS of bridge over stream at park n ride	39.267194	-76.799361
230	Into woods at 4700 block of Bonnie Branch Road	39.241667	-76.776972
241	Old Hollow Court	39.202750	-76.788083
242	Kara's Walk	39.201889	-76.753667
243	Capital Mobile Park	39.198833	-76.741889
244	State Highway Authority Lot	39.193833	-76.745028
245	Huntshire Road	39.192639	-76.772667
247	Scooters Restaurant	39.175167	-76.774556
248	DS of Scooter's Restaurant - walk SE along utility clearing	39.174861	-76.772194
252	SW of Avalon Drive	39.205556	-76.771167
253	End of Avalon Drive, walk south to stream	39.204889	-76.769361
254	Meadowridge Memorial Park	39.191861	-76.765833

APPENDIX G: WOLMAN PEBBLE COUNT

StationID	CollDate	Silt/Clay	Sand	HardPan Clay	Gravel	Cobble	Boulder	Bedrock
203	3/18/2003	21	11		56	11	1	
205	3/5/2003	12	16		25	47		
206	3/17/2003	7	7		19	9		58
207	3/18/2003	18	34		43	3	2	
208	3/18/2003	18	22		34	14	5	7
209	3/19/2003	45	18		25	10	2	
210	3/5/2003	20	57		17	5	1	
215	3/17/2003	39	9		35	16	1	
217	3/5/2003	3	42		39	15	1	
222	3/14/2003	22	46		23	9		
223	3/14/2003	10	42		19	13	6	10
225	3/12/2003	9	51		28	12		
226	3/13/2003	8	76		12	2	2	
227	3/13/2003	7	58		14	16	5	
228	3/12/2003		45			25		30
229	3/17/2003		40		5	55		
230	3/12/2003	9	26		44	18	3	
241	3/4/2003		22		42	31	4	1
242	3/5/2003		33	2	46	13		6
243	3/6/2003	5	32		57	6		
244	3/12/2003	1	27	3	49	20		
245	3/4/2003	1	4			15		80
247	3/7/2003		35		44	21		
248	3/7/2003		47	3	43	6	1	
252	3/5/2003	1	34		62	3		
253	3/5/2003		57		34	7	2	
254	3/6/2003	4	63		24	9		

APPENDIX H: WATER CHEMISTRY

StationID	Order	CollDate	Conductivity	Dissolved Oxygen	pH	Water Temperature
201	4	3/17/2003	199	11.82	7.83	10.16
203	2	3/18/2003	296	11.26	7.36	12.47
205	3	3/5/2003	282	12.32	7.55	6.42
206	1	3/17/2003	167	11.17	6.98	10.37
207	1	3/18/2003	191	11.97	7.24	9.14
208	1	3/18/2003	110	12.03	7.36	7.54
209	1	3/19/2003	152	10.96	6.87	7.78
210	1	3/5/2003	119	12.38	7.08	2.69
210QC	1	3/5/2003	162	12.38	7.08	3.59
215	1	3/17/2003	125	12.41	6.94	10.17
217	2	3/5/2003	265	11.46	7.91	8.7
221	4	3/14/2003	208	13.64	7.8	6.37
222	1	3/14/2003	144	13.55	6.92	2.3
223	1	3/14/2003	173	12.67	7.18	6.71
224	4	3/13/2003	218	13.05	7.75	6.95
225	1	3/12/2003	50	13.87	7.6	2.73
226	1	3/13/2003	339	12.64	7.59	6.68
227	1	3/13/2003	337	12.99	7.6	4.82
227QC	1	3/13/2003	337	12.99	7.6	4.82
228	1	3/12/2003	988	13.22	7.42	6.71
229	2	3/17/2003	760	11.89	7.97	8.63
230	1	3/12/2003	353	13.09	8	7.43
241	1	3/4/2003	513	12.52	8.16	4.52
242	1	3/5/2003	232	10.8	8.04	2.83
242QC	1	3/5/2003	284	11.09	8.06	3.26
243	1	3/6/2003	276	11.62	7.8	2.9
244	2	3/12/2003	283	11.21	8.25	2.84
245	1	3/4/2003	408	12.42	7.98	5
247	2	3/7/2003	357	9.4	7.97	1.2
248	2	3/7/2003	345	25.7	8.25	0.66
252	1	3/5/2003	103.9	12.04	7.87	3.43
253	1	3/5/2003	107.4	12.13	8.09	4.45
254	1	3/6/2003	375	11.64	7.77	3.21