Pyrethroid

An Assessment of Benthic Communities with Concurrent Physical Habitat, Pyrethroid, and Metals Analysis in an Urban and Residential Stream in California in 2006 and 2007

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1.0 EXECUTIVE SUMMARY

This study was designed to characterize benthic communities (macroinvertebrates) and physical habitat in both an urban (Kirker Creek) and residential (Pleasant Grove Creek) water body in California in late spring of 2006 and 2007. Concurrent water quality evaluations, physical sediment parameters, pyrethroids, and bulk metals {including simultaneously extracted metals (SEM) and acid volatile sulfides (AVS) ratios} were also measured during both years of this study. Polycyclic aromatic hydrocarbons (PAHs) were evaluated at all study sites in 2006. The relationship of various benthic metrics to physical habitat metrics, pyrethroids, and metals was evaluated for each stream with both years combined as well as both years and both streams combined to increase the statistical power for determining significant relationships.

Based on 10 instream and riparian physical habitat metrics, total physical habitat scores in Kirker Creek ranged from 35 to 113 in 2006 (maximum possible total score is 200). Most habitat metrics were highly variable among Kirker Creek sites. Channel alteration and frequency of bends/riffles metric scores were generally lower at the downstream sites. Pleasant Grove Creek total habitat scores ranged from 40 to 127. Most habitat metrics were variable and spatial trends were lacking in Pleasant Grove Creek. In general, total physical habitat scores in both streams were considered to be both poor and similar in 2006.

Total physical habitat scores in Kirker Creek ranged from 38 to 89 in 2007 based on 10 instream and riparian physical habitat metrics. As reported for 2006, most habitat metrics were highly variable among Kirker Creek sites. Channel alteration and frequency of bends/riffles metric scores were generally lower at the downstream sites. Pleasant Grove Creek total habitat scores ranged from 55 to 140. Most habitat metrics were variable and spatial trends were lacking in Pleasant Grove Creek. In general, total physical habitat scores in both streams were considered to be poor in 2007 but the total score was higher in Pleasant Grove Creek.

Approximately 12,000 individual macroinvertebrates were picked and identified from 110 taxa collected from 14 Kirker Creek sites in 2006. The five most abundant taxa – *Cyprididae* (seed shrimp), *Physa sp* (snails). *Micropsectra sp*. (Chironomids), *Tubificidae* (Oligochaetes) and *Simulium sp* (Black flies), - comprised ~ 67% of the total individuals collected. These five taxa are generally considered tolerant to moderately tolerant of environmental stressors based on their response to eutrophication and pollution from wastewater treatment plants. Approximately 18,000 individual macroinvertebrates were picked and identified from 142 taxa collected from 21 sites in Pleasant Grove Creek in 2006. The following taxa comprised ~ 56% of the total number of individuals collected: *Micropsectra* (Chironomids), *Tubificidae* unidentified immatures (Oligochaetes), *Paratanytarsus sp*. (Chironomids), *Physa sp*. (snails) and *Nais communis/variabilis* (Oligochaetes). As reported above for Kirker Creek, all of these taxa are generally tolerant of environmental degradation.

Approximately 9,500 individual macroinvertebrates were picked and identified from 114 taxa collected from 14 Kirker Creek sites in 2007. The five most abundant taxa – *Cyprididae* (seed shrimp), *Physa sp* (snails), Tubificidae (Oligochaetes), *Chironomus sp*. (Chironomidae) and *Hyalella sp.* (amphipods) - comprised ~ 68% of the total individuals collected. These five taxa are generally considered tolerant to moderately tolerant of environmental stressors. The one exception is *Hyalella sp*. as this species is extremely sensitive to pyrethroid insecticides. Approximately 18,000 individual macroinvertebrates were picked and identified from 145 taxa collected from 21 sites in Pleasant Grove Creek in 2007. The following taxa comprised ~ 40% of the total number of individuals collected: *Tubificidae* unidentified immatures (Oligochaetes), *Physa sp*. (snails), *Hyalella sp*. (amphipods), *Dugestia tigrina* (Planaridae), *Dero digitata* (Naididae), and *Dicrotendipes sp.* (Chironomidae). All of these taxa are generally tolerant of environmental degradation. It is also noteworthy that the third most dominant species *Hyalella sp*. is extremely sensitive to pyrethroids as mentioned above for Kirker Creek.

Highest concentrations of pyrethroids (1% TOC normalized) in descending order from sediment samples in Kirker Creek were reported for Bifenthrin, Permethrin, Deltamethrin, Cyfluthrin, Cypermethrin, Lambda-cyhalothrin, Esfenvalerate and Fenpropathrin in 2006. In Pleasant Grove Creek, highest concentrations of pyrethroids (1% TOC normalized) in descending order were as follows: Bifenthrin, Permethrin, Cyfluthrin, Cypermethrin, Deltamethrin, Lambda-cyhalothrin, Esfenvalerate, and Fenpropathrin. Station mean concentrations of all 8 pyrethroids were generally higher in Pleasant Grove Creek than Kirker Creek. A ranking of total Toxic Units (TUs) across both streams also showed that the top 6 sites (highest TUs) were all reported in Pleasant Grove Creek. The TU approach was based on toxicity data generated with one of the most sensitive species to pyrethroids (*Hyalella azteca*). It is noteable that the depositional areas sampled for chemical analysis represent the areas that typically accumulate the greatest concentrations of hydrophobic pesticides, while the best available habitat for benthos were generally non-depositional areas. These non-depositional areas generally provide preferred habitat for *Hyalella* and other benthic macroinvertebrates rather than the depositional areas.

For 2007, highest concentrations of pyrethroids (1% TOC normalized) in descending order from sediment samples in Kirker Creek were reported for Bifenthrin, Cyfluthrin, Permethrin, Deltamethrin, Cypermethrin, Lambda-cyhalothrin, Esfenvalerate and Fenpropathrin. For Pleasant Grove Creek, highest concentrations of pyrethroids (1% TOC normalized) in descending order were as follows: Bifenthrin, Permethrin, Cyfluthrin, Deltamethrin, Cypermethrin, Lambda-cyhalothrin, Esfenvalerate, and Fenpropathrin. As reported above for 2006, station mean concentrations of all 8 pyrethroids were generally higher in Pleasant Grove Creek than Kirker Creek. A ranking of total Toxic Units (TUs) across both streams also showed that 5 of the top 6 sites (highest TUs) were all reported in Pleasant Grove Creek in 2007.

Threshold Effect Levels (TELs) were exceeded for at least one metal in all Kirker Creek sites and approximately one third of the sites in Pleasant Grove Creek in 2006. TELs are very conservative protective biological benchmarks. The SEM/AVS data for 2006 suggests that for at least nine of the fourteen sites in Kirker Creek ratios are greater than one; therefore, metals exceeding TELs are bioavailable and potentially toxic. The SEM/AVS data suggests that for at least 13 of the 21 sites in Pleasant Grove Creek ratios are greater than one. For seven of these sites, bulk metal TELs are exceeded therefore, metals are bioavailable and potentially toxic at these sites. Metals appear to be more of a toxicity issue based on TEL exceedences in Kirker Creek in 2006 than Pleasant Grove Creek.

For 2007, TELs were exceeded for at least one metal in 11 of 14 Kirker Creek sites and approximately one fourth of the sites in Pleasant Grove Creek. TELs are very conservative protective biological benchmarks. The SEM/AVS data suggests that for at least two of the fourteen sites in Kirker Creek ratios are greater than one; therefore, metals exceeding TELs are bioavailable and potentially toxic. The SEM/AVS data suggests that for at least 12 of the 21 sites in Pleasant Grove Creek ratios are greater than one. For four of these sites, bulk metal TELs are exceeded therefore, metals are bioavailable and potentially toxic at these sites.

Results of stepwise multiple linear regressions of 2006 and 2007 data combined by creek, for both Kirker Creek and Pleasant Grove Creek, showed: (1) both habitat metrics and metals have stronger statistical relationships with benthic metrics than pyrethroids in Kirker Creek and (2) habitat metrics (primarily velocity depth regimes) dominated in their effects on benthic metrics in Pleasant Grove Creek. In the stepwise regression models that included all environmental metrics for 2006 and 2007 for both creeks combined, the habitat metrics (primarily velocity depth regimes) tended to dominate the significant relationships with benthic metrics. In combination with habitat metrics, a few metals (i.e., arsenic and nickel) were also observed to display significant but moderately small relationships to benthic metrics. A significant result from this stepwise regression analysis combining data for two years across both creeks is that when habitat metrics and to a lesser degree metals are considered in the statistical models pyrethroids do not display any significant relationships to the benthic metrics. In summary, it is apparent from this analysis that the health of benthic communities in both creeks is largely affected by habitat metrics.

2.0 INTRODUCTION

Impacts from urbanization can degrade aquatic ecosystems by altering one or more of the following principal groups of attributes: water or sediment quality; habitat structure; flow regime; energy source (food); and biotic interactions (Karr and Chu, 1999). Rhoades (1995) has reported that urbanization specifically leads to fundamental changes in the hydrologic, hydraulic, erosional, and depositional characteristics of fluvial systems causing increased channel instability. In the western United States, urbanization was reported to produce lower Index of Biotic Integrity (IBI) scores than activities such as logging and larger cities were reported to have lower IBI scores than smaller cities (Kleindl, 1995; Fore *et al.*, 1996; Patterson, 1996; and Karr, 1998). Expanded population growth in many urban and residential areas in states such as California is therefore a potential stressor to aquatic ecosystems that merits an investigation of multiple stressors that can exist.

Bioassessment, a quantitative survey of physical habitat and biological communities of a water body, is a well established approach for determining the ecological condition of stream and river systems (Yoder and Rankin, 1995; Karr and Chu, 1999; Barbour *et al.*, 1996; Wright *et al.*, 2000; Bailey *et al.*, 2004). Assessments of benthic invertebrate assemblages and physical habitat (bioassessments) have been conducted in wadeable streams in California's Central Valley for a number of years (Bacey, 2005; Brown and May, 2004; Hall and Killen, 2001; Hall and Killen, 2002; Hall and Killen, 2003; Hall and Killen, 2004; Hall and Killen, 2005a; Hall and Killen, 2005b; Jim Harrington, California Department of Fish and Game, personal communication; Tetra Tech, 2003). Recently a reference site expert panel was formed to develop a network of reference sites in California that can be used to interpret bioassessment data in the context of impairment (Peter Ode, personal communication, California Department of Fish and Game). To date most of the bioassessments conducted in California have been in rural areas with minimal data available for urban streams (Hall and Killen, 2001; Bacey and Spurlock, 2007; Peter Ode, California Department of Fish and Game, personal communication). Bioassessments provide a useful approach for integrating effects from physical, chemical, and biological stressors on aquatic organisms. The underpinnings of bioassessments are that the structure and function of an aquatic biological community can provide critical information about the quality of the surface water. Bioassessments are extremely valuable for determining the status of aquatic biological communities across large spatial scales and land use types (agricultural and urban). Information on the status of resident biological communities is particularly useful for determining impaired water bodies, developing Total Maximum Daily Loads (TMDLs), and measuring success of voluntary or regulatory actions. Bioassessments serve monitoring needs through three primary functions: (1) screening or initial assessment of conditions; (2) characterization of impairment and diagnosis; and (3) trend monitoring to evaluate improvements from mitigation practices or further degradation. In addition, bioassessments also provide a direct means of measuring compliance with the goal of biotic integrity stipulated under the Clean Water Act because assemblages of aquatic organisms (i.e., macroinvertebrates) are comprised of taxa that are differentially responsive to different environmental stressors.

In recent years, pyrethroid pesticides - replacements for the organophosphate pesticides that are used for structural pest control, landscape maintenance and residential home and garden use - have been identified at toxic concentrations in both an urban (Kirker Creek) and residential (Pleasant Grove Creek) stream in California (Weston *et al.*, 2005a; Weston *et al.*, 2005b; Amweg *et al.*, 2006). The toxicity assessment of pyrethroids in these two streams was based on sediment toxicity test results with a single species, the amphipod *Hyalella azteca*. Uncertainty exists when using only one species as a benthic barometer for suggesting impairment of ecosystem health. Bioassessments that include assessing the entire benthic assemblage in concert with physical habitat assessments, as described above, are a preferred approach for determining the ecological status of these streams. In addition, the assumption that pyrethroids are the only stressor in urban waterbodies is also questionable as other investigators have reported that chemical stressors such as metals (Crunkilton *et al.* 1997; Pettigrove and Hoffman, 2003a) and polycyclic aromatic hydrocarbons (PAHs) (Pettigrove and Hoffman, 2003b) may also be present at concentrations that are potentially toxic to aquatic life.

The primary goal of this study was to characterize benthic communities (bioassessments) and physical habitat in Kirker Creek and Pleasant Grove Creek in California in the spring of 2006 and 2007. Basic water quality parameters, eight specific pyrethroids, Total Organic Carbon (TOC), grain size, and bulk metals {including simultaneously extracted metals (SEM) and acid volatile sulfides (AVS)} were also evaluated in sediment at each stream site in concert with the bioassessments for both years. PAHs were evaluated at both streams sites in 2006. The relationship between various benthic community metrics (i.e., species richness, abundance) and physical habitat metrics, pyrethroids, and metals were evaluated for combined years by stream as well as both years and both streams. Benthic community data was interpreted in the context of biological expectations for these urban/residential streams.

3.0 MATERIALS AND METHODS

3.1 Site Selection

A total of 14 sites covering approximately 6 miles were sampled in Kirker Creek in the late spring of 2006 and 2007 (Figure 1). Sample site coordinates are listed in Tables 1 and 2 for each year. Kirker Creek was previously sampled for pyrethroids in 2004 (Amweg *et al.*, 2006). The Kirker Creek watershed encompasses residential, commercial and industrial areas of Pittsburg, California.

A total of 21 sites were sampled in Pleasant Grove Creek and its tributaries (South Branch and Kaseberg Creek) in late spring of 2006 and 2007 (Figure 2; see Tables 1 and 2 for site coordinates). Pleasant Grove Creek, located in Roseville, California, is characterized by numerous contiguous subdivisions of single family homes which are less than 10 years old. There is no industry in the area and sparse commercial development and agriculture. The distance from the upstream to downstream site was approximately 12 miles in the mainstem of Pleasant Grove Creek. The distance from the upstream to downstream site in South Branch was approximately 5 miles while the distance from the upstream to downstream site in Kaseberg Creek was approximately 6 miles. The 21 sites sampled in Pleasant Grove

Creek were the same sites sampled by Weston et al 2005a during their pyrethroid study in 2004.

3.2 Physical Habitat Assessments

Physical habitat was evaluated at each site concurrently with benthic collections, water quality evaluations, sediment parameters, pyrethroids, and metals. The physical habitat evaluation methods followed protocols described in Harrington and Born (2000). The physical habitat metrics used for this study are based on nationally standardized protocols described in Barbour *et al.* (1999). A total of 10 continuous metrics scored on a 0-20 scale were evaluated (Appendix 1). Other non-continuous metrics including percent canopy, percent gradient, and substrate composition that were also measured are described in Appendix 1.

3.3 Benthic Macroinvertebrate Sampling

Benthic macroinvertebrates were collected in the late spring of 2006 and 2007 from three replicate samples at all sample sites in the two streams. The sampling procedures were conducted in accordance with methods described in Harrington and Born (2000). Within each of these sample reaches, a riffle was located (if possible) for the collection of benthic macroinvertebrates. Only Kirker Creek site 10 and Pleasant Grove Creek sites 2 and 5 were sampled using the riffle method (see non-riffle method described below). A tape measure was placed along the riffle and potential sampling transects were located at each meter interval of the tape. Using a random numbers table, three transects were randomly selected for sampling from among those available within the riffle. Benthic samples were taken using a standard D-net with 0.5 mm mesh starting with the most downstream portion of the riffle. A 1x2 foot section of the riffle immediately upstream of the net was disturbed to a depth of 4-6 inches to dislodge and collect the benthic macroinvertebrates. Large rocks and woody debris were scrubbed and leaves were examined to dislodge organisms clinging to these substrates. Within each of the randomly chosen transects, three replicate samples were collected to reflect the structure and complexity of the habitat within the transect. If habitat complexity was lacking, samples were taken near the side margins and thalweg of the transect and the procedures described above were followed. All samples were preserved with 95% ethanol.

Due to the physical nature of these urban/residential streams, it was often difficult to locate a substantial number of riffles to sample. In numerous cases, there was only a single section of riffle available within a selected reach to sample and in most instances there were no riffles present. In cases where riffles were lacking, alternative sampling methods for non-riffle areas were used as outlined in Harrington and Born (2000). All sites except KC 10 and PGC 2 and 5 were sampled using the non-riffle method. This involved sampling the best available 1x2 foot sections of habitat throughout the reach using the same procedures described above. Nine 1x2 foot sections were randomly selected for sampling. Groups of three 1x2 foot sections were composited for each replicate for a total of three replicates per site.

3.4 Taxonomy of Benthic Macroinvertebrates

The goal of this study was to identify all benthic samples to the species level if possible. Species level identifications will be particularly useful when Indices of Biotic Integrity (IBIs) are developed for wadeable streams in California. For taxa such as oligochaetes and chironomids, family and genus level, respectively, were often the lowest level of identification possible.

The benthic macroinvertebrate subsampling (resulting in a maximum of 300 individuals) and identifications were supervised by Angie Montalvo of California's Department of Fish and Game (CDFG) in Rancho Cordova, California. The benthic macroinvertebrate samples were subsampled and sorted by personnel at the CDFG Laboratory located at Chico State University. Level 3 identifications (species level identifications) followed protocols outlined in Harrington and Born (2000). Mr. Dan Pickard of CDFG conducted the taxonomic identifications. Slide preparations and mounting for species such as midges and oligochaetes followed protocols from the United States Geological Survey National Quality Control Laboratory described in Moulton *et al.* 2000.

3.5 Water Quality and Sediment Measurements

The following water quality parameters were measured at each stream site in both years using procedures described in Kazyak (1997): temperature, pH, salinity, specific conductivity, dissolved oxygen, and turbidity (Tables 1 and 2).

Grain size (Plumb, 1981) and TOC (U. S. EPA, 2004) were measured on sediment samples collected at each site. Depositional areas - areas most likely to contain hydrophobic pesticides such as pyrethroids - were specifically sampled at each site and three to five sediment samples from depositional areas were composited for the final sample. A stainless steel spoon (similar to a scoop) was used to collect the top 2-3 cm of sediment from each site. Approximately one liter of sediment was collected from each site for grain size and TOC (as well as pyrethroids, metals and PAHs in 2006). All sampling equipment was cleaned between sites using nitric acid, ethanol and distilled water. Sediment samples were stored in a cooler on ice in the field and later transferred to a refrigerator before shipment to the Applied Marine Sciences Laboratory in League City, Texas for grain size and TOC analysis.

3.6 Pyrethroid Analysis

Bifenthrin, Cypermethrin, Cyfluthrin, Deltamethrin, Esfenvalerate, Fenpropathrin, Lambda-cyhalothrin and Permethrin residues were extracted from sediment by shaking with methanol/water mixture and hexane for one hour. The sample was centrifuged and an aliquot of the upper hexane layer evaporated to dryness and re-dissolved in a small volume of hexane. The hexane sample was then subjected to a silica solid phase extraction (SPE) procedure prior to residue determination by gas chromatography with mass selective detection using negative ion chemical ionisation (GC-MS/NICI). The limit of quantitation of the method was 0.1 ng/g wet weight for Bifenthrin, Cypermethrin, Cyfluthrin, Deltamethrin, Esfenvalerate, Fenpropathrin, Lambda-cyhalothrin and 1.0 ng/g wet weight for Permethrin (see Robinson, 2005 for details).

3.7 Bulk Metals and SEM/AVS Analysis

The following bulk metals with existing Threshold Effects Levels (TELs), conservative protective benchmarks, as described by Buchman (1999) were measured on composited sediment samples for each site as previously described using EPA method 6020m: arsenic (As), cadmium (Cd), chromium (Cr), copper (Cu), lead (Pb), nickel (Ni) and zinc (Zn). The method detection limit (MDL) for these 7 metals was 0.025 ug/g dry weight. Mercury (Hg) was also measured on all sediment samples using EPA method 245.7m. The MDL for mercury was 0.01 ug/g dry weight.

Simultaneously extracted metals (SEM) analysis was conducted on Ni, Cu, Zn, Cd, Pb, and Hg using EPA method 200.8m. The MDLs (umol/dry g) for these SEMs were as follows: Ni (0.0033), Cu (0.0062), Zn (0.0015), Cd (0.0018), Pb (0.0002) and Hg (0.00005). Acid volatile sulfides (AVS) were evaluated on sediment samples from each site using procedures described by Plumb (1981). SEM/AVS ratios were then developed for each site to provide insight on the bioavailability of these metals in sediment. The principle of SEM/AVS is based on the observation that there are some components in sediment that bind certain metals such that they are no longer available and therefore not toxic to benthic organisms (DiToro *et al.* 1990, 1992). Sulfides in sediments have the ability to bind with divalent metals such as cadmium, copper, lead, mercury, nickel and zinc and may render these metals unavailable to the extent sulfides are available. Sediments from the study sites were therefore analyzed for the amount of SEM and for the amount of freely available divalent metals as simultaneously extractable metals (SEM). Assuming that sulfides would bind with metals on a 1:1 molar basis, dividing SEM by the amount of AVS would suggest that these metals are available when the ratio is greater than 1.

3.8 PAH Analysis

Sediment samples collected in 2006 were analyzed for the following PAHs by GCMS using EPA method 8270Cm: Acenaphthene (AE), Acenaphthylene (AY), Anthracene (AO), Benz(a)anthracene (BAO), Benzo(a)pyrene (BAP), Chrysene (CO), Dibenz(a,h)anthracene (DA), Fluoranthene (FLO), Fluorene (FO), 2-Methylnaphthalene (2MN), Naphthalene (NO), Phenanthrene (PO), Pyrene (PYO) and Total Detectable PAHs (TPAH). The MDL and reporting limits (RLs) were 1 and 5, ng/g dry weight, respectively. All of the above PAHs have saltwater TELs as described by Buchman (1999). Saltwater TELs were used for assessing possible ecological risk because there are no thresholds available for freshwater and salinity does not significantly affect the toxicity of PAHs (Jerry Neff, personal communication). PAH analysis was not conducted on sediment samples collected in 2007.

3.9 Statistical Analysis

Principal components analysis (PCA) was used to determine the relationship among the various physical habitat and benthic metrics to identify groups of metrics that covary. The

Wilcoxon Rank-Sum Test and Kruskal-Wallis test were used to compare habitat and benthic metrics between the two streams.

Data for the key 14 benthic metrics were averaged across the three transects that were sampled for each site in Kirker Creek and Pleasant Grove Creek. These data were merged with data sets of pyrethroid concentrations, habitat metrics, and metals (bulk metal concentration in sediment to TEL ratio) for each site. The sediment concentration data for each pyrethroid were converted to toxicity units by standardizing them to 1% TOC and dividing by *Hyalella* LC50 values that were also standardized to 1% TOC (Erin Amweg, University of California at Berkeley, personal communication). A variable called "total toxicity units" was created by summing all of the toxicity units for pyrethroids at any given site.

The potential associations between the benthic metrics and the toxicity units for each pyrethroid were explored by a series of regression techniques. Prior to analysis, all data were unit deviate standardized for each creek to place all dependent and independent variables on the same relative scales, as well as to produce more normal distributions. Univariate general linear model (GLM) regressions were conducted for each creek with the 2006 and 2007 data combined to determine whether there were indications of significant relationships (α=0.01) between benthic metrics and specific pyrethroids.

A series of stepwise multiple regressions were conducted on the data to determine potential relationships between the benthic metrics and pyrethroids (in toxicity units), habitat metrics, and metals (bulk metal to TEL ratio). Stepwise regressions were run separately for each of these three groups of independent variables, as well as with all variables combined into the same model. Analysis was conducted on the data from the 2006 and 2007 collections combined by stream; and the data from both 2006 and 2007 collections combined across the two streams in order to have adequate sample sizes for statistically meaningful relationships. Combining data from both streams and both years is appropriate because the habitat and geographic strata is similar for the two streams.

4.0 RESULTS AND DISCUSSION

4.1 Physical Habitat

4.1.1 2006 Kirker Creek

Based on 10 instream and riparian physical habitat metrics in Table 3, total physical habitat scores in Kirker Creek ranged from 35 to 113 in 2006 (maximum possible total score is 200). Lower total physical habitat scores generally occurred at the downstream sites. Most habitat metrics were highly variable among Kirker Creek sites. Channel alteration and frequency of bends/riffles metric scores were generally lower at the downstream sites.

Other descriptive physical habitat metrics that were not scored on a 0-20 scale are presented in Table 4. These metrics are not scored on a 0-20 scale because some are bimodal (too much or too little canopy can be advantageous) and others are just descriptive. Mean flow ranged from 0.01 to 0.19 m/s for sites where flow measurements could be made. Percent canopy ranged from 0 to 99%. Gradient was consistent at all sites (1%) except upstream site KC14 (3%). The % fines ranged from 10 to 100%.

4.1.2 2007 Kirker Creek

Based on 10 instream and riparian physical habitat metrics in Table 5, total physical habitat scores in Kirker Creek ranged from 38 to 89 in 2007. Lower total physical habitat scores generally occurred at the downstream sites. Most habitat metrics were highly variable among Kirker Creek sites. Channel alteration and frequency of bends/riffles metric scores were generally lower at the downstream sites.

Other descriptive physical habitat metrics evaluated in 2007 that were not scored on a 0-20 scale are presented in Table 6. Mean flow ranged from 0.01 to 0.04 m/s for sites where flow measurements could be made. Percent canopy ranged from 0 to 97%. Gradient was consistent at all sites (1%) except upstream site KC14 (3%). The % fines ranged from 20 to 100%.

4.1.3 2006 Pleasant Grove Creek

Pleasant Grove Creek total habitat scores ranged from 55 to 140 in 2007. Most habitat metrics were variable among the creek sites (Table 5). Spatial trends in physical habitat metrics were not reported in Pleasant Grove Creek.

Descriptive physical habitat metrics in Table 6 showed the following for all sites: (1) mean flow ranged from 0.01 to 0.44 m/s for sites where flow measurements could be made; (2) % canopy ranged from 0 to 91%; (3) % gradient ranged from 1 to 2%; and (4) % fines ranged from 0 to 100%.

4.1.4 2007 Pleasant Grove Creek

Pleasant Grove Creek total habitat scores ranged from 55 to 140 in 2007. Most habitat metrics were variable among the creek sites (Table 5). Spatial trends in physical habitat metrics were not reported in Pleasant Grove Creek.

Descriptive physical habitat metrics in Table 6 showed the following for all sites: (1) mean flow ranged from 0.01 to 0.44 m/s for sites where flow measurements could be made; (2) % canopy ranged from 0 to 91%; (3) % gradient ranged from 1 to 2 %; and (4) % fines ranged from 0 to 100%.

4.1.5 2006 Summary Statistical Analysis for Both Creeks

Principal Components Analysis (PCA) was used to determine the relationship among habitat metrics and identify metrics that covary (i.e., increase or decrease together) based on 2006 sampling. The 10 habitat metrics that were scored on a 0 to 20 scale had two eigenvalues that were greater than 1 (Table 7). The significance of this finding is that 10 habitat metrics contain two important factors which explained 57% of the variance in the data set. The metrics important to each factor are presented in Table 8. Velocity/depth/diversity, bend/riffle frequency, channel alteration, epifaunal substrate, bank vegetation and channel flow were heavily loaded on factor 1. Factor 2 is comprised of riparian buffer, sediment deposition, embeddedness and bank stability. Metrics loaded on both Factors 1 and 2 included both instream as well as riparian metrics.

Correlations among raw physical habitat metrics grouped by factors and identified by PCA in Table 9 showed the following significant correlations for Factor 1: velocity/depth and channel alteration, epifaunal substrate, bank vegetation, bend/riffle frequency, and channel flow; bend/riffle frequency and channel flow, bank vegetation, and channel alternation; and channel alteration and epifaunal substrate, bank vegetation, and channel flow; and epifaunal substrate and bank vegetation and channel flow. In factor 2, significant correlations were found between sediment deposition and embeddedness.

The correlation matrix in Table 10 showed significant correlations among stream characteristics that were not scored on a 0 to 20 scale (i.e., width, depth) and some metrics that were scored on a 0 to 20 scale. The largest number of significant correlations occurred for % gravel, % cobble and % fines. Percent gravel was negatively correlated with sediment deposition, velocity depth, embeddedness and total score. Percent gravel was positively correlated with epifaunal substrate. Percent cobble was positively correlated with bend riffle frequency, epifaunal substrate, velocity/depth, embeddedness, and total score. Percent fines were positively correlated with channel alternation, and riparian buffer.

A comparison of mean habitat metric scores and total score for each creek showed that there were no statistical differences among either habitat metrics scores or total score for these two creeks in 2006 (Table 11).

4.1.6 2007 Summary Statistical Analysis for Both Creeks

As reported above, Principal Components Analysis (PCA) was used to determine the relationship among habitat metrics and identify metrics that covary (i.e., increase or decrease together) based on 2007 sampling. The 10 habitat metrics that were scored on a 0 to 20 scale had three eigenvalues that were greater than 1 (Table 12). The significance of this finding is that 10 habitat metrics contain three important factors which explained 75% of the variance in the data set. The metrics important to each factor are presented in Table 13. Velocity/depth/diversity, epifaunal substrate, bend/riffle frequency, and channel flow were heavily loaded on factor 1. Factor 2 is comprised of riparian buffer, and bank vegetation. Bank stability, channel alteration, embeddedness, and sediment deposition were heavily loaded on Factor 3. Metrics loaded on Factors 1 through 3 included both instream as well as riparian metrics.

Correlations among raw physical habitat metrics grouped by factors and identified by PCA in Table 14 showed the following significant correlations for Factor 1: velocity/depth and epifaunal substrate, bend/riffle frequency, and channel flow; and epifaunal substrate and bend/riffle frequency and channel flow. In factor 2, significant correlations were found between riparian buffer and bank vegetation. There were no significant correlations for the metrics comprising Factor 3.

The correlation matrix in Table 15 showed significant correlations among stream characteristics that were not scored on a 0 to 20 scale (i.e., width, depth) and some metrics that were scored on a 0 to 20 scale. The largest number of significant correlations occurred for % gravel and % cobble. Percent gravel was correlated with bend riffle frequency, sediment deposition, velocity depth, embeddedness, and total score. Percent cobble was positively correlated with epifaunal substrate, sediment deposition, velocity depth, embeddedness, and total score.

A comparison of mean habitat metric scores and total score for each creek showed that there were statistical differences among creeks for four metrics as well as the total score based on 2007 sampling (Table 16). Epifaunal substrate, channel alteration, riparian buffer, channel flow and total habitat scores were greater in Pleasant Grove Creek than Kirker Creek. This result is in contrast to the 2006 data where there were no significant differences among either habitat metrics or total score for these two creeks.

4.2 Benthic Macroinvertebrates

4.2.1 2006 Kirker Creek

Approximately 12,000 individual macroinvertebrates were picked and identified from 110 taxa collected from 14 Kirker Creek sites in 2006 (Table 17 and Appendix 2). The five most abundant taxa – *Cyprididae* (seed shrimp), *Physa sp* (snails). *Micropsectra sp*. (Chironomids), *Tubificidae* (Oligochaetes) and *Simulium sp* (Black flies), - comprised ~ 67% of the total individuals collected (Table 17). These five taxa are generally considered tolerant to moderately tolerant of environmental stressors (Harrington and Born, 2000; Stribling *et al.*, 1998). Pollution sensitive species such as Ephemeroptera (mayflies), Plecoptera (stoneflies) and Trichoptera (caddisflies), i.e. EPT taxa, were rare at all sites.

Total taxa richness ranged from 16 at downstream site KC1 to 41 at upstream site KC13 (Table 18). The % dominant taxa – a metric that increases with disturbance – was reported to be higher at downstream site KC2 and lower at upstream site KC13. Tolerance value – a metric that increases with disturbance – was found to be greater at downstream site KC4 and lower at upstream site KC11. Percent tolerant taxa were reported to be greater at downstream site KC1 and lower at upstream site KC11. Percent collectors/gatherers – a feeding guild that is dominant is stressed environments - were reported to both lower and higher at downstream sites KC2 and KC4, respectively. Percent collectors/filterers – a feeding guild that is dominant in stressed environments – was reported to be lower at downstream site KC2 and higher at upstream site KC11. The total abundance metric was reported to be higher at KC5 and lower at KC8.

4.2.2 2007 Kirker Creek

Approximately 9,500 individual macroinvertebrates were picked and identified from 114 taxa collected from 14 Kirker Creek sites in 2007 (Table 19 and Appendix 3). The five most abundant taxa – *Cyprididae* (seed shrimp), *Physa sp* (snails), *Tubificidae* (Oligochaetes), *Chironomus sp*., and *Hyalella sp*. and - comprised ~ 68% of the total individuals collected (Table 19). These taxa are generally considered tolerant to moderately tolerant of environmental stressors (Harrington and Born, 2000; Stribling *et al.*, 1998). The one exception is *Hyalella* as this species is extremely sensitive to pyrethroid insecticides (Giddings, 2006). Pollution sensitive species such as ephemeroptera (mayflies), plecoptera (stoneflies) and trichoptera (caddisflies), i.e. EPT taxa, were rare at all sites.

Total taxa richness ranged from 10 at KC8 to 43 at KC13 (Table 20). The % dominant taxa – a metric that increases with disturbance – was reported to be higher at upstream site KC11 and lower at downstream site KC2. Tolerance value – a metric that increases with disturbance – was found to be greater at downstream sites KC3, KC4, and KC5. Percent tolerant taxa were reported to be greater at downstream site KC3 and lower at upstream site KC11. Percent collectors/gatherers – a feeding guild that is dominant in stressed environments – were lower at KC11 when compared with other sites. Percent collectors/filterers – a feeding guild that is dominant in stressed environments – was reported to be higher at KC2 when compared with other sites. The total abundance metric was reported to be higher at upstream site KC14 when compared with other sites.

4.2.3 2006 Pleasant Grove Creek

Approximately 18,000 individual macroinvertebrates were picked and identified from 142 taxa collected from 21 sites in Pleasant Grove Creek in 2006 (Table 21; Appendix 4). The following taxa comprised ~ 56% of the total number of individuals collected: *Micropsectra* (Chironomids), *Tubificidae* unidentified immatures (Oligochaetes), *Paratanytarsus sp*. (Chironomids), *Physa sp*. (snails) and *Nais communis/variabilis* (Oligochaetes). All of these taxa are generally tolerant of environmental degradation (Harrington and Born, 2000; Stribling *et al.*, 1998). It is also noteworthy that the 12th most dominant species (*Hyalella sp*.) - which is extremely sensitive to pyrethroids as reported by Giddings (2006) - were common in approximately half the sites sampled.

Total taxa richness ranged from 17 at PGC12 to 52 at PGC4 (Table 22). Percent dominant taxa ranged from 19% at PGC4 to 70% at PGC9. EPT taxa, which are generally considered sensitive to environmental stressors, were found at low numbers in all sites with highest number found at PGC2 (8), PGC6 (7) and PGC4 (6). The tolerance value metric was reported to be higher at PGC11 and lower at PGC5. The % tolerant taxa were reported to range from 24% at PGC3 to 62% at PGC8. Percent collectors/gatherers ranged from 23% at PGC5 to 96% at PGC8 while percent collectors/filterers ranged from 0 at PGC8 and PGC22 to 61% at PGC5. Total abundance ranged from 3,725 at PGC22 to 30,928 at PGC3.

4.2.4 2007 Pleasant Grove Creek

Approximately 18,000 individual macroinvertebrates were picked and identified from 145 taxa collected from 21 sites in Pleasant Grove Creek in 2007 (Table 23; Appendix 5). The following taxa comprised ~ 40% of the total number of individuals collected: *Tubificidae* unidentified immatures (Oligochaetes), *Physa sp*. (snails), *Hyalella sp.* (amphipod), *Dugestia tigrina* (Planariidae), *Dero digitata* (Naididae), and *Dicrotendipes sp.* (Chironomidae). All of these taxa are generally tolerant of environmental degradation (Harrington and Born, 2000; Stribling *et al.*, 1998). However, it is also noteworthy that the 3rd most dominant species (*Hyalella sp*.) is extremely sensitive to pyrethroids as reported by Giddings (2006).

Total taxa richness ranged from 19 at PGC16 to 51 at PGC3 (Table 24). Percent dominant taxa ranged from 13.5% at PGC10 to 53.2% at PGC7. EPT taxa, which are generally considered sensitive to environmental stressors, were found at low numbers in all sites with highest number found at PGC2 (8), PGC4 (7) and PGC5 (7). The lowest tolerance value metric was reported at PGC5 (5.1) and the highest value was reported at PGC16 (9.1). The % tolerant taxa were reported to range from 24% at PGC5 to 67% at PGC17. Percent collectors/gatherers ranged from 19% at PGC5 to 83% at PGC6 while percent collectors/filterers ranged from 0% at PGC11 to 32% at PGC2. Total abundance ranged from 892 at PGC8 to 22,254 at PGC17.

4.2.5 2006 Summary Statistical Analysis for both Creeks

PCA was used to determine the relationship among the benthic metrics and identify metrics that covary based on the 2006 data (Table 25). Four eigenvalues exceeded 1 indicating that there were four important factors in these data. ETP taxa, number of ephemeroptera taxa, number of trichoptera taxa, % tolerant taxa, tolerance value and taxonomic richness were heavily loaded on factor 1 (Table 26). Factor 2 was composed of % dominant taxon, % scrapers, Shannon diversity, % predators, and abundance. Factor 3 was composed of % collectors/gatherers. Factor 4 was composed of EPT index (%), sensitive EPT Index, % intolerant taxa and % collectors/filterers.

A comparison among benthic metrics in Kirker Creek and Pleasant Grove Creek in Table 27 showed that number of trichoptera taxa, sensitive EPT index, and % predators were statistically (p-value $\leq$ 0.05) higher in Pleasant Grove Creek than Kirker Creek. If a significance level of $p \leq 0.10$ was used as a cutoff, the following comparisons could be made: (1) EPT Index (%) and % Hydropsychidae are higher in Pleasant Grove Creek than Kirker Creek; (2) the tolerance value is higher in Kirker Creek than Pleasant Grove Creek; and (3) taxonomic richness is higher in Pleasant Grove Creek than Kirker Creek.

4.2.6 2007 Summary Statistical Analysis for both Creeks

PCA was used to determine the relationship among the benthic metrics and identify metrics that covary based on 2007 data (Table 28). Five eigenvalues exceeded 1 indicating that there were five important factors in these data. ETP taxa, number of trichoptera taxa, number of ephemeroptera taxa, % tolerant taxa, taxonomic richness, EPT Index (%), percent collectors-filterers, and sensitive EPT Index (%) were heavily loaded on factor 1 (Table 29). Factor 2 was composed of % dominant taxon and Shannon diversity. Factor 3 was composed of % shredders and abundance. Factor 4 was composed of percent intolerant taxa, percent scrapers, and percent collectors-gatherers. Percent predators and tolerance value were heavily loaded on Factor 5.

A comparison among benthic metrics in Kirker Creek and Pleasant Grove Creek in Table 30 showed that sensitive EPT index, EPT index (%), Shannon Diversity, percent collectors-filterers, and taxonomic richness were statistically (p-value ≤ 0.05) higher in Pleasant Grove Creek than Kirker Creek. In contrast, the following metrics were higher in Kirker Creek than Pleasant Grove Creek: percent collectors-gatherers; percent dominant taxa; percent shredders; and tolerance value.

4.3 Water Quality and Sediment Parameters

4.3.1 2006 Kirker Creek

All water quality parameters, with the exception of pH (7.4 - 8.4) and salinity (0 – 1 ppt), were variable in Kirker Creek in 2006 (Table 1). Ranges of various water quality parameters were as follows: temperature (15.6 - 23.2 C), specific conductivity (252- 3970 µS), dissolved oxygen (4.8 - 10.88 mg/L), and turbidity (4.4 - 47.8 ntu).

In sediment the percent TOC in Kirker Creek ranged from 0.70 to 2.8% with a mean value of 1.2% (Table 31). Percent sand ranged from 12.3% to 69.3% with a mean value of 46%. Mean values for % gravel, % silt and % clay were 1.4, 25.4 and 27.2%, respectively.

4.3.2 2007 Kirker Creek

All water quality parameters, with the exception of pH (7.3 - 8.3), were variable in Kirker Creek in 2007 (Table 2). Ranges of various water quality parameters were as follows: temperature (15 - 24 C), specific conductivity (427-5080 µS), dissolved oxygen (1.3-15.5 mg/L), salinity (0.2 to 3 ppt) and turbidity (4.5-143 ntu).

Percent TOC in Kirker Creek sediment ranged from 0.93 to 4.7% with a mean value of 1.95% (Table 32). Percent sand ranged from 7.1% to 58.5% with a mean value of 35.6%. Mean values for % gravel, % silt and % clay were 1.7%, 29.8% and 32.9%, respectively.

4.3.3 2006 Pleasant Grove Creek

With the exception of salinity (0 – 0.4 ppt), all water quality parameters in Pleasant Grove Creek were highly variable in 2006 (Table 1). Ranges of water quality conditions across the 21 sites were as follows: temperature (18.2 - 34.6 C), specific conductivity (105 – 903 µS), pH (6.4 – 9.1), dissolved oxygen (2.9 - 13 mg/L), and turbidity (2.6 – 27.8 ntu).

Percent TOC in Pleasant Grove Creek sediment ranged from 0.3 to 8.4 % with a mean value of 2.2% (Table 31). The percent sand across sites ranged from 5.5 to 86.8% with a mean value of 60.4%. Mean percent values for % gravel, % silt and % clay were as follows 1.5, 23.5, and 15 %, respectively.

4.3.4 2007 Pleasant Grove Creek

With the exception of salinity (0.1 – 0.2 ppt), all water quality parameters in Pleasant Grove Creek were highly variable in 2007 (Table 2). Ranges of water quality conditions across the 21 sites were as follows: temperature (14 – 30 C), specific conductivity (117 – 407 µS), pH (6.7-9.6), dissolved oxygen (1.1 to 11.9 mg/L), and turbidity (1.9 to 67.7 ntu).

Percent TOC in Pleasant Grove Creek sediment ranged from 0.7 to 8.5 % with a mean value of 2.7% (Table 32). The percent sand across sites ranged from 2.4 to 77.4% with a mean value of 51.6%. Mean percent values for % gravel, % silt and % clay were as follows 1.6%, 27.7%, 19.1%, respectively.

4.4 Pyrethroids

4.4.1 2006 Kirker Creek

Ranges of pyrethroid concentrations (ng/g dry weight) in Table 33 normalized to 1% TOC in Kirker Creek for 2006 were as follows: Bifenthrin (0.04 – 8.6); Fenpropathrin (< detection limit); Lambda-cyhalothrin (0.01 – 0.332); Permethrin (0.09 – 4.2); Cyfluthrin (0.06 – 2.3); Cypermethrin (0.04 – 1.7); Esfenvalerate (0.003 – 0.194) and Deltamethrin (0.01 – 2.8). Highest concentrations of pyrethroids (1% TOC normalized) in descending order from sediment samples in Kirker Creek were reported for Bifenthrin, Permethrin, Deltamethrin, Cyfluthrin, Cypermethrin, Lambda-cyhalothrin, Esfenvalerate and Fenpropathrin.

4.4.2 2007 Kirker Creek

Ranges of pyrethroid concentrations (ng/g dry weight) in Table 34 normalized to 1% TOC in Kirker Creek for 2007 were as follows: Bifenthrin (0.1 – 15.9); Fenpropathrin (< detection limit); Lambda-cyhalothrin (0.01- 0.267); Permethrin (0.24 – 7.56); Cyfluthrin (0.024 – 11.9); Cypermethrin (0.03 – 2.6); Esfenvalerate (0.009 – 0.252) and Deltamethrin (0.03 – 3.7). Highest concentrations of pyrethroids (based on 1% TOC normalized maximum values) in descending order from sediment samples in Kirker Creek were reported for Bifenthrin, Cyfluthrin, Permethrin, Deltamethrin, Cypermethrin, Lambda-cyhalothrin, Esfenvalerate and Fenpropathrin.

4.4.3 2006 Pleasant Grove Creek

Ranges of pyrethroid concentrations (ng/g dry weight) normalized to 1% TOC in Pleasant Grove Creek in 2006 were as follows: Bifenthrin (0.226 –52.3); Fenpropathrin (0.002 – 0.062 with only detected values used); Lambda-cyhalothrin (0.012 – 3.3); Permethrin (0.122 – 106.6); Cyfluthrin (0.060 – 11.2); Cypermethrin (0.019 – 5.2); Esfenvalerate (0.009 – 1.5) and Deltamethrin (0.012 – 8.9) (Table 33). Highest concentrations of pyrethroids (1% TOC normalized) in descending order were as follows: Bifenthrin, Permethrin, Cyfluthrin, Cypermethrin, Deltamethrin, Lambda-cyhalothrin, Esfenvalerate, and Fenpropathrin. Station mean concentrations of all 8 pyrethroids were generally higher in Pleasant Grove Creek than Kirker Creek in 2006.

4.4.4 2007 Pleasant Grove Creek

Ranges of pyrethroid concentrations (ng/g dry weight) normalized to 1% TOC in Pleasant Grove Creek for 2007 were as follows: Bifenthrin (0.165 – 75.1); Fenpropathrin (0.003 – 0.098 with only detected values used); Lambda-cyhalothrin (0.020 – 3.6); Permethrin (0.29 – 53.6); Cyfluthrin (0.056 – 47.1); Cypermethrin (0.045 – 14.6); Esfenvalerate (0.020 – 1.6) and Deltamethrin (0.044 – 15.4) (Table 34). Highest concentrations of pyrethroids (based on 1% TOC normalized maximum concentrations) in descending order were as follows: Bifenthrin, Permethrin, Cyfluthrin, Deltamethrin, Cypermethrin, Lambda-cyhalothrin, Esfenvalerate, and Fenpropathrin. As reported for 2006, station mean concentrations of the various pyrethroids were generally higher in Pleasant Grove Creek than Kirker Creek in 2007.

4.4.5 2006 Toxic Unit (TU) Calculations of Pyrethroids for Both Creeks

Toxic units (TU) calculations were determined in 2006 for each pyrethroid in both creeks by dividing the 1% TOC normalized concentration by the *Hyalella* LC50 concentration (a species highly sensitive to pyrethroids) that was also 1% TOC normalized (Table 35). TU concentrations exceeding 0.5 were considered potentially toxic. Using the TU approach for Kirker Creek showed that only Bifenthrin concentrations at the five downstream sites were potentially toxic. Total TUs at Kirker Creek site 6 were also potentially toxic based on summing the TUs for all pyrethroids. A ranking of total TUs for all Kirker Creek sites showed that pyrethroid toxicity was greater at the six downstream sites.

Bifenthrin TUs in Pleasant Grove Creek also showed potential toxicity at 10 sites (Table 35). Toxic Units calculations exceeding 0.5 were also reported for Lambda-cyhalothrin (1 site), Permethrin (1 site), Cyfluthrin (2 sites), Cypermethrin (5 sites) and Deltamethrin (2 sites). Total TUs for all pyrethriods combined exceeded 0.5 at 12 Pleasant Grove Creek sites. Total TUs at a backwater site (PGC16) that is not in the mainstem were particularly high (15.3). High total TUs were reported at three sites in Pleasant Grove Creek (PGC 16, PGC 17 and PGC 10) that were located in the fairly close proximity to each other (Figure 2).

A ranking of total TUs across both streams showed that the top 6 sites (highest TUs) were all reported in Pleasant Grove Creek (Table 35). These data demonstrate that potential pyrethroid toxicity is greater in Pleasant Grove Creek compared to Kirker Creek in 2006.

4.4.6 2007 Toxic Unit (TU) Calculations of Pyrethroids for Both Creeks

Using the TU approach described above for Kirker Creek showed that bifenthrin concentrations at the seven sites and cypermethrin at one site were potentially toxic based on 2007 data (Table 36). Total pyrethroid TUs at nine Kirker Creek sites suggested potential toxicity in this creek.

Bifenthrin TUs in Pleasant Grove Creek also showed potential toxicity at nine sites (Table 36). Toxic Units calculations exceeding 0.5 were also reported for Lambda-cyhalothrin (2 sites), Cyfluthrin (3 sites), Cypermethrin (5 sites) and Deltamethrin (1 sites). Total TUs for all pyrethriods combined exceeded 0.5 at 15 Pleasant Grove Creek sites. Total TUs at site PGC17 (24.3) and PGC8 (17.5) were particularly high.

A ranking of total TUs across both streams showed that 5 of the top 6 sites (highest TUs) were all reported in Pleasant Grove Creek (Table 36). These data suggest that potential pyrethroid toxicity is greater in Pleasant Grove Creek compared to Kirker Creek in 2007. A similar result was reported in 2006.

4.5 Bulk Metals and SEM/AVS

4.5.1 2006 Kirker Creek

For all Kirker Creek sites in 2006 at least one bulk metal concentration in Table 37 exceeded a sediment Threshold Effect Level (TEL) for freshwater (Buchman, 1999). TELs are conservative highly protective biological benchmarks. Sediment TELs for nickel were exceeded at all sites and arsenic TELs were exceeded at all sites except one. The number of TEL exceedences for various metals by site were chromium (3 sites), copper (2 sites), mercury (1 site), and zinc (3 sites). There were two sites where TELs for four metals were exceeded and four sites where TELs for three metals were exceeded.

The SEM/AVS data suggests that for at least nine of the fourteen sites ratios are greater than one; therefore, metals are bioavailable and potentially toxic (Table 38). Sites where metals toxicity may occur are KC 2, KC 3, KC 7, KC 8, KC 9, KC 10, KC 11, KC 12, and KC 13.

4.5.2 2007 Kirker Creek

For 11 of 14 Kirker Creek sites at least one bulk metal concentration in Table 39 exceeded a sediment Threshold Effect Level (TEL) for freshwater in 2007 (Buchman, 1999). Sediment TELs for arsenic were exceeded at 11 sites and nickel TELs were exceeded at 9 sites. The number of TEL exceedences for various metals by site were cadmium (7 sites), copper (3 sites), mercury (1 site), and zinc (3 sites). There was one site (KC4) where TELs for six metals were exceeded and two sites (KC 3 and KC 5) where TELs for five metals were exceeded.

The SEM/AVS data suggests that for at least two of the fourteen sites ratios are greater than one; therefore, metals are bioavailable and potentially toxic (Table 40). Sites where metals toxicity may occur are KC 5 and KC 11.

4.5.3 2006 Pleasant Grove Creek

Eight sites in Pleasant Grove Creek in 2006 had at least one bulk metal TEL exceedence as presented in Table 41. The frequency of TEL exceedences was as follow: zinc (7 sites), copper (6 sites), nickel (4 sites), chromium (3 sites) and cadmium (1 site). The number of metals exceeding TELs by site were 5 metals for PGC 17, 4 metals for PGC8 and PGC 16, 3 metals for PGC 15, 2 metals for PGC 11, and 1 metal for PGC 12, PGC 18 and PGC 21.

The SEM/AVS data suggests that for at least 13 of the 21 sites ratios are greater than one; therefore, metals are bioavailable and potentially toxic if reported above TELs (Table 42). Sites where metals toxicity may occur are PGC 8, PGC 11, PGC 12, PGC 15, PGC 17, PGC 18, and PGC 21.

4.5.4 2007 Pleasant Grove Creek

Five sites in Pleasant Grove Creek in 2007 had at least one bulk metal TEL exceedence as presented in Table 43. The frequency of TEL exceedences was as follow: zinc (4 sites), copper (4 sites), cadium (3 sites), nickel (3 sites), and arsenic (2 sites). The number of metals exceeding TELs by site were 5 metals for PGC 17, 4 metals for PGC 15 and PGC 22, 2 metals for PGC 18, and 1 metal for PGC 4.

The SEM/AVS data suggests that for at least 12 of the 21 sites ratios are greater than one; therefore, metals are bioavailable and potentially toxic if reported above TELs (Table 44). Sites where metals toxicity may occur are PGC 4, PGC 15, PGC 17, and PGC 22.

4.6 PAHs

4.6.1 2006 Kirker Creek

A total of 9 TEL exceedances were reported for the 13 PAHs measured in sediment samples collected from Kirker Creek sites in 2006 (Table 45). Four TEL exceedences were reported for dibenz (a,h)anthracene while two exceedences were reported for fluoranthene and 2-methylnaphthalene. One TEL exceedance was reported for phenanthrene. The Kiker Creek sites with the highest number of exceedances (2) were sites KC3 and KC8. In general, PAH concentrations were higher in Kirker Creek (mean = 367 ng/g dry weight) when compared with Pleasant Grove Creek (mean = 165 ng/g dry weight) as described below. PAH analysis was not conducted in Kirker Creek in 2007.

4.6.2 2006 Pleaseant Grove Creek

A total of 4 TEL exceedances were reported for dibenz(a,h)anthracene in Pleasant Grove Creek (Table 46). PGC sites 16 and 17, the sites with the highest dibenz(a,h)anthracene concentrations, are in close proximity to each other (Figure 2). As reported above, the PAH concentrations in Pleasant Grove Creek were generally lower than reported in Kirker Creek. The PAH with the highest number of TEL exceedances for both Pleasant Grove Creek and Kirker Creek was dibenz(a,h)anthracene. PAH analysis was not conducted in Pleasant Grove Creek in 2007.

4.7 Relationship of Benthic Metrics to all Stressors based on 2006 and 2007 Data by Creek

4.7.1 Relationship of Benthic Metrics to Pyrethroids

When the 2006 data was combined with the 2007 data, there were relatively few significant relationships observed between benthic metrics and pyrethroids for either Kirker Creek (Table 47) or Pleasant Grove Creek (Table 48). The two exceptions were the two metrics for pollution tolerant benthic communities: the Tolerance Value metric, that displayed low to moderate direct relationships with most of the pyrethroids in Kirker Creek (R^2 values ranging from 0.19 to 0.37; Table 47); and the % Tolerant Taxa metric, that displayed moderately low direct relationships with most of the pyrethroids in Pleasant Grove Creek (R^2 values ranging from 0.16 to 0.24; Table 48). In the stepwise regressions, these same benthic metrics were shown to have significant relationships with those pyrethroids that had the highest R^2 values. For Kirker Creek, the Tolerant Value metric was directly related to Cypermethrin ($R^2 = 0.37$; Table 49a); and for Pleasant Grove Creek, the % Tolerant Taxa metric displayed a modest direct relationship to Total TUs ($R^2= 0.24$; Table 49b).

It should be noted that, with the exception of Lambda-cyhalothrin in Kirker Creek, all pyrethroid TU data, including Total TUs, are highly correlated to each other (r=0.72-0.98 in Kirker Creek and r=0.60-0.97 in Pleasant Grove Creek). The stepwise regression procedure first selects the single independent variable that explains most of the variance in the patterns of the dependent variable and then seeks the variable that explains most of the remaining variance, etc. With highly correlated variables, when the relationship with one variable has been mathematically taken into account, the statistical significance of the remaining variables (i.e., those that display similar spatial and temporal patterns) becomes insignificant. Thus, it is not unexpected that only the variables that displayed the highest R^2 values for the two benthic metrics in the univariate regressions are the only ones to be observed to be significant in the multivariate regressions. However, causality for the selected variables cannot be inferred, because the biological effects may be associated with correlated variables or combinations of variables, either those measured or not measured.

4.7.2 Relationship of Benthic Metrics to Metals

There were a few modest direct relationships observed in the univariate regression analyses between benthic metrics and metals to TEL ratios in Kirker Creek data set for 2006 and 2007 (Table 50): Ephemeroptera Taxa was directly related to Chromium to TEL ($R^2= 0.25$). Tolerance Value was directly related to Lead to TEL and Zinc to TEL ratios ($R^2= 0.28$ and 0.29, respectively). Percent Tolerant Taxa was directly related to Cadmium to TEL ratios and % Predators was directly related to Chromium to TEL ratios ($R^2= 0.29$). For the Pleasant Grove Creek data set for 2006 and 2007, there were direct relationships between % Tolerant Taxa and every metal except for the Copper to TEL ratios, with R^2 values ranging from 0.17 to 0.45 (Table 51). There were smaller direct relationships between Tolerance Value and both Mercury to TEL and Zinc to TEL ratios ($R^2 =0.16$ for both; Table 51). There were also a few small inverse relationships between metrics of benthic community health and metal to TEL ratios: Taxonomic Richness was inversely related to both Nickel to TEL and

Zinc to TEL ratios (R^2= 0.18 and 0.15, respectively); and EPT Taxa was inversely related to both Mercury to TEL and Zinc to TEL ratios (R^2= 0.19 and 0.16, respectively). Most of the relationships observed between benthic metrics and the metals to TEL ratios for the two creeks were low to modest in magnitude. However, the direction of the relationships is logical (i.e., toxicity-metals displayed direct relationships with indicators of pollution tolerant communities; inverse relationships with indicators of health of the benthic communities). This generally suggests some adverse impacts to the biological metrics may be associated with metals or other forms of environmental degradation that may be found in areas characterized by higher sediment metals concentrations, as may be associated with many areas of anthropogenic impacts (see below).

The stepwise multiple regression analyses of both the Kirker Creek and Pleasant Grove Creek data sets for 2006 and 2007 tended to re-enforce the patterns observed in the univariate models. For Kirker Creek, the same moderate direct relationships as seen for univariate regressions (Table 50) were observed in the stepwise models (Table 52a). Tolerance value was directly related to Zinc to TEL ratios (R^2= 0.29). Percent Tolerant Taxa was directly related to Cadmium to TEL ratios and % Predators was directly related to Chromium to TEL ratios (R^2= 0.29). The principal differences were that the Tolerance Value metric and % Tolerant Taxa were also inversely related to Nickel to TEL (R^2= 0.20 for both). The combination of direct relationships to certain metals in combination with these inverse relationships to nickel may be pointing to certain sites characterized by pollution tolerant communities.

In a similar manner, the stepwise models for Pleasant Grove Creek (Table 52b) reflected the significant relationships displayed in the univariate regression analyses: the Tolerance Value and % Tolerant Taxa were both directly related to Mercury to TEL ratios (R^2= 0.16 and 0.45, respectively); and Ephemeroptera Taxa and EPT Taxa were inversely related to Mercury to TEL ratios (R^2= 0.16 and 0.45, respectively). The latter two benthic metrics were also directly related to Cadmium to TEL. Since the Mercury values did not approach TEL levels in any of the samples, it is quite likely that the Mercury concentrations also characterized sites that were environmentally degraded, rather than the mercury being toxic by itself.

4.7.3 Relationship of Benthic Metrics to Habitat Metrics

The relationships between benthic metrics and habitat metrics (Table 53) were more numerous and stronger (i.e., generally displaying larger R^2 values) than those observed for the contaminants (Tables 47-52). However, different habitat metrics were observed to be significant in the two creeks. For the Kirker Creek 2006-2007 data set, Frequency of riffles/bends was important (Table 53a): Taxonomic Richness was directly related to this metric (R^2=0.26); while the Tolerance Value metric and % Tolerant Taxa were inversely related to it (R^2=0.25 and 0.46, respectively). Thus, this habitat metric appears to be directly related to the relative health of the benthic communities. In addition, Taxonomic Richness also displayed a small inverse relationship to Vegetative protection (R^2=0.16), while % Collectors/Filters displayed a moderate inverse relationship to % Fines (R^2=0.35).

For Pleasant Grove Creek, Velocity depth regimes appeared to be associated with most of the significant relationships with benthic metrics (Table 53b). Direct relationships were observed between Taxonomic Richness (R^2=0.29), Ephemeroptera Taxa (R^2=0.44), EPT Taxa (R^2=0.52), EPT Index (R^2=0.48), and % Collectors/Filters (R^2=0.39) and Velocity depth regimes. Indirect relationships were observed between the Tolerance Value metric (R^2=0.34) and % Tolerant Taxa (R^2=0.53) and Velocity depth regimes. The Tolerance Value metric was also inversely related to Sediment deposition (R^2=0.13) and directly related to % Gravel. (R^2=0.10). Overall, it appears that indicators of benthic community health were positively related to Velocity Depth regimes in Pleasant Grove Creek.

4.7.4 Relationship of Benthic Metrics to Pyrethroids, Metals and Habitat Metrics

For Kirker Creek, the stepwise regression models that included pyrethroids, metals to TELs and habitat metrics displayed results (Table 54a) that were similar to some of those observed in the univariate regressions. Taxonomic Richness was directly related to Frequency of riffles/bends (R^2=0.26) and inversely related to Vegetative protection (R^2=0.14). In addition, % Tolerant Taxa was inversely related to Frequency of riffles/bends (R^2=0.46). The persistence of this habitat metric in the multiple regression models tends to re-enforce that it is directly related to benthic community health and inversely related to the dominance of pollution tolerant taxa. Ephemeroptera taxa and % Predators were both directly related to Chromium (R^2=0.25 and 0.29, respectively), although not too much significant should be attributed to either of these relationships, because both of the benthic metrics had only about ¼ of the data represented by non-zero values. The Tolerance Value metric was directly related to Cypermethrin TUs (R^2=0.37), although, as was previously pointed out, this was only one of 6 highly correlated pyrethroids (including Total TUs) that could have been selected by the stepwise procedure, if their R^2 values had been only slightly higher (e.g., the R^2 values for Total TUs and Bifenthrin were both 0.34, while the R^2 for Cypermethrin was 0.37; see Table 47). In addition, examination of the data suggests that only a few samples from sites KC3 to KC5 appeared to be responsible for the significant regression relationship (i.e. they displayed both above average Tolerance Values and above average Cypermethrin TU values for one of the two years). Morever, the Cypermethrin concentrations did not exceed 70% of a toxicity unit in any of the samples. Conversely, some of the other highly correlated pyrethroids did display TUs that exceeded 1 in a number of samples. Thus, not too much ecological significance should be attributed to this specific relationship.

There were a few other relationships displayed by stepwise regression analyses that included all of the potential independent variables from Kirker Creek (Table 54a): % Collector/Filterers were inversely related to % fines (R^2=0.35), % Shredders were inversely related to Sediment deposition and Nickel to TEL ratios (R^2=0.17 for both), and Abundance was inversely related to Lead to TEL and % Canopy cover (R^2=0.17 for both). While only accounting for approximately a third of the variance in the benthic metrics (R^2~0.34), the relationships tended to make ecological sense.

The stepwise regression models with all independent variables from the Pleasant Grove Creek data sets from 2006 and 2007 indicated that the habitat metrics dominated in their effects on benthic metrics (Table 54b). Velocity depth regimes was the principal metric that displayed significant effects on the benthic metrics. Taxonomic Richness, Ephemeroptera Taxa, EPT Taxa, EPT Index, and % Collector/Filterers all displayed direct relationships to this metric (R^2 values ranging from approximately 0.3 to 0.5, indicating that this habitat metric "explained" from 1/3 to ½ of the variance in these benthic metrics). In contrast, the Tolerance Value metric, and % Tolerant Taxa displayed inverse relationships to this metric (R^2 values of 0.34 and 0.53, also in the same range). The direction of effects of Velocity depth regimes on these benthic metrics, tended to make ecological sense. The benthic metrics that were indicators of benthic community health (e.g. Taxonomic Richness, Ephemeroptera Taxa, EPT Taxa, EPT Index, and % Collector/Filterers) were directly related to Velocity depth regimes, while those metrics that were associated with stress tolerant communities (e.g. Tolerance Value, % Tolerant Taxa) were inversely related to this habitat metric. Other metrics displayed weaker relationships with benthic metrics in combination with Velocity depth regimes. The Tolerance Value metric was inversely related to Sediment deposition (R^2=0.13) and directly related to % Gravel (R^2=0.10). Percent Tolerant Taxa was directly related to Mercury to TEL ratios (R^2=0.16).

4.8 Relationship of Benthic Metrics to all Stressors based on 2006 and 2007 Data Combined Across both Creeks

4.8.1 Relationship of Benthic Metrics to Pyrethroids

There were a number of significant relationships between benthic metrics and pyrethroids in the combined 2006 and 2007 data sets for both creeks using univariate linear regression models (Table 55). However, the strength of the relationships tended to be rather weak (i.e. R^2<0.10). It is not surprising that weaker relationships can be detected with these models, because more samples are included, increasing the power of the analyses. Total TUs and Bifenthrin both displayed similar inverse relationships with Taxonomic Richness, Ephemeroptera Taxa, and EPT Taxa (R^2=0.07-0.09) and similar direct relationships with % Tolerance Value (R^2=0.08). Ephemeroptera Taxa and EPT Taxa also displayed weak inverse relationships with Cypermethrin (R^2=0.08 and 0.09, respectively). The % Tolerant Taxa metric was directly related to all of the pyrethoids (R^2=0.10-0.14) except Permethrin. It should be noted that most pyrethroids were strongly correlated to each other (r=0.76-0.94), except for Permethrin, which had lower correlations with Bifenthrin, Cyfluthrin and Cypermethrin (r=0.70, 0.60 and 0.59, respectively). These specific pyrethroids were the ones with the stronger direct relationship with the % Tolerant Taxa (R^2=0.12-0.14). However, considering the strong correlations between pyrethroids and the rather weak relationships with the benthic metrics, no causality can be inferred.

Due to the correlations between pyrethroids, it is not too surprising that the stepwise multiple regression analyses (Table 56) only selected those pyrethroids that displayed slightly higher R^2 values among each of the significant relationships observed in the univariate regressions. Taxonomic Richness displayed a weak inverse relationship to Bifenthrin (R^2=0.08). Ephemeroptera Taxa and EPT Taxa displayed weak inverse relationships to Total TUs (R^2=0.08 and 0.09, respectively). The Tolerance Value was directly related to Total TUs (R^2=0.08) while the % Tolerant Taxa metric was directly related to Bifenthrin (R^2=0.14). While the direction of the relationships make ecological sense (i.e., indicators of benthic health were inversely correlated to the pyrethroids, while stress indicators are directly correlated), the weak nature of the relationships, the strong correlations between pyrethroids and the potential confounding by other environmental conditions (e.g., habitat metrics and/or metals) prevent specific inference of causality as discussed below.

4.8.2 Relationship of Benthic Metrics to Metals

There were also a number of relationships between benthic metrics and metals to TEL ratios (Table 57). The relationships were somewhat stronger than those observed for pyrethroids (i.e., R^2 values that were generally greater than 0.10 and as high as 0.33). Taxonomic Richness was inversely related to Cadmium to TEL and to Zinc to TEL (R^2=0.07 – 0.09). Ephemeroptera Taxa was inversely related to Arsenic to TEL, Lead to TEL, Mercury to TEL, Nickel to TEL, and Zinc to TEL (R^2=0.09-0.12). Tolerance Value was directly related to Arsenic to TEL, Cadmium to TEL, Lead to TEL, Nickel to TEL and Zinc to TEL (R^2=0.12-0.20). The % Tolerant Taxa metric was directly related to these same metrics plus Mercury to TEL and Total Metals to TELs (R^2=0.10-0.33). Nickel to TEL is related to the largest number of benthic metrics. Percent Dominant Taxon, Tolerance Value, and % Tolerant Taxa were directly related to it (R^2=0.11, 0.12, and 0.16, respectively). In contrast, Ephemeroptera Taxa, EPT Taxa, EPT Index, Shannon Diversity, and % Collectors/Filterers were inversely related to Nickel (R^2=0.12, 0.17, 0.11, 0.16, and 0.13, respectively). Other significant relationships include: EPT Taxa was inversely related to Arsenic to TEL, and Zinc to TEL (R^2=0.17 and 0.13, respectively); and EPT Index was inversely related to Arsenic to TEL (R^2=0.14). As with the pyrethroids, the direction of the relationships make ecological sense, except they were somewhat stronger. However, many of these relationships may be confounded by other environmental factors, so causality of effects related to specific metals may not be inferred as discussed below.

The Stepwise regression models selected the metals to TELs displaying the strongest relationships reported with the univariate regressions (Table 58). Ephemeroptera Taxa, EPT Taxa, Shannon Diversity, and % Collectors/Filterers were all inversely related to Nickel to TEL (R^2=0.12, 0.17, 0.16, and 0.13, respectively), while % Dominant Taxon was directly related to it (R^2=0.11). Taxonomic Richness was inversely related to Zinc to TEL (R^2=0.09) and the EPT Index was inversely related to Arsenic to TEL (R^2=0.14). The Tolerant Value metric was directly related to Lead to TEL (R^2=0.20) and the % Tolerant Taxa metric was directly related to Cadmium to TEL (R^2=0.33). The latter two stronger relationships suggest that metals in sediment characterize more stressed environments in the two creeks that have more stress tolerant benthic communities.

4.8.3 Relationship of Benthic Metrics to Habitat Metrics

The stepwise regressions for 2006 and 2007 for both creeks indicated that Velocity depth regimes was the principal significant habitat metric that was related to approximately half of the benthic metrics and was responsible for nearly two-thirds of all significant relationships in these analyses (Table 59). Moreover, this variable accounted for up to 1/3 of the variance in the benthic metrics to which it was related: Taxonomic richness, Ephemeroptera Taxa, EPT Taxa, EPT Index, Shannon Diversity, and % Collectors/Filterers were all directly related to Velocity depth regimes (R^2 values ranging from 0.16 to 0.33, with most at or above 0.30); and % Dominant Taxon displaying a small inverse relationship to this metric (R^2=0.09). Thus, this habitat metric - which evaluates a range a velocity/depth regimes - appears to characterize environments associated with healthier benthic community indicators. The Tolerance Value and % Tolerant Taxa, two benthic metrics that were associated with stressed communities, were inversely related to Total Habitat score (R^2=0.33 and 0.45, respectively). Thus, Total Habitat score also appears to be directly related to benthic community health in the two creeks. This is not surprising as altered physical habitat is a major stressor in aquatic systems throughout the United States (Karr *et al.* 1986; Rankin, 1995).

Other significant, but weaker relationships were observed between benthic and habitat metrics: % Dominant Taxon was directly related to Sediment deposition (R^2=0.07; in combination with the Velocity depth regime relationship described above); % Collector/Gatherers were inversely related to Epifaunal substrate/available cover (R^2=0.10); and % Grazers were inversely related to Channel alteration (R^2=0.08).

4.8.4 Relationship of Benthic Metrics to Pyrethroids, Metals and Habitat Metrics

In the stepwise regression models that included all environmental metrics for 2006 and 2007 for both creeks, the habitat metrics, particularly Velocity depth regimes, tended to dominate the significant relationships with benthic metrics (Table 60). Taxonomic Richness, Ephemeroptera Taxa, EPT Taxa, EPT Index, Shannon Diversity and % Collector/Filterers all displayed direct relationships with Velocity depth regimes (R^2 values ranging from 0.16 to 0.33, with most at or above 0.30). Percent Dominant Taxon, a metric that tends to increase in stressed environments, displayed a small inverse relationship to this metric (R^2=0.05). The % Dominant Taxon variable also displayed a small direct relationship with Sediment deposition, while Shannon Diversity displayed a small inverse relationship to this habitat metric (R^2=0.08 and 0.09, respectively). The Tolerance Value and % Tolerant Taxa metrics were inversely related to Total Score (R^2=0.33 and 0.45, respectively). The other significant relationships between benthic metrics and habitat metrics were rather weak (i.e., characterized by low R^2 values). EPT Index (%) was inversely related to Frequency of riffles/bends (R^2=0.06). Percent Collectors/Gatherers was inversely related to Epifaunal substrate/available cover (R^2=0.10) and % Grazers was inversely related to Channel alterations (R^2=0.08).

In combination with habitat metrics, a few metals (e.g. arsenic, nickel and cadmium) were also observed to display significant but moderately small relationships to the benthic metrics. The % Dominant Taxon metric was directly related to Nickel to TEL ratios (R^2=0.10), while Shannon Diversity was inversely related to Nickel to TEL ratios (R^2=0.05). The EPT Taxa and EPT Index metrics both displayed small inverse relationships to Arsenic to TEL ratios (R^2=0.10 and 0.08, respectively). The Tolerant Taxa metric displayed a small direct relationship to Cadmium to TEL (R^2=0.10). While the direction of the relationships between benthic metrics and nickel, arsenic and cadmium all make ecological sense (i.e. the greater the relative metal concentrations, the greater the indications of stress in the benthic communities), the strength of these relationships are rather weak (R^2 values <=0.10). Thus, causality of impacts associated with these specific metals should not be inferred.

One of the most significant observations with the overall results from the combined data sets is that, when habitat metrics and, to a lesser extent, metals are considered in the statistical models, pyrethroids do not display any significant relationships to the benthic metrics. This observation tends to confirm the previous speculation that the rather weak relationships observed for pyrethroids when they were considered alone (Tables 55-56) may have been simple “markers” of anthropogenic disturbance of certain sites at which benthic communities may have been stressed by overall human activity and habitat alteration, rather than by toxic effects of the pyrethroids. When the habitat metrics were considered directly, these relationships between benthic metrics and pyrethroids disappeared, so inferences of causality associated with these pesticides do not appear warranted.

Finally, it is apparent that the health of the benthic communities in Kirker Creek and Pleasant Grove Creek is largely affected by habitat metrics. Velocity depth regimes and Total Habitat Score metrics appear to be directly related to healthier benthic communities, while, to a lesser extent, sediment deposition and certain metals (e.g. nickel, arsenic and cadmium) appear to be associated with more stressed or stress tolerant communities. When these factors are taken into account, pyrethroids do not appear to play a significant role in the spatiotemporal patterns of the benthic metrics of community health in these two urban/residential creeks.

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TABLES SECTION

TABLE 1 Sample site names, coordinates and water quality parameters measured during late spring and summer 2006 in Kirker Creek (KC) and Pleasant Grove Creek (PGC).

Site	Latitude	Longitude	Water Temp (C)	Specific Cond (μS)	pH	Diss Oxygen (mg/L)	Sal (ppt)	Turb (NTU)
KC 1	38.01849	121.83813	16.9	252	7.74	4.84	0	42.4
KC 2	38.01488	121.84045	21.1	1643	7.43	6.01	0	26.6
KC 3	38.01465	121.85811	22.7	278	7.98	7.22	0.1	10.2
KC 4	38.01832	121.86893	23.2	349	7.79	6.17	0.2	47.8
KC 5	38.01649	121.86965	20.1	720	8.10	7.53	0.4	13.2
KC 6	38.01065	121.87904	22.5	386	7.69	4.68	0.2	23.9
KC 7	38.00779	121.88177	19.8	1168	8.34	6.71	0.6	22.7
KC 8	38.00512	121.88454	19.2	1217	8.23	6.68	0.6	14.7
KC 9	38.00124	121.88774	17.2	827	7.93	6.90	0.3	9.95
KC 10	38.00018	121.88905	17.6	1167	8.06	7.62	0.5	4.38
KC 11	37.99846	121.89131	17.9	2512	7.78	6.95	0.6	21.7
KC 12	37.99459	121.89410	17.6	1221	8.41	7.61	0.7	29.1
KC 13	37.99101	121.89451	15.6	2267	8.35	9.04	0.7	31.9
KC 14	37.98611	121.89626	20.8	3970	8.36	10.88	1.0	14.6
PGC 1	38.80584	121.30369	30.3	602	8.50	11.87	0.3	2.87
PGC 2	38.80235	121.32950	26.7	412	8.00	8.41	0.2	5.82
PGC 3	38.80143	121.33968	23.9	357	7.87	7.01	0.2	3.98
PGC 4	38.79484	121.35876	26.6	426	8.77	11.49	0.2	3.31
PGC 5	38.81219	121.42471	25.7	583	8.36	9.87	0.3	11.5
PGC 6	38.81289	121.45128	25.2	579	8.64	12.98	0.3	7.02
PGC 7	38.80861	121.49616	24.3	382	8.69	9.63	0.1	11.9
PGC 8	38.80276	121.33842	22.3	903	7.02	2.95	0.4	6.84
PGC 9	38.80407	121.32832	24.0	141	7.07	2.51	0.1	6.13
PGC 10	38.78382	121.35748	22.2	252	7.43	3.78	0.1	14.9
PGC 11	38.77529	121.34203	22.4	105	6.97	2.85	0	22.4
PGC 12	38.76652	121.33944	22.8	141	6.86	3.36	0.1	8.22
PGC 13[a]	38.76377	121.32619	-	-	-	-	-	-
PGC 14	38.76482	121.32569	30.3	128	7.04	8.50	0.1	5.91
PGC 15	38.76415	121.32280	34.6	190	9.12	4.65	0.1	9.15
PGC 16	38.76321	121.34216	23.3	146	7.61	2.49	0.1	2.61
PGC 17	38.75906	121.33251	24.4	137	9.07	4.91	0	2.82
PGC 18	38.79470	121.34605	21.8	307	7.29	3.07	0.2	5.69
PGC 19	38.79047	121.33415	26.9	236	8.10	7.45	0.1	23.6
PGC 20	38.77000	121.31350	28.2	333	8.18	9.25	0.2	6.99
PGC 21	38.76932	121.29945	23.2	234	7.55	4.19	0.1	17.7
PGC 22	38.76616	121.28350	18.2	129	6.37	2.91	0	27.8

[a] Site no longer exists.

TABLE 2 Sample site names, coordinates and water quality parameters measured during late spring and summer 2007 in Kirker Creek (KC) and Pleasant Grove Creek (PGC).

Site	Latitude	Longitude	Water Temperature (C)	Specific Conductivity (μS)	pH	Dissolved Oxygen (mg/L)	Salinity (ppt)	Turbidity (NTU)
KC 1	38.01849	121.83813	14.8	1083.0	7.50	2.28	0.7	4.53
KC 2	38.01488	121.84045	18.7	962.0	7.32	2.65	0.5	11.8
KC 3	38.01465	121.85811	24.1	426.5	8.21	8.89	0.2	38.8
KC 4	38.01832	121.86893	16.2	487.0	7.73	7.11	0.3	9.45
KC 5	38.01649	121.86965	16.9	493.0	7.84	7.17	0.3	16.6
KC 6	38.01065	121.87904	16.0	440.1	7.75	7.45	0.3	15.6
KC 7	38.00779	121.88177	16.4	562.0	7.43	3.68	0.3	143.0
KC 8	38.00512	121.88454	16.5	615.0	8.04	4.38	0.4	48.3
KC 9	38.00124	121.88774	15.8	574.0	7.52	1.31	0.3	13.9
KC 10	38.00018	121.88905	19.2	727.0	8.25	3.85	0.4	113.0
KC 11	37.99846	121.89131	20.5	3181.0	7.81	2.85	1.8	16.8
KC 12	37.99459	121.89410	15.1	1954.0	7.92	3.61	1.3	17.7
KC 13	37.99101	121.89451	16.9	2139.0	8.10	8.45	1.3	15.1
KC 14	37.98611	121.89626	20.5	5080.0	8.09	15.64	3.0	6.72
PGC 1	38.80584	121.30369	26.6	357.1	8.22	11.86	0.2	5.15
PGC 2	38.80235	121.3295	21.1	214.4	7.50	7.22	0.1	5.52
PGC 3	38.80143	121.33968	20.4	184.4	7.44	5.70	0.1	5.62
PGC 4	38.79484	121.35876	24.8	186.8	8.23	10.30	0.1	8.32
PGC 5	38.81219	121.42471	22.9	328.9	7.54	7.91	0.2	12.3
PGC 6	38.81289	121.45128	22.0	299.5	8.00	9.45	0.2	6.52
PGC 7	38.80861	121.49616	21.6	204.9	7.60	7.44	0.1	9.62
PGC 8	38.80276	121.33842	20.0	123.0	6.97	2.90	0.1	5.23
PGC 9	38.80407	121.32832	19.9	406.6	7.15	5.69	0.2	2.13
PGC 10	38.78382	121.35748	23.8	147.4	7.46	8.25	0.1	9.15
PGC 11	38.77529	121.34203	27.5	158.4	6.92	3.62	0.1	1.93
PGC 12	38.76652	121.33944	17.6	124.8	7.03	3.08	0.1	10.6
PGC 13[a]	38.76377	121.32619	-	-	-	-	-	-
PGC 14	38.76482	121.32569	21.7	140.1	7.07	2.57	0.1	35.3
PGC 15	38.76415	121.32280	30.1	139.6	9.56	3.67	0.1	11.8
PGC 16	38.76321	121.34216	20.9	356.1	7.04	1.61	0.2	2.23
PGC 17	38.75906	121.33251	18.6	108.8	6.70	5.05	0.1	4.33
PGC 18	38.79470	121.34605	20.9	174.7	6.95	1.08	0.1	18.7
PGC 19	38.79047	121.33415	23.7	142.1	7.40	8.26	0.1	6.56
PGC 20	38.77000	121.31350	24.4	188.0	7.75	11.55	0.1	5.96
PGC 21	38.76932	121.29945	24.4	159.6	7.53	6.70	0.1	4.73
PGC 22	38.76616	121.28350	13.7	117.1	7.25	6.14	0.1	67.7

[a] Site no longer exists.

TABLE 3 **Scoring of individual physical habitat metrics (0-20 scale) and final habitat score (maximum of 200) for sites in Kirker Creek (KC) and Pleasant Grove Creek (PGC) in 2006.**

Site	Epi Subs	Embed	Veloc Depth Divers	Sedim Depos	Chan Flow Status	Chan Alt	Freq Bends Riffles	Left Bank Stab	Right Bank Stab	L Bank Veget. Protect	R Bank Veget. Protect	L Bank Ripar Zone	R Bank Ripar Zone	Total
KC 1	11	1	9	13	10	1	1	8	8	6	6	5	5	84
KC 2	1	0	1	2	8	5	0	6	5	6	4	6	8	52
KC 3	5	0	0	1	6	6	0	3	2	5	5	1	1	35
KC 4	5	0	0	0	10	2	0	9	9	1	1	1	1	39
KC 5	5	0	3	8	15	6	4	6	4	6	6	4	4	71
KC 6	2	1	2	5	6	6	0	3	3	4	4	3	5	44
KC 7	7	3	10	11	15	15	12	6	7	6	6	5	5	108
KC 8	7	0	8	14	17	15	4	6	6	9	6	5	5	102
KC 9	8	7	14	11	15	16	10	4	7	4	8	3	6	113
KC 10	12	6	10	8	11	13	9	5	3	7	7	6	3	100
KC 11	7	7	13	3	11	15	12	8	8	8	8	5	5	110
KC 12	13	6	10	2	12	15	11	6	6	8	8	6	6	109
KC 13	6	2	14	3	16	15	16	5	6	8	8	3	6	108
KC 14	6	1	5	6	8	20	15	8	8	8	9	9	9	112
PGC 1	10	1	6	1	16	16	2	8	8	7	7	9	9	100
PGC 2	10	7	12	13	10	14	11	6	4	8	6	8	6	115
PGC 3	7	2	7	4	15	15	7	7	3	8	6	9	5	95
PGC 4	10	1	6	1	13	15	3	2	2	5	5	3	6	72
PGC 5	14	7	16	11	16	16	4	6	6	8	8	7	7	126
PGC 6	9	1	16	10	18	19	14	5	5	7	7	8	8	127
PGC 7	10	0	6	6	16	11	5	5	6	6	9	2	7	89

TABLE 3 **Scoring of individual physical habitat metrics (0-20 scale) and final habitat score (maximum of 200) for sites in Kirker Creek (KC) and Pleasant Grove Creek (PGC) in 2006. (Continued)**

Site	Epi Subs	Embed	Veloc Depth Divers	Sedim Depos	Chan Flow Status	Chan Alt	Freq Bends Riffles	Left Bank Stab	Right Bank Stab	L Bank Veget. Protect	R Bank Veget. Protect	L Bank Ripar Zone	R Bank Ripar Zone	Total
PGC 8	2	0	1	0	1	10	1	6	5	4	4	3	3	40
PGC 9	10	0	1	3	16	16	10	3	3	6	6	8	8	90
PGC 10	7	1	4	4	8	12	6	6	6	7	7	3	3	74
PGC 11	4	3	5	3	16	14	4	9	9	6	6	1	1	81
PGC 12	4	0	3	0	13	16	12	3	7	6	7	7	8	86
PGC 14	4	2	5	11	16	14	4	3	6	6	8	3	5	87
PGC 15	1	0	1	1	15	8	2	4	8	6	6	5	6	63
PGC 16	11	0	0	0	16	15	2	7	7	6	7	7	5	83
PGC 17	2	0	0	0	0	11	0	6	6	8	8	3	3	47
PGC 18	10	1	7	3	14	14	8	6	6	8	8	6	5	96
PGC 19	9	10	3	10	16	14	3	6	6	7	7	5	3	99
PGC 20	7	1	8	8	15	15	10	7	4	6	8	6	6	101
PGC 21	13	7	9	15	13	13	10	4	4	8	6	5	5	112
PGC 22	5	0	1	0	5	16	5	9	9	9	8	9	9	85

TABLE 4 Physical habitat characteristics for Kirker Creek (KC) and Pleasant Grove Creek (PGC) from 2006 sampling that were not scored on a 0-20 scale.

Site	Mean Flow (m/s)	Ave. Width (m)	Ave. Depth (cm)	Canopy Cover %	Gradient %	Fines %	Gravel %	Cobble %	Boulder %	Bedrock %
KC 1	-	2.0	2.0	0	1.0	95	5	0	0	0
KC 2	-	2.0	2.0	43	1.0	100	0	0	0	0
KC 3	-	1.5	3.0	24	1.0	100	0	0	0	0
KC 4	-	3.0	10.0	30	1.0	99	0	0	1	0
KC 5	-	4.0	5.0	0	1.0	100	0	0	0	0
KC 6	0.01	1.0	8.0	20	1.0	60	0	0	0	40[a]
KC 7	-	1.0	2.0	8	1.0	95	5	0	0	0
KC 8	-	4.0	50.0	32	1.0	100	0	0	0	0
KC 9	0.01	0.3	2.0	89	1.0	60	40	0	0	0
KC 10	0.04	0.8	8.8	99	1.0	10	10	70	10	0
KC 11	0.19	0.6	11.0	49	1.0	40	40	0	0	20[a]
KC 12	-	12.0[b]	2.0	80	1.0	50	50	0	0	0
KC 13	0.19	1.1	6.2	96	1.0	70	30	0	0	0
KC 14	0.02	1.0	8.4	0	3.0	90	10	0	0	0
PGC 1	-	>10.0	>100	0	1.0	100	0	0	0	0
PGC 2	0.16	2.2	12.1	40	1.0	30	70	0	0	0
PGC 3	0.02	0.9	16.7	33	1.0	95	5	0	0	0
PGC 4	0.07	2.2	27.4	65	1.0	95	5	0	0	0
PGC 5	0.50	2.2	22.8	27	2.0	10	20	70	0	0
PGC 6	0.21	4.4	29.9	24	1.5	85	15	0	0	0
PGC 7	0.01	10.2	74.6	0	1.0	100	0	0	0	0
PGC 8	0.02	0.3	4.0	67	1.0	100	0	0	0	0
PGC 9	0	1.0	21.6	16	1.0	100	0	0	0	0
PGC 10	0.07	1.1	7.4	0	1.0	95	5	0	0	0
PGC 11	0.05	0.5	13.6	0	1.0	40	30	30	0	0
PGC 12	0.01	1.2	14.7	19	1.0	100	0	0	0	0
PGC 14	0.01	0.7	13.4	45	1.0	20	10	0	0	70[a]
PGC 15	0.01	1.8	15.7	36	1.0	100	0	0	0	0
PGC 16	-	4.3	57	19	1.0	100	0	0	0	0
PGC 17	-	2.7	18	33	1.0	100	0	0	0	0
PGC 18	0.01	0.8	7.8	94	1.0	100	0	0	0	0
PGC 19	0.01	2.0	17.4	58	1.0	55	0	40	5	0
PGC 20	0.06	0.9	14.9	0	1.0	100	0	0	0	0
PGC 21	0.01	0.6	5.2	61	1.0	40	40	10	10	0
PGC 22	-	0.4	2.0	12	1.0	100	0	0	0	0

[a] Clay hardpan.
[b] Wetted width of many braids.

TABLE 5 **Scoring of individual physical habitat metrics (0-20 scale) and final habitat score (maximum of 200) for sites in Kirker Creek (KC) and Pleasant Grove Creek (PGC) in 2007.**

Site	Epi Subs	Embedd	Veloc Depth Divers	Sedim Depos	Chan Flow Status	Chan Alt	Freq Bends Riffles	Left Bank Stab	Right Bank Stab	L Bank Veget. Protect	R Bank Veget. Protect	L Bank Ripar Zone	R Bank Ripar Zone	Total
KC 1	8	3	0	8	3	5	0	9	9	8	8	3	4	68
KC 2	1	0	0	6	2	8	0	9	9	8	6	4	6	59
KC 3	0	0	0	0	4	6	0	8	6	5	5	2	2	38
KC 4	9	4	0	2	5	3	0	9	9	2	2	2	2	49
KC 5	3	0	1	1	10	6	1	9	9	8	5	7	3	63
KC 6	4	3	8	8	10	7	6	5	5	4	4	2	2	68
KC 7	0	0	0	0	0	11	0	7	7	8	6	3	3	45
KC 8	6	0	3	0	16	15	5	9	8	8	8	5	4	87
KC 9	7	0	0	0	3	16	2	2	7	3	9	0	5	54
KC 10	8	7	8	8	10	12	7	5	3	8	5	5	3	89
KC 11	6	0	1	10	3	16	6	9	9	9	8	4	8	89
KC 12	3	0	0	0	3	16	1	9	9	9	9	5	5	69
KC 13	6	3	6	6	14	16	8	3	3	3	3	2	2	75
KC 14	6	0	0	0	2	17	3	8	9	8	6	5	5	69
PGC 1	14	0	0	4	16	16	2	9	9	6	6	6	4	92
PGC 2	14	13	14	12	15	14	10	8	6	9	7	6	4	132
PGC 3	10	3	6	5	10	16	9	7	4	9	6	8	6	99
PGC 4	11	6	14	7	11	16	14	4	6	9	7	7	6	118
PGC 5	16	8	15	10	15	16	8	8	7	9	8	5	5	130
PGC 6	8	1	15	8	14	16	10	4	6	6	6	5	5	104
PGC 7	10	0	1	5	19	18	2	6	7	6	9	4	8	95

TABLE 5 **Scoring of individual physical habitat metrics (0-20 scale) and final habitat score (maximum of 200) for sites in Kirker Creek (KC) and Pleasant Grove Creek (PGC) in 2007. (Continued)**

Site	Epi Subs	Embedd	Veloc Depth Divers	Sedim Depos	Chan Flow Status	Chan Alt	Freq Bends Riffles	Left Bank Stab	Right Bank Stab	L Bank Veget. Protect	R Bank Veget. Protect	L Bank Ripar Zone	R Bank Ripar Zone	Total
PGC 8	2	0	0	1	5	13	2	9	9	8	8	4	5	66
PGC 9	6	0	0	1	16	16	10	9	9	9	9	8	8	101
PGC 10	2	0	2	2	13	16	2	8	9	8	7	4	4	77
PGC 11	9	14	2	16	18	11	0	9	8	6	6	4	4	107
PGC 12	8	0	0	0	10	16	6	8	8	8	8	8	8	88
PGC 14	10	5	6	8	15	15	9	6	8	6	9	1	6	104
PGC 15	1	0	0	0	16	8	0	8	9	8	6	5	5	66
PGC 16	11	0	0	0	16	15	0	7	5	5	5	5	5	74
PGC 17	1	0	0	0	2	16	0	9	9	7	5	3	3	55
PGC 18	8	0	3	4	5	16	8	9	9	8	8	7	7	92
PGC 19	12	15	7	11	16	14	1	7	6	8	7	6	5	115
PGC 20	14	3	6	11	16	16	2	9	6	9	6	7	6	111
PGC 21	15	16	15	13	14	16	15	6	8	9	6	4	3	140
PGC 22	10	0	0	0	16	16	8	9	8	9	8	8	5	97

TABLE 6 **Physical habitat characteristics for 2007 Kirker Creek (KC) and Pleasant Grove Creek (PGC) sites that were not scored on a 0-20 scale.**

Site	Mean Flow m/s	Ave. Width m	Ave. Depth cm	Canopy Cover %	Gradient %	Fines %	Gravel %	Cobble %	Boulder %	Bedrock %
KC 1	-	1	3	28	1	100	00	0	0	0
KC 2	-	0.3	14	26	1	60	0	0	0	40 [a]
KC 3	-	0.5	6	38	1	100	0	0	0	0
KC 4	-	5	25	32	1	90	0	0	10	0
KC 5	-	3	10	27	1	100	0	0	0	0
KC 6	0.01	0.5	13	10	1	95	5	0	0	0
KC 7	-	0.5	8	95	1	100	0	0	0	0
KC 8	-	4	50	66	1	100	0	0	0	0
KC 9	-	4	54	80	1	100	0	0	0	0
KC 10	-	1	12	97	1	60	0	40	0	0
KC 11	-	0.3	10	87	1	20	0	0	0	80 [a]
KC 12	-	4	40	85	1	100	0	0	0	0
KC 13	0.04	0.5	5	91	1	95	5	0	0	0
KC 14	-	2	>100	0	3	100	0	0	0	0
PGC 1	-	>12	>100	0	1	100	0	0	0	0
PGC 2	0.44	2.5	8	50	1	50	45	5	0	0
PGC 3	0.13	1	15	67	1	95	5	0	0	0
PGC 4	0.20	3	14	57	1	95	5	0	0	0
PGC 5	0.18	5	20	31	2	20	20	60	0	0
PGC 6	0.27	5	12	23	1.5	99	1	0	0	0
PGC 7	0.01	11	59	0	1	100	0	0	0	0
PGC 8	-	1	10	88	1	100	0	0	0	0
PGC 9	-	1	30	91	1	0	0	0	0	100 [a]
PGC 10	0.02	0.5	12	0	1	100	0	0	0	0
PGC 11	-	0.5	30	0	1	70	0	30	0	0
PGC 12	0.02	1	6	45	1	100	0	0	0	0
PGC 14	-	1	40	76	1	100	0	0	0	0
PGC 15	-	3	30	15	1	70	0	0	0	30 [b]
PGC 16	-	4	50	0	1	100	0	0	0	0
PGC 17	-	0.5	10	39	1	100	0	0	0	0
PGC 18	-	1	10	87	1	100	0	0	0	0
PGC 19	0.01	2	15	58	1	80	10	10	0	0
PGC 20	0.01	4	41	19	1	100	0	0	0	0
PGC 21	0.30	1	15	67	1	30	65	5	0	0
PGC 22	-	0.5	20	62	1	100	0	0	0	0

[a] Clay hardpan. [b] Concrete.

TABLE 7 Eigenvalues and proportion of variance explained for the correlation matrix of the ten habitat metrics for 2006 sampling.

	Eigen Value	Proportion	Cumulative
Factor 1	4.1221	0.41	0.41
Factor 2	1.6265	0.16	0.57
Factor 3	0.9981	0.10	0.67
Factor 4	0.8149	0.08	0.76
Factor 5	0.6473	0.06	0.82
Factor 6	0.5747	0.06	0.88
Factor 7	0.4524	0.05	0.92
Factor 8	0.3552	0.04	0.96
Factor 9	0.2197	0.02	0.98
Factor 10	0.1890	0.02	1.00

TABLE 8 Eigenvectors for the two dominant factors of the correlation matrix of habitat metrics from 2006 sampling.

Habitat Metric	Factor 1	Factor 2
Factor 1		
VEL DPTH	0.41	-0.21
BENRIFF	0.38	0.18
CHAN ALT	0.37	0.36
EPI SUB	0.34	-0.21
BANKVEG	0.34	0.32
CHAN FLOW	0.29	-0.11
Factor 2		
RIPBUFF	0.26	0.47
SED DEP	0.28	-0.45
EMBEDD	0.30	-0.37
BANKSTAB	-0.00	0.27

TABLE 9 **Correlation matrix for raw physical habitat metrics grouped by factors identified by the PCA from 2006 sampling.**

In the body of the table the correlation coefficients (top) are paired with the p-value (bottom) for the null hypothesis that the correlation is 0.

	Bank Stab	Chan Alt	Vel Dpth	Epi Sub	Bank Veg	Sed Dep	Embedd	Rip Buff	Ben Riff	Chan Flow	Total
	1.00	0.02	-0.00	-0.07	0.14	-0.13	-0.01	0.09	-0.03	-0.03	0.13
BankStab		.9273	.9993	.6813	.4318	.4578	.9589	.6168	.8857	.8831	.4663
	0.02	1.00	0.44	0.36	0.66	0.11	0.29	0.54	0.67	0.39	0.74
Chan Alt	.9273		0.0079*	.0358*	0.0000*	.5289	.0883	0.0007*	0.0000*	.0216*	0.0000*
	-0.00	0.44	1.00	0.56	0.43	0.59	0.58	0.23	0.64	0.44	0.82
Vel Dpth	.9993	0.0079*		0.0005*	0.0100*	0.0002*	0.0003*	.1743	0.0000*	0.0075*	0.0000*
	-0.07	0.36	0.56	1.00	0.36	0.42	0.51	0.28	0.32	0.44	0.67
Epi Sub	.6813	.0358*	0.0005*		.0337	.0125*	0.0019*	.1030	.0572	0.0078*	0.0000*
	0.14	0.66	0.43	0.36	1.00	0.23	0.28	0.50	0.51	0.21	0.68
BankVeg	.4318	0.0000*	0.0100*	.0337*		.1925	.1047	0.0023*	0.0019*	.2267	0.0000*
	-0.13	0.11	0.59	0.42	0.23	1.00	0.50	0.07	0.27	0.38	0.58
Sed Dep	.4578	.5289	0.0002*	.0125*	.1925		0.0022*	.7076	.1167	.0247*	0.0003*
	-0.01	0.29	0.58	0.51	0.28	0.50	1.00	-0.01	0.33	0.21	0.57
Embedd	.9589	.0883	0.0003*	0.0019*	.1047	0.0022*		.9494	.0531	.2258	0.0003*
	0.09	0.54	0.23	0.28	0.50	0.07	-0.01	1.00	0.43	0.22	0.55
RipBuff	.6168	0.0007*	.1743	.1030	0.0023*	.7076	.9494		.0107*	.2007	0.0006*
	-0.03	0.67	0.64	0.32	0.51	0.27	0.33	0.43	1.00	0.34	0.76
BenRiff	.8857	0.0000*	0.0000*	.0572	0.0019*	.1167	.0531	.0107*		.0464*	0.0000*
	-0.03	0.39	0.44	0.44	0.21	0.38	0.21	0.22	0.34	1.00	0.61
Chan Flow	.8831	.0216*	0.0075*	0.0078*	.2267	.0247*	.2258	.2007	.0464*		0.0001*
	0.13	0.74	0.82	0.67	0.68	0.58	0.57	0.55	0.76	0.61	1.00
Total	.4663	0.0000*	0.0000*	0.0000*	0.0000*	0.0003*	0.0003*	0.0006*	0.0000*	0.0001*	

* $p < 0.05$

TABLE 10 Correlation matrix for stream measurements against raw physical habitat metrics and the total habitat metric score for 2006 sampling.

In the body of the table are the correlation coefficient(top) and the p-value(bottom) for the null hypothesis that the correlation is 0.

Metric	Width	Depth	MeanFlow	Fines	Gravel	Cobble
	0.13	0.11	0.17	0.19	0.09	0.04
BankStab	.4630	.5353	.4273	.2702	.6027	.8415
	0.05	0.15	0.37	0.29	-0.23	0.27
BankVeg	.7602	.3811	.0838	.0935	.1894	.1201
	-0.04	0.25	0.30	0.36	-0.22	0.28
Chan Alt	.8406	.1556	.1593	.0329*	.2112	.0971
	-0.24	-0.19	0.16	0.31	-0.23	0.51
BenRiff	.1772	.2833	.4590	.0712	.1821	0.0017*
	0.24	0.27	0.40	0.11	-0.35	0.37
Epi Sub	.1704	.1117	.0606	.5255	.0368*	.0309*
	0.17	0.27	0.23	0.39	0.10	0.04
RipBuff	.3464	.1236	.3007	.0213*	.5790	.8133
	-0.05	-0.08	0.25	0.14	-0.46	0.35
Sed Dep	.7965	.6379	.2540	.4089	0.0057*	.0401
	-0.03	-0.02	0.71	0.20	-0.53	0.64
Vel Dpth	.8854	.8930	0.0002*	.2562	0.0010*	0.0000*
	0.29	0.40	0.19	-0.03	-0.16	0.11
Ch Flow	.0953	.0170*	.3857	.8621	.3580	.5401
	-0.25	-0.21	0.32	0.05	-0.79	0.69
Embedd	.1554	.2324	.1303	.7943	0.0000*	0.0000*
	0.05	0.15	0.51	0.33	-0.44	0.53
Total	.7973	.3810	.0135	.0535	0.0087*	0.0011*

* p < 0.05

TABLE 11 **Mean scores for each physical habitat metric and the total for each creek with the p-values for comparing the means among creeks based on the Wilcoxon rank-sum test for 2006 sampling.**

Habitat Metric	Pleasant Grove Mean	Pleasant Grove N	Kirker Mean	Kirker N	Wilcoxon p-value
VEL DPTH	5.57	21	7.07	14	0.3707
EPI SUB	7.57	21	6.79	14	0.5412
BENRIFF	5.86	21	6.71	14	0.8872
CHAN ALT	14.00	21	10.71	14	0.2008
BANKVEG	13.62	21	12.29	14	0.3917
RIPBUFF	11.19	21	9.36	14	0.2498
SED DEP	4.95	21	6.21	14	0.3520
EMBEDD	2.10	21	2.43	14	0.7746
BANKSTAB	11.33	21	11.79	14	0.6689
CH FLOW	12.76	21	11.43	14	0.1517
Total	88.95	21	84.79	14	0.9597

* $p < 0.05$

TABLE 12 Eigenvalues and proportion of variance explained for the correlation matrix of the ten habitat metrics from 2007 sampling.

	Eigen Value	Proportion	Cumulative
Factor 1	4.0217	0.40	0.40
Factor 2	2.2838	0.23	0.63
Factor 3	1.1962	0.12	0.75
Factor 4	0.8531	0.09	0.84
Factor 5	0.4635	0.05	0.88
Factor 6	0.3638	0.04	0.92
Factor 7	0.3174	0.03	0.95
Factor 8	0.2068	0.02	0.97
Factor 9	0.1698	0.02	0.99
Factor 10	0.1239	0.01	1.00

TABLE 13 Eigenvectors for the three dominant factors of the correlation matrix of habitat metrics based on 2007 sampling.

Habitat Metric	Factor 1	Factor 2	Factor 3
Factor 1			
VEL DPTH	0.43	-0.16	-0.11
EPI SUB	0.41	0.04	0.14
BENRIFF	0.38	0.10	-0.32
CHAN FLOW	0.32	0.06	0.04
Factor 2			
RIPBUFF	0.15	0.56	0.06
BANKVEG	0.12	0.54	0.21
Factor 3			
BANKSTAB	-0.22	0.32	0.60
CHAN ALT	0.23	0.38	-0.40
EMBEDD	0.36	-0.25	0.39
SED DEP	0.37	-0.21	0.38

TABLE 14 Correlation matrix for raw physical habitat metrics grouped by factors identified by the PCA for 2007 sampling.

In the body of the table the correlation coefficients (top) are paired with the p-value (bottom) for the null hypothesis that the correlation is 0.00.

	Vel Dpth	Epi Sub	Ben Riff	Chan Flow	Rip Buff	Bank Veg	Bank Stab	Chan Alt	Embedd	Sed Dep	Total
Vel Dpth	1.00	0.57*	0.73*	0.38*	0.02	0.08	-0.52*	0.24	0.65*	0.66*	0.74*
	_	0.0003	0.0000	.0252	.9296	.6639	0.0014	.1707	0.0000	0.0000	0.0000
Epi Sub	0.57*	1.00	0.48*	0.57*	0.31	0.14	-0.21	0.39*	0.58*	0.58*	0.81*
	0.0003	_	0.0033	0.0003	.0743	.4247	.2204	.0205	0.0002	0.0002	0.0000
BenRiff	0.73*	0.48*	1.00	0.32	0.31	0.28	-0.38*	0.46*	0.35*	0.36*	0.71*
	0.0000	0.0033	_	.0617	.0714	.1097	.0235	0.0056	.0420	.0327	0.0000
Chan Flow	0.38*	0.57*	0.32	1.00	0.29	0.07	-0.21	0.31	0.38*	0.36*	0.67*
	.0252	0.0003	.0617	_	.0871	.6841	.2359	.0725	.0259	.0339	0.0000
RipBuff	0.02	0.31	0.31	0.29	1.00	0.68*	0.26	0.48*	-0.11	-0.01	0.48*
	.9296	.0743	.0714	.0871	_	0.0000	.1367	0.0032	.5174	.9692	0.0034
BankVeg	0.08	0.14	0.28	0.07	0.68*	1.00	0.37*	0.46*	0.02	0.06	0.45*
	.6639	.4247	.1097	.6841	0.0000	_	.0267	0.0057	.9226	.7316	0.0061
BankStab	-0.52*	-0.21	-0.38*	-0.21	0.26	0.37*	1.00	-0.18	-0.24	-0.24	-0.16
	0.0014	.2204	.0235	.2359	.1367	.0267	_	.3023	.1699	.1715	.3674
Chan Alt	0.24	0.39*	0.46*	0.31	0.48*	0.46*	-0.18	1.00	-0.01	0.04	0.53*
	.1707	.0205	0.0056	.0725	0.0032	0.0057	.3023	_	.9753	.8156	0.0011
Embedd	0.65*	0.58*	0.35*	0.38*	-0.11	0.02	-0.24	-0.01	1.00	0.80*	0.67*
	0.0000	0.0002	.0420	.0259	.5174	.9226	.1699	.9753	_	0.0000	0.0000
Sed Dep	0.66*	0.58*	0.36*	0.36*	-0.01	0.06	-0.24	0.04	0.80*	1.00	0.69*
	0.0000	0.0002	.0327	.0339	.9692	.7316	.1715	.8156	0.0000	_	0.0000
Total	0.74*	0.81*	0.71*	0.67*	0.48*	0.45*	-0.16	0.53*	0.67*	0.69*	1.00
	0.0000	0.0000	0.0000	0.0000	0.0034	0.0061	.3674	0.0011	0.0000	0.0000	_

* $p < 0.05$

TABLE 15 Correlation matrix for stream measurements against raw physical habitat metrics and the total habitat metric score for 2007 sampling.

In the body of the table are the correlation coefficient (top) and the p-value(bottom) for the null hypothesis that the correlation is 0.00.

Metric	Width	Depth	MeanFlow	Fines	Gravel	Cobble
BankStab	0.00 .9827	0.13 .4497	-0.02 .9559	-0.11 .5230	-0.14 .4257	-0.15 .4007
BankVeg	-0.08 .6569	-0.02 .9251	0.27 .3634	-0.30 .0795	0.13 .4417	0.09 .5923
Chan Alt	0.20 .2462	0.33 .0562	0.09 .7628	-0.07 .6741	0.14 .4218	0.03 .8829
BenRiff	-0.14 .4248	-0.21 .2340	0.76* 0.0028	-0.39* .0221	0.53* 0.0009	0.12 .5065
Epi Sub	0.41* .0152	0.24 .1582	0.50 .0841	-0.24 .1614	0.49* 0.0026	0.36* .0351
RipBuff	0.12 .5050	0.08 .6300	-0.03 .9200	-0.21 .2164	-0.08 .6543	-0.04 .8145
Sed Dep	-0.05 .7563	-0.21 .2269	0.52 .0689	-0.43* .0104	0.50* 0.0023	0.45* 0.0068
Vel Dpth	0.02 .9311	-0.27 .1187	0.81* 0.0008	-0.32 .0622	0.66* 0.0000	0.41* .0147
Ch Flow	0.36* .0336	0.19 .2858	0.02 .9555	-0.17 .3214	0.23 .1825	0.23 .1818
Embedd	-0.13 .4605	-0.21 .2356	0.53 .0633	-0.40* .0160	0.71* 0.0000	0.49* 0.0025
Total	0.14 .4316	-0.00 .9867	0.71* 0.0070	-0.46* 0.0056	0.60* 0.0001	0.38* .0226

$* p < 0.05$

TABLE 16 **Mean scores for each physical habitat metric and the total for each creek with the p-values for comparing the means among creeks based on the Wilcoxon rank-sum test for 2007 sampling.**

Habitat Metric	Pleasant Grove Mean	Pleasant Grove N	Kirker Mean	Kirker N	Wilcoxon p-value
VEL DPTH	5.05	21	1.93	14	0.1501
EPI SUB	9.14	21	4.79	14	0.0018*
BENRIFF	5.62	21	2.79	14	0.0567
CHAN ALT	15.05	21	11.00	14	0.0235*
BANKVEG	14.71	21	12.50	14	0.1165
RIPBUFF	10.81	21	7.36	14	0.0027*
SED DEP	5.62	21	3.50	14	0.2106
EMBEDD	4.00	21	1.43	14	0.2948
BANKSTAB	15.00	21	14.50	14	0.7917
CH FLOW	13.24	21	6.07	14	0.0002*
Total	98.24	21	65.86	14	0.0002*

* $p < 0.05$

TABLE 17 **Total and taxon abundance for benthic macroinvertebrates in Kirker Creek for 2006.**

Lowest Taxa	Higher Taxa	Total N	Total %	Cumulative %
Cyprididae	Cyprididae	2352	19.03	19.03
Physa sp.	Physidae	2236	18.09	37.12
Micropsectra sp.	Chironomidae	1964	15.89	53.01
Tubificidae unid.imm.	Tubificidae	1057	8.55	61.57
Simulium sp.	Simuliidae	680	5.50	67.07
Tubificidae w/hair	Tubificidae	591	4.78	71.85
Eukiefferiella sp.	Chironomidae	506	4.09	75.94
Radotanypus sp.	Chironomidae	372	3.01	78.95
Cricotopus sp.	Chironomidae	323	2.61	81.57
Chironomus sp.	Chironomidae	297	2.40	83.97
Nais communis/ variabilis	Naididae	243	1.97	85.94
Apedilum sp.	Chironomidae	202	1.63	87.57
Tanytarsus sp.	Chironomidae	137	1.11	88.68
Dero digitata	Naididae	128	1.04	89.72
Paratanytarsus sp.	Chironomidae	118	0.95	90.67
Parametriocnemus sp.	Chironomidae	90	0.73	91.40
Limnodrilus hoffmeisteri	Tubificidae	79	0.64	92.04
Enchytraeidae	Enchytraeidae	73	0.59	92.63
Dugesia tigrina	Planariidae	73	0.59	93.22
Hyalella sp.	Hyalellidae	68	0.55	93.77
Paranais litoralis	Naididae	67	0.54	94.31
Procladius sp.	Chironomidae	55	0.45	94.76
Corynoneura sp.	Chironomidae	48	0.39	95.15
Cricotopus bicinctus group	Chironomidae	39	0.32	95.46
Hydra sp.	Hydridae	33	0.27	95.73
Fossaria sp.	Lymnaeidae	32	0.26	95.99
Callibaetis sp.	Baetidae	29	0.23	96.22
Coenagrionidae	Coenagrionidae	28	0.23	96.45
Limnophyes sp.	Chironomidae	24	0.19	96.64
Tanytarsini	Chironomidae	23	0.19	96.83
Tipula sp.	Tipulidae	23	0.19	97.01
Alotanypus sp.	Chironomidae	21	0.17	97.18
Rheotanytarsus sp.	Chironomidae	21	0.17	97.35
Psectrotanypus sp.	Chironomidae	20	0.16	97.52
Corixidae	Corixidae	19	0.15	97.67
Stictotarsus sp.	Dytiscidae	18	0.15	97.82
Culicoides sp.	Ceratopogonidae	16	0.13	97.94
Chaetogaster diaphanus	Naididae	14	0.11	98.06
Tanypus sp.	Chironomidae	12	0.10	98.16
Microtendipes pedellus group	Chironomidae	11	0.09	98.24
Rheocricotopus sp.	Chironomidae	11	0.09	98.33

TABLE 17 Total and taxon abundance for benthic macroinvertebrates in Kirker Creek for 2006. (Continued)

Lowest Taxa	Higher Taxa	Total N	Total %	Cumulative %
Procambarus clarkii	Cambaridae	10	0.08	98.41
Scatella sp.	Ephydridae	10	0.08	98.50
Baetis tricaudatus	Baetidae	9	0.07	98.57
Menetus opercularis	Planorbidae	9	0.07	98.64
Ceratopogonidae	Ceratopogonidae	8	0.06	98.71
Polypedilum sp.	Chironomidae	8	0.06	98.77
Lumbriculus variegata	Lumbriculidae	8	0.06	98.83
Ferrissia sp.	Ancylidae	7	0.06	98.89
Phaenopsectra sp.	Chironomidae	7	0.06	98.95
Berosus sp.	Hydrophilidae	7	0.06	99.00
Muscidae	Muscidae	7	0.06	99.06
Pentaneura sp.	Chironomidae	6	0.05	99.11
Sigara sp.	Corixidae	6	0.05	99.16
Sciomyzidae	Sciomyzidae	6	0.05	99.21
Lumbricina	Glossiphoniidae	5	0.04	99.25
Laccobius sp.	Hydrophilidae	5	0.04	99.29
Tropisternus sp.	Hydrophilidae	5	0.04	99.33
Chironomini	Chironomidae	4	0.03	99.36
Psychoda sp.	Psychodidae	4	0.03	99.39
Pisidium sp.	Sphaeriidae	4	0.03	99.43
Bezzia/ Palpomyia	Ceratopogonidae	3	0.02	99.45
Paratendipes sp.	Chironomidae	3	0.02	99.47
Laccophilus sp.	Dytiscidae	3	0.02	99.50
Ephydridae	Ephydridae	3	0.02	99.52
Chrysops sp.	Tabanidae	3	0.02	99.55
Ormosia sp.	Tipulidae	3	0.02	99.57
Dicrotendipes sp.	Chironomidae	2	0.02	99.59
Nanocladius sp.	Chironomidae	2	0.02	99.60
Orthocladiinae	Chironomidae	2	0.02	99.62
Orthocladius complex	Chironomidae	2	0.02	99.64
Agabus regularis	Dytiscidae	2	0.02	99.65
Dytiscidae	Dytiscidae	2	0.02	99.67
Hydrellia sp.	Ephydridae	2	0.02	99.68
Slavina appendiculata	Naididae	2	0.02	99.70
Planariidae	Planariidae	2	0.02	99.72
Pericoma/ Telmatoscopus	Psychodidae	2	0.02	99.73
Anax walsinghami	Aeshnidae	1	0.01	99.74
Ablabesmyia sp.	Chironomidae	1	0.01	99.75
Boreochlus sp.	Chironomidae	1	0.01	99.76
Brillia sp.	Chironomidae	1	0.01	99.77
Cricotopus nostocicola	Chironomidae	1	0.01	99.77

TABLE 17 Total and taxon abundance for benthic macroinvertebrates in Kirker Creek for 2006. (Continued)

Lowest Taxa	Higher Taxa	Total N	Total %	Cumulative %
Cryptochironomus sp.	Chironomidae	1	0.01	99.78
Paraphaenocladius sp.	Chironomidae	1	0.01	99.79
Psectrocladius sp.	Chironomidae	1	0.01	99.80
Pseudosmittia sp.	Chironomidae	1	0.01	99.81
Thienemanniella sp.	Chironomidae	1	0.01	99.81
Thienemannimyia group	Chironomidae	1	0.01	99.82
Zoniagrion exlcamationis	Coenagrionidae	1	0.01	99.83
Corbicula sp.	Corbiculidae	1	0.01	99.84
Culex sp.	Culicidae	1	0.01	99.85
Agabus sp.	Dytiscidae	1	0.01	99.85
Hydroporus sp.	Dytiscidae	1	0.01	99.86
Liodessus obscurellus	Dytiscidae	1	0.01	99.87
Rhantus sp.	Dytiscidae	1	0.01	99.88
Mooreobdella microstoma	Erpobdellidae	1	0.01	99.89
Ochthebius sp.	Hydraenidae	1	0.01	99.89
Helochares sp.	Hydrophilidae	1	0.01	99.90
Hydrobius fuscipes	Hydrophilidae	1	0.01	99.91
Tropisternus lateralis	Hydrophilidae	1	0.01	99.92
Oxyethira sp.	Hydroptilidae	1	0.01	99.93
Corticacarus sp.	Hygrobatidae	1	0.01	99.94
Lymnaeidae	Lymnaeidae	1	0.01	99.94
Pristina leidyi	Naididae	1	0.01	99.95
Sialis sp.	Sialidae	1	0.01	99.96
Caloparyphus/ Euparyphus	Stratiomyidae	1	0.01	99.97
Syrphidae	Syrphidae	1	0.01	99.98
Prostoma sp.	Tertastemmatidae	1	0.01	99.98
Antocha sp.	Tipulidae	1	0.01	99.99
Limonia sp.	Tipulidae	1	0.01	100.00
	Total	12359		

TABLE 18 Benthic metrics by site for the 14 Kirker Creek sites sampled in 2006.

Site	KC 1	KC 2	KC 3	KC 4	KC 5	KC 6	KC 7	KC 8	KC 9	KC 10	KC 11	KC 12	KC 13	KC 14
Taxonomic Richness	16.00	18.00	28.00	32.00	19.00	26.00	32.00	30.00	29.00	24.00	30.00	34.00	41.00	31.00
Percent Dominant Taxon	54.58	80.81	63.38	38.05	75.81	26.67	26.14	35.04	35.64	37.05	39.86	42.23	23.50	32.81
Number Plecoptera Taxa	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Number Trichoptera Taxa	0.00	0.00	0.00	0.00	1.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
EPT Taxa	0.00	0.00	1.00	0.00	1.00	0.00	0.00	0.00	1.00	1.00	0.00	0.00	1.00	1.00
EPT Index (%)	0.00	0.00	1.99	0.00	0.11	0.00	0.00	0.00	0.23	0.58	0.00	0.00	0.24	1.24
Sensitive EPT Index (%)	0.00	0.00	0.00	0.00	0.11	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Shannon Diversity	1.36	0.80	1.60	2.32	1.08	2.31	2.23	1.95	2.13	1.90	1.95	2.03	2.46	2.08
Tolerance Value	8.18	7.98	7.80	8.62	7.73	7.72	7.18	7.58	7.53	7.13	6.72	7.52	7.60	6.96
Percent Intolerant Taxa (0-2)	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Percent Tolerant Taxa (8-10)	61.54	53.33	58.33	37.50	56.25	40.91	44.83	37.50	41.67	40.00	21.43	51.52	38.89	31.03
Percent Baetidae	0.00	0.00	1.99	0.00	0.00	0.00	0.00	0.00	0.23	0.58	0.00	0.00	0.24	1.24
Percent Chironomidae	3.09	2.84	15.93	16.76	5.38	55.28	57.42	30.03	52.02	64.21	51.63	32.30	42.30	66.85
Percent Hydropsychidae	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Percent Collectors Gatherers	42.94	16.36	30.31	89.20	87.12	83.94	79.18	93.47	70.29	35.41	57.58	72.88	73.26	53.89
Percent Collector-Filterers	1.21	0.33	0.88	4.43	1.12	10.02	8.92	1.75	1.27	23.99	27.39	4.19	12.60	13.64
Percent Scrapers	55.52	82.66	63.83	3.86	2.02	0.11	8.12	2.80	15.84	0.46	8.74	8.27	0.82	1.01
Percent Predators	0.22	0.55	4.76	2.50	9.63	5.92	1.83	1.40	4.05	1.73	2.21	8.27	9.66	31.12
Percent Shredders	0.00	0.11	0.11	0.00	0.00	0.00	0.23	0.12	0.00	0.12	0.47	0.44	0.00	0.11
Total Abundance (#/sample)	43784	46976	4375	3875	79008	9424	4410	1845	9534	13079	26144	10213	14941	24629

TABLE 19 Total and taxon abundance for benthic macroinvertebrates in Kirker Creek for 2007.

Lowest Taxa	Higher Taxa	Total N	Total %	Cumulative %
Cyprididae	Cyprididae	1466	15.56	15.56
Physa sp.	Physidae	1436	15.24	30.80
Tubificidae Unident. immature	Tubificidae	1219	12.94	43.73
Tubificidae with hair chaetae	Tubificidae	904	9.59	53.33
Chironomus sp.	Chironomidae	718	7.62	60.95
Hyalella sp.	Hyalellidae	683	7.25	68.19
Dero digitata	Naididae	428	4.54	72.74
Micropsectra sp.	Chironomidae	360	3.82	76.56
Limnodrilus hoffmeisteri	Tubificidae	312	3.31	79.87
Cricotopus sp.	Chironomidae	153	1.62	81.49
Radotanypus sp.	Chironomidae	140	1.49	82.98
Psectrotanypus sp.	Chironomidae	133	1.41	84.39
Tanypus sp.	Chironomidae	128	1.36	85.75
Paratanytarsus sp.	Chironomidae	103	1.09	86.84
Limnophyes sp.	Chironomidae	80	0.85	87.69
Lumbricina	Glossiphoniidae	79	0.84	88.53
Tanytarsus sp.	Chironomidae	70	0.74	89.27
Alotanypus sp.	Chironomidae	69	0.73	90.00
Corixidae	Corixidae	59	0.63	90.63
Nais communis/ variabilis	Naididae	57	0.60	91.23
Enchytraeidae	Enchytraeidae	50	0.53	91.76
Dugesia tigrina	Planariidae	49	0.52	92.28
Cricotopus bicinctus group	Chironomidae	46	0.49	92.77
Tipula sp.	Tipulidae	46	0.49	93.26
Coenagrionidae	Coenagrionidae	40	0.42	93.69
Callibaetis sp.	Baetidae	36	0.38	94.07
Slavina appendiculata	Naididae	36	0.38	94.45
Trichocorixa calva	Corixidae	34	0.36	94.81
Parametriocnemus sp.	Chironomidae	32	0.34	95.15
Culicidae	Culicidae	31	0.33	95.48
Procambarus clarkii	Cambaridae	30	0.32	95.80
Culiseta sp.	Culicidae	29	0.31	96.11
Tanypodinae	Chironomidae	26	0.28	96.38
Fossaria sp.	Lymnaeidae	26	0.28	96.66
Tvetenia sp.	Chironomidae	15	0.16	96.82
Culex sp.	Culicidae	14	0.15	96.96
Scatella sp.	Ephydridae	13	0.14	97.10
Simulium sp.	Simuliidae	12	0.13	97.23
Culicoides sp.	Ceratopogonidae	11	0.12	97.35
Paranais litoralis	Naididae	11	0.12	97.46
Argia sp.	Coenagrionidae	10	0.11	97.57
Pericoma/ Telmatoscopus	Psychodidae	10	0.11	97.68
Ischnura sp.	Coenagrionidae	9	0.10	97.77
Pisidium sp.	Sphaeriidae	8	0.08	97.86
Ceratopogonidae	Ceratopogonidae	7	0.07	97.93
Orthocladius complex	Chironomidae	7	0.07	98.00
Sigara mckinstryi	Corixidae	7	0.07	98.08
Corynoneura sp.	Chironomidae	6	0.06	98.14
Orthocladiinae	Chironomidae	6	0.06	98.21
Tvetenia bavarica group	Chironomidae	6	0.06	98.27

TABLE 19 Total and taxon abundance for benthic macroinvertebrates in Kirker Creek for 2007. (Continued)

Lowest Taxa	Higher Taxa	Total N	Total %	Cumulative %
Erpobdellidae	Erpobdellidae	6	0.06	98.33
Berosus sp.	Hydrophilidae	6	0.06	98.40
Oxyethira sp.	Hydroptilidae	6	0.06	98.46
Lumbriculus variegata	Lumbriculidae	6	0.06	98.52
Menetus opercularis	Planorbidae	6	0.06	98.59
Sciomyzidae	Sciomyzidae	6	0.06	98.65
Orconectes virilis	Cambaridae	5	0.05	98.71
Dicrotendipes sp.	Chironomidae	5	0.05	98.76
Smittia sp.	Chironomidae	5	0.05	98.81
Trichoclinocera sp.	Empididae	5	0.05	98.86
Lymnaea sp.	Lymnaeidae	5	0.05	98.92
Probezzia sp.	Ceratopogonidae	4	0.04	98.96
Paramerina sp.	Chironomidae	4	0.04	99.00
Ephydridae	Ephydridae	4	0.04	99.04
Brachycera	Hydrophilidae	4	0.04	99.09
Sphaeriidae	Sphaeriidae	4	0.04	99.13
Prostoma sp.	Tertastemmatidae	4	0.04	99.17
Aeshna sp.	Aeshnidae	3	0.03	99.20
Brillia sp.	Chironomidae	3	0.03	99.24
Aedes sp.	Culicidae	3	0.03	99.27
Dixella sp.	Dixidae	3	0.03	99.30
Colymbetes sp.	Dytiscidae	3	0.03	99.33
Hydra sp.	Hydridae	3	0.03	99.36
Laccobius sp.	Hydrophilidae	3	0.03	99.40
Libellulidae	Libellulidae	3	0.03	99.43
Muscidae	Muscidae	3	0.03	99.46
Psychoda sp.	Psychodidae	3	0.03	99.49
Anax junius	Aeshnidae	2	0.02	99.51
Bezzia/ Palpomyia	Ceratopogonidae	2	0.02	99.53
Apedilum sp.	Chironomidae	2	0.02	99.55
Chironomidae	Chironomidae	2	0.02	99.58
Chironomini	Chironomidae	2	0.02	99.60
Eukiefferiella sp.	Chironomidae	2	0.02	99.62
Paraphaenocladius sp.	Chironomidae	2	0.02	99.64
Pentaneura sp.	Chironomidae	2	0.02	99.66
Pseudosmittia sp.	Chironomidae	2	0.02	99.68
Mooreobdella microstoma	Erpobdellidae	2	0.02	99.70
Psychodidae	Psychodidae	2	0.02	99.72
Sialis sp.	Sialidae	2	0.02	99.75
Empididae	Empididae	1	0.01	99.80
Helobdella sp.	Glossiphoniidae	1	0.01	99.81
Decapoda	Hyalellidae	1	0.01	99.82
Diptera	Hydrophilidae	1	0.01	99.83
Tropisternus sp.	Hydrophilidae	1	0.01	99.84
Hydropsychidae	Hydropsychidae	1	0.01	99.85
Archilestes sp.	Lestidae	1	0.01	99.86
Lestidae	Lestidae	1	0.01	99.87
Libellula sp.	Libellulidae	1	0.01	99.88
Plathemis sp.	Libellulidae	1	0.01	99.89
Stylaria lacustris	Naididae	1	0.01	99.90

TABLE 19 Total and taxon abundance for benthic macroinvertebrates in Kirker Creek for 2007. (Continued)

Lowest Taxa	Higher Taxa	Total N	Total %	Cumulative %
Notonectidae	Notonectidae	1	0.01	99.92
Wormaldia sp.	Philopotamidae	1	0.01	99.93
Planorbella sp.	Planorbidae	1	0.01	99.94
Psychomyia sp.	Psychomyiidae	1	0.01	99.95
Scathophagidae	Scathophagidae	1	0.01	99.96
Stratiomyidae	Stratiomyidae	1	0.01	99.97
Stratiomys sp.	Stratiomyidae	1	0.01	99.98
Syrphidae	Syrphidae	1	0.01	99.99
Aulodrilus pigueti	Tubificidae	1	0.01	100.00
	Total	9423		

TABLE 20 Benthic metrics by site for the 14 Kirker Creek sites sampled in 2007.

Site	KC 1	KC 2	KC 3	KC 4	KC 5	KC 6	KC 7	KC 8	KC 9	KC 10	KC 11	KC 12	KC 13	KC 14
Taxonomic Richness	32	33	18	21	29	30	11	10	19	26	19	20	43	21
Percent Dominant Taxon	37.5	18	39.3	42.5	43.5	22	74.3	33.5	41.6	38.5	83.9	48.9	25.3	48.5
Number Plecoptera Taxa	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Number Trichoptera Taxa	0	1	0	1	0	0	1	0	0	0	1	1	0	1
EPT Taxa	0	1	0	1	0	0	1	0	0	0	1	1	1	2
EPT Index (%)	0	0	0	0	0	0	0	0	0	0	0	0	0	4
Sensitive EPT Index (%)	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Shannon Diversity	1.96	2.4	1.8	1.95	2.15	2.6	0.93	1.71	1.81	2.05	0.7	1.74	2.85	1.22
Tolerance Value	8.13	8.24	8.81	8.93	8.96	8.56	5.75	8.18	8.27	7.73	7.86	7.89	7.76	8
Percent Intolerant Taxa (0-2)	4	0	0	0	0	4	11	0	0	0	0	0	3	0
Percent Tolerant Taxa (8-10)	43	46	69	56	56	52	44	50	56	50	41	56	46	61
Percent Baetidae	0	0	0	0	0	0	0	0	0	0	0	0	0	4
Percent Chironomidae	16	30	26	4	16	74	4	9	5	8	5	9	67	2
Percent Hydropsychidae	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Percent Collectors Gatherers	90	65	69	96	84	75	100	95	75	54	15	86	60	94
Percent Collector-Filterers	1	11	2	1	2	3	0	1	1	0	0	1	2	0
Percent Scrapers	3	19	19	1	1	0	0	0	20	39	84	5	3	2
Percent Predators	5	4	6	0	12	21	0	0	2	2	1	7	34	3
Percent Shredders	1	0	3	0	0	0	0	4	3	0	0	1	0	0
Total Abundance (#/sample)	3313	2576	1069	729	6191	11152	6502	157	300	1071	26832	4051	13602	87632

TABLE 21 Total and taxon abundance for benthic macroinvertebrates in Pleasant Grove Creek in 2006.

Lowest Taxa	Higher Taxa	Total N	Total %	Cumulative %
Micropsectra sp.	Chironomidae	3788	20.66	20.66
Tubificidae unid.imm.	Tubificidae	2315	12.63	33.29
Paratanytarsus sp.	Chironomidae	1645	8.97	42.26
Physa sp.	Physidae	1325	7.23	49.49
Nais communis/ variabilis	Naididae	1139	6.21	55.70
Dugesia tigrina	Planariidae	868	4.73	60.43
Tubificidae w/hair	Tubificidae	620	3.38	63.82
Psectrotanypus sp.	Chironomidae	466	2.54	66.36
Rheocricotopus sp.	Chironomidae	407	2.22	68.58
Chironomus sp.	Chironomidae	362	1.97	70.55
Dero digitata	Naididae	343	1.87	72.42
Hyalella sp.	Hyalellidae	337	1.84	74.26
Cricotopus sp.	Chironomidae	334	1.82	76.08
Hydropsyche californica	Hydropsychidae	286	1.56	77.64
Liodessus obscurellus	Dytiscidae	281	1.53	79.18
Lumbriculus variegata	Lumbriculidae	266	1.45	80.63
Simulium sp.	Simuliidae	257	1.40	82.03
Hydropsyche sp.	Hydropsychidae	242	1.32	83.35
Helobdella sp.	Glossiphoniidae	230	1.25	84.60
Coenagrionidae	Coenagrionidae	226	1.23	85.84
Menetus opercularis	Planorbidae	186	1.01	86.85
Polypedilum sp.	Chironomidae	131	0.71	87.56
Pisidium sp.	Sphaeriidae	126	0.69	88.25
Cyprididae	Cyprididae	123	0.67	88.92
Corixidae	Corixidae	116	0.63	89.55
Planorbella sp.	Planorbidae	101	0.55	90.11
Ophidonais serpentina	Naididae	85	0.46	90.57
Oxyethira sp.	Hydroptilidae	83	0.45	91.02
Glossiphoniidae	Glossiphoniidae	81	0.44	91.46
Fossaria sp.	Lymnaeidae	80	0.44	91.90
Slavina appendiculata	Naididae	76	0.41	92.31
Dicrotendipes sp.	Chironomidae	68	0.37	92.69
Tanytarsus sp.	Chironomidae	64	0.35	93.03
Chaetogaster diaphanus	Naididae	63	0.34	93.38
Paratendipes sp.	Chironomidae	54	0.29	93.67
Eukiefferiella sp.	Chironomidae	53	0.29	93.96
Stylaria lacustris	Naididae	53	0.29	94.25
Baetis tricaudatus	Baetidae	48	0.26	94.51
Haemonais sp.	Naididae	48	0.26	94.77
Hydra sp.	Hydridae	43	0.23	95.01

TABLE 21 Total and taxon abundance for benthic macroinvertebrates in Pleasant Grove Creek in 2006. (Continued)

Lowest Taxa	Higher Taxa	Total N	Total %	Cumulative %
Procladius sp.	Chironomidae	42	0.23	95.24
Tricorythodes sp.	Leptohyphidae	41	0.22	95.46
Helobdella stagnalis	Glossiphoniidae	39	0.21	95.67
Helobdella triserialis	Glossiphoniidae	38	0.21	95.88
Ablabesmyia sp.	Chironomidae	35	0.19	96.07
Thienemanniella sp.	Chironomidae	32	0.17	96.25
Enchytraeidae	Enchytraeidae	30	0.16	96.41
Zavrelimyia sp.	Chironomidae	28	0.15	96.56
Cricotopus bicinctus group	Chironomidae	27	0.15	96.71
Lumbricina	Glossiphoniidae	26	0.14	96.85
Culex sp.	Culicidae	23	0.13	96.98
Cladotanytarsus sp.	Chironomidae	21	0.11	97.09
Psychoda sp.	Psychodidae	21	0.11	97.21
Corynoneura sp.	Chironomidae	20	0.11	97.32
Dero borellii	Naididae	20	0.11	97.43
Fallceon quilleri	Baetidae	18	0.10	97.52
Phaenopsectra sp.	Chironomidae	18	0.10	97.62
Libellula sp.	Libellulidae	18	0.10	97.72
Planariidae	Planariidae	18	0.10	97.82
Gyraulus sp.	Planorbidae	18	0.10	97.92
Prostoma sp.	Tertastemmatidae	16	0.09	98.00
Apedilum sp.	Chironomidae	15	0.08	98.09
Pristina leidyi	Naididae	15	0.08	98.17
Ephydridae	Ephydridae	14	0.08	98.24
Limnodrilus hoffmeisteri	Tubificidae	14	0.08	98.32
Caenis sp.	Caenidae	12	0.07	98.39
Tanypus sp.	Chironomidae	12	0.07	98.45
Hydraena sp.	Hydraenidae	11	0.06	98.51
Sciomyzidae	Sciomyzidae	11	0.06	98.57
Eucorethra sp.	Chaoboridae	10	0.05	98.63
Pristinella jenkinae	Naididae	10	0.05	98.68
Hydrellia sp.	Ephydridae	9	0.05	98.73
Ochthebius sp.	Hydraenidae	9	0.05	98.78
Orthocladiinae	Chironomidae	8	0.04	98.82
Corbicula sp.	Corbiculidae	8	0.04	98.87
Tipula sp.	Tipulidae	8	0.04	98.91
Ceratopogon sp.	Ceratopogonidae	7	0.04	98.95
Psychodidae	Psychodidae	7	0.04	98.99
Procambarus clarkii	Cambaridae	6	0.03	99.02
Ceratopogonidae	Ceratopogonidae	6	0.03	99.05
Probezzia sp.	Ceratopogonidae	6	0.03	99.08

TABLE 21 Total and taxon abundance for benthic macroinvertebrates in Pleasant Grove Creek in 2006. (Continued)

Lowest Taxa	Higher Taxa	Total N	Total %	Cumulative %
Constempellina sp.	Chironomidae	6	0.03	99.12
Cricotopus trifascia group	Chironomidae	6	0.03	99.15
Limnophyes sp.	Chironomidae	6	0.03	99.18
Microchironomus sp.	Chironomidae	6	0.03	99.21
Sanfilippodytes sp.	Dytiscidae	6	0.03	99.25
Culicoides sp.	Ceratopogonidae	5	0.03	99.27
Chironomini	Chironomidae	5	0.03	99.30
Mooreobdella microstoma	Erpobdellidae	5	0.03	99.33
Gammarus sp.	Gammaridae	5	0.03	99.36
Muscidae	Muscidae	5	0.03	99.38
Baetis sp.	Baetidae	4	0.02	99.41
Caenis latipennis	Caenidae	4	0.02	99.43
Dasyhelea sp.	Ceratopogonidae	4	0.02	99.45
Rheotanytarsus sp.	Chironomidae	4	0.02	99.47
Thienemannimyia group	Chironomidae	4	0.02	99.49
Xenochironomus sp.	Chironomidae	4	0.02	99.51
Trichocorixa calva	Corixidae	4	0.02	99.54
Tropisternus lateralis	Hydrophilidae	4	0.02	99.56
Limnesia sp.	Limnesiidae	4	0.02	99.58
Ferrissia sp.	Ancylidae	3	0.02	99.60
Callibaetis sp.	Baetidae	3	0.02	99.61
Bezzia/ Palpomyia	Ceratopogonidae	3	0.02	99.63
Cryptochironomus sp.	Chironomidae	3	0.02	99.65
Endochironomus sp.	Chironomidae	3	0.02	99.66
Zavrelimyia/ Paramerina	Chironomidae	3	0.02	99.68
Tropisternus sp.	Hydrophilidae	3	0.02	99.69
Hydroptilidae	Hydroptilidae	3	0.02	99.71
Libellulidae	Libellulidae	3	0.02	99.73
Sphaerium sp.	Sphaeriidae	3	0.02	99.74
Limonia sp.	Tipulidae	3	0.02	99.76
Ormosia sp.	Tipulidae	3	0.02	99.78
Arrenurus sp.	Arrenuridae	2	0.01	99.79
Centroptilum sp.	Baetidae	2	0.01	99.80
Larsia sp.	Chironomidae	2	0.01	99.81
Nanocladius sp.	Chironomidae	2	0.01	99.82
Orthocladius complex	Chironomidae	2	0.01	99.83
Laccophilus sp.	Dytiscidae	2	0.01	99.84
Erpobdellidae	Erpobdellidae	2	0.01	99.85
Haemopsis sp.	Hirudinidae	2	0.01	99.86
Cymbiodyta sp.	Hydrophilidae	2	0.01	99.87

TABLE 21 Total and taxon abundance for benthic macroinvertebrates in Pleasant Grove Creek in 2006. (Continued)

Lowest Taxa	Higher Taxa	Total N	Total %	Cumulative %
Leptoceridae	Leptoceridae	2	0.01	99.89
Pericoma/ Telmatoscopus	Psychodidae	2	0.01	99.90
Tipulidae	Tipulidae	2	0.01	99.91
Lauterborniella sp.	Chironomidae	1	0.01	99.91
Paracladopelma sp.	Chironomidae	1	0.01	99.92
Parakiefferiella sp.	Chironomidae	1	0.01	99.92
Pentaneura sp.	Chironomidae	1	0.01	99.93
Stempellina sp.	Chironomidae	1	0.01	99.93
Trombidiformes	Cyprididae	1	0.01	99.94
Dolichopodidae	Dolichopodidae	1	0.01	99.95
Agabus lutosus	Dytiscidae	1	0.01	99.95
Scatella sp.	Ephydridae	1	0.01	99.96
Erpetogomphus sp.	Gomphidae	1	0.01	99.96
Helophorus sp.	Helophoridae	1	0.01	99.97
Hydrobius fuscipes	Hydrophilidae	1	0.01	99.97
Hydropsychidae	Hydropsychidae	1	0.01	99.98
Amphipoda	Leptoceridae	1	0.01	99.98
Pachydiplax longipennis	Libellulidae	1	0.01	99.99
Sperchon sp.	Sperchontidae	1	0.01	99.99
Stratiomyidae	Stratiomyidae	1	0.01	100.00
	Total	18334		

TABLE 22 Benthic metrics by site for the 21 Pleasant Grove Creek sites sampled in 2006.

Site	PGC 1	PGC 2	PGC 3	PGC 4	PGC 5	PGC 6	PGC 7	PGC 8	PGC 9	PGC 10	PGC 11
Taxonomic Richness	34.00	43.00	45.00	52.00	32.00	39.00	49.00	21.00	21.00	44.00	32.00
Percent Dominant Taxon	33.78	45.56	47.13	19.02	29.40	19.16	30.81	35.25	70.00	26.77	45.95
Number Plecoptera Taxa	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Number Trichoptera Taxa	1.00	5.00	2.00	4.00	3.00	3.00	1.00	0.00	1.00	0.00	0.00
EPT Taxa	3.00	8.00	5.00	6.00	5.00	7.00	4.00	0.00	1.00	0.00	0.00
EPT Index (%)	0.68	9.70	3.28	4.40	51.23	12.13	3.27	0.00	0.34	0.00	0.00
Sensitive EPT Index (%)	0.11	0.93	2.11	2.85	0.23	0.79	0.58	0.00	0.34	0.00	0.00
Shannon Diversity	2.28	2.12	2.13	2.89	2.23	2.68	2.82	1.78	1.30	2.35	1.89
Tolerance Value	7.37	6.49	6.79	6.49	5.55	6.16	7.17	8.17	6.96	7.27	8.53
Percent Intolerant Taxa (0-2)	0.00	0.00	0.00	2.13	0.00	2.78	2.38	0.00	0.00	0.00	0.00
Percent Tolerant Taxa (8-10)	40.00	30.77	23.68	31.91	28.57	27.78	33.33	61.54	44.44	36.11	48.00
Percent Baetidae	0.34	3.39	0.35	0.36	3.15	1.13	0.00	0.00	0.00	0.00	0.00
Percent Chironomidae	25.34	67.99	64.95	44.95	17.85	51.47	55.54	0.68	83.86	44.38	9.26
Percent Hydropsychidae	0.00	4.21	0.82	1.07	47.84	7.48	0.00	0.00	0.00	0.00	0.00
Percent Collectors Gatherers	28.57	68.62	69.48	42.69	22.87	46.19	45.78	96.04	79.59	39.88	93.84
Percent Collector-Filterers	23.49	7.85	16.20	22.71	60.79	35.95	32.90	0.00	6.27	28.57	0.12
Percent Scrapers	37.89	0.94	4.34	3.69	1.75	4.78	3.04	3.39	0.57	26.43	2.44
Percent Predators	9.81	4.92	4.46	23.31	1.52	3.53	17.56	0.45	13.23	4.05	3.02
Percent Shredders	0.00	0.00	0.23	0.12	0.35	0.11	0.00	0.00	0.00	0.12	0.35
Total Abundance (#/sample)	12400	21171	30928	8004	8372	8902	4563	25675	14253	11128	4132

TABLE 22 Benthic metrics by site for the 21 Pleasant Grove Creek sites sampled in 2006. (Continued)

Site	PGC 12	PGC 14	PGC 15	PGC 16	PGC 17	PGC 18	PGC 19	PGC 20	PGC 21	PGC 22
Taxonomic Richness	17.00	29.00	31.00	33.00	23.00	23.00	37.00	40.00	35.00	22.00
Percent Dominant Taxon	27.08	25.93	37.51	24.81	22.48	40.09	53.52	22.20	68.85	35.12
Number Plecoptera Taxa	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Number Trichoptera Taxa	0.00	0.00	0.00	0.00	0.00	1	2	1	1	0.00
EPT Taxa	0.00	0.00	0.00	0.00	0.00	1	2	1	1	0.00
EPT Index (%)	0.00	0.00	0.00	0.00	0.00	0.57	0.34	0.00	0.56	0.00
Sensitive EPT Index (%)	0.00	0.00	0.00	0.00	0.00	0.57	0.46	0.34	0.56	0.00
Shannon Diversity	2.01	2.37	2.22	2.7	2.2	1.8	1.9	2.5	1.4	2.0
Tolerance Value	8.19	6.75	8.70	7.1	7.6	7.0	6.7	7.2	7.3	7.3
Percent Intolerant Taxa (0-2)	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Percent Tolerant Taxa (8-10)	50.00	45.45	50.00	51.85	53.33	30.00	38.24	38.89	44.44	55.56
Percent Baetidae	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Percent Chironomidae	53.81	41.47	33.99	20.47	12.18	67.95	74.28	27.58	79.01	5.32
Percent Hydropsychidae	0.00	0.00	0.00	0.00	0.00	0.00	0.12	0.00	0.00	0.00
Percent Collectors Gatherers	71.51	55.37	63.04	24.83	40.51	68.05	66.39	38.76	90.73	65.45
Percent Collector-Filterers	9.15	12.27	6.93	2.20	7.49	6.23	10.39	14.16	2.71	0.45
Percent Scrapers	9.50	5.37	4.84	14.15	16.63	0.35	4.97	36.52	1.58	19.93
Percent Predators	9.84	26.29	25.08	24.13	35.01	24.68	11.66	9.77	2.82	13.93
Percent Shredders	0.00	0.00	0.11	0.00	0.00	0.12	0.12	0.34	0.45	0.00
Total Abundance (#/sample)	11227	17200	9656	16286	8076	20576	5389	15603	8802	3725

TABLE 23 Total and taxon abundance for benthic macroinvertebrates in Pleasant Grove Creek for 2007.

Lowest Taxa	Higher Taxa	Total N	Total %	Cumulative %
Unidentified immature	Tubificidae	1863	10.35	10.35
Physa sp.	Physidae	1413	7.85	18.21
Hyalella sp.	Hyalellidae	1390	7.72	25.93
Dugesia tigrina	Planariidae	1110	6.17	32.10
Dero digitata	Naididae	825	4.58	36.68
Dicrotendipes sp.	Chironomidae	673	3.74	40.42
Rheocricotopus sp.	Chironomidae	622	3.46	43.88
Tricorythodes sp.	Leptohyphidae	540	3.00	46.88
Micropsectra sp.	Chironomidae	512	2.85	49.73
Pisidium sp.	Sphaeriidae	487	2.71	52.43
Menetus opercularis	Planorbidae	453	2.52	54.95
Psectrotanypus sp.	Chironomidae	439	2.44	57.39
Chironomus sp.	Chironomidae	432	2.40	59.79
Hydropsyche californica	Hydropsychidae	431	2.40	62.19
Paratanytarsus sp.	Chironomidae	426	2.37	64.55
Nais communis/ variabilis	Naididae	410	2.28	66.83
Cricotopus sp.	Chironomidae	372	2.07	68.90
with hair chaetae	Tubificidae	372	2.07	70.97
Oxyethira sp.	Hydroptilidae	353	1.96	72.93
Lumbriculus variegate	Lumbriculidae	352	1.96	74.89
Cyprididae	Cyprididae	334	1.86	76.74
Haemonais waldvogeli	Naididae	311	1.73	78.47
Turbellaria	Tertastemmatidae	268	1.49	79.96
Simulium sp.	Simuliidae	256	1.42	81.38
Rheotanytarsus sp.	Chironomidae	217	1.21	82.59
Sphaerium sp.	Sphaeriidae	179	0.99	83.58
Aulodrilus pigueti	Tubificidae	160	0.89	84.47
Lumbricina	Glossiphoniidae	150	0.83	85.31
Hydropsyche sp.	Hydropsychidae	142	0.79	86.10
Polypedilum sp.	Chironomidae	128	0.71	86.81
Baetis tricaudatus	Baetidae	127	0.71	87.51
Planorbella sp.	Planorbidae	122	0.68	88.19
Paratendipes sp.	Chironomidae	121	0.67	88.86
Limnodrilus hoffmeisteri	Tubificidae	111	0.62	89.48
Sphaeriidae	Sphaeriidae	104	0.58	90.06
Coenagrionidae	Coenagrionidae	97	0.54	90.60
Eukiefferiella sp.	Chironomidae	86	0.48	91.07
Chironomidae	Chironomidae	85	0.47	91.55
Bezzia/ Palpomyia	Ceratopogonidae	83	0.46	92.01
Corbicula sp.	Corbiculidae	76	0.42	92.43
Thienemanniella sp.	Chironomidae	74	0.41	92.84
Chironomini	Chironomidae	73	0.41	93.25
Slavina appendiculata	Naididae	73	0.41	93.65
Ophidonais serpentine	Naididae	72	0.40	94.05
Dero borellii	Naididae	66	0.37	94.42
Fossaria sp.	Lymnaeidae	55	0.31	94.73
Gyraulus sp.	Planorbidae	52	0.29	95.02
Tanytarsini	Chironomidae	47	0.26	95.28
Fallceon quilleri	Baetidae	43	0.24	95.52

TABLE 23 Total and taxon abundance for benthic macroinvertebrates in Pleasant Grove Creek for 2007. (Continued)

Lowest Taxa	Higher Taxa	Total N	Total %	Cumulative %
Orthocladiinae	Chironomidae	43	0.24	95.75
Erpobdellidae	Erpobdellidae	42	0.23	95.99
Stylaria lacustris	Naididae	42	0.23	96.22
Tanytarsus sp.	Chironomidae	39	0.22	96.44
Helobdella stagnalis	Glossiphoniidae	39	0.22	96.65
Caenis latipennis	Caenidae	36	0.20	96.85
Apedilum sp.	Chironomidae	36	0.20	97.05
Prostoma sp.	Tertastemmatidae	34	0.19	97.24
Cricotopus bicinctus group	Chironomidae	30	0.17	97.41
Enchytraeidae	Enchytraeidae	26	0.14	97.55
Ferrissia sp.	Ancylidae	25	0.14	97.69
Cryptochironomus sp.	Chironomidae	24	0.13	97.83
Cryptotendipes sp.	Chironomidae	22	0.12	97.95
Liodessus obscurellus	Dytiscidae	21	0.12	98.07
Pentaneura sp.	Chironomidae	20	0.11	98.18
Limnophyes sp.	Chironomidae	19	0.11	98.28
Stempellina sp.	Chironomidae	19	0.11	98.39
Mooreobdella microstoma	Erpobdellidae	13	0.07	98.46
Ablabesmyia sp.	Chironomidae	12	0.07	98.53
Corbicula fluminea	Corbiculidae	12	0.07	98.59
Chironominae	Chironomidae	10	0.06	98.65
Phaenopsectra sp.	Chironomidae	10	0.06	98.71
Gammarus sp.	Gammaridae	10	0.06	98.76
Ceratopogonidae	Ceratopogonidae	9	0.05	98.81
Cladotanytarsus sp.	Chironomidae	9	0.05	98.86
Planorbidae	Planorbidae	9	0.05	98.91
Procambarus clarkia	Cambaridae	8	0.04	98.96
Orthocladius complex	Chironomidae	8	0.04	99.00
Tanypus sp.	Chironomidae	8	0.04	99.04
Hydraena sp.	Hydraenidae	8	0.04	99.09
Tipula sp.	Tipulidae	8	0.04	99.13
Tanypodinae	Chironomidae	7	0.04	99.17
Planariidae	Planariidae	7	0.04	99.21
Alotanypus sp.	Chironomidae	6	0.03	99.24
Radotanypus sp.	Chironomidae	6	0.03	99.28
Corixidae	Corixidae	6	0.03	99.31
Probezzia sp.	Ceratopogonidae	5	0.03	99.34
Microtendipes sp.	Chironomidae	5	0.03	99.37
Hydrellia sp.	Ephydridae	5	0.03	99.39
Hydroptila sp.	Hydroptilidae	5	0.03	99.42
Libellula sp.	Libellulidae	5	0.03	99.45
Centroptilum sp.	Baetidae	4	0.02	99.47
Corynoneura sp.	Chironomidae	4	0.02	99.49
Lauterborniella sp.	Chironomidae	4	0.02	99.52
Ischnura sp.	Coenagrionidae	4	0.02	99.54
Tropisternus sp.	Hydrophilidae	4	0.02	99.56
Pristina leidyi	Naididae	4	0.02	99.58
Sciomyzidae	Sciomyzidae	4	0.02	99.61

TABLE 23 Total and taxon abundance for benthic macroinvertebrates in Pleasant Grove Creek for 2007. (Continued)

Lowest Taxa	Higher Taxa	Total N	Total %	Cumulative %
Gastropoda	Sphaeriidae	4	0.02	99.63
Limonia sp.	Tipulidae	4	0.02	99.65
Arrenurus sp.	Arrenuridae	3	0.02	99.67
Nanocladius sp.	Chironomidae	3	0.02	99.68
Hydra sp.	Hydridae	3	0.02	99.70
Diptera	Hydrophilidae	3	0.02	99.72
Anax junius	Aeshnidae	2	0.01	99.73
Belostoma flumineum	Belostomatidae	2	0.01	99.74
Parachironomus sp.	Chironomidae	2	0.01	99.75
Paramerina sp.	Chironomidae	2	0.01	99.76
Culex sp.	Culicidae	2	0.01	99.77
Helophorus sp.	Helophoridae	2	0.01	99.78
Brechmorhoga mendax	Libellulidae	2	0.01	99.79
Pachydiplax longipennis	Libellulidae	2	0.01	99.81
Limnesia sp.	Limnesiidae	2	0.01	99.82
Hetaerina americana	Calopterygidae	1	0.01	99.82
Ceratopogon sp.	Ceratopogonidae	1	0.01	99.83
Sphaeromias sp.	Ceratopogonidae	1	0.01	99.83
Eucorethra sp.	Chaoboridae	1	0.01	99.84
Cricotopus trifascia group	Chironomidae	1	0.01	99.84
Goeldichironomus sp.	Chironomidae	1	0.01	99.85
Labrundinia sp.	Chironomidae	1	0.01	99.86
Microtendipes pedellus group	Chironomidae	1	0.01	99.86
Nilotanypus sp.	Chironomidae	1	0.01	99.87
Parametriocnemus sp.	Chironomidae	1	0.01	99.87
Paraphaenocladius sp.	Chironomidae	1	0.01	99.88
Procladius sp.	Chironomidae	1	0.01	99.88
Prodiamesa sp.	Chironomidae	1	0.01	99.89
Psectrocladius sp.	Chironomidae	1	0.01	99.89
Stempellinella sp.	Chironomidae	1	0.01	99.90
Tribelos sp.	Chironomidae	1	0.01	99.91
Trichocorixa calva	Corixidae	1	0.01	99.91
Laccophilus sp.	Dytiscidae	1	0.01	99.92
Sanfilippodytes sp.	Dytiscidae	1	0.01	99.92
Ephydridae	Ephydridae	1	0.01	99.93
Scatella sp.	Ephydridae	1	0.01	99.93
Mooreobdella tetragon	Erpobdellidae	1	0.01	99.94
Helobdella sp.	Glossiphoniidae	1	0.01	99.94
Decapoda	Hyalellidae	1	0.01	99.95
Ochthebius sp.	Hydraenidae	1	0.01	99.96
Brachycera	Hydrophilidae	1	0.01	99.96
Paracymus sp.	Hydrophilidae	1	0.01	99.97
Tropisternus lateralis	Hydrophilidae	1	0.01	99.97
Libellulidae	Libellulidae	1	0.01	99.98
Chaetogaster diaphanus	Naididae	1	0.01	99.98
Psychoda sp.	Psychodidae	1	0.01	99.99
Psychodidae	Psychodidae	1	0.01	99.99
Sperchon sp.	Sperchontidae	1	0.01	100.00
	Total	17994		

TABLE 24 Benthic metrics by site for the 21 Pleasant Grove Creek sites sampled in 2007.

Site	PGC 1	PGC 2	PGC 3	PGC 4	PGC 5	PGC 6	PGC 7	PGC 8	PGC 9	PGC 10	PGC 11
Taxonomic Richness	38	40	51	46	34	39	43	24	21	43	23
Percent Dominant Taxon	40.2	21.8	16.7	16.7	32	52.4	53.2	31.8	25.4	13.5	43.8
Number Plecoptera Taxa	0	0	0	0	0	0	0	0	0	0	0
Number Trichoptera Taxa	1	4	3	3	3	2	2	0	0	1	1
EPT Taxa	2	8	6	7	7	5	6	0	0	2	1
EPT Index (%)	4	31	20	18	47	58	5	0	0	6	0
Sensitive EPT Index (%)	4	1	17	8	0	3	1	0	0	6	0
Shannon Diversity	2.09	2.69	3.09	2.99	2.35	1.77	2.21	1.79	2.24	3.15	1.74
Tolerance Value	7.69	6.53	6.11	5.91	5.13	5.3	7.45	7.98	6.9	6.76	4.75
Percent Intolerant Taxa (0-2)	0	0	0	0	3	6	6	0	0	0	0
Percent Tolerant Taxa (8-10)	45	26	29	35	24	30	39	62	47	41	35
Percent Baetidae	0	8	2	5	2	3	0	0	0	0	0
Percent Chironomidae	10	21	45	38	31	11	17	2	51	54	1
Percent Hydropsychidae	0	20	1	1	43	1	0	0	0	0	0
Percent Collectors Gatherers	71	40	43	26	19	83	75	66	67	72	22
Percent Collector-Filterers	5	32	11	28	61	7	7	0	1	9	0
Percent Scrapers	19	1	2	0	0	4	9	33	3	4	4
Percent Predators	2	11	9	15	10	2	7	1	29	4	74
Percent Shredders	0	0	0	0	0	1	0	0	0	0	0
Total Abundance (#/sample)	4980	4402	7805	4734	12295	7003	16228	892	2476	16984	6722

TABLE 24 Benthic metrics by site for the 21 Pleasant Grove Creek sites sampled in 2007. (Continued)

7	PGC 12	PGC 14	PGC 15	PGC 16	PGC 17	PGC 18	PGC 19	PGC 20	PGC 21	PGC 22
Taxonomic Richness	26	26	23	19	20	22	49	30	42	28
Percent Dominant Taxon	20.5	32.6	27.1	35.5	25.1	26.8	20.2	29.6	28.3	30.4
Number Plecoptera Taxa	0	0	0	0	0	0	0	0	0	0
Number Trichoptera Taxa	0	1	0	0	0	0	1	1	1	0
EPT Taxa	0	1	0	0	0	0	1	1	1	0
EPT Index (%)	0	0	0	0	0	0	1	0	0	0
Sensitive EPT Index (%)	0	0	0	0	0	0	1	0	0	0
Shannon Diversity	2.52	2.27	2.18	2.02	2.06	1.95	2.85	2.21	2.82	2.5
Tolerance Value	8.73	6.56	8.1	9.14	8.5	7.16	7.05	7.63	7.97	7.73
Percent Intolerant Taxa (0-2)	0	0	0	0	0	0	0	0	0	0
Percent Tolerant Taxa (8-10)	57	48	50	53	67	58	37	46	46	54
Percent Baetidae	0	0	0	0	0	0	0	0	0	0
Percent Chironomidae	51	4	41	70	6	4	27	18	37	15
Percent Hydropsychidae	0	0	0	0	0	0	0	0	0	0
Percent Collectors Gatherers	80	70	82	46	73	46	45	64	70	45
Percent Collector-Filterers	7	1	3	2	19	6	25	1	7	11
Percent Scrapers	8	15	3	11	4	43	19	26	9	37
Percent Predators	5	14	12	37	5	6	9	8	3	7
Percent Shredders	0	0	0	0	0	0	0	0	0	0
Total Abundance (#/sample)	10208	1856	9525	879	22254	8234	5787	12018	3316	4110

TABLE 25 Eigenvalues from PCA of benthic metrics for Kirker and Pleasant Grove Creeks in 2006.

Factor Number	Eigen Value	Proportion Variance Explained	Cumulative Variance Explained
1	6.8938	0.43	0.43
2	2.2414	0.14	0.57
3	1.7672	0.11	0.68
4	1.4794	0.09	0.77
5	0.9354	0.06	0.83
6	0.7041	0.04	0.88
7	0.4742	0.03	0.91
8	0.3976	0.02	0.93
9	0.2940	0.02	0.95
10	0.2728	0.02	0.97
11	0.2328	0.01	0.98
12	0.1422	0.01	0.99
13	0.0978	0.01	1.00
14	0.0476	0.00	1.00
15	0.0196	0.00	1.00
16	0.0000	0.00	1.00

TABLE 26 Eigen vectors (Factor Scores) from PCA of benthic metrics for Kirker and Pleasant Grove Creeks in 2006.

Benthic Metric	Factor 1	Factor 2	Factor 3	Factor 4
Factor 1				
EPT Taxa	0.33	0.22	0.16	0.12
Number Ephemeroptera Taxa	0.32	0.18	0.04	0.16
Number Trichoptera Taxa	0.30	0.22	0.24	0.07
Percent Tolerant Taxa (8-10)	-0.29	0.07	-0.09	0.19
Tolerance Value	-0.29	-0.13	0.05	0.24
Taxonomic Richness	0.29	-0.13	0.04	0.19
Factor 2				
Percent Dominant Taxon	-0.18	0.42	0.36	0.05
Percent Scrapers	-0.15	0.42	-0.33	0.26
Shannon Diversity	0.25	-0.38	-0.28	0.10
Percent Predators	0.04	-0.29	-0.26	0.27
Abundance	-0.24	0.27	-0.15	0.22
Factor 3				
Percent Collectors Gatherers	-0.10	-0.31	0.59	-0.11
Factor 4				
EPT Index (%)	0.21	0.27	-0.11	-0.46
Sensitive EPT Index (%)	0.26	0.02	0.27	0.40
Percent Intolerant Taxa (0-2)	0.25	0.02	-0.04	0.38
Percent Collector-Filterers	0.29	0.10	-0.26	-0.32

TABLE 27 Benthic metric means for Kirker Creek and Pleasant Grove Creek with statistical comparisons by Wilcoxon Test for 2006.

Benthic Metric	Kirker Creek Mean	Pleasant Grove Creek Mean	Wilcoxon p-value
Number Trichoptera Taxa	0.07	1.19	0.0055*
Number Ephemeroptera Taxa	0.36	0.90	0.5937
Sensitive EPT Index (%)	0.00	0.48	0.0251*
EPT Index (%)	0.29	4.14	0.0886
Percent Hydropsychidae	0.00	2.90	0.0647
Percent Chironomidae	35.36	41.95	0.4439
Percent Collectors Gatherers	63.14	58.10	0.4245
Percent Intolerant Taxa (0-2)	0.00	0.33	0.1642
Percent Tolerant Taxa (8-10)	44.00	41.14	0.3961
Shannon Diversity	1.88	2.17	0.1552
Percent Dominant Taxon	43.79	36.24	0.1865
Percent Predators	6.07	12.86	0.0268*
EPT Taxa	0.43	2.10	0.1159
Percent Baetidae	0.29	0.33	0.7028
Percent Scrapers	18.21	9.67	1.0000
Percent Shredders	0.00	0.00	1.0000
Percent Collector-Filterers	7.93	14.52	0.2204
Tolerance Value	7.59	7.19	0.0651
Taxonomic Richness	27.86	33.43	0.0829
Abundance	882.79	873.05	0.1867

* $p < 0.05$

TABLE 28 Eigenvalues from PCA of benthic metrics for Kirker and Pleasant Grove Creeks in 2007.

Factor Number	Eigen Value	Proportion Variance Explained	Cumulative Variance Explained
1	6.8744	0.40	0.40
2	2.5345	0.15	0.55
3	2.0071	0.12	0.67
4	1.4602	0.09	0.76
5	1.2602	0.07	0.83
6	0.8878	0.05	0.88
7	0.5220	0.03	0.91
8	0.4036	0.02	0.94
9	0.2892	0.02	0.96
10	0.2770	0.02	0.97
11	0.1651	0.01	0.98
12	0.1235	0.01	0.99
13	0.0969	0.01	0.99
14	0.0555	0.00	1.00
15	0.0371	0.00	1.00
16	0.0058	0.00	1.00
17	0.0000	0.00	1.00

TABLE 29 Eigen vectors (Factor Scores) from PCA of benthic metrics for Kirker and Pleasant Grove Creeks in 2007.

Benthic Metric	Factor 1	Factor 2	Factor 3	Factor 4	Factor 5
Factor 1					
EPT Taxa	0.35	0.16	0.08	-0.09	0.05
Number Trichoptera Taxa	0.34	0.15	0.03	-0.11	0.05
Number Ephemeroptera Taxa	0.34	0.15	0.12	-0.06	0.05
Percent Tolerant Taxa (8-10)	-0.33	-0.12	0.10	-0.03	0.12
Taxonomic Richness	0.29	-0.23	0.06	0.09	0.24
EPT Index (%)	0.29	0.24	0.10	-0.08	-0.01
Percent Collector-Filterers	0.28	-0.02	0.05	-0.21	-0.04
Sensitive EPT Index (%)	0.23	-0.10	0.16	-0.08	0.13
Factor 2					
Percent Dominant Taxon	-0.11	0.50	-0.28	0.00	0.09
Shannon Diversity	0.20	-0.46	0.23	0.08	0.02
Factor 3					
Percent Shredders	-0.14	0.22	0.42	-0.34	-0.26
Abundance	0.19	-0.18	-0.41	0.32	0.28
Factor 4					
Percent Intolerant Taxa (0-2)	0.06	0.41	-0.01	0.49	0.09
Percent Scrapers	-0.11	0.01	-0.45	-0.47	0.30
Percent Collectors Gatherers	-0.20	0.14	0.40	0.41	0.23
Factor 5					
Percent Predators	0.04	-0.16	-0.26	0.22	-0.72
Tolerance Value	-0.27	-0.19	0.17	-0.08	0.28

TABLE 30 Benthic metric means for Kirker Creek and Pleasant Grove Creek with statistical comparisons by Wilcoxon Test for 2007.

Benthic Metric	Kirker Creek Mean	Pleasant Grove Creek Mean	Wilcoxon p-value
Number Trichoptera Taxa	0.43	1.14	0.1064
Number Ephemeroptera Taxa	0.14	1.14	0.0956
Sensitive EPT Index (%)	0.00	1.95	0.0158*
EPT Index (%)	0.29	9.05	0.0263*
Percent Hydropsychidae	0.00	3.14	0.0646
Percent Chironomidae	19.64	26.38	0.2333
Percent Collectors Gatherers	75.57	57.38	0.0170*
Percent Intolerant Taxa (0-2)	1.57	0.71	0.3418
Percent Tolerant Taxa (8-10)	51.86	44.24	0.0827
Shannon Diversity	1.85	2.36	0.0164*
Percent Dominant Taxon	42.66	29.70	0.0253*
Percent Predators	6.93	12.86	0.0546
EPT Taxa	0.57	2.29	0.1477
Percent Baetidae	0.29	0.95	0.2365
Percent Scrapers	14.00	12.10	0.4040
Percent Shredders	0.86	0.05	0.0228*
Percent Collector-Filterers	1.79	11.57	0.0056*
Tolerance Value	8.08	7.10	0.0085*
Taxonomic Richness	23.71	32.71	0.0215*
Abundance	673.07	856.86	0.0778

* p-value < 0.05

TABLE 31 TOC and grain size values for Kirker Creek (KC) and Pleasant Grove Creek (PGC) sites in 2006.

Site	% TOC	% Sand	% Gravel	% Silt	% Clay
KC 1	1.0	66.43	0.60	16.7	16.2
KC 2	1.5	28.0	0.23	32.7	39.1
KC 3	1.1	53.9	1.6	20.9	23.7
KC 4	2.8	12.3	0.0	45.4	42.4
KC 5	1.5	21.2	0.41	42.6	35.7
KC 6	1.1	46.3	1.3	27.4	25.1
KC 7	0.90	59.1	2.9	17.7	20.2
KC 8	1.9	32.5	0.4	33.8	33.4
KC 9	0.90	67.3	0.9	16.7	15.2
KC 10	0.70	64.6	0.4	17.4	17.6
KC 11	0.90	69.3	5.4	9.0	16.3
KC 12	1.1	54.6	4.6	20.6	20.2
KC 13	0.80	41.1	0.10	24.6	34.3
KC 14	0.80	27.5	0.50	30.5	41.5
KC Mean	1.2	46.0	1.4	25.4	27.2
PGC 1	0.60	86.8	0.17	5.7	7.3
PGC 2	0.4	68.8	0.9	16.7	14.2
PGC 3	0.80	66.9	1.5	17.9	13.8
PGC 4	1.2	53.1	0.6	24.8	21.4
PGC 5	0.3	86.5	0.2	8.2	5.1
PGC 6	0.4	78.9	1.4	14.6	5.0
PGC 7	0.8	71.6	0.1	18.3	10.0
PGC 8	3.8	43.1	0.3	37.7	18.9
PGC 9	1.0	51.8	0.4	28.4	19.5
PGC 10	0.90	71.1	4.3	15.3	9.4
PGC 11	2.0	78.9	0.2	13.9	7.0
PGC 12	2.5	26.7	0.8	46.6	25.9
PGC 13[a]	-	-	-	-	-
PGC 14	1.1	71.6	3.9	16.9	7.7
PGC 15	6.3	70.1	2.1	17.7	10.2
PGC 16	3.7	29.6	0.2	47.6	22.7
PGC 17	8.4	5.5	0.0	58.6	35.9
PGC 18	2.3	64.4	1.2	20.3	14.1
PGC 19	1.0	62.3	1.7	21.2	14.9
PGC 20	0.8	57.1	1.5	25.0	16.4
PGC 21	1.8	69.1	8.0	13.9	9.0
PGC 22	6.2	48.9	1.3	23.4	26.4
PGC Mean	2.2	60.4	1.5	23.5	15.0

[a] Site was not sampled.

TABLE 32 TOC and grain size values for Kirker Creek (KC) and Pleasant Grove Creek (PGC) sites in 2007.

Site	% TOC	% Sand	% Gravel	% Silt	% Clay
KC 1	1.55	44.37	0.35	35.81	19.47
KC 2	1.26	23.60	2.80	21.08	52.52
KC 3	3.11	37.90	1.24	23.35	37.51
KC 4	3.39	7.14	0.07	45.04	47.75
KC 5	4.72	8.80	0.00	46.75	44.45
KC 6	1.12	54.96	1.25	21.53	22.26
KC 7	2.13	13.31	0.00	30.02	56.67
KC 8	1.21	58.55	1.54	21.00	18.91
KC 9	1.29	54.95	2.47	22.02	20.56
KC 10	1.37	43.46	2.39	24.24	29.91
KC 11	0.93	50.18	2.14	22.33	25.35
KC 12	2.67	41.06	3.77	29.70	25.47
KC 13	2.12	38.24	3.33	32.12	26.31
KC 14	1.50	20.74	1.17	38.62	39.47
Mean	1.95	35.63	1.65	29.75	32.97
PGC 1	1.12	69.57	1.71	14.44	14.28
PGC 2	1.64	65.01	1.06	17.69	16.24
PGC 3	0.66	75.27	1.23	13.53	9.97
PGC 4	1.49	45.05	0.23	30.49	24.23
PGC 5	1.42	63.97	1.06	18.90	16.07
PGC 6	0.89	69.12	4.03	13.59	13.26
PGC 7	1.75	56.18	0.20	27.15	16.47
PGC 8	1.14	52.03	6.31	26.13	15.53
PGC 9	0.79	40.91	0.56	32.96	25.57
PGC 10	1.41	74.61	0.58	14.95	9.86
PGC 11	3.21	46.83	2.08	35.36	15.73
PGC 12	3.73	42.34	0.74	37.73	19.19
PGC 14	3.18	54.74	4.70	24.23	16.33
PGC 15	3.60	53.62	4.86	24.85	16.67
PGC 16	7.09	33.01	0.50	42.08	24.41
PGC 17	1.66	49.70	1.88	31.49	16.93
PGC 18	8.53	2.42	0.06	61.71	35.81
PGC 19	3.64	19.23	0.00	48.75	32.02
PGC 20	1.10	77.38	0.03	13.45	9.14
PGC 21	1.74	60.39	0.51	21.76	17.34
PGC 22	3.31	65.94	0.21	19.21	14.64
Mean	2.72	51.61	1.60	27.69	19.10

TABLE 33 Pyrethroid concentrations (ng/g dry weight) from Pleasant Grove Creek (PGC) and Kirker Creek (KC) sites including both % TOC and 1% TOC normalized values by site for 2006.

Non-detected Fenpropathrin values were assigned a concentration of one half the detection limit (0.05).

Sample ID	% TOC	Bifenthrin (ng/g)	Bifenthrin (ng/g TOC)	Bifenthrin @ 1% TOC	Fenpropathrin (ng/g)	Fenpropathrin (ng/g TOC)	Fenpropathrin @ 1% TOC
KC 1	1.05	3.309	315.14	3.151	0.050	4.76	0.048
KC 2	1.45	5.489	378.54	3.785	0.050	3.45	0.034
KC 3	1.07	3.873	361.97	3.620	0.050	4.67	0.047
KC 4	2.77	22.469	811.16	8.112	0.050	1.81	0.018
KC 5	1.54	13.174	855.44	8.554	0.050	3.25	0.032
KC 6	1.12	1.891	168.86	1.689	0.050	4.46	0.045
KC 7	0.92	0.874	94.98	0.950	0.050	5.43	0.054
KC 8	1.90	1.795	94.49	0.945	0.050	2.63	0.026
KC 9	0.91	0.773	84.92	0.849	0.050	5.49	0.055
KC 10	0.71	0.506	71.26	0.713	0.050	7.04	0.070
KC 11	0.91	0.646	71.04	0.710	0.050	5.49	0.055
KC 12	1.07	1.116	104.27	1.043	0.050	4.67	0.047
KC 13	0.80	0.031	3.89	0.039	0.050	6.25	0.063
KC 14	0.78	0.050	6.41	0.064	0.050	6.41	0.064
PGC 1	0.62	0.339	54.64	0.546	0.050	8.06	0.081
PGC 2	0.37	0.085	23.08	0.231	0.050	13.51	0.135
PGC 3	0.83	0.568	68.38	0.684	0.050	6.02	0.060
PGC 4	1.16	0.723	62.32	0.623	0.050	4.31	0.043
PGC 5	0.26	0.285	109.45	1.095	0.008	2.98	0.030
PGC 6	0.39	0.119	30.61	0.306	0.050	12.82	0.128
PGC 7	0.73	0.294	40.26	0.403	0.050	6.85	0.068
PGC 8	3.80	153.835	4048.28	40.483	0.071	1.87	0.019
PGC 9	1.02	4.440	435.26	4.353	0.050	4.90	0.049
PGC 10	0.93	5.434	584.34	5.843	0.009	0.99	0.010
PGC 11	2.03	22.616	1114.10	11.141	0.019	0.94	0.009
PGC 12	2.47	2.436	98.63	0.986	0.027	1.09	0.011
PGC 14	1.10	10.517	956.11	9.561	0.013	1.22	0.012
PGC 15	6.26	24.751	395.38	3.954	0.061	0.97	0.010
PGC 16	3.66	191.502	5232.30	52.323	0.226	6.17	0.062
PGC 17	8.36	71.274	853.07	8.531	0.066	0.79	0.008
PGC 18	2.27	8.082	356.03	3.560	0.008	0.37	0.004
PGC 19	1.04	2.711	260.65	2.607	0.050	4.81	0.048
PGC 20	0.81	0.183	22.55	0.226	0.050	6.17	0.062
PGC 21	1.77	3.855	217.79	2.178	0.011	0.62	0.006
PGC 22	5.97	7.607	127.52	1.275	0.012	0.20	0.002

TABLE 33 Pyrethroid concentrations (ng/g dry weight) from Pleasant Grove Creek (PGC) and Kirker Creek (KC) sites including both % TOC and 1% TOC normalized values by site for 2006. (Continued)

Sample ID	% TOC	Lambda-cyhal. (ng/g)	Lambda-cyhal. (ng/g TOC)	Lambda-cyhal. @ 1% TOC	Permethrin (ng/g)	Permethrin (ng/g TOC)	Permethrin @ 1% TOC
KC 1	1.05	0.128	12.16	0.122	2.463	234.58	2.346
KC 2	1.45	0.222	15.33	0.153	2.190	151.04	1.510
KC 3	1.07	0.109	10.17	0.102	1.189	111.10	1.111
KC 4	2.77	0.804	29.02	0.290	11.369	410.44	4.104
KC 5	1.54	0.512	33.23	0.332	6.401	415.63	4.156
KC 6	1.12	0.056	4.97	0.050	0.660	58.93	0.589
KC 7	0.92	0.067	7.26	0.073	0.339	36.85	0.368
KC 8	1.90	0.045	2.37	0.024	0.498	26.21	0.262
KC 9	0.91	0.021	2.35	0.024	0.202	22.20	0.222
KC 10	0.71	0.008	1.06	0.011	0.063	8.89	0.089
KC 11	0.91	0.010	1.11	0.011	0.500	54.95	0.549
KC 12	1.07	0.013	1.18	0.012	0.572	53.46	0.535
KC 13	0.80	0.010	1.26	0.013	0.500	62.50	0.625
KC 14	0.78	0.050	6.41	0.064	0.500	64.10	0.641
PGC 1	0.62	0.009	1.49	0.015	0.080	12.89	0.129
PGC 2	0.37	0.004	1.21	0.012	0.500	135.14	1.351
PGC 3	0.83	0.010	1.19	0.012	0.500	60.24	0.602
PGC 4	1.16	0.041	3.51	0.035	0.194	16.72	0.167
PGC 5	0.26	0.036	13.65	0.137	0.500	192.31	1.923
PGC 6	0.39	0.012	3.10	0.031	0.500	128.21	1.282
PGC 7	0.73	0.045	6.10	0.061	0.057	7.79	0.078
PGC 8	3.80	2.142	56.38	0.564	37.892	997.16	9.972
PGC 9	1.02	0.257	25.23	0.252	1.409	138.17	1.382
PGC 10	0.93	0.398	42.75	0.427	2.629	282.65	2.826
PGC 11	2.03	1.461	71.97	0.720	9.416	463.86	4.639
PGC 12	2.47	0.309	12.51	0.125	1.498	60.65	0.606
PGC 14	1.10	0.697	63.35	0.633	4.417	401.59	4.016
PGC 15	6.26	2.526	40.34	0.403	17.297	276.31	2.763
PGC 16	3.66	12.064	329.61	3.296	390.141	10659.60	106.596
PGC 17	8.36	8.150	97.54	0.975	46.528	556.89	5.569
PGC 18	2.27	0.245	10.80	0.108	1.868	82.29	0.823
PGC 19	1.04	0.199	19.15	0.191	0.323	31.06	0.311
PGC 20	0.81	0.020	2.46	0.025	0.099	12.20	0.122
PGC 21	1.77	0.222	12.55	0.125	2.748	155.25	1.552
PGC 22	5.97	1.075	18.02	0.180	5.672	95.09	0.951

TABLE 33 **Pyrethroid concentrations (ng/g dry weight) from Pleasant Grove Creek (PGC) and Kirker Creek (KC) sites including both % TOC and 1% TOC normalized values by site for 2006. (Continued)**

Sample ID	% TOC	Cyfluthrin (ng/g)	Cyfluthrin (ng/g TOC)	Cyfluthrin @ 1% TOC	Cypermethrin (ng/g)	Cypermethrin (ng/g TOC)	Cypermethrin @ 1% TOC
KC 1	1.05	1.768	168.39	1.684	0.427	40.63	0.406
KC 2	1.45	1.540	106.24	1.062	0.724	49.93	0.499
KC 3	1.07	0.550	51.39	0.514	0.909	84.97	0.850
KC 4	2.77	6.236	225.13	2.251	4.840	174.73	1.747
KC 5	1.54	2.827	183.59	1.836	1.801	116.96	1.170
KC 6	1.12	0.236	21.11	0.211	0.436	38.97	0.390
KC 7	0.92	0.279	30.34	0.303	0.108	11.69	0.117
KC 8	1.90	0.378	19.89	0.199	0.288	15.17	0.152
KC 9	0.91	0.172	18.94	0.189	0.294	32.28	0.323
KC 10	0.71	0.480	67.68	0.677	0.050	7.04	0.070
KC 11	0.91	0.084	9.23	0.092	0.035	3.87	0.039
KC 12	1.07	0.155	14.49	0.145	0.070	6.54	0.065
KC 13	0.80	0.050	6.25	0.063	0.050	6.25	0.063
KC 14	0.78	0.050	6.41	0.064	0.050	6.41	0.064
PGC 1	0.62	0.056	9.02	0.090	0.012	1.92	0.019
PGC 2	0.37	0.022	6.00	0.060	0.050	13.51	0.135
PGC 3	0.83	0.053	6.36	0.064	0.030	3.65	0.037
PGC 4	1.16	0.177	15.29	0.153	0.924	79.63	0.796
PGC 5	0.26	0.199	76.64	0.766	0.108	41.50	0.415
PGC 6	0.39	0.040	10.13	0.101	0.036	9.23	0.092
PGC 7	0.73	0.049	6.74	0.067	0.056	7.67	0.077
PGC 8	3.80	19.872	522.96	5.230	19.824	521.70	5.217
PGC 9	1.02	1.383	135.59	1.356	1.027	100.66	1.007
PGC 10	0.93	7.545	811.30	8.113	4.618	496.60	4.966
PGC 11	2.03	9.755	480.55	4.805	3.262	160.67	1.607
PGC 12	2.47	1.070	43.31	0.433	0.601	24.32	0.243
PGC 14	1.10	2.759	250.83	2.508	1.406	127.86	1.279
PGC 15	6.26	15.503	247.65	2.477	6.819	108.93	1.089
PGC 16	3.66	40.923	1118.12	11.181	17.476	477.49	4.775
PGC 17	8.36	43.922	525.70	5.257	28.390	339.80	3.398
PGC 18	2.27	2.499	110.09	1.101	4.332	190.84	1.908
PGC 19	1.04	0.427	41.06	0.411	0.390	37.49	0.375
PGC 20	0.81	0.091	11.17	0.112	0.043	5.27	0.053
PGC 21	1.77	1.903	107.51	1.075	0.517	29.22	0.292
PGC 22	5.97	6.759	113.31	1.133	1.818	30.47	0.305

TABLE 33 Pyrethroid concentrations (ng/g dry weight) from Pleasant Grove Creek (PGC) and Kirker Creek (KC) sites including both % TOC and 1% TOC normalized values by site for 2006. (Continued)

Sample ID	% TOC	Esfenvalerate (ng/g)	Esfenvalerate (ng/g TOC)	Esfenvalerate @ 1% TOC	Deltamethrin (ng/g)	Deltamethrin (ng/g TOC)	Deltamethrin @ 1% TOC
KC 1	1.05	0.043	4.11	0.041	1.738	165.52	1.655
KC 2	1.45	0.068	4.67	0.047	3.749	258.58	2.586
KC 3	1.07	0.087	8.14	0.081	2.465	230.42	2.304
KC 4	2.77	0.488	17.61	0.176	7.817	282.19	2.822
KC 5	1.54	0.298	19.38	0.194	4.188	271.94	2.719
KC 6	1.12	0.054	4.78	0.048	0.748	66.75	0.667
KC 7	0.92	0.023	2.52	0.025	0.430	46.71	0.467
KC 8	1.90	0.049	2.59	0.026	0.464	24.44	0.244
KC 9	0.91	0.030	3.25	0.033	0.365	40.06	0.401
KC 10	0.71	0.011	1.49	0.015	0.200	28.23	0.282
KC 11	0.91	0.013	1.43	0.014	0.275	30.20	0.302
KC 12	1.07	0.020	1.82	0.018	0.276	25.80	0.258
KC 13	0.80	0.003	0.33	0.003	0.011	1.43	0.014
KC 14	0.78	0.050	6.41	0.064	0.021	2.74	0.027
PGC 1	0.62	0.050	8.06	0.081	0.050	8.06	0.081
PGC 2	0.37	0.050	13.51	0.135	0.050	13.51	0.135
PGC 3	0.83	0.008	0.94	0.009	0.050	6.02	0.060
PGC 4	1.16	0.024	2.05	0.021	0.114	9.83	0.098
PGC 5	0.26	0.016	6.27	0.063	0.090	34.54	0.345
PGC 6	0.39	0.010	2.56	0.026	0.050	12.82	0.128
PGC 7	0.73	0.010	1.41	0.014	0.050	6.85	0.068
PGC 8	3.80	1.725	45.39	0.454	16.546	435.43	4.354
PGC 9	1.02	0.045	4.45	0.045	0.257	25.22	0.252
PGC 10	0.93	0.116	12.43	0.124	1.013	108.91	1.089
PGC 11	2.03	0.537	26.48	0.265	2.131	104.98	1.050
PGC 12	2.47	0.134	5.41	0.054	0.609	24.67	0.247
PGC 14	1.10	0.323	29.40	0.294	1.306	118.69	1.187
PGC 15	6.26	0.977	15.60	0.156	4.196	67.03	0.670
PGC 16	3.66	5.404	147.66	1.477	32.453	886.69	8.867
PGC 17	8.36	1.710	20.47	0.205	22.341	267.40	2.674
PGC 18	2.27	0.142	6.28	0.063	0.630	27.75	0.277
PGC 19	1.04	0.040	3.86	0.039	1.033	99.33	0.993
PGC 20	0.81	0.011	1.40	0.014	0.010	1.19	0.012
PGC 21	1.77	0.101	5.69	0.057	0.836	47.26	0.473
PGC 22	5.97	0.321	5.37	0.054	1.463	24.53	0.245

TABLE 34 Pyrethroid concentrations (ng/g dry weight) from Pleasant Grove Creek (PGC) and Kirker Creek (KC) sites including both % TOC and 1% TOC normalized values by site for 2007.

Non-detected Fenpropathrin values were assigned a concentration of one half the detection limit (0.05).

Sample ID	% TOC	Bifenthrin ng/g	Bifenthrin ng/g TOC	Bifenthrin @ 1% TOC	Fenpropathrin ng/g	Fenpropathrin ng/g TOC	Fenpropathrin @ 1% TOC
KC 1	1.55	3.60	232.26	2.323	0.05	3.23	0.032
KC 2	1.26	1.43	113.49	1.135	0.05	3.97	0.040
KC 3	3.11	11.4	366.56	3.666	0.0300	0.96	0.010
KC 4	3.39	20.4	601.77	6.018	0.05	1.47	0.015
KC 5	4.72	75.4	1597.46	15.975	0.0300	0.64	0.006
KC 6	1.12	6.68	596.43	5.964	0.05	4.46	0.045
KC 7	2.13	1.40	65.73	0.657	0.05	2.35	0.023
KC 8	1.21	4.08	337.19	3.372	0.05	4.13	0.041
KC 9	1.29	2.62	203.10	2.031	0.05	3.88	0.039
KC 10	1.37	5.63	410.95	4.109	0.05	3.65	0.036
KC 11	0.93	1.04	111.83	1.118	0.05	5.38	0.054
KC 12	2.67	13.4	501.87	5.019	0.05	1.87	0.019
KC 13	2.12	0.206	9.72	0.097	0.05	2.36	0.024
KC 14	1.50	0.166	11.07	0.111	0.05	3.33	0.033
PGC 1	1.12	0.856	76.43	0.764	0.05	4.46	0.045
PGC 2	1.64	1.83	111.59	1.116	0.05	3.05	0.030
PGC 3	0.66	1.55	234.85	2.348	0.05	7.58	0.076
PGC 4	1.49	3.51	235.57	2.356	0.05	3.36	0.034
PGC 5	1.42	1.04	73.24	0.732	0.05	3.52	0.035
PGC 6	0.89	0.147	16.52	0.165	0.05	5.62	0.056
PGC 7	1.75	0.707	40.40	0.404	0.05	2.86	0.029
PGC 8	1.14	85.7	7517.54	75.175	0.05	4.39	0.044
PGC 9	0.79	3.29	416.46	4.165	0.05	6.33	0.063
PGC 10	1.41	6.81	482.98	4.830	0.0413	2.93	0.029
PGC 11	3.21	16.1	501.56	5.016	0.0420	1.31	0.013
PGC 12	3.73	21.2	568.36	5.684	0.05	1.34	0.013
PGC 14	3.18	47.1	1481.13	14.811	0.0473	1.49	0.015
PGC 15	3.60	8.30	230.56	2.306	0.05	1.39	0.014
PGC 16	7.09	24.1	339.92	3.399	0.0219	0.31	0.003
PGC 17	1.66	110	6626.51	66.265	0.163	9.82	0.098
PGC 18	8.53	14.9	174.68	1.747	0.0318	0.37	0.004
PGC 19	3.64	4.24	116.48	1.165	0.05	1.37	0.014
PGC 20	1.10	1.82	165.45	1.655	0.05	4.55	0.045
PGC 21	1.74	9.03	518.97	5.190	0.0398	2.29	0.023
PGC 22	3.31	12.3	371.60	3.716	0.0500	1.51	0.015

TABLE 34 **Pyrethroid concentrations (ng/g dry weight) from Pleasant Grove Creek (PGC) and Kirker Creek (KC) sites including both % TOC and 1% TOC normalized values by site for 2007. (Continued)**

Sample ID	% TOC	Lambda-cyhal. ng/g	Lambda-cyhal. ng/g TOC	Lambda-cyhal. @ 1% TOC	Permethrin ng/g	Permethrin ng/g TOC	Permethrin @ 1% TOC
KC 1	1.55	0.174	11.23	0.112	5.30	341.94	3.419
KC 2	1.26	0.0195	1.55	0.015	0.5	39.68	0.397
KC 3	3.11	0.274	8.81	0.088	4.79	154.02	1.540
KC 4	3.39	0.479	14.13	0.141	10.8	318.58	3.186
KC 5	4.72	1.26	26.69	0.267	35.7	756.36	7.564
KC 6	1.12	0.157	14.02	0.140	1.55	138.39	1.384
KC 7	2.13	0.200	9.39	0.094	4.13	193.90	1.939
KC 8	1.21	0.136	11.24	0.112	1.13	93.39	0.934
KC 9	1.29	0.0455	3.53	0.035	0.966	74.88	0.749
KC 10	1.37	0.0643	4.69	0.047	1.58	115.33	1.153
KC 11	0.93	0.0210	2.26	0.023	0.5	53.76	0.538
KC 12	2.67	0.0564	2.11	0.021	2.83	105.99	1.060
KC 13	2.12	0.0209	0.99	0.010	0.5	23.58	0.236
KC 14	1.50	0.05	3.33	0.033	0.5	33.33	0.333
PGC 1	1.12	0.0319	2.85	0.028	0.5	44.64	0.446
PGC 2	1.64	0.103	6.28	0.063	1.09	66.46	0.665
PGC 3	0.66	0.0275	4.17	0.042	0.5	75.76	0.758
PGC 4	1.49	0.164	11.01	0.110	0.694	46.58	0.466
PGC 5	1.42	0.0511	3.60	0.036	0.5	35.21	0.352
PGC 6	0.89	0.0175	1.97	0.020	0.5	56.18	0.562
PGC 7	1.75	0.132	7.54	0.075	0.5	28.57	0.286
PGC 8	1.14	0.506	44.39	0.444	19.2	1684.21	16.842
PGC 9	0.79	0.0487	6.16	0.062	0.717	90.76	0.908
PGC 10	1.41	0.292	20.71	0.207	2.64	187.23	1.872
PGC 11	3.21	1.11	34.58	0.346	4.09	127.41	1.274
PGC 12	3.73	0.702	18.82	0.188	5.65	151.47	1.515
PGC 14	3.18	7.79	244.97	2.450	59.2	1861.64	18.616
PGC 15	3.60	0.351	9.75	0.098	2.99	83.06	0.831
PGC 16	7.09	0.610	8.60	0.086	9.19	129.62	1.296
PGC 17	1.66	5.95	358.43	3.584	89.0	5361.45	53.614
PGC 18	8.53	0.535	6.27	0.063	4.50	52.75	0.528
PGC 19	3.64	0.251	6.90	0.069	1.43	39.29	0.393
PGC 20	1.10	0.0717	6.52	0.065	0.694	63.09	0.631
PGC 21	1.74	0.542	31.15	0.311	3.76	216.09	2.161
PGC 22	3.31	0.857	25.89	0.259	13.5	407.85	4.079

TABLE 34 Pyrethroid concentrations (ng/g dry weight) from Pleasant Grove Creek (PGC) and Kirker Creek (KC) sites including both % TOC and 1% TOC normalized values by site for 2007. (Continued)

Sample ID	% TOC	Cyfluthrin ng/g	Cyfluthrin ng/g TOC	Cyfluthrin @ 1% TOC	Cypermethrin ng/g	Cypermethrin ng/g TOC	Cypermethrin @ 1% TOC
KC 1	1.55	3.84	247.74	2.477	0.855	55.16	0.552
KC 2	1.26	0.322	25.56	0.256	0.352	27.94	0.279
KC 3	3.11	4.61	148.23	1.482	4.75	152.73	1.527
KC 4	3.39	9.03	266.37	2.664	2.69	79.35	0.794
KC 5	4.72	56.2	1190.68	11.907	12.4	262.71	2.627
KC 6	1.12	0.521	46.52	0.465	0.345	30.80	0.308
KC 7	2.13	0.368	17.28	0.173	0.206	9.67	0.097
KC 8	1.21	1.18	97.52	0.975	0.268	22.15	0.221
KC 9	1.29	0.509	39.46	0.395	0.967	74.96	0.750
KC 10	1.37	1.05	76.64	0.766	0.857	62.55	0.626
KC 11	0.93	0.165	17.74	0.177	0.0631	6.78	0.068
KC 12	2.67	1.05	39.33	0.393	1.88	70.41	0.704
KC 13	2.12	0.0515	2.43	0.024	0.0629	2.97	0.030
KC 14	1.50	0.0754	5.03	0.050	0.05	3.33	0.033
PGC 1	1.12	0.203	18.13	0.181	0.05	4.46	0.045
PGC 2	1.64	0.681	41.52	0.415	0.434	26.46	0.265
PGC 3	0.66	0.322	48.79	0.488	0.247	37.42	0.374
PGC 4	1.49	0.937	62.89	0.629	0.988	66.31	0.663
PGC 5	1.42	0.214	15.07	0.151	0.325	22.89	0.229
PGC 6	0.89	0.05	5.62	0.056	0.0591	6.64	0.066
PGC 7	1.75	0.0984	5.62	0.056	0.281	16.06	0.161
PGC 8	1.14	11.1	973.68	9.737	6.87	602.63	6.026
PGC 9	0.79	0.938	118.73	1.187	0.855	108.23	1.082
PGC 10	1.41	6.49	460.28	4.603	9.92	703.55	7.035
PGC 11	3.21	6.35	197.82	1.978	5.06	157.63	1.576
PGC 12	3.73	5.10	136.73	1.367	2.25	60.32	0.603
PGC 14	3.18	7.85	246.86	2.469	8.44	265.41	2.654
PGC 15	3.60	1.81	50.28	0.503	1.60	44.44	0.444
PGC 16	7.09	2.42	34.13	0.341	0.903	12.74	0.127
PGC 17	1.66	78.2	4710.84	47.108	24.3	1463.86	14.639
PGC 18	8.53	8.04	94.26	0.943	32.0	375.15	3.751
PGC 19	3.64	2.00	54.95	0.549	1.54	42.31	0.423
PGC 20	1.10	1.12	101.82	1.018	0.460	41.82	0.418
PGC 21	1.74	10.2	586.21	5.862	3.22	185.06	1.851
PGC 22	3.31	9.02	272.51	2.725	4.07	122.96	1.230

TABLE 34 **Pyrethroid concentrations (ng/g dry weight) from Pleasant Grove Creek (PGC) and Kirker Creek (KC) sites including both % TOC and 1% TOC normalized values by site for 2007. (Continued)**

Sample ID	% TOC	Esfenvalerate ng/g	Esfenvalerate ng/g TOC	Esfenvalerate @ 1% TOC	Deltamethrin ng/g	Deltamethrin ng/g TOC	Deltamethrin @ 1% TOC
KC 1	1.55	0.0743	4.79	0.048	2.23	143.87	1.439
KC 2	1.26	0.0204	1.62	0.016	0.151	11.98	0.120
KC 3	3.11	0.186	5.98	0.060	2.71	87.14	0.871
KC 4	3.39	0.447	13.19	0.132	5.68	167.55	1.676
KC 5	4.72	1.19	25.21	0.252	17.6	372.88	3.729
KC 6	1.12	0.0797	7.12	0.071	0.171	15.27	0.153
KC 7	2.13	0.0351	1.65	0.016	0.0937	4.40	0.044
KC 8	1.21	0.0845	6.98	0.070	0.937	77.44	0.774
KC 9	1.29	0.0450	3.49	0.035	0.406	31.47	0.315
KC 10	1.37	0.0923	6.74	0.067	1.14	83.21	0.832
KC 11	0.93	0.0229	2.46	0.025	0.177	19.03	0.190
KC 12	2.67	0.179	6.70	0.067	0.252	9.44	0.094
KC 13	2.12	0.0190	0.90	0.009	0.05	2.36	0.024
KC 14	1.50	0.0136	0.91	0.009	0.05	3.33	0.033
PGC 1	1.12	0.0490	4.38	0.044	0.150	13.39	0.134
PGC 2	1.64	0.127	7.74	0.077	0.211	12.87	0.129
PGC 3	0.66	0.0314	4.76	0.048	0.114	17.27	0.173
PGC 4	1.49	0.125	8.39	0.084	0.580	38.93	0.389
PGC 5	1.42	0.0765	5.39	0.054	0.117	8.24	0.082
PGC 6	0.89	0.0175	1.97	0.020	0.05	5.62	0.056
PGC 7	1.75	0.0629	3.59	0.036	0.0763	4.36	0.044
PGC 8	1.14	0.457	40.09	0.401	3.09	271.05	2.711
PGC 9	0.79	0.0368	4.66	0.047	0.190	24.05	0.241
PGC 10	1.41	0.0983	6.97	0.070	1.22	86.52	0.865
PGC 11	3.21	0.241	7.51	0.075	1.77	55.14	0.551
PGC 12	3.73	0.358	9.60	0.096	2.01	53.89	0.539
PGC 14	3.18	1.20	37.74	0.377	8.46	266.04	2.660
PGC 15	3.60	0.198	5.50	0.055	1.03	28.61	0.286
PGC 16	7.09	0.157	2.21	0.022	1.12	15.80	0.158
PGC 17	1.66	2.67	160.84	1.608	25.5	1536.14	15.361
PGC 18	8.53	0.469	5.50	0.055	1.32	15.47	0.155
PGC 19	3.64	0.133	3.65	0.037	0.726	19.95	0.199
PGC 20	1.10	0.0579	5.26	0.053	0.462	42.00	0.420
PGC 21	1.74	0.296	17.01	0.170	2.04	117.24	1.172
PGC 22	3.31	0.326	9.85	0.098	3.91	118.13	1.181

TABLE 35 Toxic units (TU) calculations for pyrethroids (1% TOC normalized) by site for Kirker Creek (KC) and Pleasant Grove Creek (PGC) sites in 2006.

The sum of TUs by site and ranking by stream and all sites is also included. Toxic units > 0.5 are in bold type.

Sample ID	% TOC	Bifen TU	Fen TU	Lam-cy TU	Perm TU	Cyflu TU	Cyper TU	Esfen TU	Delt TU	Sum TU	Rank Stream	Rank All
KC 1	1.05	**0.606**	n/a	0.027	0.022	0.156	0.107	0.003	0.210	**1.13**	5	14
KC 2	1.45	**0.728**	n/a	0.034	0.014	0.098	0.131	0.003	0.327	**1.34**	3	11
KC 3	1.07	**0.696**	n/a	0.023	0.010	0.048	0.224	0.005	0.292	**1.30**	4	13
KC 4	2.77	**1.560**	n/a	0.064	0.038	0.208	0.460	0.011	0.357	**2.70**	1	7
KC 5	1.54	**1.645**	n/a	0.074	0.038	0.170	0.308	0.013	0.344	**2.59**	2	8
KC 6	1.12	0.325	n/a	0.011	0.005	0.020	0.103	0.003	0.084	**0.55**	6	17
KC 7	0.92	0.183	n/a	0.016	0.003	0.028	0.031	0.002	0.059	0.32	8	23
KC 8	1.90	0.182	n/a	0.005	0.002	0.018	0.040	0.002	0.031	0.28	9	24
KC 9	0.91	0.163	n/a	0.005	0.002	0.018	0.085	0.002	0.051	0.33	7	22
KC 10	0.71	0.137	n/a	0.002	0.001	0.063	0.019	0.001	0.036	0.26	11	26
KC 11	0.91	0.137	n/a	0.002	0.005	0.009	0.010	0.001	0.038	0.20	12	27
KC 12	1.07	0.201	n/a	0.003	0.005	0.013	0.017	0.001	0.033	0.27	10	25
KC 13	0.80	0.007	n/a	0.003	0.006	0.006	0.016	0.000	0.002	0.04	14	35
KC 14	0.78	0.012	n/a	0.014	0.006	0.006	0.017	0.004	0.003	0.06	13	34
PGC 1	0.62	0.105	n/a	0.003	0.001	0.008	0.005	0.005	0.010	0.14	17	29
PGC 2	0.37	0.044	n/a	0.003	0.013	0.006	0.036	0.009	0.017	0.13	20	32
PGC 3	0.83	0.131	n/a	0.003	0.006	0.006	0.010	0.001	0.008	0.16	16	28
PGC 4	1.16	0.120	n/a	0.008	0.002	0.014	0.210	0.001	0.012	0.37	14	20
PGC 5	0.26	0.210	n/a	0.030	0.018	0.071	0.109	0.004	0.044	0.49	13	19
PGC 6	0.39	0.059	n/a	0.007	0.012	0.009	0.024	0.002	0.016	0.13	18	30
PGC 7	0.73	0.077	n/a	0.014	0.001	0.006	0.020	0.001	0.009	0.13	19	31
PGC 8	3.80	**7.785**	n/a	0.125	0.092	0.484	**1.373**	0.029	**0.551**	**10.44**	2	2
PGC 9	1.02	**0.837**	n/a	0.056	0.013	0.126	0.265	0.003	0.032	**1.33**	9	12
PGC 10	0.93	**1.124**	n/a	0.095	0.026	**0.751**	**1.307**	0.008	0.138	**3.45**	4	4
PGC 11	2.03	**2.143**	n/a	0.160	0.043	0.445	0.423	0.017	0.133	**3.36**	5	5
PGC 12	2.47	0.190	n/a	0.028	0.006	0.040	0.064	0.004	0.031	0.36	15	21
PGC 14	1.10	**1.839**	n/a	0.141	0.037	0.232	0.336	0.019	0.150	**2.75**	6	6
PGC 15	6.26	**0.760**	n/a	0.090	0.026	0.229	0.287	0.010	0.085	**1.49**	7	9
PGC 16	3.66	**10.062**	n/a	**0.732**	**0.987**	**1.035**	**1.257**	0.096	**1.122**	**15.29**	1	1
PGC 17	8.36	**1.641**	n/a	0.217	0.052	0.487	**0.894**	0.013	0.338	**3.64**	3	3
PGC 18	2.27	**0.685**	n/a	0.024	0.008	0.102	**0.502**	0.004	0.035	**1.36**	8	10
PGC 19	1.04	**0.501**	n/a	0.043	0.003	0.038	0.099	0.003	0.126	**0.81**	10	15
PGC 20	0.81	0.043	n/a	0.005	0.001	0.010	0.014	0.001	0.002	0.08	21	33
PGC 21	1.77	0.419	n/a	0.028	0.014	0.100	0.077	0.004	0.060	**0.70**	11	16
PGC 22	5.97	0.245	n/a	0.040	0.009	0.105	0.080	0.003	0.031	**0.51**	12	18

TABLE 36 Toxic units (TU) calculations for pyrethroids (1% TOC normalized) by site for Kirker Creek (KC) and Pleasant Grove Creek (PGC) sites in 2007.

The sum of TUs by site and ranking by stream and all sites is also included. Toxic units > 0.5 are in bold type.

Sample ID	% TOC	Bifen TU	Fen TU	Lam-cy TU	Perm TU	Cyflu TU	Cyper TU	Esfen TU	Delt TU	Sum TU	Rank Stream	Rank All
KC 1	1.55	0.447	n/a	0.025	0.032	0.229	0.145	0.003	0.182	**1.063**	8	18
KC 2	1.26	0.218	n/a	0.003	0.004	0.024	0.073	0.001	0.015	0.338	10	27
KC 3	3.11	**0.705**	n/a	0.020	0.014	0.137	0.402	0.004	0.110	**1.392**	3	12
KC 4	3.39	**1.157**	n/a	0.031	0.030	0.247	0.209	0.009	0.212	**1.895**	2	7
KC 5	4.72	**3.072**	n/a	0.059	0.070	1.103	**0.691**	0.016	0.472	**5.483**	1	3
KC 6	1.12	**1.147**	n/a	0.031	0.013	0.043	0.081	0.005	0.019	**1.339**	4	13
KC 7	2.13	0.126	n/a	0.021	0.018	0.016	0.026	0.001	0.006	0.214	12	30
KC 8	1.21	**0.648**	n/a	0.249	0.009	0.090	0.058	0.005	0.098	**1.157**	6	16
KC 9	1.29	0.391	n/a	0.008	0.007	0.037	0.197	0.002	0.040	**0.682**	9	21
KC 10	1.37	**0.790**	n/a	0.010	0.011	0.071	0.165	0.004	0.024	**1.075**	7	17
KC 11	0.93	0.215	n/a	0.005	0.005	0.016	0.018	0.002	0.024	0.285	11	28
KC 12	2.67	**0.965**	n/a	0.005	0.010	0.036	0.185	0.004	0.012	**1.217**	5	15
KC 13	2.12	0.019	n/a	0.002	0.002	0.002	0.008	0.0006	0.003	0.037	14	35
KC 14	1.50	0.021	n/a	0.007	0.003	0.005	0.009	0.0006	0.004	0.050	13	34
PGC 1	1.12	0.147	n/a	0.006	0.004	0.017	0.012	0.003	0.017	0.206	19	31
PGC 2	1.64	0.215	n/a	0.014	0.006	0.038	0.070	0.005	0.016	0.364	17	26
PGC 3	0.66	0.452	n/a	0.009	0.007	0.045	0.098	0.003	0.022	**0.636**	14	23
PGC 4	1.49	0.453	n/a	0.024	0.004	0.058	0.174	0.005	0.049	**0.767**	12	20
PGC 5	1.42	0.141	n/a	0.008	0.003	0.014	0.060	0.004	0.010	0.240	18	29
PGC 6	0.89	0.032	n/a	0.004	0.005	0.005	0.017	0.001	0.007	0.071	21	33
PGC 7	1.75	0.078	n/a	0.017	0.002	0.005	0.042	0.002	0.006	0.152	20	32
PGC 8	1.14	**14.456**	n/a	0.099	0.156	**0.902**	**1.586**	0.026	0.343	**17.568**	2	2
PGC 9	0.79	**0.801**	n/a	0.014	0.008	0.110	0.285	0.003	0.031	**1.252**	10	14
PGC 10	1.41	**0.929**	n/a	0.046	0.017	0.426	**1.851**	0.005	0.109	**3.383**	4	5
PGC 11	3.21	**0.965**	n/a	0.077	0.012	0.183	0.415	0.005	0.070	**1.727**	6	8
PGC 12	3.73	**1.093**	n/a	0.042	0.014	0.127	0.159	0.006	0.068	**1.509**	8	10
PGC 14	3.18	**2.848**	n/a	**0.544**	0.172	0.229	**0.698**	0.024	0.337	**4.852**	3	4
PGC 15	3.60	0.443	n/a	0.022	0.008	0.047	0.117	0.004	0.036	**0.677**	13	22
PGC 16	7.09	**0.654**	n/a	0.019	0.012	0.032	0.033	0.001	0.020	**0.771**	11	19
PGC 17	1.66	**12.743**	n/a	**0.796**	0.496	**4.362**	**3.852**	0.104	**1.944**	**24.297**	1	1
PGC 18	8.53	0.336	n/a	0.014	0.005	0.087	**0.987**	0.004	0.020	**1.453**	9	11
PGC 19	3.64	0.224	n/a	0.015	0.004	0.051	0.111	0.002	0.025	0.432	16	25
PGC 20	1.10	0.318	n/a	0.014	0.006	0.094	0.110	0.003	0.053	**0.598**	15	24
PGC 21	1.74	**0.998**	n/a	0.069	0.020	**0.543**	0.487	0.011	0.148	**2.276**	5	6
PGC 22	3.31	0.715	n/a	0.058	0.038	0.252	0.324	0.006	0.149	**1.542**	7	9

TABLE 37 **Bulk metals concentrations in sediment (µg/g dw) for Kirker Creek (KC) sites in 2006. Metals concentrations exceeding Threshold Effects Levels (TELs) are in bold.**

Site	As	Cd	Cr	Cu	Pb	Hg	Ni	Zn
KC01	**7.816**	0.305	19.580	23.766	8.213	0.029	**22.516**	86.991
KC02	**7.225**	0.540	31.420	32.586	14.177	0.104	**27.576**	**132.251**
KC03	**6.380**	0.373	24.000	**41.596**	17.667	0.088	**25.056**	**133.951**
KC04	**7.409**	0.476	32.830	**40.846**	17.157	0.101	**30.466**	**149.951**
KC05	**6.280**	0.341	26.590	32.056	12.197	0.077	**28.616**	112.351
KC06	5.572	0.280	20.650	22.516	26.427	**0.340**	**22.196**	78.801
KC07	**6.636**	0.297	20.540	23.526	8.788	0.040	**23.376**	83.551
KC08	**6.733**	0.410	29.510	30.966	14.697	0.060	**28.136**	107.251
KC09	**6.290**	0.273	26.190	22.976	9.489	0.030	**22.016**	68.301
KC10	**6.262**	0.252	21.830	20.166	8.068	0.045	**22.256**	67.691
KC11	**8.392**	0.306	20.080	21.116	6.429	0.028	**24.046**	62.801
KC12	**8.231**	0.261	**37.670**	24.696	7.864	0.140	**26.056**	69.071
KC13	**7.491**	0.309	**42.230**	27.066	8.897	0.031	**26.666**	72.691
KC14	**9.232**	0.371	**60.050**	30.096	8.143	0.026	**30.176**	72.281
TEL	**5.900**	**0.596**	**37.300**	**35.700**	**35.000**	**0.174**	**18.000**	**123.100**

TABLE 38 Concentrations of acid volatile sulfide (AVS), simultaneously extracted metals (SEM), and the SEM/AVS ratio in sediment from 14 Kirker Creek (KC) sites in 2006.

	(concentrations in µmole/g dry weight)							Total	SEM/
Station	AVS	Ni	Cu	Zn	Cd	Pb	Hg	SEM	AVS[a]
KC 1	3.579	0.097	0.033	0.668	ND	0.015	ND	0.813	0.227
KC 2	0.855	0.107	0.086	0.940	0.002	0.024	ND	1.159	**1.356**
KC 3	0.273	0.090	0.130	0.938	ND	0.037	ND	1.195	**4.377**
KC 4	6.810	0.129	0.023	1.058	0.002	0.032	ND	1.244	0.183
KC 5	4.189	0.112	0.026	0.685	ND	0.024	ND	0.847	0.202
KC 6	1.316	0.101	0.023	0.473	ND	0.061	ND	0.658	0.500
KC 7	0.217	0.083	0.078	0.481	ND	0.019	ND	0.661	**3.046**
KC 8	0.150	0.093	0.090	0.541	0.002	0.024	ND	0.750	**5.000**
KC 9	0.455	0.081	0.080	0.329	ND	0.021	ND	0.511	**1.123**
KC 10	0.264	0.073	0.068	0.252	ND	0.014	ND	0.407	**1.542**
KC 11	0.203	0.072	0.065	0.217	ND	0.012	ND	0.366	**1.803**
KC 12	0.250	0.068	0.045	0.175	ND	0.011	ND	0.299	**1.196**
KC 13	0.071	0.085	0.064	0.154	ND	0.010	ND	0.313	**4.408**
KC 14	0.506	0.080	0.195	0.100	ND	0.006	ND	0.381	0.753

[a] Bold SEM/AVS ratios > 1 suggest metals are bioavailable and may be toxic.

TABLE 39 Bulk metals concentrations in sediment (µg/g dw) for 2007 Kirker Creek (KC) sites. Metals concentrations exceeding Threshold Effects Levels (TELs) are in bold.

Site	As	Cd	Cr	Cu	Pb	Hg	Ni	Zn
KC01	**6.768**	0.42	13.645	21.065	8.813	0.042	17.029	81.653
KC02	**9.333**	0.575	26.955	30.715	18.79	0.047	**26.629**	98.803
KC03	**7.16**	**0.72**	21.885	**44.195**	24.38	0.103	**23.749**	**191.543**
KC04	**7.823**	**1.074**	23.635	**48.145**	26.6	**0.183**	**25.619**	**203.643**
KC05	**7.069**	**1.012**	25.175	**52.225**	27.19	0.145	**25.749**	**251.443**
KC06	4.781	0.343	14.335	18.665	30.5	0.059	16.679	79.133
KC07	**6.868**	**0.806**	26.555	33.365	17.58	0.091	**29.679**	103.343
KC08	5.065	0.286	15.205	17.455	14.47	0.028	15.979	72.373
KC09	5.224	0.343	14.365	20.095	14.17	0.052	15.829	64.153
KC10	**5.954**	**0.624**	13.875	20.615	12.01	0.049	17.099	75.013
KC11	**7.121**	0.439	15.915	19.515	8.904	0.023	**19.709**	68.333
KC12	**6.988**	0.505	17.035	21.495	9.543	0.03	**19.339**	75.323
KC13	**6.402**	**0.744**	33.215	22.475	9.862	0.087	**33.619**	64.123
KC14	**7.657**	**0.788**	25.605	25.775	12.22	0.031	**23.659**	69.333
TEL	**5.900**	**0.596**	**37.300**	**35.700**	**35.000**	**0.174**	**18.000**	**123.100**

TABLE 40 Concentrations of acid volatile sulfide (AVS), simultaneously extracted metals (SEM), and the SEM/AVS ratio in sediment from the 14 Kirker Creek sites in 2007.

	(concentrations in µmole/g dry weight)							Total	SEM/
Station	AVS	Ni	Cu	Zn	Cd	Pb	Hg	SEM	AVS[a]
KC 1	19.114	0.0756	ND	0.6512	ND	0.0013	ND	0.728	0.038
KC 2	2.869	0.1041	ND	0.4357	ND	0.0155	ND	0.555	0.194
KC 3	20.081	0.1312	ND	1.9738	ND	0.0081	ND	2.113	0.105
KC 4	5.893	0.0972	ND	1.4755	ND	0.0202	ND	1.593	0.270
KC 5	1.964	0.119	0.1977	2.5046	0.0053	0.0596	ND	2.886	**1.469**
KC 6	0.904	0.0568	0.0543	0.3952	ND	0.0529	0.001	0.560	0.620
KC 7	22.919	0.1747	ND	0.8989	ND	0.0057	0.001	1.080	0.047
KC 8	5.426	0.0779	ND	0.4735	0.0018	0.0097	ND	0.563	0.104
KC 9	2.495	0.0744	ND	0.3782	ND	0.0212	ND	0.474	0.190
KC 10	6.642	0.0876	ND	0.4415	0.0025	0.0172	ND	0.549	0.083
KC 11	0.187	0.0679	0.1268	0.274	0.0036	0.02	ND	0.492	**2.631**
KC 12	9.957	0.0887	ND	0.4174	0.0026	0.006	ND	0.515	0.052
KC 13	8.295	0.0786	ND	0.2714	0.0032	0.0161	ND	0.369	0.045
KC 14	23.671	0.1178	ND	0.2302	0.0039	0.0059	ND	0.358	0.015

[a] Bold SEM/AVS ratios >1 suggest metals are bioavailable and may be toxic.

TABLE 41 Bulk metals concentrations in sediment (µg/g dw) for Pleasant Grove Creek (PGC) sites in 2006.

Metals concentrations exceeding Threshold Effects Levels (TELs) are in bold.

Site	As	Cd	Cr	Cu	Pb	Hg	Ni	Zn
PGC01	1.629	0.075	21.100	13.164	6.277	ND	12.255	35.597
PGC02	1.406	0.047	19.200	11.444	3.269	0.011	11.805	30.397
PGC03	1.350	0.062	17.250	12.114	3.725	0.011	11.455	33.157
PGC04	0.922	0.045	13.250	7.687	2.467	0.010	8.260	36.497
PGC05	0.475	0.048	11.360	7.600	4.961	ND	5.051	26.577
PGC06	0.838	0.046	13.470	9.001	3.075	ND	7.217	33.367
PGC07	1.069	0.069	17.460	12.814	4.064	0.022	10.365	36.987
PGC08	3.069	0.333	**38.450**	**53.164**	7.069	0.076	**24.535**	**232.787**
PGC09	1.712	0.060	20.990	16.114	4.894	0.015	12.985	42.977
PGC10	1.227	0.071	12.450	15.664	2.899	0.019	7.796	57.237
PGC11	2.082	0.272	22.160	**35.704**	4.156	0.027	15.965	**139.487**
PGC12	2.719	0.215	26.260	28.844	6.265	0.039	15.075	**131.687**
PGC14	1.848	0.103	18.450	18.504	3.559	0.022	10.925	71.657
PGC15	2.865	0.424	27.630	**56.264**	7.158	0.056	**22.375**	**349.787**
PGC16	3.502	0.375	**37.640**	**110.464**	10.604	0.067	**24.815**	**248.687**
PGC17	4.647	**0.658**	**47.040**	**113.264**	15.084	0.081	**35.785**	**614.987**
PGC18	1.400	0.075	16.020	**143.764**	3.648	0.021	8.632	51.177
PGC19	2.315	0.091	18.970	14.904	4.138	0.020	10.445	54.857
PGC20	3.205	0.112	23.760	15.394	8.941	0.028	12.255	45.967
PGC21	4.100	0.222	34.380	27.204	5.514	0.040	17.725	**197.587**
PGC22	2.155	0.124	20.870	19.004	3.967	0.030	11.035	69.187
TEL	**5.900**	**0.596**	**37.300**	**35.700**	**35.000**	**0.174**	**18.000**	**123.100**

TABLE 42 Concentrations of acid volatile sulfide (AVS), simultaneously extracted metals (SEM) and the SEM/AVS ratio in sediment from 21 Pleasant Grove Creek (PGC) sites in 2006.

	(concentrations in µmole/g dry weight)							Total	SEM/
Station	AVS	Ni	Cu	Zn	Cd	Pb	Hg	SEM	AVS[b]
PGC 1	0.284[a]	0.030	0.052	0.133	ND	0.018	ND	0.233	0.820[a]
PGC 2	0.202	0.030	0.035	0.078	ND	0.007	ND	0.150	0.743
PGC 3	0.316	0.041	0.039	0.159	ND	0.014	ND	0.253	0.801
PGC 4	0.252	0.024	0.027	0.144	ND	0.007	ND	0.202	0.802
PGC 5	0.388	0.014	0.038	0.165	ND	0.020	ND	0.237	0.611
PGC 6	0.221	0.019	0.035	0.143	ND	0.011	ND	0.208	0.941
PGC 7	0.266	0.028	0.045	0.189	ND	0.013	ND	0.275	**1.034**
PGC 8	1.191	0.076	0.143	1.950	0.002	0.023	ND	2.194	**1.842**
PGC 9	0.426	0.031	0.039	0.163	ND	0.014	ND	0.247	0.580
PGC 10	0.134	0.022	0.085	0.424	ND	0.009	ND	0.540	**4.030**
PGC 11	0.720	0.031	0.100	0.850	ND	0.012	ND	0.993	**1.379**
PGC 12	0.432	0.043	0.110	0.987	ND	0.022	ND	1.162	**2.690**
PGC 14	0.200	0.029	0.093	0.510	ND	0.011	ND	0.643	**3.215**
PGC 15	0.847	0.062	0.171	2.635	0.002	0.035	ND	2.905	**3.430**
PGC 16	6.168	0.068	0.063	1.770	0.002	0.029	ND	1.932	0.313
PGC 17	1.262	0.111	0.317	5.056	0.004	0.056	ND	5.544	**4.393**
PGC 18	0.235	0.025	0.998	0.367	ND	0.013	ND	1.403	**5.970**
PGC 19	0.211	0.022	0.049	0.229	ND	0.010	ND	0.310	**1.469**
PGC 20	0.194	0.040	0.063	0.193	ND	0.032	ND	0.328	**1.691**
PGC 21	0.156	0.031	0.085	0.426	ND	0.013	ND	0.555	**3.558**
PGC 22	0.164[a]	0.062	0.170	2.289	0.002	0.025	ND	2.548	**15.536[a]**

[a] AVS analyses for stations PGC 1 and PGC 22 displayed low % recoveries (17.5 and 39%, respectively). The SEM/AVS ratios for these stations are thus overestimated.
[b] Bold SEM/AVS ratios >1 suggest metals are bioavailable and may be toxic.

TABLE 43 Bulk metals concentrations in sediment (µg/g dw) for the 2007 Pleasant Grove Creek (PGC) sites.

Metals concentrations exceeding Threshold Effects Levels (TELs) are in bold.

Site	As	Cd	Cr	Cu	Pb	Hg	Ni	Zn
PGC01	1.836	0.187	8.675	11.285	5.979	0.013	5.889	33.703
PGC02	1.637	0.207	16.415	16.355	7.328	0.017	12.919	59.153
PGC03	1.172	0.051	9.535	8.759	5.015	0.012	7.134	25.223
PGC04	2.142	0.445	20.875	22.365	8.233	0.024	**19.699**	66.413
PGC05	0.983	0.473	14.385	14.595	11.6	0.022	8.998	61.023
PGC06	1.237	0.229	15.485	11.695	5.655	0.015	13.139	27.753
PGC07	1.161	0.433	16.135	18.065	7.472	0.035	10.689	56.983
PGC08	2.425	0.337	20.105	21.445	6.92	0.023	15.529	70.523
PGC09	2.465	0.172	17.775	17.365	9.261	0.018	13.219	42.243
PGC10	1.29	0.168	12.475	23.145	5.164	0.025	9.005	65.113
PGC11	3.073	0.389	19.335	27.095	8.193	0.031	17.159	96.693
PGC12	2.261	0.236	15.055	18.805	6.808	0.019	10.219	107.843
PGC14	2.746	0.429	16.975	31.395	10.33	0.055	12.999	120.443
PGC15	5.788	**1.242**	26.875	**85.215**	27.27	0.122	**24.749**	**452.443**
PGC16	1.693	0.278	13.375	15.975	5.372	0.018	8.831	49.003
PGC17	**6.475**	**1.422**	31.805	**128.855**	24.11	0.134	**31.179**	**537.043**
PGC18	2.763	0.588	20.025	**240.355**	10.93	0.048	14.439	**163.743**
PGC19	1.348	0.182	10.755	10.735	4.756	0.016	6.108	39.343
PGC20	2.4	0.133	13.915	14.785	11.75	0.027	8.867	49.803
PGC21	2.501	0.452	12.355	35.425	8.074	0.056	8.39	86.293
PGC22	**6.085**	**1.245**	30.525	**2199.955**	24.9	0.133	16.499	**248.143**
TEL	**5.900**	**0.596**	**37.300**	**35.700**	**35.000**	**0.174**	**18.000**	**123.100**

TABLE 44 Concentrations of acid volatile sulfide (AVS), simultaneously extracted metals (SEM), and the SEM/AVS ratio in sediment from the 2007 Pleasant Grove Creek sites.

	(concentrations in µmole/g dry weight)							Total	SEM/
Station	AVS	Ni	Cu	Zn	Cd	Pb	Hg	SEM	AVS[a]
PGC 1	2.808	0.0293	0.0081	0.2857	ND	0.0133	ND	0.336	0.120
PGC 2	1.809	0.0353	0.0217	0.5078	ND	0.0161	ND	0.581	0.321
PGC 3	0.094	0.0294	0.0474	0.1991	ND	0.0098	ND	0.286	**3.054**
PGC 4	0.218	0.0756	0.0886	0.5529	0.0031	0.0158	ND	0.736	**3.372**
PGC 5	0.094	0.025	0.0785	0.5465	0.0022	0.0322	ND	0.684	**7.316**
PGC 6	0.027	0.0346	0.0566	0.1702	ND	0.0104	ND	0.272	**9.905**
PGC 7	3.903	0.0312	ND	0.5678	0.0025	0.0163	ND	0.618	0.158
PGC 8	1.621	0.047	0.0407	0.6068	ND	0.0123	ND	0.707	0.436
PGC 9	1.123	0.0294	0.0153	0.1718	ND	0.0112	ND	0.228	0.203
PGC 10	0.405	0.0215	0.0716	0.5638	ND	0.0092	ND	0.666	**1.643**
PGC 11	0.405	0.0675	0.0912	0.8509	0.0018	0.0138	ND	1.025	**2.529**
PGC 12	0.374	0.0462	0.0446	1.4118	ND	0.0176	ND	1.520	**4.063**
PGC 14	0.671	0.0362	0.0421	1.0863	ND	0.0134	ND	1.178	**1.756**
PGC 15	1.016	0.0789	0.0965	3.8169	0.0034	0.0478	ND	4.044	**3.979**
PGC 16	0.703	0.035	0.0365	0.3977	ND	0.0216	ND	0.491	0.699
PGC 17	4.272	0.1317	0.0614	5.64	0.0049	0.0526	ND	5.891	**1.379**
PGC 18	4.178	0.0405	0.054	1.5348	0.0022	0.0221	ND	1.654	0.396
PGC 19	0.811	0.0207	0.034	0.3534	ND	0.0116	ND	0.420	0.518
PGC 20	0.842	0.0447	0.0518	0.476	ND	0.0277	ND	0.600	0.713
PGC 21	0.281	0.0433	0.2408	0.994	ND	0.0193	ND	1.297	**4.623**
PGC 22	0.249	0.0615	2.5625	2.5138	0.0023	0.0509	ND	5.191	**20.809**

[a] Bold SEM/AVS ratios >1 suggest metals are bioavailable and may be toxic.

TABLE 45 Sediment PAH values from the spring 2006 Kirker Creek sample sites.

Values in bold exceed the TEL for each PAH. PAH abbreviations are as follows: AE = Acenaphthene; AY = Acenaphthylene; AO = Anthracene; BAO = Benz[a]anthracene; BAP = Benzo[a]pyrene; CO = Chrysene; DA = Dibenz[a,h]anthracene; FLO = Fluoranthene; FO = Fluorene; 2MN = 2-Methylnaphthalene; NO = Naphthalene; PO = Phenanthrene; PYO = Pyrene; TPAH = Total Detectable PAHs.

Station	PAHs (ng/g dry wt)													
	AE	AY	AO	BAO	BAP	CO	DA	FLO	FO	2MN	NO	PO	PYO	TPAH
KC 1	ND	ND	ND	6.4	6.9	17.9	ND	20.7	ND	**21.9**	15.5	43.0	25.1	404.6
KC 2	1.4	ND	3.1	21.1	33.7	45.2	**8.6**	52.8	1.3	ND	1.8	22.9	42.2	493.7
KC 3	2.3	ND	15.0	70.5	79.2	95.2	**14.3**	**172.9**	3.3	1.2	2.5	75.9	111.4	1076.2
KC 4	1.5	ND	3.3	26.0	39.1	59.9	**9.2**	76.8	1.9	1.8	2.3	30.2	60.5	574.1
KC 5	1.0	ND	2.6	17.4	23.7	39.4	4.0	48.4	1.3	ND	1.4	19.8	39.0	372.9
KC 6	ND	ND	1.7	17.7	25.1	31.2	5.1	41.0	1.2	ND	ND	15.0	33.1	324.9
KC 7	1.5	ND	ND	9.0	18.2	20.0	4.0	24.8	ND	**26.1**	1.7	10.2	17.3	367.1
KC 8	1.1	ND	3.5	50.3	69.9	90.5	**17.0**	**120.4**	ND	1.0	1.2	30.6	78.0	973.5
KC 9	1.4	ND	ND	4.8	4.4	8.8	ND	9.5	1.0	11.7	13.8	**139.8**	8.9	333.3
KC 10	ND	ND	ND	2.6	1.4	6.5	ND	7.3	ND	ND	ND	6.2	5.7	70.2
KC 11	ND	ND	ND	1.3	ND	3.5	ND	3.2	ND	ND	ND	2.6	3.7	60.8
KC 12	ND	ND	ND	1.1	1.3	3.2	ND	2.5	ND	2.0	ND	9.8	3.1	62.8
KC 13	ND	ND	ND	1.1	3.0	1.8	ND	2.0	ND	ND	ND	1.4	1.8	27.2
KC 14	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	2.5
TEL	6.71	5.87	46.85	74.83	88.81	107.77	6.22	112.82	21.17	20.21	34.57	86.68	152.66	1684.06

TABLE 46 Sediment PAH values from the spring 2006 Pleasant Grove Creek sample sites.

Values in bold exceed the TEL for each PAH. PAH abbreviations are as follows: AE = Acenaphthene; AY = Acenaphthylene; AO = Anthracene; BAO = Benz[a]anthracene; BAP = Benzo[a]pyrene; CO = Chrysene; DA = Dibenz[a,h]anthracene; FLO = Fluoranthene; FO = Fluorene; 2MN = 2-Methylnaphthalene; NO = Naphthalene; PO = Phenanthrene; PYO = Pyrene; TPAH = Total Detectable PAHs.

Station	PAHs (ng/g dry wt)													
	AE	AY	AO	BAO	BAP	CO	DA	FLO	FO	2MN	NO	PO	PYO	TPAH
PGC 1	ND	ND	ND	ND	1.4	4.1	ND	1.9	ND	ND	ND	ND	2.8	31.8
PGC 2	ND	ND	ND	ND	1.0	1.2	ND	1.1	ND	ND	ND	ND	1.1	7.8
PGC 3	ND	ND	ND	ND	ND	1.5	ND	1.0	ND	ND	ND	ND	ND	8.8
PGC 4	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	5.4
PGC 5	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	7.2
PGC 6	ND	ND	ND	ND	1.0	1.4	ND	1.8	ND	ND	ND	ND	1.2	12.8
PGC 7	ND	ND	1.5	1.0	1.0	1.8	ND	2.0	ND	ND	ND	ND	1.6	20.0
PGC 8	1.6	1.1	2.3	8.1	12.7	27.6	**7.3**	20.4	3.3	3.2	4.1	17.9	31.5	342.4
PGC 9	ND	ND	ND	ND	1.2	2.8	ND	1.7	ND	ND	ND	ND	2.2	26.4
PGC 10	1.7	ND	2.4	5.4	5.4	8.9	ND	12.8	1.2	ND	ND	8.8	10.4	100.6
PGC 11	1.2	ND	11.1	4.1	8.3	17.6	4.0	13.4	1.8	1.3	3.6	9.5	15.8	190.0
PGC 12	2.8	ND	1.8	2.5	3.4	8.9	1.8	13.3	2.0	ND	ND	7.2	13.2	139.2
PGC 14	ND	ND	ND	2.1	3.3	9.6	1.4	7.3	1.0	ND	1.2	3.6	8.9	101.0
PGC 15	3.4	1.3	3.3	13.2	19.5	50.2	**12.6**	37.1	3.5	2.4	5.1	20.2	44.3	492.9
PGC 16	6.1	2.1	3.1	12.1	34.6	60.6	**16.7**	36.8	7.0	5.1	8.9	27.2	57.4	646.1
PGC 17	4.4	2.6	5.0	14.9	34.6	70.7	**15.4**	56.0	3.9	4.6	8.2	32.8	68.9	774.7
PGC 18	ND	ND	ND	ND	2.7	3.8	ND	2.6	ND	ND	ND	1.6	3.4	43.0
PGC 19	ND	ND	ND	ND	ND	1.6	ND	1.2	ND	ND	ND	ND	ND	12.8
PGC 20	ND	ND	ND	1.9	2.6	3.0	ND	2.1	ND	ND	ND	ND	2.1	29.9
PGC 21	ND	ND	2.4	6.1	4.9	15.2	2.4	52.4	1.0	ND	ND	26.4	27.3	190.8
PGC 22	ND	1.1	1.5	6.4	8.9	24.0	5.9	22.9	ND	2.7	3.7	10.4	23.5	271.3
TEL	6.71	5.87	46.85	74.83	88.81	107.77	6.22	112.82	21.17	20.21	34.57	86.68	152.66	1684.06

TABLE 47 Results of univariate linear regression models of benthic metrics versus pyrethroids in sediments (standardized to toxic units by dividing TOC-standardized concentrations by LC_{50} values for the pyrethroids) in Kirker Creek in 2006 and 2007, indicating type of the relationships (+ = direct; - = inverse) and R^2 values for significant relationships (α=0.01; NS=not significant).

	Total TUs		Bifenthrin		Lambda-cyhal.		Permethrin	
Benthic Metrics	Rel.	R^2	Rel.	R^2	Rel.	R^2	Rel.	R^2
Taxonomic Richness	NS		NS		NS		NS	
% Dominant Taxon	NS		NS		NS		NS	
Ephemeroptera Taxa	NS		NS		NS		NS	
EPT Taxa	NS		NS		NS		NS	
EPT Index (%)	NS		NS		NS		NS	
Shannon Diversity	NS		NS		NS		NS	
Tolerance Value	+	0.34	+	0.34	NS		+	0.19
% Tolerant Taxa (8-10)	NS		NS		NS		NS	
% Collectors/Filterers	NS		NS		NS		NS	
% Collectors/Gatherers	NS		NS		NS		NS	
% Grazers	NS		NS		NS		NS	
% Predators	NS		NS		NS		NS	
% Shredders	NS		NS		NS		NS	
Abundance (#/sample)	NS		NS		NS		NS	

TABLE 47 Results of univariate linear regression models of benthic metrics versus pyrethroids in sediments (standardized to toxic units by dividing TOC-standardized concentrations by LC_{50} values for the pyrethroids) in Kirker Creek in 2006 and 2007, indicating type of the relationships (+ = direct; - = inverse) and R^2 values for significant relationships (α=0.01; NS=not significant). (Continued)

	Cyfluthrin		Cypermethrin		Esfenvalerate		Deltamethrin	
Benthic Metrics	Rel.	R^2	Rel.	R^2	Rel.	R^2	Rel.	R^2
Taxonomic Richness	NS		NS		NS		NS	
% Dominant Taxon	NS		NS		NS		NS	
Ephemeroptera Taxa	NS		NS		NS		NS	
EPT Taxa	NS		NS		NS		NS	
EPT Index (%)	NS		NS		NS		NS	
Shannon Diversity	NS		NS		NS		NS	
Tolerance Value	+	0.22	+	0.37	+	0.21	NS	
% Tolerant Taxa (8-10)	NS		NS		NS		NS	
% Collectors/Filterers	NS		NS		NS		NS	
% Collectors/Gatherers	NS		NS		NS		NS	
% Grazers	NS		NS		NS		NS	
% Predators	NS		NS		NS		NS	
% Shredders	NS		NS		NS		NS	
Abundance (#/sample)	NS		NS		NS		NS	

TABLE 48 **Results of univariate linear regression models of benthic metrics versus pyrethroids in sediments (standardized to toxic units by dividing TOC-standardized concentrations by LC_{50} values for the pyrethroids) in Pleasant Grove Creek in 2006 and 2007, indicating type of the relationships (+ = direct; - = inverse) and R^2 values for significant relationships (α=0.01; NS=not significant).**

	Total TUs		Bifenthrin		Lambda-cyhal.		Permethrin	
Benthic Metrics	Rel.	R^2	Rel.	R^2	Rel.	R^2	Rel.	R^2
Taxonomic Richness	NS		-	0.15	NS		NS	
% Dominant Taxon	NS		NS		NS		NS	
Ephemeroptera Taxa	NS		NS		NS		NS	
EPT Taxa	NS		NS		NS		NS	
EPT Index (%)	NS		NS		NS		NS	
Shannon Diversity	NS		NS		NS		NS	
Tolerance Value	NS		NS		NS		NS	
% Tolerant Taxa (8-10)	+	0.24	+	0.23	+	0.16	NS	
% Collectors/Filterers	NS		NS		NS		NS	
% Collectors/Gatherers	NS		NS		NS		NS	
% Grazers	NS		NS		NS		NS	
% Predators	NS		NS		NS		NS	
% Shredders	NS		NS		NS		NS	
Abundance (#/sample)	NS		NS		NS		NS	

TABLE 48 Results of univariate linear regression models of benthic metrics versus pyrethroids in sediments (standardized to toxic units by dividing TOC-standardized concentrations by LC_{50} values for the pyrethroids) in Pleasant Grove Creek in 2006 and 2007, indicating type of the relationships (+ = direct; - = inverse) and R^2 values for significant relationships (α=0.01; NS=not significant). (Continued)

	Cyfluthrin		Cypermethrin		Esfenvalerate		Deltamethrin	
Benthic Metrics	Rel.	R^2	Rel.	R^2	Rel.	R^2	Rel.	R^2
Taxonomic Richness	NS		NS		NS		NS	
% Dominant Taxon	NS		NS		NS		NS	
Ephemeroptera Taxa	NS		NS		NS		NS	
EPT Taxa	NS		NS		NS		NS	
EPT Index (%)	NS		NS		NS		NS	
Shannon Diversity	NS		NS		NS		NS	
Tolerance Value	NS		NS		NS		NS	
% Tolerant Taxa (8-10)	+	0.19	+	0.23	+	0.16	+	0.21
% Collectors/Filterers	NS		NS		NS		NS	
% Collectors/Gatherers	NS		NS		NS		NS	
% Grazers	NS		NS		NS		NS	
% Predators	NS		NS		NS		NS	
% Shredders	NS		NS		NS		NS	
Abundance (#/sample)	NS		NS		NS		NS	

TABLE 49 **Results of stepwise multiple linear regression models of benthic metrics versus toxicity units for pyrethroids for: a) Kirker Creek; b) Pleasant Grove Creek; both in 2006 and 2007. Only variables that were significant at α=0.01 were included in the models. The direction of the relationship for each significant variable is indicated (+ = direct; - = inverse), as is the contributed R^2 values.**

a) Models for benthic metrics versus toxicity units for pyrethroids for Kirker Creek.

Benthic Metrics	Prob.	R^2	Significant Variables (R^2)
Taxonomic Richness	NS		
% Dominant Taxon	NS		
Ephemeroptera Taxa	NS		
EPT Taxa	NS		
EPT Index (%)	NS		
Shannon Diversity	NS		
Tolerance Value	<0.001	0.37	+Cypermethrin (0.37)
% Tolerant Taxa (8-10)	NS		
% Collectors/Filterers	NS		
% Collectors/Gatherers	NS		
% Grazers	NS		
% Predators	NS		
% Shredders	NS		
Abundance (#/sample)	NS		

TABLE 49 Results of stepwise multiple linear regression models of benthic metrics versus toxicity units for pyrethroids for: a) Kirker Creek; b) Pleasant Grove Creek; both in 2006 and 2007. Only variables that were significant at α=0.01 were included in the models. The direction of the relationship for each significant variable is indicated (+ = direct; - = inverse), as is the contributed R^2 values. (Continued)

b) Models for benthic metrics versus toxicity units for pyrethroids for Pleasant Grove Creek.

Benthic Metrics	Prob.	R^2	Significant Variables (R^2)
Taxonomic Richness	NS		
% Dominant Taxon	NS		
Ephemeroptera Taxa	NS		
EPT Taxa	NS		
EPT Index (%)	NS		
Shannon Diversity	NS		
Tolerance Value	NS		
% Tolerant Taxa (8-10)	<0.001	0.24	+TotalTUs (0.24)
% Collectors/Filterers	NS		
% Collectors/Gatherers	NS		
% Grazers	NS		
% Predators	NS		
% Shredders	NS		
Abundance (#/sample)	NS		

TABLE 50 Results of univariate linear regression models of benthic metrics versus metals in sediments (standardized to toxic units by dividing by TEL values for the metals) in Kirker Creek in 2006 and 2007, indicating type of the relationships (+ = direct; - = inverse) and R^2 values for significant relationships (α=0.01; NS=not significant)..

	Total Metals to TELs		As to TEL		Cd to TEL		Cr to TEL	
Benthic Metrics	Rel.	R^2	Rel.	R^2	Rel.	R^2	Rel.	R^2
Taxonomic Richness	NS		NS		NS		NS	
% Dominant Taxon	NS		NS		NS		NS	
Ephemeroptera Taxa	NS		NS		NS		+	0.25
EPT Taxa	NS		NS		NS		NS	
EPT Index (%)	NS		NS		NS		NS	
Shannon Diversity	NS		NS		NS		NS	
Tolerance Value	NS		NS		NS		NS	
% Tolerant Taxa (8-10)	NS		NS		+	0.24	NS	
% Collectors/Filterers	NS		NS		NS		NS	
% Collectors/Gatherers	NS		NS		NS		NS	
% Grazers	NS		NS		NS		NS	
% Predators	NS		NS		NS		+	0.29
% Shredders	NS		NS		NS		NS	
Abundance (#/sample)	NS		NS		NS		NS	

TABLE 50 **Results of univariate linear regression models of benthic metrics versus metals in sediments (standardized to toxic units by dividing by TEL values for the metals) in Kirker Creek in 2006 and 2007, indicating type of the relationships (+ = direct; - = inverse) and R^2 values for significant relationships (α=0.01; NS=not significant). (Continued)**

	Cu to TEL		Pb to TEL		Hg to TEL		Ni to TEL		Zn to TEL	
Benthic Metrics	Rel.	R^2	Rel.	R^2	Rel.	R^2	Rel.	R^2	Rel.	R^2
Taxonomic Richness	NS		NS		NS		NS		NS	
% Dominant Taxon	NS		NS		NS		NS		NS	
Ephemeroptera Taxa	NS		NS		NS		NS		NS	
EPT Taxa	NS		NS		NS		NS		NS	
EPT Index (%)	NS		NS		NS		NS		NS	
Shannon Diversity	NS		NS		NS		NS		NS	
Tolerance Value	NS		+	0.28	NS		NS		+	0.29
% Tolerant Taxa (8-10)	NS		NS		NS		NS		NS	
% Collectors/Filterers	NS		NS		NS		NS		NS	
% Collectors/Gatherers	NS		NS		NS		NS		NS	
% Grazers	NS		NS		NS		NS		NS	
% Predators	NS		NS		NS		NS		NS	
% Shredders	NS		NS		NS		NS		NS	
Abundance (#/sample)	NS		NS		NS		NS		NS	

TABLE 51 **Results of univariate linear regression models of benthic metrics versus metals in sediments (standardized to toxic units by dividing by TEL values for the metals) in Pleasant Grove Creek in 2006 and 2007, indicating type of the relationships (+ = direct; - = inverse) and R^2 values for significant relationships (α=0.01; NS=not significant).**

	Total Metals to TELs		As to TEL		Cd to TEL		Cr to TEL	
Benthic Metrics	Rel.	R^2	Rel.	R^2	Rel.	R^2	Rel.	R^2
Taxonomic Richness	NS		NS		NS		NS	
% Dominant Taxon	NS		NS		NS		NS	
Ephemeroptera Taxa	NS		NS		NS		NS	
EPT Taxa	NS		NS		NS		NS	
EPT Index (%)	NS		NS		NS		NS	
Shannon Diversity	NS		NS		NS		NS	
Tolerance Value	NS		NS		NS		NS	
% Tolerant Taxa (8-10)	+	0.18	+	0.17	+	0.32	+	0.31
% Collectors/Filterers	NS		NS		NS		NS	
% Collectors/Gatherers	NS		NS		NS		NS	
% Grazers	NS		NS		NS		NS	
% Predators	NS		NS		NS		NS	
% Shredders	NS		NS		NS		NS	
Abundance (#/sample)	NS		NS		NS		NS	

TABLE 51 **Results of univariate linear regression models of benthic metrics versus metals in sediments (standardized to toxic units by dividing by TEL values for the metals) in Pleasant Grove Creek in 2006 and 2007, indicating type of the relationships (+ = direct; - = inverse) and R^2 values for significant relationships (α=0.01; NS=not significant). (Continued)**

	Cu to TEL		Pb to TEL		Hg to TEL		Ni to TEL		Zn to TEL	
Benthic Metrics	Rel.	R^2	Rel.	R^2	Rel.	R^2	Rel.	R^2	Rel.	R^2
Taxonomic Richness	NS		NS		NS		-	0.18	-	0.15
% Dominant Taxon	NS		NS		NS		NS		NS	
Ephemeroptera Taxa	NS		NS		NS		NS		NS	
EPT Taxa	NS		NS		-	0.19	NS		-	0.16
EPT Index (%)	NS		NS		NS		NS		NS	
Shannon Diversity	NS		NS		NS		NS		NS	
Tolerance Value	NS		NS		+	0.16	NS		+	0.16
% Tolerant Taxa (8-10)	NS		+	0.26	+	0.45	+	0.33	+	0.36
% Collectors/Filterers	NS		NS		NS		NS		NS	
% Collectors/Gatherers	NS		NS		NS		NS		NS	
% Grazers	NS		NS		NS		NS		NS	
% Predators	NS		NS		NS		NS		NS	
% Shredders	NS		NS		NS		NS		NS	
Abundance (#/sample)	NS		NS		NS		NS		NS	

TABLE 52 Results of stepwise multiple linear regression models of benthic metrics versus metals in sediments (standardized to toxic units by dividing by TEL values for the metals) for: a) Kirker Creek; b) Pleasant Grove Creek; both in 2006 and 2007. Only variables that were significant at α=0.01 were included in the models. The direction of the relationship for each significant variable is indicated (+ = direct; - = inverse), as is the contributed R^2 values.

a) Models for benthic metrics versus metals to TEL ratios for Kirker Creek.

Benthic Metrics	Prob.	R^2	Significant Variables (R^2)
Taxonomic Richness	NS		
% Dominant Taxon	NS		
Ephemeroptera Taxa	0.006	0.25	+Chromium to TEL (0.25)
EPT Taxa	NS		
EPT Index (%)	NS		
Shannon Diversity	NS		
Tolerance Value	0.003	0.49	+Zinc to TEL (0.29), -Nickel to TEL (0.20)
% Tolerant Taxa (8-10)	<0.001	0.44	+Cadmium to TEL (0.24), -Nickel to TEL (0.20)
% Collectors/Filterers	NS		
% Collectors/Gatherers	NS		
% Grazers	NS		
% Predators	0.003	0.29	+Chromium to TEL (0.29)
% Shredders	NS		
Abundance (#/sample)	NS		

TABLE 52 **Results of stepwise multiple linear regression models of benthic metrics versus metals in sediments (standardized to toxic units by dividing by TEL values for the metals) for: a) Kirker Creek; b) Pleasant Grove Creek; both in 2006 and 2007. Only variables that were significant at α=0.01 were included in the models. The direction of the relationship for each significant variable is indicated (+ = direct; - = inverse), as is the contributed R^2 values. (Continued)**

b) Models for benthic metrics versus metals to TEL ratios for Pleasant Grove Creek.

Benthic Metrics	Prob.	R^2	Significant Variables (R^2)
Taxonomic Richness	NS		
% Dominant Taxon	NS		
Ephemeroptera Taxa	<0.001	0.31	-Mercury to TEL (0.15), +Cadmium to TEL (0.16)
EPT Taxa	<0.001	0.36	-Mercury to TEL (0.19), +Cadmium to TEL (0.13)
EPT Index (%)	NS		
Shannon Diversity	NS		
Tolerance Value	0.008	0.16	+Mercury to TEL (0.16)
% Tolerant Taxa (8-10)	<0.001	0.45	+Mercury to TEL (0.45)
% Collectors/Filterers	NS		
% Collectors/Gatherers	NS		
% Grazers	NS		
% Predators	NS		
% Shredders	NS		
Abundance (#/sample)	NS		

TABLE 53 Results of stepwise multiple linear regression models of benthic metrics versus habitat metrics for: a) Kirker Creek; b) Pleasant Grove Creek; both in 2006 and 2007. Only variables that were significant at α=0.01 were included in the models. The direction of the relationship for each significant variable is indicated (+ = direct; - = inverse), as is the contributed R^2 values.

a) Models for benthic metrics versus habitat metrics for Kirker Creek.

Benthic Metrics	Prob.	R^2	Significant Variables (R^2)
Taxonomic Richness	<0.001	0.40	+Frequency of riffles/bends (0.26), -Vegetative protection (0.14)
% Dominant Taxon	NS		
Ephemeroptera Taxa	NS		
EPT Taxa	NS		
EPT Index (%)	NS		
Shannon Diversity	NS		
Tolerance Value	0.007	0.25	- Frequency of riffles/bends (0.25)
% Tolerant Taxa (8-10)	<0.001	0.46	- Frequency of riffles/bends (0.46)
% Collectors/Filterers	<0.001	0.35	-% Fines (0.35)
% Collectors/Gatherers	NS		
% Grazers	NS		
% Predators	NS		
% Shredders	NS		
Abundance (#/sample)	NS		

TABLE 53 Results of stepwise multiple linear regression models of benthic metrics versus habitat metrics for: a) Kirker Creek; b) Pleasant Grove Creek; both in 2006 and 2007. Only variables that were significant at α=0.01 were included in the models. The direction of the relationship for each significant variable is indicated (+ = direct; - = inverse), as is the contributed R^2 values. (Continued)

b) Models for benthic metrics versus habitat metrics for Pleasant Grove Creek.

Benthic Metrics	Prob.	R^2	Significant Variables (R^2)
Taxonomic Richness	<0.001	0.31	+Velocity depth regimes (0.31)
% Dominant Taxon	NS		
Ephemeroptera Taxa	<0.001	0.44	+Velocity depth regimes (0.44)
EPT Taxa	<0.001	0.52	+Velocity depth regimes (0.52)
EPT Index (%)	<0.001	0.48	+Velocity depth regimes (0.48)
Shannon Diversity	NS		
Tolerance Value	<0.001	0.57	-Velocity depth regimes (0.34), -Sediment deposition (0.13), +% Gravel (0.10)
% Tolerant Taxa (8-10)	<0.001	0.53	-Velocity depth regimes (0.53)
% Collectors/Filterers	<0.001	0.39	+Velocity depth regimes (0.39)
% Collectors/Gatherers	NS		
% Grazers	NS		
% Predators	NS		
% Shredders	NS		
Abundance (#/sample)	NS		

TABLE 54 Results of stepwise multiple linear regression models of benthic metrics versus toxicity units for pyrethroids, habitat indices, and metals to TEL ratios for: a) Kirker Creek; b) Pleasant Grove Creek; both in 2006 and 2007.

Only variables that were significant at α=0.01 were included in the models. The direction of the relationship for each significant variable is indicated (+ = direct; - = inverse), as is the contributed R^2 values.

a) Models for benthic metrics versus toxicity units for pyrethroids, habitat indices, and metals to TEL ratios for Kirker Creek.

Benthic Metrics	Prob.	R^2	Significant Variables (R^2)
Taxonomic Richness	0.002	0.40	+Frequency of riffles/bends (0.26), -Vegetative protection (0.14)
% Dominant Taxon	NS		
Ephemeroptera Taxa	0.006	0.25	+Chromium to TEL(0.25)
EPT Taxa	NS		
EPT Index (%)	NS		
Shannon Diversity	NS		
Tolerance Value	<0.001	0.37	+Cypermethrin (0.37)
% Tolerant Taxa (8-10)	<0.001	0.46	-Frequency of riffles/bends (0.46)
% Collectors/Filterers	<0.001	0.35	-% fines (0.35)
% Collectors/Gatherers	NS		
% Grazers	NS		
% Predators	0.003	0.29	+Chromium to TEL (0.29)
% Shredders	0.006	0.34	-Sediment deposition (0.17), -Nickel to TEL (0.17)
Abundance (#/sample)	0.008	0.34	-Lead to TEL (0.17), -% Canopy cover (0.17)

TABLE 54 Results of stepwise multiple linear regression models of benthic metrics versus toxicity units for pyrethroids, habitat indices, and metals to TEL ratios for: a) Kirker Creek; b) Pleasant Grove Creek; both in 2006 and 2007. (Continued)

Only variables that were significant at α=0.01 were included in the models. The direction of the relationship for each significant variable is indicated (+ = direct; - = inverse), as is the contributed R^2 values.

b) Models for benthic metrics versus toxicity units for pyrethroids, habitat indices, and metals to TEL ratios for Pleasant Grove Creek.

Benthic Metrics	Prob.	R^2	Significant Variables (R^2)
Taxonomic Richness	<0.001	0.31	+Velocity depth regimes (0.31)
% Dominant Taxon	NS		
Ephemeroptera Taxa	<0.001	0.44	+Velocity depth regimes (0.44)
EPT Taxa	<0.001	0.52	+Velocity depth regimes (0.52)
EPT Index (%)	<0.001	0.48	+Velocity depth regimes (0.48)
Shannon Diversity	NS		
Tolerance Value	<0.001	0.57	-Velocity depth regimes (0.34), -Sediment deposition (0.13), +%Gravel (0.10)
% Tolerant Taxa (8-10)	<0.001	0.69	-Velocity depth regimes (0.53), + Mercury to TEL (0.16)
% Collectors/Filterers	<0.001	0.39	+Velocity depth regimes (0.39)
% Collectors/Gatherers	NS		
% Grazers	NS		
% Predators	NS		
% Shredders	NS		
Abundance (#/sample)	NS		

TABLE 55 Results of univariate linear regression models of benthic metrics versus pyrethroids in sediments (standardized to toxic units by dividing TOC-standardized concentrations by LC_{50} values for the pyrethroids) from Kirker Creek and Pleasant Grove Creek for 2006 and 2007, indicating type of the relationships (+ = direct; - = inverse) and R^2 values for significant relationships (α=0.01; NS=not significant).

If significant creek-specific or year-specific effects were detected for benthic metrics, these effects (not shown) were corrected for (i.e. entered into the regression equations first) prior to analyses of effects associated with pyrethroids.

	Total TUs		Bifenthrin		Lambda-cyhal.		Permethrin	
Benthic Metrics	Rel.	R^2	Rel.	R^2	Rel.	R^2	Rel.	R^2
Taxonomic Richness	-	0.08	-	0.08	NS		NS	
% Dominant Taxon	NS		NS		NS		NS	
Ephemeroptera Taxa	-	0.08	-	0.07	NS		NS	
EPT Taxa	-	0.09	-	0.09	NS		NS	
EPT Index (%)	NS		NS		NS		NS	
Shannon Diversity	NS		NS		NS		NS	
Tolerance Value	+	0.08	+	0.08	NS		NS	
% Tolerant Taxa (8-10)	+	0.10	+	0.14	+	0.09	NS	
% Collectors/Filterers	NS		NS		NS		NS	
% Collectors/Gatherers	NS		NS		NS		NS	
% Grazers	NS		NS		NS		NS	
% Predators	NS		NS		NS		NS	
% Shredders	NS		NS		NS		NS	
Abundance (#/sample)	NS		NS		NS		NS	

TABLE 55 Results of univariate linear regression models of benthic metrics versus pyrethroids in sediments (standardized to toxic units by dividing TOC-standardized concentrations by LC_{50} values for the pyrethroids) from Kirker Creek and Pleasant Grove Creek for 2006 and 2007, indicating type of the relationships (+ = direct; - = inverse) and R^2 values for significant relationships (α=0.01; NS=not significant). (Continued)

	Cyfluthrin		Cypermethrin		Esfenvalerate		Deltamethrin	
Benthic Metrics	Rel.	R^2	Rel.	R^2	Rel.	R^2	Rel.	R^2
Taxonomic Richness	NS		NS		NS		NS	
% Dominant Taxon	NS		NS		NS		NS	
Ephemeroptera Taxa	NS		-	0.08	NS		NS	
EPT Taxa	NS		-	0.09	NS		NS	
EPT Index (%)	NS		NS		NS		NS	
Shannon Diversity	NS		NS		NS		NS	
Tolerance Value	NS		NS		NS		NS	
% Tolerant Taxa (8-10)	+	0.12	+	0.14	+	0.09	+	0.12
% Collectors/Filterers	NS		NS		NS		NS	
% Collectors/Gatherers	NS		NS		NS		NS	
% Grazers	NS		NS		NS		NS	
% Predators	NS		NS		NS		NS	
% Shredders	NS		NS		NS		NS	
Abundance (#/sample)	NS		NS		NS		NS	

TABLE 56 Results of stepwise multiple linear regression models of benthic metrics versus toxicity units for pyrethroids for Kirker Creek and Pleasant Grove Creek for 2006 and 2007. If significant creek-specific or year-specific effects were detected for benthic metrics, these effects (not shown) were corrected for prior to analyses of effects associated with pyrethroids.

Only variables that were significant at α=0.01 were included in the models. The direction of the relationship for each significant variable is indicated (+ = direct; - = inverse), as is the contributed R^2 values.

Benthic Metrics	Prob.	R^2	Significant Variables (R^2)
Taxonomic Richness	0.007	0.08	- Bifenthrin (0.08)
% Dominant Taxon	NS		
Ephemeroptera Taxa	0.007	0.08	- Total TUs (0.08)
EPT Taxa	NS		- Total TUs (0.09)
EPT Index (%)	NS		
Shannon Diversity	NS		
Tolerance Value	0.008	0.08	+ Total TUs (0.08)
% Tolerant Taxa (8-10)	0.004	0.14	+Bifenthrin (0.14)
% Collectors/Filterers	NS		
% Collectors/Gatherers	NS		
% Grazers	NS		
% Predators	NS		
% Shredders	NS		
Abundance (#/sample)	NS		

TABLE 57 Results of univariate linear regression models of benthic metrics versus metals in sediments (standardized to toxic units by dividing by TEL values for the metals) in Kirker Creek, and Pleasant Grove Creek for 2006 and 2007, indicating type of the relationships (+ = direct; - = inverse) and R^2 values for significant relationships (α=0.01; NS=not significant).

If significant creek-specific or year-specific effects were detected for benthic metrics, these effects (not shown) were corrected for prior to analyses of effects associated with metals.

	Total Metals to TELs		As to TEL		Cd to TEL		Cr to TEL	
Benthic Metrics	Rel.	R^2	Rel.	R^2	Rel.	R^2	Rel.	R^2
Taxonomic Richness	NS		NS		-	0.07	NS	
% Dominant Taxon	NS		NS		NS		NS	
Ephemeroptera Taxa	NS		-	0.10	NS		NS	
EPT Taxa	NS		-	0.17	NS		NS	
EPT Index (%)	NS		-	0.14	NS		NS	
Shannon Diversity	NS		NS		NS		NS	
Tolerance Value	NS		+	0.15	+	0.15	NS	
% Tolerant Taxa (8-10)	+	0.10	+	0.15	+	0.33	NS	
% Collectors/Filterers	NS		NS		NS		NS	
% Collectors/Gatherers	NS		NS		NS		NS	
% Grazers	NS		NS		NS		NS	
% Predators	NS		NS		NS		NS	
% Shredders	NS		NS		NS		NS	
Abundance (#/sample)	NS		NS		NS		NS	

TABLE 57 Results of univariate linear regression models of benthic metrics versus metals in sediments (standardized to toxic units by dividing by TEL values for the metals) in Kirker Creek, and Pleasant Grove Creek for 2006 and 2007, indicating type of the relationships (+ = direct; - = inverse) and R^2 values for significant relationships (α=0.01; NS=not significant). (Continued)

	Cu to TEL		Pb to TEL		Hg to TEL		Ni to TEL		Zn to TEL	
Benthic Metrics	Rel.	R^2	Rel.	R^2	Rel.	R^2	Rel.	R^2	Rel.	R^2
Taxonomic Richness	NS		NS		NS		NS		-	0.09
% Dominant Taxon	NS		NS		NS		+	0.11	NS	
Ephemeroptera Taxa	NS		-	0.09	-	0.10	-	0.12	-	0.10
EPT Taxa	NS		NS		NS		-	0.17	-	0.13
EPT Index (%)	NS		NS		NS		-	0.11	NS	
Shannon Diversity	NS		NS		NS		-	0.16	NS	
Tolerance Value	NS		+	0.20	NS		+	0.12	+	0.14
% Tolerant Taxa (8-10)	NS		+	0.30	+	0.18	+	0.16	+	0.21
% Collectors/Filterers	NS		NS		NS		-	0.13	NS	
% Collectors/Gatherers	NS		NS		NS		NS		NS	
% Grazers	NS		NS		NS		NS		NS	
% Predators	NS		NS		NS		NS		NS	
% Shredders	NS		NS		NS		NS		NS	
Abundance (#/sample)	NS		NS		NS		NS		NS	

TABLE 58 Results of stepwise multiple linear regression models of benthic metrics versus metals in sediments (standardized to toxic units by dividing by TEL values for the metals) for Kirker Creek and Pleasant Grove Creek for 2006 and 2007.

If significant creek-specific or year-specific effects were detected for benthic metrics, these effects (not shown) were corrected for prior to analyses of effects associated with metals. Only variables that were significant at α=0.01 were included in the models. The direction of the relationship for each significant variable is indicated (+ = direct; - = inverse), as is the contributed R^2 values.

Benthic Metrics	Prob.	R^2	Significant Variables (R^2)
Taxonomic Richness	0.005	0.09	-Zinc to TEL (0.09)
% Dominant Taxon	0.007	0.11	+Nickel to TEL (0.11)
Ephemeroptera Taxa	0.005	0.12	-Nickel to TEL (0.12)
EPT Taxa	<0.001	0.17	-Nickel to TEL (0.17)
EPT Index (%)	0.002	0.14	-Arsenic to TEL (0.14)
Shannon Diversity	<0.001	0.16	-Nickel to TEL (0.16)
Tolerance Value	<0.001	0.20	+Lead to TEL (0.20)
% Tolerant Taxa (8-10)	<0.001	0.33	+Cadmium to TEL (0.33)
% Collectors/Filterers	0.002	0.13	-Nickel to TEL (0.13)
% Collectors/Gatherers	NS		
% Grazers	NS		
% Predators	NS		
% Shredders	NS		
Abundance (#/sample)	NS		

TABLE 59 Results of stepwise multiple linear regression models of benthic metrics versus habitat metrics for Kirker Creek and Pleasant Grove Creek for 2006 and 2007.

If significant creek-specific or year-specific effects were detected for benthic metrics, these effects (not shown) were corrected for prior to analyses of effects associated with habitat metrics. Only variables that were significant at α=0.01 were included in the models. The direction of the relationship for each significant variable is indicated (+ = direct; - = inverse), as is the contributed R^2 values.

Benthic Metrics	Prob.	R^2	Significant Variables (R^2)
Taxonomic Richness	<0.001	0.33	+ Velocity depth regimes (0.33)
% Dominant Taxon	0.001	0.16	-Velocity depth regimes (0.09), +Sediment deposition (0.07)
Ephemeroptera Taxa	<0.001	0.28	+Velocity depth regimes (0.28)
EPT Taxa	<0.001	0.30	+Velocity depth regimes (0.30)
EPT Index (%)	<0.001	0.30	+Velocity depth regimes (0.30)
Shannon Diversity	0.003	0.16	+Velocity depth regimes (0.16)
Tolerance Value	<0.001	0.33	-Total score (0.33)
% Tolerant Taxa (8-10)	<0.001	0.45	-Total score (0.45)
% Collectors/Filterers	<0.001	0.32	+Velocity depth regimes (0.32)
% Collectors/Gatherers	0.007	0.10	-Epifaunal substrate/available cover (0.10)
% Grazers	0.007	0.08	-Channel alteration (0.08)
% Predators	NS		
% Shredders	NS		
Abundance (#/sample)	NS		

TABLE 60 **Results of stepwise multiple linear regression models of benthic metrics versus toxicity units for pyrethroids, habitat indices, and metals to TEL ratios in Kirker Creek and Pleasant Grove Creek for 2006 and 2007.**

If significant creek-specific or year-specific effects were detected for benthic metrics, these effects (not shown) were corrected for prior to analyses of effects associated with pyrethroids, habitat indices or metals. Only variables that were significant at α=0.01 were included in the models. The direction of the relationship for each significant variable is indicated (+ = direct; - = inverse), as is the contributed R^2 values.

Benthic Metrics	Prob.	R^2	Significant Variables (R^2)
Taxonomic Richness	<0.001	0.33	+ Velocity depth regimes (0.33)
% Dominant Taxon	0.004	0.23	+Nickel to TEL (0.10), + Sediment deposition (0.08), - Velocity depth regimes (0.05)
Ephemeroptera Taxa	<0.001	0.28	+ Velocity depth regimes (0.28)
EPT Taxa	<0.001	0.40	+ Velocity depth regimes (0.30), -Arsenic (0.10)
EPT Index (%)	<0.001	0.44	+Velocity depth regimes (0.30), -Arsenic (0.08), -Frequency of riffles/bends (0.06)
Shannon Diversity	<0.001	0.30	+Velocity depth regimes (0.16), -Sediment deposition (0.09), -Nickel to TEL (0.05)
Tolerance Value	<0.001	0.33	-Total Score (0.33)
% Tolerant Taxa (8-10)	<0.001	0.61	-Total Score (0.45), +Cadmium to TEL (0.10)
% Collectors/Filterers	<0.001	0.32	+Velocity depth regimes (0.32)
% Collectors/Gatherers	0.007	0.10	-Epifaunal substrate/available cover (0.10)
% Grazers	0.006	0.08	-Channel alteration (0.08)
% Predators	NS		
% Shredders	NS		
Abundance (#/sample)	NS		

FIGURES SECTION

FIGURE 1 **Kirker Creek (KC) sample sites.**

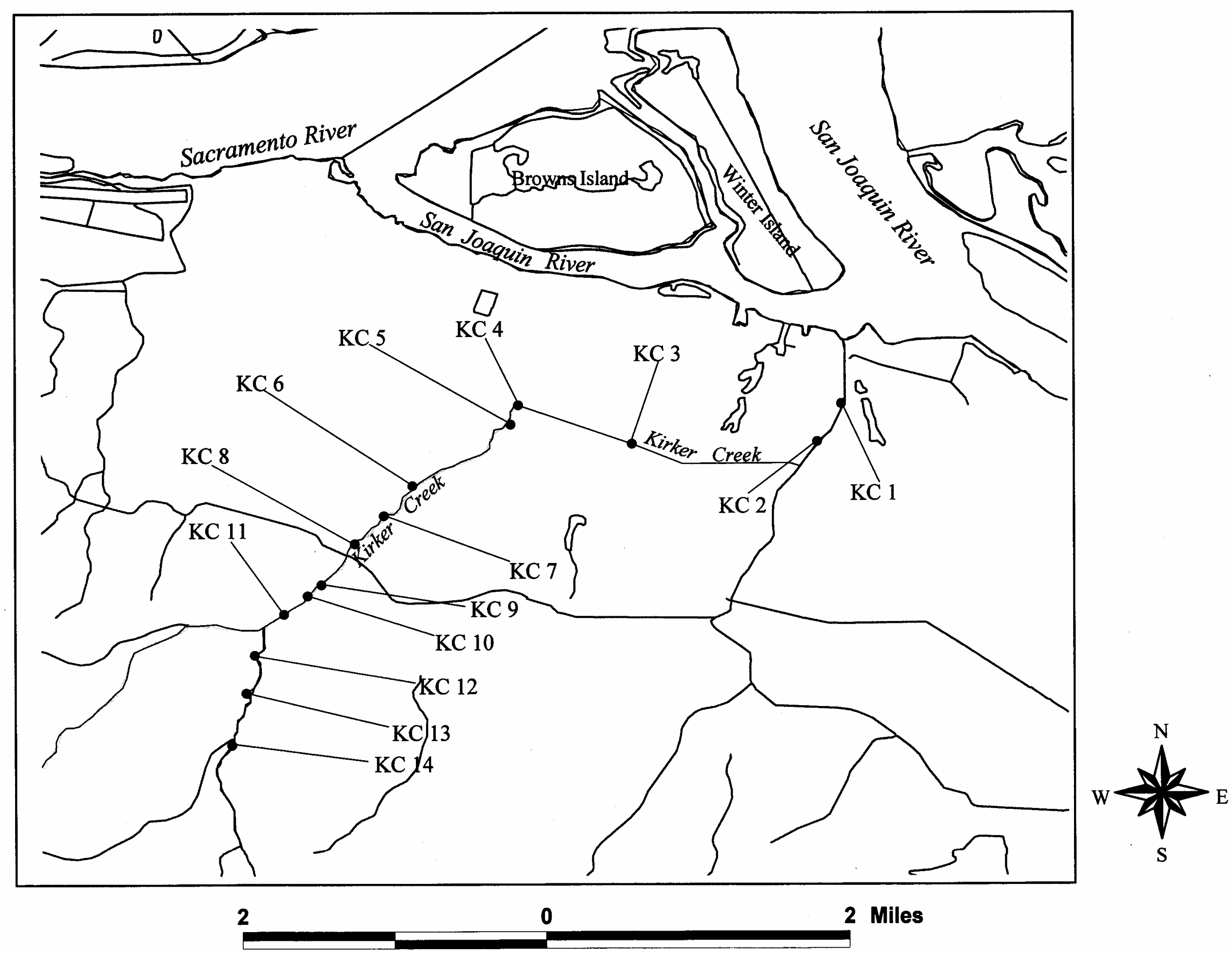
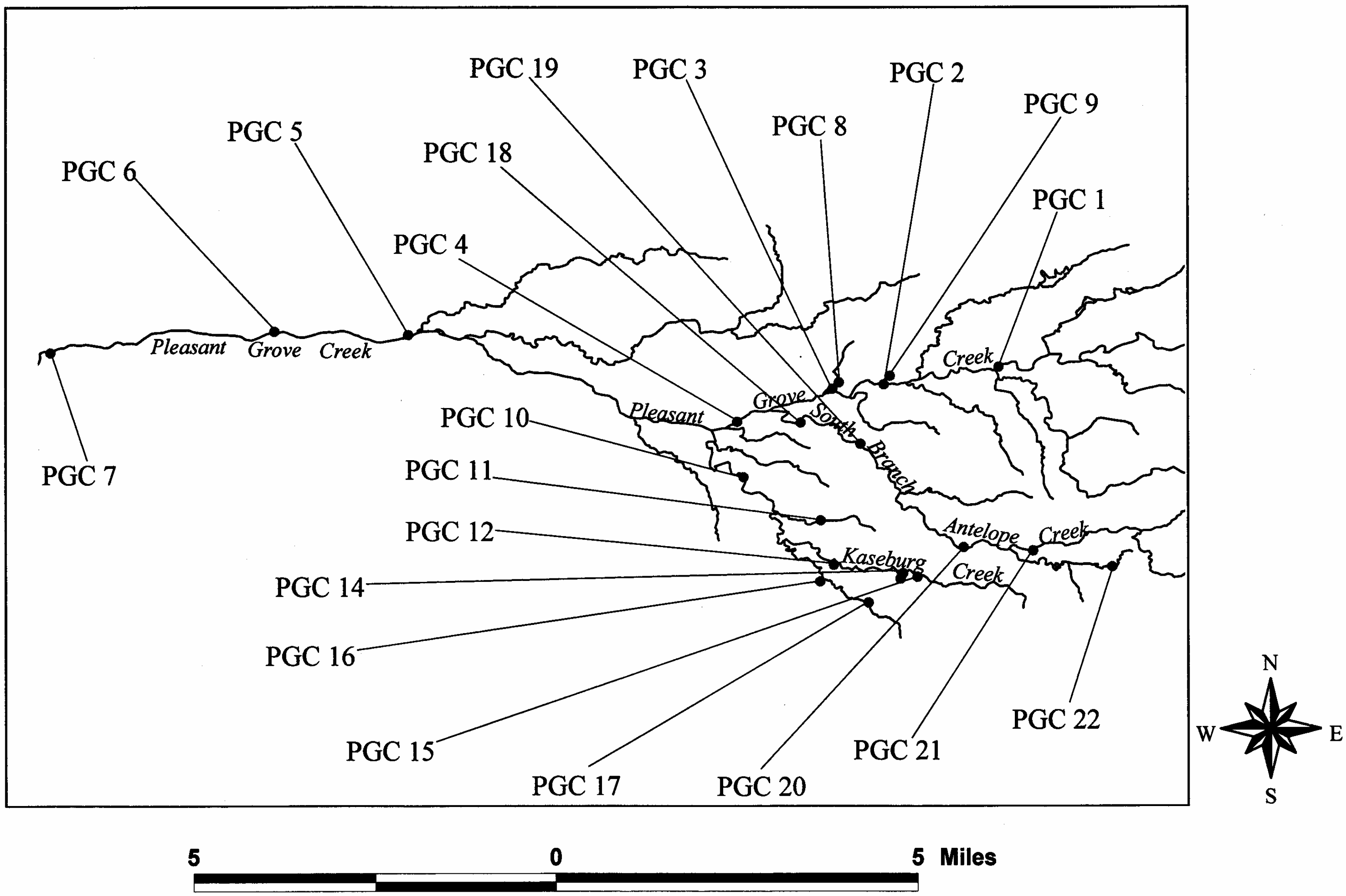


FIGURE 2 Pleasant Grove Creek (PGC) sample sites.



APPENDICIES SECTION

Appendix 1 California bioassessment worksheets including specific descriptions of the various physical habitat metrics.

CALIFORNIA BIOASSESSMENT WORKSHEET

WATERSHED/ STREAM: ____________________ DATE/ TIME: ____________________

COMPANY/ AGENCY: ____________________ SAMPLE ID #: ____________________

SITE DESCRIPTION: ____

SAMPLING CREW

____

____

____

SITE INFORMATION

GPS Coordinates

Latitude: ____________________

Longitude: ____________________

Elevation: ____________________

Ecoregion: ____________________

COMMENTS:

____

____

____

____

____

CHEMICAL CHARACTERISTICS

Water Temperature: __________

Specific Conductance: __________

pH: __________

Dissolved Oxygen: __________

Bioassessment Laboratory Information:

____

____

____

____

____

SEND A COPY OF THIS FORM TO:
DFG/ WPCL
2005 Nimbus Road
Rancho Cordova, CA 95670
(916) 358-2858
website: www.dfg.ca.gov/cabw/cabwhome.html

RIFFLE/ REACH CHARACTERISTICS

Point Source Sampling Design

Riffle Length: _____

Transect 1: _____

Transect 2: _____

Transect 3: _____

(record Physical/ Habitat Characteristcs in Riffle 1 column)

Non-Point Source Sampling Design

Reach Length: _____

Physical Habitat Quality Score: _____

Physical/ Habitat Characteristics

	Riffle 1	Riffle 2	Riffle 3
Riffle Length:			
Transect Location:			
Avg. Riffle Width:			
Avg. Riffle Depth:			
Riffle Velocity:			
% Canopy Cover:			
Substrate Complexity:			
Embeddedness:			
Substrate Composition:			
Fines (<0.1"):			
Gravel (0.1-2"):			
Cobble (2-10"):			
Boulder (>10"):			
Bedrock (solid):			
Substrate Consolidation:			
Percent Gradient:			

CALIFORNIA STREAM BIOASSESSMENT PROCEDURE

CHAIN OF CUSTODY (COC) RECORD

Project Name: ______________________ Date/ Time: ______________________

Watershed Name: ______________________ Boiassessment Lab: ______________________

Sample Number	Lab Number	Sample Date	Sample Description

Sampled by: (sign and date)	Relinquished by: (sign and date)	Received by: (sign and date)
Received by: (sign and date)	Received by: (sign and date)	Received by: (sign and date)

Address of Sampler:

____

____

____

____

Address of Project Advisor:

____

____

____

____

BIOLOGICAL METRICS USED TO DESCRIBE BENTHIC MACROINVERTEBRATE (BMI) SAMPLES COLLECTED FOLLOWING THE CALIFORNIA STREAM BIOASSESSMENT PROCEDURE (CSBP)

Biological Metrics	Description	Response to Impairment
Richness Measures		
Taxa Richness	Total number of individual taxa	decrease
EPT Taxa	Number of taxa in the Ephemeroptera (mayfly), Plecoptera (stonefly) and Trichoptera (caddisfly) insect orders	decrease
Ephemeroptera Taxa	Number of mayfly taxa (genus or species)	decrease
Plecoptera Taxa	Number of stonefly taxa (genus or species)	decrease
Trichoptera Taxa	Number of caddisfly taxa (genus or species)	decrease
Composition Measures		
EPT Index	Percent composition of mayfly, stonefly and caddisfly larvae	decrease
Sensitive EPT Index	Percent composition of mayfly, stonefly and caddisfly larvae with Tolerance Values of 0 through 3	decrease
Shannon Diversity Index	General measure of sample diversity that incorporates richness and evenness (Shannon and Weaver 1963)	decrease
Tolerance/Intolerance Measures		
Tolerance Value	Value between 0 and 10 weighted for abundance of individuals designated as pollution tolerant (higher values) and intolerant (lower values)	increase
Percent Intolerant Organisms	Percent of organisms in sample that are highly intolerant to impairment as indicated by a tolerance value of 0, 1 or 2	decrease
Percent Tolerant Organisms	Percent of organisms in sample that are highly tolerant to impairment as indicated by a tolerance value of 8, 9 or 10	increase
Percent Hydropsychidae	Percent of organisms in the caddisfly family Hydropsychidae	increase
Percent Baetidae	Percent of organisms in the mayfly family Baetidae	increase
Percent Dominant Taxa	Percent composition of the single most abundant taxon	increase
Functional Feeding Groups		
Percent Collectors	Percent of macrobenthos that collect or gather fine particulate matter	increase
Percent Filterers	Percent of macrobenthos that filter fine particulate matter	increase
Percent Scrapers (Grazers)	Percent of macrobenthos that graze upon periphyton	variable
Percent Predators	Percent of macrobenthos that feed on other organisms	variable
Percent Shredders	Percent of macrobenthos that shreds coarse particulate matter	decrease

PHYSICAL HABITAT QUALITY
(California Stream Bioassessment Procedure)

WATERSHED/ STREAM: ______________________

DATE/ TIME: ______________________

COMPANY/ AGENCY: ______________________

SAMPLE ID NUMBER: ______________________

SITE DESCRIPTION: ______________________

Circle the appropriate score for all 20 habitat parameters. Record the total score on the front page of the CBW.

Parameters to be evaluated within the sampling reach

HABITAT PARAMETER	CONDITION CATEGORY			
	OPTIMAL	**SUBOPTIMAL**	**MARGINAL**	**POOR**
1. Epifaunal Substrate/ Available Cover	Greater than 70% (50% for low gradient streams) of substrate favorable for epifaunal colonization and fish cover; most favorable is a mix of snags, submerged logs, undercut banks, cobble or other stable habitat and at stage to allow full colonization potential (i.e., logs/snags that are <u>not</u> new fall and <u>not</u> transient).	40-70% (30-50% for low gradient streams) mix of stable habitat; well-suited for full colonization potential; adequate habitat for maintenance of populations; presence of additional substrate in the form of newfall, but not yet prepared for colonization (may rate at high end of scale).	20-40% (10-30% for low gradient streams) mix of stable habitat; habitat availability less than desirable; substrate frequently disturbed or removed.	Less than 20% (10% for low gradient streams) stable habitat; lack of habitat is obvious; substrate unstable or lacking.
	20 19 18 17 16	15 14 13 12 11	10 9 8 7 6	5 4 3 2 1 0
2. Embeddedness	Gravel, cobble, and boulder particles are 0-25% surrounded by fine sediment. Layering of cobble provides diversity of niche space.	Gravel, cobble, and boulder particles are 25-50% surrounded by fine sediment.	Gravel, cobble, and boulder particles are 50-75% surrounded by fine sediment.	Gravel, cobble, and boulder particles are more than 75% surrounded by fine sediment.
	20 19 18 17 16	15 14 13 12 11	10 9 8 7 6	5 4 3 2 1 0
3. Velocity/ Depth Regimes *(deep<0.5 m, slow<0.3 m/s)*	All four velocity/depth regimes present (slow-deep, slow-shallow, fast-deep, fast-shallow).	Only 3 of the 4 regimes present (if fast-shallow is missing, score lower than if missing other regimes).	Only 2 of the 4 habitat regimes present (if fast-shallow or slow-shallow are missing, score low).	Dominated by 1 velocity/ depth regime (usually slow-deep).
	20 19 18 17 16	15 14 13 12 11	10 9 8 7 6	5 4 3 2 1 0
4. Sediment Deposition	Little or no enlargement of islands or point bars and less than 5% (<20% for low-gradient streams) of the bottom affected by sediment deposition.	Some new increase in bar formation, mostly from gravel, sand or fine sediment; 5-30% (20-50% for low-gradient) of the bottom affected; slight deposition in pools.	Moderate deposition of new gravel, sand or fine sediment on old and new bars; 30-50% (50-80% for low-gradient) of the bottom affected; sediment deposits at obstructions, constrictions, and bends; moderate deposition of pools prevalent.	Heavy deposits of fine material, increased bar development; more than 50% (80% for low-gradient) of the bottom changing frequently; pools almost absent due to substantial sediment deposition.
	20 19 18 17 16	15 14 13 12 11	10 9 8 7 6	5 4 3 2 1 0
5. Channel Flow Status	Water reaches base of both lower banks, and minimal amount of channel substrate is exposed.	Water fills >75% of the available channel; or <25% of channel substrate is exposed.	Water fills 25-75% of the available channel, and/or riffle substrates are mostly exposed.	Very little water in channel and mostly present as standing pools.
	20 19 18 17 16	15 14 13 12 11	10 9 8 7 6	5 4 3 2 1 0

Parameters to be evaluated in an area longer than the sampling reach

HABITAT PARAMETER	CONDITION CATEGORY			
	OPTIMAL	**SUBOPTIMAL**	**MARGINAL**	**POOR**
6. Channel Alteration	Channelization or dredging absent or minimal; stream with normal pattern.	Some channelization present, usually in areas of bridge abutments; evidence of past channelization, i.e., dredging, (greater than past 20 yr) may be present, but recent channelization is not present.	Channelization may be extensive; embankments or shoring structures present on both banks; and 40 to 80% of stream reach channelized and disrupted.	Banks shored with gabion or cement; over 80% of the stream reach channelized and disrupted. Instream habitat greatly altered or removed entirely.
	20 19 18 17 16	15 14 13 12 11	10 9 8 7 6	5 4 3 2 1 0
7. Frequency of Riffles (or bends)	Occurrence of riffles relatively frequent; ratio of distance between riffles divided by width of the stream <7:1 (generally 5 to 7); variety of habitat is key. In streams where riffles are continuous, placement of boulders or other large, natural obstruction is important.	Occurrence of riffles infrequent; distance between riffles divided by the width of the stream is between 7 to 15.	Occasional riffle or bend; bottom contours provide some habitat; distance between riffles divided by the width of the stream is between 15 to 25.	Generally all flat water or shallow riffles; poor habitat; distance between riffles divided by the width of the stream is a ratio of >25.
	20 19 18 17 16	15 14 13 12 11	10 9 8 7 6	5 4 3 2 1 0
8. Bank Stability (score each bank) Note: determine left of right side by facing downstream	Banks stable; evidence of erosion or bank failure absent or minimal; little potential for future problems. <5% of bank affected.	Moderately stable; infrequent, small areas of erosion mostly healed over. 5-30% of bank in reach has areas of erosion.	Moderately unstable; 30-60% of bank in reach has areas of erosion; high erosion potential during floods.	Unstable; many eroded areas; "raw" areas frequent along straight sections and bends; obvious bank sloughing; 60-100% of bank has erosional scars.
	Left Bank 10 9	8 7 6	5 4 3	2 1 0
	Right Bank 10 9	8 7 6	5 4 3	2 1 0
9. Vegetative Protection (score each bank) Note: determine left or right side by facing downstream.	More than 90% of the streambank surfaces and immediate riparian zones covered by native vegetation, including trees, understory shrubs, or nonwoody macrophytes; vegetative disruption through grazing or mowing minimal or not evident; almost all plants allowed to grow naturally.	70-90% of the streambank surfaces covered by native vegetation, but one class of plants is not well-represented; disruption evident but not affecting full plant growth potential to any great extent; more than one-half of the potential plant stubble height remaining.	50-70% of the streambank surfaces covered by vegetation; disruption obvious; patches of bare soil or closely cropped vegetation common; less than one-half of the potential plant stubble height remaining.	Less than 50% of the streambank surfaces covered by vegetation; disruption of streambank vegetation is very high; vegetation has been removed to 5 centimeters or less in average stubble height.
	Left Bank 10 9	8 7 6	5 4 3	2 1 0
	Right Bank 10 9	8 7 6	5 4 3	2 1 0
10. Riparian Vegetative Zone Width (score each bank riparian zone)	Width of riparian zone >18 meters; human activities (i.e., parking lots, roadbeds, clear-cuts, lawns, or crops) have not impacted zone.	Width of riparian zone 12-18 meters; human activities have impacted zone only minimally.	Width of riparian zone 6-12 meters; human activities haveimpacted zone a great deal.	Width of riparian zone <6 meters: little or no riparian vegetation due to human activities.
	Left Bank 10 9	8 7 6	5 4 3	2 1 0
	Right Bank 10 9	8 7 6	5 4 3	2 1 0

Appendix 2 Number of lowest identified taxa by transect and combined transects including tolerance values (TV) and feeding guilds (FFG) for Kirker Creek sites in 2006.

Tolerance values for taxa range from 1 to 10 with 10 being the most tolerant value. Feeding guilds are defined as follows: CG = collector-gatherer; CF = collector-filterer; SC = scraper; SH = shredder; P = predator; MH = macrophyte herbivore; OM = omnivore; PA = parasite; XY = Xylophage.

KC1

	T1		T2		T3		(TV)	(FFG)	Total
Cyprididae	122	Physa sp.	192	Physa sp.	246	Physa sp.	8	SC	495
Tubificidae unid.imm.	75	Cyprididae	59	Cyprididae	34	Cyprididae	8	CG	215
Physa sp.	57	Hyalella sp.	23	Hyalella sp.	22	Tubificidae unid.imm.	10	CG	87
Dero digitata	11	Tubificidae unid.imm.	10	Paratanytarsus sp.	5	Hyalella sp.	8	CG	54
Hyalella sp.	9	Chironomus sp.	3	Chironomus sp.	3	Chironomus sp.	10	CG	14
Chironomus sp.	8	Paratanytarsus sp.	2	Fossaria sp.	3	Paratanytarsus sp.	6	CF	11
Paratanytarsus sp.	4	Fossaria sp.	2	Tubificidae unid.imm.	2	Dero digitata	--	CG	11
Tubificidae w/hair	4	Mooreobdella microstoma	1	Cricotopus sp.	1	Tubificidae w/hair	5	CG	6
Tanypus sp.	1	Tubificidae w/hair	1	Rheocricotopus sp.	1	Fossaria sp.	8	SC	6
Chaetogaster diaphanus	1	Menetus opercularis	1	Nais communis/ variabilis	1	Menetus opercularis	6	SC	2
Fossaria sp.	1		294	Tubificidae w/hair	1	Tanypus sp.	10	P	1
	293			Menetus opercularis	1	Rheocricotopus sp.	6	OM	1
					320	Nais communis/ variabilis	--	CG	1
						Mooreobdella microstoma	8	P	1
						Cricotopus sp.	7	CG	1
						Chaetogaster diaphanus	--	--	1
									907

KC2

	T1		T2		T3		(TV)	(FFG)	Total
Physa sp.	242	Physa sp.	242	Physa sp.	257	Physa sp.	8	SC	741
Cyprididae	19	Cyprididae	46	Cyprididae	31	Cyprididae	8	CG	96
Nais communis/ variabilis	15	Fossaria sp.	8	Fossaria sp.	8	Nais communis/ variabilis	--	CG	23
Chironomus sp.	10	Cricotopus sp.	6	Nais communis/ variabilis	7	Fossaria sp.	8	SC	17
Cricotopus sp.	4	Tropisternus sp.	1	Paratanytarsus sp.	2	Cricotopus sp.	7	CG	12
Tubificidae w/hair	3	Nais communis/ variabilis	1	Cricotopus sp.	2	Chironomus sp.	10	CG	10
Hyalella sp.	2	Tubificidae unid.imm.	1	Dytiscidae	1	Tubificidae w/hair	5	CG	3
Tropisternus lateralis	1		305	Berosus sp.	1	Paratanytarsus sp.	6	CF	3
Paratanytarsus sp.	1			Procambarus clarkii	1	Tubificidae unid.imm.	10	CG	2
Procladius sp.	1			Lumbriculus variegata	1	Hyalella sp.	8	CG	2
Coenagrionidae	1			Tubificidae unid.imm.	1	Tropisternus sp.	5	P	1
Fossaria sp.	1				312	Tropisternus lateralis	5	CG	1
	300					Procladius sp.	9	P	1
						Procambarus clarkii	8	SH	1
						Lumbriculus variegata	--	CG	1
						Dytiscidae	5	P	1
						Coenagrionidae	--	P	1
						Berosus sp.	5	P	1
									917

KC3

	T1		T2		T3		(TV)	(FFG)	Total
Physa sp.	249	Physa sp.	128	Physa sp.	196	Physa sp.	8	SC	573
Cricotopus sp.	13	Tubificidae w/hair	44	Cricotopus sp.	47	Cricotopus sp.	7	CG	92
Callibaetis sp.	9	Cricotopus sp.	32	Nais communis/ variabilis	13	Tubificidae w/hair	5	CG	47
Corixidae	7	Dero digitata	15	Cyprididae	11	Cyprididae	8	CG	22
Tanytarsus sp.	5	Micropsectra sp.	14	Corixidae	8	Chironomus sp.	10	CG	22
Coenagrionidae	5	Chironomus sp.	13	Chironomus sp.	6	Dero digitata	--	CG	20
Dero digitata	5	Cyprididae	11	Callibaetis sp.	5	Micropsectra sp.	7	CG	18
Fossaria sp.	4	Tubificidae unid.imm.	9	Hydra sp.	5	Corixidae	10	P	18
Chironomus sp.	3	Callibaetis sp.	4	Micropsectra sp.	4	Callibaetis sp.	9	CG	18
Nais communis/ variabilis	3	Corixidae	3	Sigara sp.	3	Nais communis/ variabilis	--	CG	16
Procambarus clarkii	1	Enchytraeidae	3	Cricotopus bicinctus group	2	Tubificidae unid.imm.	10	CG	10
Tubificidae w/hair	1	Paratanytarsus sp.	2	Coenagrionidae	2	Hydra sp.	5	P	8
Tubificidae unid.imm.	1	Procladius sp.	2	Hyalella sp.	2	Coenagrionidae	--	P	7
Hydra sp.	1	Hydra sp.	2	Tubificidae w/hair	2	Tanytarsus sp.	6	CF	5
	307	Liodessus obscurellus	1	Rhantus sp.	1	Sigara sp.	8	P	4
		Sigara sp.	1	Laccobius sp.	1	Fossaria sp.	8	SC	4
		Hyalella sp.	1	Procladius sp.	1	Procladius sp.	9	P	3
		Corticacarus sp.	1	Pisidium sp.	1	Hyalella sp.	8	CG	3
		Lumbricina	1		310	Enchytraeidae	10	CG	3
			287			Paratanytarsus sp.	6	CF	2
						Cricotopus bicinctus group	7	CG	2
						Rhantus sp.	5	P	1
						Procambarus clarkii	8	SH	1
						Pisidium sp.	8	CF	1
						Lumbricina	--	CG	1
						Liodessus obscurellus	5	P	1
						Laccobius sp.	5	MH	1
						Corticacarus sp.	8	P	1
									904

KC4

	T1		T2		T3		(TV)	(FFG)	Total
Tubificidae unid.imm.	149	Tubificidae unid.imm.	119	Tubificidae unid.imm.	68	Tubificidae unid.imm.	10	CG	336
Dero digitata	57	Nais communis/ variabilis	49	Nais communis/ variabilis	41	Nais communis/ variabilis	--	CG	90
Micropsectra sp.	19	Paranais litoralis	29	Micropsectra sp.	27	Dero digitata	--	CG	81
Paranais litoralis	19	Cyprididae	23	Paratanytarsus sp.	27	Micropsectra sp.	7	CG	65
Tubificidae w/hair	13	Micropsectra sp.	19	Dero digitata	24	Paranais litoralis	--	CG	55
Limnodrilus hoffmeisteri	13	Tubificidae w/hair	14	Cricotopus sp.	12	Cyprididae	8	CG	42
Physa sp.	12	Physa sp.	12	Cyprididae	11	Tubificidae w/hair	5	CG	36
Cyprididae	8	Coenagrionidae	9	Tubificidae w/hair	9	Paratanytarsus sp.	6	CF	34
Enchytraeidae	4	Limnodrilus hoffmeisteri	8	Paranais litoralis	7	Physa sp.	8	SC	26
Paratanytarsus sp.	3	Paratanytarsus sp.	4	Paratanytarsus sp.	5	Limnodrilus hoffmeisteri	--	CG	26
Coenagrionidae	3	Cricotopus sp.	4	Limnodrilus hoffmeisteri	5	Cricotopus sp.	7	CG	16
Cricotopus bicinctus group	2	Enchytraeidae	4	Apedilum sp.	4	Coenagrionidae	--	P	14
Parametriocnemus sp.	1	Chironomus sp.	3	Chironomus sp.	3	Enchytraeidae	10	CG	8
Procladius sp.	1	Limnophyes sp.	3	Limnophyes sp.	3	Ferrissia sp.	6	SC	7
Ferrissia sp.	1	Ferrissia sp.	3	Sciomyzidae	3	Limnophyes sp.	8	CG	6
	305	Polypedilum sp.	1	Chaetogaster diaphanus	3	Chironomus sp.	10	CG	6
		Psectrotanypus sp.	1	Ferrissia sp.	3	Paratanytarsus sp.	--	--	5
		Sciomyzidae	1	Nanocladius sp.	2	Sciomyzidae	6	P	4
		Lymnaeidae	1	Coenagrionidae	2	Apedilum sp.	6	CG	4
		Planariidae	1	Lumbriculus variegata	2	Chaetogaster diaphanus	--	--	3
			308	Slavina appendiculata	2	Slavina appendiculata	--	CG	2
				Physa sp.	2	Nanocladius sp.	--	--	2
				Orthocladius complex	1	Lumbriculus variegata	--	CG	2
				Limnophyes sp.	1	Cricotopus bicinctus group	7	CG	2
				Corynoneura sp.	1	Psectrotanypus sp.	10	P	1
				Corynoneura sp.	1	Procladius sp.	9	P	1
				Muscidae	1	Polypedilum sp.	6	CG	1
					270	Planariidae	4	P	1

KC4 - continued.

T1	T2	T3		(TV)	(FFG)	Total
			Parametriocnemus sp.	5	CG	1
			Orthocladius complex	6	CG	1
			Muscidae	6	P	1
			Lymnaeidae	6	SC	1
			Limnophyes sp.	--	--	1
			Corynoneura sp.	7	CG	1
			Corynoneura sp.	--	--	1
						883

KC5

	T1		T2		T3		(TV)	(FFG)	Total
Cyprididae	253	Cyprididae	231	Cyprididae	193	Cyprididae	8	CG	677
Dugesia tigrina	24	Dugesia tigrina	12	Tubificidae unid.imm.	40	Dugesia tigrina	4	P	73
Physa sp.	6	Micropsectra sp.	9	Dugesia tigrina	37	Tubificidae unid.imm.	10	CG	45
Psectrotanypus sp.	3	Physa sp.	7	Paranais litoralis	9	Physa sp.	8	SC	17
Apedilum sp.	2	Paratanytarsus sp.	6	Dero digitata	8	Micropsectra sp.	7	CG	13
Micropsectra sp.	2	Chironomus sp.	5	Tubificidae w/hair	4	Dero digitata	--	CG	11
Oxyethira sp.	1	Cricotopus sp.	5	Physa sp.	4	Paratanytarsus sp.	6	CF	9
Corbicula sp.	1	Tubificidae unid.imm.	5	Paratanytarsus sp.	3	Paranais litoralis	--	CG	9
	292	Coenagrionidae	4	Procladius sp.	3	Chironomus sp.	10	CG	7
		Apedilum sp.	3	Chironomus sp.	2	Psectrotanypus sp.	10	P	6
		Psectrotanypus sp.	3	Micropsectra sp.	2	Cricotopus sp.	7	CG	5
		Dero digitata	3	Psychoda sp.	2	Apedilum sp.	6	CG	5
		Fossaria sp.	1		307	Tubificidae w/hair	5	CG	4
			294			Coenagrionidae	--	P	4
						Procladius sp.	9	P	3
						Psychoda sp.	10	CG	2
						Oxyethira sp.	3	PH	1
						Fossaria sp.	8	SC	1
						Corbicula sp.	8	CF	1
									893

KC6

	T1		T2		T3		(TV)	(FFG)	Total
Micropsectra sp.	124	Cyprididae	68	Cyprididae	105	Cyprididae	8	CG	235
Cyprididae	62	Tanytarsus sp.	66	Micropsectra sp.	72	Micropsectra sp.	7	CG	196
Tubificidae unid.imm.	35	Cricotopus sp.	36	Tubificidae unid.imm.	39	Tubificidae unid.imm.	10	CG	107
Procladius sp.	18	Tubificidae unid.imm.	33	Cricotopus sp.	14	Tanytarsus sp.	6	CF	66
Chironomus sp.	15	Apedilum sp.	30	Alotanypus sp.	14	Cricotopus sp.	7	CG	56
Micropsectra sp.	9	Chironomus sp.	18	Nais communis/ variabilis	14	Chironomus sp.	10	CG	43
Cricotopus sp.	6	Nais communis/ variabilis	11	Paratanytarsus sp.	11	Apedilum sp.	6	CG	35
Tanytarsini	4	Tanypus sp.	10	Chironomus sp.	10	Nais communis/ variabilis	--	CG	25
Paratanytarsus sp.	4	Tubificidae w/hair	6	Polypedilum sp.	7	Procladius sp.	9	P	19
Psectrotanypus sp.	4	Paratanytarsus sp.	5	Tubificidae w/hair	4	Paratanytarsus sp.	6	CF	16
Apedilum sp.	3	Chaetogaster diaphanus	3	Limnodrilus hoffmeisteri	3	Alotanypus sp.	7	P	14
Dero digitata	3	Berosus sp.	1	Apedilum sp.	2	Tanypus sp.	10	P	11
Physa sp.	1	Ceratopogonidae	1	Dicrotendipes sp.	2	Tubificidae w/hair	5	CG	10
	288	Procladius sp.	1	Simulium sp.	2	Micropsectra sp.	--	--	9
		Culex sp.	1	Psectrotanypus sp.	1	Polypedilum sp.	6	CG	7
		Muscidae	1	Tanypus sp.	1	Psectrotanypus sp.	10	P	5
		Ormosia sp.	1		301	Tanytarsini	--	--	4
			292			Paratanytarsus sp.	--	--	4
						Limnodrilus hoffmeisteri	--	CG	3
						Dero digitata	--	CG	3
						Chaetogaster diaphanus	--	--	3
						Simulium sp.	6	CF	2
						Dicrotendipes sp.	8	CG	2
						Physa sp.	8	SC	1
						Ormosia sp.	3	CG	1
						Muscidae	6	P	1
						Culex sp.	8	CG	1
						Ceratopogonidae	--	--	1
						Berosus sp.	5	P	1
									881

KC7

	T1		T2		T3		(TV)	(FFG)	Total
Cyprididae	101	Cyprididae	68	Micropsectra sp.	83	Cyprididae	8	CG	229
Micropsectra sp.	68	Micropsectra sp.	67	Cyprididae	60	Micropsectra sp.	7	CG	218
Tanytarsus sp.	35	Physa sp.	50	Cricotopus sp.	34	Apedilum sp.	6	CG	95
Apedilum sp.	22	Apedilum sp.	45	Apedilum sp.	28	Cricotopus sp.	7	CG	81
Cricotopus sp.	11	Cricotopus sp.	36	Tubificidae w/hair	18	Physa sp.	8	SC	65
Paratanytarsus sp.	9	Tanytarsus sp.	17	Tubificidae unid.imm.	16	Tanytarsus sp.	6	CF	61
Psectrotanypus sp.	5	Alotanypus sp.	6	Physa sp.	10	Tubificidae w/hair	5	CG	23
Scatella sp.	5	Simulium sp.	5	Tanytarsus sp.	9	Tubificidae unid.imm.	10	CG	18
Physa sp.	5	Chironomus sp.	3	Tipula sp.	4	Paratanytarsus sp.	6	CF	10
Chironomus sp.	4	Tubificidae w/hair	3	Chironomus sp.	3	Chironomus sp.	10	CG	10
Eukiefferiella sp.	3	Chaetogaster diaphanus	2	Eukiefferiella sp.	3	Scatella sp.	6	CG	8
Tipula sp.	2	Fossaria sp.	2	Scatella sp.	3	Tipula sp.	4	OM	7
Tubificidae w/hair	2	Paratanytarsus sp.	1	Phaenopsectra sp.	2	Simulium sp.	6	CF	7
Tubificidae unid.imm.	2	Eukiefferiella sp.	1	Orthocladiinae	2	Psectrotanypus sp.	10	P	6
Ceratopogonidae	1	Tipula sp.	1	Ochthebius sp.	1	Eukiefferiella sp.	8	OM	6
Phaenopsectra sp.	1	Enchytraeidae	1	Hydrobius fuscipes	1	Alotanypus sp.	7	P	6
Cricotopus bicinctus group	1	Limnodrilus hoffmeisteri	1	Culicoides sp.	1	Phaenopsectra sp.	7	SC	3
Muscidae	1		309	Cryptochironomus sp.	1	Procambarus clarkii	8	SH	2
Simulium sp.	1			Rheocricotopus sp.	1	Orthocladiinae	5	CG	2
Ormosia sp.	1			Cricotopus bicinctus group	1	Fossaria sp.	8	SC	2
Procambarus clarkii	1			Psectrotanypus sp.	1	Enchytraeidae	10	CG	2
	281			Simulium sp.	1	Cricotopus bicinctus group	7	CG	2
				Procambarus clarkii	1	Chaetogaster diaphanus	--	--	2
				Enchytraeidae	1	Rheocricotopus sp.	6	OM	1
				Dero digitata	1	Ormosia sp.	3	CG	1
					286	Ochthebius sp.	5	SC	1
						Muscidae	6	P	1
						Limnodrilus hoffmeisteri	--	CG	1
						Hydrobius fuscipes	8	CG	1
						Eukiefferiella sp.	--	--	1

KC7 - continued.

T1	T2	T3		(TV)	(FFG)	Total
			Dero digitata	--	CG	1
			Culicoides sp.	6	P	1
			Cryptochironomus sp.	8	P	1
			Ceratopogonidae	--	--	1
						876

KC8

	T1		T2		T3		(TV)	(FFG)	Total
Tubificidae w/hair	119	Tubificidae w/hair	91	Tubificidae w/hair	91	Tubificidae w/hair	5	CG	301
Chironomus sp.	52	Chironomus sp.	76	Tubificidae unid.imm.	61	Chironomus sp.	10	CG	173
Tubificidae unid.imm.	49	Tubificidae unid.imm.	56	Chironomus sp.	45	Tubificidae unid.imm.	10	CG	166
Cyprididae	16	Cyprididae	31	Cyprididae	36	Cyprididae	8	CG	83
Apedilum sp.	12	Limnodrilus hoffmeisteri	5	Physa sp.	14	Apedilum sp.	6	CG	23
Micropsectra sp.	9	Physa sp.	4	Apedilum sp.	8	Physa sp.	8	SC	20
Paratanytarsus sp.	6	Apedilum sp.	3	Cricotopus sp.	8	Micropsectra sp.	7	CG	15
Cricotopus sp.	3	Tanytarsus sp.	3	Micropsectra sp.	6	Limnodrilus hoffmeisteri	--	CG	14
Procladius sp.	3	Corynoneura sp.	2	Limnodrilus hoffmeisteri	6	Paratanytarsus sp.	6	CF	12
Nais communis/ variabilis	3	Procladius sp.	2	Paratanytarsus sp.	5	Cricotopus sp.	7	CG	12
Limnodrilus hoffmeisteri	3	Phaenopsectra sp.	1	Tipula sp.	3	Procladius sp.	9	P	5
Physa sp.	2	Paratanytarsus sp.	1	Cricotopus bicinctus group	2	Corynoneura sp.	7	CG	5
Phaenopsectra sp.	1	Cricotopus sp.	1	Corynoneura sp.	2	Tipula sp.	4	OM	3
Eukiefferiella sp.	1	Ephydridae	1	Psectrotanypus sp.	2	Tanytarsus sp.	6	CF	3
Corynoneura sp.	1	Coenagrionidae	1	Berosus sp.	1	Phaenopsectra sp.	7	SC	3
Coenagrionidae	1	Lumbriculus variegata	1	Ceratopogonidae	1	Nais communis/ variabilis	--	CG	3
Chaetogaster diaphanus	1	Fossaria sp.	1	Chironomini	1	Psectrotanypus sp.	10	P	2
	282		280	Phaenopsectra sp.	1	Cricotopus bicinctus group	7	CG	2
				Boreochlus sp.	1	Coenagrionidae	--	P	2
				Scatella sp.	1	Scatella sp.	6	CG	1
				Anax walsinghami	1	Procambarus clarkii	8	SH	1
				Procambarus clarkii	1	Lumbriculus variegata	--	CG	1
					297	Fossaria sp.	8	SC	1
						Eukiefferiella sp.	8	OM	1
						Ephydridae	6	--	1
						Chironomini	6	CG	1
						Chaetogaster diaphanus	--	--	1
						Ceratopogonidae	--	--	1
						Boreochlus sp.	--	--	1
						Berosus sp.	5	P	1
						Anax walsinghami	--	P	1
									859

KC9

	T1		T2		T3		(TV)	(FFG)	Total
Physa sp.	111	Micropsectra sp.	123	Micropsectra sp.	100	Micropsectra sp.	7	CG	309
Micropsectra sp.	86	Cyprididae	97	Eukiefferiella sp.	67	Cyprididae	8	CG	147
Cyprididae	41	Physa sp.	17	Nais communis/ variabilis	55	Physa sp.	8	SC	130
Tubificidae unid.imm.	12	Procladius sp.	11	Simulium sp.	10	Eukiefferiella sp.	8	OM	68
Radotanypus sp.	10	Nais communis/ variabilis	11	Cyprididae	9	Nais communis/ variabilis	--	CG	66
Apedilum sp.	9	Apedilum sp.	8	Enchytraeidae	8	Tubificidae unid.imm.	10	CG	22
Chironomus sp.	8	Tubificidae unid.imm.	6	Apedilum sp.	5	Apedilum sp.	6	CG	22
Menetus opercularis	5	Cricotopus sp.	1	Tubificidae unid.imm.	4	Radotanypus sp.	7	P	13
Lumbriculus variegata	4	Muscidae	1	Radotanypus sp.	4	Simulium sp.	6	CF	11
Tubificidae w/hair	4	Sciomyzidae	1	Radotanypus sp.	3	Procladius sp.	9	P	11
Cricotopus sp.	3	Hydra sp.	1	Hydra sp.	3	Enchytraeidae	10	CG	8
Paranais litoralis	2		277	Eukiefferiella sp.	3	Chironomus sp.	10	CG	8
Paratendipes sp.	1			Tubificidae w/hair	2	Menetus opercularis	6	SC	7
Eukiefferiella sp.	1			Rheocricotopus sp.	2	Tubificidae w/hair	5	CG	6
Psectrocladius sp.	1			Physa sp.	2	Cricotopus sp.	7	CG	5
Simulium sp.	1			Menetus opercularis	2	Radotanypus sp.	--	--	4
	299			Limnodrilus hoffmeisteri	2	Lumbriculus variegata	--	CG	4
				Corynoneura sp.	2	Hydra sp.	5	P	4
				Chaetogaster diaphanus	2	Eukiefferiella sp.	--	--	3
				Baetis tricaudatus	2	Rheocricotopus sp.	6	OM	2
				Tipula sp.	1	Paranais litoralis	--	CG	2
				Micropsectra sp.	1	Limnodrilus hoffmeisteri	--	CG	2
				Cricotopus sp.	1	Corynoneura sp.	7	CG	2
				Alotanypus sp.	1	Chaetogaster diaphanus	--	--	2
					291	Baetis tricaudatus	6	CG	2
						Tipula sp.	4	OM	1
						Sciomyzidae	6	P	1
						Psectrocladius sp.	8	CG	1
						Paratendipes sp.	8	CG	1
						Muscidae	6	P	1
						Micropsectra sp.	--	--	1
						Alotanypus sp.	--	--	1
									867

KC10

	T1		T2		T3		(TV)	(FFG)	Total
Micropsectra sp.	75	Eukiefferiella sp.	116	Eukiefferiella sp.	134	Eukiefferiella sp.	8	OM	322
Eukiefferiella sp.	72	Simulium sp.	88	Simulium sp.	48	Simulium sp.	6	CF	208
Simulium sp.	72	Micropsectra sp.	39	Micropsectra sp.	39	Micropsectra sp.	7	CG	153
Parametriocnemus sp.	10	Corynoneura sp.	10	Enchytraeidae	22	Corynoneura sp.	7	CG	31
Corynoneura sp.	9	Tubificidae w/hair	8	Corynoneura sp.	12	Enchytraeidae	10	CG	30
Tubificidae w/hair	8	Tubificidae unid.imm.	8	Tubificidae w/hair	11	Tubificidae w/hair	5	CG	27
Limnophyes sp.	5	Enchytraeidae	7	Limnophyes sp.	8	Parametriocnemus sp.	5	CG	22
Micropsectra sp.	4	Parametriocnemus sp.	5	Parametriocnemus sp.	7	Limnophyes sp.	8	CG	13
Eukiefferiella sp.	4	Baetis tricaudatus	3	Hydra sp.	6	Tubificidae unid.imm.	10	CG	9
Nais communis/ variabilis	4	Rheocricotopus sp.	2	Baetis tricaudatus	2	Hydra sp.	5	P	9
Hydra sp.	3	Physa sp.	2	Lumbricina	2	Nais communis/ variabilis	--	CG	5
Bezzia/ Palpomyia	2	Tipula sp.	1	Bezzia/ Palpomyia	1	Baetis tricaudatus	6	CG	5
Corynoneura sp.	2	Lumbricina	1	Rheocricotopus sp.	1	Physa sp.	8	SC	4
Brillia sp.	1	Nais communis/ variabilis	1	Thienemannimyia group	1	Micropsectra sp.	--	--	4
Limnophyes sp.	1	Chaetogaster diaphanus	1	Tipula sp.	1	Eukiefferiella sp.	--	--	4
Pentaneura sp.	1	Planariidae	1	Cyprididae	1	Tipula sp.	4	OM	3
Tipula sp.	1		293	Dero digitata	1	Rheocricotopus sp.	6	OM	3
Enchytraeidae	1			Physa sp.	1	Lumbricina	--	CG	3
Chaetogaster diaphanus	1				298	Bezzia/ Palpomyia	6	P	3
Tubificidae unid.imm.	1					Corynoneura sp.	--	--	2
Physa sp.	1					Chaetogaster diaphanus	--	--	2
	278					Thienemannimyia group	6	P	1
						Planariidae	4	P	1
						Pentaneura sp.	6	P	1
						Limnophyes sp.	--	--	1
						Dero digitata	--	CG	1
						Cyprididae	8	CG	1
						Brillia sp.	5	SH	1
									869

KC11

	T1		T2		T3		(TV)	(FFG)	Total
Micropsectra sp.	138	Micropsectra sp.	126	Simulium sp.	96	Micropsectra sp.	7	CG	342
Simulium sp.	69	Simulium sp.	56	Micropsectra sp.	78	Simulium sp.	6	CF	221
Cyprididae	23	Tubificidae w/hair	30	Physa sp.	54	Physa sp.	8	SC	75
Physa sp.	12	Tanytarsini	19	Cyprididae	23	Cyprididae	8	CG	49
Eukiefferiella sp.	11	Eukiefferiella sp.	11	Microtendipes pedellus group	10	Tubificidae w/hair	5	CG	34
Hydra sp.	6	Parametriocnemus sp.	10	Chironomini	3	Eukiefferiella sp.	8	OM	24
Apedilum sp.	4	Physa sp.	9	Paratanytarsus sp.	2	Tanytarsini	6	CG	19
Parametriocnemus sp.	4	Tubificidae unid.imm.	7	Eukiefferiella sp.	2	Parametriocnemus sp.	5	CG	16
Cricotopus sp.	3	Hydra sp.	5	Parametriocnemus sp.	2	Hydra sp.	5	P	12
Tubificidae w/hair	3	Radotanypus sp.	4	Cricotopus bicinctus group	2	Microtendipes pedellus group	6	CF	11
Cricotopus bicinctus group	2	Cricotopus sp.	3	Tipula sp.	2	Tubificidae unid.imm.	10	CG	7
Culicoides sp.	1	Tipula sp.	3	Rheocricotopus sp.	1	Tipula sp.	4	OM	6
Paratanytarsus sp.	1	Cyprididae	3	Cricotopus nostocicola	1	Cricotopus sp.	7	CG	6
Paraphaenocladius sp.	1	Cricotopus bicinctus group	2	Muscidae	1	Cricotopus bicinctus group	7	CG	6
Pentaneura sp.	1	Microtendipes pedellus group	1	Procambarus clarkii	1	Radotanypus sp.	7	P	4
Hydrellia sp.	1	Corynoneura sp.	1	Enchytraeidae	1	Apedilum sp.	6	CG	4
Limonia sp.	1	Antocha sp.	1	Tubificidae w/hair	1	Paratanytarsus sp.	6	CF	3
Tipula sp.	1	Lumbricina	1	Hydra sp.	1	Enchytraeidae	10	CG	3
Enchytraeidae	1	Enchytraeidae	1		281	Chironomini	6	CG	3
Nais communis/ variabilis	1		293			Rheocricotopus sp.	6	OM	1
	284					Procambarus clarkii	8	SH	1
						Pentaneura sp.	6	P	1
						Paraphaenocladius sp.	4	CG	1
						Nais communis/ variabilis	--	CG	1
						Muscidae	6	P	1
						Lumbricina	--	CG	1
						Limonia sp.	6	SH	1
						Hydrellia sp.	6	SH	1
						Culicoides sp.	6	P	1
						Cricotopus nostocicola	7	SH	1
						Corynoneura sp.	7	CG	1
						Antocha sp.	3	CG	1
									858

KC12

	T1		T2		T3		(TV)	(FFG)	Total
Cyprididae	208	Cyprididae	116	Micropsectra sp.	89	Cyprididae	8	CG	383
Radotanypus sp.	37	Physa sp.	54	Cyprididae	59	Micropsectra sp.	7	CG	147
Micropsectra sp.	10	Micropsectra sp.	48	Eukiefferiella sp.	28	Physa sp.	8	SC	73
Tubificidae w/hair	8	Tubificidae w/hair	28	Tubificidae w/hair	26	Radotanypus sp.	7	P	65
Physa sp.	7	Tubificidae unid.imm.	22	Simulium sp.	24	Tubificidae w/hair	5	CG	62
Chironomus sp.	2	Eukiefferiella sp.	18	Physa sp.	12	Eukiefferiella sp.	8	OM	47
Paratendipes sp.	2	Radotanypus sp.	18	Tubificidae unid.imm.	11	Simulium sp.	6	CF	36
Cricotopus sp.	2	Simulium sp.	12	Radotanypus sp.	10	Tubificidae unid.imm.	10	CG	35
Tubificidae unid.imm.	2	Pentaneura sp.	3	Enchytraeidae	5	Enchytraeidae	10	CG	6
Tropisternus sp.	1	Corynoneura sp.	2	Parametriocnemus sp.	4	Procambarus clarkii	8	SH	4
Culicoides sp.	1	Psychoda sp.	2	Procambarus clarkii	4	Pentaneura sp.	6	P	4
Eukiefferiella sp.	1	Culicoides sp.	1	Cricotopus bicinctus group	3	Parametriocnemus sp.	5	CG	4
Syrphidae	1	Phaenopsectra sp.	1	Rheocricotopus sp.	2	Eukiefferiella sp.	--	--	3
	282	Micropsectra sp.	1	Eukiefferiella sp.	2	Cricotopus sp.	7	CG	3
		Cricotopus sp.	1	Tipula sp.	2	Cricotopus bicinctus group	7	CG	3
		Eukiefferiella sp.	1	Pisidium sp.	2	Corynoneura sp.	7	CG	3
		Limnophyes sp.	1	Micropsectra sp.	1	Tipula sp.	4	OM	2
		Parametriocnemus sp.	1	Orthocladius complex	1	Rheocricotopus sp.	6	OM	2
		Thienemanniella sp.	1	Corynoneura sp.	1	Psychoda sp.	10	CG	2
		Zoniagrion exlcamationis	1	Ablabesmyia sp.	1	Pisidium sp.	8	CF	2
		Enchytraeidae	1	Pentaneura sp.	1	Paratendipes sp.	8	CG	2
		Limnodrilus hoffmeisteri	1	Sciomyzidae	1	Micropsectra sp.	--	--	2
			334	Fossaria sp.	1	Culicoides sp.	6	P	2
				Prostoma sp.	1	Chironomus sp.	10	CG	2
					291	Zoniagrion exlcamationis	9	P	1
						Tropisternus sp.	5	P	1
						Thienemanniella sp.	--	--	1
						Syrphidae	10	CG	1
						Sciomyzidae	6	P	1
						Prostoma sp.	8	P	1
						Phaenopsectra sp.	7	SC	1
						Parametriocnemus sp.	--	--	1
						Orthocladius complex	6	CG	1
						Limnophyes sp.	--	--	1
						Limnodrilus hoffmeisteri	--	CG	1
						Fossaria sp.	8	SC	1
						Ablabesmyia sp.	8	CG	1
									907

KC13

	T1		T2		T3		(TV)	(FFG)	Total
Tubificidae unid.imm.	62	Tubificidae unid.imm.	118	Micropsectra sp.	98	Tubificidae unid.imm.	10	CG	200
Micropsectra sp.	61	Simulium sp.	39	Simulium sp.	43	Micropsectra sp.	7	CG	181
Radotanypus sp.	25	Micropsectra sp.	22	Cyprididae	41	Simulium sp.	6	CF	104
Simulium sp.	22	Parametriocnemus sp.	21	Radotanypus sp.	32	Cyprididae	8	CG	72
Cyprididae	19	Tubificidae w/hair	18	Tubificidae unid.imm.	20	Radotanypus sp.	7	P	57
Parametriocnemus sp.	13	Procladius sp.	12	Apedilum sp.	13	Parametriocnemus sp.	5	CG	43
Enchytraeidae	13	Cyprididae	12	Parametriocnemus sp.	9	Tubificidae w/hair	5	CG	30
Tubificidae w/hair	12	Cricotopus sp.	9	Eukiefferiella sp.	8	Eukiefferiella sp.	8	OM	27
Eukiefferiella sp.	10	Eukiefferiella sp.	9	Hyalella sp.	6	Limnodrilus hoffmeisteri	--	CG	21
Limnodrilus hoffmeisteri	10	Nais communis/ variabilis	8	Limnodrilus hoffmeisteri	4	Cricotopus sp.	7	CG	18
Cricotopus sp.	6	Limnodrilus hoffmeisteri	7	Cricotopus sp.	3	Nais communis/ variabilis	--	CG	13
Nais communis/ variabilis	5	Laccobius sp.	1	Tanytarsus sp.	2	Enchytraeidae	10	CG	13
Physa sp.	4	Ephydridae	1	Corynoneura sp.	2	Apedilum sp.	6	CG	13
Culicoides sp.	2	Muscidae	1	Sigara sp.	2	Procladius sp.	9	P	12
Laccobius sp.	1	Baetis tricaudatus	1	Physa sp.	2	Physa sp.	8	SC	7
Rheocricotopus sp.	1	Paranais litoralis	1	Dytiscidae	1	Hyalella sp.	8	CG	6
Cricotopus bicinctus group	1	Physa sp.	1	Agabus sp.	1	Tanytarsus sp.	6	CF	2
Ephydridae	1		281	Helochares sp.	1	Sigara sp.	8	P	2
Muscidae	1			Tropisternus sp.	1	Muscidae	6	P	2
Pericoma/ Telmatoscopus	1			Chironomus sp.	1	Laccobius sp.	5	MH	2
Chrysops sp.	1			Limnophyes sp.	1	Culicoides sp.	6	P	2
Tipula sp.	1			Pseudosmittia sp.	1	Corynoneura sp.	7	CG	2
Baetis tricaudatus	1			Ormosia sp.	1	Baetis tricaudatus	6	CG	2
Sialis sp.	1			Corixidae	1	Tropisternus sp.	5	P	1
Pristina leidyi	1				294	Tipula sp.	4	OM	1
Pisidium sp.	1					Sialis sp.	4	P	1
	276					Rheocricotopus sp.	6	OM	1
						Pseudosmittia sp.	--	CG	1
						Pristina leidyi	--	CG	1
						Pisidium sp.	8	CF	1
						Pericoma/ Telmatoscopus	4	CG	1
						Paranais litoralis	--	CG	1
						Ormosia sp.	3	CG	1
						Limnophyes sp.	8	CG	1
						Helochares sp.	5	P	1
						Ephydridae	6	--	1
						Ephydridae	--	--	1
						Dytiscidae	5	P	1
						Cricotopus bicinctus group	7	CG	1
						Corixidae	10	P	1
						Chrysops sp.	8	P	1
						Chironomus sp.	10	CG	1
						Agabus sp.	8	P	1
									851

KC14

	T1		T2		T3		(TV)	(FFG)	Total
Micropsectra sp.	139	Radotanypus sp.	96	Radotanypus sp.	71	Micropsectra sp.	7	CG	291
Radotanypus sp.	62	Micropsectra sp.	83	Micropsectra sp.	69	Radotanypus sp.	7	P	229
Cyprididae	38	Simulium sp.	32	Simulium sp.	43	Cyprididae	8	CG	101
Simulium sp.	16	Cyprididae	23	Cyprididae	40	Simulium sp.	6	CF	91
Paratanytarsus sp.	9	Tubificidae unid.imm.	11	Rheotanytarsus sp.	12	Rheotanytarsus sp.	6	CF	21
Cricotopus bicinctus group	7	Limnodrilus hoffmeisteri	11	Cricotopus bicinctus group	11	Cricotopus bicinctus group	7	CG	21
Physa sp.	6	Rheotanytarsus sp.	9	Stictotarsus sp.	10	Stictotarsus sp.	5	P	18
Culicoides sp.	4	Callibaetis sp.	7	Cricotopus sp.	7	Cricotopus sp.	7	CG	16
Cricotopus sp.	4	Stictotarsus sp.	5	Culicoides sp.	4	Tubificidae unid.imm.	10	CG	13
Stictotarsus sp.	3	Cricotopus sp.	5	Ceratopogonidae	3	Limnodrilus hoffmeisteri	--	CG	11
Hyalella sp.	3	Cricotopus bicinctus group	3	Parametriocnemus sp.	3	Callibaetis sp.	9	CG	11
Agabus regularis	2	Berosus sp.	2	Callibaetis sp.	3	Culicoides sp.	6	P	10
Ceratopogonidae	2	Culicoides sp.	2	Laccophilus sp.	2	Physa sp.	8	SC	9
Laccophilus sp.	1	Physa sp.	2	Berosus sp.	2	Paratanytarsus sp.	6	CF	9
Tropisternus sp.	1	Hydroporus sp.	1	Laccobius sp.	2	Ceratopogonidae	--	--	5
Apedilum sp.	1	Tropisternus sp.	1	Tubificidae unid.imm.	2	Berosus sp.	5	P	4
Chironomus sp.	1	Hydrellia sp.	1	Tubificidae w/hair	1	Parametriocnemus sp.	5	CG	3
Limnophyes sp.	1	Pericoma/ Telmatoscopus	1	Physa sp.	1	Laccophilus sp.	5	P	3
Scatella sp.	1	Caloparyphus/ Euparyphus	1		286	Hyalella sp.	8	CG	3
Chrysops sp.	1	Chrysops sp.	1			Tubificidae w/hair	5	CG	2
Callibaetis sp.	1	Tubificidae w/hair	1			Tropisternus sp.	5	P	2
	303		298			Laccobius sp.	5	MH	2
						Chrysops sp.	8	P	2
						Agabus regularis	--	P	2
						Scatella sp.	6	CG	1
						Pericoma/ Telmatoscopus	4	CG	1
						Limnophyes sp.	8	CG	1
						Hydroporus sp.	5	P	1
						Hydrellia sp.	6	SH	1
						Chironomus sp.	10	CG	1
						Caloparyphus/ Euparyphus	8	CG	1
						Apedilum sp.	6	CG	1
									887

Appendix 3 Number of lowest identified taxa by transect and combined transects including tolerance values (TV) and feeding guilds (FFG) Kirker Creek sites in 2007.

Tolerance values for taxa range from 1 to 10 with 10 being the most tolerant value. Feeding guilds are defined as follows: CG = collector-gatherer; CF = collector-filterer; SC = scraper; SH = shredder; P = predator; MH = macrophyte herbivore; OM = omnivore; PA = parasite; XY = Xylophage.

KC1

Taxon	T 1	Taxon	T 2	Taxon	T 3	Taxon	Life Stage	Tol Val	FFG	Total
Cyprididae	118	Hyalella sp.	49	Hyalella sp.	102	Hyalella sp.		8	CG	268
Hyalella sp.	117	Cyprididae	29	Chironomus sp.	50	Cyprididae		8	CG	183
Dugesia tigrina	24	Chironomus sp.	24	Cyprididae	36	Chironomus sp.		10	CG	81
Chironomus sp.	7	Tubificidae Unident. Imm.	21	Tubificidae Unident. Imm.	30	Tubificidae Unident. Imm.		10	CG	55
Tubificidae Unident. Imm.	4	Dero digitata	8	Physa sp.	17	Dugesia tigrina		4	P	24
Dixella sp.	2	Paratanytarsus sp.	3	Dero digitata	12	Dero digitata		--	CG	21
Procambarus clarkii	2	Chironomidae	2	Tubificidae w/ hair chaetae	9	Physa sp.		8	SC	18
Micropsectra sp.	1	Dicrotendipes sp.	2	Tanytarsus sp.	4	Tubificidae w/ hair chaetae		5	CG	9
Limnophyes sp.	1	Procambarus clarkii	2	Cricotopus bicinctus grp.	4	Tanytarsus sp.		6	CF	5
Coenagrionidae	1	Tanytarsus sp.	1	Orthocladius complex	3	Cricotopus bicinctus grp.		7	CG	5
Lumbriculus variegata	1	Cricotopus sp.	1	Cricotopus sp.	2	Procambarus clarkii		8	SH	4
Enchytraeidae	1	Cricotopus bicinctus grp.	1	Cricotopus sp.	2	Paratanytarsus sp.		6	CF	4
Dero digitata	1	Cricotopus sp.	1	Psectrotanypus sp.	2	Psectrotanypus sp.		10	P	3
Hydra sp.	1	Psectrotanypus sp.	1	Fossaria sp.	2	Orthocladius complex		6	CG	3
Ferrissia sp.	1	Tanypus sp.	1	Dicrotendipes sp.	1	Dicrotendipes sp.		8	CG	3
Physa sp.	1	Menetus opercularis	1	Paratanytarsus sp.	1	Cricotopus sp.		7	CG	3
	283		147	Corynoneura sp.	1	Cricotopus sp.	Pupae	--	--	3
				Radotanypus sp.	1	Menetus opercularis		6	SC	2
				Ephydridae	1	Fossaria sp.		8	SC	2
				Sciomyzidae	1	Dixella sp.		2	CG	2
				Coenagrionidae	1	Coenagrionidae		--	P	2
				Limnodrilus hoffmeisteri	1	Chironomidae		6	CG	2
				Menetus opercularis	1	Tanypus sp.		10	P	1
					284	Sciomyzidae		6	P	1
						Radotanypus sp.		7	P	1
						Micropsectra sp.		7	CG	1
						Lumbriculus variegata		--	CG	1
						Limnophyes sp.		8	CG	1
						Limnodrilus hoffmeisteri		--	CG	1
						Hydra sp.		5	P	1
						Ferrissia sp.		6	SC	1
						Ephydridae		6	--	1
						Enchytraeidae		10	CG	1
						Corynoneura sp.		7	CG	1
										714

KC2

Taxon	T 1	Taxon	T 2	Taxon	T 3	Taxon	Life Stage	Tol Val	FFG	Total
Physa sp.	113	Chironomus sp.	77	Chironomus sp.	63	Physa sp.		8	SC	159
Cyprididae	109	Tubificidae Unident. Imm.	51	Paratanytarsus sp.	46	Chironomus sp.		10	CG	159
Chironomus sp.	19	Paratanytarsus sp.	46	Dero digitata	46	Cyprididae		8	CG	147
Tubificidae w/ hair chaetae	11	Nais communis/ variabilis	33	Tubificidae Unident. Imm.	44	Tubificidae Unident. Imm.		10	CG	102
Hyalella sp.	9	Cyprididae	22	Physa sp.	24	Paratanytarsus sp.		6	CF	93
Tubificidae Unident. Imm.	7	Physa sp.	22	Cyprididae	16	Dero digitata		--	CG	67
Fossaria sp.	3	Dero digitata	21	Hyalella sp.	12	Nais communis/ variabilis		--	CG	33
Tanytarsus sp.	2	Tubificidae w/ hair chaetae	8	Lymnaea sp.	5	Hyalella sp.		8	CG	26
Coenagrionidae	2	Hyalella sp.	5	Berosus sp.	4	Tubificidae w/ hair chaetae		5	CG	23
Limnodrilus hoffmeisteri	2	Probezzia sp.	3	Culicoides sp.	4	Berosus sp.	Larvae	5	P	6
Bezzia/ Palpomyia	1	Culicidae	3	Cricotopus bicinctus grp.	4	Lymnaea sp.		7	SC	5
Culicoides sp.	1	Fossaria sp.	3	Tubificidae w/ hair chaetae	4	Culicoides sp.		6	P	5
Paratanytarsus sp.	1	Berosus sp.	2	Colymbetes sp.	3	Cricotopus bicinctus grp.		7	CG	5
Alotanypus sp.	1	Orthocladiinae	2	Corixidae	2	Coenagrionidae		--	P	5
Alotanypus sp.	1	Tanypus sp.	2	Probezzia sp.	1	Probezzia sp.		6	P	4
Tipula sp.	1	Coenagrionidae	2	Tanytarsus sp.	1	Limnodrilus hoffmeisteri		--	CG	4
	283	Oxyethira sp.	2	Cricotopus sp.	1	Tanytarsus sp.		6	CF	3
		Limnophyes sp.	1	Syrphidae	1	Fossaria sp.		8	SC	3
		Cricotopus bicinctus grp.	1	Trichocorixa calva	1	Fossaria sp.		8	SC	3
		Tipula sp.	1	Coenagrionidae	1	Culicidae		8	CG	3
		Corixidae	1	Procambarus clarkii	1	Corixidae		10	P	3
		Trichocorixa calva	1	Stylaria lacustris	1	Colymbetes sp.	Adults	5	P	3
		Helobdella sp.	1	Limnodrilus hoffmeisteri	1	Tipula sp.		4	OM	2
		Limnodrilus hoffmeisteri	1	Menetus opercularis	1	Tanypus sp.		10	P	2
			311		287	Oxyethira sp.		3	PH	2
						Orthocladiinae		5	CG	2
						Trichocorixa calva		8	P	1
						Trichocorixa calva	Adults	--	--	1
						Syrphidae		10	CG	1
						Stylaria lacustris		--	CG	1
						Procambarus clarkii		8	SH	1
						Menetus opercularis		6	SC	1
						Limnophyes sp.		8	CG	1
						Helobdella sp.		6	PA	1
						Cricotopus sp.		7	CG	1
						Bezzia/ Palpomyia		6	P	1
						Alotanypus sp.		7	P	1
						Alotanypus sp.	Pupae	--	--	1
										881

KC3

Taxon	T 1	Taxon	T 2	Taxon	T 3	Taxon	Life Stage	Tol Val	FFG	Total
Chironomus sp.	31	Dero digitata	160	Physa sp.	24	Dero digitata		--	CG	162
Physa sp.	12	Chironomus sp.	44	Chironomus sp.	21	Chironomus sp.		10	CG	96
Trichocorixa calva	5	Physa sp.	42	Procambarus clarkii	9	Physa sp.		8	SC	78
Orconectes virilis	5	Corixidae	7	Corixidae	3	Corixidae		10	P	13
Corixidae	3	Cyprididae	6	Hyalella sp.	3	Cyprididae		8	CG	10
Alotanypus sp.	1	Paratanytarsus sp.	5	Cyprididae	3	Procambarus clarkii		8	SH	9
Tanypus sp.	1	Hyalella sp.	5	Trichocorixa calva	2	Hyalella sp.		8	CG	8
Cyprididae	1	Tanytarsus sp.	4	Dero digitata	2	Trichocorixa calva	Adults	--	--	5
	59	Enchytraeidae	3		67	Paratanytarsus sp.		6	CF	5
		Tanypus sp.	2			Orconectes virilis		6	SH	5
		Trichocorixa calva	2			Trichocorixa calva		8	P	4
		Tubificidae Unident. immature	2			Tanytarsus sp.		6	CF	4
		Bezzia/ Palpomyia	1			Tanypus sp.		10	P	3
		Culicoides sp.	1			Enchytraeidae		10	CG	3
		Slavina appendiculata	1			Tubificidae Unident. immature		10	CG	2
		Fossaria sp.	1			Slavina appendiculata		--	CG	1
			286			Fossaria sp.		8	SC	1
						Culicoides sp.		6	P	1
						Bezzia/ Palpomyia		6	P	1
						Alotanypus sp.		7	P	1
										412

KC4

Taxon	T 1	Taxon	T 2	Taxon	T 3	Taxon	Life Stage	Tol Val	FFG	Total
Tubificidae Unident. imm.	99	Tubificidae Unident. imm.	32	Tubificidae Unident. imm.	82	Tubificidae Unident. imm.		10	CG	213
Enchytraeidae	13	Enchytraeidae	5	Dero digitata	75	Dero digitata		--	CG	93
Dero digitata	13	Dero digitata	5	Tubificidae w/ hair chaetae	42	Tubificidae wi/hair chaetae		5	CG	42
Lumbricina	7	Cyprididae	4	Limnodrilus hoffmeisteri	32	Limnodrilus hoffmeisteri		--	CG	37
Limnophyes sp.	6	Fossaria sp.	2	Nais communis/ variabilis	20	Cyprididae		8	CG	25
Cyprididae	5	Limnophyes sp.	1	Cyprididae	16	Nais communis/ variabilis		--	CG	20
Limnodrilus hoffmeisteri	5	Ephydridae	1	Paranais litoralis	9	Enchytraeidae		10	CG	19
Fossaria sp.	4	Tipula sp.	1	Tanytarsus sp.	5	Paranais litoralis		--	CG	11
Tipula sp.	3	Paranais litoralis	1	Chironomus sp.	4	Lumbricina		--	CG	8
Paranais litoralis	1	Physa sp.	1	Dicrotendipes sp.	1	Limnophyes sp.		8	CG	7
Prostoma sp.	1		53	Parametriocnemus sp.	1	Fossaria sp.		8	SC	6
	157			Alotanypus sp.	1	Tanytarsus sp.		6	CF	5
				Wormaldia sp.	1	Tipula sp.		4	OM	4
				Lumbricina	1	Chironomus sp.		10	CG	4
				Enchytraeidae	1	Wormaldia sp.		3	CF	1
					291	Prostoma sp.		8	P	1
						Physa sp.		8	SC	1
						Parametriocnemus sp.		5	CG	1
						Ephydridae		6	--	1
						Dicrotendipes sp.		8	CG	1
						Alotanypus sp.	Pupae	--	--	1
										501

KC5

Taxon	T 1	Taxon	T 2	Taxon	T 3	Taxon	Life Stage	Tol Val	FFG	Total
Tubificidae Unident. Imm.	84	Tubificidae Unident. imM.	155	Tubificidae Unident. Imm.	138	Tubificidae w/ hair chaetae		5	CG	14
Limnodrilus hoffmeisteri	77	Slavina appendiculata	35	Cyprididae	72	Tubificidae Unident. Imm.		10	CG	377
Radotanypus sp.	34	Dugesia tigrina	24	Dero digitata	31	Tipula sp.		4	OM	1
Chironomus sp.	31	Dero digitata	20	Limnodrilus hoffmeisteri	10	Tanytarsus sp.		6	CF	17
Psectrotanypus sp.	21	Cyprididae	12	Fossaria sp.	6	Tanypus sp.		10	P	4
Tanytarsus sp.	9	Limnodrilus hoffmeisteri	12	Erpobdellidae	4	Sphaeriidae		8	CG	4
Tubificidae w/ hair chaetae	7	Alotanypus sp.	8	Enchytraeidae	4	Slavina appendiculata		--	CG	35
Dero digitata	6	Tanytarsus sp.	7	Sphaeriidae	4	Sciomyzidae		6	P	2
Cricotopus sp.	5	Tubificidae w/ hair chaetae	5	Lumbriculus variegata	3	Scatella sp.		6	CG	1
Cyprididae	4	Chironomus sp.	4	Micropsectra sp.	2	Radotanypus sp.		7	P	34
Alotanypus sp.	2	Alotanypus sp.	2	Sciomyzidae	2	Psectrotanypus sp.		10	P	21
Tanypus sp.	2	Tanypus sp.	2	Tubificidae w/ hair chaetae	2	Prostoma sp.		8	P	2
Alotanypus sp.	1	Brillia sp.	1	Pisidium sp.	2	Pisidium sp.		8	CF	2
Corixidae	1	Limnophyes sp.	1	Chironomus sp.	1	Physa sp.		8	SC	1
Mooreobdella microstoma	1	Scatella sp.	1	Tanytarsus sp.	1	Mooreobdella microstoma		8	P	2
Lumbriculus variegata	1	Erpobdellidae	1	Limnophyes sp.	1	Micropsectra sp.		7	CG	2
Prostoma sp.	1	Mooreobdella microstoma	1	Ephydridae	1	Lumbriculus variegata		--	CG	4
	287	Prostoma sp.	1	Ephydridae	1	Limnophyes sp.		8	CG	2
			292	Tipula sp.	1	Limnodrilus hoffmeisteri		--	CG	99
				Physa sp.	1	Fossaria sp.		8	SC	6
					287	Erpobdellidae		8	P	5
						Ephydridae		6	--	1
						Ephydridae	Pupae	--	--	1
						Enchytraeidae		10	CG	4
						Dugesia tigrina		4	P	24
						Dero digitata		--	CG	57
						Cyprididae		8	CG	88
						Cricotopus sp.		7	CG	5
						Corixidae		10	P	1
						Chironomus sp.		10	CG	36
						Brillia sp.		5	SH	1
						Alotanypus sp.		7	P	10
						Alotanypus sp.	Pupae	--	--	3
										866

KC6

Taxon	T 1
Chironomus sp.	48
Micropsectra sp.	47
Psectrotanypus sp.	40
Cricotopus sp.	29
Tanytarsus sp.	23
Tubificidae Unident. Imm.	23
Dero digitata	11
Psectrotanypus sp.	10
Tanypus sp.	10
Cricotopus bicinctus grp.	8
Cyprididae	7
Culex sp.	6
Coenagrionidae	5
Tubificidae w/ hair chaetae	5
Limnophyes sp.	4
Alotanypus sp.	4
Culicidae	4
Tanytarsus sp.	3
Micropsectra sp.	2
Tanypodinae	2
Enchytraeidae	2
Limnodrilus hoffmeisteri	2
Brachycera	1
Apedilum sp.	1
Cricotopus bicinctus group	1
Alotanypus sp.	1
Paramerina sp.	1
Fossaria sp.	1
	301

Taxon	T 2
Chironomus sp.	107
Cricotopus sp.	61
Psectrotanypus sp.	31
Tubificidae Unident. Imm.	23
Tanypus sp.	16
Coenagrionidae	13
Tubificidae w/ hair chaetae	8
Culicidae	6
Limnophyes sp.	5
Cricotopus bicinctus grp.	5
Psectrotanypus sp.	5
Culex sp.	3
Scatella sp.	3
Dero digitata	3
Tropisternus sp.	1
Ceratopogonidae	1
Chironomus sp.	1
Micropsectra sp.	1
Tanytarsus sp.	1
Cricotopus sp.	1
Paramerina sp.	1
Dixella sp.	1
Plathemis sp.	1
Fossaria sp.	1
Physa sp.	1
	300

Taxon	T 3
Tubificidae Unident. Imm.	64
Cricotopus sp.	43
Chironomus sp.	42
Micropsectra sp.	38
Cricotopus bicinctus grp.	19
Psectrotanypus sp.	16
Tanypus sp.	14
Tubificidae w/ hair chaetae	12
Cyprididae	9
Dero digitata	7
Coenagrionidae	6
Tanypodinae	5
Alotanypus sp.	4
Tanytarsus sp.	3
Cricotopus sp.	3
Psectrotanypus sp.	3
Culex sp.	2
Nais communis/ variabilis	2
Micropsectra sp.	1
Parametriocnemus sp.	1
Empididae	1
	295

Taxon	Life Stage	Tol Val	FFG	Total
Chironomus sp.		10	CG	197
Cricotopus sp.		7	CG	133
Tubificidae Unident. Imm.		10	CG	110
Psectrotanypus sp.		10	P	87
Micropsectra sp.		7	CG	86
Tanypus sp.		10	P	40
Cricotopus bicinctus grp.		7	CG	32
Tanytarsus sp.		6	CF	27
Tubificidae w/ hair chaetae		5	CG	25
Dero digitata		--	CG	21
Psectrotanypus sp.	Pupae	--	--	18
Cyprididae		8	CG	16
Coenagrionidae		--	P	13
Culex sp.		8	CG	11
Culicidae	Pupae	--	--	10
Limnophyes sp.		8	CG	9
Alotanypus sp.		7	P	8
Coenagrionidae		--	P	6
Tanypodinae		7	P	5
Coenagrionidae		--	P	5
Cricotopus sp.	Pupae	--	--	4
Tanytarsus sp.	Pupae	--	--	3
Scatella sp.		6	CG	3
Micropsectra sp.	Pupae	--	--	3
Tanypodinae	Pupae	--	--	2
Paramerina sp.		6	P	2
Nais communis/ variabilis		--	CG	2
Limnodrilus hoffmeisteri		--	CG	2
Fossaria sp.		8	SC	2
Enchytraeidae		10	CG	2
Tropisternus sp.	Larvae	5	P	1
Plathemis sp.		9	P	1
Physa sp.		8	SC	1
Parametriocnemus sp.		5	CG	1
Empididae	Pupae	--	--	1
Dixella sp.		2	CG	1
Cricotopus bicinctus group	Pupae	--	--	1
Chironomus sp.	Pupae	--	--	1
Ceratopogonidae	Pupae	--	--	1
Brachycera	Pupae	--	--	1
Apedilum sp.		6	CG	1
Alotanypus sp.	Pupae	--	--	1
				896

KC7

Taxon	T 1
Tubificidae w/ hair chaetae	114
Limnodrilus hoffmeisteri	31
Chironomus sp.	26
Tubificidae Unident. Imm.	23
Culiseta sp.	11
Cricotopus sp.	1
Scatella sp.	1
Dero digitata	1
	208

Taxon	T 2
Tubificidae w/ hair chaetae	255
Limnodrilus hoffmeisteri	17
Tubificidae Unident. Imm.	8
Psychomyia sp.	1
Erpobdellidae	1
	282

Taxon	T 3
Tubificidae w/ hair chaetae	213
Limnodrilus hoffmeisteri	35
Tubificidae Unident. Imm.	27
Culiseta sp.	11
Chironomus sp.	6
Alotanypus sp.	1
	293

Taxon	Life Stage	Tol Val	FFG	Total
Tubificidae w/ hair chaetae		5	CG	582
Limnodrilus hoffmeisteri		--	CG	83
Tubificidae Unident. Imm.		10	CG	58
Chironomus sp.		10	CG	32
Culiseta sp.		8	CG	22
Scatella sp.		6	CG	1
Psychomyia sp.		2	CG	1
Erpobdellidae		8	P	1
Dero digitata		--	CG	1
Cricotopus sp.		7	CG	1
Alotanypus sp.		7	P	1
				783

KC8

Taxon	T 1
Tubificidae Unident. Imm.	19
Limnodrilus hoffmeisteri	17
Tubificidae w/ hair chaetae	9
Scatella sp.	7
Chironomus sp.	3
Procambarus clarkii	3
Psychoda sp.	1
	59

Taxon	T 2
Tubificidae Unident. Imm.	16
Limnodrilus hoffmeisteri	13
Chironomus sp.	3
Procambarus clarkii	3
Cricotopus sp.	2
Tubificidae w/ hair chaetae	2
	39

Taxon	T 3
Limnodrilus hoffmeisteri	22
Tubificidae w/ hair chaetae	14
Tubificidae Unident. Imm.	10
Dero digitata	5
Chironomus sp.	4
Tanytarsus sp.	1
Cricotopus sp.	1
	57

Taxon	Life Stage	Tol Val	FFG	Total
Tubificidae w/ hair chaetae		5	CG	25
Tubificidae Unident. Imm.		10	CG	45
Tanytarsus sp.		6	CF	1
Scatella sp.		6	CG	7
Psychoda sp.		10	CG	1
Procambarus clarkii		8	SH	6
Limnodrilus hoffmeisteri		--	CG	52
Dero digitata		--	CG	5
Cricotopus sp.		7	CG	3
Chironomus sp.		10	CG	10
				155

KC9

Taxon	T 1	Taxon	T 2	Taxon	T 3	Taxon	Life Stage	Tol Val	FFG	Total
Tubificidae Unident. Imm.	35	Procambarus clarkii	3	Cyprididae	102	Tubificidae w/ hair chaetae		5	CG	11
Limnodrilus hoffmeisteri	6	Physa sp.	3	Physa sp.	43	Tubificidae Unident. Imm.		10	CG	50
Procambarus clarkii	3	Culicidae	1	Tubificidae Unident. Imm.	14	Tipula sp.		4	OM	1
Cyprididae	3	Cyprididae	1	Tubificidae w/ hair chaetae	10	Tanytarsus sp.		6	CF	1
Menetus opercularis	2	Tubificidae Unident. Imm.	1	Chironomus sp.	6	Sciomyzidae		6	P	1
Diptera	1	Menetus opercularis	1	Limnophyes sp.	3	Radotanypus sp.		7	P	1
Radotanypus sp.	1		10	Limnodrilus hoffmeisteri	3	Psectrotanypus sp.		10	P	2
Tubificidae w/ hair chaetae	1			Psectrotanypus sp.	2	Procambarus clarkii		8	SH	7
Physa sp.	1			Culex sp.	2	Physa sp.		8	SC	47
	53			Paratanytarsus sp.	1	Paratanytarsus sp.		6	CF	1
				Tanytarsus sp.	1	Menetus opercularis		6	SC	3
				Sciomyzidae	1	Lumbriculus variegata		--	CG	1
				Tipula sp.	1	Limnophyes sp.		8	CG	3
				Procambarus clarkii	1	Limnodrilus hoffmeisteri		--	CG	9
				Lumbriculus variegata	1	Diptera	Pupae	--	--	1
				Dero digitata	1	Dero digitata		--	CG	1
					192	Cyprididae		8	CG	106
						Culicidae		8	CG	1
						Culex sp.		8	CG	2
						Chironomus sp.		10	CG	6
										255

KC10

Taxon	T 1	Taxon	T 2	Taxon	T 3	Taxon	Life Stage	Tol Val	FFG	Total
Physa sp.	164	Limnophyes sp.	47	Physa sp.	98	Physa sp.		8	SC	307
Cyprididae	46	Physa sp.	45	Tubificidae Unident. Imm.	50	Cyprididae		8	CG	118
Lumbricina	20	Cyprididae	39	Cyprididae	33	Tubificidae Unident. Imm.		10	CG	74
Tubificidae w/ hair chaetae	12	Lumbricina	36	Tubificidae w/ hair chaetae	20	Lumbricina		--	CG	71
Tipula sp.	7	Tubificidae w/ hair chaetae	33	Lumbricina	15	Tubificidae w/ hair chaetae		5	CG	65
Limnophyes sp.	6	Tubificidae Unident. Imm.	23	Tipula sp.	14	Limnophyes sp.		8	CG	57
Limnodrilus hoffmeisteri	2	Enchytraeidae	19	Limnodrilus hoffmeisteri	6	Tipula sp.		4	OM	36
Fossaria sp.	2	Tipula sp.	15	Limnophyes sp.	4	Enchytraeidae		10	CG	21
Paraphaenocladius sp.	1	Smittia sp.	5	Ceratopogonidae	3	Limnodrilus hoffmeisteri		--	CG	13
Tubificidae Unident. Imm.	1	Limnodrilus hoffmeisteri	5	Enchytraeidae	2	Ceratopogonidae	Pupae	--	--	6
	261	Culicoides sp.	3	Pseudosmittia sp.	1	Smittia sp.		6	CG	5
		Ceratopogonidae	3	Psectrotanypus sp.	1	Muscidae		6	P	3
		Brachycera	2	Muscidae	1	Fossaria sp.		8	SC	3
		Tanypus sp.	2	Pericoma/ Telmatoscopus	1	Culicoides sp.		6	P	3
		Muscidae	2	Scathophagidae	1	Tanypus sp.		10	P	2
		Psychoda sp.	2	Sciomyzidae	1	Psychoda sp.		10	CG	2
		Pericoma/ Telmatoscopus	1	Corbicula sp.	1	Brachycera	Pupae	--	--	2
		Nais communis/ variabilis	1	Fossaria sp.	1	Sciomyzidae		6	P	1
			283	Planorbella sp.	1	Scathophagidae		--	SH	1
					254	Pseudosmittia sp.		--	CG	1
						Psectrotanypus sp.		10	P	1
						Planorbella sp.		6	SC	1
						Pericoma/ Telmatoscopus		4	CG	1
						Pericoma/ Telmatoscopus		4	CG	1
						Paraphaenocladius sp.		4	CG	1
						Nais communis/ variabilis		--	CG	1
						Corbicula sp.		8	CF	1
										798

KC11

Taxon	T 1
Physa sp.	256
Cyprididae	19
Micropsectra sp.	16
Tipula sp.	2
Dicrotendipes sp.	1
Tanypodinae	1
Radotanypus sp.	1
Oxyethira sp.	1
Procambarus clarkii	1
Tubificidae w/ hair chaetae	1
Dugesia tigrina	1
	300

Taxon	T 2
Physa sp.	226
Cyprididae	41
Tubificidae w/ hair chaetae	18
Micropsectra sp.	6
Corynoneura sp.	2
Chironomus sp.	1
Chironomus sp.	1
Cricotopus bicinctus grp.	1
Alotanypus sp.	1
Pentaneura sp.	1
Coenagrionidae	1
Procambarus clarkii	1
Nais communis/ variabilis	1
Tubificidae Unident. Imm.	1
	302

Taxon	T 3
Physa sp.	272
Cyprididae	11
Micropsectra sp.	8
Tubificidae w/ hair chaetae	5
Paraphaenocladius sp.	1
	297

Taxon	Life Stage	Tol Val	FFG	Total
Tubificidae w/ hair chaetae		5	CG	24
Tubificidae Unident. Imm.		10	CG	1
Tipula sp.		4	OM	2
Tanypodinae		7	P	1
Radotanypus sp.		7	P	1
Procambarus clarkii		8	SH	2
Physa sp.		8	SC	754
Pentaneura sp.		6	P	1
Paraphaenocladius sp.		4	CG	1
Oxyethira sp.		3	PH	1
Nais communis/ variabilis		--	CG	1
Micropsectra sp.		7	CG	30
Dugesia tigrina		4	P	1
Dicrotendipes sp.		8	CG	1
Cyprididae		8	CG	71
Cricotopus bicinctus grp.		7	CG	1
Corynoneura sp.		7	CG	2
Coenagrionidae		--	P	1
Chironomus sp.		10	CG	1
Chironomus sp.	Pupae	--	--	1
Alotanypus sp.	Pupae	--	--	1
				899

KC12

Taxon	T 1
Cyprididae	193
Tubificidae w/ hair chaetae	39
Alotanypus sp.	26
Physa sp.	14
Tubificidae Unident. Imm.	11
Chironomus sp.	1
Micropsectra sp.	1
Parametriocnemus sp.	1
Pseudosmittia sp.	1
Psectrotanypus sp.	1
Alotanypus sp.	1
Hydropsychidae	1
	290

Taxon	T 2
Tubificidae Unident. Imm.	15
Cyprididae	11
Culiseta sp.	7
Tubificidae w/ hair chaetae	6
Physa sp.	3
Orthocladiinae	1
Brillia sp.	1
Alotanypus sp.	1
Corixidae	1
Limnodrilus hoffmeisteri	1
	47

Taxon	T 3
Tubificidae Unident. Imm.	48
Culicidae	17
Cyprididae	9
Tubificidae w/ hair chaetae	7
Hyalella sp.	4
Physa sp.	4
Aedes sp.	3
Limnodrilus hoffmeisteri	2
Chironomus sp.	1
Orthocladius complex	1
Brillia sp.	1
Argia sp.	1
Procambarus clarkii	1
	99

Taxon	Life Stage	Tol Val	FFG	Total
Cyprididae		8	CG	213
Tubificidae Unident. Imm.		10	CG	74
Tubificidae w/ hair chaetae		5	CG	52
Alotanypus sp.		7	P	26
Physa sp.		8	SC	21
Culicidae		8	CG	17
Culiseta sp.		8	CG	7
Hyalella sp.		8	CG	4
Limnodrilus hoffmeisteri		--	CG	3
Aedes sp.	Pupae	--	--	3
Chironomus sp.		10	CG	2
Brillia sp.		5	SH	2
Alotanypus sp.	Pupae	--	--	2
Pseudosmittia sp.		--	CG	1
Psectrotanypus sp.		10	P	1
Procambarus clarkii		8	SH	1
Parametriocnemus sp.		5	CG	1
Orthocladius complex		6	CG	1
Orthocladiinae		5	CG	1
Micropsectra sp.		7	CG	1
Hydropsychidae		4	CF	1
Corixidae		10	P	1
Argia sp.		7	P	1
				436

KC13

Taxon	T 1	Taxon	T 2	Taxon	T 3	Taxon	Life Stage	Tol Val	FFG	Total
Chironomus sp.	88	Micropsectra sp.	110	Micropsectra sp.	109	Micropsectra sp.		7	CG	227
Tanypus sp.	72	Cyprididae	27	Radotanypus sp.	61	Radotanypus sp.		7	P	92
Corixidae	27	Tubificidae Unident. Imm.	25	Tubificidae w/ hair chaetae	31	Chironomus sp.		10	CG	88
Tubificidae Unident. Imm.	25	Radotanypus sp.	22	Corixidae	14	Tanypus sp.		10	P	73
Trichocorixa calva	23	Parametriocnemus sp.	18	Parametriocnemus sp.	11	Tubificidae Unident. Imm.		10	CG	58
Tanypodinae	11	Tvetenia sp.	15	Physa sp.	10	Corixidae		10	P	41
Alotanypus sp.	11	Physa sp.	12	Cyprididae	9	Cyprididae		8	CG	37
Radotanypus sp.	9	Pericoma/ Telmatoscopus	8	Tubificidae Unident. Imm.	8	Tubificidae w/ hair chaetae		5	CG	32
Micropsectra sp.	8	Tanypodinae	7	Limnodrilus hoffmeisteri	6	Parametriocnemus sp.		5	CG	29
Sigara mckinstryi	7	Radotanypus sp.	7	Simulium sp.	5	Physa sp.		8	SC	28
Physa sp.	6	Simulium sp.	7	Micropsectra sp.	4	Trichocorixa calva		8	P	23
Chironomus sp.	3	Argia sp.	7	Pisidium sp.	4	Tanypodinae		7	P	18
Tanypus sp.	3	Trichoclinocera sp.	3	Tvetenia bavarica group	3	Tvetenia sp.		5	CG	15
Limnodrilus hoffmeisteri	3	Laccobius sp.	2	Radotanypus sp.	3	Alotanypus sp.		7	P	13
Sialis sp.	2	Orthocladiinae	2	Tvetenia bavarica group	2	Simulium sp.		6	CF	12
Orthocladius complex	1	Psychodidae	2	Alotanypus sp.	2	Radotanypus sp.	Pupae	--	--	11
Cricotopus bicinctus grp.	1	Hyalella sp.	2	Trichoclinocera sp.	2	Limnodrilus hoffmeisteri		--	CG	9
Tvetenia bavarica group	1	Hydra sp.	2	Argia sp.	2	Argia sp.		7	P	9
Corynoneura sp.	1	Pisidium sp.	2	Laccobius sp.	1	Pericoma/ Telmatoscopus		4	CG	8
Radotanypus sp.	1	Culicoides sp.	1	Brachycera	1	Sigara mckinstryi		8	P	7
Culex sp.	1	Paratendipes sp.	1	Culicoides sp.	1	Pisidium sp.		8	CF	6
Sciomyzidae	1	Micropsectra sp.	1	Tanytarsus sp.	1	Trichoclinocera sp.		6	P	5
Decapoda	1	Orthocladius complex	1	Orthocladius complex	1	Micropsectra sp.	Pupae	--	--	5
Cyprididae	1	Eukiefferiella sp.	1	Eukiefferiella sp.	1	Tvetenia bavarica group		5	CG	3
Aulodrilus pigueti	1	Cricotopus bicinctus grp.	1	Corynoneura sp.	1	Tvetenia bavarica group	Pupae	--	--	3
	308	Corynoneura sp.	1	Pentaneura sp.	1	Tanypus sp.	Pupae	--	--	3
		Stratiomyidae	1	Tanypus sp.	1	Orthocladius complex		6	CG	3
		Tubificidae w/ hair chaetae	1	Dixidae	1	Laccobius sp.	Larvae	5	MH	3
		Prostoma sp.	1	Scatella sp.	1	Corynoneura sp.		7	CG	3
			290	Callibaetis sp.	1	Chironomus sp.	Pupae	--	--	3
					298	Sialis sp.		4	P	2
						Psychodidae		--	CG	2
						Orthocladiinae		5	CG	2
						Hydra sp.		5	P	2
						Hyalella sp.		8	CG	2
						Eukiefferiella sp.		8	OM	2
						Culicoides sp.		6	P	2
						Cricotopus bicinctus group		7	CG	2
						Tanytarsus sp.		6	CF	1
						Stratiomyidae		8	CG	1

KC13 - continued.

Taxon	T 1	Taxon	T 2	Taxon	T 3	Taxon	Life Stage	Tol Val	FFG	Total
						Sciomyzidae		6	P	1
						Scatella sp.		6	CG	1
						Prostoma sp.		8	P	1
						Pentaneura sp.		6	P	1
						Paratendipes sp.		8	CG	1
						Dixidae	Pupae	--	--	1
						Decapoda		--	--	1
						Culex sp.		8	CG	1
						Callibaetis sp.		9	CG	1
						Brachycera	Pupae	--	--	1
						Aulodrilus pigueti		--	CG	1
										896

KC14

Taxon	T 1	Taxon	T 2	Taxon	T 3	Taxon	Life Stage	Tol Val	FFG	Total
Cyprididae	129	Hyalella sp.	157	Cyprididae	225	Tanytarsus sp.		6	CF	3
Hyalella sp.	128	Cyprididae	98	Hyalella sp.	90	Stratiomys sp.		8	CG	1
Physa sp.	10	Callibaetis sp.	15	Callibaetis sp.	11	Physa sp.		8	SC	21
Callibaetis sp.	9	Ischnura sp.	8	Physa sp.	4	Paramerina sp.		6	P	2
Tanytarsus sp.	3	Physa sp.	7	Ischnura sp.	1	Oxyethira sp.		3	PH	3
Oxyethira sp.	3	Coenagrionidae	6	Libellula sp.	1	Orthocladiinae		5	CG	1
Chironomini	2	Micropsectra sp.	5		332	Notonectidae		--	P	1
Aeshna sp.	2	Libellulidae	3			Micropsectra sp.		7	CG	5
Coenagrionidae	2	Paramerina sp.	2			Libellulidae		9	P	3
Apedilum sp.	1	Anax junius	2			Libellula sp.		9	P	1
Chironomus sp.	1	Stratiomys sp.	1			Lestidae		9	P	1
Orthocladiinae	1	Aeshna sp.	1			Ischnura sp.		9	P	9
Notonectidae	1	Archilestes sp.	1			Hyalella sp.		8	CG	375
Lestidae	1		306			Cyprididae		8	CG	452
	293					Coenagrionidae		--	P	8
						Chironomus sp.		10	CG	1
						Chironomini		6	CG	2
						Callibaetis sp.		9	CG	35
						Archilestes sp.		9	P	1
						Apedilum sp.		6	CG	1
						Anax junius		--	P	2
						Aeshna sp.		5	P	3
										931

Appendix 4 Number of lowest identified taxa by transect and combined transects including tolerance values (TV) and feeding guilds (FFG) for Pleasant Grove Creek sites in 2006.

Tolerance values for taxa range from 1 to 10 with 10 being the most tolerant value. Feeding guilds are defined as follows: CG = collector-gatherer; CF = collector-filterer; SC = scraper; SH = shredder; P = predator; MH = macrophyte herbivore; OM = omnivore; PA = parasite; XY = Xylophage.

PGC1

	T1		T2		T3		(TV)	(FFG)	Total
Paratanytarsus sp.	66	Physa sp.	87	Physa sp.	150	Physa sp.	8	SC	300
Physa sp.	63	Paratanytarsus sp.	70	Hyalella sp.	37	Paratanytarsus sp.	6	CF	163
Nais communis/ variabilis	41	Hyalella sp.	35	Paratanytarsus sp.	27	Hyalella sp.	8	CG	87
Ophidonais serpentina	40	Tanytarsus sp.	17	Ophidonais serpentina	19	Ophidonais serpentina	--	--	62
Coenagrionidae	30	Coenagrionidae	16	Micropsectra sp.	15	Nais communis/ variabilis	--	CG	59
Hyalella sp.	15	Tubificidae w/hair	11	Coenagrionidae	11	Coenagrionidae	--	P	57
Cricotopus sp.	7	Pisidium sp.	11	Nais communis/ variabilis	11	Tanytarsus sp.	6	CF	18
Stylaria lacustris	3	Nais communis/ variabilis	7	Gyraulus sp.	8	Micropsectra sp.	7	CG	17
Micropsectra sp.	2	Stylaria lacustris	5	Cyprididae	6	Tubificidae w/hair	5	CG	14
Corynoneura sp.	2	Procladius sp.	3	Stylaria lacustris	6	Stylaria lacustris	--	CG	14
Cyprididae	2	Limnesia sp.	3	Corixidae	4	Pisidium sp.	8	CF	13
Tubificidae w/hair	2	Ophidonais serpentina	3	Tubificidae unid.imm.	4	Gyraulus sp.	8	SC	12
Tubificidae unid.imm.	2	Tubificidae unid.imm.	3	Ablabesmyia sp.	3	Cyprididae	8	CG	10
Pisidium sp.	2	Dicrotendipes sp.	2	Procladius sp.	2	Tubificidae unid.imm.	10	CG	9
Gyraulus sp.	2	Callibaetis sp.	2	Liodessus obscurellus	1	Cricotopus sp.	7	CG	9
Liodessus obscurellus	1	Corixidae	2	Dicrotendipes sp.	1	Corixidae	10	P	7
Tanytarsus sp.	1	Cyprididae	2	Cricotopus sp.	1	Procladius sp.	9	P	5
Cricotopus bicinctus group	1	Gyraulus sp.	2	Corynoneura sp.	1	Limnesia sp.	5	P	4
Callibaetis sp.	1	Cryptochironomus sp.	1	Oxyethira sp.	1	Corynoneura sp.	7	CG	4
Caenis sp.	1	Cricotopus sp.	1	Trombidiformes	1	Dicrotendipes sp.	8	CG	3
Corixidae	1	Corynoneura sp.	1	Helobdella stagnalis	1	Callibaetis sp.	9	CG	3
Arrenurus sp.	1	Larsia sp.	1	Tubificidae w/hair	1	Ablabesmyia sp.	8	CG	3
Limnesia sp.	1	Caenis sp.	1	Menetus opercularis	1	Liodessus obscurellus	5	P	2
	287	Gammarus sp.	1		312	Caenis sp.	7	CG	2
		Arrenurus sp.	1			Arrenurus sp.	5	P	2
		Dugesia tigrina	1			Trombidiformes	5	P	1
			289			Oxyethira sp.	3	PH	1
						Menetus opercularis	6	SC	1
						Larsia sp.	6	P	1
						Helobdella stagnalis	6	PA	1
						Gammarus sp.	6	CG	1
						Dugesia tigrina	4	P	1
						Cryptochironomus sp.	8	P	1
						Cricotopus bicinctus group	7	CG	1
									888

PGC2

	T1		T2		T3		(TV)	(FFG)	Total
Micropsectra sp.	139	Micropsectra sp.	102	Micropsectra sp.	149	Micropsectra sp.	7	CG	390
Rheocricotopus sp.	44	Rheocricotopus sp.	47	Rheocricotopus sp.	36	Rheocricotopus sp.	6	OM	127
Nais communis/ variabilis	29	Nais communis/ variabilis	41	Nais communis/ variabilis	24	Nais communis/ variabilis	--	CG	94
Thienemanniella sp.	10	Tubificidae unid.imm.	17	Baetis tricaudatus	13	Dugesia tigrina	4	P	28
Eukiefferiella sp.	7	Paratanytarsus sp.	14	Dugesia tigrina	11	Tubificidae unid.imm.	10	CG	27
Simulium sp.	7	Hydropsyche sp.	12	Hydropsyche californica	7	Baetis tricaudatus	6	CG	25
Hydropsyche californica	7	Dugesia tigrina	11	Tubificidae unid.imm.	6	Hydropsyche sp.	4	CF	20
Baetis tricaudatus	6	Thienemanniella sp.	6	Hydropsyche sp.	5	Thienemanniella sp.	6	CG	19
Dugesia tigrina	6	Baetis tricaudatus	6	Polypedilum sp.	4	Paratanytarsus sp.	6	CF	18
Tubificidae unid.imm.	4	Eukiefferiella sp.	4	Oxyethira sp.	4	Hydropsyche californica	4	CF	16
Liodessus obscurellus	3	Cricotopus sp.	3	Corbicula sp.	4	Eukiefferiella sp.	8	OM	12
Hydropsyche sp.	3	Oxyethira sp.	3	Liodessus obscurellus	3	Oxyethira sp.	3	PH	8
Tricorythodes sp.	2	Tricorythodes sp.	2	Cladotanytarsus sp.	3	Simulium sp.	6	CF	7
Hydroptilidae	2	Hydropsyche californica	2	Paratanytarsus sp.	3	Liodessus obscurellus	5	P	7
Stylaria lacustris	2	Stylaria lacustris	2	Thienemanniella sp.	3	Tricorythodes sp.	4	CG	6
Menetus opercularis	2	Menetus opercularis	2	Baetis sp.	3	Polypedilum sp.	6	CG	5
Dicrotendipes sp.	1	Liodessus obscurellus	1	Tricorythodes sp.	2	Corbicula sp.	8	CF	5
Polypedilum sp.	1	Cryptochironomus sp.	1	Ochthebius sp.	1	Stylaria lacustris	--	CG	4
Paratanytarsus sp.	1	Leptoceridae	1	Probezzia sp.	1	Menetus opercularis	6	SC	4
Cricotopus sp.	1	Gammarus sp.	1	Phaenopsectra sp.	1	Cricotopus sp.	7	CG	4
Procladius sp.	1	Sperchon sp.	1	Eukiefferiella sp.	1	Hydroptilidae	--	--	3
Muscidae	1	Hydra sp.	1	Fallceon quilleri	1	Cladotanytarsus sp.	7	CG	3
Oxyethira sp.	1	Corbicula sp.	1	Prostoma sp.	1	Baetis sp.	5	CG	3
Hydroptilidae	1	Physa sp.	1		286	Sperchon sp.	8	P	1
Amphipoda	1		282			Prostoma sp.	8	P	1
Hyalella sp.	1					Procladius sp.	9	P	1
Cyprididae	1					Probezzia sp.	6	P	1
Ophidonais serpentina	1					Pisidium sp.	8	CF	1
Pisidium sp.	1					Physa sp.	8	SC	1
Ferrissia sp.	1					Phaenopsectra sp.	7	SC	1
	287					Ophidonais serpentina	--	--	1
						Ochthebius sp.	5	SC	1
						Muscidae	6	P	1
						Leptoceridae	4	OM	1
						Hydra sp.	5	P	1
						Hyalella sp.	8	CG	1
						Gammarus sp.	6	CG	1

PGC2 - continued.

T1	T2	T3		(TV)	(FFG)	Total
			Ferrissia sp.	6	SC	1
			Fallceon quilleri	4	CG	1
			Dicrotendipes sp.	8	CG	1
			Cyprididae	8	CG	1
			Cryptochironomus sp.	8	P	1
			Amphipoda	4	--	1
						855

PGC3

	T1		T2		T3		(TV)	(FFG)	Total
Micropsectra sp.	211	Micropsectra sp.	113	Micropsectra sp.	78	Micropsectra sp.	7	CG	402
Paratanytarsus sp.	35	Tubificidae unid.imm.	34	Paratanytarsus sp.	35	Paratanytarsus sp.	6	CF	87
Nais communis/ variabilis	26	Nais communis/ variabilis	32	Simulium sp.	28	Nais communis/ variabilis	--	CG	82
Polypedilum sp.	4	Paratanytarsus sp.	17	Nais communis/ variabilis	24	Tubificidae unid.imm.	10	CG	55
Tubificidae unid.imm.	4	Simulium sp.	16	Physa sp.	20	Simulium sp.	6	CF	44
Oxyethira sp.	3	Polypedilum sp.	11	Tubificidae unid.imm.	17	Physa sp.	8	SC	24
Hydraena sp.	2	Rheocricotopus sp.	8	Hydra sp.	17	Rheocricotopus sp.	6	OM	19
Physa sp.	2	Liodessus obscurellus	6	Rheocricotopus sp.	11	Polypedilum sp.	6	CG	19
Liodessus obscurellus	1	Oxyethira sp.	6	Oxyethira sp.	9	Oxyethira sp.	3	PH	18
Probezzia sp.	1	Hydropsyche sp.	4	Eukiefferiella sp.	6	Hydra sp.	5	P	18
Apedilum sp.	1	Tubificidae w/hair	3	Liodessus obscurellus	5	Liodessus obscurellus	5	P	12
Chironomus sp.	1	Hydraena sp.	2	Polypedilum sp.	4	Eukiefferiella sp.	8	OM	8
	291	Chironomus sp.	2	Cricotopus bicinctus group	3	Hydropsyche sp.	4	CF	7
		Cricotopus sp.	2	Hydropsyche sp.	3	Hydraena sp.	5	SC	4
		Eukiefferiella sp.	2	Menetus opercularis	3	Apedilum sp.	6	CG	4
		Pericoma/ Telmatoscopus	2	Apedilum sp.	2	Tubificidae w/hair	5	CG	3
		Ormosia sp.	2	Fossaria sp.	2	Menetus opercularis	6	SC	3
		Corixidae	2	Dugesia tigrina	2	Fossaria sp.	8	SC	3
		Enchytraeidae	2	Culicoides sp.	1	Cricotopus sp.	7	CG	3
		Physa sp.	2	Cricotopus sp.	1	Cricotopus bicinctus group	7	CG	3
		Agabus lutosus	1	Cricotopus trifascia group	1	Chironomus sp.	10	CG	3
		Ochthebius sp.	1	Thienemanniella sp.	1	Thienemanniella sp.	6	CG	2
		Apedilum sp.	1	Tipulidae	1	Slavina appendiculata	--	CG	2
		Phaenopsectra sp.	1	Baetis tricaudatus	1	Pericoma/ Telmatoscopus	4	CG	2
		Limnophyes sp.	1	Coenagrionidae	1	Ormosia sp.	3	CG	2
		Cricotopus trifascia group	1	Ophidonais serpentina	1	Enchytraeidae	10	CG	2
		Thienemanniella sp.	1	Slavina appendiculata	1	Dugesia tigrina	4	P	2
		Hydrellia sp.	1	Stylaria lacustris	1	Cricotopus trifascia group	7	CG	2
		Baetis sp.	1		279	Corixidae	10	P	2
		Fallceon quilleri	1			Tipulidae	3	SH	1
		Lumbricina	1			Stylaria lacustris	--	CG	1
		Slavina appendiculata	1			Probezzia sp.	6	P	1
		Hydra sp.	1			Phaenopsectra sp.	7	SC	1
		Fossaria sp.	1			Ophidonais serpentina	--	--	1
		Gyraulus sp.	1			Ochthebius sp.	5	SC	1
			283			Lumbricina	--	CG	1

PGC3 - continued.

T1	T2	T3		(TV)	(FFG)	Total
			Limnophyes sp.	8	CG	1
			Hydrellia sp.	6	SH	1
			Gyraulus sp.	8	SC	1
			Fallceon quilleri	4	CG	1
			Culicoides sp.	6	P	1
			Coenagrionidae	--	P	1
			Baetis tricaudatus	6	CG	1
			Baetis sp.	5	CG	1
			Agabus lutosus	--	P	1
						853

PGC4

	T1		T2		T3		(TV)	(FFG)	Total
Liodessus obscurellus	98	Paratanytarsus sp.	58	Paratanytarsus sp.	62	Paratanytarsus sp.	6	CF	160
Paratanytarsus sp.	40	Polypedilum sp.	39	Micropsectra sp.	31	Liodessus obscurellus	5	P	125
Micropsectra sp.	16	Micropsectra sp.	39	Tubificidae unid.imm.	29	Micropsectra sp.	7	CG	86
Nais communis/ variabilis	14	Tubificidae unid.imm.	39	Corixidae	20	Tubificidae unid.imm.	10	CG	69
Physa sp.	14	Oxyethira sp.	19	Hyalella sp.	20	Polypedilum sp.	6	CG	69
Simulium sp.	13	Rheocricotopus sp.	18	Polypedilum sp.	19	Nais communis/ variabilis	--	CG	44
Polypedilum sp.	11	Liodessus obscurellus	17	Cyprididae	14	Rheocricotopus sp.	6	OM	29
Rheocricotopus sp.	11	Nais communis/ variabilis	16	Nais communis/ variabilis	14	Corixidae	10	P	25
Stylaria lacustris	10	Tubificidae w/hair	9	Liodessus obscurellus	10	Oxyethira sp.	3	PH	24
Hydropsyche sp.	7	Coenagrionidae	6	Eucorethra sp.	10	Hyalella sp.	8	CG	20
Oxyethira sp.	5	Simulium sp.	5	Stylaria lacustris	9	Stylaria lacustris	--	CG	19
Rheotanytarsus sp.	3	Cricotopus bicinctus group	4	Physa sp.	5	Physa sp.	8	SC	19
Cricotopus sp.	3	Corixidae	3	Menetus opercularis	5	Simulium sp.	6	CF	18
Eukiefferiella sp.	3	Lumbriculus variegata	3	Dugesia tigrina	5	Cyprididae	8	CG	14
Coenagrionidae	3	Dugesia tigrina	3	Helobdella sp.	4	Coenagrionidae	--	P	12
Corynoneura sp.	2	Apedilum sp.	2	Culicoides sp.	3	Eucorethra sp.	--	P	10
Baetis tricaudatus	2	Phaenopsectra sp.	2	Chironomini	3	Tubificidae w/hair	5	CG	9
Corixidae	2	Eukiefferiella sp.	2	Coenagrionidae	3	Dugesia tigrina	4	P	8
Hydropsyche californica	2	Probezzia sp.	1	Bezzia/ Palpomyia	2	Menetus opercularis	6	SC	7
Gyraulus sp.	2	Cricotopus sp.	1	Libellula sp.	2	Hydropsyche sp.	4	CF	7
Tropisternus lateralis	1	Corynoneura sp.	1	Probezzia sp.	1	Eukiefferiella sp.	8	OM	5
Paratendipes sp.	1	Fallceon quilleri	1	Stempellina sp.	1	Helobdella sp.	6	PA	4
Phaenopsectra sp.	1	Trichocorixa calva	1	Corynoneura sp.	1	Cricotopus sp.	7	CG	4
Thienemanniella sp.	1	Libellula sp.	1	Larsia sp.	1	Cricotopus bicinctus group	7	CG	4
Ablabesmyia sp.	1	Procambarus clarkii	1	Procladius sp.	1	Corynoneura sp.	7	CG	4
Tubificidae unid.imm.	1	Menetus opercularis	1	Pachydiplax longipennis	1	Rheotanytarsus sp.	6	CF	3
Hydra sp.	1		292	Leptoceridae	1	Phaenopsectra sp.	7	SC	3
Corbicula sp.	1			Gammarus sp.	1	Lumbriculus variegata	--	CG	3
Menetus opercularis	1			Hydra sp.	1	Libellula sp.	9	P	3
	270				279	Culicoides sp.	6	P	3
						Chironomini	6	CG	3
						Probezzia sp.	6	P	2
						Hydropsyche californica	4	CF	2
						Hydra sp.	5	P	2
						Gyraulus sp.	8	SC	2
						Bezzia/ Palpomyia	6	P	2

PGC4 - continued.

T1	T2	T3		(TV)	(FFG)	Total
			Baetis tricaudatus	6	CG	2
			Apedilum sp.	6	CG	2
			Tropisternus lateralis	5	CG	1
			Trichocorixa calva	8	P	1
			Thienemanniella sp.	6	CG	1
			Stempellina sp.	2	CG	1
			Procladius sp.	9	P	1
			Procambarus clarkii	8	SH	1
			Paratendipes sp.	8	CG	1
			Pachydiplax longipennis	9	P	1
			Leptoceridae	4	OM	1
			Larsia sp.	6	P	1
			Gammarus sp.	6	CG	1
			Fallceon quilleri	4	CG	1
			Corbicula sp.	8	CF	1
			Ablabesmyia sp.	8	CG	1
						841

PGC5

	T1		T2		T3		(TV)	(FFG)	Total
Hydropsyche californica	89	Hydropsyche sp.	55	Hydropsyche californica	109	Hydropsyche californica	4	CF	252
Hydropsyche sp.	45	Hydropsyche californica	54	Hydropsyche sp.	57	Hydropsyche sp.	4	CF	157
Rheocricotopus sp.	35	Tubificidae unid.imm.	50	Simulium sp.	34	Tubificidae unid.imm.	10	CG	102
Simulium sp.	22	Simulium sp.	44	Tubificidae unid.imm.	33	Simulium sp.	6	CF	100
Tubificidae unid.imm.	19	Rheocricotopus sp.	39	Rheocricotopus sp.	25	Rheocricotopus sp.	6	OM	99
Nais communis/ variabilis	12	Nais communis/ variabilis	8	Baetis tricaudatus	9	Nais communis/ variabilis	--	CG	23
Cricotopus sp.	8	Micropsectra sp.	7	Tanytarsus sp.	8	Baetis tricaudatus	6	CG	18
Eukiefferiella sp.	8	Baetis tricaudatus	6	Cricotopus sp.	4	Cricotopus sp.	7	CG	12
Fallceon quilleri	4	Menetus opercularis	6	Liodessus obscurellus	3	Micropsectra sp.	7	CG	10
Liodessus obscurellus	3	Orthocladiinae	5	Nais communis/ variabilis	3	Fallceon quilleri	4	CG	9
Micropsectra sp.	3	Physa sp.	4	Limnodrilus hoffmeisteri	3	Tanytarsus sp.	6	CF	8
Paratanytarsus sp.	3	Fallceon quilleri	3	Fallceon quilleri	2	Physa sp.	8	SC	8
Baetis tricaudatus	3	Limonia sp.	2	Hyalella sp.	2	Eukiefferiella sp.	8	OM	8
Oxyethira sp.	2	Orthocladius complex	1	Physa sp.	2	Menetus opercularis	6	SC	7
Hyalella sp.	2	Cricotopus sp.	1	Orthocladiinae	1	Orthocladiinae	5	CG	6
Physa sp.	2	Thienemanniella sp.	1	Hydropsychidae	1	Liodessus obscurellus	5	P	6
Dugesia tigrina	2	Pentaneura sp.	1	Lumbricina	1	Hyalella sp.	8	CG	4
Helophorus sp.	1	Enchytraeidae	1		297	Paratanytarsus sp.	6	CF	3
Polypedilum sp.	1	Dugesia tigrina	1			Limnodrilus hoffmeisteri	--	CG	3
Cricotopus bicinctus group	1		289			Dugesia tigrina	4	P	3
Thienemanniella sp.	1					Thienemanniella sp.	6	CG	2
Cyprididae	1					Oxyethira sp.	3	PH	2
Erpobdellidae	1					Limonia sp.	6	SH	2
Mooreobdella microstoma	1					Polypedilum sp.	6	CG	1
Haemopsis sp.	1					Pentaneura sp.	6	P	1
Menetus opercularis	1					Orthocladius complex	--	--	1
	271					Mooreobdella microstoma	8	P	1
						Lumbricina	--	CG	1
						Hydropsychidae	--	--	1
						Helophorus sp.	--	SH	1
						Haemopsis sp.	10	P	1
						Erpobdellidae	8	P	1
						Enchytraeidae	10	CG	1
						Cyprididae	8	CG	1
						Cricotopus sp.	--	--	1
						Cricotopus bicinctus group	7	CG	1
									857

PGC6

	T1		T2		T3		(TV)	(FFG)	Total
Simulium sp.	65	Nais communis/ variabilis	71	Paratanytarsus sp.	91	Paratanytarsus sp.	6	CF	169
Paratanytarsus sp.	52	Hydropsyche sp.	29	Nais communis/ variabilis	60	Nais communis/ variabilis	--	CG	165
Cricotopus sp.	42	Micropsectra sp.	28	Micropsectra sp.	22	Simulium sp.	6	CF	80
Nais communis/ variabilis	34	Paratanytarsus sp.	26	Physa sp.	19	Rheocricotopus sp.	6	OM	71
Rheocricotopus sp.	33	Rheocricotopus sp.	25	Cricotopus sp.	15	Micropsectra sp.	7	CG	68
Micropsectra sp.	18	Simulium sp.	14	Rheocricotopus sp.	13	Cricotopus sp.	7	CG	67
Hydropsyche sp.	12	Tricorythodes sp.	14	Liodessus obscurellus	10	Hydropsyche sp.	4	CF	50
Cladotanytarsus sp.	9	Physa sp.	14	Hydropsyche sp.	9	Physa sp.	8	SC	36
Dicrotendipes sp.	5	Hydropsyche californica	11	Tricorythodes sp.	8	Tricorythodes sp.	4	CG	26
Hydropsyche californica	5	Cricotopus sp.	10	Corixidae	6	Cricotopus bicinctus group	7	CG	17
Cricotopus trifascia group	4	Cricotopus bicinctus group	9	Cricotopus bicinctus group	5	Hydropsyche californica	4	CF	16
Tricorythodes sp.	4	Eukiefferiella sp.	5	Dicrotendipes sp.	4	Liodessus obscurellus	5	P	12
Cricotopus bicinctus group	3	Fallceon quilleri	4	Phaenopsectra sp.	4	Dicrotendipes sp.	8	CG	11
Zavrelimyia/ Paramerina	3	Thienemanniella sp.	3	Cricotopus sp.	4	Cladotanytarsus sp.	7	CG	9
Physa sp.	3	Thienemannimyia group	3	Cyprididae	4	Eukiefferiella sp.	8	OM	7
Microchironomus sp.	2	Tubificidae unid.imm.	3	Stylaria lacustris	3	Thienemanniella sp.	6	CG	6
Phaenopsectra sp.	2	Liodessus obscurellus	2	Procladius sp.	2	Phaenopsectra sp.	7	SC	6
Thienemanniella sp.	2	Chironomini	2	Oxyethira sp.	2	Fallceon quilleri	4	CG	6
Constempellina sp.	1	Dicrotendipes sp.	2	Hyalella sp.	2	Corixidae	10	P	6
Rheotanytarsus sp.	1	Oxyethira sp.	2	Eukiefferiella sp.	1	Oxyethira sp.	3	PH	5
Eukiefferiella sp.	1	Ophidonais serpentina	2	Thienemanniella sp.	1	Cyprididae	8	CG	5
Centroptilum sp.	1	Probezzia sp.	1	Thienemannimyia group	1	Tubificidae unid.imm.	10	CG	4
Baetis tricaudatus	1	Baetis tricaudatus	1	Simulium sp.	1	Thienemannimyia group	6	P	4
Fallceon quilleri	1	Erpetogomphus sp.	1	Centroptilum sp.	1	Cricotopus trifascia group	7	CG	4
Oxyethira sp.	1	Cyprididae	1	Fallceon quilleri	1	Cricotopus sp.	--	--	4
Procambarus clarkii	1		283		289	Zavrelimyia/ Paramerina	7	P	3
Mooreobdella microstoma	1					Stylaria lacustris	--	CG	3
Ophidonais serpentina	1					Ophidonais serpentina	--	--	3
Tubificidae unid.imm.	1					Procladius sp.	9	P	2
	309					Microchironomus sp.	6	CG	2
						Hyalella sp.	8	CG	2
						Chironomini	6	CG	2
						Baetis tricaudatus	6	CG	2
						Rheotanytarsus sp.	6	CF	1
						Procambarus clarkii	8	SH	1
						Probezzia sp.	6	P	1

PGC6 - continued.

T1	T2	T3		(TV)	(FFG)	Total
			Mooreobdella microstoma	8	P	1
			Erpetogomphus sp.	4	P	1
			Constempellina sp.	4	CG	1
			Centroptilum sp.	2	CG	1
			Centroptilum sp.	2	CG	1
						881

PGC7

	T1		T2		T3		(TV)	(FFG)	Total
Paratanytarsus sp.	93	Paratanytarsus sp.	115	Corixidae	63	Paratanytarsus sp.	6	CF	264
Cricotopus sp.	30	Hyalella sp.	37	Paratanytarsus sp.	56	Hyalella sp.	8	CG	80
Ablabesmyia sp.	25	Procladius sp.	23	Tubificidae unid.imm.	36	Corixidae	10	P	72
Hyalella sp.	25	Tubificidae unid.imm.	14	Cricotopus sp.	20	Cricotopus sp.	7	CG	58
Dicrotendipes sp.	19	Dicrotendipes sp.	11	Hyalella sp.	18	Tubificidae unid.imm.	10	CG	50
Dero digitata	16	Cladotanytarsus sp.	8	Nais communis/ variabilis	17	Dicrotendipes sp.	8	CG	33
Tanytarsus sp.	10	Cricotopus sp.	8	Menetus opercularis	16	Ablabesmyia sp.	8	CG	30
Cyprididae	8	Tanytarsus sp.	7	Liodessus obscurellus	15	Procladius sp.	9	P	28
Caenis sp.	7	Coenagrionidae	7	Tubificidae w/hair	15	Nais communis/ variabilis	--	CG	20
Tricorythodes sp.	7	Constempellina sp.	5	Coenagrionidae	7	Dero digitata	--	CG	19
Corixidae	5	Slavina appendiculata	5	Xenochironomus sp.	4	Menetus opercularis	6	SC	18
Oxyethira sp.	5	Microchironomus sp.	4	Ceratopogon sp.	3	Tanytarsus sp.	6	CF	17
Micropsectra sp.	3	Corixidae	4	Dicrotendipes sp.	3	Coenagrionidae	--	P	17
Procladius sp.	3	Cyprididae	4	Phaenopsectra sp.	3	Tubificidae w/hair	5	CG	15
Coenagrionidae	3	Chironomus sp.	3	Polypedilum sp.	3	Liodessus obscurellus	5	P	15
Stylaria lacustris	3	Caenis sp.	3	Ablabesmyia sp.	3	Cyprididae	8	CG	12
Physa sp.	2	Caenis latipennis	3	Trichocorixa calva	3	Caenis sp.	7	CG	10
Tropisternus sp.	1	Nais communis/ variabilis	3	Dero digitata	3	Tricorythodes sp.	4	CG	9
Bezzia/ Palpomyia	1	Polypedilum sp.	2	Corynoneura sp.	2	Cladotanytarsus sp.	7	CG	9
Chironomus sp.	1	Micropsectra sp.	2	Procladius sp.	2	Slavina appendiculata	--	CG	6
Lauterborniella sp.	1	Ablabesmyia sp.	2	Ophidonais serpentina	2	Polypedilum sp.	6	CG	5
Cladotanytarsus sp.	1	Gammarus sp.	2	Cryptochironomus sp.	1	Physa sp.	8	SC	5
Slavina appendiculata	1	Physa sp.	2	Caenis latipennis	1	Oxyethira sp.	3	PH	5
	270	Menetus opercularis	2	Tricorythodes sp.	1	Micropsectra sp.	7	CG	5
		Prostoma sp.	2	Libellulidae	1	Constempellina sp.	4	CG	5
		Ceratopogon sp.	1	Enchytraeidae	1	Xenochironomus sp.	0	P	4
		Probezzia sp.	1	Physa sp.	1	Stylaria lacustris	--	CG	4
		Paracladopelma sp.	1		300	Microchironomus sp.	6	CG	4
		Parakiefferiella sp.	1			Chironomus sp.	10	CG	4
		Cricotopus bicinctus group	1			Ceratopogon sp.	6	P	4
		Tricorythodes sp.	1			Caenis latipennis	7	CG	4
		Helobdella stagnalis	1			Trichocorixa calva	8	P	3
		Stylaria lacustris	1			Phaenopsectra sp.	7	SC	3
		Limnodrilus hoffmeisteri	1			Prostoma sp.	8	P	2
			287			Ophidonais serpentina	--	--	2
						Gammarus sp.	6	CG	2
						Corynoneura sp.	7	CG	2
						Tropisternus sp.	5	P	1
						Probezzia sp.	6	P	1

PGC7 - continued.

T1	T2	T3		(TV)	(FFG)	Total
			Parakiefferiella sp.	4	CG	1
			Paracladopelma sp.	7	--	1
			Limnodrilus hoffmeisteri	--	CG	1
			Libellulidae	9	P	1
			Lauterborniella sp.	6	CG	1
			Helobdella stagnalis	6	PA	1
			Enchytraeidae	10	CG	1
			Cryptochironomus sp.	8	P	1
			Cricotopus bicinctus group	7	CG	1
			Bezzia/ Palpomyia	6	P	1
						857

PGC8

	T1		T2		T3		(TV)	(FFG)	Total
Dero digitata	87	Tubificidae unid.imm.	180	Nais communis/ variabilis	114	Tubificidae unid.imm.	10	CG	312
Tubificidae w/hair	75	Nais communis/ variabilis	48	Tubificidae unid.imm.	62	Tubificidae w/hair	5	CG	181
Tubificidae unid.imm.	70	Tubificidae w/hair	47	Tubificidae w/hair	59	Nais communis/ variabilis	--	CG	162
Culex sp.	21	Pristinella jenkinae	10	Dero digitata	50	Dero digitata	--	CG	137
Physa sp.	14	Fossaria sp.	4	Pristina leidyi	4	Culex sp.	8	CG	22
Fossaria sp.	8	Lumbricina	3	Procladius sp.	2	Physa sp.	8	SC	17
Enchytraeidae	5	Ceratopogonidae	1	Physa sp.	2	Fossaria sp.	8	SC	13
Micropsectra sp.	2	Enchytraeidae	1	Liodessus obscurellus	1	Pristinella jenkinae	--	CG	10
Psychodidae	2	Physa sp.	1	Micropsectra sp.	1	Enchytraeidae	10	CG	6
Cricotopus sp.	1		295	Culex sp.	1	Pristina leidyi	--	CG	4
Psychoda sp.	1			Psychoda sp.	1	Lumbricina	--	CG	4
Helobdella triserialis	1			Chaetogaster diaphanus	1	Micropsectra sp.	7	CG	3
Lumbricina	1			Dero borellii	1	Psychodidae	--	--	2
Dero borellii	1			Limnodrilus hoffmeisteri	1	Psychoda sp.	10	CG	2
	289			Fossaria sp.	1	Procladius sp.	--	--	2
					301	Dero borellii	10	CG	2
						Liodessus obscurellus	5	P	1
						Limnodrilus hoffmeisteri	--	CG	1
						Helobdella triserialis	--	PA	1
						Cricotopus sp.	7	CG	1
						Chaetogaster diaphanus	--	--	1
						Ceratopogonidae	--	--	1
									885

PGC9

	T1		T2		T3		(TV)	(FFG)	Total
Micropsectra sp.	201	Micropsectra sp.	219	Micropsectra sp.	196	Micropsectra sp.	7	CG	616
Paratanytarsus sp.	26	Dugesia tigrina	20	Dugesia tigrina	26	Paratanytarsus sp.	6	CF	55
Dero digitata	21	Dero digitata	9	Paratanytarsus sp.	23	Dugesia tigrina	4	P	46
Planariidae	15	Psectrotanypus sp.	8	Psectrotanypus sp.	21	Dero digitata	--	CG	41
Chironomus sp.	14	Libellula sp.	8	Dero digitata	11	Psectrotanypus sp.	10	P	36
Psectrotanypus sp.	7	Paratanytarsus sp.	6	Chironomus sp.	8	Chironomus sp.	10	CG	24
Slavina appendiculata	2	Oxyethira sp.	3	Libellula sp.	5	Planariidae	4	P	15
Ochthebius sp.	1	Tubificidae unid.imm.	3	Hydraena sp.	3	Libellula sp.	9	P	14
Dicrotendipes sp.	1	Hydra sp.	3	Dicrotendipes sp.	3	Dicrotendipes sp.	8	CG	5
Cricotopus sp.	1	Chironomus sp.	2	Ochthebius sp.	1	Tubificidae unid.imm.	10	CG	4
Libellula sp.	1	Enchytraeidae	2	Culicoides sp.	1	Hydra sp.	5	P	4
Dero borellii	1	Chaetogaster diaphanus	2	Cyprididae	1	Oxyethira sp.	3	PH	3
Tubificidae unid.imm.	1	Dicrotendipes sp.	1	Chaetogaster diaphanus	1	Hydraena sp.	5	SC	3
	292	Cricotopus sp.	1	Hydra sp.	1	Chaetogaster diaphanus	--	--	3
			287		301	Slavina appendiculata	--	CG	2
						Ochthebius sp.	5	SC	2
						Enchytraeidae	10	CG	2
						Cricotopus sp.	7	CG	2
						Dero borellii	10	CG	1
						Cyprididae	8	CG	1
						Culicoides sp.	6	P	1
									880

PGC10

	T1		T2		T3		(TV)	(FFG)	Total
Nais communis/ variabilis	87	Paratanytarsus sp.	71	Paratanytarsus sp.	92	Paratanytarsus sp.	6	CF	231
Paratanytarsus sp.	68	Physa sp.	67	Physa sp.	89	Physa sp.	8	SC	184
Micropsectra sp.	31	Nais communis/ variabilis	31	Micropsectra sp.	28	Nais communis/ variabilis	--	CG	138
Physa sp.	28	Micropsectra sp.	30	Nais communis/ variabilis	20	Micropsectra sp.	7	CG	89
Chironomus sp.	24	Fossaria sp.	19	Ophidonais serpentina	11	Fossaria sp.	8	SC	35
Tubificidae unid.imm.	11	Tubificidae unid.imm.	13	Fossaria sp.	10	Tubificidae unid.imm.	10	CG	32
Fossaria sp.	6	Tanypus sp.	6	Tubificidae unid.imm.	8	Chironomus sp.	10	CG	29
Cricotopus sp.	5	Psectrotanypus sp.	4	Psectrotanypus sp.	5	Ophidonais serpentina	--	--	14
Ephydridae	5	Eukiefferiella sp.	3	Prostoma sp.	4	Psectrotanypus sp.	10	P	10
Slavina appendiculata	5	Enchytraeidae	3	Chironomus sp.	3	Enchytraeidae	10	CG	8
Simulium sp.	4	Ophidonais serpentina	3	Tipula sp.	3	Ephydridae	--	--	7
Dasyhelea sp.	3	Pisidium sp.	3	Liodessus obscurellus	2	Cricotopus sp.	7	CG	7
Enchytraeidae	3	Chironomus sp.	2	Ceratopogon sp.	2	Tanypus sp.	10	P	6
Limnophyes sp.	2	Polypedilum sp.	2	Ephydridae	2	Tipula sp.	4	OM	5
Psychoda sp.	2	Tipula sp.	2	Enchytraeidae	2	Slavina appendiculata	--	CG	5
Cyprididae	2	Sanfilippodytes sp.	1	Tropisternus lateralis	1	Simulium sp.	6	CF	5
Sanfilippodytes sp.	1	Liodessus obscurellus	1	Polypedilum sp.	1	Prostoma sp.	8	P	5
Apedilum sp.	1	Dasyhelea sp.	1	Cricotopus sp.	1	Pisidium sp.	8	CF	4
Psectrotanypus sp.	1	Cricotopus sp.	1	Corynoneura sp.	1	Dasyhelea sp.	6	CG	4
Ephydridae	1	Dolichopodidae	1	Thienemanniella sp.	1	Tubificidae w/hair	5	CG	3
Muscidae	1	Muscidae	1	Muscidae	1	Polypedilum sp.	6	CG	3
Tipulidae	1	Simulium sp.	1	Sciomyzidae	1	Muscidae	6	P	3
Lumbriculus variegata	1	Cyprididae	1	Lumbricina	1	Liodessus obscurellus	5	P	3
Tubificidae w/hair	1	Lumbricina	1	Lumbriculus variegata	1	Eukiefferiella sp.	8	OM	3
Limnodrilus hoffmeisteri	1	Chaetogaster diaphanus	1	Tubificidae w/hair	1	Cyprididae	8	CG	3
	295	Pristina leidyi	1	Pisidium sp.	1	Sanfilippodytes sp.	5	P	2
		Tubificidae w/hair	1	Planorbella sp.	1	Psychoda sp.	10	CG	2
		Menetus opercularis	1	Menetus opercularis	1	Menetus opercularis	6	SC	2
		Prostoma sp.	1		294	Lumbriculus variegata	--	CG	2
		Dugesia tigrina	1			Lumbricina	--	CG	2
			274			Limnophyes sp.	8	CG	2
						Ceratopogon sp.	6	P	2
						Tropisternus lateralis	5	CG	1
						Tipulidae	3	SH	1
						Thienemanniella sp.	6	CG	1
						Sciomyzidae	6	P	1
						Pristina leidyi	--	CG	1
						Planorbella sp.	6	SC	1
						Limnodrilus hoffmeisteri	--	CG	1

PGC10 - continued.

T1	T2	T3		(TV)	(FFG)	Total
			Ephydridae	6	--	1
			Dugesia tigrina	4	P	1
			Dolichopodidae	4	P	1
			Corynoneura sp.	7	CG	1
			Chaetogaster diaphanus	--	--	1
			Apedilum sp.	6	CG	1
						863

PGC11

	T1		T2		T3		(TV)	(FFG)	Total
Tubificidae unid.imm.	143	Tubificidae unid.imm.	102	Tubificidae unid.imm.	152	Tubificidae unid.imm.	10	CG	397
Tubificidae w/hair	84	Nais communis/ variabilis	63	Nais communis/ variabilis	38	Nais communis/ variabilis	--	CG	135
Nais communis/ variabilis	34	Micropsectra sp.	38	Lumbriculus variegata	24	Tubificidae w/hair	5	CG	110
Micropsectra sp.	10	Lumbriculus variegata	15	Micropsectra sp.	23	Micropsectra sp.	7	CG	71
Lumbriculus variegata	10	Tubificidae w/hair	8	Tubificidae w/hair	18	Lumbriculus variegata	--	CG	49
Psychoda sp.	5	Physa sp.	8	Tanypus sp.	4	Physa sp.	8	SC	12
Lumbricina	3	Cyprididae	6	Psychoda sp.	4	Cyprididae	8	CG	12
Enchytraeidae	3	Hydra sp.	5	Cyprididae	4	Psychoda sp.	10	CG	11
Cyprididae	2	Dugesia tigrina	5	Psychodidae	3	Planorbella sp.	6	SC	6
Orthocladiinae	1	Ceratopogonidae	3	Physa sp.	3	Dugesia tigrina	4	P	6
Hydrellia sp.	1	Psectrotanypus sp.	2	Planorbella sp.	3	Lumbricina	--	CG	5
Ephydridae	1	Hydrellia sp.	2	Liodessus obscurellus	2	Hydra sp.	5	P	5
Psychodidae	1	Psychoda sp.	2	Lumbricina	2	Tanypus sp.	10	P	4
Dero digitata	1	Dero borellii	2	Chaetogaster diaphanus	2	Enchytraeidae	10	CG	4
Physa sp.	1	Planorbella sp.	2	Dero digitata	2	Psychodidae	--	CG	3
Planorbella sp.	1	Procladius sp.	1	Fossaria sp.	2	Hydrellia sp.	6	SH	3
	301	Ephydridae	1	Paratanytarsus sp.	1	Fossaria sp.	8	SC	3
		Tipula sp.	1	Erpobdellidae	1	Dero digitata	--	CG	3
		Helobdella stagnalis	1	Dero borellii	1	Dero borellii	10	CG	3
		Enchytraeidae	1	Slavina appendiculata	1	Ceratopogonidae	--	--	3
		Haemonais sp.	1	Prostoma sp.	1	Psectrotanypus sp.	10	P	2
		Fossaria sp.	1	Dugesia tigrina	1	Liodessus obscurellus	5	P	2
		Planariidae	1		292	Chaetogaster diaphanus	--	--	2
			271			Tipula sp.	4	OM	1
						Slavina appendiculata	--	CG	1
						Psychodidae	--	--	1
						Prostoma sp.	8	P	1
						Procladius sp.	9	P	1
						Planariidae	4	P	1
						Paratanytarsus sp.	6	CF	1
						Orthocladiinae	5	CG	1
						Helobdella stagnalis	6	PA	1
						Haemonais sp.	--	CG	1
						Erpobdellidae	8	P	1
						Ephydridae	--	--	1
						Ephydridae	6	--	1
									864

PGC12

	T1		T2		T3		(TV)	(FFG)	Total
Micropsectra sp.	67	Tubificidae unid.imm.	65	Micropsectra sp.	123	Micropsectra sp.	7	CG	238
Psectrotanypus sp.	54	Physa sp.	53	Nais communis/ variabilis	107	Nais communis/ variabilis	--	CG	171
Chironomus sp.	40	Micropsectra sp.	48	Tubificidae unid.imm.	33	Tubificidae unid.imm.	10	CG	129
Tubificidae unid.imm.	31	Nais communis/ variabilis	36	Paratanytarsus sp.	18	Psectrotanypus sp.	10	P	83
Paratanytarsus sp.	29	Paratanytarsus sp.	33	Chironomus sp.	10	Physa sp.	8	SC	81
Nais communis/ variabilis	28	Psectrotanypus sp.	27	Chaetogaster diaphanus	5	Paratanytarsus sp.	6	CF	80
Physa sp.	28	Chironomus sp.	15	Cricotopus sp.	3	Chironomus sp.	10	CG	65
Slavina appendiculata	5	Tubificidae w/hair	3	Psectrotanypus sp.	2	Tubificidae w/hair	5	CG	5
Lumbriculus variegata	3	Liodessus obscurellus	1	Tanypus sp.	2	Slavina appendiculata	--	CG	5
Planorbella sp.	1	Dicrotendipes sp.	1	Haemonais sp.	2	Chaetogaster diaphanus	--	--	5
	286	Cricotopus sp.	1	Tubificidae w/hair	2	Lumbriculus variegata	--	CG	4
		Haemonais sp.	1	Lumbriculus variegata	1	Cricotopus sp.	7	CG	4
		Planorbella sp.	1		308	Haemonais sp.	--	CG	3
			285			Tanypus sp.	10	P	2
						Planorbella sp.	6	SC	2
						Liodessus obscurellus	5	P	1
						Dicrotendipes sp.	8	CG	1
									879

PGC14

	T1		T2		T3		(TV)	(FFG)	Total
Dugesia tigrina	74	Tubificidae unid.imm.	77	Micropsectra sp.	103	Micropsectra sp.	7	CG	222
Micropsectra sp.	63	Micropsectra sp.	56	Paratanytarsus sp.	53	Dugesia tigrina	4	P	148
Coenagrionidae	44	Dugesia tigrina	49	Physa sp.	26	Paratanytarsus sp.	6	CF	104
Dero digitata	28	Paratanytarsus sp.	31	Dugesia tigrina	25	Tubificidae unid.imm.	10	CG	101
Paratanytarsus sp.	20	Lumbriculus variegata	14	Dero digitata	23	Dero digitata	--	CG	63
Tubificidae unid.imm.	13	Dero digitata	12	Psectrotanypus sp.	11	Coenagrionidae	--	P	49
Planorbella sp.	8	Tubificidae w/hair	10	Tubificidae unid.imm.	11	Physa sp.	8	SC	30
Cyprididae	6	Pristina leidyi	7	Haemonais sp.	6	Lumbriculus variegata	--	CG	18
Psectrotanypus sp.	5	Planorbella sp.	5	Chironomus sp.	4	Psectrotanypus sp.	10	P	16
Haemonais sp.	4	Slavina appendiculata	4	Liodessus obscurellus	3	Planorbella sp.	6	SC	15
Slavina appendiculata	4	Chironomus sp.	3	Coenagrionidae	3	Tubificidae w/hair	5	CG	12
Chironomus sp.	3	Coenagrionidae	2	Cyprididae	3	Slavina appendiculata	--	CG	11
Helobdella sp.	3	Hydra sp.	2	Lumbriculus variegata	3	Haemonais sp.	--	CG	11
Physa sp.	3	Liodessus obscurellus	1	Slavina appendiculata	3	Cyprididae	8	CG	10
Helobdella stagnalis	2	Orthocladius complex	1	Dero borellii	2	Chironomus sp.	10	CG	10
Dero borellii	2	Procladius sp.	1	Tubificidae w/hair	2	Pristina leidyi	--	CG	7
Hydra sp.	2	Cyprididae	1	Planorbella sp.	2	Liodessus obscurellus	5	P	5
Liodessus obscurellus	1	Lumbricina	1	Ochthebius sp.	1	Hydra sp.	5	P	5
Cricotopus sp.	1	Enchytraeidae	1	Mooreobdella microstoma	1	Dero borellii	10	CG	4
Lumbriculus variegata	1	Haemonais sp.	1	Helobdella stagnalis	1	Helobdella stagnalis	6	PA	3
	287	Physa sp.	1	Enchytraeidae	1	Helobdella sp.	6	PA	3
			280	Hydra sp.	1	Enchytraeidae	10	CG	2
				Pisidium sp.	1	Procladius sp.	9	P	1
					289	Pisidium sp.	8	CF	1
						Orthocladius complex	6	CG	1
						Ochthebius sp.	5	SC	1
						Mooreobdella microstoma	8	P	1
						Lumbricina	--	CG	1
						Cricotopus sp.	7	CG	1
									856

PGC15

	T1		T2		T3		(TV)	(FFG)	Total
Tubificidae unid.imm.	119	Psectrotanypus sp.	75	Tubificidae unid.imm.	147	Tubificidae unid.imm.	10	CG	341
Psectrotanypus sp.	63	Tubificidae unid.imm.	75	Psectrotanypus sp.	34	Psectrotanypus sp.	10	P	172
Tanytarsus sp.	16	Dero digitata	32	Cricotopus sp.	30	Tubiificidae w/hair	5	CG	57
Paratanytarsus sp.	14	Tubiificidae w/hair	28	Dero digitata	25	Dero digitata	--	CG	57
Physa sp.	13	Physa sp.	21	Tubiificidae w/hair	22	Cricotopus sp.	7	CG	48
Liodessus obscurellus	11	Chironomus sp.	14	Liodessus obscurellus	11	Physa sp.	8	SC	39
Dicrotendipes sp.	10	Cricotopus sp.	10	Chironomus sp.	10	Liodessus obscurellus	5	P	26
Cricotopus sp.	8	Dugesia tigrina	6	Pisidium sp.	9	Chironomus sp.	10	CG	25
Dugesia tigrina	8	Tanytarsus sp.	5	Dugesia tigrina	7	Paratanytarsus sp.	6	CF	23
Tubiificidae w/hair	7	Liodessus obscurellus	4	Micropsectra sp.	6	Tanytarsus sp.	6	CF	21
Pisidium sp.	7	Paratanytarsus sp.	3	Paratanytarsus sp.	6	Dugesia tigrina	4	P	21
Cyprididae	3	Dero borellii	3	Physa sp.	5	Pisidium sp.	8	CF	19
Lumbriculus variegata	3	Pisidium sp.	3	Cyprididae	4	Dicrotendipes sp.	8	CG	14
Planorbella sp.	3	Dicrotendipes sp.	2	Dicrotendipes sp.	2	Cyprididae	8	CG	9
Sanfilippodytes sp.	2	Cyprididae	2	Coenagrionidae	2	Micropsectra sp.	7	CG	6
Chironomus sp.	1	Corixidae	1	Lumbricina	2	Planorbella sp.	6	SC	5
Hydrellia sp.	1	Coenagrionidae	1	Laccophilus sp.	1	Lumbriculus variegata	--	CG	3
Nais communis/ variabilis	1	Mooreobdella microstoma	1	Tropisternus lateralis	1	Dero borellii	10	CG	3
Limnodrilus hoffmeisteri	1	Enchytraeidae	1	Culex sp.	1	Coenagrionidae	--	P	3
	291	Haemonais sp.	1	Corixidae	1	Sanfilippodytes sp.	5	P	2
		Planorbella sp.	1	Enchytraeidae	1	Lumbricina	--	CG	2
			289	Haemonais sp.	1	Haemonais sp.	--	CG	2
				Planorbella sp.	1	Enchytraeidae	10	CG	2
					329	Corixidae	10	P	2
						Tropisternus lateralis	5	CG	1
						Nais communis/ variabilis	--	CG	1
						Mooreobdella microstoma	8	P	1
						Limnodrilus hoffmeisteri	--	CG	1
						Laccophilus sp.	5	P	1
						Hydrellia sp.	6	SH	1
						Culex sp.	8	CG	1
									909

PGC16

	T1
Helobdella sp.	184
Helobdella stagnalis	29
Micropsectra sp.	22
Tubificidae unid.imm.	20
Physa sp.	14
Helobdella triserialis	10
Cricotopus sp.	6
Planorbella sp.	5
Coenagrionidae	4
Dugesia tigrina	2
Sanfilippodytes sp.	1
Chironomus sp.	1
Orthocladiinae	1
Dero digitata	1
	300

	T2
Glossiphoniidae	80
Physa sp.	71
Chaetogaster diaphanus	32
Cricotopus sp.	24
Micropsectra sp.	15
Coenagrionidae	13
Helobdella triserialis	11
Slavina appendiculata	6
Planorbella sp.	5
Chironomus sp.	4
Paratanytarsus sp.	4
Dero borellii	4
Dugesia tigrina	4
Psychoda sp.	3
Cyprididae	3
Psectrotanypus sp.	2
Nais communis/ variabilis	2
Eukiefferiella sp.	1
Corynoneura sp.	1
Zavrelimyia sp.	1
Scatella sp.	1
Stratiomyidae	1
Helobdella stagnalis	1
Tubificidae unid.imm.	1
Prostoma sp.	1
	291

	T3
Coenagrionidae	47
Helobdella sp.	39
Slavina appendiculata	30
Zavrelimyia sp.	27
Physa sp.	24
Chironomus sp.	23
Dugesia tigrina	21
Micropsectra sp.	20
Helobdella triserialis	16
Paratanytarsus sp.	15
Cricotopus sp.	10
Eukiefferiella sp.	5
Chaetogaster diaphanus	5
Cyprididae	4
Psychoda sp.	3
Helobdella stagnalis	3
Dero borellii	3
Dero digitata	3
Psectrotanypus sp.	2
Planorbella sp.	2
Cymbiodyta sp.	1
Tropisternus sp.	1
Hyalella sp.	1
Mooreobdella microstoma	1
Fossaria sp.	1
Planariidae	1
	308

	(TV)	(FFG)	Total
Helobdella sp.	6	PA	223
Physa sp.	8	SC	109
Glossiphoniidae	8	P	80
Coenagrionidae	--	P	64
Micropsectra sp.	7	CG	57
Cricotopus sp.	7	CG	40
Helobdella triserialis	--	PA	37
Chaetogaster diaphanus	--	--	37
Slavina appendiculata	--	CG	36
Helobdella stagnalis	6	PA	33
Zavrelimyia sp.	8	P	28
Chironomus sp.	10	CG	28
Dugesia tigrina	4	P	27
Tubificidae unid.imm.	10	CG	21
Paratanytarsus sp.	6	CF	19
Planorbella sp.	6	SC	12
Dero borellii	10	CG	7
Cyprididae	8	CG	7
Psychoda sp.	10	CG	6
Eukiefferiella sp.	8	OM	6
Psectrotanypus sp.	10	P	4
Dero digitata	--	CG	4
Nais communis/ variabilis	--	CG	2
Tropisternus sp.	5	P	1
Stratiomyidae	8	CG	1
Scatella sp.	6	CG	1
Sanfilippodytes sp.	5	P	1
Prostoma sp.	8	P	1
Planariidae	4	P	1
Orthocladiinae	5	CG	1
Mooreobdella microstoma	8	P	1
Hyalella sp.	8	CG	1
Fossaria sp.	8	SC	1
Cymbiodyta sp.	5	CG	1
Corynoneura sp.	7	CG	1
			899

PGC17

	T1		T2		T3		(TV)	(FFG)	Total
Dugesia tigrina	76	Tubificidae unid.imm.	132	Dugesia tigrina	80	Tubificidae unid.imm.	10	CG	192
Lumbriculus variegata	74	Psectrotanypus sp.	78	Tubificidae unid.imm.	50	Dugesia tigrina	4	P	179
Physa sp.	42	Dugesia tigrina	23	Physa sp.	48	Physa sp.	8	SC	109
Planorbella sp.	21	Physa sp.	19	Pisidium sp.	43	Psectrotanypus sp.	10	P	100
Psectrotanypus sp.	13	Pisidium sp.	18	Haemonais sp.	25	Lumbriculus variegata	--	CG	85
Tubificidae unid.imm.	10	Haemonais sp.	4	Tubificidae w/hair	10	Pisidium sp.	8	CF	64
Sciomyzidae	5	Tubificidae w/hair	4	Psectrotanypus sp.	9	Haemonais sp.	--	CG	31
Cyprididae	4	Lumbriculus variegata	3	Lumbriculus variegata	8	Planorbella sp.	6	SC	29
Tubificidae w/hair	4	Limnodrilus hoffmeisteri	3	Planorbella sp.	6	Tubificidae w/hair	5	CG	18
Eukiefferiella sp.	3	Cyprididae	2	Coenagrionidae	5	Sciomyzidae	6	P	7
Dero digitata	3	Planorbella sp.	2	Sciomyzidae	2	Coenagrionidae	--	P	7
Pisidium sp.	3	Nais communis/ variabilis	1	Dero digitata	2	Dero digitata	--	CG	6
Liodessus obscurellus	2	Dero digitata	1	Liodessus obscurellus	1	Cyprididae	8	CG	6
Ceratopogonidae	2	Fossaria sp.	1	Cricotopus sp.	1	Limnodrilus hoffmeisteri	--	CG	4
Coenagrionidae	2		291	Glossiphoniidae	1	Fossaria sp.	8	SC	4
Haemonais sp.	2			Limnodrilus hoffmeisteri	1	Liodessus obscurellus	5	P	3
Fossaria sp.	2			Fossaria sp.	1	Eukiefferiella sp.	8	OM	3
Psychodidae	1				293	Ceratopogonidae	--	--	2
Slavina appendiculata	1					Slavina appendiculata	--	CG	1
	270					Psychodidae	--	--	1
						Nais communis/ variabilis	--	CG	1
						Glossiphoniidae	8	P	1
						Cricotopus sp.	7	CG	1
									854

PGC18

	T1		T2		T3		(TV)	(FFG)	Total
Micropsectra sp.	92	Micropsectra sp.	166	Micropsectra sp.	96	Micropsectra sp.	7	CG	354
Dugesia tigrina	83	Dugesia tigrina	49	Chironomus sp.	89	Dugesia tigrina	4	P	183
Chironomus sp.	40	Chironomus sp.	35	Dugesia tigrina	51	Chironomus sp.	10	CG	164
Lumbriculus variegata	32	Paratanytarsus sp.	16	Paratanytarsus sp.	22	Paratanytarsus sp.	6	CF	54
Paratanytarsus sp.	16	Tubificidae unid.imm.	7	Psectrotanypus sp.	9	Lumbriculus variegata	--	CG	35
Psectrotanypus sp.	13	Chaetogaster diaphanus	5	Tubificidae unid.imm.	5	Psectrotanypus sp.	10	P	22
Chaetogaster diaphanus	9	Hydra sp.	4	Cricotopus sp.	2	Tubificidae unid.imm.	10	CG	18
Tubificidae unid.imm.	6	Lumbriculus variegata	3	Dero digitata	2	Chaetogaster diaphanus	--	--	14
Oxyethira sp.	5	Tubificidae w/hair	2	Hydra sp.	2	Tubificidae w/hair	5	CG	6
Tubificidae w/hair	3	Liodessus obscurellus	1	Menetus opercularis	2	Hydra sp.	5	P	6
Limnophyes sp.	2	Ochthebius sp.	1	Liodessus obscurellus	1	Oxyethira sp.	3	PH	5
Liodessus obscurellus	1	Apedilum sp.	1	Corynoneura sp.	1	Liodessus obscurellus	5	P	3
Hydrellia sp.	1	Ephydridae	1	Ephydridae	1	Dero digitata	--	CG	3
Cyprididae	1		291	Cyprididae	1	Menetus opercularis	6	SC	2
Enchytraeidae	1			Enchytraeidae	1	Limnophyes sp.	8	CG	2
Dero digitata	1			Tubificidae w/hair	1	Ephydridae	--	--	2
	306				286	Enchytraeidae	10	CG	2
						Cyprididae	8	CG	2
						Cricotopus sp.	7	CG	2
						Ochthebius sp.	5	SC	1
						Hydrellia sp.	6	SH	1
						Corynoneura sp.	7	CG	1
						Apedilum sp.	6	CG	1
									883

PGC19

	T1		T2		T3		(TV)	(FFG)	Total
Micropsectra sp.	203	Micropsectra sp.	157	Micropsectra sp.	104	Micropsectra sp.	7	CG	464
Paratanytarsus sp.	22	Rheocricotopus sp.	41	Dugesia tigrina	79	Dugesia tigrina	4	P	85
Tubificidae unid.imm.	13	Physa sp.	23	Paratanytarsus sp.	32	Paratanytarsus sp.	6	CF	76
Tubificidae w/hair	11	Paratanytarsus sp.	22	Polypedilum sp.	15	Rheocricotopus sp.	6	OM	52
Polypedilum sp.	8	Tubificidae unid.imm.	15	Pisidium sp.	13	Tubificidae unid.imm.	10	CG	34
Rheocricotopus sp.	8	Nais communis/ variabilis	8	Tubificidae unid.imm.	6	Physa sp.	8	SC	28
Paratendipes sp.	6	Dugesia tigrina	6	Physa sp.	4	Polypedilum sp.	6	CG	27
Dero digitata	6	Polypedilum sp.	4	Hydraena sp.	3	Tubificidae w/hair	5	CG	13
Chironomus sp.	3	Chironomus sp.	3	Ochthebius sp.	3	Pisidium sp.	8	CF	13
Psectrotanypus sp.	2	Psectrotanypus sp.	2	Rheocricotopus sp.	3	Nais communis/ variabilis	--	CG	8
Cyprididae	1	Planorbella sp.	2	Psectrotanypus sp.	3	Psectrotanypus sp.	10	P	7
Ophidonais serpentina	1	Cymbiodyta sp.	1	Oxyethira sp.	3	Dero digitata	--	CG	7
Physa sp.	1	Apedilum sp.	1	Planorbella sp.	3	Paratendipes sp.	8	CG	6
	285	Phaenopsectra sp.	1	Menetus opercularis	3	Chironomus sp.	10	CG	6
		Corynoneura sp.	1	Liodessus obscurellus	2	Planorbella sp.	6	SC	5
		Sciomyzidae	1	Apedilum sp.	2	Oxyethira sp.	3	PH	4
		Hydropsyche sp.	1	Hyalella sp.	2	Ochthebius sp.	5	P	3
		Oxyethira sp.	1	Tubificidae w/hair	2	Menetus opercularis	6	SC	3
		Ferrissia sp.	1	Fossaria sp.	2	Hydraena sp.	5	SC	3
			291	Sanfilippodytes sp.	1	Apedilum sp.	6	CG	3
				Hydrobius fuscipes	1	Liodessus obscurellus	5	P	2
				Procladius sp.	1	Hyalella sp.	8	CG	2
				Ormosia sp.	1	Fossaria sp.	8	SC	2
				Libellula sp.	1	Sciomyzidae	6	P	1
				Procambarus clarkii	1	Sanfilippodytes sp.	5	P	1
				Dero digitata	1	Procladius sp.	9	P	1
					291	Procambarus clarkii	8	SH	1
						Phaenopsectra sp.	7	SC	1
						Ormosia sp.	3	CG	1
						Ophidonais serpentina	--	--	1
						Libellula sp.	9	P	1
						Hydropsyche sp.	4	CF	1
						Hydrobius fuscipes	8	CG	1
						Ferrissia sp.	6	SC	1
						Cyprididae	8	CG	1
						Cymbiodyta sp.	5	CG	1
						Corynoneura sp.	7	CG	1
									867

PGC20

	T1		T2		T3		(TV)	(FFG)	Total
Hyalella sp.	76	Physa sp.	126	Physa sp.	101	Physa sp.	8	SC	299
Physa sp.	72	Paratanytarsus sp.	40	Hyalella sp.	41	Hyalella sp.	8	CG	136
Paratanytarsus sp.	46	Tubificidae w/hair	31	Paratanytarsus sp.	37	Paratanytarsus sp.	6	CF	123
Cricotopus sp.	21	Cricotopus sp.	28	Liodessus obscurellus	28	Cricotopus sp.	7	CG	65
Micropsectra sp.	16	Hyalella sp.	19	Nais communis/ variabilis	22	Liodessus obscurellus	5	P	56
Liodessus obscurellus	15	Liodessus obscurellus	13	Cricotopus sp.	16	Tubificidae w/hair	5	CG	37
Cyprididae	8	Coenagrionidae	10	Planorbella sp.	14	Micropsectra sp.	7	CG	34
Tubificidae unid.imm.	7	Micropsectra sp.	8	Micropsectra sp.	10	Nais communis/ variabilis	--	CG	23
Psectrotanypus sp.	3	Stylaria lacustris	5	Corynoneura sp.	5	Planorbella sp.	6	SC	18
Tubificidae w/hair	3	Oxyethira sp.	3	Hydrellia sp.	3	Coenagrionidae	--	P	15
Chironomus sp.	2	Tubificidae unid.imm.	3	Coenagrionidae	3	Tubificidae unid.imm.	10	CG	12
Paratendipes sp.	2	Simulium sp.	2	Tubificidae w/hair	3	Cyprididae	8	CG	12
Ephydridae	2	Cyprididae	2	Menetus opercularis	3	Stylaria lacustris	--	CG	7
Corixidae	2	Planorbella sp.	2	Psectrotanypus sp.	2	Psectrotanypus sp.	10	P	6
Coenagrionidae	2	Laccophilus sp.	1	Cyprididae	2	Corynoneura sp.	7	CG	6
Libellulidae	2	Tropisternus lateralis	1	Tubificidae unid.imm.	2	Menetus opercularis	6	SC	5
Planorbella sp.	2	Tropisternus sp.	1	Apedilum sp.	1	Simulium sp.	6	CF	3
Menetus opercularis	2	Polypedilum sp.	1	Polypedilum sp.	1	Oxyethira sp.	3	PH	3
Apedilum sp.	1	Thienemanniella sp.	1	Limnophyes sp.	1	Hydrellia sp.	6	SH	3
Eukiefferiella sp.	1	Psectrotanypus sp.	1	Ablabesmyia sp.	1	Polypedilum sp.	6	CG	2
Corynoneura sp.	1	Lumbriculus variegata	1	Simulium sp.	1	Paratendipes sp.	8	CG	2
Sciomyzidae	1	Hydra sp.	1	Stylaria lacustris	1	Libellulidae	9	P	2
Nais communis/ variabilis	1	Ferrissia sp.	1	Gyraulus sp.	1	Gyraulus sp.	8	SC	2
Stylaria lacustris	1	Gyraulus sp.	1	Planariidae	1	Ephydridae	6	--	2
	289	Dugesia tigrina	1		300	Corixidae	10	P	2
			303			Chironomus sp.	10	CG	2
						Apedilum sp.	6	CG	2
						Tropisternus sp.	5	P	1
						Tropisternus lateralis	5	CG	1
						Thienemanniella sp.	6	CG	1
						Sciomyzidae	6	P	1
						Planariidae	4	P	1
						Lumbriculus variegata	--	CG	1
						Limnophyes sp.	8	CG	1
						Laccophilus sp.	5	P	1
						Hydra sp.	5	P	1
						Ferrissia sp.	6	SC	1
						Eukiefferiella sp.	8	OM	1
						Dugesia tigrina	4	P	1
						Ablabesmyia sp.	8	CG	1
									892

PGC21

	T1		T2		T3		(TV)	(FFG)	Total
Micropsectra sp.	237	Micropsectra sp.	165	Micropsectra sp.	208	Micropsectra sp.	7	CG	610
Tubificidae unid.imm.	20	Tubificidae unid.imm.	52	Paratendipes sp.	32	Tubificidae unid.imm.	10	CG	96
Paratendipes sp.	6	Nais communis/ variabilis	10	Tubificidae unid.imm.	24	Paratendipes sp.	8	CG	45
Tubificidae w/hair	4	Tubificidae w/hair	9	Paratanytarsus sp.	7	Tubificidae w/hair	5	CG	15
Dugesia tigrina	4	Dugesia tigrina	9	Physa sp.	5	Paratanytarsus sp.	6	CF	15
Phaenopsectra sp.	3	Paratendipes sp.	7	Endochironomus sp.	3	Dugesia tigrina	4	P	15
Rheocricotopus sp.	3	Paratanytarsus sp.	7	Psectrotanypus sp.	3	Nais communis/ variabilis	--	CG	11
Limnodrilus hoffmeisteri	3	Rheocricotopus sp.	7	Chironomus sp.	2	Rheocricotopus sp.	6	OM	10
Psectrotanypus sp.	2	Pisidium sp.	4	Tubificidae w/hair	2	Pisidium sp.	8	CF	8
Oxyethira sp.	2	Oxyethira sp.	3	Pisidium sp.	2	Psectrotanypus sp.	10	P	7
Hyalella sp.	2	Pristina leidyi	3	Dugesia tigrina	2	Physa sp.	8	SC	7
Cyprididae	2	Psectrotanypus sp.	2	Apedilum sp.	1	Oxyethira sp.	3	PH	5
Dero digitata	2	Hyalella sp.	2	Nanocladius sp.	1	Hyalella sp.	8	CG	4
Pisidium sp.	2	Procambarus clarkii	2	Coenagrionidae	1	Procambarus clarkii	8	SH	3
Physa sp.	2	Hydraena sp.	1	Nais communis/ variabilis	1	Pristina leidyi	--	CG	3
Paratanytarsus sp.	1	Apedilum sp.	1	Stylaria lacustris	1	Phaenopsectra sp.	7	SC	3
Procambarus clarkii	1	Cricotopus sp.	1	Corbicula sp.	1	Limnodrilus hoffmeisteri	--	CG	3
Haemopsis sp.	1	Nanocladius sp.	1	Planorbella sp.	1	Endochironomus sp.	10	CG	3
Ophidonais serpentina	1	Limonia sp.	1	Menetus opercularis	1	Planorbella sp.	6	SC	2
	298	Lumbriculus variegata	1		298	Nanocladius sp.	3	CG	2
		Hydra sp.	1			Dero digitata	--	CG	2
		Planorbella sp.	1			Cyprididae	8	CG	2
			290			Chironomus sp.	10	CG	2
						Apedilum sp.	6	CG	2
						Stylaria lacustris	--	CG	1
						Ophidonais serpentina	--	--	1
						Menetus opercularis	6	SC	1
						Lumbriculus variegata	--	CG	1
						Limonia sp.	6	SH	1
						Hydraena sp.	5	SC	1
						Hydra sp.	5	P	1
						Haemopsis sp.	10	P	1
						Cricotopus sp.	7	CG	1
						Corbicula sp.	8	CF	1
						Coenagrionidae	--	P	1
									886

PGC22

	T1		T2		T3		(TV)	(FFG)	Total
Tubificicae unid.imm.	158	Menetus opercularis	83	Tubificicae unid.imm.	105	Tubificicae unid.imm.	10	CG	310
Tubificidae w/hair	31	Dugesia tigrina	58	Tubificidae w/hair	72	Menetus opercularis	6	SC	133
Lumbriculus variegata	30	Tubificicae unid.imm.	47	Dugesia tigrina	35	Tubificidae w/hair	5	CG	122
Menetus opercularis	26	Micropsectra sp.	31	Lumbriculus variegata	28	Dugesia tigrina	4	P	114
Dugesia tigrina	21	Tubificidae w/hair	19	Menetus opercularis	24	Lumbriculus variegata	--	CG	65
Micropsectra sp.	9	Fossaria sp.	12	Cyprididae	7	Micropsectra sp.	7	CG	46
Physa sp.	8	Cyprididae	8	Micropsectra sp.	6	Fossaria sp.	8	SC	19
Slavina appendiculata	2	Lumbriculus variegata	7	Fossaria sp.	6	Physa sp.	8	SC	17
Pisidium sp.	2	Lumbricina	5	Physa sp.	4	Cyprididae	8	CG	15
Planorbella sp.	2	Physa sp.	5	Lumbricina	3	Lumbricina	--	CG	9
Psectrotanypus sp.	1	Prostoma sp.	5	Planorbella sp.	3	Slavina appendiculata	--	CG	7
Muscidae	1	Slavina appendiculata	3	Slavina appendiculata	2	Prostoma sp.	8	P	6
Sciomyzidae	1	Tipula sp.	1	Sphaerium sp.	2	Planorbella sp.	6	SC	6
Lumbricina	1	Dero digitata	1	Tipula sp.	1	Sphaerium sp.	8	CG	3
Sphaerium sp.	1	Corbicula sp.	1	Pisidium sp.	1	Pisidium sp.	8	CF	3
Fossaria sp.	1	Planorbella sp.	1	Prostoma sp.	1	Tipula sp.	4	OM	2
Gyraulus sp.	1		287		300	Sciomyzidae	6	P	1
	296					Psectrotanypus sp.	10	P	1
						Muscidae	6	P	1
						Gyraulus sp.	8	SC	1
						Dero digitata	--	CG	1
						Corbicula sp.	8	CF	1
									883

Appendix 5 Number of lowest identified taxa by transect and combined transects including tolerance values (TV) and feeding guilds (FFG) Pleasant Grove Creek sites in 2007.

Tolerance values for taxa range from 1 to 10 with 10 being the most tolerant value. Feeding guilds are defined as follows: CG = collector-gatherer; CF = collector-filterer; SC = scraper; SH = shredder; P = predator; MH = macrophyte herbivore; OM = omnivore; PA = parasite; XY = Xylophage.

PGC1

Taxon	T 1	Taxon	T 2	Taxon	T 3	Taxon	Life Stage	Tol Val	FFG	Total
Physa sp.	79	Hyalella sp.	127	Hyalella sp.	150	Hyalella sp.		8	CG	355
Hyalella sp.	78	Cyprididae	80	Cyprididae	54	Cyprididae		8	CG	148
Oxyethira sp.	21	Physa sp.	21	Physa sp.	37	Physa sp.		8	SC	137
Paratanytarsus sp.	18	Paratanytarsus sp.	13	Chironominae	10	Paratanytarsus sp.		6	CF	39
Gyraulus sp.	15	Tubificidae Unident. Imm.	11	Paratanytarsus sp.	8	Oxyethira sp.		3	PH	31
Cyprididae	14	Aulodrilus pigueti	8	Gyraulus sp.	7	Tubificidae Unident. Imm.		10	CG	26
Dero digitata	12	Cryptotendipes sp.	6	Oxyethira sp.	6	Gyraulus sp.		8	SC	25
Aulodrilus pigueti	11	Stylaria lacustris	5	Tubificidae Unident. Imm	5	Aulodrilus pigueti		--	CG	19
Tubificidae Unident. Imm.	10	Oxyethira sp.	4	Nais communis/ variabilis	3	Dero digitata		--	CG	18
Cryptotendipes sp.	9	Dero digitata	4	Cricotopus sp.	2	Cryptotendipes sp.		6	CG	15
Psectrotanypus sp.	4	Gyraulus sp.	3	Gammarus sp.	2	Chironominae		6	CG	10
Chironomus sp.	3	Radotanypus sp.	2	Procambarus clarkii	2	Stylaria lacustris		--	CG	8
Micropsectra sp.	2	Paramerina sp.	2	Dero digitata	2	Psectrotanypus sp.		10	P	4
Coenagrionidae	2	Gammarus sp.	2	Ferrissia sp.	2	Gammarus sp.		6	CG	4
Limnesia sp.	2	Chironomus sp.	1	Tanytarsus sp.	1	Chironomus sp.		10	CG	4
Stylaria lacustris	2	Corynoneura sp.	1	Ablabesmyia sp.	1	Procambarus clarkii		8	SH	3
Dicrotendipes sp.	1	Libellula sp.	1	Caenis latipennis	1	Nais communis/ variabilis		--	CG	3
Polypedilum sp.	1	Procambarus clarkii	1	Coenagrionidae	1	Cricotopus sp.		7	CG	3
Cricotopus sp.	1	Arrenurus sp.	1	Arrenurus sp.	1	Coenagrionidae		--	P	3
Psectrocladius sp.	1		293	Slavina appendiculata	1	Radotanypus sp.		7	P	2
Caenis latipennis	1			Stylaria lacustris	1	Paramerina sp.		6	P	2
Decapoda	1			Tubificidae w/ hair chaetae	1	Micropsectra sp.		7	CG	2
Pristina leidyi	1			Pisidium sp.	1	Limnesia sp.		5	P	2
Limnodrilus hoffmeisteri	1				299	Ferrissia sp.		6	SC	2
	290					Caenis latipennis		7	CG	2
						Arrenurus sp.		5	P	2
						Tubificidae w/ hair chaetae		5	CG	1
						Tanytarsus sp.		6	CF	1
						Slavina appendiculata		--	CG	1
						Psectrocladius sp.		8	CG	1
						Pristina leidyi		--	CG	1
						Polypedilum sp.		6	CG	1
						Pisidium sp.		8	CF	1
						Limnodrilus hoffmeisteri		--	CG	1
						Libellula sp.		9	P	1
						Dicrotendipes sp.		8	CG	1
						Decapoda		--	--	1
						Corynoneura sp.		7	CG	1
						Ablabesmyia sp.		8	CG	1
										882

PGC2

Taxon	T 1	Taxon	T 2	Taxon	T 3	Taxon	Life Stage	Tol Val	FFG	Total
Tubificidae Unident. Imm.	100	Tubificidae Unident. Imm.	66	Hydropsyche californica	58	Tubificidae Unident. Imm.		10	CG	188
Hydropsyche californica	37	Hydropsyche californica	41	Rheocricotopus sp.	52	Hydropsyche californica		4	CF	136
Baetis tricaudatus	31	Rheocricotopus sp.	35	Tubificidae Unident. Imm.	22	Rheocricotopus sp.		6	OM	114
Rheocricotopus sp.	27	Simulium sp.	32	Baetis tricaudatus	21	Baetis tricaudatus		6	CG	67
Corbicula sp.	24	Bezzia/ Palpomyia	15	Hydropsyche sp.	15	Simulium sp.		6	CF	53
Bezzia/ Palpomyia	16	Baetis tricaudatus	15	Bezzia/ Palpomyia	14	Bezzia/ Palpomyia		6	P	45
Dugesia tigrina	15	Hydropsyche sp.	14	Dugesia tigrina	13	Dugesia tigrina		4	P	39
Simulium sp.	10	Dugesia tigrina	11	Corbicula fluminea	12	Hydropsyche sp.		4	CF	35
Orthocladiinae	6	Rheotanytarsus sp.	7	Simulium sp.	11	Corbicula sp.		8	CF	27
Hydropsyche sp.	6	Tricorythodes sp.	6	Nais communis/ variabilis	9	Tricorythodes sp.		4	CG	16
Lumbricina	5	Nais communis/ variabilis	6	Tricorythodes sp.	8	Nais communis/ variabilis		--	CG	15
Cricotopus sp.	4	Eukiefferiella sp.	4	Cricotopus sp.	5	Corbicula fluminea		10	CF	12
Eukiefferiella sp.	2	Oxyethira sp.	4	Thienemanniella sp.	5	Rheotanytarsus sp.		6	CF	11
Tricorythodes sp.	2	Limonia sp.	3	Lumbricina	5	Lumbricina		--	CG	10
Physa sp.	2	Slavina appendiculata	3	Cryptochironomus sp.	4	Eukiefferiella sp.		8	OM	10
Cricotopus bicinctus grp.	1	Corbicula sp.	3	Rheotanytarsus sp.	4	Cricotopus sp.		7	CG	9
Thienemanniella sp.	1	Lumbriculus variegata	2	Eukiefferiella sp.	4	Thienemanniella sp.		6	CG	7
	289	Menetus opercularis	2	Prostoma sp.	4	Orthocladiinae		5	CG	6
		Paracymus sp.	1	Micropsectra sp.	3	Physa sp.		8	SC	5
		Ceratopogonidae	1	Polypedilum sp.	2	Oxyethira sp.		3	PH	5
		Chironomidae	1	Cricotopus bicinctus grp.	2	Prostoma sp.		8	P	4
		Micropsectra sp.	1	Rheocricotopus sp.	2	Micropsectra sp.		7	CG	4
		Paratanytarsus sp.	1	Thienemanniella sp.	2	Menetus opercularis		6	SC	4
		Cricotopus bicinctus grp.	1	Limnodrilus hoffmeisteri	2	Cryptochironomus sp.		8	P	4
		Thienemanniella sp.	1	Physa sp.	2	Cricotopus bicinctus grp.		7	CG	4
		Pentaneura sp.	1	Menetus opercularis	2	Slavina appendiculata		--	CG	3
		Fallceon quilleri	1	Fallceon quilleri	1	Limonia sp.		6	SH	3
		Hetaerina americana	1	Caenis latipennis	1	Thienemanniella sp.	Pupae	--	--	2
		Hydroptila sp.	1	Hydroptila sp.	1	Rheocricotopus sp.	Pupae	--	--	2
		Gammarus sp.	1	Oxyethira sp.	1	Polypedilum sp.		6	CG	2
		Tubificidae w/ hair chaetae	1	Hyalella sp.	1	Lumbriculus variegata		--	CG	2
		Pisidium sp.	1		288	Limnodrilus hoffmeisteri		--	CG	2
		Physa sp.	1			Hydroptila sp.		6	PH	2
			284			Fallceon quilleri		4	CG	2
						Tubificidae w/ hair chaetae		5	CG	1
						Pisidium sp.		8	CF	1
						Pentaneura sp.	Pupae	--	--	1
						Paratanytarsus sp.		6	CF	1
						Paracymus sp.	Adults	5	CG	1
						Hyalella sp.		8	CG	1

PGC2 - continued.

Taxon	T 1	Taxon	T 2	Taxon	T 3	Taxon	Life Stage	Tol Val	FFG	Total
						Hetaerina americana		6	P	1
						Gammarus sp.		6	CG	1
						Chironomidae		6	CG	1
						Ceratopogonidae	Pupae	--	--	1
						Caenis latipennis		7	CG	1
										861

PGC3

Taxon	T 1	Taxon	T 2	Taxon	T 3	Taxon	Life Stage	Tol Val	FFG	Total
Tubificidae Unident. Imm.	62	Oxyethira sp.	66	Oxyethira sp.	72	Oxyethira sp.		3	PH	146
Rheocricotopus sp.	51	Rheocricotopus sp.	55	Slavina appendiculata	30	Rheocricotopus sp.		6	OM	128
Cricotopus sp.	24	Paratanytarsus sp.	29	Tubificidae Unident. Imm.	27	Tubificidae Unident. Imm.		10	CG	109
Simulium sp.	23	Micropsectra sp.	24	Rheocricotopus sp.	22	Dugesia tigrina		4	P	42
Thienemanniella sp.	19	Tubificidae Unident. Imm.	20	Micropsectra sp.	13	Paratanytarsus sp.		6	CF	41
Eukiefferiella sp.	17	Dugesia tigrina	18	Paratanytarsus sp.	12	Micropsectra sp.		7	CG	41
Dugesia tigrina	15	Dicrotendipes sp.	10	Bezzia/ Palpomyia	10	Cricotopus sp.		7	CG	37
Baetis tricaudatus	9	Rheotanytarsus sp.	10	Stylaria lacustris	10	Slavina appendiculata		--	CG	30
Oxyethira sp.	8	Polypedilum sp.	8	Cricotopus sp.	9	Thienemanniella sp.		6	CG	25
Chironomini	7	Bezzia/ Palpomyia	5	Dugesia tigrina	9	Simulium sp.		6	CF	23
Lumbricina	7	Baetis tricaudatus	5	Dicrotendipes sp.	6	Dicrotendipes sp.		8	CG	20
Rheocricotopus sp.	5	Cricotopus sp.	4	Tanytarsini	6	Eukiefferiella sp.		8	OM	18
Hydropsyche sp.	5	Nais communis/ variabilis	4	Nais communis/ variabilis	6	Bezzia/ Palpomyia		6	P	16
Tubificidae w/ hair chaetae	5	Cricotopus bicinctus group	3	Ophidonais serpentina	6	Polypedilum sp.		6	CG	14
Dicrotendipes sp.	4	Rheocricotopus sp.	3	Thienemanniella sp.	5	Baetis tricaudatus		6	CG	14
Polypedilum sp.	4	Pisidium sp.	3	Chironomini	4	Rheocricotopus sp.	Pupae	--	--	12
Micropsectra sp.	4	Hydraena sp.	2	Rheocricotopus sp.	4	Nais communis/ variabilis		--	CG	12
Cricotopus bicinctus grp.	3	Hydropsyche sp.	2	Caenis latipennis	4	Chironomini		6	CG	11
Pisidium sp.	3	Hydropsyche californica	2	Probezzia sp.	3	Stylaria lacustris		--	CG	10
Cryptochironomus sp.	2	Corbicula sp.	2	Orthocladiinae	3	Rheotanytarsus sp.		6	CF	10
Orthocladiinae	2	Fossaria sp.	2	Tubificidae w/ hair chaetae	3	Lumbricina		--	CG	9
Pentaneura sp.	2	Physa sp.	2	Ceratopogonidae	2	Tubificidae w/ hair chaetae		5	CG	8
Caenis latipennis	2	Menetus opercularis	2	Polypedilum sp.	2	Pisidium sp.		8	CF	8
Nais communis/ variabilis	2	Tropisternus sp.	1	Tricorythodes sp.	2	Ophidonais serpentina		--	--	7
Helophorus sp.	1	Phaenopsectra sp.	1	Lumbricina	2	Hydropsyche sp.		4	CF	7
Hydraena sp.	1	Dicrotendipes sp.	1	Lumbriculus variegata	2	Tanytarsini		6	CG	6
Bezzia/ Palpomyia	1	Eukiefferiella sp.	1	Pisidium sp.	2	Cricotopus bicinctus grp.		7	CG	6
Cricotopus trifascia group	1	Cricotopus bicinctus grp.	1	Physa sp.	2	Caenis latipennis		7	CG	6
Cricotopus sp.	1	Thienemanniella sp.	1	Sanfilippodytes sp.	1	Physa sp.		8	SC	5
Tipula sp.	1	Thienemanniella sp.	1	Liodessus obscurellus	1	Orthocladiinae		5	CG	5
Enchytraeidae	1	Pentaneura sp.	1	Cryptochironomus sp.	1	Pentaneura sp.		6	P	4
Physa sp.	1	Ophidonais serpentina	1	Stempellinella sp.	1	Probezzia sp.		6	P	3
	293	Aulodrilus pigueti	1	Micropsectra sp.	1	Menetus opercularis		6	SC	3
			291	Parametriocnemus sp.	1	Cryptochironomus sp.		8	P	3
				Thienemanniella sp.	1	Corbicula sp.		8	CF	3
				Pentaneura sp.	1	Tricorythodes sp.		4	CG	2
				Coenagrionidae	1	Thienemanniella sp.	Pupae	--	--	2
				Mooreobdella microstoma	1	Lumbriculus variegata		--	CG	2
				Corbicula sp.	1	Hydropsyche californica		4	CF	2
				Planorbella sp.	1	Hydraena sp.	Adults	5	SC	2
				Menetus opercularis	1	Fossaria sp.		8	SC	2

PGC3 - continued.

Taxon	T 1	Taxon	T 2	Taxon	T 3	Taxon	Life Stage	Tol Val	FFG	Total
				Prostoma sp.	1	Ceratopogonidae	Pupae	--	--	2
					292	Tropisternus sp.	Larvae	5	P	1
						Tipula sp.		4	OM	1
						Stempellinella sp.		4	CF	1
						Sanfilippodytes sp.	Adults	5	P	1
						Prostoma sp.		8	P	1
						Planorbella sp.		6	SC	1
						Phaenopsectra sp.		7	SC	1
						Parametriocnemus sp.		5	CG	1
						Mooreobdella microstoma		8	P	1
						Micropsectra sp.	Pupae	--	--	1
						Liodessus obscurellus	Adults	5	P	1
						Hydraena sp.	Larvae	5	P	1
						Helophorus sp.	Larvae	--	SH	1
						Enchytraeidae		10	CG	1
						Dicrotendipes sp.	Pupae	--	--	1
						Cricotopus trifascia group		7	CG	1
						Cricotopus sp.	Pupae	--	--	1
						Cricotopus bicinctus group	Pupae	--	--	1
						Coenagrionidae		--	P	1
						Aulodrilus pigueti		--	CG	1
										876

PGC4

Taxon	T 1	Taxon	T 2	Taxon	T 3	Taxon	Life Stage	Tol Val	FFG	Total
Simulium sp.	95	Rheocricotopus sp.	57	Rheocricotopus sp.	53	Simulium sp.		6	CF	148
Rheocricotopus sp.	35	Simulium sp.	24	Dugesia tigrina	37	Rheocricotopus sp.		6	OM	145
Dugesia tigrina	26	Oxyethira sp.	21	Simulium sp.	29	Dugesia tigrina		4	P	84
Oxyethira sp.	22	Dugesia tigrina	21	Oxyethira sp.	28	Oxyethira sp.		3	PH	71
Baetis tricaudatus	21	Rheocricotopus sp.	20	Corbicula sp.	23	Corbicula sp.		8	CF	45
Corbicula sp.	21	Tubificidae Unident. Imm	18	Tricorythodes sp.	19	Rheocricotopus sp.	Pupae	--	--	38
Eukiefferiella sp.	11	Dicrotendipes sp.	14	Rheocricotopus sp.	14	Baetis tricaudatus		6	CG	37
Paratanytarsus sp.	7	Micropsectra sp.	13	Micropsectra sp.	12	Tubificidae Unident. Imm		10	CG	34
Hydropsyche californica	7	Tricorythodes sp.	12	Paratanytarsus sp.	12	Tricorythodes sp.		4	CG	31
Tubificidae Unident. Imm	7	Baetis tricaudatus	10	Hyalella sp.	10	Paratanytarsus sp.		6	CF	28
Cryptochironomus sp.	4	Paratanytarsus sp.	9	Tubificidae Unident. Imm	9	Micropsectra sp.		7	CG	25
Cladotanytarsus sp.	4	Rheotanytarsus sp.	8	Bezzia/ Palpomyia	8	Eukiefferiella sp.		8	OM	16
Rheocricotopus sp.	4	Cryptochironomus sp.	7	Baetis tricaudatus	6	Dicrotendipes sp.		8	CG	16
Thienemanniella sp.	4	Lumbriculus variegata	5	Orthocladiinae	4	Cryptochironomus sp.		8	P	14
Tanytarsini	3	Aulodrilus pigueti	5	Pentaneura sp.	4	Bezzia/ Palpomyia		6	P	14
Fallceon quilleri	3	Bezzia/ Palpomyia	4	Prostoma sp.	4	Hyalella sp.		8	CG	12
Bezzia/ Palpomyia	2	Eukiefferiella sp.	3	Cryptochironomus sp.	3	Rheotanytarsus sp.		6	CF	9
Thienemanniella sp.	2	Pentaneura sp.	3	Eukiefferiella sp.	3	Hydropsyche californica		4	CF	9
Hydropsyche sp.	2	Polypedilum sp.	2	Thienemanniella sp.	3	Thienemanniella sp.		6	CG	8
Nais communis/ variabilis	2	Eukiefferiella sp.	2	Lumbriculus variegata	3	Lumbriculus variegata		--	CG	8
Rheotanytarsus sp.	1	Cricotopus bicinctus grp.	2	Dero digitata	3	Pentaneura sp.		6	P	7
Cricotopus bicinctus grp.	1	Cricotopus sp.	2	Slavina appendiculata	3	Slavina appendiculata		--	CG	5
Cricotopus sp.	1	Pentaneura sp.	2	Dicrotendipes sp.	2	Prostoma sp.		8	P	5
Eukiefferiella sp.	1	Hydropsyche californica	2	Fallceon quilleri	2	Orthocladiinae		5	CG	5
Erpobdellidae	1	Hyalella sp.	2	Caenis latipennis	2	Fallceon quilleri		4	CG	5
Lumbricina	1	Nais communis/ variabilis	2	Stylaria lacustris	2	Aulodrilus pigueti		--	CG	5
Menetus opercularis	1	Slavina appendiculata	2	Tubificidae w/ hair chaetae	2	Nais communis/ variabilis		--	CG	4
	289	Limnodrilus hoffmeisteri	2	Liodessus obscurellus	1	Eukiefferiella sp.	Pupae	--	--	4
		Hydraena sp.	1	Ceratopogon sp.	1	Cricotopus sp.	Pupae	--	--	4
		Probezzia sp.	1	Dicrotendipes sp.	1	Cricotopus bicinctus grp.		7	CG	4
		Micropsectra sp.	1	Cricotopus bicinctus grp.	1	Cladotanytarsus sp.		7	CG	4
		Orthocladiinae	1	Cricotopus sp.	1	Thienemanniella sp.	Pupae	--	--	3
		Thienemanniella sp.	1	Thienemanniella sp.	1	Tanytarsini		6	CG	3
		Caenis latipennis	1	Pentaneura sp.	1	Pentaneura sp.	Pupae	--	--	3
		Corbicula sp.	1	Hydropsyche sp.	1	Hydropsyche sp.		4	CF	3
		Pisidium sp.	1	Sperchon sp.	1	Dero digitata		--	CG	3
		Physa sp.	1	Ophidonais serpentina	1	Caenis latipennis		7	CG	3
		Menetus opercularis	1		310	Tubificidae w/ hair chaetae		5	CG	2
		Prostoma sp.	1			Stylaria lacustris		--	CG	2
			285			Polypedilum sp.		6	CG	2

PGC4 - continued.

Taxon	T 1	Taxon	T 2	Taxon	T 3	Taxon	Life Stage	Tol Val	FFG	Total
						Menetus opercularis		6	SC	2
						Limnodrilus hoffmeisteri		--	CG	2
						Sperchon sp.		8	P	1
						Probezzia sp.		6	P	1
						Pisidium sp.		8	CF	1
						Physa sp.		8	SC	1
						Ophidonais serpentina		--	--	1
						Micropsectra sp.	Pupae	--	--	1
						Lumbricina		--	CG	1
						Liodessus obscurellus	Adults	5	P	1
						Hydraena sp.	Adults	5	SC	1
						Erpobdellidae		8	P	1
						Dicrotendipes sp.	Pupae	--	--	1
						Ceratopogon sp.		6	P	1
										884

PGC5

Taxon	T 1	Taxon	T 2	Taxon	T 3	Taxon	Life Stage	Tol Val	FFG	Total
Rheotanytarsus sp.	80	Hydropsyche californica	99	Hydropsyche californica	130	Hydropsyche californica		4	CF	274
Hydropsyche californica	45	Hydropsyche sp.	45	Rheotanytarsus sp.	40	Rheotanytarsus sp.		6	CF	131
Rheocricotopus sp.	31	Tubificidae Unident. Imm	27	Rheocricotopus sp.	31	Hydropsyche sp.		4	CF	97
Hydropsyche sp.	27	Dugesia tigrina	26	Hydropsyche sp.	25	Rheocricotopus sp.		6	OM	74
Dugesia tigrina	25	Nais communis/ variabilis	13	Dugesia tigrina	21	Dugesia tigrina		4	P	72
Nais communis/ variabilis	16	Rheocricotopus sp.	12	Polypedilum sp.	10	Tubificidae Unident. Imm		10	CG	43
Tubificidae Unident. Imm	11	Rheotanytarsus sp.	11	Nais communis/ variabilis	7	Nais communis/ variabilis		--	CG	36
Cricotopus sp.	8	Tricorythodes sp.	6	Simulium sp.	6	Polypedilum sp.		6	CG	15
Paratanytarsus sp.	7	Prostoma sp.	6	Tubificidae Unident. Imm	5	Tricorythodes sp.		4	CG	13
Tricorythodes sp.	6	Baetis tricaudatus	5	Tanytarsini	4	Fallceon quilleri		4	CG	10
Polypedilum sp.	3	Fallceon quilleri	5	Baetis tricaudatus	4	Cricotopus sp.		7	CG	10
Rheotanytarsus sp.	3	Dicrotendipes sp.	4	Fallceon quilleri	3	Baetis tricaudatus		6	CG	9
Dicrotendipes sp.	2	Orthocladiinae	3	Phaenopsectra sp.	2	Simulium sp.		6	CF	8
Rheocricotopus sp.	2	Polypedilum sp.	2	Eukiefferiella sp.	1	Prostoma sp.		8	P	8
Thienemanniella sp.	2	Cricotopus sp.	2	Tricorythodes sp.	1	Paratanytarsus sp.		6	CF	8
Pentaneura sp.	2	Eukiefferiella sp.	2	Brechmorhoga mendax	1	Dicrotendipes sp.		8	CG	6
Fallceon quilleri	2	Pentaneura sp.	2	Prostoma sp.	1	Tanytarsini		6	CG	4
Hyalella sp.	2	Simulium sp.	2		292	Pentaneura sp.		6	P	4
Tropisternus sp.	1	Limnodrilus hoffmeisteri	2			Rheotanytarsus sp.	Pupae	--	--	3
Cricotopus sp.	1	Micropsectra sp.	1			Orthocladiinae		5	CG	3
Centroptilum sp.	1	Paratanytarsus sp.	1			Hyalella sp.		8	CG	3
Brechmorhoga mendax	1	Hyalella sp.	1			Eukiefferiella sp.		8	OM	3
Oxyethira sp.	1	Erpobdellidae	1			Thienemanniella sp.		6	CG	2
Erpobdellidae	1	Helobdella stagnalis	1			Rheocricotopus sp.	Pupae	--	--	2
Lumbricina	1	Tubificidae w/ hair chaetae	1			Phaenopsectra sp.		7	SC	2
Dero digitata	1		280			Limnodrilus hoffmeisteri		--	CG	2
Ophidonais serpentina	1					Erpobdellidae		8	P	2
Menetus opercularis	1					Brechmorhoga mendax		9	P	2
Prostoma sp.	1					Tubificidae w/ hair chaetae		5	CG	1
	285					Tropisternus sp.	Larvae	5	P	1
						Oxyethira sp.		3	PH	1
						Ophidonais serpentina		--	--	1
						Micropsectra sp.		7	CG	1
						Menetus opercularis		6	SC	1
						Lumbricina		--	CG	1
						Helobdella stagnalis		6	PA	1
						Dero digitata		--	CG	1
						Cricotopus sp.	Pupae	--	--	1
						Centroptilum sp.		2	CG	1
										857

PGC6

Taxon	T 1
Tricorythodes sp.	180
Rheotanytarsus sp.	40
Hyalella sp.	35
Fallceon quilleri	12
Polypedilum sp.	9
Hydropsyche californica	6
Oxyethira sp.	6
Cricotopus sp.	3
Ophidonais serpentina	3
Lauterborniella sp.	2
Phaenopsectra sp.	2
Procambarus clarkii	2
Physa sp.	2
Liodessus obscurellus	1
Bezzia/ Palpomyia	1
Probezzia sp.	1
Chironomidae	1
Cryptotendipes sp.	1
Dicrotendipes sp.	1
Nanocladius sp.	1
Cricotopus sp.	1
Ablabesmyia sp.	1
Labrundinia sp.	1
Centroptilum sp.	1
Dero digitata	1
	314

Taxon	T 2
Tricorythodes sp.	130
Hyalella sp.	93
Physa sp.	26
Stempellina sp.	6
Oxyethira sp.	6
Tanytarsini	4
Coenagrionidae	4
Ablabesmyia sp.	3
Cryptotendipes sp.	2
Dicrotendipes sp.	2
Rheotanytarsus sp.	2
Ophidonais serpentina	2
Laccophilus sp.	1
Liodessus obscurellus	1
Helophorus sp.	1
Tropisternus lateralis	1
Ceratopogonidae	1
Sphaeromias sp.	1
Polypedilum sp.	1
Paratanytarsus sp.	1
Centroptilum sp.	1
Trichocorixa calva	1
Cyprididae	1
Mooreobdella microstoma	1
Nais communis/ variabilis	1
	293

Taxon	T 3
Tricorythodes sp.	164
Hyalella sp.	65
Ophidonais serpentina	15
Fallceon quilleri	9
Oxyethira sp.	9
Physa sp.	8
Paratanytarsus sp.	6
Rheotanytarsus sp.	4
Hydropsyche californica	4
Procambarus clarkii	2
Liodessus obscurellus	1
Lauterborniella sp.	1
Nanocladius sp.	1
Ablabesmyia sp.	1
Nilotanypus sp.	1
Belostoma flumineum	1
Coenagrionidae	1
Libellulidae	1
Mooreobdella microstoma	1
Nais communis/ variabilis	1
Slavina appendiculata	1
	297

Taxon	Life Stage	Tol Val	FFG	Total
Tricorythodes sp.		4	CG	474
Hyalella sp.		8	CG	193
Rheotanytarsus sp.		6	CF	46
Physa sp.		8	SC	36
Oxyethira sp.		3	PH	21
Fallceon quilleri		4	CG	21
Ophidonais serpentina		--	--	20
Polypedilum sp.		6	CG	10
Hydropsyche californica		4	CF	10
Paratanytarsus sp.		6	CF	7
Stempellina sp.		2	CG	6
Coenagrionidae		--	P	5
Ablabesmyia sp.		8	CG	5
Tanytarsini		6	CG	4
Procambarus clarkii		8	SH	4
Liodessus obscurellus	Adults	5	P	3
Lauterborniella sp.		6	CG	3
Dicrotendipes sp.		8	CG	3
Cryptotendipes sp.		6	CG	3
Cricotopus sp.		7	CG	3
Phaenopsectra sp.		7	SC	2
Nanocladius sp.		3	CG	2
Nais communis/ variabilis		--	CG	2
Mooreobdella microstoma		8	P	2
Centroptilum sp.		2	CG	2
Tropisternus lateralis	Adults	5	CG	1
Trichocorixa calva		8	P	1
Sphaeromias sp.		6	P	1
Slavina appendiculata		--	CG	1
Probezzia sp.		6	P	1
Nilotanypus sp.		6	P	1
Libellulidae		9	P	1
Laccophilus sp.	Adults	5	P	1
Labrundinia sp.		6	P	1
Helophorus sp.	Adults	--	SH	1
Dero digitata		--	CG	1
Cyprididae		8	CG	1
Cricotopus sp.	Pupae	--	--	1
Chironomidae		6	CG	1
Ceratopogonidae		6	P	1
Bezzia/ Palpomyia		6	P	1
Belostoma flumineum		8	P	1
				904

PGC7

Taxon	T 1	Taxon	T 2	Taxon	T 3	Taxon	Life Stage	Tol Val	FFG	Total
Hyalella sp.	185	Hyalella sp.	162	Hyalella sp.	123	Hyalella sp.		8	CG	470
Paratanytarsus sp.	13	Physa sp.	38	Dicrotendipes sp.	25	Physa sp.		8	SC	48
Coenagrionidae	12	Paratanytarsus sp.	17	Menetus opercularis	20	Paratanytarsus sp.		6	CF	42
Tubificidae Unident. Imm	12	Caenis latipennis	13	Dero digitata	19	Dicrotendipes sp.		8	CG	40
Dicrotendipes sp.	9	Polypedilum sp.	8	Stempellina sp.	13	Menetus opercularis		6	SC	30
Caenis latipennis	8	Coenagrionidae	8	Paratanytarsus sp.	12	Coenagrionidae		--	P	25
Paratanytarsus sp.	6	Menetus opercularis	8	Tubificidae Unident. Imm	11	Caenis latipennis		7	CG	24
Physa sp.	5	Dicrotendipes sp.	6	Tanytarsus sp.	8	Tubificidae Unident. Imm		10	CG	23
Cricotopus sp.	4	Liodessus obscurellus	5	Ophidonais serpentina	7	Dero digitata		--	CG	22
Ablabesmyia sp.	4	Oxyethira sp.	5	Polypedilum sp.	6	Polypedilum sp.		6	CG	15
Ischnura sp.	4	Gammarus sp.	3	Coenagrionidae	5	Stempellina sp.		2	CG	13
Liodessus obscurellus	3	Ophidonais serpentina	3	Oxyethira sp.	5	Ophidonais serpentina		--	--	13
Bezzia/ Palpomyia	3	Corixidae	2	Physa sp.	5	Oxyethira sp.		3	PH	12
Ophidonais serpentina	3	Anax junius	2	Liodessus obscurellus	3	Liodessus obscurellus	Adults	5	P	11
Tubificidae w/ hair chaetae	3	Bezzia/ Palpomyia	1	Bezzia/ Palpomyia	3	Tanytarsus sp.		6	CF	8
Ceratopogonidae	2	Eucorethra sp.	1	Cryptotendipes sp.	3	Bezzia/ Palpomyia		6	P	7
Tanytarsini	2	Chironomidae	1	Caenis latipennis	3	Paratanytarsus sp.	Pupae	--	--	6
Tricorythodes sp.	2	Lauterborniella sp.	1	Dicrotendipes sp.	2	Cricotopus sp.		7	CG	6
Oxyethira sp.	2	Cricotopus sp.	1	Cricotopus bicinctus grp.	2	Gammarus sp.		6	CG	5
Gammarus sp.	2	Fallceon quilleri	1	Ceratopogonidae	1	Ablabesmyia sp.		8	CG	5
Dero digitata	2	Tricorythodes sp.	1	Apedilum sp.	1	Tricorythodes sp.		4	CG	4
Ferrissia sp.	2	Libellula sp.	1	Cryptotendipes sp.	1	Ischnura sp.		9	P	4
Menetus opercularis	2	Hydroptila sp.	1	Orthocladiinae	1	Corixidae		10	P	4
Chironomini	1	Cyprididae	1	Cricotopus sp.	1	Tubificidae w/ hair chaetae		5	CG	3
Polypedilum sp.	1	Helobdella stagnalis	1	Ablabesmyia sp.	1	Ferrissia sp.		6	SC	3
Pentaneura sp.	1	Lumbriculus variegata	1	Centroptilum sp.	1	Cyprididae		8	CG	3
Belostoma flumineum	1	Dero digitata	1	Fallceon quilleri	1	Cryptotendipes sp.		6	CG	3
Corixidae	1		293	Tricorythodes sp.	1	Ceratopogonidae	Pupae	--	--	3
Libellula sp.	1			Corixidae	1	Tanytarsini		6	CG	2
Hydroptila sp.	1			Procambarus clarkii	1	Libellula sp.		9	P	2
Cyprididae	1			Cyprididae	1	Hydroptila sp.		6	PH	2
Helobdella stagnalis	1			Aulodrilus pigueti	1	Helobdella stagnalis		6	PA	2
Corbicula sp.	1			Ferrissia sp.	1	Fallceon quilleri		4	CG	2
	300			Gyraulus sp.	1	Dicrotendipes sp.	Pupae	--	--	2
					290	Cricotopus bicinctus grp.		7	CG	2
						Anax junius		--	P	2
						Procambarus clarkii		8	SH	1
						Pentaneura sp.	Pupae	--	--	1
						Orthocladiinae		5	CG	1
						Lumbriculus variegata		--	CG	1
						Lauterborniella sp.		6	CG	1

PGC7 - continued.

Taxon	T 1	Taxon	T 2	Taxon	T 3	Taxon	Life Stage	Tol Val	FFG	Total
						Gyraulus sp.		8	SC	1
						Eucorethra sp.		--	P	1
						Cryptotendipes sp.	Pupae	--	--	1
						Corbicula sp.		8	CF	1
						Chironomini		6	CG	1
						Chironomidae		6	CG	1
						Centroptilum sp.		2	CG	1
						Belostoma flumineum		8	P	1
						Aulodrilus pigueti		--	CG	1
						Apedilum sp.	Pupae	--	--	1
										883

PGC8

Taxon	T 1
Tubificidae Unident. Imm	60
Physa sp.	46
Dero digitata	23
Tubificidae w/ hair chaetae	9
Lumbriculus variegata	5
Orthocladiinae	3
Limnodrilus hoffmeisteri	3
Lumbricina	2
Fossaria sp.	2
Chironomini	1
Tanytarsini	1
Micropsectra sp.	1
Cricotopus sp.	1
Culex sp.	1
Helobdella stagnalis	1
Prostoma sp.	1
	160

Taxon	T 2
Tubificidae w/ hair chaetae	116
Tubificidae Unident. Imm	111
Physa sp.	48
Limnodrilus hoffmeisteri	25
Dero digitata	5
Cricotopus sp.	2
Mooreobdella microstoma	2
Ceratopogonidae	1
Orthocladiinae	1
Culex sp.	1
Psychodidae	1
Sciomyzidae	1
	314

Taxon	T 3
Physa sp.	111
Tubificidae Unident. Imm	30
Dero digitata	10
Limnophyes sp.	3
Hyalella sp.	3
Tubificidae w/ hair chaetae	3
Pristina leidyi	2
Fossaria sp.	2
Micropsectra sp.	1
Cricotopus sp.	1
Lumbriculus variegata	1
Chaetogaster diaphanus	1
Slavina appendiculata	1
Gyraulus sp.	1
	170

Taxon	Life Stage	Tol Val	FFG	Total
Physa sp.		8	SC	205
Tubificidae Unident. Imm		10	CG	201
Tubificidae w/ hair chaetae		5	CG	128
Dero digitata		--	CG	38
Limnodrilus hoffmeisteri		--	CG	28
Lumbriculus variegata		--	CG	6
Orthocladiinae		5	CG	4
Fossaria sp.		8	SC	4
Cricotopus sp.		7	CG	4
Limnophyes sp.		8	CG	3
Hyalella sp.		8	CG	3
Pristina leidyi		--	CG	2
Mooreobdella microstoma		8	P	2
Micropsectra sp.		7	CG	2
Lumbricina		--	CG	2
Tanytarsini		6	CG	1
Slavina appendiculata		--	CG	1
Sciomyzidae		6	P	1
Psychodidae		--	CG	1
Prostoma sp.		8	P	1
Helobdella stagnalis		6	PA	1
Gyraulus sp.		8	SC	1
Culex sp.		8	CG	1
Culex sp.	Pupae	--	--	1
Chironomini		6	CG	1
Chaetogaster diaphanus		--	--	1
Ceratopogonidae	Pupae	--	--	1
				644

PGC9

Taxon	T 1	Taxon	T 2	Taxon	T 3	Taxon	Life Stage	Tol Val	FFG	Total
Dugesia tigrina	37	Dugesia tigrina	75	Dicrotendipes sp.	73	Dugesia tigrina		4	P	171
Tubificidae Unident. Imm	14	Dicrotendipes sp.	52	Dugesia tigrina	59	Dicrotendipes sp.		8	CG	135
Dicrotendipes sp.	10	Micropsectra sp.	40	Micropsectra sp.	54	Micropsectra sp.		7	CG	96
Chironomus sp.	8	Chironomus sp.	38	Aulodrilus pigueti	27	Chironomus sp.		10	CG	68
Psectrotanypus sp.	5	Dero digitata	30	Chironomus sp.	22	Aulodrilus pigueti		--	CG	56
Radotanypus sp.	4	Aulodrilus pigueti	28	Dero digitata	14	Dero digitata		--	CG	46
Micropsectra sp.	2	Psectrotanypus sp.	8	Chironomini	10	Tubificidae Unident. Imm		10	CG	23
Dero digitata	2	Paratanytarsus sp.	6	Physa sp.	10	Psectrotanypus sp.		10	P	16
Tanypodinae	1	Enchytraeidae	5	Tubificidae Unident. Imm	5	Physa sp.		8	SC	10
Slavina appendiculata	1	Micropsectra sp.	4	Ferrissia sp.	4	Chironomini		6	CG	10
Aulodrilus pigueti	1	Tubificidae Unident. Imm	4	Alotanypus sp.	3	Paratanytarsus sp.		6	CF	6
Limnodrilus hoffmeisteri	1	Apedilum sp.	2	Psectrotanypus sp.	3	Enchytraeidae		10	CG	6
	86	Alotanypus sp.	1	Slavina appendiculata	2	Slavina appendiculata		--	CG	4
		Slavina appendiculata	1	Menetus opercularis	2	Radotanypus sp.		7	P	4
		Tubificidae w/ hair chaetae	1	Hydraena sp.	1	Micropsectra sp.	Pupae	--	--	4
			295	Enchytraeidae	1	Ferrissia sp.		6	SC	4
				Dero borellii	1	Alotanypus sp.		7	P	4
					291	Menetus opercularis		6	SC	2
						Apedilum sp.		6	CG	2
						Tubificidae w/ hair chaetae		5	CG	1
						Tanypodinae		7	P	1
						Limnodrilus hoffmeisteri		--	CG	1
						Hydraena sp.	Adults	5	SC	1
						Dero borellii		10	CG	1
										672

PGC10

Taxon	T 1	Taxon	T 2	Taxon	T 3	Taxon	Life Stage	Tol Val	FFG	Total
Micropsectra sp.	40	Micropsectra sp.	36	Micropsectra sp.	44	Micropsectra sp.		7	CG	120
Nais communis/ variabilis	31	Cricotopus sp.	34	Nais communis/ variabilis	39	Tubificidae Unident. Imm		10	CG	72
Chironomini	30	Polypedilum sp.	33	Pisidium sp.	26	Nais communis/ variabilis		--	CG	70
Tubificidae Unident. Imm	30	Tubificidae Unident. Imm	33	Oxyethira sp.	18	Cricotopus sp.		7	CG	63
Cricotopus sp.	20	Dicrotendipes sp.	31	Rheocricotopus sp.	16	Polypedilum sp.		6	CG	57
Oxyethira sp.	20	Dero digitata	29	Menetus opercularis	13	Oxyethira sp.		3	PH	54
Hyalella sp.	17	Paratanytarsus sp.	20	Chironomini	12	Dicrotendipes sp.		8	CG	47
Paratendipes sp.	14	Oxyethira sp.	16	Polypedilum sp.	12	Pisidium sp.		8	CF	42
Polypedilum sp.	12	Apedilum sp.	9	Dugesia tigrina	11	Chironomini		6	CG	42
Pisidium sp.	11	Stylaria lacustris	9	Hyalella sp.	10	Hyalella sp.		8	CG	34
Dicrotendipes sp.	10	Turbellaria	9	Orthocladiinae	9	Dero digitata		--	CG	30
Dugesia tigrina	10	Hyalella sp.	7	Cricotopus sp.	9	Rheocricotopus sp.		6	OM	27
Tanytarsini	6	Menetus opercularis	7	Tubificidae Unident. Imm	9	Menetus opercularis		6	SC	26
Rheocricotopus sp.	6	Rheocricotopus sp.	5	Orthocladius complex	8	Paratanytarsus sp.		6	CF	25
Menetus opercularis	6	Pisidium sp.	5	Dicrotendipes sp.	6	Paratendipes sp.		8	CG	22
Simulium sp.	5	Chironomus sp.	3	Paratendipes sp.	6	Dugesia tigrina		4	P	21
Thienemanniella sp.	4	Cladotanytarsus sp.	3	Simulium sp.	6	Apedilum sp.		6	CG	15
Erpobdellidae	4	Thienemanniella sp.	3	Eukiefferiella sp.	5	Orthocladiinae		5	CG	12
Apedilum sp.	3	Paratendipes sp.	2	Paratanytarsus sp.	4	Simulium sp.		6	CF	11
Orthocladiinae	3	Tanytarsus sp.	2	Physa sp.	4	Turbellaria		4	P	9
Eukiefferiella sp.	2	Eukiefferiella sp.	1	Apedilum sp.	3	Thienemanniella sp.		6	CG	9
Cricotopus bicinctus grp.	2	Cricotopus bicinctus grp.	1	Cricotopus bicinctus grp.	2	Stylaria lacustris		--	CG	9
Limnodrilus hoffmeisteri	2	Fallceon quilleri	1	Thienemanniella sp.	2	Orthocladius complex		6	CG	8
Liodessus obscurellus	1	Lumbricina	1	Lumbriculus variegata	2	Eukiefferiella sp.		8	OM	8
Hydraena sp.	1		300	Fossaria sp.	2	Tanytarsini		6	CG	6
Paratendipes sp.	1			Cryptochironomus sp.	1	Physa sp.		8	SC	5
Cladotanytarsus sp.	1			Corynoneura sp.	1	Cricotopus bicinctus grp.		7	CG	5
Paratanytarsus sp.	1			Fallceon quilleri	1	Erpobdellidae		8	P	4
Paratanytarsus sp.	1			Helobdella stagnalis	1	Cladotanytarsus sp.		7	CG	4
Limnophyes sp.	1			Dero digitata	1	Lumbriculus variegata		--	CG	3
Cricotopus sp.	1			Prostoma sp.	1	Fossaria sp.		8	SC	3
Rheocricotopus sp.	1				284	Fallceon quilleri		4	CG	3
Sciomyzidae	1					Chironomus sp.		10	CG	3
Fallceon quilleri	1					Tanytarsus sp.		6	CF	2
Lumbriculus variegata	1					Limnodrilus hoffmeisteri		--	CG	2
Tubificidae w/ hair chaetae	1					Tubificidae w/ hair chaetae		5	CG	1
Sphaerium sp.	1					Sphaerium sp.		8	CG	1
Fossaria sp.	1					Sciomyzidae		6	P	1
Physa sp.	1					Rheocricotopus sp.	Pupae	--	--	1
	304					Prostoma sp.		8	P	1

PGC10 - continued.

Taxon	T 1	Taxon	T 2	Taxon	T 3	Taxon	Life Stage	Tol Val	FFG	Total
						Paratendipes sp.	Pupae	--	--	1
						Paratanytarsus sp.	Pupae	--	--	1
						Lumbricina		--	CG	1
						Liodessus obscurellus	Adults	5	P	1
						Limnophyes sp.		8	CG	1
						Hydraena sp.	Adults	5	SC	1
						Helobdella stagnalis		6	PA	1
						Cryptochironomus sp.		8	P	1
						Cricotopus sp.	Pupae	--	--	1
						Corynoneura sp.		7	CG	1
										888

PGC11

Taxon	T 1
Dugesia tigrina	182
Dero digitata	39
Slavina appendiculata	27
Tubificidae Unident. Imm	26
Nais communis/ variabilis	10
Planorbella sp.	9
Prostoma sp.	8
Cyprididae	6
Tanytarsus sp.	1
Lumbriculus variegata	1
Enchytraeidae	1
Pristina leidyi	1
Fossaria sp.	1
	312

Taxon	T 2
Dugesia tigrina	217
Tubificidae Unident. Imm	24
Cyprididae	13
Planorbella sp.	11
Lumbriculus variegata	8
Dero digitata	5
Tanytarsini	4
Fossaria sp.	4
Prostoma sp.	4
Oxyethira sp.	2
Nais communis/ variabilis	2
Brachycera	1
	295

Taxon	T 3
Turbellaria	259
Dero digitata	12
Cyprididae	11
Planorbidae	9
Gastropoda	4
Apedilum sp.	2
Micropsectra sp.	2
Tubificidae Unident. Imm	2
Cricotopus sp.	1
Hydrellia sp.	1
Tubificidae w/ hair chaetae	1
	304

Taxon	Life Stage	Tol Val	FFG	Total
Dugesia tigrina		4	P	399
Turbellaria		4	P	259
Dero digitata		--	CG	56
Tubificidae Unident. Imm		10	CG	52
Cyprididae		8	CG	30
Slavina appendiculata		--	CG	27
Planorbella sp.		6	SC	20
Prostoma sp.		8	P	12
Nais communis/ variabilis		--	CG	12
Planorbidae		7	SC	9
Lumbriculus variegata		--	CG	9
Fossaria sp.		8	SC	5
Tanytarsini		6	CG	4
Gastropoda		--	SC	4
Oxyethira sp.		3	PH	2
Micropsectra sp.		7	CG	2
Apedilum sp.		6	CG	2
Tubificidae w/ hair chaetae		5	CG	1
Tanytarsus sp.		6	CF	1
Pristina leidyi		--	CG	1
Hydrellia sp.		6	SH	1
Enchytraeidae		10	CG	1
Cricotopus sp.		7	CG	1
Brachycera	Pupae	--	--	1
				911

PGC12

Taxon	T 1
Chironomus sp.	120
Tubificidae Unident. Imm	52
Aulodrilus pigueti	38
Psectrotanypus sp.	24
Physa sp.	17
Paratanytarsus sp.	13
Dero digitata	6
Micropsectra sp.	5
Menetus opercularis	5
Chironomus sp.	4
Hyalella sp.	4
Tanytarsus sp.	3
Tubificidae w/ hair chaetae	3
Cricotopus sp.	2
Limnophyes sp.	2
Limnodrilus hoffmeisteri	2
Thienemanniella sp.	1
Psectrotanypus sp.	1
Enchytraeidae	1
Ferrissia sp.	1
	304

Taxon	T 2
Tubificidae Unident. Imm	65
Chironomus sp.	59
Micropsectra sp.	55
Paratanytarsus sp.	23
Physa sp.	19
Psectrotanypus sp.	14
Nais communis/ variabilis	13
Aulodrilus pigueti	13
Menetus opercularis	11
Cricotopus bicinctus grp.	4
Hyalella sp.	4
Planorbella sp.	4
Micropsectra sp.	3
Paratendipes sp.	2
Tanytarsus sp.	2
Psectrotanypus sp.	2
Apedilum sp.	1
Tubificidae w/ hair chaetae	1
Ferrissia sp.	1
	296

Taxon	T 3
Tubificidae Unident. Imm	124
Micropsectra sp.	63
Nais communis/ variabilis	23
Paratanytarsus sp.	20
Tanytarsini	13
Lumbriculus variegata	9
Rheocricotopus sp.	5
Physa sp.	4
Menetus opercularis	4
Cricotopus bicinctus grp.	3
Tubificidae w/ hair chaetae	2
Chironomini	1
Chironomus sp.	1
Limnophyes sp.	1
Rheocricotopus sp.	1
Psectrotanypus sp.	1
Hyalella sp.	1
Cyprididae	1
Aulodrilus pigueti	1
Limnodrilus hoffmeisteri	1
	279

Taxon	Life Stage	Tol Val	FFG	Total
Tubificidae Unident. Imm		10	CG	241
Chironomus sp.		10	CG	180
Micropsectra sp.		7	CG	123
Paratanytarsus sp.		6	CF	56
Aulodrilus pigueti		--	CG	52
Physa sp.		8	SC	40
Psectrotanypus sp.		10	P	39
Nais communis/ variabilis		--	CG	36
Menetus opercularis		6	SC	20
Tanytarsini		6	CG	13
Lumbriculus variegata		--	CG	9
Hyalella sp.		8	CG	9
Cricotopus bicinctus grp.		7	CG	7
Tubificidae w/ hair chaetae		5	CG	6
Dero digitata		--	CG	6
Tanytarsus sp.		6	CF	5
Rheocricotopus sp.		6	OM	5
Planorbella sp.		6	SC	4
Chironomus sp.	Pupae	--	--	4
Psectrotanypus sp.	Pupae	--	--	3
Micropsectra sp.	Pupae	--	--	3
Limnophyes sp.		8	CG	3
Limnodrilus hoffmeisteri		--	CG	3
Paratendipes sp.		8	CG	2
Ferrissia sp.		6	SC	2
Cricotopus sp.		7	CG	2
Thienemanniella sp.	Pupae	--	--	1
Rheocricotopus sp.	Pupae	--	--	1
Enchytraeidae		10	CG	1
Cyprididae		8	CG	1
Chironomini		6	CG	1
Apedilum sp.		6	CG	1
				879

PGC14

Taxon	T 1	Taxon	T 2	Taxon	T 3	Taxon	Life Stage	Tol Val	FFG	Total
Dugesia tigrina	85	Haemonais waldvogeli	217	Dero digitata	50	Haemonais waldvogeli		--	CG	289
Dero digitata	66	Menetus opercularis	20	Haemonais waldvogeli	50	Dero digitata		--	CG	123
Menetus opercularis	30	Tubificidae Unident. Imm	13	Tubificidae w/ hair chaetae	48	Dugesia tigrina		4	P	100
Haemonais waldvogeli	22	Tubificidae w/ hair chaetae	11	Tubificidae Unident. Imm	41	Tubificidae Unident. Imm		10	CG	72
Tubificidae Unident. Imm	18	Dero digitata	7	Physa sp.	20	Menetus opercularis		6	SC	70
Physa sp.	17	Aulodrilus pigueti	7	Menetus opercularis	20	Tubificidae w/ hair chaetae		5	CG	66
Dicrotendipes sp.	16	Planorbella sp.	7	Limnodrilus hoffmeisteri	9	Physa sp.		8	SC	41
Planorbella sp.	8	Dugesia tigrina	6	Dugesia tigrina	9	Dicrotendipes sp.		8	CG	23
Tubificidae w/ hair chaetae	7	Enchytraeidae	4	Lumbriculus variegata	8	Planorbella sp.		6	SC	19
Pisidium sp.	6	Physa sp.	4	Dicrotendipes sp.	5	Aulodrilus pigueti		--	CG	12
Psectrotanypus sp.	5	Dicrotendipes sp.	2	Aulodrilus pigueti	5	Lumbriculus variegata		--	CG	9
Erpobdellidae	5	Pisidium sp.	2	Planorbella sp.	4	Limnodrilus hoffmeisteri		--	CG	9
Tanypodinae	3	Sphaerium sp.	2	Psectrotanypus sp.	3	Psectrotanypus sp.		10	P	8
Sphaerium sp.	3	Cyprididae	1	Erpobdellidae	2	Sphaerium sp.		8	CG	7
Helobdella stagnalis	2	Helobdella stagnalis	1	Helobdella stagnalis	2	Erpobdellidae		8	P	7
Hydra sp.	2	Lumbriculus variegata	1	Sphaerium sp.	2	Pisidium sp.		8	CF	6
Microtendipes sp.	1	Hydra sp.	1	Goeldichironomus sp.	1	Helobdella stagnalis		6	PA	5
Tipula sp.	1		306	Cricotopus sp.	1	Enchytraeidae		10	CG	4
Dero borellii	1			Hydroptila sp.	1	Tanypodinae		7	P	3
	298			Cyprididae	1	Hydra sp.		5	P	3
					282	Pisidium sp.		8	CF	2
						Cyprididae		8	CG	2
						Tipula sp.		4	OM	1
						Microtendipes sp.		6	CF	1
						Hydroptila sp.		6	PH	1
						Goeldichironomus sp.		6	CG	1
						Dero borellii		10	CG	1
						Cricotopus sp.		7	CG	1
										886

PGC15

Taxon	T 1	Taxon	T 2	Taxon	T 3	Taxon	Life Stage	Tol Val	FFG	Total
Dicrotendipes sp.	196	Dero digitata	93	Cricotopus sp.	84	Dicrotendipes sp.		8	CG	241
Tubificidae Unident. Imm	39	Tubificidae Unident. Imm	90	Dugesia tigrina	50	Tubificidae Unident. Imm		10	CG	159
Pisidium sp.	15	Dero borellii	37	Dero digitata	39	Dero digitata		--	CG	139
Psectrotanypus sp.	7	Psectrotanypus sp.	17	Dicrotendipes sp.	35	Cricotopus sp.		7	CG	96
Dero digitata	7	Dicrotendipes sp.	10	Tubificidae Unident. Imm	30	Dugesia tigrina		4	P	65
Planorbella sp.	6	Cricotopus sp.	10	Dero borellii	23	Dero borellii		10	CG	64
Dugesia tigrina	6	Limnodrilus hoffmeisteri	9	Coenagrionidae	10	Pisidium sp.		8	CF	25
Dero borellii	4	Dugesia tigrina	9	Pisidium sp.	9	Psectrotanypus sp.		10	P	24
Physa sp.	3	Tubificidae w/ hair chaetae	8	Aulodrilus pigueti	7	Planorbella sp.		6	SC	14
Cricotopus sp.	2	Physa sp.	5	Planorbella sp.	6	Physa sp.		8	SC	11
Libellula sp.	1	Chironomus sp.	2	Physa sp.	3	Coenagrionidae		--	P	10
Ferrissia sp.	1	Planorbella sp.	2	Menetus opercularis	3	Tubificidae w/ hair chaetae		5	CG	9
Menetus opercularis	1	Ceratopogonidae	1	Chironomus sp.	1	Limnodrilus hoffmeisteri		--	CG	9
	288	Mooreobdella microstoma	1	Cricotopus bicinctus grp.	1	Aulodrilus pigueti		--	CG	7
		Pisidium sp.	1	Tanypodinae	1	Menetus opercularis		6	SC	4
			295	Alotanypus sp.	1	Chironomus sp.		10	CG	3
				Slavina appendiculata	1	Ferrissia sp.		6	SC	2
				Tubificidae w/ hair chaetae	1	Tanypodinae	Pupae	--	--	1
				Ferrissia sp.	1	Slavina appendiculata		--	CG	1
					306	Mooreobdella microstoma		8	P	1
						Libellula sp.		9	P	1
						Cricotopus bicinctus grp.		7	CG	1
						Ceratopogonidae	Pupae	--	--	1
						Alotanypus sp.		7	P	1
										889

PGC16

Taxon	T 1
Psectrotanypus sp.	74
Tubificidae Unident. Imm	55
Chironomus sp.	49
Physa sp.	33
Helobdella stagnalis	24
Cricotopus sp.	17
Enchytraeidae	11
Limnodrilus hoffmeisteri	11
Paratanytarsus sp.	7
Tubificidae w/ hair chaetae	5
Diptera	3
Chironomini	3
Micropsectra sp.	3
Tribelos sp.	1
Tanytarsini	1
Cricotopus sp.	1
Haemonais waldvogeli	1
	299

Taxon	T 2
Psectrotanypus sp.	53
Chironomus sp.	14
Tubificidae Unident. Imm	10
Physa sp.	7
Cricotopus sp.	4
Tubificidae w/ hair chaetae	3
Chironomini	2
Paratanytarsus sp.	1
Helobdella stagnalis	1
	95

Taxon	T 3
Psectrotanypus sp.	119
Chironomus sp.	84
Cricotopus sp.	34
Physa sp.	32
Paratanytarsus sp.	6
Tanypus sp.	5
Planorbella sp.	4
Micropsectra sp.	3
Tubificidae Unident. Imm	3
Parachironomus sp.	2
Chironomus sp.	1
Scatella sp.	1
Helobdella stagnalis	1
Enchytraeidae	1
Ophidonais serpentina	1
Aulodrilus pigueti	1
Limnodrilus hoffmeisteri	1
	299

Taxon	Life Stage	Tol Val	FFG	Total
Psectrotanypus sp.		10	P	246
Chironomus sp.		10	CG	147
Physa sp.		8	SC	72
Tubificidae Unident. Imm		10	CG	68
Cricotopus sp.		7	CG	55
Helobdella stagnalis		6	PA	26
Paratanytarsus sp.		6	CF	13
Limnodrilus hoffmeisteri		--	CG	12
Enchytraeidae		10	CG	12
Tubificidae w/ hair chaetae		5	CG	8
Micropsectra sp.		7	CG	6
Tanypus sp.		10	P	5
Chironomini		6	CG	5
Planorbella sp.		6	SC	4
Diptera	Pupae	--	--	3
Parachironomus sp.		10	P	2
Tribelos sp.		5	CG	1
Tanytarsini		6	CG	1
Scatella sp.		6	CG	1
Paratanytarsus sp.	Pupae	--	--	1
Ophidonais serpentina		--	--	1
Haemonais waldvogeli		--	CG	1
Cricotopus sp.	Pupae	--	--	1
Chironomus sp.	Pupae	--	--	1
Aulodrilus pigueti		--	CG	1
				693

PGC17

Taxon	T 1
Lumbriculus variegata	207
Physa sp.	17
Psectrotanypus sp.	16
Micropsectra sp.	14
Cyprididae	9
Dugesia tigrina	9
Limnophyes sp.	4
Tubificidae Unident. Imm	4
Chironomus sp.	2
Planorbella sp.	2
Dero digitata	1
Aulodrilus pigueti	1
Fossaria sp.	1
	287

Taxon	T 2
Pisidium sp.	124
Tubificidae Unident. Imm	91
Haemonais waldvogeli	20
Tubificidae w/ hair chaetae	15
Limnodrilus hoffmeisteri	12
Psectrotanypus sp.	9
Lumbriculus variegata	6
Planorbella sp.	6
Physa sp.	2
Dugesia tigrina	1
	286

Taxon	T 3
Tubificidae Unident. Imm	110
Sphaeriidae	104
Pisidium sp.	38
Tubificidae w/ hair chaetae	17
Limnodrilus hoffmeisteri	5
Psectrotanypus sp.	3
Lumbriculus variegata	3
Physa sp.	3
Fossaria sp.	2
Ephydridae	1
Gyraulus sp.	1
Prostoma sp.	1
	288

Taxon	Life Stage	Tol Val	FFG	Total
Lumbriculus variegata		--	CG	216
Tubificidae Unident. Imm		10	CG	205
Pisidium sp.		8	CF	162
Sphaeriidae		8	CG	104
Tubificidae w/ hair chaetae		5	CG	32
Psectrotanypus sp.		10	P	28
Physa sp.		8	SC	22
Haemonais waldvogeli		--	CG	20
Limnodrilus hoffmeisteri		--	CG	17
Micropsectra sp.		7	CG	14
Dugesia tigrina		4	P	10
Cyprididae		8	CG	9
Planorbella sp.		6	SC	8
Limnophyes sp.		8	CG	4
Fossaria sp.		8	SC	3
Chironomus sp.		10	CG	2
Prostoma sp.		8	P	1
Gyraulus sp.		8	SC	1
Ephydridae	Pupae	--	--	1
Dero digitata		--	CG	1
Aulodrilus pigueti		--	CG	1
				861

PGC18

Taxon	T 1
Sphaerium sp.	98
Menetus opercularis	71
Physa sp.	40
Pisidium sp.	28
Dero digitata	16
Dugesia tigrina	14
Psectrotanypus sp.	11
Chironomus sp.	6
Liodessus obscurellus	3
Cyprididae	2
Lumbriculus variegata	2
Ferrissia sp.	2
Hydraena sp.	1
Tubificidae w/ hair chaetae	1
	295

Taxon	T 2
Menetus opercularis	114
Physa sp.	67
Dero digitata	38
Sphaerium sp.	35
Pisidium sp.	14
Psectrotanypus sp.	5
Planorbella sp.	5
Tubificidae Unident. Imm	4
Gyraulus sp.	4
Dugesia tigrina	4
Dicrotendipes sp.	2
Pachydiplax longipennis	2
Cyprididae	2
Tubificidae w/ hair chaetae	2
Micropsectra sp.	1
Erpobdellidae	1
	300

Taxon	T 3
Dero digitata	186
Menetus opercularis	55
Physa sp.	20
Pisidium sp.	11
Psectrotanypus sp.	7
Dugesia tigrina	6
Cyprididae	4
Chironomus sp.	3
Lumbriculus variegata	2
Tubificidae w/ hair chaetae	2
Limnodrilus hoffmeisteri	2
Planorbella sp.	1
	299

Taxon	Life Stage	Tol Val	FFG	Total
Menetus opercularis		6	SC	240
Dero digitata		--	CG	240
Sphaerium sp.		8	CG	133
Physa sp.		8	SC	127
Pisidium sp.		8	CF	53
Dugesia tigrina		4	P	24
Psectrotanypus sp.		10	P	23
Chironomus sp.		10	CG	9
Cyprididae		8	CG	8
Planorbella sp.		6	SC	6
Tubificidae w/ hair chaetae		5	CG	5
Tubificidae Unident. Imm		10	CG	4
Lumbriculus variegata		--	CG	4
Gyraulus sp.		8	SC	4
Liodessus obscurellus	Adults	5	P	3
Pachydiplax longipennis		9	P	2
Limnodrilus hoffmeisteri		--	CG	2
Ferrissia sp.		6	SC	2
Dicrotendipes sp.		8	CG	2
Micropsectra sp.		7	CG	1
Hydraena sp.	Adults	5	SC	1
Erpobdellidae		8	P	1
				894

PGC19

Taxon	T 1	Taxon	T 2	Taxon	T 3	Taxon	Life Stage	Tol Val	FFG	Total
Nais communis/ variabilis	113	Physa sp.	63	Pisidium sp.	49	Nais communis/ variabilis		--	CG	181
Paratanytarsus sp.	70	Nais communis/ variabilis	45	Physa sp.	38	Physa sp.		8	SC	126
Physa sp.	25	Paratanytarsus sp.	32	Dugesia tigrina	35	Paratanytarsus sp.		6	CF	117
Ophidonais serpentina	14	Pisidium sp.	31	Nais communis/ variabilis	23	Pisidium sp.		8	CF	88
Tubificidae Unident. Imm	14	Hyalella sp.	18	Dicrotendipes sp.	20	Dugesia tigrina		4	P	43
Dicrotendipes sp.	13	Dero digitata	14	Erpobdellidae	20	Dicrotendipes sp.		8	CG	36
Pisidium sp.	8	Paratendipes sp.	11	Paratendipes sp.	18	Paratendipes sp.		8	CG	29
Planariidae	7	Menetus opercularis	10	Paratanytarsus sp.	15	Tubificidae Unident. Imm		10	CG	26
Hyalella sp.	5	Dugesia tigrina	8	Tubificidae Unident. Imm	12	Hyalella sp.		8	CG	25
Lumbriculus variegata	4	Micropsectra sp.	7	Lumbriculus variegata	11	Ophidonais serpentina		--	--	23
Menetus opercularis	4	Ophidonais serpentina	7	Planorbella sp.	11	Erpobdellidae		8	P	20
Micropsectra sp.	3	Tanytarsus sp.	4	Cricotopus sp.	9	Lumbriculus variegata		--	CG	19
Paratanytarsus sp.	3	Mooreobdella microstoma	4	Stylaria lacustris	7	Planorbella sp.		6	SC	15
Apedilum sp.	2	Lumbriculus variegata	4	Ferrissia sp.	6	Menetus opercularis		6	SC	15
Rheocricotopus sp.	2	Dicrotendipes sp.	3	Apedilum sp.	4	Dero digitata		--	CG	14
Tipula sp.	2	Oxyethira sp.	3	Tubificidae w/ hair chaetae	4	Micropsectra sp.		7	CG	11
Oxyethira sp.	2	Tubificidae w/ hair chaetae	3	Mooreobdella microstoma	3	Cricotopus sp.		7	CG	11
Tubificidae w/ hair chaetae	2	Sphaerium sp.	3	Tanytarsus sp.	2	Tubificidae w/ hair chaetae		5	CG	9
Cryptochironomus sp.	1	Planorbella sp.	3	Paratanytarsus sp.	2	Apedilum sp.		6	CG	8
Phaenopsectra sp.	1	Apedilum sp.	2	Hyalella sp.	2	Stylaria lacustris		--	CG	7
Micropsectra sp.	1	Paratanytarsus sp.	2	Ophidonais serpentina	2	Planariidae		4	P	7
Cricotopus sp.	1	Aulodrilus pigueti	2	Chironomus sp.	1	Paratanytarsus sp.	Pupae	--	--	7
Paraphaenocladius sp.	1	Hydraena sp.	1	Polypedilum sp.	1	Mooreobdella microstoma		8	P	7
Corynoneura sp.	1	Ochthebius sp.	1	Cladotanytarsus sp.	1	Ferrissia sp.		6	SC	7
Corynoneura sp.	1	Tropisternus sp.	1	Micropsectra sp.	1	Tanytarsus sp.		6	CF	6
Sciomyzidae	1	Chironomini	1	Micropsectra sp.	1	Oxyethira sp.		3	PH	5
Lumbricina	1	Polypedilum sp.	1	Limonia sp.	1	Sphaerium sp.		8	CG	3
Planorbella sp.	1	Tanytarsus sp.	1	Corixidae	1	Tipula sp.		4	OM	2
	303	Cricotopus sp.	1	Haemonais waldvogeli	1	Rheocricotopus sp.		6	OM	2
		Limnophyes sp.	1	Gyraulus sp.	1	Polypedilum sp.		6	CG	2
		Nanocladius sp.	1	Menetus opercularis	1	Micropsectra sp.	Pupae	--	--	2
		Helobdella sp.	1		303	Aulodrilus pigueti		--	CG	2
		Enchytraeidae	1			Tropisternus sp.	Larvae	5	P	1
		Ferrissia sp.	1			Tanytarsus sp.	Pupae	--	--	1
		Fossaria sp.	1			Sciomyzidae		6	P	1
			292			Phaenopsectra sp.		7	SC	1
						Paraphaenocladius sp.		4	CG	1
						Ochthebius sp.	Adults	5	SC	1
						Nanocladius sp.		3	CG	1

PGC19 - continued.

Taxon	T 1	Taxon	T 2	Taxon	T 3	Taxon	Life Stage	Tol Val	FFG	Total
						Lumbricina		--	CG	1
						Limonia sp.		6	SH	1
						Limnophyes sp.		8	CG	1
						Hydraena sp.	Adults	5	SC	1
						Helobdella sp.		6	PA	1
						Haemonais waldvogeli		--	CG	1
						Gyraulus sp.		8	SC	1
						Fossaria sp.		8	SC	1
						Enchytraeidae		10	CG	1
						Cryptochironomus sp.		8	P	1
						Corynoneura sp.		7	CG	1
						Corynoneura sp.	Pupae	--	--	1
						Corixidae		10	P	1
						Cladotanytarsus sp.		7	CG	1
						Chironomus sp.		10	CG	1
						Chironomini		6	CG	1
										898

PGC20

Taxon	T 1
Hyalella sp.	99
Physa sp.	93
Chironomidae	82
Menetus opercularis	6
Cyprididae	4
Dero digitata	3
Hydrellia sp.	2
Coenagrionidae	2
Tubificidae Unident. Imm	2
Tubificidae w/ hair chaetae	2
Planorbella sp.	2
Tropisternus sp.	1
Lumbriculus variegata	1
Limnodrilus hoffmeisteri	1
	300

Taxon	T 2
Hyalella sp.	107
Physa sp.	94
Dero digitata	57
Cyprididae	11
Menetus opercularis	9
Coenagrionidae	7
Cricotopus sp.	6
Paratanytarsus sp.	4
Stylaria lacustris	4
Planorbella sp.	4
Polypedilum sp.	3
Tanypus sp.	2
Tubificidae Unident. Imm	2
Dicrotendipes sp.	1
Procladius sp.	1
Oxyethira sp.	1
Aulodrilus pigueti	1
Ferrissia sp.	1
	315

Taxon	T 3
Hyalella sp.	73
Cyprididae	66
Coenagrionidae	44
Cricotopus sp.	35
Physa sp.	26
Dero digitata	21
Psectrotanypus sp.	15
Paratanytarsus sp.	7
Tubificidae Unident. Imm	6
Menetus opercularis	5
Polypedilum sp.	4
Tubificidae w/ hair chaetae	4
Dicrotendipes sp.	2
Cricotopus sp.	2
Tanypodinae	2
Oxyethira sp.	2
Stylaria lacustris	2
Aulodrilus pigueti	2
Liodessus obscurellus	1
Chironomini	1
Phaenopsectra sp.	1
Polypedilum sp.	1
Ablabesmyia sp.	1
Libellula sp.	1
Gyraulus sp.	1
Planorbella sp.	1
	326

Taxon	Life Stage	Tol Val	FFG	Total
Hyalella sp.		8	CG	279
Physa sp.		8	SC	213
Chironomidae		6	CG	82
Dero digitata		--	CG	81
Cyprididae		8	CG	81
Coenagrionidae		--	P	53
Cricotopus sp.		7	CG	41
Menetus opercularis		6	SC	20
Psectrotanypus sp.		10	P	15
Paratanytarsus sp.		6	CF	11
Tubificidae Unident. Imm		10	CG	10
Polypedilum sp.		6	CG	7
Planorbella sp.		6	SC	7
Tubificidae w/ hair chaetae		5	CG	6
Stylaria lacustris		--	CG	6
Oxyethira sp.		3	PH	3
Dicrotendipes sp.		8	CG	3
Aulodrilus pigueti		--	CG	3
Tanypus sp.		10	P	2
Tanypodinae		7	P	2
Hydrellia sp.		6	SH	2
Cricotopus sp.	Pupae	--	--	2
Tropisternus sp.	Larvae	5	P	1
Procladius sp.	Pupae	--	--	1
Polypedilum sp.	Pupae	--	--	1
Phaenopsectra sp.		7	SC	1
Lumbriculus variegata		--	CG	1
Liodessus obscurellus	Adults	5	P	1
Limnodrilus hoffmeisteri		--	CG	1
Libellula sp.		9	P	1
Gyraulus sp.		8	SC	1
Ferrissia sp.		6	SC	1
Chironomini		6	CG	1
Ablabesmyia sp.		8	CG	1
				941

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Taxon	T 1	Taxon	T 2	Tax on	T 3	Taxon	Life Stage	Tol Val	FFG	Total
Tubificidae Unident. Imm	96	Lumbricina	54	Tubificidae Unident. Imm	115	Tubificidae Unident. Imm		10	CG	252
Paratendipes sp.	65	Rheocricotopus sp.	46	Lumbricina	48	Lumbricina		--	CG	118
Physa sp.	18	Tubificidae Unident. Imm	41	Nais communis/ variabilis	16	Paratendipes sp.		8	CG	67
Lumbricina	16	Micropsectra sp.	35	Tanytarsus sp.	14	Rheocricotopus sp.		6	OM	63
Micropsectra sp.	14	Physa sp.	16	Rheocricotopus sp.	11	Micropsectra sp.		7	CG	49
Paratanytarsus sp.	8	Nais communis/ variabilis	15	Cricotopus sp.	10	Nais communis/ variabilis		--	CG	39
Cricotopus sp.	8	Eukiefferiella sp.	12	Eukiefferiella sp.	9	Physa sp.		8	SC	36
Nais communis/ variabilis	8	Planorbella sp.	9	Apedilum sp.	7	Eukiefferiella sp.		8	OM	21
Planorbella sp.	8	Rheotanytarsus sp.	7	Thienemanniella sp.	7	Cricotopus sp.		7	CG	19
Limnodrilus hoffmeisteri	7	Paratanytarsus sp.	6	Orthocladiinae	6	Planorbella sp.		6	SC	17
Rheocricotopus sp.	6	Rheocricotopus sp.	6	Simulium sp.	5	Paratanytarsus sp.		6	CF	15
Dicrotendipes sp.	5	Simulium sp.	6	Ophidonais serpentina	4	Tanytarsus sp.		6	CF	14
Hyalella sp.	5	Dugesia tigrina	6	Fossaria sp.	4	Simulium sp.		6	CF	13
Menetus opercularis	5	Limnophyes sp.	5	Dugesia tigrina	4	Thienemanniella sp.		6	CG	12
Microtendipes sp.	4	Eukiefferiella sp.	4	Dicrotendipes sp.	3	Fossaria sp.		8	SC	12
Erpobdellidae	4	Thienemanniella sp.	4	Limnophyes sp.	2	Dugesia tigrina		4	P	12
Pisidium sp.	4	Fossaria sp.	4	Eukiefferiella sp.	2	Menetus opercularis		6	SC	9
Fossaria sp.	4	Micropsectra sp.	3	Rheocricotopus sp.	2	Limnodrilus hoffmeisteri		--	CG	9
Tanytarsini	3	Thienemanniella sp.	3	Oxyethira sp.	2	Dicrotendipes sp.		8	CG	9
Simulium sp.	2	Lumbriculus variegata	3	Physa sp.	2	Rheocricotopus sp.	Pupae	--	--	8
Ophidonais serpentina	2	Menetus opercularis	3	Paratanytarsus sp.	1	Rheotanytarsus sp.		6	CF	7
Dugesia tigrina	2	Paratendipes sp.	2	Erpobdellidae	1	Limnophyes sp.		8	CG	7
Cryptochironomus sp.	1	Phaenopsectra sp.	2	Lumbriculus variegata	1	Erpobdellidae		8	P	7
Microtendipes pedellus grp.	1	Erpobdellidae	2	Limnodrilus hoffmeisteri	1	Apedilum sp.		6	CG	7
Micropsectra sp.	1	Dicrotendipes sp.	1	Pisidium sp.	1	Pisidium sp.		8	CF	6
Orthocladiinae	1	Polypedilum sp.	1	Ferrissia sp.	1	Orthocladiinae		5	CG	6
Thienemanniella sp.	1	Polypedilum sp.	1	Gyraulus sp.	1	Ophidonais serpentina		--	--	6
Corixidae	1	Cricotopus sp.	1	Menetus opercularis	1	Hyalella sp.		8	CG	6
Lumbriculus variegata	1	Prodiamesa sp.	1		281	Eukiefferiella sp.	Pupae	--	--	6
Tubificidae w/ hair chaetae	1	Psychoda sp.	1			Lumbriculus variegata		--	CG	5
Ferrissia sp.	1	Sciomyzidae	1			Microtendipes sp.	Pupae	--	--	4
Gyraulus sp.	1	Tipula sp.	1			Micropsectra sp.	Pupae	--	--	4
	304	Hyalella sp.	1			Thienemanniella sp.	Pupae	--	--	3
		Cyprididae	1			Tanytarsini	Pupae	--	--	3
		Limnodrilus hoffmeisteri	1			Phaenopsectra sp.		7	SC	2
		Pisidium sp.	1			Oxyethira sp.		3	PH	2
		Prostoma sp.	1			Gyraulus sp.		8	SC	2
			307			Ferrissia sp.		6	SC	2
						Tubificidae w/ hair chaetae		5	CG	1
						Tipula sp.		4	OM	1
						Sciomyzidae		6	P	1

PGC21 - continued.

Taxon	T 1	Taxon	T 2	Tax on	T 3	Taxon	Life Stage	Tol Val	FFG	Total
						Psychoda sp.		10	CG	1
						Prostoma sp.		8	P	1
						Prodiamesa sp.		3	CG	1
						Polypedilum sp.		6	CG	1
						Polypedilum sp.	Pupae	--	--	1
						Orthocladiinae	Pupae	--	--	1
						Microtendipes pedellus grp.		6	CF	1
						Cyprididae		8	CG	1
						Cryptochironomus sp.		8	P	1
						Corixidae		10	P	1
										892

PGC22

Taxon	T 1	Taxon	T 2	Taxon	T 3	Taxon	Life Stage	Tol Val	FFG	Total
Physa sp.	80	Physa sp.	87	Physa sp.	106	Physa sp.		8	SC	273
Tubificidae w/ hair chaetae	60	Pisidium sp.	40	Dicrotendipes sp.	40	Pisidium sp.		8	CF	92
Pisidium sp.	48	Dicrotendipes sp.	31	Cyprididae	33	Dicrotendipes sp.		8	CG	87
Lumbriculus variegata	35	Sphaerium sp.	23	Fossaria sp.	24	Tubificidae w/ hair chaetae		5	CG	83
Tubificidae Unident. Imm	21	Tubificidae w/ hair chaetae	22	Tubificidae Unident. Imm	19	Lumbriculus variegata		--	CG	58
Dicrotendipes sp.	16	Lumbriculus variegata	18	Psectrotanypus sp.	16	Tubificidae Unident. Imm		10	CG	55
Sphaerium sp.	10	Tubificidae Unident. Imm	15	Dugesia tigrina	12	Cyprididae		8	CG	50
Dugesia tigrina	9	Cyprididae	13	Lumbricina	7	Sphaerium sp.		8	CG	35
Limnodrilus hoffmeisteri	8	Psectrotanypus sp.	9	Menetus opercularis	6	Psectrotanypus sp.		10	P	32
Psectrotanypus sp.	7	Chironomus sp.	7	Lumbriculus variegata	5	Dugesia tigrina		4	P	28
Gyraulus sp.	7	Dugesia tigrina	7	Pisidium sp.	4	Fossaria sp.		8	SC	25
Dero digitata	6	Gyraulus sp.	5	Gyraulus sp.	4	Gyraulus sp.		8	SC	16
Cyprididae	4	Helobdella stagnalis	3	Planorbella sp.	4	Limnodrilus hoffmeisteri		--	CG	11
Chironomus sp.	3	Limnodrilus hoffmeisteri	3	Tipula sp.	3	Chironomus sp.		10	CG	10
Arrenurus sp.	1	Planorbella sp.	2	Hydrellia sp.	2	Planorbella sp.		6	SC	7
Planorbella sp.	1	Tanytarsus sp.	1	Sphaerium sp.	2	Menetus opercularis		6	SC	7
	316	Paratanytarsus sp.	1	Phaenopsectra sp.	1	Lumbricina		--	CG	7
		Alotanypus sp.	1	Paratanytarsus sp.	1	Dero digitata		--	CG	6
		Psectrotanypus sp.	1	Tubificidae w/ hair chaetae	1	Tipula sp.		4	OM	3
		Tanypus sp.	1		290	Helobdella stagnalis		6	PA	3
		Mooreobdella tetragon	1			Hydrellia sp.		6	SH	2
		Fossaria sp.	1			Tanytarsus sp.		6	CF	1
		Menetus opercularis	1			Tanypus sp.		10	P	1
			293			Psectrotanypus sp.	Pupae	--	--	1
						Phaenopsectra sp.		7	SC	1
						Paratanytarsus sp.	Pupae	--	--	1
						Paratanytarsus sp.		6	CF	1
						Mooreobdella tetragon		8	P	1
						Arrenurus sp.		5	P	1
						Alotanypus sp.		7	P	1
										899