

## Appendix D – Comparison of Benthic and Fish Collections from 1976 and 1999 – 2002.

To evaluate changes in the water quality in the Popes Head Creek Watershed over time, a comparison of fish and benthic macroinvertebrate data from two different studies was conducted. The intent of the data comparison is to assess whether aquatic life conditions have improved or worsened from 1976 to 2002<sup>1</sup>. The first study took place in the mid-1970s and was conducted by Dr. Donald Kelso of George Mason University, as part of the Occoquan Environmental Baseline study<sup>2</sup>. The second study was conducted by Fairfax County from 1999 to 2002, as part of the Stream Protection Strategy Baseline Study.

### D.1 Correlating the Studies

In order to draw relevant comparisons, it was important to ensure that the data correlated with three variables: 1.) the sampling location in the watershed, 2.) similar seasons or months of the year, and 3.) the use of similar sampling methodologies.

#### D.1.1 Locations

The table below shows the sampling location and time of year for the five benthic sample collection stations that appear to coincide:

Station ID <sup>3</sup>	Creek	Kelso Collection Date	County Collection Date	Kelso Location	County Location
5, PHPI01	Upper Piney	12/76	3/99, 3/01	Braddock Rd	2 <sup>nd</sup> /Washington Streets
6, PHPI02	Lower Piney	3/76	3/99	Fairfax Station Rd	Clara Way
7, PHCC01	Lower Castle	12/76	3/99, 3/01	Newmans Rd	Newman Rd
8, PHPH01	Upper Popes Head	12/76	3/99	Popes Head Rd	Outlet Rd at Popes Head Rd
9, PHPH03	Lower Popes Head	12/76	3/99	Chapel Rd	Evans Ford Rd

The locations were checked by the project team to confirm that they are roughly coincident.

<sup>1</sup> It is presumptive to compare two points and call the result a trend. Year to year variations could greatly affect the results of the comparisons and the conclusions drawn from them.

<sup>2</sup> Parsons, Brinkerhoff, Quade and Douglas. 1978. Occoquan Environmental Baseline, Fairfax County, Virginia. Task Order 10.9. February

<sup>3</sup> The first Station ID is Dr. Kelso's ID; the second ID was designated by Fairfax County.

### **D.1.2 Collection Dates**

Dr. Kelso's notes indicated the collection of fish only at Station 8; however, the data show that collections were made at Stations 6, 7, and 9 as well. The collection date for Station 8 was April, 1976. The collection dates for the other stations were not noted; however, notes from a conversation with him indicate that Stations 6-9 were "all collected together". The County collected fish in the summer, typically during July and August. However, at stations PHCC01 and PHPI01, collections were also made during the spring (late April and May). Therefore, differences in the total number of fish collected might be due to the collection season.

Dr. Kelso collected benthic samples in March and December only, while Fairfax County collected their samples in between March 15 and April 15. The difference in season will likely not be of consequence as long as the analyses are restricted to relative abundance or the presence/absence of certain taxa.

### **D.1.3 Sampling Methods**

Dr. Kelso used seine nets to collect fish in the first years, supplemented by electroshocking in the last years. The County used electroshocking exclusively. In shallow, low turbidity waters, there will not be a substantive difference in the results using either collection method.

For benthic collections, the County delineated several 100 yard reaches and sampled the best riffle and run in each reach. Dr. Kelso indicated that he also collected from riffle areas, but avoided pools and depositional areas with soft sediments. Dr. Kelso used a Surber sampler, while the County used a kick net for benthic organism collection. The Surber collects samples from a 0.09 square meter area with a depth of 10 cm; the kick net collects an area of approximately 1 square meter with a similar depth. Using the Surber, one is more likely to obtain a comprehensive sample of the organisms in a smaller area, whereas the kick net is likely to collect a more representative sample of the entire riffle.

## **D.2 Data Analysis**

Data analysis was performed to assess if there were significant differences in the data between the earlier and later data collection periods. The main issue between the two datasets is that Dr. Kelso's fish data is ordinal and cannot be disaggregated, while the County's data is numerical. Therefore, the County's numerical data was aggregated similarly to Dr. Kelso's abundant / common / uncommon categorization scheme. This was done by allowing Dr. Kelso to reclassify the County's fish and benthic data according to his ordinal system; he was given the species name but not the year or the location of the collected samples to lessen the chance of biasing his classification.

## **D.3 Fish Data**

A comparison of the relative abundance of fish species common to both studies is shown in Table 1.

The McNemar test<sup>4</sup> for significance of changes was run, where possible, on the ordinal data from both collection periods. To test the significance of any observed change by this method, a fourfold table of frequencies is set up, in this case to represent the first and second observations at the same location. Frequencies are counted if the number of individuals of a species increased, decreased, or stayed the same. Data for all years at the same location were used to derive the frequencies. Thus at location PHCC01, there were thirteen instances where the species was observed to be more abundant than in the 1976 collection, two instances where the species was observed to be less abundant, and five in which the abundance was judged not to be different. The statistic is computed as:

$$\chi^2 = [\text{ABS}(A-D)-1]^2 / (A+D)$$

where

A is the number of changes from greater to lesser,  
D is the number of changes from lesser to greater, and  
ABS is the absolute value of the argument.

The significance of any value of  $\chi^2$  can be determined by selecting a confidence level and comparing to critical values of the Chi-Square distribution. At the 95% confidence level, the results are that the species common to both studies were more abundant at PHCC01 ( $\chi^2 = 6.67$ ) and not significantly different at PHPH01 ( $\chi^2 = 0.04$ ) or PHPI02 ( $\chi^2 = 3.00$ ). Table 1 details the results of the McNemar test.

In general, the County identified a greater number of fish species in its 1999-2002 collections. Table 2 shows the species collected by the County that were not observed in the earlier study. At site PHCC01, sixteen additional species were observed. Six of these belong to the minnow (*Cyprinidae*) family, which had been observed in 1975-76. However, ten species were from four families that were not observed in the earlier collection; these families are suckers (*Catostomidae*), sunfishes (*Centrarchidae*), mudminnows (*Umbridae*), and catfishes (*Ictaluridae*). At site PHPH01, seven additional species were observed, representing two additional families (*Catostomidae* and *Ictaluridae*). However, two species, fallfish and pumpkinseed (*Semotilus coporalis* and *Lepomis gibbosus*) were observed by Dr. Kelso but were not recorded by the County. At site PHPH03, nineteen species were observed in the later study that had not been observed in the earlier study. The earlier study had identified only one species of *Cyprinidae* at this location. At site PHPI02, fourteen species were observed that were not observed in the earlier study. Seven of these species were from two families (*Catostomidae* and *Centrarchidae*) not observed in the previous study.

The species observed in the latter study are not indicative of improved water quality or habitat conditions because they are not classified as pollution intolerant. However, the fact that there is greater species diversity, which indicates a more resilient community, in the latter sampling period is significant. Table 2 contains a list of fish species and their tolerance to pollution.

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<sup>4</sup> Siegel, S. 1956. Nonparametric statistics for the behavioral sciences. McGraw-Hill Book Company. New York.

### **D.3.1 Seasonal Variance**

One confounding factor in the analysis of the fish data is that they were collected from two different seasons. It is possible, for instance, that the greater abundance and diversity of fish observed at PHCC01 is due to the fish population being sampled in the summer versus the spring, rather than due to any improvement in water quality or habitat. To investigate this, an analysis was performed using the spring versus summer data at the two stations where they were available. Spring and summer sampling was performed only in 2001. At station PHCC01, the overall number of fish collected was 505 in the summer versus 307 in the spring, an increase of 67%. However, at station PHPI01, the summer collection netted fewer individuals than the spring collection (422 versus 188) a decline of 55%. The summer collection did not consistently yield a greater number of fish at these two locations; therefore, it is inconclusive that the numbers of fish increased due to the seasonal variations in sampling. Despite this observation, seasonal variation may still have had an impact on the number of species identified between the sampling periods. The number of species present did not change at either PHCC01 or PHPI01, although the mix of species was slightly different between the two seasons.

### **D.3.2 Year-to-Year Variation**

The year-to-year variation in the number of individual fish collected was substantial. At PHCC01, 428 individuals were collected in 1999, 297 were collected in 2000, and 505 were collected in 2001. At station PHPH01, 774, 484, and 545 individuals were collected in 1999, 2000, and 2002, respectively. At station PHPH03, 621 individuals were collected in 1999 and 501 were collected in 2000. At station PHPI01, 209 individuals were collected in 1999 and 188 were collected in 2000. Thus, at all stations, a greater number of individuals were collected in 1999 than in 2000. Populations in 2001 and 2002 were greater than the 2000 levels at the two stations that have a third year of sampling data. The effects of year-to-year variation were mitigated in the McNemar test by comparing the 1976 abundance data to abundance data from all the years from the County collections.

There was a variation in the number of species present year-to-year. At PHCC01, the number of species collected increased from 14 in 1999 to 16 in 2000, but remained at 16 in 2001. At PHPH01, the number of species collected increased from 15 in 1999 to 16 in 2000, but remained at 16 in 2002. At PHPH03, the number of species increased from 17 in 1999 to 20 in 2000. At PHPI01, the number of species increased from 14 in 1999 to 15 in 2002. Thus, the number of additional species observed from the mid-1970s to the late 1990s/early 2000s collections was much greater than the year-to-year variations observed in the latter collections. It therefore appears that the apparent increase in the species diversity is not an artifact of year-to-year bias in sampling.

A complete comparison of all the fish data can be found in Table 5.

## **D.4 Benthic Data**

Table 3 shows the abundance data for the six stations from which benthic data were collected. Unfortunately, there are too few overlapping species from the two sampling periods to make valid comparisons concerning abundance. Table 4 shows the number

of species present at the six benthic stations. The total number of species observed at any station ranged from a minimum of 9 at PHPH01 and PHPI01 to a maximum of 39 at PHCC01. At several stations, the number of species observed increased between the two sampling periods. For instance, at PHCC01, the number of species observed increased from 16 in the mid-1970s to 39 in the late 1999s/early 2000s. At PHPH03, the number increased from 7 to 12 and at PHPI01 from 17 to 20. However, the number of species decreased at two stations; from 12 to 9 at both PHPH01 and PHPI02.

One surprising observation from this data is how few species are common to both data sets. This arises from two apparent factors; first, different species within the same orders were present in the earlier versus the later collections, and, second, there appears to have been a shift in benthic species. For instance, at all stations except PHCC01, the number of EPT (*Ephemeroptera*, *Plecoptera*, *Trichoptera*) species appeared to decline slightly. EPT species consist of mayflies, stoneflies, and caddisflies, which are pollution intolerant and are therefore indicators of good water quality. At PHCC01, the number of EPT species increased from 25% to 36% of the species present. At all other stations, declines in the number of EPT species ranged from 3% to 23%. These declines tended to be made up by an increase in true flies (*Diptera*) and mollusks (*Mollusca*), both of which are used as indicators of poorer water quality. There also appeared to be a reduction of crayfish (*Decapoda*) species present and an increase in aquatic worms (*Oligochaetes*), the latter of which is also typically an indicator of poorer water quality.

#### D.4.1 Year-to-Year Variability

At the two stations where there were multiple years of data, the number of benthic macroinvertebrates collected by the County was surprisingly similar. At station PHCC01, the number of individuals collected in 1999 was 240, while in 2000 it was 271. At station PHPI01, 214 individuals were collected in 1999 in comparison to 210 collected in 2001. Over all stations and all years of the later period, the range of the number of individuals collected was 209 to 271 and averaged 239.

A complete comparison of all the benthic data can be found in Table 6.

## D.5 Conclusions

Fish and benthic data were compared from five stations in Popes Head Creek to assess whether aquatic life conditions have improved or worsened over the period from 1976 to 2002. The data used were verified to have been collected from roughly the same locations using comparable methods. Benthic data were collected at different times, primarily during spring and winter in the early study and during spring in the later study. Fish were collected primarily during spring in the earlier study and during summer in the later study. Despite the differences in collection season, the data were thought to be comparable. In particular, the seasonal variation in the number and diversity of fish collected did not exhibit a trend.

The difference in fish abundance was tested using ordinal data from the two collection periods. A nonparametric test showed that fish were more abundant in the later collections at PHCC01, but not at two other stations (PHPH01 and PHPI02). However, fish diversity appears to have improved dramatically from the mid-1970s to the late

1990s/early 2000s at all four stations where there was comparable data. It is possible that this is an artifact of a different sampling technique, as electroshocking was used by the County in the later study and is possibly more efficient than the seining used in the earlier study. Because these species do occur commonly throughout this area, it is unusual that they were not observed in the earlier sampling. However, the number of additional species present in the later sampling is remarkable. It is also possible that the greater apparent species diversity is an artifact of bias introduced by sampling in different seasons.

Because there were so few overlapping benthic species between the two studies, it was not possible to compare abundance between the two periods. While there does not appear to have been an overall increase in species diversity, as was observed in the fish data, there does appear to have been a subtle shift in the species assemblage; there were fewer pollution intolerant EPT species and more pollution tolerant species, including *Oligocheata*, *Diptera*, and *Mollusca*.

Table 1. Comparison of Relative Abundance of fish species common to both studies							
Site ID	Date	Order	Family	Fish ID	County	Kelso	Season
PHCC01	1999	Cypriniformes	Cyprinidae	Rhinichthys atratulus	xxx	x	
PHCC01	1999	Cypriniformes	Cyprinidae	Rhinichthys cataractae	x	xx	
PHCC01	1999	Cypriniformes	Cyprinidae	Semotilus corporalis	xx	x	
PHCC01	1999	Perciformes	Percidae	Etheostoma flabellare	xx	x	
PHCC01	1999	Perciformes	Percidae	Etheostoma olmstedi	xx	x	
PHCC01	2000	Cypriniformes	Cyprinidae	Rhinichthys atratulus	xx	x	
PHCC01	2000	Cypriniformes	Cyprinidae	Rhinichthys cataractae	xx	xx	
PHCC01	2000	Cypriniformes	Cyprinidae	Semotilus corporalis	xx	x	
PHCC01	2000	Perciformes	Percidae	Etheostoma flabellare	xx	x	
PHCC01	2000	Perciformes	Percidae	Etheostoma olmstedi	xx	x	
PHCC01	2001	Cypriniformes	Cyprinidae	Rhinichthys atratulus	xx	x	SP
PHCC01	2001	Cypriniformes	Cyprinidae	Rhinichthys atratulus	x	x	SU
PHCC01	2001	Cypriniformes	Cyprinidae	Rhinichthys cataractae	x	xx	SP
PHCC01	2001	Cypriniformes	Cyprinidae	Rhinichthys cataractae	xx	xx	SU
PHCC01	2001	Cypriniformes	Cyprinidae	Semotilus corporalis	x	x	SP
PHCC01	2001	Cypriniformes	Cyprinidae	Semotilus corporalis	x	x	SU
PHCC01	2001	Perciformes	Percidae	Etheostoma flabellare	xx	x	SP
PHCC01	2001	Perciformes	Percidae	Etheostoma flabellare	xx	x	SU
PHCC01	2001	Perciformes	Percidae	Etheostoma olmstedi	xx	x	SP
PHCC01	2001	Perciformes	Percidae	Etheostoma olmstedi	xx	x	SU
					<b>2</b>	<b>13</b>	<b>6.67</b>
PHPH01	1999	Cypriniformes	Catostomidae	Catostomus commersoni	xxx	xx	
PHPH01	1999	Cypriniformes	Cyprinidae	Clinostomus funduloides	xx	xxx	
PHPH01	1999	Cypriniformes	Cyprinidae	Exoglossum maxillingua	xx	xx	
PHPH01	1999	Cypriniformes	Cyprinidae	Rhinichthys atratulus	xxx	xxx	
PHPH01	1999	Cypriniformes	Cyprinidae	Rhinichthys cataractae	x	xx	
PHPH01	1999	Cypriniformes	Cyprinidae	Semotilus atromaculatus	xx	xxx	
PHPH01	1999	Perciformes	Centrarchidae	Lepomis cyanellus	xx	xx	
PHPH01	1999	Perciformes	Centrarchidae	Lepomis macrochirus	x	xx	
PHPH01	1999	Perciformes	Percidae	Etheostoma flabellare	xxx	xx	
PHPH01	1999	Perciformes	Percidae	Etheostoma olmstedi	xx	x	
PHPH01	2000	Cypriniformes	Catostomidae	Catostomus commersoni	xxx	xx	
PHPH01	2000	Cypriniformes	Cyprinidae	Clinostomus funduloides	xx	xxx	
PHPH01	2000	Cypriniformes	Cyprinidae	Exoglossum maxillingua	x	xx	
PHPH01	2000	Cypriniformes	Cyprinidae	Rhinichthys atratulus	xx	xxx	
PHPH01	2000	Cypriniformes	Cyprinidae	Rhinichthys cataractae	x	xx	
PHPH01	2000	Cypriniformes	Cyprinidae	Semotilus atromaculatus	xx	xxx	
PHPH01	2000	Perciformes	Centrarchidae	Lepomis cyanellus	xx	xx	
PHPH01	2000	Perciformes	Centrarchidae	Lepomis macrochirus	x	xx	
PHPH01	2000	Perciformes	Percidae	Etheostoma flabellare	xxx	xx	
PHPH01	2000	Perciformes	Percidae	Etheostoma olmstedi	xxx	x	
					<b>14</b>	<b>12</b>	<b>0.04</b>
PHPH03	1999	Cypriniformes	Cyprinidae	Notropis procne	xxx	x	
PHPH03	2000	Cypriniformes	Cyprinidae	Notropis procne	xx	x	
PHPI02	1999	Cypriniformes	Cyprinidae	Clinostomus funduloides	x	xx	
PHPI02	1999	Cypriniformes	Cyprinidae	Exoglossum maxillingua	x	xx	
PHPI02	1999	Cypriniformes	Cyprinidae	Rhinichthys atratulus	xx	xx	
PHPI02	1999	Cypriniformes	Cyprinidae	Semotilus atromaculatus	x	xxx	
PHPI02	1976	Perciformes	Percidae	Etheostoma olmstedi	xx	xx	
					<b>4</b>	<b>0</b>	<b>2.25</b>
xxx = abundant, seen in large numbers xx = common, seen regularly x = uncommon, seen occasionally							
Numbers shown in the shaded bars are from left to right A, D and Chi-squared values for the McNemar test							

**Table 2. Species observed by Fairfax County in 1999 - 2001 that were not observed in 1975-76**

Site ID	Order	Family	Fish ID	Tolerance
PHCC01	Cypriniformes	Catostomidae	Catostomus commersoni	T
PHCC01	Cypriniformes	Cyprinidae	Clinostomus funduloides	M
PHCC01	Cypriniformes	Cyprinidae	Exoglossum maxillingua	M
PHCC01	Cypriniformes	Cyprinidae	Notropis procne	M
PHCC01	Cypriniformes	Cyprinidae	Semotilus atromaculatus	T
PHCC01	Perciformes	Centrarchidae	Lepomis auritus	T
PHCC01	Perciformes	Centrarchidae	Lepomis cyanellus	T
PHCC01	Perciformes	Centrarchidae	Lepomis macrochirus	M
PHCC01	Perciformes	Centrarchidae	Micropterus salmoides	M
PHCC01	Cypriniformes	Catostomidae	Erimyzon oblongus	M
PHCC01	Cypriniformes	Cyprinidae	Luxilus cornutus	M
PHCC01	Cypriniformes	Cyprinidae	Notropis hudsonius	M
PHCC01	Salmoniformes	Umbridae	Umbra pygmaea	M
PHCC01	Siluriformes	Ictaluridae	Ameiurus natalis	T
PHCC01	Perciformes	Centrarchidae	Lepomis gibbosus	M
PHCC01	Perciformes	Centrarchidae	Lepomis hybrid	?
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PHPH01	Cypriniformes	Cyprinidae	Notropis procne	M
PHPH01	Cypriniformes	Cyprinidae	Pimephales notatus	T
PHPH01	Perciformes	Centrarchidae	Lepomis auritus	T
PHPH01	Siluriformes	Ictaluridae	Ameiurus natalis	T
PHPH01	Cypriniformes	Catostomidae	Erimyzon oblongus	M
PHPH01	Cypriniformes	Cyprinidae	Nocomis micropogon	M
PHPH01	Cypriniformes	Cyprinidae	Pimephales promelas	T
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PHPH03	Cypriniformes	Catostomidae	Catostomus commersoni	T
PHPH03	Cypriniformes	Catostomidae	Hypentellium nigricans	M
PHPH03	Cypriniformes	Cyprinidae	Exoglossum maxillingua	M
PHPH03	Cypriniformes	Cyprinidae	Luxilus cornutus	M
PHPH03	Cypriniformes	Cyprinidae	Nocomis micropogon	M
PHPH03	Cypriniformes	Cyprinidae	Pimephales notatus	T
PHPH03	Cypriniformes	Cyprinidae	Semotilus atromaculatus	T
PHPH03	Cypriniformes	Cyprinidae	Semotilus corporalis	M
PHPH03	Perciformes	Centrarchidae	Lepomis auritus	T
PHPH03	Perciformes	Centrarchidae	Lepomis cyanellus	T
PHPH03	Perciformes	Centrarchidae	Lepomis macrochirus	M
PHPH03	Perciformes	Centrarchidae	Micropterus dolomieu	M
PHPH03	Perciformes	Centrarchidae	Micropterus salmoides	M
PHPH03	Perciformes	Percidae	Etheostoma olmstedii	M
PHPH03	Siluriformes	Ictaluridae	Ameiurus natalis	T
PHPH03	Siluriformes	Ictaluridae	Noturus insignis	M
PHPH03	Cypriniformes	Catostomidae	Erimyzon oblongus	M
PHPH03	Cypriniformes	Cyprinidae	Clinostomus funduloides	M
PHPH03	Cypriniformes	Cyprinidae	Notropis hudsonius	M
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PHPI02	Cypriniformes	Catostomidae	Catostomus commersoni	T
PHPI02	Cypriniformes	Catostomidae	Hypentellium nigricans	M
PHPI02	Cypriniformes	Cyprinidae	Luxilus cornutus	M
PHPI02	Cypriniformes	Cyprinidae	Notemigonus chrysoleucas	T
PHPI02	Cypriniformes	Cyprinidae	Notropis procne	M
PHPI02	Cypriniformes	Cyprinidae	Pimephales notatus	T
PHPI02	Cypriniformes	Cyprinidae	Rhinichthys cataractae	M
PHPI02	Cypriniformes	Cyprinidae	Semotilus corporalis	M
PHPI02	Perciformes	Centrarchidae	Lepomis auritus	T
PHPI02	Perciformes	Centrarchidae	Lepomis cyanellus	T
PHPI02	Perciformes	Centrarchidae	Lepomis gibbosus	M
PHPI02	Perciformes	Centrarchidae	Lepomis macrochirus	M
PHPI02	Perciformes	Centrarchidae	Micropterus salmoides	M
PHPI02	Perciformes	Percidae	Etheostoma flabellare	M

Tolerance to pollution was taken from Table 3, North Carolina freshwater fishes tolerance ratings, North Carolina Stream Fish Community Structure Assessment (August, 1999)



Table 3. Benthic Abundance Data									
SiteID	Date	Phylum	Class	Order	Family	Genus	County	Kelso	
PHCC01	1976	Arthropoda	Arachnida	Acarina				x	
PHCC01	1976	Arthropoda	Crustacea	Decapoda	Cambaridae	Orconectes limosa		(x)	
PHCC01	1976	Arthropoda	Insecta	Coleoptera	Dryopidae	Helichus		x	
PHCC01	1976	Arthropoda	Insecta	Coleoptera	Elmidae	Macronychus		x	
PHCC01	1976	Arthropoda	Insecta	Diptera	Tipulidae	Dicranota		1	
PHCC01	1976	Arthropoda	Insecta	Ephemeroptera	Heptageniidae	Stenonema		x	
PHCC01	1976	Arthropoda	Insecta	Odonata	Calopterygidae	Calopteryx		(x)	
PHCC01	1976	Arthropoda	Insecta	Plecoptera	Capniidae	Allocapnia		x	
PHCC01	1976	Arthropoda	Insecta	Plecoptera	Taeniopterygidae	Brachyptera		1	
PHCC01	1976	Arthropoda	Insecta	Plecoptera	Taeniopterygidae	Taeniopteryx		1x	
PHCC01	1999	Annelida	Oligochaeta				x	x	
PHCC01	1999	Arthropoda	Insecta	Diptera	Chironomidae		x	3 x	
PHCC01	1999	Arthropoda	Insecta	Diptera	Empididae	Clinocera			
PHCC01	1999	Arthropoda	Insecta	Diptera	Simuliidae	Simulium	x	1	
PHCC01	1999	Arthropoda	Insecta	Diptera	Simuliidae	Prosimulium			
PHCC01	1999	Arthropoda	Insecta	Diptera	Stratiomyiidae	Stratiomys			
PHCC01	1999	Arthropoda	Insecta	Diptera	Tipulidae	Tipula	x	(x)	
PHCC01	1999	Arthropoda	Insecta	Ephemeroptera	Caenidae	Caenis			
PHCC01	1999	Arthropoda	Insecta	Ephemeroptera	Ephemerellidae	Serratella			
PHCC01	1999	Arthropoda	Insecta	Ephemeroptera	Ephemerellidae	Eurylophella			
PHCC01	1999	Arthropoda	Insecta	Ephemeroptera	Ephemerellidae	Ephemerella	xx	(xx)	
PHCC01	1999	Arthropoda	Insecta	Ephemeroptera	Isonychidae	Isonychia			
PHCC01	1999	Arthropoda	Insecta	Megaloptera	Corydalidae	Nigronia			
PHCC01	1999	Arthropoda	Insecta	Plecoptera	Nemouridae	Amphinemura			
PHCC01	1999	Arthropoda	Insecta	Plecoptera	Perlodidae	Diploperla			
PHCC01	1999	Arthropoda	Insecta	Plecoptera	Taeniopterygidae	Strophopteryx			
PHCC01	1999	Arthropoda	Insecta	Trichoptera	Hydropsychidae	Hydropsyche			
						<b>Total Individuals</b>	<b>240</b>		
PHCC01	2001	Annelida	Oligochaeta				x	x	
PHCC01	2001	Arthropoda	Arachnida	Acariformes	Hygrobatidae	Hygrobates			
PHCC01	2001	Arthropoda	Arachnida	Acariformes	Lebertiidae	Lebertia			
PHCC01	2001	Arthropoda	Arachnida	Acariformes	Sperchonidae	Sperchon			
PHCC01	2001	Arthropoda	Insecta	Coleoptera	Elmidae	Dubiraphia			
PHCC01	2001	Arthropoda	Insecta	Coleoptera	Elmidae	Oulimnius			
PHCC01	2001	Arthropoda	Insecta	Coleoptera	Psephenidae	Ectopria			
PHCC01	2001	Arthropoda	Insecta	Coleoptera	Ptilodactylidae	Anchytarsus			
PHCC01	2001	Arthropoda	Insecta	Diptera	Ceratopogonidae	Mallochohelea			
PHCC01	2001	Arthropoda	Insecta	Diptera	Ceratopogonidae	Culicoides			
PHCC01	2001	Arthropoda	Insecta	Diptera	Chironomidae		x	3 x	
PHCC01	2001	Arthropoda	Insecta	Diptera	Empididae	Chelifera			
PHCC01	2001	Arthropoda	Insecta	Diptera	Empididae				
PHCC01	2001	Arthropoda	Insecta	Ephemeroptera	Caenidae	Caenis			
PHCC01	2001	Arthropoda	Insecta	Ephemeroptera	Ephemerellidae	Ephemerella	xx	(xx)	
PHCC01	2001	Arthropoda	Insecta	Ephemeroptera	Heptageniidae	Stenonema	x	x	
PHCC01	2001	Arthropoda	Insecta	Ephemeroptera	Heptageniidae				
PHCC01	2001	Arthropoda	Insecta	Odonata	Gomphidae	Stylogomphus			
PHCC01	2001	Arthropoda	Insecta	Plecoptera	Nemouridae	Amphinemura			
PHCC01	2001	Arthropoda	Insecta	Plecoptera	Perlodidae	Isoperla			
PHCC01	2001	Arthropoda	Insecta	Trichoptera	Hydropsychidae	Cheumatopsyche			
PHCC01	2001	Arthropoda	Insecta	Trichoptera	Leptoceridae	Mystacides			
PHCC01	2001	Mollusca	Bivalvia	Pelecypoda	Corbiculidae	Corbicula			
PHCC01	2001	Mollusca	Gastropoda	Limnophila	Ancylidae	Ferrissia			
PHCC01	2001	Mollusca	Gastropoda	Limnophila	Lymnaidae	Pseudosuccinea			
PHCC01	2001	Mollusca	Gastropoda	Limnophila	Physidae	Physella			
PHCC01	2001	Mollusca	Gastropoda	Limnophila	Planorbidae	Helisoma			
PHCC01	2001	Mollusca	Gastropoda	Limnophila	Planorbidae	Planorbella			
						<b>Total Individuals</b>	<b>271</b>		
PHPH01	1976	Arthropoda	Crustacea	Decapoda	Cambaridae	Cambarus bartoni		(x)	
PHPH01	1976	Arthropoda	Crustacea	Decapoda	Cambaridae	Orconectes limosa		(x)	
		x - uncommon, xx - common, xxx - abundant							



Table 3. (Continued)									
SiteID	Date	Phylum	Class	Order	Family	Genus	County	Kelso	
PHPI01	1976	Arthropoda	Insecta	Trichoptera	Phryganeidae	Ptilostomis		(x)	
PHPI01	1976	Arthropoda	Insecta	Trichoptera	Rhyacophilidae	Rhyacophila		(x)	
PHPI01	1999	Annelida	Oligochaeta				xx	2 x	
PHPI01	1999	Arthropoda	Insecta	Diptera	Chironomidae		x	11 (1) (xx)	
PHPI01	1999	Arthropoda	Insecta	Diptera	Empididae	Hemerodromia			
PHPI01	1999	Arthropoda	Insecta	Diptera	Tipulidae	Antocha			
PHPI01	1999	Arthropoda	Insecta	Odonata	Gomphidae	Lanthus			
PHPI01	1999	Arthropoda	Insecta	Trichoptera	Hydropsychidae	Hydropsyche	x	(1)x	
PHPI01	1999	Arthropoda	Insecta	Trichoptera	Hydropsychidae	Cheumatopsyche			
						<b>Total Individuals</b>	<b>214</b>		
PHPI01	2001	Annelida	Oligochaeta				xx	2 x	
PHPI01	2001	Arthropoda	Arachnida	Acariformes	Hygrobatidae	Hygrobates			
PHPI01	2001	Arthropoda	Arachnida	Acariformes	Sperchonidae	Sperchon			
PHPI01	2001	Arthropoda	Insecta	Coleoptera	Elmidae	Microcylloepus			
PHPI01	2001	Arthropoda	Insecta	Coleoptera	Elmidae	Stenelmis			
PHPI01	2001	Arthropoda	Insecta	Diptera	Chironomidae		x	11(1)(xx)	
PHPI01	2001	Arthropoda	Insecta	Diptera	Empididae	Chelifera			
PHPI01	2001	Arthropoda	Insecta	Diptera	Empididae				
PHPI01	2001	Arthropoda	Insecta	Diptera	Empididae	Hemerodromia			
PHPI01	2001	Arthropoda	Insecta	Diptera	Empididae	Clinocera			
PHPI01	2001	Arthropoda	Insecta	Diptera	Simuliidae	Simulium	x	12 (1)	
PHPI01	2001	Arthropoda	Insecta	Ephemeroptera	Caenidae	Caenis			
PHPI01	2001	Arthropoda	Insecta	Ephemeroptera	Ephemerellidae	Eurylophella			
PHPI01	2001	Arthropoda	Insecta	Ephemeroptera	Heptageniidae				
PHPI01	2001	Arthropoda	Insecta	Ephemeroptera	Heptageniidae	Stenonema	x	4 (12)(xx)	
PHPI01	2001	Arthropoda	Insecta	Odonata	Gomphidae				
PHPI01	2001	Arthropoda	Insecta	Trichoptera	Hydropsychidae	Hydropsyche			
PHPI01	2001	Arthropoda	Insecta	Trichoptera	Hydropsychidae		x	(1) x	
PHPI01	2001	Arthropoda	Insecta	Trichoptera	Hydropsychidae	Cheumatopsyche	x	(6) xxx	
						<b>Total Individuals</b>	<b>210</b>		
PHPI02	1976	Arthropoda	Crustacea	Decapoda	Cambaridae	Cambarus bartoni		xx	
PHPI02	1976	Arthropoda	Crustacea	Decapoda	Cambaridae	Orconectes limosa		xx	
PHPI02	1976	Arthropoda	Insecta	Coleoptera	Dryopidae	Helichus		1 xx	
PHPI02	1976	Arthropoda	Insecta	Coleoptera	Elmidae	Optioservus		1	
PHPI02	1976	Arthropoda	Insecta	Coleoptera	Elmidae	Stenelmis		1	
PHPI02	1976	Arthropoda	Insecta	Ephemeroptera	Ephemerellidae	Ephemerella		1xx	
PHPI02	1976	Arthropoda	Insecta	Ephemeroptera	Heptageniidae	Stenonema		xxx	
PHPI02	1976	Arthropoda	Insecta	Hemiptera	Gerridae	Gerris		xx	
PHPI02	1976	Arthropoda	Insecta	Hemiptera	Vellidae	Rhagovelia		(x)	
PHPI02	1976	Arthropoda	Insecta	Odonata	Cordulegasteridae	Cordulegaster		(x)	
PHPI02	1976	Arthropoda	Insecta	Trichoptera	Hydropsychidae	Cheumatopsyche		10	
PHPI02	1999	Annelida	Oligochaeta				x		
PHPI02	1999	Arthropoda	Arachnida	Acariformes	Lebertiidae	Lebertia			
PHPI02	1999	Arthropoda	Arachnida	Acariformes	Sperchonidae	Sperchon			
PHPI02	1999	Arthropoda	Insecta	Diptera	Ceratopogonidae	Probezzia			
PHPI02	1999	Arthropoda	Insecta	Diptera	Chironomidae		x	2	
PHPI02	1999	Arthropoda	Insecta	Ephemeroptera	Caenidae	Caenis			
PHPI02	1999	Arthropoda	Insecta	Ephemeroptera	Ephemerellidae	Eurylophella			
PHPI02	1999	Arthropoda	Insecta	Odonata	Gomphidae	Lanthus			
PHPI02	1999	Mollusca	Gastropoda	Limnophila	Planorbidae	Planorbidae			
PHPI02	1999	Nematomorpha							
						<b>Total Individuals</b>	<b>209</b>		
						<b>Average No. Individuals =</b>	<b>239.25</b>		
		x - uncommon, xx - common, xxx - abundant							

Table 4. Number of benthic species present at each sampling site									
SiteID	Phylum	Class	Order	Family	Genus	County 1999	County 2001	Common	Kelso
PHCC01	Arthropoda	Arachnida	Acarina						x
PHCC01	Arthropoda	Crustacea	Decapoda	Cambaridae	Orconectes limosa				x
PHCC01	Arthropoda	Insecta	Coleoptera	Dryopidae	Helichus				x
PHCC01	Arthropoda	Insecta	Coleoptera	Elmidae	Macronychus				x
PHCC01	Arthropoda	Insecta	Diptera	Tipulidae	Dicranota				x
PHCC01	Arthropoda	Insecta	Ephemeroptera	Heptageniidae	Stenonema				x
PHCC01	Arthropoda	Insecta	Odonata	Calopterygidae	Calopteryx				x
PHCC01	Arthropoda	Insecta	Plecoptera	Capniidae	Allocapnia				x
PHCC01	Arthropoda	Insecta	Plecoptera	Taeniopterygidae	Brachyptera				x
PHCC01	Arthropoda	Insecta	Plecoptera	Taeniopterygidae	Taeniopteryx				x
PHCC01	Arthropoda	Insecta	Plecoptera	Taeniopterygidae	Taeniopteryx				x
PHCC01	Arthropoda	Insecta	Plecoptera	Taeniopterygidae	Taeniopteryx				x
PHCC01	Annelida	Oligochaeta				x	x	x	
PHCC01	Arthropoda	Insecta	Diptera	Chironomidae		x	x	x	
PHCC01	Arthropoda	Insecta	Diptera	Empididae	Clinocera	x			
PHCC01	Arthropoda	Insecta	Diptera	Simuliidae	Simulium	x		x	
PHCC01	Arthropoda	Insecta	Diptera	Simuliidae	Prosimulium	x			
PHCC01	Arthropoda	Insecta	Diptera	Stratiomyidae	Stratiomys	x			
PHCC01	Arthropoda	Insecta	Diptera	Tipulidae	Tipula	x		x	
PHCC01	Arthropoda	Insecta	Ephemeroptera	Caenidae	Caenis	x	x		
PHCC01	Arthropoda	Insecta	Ephemeroptera	Ephemerellidae	Serratella	x			
PHCC01	Arthropoda	Insecta	Ephemeroptera	Ephemerellidae	Eurylophella	x			
PHCC01	Arthropoda	Insecta	Ephemeroptera	Ephemerellidae	Ephemerella	x	x	x	
PHCC01	Arthropoda	Insecta	Ephemeroptera	Isonichidae	Isonychia	x			
PHCC01	Arthropoda	Insecta	Megaloptera	Corydalidae	Nigronia	x			
PHCC01	Arthropoda	Insecta	Plecoptera	Nemouridae	Amphinemura	x	x		
PHCC01	Arthropoda	Insecta	Plecoptera	Perlodidae	Diploperla	x			
PHCC01	Arthropoda	Insecta	Plecoptera	Taeniopterygidae	Strophopteryx	x			
PHCC01	Arthropoda	Insecta	Trichoptera	Hydropsychidae	Hydropsyche	x			
PHCC01	Arthropoda	Arachnida	Acariformes	Hygrobatidae	Hygrobates		x		
PHCC01	Arthropoda	Arachnida	Acariformes	Lebertiidae	Lebertia		x		
PHCC01	Arthropoda	Arachnida	Acariformes	Sperchonidae	Sperchon		x		
PHCC01	Arthropoda	Insecta	Coleoptera	Elmidae	Dubiraphia		x		
PHCC01	Arthropoda	Insecta	Coleoptera	Elmidae	Oulimnius		x		
PHCC01	Arthropoda	Insecta	Coleoptera	Psephenidae	Ectopria		x		
PHCC01	Arthropoda	Insecta	Coleoptera	Ptilodactylidae	Anchyrtarsus		x		
PHCC01	Arthropoda	Insecta	Diptera	Ceratopogonidae	Mallochohelea		x		
PHCC01	Arthropoda	Insecta	Diptera	Ceratopogonidae	Culicoides		x		
PHCC01	Arthropoda	Insecta	Diptera	Empididae	Chelifera		x		
PHCC01	Arthropoda	Insecta	Diptera	Empididae			x		
PHCC01	Arthropoda	Insecta	Ephemeroptera	Heptageniidae	Stenonema		x	x	
PHCC01	Arthropoda	Insecta	Ephemeroptera	Heptageniidae			x		
PHCC01	Arthropoda	Insecta	Odonata	Gomphidae	Stylogomphus		x		
PHCC01	Arthropoda	Insecta	Plecoptera	Perlodidae	Isoperla		x		
PHCC01	Arthropoda	Insecta	Trichoptera	Hydropsychidae	Cheumatopsyche		x		
PHCC01	Arthropoda	Insecta	Trichoptera	Leptoceridae	Mystacides		x		
PHCC01	Mollusca	Bivalvia	Pelecypoda	Corbiculidae	Corbicula		x		
PHCC01	Mollusca	Gastropoda	Limnophila	Ancyliidae	Ferrissia		x		
PHCC01	Mollusca	Gastropoda	Limnophila	Lymnaidae	Pseudosuccinea		x		
PHCC01	Mollusca	Gastropoda	Limnophila	Physidae	Physella		x		
PHCC01	Mollusca	Gastropoda	Limnophila	Planorbidae	Helisoma		x		
PHCC01	Mollusca	Gastropoda	Limnophila	Planorbidae	Planorbella		x		
				<b>Subtotals</b>		<b>39</b>	<b>17</b>	<b>28</b>	<b>6</b>
PHPH01	Arthropoda	Crustacea	Decapoda	Cambaridae	Cambarus bartoni				x
PHPH01	Arthropoda	Crustacea	Decapoda	Cambaridae	Orconectes limosa				x
PHPH01	Arthropoda	Crustacea	Odonata	Calopterygidae	Calopteryx				x
PHPH01	Arthropoda	Insecta	Coleoptera	Psephenidae	Psephenus				x
PHPH01	Arthropoda	Insecta	Diptera	Simuliidae					x
PHPH01	Arthropoda	Insecta	Plecoptera	Taeniopterygidae	Taeniopteryx				x
PHPH01	Arthropoda	Insecta	Trichoptera	Hydropsychidae	Hydropsyche				x
PHPH01	Arthropoda	Insecta	Trichoptera	Hydroptilidae					x
PHPH01	Annelida	Oligochaeta				x	NC	x	
PHPH01	Arthropoda	Arachnida	Acariformes	Lebertiidae	Lebertia	x	NC		
PHPH01	Arthropoda	Insecta	Coleoptera	Elmidae	Stenelmis	x	NC	x	
PHPH01	Arthropoda	Insecta	Coleoptera	Elmidae	Microcyloepus	x	NC		
PHPH01	Arthropoda	Insecta	Coleoptera	Elmidae	Oulimnius	x	NC		
PHPH01	Arthropoda	Insecta	Diptera	Ceratopogonidae	Culicoides	x	NC		
PHPH01	Arthropoda	Insecta	Diptera	Chironomidae		x	NC	x	
PHPH01	Arthropoda	Insecta	Ephemeroptera	Caenidae	Caenis	x	NC		
PHPH01	Arthropoda	Insecta	Trichoptera	Hydropsychidae	Cheumatopsyche	x	NC	x	
PHPH01	Mollusca	Bivalvia	Pelecypoda	Corbiculidae	Corbicula	x	NC		
				<b>Subtotals</b>		<b>9</b>	<b>10</b>	<b>4</b>	<b>12</b>
PHPH02	Annelida	Oligochaeta				x	NC		
PHPH02	Arthropoda	Arachnida	Acariformes	Lebertiidae	Lebertia	x	NC		

x = species present. NC = no collection.

The Common column indicates that the species were common to both the County's and Dr. Kelso's collections.

Table 4. (continued)									
SiteID	Phylum	Class	Order	Family	Genus	County 1999	County 2001	Common	Kelso
PHPH02	Arthropoda	Arachnida	Acariformes	Mideopsidae	Mideopsis	x	NC		
PHPH02	Arthropoda	Insecta	Coleoptera	Elmidae	Stenelmis	x	NC		
PHPH02	Arthropoda	Insecta	Diptera	Chironomidae		x	NC		
PHPH02	Arthropoda	Insecta	Diptera	Empididae	Clinocera	x	NC		
PHPH02	Arthropoda	Insecta	Ephemeroptera	Baetidae	Baetis	x	NC		
PHPH02	Arthropoda	Insecta	Ephemeroptera	Caenidae	Caenis	x	NC		
PHPH02	Mollusca	Bivalvia	Pelecypoda	Corbiculidae	Corbicula	x	NC		
				<b>Subtotals</b>		<b>10</b>	<b>9</b>		
PHPH03	Arthropoda	Crustacea	Decapoda	Cambaridae	Orconectes limosa				x
PHPH03	Arthropoda	Insecta	Diptera	Simuliidae					x
PHPH03	Arthropoda	Insecta	Hemiptera	Gerridae	Gerris				x
PHPH03	Arthropoda	Insecta	Plecoptera	Taeniopterygidae	Brachyptera				x
PHPH03	Arthropoda	Insecta	Plecoptera	Taeniopterygidae	Taeniopteryx				x
PHPH03	Arthropoda	Insecta	Trichoptera	Hydropsychidae	Hydropsyche				x
PHPH03	Annelida	Oligochaeta				x	NC		
PHPH03	Arthropoda	Arachnida	Acariformes	Lebertiidae	Lebertia	x	NC		
PHPH03	Arthropoda	Insecta	Diptera	Ceratopogonidae	Bezzia	x	NC		
PHPH03	Arthropoda	Insecta	Diptera	Chironomidae		x	NC	x	
PHPH03	Arthropoda	Insecta	Diptera	Empididae	Clinocera	x	NC		
PHPH03	Arthropoda	Insecta	Ephemeroptera	Caenidae	Caenis	x	NC		
PHPH03	Arthropoda	Insecta	Ephemeroptera	Heptageniidae	Stenacron	x	NC		
PHPH03	Arthropoda	Insecta	Plecoptera	Leuctridae	Zealeuctra	x	NC		
PHPH03	Arthropoda	Insecta	Plecoptera	Perlodidae		x	NC		
PHPH03	Mollusca	Gastropoda	Limnophila	Ancylidae	Ferrissia	x	NC		
PHPH03	Mollusca	Gastropoda	Limnophila	Lymnaidae	Fossaria	x	NC		
				<b>Subtotals</b>		<b>12</b>	<b>11</b>	<b>1</b>	<b>7</b>
PHPI01	Arthropoda	Crustacea	Amphipoda	Gammaridae					x
PHPI01	Arthropoda	Insecta	Coleoptera	Dryopidae	Helichus				x
PHPI01	Arthropoda	Insecta	Coleoptera	Psephenidae	Ectopria				x
PHPI01	Arthropoda	Insecta	Ephemeroptera	Ephemerellidae	Ephemerella				x
PHPI01	Arthropoda	Insecta	Ephemeroptera	Leptophlebiidae	Leptophlebia				x
PHPI01	Arthropoda	Insecta	Neuroptera	Corydalidae	Nigronia				x
PHPI01	Arthropoda	Insecta	Plecoptera	Capniidae	Allocapnia				x
PHPI01	Arthropoda	Insecta	Plecoptera	Perlidae	Alloperla				x
PHPI01	Arthropoda	Insecta	Plecoptera	Perlidae	Acroneuria				x
PHPI01	Arthropoda	Insecta	Plecoptera	Perlodidae	Isoperla				x
PHPI01	Arthropoda	Insecta	Trichoptera	Limnephilidae	Neophylax				x
PHPI01	Arthropoda	Insecta	Trichoptera	Limnephilidae	Pseudostenophylax				x
PHPI01	Arthropoda	Insecta	Trichoptera	Phryganeidae	Ptilostomis				x
PHPI01	Arthropoda	Insecta	Trichoptera	Rhyacophiliidae	Rhyacophila				x
PHPI01	Annelida	Oligochaeta				x	x		
PHPI01	Arthropoda	Insecta	Diptera	Chironomidae		x	x	x	
PHPI01	Arthropoda	Insecta	Diptera	Empididae	Hemerodromia	x	x		
PHPI01	Arthropoda	Insecta	Diptera	Tipulidae	Antocha	x			
PHPI01	Arthropoda	Insecta	Odonata	Gomphidae	Lanthus	x			
PHPI01	Arthropoda	Insecta	Trichoptera	Hydropsychidae	Hydropsyche	x	x	x	
PHPI01	Arthropoda	Insecta	Trichoptera	Hydropsychidae	Cheumatopsyche	x	x		
PHPI01	Arthropoda	Arachnida	Acariformes	Hygrobatiidae	Hygrobatas		x		
PHPI01	Arthropoda	Arachnida	Acariformes	Sperchonidae	Sperchon		x		
PHPI01	Arthropoda	Insecta	Coleoptera	Elmidae	Microcyloepus		x		
PHPI01	Arthropoda	Insecta	Coleoptera	Elmidae	Stenelmis		x		
PHPI01	Arthropoda	Insecta	Diptera	Empididae	Chelifera		x		
PHPI01	Arthropoda	Insecta	Diptera	Empididae			x		
PHPI01	Arthropoda	Insecta	Diptera	Empididae	Clinocera		x		
PHPI01	Arthropoda	Insecta	Diptera	Simuliidae	Simulium		x	x	
PHPI01	Arthropoda	Insecta	Ephemeroptera	Caenidae	Caenis		x		
PHPI01	Arthropoda	Insecta	Ephemeroptera	Ephemerellidae	Eurylophella		x		
PHPI01	Arthropoda	Insecta	Ephemeroptera	Heptageniidae			x		
PHPI01	Arthropoda	Insecta	Ephemeroptera	Heptageniidae	Stenonema		x	x	
PHPI01	Arthropoda	Insecta	Odonata	Gomphidae			x		
				<b>Subtotals</b>		<b>20</b>	<b>7</b>	<b>18</b>	<b>4</b>
PHPI02	Arthropoda	Crustacea	Decapoda	Cambaridae	Cambarus bartoni				x
PHPI02	Arthropoda	Crustacea	Decapoda	Cambaridae	Orconectes limosa				x
PHPI02	Arthropoda	Insecta	Coleoptera	Dryopidae	Helichus				x
PHPI02	Arthropoda	Insecta	Coleoptera	Elmidae	Optioservus				x
PHPI02	Arthropoda	Insecta	Coleoptera	Elmidae	Stenelmis				x
PHPI02	Arthropoda	Insecta	Ephemeroptera	Ephemerellidae	Ephemerella				x
PHPI02	Arthropoda	Insecta	Ephemeroptera	Heptageniidae	Stenonema				x
PHPI02	Arthropoda	Insecta	Hemiptera	Gerridae	Gerris				x
PHPI02	Arthropoda	Insecta	Hemiptera	Veliidae	Rhagovelia				x
PHPI02	Arthropoda	Insecta	Odonata	Cordulegasteridae	Cordulegaster				x
PHPI02	Arthropoda	Insecta	Trichoptera	Hydropsychidae	Cheumatopsyche				x
PHPI02	Annelida	Oligochaeta				x	NC		
PHPI02	Arthropoda	Arachnida	Acariformes	Lebertiidae	Lebertia	x	NC		

x = species present. NC = no collection.

The Common column indicates that the species were common to both the County's and Dr. Kelso's collections.

Table 4. (Continued)									
SiteID	Phylum	Class	Order	Family	Genus	County 1999	County 2001	Common	Kelso
PHPI02	Arthropoda	Arachnida	Acariformes	Sperchonidae	Sperchon	x	NC		
PHPI02	Arthropoda	Insecta	Diptera	Ceratopogonidae	Probezzia	x	NC		
PHPI02	Arthropoda	Insecta	Diptera	Chironomidae		x	NC	x	
PHPI02	Arthropoda	Insecta	Ephemeroptera	Caenidae	Caenis	x	NC		
PHPI02	Arthropoda	Insecta	Ephemeroptera	Ephemerellidae	Eurylophella	x	NC		
PHPI02	Arthropoda	Insecta	Odonata	Gomphidae	Lanthus	x	NC		
PHPI02	Mollusca	Gastropoda	Limnophila	Planorbidae	Planorbidae	x	NC		
PHPI02	Nematomorpha					x	NC		
				<b>Subtotals</b>		<b>9</b>	<b>10</b>	<b>1</b>	<b>12</b>
x = species present. NC = no collection.									
The Common column indicates that the species were common to both the County's and Dr. Kelso's collections.									

Table 5. Fish Collected by Kelso (1975-76) and Fairfax County (1999 - 2002).								
Site ID	Date	Order	Family	Fish ID	Count	County	Kelso	Season
PHCC01	1999	Cypriniformes	Catostomidae	Catostomus commersoni	89			
PHCC01	1999	Cypriniformes	Cyprinidae	Clinostomus funduloides	16			
PHCC01	1999	Cypriniformes	Cyprinidae	Exoglossum maxillingua	4			
PHCC01	1999	Cypriniformes	Cyprinidae	Notropis procne	3			
PHCC01	1999	Cypriniformes	Cyprinidae	Rhinichthys atratulus	92	xxx	x	
PHCC01	1999	Cypriniformes	Cyprinidae	Rhinichthys cataractae	5	x	xx	
PHCC01	1999	Cypriniformes	Cyprinidae	Semotilus atromaculatus	42			
PHCC01	1999	Cypriniformes	Cyprinidae	Semotilus corporalis	19	xx	x	
PHCC01	1999	Perciformes	Centrarchidae	Lepomis auritus	2			
PHCC01	1999	Perciformes	Centrarchidae	Lepomis cyanellus	3			
PHCC01	1999	Perciformes	Centrarchidae	Lepomis macrochirus	36			
PHCC01	1999	Perciformes	Centrarchidae	Micropterus salmoides	32			
PHCC01	1999	Perciformes	Percidae	Etheostoma flabellare	46	xx	x	
PHCC01	1999	Perciformes	Percidae	Etheostoma olmstedii	39	xx	x	
				<b>Subtotal</b>	<b>428</b>			
PHCC01	2000	Cypriniformes	Catostomidae	Catostomus commersoni	40			
PHCC01	2000	Cypriniformes	Catostomidae	Erimyzon oblongus	8			
PHCC01	2000	Cypriniformes	Cyprinidae	Clinostomus funduloides	2			
PHCC01	2000	Cypriniformes	Cyprinidae	Luxilus cornutus	2			
PHCC01	2000	Cypriniformes	Cyprinidae	Notropis hudsonius	1			
PHCC01	2000	Cypriniformes	Cyprinidae	Rhinichthys atratulus	44	xx	x	
PHCC01	2000	Cypriniformes	Cyprinidae	Rhinichthys cataractae	14	xx	xx	
PHCC01	2000	Cypriniformes	Cyprinidae	Semotilus atromaculatus	25			
PHCC01	2000	Cypriniformes	Cyprinidae	Semotilus corporalis	16	xx	x	
PHCC01	2000	Perciformes	Centrarchidae	Lepomis cyanellus	6			
PHCC01	2000	Perciformes	Centrarchidae	Lepomis macrochirus	77			
PHCC01	2000	Perciformes	Centrarchidae	Micropterus salmoides	5			
PHCC01	2000	Perciformes	Percidae	Etheostoma flabellare	31	xx	x	
PHCC01	2000	Perciformes	Percidae	Etheostoma olmstedii	23	xx	x	
PHCC01	2000	Salmoniformes	Umbridae	Umbrina pygmaea	1			
PHCC01	2000	Siluriformes	Ictaluridae	Ameiurus natalis	2			
				<b>Subtotal</b>	<b>297</b>			
PHCC01	2001	Cypriniformes	Catostomidae	Catostomus commersoni	41			SP
PHCC01	2001	Cypriniformes	Catostomidae	Catostomus commersoni	51			SU
PHCC01	2001	Cypriniformes	Catostomidae	Erimyzon oblongus	4			SP
PHCC01	2001	Cypriniformes	Catostomidae	Erimyzon oblongus	2			SU
PHCC01	2001	Cypriniformes	Cyprinidae	Clinostomus funduloides	7			SP
PHCC01	2001	Cypriniformes	Cyprinidae	Clinostomus funduloides	13			SU
PHCC01	2001	Cypriniformes	Cyprinidae	Exoglossum maxillingua	10			SU
PHCC01	2001	Cypriniformes	Cyprinidae	Luxilus cornutus	12			SP
PHCC01	2001	Cypriniformes	Cyprinidae	Rhinichthys atratulus	35	xx	x	SP
PHCC01	2001	Cypriniformes	Cyprinidae	Rhinichthys atratulus	30	x	x	SU
PHCC01	2001	Cypriniformes	Cyprinidae	Rhinichthys cataractae	7	x	xx	SP
PHCC01	2001	Cypriniformes	Cyprinidae	Rhinichthys cataractae	26	xx	xx	SU
PHCC01	2001	Cypriniformes	Cyprinidae	Semotilus atromaculatus	35			SP
PHCC01	2001	Cypriniformes	Cyprinidae	Semotilus atromaculatus	39			SU
PHCC01	2001	Cypriniformes	Cyprinidae	Semotilus corporalis	2	x	x	SP
PHCC01	2001	Cypriniformes	Cyprinidae	Semotilus corporalis	5	x	x	SU
PHCC01	2001	Perciformes	Centrarchidae	Lepomis auritus	2			SP
PHCC01	2001	Perciformes	Centrarchidae	Lepomis cyanellus	1			SP
PHCC01	2001	Perciformes	Centrarchidae	Lepomis cyanellus	4			SU
PHCC01	2001	Perciformes	Centrarchidae	Lepomis gibbosus	1			SP
PHCC01	2001	Perciformes	Centrarchidae	Lepomis hybrid	1			SU
PHCC01	2001	Perciformes	Centrarchidae	Lepomis macrochirus	103			SP
PHCC01	2001	Perciformes	Centrarchidae	Lepomis macrochirus	195			SU
PHCC01	2001	Perciformes	Centrarchidae	Micropterus salmoides	7			SP
PHCC01	2001	Perciformes	Centrarchidae	Micropterus salmoides	28			SU
PHCC01	2001	Perciformes	Percidae	Etheostoma flabellare	23	xx	x	SP
PHCC01	2001	Perciformes	Percidae	Etheostoma flabellare	44	xx	x	SU
PHCC01	2001	Perciformes	Percidae	Etheostoma olmstedii	24	xx	x	SP
PHCC01	2001	Perciformes	Percidae	Etheostoma olmstedii	49	xx	x	SU

x - uncommon, xx - common, xxx - abundant





Table 5. (Continued)								
Site ID	Date	Order	Family	Fish ID	Count	County	Kelso	Season
PHPI01	1999	Perciformes	Centrarchidae	Lepomis macrochirus	18			
PHPI01	1999	Perciformes	Percidae	Etheostoma flabellare	14			
PHPI01	1999	Perciformes	Percidae	Etheostoma olmstedii	7			
				<b>Subtotal</b>	<b>209</b>			
PHPI01	2001	Cypriniformes	Catostomidae	Catostomus commersoni	14			SP
PHPI01	2001	Cypriniformes	Catostomidae	Catostomus commersoni	8			SU
PHPI01	2001	Cypriniformes	Cyprinidae	Clinostomus funduloides	4			SP
PHPI01	2001	Cypriniformes	Cyprinidae	Clinostomus funduloides	4			SU
PHPI01	2001	Cypriniformes	Cyprinidae	Exoglossum maxillingua	8			SP
PHPI01	2001	Cypriniformes	Cyprinidae	Exoglossum maxillingua	8			SU
PHPI01	2001	Cypriniformes	Cyprinidae	Luxilus cornutus	8			SP
PHPI01	2001	Cypriniformes	Cyprinidae	Luxilus cornutus	11			SU
PHPI01	2001	Cypriniformes	Cyprinidae	Notropis procne	13			SP
PHPI01	2001	Cypriniformes	Cyprinidae	Notropis procne	2			SU
PHPI01	2001	Cypriniformes	Cyprinidae	Pimephales notatus	65			SP
PHPI01	2001	Cypriniformes	Cyprinidae	Pimephales notatus	15			SU
PHPI01	2001	Cypriniformes	Cyprinidae	Rhinichthys atratulus	91			SP
PHPI01	2001	Cypriniformes	Cyprinidae	Rhinichthys atratulus	49			SU
PHPI01	2001	Cypriniformes	Cyprinidae	Rhinichthys cataractae	15			SP
PHPI01	2001	Cypriniformes	Cyprinidae	Rhinichthys cataractae	5			SU
PHPI01	2001	Cypriniformes	Cyprinidae	Semotilus atromaculatus	28			SP
PHPI01	2001	Cypriniformes	Cyprinidae	Semotilus atromaculatus	15			SU
PHPI01	2001	Perciformes	Centrarchidae	Lepomis auritus	1			SU
PHPI01	2001	Perciformes	Centrarchidae	Lepomis cyanellus	8			SU
PHPI01	2001	Perciformes	Centrarchidae	Lepomis macrochirus	14			SP
PHPI01	2001	Perciformes	Centrarchidae	Lepomis macrochirus	20			SU
PHPI01	2001	Perciformes	Centrarchidae	Micropterus salmoides	1			SP
PHPI01	2001	Perciformes	Percidae	Etheostoma flabellare	73			SP
PHPI01	2001	Perciformes	Percidae	Etheostoma flabellare	13			SU
PHPI01	2001	Perciformes	Percidae	Etheostoma olmstedii	87			SP
PHPI01	2001	Perciformes	Percidae	Etheostoma olmstedii	29			SU
PHPI01	2001	Siluriformes	Ictaluridae	Ameiurus natalis	1			SP
				<b>Subtotal</b>	<b>188</b>			
PHPI02	1999	Cypriniformes	Catostomidae	Catostomus commersoni	38			
PHPI02	1999	Cypriniformes	Catostomidae	Hypentellium nigricans	3			
PHPI02	1999	Cypriniformes	Cyprinidae	Clinostomus funduloides	9	x	xx	
PHPI02	1999	Cypriniformes	Cyprinidae	Exoglossum maxillingua	6	x	xx	
PHPI02	1999	Cypriniformes	Cyprinidae	Luxilus cornutus	12	x	xxx	
PHPI02	1999	Cypriniformes	Cyprinidae	N. cornutus (same as L. cortunus)				
PHPI02	1999	Cypriniformes	Cyprinidae	Notemigonus chrysoleucas	1			
PHPI02	1999	Cypriniformes	Cyprinidae	Notropis procne	12			
PHPI02	1999	Cypriniformes	Cyprinidae	Pimephales notatus	12			
PHPI02	1999	Cypriniformes	Cyprinidae	Rhinichthys atratulus	32	xx	xx	
PHPI02	1999	Cypriniformes	Cyprinidae	Rhinichthys cataractae	3			
PHPI02	1999	Cypriniformes	Cyprinidae	Semotilus atromaculatus	10	x	xxx	
PHPI02	1999	Cypriniformes	Cyprinidae	Semotilus corporalis	3			
PHPI02	1999	Perciformes	Centrarchidae	Lepomis auritus	3			
PHPI02	1999	Perciformes	Centrarchidae	Lepomis cyanellus	28			
PHPI02	1999	Perciformes	Centrarchidae	Lepomis gibbosus	2			
PHPI02	1999	Perciformes	Centrarchidae	Lepomis macrochirus	22			
PHPI02	1999	Perciformes	Centrarchidae	Micropterus salmoides	1			
PHPI02	1999	Perciformes	Percidae	Etheostoma flabellare	16			
PHPI02	1999	Perciformes	Percidae	Etheostoma olmstedii	29	xx	xx	
				<b>Subtotal</b>	<b>242</b>			
x - uncommon, xx - common, xxx - abundant								

Table 6. Comparison of all Benthic Data										
SiteID	Date	Phylum	Class	Order	Family	Genus	Larval Count	Pupal Count	Adult Count	Kelso
PHCC01	1976	Arthropoda	Arachnida	Acarina						x
PHCC01	1976	Arthropoda	Crustacea	Decapoda	Cambaridae	Orconectes limosa				(x)
PHCC01	1976	Arthropoda	Insecta	Coleoptera	Dryopidae	Helichus				x
PHCC01	1976	Arthropoda	Insecta	Coleoptera	Elmidae	Macronychus				x
PHCC01	1976	Arthropoda	Insecta	Diptera	Tipulidae	Dicranota				1
PHCC01	1976	Arthropoda	Insecta	Ephemeroptera	Heptageniidae	Stenonema				x
PHCC01	1976	Arthropoda	Insecta	Odonata	Calopterygidae	Calopteryx				(x)
PHCC01	1976	Arthropoda	Insecta	Plecoptera	Capniidae	Allocaenia				x
PHCC01	1976	Arthropoda	Insecta	Plecoptera	Taeniopterygidae	Brachyptera				1
PHCC01	1976	Arthropoda	Insecta	Plecoptera	Taeniopterygidae	Taeniopteryx				1x
PHCC01	1999	Annelida	Oligochaeta				0	0	23	x
PHCC01	1999	Arthropoda	Insecta	Diptera	Chironomidae		186	0	0	3 x
PHCC01	1999	Arthropoda	Insecta	Diptera	Empididae	Clinocera	9	0	0	
PHCC01	1999	Arthropoda	Insecta	Diptera	Simuliidae	Simulium	1	0	0	1
PHCC01	1999	Arthropoda	Insecta	Diptera	Simuliidae	Prosimulium	2	0	0	
PHCC01	1999	Arthropoda	Insecta	Diptera	Stratiomyidae	Stratiomys	1	0	0	
PHCC01	1999	Arthropoda	Insecta	Diptera	Tipulidae	Tipula	1	0	0	(x)
PHCC01	1999	Arthropoda	Insecta	Ephemeroptera	Caenidae	Caenis	1	0	0	
PHCC01	1999	Arthropoda	Insecta	Ephemeroptera	Ephemerellidae	Serratella	4	0	0	
PHCC01	1999	Arthropoda	Insecta	Ephemeroptera	Ephemerellidae	Eurylophella	1	0	0	
PHCC01	1999	Arthropoda	Insecta	Ephemeroptera	Ephemerellidae	Ephemerella	2	0	0	(xx)
PHCC01	1999	Arthropoda	Insecta	Ephemeroptera	Isonichidae	Isonychia	1	0	0	
PHCC01	1999	Arthropoda	Insecta	Megaloptera	Corydalidae	Nigronia	1	0	0	
PHCC01	1999	Arthropoda	Insecta	Plecoptera	Nemouridae	Amphinemura	3	0	0	
PHCC01	1999	Arthropoda	Insecta	Plecoptera	Perlodidae	Diploperla	1	0	0	
PHCC01	1999	Arthropoda	Insecta	Plecoptera	Taeniopterygidae	Strophopteryx	1	0	0	
PHCC01	1999	Arthropoda	Insecta	Trichoptera	Hydropsychidae	Hydropsyche	2	0	0	
PHCC01	2001	Annelida	Oligochaeta				0	0	4	x
PHCC01	2001	Arthropoda	Arachnida	Acariformes	Hygrobatidae	Hygrobatas	0	0	1	
PHCC01	2001	Arthropoda	Arachnida	Acariformes	Lebertiidae	Lebertia	0	0	2	
PHCC01	2001	Arthropoda	Arachnida	Acariformes	Sperchonidae	Sperchon	0	0	1	
PHCC01	2001	Arthropoda	Insecta	Coleoptera	Elmidae	Dubiraphia	2	0	0	
PHCC01	2001	Arthropoda	Insecta	Coleoptera	Elmidae	Oulimnius	0	0	1	
PHCC01	2001	Arthropoda	Insecta	Coleoptera	Psephenidae	Ectopria	1	0	0	
PHCC01	2001	Arthropoda	Insecta	Coleoptera	Ptilodactylidae	Anchytarsus	1	0	0	
PHCC01	2001	Arthropoda	Insecta	Diptera	Ceratopogonidae	Mallochochelea	6	0	0	
PHCC01	2001	Arthropoda	Insecta	Diptera	Ceratopogonidae	Culicoides	1	0	0	
PHCC01	2001	Arthropoda	Insecta	Diptera	Chironomidae		167	0	0	3 x
PHCC01	2001	Arthropoda	Insecta	Diptera	Empididae	Chelifera	1	0	0	
PHCC01	2001	Arthropoda	Insecta	Diptera	Empididae		0	5	0	
PHCC01	2001	Arthropoda	Insecta	Ephemeroptera	Caenidae	Caenis	5	0	0	
PHCC01	2001	Arthropoda	Insecta	Ephemeroptera	Ephemerellidae	Ephemerella	17	0	0	(xx)
PHCC01	2001	Arthropoda	Insecta	Ephemeroptera	Heptageniidae	Stenonema	14	0	0	x
PHCC01	2001	Arthropoda	Insecta	Ephemeroptera	Heptageniidae		2	0	0	
PHCC01	2001	Arthropoda	Insecta	Odonata	Gomphidae	Stylogomphus	5	0	0	
PHCC01	2001	Arthropoda	Insecta	Plecoptera	Nemouridae	Amphinemura	9	0	0	
PHCC01	2001	Arthropoda	Insecta	Plecoptera	Perlodidae	Isoperla	1	0	0	
PHCC01	2001	Arthropoda	Insecta	Trichoptera	Hydropsychidae	Cheumatopsyche	7	0	0	
PHCC01	2001	Arthropoda	Insecta	Trichoptera	Leptoceridae	Mystacides	1	0	0	
PHCC01	2001	Mollusca	Bivalvia	Pelecypoda	Corbiculidae	Corbicula	0	0	8	
PHCC01	2001	Mollusca	Gastropoda	Limnophila	Ancylidae	Ferrissia	0	0	1	
PHCC01	2001	Mollusca	Gastropoda	Limnophila	Lymnaidae	Pseudosuccinea	0	0	1	
PHCC01	2001	Mollusca	Gastropoda	Limnophila	Physidae	Physella	0	0	2	
PHCC01	2001	Mollusca	Gastropoda	Limnophila	Planorbidae	Helisoma	0	0	3	
PHCC01	2001	Mollusca	Gastropoda	Limnophila	Planorbidae	Planorbella	0	0	2	
PHPH01	1976	Arthropoda	Crustacea	Decapoda	Cambaridae	Cambarus bartoni				(x)
PHPH01	1976	Arthropoda	Crustacea	Decapoda	Cambaridae	Orconectes limosa				(x)
PHPH01	1976	Arthropoda	Crustacea	Odonata	Calopterygidae	Calopteryx				(x)
PHPH01	1976	Arthropoda	Insecta	Coleoptera	Psephenidae	Psephenus				(x)
PHPH01	1976	Arthropoda	Insecta	Diptera	Simuliidae					1 (x)
PHPH01	1976	Arthropoda	Insecta	Plecoptera	Taeniopterygidae	Taeniopteryx				1
PHPH01	1976	Arthropoda	Insecta	Trichoptera	Hydropsychidae	Hydropsyche				1
PHPH01	1976	Arthropoda	Insecta	Trichoptera	Hydroptilidae					1
PHPH01	1999	Annelida	Oligochaeta				0	0	10	3(x)
PHPH01	1999	Arthropoda	Arachnida	Acariformes	Lebertiidae	Lebertia	0	0	1	
PHPH01	1999	Arthropoda	Insecta	Coleoptera	Elmidae	Stenelmis	1	0	2	1
PHPH01	1999	Arthropoda	Insecta	Coleoptera	Elmidae	Microcyloopus	3	0	0	
PHPH01	1999	Arthropoda	Insecta	Coleoptera	Elmidae	Oulimnius	1	0	0	

Table 6. (Continued)										
SiteID	Date	Phylum	Class	Order	Family	Genus	Larval Count	Pupal Count	Adult Count	Kelso
PHPH01	1999	Arthropoda	Insecta	Diptera	Ceratopogonidae	Culicoides	2	0	0	
PHPH01	1999	Arthropoda	Insecta	Diptera	Chironomidae		202	6	0	8 (x)
PHPH01	1999	Arthropoda	Insecta	Ephemeroptera	Caenidae	Caenis	1	0	0	
PHPH01	1999	Arthropoda	Insecta	Trichoptera	Hydropsychidae	Cheumatopsyche	1	0	0	7
PHPH01	1999	Mollusca	Bivalvia	Pelecypoda	Corbiculidae	Corbicula	0	0	3	
PHPH02	1999	Annelida	Oligochaeta				0	0	25	
PHPH02	1999	Arthropoda	Arachnida	Acariformes	Lebertiidae	Lebertia	0	0	3	
PHPH02	1999	Arthropoda	Arachnida	Acariformes	Mideopsidae	Mideopsis	0	0	1	
PHPH02	1999	Arthropoda	Insecta	Coleoptera	Elmidae	Stenelmis	2	0	0	
PHPH02	1999	Arthropoda	Insecta	Diptera	Chironomidae		142	2	0	
PHPH02	1999	Arthropoda	Insecta	Diptera	Empididae	Clinocera	1	0	0	
PHPH02	1999	Arthropoda	Insecta	Ephemeroptera	Baetidae	Baetis	1	0	0	
PHPH02	1999	Arthropoda	Insecta	Ephemeroptera	Caenidae	Caenis	32	0	0	
PHPH02	1999	Mollusca	Bivalvia	Pelecypoda	Corbiculidae	Corbicula	0	0	4	
PHPH03	1976	Arthropoda	Crustacea	Decapoda	Cambaridae	Orconectes limosa				(x)
PHPH03	1976	Arthropoda	Insecta	Diptera	Simuliidae					0.1
PHPH03	1976	Arthropoda	Insecta	Hemiptera	Gerridae	Gerris				(x)
PHPH03	1976	Arthropoda	Insecta	Plecoptera	Taeniopterygidae	Brachyptera				1.2
PHPH03	1976	Arthropoda	Insecta	Plecoptera	Taeniopterygidae	Taeniopteryx				4.6
PHPH03	1976	Arthropoda	Insecta	Trichoptera	Hydropsychidae	Hydropsyche				2.1
PHPH03	1999	Annelida	Oligochaeta				0	0	26	
PHPH03	1999	Arthropoda	Arachnida	Acariformes	Lebertiidae	Lebertia	0	0	1	
PHPH03	1999	Arthropoda	Insecta	Diptera	Ceratopogonidae	Bezzia	1	0	0	
PHPH03	1999	Arthropoda	Insecta	Diptera	Chironomidae		179	4	0	12, 20
PHPH03	1999	Arthropoda	Insecta	Diptera	Empididae	Clinocera	2	0	0	
PHPH03	1999	Arthropoda	Insecta	Ephemeroptera	Caenidae	Caenis	1	0	0	
PHPH03	1999	Arthropoda	Insecta	Ephemeroptera	Heptageniidae	Stenacron	1	0	0	
PHPH03	1999	Arthropoda	Insecta	Plecoptera	Leuctridae	Zealeuctra	1	0	0	
PHPH03	1999	Arthropoda	Insecta	Plecoptera	Perlodidae		1	0	0	
PHPH03	1999	Mollusca	Gastropoda	Limnophila	Ancylidae	Ferrissia	1	0	0	
PHPH03	1999	Mollusca	Gastropoda	Limnophila	Lymnaidae	Fossaria	0	0	1	
PHPI01	1976	Arthropoda	Crustacea	Amphipoda	Gammaridae					x (5)
PHPI01	1976	Arthropoda	Insecta	Coleoptera	Dryopidae	Helichus				(xx)
PHPI01	1976	Arthropoda	Insecta	Coleoptera	Psephenidae	Ectopria				(x)
PHPI01	1976	Arthropoda	Insecta	Ephemeroptera	Ephemerellidae	Ephemerella				1 (xx)
PHPI01	1976	Arthropoda	Insecta	Ephemeroptera	Leptophlebiidae	Leptophlebia				1
PHPI01	1976	Arthropoda	Insecta	Neuroptera	Corydalidae	Nigronia				(1) (x)
PHPI01	1976	Arthropoda	Insecta	Plecoptera	Capniidae	Allocaenia				5
PHPI01	1976	Arthropoda	Insecta	Plecoptera	Perlidae	Alloperla				(x)
PHPI01	1976	Arthropoda	Insecta	Plecoptera	Perlidae	Acroperia				(x)
PHPI01	1976	Arthropoda	Insecta	Plecoptera	Perlodidae	Isoperla				1
PHPI01	1976	Arthropoda	Insecta	Trichoptera	Limnephilidae	Neophylax				(xxx)
PHPI01	1976	Arthropoda	Insecta	Trichoptera	Limnephilidae	Pseudostenophylax				(x)
PHPI01	1976	Arthropoda	Insecta	Trichoptera	Phryganeidae	Ptilostomis				(x)
PHPI01	1976	Arthropoda	Insecta	Trichoptera	Rhyacophiliidae	Rhyacophila				(x)
PHPI01	1999	Annelida	Oligochaeta				0	0	134	2x
PHPI01	1999	Arthropoda	Insecta	Diptera	Chironomidae		72	0	0	11 (1) (xx)
PHPI01	1999	Arthropoda	Insecta	Diptera	Empididae	Hemerodromia	2	0	0	
PHPI01	1999	Arthropoda	Insecta	Diptera	Tipulidae	Antocha	1	1	0	
PHPI01	1999	Arthropoda	Insecta	Odonata	Gomphidae	Lanthus	1	0	0	
PHPI01	1999	Arthropoda	Insecta	Trichoptera	Hydropsychidae	Hydropsyche	1	0	0	(1)x
PHPI01	1999	Arthropoda	Insecta	Trichoptera	Hydropsychidae	Cheumatopsyche	2	0	0	
PHPI01	2001	Annelida	Oligochaeta				0	0	79	2x
PHPI01	2001	Arthropoda	Arachnida	Acariformes	Hygrobatidae	Hygrobates	0	0	2	
PHPI01	2001	Arthropoda	Arachnida	Acariformes	Sperchonidae	Sperchon	0	0	1	
PHPI01	2001	Arthropoda	Insecta	Coleoptera	Elmidae	Microclypeus	2	0	0	
PHPI01	2001	Arthropoda	Insecta	Coleoptera	Elmidae	Stenelmis	1	0	0	
PHPI01	2001	Arthropoda	Insecta	Diptera	Chironomidae		99	0	0	11 (1) (xx)
PHPI01	2001	Arthropoda	Insecta	Diptera	Empididae	Chelifera	1	0	0	
PHPI01	2001	Arthropoda	Insecta	Diptera	Empididae		0	1	0	
PHPI01	2001	Arthropoda	Insecta	Diptera	Empididae	Hemerodromia	3	0	0	
PHPI01	2001	Arthropoda	Insecta	Diptera	Empididae	Clinocera	1	0	0	
PHPI01	2001	Arthropoda	Insecta	Diptera	Simuliidae	Simulium	4	1	0	12 (1)
PHPI01	2001	Arthropoda	Insecta	Ephemeroptera	Caenidae	Caenis	1	0	0	
PHPI01	2001	Arthropoda	Insecta	Ephemeroptera	Ephemerellidae	Eurylophella	1	0	0	

Table 6. (Continued)										
SiteID	Date	Phylum	Class	Order	Family	Genus	Larval Count	Pupal Count	Adult Count	Kelso
PHPI01	2001	Arthropoda	Insecta	Ephemeroptera	Heptageniidae		3	0	0	
PHPI01	2001	Arthropoda	Insecta	Ephemeroptera	Heptageniidae	Stenonema	4	0	0	4 (12) (xx)
PHPI01	2001	Arthropoda	Insecta	Odonata	Gomphidae		1	0	0	
PHPI01	2001	Arthropoda	Insecta	Trichoptera	Hydropsychidae	Hydropsyche	1	0	0	
PHPI01	2001	Arthropoda	Insecta	Trichoptera	Hydropsychidae		0	1	0	(1) x
PHPI01	2001	Arthropoda	Insecta	Trichoptera	Hydropsychidae	Cheumatopsyche	3	0	0	(6) xxx
PHPI02	1976	Arthropoda	Crustacea	Decapoda	Cambaridae	Cambarus bartoni				xx
PHPI02	1976	Arthropoda	Crustacea	Decapoda	Cambaridae	Orconectes limosa				xx
PHPI02	1976	Arthropoda	Insecta	Coleoptera	Dryopidae	Helichus				1 xx
PHPI02	1976	Arthropoda	Insecta	Coleoptera	Elmidae	Optioservus				1
PHPI02	1976	Arthropoda	Insecta	Coleoptera	Elmidae	Stenelmis				1
PHPI02	1976	Arthropoda	Insecta	Ephemeroptera	Ephemerellidae	Ephemerella				1xx
PHPI02	1976	Arthropoda	Insecta	Ephemeroptera	Heptageniidae	Stenonema				xxx
PHPI02	1976	Arthropoda	Insecta	Hemiptera	Gerridae	Gerris				xx
PHPI02	1976	Arthropoda	Insecta	Hemiptera	Vellidae	Rhagovelia				(x)
PHPI02	1976	Arthropoda	Insecta	Odonata	Cordulegasteridae	Cordulegaster				(x)
PHPI02	1976	Arthropoda	Insecta	Trichoptera	Hydropsychidae	Cheumatopsyche				10
PHPI02	1999	Annelida	Oligochaeta				0	0	28	
PHPI02	1999	Arthropoda	Arachnida	Acariformes	Lebertiidae	Lebertia	0	0	1	
PHPI02	1999	Arthropoda	Arachnida	Acariformes	Sperchonidae	Sperchon	0	0	1	
PHPI02	1999	Arthropoda	Insecta	Diptera	Ceratopogonidae	Probezzia	1	0	0	
PHPI02	1999	Arthropoda	Insecta	Diptera	Chironomidae		169	4	0	2
PHPI02	1999	Arthropoda	Insecta	Ephemeroptera	Caenidae	Caenis	1	0	0	
PHPI02	1999	Arthropoda	Insecta	Ephemeroptera	Ephemerellidae	Eurylophella	1	0	0	
PHPI02	1999	Arthropoda	Insecta	Odonata	Gomphidae	Lanthus	1	0	0	
PHPI02	1999	Mollusca	Gastropoda	Limnophila	Planorbidae	Planorbidae	0	0	1	
PHPI02	1999	Nematomorpha					0	0	1	
<p>In Dr. Kelso's data, the numbers refer to the number of individuals collected in the Surber sampler. On one date, two Surber samples were collected at the same station, and the two results are presented separated by a comma. On other occasions, two Surber samples were collected at the same station, but on different dates. The two results are presented separately, with the first collection enclosed in parentheses and the second collection not enclosed by parentheses. Finally, in addition to the Surber samples, some qualitative observations were made of other benthic animals. These results are presented on an ordinal scale with x indicating uncommon, xx - common, and xxx - abundant, as was the case for the fish collections.</p>										