Comparison of Fish and Benthic Faunal Compositions in Polluted and Pristine Forks of a Mountain River

Lynn Betson Starnes

University of Tennessee - Knoxville

Follow this and additional works at: https://trace.tennessee.edu/utk_gradthes

Part of the Ecology and Evolutionary Biology Commons

Recommended Citation
https://trace.tennessee.edu/utk_gradthes/3298
To the Graduate Council:

I am submitting herewith a thesis written by Lynn Betson Starnes entitled "Comparison of Fish and Benthic Faunal Compositions in Polluted and Pristine Forks of a Mountain River." I have examined the final electronic copy of this thesis for form and content and recommend that it be accepted in partial fulfillment of the requirements for the degree of Master of Science, with a major in Ecology and Evolutionary Biology.

David A. Etnier, Major Professor

We have read this thesis and recommend its acceptance:

Dewey Bunting, Clifford Amundsen

Accepted for the Council:
Carolyn R. Hodges
Vice Provost and Dean of the Graduate School

(Original signatures are on file with official student records.)
To the Graduate Council:

I am submitting herewith a thesis written by Lynn Betson Starnes entitled "Comparison of Fish and Benthic Faunal Compositions in Polluted and Pristine Forks of a Mountain River." I recommend that it be accepted in partial fulfillment of the requirements for the degree of Master of Science, with a major in Ecology.

D. A. Etnier, Major Professor

We have read this thesis and recommend its acceptance:

Accepted for the Council:

Vice Chancellor
Graduate Studies and Research
COMPARISON OF FISH AND BENTHIC FAUNAL COMPOSITIONS IN POLLUTED
AND PRISTINE FORKS OF A MOUNTAIN RIVER

A Thesis
Presented for the
Master of Science
Degree
The University of Tennessee, Knoxville

Lynn Betson Starnes
December 1976
ACKNOWLEDGMENTS

The author wishes to express her gratitude to Dr. David A. Etnier, Department of Zoology, University of Tennessee for advice and guidance as major professor. Appreciation is also expressed to Dr. Dewey Bunting, Department of Zoology, and Dr. Clifford Amundsen, Department of Botany, for their cooperation and assistance as committee members.

Thanks are expressed to Don Owens, Division of Water Quality, Tennessee Public Health Department, for making available state information pertaining to Gatlinburg sewage treatment facilities.

Appreciation is expressed to Dr. Clyde Voigtlander and Dr. Donley Hill, Tennessee Valley Authority, for reviewing and editing the first draft. Thanks is also due Roger Betson, Hydrologic Research and Analysis Staff, Division of Water Control Planning, TVA, for assistance with hydrologic aspects of this study.

Special thanks are extended to Mrs. Roger Betson who typed the rough draft of this thesis.

Special thanks are also due Wayne C. Starnes for invaluable help in field collections as well as in editing the manuscript.
ABSTRACT

The Little Pigeon River in Sevier County, Tennessee presents a near ideal situation for the study of the effects of domestic sewage on species composition in a mountain river. The Little Pigeon system has two principal components, the West and Middle Prongs. The West Prong is polluted by municipal effluent from Gatlinburg and Pigeon Forge, while the Middle Prong remains relatively pristine. Physiographically, the two prongs are strikingly similar. The great similarity of natural physical and chemical water quality parameters presents an opportunity to use the pristine prong as a control for the study of changes, probably resulting from pollution, in the other.

Fish and aquatic invertebrates were sampled from riffle communities of both streams, and their composition was analyzed to gain insight into possible changes in the West Prong due to pollution. There were drastic differences in benthic invertebrates and observable differences in the fish faunal assemblages. These differences suggest that strong shifts in species composition as well as a sharp decline in population density of many invertebrates and some fish species had resulted in the West Prong due to pollution. It is speculated that these shifts were caused by organic solids.
# TABLE OF CONTENTS

<table>
<thead>
<tr>
<th>CHAPTER</th>
<th>PAGE</th>
</tr>
</thead>
<tbody>
<tr>
<td>INTRODUCTION</td>
<td>1</td>
</tr>
<tr>
<td>I. LITERATURE SURVEY</td>
<td>2</td>
</tr>
<tr>
<td>Background</td>
<td>2</td>
</tr>
<tr>
<td>Fish</td>
<td>3</td>
</tr>
<tr>
<td>Aquatic Invertebrates</td>
<td>5</td>
</tr>
<tr>
<td>Water Quality</td>
<td>8</td>
</tr>
<tr>
<td>II. THE STUDY WATERSHEDS</td>
<td>9</td>
</tr>
<tr>
<td>Land Use</td>
<td>9</td>
</tr>
<tr>
<td>Geology</td>
<td>11</td>
</tr>
<tr>
<td>Stations</td>
<td>12</td>
</tr>
<tr>
<td>III. METHODS</td>
<td>15</td>
</tr>
<tr>
<td>Sample Sites</td>
<td>15</td>
</tr>
<tr>
<td>Aquatic Invertebrates</td>
<td>15</td>
</tr>
<tr>
<td>Fish Collections</td>
<td>16</td>
</tr>
<tr>
<td>Water Quality</td>
<td>17</td>
</tr>
<tr>
<td>IV. RESULTS</td>
<td>19</td>
</tr>
<tr>
<td>Aquatic Invertebrates</td>
<td>19</td>
</tr>
<tr>
<td>Fish</td>
<td>25</td>
</tr>
<tr>
<td>Water Quality</td>
<td>30</td>
</tr>
<tr>
<td>V. DISCUSSION</td>
<td>33</td>
</tr>
<tr>
<td>VI. CONCLUSION</td>
<td>45</td>
</tr>
<tr>
<td>LIST OF REFERENCES</td>
<td>48</td>
</tr>
<tr>
<td>APPENDICES</td>
<td>54</td>
</tr>
<tr>
<td>Appendix A</td>
<td>55</td>
</tr>
<tr>
<td>Appendix B</td>
<td>87</td>
</tr>
<tr>
<td>Appendix C</td>
<td>98</td>
</tr>
<tr>
<td>VITA</td>
<td>102</td>
</tr>
</tbody>
</table>
LIST OF TABLES

<table>
<thead>
<tr>
<th>TABLE</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. River Miles and Drainage Areas of Stations on the Middle and West Prong of the Little Pigeon River</td>
</tr>
<tr>
<td>2. Analysis of Variance Summaries for Fish Collected in the Middle and West Prong of the Little Pigeon</td>
</tr>
<tr>
<td>A-1. Mean Values (Rounded to the Nearest Whole Number) of Three Surber Samples Taken Quarterly, West Prong, Little Pigeon River, Control Station (Above Gatlinburg), River km 31.3</td>
</tr>
<tr>
<td>A-2. Mean Values (Rounded to Nearest Whole Number) of Three Surber Samples Taken Monthly May 1975 to May 1976, West Prong, Little Pigeon River, Station 1, River km 32</td>
</tr>
<tr>
<td>A-3. Mean Values (Rounded to the Nearest Whole Number) of Three Surbers Taken Monthly from May 1975 to May 1976, West Prong, Little Pigeon River, Station 2, River km 20.5</td>
</tr>
<tr>
<td>A-4. Mean Values (Rounded to the Nearest Whole Number) of Three Surbers Taken Monthly from May 1975 to May 1976, West Prong, Little Pigeon River, Station 3, River km 15.3</td>
</tr>
<tr>
<td>A-5. Mean Values (Rounded to the Nearest Whole Number) of Three Surber Samples Taken Monthly from May 1975 to May 1976, West Prong, Little Pigeon, Station 4, River km 11.5</td>
</tr>
<tr>
<td>A-6. Mean Values (Rounded to the Nearest Whole Number) of Three Surber Samples Taken Monthly from May 1975 to May 1976, Middle Prong, Little Pigeon River, Station 1, River km 32</td>
</tr>
<tr>
<td>A-7. Mean Values (Rounded to the Nearest Whole Number) of Three Surber Samples Taken Monthly from May 1975 to May 1976, Middle Prong, Little Pigeon River, Station 2, River km 25.6</td>
</tr>
<tr>
<td>A-8. Mean Values (Rounded to the Nearest Whole Number) of Three Surber Samples Taken Monthly from May 1975 to May 1976, Middle Prong, Little Pigeon River, Station 3, River km 18.5</td>
</tr>
<tr>
<td>B-1. Species List of Fish Collected During Little Pigeon Study: Common and Scientific Names</td>
</tr>
<tr>
<td>B-2. Fish Collected Per Station by Cyanide Application, West Prong, Little Pigeon River, 1975-76</td>
</tr>
<tr>
<td>TABLE</td>
</tr>
<tr>
<td>---------</td>
</tr>
<tr>
<td>B-3. Fish Collected Per Station by Cyanide Application, Middle Prong, Little Pigeon River, 1975-76</td>
</tr>
<tr>
<td>B-4. Selected Collections of Fish by Carl Hubbs in 1947 and 1940</td>
</tr>
<tr>
<td>B-5. Results of Qualitative Collection at Control Station on West Prong of the Little Pigeon River Above Gatlinburg</td>
</tr>
<tr>
<td>B-6. Fish Collected by Dr. D. A. Etnier at Two Stations on the West Prong Little Pigeon River, 1968 and 1969</td>
</tr>
<tr>
<td>C-1. Water Quality Analysis of 1968 Samples at Selected Comparative Stations on the Little Pigeon River</td>
</tr>
</tbody>
</table>
INTRODUCTION

Water pollution has many aspects but its most important impact is upon living organisms. Despite this biological relationship, most studies of water pollution depend primarily on physical and chemical measurements such as dissolved oxygen, BOD, suspended solids and other such parameters to determine the degree of pollution. Since chemical studies give information on physical-chemical conditions only at the instant of sampling, and pollution studies frequently cannot be made continuously during the period of the most critical conditions, there is a need for additional methods that can be used throughout the year for determining the extent and severity of brief critical or limiting environmental factors. This need is apparent for determining the extent and severity of brief critical or limiting environmental factors when the amount of pollution is not uniform throughout the year. The qualitative and quantitative composition of an aquatic population is determined by recurring critical conditions; though of short duration, as well as the more stable or long-term environmental factors. Therefore, the organisms which develop in a given area are, in turn, indicative of environmental conditions which have occurred during their development. They may be especially valuable because they can be used even during the seasons of winter and spring when flows are frequently large, dilution is at a maximum, dissolved oxygen is near saturation, and visual evidence of pollution is at a minimum.
CHAPTER I

LITERATURE SURVEY

I. BACKGROUND

Much of the initial impetus to the biological delineation of water pollution in the United States is attributable to the publications of Kolkwitz and Marsson (1908, 1909). Since Kolkwitz and Marsson published their classification of organisms associated with various zones of pollution in rivers receiving organic wastes, numerous studies have been conducted utilizing the concept of indicator species. Sladeck (1973) has the most comprehensive review of the literature on indicator species. Often overlooked is the fact that in these early evaluations of water quality, the main emphasis was placed not on the individual organisms, but on the total biological community. It is interesting to note that the use of the saprobic or indicator organisms system has been accepted and applied by the majority of hydrobiologists in continental Europe and the Soviet Union. It is only in Great Britain and North America that the indicator organism system has not received wide acceptance (Sladecek, 1973).

Surveys of the Illinois River by Forbes (1928) and Forbes and Richardson (1913, 1919) stimulated contemporary interest in the biological investigation of organic pollution. A publication by Ellis (1937) on the detection and measurement of stream pollution, the effects of various wastes on stream environment, and the toxicity of specific
elements and compounds to fishes has served as a valuable reference handbook for many years.

When the application of biological principles to routine field investigations of water pollution in the United States was still relatively new, Brinley (1942) and Bartsch (1948) took cognizance of the biotic community and the effects of pollution on the ecological relationships of aquatic organisms. Patrick (1949) separated the biota into seven groups and demonstrated specific group responses to varying stream conditions.

After these pioneering researchers confirmed that aquatic communities are largely dependent upon nutrients delivered by the flowing water, whether these nutrients are natural or the result of human activity, more recent workers have diverged into the various facets of water pollution effects on aquatic organisms. The more important of these works will be discussed as they apply to the aspects of fish, aquatic invertebrates and water quality considered in this study.

II. FISH

Of all aquatic organisms, fish create the most human interest. They attract attention, especially when dead. While they are under closer scrutiny than other aquatic organisms, they may not be particularly good indicators of aquatic pollution. Being at the top of a pyramid of production, they are the last, and perhaps the least, affected (Maciolak, 1954).

Because fish are mobile, they may respond to changes by moving
from the scene, returning when conditions are more auspicious. Having
growth and survival rates that fluctuate widely, fish pose a difficult
substrate of variability against which to measure minor change. Being
flexible in their food habits and being associated with other species
in a complex interaction on food organisms, they may persist by exploring
alternatives (Larkin, 1954; Keast, 1965). For these reasons, fish have
a reputation as poor "indicators" of pollution. In water quality samples
the insoluble portions of sewage plant effluents are regarded as suspended
solids, and are settleable. A substantial literature documents the
lethal effects of such organic, nutrient-rich pollutants on fish. The
effects are especially lethal when the pollutants are discharged accident­
tally in large quantities into streams (Hynes, 1960; Klein, 1962; Jones,
1964). Such pollutants can have direct toxic effects (Pruthi, 1927;
Herbert, 1965), some of which are enhanced at reduced oxygen concen­
trations (Allan, et al., 1958). However, fish may be absent from the
vicinity of the outfall even when oxygen concentrations are high because
of these toxins (Katz and Gaufin, 1953; Rasmussen, 1955; Pentelow, 1938).
Effects of low oxygen concentrations on embryonic development and hatching
of fish are reviewed by Doudoroff and Warren (1965), Doudoroff and
Shumway (1967), and Purdy (1937). Sedimentation and growths of sewage
fungi may smother spawning areas (Rasmussen, 1955) as well as fish-food
organisms (Katz and Gaufin, 1953).

Having considered some direct effects of pollutants on fish, the
indirect effects concern the ecological consequences of addition of
nutrients to streams. Indirect effects (Tsai, 1975) include turbidity,
which screens sunlight and possibly reduces primary productivity,
promotes oxygen depletion, and develops conditions "unnatural" to the stream. Suspended solids may blanket the stream bottom and cause a change in the substrate, thus causing a change in the food organisms available.

III. AQUATIC INVERTEBRATES

The impact of organic enrichment from domestic wastewater effluent on macroinvertebrate community structure and production has been discussed by several authors (Hynes, 1963; Nuttall and Purvus, 1974). These studies describe the classical ecological response of benthic communities to organic loading in North American and European freshwater systems. Certain trends are discussed but the manner by which organics cause these trends is not delineated. Whitton (1975) surmises that this lack of specific information on macroinvertebrates is caused by lack of the ability to simulate field conditions in the laboratory. He believes that in the bioassay approach the controls are inadequate and the conditions so unnatural that the use of the results for predictions about field situations is highly questionable. The result is that only the most general of population trends can be uncovered in the literature. In general, various biological, physical and chemical parameters associated with changes in species diversity, biomass, production, the predominance of certain tubificid and chironomid species in the biota, decreased dissolved oxygen (DO) concentrations, substrate modifications, nutrient enrichments, and/or reduced competition and predation are common results of organic pollution.

As with fish, the organic pollutants which researchers have found
perhaps most detrimental to aquatic invertebrates are organic solids (Kemp, 1966; Patrick, 1953). Organic solids settle to the stream bottom as a blanket of debris that effectively covers the normal habitat of clean water bottom life. It could be an inexhaustible source of food but will sustain only those organisms that can qualify for life in that environment. They must be efficient in obtaining oxygen. They must be able to burrow or move so as to stay on top of the deepening layers. They must be resistant to the toxic action of hydrogen sulfide and other gases that may emanate from the bacterial action taking place in the accumulation of sludge layers. Bartsch (1948) concludes that sewage alters the normal conditions of food supply, dissolved oxygen, turbidity, substrate and chemical character of the stream and its bed.

The amount of research done on direct effects of sewage on aquatic invertebrates is infinitesimal when compared to the great amount done on the interpretation of stream conditions based on the biota present. Researchers have looked for organisms that would indicate the chemical and physical character of stream conditions. Kolkwitz and Marsson (1908, 1909) first proposed the use of aquatic organisms as indicators of the ecological conditions under which they exist. This system (the saprobic system) was modified and used by Richardson (1928); Gaufin (1956, 1958); Hynes (1962); Beck (1954, 1955). It depends on a taxonomic grouping of organisms in relation to whether they are found in clean water, polluted water, or both. This approach requires precise identification of organisms and is based on the differential tolerance of organisms to a single stress. Patrick (1949) and Wurtz (1955), using a system of
histograms, have developed an elaborate system to report the results of stream surveys based on the differences in tolerances of various groups of aquatic organisms to pollution. Beck (1954) developed a biotic index as a method of evaluating the effects of pollution on bottom fauna organisms. Schiffman (1954) presented a useful method of cataloging stream bottom organisms with respect to their pollution tolerance. Other techniques based on tolerance of aquatic organisms to pollution have been reported by Beak (1964).

Despite the preponderance of research into the role of indicator organisms, the concept has certain problems and is not commonly accepted today. Dean (1963) points out that the lack of physiological data concerning tolerance limits has complicated many biological surveys of polluted areas. Needham (1938) observed that environmental conditions other than pollution may influence the distribution of organisms. The breakdown of an assemblage of organisms into pollution tolerant, intolerant, and facultative categories is somewhat subjective since tolerance for the same organism may vary under a different set of environmental conditions. Pollution tolerant organisms are also found in clean water areas (Hynes, 1960; Gaufin, 1952). Cairns (1974) believes analysis of community structure avoids the problems already mentioned in the use of indicator organisms and is the best means of assessing the biological impact of pollution.

Community structure of aquatic macroinvertebrate populations has been frequently used to evaluate conditions in streams. In addition to pollutants, several environmental factors may affect or limit the distribution of certain species (Gaufin, 1973). Chief among these are
geographical location, erosion, floods, size of the stream, and the type of bottom. Even slight changes in environmental conditions, whether natural or man-induced, can lead to changes in community composition and diversity if the changes are persistent. Community composition is now recognized as being much more reliable than particular indicator organisms for evaluating environmental conditions (Gaufin, 1973).

IV. WATER QUALITY

Many aspects of water quality pertinent to this study have been discussed in relation to their effects on aquatic organisms. Chlorine has not been previously discussed. However, chlorine is used to disinfect municipal water supplies and sewage plant effluents. Due to its extreme toxicity, chlorine has the potential to cause considerable damage within natural aquatic systems. Brungs (1973) has produced a review of the biological effects of residual chlorine and estimated the maximum levels that would not damage aquatic life.
CHAPTER II

THE STUDY WATERSHEDS

I. LAND USE

The Little Pigeon River watershed is located in Sevier County in East Tennessee. The Great Smoky Mountains National Park contains the headwaters of the East, Middle, and West Prong of the Little Pigeon River. These prongs of the Little River are nearly pristine by water quality standards. Ground cover in the Park is nearly 100 percent forest. At the Park boundary, the West Prong of the Little Pigeon declines in gradient and enters the urban developments of Gatlinburg, Pigeon Forge, and Sevierville. As the Middle Prong (sometimes called simply Little Pigeon, see Figure 1) of the Little Pigeon leaves the Park, it continues to flow through largely forested areas having occasional houses and small farms. At Sevierville, the Middle and West Prong join to form the Little Pigeon which then joins the French Broad River.

From the time of the first settlers until the 1930's, economic conditions in this area of Sevier County were encumbered with numerous problems. Natural lines of communications and transportation were impeded by rugged terrain. Mountain streams were too small to allow industrial development. Frequent floods inhibited urban development. A lack of tillable land limited agricultural production and years of intensive logging exploited natural resources.

With the advent of the Great Smoky Mountain National Park, outsiders became aware of the natural beauty of the mountains. In 1971
Figure 1. Location of stations on the Middle and West Prong of the Little Pigeon River.
more than seven million people frequented the Smokies and by 1990 that figure is expected to reach nearly twelve million (Pinkerton, 1973). Pinkerton (1973) found that the permanent population growth over the last decade was 16.5 percent in Sevier County as compared with 10 percent for the entire state.

Gatlinburg and Pigeon Forge are summer resort cities. Neither city possesses heavy industry. Both cities draw their visitors from the large numbers of people who come to visit the Great Smoky Mountains. Gatlinburg straddles the West Prong of the Little Pigeon and extends into the surrounding hills. Gatlinburg presently obtains its water supply from the West Prong above the park boundary. Owens (Pers. Comm.) stated that the present sewage treatment facilities were built in 1956 to handle 0.75 million gallons per day (mg/d), but the potential effluent discharge is 2.0 mg/d in dry weather and 3.5 mg/d in wet weather. Pigeon Forge built its plant with a capacity of 0.25 mg/d but has flows as high as 0.5 mg/d. The excess that cannot be treated is bypassed by both cities into the West Prong of the Little Pigeon.

II. GEOLOGY

An understanding of the geology of the watershed of the Little Pigeon River is critical before the two forks of the river can be compared. From examination of geologic maps (Hardeman, 1966), it is obvious that the Middle Prong and the West Prong drain similar bedrock formations through most of their courses. Three particular groups predominate: Walden Creek Group, Great Smoky Group and Snowbird Group. In the Middle Prong, these three groups comprise 87 percent of the watershed and
similarly these same three groups make up 86 percent of the West Prong watershed. However, the percentage of the individual groups vary. In the Middle Prong 12 percent is the Walden Creek Group, 28 percent Great Smoky Group and 47 percent Snowbird Group. The West Prong was 31 percent Walden Group, 31 percent Great Smoky Group and Snowbird Group. The remaining 13 percent of the Middle and West Prong not accounted for in the three major groups is composed of small groups of formations present near the mouth of the Little Pigeon River. These formations are predominantly dolomite, with some shale, conglomerate, and sandstone more typical of the ridge and valley areas.

According to Hardeman (1966), the Walden Creek, Great Smoky, and Snowbird Groups are characterized by sedimentary rocks which are for the most part poorly sorted and coarse. The underlying rocks are siliceous in nature and thus not easily dissolved by ground water. Consequently, the total dissolved mineral solids content of the water is quite low. In general, these formations can be classified as sandstone and shale. The formations comprising these groups are limited to the region of the Great Smoky Mountains.

III. STATIONS

Sampling stations were chosen on the Middle and West Prongs to be as comparable as possible. Within the Great Smoky Mountain National Park the geology and land cover of the two watersheds are similar, hence, water quality should also be similar under pristine conditions. Any marked differences in the water quality of the two streams, therefore, should result from anthropogenic sources.
On the individual prongs, the specific stations were chosen so that stations were analogous. Only riffle ecosystems were selected as they possess perhaps the most diverse freshwater piscine and aquatic invertebrate fauna. The riffles used in the study were chosen because of similar substrate, gradient, width of stream, depth, bank vegetation and accessibility.

Because of complications that could be introduced by differing streamflow regimes, the stations were selected so that the contributing watershed drainage areas on the two prongs were similar. If the stations chosen for comparison had drainage areas that differed too greatly, factors such as stream gradient, scouring, or stream depth could have unexpected effects on fauna to be studied. Table 1 (TVA, Data Services Branch, Pers. Comm.) illustrates the drainage areas of the selected stations.

### TABLE 1

<table>
<thead>
<tr>
<th></th>
<th>West Prong</th>
<th>Middle Prong</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>River Km</td>
<td>Drainage Area (sq km)</td>
</tr>
<tr>
<td>STA 1</td>
<td>25.7</td>
<td>153.3</td>
</tr>
<tr>
<td>STA 2</td>
<td>20.6</td>
<td>180.9</td>
</tr>
<tr>
<td>STA 3</td>
<td>14.0</td>
<td>195.0</td>
</tr>
<tr>
<td>STA 4</td>
<td>10.8</td>
<td>363.5</td>
</tr>
</tbody>
</table>

Riffles selected as stations could not have exactly the same drainage areas due to physical characteristics of the stream. Some
of the headwater, mountainous character is maintained as the river enters the valley; hence deep pools, narrow gorges, and areas of large boulders prevented selection of identical drainage areas. The depth of the water at all stations in summer flows ranged from .25 to 1 m. The substrate was generally one of cobble and small boulders 10 to 30 cm in diameter. The width of the Middle Prong and the West Prong at all stations was similar, averaging 20 to 30 m. Bank vegetation was mostly hardwood trees and alder shrubs.
CHAPTER III

METHODS

I. SAMPLE SITES

Five sample stations were chosen on the West Prong. A control station was established above Gatlinburg at the Park Boundary. The remaining stations (1-4) were located below the Gatlinburg sewage plant: station 1 was 1.6 km downstream from the plant; station 2 was above Pigeon Forge; station 3 was below the city of Pigeon Forge but above the Pigeon Forge sewage plant; and station 4 was 1.6 km below the Pigeon Forge outfall. See Figure 1 (p. 10) for station locations. The three stations on the Middle Prong were selected for their similarity to stations on the West Prong.

II. AQUATIC INVERTEBRATES

Aquatic invertebrate sampling was done monthly except for quarterly sampling at the West Prong control from May 1975 to May 1976 with April 1976 omitted. Water conditions permitting, fish sampling was conducted concurrently with benthic sampling. An unmodified Surber square-foot sampler was used to take the samples. The sampler was equipped with a fine mesh bag (96 threads per inch). The gravel and rubble substrate of the chosen riffles were ideally suited to Surber sampling as the average stream depth rarely exceeded the height of the sampler. To enable comparisons of samples to be made, the individual selection of sample sites was biased to always be in cobble substrate. Three samples
were taken per station. The samples were put in jars, preserved with 60 percent isopropyl alcohol, and returned to the laboratory for sorting and identification. Identifications were made to species where literature, consultants, and personal expertise made it practical. Due to the paucity of keys, the difficulty of identification, and the large numbers of individuals collected, the identification of chironomids was to family level. Keys used in identification were: Plecoptera (Frison, 1935; Hitchcock, 1974), Trichoptera (Ross, 1944), and Ephemeroptera (Burks, 1953; Lewis, 1974), and Diptera (Johanson, 1973; Usinger, 1956).

III. FISH COLLECTIONS

Fish samples were taken with sodium cyanide (Lewis, 1960) using a 6 m. block net at the lower end of the sample area to collect affected fish. The cyanide was added at a point 15 m. above the net. Samples were made only over riffles. This facilitated pick-up of fish, as affected fish were washed into the block net. Obviously then, pool-living fish have been mostly excluded from the study by intentional sample bias. Sampling was not performed from December to April due to cold water temperatures and frequent high flows. Seining was attempted but proved impractical owing to high water levels, frequency of cobbles and small boulders, growths of algae, and the cold air temperatures. Also, seining effort could not be quantified in comparisons with cyanide samples. With the exception of the first and last sampling month all fish were field sorted, identified, counted and returned, apparently alive, to the river.

Sodium cyanide was used as a non-lethal immobilizing agent for fish. This was done to lessen the effects of monthly sampling on the
riffles and thus not decimate the study populations. Recovery rates for the fish released after cyanide collection appeared high: 80 - 95 percent for cyprinids and 95 - 100 percent for other fish collected. The first collection, the last collection and any fish of questionable identification are being kept in a voucher collection for additional work. Fish kept were returned to the University laboratory in 10 percent formalin.

Nomenclature of common and scientific names used in this study follow Bailey (1970).

An analysis of variance (ANOVA) was performed on the transformed total numbers of fish collected at each station. The raw data were transformed using $\sqrt{x+1}$. The ANOVA was performed to see if any differences existed between the two prongs and between the stations.

**IV. WATER QUALITY**

Water quality samples collected in 1968 were analyzed by the Tennessee Valley Authority, Chattanooga. The 1975 sample was analyzed at the City of Knoxville Water Plant. Data from samples in 1968 as well as 1975 have been used mainly for comparative purposes. The 1968 data have been used to show natural mineral quality in both the West and Middle Prong of the Little Pigeon. Additional 1975 data have been used to determine metals and trace metals. As dates of water quality collection do not coincide with the dates of this study, the data were not relied on heavily but were used to support inferences made during the study.

Additional water quality information has been generated from the
use of a model by Betson and McMaster (1975) which predicts mineral water quality. By considering the underlying geology of the Little Pigeon watershed and the degree of forest cover, predictions can be made as to what natural water quality should be.
CHAPTER IV

RESULTS

I. AQUATIC INVERTEBRATES

The raw data from samples collected in the West Prong and the Middle Prong of the Little Pigeon are presented in Tables A-1 through A-8. The results show firstly a lower total number of taxa per sample date (Figure 2) in the West Prong below Gatlinburg than in the Middle Prong. The West Prong control station above Gatlinburg had a higher total number of taxa than the West Prong below Gatlinburg and more closely approximated trends in the Middle Prong than the West Prong below Gatlinburg. Secondly, the mean number of organisms per sample date (Figure 3), with few exceptions, was lower in the West Prong below Gatlinburg than in the Middle Prong. Again, the West Prong control above Gatlinburg had, in general, a higher number per sample date than the West Prong below Gatlinburg. Lastly, the composition of organisms (Figure 4) for the sample year was different in the two prongs with Ephemeroptera and Plecoptera making up a larger percentage of the population in the Middle Prong than on the West Prong.

The West Prong control (above Gatlinburg) and the station on the Middle Prong had a higher total number of taxa per sample date (Figure 2) than the stations on the West Prong below Gatlinburg over the study year. In the Middle Prong over all stations the lowest total taxa number was 17 while the highest total taxa number was 36. In the West Prong below Gatlinburg over the sample year the lowest number of taxa collected was 3 and the highest number of taxa was 15. There was no overlap of the
Figure 2. Comparison of total numbers of taxa obtained on the Middle and West Prong of the Little Pigeon River. Comparisons are made between stations of the Middle and West Prongs on each sampled date.
Figure 3. Comparison of the mean number of aquatic invertebrates in the Middle and West Prong of the Little Pigeon River. Comparisons are made between stations of the Middle and West Prong on each sampled date.
Figure 4. The composition of the yearly mean number of aquatic invertebrates in the Middle and West Prong of the Little Pigeon River. Comparisons of the composition of three orders of aquatic invertebrates are made between stations of the Middle and West Prong.
highest value on the West Prong (15) and the lowest on the Middle Prong (17). The control station above Gatlinburg on the West Prong more closely resembled the Middle Prong than the West Prong below Gatlinburg with a range of 18 to 33 total taxa. In the Middle Prong the range of values for total number of taxa was fairly consistent with station 1, 19 to 36; station 2, 17 to 33, and station 3, 18 to 31. The West Prong stations below Gatlinburg had, in general, a lower range of values for total numbers of taxa per sample date, with station 1, 3 to 14, station 2, 3 to 15; station 3, 4 to 12; and station 4, 4 to 15. The number of taxa collected per sample date showed the Middle Prong to have greater totals per collection date than the West Prong below Gatlinburg.

The Middle Prong had, with a few exceptions, a higher mean number of organisms per sample date when comparing it to the West Prong, station by station (Figure 3). While Figure 3 shows that the mean numbers of organisms were higher in the Middle Prong than in the West Prong below Gatlinburg there were exceptions which could be accounted for by the effects of seasonal abundance and emergence periods, individual bias in selection of individual Surber sites, and environmental effects including scouring from high flows. The mean number of organisms collected per sample date at West Prong control above Gatlinburg ranged from 24.6 to 198. The summer quarter sample was low, but the other three quarterly samples most closely resembled the mean numbers on the Middle Prong than the West Prong. The mean numbers on the Middle Prong varied, with station 1 having a range of 46.0 to 196.0, station 2 a range of 41.3 to 262.6, and station 3 a range of 36.6 to 166.3. The West Prong range of mean numbers was slightly lower: station 1, 8.3 to 179.6; station 2, 4.3 to
62.0; station 3, 8.3 to 65.3; and station 4, 6.3 to 177.6. While some exceptions existed, the Middle Prong had a higher mean number of organisms per sample date than the West Prong below Gatlinburg.

Figure 4 demonstrates how some of the changes in total taxa and in mean numbers of organisms affects the percentages of certain families in the study areas. In all stations, Diptera made up the largest percentage of the number of organisms. Inspection of the raw data in Tables A-1 - A-8 reveals that Chironomidae made up the majority of the numbers of Diptera present in the samples. In some cases, Chironomidae comprised the majority of all individuals. While Chironomidae were not keyed to genera in the study, some selected samples were sorted to see if there was a predominance of Chironomus (blood worm) present in the summer in the West Prong compared to the Middle Prong. In those samples checked Chironomus occurred infrequently and then only in station 1 on the West Prong.

The greatest difference that Figure 4 points out is in the mean numbers of Plecoptera and Ephemeroptera in the Middle and West Prong. The mean number of Plecoptera in the West Prong at station 1 was 2 while station 2 had 2; station 3 had 3 and station 4 had 1. These values can be compared with those obtained in the Middle Prong: station 1, 30; station 2, 47; and station 3, 58. The control above Gatlinburg had an average of 29 Plecoptera. The difference between the Middle and West Prong in this family was greater than 10 fold. Like Plecoptera, Ephemeroptera showed a greater number of organisms present in the Middle Prong. The mean number of Ephemeroptera at West Prong station 1 was 13 while the Middle Prong station 1 had 248. The West Prong station 2 had
an average of 3 while the Middle Prong had 166. Lastly, the West Prong control had an average of 29 Ephemeroptera per station.

II. FISH

Table B-1 lists the common and scientific names of fish sampled in the Little Pigeon River. Data obtained during sampling of the West Prong are listed in Table B-2. Table B-3 summarizes the data collected on the Middle Prong. The data indicate that while the total numbers of fish were similar in the Middle and West Prong, species represented in the Middle Prong were slightly different from species present in the West Prong.

The 3-way analysis of variance presents results which indicate that the total numbers of fish on the Middle Prong was different than the West Prong. At the 5 percent level no significant differences could be determined between areas and stations but significant differences were detected between species and species interactive with areas and stations (Table 2). These statistical results will be elaborated on using concrete examples from the raw data.

From Table B-2 and Table B-3 it is possible to determine the number of species and the numbers of individuals present during the sampling. Over the seven sample months West Prong station 1 had 40 species representing 636 individuals. This can be contrasted with Middle Prong station 1, where there were 56 species and 717 individuals over seven months. At station 2 in the West Prong a total of 50 species and 430 individuals were represented in seven months of sampling. Station 2 on the Middle Prong had a total of 52 species with 445
### TABLE 2
ANALYSIS OF VARIANCE SUMMARIES FOR FISH COLLECTED IN THE MIDDLE AND WEST PRONG OF THE LITTLE PIGEON

<table>
<thead>
<tr>
<th>Test</th>
<th>DF</th>
<th>SS</th>
<th>MS</th>
<th>F</th>
<th>Sig.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Prongs</td>
<td>1</td>
<td>2.278735</td>
<td>2.278733</td>
<td>8.54</td>
<td>N.S.</td>
</tr>
<tr>
<td>Stations x Prongs</td>
<td>4</td>
<td>2.572956</td>
<td>.643239</td>
<td>1</td>
<td>N.S.</td>
</tr>
<tr>
<td>Species</td>
<td>30</td>
<td>640.352073</td>
<td>21.345069</td>
<td>32.88</td>
<td>S</td>
</tr>
<tr>
<td>Species x Prong</td>
<td>30</td>
<td>104.352073</td>
<td>3.494065</td>
<td>5.38</td>
<td>S</td>
</tr>
<tr>
<td>Species x Station</td>
<td>120</td>
<td>463.435945</td>
<td>3.862966</td>
<td>5.95</td>
<td>S</td>
</tr>
<tr>
<td>Error</td>
<td>1085</td>
<td>704.313473</td>
<td>.649137</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Total</td>
<td>1270</td>
<td>1917.775121</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

individuals for the study. At station 3 on the West Prong 48 species were collected in the study with 226 individuals while station 3 on the Middle Prong had a total of 52 species with 354 individuals for the study. Station 4 on the West Prong yielded a total of 45 species with 654 individuals.

Table B-1 lists the common and scientific names of 37 species collected one or more times during the cyanide collections on the Little Pigeon. It is important to note that this is not a complete species list of the Little Pigeon. Collections were made on the same seven riffles month after month to determine population changes within these particular riffles. As such, many species of fish regarded as pool species were never collected or may have been collected only a few times in the study area. An example of this are the red horses (Morocetoma) which were
collected on the West Prong at the station 4 riffle in the spring spawning run in both 1975 and 1976; otherwise Moxostoma were not collected in riffles.

One group of fish particularly important in this study are the Percidae. This family includes the darters, most commonly associated with gravel riffles. A comparison of the percid populations shows station 1 on the West Prong with 58 total individuals and three species represented for the seven month study while the Middle Prong had 275 individuals and seven species represented. At station 2, the West Prong had 79 total individuals of four species while the Middle Prong had 353 total individuals of eight species represented. West Prong station 3 had 89 total individuals of six different species while the Middle Prong station 3 had 226 individuals of eight species. Lastly, station 4 on the West Prong had 481 individuals of five species.

A sharp contrast was present in both total numbers and numbers of species of percids between the Middle and West Prong. For example, Etheostoma rufilineatum was the dominant darter in total numbers in all stations on the Middle Prong but did not occur in West Prong station 1 and only a single individual was collected at station 2; it is not until station 4 that it appeared in large numbers. Percina evinds is another darter not collected until station 3 and 4 on the West Prong but it appeared in the Middle Prong more consistently, with a single occurrence at station 1 and nearly monthly occurrence at station 2.

The populations of the subgenus Catonotus have undergone changes in the West Prong. Table B-4 shows that Carl Hubbs collected Etheostoma keniocotti from below the Pigeon Forge Bridge (roughly station 3). Also,
D. A. Etnier collected *Etheostoma kennicotti* from the same locality in 1968 (Table B-6). In 1969, D. A. Etnier collected *Etheostoma flabellare* from the mouth of Norton Creek (Table B-6). Early collection records indicated that *Catonotus* were present in the West Prong below Gatlinburg but no individuals were collected during the study. However, *Etheostoma flabellare* (Table B-5) were collected in the qualitative collection at the West Prong control station above Gatlinburg. Apparently a population of *Catonotus* exists above Gatlinburg but not below Gatlinburg.

One additional darter which was absent in collections from the West Prong was *Percina aurantica*. Though peripheral to the riffle community, *Percina aurantica* was occasionally taken in the Middle Prong cyanide samples and was observed to occur in abundance in flowing pool areas. Hubbs (1937) documented the occurrence of *Percina aurantica* in the West Prong. Twenty-eight cyanide samples in this study and an additional 12-15 recent collections by other workers have failed to demonstrate its continued existence.

Other fish in addition to the *Catonotus* and *Percina aurantica* have disappeared or decreased in numbers in the West Prong below Gatlinburg. Hubbs in 1937 collected *Percina macrocephala*. This fish has not been recollected in recent years. Dr. D. A. Etnier made several collections as presented in Table B-6, and an abundance of species was evident. In 1968 at a site equivalent to station 3 in this study, Etnier collected *Etheostoma kennicotti, Etheostoma sonale* and other species not present in Table B-2 of this study. Also, when compared with fish collected in this study the numbers collected were higher. For example, D. A. Etnier
(Table B-6) collected 109 *Etheostoma chlorobranchium* and 46 *Etheostoma swannanoa* near station 1. During seven cyanide samples at station 1 of this study, only 17 *Etheostoma chlorobranchium* and 38 *Etheostoma swannanoa* were collected (Table B-2). This indicates that changes in fish populations in the West Prong have occurred since the 1968-1969 collections.

One particular game fish of interest in these two prongs is *Salmo gairdneri*. Stocking of this fish was discontinued in 1975 on the West Prong but continues in the Middle Prong. *Salmo gairdneri* were not collected on the West Prong during this study but were netted for examination as they floated downstream in distress at station 3 and 4 on the West Prong on the July 4, 1975, weekend. On the other hand, they were collected on three separate occasions in the Middle Prong even though sampling was not being done in typical trout habitat. In addition to these confirmed collections, there were several other occasions where trout entered the block net but recovered and escaped before the net was taken ashore.

Perhaps the most conspicuous fish on the West Prong was *Campostoma anomalum*. While schools of these fish could be seen in both prongs grazing algae off the rocks, the populations were noticeably larger on the West Prong. Station 1 on the West Prong had a total of 522 *Campostoma* per sample while the Middle Prong station 1 had 427 but this probably does not reflect the actual *Campostoma* populations. One possible reason is that the sample areas had to be walked through due to overgrown banks to place the cyanide at the head of the riffle. This scared large numbers of *Campostoma* upstream away from the sample area. Visually,
numbers of *Campostoma* appeared much higher on the West Prong at station 1 and 2 than at any Middle Prong station.

The hogsucker, *Hypentelium nigricans* like *Campostoma*, had a larger population in the West Prong than in the Middle Prong. Station 1 on the Middle Prong had a single collection of 4 individuals while at the West Prong station 1 *Hypentelium nigricans* were taken in every collection with a total of 60 individuals. In the West Prong stations 1-3, 132 total individuals were collected while the Middle Prong stations 1-3 yielded 12 total individuals.

Other fish collected during the study included *Phenacoobius, Notropis* and *Hybopsis*. *Phenacoobius*, a riffle inhabitant, was picked up in station 2 and further downstream in both prongs. *Hybopsis insignis*, another riffle fish, was collected at every station of the Middle Prong but only station 3 and 4 of the West Prong. *Hybopsis amblops* and *Notropis*, typical pool species, showed very little differences in either diversity or abundance between the Middle and West Prong.

### III. WATER QUALITY

Table C-1 summarizes and compares selected 1968 water quality parameters for 3 stations: one above Gatlinburg and one below Gatlinburg at station 1 of this study on the West Prong and one on the Middle Prong at station 3 of this study.

Using information on geologic formations in the study area, predictions can be made on what mineral water quality should be in the Middle and West Prong using a nonpoint source mineral water quality model presented by Betson and McMaster (1975). With information on land cover (fraction of area forested) plus underlying geologic formations
this model can be used to predict the natural water quality. Table C-1 shows the predicted values for the Little Pigeon watershed at station 1 of both prongs and also how closely these values for parameters like pH, sodium, silica, calcium, magnesium, chloride and iron resemble the actual values recorded over the months sampled in the three selected stations. This model demonstrates that those aspects of water quality are largely a function of the underlying geology. Since the geology and land cover of both watersheds is similar, it follows that the water leaving the park on the Middle and West Prong should have very similar chemistry and therefore any differences noted should not be due to natural water chemistry differences.

Several parameters measured in Table C-1 can indicate anthropogenic influences: fecal coliform, dissolved oxygen (DO), 5-day BOD, and total phosphates. Fecal coliform counts varied between the Middle and West Prong, with the West Prong being extremely high in the summer months when compared to the low values in the Middle Prong. Above Gatlinburg fecal coliform was barely detectable, more like the Middle Prong then the West Prong below Gatlinburg. Middle Prong station 3 did have one high fecal coliform reading in June 1968 when stream flow was also high. The highest fecal coliform readings were at station 1 below Gatlinburg. An additional parameter considered is dissolved oxygen. Lowered DO might indicate decay is taking place. However, DO in stations on both the Middle and West Prong was high and indicates a well-aerated stream. The 5-day BOD was also similar in the three stations with an almost imperceptible rise in the West Prong below Gatlinburg. Total phosphate in the West Prong below Gatlinburg was tenfold higher than the
low and very similar results from the Middle Prong and above Gatlinburg.

Even with the contributions from the Gatlinburg sewage plant, the West Prong water quality shows minor change. Fecal coliform frequently exceeds EPA (1972) recreation water quality criteria indicating that untreated sewage probably enters the water. But the data in Table C-1 along with other data taken at these sites but not included indicate that in general water chemistry changed very little below the sewage plant outfall. Trace metals or toxic chemicals that might impact fauna would not be expected from this non-industrial resort community (Table C-2). A single sample in which trace constituents were analyzed was taken in October 1975 at these three stations and showed low or undetectable levels of each constituent. Therefore, other than an elevation in the loadings of fecal coliform and total phosphates, the impact of Gatlinburg upon the quality of water in the West Prong has been almost undetectable at least as quantified by a conventional monthly sampling program with the samples collected on week-days and with those samples analyzed for conventional water quality parameters.
In order to utilize fish and macroinvertebrates as "indicators" of environmental conditions in streams, it is essential to have a knowledge of the species composition and abundance of the various organisms living in riffles and which prevail in clean and organically enriched waters. By looking at conditions in the Middle Prong of the Little Pigeon, which is known to be a relatively pristine stream, it is possible to see how changes in the West Prong, as indicated by the results herein, have come about.

Of the biotic, physical and chemical parameters that integrate to form the environmental milieu to which macroinvertebrates respond, producing observed patterns of distribution and levels of abundance, certain parameters appear to be more direct in their mode of control. Excluding various degrees of human perturbation, under natural conditions the availability of food, nature of sediments and current flow generally constitute the parameters of primary significance in determining microdistribution patterns.

Geographical distribution of stream species may be determined by physical-chemical factors as it is understood that no animal can occur naturally in a region to which, for some historical reason, it has not gained access, even though suitable habitat occurs there (Whitton, 1975). Attempts to link microdistribution and abundance of faunal elements with specific parameters have been inconclusive. In the Little Pigeon within similar sampling locations, species would be expected to be similar if
not identical. The underlying geologic formations are remarkably similar causing stream water chemistries to be nearly identical and the prongs join before any natural barrier could be found which would prevent an exchange of faunas. Therefore, any detected differences in species of abundance of benthos or fish should be due to natural or anthropogenic microhabitat differences.

In the riffle habitat, as chosen in this study, current becomes an important parameter as any organisms living in the riffle must be specialized to swim against or avoid the current. Instead of using large amounts of energy to swim in the current, many organisms adapt to life in fast flowing water by taking advantage of the boundary layer phenomenon in current flow. The rate of flow decreases rapidly towards the bottom until at the boundary layer it declines very rapidly to zero. When the substrate is irregular, the flow is turbulent and the boundary layer is thicker than it would be if the flow were laminar. In order to maintain themselves in fast flowing water, benthic animals must be prepared to live in the boundary layer with suitable anatomical adaptations.

Hynes (1972) has researched the evolution of unique adaptations of macroinvertebrates to the particular microhabitat associated with the boundary layer as found in shallow riffle streams. Examples of this erosional riffle fauna (Hynes, 1972) have been taken from the Little Pigeon and include such forms as the dorso-ventrally flattened setipalpian stoneflies (Plecoptera) and the mayflies (Ephemeroptera) in the family Heptageniidae. Some of the latter (for example, Rhithrogena), have gills modified to form a sucker-like disc. In beetle larvae (Coleoptera) such as the water penny, (Psephenus) peripheral bristles on the expanded thoracic and abdominal tergites act to form a similar
seal with the substrate. While some organisms flatten and live under the stones so as to avoid current, change of body shape allows some organisms to live on the surface of the rock and remain within the boundary layer. Blackflies (Simuliidae) spin a layer of silk in which the circlet of hooks on the flattened posterior prolegs are imbedded to maintain their position on exposed surfaces of rocks. Blackflies, along with net-spinning caddisflies (Trichoptera, i.e., Hydropsychidae) have evolved filtering devices for obtaining particulate food from flowing water. Free-living Trichoptera and the larvae of Corydalidae have developed clawed posterior prolegs to grip the roughness of the substrate. Stationary or portable cases constructed of heavy materials are common adoptions for maintaining position in rapid waters as seen in certain caddisflies and midges. Goera uses the weight of an added ballast stone which it adjusts according to current to maintain position.

Since these organisms are highly specialized to living in fast flowing water, any change in habitat is likely to affect composition of the riffle community. In addition, aquatic insects are not able to migrate large distances as fish do. If at any time during development, environmental conditions become lethal for a given insect or macroinvertebrate, that organism will be eliminated even though the conditions may be present for only a short time. Therefore, species diversity and total numbers of the aquatic insects have been looked at carefully for any differences between the Middle and West Prong that might indicate a change has taken place. The results indicate a sharp decrease in the abundance of the population in aquatic insects in the West Prong below Gatlinburg when compared between the West Prong above Gatlinburg
and the Middle Prong. The results also indicate that certain families and genera have been affected more strongly than others. In general, the families most affected are those just discussed for their adaptations to life in the boundary layer of the shallow riffle habitat.

The results of the macroinvertebrate data indicates a sharp drop in both numbers of species and total numbers of individual Plecoptera and Ephemeroptera in the West Prong below Gatlinburg when compared to the West Prong above Gatlinburg or to the Middle Prong. Plecoptera, for example, are represented by a 78 percent increase in numbers of species and a 97 percent increase in the number of total individuals in the Middle Prong station 1 when compared to the West Prong station 1. Even the West Prong control station above Gatlinburg which was only sampled four times instead of 12 yielded a 66 percent increase in the number of species and a 94 percent increase in the number of individuals compared to West Prong station 1, and, yielded species not found at downstream stations. In the Plecoptera neither total numbers nor numbers of species noticeably increased downstream from station 1 on the West Prong, while numbers of species and total numbers remained high going downstream in the Middle Prong. In general, the population of Plecoptera in the West Prong below Gatlinburg is very low when compared to the Middle Prong. Ephemeroptera, though having higher number of species and total numbers, exhibited trends similar to those with Plecoptera. Middle Prong station 1 had a 52 percent increase in the number of species and a 92 percent increase in the total number of individuals compared with West Prong station 1. Populations changed very little downstream in the two prongs as the West Prong populations
remained low while the Middle Prong populations remained high in both Ephemeroptera and Plecoptera.

The reduction in population numbers and number of species is an important result as is the realization of which families have been most affected. The dorso-ventrally flattened setipalpian Plecoptera and also the Heptageniidae (Ephemeroptera) had extremely reduced populations. *Rhithrogena* was never collected at West Prong station 1 but was collected in the Middle Prong. *Psephenus* existed in large numbers in the Middle Prong as would be expected from Surber samples in cobble substrate, but collection of *Psephenus* in the West Prong was a rare event, usually only once or twice for the 12-month study at each of the 4 stations. These observations indicate that the organisms normally associated with current swept gravel have been reduced in population below Gatlinburg and its sewage plant when compared to a station above Gatlinburg or to the Middle Prong.

In running water not only macroinvertebrates but also fish have adapted to use current in the riffle habitat. Fish such as *Salmo* occurring in and relying on their ability to swim in fast water are more terete and streamlined than fish in lakes or rivers with little or no current. However, not all fish living in rapid waters are powerful swimmers. Many Little Pigeon residents such as *Cottus, Etheostoma, Hypentelium* and *Percina evides* maintain themselves close to the bottom or in shelter under or behind stones. These fish have adapted themselves to being in or near the boundary layer, and have anatomical adaptations (Hynes, 1972; Whitton, 1975) which seem to be associated with this benthic habitat. These fishes are usually dorso-ventrally flattened
or have an arched dorsal profile. The eyes tend to be dorsal, and the gill openings tend to be placed laterally rather than latero-ventrally. There also appear to be modifications in the mouth which has moved more or less ventrad so that when it is opened it does not disrupt the arched dorsal profile. Lastly, an internal modification noted in bottom dwelling fishes is the reduction in size or complete absence of the swim bladder.

Nearly all species of fish have fairly well defined breeding habits and requirements which are more restrictive than requirements necessary for other facets of life history, and those determine to a large extent the suitability of particular rivers and streams for various species. Many species select or prepare definite nest sites on stony or gravel substrate. Certain species of *Etheostoma*, *Campostoma*, and *Noemias* which construct nests are restricted not only by the size of material of the substratum, which they must be able to move, but by the need to be free of silt. A great many species such as *Moxostoma* and *Hypentelium* (Jenkins, 1970; Hynes, 1972) breed on gravel or stones but construct no nest. Nearly all fish that spawn this way move on to clean gravel to do so, often moving upstream into shallower and swifter water than is their normal habitat. The eggs of these species either adhere to stones until they hatch, or drift and roll into interstices and small pockets of dead water.

Having looked at the adaptions of certain species of fish to be unique habitat of the riffles, the results of the study must be considered with these adaptions in mind. The discussion of fish adaptions thus far should be applicable to either the West Prong or the Middle
Prong in that they are pertinent to any fast water stream. The results of the study indicate that a shift has taken place in fish species below Gatlinburg when compared to the Middle Prong. For example, both a reduction in total numbers and the number of species of Percidae has taken place in the West Prong below Gatlinburg when compared to the Middle Prong. For a specialized species to change in abundance or disappear must indicate for fish, as well as macroinvertebrates, a change in the riffle or in the conditions in the riffle habitat.

At the same time that the Percidae are decreasing in numbers below Gatlinburg, Campostoma and Hypentelium both show increases in numbers in the West Prong below Gatlinburg. Campostoma feeds by grazing algae from the surfaces of stones. Hence, any nutrients added to the West Prong which would enhance the growth of algae would increase food available to these fish and ostensibly the carrying capacity. The hogsucker, Hypentelium nigricans, similarly rolls stones over and sucks up ooze from beneath them (Raney and Lachner, 1946), so added organics and suspended solids might increase available food. These two rather opportunistic species increased in numbers while the sight-feeding Percidae (Hynes, 1972) decreased in numbers.

While all species of fish have requirements necessary for each facet of their life history, breeding habits and requirements are generally more restrictive than those to merely maintain life. So while adult fish can survive pollution, it is possible that reproduction can be curtailed. Certain species of Etheostoma, Campostoma, and Nocomis construct nests while Mozostoma, Hypentelium and Percina spawn on current swept gravel with no nest. Whitton (1975) noted that there
must be a flow of water through the interstices to maintain the required high level of dissolved oxygen for egg development in all these species. If organic solids fill the interstices then either the eggs suffocate or are excluded altogether, drifting downstream out of the riffle or being eaten by predatory species. Further, species which are particular in spawning site selection may be seriously curtailed or fail to spawn altogether.

The results have indicated that a change has taken place in both the fish and macroinvertebrate faunas of the riffle communities in the West Prong below Gatlinburg when compared to the West Prong above Gatlinburg or to the Middle Prong. Water quality comparisons indicate that natural mineral water quality parameters in the two prongs is similar if not identical, supporting the premise that the two prongs are comparable study sites. Treated and at times untreated sewage enter the West Prong from the Gatlinburg sewage treatment plant, while the Middle Prong suffers no known major anthropogenic influence. Elevated levels of fecal coliform and total phosphates in the West Prong indicate the addition of organics.

Residential sewage is a complex of organic compounds in solution and suspension. These organics and solids are in evidence at West Prong station 1 where offensive odor and milky color have been observed. Suspended solids are present as a powder of sediment lying in pools, behind rocks and in the spaces between stones. These sediments were collected in samples taken during the summer and appear to coat legs and gills of aquatic insects. Additionally, during fish collections taken in the summer months, the block seine was covered with partially digested
lettuce leaves, chicken, and other indistinguishable gelatinous masses. This was particularly true on the July 1975 sample when these suspended solids were also noticeable at West Prong station 2. (If suspended solids become heavy enough to cover up and fill the spaces or interstices, the animals which inhabit these spaces either die or move to an area that is not affected.) Movement renders the organisms more susceptible to predation, and the populations of these types of organisms that inhabit the interstices are likely to decrease. Another organism more equipped to live in the habitat covered with the suspended solids might take over the new area if present.

If this study were done in a lake or a pond instead of a stream, the explanation of the effects of suspended solids on biota could be well documented (Kemp, 1966; Hynes, 1960). Without current, the incoming nutrients and solids would accumulate in layers covering available habitat. Decay within these layers would reduce D.O. and also produce gases such as hydrogen sulfide which would be injurious to faunal population as gases accumulated. In general, the only benthos persisting would be those that can live in the accumulating muck. The only fish present would be those which could utilize these organisms and which could tolerate lower D.O. concentrations.

Since the city of Gatlinburg treats its sewage with chlorine, the potentially toxic effects of chlorine must be considered. The toxicity of chlorine to aquatic life will depend not so much on the amount of chlorine added but on the concentrations of residual chlorine remaining and on the relative amounts of free chlorine and chloramines. Available water quality data for the West Prong of the Little Pigeon
does not include information for free chlorine, residual chlorine or any chloramines. However, the state of Tennessee monitors the level of residual chlorine at the point slightly below where the chlorine is added. For the study year, the residual chlorine level never exceeded 0.5 mg/d (D. Owens, Pers Comm). The 0.5 mg/l level occurs in the summer months and any untreated sewage (1 to 2 times the treated amount) is added to the chlorinated sewage after the residual chlorine measurement. So before the effluent (treated and untreated) reach the West Prong, the residual chlorine is considerably lower (but unmeasured) than 0.5.

In spite of the potentially toxic effects of chlorine and its by-products, the West Prong still has relatively large numbers of aquatic invertebrates and fish. Only certain highly specialized species have disappeared. Chlorine effects cannot be discounted without further tests but it does not seem likely that the levels of chlorine added to the Gatlinburg and Pigeon Forge effluents could affect selectively almost 15 km of the West Prong.

Because of the numbers and types of species which have decreased or disappeared from the West Prong below Gatlinburg it appears that some factor such as suspended solids could be affecting the interstices and boundary layer of the riffle. The sewage input into the West Prong is highest in the summer when natural flows are low. Spates even in the mountainous area are infrequent and occur when temperatures are highest for the year. The soluble organics entering the system would be diluted but due to low flow suspended solids would either remain in suspension and wash out of the system or eventually settle out. Most of the suspended solids would settle out near the plant with smaller particles
being carried downstream with the current. If sufficient solids accumulate to partially or completely fill in interstices, then macroinvertebrates and the organisms that depend on them for food are affected. Apparently no research has been done in a stream environment on the susceptibility of insects to this type of pollution. Considerable time may be needed to affect a particular species. In a dry summer these organic solids may cover the substrate for two or three months, while in a wet summer the organic solids may be present for only several days. They are present in large quantities in the summer and their effects are not entirely known, but they would affect the boundary layer and dead spaces in the river. The species shown by this study to be declining in numbers are all inhabitants of that layer.

An interesting factor that might also point to the importance of organic solids is that in most pollution studies when clean water species disappear, certain species of Diptera or other sewage related species usually take their place and take advantage of the new food supply. This is reflected in a decrease in numbers of species but an increase in numbers of individuals. In this study, there is a decrease in numbers of species in the West Prong but the abundance of pollution tolerant species does not increase when compared to the Middle Prong. Perhaps because the excessive pollution only lasts three or four months, the increased organics are not present long enough for species to take advantage of them before they are flushed by heavy winter flows.

If the faunal changes are effected by organic solids there are several reasons why water quality parameters differed little in the two streams. First, most samples are taken from the surface, and except at
the outfall the majority of the suspended solids visible appeared to be at or near the bottom. Secondly, there is a dilution factor. Very clean water flows from the mountains through Gatlinburg. Even in low flows, dilution would make soluble portions of the sewage "dilute" quickly as the sewage passed downstream. In high flows, the spate-like conditions would flush or scour any accumulated materials from the system. Thirdly, Gatlinburg experiences heavy tourist trade all summer but week-ends are especially busy as local residents join tourists in the resort city. This allows some peak outputs from the city to go unnoticed as water quality sampling regimes are based on week-day samples. Lastly, the sewage plant is really only overtaxed seriously during the summer influx of tourists. Winter rains would flush the effects of the summer overload from the plant and might even allow for a partial recovery of the stream until the summer input returns again. So seasonal variability affects results the sampling program will yield, and only the summer could be expected to show the effects of heavy loads of untreated sewage.
CHAPTER VI

CONCLUSION

The results of this study show conclusively that substantial habitat perturbation has occurred in the riffle communities in the West Prong Little Pigeon River where fish and aquatic invertebrates are concerned. A general recapitulation of results and speculations on the causative aspects of the pollution will shed some light in this regard.

Available water quality data from 1968 and one 1975 sample along with model predictions indicate that the natural mineral water quality of the Middle Prong and West Prong is similar. Therefore, any large faunal changes taking place between the two prongs should be due to the known addition of organics to the West Prong at Gatlinburg and Pigeon Forge instead of any inherent differences in water quality. Water quality data indicate a mild organic loading as shown by an increase in fecal coliform and total phosphates in the West Prong below Gatlinburg. Suspended solids were not tested for in the 1968 water quality study but in the 1975-1976 faunal collections organics were in evidence as color, smell, and a covering of solids on the substrate during the May to September samples. The effects of increased organics in a stream would be on microhabitats which would cause a change in the fauna adapted to these microhabitats.

Both fish and aquatic invertebrates have been described in several riffle communities of the Little Pigeon River system. The results show an overall decrease in numbers of species and abundance in the West Prong below Gatlinburg when compared to the West Prong above Gatlinburg.
or to the Middle Prong. More important than the mere decline in numbers of species or numbers, however, are the findings that certain groups of organisms were affected more strongly than others by the input of domestic sewage. Most strongly affected are those specialized organisms that utilize the riffle boundary layer and interstitial spaces for food, living space, or spawning grounds.

Gatlinburg and Pigeon Forge, as resort cities, present some interesting implications to the results of this study. As summer resorts, the vast majority of the tourist industry occurs from June through August and even more important is the fact that the heaviest tourist traffic occurs on week-ends and holidays. A conventional week-day water quality sampling regime under these circumstances will be incapable of detecting the heaviest discharge of organic effluents due to the rapid stream flushing; as data in this study indicates. Hence, such a stream will appear to have clean water at times and yet factors such as organics and solids may still be present in restricted areas in sufficient quantities to affect the aquatic invertebrates. Therefore, for water quality parameters to be useful in detecting the effects of resorts on the aquatic environment, the sampling strategy must be set up such that samples are taken when the pollution occurs. Because of the personnel problems involved with week-end and/or holiday sampling, another means of continuous monitoring is necessary. In cases of organic pollution, aquatic invertebrates may be more sensitive and accurate means of assessing the impact of the pollution than are water quality parameters.

The input of civilizations' industrial and domestic waste products on the aquatic environment changes that environment and leads to changes in the distribution and abundance of individual
species and therefore to alterations in the community. In evaluating the reliability of aquatic organisms to reflect environmental conditions which have prevailed during the life history of the organisms comprising the population, the organisms must be considered not as separate species but as biological associations. The mere occurrence or absence of a single species in a locality is an unreliable indicator of polluted conditions. Conversely many aquatic organisms that are intolerant of persistent organic pollution can live for a short period of time in a polluted area when pollution effects are at a minimum. The organisms should be considered in groups or communities according to their morphological adaptations and physiological requirements.
LIST OF REFERENCES
LIST OF REFERENCES


APPENDICES
APPENDIX A
TABLE A-1. Mean Values (Rounded to the Nearest Whole Number) of Three Surber Samples Taken Quarterly, West Prong, Little Pigeon River, Control Station (Above Gatlinburg), River km 31.3

<table>
<thead>
<tr>
<th></th>
<th>Summer 8/17/75</th>
<th>Fall 11/15/75</th>
<th>Winter 1/17/76</th>
<th>Spring 3/13/76</th>
</tr>
</thead>
<tbody>
<tr>
<td>Platyhelminthes</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Turbellaria</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Planaria sp.</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Nemertea</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Prostoma rubrum</td>
<td>*1</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Nematomorpha</td>
<td></td>
<td>*1</td>
<td>*1</td>
<td>*1</td>
</tr>
<tr>
<td>Annelida</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Oligochaeta</td>
<td></td>
<td>*1</td>
<td>5</td>
<td>8</td>
</tr>
<tr>
<td>sp.</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Arthropoda</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Crustacea</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Decapoda</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Cyclops sp</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Arachnoidea</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Hydracarina</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>*1</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Insecta</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Ephemeroptera</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Heptageniida</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Epeorus sp.</td>
<td>2</td>
<td>*2</td>
<td>2</td>
<td>2</td>
</tr>
<tr>
<td>Stenonema sp.</td>
<td></td>
<td>*1</td>
<td>1</td>
<td>6</td>
</tr>
<tr>
<td>Stenonema sp. cf. rubrum</td>
<td>*1</td>
<td>*1</td>
<td>4</td>
<td>4</td>
</tr>
<tr>
<td>Rhithrogena sp.</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Baetida</td>
<td></td>
<td>*1</td>
<td>2</td>
<td></td>
</tr>
<tr>
<td>Baetis sp.</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Ephemerella sp. cf. invaria</td>
<td>*1</td>
<td>*1</td>
<td>2</td>
<td></td>
</tr>
<tr>
<td>Paraleptophlebia sp.</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Megaloptera</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Nigronia serricornis</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>*1</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Plecoptera</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Pteronaridae</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Pteronaroid sp. cf. doreata</td>
<td>*1</td>
<td>*1</td>
<td>*1</td>
<td></td>
</tr>
<tr>
<td>Taeniopterygidae</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Brachyptera fasciata</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Leuctridae</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Leuctra ferruginea</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Perlida</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Acroneuria ruralis</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Paragentina immarginata</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>*1</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Perlodida</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Isoperla bilineata</td>
<td>2</td>
<td>7</td>
<td>6</td>
<td></td>
</tr>
<tr>
<td>Isoperla richardsoni</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Isochrysis decisus</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Chloroperlidae</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
Table A-1 (continued)

<table>
<thead>
<tr>
<th></th>
<th>Summer 8/17/75</th>
<th>Fall 11/15/75</th>
<th>Winter 1/17/76</th>
<th>Spring 3/13/76</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Trichoptera</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Alloperla sp.</td>
<td>2</td>
<td><strong>1</strong></td>
<td>4</td>
<td>3</td>
</tr>
<tr>
<td>Chloroperla sp. cf. oxydippe</td>
<td>2</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Hydropsychidae</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Cheumatopsyche sp.</td>
<td>3</td>
<td>3</td>
<td>36</td>
<td>5</td>
</tr>
<tr>
<td>Hydropsyche bronta</td>
<td><strong>1</strong></td>
<td><strong>1</strong></td>
<td><strong>1</strong></td>
<td><strong>1</strong></td>
</tr>
<tr>
<td>Hydropsyche sloessonae</td>
<td><strong>1</strong></td>
<td><strong>1</strong></td>
<td><strong>1</strong></td>
<td><strong>1</strong></td>
</tr>
<tr>
<td>Hydropsyche sparna</td>
<td>1</td>
<td><strong>1</strong></td>
<td>2</td>
<td><strong>1</strong></td>
</tr>
<tr>
<td><strong>Rhyacophilidae</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Rhyacophila fuscula</td>
<td><strong>1</strong></td>
<td><strong>1</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Glossosoma nigror L</td>
<td><strong>1</strong></td>
<td></td>
<td></td>
<td>1</td>
</tr>
<tr>
<td><strong>Psychomyiidae</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Polycentropus sp. cf. cinereus</td>
<td></td>
<td><strong>1</strong></td>
<td>2</td>
<td>1</td>
</tr>
<tr>
<td><strong>Philopotamidae</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Sortoeta distinctus</td>
<td><strong>1</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Limnophilidae</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Pycnopsyche guttifer</td>
<td><strong>1</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Brachycentridae</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Microsema sp.</td>
<td><strong>1</strong></td>
<td></td>
<td></td>
<td><strong>1</strong></td>
</tr>
<tr>
<td><strong>Coleoptera</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Psephenidae</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Psephenus sp.</td>
<td>1</td>
<td></td>
<td>1</td>
<td></td>
</tr>
<tr>
<td><strong>Elmidae</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Stenelemis sp.</td>
<td><strong>1</strong></td>
<td><strong>1</strong></td>
<td><strong>1</strong></td>
<td><strong>1</strong></td>
</tr>
<tr>
<td><strong>Diptera</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Chironomidae</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>A</td>
<td>2</td>
<td></td>
<td>3</td>
<td>4</td>
</tr>
<tr>
<td>P</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>L</td>
<td>8</td>
<td>62</td>
<td>102</td>
<td>49</td>
</tr>
<tr>
<td>Tipulidae</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Antochoa sp.</td>
<td><strong>1</strong></td>
<td><strong>1</strong></td>
<td>3</td>
<td>4</td>
</tr>
<tr>
<td>Eriocera sp.</td>
<td><strong>1</strong></td>
<td><strong>1</strong></td>
<td><strong>1</strong></td>
<td><strong>1</strong></td>
</tr>
<tr>
<td>Pedicia sp.</td>
<td><strong>1</strong></td>
<td><strong>1</strong></td>
<td><strong>1</strong></td>
<td><strong>1</strong></td>
</tr>
<tr>
<td><strong>Rhyagoniidae</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Atherix variegata</td>
<td><strong>1</strong></td>
<td></td>
<td>1</td>
<td>1</td>
</tr>
<tr>
<td><strong>Empididae</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Heleidae</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Palpomyia sp.</td>
<td>1</td>
<td></td>
<td>1</td>
<td><strong>1</strong></td>
</tr>
<tr>
<td><strong>Mollusca</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Gastropoda</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Ancyliidae</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Ferrissia sp.</td>
<td>2</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
TABLE A-1 (continued)

<table>
<thead>
<tr>
<th></th>
<th>Summer 8/17/75</th>
<th>Fall 11/15/75</th>
<th>Winter 1/17/76</th>
<th>Spring 3/13/76</th>
</tr>
</thead>
<tbody>
<tr>
<td>Total number of insects</td>
<td>74</td>
<td>262</td>
<td>594</td>
<td>250</td>
</tr>
<tr>
<td>Mean number per sample date</td>
<td>24.6</td>
<td>87.3</td>
<td>198.0</td>
<td>83.3</td>
</tr>
<tr>
<td>Total taxa per sample date</td>
<td>18</td>
<td>25</td>
<td>33</td>
<td>18</td>
</tr>
</tbody>
</table>

*2 Early instars.

*1 = mean values are less than 1.
<table>
<thead>
<tr>
<th></th>
<th>May</th>
<th>Jun</th>
<th>Jul</th>
<th>Aug</th>
<th>Sep</th>
<th>Oct</th>
<th>Nov</th>
<th>Dec</th>
<th>Jan</th>
<th>Feb</th>
<th>Mar</th>
<th>May</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Platyhelminthes</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Turbellaria</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><em>Planaria</em> sp.</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Nemertea</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><em>Prostoma rubrum</em></td>
<td>*1</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Nematomorphpha</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Gordioidea</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><em>Gordius</em> sp.</td>
<td>*1</td>
<td>*1</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Annelida</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Oligochaeta</strong></td>
<td>8</td>
<td>13</td>
<td>7</td>
<td>6</td>
<td>10</td>
<td>46</td>
<td>174</td>
<td>7</td>
<td>64</td>
<td>11</td>
<td>2</td>
<td>19</td>
</tr>
<tr>
<td><strong>Arthropoda</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Insecta</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Plecoptera</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Leuctridae</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><em>Leuctra ferruginea</em></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Chloroperlidae</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><em>Chloroperla</em> sp. cf. <em>cydippe</em></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Ephemeroptera</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Heptageniidae</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><em>Epeorus</em> sp.</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><em>Stenonema</em> sp.</td>
<td>*1</td>
<td>*1</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><em>Stenonema</em> sp. cf. <em>rubrum</em></td>
<td>*1</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><em>Stenonema</em> sp.</td>
<td>*1</td>
<td>*1</td>
<td>*1</td>
<td>*1</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><em>Heptagenia</em> sp. cf. <em>maulipennis</em></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Baetidae</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><em>Paraleptophlebia</em> sp.</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><em>Ephemera</em> sp.</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><em>Ephemera</em> sp. cf. <em>invaria</em></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><em>Ephemera</em> sp. cf. <em>deficiens</em></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><em>Isonychia</em> sp.</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>*1</td>
<td></td>
</tr>
<tr>
<td></td>
<td>May</td>
<td>Jun</td>
<td>Jul</td>
<td>Aug</td>
<td>Sep</td>
<td>Oct</td>
<td>Nov</td>
<td>Dec</td>
<td>Jan</td>
<td>Feb</td>
<td>Mar</td>
<td>May</td>
</tr>
<tr>
<td>----------------------</td>
<td>-----</td>
<td>-----</td>
<td>-----</td>
<td>-----</td>
<td>-----</td>
<td>-----</td>
<td>-----</td>
<td>-----</td>
<td>-----</td>
<td>-----</td>
<td>-----</td>
<td>-----</td>
</tr>
<tr>
<td>Caenis sp. cf. simulans</td>
<td>9</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Baetis sp. cf. intercalaris</td>
<td>1</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Hemiptera</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Gyrinidae</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Dineutus sp.</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Trichoptera</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Hydropsychiidae</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Cheumatopsyche sp.</td>
<td>*1</td>
<td>*1</td>
<td>*1</td>
<td>*1</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>*1</td>
<td>*1</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Hydropsyche morosa</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Hydropsyche sparva</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Lepidostomatidae</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Lepidostoma sp.</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Coleoptera</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Psephenididae</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Psephenus sp.</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Elmidae</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Promoresia sp.</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Dubiraphia sp.</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Heleidae</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Dashylea sp.</td>
<td>P</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>L</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Dryopidae</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Helichus sp.</td>
<td>A</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Diptera</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Chironomidae</td>
<td>A</td>
<td>2</td>
<td>17</td>
<td>4</td>
<td>8</td>
<td>2</td>
<td>12</td>
<td>12</td>
<td>25</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>P</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>L</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Tanydaridae</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Protoplasa fitchii</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Tipulidae</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

*1
### TABLE A-2 (continued)

<table>
<thead>
<tr>
<th></th>
<th>May</th>
<th>Jun</th>
<th>Jul</th>
<th>Aug</th>
<th>Sep</th>
<th>Oct</th>
<th>Nov</th>
<th>Dec</th>
<th>Jan</th>
<th>Feb</th>
<th>Mar</th>
<th>May</th>
</tr>
</thead>
<tbody>
<tr>
<td>Antocha sp.</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>*1</td>
<td>3</td>
<td></td>
<td>*1</td>
</tr>
<tr>
<td>Antocha sp. cf. saxicola</td>
<td>P</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>*1</td>
</tr>
<tr>
<td>Psychodidae</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Psychoda sp.</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>5</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>L</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>14</td>
<td>3</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Simulidae</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Simulium sp.</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>*1</td>
</tr>
<tr>
<td>Mollusca</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Gastropoda</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Ferrissia sp.</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Physa sp.</td>
<td>*1</td>
<td>*1</td>
<td>2</td>
<td>*1</td>
<td>5</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>*1</td>
</tr>
<tr>
<td>Total number per sample date</td>
<td>34</td>
<td>183</td>
<td>25</td>
<td>32</td>
<td>63</td>
<td>201</td>
<td>539</td>
<td>53</td>
<td>226</td>
<td>85</td>
<td>41</td>
<td>139</td>
</tr>
<tr>
<td>Mean number per sample date</td>
<td>11</td>
<td>61</td>
<td>8</td>
<td>11</td>
<td>21</td>
<td>70</td>
<td>180</td>
<td>18</td>
<td>76</td>
<td>28</td>
<td>14</td>
<td>46</td>
</tr>
<tr>
<td>Total taxa per sample date</td>
<td>5</td>
<td>14</td>
<td>5</td>
<td>3</td>
<td>3</td>
<td>7</td>
<td>7</td>
<td>10</td>
<td>9</td>
<td>9</td>
<td>8</td>
<td>7</td>
</tr>
</tbody>
</table>

1 Known from adults and mature larvae or nymphs.

2 Early instars.

3 Mature nymphs sharing some characters of *Stenonema rubrum* and *S. nepotellum*.

*1 = mean values less than 1.
### TABLE A-3. Mean Values (Rounded to the Nearest Whole Number) of Three Surberes Taken Monthly from May 1975 to May 1976, West Prong, Little Pigeon River, Station 2, Riber km 20.5

<table>
<thead>
<tr>
<th>Taxon</th>
<th>May</th>
<th>Jun</th>
<th>Jul</th>
<th>Aug</th>
<th>Sep</th>
<th>Oct</th>
<th>Nov</th>
<th>Dec</th>
<th>Jan</th>
<th>Feb</th>
<th>Mar</th>
<th>May</th>
</tr>
</thead>
<tbody>
<tr>
<td>Platyhelminthes</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Turbellaria</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><em>Planaria sp.</em></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Nematomorpha</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Gordioidea</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><em>Gordius sp.</em></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Annelida</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Oligochaeta</td>
<td>1</td>
<td>4</td>
<td>4</td>
<td>4</td>
<td>1</td>
<td>4</td>
<td>3</td>
<td>3</td>
<td>13</td>
<td>7</td>
<td>1</td>
<td>5</td>
</tr>
<tr>
<td>Arthropoda</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Insecta</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Plectoptera</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Peltoperlidae</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Leuctridae</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><em>Leuctra sp.</em></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Perlidae</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><em>Acroneuria ruralis</em></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Neophasganophora capitata</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Ephemeroptera</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Heptageniidae</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><em>Stenonema sp.</em></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><em>Stenonema sp. cf. rubrum</em></td>
<td>3</td>
<td>21</td>
<td>*1</td>
<td>*1</td>
<td>*1</td>
<td>*1</td>
<td>*1</td>
<td>*1</td>
<td>*1</td>
<td>*1</td>
<td>*1</td>
<td>*1</td>
</tr>
<tr>
<td><em>Stenonema sp. cf. pudicum</em></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><em>Stenonema sp.</em></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><em>Heptagenia sp.</em></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Baetidae</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><em>Ephemerella sp.</em></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><em>Isonymia sp.</em></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><em>Caenhe sp. cf. simulans</em></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><em>Baetis sp.</em></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>May</td>
<td>Jun</td>
<td>Jul</td>
<td>Aug</td>
<td>Sep</td>
<td>Oct</td>
<td>Nov</td>
<td>Dec</td>
<td>Jan</td>
<td>Feb</td>
<td>Mar</td>
<td>May</td>
</tr>
<tr>
<td>----------------------</td>
<td>-----</td>
<td>-----</td>
<td>-----</td>
<td>-----</td>
<td>-----</td>
<td>-----</td>
<td>-----</td>
<td>-----</td>
<td>-----</td>
<td>-----</td>
<td>-----</td>
<td>-----</td>
</tr>
<tr>
<td>Hemiptera</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Gyrinidae</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Dineutus sp.</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Megaloptera</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Corydalidae</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Nigronia serricornis</td>
<td>*1</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Trichoptera</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Rhyacophilidae</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Glossosoma nigrior</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Hydropsychidae</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Cheumatopsyche sp.</td>
<td>*1</td>
<td>5</td>
<td>7</td>
<td>*1</td>
<td>1</td>
<td>4</td>
<td>3</td>
<td>3</td>
<td>5</td>
<td>4</td>
<td>4</td>
<td>2</td>
</tr>
<tr>
<td>Hydropsyche morosa</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Hydropsyche slessonae</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Hydropsyche sparina</td>
<td>1</td>
<td>*1</td>
<td>2</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Coleoptera</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Psephenidae</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Psephenus sp.</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Elmidae</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Stenelmis sp.</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>A</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>L</td>
<td>*1</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Heleidae</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Diptera</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Chironomidae</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>P</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>L</td>
<td>1</td>
<td>*1</td>
<td>*1</td>
<td></td>
<td>*1</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Pentaneura sp.</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>*1</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Tanydariidae</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Protoplasa fitchii</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Tipulidae</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Antochoa sp.</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>L</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Antochoa sp. cf. saxicola</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>P</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>*1</td>
<td>5</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>*1</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>*1</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>*1</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
TABLE A-3 (continued)

<table>
<thead>
<tr>
<th></th>
<th>May</th>
<th>Jun</th>
<th>Jul</th>
<th>Aug</th>
<th>Sep</th>
<th>Oct</th>
<th>Nov</th>
<th>Dec</th>
<th>Jan</th>
<th>Feb</th>
<th>Mar</th>
<th>May</th>
</tr>
</thead>
<tbody>
<tr>
<td>Empididae</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>1</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Psychodidae</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>P</td>
<td>*1</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Psychoda sp.</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>L</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Tabanidae</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>P</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Chrysops sp.</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>L</td>
<td>2</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Mollusca</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Gastropoda</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Ferrissia sp.</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Physa sp.</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>*1</td>
<td>*1</td>
<td>*1</td>
<td></td>
</tr>
<tr>
<td>Total number per sample date</td>
<td>13</td>
<td>98</td>
<td>186</td>
<td>14</td>
<td>36</td>
<td>36</td>
<td>36</td>
<td>19</td>
<td>74</td>
<td>53</td>
<td>65</td>
<td>57</td>
</tr>
<tr>
<td>Mean number per sample date</td>
<td>4</td>
<td>33</td>
<td>62</td>
<td>5</td>
<td>12</td>
<td>12</td>
<td>12</td>
<td>6</td>
<td>24</td>
<td>18</td>
<td>22</td>
<td>19</td>
</tr>
<tr>
<td>Total taxa per sample date</td>
<td>5</td>
<td>15</td>
<td>9</td>
<td>3</td>
<td>6</td>
<td>7</td>
<td>6</td>
<td>3</td>
<td>7</td>
<td>4</td>
<td>12</td>
<td>8</td>
</tr>
</tbody>
</table>

1 Known from adults and mature larvae and nymphs.
2 Early instars.
3 Mature nymphs sharing some characters of *Stenonema rubrum* and *S. nepotellum*.
4 Mature nymphs sharing some characters of *Stenonema pudicum* and *S. carolina*.
*1 = mean values less than 1.
TABLE A-4. Mean Values (Rounded to the Nearest Whole Number) of Three Surveys Taken Monthly from May 1975 to May 1976, West Prong, Little Pigeon River, Station 3, River km 15.3

<table>
<thead>
<tr>
<th>Class</th>
<th>May</th>
<th>Jun</th>
<th>Jul</th>
<th>Aug</th>
<th>Sep</th>
<th>Oct</th>
<th>Nov</th>
<th>Dec</th>
<th>Jan</th>
<th>Feb</th>
<th>Mar</th>
<th>May</th>
</tr>
</thead>
<tbody>
<tr>
<td>Platyhelminthes Turbellaria</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Planaria sp.</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>*1</td>
</tr>
<tr>
<td>Nematomorpha Gordioidea</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>*1</td>
</tr>
<tr>
<td>Gordius sp.</td>
<td>*1</td>
<td>1</td>
<td>*1</td>
<td></td>
<td>*1</td>
<td></td>
<td></td>
<td>*1</td>
<td></td>
<td></td>
<td></td>
<td>*1</td>
</tr>
<tr>
<td>Annelida Oligochaeta</td>
<td>2</td>
<td>2</td>
<td>1</td>
<td>3</td>
<td>1</td>
<td>3</td>
<td>5</td>
<td>1</td>
<td>3</td>
<td>1</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>Arthropoda Insecta</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>*1</td>
</tr>
<tr>
<td>Plecoptera Perlidae</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Ephemeroptera Heptageniidae</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>*1</td>
</tr>
<tr>
<td>Stenonema sp.</td>
<td></td>
<td></td>
<td></td>
<td>*1</td>
<td>3</td>
<td>4</td>
<td>*1</td>
<td>*1</td>
<td></td>
<td>2</td>
<td>*1</td>
<td></td>
</tr>
<tr>
<td>Stenonema sp. cf. rubrum</td>
<td>*1</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>*1</td>
<td></td>
<td>2</td>
<td>*1</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Stenonema sp.</td>
<td>*1</td>
<td>4</td>
<td>*1</td>
<td>*1</td>
<td>*1</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>*1</td>
</tr>
<tr>
<td>Heptagenia sp.</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>*1</td>
</tr>
<tr>
<td>Baetidae</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>*1</td>
</tr>
<tr>
<td>Ephemerella sp. cf. invaria</td>
<td>2</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Ephemerella sp. cf. tuberculata</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>*1</td>
</tr>
<tr>
<td>Caenis sp. cf. simulans</td>
<td>2</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Baetis sp.</td>
<td>*1</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Trichoptera Rhyacophilidae</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>*1</td>
</tr>
<tr>
<td>Glossosoma nigrior P</td>
<td>P</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>*1</td>
</tr>
<tr>
<td>L</td>
<td>L</td>
<td>*1</td>
<td>*1</td>
<td>*1</td>
<td>1</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>*1</td>
</tr>
<tr>
<td>Hydropsychidae</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Cheumatopsyche sp.</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>*1</td>
</tr>
<tr>
<td>P</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>*1</td>
</tr>
<tr>
<td>L</td>
<td>*1</td>
<td>18</td>
<td>2</td>
<td>15</td>
<td>13</td>
<td>3</td>
<td>14</td>
<td>5</td>
<td>2</td>
<td>3</td>
<td>2</td>
<td>3</td>
</tr>
<tr>
<td>Hydropsyche morosa</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>*1</td>
</tr>
<tr>
<td></td>
<td>2</td>
<td>2</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>May</td>
<td>Jun</td>
<td>Jul</td>
<td>Aug</td>
<td>Sep</td>
<td>Oct</td>
<td>Nov</td>
<td>Dec</td>
<td>Jan</td>
<td>Feb</td>
<td>Mar</td>
<td>May</td>
</tr>
<tr>
<td>------------------------------</td>
<td>-----</td>
<td>-----</td>
<td>-----</td>
<td>-----</td>
<td>-----</td>
<td>-----</td>
<td>-----</td>
<td>-----</td>
<td>-----</td>
<td>-----</td>
<td>-----</td>
<td>-----</td>
</tr>
<tr>
<td><em>Hydropsyche slossonae</em></td>
<td>P</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>D</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><em>Hydropsyche sparnae</em></td>
<td>L</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><em>Philopotamidae</em></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><em>Chimarra aterrima</em></td>
<td></td>
<td>3</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><em>Psychomylidae</em></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><em>Polycentropus sp. cf. cinereus</em></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><em>Coleoptera</em></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><em>Psephenidae</em></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><em>Psephenus sp.</em></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><em>Elmidae</em></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><em>Stenelmis sp.</em></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><em>Diptera</em></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><em>Chironomidae</em></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><em>Psephenus sp.</em></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><em>Elmidae</em></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><em>Stenelmis sp.</em></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><em>Diptera</em></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><em>Psychodidae</em></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><em>Psychoda sp.</em></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><em>Simulidae</em></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><em>Dixidae</em></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><em>Ferrissia sp.</em></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

* Asterisks (*) indicate presence of the species.
TABLE A-4 (continued)

<table>
<thead>
<tr>
<th></th>
<th>May</th>
<th>Jun</th>
<th>Jul</th>
<th>Aug</th>
<th>Sep</th>
<th>Oct</th>
<th>Nov</th>
<th>Dec</th>
<th>Jan</th>
<th>Feb</th>
<th>Mar</th>
<th>May</th>
</tr>
</thead>
<tbody>
<tr>
<td>Total numbers per sample date</td>
<td>49</td>
<td>139</td>
<td>32</td>
<td>91</td>
<td>60</td>
<td>34</td>
<td>85</td>
<td>25</td>
<td>83</td>
<td>47</td>
<td>131</td>
<td>129</td>
</tr>
<tr>
<td>Mean numbers per sample date</td>
<td>16</td>
<td>46</td>
<td>8</td>
<td>30</td>
<td>20</td>
<td>12</td>
<td>28</td>
<td>8</td>
<td>28</td>
<td>16</td>
<td>63</td>
<td>43</td>
</tr>
<tr>
<td>Total taxa per sample date</td>
<td>7</td>
<td>11</td>
<td>6</td>
<td>7</td>
<td>7</td>
<td>8</td>
<td>7</td>
<td>6</td>
<td>8</td>
<td>4</td>
<td>11</td>
<td>12</td>
</tr>
</tbody>
</table>

1 Known from adults and mature larvae or nymphs.
2 Early instars.
3 Mature nymphs sharing some characters of *Stenonema rubrum* and *S. nepotellum*.

*1 = mean values less than 1.
TABLE A-5. Mean Values ( Rounded to the Nearest Whole Number) of Three Surber Samples Taken Monthly from May 1975 to May 1976, West Prong, Little Pigeon, Station 4, River km 11.5

<table>
<thead>
<tr>
<th></th>
<th>May</th>
<th>Jun</th>
<th>Jul</th>
<th>Aug</th>
<th>Sep</th>
<th>Oct</th>
<th>Nov</th>
<th>Dec</th>
<th>Jan</th>
<th>Feb</th>
<th>Mar</th>
<th>May</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Nemertea</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><em>Prostoma rubrum</em></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>*1</td>
</tr>
<tr>
<td><strong>Nematomorpha</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Gordioidea</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><em>Gordius sp.</em></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>*1</td>
</tr>
<tr>
<td><strong>Annelida</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Oligochaeta</strong></td>
<td>4</td>
<td>3</td>
<td>3</td>
<td>1</td>
<td>6</td>
<td>*1</td>
<td>13</td>
<td>17</td>
<td>63</td>
<td>13</td>
<td>2</td>
<td>38</td>
</tr>
<tr>
<td><strong>Arthropoda</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Crustacea</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Isopoda</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><em>Lirceus sp. cf. brachyurus</em></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>1</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Insecta</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Plecoptera</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Taenioptrrygidae</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><em>Brachyptera fasciata</em></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Leuctridae</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><em>Leuctra ferruginea</em></td>
<td></td>
<td>1</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Ephemerooptera</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Heptageniidae</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><em>Stenonema sp.</em></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><em>Stenonema sp. cf. rubrum</em></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><em>Stenonema sp. cf. pudicum</em></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><em>Stenonema sp.</em></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><em>Stenonema sp.</em></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Baetidae</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><em>Ephemera sp. cf. invaria</em></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><em>Ephemera sp. cf. temporalis</em></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><em>Isonychia sp.</em></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><em>Caenis sp. cf. simulans</em></td>
<td></td>
<td>1</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

* *
TABLE A-5 (continued)

<table>
<thead>
<tr>
<th></th>
<th>May</th>
<th>Jun</th>
<th>Jul</th>
<th>Aug</th>
<th>Sep</th>
<th>Oct</th>
<th>Nov</th>
<th>Dec</th>
<th>Jan</th>
<th>Feb</th>
<th>Mar</th>
<th>May</th>
</tr>
</thead>
<tbody>
<tr>
<td>Odonata</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Coenagrionidae</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Argia sp.</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>*1</td>
</tr>
<tr>
<td>Enallagma divagans</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>*1</td>
</tr>
<tr>
<td>Megaloptera</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Corydalidae</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>*1</td>
</tr>
<tr>
<td>Corydalus cornutus</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Trichoptera</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Rhyacophilidae</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Glossosoma nigrior</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>*1</td>
</tr>
<tr>
<td>Hydropsychidae</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Cheumatopsyce sp.</td>
<td>P</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>L</td>
<td></td>
<td>10</td>
<td>4</td>
<td>18</td>
<td>26</td>
<td>16</td>
<td>10</td>
<td>2</td>
<td>13</td>
<td>9</td>
<td>24</td>
<td></td>
</tr>
<tr>
<td>Hydropsyche morosa</td>
<td>P</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Hydropsyche sparna</td>
<td>L</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Coleoptera</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Psephenidae</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Psephenus sp.</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Ectoparia sp.</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>*1</td>
</tr>
<tr>
<td>Elmidae</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Dubiraphia sp.</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Steneelmis sp.</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Diptera</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Chironomidae</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>A</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>P</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>L</td>
<td></td>
<td>2</td>
<td>7</td>
<td>13</td>
<td>12</td>
<td>6</td>
<td>2</td>
<td>2</td>
<td>27</td>
<td>19</td>
<td>25</td>
<td>94</td>
</tr>
<tr>
<td>Tipulidae</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Antocha sp.</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>*1</td>
</tr>
<tr>
<td>Empididae</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Hemerodromia sp.</td>
<td>P</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>*1</td>
</tr>
<tr>
<td>L</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
### TABLE A-5 (continued)

<table>
<thead>
<tr>
<th></th>
<th>May</th>
<th>Jun</th>
<th>Jul</th>
<th>Aug</th>
<th>Sep</th>
<th>Oct</th>
<th>Nov</th>
<th>Dec</th>
<th>Jan</th>
<th>Feb</th>
<th>Mar</th>
<th>May</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Simulidae</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Simulium sp.</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>*1</td>
</tr>
<tr>
<td><strong>Tabanidae</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Chrysope sp.</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>*2</td>
</tr>
<tr>
<td>Dixidae</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Paradixa sp.</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>*1</td>
</tr>
<tr>
<td><strong>Mollusca</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Gastropoda</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Ferrissia sp.</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>*1</td>
</tr>
<tr>
<td>Physa sp.</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>*1</td>
</tr>
<tr>
<td>Pleurocera sp.</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Pelecypoda</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Sphaeriidae</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Psidium sp.</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>*1</td>
</tr>
<tr>
<td>Cyreniidae</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Corbicula sp.</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>*1</td>
</tr>
</tbody>
</table>

**Total number per sample date**

|                | 18  | 103 | 47  | 121 | 165 | 71  | 97  | 75  | 329 | 161 | 141 | 533 |

**Mean number per sample date**

|                | 6   | 34  | 16  | 40  | 55  | 23  | 32  | 25  | 109.6| 54  | 47  | 178 |

**Total taxa per sample date**

|                | 4   | 15  | 9   | 9   | 9   | 6   | 10  | 7   | 9   | 9   | 9   | 8   |

1 Known from adults and mature larvae or nymphs.
2 Early instars.
3 Mature nymphs sharing some characters of *Stenonema rubrum* and *S. nepotellum.*
4 Mature nymphs sharing some characters of *Stenonema pudicum* and *S. carolina.*

*1 = mean values less than 1.
TABLE A-6. Mean Values (Rounded to the Nearest Whole Number) of Three Surber Samples Taken Monthly from May 1975 to May 1976, Middle Prong, Little Pigeon River, Station 1, River km 32

<table>
<thead>
<tr>
<th></th>
<th>May</th>
<th>Jun</th>
<th>Jul</th>
<th>Aug</th>
<th>Sep</th>
<th>Oct</th>
<th>Nov</th>
<th>Dec</th>
<th>Jan</th>
<th>Feb</th>
<th>Mar</th>
<th>May</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Platyhelminthes</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Turbellaria</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Planaria sp.</td>
<td>*1</td>
<td>*1</td>
<td>*1</td>
<td>*1</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Nemertea</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Prostoma rubrum</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>*1</td>
</tr>
<tr>
<td><strong>Nematomorpha</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Gordius sp.</td>
<td>*1</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Annelida</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Oligochaeta</td>
<td>2</td>
<td>2</td>
<td>1</td>
<td>*1</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Arthropoda</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Arachnoidea</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Hydrocarina</td>
<td>1</td>
<td>*1</td>
<td>*1</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Insecta</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Plecoptera</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Leuctridae</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Leuctra ferruginea</td>
<td>*1</td>
<td>*1</td>
<td>2</td>
<td>3</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Perlidae</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Neophasganophyca capitata</td>
<td>*1</td>
<td>*1</td>
<td>*1</td>
<td>*1</td>
<td>*1</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Acroneuria sp.</td>
<td>*1</td>
<td>*1</td>
<td>1</td>
<td>2</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Acroneuria abnormis</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>*1</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Acroneuria internata</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Acroneuria ruralis</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Paragentina immarginata</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Perlesta placida</td>
<td></td>
<td>*1</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Perlodidae</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Isoperla sp.</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Isoperla bilineata</td>
<td>2</td>
<td>6</td>
<td>4</td>
<td>2</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Isogenus decius</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Isogenus hansenii</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Chloroperlidae</td>
<td>*1</td>
<td>*1</td>
<td>2</td>
<td>*1</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
TABLE A-6 (continued)

<table>
<thead>
<tr>
<th></th>
<th>May</th>
<th>Jun</th>
<th>Jul</th>
<th>Aug</th>
<th>Sep</th>
<th>Oct</th>
<th>Nov</th>
<th>Dec</th>
<th>Jan</th>
<th>Feb</th>
<th>Mar</th>
<th>May</th>
</tr>
</thead>
<tbody>
<tr>
<td>* Chloroperla sp.*2</td>
<td>*1</td>
<td></td>
<td></td>
<td></td>
<td>*1</td>
<td>1</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>* Chloroperla sp. cf. cydippe</td>
<td>*1</td>
<td>*1</td>
<td>*1</td>
<td>*1</td>
<td></td>
<td>1</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Ephemeroptera</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Ephemeridae</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>* Ephemerida simulans*</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>* Potomanthus sp.*</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Baetidae</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>* Baetis sp.*2</td>
<td>2</td>
<td>4</td>
<td>*1</td>
<td>*1</td>
<td>*1</td>
<td>*1</td>
<td>*1</td>
<td>1</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>* Baetis sp. cf. intercalaris*</td>
<td>*1</td>
<td></td>
<td>5</td>
<td>*1</td>
<td></td>
<td></td>
<td></td>
<td>1</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>* Isorhychia sp.*</td>
<td>1</td>
<td>2</td>
<td>*1</td>
<td>2</td>
<td>2</td>
<td>2</td>
<td>*1</td>
<td>*1</td>
<td>3</td>
<td>*1</td>
<td></td>
<td></td>
</tr>
<tr>
<td>* Ephemeralia sp.*2</td>
<td></td>
<td></td>
<td>*1</td>
<td></td>
<td>*1</td>
<td></td>
<td>*1</td>
<td></td>
<td>*1</td>
<td></td>
<td>*1</td>
<td>*1</td>
</tr>
<tr>
<td>* Ephemeralia sp. cf. cornutus*</td>
<td>4</td>
<td>*1</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>* Ephemeralia sp. cf. deficiens*</td>
<td>*1</td>
<td></td>
<td>*1</td>
<td></td>
<td>*1</td>
<td>*1</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>* Ephemeralia sp. cf. dorothea*</td>
<td>2</td>
<td>2</td>
<td>*1</td>
<td>*1</td>
<td>*1</td>
<td>*1</td>
<td>*1</td>
<td>*1</td>
<td>2</td>
<td>*1</td>
<td></td>
<td></td>
</tr>
<tr>
<td>* Ephemeralia sp. cf. simplex*</td>
<td></td>
<td></td>
<td></td>
<td>*1</td>
<td></td>
<td>*1</td>
<td></td>
<td></td>
<td>*1</td>
<td>*1</td>
<td></td>
<td></td>
</tr>
<tr>
<td>* Caenis sp.*</td>
<td>2</td>
<td>2</td>
<td>1</td>
<td></td>
<td>*1</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>* Leptophlebia sp.*2</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>* Paraleptophlebia sp.*</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>* Paraleptophlebia sp. cf. praepedita*</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>* Pseudocleon sp.*</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Heptageniidae</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>* Rhithrogena sp.*2</td>
<td>2</td>
<td>2</td>
<td></td>
<td>1</td>
<td>2</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>* Rhithrogenea sp. cf. pellucida*</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>* Heptagenia sp.*2</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>* Heptagenia sp. cf. maculipennis*</td>
<td>5</td>
<td>12</td>
<td>13</td>
<td>2</td>
<td>*1</td>
<td>*1</td>
<td>2</td>
<td>*1</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>* Heptagenia sp. cf. flavescens*</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>*1</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>* Epeorus sp.*2</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td></td>
<td>*1</td>
<td>1</td>
<td>2</td>
<td>5</td>
<td>5</td>
<td>1</td>
<td></td>
<td></td>
</tr>
<tr>
<td>* Stenonema sp.*</td>
<td>8</td>
<td></td>
<td></td>
<td></td>
<td>*1</td>
<td></td>
<td></td>
<td>5</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>* Stenonema sp. cf. rubrum*</td>
<td>*1</td>
<td>3</td>
<td>24</td>
<td>9</td>
<td>1</td>
<td>6</td>
<td>7</td>
<td>4</td>
<td>1</td>
<td>1</td>
<td>3</td>
<td></td>
</tr>
<tr>
<td>* Stenonema sp. cf. pudicium*</td>
<td>*1</td>
<td>3</td>
<td>2</td>
<td>1</td>
<td>3</td>
<td>1</td>
<td>3</td>
<td>*1</td>
<td></td>
<td></td>
<td>*1</td>
<td></td>
</tr>
</tbody>
</table>
TABLE A-6 (continued)

<table>
<thead>
<tr>
<th>Order</th>
<th>May</th>
<th>Jun</th>
<th>Jul</th>
<th>Aug</th>
<th>Sep</th>
<th>Oct</th>
<th>Nov</th>
<th>Dec</th>
<th>Jan</th>
<th>Feb</th>
<th>Mar</th>
<th>May</th>
</tr>
</thead>
<tbody>
<tr>
<td>Stenonema sp.</td>
<td>1</td>
<td>3</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Stenonema sp.</td>
<td>2</td>
<td>4</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Hemiptera</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Gyrinidae</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>*1</td>
</tr>
<tr>
<td>Megaloptera</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Corydalidae</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Corydalus cornutus</td>
<td>*1</td>
<td></td>
<td>*1</td>
<td>*1</td>
<td>*1</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Nigronia serricornis</td>
<td>*1</td>
<td>*1</td>
<td>*1</td>
<td>*1</td>
<td>*1</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Trichoptera</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Rhyacophilidae</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Rhyacophila fuscata</td>
<td>*1</td>
<td></td>
<td>*1</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Rhyacophila glaberrima</td>
<td>*1</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Glossosoma nigrior</td>
<td>P</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>*1</td>
<td>6</td>
<td>2</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>L</td>
<td>*1</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>2</td>
<td>10</td>
<td>5</td>
<td>4</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Philopotamidae</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Chimarra aterrima</td>
<td>*1</td>
<td></td>
<td>*1</td>
<td></td>
<td>*1</td>
<td></td>
<td>2</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Dolophilus moestus</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Sortosa distinctus</td>
<td></td>
<td>2</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>*1</td>
</tr>
<tr>
<td>Psychomyiidae</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Polycentropus sp. cf. cinereus</td>
<td>2</td>
<td>*1</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td></td>
<td>*1</td>
<td></td>
<td>*1</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Polycentropus sp.</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Hydropsychidae</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Cheumatopsyche sp.</td>
<td>7</td>
<td>2</td>
<td>3</td>
<td>1*1</td>
<td>26</td>
<td>11</td>
<td>19</td>
<td>12</td>
<td>10</td>
<td>31</td>
<td>23</td>
<td>2</td>
</tr>
<tr>
<td>Hydropsyche bronta</td>
<td>2</td>
<td>3</td>
<td>*1</td>
<td>*1</td>
<td>5</td>
<td>10</td>
<td>8</td>
<td>4</td>
<td>4</td>
<td>9</td>
<td>4</td>
<td>3</td>
</tr>
<tr>
<td>Hydropsyche morosa</td>
<td>*1</td>
<td></td>
<td>*1</td>
<td>3</td>
<td>1</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>*1</td>
</tr>
<tr>
<td>Hydropsyche sparna</td>
<td></td>
<td>3</td>
<td>*1</td>
<td>2</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>*1</td>
</tr>
<tr>
<td>Hydropsyche venularis</td>
<td>*1</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Goeridae</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Goera calcarea</td>
<td>L</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>P</td>
<td>*1</td>
<td>*1</td>
<td>2</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Lepidostomatidae</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Taxonomy</td>
<td>May</td>
<td>Jun</td>
<td>Jul</td>
<td>Aug</td>
<td>Sep</td>
<td>Oct</td>
<td>Nov</td>
<td>Dec</td>
<td>Jan</td>
<td>Feb</td>
<td>Mar</td>
<td>May</td>
</tr>
<tr>
<td>-------------------------</td>
<td>-----</td>
<td>-----</td>
<td>-----</td>
<td>-----</td>
<td>-----</td>
<td>-----</td>
<td>-----</td>
<td>-----</td>
<td>-----</td>
<td>-----</td>
<td>-----</td>
<td>-----</td>
</tr>
<tr>
<td><strong>Lepidostoma sp.</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>*1</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Brachycentridae</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>*1</td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Microlema sp.</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Coleoptera</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Elmidae</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><em>Stenelmis sp.</em> A</td>
<td></td>
<td>*1</td>
<td>*1</td>
<td>*1</td>
<td></td>
<td>*1</td>
<td></td>
<td></td>
<td></td>
<td>*1</td>
<td></td>
<td></td>
</tr>
<tr>
<td><em>Lepidostoma sp.</em> L</td>
<td></td>
<td></td>
<td>*1</td>
<td></td>
<td>*1</td>
<td>*1</td>
<td>*1</td>
<td>*1</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Zaitzevia</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>*1</td>
</tr>
<tr>
<td><strong>Psephenididae</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><em>Psephenus sp.</em></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>*1</td>
<td>4</td>
<td>*1</td>
</tr>
<tr>
<td><strong>Diptera</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Blepharoceridae</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>*1</td>
</tr>
<tr>
<td><strong>Tipulidae</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>1</td>
</tr>
<tr>
<td>*Antocha saxicola P</td>
<td>2</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>*1</td>
</tr>
<tr>
<td><em>Antocha sp.</em></td>
<td>2</td>
<td>1</td>
<td>2</td>
<td>11</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>*1</td>
<td>*1</td>
<td>7</td>
<td>5</td>
<td>*1</td>
</tr>
<tr>
<td><em>Eriocera sp.</em></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>*1</td>
<td>*1</td>
<td>*1</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><em>Hexatoma sp.</em></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><em>Pedicia sp.</em></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>*1</td>
</tr>
<tr>
<td><em>Tipula sp.</em></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>*1</td>
</tr>
<tr>
<td><strong>Heleidae</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><em>Palpomyia sp.</em></td>
<td>2</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>*1</td>
<td>1</td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Raphinidae</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>*Atherix variegata L</td>
<td>2</td>
<td>*1</td>
<td>*1</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>*1</td>
<td></td>
<td>5</td>
<td>*1</td>
<td></td>
</tr>
<tr>
<td><strong>Simulidae</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><em>Simulium sp.</em> P</td>
<td>2</td>
<td>*1</td>
<td>*1</td>
<td></td>
<td>*1</td>
<td>*1</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Tabanidae</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><em>Tabanus sp.</em></td>
<td></td>
<td>*1</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Empididae</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><em>Empididae</em> P L</td>
<td>*1</td>
<td>*1</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>2</td>
<td>1</td>
<td>*1</td>
<td></td>
<td></td>
<td>*1</td>
</tr>
<tr>
<td><strong>Chironomidae</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><em>Chironomidae</em> A P L</td>
<td>4</td>
<td>2</td>
<td>2</td>
<td>2</td>
<td>*1</td>
<td>*1</td>
<td>1</td>
<td>*1</td>
<td></td>
<td></td>
<td></td>
<td>*1</td>
</tr>
<tr>
<td></td>
<td>144</td>
<td>4</td>
<td>2</td>
<td>2</td>
<td>2</td>
<td>2</td>
<td>30</td>
<td>14</td>
<td>79</td>
<td>95</td>
<td>21</td>
<td>20</td>
</tr>
</tbody>
</table>
TABLE A-6 (continued)

<table>
<thead>
<tr>
<th></th>
<th>May</th>
<th>Jun</th>
<th>Jul</th>
<th>Aug</th>
<th>Sep</th>
<th>Oct</th>
<th>Nov</th>
<th>Dec</th>
<th>Jan</th>
<th>Feb</th>
<th>Mar</th>
<th>May</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Mollusca</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Gastropoda</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Ancylidae</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><em>Ferrissia</em> <em>sp.</em></td>
<td>*1</td>
<td>*1</td>
<td>1</td>
<td>*1</td>
<td>1</td>
<td>*1</td>
<td>5</td>
<td>3</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Physidae</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><em>Physa</em> <em>sp.</em></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Pleuroceridae</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><em>Goniobasis</em> <em>sp.</em></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Total numbers per surber</strong></td>
<td>588</td>
<td>172</td>
<td>233</td>
<td>275</td>
<td>315</td>
<td>157</td>
<td>303</td>
<td>199</td>
<td>433</td>
<td>528</td>
<td>165</td>
<td>128</td>
</tr>
<tr>
<td><strong>Mean number per sample date</strong></td>
<td>196</td>
<td>57</td>
<td>78</td>
<td>92</td>
<td>105</td>
<td>52</td>
<td>101</td>
<td>66</td>
<td>144</td>
<td>176</td>
<td>88</td>
<td>46</td>
</tr>
<tr>
<td><strong>Total taxa per sample date</strong></td>
<td>35</td>
<td>24</td>
<td>26</td>
<td>26</td>
<td>35</td>
<td>25</td>
<td>33</td>
<td>25</td>
<td>32</td>
<td>36</td>
<td>24</td>
<td>19</td>
</tr>
</tbody>
</table>

1 Known from adults and mature larvae.
2 Early instars.
3 Mature nymphs sharing some characters of *Stenonema rubrum* and *S. nepotellum*.
4 Mature nymphs sharing some characters of *Stenonema pudicium* and *S. carolina*.
5 Mature larvae presenting a second species.

*1 = mean values less than 1.
<table>
<thead>
<tr>
<th></th>
<th>May</th>
<th>Jun</th>
<th>Jul</th>
<th>Aug</th>
<th>Sep</th>
<th>Oct</th>
<th>Nov</th>
<th>Dec</th>
<th>Jan</th>
<th>Feb</th>
<th>Mar</th>
<th>May</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Platyhelminthes</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Turbellaria</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><em>Planaria</em> sp.</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Nemertea</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><em>Prostoma rubrum</em></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Nematoda</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><em>Gordius</em> sp.</td>
<td>*1</td>
<td>*1</td>
<td>1</td>
<td>2</td>
<td>*1</td>
<td>*1</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Oligochaeta</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Arthropoda</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Annelida</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><em>Hydracarina</em></td>
<td>*1</td>
<td>*1</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Insecta</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Plecoptera</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><em>Taeniopteryginae</em></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><em>Brachyptera</em> sp.</td>
<td>1</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Leuctridae</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><em>Leuctra ferruginea</em></td>
<td>*1</td>
<td>*1</td>
<td>*1</td>
<td>*1</td>
<td>*1</td>
<td>1</td>
<td>*1</td>
<td>*1</td>
<td>*1</td>
<td>*1</td>
<td>*1</td>
<td>*1</td>
</tr>
<tr>
<td><strong>Perlidae</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><em>Neoptera alcyone</em></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><em>Neophasanghophora capitata</em></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><em>Acroneuria</em> sp.</td>
<td>*1</td>
<td>*1</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><em>Acroneuria abnormis</em></td>
<td>3</td>
<td>2</td>
<td>2</td>
<td>2</td>
<td>1</td>
<td>*1</td>
<td>2</td>
<td>*1</td>
<td>1</td>
<td>*1</td>
<td></td>
<td></td>
</tr>
<tr>
<td><em>Acroneuria internata</em></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><em>Acroneuria ruralis</em></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><em>Parangentina immarginata</em></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><em>Perlesta placida</em></td>
<td>4</td>
<td>*1</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Perlodidae</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><em>Isoperla bilineata</em></td>
<td>*1</td>
<td>*1</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

TABLE A-7. Mean Values (Rounded to the Nearest Whole Number) of Three Surber Samples Taken Monthly from May 1975 to May 1976, Middle Prong, Little Pigeon River, Station 2, River km 25.6
<table>
<thead>
<tr>
<th>Family</th>
<th>May</th>
<th>Jun</th>
<th>Jul</th>
<th>Aug</th>
<th>Sep</th>
<th>Oct</th>
<th>Nov</th>
<th>Dec</th>
<th>Jan</th>
<th>Feb</th>
<th>Mar</th>
<th>May</th>
</tr>
</thead>
<tbody>
<tr>
<td><em>Isogenus hansoni</em></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>*1</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>*1</td>
</tr>
<tr>
<td><em>Chloroperlidae</em></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><em>Chloroperla sp.</em></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>*1</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>*1</td>
</tr>
<tr>
<td><em>Chloroperla sp. cf. cydippe</em></td>
<td></td>
<td>*1</td>
<td>1</td>
<td>*1</td>
<td>1</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><em>Ephemeroptera</em></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><em>Ephemeridae</em></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>*1</td>
</tr>
<tr>
<td><em>Potomanthus sp.</em></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>*1</td>
<td></td>
</tr>
<tr>
<td><em>Baetidae</em></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>*1</td>
</tr>
<tr>
<td><em>Baetis sp.</em></td>
<td>3</td>
<td>*1</td>
<td>1</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>4</td>
</tr>
<tr>
<td><em>Baetis sp. cf. intercalaris</em></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>5</td>
<td>7</td>
<td>*1</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><em>Isonychia sp.</em></td>
<td>4</td>
<td>*1</td>
<td></td>
<td>1</td>
<td>3</td>
<td>1</td>
<td>*1</td>
<td>2</td>
<td>*1</td>
<td>2</td>
<td></td>
<td></td>
</tr>
<tr>
<td><em>Ephemera</em></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>*1</td>
</tr>
<tr>
<td><em>Ephemera sp.</em></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>6</td>
</tr>
<tr>
<td><em>Ephemera sp. cf. cornutus</em></td>
<td>2</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>*1</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>*1</td>
</tr>
<tr>
<td><em>Ephemera sp. cf. deficiens</em></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>1</td>
</tr>
<tr>
<td><em>Ephemera sp. cf. dorothea</em></td>
<td>4</td>
<td>*1</td>
<td>*1</td>
<td>*1</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>*1</td>
<td>3</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td><em>Ephemera sp. cf. invaria</em></td>
<td>*1</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>3</td>
</tr>
<tr>
<td><em>Ephemera sp. cf. simplex</em></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>*1</td>
</tr>
<tr>
<td><em>Ephemera sp. cf. temporalis</em></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>*1</td>
</tr>
<tr>
<td><em>Caenis sp.</em></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><em>Leptophlebia sp.</em></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>*1</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><em>Centroptilium sp. cf. rivularis</em></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>*1</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><em>Heptageniidae</em></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><em>Rhithrogena sp.</em></td>
<td>3</td>
<td>*1</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>*1</td>
</tr>
<tr>
<td><em>Rhithrogena sp. cf. pellucide</em></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>*1</td>
<td>1</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>*1</td>
</tr>
<tr>
<td><em>Heptagenia sp. cf. maculipennis</em></td>
<td>6</td>
<td>6</td>
<td>19</td>
<td>2</td>
<td>1</td>
<td>1</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><em>Epeorus sp.</em></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>*1</td>
</tr>
<tr>
<td><em>Stenonema sp.</em></td>
<td>2</td>
<td></td>
<td>6</td>
<td></td>
<td>*1</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><em>Stenonema sp. cf. rubrum</em></td>
<td>*1</td>
<td>4</td>
<td>9</td>
<td>8</td>
<td>4</td>
<td>9</td>
<td>9</td>
<td>3</td>
<td>*1</td>
<td>1</td>
<td></td>
<td>1</td>
</tr>
<tr>
<td><em>Stenonema sp. cf. pudicum</em></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>2</td>
<td></td>
<td></td>
<td>2</td>
</tr>
</tbody>
</table>
### TABLE A-7 (continued)

<table>
<thead>
<tr>
<th></th>
<th>May</th>
<th>Jun</th>
<th>Jul</th>
<th>Aug</th>
<th>Sep</th>
<th>Oct</th>
<th>Nov</th>
<th>Dec</th>
<th>Jan</th>
<th>Feb</th>
<th>Mar</th>
<th>May</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Stenonema sp.</strong></td>
<td>1</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>3</td>
</tr>
<tr>
<td><strong>Stenonema sp.</strong></td>
<td>2</td>
<td>1</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Odonata</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Gomphidae</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><em>Lanthus parvulus</em></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>*1</td>
<td>*1</td>
</tr>
<tr>
<td><strong>Megaloptera</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Corydalidae</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>*1</td>
<td>*1</td>
</tr>
<tr>
<td><em>Corydalus cornutus</em></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>*1</td>
<td>*1</td>
<td>*1</td>
<td>*1</td>
<td>*1</td>
</tr>
<tr>
<td><strong>Trichoptera</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Rhyacophilidae</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><em>Glossosoma nigrior</em></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>P</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>L</td>
<td>*1</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Philopotamidae</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><em>Chimarra aterrima</em></td>
<td></td>
<td>*1</td>
<td>*1</td>
<td>*1</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><em>Dolophilus moestus</em></td>
<td></td>
<td>*1</td>
<td>*1</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><em>Sortosa distinctus</em></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>*1</td>
</tr>
<tr>
<td><strong>Psychomyiidae</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><em>Polycentropus sp. cf. cinereus</em></td>
<td></td>
<td>*1</td>
<td>2</td>
<td>*1</td>
<td>1</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>*1</td>
<td>3</td>
</tr>
<tr>
<td><em>Polycentropus sp.</em></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Hydropsychidae</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><em>Cheumatopsyche sp.</em></td>
<td>8</td>
<td>3</td>
<td>9</td>
<td>12</td>
<td>5</td>
<td>11</td>
<td>7</td>
<td>3</td>
<td>3</td>
<td>2</td>
<td>23</td>
<td></td>
</tr>
<tr>
<td><em>Hydropsyche bronta</em></td>
<td></td>
<td>*1</td>
<td></td>
<td>*1</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><em>Hydropsyche morosa</em></td>
<td></td>
<td>*1</td>
<td>2</td>
<td>*1</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><em>Hydropsyche sparna</em></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>23</td>
</tr>
<tr>
<td>P</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>L</td>
<td>*1</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Hydropsyche venularis</strong></td>
<td></td>
<td>*1</td>
<td>*1</td>
<td>*1</td>
<td>*1</td>
<td>*1</td>
<td>*1</td>
<td>*1</td>
<td>*1</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Goeridae</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><em>Goera calcarata</em></td>
<td>L</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>P</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>*1</td>
</tr>
<tr>
<td><strong>Lepidostomatidae</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

78
TABLE A-7 (continued)

<table>
<thead>
<tr>
<th></th>
<th>May</th>
<th>Jun</th>
<th>Jul</th>
<th>Aug</th>
<th>Sep</th>
<th>Oct</th>
<th>Nov</th>
<th>Dec</th>
<th>Jan</th>
<th>Feb</th>
<th>Mar</th>
<th>May</th>
</tr>
</thead>
<tbody>
<tr>
<td>Lepidostoma sp.</td>
<td>*1</td>
<td>*1</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Coleoptera</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Elmidae</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Optioservus sp.</td>
<td>*1</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Promoresia sp.</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Stenelmis sp. A</td>
<td></td>
<td></td>
<td>*1</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Stenelmis sp. L</td>
<td></td>
<td>*1</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Psephenidae</td>
<td></td>
<td>*1</td>
<td>1</td>
<td>1</td>
<td>2</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>*1</td>
<td>1</td>
<td>1</td>
<td>1</td>
</tr>
<tr>
<td>Psephenus sp.</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Diptera</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Blepharoceridae</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Tipulidae</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Antocha saxicola P</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>1</td>
</tr>
<tr>
<td>Antocha sp. P L</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Tipula sp.</td>
<td></td>
<td>*1</td>
<td>2</td>
<td>1</td>
<td>3</td>
<td>*1</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>2</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Heleidae</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>1</td>
</tr>
<tr>
<td>Palpomyia sp.</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Rhagionidae</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Atherix variegata P</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>1</td>
</tr>
<tr>
<td>Simulidae</td>
<td></td>
<td>*1</td>
<td>*1</td>
<td></td>
<td>*1</td>
<td></td>
<td>*1</td>
<td></td>
<td>1</td>
<td></td>
<td></td>
<td>2</td>
</tr>
<tr>
<td>Simulium sp. P</td>
<td></td>
<td>*1</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Emididae</td>
<td></td>
<td>*1</td>
<td>1</td>
<td></td>
<td>*1</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Emidium A</td>
<td></td>
<td></td>
<td>*1</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Chironomidae</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Ferrissia sp.</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Mollusca
Gastropoda
Ancyclidae
Ferrissia sp.

79
TABLE A-7 (continued)

<table>
<thead>
<tr>
<th></th>
<th>May</th>
<th>Jun</th>
<th>Jul</th>
<th>Aug</th>
<th>Sep</th>
<th>Oct</th>
<th>Nov</th>
<th>Dec</th>
<th>Jan</th>
<th>Feb</th>
<th>Mar</th>
<th>May</th>
</tr>
</thead>
<tbody>
<tr>
<td>Physidae</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Physa sp.</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Pleuroceridae</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Goniobasis</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Total numbers per surber</td>
<td>128</td>
<td>162</td>
<td>124</td>
<td>165</td>
<td>244</td>
<td>241</td>
<td>202</td>
<td>302</td>
<td>788</td>
<td>278</td>
<td>273</td>
<td>375</td>
</tr>
<tr>
<td>Mean number per sample date</td>
<td>43</td>
<td>54</td>
<td>41</td>
<td>55</td>
<td>81</td>
<td>80</td>
<td>67</td>
<td>100</td>
<td>262</td>
<td>92</td>
<td>91</td>
<td>125</td>
</tr>
<tr>
<td>Total taxa per sample date</td>
<td>18</td>
<td>25</td>
<td>23</td>
<td>17</td>
<td>25</td>
<td>21</td>
<td>26</td>
<td>24</td>
<td>20</td>
<td>24</td>
<td>33</td>
<td>30</td>
</tr>
</tbody>
</table>

1 Known from adults and mature larvae.
2 Early instars.
3 Mature nymphs sharing characters of *Stenonema rubrum* and *S. nepotellum*.
4 Mature nymphs sharing characters of *Stenonoma pudicum* and *S. carolina*.
5 Mature nymphs representing a second species.

*1 = mean values less than 1.
### TABLE A-8. Mean Values (Rounded to the Nearest Whole Number) of Three Surber Samples Taken Monthly from May 1975 to May 1976, Middle Prong, Little Pigeon River, Station 3, River km 18.5

<table>
<thead>
<tr>
<th></th>
<th>May</th>
<th>Jun</th>
<th>Jul</th>
<th>Aug</th>
<th>Sep</th>
<th>Oct</th>
<th>Nov</th>
<th>Dec</th>
<th>Jan</th>
<th>Feb</th>
<th>Mar</th>
<th>May</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Platyhelminthes</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Turbellaria</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><em>Planaria sp.</em></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>*1</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Nemertea</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>*1</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><em>Prostoma rubrum</em></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>*1</td>
</tr>
<tr>
<td><strong>Nematomorpha</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>*1</td>
<td></td>
<td></td>
<td>*1</td>
<td>2</td>
<td>*1</td>
<td></td>
</tr>
<tr>
<td><em>Gordius sp.</em></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>*1</td>
</tr>
<tr>
<td><strong>Annelida</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Oligochaeta</strong></td>
<td>2</td>
<td>*1</td>
<td>3</td>
<td></td>
<td></td>
<td></td>
<td>*1</td>
<td>*1</td>
<td>1</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Arthropoda</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Crustacea</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Isopoda</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><em>Liraeus sp. cf. brachyurus</em></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Arachnoidea</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Hydracarina</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Insecta</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Plecoptera</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Taeniopteryginae</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><em>Taeniopteryx burksi</em></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Leuctridae</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><em>Leuctra ferruginea</em></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Perlidae</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><em>Neoperla olivene</em></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>*1</td>
</tr>
<tr>
<td><em>Neophasanophora capitata</em></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><em>Acroneuria sp.</em></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>*1</td>
<td>4</td>
<td></td>
</tr>
<tr>
<td><em>Acroneuria abnormis</em></td>
<td>2</td>
<td>1</td>
<td>1</td>
<td>3</td>
<td>1</td>
<td>3</td>
<td>3</td>
<td>*1</td>
<td>4</td>
<td>1</td>
<td>2</td>
<td></td>
</tr>
<tr>
<td><em>Acroneuria internata</em></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><em>Acroneuria ruralis</em></td>
<td>8</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>*1</td>
</tr>
<tr>
<td><em>Perlesta placida</em></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Perlodidae</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><em>Isoperla bilineata</em></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>*1</td>
</tr>
</tbody>
</table>
TABLE A-8 (continued)

<table>
<thead>
<tr>
<th></th>
<th>May</th>
<th>Jun</th>
<th>Jul</th>
<th>Aug</th>
<th>Sep</th>
<th>Oct</th>
<th>Nov</th>
<th>Dec</th>
<th>Jan</th>
<th>Feb</th>
<th>Mar</th>
<th>May</th>
</tr>
</thead>
<tbody>
<tr>
<td><em>Isogenus decisus</em></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Chloroperlidae</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><em>Chloroperla sp. cf. cydippe</em></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><em>Ephemeroptera</em></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Ephemeridae</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><em>Ephemera simulans</em></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><em>Potomanchus sp.</em></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Baetidae</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><em>Baetis sp.</em></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><em>Baetis sp. cf. intercalaris</em></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><em>Isomachia sp.</em></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><em>Ephemerella sp.</em></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><em>Ephemerella sp. cf. bicolor</em></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><em>Ephemerella sp. cf. cornutus</em></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><em>Ephemerella sp. cf. deficiens</em></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><em>Ephemerella sp. cf. dorothea</em></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><em>Ephemerella sp. cf. invaria</em></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><em>Ephemerella sp. cf. simplex</em></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><em>Ephemerella sp. cf. temporalis</em></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><em>Caenis sp.</em></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><em>Paraleptophlebia sp.</em></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><em>Centroptilium sp. cf. rivularis</em></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><em>Pseudocloeon sp.</em></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><em>Habrophlebia sp. cf. vibrans</em></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Heptageniidae</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><em>Rhithrogena sp.</em></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><em>Rhithrogena sp. cf. pellucida</em></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><em>Heptagenia sp.</em></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><em>Heptagenia sp. cf. maculipennis</em></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><em>Epeorus sp.</em></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Taxon</td>
<td>May</td>
<td>Jun</td>
<td>Jul</td>
<td>Aug</td>
<td>Sep</td>
<td>Oct</td>
<td>Nov</td>
<td>Dec</td>
<td>Jan</td>
<td>Feb</td>
<td>Mar</td>
<td>May</td>
</tr>
<tr>
<td>--------------------------------</td>
<td>-----</td>
<td>-----</td>
<td>-----</td>
<td>-----</td>
<td>-----</td>
<td>-----</td>
<td>-----</td>
<td>-----</td>
<td>-----</td>
<td>-----</td>
<td>-----</td>
<td>-----</td>
</tr>
<tr>
<td><em>Stenonema</em> sp.</td>
<td></td>
<td>2</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><em>Stenonema</em> sp. <em>cf. rubrum</em></td>
<td>1</td>
<td>7</td>
<td>12</td>
<td>12</td>
<td>9</td>
<td>9</td>
<td>3</td>
<td>2</td>
<td>*1</td>
<td>*1</td>
<td>2</td>
<td>*1</td>
</tr>
<tr>
<td><em>Stenonema</em> sp. <em>cf. pudicum</em></td>
<td>*1</td>
<td>*1</td>
<td>2</td>
<td>5</td>
<td></td>
<td></td>
<td></td>
<td>1</td>
<td>1</td>
<td></td>
<td>1</td>
<td>*1</td>
</tr>
<tr>
<td><em>Stenonema</em> sp. 1 4</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>1</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><em>Stenonema</em> sp. 2 4</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>1</td>
<td>*1</td>
<td></td>
<td></td>
<td></td>
<td>3</td>
</tr>
<tr>
<td>Odonata</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Gomphidae</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><em>Lanthus parvulus</em></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Coenagrionidae</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><em>Argia</em> sp.</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Megaloptera</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Corydalidae</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><em>Corydalus cornutus</em></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><em>Nigronia serricornis</em></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Trichoptera</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Rhyacophilidae</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><em>Glossosoma nigrior</em></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>P</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>L</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><em>P</em></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><em>L</em></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Phylloaugidae</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><em>Chimarra aterrima</em></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><em>Sortosa distinctus</em></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><em>P</em></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><em>L</em></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Psychomyiidae</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><em>Polycentropus</em> sp. <em>cf. cinereus</em></td>
<td>*1</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><em>Polycentropus</em> sp. 5</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Hydropsychidae</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><em>Cheumatopsyche</em> sp.</td>
<td>4</td>
<td>3</td>
<td>7</td>
<td>1</td>
<td>3</td>
<td>11</td>
<td>8</td>
<td>16</td>
<td>7</td>
<td>15</td>
<td>17</td>
<td>15</td>
</tr>
<tr>
<td><em>Hydropsyche bronta</em></td>
<td>*1</td>
<td>*1</td>
<td>*1</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><em>Hydropsyche morosa</em></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><em>Hydropsyche</em> sparnia</td>
<td>P</td>
<td>*1</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>L</td>
<td>1</td>
<td>*2</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><em>P</em></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><em>L</em></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><em>Hydropsyche</em> venularis</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>83</td>
</tr>
</tbody>
</table>
TABLE A-8 (continued)

<table>
<thead>
<tr>
<th></th>
<th>May</th>
<th>Jun</th>
<th>Jul</th>
<th>Aug</th>
<th>Sep</th>
<th>Oct</th>
<th>Nov</th>
<th>Dec</th>
<th>Jan</th>
<th>Feb</th>
<th>Mar</th>
<th>May</th>
</tr>
</thead>
<tbody>
<tr>
<td>Limnophilidae</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Pycnopsyche sp.</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>*1</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Goeridae</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Goera calcarata</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Lepidostomatidae</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>*1</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Lepidostoma sp.</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Brachycentridae</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Microsema sp.</td>
<td>*1</td>
<td>*1</td>
<td>2</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Coleoptera</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Elmidae</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Dubrapha sp.</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Optioservus sp.</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Promoresia sp.</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Stenelmis sp.</td>
<td>*1</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Zaitzevia sp.</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Hydraenidae</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Ochthebius sp.</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Psephenidae</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Psephenus sp.</td>
<td>*1</td>
<td>*1</td>
<td>2</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Dryopidae</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Helichus sp.</td>
<td>*1</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Diptera</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Blephariceridae</td>
<td>*1</td>
<td>*1</td>
<td>*1</td>
<td>*1</td>
<td>*1</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Tipulidae</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Antoche saxicola</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Antoche sp.</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Tipula sp.</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

*1 indicates presence.
<table>
<thead>
<tr>
<th></th>
<th>May</th>
<th>Jun</th>
<th>Jul</th>
<th>Aug</th>
<th>Sep</th>
<th>Oct</th>
<th>Nov</th>
<th>Dec</th>
<th>Jan</th>
<th>Feb</th>
<th>Mar</th>
<th>May</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Heleidae</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Palpomyia sp.</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Rhagionidae</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Atherix variegata</td>
<td></td>
<td></td>
<td></td>
<td>*1</td>
<td>*1</td>
<td></td>
<td>*1</td>
<td>*1</td>
<td></td>
<td>*1</td>
<td>*1</td>
<td>*1</td>
</tr>
<tr>
<td><strong>Simulidae</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Simulium sp.</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Empididae</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>L</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>P</td>
<td></td>
<td></td>
<td></td>
<td>*1</td>
<td>*1</td>
<td></td>
<td>*1</td>
<td>*1</td>
<td>4</td>
<td>1</td>
<td>16</td>
<td></td>
</tr>
<tr>
<td><strong>Chironomidae</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>L</td>
<td>*1</td>
<td>3</td>
<td>2</td>
<td>28</td>
<td>12</td>
<td>47</td>
<td>122</td>
<td>24</td>
<td>87</td>
<td>62</td>
<td>40</td>
<td>63</td>
</tr>
<tr>
<td>P</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Mollusca</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Gastropoda</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Ancylidae</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Ferrissia sp.</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Total numbers per surber</strong></td>
<td>110</td>
<td>140</td>
<td>146</td>
<td>227</td>
<td>121</td>
<td>277</td>
<td>499</td>
<td>328</td>
<td>388</td>
<td>330</td>
<td>259</td>
<td>481</td>
</tr>
<tr>
<td><strong>Mean number per sample date</strong></td>
<td>37</td>
<td>47</td>
<td>49</td>
<td>76</td>
<td>40</td>
<td>92</td>
<td>166</td>
<td>109</td>
<td>129</td>
<td>110</td>
<td>86</td>
<td>157</td>
</tr>
<tr>
<td><strong>Total taxa per sample date</strong></td>
<td>18</td>
<td>21</td>
<td>20</td>
<td>21</td>
<td>20</td>
<td>29</td>
<td>26</td>
<td>31</td>
<td>24</td>
<td>24</td>
<td>27</td>
<td>26</td>
</tr>
</tbody>
</table>

1 Known from adults and mature larvae.
2 Early instars.
3 Mature nymphs sharing characters of *Stenonema rubrum* and *S. nepotellum*.
4 Mature nymphs sharing characters of *Stenonema pucium* and *S. carolina*.
5 Mature nymphs representing a second species.
*1 = mean values less than 1.
APPENDIX B
TABLE B-1. Species List of Fish Collected During Little Pigeon Study: Common and Scientific Names

<table>
<thead>
<tr>
<th>Common Name</th>
<th>Scientific Name</th>
</tr>
</thead>
<tbody>
<tr>
<td>Rainbow Trout</td>
<td>Salmo gairdneri Richardson</td>
</tr>
<tr>
<td>Stoneroller</td>
<td>Compostoma anomaZum (Rafinesque)</td>
</tr>
<tr>
<td>Bigeye Chub</td>
<td>Hybopsis ambo Za (Rafinesque)</td>
</tr>
<tr>
<td>Blotched Chub</td>
<td>Hybopsis insignis Hubbs and Crowe</td>
</tr>
<tr>
<td>River Chub</td>
<td>Nocomis micropogon (Cope)</td>
</tr>
<tr>
<td>Warpaint Shiner</td>
<td>Notropis coco gen gen (Cope)</td>
</tr>
<tr>
<td>Common Shiner</td>
<td>Notropis cornutus (Mitchell)</td>
</tr>
<tr>
<td>Whitetail Shiner</td>
<td>Notropis galacturus (Cope)</td>
</tr>
<tr>
<td>Tennessee Shiner</td>
<td>Notropis leuroides (Cope)</td>
</tr>
<tr>
<td>Silver Shiner</td>
<td>Notropis photogenis (Cope)</td>
</tr>
<tr>
<td>Rosey Face Shiner</td>
<td>Notropis rubellus (Agassiz)</td>
</tr>
<tr>
<td>Saffron Shiner</td>
<td>Notropis rubricroceus (Cope)</td>
</tr>
<tr>
<td>Spotfin Shiner</td>
<td>Notropis spilopterus (Cope)</td>
</tr>
<tr>
<td>Sand Shiner</td>
<td>Notropis stramineus (Cope)</td>
</tr>
<tr>
<td>Telescope Shiner</td>
<td>Notropis telescopus (Cope)</td>
</tr>
<tr>
<td>Stargazing Minnow</td>
<td>Phenacobi us uranos (Cope)</td>
</tr>
<tr>
<td>Blacknose Dace</td>
<td>Rhinichthys atratul us (Hermann)</td>
</tr>
<tr>
<td>Longnose Dace</td>
<td>Rhinichthye ota carataeae (Valenciennes)</td>
</tr>
<tr>
<td>Creek Chub</td>
<td>Semotilus atromaculatus (Mitchell)</td>
</tr>
<tr>
<td>Northern Hogsucker</td>
<td>Hypentelium nigricans (LeSueur)</td>
</tr>
<tr>
<td>Black Redhorse</td>
<td>Moxostoma duquezii (LeSueur)</td>
</tr>
<tr>
<td>Golden Redhorse</td>
<td>Moxostoma erythrurum (Rafinesque)</td>
</tr>
<tr>
<td>Yellow Bullhead</td>
<td>Italurus natalis (LeSueur)</td>
</tr>
<tr>
<td>Rockbass</td>
<td>Ambioplites raraestris (Rafinesque)</td>
</tr>
<tr>
<td>Redbreast Sunfish</td>
<td>Lepomis auritus (Linnaeus)</td>
</tr>
<tr>
<td>Smallmouth Bass</td>
<td>Micropterus dolomieu L acepede</td>
</tr>
<tr>
<td>Greenside Darter</td>
<td>Etheostoma biennioides Rafinesque</td>
</tr>
<tr>
<td>Greenfin Darter</td>
<td>Etheostoma chlorobranchium Zorach</td>
</tr>
<tr>
<td>Fantail Darter</td>
<td>Etheostoma flabellare Rafinesque</td>
</tr>
<tr>
<td>Stripetail Darter</td>
<td>Etheostoma kennicotti (Putnam)</td>
</tr>
<tr>
<td>Redline Darter</td>
<td>Etheostoma rufilneatum (Cope)</td>
</tr>
<tr>
<td>Tennessee Darter</td>
<td>Etheostoma simotorum (Cope)</td>
</tr>
<tr>
<td>Swannanoa Darter</td>
<td>Etheostoma swannanoa Jordan and Everman</td>
</tr>
<tr>
<td>Banded Darter</td>
<td>Etheostoma sonale (Cope)</td>
</tr>
<tr>
<td>Tangarine Darter</td>
<td>Percina aurantica (Cope)</td>
</tr>
<tr>
<td>Logperch</td>
<td>Percina caprodes Rafinesque</td>
</tr>
<tr>
<td>Gilt Darter</td>
<td>Percina evides (Jordan and Copeland)</td>
</tr>
<tr>
<td>Banded Sculpin</td>
<td>Cottus carolin activities (Gil)</td>
</tr>
<tr>
<td>Species</td>
<td>Jun</td>
</tr>
<tr>
<td>----------------------------------</td>
<td>-----</td>
</tr>
<tr>
<td>Salmo gairdneri</td>
<td></td>
</tr>
<tr>
<td><em>Campostoma anamalum</em></td>
<td></td>
</tr>
<tr>
<td><em>Hybopsis amblopa</em></td>
<td></td>
</tr>
<tr>
<td><em>Hybopsis insignis</em></td>
<td></td>
</tr>
<tr>
<td><em>Nocomis micropogon</em></td>
<td></td>
</tr>
<tr>
<td><em>Notropis coccogenis</em></td>
<td></td>
</tr>
<tr>
<td><em>Notropis cornutus</em></td>
<td></td>
</tr>
<tr>
<td><em>Notropis galactarus</em></td>
<td></td>
</tr>
<tr>
<td><em>Notropis leuciodus</em></td>
<td>9</td>
</tr>
<tr>
<td><em>Notropis rubellus</em></td>
<td></td>
</tr>
<tr>
<td><em>Notropis rubricoccea</em></td>
<td></td>
</tr>
<tr>
<td><em>Notropis stramineus</em></td>
<td></td>
</tr>
<tr>
<td><em>Notropis epilopterus</em></td>
<td></td>
</tr>
<tr>
<td><em>Notropis telescopus</em></td>
<td></td>
</tr>
<tr>
<td><em>Phenacobius uranops</em></td>
<td></td>
</tr>
<tr>
<td><em>Rhinichthys atratulus</em></td>
<td>4</td>
</tr>
<tr>
<td><em>Rhinichthys cataractae</em></td>
<td></td>
</tr>
<tr>
<td><em>Semotilus atramauculatus</em></td>
<td></td>
</tr>
<tr>
<td><em>Hypentelium nigricans</em></td>
<td>8</td>
</tr>
<tr>
<td><em>Moxostoma duquesnii</em></td>
<td></td>
</tr>
<tr>
<td><em>Moxostoma erythrumum</em></td>
<td></td>
</tr>
<tr>
<td><em>Ictalurus natalis</em></td>
<td></td>
</tr>
<tr>
<td><em>Ambloplites rupestris</em></td>
<td></td>
</tr>
<tr>
<td><em>Miropterus dolomieui</em></td>
<td></td>
</tr>
<tr>
<td><em>Ettheostoma blennioides</em></td>
<td>3</td>
</tr>
<tr>
<td><em>Ettheostoma chlorobranchium</em></td>
<td></td>
</tr>
<tr>
<td><em>Ettheostoma kennicotti</em></td>
<td></td>
</tr>
<tr>
<td><em>Ettheostoma rubolineatw</em></td>
<td></td>
</tr>
<tr>
<td><em>Ettheostoma simoterum</em></td>
<td>2</td>
</tr>
<tr>
<td><em>Ettheostoma swannanoa</em></td>
<td>7</td>
</tr>
<tr>
<td><em>Ettheostoma sonsae</em></td>
<td></td>
</tr>
<tr>
<td><em>Percina aurantica</em></td>
<td></td>
</tr>
<tr>
<td><em>Percina caprodes</em></td>
<td></td>
</tr>
<tr>
<td><em>Percina evides</em></td>
<td></td>
</tr>
<tr>
<td><em>Cottus carolinae</em></td>
<td></td>
</tr>
<tr>
<td>Number of individuals</td>
<td>79</td>
</tr>
<tr>
<td>Number of species</td>
<td>7</td>
</tr>
</tbody>
</table>
TABLE B-2 (continued)

<table>
<thead>
<tr>
<th>Species</th>
<th>Jun</th>
<th>Jul</th>
<th>Aug</th>
<th>Sep</th>
<th>Oct</th>
<th>Nov</th>
<th>May</th>
</tr>
</thead>
<tbody>
<tr>
<td>Campostoma anomalum</td>
<td>43</td>
<td>3</td>
<td>121</td>
<td>8</td>
<td>2</td>
<td>4</td>
<td>6</td>
</tr>
<tr>
<td>Hybopis amblops</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Hybopis insignis</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Nocomis microphogon</td>
<td>2</td>
<td>2</td>
<td>13</td>
<td></td>
<td></td>
<td>3</td>
<td></td>
</tr>
<tr>
<td>Notropis ocoogenis</td>
<td>4</td>
<td>1</td>
<td></td>
<td></td>
<td></td>
<td>7</td>
<td></td>
</tr>
<tr>
<td>Notropis cornutus</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Notropis galacturus</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Notropis levioidus</td>
<td>5</td>
<td>15</td>
<td>10</td>
<td></td>
<td></td>
<td>13</td>
<td></td>
</tr>
<tr>
<td>Notropis rubellus</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Notropis rubricroceus</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>8</td>
<td></td>
</tr>
<tr>
<td>Notropis stramineus</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Notropis epilopterus</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Notropis telescopus</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>1</td>
<td>1</td>
</tr>
<tr>
<td>Phenacobius uranops</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Rhinichthys atratulus</td>
<td>1</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Rhinichthys cataractae</td>
<td></td>
<td>3</td>
<td>3</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>Semotilus atromaculatus</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Hypentelium nigricans</td>
<td>17</td>
<td>29</td>
<td>3</td>
<td>10</td>
<td>3</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>Moxostoma duquesnii</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Moxostoma erythrumum</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Ictalurus natalis</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Amblopites ruperstris</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>Micropterus dolomieui</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Etheostoma blemiioides</td>
<td>1</td>
<td>14</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Etheostoma chlorobranchium</td>
<td>2</td>
<td>5</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Etheostoma kennicotti</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Etheostoma rufilineatum</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>Etheostoma simoretoes</td>
<td>8</td>
<td>5</td>
<td>2</td>
<td>1</td>
<td></td>
<td>14</td>
<td></td>
</tr>
<tr>
<td>Etheostoma swannanoa</td>
<td>1</td>
<td>4</td>
<td>12</td>
<td>2</td>
<td>7</td>
<td>1</td>
<td>14</td>
</tr>
<tr>
<td>Etheostoma sonale</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Percina aurantiaca</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Percina caprodes</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Percina evides</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Cottus caroliniae</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>Number of individuals</td>
<td>80</td>
<td>30</td>
<td>225</td>
<td>13</td>
<td>15</td>
<td>17</td>
<td>47</td>
</tr>
<tr>
<td>Number of species</td>
<td>9</td>
<td>7</td>
<td>14</td>
<td>3</td>
<td>5</td>
<td>5</td>
<td>7</td>
</tr>
<tr>
<td>Species</td>
<td>Jun</td>
<td>Jul</td>
<td>Aug</td>
<td>Sep</td>
<td>Oct</td>
<td>Nov</td>
<td>May</td>
</tr>
<tr>
<td>------------------------------</td>
<td>-----</td>
<td>-----</td>
<td>-----</td>
<td>-----</td>
<td>-----</td>
<td>-----</td>
<td>-----</td>
</tr>
<tr>
<td>Notropis leuciodus</td>
<td>1</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Notropis rubellus</td>
<td></td>
<td>1</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Notropis rubrocinus</td>
<td></td>
<td></td>
<td>1</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Notropis stramineus</td>
<td></td>
<td></td>
<td></td>
<td>1</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Notropis teleostorus</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>1</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Phenacobius uranops</td>
<td>1</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Phoxinus atratus</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>1</td>
</tr>
<tr>
<td>Rhinichthys atratilus</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>1</td>
</tr>
<tr>
<td>Semotilus atromaculatus</td>
<td></td>
<td>1</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Hypentelium nigricans</td>
<td>2</td>
<td></td>
<td>1</td>
<td>1</td>
<td></td>
<td>3</td>
<td>3</td>
</tr>
<tr>
<td>Moaostoma duqueseni</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Moaostoma erythrum</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Ictalurus natalis</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Ambloplites ruperstris</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Micropterus dolomieu</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>1</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Blechnioides</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Ethoostoma chlorobranchium</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Ethoostoma kennicotti</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Ethoostoma rufilinatum</td>
<td>28</td>
<td>12</td>
<td>9</td>
<td>7</td>
<td>5</td>
<td>1</td>
<td>6</td>
</tr>
<tr>
<td>Ethoostoma simoterum</td>
<td>3</td>
<td>1</td>
<td></td>
<td></td>
<td></td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>Ethoostoma swannanoa</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>2</td>
</tr>
<tr>
<td>Ethoostoma zonale</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Percina auriolica</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Percina caprodes</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Percina evis</td>
<td>2</td>
<td>6</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>3</td>
</tr>
<tr>
<td>Cottus carolinae</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Number of individuals</td>
<td>41</td>
<td>24</td>
<td>30</td>
<td>20</td>
<td>51</td>
<td>40</td>
<td>19</td>
</tr>
<tr>
<td>Number of species</td>
<td>9</td>
<td>8</td>
<td>8</td>
<td>8</td>
<td>3</td>
<td>3</td>
<td>8</td>
</tr>
</tbody>
</table>
TABLE B-2 (continued)

<table>
<thead>
<tr>
<th>Species</th>
<th>Jun</th>
<th>Jul</th>
<th>Aug</th>
<th>Sep</th>
<th>Oct</th>
<th>Nov</th>
<th>May</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Station 4</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><em>Campostoma anomalum</em></td>
<td>5</td>
<td>26</td>
<td>6</td>
<td>9</td>
<td>7</td>
<td>29</td>
<td></td>
</tr>
<tr>
<td><em>Hybopsis amblops</em></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><em>Hybopsis insignis</em></td>
<td>3</td>
<td>14</td>
<td>6</td>
<td>5</td>
<td>6</td>
<td></td>
<td></td>
</tr>
<tr>
<td><em>Nocomis micropogon</em></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><em>Notropis coccogenis</em></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><em>Notropis cornutus</em></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><em>Notropis galacticus</em></td>
<td>5</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><em>Notropis leuciodus</em></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><em>Notropis rubellus</em></td>
<td>1</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><em>Notropis rubricoraceus</em></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><em>Notropis stramineus</em></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><em>Notropis epilopterus</em></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><em>Phenacobius uranops</em></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><em>Rhinichthys atratulus</em></td>
<td>1</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><em>Rhinichthys cataractae</em></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><em>Semotilus atramaculatus</em></td>
<td>2</td>
<td>4</td>
<td>9</td>
<td>1</td>
<td>2</td>
<td>10</td>
<td>3</td>
</tr>
<tr>
<td><em>Hypentelium nigricans</em></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><em>Moxostoma duquesnii</em></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>1</td>
<td></td>
</tr>
<tr>
<td><em>Moxostoma erythrum</em></td>
<td>5</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>1</td>
<td></td>
</tr>
<tr>
<td><em>Ictalurus natalis</em></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><em>Ambloplites ruperetris</em></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><em>Micropterus dolomiesi</em></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><em>Etheostoma blennioides</em></td>
<td>5</td>
<td>24</td>
<td>14</td>
<td>8</td>
<td>7</td>
<td>15</td>
<td>8</td>
</tr>
<tr>
<td><em>Etheostoma chlorobranchium</em></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><em>Etheostoma kennicotti</em></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><em>Etheostoma rufilinatum</em></td>
<td>56</td>
<td>172</td>
<td>23</td>
<td>32</td>
<td>41</td>
<td>5</td>
<td>57</td>
</tr>
<tr>
<td><em>Etheostoma simoterum</em></td>
<td>1</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><em>Etheostoma swannanoa</em></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><em>Etheostoma zonale</em></td>
<td>1</td>
<td>7</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><em>Perca aurantica</em></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><em>Perca caprodes</em></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><em>Percina evides</em></td>
<td>4</td>
<td>1</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><em>Cottus carolinae</em></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Number of individuals</strong></td>
<td>72</td>
<td>260</td>
<td>67</td>
<td>59</td>
<td>71</td>
<td>59</td>
<td>69</td>
</tr>
<tr>
<td><strong>Number of species</strong></td>
<td>6</td>
<td>11</td>
<td>7</td>
<td>8</td>
<td>7</td>
<td>4</td>
<td>4</td>
</tr>
</tbody>
</table>
TABLE B-3. Fish Collected Per Station by Cyanide Application, Middle Prong, Little Pigeon River, 1975-76

<table>
<thead>
<tr>
<th>Species</th>
<th>Jun</th>
<th>Jul</th>
<th>Aug</th>
<th>Sep</th>
<th>Oct</th>
<th>Nov</th>
<th>May</th>
</tr>
</thead>
<tbody>
<tr>
<td><em>Salmo gairdneri</em></td>
<td>24</td>
<td>3</td>
<td>154</td>
<td>5</td>
<td>68</td>
<td>2</td>
<td>43</td>
</tr>
<tr>
<td><em>Campostoma anomalum</em></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><em>Hybopis ambiope</em></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><em>Hybopis insignis</em></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><em>Noamis micropogon</em></td>
<td>1</td>
<td>3</td>
<td>2</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><em>Notropis cocoogenis</em></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><em>Notropis cernutus</em></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><em>Notropis galacturus</em></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><em>Notropis leuciodus</em></td>
<td>8</td>
<td>27</td>
<td>8</td>
<td>1</td>
<td>19</td>
<td></td>
<td></td>
</tr>
<tr>
<td><em>Notropis rubellus</em></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><em>Notropis rubrirocoeus</em></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><em>Notropis stramineus</em></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><em>Notropis spiopterus</em></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><em>Notropis telescopus</em></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><em>Phenacobius uranops</em></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><em>Rhinichthys atratulus</em></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><em>Rhinichthys cataractae</em></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><em>Semotilus atromaculatus</em></td>
<td>1</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><em>Hypentelium nigricans</em></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><em>Moxostoma duquesnii</em></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><em>Moxostoma erythrum</em></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><em>Ictalurus natalis</em></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><em>Ambloplites rupestris</em></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><em>Micropterus dolomiei</em></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><em>Etheostoma blennioides</em></td>
<td>6</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><em>Etheostoma chlorobranchium</em></td>
<td></td>
<td>12</td>
<td>7</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><em>Etheostoma kennicotti</em></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><em>Etheostoma ruftineatium</em></td>
<td>56</td>
<td>76</td>
<td>12</td>
<td>4</td>
<td>4</td>
<td>10</td>
<td></td>
</tr>
<tr>
<td><em>Etheostoma stinotum</em></td>
<td></td>
<td>3</td>
<td>4</td>
<td>1</td>
<td>2</td>
<td></td>
<td></td>
</tr>
<tr>
<td><em>Etheostoma swannanoa</em></td>
<td>2</td>
<td>1</td>
<td>27</td>
<td>22</td>
<td>2</td>
<td>16</td>
<td></td>
</tr>
<tr>
<td><em>Etheostoma sonale</em></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><em>Percina aurantica</em></td>
<td>1</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><em>Percina caprodes</em></td>
<td>2</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><em>Percina evides</em></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><em>Cottus carolinae</em></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Number of individuals</td>
<td>97</td>
<td>89</td>
<td>270</td>
<td>21</td>
<td>118</td>
<td>12</td>
<td>104</td>
</tr>
<tr>
<td>Number of species</td>
<td>6</td>
<td>9</td>
<td>11</td>
<td>6</td>
<td>7</td>
<td>7</td>
<td>9</td>
</tr>
</tbody>
</table>
### TABLE B-3 (continued)

<table>
<thead>
<tr>
<th></th>
<th>Jun</th>
<th>Jul</th>
<th>Aug</th>
<th>Sep</th>
<th>Oct</th>
<th>Nov</th>
<th>May</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Station 2</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><em>Salmo gairdneri</em></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><em>Campostoma anomalum</em></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><em>Hybopsis amblopa</em></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><em>Hybopsis insignis</em></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><em>Notropis micropogon</em></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><em>Notropis coccogenis</em></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><em>Notropis cornutus</em></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><em>Notropis galacturus</em></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><em>Notropis leuciodus</em></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><em>Notropis rubellus</em></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><em>Notropis rubricruceus</em></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><em>Notropis stramineus</em></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><em>Notropis epilooper</em></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><em>Notropis telescopus</em></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><em>Phenacaobius uranops</em></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><em>Rhinichthys atratulus</em></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><em>Rhinichthys cataractae</em></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><em>Semotilus atromaculatus</em></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><em>Hypentelium nigricans</em></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><em>Moxostoma duquesnii</em></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><em>Moxostoma erythrum</em></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><em>Ictalurus natalis</em></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><em>Ambloplites rupestris</em></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><em>Micropterus dolomieu</em></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><em>Etheostoma blemnitoide</em></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><em>Etheostoma chlorobranchicum</em></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><em>Etheostoma kennicotti</em></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><em>Etheostoma rufilinamen</em></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><em>Etheostoma simoterum</em></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><em>Etheostoma swannaan</em></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><em>Etheostoma zonale</em></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><em>Percina aurantica</em></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><em>Percina caprodes</em></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><em>Percina evides</em></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><em>Cottus carolinae</em></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Number of individuals</strong></td>
<td>80</td>
<td>85</td>
<td>128</td>
<td>41</td>
<td>15</td>
<td>27</td>
<td>73</td>
</tr>
<tr>
<td><strong>Number of species</strong></td>
<td>6</td>
<td>11</td>
<td>5</td>
<td>6</td>
<td>6</td>
<td>7</td>
<td>11</td>
</tr>
<tr>
<td>Species</td>
<td>Jun</td>
<td>Jul</td>
<td>Aug</td>
<td>Sep</td>
<td>Oct</td>
<td>Nov</td>
<td>May</td>
</tr>
<tr>
<td>-------------------------------</td>
<td>-----</td>
<td>-----</td>
<td>-----</td>
<td>-----</td>
<td>-----</td>
<td>-----</td>
<td>-----</td>
</tr>
<tr>
<td><em>Salmo gairdneri</em></td>
<td></td>
<td></td>
<td>3</td>
<td></td>
<td>2</td>
<td></td>
<td>3</td>
</tr>
<tr>
<td><em>Campostoma anomalum</em></td>
<td>18</td>
<td>5</td>
<td>5</td>
<td>7</td>
<td>2</td>
<td></td>
<td></td>
</tr>
<tr>
<td><em>Hybopsis amblops</em></td>
<td></td>
<td></td>
<td></td>
<td>4</td>
<td>2</td>
<td></td>
<td></td>
</tr>
<tr>
<td><em>Hybopsis insignis</em></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>1</td>
<td></td>
</tr>
<tr>
<td><em>Notropis microphogon</em></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>2</td>
</tr>
<tr>
<td><em>Notropis cococoegenis</em></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><em>Notropis cornutus</em></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>1</td>
</tr>
<tr>
<td><em>Notropis galactorurus</em></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><em>Notropis leuciodus</em></td>
<td>28</td>
<td>17</td>
<td>5</td>
<td></td>
<td></td>
<td></td>
<td>2</td>
</tr>
<tr>
<td><em>Notropis rubellus</em></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>4</td>
</tr>
<tr>
<td><em>Notropis rubricarceus</em></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><em>Notropis stramineus</em></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><em>Notropis spilotarsus</em></td>
<td>1</td>
<td>1</td>
<td>3</td>
<td>1</td>
<td></td>
<td></td>
<td>5</td>
</tr>
<tr>
<td><em>Phenacopus uranops</em></td>
<td></td>
<td></td>
<td></td>
<td>1</td>
<td>1</td>
<td></td>
<td></td>
</tr>
<tr>
<td><em>Rhinichthys atratulus</em></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><em>Rhinichthys cataractae</em></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><em>Semotilus atromaculatus</em></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><em>Hypentelium nigricans</em></td>
<td></td>
<td></td>
<td></td>
<td>2</td>
<td>1</td>
<td></td>
<td></td>
</tr>
<tr>
<td><em>Moxostoma duquesnii</em></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><em>Moxostoma erythrum</em></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><em>Ictalurus natalis</em></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><em>Ambloplites ruperstris</em></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><em>Micropterus dolomieui</em></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><em>Etheostoma biennisoides</em></td>
<td>10</td>
<td>8</td>
<td></td>
<td>3</td>
<td></td>
<td></td>
<td>2</td>
</tr>
<tr>
<td><em>Etheostoma chlorobranchium</em></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><em>Etheostoma keniocotti</em></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><em>Etheostoma rufilineatum</em></td>
<td>3</td>
<td>2</td>
<td>14</td>
<td>11</td>
<td>19</td>
<td></td>
<td>116</td>
</tr>
<tr>
<td><em>Etheostoma stenopterus</em></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>4</td>
</tr>
<tr>
<td><em>Etheostoma suwananoa</em></td>
<td>6</td>
<td>3</td>
<td>1</td>
<td></td>
<td></td>
<td></td>
<td>6</td>
</tr>
<tr>
<td><em>Etheostoma zonale</em></td>
<td></td>
<td></td>
<td></td>
<td>1</td>
<td></td>
<td></td>
<td>1</td>
</tr>
<tr>
<td><em>Percina aurantia</em></td>
<td></td>
<td></td>
<td></td>
<td>3</td>
<td>2</td>
<td></td>
<td>2</td>
</tr>
<tr>
<td><em>Percina caprodes</em></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>7</td>
<td></td>
</tr>
<tr>
<td><em>Percina eides</em></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>1</td>
</tr>
<tr>
<td><em>Cottus carolinae</em></td>
<td>1</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>1</td>
</tr>
</tbody>
</table>

**Number of individuals**: 68 22 63 31 23 149
**Number of species**: 7 6 13 9 4 13
TABLE B-4. Selected Collections of Fish by Carl Hubbs in 1947 and 1940. Collections are from the Middle and West Prongs of the Little Pigeon River.

<table>
<thead>
<tr>
<th>Richardson Cove, Hubbs Coll., M37-9086 Middle Prong</th>
<th>Below Pigeon Forge Bridge, Hubbs Coll., M37-909, West Prong</th>
<th>Walden Creek below Gatlinburg, Hubbs Coll., M40-217</th>
</tr>
</thead>
<tbody>
<tr>
<td>Compostoma anomalum</td>
<td>Compostoma anomalum</td>
<td>Compostoma anomalum</td>
</tr>
<tr>
<td>Hybopsis amblops</td>
<td>Hybopsis amblops</td>
<td>Hybopsis amblops</td>
</tr>
<tr>
<td>Nocomis micropogon</td>
<td>Nocomis micropogon</td>
<td>Nocomis micropogon</td>
</tr>
<tr>
<td>Notropis coccogenis</td>
<td>Notropis coccogenis</td>
<td>Notropis coccogenis</td>
</tr>
<tr>
<td>Notropis cornutus</td>
<td>Notropis cornutus</td>
<td>Notropis cornutus</td>
</tr>
<tr>
<td>Notropis galacturus</td>
<td>Notropis galacturus</td>
<td>Notropis galacturus</td>
</tr>
<tr>
<td>Notropis leuciodus</td>
<td>Notropis leuciodus</td>
<td>Notropis leuciodus</td>
</tr>
<tr>
<td>Notropis photogenis</td>
<td>Notropis photogenis</td>
<td>Notropis photogenis</td>
</tr>
<tr>
<td>Notropis telescopus</td>
<td>Notropis telescopus</td>
<td>Notropis telescopus</td>
</tr>
<tr>
<td>Notropis volucellus</td>
<td>Notropis volucellus</td>
<td>Notropis volucellus</td>
</tr>
<tr>
<td>Phenacobius uranops</td>
<td>Phenacobius uranops</td>
<td>Catostomus commersoni</td>
</tr>
<tr>
<td>Ambloplites ruperstris</td>
<td>Hypentelium nigricans</td>
<td>Ambloplites ruperstris</td>
</tr>
<tr>
<td>Micropterus dolomieu</td>
<td>Moxostoma duquesnii</td>
<td>Micropterus dolomieu</td>
</tr>
<tr>
<td>Etheostoma blennioide</td>
<td>Moxostoma erythrum</td>
<td>Etheostoma blennioide</td>
</tr>
<tr>
<td>Etheostoma chlorobranchium</td>
<td>Moxostoma erythrum</td>
<td>Etheostoma chlorobranchium</td>
</tr>
<tr>
<td>Etheostoma rufilinatum</td>
<td>Etheostoma rufilinatum</td>
<td>Etheostoma rufilinatum</td>
</tr>
<tr>
<td>Etheostoma simoterum</td>
<td>Etheostoma simoterum</td>
<td>Etheostoma simoterum</td>
</tr>
<tr>
<td>Percina aurantica</td>
<td>Etheostoma jessiae</td>
<td>Etheostoma jessiae</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Percina macrocephala</td>
</tr>
</tbody>
</table>
TABLE B-5. Results of Qualitative Collection at Control Station on West Prong of the Little Pigeon River Above Gatlinburg

<table>
<thead>
<tr>
<th>Species</th>
<th>Numbers</th>
</tr>
</thead>
<tbody>
<tr>
<td><em>Salmo gairdneri</em></td>
<td>1</td>
</tr>
<tr>
<td><em>Campostoma anomalum</em></td>
<td>8</td>
</tr>
<tr>
<td><em>Notropis leuciodus</em></td>
<td>1</td>
</tr>
<tr>
<td><em>Notropis rubricroceus</em></td>
<td>6</td>
</tr>
<tr>
<td><em>Rhinichthys atractulus</em></td>
<td>2</td>
</tr>
<tr>
<td><em>Rhinichthys cataractae</em></td>
<td>4</td>
</tr>
<tr>
<td><em>Hypentelium nigricans</em></td>
<td>5</td>
</tr>
<tr>
<td><em>Etheostema flabellare</em></td>
<td>10</td>
</tr>
<tr>
<td><em>Etheostema swannanoa</em></td>
<td>2</td>
</tr>
<tr>
<td><em>Cottus carolinae</em></td>
<td>6</td>
</tr>
</tbody>
</table>
### TABLE B-6. Fish Collected by Dr. D. A. Etnier at Two Stations on the West Prong Little Pigeon River, 1968 and 1969

<table>
<thead>
<tr>
<th>1968 Station 3 (Below 441 Bridge Pigeon Forge)</th>
<th>1969 Near Station 1 (At Norton Creek Road)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Campostoma anomalum</td>
<td>Salmo gairdneri</td>
</tr>
<tr>
<td>Hybopsis amblopes</td>
<td>Salmo trutta</td>
</tr>
<tr>
<td>Hybopsis inequithis</td>
<td>Campostoma anomalum</td>
</tr>
<tr>
<td>Notropis cornutus</td>
<td>Hybopsis amblopes</td>
</tr>
<tr>
<td>Notropis coccogenis</td>
<td>Nocomis microgen</td>
</tr>
<tr>
<td>Notropis galacturus</td>
<td>Notropis coccogenis</td>
</tr>
<tr>
<td>Notropis leuciodus</td>
<td>Notropis leuciodus</td>
</tr>
<tr>
<td>Notropis lurus</td>
<td>Notropis rubrioceus</td>
</tr>
<tr>
<td>Notropis photogenis</td>
<td>Notropis telecopus</td>
</tr>
<tr>
<td>Notropis rellus</td>
<td>Rhinchities cataractas</td>
</tr>
<tr>
<td>Notropis rubrioceus</td>
<td>Semotilus atromaculatus</td>
</tr>
<tr>
<td>Notropis spiloeterus</td>
<td>Hypentelium nigricans</td>
</tr>
<tr>
<td>Notropis stramineus</td>
<td>Etheostoma flaviflora</td>
</tr>
<tr>
<td>Notropis telecopus</td>
<td>Etheostoma chlorobranchium</td>
</tr>
<tr>
<td>Phenacobius urinops</td>
<td>Etheostoma flaviflora</td>
</tr>
<tr>
<td>Rhinchities cataractas</td>
<td>Etheostoma flaviflora</td>
</tr>
<tr>
<td>Semotilus atromaculatus</td>
<td>Etheostoma flaviflora</td>
</tr>
<tr>
<td>Hypentelium nigricans</td>
<td>Etheostoma flaviflora</td>
</tr>
<tr>
<td>Moxostoma duquesnii</td>
<td>Etheostoma flaviflora</td>
</tr>
<tr>
<td>Moxostoma erythrurum</td>
<td>Etheostoma flaviflora</td>
</tr>
<tr>
<td>Ambiopites rupestris</td>
<td>Etheostoma flaviflora</td>
</tr>
<tr>
<td>Lepomis auritus</td>
<td>Etheostoma flaviflora</td>
</tr>
<tr>
<td>Etheostoma blennioides</td>
<td>Etheostoma flaviflora</td>
</tr>
<tr>
<td>Etheostoma scribenti</td>
<td>Etheostoma flaviflora</td>
</tr>
<tr>
<td>Etheostoma rufilineatum</td>
<td>Etheostoma flaviflora</td>
</tr>
<tr>
<td>Etheostoma simoterum</td>
<td>Etheostoma flaviflora</td>
</tr>
<tr>
<td>Etheostoma jessiae</td>
<td>Etheostoma flaviflora</td>
</tr>
<tr>
<td>Etheostoma swannanoa</td>
<td>Etheostoma flaviflora</td>
</tr>
<tr>
<td>Etheostoma maculatum</td>
<td>Etheostoma flaviflora</td>
</tr>
<tr>
<td>Percina caprodes</td>
<td>Etheostoma flaviflora</td>
</tr>
<tr>
<td>Percina evides</td>
<td>Etheostoma flaviflora</td>
</tr>
</tbody>
</table>

**Data:**
- **1968 Station 3 (Below 441 Bridge Pigeon Forge)**
  - Campostoma anomalum: 40
  - Hybopsis amblopes: 677
  - Hybopsis inequithis: 50
  - Notropis cornutus: 41
  - Notropis coccogenis: 2
  - Notropis galacturus: 16
  - Notropis leuciodus: 26
  - Notropis lurus: 10
  - Notropis photogenis: 21
  - Notropis rellus: 87
  - Notropis rubrioceus: 1
  - Notropis spiloeterus: 3
  - Notropis stramineus: 25
  - Notropis telecopus: 116
  - Phenacobius urinops: 4
  - Rhinchities cataractas: 1
  - Semotilus atromaculatus: 1
  - Hypentelium nigricans: 8
  - Moxostoma duquesnii: 6
  - Moxostoma erythrurum: 1
  - Ambiopites rupestris: 3
  - Lepomis auritus: 1
  - Etheostoma blennioides: 23
  - Etheostoma scribenti: 2
  - Etheostoma rufilineatum: 62
  - Etheostoma simoterum: 98
  - Etheostoma jessiae: 7
  - Etheostoma swannanoa: 7
  - Etheostoma maculatum: 4
  - Percina caprodes: 5
  - Percina evides: 5

- **1969 Near Station 1 (At Norton Creek Road)**
  - Salmo gairdneri: 2
  - Salmo trutta: 1
  - Campostoma anomalum: 29
  - Hybopsis amblopes: 18
  - Nocomis microgen: 4
  - Notropis coccogenis: 18
  - Notropis leuciodus: 3
  - Notropis rubrioceus: 5
  - Notropis telecopus: 1
  - Rhinchities cataractas: 63
  - Semotilus atromaculatus: 1
  - Hypentelium nigricans: 1
  - Etheostoma flaviflora: 26
  - Etheostoma chlorobranchium: 109
  - Etheostoma flaviflora: 1
  - Etheostoma flaviflora: 12
  - Etheostoma flaviflora: 12
  - Etheostoma flaviflora: 46
  - Etheostoma flaviflora: 1
  - Cottus carolinae: 41
TABLE C-1. Water Quality Analysis of 1958 Samples at Selected Comparative Stations on the Little Pigeon River

<table>
<thead>
<tr>
<th>Date</th>
<th>Strm Flow</th>
<th>Fec. Coli. (100ml)</th>
<th>Color (μg/l)</th>
<th>pH</th>
<th>BOD</th>
<th>DO</th>
<th>SiO₂</th>
<th>Cl</th>
<th>PO₄</th>
<th>Na</th>
<th>Ca</th>
<th>Mg</th>
<th>Total Residue</th>
<th>Total Diss.</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>----------------</td>
<td>-------------</td>
</tr>
<tr>
<td>Middle Prong (River km, 18.5; 266.2 sq km = station 3)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>68/1/8</td>
<td>310</td>
<td>10k</td>
<td>5</td>
<td>70</td>
<td>7.1</td>
<td>1.0k</td>
<td>13.3</td>
<td>7.8</td>
<td>1k</td>
<td>.05</td>
<td>1.1</td>
<td>2.0</td>
<td>1.0</td>
<td>30</td>
</tr>
<tr>
<td>68/3/11</td>
<td>154</td>
<td>10k</td>
<td>5</td>
<td>50</td>
<td>7.2</td>
<td>1.7</td>
<td>11.0</td>
<td>4.6</td>
<td>1k</td>
<td>.04</td>
<td>1.0</td>
<td>1.0</td>
<td>.5k</td>
<td>10k</td>
</tr>
<tr>
<td>68/5/9</td>
<td>190</td>
<td>--</td>
<td>10</td>
<td>50k</td>
<td>7.4</td>
<td>1.1</td>
<td>10.6</td>
<td>5.8</td>
<td>1</td>
<td>.06</td>
<td>2.6</td>
<td>1.0</td>
<td>1.5</td>
<td>40</td>
</tr>
<tr>
<td>68/6/3</td>
<td>510</td>
<td>3400</td>
<td>25</td>
<td>260</td>
<td>7.0</td>
<td>1.0k</td>
<td>9.0</td>
<td>3.7</td>
<td>3</td>
<td>.08</td>
<td>1.9</td>
<td>2.0</td>
<td>1.0</td>
<td>--</td>
</tr>
<tr>
<td>68/7/29</td>
<td>112</td>
<td>400</td>
<td>10</td>
<td>170</td>
<td>7.6</td>
<td>1.0k</td>
<td>8.3</td>
<td>4.7</td>
<td>2</td>
<td>--</td>
<td>1.2</td>
<td>2.0</td>
<td>1.0</td>
<td>40</td>
</tr>
<tr>
<td>West Prong (River km, 31.3; 57.6 sq km = above Gatlinburg)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>68/1/8</td>
<td>96</td>
<td>10k</td>
<td>5</td>
<td>50</td>
<td>6.8</td>
<td>1.0</td>
<td>13.0</td>
<td>5.8</td>
<td>1k</td>
<td>--</td>
<td>.8</td>
<td>1.5</td>
<td>.5</td>
<td>30</td>
</tr>
<tr>
<td>68/3/11</td>
<td>57</td>
<td>10k</td>
<td>5</td>
<td>50k</td>
<td>6.8</td>
<td>1.8</td>
<td>11.0</td>
<td>3.9</td>
<td>1k</td>
<td>.01k</td>
<td>1.2</td>
<td>.5k</td>
<td>.5</td>
<td>--</td>
</tr>
<tr>
<td>68/5/9</td>
<td>41</td>
<td>--</td>
<td>15</td>
<td>50k</td>
<td>7.3</td>
<td>1.1</td>
<td>10.3</td>
<td>3.7</td>
<td>2</td>
<td>.06</td>
<td>1.8</td>
<td>--</td>
<td>--</td>
<td>30</td>
</tr>
<tr>
<td>68/6/3</td>
<td>47</td>
<td>10k</td>
<td>10</td>
<td>50k</td>
<td>6.7</td>
<td>1.0k</td>
<td>10.6</td>
<td>2.0</td>
<td>1</td>
<td>.03</td>
<td>1.3</td>
<td>1.0</td>
<td>.5k</td>
<td>10</td>
</tr>
<tr>
<td>68/7/29</td>
<td>54</td>
<td>20</td>
<td>15</td>
<td>80</td>
<td>7.1</td>
<td>1.0</td>
<td>9.0</td>
<td>2.3</td>
<td>4</td>
<td>.04</td>
<td>.8</td>
<td>1.0</td>
<td>.5</td>
<td>20</td>
</tr>
<tr>
<td>West Prong (River km, 25.7; 153.3 sq km = station 1)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>68/1/8</td>
<td>240</td>
<td>160</td>
<td>5</td>
<td>60</td>
<td>7.0</td>
<td>1.0k</td>
<td>12.8</td>
<td>6.3</td>
<td>1k</td>
<td>.13</td>
<td>1.4</td>
<td>1.5</td>
<td>.5</td>
<td>30</td>
</tr>
<tr>
<td>68/3/11</td>
<td>143</td>
<td>2000</td>
<td>5</td>
<td>50k</td>
<td>7.2</td>
<td>1.8</td>
<td>10.8</td>
<td>5.2</td>
<td>1</td>
<td>.23</td>
<td>1.6</td>
<td>1.5</td>
<td>1.0</td>
<td>--</td>
</tr>
<tr>
<td>68/5/9</td>
<td>101</td>
<td>--</td>
<td>15</td>
<td>50k</td>
<td>7.3</td>
<td>2.6</td>
<td>10.5</td>
<td>6.0</td>
<td>1</td>
<td>.73</td>
<td>--</td>
<td>--</td>
<td>--</td>
<td>120</td>
</tr>
<tr>
<td>68/6/3</td>
<td>124</td>
<td>8000</td>
<td>20</td>
<td>220</td>
<td>7.4</td>
<td>1.0</td>
<td>9.6</td>
<td>5.0</td>
<td>2</td>
<td>.63</td>
<td>1.3</td>
<td>3.0</td>
<td>1.0</td>
<td>60</td>
</tr>
<tr>
<td>Date</td>
<td>Flow (100ml)</td>
<td>Col. (mg/l)</td>
<td>pH</td>
<td>BOD</td>
<td>Cl</td>
<td>PO4</td>
<td>Na</td>
<td>Ca</td>
<td>Mg</td>
<td>Total Residue</td>
<td>Diss. Residue</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>------------</td>
<td>--------------</td>
<td>-------------</td>
<td>----</td>
<td>-----</td>
<td>----</td>
<td>-----</td>
<td>----</td>
<td>----</td>
<td>----</td>
<td>---------------</td>
<td>---------------</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>68/7/29</td>
<td>137</td>
<td>20</td>
<td>7.2</td>
<td>2.0</td>
<td>8.0</td>
<td>9.4</td>
<td>3</td>
<td>.70</td>
<td>1.4</td>
<td>2.5</td>
<td>.5</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>68/8/23</td>
<td>92</td>
<td>150</td>
<td>8.3</td>
<td>2.0</td>
<td>8.3</td>
<td>9.4</td>
<td>3</td>
<td>.70</td>
<td>1.4</td>
<td>2.5</td>
<td>.5</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Model Prediction

Ave. Blue Ridge

1 Betson and McMaster, 1975.

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Middle Prong at Park</th>
<th>Middle Prong Station 1</th>
<th>Middle Prong Station 3</th>
<th>West Prong Control</th>
<th>West Prong Station 1</th>
<th>West Prong Station 4</th>
</tr>
</thead>
<tbody>
<tr>
<td>Alkalinity, total mg/l</td>
<td>10</td>
<td>16</td>
<td>17</td>
<td>10</td>
<td>25</td>
<td>45</td>
</tr>
<tr>
<td>Hardness, mg/l</td>
<td>9</td>
<td>14</td>
<td>14</td>
<td>10</td>
<td>17</td>
<td>46</td>
</tr>
<tr>
<td>Color</td>
<td>1</td>
<td>1</td>
<td>2</td>
<td>1</td>
<td>1</td>
<td>1</td>
</tr>
<tr>
<td>pH</td>
<td>6.7</td>
<td>6.7</td>
<td>6.7</td>
<td>6.6</td>
<td>6.6</td>
<td>7.1</td>
</tr>
<tr>
<td>Conductivity @ 25°C</td>
<td>22</td>
<td>27</td>
<td>36</td>
<td>60</td>
<td>70</td>
<td>140</td>
</tr>
<tr>
<td>Chloride, mg/l</td>
<td>2</td>
<td>2</td>
<td>25</td>
<td>1</td>
<td>4</td>
<td>5</td>
</tr>
<tr>
<td>Cyanide, mg/l</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>Fluoride, mg/l</td>
<td>.46</td>
<td>.40</td>
<td>.35</td>
<td>.40</td>
<td>.40</td>
<td>.48</td>
</tr>
<tr>
<td>Sulfate, mg/l</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>1</td>
<td>5</td>
</tr>
<tr>
<td>Ammonia, mg/l</td>
<td>.10</td>
<td>.10</td>
<td>.10</td>
<td>.11</td>
<td>.11</td>
<td>.11</td>
</tr>
<tr>
<td>Calcium, mg/l</td>
<td>1.8</td>
<td>2.6</td>
<td>4.4</td>
<td>2.1</td>
<td>2.1</td>
<td>12.5</td>
</tr>
<tr>
<td>Iron, mg/l</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>.015</td>
<td>.054</td>
</tr>
<tr>
<td>Lithium, mg/l</td>
<td>.2</td>
<td>.2</td>
<td>.5</td>
<td>.3</td>
<td>.3</td>
<td>.5</td>
</tr>
<tr>
<td>Magnesium, mg/l</td>
<td>.8</td>
<td>.9</td>
<td>1.8</td>
<td>.8</td>
<td>1.3</td>
<td>2.3</td>
</tr>
<tr>
<td>Potassium, mg/l</td>
<td>.2</td>
<td>.3</td>
<td>.4</td>
<td>.3</td>
<td>1.0</td>
<td>1.2</td>
</tr>
<tr>
<td>Silica, mg/l</td>
<td>2.8</td>
<td>3.3</td>
<td>3.6</td>
<td>2.8</td>
<td>3.6</td>
<td>3.9</td>
</tr>
<tr>
<td>Zinc, mg/l</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>.010</td>
<td>0</td>
</tr>
<tr>
<td>Sodium, mg/l</td>
<td>1.8</td>
<td>2.4</td>
<td>4.9</td>
<td>2.0</td>
<td>2.6</td>
<td>4.9</td>
</tr>
<tr>
<td>Aluminum, mg/l</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>Arsenic, mg/l</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>Barium, mg/l</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>Cadmium, mg/l</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>Chromium, mg/l</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>Copper, mg/l</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>Lead, mg/l</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>Manganese, mg/l</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>Mercury, mg/l</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>Nickel, mg/l</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>Silver, mg/l</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>Strontium, mg/l</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
</tbody>
</table>
VITA

Lynn Betson Starnes was born in Milwaukee, Wisconsin, on July 6, 1950. She resided there until 1952, moving to Louisville, Tennessee. She attended schools in Alcoa and graduated from Alcoa High School of Blount County in June, 1968. She entered the University of Tennessee, Knoxville in September 1968 and received the Bachelor of Science Degree in Zoology in June 1972. She then joined the Peace Corps teaching Biology in The Gambia, West Africa for two years. She returned to the University of Tennessee, entering the Graduate Program in Ecology in September 1974. She received her Master of Science degree in Ecology in December 1976.

She is married to Wayne C. Starnes of Knoxville, Tennessee.