APPENDIX E
SUMMARY OF BENTHIC MACROINVERTEBRATE COUNTS

FINAL

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RED RIVER, NM BENTHIC MACROINVERTEBRATE SURVEY - DECEMBER 1995

Prepared for
Molycorp, Inc.
Questa, New Mexico

September 1996

Woodward-Clyde

4582 South Ulster Street
Denver, Colorado 80237

Project No. 23505

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EXECUTIVE SUMMARY

On 20 and 21 December 1995, Woodward-Clyde Consultants (Woodward-Clyde), at the request of Molycorp Inc., observed New Mexico Environmental Department (NMED) macroinvertebrate collection efforts from the Red River and assisted in field processing of samples. As part of a joint agreement with NMED, Molycorp Inc. provided funding for laboratory analysis of the macroinvertebrate samples and preparation of this data report. NMED personnel designed the monitoring study and selected the sampling locations. This report describes the sampling effort and the results of that effort.

The study area covered a 17 mile (river miles) stretch of the Red River from just above the Town of Red River to downstream of the Red River State Fish Hatchery. Benthic macroinvertebrate samples were collected from 12 stations. The station furthermost upstream was approximately 7.5 miles upstream of the mine mill area, and the most downstream station was approximately 9 miles downstream of the mine mill area.

Above the mine mill area there appears to be a definite longitudinal trend of decreasing community quality. Significant decreases for several community parameters (i.e., number of macroinvertebrate taxa, density, Ephemeroptera, Plecoptera, Tricoptera [EPT] Index, EPT/Chironomidae abundance) and a significant increase in the Hilsenhoff Biotic Index (HBI) indicate decreases in community quality from the farthest upstream station to just above the mine operation. Futher decreases in some of these community parameters were observed at some stations adjacent to and just below the mine operation. Community quality in the Lower Red River area appeared to be of similar or better quality than stations above the mill area. Several community measures (e.g., number of taxa, density, EPT Index, EPT/Chironomidae abundance) in the Lower Red River were either similar to or significantly higher than at stations above the mill area.

1.0 INTRODUCTION

On 20 and 21 December 1995, Woodward-Clyde Consultants (Woodward-Clyde), at the request of Molycorp Inc., observed New Mexico Environmental Department (NMED) macroinvertebrate collection efforts from the Red River and assisted in field processing of samples. NMED personnel designed the monitoring study and selected the sampling locations. As part of a joint agreement with NMED, Molycorp Inc. provided funding for laboratory analysis of the macroinvertebrate samples and preparation of this data report. This report describes the sampling effort and the results of that effort.

2.0 METHODS

2.1 Study Area

The study area was the Red River near Questa, New Mexico. The Red River is located on the western slope of the Taos Range of the Sangre de Cristo Mountains, in Taos County in north-central New Mexico (Figure 1); the Red River is part of the Rio Grande drainage. State Highway 38 is located on the north side of the upper Red River and connects the Molycorp Questa molybdenum mine and mill area with the Town of Red River, six miles to the east, and the Town of Questa, three miles to the west. Benthic macroinvertebrates samples were collected from 12 stations located from just above the Town of Red River (approximately 7.5 miles upstream of the mine mill area) to downstream of U.S. Geological Survey (USGS) gaging station #08266820, below the Red River State Fish Hatchery (approximately 9 miles downstream of the mine mill area). The benthic macroinvertebrate sampling stations (Table 1) were selected by NMED personnel. Station locations are shown on Figure 2 (Red River upstream of State Road 522 [formly State Highway 3]) and Figure 3 (Red River downstream of State Road 522); five replicate samples were collected at each macroinvertebrate sampling station. These stations correspond to several Molycorp, Inc. and NMED (Woodward-Clyde 1995) water quality sampling locations. The 12 benthic macroinvertebrate sampling stations, starting upstream and moving downstream, are described below:

Station RRB-1, upper Red River. Station RRB-1 (Figure 2) is located above the Town of Red River, near a wooden bridge approximately 4,000 feet downstream of the confluence with Placer Creek and 800 feet upstream of the confluence with Bitter Creek. Five replicate samples were collected approximately 30 to 65 feet downstream of the wooden bridge. Elevation is approximately 8,670 feet.

Station RRB-3, upper Red River. Station RRB-3 (Figure 2) is located below the Town of Red River, approximately 1,500 feet downstream of the confluence with Pioneer Creek, opposite a "large road scar" along Highway 38, and a few yards downstream of a light pole stained "rust-orange." The station is approximately 1 mile downstream of RRB-1 at an elevation of approximately 8,630 feet. Five replicate samples were collected 100 to 150 feet downstream of the light pole.

Station RRB-5, upper Red River. Station RRB-5 (Figure 2) is located near Elephant Rock Campground, downstream of a "rock wall," approximately 2,200 feet downstream of the confluence with Haut'N'Taut Creek and 4,000 feet upstream of the confluence with Hanson Creek. The site is approximately 1.8 miles downstream of RRB-3 at an approximate elevation of 8,430 feet. Five replicate samples were collected within 60 to 100 feet downstream of the rock wall.

Station RRB-7, upper Red River. Station RRB-7 (Figure 2) is located approximately 2,500 feet upstream of the confluence with Sulphur Gulch, near the "winding" road sign, and just upstream of log retaining walls and the mine mill area. The site is approximately 2.4 miles downstream of station RRB-7 at an approximate elevation of 8,100 feet. Five replicate samples were taken approximately 40 to 110 feet downstream of the winding road sign.

Station RRB-10A, upper Red River. Station RRB-10A (Figure 2) is downstream of a bridge located just below the confluence with Columbine Creek. Columbine Creek is a major tributary to the Red River; it originates well to the south of the mine site and flows northward into the Red River. The station is approximately 2 miles downstream of RRB-7 at an approximate elevation of 7,840 feet. Five replicate macroinvertebrate samples were collected approximately 90 to 165 feet downstream of the bridge

Station RRB-11, upper Red River. Station RRB-11 (Figure 2) is downstream of a bridge where the Red River crosses to the south side of Highway 38 located approximately 2,500 feet downstream of the confluence with Columbine Creek. Five replicate samples were collected approximately 45 to 140 feet downstream of the bridge. The sample site is also about 4,000 feet upstream of the confluence with Goathill Gulch and is approximately 0.5 mile below RRB-10A. Elevation at the site is approximately 7,800 feet.

Station RRB-13, upper Red River. Station RRB-13 (Figure 2) is located approximately 2,000 feet upstream of Capulin Canyon/Capulin Creek, and a few yards upstream of a "culvert" and limestone drainages. Five replicate samples were collected approximately 264 to 327 feet upstream of the culvert. The station is approximately 1.6 miles downstream of station RRB-11 at an approximate elevation of 7,610 feet.

Station RRB-16, upper Red River. Station RRB-16 (Figure 2) is located just a few feet downstream of USGS Gaging Station #08265000 near the Questa Ranger Station. Five replicate samples were collected approximately 10 to 150 feet upstream of the concrete housing for the gaging station. This station is approximately 1.5 miles downstream of RRB-13 at an approximate elevation of 7,450 feet.

Station LRB-1, lower Red River. Station LRB-1 (Figure 3) is located downstream of a bridge where the Red River crosses to the west side of Highway 522. Five replicate macroinvertebrate samples were taken approximately 150 to 200 feet downstream of the Highway 522 Bridge crossing. This station is approximately 2.6 miles downstream of RRB-16 at an approximate elevation of 7,250 feet.

Station LRB-11A, lower Red River. Station LRB-11A (Figure 3) is located approximately 300 feet west of a fence, and about 1,800 feet downstream of tailings pond discharge outfall #002. Five replicate samples were collected approximately 20 to 100 feet upstream of a large pine tree. The station is approximately 0.9 miles downstream of LRB-1 at an approximate elevation of 7,200 feet.

Station LRB-16, lower Red River. Station LRB-16 (Figure 3) is located near the new cold and warm spring water collection boxes for the Red River State Fish Hatchery, and approximately 800 feet upstream from the Hatchery River Diversion. Five replicate samples were collected approximately 25 to 80 feet downstream of the concrete collection boxes. This station is approximately 1.6 miles downstream of station LRB-11A at an elevation of 7,100 feet.

Station LRB-21, lower Red River. Station LRB-21 (Figure 3) is located approximately 300 feet below USGS Gaging Station #0266820 and about 2,000 feet below the Red River State Fish Hatchery. Five replicate samples were collected approximately 75 to 140 feet downstream of the gaging station. This station is approximately 0.8 miles downstream of LRB-16 at an approximate elevation of 7,050 feet.

Sample stations ranged in elevation from approximately 8,670 feet at the farthest upstream station, RRB-1, to 7,050 feet at the farthest downstream station, LRB-21 (Figures 2 and 3). New Mexico Department of Fish and Game (NMDFG) (Jacobi et al. 1995) recently identified two Aquatic Ecoregions within the upper Rio Grande drainage of New Mexico. Aquatic Ecoregion 1 was defined as streams and rivers at elevations ranging from 7,400 feet to 10,520 feet. Aquatic Ecoregion 2 was defined as streams and rivers at elevations of 5,410 feet to 9,550 feet. Elevations in the study area (7,050 to 8,670 feet) are contained completely within the Aquatic Ecoregion 2 elevation range but are also in the overlapping boundary (7,400 to 9,550 feet) between Ecoregion 1 and 2. NMDFG also identified a group of outlier sites that differ from Ecoregion 1 or 2 designations in the upper Rio Grande drainage (Jacobi et al. 1995). NMDFG found the boundary between Aquatic Ecoregion 1 and 2 to be similar to the ecoregion boundary for the upper Rio Grande drainage as defined by Omernik (1986, 1987). The effort to classify ecoregions provides the initial stage for development of biological criteria ('biocriteria') or an index of biotic integrity for the Rio Grande River drainage. Such biological criteria are used by some states (Ohio EPA 1990, NYDEC 1990) as water quality standards for determining significant biological impairment. The approach taken to evaluate the status of the macroinvertebrate community in the investigated area of the Red River is described in following sections.

2.2 Field Collections

Benthic macroinvertebrates were collected using a Hess sampler (0.086 m^2 diameter) fitted with a 250-micron mesh net. Samples were taken from wadable (depth less than 1 meter) riffle areas of the river. Replicates were collected going from downstream to upstream locations to avoid debris and drifting macroinvertebrates due to the previous replicate collection and disturbance from walking in the stream. No systematic sampling plan (e.g., transect) was followed for collecting replicates. The NMED personnel selected replicate sampling locations.

Depending on the sample location, the substrate at a location ranged from gravel to small boulders. The Hess sampler was placed over the bottom substrate with the net facing downstream. The substrate was disturbed, and large rubble and small boulders were turned over and brushed off, with organisms knocked free being carried by the current into the net. Net contents were washed into a bucket. The contents of the bucket were washed into a sieve (500-micron mesh) to get rid of excess water. The mesh size of the net used on the Hess sampler is smaller than the standard size, 500-micron, normally used for collections but had been modified for a different study. Therefore, the loss of organisms less than 500-microns through the sieve to get rid of excess water was not considered important. The macroinvertebrates and debris in the sieve were placed into labeled sample jars for laboratory sorting and identification. Station samples: LRB-1, LRB-11A, LRB-16, LRB-21, RRB-11, RRB-13, and RRB-16 were preserved in 70 percent ethanol. Station samples: RRB-1, RRB-3, RRB-5, RRB-7 and RRB-10A were preserved in 70 percent isopropyl alcohol. Phloxine B stain was added to all samples.

Benthic macroinvertebrate samples were collected by personnel from NMED. Woodward-Clyde documented the sampling events and assisted NMED in processing the samples (i.e., sample processing, preservation and documentation). The same NMED person (Nick Medley) collected five Hess samples from riffle areas at all 12 sample locations. Woodward-Clyde's primary function was to observe the collection effort.

NMED did not collect water quality samples and did not record habitat parameters (e.g., depth, current, temperature, substrate type, degree of embeddedness, canopy cover) at the time of sampling. Water quality of seeps, surface water (includes the 12 benthic macroinvertebrate sampling station locations [Figures 2 and 3 with RR- and LR- designations]) and groundwater have been collected on the Red River in previous studies (Woodward-Clyde in prep).

General field notes indicate that stations RRB-7 and RRB-16 were highly embedded and station RRB-13 had a whitish precipitant coating the substrate; other stations may have been highly embedded but were not recorded in field notes. McKnight and Feder (1984) observed the periphyton and benthic macroinvertebrate communities to be more adversely affected where hydrous metal oxide precipitates covered rocks of the streambed than in upstream reach areas with low pH and higher water concentrations of aluminum, iron, and zinc.

2.3 Laboratory Processing

Aquatics Associates, Fort Collins, Colorado sorted the samples and identified and enumerated the macroinvertebrates (Appendix A). All macroinvertebrates were identified to the lowest positively identified taxonomic level (Plafkin et al. 1989). Keys used for identification are listed in Appendix A. The amount and type of the organic debris present in samples was qualitatively described. The description included approximate percent of the sample that was organic debris and a brief description of its constituents. A project voucher (or archival) set of macroinvertebrates was created from these samples.

All sample processing in the lab was performed by the same individual to ensure consistency in sorting and identification.

2.4 Data Analysis Techniques

2.4.1 <u>Measures of Community Structure</u>

Several benthic community measurements were calculated for each station. These metrics included ones suggested in the U.S. Environmental Protection Agency's *Rapid Bioassessment Protocols for Use in Streams and Rivers* (EPA 1989) including: taxa richness, Hilsenhoff Biotic Index (HBI), ratio of Scrapers/Filter Feeders, relative abundance of the orders

Ephemeroptera, Plecoptera, and Tricoptera (EPT) to the family Chironomidae in the order Diptera, percent contribution of dominant family, and EPT Index. Because no coarse particulate organic matter (CPOM) samples were collected, the ratio of shredders to total number of individuals (EPA 1989) was not calculated. In order to provide comparisons to historic data, faunal density (No./square meter), percent relative abundance, and species diversity were also calculated.

The following sections describe the metrics used in this report. There are currently no metrics that can establish a direct cause and effect relationship between changes in benthic community structure and metal input. Factors such as physical habitat (e.g., substrate type, degree of embeddedness, water flow, depth, elevation), natural chemical characteristics (e.g., low pH, low alkalinity waters from natural scars), organic inputs (e.g., sewage effluent, runoff from pastures), and inputs of roadway and urban contaminants (e.g., road salt, oil, sediment load), all of which are present at various points along the Red River, can impact the metrics in a similar fashion to metals. In addition, several factors related to sampling can affect the metrics (e.g., season of collection, type of sampler, size of mesh on the sampler and strainer, number of replicates). Therefore, when comparing results within this study or with those of other studies, these factors need to be taken into consideration when interpreting the various metrics.

There is a biotic condition index, BCI, that is designed to reflect the alkalinity and sulfate tolerance of lotic benthic macroinvertebrate communities but which was not included in this report. BCI values were calculated in historic studies of macroinvertebrate communities in the Red River (Smolka and Jacobi 1986; ENSR 1988). To calculate the BCI, tolerance quotients (TQs) for the taxon found in the samples, in addition to measurements of slope, substrate, alkalinity, and sulfate concentrations at the sample stations are needed. Winget and Mangum (1979) determined TQs for a number of invertebrate families and genera to alkalinity, sulfate concentration, slope, and substrate. However, NMED did not characterize the substrate type at the time of sampling or collect water quality samples. Sulfate and alkalinity characteristics could be obtained from historic water sampling at these stations (Woodward-Clyde 1995; 1996 in preparation). The water quality data have been collected during low flows, the time period the river is thought to be most influenced by ancillary flows. Sample stations could be revisited to determine substrate type but this may provide only an estimate of how the station existed at the time of sampling. Changes in water chemistry and scouring in the Red River with changes in flow may affect the amount of precipitate observed covering rocks and the amount of embeddedness.

2.4.1.1 Taxa Richness

Taxa richness is the total number of taxa present. Reduced number of taxa is typically observed in response to metals in laboratory and field investigations (Clements 1991). However, this parameter is not specific for metals alone. For example, increased sedimentation from urban development, acidic conditions from natural or man-made sources, and organic enrichment from sewage can result in a reduction of taxa richness. Generally, the number of taxa increases with increases in water quality and habitat diversity (note: some pristine headwater streams may be naturally unproductive and contain a limited number of taxa) (EPA 1989).

The study area covers a large change in elevation (difference of approximately 1,600 feet) Based on the stream continuum concept (Vannote et al. 1980), natural changes in community structure are expected to occur. Abundance and species richness of many invertebrates is expected to increase naturally from upstream to downstream in western streams (Ward 1986; Ward and Stanford 1991). Ward (1986) predicts that for mountain streams species richness of mayflies should increase from headwaters to midorder streams.

2.4.1.2 Percent Dominance

Percent contribution of the dominant family is the abundance of the numerically dominant family to the total sample population. A community dominated by relatively few families can indicate environmental stress (EPA 1989). In addition, certain chironomids (midges) have been reported to dominate streams with metal inputs (Clements 1991).

2.4.1.3 EPT Index

The EPT Index is the sum of the number of taxa in the orders Ephemeroptera (mayflies), Plecoptera (stoneflies), and Tricoptera (caddisflies) (Table 2). The EPT Index value summarizes the taxa richness within the insect groups that are generally considered sensitive to pollution (EPA 1989). Within the same stream order, substrate type, and ecoregion, the EPT Index generally decreases with decreasing water quality. Mayflies have been found to be very sensitive to metal inputs in both laboratory and field studies (Clements 1991) and are highly vulnerable to lowered pH (Bell 1971; Herricks and Cairns 1972; Gaufin 1973). Stoneflies have been found to be moderately sensitive to metal inputs. Some caddisflies have been observed to be relatively insensitive to metal inputs like the family Hydropsychidae (net-spinning caddisflies) which has been observed to increase in abundance in streams with metal inputs (Clements 1991). Therefore, it has been suggested by Kiffney and Clements (1994) that the EPT index in western streams may not be able to distinguish metal inputs especially at low or moderate levels.

2.4.1.4 Ratio of EPT/Chironomidae Abundances

Chironomids (midges in the order Diptera [Table 2]) as a group are considered to be more tolerant to pollutants than the EPT taxa (mayflies, stoneflies, and caddisflies [Table 2]). An even distribution among all four groups is considered to reflect a good biotic condition (EPA 1989). Midges, particularly midges of the subfamily Orthocladiinae, are very tolerant of metal inputs and abundances of greater than 95 percent midges have been observed at metal impacted sites (Clements 1991). Jacobi et al. (1995) found three assemblages of midges in the upper Rio Grande drainage, of which the Red River is a part: (1) a group of widespread species, (2) species typical of clean, cold water, and (3) warmer water midges. A comparison of midges to Jacobi et al.'s (1995) classification could not be done in this study because midges were not identified to the same level between studies and the sampling methods for midges were highly different.

2.4.1.5 Hilsenhoff Biotic Index

The HBI was developed to detect organic pollution; its usefulness for other pollutants is not certain (Clements 1991). Tolerance values are assigned to each taxa ranging from 0 for taxa very intolerant of organic pollution and 10 for taxa very tolerant of organic wastes. Tolerance values assigned to taxa were obtained from the literature (Appendix A). The HBI was calculated using the following equation:

$$HBI = \sum_{i=1}^{N} \frac{n_i \, t_i}{N}$$

where:

n_i	=	number of individuals within a taxon
t_i	=	tolerance value of a taxon
N	=	total number of organisms in the sample.

Theoretically, low index values (higher proportion of the community is composed of intolerant species) indicate good water quality. Its usefulness in reflecting tolerance to metal inputs is not certain. The sensitivity of some groups of organisms to metal inputs has been reported in the literature (Clements 1991); a discussion of these organisms will be presented in section 3.1 Benthic Macroinvertebrate Taxa and Density.

2.4.1.6 Species Diversity

The index of species diversity used was the Shannon-Wiener index (H') (Krebs 1978; EPA 1989) which is consistent with methods used historically (ENSR 1988). The index provides a measure of the distribution of the number of individuals among the different taxa.

$$Shannon - Wiener\ Index\,(H') = \sum_{i=1}^{s} \left(\frac{n_i}{N}\right)\left(\log_2 \frac{n_i}{N}\right)$$

where:

n_i	=	total number of individuals in the ith taxon,
N	=	total number of individuals in the sample,
s	=	total number of taxa.

Theoretically, high index values (high diversity) indicate good water quality; however, low index values may be caused by factors other than water quality such as water flow (i.e., flood or drought) and other habitat quality factors (e.g., degree of embeddedness, type of substrate).

This index is not always a useful indicator of metal enrichment because metals often decrease abundance of all taxa (Clements 1991). Reduced species diversity has been observed in some streams receiving metal inputs (Clements 1991).

2.4.1.7 Ratio of Scraper/Filter Feeder Abundance

The term scraper and filter feeder refers to feeding strategy. Scrapers scrape food (i.e., algae) off surfaces (e.g., rocks) to obtain food and filter feeders filter out or screen out food particles (i.e., detritus) from the water column. The relative abundance of scrapers and filter feeders in the riffle/run habitat is an indication of the periphyton community composition, availability of suspended fine particulate organic material, and availability of attachment sites for filter feeders (EPA 1989). Because filter feeders were not present in some replicates, the ratio of scrapers/filter feeders could not be determined for individual replicates (i.e., division by 0). Therefore, the density of scrapers among stations and density of filter feeders among stations were evaluated individually instead of the ratio for individual replicates. An average scraper/filter feeder abundance value for each station was determined by dividing the average abundance of scrapers at a station by the average abundance of filter feeders.

In stream periphyton communities, there is a general trend of decreasing abundance of diatoms with a concomitant increase in filamentous green or blue-green algae as metal concentrations increase (Clements 1991). Scrapers tend to increase with increased abundance of diatoms and decrease as filamentous algae and aquatic mosses increase. Whereas filamentous algae and moss provide attachment sites for filter collectors. Filter feeders typically increase in density moving downstream as the concentration of organic material in the water column increases, whereas shredders tend to proportionally decrease downstream as the concentration of large organic debris (e.g., leaves, twigs) decreases.

2.4.2 Statistical Analyses

There are relatively few state agencies that have developed region-wide or ecoregion biotic indices by which the status of a macroinvertebrate community can be evaluated. Therefore, most evaluations of the status of a macroinvertebrate community rely on a reference station. NMED did not designate any of the sampling locations as a control for the other stations. In the absence of a control station, community measurements were statistically compared to one another using the nonparametric Kruskal-Wallis analysis of variance (ANOVA) test and multiple comparison test (Conover 1980) to determine if significant changes (α=0.05) in the benthic community structure occur moving from upstream to downstream sites (Appendix B).

3.0 RESULTS

Values for the various metrics described in the Data Analysis Techniques section (2.4.1) are presented in Tables 3 through 12 and Figures 4 through 12. Tables provide the value derived for each replicate, the station mean and standard deviation. In addition, at the bottom of each table the results of the nonparametric multiple comparison tests are shown using a line diagram and the sum of ranks for a station (i.e., $R_i = \Sigma R[X_{ij}]$ where $R[X_{ij}]$ is the rank assigned to sampling station i for replicates j=1 to 5). Stations with lines that do not not overlap are significantly different ($P \leq 0.05$). Except where indicated, mean values are plotted using bar diagrams with the results of the nonparametric multiple comparison tests indicated using letters. Bars with letters that do not match are significantly different. For example, a bar with a "c" over it would be significantly different from a bar with a "b" but not one with a "b,c" designation.

Interpretation of the metric data presented in this report and comparisons to other studies is limited because of the lack of information collected by NMED on key parameters including:

- Substrate type
- Degree of embeddedness
- Water depth
- Water flow
- Water temperature.

For example, decreases in community quality can be related to physical habitat quality (e.g., degree of embeddedness, metal oxide precipitates) rather than be a result of metal or low pH toxicity.

3.1 Benthic Macroinvertebrate Number of Taxa and Density

A total of 79 benthic macroinvertebrate taxa were identified from all 12 stations on the Red River (Table 2, Appendix C). The total number of taxa present at each station ranged from 16 at station RRB-16 to 48 at station RRB-1 (Table 3 and Figure 4). Number of taxa in a given replicate was lower than the total number of taxa for a station. For example, the number of taxa identified in replicates at station RRB-5 ranged from 21 to 25, whereas, a total of 34 taxa were found in all five replicates at the station.

The number of taxa collected per replicate was significantly ($P<0.05$) lower at all stations downstream of the uppermost station, RRB-1, above the town of Red River (Table 3 and Figure 4). The number of taxa collected per replicate declined moving downstream from station RRB-1 for the next five stations (RRB-3 to RRB-11); significant declines in number of taxa were observed at stations above the influence of any mine activities. Number of taxa per replicate at stations RRB-11, RRB-13, and RRB-16 were significantly lower ($P<0.05$) than stations upstream or downstream. These stations had the lowest number of taxa collected per replicate. The number of taxa collected per replicate significantly ($P<0.05$) increased at stations downstream from station RRB-16. The number of taxa at the two stations farthest downstream (LRB-16 and LRB-21) were not significantly different ($P>0.05$) from station RRB-3 and RRB-5 which are below the Town of Red River but above the influence of the mine. The underside of rocks provides habitat for many benthic macroinvertebrates, and the high degree of embeddedness observed at some middle stations will restrict habitat diversity and availability. McKnight and Feder (1984) observed the periphyton and benthic macroinvertebrate communities to be more adversely affected where hydrous metal oxide precipitates covered rocks of the streambed than in upstream reach areas with low pH and higher water concentrations of aluminum, iron, and zinc.

The highest mean macroinvertebrate density (10,121 organisms/m^2) was found at the most upstream station, RRB-1, located just above the town of Red River (Table 4 and Figure 5). Except for the most downstream station, LRB-21, macroinvertebrate density was significantly lower at all stations downstream of RRB-1. At the next station downstream of RRB-1, RRB-3, located just below the town of Red River, densities of macroinvertebrates significantly declined to a mean density of 2,616 organisms/m^2. Except for four stations (RRB-7, RRB-11, RRB-13 and RRB-16), macroinvertebrate densities were either not significantly different or had significantly higher densities than station RRB-3. The lowest macroinvertebrate densities occurred at stations RRB-11, RRB-13, and RRB-16 (319 to 600 organisms/m^2). The underside of rocks provides habitat for many benthic macroinvertebrates and the high degree of embeddedness observed at some middle stations will restrict habitat diversity and availability.

3.2 Community Parameters

3.2.1 Percent Dominance

In the middle and lower reaches of the study area, the dominance by a single family (around 60 percent) is significantly ($P<0.05$) higher than in the upper reach (approximately 30 percent) (Table 5 and Figure 6). The mayfly, *Baetis tricaudatus*, dominated the benthic macroinvertebrate community in the lower reach, LRB-11A to LRB-21 (Figure 6 and Appendix C). At the midreach station, RRB-11, the community was dominated by the midge *Paraphaenocladius* sp. At the midreach station, RRB-16, replicates were highly dominated by either a mayfly (*Rhithrogena* sp.) or a midge (*Paraphaenocladius* sp.). At station LRB-1 replicates were also highly dominated by either a mayfly (*Baetis tricaudatus*) or a midge (*Paraphaenocladius* sp.). Whereas at upstream station, RRB-1, the stonefly families of Nemouridae (spring stoneflies) and Taeniopterygidae (winter stoneflies) each comprise approximately 30 to 40 percent of the macrobenthic community. Dominant families in upstream stations RRB-3 and RRB-5 consist of the stonefly family Capniidae (small winter stoneflies) and the true fly family Chironomidae (midges). Station RRB-10A was dominated by the caddisfly family, Hydropsychidae (net-spinning caddisflies), primarily *Arctopsyche grandis*, and the mayfly family, Emphemerellidae (species *Drunella doddsi* and *D. grandis*).

The mayflies, *Baetis tricaudatus* and *Rhithrogena* spp. belong to a group of widespread macroinvertebrates in the upper Rio Grande drainage of New Mexico as identified by Jacobi et al. (1995). Jacobi et al. (1995) found organisms in this group to have a generally high relative abundance at many sites and to be intermediate in tolerance to environmental degradation. In Rocky Mountain streams, *Baetis tricaudatus* and *Rhithrogena* spp. have been observed to be very sensitive to metal inputs (Kiffney and Clements 1994; Clements and

Kiffney 1995; Clements 1991). No midges of the genus *Paraphaenocladius* sp. were recorded in the Jacobi et al. (1995) investigation and no mention of its tolerance to metals was found. However, midges have been found to be generally less sensitive to metal inputs than mayflies (Clements 1991).

The following taxa were found at all stations: mayflies *Baetis tricaudatus* and *Rhithrogena* sp.; stonefly *Podmosta/Prostoia* sp. (note: the genus could not be distinguished because of lifestage present in the sample); caddisflies *Brachycentrus americanus and Arctopsyche grandis*; the midge *Paraphaenocladius* sp.; and the true fly *Dicranota* sp. (Appendix C). The mayfly *Drunella grandis* was found at all stations except RRB-1. *Drunella doddsi*, *Cricotopus/Orthocladium* sp., and *Diamesa* sp. were found at most stations except RRB-11, RRB-13, and RRB-16. *Doddsia occidentalis* was found at all stations except RRB-13, RRB-16, and LRB-16. Most taxa occurred rarely or only at a few stations. In general, there was a shift in the community composition from stoneflies at the most upstream stations to mayflies at the downstream stations (Table 6 and Appendix D). Caddisflies composed a larger portion of the community structure in the middle stations. The underside of rocks provides habitat for many benthic macroinvertebrates and the high degree of embeddedness observed at some middle stations will restrict habitat diversity and availability.

Several of these species belong to a group of widespread macroinvertebrates in the upper Rio Grande drainage of New Mexico as identified by Jacobi et al. (1995) (i.e., *Baetis tricaudatus, Rhithrogena* sp., *Brachycentrus americanus, Drunella grandis, Drunella doddsi, Dicranota* sp.). The caddisfly, *Arctopsyche grandis*, belongs to a macroinvertebrate assemblage found in high elevation streams with low embeddedness, and they are generally less tolerant of perturbation (Jacobi et al. 1995). Some studies have observed increases in the net-spinning caddisflies (family Hydropsychidae), to which *Arctopsyche grandis* belongs, in metal impacted locations (Clements 1991). Increases in abundance of net-spinning were observed at stations above the mine mill area (RRB-5 and RRB-7) and at RRB-10A, declined in the middle reaches (RRB-11 to RRB-16), and proceeded to increase again in the lower reaches of the study area (LRB-1 to LRB-21) (Appendix E). The net-spinning caddisflies are filter-feeders and abundance would be expected to increase moving from lower to midorder streams; Ward (1986) found filter-feeders to be in low abundance in headwater streams.

3.2.2 EPT Taxa

The most upstream and farthest downstream stations, RRB-1 and LRB-21, had significantly ($P \leq 0.05$) more EPT (stonefly, mayfly, caddisfly) taxa (mean EPT index value of 18 and 15) present than the other river stations (Table 7 and Figure 7). The number of EPT taxa declined from a mean of 18 per replicate at station RRB-1 to a mean of 5 per replicate at downstream station RRB-16 and then increased to 15 taxa at LRB-21. A significant decline in EPT taxa was observed above the influence of any mine activities. At some middle stations habitat diversity and availability could be restricted because of the high degree of embeddedness observed and precipitants coating rocks. Although the EPT value was not significantly different at stations RRB-1 and LRB-21, there was a community shift. Stoneflies (order Plecoptera) predominated at RRB-1 whereas mayflies (order Ephmeroptera) predominated at station LRB-21 (Table 6). In general mayflies have been found to be more sensitive to metal inputs than stoneflies or caddisflies (order Tricoptera) (Clements 1991).

3.2.3 EPT/Chironomidae Abundance

EPT abundance was 19 times higher than midge abundance at station RRB-1 (Table 8), the most upstream station. Except for station RRB-13 from the middle reach of the study area and the two most downstream stations (LRB-16 and LRB-21), the abundance of EPT in relationship to chironomid abundance declined significantly ($P<0.05$) from that of the most upstream station (Table 8 and Figure 8). However, in comparison to town of Red River station, RRB-3, except for station RRB-11, there was no significant difference ($P>0.05$) in abundance of EPT to midge abundance in downstream stations. Station RRB-11 had the lowest ratio, 0.7 EPT to 1 chironomid. While the ratios did not differ significantly at most stations changes in overall abundance of all species was observed and is described in section 3.1.

3.2.4 Hilsenhoff Biotic Index

The mean HBI value at the most upstream station, RRB-1, was 2.72 (Table 9). This indicates that the benthic macroinvertebrate community at this location is composed primarily of relatively intolerant individuals. HBI values increase moving in a downstream direction from

RRB-1 (Table 9 and Figure 9) indicating a shift to more tolerant individuals composing the macroinvertebrate community (Table 9 and Figure 9). Except for station RRB-11, the HBI index was not found to be significantly different at stations RRB-5 to RRB-16 from that of station RRB-3 at the town of Red River.

3.2.5 Species Diversity

Mean Shannon-Wiener species diversity (H') at the most upstream station, RRB-1, was 2.80 (Table 10). Macroinvertebrate diversity was significantly higher ($P<0.05$) at downstream stations RRB-3 to RRB-10A (Table 10 and Figure 10) but was significantly lower at downstream stations in the middle and lower reaches of the study area. Mean diversity at stations RRB-3 to RRB-10A ranged from 3.16 to 3.35 (Table 10). The lower diversity at station RRB-1 is due in part to the low distribution among taxa at this station, approximately 60 to 80 percent of the individuals collected at station RRB-1 belonged to three stonefly taxa (*Podmosta/Prostoia* sp., *Doddsia occidentalis*, and unidentified Capniids). Diversity in the middle and lower reaches of the study area is due to the dominance of the mayfly *Baetis tricadutus* in the lower reaches and the mayfly *Rhithrogena* sp. and the midge *Paraphaenocladius* sp. in the middle reaches (see the description of dominant species in section 3.2.1). Species diversity values observed in December 1995 samples were slightly higher or similar to values calculated for Red River stations by ENSR (1988).

3.2.6 Ratio of Scraper/Filter Feeder Abundance

The ratio of scrapers to filter feeders could not be calculated for each replicate because of the lack of filter feeders in some replicates. Therefore, the community composition of scrapers and filter feeders was assessed separately at the stations (Tables 11 and 12 and Figure 11). However, a scraper/filter feeder ratio was calculated by comparing the mean number of scrapers at a station to the mean number of filter feeders (Table 12 and Figure 12).

Scraper composition of the benthic community was significantly higher ($P<0.05$) in the upper Red River than in the lower Red River (Table 11 and Figure 11). In comparison, filter feeders made up relatively little of the benthic community at the most upstream station, RRB-1, while making up a larger portion of the benthic community at downstream stations. Overall, filter feeders made up the largest portion of the benthic community in the middle portion of the study area (Figure 11). A major change in community composition from scrapers to filter feeders occurred between the most upstream station RRB-1 and the next downstream station, RRB-3 (Figure 12).

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APPENDIX A
SURVEY RESULTS - AQUATICS ASSOCIATES

Aquatics Associates

749 S. Lemay, Suite A3-125 • Fort Collins, Colorado 80524 • (970) 493-2626

22 February 1996

Donna M. Randall
Woodward-Clyde Consultants
Stanford Place 3, Suite 1000
4582 South Ulster Street Parkway
Denver, Colorado 80237

Subject: Project No. 23505 Task 800
Macroinvertebrate Sample Analysis

Dear Ms. Randall:

Enclosed please find results of benthic macroinvertebrate sample analysis (identification and enumeration) for samples collected from the Red River near the Molycorp Questa Mine. The complete data package is enclosed including taxonomic data for the 60 samples collected in December 1995, calculated benthic community parameters for the 12 stations, project references, and other information as outlined in the Scope of Work. Data are provided in both hard copy and disk form (Excel spreadsheet files). A second disk copy was also mailed under separate cover.

A copy of the data sheet corresponding to the voucher collection is enclosed in the data package. Let us know when you would like to arrange to pick up the actual voucher collection, empty sample containers, and Chain of Custody Record.

Let me know if you have any questions.

Sincerely,

Tami L. Schneck
Principal/Aquatic Biologist

Enclosures

Note: Density calculations made using 0.1 m^2 instead of 0.086 m2 which is the area for the sampler stated in Wilco catelog where sampler was purchased. (Note added by D.M.R. 8/8/96)

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Red River Master Species List
December 1995

TURBELLARIA					
NEMATODA					
OLIGOCHAETA					
		Enchytraeidae			
		Naididae			
HYDRACARINA					
EPHEMEROPTERA					
	Ameletidae				
		Ameletus sp.			
	Baetidae				
		Baetis tricaudatus			
	Ephemerellidae				
		Drunella doddsi			
		Drunella grandis			
		Ephemerella infrequens			
	Heptageniidae				
		Epeorus longimanus			
		Rhithrogena robusta			
		Rhithrogena sp.			
	Leptophlebiidae				
		Paraleptophlebia sp.			
PLECOPTERA					
	Capniidae				
		Eucapnopsis brevicauda			
	Leuctridae				
		Paraleuctra sp.			
	Taeniopterygidae				
		Doddsia occidentalis			
		Taenionema sp.			
	Nemouridae				
		Podmosta/Prostoia sp.			
		Zapada cinctipes			
		Zapada sp.			
	Pteronarcyidae				
		Pteronarcella badia			
	Chloroperlidae				
		Paraperla frontalis			
		Plumiperla diversa			
		Sweltsa sp.			
	Perlodidae				
		Isoperla sp.			
		Megarcys signata			
	Perlidae				
		Hesperoperla pacifica			

TRICHOPTERA					
	Brachycentridae				
		Brachycentrus americanus			
	Glossosomatidae				
		Culoptila sp.			
		Glossosoma sp.			
	Hydropsychidae				
		Arctopsyche grandis			
		Hydropsyche sp.			
	Hydroptilidae				
		Ochrotrichia sp.			
	Lepidostomatidae				
		Lepidostoma sp.			
	Limnephilidae				
		Hesperophylax sp.			
		Oligophlebodes sp.			
	Rhyacophilidae				
		Rhyacophila brunnea			
		Rhyacophila coloradensis			
		Rhyacophila pellisa			
		Rhyacophila sp. A			
		(could be immature R. coloradensis)			
COLEOPTERA					
	Dytiscidae				
		Liodessus affinis			
	Elmidae				
		Heterlimnius corpulentus			
		Narpus concolor			
		Optioservus sp.			

Red River Master Species List
December 1995

DIPTERA						
	Athericidae					
		Atherix pachypus				
	Blephariceridae					
		Bibiocephala grandis				
	Ceratopogonidae					
	Chironomidae					
		Brillia sp.				
		Cricotopus/Orthocladius sp.				
		Diamesa sp.				
		Eukiefferiella sp.				
		Heleniella sp.				
		Hydrobaenus sp.				
		Micropsectra sp.				
		Orthocladius (Symposiocladius) lignicola				
		Pagastia sp.				
		Parametriocnemus sp.				
		Paraphaenocladius sp.				
		Parorthocladius sp.				
		Phaenopsectra sp.				
		Polypedilum sp.				
		Pseudodiamesa sp.				
		Rheocricotopus sp.				
		Tvetenia sp.				
	Empididae					
		Chelifera sp.				
		Oreogeton sp.				
	Psychodidae					
		Pericoma/Telmatoscopus sp.				
	Simuliidae					
		Prosimulium sp.				
		Simulium sp.				
	Tipulidae					
		Dicranota sp.				
		Hesperoconopa sp.				
		Hexatoma sp.				
		Pedicia sp.				
		Tipula sp.				

Red River Voucher Collection
December 1995

Taxon	Quantity	Station		Specimen #
TURBELLARIA	3	LR-21 Rep 1	vial	1
NEMATODA	3	LR-16 Rep 2	vial	2
OLIGOCHAETA				
Enchytraeidae	1	RR-3 Rep 1	slide	3
Naididae	2	RR-1 Rep 3	slide	4
Enchytraeidae	1	RR-1 Rep 4	slide	5
HYDRACARINA	2	RR-10A Rep 1	vial	6
EPHEMEROPTERA				
Ameletidae				
Ameletus sp.	1	RR-10A Rep 2	vial	7
Baetidae				
Baetis tricaudatus	6	LR-21 Rep 1	vial	8
Ephemerellidae				
Drunella doddsi	1	LR-21 Rep 1	vial	9
Drunella grandis	1	LR-21 Rep 1	vial	10
Ephemerella infrequens	2	RR-1 Rep 2 & 5	vial	11
Heptageniidae				
Epeorus longimanus	1	LR-21 Rep 3	vial	12
Rhithrogena robusta	2	RR-10A Rep 2	vial	13
Rhithrogena robusta	1	RR-1 Rep 3	vial	13
Rhithrogena sp.	3	LR-21 Rep 1	vial	14
Leptophlebiidae				
Paraleptophlebia sp.	3	LR-21 Rep 3	vial	15
PLECOPTERA				
Capniidae	4	LR-21 Rep 2	vial	16
Eucapnopsis brevicauda	1	LR-16 Rep 1	vial	17
Eucapnopsis brevicauda	2	RR-1 Rep 5	vial	17
Leuctridae				
Paraleuctra sp.	1	RR-11 Rep 1	vial	18
Paraleuctra sp.	2	RR-1 Rep 2	vial	18
Taeniopterygidae				
Doddsia occidentalis	2	LR-21 Rep 2	vial	19
Taenionema sp.	3	RR-1 Rep 1	vial	20
Nemouridae				
Podmosta/Prostoia sp.	5	RR-5 Rep 1	vial	21
Zapada cinctipes	1	LR-21 Rep 1	vial	22
Zapada sp.	1	RR-5 Rep 1	vial	23
Pteronarcyidae				
Pteronarcella badia	1	RR-13 Rep 2	vial	24
Chloroperlidae				
Paraperla frontalis	2	LR-16 Rep 1	vial	25
Plumiperla diversa	2	LR-21 Rep 1	vial	26
Sweltsa sp.	1	RR-5 Rep 1	vial	27
Perlodidae				
Isoperla sp.	1	RR-1 Rep 1	vial	28
Isoperla sp.	2	LR-21 Rep 4	vial	28
Megarcys signata	1	RR-5 Rep 1	vial	29
Perlodidae (prob. Isoperla)	2	RR-1 Rep 3	vial	30
Perlidae				
Hesperoperla pacifica	1	RR-10A Rep 2	vial	31

a:\voucher

Red River Voucher Collection
December 1995

Taxon			Quantity	Station		Specimen #
TRICHOPTERA						
	Brachycentridae					
		Brachycentrus americanus	1	RR-13 Rep 2	vial	32
	Glossosomatidae					
		Culoptila sp.	1	LR-21 Rep 4	vial	33
		Glossosoma sp.	1	RR-3 Rep 4	vial	34
	Hydropsychidae					
		Arctopsyche grandis	3	RR-11 Rep 2	vial	35
		Hydropsyche sp.	3	LR-21 Rep 1	vial	36
	Hydroptilidae					
		Ochrotrichia sp.	1	LR-21 Rep 2	vial	37
	Lepidostomatidae					
		Lepidostoma sp.	1	LR-21 Rep 1	vial	38
		Lepidostoma sp.	1	RR-1 Rep 4	vial	38
	Limnephilidae		1	RR-3 Rep 2	vial	39
		Hesperophylax sp.	1	RR-3 Rep 2	vial	40
		Oligophlebodes sp.	1	RR-5 Rep 2	vial	41
	Rhyacophilidae					
		Rhyacophila brunnea	1	RR-10A Rep 4	vial	42
		Rhyacophila coloradensis	1	LR-11A Rep 3	vial	43
		Rhyacophila pellisa	2	RR-10A Rep 1	vial	44
		Rhyacophila sp. A	2	LR-21 Rep 1	vial	45
		(could be immature R. coloradensis)				
COLEOPTERA						
	Dytiscidae					
		Liodessus affinis	1	LR-16 Rep 5	vial	46
	Elmidae					
		Heterlimnius corpulentus	1	RR-5 Rep 2	vial	47
		Heterlimnius corpulentus	4	RR-1 Rep 2	vial	47
		Narpus concolor	1	RR-3 Rep1	vial	48
		Optioservus sp.	1	LR-21 Rep 1	vial	49

Red River Voucher Collection
December 1995

Taxon	Quantity	Station		Specimen #
DIPTERA				
Athericidae				
Atherix pachypus	2	RR-13 Rep 2	vial	50
Blephariceridae				
Bibiocephala grandis	3	RR-1 Rep 2	vial	51
Ceratopogonidae	1	RR-3 Rep 3	vial	52
Chironomidae				
Brillia sp.	1	LR-1 Rep 1	vial	53
Brillia sp.	2	RR-1 Rep 4	slide	53
Cricotopus/Orthocladius sp.	3	LR-16 Rep 1	slide	54
Diamesa sp.	3	LR-21 Rep 1	vial	55
Eukiefferiella sp.	3	LR-16 Rep 2	slide	56
Eukiefferiella sp.	1	LR-16 Rep 4	slide	56
Heleniella sp.	1	LR-16 Rep 4	slide	57
Heleniella sp.	1	RR-1 Rep 5	slide	57
Hydrobaenus sp.	2	RR-10A Rep 2	slide	58
Micropsectra sp.	1	RR-1 Rep 1	slide	59
Micropsectra sp.	1	RR-1 Rep 3	slide	59
Micropsectra sp.	2	RR-1 Rep 4	slide	59
Micropsectra sp.	3	RR-1 Rep 2	vial	59
Orthocladius (Symposiocladius) lignicola	2	RR-7 Rep 1	vial	60
Pagastia sp.	2	LR-21 Rep 1	vial	61
Pagastia sp.	2	RR-1 Rep 4	slide	61
Parametriocnemus sp.	3	LR-21 Rep 3	slide	62
Paraphaenocladius sp.	2	RR-13 Rep 1	slide	63
Paraphaenocladius sp.	5	LR-1 Rep 2	vial	63
Parorthocladius sp.	3	RR-5 Rep 2	slide	64
Phaenopsectra sp.	1	LR-16 Rep 5	slide	65
Polypedilum sp.	1	RR-3 Rep 2	slide	66
Polypedilum sp.	1	RR-3 Rep 3	vial	66
Pseudodiamesa sp.	1	LR-21 Rep 1	slide	67
Rheocricotopus sp.	1	LR-21 Rep 1	vial	68
Tvetenia sp.	1	LR-21 Rep 1	vial	69
Tvetenia sp.	1	RR-1 Rep 3	slide	69
Tvetenia sp.	3	RR-1 Rep 4	slide	69
Empididae				
Chelifera sp.	1	LR-1 Rep 1	vial	70
Oreogeton sp.	1	RR-5 Rep 3	vial	71
Psychodidae				
Pericoma/Telmatoscopus sp.	1	RR-5 Rep 2	vial	72
Pericoma/Telmatoscopus sp.	3	RR-1 Rep 5	vial	72
Simuliidae				
Prosimulium sp.	1	RR-11 Rep 4	vial	73
Simulium sp.	1	LR-21 Rep 1	vial	74
Tipulidae				
Dicranota sp.	2	LR-16 Rep 2	vial	75
Hesperoconopa sp.	2	LR-16 Rep 4	vial	76
Hexatoma sp.	2	LR-21 Rep 1	vial	77
Pedicia sp.	1	LR-1 Rep 3	vial	78
Tipula sp.	1	RR-7 Rep 1	vial	79

Red River RBP Values

Taxon	tolerance value		feeding group		Chironomids
TURBELLARIA	10				
NEMATODA	10				
OLIGOCHAETA	10				
HYDRACARINA	10				
EPHEMEROPTERA					
Ameletus sp.	4		Sc		
Baetis tricaudatus	7				
Drunella doddsi	0				
Drunella grandis	2		Sc		
Epeorus longimanus	2				
Ephemerella infrequens	4		Sh		
Paraleptophlebia sp.	2				
Rhithrogena robusta	2				
Rhithrogena sp.	2				
PLECOPTERA					
Capniidae	3		Sh		
Chloroperlidae	2				
Doddsia occidentalis	2		Sc		
Eucapnopsis brevicauda	2		Sh		
Hesperoperla pacifica	2				
Isoperla sp.	4				
Megarcys signata	2				
Paraleuctra sp.	2		Sh		
Paraperla frontalis	2				
Perlodidae	4				
Plumiperla diversa	2				
Podmosta/Prostoia sp.	2		Sh		
Pteronarcella badia	2		Sh		
Sweltsa sp.	2				
Taenionema sp.	4		Sh		
Zapada cinctipes	1		Sh		
Zapada sp.	1		Sh		
TRICHOPTERA					
Arctopsyche grandis	2		F		
Brachycentrus americanus	2		F		
Culoptila sp.	3		Sc		
Glossosoma sp.	2		Sc		
Hesperophylax sp.	10		Sh		
Hydropsyche sp.	10		F		
Lepidostoma sp.	2		Sh		
Limnephilidae	10				
Ochrotrichia sp.	10				
Oligophlebodes sp.	2		Sc		
Rhyacophila brunnea	2				
Rhyacophila coloradensis	2				
Rhyacophila pellisa	2				
Rhyacophila sp. A	2				
COLEOPTERA					
Heterlimnius corpulentus	10				
Liodessus affinis	7				
Narpus concolor	10				
Optioservus sp.	10		Sc		

Red River RBP Values

		tolerance value		feeding group		Chironomids
Taxon						
DIPTERA						
	Atherix pachypus	2				
	Bibiocephala grandis	0		Sc		
	Brillia sp.	10		Sh		X
	Ceratopogonidae	10				
	Chelifera sp.	10				
	Cricotopus/Orthocladius sp.	10				X
	Diamesa sp.	10				X
	Dicranota sp.	2				
	Eukiefferiella sp.	10				X
	Heleniella sp.	10				X
	Hesperoconopa sp.	7				
	Hexatoma sp.	3				
	Hydrobaenus sp.	10				X
	Micropsectra sp.	10				X
	Oreogeton sp.	10				
	Orthocladius (Symposiocladius) lignicola	10				X
	Pagastia sp.	10				X
	Parametriocnemus sp.	10				X
	Paraphaenocladius sp.	10				X
	Parorthocladius sp.	10				X
	Pedicia sp.	10				
	Pericoma/Telmatoscopus sp.	3				
	Phaenopsectra sp.	10		Sc		X
	Polypedilum sp.	10		Sh		X
	Prosimulium sp.	10		F		
	Pseudodiamesa sp.	10				X
	Rheocricotopus sp.	10				X
	Simulium sp.	10		F		
	Tipula sp.	3		Sh		
	Tipulidae	7				
	Tvetenia sp.	10				X

Note: amount of overall debris within jar not recorded. * Some jars were large because of jar size anchor ice in sample -- does not reflect size of sample necessarily. Donna

Organic Debris
Red River Samples, December 1995

Station	Sample Date	Organic Material %	Organic Material Composition	Inorganic %	Inorganic Composition	Container Size (oz)
RR-1 Rep 1	12/21/95	99%	leaves, algae, pine needles, debris	1%	sand	8
RR-1 Rep 2	"	95%	leaves, pine needles, algae	5%	sand, fine gravel	32
RR-1 Rep 3	"	95%	leaves, twigs, pine needles, moss, debris	5%	sand	8
RR-1 Rep 4	"	90%	leaves, twigs, pine needles, moss	10%	sand	32
RR-1 Rep 5	"	70%	leaves, woody debris, pine needles	30%	sand, fine gravel	32
RR-3 Rep 1	12/21/95	95%	leaves, moss, twigs, debris	5%	sand, fine & coarse gravel	32
RR-3 Rep 2	"	90%	leaves, moss, debris	10%	sand, fine gravel	32
RR-3 Rep 3	"	99%	leaves, moss, catkins	1%	sand, fine & coarse gravel	8
RR-3 Rep 4	"	70%	leaves, twigs, grass, moss	30%	sand, fine & coarse gravel	32
RR-3 Rep 5	"	70%	leaves, twigs, pine needles & cones, moss	30%	sand	32
RR-5 Rep 1	12/21/95	98%	leaves, twigs, pine needles, moss	2%	sand	16
RR-5 Rep 2	"	98%	leaves, twigs, roots, moss	2%	sand	16
RR-5 Rep 3	"	90%	pine needles, leaves, twigs, woody debris	10%	sand	16
RR-5 Rep 4	"	90%	leaves, pine needles, bark	10%	sand	16
RR-5 Rep 5	"	99%	leaves, pine cone, woody debris, moss	1%	sand	8
RR-7 Rep 1	12/21/95	98%	twigs, roots, leaves, debris	2%	sand	16
RR-7 Rep 2	"	1%	algae, bark, moss, twigs, debris	99%	sand	16
RR-7 Rep 3	"	90%	algae, twigs, pine needles, debris	10%	sand	16
RR-7 Rep 4	"	90%	algae, leaf, twigs, debris	10%	sand	16
RR-7 Rep 5	"	10%	moss, twigs	90%	sand, fine gravel	16
RR-10A Rep 1	12/21/95	10%	twigs, leaves, debris, pine needles	90%	sand, fine gravel	32
RR-10A Rep 2	"	99%	leaves, twigs, pine needles	1%	sand	32
RR-10A Rep 3	"	20%	leaves, twigs, debris, pine needles	80%	sand, fine gravel	32
RR-10A Rep 4	"	60%	leaves, pine cone & needles, twigs, moss	40%	sand	32
RR-10A Rep 5	"	99%	leaves, twigs, pine needles	1%	sand	16
RR-11 Rep 1	12/21/95	70%	leaves, bark, pine needles, catkin, debris	30%	sand, fine gravel	8
RR-11 Rep 2	"	98%	leaves, pine needles, algae, woody debris	2%	sand	8
RR-11 Rep 3	"	75%	leaves, twigs, pine needles, moss, grasses	25%	sand, fine gravel	16
RR-11 Rep 4	"	80%	leaves, twigs, debris	20%	sand	16
RR-11 Rep 5	"	70%	leaves, moss, twigs, pine needles	30%	sand, fine gravel	16
RR-13 Rep 1	12/21/95	5%	leaves, detritus, pine needles	95%	sand, fine gravel	8
RR-13 Rep 2	"	40%	leaves, twigs, roots, seeds, bark	60%	sand, fine gravel	8
RR-13 Rep 3	"	30%	one pine cone, leaves, pine needles, grass	70%	sand, fine gravel	8
RR-13 Rep 4	"	50%	leaves, twigs, moss, bark	50%	sand	8
RR-13 Rep 5	"	2%	twigs, debris	98%	sand	8
RR-16 Rep 1	12/20/95	80%	leaves, twigs, pine needles, grass & seeds	20%	sand, fine gravel	4
RR-16 Rep 2	"	1%	leaves, twigs, pine needles, grass	99%	sand, fine gravel	4
RR-16 Rep 3	"	1%	twigs, bark	99%	sand, fine gravel	4
RR-16 Rep 4	"	85%	leaves, sticks, moss, pine needles, grass	15%	sand	16
RR-16 Rep 5	"	75%	leaves, twigs, grass, pine needles	25%	sand	16

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Organic Debris
Red River Samples, December 1995

Station	Sample Date	Organic Material %	Composition	Inorganic %	Composition	Container Size (oz)
LR-1 Rep 1	12/20/95	40%	leaves, twigs, moss, bark, pine needles	60%	sand, fine gravel	4
LR-1 Rep 2	"	95%	leaves, twigs, catkins, grass, pine needles	5%	sand	16
LR-1 Rep 3	"	60%	leaves, twigs, pine needles	40%	sand, fine gravel	4
LR-1 Rep 4	"	98%	woody debris, seeds, leaves, grass	2%	sand, fine gravel	16
LR-1 Rep 5	"	60%	twigs, leaves, moss, bark, seeds	40%	sand	4
LR-11A Rep 1	12/20/95	45%	leaves, twigs, bark, debris	55%	sand, fine & coarse gravel	16
LR-11A Rep 2	"	5%	leaves, twigs, pine needles	95%	sand, fine gravel	4
LR-11A Rep 3	"	60%	leaves, twigs, pine needles, moss	40%	sand	16
LR-11A Rep 4	"	55%	leaves, twigs, pine needles, moss, grass	45%	sand	4
LR-11A Rep 5	"	55%	leaves, twigs, pine needles moss	45%	sand, fine gravel	4
LR-16 Rep 1	12/21/95	30%	leaves, catkins, twigs, debris	70%	sand	16
LR-16 Rep 2	"	25%	leaves, twigs, pine needles, debris	75%	sand, fine gravel	16
LR-16 Rep 3	"	40%	twigs, leaf, moss, debris	60%	sand, fine gravel	16
LR-16 Rep 4	"	50%	leaves, moss, twigs, pine needles	50%	sand	16
LR-16 Rep 5	"	50%	leaves, twigs, bark, moss, debris	50%	sand, fine gravel	16
LR-21 Rep 1	12/21/95	50%	leaves, moss, twigs, debris	50%	sand, fine gravel	16
LR-21 Rep 2	"	1%	moss, leaves	99%	sand, fine & coarse gravel	8
LR-21 Rep 3	"	25%	leaves, moss, twigs, bark	75%	sand	16
LR-21 Rep 4	"	20%	moss, twigs, seeds	80%	sand	16
LR-21 Rep 5	"	50%	leaves, bark, moss, twigs	50%	sand	16

BENTHIC MACROINVERTEBRATE COMMUNITY PARAMETERS
RED RIVER, DECEMBER 1995

			Station			
Parameter	**RR-1**	**RR-3**	**RR-5**	**RR-7**	**RR-10A**	**RR-11**
Total Density (N/sq.m)	8704	2250	3466	1012	1388	516
Taxa Richness	48	40	34	26	36	18
Modified Hilsenhoff Biotic Index	2.66	3.82	4.47	4.54	3.96	7.48
Ratio of Scrapers to Filtering Collectors	23.65	1.49	1.61	0.44	0.51	0.09
Ratio of EPT and Chironomid Abundances	18.81	6.16	2.46	2.72	3.92	0.45
% Dominant Taxon	36%	27%	30%	20%	26%	67%
EPT Index	23	21	18	15	23	14
Ratio of Shredders to Total Organisms	0.41	0.38	0.40	0.11	0.07	0.12
Diversity	2.80	3.67	3.40	3.62	3.54	2.01

			Station			
Parameter	**RR-13**	**RR-16**	**LR-1**	**LR-11A**	**LR-16**	**LR-21**
Total Density (N/sq.m)	274	392	2240	3346	3826	5170
Taxa Richness	17	16	22	29	34	45
Modified Hilsenhoff Biotic Index	3.82	5.27	6.73	6.29	6.22	6.37
Ratio of Scrapers to Filtering Collectors	1.11	1.14	0.39	0.49	0.19	0.15
Ratio of EPT and Chironomid Abundances	9.09	1.51	1.56	5.55	11.85	8.05
Percent Dominant Taxon	27%	38%	35%	59%	68%	62%
EPT Index	11	11	12	16	14	23
Ratio of Shredders to Total Organisms	0.05	0.12	0.02	0.04	0.04	0.05
Diversity	3.26	2.49	2.39	2.44	2.08	2.42

Note: Calculations above are based on compositing data for all 5 replicate samples (i.e., not mean values). (Note added by D.M.R. 8/8/96)

Note: Density calculations made using 0.1 m^2 instead of 0.086 m2 which is the area for the sampler stated in Wilco catelog where sampler was purchased. (Note added by D.M.R. 8/8/96)

RED RIVER

Station: RR-1
Sample Date: 21 December 1995

Taxon	Replicates 1	2	3	4	5	Mean	Avg N/ sq. m	Relative Abundance (%)
TURBELLARIA	0	1	0	12	0	2.60	26.00	0.30
NEMATODA	0	2	3	0	0	1.00	10.00	0.11
OLIGOCHAETA	0	0	2	2	2	1.20	12.00	0.14
HYDRACARINA	4	0	3	6	11	4.80	48.00	0.55
EPHEMEROPTERA								
Ameletus sp.								
Baetis tricaudatus	5	2	2	1	4	2.80	28.00	0.32
Drunella doddsi	4	2	8	4	8	5.20	52.00	0.60
Drunella grandis								
Epeorus longimanus								
Ephemerella infrequens	0	1	1	0	1	0.60	6.00	0.07
Paraleptophlebia sp.								
Rhithrogena robusta	1	4	2	1	0	1.60	16.00	0.18
Rhithrogena sp.	39	20	21	16	20	23.20	232.00	2.67
PLECOPTERA								
Capniidae	55	41	10	12	28	29.20	292.00	3.35
Chloroperlidae	2	2	0	0	0	0.80	8.00	0.09
Doddsia occidentalis	564	283	180	282	219	305.60	3056.00	35.11
Eucapnopsis brevicauda	2	1	1	0	4	1.60	16.00	0.18
Hesperoperla pacifica								
Isoperla sp.	1	0	0	0	0	0.20	2.00	0.02
Megarcys signata	12	3	1	23	0	7.80	78.00	0.90
Paraleuctra sp.	2	5	0	0	0	1.40	14.00	0.16
Paraperla frontalis								
Perlodidae	5	0	3	2	2	2.40	24.00	0.28
Plumiperla diversa								
Podmosta/Prostoia sp.	621	210	152	398	174	311.00	3110.00	35.73
Pteronarcella badia								
Sweltsa sp.	11	5	3	0	10	5.80	58.00	0.67
Taenionema sp.	14	6	3	5	5	6.60	66.00	0.76
Zapada cinctipes	2	2	5	4	6	3.80	38.00	0.44
Zapada sp.								
TRICHOPTERA								
Arctopsyche grandis	2	1	3	3	2	2.20	22.00	0.25
Brachycentrus americanus	6	1	3	20	13	8.60	86.00	0.99
Culoptila sp.								
Glossosoma sp.								
Hesperophylax sp.								
Hydropsyche sp.	0	0	0	2	0	0.40	4.00	0.05
Lepidostoma sp.	4	6	1	9	1	4.20	42.00	0.48
Limnephilidae								
Ochrotrichia sp.								
Oligophlebodes sp.	0	0	2	0	1	0.60	6.00	0.07
Rhyacophila brunnea								
Rhyacophila coloradensis								
Rhyacophila pellisa	5	9	13	5	7	7.80	78.00	0.90
Rhyacophila sp. A								

Station: RR-1 (Continued)

Taxon	Replicates					Mean	Avg N/ sq. m	Relative Abundance (%)
COLEOPTERA								
Heterlimnius corpulentus	3	6	3	5	10	5.40	54.00	0.62
Liodessus affinis								
Narpus concolor								
Optioservus sp.								
DIPTERA								
Atherix pachypus								
Bibiocephala grandis	0	5	1	0	0	1.20	12.00	0.14
Brillia sp.	2	1	1	4	6	2.80	28.00	0.32
Ceratopogonidae	0	0	1	1	1	0.60	6.00	0.07
Chelifera sp.	0	0	1	0	0	0.20	2.00	0.02
Cricotopus/Orthocladius sp.	2	0	0	1	3	1.20	12.00	0.14
Diamesa sp.	1	1	0	0	0	0.40	4.00	0.05
Dicranota sp.	17	7	11	4	17	11.20	112.00	1.29
Eukiefferiella sp.	0	0	0	3	0	0.60	6.00	0.07
Heleniella sp.	0	0	0	0	1	0.20	2.00	0.02
Hesperoconopa sp.	0	0	0	0	1	0.20	2.00	0.02
Hexatoma sp.	1	3	2	3	12	4.20	42.00	0.48
Hydrobaenus sp.								
Micropsectra sp.	1	3	2	3	6	3.00	30.00	0.34
Oreogeton sp.	0	0	0	2	0	0.40	4.00	0.05
Orthocladius (Symposiocladius) lignicola								
Pagastia sp.	5	3	0	5	4	3.40	34.00	0.39
Parametriocnemus sp.								
Paraphaenocladius sp.	11	30	19	28	13	20.20	202.00	2.32
Parorthocladius sp.	0	0	0	1	0	0.20	2.00	0.02
Pedicia sp.								
Pericoma/Telmatoscopus sp.	83	67	27	45	94	63.20	632.00	7.26
Phaenopsectra sp.								
Polypedilum sp.								
Prosimulium sp.								
Pseudodiamesa sp.	1	0	0	0	0	0.20	2.00	0.02
Rheocricotopus sp.								
Simulium sp.	1	2	2	4	0	1.80	18.00	0.21
Tipula sp.								
Tipulidae								
Tvetenia sp.	13	2	3	9	7	6.80	68.00	0.78
Totals:	1502	737	495	925	693	870.40	8704.00	100.00

Total Density (N/sq.m)	8704
Total Number of Taxa	48
Diversity ($\bar{d}$)	2.80

Station: RR-1

Density By Order

TURBELLARIA	26
NEMATODA	10
OLIGOCHAETA	12
HYDRACARINA	48
EPHEMEROPTERA	334
PLECOPTERA	6762
TRICHOPTERA	238
COLEOPTERA	54
DIPTERA	1220
Totals	8704

Density By Order

TURBELLARIA	0.3
NEMATODA	0.1
OLIGOCHAETA	0.1
HYDRACARINA	0.6
EPHEMEROPTERA	3.8
PLECOPTERA	77.7
TRICHOPTERA	2.7
COLEOPTERA	0.6
DIPTERA	14.0
Totals	100.0

RED RIVER

Station: RR-1
Sample Date: 21 December 1995

Taxon	Replicates 1	2	3	4	5	Mean	T-value	HBI
TURBELLARIA	0	1	0	12	0	2.60	10	0.03
NEMATODA	0	2	3	0	0	1.00	10	0.01
OLIGOCHAETA	0	0	2	2	2	1.20	10	0.01
HYDRACARINA	4	0	3	6	11	4.80	10	0.06
EPHEMEROPTERA								
Ameletus sp.								
Baetis tricaudatus	5	2	2	1	4	2.80	7	0.02
Drunella doddsi	4	2	8	4	8	5.20	0	0.00
Drunella grandis								
Epeorus longimanus								
Ephemerella infrequens	0	1	1	0	1	0.60	4	0.00
Paraleptophlebia sp.								
Rhithrogena robusta	1	4	2	1	0	1.60	2	0.00
Rhithrogena sp.	39	20	21	16	20	23.20	2	0.05
PLECOPTERA								
Capniidae	55	41	10	12	28	29.20	3	0.10
Chloroperlidae	2	2	0	0	0	0.80	2	0.00
Doddsia occidentalis	564	283	180	282	219	305.60	2	0.70
Eucapnopsis brevicauda	2	1	1	0	4	1.60	2	0.00
Hesperoperla pacifica								
Isoperla sp.	1	0	0	0	0	0.20	4	0.00
Megarcys signata	12	3	1	23	0	7.80	2	0.02
Paraleuctra sp.	2	5	0	0	0	1.40	2	0.00
Paraperla frontalis								
Perlodidae	5	0	3	2	2	2.40	4	0.01
Plumiperla diversa								
Podmosta/Prostoia sp.	621	210	152	398	174	311.00	2	0.71
Pteronarcella badia								
Sweltsa sp.	11	5	3	0	10	5.80	2	0.01
Taenionema sp.	14	6	3	5	5	6.60	4	0.03
Zapada cinctipes	2	2	5	4	6	3.80	1	0.00
Zapada sp.								
TRICHOPTERA								
Arctopsyche grandis	2	1	3	3	2	2.20	2	0.01
Brachycentrus americanus	6	1	3	20	13	8.60	2	0.02
Culoptila sp.								
Glossosoma sp.								
Hesperophylax sp.								
Hydropsyche sp.	0	0	0	2	0	0.40	10	0.00
Lepidostoma sp.	4	6	1	9	1	4.20	2	0.01
Limnephilidae								
Ochrotrichia sp.								
Oligophlebodes sp.	0	0	2	0	1	0.60	2	0.00
Rhyacophila brunnea								
Rhyacophila coloradensis								
Rhyacophila pellisa	5	9	13	5	7	7.80	2	0.02
Rhyacophila sp. A								

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Station: RR-1

COLEOPTERA								
Heterlimnius corpulentus	3	6	3	5	10	5.40	10	0.06
Liodessus affinis								
Narpus concolor								
Optioservus sp.								
DIPTERA								
Atherix pachypus								
Bibiocephala grandis	0	5	1	0	0	1.20	0	0.00
Brillia sp.	2	1	1	4	6	2.80	10	0.03
Ceratopogonidae	0	0	1	1	1	0.60	10	0.01
Chelifera sp.	0	0	1	0	0	0.20	10	0.00
Cricotopus/Orthocladius sp.	2	0	0	1	3	1.20	10	0.01
Diamesa sp.	1	1	0	0	0	0.40	10	0.00
Dicranota sp.	17	7	11	4	17	11.20	2	0.03
Eukiefferiella sp.	0	0	0	3	0	0.60	10	0.01
Heleniella sp.	0	0	0	0	1	0.20	10	0.00
Hesperoconopa sp.	0	0	0	0	1	0.20	7	0.00
Hexatoma sp.	1	3	2	3	12	4.20	3	0.01
Hydrobaenus sp.								
Micropsectra sp.	1	3	2	3	6	3.00	10	0.03
Oreogeton sp.	0	0	0	2	0	0.40	10	0.00
Orthocladius (Symposiocladius) lignicola								
Pagastia sp.	5	3	0	5	4	3.40	10	0.04
Parametriocnemus sp.								
Paraphaenocladius sp.	11	30	19	28	13	20.20	10	0.23
Parorthocladius sp.	0	0	0	1	0	0.20	10	0.00
Pedicia sp.								
Pericoma/Telmatoscopus sp.	83	67	27	45	94	63.20	3	0.22
Phaenopsectra sp.								
Polypedilum sp.								
Prosimulium sp.								
Pseudodiamesa sp.	1	0	0	0	0	0.20	10	0.00
Rheocricotopus sp.								
Simulium sp.	1	2	2	4	0	1.80	10	0.02
Tipula sp.								
Tipulidae								
Tvetenia sp.	13	2	3	9	7	6.80	10	0.08
Totals:	1502	737	495	925	693	870.40		2.66

HBI	2.66
Scrapers	307.40
Filtering Collectors	13.00
Scrapers/Filtering Collectors	23.65
EPT Abundance	733.40
Chironomidae Abundance	39.00
EPT/Chironomidae	18.81
EPT Index	23
Shredders	361.20
Shredders/Total	0.41

RED RIVER

Station: RR-3
Sample Date: 21 December 1995

Taxon	Replicates 1	2	3	4	5	Mean	Avg N/ sq. m	Relative Abundance (%)
TURBELLARIA	0	0	0	1	0	0.20	2.00	0.09
NEMATODA	0	1	0	0	0	0.20	2.00	0.09
OLIGOCHAETA	1	1	0	0	0	0.40	4.00	0.18
HYDRACARINA	1	0	3	2	47	10.60	106.00	4.71
EPHEMEROPTERA								
Ameletus sp.								
Baetis tricaudatus	0	1	0	0	1	0.40	4.00	0.18
Drunella doddsi	1	0	1	0	1	0.60	6.00	0.27
Drunella grandis	0	0	3	2	2	1.40	14.00	0.62
Epeorus longimanus								
Ephemerella infrequens								
Paraleptophlebia sp.								
Rhithrogena robusta	0	2	0	0	0	0.40	4.00	0.18
Rhithrogena sp.	36	10	2	9	22	15.80	158.00	7.02
PLECOPTERA								
Capniidae	154	61	21	37	36	61.80	618.00	27.47
Chloroperlidae								
Doddsia occidentalis	30	29	27	44	21	30.20	302.00	13.42
Eucapnopsis brevicauda								
Hesperoperla pacifica								
Isoperla sp.								
Megarcys signata	0	3	2	1	8	2.80	28.00	1.24
Paraleuctra sp.								
Paraperla frontalis								
Perlodidae								
Plumiperla diversa								
Podmosta/Prostoia sp.	21	11	29	15	23	19.80	198.00	8.80
Pteronarcella badia								
Sweltsa sp.	0	6	0	0	4	2.00	20.00	0.89
Taenionema sp.								
Zapada cinctipes	1	1	0	0	0	0.40	4.00	0.18
Zapada sp.	0	0	0	1	0	0.20	2.00	0.09
TRICHOPTERA								
Arctopsyche grandis	3	8	5	5	4	5.00	50.00	2.22
Brachycentrus americanus	5	13	33	23	27	20.20	202.00	8.98
Culoptila sp.								
Glossosoma sp.	0	0	0	1	0	0.20	2.00	0.09
Hesperophylax sp.	0	1	0	0	0	0.20	2.00	0.09
Hydropsyche sp.	0	0	0	1	0	0.20	2.00	0.09
Lepidostoma sp.	1	1	1	0	3	1.20	12.00	0.53
Limnephilidae	0	1	0	0	0	0.20	2.00	0.09
Ochrotrichia sp.								
Oligophlebodes sp.	7	4	1	8	10	6.00	60.00	2.67
Rhyacophila brunnea								
Rhyacophila coloradensis								
Rhyacophila pellisa	4	0	1	1	5	2.20	22.00	0.98
Rhyacophila sp. A								

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Station: RR-3 (Continued)

Taxon	Replicates					Mean	Avg N/ sq. m	Relative Abundance (%)
COLEOPTERA								
Heterlimnius corpulentus	2	3	1	2	7	3.00	30.00	1.33
Liodessus affinis								
Narpus concolor	1	0	0	0	0	0.20	2.00	0.09
Optioservus sp.								
DIPTERA								
Atherix pachypus	1	0	0	0	0	0.20	2.00	0.09
Bibiocephala grandis								
Brillia sp.	0	2	0	0	0	0.40	4.00	0.18
Ceratopogonidae	0	0	1	0	0	0.20	2.00	0.09
Chelifera sp.	0	0	0	1	0	0.20	2.00	0.09
Cricotopus/Orthocladius sp.	0	0	9	2	3	2.80	28.00	1.24
Diamesa sp.	5	6	25	20	18	14.80	148.00	6.58
Dicranota sp.	21	6	5	5	16	10.60	106.00	4.71
Eukiefferiella sp.								
Heleniella sp.								
Hesperoconopa sp.								
Hexatoma sp.								
Hydrobaenus sp.	1	0	0	2	0	0.60	6.00	0.27
Micropsectra sp.								
Oreogeton sp.								
Orthocladius (Symposiocladius) lignicola								
Pagastia sp.	1	2	4	5	3	3.00	30.00	1.33
Parametriocnemus sp.								
Paraphaenocladius sp.	12	3	0	0	8	4.60	46.00	2.04
Parorthocladius sp.	0	1	0	0	2	0.60	6.00	0.27
Pedicia sp.								
Pericoma/Telmatoscopus sp.	1	0	0	0	0	0.20	2.00	0.09
Phaenopsectra sp.								
Polypedilum sp.	0	1	1	3	0	1.00	10.00	0.44
Prosimulium sp.								
Pseudodiamesa sp.								
Rheocricotopus sp.								
Simulium sp.								
Tipula sp.								
Tipulidae								
Tvetenia sp.								
Totals:	310	178	175	191	271	225.00	2250.00	100.00

Total Density (N/sq.m)	2250
Total Number of Taxa	40
Diversity ($\bar{d}$)	3.67

Station: RR-3

Density By Order

TURBELLARIA	2
NEMATODA	2
OLIGOCHAETA	4
HYDRACARINA	106
EPHEMEROPTERA	186
PLECOPTERA	1172
TRICHOPTERA	354
COLEOPTERA	32
DIPTERA	392
Totals	2250

Density By Order

TURBELLARIA	0.1
NEMATODA	0.1
OLIGOCHAETA	0.2
HYDRACARINA	4.7
EPHEMEROPTERA	8.3
PLECOPTERA	52.1
TRICHOPTERA	15.7
COLEOPTERA	1.4
DIPTERA	17.4
Totals	100.0

RED RIVER

Station: RR-3
Sample Date: 21 December 1995

Taxon	Replicates 1	2	3	4	5	Mean	T-value	HBI
TURBELLARIA	0	0	0	1	0	0.20	10	0.01
NEMATODA	0	1	0	0	0	0.20	10	0.01
OLIGOCHAETA	1	1	0	0	0	0.40	10	0.02
HYDRACARINA	1	0	3	2	47	10.60	10	0.47
EPHEMEROPTERA								
Ameletus sp.								
Baetis tricaudatus	0	1	0	0	1	0.40	7	0.01
Drunella doddsi	1	0	1	0	1	0.60	0	0.00
Drunella grandis	0	0	3	2	2	1.40	2	0.01
Epeorus longimanus								
Ephemerella infrequens								
Paraleptophlebia sp.								
Rhithrogena robusta	0	2	0	0	0	0.40	2	0.00
Rhithrogena sp.	36	10	2	9	22	15.80	2	0.14
PLECOPTERA								
Capniidae	154	61	21	37	36	61.80	3	0.82
Chloroperlidae								
Doddsia occidentalis	30	29	27	44	21	30.20	2	0.27
Eucapnopsis brevicauda								
Hesperoperla pacifica								
Isoperla sp.								
Megarcys signata	0	3	2	1	8	2.80	2	0.02
Paraleuctra sp.								
Paraperla frontalis								
Perlodidae								
Plumiperla diversa								
Podmosta/Prostoia sp.	21	11	29	15	23	19.80	2	0.18
Pteronarcella badia								
Sweltsa sp.	0	6	0	0	4	2.00	2	0.02
Taenionema sp.								
Zapada cinctipes	1	1	0	0	0	0.40	1	0.00
Zapada sp.	0	0	0	1	0	0.20	1	0.00
TRICHOPTERA								
Arctopsyche grandis	3	8	5	5	4	5.00	2	0.04
Brachycentrus americanus	5	13	33	23	27	20.20	2	0.18
Culoptila sp.								
Glossosoma sp.	0	0	0	1	0	0.20	2	0.00
Hesperophylax sp.	0	1	0	0	0	0.20	10	0.01
Hydropsyche sp.	0	0	0	1	0	0.20	10	0.01
Lepidostoma sp.	1	1	1	0	3	1.20	2	0.01
Limnephilidae	0	1	0	0	0	0.20	10	0.01
Ochrotrichia sp.								
Oligophlebodes sp.	7	4	1	8	10	6.00	2	0.05
Rhyacophila brunnea								
Rhyacophila coloradensis								
Rhyacophila pellisa	4	0	1	1	5	2.20	2	0.02
Rhyacophila sp. A								

Station: RR-3

COLEOPTERA								
Heterlimnius corpulentus	2	3	1	2	7	3.00	10	0.13
Liodessus affinis								
Narpus concolor	1	0	0	0	0	0.20	10	0.01
Optioservus sp.								
DIPTERA								
Atherix pachypus	1	0	0	0	0	0.20	2	0.00
Bibiocephala grandis								
Brillia sp.	0	2	0	0	0	0.40	10	0.02
Ceratopogonidae	0	0	1	0	0	0.20	10	0.01
Chelifera sp.	0	0	0	1	0	0.20	10	0.01
Cricotopus/Orthocladius sp.	0	0	9	2	3	2.80	10	0.12
Diamesa sp.	5	6	25	20	18	14.80	10	0.66
Dicranota sp.	21	6	5	5	16	10.60	2	0.09
Eukiefferiella sp.								
Heleniella sp.								
Hesperoconopa sp.								
Hexatoma sp.								
Hydrobaenus sp.	1	0	0	2	0	0.60	10	0.03
Micropsectra sp.								
Oreogeton sp.								
Orthocladius (Symposiocladius) lignicola								
Pagastia sp.	1	2	4	5	3	3.00	10	0.13
Parametriocnemus sp.								
Paraphaenocladius sp.	12	3	0	0	8	4.60	10	0.20
Parorthocladius sp.	0	1	0	0	2	0.60	10	0.03
Pedicia sp.								
Pericoma/Telmatoscopus sp.	1	0	0	0	0	0.20	3	0.00
Phaenopsectra sp.								
Polypedilum sp.	0	1	1	3	0	1.00	10	0.04
Prosimulium sp.								
Pseudodiamesa sp.								
Rheocricotopus sp.								
Simulium sp.								
Tipula sp.								
Tipulidae								
Tvetenia sp.								
Totals:	310	178	175	191	271	225.00		3.82

HBI	3.82
Scrapers	37.80
Filtering Collectors	25.40
Scrapers/Filtering Collectors	1.49
EPT Abundance	171.20
Chironomidae Abundance	27.80
EPT/Chironomidae	6.16
EPT Index	21
Shredders	85.00
Shredders/Total	0.38

RED RIVER

Station: RR-5
Sample Date: 21 December 1995

Taxon	Replicates 1	2	3	4	5	Mean	Avg N/ sq. m	Relative Abundance (%)
TURBELLARIA								
NEMATODA	1	1	4	0	0	1.20	12.00	0.35
OLIGOCHAETA								
HYDRACARINA	0	0	0	0	1	0.20	2.00	0.06
EPHEMEROPTERA								
Ameletus sp.								
Baetis tricaudatus	12	6	3	6	6	6.60	66.00	1.90
Drunella doddsi	5	6	15	9	4	7.80	78.00	2.25
Drunella grandis	17	9	14	22	9	14.20	142.00	4.10
Epeorus longimanus								
Ephemerella infrequens								
Paraleptophlebia sp.								
Rhithrogena robusta								
Rhithrogena sp.	4	3	1	31	8	9.40	94.00	2.71
PLECOPTERA								
Capniidae	57	63	6	16	17	31.80	318.00	9.17
Chloroperlidae								
Doddsia occidentalis	40	7	17	53	31	29.60	296.00	8.54
Eucapnopsis brevicauda								
Hesperoperla pacifica								
Isoperla sp.								
Megarcys signata	1	0	0	4	8	2.60	26.00	0.75
Paraleuctra sp.	0	0	0	1	1	0.40	4.00	0.12
Paraperla frontalis	0	1	0	0	0	0.20	2.00	0.06
Perlodidae								
Plumiperla diversa								
Podmosta/Prostoia sp.	101	96	132	130	64	104.60	1046.00	30.18
Pteronarcella badia								
Sweltsa sp.	3	1	0	0	3	1.40	14.00	0.40
Taenionema sp.								
Zapada cinctipes	1	0	0	0	0	0.20	2.00	0.06
Zapada sp.	1	0	0	0	0	0.20	2.00	0.06
TRICHOPTERA								
Arctopsyche grandis	10	17	27	28	24	21.20	212.00	6.12
Brachycentrus americanus	4	3	10	3	5	5.00	50.00	1.44
Culoptila sp.								
Glossosoma sp.								
Hesperophylax sp.								
Hydropsyche sp.								
Lepidostoma sp.								
Limnephilidae								
Ochrotrichia sp.								
Oligophlebodes sp.	0	1	1	0	1	0.60	6.00	0.17
Rhyacophila brunnea								
Rhyacophila coloradensis								
Rhyacophila pellisa	0	0	4	1	2	1.40	14.00	0.40
Rhyacophila sp. A	2	0	0	2	0	0.80	8.00	0.23

Station: RR-5 (Continued)

Taxon	Replicates					Mean	Avg N/ sq. m	Relative Abundance (%)
COLEOPTERA								
Heterlimnius corpulentus	0	1	1	1	2	1.00	10.00	0.29
Liodessus affinis								
Narpus concolor								
Optioservus sp.								
DIPTERA								
Atherix pachypus	0	1	1	2	1	1.00	10.00	0.29
Bibiocephala grandis								
Brillia sp.	0	0	1	0	0	0.20	2.00	0.06
Ceratopogonidae	0	0	1	0	0	0.20	2.00	0.06
Chelifera sp.								
Cricotopus/Orthocladius sp.	14	12	24	11	15	15.20	152.00	4.39
Diamesa sp.	53	39	77	65	80	62.80	628.00	18.12
Dicranota sp.	8	2	13	5	4	6.40	64.00	1.85
Eukiefferiella sp.	0	0	0	0	3	0.60	6.00	0.17
Heleniella sp.								
Hesperoconopa sp.								
Hexatoma sp.								
Hydrobaenus sp.								
Micropsectra sp.								
Oreogeton sp.	0	0	1	0	0	0.20	2.00	0.06
Orthocladius (Symposiocladius) lignicola								
Pagastia sp.	0	0	1	0	0	0.20	2.00	0.06
Parametriocnemus sp.								
Paraphaenocladius sp.	17	7	15	11	15	13.00	130.00	3.75
Parorthocladius sp.	1	3	9	9	1	4.60	46.00	1.33
Pedicia sp.								
Pericoma/Telmatoscopus sp.	0	1	1	0	0	0.40	4.00	0.12
Phaenopsectra sp.								
Polypedilum sp.								
Prosimulium sp.								
Pseudodiamesa sp.								
Rheocricotopus sp.								
Simulium sp.	1	1	1	3	1	1.40	14.00	0.40
Tipula sp.								
Tipulidae								
Tvetenia sp.								
Totals:	353	281	380	413	306	346.60	3466.00	100.00

Total Density (N/sq.m)	3466
Total Number of Taxa	34
Diversity ($\bar{d}$)	3.40

Station: RR-5

Density By Order

TURBELLARIA	0
NEMATODA	12
OLIGOCHAETA	0
HYDRACARINA	2
EPHEMEROPTERA	380
PLECOPTERA	1710
TRICHOPTERA	290
COLEOPTERA	10
DIPTERA	1062
Totals	3466

Density By Order

TURBELLARIA	0.0
NEMATODA	0.3
OLIGOCHAETA	0.0
HYDRACARINA	0.1
EPHEMEROPTERA	11.0
PLECOPTERA	49.3
TRICHOPTERA	8.4
COLEOPTERA	0.3
DIPTERA	30.6
Totals	100.0

RED RIVER

Station: RR-5
Sample Date: 21 December 1995

Taxon	Replicates					Mean	T-value	HBI
	1	2	3	4	5			
TURBELLARIA								
NEMATODA	1	1	4	0	0	1.20	10	0.03
OLIGOCHAETA								
HYDRACARINA	0	0	0	0	1	0.20	10	0.01
EPHEMEROPTERA								
Ameletus sp.								
Baetis tricaudatus	12	6	3	6	6	6.60	7	0.13
Drunella doddsi	5	6	15	9	4	7.80	0	0.00
Drunella grandis	17	9	14	22	9	14.20	2	0.08
Epeorus longimanus								
Ephemerella infrequens								
Paraleptophlebia sp.								
Rhithrogena robusta								
Rhithrogena sp.	4	3	1	31	8	9.40	2	0.05
PLECOPTERA								
Capniidae	57	63	6	16	17	31.80	3	0.28
Chloroperlidae								
Doddsia occidentalis	40	7	17	53	31	29.60	2	0.17
Eucapnopsis brevicauda								
Hesperoperla pacifica								
Isoperla sp.								
Megarcys signata	1	0	0	4	8	2.60	2	0.02
Paraleuctra sp.	0	0	0	1	1	0.40	2	0.00
Paraperla frontalis	0	1	0	0	0	0.20	2	0.00
Perlodidae								
Plumiperla diversa								
Podmosta/Prostoia sp.	101	96	132	130	64	104.60	2	0.60
Pteronarcella badia								
Sweltsa sp.	3	1	0	0	3	1.40	2	0.01
Taenionema sp.								
Zapada cinctipes	1	0	0	0	0	0.20	1	0.00
Zapada sp.	1	0	0	0	0	0.20	1	0.00
TRICHOPTERA								
Arctopsyche grandis	10	17	27	28	24	21.20	2	0.12
Brachycentrus americanus	4	3	10	3	5	5.00	2	0.03
Culoptila sp.								
Glossosoma sp.								
Hesperophylax sp.								
Hydropsyche sp.								
Lepidostoma sp.								
Limnephilidae								
Ochrotrichia sp.								
Oligophlebodes sp.	0	1	1	0	1	0.60	2	0.00
Rhyacophila brunnea								
Rhyacophila coloradensis								
Rhyacophila pellisa	0	0	4	1	2	1.40	2	0.01
Rhyacophila sp. A	2	0	0	2	0	0.80	2	0.00

Station: RR-5

COLEOPTERA								
Heterlimnius corpulentus	0	1	1	1	2	1.00	10	0.03
Liodessus affinis								
Narpus concolor								
Optioservus sp.								
DIPTERA								
Atherix pachypus	0	1	1	2	1	1.00	2	0.01
Bibiocephala grandis								
Brillia sp.	0	0	1	0	0	0.20	10	0.01
Ceratopogonidae	0	0	1	0	0	0.20	10	0.01
Chelifera sp.								
Cricotopus/Orthocladius sp.	14	12	24	11	15	15.20	10	0.44
Diamesa sp.	53	39	77	65	80	62.80	10	1.81
Dicranota sp.	8	2	13	5	4	6.40	2	0.04
Eukiefferiella sp.	0	0	0	0	3	0.60	10	0.02
Heleniella sp.								
Hesperoconopa sp.								
Hexatoma sp.								
Hydrobaenus sp.								
Micropsectra sp.								
Oreogeton sp.	0	0	1	0	0	0.20	10	0.01
Orthocladius (Symposiocladius) lignicola								
Pagastia sp.	0	0	1	0	0	0.20	10	0.01
Parametriocnemus sp.								
Paraphaenocladius sp.	17	7	15	11	15	13.00	10	0.38
Parorthocladius sp.	1	3	9	9	1	4.60	10	0.13
Pedicia sp.								
Pericoma/Telmatoscopus sp.	0	1	1	0	0	0.40	3	0.00
Phaenopsectra sp.								
Polypedilum sp.								
Prosimulium sp.								
Pseudodiamesa sp.								
Rheocricotopus sp.								
Simulium sp.	1	1	1	3	1	1.40	10	0.04
Tipula sp.								
Tipulidae								
Tvetenia sp.								
Totals:	353	281	380	413	306	346.60		4.47

HBI	4.47
Scrapers	44.40
Filtering Collectors	27.60
Scrapers/Filtering Collectors	1.61
EPT Abundance	238.00
Chironomidae Abundance	96.60
EPT/Chironomidae	2.46
EPT Index	18
Shredders	137.40
Shredders/Total	0.40

RED RIVER

Station: RR-7
Sample Date: 21 December 1995

Taxon	Replicates 1	2	3	4	5	Mean	Avg N/ sq. m	Relative Abundance (%)
TURBELLARIA								
NEMATODA	0	1	0	1	1	0.60	6.00	0.59
OLIGOCHAETA								
HYDRACARINA	2	1	0	1	0	0.80	8.00	0.79
EPHEMEROPTERA								
Ameletus sp.								
Baetis tricaudatus	6	8	8	6	8	7.20	72.00	7.11
Drunella doddsi	0	4	0	0	4	1.60	16.00	1.58
Drunella grandis	19	2	6	4	9	8.00	80.00	7.91
Epeorus longimanus								
Ephemerella infrequens								
Paraleptophlebia sp.								
Rhithrogena robusta								
Rhithrogena sp.	11	26	4	2	8	10.20	102.00	10.08
PLECOPTERA								
Capniidae	2	6	0	0	0	1.60	16.00	1.58
Chloroperlidae	1	0	0	0	2	0.60	6.00	0.59
Doddsia occidentalis	0	7	2	2	4	3.00	30.00	2.96
Eucapnopsis brevicauda								
Hesperoperla pacifica								
Isoperla sp.								
Megarcys signata								
Paraleuctra sp.								
Paraperla frontalis								
Perlodidae								
Plumiperla diversa								
Podmosta/Prostoia sp.	11	10	6	16	3	9.20	92.00	9.09
Pteronarcella badia								
Sweltsa sp.	0	0	0	2	0	0.40	4.00	0.40
Taenionema sp.								
Zapada cinctipes								
Zapada sp.								
TRICHOPTERA								
Arctopsyche grandis	36	13	14	3	13	15.80	158.00	15.61
Brachycentrus americanus	33	4	10	4	3	10.80	108.00	10.67
Culoptila sp.								
Glossosoma sp.								
Hesperophylax sp.								
Hydropsyche sp.								
Lepidostoma sp.								
Limnephilidae								
Ochrotrichia sp.								
Oligophlebodes sp.	3	0	0	0	0	0.60	6.00	0.59
Rhyacophila brunnea	0	0	0	1	0	0.20	2.00	0.20
Rhyacophila coloradensis								
Rhyacophila pellisa	0	1	0	0	1	0.40	4.00	0.40
Rhyacophila sp. A	0	2	1	1	2	1.20	12.00	1.19

Station: RR-7 (Continued)

Taxon	Replicates					Mean	Avg N/ sq. m	Relative Abundance (%)
COLEOPTERA								
Heterlimnius corpulentus	0	0	1	0	0	0.20	2.00	0.20
Liodessus affinis								
Narpus concolor								
Optioservus sp.	0	1	0	0	0	0.20	2.00	0.20
DIPTERA								
Atherix pachypus	0	1	0	0	0	0.20	2.00	0.20
Bibiocephala grandis								
Brillia sp.								
Ceratopogonidae								
Chelifera sp.								
Cricotopus/Orthocladius sp.	0	3	3	4	5	3.00	30.00	2.96
Diamesa sp.	0	11	28	24	39	20.40	204.00	20.16
Dicranota sp.	5	2	0	0	4	2.20	22.00	2.17
Eukiefferiella sp.								
Heleniella sp.								
Hesperoconopa sp.								
Hexatoma sp.								
Hydrobaenus sp.								
Micropsectra sp.								
Oreogeton sp.								
Orthocladius (Symposiocladius) lignicola	4	0	0	0	0	0.80	8.00	0.79
Pagastia sp.								
Parametriocnemus sp.								
Paraphaenocladius sp.	2	2	1	3	1	1.80	18.00	1.78
Parorthocladius sp.								
Pedicia sp.								
Pericoma/Telmatoscopus sp.								
Phaenopsectra sp.								
Polypedilum sp.								
Prosimulium sp.								
Pseudodiamesa sp.								
Rheocricotopus sp.								
Simulium sp.								
Tipula sp.	1	0	0	0	0	0.20	2.00	0.20
Tipulidae								
Tvetenia sp.								
Totals:	136	105	84	74	107	101.20	1012.00	100.00

Total Density (N/sq.m)	1012
Total Number of Taxa	26
Diversity ($\bar{d}$)	3.62

Station: RR-7

Density By Order

TURBELLARIA	0
NEMATODA	6
OLIGOCHAETA	0
HYDRACARINA	8
EPHEMEROPTERA	270
PLECOPTERA	148
TRICHOPTERA	290
COLEOPTERA	4
DIPTERA	286
Totals	1012

Density By Order

TURBELLARIA	0.0
NEMATODA	0.6
OLIGOCHAETA	0.0
HYDRACARINA	0.8
EPHEMEROPTERA	26.7
PLECOPTERA	14.6
TRICHOPTERA	28.7
COLEOPTERA	0.4
DIPTERA	28.3
Totals	100.0

RED RIVER

Station: RR-7
Sample Date: 21 December 1995

Taxon	Replicates 1	2	3	4	5	Mean	T-value	HBI
TURBELLARIA								
NEMATODA	0	1	0	1	1	0.60	10	0.06
OLIGOCHAETA								
HYDRACARINA	2	1	0	1	0	0.80	10	0.08
EPHEMEROPTERA								
Ameletus sp.								
Baetis tricaudatus	6	8	8	6	8	7.20	7	0.50
Drunella doddsi	0	4	0	0	4	1.60	0	0.00
Drunella grandis	19	2	6	4	9	8.00	2	0.16
Epeorus longimanus								
Ephemerella infrequens								
Paraleptophlebia sp.								
Rhithrogena robusta								
Rhithrogena sp.	11	26	4	2	8	10.20	2	0.20
PLECOPTERA								
Capniidae	2	6	0	0	0	1.60	3	0.05
Chloroperlidae	1	0	0	0	2	0.60	2	0.01
Doddsia occidentalis	0	7	2	2	4	3.00	2	0.06
Eucapnopsis brevicauda								
Hesperoperla pacifica								
Isoperla sp.								
Megarcys signata								
Paraleuctra sp.								
Paraperla frontalis								
Perlodidae								
Plumiperla diversa								
Podmosta/Prostoia sp.	11	10	6	16	3	9.20	2	0.18
Pteronarcella badia								
Sweltsa sp.	0	0	0	2	0	0.40	2	0.01
Taenionema sp.								
Zapada cinctipes								
Zapada sp.								
TRICHOPTERA								
Arctopsyche grandis	36	13	14	3	13	15.80	2	0.31
Brachycentrus americanus	33	4	10	4	3	10.80	2	0.21
Culoptila sp.								
Glossosoma sp.								
Hesperophylax sp.								
Hydropsyche sp.								
Lepidostoma sp.								
Limnephilidae								
Ochrotrichia sp.								
Oligophlebodes sp.	3	0	0	0	0	0.60	2	0.01
Rhyacophila brunnea	0	0	0	1	0	0.20	2	0.00
Rhyacophila coloradensis								
Rhyacophila pellisa	0	1	0	0	1	0.40	2	0.01
Rhyacophila sp. A	0	2	1	1	2	1.20	2	0.02

Station: RR-7

COLEOPTERA								
Heterlimnius corpulentus	0	0	1	0	0	0.20	10	0.02
Liodessus affinis								
Narpus concolor								
Optioservus sp.	0	1	0	0	0	0.20	10	0.02
DIPTERA								
Atherix pachypus	0	1	0	0	0	0.20	2	0.00
Bibiocephala grandis								
Brillia sp.								
Ceratopogonidae								
Chelifera sp.								
Cricotopus/Orthocladius sp.	0	3	3	4	5	3.00	10	0.30
Diamesa sp.	0	11	28	24	39	20.40	10	2.02
Dicranota sp.	5	2	0	0	4	2.20	2	0.04
Eukiefferiella sp.								
Heleniella sp.								
Hesperoconopa sp.								
Hexatoma sp.								
Hydrobaenus sp.								
Micropsectra sp.								
Oreogeton sp.								
Orthocladius (Symposiocladius) lignicola	4	0	0	0	0	0.80	10	0.08
Pagastia sp.								
Parametriocnemus sp.								
Paraphaenocladius sp.	2	2	1	3	1	1.80	10	0.18
Parorthocladius sp.								
Pedicia sp.								
Pericoma/Telmatoscopus sp.								
Phaenopsectra sp.								
Polypedilum sp.								
Prosimulium sp.								
Pseudodiamesa sp.								
Rheocricotopus sp.								
Simulium sp.								
Tipula sp.	1	0	0	0	0	0.20	3	0.01
Tipulidae								
Tvetenia sp.								
Totals:	136	105	84	74	107	101.20		4.54

HBI	4.54
Scrapers	11.80
Filtering Collectors	26.60
Scrapers/Filtering Collectors	0.44
EPT Abundance	70.80
Chironomidae Abundance	26.00
EPT/Chironomidae	2.72
EPT Index	15
Shredders	11.00
Shredders/Total	0.11

RED RIVER

Station: RR-10A
Sample Date: 21 December 1995

Taxon	Replicates 1	2	3	4	5	Mean	Avg N/ sq. m	Relative Abundance (%)
TURBELLARIA								
NEMATODA								
OLIGOCHAETA								
HYDRACARINA	2	0	5	4	0	2.20	22.00	1.59
EPHEMEROPTERA								
Ameletus sp.	0	1	0	0	0	0.20	2.00	0.14
Baetis tricaudatus	8	6	6	10	6	7.20	72.00	5.19
Drunella doddsi	9	0	10	4	2	5.00	50.00	3.60
Drunella grandis	25	15	17	26	2	17.00	170.00	12.25
Epeorus longimanus								
Ephemerella infrequens	0	0	0	0	1	0.20	2.00	0.14
Paraleptophlebia sp.								
Rhithrogena robusta	0	2	0	0	0	0.40	4.00	0.29
Rhithrogena sp.	6	11	6	17	5	9.00	90.00	6.48
PLECOPTERA								
Capniidae	0	4	0	1	1	1.20	12.00	0.86
Chloroperlidae	0	1	0	0	2	0.60	6.00	0.43
Doddsia occidentalis	8	6	2	6	4	5.20	52.00	3.75
Eucapnopsis brevicauda								
Hesperoperla pacifica	0	9	0	3	1	2.60	26.00	1.87
Isoperla sp.								
Megarcys signata	0	0	0	1	0	0.20	2.00	0.14
Paraleuctra sp.								
Paraperla frontalis								
Perlodidae	0	1	0	0	0	0.20	2.00	0.14
Plumiperla diversa								
Podmosta/Prostoia sp.	4	2	3	19	11	7.80	78.00	5.62
Pteronarcella badia								
Sweltsa sp.	0	2	0	0	0	0.40	4.00	0.29
Taenionema sp.								
Zapada cinctipes								
Zapada sp.	1	0	0	0	0	0.20	2.00	0.14
TRICHOPTERA								
Arctopsyche grandis	12	62	51	52	6	36.60	366.00	26.37
Brachycentrus americanus	3	0	12	21	1	7.40	74.00	5.33
Culoptila sp.								
Glossosoma sp.	0	0	0	1	0	0.20	2.00	0.14
Hesperophylax sp.								
Hydropsyche sp.	0	0	0	1	0	0.20	2.00	0.14
Lepidostoma sp.	0	0	1	0	0	0.20	2.00	0.14
Limnephilidae								
Ochrotrichia sp.								
Oligophlebodes sp.								
Rhyacophila brunnea	0	0	0	1	0	0.20	2.00	0.14
Rhyacophila coloradensis								
Rhyacophila pellisa	2	1	0	0	0	0.60	6.00	0.43
Rhyacophila sp. A								

Station: RR-10A (Continued)

Taxon	Replicates					Mean	Avg N/ sq. m	Relative Abundance (%)
COLEOPTERA								
Heterlimnius corpulentus	0	1	1	4	1	1.40	14.00	1.01
Liodessus affinis								
Narpus concolor								
Optioservus sp.								
DIPTERA								
Atherix pachypus								
Bibiocephala grandis								
Brillia sp.	0	0	0	0	1	0.20	2.00	0.14
Ceratopogonidae								
Chelifera sp.	1	0	1	0	0	0.40	4.00	0.29
Cricotopus/Orthocladius sp.	0	1	1	0	0	0.40	4.00	0.29
Diamesa sp.	0	0	0	1	0	0.20	2.00	0.14
Dicranota sp.	4	12	3	5	3	5.40	54.00	3.89
Eukiefferiella sp.	0	0	0	1	1	0.40	4.00	0.29
Heleniella sp.								
Hesperoconopa sp.								
Hexatoma sp.								
Hydrobaenus sp.	0	2	0	0	0	0.40	4.00	0.29
Micropsectra sp.								
Oreogeton sp.								
Orthocladius (Symposiocladius) lignicola								
Pagastia sp.	1	1	0	1	0	0.60	6.00	0.43
Parametriocnemus sp.								
Paraphaenocladius sp.	8	64	13	13	22	24.00	240.00	17.29
Parorthocladius sp.								
Pedicia sp.								
Pericoma/Telmatoscopus sp.	1	0	0	0	0	0.20	2.00	0.14
Phaenopsectra sp.								
Polypedilum sp.								
Prosimulium sp.								
Pseudodiamesa sp.								
Rheocricotopus sp.								
Simulium sp.								
Tipula sp.								
Tipulidae	0	1	0	0	0	0.20	2.00	0.14
Tvetenia sp.								
Totals:	95	205	132	192	70	138.80	1388.00	100.00

Total Density (N/sq.m)	1388
Total Number of Taxa	36
Diversity ($\bar{d}$)	3.54

Station: RR-10A

Density By Order

TURBELLARIA	0
NEMATODA	0
OLIGOCHAETA	0
HYDRACARINA	22
EPHEMEROPTERA	390
PLECOPTERA	184
TRICHOPTERA	454
COLEOPTERA	14
DIPTERA	324
Totals	1388

Density By Order

TURBELLARIA	0.0
NEMATODA	0.0
OLIGOCHAETA	0.0
HYDRACARINA	1.6
EPHEMEROPTERA	28.1
PLECOPTERA	13.3
TRICHOPTERA	32.7
COLEOPTERA	1.0
DIPTERA	23.3
Totals	100.0

RED RIVER

Station: RR-10A
Sample Date: 21 December 1995

Taxon	Replicates 1	2	3	4	5	Mean	T-value	HBI
TURBELLARIA								
NEMATODA								
OLIGOCHAETA								
HYDRACARINA	2	0	5	4	0	2.20	10	0.16
EPHEMEROPTERA								
Ameletus sp.	0	1	0	0	0	0.20	4	0.01
Baetis tricaudatus	8	6	6	10	6	7.20	7	0.36
Drunella doddsi	9	0	10	4	2	5.00	0	0.00
Drunella grandis	25	15	17	26	2	17.00	2	0.24
Epeorus longimanus								
Ephemerella infrequens	0	0	0	0	1	0.20	4	0.01
Paraleptophlebia sp.								
Rhithrogena robusta	0	2	0	0	0	0.40	2	0.01
Rhithrogena sp.	6	11	6	17	5	9.00	2	0.13
PLECOPTERA								
Capniidae	0	4	0	1	1	1.20	3	0.03
Chloroperlidae	0	1	0	0	2	0.60	2	0.01
Doddsia occidentalis	8	6	2	6	4	5.20	2	0.07
Eucapnopsis brevicauda								
Hesperoperla pacifica	0	9	0	3	1	2.60	2	0.04
Isoperla sp.								
Megarcys signata	0	0	0	1	0	0.20	2	0.00
Paraleuctra sp.								
Paraperla frontalis								
Perlodidae	0	1	0	0	0	0.20	4	0.01
Plumiperla diversa								
Podmosta/Prostoia sp.	4	2	3	19	11	7.80	2	0.11
Pteronarcella badia								
Sweltsa sp.	0	2	0	0	0	0.40	2	0.01
Taenionema sp.								
Zapada cinctipes								
Zapada sp.	1	0	0	0	0	0.20	1	0.00
TRICHOPTERA								
Arctopsyche grandis	12	62	51	52	6	36.60	2	0.53
Brachycentrus americanus	3	0	12	21	1	7.40	2	0.11
Culoptila sp.								
Glossosoma sp.	0	0	0	1	0	0.20	2	0.00
Hesperophylax sp.								
Hydropsyche sp.	0	0	0	1	0	0.20	10	0.01
Lepidostoma sp.	0	0	1	0	0	0.20	2	0.00
Limnephilidae								
Ochrotrichia sp.								
Oligophlebodes sp.								
Rhyacophila brunnea	0	0	0	1	0	0.20	2	0.00
Rhyacophila coloradensis								
Rhyacophila pellisa	2	1	0	0	0	0.60	2	0.01
Rhyacophila sp. A								

Station: RR-10A

COLEOPTERA								
Heterlimnius corpulentus	0	1	1	4	1	1.40	10	0.10
Liodessus affinis								
Narpus concolor								
Optioservus sp.								
DIPTERA								
Atherix pachypus								
Bibiocephala grandis								
Brillia sp.	0	0	0	0	1	0.20	10	0.01
Ceratopogonidae								
Chelifera sp.	1	0	1	0	0	0.40	10	0.03
Cricotopus/Orthocladius sp.	0	1	1	0	0	0.40	10	0.03
Diamesa sp.	0	0	0	1	0	0.20	10	0.01
Dicranota sp.	4	12	3	5	3	5.40	2	0.08
Eukiefferiella sp.	0	0	0	1	1	0.40	10	0.03
Heleniella sp.								
Hesperoconopa sp.								
Hexatoma sp.								
Hydrobaenus sp.	0	2	0	0	0	0.40	10	0.03
Micropsectra sp.								
Oreogeton sp.								
Orthocladius (Symposiocladius) lignicola								
Pagastia sp.	1	1	0	1	0	0.60	10	0.04
Parametriocnemus sp.								
Paraphaenocladius sp.	8	64	13	13	22	24.00	10	1.73
Parorthocladius sp.								
Pedicia sp.								
Pericoma/Telmatoscopus sp.	1	0	0	0	0	0.20	3	0.00
Phaenopsectra sp.								
Polypedilum sp.								
Prosimulium sp.								
Pseudodiamesa sp.								
Rheocricotopus sp.								
Simulium sp.								
Tipula sp.								
Tipulidae	0	1	0	0	0	0.20	7	0.01
Tvetenia sp.								
Totals:	95	205	132	192	70	138.80		3.96

HBI	3.96
Scrapers	22.60
Filtering Collectors	44.20
Scrapers/Filtering Collectors	0.51
EPT Abundance	102.80
Chironomidae Abundance	26.20
EPT/Chironomidae	3.92
EPT Index	23
Shredders	9.80
Shredders/Total	0.07

RED RIVER

Station: RR-11
Sample Date: 21 December 1995

Taxon	Replicates 1	2	3	4	5	Mean	Avg N/ sq. m	Relative Abundance (%)
TURBELLARIA								
NEMATODA								
OLIGOCHAETA								
HYDRACARINA								
EPHEMEROPTERA								
Ameletus sp.								
Baetis tricaudatus	1	0	0	0	3	0.80	8.00	1.55
Drunella doddsi								
Drunella grandis	0	0	1	0	0	0.20	2.00	0.39
Epeorus longimanus								
Ephemerella infrequens								
Paraleptophlebia sp.								
Rhithrogena robusta								
Rhithrogena sp.	0	1	1	1	0	0.60	6.00	1.16
PLECOPTERA								
Capniidae	1	3	7	2	2	3.00	30.00	5.81
Chloroperlidae	0	0	0	1	0	0.20	2.00	0.39
Doddsia occidentalis	0	0	1	0	1	0.40	4.00	0.78
Eucapnopsis brevicauda								
Hesperoperla pacifica	0	0	0	0	1	0.20	2.00	0.39
Isoperla sp.								
Megarcys signata								
Paraleuctra sp.	1	0	0	0	0	0.20	2.00	0.39
Paraperla frontalis								
Perlodidae								
Plumiperla diversa								
Podmosta/Prostoia sp.	1	2	1	1	4	1.80	18.00	3.49
Pteronarcella badia								
Sweltsa sp.	0	1	0	0	0	0.20	2.00	0.39
Taenionema sp.								
Zapada cinctipes	0	0	1	0	0	0.20	2.00	0.39
Zapada sp.	0	0	1	2	1	0.80	8.00	1.55
TRICHOPTERA								
Arctopsyche grandis	3	3	1	4	12	4.60	46.00	8.91
Brachycentrus americanus	0	1	2	1	7	2.20	22.00	4.26
Culoptila sp.								
Glossosoma sp.								
Hesperophylax sp.								
Hydropsyche sp.								
Lepidostoma sp.								
Limnephilidae								
Ochrotrichia sp.								
Oligophlebodes sp.								
Rhyacophila brunnea								
Rhyacophila coloradensis								
Rhyacophila pellisa								
Rhyacophila sp. A								

Station: RR-11 (Continued)

Taxon	Replicates					Mean	Avg N/ sq. m	Relative Abundance (%)
COLEOPTERA								
Heterlimnius corpulentus								
Liodessus affinis								
Narpus concolor								
Optioservus sp.								
DIPTERA								
Atherix pachypus	0	0	1	0	0	0.20	2.00	0.39
Bibiocephala grandis								
Brillia sp.								
Ceratopogonidae								
Chelifera sp.								
Cricotopus/Orthocladius sp.								
Diamesa sp.								
Dicranota sp.	1	0	4	0	2	1.40	14.00	2.71
Eukiefferiella sp.								
Heleniella sp.								
Hesperoconopa sp.								
Hexatoma sp.								
Hydrobaenus sp.								
Micropsectra sp.								
Oreogeton sp.								
Orthocladius (Symposiocladius) lignicola								
Pagastia sp.								
Parametriocnemus sp.								
Paraphaenocladius sp.	19	9	18	85	41	34.40	344.00	66.67
Parorthocladius sp.								
Pedicia sp.								
Pericoma/Telmatoscopus sp.								
Phaenopsectra sp.								
Polypedilum sp.								
Prosimulium sp.	0	0	0	1	0	0.20	2.00	0.39
Pseudodiamesa sp.								
Rheocricotopus sp.								
Simulium sp.								
Tipula sp.								
Tipulidae								
Tvetenia sp.								
Totals:	27	20	39	98	74	51.60	516.00	100.00

Total Density (N/sq.m)	516
Total Number of Taxa	18
Diversity ($\bar{d}$)	2.01

Station: RR-11

Density By Order

TURBELLARIA	0
NEMATODA	0
OLIGOCHAETA	0
HYDRACARINA	0
EPHEMEROPTERA	16
PLECOPTERA	70
TRICHOPTERA	68
COLEOPTERA	0
DIPTERA	362
Totals	516

Density By Order

TURBELLARIA	0.0
NEMATODA	0.0
OLIGOCHAETA	0.0
HYDRACARINA	0.0
EPHEMEROPTERA	3.1
PLECOPTERA	13.6
TRICHOPTERA	13.2
COLEOPTERA	0.0
DIPTERA	70.2
Totals	100.0

RED RIVER

Station: RR-11
Sample Date: 21 December 1995

Taxon	Replicates 1	2	3	4	5	Mean	T-value	HBI
TURBELLARIA								
NEMATODA								
OLIGOCHAETA								
HYDRACARINA								
EPHEMEROPTERA								
Ameletus sp.								
Baetis tricaudatus	1	0	0	0	3	0.80	7	0.11
Drunella doddsi								
Drunella grandis	0	0	1	0	0	0.20	2	0.01
Epeorus longimanus								
Ephemerella infrequens								
Paraleptophlebia sp.								
Rhithrogena robusta								
Rhithrogena sp.	0	1	1	1	0	0.60	2	0.02
PLECOPTERA								
Capniidae	1	3	7	2	2	3.00	3	0.17
Chloroperlidae	0	0	0	1	0	0.20	2	0.01
Doddsia occidentalis	0	0	1	0	1	0.40	2	0.02
Eucapnopsis brevicauda								
Hesperoperla pacifica	0	0	0	0	1	0.20	2	0.01
Isoperla sp.								
Megarcys signata								
Paraleuctra sp.	1	0	0	0	0	0.20	2	0.01
Paraperla frontalis								
Perlodidae								
Plumiperla diversa								
Podmosta/Prostoia sp.	1	2	1	1	4	1.80	2	0.07
Pteronarcella badia								
Sweltsa sp.	0	1	0	0	0	0.20	2	0.01
Taenionema sp.								
Zapada cinctipes	0	0	1	0	0	0.20	1	0.00
Zapada sp.	0	0	1	2	1	0.80	1	0.02
TRICHOPTERA								
Arctopsyche grandis	3	3	1	4	12	4.60	2	0.18
Brachycentrus americanus	0	1	2	1	7	2.20	2	0.09
Culoptila sp.								
Glossosoma sp.								
Hesperophylax sp.								
Hydropsyche sp.								
Lepidostoma sp.								
Limnephilidae								
Ochrotrichia sp.								
Oligophlebodes sp.								
Rhyacophila brunnea								
Rhyacophila coloradensis								
Rhyacophila pellisa								
Rhyacophila sp. A								

Station: RR-11

COLEOPTERA								
Heterlimnius corpulentus								
Liodessus affinis								
Narpus concolor								
Optioservus sp.								
DIPTERA								
Atherix pachypus	0	0	1	0	0	0.20	2	0.01
Bibiocephala grandis								
Brillia sp.								
Ceratopogonidae								
Chelifera sp.								
Cricotopus/Orthocladius sp.								
Diamesa sp.								
Dicranota sp.	1	0	4	0	2	1.40	2	0.05
Eukiefferiella sp.								
Heleniella sp.								
Hesperoconopa sp.								
Hexatoma sp.								
Hydrobaenus sp.								
Micropsectra sp.								
Oreogeton sp.								
Orthocladius (Symposiocladius) lignicola								
Pagastia sp.								
Parametriocnemus sp.								
Paraphaenocladius sp.	19	9	18	85	41	34.40	10	6.67
Parorthocladius sp.								
Pedicia sp.								
Pericoma/Telmatoscopus sp.								
Phaenopsectra sp.								
Polypedilum sp.								
Prosimulium sp.	0	0	0	1	0	0.20	10	0.04
Pseudodiamesa sp.								
Rheocricotopus sp.								
Simulium sp.								
Tipula sp.								
Tipulidae								
Tvetenia sp.								
Totals:	27	20	39	98	74	51.60		7.48
HBI						7.48		
Scrapers						0.60		
Filtering Collectors						7.00		
Scrapers/Filtering Collectors						0.09		
EPT Abundance						15.40		
Chironomidae Abundance						34.40		
EPT/Chironomidae						0.45		
EPT Index						14		
Shredders						6.00		
Shredders/Total						0.12		

RED RIVER

Station: RR-13
Sample Date: 21 December 1995

Taxon	Replicates 1	2	3	4	5	Mean	Avg N/ sq. m	Relative Abundance (%)
TURBELLARIA								
NEMATODA								
OLIGOCHAETA								
HYDRACARINA	1	0	0	1	3	1.00	10.00	3.65
EPHEMEROPTERA								
Ameletus sp.								
Baetis tricaudatus	6	3	2	2	4	3.40	34.00	12.41
Drunella doddsi								
Drunella grandis	1	2	2	13	2	4.00	40.00	14.60
Epeorus longimanus								
Ephemerella infrequens								
Paraleptophlebia sp.								
Rhithrogena robusta								
Rhithrogena sp.	5	6	10	3	13	7.40	74.00	27.01
PLECOPTERA								
Capniidae	0	2	0	1	1	0.80	8.00	2.92
Chloroperlidae	0	0	0	1	0	0.20	2.00	0.73
Doddsia occidentalis								
Eucapnopsis brevicauda								
Hesperoperla pacifica								
Isoperla sp.								
Megarcys signata								
Paraleuctra sp.								
Paraperla frontalis								
Perlodidae								
Plumiperla diversa								
Podmosta/Prostoia sp.	0	0	1	0	0	0.20	2.00	0.73
Pteronarcella badia	0	1	0	0	0	0.20	2.00	0.73
Sweltsa sp.	0	0	0	0	1	0.20	2.00	0.73
Taenionema sp.								
Zapada cinctipes								
Zapada sp.								
TRICHOPTERA								
Arctopsyche grandis	4	3	3	1	0	2.20	22.00	8.03
Brachycentrus americanus	3	1	0	0	0	0.80	8.00	2.92
Culoptila sp.								
Glossosoma sp.								
Hesperophylax sp.								
Hydropsyche sp.	1	0	1	1	0	0.60	6.00	2.19
Lepidostoma sp.								
Limnephilidae								
Ochrotrichia sp.								
Oligophlebodes sp.								
Rhyacophila brunnea								
Rhyacophila coloradensis								
Rhyacophila pellisa								
Rhyacophila sp. A								

Station: RR-13 (Continued)

Taxon	Replicates					Mean	Avg N/ sq. m	Relative Abundance (%)
COLEOPTERA								
Heterlimnius corpulentus								
Liodessus affinis								
Narpus concolor								
Optioservus sp.								
DIPTERA								
Atherix pachypus	1	2	6	3	4	3.20	32.00	11.68
Bibiocephala grandis								
Brillia sp.								
Ceratopogonidae								
Chelifera sp.	0	1	0	0	0	0.20	2.00	0.73
Cricotopus/Orthocladius sp.								
Diamesa sp.								
Dicranota sp.	0	1	2	0	0	0.60	6.00	2.19
Eukiefferiella sp.								
Heleniella sp.								
Hesperoconopa sp.								
Hexatoma sp.								
Hydrobaenus sp.								
Micropsectra sp.								
Oreogeton sp.								
Orthocladius (Symposiocladius) lignicola								
Pagastia sp.								
Parametriocnemus sp.								
Paraphaenocladius sp.	3	1	5	1	1	2.20	22.00	8.03
Parorthocladius sp.								
Pedicia sp.								
Pericoma/Telmatoscopus sp.								
Phaenopsectra sp.								
Polypedilum sp.								
Prosimulium sp.								
Pseudodiamesa sp.								
Rheocricotopus sp.								
Simulium sp.								
Tipula sp.	0	0	1	0	0	0.20	2.00	0.73
Tipulidae								
Tvetenia sp.								
Totals:	25	23	33	27	29	27.40	274.00	100.00

Total Density (N/sq.m)	274
Total Number of Taxa	17
Diversity ($\bar{d}$)	3.26

Station: RR-13

Density By Order

TURBELLARIA	0
NEMATODA	0
OLIGOCHAETA	0
HYDRACARINA	10
EPHEMEROPTERA	148
PLECOPTERA	16
TRICHOPTERA	36
COLEOPTERA	0
DIPTERA	64
Totals	274

Density By Order

TURBELLARIA	0.0
NEMATODA	0.0
OLIGOCHAETA	0.0
HYDRACARINA	3.6
EPHEMEROPTERA	54.0
PLECOPTERA	5.8
TRICHOPTERA	13.1
COLEOPTERA	0.0
DIPTERA	23.4
Totals	100.0

RED RIVER

Station: RR-13
Sample Date: 21 December 1995

Taxon	Replicates 1	2	3	4	5	Mean	T-value	HBI
TURBELLARIA								
NEMATODA								
OLIGOCHAETA								
HYDRACARINA	1	0	0	1	3	1.00	10	0.36
EPHEMEROPTERA								
Ameletus sp.								
Baetis tricaudatus	6	3	2	2	4	3.40	7	0.87
Drunella doddsi								
Drunella grandis	1	2	2	13	2	4.00	2	0.29
Epeorus longimanus								
Ephemerella infrequens								
Paraleptophlebia sp.								
Rhithrogena robusta								
Rhithrogena sp.	5	6	10	3	13	7.40	2	0.54
PLECOPTERA								
Capniidae	0	2	0	1	1	0.80	3	0.09
Chloroperlidae	0	0	0	1	0	0.20	2	0.01
Doddsia occidentalis								
Eucapnopsis brevicauda								
Hesperoperla pacifica								
Isoperla sp.								
Megarcys signata								
Paraleuctra sp.								
Paraperla frontalis								
Perlodidae								
Plumiperla diversa								
Podmosta/Prostoia sp.	0	0	1	0	0	0.20	2	0.01
Pteronarcella badia	0	1	0	0	0	0.20	2	0.01
Sweltsa sp.	0	0	0	0	1	0.20	2	0.01
Taenionema sp.								
Zapada cinctipes								
Zapada sp.								
TRICHOPTERA								
Arctopsyche grandis	4	3	3	1	0	2.20	2	0.16
Brachycentrus americanus	3	1	0	0	0	0.80	2	0.06
Culoptila sp.								
Glossosoma sp.								
Hesperophylax sp.								
Hydropsyche sp.	1	0	1	1	0	0.60	10	0.22
Lepidostoma sp.								
Limnephilidae								
Ochrotrichia sp.								
Oligophlebodes sp.								
Rhyacophila brunnea								
Rhyacophila coloradensis								
Rhyacophila pellisa								
Rhyacophila sp. A								

Station: RR-13

COLEOPTERA								
Heterlimnius corpulentus								
Liodessus affinis								
Narpus concolor								
Optioservus sp.								
DIPTERA								
Atherix pachypus	1	2	6	3	4	3.20	2	0.23
Bibiocephala grandis								
Brillia sp.								
Ceratopogonidae								
Chelifera sp.	0	1	0	0	0	0.20	10	0.07
Cricotopus/Orthocladius sp.								
Diamesa sp.								
Dicranota sp.	0	1	2	0	0	0.60	2	0.04
Eukiefferiella sp.								
Heleniella sp.								
Hesperoconopa sp.								
Hexatoma sp.								
Hydrobaenus sp.								
Micropsectra sp.								
Oreogeton sp.								
Orthocladius (Symposiocladius) lignicola								
Pagastia sp.								
Parametriocnemus sp.								
Paraphaenocladius sp.	3	1	5	1	1	2.20	10	0.80
Parorthocladius sp.								
Pedicia sp.								
Pericoma/Telmatoscopus sp.								
Phaenopsectra sp.								
Polypedilum sp.								
Prosimulium sp.								
Pseudodiamesa sp.								
Rheocricotopus sp.								
Simulium sp.								
Tipula sp.	0	0	1	0	0	0.20	3	0.02
Tipulidae								
Tvetenia sp.								
Totals:	25	23	33	27	29	27.40		3.82

HBI	3.82
Scrapers	4.00
Filtering Collectors	3.60
Scrapers/Filtering Collectors	1.11
EPT Abundance	20.00
Chironomidae Abundance	2.20
EPT/Chironomidae	9.09
EPT Index	11
Shredders	1.40
Shredders/Total	0.05

RED RIVER

Station: RR-16
Sample Date: 20 December 1995

Taxon	Replicates 1	2	3	4	5	Mean	Avg N/ sq. m	Relative Abundance (%)
TURBELLARIA								
NEMATODA								
OLIGOCHAETA								
HYDRACARINA								
EPHEMEROPTERA								
Ameletus sp.								
Baetis tricaudatus	4	1	1	0	0	1.20	12.00	3.06
Drunella doddsi								
Drunella grandis	5	0	0	1	2	1.60	16.00	4.08
Epeorus longimanus								
Ephemerella infrequens								
Paraleptophlebia sp.								
Rhithrogena robusta								
Rhithrogena sp.	20	25	5	11	7	13.60	136.00	34.69
PLECOPTERA								
Capniidae	0	1	0	4	1	1.20	12.00	3.06
Chloroperlidae	0	1	0	0	0	0.20	2.00	0.51
Doddsia occidentalis								
Eucapnopsis brevicauda								
Hesperoperla pacifica								
Isoperla sp.								
Megarcys signata								
Paraleuctra sp.								
Paraperla frontalis								
Perlodidae								
Plumiperla diversa								
Podmosta/Prostoia sp.	0	1	0	0	0	0.20	2.00	0.51
Pteronarcella badia	0	0	0	9	3	2.40	24.00	6.12
Sweltsa sp.								
Taenionema sp.								
Zapada cinctipes	0	0	0	3	0	0.60	6.00	1.53
Zapada sp.								
TRICHOPTERA								
Arctopsyche grandis	0	0	2	2	0	0.80	8.00	2.04
Brachycentrus americanus	0	0	0	1	2	0.60	6.00	1.53
Culoptila sp.								
Glossosoma sp.								
Hesperophylax sp.								
Hydropsyche sp.								
Lepidostoma sp.								
Limnephilidae								
Ochrotrichia sp.								
Oligophlebodes sp.								
Rhyacophila brunnea								
Rhyacophila coloradensis								
Rhyacophila pellisa	1	0	0	0	0	0.20	2.00	0.51
Rhyacophila sp. A								

Station: RR-16 (Continued)

Taxon	Replicates					Mean	Avg N/ sq. m	Relative Abundance (%)
COLEOPTERA								
Heterlimnius corpulentus								
Liodessus affinis								
Narpus concolor	0	0	0	0	1	0.20	2.00	0.51
Optioservus sp.								
DIPTERA								
Atherix pachypus	1	0	0	0	0	0.20	2.00	0.51
Bibiocephala grandis								
Brillia sp.	0	0	0	1	0	0.20	2.00	0.51
Ceratopogonidae								
Chelifera sp.								
Cricotopus/Orthocladius sp.								
Diamesa sp.								
Dicranota sp.	0	0	0	4	2	1.20	12.00	3.06
Eukiefferiella sp.								
Heleniella sp.								
Hesperoconopa sp.								
Hexatoma sp.								
Hydrobaenus sp.								
Micropsectra sp.								
Oreogeton sp.								
Orthocladius (Symposiocladius) lignicola								
Pagastia sp.								
Parametriocnemus sp.								
Paraphaenocladius sp.	3	2	1	29	39	14.80	148.00	37.76
Parorthocladius sp.								
Pedicia sp.								
Pericoma/Telmatoscopus sp.								
Phaenopsectra sp.								
Polypedilum sp.								
Prosimulium sp.								
Pseudodiamesa sp.								
Rheocricotopus sp.								
Simulium sp.								
Tipula sp.								
Tipulidae								
Tvetenia sp.								
Totals:	34	31	9	65	57	39.20	392.00	100.00

Total Density (N/sq.m)	392
Total Number of Taxa	16
Diversity ($\bar{d}$)	2.49

Station: RR-16

Density By Order

TURBELLARIA	0
NEMATODA	0
OLIGOCHAETA	0
HYDRACARINA	0
EPHEMEROPTERA	164
PLECOPTERA	46
TRICHOPTERA	16
COLEOPTERA	2
DIPTERA	164
Totals	392

Density By Order

TURBELLARIA	0.0
NEMATODA	0.0
OLIGOCHAETA	0.0
HYDRACARINA	0.0
EPHEMEROPTERA	41.8
PLECOPTERA	11.7
TRICHOPTERA	4.1
COLEOPTERA	0.5
DIPTERA	41.8
Totals	100.0

RED RIVER

Station: RR-16
Sample Date: 20 December 1995

Taxon	Replicates 1	2	3	4	5	Mean	T-value	HBI
TURBELLARIA								
NEMATODA								
OLIGOCHAETA								
HYDRACARINA								
EPHEMEROPTERA								
Ameletus sp.								
Baetis tricaudatus	4	1	1	0	0	1.20	7	0.21
Drunella doddsi								
Drunella grandis	5	0	0	1	2	1.60	2	0.08
Epeorus longimanus								
Ephemerella infrequens								
Paraleptophlebia sp.								
Rhithrogena robusta								
Rhithrogena sp.	20	25	5	11	7	13.60	2	0.69
PLECOPTERA								
Capniidae	0	1	0	4	1	1.20	3	0.09
Chloroperlidae	0	1	0	0	0	0.20	2	0.01
Doddsia occidentalis								
Eucapnopsis brevicauda								
Hesperoperla pacifica								
Isoperla sp.								
Megarcys signata								
Paraleuctra sp.								
Paraperla frontalis								
Perlodidae								
Plumiperla diversa								
Podmosta/Prostoia sp.	0	1	0	0	0	0.20	2	0.01
Pteronarcella badia	0	0	0	9	3	2.40	2	0.12
Sweltsa sp.								
Taenionema sp.								
Zapada cinctipes	0	0	0	3	0	0.60	1	0.02
Zapada sp.								
TRICHOPTERA								
Arctopsyche grandis	0	0	2	2	0	0.80	2	0.04
Brachycentrus americanus	0	0	0	1	2	0.60	2	0.03
Culoptila sp.								
Glossosoma sp.								
Hesperophylax sp.								
Hydropsyche sp.								
Lepidostoma sp.								
Limnephilidae								
Ochrotrichia sp.								
Oligophlebodes sp.								
Rhyacophila brunnea								
Rhyacophila coloradensis								
Rhyacophila pellisa	1	0	0	0	0	0.20	2	0.01
Rhyacophila sp. A								

Station: RR-16

COLEOPTERA								
Heterlimnius corpulentus								
Liodessus affinis								
Narpus concolor	0	0	0	0	1	0.20	10	0.05
Optioservus sp.								
DIPTERA								
Atherix pachypus	1	0	0	0	0	0.20	2	0.01
Bibiocephala grandis								
Brillia sp.	0	0	0	1	0	0.20	10	0.05
Ceratopogonidae								
Chelifera sp.								
Cricotopus/Orthocladius sp.								
Diamesa sp.								
Dicranota sp.	0	0	0	4	2	1.20	2	0.06
Eukiefferiella sp.								
Heleniella sp.								
Hesperoconopa sp.								
Hexatoma sp.								
Hydrobaenus sp.								
Micropsectra sp.								
Oreogeton sp.								
Orthocladius (Symposiocladius) lignicola								
Pagastia sp.								
Parametriocnemus sp.								
Paraphaenocladius sp.	3	2	1	29	39	14.80	10	3.78
Parorthocladius sp.								
Pedicia sp.								
Pericoma/Telmatoscopus sp.								
Phaenopsectra sp.								
Polypedilum sp.								
Prosimulium sp.								
Pseudodiamesa sp.								
Rheocricotopus sp.								
Simulium sp.								
Tipula sp.								
Tipulidae								
Tvetenia sp.								
Totals:	34	31	9	65	57	39.20		5.27

HBI	5.27
Scrapers	1.60
Filtering Collectors	1.40
Scrapers/Filtering Collectors	1.14
EPT Abundance	22.60
Chironomidae Abundance	15.00
EPT/Chironomidae	1.51
EPT Index	11
Shredders	4.60
Shredders/Total	0.12

RED RIVER

Station: LR-1
Sample Date: 20 December 1995

Taxon	Replicates 1	2	3	4	5	Mean	Avg N/ sq. m	Relative Abundance (%)
TURBELLARIA								
NEMATODA								
OLIGOCHAETA								
HYDRACARINA								
EPHEMEROPTERA								
Ameletus sp.								
Baetis tricaudatus	81	93	103	38	62	75.40	754.00	33.66
Drunella doddsi	1	2	2	1	0	1.20	12.00	0.54
Drunella grandis	0	3	2	2	2	1.80	18.00	0.80
Epeorus longimanus								
Ephemerella infrequens								
Paraleptophlebia sp.								
Rhithrogena robusta								
Rhithrogena sp.	69	44	58	24	7	40.40	404.00	18.04
PLECOPTERA								
Capniidae								
Chloroperlidae	0	0	0	1	0	0.20	2.00	0.09
Doddsia occidentalis	1	2	1	0	0	0.80	8.00	0.36
Eucapnopsis brevicauda								
Hesperoperla pacifica								
Isoperla sp.								
Megarcys signata								
Paraleuctra sp.								
Paraperla frontalis								
Perlodidae								
Plumiperla diversa								
Podmosta/Prostoia sp.	2	2	0	1	1	1.20	12.00	0.54
Pteronarcella badia	1	5	0	0	1	1.40	14.00	0.63
Sweltsa sp.								
Taenionema sp.								
Zapada cinctipes	0	4	0	0	0	0.80	8.00	0.36
Zapada sp.								
TRICHOPTERA								
Arctopsyche grandis	5	5	5	2	3	4.00	40.00	1.79
Brachycentrus americanus	1	1	4	3	0	1.80	18.00	0.80
Culoptila sp.								
Glossosoma sp.								
Hesperophylax sp.								
Hydropsyche sp.	5	1	1	0	0	1.40	14.00	0.63
Lepidostoma sp.								
Limnephilidae								
Ochrotrichia sp.								
Oligophlebodes sp.								
Rhyacophila brunnea								
Rhyacophila coloradensis								
Rhyacophila pellisa								
Rhyacophila sp. A								

Station: LR-1 (Continued)

Taxon	Replicates					Mean	Avg N/ sq. m	Relative Abundance (%)
COLEOPTERA								
Heterlimnius corpulentus								
Liodessus affinis								
Narpus concolor								
Optioservus sp.	1	0	0	0	0	0.20	2.00	0.09
DIPTERA								
Atherix pachypus	9	8	9	5	2	6.60	66.00	2.95
Bibiocephala grandis								
Brillia sp.	0	1	0	0	0	0.20	2.00	0.09
Ceratopogonidae								
Chelifera sp.	1	0	0	1	0	0.40	4.00	0.18
Cricotopus/Orthocladius sp.	3	6	1	1	0	2.20	22.00	0.98
Diamesa sp.	5	3	7	2	0	3.40	34.00	1.52
Dicranota sp.	1	9	1	0	0	2.20	22.00	0.98
Eukiefferiella sp.								
Heleniella sp.								
Hesperoconopa sp.								
Hexatoma sp.	2	0	0	0	0	0.40	4.00	0.18
Hydrobaenus sp.								
Micropsectra sp.								
Oreogeton sp.								
Orthocladius (Symposiocladius) lignicola								
Pagastia sp.								
Parametriocnemus sp.								
Paraphaenocladius sp.	9	235	122	14	9	77.80	778.00	34.73
Parorthocladius sp.								
Pedicia sp.	0	0	1	0	0	0.20	2.00	0.09
Pericoma/Telmatoscopus sp.								
Phaenopsectra sp.								
Polypedilum sp.								
Prosimulium sp.								
Pseudodiamesa sp.								
Rheocricotopus sp.								
Simulium sp.								
Tipula sp.								
Tipulidae								
Tvetenia sp.								
Totals:	197	424	317	95	87	224.00	2240.00	100.00

Total Density (N/sq.m)	2240
Total Number of Taxa	22
Diversity ($\bar{d}$)	2.39

Station: LR-1

Density By Order

TURBELLARIA	0
NEMATODA	0
OLIGOCHAETA	0
HYDRACARINA	0
EPHEMEROPTERA	1188
PLECOPTERA	44
TRICHOPTERA	72
COLEOPTERA	2
DIPTERA	934
Totals	2240

Density By Order

TURBELLARIA	0.0
NEMATODA	0.0
OLIGOCHAETA	0.0
HYDRACARINA	0.0
EPHEMEROPTERA	53.0
PLECOPTERA	2.0
TRICHOPTERA	3.2
COLEOPTERA	0.1
DIPTERA	41.7
Totals	100.0

RED RIVER

Station: LR-1
Sample Date: 20 December 1995

Taxon	Replicates 1	2	3	4	5	Mean	T-value	HBI
TURBELLARIA								
NEMATODA								
OLIGOCHAETA								
HYDRACARINA								
EPHEMEROPTERA								
Ameletus sp.								
Baetis tricaudatus	81	93	103	38	62	75.40	7	2.36
Drunella doddsi	1	2	2	1	0	1.20	0	0.00
Drunella grandis	0	3	2	2	2	1.80	2	0.02
Epeorus longimanus								
Ephemerella infrequens								
Paraleptophlebia sp.								
Rhithrogena robusta								
Rhithrogena sp.	69	44	58	24	7	40.40	2	0.36
PLECOPTERA								
Capniidae								
Chloroperlidae	0	0	0	1	0	0.20	2	0.00
Doddsia occidentalis	1	2	1	0	0	0.80	2	0.01
Eucapnopsis brevicauda								
Hesperoperla pacifica								
Isoperla sp.								
Megarcys signata								
Paraleuctra sp.								
Paraperla frontalis								
Perlodidae								
Plumiperla diversa								
Podmosta/Prostoia sp.	2	2	0	1	1	1.20	2	0.01
Pteronarcella badia	1	5	0	0	1	1.40	2	0.01
Sweltsa sp.								
Taenionema sp.								
Zapada cinctipes	0	4	0	0	0	0.80	1	0.00
Zapada sp.								
TRICHOPTERA								
Arctopsyche grandis	5	5	5	2	3	4.00	2	0.04
Brachycentrus americanus	1	1	4	3	0	1.80	2	0.02
Culoptila sp.								
Glossosoma sp.								
Hesperophylax sp.								
Hydropsyche sp.	5	1	1	0	0	1.40	10	0.06
Lepidostoma sp.								
Limnephilidae								
Ochrotrichia sp.								
Oligophlebodes sp.								
Rhyacophila brunnea								
Rhyacophila coloradensis								
Rhyacophila pellisa								
Rhyacophila sp. A								

Station: LR-1

COLEOPTERA								
Heterlimnius corpulentus								
Liodessus affinis								
Narpus concolor								
Optioservus sp.	1	0	0	0	0	0.20	10	0.01
DIPTERA								
Atherix pachypus	9	8	9	5	2	6.60	2	0.06
Bibiocephala grandis								
Brillia sp.	0	1	0	0	0	0.20	10	0.01
Ceratopogonidae								
Chelifera sp.	1	0	0	1	0	0.40	10	0.02
Cricotopus/Orthocladius sp.	3	6	1	1	0	2.20	10	0.10
Diamesa sp.	5	3	7	2	0	3.40	10	0.15
Dicranota sp.	1	9	1	0	0	2.20	2	0.02
Eukiefferiella sp.								
Heleniella sp.								
Hesperoconopa sp.								
Hexatoma sp.	2	0	0	0	0	0.40	3	0.01
Hydrobaenus sp.								
Micropsectra sp.								
Oreogeton sp.								
Orthocladius (Symposiocladius) lignicola								
Pagastia sp.								
Parametriocnemus sp.								
Paraphaenocladius sp.	9	235	122	14	9	77.80	10	3.47
Parorthocladius sp.								
Pedicia sp.	0	0	1	0	0	0.20	10	0.01
Pericoma/Telmatoscopus sp.								
Phaenopsectra sp.								
Polypedilum sp.								
Prosimulium sp.								
Pseudodiamesa sp.								
Rheocricotopus sp.								
Simulium sp.								
Tipula sp.								
Tipulidae								
Tvetenia sp.								
Totals:	197	424	317	95	87	224.00		6.73

HBI	6.73
Scrapers	2.80
Filtering Collectors	7.20
Scrapers/Filtering Collectors	0.39
EPT Abundance	130.40
Chironomidae Abundance	83.60
EPT/Chironomidae	1.56
EPT Index	12
Shredders	3.60
Shredders/Total	0.02

RED RIVER

Station: LR-11A
Sample Date: 20 December 1995

Taxon	Replicates 1	2	3	4	5	Mean	Avg N/ sq. m	Relative Abundance (%)
TURBELLARIA	1	0	0	0	0	0.20	2.00	0.06
NEMATODA	0	0	1	0	2	0.60	6.00	0.18
OLIGOCHAETA								
HYDRACARINA								
EPHEMEROPTERA								
Ameletus sp.								
Baetis tricaudatus	150	79	261	162	334	197.20	1972.00	58.94
Drunella doddsi	1	1	1	1	1	1.00	10.00	0.30
Drunella grandis	11	2	4	5	11	6.60	66.00	1.97
Epeorus longimanus								
Ephemerella infrequens								
Paraleptophlebia sp.								
Rhithrogena robusta								
Rhithrogena sp.	52	9	19	26	77	36.60	366.00	10.94
PLECOPTERA								
Capniidae	7	4	6	2	1	4.00	40.00	1.20
Chloroperlidae	2	2	0	0	0	0.80	8.00	0.24
Doddsia occidentalis	2	1	1	0	2	1.20	12.00	0.36
Eucapnopsis brevicauda								
Hesperoperla pacifica								
Isoperla sp.								
Megarcys signata								
Paraleuctra sp.								
Paraperla frontalis								
Perlodidae	0	0	0	1	0	0.20	2.00	0.06
Plumiperla diversa								
Podmosta/Prostoia sp.	3	2	15	9	6	7.00	70.00	2.09
Pteronarcella badia	7	1	1	1	1	2.20	22.00	0.66
Sweltsa sp.								
Taenionema sp.								
Zapada cinctipes	0	0	0	0	2	0.40	4.00	0.12
Zapada sp.								
TRICHOPTERA								
Arctopsyche grandis	7	1	4	9	6	5.40	54.00	1.61
Brachycentrus americanus	2	0	2	7	20	6.20	62.00	1.85
Culoptila sp.								
Glossosoma sp.								
Hesperophylax sp.								
Hydropsyche sp.	4	0	2	4	12	4.40	44.00	1.32
Lepidostoma sp.								
Limnephilidae								
Ochrotrichia sp.								
Oligophlebodes sp.								
Rhyacophila brunnea								
Rhyacophila coloradensis	0	0	1	0	0	0.20	2.00	0.06
Rhyacophila pellisa								
Rhyacophila sp. A	2	0	2	0	1	1.00	10.00	0.30

Station: LR-11A (Continued)

Taxon	Replicates					Mean	Avg N/ sq. m	Relative Abundance (%)
COLEOPTERA								
Heterlimnius corpulentus								
Liodessus affinis								
Narpus concolor								
Optioservus sp.	1	0	0	0	0	0.20	2.00	0.06
DIPTERA								
Atherix pachypus	15	2	6	8	5	7.20	72.00	2.15
Bibiocephala grandis								
Brillia sp.								
Ceratopogonidae	0	0	0	1	0	0.20	2.00	0.06
Chelifera sp.	0	1	1	0	0	0.40	4.00	0.12
Cricotopus/Orthocladius sp.	5	2	19	7	8	8.20	82.00	2.45
Diamesa sp.	27	7	24	3	27	17.60	176.00	5.26
Dicranota sp.	2	0	0	0	1	0.60	6.00	0.18
Eukiefferiella sp.	1	0	7	2	3	2.60	26.00	0.78
Heleniella sp.								
Hesperoconopa sp.								
Hexatoma sp.	1	3	2	0	0	1.20	12.00	0.36
Hydrobaenus sp.								
Micropsectra sp.								
Oreogeton sp.								
Orthocladius (Symposiocladius) lignicola								
Pagastia sp.								
Parametriocnemus sp.								
Paraphaenocladius sp.	47	5	10	10	33	21.00	210.00	6.28
Parorthocladius sp.								
Pedicia sp.								
Pericoma/Telmatoscopus sp.								
Phaenopsectra sp.								
Polypedilum sp.								
Prosimulium sp.								
Pseudodiamesa sp.								
Rheocricotopus sp.								
Simulium sp.	0	0	0	0	1	0.20	2.00	0.06
Tipula sp.								
Tipulidae								
Tvetenia sp.								
Totals:	350	122	389	258	554	334.60	3346.00	100.00

Total Density (N/sq.m)	3346
Total Number of Taxa	29
Diversity ($\bar{d}$)	2.44

Station: LR-11A

Density By Order

TURBELLARIA	2
NEMATODA	6
OLIGOCHAETA	0
HYDRACARINA	0
EPHEMEROPTERA	2414
PLECOPTERA	158
TRICHOPTERA	172
COLEOPTERA	2
DIPTERA	592
Totals	3346

Density By Order

TURBELLARIA	0.1
NEMATODA	0.2
OLIGOCHAETA	0.0
HYDRACARINA	0.0
EPHEMEROPTERA	72.1
PLECOPTERA	4.7
TRICHOPTERA	5.1
COLEOPTERA	0.1
DIPTERA	17.7
Totals	100.0

RED RIVER

Station: LR-11A
Sample Date: 20 December 1995

Taxon	Replicates 1	2	3	4	5	Mean	T-value	HBI
TURBELLARIA	1	0	0	0	0	0.20	10	0.01
NEMATODA	0	0	1	0	2	0.60	10	0.02
OLIGOCHAETA								
HYDRACARINA								
EPHEMEROPTERA								
Ameletus sp.								
Baetis tricaudatus	150	79	261	162	334	197.20	7	4.13
Drunella doddsi	1	1	1	1	1	1.00	0	0.00
Drunella grandis	11	2	4	5	11	6.60	2	0.04
Epeorus longimanus								
Ephemerella infrequens								
Paraleptophlebia sp.								
Rhithrogena robusta								
Rhithrogena sp.	52	9	19	26	77	36.60	2	0.22
PLECOPTERA								
Capniidae	7	4	6	2	1	4.00	3	0.04
Chloroperlidae	2	2	0	0	0	0.80	2	0.00
Doddsia occidentalis	2	1	1	0	2	1.20	2	0.01
Eucapnopsis brevicauda								
Hesperoperla pacifica								
Isoperla sp.								
Megarcys signata								
Paraleuctra sp.								
Paraperla frontalis								
Perlodidae	0	0	0	1	0	0.20	4	0.00
Plumiperla diversa								
Podmosta/Prostoia sp.	3	2	15	9	6	7.00	2	0.04
Pteronarcella badia	7	1	1	1	1	2.20	2	0.01
Sweltsa sp.								
Taenionema sp.								
Zapada cinctipes	0	0	0	0	2	0.40	1	0.00
Zapada sp.								
TRICHOPTERA								
Arctopsyche grandis	7	1	4	9	6	5.40	2	0.03
Brachycentrus americanus	2	0	2	7	20	6.20	2	0.04
Culoptila sp.								
Glossosoma sp.								
Hesperophylax sp.								
Hydropsyche sp.	4	0	2	4	12	4.40	10	0.13
Lepidostoma sp.								
Limnephilidae								
Ochrotrichia sp.								
Oligophlebodes sp.								
Rhyacophila brunnea								
Rhyacophila coloradensis	0	0	1	0	0	0.20	2	0.00
Rhyacophila pellisa								
Rhyacophila sp. A	2	0	2	0	1	1.00	2	0.01

Station: LR-11A

COLEOPTERA								
Heterlimnius corpulentus								
Liodessus affinis								
Narpus concolor								
Optioservus sp.	1	0	0	0	0	0.20	10	0.01
DIPTERA								
Atherix pachypus	15	2	6	8	5	7.20	2	0.04
Bibiocephala grandis								
Brillia sp.								
Ceratopogonidae	0	0	0	1	0	0.20	10	0.01
Chelifera sp.	0	1	1	0	0	0.40	10	0.01
Cricotopus/Orthocladius sp.	5	2	19	7	8	8.20	10	0.25
Diamesa sp.	27	7	24	3	27	17.60	10	0.53
Dicranota sp.	2	0	0	0	1	0.60	2	0.00
Eukiefferiella sp.	1	0	7	2	3	2.60	10	0.08
Heleniella sp.								
Hesperoconopa sp.								
Hexatoma sp.	1	3	2	0	0	1.20	3	0.01
Hydrobaenus sp.								
Micropsectra sp.								
Oreogeton sp.								
Orthocladius (Symposiocladius) lignicola								
Pagastia sp.								
Parametriocnemus sp.								
Paraphaenocladius sp.	47	5	10	10	33	21.00	10	0.63
Parorthocladius sp.								
Pedicia sp.								
Pericoma/Telmatoscopus sp.								
Phaenopsectra sp.								
Polypedilum sp.								
Prosimulium sp.								
Pseudodiamesa sp.								
Rheocricotopus sp.								
Simulium sp.	0	0	0	0	1	0.20	10	0.01
Tipula sp.								
Tipulidae								
Tvetenia sp.								
Totals:	350	122	389	258	554	334.60		6.29

HBI	6.29
Scrapers	8.00
Filtering Collectors	16.20
Scrapers/Filtering Collectors	0.49
EPT Abundance	274.40
Chironomidae Abundance	49.40
EPT/Chironomidae	5.55
EPT Index	16
Shredders	13.60
Shredders/Total	0.04

RED RIVER

Station: LR-16
Sample Date: 21 December 1995

Taxon	Replicates 1	2	3	4	5	Mean	Avg N/ sq. m	Relative Abundance (%)
TURBELLARIA								
NEMATODA	1	4	3	1	2	2.20	22.00	0.58
OLIGOCHAETA	0	0	1	0	0	0.20	2.00	0.05
HYDRACARINA	2	0	0	1	0	0.60	6.00	0.16
EPHEMEROPTERA								
Ameletus sp.								
Baetis tricaudatus	232	294	216	269	293	260.80	2608.00	68.17
Drunella doddsi								
Drunella grandis	2	0	6	3	5	3.20	32.00	0.84
Epeorus longimanus								
Ephemerella infrequens								
Paraleptophlebia sp.								
Rhithrogena robusta								
Rhithrogena sp.	44	55	25	12	31	33.40	334.00	8.73
PLECOPTERA								
Capniidae	1	7	5	4	2	3.80	38.00	0.99
Chloroperlidae	0	0	2	1	1	0.80	8.00	0.21
Doddsia occidentalis								
Eucapnopsis brevicauda	1	0	0	0	0	0.20	2.00	0.05
Hesperoperla pacifica								
Isoperla sp.								
Megarcys signata								
Paraleuctra sp.								
Paraperla frontalis	2	0	0	0	0	0.40	4.00	0.10
Perlodidae								
Plumiperla diversa								
Podmosta/Prostoia sp.	5	4	5	4	4	4.40	44.00	1.15
Pteronarcella badia	7	5	7	1	6	5.20	52.00	1.36
Sweltsa sp.								
Taenionema sp.								
Zapada cinctipes								
Zapada sp.								
TRICHOPTERA								
Arctopsyche grandis	7	6	8	12	8	8.20	82.00	2.14
Brachycentrus americanus	5	8	7	10	6	7.20	72.00	1.88
Culoptila sp.								
Glossosoma sp.								
Hesperophylax sp.								
Hydropsyche sp.	1	4	8	7	6	5.20	52.00	1.36
Lepidostoma sp.	0	0	0	1	0	0.20	2.00	0.05
Limnephilidae								
Ochrotrichia sp.								
Oligophlebodes sp.								
Rhyacophila brunnea								
Rhyacophila coloradensis								
Rhyacophila pellisa								
Rhyacophila sp. A	2	3	3	6	3	3.40	34.00	0.89

Station: LR-16 (Continued)

Taxon	Replicates					Mean	Avg N/ sq. m	Relative Abundance (%)
COLEOPTERA								
Heterlimnius corpulentus								
Liodessus affinis	0	0	0	0	1	0.20	2.00	0.05
Narpus concolor	2	0	0	0	0	0.40	4.00	0.10
Optioservus sp.	1	1	0	0	1	0.60	6.00	0.16
DIPTERA								
Atherix pachypus	14	12	11	9	11	11.40	114.00	2.98
Bibiocephala grandis								
Brillia sp.	0	0	0	0	1	0.20	2.00	0.05
Ceratopogonidae								
Chelifera sp.	0	0	1	1	0	0.40	4.00	0.10
Cricotopus/Orthocladius sp.	8	4	4	4	3	4.60	46.00	1.20
Diamesa sp.	1	2	3	0	4	2.00	20.00	0.52
Dicranota sp.	0	2	1	0	2	1.00	10.00	0.26
Eukiefferiella sp.	0	3	1	3	6	2.60	26.00	0.68
Heleniella sp.	0	0	0	1	0	0.20	2.00	0.05
Hesperoconopa sp.	0	0	0	2	1	0.60	6.00	0.16
Hexatoma sp.	1	0	0	0	0	0.20	2.00	0.05
Hydrobaenus sp.								
Micropsectra sp.								
Oreogeton sp.								
Orthocladius (Symposiocladius) lignicola								
Pagastia sp.	0	0	0	0	1	0.20	2.00	0.05
Parametriocnemus sp.								
Paraphaenocladius sp.	34	14	11	10	22	18.20	182.00	4.76
Parorthocladius sp.								
Pedicia sp.								
Pericoma/Telmatoscopus sp.								
Phaenopsectra sp.	0	0	0	0	1	0.20	2.00	0.05
Polypedilum sp.								
Prosimulium sp.								
Pseudodiamesa sp.								
Rheocricotopus sp.								
Simulium sp.								
Tipula sp.								
Tipulidae								
Tvetenia sp.	1	0	0	0	0	0.20	2.00	0.05
Totals:	374	428	328	362	421	382.60	3826.00	100.00

Total Density (N/sq.m)	3826
Total Number of Taxa	34
Diversity ($\bar{d}$)	2.08

Station: LR-16

Density By Order

TURBELLARIA	0
NEMATODA	22
OLIGOCHAETA	2
HYDRACARINA	6
EPHEMEROPTERA	2974
PLECOPTERA	148
TRICHOPTERA	242
COLEOPTERA	12
DIPTERA	420
Totals	3826

Density By Order

TURBELLARIA	0.0
NEMATODA	0.6
OLIGOCHAETA	0.1
HYDRACARINA	0.2
EPHEMEROPTERA	77.7
PLECOPTERA	3.9
TRICHOPTERA	6.3
COLEOPTERA	0.3
DIPTERA	11.0
Totals	100.0

RED RIVER

Station: LR-16
Sample Date: 21 December 1995

Taxon	Replicates 1	2	3	4	5	Mean	T-value	HBI
TURBELLARIA								
NEMATODA	1	4	3	1	2	2.20	10	0.06
OLIGOCHAETA	0	0	1	0	0	0.20	10	0.01
HYDRACARINA	2	0	0	1	0	0.60	10	0.02
EPHEMEROPTERA								
Ameletus sp.								
Baetis tricaudatus	232	294	216	269	293	260.80	7	4.77
Drunella doddsi								
Drunella grandis	2	0	6	3	5	3.20	2	0.02
Epeorus longimanus								
Ephemerella infrequens								
Paraleptophlebia sp.								
Rhithrogena robusta								
Rhithrogena sp.	44	55	25	12	31	33.40	2	0.17
PLECOPTERA								
Capniidae	1	7	5	4	2	3.80	3	0.03
Chloroperlidae	0	0	2	1	1	0.80	2	0.00
Doddsia occidentalis								
Eucapnopsis brevicauda	1	0	0	0	0	0.20	2	0.00
Hesperoperla pacifica								
Isoperla sp.								
Megarcys signata								
Paraleuctra sp.								
Paraperla frontalis	2	0	0	0	0	0.40	2	0.00
Perlodidae								
Plumiperla diversa								
Podmosta/Prostoia sp.	5	4	5	4	4	4.40	2	0.02
Pteronarcella badia	7	5	7	1	6	5.20	2	0.03
Sweltsa sp.								
Taenionema sp.								
Zapada cinctipes								
Zapada sp.								
TRICHOPTERA								
Arctopsyche grandis	7	6	8	12	8	8.20	2	0.04
Brachycentrus americanus	5	8	7	10	6	7.20	2	0.04
Culoptila sp.								
Glossosoma sp.								
Hesperophylax sp.								
Hydropsyche sp.	1	4	8	7	6	5.20	10	0.14
Lepidostoma sp.	0	0	0	1	0	0.20	2	0.00
Limnephilidae								
Ochrotrichia sp.								
Oligophlebodes sp.								
Rhyacophila brunnea								
Rhyacophila coloradensis								
Rhyacophila pellisa								
Rhyacophila sp. A	2	3	3	6	3	3.40	2	0.02

Station: LR-16

COLEOPTERA								
Heterlimnius corpulentus								
Liodessus affinis	0	0	0	0	1	0.20	7	0.00
Narpus concolor	2	0	0	0	0	0.40	10	0.01
Optioservus sp.	1	1	0	0	1	0.60	10	0.02
DIPTERA								
Atherix pachypus	14	12	11	9	11	11.40	2	0.06
Bibiocephala grandis								
Brillia sp.	0	0	0	0	1	0.20	10	0.01
Ceratopogonidae								
Chelifera sp.	0	0	1	1	0	0.40	10	0.01
Cricotopus/Orthocladius sp.	8	4	4	4	3	4.60	10	0.12
Diamesa sp.	1	2	3	0	4	2.00	10	0.05
Dicranota sp.	0	2	1	0	2	1.00	2	0.01
Eukiefferiella sp.	0	3	1	3	6	2.60	10	0.07
Heleniella sp.	0	0	0	1	0	0.20	10	0.01
Hesperoconopa sp.	0	0	0	2	1	0.60	7	0.01
Hexatoma sp.	1	0	0	0	0	0.20	3	0.00
Hydrobaenus sp.								
Micropsectra sp.								
Oreogeton sp.								
Orthocladius (Symposiocladius) lignicola								
Pagastia sp.	0	0	0	0	1	0.20	10	0.01
Parametriocnemus sp.								
Paraphaenocladius sp.	34	14	11	10	22	18.20	10	0.48
Parorthocladius sp.								
Pedicia sp.								
Pericoma/Telmatoscopus sp.								
Phaenopsectra sp.	0	0	0	0	1	0.20	10	0.01
Polypedilum sp.								
Prosimulium sp.								
Pseudodiamesa sp.								
Rheocricotopus sp.								
Simulium sp.								
Tipula sp.								
Tipulidae								
Tvetenia sp.	1	0	0	0	0	0.20	10	0.01
Totals:	374	428	328	362	421	382.60		6.22

HBI	6.22
Scrapers	4.00
Filtering Collectors	20.60
Scrapers/Filtering Collectors	0.19
EPT Abundance	336.40
Chironomidae Abundance	28.40
EPT/Chironomidae	11.85
EPT Index	14
Shredders	14.00
Shredders/Total	0.04

RED RIVER

Station: LR-21
Sample Date: 21 December 1995

Taxon	Replicates 1	2	3	4	5	Mean	Avg N/ sq. m	Relative Abundance (%)
TURBELLARIA	3	1	6	2	12	4.80	48.00	0.93
NEMATODA	0	0	1	3	0	0.80	8.00	0.15
OLIGOCHAETA	0	1	0	0	0	0.20	2.00	0.04
HYDRACARINA	1	0	0	1	0	0.40	4.00	0.08
EPHEMEROPTERA								
Ameletus sp.	0	0	0	1	0	0.20	2.00	0.04
Baetis tricaudatus	196	230	380	416	378	320.00	3200.00	61.90
Drunella doddsi	1	0	1	0	2	0.80	8.00	0.15
Drunella grandis	1	4	3	7	9	4.80	48.00	0.93
Epeorus longimanus	0	0	1	2	0	0.60	6.00	0.12
Ephemerella infrequens								
Paraleptophlebia sp.	0	0	3	3	0	1.20	12.00	0.23
Rhithrogena robusta								
Rhithrogena sp.	20	36	46	22	61	37.00	370.00	7.16
PLECOPTERA								
Capniidae	6	4	27	3	16	11.20	112.00	2.17
Chloroperlidae	0	2	4	0	1	1.40	14.00	0.27
Doddsia occidentalis	0	2	0	0	0	0.40	4.00	0.08
Eucapnopsis brevicauda								
Hesperoperla pacifica								
Isoperla sp.	0	0	1	2	2	1.00	10.00	0.19
Megarcys signata								
Paraleuctra sp.	0	2	0	0	1	0.60	6.00	0.12
Paraperla frontalis								
Perlodidae								
Plumiperla diversa	3	0	2	4	4	2.60	26.00	0.50
Podmosta/Prostoia sp.	3	1	9	4	32	9.80	98.00	1.90
Pteronarcella badia	3	0	2	0	6	2.20	22.00	0.43
Sweltsa sp.								
Taenionema sp.								
Zapada cinctipes	1	0	0	0	2	0.60	6.00	0.12
Zapada sp.								
TRICHOPTERA								
Arctopsyche grandis	1	1	7	4	14	5.40	54.00	1.04
Brachycentrus americanus	24	5	17	34	26	21.20	212.00	4.10
Culoptila sp.	0	0	0	1	0	0.20	2.00	0.04
Glossosoma sp.								
Hesperophylax sp.								
Hydropsyche sp.	17	1	29	14	19	16.00	160.00	3.09
Lepidostoma sp.	2	1	0	0	1	0.80	8.00	0.15
Limnephilidae								
Ochrotrichia sp.	0	1	0	0	0	0.20	2.00	0.04
Oligophlebodes sp.								
Rhyacophila brunnea								
Rhyacophila coloradensis								
Rhyacophila pellisa								
Rhyacophila sp. A	3	4	6	11	6	6.00	60.00	1.16

Station: LR-21 (Continued)

Taxon	Replicates					Mean	Avg N/ sq. m	Relative Abundance (%)
COLEOPTERA								
Heterlimnius corpulentus								
Liodessus affinis								
Narpus concolor								
Optioservus sp.	1	0	2	1	1	1.00	10.00	0.19
DIPTERA								
Atherix pachypus	6	2	7	6	9	6.00	60.00	1.16
Bibiocephala grandis								
Brillia sp.	0	0	0	0	2	0.40	4.00	0.08
Ceratopogonidae	0	1	0	0	0	0.20	2.00	0.04
Chelifera sp.	0	0	1	1	2	0.80	8.00	0.15
Cricotopus/Orthocladius sp.								
Diamesa sp.	3	1	1	2	1	1.60	16.00	0.31
Dicranota sp.	0	0	2	1	0	0.60	6.00	0.12
Eukiefferiella sp.	0	0	4	3	6	2.60	26.00	0.50
Heleniella sp.								
Hesperoconopa sp.	0	0	0	1	1	0.40	4.00	0.08
Hexatoma sp.	2	0	1	1	0	0.80	8.00	0.15
Hydrobaenus sp.								
Micropsectra sp.								
Oreogeton sp.								
Orthocladius (Symposiocladius) lignicola								
Pagastia sp.	2	0	5	0	1	1.60	16.00	0.31
Parametriocnemus sp.	0	0	6	1	0	1.40	14.00	0.27
Paraphaenocladius sp.	118	8	35	18	50	45.80	458.00	8.86
Parorthocladius sp.								
Pedicia sp.								
Pericoma/Telmatoscopus sp.								
Phaenopsectra sp.								
Polypedilum sp.								
Prosimulium sp.								
Pseudodiamesa sp.	1	0	1	0	0	0.40	4.00	0.08
Rheocricotopus sp.	1	0	0	0	0	0.20	2.00	0.04
Simulium sp.	1	0	3	1	1	1.20	12.00	0.23
Tipula sp.	1	0	0	0	1	0.40	4.00	0.08
Tipulidae								
Tvetenia sp.	1	0	1	1	3	1.20	12.00	0.23
Totals:	422	308	614	571	670	517.00	5170.00	100.00

Total Density (N/sq.m)	5170
Total Number of Taxa	45
Diversity ($\bar{d}$)	2.42

Station: LR-21

Density By Order

TURBELLARIA	48
NEMATODA	8
OLIGOCHAETA	2
HYDRACARINA	4
EPHEMEROPTERA	3646
PLECOPTERA	298
TRICHOPTERA	498
COLEOPTERA	10
DIPTERA	656
Totals	5170

Density By Order

TURBELLARIA	0.9
NEMATODA	0.2
OLIGOCHAETA	0.0
HYDRACARINA	0.1
EPHEMEROPTERA	70.5
PLECOPTERA	5.8
TRICHOPTERA	9.6
COLEOPTERA	0.2
DIPTERA	12.7
Totals	100.0

RED RIVER

Station: LR-21
Sample Date: 21 December 1995

Taxon	Replicates 1	2	3	4	5	Mean	T-value	HBI
TURBELLARIA	3	1	6	2	12	4.80	10	0.09
NEMATODA	0	0	1	3	0	0.80	10	0.02
OLIGOCHAETA	0	1	0	0	0	0.20	10	0.00
HYDRACARINA	1	0	0	1	0	0.40	10	0.01
EPHEMEROPTERA								
Ameletus sp.	0	0	0	1	0	0.20	4	0.00
Baetis tricaudatus	196	230	380	416	378	320.00	7	4.33
Drunella doddsi	1	0	1	0	2	0.80	0	0.00
Drunella grandis	1	4	3	7	9	4.80	2	0.02
Epeorus longimanus	0	0	1	2	0	0.60	2	0.00
Ephemerella infrequens								
Paraleptophlebia sp.	0	0	3	3	0	1.20	2	0.00
Rhithrogena robusta								
Rhithrogena sp.	20	36	46	22	61	37.00	2	0.14
PLECOPTERA								
Capniidae	6	4	27	3	16	11.20	3	0.06
Chloroperlidae	0	2	4	0	1	1.40	2	0.01
Doddsia occidentalis	0	2	0	0	0	0.40	2	0.00
Eucapnopsis brevicauda								
Hesperoperla pacifica								
Isoperla sp.	0	0	1	2	2	1.00	4	0.01
Megarcys signata								
Paraleuctra sp.	0	2	0	0	1	0.60	2	0.00
Paraperla frontalis								
Perlodidae								
Plumiperla diversa	3	0	2	4	4	2.60	2	0.01
Podmosta/Prostoia sp.	3	1	9	4	32	9.80	2	0.04
Pteronarcella badia	3	0	2	0	6	2.20	2	0.01
Sweltsa sp.								
Taenionema sp.								
Zapada cinctipes	1	0	0	0	2	0.60	1	0.00
Zapada sp.								
TRICHOPTERA								
Arctopsyche grandis	1	1	7	4	14	5.40	2	0.02
Brachycentrus americanus	24	5	17	34	26	21.20	2	0.08
Culoptila sp.	0	0	0	1	0	0.20	3	0.00
Glossosoma sp.								
Hesperophylax sp.								
Hydropsyche sp.	17	1	29	14	19	16.00	10	0.31
Lepidostoma sp.	2	1	0	0	1	0.80	2	0.00
Limnephilidae								
Ochrotrichia sp.	0	1	0	0	0	0.20	10	0.00
Oligophlebodes sp.								
Rhyacophila brunnea								
Rhyacophila coloradensis								
Rhyacophila pellisa								
Rhyacophila sp. A	3	4	6	11	6	6.00	2	0.02

Station: LR-21

COLEOPTERA								
Heterlimnius corpulentus								
Liodessus affinis								
Narpus concolor								
Optioservus sp.	1	0	2	1	1	1.00	10	0.02
DIPTERA								
Atherix pachypus	6	2	7	6	9	6.00	2	0.02
Bibiocephala grandis								
Brillia sp.	0	0	0	0	2	0.40	10	0.01
Ceratopogonidae	0	1	0	0	0	0.20	10	0.00
Chelifera sp.	0	0	1	1	2	0.80	10	0.02
Cricotopus/Orthocladius sp.								
Diamesa sp.	3	1	1	2	1	1.60	10	0.03
Dicranota sp.	0	0	2	1	0	0.60	2	0.00
Eukiefferiella sp.	0	0	4	3	6	2.60	10	0.05
Heleniella sp.								
Hesperoconopa sp.	0	0	0	1	1	0.40	7	0.01
Hexatoma sp.	2	0	1	1	0	0.80	3	0.00
Hydrobaenus sp.								
Micropsectra sp.								
Oreogeton sp.								
Orthocladius (Symposiocladius) lignicola								
Pagastia sp.	2	0	5	0	1	1.60	10	0.03
Parametriocnemus sp.	0	0	6	1	0	1.40	10	0.03
Paraphaenocladius sp.	118	8	35	18	50	45.80	10	0.89
Parorthocladius sp.								
Pedicia sp.								
Pericoma/Telmatoscopus sp.								
Phaenopsectra sp.								
Polypedilum sp.								
Prosimulium sp.								
Pseudodiamesa sp.	1	0	1	0	0	0.40	10	0.01
Rheocricotopus sp.	1	0	0	0	0	0.20	10	0.00
Simulium sp.	1	0	3	1	1	1.20	10	0.02
Tipula sp.	1	0	0	0	1	0.40	3	0.00
Tipulidae								
Tvetenia sp.	1	0	1	1	3	1.20	10	0.02
Totals:	422	308	614	571	670	517.00		6.37

HBI	6.37
Scrapers	6.60
Filtering Collectors	43.80
Scrapers/Filtering Collectors	0.15
EPT Abundance	444.20
Chironomidae Abundance	55.20
EPT/Chironomidae	8.05
EPT Index	23
Shredders	26.00
Shredders/Total	0.05

Woodward-Clyde Consultants

Stanford Place 3, Suite 1000
Denver, Colorado 80237

4582 South Ulster Street
303-694-2770

Chain of Custody Record

PROJECT NO. 23505 Task 800

SAMPLERS: (Signature) [signature] Donna Randall

ANALYSES: macroinvert. ID/Enumeration

REMARKS (Sample preservation, handling procedures, etc.)
For ______

DATE	TIME	SAMPLE NUMBER	macroinvert. ID/Enumeration	NUMBER OF CONTAINERS
12/21/95	11:30 am	RR-10A Rep #1	✓	1
12/21/95		RR-10A Rep #2	✓	1
12/21/95		RR-10A Rep #3	✓	1
12/21/95		RR-10A Rep #4	✓	1
12/21/95	4:05 pm	RR-3 Rep #1	✓	1
12/21/95		RR-3 Rep #2	✓	1
12/21/95		RR-3 Rep # 4	✓	1
12/21/95		RR-3 Rep # 5	✓	1
12/21/95		RR-1 Rep # 2	✓	1
12/21/95		RR-1 Rep # 4	✓	1
12/21/95		RR-1 Rep # 5	✓	1

Matrix- Benthic macroinvert samples Hess Sampler

All samples ~~stored on ice.~~ preserved in ~~ethanol~~ isopropyl 70%

Contact Personnel: Donna Randall

TOTAL NUMBER OF CONTAINERS: 11

RELINQUISHED BY: (Signature)	DATE/TIME	RECEIVED BY: (Signature)	RELINQUISHED BY: (Signature)	DATE/TIME	RECEIVED BY: (Signature)
			Donna Randall	1/25/96 12:10 pm	[signature]

METHOD OF SHIPMENT:	SHIPPED BY: (Signature)	COURIER: (Signature)	RECEIVED FOR LAB BY: (Signature)	DATE/TIME

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Stanford Place 3, Suite 1000
4582 South Ulster Street
Denver, Colorado 80237
303-694-2770

Chain of Custody Record

PROJECT NO. 23505 Task 800

SAMPLERS: (Signature) [signature] Donna Randall

DATE	TIME	SAMPLE NUMBER	ANALYSES: macroinvert. ID/Enumeration							NUMBER OF CONTAINERS	REMARKS (Sample preservation, handling procedures, etc.) For ____
12/21/95		RR-7 Rep #3	✓							1	
12/21/95		RR-7 Rep #4	✓							1	Matrix- Benthic macro-invert. samples Hess Sampler
12/21/95		RR-7 Rep #5	✓							1	
12/21/95	2:26pm	RR-5 Rep #1	✓							1	
12/21/95		RR-5 Rep #2	✓							1	All samples ~~stored on ice.~~ preserved in 90% isopropyl
12/21/95		RR-5 Rep #3	✓							1	
12/21/95		RR-5 Rep #4	✓							1	

Contact Personnel: Donna Randall

TOTAL NUMBER OF CONTAINERS 7

RELINQUISHED BY: (Signature)	DATE/TIME	RECEIVED BY: (Signature)	RELINQUISHED BY: (Signature)	DATE/TIME	RECEIVED BY: (Signature)
			Donna Randall	1/25/96 12:10pm	[signature]

METHOD OF SHIPMENT:	SHIPPED BY: (Signature)	COURIER: (Signature)	RECEIVED FOR LAB BY: (Signature)	DATE/TIME

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Denver, Colorado 80237 303-694-2770

Chain of Custody Record

PROJECT NO. 23505 Task 800

SAMPLERS: (Signature)

ANALYSES: macroinvert. ID/Enumeration

DATE	TIME	SAMPLE NUMBER	macroinvert. ID/Enumeration						NUMBER OF CONTAINERS	REMARKS (Sample preservation, handling procedures, etc.) For
12/21/95	~~4:34~~ 9:55am	RR-13 Rep#1	✓						1	↑
12/21/95		RR-13 Rep#2	✓						1	Matrix- Benthic Macro-invert. samples
12/21/95		RR-13 Rep#3	✓						1	Hess Sampler
12/21/95		RR-13 Rep#4	✓						1	All samples ~~stored on ice.~~ preserved in ethanol 70%
12/21/95		RR-13 Rep#5	✓						1	
12/21/95	10:36 am	RR-11 Rep#1	✓						1	*Note RR-13 samples had stained added after preservati
12/21/95		RR-11 Rep#2	✓						1	↓
~~12/21/95~~		~~RR-11 Rep#3~~								
~~12/21/95~~		~~RR-11 Rep#4~~								
~~12/21/95~~		~~RR-11 Rep#5~~								
12/21/95	4:05pm	RR-1 Rep#1	✓						1	↑ samples preserved in 70% isopropyl ↓
12/21/95		RR-1 Rep#3	✓						1	
12/21/95		RR-3 Rep#3	✓						1	
12/21/95		RR-5 Rep#5	✓						1	
12/21/95		LR-21 Rep#2	✓						1	sample preserved in 70% ethanol

Contact Personnel: Donna Randall

TOTAL NUMBER OF CONTAINERS: 12

RELINQUISHED BY: (Signature)	DATE/TIME	RECEIVED BY: (Signature)	RELINQUISHED BY: (Signature)	DATE/TIME	RECEIVED BY: (Signature)
			Donna Randall	1/25/96 12:10pm	[signature]

METHOD OF SHIPMENT:	SHIPPED BY: (Signature)	COURIER: (Signature)	RECEIVED FOR LAB BY: (Signature)	DATE/TIME

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Chain of Custody Record

PROJECT NO. 23505 Task 800

SAMPLERS: (Signature) Ted Shade, Donna Randall

ANALYSES: macroinvert. ID/Enumeration

DATE	TIME	SAMPLE NUMBER	macroinvert. ID/Enumeration						NUMBER OF CONTAINERS	REMARKS (Sample preservation, handling procedures, etc.) For ____
12/20/95	8:16 am	LR-16 Rep #1	✓						1	
12/20/95		LR-16 Rep #2	✓						1	Matrix- Benthic macro-invert. samples Hess sampler
12/21/95		LR-16 Rep #3	✓						1	
12/21/95		LR-16 Rep #4	✓						1	
12/21/95		LR-16 Rep #5	✓						1	All samples ~~stored on ice.~~ preserved in 70% ethanol
12/21/95	7:15 am	LR-21 Rep #1	✓						1	
12/21/95		LR-21 Rep #3	✓						1	
12/21/95		LR-21 Rep #4	✓						1	* Note stain was added to these samples after preservation
12/21/95		LR-21 Rep #5	✓						1	

Contact Personnel: Donna Randall

TOTAL NUMBER OF CONTAINERS: 9

RELINQUISHED BY: (Signature)	DATE/TIME	RECEIVED BY: (Signature)	RELINQUISHED BY: (Signature)	DATE/TIME	RECEIVED BY: (Signature)
			Donna Randall	1/25/96 12:10pm	for 2. [illegible]

METHOD OF SHIPMENT:	SHIPPED BY: (Signature)	COURIER: (Signature)	RECEIVED FOR LAB BY: (Signature)	DATE/TIME

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Chain of Custody Record

PROJECT NO. 23505 Task 800

SAMPLERS: (Signature) [signature] Donna Randall

ANALYSES: Macroinvert. ID/Enumeration

DATE	TIME	SAMPLE NUMBER	Macroinvert. ID/Enumeration							NUMBER OF CONTAINERS	REMARKS (Sample preservation, handling procedures, etc.) For
12/20/95	2:10 pm	LR-11A Rep #1	✓							1	Matrix- Benthic macroinvert. Samples Hess Sampler
12/20/95		LR-11A Rep #2	✓							1	samples ~~stored on ice.~~ preserved in ethanol 70%
12/20/95		LR-11A Rep #3	✓							1	
12/20/95		LR-11A Rep #4	✓							1	
12/20/95		LR-11A Rep #5	✓							1	
12/20/95	3:20 pm	LR-1 Rep #1	✓							1	
12/20/95		LR-1 Rep #2	✓							1	
12/20/95		LR-1 Rep #3	✓							1	
12/20/95		LR-1 Rep #4	✓							1	
12/20/95		LR-1 Rep #5	✓							1	*Note stained added to these after preservation
12/20/95	4:03 pm	RR-16 Rep #1	✓							1	
12/20/95		RR-16 Rep #2	✓							1	
12/20/95		RR-16 Rep #3	✓							1	
12/20/95		RR-16 Rep #4	✓							1	
12/20/95		RR-16 Rep #5	✓							1	
~~12/21/95~~		~~RR-13~~									
12/21/95		RR-11 Rep #3	✓							1	
12/21/95		RR-11 Rep #4	✓							1	
12/21/95		RR-11 Rep #5	✓							1	
12/21/95		RR-10A Rep #5	✓							1	Contact Personnel: Donna Randall
12/21/95	12:32 pm	RR-7 Rep #1	✓							1	samples preserved in 70% isopropyl
12/21/95		RR-7 Rep #2	✓							1	

TOTAL NUMBER OF CONTAINERS: ~~22~~ 21

RELINQUISHED BY: (Signature)	DATE/TIME	RECEIVED BY: (Signature)	RELINQUISHED BY: (Signature)	DATE/TIME	RECEIVED BY: (Signature)
			Donna Randall	1/25/96 12:10 pm	[signature]

METHOD OF SHIPMENT:	SHIPPED BY: (Signature)	COURIER: (Signature)	RECEIVED FOR LAB BY: (Signature)	DATE/TIME

APPENDIX B
STATISTICAL ANALYSES

KRUSKAL-WALLIS AND MULTIPLE COMPARISON TEST

Kruskal-Wallis Test:

Conover, W. J. 1980. Practical Nonparametric Statistics. 2nd edition. John Wiley & Sons, Inc. New York (pp. 229-232).

R(Xij): Represents the rank assigned to observation X_{ij} where i is station location and j is replicate number.

R_i: Sum of the ranks assigned to the ith station location.

n_i: sample size for the ith station location.

N: total number of samples

T: Kruskal-Wallis calculated test statistic.

$T_{df,0.05}$ = Kruskal-Wallis table value.

k: number of station locations

df: degrees of freedom which is equal to k-1.

Null hypothesis: All of the station locations have identical population distribution functions (e.g., number of taxa, densities).

Alternative hypothesis: At least one of the stations tends to yield higher observations (e.g., number of taxa, density) than at least one of the other stations.

Reject the null hypothesis if $T > T_{df,0.05}$

Kruskal-Wallis Multiple Comparison Test:

Conover, W. J. 1980. Practical Nonparametric Statistics. 2nd edition. John Wiley & Sons, Inc. New York (pp. 229-232).

$|R_i/n_i - R_j/n_j|$: Difference between the average rank sums of station i and j.

Null hypothesis: The two station locations have identical population distribution functions (e.g., number of taxa, density).

Alternative hypothesis: One of the stations tends to yield higher observations (e.g., number of taxa, density) than the other station.

Reject the null hypothesis if $|R_i/n_i - R_j/n_j|$>Table Value.

Table Value = $t_{N-k,0.95}$ x sqrt(S^2 x (N-1-T)/(N-k)) x sqrt(1/n_i + 1/n_j).

signif: Indicates that the null hypothesis is rejected.

TABLE B-1

KRUSKAL-WALLIS AND MULTIPLE COMPARISON TEST RESULTS[1] FOR NUMBER OF MACROINVERTEBRATE TAXA COLLECTED AT RED RIVER STATIONS (December 1995)

Station	No. of Taxa	$R(X_{ij})$	$R(X_{ij})^2$						Comparisons	$\|R_i/n_i - R_j/n_j\|$	Table Value	
RRB-1	34	59	3481	N =	60		S^2 =	303.89				
RRB-1	34	59	3481						RRB-1 and LRB-21	8.6	7.006	signif
RRB-1	34	59	3481			R_i^2/n_i	$T_{(with\ ties)}$ =	52.1235	RRB-1 and RRB-3	14.3		signif
RRB-1	33	57	3249	R_i =	290	16820	k =	12	RRB-1 and RRB-5	14.2		signif
RRB-1	32	56	3136	n_i =	5		df =	11	RRB-1 and LRB-16	19.7		signif
LRB-21	31	55	3025						RRB-1 and LRB-11A	23.6		signif
LRB-21	30	53.5	2862				$T_{df,0.05}$ =	19.68	RRB-1 and RRB-10A	28.1		signif
LRB-21	30	53.5	2862			R_i^2/n_i			RRB-1 and RRB-7	35.5		signif
LRB-21	27	52	2704	R_i =	247	12201.8			RRB-1 and LRB-1	37.9		signif
LRB-21	20	33	1089	n_i =	5				RRB-1 and RRB-13	46.7		signif
RRB-3	25	50.5	2550				$t_{N-k,0.95}$ =	1.6788	RRB-1 and RRB-11	48.5		signif
RRB-3	23	47	2209				N-k =	48	RRB-1 and RRB-16	52.9		signif
RRB-3	22	44	1936			R_i^2/n_i	interpolation for df					
RRB-3	22	44	1936	R_i =	218.5	9548.45	40	1.684	RRB-21 and RRB-3	5.7		
RRB-3	20	33	1089	n_i =	5		48		RRB-21 and RRB-5	5.6		
RRB-5	25	50.5	2550				60	1.671	RRB-21 and LRB-16	11.1		signif
RRB-5	24	48.5	2352						RRB-21 and LRB-11A	15.0		signif
RRB-5	22	44	1936			R_i^2/n_i	x =	-0.0052	RRB-21 and RRB-10A	19.5		signif
RRB-5	21	38	1444	R_i =	219	9592.2	48	1.6788	RRB-21 and RRB-7	26.9		signif
RRB-5	21	38	1444	n_i =	5				RRB-21 and LRB-1	29.3		signif
LRB-16	24	48.5	2352						RRB-21 and RRB-13	38.1		signif
LRB-16	22	44	1936						RRB-21 and RRB-11	39.9		signif
LRB-16	21	38	1444			R_i^2/n_i			RRB-21 and RRB-16	44.3		signif
LRB-16	20	33	1089	R_i =	191.5	7334.45						
LRB-16	17	28	784	n_i =	5				RRB-3 and RRB-5	0.1		
LRB-11	22	44	1936						RRB-3 and LRB-16	5.4		
LRB-11	21	38	1444						RRB-3 and LRB-11A	9.3		signif
LRB-11	21	38	1444			R_i^2/n_i			RRB-3 and RRB-10A	13.8		signif
LRB-11	17	28	784	R_i =	172	5916.8			RRB-3 and RRB-7	21.2		signif
LRB-11	16	24	576	n_i =	5				RRB-3 and LRB-1	23.6		signif
RRB-10	21	38	1444						RRB-3 and RRB-13	32.4		signif
RRB-10	21	38	1444						RRB-3 and RRB-11	34.2		signif
RRB-10	17	28	784			R_i^2/n_i			RRB-3 and RRB-16	38.6		signif
RRB-10	16	24	576	R_i =	149.5	4470.05						
RRB-10	15	21.5	462.3	n_i =	5				RRB-5 and LRB-16	5.5		
RRB-7	19	31	961						RRB-5 and LRB-11A	9.4		signif
RRB-7	16	24	576						RRB-5 and RRB-10A	13.9		signif

TABLE B-1

KRUSKAL-WALLIS AND MULTIPLE COMPARISON TEST RESULTS[1] FOR NUMBER OF MACROINVERTEBRATE TAXA COLLECTED AT RED RIVER STATIONS (December 1995)

Station	No. of Taxa	$R(X_{ij})$	$R(X_{ij})^2$				Comparisons	$\|R_i/n_i - R_j/n_j\|$	Table Value
RRB-7	15	21.5	462.3			R_i^2/n_i	RRB-5 and RRB-7	21.3	signif
RRB-7	14	19.5	380.3	R_i =	112.5	2531.25	RRB-5 and LRB-1	23.7	signif
RRB-7	12	16.5	272.3	n_i =	5		RRB-5 and RRB-13	32.5	signif
LRB-1	17	28	784				RRB-5 and RRB-11	34.3	signif
LRB-1	17	28	784				RRB-5 and RRB-16	38.7	signif
LRB-1	14	19.5	380.3			R_i^2/n_i			
LRB-1	13	18	324	R_i =	100.5	2020.05	LRB-16 and LRB-11A	3.9	
LRB-1	8	7	49	n_i =	5		LRB-16 and RRB-10A	8.4	signif
RRB-13	11	15	225				LRB-16 and RRB-7	15.8	signif
RRB-13	10	12.5	156.3				LRB-16 and LRB-1	18.2	signif
RRB-13	10	12.5	156.3			R_i^2/n_i	LRB-16 and RRB-13	27.0	signif
RRB-13	9	9.5	90.25	R_i =	56.5	638.45	LRB-16 and RRB-11	28.8	signif
RRB-13	8	7	49	n_i =	5		LRB-16 and RRB-16	33.2	signif
RRB-11	12	16.5	272.3						
RRB-11	10	12.5	156.3				LRB-11A and RRB-10A	4.5	
RRB-11	9	9.5	90.25			R_i^2/n_i	LRB-11A and RRB-7	11.9	signif
RRB-11	7	4.5	20.25	R_i =	47.5	451.25	LRB-11A and LRB-1	14.3	signif
RRB-11	7	4.5	20.25	n_i =	5		LRB-11A and RRB-13	23.1	signif
RRB-16	10	12.5	156.3				LRB-11A and RRB-11	24.9	signif
RRB-16	8	7	49				LRB-11A and RRB-16	29.3	signif
RRB-16	6	2.5	6.25			R_i^2/n_i			
RRB-16	6	2.5	6.25	R_i =	25.5	130.05	RRB-10A and RRB-7	7.4	signif
RRB-16	4	1	1	n_i =	5		RRB-10A and LRB-1	9.8	signif
							RRB-10A and RRB-13	18.6	signif
							RRB-10A and RRB-11	20.4	signif
							RRB-10A and RRB-16	24.8	signif
							RRB-7 and LRB-1	2.4	
							RRB-7 and RRB-13	11.2	signif
							RRB-7 and RRB-11	13.0	signif
							RRB-7 and RRB-16	17.4	signif
							LRB-1 and RRB-13	8.8	signif
							LRB-1 and RRB-11	10.6	signif
							LRB-1 and RRB-16	15.0	signif
							RRB-13 and RRB-11	1.8	
							RRB-13 and RRB-16	6.2	
							RRB-11 and RRB-16	4.4	

TABLE B-2

KRUSKAL-WALLIS AND MULTIPLE COMPARISON TEST RESULTS FOR BENTHIC MACROINVERTEBRATE DENSITIES AT RED RIVER STATIONS (December 1995)

Station	Count	$R(X_{ij})$	$R(X_{ij})^2$						Comparisons	$\lvert R_i/n_i - R_j/n_j \rvert$	Table Value
RRB-1	1502	60	3600	N =	60		S^2 =	304.975			
RRB-1	925	59	3481						RRB-1 and LRB-21	7.0	7.566
RRB-1	737	58	3364			R_i^2/n_i	$T_{(ties)}$ =	51.0075	RRB-1 and LRB-16	12.0	signif
RRB-1	693	57	3249	R_i =	286	16359	k =	12	RRB-1 and RRB-5	16.2	signif
RRB-1	495	52	2704	n_i =	5		df =	11	RRB-1 and LRB-11A	17.8	signif
LRB-21	670	56	3136						RRB-1 and RRB-3	26.0	signif
LRB-21	614	55	3025				$T_{df,0.05}$ =	19.68	RRB-1 and LRB-1	25.7	signif
LRB-21	571	54	2916			R_i^2/n_i			RRB-1 and RRB-10A	33.1	signif
LRB-21	422	49	2401	R_i =	251	12600			RRB-1 and RRB-7	36.5	signif
LRB-21	308	37	1369	n_i =	5				RRB-1 and RRB-11	46.2	signif
LRB-16	428	51	2601				$t_{N-k,0.95}$ =	1.6788	RRB-1 and RRB-16	48.4	signif
LRB-16	421	48	2304				N-k =	48	RRB-1 and RRB-13	51.5	signif
LRB-16	374	44	1936			R_i^2/n_i	interpolation for df				
LRB-16	362	43	1849	R_i =	226	10215	40	1.684	LRB-21 and LRB-16	5.0	
LRB-16	328	40	1600	n_i =	5		48		LRB-21 and RRB-5	9.2	signif
RRB-5	413	47	2209				60	1.671	LRB-21 and LRB-11A	10.8	signif
RRB-5	380	45	2025						LRB-21 and RRB-3	19.0	signif
RRB-5	353	42	1764			R_i^2/n_i	x =	-0.0052	LRB-21 and LRB-1	18.7	signif
RRB-5	306	36	1296	R_i =	205	8405	48	1.6788	LRB-21 and RRB-10A	26.1	signif
RRB-5	281	35	1225	n_i =	5				LRB-21 and RRB-7	29.5	signif
LRB-11	554	53	2809						LRB-21 and RRB-11	39.2	signif
LRB-11	389	46	2116						LRB-21 and RRB-16	41.4	signif
LRB-11	350	41	1681			R_i^2/n_i			LRB-21 and RRB-13	44.5	signif
LRB-11	258	33	1089	R_i =	197	7761.8					
LRB-11	122	24	576	n_i =	5				LRB-16 and RRB-5	4.2	
RRB-3	310	38	1444						LRB-16 and LRB-11A	5.8	
RRB-3	271	34	1156						LRB-16 and RRB-3	14.0	signif
RRB-3	191	29	841			R_i^2/n_i			LRB-16 and LRB-1	13.7	signif
RRB-3	178	28	784	R_i =	156	4867.2			LRB-16 and RRB-10A	21.1	signif
RRB-3	175	27	729	n_i =	5				LRB-16 and RRB-7	24.5	signif
LRB-1	424	50	2500						LRB-16 and RRB-11	34.2	signif
LRB-1	317	39	1521						LRB-16 and RRB-16	36.4	signif
LRB-1	197	31	961			R_i^2/n_i			LRB-16 and RRB-13	39.5	signif
LRB-1	95	19.5	380.25	R_i =	157.5	4961.3					
LRB-1	87	18	324	n_i =	5				RRB-5 and LRB-11A	1.6	
RRB-10	205	32	1024						RRB-5 and RRB-3	9.8	signif
RRB-10	192	30	900						RRB-5 and LRB-1	9.5	signif
RRB-10	132	25	625			R_i^2/n_i			RRB-5 and RRB-10A	16.9	signif
RRB-10	95	19.5	380.25	R_i =	120.5	2904.1			RRB-5 and RRB-7	20.3	signif
RRB-10	70	14	196	n_i =	5				RRB-5 and RRB-11	30.0	signif
RRB-7	136	26	676						RRB-5 and RRB-16	32.2	signif
RRB-7	107	23	529						RRB-5 and RRB-13	35.3	signif
RRB-7	105	22	484			R_i^2/n_i					

TABLE B-2

KRUSKAL-WALLIS AND MULTIPLE COMPARISON TEST RESULTS FOR BENTHIC MACROINVERTEBRATE DENSITIES AT RED RIVER STATIONS (December 1995)

Station	Count	$R(X_{ij})$	$R(X_{ij})^2$			
RRB-7	84	17	289	R_i =	103.5	2142.5
RRB-7	74	15.5	240.25	n_i =	5	
RRB-11	98	21	441			
RRB-11	74	15.5	240.25			
RRB-11	39	11	121			R_i^2/n_i
RRB-11	27	5.5	30.25	R_i =	55	605
RRB-11	20	2	4	n_i =	5	
RRB-16	65	13	169			
RRB-16	57	12	144			
RRB-16	34	10	100			R_i^2/n_i
RRB-16	31	8	64	R_i =	44	387.2
RRB-16	9	1	1	n_i =	5	
RRB-13	33	9	81			
RRB-13	29	7	49			
RRB-13	27	5.5	30.25			R_i^2/n_i
RRB-13	25	4	16	R_i =	28.5	162.45
RRB-13	23	3	9	n_i =	5	

Comparisons	$\lvert R_i/n_i - R_j/n_j \rvert$	Table Value
LRB-11A and RRB-3	8.2	signif
LRB-11A and LRB-1	7.9	signif
LRB-11A and RRB-10A	15.3	signif
LRB-11A and RRB-7	18.7	signif
LRB-11A and RRB-11	28.4	signif
LRB-11A and RRB-16	30.6	signif
LRB-11A and RRB-13	33.7	signif
RRB-3 and LRB-1	0.3	
RRB-3 and RRB-10A	7.1	
RRB-3 and RRB-7	10.5	signif
RRB-3 and RRB-11	20.2	signif
RRB-3 and RRB-16	22.4	signif
RRB-3 and RRB-13	25.5	signif
LRB-1 and RRB-10A	7.4	
LRB-1 and RRB-7	10.8	signif
LRB-1 and RRB-11	20.5	signif
LRB-1 and RRB-16	22.7	signif
LRB-1 and RRB-13	25.8	signif
RRB-10A and RRB-7	3.4	
RRB-10A and RRB-11	13.1	signif
RRB-10A and RRB-16	15.3	signif
RRB-10A and RRB-13	18.4	signif
RRB-7 and RRB-11	9.7	signif
RRB-7 and RRB-16	11.9	signif
RRB-7 and RRB-13	15.0	signif
RRB-11 and RRB-16	2.2	
RRB-11 and RRB-13	5.3	
RRB-16 and RRB-13	3.1	

TABLE B-3

KRUSKAL-WALLIS AND MULTIPLE COMPARISON RESULTS FOR DOMINANCE (PERCENT) AT RED RIVER STATIONS
(December 1995)

Station	Dominance	$R(X_{ij})$	$R(X_{ij})^2$						Comparisons	$\|R_i/n_i-R_j/n_j\|$	Table Value
LRB-16	74.31	57	3249	N =	60		S^2 =	304.99			
LRB-16	69.6	53	2809						LRB-16 and RRB-16	5.9	11.13
LRB-16	68.69	52	2704			R_i^2/n_i	$T_{(ties)}$ =	41.711	LRB-16 and LRB-21	4.2	
LRB-16	65.85	49	2401	R_i =	257	13210	k =	12	LRB-16 and RRB-11	7.3	
LRB-16	62.03	46	2116	n_i =	5		df =	11	LRB-16 and LRB-11A	7.6	
RRB-16	80.65	59	3481						LRB-16 and LRB-1	17.0	signif
RRB-16	68.42	51	2601				$T_{df,0.05}$ =	19.68	LRB-16 and RRB-1	29.0	signif
RRB-16	58.82	43	1849			R_i^2/n_i			LRB-16 and RRB-7	33.4	signif
RRB-16	55.56	40	1600	R_i =	227.5	10351			LRB-16 and RRB-13	33.6	signif
RRB-16	46.15	34.5	1190.3	n_i =	5				LRB-16 and RRB-10A	36.0	signif
LRB-21	74.68	58	3364				$t_{N-k,0.95}$ =	1.6788	LRB-16 and RRB-5	37.2	signif
LRB-21	72.85	56	3136				N-k =	48	LRB-16 and RRB-3	39.6	signif
LRB-21	61.89	45	2025			R_i^2/n_i	interpolation for df				
LRB-21	56.42	41	1681	R_i =	236	11139	40	1.684	RRB-16 and LRB-21	1.7	
LRB-21	46.45	36	1296	n_i =	5		48		RRB-16 and RRB-11	1.4	
RRB-11	86.73	60	3600				60	1.671	RRB-16 and LRB-11A	1.7	
RRB-11	70.37	54	2916						RRB-16 and LRB-1	11.1	
RRB-11	55.41	39	1521			R_i^2/n_i	x =	-0.005	RRB-16 and RRB-1	23.1	signif
RRB-11	46.15	34.5	1190.3	R_i =	220.5	9724.1	48	1.6788	RRB-16 and RRB-7	27.5	signif
RRB-11	45	33	1089	n_i =	5				RRB-16 and RRB-13	27.7	signif
LRB-11A	67.1	50	2500						RRB-16 and RRB-10A	30.1	signif
LRB-11A	64.75	48	2304						RRB-16 and RRB-5	31.3	signif
LRB-11A	62.79	47	2209			R_i^2/n_i			RRB-16 and RRB-3	33.7	signif
LRB-11A	60.29	44	1936	R_i =	219	9592.2					
LRB-11A	42.86	30	900	n_i =	5				LRB-21 and RRB-11	3.1	
LRB-1	71.26	55	3025						LRB-21 and LRB-11A	3.4	
LRB-1	57.78	42	1764						LRB-21 and LRB-1	12.8	signif
LRB-1	41.12	26	676			R_i^2/n_i			LRB-21 and RRB-1	24.8	signif
LRB-1	41.01	25	625	R_i =	172	5916.8			LRB-21 and RRB-7	29.2	signif
LRB-1	40	24	576	n_i =	5				LRB-21 and RRB-13	29.4	signif
RRB-1	43.46	31	961						LRB-21 and RRB-10A	31.8	signif
RRB-1	41.48	27	729						LRB-21 and RRB-5	33.0	signif
RRB-1	39.21	23	529			R_i^2/n_i			LRB-21 and RRB-3	35.4	signif
RRB-1	36.97	19	361	R_i =	112	2508.8					
RRB-1	32.32	12	144	n_i =	5				RRB-11 and LRB-11A	0.3	
RRB-7	42.06	29	841						RRB-11 and LRB-1	9.7	
RRB-7	41.89	28	784						RRB-11 and RRB-1	21.7	signif
RRB-7	38.1	21	441			R_i^2/n_i			RRB-11 and RRB-7	26.1	signif
RRB-7	26.47	7	49	R_i =	90	1620			RRB-11 and RRB-13	26.3	signif
RRB-7	24.76	5	25	n_i =	5				RRB-11 and RRB-10A	28.7	signif
RRB-13	48.15	37	1369						RRB-11 and RRB-5	29.9	signif
RRB-13	44.83	32	1024						RRB-11 and RRB-3	32.3	signif

TABLE B-3

KRUSKAL-WALLIS AND MULTIPLE COMPARISON RESULTS FOR DOMINANCE (PERCENT) AT RED RIVER STATIONS (December 1995)

Station	Dominance	$R(X_{ij})$	$R(X_{ij})^2$				Comparisons	$\lvert R_i/n_i - R_j/n_j \rvert$	Table Value
RRB-13	30.3	10	100			R_i^2/n_i			
RRB-13	26.09	6	36	$R_i =$	89	1584.2	LRB-11A and LRB-1	9.4	
RRB-13	24	4	16	$n_i =$	5		LRB-11A and RRB-1	21.4	signif
RRB-10A	38.64	22	484				LRB-11A and RRB-7	25.8	signif
RRB-10A	35.79	18	324				LRB-11A and RRB-13	26.0	signif
RRB-10A	34.29	16	256			R_i^2/n_i	LRB-11A and RRB-10A	28.4	signif
RRB-10A	33.17	13	169	$R_i =$	77	1185.8	LRB-11A and RRB-5	29.6	signif
RRB-10A	27.6	8	64	$n_i =$	5		LRB-11A and RRB-3	32.0	signif
RRB-5	37.25	20	400						
RRB-5	34.74	17	289				LRB-1 and RRB-1	12.0	signif
RRB-5	34.16	14	196			R_i^2/n_i	LRB-1 and RRB-7	16.4	signif
RRB-5	31.48	11	121	$R_i =$	71	1008.2	LRB-1 and RRB-13	16.6	signif
RRB-5	29.18	9	81	$n_i =$	5		LRB-1 and RRB-10A	19.0	signif
RRB-3	49.68	38	1444				LRB-1 and RRB-5	20.2	signif
RRB-3	34.27	15	225				LRB-1 and RRB-3	22.6	signif
RRB-3	23.04	3	9			R_i^2/n_i			
RRB-3	22.29	2	4	$R_i =$	59	696.2	RRB-1 and RRB-7	4.4	
RRB-3	17.34	1	1	$n_i =$	5		RRB-1 and RRB-13	4.6	
							RRB-1 and RRB-10A	7.0	
							RRB-1 and RRB-5	8.2	
							RRB-1 and RRB-3	10.6	
							RRB-7 and RRB-13	0.2	
							RRB-7 and RRB-10A	2.6	
							RRB-7 and RRB-5	3.8	
							RRB-7 and RRB-3	6.2	
							RRB-13 and RRB-10A	2.4	
							RRB-13 and RRB-5	3.6	
							RRB-13 and RRB-3	6.0	
							RRB-10A and RRB-5	1.2	
							RRB-10A and RRB-3	3.6	
							RRB-5 and RRB-3	2.4	

TABLE B-4

KRUSKAL-WALLIS AND MULTIPLE COMPARISON TEST RESLUTS FOR EPT INDEX AT RED RIVER STATIONS
(December 1995)

Station	EPT Index	$R(X_{ij})$	$R(X_{ij})^2$						Comparisons	$\lvert R_i/n_i - R_j/n_j \rvert$	Table Value
RRB-1	20	60	3600	N =	60		S^2 =	302.9			
RRB-1	19	58.5	3422.25						RRB-1 and LRB-21	5.7	7.465
RRB-1	19	58.5	3422.25			R_i^2/n_i	$T_{(ties)}$ =	51.167	RRB-1 and RRB-3	15.6	signif
RRB-1	17	56.5	3192.25	R_i =	288	16589	k =	12	RRB-1 and RRB-5	16.5	signif
RRB-1	16	54.5	2970.25	n_i =	5		df =	11	RRB-1 and LRB-11A	21.3	signif
LRB-21	17	56.5	3192.25						RRB-1 and RRB-10A	21.8	signif
LRB-21	16	54.5	2970.25				$T_{df,0.05}$ =	19.68	RRB-1 and LRB-16	26.4	signif
LRB-21	15	52.5	2756.25			R_i^2/n_i			RRB-1 and RRB-7	32.9	signif
LRB-21	14	48	2304	R_i =	259.5	13468			RRB-1 and LRB-1	39.0	signif
LRB-21	14	48	2304	n_i =	5				RRB-1 and RRB-11	45.0	signif
RRB-3	15	52.5	2756.25				$t_{N-k,0.95}$ =	1.6788	RRB-1 and RRB-13	48.3	signif
RRB-3	14	48	2304				N-k =	48	RRB-1 and RRB-16	52.7	signif
RRB-3	13	42	1764			R_i^2/n_i	interpolation for df				
RRB-3	12	37	1369	R_i =	210	8820	40	1.684	LRB-21 and RRB-3	9.9	signif
RRB-3	11	30.5	930.25	n_i =	5		48		LRB-21 and RRB-5	10.8	signif
RRB-5	14	48	2304				60	1.671	LRB-21 and LRB-11A	15.6	signif
RRB-5	14	48	2304						LRB-21 and RRB-10A	16.1	signif
RRB-5	13	42	1764			R_i^2/n_i	x =	-0.0052	LRB-21 and LRB-16	20.7	signif
RRB-5	12	37	1369	R_i =	205.5	8446.1	48	1.6788	LRB-21 and RRB-7	27.2	signif
RRB-5	11	30.5	930.25	n_i =	5				LRB-21 and LRB-1	33.3	signif
LRB-11A	13	42	1764						LRB-21 and RRB-11	39.3	signif
LRB-11A	13	42	1764						LRB-21 and RRB-13	42.6	signif
LRB-11A	13	42	1764			R_i^2/n_i			LRB-21 and RRB-16	47.0	signif
LRB-11A	11	30.5	930.25	R_i =	181.5	6588.5					
LRB-11A	10	25	625	n_i =	5				RRB-3 and RRB-5	0.9	
RRB-10A	14	48	2304						RRB-3 and LRB-11A	5.7	
RRB-10A	14	48	2304						RRB-3 and RRB-10A	6.2	
RRB-10A	12	37	1369			R_i^2/n_i			RRB-3 and LRB-16	10.8	signif
RRB-10A	10	25	625	R_i =	179	6408.2			RRB-3 and RRB-7	17.3	signif
RRB-10A	9	21	441	n_i =	5				RRB-3 and LRB-1	23.4	signif
LRB-16	12	37	1369						RRB-3 and RRB-11	29.4	signif
LRB-16	12	37	1369						RRB-3 and RRB-13	32.7	signif
LRB-16	11	30.5	930.25			R_i^2/n_i			RRB-3 and RRB-16	37.1	signif
LRB-16	11	30.5	930.25	R_i =	156	4867.2					
LRB-16	9	21	441	n_i =	5				RRB-5 and LRB-11A	4.8	
RRB-7	11	30.5	930.25						RRB-5 and RRB-10A	5.3	
RRB-7	11	30.5	930.25						RRB-5 and LRB-16	9.9	signif
RRB-7	10	25	625			R_i^2/n_i			RRB-5 and RRB-7	16.4	signif
RRB-7	9	21	441	R_i =	123.5	3050.5			RRB-5 and LRB-1	22.5	signif
RRB-7	8	16.5	272.25	n_i =	5				RRB-5 and RRB-11	28.5	signif
LRB-1	11	30.5	930.25						RRB-5 and RRB-13	31.8	signif
LRB-1	9	21	441						RRB-5 and RRB-16	36.2	signif

TABLE B-4

KRUSKAL-WALLIS AND MULTIPLE COMPARISON TEST RESLUTS FOR EPT INDEX AT RED RIVER STATIONS (December 1995)

Station	EPT Index	$R(X_{ij})$	$R(X_{ij})^2$				Comparisons	$\lvert R_i/n_i- R_j/n_j\rvert$	Table Value
LRB-1	8	16.5	272.25			R_i^2/n_i			
LRB-1	8	16.5	272.25	$R_i =$	93	1729.8	LRB-11A and RRB-10A	0.5	
LRB-1	6	8.5	72.25	$n_i =$	5		LRB-11A and LRB-16	5.1	
RRB-11	9	21	441				LRB-11A and RRB-7	11.6	signif
RRB-11	8	16.5	272.25				LRB-11A and LRB-1	17.7	signif
RRB-11	7	12.5	156.25			R_i^2/n_i	LRB-11A and RRB-11	23.7	signif
RRB-11	6	8.5	72.25	$R_i =$	63	793.8	LRB-11A and RRB-13	27.0	signif
RRB-11	5	4.5	20.25	$n_i =$	5		LRB-11A and RRB-16	31.4	signif
RRB-13	7	12.5	156.25						
RRB-13	7	12.5	156.25				RRB-10A and LRB-16	4.6	
RRB-13	6	8.5	72.25			R_i^2/n_i	RRB-10A and RRB-7	11.1	signif
RRB-13	6	8.5	72.25	$R_i =$	46.5	432.45	RRB-10A and LRB-1	17.2	signif
RRB-13	5	4.5	20.25	$n_i =$	5		RRB-10A and RRB-11	23.2	signif
RRB-16	7	12.5	156.25		20		RRB-10A and RRB-13	26.5	signif
RRB-16	5	4.5	20.25				RRB-10A and RRB-16	30.9	signif
RRB-16	5	4.5	20.25			R_i^2/n_i			
RRB-16	4	2	4	$R_i =$	24.5	120.05	LRB-16 and RRB-7	6.5	
RRB-16	3	1	1	$n_i =$	5		LRB-16 and LRB-1	12.6	signif
							LRB-16 and RRB-11	18.6	signif
							LRB-16 and RRB-13	21.9	signif
							LRB-16 and RRB-16	26.3	signif
							RRB-7 and LRB-1	6.1	
							RRB-7 and RRB-11	12.1	signif
							RRB-7 and RRB-13	15.4	signif
							RRB-7 and RRB-16	19.8	signif
							LRB-1 and RRB-11	6.0	
							LRB-1 and RRB-13	9.3	signif
							LRB-1 and RRB-16	13.7	signif
							RRB-11 and RRB-13	3.3	
							RRB-11 and RRB-16	7.7	signif
							RRB-13 and RRB-16	4.4	

TABLE B-5

KRUSKAL-WALLIS AND MULTIPLE COMPARISON TEST RESULTS FOR RATIO OF EPT/CHIRONOMID ABUNDANCE AT RED RIVER STATIONS (December 1995)

Station	EPT/ Chironomid	$R(X_{ij})$	$R(X_{ij})^2$						Comparisons	$\lvert R_i/n_i - R_j/n_j \rvert$	Table Value	
RRB-1	37.7	60	3600	N =	60		S^2 =	304.92				
RRB-1	16.6	51	2601						RRB-1 and LRB-16	5.6	14	
RRB-1	15.1	49	2401			R_i^2/n_i	$T_{(ties)}$ =	31.634	RRB-1 and RRB-13	6.7		
RRB-1	14.6	48	2304	R_i =	253	12802	k =	12	RRB-1 and LRB-21	8.1		
RRB-1	12.6	45	2025	n_i =	5		df =	11	RRB-1 and RRB-3	18.9		signif
LRB-16	18.3	54	2916						RRB-1 and LRB-11A	20.1		signif
LRB-16	16.8	52	2704				$T_{df,0.05}$ =	19.68	RRB-1 and RRB-10A	22.3		signif
LRB-16	15.4	50	2500			R_i^2/n_i			RRB-1 and RRB-16	24.5		signif
LRB-16	9.6	38	1444	R_i =	225	10125			RRB-1 and RRB-7	27.9		signif
LRB-16	7.0	31	961	n_i =	5				RRB-1 and LRB-1	28.0		signif
RRB-13	22.00	58	3364				$t_{N-k,0.95}$ =	1.6788	RRB-1 and RRB-5	33.0		signif
RRB-13	21.00	56	3136				N-k =	48	RRB-1 and RRB-11	46.1		signif
RRB-13	18.00	53	2809			R_i^2/n_i	interpolation for df					
RRB-13	6.70	29.5	870.25	R_i =	219.5	9636.1	40	1.684	LRB-16 and RRB-13	1.1		
RRB-13	3.80	23	529	n_i =	5		48		LRB-16 and LRB-21	2.5		
LRB-21	32.7	59	3481				60	1.671	LRB-16 and RRB-3	13.3		
LRB-21	21.1	57	3249						LRB-16 and LRB-11A	14.5		signif
LRB-21	10.2	42.5	1806.25			R_i^2/n_i	x =	-0.0052	LRB-16 and RRB-10A	16.7		signif
LRB-21	9.2	37	1369	R_i =	212.5	9031.3	48	1.6788	LRB-16 and RRB-16	18.9		signif
LRB-21	2.2	17	289	n_i =	5				LRB-16 and RRB-7	22.3		signif
RRB-3	13.8	46	2116						LRB-16 and LRB-1	22.4		signif
RRB-3	10.1	41	1681						LRB-16 and RRB-5	27.4		signif
RRB-3	4.9	26	676			R_i^2/n_i			LRB-16 and RRB-11	40.5		signif
RRB-3	4.6	25	625	R_i =	158.5	5024.5						
RRB-3	3.2	20.5	420.25	n_i =	5				RRB-13 and LRB-21	1.4		
LRB-11A	10.3	44	1936						RRB-13 and RRB-3	12.2		
LRB-11A	7.3	32	1024						RRB-13 and LRB-11A	13.4		
LRB-11A	6.7	29.5	870.25			R_i^2/n_i			RRB-13 and RRB-10A	15.6		signif
LRB-11A	5.3	28	784	R_i =	152.5	4651.3			RRB-13 and RRB-16	17.8		signif
LRB-11A	3.1	19	361	n_i =	5				RRB-13 and RRB-7	21.2		signif
RRB-10A	10.2	42.5	1806.25						RRB-13 and LRB-1	21.3		signif
RRB-10A	8.7	36	1296						RRB-13 and RRB-5	26.3		signif
RRB-10A	7.7	33	1089			R_i^2/n_i			RRB-13 and RRB-11	39.4		signif
RRB-10A	1.8	15	225	R_i =	141.5	4004.5						
RRB-10A	1.8	15	225	n_i =	5				LRB-21 and RRB-3	10.8		
RRB-16	14.50	47	2209						LRB-21 and LRB-11A	12.0		
RRB-16	10.00	40	1600						LRB-21 and RRB-10A	14.2		signif
RRB-16	8.00	34	1156			R_i^2/n_i			LRB-21 and RRB-16	16.4		signif
RRB-16	1.00	7	49	R_i =	130.5	3406.1			LRB-21 and RRB-7	19.8		signif
RRB-16	0.40	2.5	6.25	n_i =	5				LRB-21 and LRB-1	19.9		signif
RRB-7	20.3	55	3025						LRB-21 and RRB-5	24.9		signif
RRB-7	5.2	27	729						LRB-21 and RRB-11	38.0		signif
RRB-7	1.6	12.5	156.25			R_i^2/n_i						
RRB-7	1.3	9.5	90.25	R_i =	113.5	2576.5			RRB-3 and LRB-11A	1.2		
RRB-7	1.3	9.5	90.25	n_i =	5				RRB-3 and RRB-10A	3.4		
LRB-1	9.8	39	1521						RRB-3 and RRB-16	5.6		

TABLE B-5

KRUSKAL-WALLIS AND MULTIPLE COMPARISON TEST RESULSTS FOR RATIO OF EPT/CHIRONOMID ABUNDANCE AT RED RIVER STATIONS (December 1995)

Station	EPT/ Chironomid	$R(X_{ij})$	$R(X_{ij})^2$				Comparisons	$\lvert R_i/n_i-R_j/n_j \rvert$	Table Value
LRB-1	8.4	35	1225				RRB-3 and RRB-7	9.0	
LRB-1	4.2	24	576			R_i^2/n_i	RRB-3 and LRB-1	9.1	
LRB-1	1.4	11	121	$R_i =$	113	2553.8	RRB-3 and RRB-5	14.1	signif
LRB-1	0.7	4	16	$n_i =$	5		RRB-3 and RRB-11	27.2	signif
RRB-5	3.5	22	484						
RRB-5	3.2	20.5	420.25				LRB-11A and RRB-10A	2.2	
RRB-5	3.0	18	324			R_i^2/n_i	LRB-11A and RRB-16	4.4	
RRB-5	1.8	15	225	$R_i =$	88	1548.8	LRB-11A and RRB-7	7.8	
RRB-5	1.6	12.5	156.25	$n_i =$	5		LRB-11A and LRB-1	7.9	
RRB-11	1.20	8	64				LRB-11A and RRB-5	12.9	
RRB-11	0.90	6	36				LRB-11A and RRB-11	26.0	signif
RRB-11	0.80	5	25			R_i^2/n_i			
RRB-11	0.40	2.5	6.25	$R_i =$	22.5	101.25	RRB-10A and RRB-16	2.2	
RRB-11	0.10	1	1	$n_i =$	5		RRB-10A and RRB-7	5.6	
							RRB-10A and LRB-1	5.7	
							RRB-10A and RRB-5	10.7	
							RRB-10A and RRB-11	23.8	signif
							RRB-16 and RRB-7	3.4	
							RRB-16 and LRB-1	3.5	
							RRB-16 and RRB-5	8.5	
							RRB-16 and RRB-11	21.6	signif
							RRB-7 and LRB-1	0.1	
							RRB-7 and RRB-5	5.1	
							RRB-7 and RRB-11	18.2	signif
							LRB-1 and RRB-5	5.0	
							LRB-1 and RRB-11	18.1	signif
							RRB-5 and RRB-11	13.1	

TABLE B-6

KRUSKAL-WALLIS AND MULTIPLE COMPARISON TEST RESULTS FOR HILSENHOFF BIOTIC INDEX AT RED RIVER STATIONS
(December 1995)

Station	HBI	$R(X_{ij})$	$R(X_{ij})^2$						Comparisons	$\lvert R_i/n_i - R_j/n_j \rvert$	Table Value	
RRB-1	2.36	60	3600	N =	60		S^2 =	304.983				
RRB-1	2.72	57	3249						RRB-1 and RRB-3	13.1	11.08	signif
RRB-1	2.73	56	3136			R_i^2/n_i	$T_{(ties)}$ =	41.8495	RRB-1 and RRB-13	13.4		signif
RRB-1	2.83	55	3025	R_i =	282	15904.8	k =	12	RRB-1 and RRB-10A	13.7		signif
RRB-1	2.96	54	2916	n_i =	5		df =	11	RRB-1 and RRB-16	19.5		signif
RRB-3	3.11	53	2809						RRB-1 and RRB-5	20.2		signif
RRB-3	3.35	47.5	2256.25				$T_{df,0.05}$ =	19.68	RRB-1 and RRB-7	20.7		signif
RRB-3	3.82	42	1764			R_i^2/n_i			RRB-1 and LRB-1	40.4		signif
RRB-3	4.12	38	1444	R_i =	216.5	9374.45	$T_{(no\ ties)}$ =	41.8472	RRB-1 and LRB-16	41.2		signif
RRB-3	4.74	36	1296	n_i =	5				RRB-1 and RRB-11A	41.4		signif
RRB-13	3.30	49	2401				$t_{N-k,0.95}$ =	1.6788	RRB-1 and LRB-21	42.8		signif
RRB-13	3.43	46	2116				N-k =	48	RRB-1 and RRB-11	44.4		signif
RRB-13	3.79	44	1936			R_i^2/n_i	interpolation					
RRB-13	3.83	41	1681	R_i =	215	9245	40	1.684	RRB-3 and RRB-13	0.3		
RRB-13	4.80	35	1225	n_i =	5		48		RRB-3 and RRB-10A	0.6		
RRB-10A	3.24	52	2704				60	1.671	RRB-3 and RRB-16	6.4		
RRB-10A	3.27	51	2601						RRB-3 and RRB-5	7.1		
RRB-10A	3.35	47.5	2256.25			R_i^2/n_i	x =	-0.0052	RRB-3 and RRB-7	7.6		
RRB-10A	4.90	33	1089	R_i =	213.5	9116.45	48	1.6788	RRB-3 and LRB-1	27.3		signif
RRB-10A	5.27	30	900	n_i =	5				RRB-3 and LRB-16	28.1		signif
RRB-16	2.71	58.5	3422.25						RRB-3 and RRB-11A	28.3		signif
RRB-16	3.29	50	2500						RRB-3 and LRB-21	29.7		signif
RRB-16	3.44	45	2025			R_i^2/n_i			RRB-3 and RRB-11	31.3		signif
RRB-16	5.71	27	729	R_i =	184.5	6808.05						
RRB-16	7.63	4	16	n_i =	5				RRB-13 and RRB-10A	0.3		
RRB-5	4.00	40	1600						RRB-13 and RRB-16	6.1		
RRB-5	4.11	39	1521						RRB-13 and RRB-5	6.8		
RRB-5	4.27	37	1369			R_i^2/n_i			RRB-13 and RRB-7	7.3		
RRB-5	4.82	34	1156	R_i =	181	6552.2			RRB-13 and LRB-1	27.0		signif
RRB-5	5.21	31	961	n_i =	5				RRB-13 and LRB-16	27.8		signif
RRB-7	2.71	58.5	3422.25						RRB-13 and RRB-11A	28.0		signif
RRB-7	3.81	43	1849						RRB-13 and LRB-21	29.4		signif
RRB-7	5.62	28	784			R_i^2/n_i			RRB-13 and RRB-11	31.0		signif
RRB-7	5.74	26	676	R_i =	178.5	6372.45						
RRB-7	5.97	23	529	n_i =	5				RRB-10A and RRB-16	5.8		
LRB-1	5.03	32	1024						RRB-10A and RRB-5	6.5		
LRB-1	5.49	29	841						RRB-10A and RRB-7	7.0		
LRB-1	6.39	10	100			R_i^2/n_i			RRB-10A and LRB-1	26.7		signif
LRB-1	6.94	6	36	R_i =	80	1280			RRB-10A and LRB-16	27.5		signif
LRB-1	7.72	3	9	n_i =	5				RRB-10A and RRB-11A	27.7		signif
LRB-16	6.05	20	400						RRB-10A and LRB-21	29.1		signif

TABLE B-6

KRUSKAL-WALLIS AND MULTIPLE COMPARISON TEST RESULTS FOR HILSENHOFF BIOTIC INDEX AT RED RIVER STATIONS
(December 1995)

Station	HBI	$R(X_{ij})$	$R(X_{ij})^2$			
LRB-16	6.09	19	361			
LRB-16	6.20	16	256			R_i^2/n_i
LRB-16	6.37	12	144	R_i =	76	1155.2
LRB-16	6.40	9	81	n_i =	5	
LRB-11A	5.98	22	484			
LRB-11A	6.13	17	289			
LRB-11A	6.25	15	225			R_i^2/n_i
LRB-11A	6.26	14	196	R_i =	75	1125
LRB-11A	6.69	7	49	n_i =	5	
LRB-21	6.02	21	441			
LRB-21	6.11	18	324			
LRB-21	6.34	13	169			R_i^2/n_i
LRB-21	6.38	11	121	R_i =	68	924.8
LRB-21	7.16	5	25	n_i =	5	
RRB-11	5.75	25	625			
RRB-11	5.82	24	576			
RRB-11	6.65	8	64			R_i^2/n_i
RRB-11	7.85	2	4	R_i =	60	720
RRB-11	9.02	1	1	n_i =	5	

Comparisons	$\lvert R_i/n_i - R_j/n_j \rvert$	Table Value
RRB-10A and RRB-11	30.7	signif
RRB-16 and RRB-5	0.7	
RRB-16 and RRB-7	1.2	
RRB-16 and LRB-1	20.9	signif
RRB-16 and LRB-16	21.7	signif
RRB-16 and RRB-11A	21.9	signif
RRB-16 and LRB-21	23.3	signif
RRB-16 and RRB-11	24.9	signif
RRB-5 and RRB-7	0.5	
RRB-5 and LRB-1	20.2	signif
RRB-5 and LRB-16	21.0	signif
RRB-5 and RRB-11A	21.2	signif
RRB-5 and LRB-21	22.6	signif
RRB-5 and RRB-11	24.2	signif
RRB-7 and LRB-1	19.7	signif
RRB-7 and LRB-16	20.5	signif
RRB-7 and RRB-11A	20.7	signif
RRB-7 and LRB-21	22.1	signif
RRB-7 and RRB-11	23.7	signif
LRB-1 and LRB-16	0.8	
LRB-1 and RRB-11A	1.0	
LRB-1 and LRB-21	2.4	
LRB-1 and RRB-11	4.0	
LRB-16 and RRB-11A	0.2	
LRB-16 and LRB-21	1.6	
LRB-16 and RRB-11	3.2	
RRB-11A and LRB-21	1.4	
RRB-11A and RRB-11	3.0	
RRB-21 and RRB-11	1.6	

TABLE B-7

KRUSKAL-WALLIS AND MULTIPLE COMPARISON TEST RESULTS FOR SHANNON-WIENER DIVERSITY INDEX (H') AT RED RIVER STATIONS

(December 1995)

Station	H'	$R(X_{ij})$	$R(X_{ij})^2$						Comparisons	$\lvert R_i/n_i - R_j/n_j \rvert$	Table Value	
RR-3	3.82	60	3600	N =	60		S^2 =	304.82				
RR-3	3.47	58	3364						RRB-3 and RRB-5	2.2	9.215	
RR-3	3.43	55.5	3080.25			R_i^2/n_i	$T_{(ties)}$ =	47.140	RRB-3 and RRB-10A	3.2		
RR-3	3.35	53	2809	R_i =	260	13520	k =	12	RRB-3 and RRB-7	5.3		
RR-3	2.67	33.5	1122.25	n_i =	5		df =	11	RRB-3 and RRB-1	15.6		signif
RR-5	3.44	57	3249						RRB-3 and RRB-13	16.6		signif
RR-5	3.27	51	2601				$T_{df,0.05}$ =	19.68	RRB-3 and LRB-11A	30.0		signif
RR-5	3.23	49.5	2450.25			R_i^2/n_i			RRB-3 and LRB-21	31.4		signif
RR-5	3.21	48	2304	R_i =	249	12400	$T_{(no\ ties)}$ =	47.1125	RRB-3 and LRB-1	34.1		signif
RR-5	3.00	43.5	1892.25	n_i =	5				RRB-3 and RRB-11	36.2		signif
RR-10A	3.43	55.5	3080.25				$t_{N-k,0.95}$ =	1.6788	RRB-3 and LRB-16	38.4		signif
RR-10A	3.41	54	2916				N-k =	48	RRB-3 and RRB-16	45.0		signif
RR-10A	3.31	52	2704			R_i^2/n_i	interpolation for df					
RR-10A	2.97	42	1764	R_i =	244	11907	40	1.684	RRB-5 and RRB-10A	1.0		
RR-10A	2.96	40.5	1640.25	n_i =	5		48		RRB-5 and RRB-7	3.1		
RR-7	3.58	59	3481				60	1.671	RRB-5 and RRB-1	13.4		signif
RR-7	3.19	47	2209						RRB-5 and RRB-13	14.4		signif
RR-7	3.11	45	2025			R_i^2/n_i	x =	-0.0052	RRB-5 and LRB-11A	27.8		signif
RR-7	3.00	43.5	1892.25	R_i =	233.5	10904	48	1.6788	RRB-5 and LRB-21	29.2		signif
RR-7	2.93	39	1521	n_i =	5				RRB-5 and LRB-1	31.9		signif
RR-1	3.23	49.5	2450.25						RRB-5 and RRB-11	34.0		signif
RR-1	2.96	40.5	1640.25						RRB-5 and LRB-16	36.2		signif
RR-1	2.80	35	1225			R_i^2/n_i			RRB-5 and RRB-16	42.8		signif
RR-1	2.67	33.5	1122.25	R_i =	182	6624.8						
RR-1	2.32	23.5	552.25	n_i =	5				RRB-10A and RRB-7	2.1		
RR-13	3.17	46	2116						RRB-10A and RRB-1	12.4		signif
RR-13	2.89	38	1444						RRB-10A and RRB-13	13.4		signif
RR-13	2.86	37	1369			R_i^2/n_i			RRB-10A and LRB-11A	26.8		signif
RR-13	2.55	30	900	R_i =	177	6265.8			RRB-10A and LRB-21	28.2		signif
RR-13	2.41	26	676	n_i =	5				RRB-10A and LRB-1	30.9		signif
LR-11A	2.85	36	1296						RRB-10A and RRB-11	33.0		signif
LR-11A	2.22	22	484						RRB-10A and LRB-16	35.2		signif
LR-11A	2.21	20.5	420.25			R_i^2/n_i			RRB-10A and RRB-16	41.8		signif
LR-11A	2.17	17.5	306.25	R_i =	110	2420						
LR-11A	2.09	14	196	n_i =	5				RRB-7 and RRB-1	10.3		signif
LR-21	2.63	32	1024						RRB-7 and RRB-13	11.3		signif
LR-21	2.47	28	784						RRB-7 and LRB-11A	24.7		signif
LR-21	2.43	27	729			R_i^2/n_i			RRB-7 and LRB-21	26.1		signif
LR-21	1.90	11	121	R_i =	103	2121.8			RRB-7 and LRB-1	28.8		signif
LR-21	1.58	5	25	n_i =	5				RRB-7 and RRB-11	30.9		signif
LR-1	2.52	29	841						RRB-7 and LRB-16	33.1		signif

TABLE B-7

KRUSKAL-WALLIS AND MULTIPLE COMPARISON TEST RESULTS FOR SHANNON-WIENER DIVERSITY INDEX (H') AT RED RIVER STATIONS
(December 1995)

Station	H'	$R(X_{ij})$	$R(X_{ij})^2$			
LR-1	2.36	25	625			
LR-1	2.17	17.5	306.25			R_i^2/n_i
LR-1	2.09	14	196	R_i =	89.5	1602.1
LR-1	1.55	4	16	n_i =	5	
RR-11	2.60	31	961			
RR-11	2.32	23.5	552.25			
RR-11	2.17	17.5	306.25			R_i^2/n_i
RR-11	1.59	6	36	R_i =	79	1248.2
RR-11	0.93	1	1	n_i =	5	
LR-16	2.21	20.5	420.25			
LR-16	2.17	17.5	306.25			
LR-16	2.02	12	144			R_i^2/n_i
LR-16	1.87	10	100	R_i =	68	924.8
LR-16	1.81	8	64	n_i =	5	
RR-16	2.09	14	196			
RR-16	1.83	9	81			
RR-16	1.66	7	49			R_i^2/n_i
RR-16	1.46	3	9	R_i =	35	245
RR-16	1.14	2	4	n_i =	5	

Comparisons	$\lvert R_i/n_i - R_j/n_j \rvert$	Table Value
RRB-7 and RRB-16	39.7	signif
RRB-1 and RRB-13	1.0	
RRB-1 and LRB-11A	14.4	signif
RRB-1 and LRB-21	15.8	signif
RRB-1 and LRB-1	18.5	signif
RRB-1 and RRB-11	20.6	signif
RRB-1 and LRB-16	22.8	signif
RRB-1 and RRB-16	29.4	signif
RRB-13 and LRB-11A	13.4	signif
RRB-13 and LRB-21	14.8	signif
RRB-13 and LRB-1	17.5	signif
RRB-13 and RRB-11	19.6	signif
RRB-13 and LRB-16	21.8	signif
RRB-13 and RRB-16	28.4	signif
LRB-11A and LRB-21	1.4	
LRB-11A and LRB-1	4.1	
LRB-11A and RRB-11	6.2	
LRB-11A and LRB-16	8.4	
LRB-11A and RRB-16	15.0	signif
LRB-21 and LRB-1	2.7	
LRB-21 and RRB-11	4.8	
LRB-21 and LRB-16	7.0	
LRB-21 and RRB-16	13.6	signif
LRB-1 and RRB-11	2.1	
LRB-1 and LRB-16	4.3	
LRB-1 and RRB-16	10.9	signif
RRB-11 and LRB-16	2.2	
RRB-11 and RRB-16	8.8	
LRB-16 and RRB-16	6.6	

TABLE B-8

KRUSKAL-WALLIS AND MULTIPLE COMPARISON TEST RESULTS FOR SCRAPER ABUNDANCE AT RED RIVER STATIONS (December 1995)

Station	Filter feeder abundance (%)	$R(X_{ij})$	$R(X_{ij})^2$						Comparisons	$\lvert R_i/n_i - R_j/n_j \rvert$	Table Value
RRB-1	39.08	59	3481	N =	60		S^2 =	304.81			
RRB-1	37.55	58	3364						RRB-1 and RRB-3	8.8	9.5582
RRB-1	36.97	57	3249			R_i^2/n_i	$T_{(ties)}$ =	46.238	RRB-1 and RRB-10A	11.4	signif
RRB-1	31.75	55	3025	R_i =	283	16018	k =	12	RRB-1 and RRB-5	15.0	signif
RRB-1	30.49	54	2916	n_i =	5		df =	11	RRB-1 and RRB-7	16.4	signif
RRB-3	28.80	53	2809						RRB-1 and RRB-13	18.5	signif
RRB-3	18.54	52	2704				$T_{df,0.05}$ =	19.68	RRB-1 and LRB-11A	33.7	signif
RRB-3	17.71	50	2500			R_i^2/n_i			RRB-1 and RRB-16	37.4	signif
RRB-3	12.18	43	1849	R_i =	239	11424			RRB-1 and LRB-1	40.0	signif
RRB-3	11.94	41	1681	n_i =	5				RRB-1 and LRB-21	42.0	signif
RRB-10A	34.74	56	3136				$t_{N-k,0.95}$ =	1.6788	RRB-1 and LRB-16	44.2	signif
RRB-10A	17.19	49	2401				N-k =	48	RRB-1 and RRB-11	45.8	signif
RRB-10A	14.39	45	2025			R_i^2/n_i	interpolation				
RRB-10A	10.73	40	1600	R_i =	226	10215	40	1.684	RRB-3 and RRB-10A	2.6	
RRB-10A	8.57	36	1296	n_i =	5		48		RRB-3 and RRB-5	6.2	
RRB-5	18.16	51	2601				60	1.671	RRB-3 and RRB-7	7.6	
RRB-5	16.15	47	2209						RRB-3 and RRB-13	9.7	signif
RRB-5	13.40	44	1936			R_i^2/n_i	x =	-0.005	RRB-3 and LRB-11A	24.9	signif
RRB-5	8.42	35	1225	R_i =	208	8653	48	1.6788	RRB-3 and RRB-16	28.6	signif
RRB-5	6.05	31	961	n_i =	5				RRB-3 and LRB-1	31.2	signif
RRB-7	16.18	48	2304						RRB-3 and LRB-21	33.2	signif
RRB-7	12.15	42	1764						RRB-3 and LRB-16	35.4	signif
RRB-7	9.52	38.5	1482			R_i^2/n_i			RRB-3 and RRB-11	37.0	signif
RRB-7	9.52	38.5	1482	R_i =	201	8080					
RRB-7	8.11	34	1156	n_i =	5				RRB-10A and RRB-5	3.6	
RRB-13	48.15	60	3600						RRB-10A and RRB-7	5.0	
RRB-13	8.70	37	1369						RRB-10A and RRB-13	7.1	
RRB-13	6.90	33	1089			R_i^2/n_i			RRB-10A and LRB-11A	22.3	signif
RRB-13	6.06	32	1024	R_i =	191	7258			RRB-10A and RRB-16	26.0	signif
RRB-13	4.00	28.5	812.3	n_i =	5				RRB-10A and LRB-1	28.6	signif
LRB-11A	4.00	28.5	812.3						RRB-10A and LRB-21	30.6	signif
LRB-11A	2.46	26	676						RRB-10A and LRB-16	32.8	signif
LRB-11A	2.35	25	625			R_i^2/n_i			RRB-10A and RRB-11	34.4	signif
LRB-11A	1.94	21	441	R_i =	115	2622					
LRB-11A	1.29	14	196	n_i =	5				RRB-5 and RRB-7	1.4	
RRB-16	14.71	46	2116						RRB-5 and RRB-13	3.5	
RRB-16	3.51	27	729						RRB-5 and LRB-11A	18.7	signif
RRB-16	1.54	17	289			R_i^2/n_i			RRB-5 and RRB-16	22.4	signif
RRB-16	0.00	3	9	R_i =	96	1843			RRB-5 and LRB-1	25.0	signif

TABLE B-8

KRUSKAL-WALLIS AND MULTIPLE COMPARISON TEST RESULTS FOR SCRAPER ABUNDANCE AT RED RIVER STATIONS
(December 1995)

Station	Filter feeder abundance (%)	$R(X_{ij})$	$R(X_{ij})^2$				Comparisons	$\|R_i/n_i-R_j/n_j\|$	Table Value
RRB-16	0.00	3	9	n_i =	5		RRB-5 and LRB-21	27.0	signif
LRB-1	2.30	24	576				RRB-5 and LRB-16	29.2	signif
LRB-1	2.11	23	529				RRB-5 and RRB-11	30.8	signif
LRB-1	1.18	13	169			R_i^2/n_i			
LRB-1	1.02	12	144	R_i =	83	1378	RRB-7 and RRB-13	2.1	
LRB-1	0.95	11	121	n_i =	5		RRB-7 and LRB-11A	17.3	signif
LRB-21	1.95	22	484				RRB-7 and RRB-16	21.0	signif
LRB-21	1.75	19	361				RRB-7 and LRB-1	23.6	signif
LRB-21	1.49	16	256			R_i^2/n_i	RRB-7 and LRB-21	25.6	signif
LRB-21	0.81	9	81	R_i =	73	1066	RRB-7 and LRB-16	27.8	signif
LRB-21	0.47	7	49	n_i =	5		RRB-7 and RRB-11	29.4	signif
LRB-16	1.83	20	400						
LRB-16	1.66	18	324				RRB-13 and LRB-11A	15.2	signif
LRB-16	0.83	10	100			R_i^2/n_i	RRB-13 and RRB-16	18.9	signif
LRB-16	0.80	8	64	R_i =	62	768.8	RRB-13 and LRB-1	21.5	signif
LRB-16	0.23	6	36	n_i =	5		RRB-13 and LRB-21	23.5	signif
RRB-11	5.13	30	900				RRB-13 and LRB-16	25.7	signif
RRB-11	1.35	15	225				RRB-13 and RRB-11	27.3	signif
RRB-11	0.00	3	9			R_i^2/n_i			
RRB-11	0.00	3	9	R_i =	54	583.2	LRB-11A and RRB-16	3.7	
RRB-11	0.00	3	9	n_i =	5		LRB-11A and LRB-1	6.3	
							LRB-11A and LRB-21	8.3	
							LRB-11A and LRB-16	10.5	signif
							LRB-11A and RRB-11	12.1	signif
							RRB-16 and LRB-1	2.6	
							RRB-16 and LRB-21	4.6	
							RRB-16 and LRB-16	6.8	
							RRB-16 and RRB-11	8.4	
							LRB-1 and LRB-21	2.0	
							LRB-1 and LRB-16	4.2	
							LRB-1 and RRB-11	5.8	
							LRB-21 and LRB-16	2.2	
							LRB-21 and RRB-11	3.8	
							LRB-16 and RRB-11	1.6	

TABLE B-9

KRUSKAL-WALLIS AND MULTIPLE COMPARISON TEST RESULTS FOR FILTER FEEDER ABUNDANCE AT RED RIVER STATIONS
(December 1995)

Station	Filter feeder abundance (%)	$R(X_{ij})$	$R(X_{ij})^2$						Comparisons	$\lvert R_i/n_i - R_j/n_j \rvert$	Table Value	
RB-10A	47.7	59	3481	N =	60		S^2 =	304.93				
RRB-10A	38.5	58	3364						RRB-10A and RRB-7	2.7	13.33	
RRB-10A	30.2	56	3136			R_i^2/n_i	$T_{(ties)}$ =	34.189	RRB-10A and RRB-11	11.7		
RB-10A	15.8	48	2304	R_i =	260.5	13572	k =	12	RRB-10A and RRB-3	12.5		
RRB-10A	10.0	39.5	1560	n_i =	5		df =	11	RRB-10A and RRB-13	15.7		signif
RRB-7	50.7	60	3600						RRB-10A and RRB-5	20.3		signif
RB-7	28.6	55	3025				$T_{df,0.05}$ =	19.68	RRB-10A and LRB-21	20.7		signif
RRB-7	16.2	49	2401			R_i^2/n_i			RRB-10A and LRB-16	28.8		signif
RRB-7	15.0	46	2116	R_i =	247	12202			RRB-10A and RRB-16	33.2		signif
RB-7	9.5	37	1369	n_i =	5				RRB-10A and LRB-11A	34.0		signif
RRB-11	25.7	54	2916				$t_{N-k,0.95}$ =	1.6788	RRB-10A and LRB-1	35.3		signif
RRB-11	20.0	51	2601				N-k =	48	RRB-10A and RRB-1	44.3		signif
RB-11	11.1	42	1764			R_i^2/n_i	interpolation for df					
RRB-11	7.7	30	900	R_i =	202	8160.8	40	1.684	RRB-7 and RRB-11	9.0		
RB-11	6.1	25	625	n_i =	5		48		RRB-7 and RRB-3	9.8		
RB-3	21.7	52	2704				60	1.671	RRB-7 and RRB-13	13.0		
RRB-3	15.2	47	2209						RRB-7 and RRB-5	17.6		signif
RB-3	11.8	44	1936			R_i^2/n_i	x =	-0.0052	RRB-7 and LRB-21	18.0		signif
RB-3	11.4	43	1849	R_i =	198	7840.8	48	1.6788	RRB-7 and LRB-16	26.1		signif
RRB-3	2.6	12	144	n_i =	5				RRB-7 and RRB-16	30.5		signif
RB-13	32.0	57	3249						RRB-7 and LRB-11A	31.3		signif
RB-13	17.4	50	2500						RRB-7 and LRB-1	32.6		signif
RRB-13	12.1	45	2025			R_i^2/n_i			RRB-7 and RRB-1	41.6		signif
RB-13	7.4	28	784	R_i =	182	6624.8						
RB-13	0.0	2	4	n_i =	5				RRB-11 and RRB-3	0.8		
RRB-5	10.0	39.5	1560						RRB-11 and RRB-13	4.0		
RB-5	9.8	38	1444						RRB-11 and RRB-5	8.6		
RB-5	8.2	33	1089			R_i^2/n_i			RRB-11 and LRB-21	9.0		
RRB-5	7.5	29	841	R_i =	159	5056.2			RRB-11 and LRB-16	17.1		signif
RB-5	4.2	19.5	380.3	n_i =	5				RRB-11 and RRB-16	21.5		signif
RB-21	10.2	41	1681						RRB-11 and LRB-11A	22.3		signif
LRB-21	9.3	36	1296						RRB-11 and LRB-1	23.6		signif
RB-21	9.1	35	1225			R_i^2/n_i			RRB-11 and RRB-1	32.6		signif
RB-21	9.0	34	1156	R_i =	157	4929.8						
LRB-21	2.3	11	121	n_i =	5				RRB-3 and RRB-13	3.2		
RB-16	8.0	32	1024						RRB-3 and RRB-5	7.8		
RB-16	7.0	26.5	702.3						RRB-3 and LRB-21	8.2		
LRB-16	4.8	22	484			R_i^2/n_i			RRB-3 and LRB-16	16.3		signif
RB-16	4.2	19.5	380.3	R_i =	116.5	2714.5			RRB-3 and RRB-16	20.7		signif

TABLE B-9

KRUSKAL-WALLIS AND MULTIPLE COMPARISON TEST RESULTS FOR FILTER FEEDER ABUNDANCE AT RED RIVER STATIONS (December 1995)

Station	Filter feeder abundance (%)	$R(X_{ij})$	$R(X_{ij})^2$			
RB-16	3.5	16.5	272.3	n_i =	5	
RRB-16	22.2	53	2809			
RRB-16	4.6	21	441			
RB-16	3.5	16.5	272.3			R_i^2/n_i
RRB-16	0.0	2	4	R_i =	94.5	1786.1
RRB-16	0.0	2	4	n_i =	5	
RB-11A	7.8	31	961			
LRB-11A	7.0	26.5	702.3			
RB-11A	3.7	18	324			R_i^2/n_i
RB-11A	2.1	9	81	R_i =	90.5	1638.1
LRB-11A	0.8	6	36	n_j =	5	
RB-1	5.6	24	576			
RB-1	5.3	23	529			
LRB-1	3.4	15	225			R_i^2/n_i
RB-1	3.2	14	196	R_i =	84	1411.2
RB-1	1.7	8	64	n_i =	5	
RRB-1	3.1	13	169			
RRB-1	2.2	10	100			
RB-1	1.6	7	49			R_i^2/n_i
RRB-1	0.6	5	25	R_i =	39	304.2
RRB-1	0.5	4	16	n_i =	5	

Comparisons	$\|R_i/n_i - R_j/n_j\|$	Table Value
RRB-3 and LRB-11A	21.5	signif
RRB-3 and LRB-1	22.8	signif
RRB-3 and RRB-1	31.8	signif
RRB-13 and RRB-5	4.6	
RRB-13 and LRB-21	5.0	
RRB-13 and LRB-16	13.1	
RRB-13 and RRB-16	17.5	signif
RRB-13 and LRB-11A	18.3	signif
RRB-13 and LRB-1	19.6	signif
RRB-13 and RRB-1	28.6	signif
RRB-5 and LRB-21	0.4	
RRB-5 and LRB-16	8.5	
RRB-5 and RRB-16	12.9	
RRB-5 and LRB-11A	13.7	signif
RRB-5 and LRB-1	15.0	signif
RRB-5 and RRB-1	24.0	signif
LRB-21 and LRB-16	8.1	
LRB-21 and RRB-16	12.5	
LRB-21 and LRB-11A	13.3	
LRB-21 and LRB-1	14.6	signif
LRB-21 and RRB-1	23.6	signif
LRB-16 and RRB-16	4.4	
LRB-16 and LRB-11A	5.2	
LRB-16 and LRB-1	6.5	
LRB-16 and RRB-1	15.5	signif
RRB-16 and LRB-11A	0.8	
RRB-16 and LRB-1	2.1	
RRB-16 and RRB-1	11.1	
LRB-11A and LRB-1	1.3	
LRB-11A and RRB-1	10.3	
LRB-1 and RRB-1	9.0	

APPENDIX C
PERCENT COMPOSITION OF BENTHIC MACROINVERTEBRATES

APPENDIX C

PERCENT COMPOSITION OF BENTHIC MACROINVERTEBRATES AT RED RIVER LOCATIONS
(December 1995)

	RRB-1 Replicates					RRB-3 Replicates					RRB-5 Replicates					RRB-7 Replicates					RRB-10A Replicates					RRB-11 Replicates				
Taxon	1	2	3	4	5	1	2	3	4	5	1	2	3	4	5	1	2	3	4	5	1	2	3	4	5	1	2	3	4	5
TURBELLARIA	0	0.14	0	1.30	0	0	0	0	0.52	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
NEMATODA	0	0.27	0.61	0	0	0	0.56	0	0	0	0.28	0.36	1.05	0	0	0	0.95	0	1.35	0.93	0	0	0	0	0	0	0	0	0	0
OLIGOCHAETA	0	0	0.40	0.22	0.29	0.32	0.56	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
HYDRACARINA	0.27	0	0.61	0.65	1.59	0.32	0	1.71	1.05	17	0	0	0	0	0.33	1.47	0.95	0	1.35	0	2.11	0	3.79	2.08	0	0	0	0	0	0
EPHEMEROPTERA																														
Ameletidae																														
Ameletus sp.	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.49	0	0	0	0	0	0	0	0
Baetidae																														
Baetis tricaudatus	0.33	0.27	0.40	0.11	0.58	0	0.56	0	0	0.37	3.40	2.14	0.79	1.45	1.96	4.41	7.62	9.52	8.11	7.48	8.42	2.93	4.55	5.21	8.57	3.70	0	0	0	4.05
Ephemerellidae																														
Drunella doddsi	0.27	0.27	1.62	0.43	1.15	0.32	0	0.57	0	0.37	1.42	2.14	3.95	2.18	1.31	0	3.81	0	0	3.74	9.47	0	7.58	2.08	2.86	0	0	0	0	0
Drunella grandis	0	0	0	0	0	0	0	1.71	1.05	0.74	4.82	3.20	3.68	5.33	2.94	13.97	1.90	7.14	5.41	8.41	26.3	7.32	12.9	13.54	2.86	0	0	2.56	0	0
Ephemerella infrequens	0	0.14	0.20	0	0.14	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1.43	0	0	0	0	0
Heptageniidae																														
Epeorus longimanus	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Rhithrogena robusta	0.07	0.54	0.40	0.11	0	0	1.12	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.98	0	0	0	0	0	0	0	0
Rhithrogena sp.	2.60	2.71	4.24	1.73	2.89	11.61	5.62	1.14	4.71	8.12	1.13	1.07	0.26	7.51	2.61	8.09	24.76	4.76	2.70	7.48	6.32	5.37	4.55	8.85	7.14	0	5.00	2.56	1.02	0.00
Leptophlebiidae																														
Paraleptophlebia sp.	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
PLECOPTERA																														
Capniidae	3.66	5.56	2.02	1.30	4.04	49.68	34.27	12.00	19.37	13.28	16.15	22.42	1.58	3.87	5.56	1.47	5.71	0	0	0	0	1.95	0	0.52	1.43	3.70	15.00	17.95	2.04	2.70
Eucapnopsis brevicauda	0.13	0.14	0.20	0	0.58	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Leuctridae																														
Paraleuctra sp.	0.13	0.68	0	0	0	0	0	0	0	0	0	0	0	0.24	0.33	0	0	0	0	0	0	0	0	0	0	3.70	0	0	0	0
Taeniopterygidae																														
Doddsia occidentalis	37.55	38.40	36	30.49	32	10	16	15	23.0	7.75	11.33	2.49	4.47	12.83	10.13	0	6.67	2.38	2.70	3.74	8.42	2.93	1.52	3.13	5.71	0	0	2.56	0	1.35
Taenionema sp.	0.93	0.81	0.61	0.54	0.72	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Nemouridae																														
Podmosta/ Prostoia sp.	41.34	28.49	30.71	43.03	25.11	6.77	6.18	16.57	7.85	8.49	28.61	34.16	34.74	31.48	20.92	8.09	9.52	7.14	21.62	2.80	4.21	0.98	2.27	9.90	15.71	3.70	10.00	2.56	1.02	5.41
Zapada cinctipes	0.13	0.27	1.01	0.43	0.87	0.32	0.56	0	0	0	0.28	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2.56	0	0
Zapada sp.	0	0	0	0	0	0	0	0	0.52	0	0.28	0	0	0	0	0	0	0	0	0	1.05	0	0	0	0	0	0	2.56	2.04	1.35
Pteronarcyidae																														
Pteronarcella badia	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Chloroperlidae	0.13	0.27	0	0	0	0	0	0	0	0	0	0	0	0	0	0.74	0	0	0	1.87	0	0.49	0	0	2.86	0	0	0	1.02	0.00
Paraperla frontalis	0	0	0	0	0	0	0	0	0	0	0	0.36	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Plumiperla diversa	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Sweltsa sp.	0.73	0.68	0.61	0	1.44	0	3.37	0	0	1.48	0.85	0.36	0	0	0.98	0	0	0	2.70	0	0	0.98	0	0	0	0	5.00	0.00	0	0
Perlodidae	0.33	0	0.61	0.22	0.29	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.49	0	0	0	0	0	0	0	0
Isoperla sp.	0.07	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Megarcys signata	0.80	0.41	0.20	2.49	0	0	1.69	1.14	0.52	2.95	0.28	0	0	0.97	2.61	0	0	0	0	0	0	0	0	0.52	0	0	0	0	0	0
Perlidae																														
Hesperoperla pacifica	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	4.39	0	1.56	1.43	0	0	0	0	1.35
TRICHOPTERA																														
Brachycentridae																														
Brachycentrus americanus	0.40	0.14	0.61	2.16	1.88	1.61	7.30	18.86	12.04	9.96	1.13	1.07	2.63	0.73	1.63	24.26	3.81	11.9	5.41	2.80	3.16	0	9.09	10.94	1.43	0	5.00	5.13	1.02	9.46
Glossosomatidae																														
Culoptila sp.	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Glossosoma sp.	0	0	0	0	0	0	0	0	0.52	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.52	0	0	0	0	0	0
Hydropsychidae																														
Arctopsyche grandis	0.13	0.14	0.61	0.32	0.29	0.97	4.49	2.86	2.62	1.48	2.83	6.05	7.11	6.78	7.84	26.47	12.38	16.67	4.05	12.15	12.63	30.24	38.64	27.08	8.57	11.11	15.00	2.56	4.08	16.22
Hydropsyche sp.	0	0	0	0.22	0	0	0	0	0.52	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.52	0	0	0	0	0	0
Hydroptilidae																														
Ochrotrichia sp.	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Lepidostomatidae																														
Lepidostoma sp.	0.27	0.81	0.20	0.97	0.14	0.32	0.56	0.57	0	1.11	0	0	0	0	0	0	0	0	0	0	0	0	0.76	0	0	0	0	0	0	0

	RRB-13 Replicates					RRB-16 Replicates					LRB-1 Replicates					LRB-11A Replicates					LRB-16 Replicates					LRB-21 Replicates				
Taxon	1	2	3	4	5	1	2	3	4	5	1	2	3	4	5	1	2	3	4	5	1	2	3	4	5	1	2	3	4	5
TURBELLARIA	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.29	0	0	0	0	0	0	0	0	0	0.71	0.32	0.98	0.35	1.79
NEMATODA	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.26	0	0.36	0.27	0.93	0.91	0.28	0.48	0	0	0.16	0.53	0
OLIGOCHAETA	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.30	0	0	0	0.32	0	0	0
HYDRACARINA	4.00	0	0	3.70	10.34	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.53	0	0	0.28	0	0.24	0	0	0.18	0
EPHEMEROPTERA																														
Ameletidae																														
Ameletus sp.	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.18	0.00
Baetidae																														
Baetis tricaudatus	24.00	13.04	6.06	7.41	13.79	11.76	3.23	11.11	0	0	41.12	21.93	32.49	40.00	71.26	42.86	64.75	67.10	62.79	60.29	62.03	68.69	65.85	74.31	69.60	46.45	74.68	61.89	72.85	56.42
Ephemerellidae																														
Drunella doddsi	0	0	0	0	0	0	0	0	0	0	0.51	0.47	0.63	1.05	0	0.29	0.82	0.26	0.39	0.18	0	0	0	0	0	0.24	0	0.16	0	0.30
Drunella grandis	4.00	8.70	6.06	48.15	6.90	14.71	0	0	1.54	3.51	0	0.71	0.63	2.11	2.30	3.14	1.64	1.03	1.94	1.99	0.53	0.00	1.83	0.83	1.19	0.24	1.30	0.49	1.23	1.34
Ephemerella infrequens	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Heptageniidae																														
Epeorus longimanus	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.16	0.35	0
Rhithrogena robusta	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Rhithrogena sp.	20.00	26.09	30.30	11.11	44.83	58.82	80.65	55.56	16.92	12.28	35.03	10.38	18.30	25.26	8.05	14.86	7.38	4.88	10.08	13.90	11.76	12.85	7.62	3.31	7.36	4.74	11.69	7.49	3.85	9.10
Leptophlebiidae																														
Paraleptophlebia sp.	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.49	0.53	0
PLECOPTERA																														
Capniidae	0	8.70	0	3.70	3.45	0	3.23	0	6.15	1.75	0	0	0	0	0	2.00	3.28	1.54	0.78	0.18	0.27	1.64	1.52	1.10	0.48	1.42	1.30	4.40	0.53	2.39
Eucapnopsis brevicauda	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.27	0	0	0	0	0	0	0	0	0
Leuctridae																														
Paraleuctra sp.	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.65	0	0	0.15
Taeniopterygidae																														
Doddsia occidentalis	0	0	0	0	0	0	0	0	0	0	0.51	0.47	0.32	0	0	0.57	0.82	0.26	0	0.36	0	0	0	0	0	0	0.65	0	0	0
Taenionema sp.	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Nemouridae																														
Podmosta/ Prostoia sp.	0	0	3.03	0	0	0	3.23	0	0	0	1.02	0.47	0.00	1.05	1.15	0.86	1.64	3.86	3.49	1.08	1.34	0.93	1.52	1.10	0.95	0.71	0.32	1.47	0.70	4.78
Zapada cinctipes	0	0	0	0	0	0	0	0	4.62	0	0	0.94	0	0	0	0	0	0	0	0.36	0	0	0	0	0	0.24	0	0	0	0.30
Zapada sp.	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.00	0	0	0	0.00
Pteronarcyidae																														
Pteronarcella badia	0	4.35	0	0	0	0	0	0	13.85	5.26	0.51	1.18	0	0.00	1.15	2.00	0.82	0.26	0.39	0.18	1.87	1.17	2.13	0.28	1.43	0.71	0	0.33	0	0.90
Chloroperlidae	0	0	0	3.70	0	0	3.23	0	0	0	0	0	0	1.05	0	0.57	1.64	0	0	0	0	0	0.61	0.28	0.24	0	0.65	0.65	0	0.15
Paraperla frontalis	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.53	0	0	0	0	0	0	0	0	0
Plumiperla diversa	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.71	0	0.33	0.70	0.60
Sweltsa sp.	0	0	0	0	3.45	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Perlodidae	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.39	0	0	0	0	0	0	0	0	0	0	0
Isoperla sp.	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.16	0.35	0.30
Megarcys signata	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Perlidae																														
Hesperoperla pacifica	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
TRICHOPTERA																														
Brachycentridae																														
Brachycentrus americanus	12.00	4.35	0	0	0	0	0	0	1.54	3.51	0.51	0.24	1.26	3.16	0	0.57	0.00	0.51	2.71	3.61	1.34	1.87	2.13	2.76	1.43	5.69	1.62	2.77	5.95	3.88
Glossosomatidae																														
Culoptila sp.	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.18	0
Glossosoma sp.	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Hydropsychidae																														
Arctopsyche grandis	16.00	13.04	9.09	3.70	0	0	0	22.22	3.08	0	2.54	1.18	1.58	2.11	3.45	2.00	0.82	1.03	3.49	1.08	1.87	1.40	2.44	3.31	1.90	0.24	0.32	1.14	0.70	2.09
Hydropsyche sp.	4.00	0	3.03	3.70	0	0	0	0	0	0	2.54	0.24	0.32	0	0	1.14	0	0.51	1.55	2.17	0.27	0.93	2.44	1.93	1.43	4.03	0.32	4.72	2.45	2.84
Hydroptilidae																														
Ochrotrichia sp.	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.32	0	0	0
Lepidostomatidae																														
Lepidostoma sp.	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.28	0	0.47	0.32	0	0	0.15

APPENDIX C

PERCENT COMPOSITION OF BENTHIC MACROINVERTEBRATES AT RED RIVER LOCATIONS
(December 1995)

Taxon	RRB-1 Replicates					RRB-3 Replicates					RRB-5 Replicates					RRB-7 Replicates				
	1	2	3	4	5	1	2	3	4	5	1	2	3	4	5	1	2	3	4	5
Limnephilidae	0	0	0	0	0	0	0.56	0	0	0	0	0	0	0	0	0	0	0	0	0
Hesperophylax sp.	0	0	0	0	0	0	0.56	0	0	0	0	0	0	0	0	0	0	0	0	0
Oligophlebodes sp.	0	0	0.40	0	0.14	2.26	2.25	0.57	4.19	3.69	0	0.36	0.26	0	0.33	2.21	0	0	0	0
Rhyacophilidae																				
Rhyacophila brunnea	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1.35	0
Rhyacophila coloradensis	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Rhyacophila pellisa	0.33	1.22	2.63	0.54	1.01	1.29	0	0.57	0.52	1.85	0	0	1.05	0.24	0.65	0	0.95	0	0	0.93
Rhyacophila sp. A	0	0	0	0	0	0	0	0	0	0	0.57	0	0	0.48	0	0	1.90	1.19	1.35	1.87
COLEOPTERA																				
Dytiscidae																				
Liodessus affinis	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Elmidae																				
Heterlimnius corpulentus	0.20	0.81	0.61	0.54	1.44	0.65	1.69	0.57	1.05	2.58	0.00	0.36	0.26	0.24	0.65	0	0	1.19	0	0
Narpus concolor	0	0	0	0	0	0.32	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Optioservus sp.	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.95	0	0	0
DIPTERA																				
Athericidae																				
Atherix pachypus	0	0	0	0	0	0.32	0	0	0	0	0	0.36	0.26	0.48	0.33	0	0.95	0	0	0
Blephariceridae																				
Bibiocephala grandis	0	0.68	0.20	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Ceratopogonidae	0	0	0.20	0.11	0.14	0	0	0.57	0	0	0	0	0.26	0	0	0	0	0	0	0
Chironomidae																				
Brillia sp.	0.13	0.14	0.20	0.43	0.87	0	1.12	0.00	0	0	0	0	0.26	0	0	0	0	0	0	0
Cricotopus/Orthocladius sp.	0.13	0	0	0.11	0.43	0	0	5.14	1.05	1.11	3.97	4.27	6.32	2.66	4.90	0	2.86	3.57	5.41	4.67
Diamesa sp.	0.07	0.14	0	0	0	1.61	3.37	14.29	10.47	6.64	15.01	13.88	20.26	15.74	26.14	0	10.48	33.33	32.43	36.45
Eukiefferiella sp.	0	0	0	0.32	0	0	0	0	0	0	0	0	0	0	0.98	0	0	0	0	0
Heleniella sp.	0	0	0	0	0.14	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Hydrobaenus sp.	0	0	0	0	0	0.32	0.00	0	1.05	0	0	0	0	0	0	0	0	0	0	0
Micropsectra sp.	0.07	0.41	0.40	0.32	0.87	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Orthocladius (Symposiocladius) lignicola	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2.94	0	0	0	0
Pagastia sp.	0.33	0.41	0	0.54	0.58	0.32	1.12	2.29	2.62	1.11	0	0	0.26	0	0	0	0	0	0	0
Parametriocnemus sp.	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Paraphaenocladius sp.	0.73	4.07	3.84	3.03	1.88	3.87	1.69	0	0	2.95	4.82	2.49	3.95	2.66	4.90	1.47	1.90	1.19	4.05	0.93
Parorthocladius sp.	0	0	0	0.11	0	0	0.56	0	0	0.74	0.28	1.07	2.37	2.18	0.33	0	0	0	0	0
Phaenopsectra sp.	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Polypedilum sp.	0	0	0	0	0	0	0.56	0.57	1.57	0	0	0	0	0	0	0	0	0	0	0
Pseudodiamesa sp	0.07	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Rheocricotopus sp.	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Tvetenia sp.	0.87	0.27	0.61	0.97	1.01	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Empididae																				
Chelifera sp.	0	0	0.20	0	0	0	0	0	0.52	0	0	0	0	0	0	0	0	0	0	0
Oreogeton sp.	0	0	0	0.22	0	0	0	0	0	0	0	0	0.26	0	0	0	0	0	0	0
Psychodidae																				
Pericoma/Telmatoscopus sp.	5.53	9.09	5.45	4.86	13.56	0.32	0.00	0.00	0.00	0	0.00	0.36	0.26	0.00	0	0	0	0	0	0
Simuliidae																				
Prosimulium sp.	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Simulium sp.	0.07	0.27	0.40	0.43	0	0	0	0	0	0	0.28	0.36	0.26	0.73	0.33	0	0	0	0	0
Tipulidae	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Dicranota sp.	1.13	0.95	2.22	0.43	2.45	6.77	3.37	2.86	2.62	6	2.27	0.71	3.42	1.21	1.31	3.68	1.90	0	0	3.74
Hesperoconopa sp	0	0	0	0	0.14	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Hexatoma sp.	0.07	0.41	0.40	0.32	1.73	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Pedicia sp.	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Tipula sp.	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.74	0	0	0	0
Totals:	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100

Taxon	RRB-10A Replicates					RRB-11 Replicates					RRB-13 Replicates					RRB-16 Replicates				
	1	2	3	4	5	1	2	3	4	5	1	2	3	4	5	1	2	3	4	5
Limnephilidae	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Hesperophylax sp.	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Oligophlebodes sp.	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Rhyacophilidae																				
Rhyacophila brunnea	0	0	0	0.52	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Rhyacophila coloradensis	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Rhyacophila pellisa	2.11	0.49	0	0	0	0	0	0	0	0	0	0	0	0	0	2.94	0	0	0	0
Rhyacophila sp. A	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
COLEOPTERA																				
Dytiscidae																				
Liodessus affinis	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Elmidae																				
Heterlimnius corpulentus	0	0.49	0.76	2.08	1.43	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Narpus concolor	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1.75
Optioservus sp.	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
DIPTERA																				
Athericidae																				
Atherix pachypus	0	0	0	0	0	0	0	2.56	0	0	4.00	8.70	18.18	11.11	13.79	2.94	0	0	0	0
Blephariceridae																				
Bibiocephala grandis	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Ceratopogonidae	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Chironomidae																				
Brillia sp.	0	0	0	0	1.43	0	0	0	0	0	0	0	0	0	0	0	0	0	1.54	0
Cricotopus/Orthocladius sp.	0	0.49	0.76	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Diamesa sp.	0	0	0	0.52	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Eukiefferiella sp.	0	0	0	0.52	1.43	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Heleniella sp.	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Hydrobaenus sp.	0	0.98	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Micropsectra sp.	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Orthocladius (Symposiocladius) lignicola	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Pagastia sp.	1.05	0.49	0	0.52	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Parametriocnemus sp.	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Paraphaenocladius sp.	8.42	31.22	9.85	6.77	31.43	70.37	45.00	46.15	86.73	55.41	12.00	4.35	15.15	3.70	3.45	8.82	6.45	11.11	44.62	68.42
Parorthocladius sp.	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Phaenopsectra sp.	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Polypedilum sp.	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Pseudodiamesa sp	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Rheocricotopus sp.	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Tvetenia sp.	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Empididae																				
Chelifera sp.	1.05	0	0.76	0	0	0	0	0	0	0	0	4.35	0	0	0	0	0	0	0	0
Oreogeton sp.	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Psychodidae																				
Pericoma/Telmatoscopus sp.	1.05	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Simuliidae																				
Prosimulium sp.	0	0	0	0	0	0	0	0	1.02	0	0	0	0	0	0	0	0	0	0	0
Simulium sp.	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Tipulidae	0	0.49	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Dicranota sp.	4.21	5.85	2.27	2.60	4.29	3.70	0	10.26	0	2.70	0	4.35	6.06	0	0	0	0	0	6.15	3.51
Hesperoconopa sp	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Hexatoma sp.	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Pedicia sp.	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Tipula sp.	0	0	0	0	0	0	0	0	0	0	0	0	3.03	0	0	0	0	0	0	0
Totals:	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100

Taxon	LRB-1 Replicates					LRB-11A Replicates					LRB-16 Replicates					LRB-21 Replicates				
	1	2	3	4	5	1	2	3	4	5	1	2	3	4	5	1	2	3	4	5
Limnephilidae	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Hesperophylax sp.	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Oligophlebodes sp.	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Rhyacophilidae																				
Rhyacophila brunnea	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Rhyacophila coloradensis	0	0	0	0	0	0	0	0.26	0	0	0	0	0	0	0	0	0	0	0	0
Rhyacophila pellisa	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Rhyacophila sp. A	0	0	0	0	0	0.57	0	0.51	0	0.18	0.53	0.70	0.91	1.66	0.71	0.71	1.30	0.98	1.93	0.90
COLEOPTERA																				
Dytiscidae																				
Liodessus affinis	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.24	0	0	0	0	0
Elmidae																				
Heterlimnius corpulentus	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Narpus concolor	0	0	0	0	0	0	0	0	0	0	0.53	0	0	0	0	0	0	0	0	0
Optioservus sp.	0.51	0	0	0	0	0.29	0	0	0	0	0.27	0.23	0	0	0.24	0.24	0	0.33	0.18	0.15
DIPTERA																				
Athericidae																				
Atherix pachypus	4.57	1.89	2.84	5.26	2.30	4.29	1.64	1.54	3.10	0.90	3.74	2.80	3.35	2.49	2.61	1.42	0.65	1.14	1.05	1.34
Blephariceridae																				
Bibiocephala grandis	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Ceratopogonidae	0	0	0	0	0	0	0	0	0.39	0	0	0	0	0	0	0	0.32	0	0	0
Chironomidae																				
Brillia sp.	0	0.24	0	0	0	0	0	0	0	0	0	0	0	0	0.24	0	0	0	0	0.30
Cricotopus/Orthocladius sp.	1.52	1.42	0.32	1.05	0	1.43	1.64	4.88	2.71	1.44	2.14	0.93	1.22	1.10	0.71	0	0	0	0	0
Diamesa sp.	2.54	0.71	2.21	2.11	0	7.71	5.74	6.17	1.16	4.87	0.27	0.47	0.91	0	0.95	0.71	0.32	0.16	0.35	0.15
Eukiefferiella sp.	0	0	0	0	0	0.29	0	1.80	0.78	0.54	0	0.70	0.30	0.83	1.43	0	0	0.65	0.53	0.90
Heleniella sp.	0	0	0	0	0	0	0	0	0	0	0	0	0	0.28	0	0	0	0	0	0
Hydrobaenus sp.	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Micropsectra sp.	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Orthocladius (Symposiocladius) lignicola	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Pagastia sp.	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.24	0.47	0	0.81	0	0.15
Parametriocnemus sp.	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.98	0.18	0
Paraphaenocladius sp.	4.57	55.42	38.49	14.74	10.34	13.43	4.10	2.57	3.88	5.96	9.09	3.27	3.35	2.76	6.23	27.96	2.60	5.70	3.15	7.46
Parorthocladius sp.	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Phaenopsectra sp.	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.24	0	0	0	0	0
Polypedilum sp.	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Pseudodiamesa sp	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.24	0	0.16	0	0
Rheocricotopus sp.	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.24	0	0	0	0
Tvetenia sp.	0	0	0	0	0	0	0	0	0	0	0.27	0	0	0	0	0.24	0	0.16	0.18	0.45
Empididae																				
Chelifera sp.	0.51	0	0	1.05	0	0	0.82	0.26	0	0	0	0	0.30	0.28	0	0	0	0.16	0.18	0.30
Oreogeton sp.	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Psychodidae																				
Pericoma/Telmatoscopus sp.	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Simuliidae																				
Prosimulium sp.	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Simulium sp.	0	0	0	0	0	0	0	0	0	0.18	0	0	0	0	0	0.24	0	0.49	0.18	0.15
Tipulidae	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Dicranota sp.	0.51	2.12	0.32	0	0	0.57	0	0	0	0.18	0	0.47	0.30	0	0.48	0	0	0.33	0.18	0
Hesperoconopa sp	0	0	0	0	0	0	0	0	0	0	0	0	0	0.55	0.24	0	0	0	0.18	0.15
Hexatoma sp.	1.02	0	0	0	0	0.29	2.46	0.51	0.00	0.00	0.27	0	0	0	0	0.47	0	0.16	0.18	0
Pedicia sp.	0	0	0.32	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Tipula sp.	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.24	0	0	0	0.15
Totals:	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100

APPENDIX D
CLASS COMPOSITION OF BENTHIC MACROINVERTEBRATES

APPENDIX D

CLASS COMPOSITION (PERCENT) OF BENTHIC MACROINVERTEBRATES (PERCENT) AT RED RIVER STATIONS
(December 1995)

Sample Location	TURBELLARIA Flatworms Replicates 1	2	3	4	5	NEMATODA Roundworms Replicates 1	2	3	4	5	OLIGOCHAETA Aquatic Earthworms Replicates 1	2	3	4	5
RRB-1	0	0.14	0	1.30	0	0	0.27	0.61	0	0	0	0	0.40	0.22	0.29
RRB-3	0	0	0	0.52	0	0	0.56	0	0	0	0.32	0.56	0	0	0
RRB-5	0	0	0	0	0	0.28	0.36	1.05	0	0	0	0	0	0	0
RRB-7	0	0	0	0	0	0	0	0	0.95	0	0	0	0	0	0
RRB-10A	0	0	0	0	0	1.35	0.93	0	0	0	0	0	0	0	0
RRB-11	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
RRB-13	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
RRB-16	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
LRB-1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
LRB-11A	0	0.0	0.29	0	0	0	0	0	0	0.26	0	0	0	0	0
LRB-16	0	0.0	0	0	0	0	0.36	0.27	0.93	0.91	0	0	0	0	0.30
LRB-21	0	0.00	0.71	0.32	0.98	0.28	0.48	0	0	0.16	0	0	0	0.32	0

Sample Location	HYDRACARINA Water Mites Replicates 1	2	3	4	5	EPHEMEROPTERA Mayflies Replicates 1	2	3	4	5	PLECOPTERA Stoneflies Replicates 1	2	3	4	5
RRB-1	0.27	0	0.61	0.65	1.59	3.26	3.93	6.87	2.38	4.76	85.95	75.71	72.32	78.49	64.65
RRB-3	0.32	0	1.71	1.05	17.34	11.94	7.30	3.43	5.76	9.59	66.45	62.36	45.14	51.31	33.95
RRB-5	0	0	0	0	0.33	10.76	8.54	8.68	16.46	8.82	57.79	59.79	40.79	49.39	40.52
RRB-7	0	0.33	1.47	0.95	0	26.47	38.10	21.43	16.22	27.10	10.29	21.90	9.52	27.03	8.41
RRB-10A	1.35	0	2.11	0	3.79	50.53	17.07	29.55	29.69	22.86	13.68	12.20	3.79	15.63	27.14
RRB-11	2.08	0	0	0	0	3.70	5.00	5.13	1.02	4.05	11.11	30.00	28.21	6.12	12.16
RRB-13	0.00	0	4.00	0	0	48.00	47.83	42.42	66.67	65.52	0	13.04	3.03	7.41	6.90
RRB-16	3.70	10.34	0	0	0	85.29	83.87	66.67	18.46	15.79	0	9.68	0	24.62	7.02
LRB-1	0	0	0	0	0	76.65	33.49	52.05	68.42	81.61	2.03	3.07	0.32	2.11	2.30
LRB-11A	0	0	0	0	0	61.14	74.59	73.26	75.19	76.35	6.00	8.20	5.91	5.04	2.17
LRB-16	0	0	0.53	0	0	74.33	81.54	75.30	78.45	78.15	4.28	3.74	5.79	2.76	3.09
LRB-21	0.28	0	0.24	0	0	51.66	87.66	70.68	78.98	67.16	3.79	3.57	7.33	2.28	9.55

Sample Location	TRICHOPTERA Caddisflies Replicates 1	2	3	4	5	COLEOPTERA Beetles Replicates 1	2	3	4	5	DIPTERA True Flies Replicates 1	2	3	4	5
RRB-1	1.13	2.31	4.44	4.22	3.46	0.20	0.81	0.61	0.54	1.44	9.19	17.64	14.75	12.76	25.25
RRB-3	6.45	15.73	23.43	20.42	18.08	0.97	1.69	0.57	1.05	2.58	14.52	13.48	26.29	20.94	21.03
RRB-5	4.53	7.47	11.05	8.23	10.46	0.57	0.36	0.26	0.73	0.65	27.20	23.84	38.42	26.39	39.87
RRB-7	52.94	19.05	29.76	12.16	17.76	0.00	2.86	2.38	1.35	1.87	8.82	20.95	40.48	43.24	47.66
RRB-10A	17.89	30.73	48.48	39.58	10.00	0	0.49	0.76	2.08	1.43	15.79	40.00	14.39	13.02	40.00
RRB-11	11.11	20.00	7.69	5.10	25.68	0	0	0	0	0	74.07	45.00	58.97	87.76	58.11
RRB-13	32.00	17.39	12.12	7.41	0.00	0	0	0	0	0	16.00	21.74	42.42	14.81	17.24
RRB-16	2.94	0.00	22.22	4.62	3.51	0	0	0	0	1.75	11.76	6.45	11.11	52.31	73.68
LRB-1	5.58	1.65	3.15	5.26	3.45	0.51	0	0	0	0	15.74	61.79	44.48	24.21	12.64
LRB-11A	4.29	0.82	2.83	7.75	7.04	0.86	0	0.51	0	0.18	28.86	16.39	18.25	12.02	14.26
LRB-16	4.01	4.91	7.93	9.94	5.46	1.34	0.93	0.91	1.66	1.19	17.11	9.58	10.67	9.94	13.54
LRB-21	11.14	4.22	9.61	11.21	9.85	0.95	1.30	1.30	2.10	1.04	33.18	5.19	12.21	8.41	12.54

APPENDIX E

COUNTS OF BENTHIC MACROINVERTEBRATES IDENTIFIED AT RED RIVER LOCATIONS
(December 1995)

Taxon	RRB-1 Replicates					RRB-3 Replicates					RRB-5 Replicates					RRB-7 Replicates				
	1	2	3	4	5	1	2	3	4	5	1	2	3	4	5	1	2	3	4	5
Limnephilidae[a]	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0
Hesperophylax sp.	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0
Oligophlebodes sp.	0	0	2	0	1	7	4	1	8	10	0	1	1	0	1	3	0	0	0	0
Rhyacophilidae																				
Rhyacophila brunnea	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0
Rhyacophila coloradensis	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Rhyacophila pellisa	5	9	13	5	7	4	0	1	1	5	0	0	4	1	2	0	1	0	0	1
Rhyacophila sp. A	0	0	0	0	0	0	0	0	0	0	2	0	0	2	0	0	2	1	1	2
COLEOPTERA																				
Dytiscidae																				
Liodessus affinis	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Elmidae																				
Heterlimnius corpulentus	3	6	3	5	10	2	3	1	2	7	0	1	1	1	2	0	0	1	0	0
Narpus concolor	0	0	0	0	0	1	0	0	0	0						0	0	0	0	0
Optioservus sp.	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0
DIPTERA																				
Athericidae																				
Atherix pachypus	0	0	0	0	0	1	0	0	0	0	0	1	1	2	1	0	1	0	0	0
Blephariceridae																				
Bibiocephala grandis	0	5	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Ceratopogonidae[a]	0	0	1	1	1	0	0	1	0	0	0	0	1	0	0	0	0	0	0	0
Chironomidae																				
Brillia sp.	2	1	1	4	6	0	2	0	0	0	0	0	1	0	0	0	0	0	0	0
Cricotopus/ Orthocladius sp.[b]	2	0	0	1	3	0	0	9	2	3	14	12	24	11	15	0	3	3	4	5
Diamesa sp.	1	1	0	0	0	5	6	25	20	18	53	39	77	65	80	0	11	28	24	39
Eukiefferiella sp.	0	0	0	3	0	0	0	0	0	0	0	0	0	0	3	0	0	0	0	0
Heleniella sp.	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Hydrobaenus sp.	0	0	0	0	0	1	0	0	2	0	0	0	0	0	0	0	0	0	0	0
Micropsectra sp.	1	3	2	3	6	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Orthocladius (Symposiocladius) lignicola	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	4	0	0	0	0
Pagastia sp.	5	3	0	5	4	1	2	4	5	3	0	0	1	0	0	0	0	0	0	0
Parametriocnemus sp.	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Paraphaenocladius sp	11	30	19	28	13	12	3	0	0	8	17	7	15	11	15	2	2	1	3	1
Parorthocladius sp.	0	0	0	1	0	0	1	0	0	2	1	3	9	9	1	0	0	0	0	0
Phaenopsectra sp.	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Polypedilum sp.	0	0	0	0	0	0	1	1	3	0	0	0	0	0	0	0	0	0	0	0
Pseudodiamesa sp.	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Rheocricotopus sp.	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Tvetenia sp.	13	2	3	9	7	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Empididae																				
Chelifera sp.	0	0	1	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0
Oreogeton sp.	0	0	0	2	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0
Psychodidae																0	0	0	0	0
Pericoma/ Telmatoscopus sp.[b]	83	67	27	45	94	1	0	0	0	0	0	1	1	0	0	0	0	0	0	0
Simuliidae																				
Prosimulium sp.	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Simulium sp.	1	2	2	4	0	0	0	0	0	0	1	1	1	3	1	0	0	0	0	0
Tipulidae	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Dicranota sp.	17	7	11	4	17	21	6	5	5	16	8	2	13	5	4	5	2	0	0	4
Hesperoconopa sp.	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Hexatoma sp.	1	3	2	3	12	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Pedicia sp.	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Tipula sp.	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0
Total:	1502	737	495	925	693	310	178	175	191	271	353	281	380	413	306	136	105	84	74	107
Total Number of Taxa	34	33	34	34	32	22	25	20	23	22	21	22	25	21	24	14	19	12	15	16

Taxon	RRB-10A Replicates					RRB-11 Replicates					RRB-13 Replicates					RRB-16 Replicates				
	1	2	3	4	5	1	2	3	4	5	1	2	3	4	5	1	2	3	4	5
Limnephilidae[a]	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Hesperophylax sp.	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Oligophlebodes sp.	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Rhyacophilidae																				
Rhyacophila brunnea	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Rhyacophila coloradensis	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Rhyacophila pellisa	2	1	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0
Rhyacophila sp. A	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
COLEOPTERA																				
Dytiscidae																				
Liodessus affinis	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Elmidae																				
Heterlimnius corpulentus	0	1	1	4	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Narpus concolor	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1
Optioservus sp.	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
DIPTERA																				
Athericidae																				
Atherix pachypus	0	0	0	0	0	0	0	1	0	0	1	2	6	3	4	1	0	0	0	0
Blephariceridae																				
Bibiocephala grandis	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Ceratopogonidae[a]	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Chironomidae																				
Brillia sp.	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0
Cricotopus/ Orthocladius sp.[b]	0	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Diamesa sp.	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Eukiefferiella sp.	0	0	0	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Heleniella sp.	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Hydrobaenus sp.	0	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Micropsectra sp.	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Orthocladius (Symposiocladius) lignicola	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Pagastia sp.	1	1	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Parametriocnemus sp.	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Paraphaenocladius sp	8	64	13	13	22	19	9	18	85	41	3	1	5	1	1	3	2	1	29	39
Parorthocladius sp.	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Phaenopsectra sp.	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Polypedilum sp.	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Pseudodiamesa sp.	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Rheocricotopus sp.	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Tvetenia sp.	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Empididae																				
Chelifera sp.	1	0	1	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0
Oreogeton sp.	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Psychodidae	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Pericoma/ Telmatoscopus sp.[b]	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Simuliidae																				
Prosimulium sp.	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0
Simulium sp.	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Tipulidae	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Dicranota sp.	4	12	3	5	3	1	0	4	0	2	0	1	2	0	0	0	0	0	4	2
Hesperoconopa sp.	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Hexatoma sp.	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Pedicia sp.	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Tipula sp.	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0
Total:	95	205	132	192	70	27	20	39	98	74	25	23	33	27	29	34	31	9	65	57
Total Number of Taxa	16	21	15	21	17	7	7	12	9	10	9	11	10	10	8	6	6	4	10	8

Taxon	LRB-1 Replicates					LRB-11A Replicates					LRB-16 Replicates					LRB-21 Replicates				
	1	2	3	4	5	1	2	3	4	5	1	2	3	4	5	1	2	3	4	5
Limnephilidae[a]	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Hesperophylax sp.	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Oligophlebodes sp.	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Rhyacophilidae																				
Rhyacophila brunnea	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Rhyacophila coloradensis	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0
Rhyacophila pellisa	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Rhyacophila sp. A	0	0	0	0	0	2	0	2	0	1	2	3	3	6	3	3	4	6	11	6
COLEOPTERA																				
Dytiscidae																				
Liodessus affinis	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0
Elmidae																				
Heterlimnius corpulentus	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Narpus concolor	0	0	0	0	0	0	0	0	0	0	2	0	0	0	0	0	0	0	0	0
Optioservus sp.	1	0	0	0	0	1	0	0	0	0	1	1	0	0	1	1	0	2	1	1
DIPTERA																				
Athericidae																				
Atherix pachypus	9	8	9	5	2	15	2	6	8	5	14	12	11	9	11	6	2	7	6	9
Blephariceridae																				
Bibiocephala grandis	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Ceratopogonidae[a]	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	1	0	0	0
Chironomidae																				
Brillia sp.	0	1	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	2
Cricotopus/ Orthocladius sp.[b]	3	6	1	1	0	5	2	19	7	8	8	4	4	4	3	0	0	0	0	0
Diamesa sp.	5	3	7	2	0	27	7	24	3	27	1	2	3	0	4	3	1	1	2	1
Eukiefferiella sp.	0	0	0	0	0	1	0	7	2	3	0	3	1	3	6	0	0	4	3	6
Heleniella sp.	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0
Hydrobaenus sp.	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Micropsectra sp.	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Orthocladius (Symposiocladius) lignicola	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Pagastia sp.	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	2	0	5	0	1
Parametriocnemus sp.	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	6	1	0
Paraphaenocladius sp	9	235	122	14	9	47	5	10	10	33	34	14	11	10	22	118	8	35	18	50
Parorthocladius sp.	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Phaenopsectra sp.	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0
Polypedilum sp.	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Pseudodiamesa sp.	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	1	0	0
Rheocricotopus sp.	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0
Tvetenia sp.	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	1	0	1	1	3
Empididae																				
Chelifera sp.	1	0	0	1	0	0	1	1	0	0	0	0	1	1	0	0	0	1	1	2
Oreogeton sp.	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Psychodidae	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Pericoma/ Telmatoscopus sp.[b]	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Simuliidae																				
Prosimulium sp.	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Simulium sp.	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	1	0	3	1	1
Tipulidae	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Dicranota sp.	1	9	1	0	0	2	0	0	0	1	0	2	1	0	2	0	0	2	1	0
Hesperoconopa sp.	0	0	0	0	0	0	0	0	0	0	0	0	0	2	1	0	0	0	1	1
Hexatoma sp.	2	0	0	0	0	1	3	2	0	0	1	0	0	0	0	2	0	1	1	0
Pedicia sp.	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Tipula sp.	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	1
Total:	197	424	317	95	87	350	122	389	258	554	374	428	328	362	421	422	308	614	571	670
Total Number of Taxa	17	17	14	13	8	22	16	21	17	21	22	17	20	21	24	27	20	31	30	30

[a]Immature stages present in sample. Not able to identify to genus.

[b]Genus/Genus sp. designates genera that are not separable at the early instar or larval stage present in the sample

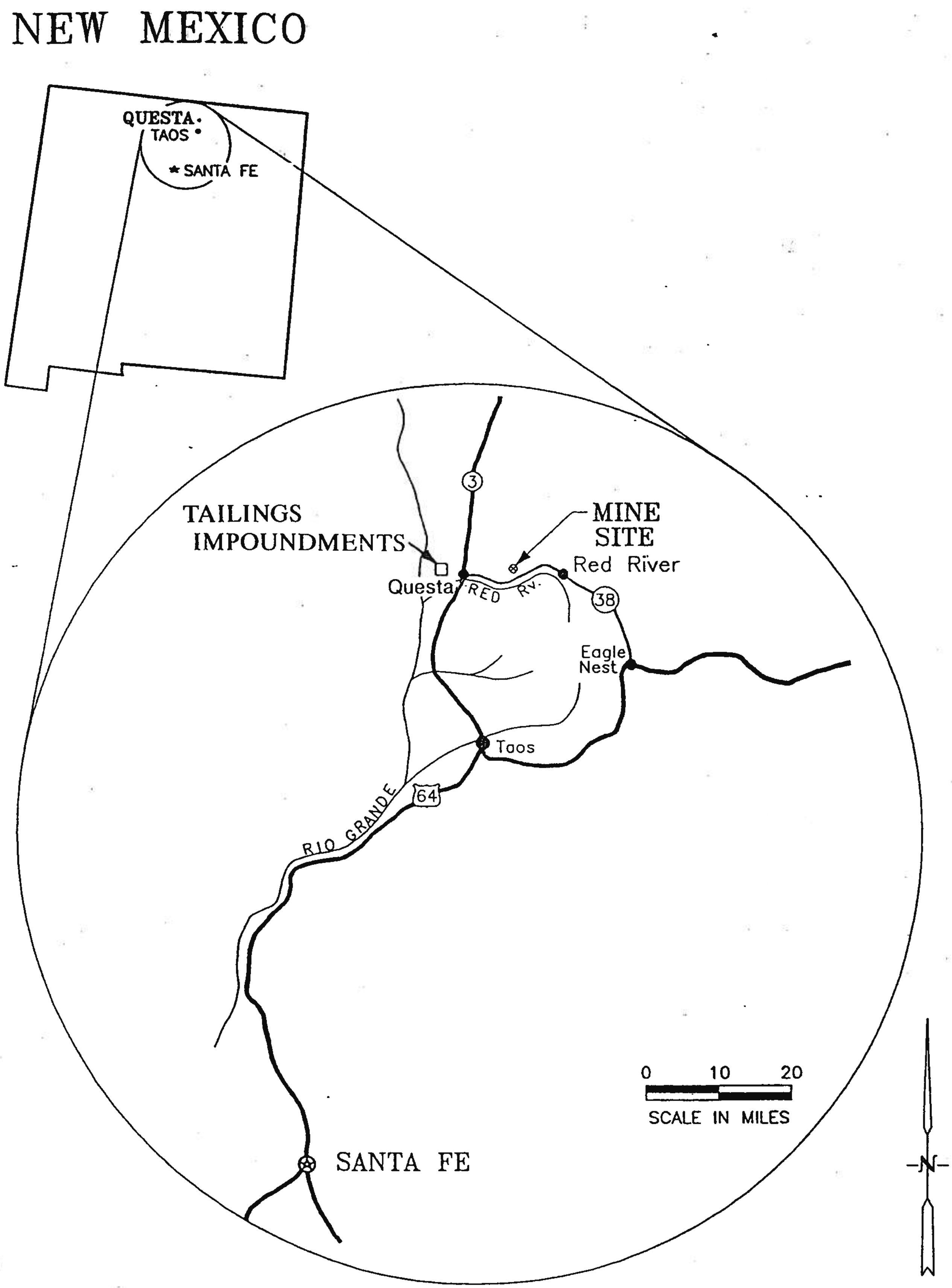
SUMMRY.XLS\appd-b (7/18/96:12:38 PM)

APPENDIX E

COUNTS OF BENTHIC MACROINVERTEBRATES IDENTIFIED AT RED RIVER LOCATIONS
(December 1995)

Taxon	RRB-1 Replicates					RRB-3 Replicates					RRB-5 Replicates					RRB-7 Replicates					RRB-10A Replicates					RRB-11 Replicates				
	1	2	3	4	5	1	2	3	4	5	1	2	3	4	5	1	2	3	4	5	1	2	3	4	5	1	2	3	4	5
TURBELLARIA	0	1	0	12	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
NEMATODA	0	2	3	0	0	0	1	0	0	0	1	1	4	0	0	0	1	0	1	1	0	0	0	0	0	0	0	0	0	0
OLIGOCHAETA	0	0	2	2	2	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
HYDRACARINA	4	0	3	6	11	1	0	3	2	47	0	0	0	0	1	2	1	0	1	0	2	0	5	4	0	0	0	0	0	0
EPHEMEROPTERA																														
Ameletidae																														
Ameletus sp.	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0
Baetidae																														
Baetis tricaudatus	5	2	2	1	4	0	1	0	0	1	12	6	3	6	6	6	8	8	6	8	8	6	6	10	6	1	0	0	0	3
Ephemerellidae																														
Drunella doddsi	4	2	8	4	8	1	0	1	0	1	5	6	15	9	4	0	4	0	0	4	9	0	10	4	2	0	0	0	0	0
Drunella grandis	0	0	0	0	0	0	0	3	2	2	17	9	14	22	9	19	2	6	4	9	25	15	17	26	2	0	0	1	0	0
Ephemerella infrequens	0	1	1	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0
Heptageniidae																														
Epeorus longimanus	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Rhithrogena robusta	1	4	2	1	0	0	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2	0	0	0	0	0	0	0	0
Rhithrogena sp.	39	20	21	16	20	36	10	2	9	22	4	3	1	31	8	11	26	4	2	8	6	11	6	17	5	0	1	1	1	0
Leptophlebiidae																														
Paraleptophlebia sp.	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
PLECOPTERA																														
Capniidae[a]	55	41	10	12	28	154	61	21	37	36	57	63	6	16	17	2	6	0	0	0	0	4	0	1	1	1	3	7	2	2
Eucapnopsis brevicauda	2	1	1	0	4	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Leuctridae																														
Paraleuctra sp.	2	5	0	0	0	0	0	0	0	0	0	0	0	1	1	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0
Taeniopterygidae																														
Doddsia occidentalis	564	283	180	282	219	30	29	27	44	21	40	7	17	53	31	0	7	2	2	4	8	6	2	6	4	0	0	1	0	1
Taenionema sp.	14	6	3	5	5	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Nemouridae																														
Podmosta/Prostoia sp.[b]	621	210	152	398	174	21	11	29	15	23	101	96	132	130	64	11	10	6	16	3	4	2	3	19	11	1	2	1	1	4
Zapada cinctipes	2	2	5	4	6	1	1	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0
Zapada sp.	0	0	0	0	0	0	0	0	1	0	1	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	1	2	1
Pteronarcyidae																														
Pteronarcella badia	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Chloroperlidae[a]	2	2	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	2	0	1	0	0	2	0	0	0	1	0
Paraperla frontalis	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Plumiperla diversa	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Sweltsa sp.	11	5	3	0	10	0	6	0	0	4	3	1	0	0	3	0	0	0	2	0	0	2	0	0	0	0	1	0	0	0
Perlodidae[a]	5	0	3	2	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0
Isoperla sp.	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Megarcys signata	12	3	1	23	0	0	3	2	1	8	1	0	0	4	8	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0
Perlidae																														
Hesperoperla pacifica	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	9	0	3	1	0	0	0	0	1
TRICHOPTERA																														
Brachycentridae																														
Brachycentrus americanus	6	1	3	20	13	5	13	33	23	27	4	3	10	3	5	33	4	10	4	3	3	0	12	21	1	0	1	2	1	7
Glossosomatidae																														
Culoptila sp.	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Glossosoma sp.	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0
Hydropsychidae																														
Arctopsyche grandis	2	1	3	3	2	3	8	5	5	4	10	17	27	28	24	36	13	14	3	13	12	62	51	52	6	3	3	1	4	12
Hydropsyche sp.	0	0	0	2	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0
Hydroptilidae																														
Ochrotrichia sp.	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Lepidostomatidae																														
Lepidostoma sp.	4	6	1	9	1	1	1	1	0	3	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0

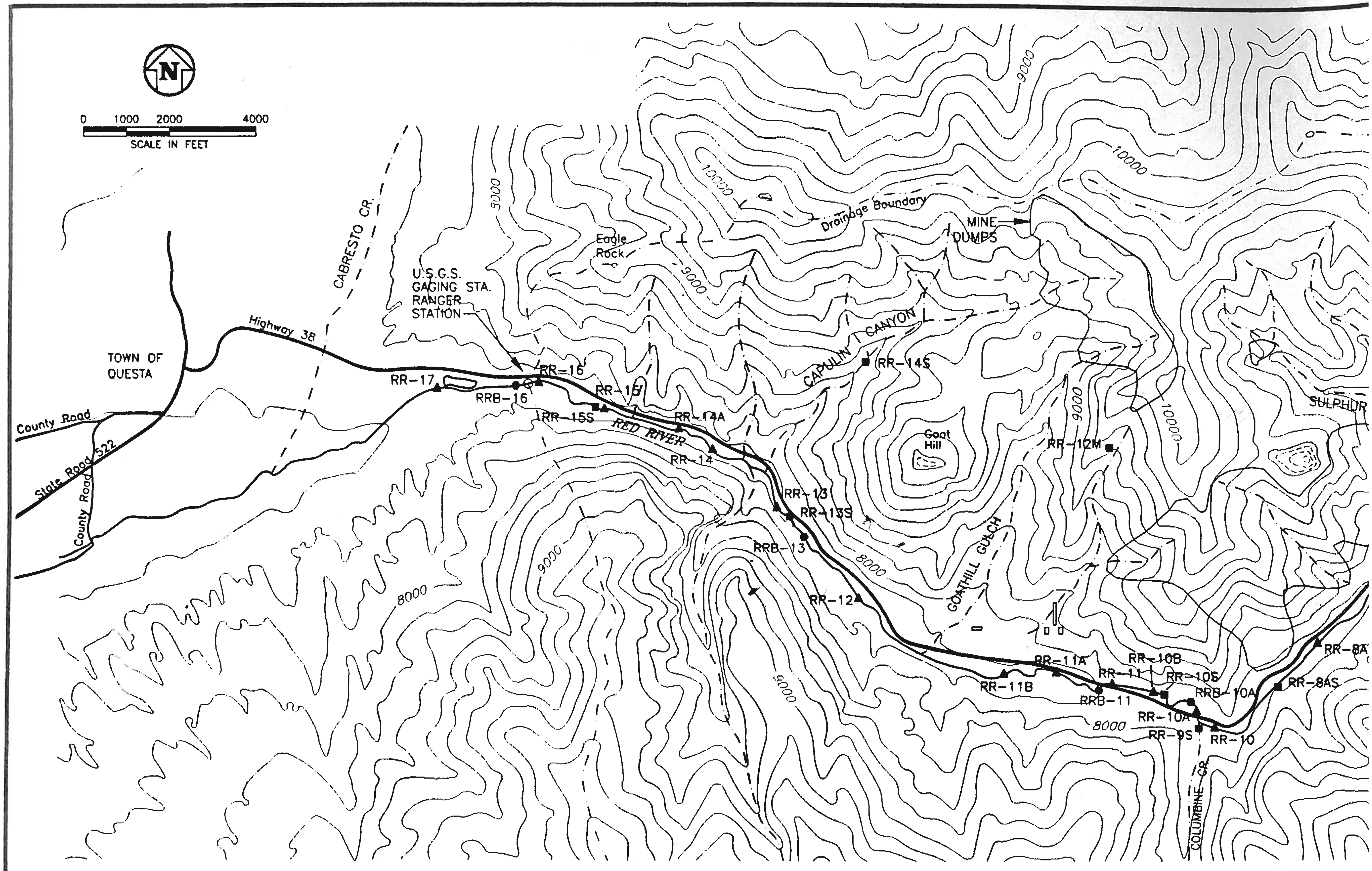
Taxon	RRB-13 Replicates					RRB-16 Replicates					LRB-1 Replicates					LRB-11A Replicates					LRB-16 Replicates					LRB-21 Replicates				
	1	2	3	4	5	1	2	3	4	5	1	2	3	4	5	1	2	3	4	5	1	2	3	4	5	1	2	3	4	5
TURBELLARIA	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	3	1	6	2	12
NEMATODA	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	2	1	4	3	1	2	0	0	1	3	0
OLIGOCHAETA	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	1	0	0	0
HYDRACARINA	1	0	0	1	3	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2	0	0	1	0	1	0	0	1	0
EPHEMEROPTERA																														
Ameletidae																														
Ameletus sp.	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0
Baetidae																														
Baetis tricaudatus	6	3	2	2	4	4	1	1	0	0	81	93	103	38	62	150	79	261	162	334	232	294	216	269	293	196	230	380	416	378
Ephemerellidae																														
Drunella doddsi	0	0	0	0	0	0	0	0	0	0	1	2	2	1	0	1	1	1	1	1	0	0	0	0	0	1	0	1	0	2
Drunella grandis	1	2	2	13	2	5	0	0	1	2	0	3	2	2	2	11	2	4	5	11	2	0	6	3	5	1	4	3	7	9
Ephemerella infrequens	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Heptageniidae																														
Epeorus longimanus	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	2	0
Rhithrogena robusta	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Rhithrogena sp.	5	6	10	3	13	20	25	5	11	7	69	44	58	24	7	52	9	19	26	77	44	55	25	12	31	20	36	46	22	61
Leptophlebiidae																														
Paraleptophlebia sp.	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	3	3	0
PLECOPTERA																														
Capniidae[a]	0	2	0	1	1	0	1	0	4	1	0	0	0	0	0	7	4	6	2	1	1	7	5	4	2	6	4	27	3	16
Eucapnopsis brevicauda	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0
Leuctridae																														
Paraleuctra sp.	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2	0	0	1
Taeniopterygidae																														
Doddsia occidentalis	0	0	0	0	0	0	0	0	0	0	1	2	1	0	0	2	1	1	0	2	0	0	0	0	0	0	2	0	0	0
Taenionema sp.	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Nemouridae																														
Podmosta/Prostoia sp.[b]	0	0	1	0	0	0	1	0	0	0	2	2	0	1	1	3	2	15	9	6	5	4	5	4	4	3	1	9	4	32
Zapada cinctipes	0	0	0	0	0	0	0	0	3	0	0	4	0	0	0	0	0	0	0	2	0	0	0	0	0	1	0	0	0	2
Zapada sp.	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Pteronarcyidae																														
Pteronarcella badia	0	1	0	0	0	0	0	0	9	3	1	5	0	0	1	7	1	1	1	1	7	5	7	1	6	3	0	2	0	6
Chloroperlidae[a]	0	0	0	1	0	0	1	0	0	0	0	0	0	1	0	2	2	0	0	0	0	0	2	1	1	0	2	4	0	1
Paraperla frontalis	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2	0	0	0	0	0	0	0	0	0
Plumiperla diversa	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	3	0	2	4	4
Sweltsa sp.	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Perlodidae[a]	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0
Isoperla sp.	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	2	2
Megarcys signata	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Perlidae																														
Hesperoperla pacifica	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
TRICHOPTERA																														
Brachycentridae																														
Brachycentrus americanus	3	1	0	0	0	0	0	0	1	2	1	1	4	3	0	2	0	2	7	20	5	8	7	10	6	24	5	17	34	26
Glossosomatidae																														
Culoptila sp.	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0
Glossosoma sp.	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Hydropsychidae																														
Arctopsyche grandis	4	3	3	1	0	0	0	2	2	0	5	5	5	2	3	7	1	4	9	6	7	6	8	12	8	1	1	7	4	14
Hydropsyche sp.	1	0	1	1	0	0	0	0	0	0	5	1	1	0	0	4	0	2	4	12	1	4	8	7	6	17	1	29	14	19
Hydroptilidae																														
Ochrotrichia sp.	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0
Lepidostomatidae																														
Lepidostoma sp.	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	2	1	0	0	1

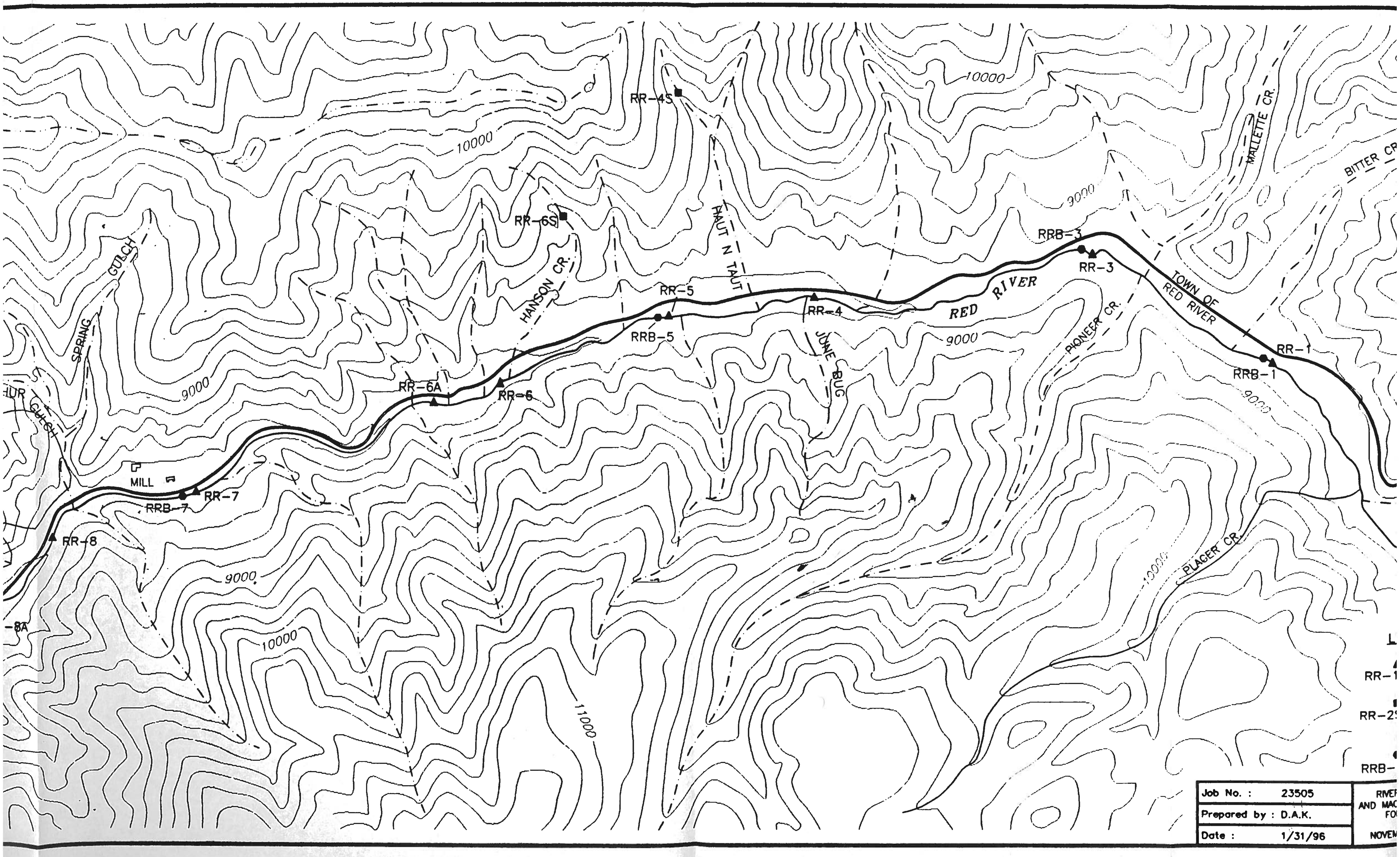


SOURCE: SOUTH PASS RESOURCES 1993

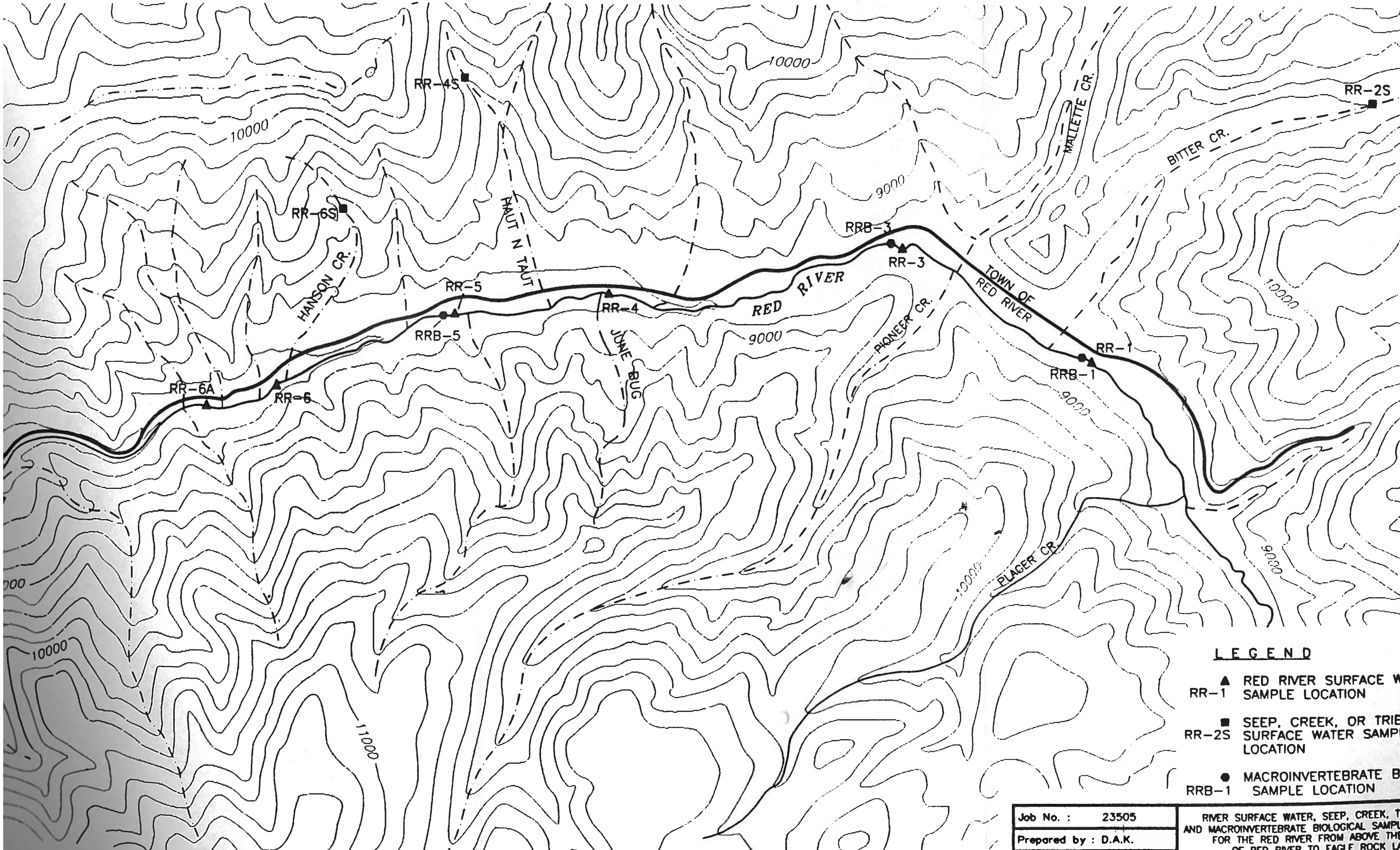
Job No. :	23505	SITE LOCATION MAP
Prepared by :	C.S.B.	
Date :	5/17/94	

FIG. 1


N
0 1000 2000 4000
SCALE IN FEET
TOWN OF QUESTA
County Road
State Road 522
County Road
Highway 38
CABRESTO CR.
U.S.G.S. GAGING STA. RANGER STATION
RR-17
RRB-16
RR-16
RR-15
RR-15S
RED RIVER
RR-14A
RR-14
RR-13
RR-13S
RRB-13
RR-12
RR-11A
RR-11B
RR-11
RRB-11
RR-10B
RR-10S
RRB-10A
RR-10A
RR-9S
RR-10
RR-8AS
RR-8A
COLUMBINE CR.
Eagle Rock
Drainage Boundary
MINE DUMPS
CAPULIN CANYON
RR-14S
Goat Hill
GOATHILL GULCH
RR-12M
SULPHUR
8000
9000
10000
23505URR


RED RIVER
TOWN OF RED RIVER
SPRING GULCH
HANSON CR.
HAUT N TAUT
JUNE BUG
PIONEER CR.
PLACER CR.
MALLETTE CR.
BITTER CR
MILL
RR-1
RRB-1
RR-3
RRB-3
RR-4
RR-4S
RR-5
RRB-5
RR-6
RR-6A
RR-6S
RR-7
RRB-7
RR-8
9000
10000
11000
Job No. : 23505
Prepared by : D.A.K.
Date : 1/31/96

Woodward-Clyde Consultants



LEGEND

▲ RR-1 RED RIVER SURFACE WATER SAMPLE LOCATION

■ RR-2S SEEP, CREEK, OR TRIBUTARY SURFACE WATER SAMPLE LOCATION

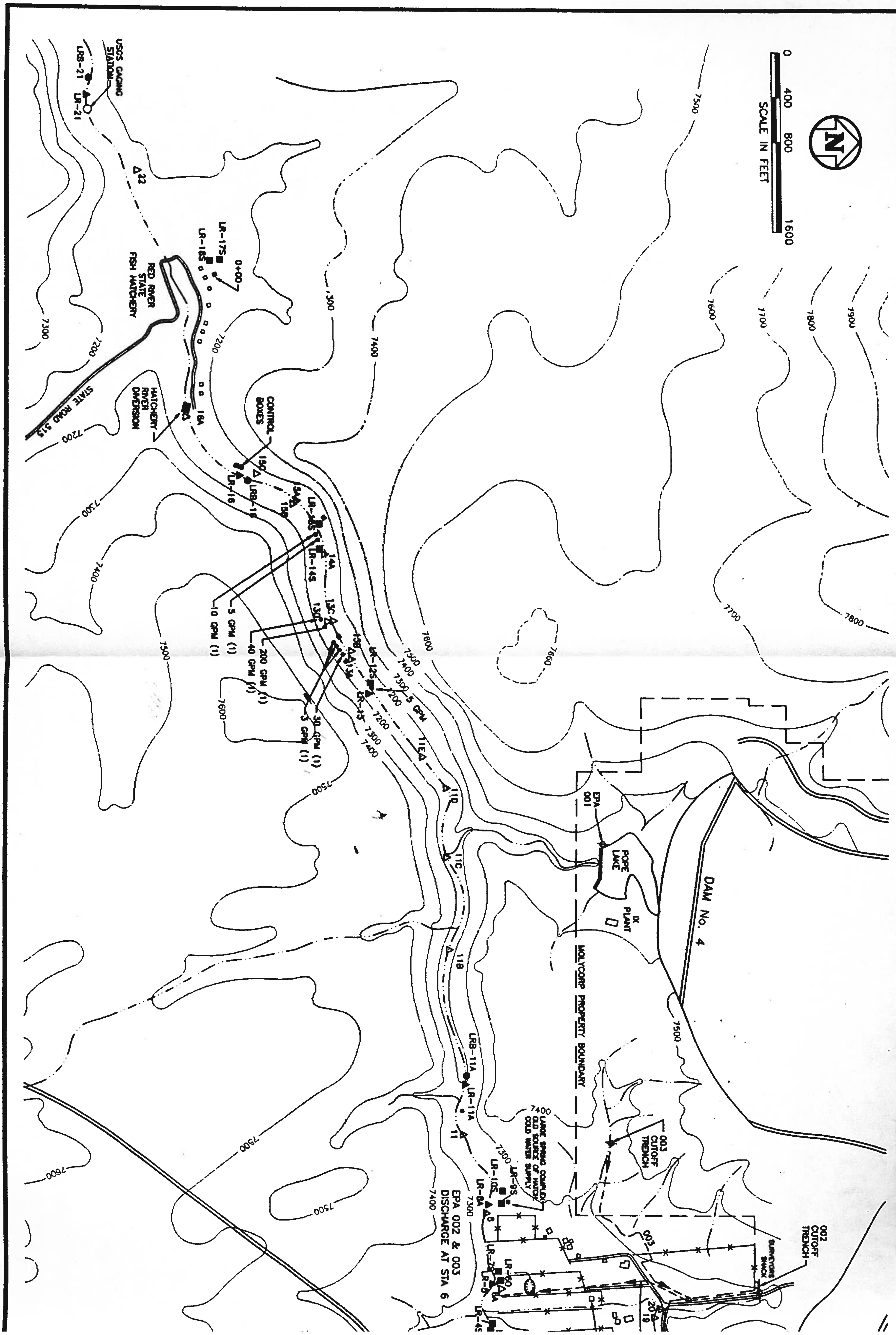
● RRB-1 MACROINVERTEBRATE BIOLOGICAL SAMPLE LOCATION

Job No. :	23505
Prepared by :	D.A.K.
Date :	1/31/96

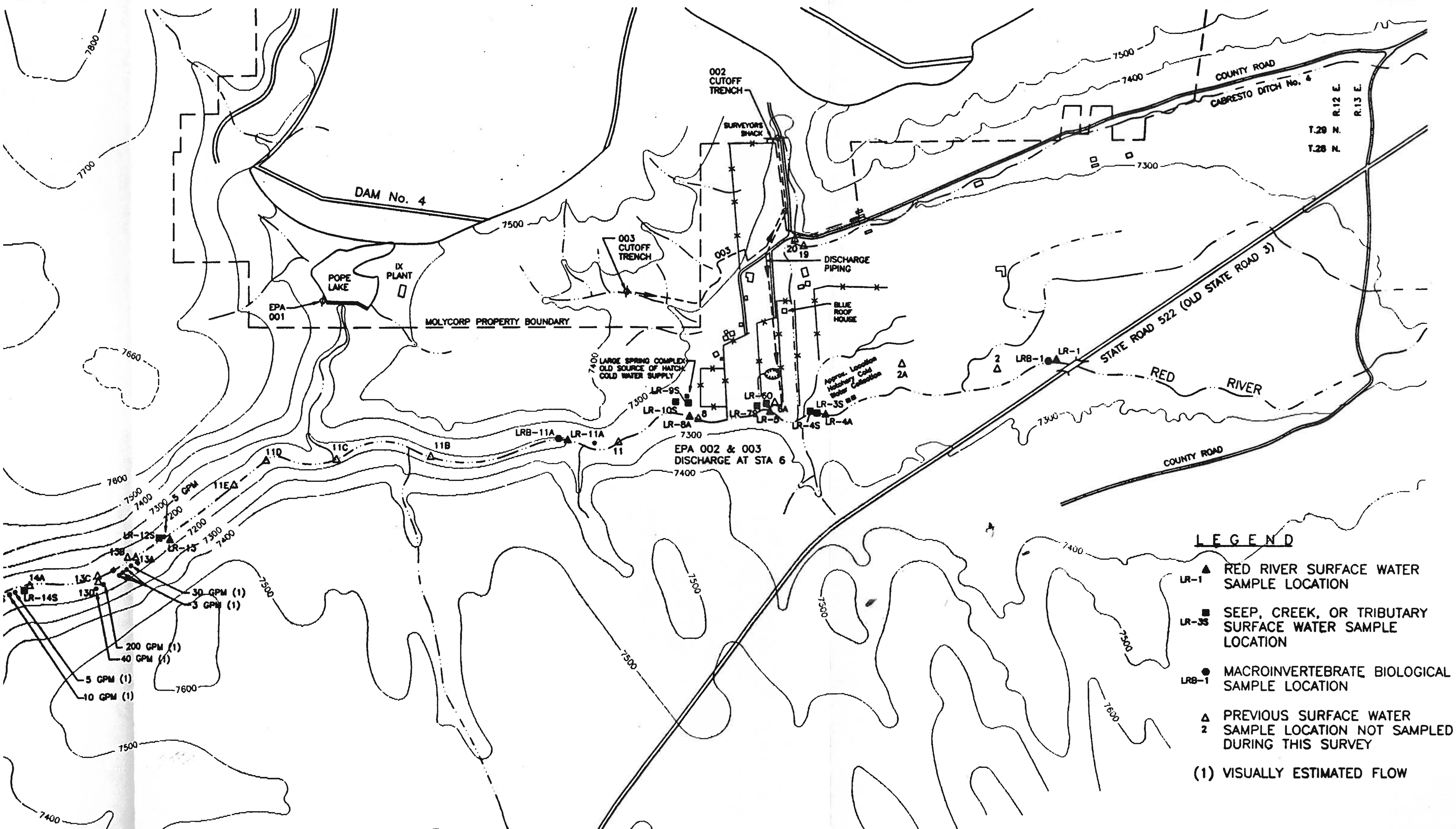
RIVER SURFACE WATER, SEEP, CREEK, TRIBUTARY AND MACROINVERTEBRATE BIOLOGICAL SAMPLE LOCATIONS FOR THE RED RIVER FROM ABOVE THE TOWN OF RED RIVER TO EAGLE ROCK LAKE NOVEMBER 9-10, 1995/DECEMBER 20-21, 1995

FIG. 2

23505LRR


SCALE IN FEET
0
400
800
1600
N
USGS GAGING STATION
LRB-21
LR-21
RED RIVER STATE FISH HATCHERY
STATE ROAD 513
HATCHERY RIVER DIVERSION
CONTROL BOXES
10 GPM (1)
5 GPM (1)
200 GPM (1)
40 GPM (1)
30 GPM (1)
3 GPM (1)
5 GPM
EPA 001
POPE LAKE
IX PLANT
DAM No. 4
MOLYCORP PROPERTY BOUNDARY
LRB-11A
LR-11A
003 CUTOFF TRENCH
LARGE SPRING COMPLEX COLD SOURCE OF HATCH COLD WATER SUPPLY
EPA 002 & 003 DISCHARGE AT STA 6
002 CUTOFF TRENCH
SURVEYORS SHACK

Woodward-Clyde Consultants



Job No. :	23505
Prepared by :	D.A.K.
Date :	1/31/96

RIVER SURFACE WATER, SEEP, CREEK, TRIBUTARY AND MACROINVERTEBRATE BIOLOGICAL SAMPLE LOCATIONS FOR THE RED RIVER FROM HIGHWAY 38 BRIDGE TO THE USGS GAGING STATION BELOW THE FISH HATCHERY NOVEMBER 11, 1995/DECEMBER 20-21, 1995

FIG. 3

Figure 4. NUMBER OF MACROINVERTEBRATE TAXA AT RED RIVER STATIONS (DECEMBER 1995)

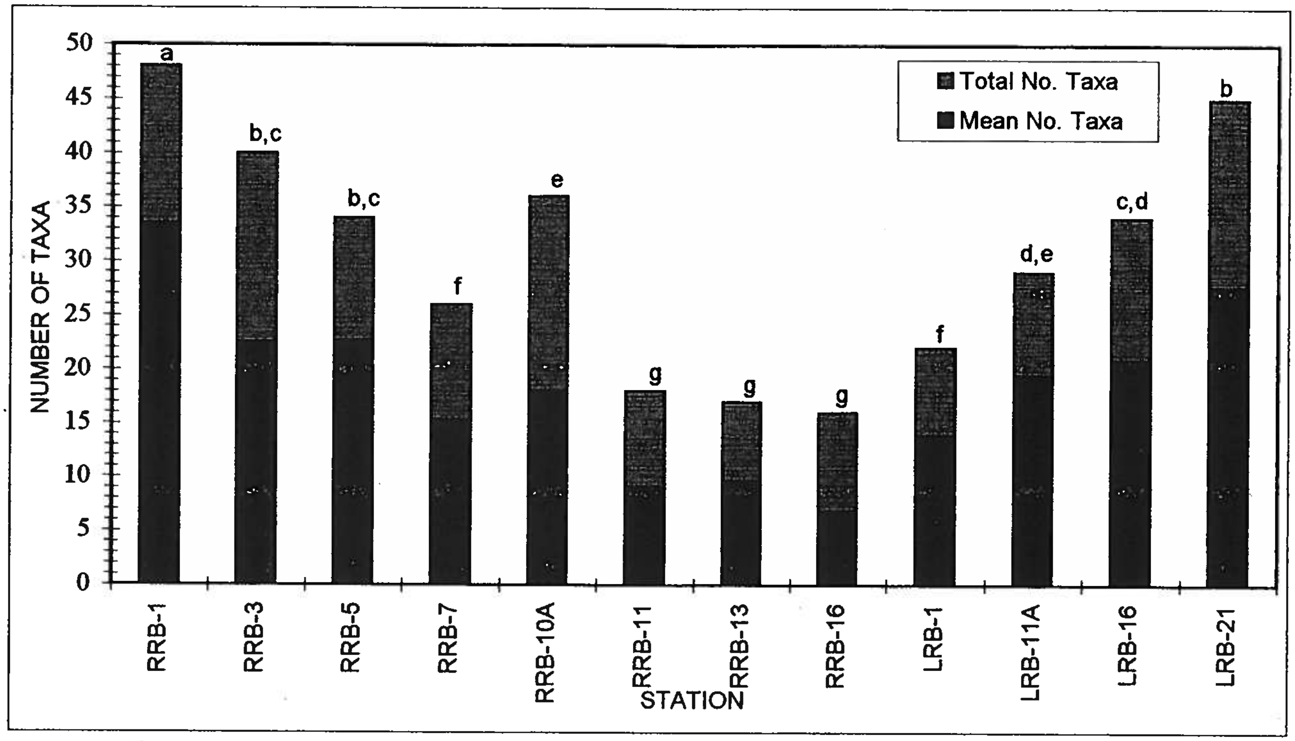
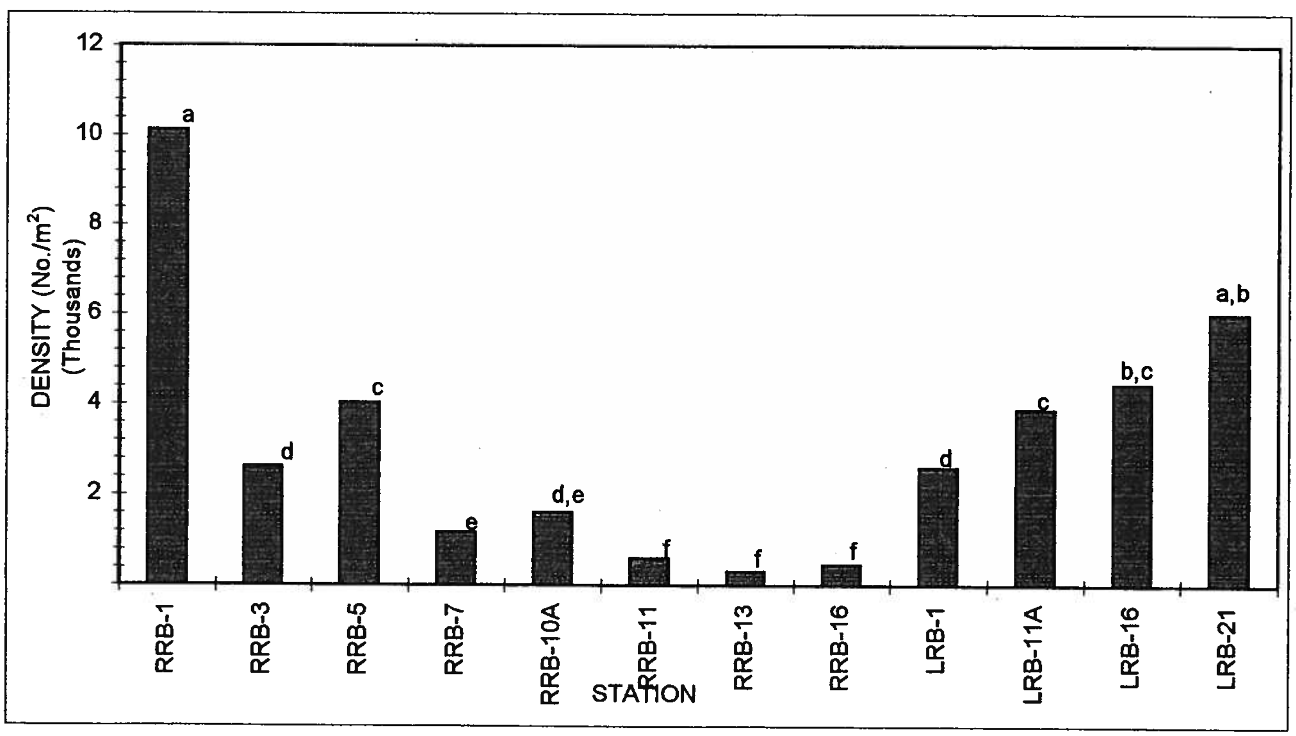
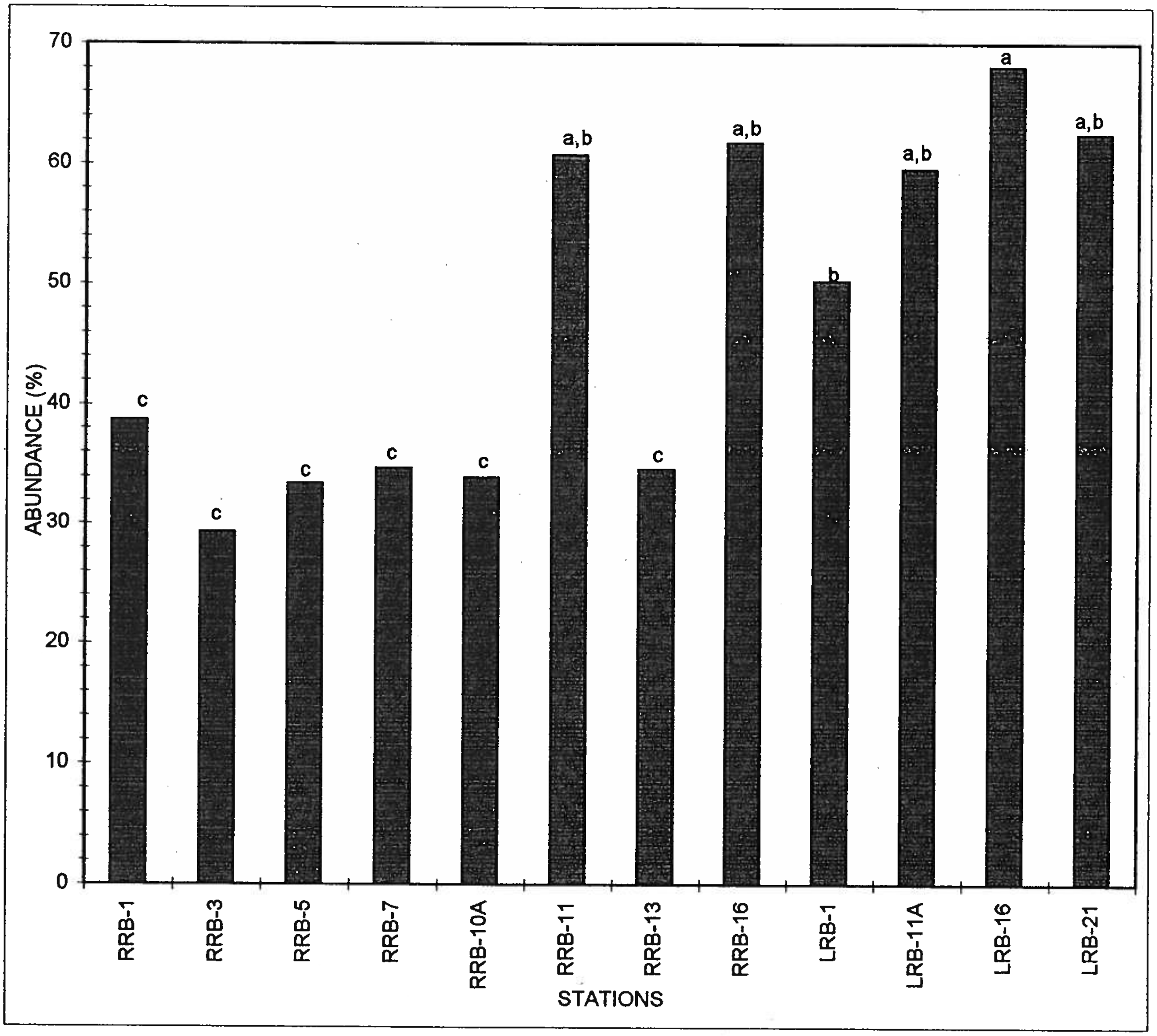


Figure 5. MEAN DENSITY (No./m²) OF MACROINVERTEBRATES AT RED RIVER STATIONS (DECEMBER 1995)



Note: Bars with letters that do not match are significantly different ($P<0.05$).

Figure 6. MEAN DOMINANCE (PERCENT) AT RED RIVER STATIONS (DECEMBER 1995)



Note: Bars with letters that do not match are significantly different (P<0.05).

FIGURES.XLS\fig 6 (7/17/96:6:07 PM)

Figure 7. MEAN EPT INDEX AT RED RIVER STATIONS (DECEMBER 1995)

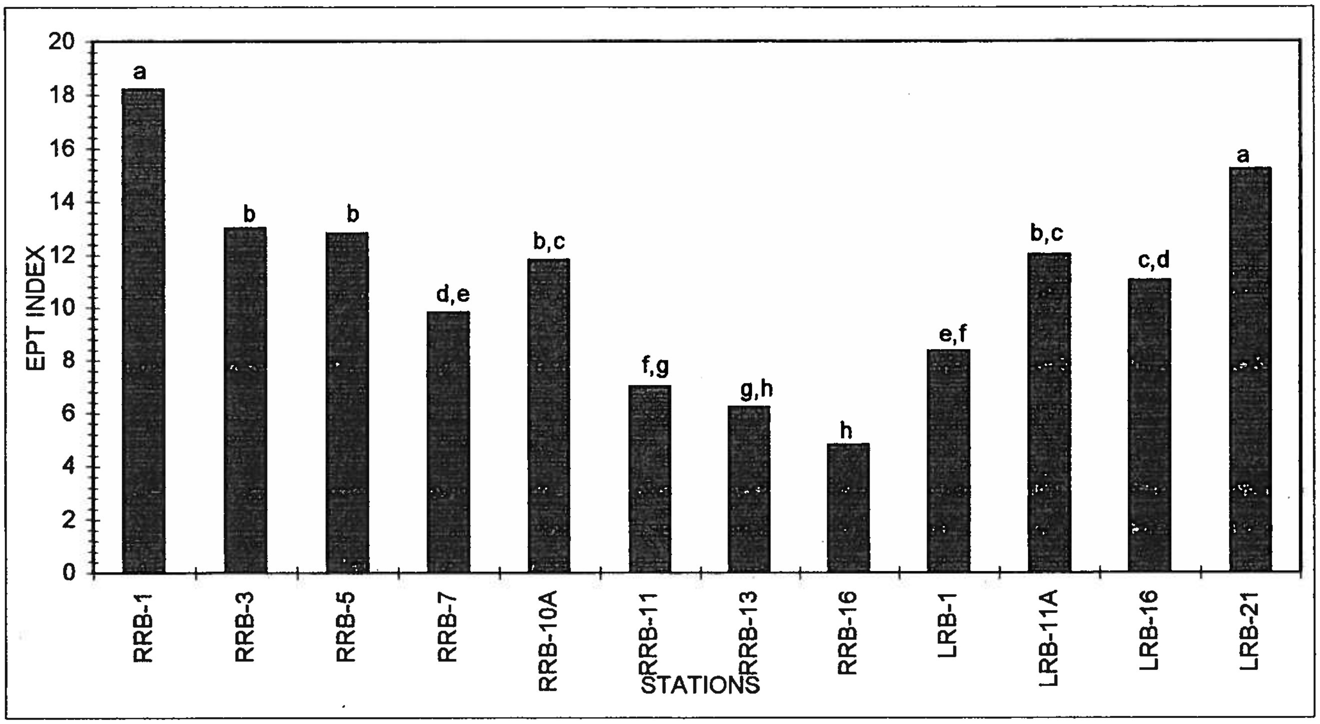
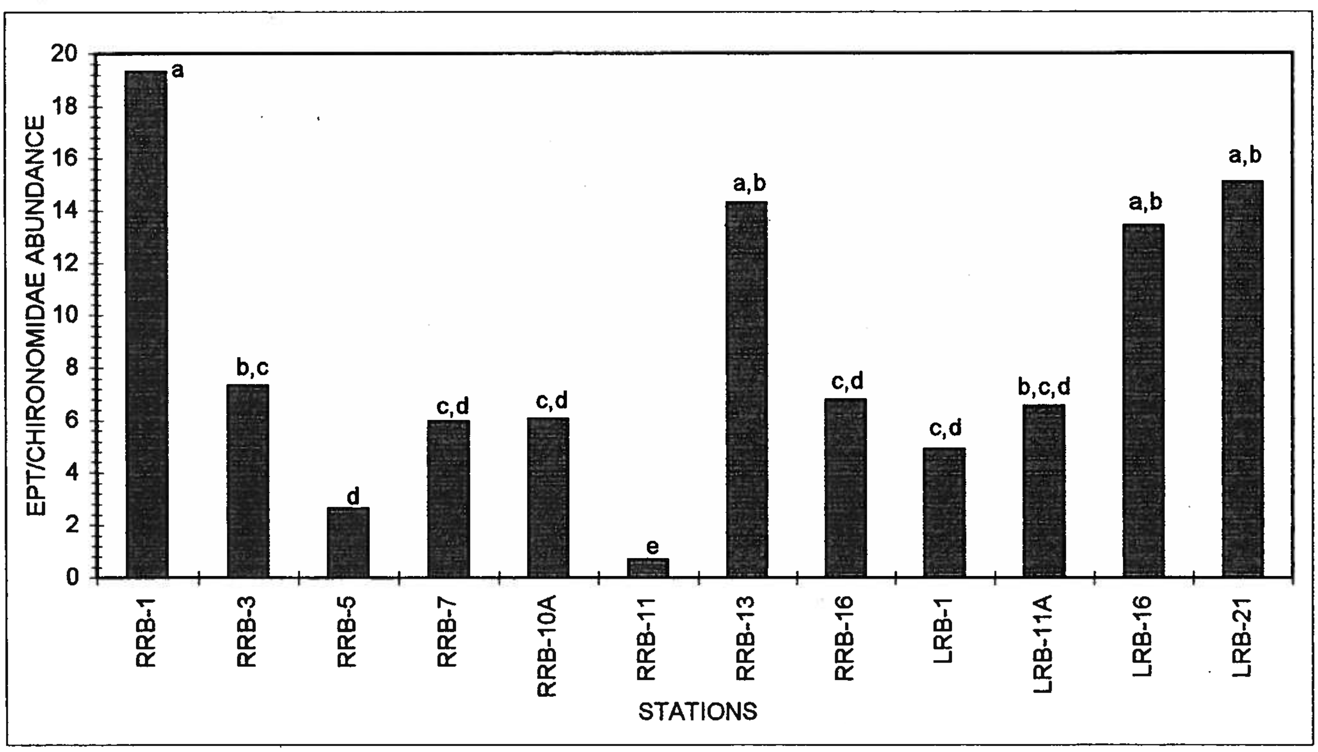


Figure 8. MEAN EPT/CHIRONOMID RATIO AT RED RIVER STATIONS (DECEMBER 1995)



Note: Bars with letters that do not match are significantly different ($P<0.05$).

FIGURES.XLS\tab-7&8 (7/17/96:6:15 PM)

Figure 9. MEAN HILSENHOFF BIOTIC INDEX AT RED RIVER STATIONS (DECEMBER 1995)

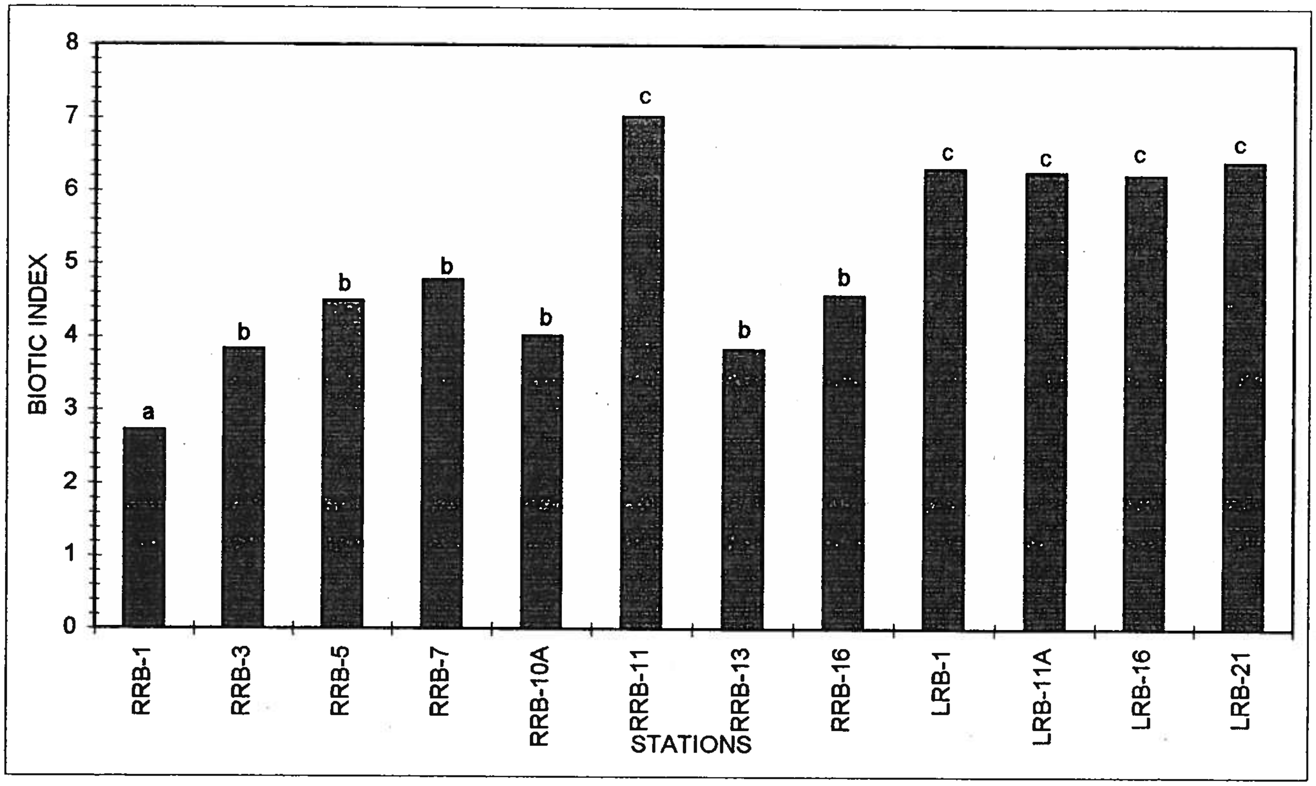
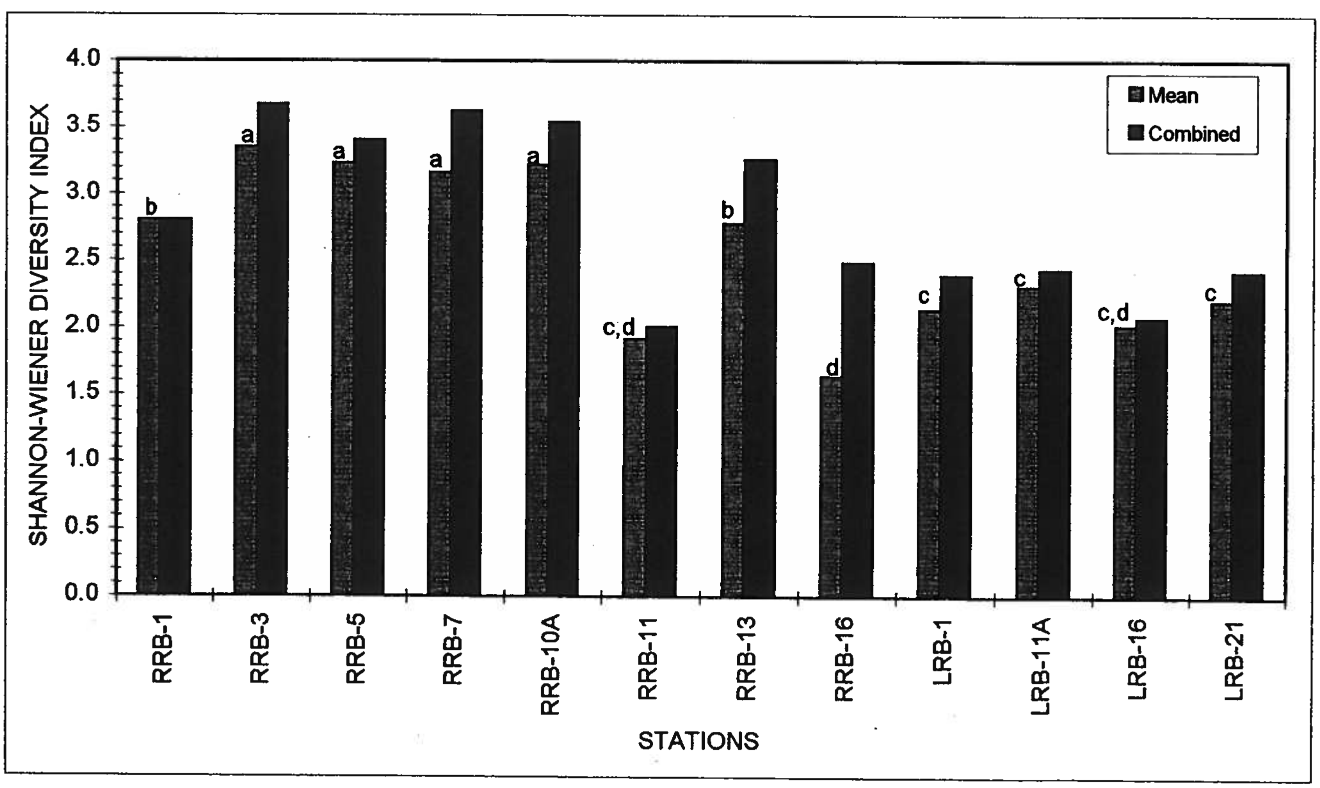


Figure 10. MEAN SHANNON-WIENER DIVERSITY INDEX (H') AT RED RIVER STATIONS (DECEMBER 1995)



Note: Bars with letters that do not match are significantly different (P<0.05).

FIGURES.XLS\tab-9&10 (7/17/96:6:13 PM)

Figure 11. MEAN ABUNDANCE OF SCRAPERS AND FILTER FEEDERS AT RED RIVER STATIONS (DECEMBER 1995)

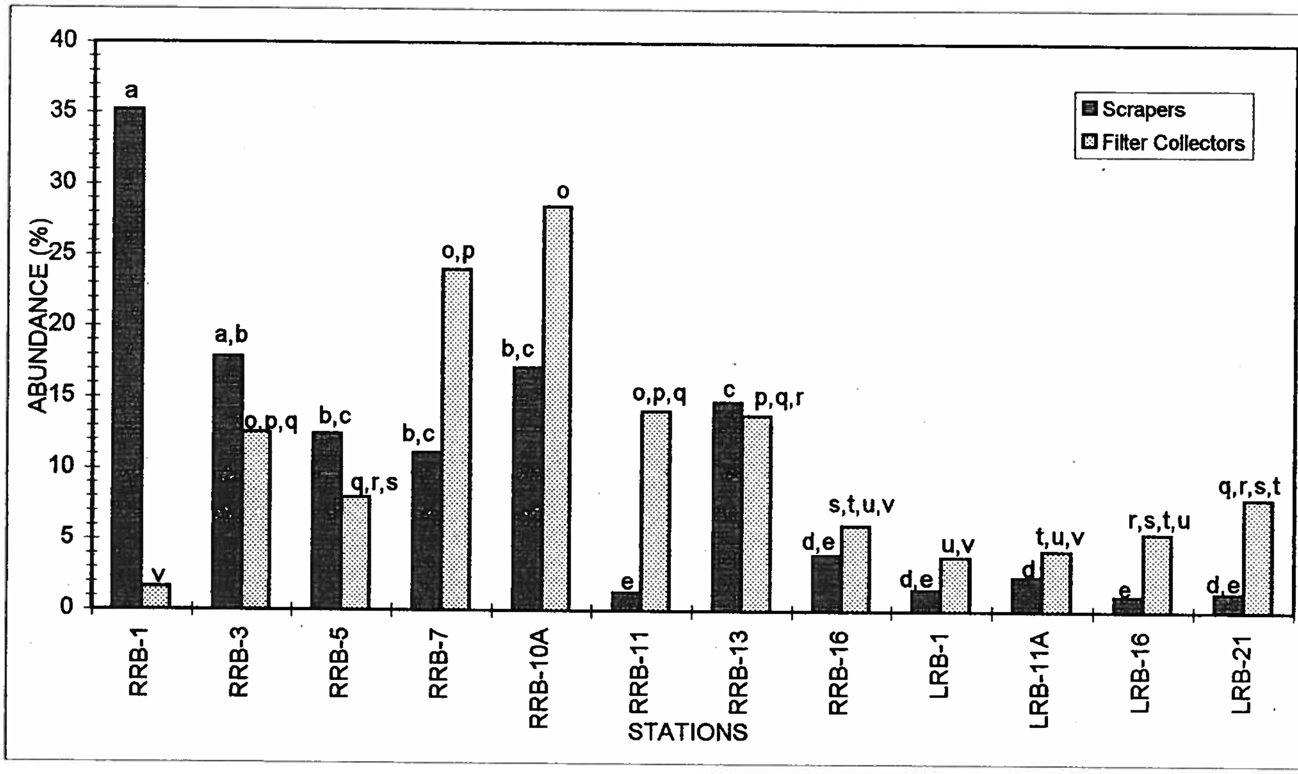
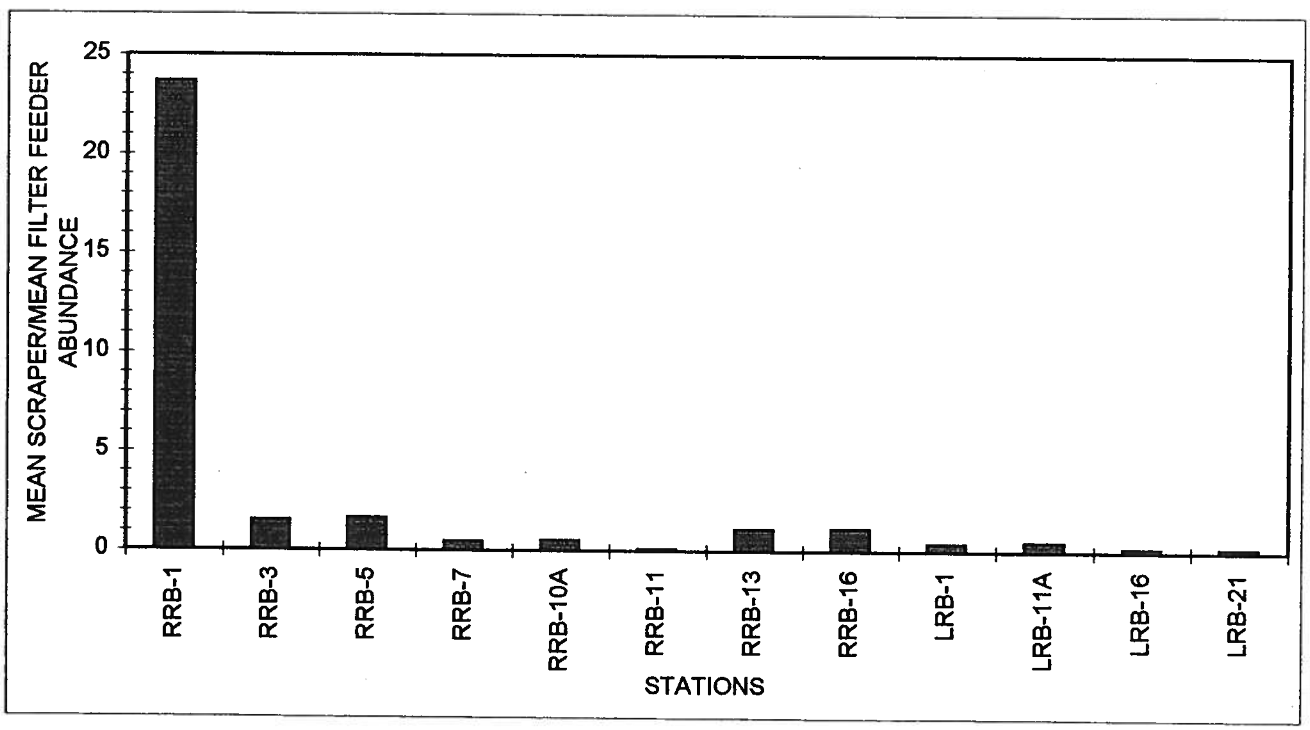


Figure 12. RATIO OF MEAN SCRAPER AND FILTER FEEDER NUMBERS AT RED RIVER STATIONS (DECEMBER 1995)



Note: Bars with letters that do not match are significantly different (P<0.05).

FIGURES.XLS\fig 11&12 (8/8/96:3:06 PM)

TABLE 1

DESCRIPTION OF MACROINVERTEBRATE SAMPLING LOCATIONS

Sampling Station		Relative Distance From	
ID	Date	Previous Station (river miles)	Location
RRB-1	12/21/95	0	Upper Red River above confluence with Bitter Creek (just above the Town of Red River)
RRB-3	12/21/95	0.98	Upper Red River below confluence with Pioneer Creek (just below the Town of Red River)
RRB-5	12/21/95	1.8	Upper Red River below confluence Haut'N'Taut Creek
RRB-7	12/21/95	2.4	Upper Red River above confluence with Sulpher Gulch
RRB-10A	12/21/95	2.0	Upper Red River just below confluence with Columbine Creek
RRB-11	12/21/95	0.44	Upper Red River below confluence with Columbine Creek
RRB-13	12/21/95	1.6	Upper Red River above Capulin Canyon
RRB-16	12/20/95	1.5	Upper Red River below USGS Gaging Station #08265000 near the Questa Ranger Station
LRB-1	12/20/95	2.6	Lower Red River below Highway 522 Bridge
LRB-11A	12/20/95	0.9	Lower Red River below tailings pond discharge outfall #002
LRB-16	12/21/95	1.6	Lower Red River at new cold and warm spring water control boxes for the Red River Fish Hatchery
LRB-21	12/21/95	0.8	Lower Red River below USGS Gaging Station #0266820 below the Red River Fish Hatchery

TABLE 2

TAXONOMIC CLASSIFICATION OF MACROINVERTEBRATES COLLECTED IN THE RED RIVER (December 1995)

Order	Family	Genus and Species	Common Name
TURBELLARIA			Flatworms
NEMATODA			Roundworms
OLIGOCHAETA			Aquatic Earthworms
HYDRACARINA			Water mites
EPHEMEROPTERA			Mayflies
	Ameletidae	*Ameletus* sp.	
	Baetidae	*Baetis tricaudatus*	Small mayflies
	Ephemerellidae	*Drunella doddsi*	
		Drunella grandis	
		Ephemerella infrequens	
	Heptageniidae	*Epeorus longimanus*	Stream mayflies
		Rhithrogena robusta	
		Rhithrogena sp.	
	Leptophlebiidae	*Paraleptophlebia* sp.	
PLECOPTERA			Stoneflies
	Capniidae	Unidentified capniids	Small winter stoneflies
		Eucapnopsis brevicauda	
	Leuctridae	*Paraleuctra* sp.	Rolled-wing stoneflies
	Taeniopterygidae	*Doddsia occidentalis*	Winter stoneflies
		Taenionema sp.	
	Nemouridae	*Podmosta/Prostoia* sp.	Spring stoneflies
		Zapada cinctipes	
		Zapada sp.	
	Pteronarcyidae	*Pteronarcella badia*	Giant stoneflies
	Chloroperlidae	Unidentified individuals	Green stoneflies
		Paraperla frontalis	
		Plumiperla diversa	
		Sweltsa sp.	
	Perlodidae	Unidentified perlodids	Perlodid stoneflies
		Isoperla sp.	
		Megarcys signata	

TABLE 2

TAXONOMIC CLASSIFICATION OF MACROINVERTEBRATES COLLECTED IN THE RED RIVER (December 1995)

Order	Family	Genus and Species	Common Name
PLECOPTERA (cont.)	Perlidae	*Hesperoperla pacifica*	Common stoneflies
TRICHOPTERA			Caddisflies
	Brachycentridae	*Brachycentrus americanus*	Brachycentrids
	Glossosomatidae	*Culoptila* sp.	
		Glossosoma sp.	
	Hydropsychidae	*Arctopsyche grandis*	Net-spinning caddisflies
		Hydropsyche sp.	
	Hydroptilidae	*Ochrotrichia* sp.	Micro-caddisflies
	Lepidostomatidae	*Lepidostoma* sp.	Lepidostomatids
	Limnephilidae	Unidentified limnephilids	Northern caddisflies
		Hesperophylax sp.	
		Oligophlebodes sp.	
	Rhyacophilidae	*Rhyacophila brunnea*	Primative caddisflies
		Rhyacophila coloradensis	
		Rhyacophila pellisa	
		Rhyacophila sp. A	
COLEOPTERA			Beetles
	Dytiscidae	*Liodessus affinis*	Predaceous diving beetles
	Elmidae	*Heterlimnius corpulentus*	Riffle beetles
		Narpus concolor	
		Optioservus sp.	
DIPTERA			True flies
	Athericidae	*Atherix pachypus*	
	Blephariceridae	*Bibiocephala grandis*	Net-winged midges
	Ceratopogonidae	Unidentified ceratopogonids	Punkies or biting midges
	Chironomidae	*Brillia* sp.	Midges
		Cricotopus/Orthocladius sp.	
		Diamesa sp.	
		Eukiefferiella sp.	
		Heleniella sp.	
		Hydrobaenus sp.	
		Micropsectra sp.	
		Orthocladius (Symposiocladius) lignicola	

TABLE 2

TAXONOMIC CLASSIFICATION OF MACROINVERTEBRATES COLLECTED IN THE RED RIVER (December 1995)

Order	Family	Genus and Species	Common Name
DIPTERA (cont.)	Chironomidae (Continued)	*Pagastia* sp.	
		Parametriocnemus sp.	
		Paraphaenocladius sp.	
		Parorthocladius sp.	
		Phaenopsectra sp.	
		Polypedilum sp.	
		Pseudodiamesa sp.	
		Rheocricotopus sp.	
		Tvetenia sp.	
	Empididae	*Chelifera* sp.	Dance flies
		Oreogeton sp.	
	Psychodidae	*Pericoma/Telmatoscopus* sp.	Moth and sand flies
	Simuliidae	*Prosimulium* sp.	Blackflies
		Simulium sp.	
	Tipulidae	Unidentified tipulids	Crane flies
		Dicranota sp.	
		Hesperoconopa sp.	
		Hexatoma sp.	
		Pedicia sp.	
		Tipula sp.	

Genus/Genus sp. = genera that are not separable at the early instar or larva stage present in the sample.

TABLE 3

NUMBER OF MACROINVERTEBRATE TAXA COLLECTED AT RED RIVER STATIONS (December 1995)

Sample Location	Replicate 1	2	3	4	5	Mean	Standard Deviation	Total Taxa
RRB-1	34	33	34	34	32	33	0.9	48
RRB-3	22	25	20	23	22	22	1.8	40
RRB-5	21	22	25	21	24	23	1.8	34
RRB-7	14	19	12	15	16	15	2.6	26
RRB-10A	16	21	15	21	17	18	2.8	36
RRB-11	7	7	12	9	10	9	2.1	18
RRB-13	9	11	10	10	8	10	1.1	17
RRB-16	6	6	4	10	8	7	2.3	16
LRB-1	17	17	14	13	8	14	3.7	22
LRB-11A	22	16	21	17	21	19	2.7	29
LRB-16	22	17	20	21	24	21	2.6	34
LRB-21	27	20	31	30	30	27.6	4.5	45

*Multiple comparison results are shown below. Lines that do not overlap indicate significantly different stations ($P<0.05$). Sum of ranks for station i is $R_i = \Sigma R(X_{ij})$ where $R(X_{ij})$=rank assigned to observation Xij and j= the replicate.

Station*	RRB-1	LRB-21	RRB-5	RRB-3	LRB-16	LRB-11A	RRB-10A	RRB-7	LRB-1	RRB-13	RRB-11	RRB-16
R_i	290	247	219	218.5	191.5	172	149.5	112.5	100.5	56.5	47.5	25.5

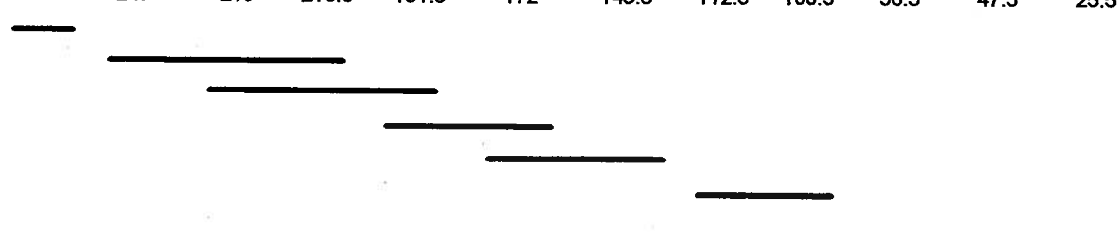


TABLE 4

TOTAL NUMBER AND DENSITY OF MACROINVERTEBRATES COLLECTED AT RED RIVER STATIONS (December 1995)

Sample Location	Number of Individuals: Replicate 1	2	3	4	5	Mean	Standard Deviation	Mean Density[a] (No./m^2)
RRB-1	1502	737	495	925	693	870	384.7	10121
RRB-3	310	178	175	191	271	225	61.7	2616
RRB-5	353	281	380	413	306	347	53.7	4030
RRB-7	136	105	84	74	107	101	24.0	1177
RRB-10A	95	205	132	192	70	139	59.0	1614
RRB-11	27	20	39	98	74	52	33.2	600
RRB-13	25	23	33	27	29	27	3.8	319
RRB-16	34	31	9	65	57	39	22.3	456
LRB-1	197	424	317	95	87	224	145.6	2605
LRB-11A	350	122	389	258	554	335	160.0	3891
LRB-16	374	428	328	362	421	383	41.9	4449
LRB-21	422	308	614	571	670	517	148.7	6012

[a]Open bottom area of the Hess sampler is 0.086 m^2.

*Multiple comparison results are shown below. Lines that do not overlap indicate significantly different stations ($P<0.05$). Sum of ranks for station i is $R_i = \Sigma R(X_{ij})$ where $R(X_{ij})$=rank assigned to observation Xij and j= the replicate.

Station*	RRB-1	LRB-21	RRB-16	RRB-5	LRB-11A	RRB-3	LRB-1	RRB-10A	RRB-7	RRB-11	RRB-16	RRB-13
R_i	286	251	226	205	197	156	157.5	120.5	103.5	55	44	28.5

TABLE 5

PERCENT DOMINANT BENTHIC MACROINVERTEBRATE ABUNDANCE AT RED RIVER STATIONS (December 1995)

Sample Location	Replicate 1	2	3	4	5	Mean	Standard Deviation
RRB-1	41.5	39.2	37.0	43.5	32.3	38.7	4.31
RRB-3	49.7	34.3	22.3	23.0	17.3	29.3	12.96
RRB-5	29.2	34.2	34.7	31.5	37.3	33.4	3.11
RRB-7	26.5	24.8	38.1	41.9	42.1	34.7	8.43
RRB-10A	35.8	33.2	38.6	27.6	34.3	33.9	4.08
RRB-11	70.4	45.0	46.2	86.7	55.4	60.7	17.73
RRB-13	24.0	26.1	30.3	48.2	44.8	34.7	11.09
RRB-16	58.8	80.7	55.6	46.2	68.4	61.9	13.15
LRB-1	41.1	57.8	41.0	40.0	71.3	50.2	13.89
LRB-11A	42.9	64.8	67.1	62.8	60.3	59.6	9.67
LRB-16	62.0	68.7	65.9	74.3	69.6	68.1	4.56
LRB-21	46.5	74.7	61.9	72.9	56.4	62.5	11.73

*Multiple comparison results are shown below. Lines that do not overlap indicate significantly different stations ($P<0.05$). Sum of ranks for station i is $R_i = \Sigma R(X_{ij})$ where $R(X_{ij})$=rank assigned to observation Xij and j= the replicate.

Station*	LRB-16	RRB-16	LRB-21	RRB-11	LRB-11A	LRB-1	RRB-1	RRB-7	RRB-13	RRB-10	RRB-5	RRB-3
R_i	257	227.5	236	220.5	219	172	112	90	89	77	71	59

TABLE 6

MACROINVERTEBRATE CLASS COMPOSITION (PERCENT) AT RED RIVER STATIONS (December 1995)

Sample Location	TURBELLARIA Flatworms	NEMATODA Roundworms	OLIGOCHAETA Aquatic Earthworms	HYDRACARINA Water Mites	EPHEMEROPTERA Mayflies	PLECOPTERA Stoneflies	TRICHOPTERA Caddisflies	COLEOPTERA Beetles	DIPTERA True Flies
RRB-1	0.29	0.18	0.18	0.62	4.24	75.42	3.11	0.72	15.92
RRB-3	0.10	0.11	0.18	4.09	7.60	51.84	16.82	1.37	19.25
RRB-5	--	0.34	--	0.07	10.66	49.66	8.35	0.51	31.14
RRB-7	--	0.19	--	0.55	25.86	15.43	26.33	1.69	32.23
RRB-10A	--	0.46	--	1.45	29.94	14.49	29.34	0.95	24.64
RRB-11	--	--	--	0.42	3.78	17.52	13.92	--	64.78
RRB-13	--	--	--	0.80	54.09	6.08	13.78	--	22.44
RRB-16	--	--	--	2.81	54.02	8.26	6.66	0.35	31.06
LRB-1	--	--	--	--	62.44	1.96	3.82	0.10	31.77
LRB-11A	0.06	0.05	--	--	72.11	5.46	4.54	0.31	17.96
LRB-16	--	0.50	0.06	0.11	77.56	3.93	6.45	1.21	12.17
LRB-21	0.40	0.18	0.06	0.10	71.23	5.30	9.21	1.34	14.31

-- Not found in the samples.

TABLE 7

EPT INDEX AT RED RIVER STATIONS
(December 1995)

Sample Location	Replicate 1	2	3	4	5	Mean	Standard Deviation
RRB-1	20	19	19	16	17	18.2	1.64
RRB-3	11	15	12	13	14	13.0	1.58
RRB-5	14	12	11	13	14	12.8	1.30
RRB-7	9	11	8	10	11	9.8	1.30
RRB-10A	10	14	9	14	12	11.8	2.28
RRB-11	5	6	9	7	8	7.0	1.58
RRB-13	6	7	6	7	5	6.2	0.84
RRB-16	4	5	3	7	5	4.8	1.48
LRB-1	9	11	8	8	6	8.4	1.82
LRB-11A	13	10	13	11	13	12.0	1.41
LRB-16	12	9	11	12	11	11.0	1.23
LRB-21	14	14	16	15	17	15.2	1.30

*Multiple comparison results are shown below. Lines that do not overlap indicate significantly different stations ($P<0.05$). Sum of ranks for station i is $R_i = \Sigma R(X_{ij})$ where $R(X_{ij})$=rank assigned to observation Xij and j= the replicate.

Station*	RRB-1	LRB-21	RRB-3	RRB-5	LRB-11A	RRB-10A	LRB-16	RRB-7	LRB-1	RRB-11	RRB-13	RRB-16
R_i	288	259.5	210	205.5	181.5	179	156	123.5	93	63	46.5	24.5

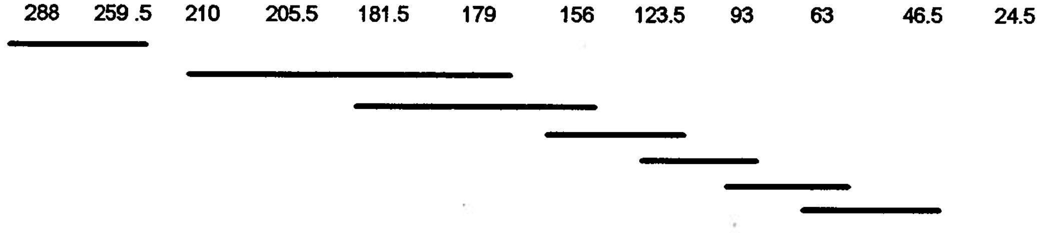


TABLE 8

RATIO OF EPT/CHIRONOMID ABUNDANCE AT RED RIVER STATIONS
(December 1995)

Sample Location	Replicate 1	Replicate 2	Replicate 3	Replicate 4	Replicate 5	Mean	Standard Deviation
RRB-1	37.7	15.1	16.6	14.6	12.6	19.3	10.37
RRB-3	13.8	10.1	3.2	4.6	4.9	7.3	4.47
RRB-5	3.0	3.5	1.8	3.2	1.6	2.6	0.86
RRB-7	20.3	5.2	1.6	1.3	1.3	5.9	8.20
RRB-10A	8.7	1.8	7.7	10.2	1.8	6.0	3.97
RRB-11	0.4	1.2	0.9	0.1	0.8	0.7	0.43
RRB-13	6.7	18.0	3.8	22.0	21.0	14.3	8.45
RRB-16	10.0	14.5	8.0	1.0	0.4	6.8	6.03
LRB-1	9.8	0.7	1.4	4.2	8.4	4.9	4.08
LRB-11A	3.1	7.3	5.3	10.3	6.7	6.5	2.65
LRB-16	7.0	16.8	15.4	18.3	9.9	13.5	4.82
LRB-21	2.2	32.7	10.2	21.1	9.2	15.1	11.95

*Multiple comparison results are shown below. Lines that do not overlap indicate significantly different stations ($P<0.05$). Sum of ranks for station i is $R_i = \Sigma R(X_{ij})$ where $R(X_{ij})$=rank assigned to observation Xij and j= the replicate.

Station*	RRB-1	LRB-16	RRB-13	LRB-21	RRB-3	LRB-11A	RRB-10A	RRB-16	RRB-7	LRB-1	RRB-5	RRB-11
R_i	253	225	219.5	212.5	158.5	152.5	141.5	130.5	113.5	113	88	22

TABLE 9

HILSENHOFF BIOTIC INDEX FOR BENTHIC MACROINVERTEBRATES AT RED RIVER STATIONS (December 1995)

Sample Location	Replicate 1	2	3	4	5	Mean	Standard Deviation
RRB-1	2.36	2.72	2.73	2.83	2.96	2.72	0.223
RRB-3	3.11	3.35	4.12	3.82	4.74	3.83	0.644
RRB-5	4.27	4.11	4.82	4.00	5.21	4.48	0.514
RRB-7	2.71	3.81	5.62	5.97	5.74	4.77	1.437
RRB-10A	3.24	4.90	3.35	3.27	5.27	4.01	0.996
RRB-11	7.85	5.75	5.82	9.02	6.65	7.02	1.404
RRB-13	4.80	3.43	3.79	3.30	3.83	3.83	0.588
RRB-16	3.29	2.71	3.44	5.71	7.63	4.56	2.063
LRB-1	5.03	7.72	6.94	5.49	6.39	6.32	1.084
LRB-11A	6.13	6.26	6.69	5.98	6.25	6.26	0.262
LRB-16	6.20	6.05	6.09	6.37	6.40	6.22	0.160
LRB-21	7.16	6.11	6.38	6.34	6.02	6.40	0.450

*Multiple comparison results are shown below. Lines that do not overlap indicate significantly different stations ($P<0.05$). Sum of ranks for station i is $R_i = \Sigma R(X_{ij})$ where $R(X_{ij})$=rank assigned to observation Xij and j= the replicate.

Station*	RRB-1	RRB-3	RRB-13	RRB-10A	RRB-16	RRB-5	RRB-7	LRB-1	LRB-16	LRB-11A	LRB-21	RRB-11
R_i	282	216.5	215	213.5	184.5	181	178.5	80	76	75	64	60

TABLE 10

SHANNON-WIENER DIVERSITY INDEX FOR BENTHIC MACROINVERTEBRATES AT RED RIVER STATIONS (December 1995)

Sample Location	Replicate 1	2	3	4	5	Mean	Standard Deviation	Combined Station Average
RRB-1	2.32	2.80	2.96	2.67	3.23	2.80	0.338	2.80
RRB-3	2.67	3.43	3.35	3.47	3.82	3.35	0.420	3.67
RRB-5	3.23	3.00	3.21	3.27	3.44	3.23	0.157	3.40
RRB-7	3.00	3.58	2.93	3.11	3.19	3.16	0.254	3.62
RRB-10A	3.41	2.96	2.97	3.43	3.31	3.22	0.234	3.54
RRB-11	1.59	2.32	2.60	0.93	2.17	1.92	0.666	2.01
RRB-13	2.86	3.17	2.89	2.55	2.41	2.78	0.300	3.26
RRB-16	1.83	1.14	1.66	2.09	1.46	1.64	0.361	2.49
LRB-1	2.36	2.09	2.17	2.52	1.55	2.14	0.369	2.39
LRB-11A	2.85	2.17	2.09	2.22	2.21	2.31	0.307	2.44
LRB-16	2.17	1.87	2.21	1.81	2.02	2.02	0.177	2.08
LRB-21	2.47	1.58	2.43	1.90	2.63	2.20	0.443	2.42

*Multiple comparison results are shown below. Lines that do not overlap indicate significantly different stations ($P<0.05$). Sum of ranks for station i is $R_i = \Sigma R(X_{ij})$ where $R(X_{ij})$=rank assigned to observation Xij and j= the replicate.

Station*	RRB-3	RRB-5	RRB-10A	RRB-7	RRB-1	RRB-13	LRB-11A	LRB-21	LRB-1	RRB-11	LRB-16	RRB-16
R_i	260	249	244	233.5	182	177	110	103	89.5	79	68	35

TABLE 11

SCRAPER ABUNDANCE (PERCENT) AT RED RIVER STATIONS
(December 1995)

Sample Location	Replicate 1	2	3	4	5	Mean	Standard Deviation
RRB-1	37.5	39.1	37.0	30.5	31.7	35.2	3.80
RRB-3	11.9	18.5	17.7	28.8	12.2	17.8	6.85
RRB-5	16.1	6.0	8.4	18.2	13.4	12.4	5.11
RRB-7	16.2	9.5	9.5	8.1	12.1	11.1	3.19
RRB-10A	34.7	10.7	14.4	17.2	8.6	17.1	10.39
RRB-11	0.0	0.0	5.1	0.0	1.4	1.3	2.22
RRB-13	4.0	8.7	6.1	48.1	6.9	14.8	18.74
RRB-16	14.7	0.0	0.0	1.5	3.5	4.0	6.18
LRB-1	1.0	1.2	0.9	2.1	2.3	1.5	0.64
LRB-11A	4.0	2.5	1.3	1.9	2.3	2.4	1.00
LRB-16	0.8	0.2	1.8	0.8	1.7	1.1	0.66
LRB-21	0.5	1.9	0.8	1.8	1.5	1.3	0.63

*Multiple comparison results are shown below. Lines that do not overlap indicate significantly different stations ($P<0.05$). Sum of ranks for station i is $R_i = \Sigma R(X_{ij})$ where $R(X_{ij})$=rank assigned to observation Xij and j= the replicate.

Station*	RRB-1	RRB-3	RRB-10A	RRB-5	RRB-7	RRB-13	LRB-11A	RRB-16	LRB-1	LRB-21	LRB-16	RRB-11
R_i	283	239	226	208	201	190.5	114.5	95.5	83.5	73.5	61.5	54

TABLE 12

FILTER FEEDER ABUNDANCE (PERCENT) AT RED RIVER STATIONS
(December 1995)

Sample Location	Filter Feeder Abundance							Mean Ratio of Scrapers to Filter Feeders
	Replicate 1	Replicate 2	Replicate 3	Replicate 4	Replicate 5	Mean	Standard Deviation	
RRB-1	0.6	0.5	1.6	3.1	2.2	1.6	1.10	23.65
RRB-3	2.6	11.8	21.7	15.2	11.4	12.5	6.93	1.49
RRB-5	4.2	7.5	10.0	8.2	9.8	8.0	2.33	1.61
RRB-7	50.7	16.2	28.6	9.5	15.0	24.0	16.51	0.44
RRB-10A	15.8	30.2	47.7	38.5	10.0	28.5	15.63	0.51
RRB-11	11.1	20.0	7.7	6.1	25.7	14.1	8.40	0.09
RRB-13	32.0	17.4	12.1	7.4	0.0	13.8	12.02	1.11
RRB-16	0.0	0.0	22.2	4.6	3.5	6.1	9.26	1.14
LRB-1	5.6	1.7	3.2	5.3	3.4	3.8	1.62	0.39
LRB-11A	3.7	0.8	2.1	7.8	7.0	4.3	3.04	0.49
LRB-16	3.5	4.2	7.0	8.0	4.8	5.5	1.93	0.19
LRB-21	10.2	2.3	9.1	9.3	9.0	8.0	3.22	0.19

*Multiple comparison results are shown below. Lines that do not overlap indicate significantly different stations ($P<0.05$). Sum of ranks for station i is $R_i = \Sigma R(X_{ij})$ where $R(X_{ij})$=rank assigned to observation Xij and j= the replicate.

Station*	RRB-10A	RRB-7	RRB-11	RRB-3	RRB-13	RRB-5	LRB-21	LRB-16	RRB-16	LRB-11A	LRB-1	RRB-1
R_i	260.5	247	202	198	182	159	157	116.5	94.5	90.5	84	39