COMBINED AQUATICS WORKING GROUP

CAWG 10-MACROINVERTEBRATES

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1.0 EXECUTIVE SUMMARY

During August and September 2002, the CAWG 10 Macroinvertebrate study was carried out. The study involved three major elements:

1. Application of the California Stream Bioassessment Procedure (CSBP);
2. Visual surveys for mollusks at fish sampling locations; and
3. Crayfish trapping in Shaver Lake and Mammoth Pool Reservoir.

Each of these elements was successfully carried out. The CSBP was used in Project diverted streams; flow augmented streams; and in bypass reaches downstream of Project impoundments. Most of the small Project diversions are only operated during the runoff period, usually May through July. Diversion operation dates for 2002 are presented in Appendix H. During the index period for sample collection (August and September), most of the small Project diversions were not in operation. Therefore, conditions below the small diversions normally contain low or "base" flows. Water year 2002 was classified as a dry water year. In 2002, flows were smaller than normal for runoff and "base flow", limiting potential sampling areas and macroinvertebrate habitat.

In each stream containing a Project diversion, physical/habitat quality was assessed at each site according to CSBP guidelines; samples were taken upstream of the diversion, downstream of the diversion nearer the upper end of the bypass reach, and within but near the downstream end of the bypass reach. For longer bypass reaches, additional samples were taken at approximately two-mile intervals, depending upon accessibility. To the extent feasible, samples were taken in a single Rosgen Level I channel type for each stream and in either riffle or run habitats. Project diversions are frequently constructed at locations where there were changes in channel characteristics. As a result, there were physical differences in stream segments, that may affect comparisons above and below diversions. Samples were analyzed at CSBP Level 3, and subject to Quality Control (QC) by the California Department of Fish and Game Laboratory. CSBP metrics (metrics) were calculated for each sample and tabulated by site including standard sample statistics. Metrics were used as comparative measures of disturbance according to the CSBP. Statistical comparisons of abundance and metrics by site were carried out using standard test statistics. Cluster analysis was used to examine physical/habitat quality between sites, and family-level taxonomy by site for each stream.

A few macroinvertebrate taxa were abundant, regardless of site location or stream. Many of these were members of families within the Diptera (flies) and included Orthocladiinae, Tanytarsini, and Simuliidae. The most common family of the Ephemeroptera (mayflies) was Baetidae. The most common Plecoptera (stoneflies) were members of the family Nemouridae. For Trichoptera (caddisflies) the most common family was Hydropsychidae. Other families and genera of these groups were abundant in some individual streams, as well.

Results indicated that metrics were highly variable within sites and between sites within streams. Locations where diversions have not been operated for many years indicated differences in metrics between sites above and below diversions. These diversions have not been operational, and are not capable of diverting flow. Therefore, differences in metrics at the non-operational diversion sites are not related to effects of flow on the macroinvertebrate community. At other sites, where diversions are currently operated, differences in metrics upstream and downstream of diversions also were found. Some of these were different at statistically significant levels ($p \leq 0.05$), others were not. Differences in some metrics suggested disturbance in sites above diversions, as well as downstream.

Visual surveys for mollusks located few individuals, and these were generally very small in size, and at a limited number of locations. A small number of small-sized mollusks were collected as part of the CSBP sampling and are reported.

Crayfish trapping in Shaver Lake and Mammoth Pool Reservoir suggests that Crayfish are well-distributed with depth and location. In Shaver Lake, catch per night sampled in 2002 was similar to that of a study conducted in 1988. In Mammoth Pool Reservoir, crayfish were abundant and well-distributed, but when gear efficiency is considered, relative catches were lower than in 1988.

2.0
STUDY OBJECTIVES

The study objectives of the CAWG 10 Macroinvertebrates Study Plan are:

1. Characterize macroinvertebrate communities (including mollusks, specifically bivalves).

2. Evaluate results of whitewater studies on macroinvertebrate communities.

3.0 STUDY IMPLEMENTATION

3.1 GENERAL APPROACH

Implementation of the CAWG 10 Macroinvertebrates Study Plan (SCE 2001a) was designed to take place through a general approach that contained seven major elements. The list below identifies the elements and whether they were completed during 2002.

Element	State of Completion
1. Available information on macroinvertebrates will be reviewed for bypass reaches.	1. Available data for Study streams were reviewed.
2. Macroinvertebrates will be sampled in and along bypass reaches and reference sites (generally upstream of the diversion).	2. Representative locations were identified within bypass reaches and above diversions or other Project facilities on small streams. Sampling sites were primarily located in dominant Rosgen Level I channel areas. Sites and habitats to be sampled were presented to and approved by the CAWG prior to sampling.
3. The California Stream Bioassessment Procedure (CSBP) will be used.	3. The California Stream Bioassessment Procedure (CSBP) was used.
4. Mollusks will be sampled separately in fish sampling locations. Taxonomic composition will be identified and relative abundance (catch-per-effort) will be recorded. Habitat conditions will be characterized for the time of sampling.	4. Mollusks were sampled separately in fish sampling locations. Habitat conditions were characterized for the time of sampling.

5. Crayfish trapping will take place in Mammoth Pool Reservoir and Shaver Lake to determine relative abundance and species present.	5. Crayfish trapping was conducted in Mammoth Pool Reservoir and Shaver Lake to determine relative abundance and species present.
6. Water quality will be evaluated using the results of the rapid bioassessment procedures.	6. Data were analyzed using CSBP metrics, indicators, and community characteristics. Water quality was not evaluated, the purpose of this report is to present results and not interpret them.
7. Sampling locations and results will be added to GIS maps and tabulated.	7. Sampling locations were mapped in GIS and tabulated.

3.2 OUTSTANDING STUDY ELEMENTS

Macroinvertebrate sampling in conjunction with out of season whitewater flows has not been implemented at this time. In addition, Native Americans have requested sampling of mollusks at traditional collection locations in the vicinity of the Big Creek 4 Powerhouse and Kerckhoff Reservoir. This additional mollusk sampling was completed in the fall of 2003.

4.0
STUDY METHODOLOGY

4.1 SITE SELECTION

In each bypass reach, the major Rosgen Level I channel type was identified and selected for sampling (with few exceptions[1]). One sampling site was established in the upstream and downstream ends of the reach. In the case of a long bypass reach (more than two miles), intermediate sampling sites at intervals of about two miles (depending upon access) were sampled for BMI's to better describe longitudinal changes along the reach. Locations upstream of each diversion also were selected for comparison. The upstream locations were selected in the same Rosgen Level I channel type and habitat types as selected for the bypass reach, to the extent feasible[2].

Dry water year conditions occurred during 2002, which resulted in smaller than normal flows in streams within the Project Area. Because the index period for macroinvertebrate sampling is August and September, most streams are at base (low) flow. These low flows resulted in very small wetted widths in some streams and discontinuous flows in some others. In cases where the stream was dry, no sample could be taken in a reach. In streams where areas of appropriate habitats or “spots” were limited, the target number of replicates could not be obtained.

The locations of the sampling sites are shown in Maps CAWG 10-1 through 10-8. A detailed description of the methodology is presented in Appendix A.

4.2 MACROINVERTEBRATE SAMPLE COLLECTION

Sampling for this study followed guidelines from the most current version of the California Stream Bioassessment Procedure (CSBP) (CDFG 1999). Samples were collected using a D-frame net with a 0.5-mm mesh. A more detailed description of the methodology is presented in Appendix A.

4.3 PHYSICAL DATA COLLECTION

At each habitat unit sampled, water temperature, specific conductance, pH and dissolved oxygen were measured using direct-reading instruments. Streamflow measurements were taken where appropriate measurement locations were immediately available to the sample site. A detailed description of the methodology is presented in Appendix A. At each reach where BMI samples were collected, the physical habitat

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[1] In some instances the CAWG determined that more than one channel type should be sampled due to the extent or spatial distribution of channel types in a bypass reach.

[2] Where there were differences in Rosgen Level I channel type between the bypass reach and the reach upstream of the diversion, more than one channel type may have been sampled.

characteristics were recorded in a *California Bioassessment Worksheet*. This information is provided in Appendix B.

4.4 LABORATORY ANALYSIS PROCEDURE

A detailed description of the methodology is presented in Appendix A.

4.5 DATA ANALYSIS

4.5.1 METRICS

The CSBP Biological Metrics (Harrington and Born 2000) calculated for the study are presented in Table CAWG 10-1. These metrics were calculated for each replicate sample in each study reach. The mean, standard deviation, and coefficient of variation also were calculated for each biological metric or index. The Shannon-Weaver index was calculated using the commonly accepted formulation presented by Zar (1996).

4.5.2 CLUSTER ANALYSIS

Analyses of relationships between the sampling sites based on physical/habitat quality and, separately, BMI community composition were carried out for each site within each stream. Cluster analysis was used to provide a means of assessing those relationships (See Appendix A). Comparisons of the habitat quality dendrograms and those for community compositions may suggest the response of community composition to factors affecting habitat quality.

4.5.3 STATISTICAL ANALYSES

Statistical analyses are included in this report to assist the reader in evaluating differences in metrics between sites in a study reach. These analyses provide an objective approach to such evaluations, however interpretation is left to the reader.

Analysis of Variance (ANOVA) (Wilkinson and Coward, 2000) was used to test for differences among sites for values of biological metrics and abundance of BMI's. Standard parametric ANOVA was used, when the underlying assumption of equal (homogeneity of) variance was met. Where this assumption was not met, the Welch test, which does not depend upon this assumption, was used instead, where possible (Dixon et al. 1990). An alternative to this test was the non-parametric Kruskal-Wallis Test, which was used where an alternative to the Welch test was needed.

The level used to test for significance was $p \leq 0.05$, signifying that the resultant difference under analysis could occur 1 out of 20 times due to chance alone. This is the standard probability used in testing to hold the potential for Type I errors (rejection of the null hypothesis, when it is true) to an acceptable level (Sokal and Rohlf 1981). The result of each ANOVA test of a metric among sites for a stream was reported as a probability value associated with the metric evaluated. Where a statistically significant result was observed from the standard ANOVA, a *Post Hoc* test between individual sites was conducted. In this case, a Bonferroni t-test was used (Dixon et al. 1990). The Bonferroni test was not carried out when the Welch or Kruskal-Wallis tests was used due to the violation of the assumption of homogeneity of variance. A more detailed discussion of the statistical analyses performed is presented in Appendix A.

4.6 MOLLUSK SAMPLE COLLECTION

Mollusks were sampled separately in pool and run habitats near fish (CAWG 7) sampling sites, as agreed to by the CAWG. The locations of the sites sampled for mollusks are shown in Maps CAWG 10-9 through 10-15. The focus of the mollusk sampling effort was to determine the occurrence and distribution of mollusk species (specifically bivalves) in the Big Creek study streams. Sampling was conducted using methods described by Metcalfe-Smith et al. (2000). Methods are discussed in more detail in Appendix A.

4.7 RESERVOIR CRAYFISH SAMPLE COLLECTION

Mammoth Pool Reservoir and Shaver Lake were sampled with baited inclined plane traps to collect crayfish. Ten traps were deployed for two 24-hour sets at each of three depth/location strata. Each of the locations was trapped for 24-hours, then the traps were moved and redeployed. At least two traps were deployed near the mouth of each major tributary stream entering the reservoir (Maps CAWG 10-16 and 10-17) (See Appendix A for additional details).

5.0 STUDY RESULTS AND ANALYSIS

5.1 RESULTS OVERVIEW

This section of the report presents the results of the macroinvertebrate surveys conducted during August and September 2002. Results are presented as tabular summaries of abundance, abundant BMI taxa, CSBP metrics, statistical comparisons of metrics, as well as graphic summaries of functional feeding groups and cluster diagrams of physical/quality parameters and taxa. Results also are summarized for visual mollusk surveys. Results are presented by drainage in a general upstream to downstream order. These include the South Fork San Joaquin River, the San Joaquin River (Mammoth and Stevenson reaches), Big Creek, and Stevenson Creek (including North Fork Stevenson Creek). The discussion of tributaries follows presentation of mainstem results.

The results of physical habitat data collections for each sampling site are presented in Appendix C. Laboratory identifications of BMI's are provided in Appendix D.

5.2 SOUTH FORK SAN JOAQUIN RIVER SUB BASIN

The mainstem of the South Fork San Joaquin River (SFSJR) was sampled from upstream of Florence Lake (SFSJR RM 30.65) downstream to the confluence with the San Joaquin River (SFSJR RM 0.0). Tributaries with diversions, excluding those included in SCE's traditional licensing processes, also were sampled (Maps CAWG 10-1 through 10-3). Historical information on macroinvertebrates is summarized in Appendix B.

5.2.1 SOUTH FORK SAN JOAQUIN RIVER MAINSTEM

There were nine sample sites located in the SFSJR. Site 9 was upstream of Florence Lake. Sites 8 through 1 were located downstream of the Florence Lake dam from Jackass Meadow (Site 8) to the lower SFSJR near its confluence with the San Joaquin River (Site 1) (Maps CAWG 10-1 through 10-3).

5.2.1.1 Physical Habitat

All of the sample sites in the SFSJR were in Rosgen Level I type B channel sites except for Site 8 which was classified as a Rosgen Level I type C/B channel.

Physical/habitat quality parameter score totals for the SFSJR mainstem ranged from 134 to 179 out of a potential range of zero to 200 (Table CAWG 10-2). Harrington and Born (2000) characterize four scoring categories based on the numerical scores. These categories are poor (zero to 49), marginal (50 to 99), suboptimal (100 to 149) and optimal (150 to 200). Based on these categories, five of the nine sites in the SFSJR mainstem would fall into the optimal range and four would fall into the suboptimal range.

5.2.1.2 Abundance

The mean densities of BMIs by site (numbers per square meter), standard deviations (SD), and coefficients of variation (CV) of benthic macroinvertebrates for all SFSJR mainstem sampling sites, are presented in Table CAWG 10-3.

There was a statistically significant difference in BMI densities among sites (p=0. 009). However, differences between pairs of sites were not statistically significantly different. Among the sites, Site 7 had the highest mean density value, and Site 2 had the lowest mean density value. Site 9, upstream of Florence Lake had the third lowest density. The standard deviations and coefficients of variation were high for most of the SFSJR mainstem sites, which indicates high variability between most replicate BMI densities.

5.2.1.3 Abundant Taxa

The abundant taxa in the SFSJR mainstem are represented by the taxa at each site contributing the six higher percentage densities at each site (Table CAWG 10-4). The most abundant taxa were Diptera (flies) of the Orthocladiinae and *Simulium sp*. at all sites except Site 7, downstream of the North Slide Creek confluence. Orthocladiinae are members of the family Chironomidae, which is the largest family of aquatic insects, consisting of more than 150 North American genera. *Simulium spp*. are members of the family Simuliidae, which is represented by two genera in western North American streams and rivers. Orthocladiinae are classified as collectors, while *Simulium spp*. are classified as filterers. The life cycle of chironomids can range from several generations per year to a two-year cycle in some northern species. Simulids usually have one life cycle per year, but some species have several. The CSBP considers these taxa to be moderately tolerant of disturbance or pollution, with moderate tolerance values of five and six, respectively. Simulids were the most abundant group in the SFSJR upstream of Florence Lake and the site immediately downstream. This also was the most abundant group at Site 5 and downstream to the confluence (Site 1).

A relatively abundant Trichoptera taxon was the genus *Hydroptila*. *Hydoptila* is a member of the family Hydroptilidae. *Hydroptila* has a moderate tolerance value of six and is classified as a scraper.

Other relatively abundant taxa were generally found at seven or fewer sites. Mayflies (*Baetis sp.*) and flies (Tanytarsini) were each found at seven of the sites on the SFSJR mainstem. These are members of the families Baetidae and Chironomidae, respectively. *Baetis sp*. is a gatherer and Tanytarsini are filterers. *Baetis sp*. has a moderate tolerance value of four, while Tanytarsini have a moderate tolerance of six (Harrington and Born 2000), both groups were found upstream of Florence Lake, as well as downstream. Increased percentage composition by Baetidae is considered to be an indication of disturbance.

5.2.1.4 Metrics

Table CAWG 10-5 displays the mean, standard deviation (SD), coefficient of variation (CV), and results of statistical testing for the CSBP metrics. For each metric, the results of ANOVA testing among sites are shown as the resulting probability (p) value. For each metric in which $p \leq 0.05$ (statistically significant), the row representing the metric has been highlighted. Where pairwise Bonferroni *post hoc* testing indicated a statistically significant difference between one or more pairs of sites, a darker shade of highlighting is shown. The results of this report are more clearly and efficiently presented in tables and figures. Therefore, the results of the metrics are not discussed in detail in the following text, except for the South Fork San Joaquin, as an example of how to interpret the Tables and Figures. After that, specific metrics are summarized when not statistically significantly different and discussed where differences between sites are statistically significant, or where additional information is necessary to put the results into context.

Taxa Richness: The calculated metric for each site for Taxa Richness ranged from 22.0 at Site 2 to 38.0 at Site 7. Statistically, these site metrics were significantly different ($p=0.02$). SFSJR Site 2 was lower in value and significantly different ($p=0.04$) from SFSJR Site 7 (Table CAWG 10-6). Lower values for this metric may indicate disturbance.

Ephemeroptera Taxa: The Ephemeroptera Taxa metric value was 6.7 upstream of Florence Lake and downstream ranged from 3.7 at Site 3 to 7.0 at Site 1. These site metrics were not significantly different ($p=0.22$).

Plecoptera Taxa: Plecoptera Taxa were 2.0 upstream of Florence Lake and downstream ranged from 1.0 at Site 2 to 4.7 at Site 7. These metrics were significantly different ($p=0.01$). SFSJR Site 2 was lower in value and significantly different ($p=0.05$) from SFSJR Site 4 and from SFSJR Site 7 ($p=0.02$) (Table CAWG 10-7). Lower values in this metric tend to indicate disturbance.

Trichoptera Taxa: Trichoptera Taxa were 5.0 upstream of Florence Lake and downstream ranged from 4.3 at Site 2, to 8.3 at Site 7, and were not significantly different ($p=0.06$).

EPT Taxa: EPT Taxa were 13.7 upstream of Florence Lake and downstream ranged from 9.3 at Site 2 to 19.0 at Site 7. These metrics were statistically significantly different ($p<0.0001$)[1].

EPT Index: The EPT Index was 23.5 upstream of Florence Lake and downstream ranged from a low of 17.1 at Site 2 to 60.0 at Site 6. These site metrics were different at a significant level ($p=0.0006$). Few of the sites were statistically significantly different, when compared on a site-by-site basis Table CAWG 10-8).

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[1] Due to unequal variances, site by site statistical tests were not conducted.

Sensitive EPT Index: The Sensitive EPT Index was 7.2 upstream of Florence Lake. Downstream, it ranged from 3.7 at Site 5 to 15.7 at Site 8. These site metrics were significantly different (p=0.0001). Lower values in this metric tend to indicate disturbance[1].

Shannon-Weaver Diversity Index: The Shannon-Weaver Diversity Index was 0.8 upstream of Florence Lake and downstream ranged from 0.5 at Site 2 to 1.2 at Site 7. These were significantly different ($p<0.0001$)[1]. Lower values in this metric tend to indicate disturbance.

Relative Diversity (Evenness): Evenness was 0.6 upstream of Florence Lake, and ranged from 0.4 at Site 2, to 0.8 at Site 7. These values were significantly different (p=0.0001)[1]. Lower values in this metric tend to indicate disturbance.

Tolerance Value: Tolerance Values were 5.0 upstream of Florence Lake and ranged from 4.6 at Site 1 to 5.5 at Sites 5 and 8. These metrics were statistically significantly different (p=0.01)[1]. Higher values in this metric tend to indicate disturbance.

Percent Intolerant Organisms: Percent Intolerant Organisms was 9.1 upstream of Florence Lake and ranged from 4.0 at Site 5 to 16.2 at Site 7. These metrics were statistically significantly different (p=0.001)[1]. Lower values in this metric tend to indicate disturbance.

Percent Tolerant Organisms: Percent Tolerant Organisms was 0.2 upstream of Florence Lake and downstream ranged from 0.2 at Sites 2 and 9 to 20.0 at Site 8. These site metrics were significantly different (p=0.0004). Table CAWG 10-9 indicates that SFSJR Site 9, upstream of Florence Lake was lower in value than Sites 8 and 7, downstream of the lake. Site 8 also was significantly different from the four sites at the lower end of the bypass reach and Site 7 was significantly different from two of those sites. Higher values are generally associated with disturbance.

Percent Hydropsychidae: Percent Hydropsychidae was 4.1 upstream of Florence Lake and downstream ranged from 0.3 at Site 8 to 21.2 at Site 1, and were not significantly different (p=0.30).

Percent Baetidae: Percent Baetidae was 5.9 upstream of Florence Lake and downstream ranged from 0.3 at Site 8 to 10.6 at Site 3 and were not significantly different (p=0.30).

Percent Dominant Taxa: Percent Dominant Taxa was 51.6 upstream of Florence Lake and downstream ranged from 25.8 at Site 7 to 74.4 at Site 2. These site metrics were significantly different (p=0.04). On a site by site comparison basis (Table CAWG 10-10), the metrics were not significantly different. Percent Dominant Taxa increases with disturbance.

Percent Collectors: The mean Functional Feeding Group percentages by site are shown in Figure CAWG 10-1. Percent Collectors was 42.6 upstream of Florence Lake and downstream ranged from 12.0 at Site 2 to 55.2 at Site 1, and were not significantly different (p=0.12).

Percent Filterers: Percent Filterers was 43.7 upstream of Florence Lake and downstream ranged from 6.9 at Site 7 to 80.3 at Site 2. These site metrics were significantly different (p<0.0001) [1]. Higher values in this metric tend to indicate disturbance.

Percent Scrapers: Percent Scrapers was 8.9 upstream of Florence Lake and downstream ranged from 2.7 at Site 8 to 42.9 at Site 6, among sampling sites. These site metrics were different at a significant level (p<0.0001). On a site by site basis (Table CAWG 10-11), SFSJR Site 9, upstream of Florence Lake was significantly different from SFSJR Sites 6 and 7. Site 6, additionally, was significantly different from downstream Sites 1 through 4 and upstream Site 8. Site 7 also was significantly different from Sites 2, 3, and 8. Values of this metric have a variable response to disturbance.

Percent Predators: Percent Predators was 3.7 upstream of Florence Lake and downstream ranged from 2.7 at Site 3 to 17.6 at Site 7. These metrics were significantly different (p<0.0001). SFSJR Site 7, downstream of the North Slide Creek confluence, was higher in value and significantly different (Table CAWG 10-12) from all other sites other than Site 8 (near Jackass Meadow). Values of this metric have a variable response to disturbance.

Percent Shredders: Percent Shredders was 1.2 upstream of Florence Lake and downstream ranged from 0.3 at Site 2 to 14.3 at Site 8, among sampling sites. These metrics were significantly different (p<0.0001). SFSJR Site 9, upstream of Florence Lake, had a lower value and was statistically significantly different (Table CAWG 10-13) from Sites 8 through 6, downstream of the lake. Sites 6 through 8 also had higher values and were significantly different from most of the sites downstream of the sites. A decrease in Percent Shredders may indicate increased disturbance.

5.2.1.5 Cluster Analysis

A Dendrogram (cluster diagram) of SFSJR sites based on physical/habitat quality scores is presented in Figure CAWG 10-2. The Dendrogram shows that the physical/habitat quality scores formed two groups of relatively similar sites. The first group consisted of SFSJR Sites 1, 3, 6, 7, and 8. The second group consisted of SFSJR Sites 2, 4, 5, and 9. In interpreting this dendrogram, it should be noted that there was a high degree of similarity between sites. The largest dissimilarity value was 0.265 (at the point that the two groupings joined) which is a relatively low dissimilarity value.

Clusters of SFSJR sampling sites based on BMI Taxa at the family-level are presented in Figure CAWG 10-3. The dendrogram shows that the SFSJR sampling sites were resolved into two principal clusters at a relatively high level of dissimilarity. One cluster consisted of the sites near Florence Lake (Site 9 (upstream of Florence Lake), Site 7, Site 6, and Site 5). However, the dendrogram indicates that there were differences in taxonomic makeup between sites in these upper SFSJR sites, with Site 9 differing the most from the remainder of the cluster. The second group consisted of the lower SFSJR sampling sites (Sites 1, 2, 3, and 4). Similar to the upper SFSJR sites, the dendrogram indicates that there also were differences in between the lower SFSJR sites.

SFSJR Site 8, the first site downstream of Florence Lake, was least similar to the other sites. This site was the only site that was not in a Rosgen Level I B channel. This segment of the SFSJR was identified as Rosgen Level I C/B type channel.

5.2.1.6 Mollusk Survey

Mollusk surveys were performed at each of the SFSJR fish sampling sites (Maps CAWG 10-9 through 10-11). These included each of the major Rosgen Level I channel types within each stream. No mollusks were observed in the SFSJR during this survey. Some members of the phylum Mollusca were collected during BMI collections for the CSBP. The mollusk taxa collected were bivalves of the family Sphaeridae, which are small clams, sometimes called fingernail clams. They were identified in the BMI samples collected at Sites 8, 7, 6, 5, and 4, with most of the clams found at Sites 8 and 7 (Appendix E), the sites closest to Florence Dam.

5.2.2 South Fork San Joaquin River Tributaries

These tributaries, from upstream to downstream were Tombstone, South Slide, North Slide, Hooper, Crater, Bear, Chinquapin, Camp 62, Bolsillo, and Mono Creeks. Sampling sites are shown in Maps CAWG 10-1 and 10-3. These tributaries were affected by the low flows that occurred during 2002, which affected areas and habitats available for sampling.

5.2.2.1 Tombstone Creek

Physical Habitat

Tombstone Creek Diversion is not currently operated. Sites in the creek were sampled in Rosgen Level I Aa+ channel types. Physical/habitat quality parameter score totals ranged from 145 to 167 out of a potential range of zero to 200 for the three sampling sites (Table CAWG 10-14). Based on categories developed by Harrington and Born (2000), Site BD 1, furthest site downstream of the diversion, would fall into the optimal range, Site AD, above the diversion, and Site BD 2, below the diversion, would fall into the suboptimal range.

Abundance

Table CAWG 10-15 indicates that Site BD 1 had the highest mean density value (8,393) and Site BD 2 had the lowest mean density value (1,883), although there was only one replicate sample available at this site. There were limited amounts of wetted area in Tombstone Creek, therefore, the areas available to sample were sparse. There were limited areas to sample in appropriate habitats at Sites AD and BD2, above and downstream of the diversion, respectively. There was no significant difference in BMI density among Tombstone Creek sampling sites (p=0.46).

Abundant Taxa

Table CAWG 10-16 indicates that the most abundant taxa for the Tombstone Creek sampling sites were Diptera of the Orthocladiinae group. Orthocladiinae is member of the family Chironomidae. Orthocladiinae are classified as collectors and have a moderate tolerance classification of five.

There were three taxa that were relatively abundant. These were Tanytarsini of the order Diptera, and *Ironodes sp*. and *Serratella sp.* of the order Ephemeroptera. Tanytarsini are classified as filterers and have a moderate tolerance value of six. *Ironodes sp*. is a member of the family Heptageniidae and *Serratella sp*. is a member of the family Ephemerellidae. *Ironodes sp*. is classified as a scraper and has a moderate tolerance value of four and *Serratella sp*. is classified as a collector and is intolerant of habitat disturbance with a tolerance value of two.

Metrics

Table CAWG 10-17 presents the CSBP metrics for Tombstone Creek. The mean Functional Feeding Group percentages by site are shown summarized in Figure CAWG 10-4.

Metrics for Taxa Richness, Ephemeroptera Taxa, Plecoptera Taxa, Trichoptera Taxa, EPT Taxa, Shannon-Weaver Diversity Index, Relative Diversity, Tolerance, Value, Percent Hydropsychidae, Percent Baetidae, Percent Dominant Taxa, Percent Filterers, Percent Predators, and Percent Shredders were not statistically significantly different among sites. In general, numerical differences were small, as well. Results for metrics in which statistically significant differences occurred among sites are discussed below.

EPT Index: The EPT Index ranged from 57.5 at Site AD to 27.2 at Site BD 1. These metrics were significantly different among sites (p=0.05). Individual locations were not significantly different based on pairwise comparisons (Table CAWG 10-18).

Sensitive EPT Index: The Sensitive EPT Index ranged from 25.3 at Site AD, 42.1 at Site BD 2, and 22.5 at Site BD 1. These metrics were significantly different among sites (p=0.05). Pairwise comparisons were not significantly different (Table CAWG 10-19). Lower values of this metric tend to indicate disturbance.

Percent Intolerant Organisms: Percent Intolerant Organisms was 25.7 at Site AD, 23.0 at Site BD 1, and 42.1 at Site BD 2. These site metrics were significantly different (p=0.05). On a site by site basis, the metrics were not significantly different (Table CAWG 10-20).

Percent Tolerant Organisms: Percent Tolerant Organisms ranged from 2.6 at Site AD to 7.0 at Site BD 2, and were significantly different (p=0.005). Site BD 2 was higher in value and significantly different from Site AD (p=0.01) and Site BD 1 (p=0.008) (Table CAWG 10-21).

Percent Collectors: Percent Collectors ranged from 28.7 at Site AD to 56.7 at Site BD 1, and were significantly different (p=0.04). On a site by site basis, the metrics were not significantly different (Table CAWG 10-22). Percent collectors tend to increase in response to disturbance.

Percent Scrapers: Percent Scrapers ranged from 30.3 at Site AD to 7.6 at Site BD 1, and were different at p=0.05. Site-by-site comparisons (Table CAWG 10-23) indicated no significant difference. This metric may have variable responses to disturbance.

Cluster Analysis

Figure CAWG 10-5 shows that the physical/habitat quality scores were similar (low dissimilarity) for the three sites in Tombstone Creek. Sites BD 1, and BD 2 were more similar to each other than Site AD.

Figure CAWG 10-6 presents the dendrogram for BMI taxa for the Project sampling sites. The three sites were relatively dissimilar. Site AD and Site BD 2 were more similar to each other than Site BD 1.

Mollusk Survey

No mollusks were observed during visual surveys (Maps CAWG 10-9 and 10-11). The bivalves Sphaeridae, and *Pisidium sp.* (small clams sometimes called fingernail clams) were collected. Sphaeridae were identified in the BMI samples collected at Site AD and Site BD 1; *Pisidium sp.* was identified in the samples collected at Site BD 1 (no mollusk was collected at Site BD 2) (Appendix E).

5.2.2.2 South Slide Creek

Physical Habitat

South Slide Creek Diversion is not currently operated. Samples were collected from Rosgen Level I Aa+ channel types above and below the diversion. There was little flow present at the time of sampling and consequently wetted areas and available habitats for sampling were limited. Physical/habitat quality parameter score totals were 165 above the diversion (Site AD) and 128 below the diversion (Site BD 2) (Table CAWG 10-14). Based on categories developed by Harrington and Born (2000), South Slide Creek Site AD would fall into the optimal range, and Site BD 2 would fall into the suboptimal range.

Abundance

In South Slide Creek, Site AD had the higher mean BMI density value (3,047) and Site 2 had the lower (2,119). The difference between the sampling sites was not significant (p=0.47).

Abundant Taxa

The most abundant taxon for the South Slide Creek sampling sites (Table CAWG 10-16) was Diptera of the Orthocladiinae group. Orthoclads, in fact, were among the abundant taxa for all of the SFSJR tributaries.

There were three taxa groups that were relatively abundant. These were *Ironodes sp.* of the order Ephemeroptera, Tanytarsini of the order Diptera, and *Zapada sp.* of the order Plecoptera.

Metrics

Table CAWG 10-24 presents the CSBP metrics. The mean Functional Feeding Group percentages by site are shown in Figure CAWG 10-7. The following metrics were not statistically significantly different among South Slide Creek sites: Taxa Richness, Ephemeroptera Taxa, Plecoptera Taxa, Trichoptera Taxa, EPT Taxa, EPT Index, Sensitive EPT Index, Relative Diversity (Evenness), Tolerance Value, Percent Intolerant Organisms, Percent Tolerant Organisms, Percent Hydropsychidae, Percent Dominant Taxa, Percent Collectors, Percent Filterers, Percent Scrapers, and Percent Shredders. There were three metrics with statistically significant differences among sites; these are discussed in the following section.

Shannon-Weaver Diversity Index: The Shannon-Weaver Diversity Index was 1.1 at Site AD and 0.9 at Site BD 2. These site metrics were significantly different (p=0.05). Decreased diversity is an indicator of increased disturbance.

Percent Baetidae: Values were 0.1 at Site AD and 2.7 at Site BD 2. These metrics were statistically significantly different (p=0.0006).

Percent Predators: Percent Predators was 21.7 at Site AD and 11.9 at Site BD 2, and were different at a significant level (p=0.02). Percent Predators may have a variable response to disturbance.

Cluster Analysis

There were only two sampling sites in South Slide Creek. Cluster analysis is only useful for visualizing information from streams with more than two sampling sites.

Mollusk Survey

No mollusks were observed during the visual survey or collected in South Slide Creek (Appendix E).

5.2.2.3 North Slide Creek

Physical Habitat

North Slide Creek Diversion is not currently operated. There was limited flow present at the time of sampling, particularly downstream of the diversion. Consequently, wetted areas and available habitats for sampling were limited. Samples were collected from Rosgen Level I Aa+ channel types above and below the diversion. Physical/habitat quality parameter score totals were 168 at Site AD, and 124 and 129 at Sites BD 2 and BD 1, respectively (Table CAWG 10-14). Site AD would fall into the optimal range, Sites BD 2 and BD 1 would fall into the suboptimal range (Harrington and Born 2000).

Abundance

As indicated in Table CAWG 10-15, Site AD had the highest mean density value (4,827), Site BD 2 had the lowest mean density value (299), and Site BD 1 was intermediate (3,108). Densities were not significantly different (p=0.56). The standard deviations and coefficients of variation were high for Site AD and Site 2 (the SD and CV could not be calculated for Site 1 due to lack of appropriate wetted habitat from which to collect replicate samples).

Abundant Taxa

Table CAWG 10-16 shows that the most abundant taxa for North Slide Creek were Diptera of the Orthocladiinae group, primarily at Sites AD and BD 1. The dipteran Tanytarsini was also highly abundant with greater abundances downstream. The plecopteran *Zapada sp.* was relatively abundant at Sites AD and BD 1, as well.

Metrics

Table CAWG 10-25 presents the CSBP metrics. The mean Functional Feeding Group percentages by site are shown in Figure CAWG 10-8. The following metrics were not statistically significantly different among North Slide Creek sites: Ephemeroptera Taxa, Plecoptera Taxa, EPT Index, Percent Hydropsychidae, Percent Baetidae, Percent Filterers, Percent Scrapers, and Percent Predators. There were differences in mean metric values for several of these metrics. Metrics with statistically significant differences among North Slide Creek sites are detailed in the following section.

Taxa Richness: Taxa Richness ranged from 41.7 at Site AD to 20.0 at Site BD 2. These metrics were statistically significantly different (p=0.03). Site BD 2 was lower in value and significantly different from Site AD (p=0.03) (Table CAWG 10-26).

Trichoptera Taxa: Trichoptera Taxa ranged from 6.3 at Site AD to 2.5 at Site BD 2. The site metrics were significantly different (p=0.02). Site BD 2 was lower in value and significantly different (p=0.02) from Site AD (Table CAWG 10-27). The number of caddisfly taxa tends to decrease in response to disturbance.

EPT Taxa: EPT Taxa ranged from 19.7 at Site AD to 7.0 at Site BD 2. These metric values were significantly different (p=0.015). Site BD 2 was lower in value and significantly different (p=0.02) from Site AD (Table CAWG 10-28). Disturbance is indicated by lower EPT Taxa values.

Sensitive EPT Index: The Sensitive EPT Index ranged from 23.5 at Site AD to 3.0 at Site BD 2. Metric values were significantly different (p=0.05) among sites. On a site by site basis, the sites were not significantly different (Table CAWG 10-29).

Shannon-Weaver Diversity Index: The Shannon-Weaver Diversity Index ranged from 1.3 at Site AD to 0.9 at Sites BD 1, and BD 2. These metrics were significantly different (p=0.0006). Site AD was higher in value and significantly different from Sites BD 1 (p= 0.002) and BD 2 (p=0.001) (Table CAWG 10-30). Decreased diversity is generally used as an indicator of increased disturbance.

Relative Diversity (Evenness): Evenness ranged from 0.8 at Site AD to 0.6 at Site BD 1, and were different at a significant level (p=0.04). Site by site differences were not significantly different (Table CAWG 10-31).

Tolerance Value: Tolerance Values ranged from 4.4 at Site AD to 6.6 at Site BD 2, and were significantly different (p=0.03). Table CAWG 10-32 indicates that Site BD 2 was significantly different (p=0.04) from Site AD. Higher values are generally associated with disturbance.

Percent Intolerant Organisms: Percent Intolerant Organisms ranged from 25.2 at Site AD to 3.8 at Site BD 2. These metrics were significantly different (p=0.05). Table CAWG 10-33 indicates that the individual site by site comparisons were not significantly different at p≤0.05.

Percent Tolerant Organisms: Percent Tolerant Organisms was 8.5 at Site AD, 2.5 at Site BD 1, and 38.3 at Site BD 2. These metrics were significantly different (p=0.02). Table CAWG 10-34 indicates that the lower value at Site BD 2 was significantly different from Site AD (p=0.03) and Site BD 1 (p=0.04). Higher values are generally associated with disturbance.

Percent Dominant Taxa: Percent Dominant Taxa ranged from 21.9 at Site AD to 36.9 at Site BD 1, and were significantly different (p=0.01). Table CAWG 10-35 indicated that the higher value at Site BD 1 was significantly different from Site AD (p=0.01). Site BD 2 also was higher in value and significantly different from Site AD (p=0.04). An increase in this value generally indicates disturbance.

Percent Collectors: Percent Collectors ranged from 43.1 at Site AD to 73.5 at Site BD 2, and were significantly different (p=0.02). Table CAWG 10-36 indicated that the higher value at Site BD 2 was significantly different (p=0.02) from Site AD. Percent collectors tend to increase in response to disturbance.

Percent Shredders: Percent Shredders ranged from 16.1 at Site AD to 0.0 at Site BD 2, and were statistically significantly different (p=0.0012). Table CAWG 10-37 indicated that Site BD 2 (lower in value) was significantly different from Site AD (p=0.002) and Site BD 1 (p=0.005). A decrease in Percent Shredders may indicate increased disturbance.

Cluster Analysis

Figure CAWG 10-9 shows that the physical/habitat quality scores were similar for the three sites in North Slide Creek. Among sampling sites, Sites BD 1 and BD 2 were more similar to each other than Site AD.

Figure CAWG 10-10 indicates that the BMI communities at the sampling sites were relatively dissimilar and that Site AD and Site BD 1 were more similar to each other than Site BD 2.

Mollusk Survey

No mollusks were observed during visual surveys, but Mollusca were collected during the conduct of the CSBP. The mollusk taxa collected were the bivalves Sphaeridae, and *Pisidium sp*. Sphaeridae was identified in the BMI samples collected at all three North Slide Creek sites, and *Pisidium sp.* was identified in the samples collected at Site AD (Appendix E).

5.2.2.4 Hooper Creek

Physical Habitat

Hooper Creek was sampled at three sites, all three sites were located within Rosgen Level I type Aa+ channel. Hooper Creek Diversion was operated from April through October 8, 2002; and therefore, was in operation during BMI sampling. Only two units of riffle habitat were present in the study reach upstream of the diversion, both were sampled resulting in two replicates. Physical/habitat quality parameter score totals were 133 at Site AD, 168 at Site BD 2 below the diversion and 141 at Site BD 1 (Table CAWG 10-14). Site BD 2 would fall into the optimal range, the other two sites (Site AD and Site 1) would fall into the suboptimal range (Harrington and Born 2000).

Abundance

Among the Hooper Creek sampling sites (Table CAWG 10-15), Site AD had the highest mean density value (3,120) and Site BD 1 had the lowest mean density value (1,012). There was no statistically significant difference in BMI densities among Hooper Creek sampling sites (p=0.29).

Abundant Taxa

The most abundant taxa for the Hooper Creek sampling sites were Diptera of the Orthocladiinae and the Tanytarsini groups (Table CAWG 10-16). The plecopteran *Zapada sp.* also was an abundant taxon at all three sites.

The ephemeropterans *Baetis sp.* and *Drunella sp*. were relatively abundant. *Baetis sp.* is a member of the family Baetidae. *Baetis sp.,* which were collected from Sites BD 1 and 2, are classified as collectors and have a moderate tolerance value (they have been designated a tolerance value of four). *Drunella sp., which was collected from Sites AD and BD 1,* is a member of the family Ephemerellidae. *Drunella sp.* are classified as scrapers and are intolerant of habitat disturbance (they have been designated with a tolerance value of zero).

Metrics

The CSBP metrics are presented in Table CAWG 10-38. The mean Functional Feeding Group percentages by site are shown in Figure CAWG 10-11. The following metrics were not statistically significantly different among Hooper Creek sites: Taxa Richness, Ephemeroptera Taxa, Plecoptera Taxa, Trichoptera Taxa, EPT Taxa, EPT Index, Sensitive EPT Index, Shannon-Weaver Diversity Index, Relative Diversity (Evenness), Tolerance Value, Percent Intolerant Organisms, Percent Tolerant Organisms, Percent Hydropsychidae, Percent Baetidae, Percent Dominant Taxa, Percent Collectors, Percent Filterers, and Percent Scrapers. Many of the numerical differences among sites for these metrics were relatively small. There were only two metrics with statistically significant differences among Hooper Creek sites; these are discussed in the following sections.

Percent Predators: Percent Predators ranged from 19.8 at Site AD to 10.5 at Site BD 1 and were statistically significantly different (p=0.04). On a site by site basis (Table CAWG 10-39), the metrics were not significantly different.

Percent Shredders: Percent Shredders ranged from 5.5 at Site AD to 17.5 at Site BD 1. These site metrics were statistically significantly different (p=0.05). As indicated in Table CAWG 10-40, there was no significant difference on a site by site basis.

Cluster Analysis

Dendrograms (clusters) of Project sites, based on physical/habitat quality scores, are presented in Figure CAWG 10-12. The dendrogram shows that the physical/habitat quality scores were similar for the three sites in Hooper Creek. Among sampling sites, Site AD and Site BD 1 were more similar to each other than Site BD 2.

Clusters of Project sites based on BMI taxa at the family-level are presented in Figure CAWG 10-13. The dendrogram shows that the BMI taxa for the Project sampling sites were relatively dissimilar. Sites BD 2 and BD 1 were less dissimilar to each other than Site AD.

Mollusk Survey

No mollusks were observed (Maps CAWG 10-9 and 10-11) during the visual survey. No member of the phylum Mollusca was collected as part of the CSBP survey in Hooper Creek (Appendix E).

5.2.2.5 Crater Creek

Physical Habitat

One run was sampled at the site above (AD) and three below the diversion (BD 3), respectively. Both sites were located in Rosgen Level I type Aa+ channel. A riffle downstream of the diversion in the vicinity of one of the sampled runs also was sampled and included with data from Site BD 3. Diversion operations in Crater Creek ceased on July 16, 2002, and so no flow was being diverted at the time of sampling. There was little flow present at the time of sampling. Physical/habitat quality parameter score totals were 99 at Site AD and 112 at Site BD 3 (Table CAWG 10-14). Based on categories developed by Harrington and Born (2000), Crater Creek Site BD 3 would fall into the suboptimal range, and Crater Creek Site AD would fall into the marginal range.

Abundance

As shown in Table CAWG 10-15, Site AD had the higher mean density value (11,797 BMI/m^2) and Site BM 3 the lower (5,989 BMI/m^2), although there was only one replicate sample available at the AD site due to a very small suitable wetted area. There was no statistically significant difference in BMI densities (p=0.57).

Abundant Taxa

Table CAWG 10-16 shows that the most abundant taxa for the Crater Creek sampling sites were Diptera of the Orthocladiinae and the Tanytarsini groups. The dipteran Tanypodinae, the plecopteran *Zapada sp.*, and the ephemeropteran *Serratella sp.* were relatively abundant. *Zapada sp*. and *Serratella sp*. have been discussed previously. The dipteran Tanypodinae is a member of the family Chironomidae. Tanypodinae are classified as predators and are moderately tolerant of habitat disturbance (they have been designated a tolerance value of six).

Metrics

Table CAWG 10-41 the CSBP metrics. The mean Functional Feeding Group percentages by site are shown in Figure CAWG 10-14. The following metrics were not statistically significantly different among Crater Creek sites: Taxa Richness, Ephemeroptera Taxa, Plecoptera Taxa, Trichoptera Taxa, EPT Taxa, EPT Index, Sensitive EPT Index, Shannon-Weaver Diversity Index, Relative Diversity (Evenness), Tolerance Value, Percent Intolerant Organisms, Percent Tolerant Organisms, Percent Hydropsychidae, Percent Baetidae, Percent Dominant Taxa, Percent Collectors, Percent Filterers, Percent Scrapers, and Percent Predators. Percent Shredders was the only biological metric that was statistically significantly different among Hooper Creek sites. This metric is discussed below.

Percent Shredders: Percent Shredders was 6.6 at Site AD and 11.7 at Site BD 3. These site metrics were statistically significantly different ($p=0.0000$). A decrease in Percent Shredders may indicate increased disturbance.

Cluster Analysis

There were only two sampling sites in Crater Creek. Cluster analysis is only useful on streams with more than two sampling sites.

Mollusk Survey

No mollusks were observed during the visual survey (Maps CAWG 10-9 and 10-11). No members of the phylum Mollusca were collected in Crater Creek (Appendix E).

5.2.2.6 Bear Creek

Physical Habitat

One site was sampled above the diversion and two sites below the diversion in Bear Creek. Riffles were sampled in all locations. The site above the diversion was located in a Rosgen Level I B channel type. Below the diversion, the channel consisted of Rosgen Level I A channel type with B inclusions. The diversion was in operation throughout the summer of 2002, including the sampling period. Physical/habitat quality parameter score totals 169 at Site AD and 154 and 142 at Sites BD 2 and BD 1, respectively (Table CAWG 10-14). Based on categories developed by Harrington and Born (2000), Bear Creek Site AD and Site BD 2 would fall into the optimal range, and Site BD 1 would fall into the suboptimal range.

Abundance

As presented in Table CAWG 10-15, Site AD had a density of 3,185 BMI/m², Site BD 2 had the lowest density in this stream, 2,139 BMI/m², and Site BD 1 had the highest density, 3,345 BMI/m². There was no significant difference in BMI density among Bear Creek sampling sites ($p=0.66$).

Abundant Taxa

Table CAWG 10-16 shows that the most abundant taxa for the Bear Creek sites were Diptera of the Orthocladiinae group. The dipteran *Simulium sp.* and the trichopteran *Hydropsyche sp.* were relatively abundant. *Simulium sp.* are members of the family Simuliidae. *Simulium sp.* are classified as filterers and have a moderate tolerance value (value of six). *Hydropsyche sp*. is a member of the family Hydropsychidae. *Hydropsyche sp*. also are classified as filterers and have a moderate tolerance value (value of four).

Metrics

Table CAWG 10-42 displays the CSBP metrics. The mean Functional Feeding Group percentages by site are shown in Figure CAWG 10-15. The following metrics were not statistically significantly different among Bear Creek sites: Trichoptera Taxa, EPT Index, Shannon-Weaver Diversity Index, Relative Diversity (Evenness), Percent Baetidae, Percent Dominant Taxa, Percent Scrapers, and Percent Shredders. There were varying numerical differences in some of the mean metric values for these non-statistically significant metrics. Metrics with statistically significant differences among Bear Creek sites are discussed in the following sections.

Taxa Richness: Taxa Richness ranged from 40.0 at Site AD to 27.0 Site BD 1. These site values were statistically significantly different (p=0.02). Site BD 1 was lower in value and significantly different (p=0.04) from Site AD (Table CAWG 10-43).

Ephemeroptera Taxa: Ephemeroptera Taxa ranged from 10.0 at Site AD to 5.0 at Site BD 1. These metrics were significantly different (p=0.001). Site AD was higher in value and significantly different from Site BD 1 (p=0.001) and Site BD 2 (p=0.01) (Table CAWG 10-44).

Plecoptera Taxa: Plecoptera Taxa ranged from 7.0 at Site AD to 2.0 at Site BD 1 and were significantly different (p=0.05). There was no significant difference in comparisons between individual sites (Table CAWG 10-45)

EPT Taxa: EPT Taxa ranged from 24.0 at Site AD to 13.7 at Site BD 1. These values were statistically significantly different (p=0.003). Site AD was higher in value and significantly different from Sites BD 1 (p=0.003) and BD 2 (p=0.02) (Table CAWG 10-46).

Sensitive EPT Index: The Sensitive EPT Index ranged from 33.4 at Site AD to 6.3 at Site BD 1 and were significantly different (p=0.02). Site BD 1 was lower in value and significantly different from Site AD (p=0.02) (Table CAWG 10-47).

Tolerance Value: Tolerance Values ranged from 3.4 at Site AD to 5.6 at Site BD 1 and were significantly different (p=0.01). Site AD was lower in value and significantly different from Site BD 1 (p=0.01) (Table CAWG 10-48).

Percent Intolerant Organisms: Percent Intolerant Organisms ranged from 33.6 at Site AD to 8.5 at Site BD 1. These site metrics were significantly different (p=0.03). Site BD 1 was lower in value and significantly different from Site AD (p=0.03) (Table CAWG 10-49).

Percent Tolerant Organisms: Percent Tolerant Organisms was 3.7 at Site AD, 0.4 at Site BD 2, and 23.1 at Site BD 1. These metrics were statistically significantly different (p=0.002). Site BD 1 was higher in value and significantly different from Site BD 2 (p=0.004) and Site AD (p=0.008) (Table CAWG 10-50).

Percent Hydropsychidae: Percent Hydropsychidae ranged from 16.8 at Site AD to 2.0 at Site BD 1 and were significantly different (p=0.02). Site BD 1 was lower in value and significantly different from Site AD (p=0.02) (Table CAWG 10-51).

Percent Collectors: Percent Collectors was 44.7 at Site AD, 33.5 at Site BD 2, and 59.1 at Site BD 1. These metrics were statistically significantly different (p=0.01). Site BD 2 was lower in value and significantly different from Site BD 1 (p=0.01) (Table CAWG 10-52).

Percent Filterers: Percent Filterers was 16.9 at Site AD, 44.9 at Site BD 2, and 14.5 at Site BD 1. These metrics were significantly different (p=0.02). Site BD 2 was higher in value and significantly different from Sites AD (p=0.05) and BD 1 (p=0.03) (Table CAWG 10-53).

Percent Predators: Percent Predators ranged from 14.5 at Site AD to 4.6 at Site BD 2 and were significantly different (p=0.03). Site BD 2 was lower in value and significantly different from Site AD (p=0.05). Site AD was higher in value and significantly different from Site BD 1 (p=0.05) (Table CAWG 10-54).

Cluster Analysis

Figure CAWG 10-16 presents the dendrogram of the physical/habitat quality scores, which were relatively similar for all three sites. Among sampling sites, Site AD and Site BD 2 were more similar to each other than Site 1.

The dendrogram in Figure CAWG 10-17 shows that the BMI taxa were relatively dissimilar between sites. Sites BD 2 and BD 1 were more similar to each other than Site AD.

Mollusk Survey

No mollusks were observed during the visual survey (Maps CAWG 10-9 and 10-11). One member of the phylum Mollusca was collected during BMI sampling. The mollusk taxon was the bivalve Sphaeridae (Appendix E) at Site BD 2.

5.2.2.7 Chinquapin Creek

Physical Habitat

One site was sampled upstream of the Chinquapin Diversion and two sites were sampled downstream of the diversion. All three sites were located in Rosgen Level I Aa+ type channel. Chinquapin Diversion was in operation from early April through July 9, 2002, therefore no diversion of flow took place during CSBP sampling. Step pool habitat was the only habitat type found in the reach upstream of the diversion. Few riffles were present downstream of the diversion. Spot sampling in "riffle-like" portions of step pools was used upstream of the diversion. Relatively little flow was present in the creek. Physical/habitat quality parameter scores were 140 at Site AD and 113 at both Sites BD 2 and BD 1 (Table CAWG 10-14). All three of the Chinquapin Creek sampling sites would fall into the suboptimal range (Harrington and Born 2000).

Abundance

Table CAWG 10-15 shows that Site AD had a BMI density of 4,204 BMI/m², Site BD 1 had the highest mean density (9,731), and Site BD 2 had the lowest (1,463). There was a statistically significant difference in BMI density among the sampling sites (p=0.02). Site BD 1 had greater mean density and was significantly different (p=0.02) from Site BD 2.

Abundant Taxa

Table CAWG 10-16 indicates that the most abundant taxa were Diptera of the Orthocladiinae group. The dipteran Tanytarsini and the plecopteran *Zapada sp.* also were highly abundant.

Metrics

Table CAWG 10-55 presents the CSBP metrics. The mean Functional Feeding Group percentages by site are shown in Figure CAWG 10-18. The following metrics were not statistically significantly different among Chinquapin Creek sites: Taxa Richness, Ephemeroptera Taxa, Plecoptera Taxa, Trichoptera Taxa, EPT Taxa, Percent Tolerant Organisms, Percent Hydropsychidae, Percent Baetidae, Percent Dominant Taxa, Percent Filterers, Percent Scrapers, and Percent Predators. There were varying levels of numerical differences in the mean metric values for these non-statistically significant metrics. Metrics with statistically significant differences among Chinquapin Creek sites are discussed in the following sections.

EPT Index: EPT Index values ranged from 48.9 at Site AD to 7.7 at Site BD 1. These site metrics were significantly different (p=0.01). Site BD 1 was lower in value and significantly different from Site AD (p=0.01) and Site BD 2 (p=0.02) (Table CAWG 10-56).

Sensitive EPT Index: The Sensitive EPT Index ranged from 39.4 at Site AD to 5.6 at Site BD 1. These metrics were significantly different (p=0.04). On a site by site basis, these site metrics were not significantly different (Table CAWG 10-57).

Shannon-Weaver Diversity Index: The Shannon-Weaver Diversity Index ranged from 1.2 at Site AD to 0.7 at Site BD 1 and were significantly different (p=0.03). Site BD 1 was lower in value and significantly different from Site AD (p=0.05) (Table CAWG 10-58).

Relative Diversity (Evenness): Evenness values ranged from 0.8 at Site AD to 0.5 at Site BD 1 and were significantly different (p=0.02). Site BD 1 was lower in value and significantly different from Site AD (p=0.03) (Table CAWG 10-59).

Tolerance Value: Tolerance Values ranged from 3.6 at Sites AD and BD 2 to 5.1 at Site BD 1 and were different at a significant level (p=0.009). Site BD 1 was greater in value and significantly different from Site AD (p=0.01) and Site BD 2 (p=0.02) (Table CAWG 10-60).

Percent Intolerant Organisms: Percent Intolerant Organisms was 41.1 at Site AD, 41.9 at Site BD 2, and 8.6 at Site BD 1 and these were significantly different (p=0.04). On a site by site basis, these values were not significantly different (Table CAWG 10-61).

Percent Collectors: Percent Collectors ranged from 48.6 at Site AD to 87.0 at Site BD 1 and were significantly different (p=0.01). Site BD 1 was greater in value and significantly different from Site AD (p=0.02) and Site BD 2 (p=0.03) (Table CAWG 10-62).

Percent Shredders: Percent Shredders were 17.6 at Site AD, 21.9 at Site BD 2, and 2.7 at Site BD 1. These site metrics were significantly different (p=0.002). Site BD 1 was lower in value and significantly different from Site AD (p=0.004) and Site BD 2 (p=0.003) (Table CAWG 10-63).

Cluster Analysis

In Figure CAWG 10-19, the dendrogram shows that the physical/habitat quality scores were similar for the three sites in Chinquapin Creek. Among sampling sites, Sites BD 1 and BD 2 were more similar to each other than Site AD.

In Figure CAWG 10-20, the dendrogram shows that the BMI communities at the sampling sites were relatively dissimilar. Site AD and Site BD 2 (the closest site downstream of the diversion) were more similar to each other than to Site BD 1.

Mollusk Survey

No mollusks were observed during the visual survey (Maps CAWG 10-9 and 10-11). One mollusk taxon was collected among CSBP samples at Site BD 1. This was the bivalve *Pisidium sp.* (Appendix E).

5.2.2.8 Camp 62 Creek

Physical Habitat

One site was sampled above the diversion and two sites below the diversion in Camp 62 Creek. All three sites were riffles located in Rosgen Level I Aa+ type channels. Camp 62 Diversion was operated from April 11 until July 21, 2002. No flow was diverted when the CSBP sampling was carried out. Flow was low at the time of sampling. Physical/habitat quality parameter score totals were 127 at Site AD, 128 at Site BD 2 (below the diversion), and 158 at Site BD 1 (downstream end of the bypass reach) (Table CAWG 10-14). Camp 62 Site BD 1 would fall into the optimal range, and

Sites AD and BD 2 would fall into the suboptimal range (Harrington and Born 2000). Only one riffle was in the downstream of the diversion and in its immediate vicinity. This was sampled as Site BD 2.

Abundance

Table CAWG 10-15 presents BMI density information for Camp 62 Creek. Site BD 1 had the highest mean density value (2,736 BMI/m²) and Site AD had the lowest (1,567). There was no statistically significant difference in BMI density among the sampling sites (p=0.40).

Abundant Taxa

Table CAWG 10-16 present the abundant insect taxa at each site in the SFSJR tributaries. The most abundant taxa for the Camp 62 Creek sampling sites were dipterans of the Orthocladiinae and Tanytarsini groups and the plecopteran *Zapada sp*.

Metrics

Table CAWG 10-64 presents the mean, standard deviation (SD), coefficient of variation (CV), and results of statistical testing for the CSBP metrics. The mean Functional Feeding Group percentages by site are shown in Figure CAWG 10-21. The following metrics were not statistically significantly different among Camp 62 Creek sites: Taxa Richness, Ephemeroptera Taxa, Plecoptera Taxa, EPT Taxa, EPT Index, Sensitive EPT Index, Shannon-Weaver Diversity Index, Relative Diversity (Evenness), Tolerance Value, Percent Intolerant Organisms, Percent Tolerant Organisms, Percent Baetidae, Percent Dominant Taxa, Percent Collectors, Percent Filterers, Percent Scrapers, Percent Predators, and Percent Shredders. There were two metrics with statistically significant differences among Camp 62 Creek sites; these are discussed below.

Trichoptera Taxa: Trichoptera Taxa ranged from 5.0 at Site AD to 11.3 at Site BD 1. These site metrics were significantly different (p=0.009). Site AD was lower in value and significantly different from Site BD 1 (p=0.01) (Table CAWG 10-65).

Percent Hydropsychidae: Percent Hydropsychidae ranged from 0.0 at Site AD to 0.4 at Site BD 1. These metrics were statistically significantly different (p=0.0001).

Cluster Analysis

In Figure CAWG 10-22, the dendrogram shows that the physical/habitat quality scores were similar for the three sites. Sites AD and BD 2 (next site downstream from the diversion) were more similar to each other than Site BD 1 (furthest site downstream).

Clusters of Project sites based on BMI taxa at the family-level are presented in Figure CAWG 10-23. The dendrogram shows that the sites were relatively dissimilar. Sites AD and BD 2 were more similar to each other than Site BD 1.

Mollusk Survey

No mollusks were observed during the visual survey (Maps CAWG 10-9 and 10-11). No members of the phylum Mollusca were collected in Camp 62 Creek (Appendix E).

5.2.2.9 Bolsillo Creek

Physical Habitat

One site was sampled above the diversion and two sites below the diversion in Bolsillo Creek. The sites above the diversion (AD) and directly downstream of the diversion (BD 2) were located in Rosgen Level I B type channel. Site BD 1 (furthest downstream) was located in Rosgen Level I Aa+ type channel. The Bolsillo Creek diversion was operated during runoff and was turned out (diversions ceased) on July 2, 2002. Therefore, no flow was diverted from this creek during the CSBP sampling period. However, flows were low. Run habitat was sampled at each of the sites on this creek, but both the availability of runs and wetted habitat areas were limited. This limited the number of potential sampling sites and resulted in fewer than the desired number of replicates. Physical/habitat quality parameter score totals were 117 at Site AD, 119 at Site BD 2, and 67 at Site BD 1 (Table CAWG 10-14). Based on categories developed by Harrington and Born (2000), Bolsillo Site AD and Site 2 would fall into the suboptimal range, and Camp 62 Site 1 would fall into the marginal range.

Abundance

Table CAWG 10-15 shows that Site AD had a mean density of 1,943 BMI/m², Site BD 2 had the highest mean density value (2,795) and Site BD 1 had the lowest mean density value (380), although there was only one replicate sample available at this site. There was no statistically significant difference in BMI densities among sampling sites ($p=0.22$).

Abundant Taxa

Table CAWG 10-16 indicates that the most abundant taxa were Diptera of the Orthocladiinae group, and Plecoptera of the Capniidae group. Capniids as a group are classified as shredders. All of the members of the family Capniidae are intolerant of pollution and habitat deterioration.

The dipteran Tanytarsini and the plecopteran *Zapada sp.* also were relatively abundant taxa for the Bolsillo Creek sampling sites.

Metrics

Table CAWG 10-66 displays the CSBP metrics. The mean Functional Feeding Group percentages by site are shown in Figure CAWG 10-24. The following metrics were not statistically significantly different among Bolsillo Creek sites: Ephemeroptera Taxa, Plecoptera Taxa, Trichoptera Taxa, EPT Index, Sensitive EPT Index, Shannon-Weaver

Diversity Index, Relative Diversity (Evenness), Tolerance Value, Percent Intolerant Organisms, Percent Tolerant Organisms, Percent Hydropsychidae, Percent Baetidae, Percent Dominant Taxa, Percent Collectors, Percent Filterers, Percent Scrapers, Percent Predators, and Percent Shredders. There were varying levels of numerical differences in the mean metric values for the non-statistically significant metrics. There were two metrics with statistically significant differences among Bolsillo Creek sites; these are discussed below.

Taxa Richness: Taxa Richness values were 29.5 at Site AD, 35.0 at Site BD 2, and 9.0 at Site BD 1. These site metrics were statistically significantly different (p=0.02). Site BD 1 was lower in value and significantly different from Site AD (p=0.04) and Site BD 2 (p=0.03) (Table CAWG 10-67).

EPT Taxa: EPT Taxa values were 19 at Site AD, 20.5 at Site BD 2, and 2.0 at Site BD 1. These values were significantly different (p=0.03). Site BD 1 was lower in value than Site AD and significantly different (p=0.05) (Table CAWG 10-68).

Cluster Analysis

In Figure CAWG 10-25, the dendrogram shows that the physical/habitat quality scores were similar for the three sites. Sites AD and BD 2 (the two upstream sites) were more similar to each other than Site BD 1 (the downstream site).

In Figure CAWG 10-26, the dendrogram shows that the BMI taxa for the Project sampling sites were relatively dissimilar. Sites AD and BD 2 were more similar to each other than Site BD 1.

Mollusk Survey

No mollusks were observed during the visual survey (Maps CAWG 10-9 and 10-11). One mollusk taxon, the bivalve Sphaeridae (Appendix E), was collected at Sites AD and BD 2.

5.2.2.10 Mono Creek

Physical Habitat

Four sites were sampled in Mono Creek downstream of the Mono Diversion from 0.4 to 5.7 miles upstream of the confluence with the SFSJR. Upstream of the Mono Diversion, Mono Creek below Vermilion Valley Dam is utilized as a conveyance channel for routing flow from Lake Thomas A. Edison to Ward Tunnel via the Mono Diversion and the Mono-Bear Siphon. A complete description of Mono Creek upstream of Mono Diversion was included in the Vermilion Valley Project, a traditional relicensing proceeding (SCE 2001b). A summary of the results for the BMI community in Mono Creek is provided in Appendix G. All four sampling sites in Mono Creek were located in Rosgen Level I B type channel. Flows downstream of the diversion are maintained by controlled releases. Flows were maintained in the creek by releases made at the diversion during the sampling period. Physical/habitat quality parameter score totals ranged from 150 to 176 with the lowest score below the Mono Diversion and the greatest score upstream of the confluence with the SFSJR (Table CAWG 10-14). All of the Mono Creek sampling sites would fall into the optimal range (Harrington and Born 2000).

Abundance

As presented in Table CAWG 10-15, Site BD 2 (second most downstream site) had the highest mean density value (2,617 BMI/m²) and Site BD 1 (most downstream site) had the lowest mean density value (845). There was no statistically significant difference in BMI density among Mono Creek sampling sites (p=0.12).

Abundant Taxa

Table CAWG 10-16 indicates that the most abundant taxa at the Mono Creek sampling sites were Diptera of the Orthocladiinae group, the plecopteran *Zapada sp*., and the ephemeropteran *Baetis sp.* The dipteran *Simulium sp.* also was relatively abundant. Each of these taxa has been discussed in previous sections.

Metrics

Table CAWG 10-69 presents the CSBP metrics. The mean Functional Feeding Group percentages by site are shown in Figure CAWG 10-27. The following metrics were not statistically significantly different among Mono Creek sites: Taxa Richness, Ephemeroptera Taxa, Plecoptera Taxa, Trichoptera Taxa, EPT Taxa, Sensitive EPT Index, Shannon-Weaver Diversity Index, Relative Diversity (Evenness), Tolerance Value, Percent Intolerant Organisms, Percent Hydropsychidae, Percent Dominant Taxa, Percent Scrapers, and Percent Predators. There were varying levels of numerical differences in the mean metric values for the non-statistically significant metrics. Metrics with statistically significant differences among Mono Creek sites are discussed in the following sections.

EPT Index: The EPT Index ranged from 25.6 at Site BD 2 to 64.1 at Site BD 3. These site metrics were significantly different (p=0.01). Site BD 2 was lower in value and significantly different from Site BD 3 (p=0.02) (Table CAWG 10-70).

Percent Tolerant Organisms: Percent Tolerant Organisms ranged from 0.9 at Site BD 1 to 18.7 at Site BD 4 and were statistically significantly different (p=0.03). Site BD 1 was lower in value and significantly different from Site BD 4 (p=0.04) (Table CAWG 10-71).

Percent Baetidae: Percent Baetidae ranged from 5.9 at Site BD 4 to 40.8 at Site BD 3 and were significantly different (p<0.0001). Site BD 3 was greater in value and significantly different all of the other sites. Site BD 4 was lower in value and significantly different from Site BD 1 (p=0.01) (Table CAWG 10-72).

Percent Collectors: Percent Collectors ranged from 25.2 at Site BD 2 to 75.7 at Site BD 3. These metrics were significantly different (p=0.0002). Sites BD 3 and BD 4 were higher in value and significantly different from Sites BD 1 and BD 2 (Table CAWG 10-73).

Percent Filterers: Percent Filterers ranged from 3.4 at Site BD 4 to 57.9 at Site BD 2 and were significantly different (p=0.0001). Sites BD 1 and BD 2 were higher in value and significantly different from Site BD 3 and Site BD 4 (Table CAWG 10-74).

Percent Shredders: Percent Shredders ranged from 4.0 at Site BD 1 to 12.4 at Site BD 4 and were significantly different (p=0.04). On a site by site basis, the metrics were not significantly different (Table CAWG 10-75).

Cluster Analysis

In Figure CAWG 10-28, the dendrogram shows that the physical/habitat quality scores were similar for the four sites in Mono Creek. Sites 1 and 2 (sites furthest downstream) were the most similar to each other; Site 3 was the next closest in similarity to Sites 1 and 2; and Site 4 (most upstream site) was the least similar.

In Figure CAWG 10-29, the dendrogram shows that the BMI taxa for the Mono Creek sampling sites were relatively dissimilar. However, the pattern of site clusters paralleled that of the physical/habitat quality clusters by site, with the two downstream sites being most similar to each other followed in order by the two upstream sites.

Mollusk Survey

No mollusks were observed during the visual survey (Maps CAWG 10-9 and 10-11). The bivalves Sphaeridae, and an unidentified bivalve taxon were collected with BMI samples. Sphaeridae were identified in the BMI samples collected at all four Mono Creek sites, and the unidentified bivalve taxon was collected at Mono Creek Site 1 (Appendix E).

5.2.3 MAMMOTH REACH OF THE SAN JOAQUIN RIVER BASIN

The Mammoth Reach of the San Joaquin River (SJR) extends from Mammoth Pool Dam (SJR RM 25.55) to Mammoth Pool Powerhouse (SJR RM 18.2). Diverted tributaries to the Mammoth Reach of the SJR include Rock Creek and Ross Creek. Sampling locations are shown in Map CAWG 10-4. Ross Creek is an ephemeral stream, and was dry above and below the Ross Creek Diversion at the time of sampling. Ross Creek, therefore, could not be sampled for benthic macroinvertebrates.

5.2.3.1 San Joaquin River (Mammoth Reach)

Four locations were sampled in the SJR between the Mammoth Pool Dam and the Mammoth Pool Powerhouse. Two of the samples were taken upstream of Rock Creek in Rosgen Level I G type channel, and two samples were taken downstream of Rock Creek in Rosgen Level I B type channel. One additional sample was taken in the SJR upstream of Mammoth Pool Reservoir in Rosgen Level I G type channel. Minimum instream flows are released from Mammoth Pool Dam and were present throughout the sampling period. Sampling locations are shown in Map CAWG 10-4.

Physical Habitat

Physical/habitat quality parameter score totals ranged from 109 to 150 (Table CAWG 10-76). The site upstream of Mammoth Pool Reservoir (above Mammoth Pool [AM]) had a total score of 129. Scores for the sites in the G type channel below Mammoth Pool Dam (BM), in upstream to downstream order, were 109 and 146. Scores for the sites in the B type channel, in upstream to downstream order, were 142 and 150.

Based on Harrington and Born (2000), the Site BM 1 (furthest downstream) would fall into the optimal range and the other four (including upstream of Mammoth Pool Reservoir) would fall into the suboptimal range.

Abundance

In Table CAWG 10-77, Site BM 4 had the highest mean density value (2,556 BMI/m²) and Site AM had the lowest mean density value (942). There was no statistically significant difference in BMI density among all SJR Mammoth Reach sampling sites (p=0.21).

Abundant Taxa

Table CAWG 10-78 presents the abundant insect taxa at each site in SJR Mammoth Reach. The most abundant taxa for the SJR Mammoth Reach sampling sites were the dipterans *Simulium sp.*, Orthocladinae, and the ephemeropteran *Baetis sp*.

There were three taxa groups that were relatively abundant. These were Tanytarsini of the order Diptera, and the trichopterans *Hydropsyche sp*. and *Ochrotrichia sp*.

Metrics

Table CAWG 10-79 displays the CSBP metrics. The mean Functional Feeding Group percentages by site are shown in Figure CAWG 10-30. The following metrics were not statistically significantly different among SJR Mammoth Reach sites: Taxa Richness, Ephemeroptera Taxa, Plecoptera Taxa, Trichoptera Taxa, EPT Taxa, EPT Index, Sensitive EPT Index, Shannon-Weaver Diversity Index, Relative Diversity (Evenness), Tolerance Value, Percent Intolerant Organisms, Percent Tolerant Organisms, Percent Baetidae, Percent Dominant Taxa, Percent Filterers, Percent Scrapers, Percent Predators, and Percent Shredders. There were varying levels of numerical differences in the mean metric values for the non-statistically significant metrics. There were two metrics with statistically significant differences among SJR Mammoth Reach sites, which are discussed in the following sections.

Percent Hydropsychidae: Percent Hydropsychidae was 1.2 at Site AM, and downstream of Mammoth Pool ranged from 0.1 at Site BM 4 to 17.8 at Site BM 1. These site metrics were significantly different (p=0.007). Site BM 1 was higher in value and significantly different from Site AM (p=0.02) and Site BM 4 (p=0.01) (Table CAWG 10-80).

Percent Collectors: Percent Collectors was 43.8 at Site AM and ranged downstream from 27.7 at Site BM 3 to 63.5 at Site BM 4. These site metrics were statistically significantly different (p=0.01). Due to the unequal variances, site by site testing was not performed.

Cluster Analysis

In Figure CAWG 10-31, the dendrogram shows that the physical/habitat quality scores for the two upstream Sites AM and Site 4 (first site below Mammoth Pool Dam) were the most similar. Sites 1, 2, and 3 below the diversion were grouped, with Sites 1 and 2 being the most similar within this group. The upstream and downstream groups of sites were relatively dissimilar.

Clusters of study sites based on BMI taxa at the family-level are presented in Figure CAWG 10-32. The dendrogram shows that the sites were resolved into two principal clusters. One cluster consisted of the sites near Mammoth Pool Dam (Site BM 4, immediately downstream of Mammoth Pool Dam and Site BM 3, the subsequent downstream site) and Site AM, upstream. The second group consisted of the lower SJR Mammoth Reach sampling sites (Sites BM 1, and BM 2). Sites BM 1 and BM 2 of the SJR Mammoth Reach were in Rosgen Level I B type channel, while the other three sites in this reach were in Rosgen Level I G type channel.

Mollusk Survey

No mollusks were observed during the visual surveys (Map CAWG 10-12). Mollusk taxa that were collected during BMI sampling included the bivalve Sphaeridae, and the gastropods *Menetus sp.*, *Physa sp.*, and Planorbidae. Sphaeridae were identified in the BMI samples collected at the SJR site above Mammoth Pool. *Menetus sp.* was identified at Site BM 1; *Physa sp.* was identified at Sites BM 1, and BM 2; and Planorbidae was identified in the samples collected at Site BM 4 (Appendix E).

5.2.3.2 Rock Creek

Three sample sites were located in Rock Creek. One of the samples was taken upstream of Rock Creek Diversion, and two samples were taken downstream of Rock Creek Diversion. All three sites were located in Rosgen Level I Aa+ type channel. Rock Creek diversion was in operation during sampling. The upstream samples were collected using “spot” sampling. The downstream site was sampled from the two riffles available. Sampling locations are shown in Map CAWG 10-4.

Physical Habitat

Physical/habitat quality parameter score totals ranged from 147 at Site AD to 113 at Site BD 1 (furthest downstream) (Table CAWG 10-76). Based on Harrington and Born (2000), all three sites in Rock Creek would fall into the suboptimal range.

Abundance

In Table CAWG 10-77, Site AD had a density of 3,774 BMI/m²; Site BD 2 had the highest mean density value (22,696) and Site BD 1 had the lowest mean density value (3,565). There was no statistically significant difference in BMI density among sampling sites (p=0.60).

Abundant Taxa

Table CAWG 10-78 shows that the most abundant taxa for the Rock Creek sampling sites were the dipterans *Simulium sp.*, and Orthocladinae. A relatively abundant taxa for the Rock Creek sampling sites was the trichopteran *Hydropsyche sp*. The trichopterans *Lepidostoma sp. and Micrasema sp also were abundant upstream of the diversion.*

Metrics

Table CAWG 10-81 presents the CSBP metrics. The mean Functional Feeding Group percentages by site are shown in Figure CAWG 10-33. The following metrics were not statistically significantly different among Rock Creek sites: Percent Hydropsychidae, Percent Baetidae, Percent Filterers, and Percent Shredders. There were varying levels of differences in some of the mean metric values for these non-statistically significant metrics. Metrics with statistically significant differences among Rock Creek sites are discussed in the following sections.

Taxa Richness: Taxa Richness ranged from 36.3 at Site AD to 15.3 at Site BD 2. These metrics were statistically significantly different (p=0.02). Site BD 2 was lower in value and significantly different from Site AD (p=0.03) (Table CAWG 10-82).

Ephemeroptera Taxa: Ephemeroptera Taxa ranged from 5.7 at Site AD to 2.0 at Site BD 2 and were significantly different (p=0.03). Site BD 2 was lower in value and significantly different from Site AD (p=0.04) (Table CAWG 10-83).

Plecoptera Taxa: Plecoptera Taxa ranged from 4.0 at Site AD to 0.3 at Site BD 2 and were different at a significant level (p=0.004). Site AD was higher in value and significantly different from Site BD 1 (p=0.01) and Site BD 2 (p=0.007) (Table CAWG 10-84).

Trichoptera Taxa: Trichoptera Taxa ranged from 7.3 at Site AD to 3.3 at Site BD 2 and were significantly different (p=0.0006). Site AD was larger in value and significantly different from both Sites BD 1 (p=0.01) and BD 2 (p=0.006). Site BD 1 also was higher in value and significantly different from Site BD 2 (p=0.05) (Table CAWG 10-85).

EPT Taxa: EPT Taxa ranged from 17.0 at Site AD TO 5.7 at Site BD 2 and were significantly different (p=0.0006). Site AD was larger in value and significantly different from both Site BD 1 (p=0.01) and Site BD 2 (p=0.0006) (Table CAWG 10-86).

EPT Index: The EPT Index ranged from 47.4 at Site AD to 15.6 at Site BD 2 and were significantly different (p=0.03). Site AD was greater in value than Site BD 2 and significantly different (p=0.04) (Table CAWG 10-87).

Sensitive EPT Index: The Sensitive EPT Index ranged from 36.6 at Site AD to 0.8 at Site BD 2 and were statistically significantly different (p=0.04). On a site by site basis, these site metrics were not statistically significantly different (Table CAWG 10-88).

Shannon-Weaver Diversity Index: The Shannon-Weaver Diversity Index ranged from 1.1 at Sites AD and BD 1 to 0.6 at Site BD 2. These site metrics were different at a significant level (p=0.0009). Site BD 2 was lower in value and significantly different from Sites AD (p=0.001) and BD 1 (p=0.004) (Table CAWG 10-89).

Relative Diversity (Evenness): Evenness ranged from 0.7 at Sites AD and BD 1 to 0.5 at Site BD 2. These site metrics were significantly different (p=0.002). Site BD 2 was lower in value and significantly different from Site AD (p=0.003) and BD 1 (p=0.007) (Table CAWG 10-90).

Tolerance Value: Tolerance Values ranged from 3.4 at Site AD to 5.1 at Sites BD 1 and BD 2 and were significantly different (p=0.03). Site AD was lower in value and significantly different from Site BD 2 (p=0.05) (Table CAWG 10-91).

Percent Intolerant Organisms: Percent Intolerant Organisms ranged from 36.5 at Site AD to 1.0 at Site BD 2 and were significantly different (p=0.05). On a site by site basis, there was no significant difference (Table CAWG 10-92).

Percent Tolerant Organisms: Percent Tolerant Organisms was 1.5 at Sit AD, 0.5 at Site BD 2, and 2.8 at Site BD 1. These site metrics were significantly different (p=0.03). Site BD 2 was lower in value and significantly different from Site BD 1 (p=0.03) (Table CAWG 10-93).

Percent Dominant Taxa: Percent Dominant Taxa was 26.3 at Site AD, 25.8 at Site BD 1, and 54.0 at Site BD 2. These site metrics were significantly different (p=0.007). Site BD 2 was larger in value and significantly different from Site AD (p=0.01) and Site BD 1 (p=0.02) (Table CAWG 10-94).

Percent Collectors: Percent Collectors ranged from 41.7 at Site AD to 70.9 at Site BD 2 and were significantly different (p=0.03). Site AD was lower in value and significantly different from Site BD 2 (p=0.04) (Table CAWG 10-95).

Percent Scrapers: Percent Scrapers ranged from 16.1 at Site AD to 2.2 at Site BD 2 and were significantly different (p=0.003). Sites BD 1 and BD 2 were lower in value and significantly different from Site AD (Table CAWG 10-96).

Percent Predators: Percent Predators was 6.8 at Site AD, 3.7 at Site BD 2, and 10.8 at Site BD 1. These site metrics were significantly different (p=0.009). Site BD 2 was lower in value and significantly different from Site BD 1 (p=0.01) (Table CAWG 10-97).

Cluster Analysis

The Dendrogram in Figure CAWG 10-34 shows that the dissimilarity in physical/habitat quality scores among sampling sites differed at near the same values. Site BD 1 and Site BD 2 were more similar to each other than Site AD.

Figure CAWG 10-35 shows that the clusters of sites based on BMI taxa at the family level were dissimilar. Sites AD and BD 1 (furthest downstream) were more similar to each other than to Site BD 2.

Mollusk Survey

Mollusk surveys were performed for each of the fish sampling sites in Rock Creek. No mollusks were observed during the visual survey (Map CAWG 10-12). Mollusk taxa were collected in BMI samples including the bivalves Sphaeridae and *Pisidium sp.*, and the gastropod *Physa sp*. Sphaeridae were identified in the BMI samples collected at Rock Creek Site BD 1 and Site AD, *Pisidium sp.* were identified at Site AD, and *Physa sp.* were identified at Sites BD 1 and BD 2.

5.2.4 STEVENSON REACH OF THE SAN JOAQUIN RIVER

The Stevenson Reach of the San Joaquin River (SJR) extends from Dam No. 6 (SJR RM 17.05) to Big Creek Powerhouse No. 3 (SJR RM 11.25). BMI samples were taken at four sites downstream of Dam 6 in Rosgen Level I G type channel (Map CAWG-10-5). Minimum instream flows are released from Dam 6 and were present during the sampling period. Riffles were sampled in each location. However, only two riffles were present within one mile of Dam 6. Both of these were sampled to provide two replicates for the upstream site.

Physical Habitat

Physical/habitat quality parameter score totals for the SJR Stevenson Reach ranged from 132 at Site SR 4 (closest site to Dam 6) to 142 at Site SR 1 (upstream of Powerhouse 3) (Table CAWG 10-98). All four sites in the SJR Stevenson Reach would fall into the suboptimal range (Harrington and Born 2000).

Abundance

Table CAWG 10-99 presents the BMI densities for the Stevenson Reach of the SJR. Site 2 had the highest mean density value (11,466 BMI/m²) and Site 3 had the lowest mean density value (1,693). There was no statistically significant difference in BMI density among sites (p=0.44).

Abundant Taxa

Table CAWG 10-100 shows that the most abundant taxon among the sites was the dipteran *Simulium sp*. Relatively abundant taxa for the SJR Stevenson Reach also included *Baetis sp*. of the order Ephemeroptera, Orthocladiinae and Tanytarsini of the order Diptera.

Metrics

Table CAWG 10-101 presents the CSBP metrics. The mean Functional Feeding Group percentages by site are shown in Figure CAWG 10-36. The following metrics were not statistically significantly different among SJR Stevenson Reach sites: Taxa Richness, Ephemeroptera Taxa, Trichoptera Taxa, EPT Taxa, EPT Index, Sensitive EPT Index, Shannon-Weaver Diversity Index, Relative Diversity (Evenness), Tolerance Value, Percent Tolerant Organisms, Percent Hydropsychidae, Percent Baetidae, Percent Dominant Taxa, Percent Collectors, Percent Filterers, Percent Scrapers, Percent Predators, and Percent Shredders. There were varying levels of differences in some of the mean metric values for these non-statistically significant metrics. The two metrics with statistically significant differences among SJR Stevenson Reach sites are discussed below.

Plecoptera Taxa: Plecoptera Taxa ranged from 0.0 at Sites SR 1, SR 3, and SR 4 to 0.3 at Site SR 2. These metrics were statistically significantly different (p=0.0001). Due to the unequal variances, site by site testing was not performed.

Percent Intolerant Organisms: Percent Intolerant Organisms ranged from 0.1 at Site SR 1 to 1.6 at Site SR 3. These metrics were statistically significantly different (p=0.01). Site SR 1 was lower in value and significantly different from Site SR 3 (p=0.03) (Table CAWG 10-102).

Percent Hydropsychidae: The lowest value for Percent Hydropsychidae was 1.1 at Site SR 4, while the highest Percent Hydropsychidae value was 6.2 at Site SR 1. These site metrics were not statistically significantly different (p=0.72).

Cluster Analysis

A dendrogram of sites based on physical/habitat quality scores presented in Figure CAWG 10-37 shows that the physical/habitat quality scores were relatively similar. There were two sets of clusters: one consisted of Sites SR 1 and SR 2; the other consisted of Sites SR 3 and SR 4.

Clusters of Project sites based on BMI taxa at the family-level are presented in Figure CAWG 10-38. Sites were relatively dissimilar. Sites SR 1 and SR 2 (sites furthest downstream) were the closest in similarity. Site SR 3 was the next closest in similarity to the first two sites, and Site SR 4 was the most dissimilar.

Mollusk Survey

No mollusks were observed during the visual survey (Map CAWG 10-13). Mollusk taxa were collected during BMI sampling, including the gastropods *Ferrissia sp.*, *Menetus sp.*, *Physa sp.*, and Planorbidae. *Ferrissia sp.* were identified in samples collected at Sites SR 1 and SR 3; *Menetus sp.* was identified at Site SR 1; *Physa sp.* was identified at Sites SR 1 and SR 2; and Planorbidae was identified in the samples collected at Site SR 3 (Appendix E).

5.2.5 Big Creek Mainstem

The Mainstem of Big Creek (BC) extends from Dam 1 at Huntington Lake (BC RM 9.9) to Big Creek Powerhouse 8 (BC RM 0.0). The BC Mainstem is separated into three reaches. The first reach extends from Huntington Lake Dam 1 to upstream of BC Powerhouse 1 (PH 1). The second reach extends from BC Dam No. 4 (Dam 4) to upstream of BC Powerhouse 2 (PH 2). The third reach extends from BC Dam No. 5 to upstream of BC Powerhouse 8 (PH 8). BMI samples were taken during the fall of 2002. Sampling locations are shown in Map CAWG 10-6. Each reach is discussed separately, below.

5.2.5.1 Big Creek Dam 1 (Huntington Lake) to Powerhouse 1

Physical Habitat

Four locations were sampled in this reach. Three stations were located in Rosgen Level I Aa+ type channel (Sites 3 through 1, from upstream to downstream. A fourth site was sampled in Rosgen Level I B type channel in the upper portion of the reach (Site B). This reach included an elevation difference from top to bottom of about 2,000 ft. Minimum instream flows are released to this reach from Dam 1, and were present throughout sampling. Riffles were present sampled at Sites 3, 2, and B. However, Site B was heavily overgrown with vegetation, which created dammed pools and reduced appropriate habitat for sampling to a single riffle. At Site 2, only two riffles were available for sampling among large cascades. At Site 1, no riffles were present and "spot" sampling was used in selected areas of run and step pool habitats. Physical/habitat quality parameter score totals for Big Creek Dam 1 to PH 1 ranged from 150 (Site 3) to 119 (Site 1) in the Aa+ channel and 113 (Site B) in the B channel (Table CAWG 10-98). Based on Harrington and Born (2000), Site 3 would fall into the optimal range, whereas the other three sites would fall into the suboptimal range.

Abundance

Table CAWG 10-104 indicates that Site 1 had the highest mean density value (12,807 BMI/m²) and Site 2 had the lowest mean density value (1,208). There was no statistically significant difference in BMI densities ($p=0.22$).

Abundant Taxa

Table CAWG 10-105 presents the abundant insect taxa at each site in the Big Creek Dam 1 to PH 1 sampling sites. The most abundant taxon was the dipteran *Simulium sp*. Diptera of the Orthocladiinae and Tanytarsini groups, the plecopteran *Yoraperla sp.*, and the ephemeropteran *Baetis sp.* were relatively abundant taxa, as well.

Metrics

Table CAWG 10-106 displays the CSBP metrics. The mean Functional Feeding Group percentages by site are shown in Figure CAWG 10-39. The following metrics were not statistically significantly different among Big Creek Dam 1 to PH 1 sites: Plecoptera Taxa, Trichoptera Taxa, Shannon-Weaver Diversity Index, Relative Diversity (Evenness), Tolerance Value, Percent Tolerant Organisms, Percent Hydropsychidae, Percent Dominant Taxa, Percent Collectors, Percent Filterers, and Percent Shredders. There were varying levels of differences in some of the mean metric values for the non-statistically significant metrics. Metrics with statistically significant differences among Big Creek Dam 1 to PH 1 sites are detailed in the following section.

Taxa Richness: Taxa Richness values ranged from 23.7 at Site 3 to 35.5 at Site 2 and were statistically significantly different (p=0.01). Site 3 was lower in value and significantly different from Site 1 (p=0.03) and Site 2 (p=0.03) (Table CAWG 10-107).

Ephemeroptera Taxa: Ephemeroptera Taxa ranged from 2.3 at Site 3 to 7.5 at Site 2 and were significantly different (p=0.007). Site 3 was lower in value and significantly different from Site 1 (p=0.01) and Site 2 (p=0.02) (Table CAWG 10-108).

EPT Taxa: EPT Taxa ranged from 10.7 at Site 3 to 19.0 at Site 2. These site metrics were significantly different (p=0.03). Site 3 was lower in value and significantly different from Site 2 (p=0.05) (Table CAWG 10-109).

EPT Index: The EPT Index ranged from 23.1 at Site 3 to 66.6 at Site B. These were significantly different (p=0.01). Site 2 was greater in value and significantly different from Site 1 (p=0.04) and Site 3 (p=0.04) (Table CAWG 10-110).

Sensitive EPT Index: The Sensitive EPT Index ranged from 14.1 at Site 3 to 47.2 at Site B and were significantly different (p=0.05). On a site by site basis, there was no difference at a significant level (Table CAWG 10-111).

Percent Intolerant Organisms: Percent Intolerant Organisms ranged from 16.1 at Site 3 to 47.4 at Site B and were significantly different (p=0.04). On a site by site basis, there was no significant difference (Table CAWG 10-112).

Percent Baetidae: Percent Baetidae ranged from 0.6 at Site 3 to 24.2 at Site 2 and were significantly different (p=0.001). Site 3 was lower in value and significantly different from the other sites. Site 1 also was lower in value and significantly different from Site 2 (Table CAWG 10-113).

Percent Scrapers: Percent Scrapers ranged from 0.6 at Site 3 to 17.8 at Site 2. These site metrics were statistically significantly different (p=0.0001). Site 3 was lower in value and significantly different from the other sites. Site 1 was lower in value and significantly different from Sites 2 and Site B (Table CAWG 10-114).

Percent Predators: Percent Predators ranged from 7.3 at Site 2 to 41.0 at Site 3 and were significantly different (p=0.03). On a site by site basis, these metrics were not significantly different (Table CAWG 10-115).

Cluster Analysis

Figure CAWG 10-40 shows that the physical/habitat quality scores were closest in similarity for Sites 2 and 3, which were then joined by Site B, and lastly by Site 1 (furthest site downstream and lowest elevation).

In Figure CAWG 10-41, the dendrogram shows that the sites based on BMI taxa formed two groups of relatively dissimilar clusters. The first cluster consisted of Sites 1 and 3, the most upstream and downstream sites. The other cluster consisted of Site 2 and Site B, the two middle sites.

Mollusk Survey

No mollusks were observed during the visual survey (Maps CAWG 10-13 and 10-14). However, one taxon was collected among the BMI samples, the bivalve Sphaeridae (Appendix E), which occurred at all four sampling sites.

5.2.5.2 Big Creek Dam 4 (PH 1) to Powerhouse 2

Physical Habitat

Three sites were sampled in the reach between Dam 4 and Powerhouse 2. All three sites were located in Rosgen Level I A type channel. The most upstream site (Site 3) was closest to Dam 4 and the most downstream site (Site 1) was upstream of PH 2. Flows in this reach originate from the base of Dam 4 and from tributary contributions. Riffles were sampled at each site, however riffles were uncommon, and only one small riffle was present near Site 2. This riffle was sampled and resulted in the collection of one replicate. Physical/habitat quality parameter score totals for Big Creek Dam 4 to PH 2 ranged from 124 at Site 3 to 148 at Site 1 (Table CAWG 10-98). Based on Harrington and Born (2000), all three of the sites would fall into the suboptimal range.

Abundance

As shown in Table CAWG 10-104, Site 1 had the highest mean density value (6,155 BMI/m^2) and Site 2 had the lowest mean density value (2,583). There was no statistically significant difference in BMI density among the sampling sites (p=0.39).

Abundant Taxa

Table CAWG 10-105 indicates that the most abundant taxa were Diptera of the Tanytarsini group, the tricopteran *Lepidostoma sp.*, and the ephemeropteran *Baetis sp*. Relatively abundant taxa include Diptera of the Orthocladiinae group, the trichopteran *Hydropsyche sp*., and the ephemeropteran *Epeorus sp*.

Metrics

Table CAWG 10-116 presents the CSBP metrics. The mean Functional Feeding Group percentages by site are shown in Figure CAWG 10-42. The following metrics were not statistically significantly different among Big Creek Dam 4 to PH 2 sites: Taxa Richness, Ephemeroptera Taxa, Plecoptera Taxa, Trichoptera Taxa, EPT Taxa, EPT Index, Sensitive EPT Index, Shannon-Weaver Diversity Index, Relative Diversity (Evenness), Tolerance Value, Percent Intolerant Organisms, Percent Tolerant Organisms, Percent Hydropsychidae, Percent Dominant Taxa, Percent Collectors, Percent Filterers, and Percent Shredders. There were varying levels of differences in some of the mean metric values for the non-statistically significant metrics. There were three metrics with statistically significant differences among Big Creek Dam 4 to PH 2 sites. These are discussed below.

Percent Baetidae: Percent Baetidae ranged from 7.8 at Site 3 to 20.0 at Site 2. These metrics were significantly different (p=0.04). Site 3 was lower in value and significantly different from Site 2 (p=0.05) (Table CAWG 10-117).

Percent Scrapers: Percent Scrapers ranged from 7.1 at Site 3 to 33.4 at Site 2. These site metrics were significantly different (p=0.01). Site 3 was lower in value and significantly different from Site 1 (p=0.01) and Site 2 (p=0.05) (Table CAWG 10-118).

Percent Predators: Percent Predators ranged from 6.4 at Site 1 to 8.0 at Site 3. These metrics were significantly different (p=0.04). On a site by site basis, site metrics were not significantly different (Table CAWG 10-119).

Cluster Analysis

Dendrograms (clusters) of study sites based on physical/habitat quality scores (Figure CAWG 10-43) show that Sites 2 and 3 (the upstream sites) were more similar to each other than Site 1.

Figure CAWG 10-44 shows that the family-level BMI taxa at all three site were relatively dissimilar. Sites 1 and 2 were more similar to each other than Site 3.

Mollusk Survey

No mollusks were observed during the visual survey (Maps CAWG 10-13 and 10-14). Mollusk taxa including the bivalves *Pisidium sp.* and Sphaeridae, and the gastropod *Physa sp*. (Appendix E) were collected in BMI samples. *Pisidium sp.* was identified at

Site 3, Sphaeridae and *Physa sp.* were identified at all three sites between Dam 4 and PH 2.

5.2.5.3 Big Creek Dam 5 (PH 2/2A) to Powerhouse 8

Two locations were sampled between Dam 5 and Powerhouse 8. Both sites were located in Rosgen Level I A type channel. Minimum instream flows are maintained in this reach from a release at Dam 5. These flows were present throughout the BMI sampling. Physical/habitat quality parameter score totals were 162 at Site 2 (downstream of Dam 5) and 127 at Site 1 (upstream of PH 8) (Table CAWG 10-103). Based on the classification of Harrington and Born (2000), Site 2 would be classified as optimal and Site 1 would be suboptimal.

Abundance

Table CAWG 10-104 shows that Site 1 had a slightly higher mean density (5,907 BMI/m²) than Site 2 (5,330). There was no statistically significant difference (p=0.85).

Abundant Taxa

Table CAWG 10-105 indicates that the most abundant taxon in this reach was the dipteran *Simulium sp*. Relatively abundant taxa included Diptera of the Tanytarsini and Orthocladiinae groups, and the ephemeropteran *Baetis sp*.

Metrics

Table CAWG 10-120 presents the CSBP metrics. The mean Functional Feeding Group percentages by site are shown in Figure CAWG 10-45. The following metrics were not statistically significantly different among Big Creek Dam 5 to PH 8 sites: Taxa Richness, Ephemeroptera Taxa, Plecoptera Taxa, Trichoptera Taxa, EPT Taxa, EPT Index, Sensitive EPT Index, Shannon-Weaver Diversity Index, Relative Diversity (Evenness), Tolerance Value, Percent Intolerant Organisms, Percent Tolerant Organisms, Percent Hydropsychidae, Percent Baetidae, Percent Dominant Taxa, Percent Collectors, Percent Filterers, Percent Scrapers, and Percent Predators. There were varying levels of differences in mean metric values for the non-significant metrics. Percent Shredders was the only biological metric that was statistically significantly different among Big Creek Dam 5 to PH 8 sites. This metric is discussed below.

Percent Shredders: Percent Shredders was 2.6 at Site 1 and 9.3 at Site 2. These site metrics were statistically significantly different (p=0.05) (Table CAWG 10-120.

Cluster Analysis

There were only two sampling sites in Big Creek Dam 5 to PH 8. Cluster analysis is only useful on streams with more than two sampling sites.

Mollusk Survey

No mollusks were observed during the visual survey (Maps CAWG 10-13 and 10-14). The bivalve Sphaeridae, and the gastropod *Physa sp*. (Appendix E) were collected during BMI sampling. Sphaeridae was identified at Site 2 and *Physa sp.* was identified at Site 1.

5.2.6 BIG CREEK TRIBUTARIES

There are four streams containing diversions, which are tributaries to the mainstem of Big Creek between Dam 1 at Huntington Lake and Big Creek Powerhouse 3. The four tributaries are Pitman Creek, Balsam Creek, Ely Creek, and Adit 8 Creek. BMI samples were collected at each of these streams during the fall of 2002. Sampling locations are shown in Maps CAWG 10-6 and 10-7.

5.2.6.1 Pitman Creek

Physical Habitat

Four sites were sampled in Pitman Creek. The site above the diversion (Site AD) and the first site downstream of the diversion (Site BD 2) were located in Rosgen Level I type B channels. The two most downstream sites (Sites BD 1 and BD 0) were located in Rosgen Level I type Aa+ channels. Pitman Creek Diversion was operated throughout the summer and fall during 2002. The diversion was operating during BMI sampling. Differences in habitats present at each site ranging from resulted in sampling of run habitat at Site AD to “spot” sampling of step pools and bedrock downstream. Physical/habitat quality parameter score totals were 160 and 147, at Sites AD and BD 2, respectively. Scores in Sites BD 1 and BD 0 were 132 and 148, respectively (Table CAWG 10-121). Based on categories developed by Harrington and Born (2000), Site AD would fall into the optimal range, the other three sites (Sites BD 2, BD 1, and BD 0) would fall into the suboptimal range.

Abundance

As presented in Table CAWG 10-122, Site 1 had the highest mean density value (8,039 BMI/m²) and Site B had the lowest mean density value (2,954). There was no statistically significant difference in BMI density among sampling sites (p=0.59).

Abundant Taxa

Table CAWG 10-123 shows that the most abundant taxa were Diptera of the Orthocladiinae group and the ephemeropteran *Baetis sp*. The *dipteran Simulium sp*., dipterans of the Tanytarsini group, and the trichopteran *Hydropsyche* sp. also were relatively abundant taxa at the Pitman Creek sampling sites.

Metrics

Table CAWG 10-124 presents the CSBP metrics. The mean Functional Feeding Group percentages by site are shown in Figure CAWG 10-46. The following metrics were not statistically significantly different among Pitman Creek sites: Trichoptera Taxa, Percent Tolerant Organisms, Percent Dominant Taxa, Percent Collectors, and Percent Filterers. However, there were numeric differences of varying levels for some mean metric values that were not statistically significantly difference. Metrics with statistically significant differences among Pitman Creek sites are discussed below.

Taxa Richness: Taxa Richness ranged from 39.0 at Site AD to 14.3 at Site BD 2. These site metrics were statistically significantly different (p=0.0009). Site AD was larger in value and significantly different from Site BD 1 (p=0.004) and Site BD 2 (p=0.001) (Table CAWG 10-125).

Ephemeroptera Taxa: Ephemeroptera Taxa ranged from 8.3 at Site AD to 1.7 at Site BD 2 and were significantly different (p=0.002). Site AD was larger in value and significantly different from Site BD 1 (p=0.01) and Site BD 2 (p=0.002) (Table CAWG 10-126).

Plecoptera Taxa: Plecoptera Taxa ranged from 5.7 at Site AD to 0.3 at Site BD 2 and were significantly different (p=0.001). Site AD was greater in value and significantly different from the other sites (Table CAWG 10-127).

EPT Taxa: EPT Taxa ranged from 25.0 at Site AD to 7.0 at Site BD 2 and were different at a significant level (p=0.0002). Site AD was larger in value and significantly different from the other sites (Table CAWG 10-128).

EPT Index: The EPT Index was 40.6 at Site AD and ranged downstream from 18.3 at Site BD 2 to 43.9 at Site BD 0. The EPT Index metrics were significantly different (p=0.01). Site BD 2 was lower in value and significantly different from Site AD (p=0.03) and Site BD 0 (p=0.03) (Table CAWG 10-129).

Sensitive EPT Index: The Sensitive EPT Index ranged from 16.0 at Site AD to 0.9 at Site BD 2 and were significantly different (p=0.006). Site AD was larger in value and significantly different from Site BD 2 (p=0.005), the first site downstream of the diversion (Table CAWG 10-130).

Shannon-Weaver Diversity Index: The Shannon-Weaver Diversity Index ranged from 1.2 at Site AD to 0.7 at Site BD 2. These were significantly different (p=0.003). Site AD was greater in value and significantly different from the other sites (Table CAWG 10-131).

Relative Diversity (Evenness): Evenness ranged from 0.7 at Site AD to 0.6 at Sites BD 0, BD 1, and BD 2. These metrics were significantly different (p=0.02). Site AD was larger in value and significantly different from Site BD 0 (p=0.04) and Site BD 2 (p=0.03) (Table CAWG 10-132).

Tolerance Value: Tolerance Values ranged from 4.5 at Site AD to 5.5 at Site BD 2 and were significantly different (p=0.002). Site AD was lower in value and significantly different from Site BD 2 (p=0.001) (Table CAWG 10-133).

Percent Intolerant Organisms: Percent Intolerant Organisms ranged from 15.5 at Site AD to 1.3 at Site BD 2 and were significantly different (p=0.006). Site AD was greater in value and significantly different from Site BD 2 (p=0.005) (Table CAWG 10-134).

Percent Hydropsychidae: Percent Hydropsychidae ranged from 10.7 at Site AD to 1.5 at Site BD 2 and were significantly different (p=0.006). Site AD was greater in value and significantly different from Site BD 0 (p=0.01) and Site BD 2 (p=0.01) (Table CAWG 10-135).

Percent Baetidae: Percent Baetidae ranged from 3.7 at Site AD to 30.8 at Site BD 0 and were significantly different (p=0.03). Due to the unequal variances, site by site tests were not available.

Percent Scrapers: Percent Scrapers ranged from 17.0 at Site AD to 1.7 at Site BD 1 and were significantly different (p=0.001). Site AD was larger in value and significantly different from the other sites (Table CAWG 10-136).

Percent Predators: Percent Predators ranged from 6.5 at Site AD to 1.2 at Site BD 2 and were significantly different (p=0.04). Site AD was larger in value and significantly different from Site BD 2 (p=0.05) (Table CAWG 10-137).

Percent Shredders: Percent Shredders ranged from 5.5 at Site AD to 0.1 at Site BD 2 and were significantly different (p=0.05). However, on a site by site basis, there was no difference at a significant level (Table CAWG 10-138)

Cluster Analysis

Dendrograms based on physical/habitat quality scores are presented in Figure CAWG 10-47. The dendrogram shows that Sites BD 0 and BD 2 were the most similar, followed by Site 1. Site AD was the most dissimilar site compared to the others.

Figure CAWG 10-48 shows that the family-level BMI taxa by site for Pitman Creek were relatively dissimilar and formed two separate groups. One cluster consisted of Sites AD and Site BD 0. The other cluster consisted of Sites BD 2 and BD 1.

Mollusk Survey

No mollusk was observed during the visual survey (Maps CAWG 10-13 through 10-15). No member of the phylum Mollusca was collected during the BMI sampling in Pitman Creek (Appendix E).

5.2.6.2 Ely Creek

Physical Habitat

Four locations were sampled in Ely Creek, one location above the diversion (Site AD) and three locations from below the diversion to near the confluence with Big Creek (Sites 3 through 1). Each of the sites was located in a Rosgen Level I type Aa+ channel. Ely Creek Diversion was operated from winter 2001 through May 23, 2002. No flow was diverted from Ely Creek during sampling. Flow was very low at the time of sampling, this resulted in the collection of one replicate upstream of the diversion, and sampling the most appropriate available moving water habitats downstream, including “spot” samples. Physical/habitat quality parameter scores were 112 at Site AD and 116 to 133 downstream of the diversion (Table CAWG 10-121). Based on categories developed by Harrington and Born (2000), all four of the Ely Creek sites would fall into the suboptimal range.

Abundance

Table CAWG 10-122 shows that Site AD had the highest mean density value (8,181 BMI/m²) and Site 2 had the lowest mean density value (485), although there was only one replicate sample available at Site AD. There was a statistically significant difference in BMI density among Ely Creek sampling sites (p=0.003). The mean density at Site AD value was larger and significantly different from Site 1 (p=0.01), Site 2 (p=0.004), and Site 3 (p=0.004).

Abundant Taxa

Table CAWG 10-123 indicates that Dipterans of the Orthocladiinae, Tanypodinae, and the Tanytarsini groups were relatively abundant taxa. Also relatively abundant was the trichopteran *Lepidostoma sp.* *Lepidostoma sp.* is classified as a shredder and is intolerant of habitat disturbance (tolerance value of one).

Metrics

Table CAWG 10-139 presents the CSBP metrics. The mean Functional Feeding Group percentages by site are shown in Figure CAWG 10-49. The following metrics were not statistically significantly different among Ely Creek sites: Taxa Richness, Ephemeroptera Taxa, Trichoptera Taxa, EPT Taxa, EPT Index, Sensitive EPT Index, Shannon-Weaver Diversity Index, Relative Diversity (Evenness), Tolerance Value, Percent Intolerant Organisms, Percent Tolerant Organisms, Percent Hydropsychidae, Percent Baetidae, Percent Dominant Taxa, Percent Filterers, Percent Scrapers, Percent Predators, Percent Shredders. There were varying levels of numeric differences in mean metric values that were not statistically significant different. There were two metrics with statistically significant differences among Ely Creek sites are detailed in the following section.

Plecoptera Taxa: Plecoptera Taxa ranged from 5.0 at Site AD to 0.0 at Site BD 3 and were significantly different ($p<0.0001$). Due to the unequal variances, site by site test results were not available.

Percent Collectors: Percent Collectors was 49.8 at Site AD and ranged downstream from 24.0 at Site BD 2 to 53.4 at Site BD 1. These site metrics were significantly different ($p=0.01$). Percent collectors at Site BD 1 was larger and significantly different than Site 2 ($p=0.02$) (Table CAWG 10-140).

Cluster Analysis

Figure CAWG 10-50 presents the dendrogram for physical/habitat quality scores for Ely Creek. Sites BD 1 and BD 3 were closest in similarity followed by Site BD 2. Site AD was the most dissimilar site.

Clusters of Project sites based on BMI taxa at the family level are presented in Figure CAWG 10-51. The dendrogram shows that the BMI taxa for the Ely Creek were relatively dissimilar. Sites BD 2 and BD 3 were most similar, followed by Site BD 1. Site AD was the most dissimilar site.

Mollusk Survey

No mollusks were observed during the visual survey (Maps CAWG 10-13 through 10-15). Mollusk taxa collected in Ely Creek during BMI sampling included the bivalves Sphaeridae and *Pisidium sp.* (Appendix E). Sphaeridae were collected at all four of the Ely Creek sampling sites and *Pisidium sp.* was collected at Site AD.

5.2.6.3 Balsam Creek

Physical Habitat

Three sites were sampled in Balsam Creek, one site upstream of the diversion and two sites between the diversion and the confluence with Big Creek. All three sites were located in Rosgen Level I type Aa+ channels. Balsam Creek was diverted from May through October 30, 2002. Flow was diverted during CSBP sampling. Physical/habitat quality parameter score totals were 145 at Site AD, and 112 and 127 at the two succeeding sites downstream of the diversion, respectively (Table CAWG 10-121). Based on categories developed by Harrington and Born (2000), all three of the Balsam Creek sites would fall into the suboptimal range.

Abundance

Table CAWG 10-122 indicates Site AD had the highest mean density value (5,271 BMI/m^2) and Site BD 1 had the lowest mean density value (1,468). There was no statistically significant difference in BMI densities ($p=0.39$).

Abundant Taxa

Table CAWG 10-123 shows that the most abundant taxa for the Balsam Creek sampling sites were Diptera of the Orthocladiinae group and the ephemeropteran *Baetis sp*. Diptera of the Tanytarsini group, and the trichopterans *Hydropsyche sp.* and *Lepidostoma sp*. also were relatively abundant taxa.

Metrics

Table CAWG 10-141 presents the CSBP metrics. The mean Functional Feeding Group percentages by site are shown in Figure CAWG 10-52. The following metrics were not statistically significantly different among Balsam Creek sites: Taxa Richness, Ephemeroptera Taxa, Plecoptera Taxa, Trichoptera Taxa, EPT Taxa, EPT Index, Sensitive EPT Index, Tolerance Value, Percent Intolerant Organisms, Percent Tolerant Organisms, Percent Hydropsychidae, Percent Baetidae, Percent Dominant Taxa, Percent Filterers, Percent Predators, Percent Shredders. There were varying levels of numeric differences among mean metric values that were not statistically significant different. There were four metrics with statistically significant differences, these are described below.

Shannon-Weaver Diversity Index: The Shannon-Weaver Diversity Index ranged from 1.2 at Sites AD and BD 1 to 1.1 at Site BD 2. These site metrics were statistically significantly different (p=0.01). Site BD 2 was lower in value and significantly different from Site AD (p=0.02) and BD 1 (p=0.05) (Table CAWG 10-142).

Relative Diversity (Evenness): Evenness ranged from 0.8 at Sites AD and BD 1 to 0.7 at Site BD 2 and sites were significantly different (p=0.03). Site BD 2 was lower in value and significantly different from Site BD 1 (p=0.04) (Table CAWG 10-145).

Percent Collectors: Percent Collectors were 53.0 at Site AD, 23.0 at Site BD 1, and 54.8 at Site BD 2, and were significantly different (p=0.005). Site BD 1 was lower in value and significantly different from Site AD (p=0.01) and Site BD 2 (p=0.009) (Table CAWG 10-144).

Percent Scrapers: Percent Scrapers was 17.2 at Site AD, 25.8 at Site BD 1, and 8.6 at Site BD 2, and were different at a significant level (p=0.005). Site BD 2 was lower in value and significantly different from Site BD 1 (p=0.01) (Table CAWG 10-145).

Cluster Analysis

Figure CAWG 10-53 presents the dendrogram of physical/habitat quality scores for Balsam Creek. Sites BD 1 and BD 2 were more similar to each other than Site AD.

Figure CAWG 10-54 presents the dendrogram based on family-level BMI taxa for the Balsam Creek. Sites AD and BD 2, were more similar to each other than to Site 1.

Mollusk Survey

No mollusk was observed during visual surveys (Maps CAWG 10-13 through 10-15). One (Appendix E) mollusk taxa, the bivalve Sphaeridae, was collected during BMI sampling. It was identified at all three sites.

5.2.6.4 Adit 8 Creek

Physical Habitat

Adit 8 Creek was used to route flow early in the history of the development of the Big Creek Project, but is no longer used. Two sites were sampled in Adit 8 Creek, both sites were downstream of the diversion location, where flow was present. Both were located in Rosgen Level I type Aa+ channel. Physical/habitat quality parameter score totals were 113 and 134 at the upstream (Site 2) and downstream (Site 1) locations, respectively (Table CAWG 10-114). Both sites would be classified as suboptimal (Harrington and Born (2000).

Abundance

Table CAWG 10-122 shows that Site 1 had a mean density of 304 BMI/m² and Site 2 had a mean density of 215 BMI/m². There was no significant difference in BMI densities (p=0.18).

Abundant Taxa

Table CAWG 10-123 indicates that the most abundant taxa were Diptera of the Orthocladiinae group and the ephemeropteran *Baetis sp*. The plecopteran *Soyedina sp*. also was relatively abundant.

Metrics

Table CAWG 10-146 presents the CSBP metrics. The mean Functional Feeding Group percentages by site are shown in Figure CAWG 10-55. The following metrics were not statistically significantly different between the Adit 8 Creek sites: Ephemeroptera Taxa, Plecoptera Taxa, Sensitive EPT Index, Relative Diversity (Evenness), Tolerance Value, Percent Intolerant Organisms, Percent Hydropsychidae, Percent Baetidae, Percent Dominant Taxa, Percent Collectors, Percent Filterers, and Percent Predators. There were varying levels of numeric differences among the mean metric values that were not statistically significant different. Metrics with statistically significant differences among Adit 8 Creek sites are detailed in the following section.

<u>Taxa Richness:</u> Taxa Richness was 14.0 at Site 2 and 31.7 at Site 1 and these were statistically significantly different (p=0.002).

<u>Trichoptera Taxa:</u> Trichoptera Taxa were 2.0 at Site 2 and 7.3 at Site 1 and were statistically significantly different (p=0.001).

EPT Taxa: EPT Taxa were 7.0 at Site 2 and 16.7 at Site 1 and site metrics were significantly different (p=0.003).

EPT Index: The EPT Index was 21.3 at Site 2 and 64.2 at Site 1 and site metrics were different at a significant level (p=0.009).

Shannon-Weaver Diversity Index: The Shannon-Weaver Diversity Index was 0.8 at Site 2 and 1.2 at Site 1. These metrics were significantly different (p=0.01).

Percent Tolerant Organisms: Percent Tolerant Organisms was 7.6 at Site 1 and 41.0 at Site 2 and site metrics were significantly different (p=0.05).

Percent Scrapers: Percent Scrapers was 1.6 at Site 2 and 19.6 at Site 1 and site metrics were significantly different (p=0.02).

Cluster Analysis

There were only two sampling sites in Adit 8 Creek. Cluster analysis is only useful on streams with more than two sampling sites, and was not performed for this reach.

Mollusk Survey

No mollusk was observed the visual survey (Maps CAWG 10-13 through 10-15). Mollusk taxa were collected in Adit 8 Creek during BMI collections and included the bivalve Sphaeridae and the gastropod Planorbidae. Sphaeridae was identified at Site 1 and Planorbidae was present at Site 2 (Appendix E).

5.2.7 STEVENSON CREEK SUB BASIN

The Stevenson Creek Sub Basin includes North Fork Stevenson Creek above Shaver Lake, and Stevenson Creek below Shaver Lake. BMI samples were taken during the fall of 2002. There were four sample sites in North Fork Stevenson Creek, and five sample sites in Stevenson Creek. Sampling locations are shown in Map CAWG 10-7.

5.2.7.1 North Fork Stevenson Creek

Physical Habitat

North Fork Stevenson Creek (NFSC) is a flow-augmented stream. Four locations were sampled: one above the flow release point (above outlet [AO]); and three below the outlet (BO) and upstream of Shaver Lake. All four sites were located in Rosgen Level I type Aa+ channels. Flows were released throughout the sampling period. Riffle habitat was not present in the reach above the outlet, spot sampling was conducted in the most appropriate available habitat. In addition, there was limited riffle habitat available at Site BO 2, which resulted in the collection of two replicates. Physical/habitat quality parameter score totals ranged from 133 at Site AO and between 149 and 139 at sites below the outlet (Table CAWG 10-147). Based on categories developed by Harrington and Born (2000), all four of the North Fork Stevenson Creek sites would fall into the suboptimal range.

Abundance

As presented in Table CAWG 10-148, Site BO 1 had the highest mean density value (8,244 BMI/m²) and Site BO 3 had the lowest mean density value (3,087). There was no statistically significant difference in BMI density among NFSC sampling sites (p=0.41).

Abundant Taxa

Table CAWG 10-149 presents the abundant insect taxa at each site in NFSC. The most abundant taxa were Diptera of the Orthocladiinae and Tanytarsini groups, and the plecopteran *Zapada sp*. *Simulium sp, a* dipteran genus also was abundant at Site BO 3.

Metrics

Table CAWG 10-150 presents the CSBP metrics. The mean Functional Feeding Group percentages by site are shown in Figure CAWG 10-56. The following metrics were not statistically significantly different among North Fork Stevenson Creek sites: Taxa Richness, Ephemeroptera Taxa, Plecoptera Taxa, Trichoptera Taxa, EPT Taxa, Percent Intolerant Organisms, Percent Filterers, and Percent Shredders. There were varying levels of numeric differences among the mean metric values that were not statistically significant different. Metrics with statistically significant differences among North Fork Stevenson Creek sites are described below.

EPT Index: The EPT Index was 43.3 at Site AO and ranged from 16.7 at Site BO 3 to 54.3 at Site BO 1. Site BO 3 was lower in value and significantly different from Site BO 1 (p=0.03) (Table CAWG 10-151).

Sensitive EPT Index: The Sensitive EPT Index was 35.2 at Site AO and ranged from 11.8 at Site BO 3 to 35.8 at Site BO 1. These sites were significantly different (p=0.05). On a site by site basis, the metrics were not significantly different (Table CAWG 10-152).

Shannon-Weaver Diversity Index: The Shannon-Weaver Diversity Index was 1.2 at Site AO and ranged downstream from 0.8 at Site BO 3 to 1.3 at Site BO 2. The site metrics were significantly different (p=0.04). On a site by site basis, the metrics were not significantly different (Table CAWG 10-153).

Relative Diversity (Evenness): Evenness was 0.7 at Site AO and ranged downstream from 0.6 at Site BO 3 to 0.8 at Sites BO 1 and BO 2. These site metrics were significantly different (p=0.01). Site BO 3 was lower in value and significantly different from Site BO 1 (p=0.02) and Site BO 2 (p=0.02) (Table CAWG 10-154).

Tolerance Value: Tolerance Values were 3.9 at Site AO, and ranged from 3.6 at Site BO 1 to 5.4 at Site BO 3 downstream. These site metrics were different at a significant level (p=0.02). Site BO 1 was lower in value and significantly different from Site BO 3 (p=0.03) (Table CAWG 10-155).

Percent Tolerant Organisms: Tolerant Organisms were 1.1 at Site AO and ranged downstream from 0.9 at Site BO 1 to 35.8 at Site BO 3. These site metrics were significantly different (p=0.0002). Site BO 3 was greater in value and significantly different from Site AO (p=0.0006) and Site BO 1 (p=0.0005). Site BO 2 also was higher in value and significantly different from Site AO (p=0.03) and Site BO 1 (0.03) (Table CAWG 10-156).

Percent Hydropsychidae: Percent Hydropsychidae was 3.9 at Site AO, and ranged from 0.3 at Site BO 3 to 4.6 at Site BO 2, downstream. These metrics were different at a significant level (p=0.05). On a site by site basis, there was no significant difference (Table CAWG 10-157).

Percent Baetidae: Percent Baetidae ranged from 0.8 at Site AO to 6.3 at Site BO 1 and were significantly different (p=0.03). Site AO was lower in value and significantly different from Site BO 1 (p=0.03) (Table CAWG 10-158).

Percent Dominant Taxa: Percent Dominant Taxa was 21.1 at Site AO and ranged downstream from 15.0 at Site BO 2, to 40.9 at Site BO 3. These site metrics were significantly different (p=0.03). Site BO 2 was lower in value and significantly different from Site BO 3 (p=0.05) (Table CAWG 10-159).

Percent Collectors: Percent Collectors was 48.7 at Site AO and ranged from 36.6 at Site BO 1 to 82.0 at Site BO 3. These site metrics were significantly different (p=0.0006). Site BO 3 was larger in value and significantly different from the other sites (Table CAWG 10-160).

Percent Scrapers: Percent Scrapers was 6.6 at Site AO and downstream ranged from 2.9 at Site BO 3 to 21.3 at Site BO 2. These values were significantly different (p=0.001). Site BO 3 was lower in value and significantly different from Site BO 1 (p=0.004) and Site BO 2 (p=0.007). Site AO was lower in value and significantly different from Site BO 1 (p=0.02) and Site BO 2 (p=0.02). This metric may have variable responses to disturbance (Table CAWG 10-161).

Percent Predators: Percent Predators ranged from 19.3 at Site AO to 6.1 at Site BO 3 and were significantly different (p=0.03). Site AO was larger in value and significantly different from Site BO 3 (p=0.04) (Table CAWG 10-162).

Cluster Analysis

Figure CAWG 10-57 presents the dendrogram for the physical/habitat quality scores by category. Sites BO 1 and BO 2 were most similar to each other, followed in similarity by Site BO 3. Site AO was the most dissimilar site.

Clusters of Project sites based on BMI taxa at the family level are presented in Figure CAWG 10-58. The dendrogram shows that taxa at sites were relatively dissimilar. Sites AO and BO 2 were most similar to each other, followed by Site BO 3, and then Site BO 1.

Mollusk Survey

No mollusk was observed during the visual survey (Map CAWG 10-15). Some members of the phylum Mollusca were collected during BMI sampling. These included the bivalves *Pisidium sp.* and Sphaeridae. *Pisidium sp.* was identified at Site BO 2 and Sphaeridae were identified at Sites BO 1 and BO 2 (Appendix E).

5.2.7.2 Stevenson Creek

Physical Habitat

Five locations were sampled in Stevenson Creek downstream of Shaver Lake Dam. Sites were located primarily in Rosgen Level I type Aa+ channels. However, Sites 3 and 1 were located in B and A type channels, respectively. Flows in this stream originate from releases from the dam. Flows were maintained by releases throughout the sampling period. There was little riffle habitat in this stream, only 3.1 percent of habitat in the Aa+ reach consisted of riffle. Due to the low occurrence of riffles, fewer replicates were collected than originally planned. Physical/habitat quality parameter score totals ranged from 168 downstream of Shaver Lake Dam to 158 at the most downstream site (Site 1) (Table CAWG 10-147). All five of the Stevenson Creek sampling sites would fall into the optimal range (Harrington and Born 2000).

Abundance

Table CAWG 10-148 shows that Site 4 had the highest mean density value (28,847 BMI/m²) and Site 3 had the lowest mean density value (2,644), although there was only one replicate sample available at Site 4. There was a statistically significant difference in BMI density among sites (p=0.01). Site 4 was higher in mean density value and significantly different from Site 1 (p=0.02), Site 3 (p=0.02), and Site 5 (p=0.02).

Abundant Taxa

Table CAWG 10-149 shows the most abundant taxa for the Stevenson Creek sampling sites were Diptera of the Orthocladiinae and Tanytarsini groups and the dipteran *Simulium sp*. The ephemeropteran *Baetis sp*. was a relatively abundant taxa for the Stevenson Creek sampling sites.

Metrics

Table CAWG 10-163 shows the CSBP metrics. The mean Functional Feeding Group percentages by site are shown in Figure CAWG 10-59. The following metrics were not statistically significantly different among Stevenson Creek sites: Taxa Richness, Ephemeroptera Taxa, Plecoptera Taxa, Trichoptera Taxa, EPT Taxa, EPT Index, Shannon-Weaver Diversity Index, Relative Diversity (Evenness), Tolerance Value, Percent Intolerant Organisms, Percent Tolerant Organisms, Percent Hydropsychidae, Percent Baetidae, Percent Dominant Taxa, Percent Collectors, Percent Filterers, Percent Scrapers, Percent Predators, and Percent Shredders. There were varying levels of numeric differences among the mean metric values that were not statistically significant different. Sensitive EPT Index was the only biological metric that was statistically significantly different among Stevenson Creek sites are detailed in the following section. This metric is described below.

Sensitive EPT Index: The Sensitive EPT Index ranged from 9.6 at Site 2 to 27.5 at Site 5 and were significantly different (p=0.04). Due to the unequal variances, site by site tests were not available.

Cluster Analysis

Figure CAWG 10-60 presents the dendrogram of the physical/habitat quality scores, which were relatively similar and formed two relatively similar groups. The first group consisted of Sites 2 and 4, with the other group consisting of Sites 3 and 5. Site 1 was most similar to the first group (Sites 2 and 4).

Clusters of sites based on BMI taxa at the family level are presented in Figure CAWG 10-61. The dendrogram shows that the BMI groups at the sites were relatively dissimilar. Sites 1 and 5 formed one group, with Site 4 more similar to this group than the second group. The second group consisted of Sites 2 and 3, which was dissimilar to the other group.

Mollusk Survey

No mollusks were observed during the visual survey (Map CAWG 10-15). Mollusk taxa collected in Stevenson Creek during BMI sampling included the bivalve Sphaeridae and the gastropod *Physa sp.* Sphaeridae were identified at Sites 1 and 5 and *Physa sp.* was present at Site 1 (Appendix E).

5.2.8 Reservoir Crayfish Survey

Crayfish sampling was performed in 2002 at Shaver Lake and Mammoth Pool Reservoir (Maps CAWG 10-16 and 10-17, respectively).

5.2.8.1 Shaver Lake

Crayfish were sampled in Shaver Lake using baited inclined plane traps. Baited minnow traps were set, as well, to provide information that would be comparable to that collected by BioSystems (1989) using similar traps. Thirty inclined-plane crayfish traps were set in Shaver Lake, in three depth intervals, on July 30, 2002 and fished for over 770 hours. Thirty-eight crayfish were caught in the traps, yielding a catch per unit effort

(CPUE) of 0.05 crayfish per hour (Table CAWG 10-164). One species of crayfish was collected in Shaver Lake (*Pacifastacus leniusculus*).

As shown in Table CAWG 10-165, CPUEs for the depth intervals were similar. There were slightly fewer crayfish caught at the greater depths. Table CAWG 10-166 presents a comparison of results obtained from the inclined plane traps and minnow traps fished during 2002. As shown in this table, the inclined plane traps were more efficient in capturing crayfish than minnow traps, capturing approximately four times as many fish per hour. For comparison with the results of the BioSystems study, results were expressed as catch per trap per night, the CPUE unit used in that study. Inclined plane traps were a little less than three times as effective at capturing crayfish on a catch per trap per night basis (Table CAWG 10-166).

The crayfish CPUE data for 2002 was compared to the CPUE data collected in Shaver Lake in 1988 by BioSystems Analysis, Inc (BioSystems, 1989). There was a higher number of crayfish collected per trap-night for inclined plane traps in the 2002 study (0.63 crayfish/trap-night) when compared to the 1988 study (0.25 crayfish/trap-night). However, if we compare catch per trap per night for minnow traps only, there was little difference 0.23 crayfish/trap-night in 2002 and 0.25 crayfish/trap-night in 1988.

5.2.8.2 Mammoth Pool

Thirty inclined plane traps were set in Mammoth Pool and fished for a total of about 1500 hours during September 2002. A total of 654 crayfish were caught in the traps, yielding a Catch Per Unit Effort (CPUE) of 0.44 crayfish per hour (Table CAWG 10-167). One species of crayfish was collected in Mammoth Pool (*Pacifastacus leniusculus*).

Sampling effort (Table CAWG 10-168) was divided among three depth strata similar to those used in Shaver Lake. CPUEs were approximately equal in all three depth intervals.

The crayfish CPUE data for 2002 was compared to the CPUE data collected in Mammoth Pool in 1998 by BioSystems Analysis, Inc (BioSystems, 1989). There was a lower CPUE for the 2002 study (10.90 crayfish/trap-night) than for the 1988 study (18.02 crayfish/trap-night). Based on the comparison of capture efficiency between minnow traps and inclined plane traps observed in Shaver Lake, the results suggest that relative abundance of crayfish in 2002 was even lower.

6.0
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TABLES

Table CAWG 10-1. Biological Metrics Used to Describe Benthic Macroinvertebrate (BMI) Samples Collected Following the California Stream Bioassessment Procedure (CSBP) (CDFG 1999).

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

Table CAWG 10-2.Physical/Habitat Quality Parameter Scores and Rosgen Level I Channel Types, South Fork San Joaquin River, Fall 2002.

Reach Name	Site	River Mile	Rosgen Level I Channel Type	Epifaunal Substrate/ Available Cover	Embeddedness	Velocity/ Depth Regimes	Sediment Deposition	Channel Flow Status	Channel Alteration	Frequency of Riffles	Bank Stability Left Bank	Bank Stability Right Bank	Vegetation Protection Left Bank	Vegetation Protection Right Bank	Riparian Vegetation Zone Width Left Bank	Riparian Vegetation Zone Width Right Bank	Total
South Fork San Joaquin River	Site 1	(RM 0.80)	B	19	18	19	17	20	19	18	10	8	2	9	1	3	163
	Site 2	(RM 15.40)	B	10	20	20	20	15	20	18	10	10	2	2	1	3	151
	Site 3	(RM 16.95)	B	10	20	20	19	16	20	16	10	10	10	10	2	1	164
	Site 4	(RM 19.70)	B	15	16	18	19	18	20	13	10	10	2	2	1	1	145
	Site 5	(RM 21.40)	B	14	18	17	18	15	19	14	10	10	2	2	2	2	143
	Site 6	(RM 23.75)	B	17	19	19	16	19	18	18	8	8	7	7	2	2	160
	Site 7	(RM 25.60)	B	18	18	20	19	19	19	15	8	9	8	10	7	9	179
	Site 8	(RM 26.90)	C/B	16	10	16	9	16	16	14	7	6	7	7	5	5	134
	Site 9[1]	(RM 30.65)	B	10	18	20	20	12	20	19	10	9	1	1	1	1	142

[1] Upstream of Florence Lake

Table CAWG 10-3. Densities of Macroinvertebrates, South Fork San Joaquin River, Fall 2002.

Stream	Site	River Mile	Mean Density (No./Sq-M)	Standard Deviation	Coefficient of Variation
South Fork San Joaquin River	Site 1	(RM 0.80)	6997	657	9
	Site 2	(RM 15.40)	1684	781	46
	Site 3	(RM 16.95)	2412	1844	76
	Site 4	(RM 19.70)	3431	2603	76
	Site 5	(RM 21.40)	5403	1797	33
	Site 6	(RM 23.75)	6339	1058	17
	Site 7	(RM 25.60)	7961	4515	57
	Site 8	(RM 26.90)	6458	*	*
	Site 9[1]	(RM 30.65)	2724	827	30

- Only one Replicate

[1] Upstream of Florence Lake

Table CAWG 10-4. Abundant Benthic Macroinvertebrate Insect Taxa and Percent Contribution by Site, South Fork San Joaquin River, Fall 2002.

Order	Taxa	Site 9[1] (RM 30.65)	Site 8 (RM 26.90)	Site 7 (RM 25.60)	Site 6 (RM 23.75)	Site 5 (RM 21.40)	Site 4 (RM 19.70)	Site 3 (RM 16.95)	Site 2 (RM 15.40)	Site 1 (RM 0.80)
Ephemeroptera	*Baetis sp.*	4.9			5.2	5.3	6.9	10.5	7.0	16.4
Ephemeroptera	*Cinygmula sp.*		1.7							
Ephemeroptera	*Epeorus sp.*						3.9		1.5	
Ephemeroptera	*Paraleptophlebia sp.*		2.3							
Plecoptera	*Zapada sp.*		13.7	5.4						
Trichoptera	*Arctopsyche sp.*								1.2	
Trichoptera	*Hydropsyche sp.*	2.9				3.5	4.0	2.8	3.5	1.4
Trichoptera	*Hydroptila sp.*	4.6		25.9	38.1	18.0				1.4
Trichoptera	*Lepidostoma sp.*				3.1					
Trichoptera	*Ochrotrichia sp.*									2.4
Trichoptera	*Rhyacophila sp.*									3.2
Diptera	*Simulium sp.*	39.2	39.3		10.1	31.9	45.6	59.7	74.5	48.9
Diptera	Chironomini			6.7				2.0		
Diptera	Diamesinae			3.8						
Diptera	Orthocladiinae	25.2	6.0	9.4	10.4	19.0	7.1	7.5	2.3	18.3
Diptera	Tanytarsini	4.6	2.0	4.6	3.3	4.7	8.4	5.5		
Totals		81.5	65.0	55.7	70.1	82.3	76.0	88.1	90.1	92.0

[1] Upstream of Florence Lake

Table CAWG 10-5. Metric Values by Site for South Fork San Joaquin River Benthic Macroinvertebrates, Big Creek ALP, Fall 2002.

Biological Metrics	South Fork San Joaquin River																											Probability Value from ANOVA
	Site 9[1] (RM 30.65)			Site 8 (RM 26.90)			Site 7 (RM 25.60)			Site 6 (RM 23.75)			Site 5 (RM 21.40)			Site 4 (RM 19.70)			Site 3 (RM 16.95)			Site 2 (RM 15.40)			Site 1 (RM 0.80)			
	Mean	SD[2]	CV[3]	Mean	SD	CV	Mean	SD	CV	Mean	SD	CV	Mean	SD	CV	Mean	SD	CV	Mean	SD	CV	Mean	SD	CV	Mean	SD	CV	
Taxa Richness	24.0	9.2	38.2	24.0	*	*	38.0	2.6	7.0	32.3	4.5	13.9	24.0	4.0	16.7	30.3	5.5	18.2	24.3	4.7	19.4	22.0	3.5	15.7	31.3	1.2	3.7	p=0.02
Ephemeroptera Taxa	6.7	3.1	45.8	4.0	*	*	6.0	1.0	16.7	6.3	0.6	9.1	5.3	0.6	10.8	6.3	0.6	9.1	3.7	1.2	31.5	4.0	0.0	0.0	7.0	0.0	0.0	p=0.22[A]
Plecoptera Taxa	2.0	1.0	50.0	3.0	*	*	4.7	0.6	12.4	3.0	1.0	33.3	1.7	1.2	69.3	4.3	0.6	13.3	2.0	1.0	50.0	1.0	0.0	0.0	3.0	2.0	66.7	p=0.01
Trichoptera Taxa	5.0	1.0	20.0	5.0	*	*	8.3	0.6	6.9	5.3	0.6	10.8	5.0	2.0	40.0	6.0	1.7	28.9	5.0	0.0	0.0	4.3	0.6	13.3	6.0	2.0	33.3	p=0.06
EPT Taxa	13.7	5.0	36.8	12.0	*	*	19.0	1.7	9.1	14.7	0.6	3.9	12.0	2.6	22.0	16.7	2.1	12.5	10.7	0.6	5.4	9.3	0.6	6.2	16.0	0.0	0.0	p<0.0001[A]
EPT Index	23.5	18.5	78.9	21.7	*	*	46.3	8.1	17.5	60.0	8.6	14.3	32.5	8.4	25.9	27.4	4.9	17.9	19.0	5.4	28.2	17.1	4.7	27.3	48.2	12.2	25.4	p=0.0006
Sensitive EPT Index	7.2	4.8	65.8	15.7	*	*	12.0	2.4	19.7	11.4	2.4	20.9	3.7	1.7	44.1	10.8	0.7	6.1	3.9	1.7	43.7	3.9	0.9	21.9	10.9	0.9	8.4	p=0.0001[A]
Shannon-Weaver Diversity Index	0.8	0.4	57.4	0.9	*	*	1.2	0.1	4.7	1.0	0.1	8.3	0.9	0.0	5.4	0.9	0.2	25.7	0.7	0.2	26.4	0.5	0.0	4.8	1.0	0.1	11.5	p<0.0001[A]
Relative Diversity (Evenness)	0.6	0.3	48.8	0.7	*	*	0.8	0.0	4.2	0.7	0.0	6.1	0.7	0.0	6.0	0.6	0.1	22.6	0.5	0.1	21.1	0.4	0.0	9.1	0.7	0.1	10.7	p=0.0001[A]
Tolerance Value	5.0	0.6	11.8	5.5	*	*	5.0	0.2	3.4	5.1	0.3	5.4	5.5	0.2	2.9	4.9	0.2	3.3	5.4	0.1	1.8	5.4	0.1	1.6	4.6	0.2	5.3	p=0.01[A]
Percent Intolerant Organisms	9.1	5.7	62.3	16.0	*	*	16.2	3.6	22.0	12.5	2.7	21.7	4.0	1.8	45.4	12.3	2.4	19.2	5.1	0.5	9.8	6.0	0.9	14.5	8.7	0.3	3.9	p=0.0007[A]
Percent Tolerant Organisms	0.2	0.2	86.7	20.0	*	*	7.0	2.5	35.4	4.2	4.2	99.6	4.1	1.6	38.7	1.1	1.0	92.6	0.4	0.7	173.2	0.2	0.2	86.9	2.2	3.0	138.0	p=0.0004
Percent Hydropsychidae	4.1	2.6	62.6	0.3	*	*	2.1	1.5	72.5	2.2	1.1	49.2	3.9	3.5	89.8	4.9	1.0	21.2	3.4	1.3	38.4	4.9	3.6	73.0	21.2	13.9	65.3	p=0.30[A]
Percent Baetidae	5.9	4.8	80.6	0.3	*	*	2.9	0.9	29.4	5.3	2.4	45.8	5.7	3.0	52.7	6.9	2.5	37.0	10.6	6.0	56.7	7.2	5.3	73.6	9.9	4.6	46.5	p=0.30
Percent Dominant Taxa	51.6	32.1	62.2	39.3	*	*	25.8	5.0	19.3	38.0	10.4	27.5	31.9	2.8	8.8	45.9	18.6	40.5	59.6	15.4	25.8	74.4	3.6	4.9	34.0	12.0	35.2	p=0.04
Percent Collectors	42.6	30.6	72.0	23.7	*	*	38.3	5.8	15.1	26.6	3.9	14.6	36.9	7.8	21.2	29.7	14.7	49.3	28.5	15.1	52.9	12.0	3.8	31.9	55.2	16.2	29.3	p=0.12
Percent Filterers	43.7	39.4	90.4	47.7	*	*	6.9	2.5	36.1	15.8	6.1	38.9	36.5	6.2	17.0	51.9	16.9	32.6	64.1	17.8	27.7	80.3	5.7	7.1	26.5	17.2	64.7	p<0.0001[A]
Percent Scrapers	8.9	8.8	98.4	2.7	*	*	29.9	6.6	22.0	42.9	10.4	24.3	19.4	9.4	48.7	9.4	1.3	13.7	4.1	1.3	30.9	4.5	1.5	34.5	12.3	2.5	20.3	p<0.0001
Percent Predators	3.7	3.0	82.4	11.7	*	*	17.6	4.0	22.8	9.2	1.0	10.8	5.7	2.4	41.5	6.1	4.0	65.0	2.7	1.3	46.4	2.9	1.0	34.6	5.0	1.4	27.9	p<0.0001
Percent Shredders	1.2	1.2	101.7	14.3	*	*	7.3	1.7	22.7	5.5	2.1	37.8	1.6	0.9	57.0	2.8	0.9	30.4	0.7	0.3	48.8	0.3	0.0	5.0	1.0	0.6	59.3	p<0.0001

* only one Replicate

[A] Data do not meet equal variance (homogeneity) assumption. Welch Test applied to this metric, Bonferroni t-Test not used.

Statistically significant ANOVA p≤0.05 among all sites.

Statistically significant ANOVA p≤0.05 among all sites and statistically significant difference between two or more individual sites based on Boneferroni t-test.

[1] Upstream of Florence Lake
[2] Standard Deviation
[3] Coefficient of Variation

Table CAWG 10-6. Matrix of Probabilities Resulting from *Post Hoc* Pairwise Bonferroni t-Test Comparisons for South Fork San Joaquin River Taxa Richness.

	Taxa Richness								
	Site 1 (RM 0.80)	Site 2 (RM 15.40)	Site 3 (RM 16.95)	Site 4 (RM 19.70)	Site 5 (RM 21.40)	Site 6 (RM 23.75)	Site 7 (RM 25.60)	Site 8 (RM 26.90)	Site 9 (RM 30.65)
Site 1	X	X	X	X	X	X	X	X	X
Site 2	1.00	X	X	X	X	X	X	X	X
Site 3	1.00	1.00	X	X	X	X	X	X	X
Site 4	1.00	1.00	1.00	X	X	X	X	X	X
Site 5	1.00	1.00	1.00	1.00	X	X	X	X	X
Site 6	1.00	0.73	1.00	1.00	1.00	X	X	X	X
Site 7	1.00	0.04	0.13	1.00	0.11	1.00	X	X	X
Site 8	1.00	1.00	1.00	1.00	1.00	1.00	0.91	X	X
Site 9	1.00	1.00	1.00	1.00	1.00	1.00	0.11	1.00	X

Probabilities ≤ 0.05 are highlighted

Probabilities ≤ 0.0001 shown as 0.0001

Table CAWG 10-7. Matrix of Probabilities Resulting from *Post Hoc* Pairwise Bonferroni t-Test Comparisons for South Fork San Joaquin River Plecoptera Taxa.

Plecoptera Taxa									
	Site 1 (RM 0.80)	Site 2 (RM 15.40)	Site 3 (RM 16.95)	Site 4 (RM 19.70)	Site 5 (RM 21.40)	Site 6 (RM 23.75)	Site 7 (RM 25.60)	Site 8 (RM 26.90)	Site 9 (RM 30.65)
Site 1	X	X	X	X	X	X	X	X	X
Site 2	1.00	X	X	X	X	X	X	X	X
Site 3	1.00	1.00	X	X	X	X	X	X	X
Site 4	1.00	0.05	0.57	X	X	X	X	X	X
Site 5	1.00	1.00	1.00	0.26	X	X	X	X	X
Site 6	1.00	1.00	1.00	1.00	1.00	X	X	X	X
Site 7	1.00	0.02	0.26	1.00	0.12	1.00	X	X	X
Site 8	1.00	1.00	1.00	1.00	1.00	1.00	1.00	X	X
Site 9	1.00	1.00	1.00	0.57	1.00	1.00	0.26	1.00	X

Probabilities ≤ 0.05 are highlighted
Probabilities ≤ 0.0001 shown as 0.0001

Table CAWG 10-8. Matrix of Probabilities Resulting from *Post Hoc* Pairwise Bonferroni t-Test Comparisons for South Fork San Joaquin River EPT Index.

EPT Index									
	Site 1 (RM 0.80)	Site 2 (RM 15.40)	Site 3 (RM 16.95)	Site 4 (RM 19.70)	Site 5 (RM 21.40)	Site 6 (RM 23.75)	Site 7 (RM 25.60)	Site 8 (RM 26.90)	Site 9 (RM 30.65)
Site 1	X	X	X	X	X	X	X	X	X
Site 2	0.05	X	X	X	X	X	X	X	X
Site 3	0.08	1.00	X	X	X	X	X	X	X
Site 4	0.72	1.00	1.00	X	X	X	X	X	X
Site 5	1.00	1.00	1.00	1.00	X	X	X	X	X
Site 6	1.00	0.002	0.004	0.03	0.13	X	X	X	X
Site 7	1.00	0.08	0.14	1.00	1.00	1.00	X	X	X
Site 8	1.00	1.00	1.00	1.00	1.00	0.14	1.00	X	X
Site 9	0.26	1.00	1.00	1.00	1.00	0.01	0.43	1.00	X

Probabilities ≤ 0.05 are highlighted

Probabilities ≤ 0.0001 shown as 0.0001

Table CAWG 10-9. Matrix of Probabilities Resulting from *Post Hoc* Pairwise Bonferroni t-Test Comparisons for South Fork San Joaquin River Percent Tolerant Organisms.

Percent Tolerant Organisms									
	Site 1 (RM 0.80)	Site 2 (RM 15.40)	Site 3 (RM 16.95)	Site 4 (RM 19.70)	Site 5 (RM 21.40)	Site 6 (RM 23.75)	Site 7 (RM 25.60)	Site 8 (RM 26.90)	Site 9 (RM 30.65)
Site 1	X	X	X	X	X	X	X	X	X
Site 2	1.00	X	X	X	X	X	X	X	X
Site 3	1.00	1.00	X	X	X	X	X	X	X
Site 4	1.00	1.00	1.00	X	X	X	X	X	X
Site 5	1.00	0.30	0.30	1.00	X	X	X	X	X
Site 6	1.00	0.43	0.44	1.00	1.00	X	X	X	X
Site 7	0.75	0.03	0.03	0.17	1.00	1.00	X	X	X
Site 8	0.03	0.003	0.003	0.01	0.25	0.19	1.00	X	X
Site 9	1.00	1.00	1.00	1.00	0.31	0.45	0.028	0.003	X

Probabilities ≤ 0.05 are highlighted

Probabilities ≤ 0.0001 shown as 0.0001

Table CAWG 10-10. Matrix of Probabilities Resulting from *Post Hoc* Pairwise Bonferroni t-Test Comparisons for South Fork San Joaquin River Percent Dominant Taxa.

Percent Dominant Taxa									
	Site 1 (RM 0.80)	Site 2 (RM 15.40)	Site 3 (RM 16.95)	Site 4 (RM 19.70)	Site 5 (RM 21.40)	Site 6 (RM 23.75)	Site 7 (RM 25.60)	Site 8 (RM 26.90)	Site 9 (RM 30.65)
Site 1	X	X	X	X	X	X	X	X	X
Site 2	0.22	X	X	X	X	X	X	X	X
Site 3	1.00	1.00	X	X	X	X	X	X	X
Site 4	1.00	1.00	1.00	X	X	X	X	X	X
Site 5	1.00	0.16	1.00	1.00	X	X	X	X	X
Site 6	1.00	0.43	1.00	1.00	1.00	X	X	X	X
Site 7	1.00	0.06	0.63	1.00	1.00	1.00	X	X	X
Site 8	1.00	1.00	1.00	1.00	1.00	1.00	1.00	X	X
Site 9	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	X

Probabilities ≤ 0.05 are highlighted

Probabilities ≤ 0.0001 shown as 0.0001

Table CAWG 10-11. Matrix of Probabilities Resulting from *Post Hoc* Pairwise Bonferroni t-Test Comparisons for South Fork San Joaquin River Percent Scrapers.

Percent Scrapers									
	Site 1 (RM 0.80)	Site 2 (RM 15.40)	Site 3 (RM 16.95)	Site 4 (RM 19.70)	Site 5 (RM 21.40)	Site 6 (RM 23.75)	Site 7 (RM 25.60)	Site 8 (RM 26.90)	Site 9 (RM 30.65)
Site 1	X	X	X	X	X	X	X	X	X
Site 2	1.00	X	X	X	X	X	X	X	X
Site 3	1.00	1.00	X	X	X	X	X	X	X
Site 4	1.00	1.00	1.00	X	X	X	X	X	X
Site 5	1.00	0.24	0.18	1.00	X	X	X	X	X
Site 6	0.02	0.0003	0.0002	0.005	0.18	X	X	X	X
Site 7	0.46	0.008	0.006	0.13	1.00	1.00	X	X	X
Site 8	1.00	1.00	1.00	1.00	0.62	0.005	0.05	X	X
Site 9	1.00	1.00	1.00	1.00	1.00	0.001	0.04	1.00	X

Probabilities ≤ 0.05 are highlighted

Probabilities ≤ 0.0001 shown as 0.0001

Table CAWG 10-12. Matrix of Probabilities Resulting from *Post Hoc* Pairwise Bonferroni t-Test Comparisons for South Fork San Joaquin River Percent Predators.

Percent Predators									
	Site 1 (RM 0.80)	Site 2 (RM 15.40)	Site 3 (RM 16.95)	Site 4 (RM 19.70)	Site 5 (RM 21.40)	Site 6 (RM 23.75)	Site 7 (RM 25.60)	Site 8 (RM 26.90)	Site 9 (RM 30.65)
Site 1	X	X	X	X	X	X	X	X	X
Site 2	1.00	X	X	X	X	X	X	X	X
Site 3	1.00	1.00	X	X	X	X	X	X	X
Site 4	1.00	1.00	1.00	X	X	X	X	X	X
Site 5	1.00	1.00	1.00	1.00	X	X	X	X	X
Site 6	1.00	0.30	0.26	1.00	1.00	X	X	X	X
Site 7	0.0005	0.0001	0.0001	0.002	0.001	0.03	X	X	X
Site 8	1.00	0.33	0.29	1.00	1.00	1.00	1.00	X	X
Site 9	1.00	1.00	1.00	1.00	1.00	0.64	0.0001	0.56	X

Probabilities ≤ 0.05 are highlighted

Probabilities ≤ 0.0001 shown as 0.0001

Table CAWG 10-13. Matrix of Probabilities Resulting from *Post Hoc* Pairwise Bonferroni t-Test Comparisons for South Fork San Joaquin River Percent Shredder.

Percent Shredder									
	Site 1 (RM 0.80)	Site 2 (RM 15.40)	Site 3 (RM 16.95)	Site 4 (RM 19.70)	Site 5 (RM 21.40)	Site 6 (RM 23.75)	Site 7 (RM 25.60)	Site 8 (RM 26.90)	Site 9 (RM 30.65)
Site 1	X	X	X	X	X	X	X	X	X
Site 2	1.00	X	X	X	X	X	X	X	X
Site 3	1.00	1.00	X	X	X	X	X	X	X
Site 4	0.70	0.03	0.18	X	X	X	X	X	X
Site 5	1.00	0.82	1.00	1.00	X	X	X	X	X
Site 6	0.005	0.0002	0.001	1.00	0.04	X	X	X	X
Site 7	0.0003	0.0001	0.0001	0.06	0.002	1.00	X	X	X
Site 8	0.0001	0.0001	0.0001	0.002	0.0001	0.05	0.39	X	X
Site 9	1.00	1.00	1.00	0.85	1.00	0.006	0.0003	0.0001	X

Probabilities ≤ 0.05 are highlighted
Probabilities ≤ 0.0001 shown as 0.0001

Table CAWG 10-14. Physical/Habitat Quality Parameter Scores, South Fork San Joaquin River Tributaries.

Reach Name	Site	River Mile[1]	Rosgen Level I Channel Type	Epifaunal Substrate/ Available Cover	Embeddedness	Velocity/ Depth Regimes	Sediment Deposition	Channel Flow Status	Channel Alteration	Frequency of Riffles	Bank Stability Left Bank	Bank Stability Right Bank	Vegetation Protection Left Bank	Vegetation Protection Right Bank	Riparian Vegetation Zone Width Left Bank	Riparian Vegetation Zone Width Right Bank	Total
Tombstone Creek	Site AD	(RM 1.15)	Aa+	15	16	16	15	18	20	19	4	4	4	4	5	5	145
	Site BD 2	(RM 0.95)	Aa+	16	12	10	18	17	20	18	10	10	7	9	1	1	149
	Site BD1	(RM 0.70)	Aa+	17	13	15	15	12	20	17	10	10	9	9	10	10	167
South Slide Creek	Site AD	(RM 0.40)	Aa+	18	17	10	17	17	20	20	10	10	8	8	5	5	165
	Site BD 2	(RM 0.05)	Aa+	9	8	13	6	10	19	17	8	8	9	9	6	6	128
North Slide Creek	Site AD	(RM 0.35)	Aa+	20	18	15	18	15	20	19	10	10	8	8	5	2	168
	Site BD 2	(RM 0.25)	Aa+	10	8	9	5	5	19	18	9	9	10	10	6	6	124
	Site BD 1	(RM 0.05)	Aa+	13	8	9	8	16	19	18	7	7	10	10	2	2	129
Hooper Creek	Site AD	(RM 0.70)	Aa+	13	11	8	15	16	18	17	9	6	5	5	5	5	133
	Site BD 2	(RM 0.55)	Aa+	19	14	18	15	18	19	20	10	10	10	10	2	3	168
	Site BD 1	(RM 0.05)	Aa+	15	13	14	14	16	18	17	6	6	6	6	5	5	141
Crater Creek	Site AD	(RM 3.10)	Aa+	6	16	9	9	5	19	3	9	7	6	6	2	2	99
	Site BD 3	(RM 2.40)	Aa+	7	12	4	13	11	19	8	9	8	9	8	2	2	112
Bear Creek	Site AD	(RM 1.80)	B	16	17	16	18	15	20	19	9	9	8	8	7	7	169
	Site BD 2	(RM 1.50)	A (w/B)	17	18	16	19	14	16	15	8	9	6	6	5	5	154
	Site BD 1	(RM 0.05)	A (w/B)	17	17	20	19	16	19	12	10	10	1	1	0	0	142
Chinquapin Creek	Site AD	(RM 0.95)	Aa+	13	16	19	15	8	20	16	10	10	2	2	8	1	140
	Site BD 2	(RM 0.60)	Aa+	14	16	8	11	9	18	13	5	5	5	5	2	2	113
	Site BD 1	(RM 0.35)	Aa+	11	11	10	6	6	16	16	7	9	9	8	2	2	113
Camp 62 Creek	Site AD	(RM 1.40)	Aa+	13	14	10	12	10	16	18	8	8	6	6	3	3	127
	Site BD 2	(RM 1.20)	Aa+	11	16	10	12	7	17	19	9	9	6	6	3	3	128
	Site BD 1	(RM 0.05)	Aa+	15	16	14	13	13	19	19	9	9	9	9	7	6	158
Bolsillo Creek	Site AD	(RM 1.65)	B	11	10	10	13	11	14	16	7	7	5	5	4	4	117
	Site BD 2	(RM 1.30)	B	9	12	10	9	13	20	11	6	7	7	7	4	4	119
	Site BD 1	(RM 0.70)	Aa+	3	0	2	3	7	20	3	8	6	6	5	2	2	67
Mono Creek	Site BD 4	(RM 5.70)	B	9	20	18	8	16	19	18	8	8	8	8	5	5	150
	Site BD 3	(RM 4.90)	B	13	20	13	20	19	19	14	9	9	9	9	4	4	162
	Site BD 2	(RM 1.30)	B	17	19	19	18	19	19	18	9	9	9	9	5	5	175
	Site BD 1	(RM 0.40)	B	18	19	18	19	19	19	18	10	10	9	9	4	4	176

[1] Stream River Miles (RM) begin at major downstream confluence.

Table CAWG 10-15. Densities of Macroinvertebrate Samples, South Fork San Joaquin River Tributaries, Fall 2002.

Stream	Site	River Mile	Mean Density (No./Sq-M)	Standard Deviation	Coefficient of Variation
Tombstone Creek	Site AD	(RM 1.15)	2652	*	*
	Site BD 2	(RM 0.95)	1883	*	*
	Site BD 1	(RM 0.70)	8393	4408	53
South Slide Creek	Site AD	(RM 0.40)	3047	877	29
	Site BD 2	(RM 0.05)	2119	1738	82
North Slide Creek	Site AD	(RM 0.35)	4827	5140	106
	Site BD 2	(RM 0.25)	299	194	65
	Site BD 1	(RM 0.05)	3108	*	*
Hooper Creek	Site AD	(RM 0.70)	3120	2773	89
	Site BD 2	(RM 0.55)	2214	1321	60
	Site BD 1	(RM 0.05)	1012	226	22
Crater Creek	Site AD	(RM 3.10)	11797	*	*
	Site BD 3	(RM 2.40)	5989	8065	135
Bear Creek	Site AD	(RM 1.80)	3185	2096	66
	Site BD 2	(RM 1.50)	2139	648	30
	Site BD 1	(RM 0.05)	3345	1927	58
Chinquapin Creek	Site AD	(RM 0.95)	4204	795	19
	Site BD 2	(RM 0.60)	1463	1450	99
	Site BD 1	(RM 0.35)	9731	*	*
Camp 62 Creek	Site AD	(RM 1.40)	1567	641	41
	Site BD 2	(RM 1.20)	1625	*	*
	Site BD 1	(RM 0.05)	2736	1246	46
Bolsillo Creek	Site AD	(RM 1.65)	1943	429	22
	Site BD 2	(RM 1.30)	2795	949	34
	Site BD 1	(RM 0.70)	380	*	*
Mono Creek	Site BD 4	(RM 5.70)	2526	498	20
	Site BD 3	(RM 4.90)	911	318	35
	Site BD 2	(RM 1.30)	2617	1919	73
	Site BD 1	(RM 0.40)	845	487	58

* only one Replicate

Table CAWG 10-16. Abundant Benthic Macroinvertebrate Insect Taxa and Percent Contribution by Site, South Fork San Joaquin River Tribs, Fall 2002.

Order	Taxa	Tombstone Creek			South Slide Creek		North Slide Creek			Hooper Creek			Crater Creek		Bear Creek			Chinquapin Creek			Camp 62			Bolsillo Creek			Mono Creek			
		Site AD (RM 1.15)	Site BD 2 (RM 0.95)	Site BD 1 (RM 0.70)	Site AD (RM 0.40)	Site BD 2 (RM 0.05)	Site AD (RM 0.35)	Site BD 2 (RM 0.25)	Site BD 1 (RM 0.05)	Site AD (RM 0.70)	Site BD 2 (RM 0.55)	Site BD 1 (RM 0.05)	Site AD (RM 3.10)	Site BD 3 (RM 2.40)	Site AD (RM 1.80)	Site BD 2 (RM 1.50)	Site BD 1 (RM 0.05)	Site AD (RM 0.95)	Site BD 2 (RM 0.60)	Site BD 1 (RM 0.35)	Site AD (RM 1.40)	Site BD 2 (RM 1.20)	Site BD 1 (RM 0.05)	Site AD (RM 1.65)	Site BD 2 (RM 1.30)	Site BD 1 (RM 0.70)	Site BD 4 (RM 5.70)	Site BD 3 (RM 4.90)	Site BD 2 (RM 1.30)	Site BD 1 (RM 0.40)
Ephemeroptera	*Baetis sp.*	3.6				2.7					5.4	15.1				7.1	8.4										5.9	40.5	9.3	17.9
Ephemeroptera	*Cinygmula sp.*																							5.1	3.4				1.8	
Ephemeroptera	*Diphetor hageni*													5.3											4.4					
Ephemeroptera	*Drunella sp.*									13.0		7.3						4.0	4.5		8.6	6.6								
Ephemeroptera	*Epeorus sp.*														4.9															
Ephemeroptera	*Ephemerella sp.*														7.3															
Ephemeroptera	*Ironodes sp.*	24.7	5.2		18.1	9.7	6.6													1.2										1.9
Ephemeroptera	*Paraleptophlebia sp.*						2.6									4.7												2.9		
Ephemeroptera	*Rhithrogena sp.*									3.0																				
Ephemeroptera	*Serratella sp.*		11.6	4.9									6.6	6.2							7.9			3.0						
Plecoptera	*Capniidae*					4.0												5.0						22.4	3.2	32.5				
Plecoptera	*Doroneuria sp.*									9.2									3.6			7.0								
Plecoptera	*Moselia infuscata*								2.2																					
Plecoptera	*Paracapnia sp.*												3.3																	
Plecoptera	*Yoraperla sp.*	6.2	7.3																											
Plecoptera	*Zapada sp.*			4.8	3.1	8.4	11.5		10.2	5.2	15.4	11.7	3.3	9.6		6.0		7.4	17.1	1.2	13.4	16.2	7.9	19.3	20.6		11.9	4.4	1.7	2.1
Trichoptera	*Agapetus sp.*																						4.6							
Trichoptera	*Anagapetus sp.*		5.2								5.7							6.4												
Trichoptera	*Arctopsychinae*	3.6																												
Trichoptera	*Cryptochia sp.*																									1.9				
Trichoptera	*Glossosoma sp.*																						5.5							
Trichoptera	*Hydropsyche sp.*														13.0	5.1													1.7	2.4
Trichoptera	*Hydroptila sp.*																12.9										9.3			
Trichoptera	*Hydroptilidae*																2.6													
Trichoptera	*Lepidostoma sp.*														4.3					1.2			6.9						2.8	
Trichoptera	*Limnephilidae*																				6.5									
Trichoptera	*Micrasema sp.*		6.7	3.3																										
Trichoptera	*Neothremma sp.*				2.6																									

Table CAWG 10-16. Abundant Benthic Macroinvertebrate Insect Taxa and Percent Contribution by Site, South Fork San Joaquin River Tribs, Fall 2002. (Continued)

Order	Taxa	Tombstone Creek			South Slide Creek		North Slide Creek			Hooper Creek			Crater Creek		Bear Creek			Chinquapin Creek			Camp 62			Bolsillo Creek			Mono Creek			
		Site AD (RM 1.15)	Site BD 2 (RM 0.95)	Site BD 1 (RM 0.70)	Site AD (RM 0.40)	Site BD 2 (RM 0.05)	Site AD (RM 0.35)	Site BD 2 (RM 0.25)	Site BD 1 (RM 0.05)	Site AD (RM 0.70)	Site BD 2 (RM 0.55)	Site BD 1 (RM 0.05)	Site AD (RM 3.10)	Site BD 3 (RM 2.40)	Site AD (RM 1.80)	Site BD 2 (RM 1.50)	Site BD 1 (RM 0.05)	Site AD (RM 0.95)	Site BD 2 (RM 0.60)	Site BD 1 (RM 0.35)	Site AD (RM 1.40)	Site BD 2 (RM 1.20)	Site BD 1 (RM 0.05)	Site AD (RM 1.65)	Site BD 2 (RM 1.30)	Site BD 1 (RM 0.70)	Site BD 4 (RM 5.70)	Site BD 3 (RM 4.90)	Site BD 2 (RM 1.30)	Site BD 1 (RM 0.40)
Trichoptera	*Oligophlebodes sp.*											6.3																		
Trichoptera	*Rhyacophila sp.*						3.3																							
Diptera	*Antocha sp.*																											4.3		
Diptera	*Bezzia/ Palpomyia sp.*							1.8																						
Diptera	*Culicoides sp.*							13.5																						
Diptera	*Forcipomyia sp.*																									1.4				
Diptera	*Glutops sp.*				2.7																									
Diptera	*Gonomyia sp.*																									0.5				
Diptera	*Neoplasta sp.*								2.2																					
Diptera	*Simulium sp.*	5.2		3.2							5.4					34.4	12.4										3.2		53.5	41.7
Diptera	*Chironomini*							9.0																						
Diptera	*Diamesinae*																		3.2	2.7		5.6								
Diptera	*Orthocladiinae*	12.3	11.0	29.9	28.6	35.6	21.9	3.6	28.0	28.7	23.8	10.7	56.6	38.1	4.4	11.9	15.2	26.8	29.1	42.2	18.4	19.9	27.9	15.6	26.2	42.5	29.7	11.3	6.7	11.2
Diptera	*Podonominae*																									18.9				
Diptera	*Tanypodinae*					2.7		3.3	2.2				9.9	6.2						4.1										
Diptera	*Tanytarsini*	6.8		12.2	2.5	16.9	7.1	15.3	36.9	12.7	19.2	14.7	13.1	11.3	7.6		5.1	5.9	11.3	38.6	6.7	8.6	8.8	14.9	19.6		2.4	9.0		
Totals		62.3	47.0	58.2	57.6	80.0	53.1	46.5	81.5	71.6	74.8	65.8	92.7	76.6	41.5	69.2	56.6	55.6	68.7	91.2	61.5	63.9	61.5	80.3	77.3	97.6	62.4	72.4	77.5	77.2

Table CAWG 10-17. Metric Values by Site for Tombstone Creek Benthic Macroinvertebrates, Big Creek ALP, Fall 2002.

Biological Metrics	Tombstone Creek Site AD (RM 1.15) Mean	Standard Deviation	Coefficient of Variation	Tombstone Creek Site BD 2 (RM 0.95) Mean	Standard Deviation	Coefficient of Variation	Tombstone Creek Site BD 1 (RM 0.70) Mean	Standard Deviation	Coefficient of Variation	Probability Value from ANOVA
Taxa Richness	35.0	*	*	36.0	*	*	36.0	2.6	7.3	p=0.95
Ephemeroptera Taxa	5.0	*	*	7.0	*	*	5.3	0.6	10.8	p=0.21
Plecoptera Taxa	7.0	*	*	3.0	*	*	4.7	1.2	24.7	p=0.25
Trichoptera Taxa	7.0	*	*	7.0	*	*	6.3	1.5	24.1	p=0.90
EPT Taxa	19.0	*	*	17.0	*	*	16.3	3.2	19.7	p=0.79
EPT Index	57.5	*	*	52.4	*	*	27.2	5.0	18.4	p=0.05
Sensitive EPT Index	25.3	*	*	42.1	*	*	22.5	2.8	12.6	p=0.05
Shannon-Weaver Diversity Index	1.2	*	*	1.3	*	*	1.2	0.0	4.0	p=0.16
Relative Diversity (Evenness)	0.8	*	*	0.9	*	*	0.7	0.0	4.9	p=0.22
Tolerance Value	3.9	*	*	3.7	*	*	4.4	0.2	3.6	p=0.09
Percent Intolerant Organisms	25.7	*	*	42.1	*	*	23.0	2.7	11.8	p=0.05
Percent Tolerant Organisms	2.6	*	*	7.0	*	*	2.8	0.2	6.9	p=0.005
Percent Hydropsychidae	0.3	*	*	0.0	*	*	0.2	0.2	87.2	p=0.54
Percent Baetidae	3.6	*	*	4.0	*	*	0.8	0.8	102.2	p=0.11
Percent Dominant Taxa	24.7	*	*	11.6	*	*	30.4	9.9	32.6	p=0.43
Percent Collectors	28.7	*	*	42.4	*	*	56.7	3.3	5.9	p=0.04
Percent Filterers	10.1	*	*	4.6	*	*	4.2	1.4	32.5	p=0.12
Percent Scrapers	30.3	*	*	18.3	*	*	7.6	3.4	44.2	p=0.05
Percent Predators	20.2	*	*	26.2	*	*	24.0	5.4	22.6	p=0.76
Percent Shredders	10.7	*	*	8.5	*	*	7.5	3.1	41.2	p=0.71

* only one Replicate

Statistically significant ANOVA p≤0.05 among all sites.

Statistically significant ANOVA p≤0.05 among all sites and statistically significant difference between two or more individual sites based on Bonferroni t-Test.

Table CAWG 10-18. Matrix of Probabilities Resulting from *Post Hoc* Pairwise Bonferroni t-Test Comparisons for Tombstone Creek EPT Index.

EPT Index			
	Site AD (RM 1.15)	Site BD 1 (RM 0.70)	Site BD 2 (RM 0.95)
Site AD	X	X	X
Site BD 1	0.10	X	X
Site BD 2	1.00	0.15	X

Probabilities ≤ 0.05 are highlighted
Probabilities ≤ 0.0001 shown as 0.0001

Table CAWG 10-19. Matrix of Probabilities Resulting from *Post Hoc* Pairwise Bonferroni t-Test Comparisons for Tombstone Creek Sensitive EPT Index.

Sensitive EPT Index			
	Site AD (RM 1.15)	Site BD 2 (RM 0.95)	Site BD 1 (RM 0.70)
Site AD	X	X	X
Site BD 2	0.16	X	X
Site BD 1	1.00	0.08	X

Probabilities ≤ 0.05 are highlighted
Probabilities ≤ 0.0001 shown as 0.0001

Table CAWG 10-20. Matrix of Probabilities Resulting from *Post Hoc* Pairwise Bonferroni t-Test Comparisons for Tombstone Creek Percent Intolerant Organisms.

Percent Intolerant Organisms			
	Site AD (RM 1.15)	Site BD 2 (RM 0.95)	Site BD 1 (RM 0.70)
Site AD	X	X	X
Site BD 2	0.14	X	X
Site BD 1	1.00	0.07	X

Probabilities ≤ 0.05 are highlighted
Probabilities ≤ 0.0001 shown as 0.0001

Table CAWG 10-21. Matrix of Probabilities Resulting from *Post Hoc* Pairwise Bonferroni t-Test Comparisons for Tombstone Creek Percent Tolerant Organisms.

Percent Tolerant Organisms			
	Site AD (RM 1.15)	Site BD 2 (RM 0.95)	Site BD 1 (RM 0.70)
Site AD	X	X	X
Site BD 2	0.01	X	X
Site BD 1	1.00	0.008	X

Probabilities ≤ 0.05 are highlighted
Probabilities ≤ 0.0001 shown as 0.0001

Table CAWG 10-22. Matrix of Probabilities Resulting from *Post Hoc* Pairwise Bonferroni t-Test Comparisons for Tombstone Creek Percent Collectors.

Percent Collectors			
	Site AD (RM 1.15)	Site BD 2 (RM 0.95)	Site BD 1 (RM 0.70)
Site AD	X	X	X
Site BD 2	0.37	X	X
Site BD 1	0.06	0.21	X

Probabilities ≤ 0.05 are highlighted
Probabilities ≤ 0.0001 shown as 0.0001

Table CAWG 10-23. Matrix of Probabilities Resulting from *Post Hoc* Pairwise Bonferroni t-Test Comparisons for Tombstone Creek Percent Scrapers.

Percent Scrapers			
	Site AD (RM 1.15)	Site BD 2 (RM 0.95)	Site BD 1 (RM 0.70)
Site AD	X	X	X
Site BD 2	0.37	X	X
Site BD 1	0.08	0.33	X

Probabilities ≤ 0.05 are highlighted
Probabilities ≤ 0.0001 shown as 0.0001

Table CAWG 10-24. Metric Values by Site for South Slide Creek Benthic Macroinvertebrates, Big Creek ALP, Fall 2002.

Biological Metrics	South Slide Creek Site AD (RM 0.40)			South Slide Creek Site BD 2 (RM 0.05)			Probability Value from ANOVA
	Mean	Standard Deviation	Coefficient of Variation	Mean	Standard Deviation	Coefficient of Variation	
Taxa Richness	34.7	5.1	14.8	25.5	2.1	8.3	p=0.10
Ephemeroptera Taxa	5.0	1.7	34.6	5.0	1.4	28.3	p=0.10
Plecoptera Taxa	6.7	0.6	8.7	5.0	2.8	56.6	p=0.56[A]
Trichoptera Taxa	5.0	1.0	20.0	2.5	0.7	28.3	p=0.06
EPT Taxa	16.7	2.5	15.1	12.5	2.1	17.0	p=0.15
EPT Index	37.0	10.9	29.4	34.2	11.9	34.9	p=0.80
Sensitive EPT Index	16.5	5.2	31.6	19.0	6.0	31.4	p=0.66
Shannon-Weaver Diversity Index	1.1	0.1	6.6	0.9	0.0	0.1	p=0.05
Relative Diversity (Evenness)	0.7	0.0	6.2	0.7	0.0	2.4	p=0.21
Tolerance Value	4.3	0.4	8.7	4.5	0.6	13.7	p=0.70
Percent Intolerant Organisms	17.1	4.8	28.1	19.8	5.7	29.0	p=0.60
Percent Tolerant Organisms	11.6	4.8	41.3	4.5	3.2	70.5	p=0.17
Percent Hydropsychidae	0.0	0.0	0.0	0.0	0.0	0.0	N/A
Percent Baetidae	0.1	0.2	173.2	2.7	0.2	8.1	p=0.0006
Percent Dominant Taxa	29.5	6.6	22.4	36.7	8.7	23.8	p=0.40
Percent Collectors	46.9	11.6	24.7	62.1	13.5	21.8	p=0.27
Percent Filterers	0.4	0.4	87.2	0.0	0.0	0.0	p=0.22
Percent Scrapers	22.6	8.6	38.0	11.1	10.3	92.4	p=0.27
Percent Predators	21.7	1.5	6.8	11.9	3.2	27.0	p=0.02
Percent Shredders	8.4	5.5	65.4	14.8	0.0	0.2	p=0.22

[A] Data do not meet equal variance (homogeneity) assumption. Welch Test applied to this metric, Bonferroni t-Test not used.

Statistically significant ANOVA p≤0.05 among all sites.

Statistically significant ANOVA p≤0.05 among all sites and statistically significant difference between two or more individual sites based on Bonferroni t-Test.

Table CAWG 10-25. Metric Values by Site for North Slide Creek Benthic Macroinvertebrates, Big Creek ALP, Fall 2002.

Biological Metrics	North Slide Creek Site AD (RM 0.35)			North Slide Creek Site BD 2 (RM 0.25)			North Slide Creek Site BD 1 (RM 0.05)			Probability Value from ANOVA
	Mean	Standard Deviation	Coefficient of Variation	Mean	Standard Deviation	Coefficient of Variation	Mean	Standard Deviation	Coefficient of Variation	
Taxa Richness	41.7	5.1	12.3	20.0	1.4	7.1	29.0	*	*	p=0.03
Ephemeroptera Taxa	6.3	0.6	9.1	3.0	1.4	47.1	4.0	*	*	p=0.06[A]
Plecoptera Taxa	7.0	2.0	28.6	1.5	0.7	47.1	4.0	*	*	p=0.08
Trichoptera Taxa	6.3	0.6	9.1	2.5	0.7	28.3	4.0	*	*	p=0.01
EPT Taxa	19.7	2.3	11.7	7.0	1.4	20.2	12.0	*	*	p=0.01
EPT Index	35.2	7.8	22.2	8.3	7.1	85.4	19.4	*	*	p=0.07
Sensitive EPT Index	23.5	6.0	25.3	3.0	2.0	65.0	17.5	*	*	p=0.05
Shannon-Weaver Diversity Index	1.3	0.0	1.3	0.9	0.0	2.9	0.9	*	*	p=0.0006
Relative Diversity (Evenness)	0.8	0.0	3.7	0.7	0.0	5.3	0.6	*	*	p=0.04
Tolerance Value	4.4	0.4	9.6	6.6	0.5	8.0	4.8	*	*	p=0.03
Percent Intolerant Organisms	25.2	6.3	25.1	3.8	2.5	65.0	17.8	*	*	p=0.05
Percent Tolerant Organisms	8.5	4.7	55.2	38.3	7.0	18.2	2.5	*	*	p=0.02
Percent Hydropsychidae	0.5	0.7	125.0	0.0	0.0	0.0	0.0	*	*	p=0.56
Percent Baetidae	1.4	0.9	66.2	0.2	0.3	141.4	0.3	*	*	p=0.33
Percent Dominant Taxa	21.9	2.0	9.3	30.4	1.0	3.4	36.9	*	*	p=0.01
Percent Collectors	43.1	6.0	13.9	73.5	4.5	6.1	69.8	*	*	p=0.02
Percent Filterers	3.2	2.2	70.0	0.2	0.3	141.4	0.3	*	*	p=0.29
Percent Scrapers	9.4	4.8	51.4	3.4	3.1	90.0	0.6	*	*	p=0.27
Percent Predators	28.3	2.3	8.2	22.9	7.2	31.5	13.8	*	*	p=0.69[A]
Percent Shredders	16.1	1.4	8.6	0.0	0.0	0.0	15.4	*	*	p=0.001

* only one Replicate

[A] Data do not meet equal variance (homogeneity) assumption. Welch Test applied to this metric, Bonferroni t-Test not used.

Statistically significant ANOVA p≤0.05 among all sites.

Statistically significant ANOVA p≤0.05 among all sites and statistically significant difference between two or more individual sites based on Bonferroni t-Test.

Table CAWG 10-26. Matrix of Probabilities Resulting from *Post Hoc* Pairwise Bonferroni t-Test Comparisons for North Slide Creek Taxa Richness.

Taxa Richness			
	Site AD (RM 0.35)	Site BD 2 (RM 0.25)	Site BD 1 (RM 0.05)
Site AD	X	X	X
Site BD 2	0.03	X	X
Site BD 1	0.25	0.55	X

Probabilities ≤ 0.05 are highlighted
Probabilities ≤ 0.0001 shown as 0.0001

Table CAWG 10-27. Matrix of Probabilities Resulting from *Post Hoc* Pairwise Bonferroni t-Test Comparisons for North Slide Creek Trichoptera Taxa.

Trichoptera Taxa			
	Site AD (RM 0.35)	Site BD 2 (RM 0.25)	Site BD 1 (RM 0.05)
Site AD	X	X	X
Site BD 2	0.02	X	X
Site BD 1	0.14	0.43	X

Probabilities ≤ 0.05 are highlighted
Probabilities ≤ 0.0001 shown as 0.0001

Table CAWG 10-28. Matrix of Probabilities Resulting from *Post Hoc* Pairwise Bonferroni t-Test Comparisons for North Slide Creek EPT Taxa.

EPT Taxa			
	Site AD (RM 0.35)	Site BD 2 (RM 0.25)	Site BD 1 (RM 0.05)
Site AD	X	X	X
Site BD 2	0.02	X	X
Site BD 1	0.14	0.42	X

Probabilities ≤ 0.05 are highlighted
Probabilities ≤ 0.0001 shown as 0.0001

Table CAWG 10-29. Matrix of Probabilities Resulting from *Post Hoc* Pairwise Bonferroni t-Test Comparisons for North Slide Creek Sensitive EPT Index.

Sensitive EPT Index			
	Site AD (RM 0.35)	Site BD 2 (RM 0.25)	Site BD 1 (RM 0.05)
Site AD	X	X	X
Site BD 2	0.06	X	X
Site BD 1	1.00	0.30	X

Probabilities ≤ 0.05 are highlighted
Probabilities ≤ 0.0001 shown as 0.0001

Table CAWG 10-30. Matrix of Probabilities Resulting from *Post Hoc* Pairwise Bonferroni t-Test Comparisons for North Slide Creek Shannon-Weaver Diversity Index.

Shannon-Weaver Diversity Index			
	Site AD (RM 0.35)	Site BD 2 (RM 0.25)	Site BD 1 (RM 0.05)
Site AD	X	X	X
Site BD 2	0.001	X	X
Site BD 1	0.002	0.38	X

Probabilities ≤ 0.05 are highlighted
Probabilities ≤ 0.0001 shown as 0.0001

Table CAWG 10-31. Matrix of Probabilities Resulting from *Post Hoc* Pairwise Bonferroni t-Test Comparisons for North Slide Creek Relative Diversity (Evenness).

Relative Diversity (Evenness)			
	Site AD (RM 0.35)	Site BD 2 (RM 0.25)	Site BD 1 (RM 0.05)
Site AD	X	X	X
Site BD 2	0.52	X	X
Site BD 1	0.06	0.18	X

Probabilities ≤ 0.05 are highlighted
Probabilities ≤ 0.0001 shown as 0.0001

Table CAWG 10-32. Matrix of Probabilities Resulting from *Post Hoc* Pairwise Bonferroni t-Test Comparisons for North Slide Creek Tolerance Value.

Tolerance Value			
	Site AD (RM 0.35)	Site BD 2 (RM 0.25)	Site BD 1 (RM 0.05)
Site AD	X	X	X
Site BD 2	0.04	X	X
Site BD 1	1.00	0.16	X

Probabilities ≤ 0.05 are highlighted
Probabilities ≤ 0.0001 shown as 0.0001

Table CAWG 10-33. Matrix of Probabilities Resulting from *Post Hoc* Pairwise Bonferroni t-Test Comparisons for North Slide Creek Percent Intolerant Organisms.

Percent Intolerant Organisms			
	Site AD (RM 0.35)	Site BD 2 (RM 0.25)	Site BD 1 (RM 0.05)
Site AD	X	X	X
Site BD 2	0.07	X	X
Site BD 1	0.96	0.38	X

Probabilities ≤ 0.05 are highlighted
Probabilities ≤ 0.0001 shown as 0.0001

Table CAWG 10-34. Matrix of Probabilities Resulting from *Post Hoc* Pairwise Bonferroni t-Test Comparisons for North Slide Creek Percent Tolerant Organisms.

Percent Tolerant Organisms			
	Site AD (RM 0.35)	Site BD 2 (RM 0.25)	Site BD 1 (RM 0.05)
Site AD	X	X	X
Site BD 2	0.03	X	X
Site BD 1	1.00	0.04	X

Probabilities ≤ 0.05 are highlighted
Probabilities ≤ 0.0001 shown as 0.0001

Table CAWG 10-35. Matrix of Probabilities Resulting from *Post Hoc* Pairwise Bonferroni t-Test Comparisons for North Slide Creek Percent Dominant Taxa.

Percent Dominant Taxa			
	Site AD (RM 0.35)	Site BD 2 (RM 0.25)	Site BD 1 (RM 0.05)
Site AD	X	X	X
Site BD 2	0.04	X	X
Site BD 1	0.01	0.16	X

Probabilities ≤ 0.05 are highlighted
Probabilities ≤ 0.0001 shown as 0.0001

Table CAWG 10-36. Matrix of Probabilities Resulting from *Post Hoc* Pairwise Bonferroni t-Test Comparisons for North Slide Creek Percent Collectors.

Percent Collectors			
	Site AD (RM 0.35)	Site BD 2 (RM 0.25)	Site BD 1 (RM 0.05)
Site AD	X	X	X
Site BD 2	0.02	X	X
Site BD 1	0.07	1.00	X

Probabilities ≤ 0.05 are highlighted
Probabilities ≤ 0.0001 shown as 0.0001

Table CAWG 10-37. Matrix of Probabilities Resulting from *Post Hoc* Pairwise Bonferroni t-Test Comparisons for North Slide Creek Percent Shredders.

Percent Shredders			
	Site AD (RM 0.35)	Site BD 1 (RM 0.05)	Site BD 2 (RM 0.25)
Site AD	X	X	X
Site BD 2	0.002	0.005	X
Site BD 1	1.00	X	X

Probabilities ≤ 0.05 are highlighted
Probabilities ≤ 0.0001 shown as 0.0001

Table CAWG 10-38. Metric Values by Site for Hooper Creek Benthic Macroinvertebrates, Big Creek ALP, Fall 2002.

Biological Metric	Hooper Creek Site AD (RM 0.70)			Hooper Creek Site BD 2 (RM 0.55)			Hooper Creek Site BD 1 (RM 0.05)			Probability Value from ANOVA
	Mean	Standard Deviation	Coefficient of Variation	Mean	Standard Deviation	Coefficient of Variation	Mean	Standard Deviation	Coefficient of Variation	
Taxa Richness	34.0	4.2	12.5	34.3	4.9	14.4	30.3	0.6	1.9	p=0.45[A]
Ephemeroptera Taxa	6.5	0.7	10.9	7.3	0.6	7.9	5.7	2.1	36.7	p=0.41
Plecoptera Taxa	5.5	0.7	12.9	6.7	2.3	34.6	4.3	0.6	13.3	p=0.30
Trichoptera Taxa	6.0	1.4	23.6	4.3	1.5	35.3	6.0	1.7	28.9	p=0.42
EPT Taxa	18.0	1.4	7.9	18.3	0.6	3.1	16.0	3.0	18.8	p=0.40
EPT Index	46.5	12.6	27.1	58.7	21.7	36.9	42.9	5.4	12.6	p=0.48
Sensitive EPT Index	42.7	8.4	19.7	41.7	12.3	29.6	35.7	1.5	4.2	p=0.63
Shannon-Weaver Diversity Index	1.1	0.1	10.7	1.1	0.1	4.7	1.0	0.1	11.4	p=0.53
Relative Diversity (Evenness)	0.7	0.1	7.1	0.7	0.0	6.0	0.7	0.1	11.9	p=0.74
Tolerance Value	3.2	0.5	15.2	3.5	1.0	27.3	3.9	0.2	5.6	p=0.56
Percent Intolerant Organisms	43.5	3.9	9.1	42.5	12.6	29.7	36.1	1.6	4.4	p=0.57
Percent Tolerant Organisms	0.0	0.0	0.0	2.0	2.2	108.9	1.1	0.7	64.2	p=0.39
Percent Hydropsychidae	0.3	0.0	6.5	0.1	0.2	173.2	0.0	0.0	0.0	p=0.38[A]
Percent Baetidae	2.9	3.3	114.0	15.8	15.6	99.2	5.8	3.5	59.7	p=0.39
Percent Dominant Taxa	28.5	3.6	12.6	26.4	8.2	30.9	26.1	4.9	18.8	p=0.90
Percent Collectors	49.7	9.7	19.5	49.4	10.1	20.5	52.3	7.3	13.9	p=0.91
Percent Filterers	2.4	1.9	75.9	2.9	1.8	62.7	6.6	4.1	62.5	p=0.29
Percent Scrapers	22.5	12.3	54.6	16.3	14.7	89.9	13.1	6.2	47.4	p=0.68
Percent Predators	19.8	1.5	7.7	16.3	1.8	10.8	10.5	4.3	41.2	p=0.04
Percent Shredders	5.5	3.0	53.5	15.1	3.7	24.5	17.5	4.7	26.6	p=0.05

[A] Data do not meet equal variance (homogeneity) assumption. Welch Test applied to this metric, Bonferroni t-Test not used.

Statistically significant ANOVA p≤0.05 among all sites.

Statistically significant ANOVA p≤0.05 among all sites and statistically significant difference between two or more individual sites based on Bonferroni t-Test.

Table CAWG 10-39. Matrix of Probabilities Resulting from *Post Hoc* Pairwise Bonferroni t-Test Comparisons for Hooper Creek Percent Predators.

Percent Predators			
	Site AD (RM 0.70)	Site BD 1 (RM 0.05)	Site BD 2 (RM 0.55)
Site AD	X	X	X
Site BD 1	0.06	X	X
Site BD 2	0.75	0.20	X

Probabilities ≤ 0.05 are highlighted
Probabilities ≤ 0.0001 shown as 0.0001

Table CAWG 10-40. Matrix of Probabilities Resulting from *Post Hoc* Pairwise Bonferroni t-Test Comparisons for Hooper Creek Percent Shredders.

Percent Shredders			
	Site AD (RM 0.70)	Site BD 1 (RM 0.05)	Site BD 2 (RM 0.55)
Site AD	X	X	X
Site BD 1	0.07	X	X
Site BD 2	0.14	1.00	X

Probabilities ≤ 0.05 are highlighted
Probabilities ≤ 0.0001 shown as 0.0001

Table CAWG 10-41. Metric Values by Site for Crater Creek Benthic Macroinvertebrates, Big Creek ALP, Fall 2002.

Biological Metrics	Crater Creek Site AD (RM 3.10)			Crater Creek Site BD 3 (RM 2.40)			Probability Value from ANOVA
	Mean	Standard Deviation	Coefficient of Variation	Mean	Standard Deviation	Coefficient of Variation	
Taxa Richness	16.0	*	*	30.3	8.2	27.0	p=0.22
Ephemeroptera Taxa	5.0	*	*	6.5	1.7	26.6	p=0.50
Plecoptera Taxa	2.0	*	*	5.8	1.7	29.7	p=0.14
Trichoptera Taxa	3.0	*	*	4.3	2.4	55.6	p=0.67
EPT Taxa	10.0	*	*	16.5	5.2	31.5	p=0.34
EPT Index	19.0	*	*	33.9	24.7	72.8	p=0.63
Sensitive EPT Index	17.2	*	*	23.9	15.1	63.3	p=0.72
Shannon-Weaver Diversity Index	0.7	*	*	1.0	0.2	24.4	p=0.37
Relative Diversity (Evenness)	0.6	*	*	0.6	0.1	16.6	p=0.57
Tolerance Value	4.6	*	*	4.4	0.6	14.4	p=0.82
Percent Intolerant Organisms	17.2	*	*	25.1	15.5	62.0	p=0.68
Percent Tolerant Organisms	0.0	*	*	3.4	1.7	49.3	p=0.17
Percent Hydropsychidae	0.0	*	*	0.0	0.0	0.0	N/A
Percent Baetidae	0.0	*	*	5.6	5.9	105.9	p=0.46
Percent Dominant Taxa	56.6	*	*	39.1	18.5	47.2	p=0.45
Percent Collectors	78.1	*	*	70.2	13.6	19.4	p=0.66
Percent Filterers	0.0	*	*	0.2	0.4	200.0	p=0.69
Percent Scrapers	4.4	*	*	4.7	2.7	57.2	p=0.91
Percent Predators	10.9	*	*	13.1	6.7	51.1	p=0.79
Percent Shredders	6.6	*	*	11.7	9.0	76.9	p=0.0000[A]

* only one Replicate

[A] Data do not meet equal variance (homogeneity) assumption. Welch Test applied to this metric, Bonferroni t-Test not used.

(light grey) Statistically significant ANOVA p≤0.05 among all sites.

(dark grey) Statistically significant ANOVA p≤0.05 among all sites and statistically significant difference between two or more individual sites based on Bonferroni t-Test.

Table CAWG 10-42. Metric Values by Site for Bear Creek Benthic Macroinvertebrates, Big Creek ALP, Fall 2002.

Biological Metrics	Bear Creek Site AD (RM 1.80)			Bear Creek Site BD 2 (RM 1.50)			Bear Creek Site BD 1 (RM 0.05)			Probability Value from ANOVA
	Mean	Standard Deviation	Coefficient of Variation	Mean	Standard Deviation	Coefficient of Variation	Mean	Standard Deviation	Coefficient of Variation	
Taxa Richness	40.0	3.0	7.5	29.0	3.5	11.9	27.0	6.2	23.1	p=0.02
Ephemeroptera Taxa	10.0	1.0	10.0	6.7	0.6	8.7	5.0	1.0	20.0	p=0.0012
Plecoptera Taxa	7.0	3.0	42.9	2.3	1.2	49.5	2.0	2.0	100.0	p=0.05
Trichoptera Taxa	7.0	1.0	14.3	7.7	1.2	15.1	6.7	2.3	34.6	p=0.75
EPT Taxa	24.0	3.0	12.5	16.7	0.6	3.5	13.7	2.1	15.2	p=0.0026
EPT Index	62.7	22.7	36.3	40.7	20.0	49.2	34.8	1.0	3.0	p=0.22
Sensitive EPT Index	33.4	10.4	31.1	17.5	9.4	53.4	6.3	2.8	44.9	p=0.02
Shannon-Weaver Diversity Index	1.3	0.1	6.1	1.0	0.2	21.7	1.1	0.1	11.6	p=0.08
Relative Diversity (Evenness)	0.8	0.0	4.1	0.7	0.1	20.1	0.7	0.0	6.8	p=0.21
Tolerance Value	3.4	0.6	18.8	4.6	0.7	15.1	5.6	0.4	6.8	p=0.01
Percent Intolerant Organisms	33.6	10.1	30.2	18.4	9.0	49.0	8.5	3.8	45.0	p=0.03
Percent Tolerant Organisms	3.7	2.5	68.5	0.4	0.5	122.1	23.1	7.8	33.8	p=0.0023
Percent Hydropsychidae	16.8	5.0	29.8	5.5	6.1	111.1	2.0	1.7	87.1	p=0.02
Percent Baetidae	4.3	2.6	60.3	8.9	5.7	64.1	8.8	2.0	22.5	p=0.31
Percent Dominant Taxa	15.7	2.4	15.4	37.6	21.8	57.9	24.8	5.3	21.5	p=0.20
Percent Collectors	44.7	7.8	17.3	33.5	8.0	24.0	59.1	4.0	6.7	p=0.0098
Percent Filterers	16.9	5.0	29.6	44.9	16.0	35.7	14.5	4.2	28.7	p=0.02
Percent Scrapers	15.4	7.9	51.5	7.8	2.8	36.5	19.1	2.4	12.4	p=0.08
Percent Predators	14.5	5.4	37.5	4.6	2.6	56.4	4.7	1.9	40.8	p=0.03
Percent Shredders	8.5	0.8	9.4	9.3	6.5	70.1	2.6	1.0	37.4	p=0.07

Statistically significant ANOVA $p \leq 0.05$ among all sites.

Statistically significant ANOVA $p \leq 0.05$ among all sites and statistically significant difference between two or more individual sites based on Bonferroni t-Test.

Table CAWG 10-43. Matrix of Probabilities Resulting from *Post Hoc* Pairwise Bonferroni t-Test Comparisons for Bear Creek Taxa Richness.

Taxa Richness			
	Site AD (RM 1.80)	Site BD 1 (RM 0.05)	Site BD 2 (RM1.50)
Site AD	X	X	X
Site BD 1	0.04	X	X
Site BD 2	0.07	1.00	X

Probabilities ≤ 0.05 are highlighted
Probabilities ≤ 0.0001 shown as 0.0001

Table CAWG 10-44. Matrix of Probabilities Resulting from *Post Hoc* Pairwise Bonferroni t-Test Comparisons for Bear Creek Ephemeroptera Taxa.

Ephemeroptera Taxa			
	Site AD (RM 1.80)	Site BD 1 (RM 0.05)	Site BD 2 (RM1.50)
Site AD	X	X	X
Site BD 1	0.001	X	X
Site BD 2	0.01	0.18	X

Probabilities ≤ 0.05 are highlighted
Probabilities ≤ 0.0001 shown as 0.0001

Table CAWG 10-45. Matrix of Probabilities Resulting from *Post Hoc* Pairwise Bonferroni t-Test Comparisons for for Bear Creek Plecoptera Taxa.

Plecoptera Taxa			
	Site AD (RM 1.80)	Site BD 1 (RM 0.05)	Site BD 2 (RM1.50)
Site AD	X	X	X
Site BD 1	0.09	X	X
Site BD 2	0.12	1.00	X

Probabilities ≤ 0.05 are highlighted
Probabilities ≤ 0.0001 shown as 0.0001

Table CAWG 10-46. Matrix of Probabilities Resulting from *Post Hoc* Pairwise Bonferroni t-Test Comparisons for Bear Creek EPT Taxa.

EPT Taxa			
	Site AD (RM 1.80)	Site BD 1 (RM 0.05)	Site BD 2 (RM1.50)
Site AD	X	X	X
Site BD 1	0.003	X	X
Site BD 2	0.017	0.41	X

Probabilities ≤ 0.05 are highlighted
Probabilities ≤ 0.0001 shown as 0.0001

Table CAWG 10-47. Matrix of Probabilities Resulting from *Post Hoc* Pairwise Bonferroni t-Test Comparisons for Bear Creek Sensitive EPT Index.

Sensitive EPT Index			
	Site AD (RM 1.80)	Site BD 1 (RM 0.05)	Site BD 2 (RM1.50)
Site AD	X	X	X
Site BD 1	0.021	X	X
Site BD 2	0.17	0.43	X

Probabilities ≤ 0.05 are highlighted
Probabilities ≤ 0.0001 shown as 0.0001

Table CAWG 10-48. Matrix of Probabilities Resulting from *Post Hoc* Pairwise Bonferroni t-Test Comparisons for Bear Creek Tolerance Value.

Tolerance Value			
	Site AD (RM 1.80)	Site BD 1 (RM 0.05)	Site BD 2 (RM1.50)
Site AD	X	X	X
Site BD 1	0.01	X	X
Site BD 2	0.15	0.25	X

Probabilities ≤ 0.05 are highlighted
Probabilities ≤ 0.0001 shown as 0.0001

Table CAWG 10-49. Matrix of Probabilities Resulting from *Post Hoc* Pairwise Bonferroni t-Test Comparisons for Bear Creek Percent Intolerant Organisms.

Percent Intolerant Organisms			
	Site AD (RM 1.80)	Site BD 1 (RM 0.05)	Site BD 2 (RM1.50)
Site AD	X	X	X
Site BD 1	0.03	X	X
Site BD 2	0.18	0.58	X

Probabilities ≤ 0.05 are highlighted
Probabilities ≤ 0.0001 shown as 0.0001

Table CAWG 10-50. Matrix of Probabilities Resulting from *Post Hoc* Pairwise Bonferroni t-Test Comparisons for Bear Creek Percent Tolerant Organisms.

Percent Tolerant Organisms			
	Site AD (RM 1.80)	Site BD 1 (RM 0.05)	Site BD 2 (RM1.50)
Site AD	X	X	X
Site BD 1	0.008	X	X
Site BD 2	1.00	0.004	X

Probabilities ≤ 0.05 are highlighted
Probabilities ≤ 0.0001 shown as 0.0001

Table CAWG 10-51. Matrix of Probabilities Resulting from *Post Hoc* Pairwise Bonferroni t-Test Comparisons for Bear Creek Percent Hydropsychidae.

Percent Hydropsychidae			
	Site AD (RM 1.80)	Site BD 1 (RM 0.05)	Site BD 2 (RM1.50)
Site AD	X	X	X
Site BD 1	0.02	X	X
Site BD 2	0.08	1.00	X

Probabilities ≤ 0.05 are highlighted
Probabilities ≤ 0.0001 shown as 0.0001

Table CAWG 10-52. Matrix of Probabilities Resulting from *Post Hoc* Pairwise Bonferroni t-Test Comparisons for Bear Creek Percent Collectors.

Percent Collectors			
	Site AD (RM 1.80)	Site BD 1 (RM 0.05)	Site BD 2 (RM1.50)
Site AD	X	X	X
Site BD 1	0.11	X	X
Site BD 2	0.29	0.01	X

Probabilities ≤ 0.05 are highlighted
Probabilities ≤ 0.0001 shown as 0.0001

Table CAWG 10-53. Matrix of Probabilities Resulting from *Post Hoc* Pairwise Bonferroni t-Test Comparisons for Bear Creek Percent Filterers.

Percent Filterers			
	Site AD (RM 1.80)	Site BD 1 (RM 0.05)	Site BD 2 (RM1.50)
Site AD	X	X	X
Site BD 1	1.00	X	X
Site BD 2	0.05	0.03	X

Probabilities ≤ 0.05 are highlighted
Probabilities ≤ 0.0001 shown as 0.0001

Table CAWG 10-54. Matrix of Probabilities Resulting from *Post Hoc* Pairwise Bonferroni t-Test Comparisons for Bear Creek Percent Predators.

Percent Predators			
	Site AD (RM 1.80)	Site BD 1 (RM 0.05)	Site BD 2 (RM1.50)
Site AD	X	X	X
Site BD 1	0.05	X	X
Site BD 2	0.05	1.00	X

Probabilities ≤ 0.05 are highlighted
Probabilities ≤ 0.0001 shown as 0.0001

Table CAWG 10-55. Metric Values by Site for Chinquapin Creek Benthic Macroinvertebrates, Big Creek ALP, Fall 2002.

Biological Metrics	Chinquapin Creek Site AD (RM 0.95)			Chinquapin Creek Site BD 2 (RM 0.60)			Chinquapin Creek Site BD 1 (RM 0.35)			Probability Value from ANOVA
	Mean	Standard Deviation	Coefficient of Variation	Mean	Standard Deviation	Coefficient of Variation	Mean	Standard Deviation	Coefficient of Variation	
Taxa Richness	38.0	5.6	14.7	40.0	1.4	3.5	30.0	*	*	p=0.33
Ephemeroptera Taxa	7.3	1.2	15.7	9.0	1.4	15.7	8.0	*	*	p=0.45
Plecoptera Taxa	9.3	2.5	27.0	8.5	0.7	8.3	3.0	*	*	p=0.16
Trichoptera Taxa	6.7	1.2	17.3	6.0	1.4	23.6	3.0	*	*	p=0.18
EPT Taxa	23.3	2.5	10.8	23.5	2.1	9.0	14.0	*	*	p=0.08
EPT Index	48.9	3.8	7.7	46.7	6.4	13.6	7.7	*	*	p=0.01
Sensitive EPT Index	39.4	7.3	18.7	37.3	4.0	10.8	5.6	*	*	p=0.04
Shannon-Weaver Diversity Index	1.2	0.1	8.5	1.1	0.1	5.6	0.7	*	*	p=0.03
Relative Diversity (Evenness)	0.8	0.1	6.7	0.7	0.0	4.6	0.5	*	*	p=0.02
Tolerance Value	3.6	0.2	5.4	3.6	0.1	4.0	5.1	*	*	p=0.009
Percent Intolerant Organisms	41.1	7.5	18.3	41.9	2.1	4.9	8.6	*	*	p=0.04
Percent Tolerant Organisms	8.0	5.0	62.3	1.4	0.1	4.9	1.5	*	*	p=0.28
Percent Hydropsychidae	1.9	3.3	173.2	0.3	0.5	141.4	0.0	*	*	p=0.77
Percent Baetidae	2.7	1.2	46.2	1.4	1.0	70.0	0.9	*	*	p=0.39
Percent Dominant Taxa	27.0	10.9	40.5	29.4	5.9	20.1	42.2	*	*	p=0.47
Percent Collectors	48.6	7.2	14.9	52.8	2.8	5.2	87.0	*	*	p=0.01
Percent Filterers	1.9	3.3	173.2	0.5	0.7	141.4	0.6	*	*	p=0.84
Percent Scrapers	18.8	5.6	30.0	13.3	2.4	17.9	2.9	*	*	p=0.14
Percent Predators	13.1	1.9	14.5	11.4	2.1	18.2	6.8	*	*	p=0.15
Percent Shredders	17.6	1.2	6.7	21.9	2.4	11.1	2.7	*	*	p=0.002

* only one Replicate

Statistically significant ANOVA p≤0.05 among all sites.

Statistically significant ANOVA p≤0.05 among all sites and statistically significant difference between two or more individual sites based on Bonferroni t-Test.

Table CAWG 10-56. Matrix of Probabilities Resulting from *Post Hoc* Pairwise Bonferroni t-Test Comparisons for Chinquapin Creek EPT Index.

EPT Index			
	Site AD (RM 0.95)	Site BD 1 (RM 0.35)	Site BD 2 (RM 0.60)
Site AD	X	X	X
Site BD 1	0.01	X	X
Site BD 2	1.00	0.02	X

Probabilities ≤ 0.05 are highlighted
Probabilities ≤ 0.0001 shown as 0.0001

Table CAWG 10-57. Matrix of Probabilities Resulting from *Post Hoc* Pairwise Bonferroni t-Test Comparisons for Chinquapin Creek Sensitive EPT Index.

Sensitive EPT Index			
	Site AD (RM 0.95)	Site BD 1 (RM 0.35)	Site BD 2 (RM 0.60)
Site AD	X	X	X
Site BD 1	0.06	X	X
Site BD 2	1.00	0.08	X

Probabilities ≤ 0.05 are highlighted
Probabilities ≤ 0.0001 shown as 0.0001

Table CAWG 10-58. Matrix of Probabilities Resulting from *Post Hoc* Pairwise Bonferroni t-Test Comparisons for Chinquapin Creek Shannon-Weaver Diversity Index.

Shannon-Weaver Diversity Index			
	Site AD (RM 0.95)	Site BD 1 (RM 0.35)	Site BD 2 (RM 0.60)
Site AD	X	X	X
Site BD 1	0.05	X	X
Site BD 2	1.00	0.09	X

Probabilities ≤ 0.05 are highlighted
Probabilities ≤ 0.0001 shown as 0.0001

Table CAWG 10-59. Matrix of Probabilities Resulting from *Post Hoc* Pairwise Bonferroni t-Test Comparisons for Chinquapin Creek Relative Diversity (Evenness).

Relative Diversity (Evenness)			
	Site AD (RM 0.95)	Site BD 1 (RM 0.35)	Site BD 2 (RM 0.60)
Site AD	X	X	X
Site BD 1	0.03	X	X
Site BD 2	0.62	0.07	X

Probabilities ≤ 0.05 are highlighted
Probabilities ≤ 0.0001 shown as 0.0001

Table CAWG 10-60. Matrix of Probabilities Resulting from *Post Hoc* Pairwise Bonferroni t-Test Comparisons for Chinquapin Creek Tolerance Value.

Tolerance Value			
	Site AD (RM 0.95)	Site BD 1 (RM 0.35)	Site BD 2 (RM 0.60)
Site AD	X	X	X
Site BD 1	0.01	X	X
Site BD 2	1.00	0.02	X

Probabilities ≤ 0.05 are highlighted
Probabilities ≤ 0.0001 shown as 0.0001

Table CAWG 10-61. Matrix of Probabilities Resulting from *Post Hoc* Pairwise Bonferroni t-Test Comparisons for Chinquapin Creek Percent Intolerant Organisms.

Percent Intolerant Organisms			
	Site AD (RM 0.95)	Site BD 1 (RM 0.35)	Site BD 2 (RM 0.60)
Site AD	X	X	X
Site BD 1	0.07	X	X
Site BD 2	1.00	0.08	X

Probabilities ≤ 0.05 are highlighted
Probabilities ≤ 0.0001 shown as 0.0001

Table CAWG 10-62. Matrix of Probabilities Resulting from *Post Hoc* Pairwise Bonferroni t-Test Comparisons for Chinquapin Creek Percent Collectors.

Percent Collectors			
	Site AD (RM 0.95)	Site BD 1 (RM 0.35)	Site BD 2 (RM 0.60)
Site AD	X	X	X
Site BD 1	0.02	X	X
Site BD 2	1.00	0.03	X

Probabilities ≤ 0.05 are highlighted
Probabilities ≤ 0.0001 shown as 0.0001

Table CAWG 10-63. Matrix of Probabilities Resulting from *Post Hoc* Pairwise Bonferroni t-Test Comparisons for Chinquapin Creek Percent Shredders.

Percent Shredders			
	Site AD (RM 0.95)	Site BD 1 (RM 0.35)	Site BD 2 (RM 0.60)
Site AD	X	X	X
Site BD 1	0.004	X	X
Site BD 2	0.20	0.003	X

Probabilities ≤ 0.05 are highlighted
Probabilities ≤ 0.0001 shown as 0.0001

Table CAWG 10-64. Metric Values by Site for Camp 62 Creek Benthic Macroinvertebrates, Big Creek ALP, Fall 2002.

Biological Metrics	Camp 62 Creek Site AD (RM 1.40)			Camp 62 Creek Site BD 2 (RM 1.20)			Camp 62 Creek Site BD 1 (RM 0.05)			Probability Value from ANOVA
	Mean	Standard Deviation	Coefficient of Variation	Mean	Standard Deviation	Coefficient of Variation	Mean	Standard Deviation	Coefficient of Variation	
Taxa Richness	35.0	1.7	4.9	35.0	*	*	40.3	2.9	7.2	p=0.10
Ephemeroptera Taxa	6.7	1.5	22.9	7.0	*	*	7.7	2.5	32.8	p=0.84
Plecoptera Taxa	6.7	1.2	17.3	5.0	*	*	4.3	1.2	26.6	p=0.15
Trichoptera Taxa	5.0	1.0	20.0	6.0	*	*	11.3	1.5	13.5	p=0.0088
EPT Taxa	18.3	1.5	8.3	18.0	*	*	23.3	3.1	13.1	p=0.12
EPT Index	61.0	17.5	28.7	56.3	*	*	43.1	17.0	39.6	p=0.50
Sensitive EPT Index	47.6	12.1	25.4	49.0	*	*	37.7	15.3	40.6	p=0.65
Shannon-Weaver Diversity Index	1.2	0.1	6.3	1.2	*	*	1.2	0.2	17.8	p=0.90
Relative Diversity (Evenness)	0.8	0.1	7.5	0.8	*	*	0.7	0.1	16.1	p=0.67
Tolerance Value	3.1	0.7	23.8	3.0	*	*	3.6	0.7	19.4	p=0.71
Percent Intolerant Organisms	50.3	13.5	26.9	56.9	*	*	38.1	16.4	43.1	p=0.50
Percent Tolerant Organisms	1.7	1.9	107.4	0.7	*	*	0.6	0.4	68.1	p=0.58
Percent Hydropsychidae	0.0	0.0	0.0	0.3	*	*	0.4	0.2	46.3	p=0.0000[A]
Percent Baetidae	2.8	1.7	59.7	4.0	*	*	2.4	1.5	63.6	p=0.73
Percent Dominant Taxa	18.9	7.6	39.9	19.9	*	*	31.3	18.8	60.2	p=0.58
Percent Collectors	43.3	1.2	2.8	49.5	*	*	49.8	15.0	30.2	p=0.74
Percent Filterers	0.9	0.5	56.5	0.7	*	*	3.9	2.3	60.0	p=0.17
Percent Scrapers	17.9	9.1	50.8	15.4	*	*	18.1	9.2	51.1	p=0.96
Percent Predators	15.9	3.2	20.4	15.0	*	*	11.8	1.4	11.8	p=0.24
Percent Shredders	22.0	5.0	22.8	19.5	*	*	16.4	6.8	41.4	p=0.56

* only one Replicate

[A] Data do not meet equal variance (homogeneity) assumption. Welch Test applied to this metric, Bonferroni t-Test not used.

Statistically significant ANOVA p≤0.05 among all sites.

Statistically significant ANOVA p≤0.05 among all sites and statistically significant difference between two or more individual sites based on Bonferroni t-Test.

Table CAWG 10-65. Matrix of Probabilities Resulting from *Post Hoc* Pairwise Bonferroni t-Test Comparisons for Camp 62 Creek Trichoptera Taxa.

Trichoptera Taxa			
	Site AD (RM 1.40)	Site BD 1 (RM 0.05)	Site BD 2 (RM 1.20)
Site AD	X	X	X
Site BD 1	0.01	X	X
Site BD 2	1.00	0.07	X

Probabilities ≤ 0.05 are highlighted
Probabilities ≤ 0.0001 shown as 0.0001

Table CAWG 10-66. Metric Values by Site for Bolsillo Creek Benthic Macroinvertebrates, Big Creek ALP, Fall 2002.

Biological Metrics	Bolsillo Creek Site AD (RM 1.65)			Bolsillo Creek Site BD 2 (RM 1.30)			Bolsillo Creek Site BD 1 (RM 0.70)			Probability Value from ANOVA
	Mean	Standard Deviation	Coefficient of Variation	Mean	Standard Deviation	Coefficient of Variation	Mean	Standard Deviation	Coefficient of Variation	
Taxa Richness	29.5	0.7	2.4	35.0	2.8	8.1	9.0	*	*	p=0.02
Ephemeroptera Taxa	7.5	0.7	9.4	6.5	2.1	32.6	0.0	*	*	p=0.11
Plecoptera Taxa	8.0	0.0	0.0	8.0	0.0	0.0	1.0	*	*	p=0.14[A]
Trichoptera Taxa	3.5	2.1	60.6	6.0	1.4	23.6	1.0	*	*	p=0.27
EPT Taxa	19.0	2.8	14.9	20.5	0.7	3.4	2.0	*	*	p=0.03
EPT Index	62.5	5.8	9.2	47.8	1.2	2.6	34.4	*	*	p=0.06
Sensitive EPT Index	51.9	7.0	13.5	34.9	6.4	18.3	34.4	*	*	p=0.20
Shannon-Weaver Diversity Index	1.0	0.1	12.0	1.0	0.0	1.5	0.6	*	*	p=0.08
Relative Diversity (Evenness)	0.7	0.1	11.3	0.7	0.0	3.8	0.6	*	*	p=0.60
Tolerance Value	3.3	0.4	12.8	3.9	0.2	5.2	3.8	*	*	p=0.31
Percent Intolerant Organisms	52.8	6.3	11.9	36.1	6.1	16.9	34.4	*	*	p=0.18
Percent Tolerant Organisms	0.5	0.2	43.3	0.9	0.9	90.9	0.5	*	*	p=0.74
Percent Hydropsychidae	0.0	0.0	0.0	0.0	0.0	0.0	0.0	*	*	N/A
Percent Baetidae	2.9	1.0	33.8	4.4	0.9	21.6	0.0	*	*	p=0.13
Percent Dominant Taxa	29.4	7.7	26.1	26.1	3.9	15.1	42.5	*	*	p=0.28
Percent Collectors	41.2	9.3	22.6	56.9	3.2	5.5	61.8	*	*	p=0.19
Percent Filterers	0.2	0.3	141.4	0.6	0.4	66.2	0.0	*	*	p=0.44
Percent Scrapers	10.0	4.9	49.5	8.8	0.5	5.9	1.9	*	*	p=0.35
Percent Predators	7.0	1.4	19.5	7.3	0.7	9.1	1.4	*	*	p=0.08
Percent Shredders	41.6	15.3	36.8	26.4	3.9	14.8	34.9	*	*	p=0.53

* only one Replicate

[A] Kraskal-Wallis non-parametric test was used.

Statistically significant ANOVA p≤0.05 among all sites.

Statistically significant ANOVA p≤0.05 among all sites and statistically significant difference between two or more individual sites based on Bonferroni t-Test.

Table CAWG 10-67. Matrix of Probabilities Resulting from *Post Hoc* Pairwise Bonferroni t-Test Comparisons for Bolsillo Creek Taxa Richness.

Taxa Richness			
	Site AD (RM 165)	Site BD 1 (RM 0.70)	Site BD 2 (RM 1.30)
Site AD	X	X	X
Site BD 1	0.04	X	X
Site BD 2	0.35	0.03	X

Probabilities ≤ 0.05 are highlighted
Probabilities ≤ 0.0001 shown as 0.0001

Table CAWG 10-68. Matrix of Probabilities Resulting from *Post Hoc* Pairwise Bonferroni t-Test Comparisons for Bolsillo Creek EPT Taxa.

EPT Taxa			
	Site AD (RM 165)	Site BD 1 (RM 0.70)	Site BD 2 (RM 1.30)
Site AD	X	X	X
Site BD 1	0.06	X	X
Site BD 2	1.00	0.05	X

Probabilities ≤ 0.05 are highlighted
Probabilities ≤ 0.0001 shown as 0.0001

Table CAWG 10-69. Metric Values by Site for Mono Creek Benthic Macroinvertebrates, Big Creek ALP, Fall 2002.

Biological Metrics	Mono Creek Site BD 4 (RM 5.70)			Mono Creek Site BD 3 (RM 4.90)			Mono Creek Site BD 2 (RM 1.30)			Mono Creek Site BD 1 (RM 0.40)			Probability Value from ANOVA
	Mean	Standard Deviation	Coefficient of Variation	Mean	Standard Deviation	Coefficient of Variation	Mean	Standard Deviation	Coefficient of Variation	Mean	Standard Deviation	Coefficient of Variation	
Taxa Richness	28.0	3.6	12.9	27.3	3.1	11.2	29.3	8.6	29.4	31.0	8.7	28.1	p=0.91
Ephemeroptera Taxa	3.7	2.3	63.0	5.0	1.0	20.0	6.3	1.2	18.2	6.7	1.5	22.9	p=0.16
Plecoptera Taxa	4.3	1.2	26.6	4.3	2.1	48.0	3.0	1.7	57.7	3.7	0.6	15.7	p=0.67
Trichoptera Taxa	3.7	1.2	31.5	6.3	0.6	9.1	8.0	2.6	33.1	6.7	2.1	31.2	p=0.09
EPT Taxa	11.7	4.2	35.7	15.7	2.3	14.7	17.3	3.1	17.6	17.0	3.6	21.2	p=0.22
EPT Index	34.6	8.0	23.2	64.1	16.0	25.0	25.6	10.4	40.7	34.4	6.4	18.7	p=0.01
Sensitive EPT Index	18.3	4.3	23.7	13.1	4.2	32.2	10.1	4.8	47.5	9.5	4.3	45.2	p=0.14
Shannon-Weaver Diversity Index	1.0	0.1	7.3	1.0	0.1	5.3	0.8	0.4	47.6	0.9	0.2	25.6	p=0.80
Relative Diversity (Evenness)	0.7	0.0	4.5	0.7	0.1	8.8	0.6	0.2	39.9	0.6	0.1	19.4	p=0.57
Tolerance Value	5.0	0.1	2.3	4.6	0.3	7.0	5.1	0.4	7.8	5.0	0.3	6.3	p=0.26
Percent Intolerant Organisms	18.8	3.4	18.2	13.0	3.8	29.1	10.4	5.2	49.7	10.5	4.3	41.2	p=0.12
Percent Tolerant Organisms	18.7	6.6	35.3	6.5	7.7	119.5	5.0	6.7	132.8	0.9	1.0	113.0	p=0.03
Percent Hydropsychidae	0.1	0.2	173.2	2.6	0.9	34.2	1.8	1.7	94.4	3.6	2.3	63.9	p=0.10
Percent Baetidae	5.9	0.4	7.0	40.8	9.8	24.1	9.4	3.7	38.9	18.0	1.1	5.9	p<0.0001
Percent Dominant Taxa	29.6	11.9	40.3	40.6	9.7	23.9	52.2	29.7	56.8	42.0	14.6	34.7	p=0.51
Percent Collectors	61.5	6.8	11.1	75.7	3.3	4.3	25.2	14.3	56.9	37.0	6.3	16.9	p=0.0002
Percent Filterers	3.4	1.2	35.6	5.2	1.2	23.5	57.9	24.5	42.3	47.4	12.7	26.7	p=0.0001
Percent Scrapers	9.7	6.2	63.7	8.0	3.1	39.1	7.6	3.0	39.9	5.3	1.4	25.8	p=0.60
Percent Predators	13.1	4.1	31.4	6.5	1.5	23.6	4.4	4.5	101.9	6.3	3.1	49.9	p=0.07
Percent Shredders	12.4	3.4	27.3	4.6	2.9	64.0	4.9	2.9	59.2	4.0	3.6	90.5	p=0.04

Statistically significant ANOVA p≤0.05 among all sites.

Statistically significant ANOVA p≤0.05 among all sites and statistically significant difference between two or more individual sites based on Bonferroni t-Test.

Table CAWG 10-70. Matrix of Probabilities Resulting from *Post Hoc* Pairwise Bonferroni t-Test Comparisons for Mono Creek EPT Index.

EPT Index				
	Site BD 1 (RM 0.40)	Site BD 2 (RM 1.30)	Site BD 3 (RM 4.90)	Site BD 4 (RM 5.70)
Site BD 1	X	X	X	X
Site BD 2	1.00	X	X	X
Site BD 3	0.06	0.02	X	X
Site BD 4	1.00	1.00	0.06	X

Probabilities ≤ 0.05 are highlighted
Probabilities ≤ 0.0001 shown as 0.0001

Table CAWG 10-71. Matrix of Probabilities Resulting from *Post Hoc* Pairwise Bonferroni t-Test Comparisons for Mono Creek Percent Tolerant Organisms.

Percent Tolerant Organisms				
	Site BD 1 (RM 0.40)	Site BD 2 (RM 1.30)	Site BD 3 (RM 4.90)	Site BD 4 (RM 5.70)
Site BD 1	X	X	X	X
Site BD 2	1.00	X	X	X
Site BD 3	1.00	1.00	X	X
Site BD 4	0.04	0.15	0.23	X

Probabilities ≤ 0.05 are highlighted
Probabilities ≤ 0.0001 shown as 0.0001

Table CAWG 10-72. Matrix of Probabilities Resulting from *Post Hoc* Pairwise Bonferroni t-Test Comparisons for Mono Creek Percent Baetidae.

Percent Baetidae				
	Site BD 1 (RM 0.40)	Site BD 2 (RM 1.30)	Site BD 3 (RM 4.90)	Site BD 4 (RM 5.70)
Site BD 1	X	X	X	X
Site BD 2	0.09	X	X	X
Site BD 3	0.006	0.0002	X	X
Site BD 4	0.01	0.94	0.0001	X

Probabilities ≤ 0.05 are highlighted
Probabilities ≤ 0.0001 shown as 0.0001

Table CAWG 10-73. Matrix of Probabilities Resulting from *Post Hoc* Pairwise Bonferroni t-Test Comparisons for Mono Creek Percent Collectors.

Percent Collectors				
	Site BD 1 (RM 0.40)	Site BD 2 (RM 1.30)	Site BD 3 (RM 4.90)	Site BD 4 (RM 5.70)
Site BD 1	X	X	X	X
Site BD 2	0.94	X	X	X
Site BD 3	0.002	0.0003	X	X
Site BD 4	0.04	0.005	0.22	X

Probabilities ≤ 0.05 are highlighted
Probabilities ≤ 0.0001 shown as 0.0001

Table CAWG 10-74. Matrix of Probabilities Resulting from *Post Hoc* Pairwise Bonferroni t-Test Comparisons for Mono Creek Percent Filterers.

Percent Filterers				
	Site BD 1 (RM 0.40)	Site BD 2 (RM 1.30)	Site BD 3 (RM 4.90)	Site BD 4 (RM 5.70)
Site BD 1	X	X	X	X
Site BD 2	1.0000	X	X	X
Site BD 3	0.0021	0.0009	X	X
Site BD 4	0.0010	0.0004	1.0000	X

Probabilities ≤ 0.05 are highlighted
Probabilities ≤ 0.0001 shown as 0.0001

Table CAWG 10-75. Matrix of Probabilities Resulting from *Post Hoc* Pairwise Bonferroni t-Test Comparisons for Mono Creek Percent Shredders.

Percent Shredders				
	Site BD 1 (RM 0.40)	Site BD 2 (RM 1.30)	Site BD 3 (RM 4.90)	Site BD 4 (RM 5.70)
Site BD 1	X	X	X	X
Site BD 2	1.00	X	X	X
Site BD 3	1.00	1.00	X	X
Site BD 4	0.08	0.13	0.11	X

Probabilities ≤ 0.05 are highlighted
Probabilities ≤ 0.0001 shown as 0.0001

Table CAWG 10-76. Physical/Habitat Quality Parameter Scores, San Joaquin River Mammoth Reach, Fall 2002.

Reach Name	Site	River Mile	Rosgen Level I Channel Type	Epifaunal Substrate/ Available Cover	Embeddedness	Velocity/ Depth Regimes	Sediment Deposition	Channel Flow Status	Channel Alteration	Frequency of Riffles	Bank Stability Left Bank	Bank Stability Right Bank	Vegetation Protection Left Bank	Vegetation Protection Right Bank	Riparian Vegetation Zone Width Left Bank	Riparian Vegetation Zone Width Right Bank	Total
San Joaquin River Mammoth Reach	Site AM	(RM 34.55)	G	14	19	12	14	14	19	13	8	8	2	2	2	2	129
	Site BM 4	(RM 26.20)	G	14	17	16	14	12	17	14	6	8	2	2	2	2	109
	Site BM 3	(RM 22.85)	G	17	19	16	16	17	17	14	8	8	4	4	4	2	146
	Site BM 2	(RM 22.10)	B	16	18	16	16	12	16	14	9	9	5	5	3	3	142
	Site BM 1	(RM 18.40)	B	16	17	19	16	15	16	14	7	9	8	5	4	4	150
Rock Creek	Site AD	(RM 0.55)	Aa+	13	15	18	18	18	12	15	8	5	7	8	5	5	147
	Site BD 1	(RM 0.05)	Aa+	11	19	17	12	19	17	7	10	9	2	2	1	1	127
	Site BD 2	(RM 0.40)	Aa+	1	20	4	20	16	12	7	10	9	4	4	3	3	113

Table CAWG 10-77. Densities of Macroinvertebrate Samples, San Joaquin River Mammoth Reach, Fall 2002.

Stream	Site	River Mile	Mean Density (No./Sq-M)	Standard Deviation	Coefficient of Variation
San Joaquin River Mammoth Reach	Site AM	(RM 34.55)	942	608	65
	Site BM 4	(RM 26.20)	2556	723	28
	Site BM 3	(RM 22.85)	1219	97	8
	Site BM 2	(RM 22.10)	1616	732	45
	Site BM 1	(RM 18.40)	1496	1321	88
Rock Creek	Site AD	(RM 0.55)	3774	629	17
	Site BD 2	(RM 0.40)	22696	25390	112
	Site BD 1	(RM 0.05)	3565	1291	36

Table CAWG 10-78. Abundant Benthic Macroinvertebrate Insect Taxa and Percent Contribution by Site, San Joaquin River Mammoth Reach, Fall 2002.

Order	Taxa	SJR Mammoth Reach					Rock Creek		
		Site AM (RM 34.55)	Site BD 4 (RM 26.20)	Site BD 3 (RM 22.85)	Site BD 2 (RM 22.10)	Site BD 1 (RM 18.40)	Site AD (RM 0.55)	Site BD 2 (RM 0.40)	Site BD 1 (RM 0.05)
Ephemeroptera	*Baetis sp.*	16.4	15.2	11.3	19.9	15.3		9.3	10.8
Ephemeroptera	*Paraleptophlebia sp.*						3.2		
Trichoptera	*Hydropsyche sp.*	1.4		2.3	6.4	17.3	3.8	1.6	4.8
Trichoptera	*Hydroptila sp.*	1.4	1.5			2.7			
Trichoptera	Hydroptilidae							1.6	
Trichoptera	*Lepidostoma sp.*						19.0		
Trichoptera	*Micrasema sp.*						8.2		
Trichoptera	*Ochrotrichia sp.*	2.4	1.7	3.4	3.3			2.3	
Trichoptera	*Rhyacophila sp.*	3.2							
Diptera	*Hemerodromia sp.*							2.7	
Diptera	*Simulium sp.*	48.9	31.6	65.8	32.1	37.0	8.1	20.7	25.8
Diptera	Orthocladiinae	18.3	18.2	3.2	10.3	2.9	14.7	54.1	18.7
Diptera	Tanypodinae								4.8
Diptera	Tanytarsini		24.4	6.5	13.3	8.0			6.8
Totals		92.0	92.6	92.5	85.3	83.3	57.0	92.3	71.8

Table CAWG 10-79. Metric Values by Site for San Joaquin River Mammoth Reach Benthic Macroinvertebrates, Big Creek ALP, Fall 2002.

Biological Metrics	San Joaquin River Above Mammoth Pool Site AM (RM 34.55)			San Joaquin River Below Mammoth Pool Site BM 4 (RM 26.20)			San Joaquin River Below Mammoth Pool Site BM 3 (RM 22.85)			San Joaquin River Below Mammoth Pool Site BM 2 (RM 22.10)			San Joaquin River Below Mammoth Pool Site BM 1 (RM 18.40)			Probability Value from ANOVA
	Mean	Standard Deviation	Coefficient of Variation	Mean	Standard Deviation	Coefficient of Variation	Mean	Standard Deviation	Coefficient of Variation	Mean	Standard Deviation	Coefficient of Variation	Mean	Standard Deviation	Coefficient of Variation	
Taxa Richness	12.3	8.5	69	15.0	1.0	7	13.3	2.9	22	21.0	6.6	31	23.0	5.0	22	p=0.13
Ephemeroptera Taxa	2.7	2.1	78	1.3	0.6	43	1.7	1.2	69	1.3	0.6	43	3.3	0.6	17	p=0.19
Plecoptera Taxa	0.7	1.2	173	0.0	0.0	0	0.0	0.0	0	0.3	0.6	173	0.7	0.6	87	p=0.97[A]
Trichoptera Taxa	3.0	2.6	88	4.7	0.6	12	4.3	1.2	27	5.7	2.1	37	6.0	1.0	17	p=0.27
EPT Taxa	6.3	5.9	93	6.0	0.0	0	6.0	2.0	33	7.3	2.3	31	10.0	1.0	10	p=0.18[A]
EPT Index	26.6	24.9	93	20.9	12.8	61	21.3	11.6	54	35.8	17.3	48	42.9	16.0	37	p=0.48[A]
Sensitive EPT Index	5.0	7.8	156	2.0	0.9	47	2.1	1.2	61	1.3	0.5	39	2.5	1.7	65	p=0.70[A]
Shannon-Weaver Diversity Index	0.6	0.4	60	0.7	0.1	9	0.6	0.2	30	0.8	0.1	16	0.8	0.3	30	p=0.45
Relative Diversity (Evenness)	0.6	0.2	35	0.6	0.1	11	0.5	0.1	22	0.6	0.1	11	0.6	0.2	25	p=0.68
Tolerance Value	5.2	0.7	13	5.6	0.3	5	5.6	0.2	3	5.4	0.3	6	5.3	0.2	4	p=0.61
Percent Intolerant Organisms	6.2	8.0	128	0.9	0.8	87	1.0	0.2	17	1.2	1.5	122	2.5	2.3	92	p=0.77[A]
Percent Tolerant Organisms	0.8	0.8	107	3.3	1.1	33	1.5	1.3	87	3.3	3.2	97	5.6	4.4	78	p=0.25
Percent Hydropsychidae	1.2	2.1	173	0.1	0.2	173	2.3	2.1	91	6.6	5.8	87	17.8	8.7	49	p=0.007
Percent Baetidae	16.2	9.5	58	15.4	10.7	70	11.9	6.5	55	20.5	16.6	81	16.7	5.1	31	p=0.89
Percent Dominant Taxa	50.2	29.2	58	35.4	7.1	20	65.8	12.2	19	39.8	13.0	33	41.3	21.8	53	p=0.35
Percent Collectors	43.8	24.1	55	63.5	0.5	1	27.7	8.2	30	54.5	20.4	37	34.7	15.5	45	p=0.01[A]
Percent Filterers	48.7	31.4	65	32.8	2.3	7	69.4	9.1	13	38.7	24.1	62	56.7	20.7	36	p=0.30
Percent Scrapers	3.4	4.5	132	1.9	1.6	84	1.9	1.1	58	3.5	2.4	68	5.9	4.3	73	p=0.62
Percent Predators	3.6	5.9	165	1.9	0.6	31	0.7	0.2	25	2.6	1.9	74	2.7	1.0	36	p=0.10[A]
Percent Shredders	0.6	1.0	173	0.0	0.0	0	0.3	0.3	100	0.8	1.0	137	0.0	0.0	0	p=1.00[A]

[A] Data do not meet equal variance (homogeneity) assumption. Welch Test applied to this metric, Bonferroni t-Test not used.

Statistically significant ANOVA p≤0.05 among all sites.

Statistically significant ANOVA p≤0.05 among all sites and statistically significant difference between two or more individual sites based on Bonferroni t-Test.

Table CAWG 10-80. Matrix of Probabilities Resulting from *Post Hoc* Pairwise Bonferroni t-Test Comparisons for San Joaquin River Mammoth Reach Percent Hydropsychidae.

Percent Hydropsychidae					
	Site AM)	Site BM 1	Site BM 2	Site BM 3	Site BM 4
Site AM	X	X	X	X	X
Site BM 1	0.02	X	X	X	X
Site BM 2	0.91	0.56	X	X	X
Site BM 3	1.00	0.07	1.00	X	X
Site BM 4	1.00	0.01	0.38	1.00	X

Probabilities ≤ 0.05 are highlighted
Probabilities ≤ 0.0001 shown as 0.0001

Table CAWG 10-81. Metric Values by Site for Rock Creek Benthic Macroinvertebrates, Big Creek ALP, Fall 2002.

Biological Metrics	Rock Creek Site AD (RM 0.55)			Rock Creek Site BD 2 (RM 0.40)			Rock Creek Site BD 1 (RM 0.05)			Probability Value from ANOVA
	Mean	Standard Deviation	Coefficient of Variation	Mean	Standard Deviation	Coefficient of Variation	Mean	Standard Deviation	Coefficient of Variation	
Taxa Richness	36.3	6.4	17.5	15.3	6.5	42.4	31.5	4.9	15.7	p=0.02
Ephemeroptera Taxa	5.7	0.6	10.2	2.0	1.7	86.6	4.5	0.7	15.7	p=0.03
Plecoptera Taxa	4.0	1.0	25.0	0.3	0.6	173.2	0.5	0.7	141.4	p=0.004
Trichoptera Taxa	7.3	0.6	7.9	3.3	0.6	17.3	5.0	0.0	0.0	p=0.0006
EPT Taxa	17.0	1.0	5.9	5.7	2.1	36.7	10.0	0.0	0.0	p=0.0006
EPT Index	47.4	13.9	29.4	15.6	9.3	59.4	22.7	1.8	8.1	p=0.03
Sensitive EPT Index	36.6	20.1	54.9	0.8	1.1	142.4	6.1	1.4	23.2	p=0.04
Shannon-Weaver Diversity Index	1.1	0.1	6.2	0.6	0.1	12.1	1.1	0.1	8.8	p=0.0009
Relative Diversity (Evenness)	0.7	0.0	5.5	0.5	0.0	5.7	0.7	0.0	4.2	p=0.002
Tolerance Value	3.4	0.9	26.9	5.1	0.2	3.2	5.1	0.0	0.2	p=0.03
Percent Intolerant Organisms	36.5	20.6	56.5	1.0	1.2	126.2	6.8	1.0	14.4	p=0.05
Percent Tolerant Organisms	1.5	0.5	31.0	0.5	0.7	130.6	2.8	0.7	25.8	p=0.03
Percent Hydropsychidae	3.7	5.9	159.6	1.8	0.5	27.5	4.8	6.3	131.9	p=0.78[A]
Percent Baetidae	3.0	1.6	53.6	9.2	8.4	91.3	11.0	1.9	17.5	p=0.20
Percent Dominant Taxa	26.3	9.8	37.4	54.0	4.6	8.5	25.8	3.0	11.5	p=0.007
Percent Collectors	41.7	9.2	22.2	70.9	11.3	16.0	48.7	6.7	13.8	p=0.03
Percent Filterers	13.6	18.8	138.5	22.8	12.3	54.1	31.3	9.2	29.5	p=0.48
Percent Scrapers	16.1	3.6	22.2	2.2	1.3	57.9	8.2	1.2	15.0	p=0.003
Percent Predators	6.8	1.8	26.2	3.7	1.2	32.4	10.8	1.3	11.7	p=0.009
Percent Shredders	21.9	18.7	85.4	0.4	0.2	50.3	1.0	0.0	1.1	p=0.14

[A] Data do not meet equal variance (homogeneity) assumption. Welch Test applied to this metric, Bonferroni t-Test not used.

Statistically significant ANOVA p≤0.05 among all sites.

Statistically significant ANOVA p≤0.05 among all sites and statistically significant difference between two or more individual sites based on Bonferroni t-Test.

Table CAWG 10-82. Matrix of Probabilities Resulting from *Post Hoc* Pairwise Bonferroni t-Test Comparisons for Rock Creek Taxa Richness.

Taxa Richness			
	Site AD (RM 0.55)	Site BD 1 (RM 0.05)	Site BD 2 (RM 0.40)
Site AD	X	X	X
Site BD 1	1.00	X	X
Site BD 2	0.03	0.10	X

Probabilities ≤ 0.05 are highlighted
Probabilities ≤ 0.0001 shown as 0.0001

Table CAWG 10-83. Matrix of Probabilities Resulting from *Post Hoc* Pairwise Bonferroni t-Test Comparisons for Rock Creek Ephemeroptera Taxa.

Ephemeroptera Taxa			
	Site AD (RM 0.55)	Site BD 1 (RM 0.05)	Site BD 2 (RM 0.40)
Site AD	X	X	X
Site BD 1	1.00	X	X
Site BD 2	0.04	0.23	X

Probabilities ≤ 0.05 are highlighted
Probabilities ≤ 0.0001 shown as 0.0001

Table CAWG 10-84. Matrix of Probabilities Resulting from *Post Hoc* Pairwise Bonferroni t-Test Comparisons for Rock Creek Plecoptera Taxa.

Plecoptera Taxa			
	Site AD (RM 0.55)	Site BD 1 (RM 0.05)	Site BD 2 (RM 0.40)
Site AD	X	X	X
Site BD 1	0.01	X	X
Site BD 2	0.007	1.00	X

Probabilities ≤ 0.05 are highlighted
Probabilities ≤ 0.0001 shown as 0.0001

Table CAWG 10-85. Matrix of Probabilities Resulting from *Post Hoc* Pairwise Bonferroni t-Test Comparisons for Rock Creek Plecoptera Taxa.

Trichoptera Taxa			
	Site AD (RM 0.55)	Site BD 1 (RM 0.05)	Site BD 2 (RM 0.40)
Site AD	X	X	X
Site BD 1	0.01	X	X
Site BD 2	0.0006	0.05	X

Probabilities ≤ 0.05 are highlighted
Probabilities ≤ 0.0001 shown as 0.0001

Table CAWG 10-86. Matrix of Probabilities Resulting from *Post Hoc* Pairwise Bonferroni t-Test Comparisons for Rock Creek EPT Taxa.

EPT Taxa			
	Site AD (RM 0.55)	Site BD 1 (RM 0.05)	Site BD 2 (RM 0.40)
Site AD	X	X	X
Site BD 1	0.01	X	X
Site BD 2	0.0006	0.07	X

Probabilities ≤ 0.05 are highlighted
Probabilities ≤ 0.0001 shown as 0.0001

Table CAWG 10-87. Matrix of Probabilities Resulting from *Post Hoc* Pairwise Bonferroni t-Test Comparisons for Rock Creek EPT Index.

EPT Index			
	Site AD (RM 0.55)	Site BD 1 (RM 0.05)	Site BD 2 (RM 0.40)
Site AD	X	X	X
Site BD 1	0.16	X	X
Site BD 2	0.04	1.00	X

Probabilities ≤ 0.05 are highlighted
Probabilities ≤ 0.0001 shown as 0.0001

Table CAWG 10-88. Matrix of Probabilities Resulting from *Post Hoc* Pairwise Bonferroni t-Test Comparisons for Rock Creek Sensitive EPT Index.

Sensitive EPT Index			
	Site AD (RM 0.55)	Site BD 1 (RM 0.05)	Site BD 2 (RM 0.40)
Site AD	X	X	X
Site BD 1	0.14	X	X
Site BD 2	0.06	1.00	X

Probabilities ≤ 0.05 are highlighted
Probabilities ≤ 0.0001 shown as 0.0001

Table CAWG 10-89. Matrix of Probabilities Resulting from *Post Hoc* Pairwise Bonferroni t-Test Comparisons for Rock Creek Shannon-Weaver Diversity Index.

Shannon-Weaver Diversity Index			
	Site AD (RM 0.55)	Site BD 1 (RM 0.05)	Site BD 2 (RM 0.40)
Site AD	X	X	X
Site BD 1	1.00	X	X
Site BD 2	0.001	0.004	X

Probabilities ≤ 0.05 are highlighted
Probabilities ≤ 0.0001 shown as 0.0001

Table CAWG 10-90. Matrix of Probabilities Resulting from *Post Hoc* Pairwise Bonferroni t-Test Comparisons for Rock Creek Relative Diversity (Evenness).

Relative Diversity (Evenness)			
	Site AD (RM 0.55)	Site BD 1 (RM 0.05)	Site BD 2 (RM 0.40)
Site AD	X	X	X
Site BD 1	1.00	X	X
Site BD 2	0.003	0.007	X

Probabilities ≤ 0.05 are highlighted
Probabilities ≤ 0.0001 shown as 0.0001

Table CAWG 10-91. Matrix of Probabilities Resulting from *Post Hoc* Pairwise Bonferroni t-Test Comparisons for Rock Creek Tolerance Value.

Tolerance Value			
	Site AD (RM 0.55)	Site BD 1 (RM 0.05)	Site BD 2 (RM 0.40)
Site AD	X	X	X
Site BD 1	0.08	X	X
Site BD 2	0.05	1.00	X

Probabilities ≤ 0.05 are highlighted
Probabilities ≤ 0.0001 shown as 0.0001

Table CAWG 10-92. Matrix of Probabilities Resulting from *Post Hoc* Pairwise Bonferroni t-Test Comparisons for for Rock Creek Percent Intolerant Organisms.

Percent Intolerant Organisms			
	Site AD (RM 0.55)	Site BD 1 (RM 0.05)	Site BD 2 (RM 0.40)
Site AD	X	X	X
Site 1	0.19	X	X
Site 2	0.08	1.00	X

Probabilities ≤ 0.05 are highlighted
Probabilities ≤ 0.0001 shown as 0.0001

Table CAWG 10-93. Matrix of Probabilities Resulting from *Post Hoc* Pairwise Bonferroni t-Test Comparisons for Rock Creek Percent Tolerant Organisms.

Percent Tolerant Organisms			
	Site AD (RM 0.55)	Site BD 1 (RM 0.05)	Site BD 2 (RM 0.40)
Site AD	X	X	X
Site BD 1	0.24	X	X
Site BD 2	0.34	0.03	X

Probabilities ≤ 0.05 are highlighted
Probabilities ≤ 0.0001 shown as 0.0001

Table CAWG 10-94. Matrix of Probabilities Resulting from *Post Hoc* Pairwise Bonferroni t-Test Comparisons for Rock Creek Percent Dominant Taxa.

Percent Dominant Taxa			
	Site AD (RM 0.55)	Site BD 1 (RM 0.05)	Site BD 2 (RM 0.40)
Site AD	X	X	X
Site BD 1	1.00	X	X
Site BD 2	0.01	0.02	X

Probabilities ≤ 0.05 are highlighted
Probabilities ≤ 0.0001 shown as 0.0001

Table CAWG 10-95. Matrix of Probabilities Resulting from *Post Hoc* Pairwise Bonferroni t-Test Comparisons for Rock Creek Percent Collectors.

Percent Collectors			
	Site AD (RM 0.55)	Site BD 1 (RM 0.05)	Site BD 2 (RM 0.40)
Site AD	X	X	X
Site BD 1	1.00	X	X
Site BD 2	0.04	0.15	X

Probabilities ≤ 0.05 are highlighted
Probabilities ≤ 0.0001 shown as 0.0001

Table CAWG 10-96. Matrix of Probabilities Resulting from *Post Hoc* Pairwise Bonferroni t-Test Comparisons for Rock Creek Percent Scrapers.

Percent Scrapers			
	Site AD (RM 0.55)	Site BD 1 (RM 0.05)	Site BD 2 (RM 0.40)
Site AD	X	X	X
Site BD 1	0.05	X	X
Site BD 2	0.003	0.13	X

Probabilities ≤ 0.05 are highlighted
Probabilities ≤ 0.0001 shown as 0.0001

Table CAWG 10-97. Matrix of Probabilities Resulting from *Post Hoc* Pairwise Bonferroni t-Test Comparisons for Rock Creek Percent Predators.

Percent Predators			
	Site AD (RM 0.55)	Site BD 1 (RM 0.05)	Site BD 2 (RM 0.40)
Site AD	X	X	X
Site BD 1	0.09	X	X
Site BD 2	0.15	0.01	X

Probabilities ≤ 0.05 are highlighted
Probabilities ≤ 0.0001 shown as 0.0001

Table CAWG 10-98. Physical/Habitat Quality Parameter Scores, San Joaquin River Stevenson Reach, Fall 2002.

Reach Name	Site	River Mile	Rosgen Level I Channel Type	Epifaunal Substrate/ Available Cover	Embeddedness	Velocity/ Depth Regimes	Sediment Deposition	Channel Flow Status	Channel Alteration	Frequency of Riffles	Bank Stability Left Bank	Bank Stability Right Bank	Vegetation Protection Left Bank	Vegetation Protection Right Bank	Riparian Vegetation Zone Width Left Bank	Riparian Vegetation Zone Width Right Bank	Total
San Joaquin River Stevenson Reach	Site SR 4	(RM 16.90)	G	11	18	16	18	14	13	16	9	9	2	2	2	2	132
	Site SR 3	(RM 15.40)	G	13	19	15	15	14	16	18	9	9	2	2	2	2	136
	Site SR 2	(RM 13.50)	G	12	18	18	16	13	15	15	9	9	5	5	2	2	139
	Site SR 1	(RM 11.80)	G	11	19	18	17	11	18	16	9	9	5	5	2	2	142

Table CAWG 10-99. Densities of Macroinvertebrate Samples, San Joaquin River Stevenson Reach, Fall 2002.

Stream	Site	River Mile	Mean Density (No./Sq-M)	Standard Deviation	Coefficient of Variation
San Joaquin River Stevenson Reach	Site SR 4	(RM 16.90)	6703	4923	73
	Site SR 3	(RM 15.40)	1693	256	15
	Site SR 2	(RM 13.50)	11466	13268	116
	Site SR 1	(RM 11.80)	2215	620	28

* only one Replicate

Table CAWG 10-100. Abundant Benthic Macroinvertebrate Insect Taxa and Percent Contribution by Site, San Joaquin River Stevenson Reach, Fall 2002.

Order	Taxa	San Joaquin River Stevenson Reach			
		Site SR 4	Site SR 3	Site SR 2	Site SR 1
		(RM 16.90)	(RM 15.40)	(RM 13.50)	(RM 11.80)
Ephemeroptera	*Baetis sp.*	9.9	6.2	7.8	5.1
Trichoptera	*Chimarra sp.*				1.0
Trichoptera	*Hydropsyche sp.*		4.7	5.4	5.8
Trichoptera	*Hydroptila sp.*	5.4		0.9	
Trichoptera	*Ochrotrichia sp.*	3.5	2.3	1.1	
Diptera	*Simulium sp.*	34.2	42.0	54.7	54.7
Diptera	Orthocladiinae	15.3	7.9	10.8	8.1
Diptera	Tanytarsini	5.2	17.3		5.0
Totals		73.4	80.3	80.8	79.7

Table CAWG 10-101. Metric Values by Site for San Joaquin River Stevenson Reach Benthic Macroinvertebrates, Big Creek ALP, Fall 2002.

Biological Metrics	San Joaquin River Stevenson Reach Site SR 4 (RM 16.90)			San Joaquin River Stevenson Reach Site SR 3 (RM 15.40)			San Joaquin River Stevenson Reach Site SR 2 (RM 13.50)			San Joaquin River Stevenson Reach Site SR 1 (RM 11.80)			Probability Value from ANOVA
	Mean	Standard Deviation	Coefficient of Variation	Mean	Standard Deviation	Coefficient of Variation	Mean	Standard Deviation	Coefficient of Variation	Mean	Standard Deviation	Coefficient of Variation	
Taxa Richness	23.5	0.7	3.0	23.3	9.0	38.4	17.0	3.6	21.2	19.7	4.9	25.1	p=0.58
Ephemeroptera Taxa	1.5	0.7	47.1	1.3	0.6	43.3	1.0	0.0	0.0	1.0	0.0	0.0	p=1.00[A]
Plecoptera Taxa	0.0	0.0	0.0	0.0	0.0	0.0	0.3	0.6	173.2	0.0	0.0	0.0	p=0.0001[A]
Trichoptera Taxa	5.5	0.7	12.9	5.0	1.7	34.6	5.0	1.0	20.0	7.0	1.7	24.7	p=0.35
EPT Taxa	7.0	0.0	0.0	6.3	2.1	32.9	6.3	1.2	18.2	8.0	1.7	21.7	p=0.56
EPT Index	24.8	1.9	7.5	16.9	11.7	69.4	17.9	6.8	38.2	14.9	11.8	78.8	p=0.73
Sensitive EPT Index	2.3	1.4	59.0	1.6	1.0	59.6	0.6	0.5	93.3	0.4	0.2	41.0	p=0.09
Shannon-Weaver Diversity Index	0.9	0.0	2.0	0.8	0.3	40.7	0.6	0.3	44.4	0.7	0.3	40.1	p=0.55
Relative Diversity (Evenness)	0.7	0.0	1.1	0.6	0.2	29.8	0.5	0.2	38.5	0.5	0.2	33.2	p=0.57
Tolerance Value	5.7	0.0	0.4	5.6	0.1	2.5	5.8	0.3	5.3	5.9	0.4	6.4	p=0.59
Percent Intolerant Organisms	0.2	0.2	141.4	1.6	0.9	56.0	1.2	0.3	24.9	0.1	0.2	173.2	p=0.01
Percent Tolerant Organisms	12.0	3.9	32.8	4.8	3.7	77.3	12.2	20.6	169.3	12.3	10.2	82.4	p=0.84
Percent Hydropsychidae	1.1	0.8	67.5	5.0	6.0	118.0	5.5	2.0	36.5	6.2	6.9	111.0	p=0.72
Percent Baetidae	9.9	0.2	2.0	5.9	5.3	88.4	8.1	4.9	61.2	5.1	4.2	81.3	p=0.65
Percent Dominant Taxa	33.8	8.9	26.2	52.3	22.8	43.7	60.5	24.7	40.7	53.8	22.0	41.0	p=0.64
Percent Collectors	51.7	11.4	22.0	43.4	26.9	62.0	36.1	31.3	86.6	33.7	16.2	48.0	p=0.86
Percent Filterers	36.7	10.2	27.7	50.1	28.0	55.8	60.2	33.2	55.1	61.4	19.5	31.8	p=0.71
Percent Scrapers	8.1	1.5	18.7	3.2	3.4	107.5	1.6	0.6	37.1	3.1	2.5	81.7	p=0.09
Percent Predators	3.0	0.0	1.2	3.0	0.4	13.8	1.9	1.4	74.6	1.8	1.2	68.1	p=0.44
Percent Shredders	0.5	0.3	54.7	0.2	0.4	173.2	0.2	0.2	86.8	0.0	0.0	0.0	p=0.76

[A] Data do not meet equal variance (homogeneity) assumption. Welch Test applied to this metric, Bonferroni t-Test not used.

Statistically significant ANOVA p≤0.05 among all sites.

Statistically significant ANOVA p≤0.05 among all sites and statistically significant difference between two or more individual sites based on Bonferroni t-Test.

Table CAWG 10-102. Matrix of Probabilities Resulting from *Post Hoc* Pairwise Bonferroni t-Test Comparisons for San Joaquin River Stevenson Reach Percent Intolerant Organisms.

Percent Intolerant Organisms				
	Site SR 1 (RM 11.80)	Site SR 2 (RM 13.50)	Site SR 3 (RM 15.40)	Site SR 4 (RM 16.90)
Site SR 1	X	X	X	X
Site SR 2	0.07	X	X	X
Site SR 3	0.03	1.00	X	X
Site SR 4	1.00	0.20	0.10	X

Probabilities ≤ 0.05 are highlighted
Probabilities ≤ 0.0001 shown as 0.0001

Table CAWG 10-103. Physical/Habitat Quality Parameter Scores, Big Creek, Fall 2002.

Reach Name	Site	River Mile	Rosgen Level I Channel Type	Epifaunal Substrate/ Available Cover	Embeddedness	Velocity/ Depth Regimes	Sediment Deposition	Channel Flow Status	Channel Alteration	Frequency of Riffles	Bank Stability Left Bank	Bank Stability Right Bank	Vegetation Protection Left Bank	Vegetation Protection Right Bank	Riparian Vegetation Zone Width Left Bank	Riparian Vegetation Zone Width Right Bank	Total
Big Creek Dam 1 to PH 1	Site 3	(RM 9.85)	Aa+	19	14	10	13	18	15	17	8	8	8	8	6	6	150
	Site 2	(RM 7.90)	Aa+	2	17	12	14	17	20	5	10	10	8	8	2	2	127
	Site 1	(RM 6.40)	Aa+	9	7	16	8	14	19	16	10	10	5	4	1	0	119
	Site B	(RM 8.80)	B	3	3	7	6	19	16	4	10	10	10	10	7	8	113
Big Creek Dam 4 to PH 2	Site 3	(RM 6.00)	A	13	14	16	8	15	20	16	10	10	0	0	1	1	124
	Site 2	(RM 4.95)	A	18	18	17	10	14	20	8	10	10	1	0	1	0	127
	Site 1	(RM 2.15)	A	17	17	15	18	19	20	18	10	10	0	3	0	1	148
Big Creek Dam 5 to PH 8	Site 2	(RM 1.55)	A	12	17	19	18	18	15	18	10	10	7	6	7	5	162
	Site 1	(RM 0.55)	A	7	18	13	19	19	10	13	9	9	4	4	1	1	127

Table CAWG 10-104. Densities of Macroinvertebrate Samples, Big Creek, Fall 2002.

Stream	Site	River Mile	Mean Density (No./Sq-M)	Standard Deviation	Coefficient of Variation
Big Creek Dam 1 to PH 1	Site 3	(RM 9.85)	3139	4147	132
	Site 2	(RM 7.90)	1208	719	60
	Site 1	(RM 6.40)	12807	11930	93
	Site B	(RM 8.80)	3509	*	*
Big Creek Dam 4 to PH 2	Site 3	(RM 6.00)	4905	1383	28
	Site 2	(RM 4.95)	2583	*	*
	Site 1	(RM 2.15)	6155	2482	40
Big Creek Dam 5 to PH 8	Site 2	(RM 1.55)	5,330	3211	60
	Site 1	(RM 0.55)	5907	3936	67

* only one Replicate

Table CAWG 10-105. Abundant Benthic Macroinvertebrate Insect Taxa and Percent Contribution by Site, Big Creek, Fall 2002.

Order	Taxa	Dam 1 to PH 1				Dam 4 to PH 2			Dam 5 to PH 8	
		Site 3 (RM 9.85)	Site 2 (RM 7.90)	Site 1 (RM 6.40)	Site B (RM 8.80)	Site 3 (RM 6.00)	Site 2 (RM 4.95)	Site 1 (RM 2.15)	Site 2 (RM 1.55)	Site 1 (RM 0.55)
Ephemeroptera	*Baetis sp.*	12.6	24.5	2.5		7.3	20.0	10.7	10.2	11.3
Ephemeroptera	*Epeorus sp.*		5.7				5.3	5.1		
Ephemeroptera	*Paraleptophlebia sp.*						1.7			
Plecoptera	*Malenka sp.*								5.6	
Plecoptera	*Yoraperla sp.*	10.7	4.5	5.8						
Plecoptera	*Zapada sp.*	23.0			10.0					1.8
Trichoptera	*Gumaga sp.*						3.3			
Trichoptera	*Hydropsyche sp.*				7.4	9.9		3.0		7.2
Trichoptera	*Hydroptila sp.*								5.2	
Trichoptera	*Lepidostoma sp.*					6.9	12.0	18.0		
Trichoptera	*Micrasema sp.*	4.9	5.0							
Trichoptera	*Wormaldia sp.*							3.1		
Diptera	*Simulium sp.*	6.1	16.2	20.3	6.3	25.6			32.9	24.2
Diptera	*Diamesinae*				1.9					
Diptera	*Orthocladiinae*	9.5		11.5	9.8	10.8		3.0	10.0	14.9
Diptera	*Tanypodinae*			4.3						
Diptera	*Tanytarsini*		5.4	9.8	6.9	11.3	10.3	8.0	9.0	12.0
Totals		66.9	61.4	54.2	42.4	71.7	52.7	50.8	72.9	71.4

Table CAWG 10-106. Metric Values by Site for Big Creek Dam 1 to PH 1 Benthic Macroinvertebrates, Big Creek ALP, Fall 2002

Biological Metrics	Big Creek Site 3 (RM 9.85)			Big Creek Site 2 (RM 7.90)			Big Creek Site 1 (RM 6.40)			Big Creek Site B (RM 8.80)			Probability Value from ANOVA
	Mean	Standard Deviation	Coefficient of Variation	Mean	Standard Deviation	Coefficient of Variation	Mean	Standard Deviation	Coefficient of Variation	Mean	Standard Deviation	Coefficient of Variation	
Taxa Richness	23.7	3.2	13.6	35.5	3.5	10.0	35.0	1.7	4.9	31.0	*	*	p=0.01
Ephemeroptera Taxa	2.3	1.5	65.5	7.5	0.7	9.4	7.3	0.6	7.9	6.0	*	*	p=0.007
Plecoptera Taxa	4.3	1.2	26.6	3.0	1.4	47.1	4.0	1.0	25.0	3.0	*	*	p=0.58
Trichoptera Taxa	4.0	1.0	25.0	8.5	2.1	25.0	5.3	2.3	43.3	7.0	*	*	p=0.17
EPT Taxa	10.7	2.3	21.7	19.0	0.0	0.0	16.7	2.5	15.1	16.0	*	*	p=0.03
EPT Index	23.1	4.4	19.1	60.8	8.8	14.4	23.8	12.3	51.9	66.6	*	*	p=0.01
Sensitive EPT Index	14.1	7.5	53.2	28.4	3.8	13.2	16.6	9.6	57.9	47.2	*	*	p=0.05
Shannon-Weaver Diversity Index	0.9	0.1	14.0	1.2	0.2	14.2	1.1	0.2	18.9	1.1	*	*	p=0.40
Relative Diversity (Evenness)	0.7	0.1	11.1	0.8	0.1	11.4	0.7	0.1	20.1	0.8	*	*	p=0.76
Tolerance Value	4.6	0.6	14.0	4.0	0.1	2.0	5.1	0.5	10.1	3.6	*	*	p=0.14
Percent Intolerant Organisms	16.1	6.7	41.5	28.0	2.4	8.7	17.9	9.2	51.5	47.4	*	*	p=0.04
Percent Tolerant Organisms	13.0	13.5	104.3	4.3	3.2	74.3	17.0	9.0	52.7	5.5	*	*	p=0.58
Percent Hydropsychidae	8.3	3.8	46.4	2.7	0.7	26.7	1.3	0.7	54.6	0.0	*	*	p=0.06
Percent Baetidae	0.6	0.3	50.9	24.2	12.9	53.5	3.5	0.4	12.2	12.6	*	*	p=0.001
Percent Dominant Taxa	38.7	10.3	26.6	24.2	12.9	53.5	30.6	25.2	82.5	23.0	*	*	p=0.81
Percent Collectors	22.1	8.2	37.0	44.3	1.5	3.3	52.5	28.6	54.5	38.2	*	*	p=0.35
Percent Filterers	25.1	10.9	43.4	21.6	3.0	13.9	23.4	34.4	146.8	9.8	*	*	p=0.91
Percent Scrapers	0.6	0.5	86.6	17.8	2.5	14.3	3.8	0.6	16.2	10.2	*	*	p=0.0001
Percent Predators	41.0	13.9	33.9	7.3	1.6	22.5	10.6	3.8	36.4	7.4	*	*	p=0.03
Percent Shredders	11.2	6.9	61.5	9.1	5.4	59.2	9.7	7.3	75.1	34.5	*	*	p=0.08

* only one Replicate

Statistically significant ANOVA p≤0.05 among all sites.

Statistically significant ANOVA p≤0.05 among all sites and statistically significant difference between two or more individual sites based on Bonferroni t-Test.

Table CAWG 10-107. Matrix of Probabilities Resulting from *Post Hoc* Pairwise Bonferroni t-Test Comparisons for Big Creek Dam 1 to PH 1 Taxa Richness.

Taxa Richness				
	Site B (RM 8.80)	Site 1 (RM 6.40)	Site 2 (RM 7.90)	Site 3 (RM 9.85)
Site B	X	X	X	X
Site 1	1.00	X	X	X
Site 2	1.00	1.00	X	X
Site 3	0.44	0.03	0.03	X

Probabilities ≤ 0.05 are highlighted
Probabilities ≤ 0.0001 shown as 0.0001

Table CAWG 10-108. Matrix of Probabilities Resulting from *Post Hoc* Pairwise Bonferroni t-Test Comparisons for Big Creek Dam 1 to PH 1 Ephemeroptera Taxa.

Ephemeroptera Taxa				
	Site B (RM 8.80)	Site 1 (RM 6.40)	Site 2 (RM 7.90)	Site 3 (RM 9.85)
Site B	X	X	X	X
Site 1	1.00	X	X	X
Site 2	1.00	1.00	X	X
Site 3	0.19	0.01	0.02	X

Probabilities ≤ 0.05 are highlighted
Probabilities ≤ 0.0001 shown as 0.0001

Table CAWG 10-109. Matrix of Probabilities Resulting from *Post Hoc* Pairwise Bonferroni t-Test Comparisons for Big Creek Dam 1 to PH 1 EPT Taxa.

EPT Taxa				
	Site B (RM 8.80)	Site 1 (RM 6.40)	Site 2 (RM 7.90)	Site 3 (RM 9.85)
Site B	X	X	X	X
Site 1	1.00	X	X	X
Site 2	1.00	1.00	X	X
Site 3	0.51	0.12	0.05	X

Probabilities ≤ 0.05 are highlighted
Probabilities ≤ 0.0001 shown as 0.0001

Table CAWG 10-110. Matrix of Probabilities Resulting from *Post Hoc* Pairwise Bonferroni t-Test Comparisons for Big Creek Dam 1 to PH 1 EPT Index.

EPT Index				
	Site B (RM 8.80)	Site 1 (RM 6.40)	Site 2 (RM 7.90)	Site 3 (RM 9.85)
Site B	X	X	X	X
Site 1	0.06	X	X	X
Site 2	1.00	0.04	X	X
Site 3	0.06	1.00	0.04	X

Probabilities ≤ 0.05 are highlighted
Probabilities ≤ 0.0001 shown as 0.0001

Table CAWG 10-111. Matrix of Probabilities Resulting from *Post Hoc* Pairwise Bonferroni t-Test Comparisons for Big Creek Dam 1 to PH 1 Sensitive EPT Index.

Sensitive EPT Index				
	Site B (RM 8.80)	Site 1 (RM 6.40)	Site 2 (RM 7.90)	Site 3 (RM 9.85)
Site B	X	X	X	X
Site 1	0.12	X	X	X
Site 2	0.65	0.97	X	X
Site 3	0.09	1.00	0.62	X

Probabilities ≤ 0.05 are highlighted
Probabilities ≤ 0.0001 shown as 0.0001

Table CAWG 10-112. Matrix of Probabilities Resulting from *Post Hoc* Pairwise Bonferroni t-Test Comparisons for Big Creek Dam 1 to PH 1 Percent Intolerant Organisms.

Percent Intolerant Organisms				
	Site B (RM 8.80)	Site 1 (RM 6.40)	Site 2 (RM 7.90)	Site 3 (RM 9.85)
Site B	X	X	X	X
Site 1	0.17	X	X	X
Site 2	0.33	1.00	X	X
Site 3	0.08	1.00	0.46	X

Probabilities ≤ 0.05 are highlighted
Probabilities ≤ 0.0001 shown as 0.0001

Table CAWG 10-113. Matrix of Probabilities Resulting from *Post Hoc* Pairwise Bonferroni t-Test Comparisons for Big Creek Dam 1 to PH 1 Percent Baetidae.

Percent Baetidae				
	Site B (RM 8.80)	Site 1 (RM 6.40)	Site 2 (RM 7.90)	Site 3 (RM 9.85)
Site B	X	X	X	X
Site 1	0.33	X	X	X
Site 2	1.00	0.04	X	X
Site 3	0.01	0.02	0.002	X

Probabilities ≤ 0.05 are highlighted
Probabilities ≤ 0.0001 shown as 0.0001

Table CAWG 10-114. Matrix of Probabilities Resulting from *Post Hoc* Pairwise Bonferroni t-Test Comparisons for Big Creek Dam 1 to PH 1 Percent Scrapers.

Percent Scrapers				
	Site B (RM 8.80)	Site 1 (RM 6.40)	Site 2 (RM 7.90)	Site 3 (RM 9.85)
Site B	X	X	X	X
Site 1	0.02	X	X	X
Site 2	0.16	0.001	X	X
Site 3	0.0007	0.002	0.0001	X

Probabilities ≤ 0.05 are highlighted
Probabilities ≤ 0.0001 shown as 0.0001

Table CAWG 10-115. Matrix of Probabilities Resulting from *Post Hoc* Pairwise Bonferroni t-Test Comparisons for Big Creek Dam 1 to PH 1 Percent Predators.

Percent Predators				
	Site B (RM 8.80)	Site 1 (RM 6.40)	Site 2 (RM 7.90)	Site 3 (RM 9.85)
Site B	X	X	X	X
Site 1	1.00	X	X	X
Site 2	1.00	1.00	X	X
Site 3	0.16	0.06	0.07	X

Probabilities ≤ 0.05 are highlighted
Probabilities ≤ 0.0001 shown as 0.0001

Table CAWG 10-116. Metric Values by Site for Big Creek Dam 4 to PH 2 Benthic Macroinvertebrates, Big Creek ALP, Fall 2002.

Biological Metrics	Big Creek Dam 4 to PH 2 Site 3 (RM 6.00)			Big Creek Dam 4 to PH 2 Site 2 (RM 4.95)			Big Creek Dam 4 to PH 2 Site 1 (RM 2.15)			Probability Value from ANOVA
	Mean	Standard Deviation	Coefficient of Variation	Mean	Standard Deviation	Coefficient of Variation	Mean	Standard Deviation	Coefficient of Variation	
Taxa Richness	34.7	6.1	17.6	37.0	*	*	39.0	4.6	11.8	p=0.65
Ephemeroptera Taxa	5.7	2.5	44.4	4.0	*	*	6.0	1.7	28.9	p=0.74
Plecoptera Taxa	4.3	1.2	26.6	2.0	*	*	2.3	1.2	49.5	p=0.17
Trichoptera Taxa	6.3	1.5	24.1	8.0	*	*	8.7	1.5	17.6	p=0.28
EPT Taxa	16.3	5.0	30.8	14.0	*	*	17.0	2.6	15.6	p=0.82
EPT Index	37.7	27.1	71.8	48.7	*	*	49.6	1.9	3.7	p=0.75
Sensitive EPT Index	17.3	15.3	88.1	25.7	*	*	32.2	7.3	22.5	p=0.40
Shannon-Weaver Diversity Index	1.0	0.3	33.5	1.2	*	*	1.3	0.1	8.0	p=0.48
Relative Diversity (Evenness)	0.6	0.2	29.6	0.7	*	*	0.8	0.0	4.8	p=0.46
Tolerance Value	4.5	1.1	23.3	3.9	*	*	3.5	0.3	7.8	p=0.38
Percent Intolerant Organisms	20.2	15.7	78.0	22.1	*	*	29.8	6.7	22.3	p=0.64
Percent Tolerant Organisms	2.6	0.3	11.1	5.0	*	*	3.4	1.4	42.1	p=0.24
Percent Hydropsychidae	9.8	8.7	88.8	0.7	*	*	3.2	1.9	59.0	p=0.39
Percent Baetidae	7.8	2.7	34.2	20.0	*	*	11.5	2.8	24.6	p=0.04
Percent Dominant Taxa	39.0	26.7	68.6	20.0	*	*	20.1	8.1	40.0	p=0.52
Percent Collectors	38.8	20.7	53.3	42.1	*	*	34.7	3.7	10.5	p=0.89
Percent Filterers	34.9	31.1	89.3	2.0	*	*	7.8	2.5	32.5	p=0.06
Percent Scrapers	7.1	6.1	86.2	33.4	*	*	32.4	5.8	17.8	p=0.01
Percent Predators	8.0	0.7	8.6	6.7	*	*	6.4	0.2	3.8	p=0.04
Percent Shredders	11.2	9.9	88.0	15.7	*	*	18.7	11.0	58.9	p=0.70

* only one Replicate

Statistically significant ANOVA p≤0.05 among all sites.

Statistically significant ANOVA p≤0.05 among all sites and statistically significant difference between two or more individual sites based on Bonferroni t-Test.

Table CAWG 10-117. Matrix of Probabilities Resulting from *Post Hoc* Pairwise Bonferroni t-Test Comparisons for Big Creek Dam 4 to PH 2 Percent Baetidae.

Percent Baetidae			
	Site 3 (RM 6.00)	Site 2 (RM 4.95)	Site 1 (RM 2.15)
Site 3	X	X	X
Site 2	0.05	X	X
Site 1	0.52	0.17	X

Probabilities ≤ 0.05 are highlighted
Probabilities ≤ 0.0001 shown as 0.0001

Table CAWG 10-118. Matrix of Probabilities Resulting from *Post Hoc* Pairwise Bonferroni t-Test Comparisons for Big Creek Dam 4 to PH 2 Percent Scrapers.

Percent Scrapers			
	Site 3 (RM 6.00)	Site 2 (RM 4.95)	Site 1 (RM 2.15)
Site 3	X	X	X
Site 2	0.05	X	X
Site 1	0.01	1.00	X

Probabilities ≤ 0.05 are highlighted
Probabilities ≤ 0.0001 shown as 0.0001

Table CAWG 10-119. Matrix of Probabilities Resulting from *Post Hoc* Pairwise Bonferroni t-Test Comparisons for Big Creek Dam 4 to PH 2 Percent Predators.

Percent Predators			
	Site 3 (RM 6.00)	Site 2 (RM 4.95)	Site 1 (RM 2.15)
Site 3	X	X	
Site 2	0.23	X	
Site 1	0.13	0.49	

Probabilities ≤ 0.05 are highlighted
Probabilities ≤ 0.0001 shown as 0.0001

Table CAWG 10-120. Metric Values by Site for Big Creek Dam 5 to PH 8 Benthic Macroinvertebrates, Big Creek ALP, Fall 2002.

Biological Metrics	Big Creek Dam 5 to PH 8 Dam 5 to PH 8 Upstream Site 2 (RM 1.55)			Big Creek Dam 5 to PH 8 Dam 5 to PH 8 Downstream Site 1 (RM 0.55)			Probability Value from ANOVA
	Mean	Standard Deviation	Coefficient of Variation	Mean	Standard Deviation	Coefficient of Variation	
Taxa Richness	22.0	2.6	12.0	30.0	7.2	24.0	p=0.15
Ephemeroptera Taxa	2.7	0.6	21.7	3.7	2.1	56.8	p=0.47
Plecoptera Taxa	2.3	0.6	24.7	2.0	1.0	50.0	p=0.64
Trichoptera Taxa	6.3	0.6	9.1	5.3	1.5	28.6	p=0.35
EPT Taxa	11.3	0.6	5.1	11.0	3.0	27.3	p=0.86
EPT Index	34.8	16.3	46.7	26.5	1.6	6.1	p=0.43
Sensitive EPT Index	11.3	5.1	45.0	5.4	3.8	70.5	p=0.19
Shannon-Weaver Diversity Index	0.9	0.2	17.0	1.0	0.2	16.9	p=0.56
Relative Diversity (Evenness)	0.7	0.1	13.3	0.7	0.1	9.7	p=0.97
Tolerance Value	5.3	0.5	8.6	5.3	0.2	4.5	p=0.83
Percent Intolerant Organisms	11.2	4.8	43.0	4.3	1.4	33.3	p=0.08
Percent Tolerant Organisms	9.8	5.5	56.1	7.1	0.3	4.4	p=0.45
Percent Hydropsychidae	2.8	1.3	47.0	7.5	3.3	43.8	p=0.08
Percent Baetidae	10.3	1.1	10.5	12.1	5.9	48.9	p=0.62
Percent Dominant Taxa	33.2	16.1	48.5	31.9	10.8	33.9	p=0.90
Percent Collectors	40.1	11.6	28.9	52.2	10.5	20.2	p=0.26
Percent Filterers	36.2	14.8	41.0	33.7	18.0	53.2	p=0.87
Percent Scrapers	10.6	9.0	85.0	5.2	2.2	42.0	p=0.37
Percent Predators	3.8	2.0	50.8	6.3	4.7	74.6	p=0.45
Percent Shredders	9.3	3.9	42.1	2.6	1.9	72.9	p=0.05

Statistically significant ANOVA $p \leq 0.05$ among all sites.

Statistically significant ANOVA $p \leq 0.05$ among all sites and statistically significant difference between two or more individual sites based on Bonferroni t-Test.

Table CAWG 10-121. Physical/Habitat Quality Parameter Scores, Big Creek Tributaries, Fall 2002.

Reach Name	Site	River Mile	Rosgen Level I Channel Type	Epifaunal Substrate/ Available Cover	Embeddedness	Velocity/ Depth Regimes	Sediment Deposition	Channel Flow Status	Channel Alteration	Frequency of Riffles	Bank Stability Left Bank	Bank Stability Right Bank	Vegetation Protection Left Bank	Vegetation Protection Right Bank	Riparian Vegetation Zone Width Left Bank	Riparian Vegetation Zone Width Right Bank	Total
Pitman Creek	Site AD	(RM 1.65)	B	11	20	15	15	14	20	18	9	10	8	8	6	6	160
	Site BD 2	(RM 1.45)	B	7	20	19	19	8	20	20	10	10	5	5	2	2	147
	Site BD 1	(RM 1.30)	Aa+	7	20	14	20	7	20	20	10	10	1	1	1	1	132
	Site BD 0	(RM 0.20)	Aa+	12	18	19	15	9	20	20	10	10	5	5	1	4	148
Ely Creek	Site AD	(RM 1.20)	Aa+	8	8	2	9	2	20	17	10	10	9	9	4	4	112
	Site BD 3	(RM 0.60)	Aa+	15	13	1	17	2	20	12	8	8	8	8	2	2	116
	Site BD 2	(RM 0.45)	Aa+	17	14	1	15	1	20	19	9	9	6	6	1	3	121
	Site BD 1	(RM 0.20)	Aa+	16	13	6	16	3	20	19	10	10	8	8	2	2	133
Balsam Creek	Site AD	(RM 0.80)	Aa+	15	13	14	15	14	15	19	8	6	8	6	6	6	145
	Site BD 2	(RM 0.50)	Aa+	12	8	11	7	12	14	16	6	6	6	6	4	4	112
	Site BD 1	(RM 0.10)	Aa+	11	8	15	7	14	18	14	8	8	7	7	5	5	127
Adit 8 Creek	Site 2	(RM 0.90)	Aa+	5	16	7	17	18	10	8	5	5	8	8	3	3	113
	Site 1	(RM 0.40)	Aa+	9	7	8	18	19	16	17	9	9	9	9	2	2	134

Table CAWG 10-122. Densities of Macroinvertebrate Samples, Big Creek Tributaries, Fall 2002.

Stream	Site	River Mile	Mean Density (No./Sq-M)	Standard Deviation	Coefficient of Variation
Pitman Creek	Site AD	(RM 1.65)	7157	4487	63
	Site BD 2	(RM 1.45)	2954	1681	57
	Site BD 1	(RM 1.30)	8039	8206	102
	Site BD 0	(RM 0.20)	7760	3041	39
Ely Creek	Site AD	(RM 1.20)	8181	*	*
	Site BD 3	(RM 0.60)	1974	1694	86
	Site BD 2	(RM 0.45)	485	352	73
	Site BD 1	(RM 0.20)	535	321	60
Balsam Creek	Site AD	(RM 0.80)	5271	6132	116
	Site BD 2	(RM 0.50)	1468	609	42
	Site BD 1	(RM 0.10)	1847	661	36
Adit 8 Creek	Site 2	(RM 0.90)	304	73	24
	Site 1	(RM 0.40)	215	59	27

* only one Replicate

Table CAWG 10-123. Abundant Benthic Macroinvertebrate Insect Taxa and Percent Contribution by Site, Big Creek Tributaries, Fall 2002.

Order	Taxa	Pitman Creek				Ely Creek				Balsam Creek			Adit 8 Creek	
		Site AD (RM 1.65)	Site BD 2 (RM 1.45)	Site BD 1 (RM 1.30)	Site BD 0 (RM 0.20)	Site AD (RM 1.20)	Site BD 3 (RM 0.60)	Site BD 2 (RM 0.45)	Site BD 1 (RM 0.20)	Site AD (RM 0.80)	Site BD 2 (RM 0.50)	Site BD 1 (RM 0.10)	Site 2 (RM 0.90)	Site 1 (RM 0.40)
Ephemeroptera	*Baetis sp.*	3.2	13.4	11.9	30.1					17.5	18.4	6.3	1.7	20.4
Ephemeroptera	*Cinygmula sp.*	3.8												
Ephemeroptera	*Epeorus sp.*				2.2					5.2				
Ephemeroptera	*Ironodes sp.*									4.7		6.2		5.3
Ephemeroptera	*Paraleptophlebia sp.*								4.2					
Plecoptera	*Hesperoperla sp.*													4.1
Plecoptera	*Soyedina sp.*												8.9	
Plecoptera	*Zapada sp.*			4.3		5.6				9.3			2.2	4.1
Trichoptera	*Agapetus sp.*											9.2		
Trichoptera	*Apatania sp.*						4.3							
Trichoptera	*Dolophilodes sp.*										3.6			
Trichoptera	*Heteroplectron sp.*							2.5	4.7					
Trichoptera	*Hydropsyche sp.*	9.5	1.3	2.3							9.2	13.9		
Trichoptera	*Lepidostoma sp.*				3.1	8.8		1.7	5.8		7.7	17.6		
Trichoptera	*Micrasema sp.*					3.9	3.0							4.3
Trichoptera	*Neothremma sp.*													9.0
Trichoptera	*Parapsyche sp.*												1.1	
Trichoptera	*Rhyacophila sp.*												1.9	
Diptera	*Antocha sp.*		2.0	2.6										
Diptera	*Bezzia/Palpomyia sp.*						5.9							
Diptera	*Forcipomyia sp.*						5.0							
Diptera	*Simulium sp.*		47.3	26.7	27.1									
Diptera	*Chironomini*						6.1							
Diptera	*Chironomini*	3.8						4.5						
Diptera	*Orthocladiinae*	19.9	16.7	37.7	11.6	16.1	11.6	11.9	12.1	12.5	25.6	6.4	15.0	4.9
Diptera	*Orthocladiinae*													
Diptera	*Tanypodinae*					7.4		2.6	9.8					
Diptera	*Tanytarsini*	20.1	14.2		10.9	18.9		1.3	21.6	14.2	4.7			
Totals		60.3	94.9	85.4	85.0	60.7	35.8	24.5	58.3	63.3	69.1	59.7	30.8	52.3

Table CAWG 10-124. Metric Values by Site for Pitman Creek Benthic Macroinvertebrates, Big Creek ALP, Fall 2002.

Biological Metrics	Pitman Creek Site AD (RM 1.65)			Pitman Creek Site BD 2 (RM 1.45)			Pitman Creek Site BD 1 (RM 1.30)			Pitman Creek Site BD 0 (RM 0.20)			Probability Value from ANOVA
	Mean	Standard Deviation	Coefficient of Variation	Mean	Standard Deviation	Coefficient of Variation	Mean	Standard Deviation	Coefficient of Variation	Mean	Standard Deviation	Coefficient of Variation	
Taxa Richness	39.0	4.6	11.8	14.3	2.9	20.1	18.3	2.5	13.7	26.0	7.2	27.7	p=0.0009
Ephemeroptera Taxa	8.3	0.6	6.9	1.7	1.2	69.3	3.0	0.0	0.0	5.3	2.5	47.2	p=0.002
Plecoptera Taxa	5.7	1.5	27.0	0.3	0.6	173.2	1.3	0.6	43.3	1.3	1.2	86.6	p=0.001
Trichoptera Taxa	11.0	2.6	24.1	5.0	1.0	20.0	5.0	0.0	0.0	5.0	1.7	34.6	p=0.06[A]
EPT Taxa	25.0	4.0	16.0	7.0	2.0	28.6	9.3	0.6	6.2	11.7	3.8	32.5	p=0.0002
EPT Index	40.6	4.0	9.8	18.3	1.8	10.1	26.4	8.6	32.4	43.9	18.6	42.2	p=0.01
Sensitive EPT Index	16.0	3.8	24.0	0.9	0.8	86.6	7.9	3.3	41.8	7.1	5.1	72.5	p=0.0064
Shannon-Weaver Diversity Index	1.2	0.1	11.8	0.7	0.1	14.5	0.8	0.1	11.7	0.8	0.1	12.6	p=0.003
Relative Diversity (Evenness)	0.7	0.1	8.6	0.6	0.0	7.1	0.6	0.1	8.9	0.6	0.0	4.3	p=0.02
Tolerance Value	4.5	0.2	4.6	5.5	0.1	2.4	5.0	0.2	4.3	5.0	0.2	4.5	p=0.002
Percent Intolerant Organisms	15.5	3.4	21.6	1.3	1.2	90.6	7.7	3.3	43.2	7.6	4.5	59.3	p=0.006
Percent Tolerant Organisms	2.3	2.9	123.1	0.0	0.0	0.0	1.3	0.9	74.1	0.3	0.3	97.7	p=0.42[A]
Percent Hydropsychidae	10.7	3.6	33.9	1.5	0.8	52.1	3.9	3.1	79.8	1.7	1.2	74.0	p=0.006
Percent Baetidae	3.7	2.8	77.6	13.6	1.4	10.5	12.8	7.8	61.1	30.8	15.2	49.4	p=0.03[A]
Percent Dominant Taxa	32.2	8.8	27.4	47.7	17.7	37.1	37.3	4.3	11.5	42.1	4.8	11.5	p=0.36
Percent Collectors	57.2	5.0	8.7	48.5	19.7	40.6	60.4	5.7	9.5	57.3	19.4	33.8	p=0.81
Percent Filterers	13.8	6.2	45.3	47.9	20.0	41.7	30.2	7.8	25.7	28.4	20.6	72.4	p=0.13
Percent Scrapers	17.0	5.0	29.2	2.3	0.9	39.4	1.7	2.2	129.2	7.8	2.2	27.9	p=0.001
Percent Predators	6.5	3.3	51.4	1.2	0.4	36.4	3.2	1.6	49.8	2.7	1.5	54.8	p=0.04
Percent Shredders	5.5	3.9	70.9	0.1	0.2	173.2	4.5	2.1	45.5	3.8	3.2	82.7	p=0.05

[A] Data do not meet equal variance (homogeneity) assumption. Welch Test applied to this metric, Bonferroni t-Test not used.

(light grey) Statistically significant ANOVA p≤0.05 among all sites.

(dark grey) Statistically significant ANOVA p≤0.05 among all sites and statistically significant difference between two or more individual sites based on Bonferroni t-Test.

Table CAWG 10-125. Matrix of Probabilities Resulting from *Post Hoc* Pairwise Bonferroni t-Test Comparisons for Pitman Creek Taxa Richness.

Taxa Richness				
	Site AD (RM 1.65)	Site BD 0 (RM 0.20)	Site BD 1 (RM 1.30)	Site BD 2 (RM 1.45)
Site AD	X	X	X	X
Site BD 0	0.06	X	X	X
Site BD 1	0.004	0.48	X	X
Site BD 2	0.001	0.09	1.00	X

Probabilities ≤ 0.05 are highlighted
Probabilities ≤ 0.0001 shown as 0.0001

Table CAWG 10-126. Matrix of Probabilities Resulting from *Post Hoc* Pairwise Bonferroni t-Test Comparisons for Pitman Creek Ephemeroptera Taxa.

Ephemeroptera Taxa				
	Site AD (RM 1.65)	Site BD 0 (RM 0.20)	Site BD 1 (RM 1.30)	Site BD 2 (RM 1.45)
Site AD	X	X	X	X
Site BD 0	0.19	X	X	X
Site BD 1	0.01	0.47	X	X
Site BD 2	0.002	0.08	1.00	X

Probabilities ≤ 0.05 are highlighted
Probabilities ≤ 0.0001 shown as 0.0001

Table CAWG 10-127. Matrix of Probabilities Resulting from *Post Hoc* Pairwise Bonferroni t-Test Comparisons for Pitman Creek Plecoptera Taxa.

Plecoptera Taxa				
	Site AD (RM 1.65)	Site BD 0 (RM 0.20)	Site BD 1 (RM 1.30)	Site BD 2 (RM 1.45)
Site AD	X	X	X	X
Site BD 0	0.006	X	X	X
Site BD 1	0.006	1.00	X	X
Site BD 2	0.001	1.00	1.00	X

Probabilities ≤ 0.05 are highlighted
Probabilities ≤ 0.0001 shown as 0.0001

Table CAWG 10-128. Matrix of Probabilities Resulting from *Post Hoc* Pairwise Bonferroni t-Test Comparisons for Pitman Creek EPT Taxa.

EPT Taxa				
	Site AD (RM 1.65)	Site BD 0 (RM 0.20)	Site BD 1 (RM 1.30)	Site BD 2 (RM 1.45)
Site AD	X	X	X	X
Site BD 0	0.003	X	X	X
Site BD 1	0.001	1.00	X	X
Site BD 2	0.0004	0.53	1.00	X

Probabilities ≤ 0.05 are highlighted
Probabilities ≤ 0.0001 shown as 0.0001

Table CAWG 10-129. Matrix of Probabilities Resulting from *Post Hoc* Pairwise Bonferroni t-Test Comparisons for Pitman Creek EPT Index.

EPT Index				
	Site AD (RM 1.65)	Site BD 0 (RM 0.20)	Site BD 1 (RM 1.30)	Site BD 2 (RM 1.45)
Site AD	X	X	X	X
Site BD 0	1.00	X	X	X
Site BD 1	0.37	0.32	X	X
Site BD 2	0.03	0.03	0.83	X

Probabilities ≤ 0.05 are highlighted
Probabilities ≤ 0.0001 shown as 0.0001

Table CAWG 10-130. Matrix of Probabilities Resulting from *Post Hoc* Pairwise Bonferroni t-Test Comparisons for Pitman Creek Sensitive EPT Index.

Sensitive EPT Index				
	Site AD (RM 1.65)	Site BD 0 (RM 0.20)	Site BD 1 (RM 1.30)	Site BD 2 (RM 1.45)
Site AD	X	X	X	X
Site BD 0	0.10	X	X	X
Site BD 1	0.15	1.00	X	X
Site BD 2	0.005	0.42	0.27	X

Probabilities ≤ 0.05 are highlighted
Probabilities ≤ 0.0001 shown as 0.0001

Table CAWG 10-131. Matrix of Probabilities Resulting from *Post Hoc* Pairwise Bonferroni t-Test Comparisons for Pitman Creek Shannon-Weaver Diversity Index.

Shannon-Weaver Diversity Index				
	Site AD (RM 1.65)	Site BD 0 (RM 0.20)	Site BD 1 (RM 1.30)	Site BD 2 (RM 1.45)
Site AD	X	X	X	X
Site BD 0	0.03	X	X	X
Site BD 1	0.02	1.00	X	X
Site BD 2	0.003	0.65	0.95	X

Probabilities ≤ 0.05 are highlighted
Probabilities ≤ 0.0001 shown as 0.0001

Table CAWG 10-132. Matrix of Probabilities Resulting from *Post Hoc* Pairwise Bonferroni t-Test Comparisons for Pitman Creek Relative Diversity (Evenness).

Relative Diversity (Evenness)				
	Site AD (RM 1.65)	Site BD 0 (RM 0.20)	Site BD 1 (RM 1.30)	Site BD 2 (RM 1.45)
Site AD	X	X	X	X
Site BD 0	0.04	X	X	X
Site BD 1	0.28	1.00	X	X
Site BD 2	0.03	1.00	1.00	X

Probabilities ≤ 0.05 are highlighted
Probabilities ≤ 0.0001 shown as 0.0001

Table CAWG 10-133. Matrix of Probabilities Resulting from *Post Hoc* Pairwise Bonferroni t-Test Comparisons for Pitman Creek Tolerance Value.

Tolerance Value				
	Site AD (RM 1.65)	Site BD 0 (RM 0.20)	Site BD 1 (RM 1.30)	Site BD 2 (RM 1.45)
Site AD	X	X	X	X
Site BD 0	0.06	X	X	X
Site BD 1	0.11	1.00	X	X
Site BD 2	0.001	0.11	0.06	X

Probabilities ≤ 0.05 are highlighted
Probabilities ≤ 0.0001 shown as 0.0001

Table CAWG 10-134. Matrix of Probabilities Resulting from *Post Hoc* Pairwise Bonferroni t-Test Comparisons for Pitman Creek Percent Intolerant Organisms.

Percent Intolerant Organisms				
	Site AD (RM 1.65)	Site BD 0 (RM 0.20)	Site BD 1 (RM 1.30)	Site BD 2 (RM 1.45)
Site AD	X	X	X	X
Site BD 0	0.11	X	X	X
Site BD 1	0.12	1.00	X	X
Site BD 2	0.005	0.30	0.28	X

Probabilities ≤ 0.05 are highlighted
Probabilities ≤ 0.0001 shown as 0.0001

Table CAWG 10-135. Matrix of Probabilities Resulting from *Post Hoc* Pairwise Bonferroni t-Test Comparisons for Pitman Creek Percent Hydropsychidae.

Percent Hydropsychidae				
	Site AD (RM 1.65)	Site BD 0 (RM 0.20)	Site BD 1 (RM 1.30)	Site BD 2 (RM 1.45)
Site AD	X	X	X	X
Site BD 0	0.01	X	X	X
Site BD 1	0.06	1.00	X	X
Site BD 2	0.01	1.00	1.00	X

Probabilities ≤ 0.05 are highlighted
Probabilities ≤ 0.0001 shown as 0.0001

Table CAWG 10-136. Matrix of Probabilities Resulting from *Post Hoc* Pairwise Bonferroni t-Test Comparisons for Pitman Creek Percent Scrapers.

Percent Scrapers				
	Site AD (RM 1.65)	Site BD 0 (RM 0.20)	Site BD 1 (RM 1.30)	Site BD 2 (RM 1.45)
Site AD	X	X	X	X
Site BD 0	0.03	X	X	X
Site BD 1	0.001	0.22	X	X
Site BD 2	0.002	0.33	1.00	X

Probabilities ≤ 0.05 are highlighted
Probabilities ≤ 0.0001 shown as 0.0001

Table CAWG 10-137. Matrix of Probabilities Resulting from *Post Hoc* Pairwise Bonferroni t-Test Comparisons for Pitman Creek Percent Predators.

Percent Predators				
	Site AD (RM 1.65)	Site BD 0 (RM 0.20)	Site BD 1 (RM 1.30)	Site BD 2 (RM 1.45)
Site AD	X	X	X	X
Site BD 0	0.35	X	X	X
Site BD 1	0.63	1.00	X	X
Site BD 2	0.05	1.00	0.74	X

Probabilities ≤ 0.05 are highlighted
Probabilities ≤ 0.0001 shown as 0.0001

Table CAWG 10-138. Matrix of Probabilities Resulting from *Post Hoc* Pairwise Bonferroni t-Test Comparisons for Pitman Creek Percent Shredders.

Percent Shredders				
	Site AD (RM 1.65)	Site BD 0 (RM	Site BD 1 (RM	Site BD 2 (RM
Site AD	X	X	X	X
Site BD 0	1.00	X	X	X
Site 1	1.00	1.00	X	X
Site 2	0.09	0.25	0.12	X

Probabilities ≤ 0.05 are highlighted
Probabilities ≤ 0.0001 shown as 0.0001

Table CAWG 10-139. Metric Values by Site for Ely Creek Benthic Macroinvertebrates, Big Creek ALP, Fall 2002.

Biological Metrics	Ely Creek Site AD (RM 1.20) Mean	Standard Deviation	Coefficient of Variation	Ely Creek Site BD 3 (RM 0.60) Mean	Standard Deviation	Coefficient of Variation	Ely Creek Site BD 2 (RM 0.45) Mean	Standard Deviation	Coefficient of Variation	Ely Creek Site BD 1 (RM 0.20) Mean	Standard Deviation	Coefficient of Variation	Probability Value from ANOVA
Taxa Richness	45.0	*	*	29.7	13.3	44.9	25.3	0.6	2.3	29.3	2.9	9.8	p=0.29
Ephemeroptera Taxa	6.0	*	*	0.0	0.0	0.0	0.0	0.0	0.0	3.0	3.0	100.0	p=0.06
Plecoptera Taxa	5.0	*	*	0.0	0.0	0.0	0.7	0.6	86.6	1.0	0.0	0.0	p<0.0001[A]
Trichoptera Taxa	6.0	*	*	4.3	2.5	58.1	4.0	0.0	0.0	4.0	2.0	50.0	p=0.80
EPT Taxa	17.0	*	*	4.3	2.5	58.1	4.7	0.6	12.4	8.0	5.0	62.5	p=0.06
EPT Index	31.6	*	*	9.5	7.3	76.4	8.5	4.1	48.3	24.1	11.2	46.5	p=0.08
Sensitive EPT Index	28.1	*	*	9.3	7.3	78.0	8.5	4.1	48.3	14.2	6.7	47.1	p=0.13
Shannon-Weaver Diversity Index	1.3	*	*	1.2	0.3	24.7	1.0	0.1	11.1	1.1	0.1	10.0	p=0.63
Relative Diversity (Evenness)	0.8	*	*	0.8	0.1	10.5	0.7	0.1	11.8	0.8	0.1	7.1	p=0.72
Tolerance Value	4.4	*	*	5.1	0.4	8.7	4.6	0.4	9.1	4.8	0.4	8.5	p=0.41
Percent Intolerant Organisms	30.5	*	*	9.0	7.2	79.9	9.5	4.6	48.3	17.5	8.1	46.3	p=0.10
Percent Tolerant Organisms	8.4	*	*	15.7	6.7	42.5	5.2	1.7	32.5	7.6	4.7	62.4	p=0.15
Percent Hydropsychidae	0.0	*	*	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	N/A
Percent Baetidae	1.8	*	*	0.0	0.0	0.0	0.0	0.0	0.0	2.0	1.8	86.9	p=0.12
Percent Dominant Taxa	18.9	*	*	22.0	14.3	65.1	31.1	11.6	37.1	25.5	12.5	49.1	p=0.79
Percent Collectors	49.8	*	*	34.8	7.6	21.8	24.0	2.0	8.2	53.4	10.0	18.7	p=0.01
Percent Filterers	2.1	*	*	9.1	12.0	132.6	1.7	1.1	66.1	0.3	0.3	97.5	p=0.49
Percent Scrapers	6.7	*	*	17.1	12.2	71.7	21.9	9.3	42.4	12.3	10.8	87.7	p=0.60
Percent Predators	23.5	*	*	33.8	5.3	15.6	45.0	17.6	39.1	21.4	8.6	40.0	p=0.19
Percent Shredders	17.9	*	*	5.3	3.7	69.6	7.4	6.4	86.7	12.6	9.7	77.4	p=0.41

* only one Replicate

[A] Data do not meet equal variance (homogeneity) assumption. Welch Test applied to this metric, Bonferroni t-Test not used.

(light grey) Statistically significant ANOVA p≤0.05 among all sites.

(dark grey) Statistically significant ANOVA p≤0.05 among all sites and statistically significant difference between two or more individual sites based on Bonferroni t-Test.

Table CAWG 10-140. Matrix of Probabilities Resulting from *Post Hoc* Pairwise Bonferroni t-Test Comparisons for Ely Creek Percent Collectors.

Percent Collectors				
	Site AD (RM 1.20)	Site BD 1 (RM 0.20)	Site BD 2 (RM 0.45)	Site BD 3 (RM 0.60)
Site AD	X	X	X	X
Site BD 1	1.00	X	X	X
Site BD 2	0.16	0.02	X	X
Site BD 3	0.82	0.13	0.87	X

Probabilities ≤ 0.05 are highlighted
Probabilities ≤ 0.0001 shown as 0.0001

Table CAWG 10-141. Metric Values by Site for Balsam Creek Benthic Macroinvertebrates, Big Creek ALP, Fall 2002.

Biological Metrics	Balsam Creek Site AD (RM 0.80)			Balsam Creek Site BD 2 (RM 0.50)			Balsam Creek Site BD 1 (RM 0.10)			Probability Value from ANOVA
	Mean	Standard Deviation	Coefficient of Variation	Mean	Standard Deviation	Coefficient of Variation	Mean	Standard Deviation	Coefficient of Variation	
Taxa Richness	35.7	1.2	3.2	35.3	2.5	7.1	31.7	4.5	14.2	p=0.28
Ephemeroptera Taxa	7.0	0.0	0.0	6.3	1.2	18.2	6.0	1.0	16.7	p=0.42
Plecoptera Taxa	4.7	1.5	32.7	3.7	0.6	15.7	3.7	2.1	56.8	p=0.67
Trichoptera Taxa	7.7	0.6	7.5	7.3	1.2	15.7	7.3	1.2	15.7	p=0.90
EPT Taxa	19.3	1.2	6.0	17.3	2.1	12.0	17.0	2.0	11.8	p=0.30
EPT Index	60.5	10.9	18.1	55.2	14.5	26.3	74.9	6.4	8.5	p=0.16
Sensitive EPT Index	31.9	3.4	10.6	23.2	12.1	52.0	44.9	9.9	22.1	p=0.07
Shannon-Weaver Diversity Index	1.2	0.0	0.8	1.1	0.1	5.9	1.2	0.0	1.9	p=0.01
Relative Diversity (Evenness)	0.8	0.0	1.1	0.7	0.1	7.9	0.8	0.0	2.3	p=0.03
Tolerance Value	3.7	0.2	5.9	3.9	0.6	14.9	2.9	0.5	16.6	p=0.08
Percent Intolerant Organisms	34.5	2.5	7.3	26.6	13.0	48.8	44.6	9.7	21.6	p=0.14
Percent Tolerant Organisms	1.5	2.1	137.6	1.6	0.9	54.7	0.3	0.3	98.9	p=0.38
Percent Hydropsychidae	3.7	1.7	45.3	9.1	6.8	74.9	13.9	5.7	40.6	p=0.13
Percent Baetidae	18.3	6.5	35.7	19.1	9.3	48.8	7.7	5.7	73.9	p=0.19
Percent Dominant Taxa	20.8	1.4	6.6	30.4	8.3	27.2	18.5	2.1	11.3	p=0.06
Percent Collectors	53.0	4.7	8.9	54.8	10.7	19.5	23.0	6.5	28.4	p=0.0053
Percent Filterers	8.3	2.2	25.9	15.9	12.7	79.9	19.7	5.2	26.4	p=0.28
Percent Scrapers	17.2	4.0	23.2	8.6	2.7	31.6	25.8	6.5	25.3	p=0.01
Percent Predators	9.7	3.7	38.3	10.3	3.8	36.7	9.4	3.8	40.7	p=0.95
Percent Shredders	11.7	3.4	29.3	10.5	8.3	79.7	22.1	2.3	10.2	p=0.07

Statistically significant ANOVA p≤0.05 among all sites.

Statistically significant ANOVA p≤0.05 among all sites and statistically significant difference between two or more individual sites based on Bonferroni t-Test.

Table CAWG 10-142. Matrix of Probabilities Resulting from *Post Hoc* Pairwise Bonferroni t-Test Comparisons for Balsam Creek Shannon-Weaver Diversity Index.

Shannon-Weaver Diversity Index			
	Site AD (RM 0.80)	Site BD 1 (RM 0.10)	Site BD 2 (RM 0.50)
Site AD	X	X	X
Site BD 1	1.00	X	X
Site BD 2	0.02	0.05	X

Probabilities ≤ 0.05 are highlighted
Probabilities ≤ 0.0001 shown as 0.0001

Table CAWG 10-143. Matrix of Probabilities Resulting from *Post Hoc* Pairwise Bonferroni t-Test Comparisons for Balsam Creek Shannon-Weaver Diversity Index.

Relative Diversity (Evenness)			
	Site AD (RM 0.80)	Site BD 1 (RM 0.10)	Site BD 2 (RM 0.50)
Site AD	X	X	X
Site BD 1	1.00	X	X
Site BD 2	0.08	0.04	X

Probabilities ≤ 0.05 are highlighted
Probabilities ≤ 0.0001 shown as 0.0001

Table CAWG 10-144. Matrix of Probabilities Resulting from *Post Hoc* Pairwise Bonferroni t-Test Comparisons for Balsam Creek Percent Collectors.

Percent Collectors			
	Site AD (RM 0.80)	Site BD 1 (RM 0.10)	Site BD 2 (RM 0.50)
Site AD	X	X	X
Site BD 1	0.01	X	X
Site BD 2	1.00	0.009	X

Probabilities ≤ 0.05 are highlighted
Probabilities ≤ 0.0001 shown as 0.0001

Table CAWG 10-145. Matrix of Probabilities Resulting from *Post Hoc* Pairwise Bonferroni t-Test Comparisons for Balsam Creek Percent Scrapers.

Percent Scrapers			
	Site AD (RM 0.80)	Site BD 1 (RM 0.10)	Site BD 2 (RM 0.50)
Site AD	X	X	X
Site BD 1	0.20	X	X
Site BD 2	0.21	0.01	X

Probabilities ≤0.05 are highlighted
Probabilities ≤0.0001 shown as 0.0001

Table CAWG 10-146. Metric Values by Site for Adit 8 Creek Benthic Macroinvertebrates, Big Creek ALP, Fall 2002.

Biological Metrics	Adit 8 Creek Site 2 (RM 0.90)			Adit 8 Creek Site 1 (RM 0.40)			Probability Value from ANOVA
	Mean	Standard Deviation	Coefficient of Variation	Mean	Standard Deviation	Coefficient of Variation	
Taxa Richness	14.0	3.0	21.4	31.7	3.1	9.6	p=0.0020
Ephemeroptera Taxa	2.0	1.0	50.0	3.7	0.6	15.7	p=0.07
Plecoptera Taxa	3.0	1.0	33.3	5.7	2.5	44.4	p=0.16
Trichoptera Taxa	2.0	1.0	50.0	7.3	0.6	7.9	p=0.0013
EPT Taxa	7.0	1.0	14.3	16.7	2.5	15.1	p=0.0034
EPT Index	21.3	9.5	44.4	64.2	12.5	19.5	p=0.0091
Sensitive EPT Index	18.0	8.7	48.1	30.9	11.5	37.3	p=0.20
Shannon-Weaver Diversity Index	0.8	0.0	3.9	1.2	0.2	12.8	p=0.01
Relative Diversity (Evenness)	0.7	0.1	12.2	0.8	0.1	11.7	p=0.36
Tolerance Value	5.4	1.0	18.2	3.8	0.5	14.2	p=0.07
Percent Intolerant Organisms	18.1	8.7	48.0	30.5	11.6	38.0	p=0.21
Percent Tolerant Organisms	41.0	19.3	47.1	7.6	8.6	113.9	p=0.05
Percent Hydropsychidae	1.5	1.9	132.4	1.8	2.3	125.6	p=0.84
Percent Baetidae	1.9	1.8	94.4	25.0	23.8	95.4	p=0.08
Percent Dominant Taxa	39.6	5.7	14.5	26.8	19.4	72.7	p=0.35
Percent Collectors	58.5	20.7	35.3	38.6	21.2	54.9	p=0.30
Percent Filterers	1.5	1.9	132.4	2.8	1.9	65.4	p=0.42
Percent Scrapers	1.6	1.1	69.5	19.6	8.2	42.0	p=0.02
Percent Predators	24.6	12.6	51.3	28.4	7.6	26.6	p=0.68
Percent Shredders	13.9	6.7	48.5	10.6	3.8	35.7	p=0.50

Statistically significant ANOVA p≤0.05 among all sites.

Statistically significant ANOVA p≤0.05 among all sites and statistically significant difference between two or more individual sites based on Bonferroni t-Test.

Table CAWG 10-147. Physical/Habitat Quality Parameter Scores, North Fork Stevenson and Stevenson Creeks.

Reach Name	Site	River Mile	Rosgen Level I Channel Type	Epifaunal Substrate/ Available Cover	Embeddedness	Velocity/ Depth Regimes	Sediment Deposition	Channel Flow Status	Channel Alteration	Frequency of Riffles	Bank Stability Left Bank	Bank Stability Right Bank	Vegetation Protection Left Bank	Vegetation Protection Right Bank	Riparian Vegetation Zone Width Left Bank	Riparian Vegetation Zone Width Right Bank	Total
North Fork Stevenson	Site AO	(RM 3.60)	Aa+	19	14	10	13	12	15	16	9	7	5	8	1	4	133
	Site BO 3	(RM 3.45)	Aa+	13	19	15	19	19	18	10	9	5	6	6	5	5	149
	Site BO 2	(RM 2.75)	Aa+	16	19	19	20	17	18	11	7	7	5	5	1	1	146
	Site BO 1	(RM 1.35)	Aa+	10	19	15	19	19	16	9	8	8	6	6	2	2	139
Stevenson Creek	Site 5	(RM 3.95)	Aa+	16	18	18	18	19	19	19	9	9	7	6	5	5	168
	Site 4	(RM 2.60)	Aa+	17	20	20	20	19	20	20	10	10	5	5	3	9	178
	Site 3	(RM 2.40)	B	17	18	20	18	19	19	17	9	9	8	8	5	5	172
	Site 2	(RM 2.10)	Aa+	18	20	19	20	18	20	20	10	10	5	5	3	5	173
	Site 1	(RM 0.80)	A	16	19	15	17	19	20	20	10	10	5	5	1	1	158

Table CAWG 10-148. Densities of Macroinvertebrate Samples, North Fork Stevenson and Stevenson Creeks, Fall 2002.

Stream	Site	River Mile	Mean Density (No./Sq-M)	Standard Deviation	Coefficient of Variation
North Fork Stevenson Creek	Site AO	(RM 3.60)	5418	2723	50
	Site BO 3	(RM 3.45)	3087	1378	45
	Site BO 2	(RM 2.75)	5973	2838	48
	Site BO 1	(RM 1.35)	8244	5389	65
Stevenson Creek	Site 5	(RM 3.95)	3938	2322	59
	Site 4	(RM 2.60)	28847	*	*
	Site 3	(RM 2.40)	2644	390	15
	Site 2	(RM 2.10)	6476	*	*
	Site 1	(RM 0.80)	4937	3827	78

Table CAWG 10-149. Abundant Benthic Macroinvertebrate Insect Taxa and Percent Contribution by Site, North Fork Stevenson and Stevenson Creeks, Fall 2002.

Order	Taxa	Stevenson Creek					North Fork Stevenson Creek			
		Site 5 (RM 3.95)	Site 4 (RM 2.60)	Site 3 (RM 2.40)	Site 2 (RM 2.10)	Site 1 (RM 0.80)	Site AO (RM 3.60)	Site BO 3 (RM 3.45)	Site BO 2 (RM 2.75)	Site BO 1 (RM 1.35)
Ephemeroptera	*Baetis sp.*		11.0	11.7	5.3	7.2		2.4		6.2
Ephemeroptera	*Epeorus sp.*	4.8		3.0					5.3	4.5
Ephemeroptera	*Ironodes sp.*		3.3						4.3	
Ephemeroptera	*Paraleptophlebia sp.*				2.7					
Plecoptera	*Zapada sp.*	7.3	6.3				14.0	7.2	4.8	6.6
Trichoptera	*Agapetus sp.*	5.7								
Trichoptera	*Hydropsyche sp.*						2.8		4.1	
Trichoptera	*Lepidostoma sp.*					2.3	6.8			
Trichoptera	*Micrasema sp.*			3.0	2.9	2.9	2.8			9.4
Diptera	*Antocha sp.*							1.0		
Diptera	*Simulium sp.*	4.8	26.3	35.7	35.1	9.2				18.0
Diptera	*Diamesinae*							8.4		
Diptera	*Orthocladiinae*	12.1	26.0	11.1	16.5	8.8	17.9	27.9	14.1	9.3
Diptera	*Tanypodinae*						6.2			
Diptera	*Tanytarsini*	14.9	5.4	16.6	6.4	15.5	18.7	4.1	14.7	
Totals		49.7	78.2	81.0	68.9	46.0	69.1	51.0	47.4	54.0

Table CAWG 10-150. Metric Values by Site for NF Stevenson Creek Benthic Macroinvertebrates, Big Creek ALP, Fall 2002.

Biological Metrics	North Fork Stevenson Creek Site AO (RM 3.60)			North Fork Stevenson Creek Site BO 3 (RM 3.45)			North Fork Stevenson Creek Site BO 2 (RM 2.75)			North Fork Stevenson Creek Site BO 1 (RM 1.35)			Probability Value from ANOVA
	Mean	Standard Deviation	Coefficent of Variation	Mean	Standard Deviation	Coefficent of Variation	Mean	Standard Deviation	Coefficient of Variation	Mean	Standard Deviation	Coefficient of Variation	
Taxa Richness	41.0	9.2	22.4	25.3	8.6	34.0	42.0	1.4	3.4	34.3	9.3	27.1	p=0.16
Ephemeroptera Taxa	7.7	3.5	45.8	6.0	3.6	60.1	8.5	0.7	8.3	7.3	2.1	28.4	p=0.81
Plecoptera Taxa	6.7	1.2	17.3	2.7	2.5	94.4	5.0	0.0	0.0	3.0	1.7	57.7	p=0.08
Trichoptera Taxa	8.0	1.0	12.5	4.7	2.1	44.6	8.5	0.7	8.3	6.3	1.2	18.2	p=0.06
EPT Taxa	22.3	5.1	23.0	13.3	7.4	55.3	22.0	0.0	0.0	16.7	4.9	29.6	p=0.24
EPT Index	43.3	11.7	27.0	16.7	12.5	74.8	46.6	1.3	2.7	54.3	13.5	25.0	p=0.03
Sensitive EPT Index	35.2	10.7	30.3	11.8	9.6	82.0	27.3	5.5	20.1	35.8	8.3	23.3	p=0.05
Shannon-Weaver Diversity Index	1.2	0.2	14.5	0.8	0.1	17.3	1.3	0.0	1.7	1.2	0.2	16.4	p=0.04
Relative Diversity (Evenness)	0.7	0.1	8.7	0.6	0.0	6.1	0.8	0.0	0.8	0.8	0.1	8.7	p=0.0097
Tolerance Value	3.9	0.5	12.9	5.4	0.8	14.2	4.3	0.4	9.9	3.6	0.4	12.5	p=0.02
Percent Intolerant Organisms	37.3	12.2	32.6	20.3	8.5	41.9	29.1	6.8	23.5	36.2	7.9	21.9	p=0.19
Percent Tolerant Organisms	1.1	0.5	45.2	35.8	14.6	40.9	14.9	4.3	28.7	0.9	0.6	61.8	p=0.0002
Percent Hydropsychidae	3.9	1.6	41.1	0.3	0.3	101.0	4.6	2.7	59.3	4.4	1.7	39.3	p=0.05
Percent Baetidae	0.8	0.5	64.8	2.5	2.1	83.2	3.7	1.4	39.1	6.3	2.1	34.0	p=0.001
Percent Dominant Taxa	21.1	6.9	32.5	40.9	6.9	16.7	15.0	0.8	5.5	19.9	11.2	56.3	p=0.03
Percent Collectors	48.7	8.4	17.3	82.0	7.1	8.7	53.8	3.5	6.6	36.6	5.7	15.5	p=0.0006
Percent Filterers	4.0	1.5	35.9	0.8	0.7	98.5	7.1	0.5	7.0	22.3	15.2	68.0	p=0.06
Percent Scrapers	6.6	2.0	30.5	2.9	1.8	61.3	21.3	4.8	22.4	20.8	5.6	26.9	p=0.0013
Percent Predators	19.3	4.1	21.5	6.1	2.1	34.8	9.5	2.3	24.7	9.1	6.2	67.9	p=0.03
Percent Shredders	21.4	9.9	46.0	8.2	7.2	88.0	8.3	3.1	37.4	11.2	8.1	72.6	p=0.24

Statistically significant ANOVA p≤0.05 among all sites.

Statistically significant ANOVA p≤0.05 among all sites and statistically significant difference between two or more individual sites based on Bonferroni t-Test.

Table CAWG 10-151. Matrix of Probabilities Resulting from *Post Hoc* Pairwise Bonferroni t-Test Comparisons for North Fork Stevenson Creek EPT Index.

EPT Index				
	Site AO (RM 3.60)	Site BO 1 (RM 1.35)	Site BO 2 (RM 2.75)	Site BO 3 (RM 3.45)
Site AO	X	X	X	X
Site BO 1	1.00	X	X	X
Site BO 2	1.00	1.00	X	X
Site BO 3	0.16	0.03	0.16	X

Probabilities ≤ 0.05 are highlighted
Probabilities ≤ 0.0001 shown as 0.0001

Table CAWG 10-152. Matrix of Probabilities Resulting from *Post Hoc* Pairwise Bonferroni t-Test Comparisons for North Fork Stevenson Creek Sensitive EPT Index.

Sensitive EPT Index				
	Site AO (RM 3.60)	Site BO 1 (RM 1.35)	Site BO 2 (RM 2.75)	Site BO 3 (RM 3.45)
Site AO	X	X	X	X
Site BO 1	1.00	X	X	X
Site BO 2	1.00	1.00	X	X
Site BO 3	0.10	0.09	0.63	X

Probabilities ≤ 0.05 are highlighted
Probabilities ≤ 0.0001 shown as 0.0001

Table CAWG 10-153. Matrix of Probabilities Resulting from *Post Hoc* Pairwise Bonferroni t-Test Comparisons for North Fork Stevenson Creek Shannon-Weaver Diversity Index.

Shannon-Weaver Diversity Index				
	Site AO (RM 3.60)	Site BO 1 (RM 1.35)	Site BO 2 (RM 2.75)	Site BO 3 (RM 3.45)
Site AO	X	X	X	X
Site BO 1	1.00	X	X	X
Site BO 2	1.00	1.00	X	X
Site BO 3	0.18	0.16	0.07	X

Probabilities ≤ 0.05 are highlighted
Probabilities ≤ 0.0001 shown as 0.0001

Table CAWG 10-154. Matrix of Probabilities Resulting from *Post Hoc* Pairwise Bonferroni t-Test Comparisons for North Fork Stevenson Creek Relative Diversity (Evenness).

Relative Diversity (Evenness)				
	Site AO (RM 3.60)	Site BO 1 (RM 1.35)	Site BO 2 (RM 2.75)	Site BO 3 (RM 3.45)
Site AO	X	X	X	X
Site BO 1	1.00	X	X	X
Site BO 2	1.00	1.00	X	X
Site BO 3	0.10	0.02	0.02	X

Probabilities ≤ 0.05 are highlighted
Probabilities ≤ 0.0001 shown as 0.0001

Table CAWG 10-155. Matrix of Probabilities Resulting from *Post Hoc* Pairwise Bonferroni t-Test Comparisons for North Fork Stevenson Creek Tolerance Value.

Tolerance Value				
	Site AO (RM 3.60)	Site BO 1 (RM 1.35)	Site BO 2 (RM 2.75)	Site BO 3 (RM 3.45)
Site AO	X	X	X	X
Site BO 1	1.00	X	X	X
Site BO 2	1.00	1.00	X	X
Site BO 3	0.08	0.03	0.40	X

Probabilities ≤ 0.05 are highlighted
Probabilities ≤ 0.0001 shown as 0.0001

Table CAWG 10-156. Matrix of Probabilities Resulting from *Post Hoc* Pairwise Bonferroni t-Test Comparisons for North Fork Stevenson Creek Percent Tolerant Organisms.

Percent Tolerant Organisms				
	Site AO (RM 3.60)	Site BO 1 (RM 1.35)	Site BO 2 (RM 2.75)	Site BO 3 (RM 3.45)
Site AO	X	X	X	X
Site BO 1	1.00	X	X	X
Site BO 2	0.03	0.03	X	X
Site BO 3	0.0006	0.0005	0.1216	X

Probabilities ≤ 0.05 are highlighted
Probabilities ≤ 0.0001 shown as 0.0001

Table CAWG 10-157. Matrix of Probabilities Resulting from *Post Hoc* Pairwise Bonferroni t-Test Comparisons for North Fork Stevenson Creek Percent Hydropsychidae.

Percent Hydropsychidae				
	Site AO (RM 3.60)	Site BO 1 (RM 1.35)	Site BO 2 (RM 2.75)	Site BO 3 (RM 3.45)
Site AO	X	X	X	X
Site BO 1	1.00	X	X	X
Site BO 2	1.00	1.00	X	X
Site BO 3	0.18	0.11	0.14	X

Probabilities ≤ 0.05 are highlighted
Probabilities ≤ 0.0001 shown as 0.0001

Table CAWG 10-158. Matrix of Probabilities Resulting from *Post Hoc* Pairwise Bonferroni t-Test Comparisons for North Fork Stevenson Creek Percent Baetidae.

Percent Baetidae				
	Site AO (RM 3.60)	Site BO 1 (RM 1.35)	Site BO 2 (RM 2.75)	Site BO 3 (RM 3.45)
Site AO	X	X	X	X
Site BO 1	0.03	X	X	X
Site BO 2	0.64	0.82	X	X
Site BO 3	1.00	0.18	1.00	X

Probabilities ≤ 0.05 are highlighted
Probabilities ≤ 0.0001 shown as 0.0001

Table CAWG 10-159. Matrix of Probabilities Resulting from *Post Hoc* Pairwise Bonferroni t-Test Comparisons for North Fork Stevenson Creek Percent Dominant Taxa.

Percent Dominant Taxa				
	Site AO (RM 3.60)	Site BO 1 (RM 1.35)	Site BO 2 (RM 2.75)	Site BO 3 (RM 3.45)
Site AO	X	X	X	X
Site BO 1	1.00	X	X	X
Site BO 2	1.00	1.00	X	X
Site BO 3	0.10	0.08	0.05	X

Probabilities ≤ 0.05 are highlighted
Probabilities ≤ 0.0001 shown as 0.0001

Table CAWG 10-160. Matrix of Probabilities Resulting from *Post Hoc* Pairwise Bonferroni t-Test Comparisons for North Fork Stevenson Creek Percent Collectors.

Percent Collectors				
	Site AO (RM 3.60)	Site BO 1 (RM 1.35)	Site BO 2 (RM 2.75)	Site BO 3 (RM 3.45)
Site AO	X	X	X	X
Site BO 1	0.76	X	X	X
Site BO 2	1.00	0.37	X	X
Site BO 3	0.004	0.0007	0.02	X

Probabilities ≤ 0.05 are highlighted
Probabilities ≤ 0.0001 shown as 0.0001

Table CAWG 10-161. Matrix of Probabilities Resulting from *Post Hoc* Pairwise Bonferroni t-Test Comparisons for North Fork Stevenson Creek Percent Scrapers.

Percent Scrapers				
	Site AO (RM 3.60)	Site BO 1 (RM 1.35)	Site BO 2 (RM 2.75)	Site BO 3 (RM 3.45)
Site AO	X	X	X	X
Site BO 1	0.02	X	X	X
Site BO 2	0.02	1.00	X	X
Site BO 3	1.00	0.004	0.007	X

Probabilities ≤ 0.05 are highlighted
Probabilities ≤ 0.0001 shown as 0.0001

Table CAWG 10-162. Matrix of Probabilities Resulting from *Post Hoc* Pairwise Bonferroni t-Test Comparisons for North Fork Stevenson Creek Percent Predators.

Percent Predators				
	Site AO (RM 3.60)	Site BO 1 (RM 1.35)	Site BO 2 (RM 2.75)	Site BO 3 (RM 3.45)
Site AO	X	X	X	X
Site BO 1	0.13	X	X	X
Site BO 2	0.23	1.00	X	X
Site BO 3	0.04	1.00	1.00	X

Probabilities ≤ 0.05 are highlighted
Probabilities ≤ 0.0001 shown as 0.0001

Table CAWG 10-163. Metric Values by Site for Stevenson Creek Benthic Macroinvertebrates, Big Creek ALP, Fall 2002.

Biological Metrics	Stevenson Creek Site 5 (RM 3.95)			Stevenson Creek Site 4 (RM 2.60)			Stevenson Creek Site 3 (RM 2.40)			Stevenson Creek Site 2 (RM 2.10)			Stevenson Creek Site 1 (RM 0.80)			Probability Value from ANOVA
	Mean	Standard Deviation	Coefficient of Variation	Mean	Standard Deviation	Coefficient of Variation	Mean	Standard Deviation	Coefficient of Variation	Mean	Standard Deviation	Coefficient of Variation	Mean	Standard Deviation	Coefficient of Variation	
Taxa Richness	43.0	2.8	6.6	34.0	*	*	29.0	12.7	43.9	28.0	*	*	40.3	5.8	14.3	p=0.75[A]
Ephemeroptera Taxa	4.5	0.7	15.7	6.0	*	*	5.5	3.5	64.3	7.0	*	*	5.3	1.2	21.7	p=0.93[A]
Plecoptera Taxa	3.5	2.1	60.6	4.0	*	*	3.0	1.4	47.1	1.0	*	*	3.0	1.0	33.3	p=0.66
Trichoptera Taxa	10.5	2.1	20.2	6.0	*	*	6.5	2.1	32.6	4.0	*	*	9.0	1.0	11.1	p=0.12
EPT Taxa	18.5	0.7	3.8	16.0	*	*	15.0	7.1	47.1	12.0	*	*	17.3	0.6	3.3	p=0.61[A]
EPT Index	36.9	4.1	11.0	31.3	*	*	30.1	1.6	5.4	18.1	*	*	27.4	1.8	6.4	p=0.21[A]
Sensitive EPT Index	27.5	2.6	9.5	12.5	*	*	13.9	11.7	84.2	9.6	*	*	15.1	2.6	17.6	p=0.04[A]
Shannon-Weaver Diversity Index	1.3	0.1	6.7	1.0	*	*	0.8	0.4	48.5	1.0	*	*	1.3	0.1	7.1	p=0.67[A]
Relative Diversity (Evenness)	0.8	0.0	5.0	0.7	*	*	0.5	0.2	36.1	0.7	*	*	0.8	0.0	5.5	p=0.67[A]
Tolerance Value	4.0	0.1	3.3	4.8	*	*	4.9	0.7	14.5	5.1	*	*	4.3	0.4	9.0	p=0.34
Percent Intolerant Organisms	28.6	2.3	7.9	14.0	*	*	14.8	11.3	76.4	12.0	*	*	18.9	7.0	37.3	p=0.40
Percent Tolerant Organisms	6.1	4.7	77.1	1.8	*	*	0.3	0.4	141.4	8.0	*	*	3.7	3.4	91.6	p=0.42
Percent Hydropsychidae	2.0	0.2	10.0	2.4	*	*	0.1	0.2	141.4	0.0	*	*	1.5	1.1	70.9	p=0.17
Percent Baetidae	4.8	0.3	5.4	11.6	*	*	12.1	13.3	109.6	5.6	*	*	8.0	2.5	31.4	p=0.50[A]
Percent Dominant Taxa	20.0	5.8	28.8	26.3	*	*	48.8	23.6	48.3	35.1	*	*	17.5	3.0	17.1	p=0.68[A]
Percent Collectors	41.0	11.4	27.7	49.6	*	*	43.9	27.0	61.6	45.5	*	*	47.4	9.8	20.6	p=0.99[A]
Percent Filterers	7.6	0.8	10.0	29.6	*	*	35.5	42.9	120.9	35.1	*	*	11.8	10.0	85.1	p=0.90[A]
Percent Scrapers	25.3	14.0	55.2	8.1	*	*	12.2	8.9	73.0	10.4	*	*	21.8	10.0	45.8	p=0.59[A]
Percent Predators	13.9	2.2	15.6	6.3	*	*	4.2	3.9	92.0	5.3	*	*	14.5	8.4	58.0	p=0.43[A]
Percent Shredders	12.1	5.6	46.0	7	*	*	4.2	3.0	72.1	3.7	*	*	4.6	0.3	7.5	p=0.68[A]

* only one Replicate

[A] Data do not meet equal variance (homogeneity) assumption. Welch Test applied to this metric, Bonferroni t-Test not used.

Statistically significant ANOVA p≤0.05 among all sites.

Statistically significant ANOVA p≤0.05 among all sites and statistically significant difference between two or more individual sites based on Bonferroni t-Test.

Table CAWG 10-164. Catch Per Unit Effort (CPUE) of Crayfish Collected in Shaver Lake, 2002.

Trap Site Name	Total Number of Crayfish Collected	Hours Fished Per Trap	Total Hours Fished	CPUE (Fish/Hour)	CPUE (Fish/Day*)	Total Number of Trap-Nights [2]	Crayfish Collected/ Trap-Night	Crayfish Collected/ Trap-Night [3]
Crayfish Trap Set 1 [1]	5	44.97	269.8	0.02	0.44	12	0.42	--
Crayfish Trap Set 2 [1]	17	42.28	253.7	0.07	1.61	12	1.42	--
Crayfish Trap Set 3 [1]	5	41.22	247.3	0.02	0.49	12	0.42	--
Crayfish Trap Set 4 [1]	3	40.50	243.0	0.01	0.30	12	0.25	--
Crayfish Trap Set 5 [1]	8	39.30	235.8	0.03	0.81	12	0.67	--
Total Crayfish Traps	**38**	**--**	**770.8**	**0.05**	**1.18**	**60**	**0.63**	**0.25**

[1] There were 6 crayfish traps per set.

[2] Number of Trap-Nights equals the number of working traps multiplied by the number of collection nights

*-24-hours

Table CAWG 10-165. Comparison of Crayfish Caught by Depth Strata at Shaver Lake, 2002.

Depth Sampled	Number Collected at Shaver Lake	Total Hours Fished	CPUE (#/Hour)	CPUE (#/Day*)	Total Number of Trap-Nights	Crayfish Collected/ Trap-Night
Less than 5 meters	15	256.9	0.06	1.40	20	0.75
5 to 10 meters	12	256.9	0.05	1.12	20	0.60
Greater than 10 meters	11	256.9	0.04	1.03	20	0.55
Total Catch	**38**	**770.8**	**0.05**	**1.18**	**60**	**0.63**

*-24-hours

Table CAWG 10-166. Comparison of Crayfish Caught by Trap Type (Minnow Trap versus Inclined Plane Trap) at Shaver Lake, 2002.

Depth Sampled	Number Collected with Minnow Traps	Total Hours Fished	CPUE (#/Hour)	CPUE (#/Day*)	Total Number of Trap-Nights	Crayfish Collected/ Trap-Night
Less than 5 meters	1	140.7	0.01	0.17	6	0.17
5 to 10 meters	3	281.4	0.01	0.26	12	0.25
Greater than 10 meters	3	281.4	0.01	0.26	12	0.25
Total Catch	**7**	**703.5**	**0.01**	**0.24**	**30**	**0.23**

*-24-hours

Depth Sampled	Number Collected with Crayfish Traps	Total Hours Fished	CPUE (#/Hour)	CPUE (#/Day*)	Total Number of Trap-Nights	Crayfish Collected/ Trap-Night
Less than 5 meters	15	256.9	0.06	1.40	20	0.75
5 to 10 meters	12	256.9	0.05	1.12	20	0.60
Greater than 10 meters	11	256.9	0.04	1.03	20	0.55
Total Catch	**38**	**770.8**	**0.05**	**1.18**	**60**	**0.63**

*-24-hours

Table CAWG 10-167. Catch Per Unit Effort (CPUE) of Crayfish Collected in Mammoth Pool Reservoir, 2002.

Trap Site Name	Total Number of Crayfish Collected	Hours Fished Per Trap	Total Hours Fished	CPUE (Fish/Hour)	CPUE (Fish/Day*)	Total Number of Trap-Nights [2]	Crayfish Collected/ Trap-Night	Crayfish Collected/ Trap-Night [3]
Crayfish Trap Set 1 [1]	279	50.83	508.3	0.55	13.17	20	13.95	--
Crayfish Trap Set 2 [1]	314	51.00	510.0	0.62	14.78	20	15.70	--
Crayfish Trap Set 3 [1]	61	47.75	477.5	0.13	3.07	20	3.05	--
Total Crayfish Traps	**654**	**--**	**1495.8**	**0.44**	**10.49**	**60**	**10.90**	**18.02**

[1] There were 10 Crayfish traps per set.
[2] Number of Trap-Nights equals the number of working traps multiplied by the number of collection nights.
* -24-hours

Table CAWG 10-168. Comparison of Crayfish Caught by Depth Strata at Mammoth Pool, 2002.

Depth Sampled	Number Collected at Mammoth Pool	Total Hours Fished	CPUE (#/Hour)	CPUE (#/Day*)	Total Number of Trap-Nights	Crayfish Collected/ Trap-Night
Less than 5 meters	195	448.74	0.43	10.43	18	10.83
5 to 10 meters	199	448.74	0.44	10.64	18	11.06
Greater than 10 meters	260	598.32	0.43	10.43	24	10.83
Total Catch	**654**	**1495.8**	**0.44**	**10.49**	**60**	**10.90**

*-24-hours

FIGURES

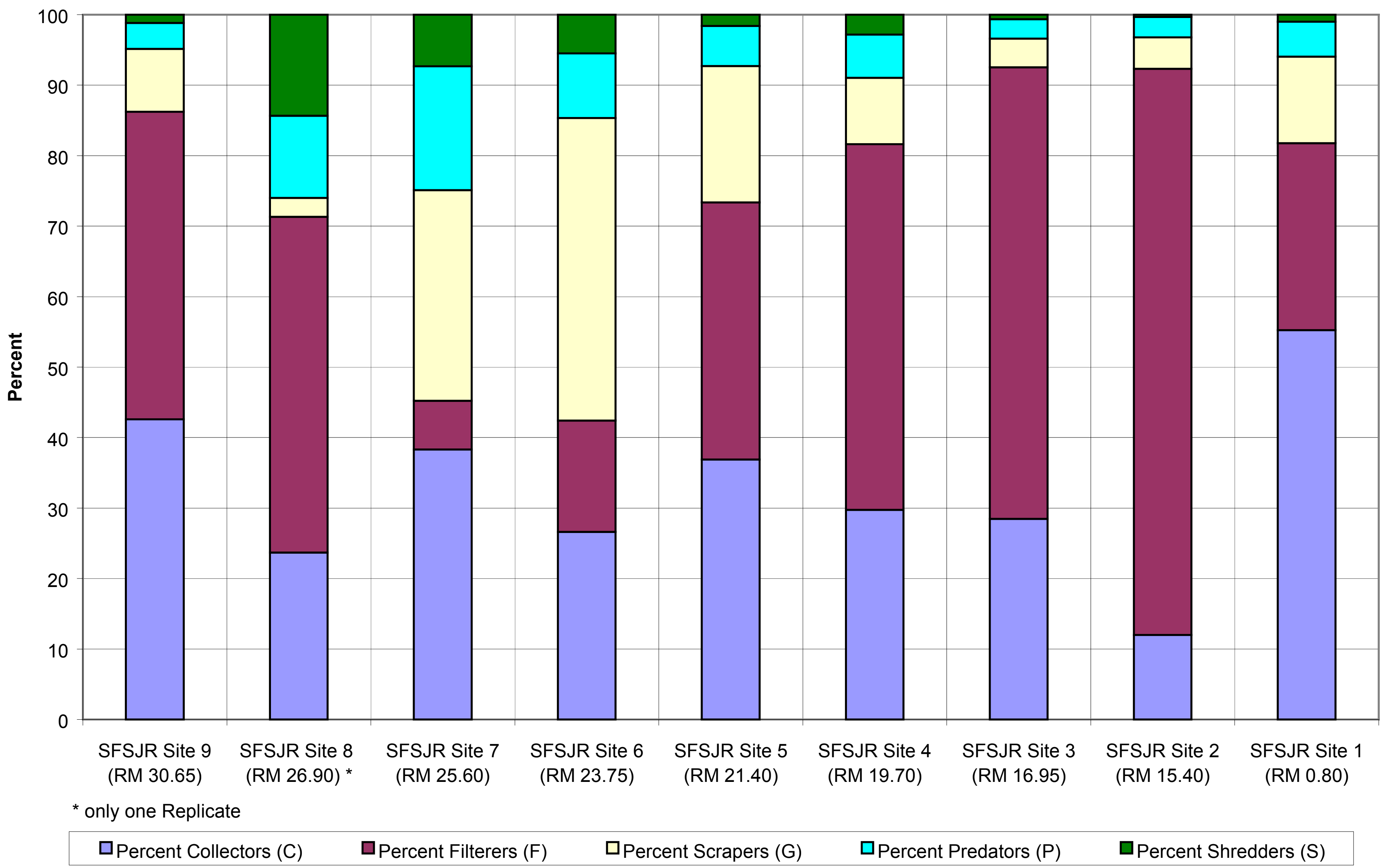

Figure CAWG 10-1. South Fork San Joaquin River (SFSJR) Mean Functional Feeding Group Percentages by Site, Big Creek ALP, Fall 2002.

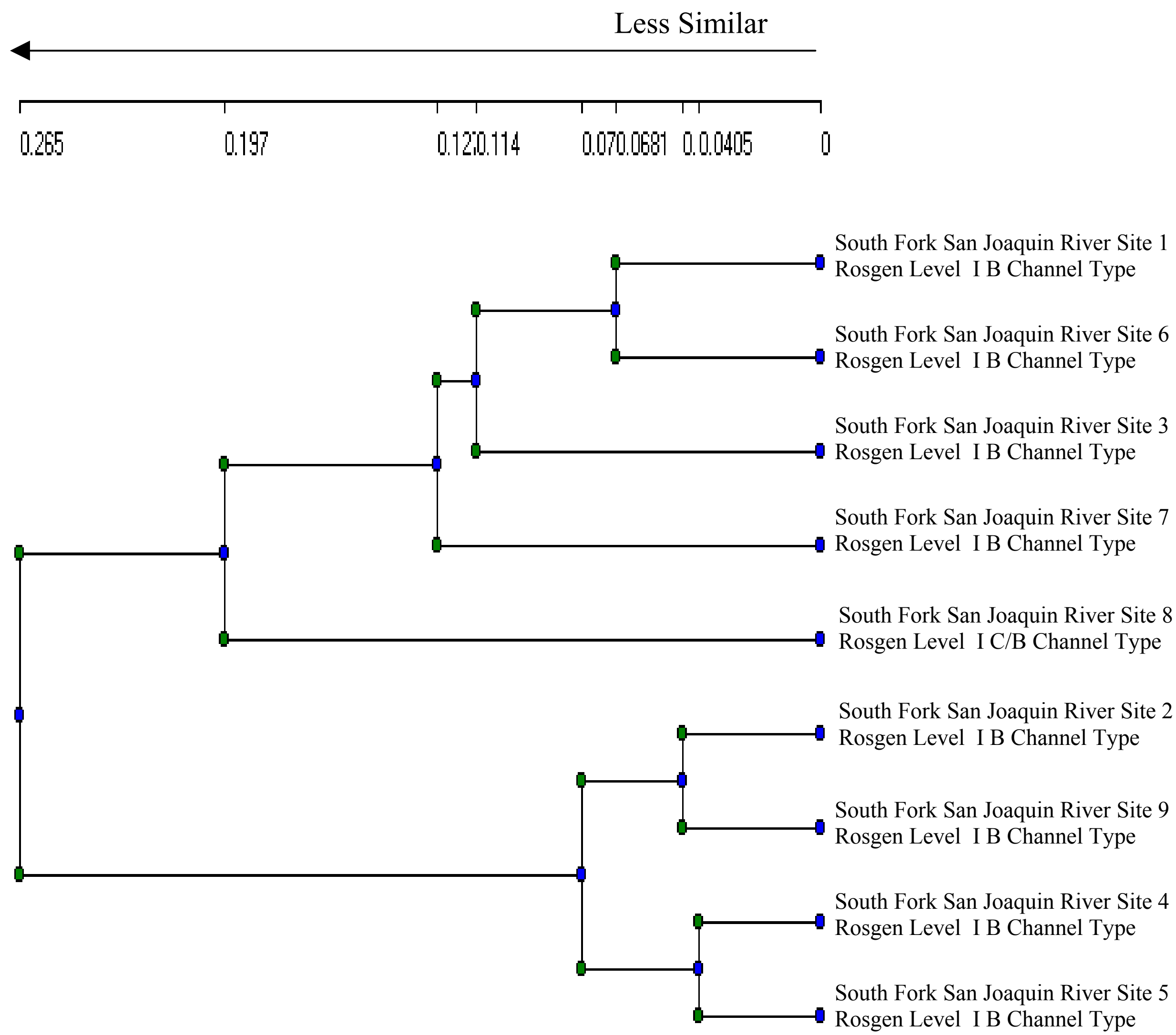

Figure CAWG 10-2. Dendrogram Based on Physical/Habitat Quality Score for South Fork San Joaquin River.

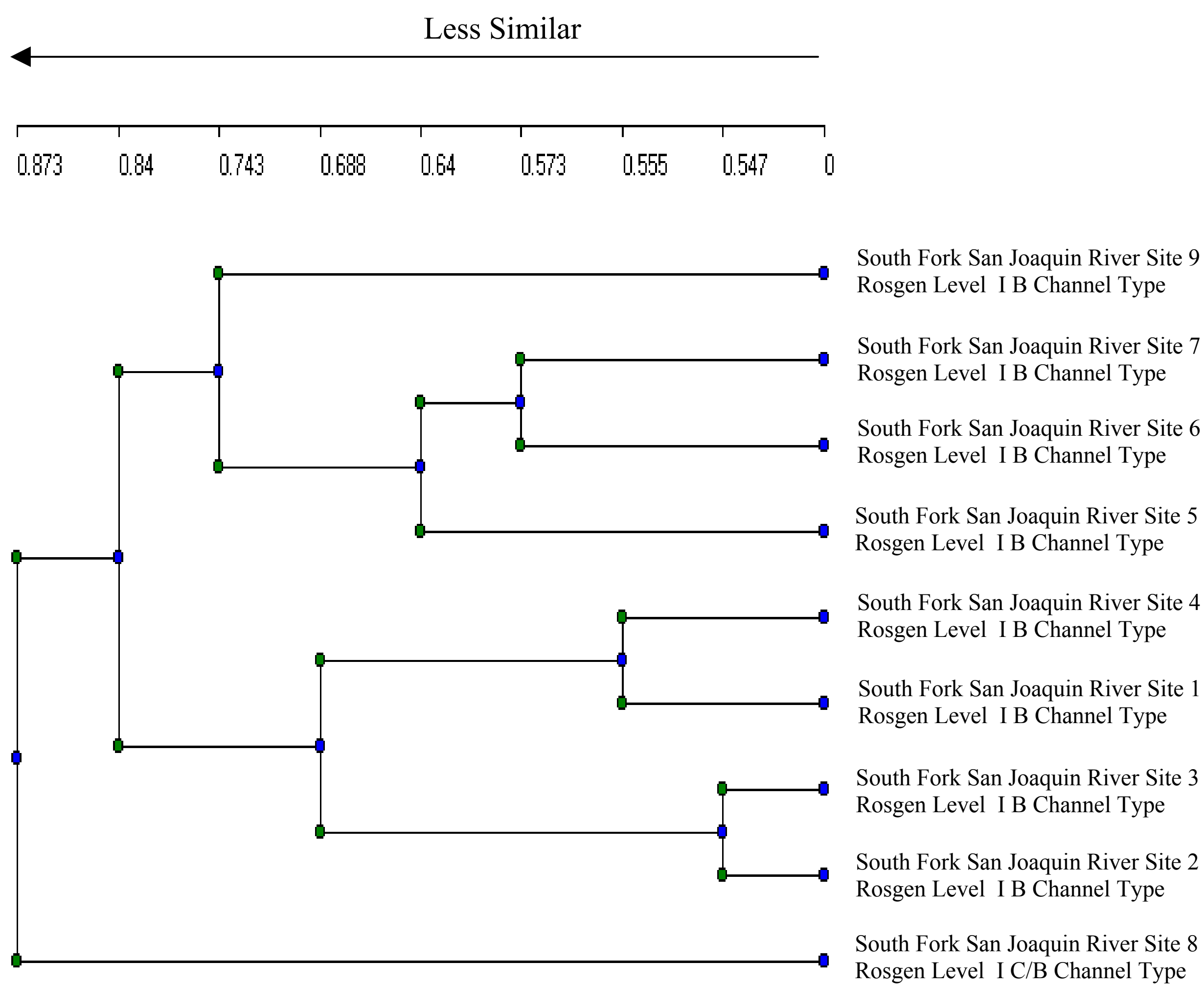

Figure CAWG 10-3. Dendrogram Based on Project BMI Taxa for South Fork San Joaquin River.

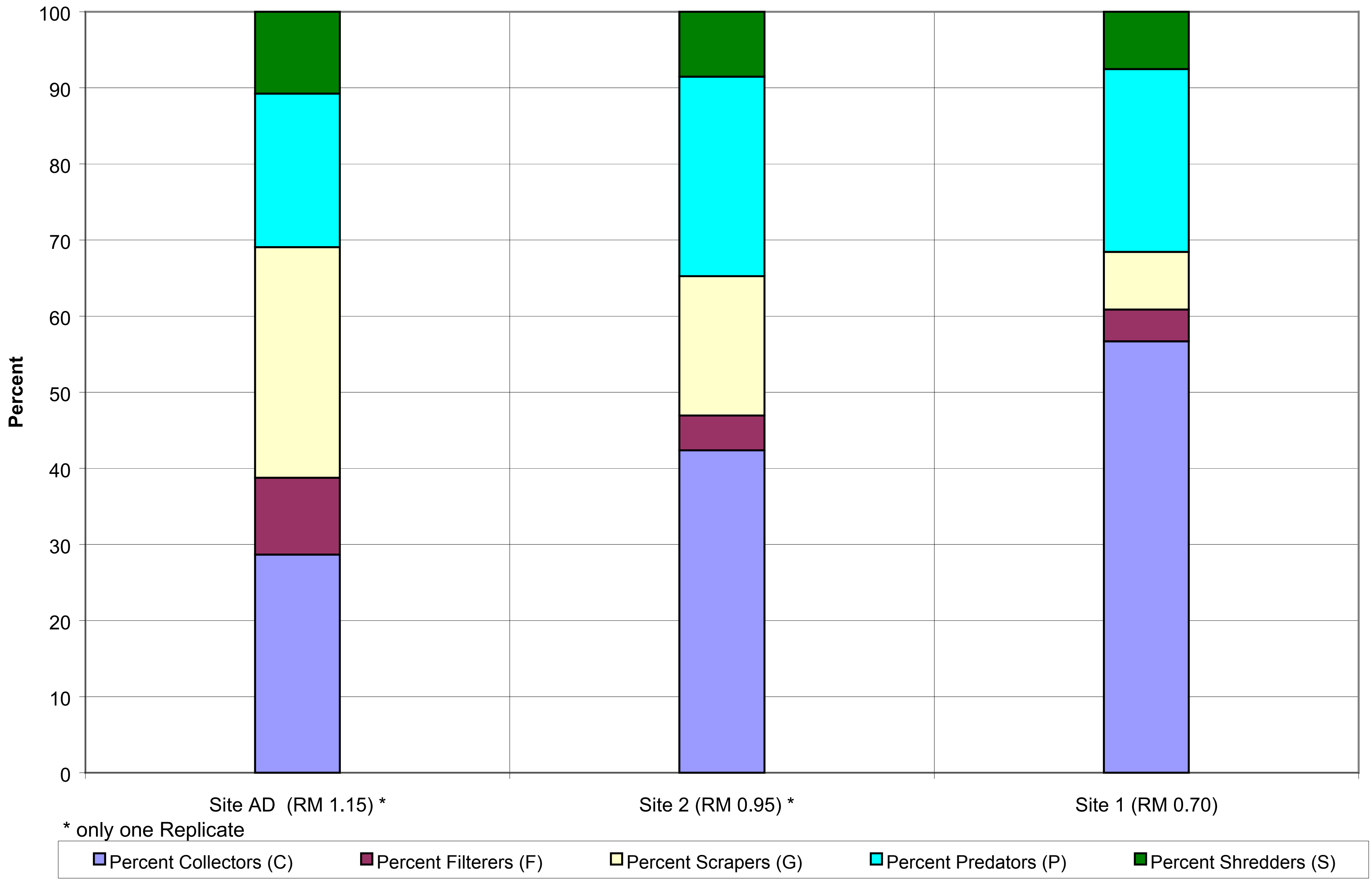

Figure CAWG 10-4. Tombstone Creek Mean Functional Feeding Group Percentages by Site, Big Creek ALP, Fall 2002.

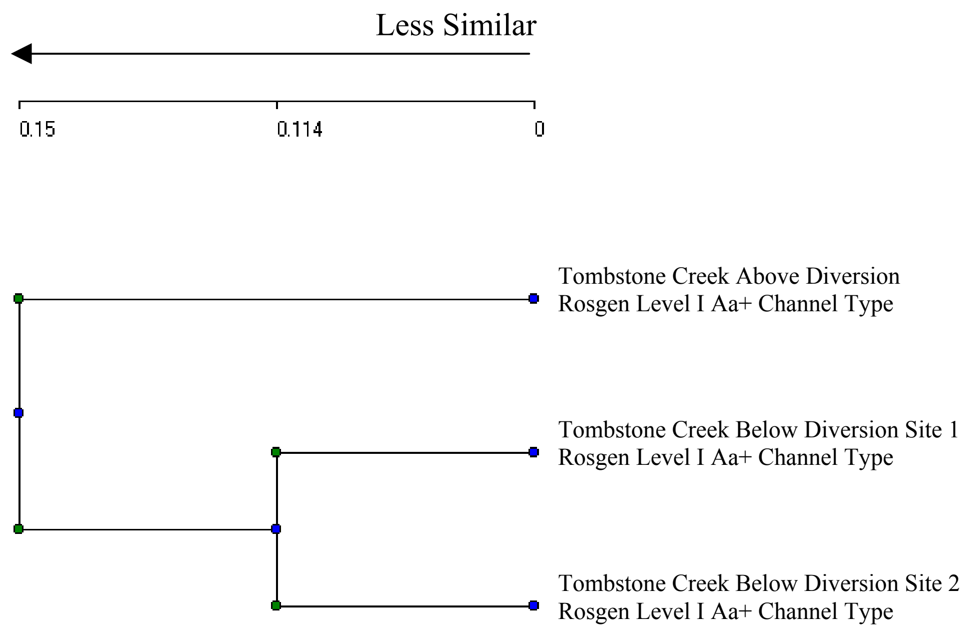

Figure CAWG 10-5. Dendrogram Based on Physical/Habitat Quality Score for Tombstone Creek.

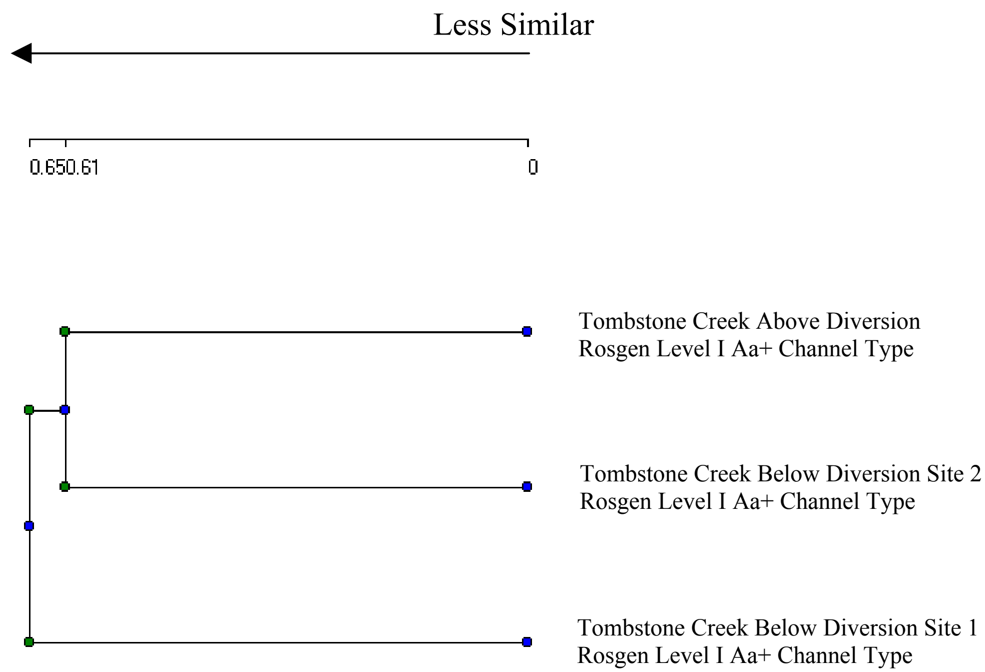

Figure CAWG 10-6. Dendrogram Based on Project BMI Taxa for Tombstone Creek.

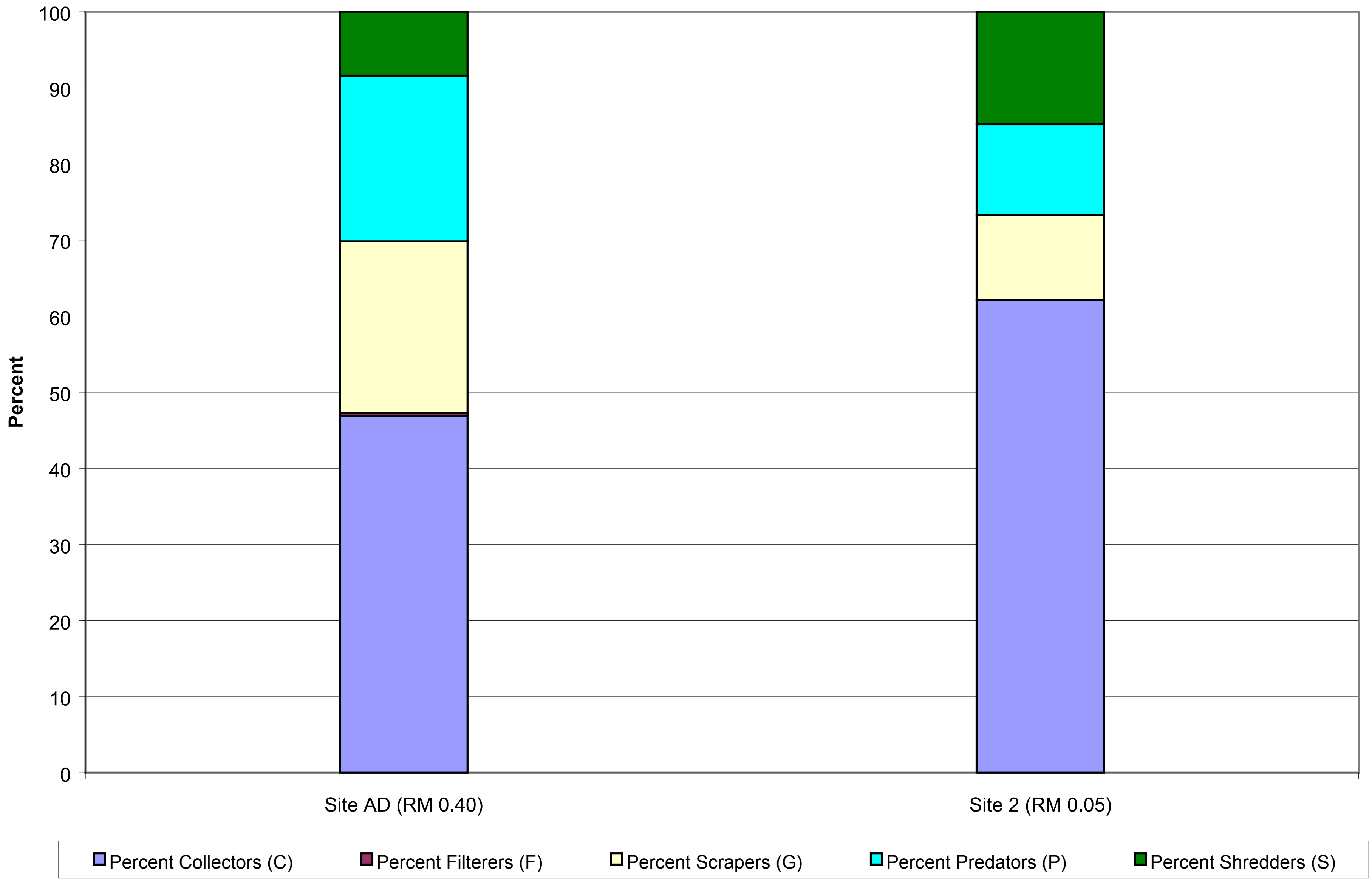

Figure CAWG 10-7. South Slide Creek Mean Functional Feeding Group Percentages by Site, Big Creek ALP, Fall 2002.

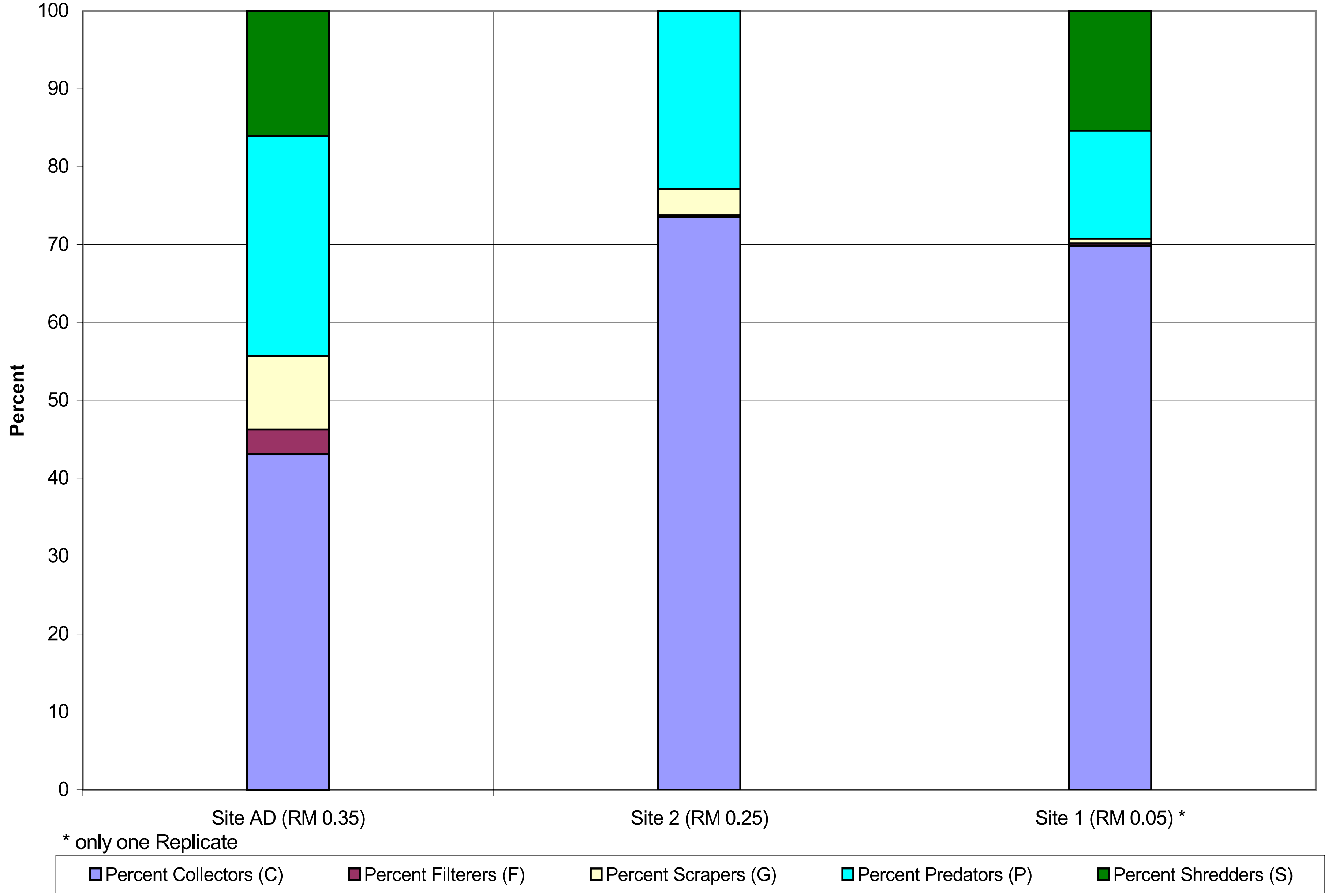

Figure CAWG 10-8. North Slide Creek Mean Functional Feeding Group Percentages by Site, Big Creek ALP, Fall 2002.

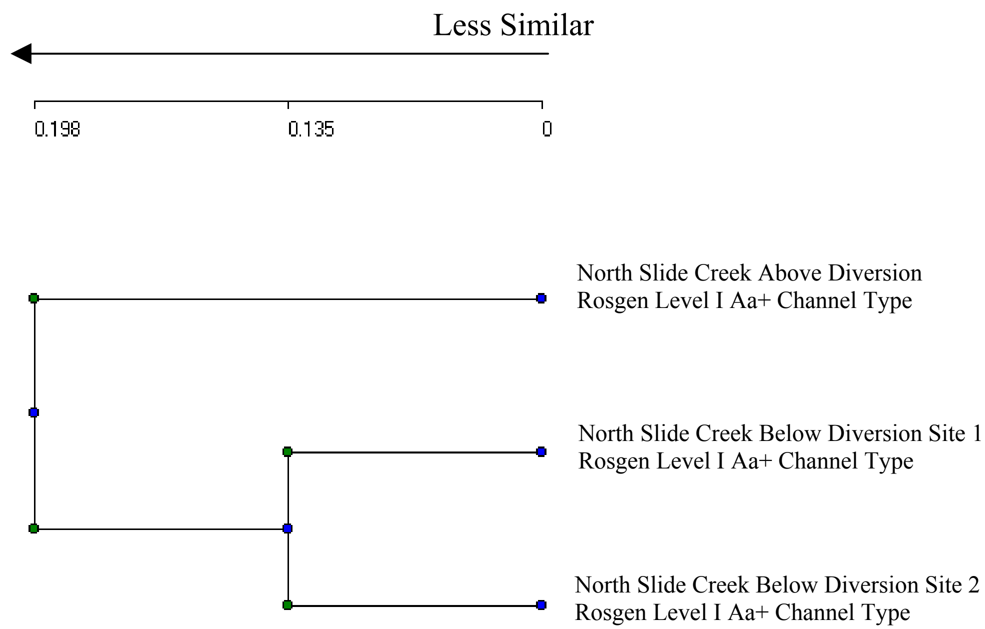

Figure CAWG 10-9. Dendrogram Based on Physical/Habitat Quality Score for North Slide Creek.

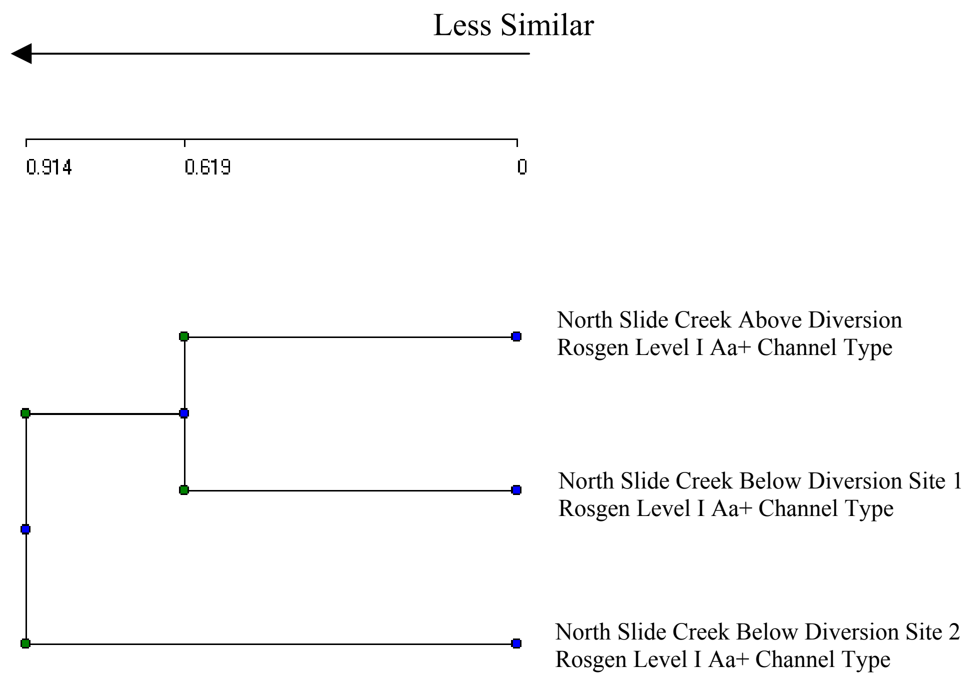

Figure CAWG 10-10. Dendrogram Based on Project BMI Taxa for North Slide Creek.

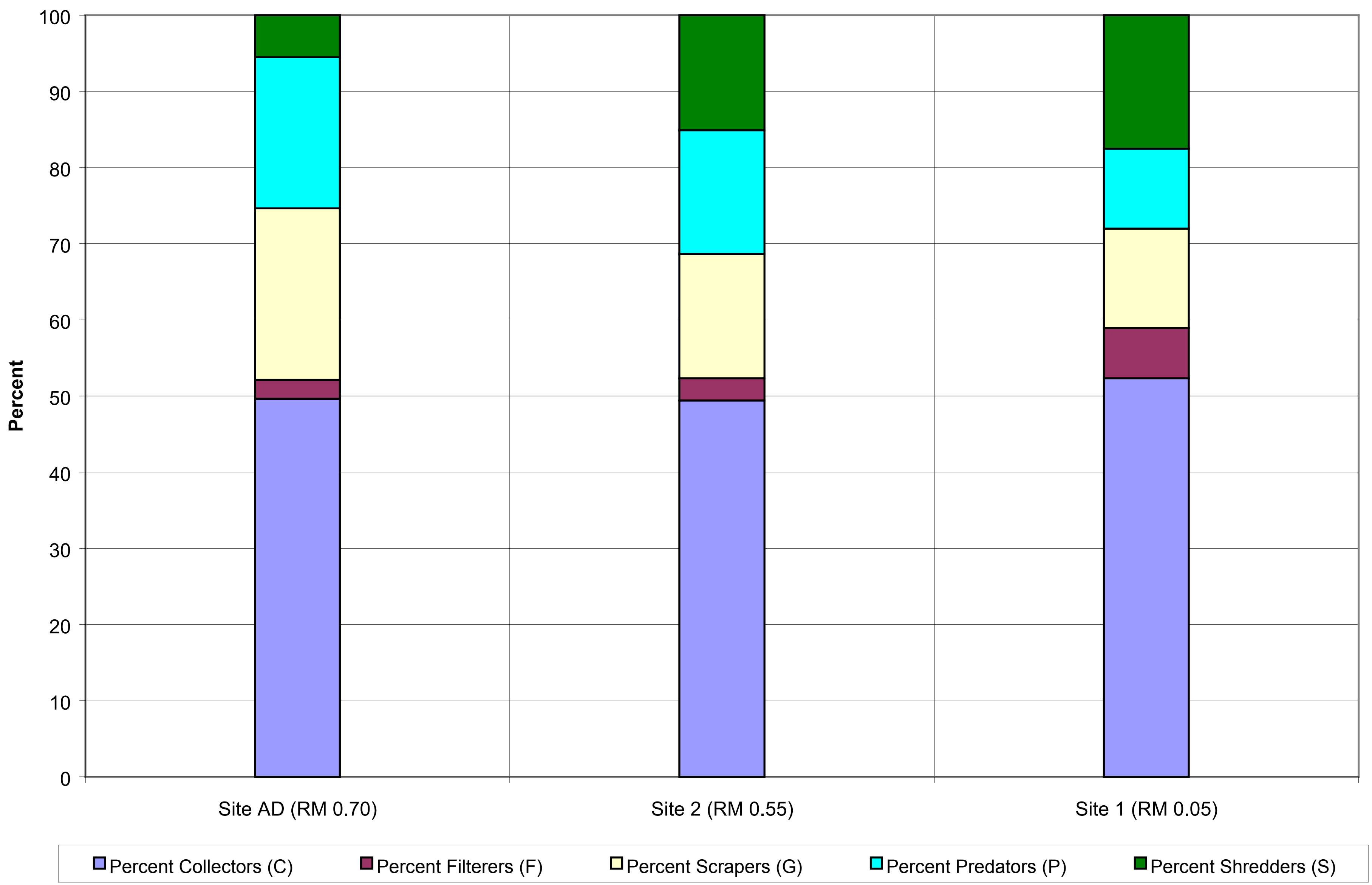

Figure CAWG 10-11. Hooper Creek Mean Functional Feeding Group Percentages by Site, Big Creek ALP, Fall 2002.

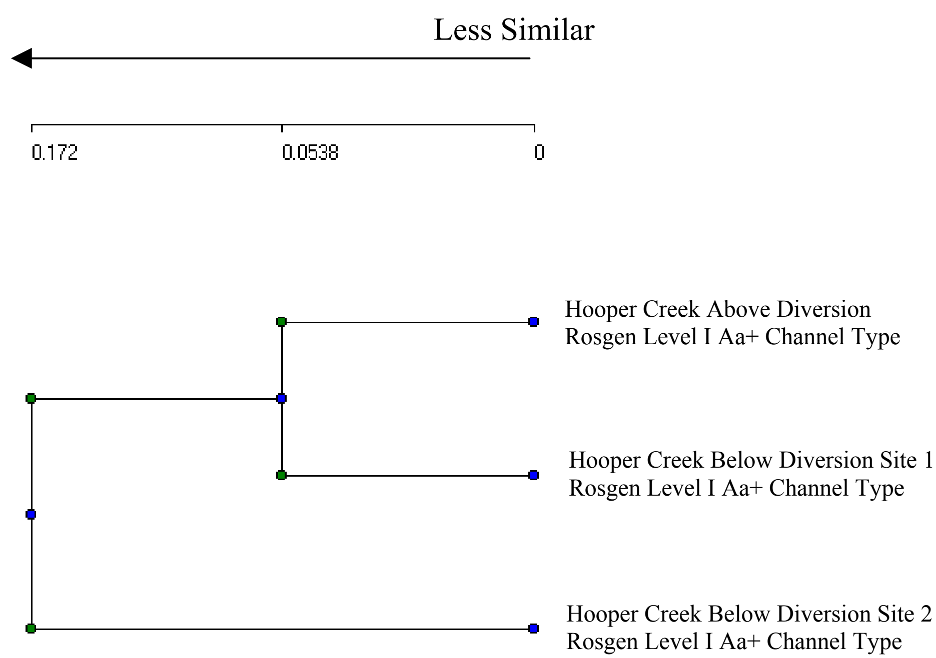

Figure CAWG 10-12. Dendrogram Based on Physical/Habitat Quality Score for Hooper Creek.

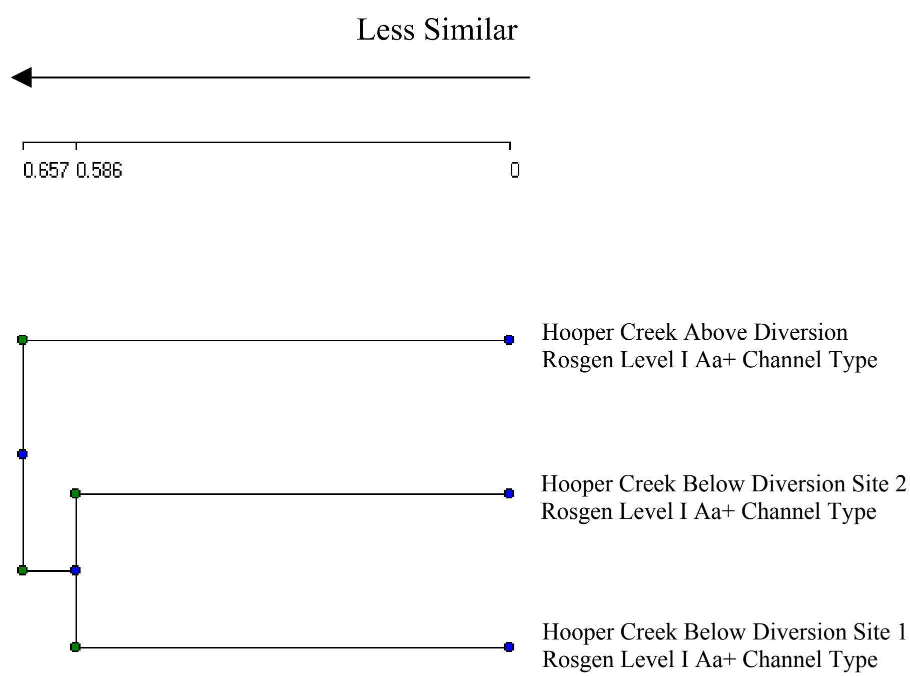

Figure CAWG 10-13. Dendrogram Based on Project BMI Taxa for Hooper Creek.

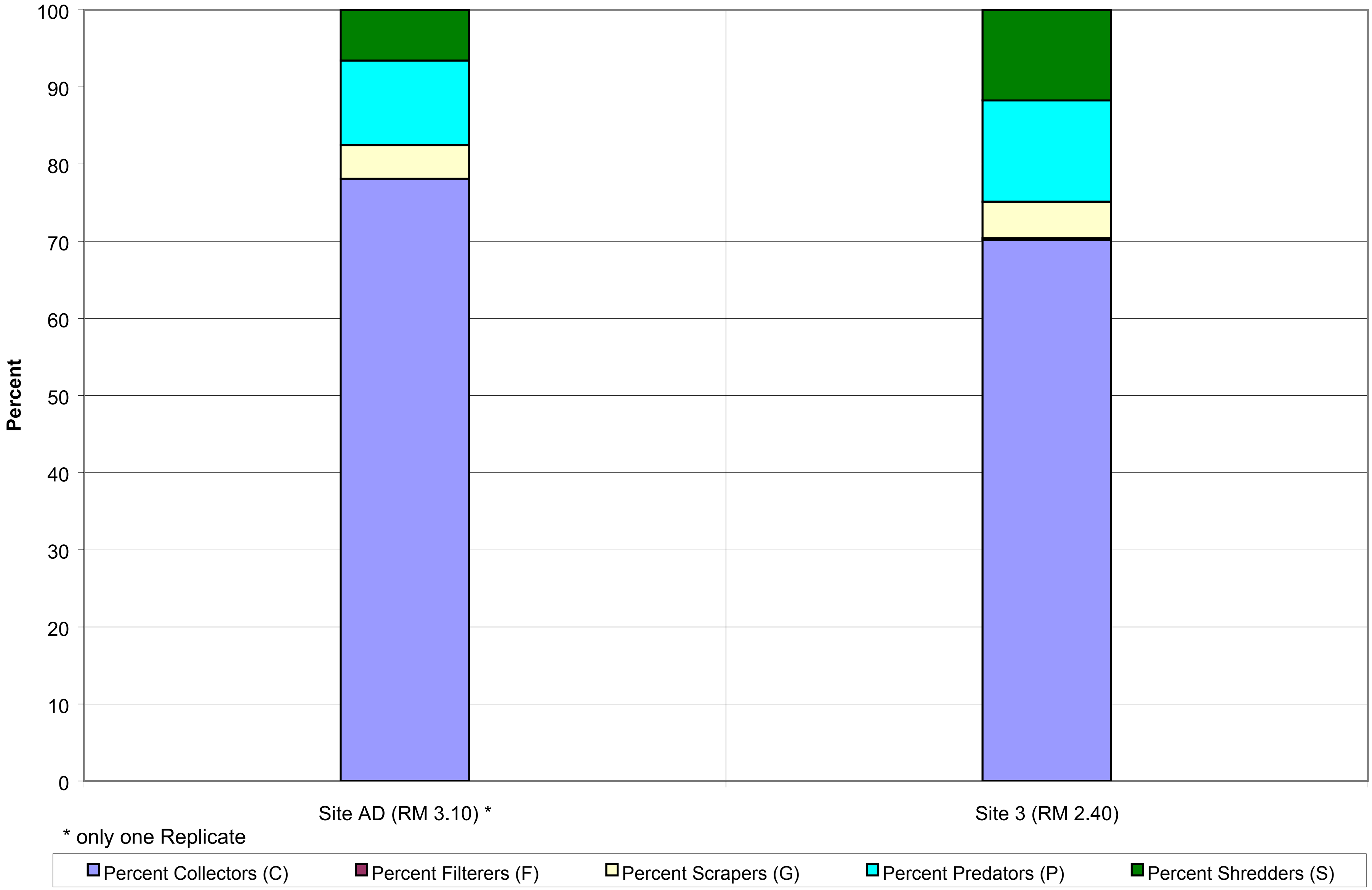

Figure CAWG 10-14. Crater Creek Mean Functional Feeding Group Percentages by Site, Big Creek ALP, Fall 2002.

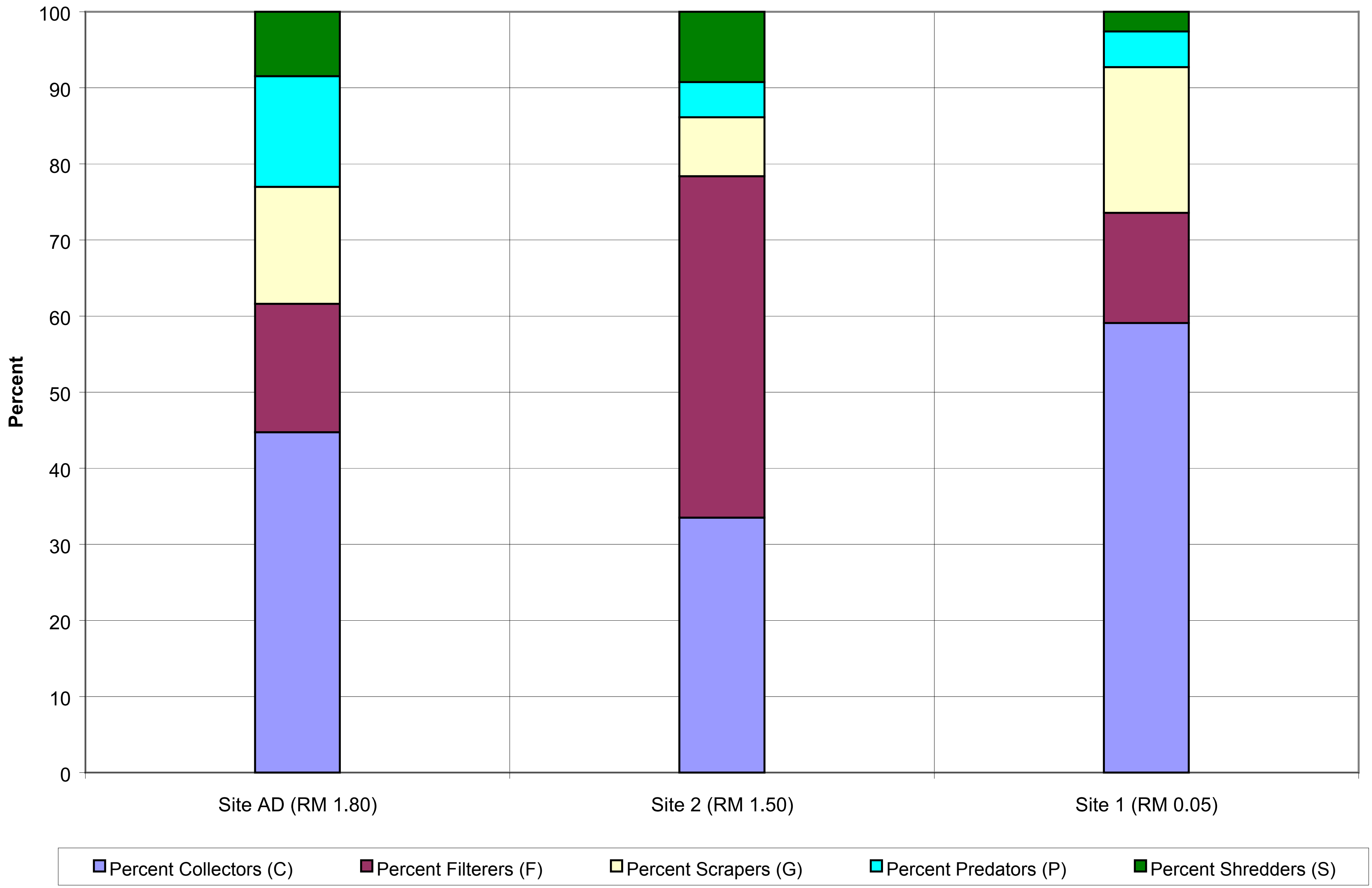

Figure CAWG 10-15. Bear Creek Mean Functional Feeding Group Percentages by Site, Big Creek ALP, Fall 2002.

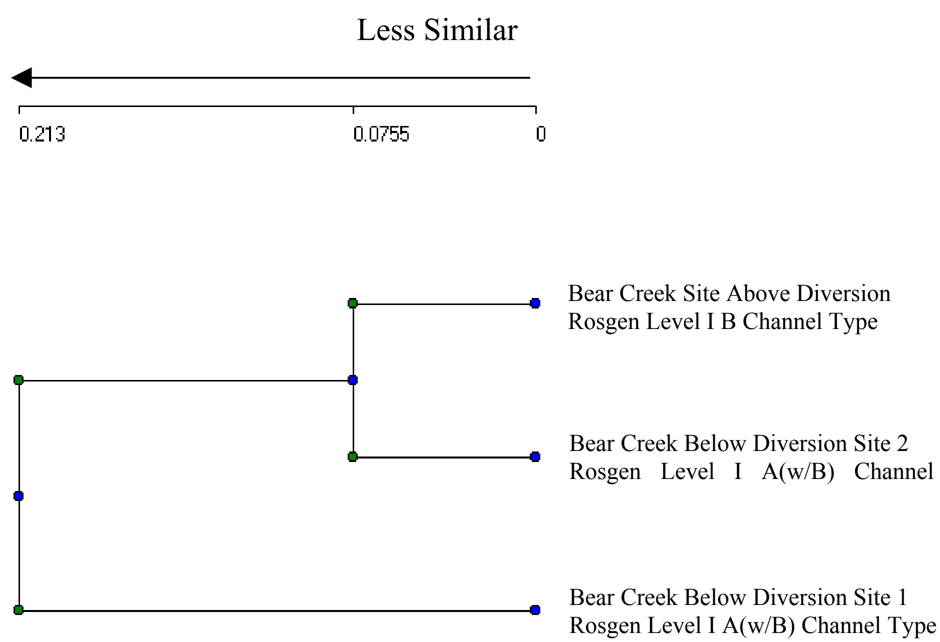

Figure CAWG 10-16. Dendrogram Based on Physical/Habitat Quality Score for Bear Creek.

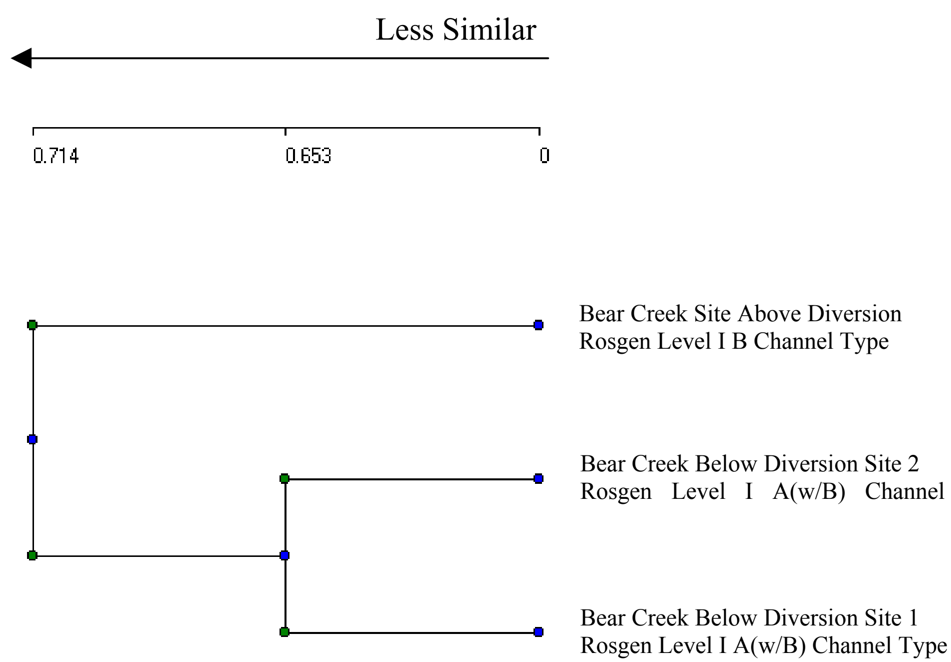

Figure CAWG 10-17. Dendrogram Based on Project BMI Taxa for Bear Creek.

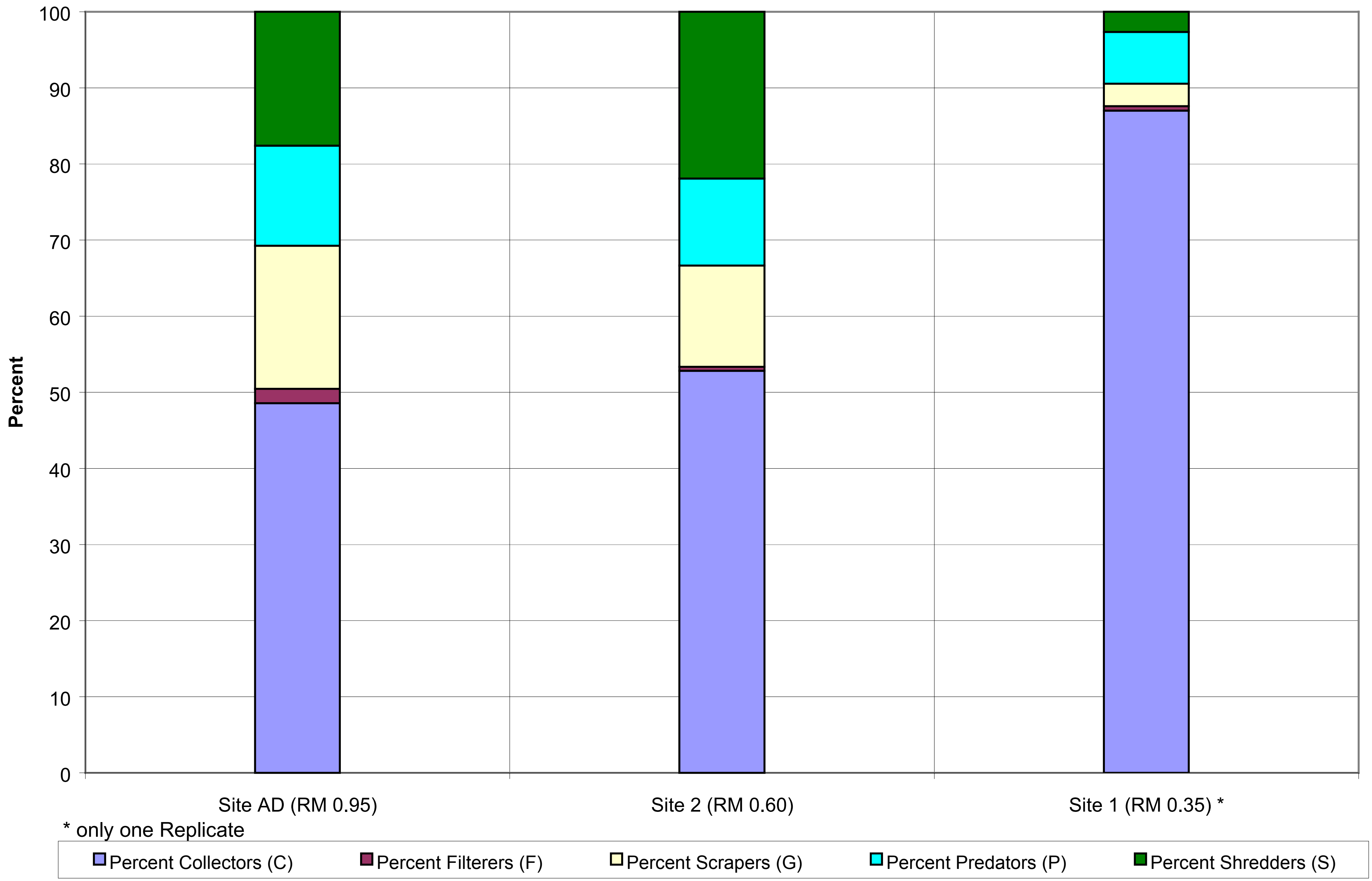

Figure CAWG 10-18. Chinquapin Creek Mean Functional Feeding Group Percentages by Site, Big Creek ALP, Fall 2002.

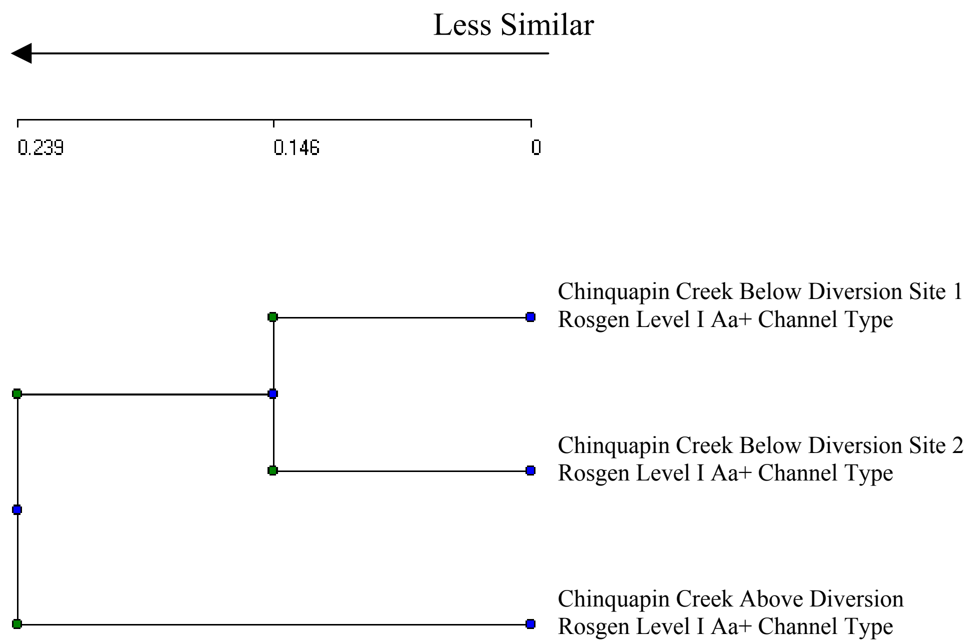

Figure CAWG 10-19. Dendrogram Based on Physical/Habitat Quality Score for Chinquapin Creek.

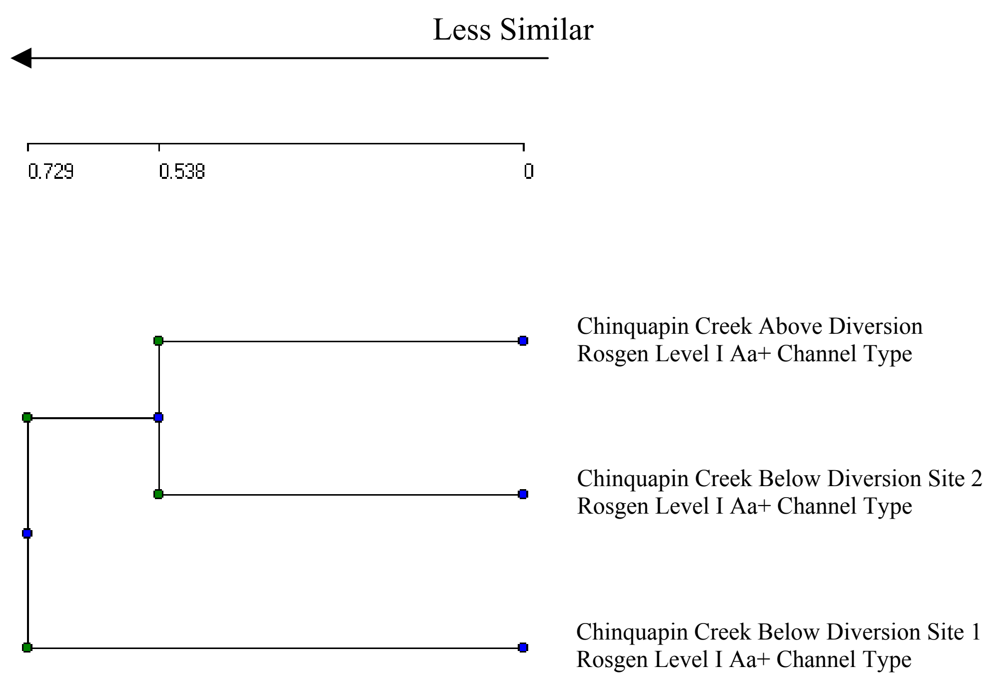

Figure CAWG 10-20. Dendrogram Based on Project BMI Taxa for Chinquapin Creek.

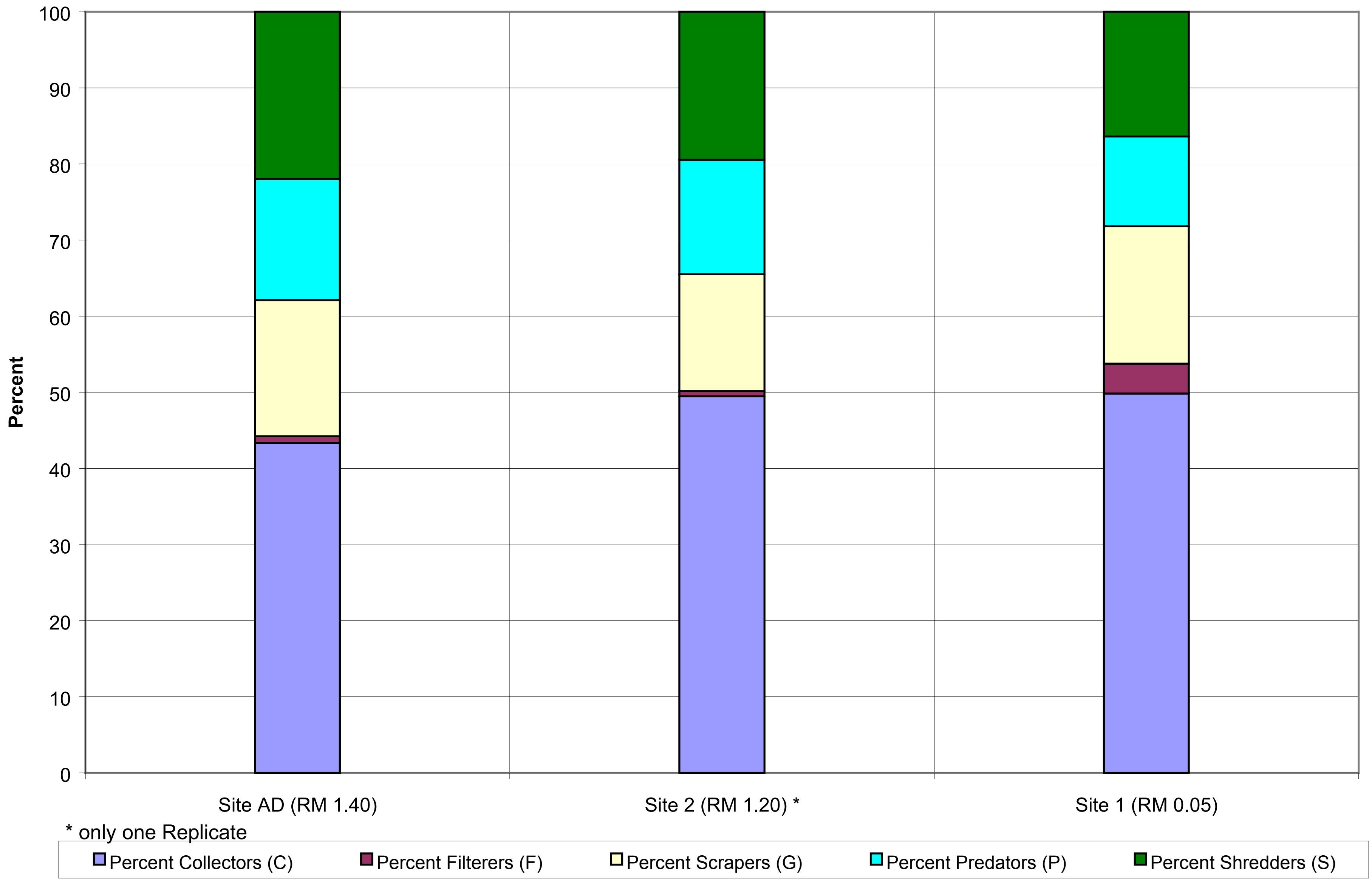

Figure CAWG 10-21. Camp 62 Creek Mean Functional Feeding Group Percentages by Site, Big Creek ALP, Fall 2002.

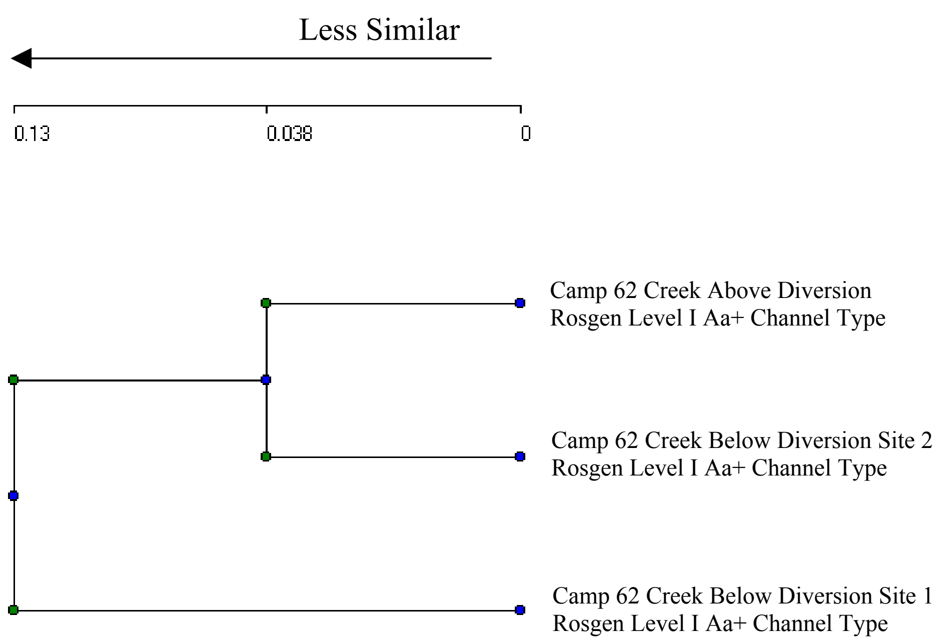

Figure CAWG 10-22. Dendrogram Based on Physical/Habitat Quality Score for Camp 62 Creek.

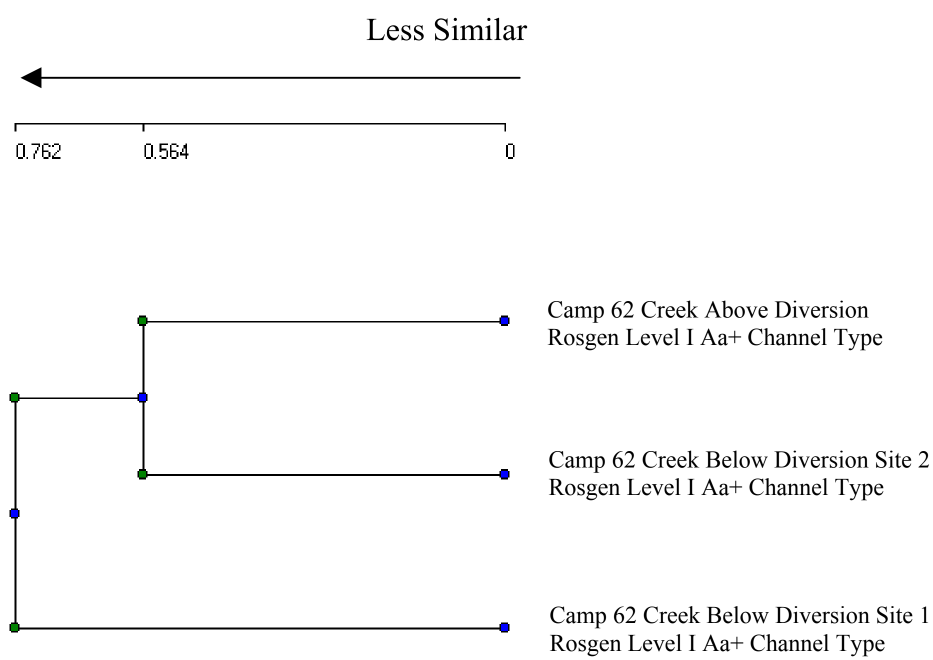

Figure CAWG 10-23. Dendrogram Based on Project BMI Taxa for Camp 62 Creek.

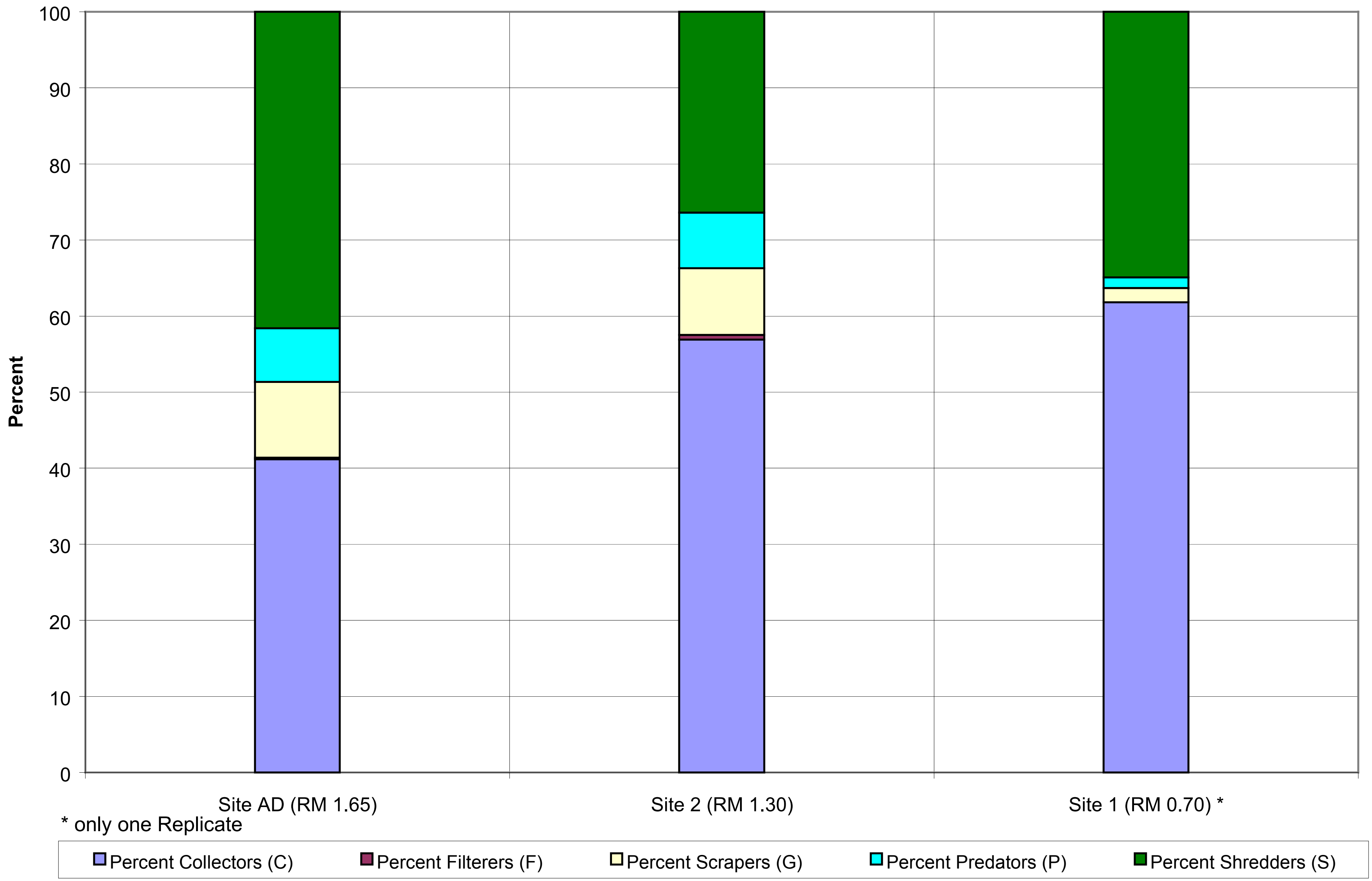

Figure CAWG 10-24. Bolsillo Creek Mean Functional Feeding Group Percentages by Site, Big Creek ALP, Fall 2002.

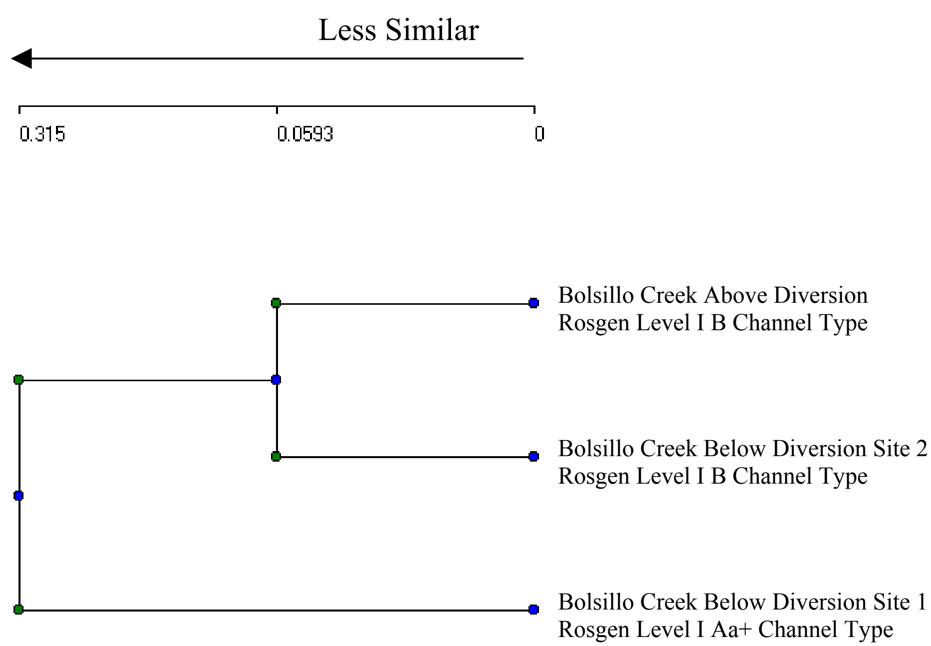

Figure CAWG 10-25. Dendrogram Based on Physical/Habitat Quality Score for Bolsillo Creek.

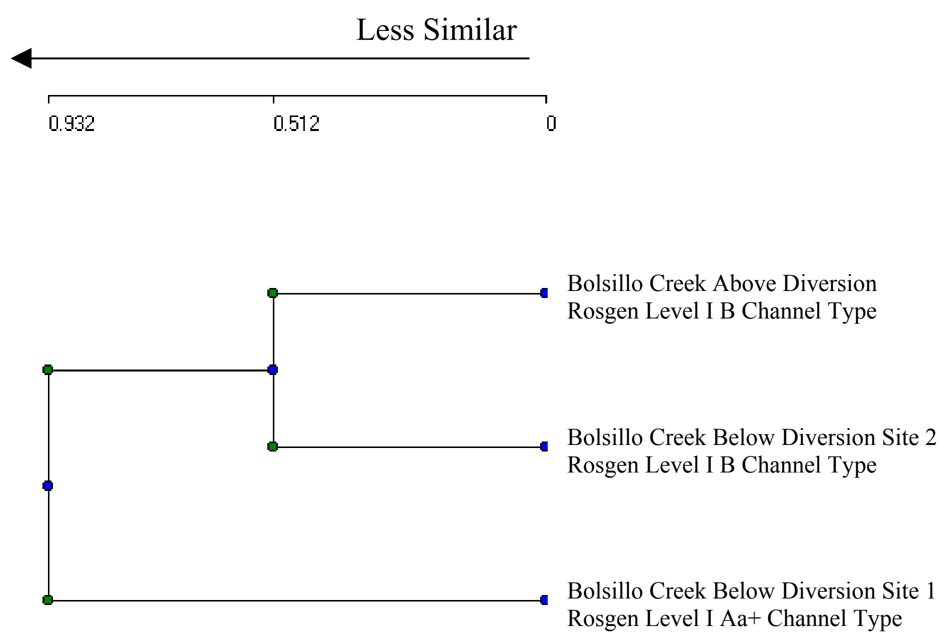

Figure CAWG 10-26. Dendrogram Based on Project BMI Taxa for Bolsillo Creek.

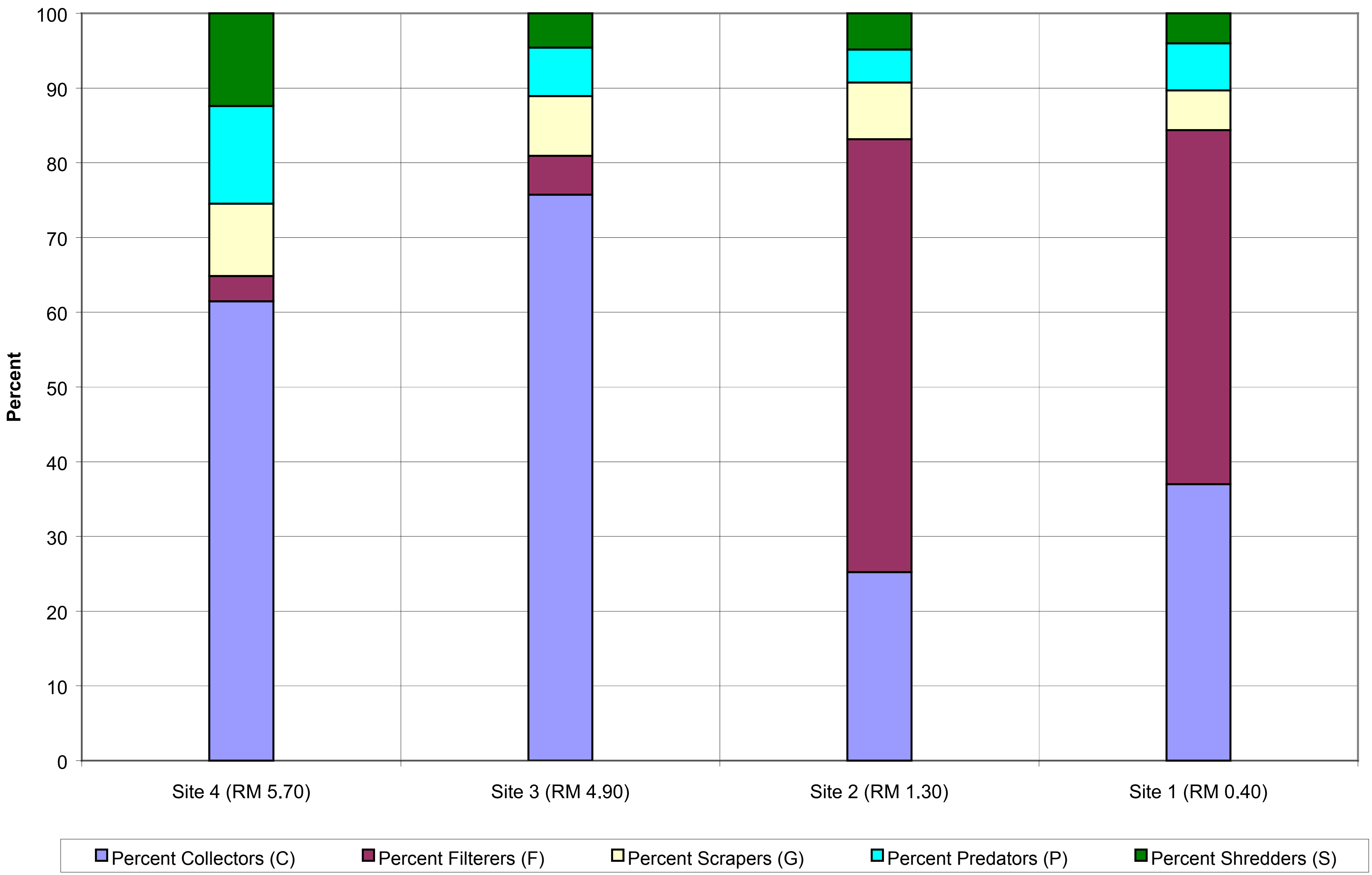

Figure CAWG 10-27. Mono Creek Mean Functional Feeding Group Percentages by Site, Big Creek ALP, Fall 2002.

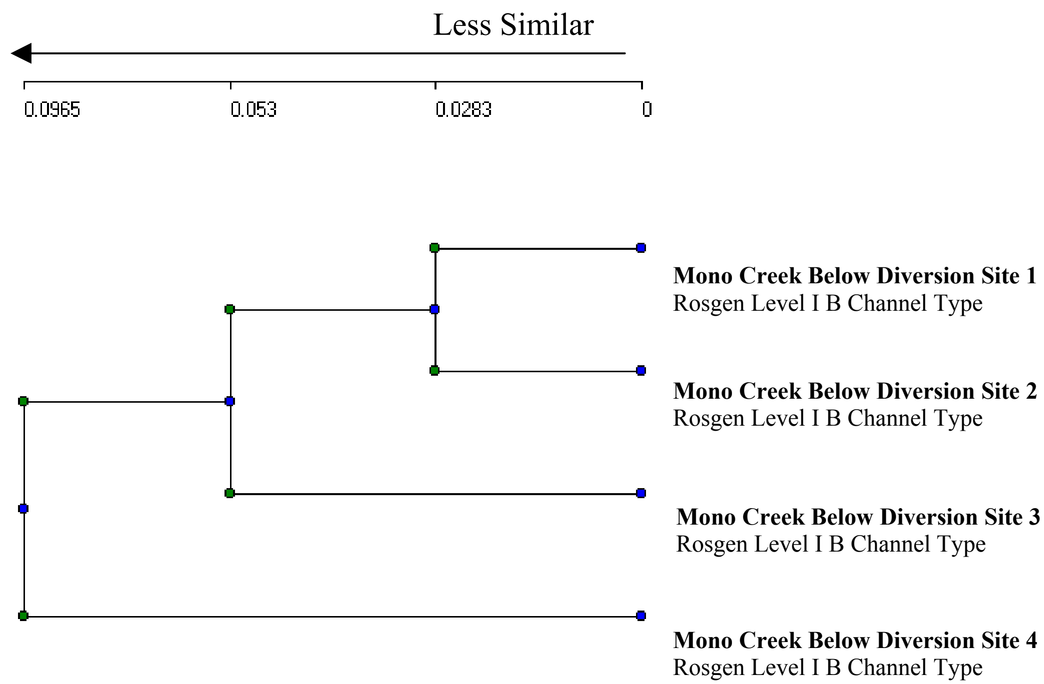

Figure CAWG 10-28. Dendrogram Based on Physical/Habitat Quality Score for Mono Creek.

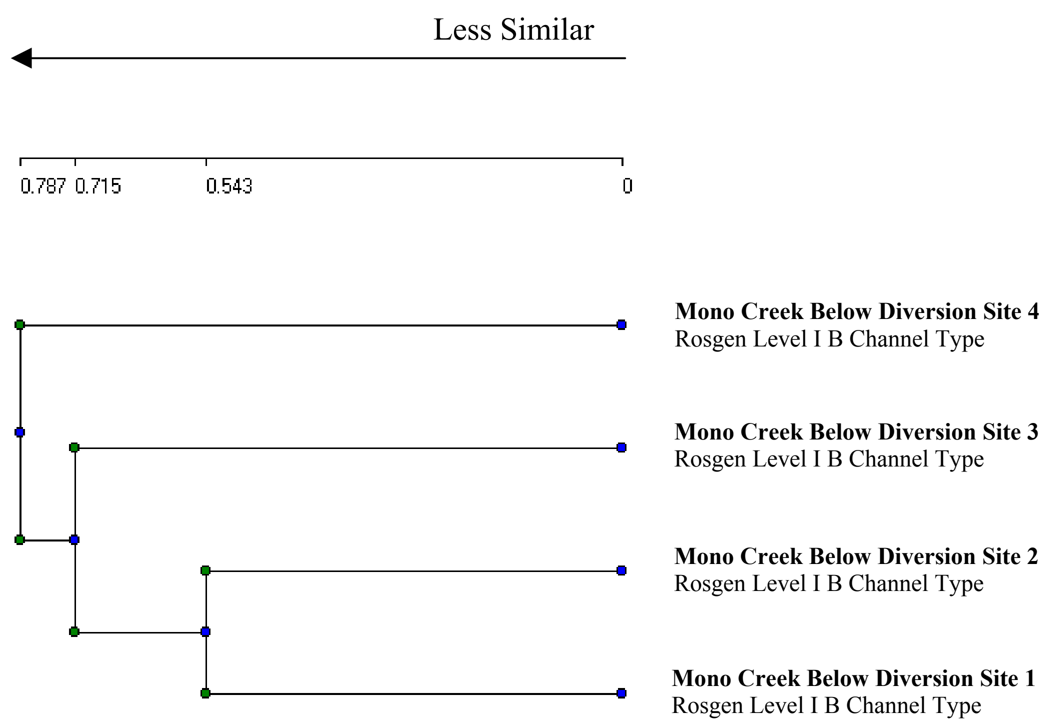

Figure CAWG 10-29. Dendrogram Based on Project BMI Taxa for Mono Creek.

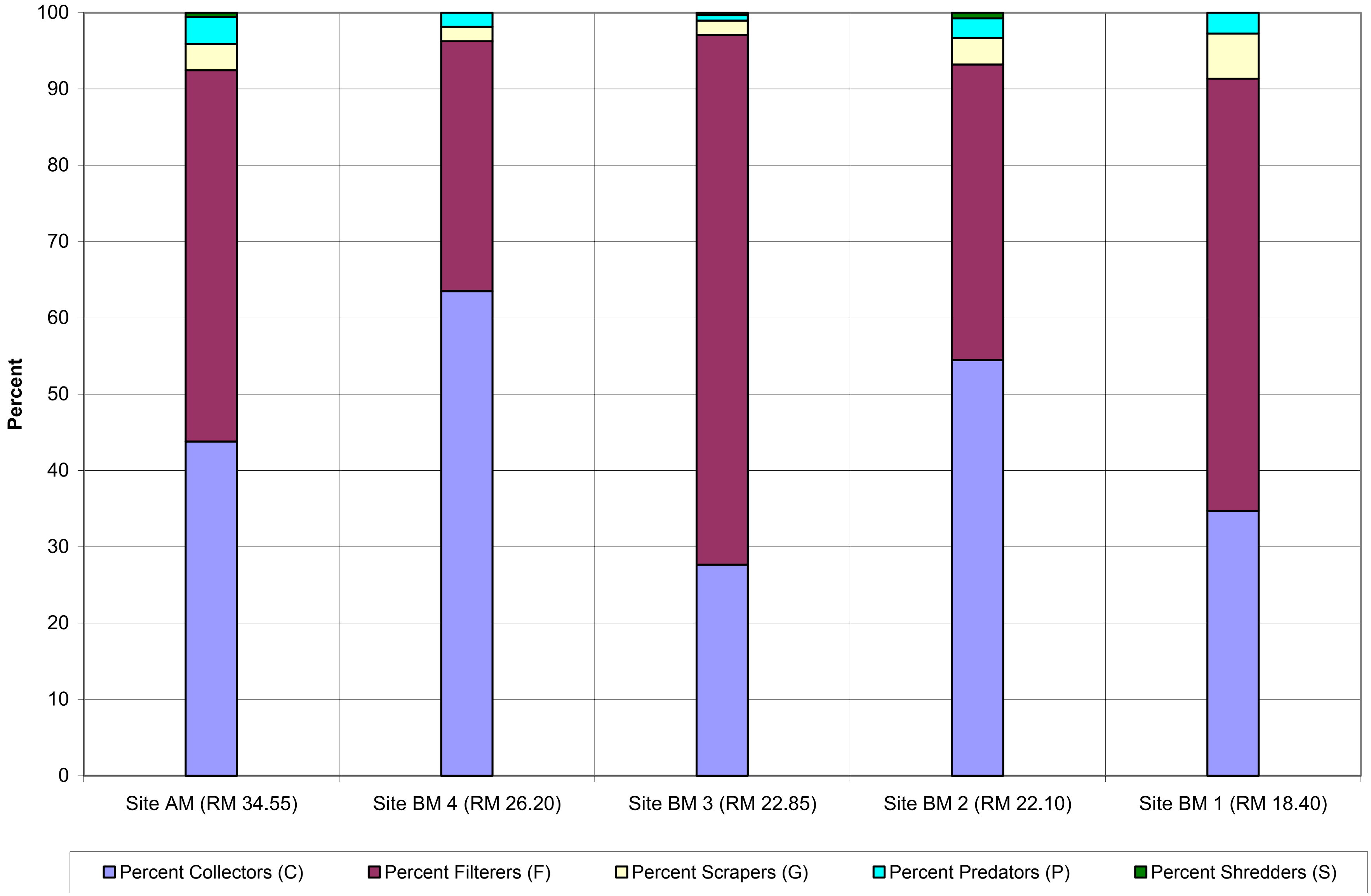

Figure CAWG 10-30. San Joaquin River Mammoth Reach Mean Functional Feeding Group Percentages by Site, Big Creek ALP, Fall 2002.

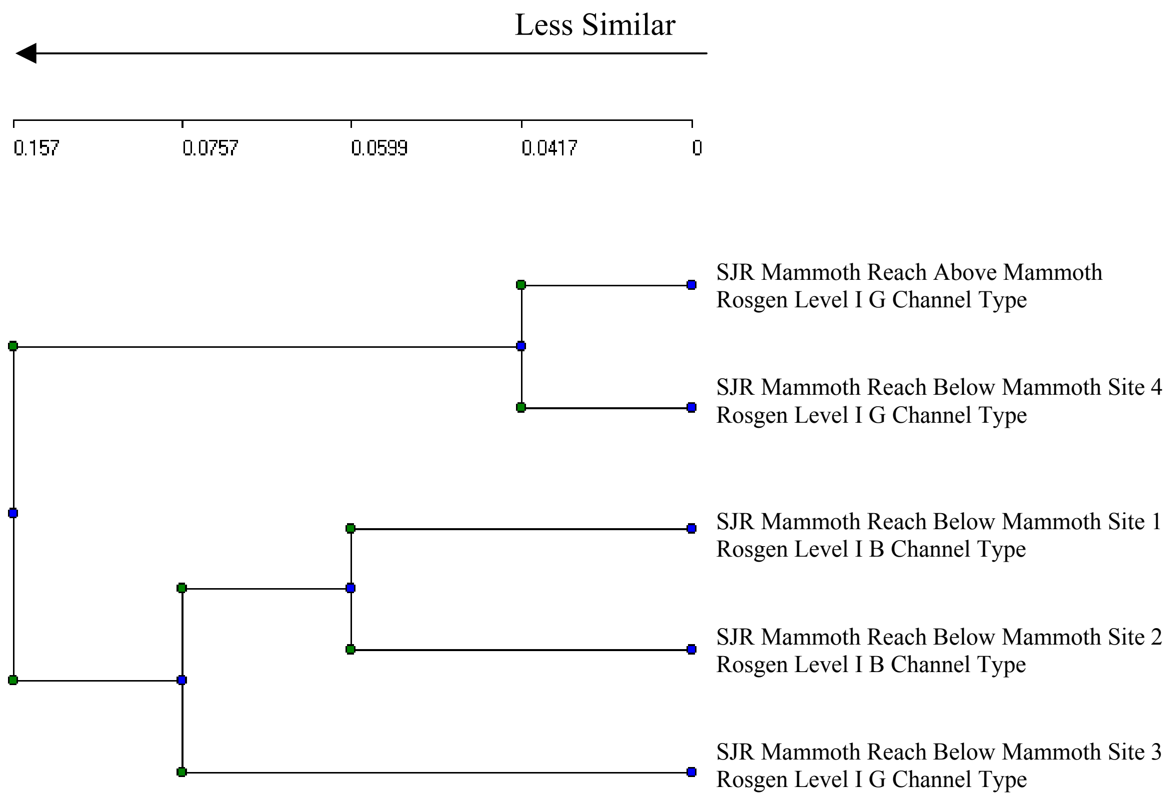

Figure CAWG 10-31. Dendrogram Based on Physical/Habitat Quality Score for San Joaquin River Mammoth Reach.

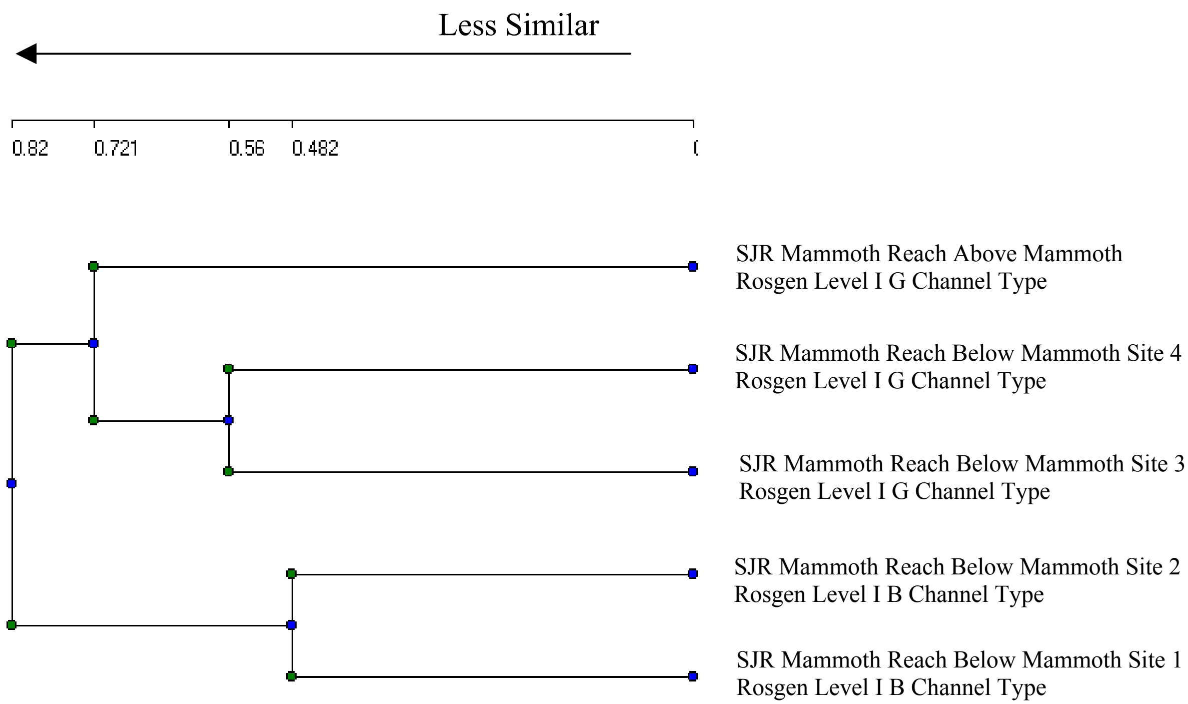

Figure CAWG 10-32. Dendrogram Based on Project BMI Taxa for San Joaquin River Mammoth Reach.

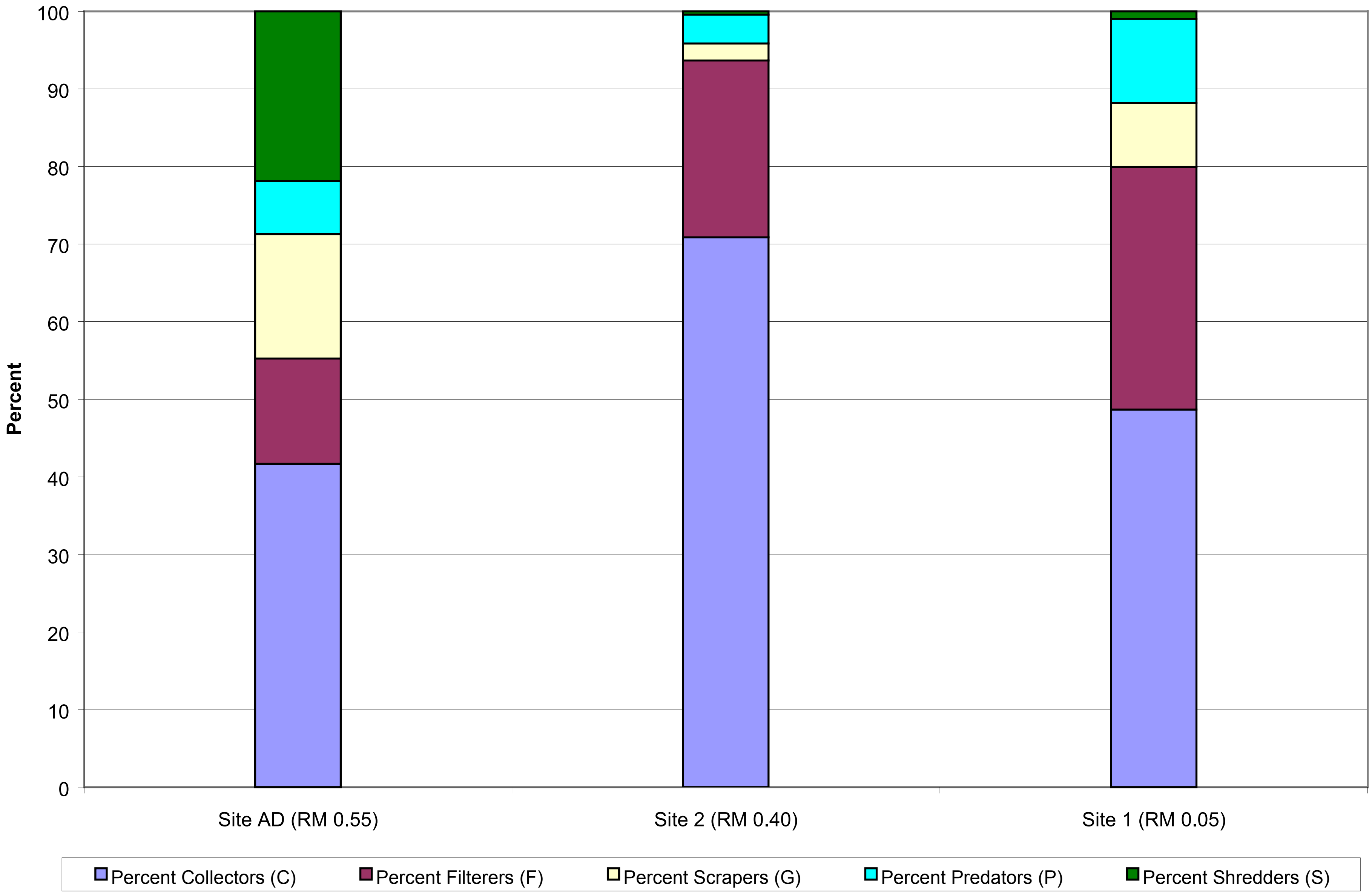

Figure CAWG 10-33. Rock Creek Mean Functional Feeding Group Percentages by Site, Big Creek ALP, Fall 2002.

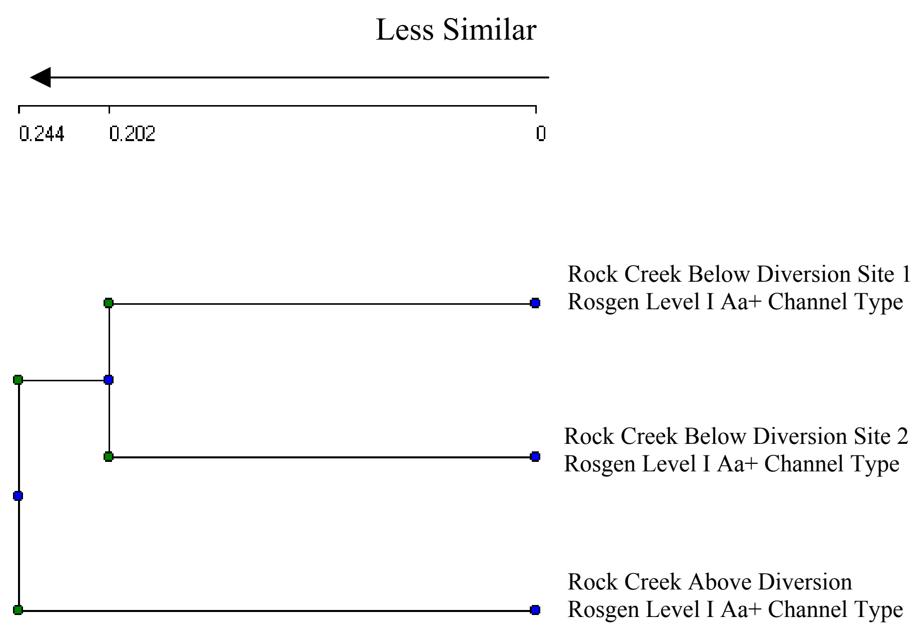

Figure CAWG 10-34. Dendrogram Based on Physical/Habitat Quality Score for Rock Creek.

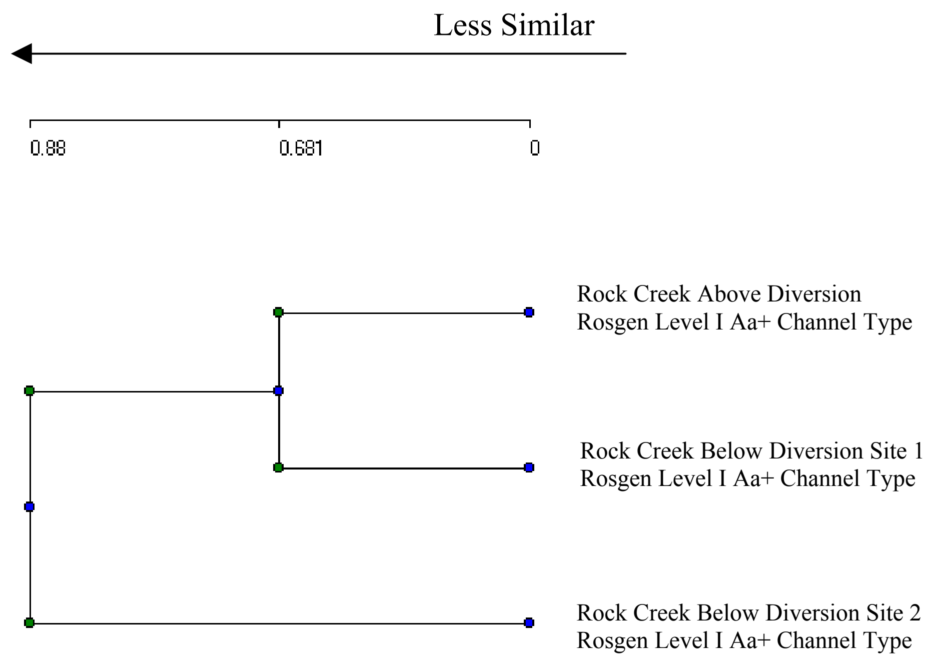

Figure CAWG 10-35. Dendrogram Based on Project BMI Taxa for Rock Creek.

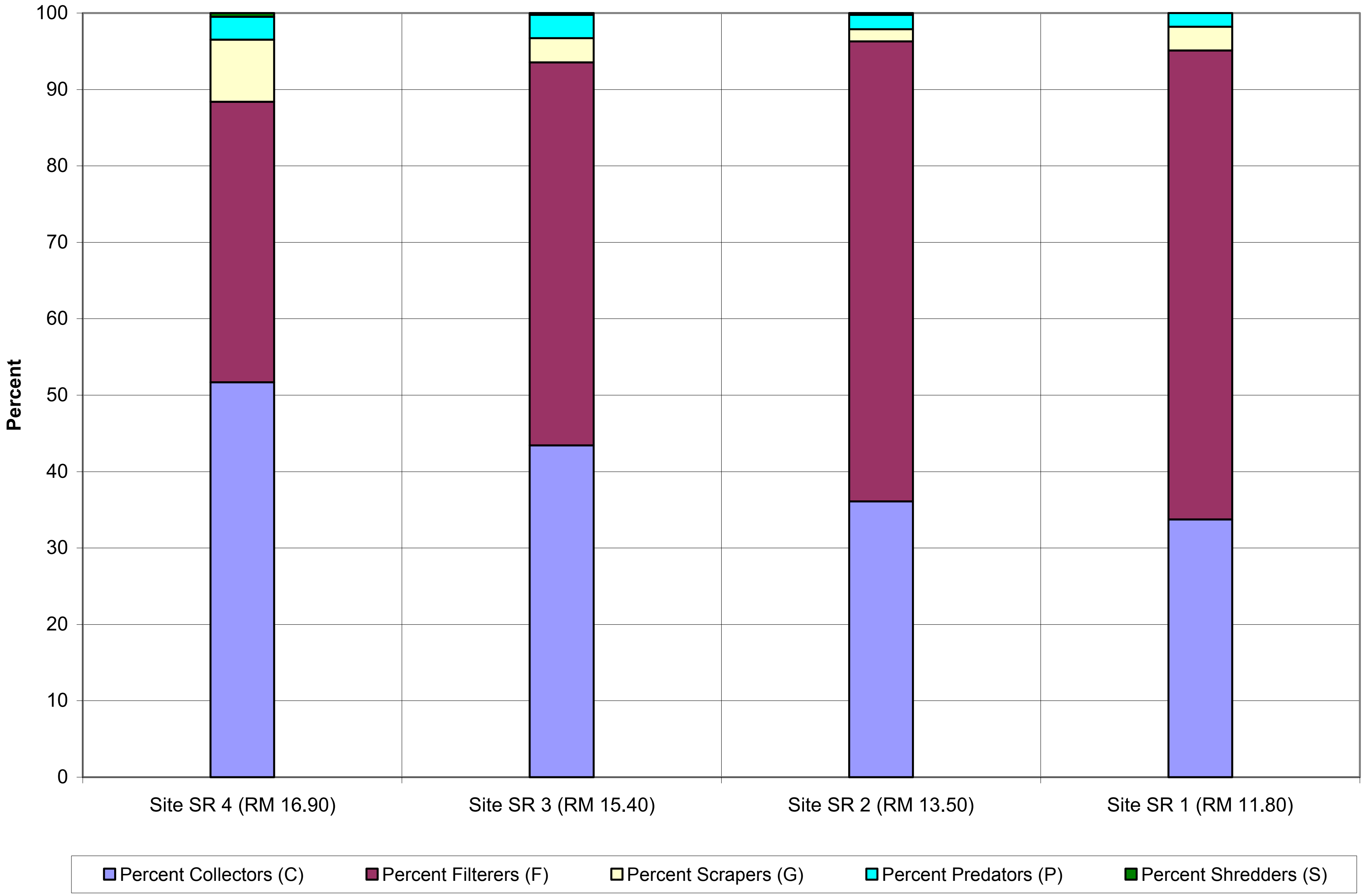

Figure CAWG 10-36. San Joaquin River Stevenson Reach Mean Functional Feeding Group Percentages by Site, Big Creek ALP, Fall 2002.

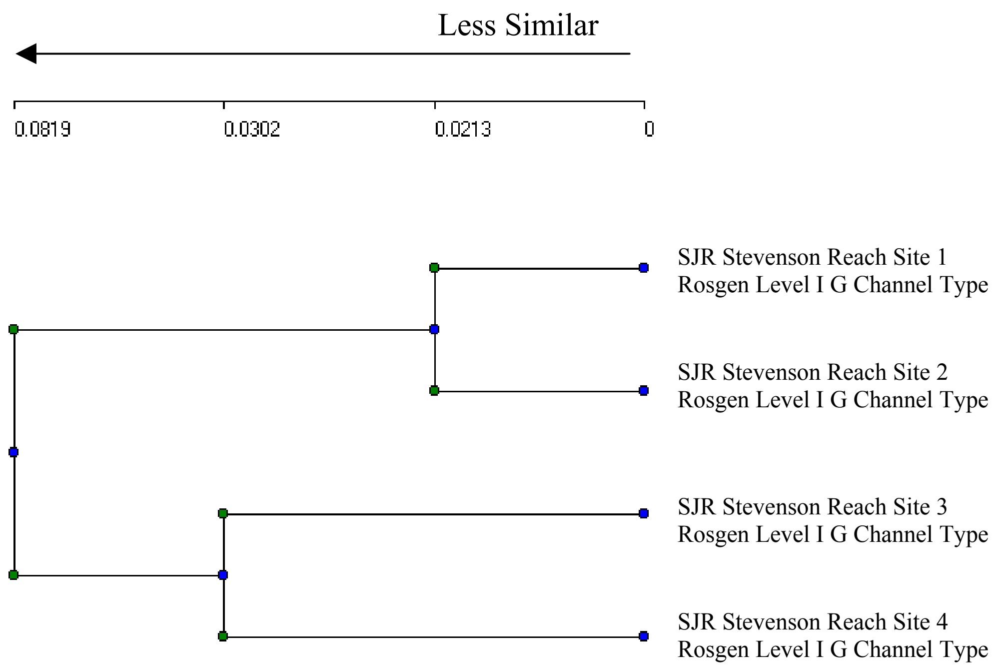

Figure CAWG 10-37. Dendrogram Based on Physical/Habitat Quality Score for San Joaquin River Stevenson Reach.

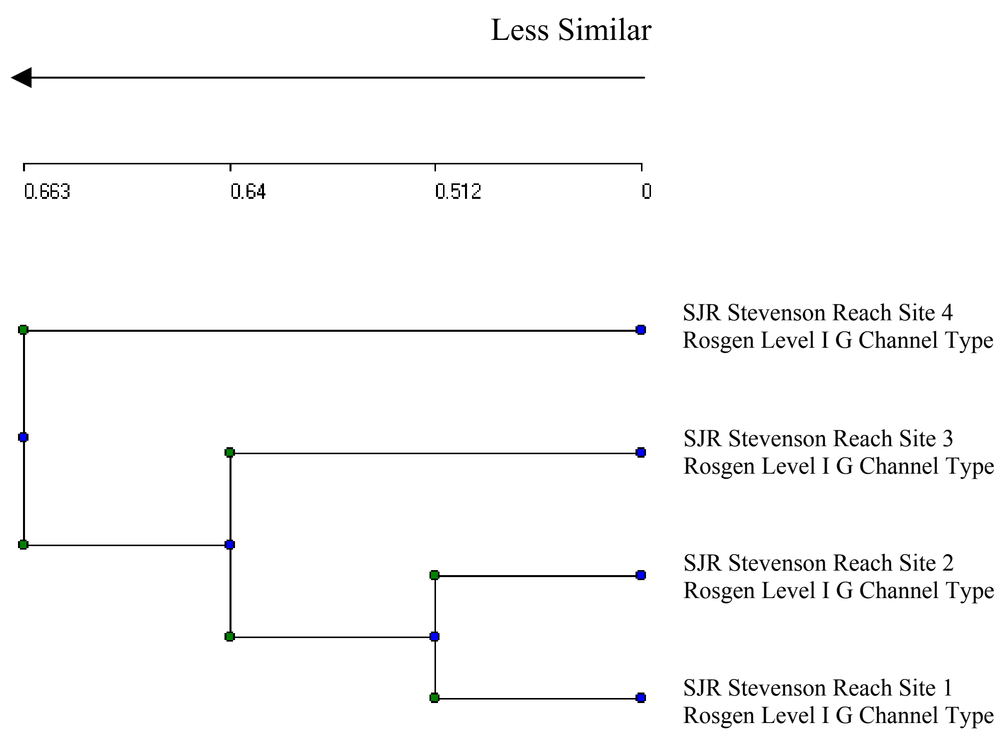

Figure CAWG 10-38. Dendrogram Based on Project BMI Taxa for San Joaquin River Stevenson Reach.

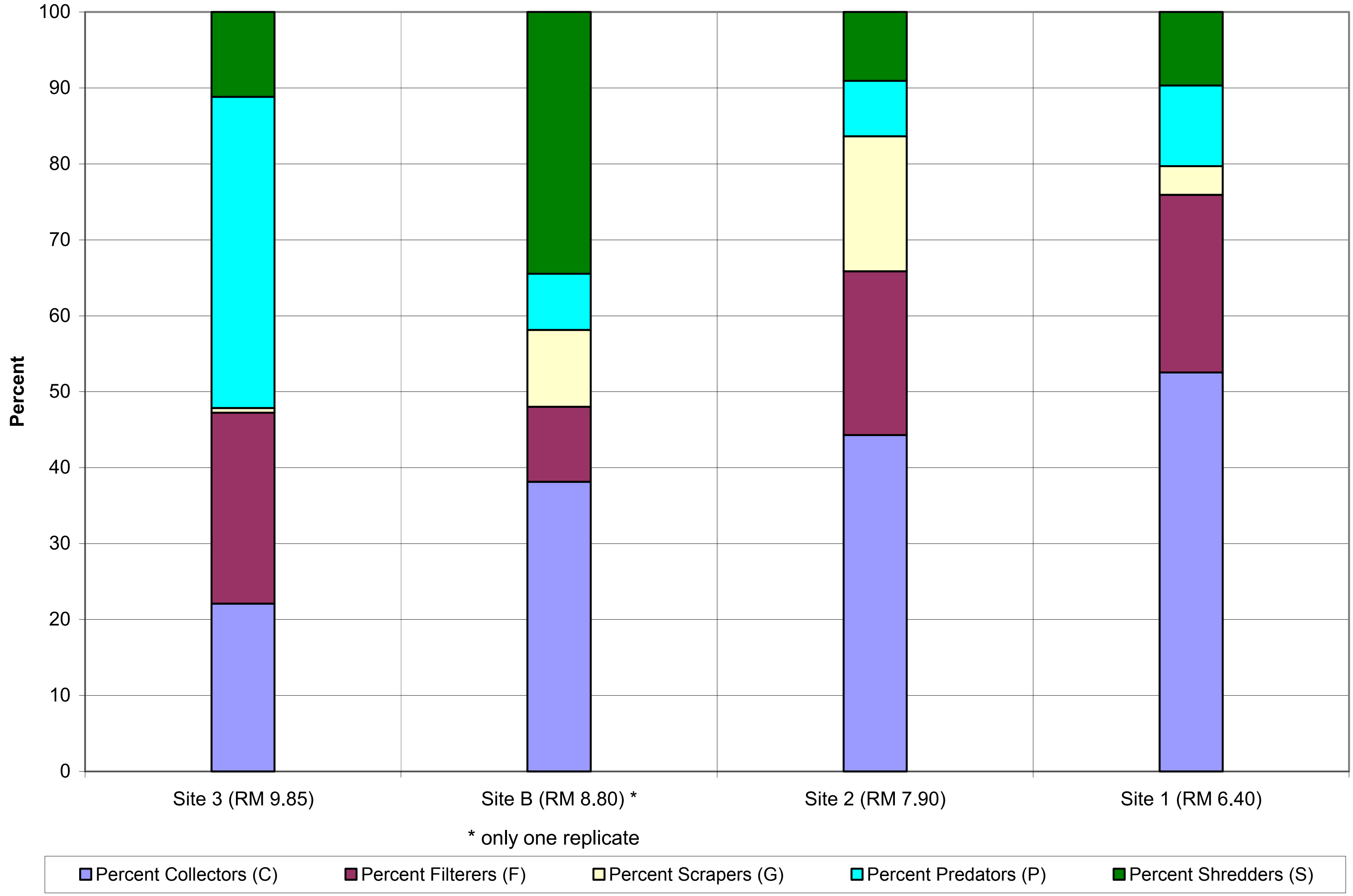

Figure CAWG 10-39. Big Creek Dam 1 to PH 1 Mean Functional Feeding Group Percentages by Site, Big Creek ALP, Fall 2002.

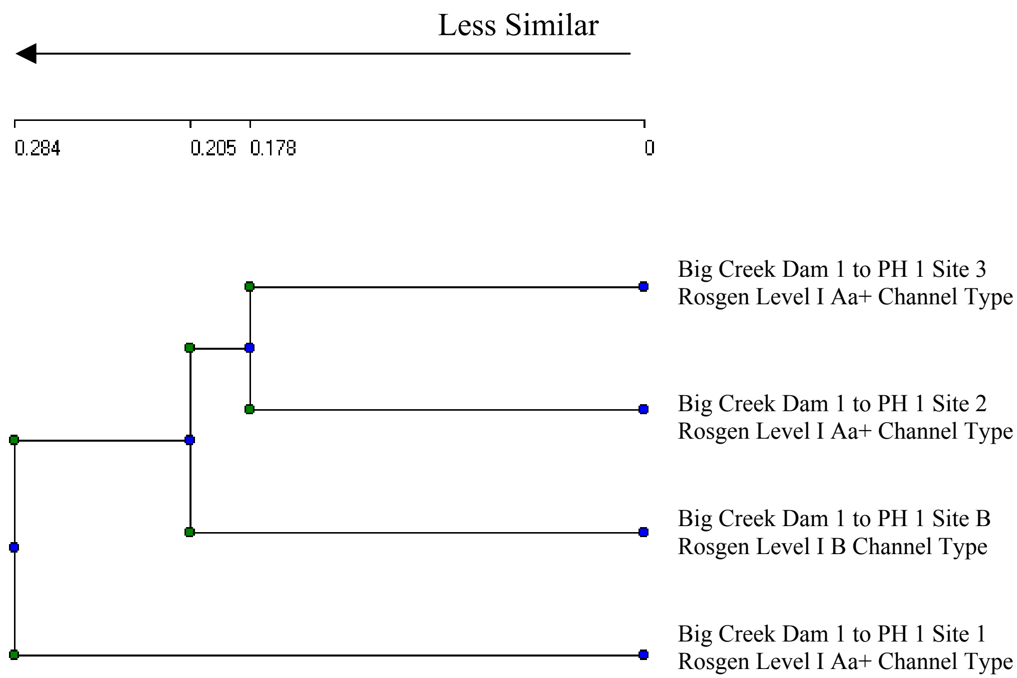

Figure CAWG 10-40. Dendrogram Based on Physical/Habitat Quality Score for Big Creek Dam 1 to PH 1.

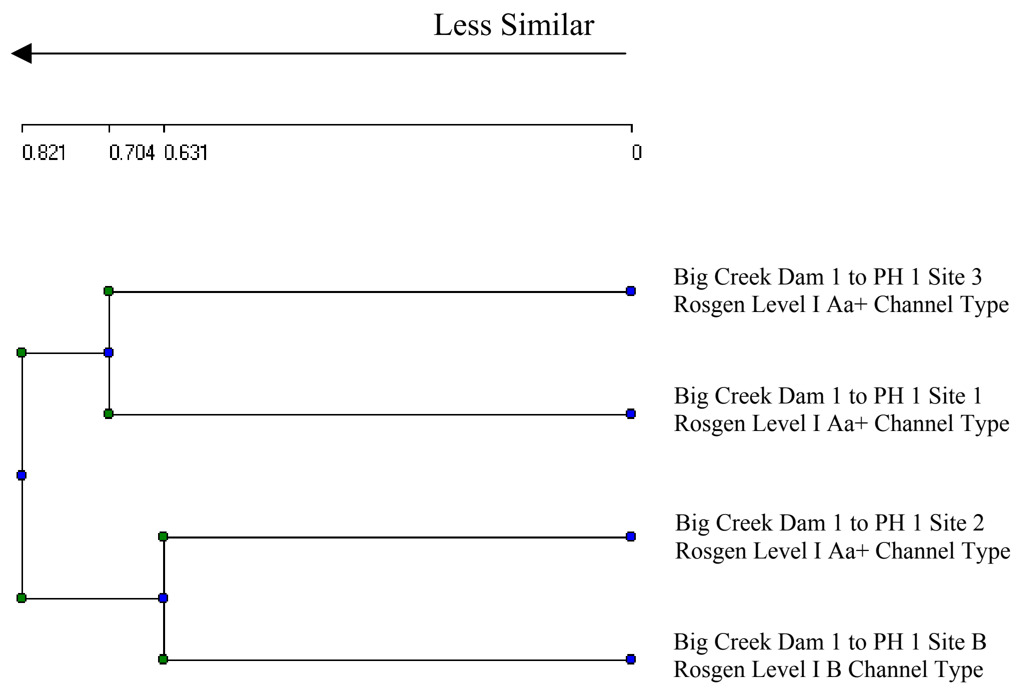

Figure CAWG 10-41. Dendrogram Based on Project BMI Taxa for Big Creek Dam 1 to PH 1.

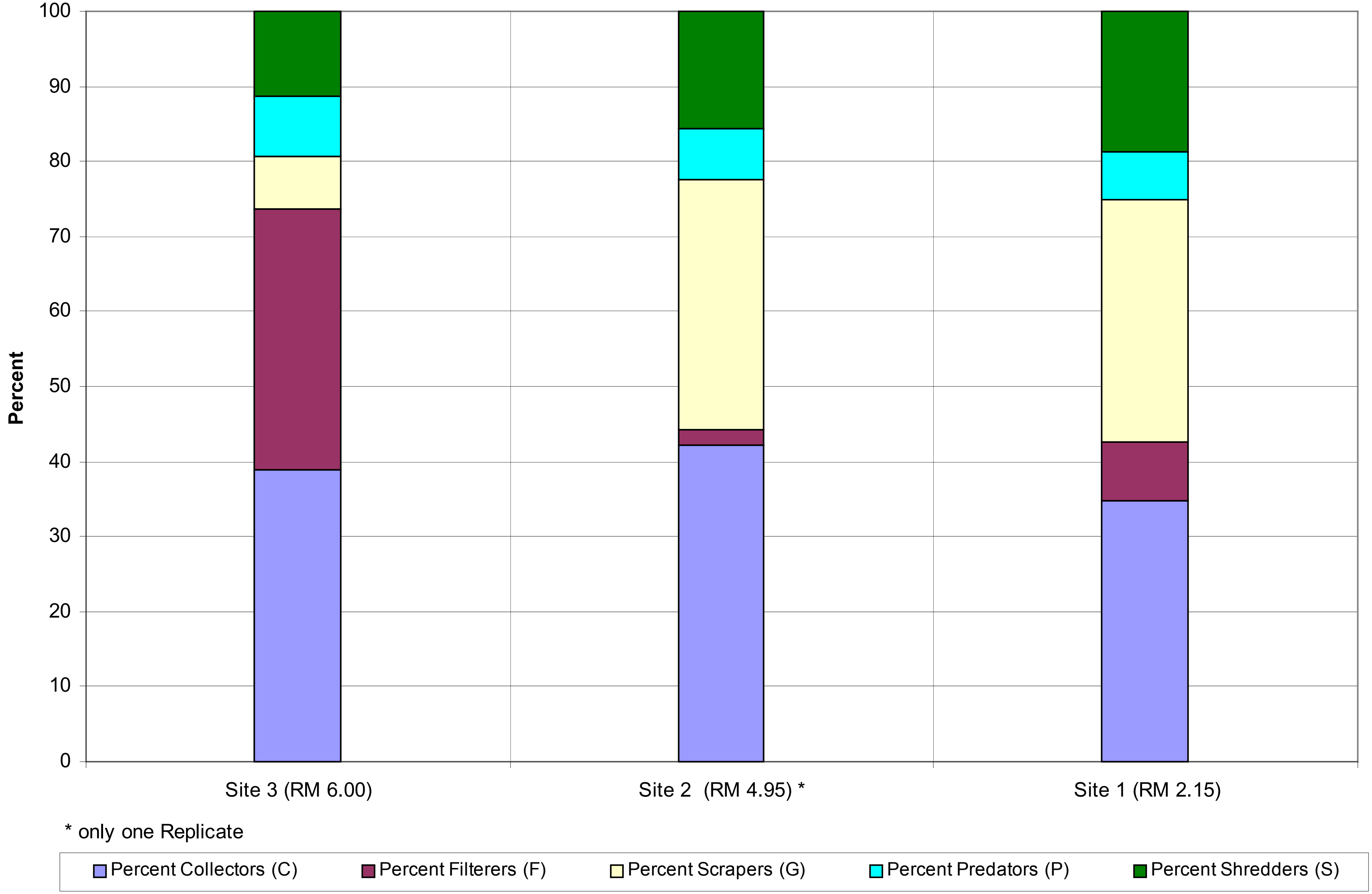

Figure CAWG 10-42. Big Creek Dam 4 to PH 2 Mean Functional Feeding Group Percentages by Site, Big Creek ALP, Fall 2002.

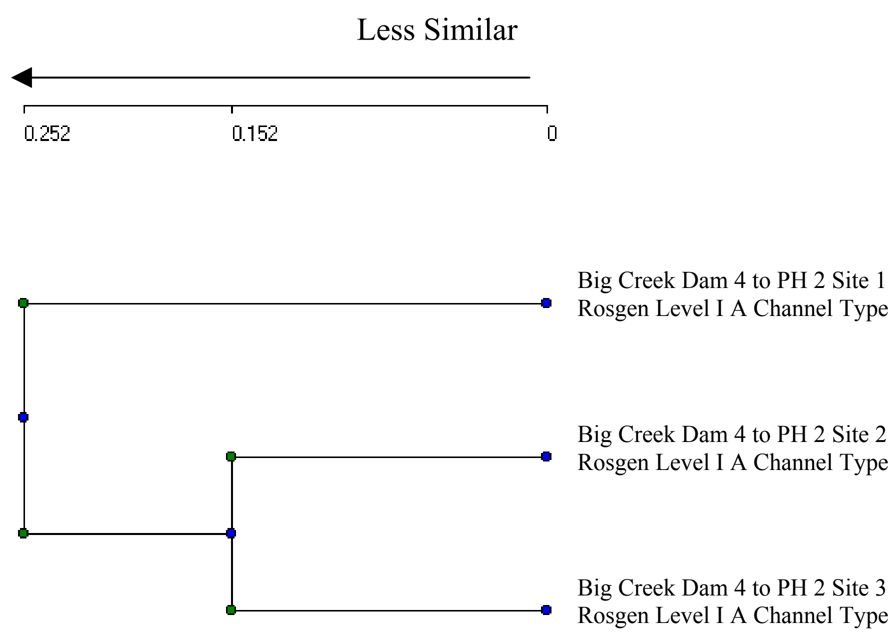

Figure CAWG 10-43. Dendrogram Based on Physical/Habitat Quality Score for Big Creek Dam 4 to PH 2.

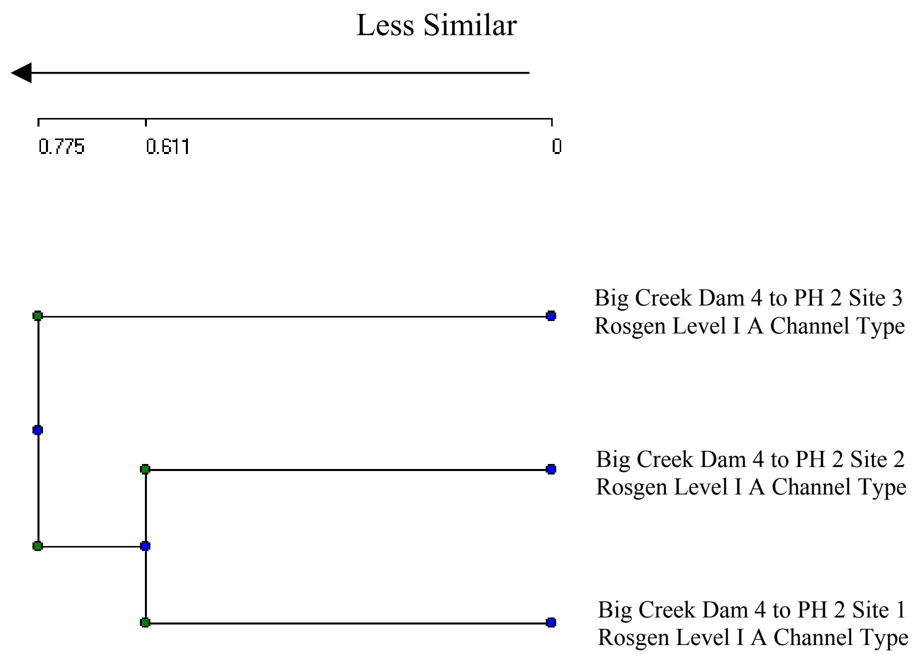

Figure CAWG 10-44. Dendrogram Based on Project BMI Taxa for Big Creek Dam 4 to PH 2.

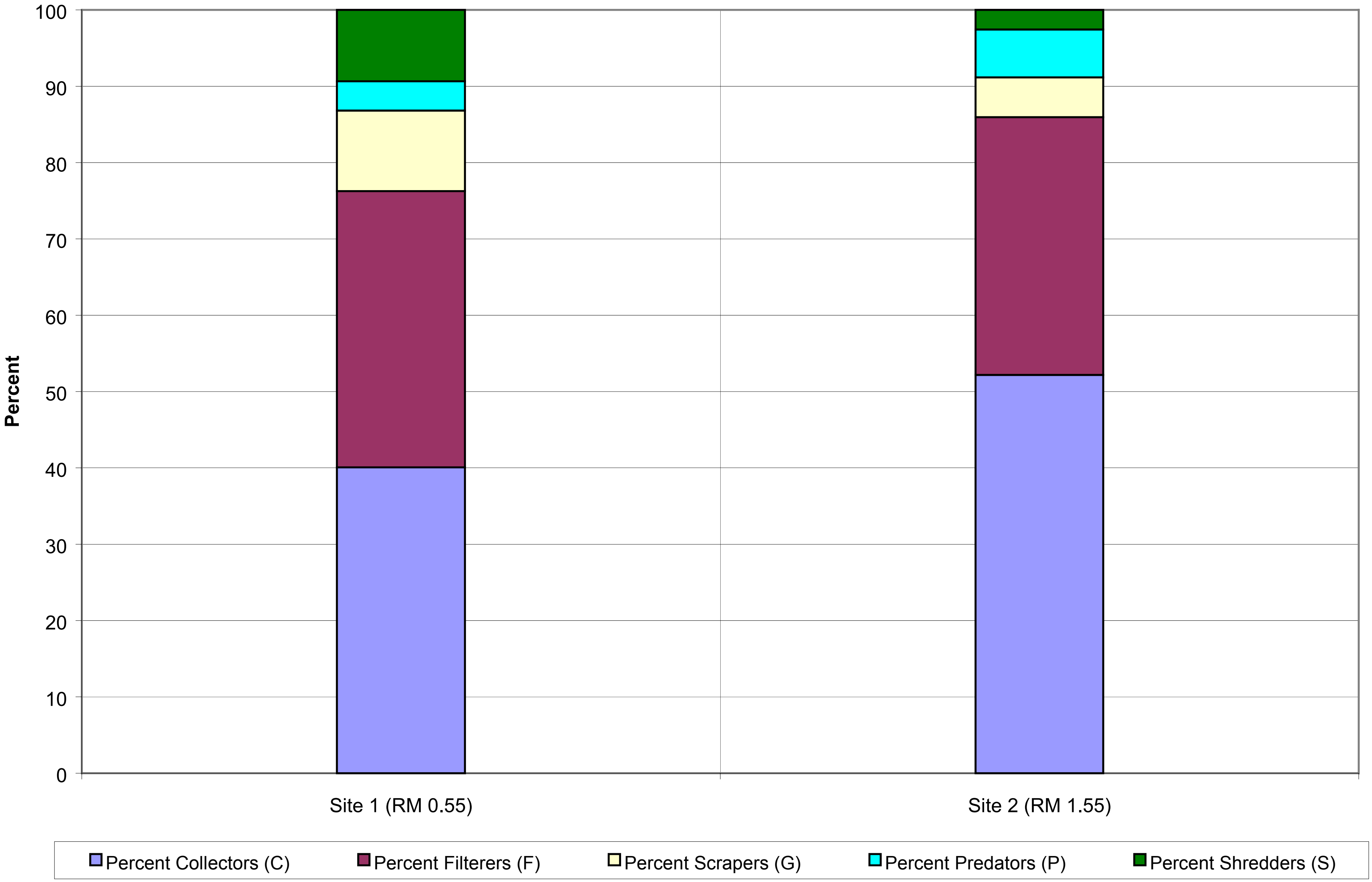

Figure CAWG 10-45. Big Creek Dam 5 to PH 8 Mean Functional Feeding Group Percentages by Site, Big Creek ALP, Fall 2002.

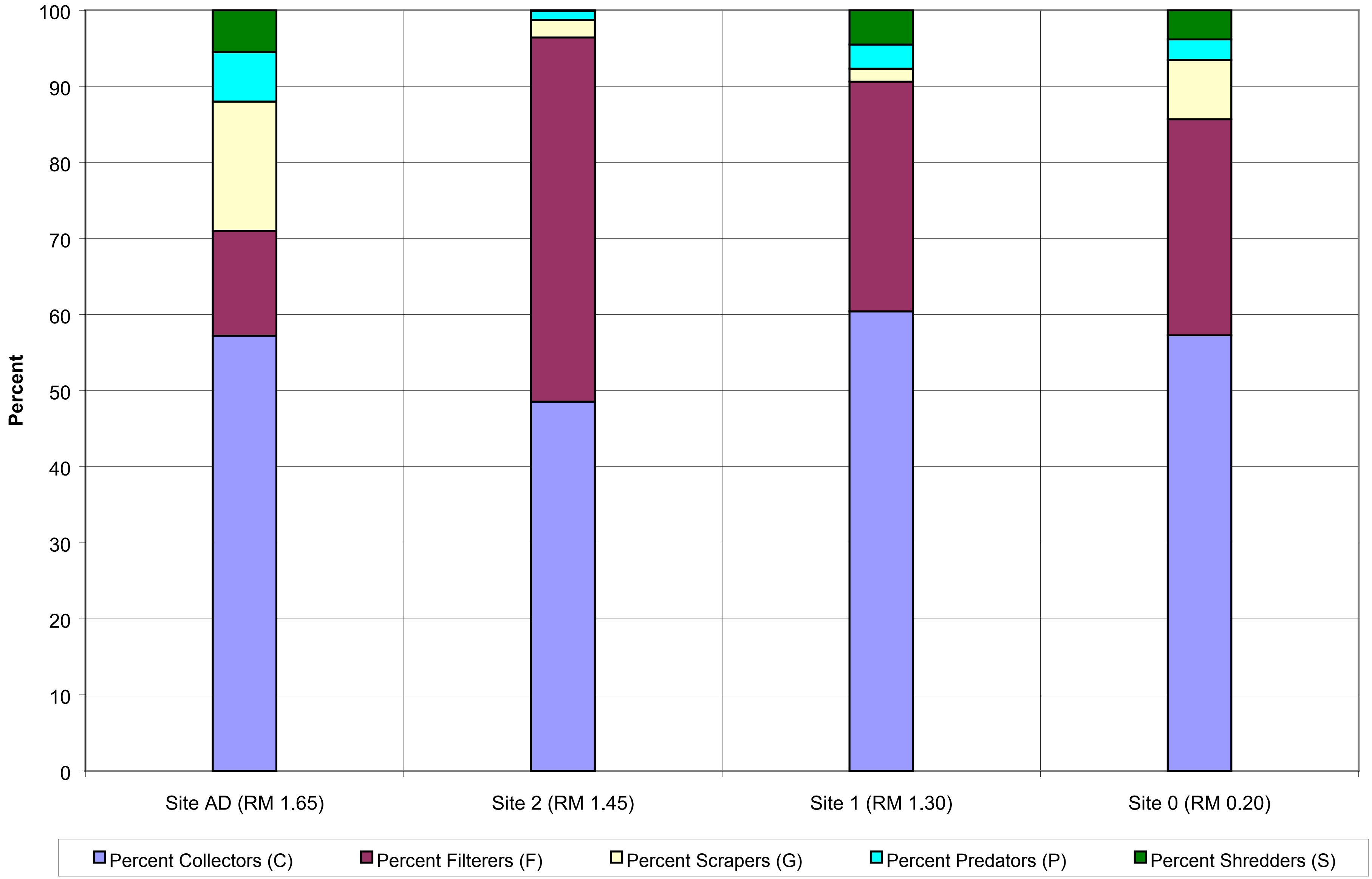

Figure CAWG 10-46. Pitman Creek Mean Functional Feeding Group Percentages by Site, Big Creek ALP, Fall 2002.

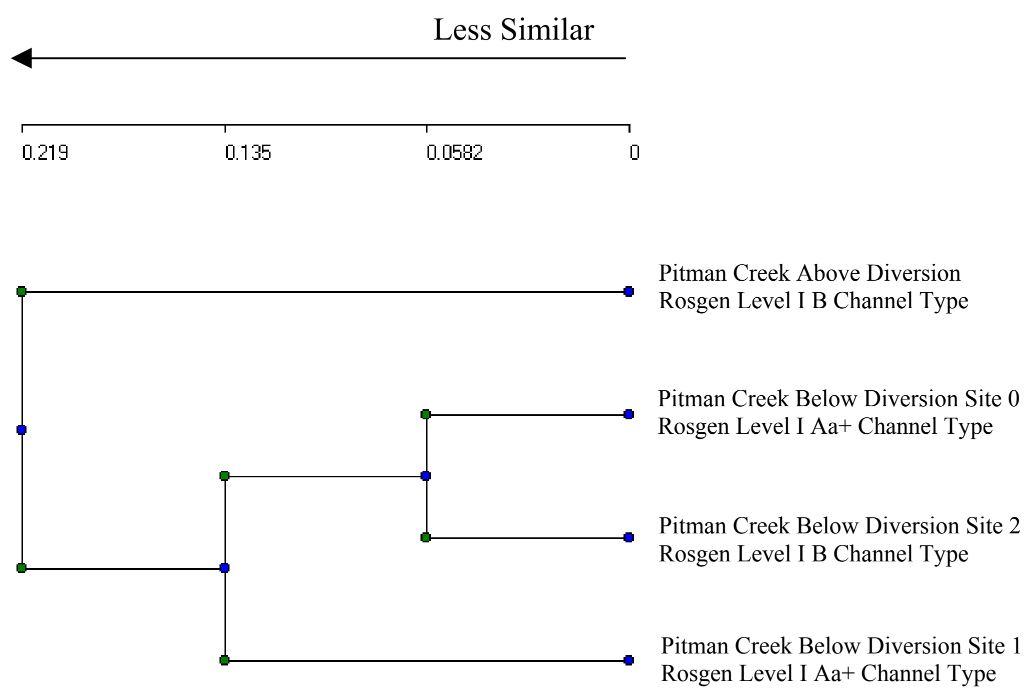

Figure CAWG 10-47. Dendrogram Based on Physical/Habitat Quality Score for Pitman Creek.

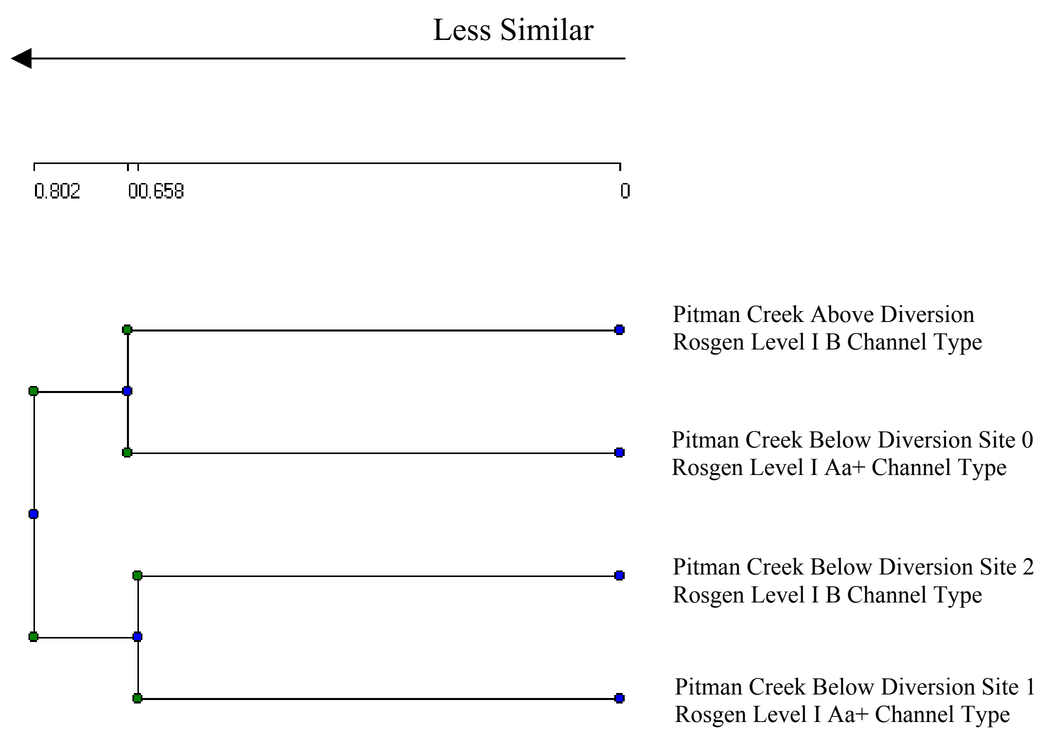

Figure CAWG 10-48. Dendrogram Based on Project BMI Taxa for Pitman Creek.

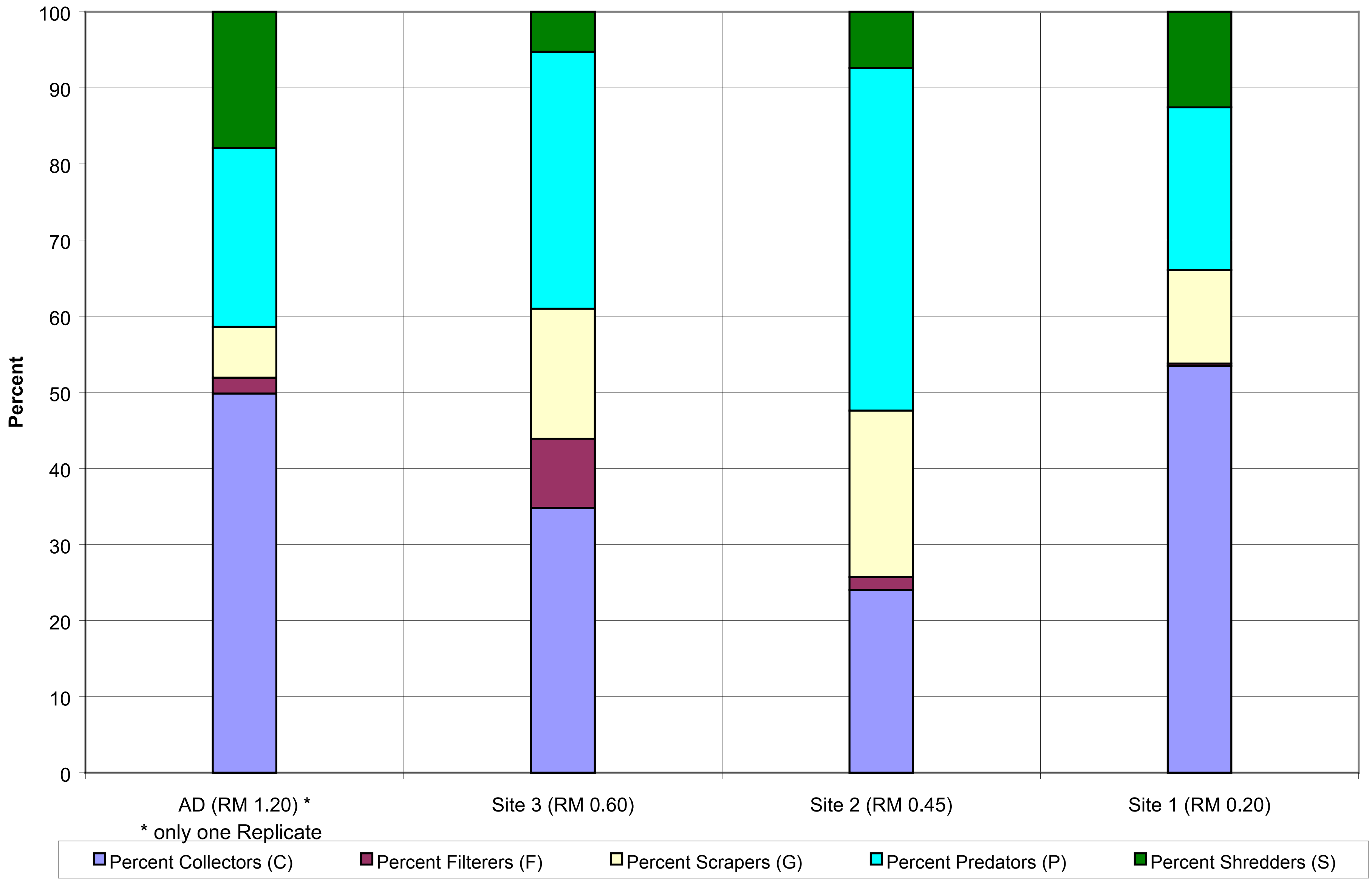

Figure CAWG 10-49. Ely Creek Mean Functional Feeding Group Percentages by Site, Big Creek ALP, Fall 2002.

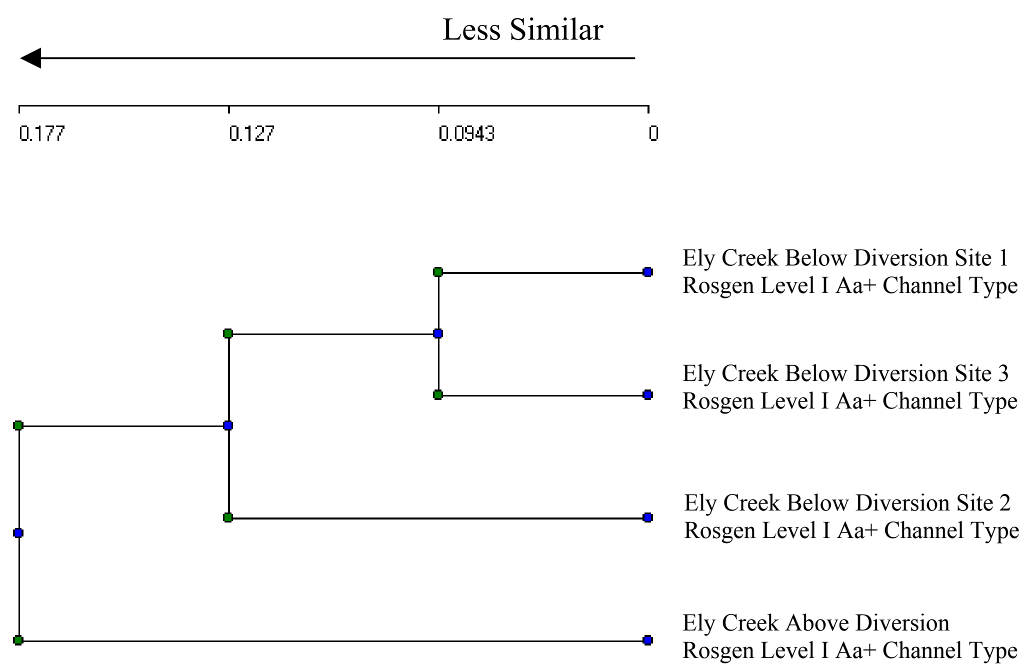

Figure CAWG 10-50. Dendrogram Based on Physical/Habitat Quality Score for Ely Creek.

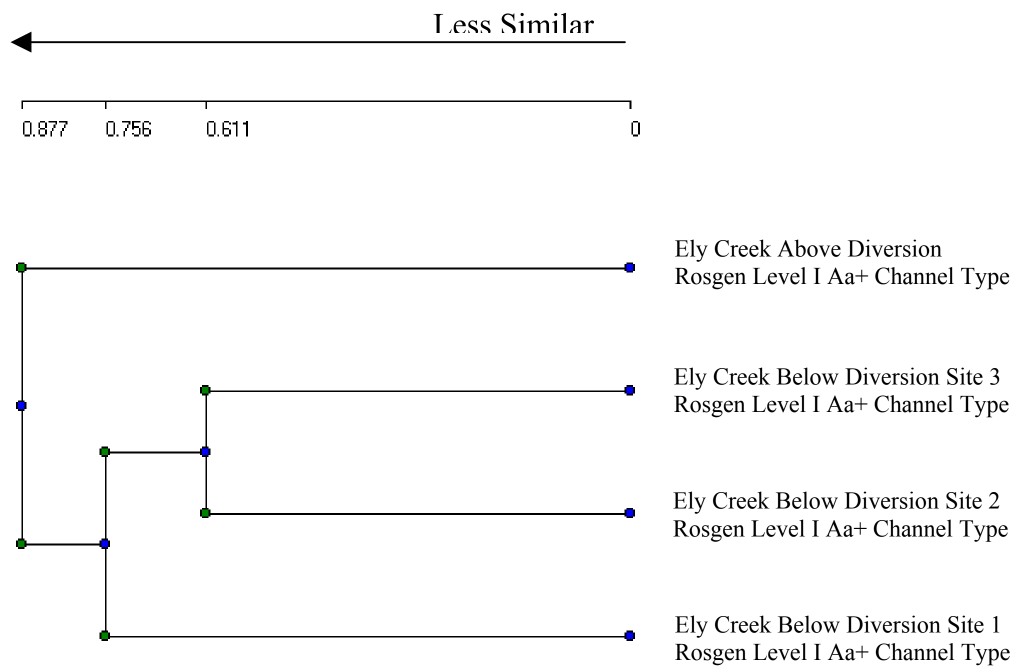

Figure CAWG 10-51. Dendrogram Based on Project BMI Taxa for Ely Creek.

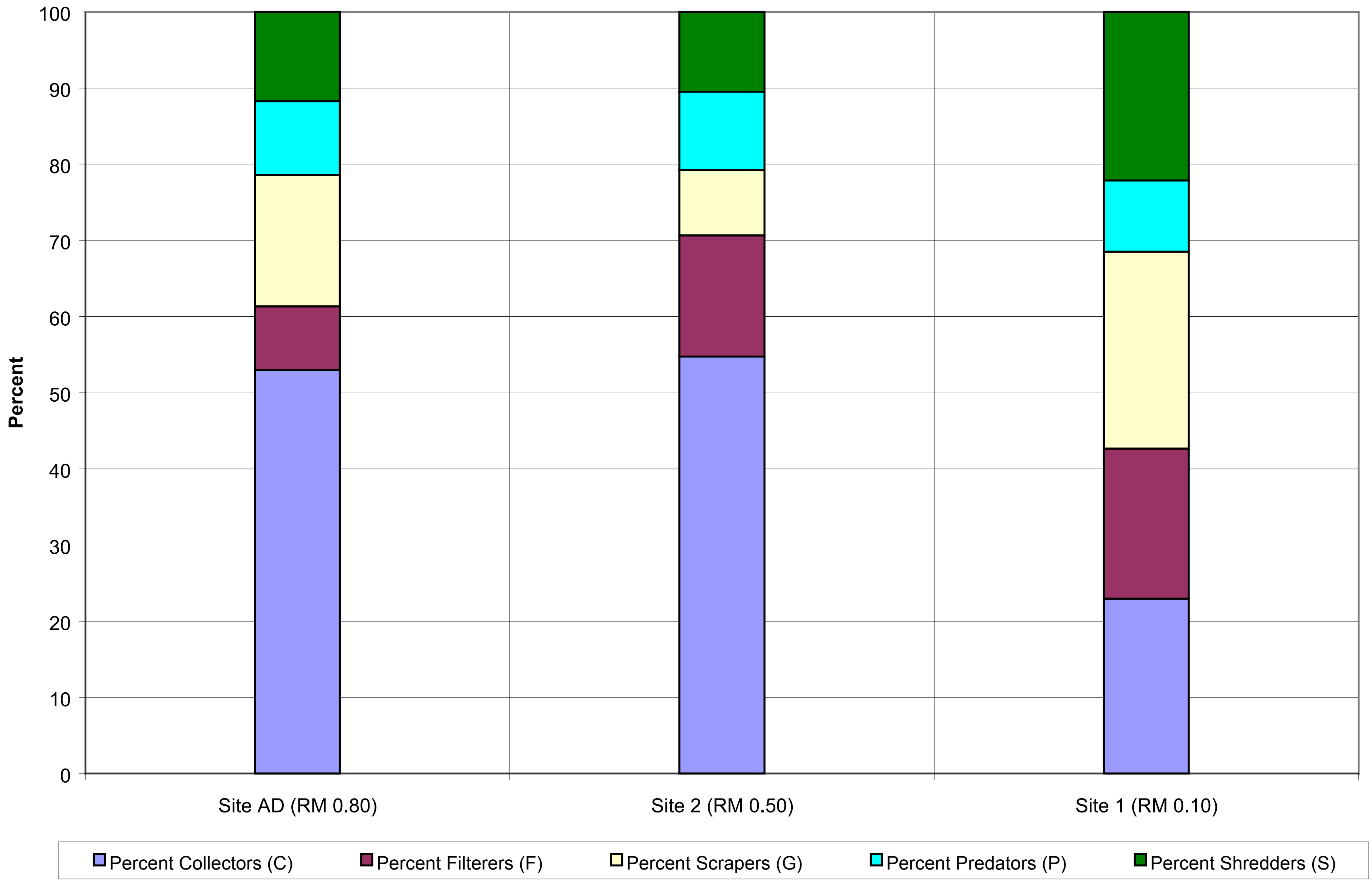

Figure CAWG 10-52. Balsam Creek Mean Functional Feeding Group Percentages by Site, Big Creek ALP, Fall 2002.

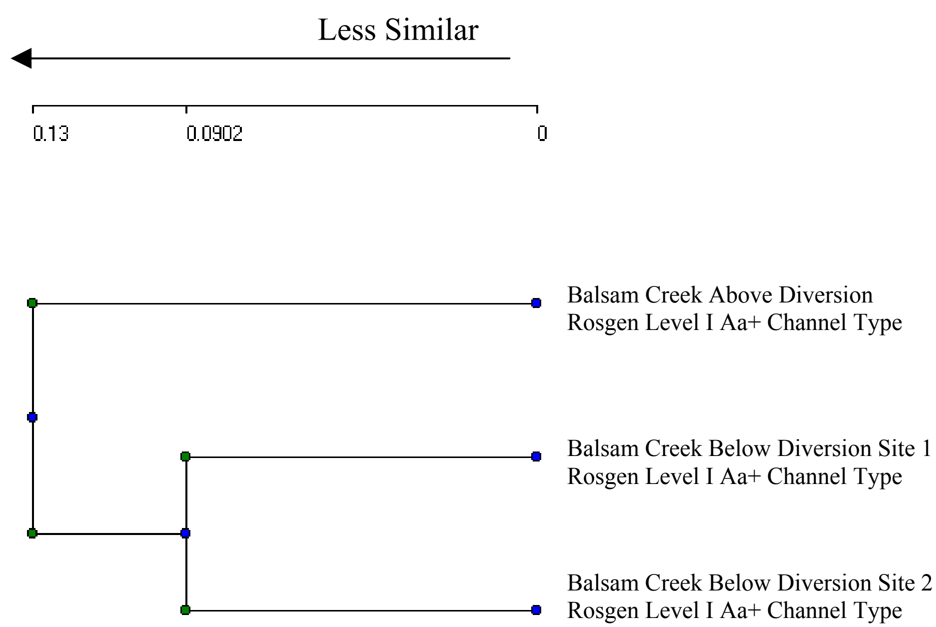

Figure CAWG 10-53. Dendrogram Based on Physical/Habitat Quality Score for Balsam Creek.

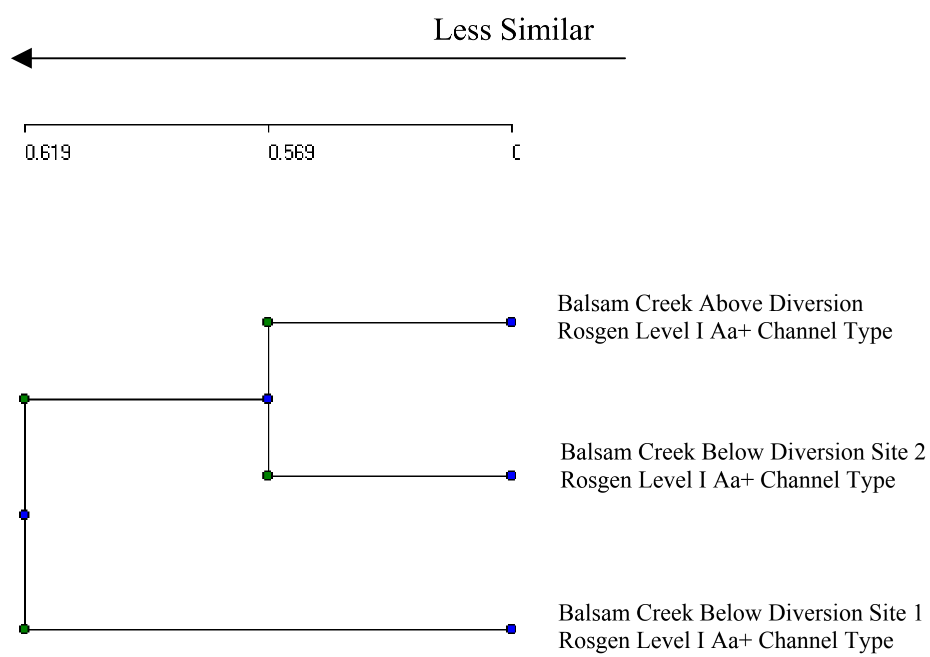

Figure CAWG 10-54. Dendrogram Based on Project BMI Taxa for Balsam Creek.

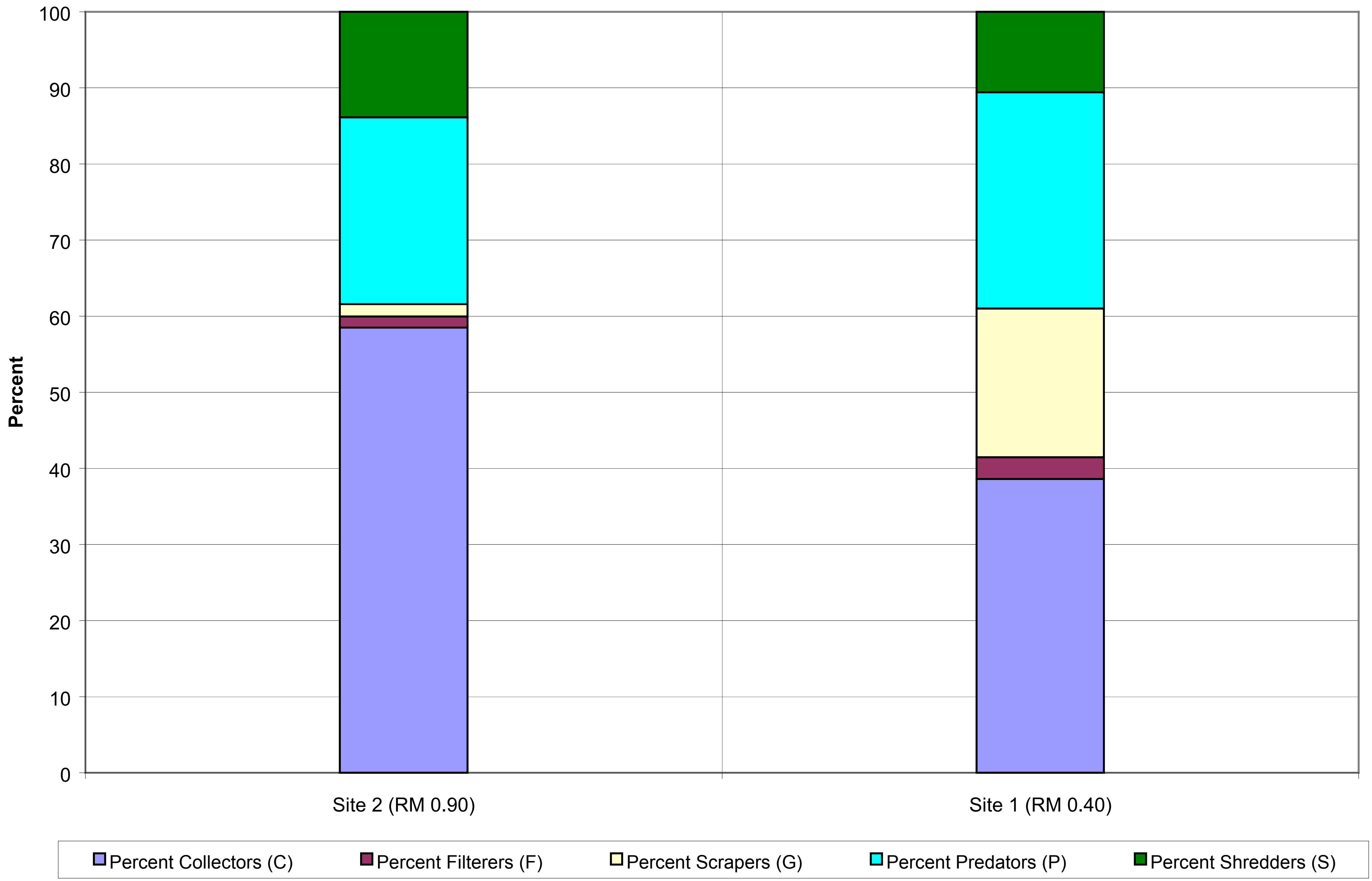

Figure CAWG 10-55. Adit 8 Creek Mean Functional Feeding Group Percentages by Site, Big Creek ALP, Fall 2002.

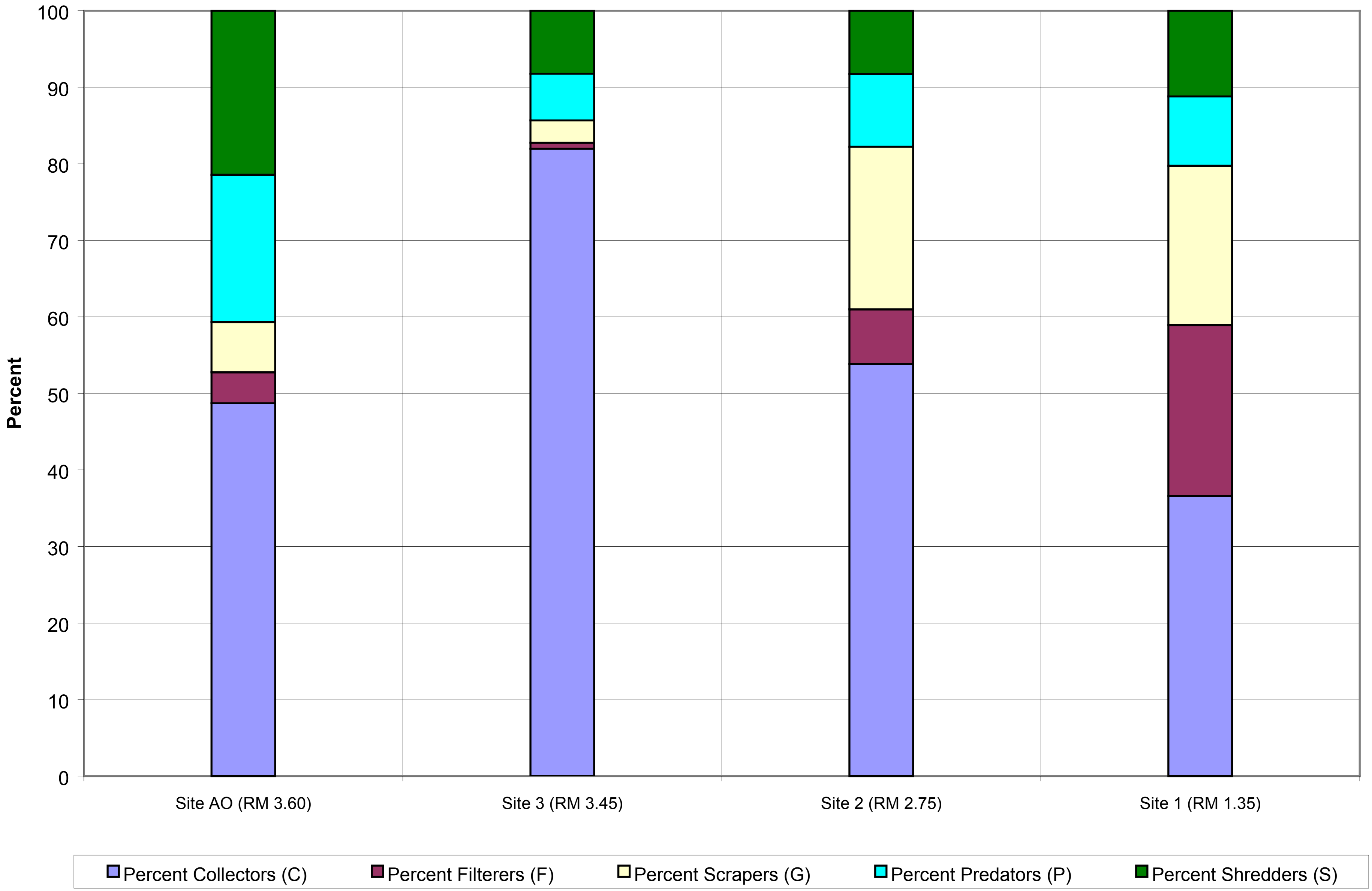

Figure CAWG 10-56. North Fork Stevenson Creek Mean Functional Feeding Group by Site, Big Creek ALP, Fall 2002.

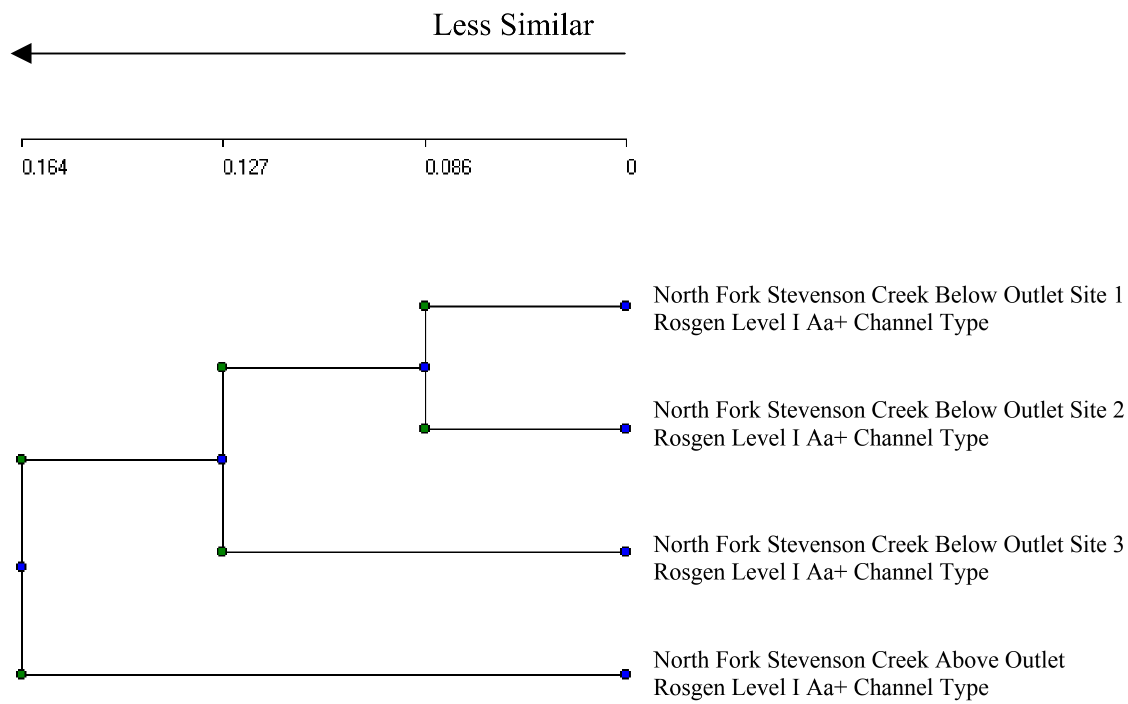

Figure CAWG 10-57. Dendrogram Based on Physical/Habitat Quality Score for North Fork Stevenson Creek.

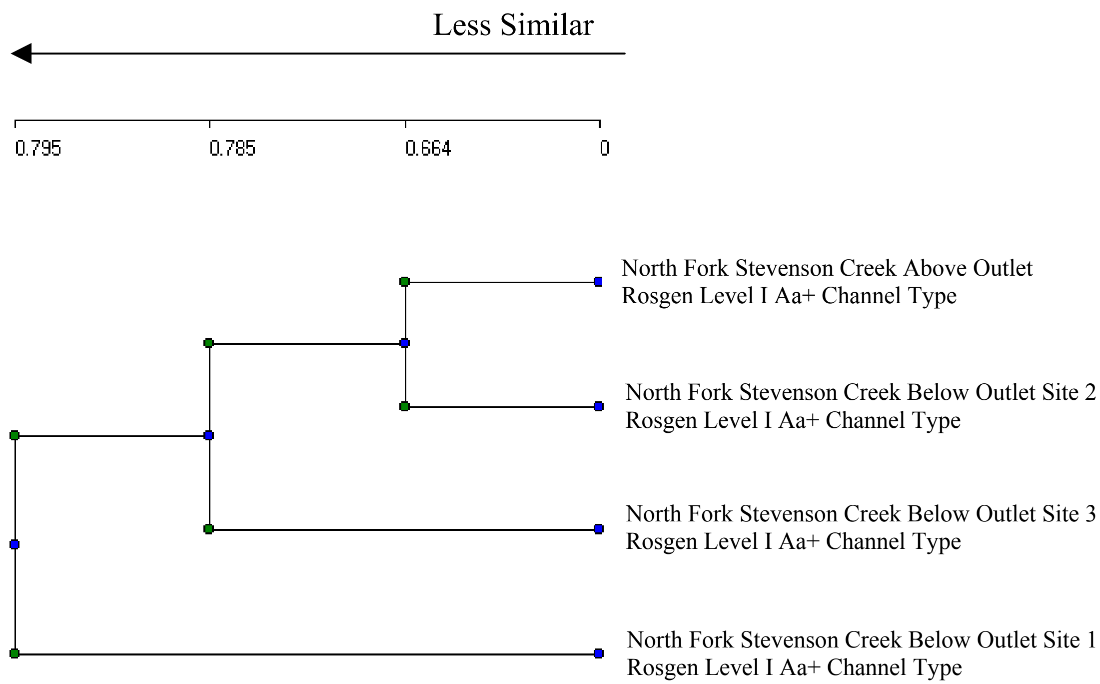

Figure CAWG 10-58. Dendrogram Based on Project BMI Taxa for North Fork Stevenson Creek.

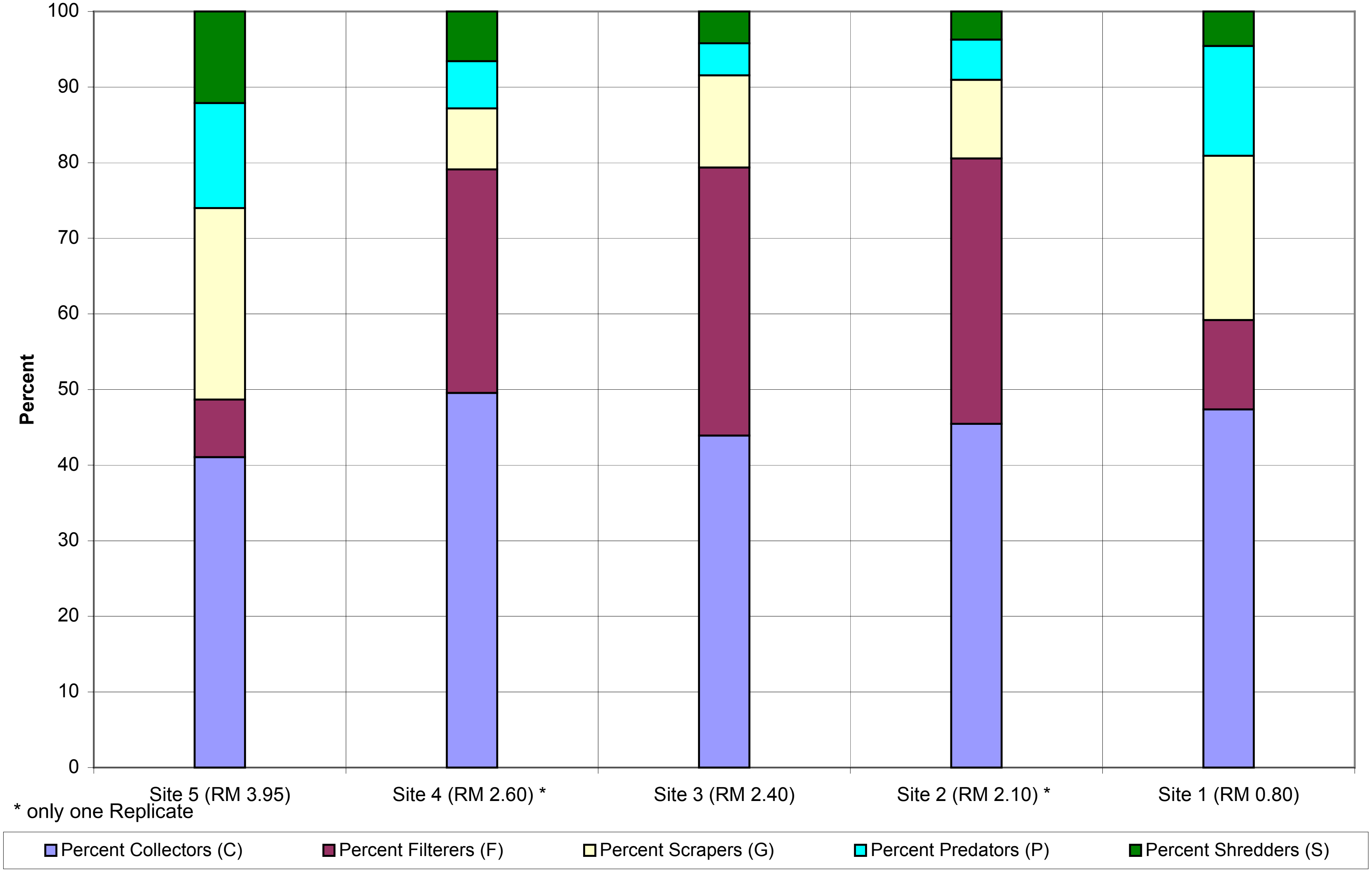

Figure CAWG 10-59. Stevenson Creek Mean Functional Feeding Group Percentages by Site, Big Creek ALP, Fall 2002.

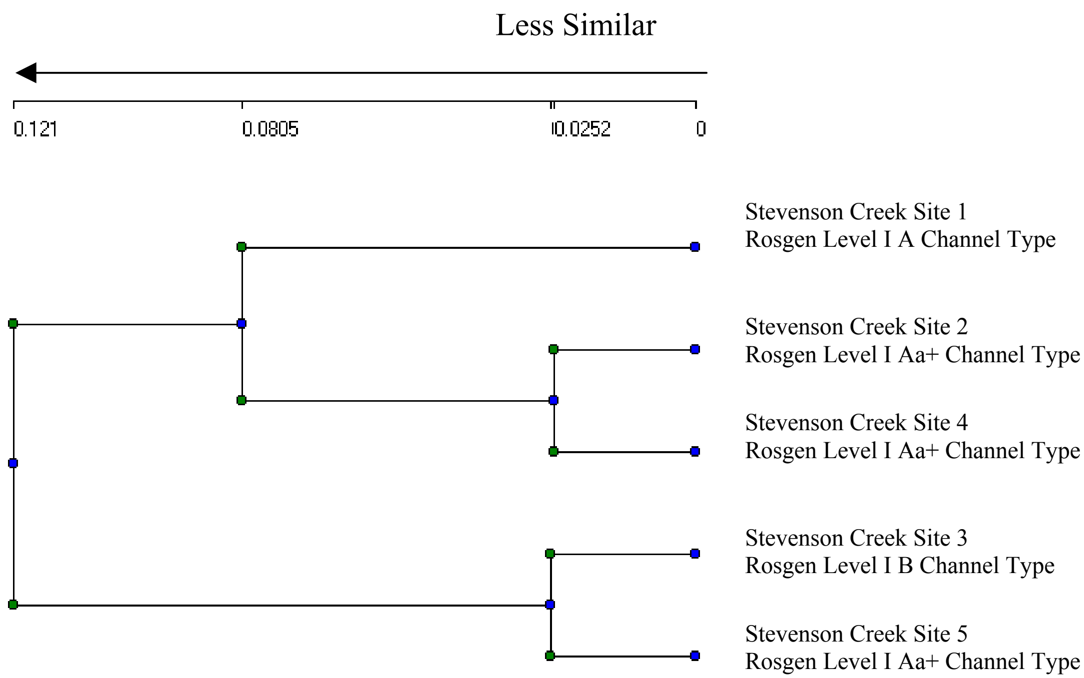

Figure CAWG 10-60. Dendrogram Based on Physical/Habitat Quality Score for Stevenson Creek.

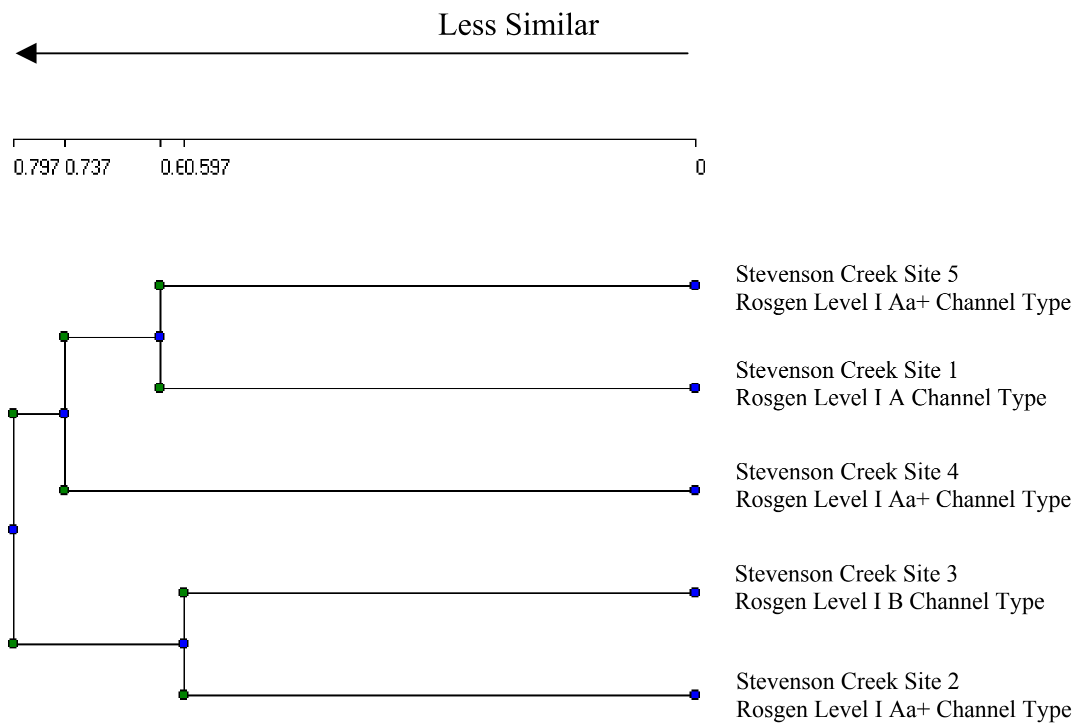

Figure CAWG 10-61. Dendrogram Based on Project BMI Taxa for Stevenson Creek.

MAPS

Map CAWG 10-1. Macroinvertebrate Sample Sites – Florence Lake Area

Map CAWG 10-2. Macroinvertebrate Sample Sites – Upper San Joaquin River/Lower SFSJR Area

Map CAWG 10-3. Macroinvertebrate Sample Sites – Lake Edison Area

Map CAWG 10-4. Macroinvertebrate Sample Sites – San Joaquin River Area

Map CAWG 10-5. Macroinvertebrate Sample Sites – San Joaquin River Stevenson Reach Area

Map CAWG 10-6. Macroinvertebrate Sample Sites – Huntington Lake Area

Map CAWG 10-7. Macroinvertebrate Sample Sites – Shaver Lake Area

Map CAWG 10-8. Macroinvertebrate Sample Sites – Mammoth Pool Area

Map CAWG 10-9. Macroinvertebrate Sample Sites – Florence Lake Area

Map CAWG 10-10. Mollusk Population Sample Sites – Upper San Joaquin River/Lower SFSJR Area

Map CAWG 10-11. Mollusk Population Sample Sites – Lake Edison Area

Map CAWG 10-12. Mollusk Population Sample Sites – San Joaquin River Area

Map CAWG 10-13. Mollusk Population Sample Sites – San Joaquin River Stevenson Reach Area

Map CAWG 10-14. Mollusk Population Sample Sites – Huntington Lake Area

Map CAWG 10-15. Mollusk Population Sample Sites – Shaver Lake Area

Map CAWG 10-16. Crayfish Sampling Locations – Shaver Lake Area

Map CAWG 10-17. Crayfish Sampling Locations – Mammoth Pool Area

Non-Internet Public Information

These Maps have been removed in accordance with the Commission regulations at 18 CFR Section 388.112.
These Maps are considered Non-Internet Public information and should not be posted on the Internet. This information is provided in Volume 4 of the Application for New License and is identified as “Non-Internet Public” information. This information may be accessed from the FERC’s Public Reference Room, but is not expected to be posted on the Commission’s electronic library, except as an indexed item.

APPENDIX A

STUDY METHODOLOGY

APPENDIX A
STUDY METHODOLOGY

SITE SELECTION

The study objective was to use Benthic Macroinvertebrates (BMI's) to help assess Project effects on the chemical, physical and biological integrity of the affected streams. To accomplish this objective, comparative macroinvertebrate sampling was conducted to examine changes in the macroinvertebrate community upstream of and within each bypass reach. To facilitate this comparison, macroinvertebrate sampling locations in the Project bypass reaches (and flow-enhanced reaches) were selected in the same habitat and channel types, as those collected above the diversion, to the extent feasible.

In each bypass reach, the major Rosgen Level I channel type was identified and selected for sampling (with few exceptions[1]). One sampling site was established in the upstream and downstream ends of the reach. In the case of a long bypass reach (more than two miles), intermediate sampling sites at intervals of about two miles (depending upon access) were sampled for BMI's to better describe longitudinal changes along the reach. Locations upstream of each diversion also were selected for comparison. The upstream locations were selected in the same Rosgen Level I channel type and habitat types as selected for the bypass reach, to the extent feasible[2].

The specific habitat types to be sampled and potential site locations were identified based on habitat mapping data collected under CAWG 1. This information was summarized and presented to the CAWG for its concurrence, prior to sampling. Sampling was only conducted after approval by the CAWG. Habitats sampled were generally riffles or runs. Riffles were selected, where available. Runs were the preferred alternative to riffles. Where neither habitat was present in each of the locations to be sampled in a reach, “spot” sampling was used to collect samples from small areas that were similar to riffles or runs (Harrington pers. comm.).

Dry water year conditions, which occurred during 2002 resulted in smaller than normal flows in streams within the Project Area. Because the index period for macroinvertebrate sampling is August and September, most streams are at base flow. These low flows resulted in very small wetted widths some streams and discontinuous flows in others. These conditions took place after diversion operations had ceased for most small streams and resulted in limited areas for sampling in many of the smaller streams. In cases where the stream was dry, no sample could be taken in a reach. In other locations, areas of wetted, suitable and comparable physical conditions for sampling were limited. This was the case in some streams where only pools were

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[1] In some instances, the CAWG determined that more than one channel type should be sampled due to the extent or spatial distribution of channel types in a bypass reach.

[2] Where there were differences in Rosgen Level 1 channel type between the bypass reach and the reach upstream of the diversion, more than one channel type may have been sampled.

Table CAWG 10 Appendix-A1. Location and Number of Replicate Samples for Macroinvertebrate Sample Sites, 2002.

Stream	Site Name	Number of Replicate Samples
South Fork San Joaquin River	SFSJR Site 9	3
	SFSJR Site 8	1
	SFSJR Site 7	3
	SFSJR Site 6	3
	SFSJR Site 5	3
	SFSJR Site 4	3
	SFSJR Site 3	3
	SFSJR Site 2	3
	SFSJR Site 1	3
Tombstone Creek	Tombstone Creek Site AD	1
	Tombstone Creek Site BD 2	1
	Tombstone Creek Site BD 1	3
South Slide Creek	S Slide Creek Site AD	3
	S Slide Creek Site BD 2	2
North Slide Creek	N Slide Creek Site AD	3
	N Slide Creek Site BD 2	2
	N Slide Creek Site BD 1	1

Table CAWG 10 Appendix-A1. Location and Number of Replicate Samples for Macroinvertebrate Sample Sites, 2002 (cont.)

Stream	Site Name	Number of Replicate Samples
Hooper Creek	Hooper Creek Site AD	2
	Hooper Creek Site BD 2	3
	Hooper Creek Site BD 1	3
Crater Creek	Crater Creek Site AD	1[s]
	Crater Creek Site BD 3	4
Bear Creek	Bear Creek Site AD	3
	Bear Creek Site BD 2	3
	Bear Creek Site BD 1	3
Chinquapin Creek	Chinquapin Creek Site AD	3[s]
	Chinquapin Creek Site BD 2	2
	Chinquapin Creek Site BD 1	1
Camp 62 Creek	Camp 62 Creek Site AD	3
	Camp 62 Creek Site BD 2	1
	Camp 62 Creek Site BD 1	3
Bolsillo Creek	Bolsillo Creek Site AD	2
	Bolsillo Creek Site BD 2	2
	Bolsillo Creek Site BD 1	1
Mono Creek	Mono Creek Site BD 4	3
	Mono Creek Site BD 3	3

Table CAWG 10 Appendix-A1. Location and Number of Replicate Samples for Macroinvertebrate Sample Sites, 2002 (cont.)

Stream	Site Name	Number of Replicate Samples
	Mono Creek Site BD 2	3
	Mono Creek Site BD 1	3
San Joaquin River (Mammoth Reach)	SJR Above Mammoth Pool (AM) Site	3
	SJR Below Mammoth (BM) Site 4	3
	SJR Below Mammoth (BM)Site 3	3
	SJR Below Mammoth (BM)Site 2	3
	SJR Below Mammoth (BM)Site 1	3
Rock Creek	Rock Creek Site AD	3
	Rock Creek Site BD 2	3
	Rock Creek Site BD 1	2
San Joaquin River (Stevenson Reach)	SJR Stevenson Site SR 4	2
	SJR Stevenson Site SR 3	3
	SJR Stevenson Site SR 2	3
	SJR Stevenson Site SR 1	3
Big Creek	Big Creek Dam 1 to PH 1 Site 3	3
	Big Creek Dam 1 to PH 1 B Channel Site	1
	Big Creek Dam 1 to PH 1 Site 2	2

Table CAWG 10 Appendix-A1. Location and Number of Replicate Samples for Macroinvertebrate Sample Sites, 2002 (cont.)

Stream	Site Name	Number of Replicate Samples
	Big Creek Dam 1 to PH 1 Site 1	3
	Big Creek Dam 4 to PH 2 Site 3	3
	Big Creek Dam 4 to PH 2 Site 2	1
	Big Creek Dam 4 to PH 2 Site 1	3
	Big Creek Dam 5 to PH 8 Site 2	3
	Big Creek Dam 5 to PH 8 Site 1	3
Pitman Creek	Pitman Creek Site AD	3
	Pitman Creek Site BD 2	3[s]
	Pitman Creek Site BD 1	3[s]
	Pitman Creek Site BD 0	3[s]
Ely Creek	Ely Creek Site AD	1
	Ely Creek Site BD 3	3
	Ely Creek Site BD 2	3
	Ely Creek Site BD 1	3[s]
Balsam Creek	Balsam Creek Site AD	3
	Balsam Creek Site BD 2	3
	Balsam Creek Site BD 1	3
Adit 8 Creek	Adit 8 Creek Site 2	3[s]
	Adit 8 Creek Site 1	3

Table CAWG 10 Appendix-A1. Location and Number of Replicate Samples for Macroinvertebrate Sample Sites, 2002 (cont.)

Stream	Site Name	Number of Replicate Samples
North Fork Stevenson Creek	NF Stevenson Site AO	3[s]
	NF Stevenson Site BO 3	3
	NF Stevenson Site BO 2	2
	NF Stevenson Site BO 1	3
Stevenson Creek	Stevenson Creek Site 5	2
	Stevenson Creek Site 4	1
	Stevenson Creek Site 3	2
	Stevenson Creek Site 2	1
	Stevenson Creek Site 1	3

[s] "Spot" sampling was used to collect one or more replicates at this station.

present or there was only extremely shallow "sheet" flow between pools. In cases where “spot: sampling was applied, the amount of area available or the number of locations was frequently limited, and the spot samples were composited to produce the equivalent of fewer replicates than planned. In streams where areas of appropriate habitats or “spots” with equivalent conditions were limited, the target number of replicates could not be obtained in some locations. Table CAWG 10-A1 identifies the sampling locations and the number of replicates that were obtained for each sampling site.

Each site location was identified using a Global Positioning System (GPS) unit (where feasible), so that it could be mapped. Where GPS signals were insufficient for obtaining accurate coordinates, locations were marked on a topographic map or orthorectified aerial photograph. The locations of the sampling sites are shown in Maps CAWG 10-1 through 10-8.

1.1 MACROINVERTEBRATE SAMPLE COLLECTION

Sampling for this study followed guidelines from the most current version of the California Stream Bioassessment Procedure (CSBP) (CDFG, 1999). This approach was adapted from that of the U.S. Environmental Protection Agency (USEPA) (Plafkin et al., 1989; Klemm et al., 1990; Barbour et al., 1999). Samples were collected from each of three habitat units at each sampling site using a D-frame net with a 0.5-mm mesh. Equipment was washed with an antifungal solution, Quat™, between sites to prevent the movement of pathogens between streams.

Samples were generally collected within riffle habitats (see above). Upon collection, each sample was placed in labeled jars and preserved in 95 percent ethanol. Chain-of-Custody forms were filled out and maintained on all samples.

1.2 PHYSICAL DATA COLLECTION

At each habitat unit sampled, water temperature, specific conductance, pH and dissolved oxygen were measured using direct-reading instruments. A Marsh McBirney or equivalent flow meter was used to measure velocity at three locations across transects where a macroinvertebrate sample was collected. Streamflow measurements were taken where appropriate measurement locations were immediately available to the sample site. When taken, streamflow measurements were taken with a velocity meter and a top-set rod. The percent of the riffle (sample habitat unit) surface covered by shade from streamside vegetation (canopy cover) was estimated using a spherical densiometer at three places along the sample habitat unit and estimates were averaged. The substrate composition was visually estimated based on the same categories as used for habitat characterization.

Substrate consolidation was characterized by kicking the substrate with the heel of a boot to note whether it is loosely, moderately or tightly cemented, as suggested in the CSBP. The slope of the riffle (or run) was estimated using a stadia rod and hand level or a clinometer, and the riffle (run) was characterized as either high or low gradient. The GPS coordinates of the sampled habitat unit were recorded. At each reach where BMI samples were collected, the physical habitat characteristics were recorded in a *California Bioassessment Worksheet*. This information is provided in Appendix B.

Habitat quality at each collection site also was characterized. Habitat quality was assessed using scoring criteria for parameters identified in CDFG's *Water Pollution Laboratory Physical/Habitat Quality Forms Revision Date May 1999* (Harrington and Born, 2000). The Physical/Habitat Quality form scoring was designed to represent a variety of conditions that may affect macroinvertebrates in streams. Several of the values address both natural conditions and a variety of human impacts. Where both types of conditions could be addressed for a single parameter, precedence was given to qualification of anthropogenic effects such as bank degradation due to grazing.

Sampling locations were recorded in the field using a GPS unit. In cases of poor reception, sampling locations were recorded in the field on topographic maps and/or aerial photographs.

1.3 LABORATORY ANALYSIS PROCEDURE

Laboratory procedures for macroinvertebrates followed the CSBP Level 3 Laboratory Procedures. The benthic macroinvertebrates collected were identified to the appropriate level of identification in the CSBP under "taxonomic effort."

Quality assurance and Quality control (QA/QC) checks and 20 percent bioassessment validation were conducted on all macroinvertebrate samples by CDFG's laboratory.

Laboratory data were stored in electronic format and tabulated. All data entries were subject to QC checking. All calculations of metrics and indices were made using the QC validated electronic data.

1.4 DATA ANALYSIS

1.4.1 METRICS

The CSBP Biological Metrics calculated for the study are presented in Table CAWG 10-1. These metrics were calculated for each replicate sample in each study reach. The mean, standard deviation, and coefficient of variation also were calculated for each biological metric or index. The Shannon-Weaver index was calculated using the commonly accepted formulation presented by Zar (1996).

In reaches where the area upstream of the diversion is within another bypass reach, the data gathered for upstream/downstream comparisons may only yield information on incremental differences. In these instances, the primary analysis focuses on differences between the most upstream bypass reach and the reference site. Data collected at other sites were presented to describe trends in the invertebrate community with distance downstream. However, due to changes in elevation and temperature along streams, physical differences in the environment may confound such upstream/downstream comparisons.

1.4.2 CLUSTER ANALYSIS

Community ecologists are typically faced with complex data involving numerous organisms belonging to different taxonomic groups found at different sampling sites. In order to better understand complex data and relate such data to environmental factors, various techniques may be used to classify and simplify the information for analysis (Gauch, 1982). One of the techniques available for such analysis is cluster analysis (also known as hierarchical agglomerative cluster analysis). In this approach, the taxonomic composition of organisms at each sampling site in a stream is compared to each other using a measure of similarity or dissimilarity. Groups of sites are created based on an accepted technique for linking or associating groups, such as single linkage, complete linkage, centroid, etc. These groups can then be presented graphically in a dendrogram or cluster-tree diagram. In a dendrogram, groups are shown as sites joined by lines with the x-axis where the line joins them indicating the level of similarity (or dissimilarity) at which the groups are related.

Analysis of relationships between the sampling sites based on BMI community composition was also carried out for each site within each stream. The replicate samples were averaged to calculate one value per sample for the BMI Taxa at the family level. The taxonomic composition of the BMI communities at the family level was statistically standardized and then compared based on the Bray-Curtis dissimilarity measure (Clifford and Stephenson 1975). Dendrograms (cluster-trees) were then constructed based on dissimilarity distances between BMI communities at each site within a stream (Sneath and Sokal 1973; McGarigal et al. 2000; Pisces Conservation LTD. 2001). Another cluster analysis was conducted using the habitat quality values for each site within each Project Area stream. These dendrograms provide an indication of the relationship between sites within a stream based on the various physical/habitat quality values (Harrington and Born 2000). Comparisons of the habitat quality dendrograms and those for community compositions may suggest the response of community compositions to habitat quality.

1.4.3 ANALYSIS OF VARIANCE (ANOVA)

Analysis of Variance (ANOVA) (Wilkinson and Coward 2000) was used to test for differences among sites for values of biological metrics and abundance of BMI's.

The ANOVA test used sites as factors with samples within those sites as replicates. This resulted in a test for metrics or abundances as to whether there was a significant statistical difference among the sites. In general, the level used to test for significance was $p \leq 0.05$, signifying that the resultant difference under analysis could occur one out of 20 times due to chance alone. This is the standard probability used in testing to hold the potential for Type I errors (rejection of the null hypothesis, when it is true) to an acceptable level (Sokal and Rohlf 1981). For reported probabilities, values that round to $p \leq 0.05$ at two decimal places, are considered to be significant. The result of each ANOVA was reported as a probability value associated with the metric evaluated by stream. Where needed, appropriate transformations were applied (Sokal and Rohlf, 1981). Levene's Test for equal variance (homogeneity) was used to decide if a test or transformation was appropriate (Dixon et al. 1990, Miliken and Johnson 1984). Where homogeneity could not be obtained with two or fewer transformations, the Welch Test was used. The Welch Test does not require the assumption of equal variance and approximates the results of one-way ANOVA at equal variances (Dixon et al. 1990). In a few cases, the Welch Test was in appropriate. In those cases, the Kruskal-Wallis no parametric test was used.

Where a statistically significant result was observed from ANOVA, a *Post Hoc* test between individual sites was conducted. In this case, a Bonferroni t-test was used (Dixon et al. 1990). This is a multiple comparison test based on Student's t statistic. It adjusts the observed significance level for the fact that multiple comparisons are made. This results in a probability value for each comparison between each site. The same significance level ($p \leq 0.05$) was applied to these tests. The results were then used to characterize which metrics differed on a site by site basis using an objective level of statistical significance. In the case of a statistically significant result from the Welch Test, the Bonferroni test was not applied due to failure to meet the assumption of equal variances.

1.5 MOLLUSK SAMPLE COLLECTION

Mollusks were sampled separately in pool and run habitats near fish sampling sites, as agreed to by the CAWG in the CAWG 7 Technical Study Plan. The locations of the sites sampled for mollusks are shown in Maps CAWG 10-8 to 10-14. The focus of the mollusk sampling effort was to determine the occurrence and distribution of mollusk species (specifically bivalves) in the Big Creek Project Area. Sampling was conducted using methods described by Metcalfe-Smith et al. (2000). Mollusks were collected by two-person crews using 4.5 person-hours of effort at each site. Each person surveyed the streambed of the sample site by snorkeling or using polarized sunglasses and an underwater viewer in shallow sites for a total of 2.25 hours. The collection sites were thoroughly searched for mollusks, including the underside of rocks and woody debris. Collected mollusks (if large enough to be found through this effort) were placed in a pail filled with stream water during the collection effort. When the collection effort was complete, identified mollusks of sufficient size were photographed and returned to the sample site. If the identity of the mollusk was uncertain, voucher specimens were taken. Voucher specimens were preserved in alcohol and labeled with specific site information for later laboratory identification. Each site sampled was identified with GPS coordinates. Mollusks collected as part of the application of the CSBP were handled as part of the BMI samples.

1.6 Reservoir Crayfish Sample Collection

Shaver Lake and Mammoth Pool Reservoir were sampled with baited inclined plane traps to collect crayfish. Ten traps were deployed for two 24-hours sets at each of three depth/location strata. Each of the locations was trapped for 24-hours, then the traps were moved and redeployed. At least two traps were deployed near the mouth of each major tributary stream entering the reservoir (Maps CAWG 10-15 and 10-16). Baited minnow traps also were deployed in Shaver Lake at the same depth strata for comparison of catch per unit effort (CPUE) with the inclined plane traps. Baited minnow traps were used in an earlier study (BioSystems 1989), and an index of the relative trap efficiencies was needed to be able to compare results.

The collected crayfish were identified to the species level, counted, and released. Abundance was represented as CPUE in number per trap per hour, number per trap per day (24 hours), and number per trap per night set (used in previous study).

At each crayfish trapping location, the depth of the net or trap was noted and the location determined using a GPS. The water temperature and dissolved oxygen were measured at the depth of the trap, the substrate was characterized visually, as feasible. The presence of vegetation, woody debris, or man-made structures were noted, as feasible. Reservoir elevation was noted at the start and end of each 24-hour trapping period.

APPENDIX B

FIELD DATA

BMI HABITAT DATA FORM

Project	506637-8333	**Date**	9/21/02
Stream	South Fork San Joaquin River	**Crew**	KJ, CG, MR
GPS Coordinate (WGS 84/utm) (accuracy may vary)		**Site ID**	SFSJR_9/Site 9
Upper Boundary of Reach	0327694/4123474		
GPS Coordinate (WGS 84/utm) (accuracy may vary)			
Lower Boundary of Reach	0327773/4123451	**Elev. (ft)**	

Water Chemistry

Air Temp. (ºC)	H_20 Temp. (°C)	D.O. (mg/l)	pH	Sp. Cond. (µs/cm)	Turb.
---	14.1	11.01	5.5	0.025	---

Physical Habitat Characteristics

Reach Length (ft) (if applicable)

	Habitat 1	Habitat 2	Habitat 3	Notes (note book ID)
Habitat	RIFFLE	RIFFLE	RIFFLE	
Length (ft)	27	20	58	
Transect Location	Top Third	Top Third	Top Third	
Avg Width (ft)	18	35	22.5	
Avg Depth (ft)	1.5	0.7	0.8	
Max Depth (ft)	2.8	1.0	1.2	
Specific Depth (ft)	1.5/1.5/0.5	0.6/0.5/0.7	1.0/0.6/0.5	
Embeddedness (%)	0	0	0	
SUBSTRATE COMP (%)				
1. Fines	---	---	---	
2. Sands	---	---	---	
3. Gravels	---	---	---	
4. Cobbles	10	10	10	
5. Boulders	50	80	40	
6. Bedrock	40	10	50	

*1. Fines-silt/clay, <0.062 mm; 2. Sands, 0.062-2 mm; 3. Gravel, 2-64 mm; 4. Cobbles, 64-256 mm; 5. Boulders, 256-2048 mm; 6. Bedrock

	Habitat 1	Habitat 2	Habitat 3	Notes (note book ID)
Gradient (%)	7	6	7.5	
Riffle Velocity (cfs)	2.0	0.8	0.9	
Specific Velocity (cfs)	0.6/1.2/4.1	0.7/0.4/1.4	0.4/0.8/1.4	
Streamflow (cfs)	20	20	20	
% Canopy Cover	5	4	6	

***Poor GPS signal, coordinates corrected based on USGS Topographical map**

BMI HABITAT DATA FORM

Project	506637-8333	**Date**	9/21/02
Stream	South Fork San Joaquin River	**Crew**	EG, MF, G
GPS Coordinate (WGS 84/utm) (accuracy may vary)		**Site ID**	SFSJR_8/Site 8
Upper Boundary of Reach	0326034/4128100		
GPS Coordinate (WGS 84/utm) (accuracy may vary)			
Lower Boundary of Reach	0326034/4128100	**Elev. (ft)**	7000

Water Chemistry

Air Temp. (ºC)	H_20 Temp. (°C)	D.O. (mg/l)	pH	Sp. Cond. (µs/cm)	Turb.
---	15.9	7.10	6.10	0.01	---

Physical Habitat Characteristics

Reach Length (ft) (if applicable)

	Habitat 1	Habitat 2	Habitat 3	Notes (note book ID)
Habitat	HGR			
Length (ft)	53			
Transect Location	18 T			
Avg Width (ft)	75			
Avg Depth (ft)	0.3			
Max Depth (ft)	1.5			
Specific Depth (ft)	0.45/0.20/0.50			
Embeddedness (%)	60			

SUBSTRATE COMP (%)

1. Fines	---			
2. Sands	10			
3. Gravels	40			
4. Cobbles	30			
5. Boulders	20			
6. Bedrock	---			

*1. Fines-silt/clay, <0.062 mm; 2. Sands, 0.062-2 mm; 3. Gravel, 2-64 mm; 4. Cobbles, 64-256 mm; 5. Boulders, 256-2048 mm; 6. Bedrock

Gradient (%)	3			
Riffle Velocity (cfs)	---			
Specific Velocity (cfs)	---			
Streamflow (cfs)	**			
% Canopy Cover	20			

***Poor GPS signal, coordinates corrected based on USGS Topographical map**
****Streamflow gage below Florence Lake Dam measured 26.6 cfs on September 21, 2002.**
T=Feet from top of unit

BMI HABITAT DATA FORM

Project	506637-8333	**Date**	9/21/02
Stream	South Fork San Joaquin River	**Crew**	MF, EG, GM
GPS Coordinate (WGS 84/utm) (accuracy may vary)		**Site ID**	SFSJR_7/Site 7
Upper Boundary of Reach	0326722/4129833		
GPS Coordinate (WGS 84/utm) (accuracy may vary)			
Lower Boundary of Reach	0326722/4129833	**Elev. (ft)**	

Water Chemistry

Air Temp. (ºC)	$H_2$0 Temp. (°C)	D.O. (mg/l)	pH	Sp. Cond. (µs/cm)	Turb.
79.6	15.8	7.62	6.12	0.01	---

Physical Habitat Characteristics

Reach Length (ft) (if applicable)

	Habitat 1	Habitat 2	Habitat 3	Notes (note book ID)
Habitat	Riffle	Riffle	Riffle	
Length (ft)	97	46	71	
Transect Location	0 T	Top Third	Top Third	
Avg Width (ft)	65	54	39	
Avg Depth (ft)	0.7	0.5	0.8	
Max Depth (ft)	1.9	1.6	2.0	
Specific Depth (ft)	0.9/1.2/0.5	0.5/0.6/1.0	0.5/0.6/0.9	
Embeddedness (%)	25	25	25	

SUBSTRATE COMP (%)

1. Fines	---	---	---	
2. Sands	2	1	---	
3. Gravels	3	4	3	
4. Cobbles	30	40	22	
5. Boulders	60	50	60	
6. Bedrock	5	5	15	

*1. Fines-silt/clay, <0.062 mm; 2. Sands, 0.062-2 mm; 3. Gravel, 2-64 mm; 4. Cobbles, 64-256 mm; 5. Boulders, 256-2048 mm; 6. Bedrock

Gradient (%)	3	4	5	
Riffle Velocity (cfs)	~0.5	---	---	
Specific Velocity (cfs)	~0.5	---	---	
Streamflow (cfs)	**	---	---	
% Canopy Cover	20	15	10	

***Poor GPS signal, coordinates corrected based on USGS Topographical map**
****Streamflow gage below Florence Lake Dam measured 26.6 cfs on September 21, 2002.**
T=Feet from top of unit

BMI HABITAT DATA FORM

Project	506637-8333	**Date**	9/22/02
Stream	South Fork San Joaquin River	**Crew**	MF/GM
GPS Coordinate (WGS 84/utm) (accuracy may vary)		**Site ID**	SFSJR_6/Site 6
Upper Boundary of Reach	0325095/4131433		
GPS Coordinate (WGS 84/utm) (accuracy may vary)			
Lower Boundary of Reach	0325231/4131479	**Elev. (ft)**	

Water Chemistry

Air Temp. (ºC)	H_20 Temp. (°C)	D.O. (mg/l)	pH	Sp. Cond. (µs/cm)	Turb.
80°F	16.6	7.64	5.96	0.01	---

Physical Habitat Characteristics

Reach Length (ft) (if applicable)

	Habitat 1	Habitat 2	Habitat 3	Notes (note book ID)
Habitat	Riffle	Riffle	Riffle	
Length (ft)	155	47	104.5	
Transect Location	45 T	4 T	25 T	
Avg Width (ft)	74	40	61	
Avg Depth (ft)	1.8	0.8	1.0	
Max Depth (ft)	2.7	3.0	2.5	
Specific Depth (ft)	1.7/0.8/2.5	2.0/1.6/0.8	1.7/0.7/1.9	
Embeddedness (%)	15	10	15	

SUBSTRATE COMP (%)

1. Fines	---	---	---	
2. Sands	---	---	---	
3. Gravels	5	5	---	
4. Cobbles	20	15	20	
5. Boulders	75	80	80	
6. Bedrock	---	---	---	

*1. Fines-silt/clay, <0.062 mm; 2. Sands, 0.062-2 mm; 3. Gravel, 2-64 mm; 4. Cobbles, 64-256 mm; 5. Boulders, 256-2048 mm; 6. Bedrock

Gradient (%)	6	5	4	
Riffle Velocity (cfs)	---	---	---	
Specific Velocity (cfs)	---	---	---	
Streamflow (cfs)	**	---	---	
% Canopy Cover	2	2	2	

***Poor GPS signal, coordinates corrected based on USGS Topographical map**
****Streamflow gage below Hooper Creek measured 27.0 cfs on September 22, 2002.**
T=Feet from top of unit

BMI HABITAT DATA FORM

Project	506637-8333	**Date**	9/22/02
Stream	South Fork San Joaquin River	**Crew**	EG, KKY
GPS Coordinate (WGS 84/utm) (accuracy may vary)		**Site ID**	SFSJR_5/Site 5
Upper Boundary of Reach	0322151/4133034		
GPS Coordinate (WGS 84/utm) (accuracy may vary)			
Lower Boundary of Reach	0322375/4133210	**Elev. (ft)**	

Water Chemistry

Air Temp. (ºC)	$H_2$0 Temp. (°C)	D.O. (mg/l)	pH	Sp. Cond. (µs/cm)	Turb.
22	14	---	---	---	---

Physical Habitat Characteristics

Reach Length (ft) (if applicable) 10,000

	Habitat 1	Habitat 2	Habitat 3	Notes (note book ID)
Habitat	HGR	HGR	HGR	
Length (ft)	101	76	37	
Transect Location	24 T	12 T	6 T	
Avg Width (ft)	42	34	39	
Avg Depth (ft)	1.1	0.7	0.9	
Max Depth (ft)	2.4	2.1	1.8	
Specific Depth (ft)	0.8/0.7/0.6	0.5/0.6/0.4	0.5/0.7/0.4	
Embeddedness (%)	15	15	15	

SUBSTRATE COMP (%)

1. Fines	---	---	---	
2. Sands	---	---	---	
3. Gravels	---	---	---	
4. Cobbles	15	20	25	
5. Boulders	70	70	70	
6. Bedrock	15	10	5	

*1. Fines-silt/clay, <0.062 mm; 2. Sands, 0.062-2 mm; 3. Gravel, 2-64 mm; 4. Cobbles, 64-256 mm; 5. Boulders, 256-2048 mm; 6. Bedrock

Gradient (%)	5	3	6	
Riffle Velocity (cfs)	1.7	1.6	1.7	
Specific Velocity (cfs)	2.7/1.1/2.0	1.5/2.5/0.8	1.2/2.6/1.3	
Streamflow (cfs)	---	---	---	
% Canopy Cover	20	20	20	

***Poor GPS signal, coordinates corrected based on USGS Topographical map**
T=Feet from top of unit

BMI HABITAT DATA FORM

Project	506637-8333	**Date**	9/22/02
Stream	South Fork San Joaquin River	**Crew**	EG, KKY
GPS Coordinate (WGS 84/utm) (accuracy may vary)		**Site ID**	SFSJR_4/Site 4
Upper Boundary of Reach	0320064/4133128		
GPS Coordinate (WGS 84/utm) (accuracy may vary)			
Lower Boundary of Reach	0319806/4133479	**Elev. (ft)**	

Water Chemistry

Air Temp. (ºC)	H_2O Temp. (°C)	D.O. (mg/l)	pH	Sp. Cond. (µs/cm)	Turb.
25.7	16.5	---	---	---	---

Physical Habitat Characteristics

Reach Length (ft) (if applicable)

	Habitat 1	Habitat 2	Habitat 3	Notes (note book ID)
Habitat	HGR	HGR	HGR	
Length (ft)	69	55	39	
Transect Location	13 T	25 T	12 T	
Avg Width (ft)	61	45	32	
Avg Depth (ft)	0.8	0.6	0.7	
Max Depth (ft)	2.10	1.4	0.9	
Specific Depth (ft)	0.4/0.9/0.7	0.5/0.9/0.2	0.3/0.7/0.5	
Embeddedness (%)	15	15	20	

SUBSTRATE COMP (%)

1. Fines	---	---	---	
2. Sands	---	---	---	
3. Gravels	5	---	5	
4. Cobbles	25	15	25	
5. Boulders	50	60	70	
6. Bedrock	20	25	---	

*1. Fines-silt/clay, <0.062 mm; 2. Sands, 0.062-2 mm; 3. Gravel, 2-64 mm; 4. Cobbles, 64-256 mm; 5. Boulders, 256-2048 mm; 6. Bedrock

Gradient (%)	7	5	5	
Riffle Velocity (cfs)	1.7	1.9	1.8	
Specific Velocity (cfs)	0.8/2.5/1.8	1.3/2.7/0.6	1.5/2.2/1.8	
Streamflow (cfs)	---	---	---	
% Canopy Cover	25	25	35	

***Poor GPS signal, coordinates corrected based on USGS Topographical map**
T=Feet from top of unit

BMI HABITAT DATA FORM

Project	506637-8333	**Date**	9/22/02
Stream	South Fork San Joaquin River	**Crew**	KJ, MR, CG
GPS Coordinate (WGS 84/utm) (accuracy may vary)		**Site ID**	SFSJR_3/Site 3
Upper Boundary of Reach	0316772/4135860		
GPS Coordinate (WGS 84/utm) (accuracy may vary)			
Lower Boundary of Reach	0316729/4135667	**Elev. (ft)**	

Water Chemistry

Air Temp. (ºC)	H_20 Temp. (°C)	D.O. (mg/l)	pH	Sp. Cond. (µs/cm)	Turb.
---	19.3	8.90	7.30	0.042	---

Physical Habitat Characteristics

Reach Length (ft) (if applicable)

	Habitat 1	Habitat 2	Habitat 3	Notes (note book ID)
Habitat	RIFF	RIFF	RIFF	
Length (ft)	90	80	160	
Transect Location	Top Third	Top Third	Top Third	
Avg Width (ft)	35	40	85	
Avg Depth (ft)	1.2	0.8	1.1	
Max Depth (ft)	2.4	1.6	2.2	
Specific Depth (ft)	1.2/1.3/1.1	0.6/1.1/0.9	0.6/1.4/1.0	
Embeddedness (%)	0	0	0	

SUBSTRATE COMP (%)

1. Fines	---	---	---	
2. Sands	---	---	---	
3. Gravels	---	---	---	
4. Cobbles	20	30	10	
5. Boulders	80	70	90	
6. Bedrock	---	---	---	

*1. Fines-silt/clay, <0.062 mm; 2. Sands, 0.062-2 mm; 3. Gravel, 2-64 mm; 4. Cobbles, 64-256 mm; 5. Boulders, 256-2048 mm; 6. Bedrock

Gradient (%)	8	6	8	
Riffle Velocity (cfs)	1.4	2.5	1.6	
Specific Velocity (cfs)	2.5/1.3/0.4	1.8/2.8/2.9	1.1/2.0/1.8	
Streamflow (cfs)	---	---	---	
% Canopy Cover	21	28	13	

***Poor GPS signal, coordinates corrected based on USGS Topographical map**

BMI HABITAT DATA FORM

Project	506637-8333	**Date**	9/22/02
Stream	South Fork San Joaquin River	**Crew**	KJ, CG, MR
GPS Coordinate (WGS 84/utm) (accuracy may vary)		**Site ID**	SFSJR_2/Site 2
Upper Boundary of Reach	0315050/4136916		
GPS Coordinate (WGS 84/utm) (accuracy may vary)			
Lower Boundary of Reach	0315566/4137169	**Elev. (ft)**	

Water Chemistry

Air Temp. (ºC)	H_2O Temp. (°C)	D.O. (mg/l)	pH	Sp. Cond. (µs/cm)	Turb.
---	13.8	9.08	5.45	0.035	---

Physical Habitat Characteristics

Reach Length (ft) (if applicable)

	Habitat 1	Habitat 2	Habitat 3	Notes (note book ID)
Habitat	RIFFLE	RIFFLE	RIFFLE	
Length (ft)	90	50	60	
Transect Location	Top Third	Top Third	Top Third	
Avg Width (ft)	40	65	40	
Avg Depth (ft)	1.8	1.2	1.3	
Max Depth (ft)	3	2.8	2.8	
Specific Depth (ft)	1.5/2.0/1.8	1.4/1.8/0.7	1.4/1.8/1.2	
Embeddedness (%)	N/A	N/A	N/A	

SUBSTRATE COMP (%)

1. Fines	---	---	---	
2. Sands	---	---	---	
3. Gravels	---	---	---	
4. Cobbles	---	10	---	
5. Boulders	90	80	80	
6. Bedrock	10	10	20	

*1. Fines-silt/clay, <0.062 mm; 2. Sands, 0.062-2 mm; 3. Gravel, 2-64 mm; 4. Cobbles, 64-256 mm; 5. Boulders, 256-2048 mm; 6. Bedrock

Gradient (%)	6	7	---	
Riffle Velocity (cfs)	3	2.3	2.3	
Specific Velocity (cfs)	2.8/3.1/3.2	2.4/2.8/1.6	2.2/2.8/1.8	
Streamflow (cfs)	70	---	---	
% Canopy Cover	15	11	7	

***Poor GPS signal, coordinates corrected based on USGS Topographical map**

BMI HABITAT DATA FORM

Project	506637-8333	**Date**	9/27/02
Stream	South Fork San Joaquin River	**Crew**	SH, MF, GM
GPS Coordinate (WGS 84/utm) (accuracy may vary)		**Site ID**	SFSJR_1/Site 1
Upper Boundary of Reach	0302030/4145838		
GPS Coordinate (WGS 84/utm) (accuracy may vary)			
Lower Boundary of Reach	0302238/4145989	**Elev. (ft)**	

Water Chemistry

Air Temp. (ºC)	H_20 Temp. (°C)	D.O. (mg/l)	pH	Sp. Cond. (µs/cm)	Turb.
---	15.7	10.44	7.05	0.062	---

Physical Habitat Characteristics

Reach Length (ft) (if applicable)

	Habitat 1	Habitat 2	Habitat 3	Notes (note book ID)
Habitat	RIFF	RIFF	RIFF	
Length (ft)	53	51.2	43	
Transect Location	Top Third	Top Third	Top Third	
Avg Width (ft)	15	45	40	
Avg Depth (ft)	1.2	1.2	1.3	
Max Depth (ft)	2.2	2.0	2.8	
Specific Depth (ft)	1.0/1.0/0.8	0.7/1.0/0.3	0.9/1.0/0.4	
Embeddedness (%)	35	15	15	

SUBSTRATE COMP (%)

1. Fines	---	---	---	
2. Sands	20	---	---	
3. Gravels	---	---	---	
4. Cobbles	30	---	---	
5. Boulders	40	80	85	
6. Bedrock	10	20	15	

*1. Fines-silt/clay, <0.062 mm; 2. Sands, 0.062-2 mm; 3. Gravel, 2-64 mm; 4. Cobbles, 64-256 mm; 5. Boulders, 256-2048 mm; 6. Bedrock

Gradient (%)	4	7	5	
Riffle Velocity (cfs)	---	---	---	
Specific Velocity (cfs)	---	---	---	
Streamflow (cfs)	---	---	---	
% Canopy Cover	1	25	18	

***Poor GPS signal, coordinates corrected based on USGS Topographical map**

BMI HABITAT DATA FORM

Project	506637-8333	**Date**	8/8/02
Stream	Tombstone Creek	**Crew**	MF, WT, RS
GPS Coordinate (WGS 84/utm) (accuracy may vary)		**Site ID**	Tomb_AD/Site AD
Upper Boundary of Reach	No Data		
GPS Coordinate (WGS 84/utm) (accuracy may vary)			
Lower Boundary of Reach	115 0327110/4126933	**Elev. (ft)**	7835

Water Chemistry

Air Temp. (ºC)	$H_2$0 Temp. (°C)	D.O. (mg/l)	pH	Sp. Cond. (µs/cm)	Turb.
27	10	11.0	6.4	0.020	15

Physical Habitat Characteristics

Reach Length (ft) (if applicable)

	Habitat 1	Habitat 2	Habitat 3	Notes (note book ID)
Habitat	RIFF			
Length (ft)	12.4			
Transect Location	2, 4, 6 T			
Avg Width (ft)	1.9			
Avg Depth (ft)	0.15			
Max Depth (ft)	0.2			
Specific Depth (ft)	0.15/0.15/0.15			
Embeddedness (%)	.5			

SUBSTRATE COMP (%)

1. Fines	---			
2. Sands	20			
3. Gravels	60			
4. Cobbles	20			
5. Boulders	---			
6. Bedrock	---			

*1. Fines-silt/clay, <0.062 mm; 2. Sands, 0.062-2 mm; 3. Gravel, 2-64 mm; 4. Cobbles, 64-256 mm; 5. Boulders, 256-2048 mm; 6. Bedrock

Gradient (%)	2.2			
Riffle Velocity (cfs)	1.5			
Specific Velocity (cfs)	1.50/1.85/1.25			
Streamflow (cfs)	---			
% Canopy Cover	98			

***Poor GPS signal, coordinates corrected based on USGS Topographical map**
T=Feet from top of unit

BMI HABITAT DATA FORM

Project	506637-8333	**Date**	9/4/02
Stream	Tombstone Creek	**Crew**	SF, MF, WT, KJ
GPS Coordinate (WGS 84/utm) (accuracy may vary)		**Site ID**	Tomb_BD2/Site 2
Upper Boundary of Reach	0326855/4127072		
GPS Coordinate (WGS 84/utm) (accuracy may vary)			
Lower Boundary of Reach	0326855/4127072	**Elev. (ft)**	

Water Chemistry

Air Temp. (ºC)	H_20 Temp. (°C)	D.O. (mg/l)	pH	Sp. Cond. (µs/cm)	Turb.
---	10.6	12.43	5.43	0.016	---

Physical Habitat Characteristics

Reach Length (ft) (if applicable)

	Habitat 1	Habitat 2	Habitat 3	Notes (note book ID)
Habitat	HGR			
Length (ft)	42			
Transect Location	14, 11, 5 T			
Avg Width (ft)	2.93			
Avg Depth (ft)	0.5			
Max Depth (ft)	0.92			
Specific Depth (ft)	0.5			
Embeddedness (%)	40			

SUBSTRATE COMP (%)

1. Fines	5			
2. Sands	15			
3. Gravels	20			
4. Cobbles	35			
5. Boulders	25			
6. Bedrock	0			

*1. Fines-silt/clay, <0.062 mm; 2. Sands, 0.062-2 mm; 3. Gravel, 2-64 mm; 4. Cobbles, 64-256 mm; 5. Boulders, 256-2048 mm; 6. Bedrock

Gradient (%)	4			
Riffle Velocity (cfs)	0.5			
Specific Velocity (cfs)	0.28/0.38/1.06			
Streamflow (cfs)	0.190			
% Canopy Cover	100			

***Poor GPS signal, coordinates corrected based on USGS Topographical map**
T=Feet from top of unit

BMI HABITAT DATA FORM

Project	506637-8333	**Date**	9/4/02
Stream	Tombstone Creek	**Crew**	SF, MF, WT, KJ
GPS Coordinate (WGS 84/utm) (accuracy may vary)		**Site ID**	Tomb_BD1/Site 1
Upper Boundary of Reach	0326855/4127072		
GPS Coordinate (WGS 84/utm) (accuracy may vary)			
Lower Boundary of Reach	0326855/4127072	**Elev. (ft)**	

Water Chemistry

Air Temp. (ºC)	$H_2$0 Temp. (°C)	D.O. (mg/l)	pH	Sp. Cond. (µs/cm)	Turb.
---	10.6	12.43	5.43	0.016	---

Physical Habitat Characteristics

Reach Length (ft) (if applicable)

	Habitat 1	Habitat 2	Habitat 3	Notes (note book ID)
Habitat	HGR			
Length (ft)	42			
Transect Location	14, 11, 5 T			
Avg Width (ft)	2.93			
Avg Depth (ft)	0.5			
Max Depth (ft)	0.92			
Specific Depth (ft)	0.5			
Embeddedness (%)	40			
SUBSTRATE COMP (%)				
1. Fines	5			
2. Sands	15			
3. Gravels	20			
4. Cobbles	35			
5. Boulders	25			
6. Bedrock	---			

*1. Fines-silt/clay, <0.062 mm; 2. Sands, 0.062-2 mm; 3. Gravel, 2-64 mm; 4. Cobbles, 64-256 mm; 5. Boulders, 256-2048 mm; 6. Bedrock

Gradient (%)	4			
Riffle Velocity (cfs)	0.6			
Specific Velocity (cfs)	0.28/0.38/1.06			
Streamflow (cfs)	0.190			
% Canopy Cover	100			

***Poor GPS signal, coordinates corrected based on USGS Topographical map**
T=Feet from top of unit

BMI HABITAT DATA FORM

Project	506637-8333	**Date**	9/5/02
Stream	South Slide Creek	**Crew**	SF, WT, KJ
GPS Coordinate (WGS 84/utm) (accuracy may vary)		**Site ID**	SSld_AD/Site AD
Upper Boundary of Reach	0327072/4129029		
GPS Coordinate (WGS 84/utm) (accuracy may vary)			
Lower Boundary of Reach	0327072/4129029	**Elev. (ft)**	

Water Chemistry

Air Temp. (ºC)	H_2O Temp. (°C)	D.O. (mg/l)	pH	Sp. Cond. (µs/cm)	Turb.
---	8.9	11.47	6.36	.013	---

Physical Habitat Characteristics

Reach Length (ft) (if applicable)

	Habitat 1	Habitat 2	Habitat 3	Notes (note book ID)
Habitat	STEP Pools	Cascade	Cascade	
Length (ft)	35	35	35	
Transect Location	9, 23, 26 T	8, 20, 33 T	1, 4, 10 T	
Avg Width (ft)	2	3	2	
Avg Depth (ft)	0.3	.15	0.17	
Max Depth (ft)	0.5	.3	0.3	
Specific Depth (ft)	.2/.1/.1	0.1/0.2/0.2	0.2/0.3/0.1	
Embeddedness (%)	40	20	10	

SUBSTRATE COMP (%)

1. Fines	---	<1	<1	
2. Sands	20	5	8	
3. Gravels	25	10	7	
4. Cobbles	20	30	35	
5. Boulders	35	55	30	
6. Bedrock	---	---	20	

*1. Fines-silt/clay, <0.062 mm; 2. Sands, 0.062-2 mm; 3. Gravel, 2-64 mm; 4. Cobbles, 64-256 mm; 5. Boulders, 256-2048 mm; 6. Bedrock

Gradient (%)	10	27	20	
Riffle Velocity (cfs)	0.2	1.1	0.9	
Specific Velocity (cfs)	.21/*0/*0	0.5/0.24/.37	0.5/0.3/2	
Streamflow (cfs)	---	---	---	
% Canopy Cover	100	100	60	

***Poor GPS signal, coordinates corrected based on USGS Topographical map**
***0 = Too Shallow**
T=Feet from top of unit

BMI HABITAT DATA FORM

Project	506637-8333	**Date**	8/13/02
Stream	South Slide Creek	**Crew**	KKY, WT
GPS Coordinate (WGS 84/utm) (accuracy may vary)		**Site ID**	SSld_BD/Site 2
Upper Boundary of Reach	0326882/4129133		
GPS Coordinate (WGS 84/utm) (accuracy may vary)			
Lower Boundary of Reach	0326842/4129322	**Elev. (ft)**	7273

Water Chemistry

Air Temp. (ºC)	H_20 Temp. (°C)	D.O. (mg/l)	pH	Sp. Cond. (µs/cm)	Turb.
24	16	8.6	7.0	0.01	---

Physical Habitat Characteristics

Reach Length (ft) (if applicable)

	Habitat 1	Habitat 2	Habitat 3	Notes (note book ID)
Habitat		SRN/RIFF	SRN/RIFF	
Length (ft)		98	388	
Transect Location		8, 16, 24 T	40, 85, 95 T	
Avg Width (ft)		1.5	2	
Avg Depth (ft)		0.1	0.2	
Max Depth (ft)		0.3	0.5	
Specific Depth (ft)		0.1/0.1/0.1	0.1/0.1/0.1	
Embeddedness (%)		60	50	
SUBSTRATE COMP (%)				
1. Fines		20	5	
2. Sands		20	10	
3. Gravels		20	10	
4. Cobbles		20	35	
5. Boulders		20	30	
6. Bedrock		---	---	

*1. Fines-silt/clay, <0.062 mm; 2. Sands, 0.062-2 mm; 3. Gravel, 2-64 mm; 4. Cobbles, 64-256 mm; 5. Boulders, 256-2048 mm; 6. Bedrock

Gradient (%)		9	15	
Riffle Velocity (cfs)		Too low to measure	Too low to measure	
Specific Velocity (cfs)		Too low to measure	Too low to measure	
Streamflow (cfs)		<0.1	<0.1	
% Canopy Cover		35	85	

***Poor GPS signal, coordinates corrected based on USGS Topographical map**
T=Feet from top of unit

BMI HABITAT DATA FORM

Project	506637-8333	**Date**	9/5/02
Stream	North Slide Creek	**Crew**	SF, WT, KJ
GPS Coordinate (WGS 84/utm) (accuracy may vary)		**Site ID**	NSld_AD/Site AD
Upper Boundary of Reach	0327167/4129209		
GPS Coordinate (WGS 84/utm) (accuracy may vary)			
Lower Boundary of Reach	No Data Available	**Elev. (ft)**	

Water Chemistry

Air Temp. (ºC)	H_20 Temp. (°C)	D.O. (mg/l)	pH	Sp. Cond. (µs/cm)	Turb.
---	9.3	9.14	6.11	.019	---

Physical Habitat Characteristics

Reach Length (ft) (if applicable)

	Habitat 1	Habitat 2	Habitat 3	Notes (note book ID)
Habitat	Cascade	Cascade	Cascade	
Length (ft)	35	35	35	
Transect Location	9, 19, 32 T	14, 19, 30 T	16, 19, 25 T	
Avg Width (ft)	3.5	2	2.5	
Avg Depth (ft)	0.58	0.45	0.60	
Max Depth (ft)	2.0	0.6	1.9 in	
Specific Depth (ft)	0.2/0.1/0.1	0.25/ 0.17/ 0.04	0.4/0.2/0.2	
Embeddedness (%)	15	30	10	

SUBSTRATE COMP (%)

1. Fines	5	<1	20	
2. Sands	40	17	10	
3. Gravels	40	18	10	
4. Cobbles	10	15	10	
5. Boulders	5	50	50	
6. Bedrock	---	---	---	

*1. Fines-silt/clay, <0.062 mm; 2. Sands, 0.062-2 mm; 3. Gravel, 2-64 mm; 4. Cobbles, 64-256 mm; 5. Boulders, 256-2048 mm; 6. Bedrock

Gradient (%)	23	21	18	
Riffle Velocity (cfs)	0.4	0.5	0.2	
Specific Velocity (cfs)	.39/NR/*0	NR/0.45/*0	0.15/0.36/0.11	
Streamflow (cfs)	---	---	---	
% Canopy Cover	100	100	100	

***Poor GPS signal, coordinates corrected based on USGS Topographical map**
T=Feet from top of unit

BMI HABITAT DATA FORM

Project	506637-8333	**Date**	8/12/02
Stream	North Slide Creek	**Crew**	WT, KKY
GPS Coordinate (WGS 84/utm) (accuracy may vary)		**Site ID**	NSld_BD2/Site 2
Upper Boundary of Reach	0326997/4129246		
GPS Coordinate (WGS 84/utm) (accuracy may vary)			
Lower Boundary of Reach	0326956/4129277	**Elev. (ft)**	7310

Water Chemistry

Air Temp. (ºC)	H_2O Temp. (°C)	D.O. (mg/l)	pH	Sp. Cond. (μs/cm)	Turb.
29	12	9.2	6.7	0.09	4

Physical Habitat Characteristics

Reach Length (ft) (if applicable)

	Habitat 1	Habitat 2	Habitat 3	Notes (note book ID)
Habitat	RIFF	RIFF		
Length (ft)	35	117		
Transect Location	3, 9, 12 T	12, 20, 24 T		
Avg Width (ft)	2	2		
Avg Depth (ft)	0.1	0.2		
Max Depth (ft)	0.3	0.5		
Specific Depth (ft)	0.1/0.1/0.1	0.1/0.1/0.1		
Embeddedness (%)	70	50		

SUBSTRATE COMP (%)

1. Fines	---	---		
2. Sands	50	20		
3. Gravels	30	20		
4. Cobbles	10	40		
5. Boulders	10	20		
6. Bedrock	---	---		

*1. Fines-silt/clay, <0.062 mm; 2. Sands, 0.062-2 mm; 3. Gravel, 2-64 mm; 4. Cobbles, 64-256 mm; 5. Boulders, 256-2048 mm; 6. Bedrock

Gradient (%)	4.1	12		
Riffle Velocity (cfs)	Too low to measure	Too low to measure		
Specific Velocity (cfs)	Too low to measure	Too low to measure		
Streamflow (cfs)	Too low to measure	Too low to measure		
% Canopy Cover	70	70		

***Poor GPS signal, coordinates corrected based on USGS Topographical map**
T=Feet from top of unit

BMI HABITAT DATA FORM

Project	506637-8333	**Date**	8/12/02
Stream	North Slide Creek	**Crew**	WT, KKY
GPS Coordinate (WGS 84/utm) (accuracy may vary)		**Site ID**	NSld_BD1/Site1
Upper Boundary of Reach	0326904/4129339		
GPS Coordinate (WGS 84/utm) (accuracy may vary)			
Lower Boundary of Reach	0326904/4129339	**Elev. (ft)**	7263

Water Chemistry

Air Temp. (ºC)	H_20 Temp. (°C)	D.O. (mg/l)	pH	Sp. Cond. (µs/cm)	Turb.
28	12	9.2	6.7	0.09	4

Physical Habitat Characteristics

Reach Length (ft) (if applicable)

	Habitat 1	Habitat 2	Habitat 3	Notes (note book ID)
Habitat	RIFF			
Length (ft)	104			
Transect Location	6, 10, 21 T			
Avg Width (ft)	2			
Avg Depth (ft)	0.2			
Max Depth (ft)	0.5			
Specific Depth (ft)	0.1/0.1/0.1			
Embeddedness (%)	50			
SUBSTRATE COMP (%)				
1. Fines	---			
2. Sands	30			
3. Gravels	20			
4. Cobbles	20			
5. Boulders	30			
6. Bedrock	---			

*1. Fines-silt/clay, <0.062 mm; 2. Sands, 0.062-2 mm; 3. Gravel, 2-64 mm; 4. Cobbles, 64-256 mm; 5. Boulders, 256-2048 mm; 6. Bedrock

Gradient (%)	26.1			
Riffle Velocity (cfs)	Too low to measure			
Specific Velocity (cfs)	Too low to measure			
Streamflow (cfs)	Too low to measure			
% Canopy Cover	97			

***Poor GPS signal, coordinates corrected based on USGS Topographical map**
T=Feet from top of unit

BMI HABITAT DATA FORM

Project	506637-8333	**Date**	8/12/02
Stream	Hooper Creek	**Crew**	WT, KKY
GPS Coordinate (WGS 84/utm) (accuracy may vary)		**Site ID**	Hoop_AD/Site AD
Upper Boundary of Reach	0327471/4130636		
GPS Coordinate (WGS 84/utm) (accuracy may vary)			
Lower Boundary of Reach	0327157/4130642	**Elev. (ft)**	7320

Water Chemistry

Air Temp. (ºC)	H_20 Temp. (°C)	D.O. (mg/l)	pH	Sp. Cond. (µs/cm)	Turb.
24	12.0	11.0	6.6	0.02	2.0

Physical Habitat Characteristics

Reach Length (ft) (if applicable)

	Habitat 1	Habitat 2	Habitat 3	Notes (note book ID)
Habitat	RIFF	RIFF		
Length (ft)	78	36		
Transect Location	12 T	6 T		
Avg Width (ft)	10	19		
Avg Depth (ft)	0.7	0.4		
Max Depth (ft)	1.4	1.0		
Specific Depth (ft)	0.5/0.5/0.5	0.3/0.3/0.4		
Embeddedness (%)	50	30		

SUBSTRATE COMP (%)

1. Fines	---	---		
2. Sands	10	10		
3. Gravels	---	10		
4. Cobbles	40	60		
5. Boulders	50	15		
6. Bedrock	---	5		

*1. Fines-silt/clay, <0.062 mm; 2. Sands, 0.062-2 mm; 3. Gravel, 2-64 mm; 4. Cobbles, 64-256 mm; 5. Boulders, 256-2048 mm; 6. Bedrock

Gradient (%)	7.17	5.7		
Riffle Velocity (cfs)	1.3	0.8		
Specific Velocity (cfs)	1.2/0.8/1.9	0.3/0.76/1.36		
Streamflow (cfs)	2.5	2.5		
% Canopy Cover	64	40		

***Poor GPS signal, coordinates corrected based on USGS Topographical map**
T=Feet from top of unit

BMI HABITAT DATA FORM

Project	506637-8333	**Date**	9/4/02
Stream	Hooper Creek	**Crew**	SF, KJ, WT
GPS Coordinate (WGS 84/utm) (accuracy may vary)		**Site ID**	Hoop_BD2/Site 2
Upper Boundary of Reach	0327049/4130569		
GPS Coordinate (WGS 84/utm) (accuracy may vary)			
Lower Boundary of Reach	0327049/4130569	**Elev. (ft)**	

Spot Sampling

Water Chemistry

Air Temp. (ºC)	$H_2$0 Temp. (°C)	D.O. (mg/l)	pH	Sp. Cond. (µs/cm)	Turb.
---	11.5	12.23	6.98	0.020	---

Physical Habitat Characteristics

Reach Length (ft) (if applicable)

	Habitat 1	Habitat 2	Habitat 3	Notes (note book ID)
Habitat	RIFF	RIFF	RIFF	
Length (ft)	50	50	50	
Transect Location	5, 15, 20 T	20, 35, 40 T	15, 25, 40 T	
Avg Width (ft)	7.5	10	7	
Avg Depth (ft)	0.83	0.85	0.79	
Max Depth (ft)	1.17	1.5	1.42	
Specific Depth (ft)	0.5/ 0.5/ 0.67	0.75/ 0.67/ 1.0	0.33/ 0.5/ 0.58	
Embeddedness (%)	40	15	20	

SUBSTRATE COMP (%)

	Habitat 1	Habitat 2	Habitat 3	Notes (note book ID)
1. Fines	1	1	<1	
2. Sands	20	40	35	
3. Gravels	9	9	5	
4. Cobbles	20	30	20	
5. Boulders	50	20	40	
6. Bedrock	---	---	---	

*1. Fines-silt/clay, <0.062 mm; 2. Sands, 0.062-2 mm; 3. Gravel, 2-64 mm; 4. Cobbles, 64-256 mm; 5. Boulders, 256-2048 mm; 6. Bedrock

	Habitat 1	Habitat 2	Habitat 3	Notes (note book ID)
Gradient (%)	8	18	14	
Riffle Velocity (cfs)	1.7	1.0	0.7	
Specific Velocity (cfs)	1.00/1.37/2.76	0.80/1.18/1.16	0.94/0.78/0.28	
Streamflow (cfs)	1.6	1.6	1.6	
% Canopy Cover	100	99	74	

***Poor GPS signal, coordinates corrected based on USGS Topographical map**
T=Feet from top of unit

BMI HABITAT DATA FORM

Project	506637-8333	**Date**	8/11/02
Stream	Hooper Creek	**Crew**	KKY, WT, RS
GPS Coordinate (WGS 84/utm) (accuracy may vary)		**Site ID**	Hoop_BD1/Site 1
Upper Boundary of Reach	0326262/4130742		
GPS Coordinate (WGS 84/utm) (accuracy may vary)			
Lower Boundary of Reach	0326165/4130764	**Elev. (ft)**	6897'

Water Chemistry

Air Temp. (ºC)	H_20 Temp. (°C)	D.O. (mg/l)	pH	Sp. Cond. (µs/cm)	Turb.
27	15	11.6	6.1	0.02	2.0

Physical Habitat Characteristics

Reach Length (ft) (if applicable)

	Habitat 1	Habitat 2	Habitat 3	Notes (note book ID)
Habitat	RIFF	RIFF	RIFF	
Length (ft)	38	71	44	
Transect Location	12 T	24 T	15 T	
Avg Width (ft)	3.8	5.5	13.5	
Avg Depth (ft)	0.3	0.5	0.5	
Max Depth (ft)	0.6	1.3	0.9	
Specific Depth (ft)	0.2/0.2/0.2	0.5/0.3/0.7	0.3/0.2/0.3	
Embeddedness (%)	40	50	50	

SUBSTRATE COMP (%)

1. Fines	---	---	---	
2. Sands	---	10	30	
3. Gravels	10	5	20	
4. Cobbles	80	40	40	
5. Boulders	10	45	10	
6. Bedrock	---	---	---	

*1. Fines-silt/clay, <0.062 mm; 2. Sands, 0.062-2 mm; 3. Gravel, 2-64 mm; 4. Cobbles, 64-256 mm; 5. Boulders, 256-2048 mm; 6. Bedrock

Gradient (%)	2.2'/38'=5.7	4.1	2.0	
Riffle Velocity (cfs)	1.5	1.1	0.6	
Specific Velocity (cfs)	0.69/1.85/1.95	.11/1.66/1.41	.12/0.08/0.47	
Streamflow (cfs)	1.03	1.03	1.03	
% Canopy Cover	90	70	73	

***Poor GPS signal, coordinates corrected based on USGS Topographical map**
T=Feet from top of unit

BMI HABITAT DATA FORM

Project	506637-8333	**Date**	9/19/02
Stream	Crater Creek	**Crew**	KS, EC, EG
GPS Coordinate (WGS 84/utm) (accuracy may vary)		**Site ID**	Crat_AD/Site AD
Upper Boundary of Reach	0323010/4127141		
GPS Coordinate (WGS 84/utm) (accuracy may vary)			
Lower Boundary of Reach	0323010/4127141	**Elev. (ft)**	

Water Chemistry

Air Temp. (ºC)	$H_2$0 Temp. (°C)	D.O. (mg/l)	pH	Sp. Cond. (µs/cm)	Turb.
---	10	9.97	5.65	.044	---

Physical Habitat Characteristics

Reach Length (ft) (if applicable)

	Habitat 1	Habitat 2	Habitat 3	Notes (note book ID)
Habitat	RUN			
Length (ft)	SPOT			
Transect Location	Top Third			
Avg Width (ft)	4			
Avg Depth (ft)	0.4			
Max Depth (ft)	0.6			
Specific Depth (ft)	0.4/0.3/0.4			
Embeddedness (%)	15			

SUBSTRATE COMP (%)

1. Fines	---			
2. Sands	20			
3. Gravels	10			
4. Cobbles	10			
5. Boulders	60			
6. Bedrock	---			

*1. Fines-silt/clay, <0.062 mm; 2. Sands, 0.062-2 mm; 3. Gravel, 2-64 mm; 4. Cobbles, 64-256 mm; 5. Boulders, 256-2048 mm; 6. Bedrock

Gradient (%)	3			
Riffle Velocity (cfs)	---			
Specific Velocity (cfs)	VERY LOW (NEAR STAGNANT)			
Streamflow (cfs)	---			
% Canopy Cover	60			

***Poor GPS signal, coordinates corrected based on USGS Topographical map**

BMI HABITAT DATA FORM

Project	506637-8333	**Date**	9/19/02
Stream	Crater Creek	**Crew**	KS, EG, EC
GPS Coordinate (WGS 84/utm) (accuracy may vary)		**Site ID**	Crat_BD3/Site 3
Upper Boundary of Reach	323324/4127844		
GPS Coordinate (WGS 84/utm) (accuracy may vary)			
Lower Boundary of Reach	323467/4128128	**Elev. (ft)**	

Water Chemistry

Air Temp. (ºC)	H_20 Temp. (°C)	D.O. (mg/l)	pH	Sp. Cond. (µs/cm)	Turb.
---	11.5	10.05	6.22	0.057	---

Physical Habitat Characteristics

Reach Length (ft) (if applicable)

	Habitat 1	Habitat 2	Habitat 3	Notes (note book ID)
Habitat	RUN	RUN	RUN	
Length (ft)	22	45	35	
Transect Location	Top Third	Top Third	Top Third	
Avg Width (ft)	3	3.5	2.5	
Avg Depth (ft)	.2	.3	.2	
Max Depth (ft)	.5	.7	.4	
Specific Depth (ft)	.5/.1/.1	.3/.2/.2	.1/.1/.2	
Embeddedness (%)	70	40	30	

SUBSTRATE COMP (%)

1. Fines	---	---	---	
2. Sands	30	20	20	
3. Gravels	50	10	---	
4. Cobbles	---	---	---	
5. Boulders	20	70	80	
6. Bedrock	---	---	---	

*1. Fines-silt/clay, <0.062 mm; 2. Sands, 0.062-2 mm; 3. Gravel, 2-64 mm; 4. Cobbles, 64-256 mm; 5. Boulders, 256-2048 mm; 6. Bedrock

Gradient (%)	1	2	3	
Riffle Velocity (cfs)	---	---	---	
Specific Velocity (cfs)	---	---	---	
Streamflow (cfs)	---	---	---	
% Canopy Cover	50	75	65	

***Poor GPS signal, coordinates corrected based on USGS Topographical map**

BMI HABITAT DATA FORM

Project	506637-8333	**Date**	9/19/02
Stream	Crater Creek	**Crew**	KS, EG, EC
GPS Coordinate (WGS 84/utm) (accuracy may vary)		**Site ID**	Crat_BD3/Site 3
Upper Boundary of Reach	323324/4127844		
GPS Coordinate (WGS 84/utm) (accuracy may vary)			
Lower Boundary of Reach	323467/4128128	**Elev. (ft)**	

Water Chemistry

Air Temp. (ºC)	H_20 Temp. (°C)	D.O. (mg/l)	pH	Sp. Cond. (µs/cm)	Turb.
---	11.5	10.05	6.22	0.057	---

Physical Habitat Characteristics

Reach Length (ft) (if applicable)

	Habitat 4	Habitat 2	Habitat 3	Notes (note book ID)
Habitat	Riffle			
Length (ft)	30			
Transect Location	Top Third			
Avg Width (ft)	3.5			
Avg Depth (ft)	.2			
Max Depth (ft)	.8			
Specific Depth (ft)	.2/.2/.1			
Embeddedness (%)	20			

SUBSTRATE COMP (%)

1. Fines	---			
2. Sands	10			
3. Gravels	10			
4. Cobbles	20			
5. Boulders	60			
6. Bedrock	---			

*1. Fines-silt/clay, <0.062 mm; 2. Sands, 0.062-2 mm; 3. Gravel, 2-64 mm; 4. Cobbles, 64-256 mm; 5. Boulders, 256-2048 mm; 6. Bedrock

Gradient (%)	5			
Riffle Velocity (cfs)	---			
Specific Velocity (cfs)	---			
Streamflow (cfs)	---			
% Canopy Cover	85			

***Poor GPS signal, coordinates corrected based on USGS Topographical map**

BMI HABITAT DATA FORM

Project	506637-8333	**Date**	9/24/02
Stream	Bear Creek	**Crew**	GM, JV, KKY
GPS Coordinate (WGS 84/utm) (accuracy may vary)		**Site ID**	Bear_AD/Site AD
Upper Boundary of Reach	0325160/4134279		
GPS Coordinate (WGS 84/utm) (accuracy may vary)			
Lower Boundary of Reach	0325160/4134279	**Elev. (ft)**	7500

Water Chemistry

Air Temp. (ºC)	H_20 Temp. (°C)	D.O. (mg/l)	pH	Sp. Cond. (µs/cm)	Turb.
23.0	13.3	9.08	6.96	0.022	N/R

Physical Habitat Characteristics

Reach Length (ft) (if applicable)

	Habitat 1	Habitat 2	Habitat 3	Notes (note book ID)
Habitat	RIFF	RIFF	RIFF	
Length (ft)	72	48	62	
Transect Location	25 T	16 T	18 T	
Avg Width (ft)	37	19	61	
Avg Depth (ft)	0.6	0.5	0.4	
Max Depth (ft)	1.2	0.9	0.7	
Specific Depth (ft)	1.0/0.3/0.5	0.4/0.4/0.6	0.6/0.3/0.6	
Embeddedness (%)	30	20	30	

SUBSTRATE COMP (%)

1. Fines	---	---	---	
2. Sands	10	5	10	
3. Gravels	---	10	25	
4. Cobbles	20	50	60	
5. Boulders	20	5	5	
6. Bedrock	50	30	---	

*1. Fines-silt/clay, <0.062 mm; 2. Sands, 0.062-2 mm; 3. Gravel, 2-64 mm; 4. Cobbles, 64-256 mm; 5. Boulders, 256-2048 mm; 6. Bedrock

Gradient (%)	3	4	4	
Riffle Velocity (cfs)	0.7	1.0	0.7	
Specific Velocity (cfs)	0.63/0.45/0.94	0.87/0.90/1.1	0.64/0.68/0.77	
Streamflow (cfs)	**	---	---	
% Canopy Cover	35	60	35	

***Poor GPS signal, coordinates corrected based on USGS Topographical map**
****Streamflow gage below Bear Creek Diversion measured 4.6 cfs on September 24, 2002.**
T=Feet from top of unit

BMI HABITAT DATA FORM

Project	506637-8333	**Date**	9/24/02
Stream	Bear Creek	**Crew**	GM, JV, KKY
GPS Coordinate (WGS 84/utm) (accuracy may vary)		**Site ID**	Bear_BD2/Site 2
Upper Boundary of Reach	0324973/4133937		
GPS Coordinate (WGS 84/utm) (accuracy may vary)			
Lower Boundary of Reach	0324821/4133786	**Elev. (ft)**	7450

Water Chemistry

Air Temp. (ºC)	H_20 Temp. (°C)	D.O. (mg/l)	pH	Sp. Cond. (µs/cm)	Turb.
13.8	13.2	7.45	7.02	0.022	N/R

Physical Habitat Characteristics

Reach Length (ft) (if applicable)

	Habitat 1	Habitat 2	Habitat 3	Notes (note book ID)
Habitat	RIFF	RIFF	RIFF	
Length (ft)	43	145	30	
Transect Location	15 T	50 T	10 T	
Avg Width (ft)	23	35	25	
Avg Depth (ft)	1.0	0.5	0.8	
Max Depth (ft)	2.8	2.0	1.9	
Specific Depth (ft)	1.3/1.8/0.4	0.5/0.4/0.2	0.8/0.8/0.4	
Embeddedness (%)	20	25	20	

SUBSTRATE COMP (%)

1. Fines	---	---	---	
2. Sands	---	---	---	
3. Gravels	5	20	10	
4. Cobbles	20	45	45	
5. Boulders	60	30	45	
6. Bedrock	15	5	---	

*1. Fines-silt/clay, <0.062 mm; 2. Sands, 0.062-2 mm; 3. Gravel, 2-64 mm; 4. Cobbles, 64-256 mm; 5. Boulders, 256-2048 mm; 6. Bedrock

Gradient (%)	7	4	3	
Riffle Velocity (cfs)	0.8	0.8	0.8	
Specific Velocity (cfs)	0.61/0.79/1.04	0.75/0.97/0.81	0.65/1.06/0.55	
Streamflow (cfs)	**	---	---	
% Canopy Cover	40	45	25	

***Poor GPS signal, coordinates corrected based on USGS Topographical map**
****Streamflow gage below Bear Creek Diversion measured 3.3 cfs on September 24, 2002.**
T=Feet from top of unit

BMI HABITAT DATA FORM

Project	506637-8333	**Date**	9/23/02
Stream	Bear Creek	**Crew**	MF, KJ
GPS Coordinate (WGS 84/utm) (accuracy may vary)		**Site ID**	Bear_BD1/Site 1
Upper Boundary of Reach	323548/4132401		
GPS Coordinate (WGS 84/utm) (accuracy may vary)			
Lower Boundary of Reach	323563/4132510	**Elev. (ft)**	

Water Chemistry

Air Temp. (ºC)	H_20 Temp. (°C)	D.O. (mg/l)	pH	Sp. Cond. (µs/cm)	Turb.
---	15.2	8.84	7.19	0.021	---

Physical Habitat Characteristics

Reach Length (ft) (if applicable)

	Habitat 1	Habitat 2	Habitat 3	Notes (note book ID)
Habitat	RIFF	RIFF	RIFF	
Length (ft)	85	26	28	
Transect Location	Top Third	Top Third	Top Third	
Avg Width (ft)	25	14	16	
Avg Depth (ft)	1.3	0.95	1.1	
Max Depth (ft)	2.0	1.2	2.0	
Specific Depth (ft)	0.6/0.4/0.2	0.5/0.8/0.7	0.7/0.6/0.3	
Embeddedness (%)	---	<5	5	

SUBSTRATE COMP (%)

1. Fines	---	---	---	
2. Sands	---	---	---	
3. Gravels	---	---	---	
4. Cobbles	5	10	15	
5. Boulders	95	80	80	
6. Bedrock	---	10	5	

*1. Fines-silt/clay, <0.062 mm; 2. Sands, 0.062-2 mm; 3. Gravel, 2-64 mm; 4. Cobbles, 64-256 mm; 5. Boulders, 256-2048 mm; 6. Bedrock

Gradient (%)	5	4	6	
Riffle Velocity (cfs)	---	---	---	
Specific Velocity (cfs)	---	---	---	
Streamflow (cfs)	**	---	---	
% Canopy Cover	25	5	25	

***Poor GPS signal, coordinates corrected based on USGS Topographical map**
****Streamflow gage below Bear Creek Diversion measured 3.3 cfs on September 23, 2002.**

BMI HABITAT DATA FORM

Project	506637-8333	**Date**	9/6/02
Stream	Chinquapin Creek	**Crew**	SF, WT, KJ
GPS Coordinate (WGS 84/utm) (accuracy may vary)		**Site ID**	Chin_AD/Site AD
Upper Boundary of Reach	0320974/4130374		
GPS Coordinate (WGS 84/utm) (accuracy may vary)			
Lower Boundary of Reach	No Data	**Elev. (ft)**	

Water Chemistry

Air Temp. (ºC)	H_20 Temp. (°C)	D.O. (mg/l)	pH	Sp. Cond. (µs/cm)	Turb.
---	9.1	11.08	6.78	.037	---

Physical Habitat Characteristics

Reach Length (ft) (if applicable)

	Habitat 1	Habitat 2	Habitat 3	Notes (note book ID)
Habitat	Step Pool	Step Pool	Step Pool	
Length (ft)	35	35	35	
Transect Location	4, 12, 31 T	31, 33, 35 T	1, 25, 28 T	
Avg Width (ft)	5.5	8	10	
Avg Depth (ft)	0.82	0.44	0.88	
Max Depth (ft)	1.5	1.6	2.0	
Specific Depth (ft)	0.5/0.2/0.4	0.5 in/ 1 in/ 0.5 in	1 in/ 1.5 in/ 2 in	
Embeddedness (%)	10	25	30	

SUBSTRATE COMP (%)

	Habitat 1	Habitat 2	Habitat 3	Notes
1. Fines	---	1	---	
2. Sands	10	4	5	
3. Gravels	20	10	10	
4. Cobbles	15	25	35	
5. Boulders	50	60	50	
6. Bedrock	5	---	---	

*1. Fines-silt/clay, <0.062 mm; 2. Sands, 0.062-2 mm; 3. Gravel, 2-64 mm; 4. Cobbles, 64-256 mm; 5. Boulders, 256-2048 mm; 6. Bedrock

	Habitat 1	Habitat 2	Habitat 3	Notes
Gradient (%)	12	31	23	
Riffle Velocity (cfs)	0.6	0.3	0.5	
Specific Velocity (cfs)	0.6/0.62/0.52	0.3/0.3/0.3	0.3/0.75/0.3	
Streamflow (cfs)	FTL	FTL	FTL	
% Canopy Cover	57	67	20	

***Poor GPS signal, coordinates corrected based on USGS Topographical map**
FTL = Flow Too Low
T=Feet from top of unit

BMI HABITAT DATA FORM

Project	506637-8333	**Date**	8/13/02
Stream	Chinquapin Creek	**Crew**	KKY, WT
GPS Coordinate (WGS 84/utm) (accuracy may vary)		**Site ID**	Chin_BD2/Site 2
Upper Boundary of Reach	0320975/4130891		
GPS Coordinate (WGS 84/utm) (accuracy may vary)			
Lower Boundary of Reach	0320968/4130895	**Elev. (ft)**	7201

Water Chemistry

Air Temp. (ºC)	$H_2$0 Temp. (°C)	D.O. (mg/l)	pH	Sp. Cond. (µs/cm)	Turb.
24	15	9.9	7.0	0.03	---

Physical Habitat Characteristics

Reach Length (ft) (if applicable)

	Habitat 1	Habitat 2	Habitat 3	Notes (note book ID)
Habitat	RIFF	RIFF		
Length (ft)	26*	27*		
Transect Location	3, 6, 9 T	2, 5, 8 T		
Avg Width (ft)	4	3		
Avg Depth (ft)	0.2	0.2		
Max Depth (ft)	0.4	0.4		
Specific Depth (ft)	0.2/0.2/0.2	0.2/0.3/0.2		
Embeddedness (%)	40	20		

SUBSTRATE COMP (%)

1. Fines	---	---		
2. Sands	5	10		
3. Gravels	15	---		
4. Cobbles	40	40		
5. Boulders	40	50		
6. Bedrock	---	---		

*1. Fines-silt/clay, <0.062 mm; 2. Sands, 0.062-2 mm; 3. Gravel, 2-64 mm; 4. Cobbles, 64-256 mm; 5. Boulders, 256-2048 mm; 6. Bedrock

Gradient (%)	12.3	17.3		
Riffle Velocity (cfs)	0.2	0.2		
Specific Velocity (cfs)	.17/.16/.20	0.33/0.10/0.09		
Streamflow (cfs)	Too low to measure	Too low to measure		
% Canopy Cover	20	65		

*** Channel to narrow to sample along transect**

***Poor GPS signal, coordinates corrected based on USGS Topographical map**
T=Feet from top of unit

BMI HABITAT DATA FORM

Project	506637-8333	**Date**	8/13/02
Stream	Chinquapin Creek	**Crew**	KKY, WT
GPS Coordinate (WGS 84/utm) (accuracy may vary)		**Site ID**	Chin_BD1/Site 1
Upper Boundary of Reach	0320741/4131123		
GPS Coordinate (WGS 84/utm) (accuracy may vary)			
Lower Boundary of Reach	0320741/4131123	**Elev. (ft)**	7021

Water Chemistry

Air Temp. (ºC)	H_2O Temp. (°C)	D.O. (mg/l)	pH	Sp. Cond. (µs/cm)	Turb.
27	15	8.2	6.2	0.02	

Physical Habitat Characteristics

Reach Length (ft) (if applicable)

	Habitat 1	Habitat 2	Habitat 3	Notes (note book ID)
Habitat	RIFF			
Length (ft)	22			
Transect Location	5, 12, 20 T			
Avg Width (ft)	6			
Avg Depth (ft)	0.15			
Max Depth (ft)	0.3			
Specific Depth (ft)	0.1/0.1/0.1			
Embeddedness (%)	70			
SUBSTRATE COMP (%)				
1. Fines	22.7			
2. Sands	20			
3. Gravels	20			
4. Cobbles	20			
5. Boulders	40			
6. Bedrock	---			
Gradient (%)	22.7			
Riffle Velocity (cfs)	Too low to measure			
Specific Velocity (cfs)	Too low to measure			
Streamflow (cfs)	Not enough flow			
% Canopy Cover	40			

*1. Fines-silt/clay, <0.062 mm; 2. Sands, 0.062-2 mm; 3. Gravel, 2-64 mm; 4. Cobbles, 64-256 mm; 5. Boulders, 256-2048 mm; 6. Bedrock

***Poor GPS signal, coordinates corrected based on USGS Topographical map**
T=Feet from top of unit

BMI HABITAT DATA FORM

Project	506637-8333	**Date**	8/14/02
Stream	Camp 62 Creek	**Crew**	KKY, WT, RS
GPS Coordinate (WGS 84/utm) (accuracy may vary)		**Site ID**	C62_AD/Site AD
Upper Boundary of Reach	0320260/4130957		
GPS Coordinate (WGS 84/utm) (accuracy may vary)			
Lower Boundary of Reach	0320259/4131025	**Elev. (ft)**	7267

Water Chemistry

Air Temp. (ºC)	H_2O Temp. (°C)	D.O. (mg/l)	pH	Sp. Cond. (µs/cm)	Turb.
24	14	9.0	5.9	0.02	---

Physical Habitat Characteristics

Reach Length (ft) (if applicable)

	Habitat 1	Habitat 2	Habitat 3	Notes (note book ID)
Habitat	RIFF	RIFF	RIFF	
Length (ft)	48	31	92	
Transect Location	5, 8, 11 T	3, 8, 11 T	10, 15, 20 T	
Avg Width (ft)	6	5	4	
Avg Depth (ft)	0.3	0.4	0.3	
Max Depth (ft)	1.1	0.8	0.7	
Specific Depth (ft)	0.2/0.4/0.3	0.2/0.3/0.2	0.2/0.5/0.2	
Embeddedness (%)	30	40	20	

SUBSTRATE COMP (%)

1. Fines	---	---	---	
2. Sands	5	5	5	
3. Gravels	15	10	15	
4. Cobbles	40	30	50	
5. Boulders	40	55	30	
6. Bedrock	---	---	---	

*1. Fines-silt/clay, <0.062 mm; 2. Sands, 0.062-2 mm; 3. Gravel, 2-64 mm; 4. Cobbles, 64-256 mm; 5. Boulders, 256-2048 mm; 6. Bedrock

Gradient (%)	8.8	8.8	5.8	
Riffle Velocity (cfs)	0.2	0.3	0.3	
Specific Velocity (cfs)	0.15/0.25/0.31	0.24/0.42/0.10	0.14/0.15/0.67	
Streamflow (cfs)	0.02	0.02	0.02	
% Canopy Cover	60	60	50	

***Poor GPS signal, coordinates corrected based on USGS Topographical map**
T=Feet from top of unit

BMI HABITAT DATA FORM

Project	506637-8333	**Date**	8/14/02
Stream	Camp 62 Creek	**Crew**	KKY, WT
GPS Coordinate (WGS 84/utm) (accuracy may vary)		**Site ID**	C62_BD2/Site 2
Upper Boundary of Reach	0320350/4131173		
GPS Coordinate (WGS 84/utm) (accuracy may vary)			
Lower Boundary of Reach	0320469/4131393	**Elev. (ft)**	7086

Water Chemistry

Air Temp. (ºC)	H_2O Temp. (°C)	D.O. (mg/l)	pH	Sp. Cond. (µs/cm)	Turb.
23	14	9.2	9.9	0.02	---

Physical Habitat Characteristics

Reach Length (ft) (if applicable)

	Habitat 1	Habitat 2	Habitat 3	Notes (note book ID)
Habitat			RIFF	
Length (ft)			42	
Transect Location			4, 8, 14 T	
Avg Width (ft)			5.2	
Avg Depth (ft)			0.3	
Max Depth (ft)			0.7	
Specific Depth (ft)			0.5/0.3/0.2	
Embeddedness (%)			20	

SUBSTRATE COMP (%)

1. Fines			---	
2. Sands			5	
3. Gravels			5	
4. Cobbles			30	
5. Boulders			60	
6. Bedrock			---	

*1. Fines-silt/clay, <0.062 mm; 2. Sands, 0.062-2 mm; 3. Gravel, 2-64 mm; 4. Cobbles, 64-256 mm; 5. Boulders, 256-2048 mm; 6. Bedrock

Gradient (%)			12.8	
Riffle Velocity (cfs)			0.3	
Specific Velocity (cfs)			0.08/.10/0.67	
Streamflow (cfs)			0.01	
% Canopy Cover			65	

***Poor GPS signal, coordinates corrected based on USGS Topographical map**
T=Feet from top of unit

BMI HABITAT DATA FORM

Project	506637-8333	**Date**	8/14/02
Stream	Camp 62 Creek	**Crew**	WT, RS, KKY
GPS Coordinate (WGS 84/utm) (accuracy may vary)		**Site ID**	C62_BD1/Site 1
Upper Boundary of Reach	0320508/4132857		
GPS Coordinate (WGS 84/utm) (accuracy may vary)			
Lower Boundary of Reach	0320535/4132938	**Elev. (ft)**	6507

Water Chemistry

Air Temp. (ºC)	$H_2$0 Temp. (°C)	D.O. (mg/l)	pH	Sp. Cond. (µs/cm)	Turb.
25	15	9.4	7.8	0.45	---

Physical Habitat Characteristics

Reach Length (ft) (if applicable)

	Habitat 1	Habitat 2	Habitat 3	Notes (note book ID)
Habitat	RIFF	RIFF	RIFF	
Length (ft)	25	122	86	
Transect Location	1, 4, 7 T	2, 6, 20 T	10, 14, 25 T	
Avg Width (ft)	8	6.1	7.5	
Avg Depth (ft)	0.3	0.4	0.5	
Max Depth (ft)	0.5	0.7	0.9	
Specific Depth (ft)	0.3/0.3/0.3	0.3/0.4/0.3	0.3/0.5/0.3	
Embeddedness (%)	20	20	20	
SUBSTRATE COMP (%)				
1. Fines	---	---	---	
2. Sands	20	15	5	
3. Gravels	---	5	10	
4. Cobbles	70	40	20	
5. Boulders	10	40	65	
6. Bedrock	---	---	---	
Gradient (%)	8.5	4.5	12.5	
Riffle Velocity (cfs)	0.5	0.5	0.5	
Specific Velocity (cfs)	.50/.85/.07	0.83/0.17/0.62	0.59/0.18/0.67	
Streamflow (cfs)	<0.1	<0.1	<0.1	
% Canopy Cover	20	65	85	

*1. Fines-silt/clay, <0.062 mm; 2. Sands, 0.062-2 mm; 3. Gravel, 2-64 mm; 4. Cobbles, 64-256 mm; 5. Boulders, 256-2048 mm; 6. Bedrock

***Poor GPS signal, coordinates corrected based on USGS Topographical map**
T=Feet from top of unit

BMI HABITAT DATA FORM

/Project	506637-8333	Date	9/20/02
Stream	Bolsillo Creek	Crew	EG, EC, KJ
GPS Coordinate (WGS 84/utm) (accuracy may vary)		Site ID	Bols_AD/Site AD
Upper Boundary of Reach	0319179/4131324		
GPS Coordinate (WGS 84/utm) (accuracy may vary)			
Lower Boundary of Reach	0319265/4131245	Elev. (ft)	

Water Chemistry

Air Temp. (ºC)	H_2O Temp. (°C)	D.O. (mg/l)	pH	Sp. Cond. (µs/cm)	Turb.
---	10	7.53	7.30	0.046	---

Physical Habitat Characteristics

Reach Length (ft) (if applicable)

	Habitat 1	Habitat 2	Habitat 3	Notes (note book ID)
Habitat	RUN	STEP RUN		
Length (ft)	80’	---		
Transect Location	Top Third	Top Third		
Avg Width (ft)	4’	3’		
Avg Depth (ft)	.3	.3		
Max Depth (ft)	1.2	.7		
Specific Depth (ft)	0.1/0.1/0.1	0.2/0.2/0.2		
Embeddedness (%)	NA (no cobble/boulders)	20		

SUBSTRATE COMP (%)

1. Fines	5	---		
2. Sands	70	5		
3. Gravels	25	10		
4. Cobbles	---	35		
5. Boulders	---	50		
6. Bedrock	---	---		

*1. Fines-silt/clay, <0.062 mm; 2. Sands, 0.062-2 mm; 3. Gravel, 2-64 mm; 4. Cobbles, 64-256 mm; 5. Boulders, 256-2048 mm; 6. Bedrock

Gradient (%)	2 or 1	5		
Riffle Velocity (cfs)	~0.7 estimated	~0.7 estimated		
Specific Velocity (cfs)	~0.7 estimated	~0.7 estimated		
Streamflow (cfs)	~0.3 (estimated)	---		
% Canopy Cover	80	70		

***Poor GPS signal, coordinates corrected based on USGS Topographical map**

BMI HABITAT DATA FORM

Project	506637-8333	**Date**	9/20/02
Stream	Bolsillo Creek	**Crew**	KS, EC,EG
GPS Coordinate (WGS 84/utm) (accuracy may vary)		**Site ID**	Bols_BD2/Site 2
Upper Boundary of Reach	0319097/4131776		
GPS Coordinate (WGS 84/utm) (accuracy may vary)			
Lower Boundary of Reach	0319141/4131498	**Elev. (ft)**	

Water Chemistry

Air Temp. (ºC)	H_2O Temp. (°C)	D.O. (mg/l)	pH	Sp. Cond. (µs/cm)	Turb.
---	11.6	7.31	7.58	0.047	---

Physical Habitat Characteristics

Reach Length (ft) (if applicable)

	Habitat 1	Habitat 2	Habitat 3	Notes (note book ID)
Habitat	Run	Run		
Length (ft)	112	167		
Transect Location	Top Third	Top Third		
Avg Width (ft)	3	3		
Avg Depth (ft)	.35	.35		
Max Depth (ft)	.7	.7		
Specific Depth (ft)	.15/.2/.2	.15/.3/.2		
Embeddedness (%)	15	20		
SUBSTRATE COMP (%)				
1. Fines	---	---		
2. Sands	30	40		
3. Gravels	50	10		
4. Cobbles	10	10		
5. Boulders	10	10		
6. Bedrock	---	30		

*1. Fines-silt/clay, <0.062 mm; 2. Sands, 0.062-2 mm; 3. Gravel, 2-64 mm; 4. Cobbles, 64-256 mm; 5. Boulders, 256-2048 mm; 6. Bedrock

Gradient (%)	2	3		
Riffle Velocity (cfs)	---	---		
Specific Velocity (cfs)	---	---		
Streamflow (cfs)	---	---		
% Canopy Cover	95	90		

***Poor GPS signal, coordinates corrected based on USGS Topographical map**

BMI HABITAT DATA FORM

Project	506637-8333	**Date**	9/20/02
Stream	Bolsillo Creek	**Crew**	KS, EC, EG
GPS Coordinate (WGS 84/utm) (accuracy may vary)		**Site ID**	Bols_BD1/Site 1
Upper Boundary of Reach	318954/4132756		
GPS Coordinate (WGS 84/utm) (accuracy may vary)			
Lower Boundary of Reach	318954/4132756	**Elev. (ft)**	

Water Chemistry

Air Temp. (ºC)	H_20 Temp. (°C)	D.O. (mg/l)	pH	Sp. Cond. (µs/cm)	Turb.
---	10.9	8.53	6.21	0.069	---

Physical Habitat Characteristics

Reach Length (ft) (if applicable)

	Habitat 1	Habitat 2	Habitat 3	Notes (note book ID)
Habitat	Dry No	Run		
Length (ft)	Alternate	112		
Transect Location	Available	Top Third		
Avg Width (ft)	(Also Dry)	2.5		
Avg Depth (ft)		.2		
Max Depth (ft)		.9		
Specific Depth (ft)		.1/.1/.1		
Embeddedness (%)		N/A		

SUBSTRATE COMP (%)

1. Fines		---		
2. Sands		80		
3. Gravels		20		
4. Cobbles		---		
5. Boulders		---		
6. Bedrock		---		

*1. Fines-silt/clay, <0.062 mm; 2. Sands, 0.062-2 mm; 3. Gravel, 2-64 mm; 4. Cobbles, 64-256 mm; 5. Boulders, 256-2048 mm; 6. Bedrock

Gradient (%)		1		
Riffle Velocity (cfs)		---		
Specific Velocity (cfs)		---		
Streamflow (cfs)		---		
% Canopy Cover		85		

***Poor GPS signal, coordinates corrected based on USGS Topographical map**

BMI HABITAT DATA FORM

Project	506637-8333	**Date**	9/19/02
Stream	Mono Creek	**Crew**	CG, MR, GM
GPS Coordinate (WGS 84/utm) (accuracy may vary)		**Site ID**	Mono_BD4/Site 4
Upper Boundary of Reach	0322986/4136667		
GPS Coordinate (WGS 84/utm) (accuracy may vary)			
Lower Boundary of Reach	0322940/4136565	**Elev. (ft)**	

Water Chemistry

Air Temp. (ºC)	H_20 Temp. (°C)	D.O. (mg/l)	pH	Sp. Cond. (µs/cm)	Turb.
---	16.35	6.84	6.55	0	---

Physical Habitat Characteristics

Reach Length (ft) (if applicable)

	Habitat 1	Habitat 2	Habitat 3	Notes (note book ID)
Habitat	Riffle	Riffle	Riffle	
Length (ft)	31	52	30	
Transect Location	Upper third	Upper third	Upper third	
Avg Width (ft)	14.5	25	29	
Avg Depth (ft)	1.2	1.6	1.8	
Max Depth (ft)	1.6	4.0	2.2	
Specific Depth (ft)	1.2	1.6	1.8	
Embeddedness (%)	25	25	25	

SUBSTRATE COMP (%)

1. Fines	5	10	10	
2. Sands	20	25	20	
3. Gravels	---	---	---	
4. Cobbles	35	30	10	
5. Boulders	40	35	60	
6. Bedrock	---	---	---	

*1. Fines-silt/clay, <0.062 mm; 2. Sands, 0.062-2 mm; 3. Gravel, 2-64 mm; 4. Cobbles, 64-256 mm; 5. Boulders, 256-2048 mm; 6. Bedrock

Gradient (%)	5.65	4.81	5.57	
Riffle Velocity (cfs)	1.8	1.8	1.5	
Specific Velocity (cfs)	1.8/1.8/1.8	1.8/1.8/1.8	1.5/1.5/1.5	
Streamflow (cfs)	18.34	18.34	18.34	
% Canopy Cover	45	12.5	20	

***Poor GPS signal, coordinates corrected based on USGS Topographical map**

BMI HABITAT DATA FORM

Project	506637-8333	**Date**	9/19/02
Stream	Mono Creek	**Crew**	CG, MR, GM
GPS Coordinate (WGS 84/utm) (accuracy may vary)		**Site ID**	Mono_BD3/Site 3
Upper Boundary of Reach	0322194/4136398		
GPS Coordinate (WGS 84/utm) (accuracy may vary)			
Lower Boundary of Reach	0322174/4136290	**Elev. (ft)**	

Water Chemistry

Air Temp. (ºC)	H_20 Temp. (°C)	D.O. (mg/l)	pH	Sp. Cond. (µs/cm)	Turb.
---	16.35	6.84	6.55	0	---

Physical Habitat Characteristics

Reach Length (ft) (if applicable)

	Habitat 1 3a	Habitat 2 3b	Habitat 3 3c	Notes (note book ID)
Habitat	Riffle	Riffle	Riffle	
Length (ft)	55	53	44	
Transect Location	Upper third	Upper third	Upper third	
Avg Width (ft)	41	38	23	
Avg Depth (ft)	1.2	1.8	2.1	
Max Depth (ft)	2.2	1.9	2.6	
Specific Depth (ft)	1.2	1.8	2.1	
Embeddedness (%)	25	25	25	

SUBSTRATE COMP (%)

1. Fines	---	---	---	
2. Sands	10	5	5	
3. Gravels	---	15	10	
4. Cobbles	10	---	5	
5. Boulders	80	80	80	
6. Bedrock	---	---	---	

*1. Fines-silt/clay, <0.062 mm; 2. Sands, 0.062-2 mm; 3. Gravel, 2-64 mm; 4. Cobbles, 64-256 mm; 5. Boulders, 256-2048 mm; 6. Bedrock

Gradient (%)	6.82	5.66	4.55	
Riffle Velocity (cfs)	2.4	2.6	1.6	
Specific Velocity (cfs)	2.4/2.4/2.4	2.6/2.6/2.6	1.6/1.6/1.6	
Streamflow (cfs)	---	---	---	
% Canopy Cover	20	35	20	

***Poor GPS signal, coordinates corrected based on USGS Topographical map**

BMI HABITAT DATA FORM

Project	506637-8333	**Date**	9/20/02
Stream	Mono Creek	**Crew**	CG, MR, GM
GPS Coordinate (WGS 84/utm) (accuracy may vary)		**Site ID**	Mono_BD2/Site 2
Upper Boundary of Reach	0318289/4135595		
GPS Coordinate (WGS 84/utm) (accuracy may vary)			
Lower Boundary of Reach	0318265/4135438	**Elev. (ft)**	

Water Chemistry

Air Temp. (ºC)	H_2O Temp. (°C)	D.O. (mg/l)	pH	Sp. Cond. (µs/cm)	Turb.
---	16.35	6.84	6.55	0	---

Physical Habitat Characteristics

Reach Length (ft) (if applicable)

	Habitat 1	Habitat 2	Habitat 3	Notes (note book ID)
Habitat	Riffle	Riffle	Riffle	
Length (ft)	40	36	105	
Transect Location	Upper third	Upper third	Upper third	
Avg Width (ft)	31	32	28	
Avg Depth (ft)	1.5	1.5	1.6	
Max Depth (ft)	2.25	2.3	2.5	
Specific Depth (ft)	1.5	1.5	1.6	
Embeddedness (%)	25	25	25	

SUBSTRATE COMP (%)

1. Fines	---	---	---	
2. Sands	2	2	5	
3. Gravels	3	4	10	
4. Cobbles	5	4	5	
5. Boulders	90	90	80	
6. Bedrock	---	---	---	

*1. Fines-silt/clay, <0.062 mm; 2. Sands, 0.062-2 mm; 3. Gravel, 2-64 mm; 4. Cobbles, 64-256 mm; 5. Boulders, 256-2048 mm; 6. Bedrock

Gradient (%)	2.5	11.11	4.0	
Riffle Velocity (cfs)	1.4	2.5	24.9	
Specific Velocity (cfs)	1.4/1.4/1.4	2.5/2.5/2.5	24.93/24.93/24.93	
Streamflow (cfs)	24.93	24.93	24.93	
% Canopy Cover	15	30	25	

***Poor GPS signal, coordinates corrected based on USGS Topographical map**

BMI HABITAT DATA FORM

Project	506637-8333	**Date**	9/20/02
Stream	Mono Creek	**Crew**	CG, MR, GM
GPS Coordinate (WGS 84/utm) (accuracy may vary)		**Site ID**	Mono_BD1/Site 1
Upper Boundary of Reach	0317324/4135798		
GPS Coordinate (WGS 84/utm) (accuracy may vary)			
Lower Boundary of Reach	0317174/4135961	**Elev. (ft)**	

Water Chemistry

Air Temp. (ºC)	H_2O Temp. (°C)	D.O. (mg/l)	pH	Sp. Cond. (µs/cm)	Turb.
---	16.35	6.84	6.55	0	---

Physical Habitat Characteristics

Reach Length (ft) (if applicable)

	Habitat 1	Habitat 2	Habitat 3	Notes (note book ID)
Habitat	Riffle	Riffle	Riffle	
Length (ft)	25	250	60	
Transect Location	Upper half	Upper third	Upper third	
Avg Width (ft)	17	50	35	
Avg Depth (ft)	1.4	1.2	1.8	
Max Depth (ft)	2.2	2.8	2.5	
Specific Depth (ft)	1.4	1.2	1.8	
Embeddedness (%)	25	25	25	

SUBSTRATE COMP (%)

1. Fines	---	---	---	
2. Sands	5	3	2	
3. Gravels	10	5	3	
4. Cobbles	---	2	5	
5. Boulders	85	90	90	
6. Bedrock	---	---	---	

*1. Fines-silt/clay, <0.062 mm; 2. Sands, 0.062-2 mm; 3. Gravel, 2-64 mm; 4. Cobbles, 64-256 mm; 5. Boulders, 256-2048 mm; 6. Bedrock

Gradient (%)	10	5	4	
Riffle Velocity (cfs)	1.2	1.1	1.6	
Specific Velocity (cfs)	1.2/1.2/1.2	1.1/1.1/1.1	1.6/1.6/1.6	
Streamflow (cfs)	---	---	---	
% Canopy Cover	25	15	20	

***Poor GPS signal, coordinates corrected based on USGS Topographical map**

BMI HABITAT DATA FORM

Project	506637-8333	**Date**	8/27/02
Stream	San Joaquin River (Mammoth Reach)	**Crew**	RS, EC, KKY
GPS Coordinate (WGS 84/utm) (accuracy may vary)		**Site ID**	SJR_AMP/Site AD
Upper Boundary of Reach	0298636/4141171		
GPS Coordinate (WGS 84/utm) (accuracy may vary)			
Lower Boundary of Reach	0298425/4140994	**Elev. (ft)**	3380

Water Chemistry

Air Temp. (ºC)	$H_2$0 Temp. (°C)	D.O. (mg/l)	pH	Sp. Cond. (µs/cm)	Turb.
24	18.7	10.25	6.42	0.064	N/R

Physical Habitat Characteristics

Reach Length (ft) (if applicable)

	Habitat 1	Habitat 2	Habitat 3	Notes (note book ID)
Habitat	RIFF	RIFF	RIFF	
Length (ft)	58	47	66	
Transect Location	15 T	12 T	18 T	
Avg Width (ft)	50	43	70	
Avg Depth (ft)	2.0	2.2	1.2	
Max Depth (ft)	5.5	4.0	3.0	
Specific Depth (ft)	1.6/0.6/1.9	0.6/1.2/1.5	0.6/0.2/0.4	
Embeddedness (%)	10	25	10	
SUBSTRATE COMP (%)				
1. Fines	---	---	---	
2. Sands	---	---	---	
3. Gravels	---	---	---	
4. Cobbles	10	20	10	
5. Boulders	20	40	30	
6. Bedrock	70	40	60	
Gradient (%)	3.8	4.3	5.7	
Riffle Velocity (cfs)	1.6	2.7	1.8	
Specific Velocity (cfs)	1.27/2.21/1.45	3.07/2.50/2.51	1.41/2.24/1.82	
Streamflow (cfs)	---	---	---	
% Canopy Cover	6	8	6	

*1. Fines-silt/clay, <0.062 mm; 2. Sands, 0.062-2 mm; 3. Gravel, 2-64 mm; 4. Cobbles, 64-256 mm; 5. Boulders, 256-2048 mm; 6. Bedrock

***Poor GPS signal, coordinates corrected based on USGS Topographical map**
T=Feet from top of unit

BMI HABITAT DATA FORM

Project	506637-8333	**Date**	8/24/02
Stream	San Joaquin River (Mammoth Reach)	**Crew**	RS, KKY
GPS Coordinate (WGS 84/utm) (accuracy may vary)		**Site ID**	SJR_BM4/Site 4
Upper Boundary of Reach	0294024/4132990		
GPS Coordinate (WGS 84/utm) (accuracy may vary)			
Lower Boundary of Reach	0293852/4132803	**Elev. (ft)**	2861

Water Chemistry

Air Temp. (ºC)	H_20 Temp. (°C)	D.O. (mg/l)	pH	Sp. Cond. (µs/cm)	Turb.
---	17.2	11.29	6.83	.018	N/R

Physical Habitat Characteristics

Reach Length (ft) (if applicable)

	Habitat 1	Habitat 2	Habitat 3	Notes (note book ID)
Habitat	RIFF	RIFF	RIFF	
Length (ft)	218	32	45	
Transect Location	60 T	3 T	15 T	
Avg Width (ft)	55	45	29	
Avg Depth (ft)	0.9	0.7	0.8	
Max Depth (ft)	3.0	1.8	1.8	
Specific Depth (ft)	0.3/0.6/0.4	0.6/0.8/0.9	0.6/0.5/0.8	
Embeddedness (%)	10	10	15	
SUBSTRATE COMP (%)				
1. Fines	---	---	---	
2. Sands	---	---	---	
3. Gravels	---	---	5	
4. Cobbles	20	30	40	
5. Boulders	70	60	50	
6. Bedrock	10	10	5	

*1. Fines-silt/clay, <0.062 mm; 2. Sands, 0.062-2 mm; 3. Gravel, 2-64 mm; 4. Cobbles, 64-256 mm; 5. Boulders, 256-2048 mm; 6. Bedrock

Gradient (%)	17.2	10	6.3	
10	2.2	1.6	2.5	
Specific Velocity (cfs)	0.85/1.77/4.01	0.94/2.42/2.38	2.09/1.60/3.82	
Streamflow (cfs)	**	---	---	
% Canopy Cover	3	1	13	

***Poor GPS signal, coordinates corrected based on USGS Topographical map**
****Streamflow gage above Shakeflat Creek confluence measured 34 cfs on August 24, 2002.**
T=Feet from top of unit

BMI HABITAT DATA FORM

Project	506637-8333	**Date**	8/23/02
Stream	San Joaquin River (Mammoth Reach)	**Crew**	RS, RE, KKY
GPS Coordinate (WGS 84/utm) (accuracy may vary)		**Site ID**	SJR_BM3/Site 3
Upper Boundary of Reach	0293347/4128747		
GPS Coordinate (WGS 84/utm) (accuracy may vary)			
Lower Boundary of Reach	0293339/4128419	**Elev. (ft)**	2694

Water Chemistry

Air Temp. (ºC)	H_20 Temp. (°C)	D.O. (mg/l)	pH	Sp. Cond. (µs/cm)	Turb.
24.3	18.5	8.01	8.23	0.018	N/R

Physical Habitat Characteristics

Reach Length (ft) (if applicable)

	Habitat 1	Habitat 2	Habitat 3	Notes (note book ID)
Habitat	RIFF	RIFF	RIFF	
Length (ft)	52	48	127	
Transect Location	12 T	15 T	4 T	
Avg Width (ft)	58	48	37	
Avg Depth (ft)	1.0	1.2	1.1	
Max Depth (ft)	2.3	3.0	3.1	
Specific Depth (ft)	0/0.7/0.7	0.7/0.8/0.7	0.4/0.7/0.6	
Embeddedness (%)	30	20	20	

SUBSTRATE COMP (%)

1. Fines	---	---	---	
2. Sands	---	---	---	
3. Gravels	---	---	---	
4. Cobbles	10	15	10	
5. Boulders	30	25	30	
6. Bedrock	60	60	60	

*1. Fines-silt/clay, <0.062 mm; 2. Sands, 0.062-2 mm; 3. Gravel, 2-64 mm; 4. Cobbles, 64-256 mm; 5. Boulders, 256-2048 mm; 6. Bedrock

Gradient (%)	10.3	4.7	15.9	
Riffle Velocity (cfs)	1.3	4.1	1.4	
Specific Velocity (cfs)	2.17/0.51/1.1/	2.58/4.38/5.22	1.26/0.49/2.45	
Streamflow (cfs)	**	---	---	
% Canopy Cover	9	14	12	

***Poor GPS signal, coordinates corrected based on USGS Topographical map**
****Streamflow gage above Shakeflat Creek confluence measured 34 cfs on August 23, 2002.**
T=Feet from top of unit

BMI HABITAT DATA FORM

Project	506637-8333	**Date**	8/23/02
Stream	San Joaquin River (Mammoth Reach)	**Crew**	RS, RE, KKY
GPS Coordinate (WGS 84/utm) (accuracy may vary)		**Site ID**	SJR_BM2/Site 2
Upper Boundary of Reach	0293434/4127632		
GPS Coordinate (WGS 84/utm) (accuracy may vary)			
Lower Boundary of Reach	0293750/4127190	**Elev. (ft)**	2475

Water Chemistry

Air Temp. (ºC)	$H_2$0 Temp. (°C)	D.O. (mg/l)	pH	Sp. Cond. (µs/cm)	Turb.
31	18.9	8.72	8.98	0.024	N/R

Physical Habitat Characteristics

Reach Length (ft) (if applicable)

	Habitat 1	Habitat 2	Habitat 3	Notes (note book ID)
Habitat	RIFF	RIFF	RIFF	
Length (ft)	73	161	73	
Transect Location	15 T	45 T	18 T	
Avg Width (ft)	40	103	60	
Avg Depth (ft)	0.8	1.5	1.0	
Max Depth (ft)	1.9	3.8	3.5	
Specific Depth (ft)	0.8/0.8/0.6	0.7/0.4/0.9	1.8/1.0/0.9	
Embeddedness (%)	20	30	20	

SUBSTRATE COMP (%)

1. Fines	---	---	---	
2. Sands	---	---	---	
3. Gravels	5	---	---	
4. Cobbles	20	10	20	
5. Boulders	65	30	50	
6. Bedrock	10	60	30	

*1. Fines-silt/clay, <0.062 mm; 2. Sands, 0.062-2 mm; 3. Gravel, 2-64 mm; 4. Cobbles, 64-256 mm; 5. Boulders, 256-2048 mm; 6. Bedrock

Gradient (%)	3.3	5.2	5.5	
Riffle Velocity (cfs)	1.7	1.8	1.9	
Specific Velocity (cfs)	1.32/2.55/1.46	2.99/1.11/1.42	2.34/1.63/1.96	
Streamflow (cfs)	---	---	---	
% Canopy Cover	12	9	13	

***Poor GPS signal, coordinates corrected based on USGS Topographical map**
T=Feet from top of unit

BMI HABITAT DATA FORM

Project	506637-8333	**Date**	8/22/02
Stream	San Joaquin River (Mammoth Reach)	**Crew**	RS, RE, KKY
GPS Coordinate (WGS 84/utm) (accuracy may vary)		**Site ID**	SJR_BM1/Site 1
Upper Boundary of Reach	0292953/4122483		
GPS Coordinate (WGS 84/utm) (accuracy may vary)			
Lower Boundary of Reach	0292706/4121985	**Elev. (ft)**	2156

Water Chemistry

Air Temp. (ºC)	H_2O Temp. (°C)	D.O. (mg/l)	pH	Sp. Cond. (µs/cm)	Turb.
29	20.4	9.16	7.08	0.026	N/R

Physical Habitat Characteristics

Reach Length (ft) (if applicable)

	Habitat 1	Habitat 2	Habitat 3	Notes (note book ID)
Habitat	RIFF	RIFF	RIFF	
Length (ft)	267	134	48	
Transect Location	63 T	39 T	3 T	
Avg Width (ft)	83	33	52	
Avg Depth (ft)	0.7	0.5	0.9	
Max Depth (ft)	1.8	1.3	2.0	
Specific Depth (ft)	0.6/0.5/0.5	0.6/0.6/0.9	0.5/0.6/0.2	
Embeddedness (%)	25	10	10	

SUBSTRATE COMP (%)

1. Fines	---	---	---	
2. Sands	---	---	---	
3. Gravels	20	10	5	
4. Cobbles	50	60	35	
5. Boulders	30	20	40	
6. Bedrock	---	10	20	

*1. Fines-silt/clay, <0.062 mm; 2. Sands, 0.062-2 mm; 3. Gravel, 2-64 mm; 4. Cobbles, 64-256 mm; 5. Boulders, 256-2048 mm; 6. Bedrock

Gradient (%)	2.2	1.8	2.1	
Riffle Velocity (cfs)	2.5	1.4	1.6	
Specific Velocity (cfs)	1.38/3.27/3.0	1.61/1.12/1.75	1.98/2.23/0.82	
Streamflow (cfs)	---	---	---	
% Canopy Cover	5	4	7	

***Poor GPS signal, coordinates corrected based on USGS Topographical map**
T=Feet from top of unit

BMI HABITAT DATA FORM

Project	506637-8333	**Date**	9/26/03
Stream	Rock Creek	**Crew**	SH JV
GPS Coordinate (WGS 84/utm) (accuracy may vary)		**Site ID**	Rock_AD/Site AD
Upper Boundary of Reach	0292565/4127796		
GPS Coordinate (WGS 84/utm) (accuracy may vary)			
Lower Boundary of Reach	0292565/4127796	**Elev. (ft)**	4853

Water Chemistry

Air Temp. (ºC)	H_20 Temp. (°C)	D.O. (mg/l)	pH	Sp. Cond. (µs/cm)	Turb.
---	16.3	9.1	6.82	0.045	---

Physical Habitat Characteristics

Reach Length (ft) (if applicable) ~400

	Habitat 1	Habitat 2	Habitat 3	Notes (note book ID)
Habitat	RIFF	RIFF	RIFF	
Length (ft)	25.0	45.0	35.0	
Transect Location	SPOT	SPOT	SPOT	
Avg Width (ft)	3.5	3.5	5.0	
Avg Depth (ft)	0.5	0.3	0.4	
Max Depth (ft)	1.0	0.8	1.2	
Specific Depth (ft)	0.9	0.4/0.4/0.6	0.6/0.4/0.3	
Embeddedness (%)	20	20	20	

SUBSTRATE COMP (%)

	Habitat 1	Habitat 2	Habitat 3	Notes (note book ID)
1. Fines	---	---	---	
2. Sands	---	---	---	
3. Gravels	---	10	10	
4. Cobbles	10	20	20	
5. Boulders	70	60	70	
6. Bedrock	20	10	---	

*1. Fines-silt/clay, <0.062 mm; 2. Sands, 0.062-2 mm; 3. Gravel, 2-64 mm; 4. Cobbles, 64-256 mm; 5. Boulders, 256-2048 mm; 6. Bedrock

	Habitat 1	Habitat 2	Habitat 3	Notes (note book ID)
Gradient (%)	2.0	2.0	3.0	
Riffle Velocity (cfs)	---	---	---	
Specific Velocity (cfs)	---	---	---	
Streamflow (cfs)	---	---	---	
% Canopy Cover	90	70	70	

***Poor GPS signal, coordinates corrected based on USGS Topographical map**

BMI HABITAT DATA FORM

Project	506637-8333	**Date**	9/26/02
Stream	Rock Creek	**Crew**	SH JV
GPS Coordinate (WGS 84/utm) (accuracy may vary)		**Site ID**	Rock_BD2/Site 2
Upper Boundary of Reach	0292656/04127864		
GPS Coordinate (WGS 84/utm) (accuracy may vary)			
Lower Boundary of Reach	0292656/04127864	**Elev. (ft)**	

Water Chemistry

Air Temp. (ºC)	H_2O Temp. (°C)	D.O. (mg/l)	pH	Sp. Cond. (µs/cm)	Turb.
---	17.5	8.87	6.8	0.044	---

Physical Habitat Characteristics

Reach Length (ft) (if applicable) ~200

	Habitat 1	Habitat 2	Habitat 3	Notes (note book ID)
Habitat	BRSH	BRSH	BRSH	
Length (ft)	30	30	30	
Transect Location	SPOT	SPOT	SPOT	
Avg Width (ft)	5.0	5.0	5.0	
Avg Depth (ft)	0.6	0.2	0.3	
Max Depth (ft)	1.9*	1.1*	1.0*	
Specific Depth (ft)	0.2/0.2/0.5	0.5/0.1/0.1	0.2/0.2/0.4	
Embeddedness (%)	0	0	0	

SUBSTRATE COMP (%)

1. Fines	----	----	----	
2. Sands	----	----	---	
3. Gravels	---	---	---	
4. Cobbles	---	---	---	
5. Boulders	---	---	---	
6. Bedrock	100	100	100	

*1. Fines-silt/clay, <0.062 mm; 2. Sands, 0.062-2 mm; 3. Gravel, 2-64 mm; 4. Cobbles, 64-256 mm; 5. Boulders, 256-2048 mm; 6. Bedrock

Gradient (%)	2	2	2	
Riffle Velocity (cfs)	---	---	---	
Specific Velocity (cfs)	---	---	---	
Streamflow (cfs)	---	---	---	
% Canopy Cover	5	5	5	

***max depth reading in bedrock scour pockets**

BMI HABITAT DATA FORM

Project	506637-8333	**Date**	9/26/02
Stream	Rock Creek	**Crew**	MF GM
GPS Coordinate (WGS 84/utm) (accuracy may vary)		**Site ID**	Rock_BD1/Site 1
Upper Boundary of Reach	293200/4127948		
GPS Coordinate (WGS 84/utm) (accuracy may vary)			
Lower Boundary of Reach	293200/4127948	**Elev. (ft)**	

Water Chemistry

Air Temp. (ºC)	H_20 Temp. (°C)	D.O. (mg/l)	pH	Sp. Cond. (µs/cm)	Turb.
---	16.8	8.04	7.05	0.06	---

Physical Habitat Characteristics

Reach Length (ft) (if applicable)

	Habitat 1	Habitat 2	Habitat 3	Notes (note book ID)
Habitat	RIFF	RIFF		
Length (ft)	13	14		
Transect Location	Top Third	Top Third		
Avg Width (ft)	3.5	10		
Avg Depth (ft)	0.45	0.6		
Max Depth (ft)	1.0	0.8		
Specific Depth (ft)	0.15/0.2/0.45	0.6/0.6/0.8		
Embeddedness (%)	5	50		

SUBSTRATE COMP (%)

	Habitat 1	Habitat 2	Habitat 3	Notes (note book ID)
1. Fines	---	---		
2. Sands	15	---		
3. Gravels	---	---		
4. Cobbles	---	---		
5. Boulders	85	95		
6. Bedrock	---	5		

*1. Fines-silt/clay, <0.062 mm; 2. Sands, 0.062-2 mm; 3. Gravel, 2-64 mm; 4. Cobbles, 64-256 mm; 5. Boulders, 256-2048 mm; 6. Bedrock

	Habitat 1	Habitat 2	Habitat 3	Notes (note book ID)
Gradient (%)	7	3		
Riffle Velocity (cfs)	---	---		
Specific Velocity (cfs)	---	---		
Streamflow (cfs)	---	---		
% Canopy Cover	87	75		

***Poor GPS signal, coordinates corrected based on USGS Topographical map**

BMI HABITAT DATA FORM

Project	506637-8333	**Date**	8/22/02
Stream	San Joaquin River (Stevenson Reach)	**Crew**	RS, RE, KKY
GPS Coordinate (WGS 84/utm) (accuracy may vary)		**Site ID**	SJR_SR4/Site SR4
Upper Boundary of Reach	0293190/4120342		
GPS Coordinate (WGS 84/utm) (accuracy may vary)			
Lower Boundary of Reach	0293144/4120208	**Elev. (ft)**	1983

Water Chemistry

Air Temp. (ºC)	H_20 Temp. (°C)	D.O. (mg/l)	pH	Sp. Cond. (µs/cm)	Turb.
26.5	15.7	9.58	8.33	0.016	10

Physical Habitat Characteristics

Reach Length (ft) (if applicable)

	Habitat 1	Habitat 2	Habitat 3	Notes (note book ID)
Habitat	RIFF	RIFF		
Length (ft)	119	57		
Transect Location	20 T	18 T		
Avg Width (ft)	40	42		
Avg Depth (ft)	0.6	0.8		
Max Depth (ft)	1.3	2.4		
Specific Depth (ft)	0.6/0.3/0.4	0.6/0.4/0.4		
Embeddedness (%)	20	10		

SUBSTRATE COMP (%)

1. Fines	---	---		
2. Sands	---	---		
3. Gravels	---	---		
4. Cobbles	20	15		
5. Boulders	20	60		
6. Bedrock	60	25		

*1. Fines-silt/clay, <0.062 mm; 2. Sands, 0.062-2 mm; 3. Gravel, 2-64 mm; 4. Cobbles, 64-256 mm; 5. Boulders, 256-2048 mm; 6. Bedrock

Gradient (%)	3.4	6.1		
Riffle Velocity (cfs)	2.2	1.6		
Specific Velocity (cfs)	2.8/1.5/2.4	1.7/0.69/2.4		
Streamflow (cfs)	**	---		
% Canopy Cover	4	7		

***Poor GPS signal, coordinates corrected based on USGS Topographical map**
****Streamflow gage above Stevenson Creek confluence measured 3.5 cfs on August 22, 2002.**
T=Feet from top of unit

BMI HABITAT DATA FORM

Project	506637-8333	**Date**	8/21/02
Stream	San Joaquin River (Stevenson Reach)	**Crew**	RS, RE, KKY
GPS Coordinate (WGS 84/utm) (accuracy may vary)		**Site ID**	SJR_SR3/Site SR3
Upper Boundary of Reach	0291880/4118328		
GPS Coordinate (WGS 84/utm) (accuracy may vary)			
Lower Boundary of Reach	0291743/4118277	**Elev. (ft)**	1954

Water Chemistry

Air Temp. (ºC)	H_20 Temp. (°C)	D.O. (mg/l)	pH	Sp. Cond. (µs/cm)	Turb.
32	20.4	8.06	8.24	0.019	10

Physical Habitat Characteristics

Reach Length (ft) (if applicable)

	Habitat 1	Habitat 2	Habitat 3	Notes (note book ID)
Habitat	RIFF	RIFF	RIFF	
Length (ft)	26	65	32	
Transect Location	6 T	15 T	10 T	
Avg Width (ft)	37	74	32	
Avg Depth (ft)	0.5	0.6	0.6	
Max Depth (ft)	2.0	1.3	1.6	
Specific Depth (ft)	0.6/0.4/0.4	0.4/0.12/0.3	0.3/0.3/0.3	
Embeddedness (%)	20	10	30	

SUBSTRATE COMP (%)

1. Fines	---	---	---	
2. Sands	---	---	---	
3. Gravels	---	10	20	
4. Cobbles	20	10	20	
5. Boulders	40	40	40	
6. Bedrock	40	40	20	

*1. Fines-silt/clay, <0.062 mm; 2. Sands, 0.062-2 mm; 3. Gravel, 2-64 mm; 4. Cobbles, 64-256 mm; 5. Boulders, 256-2048 mm; 6. Bedrock

Gradient (%)	5.7	12.3	13.3	
Riffle Velocity (cfs)	1.7	1.0	1.3	
Specific Velocity (cfs)	1.38/0.29/3.45	1.45/1.1/0.37	1.5/1.37/0.89	
Streamflow (cfs)	**	---	---	
% Canopy Cover	12	6	8	

***Poor GPS signal, coordinates corrected based on USGS Topographical map**
****Streamflow gage above Stevenson Creek confluence measured 3.5 cfs on August 22, 2002.**
T=Feet from top of unit

BMI HABITAT DATA FORM

Project	506637-8333	**Date**	8/21/02
Stream	San Joaquin River (Stevenson Reach)	**Crew**	RS, RE, KKY
GPS Coordinate (WGS 84/utm) (accuracy may vary)		**Site ID**	SJR_SR2/Site SR2
Upper Boundary of Reach	0290408/4116304		
GPS Coordinate (WGS 84/utm) (accuracy may vary)			
Lower Boundary of Reach	0290257/4116067	**Elev. (ft)**	1587

Water Chemistry

Air Temp. (ºC)	$H_2$0 Temp. (°C)	D.O. (mg/l)	pH	Sp. Cond. (µs/cm)	Turb.
31	18.4	9.61	Not Working	0.023	2

Physical Habitat Characteristics

Reach Length (ft) (if applicable)

	Habitat 1	Habitat 2	Habitat 3	Notes (note book ID)
Habitat	RIFF	RIFF	RIFF	
Length (ft)	90	32	49	
Transect Location	21 T	11 T	15 T	
Avg Width (ft)	88	44	69	
Avg Depth (ft)	0.7	0.9	1.0	
Max Depth (ft)	1.7	1.8	2.4	
Specific Depth (ft)	0.5/0.3/0.3	1.0/0.5/0.4	0.4/0.4/0.3	
Embeddedness (%)	0	10	20	

SUBSTRATE COMP (%)

1. Fines	---	---	---	
2. Sands	---	---	---	
3. Gravels	---	---	---	
4. Cobbles	10	10	30	
5. Boulders	50	50	30	
6. Bedrock	40	30	40	

*1. Fines-silt/clay, <0.062 mm; 2. Sands, 0.062-2 mm; 3. Gravel, 2-64 mm; 4. Cobbles, 64-256 mm; 5. Boulders, 256-2048 mm; 6. Bedrock

Gradient (%)	15.8	5.2	2.4	
Riffle Velocity (cfs)	1.2	3.8	1.3	
Specific Velocity (cfs)	0.21/1.98/1.41	2.04/1.45/7.85	2.22/1.49/0.09	
Streamflow (cfs)	---	---	---	
% Canopy Cover	12	12	9	

***Poor GPS signal, coordinates corrected based on USGS Topographical map**
T=Feet from top of unit

BMI HABITAT DATA FORM

Project	506637-8333	**Date**	8/20/02
Stream	San Joaquin River (Stevenson Reach)	**Crew**	RS, RE, KKY
GPS Coordinate (WGS 84/utm) (accuracy may vary)		**Site ID**	SJR_SR1/Site SR1
Upper Boundary of Reach	0289075/4115019		
GPS Coordinate (WGS 84/utm) (accuracy may vary)			
Lower Boundary of Reach	0288436/4114667	**Elev. (ft)**	1408

Water Chemistry

Air Temp. (ºC)	$H_2$0 Temp. (°C)	D.O. (mg/l)	pH	Sp. Cond. (µs/cm)	Turb.
29	22	10.9	9.9	0.03	-1

Physical Habitat Characteristics

Reach Length (ft) (if applicable)

	Habitat 1	Habitat 2	Habitat 3	Notes (note book ID)
Habitat	RIFF	RIFF	RIFF	
Length (ft)	66	33	132	
Transect Location	9 T	12 T	24 T	
Avg Width (ft)	65	81	70	
Avg Depth (ft)	0.7	0.7	0.7	
Max Depth (ft)	1.3	2.2	1.8	
Specific Depth (ft)	0.4/0.5/0.3	0.3/0.2/0.8	0.5/0.2/0.3	
Embeddedness (%)	10	20	10	

SUBSTRATE COMP (%)

1. Fines	---	---	---	
2. Sands	---	---	---	
3. Gravels	5	5	---	
4. Cobbles	35	15	15	
5. Boulders	60	50	50	
6. Bedrock	---	30	35	

*1. Fines-silt/clay, <0.062 mm; 2. Sands, 0.062-2 mm; 3. Gravel, 2-64 mm; 4. Cobbles, 64-256 mm; 5. Boulders, 256-2048 mm; 6. Bedrock

Gradient (%)	2.6	2.2	5.4	
Riffle Velocity (cfs)	1.3	0.6	1.6	
Specific Velocity (cfs)	1.80/0.81/1.73	0.03/0.52/1.24	2.28/1.07/2.64	
Streamflow (cfs)	4.13	4.13	4.13	
% Canopy Cover	5	4	2	

***Poor GPS signal, coordinates corrected based on USGS Topographical map**
T=Feet from top of unit

BMI HABITAT DATA FORM

Project	506637-8333	**Date**	9/23/02
Stream	Big Creek Dam 1 to Powerhouse 1	**Crew**	CG, MR
GPS Coordinate (WGS 84/utm) (accuracy may vary)		**Site ID**	BC1-1_3/Site 3
Upper Boundary of Reach	0303783/4123048		
GPS Coordinate (WGS 84/utm) (accuracy may vary)			
Lower Boundary of Reach	0303783/4123048	**Elev. (ft)**	

Water Chemistry

Air Temp. (ºC)	$H_2$0 Temp. (°C)	D.O. (mg/l)	pH	Sp. Cond. (µs/cm)	Turb.
---	15.7	7.5	6.36	0.020	---

Physical Habitat Characteristics

Reach Length (ft) (if applicable)

	Habitat 1	Habitat 2	Habitat 3	Notes (note book ID)
Habitat	RIFF	RIFF	RIFF	
Length (ft)	10	35	80	
Transect Location	Top Third	Top Third	Top Third	
Avg Width (ft)	6	5	6	
Avg Depth (ft)	0.2	0.6	0.4	
Max Depth (ft)	0.5	0.8	0.8	
Specific Depth (ft)	0.3/0.2/0.2	0.2/0.4/0.6	0.4/0.4/0.5	
Embeddedness (%)	40	40	40	
SUBSTRATE COMP (%)				
1. Fines	10	10	20	
2. Sands	70	60	50	
3. Gravels	---	15	25	
4. Cobbles	20	15	3	
5. Boulders	---	---	2	
6. Bedrock	---	---	---	
Gradient (%)	4	6	3	
Riffle Velocity (cfs)	1.1	1.1	1.1	
Specific Velocity (cfs)	1.1/1.1/1.1	1.1/1.1/1.1	1.1/1.1/1.1	
Streamflow (cfs)	2.0	2.0	2.0	
% Canopy Cover	85	99	99	

*1. Fines-silt/clay, <0.062 mm; 2. Sands, 0.062-2 mm; 3. Gravel, 2-64 mm; 4. Cobbles, 64-256 mm; 5. Boulders, 256-2048 mm; 6. Bedrock

***Poor GPS signal, coordinates corrected based on USGS Topographical map**

BMI HABITAT DATA FORM

Project	506637-8333	**Date**	9/20/02
Stream	Big Creek Dam 1 to Powerhouse 1 – B Channel Site	**Crew**	MF, TM
GPS Coordinate (WGS 84/utm) (accuracy may vary)		**Site ID**	BC1-1_"B"/Site B
Upper Boundary of Reach	0303691/4121758		
GPS Coordinate (WGS 84/utm) (accuracy may vary)			
Lower Boundary of Reach	0303691/4121758	**Elev. (ft)**	

Water Chemistry

Air Temp. (ºC)	H_20 Temp. (°C)	D.O. (mg/l)	pH	Sp. Cond. (μs/cm)	Turb.
80°F	15.5	7.25	6.16	0.02	---

Physical Habitat Characteristics

Reach Length (ft) (if applicable)

	Habitat 1	Habitat 2	Habitat 3	Notes (note book ID)
Habitat	RIFF	N/A	N/A	
Length (ft)	15			
Transect Location	N/A			
Avg Width (ft)	6			
Avg Depth (ft)	0.5			
Max Depth (ft)	0.9			
Specific Depth (ft)	0.4/0.5/0.6			
Embeddedness (%)	60			

SUBSTRATE COMP (%)

1. Fines	---			
2. Sands	---			
3. Gravels	---			
4. Cobbles	---			
5. Boulders	80			
6. Bedrock	20			

*1. Fines-silt/clay, <0.062 mm; 2. Sands, 0.062-2 mm; 3. Gravel, 2-64 mm; 4. Cobbles, 64-256 mm; 5. Boulders, 256-2048 mm; 6. Bedrock

Gradient (%)	4			
Riffle Velocity (cfs)	---			
Specific Velocity (cfs)	---			
Streamflow (cfs)	---			
% Canopy Cover	80			

***Poor GPS signal, coordinates corrected based on USGS Topographical map**

N/A – There was a lack of available riffles. Streambed choked with alders, leaving dammed pools.

BMI HABITAT DATA FORM

Project	506637-8333	**Date**	9/20/02
Stream	Big Creek Dam 1 to Powerhouse 1	**Crew**	MF, TM
GPS Coordinate (WGS 84/utm) (accuracy may vary)		**Site ID**	BC1-1_2/Site 2
Upper Boundary of Reach	0302713/4121461		
GPS Coordinate (WGS 84/utm) (accuracy may vary)			
Lower Boundary of Reach	0302713/4121461	**Elev. (ft)**	

Water Chemistry

Air Temp. (ºC)	H_20 Temp. (°C)	D.O. (mg/l)	pH	Sp. Cond. (µs/cm)	Turb.
---	---	---	---	---	---

Physical Habitat Characteristics

Reach Length (ft) (if applicable)

	Habitat 1	Habitat 2	Habitat 3	Notes (note book ID)
Habitat	RIFF	RIFF	N/A	
Length (ft)	23.6	35		
Transect Location	N/A	11 T		
Avg Width (ft)	5.5	10.5		
Avg Depth (ft)	0.7	0.7		
Max Depth (ft)	2.2	1.4		
Specific Depth (ft)	1.3/0.4/1.1	0.7/0.4/0.6		
Embeddedness (%)	25	35		
SUBSTRATE COMP (%)				
1. Fines	---	---		
2. Sands	---	---		
3. Gravels	---	---		
4. Cobbles	---	---		
5. Boulders	80	80		
6. Bedrock	20	20		

*1. Fines-silt/clay, <0.062 mm; 2. Sands, 0.062-2 mm; 3. Gravel, 2-64 mm; 4. Cobbles, 64-256 mm; 5. Boulders, 256-2048 mm; 6. Bedrock

Gradient (%)	7	3		
Riffle Velocity (cfs)	---	---		
Specific Velocity (cfs)	---	---		
Streamflow (cfs)	---	---		
% Canopy Cover	15	100		

***Poor GPS signal, coordinates corrected based on USGS Topographical map**
T=Feet from top of unit
N/A - The crew obtained two replicate samples, but ran into a long series of cascades, and could not obtain any more samples.

BMI HABITAT DATA FORM

Project	506637-8333	**Date**	9/18/02
Stream	Big Creek Dam 1 to Powerhouse 1	**Crew**	
GPS Coordinate (WGS 84/utm) (accuracy may vary)		**Site ID**	BC1-1_1/Site 1
Upper Boundary of Reach	0301400/4119876		
GPS Coordinate (WGS 84/utm) (accuracy may vary)			
Lower Boundary of Reach	0301400/4119876	**Elev. (ft)**	

Water Chemistry

Air Temp. (ºC)	H_2O Temp. (°C)	D.O. (mg/l)	pH	Sp. Cond. (µs/cm)	Turb.
---	9	12.1	4.9	0.02	---

Physical Habitat Characteristics

Reach Length (ft) (if applicable)

	Habitat 1	Habitat 2	Habitat 3	Notes (note book ID)
Habitat	Step pool **	Run **	Step Run **	
Length (ft)	100 T	100 T	100 T	
Transect Location	N/A	42/60/70	30/37/39	
Avg Width (ft)	50	22	13	
Avg Depth (ft)		.6	1.24	
Max Depth (ft)		1.4	3.4	
Specific Depth (ft)	.7/.5/.3	.6/.7/.6	.9/.4/.7	
Embeddedness (%)				
SUBSTRATE COMP (%)				
1. Fines	---	---	---	
2. Sands	30	20	10	
3. Gravels	---	---	---	
4. Cobbles	---	20	10	
5. Boulders	70	50	60	
6. Bedrock	---	10	---	

*1. Fines-silt/clay, <0.062 mm; 2. Sands, 0.062-2 mm; 3. Gravel, 2-64 mm; 4. Cobbles, 64-256 mm; 5. Boulders, 256-2048 mm; 6. Bedrock

Gradient (%)	---	---	---	
Riffle Velocity (cfs)	---	---	---	
Specific Velocity (cfs)	---	---	---	
Streamflow (cfs)	---	---	---	
% Canopy Cover	---	---	---	

***Poor GPS signal, coordinates corrected based on USGS Topographical map**
T=Feet from top of unit
**** Spot sampling was used in the reach, due to lack of available riffles.**

BMI HABITAT DATA FORM

Project	506637-8333	**Date**	9/19/02
Stream	Big Creek Dam 4 to Powerhouse 2	**Crew**	MF, TM
GPS Coordinate (WGS 84/utm) (accuracy may vary)		**Site ID**	BC4-2_3/Site 3
Upper Boundary of Reach	0300820/4119629		
GPS Coordinate (WGS 84/utm) (accuracy may vary)			
Lower Boundary of Reach	0300820/4119629	**Elev. (ft)**	

Water Chemistry

Air Temp. (ºC)	H_20 Temp. (°C)	D.O. (mg/l)	pH	Sp. Cond. (µs/cm)	Turb.
81°F	16.1	7.6	6.1	0.02	---

Physical Habitat Characteristics

Reach Length (ft) (if applicable)

	Habitat 1	Habitat 2	Habitat 3	Notes (note book ID)
Habitat	RIFF	RIFF	RIFF	
Length (ft)	20.2	48.6	19.9	
Transect Location	4 T	5 T	N/A	
Avg Width (ft)	11.7	13.1	9.6	
Avg Depth (ft)	0.5	0.5	0.2	
Max Depth (ft)	0.9	1.6	0.3	
Specific Depth (ft)	0.6/0.9/0.7	0.5/0.4/0.4	0.2/0.2/0.2	
Embeddedness (%)	25	20	40	

SUBSTRATE COMP (%)

1. Fines	---	---	---	
2. Sands	---	---	---	
3. Gravels	---	---	20	
4. Cobbles	70	40	10	
5. Boulders	20	60	70	
6. Bedrock	---	---	---	

*1. Fines-silt/clay, <0.062 mm; 2. Sands, 0.062-2 mm; 3. Gravel, 2-64 mm; 4. Cobbles, 64-256 mm; 5. Boulders, 256-2048 mm; 6. Bedrock

Gradient (%)	4	5	7	
Riffle Velocity (cfs)	---	---	---	
Specific Velocity (cfs)	---	---	---	
Streamflow (cfs)	---	---	---	
% Canopy Cover	50	75	70	

***Poor GPS signal, coordinates corrected based on USGS Topographical map**
T=Feet from top of unit

BMI HABITAT DATA FORM

Project	506637-8333	**Date**	9/19/02
Stream	Big Creek Dam 4 to Powerhouse 2	**Crew**	MF, TM
GPS Coordinate (WGS 84/utm) (accuracy may vary)		**Site ID**	BC4-2_2/Site 2
Upper Boundary of Reach	0299405/4119007		
GPS Coordinate (WGS 84/utm) (accuracy may vary)			
Lower Boundary of Reach	0299405/4119007	**Elev. (ft)**	

Water Chemistry

Air Temp. (ºC)	H_2O Temp. (°C)	D.O. (mg/l)	pH	Sp. Cond. (µs/cm)	Turb.
---	14.9	7.9	6.75	0.04	---

Physical Habitat Characteristics

Reach Length (ft) (if applicable)

	Habitat 1	Habitat 2	Habitat 3	Notes (note book ID)
Habitat	RIFF			
Length (ft)	39.5			
Transect Location	5 T			
Avg Width (ft)	16.3			
Avg Depth (ft)	0.6			
Max Depth (ft)	1.2			
Specific Depth (ft)	0.4/0.5/0.5			
Embeddedness (%)	25			

SUBSTRATE COMP (%)

1. Fines	---			
2. Sands	---			
3. Gravels	10			
4. Cobbles	70			
5. Boulders	20			
6. Bedrock	---			

*1. Fines-silt/clay, <0.062 mm; 2. Sands, 0.062-2 mm; 3. Gravel, 2-64 mm; 4. Cobbles, 64-256 mm; 5. Boulders, 256-2048 mm; 6. Bedrock

Gradient (%)	4			
Riffle Velocity (cfs)	---			
Specific Velocity (cfs)	---			
Streamflow (cfs)	---			
% Canopy Cover	38			

***Poor GPS signal, coordinates corrected based on USGS Topographical map**
T=Feet from top of unit

BMI HABITAT DATA FORM

Project	506637-8333	**Date**	9/18/02
Stream	Big Creek Dam 4 to Powerhouse 2	**Crew**	MF, TM
GPS Coordinate (WGS 84/utm) (accuracy may vary)		**Site ID**	BC4-2_1/Site 1
Upper Boundary of Reach	0295626/4119456		
GPS Coordinate (WGS 84/utm) (accuracy may vary)			
Lower Boundary of Reach	0295626/4119456	**Elev. (ft)**	

Water Chemistry

Air Temp. (ºC)	$H_2$0 Temp. (°C)	D.O. (mg/l)	pH	Sp. Cond. (µs/cm)	Turb.
18	16	10.6	6.4	0.04	2.5

Physical Habitat Characteristics

Reach Length (ft) (if applicable)

	Habitat 1	Habitat 2	Habitat 3	Notes (note book ID)
Habitat	RIFF	RIFF	RIFF	
Length (ft)	35.5	28.6	38.9	
Transect Location	4 T	6 T	10 T	
Avg Width (ft)	28.4	26.5	44	
Avg Depth (ft)	0.6	0.45	0.65	
Max Depth (ft)	1.0	1.1	1.0	
Specific Depth (ft)	0.55/0.6/0.5	0.4/0.45/0.9	0.45/0.5/0.45	
Embeddedness (%)	35	20	30	

SUBSTRATE COMP (%)

1. Fines	5	---	---	
2. Sands	---	---	---	
3. Gravels	15	20	30	
4. Cobbles	20	60	40	
5. Boulders	60	20	30	
6. Bedrock	---	---	---	

*1. Fines-silt/clay, <0.062 mm; 2. Sands, 0.062-2 mm; 3. Gravel, 2-64 mm; 4. Cobbles, 64-256 mm; 5. Boulders, 256-2048 mm; 6. Bedrock

Gradient (%)	3	3	2	
Riffle Velocity (cfs)	---	---	---	
Specific Velocity (cfs)	---	---	---	
Streamflow (cfs)	---	---	---	
% Canopy Cover	40	50	40	

***Poor GPS signal, coordinates corrected based on USGS Topographical map**
T=Feet from top of unit

BMI HABITAT DATA FORM

Project	506637-8333	**Date**	9/23/02
Stream	Big Creek Dam 5 to Powerhouse 8	**Crew**	CG, MR
GPS Coordinate (WGS 84/utm) (accuracy may vary)		**Site ID**	BC5-8_2/Site 2
Upper Boundary of Reach	0295001/4119688		
GPS Coordinate (WGS 84/utm) (accuracy may vary)			
Lower Boundary of Reach	0295001/4119688	**Elev. (ft)**	

Water Chemistry

Air Temp. (ºC)	H_20 Temp. (°C)	D.O. (mg/l)	pH	Sp. Cond. (µs/cm)	Turb.
---	17.5	6.9	6.57	0.016	---

Physical Habitat Characteristics

Reach Length (ft) (if applicable)

	Habitat 1	Habitat 2	Habitat 3	Notes (note book ID)
Habitat	RIFF	RIFF	RIFF	
Length (ft)	20	14	40	
Transect Location	Top Third	Top Third	Top Third	
Avg Width (ft)	20	12.5	33	
Avg Depth (ft)	0.5	0.3	0.6	
Max Depth (ft)	1.5	0.7	1.8	
Specific Depth (ft)	1.2/0.8/0.6	0.3/0.4/0.3	0.7/0.3/0.5	
Embeddedness (%)	5	10	10	

SUBSTRATE COMP (%)

1. Fines	---	---	---	
2. Sands	---	---	---	
3. Gravels	---	---	---	
4. Cobbles	20	40	30	
5. Boulders	30	40	60	
6. Bedrock	50	20	10	

*1. Fines-silt/clay, <0.062 mm; 2. Sands, 0.062-2 mm; 3. Gravel, 2-64 mm; 4. Cobbles, 64-256 mm; 5. Boulders, 256-2048 mm; 6. Bedrock

Gradient (%)	6.5	6	6	
Riffle Velocity (cfs)	1.1	1.0	1.4	
Specific Velocity (cfs)	1.4/0.8/1.2	1.1/1.3/0.8	1.4/0.9/1.8	
Streamflow (cfs)	7	7	7	
% Canopy Cover	10	15	15	

***Poor GPS signal, coordinates corrected based on USGS Topographical map**

BMI HABITAT DATA FORM

Project	506637-8333	**Date**	9/18/02
Stream	Big Creek Dam 5 to Powerhouse 8	**Crew**	CG, MR, GM
GPS Coordinate (WGS 84/utm) (accuracy may vary)		**Site ID**	BC5-8_1/Site 1
Upper Boundary of Reach	0293594/4120514		
GPS Coordinate (WGS 84/utm) (accuracy may vary)			
Lower Boundary of Reach	0293594/4120514	**Elev. (ft)**	

Water Chemistry

Air Temp. (ºC)	H_20 Temp. (°C)	D.O. (mg/l)	pH	Sp. Cond. (µs/cm)	Turb.
---	17.48	7.61	6.47	0.019 mg/cm	---

Physical Habitat Characteristics

Reach Length (ft) (if applicable)

	Habitat 1	Habitat 2	Habitat 3	Notes (note book ID)
Habitat	Riffle	Riffle	Riffle	
Length (ft)	15	513	3	
Transect Location	1 T	Middle half	Top half	
Avg Width (ft)	13	7.0	6.0	
Avg Depth (ft)	0.3	0.8	0.9	
Max Depth (ft)	0.8	1.6	1.6	
Specific Depth (ft)	0.3	0.8	0.9	
Embeddedness (%)	25	25	25	
SUBSTRATE COMP (%)				
1. Fines	---	---	---	
2. Sands	15	---	---	
3. Gravels	35	---	---	
4. Cobbles	35	15	25	
5. Boulders	15	15	15	
6. Bedrock	---	70	60	
Gradient (%)	4.4	5.5	6.25	
Riffle Velocity (cfs)	0.6	2.6	2.9	
Specific Velocity (cfs)	0.6/0.6/0.6	2.6/2.6/2.6	2.9/2.9/2.9	
Streamflow (cfs)	4	4	4	
% Canopy Cover	9	45	13	

*1. Fines-silt/clay, <0.062 mm; 2. Sands, 0.062-2 mm; 3. Gravel, 2-64 mm; 4. Cobbles, 64-256 mm; 5. Boulders, 256-2048 mm; 6. Bedrock

***Poor GPS signal, coordinates corrected based on USGS Topographical map**
T=Feet from top of unit

BMI HABITAT DATA FORM

Project	506637-8333	**Date**	9/11/02
Stream	Pitman Creek	**Crew**	SF, KJ
GPS Coordinate (WGS 84/utm) (accuracy may vary)		**Site ID**	Pitm_AD/Site AD
Upper Boundary of Reach	0303550/4119064		
GPS Coordinate (WGS 84/utm) (accuracy may vary)			
Lower Boundary of Reach	0303550/4119064	**Elev. (ft)**	

Water Chemistry

Air Temp. (ºC)	H_20 Temp. (°C)	D.O. (mg/l)	pH	Sp. Cond. (µs/cm)	Turb.
---	8.0	9.8	5.9	.080	---

Physical Habitat Characteristics

Reach Length (ft) (if applicable)

	Habitat 1	Habitat 2	Habitat 3	Notes (note book ID)
Habitat	Run/HGR	Run/HGR	SRN	
Length (ft)	35	26	65	
Transect Location	29, 29, 31 T	23 T	40, 45, 50 T	
Avg Width (ft)	5	8	11	
Avg Depth (ft)	0.5	.52	.74	
Max Depth (ft)	1.3	.7	1.0	
Specific Depth (ft)	.15/.3/.2	.20/.25/.10	.2/.2/.25	
Embeddedness (%)	10	5	5	

SUBSTRATE COMP (%)

1. Fines	---	---	---	
2. Sands	1	---	1	
3. Gravels	4	9	4	
4. Cobbles	50	80	20	
5. Boulders	30	10	65	
6. Bedrock	15	1	10	

*1. Fines-silt/clay, <0.062 mm; 2. Sands, 0.062-2 mm; 3. Gravel, 2-64 mm; 4. Cobbles, 64-256 mm; 5. Boulders, 256-2048 mm; 6. Bedrock

Gradient (%)	4.6	0.8	3.1	
Riffle Velocity (cfs)	2.3	0.4	1.3	
Specific Velocity (cfs)	0.55/0.61/1.17	.19/.21/.75	1.79/.62/1.62	
Streamflow (cfs)	0.17	---	---	
% Canopy Cover	43	22	12	

***Poor GPS signal, coordinates corrected based on USGS Topographical map**
T=Feet from top of unit

BMI HABITAT DATA FORM

Project	506637-8333	**Date**	9/10/02
Stream	Pitman Creek	**Crew**	SF, KJ
GPS Coordinate (WGS 84/utm) (accuracy may vary)		**Site ID**	Pitm_BD2/Site 2
Upper Boundary of Reach	0303380/4119272		
GPS Coordinate (WGS 84/utm) (accuracy may vary)			
Lower Boundary of Reach	0303380/4119272	**Elev. (ft)**	

Water Chemistry

Air Temp. (ºC)	$H_2$0 Temp. (°C)	D.O. (mg/l)	pH	Sp. Cond. (µs/cm)	Turb.
---	13.0	9.60	7.00	.050	---

Physical Habitat Characteristics

Reach Length (ft) (if applicable)

	Habitat 1	Habitat 2	Habitat 3	Notes (note book ID)
Habitat	SPO – Bedrock**	SPO – Bedrock**	SPO – Bedrock**	
Length (ft)	50	50	50	
Transect Location	0, 24, 48 T	7, 24, 31 T	4, 33, 46 T	
Avg Width (ft)	7	8	4	
Avg Depth (ft)	2.56	1.3	.98	
Max Depth (ft)	5.0	3.5	3.4	
Specific Depth (ft)	.1/.05/.1	.2/.1/.3	.15/.20/.3	
Embeddedness (%)	N/A	N/A	N/A	

SUBSTRATE COMP (%)

	Habitat 1	Habitat 2	Habitat 3	Notes
1. Fines	---	<1	---	
2. Sands	---	.5	1	
3. Gravels	---	.5	1	
4. Cobbles	3	4	3	
5. Boulders	7	5	---	
6. Bedrock	90	90	95	

*1. Fines-silt/clay, <0.062 mm; 2. Sands, 0.062-2 mm; 3. Gravel, 2-64 mm; 4. Cobbles, 64-256 mm; 5. Boulders, 256-2048 mm; 6. Bedrock

	Habitat 1	Habitat 2	Habitat 3	Notes
Gradient (%)	7	2	13	
Riffle Velocity (cfs)	0.9	0.9	1.1	
Specific Velocity (cfs)	1.41/*0/.33	.09/1.02/1.51	0.4/1.17/1.79	
Streamflow (cfs)	0.29	0.29	0.29	
% Canopy Cover	20	17	9	

***Poor GPS signal, coordinates corrected based on USGS Topographical map**
***0 = too shallow**
**** - Spot Sampling**
T=Feet from top of unit

BMI HABITAT DATA FORM

Project	506637-8333	**Date**	9/10/02
Stream	Pitman Creek	**Crew**	SF, KJ
GPS Coordinate (WGS 84/utm) (accuracy may vary)		**Site ID**	Pitm_BD1/Site 1
Upper Boundary of Reach	0303202/4119375		
GPS Coordinate (WGS 84/utm) (accuracy may vary)			
Lower Boundary of Reach	0303202/4119375	**Elev. (ft)**	

Water Chemistry

Air Temp. (ºC)	H_2O Temp. (°C)	D.O. (mg/l)	pH	Sp. Cond. (µs/cm)	Turb.
---	8	11.1	5.70	.050	---

Physical Habitat Characteristics

Reach Length (ft) (if applicable)

	Habitat 1	Habitat 2	Habitat 3	Notes (note book ID)
Habitat	SPO – Bedrock**	SPO – Bedrock**	SPO – Bedrock**	
Length (ft)	50	50	50	
Transect Location	16, 28, 34 T	1, 12, 48 T	2, 43, 48 T	
Avg Width (ft)	6	3.5	4.5	
Avg Depth (ft)	1.08	1.98	2.44	
Max Depth (ft)	2.6	3.7	4.3	
Specific Depth (ft)	0.1/ 0.1/ 0.1	0.1/ 0.1/ 0.05	0.04/ 0.04/ 0.1	
Embeddedness (%)	N/A	N/A	N/A	

SUBSTRATE COMP (%)

1. Fines	---	---	---	
2. Sands	---	1	1	
3. Gravels	---	1	2	
4. Cobbles	---	3	2	
5. Boulders	---	---	---	
6. Bedrock	100	95	95	

*1. Fines-silt/clay, <0.062 mm; 2. Sands, 0.062-2 mm; 3. Gravel, 2-64 mm; 4. Cobbles, 64-256 mm; 5. Boulders, 256-2048 mm; 6. Bedrock

Gradient (%)	19	31	12	
Riffle Velocity (cfs)	1.0	0.2	2.3	
Specific Velocity (cfs)	1.30/0.56/1.21	.15/.23/*0	***0/*0/2.25**	
Streamflow (cfs)	0.29	0.29	0.29	
% Canopy Cover	16	19	19	

***Poor GPS signal, coordinates corrected based on USGS Topographical map**
***0 = too shallow**
**** - Spot Sampling**
T=Feet from top of unit

BMI HABITAT DATA FORM

Project	506637-8333	**Date**	9-11-02
Stream	Pitman Creek	**Crew**	SF, KJ
GPS Coordinate (WGS 84/utm) (accuracy may vary)		**Site ID**	Pitm_BD0/Site 0
Upper Boundary of Reach	0301617/4119860		
GPS Coordinate (WGS 84/utm) (accuracy may vary)			
Lower Boundary of Reach	0301617/4119860	**Elev. (ft)**	

Water Chemistry

Air Temp. (ºC)	H_20 Temp. (°C)	D.O. (mg/l)	pH	Sp. Cond. (μs/cm)	Turb.
---	13.0	9.7	6.6	0.120	---

Physical Habitat Characteristics

Reach Length (ft) (if applicable)

	Habitat 1	Habitat 2	Habitat 3	Notes (note book ID)
Habitat	Bedrock**	Bedrock**	Bedrock**	
Length (ft)	35	35	35	
Transect Location	4, 12, 15 T	11, 19, 23 T	26 T	
Avg Width (ft)	3.5	2.0	9	
Avg Depth (ft)	1.26	0.54	1.12	
Max Depth (ft)	2.5	1.0	1.8	
Specific Depth (ft)	0.1/ 0.4/ 0.6	0.05/ 0.2/ 0.3	0.4/ 0.05/ 0.6	
Embeddedness (%)	5	0	35	
SUBSTRATE COMP (%)				
1. Fines	<1	---	1	
2. Sands	1	---	6	
3. Gravels	1	---	6	
4. Cobbles	3	5	20	
5. Boulders	1	3	25	
6. Bedrock	100	100	100	

*1. Fines-silt/clay, <0.062 mm; 2. Sands, 0.062-2 mm; 3. Gravel, 2-64 mm; 4. Cobbles, 64-256 mm; 5. Boulders, 256-2048 mm; 6. Bedrock

Gradient (%)	0.6	6	2.6	
Riffle Velocity (cfs)	1.4	0.9	0.3	
Specific Velocity (fs)	1.70/2.08/.47	*0/1.00/0.78	.30/*0/.23	
Streamflow (cfs)	0.35	0.35	0.35	
% Canopy Cover	14	22	34	

***Poor GPS signal, coordinates corrected based on USGS Topographical map**
***0 = too shallow**
**** - Spot Sampling**
T=Feet from top of unit

BMI HABITAT DATA FORM

Project	506637-8333	**Date**	9/6/02
Stream	Ely Creek	**Crew**	SF, WT, KJ
GPS Coordinate (WGS 84/utm) (accuracy may vary)		**Site ID**	Ely_AD/Site AD
Upper Boundary of Reach	0296916/4117293		
GPS Coordinate (WGS 84/utm) (accuracy may vary)			
Lower Boundary of Reach	0296916/4117293	**Elev. (ft)**	

Water Chemistry

Air Temp. (ºC)	H_20 Temp. (°C)	D.O. (mg/l)	pH	Sp. Cond. (µs/cm)	Turb.
---	12.5	5.67	6.19	.088	---

Physical Habitat Characteristics

Reach Length (ft) (if applicable)

	Habitat 1	Habitat 2	Habitat 3	Notes (note book ID)
Habitat	SRN			
Length (ft)	115			
Transect Location	30, 50, 115 T			
Avg Width (ft)	2			
Avg Depth (ft)	.34			
Max Depth (ft)	0.9			
Specific Depth (ft)	0.08/ 0.125/ 0.02			
Embeddedness (%)	75			
SUBSTRATE COMP (%)				
1. Fines	2			
2. Sands	18			
3. Gravels	20			
4. Cobbles	10			
5. Boulders	30			
6. Bedrock	20			
Gradient (%)	3			
Riffle Velocity (cfs)	---			
Specific Velocity (cfs)	---			
Streamflow (cfs)	---			
% Canopy Cover	100			

*1. Fines-silt/clay, <0.062 mm; 2. Sands, 0.062-2 mm; 3. Gravel, 2-64 mm; 4. Cobbles, 64-256 mm; 5. Boulders, 256-2048 mm; 6. Bedrock

***Poor GPS signal, coordinates corrected based on USGS Topographical map**
T=Feet from top of unit

BMI HABITAT DATA FORM

Project	506637-8333	**Date**	9/9/02
Stream	Ely Creek	**Crew**	SF, KJ
GPS Coordinate (WGS 84/utm) (accuracy may vary)		**Site ID**	Ely_BD3/Site 3
Upper Boundary of Reach	0297219/4118198		
GPS Coordinate (WGS 84/utm) (accuracy may vary)			
Lower Boundary of Reach	0297219/4118198	**Elev. (ft)**	

Water Chemistry

Air Temp. (ºC)	H_2O Temp. (°C)	D.O. (mg/l)	pH	Sp. Cond. (µs/cm)	Turb.
---	14.0	7.1	6.9	.040	---

Physical Habitat Characteristics

Reach Length (ft) (if applicable)

	Habitat 1	Habitat 2	Habitat 3	Notes (note book ID)
Habitat	RUN	SRN	RUN	
Length (ft)	26	60	31	
Transect Location	13, 16, 16 T	40, 47, 50 T	3, 7, 10 T	
Avg Width (ft)	5	3.5	1.5	
Avg Depth (ft)	0.22	0.30	0.22	
Max Depth (ft)	0.4	0.6	0.4	
Specific Depth (ft)	0.17/ 0.17/ 0.17	0.5/ 0.33/ 0.25	0.17/ 0.25/ 0.25	
Embeddedness (%)	40	30	30	

SUBSTRATE COMP (%)

1. Fines	5	1	1	
2. Sands	20	4	4	
3. Gravels	20	15	20	
4. Cobbles	50	30	30	
5. Boulders	5	50	45	
6. Bedrock	---	---	---	

*1. Fines-silt/clay, <0.062 mm; 2. Sands, 0.062-2 mm; 3. Gravel, 2-64 mm; 4. Cobbles, 64-256 mm; 5. Boulders, 256-2048 mm; 6. Bedrock

Gradient (%)	2	5	3	
Riffle Velocity (cfs)	*0	*0	*0	
Specific Velocity (cfs)	*0	*0	*0	
Streamflow (cfs)	*0	*0	*0	
% Canopy Cover	97	60	93	

***Poor GPS signal, coordinates corrected based on USGS Topographical map**
***0 = Flow Too Low**
T=Feet from top of unit

BMI HABITAT DATA FORM

Project	506637-8333	**Date**	9/9/02
Stream	Ely Creek	**Crew**	SF, KJ
GPS Coordinate (WGS 84/utm) (accuracy may vary)		**Site ID**	Ely_BD2/Site 2
Upper Boundary of Reach	0297310/4118380		
GPS Coordinate (WGS 84/utm) (accuracy may vary)			
Lower Boundary of Reach	0297310/4118380	**Elev. (ft)**	

Water Chemistry

Air Temp. (ºC)	H_2O Temp. (°C)	D.O. (mg/l)	pH	Sp. Cond. (µs/cm)	Turb.
---	15.0	5.2	6.5	.040	---

Physical Habitat Characteristics

Reach Length (ft) (if applicable)

	Habitat 1	Habitat 2	Habitat 3	Notes (note book ID)
Habitat	HGR	HGR/SRN	HGR	
Length (ft)	20	21	39	
Transect Location	5, 11, 17 T	140, 148, 150 T	7, 9, 35 T	
Avg Width (ft)	4	2.5	1	
Avg Depth (ft)	0.19	0.26	0.12	
Max Depth (ft)	0.3	0.4	0.2	
Specific Depth (ft)	0.08/ 0.42/ 0.33	0.25/ 0.33/ 0.33	0.125/ 0.17/ 0.21	
Embeddedness (%)	40	30	20	

SUBSTRATE COMP (%)

1. Fines	1	<1	<1	
2. Sands	4	4	5	
3. Gravels	15	9	10	
4. Cobbles	45	25	35	
5. Boulders	35	60	50	
6. Bedrock	---	2	---	

*1. Fines-silt/clay, <0.062 mm; 2. Sands, 0.062-2 mm; 3. Gravel, 2-64 mm; 4. Cobbles, 64-256 mm; 5. Boulders, 256-2048 mm; 6. Bedrock

Gradient (%)	4	8	6	
Riffle Velocity (cfs)	*0	*0	*0	
Specific Velocity (cfs)	*0	*0	*0	
Streamflow (cfs)	*0	*0	*0	
% Canopy Cover	99	98	98	

***Poor GPS signal, coordinates corrected based on USGS Topographical map**
***0 = Flow Too Low**
T=Feet from top of unit

BMI HABITAT DATA FORM

Project	506637-8333	**Date**	9/9/02
Stream	Ely Creek	**Crew**	SF, KJ
GPS Coordinate (WGS 84/utm) (accuracy may vary)		**Site ID**	Ely_BD1/Site 1
Upper Boundary of Reach	0297259/4118750		
GPS Coordinate (WGS 84/utm) (accuracy may vary)			
Lower Boundary of Reach	0297259/4118750	**Elev. (ft)**	

Water Chemistry

Air Temp. (ºC)	H_2O Temp. (°C)	D.O. (mg/l)	pH	Sp. Cond. (µs/cm)	Turb.
---	11.1	6.50	6.91	0.113	---

Physical Habitat Characteristics

Reach Length (ft) (if applicable)

	Habitat 1	Habitat 2	Habitat 3	Notes (note book ID)
Habitat	RUN with Standing H20**	SPO**	HGR**	
Length (ft)	45	70	22	
Transect Location	12, 25, 40 T	1, 38, 43 T	5, 7, 9 T	
Avg Width (ft)	4	6	2.5	
Avg Depth (ft)	.44	1.44	0.16	
Max Depth (ft)	0.8	3.2	0.3	
Specific Depth (ft)	0.17/ 0.33/ 0.25	0.25/ 0.58/ 0.21	0.17/ 0.25/ 0.25	
Embeddedness (%)	30	40	40	

SUBSTRATE COMP (%)

1. Fines	2	4	1	
2. Sands	3	13	5	
3. Gravels	10	13	10	
4. Cobbles	40	15	35	
5. Boulders	35	40	45	
6. Bedrock	10	15	5	

*1. Fines-silt/clay, <0.062 mm; 2. Sands, 0.062-2 mm; 3. Gravel, 2-64 mm; 4. Cobbles, 64-256 mm; 5. Boulders, 256-2048 mm; 6. Bedrock

Gradient (%)	5	2	8	
Riffle Velocity (cfs)	No Flow	No Flow	No Flow	
Specific Velocity (cfs)	No Flow	No Flow	No Flow	
Streamflow (cfs)	No Flow	No Flow	No Flow	
% Canopy Cover	99	99	97	

***Poor GPS signal, coordinates corrected based on USGS Topographical map**
**** - Spot Sampling**
T=Feet from top of unit

BMI HABITAT DATA FORM

Project	506637-8333	**Date**	8/26/02
Stream	Balsam Creek	**Crew**	RS, KKY
GPS Coordinate (WGS 84/utm) (accuracy may vary)		**Site ID**	Bals_AD/Site AD
Upper Boundary of Reach	0299537/4117938		
GPS Coordinate (WGS 84/utm) (accuracy may vary)			
Lower Boundary of Reach	0299535/4117980	**Elev. (ft)**	4754

Water Chemistry

Air Temp. (ºC)	H_2O Temp. (°C)	D.O. (mg/l)	pH	Sp. Cond. (µs/cm)	Turb.
22	13.6	10.46	Not Working	0.030	N/R

Physical Habitat Characteristics

Reach Length (ft) (if applicable)

	Habitat 1	Habitat 2	Habitat 3	Notes (note book ID)
Habitat	RIFF	RIFF	RIFF	
Length (ft)	30	45	70	
Transect Location	10 T	12 T	16 T	
Avg Width (ft)	9.5	8.0	6.5	
Avg Depth (ft)	0.3	0.4	0.3	
Max Depth (ft)	0.8	0.9	1.0	
Specific Depth (ft)	0.4/0.4/0.5	0.2/0.3/0.9	0.3/0.3/0.5	
Embeddedness (%)	50	40	30	

SUBSTRATE COMP (%)

1. Fines	---	---	---	
2. Sands	30	25	10	
3. Gravels	30	30	30	
4. Cobbles	30	40	50	
5. Boulders	10	5	10	
6. Bedrock	---	---	---	

*1. Fines-silt/clay, <0.062 mm; 2. Sands, 0.062-2 mm; 3. Gravel, 2-64 mm; 4. Cobbles, 64-256 mm; 5. Boulders, 256-2048 mm; 6. Bedrock

Gradient (%)	3.4	11.1	6.8	
Riffle Velocity (cfs)	1.3	1.2	1.4	
Specific Velocity (cfs)	1.85/1.20/0.83	0.97/1.06/1.23	1.29/1.61/1.40	
Streamflow (cfs)	2	2	2	
% Canopy Cover	88	87	95	

***Poor GPS signal, coordinates corrected based on USGS Topographical map**
T=Feet from top of unit

BMI HABITAT DATA FORM

Project	506637-8333	**Date**	8/26/02
Stream	Balsam Creek	**Crew**	RS, KKY
GPS Coordinate (WGS 84/utm) (accuracy may vary)		**Site ID**	Bals_BD2/Site 2
Upper Boundary of Reach	0299417/4118276		
GPS Coordinate (WGS 84/utm) (accuracy may vary)			
Lower Boundary of Reach	0299423/4118376	**Elev. (ft)**	4520

Water Chemistry

Air Temp. (ºC)	$H_2$0 Temp. (°C)	D.O. (mg/l)	pH	Sp. Cond. (µs/cm)	Turb.
27	11.8	10.80	Not Working	0.038	N/R

Physical Habitat Characteristics

Reach Length (ft) (if applicable)

	Habitat 1	Habitat 2	Habitat 3	Notes (note book ID)
Habitat	RIFF	RIFF	RIFF	
Length (ft)	106	31	71	
Transect Location	30 T	4 T	18 T	
Avg Width (ft)	7.5	6	11	
Avg Depth (ft)	0.2	0.3	0.3	
Max Depth (ft)	0.7	0.7	0.8	
Specific Depth (ft)	0.5/0.4/0.2	0.2/0.5/0.4	0.2/0.3/0.2	
Embeddedness (%)	70	60	60	

SUBSTRATE COMP (%)

1. Fines	20	10	---	
2. Sands	40	30	30	
3. Gravels	20	30	30	
4. Cobbles	20	30	30	
5. Boulders	---	---	10	
6. Bedrock	---	---	---	

*1. Fines-silt/clay, <0.062 mm; 2. Sands, 0.062-2 mm; 3. Gravel, 2-64 mm; 4. Cobbles, 64-256 mm; 5. Boulders, 256-2048 mm; 6. Bedrock

Gradient (%)	2.6	2.5	8.2	
Riffle Velocity (cfs)	1.0	1.1	1.1	
Specific Velocity (cfs)	0.99/1.15/0.80	0.91/1.33/0.94	0.95/1.45/0.94	
Streamflow (cfs)	---	---	---	
% Canopy Cover	88	81	92	

***Poor GPS signal, coordinates corrected based on USGS Topographical map**
T=Feet from top of unit

BMI HABITAT DATA FORM

Project	506637-8333	**Date**	8/25/02
Stream	Balsam Creek	**Crew**	RS, KKY
GPS Coordinate (WGS 84/utm) (accuracy may vary)		**Site ID**	Bals_BD1/Site 1
Upper Boundary of Reach	0299281/4118824		
GPS Coordinate (WGS 84/utm) (accuracy may vary)			
Lower Boundary of Reach	0299297/4118956	**Elev. (ft)**	3973

Water Chemistry

Air Temp. (ºC)	H_20 Temp. (°C)	D.O. (mg/l)	pH	Sp. Cond. (µs/cm)	Turb.
19	12.9	10.38	7.00	.045	N/R

Physical Habitat Characteristics

Reach Length (ft) (if applicable)

	Habitat 1	Habitat 2	Habitat 3	Notes (note book ID)
Habitat	RIFF	RIFF	RIFF	
Length (ft)	53	45	125	
Transect Location	14 T	9 T	45 T	
Avg Width (ft)	6	6	5.5	
Avg Depth (ft)	0.4	0.3	0.4	
Max Depth (ft)	0.7	0.6	0.7	
Specific Depth (ft)	0.3/0.3/0.2	0.2/0.3/0.3	2.5/2.0/1.5	
Embeddedness (%)	60	50	40	

SUBSTRATE COMP (%)

1. Fines	---	---	---	
2. Sands	25	10	30	
3. Gravels	30	10	30	
4. Cobbles	40	30	30	
5. Boulders	5	10	10	
6. Bedrock	---	40	---	

*1. Fines-silt/clay, <0.062 mm; 2. Sands, 0.062-2 mm; 3. Gravel, 2-64 mm; 4. Cobbles, 64-256 mm; 5. Boulders, 256-2048 mm; 6. Bedrock

Gradient (%)	6.4	6.8	3.3	
Riffle Velocity (cfs)	0.8	1.2	0.9	
Specific Velocity (cfs)	1.16/0.85/0.50	1.80/1.44/0.27	0.88/0.69/1.01	
Streamflow (cfs)	---	---	---	
% Canopy Cover	94	81	86	

***Poor GPS signal, coordinates corrected based on USGS Topographical map**
T=Feet from top of unit

BMI HABITAT DATA FORM

Project	506637-8333	**Date**	9/26/02
Stream	Adit 8 Creek	**Crew**	SH, JV
GPS Coordinate (WGS 84/utm) (accuracy may vary)		**Site ID**	Adit8_BD2/Site 2
Upper Boundary of Reach	0296040/4117911		
GPS Coordinate (WGS 84/utm) (accuracy may vary)			
Lower Boundary of Reach	0296040/4117911	**Elev. (ft)**	4854

Water Chemistry

Air Temp. (ºC)	H_2O Temp. (°C)	D.O. (mg/l)	pH	Sp. Cond. (µs/cm)	Turb.
---	---	---	---	---	---

Physical Habitat Characteristics

Reach Length (ft) (if applicable) ~300

	Habitat 1	Habitat 2	Habitat 3	Notes (note book ID)
Habitat	RIFF	RIFF	RIFF	
Length (ft)	20.0	30.0	35.0	
Transect Location	SPOT	SPOT	SPOT	
Avg Width (ft)	3.0	4.0	6.0	
Avg Depth (ft)	0.4	0.3	0.3	
Max Depth (ft)	1.0	0.5	1.0	
Specific Depth (ft)	0.3/0.2/0.7	0.4/0.1/0.1	0.4/0.4/0.8	
Embeddedness (%)	15	10	10	

SUBSTRATE COMP (%)

1. Fines	---	---	---	
2. Sands	---	---	---	
3. Gravels	10	---	---	
4. Cobbles	20	20	20	
5. Boulders	30	70	60	
6. Bedrock	40	10	20	

*1. Fines-silt/clay, <0.062 mm; 2. Sands, 0.062-2 mm; 3. Gravel, 2-64 mm; 4. Cobbles, 64-256 mm; 5. Boulders, 256-2048 mm; 6. Bedrock

Gradient (%)	3	5	5-6	
Riffle Velocity (cfs)	---	---	---	
Specific Velocity (cfs)	---	---	---	
Streamflow (cfs)	---	---	---	
% Canopy Cover	90	90	90	

***Poor GPS signal, coordinates corrected based on USGS Topographical map**

BMI HABITAT DATA FORM

Project	506637-8333	**Date**	9.26/02
Stream	Adit 8 Creek	**Crew**	MF, GM
GPS Coordinate (WGS 84/utm) (accuracy may vary)		**Site ID**	Adit8_BD1/Site 1
Upper Boundary of Reach	0296227/4118626		
GPS Coordinate (WGS 84/utm) (accuracy may vary)			
Lower Boundary of Reach	0296225/4118595	**Elev. (ft)**	

Water Chemistry

Air Temp. (ºC)	H_20 Temp. (°C)	D.O. (mg/l)	pH	Sp. Cond. (μs/cm)	Turb.
---	13.9	9.42	6.14	0.01	---

Physical Habitat Characteristics

Reach Length (ft) (if applicable)

	Habitat 1	Habitat 2	Habitat 3	Notes (note book ID)
Habitat	RIFF	RIFF	RIFF	
Length (ft)	23	8.5	15	
Transect Location	Top Third	Top Third	Top Third	
Avg Width (ft)	3	2.0	2.5	
Avg Depth (ft)	0.3	0.3	0.4	
Max Depth (ft)	0.6	0.5	0.7	
Specific Depth (ft)	0.4/0.3/0.3	0.4/0.4/0.3	0.45/0.4/0.4	
Embeddedness (%)	65	70	70	

SUBSTRATE COMP (%)

1. Fines	---	---	---	
2. Sands	30	25	20	
3. Gravels	20	25	30	
4. Cobbles	40	50	35	
5. Boulders	10	---	15	
6. Bedrock	---	---	---	

*1. Fines-silt/clay, <0.062 mm; 2. Sands, 0.062-2 mm; 3. Gravel, 2-64 mm; 4. Cobbles, 64-256 mm; 5. Boulders, 256-2048 mm; 6. Bedrock

Gradient (%)	2.5	3	3	
Riffle Velocity (cfs)	---	---	---	
Specific Velocity (cfs)	---	---	---	
Streamflow (cfs)	---	---	---	
% Canopy Cover	99	96	92	

***Poor GPS signal, coordinates corrected based on USGS Topographical map**

BMI HABITAT DATA FORM

Project	506637-8333	**Date**	9/6/02
Stream	North Fork Stevenson Creek Above Tunnel 7 Outlet	**Crew**	SF, WT, KJ
GPS Coordinate (WGS 84/utm) (accuracy may vary)		**Site ID**	NFSC_AO/Site AO
Upper Boundary of Reach	0301761/4114398		
GPS Coordinate (WGS 84/utm) (accuracy may vary)			
Lower Boundary of Reach	0301761/4114398	**Elev. (ft)**	

Water Chemistry

Air Temp. (ºC)	H_20 Temp. (°C)	D.O. (mg/l)	pH	Sp. Cond. (µs/cm)	Turb.
---	11.1	9.75	6.35	.035	---

Physical Habitat Characteristics

Reach Length (ft) (if applicable)

	Habitat 1	Habitat 2	Habitat 3	Notes (note book ID)
Habitat	Cascade Pool**	Cascade Pool**	Cascade Pool**	
Length (ft)	35	35	35	
Transect Location	5, 19, 32 T	7, 23, 32 T	6, 17, 34 T	
Avg Width (ft)	3	5	4	
Avg Depth (ft)	.34	.42	.42	
Max Depth (ft)	.7	.9	.6	
Specific Depth (ft)	0.3/0.3/0.1	.1/.5/.5	.3/.3/.5	
Embeddedness (%)	50	35	50	

SUBSTRATE COMP (%)

1. Fines	2	2	5	
2. Sands	15	15	25	
3. Gravels	18	15	25	
4. Cobbles	15	8	10	
5. Boulders	50	60	35	
6. Bedrock	---	---	---	

*1. Fines-silt/clay, <0.062 mm; 2. Sands, 0.062-2 mm; 3. Gravel, 2-64 mm; 4. Cobbles, 64-256 mm; 5. Boulders, 256-2048 mm; 6. Bedrock

Gradient (%)	12	21	9	
Riffle Velocity (cfs)	0.6	0.2	0.1	
Specific Velocity (cfs)	0.9/.21/*0	*0/.21/.16	.18/.22/.02	
Streamflow (cfs)	---	---	---	
% Canopy Cover	85	33	23	

***Poor GPS signal, coordinates corrected based on USGS Topographical map**
***0 = Too Shallow**
**** - Spot Sampling**
T=Feet from top of unit

BMI HABITAT DATA FORM

Project	506637-8333	**Date**	9/25/02
Stream	North Fork Stevenson Creek Below Tunnel 7 Outlet	**Crew**	SH JV
GPS Coordinate (WGS 84/utm) (accuracy may vary)		**Site ID**	NFSC_BO3/Site 3
Upper Boundary of Reach	0301546/4114365		
GPS Coordinate (WGS 84/utm) (accuracy may vary)			
Lower Boundary of Reach	0301546/4114365	**Elev. (ft)**	6658

Water Chemistry

Air Temp. (ºC)	$H_2$0 Temp. (°C)	D.O. (mg/l)	pH	Sp. Cond. (µs/cm)	Turb.
---	16.9	8.29	7.00	0.010	---

Physical Habitat Characteristics

Reach Length (ft) (if applicable) ~500

	Habitat 1	Habitat 2	Habitat 3	Notes (note book ID)
Habitat	RIFF	RIFF	RIFF	
Length (ft)	67	41	65	
Transect Location	10 T	20 T	20 T	
Avg Width (ft)	24	28	20	
Avg Depth (ft)	0.9	0.8	0.8	
Max Depth (ft)	2	2.2	2.1	
Specific Depth (ft)	0.9/1.1/0.7	0.8/0.9/1.3	1.5/1.4/1.0	
Embeddedness (%)	0	0	0	

SUBSTRATE COMP (%)

1. Fines	---	---	---	
2. Sands	---	---	---	
3. Gravels	---	---	---	
4. Cobbles	10	10	10	
5. Boulders	10	20	20	
6. Bedrock	80	70	70	

*1. Fines-silt/clay, <0.062 mm; 2. Sands, 0.062-2 mm; 3. Gravel, 2-64 mm; 4. Cobbles, 64-256 mm; 5. Boulders, 256-2048 mm; 6. Bedrock

Gradient (%)	4	6	6	
Riffle Velocity (cfs)	---	---	---	
Specific Velocity (cfs)	---	---	---	
Streamflow (cfs)	**	---	---	
% Canopy Cover	25	20	20	

***Poor GPS signal, coordinates corrected based on USGS Topographical map**
****Streamflow gage in North Fork Stevenson Creek measured 5.4 cfs on September 25, 2002.**
T=Feet from top of unit

BMI HABITAT DATA FORM

Project	506637-8333	**Date**	9/25/02
Stream	North Fork Stevenson Creek Below Tunnel 7 Outlet	**Crew**	MFGM
GPS Coordinate (WGS 84/utm) (accuracy may vary)		**Site ID**	NFSC_BO2/Site 2
Upper Boundary of Reach	0300805/4113560		
GPS Coordinate (WGS 84/utm) (accuracy may vary)			
Lower Boundary of Reach	0300805/4113560	**Elev. (ft)**	

Water Chemistry

Air Temp. (ºC)	H_20 Temp. (°C)	D.O. (mg/l)	pH	Sp. Cond. (µs/cm)	Turb.
---	16.3	8.15	6.0	0.01	---

Physical Habitat Characteristics

Reach Length (ft) (if applicable)

	Habitat 1	Habitat 2	Habitat 3	Notes (note book ID)
Habitat	RIFF	RIFF		
Length (ft)	53	55		
Transect Location	Top Third	Top Third		
Avg Width (ft)	29	37		
Avg Depth (ft)	0.9	0.8		
Max Depth (ft)	2.0	2.5		
Specific Depth (ft)	0.6/0.6/0.7	1.0/1.5/1.6		
Embeddedness (%)	15	20		
SUBSTRATE COMP (%)				
1. Fines	---	---		
2. Sands	---	---		
3. Gravels	5	---		
4. Cobbles	10	5		
5. Boulders	85	90		
6. Bedrock	---	5		

*1. Fines-silt/clay, <0.062 mm; 2. Sands, 0.062-2 mm; 3. Gravel, 2-64 mm; 4. Cobbles, 64-256 mm; 5. Boulders, 256-2048 mm; 6. Bedrock

	Habitat 1	Habitat 2	Habitat 3	Notes (note book ID)
Gradient (%)	5	6		
Riffle Velocity (cfs)	---	---		
Specific Velocity (cfs)	---	---		
Streamflow (cfs)	**	---		
% Canopy Cover	65	50		

***Poor GPS signal, coordinates corrected based on USGS Topographical map**
****Streamflow gage in North Fork Stevenson Creek measured 5.4 cfs on September 25, 2002.**

BMI HABITAT DATA FORM

Project	506637-8333	**Date**	9/25/02
Stream	North Fork Stevenson Creek Below Tunnel 7 Outlet	**Crew**	MF SH JV GM
GPS Coordinate (WGS 84/utm) (accuracy may vary)		**Site ID**	NFSC_BO1/Site 1
Upper Boundary of Reach	0299282/4112242		
GPS Coordinate (WGS 84/utm) (accuracy may vary)			
Lower Boundary of Reach	0299282/4112242	**Elev. (ft)**	~5600

Water Chemistry

Air Temp. (ºC)	H_2O Temp. (°C)	D.O. (mg/l)	pH	Sp. Cond. (µs/cm)	Turb.
---	12.6	9.52	6.60	0.14	---

Physical Habitat Characteristics

Reach Length (ft) (if applicable)

	Habitat 1	Habitat 2	Habitat 3	Notes (note book ID)
Habitat	RIFF	RIFF	RIFF	
Length (ft)	31.0	60.0	14.9	
Transect Location	3 T	30 T	7 T	
Avg Width (ft)	15.0	65.0	10.0	
Avg Depth (ft)	0.2	0.4	0.5	
Max Depth (ft)	1.3	1.2	1.2	
Specific Depth (ft)	0.5/0.1	0.4/0.3/0.4	0.2/0.4/0.6	
Embeddedness (%)	0	3	3	

SUBSTRATE COMP (%)

1. Fines	---	---	---	
2. Sands	---	10	---	
3. Gravels	---	10	---	
4. Cobbles	---	20	10	
5. Boulders	---	50	20	
6. Bedrock	100	---	70	

*1. Fines-silt/clay, <0.062 mm; 2. Sands, 0.062-2 mm; 3. Gravel, 2-64 mm; 4. Cobbles, 64-256 mm; 5. Boulders, 256-2048 mm; 6. Bedrock

Gradient (%)	4-5	2	4-5	
Riffle Velocity (cfs)	---	---	---	
Specific Velocity (cfs)	---	---	---	
Streamflow (cfs)	**	---	---	
% Canopy Cover	48	20	45	

***Poor GPS signal, coordinates corrected based on USGS Topographical map**
****Streamflow gage in North Fork Stevenson Creek measured 5.4 cfs on September 25, 2002.**
T=Feet from top of unit

BMI HABITAT DATA FORM

Project	506637-8333	Date	8/7/02
Stream	Stevenson Creek Below Shaver Dam	Crew	SF, KJ, EG
GPS Coordinate (WGS 84/utm) (accuracy may vary)		Site ID	Stev_5/Site 5
Upper Boundary of Reach	0295167/4113280		
GPS Coordinate (WGS 84/utm) (accuracy may vary)			
Lower Boundary of Reach	0295167/4113280	Elev. (ft)	

Water Chemistry

Air Temp. (ºC)	$H_2$0 Temp. (°C)	D.O. (mg/l)	pH	Sp. Cond. (µs/cm)	Turb.
---	13.0	8.6	6.8	---	---

Physical Habitat Characteristics

Reach Length (ft) (if applicable)

	Habitat 1	Habitat 2	Habitat 3	Notes (note book ID)
Habitat	HGR	HGR		
Length (ft)	21 T	24 T		
Transect Location	4, 12, 18 T	3, 12, 20 T		
Avg Width (ft)	6	5		
Avg Depth (ft)	1.1	0.9		
Max Depth (ft)	1.5	1.3		
Specific Depth (ft)	1.1/1.0/1.1	0.8/0.9/0.8		
Embeddedness (%)	10	10		

SUBSTRATE COMP (%)

1. Fines	---	---		
2. Sands	---	---		
3. Gravels	5	5		
4. Cobbles	25	25		
5. Boulders	60	60		
6. Bedrock	10	10		

*1. Fines-silt/clay, <0.062 mm; 2. Sands, 0.062-2 mm; 3. Gravel, 2-64 mm; 4. Cobbles, 64-256 mm; 5. Boulders, 256-2048 mm; 6. Bedrock

Gradient (%)	5	5		
Riffle Velocity (cfs)	MNF	MNF		
Specific Velocity (cfs)	MNF	MNF		
Streamflow (cfs)	MNF**	MNF		
% Canopy Cover	65	70		

***Poor GPS signal, coordinates corrected based on USGS Topographical map**
****Streamflow gage in Stevenson Creek measured 3.1 cfs on August 7, 2002.**
MNF = Meter Not Functioning
T=Feet from top of unit

BMI HABITAT DATA FORM

Project	506637-8333	**Date**	9/8/02
Stream	Stevenson Creek Below Shaver Dam	**Crew**	SF, KJ, EG
GPS Coordinate (WGS 84/utm) (accuracy may vary)		**Site ID**	Stev_4/Site 4
Upper Boundary of Reach	0293458/4114514		
GPS Coordinate (WGS 84/utm) (accuracy may vary)			
Lower Boundary of Reach	0293458/4114514	**Elev. (ft)**	

Water Chemistry

Air Temp. (ºC)	H_2O Temp. (°C)	D.O. (mg/l)	pH	Sp. Cond. (µs/cm)	Turb.
---	13.0	10.11	6.62	.021	---

Physical Habitat Characteristics

Reach Length (ft) (if applicable)

	Habitat 1	Habitat 2	Habitat 3	Notes (note book ID)
Habitat	HGR			
Length (ft)	28			
Transect Location	5, 22, 25 T			
Avg Width (ft)	4			
Avg Depth (ft)	11			
Max Depth (ft)	1.5			
Specific Depth (ft)	11/7/9			
Embeddedness (%)	0			

SUBSTRATE COMP (%)

1. Fines	---			
2. Sands	0			
3. Gravels	0			
4. Cobbles	5			
5. Boulders	70			
6. Bedrock	25			

*1. Fines-silt/clay, <0.062 mm; 2. Sands, 0.062-2 mm; 3. Gravel, 2-64 mm; 4. Cobbles, 64-256 mm; 5. Boulders, 256-2048 mm; 6. Bedrock

Gradient (%)	6			
Riffle Velocity (cfs)	MNF			
Specific Velocity (cfs)	MNF			
Streamflow (cfs)	MNF**			
% Canopy Cover	87			

***Poor GPS signal, coordinates corrected based on USGS Topographical map**
****Streamflow gage in Stevenson Creek measured 3.4 cfs on September 8, 2002.**
MNF = Meter Not Functioning
T=Feet from top of unit

BMI HABITAT DATA FORM

Project	506637-8333	**Date**	9/8/02
Stream	Stevenson Creek Below Shaver Dam	**Crew**	SF, KJ, EG
GPS Coordinate (WGS 84/utm) (accuracy may vary)		**Site ID**	Stev_3/Site 3
Upper Boundary of Reach	0293201/4114672		
GPS Coordinate (WGS 84/utm) (accuracy may vary)			
Lower Boundary of Reach	0293201/4114672	**Elev. (ft)**	

Water Chemistry

Air Temp. (ºC)	H_20 Temp. (°C)	D.O. (mg/l)	pH	Sp. Cond. (µs/cm)	Turb.
---	11.2	10.30	6.15	.021	---

Physical Habitat Characteristics

Reach Length (ft) (if applicable)

	Habitat 1	Habitat 2	Habitat 3	Notes (note book ID)
Habitat	HGR	HGR		
Length (ft)	26	20		
Transect Location	4, 4, 6 T	7 T		
Avg Width (ft)	3	15		
Avg Depth (ft)	.5	.4		
Max Depth (ft)	1	.7		
Specific Depth (ft)	0.3/0.35/**	0.5/0.5/0.5		
Embeddedness (%)	0	15		
SUBSTRATE COMP (%)				
1. Fines	---	<1		
2. Sands	---	2		
3. Gravels	---	3		
4. Cobbles	10	55		
5. Boulders	40	40		
6. Bedrock	50	---		

*1. Fines-silt/clay, <0.062 mm; 2. Sands, 0.062-2 mm; 3. Gravel, 2-64 mm; 4. Cobbles, 64-256 mm; 5. Boulders, 256-2048 mm; 6. Bedrock

Gradient (%)	3	2		
Riffle Velocity (cfs)	1.0	MNF		
Specific Velocity (cfs)	0.35/1.76/**	MNF		
Streamflow (cfs)	MNF***	MNF		
% Canopy Cover	77	78		

***Poor GPS signal, coordinates corrected based on USGS Topographical map**
**** Not Recordable**
*****Streamflow gage in Stevenson Creek measured 3.4 cfs on September 8, 2002.**
MNF = Meter Not Functioning
T=Feet from top of unit

BMI HABITAT DATA FORM

Project	506637-8333	**Date**	9/8/02
Stream	Stevenson Creek Below Shaver Dam	**Crew**	SF, KJ, EG
GPS Coordinate (WGS 84/utm) (accuracy may vary)		**Site ID**	Stev_2/Site 2
Upper Boundary of Reach	0292994/4114835		
GPS Coordinate (WGS 84/utm) (accuracy may vary)			
Lower Boundary of Reach	0292994/4114835	**Elev. (ft)**	

Water Chemistry

Air Temp. (ºC)	H_2O Temp. (°C)	D.O. (mg/l)	pH	Sp. Cond. (µs/cm)	Turb.
---	10.5	10.46	5.50	.020	---

Physical Habitat Characteristics

Reach Length (ft) (if applicable)

	Habitat 1	Habitat 2	Habitat 3	Notes (note book ID)
Habitat	HGR			
Length (ft)	29			
Transect Location	15, 23, 27 T			
Avg Width (ft)	5			
Avg Depth (ft)	0.8			
Max Depth (ft)	1.8			
Specific Depth (ft)	0.7/0.9/0.5			
Embeddedness (%)	5			

SUBSTRATE COMP (%)

1. Fines	---			
2. Sands	2			
3. Gravels	3			
4. Cobbles	5			
5. Boulders	40			
6. Bedrock	50			

*1. Fines-silt/clay, <0.062 mm; 2. Sands, 0.062-2 mm; 3. Gravel, 2-64 mm; 4. Cobbles, 64-256 mm; 5. Boulders, 256-2048 mm; 6. Bedrock

Gradient (%)	8			
Riffle Velocity (cfs)	1.8			
Specific Velocity (cfs)	2.8/2.2/0.31			
Streamflow (cfs)	---			
% Canopy Cover	55			

***Poor GPS signal, coordinates corrected based on USGS Topographical map**
T=Feet from top of unit

BMI HABITAT DATA FORM

Project	506637-8333	**Date**	9/7/02
Stream	Stevenson Creek Below Shaver Dam	**Crew**	SF, KJ, EG
GPS Coordinate (WGS 84/utm) (accuracy may vary)		**Site ID**	Stev_1/Site 1
Upper Boundary of Reach	0291208/4115583		
GPS Coordinate (WGS 84/utm) (accuracy may vary)			
Lower Boundary of Reach	0291208/4115583	**Elev. (ft)**	

Water Chemistry

Air Temp. (ºC)	H_20 Temp. (°C)	D.O. (mg/l)	pH	Sp. Cond. (µs/cm)	Turb.
---	13.8	11.38	5.90	.021	---

Physical Habitat Characteristics

Reach Length (ft) (if applicable)

	Habitat 1	Habitat 2	Habitat 3	Notes (note book ID)
Habitat	HGR	HGR	HGR	
Length (ft)	20	28	16	
Transect Location	6, 6, 4 T	14, 18, 18 T	13 T	
Avg Width (ft)	13	18	16	
Avg Depth (ft)	0.4	0.7	0.8	
Max Depth (ft)	1.1	1.3	1.9	
Specific Depth (ft)	0.8/0.35/**	0.6/0.6/**	0.8	
Embeddedness (%)	5	40	10	

SUBSTRATE COMP (%)

1. Fines	<1	---	<1	
2. Sands	5	5	2	
3. Gravels	5	5	8	
4. Cobbles	15	10	30	
5. Boulders	60	60	50	
6. Bedrock	15	20	10	

*1. Fines-silt/clay, <0.062 mm; 2. Sands, 0.062-2 mm; 3. Gravel, 2-64 mm; 4. Cobbles, 64-256 mm; 5. Boulders, 256-2048 mm; 6. Bedrock

Gradient (%)	10	4	6	
Riffle Velocity (cfs)	.4	0.4	4.0	
Specific Velocity (cfs)	0.34/0.39**	0.51/0.29/**	4.0	
Streamflow (cfs)	8.23	8.23	8.23	
% Canopy Cover	62	78	88	

***Poor GPS signal, coordinates corrected based on USGS Topographical map**
**** Not Recordable**
T=Feet from top of unit

APPENDIX C

LABORATORY DATA

FAMILY	GENUS Species	Adit 8 Creek-1 A	Adit 8 Creek-1 B	Adit 8 Creek-1 C	Adit 8 Creek-2 A	Adit 8 Creek-2 B	Adit 8 Creek-2 C	Balsam Creek-AD A	Balsam Creek-AD B	Balsam Creek-AD C	Balsam Creek-1 A (BD1)	Balsam Creek-1 B (BD1)	Balsam Creek-1 C (BD1)	Balsam Creek-2 A (BD2)	Balsam Creek-2 B (BD2)	Balsam Creek-2 C (BD2)	Bear Creek-AD A	Bear Creek-AD B	Bear Creek-AD C
Ephemeroptera	Acentrella sp.																		
	Ameletus sp.												1			1			
	Attenella sp.																		
	Baetidae																		
	Baetis sp.	23	20	61		3	3	65	31	69	12	38	9	40	43	87	21	5	14
	Caudatella sp.							1									3	2	1
	Centroptilum sp.													1					
	Cinygma sp.																		
	Cinygmula sp.																9		4
	Cloeodes sp.																		
	Diphetor hageni			4				1	3	4	4	5	3	1		3			1
	Drunella sp.								2	1							6	3	2
	Epeorus sp.		1					13	9	27	13	10	13	2	2	1	28	4	15
	Ephemerella sp.																24	9	37
	Ephemerellidae														1	1		9	
	Ephemeroptera																		
	Heptageniidae								1			2	3	1				1	
	Ironodes sp.	12	12	3	1	1	1	15	7	22	21	15	22	3	9	6	4	1	19
	Leptophlebiidae																		
	Nixe sp.																		
	Paraleptophlebia sp.	4	2	2			1	5	8	4	2	5	8	3	2	4	15	2	21
	Procloeon sp.																		
	Rhithrogena sp.							1									16	4	9
	Serratella sp.									1								1	

FAMILY	GENUS Species	Adit 8 Creek-1 A	Adit 8 Creek-1 B	Adit 8 Creek-1 C	Adit 8 Creek-2 A	Adit 8 Creek-2 B	Adit 8 Creek-2 C	Balsam Creek-AD A	Balsam Creek-AD B	Balsam Creek-AD C	Balsam Creek-1 A (BD1)	Balsam Creek-1 B (BD1)	Balsam Creek-1 C (BD1)	Balsam Creek-2 A (BD2)	Balsam Creek-2 B (BD2)	Balsam Creek-2 C (BD2)	Bear Creek-AD A	Bear Creek-AD B	Bear Creek-AD C
Odonata	Anisoptera																		
	Argia sp.																		
	Coenagrionidae																		
	Cordulegaster sp.	2									1				5				
	Corduliinae																		
	Gomphidae										2				1	1			
	Hetaerina sp.																		
	Libellulidae																		
	Octogomphus specularis																		
Plecoptera	Calineuria californica																4		3
	Capniidae	1															2		
	Chloroperlidae			2													1		
	Cultus sp.																		
	Despaxia augusta																		
	Doroneuria sp.																3		
	Frisonia picticeps																		
	Hesperoperla sp.	3	16	2				1		1			1	1			1	2	1
	Isoperla sp.																		
	Kogotus sp.																		
	Kogotus/Rickera sp.																		
	Leuctridae	1																	
	Malenka sp.				1		2								1		1		
	Moselia infuscata	1																	
	Nemouridae																		

FAMILY	GENUS Species	Adit 8 Creek-1 A	Adit 8 Creek-1 B	Adit 8 Creek-1 C	Adit 8 Creek-2 A	Adit 8 Creek-2 B	Adit 8 Creek-2 C	Balsam Creek-AD A	Balsam Creek-AD B	Balsam Creek-AD C	Balsam Creek-1 A (BD1)	Balsam Creek-1 B (BD1)	Balsam Creek-1 C (BD1)	Balsam Creek-2 A (BD2)	Balsam Creek-2 B (BD2)	Balsam Creek-2 C (BD2)	Bear Creek-AD A	Bear Creek-AD B	Bear Creek-AD C
	Paracapnia sp.																		
	Paraperla sp.																		
	Perlidae							2	1	4			5			2			2
	Perlinodes aurea																1		2
	Perlodidae	2			2		1				4		4						
	Plecoptera									2									
	Skwala sp.							7		2		1	1	2	2				2
	Soyedina sp.			1	15	9	8												
	Suwallia sp.																		
	Sweltsa sp.	2		1			1	7	6	5		2	5	2	8	8	3	4	2
	Taeniopterygidae																		
	Visoka cataractae																		
	Yoraperla sp.	5	8	1													3	20	
	Zapada sp.	4	13	4		8		38	33	17	12	12	18	6	14	3	3	3	8
Coleoptera	Agabinus sp.																		
	Agabus sp.																		
	Amphizoa sp.																		
	Ampumixis dispar							6	1	4	2	4	1	2	3	1			
	Chaetarthria sp.																		
	Cleptelmis addenda																	59	
	Cymbiodyta sp.																		
	Elmidae													1			1		
	Eubrianax edwardsi																		
	Heterlimnius sp.																		

FAMILY	GENUS Species	Adit 8 Creek-1 A	Adit 8 Creek-1 B	Adit 8 Creek-1 C	Adit 8 Creek-2 A	Adit 8 Creek-2 B	Adit 8 Creek-2 C	Balsam Creek-AD A	Balsam Creek-AD B	Balsam Creek-AD C	Balsam Creek-1 A (BD1)	Balsam Creek-1 B (BD1)	Balsam Creek-1 C (BD1)	Balsam Creek-2 A (BD2)	Balsam Creek-2 B (BD2)	Balsam Creek-2 C (BD2)	Bear Creek-AD A	Bear Creek-AD B	Bear Creek-AD C
	Hydraena sp.	2	33	2		1				1	5	1	1		4				
	Hydroporinae						1												
	Hydroporus sp.				1														
	Hydrotrupes sp.																		
	Lara sp.	4	6	1							1								
	Microcylloepus sp.																		
	Narpus sp.										2							1	
	Ochthebius sp.			1															
	Optioservus sp.							1	8	5	5	5	4		2	2		2	1
	Ordobrevia nubifera													1					
	Oreodytes sp.																		
	Psephenus sp.																		
	Rhizelmis nigra									2				2	1	3			
	Sanfillipodytes sp.																		
	Stenocolus scutellaris																		
	Zaitzevia sp.							2	13								24	5	10
Megaloptera	Corydalidae																		
	Orohermes crepusculus									4						2			1
	Sialis sp.																		
Trichoptera	Agapetus sp.							1	9		14	20	52	1	5	3			
	Amiocentrus aspilus																		
	Anagapetus sp.	2	1	3					2	1	12	15	10		8				
	Apatania sp.			1				12	9	6						3			
	Arctopsyche sp.																13	4	3

FAMILY	GENUS Species	Adit 8 Creek-1 A	Adit 8 Creek-1 B	Adit 8 Creek-1 C	Adit 8 Creek-2 A	Adit 8 Creek-2 B	Adit 8 Creek-2 C	Balsam Creek-AD A	Balsam Creek-AD B	Balsam Creek-AD C	Balsam Creek-1 A (BD1)	Balsam Creek-1 B (BD1)	Balsam Creek-1 C (BD1)	Balsam Creek-2 A (BD2)	Balsam Creek-2 B (BD2)	Balsam Creek-2 C (BD2)	Bear Creek-AD A	Bear Creek-AD B	Bear Creek-AD C
	Arctopsychinae																		
	Brachycentridae																		
	Chimarra sp.																		
	Cryptochia sp.																		
	Dolophilodes sp.							11	8	11		1		1	32				
	Ecclisomyia sp.																		
	Glossosoma sp.																1		2
	Glossosomatidae															1			
	Gumaga sp.	2																	
	Helicopsyche sp.																		
	Heteroplectron sp.																		
	Hydropsyche sp.	2	6					15	6	10	63	29	38	37	44	4	42	33	49
	Hydropsychidae							3											16
	Hydroptila sp.													6		2	1		
	Hydroptilidae																		
	Lepidostoma sp.	3	1	1				5	11	7	54	49	61	5	9	57	16	3	22
	Leptoceridae																		
	Leucotrichia sp.																		
	Limnephilidae																		
	Micrasema sp.	4	18					1	1	1	1			2		12		6	
	Neophylax sp.											1							
	Neothremma sp.	18	24	4	2														
	Ochrotrichia sp.																		
	Oecetis sp.																		

FAMILY	GENUS Species	Adit 8 Creek-1 A	Adit 8 Creek-1 B	Adit 8 Creek-1 C	Adit 8 Creek-2 A	Adit 8 Creek-2 B	Adit 8 Creek-2 C	Balsam Creek-AD A	Balsam Creek-AD B	Balsam Creek-AD C	Balsam Creek-1 A (BD1)	Balsam Creek-1 B (BD1)	Balsam Creek-1 C (BD1)	Balsam Creek-2 A (BD2)	Balsam Creek-2 B (BD2)	Balsam Creek-2 C (BD2)	Bear Creek-AD A	Bear Creek-AD B	Bear Creek-AD C
	Oligophlebodes sp.										1			1			3		5
	Oxyethira sp.																		
	Parapsyche sp.		3			3	1		1										
	Pedomoecus sierra																		
	Philopotamidae																1		
	Polycentropodidae																		
	Polycentropus sp.	1		1															
	Psychoglypha sp.																		
	Rhyacophila sp.	6	2	3	5	2		17		9	7	7	7	5	7	4	12	1	2
	Tinodes sp.																		
	Trichoptera				1													1	
	Uenoidae			2															
	Wormaldia sp.										3	1	3						
	Yphria californica																		
Diptera	Antocha sp.								1					1			2	2	3
	Atherix sp.																		
	Atrichopogon sp.																		
	Bezzia/Palpomyia sp.			2					3		2						3		2
	Blephariceria sp.																		
	Blephariceridae																		
	Caloparyphus sp.													3					
	Ceratopogon sp.										1								
	Ceratopogonidae																		
	Ceratopogoninae																		

FAMILY	GENUS Species	Adit 8 Creek-1 A	Adit 8 Creek-1 B	Adit 8 Creek-1 C	Adit 8 Creek-2 A	Adit 8 Creek-2 B	Adit 8 Creek-2 C	Balsam Creek-AD A	Balsam Creek-AD B	Balsam Creek-AD C	Balsam Creek-1 A (BD1)	Balsam Creek-1 B (BD1)	Balsam Creek-1 C (BD1)	Balsam Creek-2 A (BD2)	Balsam Creek-2 B (BD2)	Balsam Creek-2 C (BD2)	Bear Creek-AD A	Bear Creek-AD B	Bear Creek-AD C
	Chelifera sp.																		
	Chlorotabanus sp.																		
	Clinocera sp.																		
	Cryptolabis sp.																		
	Culicidae																		
	Culicoides sp.																		
	Culiseta sp.																		
	Dasyhelea sp.																		
	Dicranota sp.	1	1				1				5	1	5	1	1	14	1		1
	Diptera																		
	Dixa sp.							1						1					
	Dixella sp.																		
	Dolichopodidae																		
	Empididae													1					
	Ephydridae																		
	Euparyphus sp.									1	1		1						
	Forcipomyia sp.							2		2			1						
	Glutops sp.	1	1	1					1					1					
	Gonomyia sp.																		
	Hemerodromia sp.																		
	Hesperoconopa sp.																		
	Hexatoma sp.							1	1	3	1				1	3		1	1
	Limnophila sp.																		
	Limonia sp.													1					

FAMILY	GENUS Species	Adit 8 Creek-1 A	Adit 8 Creek-1 B	Adit 8 Creek-1 C	Adit 8 Creek-2 A	Adit 8 Creek-2 B	Adit 8 Creek-2 C	Balsam Creek-AD A	Balsam Creek-AD B	Balsam Creek-AD C	Balsam Creek-1 A (BD1)	Balsam Creek-1 B (BD1)	Balsam Creek-1 C (BD1)	Balsam Creek-2 A (BD2)	Balsam Creek-2 B (BD2)	Balsam Creek-2 C (BD2)	Bear Creek-AD A	Bear Creek-AD B	Bear Creek-AD C
	Maruina sp.							1					1						
	Meringodixa sp.																		
	Molophilus sp.																		
	Muscidae																		
	Neoplasta sp.	3	1							2					2	1		3	
	Oreogeton sp.	3	1																
	Ormosia sp.																		
	Pedicia sp.																		
	Pericoma/Telmatoscopus sp.	1								1									
	Probezzia sp.																		
	Prosimulium sp.																		
	Psychodidae																		
	Rhabdomastix sp.																		
	Sciomyzidae																		
	Simuliidae																		
	Simulium sp.							6	4	2	5	37	2	17	9				
	Stilobezzia sp.																		
	Tabanidae																		
	Thaumaleidae																		
	Tipula sp.				3														
	Tipulidae																		
	Tipulinae																		
	Wiedemannia sp.																		
Diptera-Chironomidae	Chironomidae																		

FAMILY	GENUS Species	Adit 8 Creek-1 A	Adit 8 Creek-1 B	Adit 8 Creek-1 C	Adit 8 Creek-2 A	Adit 8 Creek-2 B	Adit 8 Creek-2 C	Balsam Creek-AD A	Balsam Creek-AD B	Balsam Creek-AD C	Balsam Creek-1 A (BD1)	Balsam Creek-1 B (BD1)	Balsam Creek-1 C (BD1)	Balsam Creek-2 A (BD2)	Balsam Creek-2 B (BD2)	Balsam Creek-2 C (BD2)	Bear Creek-AD A	Bear Creek-AD B	Bear Creek-AD C
	Chironomini							2		1	1						2	2	2
	Diamesinae							2	7	2	1			6	1	9			
	Orthocladiinae	14	8	3	23	10	21	34	43	41	29	17	14	121	72	43	5	13	24
	Podonominae				1														
	Pseudochironomini																		
	Tanypodinae			1							3		1	5	2	2	3	7	
	Tanytarsini	1	1	1	2			42	62	30	15	21	18	19	17	7	12	44	17
Lepidoptera	Lepidoptera																		
	Petrophila sp.																		
Lumbricina	Lumbricina					14	27												
Nemertea (phylum)	Prostoma sp.																		
Oligochaeta (class)	Enchytraeidae	27	2			2	51							1		5	11	19	3
	Lumbriculidae																		
	Naididae	1	1						11					3	2		2		
	Oligochaeta			3	65														
	Tubificidae		1																
Nematoda (phylum)	Nematoda	8	2	3	1				2								2	44	4
Bivalvia (class)	Bivalvia																		
Ostracoda (class)	Cyprididae																		
	Ostracoda																		
Copepoda	Calanoida																		
	Cyclopoida																		
	Harpacticoida																		
Tricladida	Planariidae	14	13		16			2	1	3	2	1	7		1				1

FAMILY	GENUS Species	Adit 8 Creek-1 A	Adit 8 Creek-1 B	Adit 8 Creek-1 C	Adit 8 Creek-2 A	Adit 8 Creek-2 B	Adit 8 Creek-2 C	Balsam Creek-AD A	Balsam Creek-AD B	Balsam Creek-AD C	Balsam Creek-1 A (BD1)	Balsam Creek-1 B (BD1)	Balsam Creek-1 C (BD1)	Balsam Creek-2 A (BD2)	Balsam Creek-2 B (BD2)	Balsam Creek-2 C (BD2)	Bear Creek-AD A	Bear Creek-AD B	Bear Creek-AD C
	Polycelis sp.			7		29	18										1		
Hydroida	Hydra sp.																		
Arachnida (class)	Acari							2								1			
Trombidiformes	Hydrovolziidae																		
	Hydryphantidae										2								
	Hygrobatidae																		1
	Lebertiidae		3	1													1	2	1
	Limnesiidae																		
	Mideopsidae																		
	Sperchontidae	1		1				2	1		1	1				2		1	
	Stygothrombidiidae																1		
	Torrenticolidae		1						1			1		1	1	1	5		5
Veneroida	Pisidium sp.																		
	Sphaeriidae	4		1					1	1			1		1	3			
Basommatophora	Ferrissia sp.																		
	Menetus sp.																		
	Physa sp.																		
	Planorbidae				1														
Sarcoptiformes	Oribatei				1													1	
	Total	**183**	**202**	**124**	**141**	**82**	**137**	**327**	**309**	**309**	**310**	**302**	**321**	**308**	**313**	**302**	**313**	**324**	**319**

FAMILY	GENUS Species	Bear Creek-1 A (BD1)	Bear Creek-1 B (BD1)	Bear Creek-1 C (BD1)	Bear Creek-2 A (BD2)	Bear Creek-2 B (BD2)	Bear Creek-2 C (BD2)	Big Creek Dam 1 to PH 1- Site B	Big Creek Dam 1 to PH 1-3 A	Big Creek Dam 1 to PH 1-3 B	Big Creek Dam 1 to PH 1-3 C	Big Creek Dam 1 to PH 1-2 A	Big Creek Dam 1 to PH 1-2 B	Big Creek Dam 1 to PH 1-1 A	Big Creek Dam 1 to PH 1-1 B	Big Creek Dam 1 to PH 1-1 C	Big Creek Dam 4 to PH 2-1 A	Big Creek Dam 4 to PH 2-1 B	Big Creek Dam 4 to PH 2-1 C
Ephemeroptera	Acentrella sp.																		
	Ameletus sp.						1												
	Attenella sp.																		
	Baetidae			1															
	Baetis sp.	35	24	20	48	11	10	41	3	1	2	114	48	7	9	8	44	27	41
	Caudatella sp.				3	1	1	6				4	3	1		1			
	Centroptilum sp.																		
	Cinygma sp.																		
	Cinygmula sp.						3					3							
	Cloeodes sp.																		
	Diphetor hageni		1	2	1	11	5							3	3	4	3	2	4
	Drunella sp.	1			1							5	8	1	1	2	1	1	
	Epeorus sp.	4	7	6	3	14						27	11	1	2	3	29	12	12
	Ephemerella sp.						1								3				3
	Ephemerellidae		2											1	4	11	4		
	Ephemeroptera																		
	Heptageniidae					1		2					2						
	Ironodes sp.			13	1	6		2		2	2	11	9	2		5	3	1	
	Leptophlebiidae																		
	Nixe sp.																3		1
	Paraleptophlebia sp.	1	1	4		42	3	6		2		1	9		5	11	5		
	Procloeon sp.																		
	Rhithrogena sp.																		
	Serratella sp.							2		1			1						

FAMILY	GENUS Species	Bear Creek-1 A (BD1)	Bear Creek-1 B (BD1)	Bear Creek-1 C (BD1)	Bear Creek-2 A (BD2)	Bear Creek-2 B (BD2)	Bear Creek-2 C (BD2)	Big Creek Dam 1 to PH 1- Site B	Big Creek Dam 1 to PH 1-3 A	Big Creek Dam 1 to PH 1-3 B	Big Creek Dam 1 to PH 1-3 C	Big Creek Dam 1 to PH 1-2 A	Big Creek Dam 1 to PH 1-2 B	Big Creek Dam 1 to PH 1-1 A	Big Creek Dam 1 to PH 1-1 B	Big Creek Dam 1 to PH 1-1 C	Big Creek Dam 4 to PH 2-1 A	Big Creek Dam 4 to PH 2-1 B	Big Creek Dam 4 to PH 2-1 C
Odonata	Anisoptera																		
	Argia sp.																1		
	Coenagrionidae																		1
	Cordulegaster sp.																		
	Corduliinae																		1
	Gomphidae																		
	Hetaerina sp.																		
	Libellulidae																		
	Octogomphus specularis																1		
Plecoptera	Calineuria californica		6			2							1				4	1	1
	Capniidae																		
	Chloroperlidae																		
	Cultus sp.																		
	Despaxia augusta																		
	Doroneuria sp.																		
	Frisonia picticeps															1			
	Hesperoperla sp.		1					2		5	2					1			
	Isoperla sp.																		
	Kogotus sp.																		
	Kogotus/Rickera sp.																		
	Leuctridae									1									
	Malenka sp.		1			8	3		1	1				1	1		2		
	Moselia infuscata																		
	Nemouridae																		

FAMILY	GENUS Species	Bear Creek-1 A (BD1)	Bear Creek-1 B (BD1)	Bear Creek-1 C (BD1)	Bear Creek-2 A (BD2)	Bear Creek-2 B (BD2)	Bear Creek-2 C (BD2)	Big Creek Dam 1 to PH 1- Site B	Big Creek Dam 1 to PH 1-3 A	Big Creek Dam 1 to PH 1-3 B	Big Creek Dam 1 to PH 1-3 C	Big Creek Dam 1 to PH 1-2 A	Big Creek Dam 1 to PH 1-2 B	Big Creek Dam 1 to PH 1-1 A	Big Creek Dam 1 to PH 1-1 B	Big Creek Dam 1 to PH 1-1 C	Big Creek Dam 4 to PH 2-1 A	Big Creek Dam 4 to PH 2-1 B	Big Creek Dam 4 to PH 2-1 C
	Paracapnia sp.																		
	Paraperla sp.																		
	Perlidae			3			1						2	2					
	Perlinodes aurea																		
	Perlodidae										1					5			
	Plecoptera																		
	Skwala sp.																	1	
	Soyedina sp.																		
	Suwallia sp.																		
	Sweltsa sp.								1		1								
	Taeniopterygidae																		
	Visoka cataractae																		
	Yoraperla sp.							35		4	3	6	24	5	7	44			
	Zapada sp.		3	7	9	42	7	75	16	56	26	9	14	3	3	8	2	3	
Coleoptera	Agabinus sp.																		
	Agabus sp.																		
	Amphizoa sp.																		
	Ampumixis dispar											1			2	1			
	Chaetarthria sp.																		
	Cleptelmis addenda							25				10	14	7	10	39	1	3	
	Cymbiodyta sp.																		
	Elmidae														6	7			
	Eubrianax edwardsi																		19
	Heterlimnius sp.																		

FAMILY	GENUS Species	Bear Creek-1 A (BD1)	Bear Creek-1 B (BD1)	Bear Creek-1 C (BD1)	Bear Creek-2 A (BD2)	Bear Creek-2 B (BD2)	Bear Creek-2 C (BD2)	Big Creek Dam 1 to PH 1- Site B	Big Creek Dam 1 to PH 1-3 A	Big Creek Dam 1 to PH 1-3 B	Big Creek Dam 1 to PH 1-3 C	Big Creek Dam 1 to PH 1-2 A	Big Creek Dam 1 to PH 1-2 B	Big Creek Dam 1 to PH 1-1 A	Big Creek Dam 1 to PH 1-1 B	Big Creek Dam 1 to PH 1-1 C	Big Creek Dam 4 to PH 2-1 A	Big Creek Dam 4 to PH 2-1 B	Big Creek Dam 4 to PH 2-1 C
	Hydraena sp.													4			1	2	
	Hydroporinae																		
	Hydroporus sp.																		
	Hydrotrupes sp.																		
	Lara sp.																		
	Microcylloepus sp.																		
	Narpus sp.																		
	Ochthebius sp.																		
	Optioservus sp.						1						1	1	1	2	43	41	45
	Ordobrevia nubifera																5	12	10
	Oreodytes sp.																1		
	Psephenus sp.												1	1			35	29	
	Rhizelmis nigra																		
	Sanfillipodytes sp.																		
	Stenocolus scutellaris																		
	Zaitzevia sp.	8	10	12		1											12	18	10
Megaloptera	Corydalidae					1								2					
	Orohermes crepusculus		1	1								2	1						1
	Sialis sp.																		
Trichoptera	Agapetus sp.																4		2
	Amiocentrus aspilus											1	6	1					
	Anagapetus sp.										1								
	Apatania sp.							2		1		1		1					
	Arctopsyche sp.			1	3	5						9	6						

FAMILY	GENUS Species	Bear Creek-1 A (BD1)	Bear Creek-1 B (BD1)	Bear Creek-1 C (BD1)	Bear Creek-2 A (BD2)	Bear Creek-2 B (BD2)	Bear Creek-2 C (BD2)	Big Creek Dam 1 to PH 1- Site B	Big Creek Dam 1 to PH 1-3 A	Big Creek Dam 1 to PH 1-3 B	Big Creek Dam 1 to PH 1-3 C	Big Creek Dam 1 to PH 1-2 A	Big Creek Dam 1 to PH 1-2 B	Big Creek Dam 1 to PH 1-1 A	Big Creek Dam 1 to PH 1-1 B	Big Creek Dam 1 to PH 1-1 C	Big Creek Dam 4 to PH 2-1 A	Big Creek Dam 4 to PH 2-1 B	Big Creek Dam 4 to PH 2-1 C
	Arctopsychinae																		
	Brachycentridae																		
	Chimarra sp.																		
	Cryptochia sp.																		
	Dolophilodes sp.			2	11	21							2						
	Ecclisomyia sp.																		
	Glossosoma sp.											2							
	Glossosomatidae																		2
	Gumaga sp.																		
	Helicopsyche sp.																	4	7
	Heteroplectron sp.							1						1					
	Hydropsyche sp.	1	4	12	1	40	8		37	18	18	2	1	4		7	16	6	9
	Hydropsychidae	1							3						2		3		
	Hydroptila sp.	51	37	33	15	7	5	11						1			4		7
	Hydroptilidae	13	7	4	1		1					1					1	1	1
	Lepidostoma sp.	5	6	2	3	9	12	1			2	3	3	9	5	9	22	100	67
	Leptoceridae																		
	Leucotrichia sp.																		
	Limnephilidae																		
	Micrasema sp.	1		1	12	1	3	16				14	19	4	6	3	7	2	5
	Neophylax sp.																		
	Neothremma sp.																		
	Ochrotrichia sp.				1														
	Oecetis sp.																		

FAMILY	GENUS Species	Bear Creek-1 A (BD1)	Bear Creek-1 B (BD1)	Bear Creek-1 C (BD1)	Bear Creek-2 A (BD2)	Bear Creek-2 B (BD2)	Bear Creek-2 C (BD2)	Big Creek Dam 1 to PH 1- Site B	Big Creek Dam 1 to PH 1-3 A	Big Creek Dam 1 to PH 1-3 B	Big Creek Dam 1 to PH 1-3 C	Big Creek Dam 1 to PH 1-2 A	Big Creek Dam 1 to PH 1-2 B	Big Creek Dam 1 to PH 1-1 A	Big Creek Dam 1 to PH 1-1 B	Big Creek Dam 1 to PH 1-1 C	Big Creek Dam 4 to PH 2-1 A	Big Creek Dam 4 to PH 2-1 B	Big Creek Dam 4 to PH 2-1 C
	Oligophlebodes sp.											3							
	Oxyethira sp.																		
	Parapsyche sp.								1		4								
	Pedomoecus sierra																		
	Philopotamidae																		
	Polycentropodidae																		
	Polycentropus sp.	1		1			2												
	Psychoglypha sp.																		
	Rhyacophila sp.				3	3	1	14	1	1	9	13	5	3	4	5	3	2	2
	Tinodes sp.																		
	Trichoptera	1						1											
	Uenoidae																		
	Wormaldia sp.																9	11	13
	Yphria californica																		
Diptera	Antocha sp.		2		15	6	4	1				2					7	2	6
	Atherix sp.																		
	Atrichopogon sp.																		
	Bezzia/Palpomyia sp.		2											1	1	2			
	Blephoricera sp.																		
	Blephariceridae																		
	Caloparyphus sp.																		
	Ceratopogon sp.																		
	Ceratopogonidae																		
	Ceratopogoninae																		

FAMILY	GENUS Species	Bear Creek-1 A (BD1)	Bear Creek-1 B (BD1)	Bear Creek-1 C (BD1)	Bear Creek-2 A (BD2)	Bear Creek-2 B (BD2)	Bear Creek-2 C (BD2)	Big Creek Dam 1 to PH 1- Site B	Big Creek Dam 1 to PH 1-3 A	Big Creek Dam 1 to PH 1-3 B	Big Creek Dam 1 to PH 1-3 C	Big Creek Dam 1 to PH 1-2 A	Big Creek Dam 1 to PH 1-2 B	Big Creek Dam 1 to PH 1-1 A	Big Creek Dam 1 to PH 1-1 B	Big Creek Dam 1 to PH 1-1 C	Big Creek Dam 4 to PH 2-1 A	Big Creek Dam 4 to PH 2-1 B	Big Creek Dam 4 to PH 2-1 C
	Chelifera sp.										7								
	Chlorotabanus sp.																		
	Clinocera sp.			2														1	
	Cryptolabis sp.																		
	Culicidae																		
	Culicoides sp.																		
	Culiseta sp.																		
	Dasyhelea sp.																		
	Dicranota sp.								2	3	5		1						
	Diptera																		
	Dixa sp.						1						1						
	Dixella sp.																		
	Dolichopodidae																		
	Empididae			1	1														
	Ephydridae																		
	Euparyphus sp.																1		
	Forcipomyia sp.																		
	Glutops sp.												1						
	Gonomyia sp.																		
	Hemerodromia sp.					2													
	Hesperoconopa sp.																		
	Hexatoma sp.	1																	
	Limnophila sp.																		
	Limonia sp.																		

FAMILY	GENUS Species	Bear Creek-1 A (BD1)	Bear Creek-1 B (BD1)	Bear Creek-1 C (BD1)	Bear Creek-2 A (BD2)	Bear Creek-2 B (BD2)	Bear Creek-2 C (BD2)	Big Creek Dam 1 to PH 1- Site B	Big Creek Dam 1 to PH 1-3 A	Big Creek Dam 1 to PH 1-3 B	Big Creek Dam 1 to PH 1-3 C	Big Creek Dam 1 to PH 1-2 A	Big Creek Dam 1 to PH 1-2 B	Big Creek Dam 1 to PH 1-1 A	Big Creek Dam 1 to PH 1-1 B	Big Creek Dam 1 to PH 1-1 C	Big Creek Dam 4 to PH 2-1 A	Big Creek Dam 4 to PH 2-1 B	Big Creek Dam 4 to PH 2-1 C
	Maruina sp.																8	9	
	Meringodixa sp.													1					
	Molophilus sp.																		
	Muscidae																		
	Neoplasta sp.	1							1	2					1				
	Oreogeton sp.																		
	Ormosia sp.																		
	Pedicia sp.																		
	Pericoma/Telmatoscopus sp.																		
	Probezzia sp.																		
	Prosimulium sp.																		
	Psychodidae																		
	Rhabdomastix sp.																		
	Sciomyzidae																		
	Simuliidae																		
	Simulium sp.	46	25	46	136	33	164	20	34	18	10	64	43	195	3		3		5
	Stilobezzia sp.																		
	Tabanidae																		
	Thaumaleidae			1															
	Tipula sp.																		
	Tipulidae																		
	Tipulinae																		
	Wiedemannia sp.																		
Diptera-Chironomidae	Chironomidae																		

FAMILY	GENUS Species	Bear Creek-1 A (BD1)	Bear Creek-1 B (BD1)	Bear Creek-1 C (BD1)	Bear Creek-2 A (BD2)	Bear Creek-2 B (BD2)	Bear Creek-2 C (BD2)	Big Creek Dam 1 to PH 1- Site B	Big Creek Dam 1 to PH 1-3 A	Big Creek Dam 1 to PH 1-3 B	Big Creek Dam 1 to PH 1-3 C	Big Creek Dam 1 to PH 1-2 A	Big Creek Dam 1 to PH 1-2 B	Big Creek Dam 1 to PH 1-1 A	Big Creek Dam 1 to PH 1-1 B	Big Creek Dam 1 to PH 1-1 C	Big Creek Dam 4 to PH 2-1 A	Big Creek Dam 4 to PH 2-1 B	Big Creek Dam 4 to PH 2-1 C
	Chironomini			4	1	6	1										1	1	2
	Diamesinae	4	9	4	5		1		10	5	4	1		2	6	3			
	Orthocladiinae	39	60	44	38	49	28	31	53	13	30	10	19	13	59	40	5	10	16
	Podonominae																		
	Pseudochironomini																		
	Tanypodinae	2	3	2	1	2	2	1	3	1	3		6	6	26	10	4	8	1
	Tanytarsini	3	28	17		17	15	6	5	16	47	10	26	13	47	35	31	24	29
Lepidoptera	Lepidoptera																		
	Petrophila sp.																		
Lumbricina	Lumbricina			1					2								7	1	2
Nemertea (phylum)	Prostoma sp.																		
Oligochaeta (class)	Enchytraeidae							1		3	1	1	8	5		17	4	5	
	Lumbriculidae																		
	Naididae	99	44	75		1	2	4	12	1			3	8	52	40	1	2	
	Oligochaeta																		
	Tubificidae										4								3
Nematoda (phylum)	Nematoda		2	4			1			6	8	2	2	5	6	1	2		
Bivalvia (class)	Bivalvia																		
Ostracoda (class)	Cyprididae							1							15				
	Ostracoda													3					
Copepoda	Calanoida								1						4	1			
	Cyclopoida																		
	Harpacticoida																		
Tricladida	Planariidae			1	2	6		1	137	155	42				1	1	3	5	4

FAMILY	GENUS Species	Bear Creek-1 A (BD1)	Bear Creek-1 B (BD1)	Bear Creek-1 C (BD1)	Bear Creek-2 A (BD2)	Bear Creek-2 B (BD2)	Bear Creek-2 C (BD2)	Big Creek Dam 1 to PH 1- Site B	Big Creek Dam 1 to PH 1-3 A	Big Creek Dam 1 to PH 1-3 B	Big Creek Dam 1 to PH 1-3 C	Big Creek Dam 1 to PH 1-2 A	Big Creek Dam 1 to PH 1-2 B	Big Creek Dam 1 to PH 1-1 A	Big Creek Dam 1 to PH 1-1 B	Big Creek Dam 1 to PH 1-1 C	Big Creek Dam 4 to PH 2-1 A	Big Creek Dam 4 to PH 2-1 B	Big Creek Dam 4 to PH 2-1 C
	Polycelis sp.											2							
Hydroida	Hydra sp.																		
Arachnida (class)	Acari																		
Trombidiformes	Hydrovolziidae			2															
	Hydryphantidae												2						
	Hygrobatidae																		1
	Lebertiidae					1		1		1	3	1	1	2				2	1
	Limnesiidae																		
	Mideopsidae							1											
	Sperchontidae					1	2	3	1		2	1	4		1	3		1	2
	Stygothrombidiidae																		
	Torrenticolidae	3	1	2	1	9	2						1		3	2	3		6
Veneroida	Pisidium sp.																		1
	Sphaeriidae						1	12		15	88	6	10	8	6	5	5	1	
Basommatophora	Ferrissia sp.																		
	Menetus sp.																		
	Physa sp.																		1
	Planorbidae																		
Sarcoptiformes	Oribatei			1				1							3				
	Total	**321**	**287**	**332**	**316**	**359**	**292**	**326**	**324**	**332**	**325**	**342**	**319**	**328**	**308**	**337**	**354**	**351**	**344**

FAMILY	GENUS Species	Big Creek Dam 4 to PH 2-1 Mollusca	Big Creek Dam 4 to PH 2-2 A	Big Creek Dam 4 to PH 2-2 Mollusca	Big Creek Dam 4 to PH 2-3 A	Big Creek Dam 4 to PH 2-3 B	Big Creek Dam 4 to PH 2-3 C	Big Creek Dam 4 to PH 2-3 Mollusca	Big Creek Dam 5 to PH 8-2 A	Big Creek Dam 5 to PH 8-2 B	Big Creek Dam 5 to PH 8-2 C	Big Creek Dam 5 to PH 8-1 A	Big Creek Dam 5 to PH 8-1 B	Big Creek Dam 5 to PH 8-1 C	Bolsillo Creek-AD A	Bolsillo Creek-AD B	Bolsillo Creek-1 B (BD1)	Bolsillo Creek-2 A (BD2)	Bolsillo Creek-2 B (BD2)
Ephemeroptera	Acentrella sp.																		
	Ameletus sp.														1	4			1
	Attenella sp.																		
	Baetidae											1							
	Baetis sp.		60		30	28	20		24	54	28	33	36	28	1	1			
	Caudatella sp.																		
	Centroptilum sp.																		
	Cinygma sp.				1		1											6	6
	Cinygmula sp.														24	17		18	3
	Cloeodes sp.																		
	Diphetor hageni				2	1			4	2					17	6		15	12
	Drunella sp.					2									5	6			7
	Epeorus sp.		16		7	4			2	1									
	Ephemerella sp.		4		6	21													
	Ephemerellidae								1										
	Ephemeroptera								1										
	Heptageniidae												2						
	Ironodes sp.					15			2			8	25	7	1	5			3
	Leptophlebiidae																		1
	Nixe sp.				1	1					1								
	Paraleptophlebia sp.		5			1	2								5	6		14	
	Procloeon sp.																		
	Rhithrogena sp.																		
	Serratella sp.															24		7	3

FAMILY	GENUS Species	Big Creek Dam 4 to PH 2-1 Mollusca	Big Creek Dam 4 to PH 2-2 A	Big Creek Dam 4 to PH 2-2 Mollusca	Big Creek Dam 4 to PH 2-3 A	Big Creek Dam 4 to PH 2-3 B	Big Creek Dam 4 to PH 2-3 C	Big Creek Dam 4 to PH 2-3 Mollusca	Big Creek Dam 5 to PH 8-2 A	Big Creek Dam 5 to PH 8-2 B	Big Creek Dam 5 to PH 8-2 C	Big Creek Dam 5 to PH 8-1 A	Big Creek Dam 5 to PH 8-1 B	Big Creek Dam 5 to PH 8-1 C	Bolsillo Creek-AD A	Bolsillo Creek-AD B	Bolsillo Creek-1 B (BD1)	Bolsillo Creek-2 A (BD2)	Bolsillo Creek-2 B (BD2)
Odonata	Anisoptera																		
	Argia sp.		1						5	2									
	Coenagrionidae																		
	Cordulegaster sp.		1																
	Corduliinae																		
	Gomphidae					3													
	Hetaerina sp.																		
	Libellulidae								1										
	Octogomphus specularis																		
Plecoptera	Calineuria californica		2			5													
	Capniidae														172	9	69	8	12
	Chloroperlidae														4			2	2
	Cultus sp.																		
	Despaxia augusta																	2	
	Doroneuria sp.														4	3			3
	Frisonia picticeps																		
	Hesperoperla sp.														1	2			
	Isoperla sp.																		
	Kogotus sp.																		
	Kogotus/Rickera sp.														5			2	
	Leuctridae														4	3			1
	Malenka sp.				5	7	3		6			11	24	18					
	Moselia infuscata																		4
	Nemouridae															3			

FAMILY	GENUS Species	Big Creek Dam 4 to PH 2-1 Mollusca	Big Creek Dam 4 to PH 2-2 A	Big Creek Dam 4 to PH 2-2 Mollusca	Big Creek Dam 4 to PH 2-3 A	Big Creek Dam 4 to PH 2-3 B	Big Creek Dam 4 to PH 2-3 C	Big Creek Dam 4 to PH 2-3 Mollusca	Big Creek Dam 5 to PH 8-2 A	Big Creek Dam 5 to PH 8-2 B	Big Creek Dam 5 to PH 8-2 C	Big Creek Dam 5 to PH 8-1 A	Big Creek Dam 5 to PH 8-1 B	Big Creek Dam 5 to PH 8-1 C	Bolsillo Creek-AD A	Bolsillo Creek-AD B	Bolsillo Creek-1 B (BD1)	Bolsillo Creek-2 A (BD2)	Bolsillo Creek-2 B (BD2)
	Paracapnia sp.																		
	Paraperla sp.																		
	Perlidae				1														
	Perlinodes aurea																		
	Perlodidae				1														
	Plecoptera					1													
	Skwala sp.											1							
	Soyedina sp.						3												
	Suwallia sp.																		
	Sweltsa sp.		2		1	1			1		1				2	2		2	5
	Taeniopterygidae																		
	Visoka cataractae															2		1	3
	Yoraperla sp.																	1	
	Zapada sp.				11	13	4		8	7	2	4	17	9	81	75		55	72
Coleoptera	Agabinus sp.																		
	Agabus sp.																		
	Amphizoa sp.																		
	Ampumixis dispar		1																
	Chaetarthria sp.																		
	Cleptelmis addenda								4	12	24								
	Cymbiodyta sp.																		1
	Elmidae																		
	Eubrianax edwardsi				1														
	Heterlimnius sp.																		

FAMILY	GENUS Species	Big Creek Dam 4 to PH 2-1 Mollusca	Big Creek Dam 4 to PH 2-2 A	Big Creek Dam 4 to PH 2-2 Mollusca	Big Creek Dam 4 to PH 2-3 A	Big Creek Dam 4 to PH 2-3 B	Big Creek Dam 4 to PH 2-3 C	Big Creek Dam 4 to PH 2-3 Mollusca	Big Creek Dam 5 to PH 8-2 A	Big Creek Dam 5 to PH 8-2 B	Big Creek Dam 5 to PH 8-2 C	Big Creek Dam 5 to PH 8-1 A	Big Creek Dam 5 to PH 8-1 B	Big Creek Dam 5 to PH 8-1 C	Bolsillo Creek-AD A	Bolsillo Creek-AD B	Bolsillo Creek-1 B (BD1)	Bolsillo Creek-2 A (BD2)	Bolsillo Creek-2 B (BD2)
	Hydraena sp.					1	22										3	1	1
	Hydroporinae						1												
	Hydroporus sp.																		
	Hydrotrupes sp.																		
	Lara sp.																		
	Microcylloepus sp.																		
	Narpus sp.																		
	Ochthebius sp.																		
	Optioservus sp.		55		19	4			13	4	7	2						1	
	Ordobrevia nubifera	1																	
	Oreodytes sp.																		
	Psephenus sp.		17						1		3								
	Rhizelmis nigra																		
	Sanfillipodytes sp.																		
	Stenocolus scutellaris																		
	Zaitzevia sp.		6		2				2		1		1						
Megaloptera	Corydalidae				3		1												
	Orohermes crepusculus				5														
	Sialis sp.		1																
Trichoptera	Agapetus sp.		3																
	Amiocentrus aspilus																		
	Anagapetus sp.															2		1	3
	Apatania sp.														1				
	Arctopsyche sp.																		

FAMILY	GENUS Species	Big Creek Dam 4 to PH 2-1 Mollusca	Big Creek Dam 4 to PH 2-2 A	Big Creek Dam 4 to PH 2-2 Mollusca	Big Creek Dam 4 to PH 2-3 A	Big Creek Dam 4 to PH 2-3 B	Big Creek Dam 4 to PH 2-3 C	Big Creek Dam 4 to PH 2-3 Mollusca	Big Creek Dam 5 to PH 8-2 A	Big Creek Dam 5 to PH 8-2 B	Big Creek Dam 5 to PH 8-2 C	Big Creek Dam 5 to PH 8-1 A	Big Creek Dam 5 to PH 8-1 B	Big Creek Dam 5 to PH 8-1 C	Bolsillo Creek-AD A	Bolsillo Creek-AD B	Bolsillo Creek-1 B (BD1)	Bolsillo Creek-2 A (BD2)	Bolsillo Creek-2 B (BD2)
	Arctopsychinae																		
	Brachycentridae																		
	Chimarra sp.																		
	Cryptochia sp.																4	1	1
	Dolophilodes sp.																		
	Ecclisomyia sp.																		
	Glossosoma sp.		1																
	Glossosomatidae																		
	Gumaga sp.		10			1													
	Helicopsyche sp.	3	3	1															
	Heteroplectron sp.					1													
	Hydropsyche sp.		2		30	71	4		20	13	35	10	12	3					
	Hydropsychidae								3			1		1					
	Hydroptila sp.		1		1				3	2	1	3	38	9					
	Hydroptilidae				2					1	2			1					
	Lepidostoma sp.	2	36		9	63	1			1		3	1	1		4		2	1
	Leptoceridae																		
	Leucotrichia sp.																		
	Limnephilidae																		
	Micrasema sp.				4	5					5					6		1	4
	Neophylax sp.																		
	Neothremma sp.																		
	Ochrotrichia sp.										1		5						
	Oecetis sp.																		

FAMILY	GENUS Species	Big Creek Dam 4 to PH 2-1 Mollusca	Big Creek Dam 4 to PH 2-2 A	Big Creek Dam 4 to PH 2-2 Mollusca	Big Creek Dam 4 to PH 2-3 A	Big Creek Dam 4 to PH 2-3 B	Big Creek Dam 4 to PH 2-3 C	Big Creek Dam 4 to PH 2-3 Mollusca	Big Creek Dam 5 to PH 8-2 A	Big Creek Dam 5 to PH 8-2 B	Big Creek Dam 5 to PH 8-2 C	Big Creek Dam 5 to PH 8-1 A	Big Creek Dam 5 to PH 8-1 B	Big Creek Dam 5 to PH 8-1 C	Bolsillo Creek-AD A	Bolsillo Creek-AD B	Bolsillo Creek-1 B (BD1)	Bolsillo Creek-2 A (BD2)	Bolsillo Creek-2 B (BD2)
	Oligophlebodes sp.																		
	Oxyethira sp.																		
	Parapsyche sp.																		
	Pedomoecus sierra																		
	Philopotamidae						1												
	Polycentropodidae																		
	Polycentropus sp.				1	2	1					2						1	
	Psychoglypha sp.																		
	Rhyacophila sp.					4	1		1		2	3	11	3		2		4	4
	Tinodes sp.										1								
	Trichoptera		1													1			
	Uenoidae																		
	Wormaldia sp.					2			13				1	1					
	Yphria californica														1			1	
Diptera	Antocha sp.		4		2	3			2	1	8	2							
	Atherix sp.																		
	Atrichopogon sp.													1	2				1
	Bezzia/Palpomyia sp.														6	1			
	Blepharicera sp.																		
	Blephariceridae																		
	Caloparyphus sp.						1												
	Ceratopogon sp.																		
	Ceratopogonidae																		
	Ceratopogoninae																		

FAMILY	GENUS Species	Big Creek Dam 4 to PH 2-1 Mollusca	Big Creek Dam 4 to PH 2-2 A	Big Creek Dam 4 to PH 2-2 Mollusca	Big Creek Dam 4 to PH 2-3 A	Big Creek Dam 4 to PH 2-3 B	Big Creek Dam 4 to PH 2-3 C	Big Creek Dam 4 to PH 2-3 Mollusca	Big Creek Dam 5 to PH 8-2 A	Big Creek Dam 5 to PH 8-2 B	Big Creek Dam 5 to PH 8-2 C	Big Creek Dam 5 to PH 8-1 A	Big Creek Dam 5 to PH 8-1 B	Big Creek Dam 5 to PH 8-1 C	Bolsillo Creek-AD A	Bolsillo Creek-AD B	Bolsillo Creek-1 B (BD1)	Bolsillo Creek-2 A (BD2)	Bolsillo Creek-2 B (BD2)
	Chelifera sp.																		
	Chlorotabanus sp.																		
	Clinocera sp.																		
	Cryptolabis sp.		1																
	Culicidae																		
	Culicoides sp.																		
	Culiseta sp.																		
	Dasyhelea sp.																		
	Dicranota sp.						1												
	Diptera																		
	Dixa sp.				1		2												1
	Dixella sp.																		
	Dolichopodidae																		
	Empididae		1								1								
	Ephydridae																	1	
	Euparyphus sp.																		
	Forcipomyia sp.												1				3		
	Glutops sp.																		
	Gonomyia sp.																1		
	Hemerodromia sp.								2										
	Hesperoconopa sp.																		
	Hexatoma sp.																		
	Limnophila sp.														2			1	
	Limonia sp.						1						1						

FAMILY	GENUS Species	Big Creek Dam 4 to PH 2-1 Mollusca	Big Creek Dam 4 to PH 2-2 A	Big Creek Dam 4 to PH 2-2 Mollusca	Big Creek Dam 4 to PH 2-3 A	Big Creek Dam 4 to PH 2-3 B	Big Creek Dam 4 to PH 2-3 C	Big Creek Dam 4 to PH 2-3 Mollusca	Big Creek Dam 5 to PH 8-2 A	Big Creek Dam 5 to PH 8-2 B	Big Creek Dam 5 to PH 8-2 C	Big Creek Dam 5 to PH 8-1 A	Big Creek Dam 5 to PH 8-1 B	Big Creek Dam 5 to PH 8-1 C	Bolsillo Creek-AD A	Bolsillo Creek-AD B	Bolsillo Creek-1 B (BD1)	Bolsillo Creek-2 A (BD2)	Bolsillo Creek-2 B (BD2)
	Maruina sp.		2								1								
	Meringodixa sp.																		
	Molophilus sp.																		
	Muscidae																		
	Neoplasta sp.					4							1			1		1	2
	Oreogeton sp.																		
	Ormosia sp.																		
	Pedicia sp.																		
	Pericoma/Telmatoscopus sp.																		
	Probezzia sp.																		
	Prosimulium sp.																		
	Psychodidae																		
	Rhabdomastix sp.																		
	Sciomyzidae																		
	Simuliidae																		
	Simulium sp.		2		6	4	263	1	9	131	88	94	63	157	1				
	Stilobezzia sp.																		
	Tabanidae						1												
	Thaumaleidae															2			
	Tipula sp.														2				
	Tipulidae																		
	Tipulinae																		
	Wiedemannia sp.																		
Diptera-Chironomidae	Chironomidae																		

FAMILY	GENUS Species	Big Creek Dam 4 to PH 2-1 Mollusca	Big Creek Dam 4 to PH 2-2 A	Big Creek Dam 4 to PH 2-2 Mollusca	Big Creek Dam 4 to PH 2-3 A	Big Creek Dam 4 to PH 2-3 B	Big Creek Dam 4 to PH 2-3 C	Big Creek Dam 4 to PH 2-3 Mollusca	Big Creek Dam 5 to PH 8-2 A	Big Creek Dam 5 to PH 8-2 B	Big Creek Dam 5 to PH 8-2 C	Big Creek Dam 5 to PH 8-1 A	Big Creek Dam 5 to PH 8-1 B	Big Creek Dam 5 to PH 8-1 C	Bolsillo Creek-AD A	Bolsillo Creek-AD B	Bolsillo Creek-1 B (BD1)	Bolsillo Creek-2 A (BD2)	Bolsillo Creek-2 B (BD2)
	Chironomini		2		2	2	2		3			2	4					2	
	Diamesinae				10	6					1	1			2	3		4	2
	Orthocladiinae		2		33	54	28		66	26	48	19	42	34	89	37	90	69	93
	Podonominae						1								4		40		2
	Pseudochironomini								2		2								
	Tanypodinae		1		5	3	3		8	2	5	7	1	1	5	13		6	2
	Tanytarsini	1	31		88	30	2		78	12	23	66	17	3	49	71		63	58
Lepidoptera	Lepidoptera																1		
	Petrophila sp.																		
Lumbricina	Lumbricina		10				5			1	1						1		1
Nemertea (phylum)	Prostoma sp.								1										
Oligochaeta (class)	Enchytraeidae					1	4									1			1
	Lumbriculidae					1													
	Naididae		1		2	4			13		6	49	13	28					
	Oligochaeta																		
	Tubificidae														2				
Nematoda (phylum)	Nematoda		7			1			1	1	2					1		1	
Bivalvia (class)	Bivalvia																		
Ostracoda (class)	Cyprididae								7		16								
	Ostracoda									20									
Copepoda	Calanoida																		
	Cyclopoida																		
	Harpacticoida																		
Tricladida	Planariidae								12	1	1	2	3						

FAMILY	GENUS Species	Big Creek Dam 4 to PH 2-1 Mollusca	Big Creek Dam 4 to PH 2-2 A	Big Creek Dam 4 to PH 2-2 Mollusca	Big Creek Dam 4 to PH 2-3 A	Big Creek Dam 4 to PH 2-3 B	Big Creek Dam 4 to PH 2-3 C	Big Creek Dam 4 to PH 2-3 Mollusca	Big Creek Dam 5 to PH 8-2 A	Big Creek Dam 5 to PH 8-2 B	Big Creek Dam 5 to PH 8-2 C	Big Creek Dam 5 to PH 8-1 A	Big Creek Dam 5 to PH 8-1 B	Big Creek Dam 5 to PH 8-1 C	Bolsillo Creek-AD A	Bolsillo Creek-AD B	Bolsillo Creek-1 B (BD1)	Bolsillo Creek-2 A (BD2)	Bolsillo Creek-2 B (BD2)
	Polycelis sp.				1	4													
Hydroida	Hydra sp.																		
Arachnida (class)	Acari																		1
Trombidiformes	Hydrovolziidae																		
	Hydryphantidae									1	1								
	Hygrobatidae				1														
	Lebertiidae		1						1									1	1
	Limnesiidae																		
	Mideopsidae																		
	Sperchontidae					2			2		2		1	1					1
	Stygothrombidiidae																		
	Torrenticolidae		3		3	3			2										
Veneroida	Pisidium sp.	1																	
	Sphaeriidae		2		3	4				1					1			1	3
Basommatophora	Ferrissia sp.																		
	Menetus sp.																		
	Physa sp.	1	2		2		1	2				1	1	2					
	Planorbidae																		
Sarcoptiformes	Oribatei										1								
	Total	**9**	**300**	**1**	**302**	**383**	**380**	**3**	**324**	**296**	**321**	**325**	**321**	**308**	**494**	**313**	**212**	**296**	**322**

FAMILY	GENUS Species	Camp 62 Creek-AD A	Camp 62 Creek-AD B	Camp 62 Creek-AD C	Camp 62 Creek-1 A (BD1)	Camp 62 Creek-1 B (BD1)	Camp 62 Creek-1 C (BD1)	Camp 62 Creek-2 C (BD2)	Chinquapin Creek-1 A (BD1)	Chinquapin Creek-2 A (BD2)	Chinquapin Creek-2 B (BD2)	Chinquapin Creek-AD A	Chinquapin Creek-AD B	Chinquapin Creek-AD C	Crater Creek-AD	Crater Creek-3 A (BD3)	Crater Creek-3 B (BD3)	Crater Creek-3 C (BD3)	Crater Creek-3 D (BD3)
Ephemeroptera	Acentrella sp.																		
	Ameletus sp.	1	9	8			8	9	2	2	3	8	2	11			1	1	
	Attenella sp.				1		3												
	Baetidae								2										
	Baetis sp.	3	9	15	2	9	11	12		5	2	4	4	6			1	1	3
	Caudatella sp.		9	13				8	1	2	1				1				
	Centroptilum sp.								1										
	Cinygma sp.				1			1											
	Cinygmula sp.		3								9	4	16	3	1		4		7
	Cloeodes sp.																		
	Diphetor hageni											8	2			8	47	5	8
	Drunella sp.	2	32	47	1		1	20	1	7	17	6	16	14	3	3	1	8	
	Epeorus sp.				3	2	9				1								
	Ephemerella sp.														4				4
	Ephemerellidae				1	3	2												
	Ephemeroptera																		
	Heptageniidae						2			3		11					5		
	Ironodes sp.	12	4	3	3	2	1		4	1	1			3		1	8	2	
	Leptophlebiidae																		
	Nixe sp.																		
	Paraleptophlebia sp.	3			3	3	5		1	3	11			1		4	18		2
	Procloeon sp.																		
	Rhithrogena sp.		5	13				2			2	1		2					
	Serratella sp.		40	35			1	16	1	3	5	6	3	4	18	9	39	25	6

FAMILY	GENUS Species	Camp 62 Creek-AD A	Camp 62 Creek-AD B	Camp 62 Creek-AD C	Camp 62 Creek-1 A (BD1)	Camp 62 Creek-1 B (BD1)	Camp 62 Creek-1 C (BD1)	Camp 62 Creek-2 C (BD2)	Chinquapin Creek-1 A (BD1)	Chinquapin Creek-2 A (BD2)	Chinquapin Creek-2 B (BD2)	Chinquapin Creek-AD A	Chinquapin Creek-AD B	Chinquapin Creek-AD C	Crater Creek-AD	Crater Creek-3 A (BD3)	Crater Creek-3 B (BD3)	Crater Creek-3 C (BD3)	Crater Creek-3 D (BD3)
Odonata	Anisoptera																		
	Argia sp.																		
	Coenagrionidae																		
	Cordulegaster sp.						1												
	Corduliinae																		
	Gomphidae																		
	Hetaerina sp.																		
	Libellulidae																		
	Octogomphus specularis																		
Plecoptera	Calineuria californica					2													
	Capniidae	8		1					1	1	1	15	21	9			4	1	5
	Chloroperlidae			1				2				8	1	2					
	Cultus sp.																		
	Despaxia augusta																		
	Doroneuria sp.			23	1	3	6	21		5	14	2	3	6			1		
	Frisonia picticeps																		
	Hesperoperla sp.	1	2		2	6				1	2	1	1						
	Isoperla sp.											1				1	13		
	Kogotus sp.																2		1
	Kogotus/Rickera sp.			4						1	2	2	1						
	Leuctridae											2	2						1
	Malenka sp.				1	2	3												
	Moselia infuscata	3																	
	Nemouridae											1	5	1					

FAMILY	GENUS Species	Camp 62 Creek-AD A	Camp 62 Creek-AD B	Camp 62 Creek-AD C	Camp 62 Creek-1 A (BD1)	Camp 62 Creek-1 B (BD1)	Camp 62 Creek-1 C (BD1)	Camp 62 Creek-2 C (BD2)	Chinquapin Creek-1 A (BD1)	Chinquapin Creek-2 A (BD2)	Chinquapin Creek-2 B (BD2)	Chinquapin Creek-AD A	Chinquapin Creek-AD B	Chinquapin Creek-AD C	Crater Creek-AD	Crater Creek-3 A (BD3)	Crater Creek-3 B (BD3)	Crater Creek-3 C (BD3)	Crater Creek-3 D (BD3)
	Paracapnia sp.														9				
	Paraperla sp.									2									
	Perlidae		6														2		
	Perlinodes aurea																		
	Perlodidae	5	3	2															
	Plecoptera		12	2				9		3	2	1				1			
	Skwala sp.																		
	Soyedina sp.																		
	Suwallia sp.																		
	Sweltsa sp.				2				1	1	1	1		1		1	14	3	1
	Taeniopterygidae																		
	Visoka cataractae		1	1				6		1	2	2	3	5				1	
	Yoraperla sp.	1														4	8		1
	Zapada sp.	69	32	26	21	43	7	49	4	49	42	15	14	38	9	5	48	12	58
Coleoptera	Agabinus sp.																		
	Agabus sp.																		
	Amphizoa sp.																		
	Ampumixis dispar																		
	Chaetarthria sp.																		
	Cleptelmis addenda				1	12													
	Cymbiodyta sp.																		
	Elmidae					1													
	Eubrianax edwardsi																		
	Heterlimnius sp.		3	2				1											

FAMILY	GENUS Species	Camp 62 Creek-AD A	Camp 62 Creek-AD B	Camp 62 Creek-AD C	Camp 62 Creek-1 A (BD1)	Camp 62 Creek-1 B (BD1)	Camp 62 Creek-1 C (BD1)	Camp 62 Creek-2 C (BD2)	Chinquapin Creek-1 A (BD1)	Chinquapin Creek-2 A (BD2)	Chinquapin Creek-2 B (BD2)	Chinquapin Creek-AD A	Chinquapin Creek-AD B	Chinquapin Creek-AD C	Crater Creek-AD	Crater Creek-3 A (BD3)	Crater Creek-3 B (BD3)	Crater Creek-3 C (BD3)	Crater Creek-3 D (BD3)
	Hydraena sp.				1	1												1	
	Hydroporinae																		
	Hydroporus sp.																		
	Hydrotrupes sp.																		
	Lara sp.					1													
	Microcylloepus sp.																		
	Narpus sp.																		
	Ochthebius sp.																		
	Optioservus sp.				6	9	9							1					
	Ordobrevia nubifera																		
	Oreodytes sp.																		
	Psephenus sp.																		
	Rhizelmis nigra																		
	Sanfillipodytes sp.																		
	Stenocolus scutellaris																		
	Zaitzevia sp.																		
Megaloptera	Corydalidae																		
	Orohermes crepusculus																		
	Sialis sp.						1												
Trichoptera	Agapetus sp.				13	17	11												
	Amiocentrus aspilus					1				2				1			1		
	Anagapetus sp.	5	6	7	1		1	9		3	7	5	34	19					2
	Apatania sp.		2			3	7	1	1		1	1	2	5	1			1	
	Arctopsyche sp.																		

FAMILY	GENUS Species	Camp 62 Creek-AD A	Camp 62 Creek-AD B	Camp 62 Creek-AD C	Camp 62 Creek-1 A (BD1)	Camp 62 Creek-1 B (BD1)	Camp 62 Creek-1 C (BD1)	Camp 62 Creek-2 C (BD2)	Chinquapin Creek-1 A (BD1)	Chinquapin Creek-2 A (BD2)	Chinquapin Creek-2 B (BD2)	Chinquapin Creek-AD A	Chinquapin Creek-AD B	Chinquapin Creek-AD C	Crater Creek-AD	Crater Creek-3 A (BD3)	Crater Creek-3 B (BD3)	Crater Creek-3 C (BD3)	Crater Creek-3 D (BD3)
	Arctopsychinae																		
	Brachycentridae				1														
	Chimarra sp.																		
	Cryptochia sp.			1				1										1	
	Dolophilodes sp.				2	17	1												
	Ecclisomyia sp.																1		
	Glossosoma sp.				1	14	34												
	Glossosomatidae																		
	Gumaga sp.																		
	Helicopsyche sp.																		
	Heteroplectron sp.				2	1	4												
	Hydropsyche sp.				2	1	1												
	Hydropsychidae																		
	Hydroptila sp.										1					1			3
	Hydroptilidae											2			4		1		
	Lepidostoma sp.	1			1	12	49	1	4		7	10	4	1			3		1
	Leptoceridae																		
	Leucotrichia sp.																		
	Limnephilidae	4	16	42						3	6	10							
	Micrasema sp.	2		4			2						1		2		4	4	1
	Neophylax sp.																		
	Neothremma sp.	1																	
	Ochrotrichia sp.									1			1	8					2
	Oecetis sp.																		

FAMILY	GENUS Species	Camp 62 Creek-AD A	Camp 62 Creek-AD B	Camp 62 Creek-AD C	Camp 62 Creek-1 A (BD1)	Camp 62 Creek-1 B (BD1)	Camp 62 Creek-1 C (BD1)	Camp 62 Creek-2 C (BD2)	Chinquapin Creek-1 A (BD1)	Chinquapin Creek-2 A (BD2)	Chinquapin Creek-2 B (BD2)	Chinquapin Creek-AD A	Chinquapin Creek-AD B	Chinquapin Creek-AD C	Crater Creek-AD	Crater Creek-3 A (BD3)	Crater Creek-3 B (BD3)	Crater Creek-3 C (BD3)	Crater Creek-3 D (BD3)
	Oligophlebodes sp.																		
	Oxyethira sp.																		
	Parapsyche sp.							1			2			18					
	Pedomoecus sierra																		
	Philopotamidae				1														
	Polycentropodidae																		
	Polycentropus sp.						3												
	Psychoglypha sp.					1													
	Rhyacophila sp.	6	11	2	1	1	1	2	2	4	6	4	7	8			4	1	2
	Tinodes sp.																		
	Trichoptera													1					
	Uenoidae																		
	Wormaldia sp.				4		1												
	Yphria californica						1												
Diptera	Antocha sp.																		
	Atherix sp.																		
	Atrichopogon sp.					2		1		1	1	1		3					
	Bezzia/Palpomyia sp.	2	4	2	7	2		4		1	1			2		2		1	
	Blepharicera sp.																		
	Blephariceridae																		
	Caloparyphus sp.																		
	Ceratopogon sp.																		
	Ceratopogonidae																		
	Ceratopogoninae								1										

FAMILY	GENUS Species	Camp 62 Creek-AD A	Camp 62 Creek-AD B	Camp 62 Creek-AD C	Camp 62 Creek-1 A (BD1)	Camp 62 Creek-1 B (BD1)	Camp 62 Creek-1 C (BD1)	Camp 62 Creek-2 C (BD2)	Chinquapin Creek-1 A (BD1)	Chinquapin Creek-2 A (BD2)	Chinquapin Creek-2 B (BD2)	Chinquapin Creek-AD A	Chinquapin Creek-AD B	Chinquapin Creek-AD C	Crater Creek-AD	Crater Creek-3 A (BD3)	Crater Creek-3 B (BD3)	Crater Creek-3 C (BD3)	Crater Creek-3 D (BD3)
	Chelifera sp.																		
	Chlorotabanus sp.																		
	Clinocera sp.	1	1	1										1				1	
	Cryptolabis sp.																		
	Culicidae																		
	Culicoides sp.																		
	Culiseta sp.																		
	Dasyhelea sp.																		
	Dicranota sp.	4				1	1	2	1	2		1		5					
	Diptera																		
	Dixa sp.			1					1	1				1			1		
	Dixella sp.																		
	Dolichopodidae																		
	Empididae			4	5			1		1	1			3					
	Ephydridae												1						
	Euparyphus sp.																		
	Forcipomyia sp.																		
	Glutops sp.								1		1			3					
	Gonomyia sp.																		
	Hemerodromia sp.																		
	Hesperoconopa sp.						1												
	Hexatoma sp.					2	1												
	Limnophila sp.									1									
	Limonia sp.									1									

FAMILY	GENUS Species	Camp 62 Creek-AD A	Camp 62 Creek-AD B	Camp 62 Creek-AD C	Camp 62 Creek-1 A (BD1)	Camp 62 Creek-1 B (BD1)	Camp 62 Creek-1 C (BD1)	Camp 62 Creek-2 C (BD2)	Chinquapin Creek-1 A (BD1)	Chinquapin Creek-2 A (BD2)	Chinquapin Creek-2 B (BD2)	Chinquapin Creek-AD A	Chinquapin Creek-AD B	Chinquapin Creek-AD C	Crater Creek-AD	Crater Creek-3 A (BD3)	Crater Creek-3 B (BD3)	Crater Creek-3 C (BD3)	Crater Creek-3 D (BD3)
	Maruina sp.									1									
	Meringodixa sp.	2																	
	Molophilus sp.																		
	Muscidae																		
	Neoplasta sp.	15	1			6		4	1	2	1		3			1	1		1
	Oreogeton sp.																		
	Ormosia sp.																		
	Pedicia sp.																		
	Pericoma/Telmatoscopus sp.	4								1							1		
	Probezzia sp.																		
	Prosimulium sp.																		
	Psychodidae																	5	
	Rhabdomastix sp.																		
	Sciomyzidae																		
	Simuliidae			2															
	Simulium sp.	2	4		4		1	1	1		1						3		
	Stilobezzia sp.																		
	Tabanidae																		
	Thaumaleidae		1			2		3		11	1			2	1		2		
	Tipula sp.																1		
	Tipulidae																		
	Tipulinae																		
	Wiedemannia sp.																		
Diptera-Chironomidae	Chironomidae																		

FAMILY	GENUS Species	Camp 62 Creek-AD A	Camp 62 Creek-AD B	Camp 62 Creek-AD C	Camp 62 Creek-1 A (BD1)	Camp 62 Creek-1 B (BD1)	Camp 62 Creek-1 C (BD1)	Camp 62 Creek-2 C (BD2)	Chinquapin Creek-1 A (BD1)	Chinquapin Creek-2 A (BD2)	Chinquapin Creek-2 B (BD2)	Chinquapin Creek-AD A	Chinquapin Creek-AD B	Chinquapin Creek-AD C	Crater Creek-AD	Crater Creek-3 A (BD3)	Crater Creek-3 B (BD3)	Crater Creek-3 C (BD3)	Crater Creek-3 D (BD3)
	Chironomini				3	1	34	2	3							9	2	5	1
	Diamesinae	2	6	4	2	8		17	9	9	8	4	6	4			2	2	11
	Orthocladiinae	86	35	53	152	77	21	60	143	82	73	115	65	61	155	177	37	108	165
	Podonominae																1	1	
	Pseudochironomini																		
	Tanypodinae	9	1	2	9	6	11	4	14	5	4	7	12	6	27	24	26	24	5
	Tanytarsini	27	12	24	26	20	33	26	131	19	41	19	21	13	36	54	18	50	22
Lepidoptera	Lepidoptera																		
	Petrophila sp.																		
Lumbricina	Lumbricina			1					1	1				1			1		1
Nemertea (phylum)	Prostoma sp.																		
Oligochaeta (class)	Enchytraeidae	7	2	1	1	1	3	2		2	1	8	18	29			2		1
	Lumbriculidae																		
	Naididae												2	3				6	
	Oligochaeta																		
	Tubificidae	2																	
Nematoda (phylum)	Nematoda	9			2	1			1			1		1				3	
Bivalvia (class)	Bivalvia																		
Ostracoda (class)	Cyprididae	2							3		3		5	7		7	4	5	10
	Ostracoda																		
Copepoda	Calanoida																	1	
	Cyclopoida																		
	Harpacticoida	1																	
Tricladida	Planariidae										2	13	3				2	1	

FAMILY	GENUS Species	Camp 62 Creek-AD A	Camp 62 Creek-AD B	Camp 62 Creek-AD C	Camp 62 Creek-1 A (BD1)	Camp 62 Creek-1 B (BD1)	Camp 62 Creek-1 C (BD1)	Camp 62 Creek-2 C (BD2)	Chinquapin Creek-1 A (BD1)	Chinquapin Creek-2 A (BD2)	Chinquapin Creek-2 B (BD2)	Chinquapin Creek-AD A	Chinquapin Creek-AD B	Chinquapin Creek-AD C	Crater Creek-AD	Crater Creek-3 A (BD3)	Crater Creek-3 B (BD3)	Crater Creek-3 C (BD3)	Crater Creek-3 D (BD3)
	Polycelis sp.	6	2	3				1			1								
Hydroida	Hydra sp.																		
Arachnida (class)	Acari	2	3			1	1					1			1				
Trombidiformes	Hydrovolziidae																		
	Hydryphantidae					4	2							1		1			1
	Hygrobatidae							2				1	1						
	Lebertiidae		1	2				1			2		1	1			1	3	2
	Limnesiidae																		
	Mideopsidae																		
	Sperchontidae					1			1									14	4
	Stygothrombidiidae																		
	Torrenticolidae	1	4	1		3	6				1				2	2			
Veneroida	Pisidium sp.								1										
	Sphaeriidae																		
Basommatophora	Ferrissia sp.																		
	Menetus sp.																		
	Physa sp.																		
	Planorbidae																		
Sarcoptiformes	Oribatei			1			1												
	Total	**311**	**282**	**354**	**290**	**305**	**302**	**302**	**339**	**244**	**289**	**291**	**291**	**318**	**274**	**315**	**335**	**297**	**332**

FAMILY	GENUS Species	Ely Creek-1 A (BD1)	Ely Creek-1 B (BD1)	Ely Creek-1 C (BD1)	Ely Creek-2 A (BD2)	Ely Creek-2 B (BD2)	Ely Creek-2 C (BD2)	Ely Creek-3 A (BD3)	Ely Creek-3 B (BD3)	Ely Creek-3 C (BD3)	Ely Creek-AD	Hooper Creek-AD A	Hooper Creek-AD B	Hooper Creek-2 A (BD2)	Hooper Creek-2 B (BD2)	Hooper Creek-2 C (BD2)	Hooper Creek-1 A (BD1)	Hooper Creek-1 B (BD1)	Hooper Creek-1 C (BD1)
Ephemeroptera	Acentrella sp.																		
	Ameletus sp.			1							1	3	2	2		2	4		5
	Attenella sp.																	1	
	Baetidae																		
	Baetis sp.										2	17	2	99	3	32	25	19	6
	Caudatella sp.										2	6	6	14		2	6	1	
	Centroptilum sp.		9	7														3	
	Cinygma sp.																		
	Cinygmula sp.																		
	Cloeodes sp.																		
	Diphetor hageni			2							3				6				
	Drunella sp.											52	36	24	5	36	11	4	2
	Epeorus sp.													2				2	
	Ephemerella sp.																		
	Ephemerellidae																		
	Ephemeroptera																		
	Heptageniidae		1	3							1								
	Ironodes sp.											1			1		1	9	2
	Leptophlebiidae															1			
	Nixe sp.			6								1							
	Paraleptophlebia sp.		7	31							4		1	4	3				
	Procloeon sp.																		
	Rhithrogena sp.											15	5	3	2	2			
	Serratella sp.													2	8	10		1	

FAMILY	GENUS Species	Ely Creek-1 A (BD1)	Ely Creek-1 B (BD1)	Ely Creek-1 C (BD1)	Ely Creek-2 A (BD2)	Ely Creek-2 B (BD2)	Ely Creek-2 C (BD2)	Ely Creek-3 A (BD3)	Ely Creek-3 B (BD3)	Ely Creek-3 C (BD3)	Ely Creek-AD	Hooper Creek-AD A	Hooper Creek-AD B	Hooper Creek-2 A (BD2)	Hooper Creek-2 B (BD2)	Hooper Creek-2 C (BD2)	Hooper Creek-1 A (BD1)	Hooper Creek-1 B (BD1)	Hooper Creek-1 C (BD1)
Odonata	Anisoptera																		
	Argia sp.																		
	Coenagrionidae																		
	Cordulegaster sp.	11	2	8	2	7	6		12	2									
	Corduliinae																		
	Gomphidae	7	10	2	1	1	3			9									
	Hetaerina sp.																		
	Libellulidae										4								
	Octogomphus specularis				1														
Plecoptera	Calineuria californica			2															
	Capniidae	1												2	1	14			1
	Chloroperlidae				1														
	Cultus sp.																		
	Despaxia augusta																		
	Doroneuria sp.											24	38	14	6	12		3	12
	Frisonia picticeps												1	5					
	Hesperoperla sp.														2	1	3		
	Isoperla sp.																		
	Kogotus sp.																		
	Kogotus/Rickera sp.															1			
	Leuctridae		2													1			
	Malenka sp.												1		1		1	7	4
	Moselia infuscata														2				1
	Nemouridae										2				1				

FAMILY	GENUS Species	Ely Creek-1 A (BD1)	Ely Creek-1 B (BD1)	Ely Creek-1 C (BD1)	Ely Creek-2 A (BD2)	Ely Creek-2 B (BD2)	Ely Creek-2 C (BD2)	Ely Creek-3 A (BD3)	Ely Creek-3 B (BD3)	Ely Creek-3 C (BD3)	Ely Creek-AD	Hooper Creek-AD A	Hooper Creek-AD B	Hooper Creek-2 A (BD2)	Hooper Creek-2 B (BD2)	Hooper Creek-2 C (BD2)	Hooper Creek-1 A (BD1)	Hooper Creek-1 B (BD1)	Hooper Creek-1 C (BD1)
	Paracapnia sp.																		
	Paraperla sp.																		
	Perlidae																		
	Perlinodes aurea																		
	Perlodidae										1		1						
	Plecoptera											3				2		1	
	Skwala sp.											3							
	Soyedina sp.																		
	Suwallia sp.																		
	Sweltsa sp.						2				6	2					1		
	Taeniopterygidae																		
	Visoka cataractae												1			1			
	Yoraperla sp.										5				1				
	Zapada sp.										16	10	25	39	49	16	50	30	63
Coleoptera	Agabinus sp.									1									
	Agabus sp.					2													
	Amphizoa sp.																		
	Ampumixis dispar																		
	Chaetarthria sp.																		
	Cleptelmis addenda			1			2		1										
	Cymbiodyta sp.																		
	Elmidae																		
	Eubrianax edwardsi																		
	Heterlimnius sp.				8		1	1	2										

FAMILY	GENUS Species	Ely Creek-1 A (BD1)	Ely Creek-1 B (BD1)	Ely Creek-1 C (BD1)	Ely Creek-2 A (BD2)	Ely Creek-2 B (BD2)	Ely Creek-2 C (BD2)	Ely Creek-3 A (BD3)	Ely Creek-3 B (BD3)	Ely Creek-3 C (BD3)	Ely Creek-AD	Hooper Creek-AD A	Hooper Creek-AD B	Hooper Creek-2 A (BD2)	Hooper Creek-2 B (BD2)	Hooper Creek-2 C (BD2)	Hooper Creek-1 A (BD1)	Hooper Creek-1 B (BD1)	Hooper Creek-1 C (BD1)
	Hydraena sp.			1	1	42	129		6	15	5	1							
	Hydroporinae																		
	Hydroporus sp.																		
	Hydrotrupes sp.																		
	Lara sp.								3	1	2								
	Microcylloepus sp.																		
	Narpus sp.				1			1		1									
	Ochthebius sp.									1									
	Optioservus sp.	2	2	3	35	28	24	3	26	26	2								
	Ordobrevia nubifera									1									
	Oreodytes sp.																		
	Psephenus sp.	9	21	34	6	1	4		2	5									
	Rhizelmis nigra																		
	Sanfillipodytes sp.										1								1
	Stenocolus scutellaris																		
	Zaitzevia sp.																		
Megaloptera	Corydalidae																		
	Orohermes crepusculus																		
	Sialis sp.		3							2									
Trichoptera	Agapetus sp.																		
	Amiocentrus aspilus						1			1								2	1
	Anagapetus sp.										2	1						41	12
	Apatania sp.			1	1	5	1		22	9	2	1							
	Arctopsyche sp.																		

FAMILY	GENUS Species	Ely Creek-1 A (BD1)	Ely Creek-1 B (BD1)	Ely Creek-1 C (BD1)	Ely Creek-2 A (BD2)	Ely Creek-2 B (BD2)	Ely Creek-2 C (BD2)	Ely Creek-3 A (BD3)	Ely Creek-3 B (BD3)	Ely Creek-3 C (BD3)	Ely Creek-AD	Hooper Creek-AD A	Hooper Creek-AD B	Hooper Creek-2 A (BD2)	Hooper Creek-2 B (BD2)	Hooper Creek-2 C (BD2)	Hooper Creek-1 A (BD1)	Hooper Creek-1 B (BD1)	Hooper Creek-1 C (BD1)
	Arctopsychinae												1				1		
	Brachycentridae										5								
	Chimarra sp.																		
	Cryptochia sp.																		
	Dolophilodes sp.											1		1				6	3
	Ecclisomyia sp.																		
	Glossosoma sp.													1			5		1
	Glossosomatidae																		
	Gumaga sp.		3			1	1	1	6	7									
	Helicopsyche sp.																		
	Heteroplectron sp.	28	10	5	5	10			7										
	Hydropsyche sp.																		
	Hydropsychidae													1					
	Hydroptila sp.									1									
	Hydroptilidae																		
	Lepidostoma sp.	6	44	3	8	2				6	25				3			1	3
	Leptoceridae																		
	Leucotrichia sp.																		
	Limnephilidae									1								2	1
	Micrasema sp.			8	1		6		14	8	11				2	3	18	2	
	Neophylax sp.											13							
	Neothremma sp.																		
	Ochrotrichia sp.																		
	Oecetis sp.																		

FAMILY	GENUS Species	Ely Creek-1 A (BD1)	Ely Creek-1 B (BD1)	Ely Creek-1 C (BD1)	Ely Creek-2 A (BD2)	Ely Creek-2 B (BD2)	Ely Creek-2 C (BD2)	Ely Creek-3 A (BD3)	Ely Creek-3 B (BD3)	Ely Creek-3 C (BD3)	Ely Creek-AD	Hooper Creek-AD A	Hooper Creek-AD B	Hooper Creek-2 A (BD2)	Hooper Creek-2 B (BD2)	Hooper Creek-2 C (BD2)	Hooper Creek-1 A (BD1)	Hooper Creek-1 B (BD1)	Hooper Creek-1 C (BD1)
	Oligophlebodes sp.											13	1	4	2	50			
	Oxyethira sp.																		
	Parapsyche sp.											1	1						
	Pedomoecus sierra													1					
	Philopotamidae																		
	Polycentropodidae																		
	Polycentropus sp.			9															
	Psychoglypha sp.																		
	Rhyacophila sp.										2	12	6	7	5	5	8	9	3
	Tinodes sp.																		
	Trichoptera		20	7															
	Uenoidae												5						
	Wormaldia sp.																		
	Yphria californica							1											
Diptera	Antocha sp.			3								6				3		2	
	Atherix sp.																		
	Atrichopogon sp.									21									
	Bezzia/Palpomyia sp.	8	2		1	4	1		29	14	10	1			2	1			1
	Blepharicera sp.																		
	Blephariceridae																		
	Caloparyphus sp.																		
	Ceratopogon sp.																		
	Ceratopogonidae																		
	Ceratopogoninae	1				1		1											

FAMILY	GENUS Species	Ely Creek-1 A (BD1)	Ely Creek-1 B (BD1)	Ely Creek-1 C (BD1)	Ely Creek-2 A (BD2)	Ely Creek-2 B (BD2)	Ely Creek-2 C (BD2)	Ely Creek-3 A (BD3)	Ely Creek-3 B (BD3)	Ely Creek-3 C (BD3)	Ely Creek-AD	Hooper Creek-AD A	Hooper Creek-AD B	Hooper Creek-2 A (BD2)	Hooper Creek-2 B (BD2)	Hooper Creek-2 C (BD2)	Hooper Creek-1 A (BD1)	Hooper Creek-1 B (BD1)	Hooper Creek-1 C (BD1)
	Chelifera sp.														4				
	Chlorotabanus sp.																		
	Clinocera sp.											2	1		2		1		2
	Cryptolabis sp.		6																
	Culicidae									2									
	Culicoides sp.																		
	Culiseta sp.								3	6									
	Dasyhelea sp.																		
	Dicranota sp.	1										2	2	1		12	1		2
	Diptera								3										
	Dixa sp.										2				1				
	Dixella sp.		1																
	Dolichopodidae								1	1									
	Empididae												4		5	1			
	Ephydridae						2												
	Euparyphus sp.																		
	Forcipomyia sp.	1	1	11		6			13	23							1		
	Glutops sp.																		1
	Gonomyia sp.																		
	Hemerodromia sp.																		
	Hesperoconopa sp.																		
	Hexatoma sp.				1		1		1	5									
	Limnophila sp.										1								
	Limonia sp.	2										1							

FAMILY	GENUS Species	Ely Creek-1 A (BD1)	Ely Creek-1 B (BD1)	Ely Creek-1 C (BD1)	Ely Creek-2 A (BD2)	Ely Creek-2 B (BD2)	Ely Creek-2 C (BD2)	Ely Creek-3 A (BD3)	Ely Creek-3 B (BD3)	Ely Creek-3 C (BD3)	Ely Creek-AD	Hooper Creek-AD A	Hooper Creek-AD B	Hooper Creek-2 A (BD2)	Hooper Creek-2 B (BD2)	Hooper Creek-2 C (BD2)	Hooper Creek-1 A (BD1)	Hooper Creek-1 B (BD1)	Hooper Creek-1 C (BD1)
	Maruina sp.																		
	Meringodixa sp.	1	2	4							4								
	Molophilus sp.					1													
	Muscidae																		
	Neoplasta sp.										1	2	5	7	10	3	7		2
	Oreogeton sp.																		
	Ormosia sp.				1			2	1										
	Pedicia sp.								1										
	Pericoma/Telmatoscopus sp.			1		1					3				1				1
	Probezzia sp.	9	4		1			9		4									
	Prosimulium sp.											1							
	Psychodidae								1										
	Rhabdomastix sp.				2					1									
	Sciomyzidae					1													
	Simuliidae																		
	Simulium sp.							1				9	2	12	9	3	27	20	3
	Stilobezzia sp.									1									
	Tabanidae																		
	Thaumaleidae																		
	Tipula sp.				6				2										
	Tipulidae	2					1		5		1					3			
	Tipulinae									8									
	Wiedemannia sp.																		
Diptera-Chironomidae	Chironomidae																		

FAMILY	GENUS Species	Ely Creek-1 A (BD1)	Ely Creek-1 B (BD1)	Ely Creek-1 C (BD1)	Ely Creek-2 A (BD2)	Ely Creek-2 B (BD2)	Ely Creek-2 C (BD2)	Ely Creek-3 A (BD3)	Ely Creek-3 B (BD3)	Ely Creek-3 C (BD3)	Ely Creek-AD	Hooper Creek-AD A	Hooper Creek-AD B	Hooper Creek-2 A (BD2)	Hooper Creek-2 B (BD2)	Hooper Creek-2 C (BD2)	Hooper Creek-1 A (BD1)	Hooper Creek-1 B (BD1)	Hooper Creek-1 C (BD1)
	Chironomini	11	9	13		12	15		13	31	2		1	1	1		3		
	Diamesinae										1	4	14		2	3	1	4	2
	Orthocladiinae	30	53	27	26	9	37	35	31	18	46	84	110	17	44	34	68	73	80
	Podonominae																		
	Pseudochironomini																		
	Tanypodinae	19	15	55	3	7	6			8	21	1	5	1	1	1	2	2	4
	Tanytarsini	125	49	22		8			5	4	54	20	66	21	86	23	28	48	103
Lepidoptera	Lepidoptera																		
	Petrophila sp.																		
Lumbricina	Lumbricina		1		1				4										
Nemertea (phylum)	Prostoma sp.																		
Oligochaeta (class)	Enchytraeidae					1		1	11	11	9			4	10		4	4	
	Lumbriculidae																		
	Naididae	17	12			8	1		5	12	1								
	Oligochaeta																		
	Tubificidae	8	8	6			9		7		2						1		
Nematoda (phylum)	Nematoda	6	1	1	2			9	31	9	4	3			7		14		
Bivalvia (class)	Bivalvia																		
Ostracoda (class)	Cyprididae										2			1	2				1
	Ostracoda																		
Copepoda	Calanoida	3	10																
	Cyclopoida		1																
	Harpacticoida														1				
Tricladida	Planariidae						2		2			2		2			2		

FAMILY	GENUS Species	Ely Creek-1 A (BD1)	Ely Creek-1 B (BD1)	Ely Creek-1 C (BD1)	Ely Creek-2 A (BD2)	Ely Creek-2 B (BD2)	Ely Creek-2 C (BD2)	Ely Creek-3 A (BD3)	Ely Creek-3 B (BD3)	Ely Creek-3 C (BD3)	Ely Creek-AD	Hooper Creek-AD A	Hooper Creek-AD B	Hooper Creek-2 A (BD2)	Hooper Creek-2 B (BD2)	Hooper Creek-2 C (BD2)	Hooper Creek-1 A (BD1)	Hooper Creek-1 B (BD1)	Hooper Creek-1 C (BD1)
	Polycelis sp.												2					1	
Hydroida	Hydra sp.		1																
Arachnida (class)	Acari							1			2		4	1	1				1
Trombidiformes	Hydrovolziidae																		
	Hydryphantidae																1		
	Hygrobatidae										2			1		2			
	Lebertiidae					1	1			1	1	3	2	2	4	8	4	3	1
	Limnesiidae																		
	Mideopsidae									2									
	Sperchontidae	1					2			1		1		2	3		2	2	
	Stygothrombidiidae																		
	Torrenticolidae	3	1	4	22	14	27	6	12	59	6	1	3		2			1	
Veneroida	Pisidium sp.										4								
	Sphaeriidae	2			4	1	5	20	11	2	2								
Basommatophora	Ferrissia sp.																		
	Menetus sp.																		
	Physa sp.																		
	Planorbidae																		
Sarcoptiformes	Oribatei			1															
	Total	**314**	**311**	**282**	**141**	**174**	**290**	**92**	**293**	**341**	**285**	**323**	**354**	**298**	**301**	**288**	**301**	**304**	**325**

FAMILY	GENUS Species	Mono Creek-1 A (BD1)	Mono Creek-1 B (BD1)	Mono Creek-1 C (BD1)	Mono Creek-2 A (BD2)	Mono Creek-2 B (BD2)	Mono Creek-2 C (BD2)	Mono Creek-3 A (BD3)	Mono Creek-3 B (BD3)	Mono Creek-3 C (BD3)	Mono Creek-4 A (BD4)	Mono Creek-4 B (BD4)	Mono Creek-4 C (BD4)	North Fork Stevenson Creek-1 A (BO1)	North Fork Stevenson Creek-1 B (BO1)	North Fork Stevenson Creek-1 C (BO1)	North Fork Stevenson Creek-2 A (BO2)	North Fork Stevenson Creek-2 B (BO2)	North Fork Stevenson Creek-3 A (BO3)
Ephemeroptera	Acentrella sp.																		
	Ameletus sp.													1					
	Attenella sp.																		
	Baetidae																		
	Baetis sp.	51	69	35	39	20	29	127	151	91	18	19	17	1			15	17	29
	Caudatella sp.											1	17				14	1	4
	Centroptilum sp.														1				
	Cinygma sp.																		
	Cinygmula sp.		2		10	6	1	3	5				1					8	8
	Cloeodes sp.																		
	Diphetor hageni		1					2										1	
	Drunella sp.	2	2	2		1	4												1
	Epeorus sp.	1	1	1	4	1	1	6	10	3								28	16
	Ephemerella sp.	2		2			7					1	3				7	6	18
	Ephemerellidae		3			1									1		2		
	Ephemeroptera																		
	Heptageniidae														1				
	Ironodes sp.	6	5	5	2	2	6	9	5	5		1	1					10	26
	Leptophlebiidae																		
	Nixe sp.														1	2			
	Paraleptophlebia sp.	2	8		2	1	3	14	11	1		1		3		2		16	4
	Procloeon sp.																		
	Rhithrogena sp.	1																	
	Serratella sp.													2			1	1	

FAMILY	GENUS Species	Mono Creek-1 A (BD1)	Mono Creek-1 B (BD1)	Mono Creek-1 C (BD1)	Mono Creek-2 A (BD2)	Mono Creek-2 B (BD2)	Mono Creek-2 C (BD2)	Mono Creek-3 A (BD3)	Mono Creek-3 B (BD3)	Mono Creek-3 C (BD3)	Mono Creek-4 A (BD4)	Mono Creek-4 B (BD4)	Mono Creek-4 C (BD4)	North Fork Stevenson Creek-1 A (BO1)	North Fork Stevenson Creek-1 B (BO1)	North Fork Stevenson Creek-1 C (BO1)	North Fork Stevenson Creek-2 A (BO2)	North Fork Stevenson Creek-2 B (BO2)	North Fork Stevenson Creek-3 A (BO3)
Odonata	Anisoptera																		
	Argia sp.																		
	Coenagrionidae																		
	Cordulegaster sp.																	1	
	Corduliinae																		
	Gomphidae																		
	Hetaerina sp.																		
	Libellulidae																		
	Octogomphus specularis																		
Plecoptera	Calineuria californica		2	1	4			7	1			1			1			4	10
	Capniidae							1						4					
	Chloroperlidae															2			
	Cultus sp.																		
	Despaxia augusta																		
	Doroneuria sp.																		
	Frisonia picticeps																		
	Hesperoperla sp.	1		1				2	1	1		1	2						
	Isoperla sp.																		
	Kogotus sp.																		
	Kogotus/Rickera sp.																		
	Leuctridae										1								
	Malenka sp.	1	1		1							1	1	3					2
	Moselia infuscata													7					
	Nemouridae																		

FAMILY	GENUS Species	Mono Creek-1 A (BD1)	Mono Creek-1 B (BD1)	Mono Creek-1 C (BD1)	Mono Creek-2 A (BD2)	Mono Creek-2 B (BD2)	Mono Creek-2 C (BD2)	Mono Creek-3 A (BD3)	Mono Creek-3 B (BD3)	Mono Creek-3 C (BD3)	Mono Creek-4 A (BD4)	Mono Creek-4 B (BD4)	Mono Creek-4 C (BD4)	North Fork Stevenson Creek-1 A (BO1)	North Fork Stevenson Creek-1 B (BO1)	North Fork Stevenson Creek-1 C (BO1)	North Fork Stevenson Creek-2 A (BO2)	North Fork Stevenson Creek-2 B (BO2)	North Fork Stevenson Creek-3 A (BO3)
	Paracapnia sp.																		
	Paraperla sp.																		
	Perlidae						1		1										
	Perlinodes aurea						1												
	Perlodidae	1							1									2	4
	Plecoptera							1											
	Skwala sp.																		
	Soyedina sp.																		
	Suwallia sp.																		
	Sweltsa sp.		9		4		1		1		1	3	1			2		3	
	Taeniopterygidae																		
	Visoka cataractae																		
	Yoraperla sp.												1						
	Zapada sp.	3	12	3	6	7	3	22	8	10	28	47	34	33			7	31	27
Coleoptera	Agabinus sp.																		
	Agabus sp.																		
	Amphizoa sp.																		
	Ampumixis dispar																10	1	5
	Chaetarthria sp.																		
	Cleptelmis addenda	1	4	2	2		2								1		24	13	14
	Cymbiodyta sp.																		
	Elmidae																		
	Eubrianax edwardsi																	2	
	Heterlimnius sp.																		

FAMILY	GENUS Species	Mono Creek-1 A (BD1)	Mono Creek-1 B (BD1)	Mono Creek-1 C (BD1)	Mono Creek-2 A (BD2)	Mono Creek-2 B (BD2)	Mono Creek-2 C (BD2)	Mono Creek-3 A (BD3)	Mono Creek-3 B (BD3)	Mono Creek-3 C (BD3)	Mono Creek-4 A (BD4)	Mono Creek-4 B (BD4)	Mono Creek-4 C (BD4)	North Fork Stevenson Creek-1 A (BO1)	North Fork Stevenson Creek-1 B (BO1)	North Fork Stevenson Creek-1 C (BO1)	North Fork Stevenson Creek-2 A (BO2)	North Fork Stevenson Creek-2 B (BO2)	North Fork Stevenson Creek-3 A (BO3)
	Hydraena sp.													1					11
	Hydroporinae																		
	Hydroporus sp.																		
	Hydrotrupes sp.																		
	Lara sp.													1					
	Microcylloepus sp.																		
	Narpus sp.																		
	Ochthebius sp.																		
	Optioservus sp.	1	7		12	1	4											5	2
	Ordobrevia nubifera				1														
	Oreodytes sp.																		
	Psephenus sp.																		
	Rhizelmis nigra																		
	Sanfillipodytes sp.																		
	Stenocolus scutellaris																		
	Zaitzevia sp.	2	18		31	1										2		4	2
Megaloptera	Corydalidae																		1
	Orohermes crepusculus							1	5		1	2							
	Sialis sp.		1																
Trichoptera	Agapetus sp.																		
	Amiocentrus aspilus				1			3	4	3			6					1	
	Anagapetus sp.																		
	Apatania sp.																		1
	Arctopsyche sp.	1		2				4	11	4									

FAMILY	GENUS Species	Mono Creek-1 A (BD1)	Mono Creek-1 B (BD1)	Mono Creek-1 C (BD1)	Mono Creek-2 A (BD2)	Mono Creek-2 B (BD2)	Mono Creek-2 C (BD2)	Mono Creek-3 A (BD3)	Mono Creek-3 B (BD3)	Mono Creek-3 C (BD3)	Mono Creek-4 A (BD4)	Mono Creek-4 B (BD4)	Mono Creek-4 C (BD4)	North Fork Stevenson Creek-1 A (BO1)	North Fork Stevenson Creek-1 B (BO1)	North Fork Stevenson Creek-1 C (BO1)	North Fork Stevenson Creek-2 A (BO2)	North Fork Stevenson Creek-2 B (BO2)	North Fork Stevenson Creek-3 A (BO3)
	Arctopsychinae																		
	Brachycentridae																		
	Chimarra sp.																		
	Cryptochia sp.																		
	Dolophilodes sp.		5	3	1	2		6											
	Ecclisomyia sp.																		
	Glossosoma sp.																		1
	Glossosomatidae					1												3	
	Gumaga sp.		1																
	Helicopsyche sp.																		
	Heteroplectron sp.																		
	Hydropsyche sp.	5	7	9	5		11	1		3			1				21	12	10
	Hydropsychidae	1	1	1	1					1									
	Hydroptila sp.		3		1	2	1		13	2	22	49	14		1	3			
	Hydroptilidae				1	1	1												
	Lepidostoma sp.		10	2	17	3	7										1	27	14
	Leptoceridae														1				
	Leucotrichia sp.																		
	Limnephilidae													2					
	Micrasema sp.	1	2		1		6	2	3	7							52	28	13
	Neophylax sp.																		
	Neothremma sp.													1					
	Ochrotrichia sp.										2	2	1				3		2
	Oecetis sp.																		

FAMILY	GENUS Species	Mono Creek-1 A (BD1)	Mono Creek-1 B (BD1)	Mono Creek-1 C (BD1)	Mono Creek-2 A (BD2)	Mono Creek-2 B (BD2)	Mono Creek-2 C (BD2)	Mono Creek-3 A (BD3)	Mono Creek-3 B (BD3)	Mono Creek-3 C (BD3)	Mono Creek-4 A (BD4)	Mono Creek-4 B (BD4)	Mono Creek-4 C (BD4)	North Fork Stevenson Creek-1 A (BO1)	North Fork Stevenson Creek-1 B (BO1)	North Fork Stevenson Creek-1 C (BO1)	North Fork Stevenson Creek-2 A (BO2)	North Fork Stevenson Creek-2 B (BO2)	North Fork Stevenson Creek-3 A (BO3)
	Oligophlebodes sp.																		
	Oxyethira sp.																		
	Parapsyche sp.																		
	Pedomoecus sierra																		
	Philopotamidae				1				1										
	Polycentropodidae															1			
	Polycentropus sp.																		
	Psychoglypha sp.														1				
	Rhyacophila sp.	4	3	2	2		2	3	2	9	12	2	3	1			7	1	11
	Tinodes sp.																		
	Trichoptera																		
	Uenoidae																		
	Wormaldia sp.		1		1	1	1											2	
	Yphria californica													5					
Diptera	Antocha sp.						1	3	20	16		1	2						
	Atherix sp.																		
	Atrichopogon sp.																		
	Bezzia/Palpomyia sp.		1	1			2							5	1	5			1
	Blepharicera sp.						1												
	Blephariceridae																		
	Caloparyphus sp.																		
	Ceratopogon sp.																		
	Ceratopogonidae																		
	Ceratopogoninae																		

FAMILY	GENUS Species	Mono Creek-1 A (BD1)	Mono Creek-1 B (BD1)	Mono Creek-1 C (BD1)	Mono Creek-2 A (BD2)	Mono Creek-2 B (BD2)	Mono Creek-2 C (BD2)	Mono Creek-3 A (BD3)	Mono Creek-3 B (BD3)	Mono Creek-3 C (BD3)	Mono Creek-4 A (BD4)	Mono Creek-4 B (BD4)	Mono Creek-4 C (BD4)	North Fork Stevenson Creek-1 A (BO1)	North Fork Stevenson Creek-1 B (BO1)	North Fork Stevenson Creek-1 C (BO1)	North Fork Stevenson Creek-2 A (BO2)	North Fork Stevenson Creek-2 B (BO2)	North Fork Stevenson Creek-3 A (BO3)
	Chelifera sp.																		
	Chlorotabanus sp.																		
	Clinocera sp.			1					1										
	Cryptolabis sp.		4				1												
	Culicidae																		
	Culicoides sp.														44	1			
	Culiseta sp.																		
	Dasyhelea sp.														4				
	Dicranota sp.										1	2	2						
	Diptera																		
	Dixa sp.								1	2		1		1				1	1
	Dixella sp.																		
	Dolichopodidae																		
	Empididae										1								
	Ephydridae																		
	Euparyphus sp.																		
	Forcipomyia sp.																		
	Glutops sp.													1					
	Gonomyia sp.																		
	Hemerodromia sp.																1		
	Hesperoconopa sp.																		
	Hexatoma sp.		2												1	1			
	Limnophila sp.																		
	Limonia sp.		2																

FAMILY	GENUS Species	Mono Creek-1 A (BD1)	Mono Creek-1 B (BD1)	Mono Creek-1 C (BD1)	Mono Creek-2 A (BD2)	Mono Creek-2 B (BD2)	Mono Creek-2 C (BD2)	Mono Creek-3 A (BD3)	Mono Creek-3 B (BD3)	Mono Creek-3 C (BD3)	Mono Creek-4 A (BD4)	Mono Creek-4 B (BD4)	Mono Creek-4 C (BD4)	North Fork Stevenson Creek-1 A (BO1)	North Fork Stevenson Creek-1 B (BO1)	North Fork Stevenson Creek-1 C (BO1)	North Fork Stevenson Creek-2 A (BO2)	North Fork Stevenson Creek-2 B (BO2)	North Fork Stevenson Creek-3 A (BO3)
	Maruina sp.	3	3																
	Meringodixa sp.																		
	Molophilus sp.																		
	Muscidae																		
	Neoplasta sp.	2	1	2	4					2	4		3	7			1		
	Oreogeton sp.																		
	Ormosia sp.																		
	Pedicia sp.																		
	Pericoma/Telmatoscopus sp.													2					
	Probezzia sp.																		
	Prosimulium sp.																		
	Psychodidae																		
	Rhabdomastix sp.																		
	Sciomyzidae																		
	Simuliidae																		
	Simulium sp.	176	111	73	58	260	191	5	1	5	10	13	6				107	10	60
	Stilobezzia sp.															1			
	Tabanidae																		
	Thaumaleidae																		
	Tipula sp.																		
	Tipulidae																		
	Tipulinae																		
	Wiedemannia sp.											1					1		
Diptera-Chironomidae	Chironomidae																		

FAMILY	GENUS Species	Mono Creek-1 A (BD1)	Mono Creek-1 B (BD1)	Mono Creek-1 C (BD1)	Mono Creek-2 A (BD2)	Mono Creek-2 B (BD2)	Mono Creek-2 C (BD2)	Mono Creek-3 A (BD3)	Mono Creek-3 B (BD3)	Mono Creek-3 C (BD3)	Mono Creek-4 A (BD4)	Mono Creek-4 B (BD4)	Mono Creek-4 C (BD4)	North Fork Stevenson Creek-1 A (BO1)	North Fork Stevenson Creek-1 B (BO1)	North Fork Stevenson Creek-1 C (BO1)	North Fork Stevenson Creek-2 A (BO2)	North Fork Stevenson Creek-2 B (BO2)	North Fork Stevenson Creek-3 A (BO3)
	Chironomini		7	1											24	6		3	
	Diamesinae		1	2	4		3		1		3	1	3				2	1	1
	Orthocladiinae	28	31	38	24	18	22	16	25	62	134	65	73	91	6	6	49	30	13
	Podonominae																		
	Pseudochironomini																		
	Tanypodinae	1	4							9	1	4	2	7	9	2	1	1	1
	Tanytarsini	3	5		3	1	1	39	23	20	3	11	8	120	28	23	3	27	6
Lepidoptera	Lepidoptera																		
	Petrophila sp.																		
Lumbricina	Lumbricina							3								1		1	
Nemertea (phylum)	Prostoma sp.																		
Oligochaeta (class)	Enchytraeidae	1			3			2		20	2	3	4	4		1			
	Lumbriculidae																		
	Naididae				10		4		2	27	33	54	72		72	28	2	1	2
	Oligochaeta																		
	Tubificidae														32			2	
Nematoda (phylum)	Nematoda		7	3	6	4		1	1	2	12	4	19	12	12				1
Bivalvia (class)	Bivalvia	1																	
Ostracoda (class)	Cyprididae											1		3					
	Ostracoda																		
Copepoda	Calanoida																		
	Cyclopoida										1								
	Harpacticoida																		
Tricladida	Planariidae																		

FAMILY	GENUS Species	Mono Creek-1 A (BD1)	Mono Creek-1 B (BD1)	Mono Creek-1 C (BD1)	Mono Creek-2 A (BD2)	Mono Creek-2 B (BD2)	Mono Creek-2 C (BD2)	Mono Creek-3 A (BD3)	Mono Creek-3 B (BD3)	Mono Creek-3 C (BD3)	Mono Creek-4 A (BD4)	Mono Creek-4 B (BD4)	Mono Creek-4 C (BD4)	North Fork Stevenson Creek-1 A (BO1)	North Fork Stevenson Creek-1 B (BO1)	North Fork Stevenson Creek-1 C (BO1)	North Fork Stevenson Creek-2 A (BO2)	North Fork Stevenson Creek-2 B (BO2)	North Fork Stevenson Creek-3 A (BO3)
	Polycelis sp.				1						6	4	2					2	12
Hydroida	Hydra sp.																		
Arachnida (class)	Acari			1							1								
Trombidiformes	Hydrovolziidae																		
	Hydryphantidae		1					1											
	Hygrobatidae																	1	
	Lebertiidae				1			3	1		2	1	7	1		1		1	
	Limnesiidae																		
	Mideopsidae																		
	Sperchontidae				3				1	2	10	1		3			3	2	1
	Stygothrombidiidae																		
	Torrenticolidae		3	1	3		1						1	2				3	1
Veneroida	Pisidium sp.																		
	Sphaeriidae		7		24		4	3	2			1		1	1			1	
Basommatophora	Ferrissia sp.																		
	Menetus sp.																		
	Physa sp.																		
	Planorbidae																		
Sarcoptiformes	Oribatei															1			
	Total	**302**	**368**	**194**	**294**	**334**	**323**	**290**	**313**	**307**	**309**	**299**	**307**	**325**	**243**	**90**	**335**	**315**	**336**

FAMILY	GENUS Species	North Fork Stevenson Creek-3 B (BO3)	North Fork Stevenson Creek-3 C (BO3)	North Fork Stevenson Creek-AO A	North Fork Stevenson Creek-AO B	North Fork Stevenson Creek-AO C	North Slide Creek-AD A	North Slide Creek-AD B	North Slide Creek-AD C	North Slide Creek-1 A (BD1)	North Slide Creek-2 A (BD2)	North Slide Creek-2 B (BD2)	Pitman Creek-AD A	Pitman Creek-AD B	Pitman Creek-AD C	Pitman Creek-0 A (BD0)	Pitman Creek-0 B (BD0)	Pitman Creek-0 C (BD0)	Pitman Creek-1 A (BD1)
Ephemeroptera	Acentrella sp.																		
	Ameletus sp.							3	2						2				
	Attenella sp.																		
	Baetidae									1									
	Baetis sp.	5	8	5	2	15	1	4			2	3	11	1	19	68	67	143	56
	Caudatella sp.	1	2			8		8	2						1				8
	Centroptilum sp.																	2	
	Cinygma sp.					1		1			2	2				2			
	Cinygmula sp.	5	4		2	1		1					6	23	8				
	Cloeodes sp.																		
	Diphetor hageni	8			1		1		1		4	3	4	1		2			
	Drunella sp.	3	10	1	4	1		6	1	1	1		1	2	2				
	Epeorus sp.	11	20			1		1				2	15	4	5	9	1	10	
	Ephemerella sp.	8	6		1														
	Ephemerellidae					7							1						
	Ephemeroptera																		
	Heptageniidae								4	3			5						1
	Ironodes sp.	12	13		1	5	2	2	2	23	6	34	4	8		1	2	15	
	Leptophlebiidae																		
	Nixe sp.													1		2		1	
	Paraleptophlebia sp.		3		1	1		1	4	5	11	9		3	2	4			
	Procloeon sp.																		
	Rhithrogena sp.		1					1						1					
	Serratella sp.						4	7	8	5		1			1	1			

FAMILY	GENUS Species	North Fork Stevenson Creek-3 B (BO3)	North Fork Stevenson Creek-3 C (BO3)	North Fork Stevenson Creek-AO A	North Fork Stevenson Creek-AO B	North Fork Stevenson Creek-AO C	North Slide Creek-AD A	North Slide Creek-AD B	North Slide Creek-AD C	North Slide Creek-1 A (BD1)	North Slide Creek-2 A (BD2)	North Slide Creek-2 B (BD2)	Pitman Creek-AD A	Pitman Creek-AD B	Pitman Creek-AD C	Pitman Creek-0 A (BD0)	Pitman Creek-0 B (BD0)	Pitman Creek-0 C (BD0)	Pitman Creek-1 A (BD1)
Odonata	Anisoptera																		
	Argia sp.																		
	Coenagrionidae																		
	Cordulegaster sp.																		
	Corduliinae																		
	Gomphidae																		
	Hetaerina sp.																		
	Libellulidae																		
	Octogomphus specularis																		
Plecoptera	Calineuria californica	2			1		1						5	10	1				
	Capniidae								1	1	1		10	1					
	Chloroperlidae						1				1		1	2	1				
	Cultus sp.																		
	Despaxia augusta																		
	Doroneuria sp.																		
	Frisonia picticeps		1					1										2	
	Hesperoperla sp.						10	2	1	2	1	3							
	Isoperla sp.																		
	Kogotus sp.								1										
	Kogotus/Rickera sp.												1						
	Leuctridae						1				1		4	1					
	Malenka sp.				3	4		1	1										
	Moselia infuscata										5	4							
	Nemouridae									4	2	4							

FAMILY	GENUS Species	North Fork Stevenson Creek-3 B (BO3)	North Fork Stevenson Creek-3 C (BO3)	North Fork Stevenson Creek-AO A	North Fork Stevenson Creek-AO B	North Fork Stevenson Creek-AO C	North Slide Creek-AD A	North Slide Creek-AD B	North Slide Creek-AD C	North Slide Creek-1 A (BD1)	North Slide Creek-2 A (BD2)	North Slide Creek-2 B (BD2)	Pitman Creek-AD A	Pitman Creek-AD B	Pitman Creek-AD C	Pitman Creek-0 A (BD0)	Pitman Creek-0 B (BD0)	Pitman Creek-0 C (BD0)	Pitman Creek-1 A (BD1)
	Paracapnia sp.																		
	Paraperla sp.																		
	Perlidae							1											
	Perlinodes aurea														1				
	Perlodidae	2	8		2	1		2		4	3	3							
	Plecoptera	10	6		1			4					3						
	Skwala sp.																		
	Soyedina sp.											1							
	Suwallia sp.																		
	Sweltsa sp.		2				2	8	1					1					
	Taeniopterygidae																		
	Visoka cataractae	1																	
	Yoraperla sp.										1	1				1			
	Zapada sp.	14	14		39	27	11	41	75	47	30	33	7	19	3	2		1	17
Coleoptera	Agabinus sp.																		
	Agabus sp.																		
	Amphizoa sp.							1											
	Ampumixis dispar	2																	
	Chaetarthria sp.															1			
	Cleptelmis addenda				1			2	10				2		5	4	1		1
	Cymbiodyta sp.																		
	Elmidae		2					2					1						
	Eubrianax edwardsi														1	1		3	
	Heterlimnius sp.																		

FAMILY	GENUS Species	North Fork Stevenson Creek-3 B (BO3)	North Fork Stevenson Creek-3 C (BO3)	North Fork Stevenson Creek-AO A	North Fork Stevenson Creek-AO B	North Fork Stevenson Creek-AO C	North Slide Creek-AD A	North Slide Creek-AD B	North Slide Creek-AD C	North Slide Creek-1 A (BD1)	North Slide Creek-2 A (BD2)	North Slide Creek-2 B (BD2)	Pitman Creek-AD A	Pitman Creek-AD B	Pitman Creek-AD C	Pitman Creek-0 A (BD0)	Pitman Creek-0 B (BD0)	Pitman Creek-0 C (BD0)	Pitman Creek-1 A (BD1)
	Hydraena sp.							1	1				1			1			
	Hydroporinae																		
	Hydroporus sp.																		
	Hydrotrupes sp.																		
	Lara sp.							1	1		1	1							
	Microcylloepus sp.																		
	Narpus sp.																		
	Ochthebius sp.								1										
	Optioservus sp.		2			2	1	1	2				4	4	5	2		1	
	Ordobrevia nubifera																		
	Oreodytes sp.																		
	Psephenus sp.																		
	Rhizelmis nigra																		
	Sanfillipodytes sp.																		
	Stenocolus scutellaris																		
	Zaitzevia sp.	1	2			1	1		2				7	15	6	2			
Megaloptera	Corydalidae					1													
	Orohermes crepusculus																		
	Sialis sp.								1										
Trichoptera	Agapetus sp.																		
	Amiocentrus aspilus	1					2	3					3	1	5				1
	Anagapetus sp.						2	2		2	1								
	Apatania sp.													1					
	Arctopsyche sp.																		

FAMILY	GENUS Species	North Fork Stevenson Creek-3 B (BO3)	North Fork Stevenson Creek-3 C (BO3)	North Fork Stevenson Creek-AO A	North Fork Stevenson Creek-AO B	North Fork Stevenson Creek-AO C	North Slide Creek-AD A	North Slide Creek-AD B	North Slide Creek-AD C	North Slide Creek-1 A (BD1)	North Slide Creek-2 A (BD2)	North Slide Creek-2 B (BD2)	Pitman Creek-AD A	Pitman Creek-AD B	Pitman Creek-AD C	Pitman Creek-0 A (BD0)	Pitman Creek-0 B (BD0)	Pitman Creek-0 C (BD0)	Pitman Creek-1 A (BD1)
	Arctopsychinae																		
	Brachycentridae							3					1						
	Chimarra sp.																		
	Cryptochia sp.									2		1							
	Dolophilodes sp.																		
	Ecclisomyia sp.																		
	Glossosoma sp.	1	8										6		3	1			
	Glossosomatidae													1					
	Gumaga sp.								1										
	Helicopsyche sp.																		
	Heteroplectron sp.								2										
	Hydropsyche sp.	16	8			2	11	7	7				33	16	43	2	2	9	5
	Hydropsychidae	2			1		4	6					7	5			2		
	Hydroptila sp.	4		1		2							14	13	1	6	10		10
	Hydroptilidae	5	1	1	1	1								4	1				1
	Lepidostoma sp.	13	4		1	3	19	25	18		4	4	8	2		18	1	10	
	Leptoceridae																		
	Leucotrichia sp.																		
	Limnephilidae									1	2	1							
	Micrasema sp.	7	12	1		1	7	6	12	7	2	1		2	2		1		
	Neophylax sp.																		
	Neothremma sp.											1							
	Ochrotrichia sp.		1			1								1	1				
	Oecetis sp.																		

FAMILY	GENUS Species	North Fork Stevenson Creek-3 B (BO3)	North Fork Stevenson Creek-3 C (BO3)	North Fork Stevenson Creek-AO A	North Fork Stevenson Creek-AO B	North Fork Stevenson Creek-AO C	North Slide Creek-AD A	North Slide Creek-AD B	North Slide Creek-AD C	North Slide Creek-1 A (BD1)	North Slide Creek-2 A (BD2)	North Slide Creek-2 B (BD2)	Pitman Creek-AD A	Pitman Creek-AD B	Pitman Creek-AD C	Pitman Creek-0 A (BD0)	Pitman Creek-0 B (BD0)	Pitman Creek-0 C (BD0)	Pitman Creek-1 A (BD1)
	Oligophlebodes sp.		1										1	3	6	1			
	Oxyethira sp.																		
	Parapsyche sp.									4	1								
	Pedomoecus sierra																		
	Philopotamidae																		
	Polycentropodidae																		
	Polycentropus sp.						1	3	6										
	Psychoglypha sp.													1					
	Rhyacophila sp.	1	5		1	3	5	11	1	13	1	17	1	1	2	3	1	1	5
	Tinodes sp.																		
	Trichoptera																		
	Uenoidae																		
	Wormaldia sp.												1	3					
	Yphria californica											1							
Diptera	Antocha sp.		2	3		6							1		5		7	1	16
	Atherix sp.																		
	Atrichopogon sp.																	1	
	Bezzia/Palpomyia sp.							5	5	7	7	3							
	Blepharicera sp.																		
	Blephariceridae																		
	Caloparyphus sp.															1		3	
	Ceratopogon sp.																		
	Ceratopogonidae																		
	Ceratopogoninae																		

FAMILY	GENUS Species	North Fork Stevenson Creek-3 B (BO3)	North Fork Stevenson Creek-3 C (BO3)	North Fork Stevenson Creek-AO A	North Fork Stevenson Creek-AO B	North Fork Stevenson Creek-AO C	North Slide Creek-AD A	North Slide Creek-AD B	North Slide Creek-AD C	North Slide Creek-1 A (BD1)	North Slide Creek-2 A (BD2)	North Slide Creek-2 B (BD2)	Pitman Creek-AD A	Pitman Creek-AD B	Pitman Creek-AD C	Pitman Creek-0 A (BD0)	Pitman Creek-0 B (BD0)	Pitman Creek-0 C (BD0)	Pitman Creek-1 A (BD1)
	Chelifera sp.									6	2								
	Chlorotabanus sp.																		
	Clinocera sp.		1																
	Cryptolabis sp.																		
	Culicidae																		
	Culicoides sp.																		
	Culiseta sp.																		
	Dasyhelea sp.	1																	
	Dicranota sp.		1				1			2		3							1
	Diptera																		
	Dixa sp.							2	1			4	1						
	Dixella sp.																		
	Dolichopodidae																		
	Empididae							2			8								
	Ephydridae																		
	Euparyphus sp.																		
	Forcipomyia sp.																		
	Glutops sp.									1	2	4							
	Gonomyia sp.																		
	Hemerodromia sp.																		
	Hesperoconopa sp.																		
	Hexatoma sp.																		
	Limnophila sp.																		
	Limonia sp.																	3	

FAMILY	GENUS Species	North Fork Stevenson Creek-3 B (BO3)	North Fork Stevenson Creek-3 C (BO3)	North Fork Stevenson Creek-AO A	North Fork Stevenson Creek-AO B	North Fork Stevenson Creek-AO C	North Slide Creek-AD A	North Slide Creek-AD B	North Slide Creek-AD C	North Slide Creek-1 A (BD1)	North Slide Creek-2 A (BD2)	North Slide Creek-2 B (BD2)	Pitman Creek-AD A	Pitman Creek-AD B	Pitman Creek-AD C	Pitman Creek-0 A (BD0)	Pitman Creek-0 B (BD0)	Pitman Creek-0 C (BD0)	Pitman Creek-1 A (BD1)
	Maruina sp.														4		3		
	Meringodixa sp.							2			1	1							
	Molophilus sp.																		
	Muscidae																		
	Neoplasta sp.		2				2	2	1	12	2	9							
	Oreogeton sp.																		
	Ormosia sp.																		
	Pedicia sp.																		
	Pericoma/Telmatoscopus sp.								1	2		4							
	Probezzia sp.																		
	Prosimulium sp.																		
	Psychodidae																		
	Rhabdomastix sp.																		
	Sciomyzidae																		
	Simuliidae													1					
	Simulium sp.		5	1					1	9	1	2	5		19	128	117	5	56
	Stilobezzia sp.																		
	Tabanidae																		
	Thaumaleidae		1									1							
	Tipula sp.																		
	Tipulidae											1							
	Tipulinae																		
	Wiedemannia sp.																		1
Diptera-Chironomidae	Chironomidae																		

FAMILY	GENUS Species	North Fork Stevenson Creek-3 B (BO3)	North Fork Stevenson Creek-3 C (BO3)	North Fork Stevenson Creek-AO A	North Fork Stevenson Creek-AO B	North Fork Stevenson Creek-AO C	North Slide Creek-AD A	North Slide Creek-AD B	North Slide Creek-AD C	North Slide Creek-1 A (BD1)	North Slide Creek-2 A (BD2)	North Slide Creek-2 B (BD2)	Pitman Creek-AD A	Pitman Creek-AD B	Pitman Creek-AD C	Pitman Creek-0 A (BD0)	Pitman Creek-0 B (BD0)	Pitman Creek-0 C (BD0)	Pitman Creek-1 A (BD1)
	Chironomini	2						4	2				22	15		2	1	1	
	Diamesinae	1	6	29	25	23	3	6	8	5	2	3	2		1	1	1		
	Orthocladiinae	35	47	68	76	113	75	39	49	61	72	76	99	83	12	22	70	15	93
	Podonominae										1								
	Pseudochironomini																		
	Tanypodinae	4	1	2	1	1	24	12	20	4	5	3	17	9	1	6	1	1	
	Tanytarsini	40	45	16	17	5	75	41	54	26	29	13	37	32	127	22	10	69	13
Lepidoptera	Lepidoptera																		
	Petrophila sp.																		
Lumbricina	Lumbricina	2			1											1			
Nemertea (phylum)	Prostoma sp.																		
Oligochaeta (class)	Enchytraeidae	2	2	1	1		2	5		9	11	27		1	2				
	Lumbriculidae	2	1										1			1			
	Naididae	40	25	144	118	62			3				19	1				1	1
	Oligochaeta																		
	Tubificidae										6	4							
Nematoda (phylum)	Nematoda	1	2	17	11				1	28	51	15							
Bivalvia (class)	Bivalvia																		
Ostracoda (class)	Cyprididae										1	2							
	Ostracoda												1						
Copepoda	Calanoida																		
	Cyclopoida																		
	Harpacticoida										8								
Tricladida	Planariidae							9											

FAMILY	GENUS Species	North Fork Stevenson Creek-3 B (BO3)	North Fork Stevenson Creek-3 C (BO3)	North Fork Stevenson Creek-AO A	North Fork Stevenson Creek-AO B	North Fork Stevenson Creek-AO C	North Slide Creek-AD A	North Slide Creek-AD B	North Slide Creek-AD C	North Slide Creek-1 A (BD1)	North Slide Creek-2 A (BD2)	North Slide Creek-2 B (BD2)	Pitman Creek-AD A	Pitman Creek-AD B	Pitman Creek-AD C	Pitman Creek-0 A (BD0)	Pitman Creek-0 B (BD0)	Pitman Creek-0 C (BD0)	Pitman Creek-1 A (BD1)
	Polycelis sp.	1				1	5			5	1	18				1	2		
Hydroida	Hydra sp.					3													
Arachnida (class)	Acari	1				1				1	1								1
Trombidiformes	Hydrovolziidae																		
	Hydryphantidae						1		3		1								
	Hygrobatidae																		
	Lebertiidae				1			1	2	1	3								
	Limnesiidae																		
	Mideopsidae																		
	Sperchontidae	2	1	3	3		2	5	3	5	2	3	1	1	2	1		1	
	Stygothrombidiidae																		
	Torrenticolidae	6	9	2		3	4			2	1	2	3	2		2	1	1	
Veneroida	Pisidium sp.		1							1									
	Sphaeriidae	2	6								12								
Basommatophora	Ferrissia sp.																		
	Menetus sp.																		
	Physa sp.																		
	Planorbidae																		
Sarcoptiformes	Oribatei	1				1		1											
	Total	**278**	**302**	**295**	**317**	**308**	**281**	**305**	**323**	**312**	**313**	**328**	**377**	**296**	**300**	**322**	**301**	**300**	**287**

FAMILY	GENUS Species	Pitman Creek-1 B (BD1)	Pitman Creek-1 C (BD1)	Pitman Creek-2 A (BD2)	Pitman Creek-2 B (BD2)	Pitman Creek-2 C (BD2)	Rock Creek-1 A (BD1)	Rock Creek-1 B (BD1)	Rock Creek-2 A (BD2)	Rock Creek-2 B (BD2)	Rock Creek-2 C (BD2)	Rock Creek-AD A	Rock Creek-AD B	Rock Creek-AD C	South Fork San Joaquin River-1 A	South Fork San Joaquin River-1 B	South Fork San Joaquin River-1 C	South Fork San Joaquin River-4 A	South Fork San Joaquin River-4 B
Ephemeroptera	Acentrella sp.																		
	Ameletus sp.													2					
	Attenella sp.																		
	Baetidae							1											
	Baetis sp.	48	17	42	43	44	38	29	68	14	9	15	11		8	9	43	32	18
	Caudatella sp.	4	10								2	10			2				
	Centroptilum sp.			1															
	Cinygma sp.												1						
	Cinygmula sp.																1	2	1
	Cloeodes sp.													4					
	Diphetor hageni										4							1	
	Drunella sp.																1		
	Epeorus sp.						2					1	3			1	7	19	12
	Ephemerella sp.						7	4				4	3	7				2	3
	Ephemerellidae			1													6		
	Ephemeroptera																		
	Heptageniidae																		
	Ironodes sp.	1					2					1	2		52	8	6	7	12
	Leptophlebiidae							2											
	Nixe sp.															2			
	Paraleptophlebia sp.		2				2				1	2	24	6		2	2	4	4
	Procloeon sp.																		
	Rhithrogena sp.													4	1				1
	Serratella sp.															5			

FAMILY	GENUS Species	Pitman Creek-1 B (BD1)	Pitman Creek-1 C (BD1)	Pitman Creek-2 A (BD2)	Pitman Creek-2 B (BD2)	Pitman Creek-2 C (BD2)	Rock Creek-1 A (BD1)	Rock Creek-1 B (BD1)	Rock Creek-2 A (BD2)	Rock Creek-2 B (BD2)	Rock Creek-2 C (BD2)	Rock Creek-AD A	Rock Creek-AD B	Rock Creek-AD C	South Fork San Joaquin River-1 A	South Fork San Joaquin River-1 B	South Fork San Joaquin River-1 C	South Fork San Joaquin River-4 A	South Fork San Joaquin River-4 B
Odonata	Anisoptera						1												
	Argia sp.						8	9					5	4					
	Coenagrionidae						2												
	Cordulegaster sp.																		
	Corduliinae																		
	Gomphidae							3						2					
	Hetaerina sp.																		
	Libellulidae																		
	Octogomphus specularis												3	1					
Plecoptera	Calineuria californica												1	7			1	1	2
	Capniidae													1	24	1			
	Chloroperlidae														5				
	Cultus sp.																		
	Despaxia augusta																		
	Doroneuria sp.																		
	Frisonia picticeps																		
	Hesperoperla sp.														3			1	2
	Isoperla sp.																		
	Kogotus sp.																		
	Kogotus/Rickera sp.																		
	Leuctridae																		
	Malenka sp.																		2
	Moselia infuscata														1				
	Nemouridae																		

FAMILY	GENUS Species	Pitman Creek-1 B (BD1)	Pitman Creek-1 C (BD1)	Pitman Creek-2 A (BD2)	Pitman Creek-2 B (BD2)	Pitman Creek-2 C (BD2)	Rock Creek-1 A (BD1)	Rock Creek-1 B (BD1)	Rock Creek-2 A (BD2)	Rock Creek-2 B (BD2)	Rock Creek-2 C (BD2)	Rock Creek-AD A	Rock Creek-AD B	Rock Creek-AD C	South Fork San Joaquin River-1 A	South Fork San Joaquin River-1 B	South Fork San Joaquin River-1 C	South Fork San Joaquin River-4 A	South Fork San Joaquin River-4 B
	Paracapnia sp.																		
	Paraperla sp.																		
	Perlidae																		
	Perlinodes aurea																		
	Perlodidae											7	1		8	6			
	Plecoptera																		
	Skwala sp.																	1	
	Soyedina sp.																		
	Suwallia sp.																		
	Sweltsa sp.												1	3					3
	Taeniopterygidae																		
	Visoka cataractae																		
	Yoraperla sp.		2								2	3	8	1	1				
	Zapada sp.	7	20	1				1				1		1	20	32			1
Coleoptera	Agabinus sp.																		
	Agabus sp.																		
	Amphizoa sp.																		
	Ampumixis dispar						7	5		1	8	23	28	21					
	Chaetarthria sp.																		
	Cleptelmis addenda		14			2	17	6			26	35	25	8					
	Cymbiodyta sp.																		
	Elmidae																		
	Eubrianax edwardsi											2	4	6					6
	Heterlimnius sp.																		

FAMILY	GENUS Species	Pitman Creek-1 B (BD1)	Pitman Creek-1 C (BD1)	Pitman Creek-2 A (BD2)	Pitman Creek-2 B (BD2)	Pitman Creek-2 C (BD2)	Rock Creek-1 A (BD1)	Rock Creek-1 B (BD1)	Rock Creek-2 A (BD2)	Rock Creek-2 B (BD2)	Rock Creek-2 C (BD2)	Rock Creek-AD A	Rock Creek-AD B	Rock Creek-AD C	South Fork San Joaquin River-1 A	South Fork San Joaquin River-1 B	South Fork San Joaquin River-1 C	South Fork San Joaquin River-4 A	South Fork San Joaquin River-4 B
	Hydraena sp.		5				2												
	Hydroporinae																		
	Hydroporus sp.																		
	Hydrotrupes sp.		2																
	Lara sp.																		
	Microcylloepus sp.																		
	Narpus sp.																		
	Ochthebius sp.																		
	Optioservus sp.						13	12				6	27	7			15	8	1
	Ordobrevia nubifera						7						2	5			3	8	5
	Oreodytes sp.																		
	Psephenus sp.																		
	Rhizelmis nigra																		
	Sanfillipodytes sp.																		
	Stenocolus scutellaris							1					1						1
	Zaitzevia sp.						1						11	10			4	5	4
Megaloptera	Corydalidae																		
	Orohermes crepusculus																		
	Sialis sp.																		
Trichoptera	Agapetus sp.																		
	Amiocentrus aspilus	1				1													
	Anagapetus sp.														3				
	Apatania sp.																		
	Arctopsyche sp.																		

FAMILY	GENUS Species	Pitman Creek-1 B (BD1)	Pitman Creek-1 C (BD1)	Pitman Creek-2 A (BD2)	Pitman Creek-2 B (BD2)	Pitman Creek-2 C (BD2)	Rock Creek-1 A (BD1)	Rock Creek-1 B (BD1)	Rock Creek-2 A (BD2)	Rock Creek-2 B (BD2)	Rock Creek-2 C (BD2)	Rock Creek-AD A	Rock Creek-AD B	Rock Creek-AD C	South Fork San Joaquin River-1 A	South Fork San Joaquin River-1 B	South Fork San Joaquin River-1 C	South Fork San Joaquin River-4 A	South Fork San Joaquin River-4 B
	Arctopsychinae																		
	Brachycentridae																		
	Chimarra sp.																		
	Cryptochia sp.																		
	Dolophilodes sp.																		1
	Ecclisomyia sp.																		
	Glossosoma sp.																		
	Glossosomatidae																		
	Gumaga sp.												1						
	Helicopsyche sp.											2	1	3			2		1
	Heteroplectron sp.													2					
	Hydropsyche sp.	6	12	5	6	2	1	29	5	5	6	35	2				67	20	122
	Hydropsychidae	2	17		2						1						4		
	Hydroptila sp.	1	1	1	4	4	1					2					7	1	
	Hydroptilidae			4	3	4			11	5							4	4	
	Lepidostoma sp.						1	1	1			7	64	116					
	Leptoceridae													2					
	Leucotrichia sp.																		
	Limnephilidae															13			
	Micrasema sp.					2	10	6			2	26	24	31					
	Neophylax sp.																		
	Neothremma sp.														1	1			
	Ochrotrichia sp.			3					9	13							2	2	
	Oecetis sp.																		

FAMILY	GENUS Species	Pitman Creek-1 B (BD1)	Pitman Creek-1 C (BD1)	Pitman Creek-2 A (BD2)	Pitman Creek-2 B (BD2)	Pitman Creek-2 C (BD2)	Rock Creek-1 A (BD1)	Rock Creek-1 B (BD1)	Rock Creek-2 A (BD2)	Rock Creek-2 B (BD2)	Rock Creek-2 C (BD2)	Rock Creek-AD A	Rock Creek-AD B	Rock Creek-AD C	South Fork San Joaquin River-1 A	South Fork San Joaquin River-1 B	South Fork San Joaquin River-1 C	South Fork San Joaquin River-4 A	South Fork San Joaquin River-4 B
	Oligophlebodes sp.																		
	Oxyethira sp.																		
	Parapsyche sp.		1																
	Pedomoecus sierra																		
	Philopotamidae																		
	Polycentropodidae													1					
	Polycentropus sp.																		
	Psychoglypha sp.																		
	Rhyacophila sp.	2	2	1		1	2	1				1	3		3		9	4	
	Tinodes sp.													1					
	Trichoptera																		
	Uenoidae																		
	Wormaldia sp.							1				1	1	2			5	5	15
	Yphria californica																		
Diptera	Antocha sp.	5	5	2	8	9	1				1						1		
	Atherix sp.																		
	Atrichopogon sp.																		
	Bezzia/Palpomyia sp.												1		5				
	Blepharicera sp.																		
	Blephariceridae																		
	Caloparyphus sp.												2						
	Ceratopogon sp.																		
	Ceratopogonidae																		
	Ceratopogoninae																		

FAMILY	GENUS Species	Pitman Creek-1 B (BD1)	Pitman Creek-1 C (BD1)	Pitman Creek-2 A (BD2)	Pitman Creek-2 B (BD2)	Pitman Creek-2 C (BD2)	Rock Creek-1 A (BD1)	Rock Creek-1 B (BD1)	Rock Creek-2 A (BD2)	Rock Creek-2 B (BD2)	Rock Creek-2 C (BD2)	Rock Creek-AD A	Rock Creek-AD B	Rock Creek-AD C	South Fork San Joaquin River-1 A	South Fork San Joaquin River-1 B	South Fork San Joaquin River-1 C	South Fork San Joaquin River-4 A	South Fork San Joaquin River-4 B
	Chelifera sp.																		
	Chlorotabanus sp.																		
	Clinocera sp.						1								1				
	Cryptolabis sp.													1			2	2	2
	Culicidae																		
	Culicoides sp.																		
	Culiseta sp.																		
	Dasyhelea sp.																	1	
	Dicranota sp.														3	4			
	Diptera																		
	Dixa sp.					2	1	1			1		1			1			
	Dixella sp.																		
	Dolichopodidae																		
	Empididae						1		1		1								
	Ephydridae																		
	Euparyphus sp.																		
	Forcipomyia sp.																		
	Glutops sp.														1				
	Gonomyia sp.																		
	Hemerodromia sp.							2	12	11	3								
	Hesperoconopa sp.																		
	Hexatoma sp.																3		3
	Limnophila sp.																		
	Limonia sp.						2			1									

FAMILY	GENUS Species	Pitman Creek-1 B (BD1)	Pitman Creek-1 C (BD1)	Pitman Creek-2 A (BD2)	Pitman Creek-2 B (BD2)	Pitman Creek-2 C (BD2)	Rock Creek-1 A (BD1)	Rock Creek-1 B (BD1)	Rock Creek-2 A (BD2)	Rock Creek-2 B (BD2)	Rock Creek-2 C (BD2)	Rock Creek-AD A	Rock Creek-AD B	Rock Creek-AD C	South Fork San Joaquin River-1 A	South Fork San Joaquin River-1 B	South Fork San Joaquin River-1 C	South Fork San Joaquin River-4 A	South Fork San Joaquin River-4 B
	Maruina sp.								1					2					
	Meringodixa sp.													1					
	Molophilus sp.																		
	Muscidae					1													
	Neoplasta sp.												1		1	2			2
	Oreogeton sp.																		
	Ormosia sp.																		
	Pedicia sp.														1				
	Pericoma/Telmatoscopus sp.						1												
	Probezzia sp.																		
	Prosimulium sp.																		
	Psychodidae																		
	Rhabdomastix sp.																		
	Sciomyzidae																		
	Simuliidae																		
	Simulium sp.	104	111	76	229	151	73	87	44	111	47	76	3	1			7	3	18
	Stilobezzia sp.																		
	Tabanidae																		
	Thaumaleidae																		
	Tipula sp.																		
	Tipulidae																		
	Tipulinae																		
	Wiedemannia sp.																1		
Diptera-Chironomidae	Chironomidae																		

FAMILY	GENUS Species	Pitman Creek-1 B (BD1)	Pitman Creek-1 C (BD1)	Pitman Creek-2 A (BD2)	Pitman Creek-2 B (BD2)	Pitman Creek-2 C (BD2)	Rock Creek-1 A (BD1)	Rock Creek-1 B (BD1)	Rock Creek-2 A (BD2)	Rock Creek-2 B (BD2)	Rock Creek-2 C (BD2)	Rock Creek-AD A	Rock Creek-AD B	Rock Creek-AD C	South Fork San Joaquin River-1 A	South Fork San Joaquin River-1 B	South Fork San Joaquin River-1 C	South Fork San Joaquin River-4 A	South Fork San Joaquin River-4 B
	Chironomini						3	3					2	1			8		21
	Diamesinae			1		2									2	2			
	Orthocladiinae	130	160	76	35	50	42	74	199	154	174	57	54	34	133	88	49	28	56
	Podonominae																		
	Pseudochironomini								1		3								
	Tanypodinae	3	2	3	2		18	12	1		2	3	2	3	7	10			1
	Tanytarsini	6	3	88	26	23	31	11			3	4	4	2	10	95	21	143	36
Lepidoptera	Lepidoptera																		
	Petrophila sp.																		
Lumbricina	Lumbricina						4												
Nemertea (phylum)	Prostoma sp.																		
Oligochaeta (class)	Enchytraeidae															17	4		2
	Lumbriculidae														7				
	Naididae	4	9				2	2			2						13	1	
	Oligochaeta																		
	Tubificidae																		
Nematoda (phylum)	Nematoda	1		1			1	3							4	6		1	1
Bivalvia (class)	Bivalvia																		
Ostracoda (class)	Cyprididae															1			
	Ostracoda																		
Copepoda	Calanoida															3			
	Cyclopoida																		
	Harpacticoida																		
Tricladida	Planariidae												1	1	3	1			

FAMILY	GENUS Species	Pitman Creek-1 B (BD1)	Pitman Creek-1 C (BD1)	Pitman Creek-2 A (BD2)	Pitman Creek-2 B (BD2)	Pitman Creek-2 C (BD2)	Rock Creek-1 A (BD1)	Rock Creek-1 B (BD1)	Rock Creek-2 A (BD2)	Rock Creek-2 B (BD2)	Rock Creek-2 C (BD2)	Rock Creek-AD A	Rock Creek-AD B	Rock Creek-AD C	South Fork San Joaquin River-1 A	South Fork San Joaquin River-1 B	South Fork San Joaquin River-1 C	South Fork San Joaquin River-4 A	South Fork San Joaquin River-4 B
	Polycelis sp.																		
Hydroida	Hydra sp.																		
Arachnida (class)	Acari				1													1	
Trombidiformes	Hydrovolziidae																		
	Hydryphantidae											1	1						
	Hygrobatidae								3					1				2	1
	Lebertiidae																1		
	Limnesiidae																		
	Mideopsidae																		
	Sperchontidae		7			1		1	1		2	2	4	1		1	1	1	
	Stygothrombidiidae																		
	Torrenticolidae		2				1					2	2	1			4	1	
Veneroida	Pisidium sp.											1							
	Sphaeriidae						2	1				5	6	3					
Basommatophora	Ferrissia sp.																		
	Menetus sp.																		
	Physa sp.							4	1		2								
	Planorbidae																		
Sarcoptiformes	Oribatei																		
	Total	**325**	**404**	**306**	**359**	**299**	**308**	**312**	**358**	**315**	**302**	**335**	**341**	**310**	**310**	**311**	**304**	**311**	**360**

FAMILY	GENUS Species	South Fork San Joaquin River-4 C	South Fork San Joaquin River-5 A	South Fork San Joaquin River-5 B	South Fork San Joaquin River-5 C	South Fork San Joaquin River-6 A	South Fork San Joaquin River-6 B	South Fork San Joaquin River-6 C	South Fork San Joaquin River-7 A	South Fork San Joaquin River-7 B	South Fork San Joaquin River-7 C	South Fork San Joaquin River-3 A	South Fork San Joaquin River-3 B	South Fork San Joaquin River-3 C	South Fork San Joaquin River-2 A	South Fork San Joaquin River-2 B	South Fork San Joaquin River-2 C	South Fork San Joaquin River-9 A	South Fork San Joaquin River-9 B
Ephemeroptera	Acentrella sp.																		
	Ameletus sp.							1				1	1						
	Attenella sp.																		
	Baetidae																		
	Baetis sp.	28	12	23	27	12	13	13	24	12	6	9	9	49	14	33	39	7	22
	Caudatella sp.																		
	Centroptilum sp.																		
	Cinygma sp.																		
	Cinygmula sp.	7	7	6				8	1	1	1					1	4		
	Cloeodes sp.																		
	Diphetor hageni				2	1						2	1						
	Drunella sp.			1		2			1	1								3	1
	Epeorus sp.	6	19	11		3	1	2	4	5	2		1	7	3	3	5	6	4
	Ephemerella sp.	8		1	3		4						1			1		2	
	Ephemerellidae		2									2							
	Ephemeroptera																		
	Heptageniidae											1							
	Ironodes sp.	4	1	2	1	3	1	1	4	6	1		1		2	2			
	Leptophlebiidae																		
	Nixe sp.																		
	Paraleptophlebia sp.	7	3	4	1	1	1	1	2	3	7	9	5	1			1		2
	Procloeon sp.																		
	Rhithrogena sp.																		
	Serratella sp.									1									

FAMILY	GENUS Species	South Fork San Joaquin River-4 C	South Fork San Joaquin River-5 A	South Fork San Joaquin River-5 B	South Fork San Joaquin River-5 C	South Fork San Joaquin River-6 A	South Fork San Joaquin River-6 B	South Fork San Joaquin River-6 C	South Fork San Joaquin River-7 A	South Fork San Joaquin River-7 B	South Fork San Joaquin River-7 C	South Fork San Joaquin River-3 A	South Fork San Joaquin River-3 B	South Fork San Joaquin River-3 C	South Fork San Joaquin River-2 A	South Fork San Joaquin River-2 B	South Fork San Joaquin River-2 C	South Fork San Joaquin River-9 A	South Fork San Joaquin River-9 B
Odonata	Anisoptera																		
	Argia sp.																		
	Coenagrionidae																		
	Cordulegaster sp.																		
	Corduliinae																		
	Gomphidae																		
	Hetaerina sp.																		
	Libellulidae																		
	Octogomphus specularis																		
Plecoptera	Calineuria californica	3		2						1		1	3	2				1	
	Capniidae																		
	Chloroperlidae																		
	Cultus sp.													1					
	Despaxia augusta																		
	Doroneuria sp.																		
	Frisonia picticeps																		
	Hesperoperla sp.	1					1	1			1				1				
	Isoperla sp.																		
	Kogotus sp.																		
	Kogotus/Rickera sp.																		
	Leuctridae																		
	Malenka sp.	2	1						3		1	3	1		1				1
	Moselia infuscata																		
	Nemouridae																		

FAMILY	GENUS Species	South Fork San Joaquin River-4 C	South Fork San Joaquin River-5 A	South Fork San Joaquin River-5 B	South Fork San Joaquin River-5 C	South Fork San Joaquin River-6 A	South Fork San Joaquin River-6 B	South Fork San Joaquin River-6 C	South Fork San Joaquin River-7 A	South Fork San Joaquin River-7 B	South Fork San Joaquin River-7 C	South Fork San Joaquin River-3 A	South Fork San Joaquin River-3 B	South Fork San Joaquin River-3 C	South Fork San Joaquin River-2 A	South Fork San Joaquin River-2 B	South Fork San Joaquin River-2 C	South Fork San Joaquin River-9 A	South Fork San Joaquin River-9 B
	Paracapnia sp.																		
	Paraperla sp.																		
	Perlidae		2	2							2	1	1						
	Perlinodes aurea																		
	Perlodidae							1											
	Plecoptera																		
	Skwala sp.																		
	Soyedina sp.																		
	Suwallia sp.																		
	Sweltsa sp.	1	1	7			1	1	1			3	1			1	3		
	Taeniopterygidae																		
	Visoka cataractae																		
	Yoraperla sp.																		
	Zapada sp.	3	3	5	2	8	4	5	9	5	14	13	23	1					
Coleoptera	Agabinus sp.																		
	Agabus sp.																		
	Amphizoa sp.																		
	Ampumixis dispar																		
	Chaetarthria sp.																		
	Cleptelmis addenda									1									1
	Cymbiodyta sp.																		
	Elmidae																		
	Eubrianax edwardsi													1					
	Heterlimnius sp.																		

FAMILY	GENUS Species	South Fork San Joaquin River-4 C	South Fork San Joaquin River-5 A	South Fork San Joaquin River-5 B	South Fork San Joaquin River-5 C	South Fork San Joaquin River-6 A	South Fork San Joaquin River-6 B	South Fork San Joaquin River-6 C	South Fork San Joaquin River-7 A	South Fork San Joaquin River-7 B	South Fork San Joaquin River-7 C	South Fork San Joaquin River-3 A	South Fork San Joaquin River-3 B	South Fork San Joaquin River-3 C	South Fork San Joaquin River-2 A	South Fork San Joaquin River-2 B	South Fork San Joaquin River-2 C	South Fork San Joaquin River-9 A	South Fork San Joaquin River-9 B
	Hydraena sp.																		
	Hydroporinae																		
	Hydroporus sp.																		
	Hydrotrupes sp.																		
	Lara sp.																	1	
	Microcylloepus sp.																		
	Narpus sp.																		
	Ochthebius sp.																		
	Optioservus sp.	7	3	7			1					3	7	3	2	4	4	2	
	Ordobrevia nubifera	5	3	1					1	1		1			2	2		1	1
	Oreodytes sp.																		
	Psephenus sp.																		
	Rhizelmis nigra																		
	Sanfillipodytes sp.																		
	Stenocolus scutellaris																		
	Zaitzevia sp.	6		1			1			3	3	3	1	2		2			
Megaloptera	Corydalidae																		
	Orohermes crepusculus			7								2	1						
	Sialis sp.									1	1	1							
Trichoptera	Agapetus sp.																		
	Amiocentrus aspilus																		
	Anagapetus sp.																		
	Apatania sp.																		
	Arctopsyche sp.	3		3		1	2			1		2	1		3	2	1	4	7

FAMILY	GENUS Species	South Fork San Joaquin River-4 C	South Fork San Joaquin River-5 A	South Fork San Joaquin River-5 B	South Fork San Joaquin River-5 C	South Fork San Joaquin River-6 A	South Fork San Joaquin River-6 B	South Fork San Joaquin River-6 C	South Fork San Joaquin River-7 A	South Fork San Joaquin River-7 B	South Fork San Joaquin River-7 C	South Fork San Joaquin River-3 A	South Fork San Joaquin River-3 B	South Fork San Joaquin River-3 C	South Fork San Joaquin River-2 A	South Fork San Joaquin River-2 B	South Fork San Joaquin River-2 C	South Fork San Joaquin River-9 A	South Fork San Joaquin River-9 B
	Arctopsychinae																		
	Brachycentridae																		
	Chimarra sp.																		
	Cryptochia sp.																		
	Dolophilodes sp.	6	1			2	3	6	7	14	2				7			3	7
	Ecclisomyia sp.																		
	Glossosoma sp.																		
	Glossosomatidae																		
	Gumaga sp.																		
	Helicopsyche sp.																		
	Heteroplectron sp.																		
	Hydropsyche sp.	16	11	10		20	14	5	5	10	2	4	2	8	12	6	3	11	20
	Hydropsychidae		1	1		2						5	3					2	
	Hydroptila sp.			1	74	21	81	156	119	84	62	83	95	1		2		1	
	Hydroptilidae									3						2	2		
	Lepidostoma sp.	4	1	1		1		7	11	11	3	4	5	1		1			
	Leptoceridae																		
	Leucotrichia sp.																		
	Limnephilidae																		
	Micrasema sp.			2				5	4		3	8	7						
	Neophylax sp.																		
	Neothremma sp.																		
	Ochrotrichia sp.				1						2		1						
	Oecetis sp.																		

FAMILY	GENUS Species	South Fork San Joaquin River-4 C	South Fork San Joaquin River-5 A	South Fork San Joaquin River-5 B	South Fork San Joaquin River-5 C	South Fork San Joaquin River-6 A	South Fork San Joaquin River-6 B	South Fork San Joaquin River-6 C	South Fork San Joaquin River-7 A	South Fork San Joaquin River-7 B	South Fork San Joaquin River-7 C	South Fork San Joaquin River-3 A	South Fork San Joaquin River-3 B	South Fork San Joaquin River-3 C	South Fork San Joaquin River-2 A	South Fork San Joaquin River-2 B	South Fork San Joaquin River-2 C	South Fork San Joaquin River-9 A	South Fork San Joaquin River-9 B
	Oligophlebodes sp.											1							
	Oxyethira sp.																		
	Parapsyche sp.																		
	Pedomoecus sierra																		
	Philopotamidae			2								1							
	Polycentropodidae																		
	Polycentropus sp.		1	1			1				3	1							
	Psychoglypha sp.																		
	Rhyacophila sp.	1			1	1					1		1	1	1		1		1
	Tinodes sp.																		
	Trichoptera																		
	Uenoidae																		
	Wormaldia sp.													2	1				
	Yphria californica																		
Diptera	Antocha sp.			1		1		2	4	2	1	2	3					1	
	Atherix sp.							1						1					1
	Atrichopogon sp.																		
	Bezzia/Palpomyia sp.				2				1	2	1	2				2	1		
	Blepharicera sp.													1	1	1	4	1	5
	Blephariceridae																		
	Caloparyphus sp.																		
	Ceratopogon sp.																		
	Ceratopogonidae																		
	Ceratopogoninae																		

FAMILY	GENUS Species	South Fork San Joaquin River-4 C	South Fork San Joaquin River-5 A	South Fork San Joaquin River-5 B	South Fork San Joaquin River-5 C	South Fork San Joaquin River-6 A	South Fork San Joaquin River-6 B	South Fork San Joaquin River-6 C	South Fork San Joaquin River-7 A	South Fork San Joaquin River-7 B	South Fork San Joaquin River-7 C	South Fork San Joaquin River-3 A	South Fork San Joaquin River-3 B	South Fork San Joaquin River-3 C	South Fork San Joaquin River-2 A	South Fork San Joaquin River-2 B	South Fork San Joaquin River-2 C	South Fork San Joaquin River-9 A	South Fork San Joaquin River-9 B
	Chelifera sp.							1											
	Chlorotabanus sp.																		
	Clinocera sp.					1	1	2			1								
	Cryptolabis sp.	3	2	1	1							1				2	1		
	Culicidae																		
	Culicoides sp.																		
	Culiseta sp.																		
	Dasyhelea sp.															2			
	Dicranota sp.																		
	Diptera																		
	Dixa sp.																		
	Dixella sp.																		
	Dolichopodidae																		
	Empididae													1					
	Ephydridae																		
	Euparyphus sp.																		
	Forcipomyia sp.																		
	Glutops sp.																		
	Gonomyia sp.																		
	Hemerodromia sp.					1													
	Hesperoconopa sp.																		
	Hexatoma sp.			2						2	1	1					3	2	
	Limnophila sp.																		
	Limonia sp.																		

FAMILY	GENUS Species	South Fork San Joaquin River-4 C	South Fork San Joaquin River-5 A	South Fork San Joaquin River-5 B	South Fork San Joaquin River-5 C	South Fork San Joaquin River-6 A	South Fork San Joaquin River-6 B	South Fork San Joaquin River-6 C	South Fork San Joaquin River-7 A	South Fork San Joaquin River-7 B	South Fork San Joaquin River-7 C	South Fork San Joaquin River-3 A	South Fork San Joaquin River-3 B	South Fork San Joaquin River-3 C	South Fork San Joaquin River-2 A	South Fork San Joaquin River-2 B	South Fork San Joaquin River-2 C	South Fork San Joaquin River-9 A	South Fork San Joaquin River-9 B
	Maruina sp.	1	1											1				1	
	Meringodixa sp.																		
	Molophilus sp.																		
	Muscidae																		
	Neoplasta sp.				1		1	2	1	3	7	5	17			1			
	Oreogeton sp.																		
	Ormosia sp.																		
	Pedicia sp.																		
	Pericoma/Telmatoscopus sp.																		
	Probezzia sp.																		
	Prosimulium sp.																		
	Psychodidae				1														
	Rhabdomastix sp.																		
	Sciomyzidae																		
	Simuliidae																		
	Simulium sp.	95	198	124	94	106	113	18	32	45	6	1	2	138	235	173	224	268	230
	Stilobezzia sp.																		
	Tabanidae																		
	Thaumaleidae																		
	Tipula sp.																		
	Tipulidae																		
	Tipulinae																		
	Wiedemannia sp.	1								2									
Diptera-Chironomidae	Chironomidae										28								

FAMILY	GENUS Species	South Fork San Joaquin River-4 C	South Fork San Joaquin River-5 A	South Fork San Joaquin River-5 B	South Fork San Joaquin River-5 C	South Fork San Joaquin River-6 A	South Fork San Joaquin River-6 B	South Fork San Joaquin River-6 C	South Fork San Joaquin River-7 A	South Fork San Joaquin River-7 B	South Fork San Joaquin River-7 C	South Fork San Joaquin River-3 A	South Fork San Joaquin River-3 B	South Fork San Joaquin River-3 C	South Fork San Joaquin River-2 A	South Fork San Joaquin River-2 B	South Fork San Joaquin River-2 C	South Fork San Joaquin River-9 A	South Fork San Joaquin River-9 B
	Chironomini	8	3	3	9	9	3	2		7	31	27	4	7	5	6			
	Diamesinae			4			2	2	5		8	11	16			10		1	2
	Orthocladiinae	29	12	24	64	79	43	25	21	52	22	20	45	26	13	30	4	10	8
	Podonominae																		
	Pseudochironomini																		
	Tanypodinae	12			9		1	2	2	1	18	12	3	2		3		3	
	Tanytarsini	42	8	27	11	19	16	9	11	11	19	12	12	36	2	12	4	5	2
Lepidoptera	Lepidoptera																		
	Petrophila sp.																		
Lumbricina	Lumbricina																		
Nemertea (phylum)	Prostoma sp.																		
Oligochaeta (class)	Enchytraeidae	1							2	2		5	1				1	1	
	Lumbriculidae																		
	Naididae	3		4	12	19	7	24	3	3	10	8	8			4			
	Oligochaeta																		
	Tubificidae																		
Nematoda (phylum)	Nematoda			2	3	23	4	13	14	2	16	4	7	1	1		1	1	1
Bivalvia (class)	Bivalvia																		
Ostracoda (class)	Cyprididae			1															
	Ostracoda																		
Copepoda	Calanoida							2											
	Cyclopoida																		
	Harpacticoida																		
Tricladida	Planariidae										1								

FAMILY	GENUS Species	South Fork San Joaquin River-4 C	South Fork San Joaquin River-5 A	South Fork San Joaquin River-5 B	South Fork San Joaquin River-5 C	South Fork San Joaquin River-6 A	South Fork San Joaquin River-6 B	South Fork San Joaquin River-6 C	South Fork San Joaquin River-7 A	South Fork San Joaquin River-7 B	South Fork San Joaquin River-7 C	South Fork San Joaquin River-3 A	South Fork San Joaquin River-3 B	South Fork San Joaquin River-3 C	South Fork San Joaquin River-2 A	South Fork San Joaquin River-2 B	South Fork San Joaquin River-2 C	South Fork San Joaquin River-9 A	South Fork San Joaquin River-9 B
	Polycelis sp.																		
Hydroida	Hydra sp.																		
Arachnida (class)	Acari									1								1	
Trombidiformes	Hydrovolziidae																		
	Hydryphantidae															1			
	Hygrobatidae									1				1		2			
	Lebertiidae	1	1				1	1		1			3						2
	Limnesiidae																		
	Mideopsidae																		
	Sperchontidae									2									
	Stygothrombidiidae																		
	Torrenticolidae		1	7		2	1	7	5	12	15	13	12	1	1		3	2	1
Veneroida	Pisidium sp.																		
	Sphaeriidae			1			1	4	1		4	16	13						
Basommatophora	Ferrissia sp.																		
	Menetus sp.																		
	Physa sp.																		
	Planorbidae																		
Sarcoptiformes	Oribatei																		
	Total	**314**	**298**	**302**	**319**	**338**	**323**	**330**	**298**	**315**	**306**	**304**	**318**	**296**	**307**	**311**	**309**	**341**	**319**

FAMILY	GENUS Species	South Fork San Joaquin River-9 C	South Fork San Joaquin River-8 A	San Joaquin River Mammoth Reach-AM A	San Joaquin River Mammoth Reach-AM B	San Joaquin River Mammoth Reach-AM C	San Joaquin River Mammoth Reach-BM1 A	San Joaquin River Mammoth Reach-BM1 B	San Joaquin River Mammoth Reach-BM1 C	San Joaquin River Mammoth Reach-BM2 A	San Joaquin River Mammoth Reach-BM2 B	San Joaquin River Mammoth Reach-BM2 C	San Joaquin River Mammoth Reach-BM3 A	San Joaquin River Mammoth Reach-BM3 B	San Joaquin River Mammoth Reach-BM3 C	San Joaquin River Mammoth Reach-BM4 A	San Joaquin River Mammoth Reach-BM4 B	San Joaquin River Mammoth Reach-BM4 C	San Joaquin River Stevenson Reach-SR1 A
Ephemeroptera	Acentrella sp.								2	3	4			1		6		1	
	Ameletus sp.																		
	Attenella sp.																		
	Baetidae	2		2							1								
	Baetis sp.	25	3	17	1	20	26	79	46	57	29	40	34	122	26	57	27	83	28
	Caudatella sp.	1		6				2											
	Centroptilum sp.																		
	Cinygma sp.																		
	Cinygmula sp.				5														
	Cloeodes sp.																		
	Diphetor hageni	6						1											
	Drunella sp.							4											
	Epeorus sp.	8	1	9				5	7	4	1					2			
	Ephemerella sp.																		
	Ephemerellidae	5		4		1													
	Ephemeroptera																		
	Heptageniidae	8			1														
	Ironodes sp.																		
	Leptophlebiidae																		
	Nixe sp.																		
	Paraleptophlebia sp.	5	1		7														
	Procloeon sp.																		
	Rhithrogena sp.	8	1	1															
	Serratella sp.	1																	

FAMILY	GENUS Species	South Fork San Joaquin River-9 C	South Fork San Joaquin River-8 A	San Joaquin River Mammoth Reach-AM A	San Joaquin River Mammoth Reach-AM B	San Joaquin River Mammoth Reach-AM C	San Joaquin River Mammoth Reach-BM1 A	San Joaquin River Mammoth Reach-BM1 B	San Joaquin River Mammoth Reach-BM1 C	San Joaquin River Mammoth Reach-BM2 A	San Joaquin River Mammoth Reach-BM2 B	San Joaquin River Mammoth Reach-BM2 C	San Joaquin River Mammoth Reach-BM3 A	San Joaquin River Mammoth Reach-BM3 B	San Joaquin River Mammoth Reach-BM3 C	San Joaquin River Mammoth Reach-BM4 A	San Joaquin River Mammoth Reach-BM4 B	San Joaquin River Mammoth Reach-BM4 C	San Joaquin River Stevenson Reach-SR1 A
Odonata	Anisoptera																		
	Argia sp.									2									
	Coenagrionidae																		
	Cordulegaster sp.																		
	Corduliinae												1						
	Gomphidae																		
	Hetaerina sp.									2									
	Libellulidae																		
	Octogomphus specularis																		
Plecoptera	Calineuria californica				2														
	Capniidae	7		1															
	Chloroperlidae	1																	
	Cultus sp.																		
	Despaxia augusta																		
	Doroneuria sp.																		
	Frisonia picticeps																		
	Hesperoperla sp.							2	1		1	2							
	Isoperla sp.																		
	Kogotus sp.																		
	Kogotus/Rickera sp.																		
	Leuctridae																		
	Malenka sp.																		
	Moselia infuscata																		
	Nemouridae																		

FAMILY	GENUS Species	South Fork San Joaquin River-9 C	South Fork San Joaquin River-8 A	San Joaquin River Mammoth Reach-AM A	San Joaquin River Mammoth Reach-AM B	San Joaquin River Mammoth Reach-AM C	San Joaquin River Mammoth Reach-BM1 A	San Joaquin River Mammoth Reach-BM1 B	San Joaquin River Mammoth Reach-BM1 C	San Joaquin River Mammoth Reach-BM2 A	San Joaquin River Mammoth Reach-BM2 B	San Joaquin River Mammoth Reach-BM2 C	San Joaquin River Mammoth Reach-BM3 A	San Joaquin River Mammoth Reach-BM3 B	San Joaquin River Mammoth Reach-BM3 C	San Joaquin River Mammoth Reach-BM4 A	San Joaquin River Mammoth Reach-BM4 B	San Joaquin River Mammoth Reach-BM4 C	San Joaquin River Stevenson Reach-SR1 A
	Paracapnia sp.																		
	Paraperla sp.																		
	Perlidae																		
	Perlinodes aurea	2																	
	Perlodidae																		
	Plecoptera																		
	Skwala sp.				1			5											
	Soyedina sp.																		
	Suwallia sp.																		
	Sweltsa sp.																		
	Taeniopterygidae																		
	Visoka cataractae																		
	Yoraperla sp.		1																
	Zapada sp.			1	41														
Coleoptera	Agabinus sp.																		
	Agabus sp.																		
	Amphizoa sp.																		
	Ampumixis dispar																		
	Chaetarthria sp.																		
	Cleptelmis addenda																		
	Cymbiodyta sp.																		
	Elmidae	2																	
	Eubrianax edwardsi																		
	Heterlimnius sp.																		

FAMILY	GENUS Species	South Fork San Joaquin River-9 C	South Fork San Joaquin River-8 A	San Joaquin River Mammoth Reach-AM A	San Joaquin River Mammoth Reach-AM B	San Joaquin River Mammoth Reach-AM C	San Joaquin River Mammoth Reach-BM1 A	San Joaquin River Mammoth Reach-BM1 B	San Joaquin River Mammoth Reach-BM1 C	San Joaquin River Mammoth Reach-BM2 A	San Joaquin River Mammoth Reach-BM2 B	San Joaquin River Mammoth Reach-BM2 C	San Joaquin River Mammoth Reach-BM3 A	San Joaquin River Mammoth Reach-BM3 B	San Joaquin River Mammoth Reach-BM3 C	San Joaquin River Mammoth Reach-BM4 A	San Joaquin River Mammoth Reach-BM4 B	San Joaquin River Mammoth Reach-BM4 C	San Joaquin River Stevenson Reach-SR1 A
	Hydraena sp.																		2
	Hydroporinae																		
	Hydroporus sp.																		
	Hydrotrupes sp.																		
	Lara sp.																		
	Microcylloepus sp.																		
	Narpus sp.																		
	Ochthebius sp.																		
	Optioservus sp.									4		1							
	Ordobrevia nubifera												3	1					
	Oreodytes sp.																		
	Psephenus sp.																		
	Rhizelmis nigra																		
	Sanfillipodytes sp.																		
	Stenocolus scutellaris																		
	Zaitzevia sp.	5		7						1									
Megaloptera	Corydalidae																		
	Orohermes crepusculus																		
	Sialis sp.																		
Trichoptera	Agapetus sp.																		
	Amiocentrus aspilus																		
	Anagapetus sp.																		
	Apatania sp.																		
	Arctopsyche sp.		1																

FAMILY	GENUS Species	South Fork San Joaquin River-9 C	South Fork San Joaquin River-8 A	San Joaquin River Mammoth Reach-AM A	San Joaquin River Mammoth Reach-AM B	San Joaquin River Mammoth Reach-AM C	San Joaquin River Mammoth Reach-BM1 A	San Joaquin River Mammoth Reach-BM1 B	San Joaquin River Mammoth Reach-BM1 C	San Joaquin River Mammoth Reach-BM2 A	San Joaquin River Mammoth Reach-BM2 B	San Joaquin River Mammoth Reach-BM2 C	San Joaquin River Mammoth Reach-BM3 A	San Joaquin River Mammoth Reach-BM3 B	San Joaquin River Mammoth Reach-BM3 C	San Joaquin River Mammoth Reach-BM4 A	San Joaquin River Mammoth Reach-BM4 B	San Joaquin River Mammoth Reach-BM4 C	San Joaquin River Stevenson Reach-SR1 A
	Arctopsychinae																		
	Brachycentridae																		
	Chimarra sp.								11	6	2	15							
	Cryptochia sp.																		
	Dolophilodes sp.		2	3				1											
	Ecclisomyia sp.																		
	Glossosoma sp.																		
	Glossosomatidae																		
	Gumaga sp.																		
	Helicopsyche sp.																		
	Heteroplectron sp.																		
	Hydropsyche sp.	15	8	4				11	33	76	40	28	34	1		13	9		1
	Hydropsychidae	7		3	1					5		2	1						
	Hydroptila sp.	31		12	2	1		10	10	12	1	3	4	16	2	6	7	9	1
	Hydroptilidae							6	2			1					1		1
	Lepidostoma sp.	1			2														
	Leptoceridae																		
	Leucotrichia sp.																		
	Limnephilidae																		
	Micrasema sp.																		
	Neophylax sp.																		
	Neothremma sp.																		
	Ochrotrichia sp.	1			1	2		16	1	2	1	6		27	12	19	2	6	2
	Oecetis sp.																		

FAMILY	GENUS Species	South Fork San Joaquin River-9 C	South Fork San Joaquin River-8 A	San Joaquin River Mammoth Reach-AM A	San Joaquin River Mammoth Reach-AM B	San Joaquin River Mammoth Reach-AM C	San Joaquin River Mammoth Reach-BM1 A	San Joaquin River Mammoth Reach-BM1 B	San Joaquin River Mammoth Reach-BM1 C	San Joaquin River Mammoth Reach-BM2 A	San Joaquin River Mammoth Reach-BM2 B	San Joaquin River Mammoth Reach-BM2 C	San Joaquin River Mammoth Reach-BM3 A	San Joaquin River Mammoth Reach-BM3 B	San Joaquin River Mammoth Reach-BM3 C	San Joaquin River Mammoth Reach-BM4 A	San Joaquin River Mammoth Reach-BM4 B	San Joaquin River Mammoth Reach-BM4 C	San Joaquin River Stevenson Reach-SR1 A
	Oligophlebodes sp.																		
	Oxyethira sp.								1				2						
	Parapsyche sp.																		
	Pedomoecus sierra																		
	Philopotamidae									3		1							
	Polycentropodidae																		
	Polycentropus sp.																		
	Psychoglypha sp.																		
	Rhyacophila sp.	1	1	1			1	23	2					6	3	2		3	
	Tinodes sp.																		
	Trichoptera																		
	Uenoidae																		
	Wormaldia sp.				1						1	1	1			7	6	5	3
	Yphria californica																		
Diptera	Antocha sp.	4		2				7	1	1		1	6	10		2	5		1
	Atherix sp.																		
	Atrichopogon sp.								2				2						
	Bezzia/Palpomyia sp.																		
	Blepharicera sp.							1											
	Blephariceridae						1												
	Caloparyphus sp.																		
	Ceratopogon sp.																		
	Ceratopogonidae								1				1						
	Ceratopogoninae																		

FAMILY	GENUS Species	South Fork San Joaquin River-9 C	South Fork San Joaquin River-8 A	San Joaquin River Mammoth Reach-AM A	San Joaquin River Mammoth Reach-AM B	San Joaquin River Mammoth Reach-AM C	San Joaquin River Mammoth Reach-BM1 A	San Joaquin River Mammoth Reach-BM1 B	San Joaquin River Mammoth Reach-BM1 C	San Joaquin River Mammoth Reach-BM2 A	San Joaquin River Mammoth Reach-BM2 B	San Joaquin River Mammoth Reach-BM2 C	San Joaquin River Mammoth Reach-BM3 A	San Joaquin River Mammoth Reach-BM3 B	San Joaquin River Mammoth Reach-BM3 C	San Joaquin River Mammoth Reach-BM4 A	San Joaquin River Mammoth Reach-BM4 B	San Joaquin River Mammoth Reach-BM4 C	San Joaquin River Stevenson Reach-SR1 A
	Chelifera sp.																		
	Chlorotabanus sp.																		
	Clinocera sp.		1	1															
	Cryptolabis sp.																		
	Culicidae																		
	Culicoides sp.																		
	Culiseta sp.																		
	Dasyhelea sp.																		
	Dicranota sp.																		
	Diptera																		
	Dixa sp.																		
	Dixella sp.																		
	Dolichopodidae																		
	Empididae			1													1		1
	Ephydridae																		
	Euparyphus sp.																		
	Forcipomyia sp.						2												
	Glutops sp.																		
	Gonomyia sp.																		
	Hemerodromia sp.								1		1		1					1	
	Hesperoconopa sp.																		
	Hexatoma sp.				1														
	Limnophila sp.																		
	Limonia sp.							5					1	6	1	2			

FAMILY	GENUS Species	South Fork San Joaquin River-9 C	South Fork San Joaquin River-8 A	San Joaquin River Mammoth Reach-AM A	San Joaquin River Mammoth Reach-AM B	San Joaquin River Mammoth Reach-AM C	San Joaquin River Mammoth Reach-BM1 A	San Joaquin River Mammoth Reach-BM1 B	San Joaquin River Mammoth Reach-BM1 C	San Joaquin River Mammoth Reach-BM2 A	San Joaquin River Mammoth Reach-BM2 B	San Joaquin River Mammoth Reach-BM2 C	San Joaquin River Mammoth Reach-BM3 A	San Joaquin River Mammoth Reach-BM3 B	San Joaquin River Mammoth Reach-BM3 C	San Joaquin River Mammoth Reach-BM4 A	San Joaquin River Mammoth Reach-BM4 B	San Joaquin River Mammoth Reach-BM4 C	San Joaquin River Stevenson Reach-SR1 A
	Maruina sp.								2					3				1	
	Meringodixa sp.																		
	Molophilus sp.																		
	Muscidae																		
	Neoplasta sp.			1				1										1	
	Oreogeton sp.																		
	Ormosia sp.																		
	Pedicia sp.																		
	Pericoma/Telmatoscopus sp.																		
	Probezzia sp.																		
	Prosimulium sp.																		
	Psychodidae																		
	Rhabdomastix sp.																		
	Sciomyzidae																		
	Simuliidae																		
	Simulium sp.	53	266	44	118	61	260	51	81	30	207	200	60	57	259	189	192	87	110
	Stilobezzia sp.																		
	Tabanidae																		
	Thaumaleidae																		
	Tipula sp.																		
	Tipulidae																		
	Tipulinae																		
	Wiedemannia sp.																	1	1
Diptera-Chironomidae	Chironomidae																		

FAMILY	GENUS Species	South Fork San Joaquin River-9 C	South Fork San Joaquin River-8 A	San Joaquin River Mammoth Reach-AM A	San Joaquin River Mammoth Reach-AM B	San Joaquin River Mammoth Reach-AM C	San Joaquin River Mammoth Reach-BM1 A	San Joaquin River Mammoth Reach-BM1 B	San Joaquin River Mammoth Reach-BM1 C	San Joaquin River Mammoth Reach-BM2 A	San Joaquin River Mammoth Reach-BM2 B	San Joaquin River Mammoth Reach-BM2 C	San Joaquin River Mammoth Reach-BM3 A	San Joaquin River Mammoth Reach-BM3 B	San Joaquin River Mammoth Reach-BM3 C	San Joaquin River Mammoth Reach-BM4 A	San Joaquin River Mammoth Reach-BM4 B	San Joaquin River Mammoth Reach-BM4 C	San Joaquin River Stevenson Reach-SR1 A
	Chironomini	1						4					5			1			2
	Diamesinae	5	2	10	1	3		3	1		1	1					3		
	Orthocladiinae	68	22	143	18	57	24	58	11	9	5	11	33	58	8	8	15	92	21
	Podonominae																		
	Pseudochironomini									1				1					
	Tanypodinae	7		3	2												1		
	Tanytarsini	23	1	19	6	1			12	46	11	49	81	1	11	7	45	5	142
Lepidoptera	Lepidoptera																		
	Petrophila sp.												1						
Lumbricina	Lumbricina									4		4	10		1		1		1
Nemertea (phylum)	Prostoma sp.																		
Oligochaeta (class)	Enchytraeidae																		
	Lumbriculidae									4			1						
	Naididae	1		1	37			5	25	7	3	6	2		1	3	9	7	9
	Oligochaeta																		
	Tubificidae																		
Nematoda (phylum)	Nematoda			1	3														
Bivalvia (class)	Bivalvia																		
Ostracoda (class)	Cyprididae									2		2	2						
	Ostracoda																		
Copepoda	Calanoida																		
	Cyclopoida																		
	Harpacticoida																		
Tricladida	Planariidae																		

FAMILY	GENUS Species	South Fork San Joaquin River-9 C	South Fork San Joaquin River-8 A	San Joaquin River Mammoth Reach-AM A	San Joaquin River Mammoth Reach-AM B	San Joaquin River Mammoth Reach-AM C	San Joaquin River Mammoth Reach-BM1 A	San Joaquin River Mammoth Reach-BM1 B	San Joaquin River Mammoth Reach-BM1 C	San Joaquin River Mammoth Reach-BM2 A	San Joaquin River Mammoth Reach-BM2 B	San Joaquin River Mammoth Reach-BM2 C	San Joaquin River Mammoth Reach-BM3 A	San Joaquin River Mammoth Reach-BM3 B	San Joaquin River Mammoth Reach-BM3 C	San Joaquin River Mammoth Reach-BM4 A	San Joaquin River Mammoth Reach-BM4 B	San Joaquin River Mammoth Reach-BM4 C	San Joaquin River Stevenson Reach-SR1 A
	Polycelis sp.				1														
Hydroida	Hydra sp.																		
Arachnida (class)	Acari											1							
Trombidiformes	Hydrovolziidae																		
	Hydryphantidae																		
	Hygrobatidae								3	2	2		3						
	Lebertiidae	1			7					2		1							
	Limnesiidae																		
	Mideopsidae																		
	Sperchontidae	1			18					1	1		1						
	Stygothrombidiidae																		
	Torrenticolidae	8		3						1			6						
Veneroida	Pisidium sp.																		
	Sphaeriidae				23	1													
Basommatophora	Ferrissia sp.																		
	Menetus sp.								1	3									
	Physa sp.									1		1	3						
	Planorbidae																	1	
Sarcoptiformes	Oribatei												1						
	Total	**314**	**311**	**300**	**300**	**147**	**314**	**300**	**257**	**291**	**312**	**377**	**300**	**310**	**324**	**324**	**324**	**303**	**326**

FAMILY	GENUS Species	San Joaquin River Stevenson Reach-SR1 B	San Joaquin River Stevenson Reach-SR1 C	San Joaquin River Stevenson Reach-SR2 A	San Joaquin River Stevenson Reach-SR2 B	San Joaquin River Stevenson Reach-SR2 C	San Joaquin River Stevenson Reach-SR3 A	San Joaquin River Stevenson Reach-SR3 B	San Joaquin River Stevenson Reach-SR3 C	San Joaquin River Stevenson Reach-SR4 A	San Joaquin River Stevenson Reach-SR4 B	South Slide Creek-AD A	South Slide Creek-AD B	South Slide Creek-AD C	South Slide Creek-2 B (BD2)	South Slide Creek-2 C (BD2)	Stevenson Creek-5 A	Stevenson Creek-5 B	Stevenson Creek-1 A
Ephemeroptera	Acentrella sp.																		
	Ameletus sp.															1			
	Attenella sp.																		
	Baetidae															1			
	Baetis sp.	29	12	31	5	16	40	19	12	6	41	33	30				8	5	34
	Caudatella sp.													2					
	Centroptilum sp.																		
	Cinygma sp.																		
	Cinygmula sp.																		
	Cloeodes sp.																		
	Diphetor hageni																8	10	
	Drunella sp.																		
	Epeorus sp.										1			3	1	1	17	14	
	Ephemerella sp.																		
	Ephemerellidae														2	4	2		4
	Ephemeroptera																		
	Heptageniidae															3			8
	Ironodes sp.													89	29	56		2	
	Leptophlebiidae																		
	Nixe sp.																		
	Paraleptophlebia sp.														3	3		9	4
	Procloeon sp.											1							
	Rhithrogena sp.																		
	Serratella sp.													2					

FAMILY	GENUS Species	San Joaquin River Stevenson Reach-SR1 B	San Joaquin River Stevenson Reach-SR1 C	San Joaquin River Stevenson Reach-SR2 A	San Joaquin River Stevenson Reach-SR2 B	San Joaquin River Stevenson Reach-SR2 C	San Joaquin River Stevenson Reach-SR3 A	San Joaquin River Stevenson Reach-SR3 B	San Joaquin River Stevenson Reach-SR3 C	San Joaquin River Stevenson Reach-SR4 A	San Joaquin River Stevenson Reach-SR4 B	South Slide Creek-AD A	South Slide Creek-AD B	South Slide Creek-AD C	South Slide Creek-2 B (BD2)	South Slide Creek-2 C (BD2)	Stevenson Creek-5 A	Stevenson Creek-5 B	Stevenson Creek-1 A
Odonata	Anisoptera																		
	Argia sp.										2								4
	Coenagrionidae																2		
	Cordulegaster sp.																2		2
	Corduliinae			1				1											
	Gomphidae																4	6	47
	Hetaerina sp.																		
	Libellulidae			1															
	Octogomphus specularis																1		1
Plecoptera	Calineuria californica																	1	
	Capniidae													11	1	8			
	Chloroperlidae														3	2			
	Cultus sp.																		
	Despaxia augusta																		
	Doroneuria sp.																		
	Frisonia picticeps																		
	Hesperoperla sp.					1								7	3	1			
	Isoperla sp.																		
	Kogotus sp.																		
	Kogotus/Rickera sp.																		
	Leuctridae																		
	Malenka sp.																	3	
	Moselia infuscata														1	13			
	Nemouridae															3			

FAMILY	GENUS Species	San Joaquin River Stevenson Reach-SR1 B	San Joaquin River Stevenson Reach-SR1 C	San Joaquin River Stevenson Reach-SR2 A	San Joaquin River Stevenson Reach-SR2 B	San Joaquin River Stevenson Reach-SR2 C	San Joaquin River Stevenson Reach-SR3 A	San Joaquin River Stevenson Reach-SR3 B	San Joaquin River Stevenson Reach-SR3 C	San Joaquin River Stevenson Reach-SR4 A	San Joaquin River Stevenson Reach-SR4 B	South Slide Creek-AD A	South Slide Creek-AD B	South Slide Creek-AD C	South Slide Creek-2 B (BD2)	South Slide Creek-2 C (BD2)	Stevenson Creek-5 A	Stevenson Creek-5 B	Stevenson Creek-1 A
	Paracapnia sp.																		
	Paraperla sp.																		
	Perlidae																	2	
	Perlinodes aurea																		
	Perlodidae													1		2	2		
	Plecoptera																		3
	Skwala sp.																		
	Soyedina sp.																		
	Suwallia sp.														1				
	Sweltsa sp.													2	1			1	1
	Taeniopterygidae																		
	Visoka cataractae																		
	Yoraperla sp.													1					
	Zapada sp.													4	8	18	3	44	2
Coleoptera	Agabinus sp.																		
	Agabus sp.																		
	Amphizoa sp.																		
	Ampumixis dispar																		2
	Chaetarthria sp.																		
	Cleptelmis addenda																2		1
	Cymbiodyta sp.																		
	Elmidae		2	2							2								
	Eubrianax edwardsi																		
	Heterlimnius sp.																		

FAMILY	GENUS Species	San Joaquin River Stevenson Reach-SR1 B	San Joaquin River Stevenson Reach-SR1 C	San Joaquin River Stevenson Reach-SR2 A	San Joaquin River Stevenson Reach-SR2 B	San Joaquin River Stevenson Reach-SR2 C	San Joaquin River Stevenson Reach-SR3 A	San Joaquin River Stevenson Reach-SR3 B	San Joaquin River Stevenson Reach-SR3 C	San Joaquin River Stevenson Reach-SR4 A	San Joaquin River Stevenson Reach-SR4 B	South Slide Creek-AD A	South Slide Creek-AD B	South Slide Creek-AD C	South Slide Creek-2 B (BD2)	South Slide Creek-2 C (BD2)	Stevenson Creek-5 A	Stevenson Creek-5 B	Stevenson Creek-1 A
	Hydraena sp.																		2
	Hydroporinae																		
	Hydroporus sp.																		
	Hydrotrupes sp.																		
	Lara sp.																		
	Microcylloepus sp.					3													
	Narpus sp.																		
	Ochthebius sp.																		
	Optioservus sp.								1		2						51	14	44
	Ordobrevia nubifera		1			3			1										
	Oreodytes sp.																	1	1
	Psephenus sp.																14		32
	Rhizelmis nigra																		
	Sanfillipodytes sp.																		
	Stenocolus scutellaris																		
	Zaitzevia sp.					2													
Megaloptera	Corydalidae																		
	Orohermes crepusculus																		
	Sialis sp.																		
Trichoptera	Agapetus sp.																23	14	7
	Amiocentrus aspilus																1	2	
	Anagapetus sp.														3	1			
	Apatania sp.																		
	Arctopsyche sp.																		

FAMILY	GENUS Species	San Joaquin River Stevenson Reach-SR1 B	San Joaquin River Stevenson Reach-SR1 C	San Joaquin River Stevenson Reach-SR2 A	San Joaquin River Stevenson Reach-SR2 B	San Joaquin River Stevenson Reach-SR2 C	San Joaquin River Stevenson Reach-SR3 A	San Joaquin River Stevenson Reach-SR3 B	San Joaquin River Stevenson Reach-SR3 C	San Joaquin River Stevenson Reach-SR4 A	San Joaquin River Stevenson Reach-SR4 B	South Slide Creek-AD A	South Slide Creek-AD B	South Slide Creek-AD C	South Slide Creek-2 B (BD2)	South Slide Creek-2 C (BD2)	Stevenson Creek-5 A	Stevenson Creek-5 B	Stevenson Creek-1 A
	Arctopsychinae														1				
	Brachycentridae																		
	Chimarra sp.		6	2	1	8					8								
	Cryptochia sp.																		
	Dolophilodes sp.																		
	Ecclisomyia sp.																		
	Glossosoma sp.																3		5
	Glossosomatidae																		
	Gumaga sp.																		2
	Helicopsyche sp.																		
	Heteroplectron sp.																5		1
	Hydropsyche sp.		13	41		24	14	14	3	7	35	2	5				6	3	2
	Hydropsychidae			3	1						6							4	
	Hydroptila sp.	4	6	1	1	6	2	1	8			16	18				1	1	
	Hydroptilidae		2	1					1			14	2						
	Lepidostoma sp.																18	1	10
	Leptoceridae																		
	Leucotrichia sp.		2	2	1		5	2	2										
	Limnephilidae													3	2	4			
	Micrasema sp.																2	4	3
	Neophylax sp.																		
	Neothremma sp.													13	5	7			
	Ochrotrichia sp.	8		3	1	3	6	2	6	10	6	11	11						
	Oecetis sp.																2		

FAMILY	GENUS Species	San Joaquin River Stevenson Reach-SR1 B	San Joaquin River Stevenson Reach-SR1 C	San Joaquin River Stevenson Reach-SR2 A	San Joaquin River Stevenson Reach-SR2 B	San Joaquin River Stevenson Reach-SR2 C	San Joaquin River Stevenson Reach-SR3 A	San Joaquin River Stevenson Reach-SR3 B	San Joaquin River Stevenson Reach-SR3 C	San Joaquin River Stevenson Reach-SR4 A	San Joaquin River Stevenson Reach-SR4 B	South Slide Creek-AD A	South Slide Creek-AD B	South Slide Creek-AD C	South Slide Creek-2 B (BD2)	South Slide Creek-2 C (BD2)	Stevenson Creek-5 A	Stevenson Creek-5 B	Stevenson Creek-1 A
	Oligophlebodes sp.																		
	Oxyethira sp.	1	1	1		1							3						
	Parapsyche sp.																		
	Pedomoecus sierra																		
	Philopotamidae			1			1				6								2
	Polycentropodidae																		
	Polycentropus sp.																		
	Psychoglypha sp.																		
	Rhyacophila sp.	4			1		2			5				6	7	9	4	7	4
	Tinodes sp.																		
	Trichoptera													3	3	1	2		
	Uenoidae																		
	Wormaldia sp.	2							2		2	11	1				2	2	1
	Yphria californica																		
Diptera	Antocha sp.	1	2	2	1		3	3	8	1	8	4	9				3	3	1
	Atherix sp.																		
	Atrichopogon sp.	1					3		4				1						
	Bezzia/Palpomyia sp.														2		1	3	
	Blephariceera sp.																		
	Blephariceridae																		
	Caloparyphus sp.						1												
	Ceratopogon sp.																		
	Ceratopogonidae						2		2			2							
	Ceratopogoninae																		

FAMILY	GENUS Species	San Joaquin River Stevenson Reach-SR1 B	San Joaquin River Stevenson Reach-SR1 C	San Joaquin River Stevenson Reach-SR2 A	San Joaquin River Stevenson Reach-SR2 B	San Joaquin River Stevenson Reach-SR2 C	San Joaquin River Stevenson Reach-SR3 A	San Joaquin River Stevenson Reach-SR3 B	San Joaquin River Stevenson Reach-SR3 C	San Joaquin River Stevenson Reach-SR4 A	San Joaquin River Stevenson Reach-SR4 B	South Slide Creek-AD A	South Slide Creek-AD B	South Slide Creek-AD C	South Slide Creek-2 B (BD2)	South Slide Creek-2 C (BD2)	Stevenson Creek-5 A	Stevenson Creek-5 B	Stevenson Creek-1 A
	Chelifera sp.																		
	Chlorotabanus sp.																		
	Clinocera sp.														1				
	Cryptolabis sp.																	4	1
	Culicidae																		
	Culicoides sp.																		
	Culiseta sp.																		
	Dasyhelea sp.		3				6		14			7	5						
	Dicranota sp.													7	4	3	1		
	Diptera								1										
	Dixa sp.																		
	Dixella sp.																		
	Dolichopodidae						2												
	Empididae		1													1			
	Ephydridae																		
	Euparyphus sp.																2		
	Forcipomyia sp.																	1	
	Glutops sp.													12	11	3			
	Gonomyia sp.																		
	Hemerodromia sp.		4			5	1		1		2	2	2						
	Hesperoconopa sp.														1				
	Hexatoma sp.																		
	Limnophila sp.														1				
	Limonia sp.					1	1		2			1	1						

FAMILY	GENUS Species	San Joaquin River Stevenson Reach-SR1 B	San Joaquin River Stevenson Reach-SR1 C	San Joaquin River Stevenson Reach-SR2 A	San Joaquin River Stevenson Reach-SR2 B	San Joaquin River Stevenson Reach-SR2 C	San Joaquin River Stevenson Reach-SR3 A	San Joaquin River Stevenson Reach-SR3 B	San Joaquin River Stevenson Reach-SR3 C	San Joaquin River Stevenson Reach-SR4 A	San Joaquin River Stevenson Reach-SR4 B	South Slide Creek-AD A	South Slide Creek-AD B	South Slide Creek-AD C	South Slide Creek-2 B (BD2)	South Slide Creek-2 C (BD2)	Stevenson Creek-5 A	Stevenson Creek-5 B	Stevenson Creek-1 A
	Maruina sp.						2	3	6	2	1		1				1		1
	Meringodixa sp.																		
	Molophilus sp.																		
	Muscidae												2						
	Neoplasta sp.													3	1	3		2	
	Oreogeton sp.																		
	Ormosia sp.																		
	Pedicia sp.															1			
	Pericoma/Telmatoscopus sp.													2	1	9			
	Probezzia sp.																		
	Prosimulium sp.																		
	Psychodidae								2										
	Rhabdomastix sp.																		
	Sciomyzidae																		
	Simuliidae																		
	Simulium sp.	95	94	166	253	43	177	306	125	244	32	135	82	2	1		18	13	9
	Stilobezzia sp.																		
	Tabanidae																1		
	Thaumaleidae													2	4				
	Tipula sp.																		
	Tipulidae												1	1	1				
	Tipulinae																		
	Wiedemannia sp.				2								3						
Diptera-Chironomidae	Chironomidae																		

FAMILY	GENUS Species	San Joaquin River Stevenson Reach-SR1 B	San Joaquin River Stevenson Reach-SR1 C	San Joaquin River Stevenson Reach-SR2 A	San Joaquin River Stevenson Reach-SR2 B	San Joaquin River Stevenson Reach-SR2 C	San Joaquin River Stevenson Reach-SR3 A	San Joaquin River Stevenson Reach-SR3 B	San Joaquin River Stevenson Reach-SR3 C	San Joaquin River Stevenson Reach-SR4 A	San Joaquin River Stevenson Reach-SR4 B	South Slide Creek-AD A	South Slide Creek-AD B	South Slide Creek-AD C	South Slide Creek-2 B (BD2)	South Slide Creek-2 C (BD2)	Stevenson Creek-5 A	Stevenson Creek-5 B	Stevenson Creek-1 A
	Chironomini			3	4			1	16		2	2	1					3	9
	Diamesinae													1	1		1	1	
	Orthocladiinae	55	42	24	10	77	23	4	33	13	29	34	63	83	112	80	38	40	10
	Podonominae														4				
	Pseudochironomini										1	2	1						
	Tanypodinae					1					1					3	2	4	4
	Tanytarsini	78	25	22		3		3	22	17	126	23	10	6	8	10	18	78	30
Lepidoptera	Lepidoptera																		
	Petrophila sp.			5					1	1	1								
Lumbricina	Lumbricina								1		2						1		1
Nemertea (phylum)	Prostoma sp.								1		2						1		
Oligochaeta (class)	Enchytraeidae													38	49	21	6		3
	Lumbriculidae																		7
	Naididae	13	60	2	48	111		1	14	2	22	31	44					5	1
	Oligochaeta																		
	Tubificidae																	3	
Nematoda (phylum)	Nematoda	2									1	1		10	5	8	8	4	1
Bivalvia (class)	Bivalvia																		
Ostracoda (class)	Cyprididae										1					1	15		10
	Ostracoda																		
Copepoda	Calanoida																		
	Cyclopoida																		
	Harpacticoida																		
Tricladida	Planariidae					1			6		1	1		28	14	21	6	2	1

FAMILY	GENUS Species	San Joaquin River Stevenson Reach-SR1 B	San Joaquin River Stevenson Reach-SR1 C	San Joaquin River Stevenson Reach-SR2 A	San Joaquin River Stevenson Reach-SR2 B	San Joaquin River Stevenson Reach-SR2 C	San Joaquin River Stevenson Reach-SR3 A	San Joaquin River Stevenson Reach-SR3 B	San Joaquin River Stevenson Reach-SR3 C	San Joaquin River Stevenson Reach-SR4 A	San Joaquin River Stevenson Reach-SR4 B	South Slide Creek-AD A	South Slide Creek-AD B	South Slide Creek-AD C	South Slide Creek-2 B (BD2)	South Slide Creek-2 C (BD2)	Stevenson Creek-5 A	Stevenson Creek-5 B	Stevenson Creek-1 A
	Polycelis sp.																		
Hydroida	Hydra sp.																		
Arachnida (class)	Acari		1									1			2	2			
Trombidiformes	Hydrovolziidae																		
	Hydryphantidae																		
	Hygrobatidae		2									2					5		1
	Lebertiidae														1	1	3	2	2
	Limnesiidae									1									
	Mideopsidae																		
	Sperchontidae	1	1		1	1				2	2		1	3	2	3		3	2
	Stygothrombidiidae																		
	Torrenticolidae			1								1	1	1	2	5	4	2	1
Veneroida	Pisidium sp.																		
	Sphaeriidae																	1	
Basommatophora	Ferrissia sp.		5	5					3										
	Menetus sp.		1																
	Physa sp.		1			1													1
	Planorbidae								1										
Sarcoptiformes	Oribatei																		
	Total	**294**	**287**	**320**	**330**	**311**	**291**	**360**	**299**	**311**	**345**	**337**	**298**	**346**	**302**	**313**	**320**	**324**	**325**

FAMILY	GENUS Species	Stevenson Creek-1 B	Stevenson Creek-1 C	Stevenson Creek-2 A	Stevenson Creek-3 A	Stevenson Creek-3 B	Stevenson Creek-4 A	Tombstone Creek-AD A	Tombstone Creek-1 A (BD1)	Tombstone Creek-1 B (BD1)	Tombstone Creek-1 C (BD1)	Tombstone Creek-2 A (BD2)
Ephemeroptera	Acentrella sp.											
	Ameletus sp.							1	3	1	3	2
	Attenella sp.											
	Baetidae										1	
	Baetis sp.	16	18	20	73	5	37	11	6	1		13
	Caudatella sp.	1					1		21			5
	Centroptilum sp.											
	Cinygma sp.											1
	Cinygmula sp.											
	Cloeodes sp.											
	Diphetor hageni		8	1		4	2					
	Drunella sp.			2							1	
	Epeorus sp.	3	6	1	5	15	4					
	Ephemerella sp.											
	Ephemerellidae		1	5		5						
	Ephemeroptera											
	Heptageniidae	3		1		4		1	1			
	Ironodes sp.	1	1		5	1	11	76	15	11		17
	Leptophlebiidae											
	Nixe sp.					5						
	Paraleptophlebia sp.	2	5	10		9	5	10	6	1	4	2
	Procloeon sp.											
	Rhithrogena sp.											
	Serratella sp.									30	17	38

FAMILY	GENUS Species	Stevenson Creek-1 B	Stevenson Creek-1 C	Stevenson Creek-2 A	Stevenson Creek-3 A	Stevenson Creek-3 B	Stevenson Creek-4 A	Tombstone Creek-AD A	Tombstone Creek-1 A (BD1)	Tombstone Creek-1 B (BD1)	Tombstone Creek-1 C (BD1)	Tombstone Creek-2 A (BD2)
Odonata	Anisoptera											
	Argia sp.	2										
	Coenagrionidae											
	Cordulegaster sp.	9										
	Corduliinae											
	Gomphidae		1	6		3						
	Hetaerina sp.											
	Libellulidae											
	Octogomphus specularis											
Plecoptera	Calineuria californica					2						
	Capniidae					1		2	2			
	Chloroperlidae								1			
	Cultus sp.											
	Despaxia augusta											
	Doroneuria sp.											
	Frisonia picticeps											
	Hesperoperla sp.							7	6	1	3	4
	Isoperla sp.											
	Kogotus sp.											
	Kogotus/Rickera sp.											
	Leuctridae											
	Malenka sp.						1					
	Moselia infuscata								1			
	Nemouridae											

FAMILY	GENUS Species	Stevenson Creek-1 B	Stevenson Creek-1 C	Stevenson Creek-2 A	Stevenson Creek-3 A	Stevenson Creek-3 B	Stevenson Creek-4 A	Tombstone Creek-AD A	Tombstone Creek-1 A (BD1)	Tombstone Creek-1 B (BD1)	Tombstone Creek-1 C (BD1)	Tombstone Creek-2 A (BD2)
	Paracapnia sp.											
	Paraperla sp.											
	Perlidae		1		1							
	Perlinodes aurea											
	Perlodidae	2	2				2	1		2	1	
	Plecoptera							1				
	Skwala sp.											
	Soyedina sp.											
	Suwallia sp.											
	Sweltsa sp.					1	1					
	Taeniopterygidae											
	Visoka cataractae							2				
	Yoraperla sp.		1					19	13	4	3	24
	Zapada sp.	2	10	6	6	4	21	9	3	28	15	3
Coleoptera	Agabinus sp.											
	Agabus sp.											
	Amphizoa sp.											
	Ampumixis dispar	2	1		3		4					
	Chaetarthria sp.											
	Cleptelmis addenda	22	37	11	1		1					
	Cymbiodyta sp.											
	Elmidae											
	Eubrianax edwardsi											
	Heterlimnius sp.											

FAMILY	GENUS Species	Stevenson Creek-1 B	Stevenson Creek-1 C	Stevenson Creek-2 A	Stevenson Creek-3 A	Stevenson Creek-3 B	Stevenson Creek-4 A	Tombstone Creek-AD A	Tombstone Creek-1 A (BD1)	Tombstone Creek-1 B (BD1)	Tombstone Creek-1 C (BD1)	Tombstone Creek-2 A (BD2)
	Hydraena sp.	9	2		1		5		1			
	Hydroporinae											
	Hydroporus sp.											
	Hydrotrupes sp.											
	Lara sp.		1									
	Microcylloepus sp.											
	Narpus sp.											
	Ochthebius sp.		1									
	Optioservus sp.	30	10	21	2	5	1					
	Ordobrevia nubifera		1									
	Oreodytes sp.											
	Psephenus sp.	6	2			1						
	Rhizelmis nigra				1							
	Sanfillipodytes sp.											
	Stenocolus scutellaris											
	Zaitzevia sp.											
Megaloptera	Corydalidae											
	Orohermes crepusculus											
	Sialis sp.					1						
Trichoptera	Agapetus sp.	6	1	1		3	1					
	Amiocentrus aspilus	1				1	1					
	Anagapetus sp.									1	1	17
	Apatania sp.	1				1						
	Arctopsyche sp.											

FAMILY	GENUS Species	Stevenson Creek-1 B	Stevenson Creek-1 C	Stevenson Creek-2 A	Stevenson Creek-3 A	Stevenson Creek-3 B	Stevenson Creek-4 A	Tombstone Creek-AD A	Tombstone Creek-1 A (BD1)	Tombstone Creek-1 B (BD1)	Tombstone Creek-1 C (BD1)	Tombstone Creek-2 A (BD2)
	Arctopsychinae						3	11	2		4	14
	Brachycentridae									1		3
	Chimarra sp.											
	Cryptochia sp.							1				
	Dolophilodes sp.											
	Ecclisomyia sp.								1			
	Glossosoma sp.								2			
	Glossosomatidae	2	2	2	3	5		9				
	Gumaga sp.											
	Helicopsyche sp.											
	Heteroplectron sp.		1			2						
	Hydropsyche sp.	8	4		1		8					
	Hydropsychidae											
	Hydroptila sp.											
	Hydroptilidae					2						
	Lepidostoma sp.	11	1	8	1	14			1	2		
	Leptoceridae											
	Leucotrichia sp.											
	Limnephilidae											1
	Micrasema sp.	12	12	11	1	19	3	5	17	4	11	22
	Neophylax sp.											
	Neothremma sp.							1	1			1
	Ochrotrichia sp.											
	Oecetis sp.											

FAMILY	GENUS Species	Stevenson Creek-1 B	Stevenson Creek-1 C	Stevenson Creek-2 A	Stevenson Creek-3 A	Stevenson Creek-3 B	Stevenson Creek-4 A	Tombstone Creek-AD A	Tombstone Creek-1 A (BD1)	Tombstone Creek-1 B (BD1)	Tombstone Creek-1 C (BD1)	Tombstone Creek-2 A (BD2)
	Oligophlebodes sp.											
	Oxyethira sp.											
	Parapsyche sp.							1	1	1		
	Pedomoecus sierra											
	Philopotamidae											
	Polycentropodidae											
	Polycentropus sp.											
	Psychoglypha sp.											
	Rhyacophila sp.	10	3		2		4	9	3	3	1	5
	Tinodes sp.											
	Trichoptera											
	Uenoidae											
	Wormaldia sp.	2	5									
	Yphria californica										2	
Diptera	Antocha sp.			4		1	2					
	Atherix sp.											
	Atrichopogon sp.											
	Bezzia/Palpomyia sp.			4		1			2	2	4	1
	Blepharicera sp.											
	Blephariceridae											
	Caloparyphus sp.											
	Ceratopogon sp.											
	Ceratopogonidae											
	Ceratopogoninae											

FAMILY	GENUS Species	Stevenson Creek-1 B	Stevenson Creek-1 C	Stevenson Creek-2 A	Stevenson Creek-3 A	Stevenson Creek-3 B	Stevenson Creek-4 A	Tombstone Creek-AD A	Tombstone Creek-1 A (BD1)	Tombstone Creek-1 B (BD1)	Tombstone Creek-1 C (BD1)	Tombstone Creek-2 A (BD2)
	Chelifera sp.									5		
	Chlorotabanus sp.			2								
	Clinocera sp.											
	Cryptolabis sp.											
	Culicidae											
	Culicoides sp.											
	Culiseta sp.											
	Dasyhelea sp.											
	Dicranota sp.								1		1	
	Diptera											
	Dixa sp.							1	1		1	
	Dixella sp.											
	Dolichopodidae											
	Empididae									6		
	Ephydridae											
	Euparyphus sp.	1				1	1					
	Forcipomyia sp.	2	2				1					
	Glutops sp.							3	1			1
	Gonomyia sp.											
	Hemerodromia sp.											
	Hesperoconopa sp.											
	Hexatoma sp.											
	Limnophila sp.											
	Limonia sp.											

FAMILY	GENUS Species	Stevenson Creek-1 B	Stevenson Creek-1 C	Stevenson Creek-2 A	Stevenson Creek-3 A	Stevenson Creek-3 B	Stevenson Creek-4 A	Tombstone Creek-AD A	Tombstone Creek-1 A (BD1)	Tombstone Creek-1 B (BD1)	Tombstone Creek-1 C (BD1)	Tombstone Creek-2 A (BD2)
	Maruina sp.				3		6			1		
	Meringodixa sp.											
	Molophilus sp.											
	Muscidae											
	Neoplasta sp.	1	1	1		1		6	3		9	14
	Oreogeton sp.											
	Ormosia sp.											
	Pedicia sp.						1					1
	Pericoma/Telmatoscopus sp.						1		12	13	3	2
	Probezzia sp.											
	Prosimulium sp.							2				
	Psychodidae											
	Rhabdomastix sp.											
	Sciomyzidae											
	Simuliidae											
	Simulium sp.	12	66	132	222	17	88	16	17	8	6	1
	Stilobezzia sp.											
	Tabanidae											
	Thaumaleidae											
	Tipula sp.											
	Tipulidae											
	Tipulinae											
	Wiedemannia sp.											
Diptera-Chironomidae	Chironomidae											

FAMILY	GENUS Species	Stevenson Creek-1 B	Stevenson Creek-1 C	Stevenson Creek-2 A	Stevenson Creek-3 A	Stevenson Creek-3 B	Stevenson Creek-4 A	Tombstone Creek-AD A	Tombstone Creek-1 A (BD1)	Tombstone Creek-1 B (BD1)	Tombstone Creek-1 C (BD1)	Tombstone Creek-2 A (BD2)
	Chironomini	5	7	3		3						
	Diamesinae			3							1	
	Orthocladiinae	39	34	62	2	72	87	38	127	50	112	36
	Podonominae											
	Pseudochironomini											
	Tanypodinae	2	5	4		4	3		1	5	4	
	Tanytarsini	52	64	24	5	106	18	21	25	58	35	16
Lepidoptera	Lepidoptera											
	Petrophila sp.											
Lumbricina	Lumbricina					1						
Nemertea (phylum)	Prostoma sp.											
Oligochaeta (class)	Enchytraeidae	8						4	6	7		8
	Lumbriculidae											
	Naididae		1	28			5					1
	Oligochaeta											
	Tubificidae							3	3		4	4
Nematoda (phylum)	Nematoda					1		8	11	20	13	21
Bivalvia (class)	Bivalvia											
Ostracoda (class)	Cyprididae	1								1	4	10
	Ostracoda											
Copepoda	Calanoida											
	Cyclopoida											
	Harpacticoida											
Tricladida	Planariidae	5					3	17	4		1	

FAMILY	GENUS Species	Stevenson Creek-1 B	Stevenson Creek-1 C	Stevenson Creek-2 A	Stevenson Creek-3 A	Stevenson Creek-3 B	Stevenson Creek-4 A	Tombstone Creek-AD A	Tombstone Creek-1 A (BD1)	Tombstone Creek-1 B (BD1)	Tombstone Creek-1 C (BD1)	Tombstone Creek-2 A (BD2)
	Polycelis sp.									8		25
Hydroida	Hydra sp.											
Arachnida (class)	Acari		3			4	2	2	7	2	8	2
Trombidiformes	Hydrovolziidae											
	Hydryphantidae										2	1
	Hygrobatidae							1		6	8	2
	Lebertiidae							5	12	17	25	4
	Limnesiidae											
	Mideopsidae											
	Sperchontidae	2	2	2	1	2	1	3	6	1	3	6
	Stygothrombidiidae											
	Torrenticolidae			1		3			3	4	1	
Veneroida	Pisidium sp.									1		
	Sphaeriidae	1						1			1	
Basommatophora	Ferrissia sp.											
	Menetus sp.											
	Physa sp.											
	Planorbidae											
Sarcoptiformes	Oribatei											
	Total	**294**	**323**	**376**	**339**	**330**	**335**	**308**	**349**	**306**	**313**	**328**

APPENDIX D

HISTORICAL INFORMATION

Table CAWG 10 Appendix D-1. Macroinvertebrates Historically Observed in Bear Creek Drainage.

Order	Common Name	Date	Total Number in Sample	References	Comments	Habitat Flag
Diptera	Black fly	1942	Predominated	2	Superficial examination made - no samples collected.	1
Trichoptera	Caddisfly	1942	Predominated	2	Superficial examination made - no samples collected.	1
Ephemeroptera	Mayfly	1942	Predominated	2	Superficial examination made - no samples collected.	1
Trichoptera	Caddisfly	1942	Large numbers	2	Observed in barren lakes of Bear Cr.	1
Ephemeroptera	Mayfly	1942	Large numbers	2	Observed in barren lakes of Bear Cr.	1
Diptera	Black fly	1942	Numerous	2	Observed in inlets or streams connecting lakes of Bear Cr.	1

Species Present

Order	Common Name	Date	Total Number in Sample	References	Comments	Habitat Flag
Diptera	Black fly			2		
Trichoptera	Caddisfly			2		
Ephemeroptera	Mayfly			2		

References

[2]Dill, W.A. 1943. A fisheries study of the Upper Bear Creek Drainage, Fresno County, California. In: CDFG. Administrative Reports 1943. California Natural Resources Agency, Inland Fisheries Branch.

Table CAWG 10 Appendix D-2. Macroinvertebrates Historically Captured in Mammoth Pool (Dredge Samples).

Order	Family	Common Name	Date	Total Number in Sample	References	Comments	Habitat Flag
Diptera	Chironomidae	Biting midge	7/16/88	395	3	Aquatic insect, numbers pooled for all sample sites.	1
Hymenoptera	Eucoilidae	Wasp	7/16/88	1	3	Aquatic insect, numbers pooled for all sample sites.	1
Hymenoptera	Scelionidae	Wasp	7/16/88	2	3	Aquatic insect, numbers pooled for all sample sites.	1
Hemiptera	Anthocoridae	Flower bug	7/16/88	1	3	Terrestrial insect, numbers pooled for all sample sites.	1
Homoptera	Aphididae		7/16/88	5	3	Terrestrial insect, numbers pooled for all sample sites.	1
Thysanoptera	Phlaeothripidae	Thrips	7/16/88	3	3	Terrestrial insect, numbers pooled for all sample sites.	1
Haplotaxidae	Naididae		7/16/88	2	3	Oligochaete, numbers pooled for all sample sites	1
Lumbriculida	Lumbriculidae		7/16/88	22	3	Oligochaete, numbers pooled for all sample sites	1
Coleoptera	Curculionidae	Beetle	7/16/88	1	3	Aquatic insect, numbers pooled for all sample sites.	1
Arachnid		Spider	7/16/88	5	3	Terrestrial insect, numbers pooled for all sample sites.	1
Ephemeroptera	Unknown	Mayfly	7/16/88	1	3	Aquatic insect, numbers pooled for all sample sites.	1
Thysanoptera		Thrips	7/16/88	1	3	Terrestrial insect, numbers pooled for all sample sites.	1

Species Present

Order	Family	Common Name	Date	Total Number in Sample	References	Comments	Habitat Flag
Diptera	Chironomidae	Biting midge			3		
Hymenoptera	Eucoilidae	Wasp			3		
Hymenoptera	Scelionidae	Wasp			3		
Hemiptera	Anthocoridae	Flower bug			3		

Table CAWG 10 Appendix D-2. Macroinvertebrates Historically Captured in Mammoth Pool (Dredge Samples) (cont).

Order	Family	Common Name	Date	Total Number in Sample	References	Comments	Habitat Flag
Homoptera	Aphididae				3		
Thysanoptera	Phlaeothripidae	Thrips			3		
Haplotaxidae	Naididae				3		
Lumbriculida	Lumbriculidae				3		
Coleoptera	Curculionidae	Beetle			3		
Arachnid		Spider			3		
Ephemeroptera	Unknown	Mayfly			3		
Thysanoptera		Thrips			3		
		Crayfish			3		

References

[3]Biosystems Analysis, Inc. 1989. Fisheries studies of Shaver lake: 1988 Annual Report. 44 p. + appendices.

Table CAWG 10 Appendix D-3. Crayfish Historically Captured in Mammoth Pool.

Species	Date	Total Number Captured	Carapace Length (mm)	References	Comments	Habitat Flag
Crayfish	7/15/88	864		3	Sites and traps pooled together per date	1
Crayfish	7/16/88	883		3	Sites and traps pooled together per date	1
Crayfish	7/17/88	444		3	Sites and traps pooled together per date	1
Crayfish	8/25/88	728		3	Sites and traps pooled together per date	1
Crayfish	7/88 & 8/88		24-64	3	Carapace length reported for both months.	1

References

[3]Biosystems Analysis, Inc. 1989. Fisheries studies of Shaver lake: 1988 Annual Report. 44 p. + appendices.

Table CAWG 10 Appendix D-4. Macroinvertebrates Historically Captured in Shaver Lake (Dredge Samples).

Order	Family	Date	Total Number in Sample	References	Comments	Habitat Flag
Coleoptera	Melyridae	7/10/88	2	[3]	Aquatic insect, numbers pooled for all sample sites.	1
Coleoptera	Staphylinidae	7/10/88	1	[3]	Aquatic insect, numbers pooled for all sample sites.	1
Diptera	Ceratopoginidae	7/10/88	9	[3]	Aquatic insect, numbers pooled for all sample sites.	1
Diptera	Chironomidae	7/10/88	205	[3]	Aquatic insect, numbers pooled for all sample sites.	1
Diptera	Dolichopodidae	7/10/88	1	[3]	Aquatic insect, numbers pooled for all sample sites.	1
Hymenoptera	Eucoilidae	7/10/88	3	[3]	Aquatic insect, numbers pooled for all sample sites.	1
Hymenoptera	Eulophidae	7/10/88	2	[3]	Aquatic insect, numbers pooled for all sample sites.	1
Hymenoptera	Scelionidae	7/10/88	1	[3]	Aquatic insect, numbers pooled for all sample sites.	1
Acari	Hydrachnellae	7/10/88	8	[3]	Terrestrial insect, numbers pooled for all sample sites.	1
Acari	Planorbidae	7/10/88	1	[3]	Terrestrial insect, numbers pooled for all sample sites.	1
Hemiptera	Anthocoridae	7/10/88	1	[3]	Terrestrial insect, numbers pooled for all sample sites.	1
Hemiptera	Miridae	7/10/88	2	[3]	Terrestrial insect, numbers pooled for all sample sites.	1
Homoptera		7/10/88	5	[3]	Terrestrial insect, numbers pooled for all sample sites.	1
Thysanoptera	Phlaeothripidae	7/10/88	7	[3]	Terrestrial insect, numbers pooled for all sample sites.	1
Thysanoptera	Tripidae	7/10/88	8	[3]	Terrestrial insect, numbers pooled for all sample sites.	1
Haplotaxidae	Naididae	7/10/88	86	[3]	Oligochaete, numbers pooled for all sample sites.	1
Lumbriculida	Lumbriculidae	7/10/88	2	[3]	Oligochaete, numbers pooled for all sample sites.	1
Coleoptera		7/10/88	3	[3]	Aquatic insect, numbers pooled for all sample sites.	1
Hymenoptera		7/10/88	1	[3]	Aquatic insect, numbers pooled for all sample sites.	1
Hemiptera		7/10/88	1	[3]	Terrestrial insect, numbers pooled for all sample sites.	1
Diptera		7/10/88	1	[3]	Aquatic insect, numbers pooled for all sample sites.	1

Table CAWG 10 Appendix D-4. Macroinvertebrates Historically Captured in Shaver Lake (Dredge Samples) (cont).

Species Present

Order	Family	Common Name	Total Number in Sample	References	Comments	Habitat Flag
Coleoptera	Melyridae	Softwinged flower beetle		3		
Coleoptera	Staphylinidae	Rove beetle		3		
Diptera	Ceratopoginidae	Biting midge		3		
Diptera	Chironomidae	Midge		3		
Diptera	Dolichopodidae	Mining fly		3		
Hymenoptera	Eucoilidae	Wasp		3		
Hymenoptera	Eulophidae	Parasitic Wasp		3		
Hymenoptera	Scelionidae	Wasp		3		
Acari	Hydrachnellae	Water mite		3		
Acari	Planorbidae	Mite		3		
Hemiptera	Anthocoridae	Flower bug		3		
Hemiptera	Miridae	Plant bug		3		
Homoptera				3		
Thysanoptera	Phlaeothripidae	Thrips		3		
Thysanoptera	Tripidae	Thrips		3		
Haplotaxidae	Naididae			3		
Lumbriculida	Lumbriculidae			3		
		Crayfish		3		
Ephemeroptera	Baetidae	Baetid mayfly		3		
Diptera	Empididae	Dance flies		3		

References

[3]Biosystems Analysis, Inc. 1989. Fisheries studies of Shaver lake: 1988 Annual Report. 44 p. + appendices.

Table CAWG 10 Appendix D-5. Macroinvertebrates Historically Found in Smallmouth Bass in Shaver Lake.

Order	Family	Date	Total Number in 100-159 mm TL Fish	Total Number in 160-219 mm TL Fish	Total Number in >219 mm TL Fish	References	Comments	Habitat Flag
Diptera	Chironomidae	5/88	84	91	15	3	Aquatic insect	
Diptera	Ceratopoginidae	5/88	26	16	8	3	Aquatic insect	
Diptera	Empididae	5/88	0	0	0	3	Aquatic insect	
Diptera	Sciomyzidae	5/88	0	0	1	3	Aquatic insect	
Tricoptera	Leptoceridae	5/88	5	42	1	3	Aquatic insect	
Lepidoptera	Pyralididae	5/88	0	0	0	3	Aquatic insect	
Coleoptera		5/88	2	0	0	3	Aquatic insect	
Ephemeroptera	Baetidae	5/88	0	3	2	3	Aquatic insect	
Hymenoptera	(Ant)	5/88	9	17	33	3	Terrestrial insect	
Hymenoptera	(Wasp/bee)	5/88	1	4	6	3	Terrestrial insect	
Hemiptera		5/88	3	1	1	3	Terrestrial insect	
Homoptera		5/88	114	34	0	3	Terrestrial insect	
Arachnid		5/88	2	5	0	3	Terrestrial insect	
Lepidoptera		5/88	1	1	2	3	Terrestrial insect	
Coleoptera		5/88	7	8	11	3	Terrestrial insect	
Acari		5/88	7	0	0	3	Terrestrial insect	
Diptera	Chironomidae	7/88	33	17	0	3	Aquatic insect	
Diptera	Ceratopoginidae	7/88	225	34	0	3	Aquatic insect	
Diptera	Empididae	7/88	1	1	0	3	Aquatic insect	
Diptera	Sciomyzidae	7/88	0	0	0	3	Aquatic insect	
Tricoptera	Leptoceridae	7/88	0	2	0	3	Aquatic insect	
Lepidoptera	Pyralididae	7/88	1	0	0	3	Aquatic insect	
Coleoptera		7/88	0	0	0	3	Aquatic insect	
Ephemeroptera	Baetidae	7/88	0	0	0	3	Aquatic insect	
Hymenoptera	(Ant)	7/88	1	4	0	3	Terrestrial insect	
Hymenoptera	(Wasp/bee)	7/88	0	0	0	3	Terrestrial insect	

Table CAWG 10 Appendix D-5. Macroinvertebrates Historically Found in Smallmouth Bass in Shaver Lake (cont).

Order	Family	Date	Total Number in 100-159 mm TL Fish	Total Number in 160-219 mm TL Fish	Total Number in >219 mm TL Fish	References	Comments	Habitat Flag
Hemiptera		7/88	7	6	0	3	Terrestrial insect	
Homoptera		7/88	25	1	0	3	Terrestrial insect	
Arachnid		7/88	6	3	0	3	Terrestrial insect	
Lepidoptera		7/88	1	0	0	3	Terrestrial insect	
Coleoptera		7/88	4	0	0	3	Terrestrial insect	
Acari		7/88	0	0	0	3	Terrestrial insect	

References

[3]Biosystems Analysis, Inc. 1989. Fisheries studies of Shaver lake: 1988 Annual Report. 44 p. + appendices.

Table CAWG 10 Appendix D-6. Crayfish Historically Captured in Shaver Lake.

Species	Date	Total Number Captured	Carapace Length (mm)	References	Comments	Habitat Flag
Crayfish	7/9/88	10		3	Sites and traps pooled together per date	1
Crayfish	7/10/88	13		3	Sites and traps pooled together per date	1
Crayfish	7/11/88	13		3	Sites and traps pooled together per date	1
Crayfish	8/23/88	12		3	Sites and traps pooled together per date	1
Crayfish	8/24/88	15		3	Sites and traps pooled together per date	1
Crayfish	7/88 & 8/88		40-69	3	Carapace length reported for both months.	1

References

[3]Biosystems Analysis, Inc. 1989. Fisheries studies of Shaver lake: 1988 Annual Report. 44 p. + appendices.

APPENDIX E

MOLLUSK TABLES

Table CAWG 10-Appendix E-1. Mollusks Collected During Benthic Macroinvertebrate Collection Surveys, Big Creek ALP, 2002 (from Appendix C).

	Class	Bivalvia			Gastropoda			
Reach	**Taxa Identification**	**Bivalvia**	***Pisidium sp.***	**Sphaeriidae**	***Ferrissia sp.***	***Menetus sp.***	***Physa sp.***	**Planorbidae**
South Fork San Joaquin River	**Site 9**	0	0	0	0	0	0	0
	Site 8	0	0	23	0	0	0	0
	Site 7	0	0	33	0	0	0	0
	Site 6	0	0	5	0	0	0	0
	Site 5	0	0	1	0	0	0	0
	Site 4	0	0	1	0	0	0	0
	Site 3	0	0	0	0	0	0	0
	Site 2	0	0	0	0	0	0	0
	Site 1	0	0	0	0	0	0	0
Tombstone Creek	**Site AD**	0	0	1	0	0	0	0
	Site BD 2	0	0	0	0	0	0	0
	Site BD 1	0	1	1	0	0	0	0
South Slide Creek	**Site AD**	0	0	0	0	0	0	0
	Site BD 2	0	0	0	0	0	0	0
North Slide Creek	**Site AD**	0	1	12	0	0	0	0
	Site BD 2	0	0	1	0	0	0	0
	Site BD 1	0	0	1	0	0	0	0
Hooper Creek	**Site AD**	0	0	0	0	0	0	0
	Site BD 2	0	0	0	0	0	0	0
	Site BD 1	0	0	0	0	0	0	0
Crater Creek	**Site AD**	0	0	0	0	0	0	0
	Site BD 3	0	0	0	0	0	0	0

Table CAWG 10 Appendix E-1. Mollusks Collected During Benthic Macroinvertebrate Collection Surveys, Big Creek ALP, 2002 (from Appendix C) (cont).

	Class	Bivalvia			Gastropoda			
Reach	**Taxa Identification**	**Bivalvia**	***Pisidium sp.***	**Sphaeriidae**	***Ferrissia sp.***	***Menetus sp.***	***Physa sp.***	**Planorbidae**
Bear Creek	**Site AD**	0	0	0	0	0	0	0
	Site BD 2	0	0	1	0	0	0	0
	Site BD 1	0	0	0	0	0	0	0
Chinquapin Creek	**Site AD**	0	0	0	0	0	0	0
	Site BD 2	0	0	0	0	0	0	0
	Site BD 1	0	1	0	0	0	0	0
Camp 62 Creek	**Site AD**	0	0	0	0	0	0	0
	Site BD 2	0	0	0	0	0	0	0
	Site BD 1	0	0	0	0	0	0	0
Bolsillo Creek	**Site AD**	0	0	1	0	0	0	0
	Site BD 2	0	0	4	0	0	0	0
	Site BD 1	0	0	0	0	0	0	0
Mono Creek	**Site BD 4**	0	0	1	0	0	0	0
	Site BD 3	0	0	5	0	0	0	0
	Site BD 2	0	0	28	0	0	0	0
	Site BD 1	1	0	7	0	0	0	0
SJR Mammoth Reach	**Site AM**	0	0	1	0	0	0	0
	Site BM 4	0	0	0	0	0	0	1
	Site BM 3	0	0	0	0	0	0	0
	Site BM 2	0	0	0	0	0	4	0
	Site BM 1	0	0	0	0	4	1	0

Table CAWG 10 Appendix E-1. Mollusks Collected During Benthic Macroinvertebrate Collection Surveys, Big Creek ALP, 2002 (from Appendix C) (cont).

	Class	Bivalvia			Gastropoda			
Reach	Taxa Identification	Bivalvia	*Pisidium sp.*	Sphaeriidae	*Ferrissia sp.*	*Menetus sp.*	*Physa sp.*	Planorbidae
Rock Creek	Site AD	0	1	14	0	0	0	0
	Site BD 2	0	0	0	0	0	3	0
	Site BD 1	0	0	3	0	0	4	0
SJR Stevenson Reach	Site SR 4	0	0	0	0	0	0	0
	Site SR 3	0	0	0	3	0	0	1
	Site SR 2	0	0	0	0	0	1	0
	Site SR 1	0	0	0	10	1	1	0
Big Creek Dam 1 to PH 1	Site 3	0	0	103	0	0	0	0
	Site B	0	0	12	0	0	0	0
	Site 2	0	0	16	0	0	0	0
	Site 1	0	0	19	0	0	0	0
Big Creek Dam 4 to PH 2	Site 3	0	0	7	0	0	3	0
	Site 2	0	0	2	0	0	2	0
	Site 1	0	1	6	0	0	1	0
Big Creek Dam 5 to PH 8	Site 2	0	0	0	0	0	4	0
	Site 1	0	0	1	0	0	0	0
Pitman Creek	Site AD	0	0	0	0	0	0	0
	Site BD 2	0	0	0	0	0	0	0
	Site BD 1	0	0	0	0	0	0	0
	Site BD 0	0	0	0	0	0	0	0

Table CAWG 10 Appendix E-1. Mollusks Collected During Benthic Macroinvertebrate Collection Surveys, Big Creek ALP, 2002 (from Appendix C) (cont).

	Class	Bivalvia			Gastropoda			
Reach	**Taxa Identification**	**Bivalvia**	***Pisidium sp.***	**Sphaeriidae**	***Ferrissia sp.***	***Menetus sp.***	***Physa sp.***	**Planorbidae**
Ely Creek	**Site AD**	0	4	2	0	0	0	0
	Site BD 3	0	0	33	0	0	0	0
	Site BD 2	0	0	10	0	0	0	0
	Site BD 1	0	0	2	0	0	0	0
Balsam Creek	**Site AD**	0	0	2	0	0	0	0
	Site BD 2	0	0	4	0	0	0	0
	Site BD 1	0	0	1	0	0	0	0
Adit 8 Creek	**Site 2**	0	0	0	0	0	0	1
	Site 1	0	0	5	0	0	0	0
NF Stevenson Creek	**Site AO**	0	0	0	0	0	0	0
	Site BO 3	0	0	0	0	0	0	0
	Site BO 2	0	1	8	0	0	0	0
	Site BO 1	0	0	1	0	0	0	0
Stevenson Creek	**Site 5**	0	0	1	0	0	0	0
	Site 4	0	0	0	0	0	0	0
	Site 3	0	0	0	0	0	0	0
	Site 2	0	0	0	0	0	0	0
	Site 1	0	0	1	0	0	1	0

APPENDIX F

CONSULTATION DOCUMENTATION

Big Creek Collaborative

Combined Aquatic Working Group

July 10, 2002

Final Meeting Notes

Time:	10:00 – 3:00 PM	**Moderator:**	Wayne Lifton
Location:	USFS Offices – Clovis, CA	**Facilitator**:	Bill Pistor
Teleconference No.:	1-800-556-4976	**Recorder**:	Wayne Lifton/Mitchell Katzel
Teleconference Name:	Combined Aquatic Working Group		

Attended By	Mitchell Katzel	ENTRIX
	Mike Henry	FERC
	Geoff Rabone	SCE
	Mark Newquist	SCE
	Wayne Allen	SCE
	Steve Rowan	SCE
	Wayne Lifton	ENTRIX
	Phil Strand	USFS
	Bill Pistor	Kearns & West
	Britt Fecko	SWRCB
	Lonnie Schardt	HLA
	Julie Means	CDFG
	Carson Cox	SWRCB

Phone Participants None

<u>Handouts</u>

- Agenda
- June meeting notes
- Carson Cox's comments on May Meeting Notes
- Larry Wise's map package
- Mitchell Katzel's aerial Overflight Forms
- Wayne Lifton's Candidate Fish Site and Macroinvertebrate Site Selection tables

Action Items Discussed

- CD-ROM identification still needs to be completed.
- Other materials went out
- Lind versus modified Lind still under discussion in subgroup.

It was suggested that all future meeting notes be more of a summary and a record of agreements/disagreements rather than pseudo transcriptions.
Need to avoid attributions unless someone wants to go formally on the record.

Geomorphology Update

Mitchell Katzel:
Verification of Rosgen Types and collection of other data.
NF Stevenson Creek outlet is Tunnel 7, Gate 2.
Stevenson Creek, review of changes based on ground.
Further clarification will be provided as work continues.

Did you see much woody debris? Not a lot. Not much geomorphic function.

Fish and Macroinvertebrate Sampling

Wayne Lifton's Presentation
We are only identifying sampling sites for those streams where we know the Rosgen stream typing. As we verify the Rosgen types from the Level I classification, we will stratify and identify the sampling locations.

Fish Sampling
Objective: determine fish abundance, growth, (etc based on CAWG-7) to be sampled in representative manner based on channel geomorphic type and habitat type (CAWG-1, -2).

Electrofishing sampling

Snorkeling surveys – habitats too deep for electrofishing

Stratification – sample one of each major Rosgen type, use Hawkins/collapsed habitat types that are representative based on habitat mapping. 100 meter sites per plan.

Reference sites – one site in comparable channel type upstream of Project diversion for small and medium size diversions. Upstream of diversions are not always the same Rosgen types as downstream. Larger streams – may not have good references to survey. Example is Stevenson Reach of San Joaquin River; Mammoth Pool Reach is upstream. It is not an adequate reference.

Discussion of streams and habitats to be sampled based on handout and slides. These included:
Adit No. 8, Balsam Creek, Ely Creek, NF Stevenson Creek, Stevenson Creek, Rock Creek, Ross Creek, Camp 62 Creek, Chinquapin Creek, North and South Slide Creeks, Crater Creek, Crater Creek Diversion, Hooper Creek, and Tombstone Creek.

Can you tell the difference between wild and hatchery fish in streams that are stocked? Usually yes, by appearance. Scales can be definitive if there is doubt.
Comment: Stratification approach is a good approach. Stratification procedure may help explain number differences between locations. In the past, stratification was just based

on visual observation and access.

Stevenson Creek – is above the Lake a suitable reference reach? We will need to evaluate.

Mammoth Pool Reach, San Joaquin River, SF San Joaquin River, Mono Creek, and Bolsillo Creek are waiting for Rosgen type verifications before determining fish sampling locations. Plan to present these to CAWG at next meeting.

No objections to proposed fish sampling sites.

Action Item 1: Copy of letter to USFWS for SWRCB electrofishing sampling.
It may be on website, otherwise will bring to next meeting.

<u>Macroinvertebrate Sampling</u>

Based on CAWG-10 Plan - focus is on water quality not macroinvertebrate community *per se.* Slide presentation.

Discussion of streams and habitats to be sampled based on handout and slides. These included:
Adit No. 8, Balsam Creek, Ely Creek, NF Stevenson Creek, Stevenson Creek, Rock Creek, Ross Creek, Camp 62 Creek, Chinquapin Creek, North and South Slide Creeks, Crater Creek, Crater Creek Diversion, Hooper Creek, and Tombstone Creek.

Comment: Macroinvertebrate sampling has been controversial; methodology is based on effects of toxics in the stream, not diversions.

Factors affecting macroinvertebrate sampling

Stratification – reduce variability due to channel type, substrate, and habitat type, in order to identify Project effects. Use reference sites that do not contribute additional variability or confounding comparisons. We have found that substrate size influences benthic community. Sample only one Rosgen Level I Channel type per study plan.

One sampling site at the upstream and downstream ends of each bypass reach.

RBP methodology specifies sampling riffle habitat. Some sites have no riffles. Runs are a potential substitute, but some sites have no runs.

Comment: Sampling should be representative of the reach.
We will visually estimate substrate particle size at sampling site. We probably won't have many choices for where we sample. RBP used as a water quality component.

Comment: Does study give any meaningful data if it's not done in a riffle or run?
Pools can be sampled, but we need to use different methods than for riffle/run. Cascades not practical to sample. Taxa and metrics from other habitat types may not be comparable, may confound use of metrics.

Comment: How are we considering tributary inputs?
We are not considering tributaries in these streams. We may want to give some thought to tributary influences in deciding where we sample. This is not a big issue on the streams we are discussing today, but sampling location on the larger streams have not yet been determined; we should consider tributary influences on the larger streams (**Action Item for August meeting**).

Decisions: There are three choices for sampling macroinvertebrates above and below diversions in a given stream type given the lack of riffles and runs in some reaches.

Proposal:
(1) If riffles are present in bypass reach but not above diversion, sample riffles – no reference site used above diversion.
(2) Where riffles are not available in bypass reach, but runs are, sample runs. Sample runs if available above diversion.
(3) If neither riffle nor run available, do not sample.

Discussion of potential approaches.
Suggest we sample riffles, stays closer to protocol. Better for diagnosing impacts to use riffles. Riffles tend to have greater diversity than runs. Larger rivers, runs can be more productive; on smaller streams riffles are more productive.

Concern expressed about not having an upstream reference, even if you use runs as a reference for riffles downstream. Concern for confounding results. Is sampling the riffle below diversion going to tell us anything about the Project diversion effect if there is no reference riffle upstream of the diversion? It will tell us something about the health of the stream, but you can't attribute anything to Project effects without the upstream reference.

Wayne – A way to address this is to compare runs above and below diversion, only the one run station immediately below the diversion. Riffles below the diversion would also be sampled including at the end of the reach, and intermediate station in long reaches. Only one channel type would be sampled per study plan. This would allow both a comparison above and below the diversion, and a comparison of changes along the bypass reach.

SWRCB – Would like to check with Russ Kanz before making a final decision on sampling protocol decisions. Will get back to the group, if any concerns.

List of streams with appropriate reference sites. **No objections to Wayne's proposal for sites and approach.**

Need reference sites for Stevenson Creek, if any. Will discuss with Geomorphologists.

Comment: Is there an example of instream flow release requirement for macroinvertebrates? None was identified.

<u>Short Lunch Break</u>

<u>Review of BiCEPs Instream Flow Studies</u>

After lunch, Larry Wise presented BiCEP PHABSIM studies done in mid-1980's.

The BiCEP project, conducted in the 1980's, evaluated the potential environmental effects associated with increasing the generation capacity of the Big Creek System. As part of these studies, an evaluation of fish habitat as a function of flow was undertaken in Big Creek, and the San Joaquin River below Mammoth Pool.

Reaches included:

Lower Big Creek (Big Creek Powerhouse 8 to Dam 5)
Upper Big Creek (Big Creek Powerhouse 2 to Dam 4)
Mammoth Reach (Mammoth Pool to Mammoth Pool Powerhouse)
Stevenson Reach (Powerhouse 3 to Dam 6)

Objectives of BiCEP PHABSIM Model Review:

1. Review of BiCEPs PHABSIM models to determine their utility in the ALP process and in meeting the informational needs of the CAWG
2. Provide recommendations regarding their use and their limitations

Review Criteria:

Is the habitat type identified in each of the models?
Do the model statistics for mean error and velocity adjustment factors fall within acceptable boundaries?
Do the range of flows in these models meet those needed for the current study or can they be extended to meet this range?
At what Flow are the headpins overtopped?
Are the transects representative of channel-types and mesohabitat types?
Have channel changes occurred that would affect the validity of the use of the models?

Explanation of PHABSIM model.

What's the probability of potential for significant change in channel type since 1984 when BiCEP transects were surveyed? Geomorphology will have to consider the potential for channel change since 1984.

Lower Big Creek Conclusions/Recommendations

- Habitat types identified in models, riffle not represented
- Calibration statistics within recommended tolerances
- Range of simulations limited by extent of channel profile survey, but may be extended to 75 cfs
- Re-weight habitat models to reflect recent habitat mapping

Upper Big Creek Conclusions/Recommendations:

- Habitat types identified in models
- Calibration statistics for most transects within recommended tolerances
- Range of simulations limited by extent of channel profile survey
- Upper range of simulations may be limited to 20 to 33 cfs at 5 of 15 transects
- Solutions for extending simulation range
  - Obtain additional transect measurements
  - Apply Lower Big Creek models to Upper Big Creek Reach

Mammoth Reach Conclusions/Recommendations:

- Habitat types identified in models
- Stage Discharge Relationships acceptable
- Velocity calibrations for most transects acceptable for some flows based on VAFs for a three flow model
- Re-weight habitat models to reflect recent habitat mapping
- Recommend attempting re-calibration using IFG-4A method
- Upper range of simulations limited to 375 cfs at 9 transects based on headpin elevations
- Additional transects needed to simulate whitewater flows (600 - 1,500 cfs)

Stevenson Reach – are Mammoth transects appropriate for Stevenson Reach? Need to complete channel geomorphology Rosgen Level I assessment.

If Mammoth Reach conclusions are applicable:

- Appropriate simulation range insufficient for whitewater flows (500 - 800 cfs), will need to add transects to simulate whitewater flows
- Re-weight habitat models to reflect recent habitat mapping

Need to select for any supplementary transects in September. Measurements to be made in Spring 2003. Hope to get report out in about two weeks, depends upon receiving geomorphology results.

Other Project reaches where IFIM needs to be performed but are not included in the BiCEP work:

- SF San Joaquin River
- Mono Creek
- Stevenson Creek
- NF Stevenson Creek

WETTED PERIMETER

Small tributaries with no storage
Diverted only during run-off period
Habitat bottlenecks likely to occur during base flow period
Sample reach upstream and bypass reach downstream of diversions
Studies dependent upon the presence of run-off due to lack of storage
Select sites and transects this fall

Measure 3 riffles (runs where riffles are not available)
Measure Stage-Q relationship
Determine flow needed to reach inflection point (where channel bottom fills with water)
Determine passage conditions

Seven tributaries for WP studies to be considered during field trip:
Ross Creek, Rock Creek, Adit 8 Creek (break in pipe is source of water), Ely Creek, Balsam Creek, and Pitman Creek.

Adit 8 Creek has 4 riffles for review by CAWG
Ely Creek has 5 riffles suitable for CAWG review below diversion
Rock Creek - 3 sites above diversion suitable for review; 2 sites below diversion

Comment - Consider plunge pool approach for Rock Creek and Bolsillo Creek? Consider amount of flow needed to transport food through pools. Look at velocity distribution through pools – literature suggests you need 0.3 ft/sec to move food through pools.

Field trip to select WP transects to begin July 29.

IFIM Transect Selections
Aug 19-23 - SF San Joaquin River
Sep 23-27 - Mono Creek, Stevenson Creek, NF Stevenson Creek, Big Creek below Huntington Lake

Geomorphology Subgroup

Vegetation Encroachment included:
Aerial Survey Reconnaissance Data Sheet
CAWG agrees on Aerial Survey data forms – with one modification:
(1) Add Active or Inactive to Tributary Recruitment conditions

Ground Survey Forms to be finalized via Phone Conference.

Report from Amphibian Subgroup

Phil Strand reviewed work by subgroup and recommendations.
Yosemite toad methodology– handout
 Yosemite toad methodology approved
Mountain Yellow-legged frog
 Handout
 Geographical and geomorphic stratification
Changes in sites:
Keep SFSJR Mono Xing to Rattlesnake, drop South Slide
Mono Creek above Lake Edison in place of Bear to be explained.

Approved MYLF site selection and methodology

Western Pond turtle pools are found in cascade/high gradient streams

Use Reese methodology for WPT, as discussed in subgroup. **No objections.**

Modifying approach based on fish and Foothill Yellow-Legged Frog surveys.
Focus surveys to look for them where they haven't been found.

Use both geographic and geomorphic stratification. Habitat quality (based on suitability analysis) is variable. Species is very mobile. Surveys need to be done by the end of July. Another meeting may be needed, probably next week to address sites and pool definition.

List of Action Items

1. Incorporate Carson's comments into 6/12 CAWG meeting summary

2. Meeting summary – Format improvement – July notes as model – Review in August meeting

3. SCE – USFWS letter Re: amphibians and electrofishing. Copy to Britt Fecko

4. August meeting topic – Tributary inputs for macroinvertebrates – S. Fork San Joaquin River in particular

5. Call Re: Wayne proposal on Run/Run reference and Riffle BD. Britt/Carson to check with Russ. Call With Russ and others, if needed

6. Remaining Geomorphology verification – remaining stream sample sites identified at August CAWG

7. Report on BiCEP transect use in ALP—discuss in August meeting

8. Transect selection: Field trip 7/29 – 8/02, 8/19 SFSJR, 9/23 Mono, Stevenson, NF Stevenson, Big Creek below Huntington Lake

9. Combine 7/10/02 presentations (Larry and Wayne) onto CD ROM and distribute

10. Teleconference – Geomorphology ground survey forms

Approvals/Concurrence

1. Fish Sampling sites

2. Macroinvertebrate Sampling Sites and Proposed Approach (Pending feedback from SWRCB regarding use of runs in upstream reference sites and immediately below the diversion for those streams with runs, but without riffles upstream of diversion, and having riffles present in bypass reach. Riffles in bypass reach would be sampled per study plan.)

3. Yosemite Toad Methodology as recommended by Amphibian Subgroup.

4. Mountain Yellow-legged Frog methodology as recommended by Amphibian Subgroup.

5. Reese Western Pond Turtle Methodology as recommended Amphibian Subgroup.

Action Item 2: South Fork San Joaquin River - field for electrofishing, snorkeling, fish and macroinvertebrates (Sept). Let group (Britt) know when scheduled.

Action Item 3: Question: CSBP – alternatives for dealing w/ when a riffle is not available – i.e. spot sampling. Issue: can you compare a spot sampled riffle in reference reach with a "normal" riffle in BD reach?

Action Item 4: BiCEP PHABSIM Report and proposed additional transects:
- USFS/R2 review – Julie Tupper to contact Dudley Riser
- CDFG background and reviewers – Julie Means to contact Gary Smith and Dale Mitchell
- Carson verify from Canaday – Craig Hunter or Chris ? and proceed from there
- USFWS – Wayne Lifton to contact USFWS (Gary Taylor) to see if Mark Gard or other reviewer available
- Larry – report out quickly target date: 8/26/02

Group check with experts and report on Tuesday
* Fast review – concluded by September 12, 2002

Action Item 5: New transect selection - schedule meeting/call for next week – Tuesday 8/20/02 from 3 to 5 PM at USFS office in Clovis.

Action Item 6: Geomorphology data sheet needs substrate (dominant; subdominant; left and right bank (looking down); setting; comment and location).

Action Item 7: John Hale (or other riparian person) to go with geomorphology crew to help identify plants and locations.

Big Creek Collaborative
Combined Aquatic Working Group

August 14, 2002

FINAL Meeting Notes

Time:	10 AM to 4 PM	**Moderator:**	Wayne Lifton
Location:	USFS Offices in Clovis	**Facilitator**:	Bill Pistor
Teleconference No.:	1-800-556-4976	**Recorder**:	Wayne Lifton/ Mitchell Katzel/ Larry Wise
Teleconference Name:	Combined Aquatic Working Group		

Attended By	Larry Wise	ENTRIX
	Lonnie Schardt	HLA
	Julie Means	CDFG
	Wayne Allen	SCE
	Bill Pistor	Kearns & West
	Britt Fecko	SWRCB
	Phil Strand	USFS
	Steve Rowan	SCE
	Wayne Lifton	ENTRIX
	Carson Cox	SWRCB
	Mitchell Katzel	ENTRIX
	Julie Tupper	USFS

Phone Participants	**For Amphibian Portion**	
	Laurraine Tigas	ENTRIX
	Kathy Little	ENTRIX
	John Hale	

<u>Review Previous Action Items</u>

- Discuss Run sampling for BMI
- May meting notes approved
- CD ROM of July presentations distributed
- July meeting notes approved
- SCE letter to USFWS re: electrofishing and amphibians. Copy sent to Britt.
- Brief discussion – EPA protocol uses runs. ENTRIX has call into Jim Harrington, will report results. Britt and Carson checked with Russ Kanz- he said runs OK and move forward or check with Harrington.

- September plenary meeting moved to Wednesday September 12
- CAWG Thursday September 13
- Recreation meeting Tuesday September 11
- Bill to follow up on September meeting schedule with group.
- Other action items to be addressed during today's meeting

Geomorphology Verification Presentation:
Rosgen reach breaks for San Joaquin River, SF San Joaquin River, Big Creek, Mono Creek
Review of Rosgen reach breaks Level 1.5.
CD-ROM passed out to subgroup 2 weeks ago. Will be revised later based on evaluation of field data.

SF San Joaquin River starting from confluence B and G, mostly G2 highly entrenched and confined becomes B at Rattlesnake Crossing. B2 and B3 based on substrate, C at Mono Hot Springs. B and G upstream. CS/B5 – near Jackass Meadow. Candidate for quantitative study lots of sand with gravel.

Macroinvertebrate and Fish Study Sites Presentation
Fish and Macroinvertebrate site selection
Review objectives
Streams to be discussed listed in handouts for fish and macroinvertebrates
Stratification strategy presented again from July presentation
For fish will sample all Rosgen Level I channel types representing >5% of a reach.
100 m sites with all major habitat types will be used for fish sampling.

Sampling sites to be selected for sites not previously approved. Waited for verification of channel types by geomorphology team. Sampling Sites based on Rosgen Channel Types from Level I and then verified from the Level 1.5 channel typing from aerial surveys and ground surveys. Includes additional reaches due to increased number of stream types than originally delineated from just Level I typing.
Streams include:

- SF SJR
- Mono Creek
- Bolsillo Creek
- Mammoth Pool Reach SJR
- Stevenson Reach of SJR
- Big Creek
- Pitman Creek

Fish Sampling

South Fork San Joaquin River:

- Primarily Rosgen Level I: B and G Channel Types with small areas of C.
- B Channel Type dominant downstream of Florence Lake
- G Channel Type dominant downstream of Hoffman Creek
- Sampling of Channel Types constituting >5% of length in each reach
- Sampling in reaches identified in CAWG-7.

Handout of fish sampling sites lists reaches and candidate sites.
SFSJR:
Florence to Bear – sample B and C not G type. Look at potential reference sites upstream of Florence.
Bear to Mono – sample B, C, and G
Rattlesnake to Mono – Sample B type channel
Rattlesnake to Confluence – very inaccessible. G-type channel One site identified upstream of Hoffman.

Description of potential reference reach sampling units (B and G channel types) upstream of Florence Lake to compare with SF San Joaquin River below Florence Lake for fish. No reference available for C type channel. References mostly valid for upper end of project reach – lower end is substantially lower in elevation.

Mono Creek- all B channel. One site below diversion. No adequate channel reference for Mono Creek above diversion because above is another bypass reach.

Bolsillo Creek-B channel above and below diversion, Aa+ channel also present below diversion. One site in each of these reaches.

Fish sampling in Mammoth Pool reach of SJR – B and G channel types, one site in each. No upstream reference, but this will be discussed later in presentation.

Stevenson Reach-all G channel type. Access can be challenging.
Sample two sites, one each in upper and lower portions of reach

Big Creek Dam 4 to PH 2 (Upper Big Creek Reach). Almost all A Channel type. No suitable reference upstream due to bypassed reach. One sampling site in A channel type.

Dam 5 to PH 8 (Lower Big Creek Reach). Primarily A channel, with Aa+ section in lower ½ mile. One sampling site in each channel type.

Big Creek below Huntington Lake Reach-Big Creek two miles below the dam to be verified by geomorphology team on the ground for next CAWG meeting. Will present potential fish sampling sites at that time.

Pitman Creek-Two channel types present B and Aa+. Only B present upstream of the diversion. We propose to sample three sites: B-above the diversion, B and Aa+ below the diversion.

Clarify that we are sampling representative reaches vs individual habitat units. We are sampling sites containing representative habitat types by channel type and stream reach. A stakeholder raised a concern that we may not be sampling large pools. Pools in candidate sites are selected to be representative of types for channel and reach type. Bigger, deeper pools will be snorkeled. Prefer to sample contiguous habitat types.

A question was asked as to how the group will address fishing pressure?
Will integrate data at some point in the future to tell the whole story regarding fish population issues; consider temperature, water quality, recreation take, stocking, hydrology, geomorphology, etc.

Macroinvertebrate Sampling

Macroinvertebrate sampling protocols described. If riffles are not present above diversion, but run is and is present below diversion, we will sample run above and immediately below the diversion and riffles throughout the bypass reach.
Are we taking into account the CSBP suggested alternate methodology if you don't have riffles? Spot sampling vs. Best available habitat discussion. Original EPA methodology was based on sampling cobble, and was not meant for pools or cascades. ENTRIX has called Jim Harrington at CDFG, but we have not talked with him at this time. Will discuss with him and adopt suggestions, as applicable.

South Fork San Joaquin River. Mostly B and G channel types. B channel dominant type below Florence Lake and in the vicinity of the diverted tributaries. G channel dominant in lower portion of reach including inaccessible areas. Both types are present at the bottom of the reach. Propose to sample B channel type, all candidate sites are riffles. Sample eight sites between Florence Lake and confluence with San Joaquin River.

Description of potential reference reach sampling units (B channel types) upstream of Florence Lake to compare with SF San Joaquin River below Florence Lake for macroinvertebrates.
Mono Creek downstream of Mono Diversion

- Rosgen Level I: B Type Channel
- Riffles Present
- Upstream reach is below Vermilion Valley Dam
- Reach upstream of Lake Edison sampled for Vermilion relicensing, may represent a potential reference

Four sites to be sampled in Mono Creek. Sampling will be conducted in similar substrate types – we don't want to sample sand in one location and gravel in another because this will confound the study results.

Bolsillo Creek. Bolsillo will be sampled above and below the diversion.
B channel type AD, B and Aa+ channel types BD
Sample B channel type AD and BD.

Mammoth Pool Reach. B and G channel types, B channel is the majority.
Propose to sample B type channel. There are riffles present in each of the B channel segments. Unclear as to whether the San Joaquin River section below the Mainstem San Joaquin River and SF San Joaquin River confluence could be used as a partial reference. It has upstream diversions on the South Fork, but also a major unregulated drainage area input. Subject of discussion for today, as well.

Can we sample B and G channel type instead of just the B channel type? Is this a change in the study plan? G channel type macroinvertebrate results are likely to be different than the B channel type results.

How do we sample every 2 miles and still consistently sample the same channel type? It seems like we are mixing and matching methodologies. We are using two approaches, point source (i.e., for example the Rock Creek spoils pile) and then comparing longitudinally above and below diversion ("ambient water quality" approach).

It is to our advantage to hold channel types constant to compare type B to type B. It may be difficult to sample across channel types and interpret the results. Try to reduce the factors that influence the results. Comparing above and below the diversion, you must hold the channel type constant. However, there are reasons to sample across channel types because this is considering things at a bigger scale to get at the overall stream aquatic health- longitudinal change issues. Concerns over the sediment input from the Rock Creek spoils pile and measuring effect on BMIs.

Proposed wording that stakeholders would like to have information across different channel types, sampling approximately every two miles to address issue of overall health of aquatic ecosystem, in addition to following the existing Study Plan which holds channel types constant above and below Project facilities to specifically addresses effect of diversions. State Board staff expressed that the proposal to have information across different channel types and sampling approximately every two miles is already a part of the study plan and is not an addition.

Channel type was over-riding factor in deciding where to put sampling locations according to existing Study Plan. We are reducing the variability by sticking to one channel type. State Board staff believe according to the existing study plan that channel type should only be one factor in deciding where to put sampling locations and see value in comparing CSVP information across channel types.

It is valuable to sample both types, but comparing across is adding too much variability and will confound results. Important to factor out this variability. Other factors such as temperature and elevation already contribute a lot of variability. State Water Board staff do not agree with this statement and see value in analyzing CVSP information both within and between channel types.

Proposal to sample B and G but treat as two "reaches" in Mammoth Reach:

Two sites in G type

Two sites in B type

Samples will likely come up with differences in BMIs. Must have an understanding that comparisons between channel types are likely to be confounded by differences. Move Site 3 upstream of Shakeflat Creek from the B into the G channel section. Put a site above Rock Creek in the G channel section. Proposed sites will address here spoils pile issue concerns. This provides data for longitude of reach and provides data also for within channel type comparisons. Stakeholders will have information to make comparisons either way. Seems agreeable group move on.

Discussion of reach from top of Mammoth Pool and NF-SF Confluence, one site will be sampled for reference placed in the first appropriate riffle upstream of inundation zone of Mammoth Pool.

Stevenson Reach - Only G type channel in this reach, which will be sampled at four locations. Access can be a problem in this reach. Riffles are available at each candidate site.

Big Creek

<u>Big Creek Dam 4 to PH 2 (Upper Reach).</u> Mainly A type channel. Riffles present at candidate sites. Sample three sites. No adequate reference, reach upstream is diverted.

<u>Big Creek Dam 5 to PH 8 (Lower Reach).</u> Mainly A type channel. Riffles present at candidate sites. Sample two sites. No adequate reference, reach upstream is diverted.

Pitman Creek. Two Rosgen channel types present: B and Aa+. Upstream of diversion B Channel Type with run habitat. Small section of B below diversion, but no riffles or runs. Aa+ below the diversion contains run habitat. B Channel run above diversion may lead to confounded comparisons. Propose to sample Aa+ channel only.

Would like to sample B channel AD to use as a reference to B channel BD on other sites without other references. The Aa+ channel section below the diversion can be compared with other Aa+ channel type reference sites on other streams, where the variability due to flow, altitude, drainage area, etc. is minimized.

Proposal to take one sample in the B-channel section above the diversion. SCE agrees to include this sample for reference reach purposes, not for comparison with the Aa+ channel section.

Next Steps:

Verify geomorphology for Rancheria Creek and for Big Creek between Huntington Lake and PH 1. Bring candidate sites to September CAWG meeting.

Does CAWG want sampling site in the lower South Fork Near Hoffman confluence? Access would require a 2-3 day commitment of time. There is a site near confluence. No, don't think this is worth the time for one site.

BiCEP Model Review (*Larry Wise: BiCEP presentation)*
Presentation of conclusions of Hydraulic Review
Recommend re-calibration of model using IFG4-A
Re-cap of last time. Conclusions of hydraulic review. Stage – discharge relationships look good.
Add transcects as suggested.

Big Creek Reach

Lower Big Creek

Aa+ - type channel not represented in BiCEP models. Major habitat types are deep pools, cascade and shallow pools. CAWG recommended adding transects to represent deep and shallow pools (3 transects each). No transects in cascades as they don't provide substantial habitat. How important is it to pick three additional transects for Shallow Pool when it represents only 12% of a reach length that represents 29% of the reach length (i.e., 3% of the channel length)? It could be important because it may be the only significant area of fish production.

A-type channel represented in BiCEP model, except riffles. Recommend adding two transects to represent riffles.

Upper Big Creek

A-type channel: Information provided at meeting regarding habitats represented by existing transects was incorrect. Correct habitat representation provided below.

Original Information:

Channel Type	**A**		**B**	
Percent of Reach Length	***95.3%***		***4.7%***	
Habitat Classification	Percent	No. of transects	Percent	No. of transects
FLATWATER	6%	1	4%	3
RIFFLE	7%	2	15%	0 (+2)
SHALLOW POOL	15%	5	5%	0
DEEP POOL	51%	4	45%	0 (+2)

Corrected Information:

Channel Type	A		B	
Percent of Reach Length	***95.3%***		***4.7%***	
Habitat Classification	Percent	No. of transects	Percent	No. of transects
FLATWATER	6%	5	4%	3
RIFFLE	7%	1 (+1)	15%	0 (+2)
SHALLOW POOL	15%	6	5%	0
DEEP POOL	51%	0 (+3)	45%	0 (+2)

Based on this corrected information, we would recommend that one transect be added to better represent flatwater habitat. The initial proposed addition of transects to riffles and deep pools is now unnecessary.

B-type channel: very short reach of channel, but flatwater (run) represented in BiCEP model by three transects. CAWG recommended adding two transects to riffles and two to deep pools to round out representation of habitat in this channel type. No transects would be placed in shallow pools.

SJR Mammoth Pool Reach
Mammoth – recommend recalibration using IFG 4A to extend range of flow simulation.

G-type channel: All habitat types adequately represented in G-type channel. No additional transects recommended for modeling usual range of flows.
B-type channel: Riffles not represented and deep pools underrepresented. Recommended adding two transects to each of these two habitat types.

Stevenson Reach
No BiCEP transect in Stevenson Reach. In BiCEP, Mammoth transects were used to represent Stevenson Reach.

Mammoth and Stevenson Reach have similar channel type, habitat type composition, and similar widths and depths. Recommend accepting use of Mammoth G-channel transects in Stevenson Reach.

State Board would like to see the BiCEP transect models peer reviewed. Some CDFG staff in the Region were involved in the BiCEP model. Gary Smith – CDFG can do the review. USFS would also like to peer review of the report. They will contact R2. SCE would like to see the peer reviewers consider if the additional transects proposed are necessary and cost-effective. Potential peer reviewers list: Gary Smith, Craig (?Chris)

Hunter (State Board recommendation), Mark Gard (USFWS), Dudley Reiser (from R2).
Wayne Lifton to ask USFWS (Gary Taylor) about possible Mark Gard peer review.
Get it out quickly
Reviews must be back before September CAWG meeting.

Need review completed by CAWG meeting on September 12. Report done by August 26 for peer review. Let Bill Pistor know by 26th who will be reviewing report.

Postpone IFIM transect selection presentation due to lack of time. Reschedule to Tuesday 20th from 3:00-5:00 PM - Meeting to review Larry's presentation. Meeting to be facilitated.

Amphibians Study Discussion
Proposed pool definition for Western Pond Turtles. No objections to language in hand-out. Approval from CAWG.

Riparian Study Discussion
Substrate Size characteristics data collection is a concern in conjunction with the riparian vegetation. What is riparian vegetation nexus with particle size data?
Discussion of riparian data collection sheet, concern about what substrate data are being collected, especially out of channel/microhabitat.
Concern with field crews already out there doing geomorphology surveys. If this isn't decided may miss opportunity. Riparian info important for designing qualitative studies with PFC, SCI. How important is it?

Add to Riparian Data Collection Form information on Substrate at specific sites where riparian vegetation is growing. Data Sheet to now include:
Left Bank Dominant Particle Size Subdominant Particle Size
Right Bank Dominant Particle Size Subdominant Particle Size
Data Sheet approved with modifications.

Riparian Data to be collected by Riparian/Botanist (John Hale for week of August 19).

Geomorphology
A reminder to everyone that the CD-ROM is mislabeled, it should indicate that the material represents the Rosgen "Level 1.5" classification and not Level I. We will do something about the labels.

Everyone has reviewed the memo material on CD-ROM, candidate study reaches for quantitative not to be sampled. There are 28 miles to be ground-truthed.

What if we feel there are holes in qualitative surveys? CAWG approves the list of ground survey sites for qualitative study.

Mitchell wants a concurrence from group on locations of ground survey sites for qualitative study. Approved.

Candidate sites for quantitative sites. Do not collect qualitative data at these locations. Mitch and Woody will be prepared to initiate first discussions regarding quantitative studies for the CAWG meeting on September 12th.

IFIM Transect Selection Schedule:
Upper Basin Sept 23-27
Sept 30 - Oct 4

Wayne to take care of CSBP question follow-up.

Agreement Actions:

1. CAWG agrees to fish and macroinvertebrate sampling sites as modified during the meeting today.

2. CAWG agrees on adding a macroinvertebrate site in G1/G2 section above Mammoth Pool since there is an added G sampling site below Mammoth Pool. The sampling will need to be done quickly since the elevation of Mammoth is dropping quickly.

3. CAWG approves list of Geomorphology Ground Survey Sites for Qualitative Study.

4. Western Pond Turtle pool definition approved.

5. Riparian forms approved with modification.

6. Geomorphology ground level qualitative study sites approved.

List of Action Items

Action Item 1: Kearns & West to finalize and distribute September meeting schedule.

Action Item 2: South Fork San Joaquin River - field for electrofishing, snorkeling, fish and macroinvertebrates (Sept). Let group (Britt) know when scheduled.

Action Item 3: Question: CSBP – alternatives for dealing w/ when a riffle is not available – i.e. spot sampling. Issue: can you compare a spot sampled riffle in reference reach with a "normal" riffle in BD reach?

Action Item 4: BiCEP PHABSIM Report and proposed additional transects:
- USFS/R2 review – Julie Tupper to contact Dudley Riser
- CDFG background and reviewers – Julie Means to contact Gary Smith and Dale Mitchell
- Carson verify from Canaday – Craig Hunter or Chris ? and proceed from there
- USFWS – Wayne Lifton to contact USFWS (Gary Taylor) to see if Mark Gard or other reviewer available
- Larry – report out quickly target date: 8/26/02

Group check with experts and report on Tuesday
* Fast review – concluded by September 12, 2002

Action Item 5: New transect selection - schedule meeting/call for next week – Tuesday 8/20/02 from 3 to 5 PM at USFS office in Clovis.

Action Item 6: Geomorphology data sheet needs substrate (dominant; subdominant; left and right bank (looking down); setting; comment and location).

Action Item 7: John Hale (or other riparian person) to go with geomorphology crew to help identify plants and locations.

Big Creek Collaborative
Combined Aquatic Working Group

August 20, 2002

FINAL Meeting Notes

Time:	3 PM to 5 PM	**Moderator:**	Wayne Lifton
Location:	USFS Clovis, CA	**Facilitator**:	Bill Pistor
Teleconference No.:	1-800-556-4976	**Recorder**:	Wayne Lifton
Teleconference Name:	IFIM Combined Aquatic Working Group		

Attended By	Wayne Lifton	ENTRIX
	Phil Strand	USFS
	Bill Pistor	Kearns & West
	Wayne Allen	SCE
	Larry Wise	ENTRIX
	Julie Means	CDFG
Phone Participants	Carson Cox	SWRCB
	Britt Fecko	SWRCB

Instream Flow Transect Allocation
Larry Wise Presentation
Discussion of transect selection, stratification

Reaches typically based on Project features, hydrological features. We use this, but then stratify by Rosgen channel type. Representative mesohabitats are selected within Rosgen channel types to account for variability in how channel types affect characteristics of mesohabitats. This generally results in as many or more transects than in other types of transect allocation.

Concerns expressed by some about not understanding the approach and that the CAWG has approved an approach yet. Details had been discussed in the preparation of the CAWG-3 Study Plan, but were reduced in later versions. The last version was moved to an appendix to the plan, during final CAWG approval process, it was decided to leave the appendix out of the plan.

Can appendix or details be found and provided to those not involved in plan development. ENTRIX will look for document. Can Larry explain process? He will provide information.

Some not familiar with information, want to review before making a decision.

Question about access downstream of Rattlesnake Crossing. Difficult to access area, requires a lot of time to get in and out, as well as collect data. Access time in excess of what was considered reasonable access time per plan. Larry to analyze G channel mesohabitats downstream of Rattlesnake to see if sites there would be needed and report back.

Bear to Florence C and B channel

Number of transects to be placed SF San Joaquin River: Bear Creek to Florence Lake

Channel Type	B		C		G	
Percent of Reach Length	***69.8%***		***27.4%***		***2.8%***	
Habitat Classification	Percent	No. of transects	Percent	No. of transects	Percent	No. of transects
FLATWATER	50%	2	50%	2	50%	0
RIFFLE	23%	2	1%	0	0%	0
SHALLOW POOL	1%	0	2%	0	0%	0
DEEP POOL	23%	3	46%	3	38%	0

Reach
G channel not included <5 percent.

Bear to Mono
Number of transects to be placed SF San Joaquin River Mono Crossing to Bear Creek Reach

Channel Type	B		C		G	
Percent of Reach Length	***58.9%***		***20.4%***		***20.7%***	
Habitat Classification	Percent	No. of transects	Percent	No. of transects	Percent	No. of transects
FLATWATER	25%	2	19%	2	23%	2
RIFFLE	25%	2	37%	2	26%	2
SHALLOW POOL	8%	3	0%	0	8%	3
DEEP POOL	40%	3	44%	3	43%	3

Mammoth Pool
B and G channel types
BiCEPs transects in both
G = 46% deep pool, riffle, flatwater
B = 54% deep pool, flatwater, riffle

Number of transects to be placed in San Joaquin River Mammoth Reach

Channel Type	B		G	
Percent of Reach Length	***54.3%***		***45.7%***	
Habitat Classification	Percent	No. of transects	Percent	No. of transects
FLATWATER	18%	4	6%	3
RIFFLE	14%	0 (+2)	14%	2
SHALLOW POOL	0%	3	2%	2
DEEP POOL	68%	2 (+2)	75%	7

Number of transects represent those from BiCEPs study with additional transect recommendation in parentheses

Stevenson Reach
G channel Type
Deep pool, flatwater, riffle – Use BiCEP transect only

Mono Creek
All B channel type
Flatwater, riffle, deep pool, shallow pool

Number of transects to be placed Mono Creek Below Mono Diversion Reach

Channel Type	B	
Percent of Reach Length	***100%***	
Habitat Classification	Percent	No. of transects
FLATWATER	45%	2
RIFFLE	11%	2
SHALLOW POOL	5%	3
DEEP POOL	28%	3

Big Creek
Dam 4 to PH 2
B and A channel types
Some BiCEP transects in B

Number of transects to be placed Big Creek – Dam 4 to PH 2 Reach
Number of transects represent those from BiCEPs study with additional transect recommendation in parentheses

Channel Type	**A**		**B**	
Percent of Reach Length	***95.3%***		***4.7%***	
Habitat Classification	Percent	No. of transects	Percent	No. of transects
FLATWATER	6%	1	4%	3
RIFFLE	7%	2	15%	0 (+2)
SHALLOW POOL	15%	5	5%	0
DEEP POOL	51%	4	45%	0 (+2)

Dam 5 to PH 8
A and Aa+ channel type

Number of transects to be placed Big Creek – Dam 5 to PH 8 Reach
Number of transects represent those from BiCEPs study with additional transect

Channel Type	**A**		**Aa+**	
Percent of Reach Length	***70.9%***		***29.1%***	
Habitat Classification	Percent	No. of transects	Percent	No. of transects
FLATWATER	3%	4	4%	0
RIFFLE	8%	0 (+2)	3%	0
SHALLOW POOL	16%	2	12%	0 (+3)
DEEP POOL	62%	2	60%	0 (+3)

recommendation in parentheses

Would like alternative approach in writing if use of BiCEP models is not approved. List as Action Item.

NF Stevenson Enhanced Reach

Number of transects to be placed North Fork Stevenson
Don't sample A
Will sample G

Stevenson Creek

Channel Type	A		Aa+		B		C		G	
Percent of Reach Length	*4.3%*		*50.4%*		*20.2%*		*17.1%*		*8.1%*	
Habitat Classification	Percent	No. of transects	Percent	No. of transects	Percent	No. of transects	Percent	No. of transects	Percent	No. of transects
FLATWATER	20%	0	9%	2	4%	0	44%	2	37%	2
RIFFLE	0%	0	13%	2	10%	2	12%	2	5%	2
SHALLOW POOL	10%	0	8%	3	0%	0	15%	3	0%	0
DEEP POOL	0%	0	15%	3	86%	3	26%	3	57%	3

Shaver Lake to SJR

Number of transects to be placed Stevenson Creek

28 transects
G channel type < 5%, will not be modeled

Channel Type	A		Aa+		B		G	
Percent of Reach Length	*15.8%*		*51.2%*		*29.9%*		*3.2%*	
Habitat Classification	Percent	No. of transects	Percent	No. of transects	Percent	No. of transects	Percent	No. of transects
FLATWATER	7%	2	11%	2	9%	2	4%	0
RIFFLE	13%	2	3%	0	6%	2	4%	0
SHALLOW POOL	23%	3	12%	3	12%	3	0%	0
DEEP POOL	40%	3	27%	3	55%	3	65%	0

Brief discussion of transects and habitat types
Number of stations per cross-section. ~20 in low flow channel usually 25-40 across transect

Need to find old appendix that was removed after discussion prior to approval of CAWG 3 Plan

Description of selection of habitat clusters / sequences - need review of approach.

Whitewater Studies
Objective- needs to be clearly defined
Approach to be used depends on objectives

Single flow – three reaches from Recreation Group
1. Mammoth Reach
2. Stevenson Reach
3. Below Florence to Rattlesnake

<u>Other Possibilities</u>
Mono Creek
Bear Creek
Big Creek Dam 4 to PH 2
Big Creek Dam 5 to PH 8
North Fork Stevenson

Need to consult with Gangemi, Martinez, and Martzen after August 27 to identify whitewater flows and reaches.

Concern about transition-zone fish community in Stevenson Reach.
Stevenson Reach not being considered for augmental flow release at present.
Field work issues at higher flows: 600-1200 cfs-safety, difficulty of taking measurements, difficulties of gaining access.

Maybe focus on edge cells, critical habitats. Need to select sites where we can get access and work at high flows.

Objectives
Native cyprinids and catastomids, more of an issue with Stevenson rather than Mammoth out of season flows, effects on amphibian, reptiles.

Stranding and ramping-fry rearing and spawning locations, sensitive species areas that need to be sampled.
Use habitat suitability of amphibian habitats from Janelle's work to identify amphibian sites.

Wayne Lifton to find technical appendix material. Get out by next CAWG meeting.

List of Action Items

Action Item 1: Larry - Write-up an overview of transect allocation approach.
Channel type
Transects per channel type
Transects per mesohabitat

Action Item 2: Teleconference to discuss the above, if needed. Otherwise discuss, if needed, at CAWG meeting.

Action Item 3: Larry - South Fork San Joaquin – G channel. Hoffman/Rattlesnake – prepare presentation re: mesohabitat types.

Action Item 4: Larry - Write-up proposed approach for transects if the current BiCEP transects are NOT approved by CAWG (combine with write-up from Action Item 1).

Action Item 5: With Action Items 1 and 4, find study plan details – i.e. Appendix that was ultimately pulled out of study plan and redistributed to group.

Action Item 6: Add to write-up:

- How to come up with random areas for transect selection

Action Item 7: Re: Whitewater flows to be considered for IFIM. Check with Martzen, et al. re: appropriate flows (Aug. 27 Flight). Mono, Bear, Big Creek, and NF Stevenson Creek.

Action Item 8: Out of Season whitewater flows –

- Bring in amphibian sub-group
- Bring in amphibian experience from Pit (Britt to discuss with Russ Kanz and make sure Julie Tupper provides input)-for next CAWG meeting
- Identify species of interest in selecting transects
- Geomorphology re: spawning gravel
- Larry to take group's Site/Species concerns and recreation group's recommended flows (Aug 27) and develop straw man proposal for new whitewater transects.

FINAL

Big Creek Collaborative Relicensing
Combined Aquatics Working Group
Meeting Summary
September 12, 2002
10:00 AM – 3:00PM

Attendees:

Present:	Julie Means	CDFG
	Larry Wise	Entrix
	Wayne Lifton	Entrix
	Wayne Thompson	Federation of Fly Fishers
	Mike Henry	FERC
	Roger Robb	Friant Water Users Authority
	Lonnie Schardt	Huntington Lake Association
	Bill Pistor (Facilitator)	Kearns & West
	Bryan Harland (Notetaker)	Kearns & West
	Larry Lockwood	SAMS Coalition
	Geoff Rabone	Southern California Edison
	Wayne Allen	Southern California Edison
	Carson Cox	SWRCB
	Britt Fecko	SWRCB
	Rick Hopson	US Forest Service
	Cindy Whelan	US Forest Service
	Phil Strand	US Forest Service

Phone: [none]

Introduction, Ground rules, Agenda – Bill Pistor (Facilitator, Kearns & West) proposed ending the meeting at 3 today so that CRWG members can make it to the Cultural Resources Working Group meeting at 4PM at the Prather Forest Service Office. He then distributed and reviewed the meeting agenda with the group, which approved the agenda with the change in meeting time **[Attachment A: CAWG September 12, 2002 Meeting Agenda]**. Bill reviewed the groundrules from the Big Creek Collaborative Communications Protocol.

Review Previous Action Items – The CAWG reviewed action items from the Aug 14 and 20th meetings. Below are any action items from either of those meetings that are not yet completed (all actions are completed if not listed below):

- BICEP PHABSIM Report and proposed transect selection peer review
  - Julie Tupper contact Dudley Riser
  - Carson verify from Canaday
  - Julie Means has not heard back from Gary Smith and Dale Mitchell, by the end of the week she should hear from them.
  - Wayne Lifton to contact USFWS, has not heard back from them yet.

- Mike asked about the range of low to high flows Entrix is looking at in the middle range velocity measurements. Mike drew diagrams on flip chart to explain his issue. Suggested using the low flow and high flow velocities only and not the middle set of velocities to measure the IFG4. Whitewater flows are too high to extrapolate down to these flows. The group agreed.
- Britt to contact Russ Kanz RE: Pit amphibian experience (8/20 - Action Item 8).
- Check in with Recreation group after their walk through (8/20 - Action Item 8).

Mike Henry (FERC) asked about the reference to spawning gravel with Geomorphology. Wayne Lifton (Entrix) stated that the Stevenson Creek is a self contained creek that will need to be looked at for spawning gravel. Phil Strand (USFS) said that it might have been him that made the reference.

<u>Schedule Riparian & Amphibian SubGroup Meetings</u> – members were asked if they could make a combo Riparian (2 hrs) & Amphibian (3hrs) subgroup meeting on Oct 28th from 10AM to 4PM (10AM to 12PM for Riparian / 1PM to 4PM for Amphibian). **Action:** Julie Means (CDFG) will check availability of CDFG office for that day, if not available, **Action:** Phil Strand (USFS) will check the availability of the Clovis USFS office. **Action:** Janelle Nolan-Summers (Entrix) will provide meeting materials and agenda in advance to subgroup members.

<u>Review and Approve Meeting Notes</u> – Bill moved to postpone approving the meeting summaries due to a comment that needs to be addressed in the August 14th summary. **Action:** The revised meeting notes will be sent out to CAWG members at a later date for approval. **Agreement:** The group agreed.

<u>ID Stream Sampling Locations for Fish and Macroinvertebrates for Rancheria Creek and Big Creek Downstream of Huntngton Lake</u>
Wayne Lifton (Entrix) provided handouts to the group with sampling site locations RE: CAWG 7 & CAWG 10 **[Attachment B: CAWG September 12, 2002 PowerPoint Slides]**.

CAWG-7: Fish
Wayne reviewed Channel Types and characteristics for Big Creek and Rancheria Creek (cascade, riffle, pool habitats). Question was asked if the dog legged section that creates an artificial channel needs to be sampled. Are we trying to sample above and below the energy dissipation structure, which created an artificial channel, to see the impacts vs. the natural channel?

A suggestion was made to stay with the natural channels and the project effects to those and not sample the unnatural channels. Wayne proposed sampling above and below the channel and an extra sample in the artificial affected channel. **Agreement:** The group agreed.

Bill asked if the group approves the proposed approach for fish. The group agreed.

CAWG-10: Macroinvertebrates
Wayne reviewed sampling sites for CAWG-10 (channel types and characteristics). Rancheria Creek and Big Creek. Wayne asked if, based on the CAWG-7 discussion, does the group want to do a spot sample in the artificial channel as well? **Agreement:** The group agreed.

A question was raised as to whether the CAWG will be sampling above and below the dam on Big Creek? Wayne said that the group will have to make that decision because there are no good reference sites. Balsam, and Stevenson might be good references. A stakeholder stated that he would prefer more samplings in the B channel types. Wayne suggested taking an extra B channel sample. **Agreement:** The group agreed to adding a B channel sample between the two proposed B channel sample sites.

Instream Flow/Wetted Perimeter – Larry Wise (Entrix) reviewed the topics for discussion of Instream Flow / Wetted Perimeter studies with a PowerPoint Presentation**.**

Raionale for Number of Transects by Channel and Habitat Type
Larry gave the reasons for transect selections for PHABSIM studies and an overview of the ALP PHABSIM and wetted perimeter studies. Larry explained how streams were categorized for the study plan development by using Rosgen channel types. By placing transects in each major habitat type within each Rosgen channel type, variability is reduced. The number of transects used in other relicensing studies –Lower Tule, Pit, and Stanislaus– done by different environmental engineering firms show that the number of proposed transects for the Big Creek Relicensing are equal to or greater than the number of transects being used for other current relicensings.

A comment was made that the number of transects that have been selected are within the protocols he's read. Another stakeholder said that Gary Smith likes the rule of 3 (3 within each habitat and 3 replicates). A proposal was made that the group agree to an established process for transect selection in writing.

The group discussed that it would be difficult to decide at a working group meeting on what the rules of transects selections should be, since it's often a decision that is made in the field based on the channels and similarity to other channels.

A stakeholder suggested a meeting between the experts for the transects selection process. Bill proposed a conference call with the SWRCB, the CDFG and Gary Smith to review the proposed transect methodology. The CDFG agreed to participating in a conference call/meeting to go over the transect selection to give the SWRCB a comfort level with the transects selection.

Bill asked if there was a consensus on the proposed approach on the number of transects selections. The CAWG, with the exception of the SWRCB, agreed on the protocol for transect selection. The SWRCB would like to consult with Gary Smith who works in an advisory capacity for the SWRCB and CDFG before agreeing to the approach. The CDFG agreed to participate in the consultation meeting with Gary Smith, who is working for both the CDFG and SWRCB.

Bill proposed the following process for review and approval of the transect selection (see below)

Proposed approach to resolve the number of transects question:

1.) Immediately following today's CAWG meeting: Julie, Carson, Britt, and Larry Meet Re: number of transect selection
2.) Blurb on 2, 2, 3 rationale explained by Larry emailed to the group on September 13.
3.) SWRCB and CADFG call w/Gary Smith Friday September 13th.
4.) Follow-Up with Wayne, if necessary on Monday September 16th.
5.) Decision Mid-Next Week. Kearns & West will make calls to the SWRCB and CADFG to get the decision.

Agreement: The group agreed to this process and will be provided with an update on the process before the next working group meeting.

Major Habitats for the South Fork San Joaquin River by Channel Type

Larry gave a presentation on the Rosgen channel types on the South Fork San Joaquin River.

Larry explained that it would be extremely dangerous and difficult to do samples in the South Fork San Joaquin below Rattlesnake Crossing. Larry suggested that since the data can be replicated elsewhere, that the CAWG not sample the inaccessible reach and instead use data from comparable reaches with similar channel types. **Agreement:** The group also agreed to not do samples in the G channels and use the G channel near Florence dam to represent the inaccessible G channel downstream.

South Fork San Joaquin B Channel Summary

- Place new transects in riffles and runs in area below Mono Crossing
- 2 transects per habitat type
- Use transects in upstream B-type channel to represent pools in this area

Bill asked for a consensus on the proposed channel selection for B channel types. **Agreement:** The group agreed, pending the decision on the approach to the numbers of transects, per the earlier action item with SWRCB and CDFG consultation with Gary Smith.

Transect Placement in Non BiCEP Reaches (IFIM Reaches)
Rancheria Creek and Big Creek Wetted Perimeter Studies. The proposal is to put three transects in the riffles of B-Channel types in Rancheria Creek. Proposal to put transects in each of the major habitat types in each of the channel types (four sets) within this reach, except for channel types that are less than 5%.

(Please see PowerPoint Presentation for detailed analysis of Channel types and number of transects)

Agreement: The group agreed on the locations of the transects, with the pending discussion with Gary Smith on the numbers of transects.

BiCEP Review
Bill asked if there has been enough peer review for a discussion on the BiCEP review. The group said that they needed more time to review the documents that were distributed and would like to postpone the discussion for a later date.

Wayne Lifton asked if the group could schedule a meeting to discuss the BiCEP Review on October 3rd at Big Creek in person and conference call from 8AM to 10AM. **Action:** Wayne will distribute an agenda with call-in information to CAWG members. **Agreement:** The group agreed.

Geomorphology-Approach to Quantitative Studies – Mitch gave presentation on the framework for identifying project effects and quantitative studies.
[Attachment C: Montgomery-Buffington Approach to Channel Classification PowerPoint Presentation]

Mitch explained the different categorizations for channels based on the Montgomery-Buffington approach and described the characteristics of each channel type (see Attachment E for further details).

Mitch explained that the different channel types influence the potential responses to change in flow or sediment regime. The intensity of disturbance is an important factor in the channel responses. The further downstream from the disturbance, the more the channel asserts its' natural form.

Montgomery and Buffington categorized different channel types possible response to changing conditions. Bedrock channels are not very likely to respond to change in transport. Riffles have the highest probability to change, but they are the smallest percentage of channel types in the Big Creek Project.

When the group looks at project affects, they should keep in mind how likely these channel types are affected by the project. Also, when developing PM&E measures, these differences in channel types and responses to change are a major factor in deciding where the most effect will be.

There was a brief discussion on the suitability of studies based on differing channel types. The group agreed to discuss that issue at a later date.

A question was asked if there is an instance in the Big Creek Project where the channel type changed entirely. Mitch stated that North Fork Stevenson is probably the best example.

Due to a lack of time, the Geomorphology presentation will be continued at the October CAWG meeting. **Action:** CAWG members also asked Mitch to email copies of this PowerPoint presentation to the group before the October meeting. Mitch agreed.

Agreements

1. The CAWG agreed to Riparian and Amphibian SubGroup meetings on October 28 from 10AM to 4PM (10 to 12: Riparian / 1 to 4 Amphibian).
2. CAWG agreed to postpone approving the Aug 14 and 20 meeting summaries until revised versions have been sent to members for review.
3. CAWG agreed to an extra sample in the "artificial channel" on Rancheria Creek for CAWG-7 and CAWG-10.
4. CAWG agreed to the proposed B channel samples on Big Creek for CAWG-10 and adding another B channel sample between the two B channels.
5. CAWG, with the exception of Britt Fecko, Carson Cox, and Julie Means, agreed to the transect selection rationale proposed by Entrix. Britt, Carson, and Julie will contact Gary Smith on September 13 and report back to CAWG (see action item 3 below).
6. CAWG agreed to not do samples in G channel types on the South Fork San Joaquin, due to inaccessibility. CAWG agreed to use the G channel type near Florence Dam to represent the inaccessible G channel downstream instead.
7. CAWG agreed, pending the SWRCB/CDFG Gary Smith review of transect selection methodology, to the proposed B channel sampling approach on the South Fork San Joaquin River.
8. CAWG agreed, pending the SWRCB/CDFG Gary Smith review of transect selection methodology, to the proposed transect placement in Non BiCEP Reaches.
9. CAWG agreed to a meeting/conference call on October 3 from 8AM to 10AM RE: BiCEP Review.

Unfinished Actions from Previous Meetings

- BICEP PHABSIM Report and proposed transect selection peer review (8/14 - Action Item 4)
    - Julie Tupper contact Dudley Riser
    - Carson verify from Canaday
    - Wayne Lifton to contact USFWS, has not heard back from them yet.
- Britt to contact Russ Kanz RE: Pit amphibian experience (8/20 - Action Item 8).
- Check in with Recreation group after their walk through (8/20 - Action Item 8).

<u>List of Actions from September 12, 2002 Meeting</u>

Action 1: Riparian & Amphibian SubGroup meeting scheduled on October 28 from 10AM to 4PM (10 to 12: Riparian / 1 to 4 Amphibian).. Julie Means will check meeting room availability at the CDFG office in Fresno. If CDFG meeting room is not available, Phil Strand will check meeting room availability at the USFS Clovis Office.

Action 2: The August 14, 2002 CAWG meeting summary will be revised and distributed to CAWG members for final approval.

Action 3: *CDFG & SWRCB secondary review of transect selection methodology*

- Immediately following the September 12, 2002 CAWG meeting, Julie Means (CDFG), Carson Cox (SWRCB), Britt Fecko (SWRCB), and Larry Wise (Entrix) meet to discuss the rationale for transect selection. Larry to give memo to SWRCB & CDG for meeting with Gary Smith.
- Larry to email transect selection memo to CAWG on September 13, 2002.
- SWRCB and CDFG conference call with Gary Smith on September 13, 2002 RE: transect selection.
- On September 16, 2002, SWRCB and CDFG call Wayne Lifton with any questions from Gary Smith call, if necessary. Wayne to relay any questions to Larry; give answers to CDFG & SWRCB by September 18, 2002.
- SWRCB and CDFG to give Wayne Lifton decision if agree with transect select methodology or not by September 19, 2002.

Action 4: CAWG to hold a meeting to discuss the BiCEP review on October 3, 2002 from 8AM to 10AM. Wayne Lifton will distribute agenda and conference call information to CAWG members.

Action 5: Mitch (Entrix) will email the Geomorphology PowerPoint presentation on the Montgomery-Buffington Approach to Channel Classification to CAWG members.

Attachments

Attachment A: CAWG September 12, 2002 Meeting Agenda
Attachment B: CAWG September 12, 2002 PowerPoint Presentation
Attachment C: Montgomery-Buffington Approach to Channel Classification PowerPoint Presentation

APPENDIX G

MONO CREEK BENTHIC MACROINVERTEBRATE STUDY SUMMARY

APPENDIX G
MONO CREEK BENTHIC MACROINVERTEBRATE SUMMARY

1.1 CAWG 10-APPENDIX G MONO CREEK BENTHIC MACROINVERTEBRATE SUMMARY

The benthic macroinvertebrate community of Mono Creek was surveyed in 2001 as part of the Vermilion Traditional Relicensing (FERC No. 2086). As was requested by the resource agencies in comments on the Draft Application for New License (SCE 2001), SCE completed the benthic macroinvertebrate study in 2001 for streams in the Project study area using the California Stream Bioassessment Procedure (CSBP [CDFG 1999]). The methodology for the Vermilion benthic macroinvertebrate study used the same methodology as described in the CAWG 10 study for the Big Creek ALP (CAWG 10 Appendix A).

The BMI sampling in Vermilion was completed in a different year than the Big Creek ALP sampling (2001 versus 2002). Due to the differences in sampling years, as well as differences in location, altitude, and habitat, direct comparisons of the results from the two studies potentially could yield many differences. These differences may be caused by changes in rainfall, temperature, or a host of other environmental factors.

The Mono Creek sample site locations are listed in Table CAWG 10 Appendix G-1. All of the sites were sampled in the latter half of September 2001.

1.1.1 STUDY RESULTS AND ANALYSIS

Mono Creek consists of two principal segments, one upstream of Lake Edison, the other downstream of the lake and Vermilion Valley Dam. In the segment downstream of Vermilion Valley Dam, the first site (Site 1) is located in an artificial channel subject to relatively high velocity flows released from the lake. The leakage channel from Vermilion Valley Dam (Leakage Channel) has its confluence with Mono Creek downstream of Site 1 below Vermilion Valley Dam. The Leakage Channel also was sampled upstream of its confluence with lower Mono Creek.

PHYSICAL HABITAT

Physical/habitat quality scores for Mono Creek sites and the Leakage Channel ranged from optimal to suboptimal (Table CAWG 10 Appendix G-2). All sites within Mono Creek were scored as optimal, with Site 1 in the artificial channel downstream of Vermilion Valley Dam having the lowest score among sites within Mono Creek. The Leakage Channel (not part of Mono Creek) was scored as suboptimal and had the lowest score of any site sampled in this study.

Table CAWG 10 Appendix G-1. Benthic Macroinvertebrate Sampling Locations and Identification Numbers.

Reach Name	Site (Site ID)	Sample ID	Date Collected
Mono Creek upstream of Lake Edison	Site 1 - Upper Site 1 (UM 1)	UM-1-A	09/26/2001
		UM-1-B	09/26/2001
		UM-1-C	09/26/2001
	Site 2 - Upper Site 2 (UM 2)	UM-2-A	09/26/2001
		UM-2-B	09/26/2001
		UM-2-C	09/26/2001
Mono Creek downstream of Vermilion Valley Dam	Site 1 - Lower Site 1 (LM 1)	LM-1-A	09/18/2001
		LM-1-B	09/18/2001
		LM-1-C	09/18/2001
	Site 2 - Lower Site 2 (LM 2)	LM-2-A	09/18/2001
		LM-2-B	09/18/2001
		LM-2-C	09/18/2001
	Site 3 - Lower Site 3 (LM 3)	LM-3-A	09/18/2001
		LM-3-B	09/18/2001
		LM-3-C	09/18/2001
	Site 4 - Lower Site 4 (LM 4)	LM-4-A	09/18/2001
		LM-4-B	09/18/2001
		LM-4-C	09/18/2001
Vermilion Valley Dam Leakage Channel	Site 5 - Leakage Channel (LC 1)	LM-5-A	09/19/2001
		LM-5-B	09/19/2001
		LM-5-C	09/19/2001

Table CAWG 10 Appendix G-2. Physical/Habitat Quality Parameter Scores for Mono Creek Benthic Macroinvertebrate Sampling Sites.

		Scores (0 to 20, 20 being highest possible score) by Condition Category										
Reach Name	Site	Epifaunal Substrate / Available Cover	Embed-dedness	Velocity/ Depth Regimes	Sediment Depositio n	Channel Flow Status	Channel Alteration	Frequenc y of Riffles (or bends)	Bank Stability	Vegetatio n Protectio n	Riparian Vegetatio n Zone Width	Totals (Physic al Habitat Score)
Mono Creek upstream of Lake Edison	Site 1	17	19	18	19	19	20	19	10	18	20	179
	Site 2	18	18	19	20	17	20	20	20	18	18	188
Mono Creek downstream of Vermilion Valley Dam	Site 1 - Upstream of Leakage Channel	15	13	14	18	18	15	18	18	17	14	160
	Site 2 - Downstream of Leakage Channel	20	19	19	19	19	20	20	20	20	16	192
	Site 3 - Mid-reach Location	20	19	19	19	19	20	20	20	20	16	172
	Site 4 - Upstream of Mono Diversion Forebay	20	15	19	19	20	20	20	20	20	20	193
Vermilion Valley Dam Leakage Channel upstream of Mono Creek	Site 5	2	6	8	20	20	6	18	18	2	2	102

ABUNDANCE

The density of macroinvertebrates in the reach upstream of Lake Edison was less than the density observed in the reach downstream of Vermilion Valley Dam (Table CAWG 10 Appendix G-3). Downstream of the Vermilion Valley Dam, Site 1 had the highest density of macroinvertebrates and Site 4 had the lowest. The abundance at Site 1 was, in large part, due to the abundance of Simuliidae. The density of macroinvertebrates at this site was statistically greater ($p \leq 0.05$) than the sites upstream of Lake Edison, the most downstream site below Vermilion Valley Dam (Site 4), and the Vermilion Valley Dam Leakage Channel. Densities at the other sites did not differ at a statistically significant level.

ABUNDANT TAXA

Table CAWG 10 Appendix G-4 presents the abundant taxa at each site in Mono Creek. Macroinvertebrate taxa in Mono Creek upstream of Lake Edison and downstream of Vermilion Valley Dam including the Vermilion Valley Dam Leakage Channel were dominated by the dipterans: Orthocladiinae, Tanytarsini, *Simulium*, and Chironomini, the ephemeropteran: *Rhithrogena*, and the plecopteran: *Zapada.* The midge Orthocladiinae was an abundant insect taxon in all Mono Creek sites. The midge Tanytarsini was an abundant taxon in all Mono Creek sites, except for Site 2 downstream of Vermilion Valley Dam. The relative abundance of Tanytarsini was generally much lower than that of Orthocladiinae. The blackfly *Simulium* was an abundant taxon in Mono Creek at Site 2 upstream of Lake Edison and at all four sites downstream of Vermilion Valley Dam, it was absent from the Leakage Channel. *Simulium* was most abundant immediately downstream of the dam and its relative abundance decreased downstream. *Simulium* are well-adapted to fast moving water and use their terminal sucking disk to hold themselves on rocky substrates. They also are filterers and so are extremely well adapted to the high velocity conditions and the lake-derived food source in the artificial channel present at Site 1. Chironomini was a dominant insect taxon in the Vermilion Valley Dam leakage Channel making up 32.9 percent of the individuals.

The dipterans Orthocladiinae, Tanytarsini, and Chironomini are members of the family Chironomidae, which is the largest family of aquatic insects. All three taxa are moderately tolerant of disturbance. Orthocladiinae have a tolerance value of five, and are classified as collectors. Tanytarsini and Chironomini have a tolerance value of six and are classified as filterers. *Simulium* is a member of the family Simuliidae. *Simulium* have a tolerance value of six, and are classified as filterers. Simulids usually have one life cycle a year, but some species have several.

Rhithrogena was an abundant taxon in the Mono Creek sites upstream of Lake Edison, as well as in Cold Creek Site 1. This taxon was absent from Mono Creek downstream of Vermilion Valley Dam. *Rhithrogena* is a member of the family Heptageniidae of the order Ephemeroptera. *Rhithrogena* have a tolerance value of zero, and are classified

Table CAWG 10 Appendix G-3. Mean Density and Descriptive Statistics of Macroinvertebrates at Each Sampling Site, September 2001*.

Location	Site	Mean Density	Standard Deviation	Coefficient of Variation (%)
Mono Creek Upstream of Lake Edison	Site 1	2078	1996	96
	Site 2	1388	370	27
	REACH	**1733**	**1338**	**77**
Mono Creek Downstream of Vermilion Valley Dam	Site 1	8918	5426	61
	Site 2	3263	1171	36
	Site 3	3421	1202	35
	Site 4	2202	1897	86
	REACH	**4451**	**3744**	**84**
Vermilion Valley Dam Leakage Channel	Site 5	2130	772	36

*No diversion of Warm Creek flow to Boggy Meadow Creek was occurring at the time of sampling.

Table CAWG 10 Appendix G-4. Abundant Benthic Macroinvertebrate Insect Taxa and Percentage of Total Density by Site, Cold Creek and Mono Creek, September 2001.

Order	Taxa	Mono Creek Upstream of Lake Edison (%)		Mono Creek Downstream of Vermilion Valley Dam (%)				Vermilion Valley Dam Leakage Channel (%)
		Site 1	Site 2	Site 1	Site 2	Site 3	Site 4	
Ephemeroptera	*Baetis*	7.4	8.1		1.3	2.1		
Ephemeroptera	*Caudatella*	5.4						
Ephemeroptera	*Drunella*		4.3					
Ephemeroptera	*Rhithrogen*	13.1	24.2					
Ephemeroptera	*Serratella*							
Plecoptera	*Zapada*			0.9	10.5	21.0	16.4	0.2
Trichoptera	*Apatania*	5.3						
Trichoptera	*Agraylea*						3.1	
Trichoptera	*Hydroptila*			0.6				
Trichoptera	*Rhyacophil*							
Diptera	Chironomini			0.1				32.9
Diptera	Tanytarsini	4.0	10.7	0.2		2.0	2.7	0.1
Diptera	Diamesina							0.4
Diptera	Orthocladii	25.5	17.8	18.6	39.0	32.1	25.0	58.8
Diptera	*Chelifera*				1.6			
Diptera	*Simulium*		4.2	59.8	20.6	10.3	7.9	
Diptera	*Antocha*				3.0	3.7	4.3	
Coleoptera	*Paracymus*							0.1
Total by Site (Percent)		60.9	69.3	80.1	76.0	71.1	59.3	92.6

as gatherers. Nymphs of the family Heptageniidae usually live for one year in streams and hatch between April and August. Members of the family Heptageniidae range in pollution tolerance from very sensitive to moderately sensitive. *Rhithrogena*, with a tolerance value of zero, is very sensitive to disturbance or pollution. As a group, heptageniids tolerate temperature fluctuations, but are sensitive to metals and intolerant of habitat disturbance and scour events (Harrington and Born 2000).

Baetis was an abundant insect taxon in both Mono Creek sites upstream of Lake Edison, and in Mono Creek downstream of Vermilion Valley Dam at Sites 2 and 3. *Baetis* have a tolerance value of five, and are classified as collectors.

Zapada was an abundant taxon in the Mono Creek sites downstream of Vermilion Valley Dam, as well as the Vermilion Valley Dam Leakage Channel, at a much lower relative abundance. *Zapada* have a low tolerance (intolerant) value of two, and are classified as shredders. All of the members of the family Nemouridae are intolerant of pollution and habitat deterioration (Harrington and Born 2000).

METRICS

The mean, standard deviation, coefficient of variation and ANOVA results (p values) for the site data are presented in Table CAWG 10 Appendix G-5. In addition to the sampling sites in Mono Creek, these tables report on sampling of the Leakage Channel. The results for the Leakage Channel sampling site (Site 5) are discussed along with the other sites.

RICHNESS MEASURES

For all calculated Measures of Richness, values were greater at sites above Lake Edison than at sites below Vermilion Valley Dam (Table CAWG 10 Appendix G-5). Additionally, sites downstream of Vermilion Valley Dam showed an increase in richness measures from upstream to downstream. Taxa Richness and EPT Taxa were lowest at Lower Site 1 downstream of Vermilion Valley Dam, and increased at each successive downstream site. Taxa Richness metrics were statistically significantly different ($p<0.001$) between Mono Creek sites. Lower Sites 1 and 2 were statistically significantly different from Upper Sites 1 ($p=0.001$ and $p=0.003$, respectively), and 2 ($p<0.001$ and $p=0.001$, respectively) upstream of Lake Edison. The differences in Taxa Richness between Lower Sites 3 and 4 and Upper Sites 1 and 2 were not statistically significant different (Table CAWG 10 Appendix G-6).

Taxa Richness in the Vermilion Valley Dam Leakage Channel Site was statistically significantly different from Lower Sites 3 ($p=0.01$) and 4 ($p=0.008$) and Upper Sites 1 ($p<0.001$) and 2 ($p<0.001$) (Table CAWG 10 Appendix G-6).

There were significant statistical differences between sites in Ephemeroptera Taxa, Plecoptera Taxa, and Trichoptera Taxa metrics ($p<0.001$ for all metrics). For

Table CAWG 10 Appendix G-5. Metric Values by Site, Mono Creek and Vermilion Valley Dam Leakage Channel, September 2001.

	Upstream of Lake Edison						Downstream of Vermilion Valley Dam												Vermilion Valley Dam Leakage Channel			
	Site 1			Site 2			Site 1			Site 2			Site 3			Site 4						
Biological Metric	Mean	SD	CV	Mean	SD	CV	Mean	SD	CV	Mean	SD	CV	Mean	SD	CV	Mean	SD	CV	Mean	SD	CV	p value **
Taxa Richness	32.0	7.5	23.6	33.7	4.0	12.0	13.7	2.5	18.4	15.7	3.2	20.5	22.3	2.5	11.3	22.7	1.2	5.1	8.0	2.6	33.1	p=0.001
Ephemeroptera Taxa	7.3	1.5	20.8	8.7	0.6	6.7	0.0	N/A	N/A	1.0	1.0	100.0	2.0	0.0	0.0	1.7	1.2	69.3	0.0	N/A	N/A	p=0.001
Plecoptera Taxa	5.7	1.2	20.4	5.0	1.0	20.0	1.0	0.0	0.0	1.3	0.6	43.3	2.0	1.0	50.0	3.0	0.0	0.0	0.7	0.6	86.6	p=0.001
Trichoptera Taxa	6.0	2.0	33.3	7.0	1.0	14.3	1.0	0.0	0.0	2.0	1.0	50.0	3.0	0.0	0.0	3.7	1.2	31.5	0.0	N/A	N/A	p=0.001
EPT Taxa	19.0	4.4	22.9	20.7	2.5	12.2	2.0	0.0	0.0	4.3	1.2	26.6	7.0	1.0	14.3	8.3	1.2	13.9	0.7	0.6	86.6	p=0.001
EPT Index	63.6	23.3	36.7	66.2	16.4	24.7	2.3	1.2	53.0	20.4	13.3	65.2	27.6	6.7	24.4	27.6	9.3	33.7	0.4	0.4	94.1	p=0.001
Sensitive EPT Index	34.3	1.8	5.3	23.6	0.9	3.8	1.3	0.6	50.9	16.8	10.4	62.0	23.3	7.5	32.2	20.8	6.6	31.9	0.4	0.4	94.1	p=0.001
Shannon-Weaver Diversity Index*	1.1	0.1	13.1	1.1	0.1	6.2	0.6	0.0	3.2	0.8	0.1	10.6	0.9	0.0	5.3	1.0	0.1	8.2	0.4	0.0	7.5	p=0.001
Relative Diversity (Evenness)*	0.7	0.1	11.1	0.7	0.0	3.6	0.5	0.0	10.1	0.7	0.0	5.1	0.7	0.0	3.7	0.8	0.1	7.2	0.5	0.1	11.9	p=0.001
Tolerance Value	3.9	0.3	9.0	4.0	0.3	7.8	6.3	0.2	3.9	5.1	0.7	13.4	5.1	0.4	8.0	5.2	0.5	9.6	6.2	0.1	1.5	p=0.001
Percent Intolerant Organisms	28.3	3.9	13.9	21.8	1.4	6.5	1.3	0.6	50.1	18.2	11.7	64.5	24.5	8.1	33.2	21.0	6.4	30.2	0.4	0.4	94.1	p=0.001
Percent Tolerant Organisms	3.5	0.7	20.7	0.6	0.6	94.7	23.8	14.0	58.6	10.0	4.7	47.3	17.5	4.2	24.1	20.5	5.7	27.7	10.3	4.6	44.6	p=0.001
Percent Hydropsychidae	2.3	1.1	48.4	3.8	3.1	81.2	0.0	N/A	N/A	0.0	N/A	N/A	0.0	N/A	N/A	0.0	N/A	N/A	0.0	N/A	N/A	p=0.030
Percent Baetidae	9.5	9.6	100.9	9.1	3.8	41.8	0.0	N/A	N/A	1.8	1.9	104.9	2.2	0.7	31.9	2.4	2.4	100.1	0.0	N/A	N/A	p=0.035
Percent Dominant Taxa	32.4	13.4	41.3	31.2	10.1	32.3	54.4	20.4	37.5	43.5	10.9	25.1	36.9	6.3	17.1	27.2	5.0	18.6	66.3	14.2	21.4	p=0.001
Percent Collectors (CG)	44.5	15.2	34.1	39.8	13.1	32.9	33.3	12.4	37.3	54.1	15.4	28.6	56.5	9.2	16.3	60.1	6.7	11.1	99.2	0.2	0.2	p=0.001

Table CAWG 10 Appendix G-5. Metric Values by Site, Mono Creek and Vermilion Valley Dam Leakage Channel, September 2001 (continued).

	Upstream of Lake Edison						Downstream of Vermilion Valley Dam												Vermilion Valley Dam Leakage Channel			p value **
	Site 1			Site 2			Site 1			Site 2			Site 3			Site 4						
Biological Metric	Mean	SD	CV	Mean	SD	CV	Mean	SD	CV	Mean	SD	CV	Mean	SD	CV	Mean	SD	CV	Mean	SD	CV	
Percent Filterers (FC)	6.2	5.2	84.3	8.2	7.4	90.3	61.9	10.6	17.0	22.0	11.2	51.0	11.3	0.8	7.2	9.1	7.0	77.4	0.0	N/A	N/A	p=0.001
Percent Scrapers (SC)	33.5	12.1	36.1	39.7	16.1	40.6	0.0	N/A	N/A	0.1	0.2	173.2	0.6	0.4	70.3	0.6	1.0	173.2	0.0	N/A	N/A	p=0.001
Percent Predators (P)	7.1	2.0	28.6	7.8	0.5	6.0	3.7	2.6	68.7	9.1	2.2	24.0	4.6	0.6	12.0	6.0	2.4	40.6	0.6	0.2	34.8	p=0.001
Percent Shredders (SH)	8.7	1.8	21.1	4.6	0.4	8.5	1.0	0.9	88.4	14.7	7.5	50.8	26.9	9.0	33.5	24.2	7.3	30.2	0.2	0.2	86.6	p=0.001

"N/A" - Mean metric value was equal to zero, therefore, Standard Deviation and Coefficient of Variation were not calculated.
* - Values less than 0.05 were rounded to 0.0
** - Probabilities ≤ 0.001 shown as 0.001

Statistically significant ANOVA p≤0.05 among all sites.

Statistically significant ANOVA p≤0.05 among all sites and statistically significant difference between two or more individual sites based on Boneferroni t-test.

Table CAWG 10 Appendix G-6. Matrix of Probabilities Resulting from *Post Hoc* Pairwise Bonferroni t-Test Comparisons for Mono Creek Taxa Richness.

	Taxa Richness						
	Lower Site 1	**Lower Site 2**	**Lower Site 3**	**Lower Site 4**	**Leakage Channel**	**Upper Site 1**	**Upper Site 2**
Lower Site 1	X	X	X	X	X	X	X
Lower Site 2	1.000	X	X	X	X	X	X
Lower Site 3	0.332	1.000	X	X	X	X	X
Lower Site 4	0.270	0.917	1.000	X	X	X	X
Leakage Channel	1.000	0.614	0.010	0.008	X	X	X
Upper Site 1	0.001	0.003	0.177	0.219	0.001	X	X
Upper Site 2	0.001	0.001	0.062	0.077	0.001	1.000	X

Probabilities ≤ 0.05 are highlighted
Probabilities ≤ 0.001 shown as 0.001

Ephemeroptera Taxa, the two sites upstream of Lake Edison had greater values and were different at a statistically significant level ($p<0.001$) from all sites downstream, including the Leakage Channel (Table CAWG 10 Appendix G-7). Plecoptera Taxa values upstream of Lake Edison were larger than those downstream and generally significantly different ($p<0.02$) from sites downstream of Vermilion Valley Dam. However, Site 2 upstream of Lake Edison was not statistically different from Site 4 downstream of Vermilion Valley Dam (Table CAWG 10 Appendix G-8). Plecoptera Taxa in the Leakage Channel was statistically significantly different from both sites upstream of Lake Edison ($p<0.001$) and Lower Site 4 ($p=0.043$).

For Trichoptera Taxa, the sites upstream of Lake Edison had larger values than downstream and were generally significantly different ($p<0.03$) from sites below Vermilion Valley Dam. However, Upper Site 1 was not significantly different from Lower Sites 3 and 4 (Table CAWG 10 Appendix G-9). The Leakage Channel was statistically significantly different from both sites upstream of Lake Edison and Site 4 below Vermilion Valley Dam ($p<0.001$ for the upper sites, and $p<0.02$, for Lower Site 4, respectively).

EPT Taxa metrics were statistically significantly different ($p<0.001$) among Mono Creek sites. Upper Sites 1 and 2 had larger values than downstream sites and were statistically significantly different ($p<0.001$ for all cases) from all sites downstream of the Vermilion Valley Dam (including the Dam Leakage Channel) (Table CAWG 10 Appendix G-10). Lower Site 1 also was statistically significantly different from Site 4 ($p=0.042$). The Leakage Channel had the lowest value and was statistically significantly different from Lower Sites 3 ($p=0.042$), and 4 ($p=0.009$), in addition to the upper sites.

Composition Measures

The values for EPT Index, Sensitive EPT, Shannon Weaver Diversity indices, and Relative Diversity values were generally greater at sites upstream of Lake Edison compared to sites downstream of Vermilion Valley Dam (Table CAWG 10 Appendix G-5). However, values in the two most downstream sites below Vermilion Valley Dam were more similar to the sites upstream of Lake Edison (including Cold Creek) than other sites.

The high coefficient of variation observed at many of the sites for the EPT metrics indicates that there was a high degree of variability among the EPT groups at each site. Statistics for EPT Index metrics were significantly different ($p<0.001$) among Mono Creek sites. Upper Sites 1 and 2 had larger values and were significantly different ($p<0.05$) from all sites downstream of the Vermilion Valley Dam (including the Vermilion Valley Dam Leakage Channel, $p<0.0001$) (Table CAWG 10 Appendix G-11).

There were significant statistical differences in Sensitive EPT Index metrics ($p<0.001$) between Mono Creek sites, as well (Table CAWG 10 Appendix G-5). Downstream of Vermilion Valley Dam, Lower Site 1 was statistically significantly different from Lower Sites 3 ($p=0.001$), and 4 ($p=0.004$); and Upper Sites 1 ($p<0.0001$), and 2 ($p=0.001$) (Table CAWG 10 Appendix G-12). Lower Site 2 also was statistically significantly different from Upper Site 1 ($p=0.001$). The Vermilion

Table CAWG 10 Appendix G-7. Matrix of Probabilities Resulting from *Post Hoc* Pairwise Bonferroni t-Test Comparisons for Mono Creek Ephemeroptera Taxa.

	Ephemeroptera Taxa						
	Lower Site 1	Lower Site 2	Lower Site 3	Lower Site 4	Leakage Channel	Upper Site 1	Upper Site 2
Lower Site 1	X	X	X	X	X	X	X
Lower Site 2	1.000	X	X	X	X	X	X
Lower Site 3	0.245	1.000	X	X	X	X	X
Lower Site 4	0.630	1.000	1.000	X	X	X	X
Leakage Channel	1.000	1.000	0.245	0.630	X	X	X
Upper Site 1	0.001	0.001	0.001	0.001	0.001	X	X
Upper Site 2	0.001	0.001	0.001	0.001	0.001	1.000	X

Probabilities ≤ 0.05 are highlighted
Probabilities ≤ 0.001 shown as 0.001

Table CAWG 10 Appendix G-8. Matrix of Probabilities Resulting from *Post Hoc* Pairwise Bonferroni t-Test Comparisons for Mono Creek Plecoptera Taxa.

	Plecoptera Taxa						
	Lower Site 1	Lower Site 2	Lower Site 3	Lower Site 4	Leakage Channel	Upper Site 1	Upper Site 2
Lower Site 1	X	X	X	X	X	X	X
Lower Site 2	1.000	X	X	X	X	X	X
Lower Site 3	1.000	1.000	X	X	X	X	X
Lower Site 4	0.124	0.362	1.000	X	X	X	X
Leakage Channel	1.000	1.000	1.000	0.043	X	X	X
Upper Site 1	0.001	0.001	0.001	0.015	0.001	X	X
Upper Site 2	0.001	0.001	0.005	0.124	0.001	1.000	X

Probabilities ≤ 0.05 are highlighted
Probabilities ≤ 0.001 shown as 0.001

Table CAWG 10 Appendix G-9. Matrix of Probabilities Resulting from *Post Hoc* Pairwise Bonferroni t-Test Comparisons for Mono Creek Trichoptera Taxa.

	Trichoptera Taxa						
	Lower Site 1	Lower Site 2	Lower Site 3	Lower Site 4	Leakage Channel	Upper Site 1	Upper Site 2
Lower Site 1	X	X	X	X	X	X	X
Lower Site 2	1.000	X	X	X	X	X	X
Lower Site 3	0.657	1.000	X	X	X	X	X
Lower Site 4	0.137	1.000	1.000	X	X	X	X
Leakage Channel	1.000	0.657	0.062	0.013	X	X	X
Upper Site 1	0.001	0.006	0.062	0.302	0.001	X	X
Upper Site 2	0.001	0.001	0.006	0.028	0.001	1.000	X

Probabilities ≤ 0.05 are highlighted
Probabilities ≤ 0.001 shown as 0.001

Table CAWG 10 Appendix G-10. Matrix of Probabilities Resulting from *Post Hoc* Pairwise Bonferroni t-Test Comparisons for Mono Creek EPT Taxa.

	EPT Taxa						
	Lower Site 1	Lower Site 2	Lower Site 3	Lower Site 4	Leakage Channel	Upper Site 1	Upper Site 2
Lower Site 1	X	X	X	X	X	X	X
Lower Site 2	1.000	X	X	X	X	X	X
Lower Site 3	0.204	1.000	X	X	X	X	X
Lower Site 4	0.042	0.657	1.000	X	X	X	X
Leakage Channel	1.000	0.958	0.042	0.009	X	X	X
Upper Site 1	0.001	0.001	0.001	0.001	0.001	X	X
Upper Site 2	0.001	0.001	0.001	0.001	0.001	1.000	X

Probabilities ≤ 0.05 are highlighted
Probabilities ≤ 0.001 shown as 0.001

Table CAWG 10 Appendix G-11. Matrix of Probabilities Resulting from *Post Hoc* Pairwise Bonferroni t-Test Comparisons for Mono Creek EPT Index.

	EPT Index						
	Lower Site 1	Lower Site 2	Lower Site 3	Lower Site 4	Leakage Channel	Upper Site 1	Upper Site 2
Lower Site 1	X	X	X	X	X	X	X
Lower Site 2	1.000	X	X	X	X	X	X
Lower Site 3	0.319	1.000	X	X	X	X	X
Lower Site 4	0.296	1.000	1.000	X	X	X	X
Leakage Channel	1.000	1.000	0.238	0.221	X	X	X
Upper Site 1	0.000	0.003	0.043	0.047	0.000	X	X
Upper Site 2	0.000	0.003	0.036	0.039	0.000	1.000	X

Probabilities ≤ 0.05 are highlighted
Probabilities ≤ 0.001 shown as 0.001

Table CAWG 10 Appendix G-12. Matrix of Probabilities Resulting from *Post Hoc* Pairwise Bonferroni t-Test Comparisons for Mono Creek Sensitive EPT Index.

	Sensitive EPT Index						
	Lower Site 1	Lower Site 2	Lower Site 3	Lower Site 4	Leakage Channel	Upper Site 1	Upper Site 2
Lower Site 1	X	X	X	X	X	X	X
Lower Site 2	0.269	X	X	X	X	X	X
Lower Site 3	0.001	0.215	X	X	X	X	X
Lower Site 4	0.004	1.000	1.000	X	X	X	X
Leakage Channel	1.000	0.177	0.001	0.003	X	X	X
Upper Site 1	0.000	0.001	0.369	0.076	0.000	X	X
Upper Site 2	0.001	0.332	1.000	1.000	0.001	1.000	X

Probabilities ≤ 0.05 are highlighted
Probabilities ≤ 0.001 shown as 0.001

Valley Dam Leakage Channel had the lowest value of any of the sites associated with Mono Creek. The Leakage Channel was statistically significantly different from Lower Sites 3 (p=0.001), and 4 (p=0.003), as well as Upper Sites 1 and 2 (p<0.001).

The Shannon-Weaver Diversity Index and Relative Diversity were lowest among sites within Mono Creek at Lower Site 1, but increased with distance downstream. The lowest values occurred in the Leakage Channel. The Shannon-Weaver Diversity Index metrics were statistically significantly different (p<0.001) between sites in Mono Creek (Table CAWG 10 Appendix G-5). At Lower Site 4, the Shannon-Weaver Diversity Index was similar to the sites upstream of Lake Edison. Lower Site 1 was statistically significantly different from Lower Sites 2 (p=0.046), 3 (p=0.002) and 4 (p<0.001), and Upper Sites 1 (p<0.001) and 2 (p<0.001) (Table CAWG 10 Appendix G-13).

Lower Site 2 downstream of Vermilion Valley Dam was statistically significantly different from Upper Sites 1 (p=0.005) and 2 (p=0.005), and the Dam Leakage Channel (p=0.001). The Leakage Channel Site also was statistically significantly different (p<0.001) from Lower Sites 2, 3 and 4 and Upper Sites 1 and 2.

Statistics for the Relative Diversity metrics were significantly different (p<0.001) among Mono Creek sites (Table CAWG 10 Appendix G-5). Lower Site 1 was statistically significantly different from Lower Sites 2, 3 and 4 (p<0.02), as well as Upper Sites 1 and 2 (p=0.001 for both) (Table CAWG 10 Appendix G-14). The Leakage Channel Site was statistically significantly different from Lower Sites 2 (p=0.011), 3 (p=0.011), and 4 (p<0.001), and Upper Sites 1 (p<0.001) and 2 (p=0.001).

TOLERANCE/INTOLERANCE MEASURES

Mean Tolerance Values were greater at the sites downstream of Vermilion Valley Dam than at the sites upstream of Lake Edison (Table CAWG 10 Appendix G-5). The Tolerance Value metrics were statistically significantly different (p<0.001) among sites in Mono Creek. Upper Sites 1 and 2 were statistically significantly different (p<0.03) from all sites downstream of the Vermilion Valley Dam (including the Leakage Channel) (Table CAWG 10 Appendix G-15). Downstream of Vermilion Valley Dam, Lower Site 1 had a higher value and was statistically significantly different from Sites 3 and 4 (p=0.010 and p=0.030, respectively). The Leakage Channel Site also was significantly different from Sites 3 and 4 downstream of Vermilion Valley Dam (p=0.014 and p=0.042, respectively).

The mean Percent of Intolerant Organisms metrics at Lower Site 1 and the Leakage Channel were substantially lower than the percentages for each of the sites upstream of Lake Edison (Table CAWG 10 Appendix G-5). Lower Site 1 was statistically different from Upper Sites 1 and 2 (p<0.01) and Lower Sites 3 and 4 (p<0.01), but not from Lower Site 2 or the Leakage Channel (Table CAWG 10 Appendix G-16). At Lower Sites 2, 3, and 4, the Percent Intolerant Organisms metrics were similar to the values observed for the sites upstream of Lake Edison. These sites were not statistically significantly different from either of the sites upstream of Lake Edison. Percent Intolerant Organisms at the Leakage Channel was statistically significantly different from all sites except Lower Sites 1 and 2 (p<0.01).

Table CAWG 10 Appendix G-13. Matrix of Probabilities Resulting from *Post Hoc* Pairwise Bonferroni t-Test Comparisons for Mono Creek Shannon-Weaver Diversity Index.

	Shannon-Weaver Diversity Index						
	Lower Site 1	Lower Site 2	Lower Site 3	Lower Site 4	Leakage Channel	Upper Site 1	Upper Site 2
Lower Site 1	X	X	X	X	X	X	X
Lower Site 2	0.046	X	X	X	X	X	X
Lower Site 3	0.002	1.000	X	X	X	X	X
Lower Site 4	0.000	0.060	1.000	X	X	X	X
Leakage Channel	1.000	0.001	0.000	0.000	X	X	X
Upper Site 1	0.000	0.005	0.116	1.000	0.000	X	X
Upper Site 2	0.000	0.005	0.125	1.000	0.000	1.000	X

Probabilities ≤ 0.05 are highlighted
Probabilities ≤ 0.001 shown as 0.001

Table CAWG 10 Appendix G-14. Matrix of Probabilities Resulting from *Post Hoc* Pairwise Bonferroni t-Test Comparisons for Mono Creek Relative Diversity (Evenness).

	Relative Diversity (Evenness)						
	Lower Site 1	Lower Site 2	Lower Site 3	Lower Site 4	Leakage Channel	Upper Site 1	Upper Site 2
Lower Site 1	X	X	X	X	X	X	X
Lower Site 2	0.016	X	X	X	X	X	X
Lower Site 3	0.017	1.000	X	X	X	X	X
Lower Site 4	0.000	1.000	0.992	X	X	X	X
Leakage Channel	1.000	0.011	0.011	0.000	X	X	X
Upper Site 1	0.001	1.000	1.000	1.000	0.000	X	X
Upper Site 2	0.001	1.000	1.000	1.000	0.001	1.000	X

Probabilities ≤ 0.05 are highlighted
Probabilities ≤ 0.001 shown as 0.001

Table CAWG 10 Appendix G-15. Matrix of Probabilities Resulting from *Post Hoc* Pairwise Bonferroni t-Test Comparisons for Mono Creek Tolerance Value.

	Tolerance Value						
	Lower Site 1	**Lower Site 2**	**Lower Site 3**	**Lower Site 4**	**Leakage Channel**	**Upper Site 1**	**Upper Site 2**
Lower Site 1	X	X	X	X	X	X	X
Lower Site 2	0.173	X	X	X	X	X	X
Lower Site 3	0.010	1.000	X	X	X	X	X
Lower Site 4	0.030	1.000	1.000	X	X	X	X
Leakage Channel	1.000	0.241	0.014	0.042	X	X	X
Upper Site 1	0.000	0.000	0.004	0.002	0.000	X	X
Upper Site 2	0.000	0.001	0.020	0.007	0.000	1.000	X

Probabilities ≤ 0.05 are highlighted
Probabilities ≤ 0.001 shown as 0.001

Table CAWG 10 Appendix G-16. Matrix of Probabilities Resulting from *Post Hoc* Pairwise Bonferroni t-Test Comparisons for Mono Creek Percent Intolerant Organisms.

	Percent Intolerant Organisms						
	Lower Site 1	**Lower Site 2**	**Lower Site 3**	**Lower Site 4**	**Leakage Channel**	**Upper Site 1**	**Upper Site 2**
Lower Site 1	X	X	X	X	X	X	X
Lower Site 2	0.340	X	X	X	X	X	X
Lower Site 3	0.001	0.274	X	X	X	X	X
Lower Site 4	0.008	1.000	1.000	X	X	X	X
Leakage Channel	1.000	0.232	0.001	0.005	X	X	X
Upper Site 1	0.000	0.061	1.000	1.000	0.000	X	X
Upper Site 2	0.008	1.000	1.000	1.000	0.005	1.000	X

Probabilities ≤ 0.05 are highlighted
Probabilities ≤ 0.001 shown as 0.001

The Percent Tolerant Organisms metrics were statistically significantly different ($p<0.001$) between Mono Creek sites (Table CAWG 10 Appendix G-5). Upper Sites 1 and 2 were lower in value and significantly different from Lower Sites 1 through 4 ($p<0.012$). Upper Site 2 was statistically significantly different from the Leakage Channel ($p<0.001$) (Table CAWG 10 Appendix G-17). However, Upper Site 1 was statistically significantly different from Upper Site 2 ($p<0.001$), but not from the Leakage Channel. Lower Site 2 was statistically significantly different from Lower Site 4 ($p=0.007$). The Percent Tolerant Organisms at the Leakage Channel also was statistically significantly different ($p<0.03$) from Lower Sites 1, 3, and 4.

Hydropsychidae were only found in Mono Creek sites upstream of Lake Edison. However, variability (CV) was high and no significant difference was found in pairwise comparisons (Table CAWG 10 Appendix G-18). This taxonomic group is generally considered an indicator of disturbance or pollution (Harrington and Born 2000).

Mean Percent Baetidae values for sites upstream of Lake Edison were greater than for sites downstream and there was a statistically significant difference among sites ($p=0.035$) (Table CAWG 10 Appendix G-5). There was no statistically significant difference between individual sites on a pairwise comparison basis ($p>0.05$) (Table CAWG 10 Appendix G-19). Baetids are generally considered indicators of disturbance or pollution (Harrington and Born 2000).

The mean percentage of Dominant Taxa was highest in the Leakage Channel. The sites within Mono Creek below the dam showed a decrease in proportion of Dominant Taxa from upstream to downstream sites (Table CAWG 10 Appendix G-5). There was a statistically significant difference in Percent Dominant Taxa among sites ($p=0.001$). At Lower Site 4, the percentage of Dominant Taxa was similar to what was observed upstream of Lake Edison. Lower Site 1 and the Vermilion Valley Leakage Channel were statistically significantly different ($p\leq0.05$) from the sites upstream of the lake and Lower Site 4 (Table CAWG 10 Appendix G-20).

FUNCTIONAL FEEDING GROUPS

In the Mono Creek reach upstream of Lake Edison, the dominant Functional Feeding Groups were the Collectors and Scrapers (Table CAWG 10 Appendix G-5). Figure CAWG 10 Appendix G-1 shows Percentages of Functional Feeding Groups consolidated by site. Increases in Percent Collectors are expected responses to disturbance (Harrington and Born 2000). The values for Percent Collectors increased downstream from Sites 1 to 4 below Vermilion Valley Dam, and were greater in Lower Sites 2, 3, and 4 than the values observed at sites above Lake Edison. However, only the Leakage Channel Site, which had the largest value, was statistically significantly different ($p<0.02$) from all other Mono Creek Sites (Table CAWG 10 Appendix G-21).

The Percent Filterers was greatest at Lower Site 1 and decreased downstream. The lowest value for Percent Filterers downstream of the dam (Lower Site 4) was greater than either value upstream of Lake Edison. The Percent Filterers metrics were statistically significantly different ($p<0.001$) among sites in Mono Creek. Lower Site 1

Table CAWG 10 Appendix G-17. Matrix of Probabilities Resulting from *Post Hoc* Pairwise Bonferroni t-Test Comparisons for Mono Creek Percent Tolerant Organisms.

	Percent Tolerant Organisms						
	Lower Site 1	Lower Site 2	Lower Site 3	Lower Site 4	Leakage Channel	Upper Site 1	Upper Site 2
Lower Site 1	X	X	X	X	X	X	X
Lower Site 2	1.000	X	X	X	X	X	X
Lower Site 3	1.000	0.274	X	X	X	X	X
Lower Site 4	0.229	0.007	1.000	X	X	X	X
Leakage Channel	0.032	0.975	0.004	0.001	X	X	X
Upper Site 1	0.001	0.012	0.001	0.001	1.000	X	X
Upper Site 2	0.001	0.001	0.001	0.001	0.001	0.036	X

Probabilities ≤ 0.05 are highlighted
Probabilities ≤ 0.001 shown as 0.001

Table CAWG 10 Appendix G-18. Matrix of Probabilities Resulting from *Post Hoc* Pairwise Bonferroni t-Test Comparisons for Mono Creek Percent Hydropsychidae.

	Percent Hydropsychidae						
	Lower Site 1	Lower Site 2	Lower Site 3	Lower Site 4	Leakage Channel	Upper Site 1	Upper Site 2
Lower Site 1	X	X	X	X	X	X	X
Lower Site 2	1.000	X	X	X	X	X	X
Lower Site 3	1.000	1.000	X	X	X	X	X
Lower Site 4	1.000	1.000	1.000	X	X	X	X
Leakage Channel	1.000	1.000	1.000	1.000	X	X	X
Upper Site 1	0.549	0.549	0.549	0.549	0.549	X	X
Upper Site 2	0.312	0.312	0.312	0.312	0.312	1.000	X

Probabilities ≤ 0.05 are highlighted
Probabilities ≤ 0.001 shown as 0.001

Table CAWG 10 Appendix G-19. Matrix of Probabilities Resulting from *Post Hoc* Pairwise Bonferroni t-Test Comparisons for Mono Creek Percent Baetidae.

	Percent Baetidae						
	Lower Site 1	**Lower Site 2**	**Lower Site 3**	**Lower Site 4**	**Leakage Channel**	**Upper Site 1**	**Upper Site 2**
Lower Site 1	X	X	X	X	X	X	X
Lower Site 2	1.000	X	X	X	X	X	X
Lower Site 3	1.000	1.000	X	X	X	X	X
Lower Site 4	1.000	1.000	1.000	X	X	X	X
Leakage Channel	1.000	1.000	1.000	1.000	X	X	X
Upper Site 1	0.207	0.502	0.833	0.893	0.207	X	X
Upper Site 2	0.300	0.722	1.000	1.000	0.300	1.000	X

Probabilities ≤ 0.05 are highlighted
Probabilities ≤ 0.001 shown as 0.001

Table CAWG 10 Appendix G-20. Matrix of Probabilities Resulting from *Post Hoc* Pairwise Bonferroni t-Test Comparisons for Mono Creek Percent Dominant Taxa.

	Percent Dominant Taxa						
	Lower Site 1	**Lower Site 2**	**Lower Site 3**	**Lower Site 4**	**Leakage Channel**	**Upper Site 1**	**Upper Site 2**
Lower Site 1	X	X	X	X	X	X	X
Lower Site 2	0.565	X	X	X	X	X	X
Lower Site 3	0.094	1.000	X	X	X	X	X
Lower Site 4	0.008	1.000	1.000	X	X	X	X
Leakage Channel	1.000	0.842	0.142	0.013	X	X	X
Upper Site 1	0.029	1.000	1.000	1.000	0.044	X	X
Upper Site 2	0.018	1.000	1.000	1.000	0.027	1.000	X

Probabilities ≤ 0.05 are highlighted
Probabilities ≤ 0.001 shown as 0.001

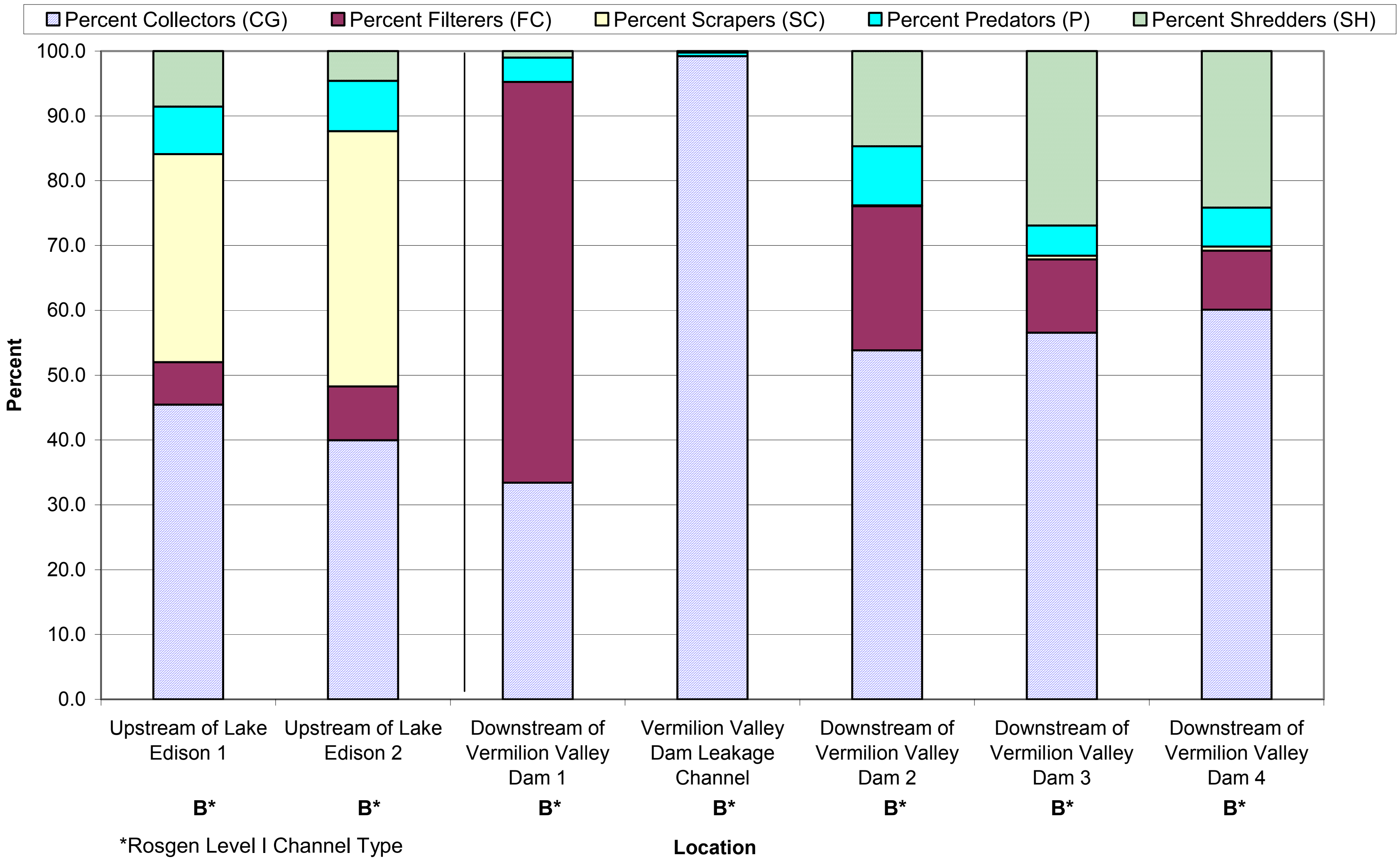


Figure CAWG 10 Appendix G-1. Functional Feeding Group Percentages by Site, Mono Creek, September 2001.

Table CAWG 10 Appendix G-21. Matrix of Probabilities Resulting from *Post Hoc* Pairwise Bonferroni t-Test Comparisons for Mono Creek Percent Collectors.

	Percent Collectors						
	Lower Site 1	**Lower Site 2**	**Lower Site 3**	**Lower Site 4**	**Leakage Channel**	**Upper Site 1**	**Upper Site 2**
Lower Site 1	X	X	X	X	X	X	X
Lower Site 2	0.927	X	X	X	X	X	X
Lower Site 3	0.563	1.000	X	X	X	X	X
Lower Site 4	0.268	1.000	1.000	X	X	X	X
Leakage Channel	0.000	0.006	0.010	0.020	X	X	X
Upper Site 1	1.000	1.000	1.000	1.000	0.001	X	X
Upper Site 2	1.000	1.000	1.000	1.000	0.000	1.000	X

Probabilities ≤ 0.05 are highlighted
Probabilities ≤ 0.001 shown as 0.001

had the largest value and was statistically significantly different ($p<0.001$) from all other Mono Creek Sites, and the Leakage Channel Site (Table CAWG 10 Appendix G-22). Lower Site 2 also was statistically significantly different ($p<0.05$) from the Vermilion Valley Dam Leakage Channel Site. Increases in the percentage of Filterers are expected responses to disturbance (Harrington and Born 2000).

The values for Percent Scrapers were greater upstream of Lake Edison than downstream of Vermilion Valley Dam. The values for this metric at sites upstream of Lake Edison were statistically significantly greater ($p\leq0.002$) than sites downstream. The response of scrapers to disturbance is considered to be variable (Table CAWG 10 Appendix G-23).

Predators represented a small percentage of the Functional Feeding Groups at all sites (Table CAWG 10 Appendix G-5). The largest mean relative abundance occurred at Lower Site 2 and the smallest in the Leakage Channel. The Percentage Predators in the Leakage Channel was smaller than all other sites and was statistically significantly different ($p<0.05$) from all sites except Lower Sites 1 and 3 (Table CAWG 10 Appendix G-24). Percentage Predators is expected to have a variable response to disturbance (Harrington and Born 2000).

The Percent Shredder value at Lower Site 1 was lowest among the downstream sites where it was the second least abundant functional feeding group. At each successive downstream site, the proportion of Shredders increased. At Lower Sites 3 and 4, they were the second most abundant group represented. The Percent Shredders metrics were statistically significantly different ($p<0.001$) among sites in Mono Creek. Lower Site 1 was significantly different ($p\leq0.002$) from Lower Sites 3 and 4. Lower Site 3 differed significantly from the low value of the Leakage Channel ($p<0.001$). Sites 3 and 4 differed significantly from Upper Site 2 ($p<0.02$). Upper Site 1 was not statistically significantly different from Lower Site 4 ($p=0.061$). The Leakage Channel was not significantly different from either Site upstream of the lake or Lower Sites 1 and 2. Percent Shredders are characterized as decreasing in response to disturbance. The Leakage channel contained significantly lower Percentage Shredders than either of the sites upstream of the lake. Lower Sites 3 and 4 had statistically greater Percent Shredders than Upper Sites 1 and 2, which are unaffected by the Project. This metric suggests less environmental disturbance at downstream Sites 3 and 4 than both sites upstream of the lake (Table CAWG 10 Appendix G-25).

The structure of the Functional Feeding Groups downstream of Vermilion Valley Dam, when compared to sites upstream, provides a mixed indication of disturbed stream conditions. For Lower Site 1, these metrics may be viewed as suggesting a disturbed stream condition compared to sites upstream of Lake Edison, but there are other explanations for the observed differences. Lower Site 1 is located in a man-made channel, which is lined with rip-rap. The Leakage channel site is located downstream of a series of short channels providing very little flow from seepage from the dam and monitoring wells. The metrics may also be viewed as indicating improvement with distance downstream of Lower Site 1 (Table CAWG 10 Appendix G-5). However, this

Table CAWG 10 Appendix G-22. Matrix of Probabilities Resulting from *Post Hoc* Pairwise Bonferroni t-Test Comparisons for Mono Creek Percent Filterers.

	Percent Filterers						
	Lower Site 1	Lower Site 2	Lower Site 3	Lower Site 4	Leakage Channel	Upper Site 1	Upper Site 2
Lower Site 1	X	X	X	X	X	X	X
Lower Site 2	0.000	X	X	X	X	X	X
Lower Site 3	0.000	1.000	X	X	X	X	X
Lower Site 4	0.000	0.983	1.000	X	X	X	X
Leakage Channel	0.000	0.049	1.000	1.000	X	X	X
Upper Site 1	0.000	0.385	1.000	1.000	1.000	X	X
Upper Site 2	0.000	0.745	1.000	1.000	1.000	1.000	X

Probabilities ≤ 0.05 are highlighted
Probabilities ≤ 0.001 shown as 0.001

Table CAWG 10 Appendix G-23. Matrix of Probabilities Resulting from *Post Hoc* Pairwise Bonferroni t-Test Comparisons for Mono Creek Percent Scrapers.

	Percent Scrapers						
	Lower Site 1	Lower Site 2	Lower Site 3	Lower Site 4	Leakage Channel	Upper Site 1	Upper Site 2
Lower Site 1	X	X	X	X	X	X	X
Lower Site 2	1.000	X	X	X	X	X	X
Lower Site 3	1.000	1.000	X	X	X	X	X
Lower Site 4	1.000	1.000	1.000	X	X	X	X
Leakage Channel	1.000	1.000	1.000	1.000	X	X	X
Upper Site 1	0.002	0.002	0.002	0.002	0.002	X	X
Upper Site 2	0.000	0.000	0.000	0.000	0.000	1.000	X

Probabilities ≤ 0.05 are highlighted
Probabilities ≤ 0.001 shown as 0.001

Table CAWG 10 Appendix G-24. Matrix of Probabilities Resulting from *Post Hoc* Pairwise Bonferroni t-Test Comparisons for Mono Creek Percent Predators.

Percent Predators	Lower Site 1	Lower Site 2	Lower Site 3	Lower Site 4	Leakage Channel	Upper Site 1	Upper Site 2
Lower Site 1	X	X	X	X	X	X	X
Lower Site 2	0.051	X	X	X	X	X	X
Lower Site 3	1.000	0.179	X	X	X	X	X
Lower Site 4	1.000	1.000	1.000	X	X	X	X
Leakage Channel	0.947	0.001	0.282	0.043	X	X	X
Upper Site 1	0.745	1.000	1.000	1.000	0.010	X	X
Upper Site 2	0.309	1.000	1.000	1.000	0.004	1.000	X

Probabilities ≤ 0.05 are highlighted
Probabilities ≤ 0.001 shown as 0.001

Table CAWG 10 Appendix G-25. Matrix of Probabilities Resulting from *Post Hoc* Pairwise Bonferroni t-Test Comparisons for Mono Creek Percent Shredders.

Percent Shredders	Lower Site 1	Lower Site 2	Lower Site 3	Lower Site 4	Leakage Channel	Upper Site 1	Upper Site 2
Lower Site 1	X	X	X	X	X	X	X
Lower Site 2	0.139	X	X	X	X	X	X
Lower Site 3	0.001	0.285	X	X	X	X	X
Lower Site 4	0.002	0.948	1.000	X	X	X	X
Leakage Channel	1.000	0.096	0.000	0.001	X	X	X
Upper Site 1	1.000	1.000	0.018	0.061	1.000	X	X
Upper Site 2	1.000	0.710	0.003	0.009	1.000	1.000	X

Probabilities ≤ 0.05 are highlighted
Probabilities ≤ 0.001 shown as 0.001

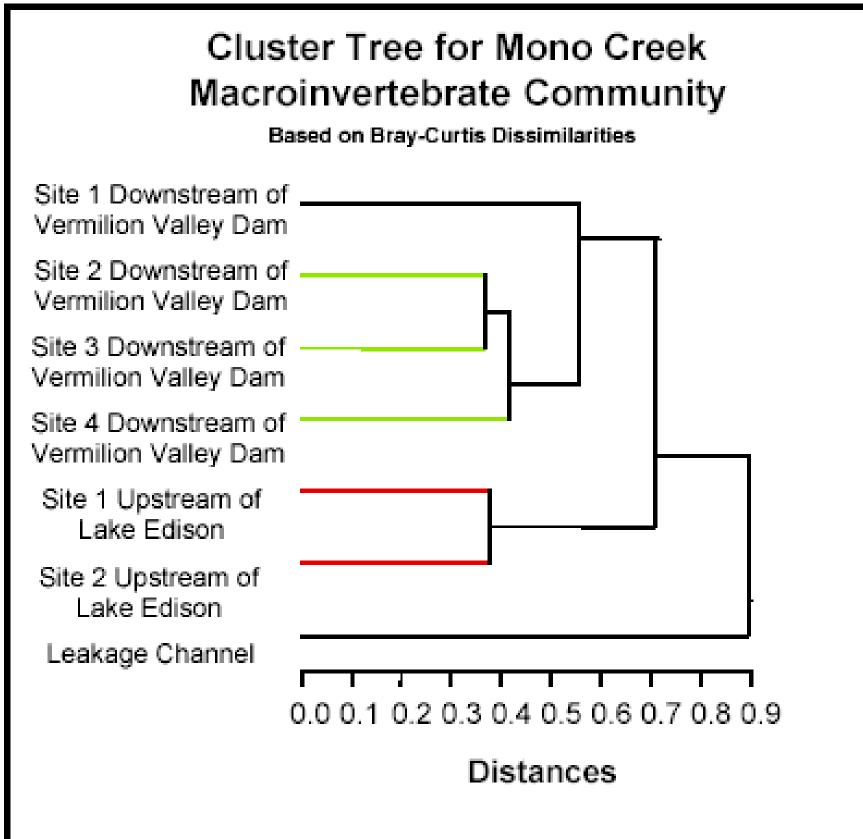
interpretation may not be completely appropriate. The area immediately downstream of Vermilion Valley Dam receives little input in the form of coarse particulate matter (CPOM) from a surrounding riparian corridor. The organic materials entering the lake from upstream tributaries are incorporated into the lake's trophic web. Materials are cycled through lake organisms including plankton and are not passed directly downstream. Water discharged to Mono Creek downstream of the lake is withdrawn through an intake located in deep water.

The releases from the lake are more likely to contain phytoplankton, zooplankton, and products of their bacterial decomposition as a source of food for macroinvertebrates downstream than materials that would normally be associated with a montane stream. Because of the materials available to the macroinvertebrate community downstream of the lake, niches are available that heavily favor filter feeding organisms. While this condition differs from typical low order stream communities, it does not indicate "impairment." Harrington and Born (2000) remark on the typical abundance of filterers at sites downstream of lakes and dams due to their adaptations to make use of the plankton-derived food sources.

CLUSTER ANALYSIS

Cluster analyses were performed on the BMI community based on family-level taxonomy and physical/habitat quality parameters, respectively, for Mono Creek. The cluster trees for community composition and physical/habitat quality parameters for Mono Creek are presented in Figure CAWG 10 Appendix G-2. Both the community composition and physical/habitat quality parameter cluster trees show the Leakage Channel to be distinct and quite dissimilar to all other sites in Mono Creek. In the taxonomic tree, Sites AD 1 and AD 2 appear to be most similar to each other and different from the sites in Mono Creek below Vermilion Valley Dam. Lower Sites 2, 3, and 4 are shown to be relatively similar in taxonomic composition. The community composition of Lower Site 1 is indicated to be more similar to the other downstream sites than the upstream sites. The Leakage Channel was dissimilar from the other sites.

The physical/habitat quality parameter cluster tree (like the community composition tree) shows the Leakage Channel clearly isolated by the dissimilarity of its physical/habitat quality characteristics from all of the other sites. Among the remaining sites, Lower Sites 2 and 3 are the most similar to each other (as shown by distance scores) followed by Upper Site 2 and Lower Site 4. Upper Site 1 and Lower Site 1 are relatively dissimilar (based on similarity scores) from the rest of the sites, although not similar to each other. The physical/habitat quality scores for Lower Site 1 and its subsequent dissimilarity from other sites reflected the differences of its artificial channel and the effect of long-term high flow releases from the dam.



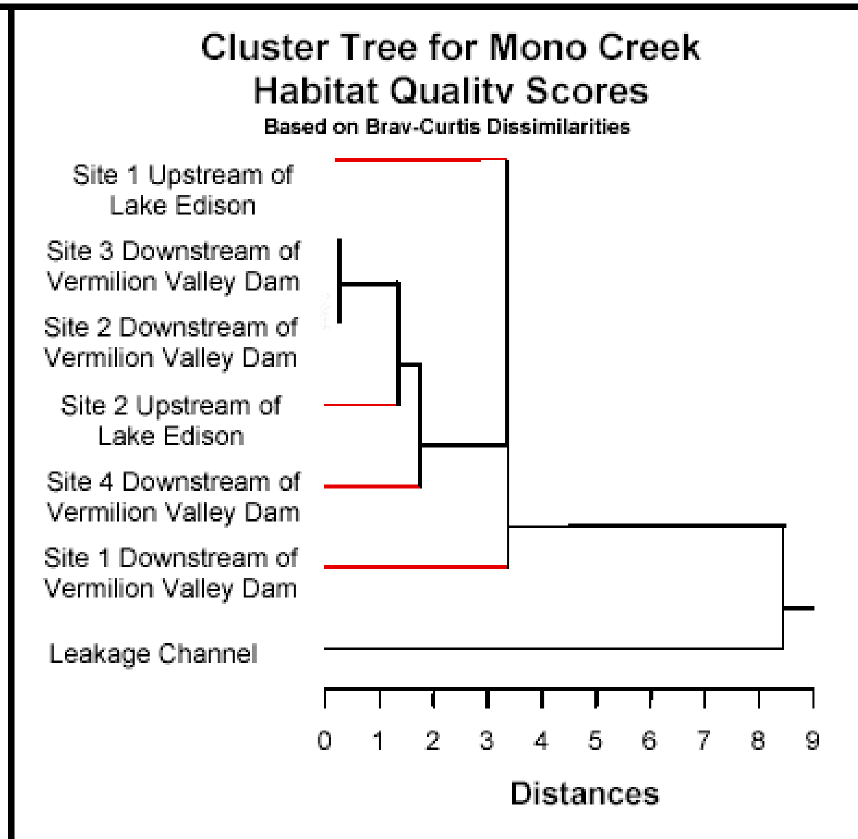


Figure CAWG 10 Appendix G-2.Cluster Trees for Mono Creek and Leakage Channel.

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CDFG. 1999. California Stream Bioassessment Procedure (Protocol Brief for Biological and Physical/Habitat Assessment in Wadable Streams). CDFG, Water Pollution Control Laboratory. Rancho Cordova, California.

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APPENDIX H

DIVERSION OPERATION DATES 2002

Table CAWG 10 APPENDIX H-1. Project Diversion Operation Dates for 2002.

Diversion	Turned In (month/day/year)	Turned Out (month/day/year)
Tombstone Creek	Not Operational	
South Slide Creek	Not Operational	
North Slide Creek	Not Operational	
Hooper Creek	04/01/02	10/08/02
Crater Creek	05/04/02	07/16/02
Bear Creek	All Year	--
Chinquapin Creek	04/11/02	07/09/02
Camp 62 Creek	04/11/02	07/21/02
Bolsillo Creek	04/25/02	07/02/02
Mono Creek	All Year	--
Rock Creek	All Year	--
Ross Creek	All Year	--
Pitman Creek	03/11/02	07/24/02
Balsam Creek	3/28/02	11/14/02
Ely Creek	--	All Year

