The Distribution and Abundance of Lotic Macroinvertebrates during Spring 1997 in Seven Streams of the Santa Clara Valley area, California

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SANTA CLARA VALLEY
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By James L. Carter and Steven V. Fend

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THE DISTRIBUTION AND ABUNDANCE OF LOTIC MACROINVERTEBRATES DURING SPRING 1997 IN SEVEN STREAMS OF THE SANTA CLARA VALLEY AREA, CALIFORNIA

By James L. Carter *and* Steven V. Fend

ABSTRACT

Benthic macroinvertebrates were collected during May 1997 from riffle habitats located in 7 streams within the Santa Clara Valley area. A total of 261 taxa were identified from 44 sites. In general, total taxon richness decreased from upstream to downstream sites. Sites located in most upland areas contained more taxa and higher percentage composition of the Orders Ephemeroptera, Plecoptera, and Trichoptera than sites from lowland areas. Sites located in lowland areas contained more taxa and higher percentage composition of taxa contained within the Chironomidae and Oligochaeta.

INTRODUCTION

Aquatic macroinvertebrates are the most numerous animals inhabiting streams and rivers. In addition to being numerically abundant, they also represent more species than any other group of animals found in lotic systems. Individual species and species assemblages have been used for about a century to assess the condition of many types of aquatic resources (Kolkwitz and Marsson, 1909; Helawell, 1986).

Macroinvertebrates have many characteristics that make them useful for monitoring the quality of lotic systems (Rosenberg and Resh, 1993). They are easily and inexpensively sampled using a variety of sampling devices. Depending on the species, their populations can respond both negatively and positively to anthropogenic (human induced) influences. Some macroinvertebrate species live for only weeks, while other species live for several years allowing the evaluation of both short- and long-term environmental influences. Most macroinvertebrates are relatively easy to identify once they have developed to their mature aquatic stage. Although some taxonomic groups are poorly known at the species-level and are time consuming to identify, many advances in aquatic invertebrate taxonomy have occurred during the last few decades and environmental criteria are often based on taxonomic levels higher than the species.

Macroinvertebrates are an integral and functional part of stream ecosystems. All trophic groups, such as grazers, detritivores, and predators are represented, and impacts on stream function have been evaluated by assessing changes in the trophic structure of the macroinvertebrate community. Macroinvertebrates are the primary link between plants and insectivorous fish in lotic systems and many stream fishes (e.g. trout and sculpins) depend on benthic invertebrates for their survival. Lastly, terrestrial predators including other insects, spiders, birds, bats, and raccoons prey upon stream invertebrates creating an energy pathway from the stream to the surrounding terrestrial ecosystem.

As a result of the above characteristics, benthic macroinvertebrates are the most frequently used group of organisms for monitoring the "health" of lotic systems (Rosenberg and Resh, 1993; Karr and Chu, 1999). However, the faunas of most geographic areas are poorly known and there tends to be little information on the occurrence and natural variability in macroinvertebrate communities over larger spatial areas and/or temporally. This is particularly true for urban areas. The development of biocriteria based on the macroinvertebrate community of streams found in the San Francisco Bay area is dependent on obtaining sufficient knowledge of the spatial and temporal variability in the composition of lotic macroinvertebrates inhabiting the areas streams.

The objective of this report is to provide baseline information on the occurrence and abundance of macroinvertebrates in selected streams within the Santa Clara Valley area. Our intent is to provide high-resolution taxonomic macroinvertebrate data for locations that represent physically, chemically, and biologically diverse conditions within this highly developed urban environment. The ultimate goal of this study is to develop biocriteria based on benthic macroinvertebrate community composition to evaluate the integrity of streams and rivers in the San Francisco Bay area.

Acknowledgements

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METHODS

Eighty-five sites located on 14 streams within the Santa Clara Valley area were sampled for macroinvertebrates (Figure 1). The streams were: 1) San Francisquito Ck., 2) Corte Madera Ck., 3) Los Trancos Ck., 4) Stevens Ck., 5) Saratoga Ck., 6) Guadalupe R., 7) Los Gatos Ck., 8) Ross Ck., 9) Guadalupe Ck., 10) Alamos Ck., 11) Barret Ck., 12) Arroyo Calero, 13) Coyote Ck., and 14) Upper Penitencia Ck. This report details the macroinvertebrate composition of 44 sites located on 7 streams in the eastern portion of the basin: Guadalupe R., Guadalupe Ck., Alamos Ck., Barret Ck., Arroyo Calero, Coyote Ck., and Upper Penitencia Ck.

Field

Sampling locations were chosen to be approximately equidistant, with sites set at 2 km intervals. The most downstream site within each sub-basin was either the point of observed or assumed intermittent flow or where there appeared to be a tidal influence to river flow and/or sediment type. In general, the most upstream site was at an altitude of approximately 300m.

At each site a semi-quantitative collection of macroinvertebrates was made from a single riffle. Each collection was a composite of 5-0.09 m² kick samples taken with a 0.3 m wide D-frame kicknet fitted with a 500 µm mesh. The five individual kick samples were taken systematically in each riffle in a downstream to upstream direction, crossing the stream twice along two perpendicular diagonal lines (i.e. a V-shape across the riffle's breadth). Two of the five samples were obtained in the thalweg and the remaining three samples were taken between the thalweg and the margins. At sites containing extremely long riffles, sampling focused on the upstream portion of the riffle.

Large organic (leaves and twigs) and inorganic material was removed from each kick sample prior to field elutriating, compositing, and preserving. If the remaining material contained excessive amounts of fine inorganic material (e.g., sand and fine gravel) the organic material was elutriated from the inorganic material. The inorganic material remaining after elutriating was then searched for taxa with high specific gravities (e.g., cased Trichoptera) that may not have been removed while elutriating. The composited sample was preserved in the field with 10% buffered formalin.

Laboratory

All samples were subsampled in the laboratory. The subsampling device was a rectangular, acrylic frame with a bottom of 100 µm mesh nylon underlain by 2.5 cm² wire mesh for support and demarcating 5 cm² grids. Three sizes of the frame were constructed to accommodate different sample volumes. While the frame was partially submerged in water, the sample was added and uniformly distributed. The frame was then raised out of the water and allowed to drain, thereby fixing the position of the sample in the frame.

Five randomly chosen 5 cm x 5 cm grids were removed. The density of the organisms per grid was estimated to determine the number of grids needed to obtain at least 500 organisms. If the density of organisms contained in a minimum of 3 grids substantially exceeded 500, at least 3 of the 5 grids were

uniformly distributed in another frame and the procedure repeated. The necessary grids were removed and combined to form the subsample. All organisms were sorted from the subsample at 8x magnification. After each subsample was sorted a second person searched the just-sorted material for a maximum of 30 min. to remove the organisms that may have been overlooked during the initial sorting. After the subsample was removed from the sample, visually obvious taxa that may not have been contained in the subsample were sorted from the remaining portion of the sample for a period of 15 min. All taxa were placed in vials and stored in 80% ethanol prior to identification.

All organisms were identified to the lowest practicable taxonomic level. Primary references included Merritt and Cummins (1996), Thorp and Covich (1991), and Pennak (1989). All data were entered into an electronic spreadsheet.

RESULTS AND DISCUSSION

Description of data tables

Site locations and site name abbreviations are detailed in Table 1. A common format is used for site names throughout the report. The first three characters represent the stream name and the last two characters (numbers) represent the approximate distance from the site to the mouth of the stream in km.

Abbreviations used to qualify taxonomic designations used in Tables 4-10 are defined in Table 2. Table 3 summarizes sample characteristics including abundance m^{-2} , total taxon richness, and richness and proportional abundance of taxonomic groups generally considered pollution tolerant (Orders: Ephemeroptera, Plecoptera, and Trichoptera) and pollution intolerant (Chironomidae and Oligochaeta). Table 4 lists all the taxa identified from the 44 sites, the per taxon abundance m^{-2} summed across all 44 sites, and the constancy for each taxon. Constancy represents the number of sites in which the taxon was found.

Tables 5-10 contain the estimated number of individuals m^2 /taxon/site grouped by stream. At the bottom of each site-column is the estimated number of individuals m^2 /site and the total taxonomic richness per site (i.e. the number of taxa identified from the site). Although macroinvertebrate samples were collected semi-quantitatively, abundances are listed as densities (number of individuals m^{-2}) for comparative purposes.

Summarization of taxonomic richness and percentage composition

The total number of taxa (richness) identified from the 44 collections was 261. The mean richness per site was 52.7 ± 11.45 (standard deviation). The sites ranged in richness from 35 at COC35 and COC54 to 81 at BAC01 in the Alamitos Ck. drainage (Table 3). The combined richness of the Orders Ephemeroptera, Plecoptera, and Trichoptera (EPT), which are generally considered to be pollution intolerant, ranged from 3 at GUR07 and COC12 to 27 at ALC14 and BAC01. In general, richness decreased from upstream sites to downstream sites (Figure 2) with the exception of sites within the mid-portion of Coyote Ck.

The distribution of taxa among major taxonomic groups also varied from upstream to downstream and among streams. In general, the percentage of the total richness per site attributed to the richness of EPT decreased from upstream to downstream. Consequently, EPT richness was relatively high in streams that were contained in upland areas such as Guadalupe Ck. and lower in streams contained in lowland areas such as Guadalupe R. In Penitencia Ck., although EPT richness decreased from upstream to downstream sites (Table 3), the percentage of richness attributable to the EPT remained relatively high over the entire portion sampled (Figure 2).

In contrast to EPT richness, the percentage of total richness per site attributed to the richness of Chironomidae and Oligochaeta increased from upstream to downstream sites. Oligochaete richness was maximum (21) at COC12 and represented approximately 50% of the taxa present at that site (Table 3). Chironomid and oligochaete richness also was high at the upstream sites on Arroyo Calero and represented approximately 50% of the taxa identified (Figure 2).

The estimated mean density of macroinvertebrates among the 44 sites was $21,435 \text{ m}^{-2} \pm 10,725$ (standard deviation). The estimated density of macroinvertebrates per site ranged from $2,971 \text{ m}^{-2}$ at PEC00 to $46,753 \text{ m}^{-2}$ at GUR11 (Table 3).

The pattern of density among sites differed from the pattern of total richness among sites (Figure 3). Macroinvertebrate densities were generally lower at the most upstream and downstream sites and higher at mid-elevation sites. Even though densities were similar at upstream and downstream sites, the community composition differed dramatically. Upstream sites contained higher percentages of EPT and downstream sites contained higher percentages of oligochaetes; a pattern similar to the pattern found for richness among major taxonomic groups. Percentages of chironomids generally increased downstream. However, at the most upstream sites on Coyote Ck. (COC83 and COC89), chironomids represented approximately 50% of the individuals (Figure 3). The maximum percentage composition of oligochaetes (87.5%) occurred at the most downstream Coyote Ck. site (COC12) (Table 3).

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Figure 1. Location of the 85 sites on 14 streams in the Santa Clara Valley area, CA.

Figure 2. Percentage taxon richness of major taxonomic groups. The size of the circle is an indication of the total absolute taxon richness per site.

Table 1. Site code abbreviations, site name, latitude, and longitude.

Abbreviation	Site name	Latitude			Longitude		
GUR07	Guadalupe River at Trimble Rd.	37	22	51.11	121	56	17.26
GUR08	Guadalupe River at airport	37	22	16.50	121	55	43.33
GUR11	Guadalupe River at Hedding St.	37	21	01.95	121	54	35.82
GUR13	Guadalupe River at St. John St.	37	20	05.23	121	53	58.03
GUR15	Guadalupe River at Virginia St.	37	19	13.59	121	53	21.27
GUR17	Guadalupe River at Willow Glen Way	37	18	13.33	121	52	55.93
GUR22	Guadalupe River at Branham Rd.	37	15	40.69	121	52	22.17
GUR24	Guadalupe River at Water District	37	14	56.85	121	52	12.59
GUC02	Guadalupe Creek at Meander Dr.	37	14	07.33	121	53	27.42
GUC03	Guadalupe Creek at Camden Ave.	37	13	35.32	121	54	10.61
GUC04	Guadalupe Creek at gage	37	13	02.89	121	54	36.16
GUC06	Guadalupe Creek above Pheasant Hill Rd.	37	12	38.73	121	54	23.43
GUC07	Guadalupe Creek below Reynolds Rd.	37	12	23.23	121	53	52.00
GUC09	Guadalupe Creek below Reservoir	37	12	01.64	121	52	57.10
GUC11	Guadalupe Creek above Reservoir	37	10	52.47	121	52	24.21
ALC01	Alamitos Creek at Mazzone Dr.	37	14	00.46	121	52	13.69
ALC03	Alamitos Creek at Mt Forest Dr.	37	13	23.38	121	51	13.56
ALC05	Alamitos Creek at Camden Ave.	37	12	58.95	121	50	26.82
ALC07	Alamitos Creek at Hampswood St.	37	12	18.31	121	49	49.62
ALC10	Alamitos Creek at New Almaden	37	10	34.81	121	49	16.17
ALC12	Alamitos Creek above New Almaden	37	10	08.90	121	49	41.47
ALC14	Alamitos Creek above Reservoir	37	09	24.18	121	50	37.81
BAC01	Barret Creek	37	09	03.47	121	50	28.83
CAC00	Arroyo Calero at mouth	37	12	50.72	121	50	02.82
CAC02	Arroyo Calero at Harry St.	37	12	26.55	121	49	26.32
CAC04	Arroyo Calero above Fortini Rd.	37	11	54.50	121	48	21.42
CAC06	Arroyo Calero below dam	37	11	11.14	121	47	35.84
COC12	Coyote Creek at Montague Expr.	37	23	51.60	121	54	54.59
COC16	Coyote Creek at Oakland Rd.	37	22	24.14	121	53	21.23
COC32	Coyote Creek at Scarlet Way	37	16	32.04	121	47	56.04
COC35	Coyote Creek at Silver Creek Valley Rd.	37	15	24.92	121	47	28.49
COC37	Coyote Creek at Bernal Rd.	37	14	57.90	121	46	18.25
COC50	Coyote Creek at Metcalf Rd.	37	13	32.47	121	44	57.18
COC53	Coyote Creek above Malech Lane	37	12	33.69	121	43	34.24
COC54	Coyote Creek at Riverside Golf Course	37	11	52.74	121	42	53.15
COC62	Coyote Creek below dam	37	09	53.43	121	39	20.67
COC83	Coyote Creek at cableway	37	04	38.70	121	29	46.99
COC89	Coyote Creek below Gilroy Hot Springs	37	05	49.17	121	28	15.23
PEC00	Upper Penitencia Creek at Flea Market	37	22	06.14	121	52	46.93
PEC02	Upper Penitencia Creek at Mabury Rd.	37	22	20.62	121	51	42.62
PEC04	Upper Penitencia Creek at Summerdale St.	37	23	14.10	121	51	03.16
PEC06	Upper Penitencia Creek below Alum Rock	37	23	38.41	121	49	53.36
PEC08	Upper Penitencia Creek at Alum Rock -Downstream	37	23	38.81	121	48	46.77
PEC10	Upper Penitencia Creek at Alum Rock-Upstream	37	24	03.39	121	47	42.44
PEC12	Upper Penitencia Creek above Alum Rock	37	24	21.51	121	46	39.25

Table 2. Definitions of taxonomic abbreviations.

Abbreviation	Definition
sp.	The specimen most probably represents a single undetermined species.
spp.	The specimens represent a mixture of two or more undetermined species.
sp. l	Represents a single distinctive species lacking a published description for the life-stage at which the specimen was collected.
cf	The specimen is probably the taxon indicated but there is uncertainty because of life-stage, condition of the specimen, and/or lack of adequate description.
nr	The specimen is probably not the taxon indicated but is morphologically closer to the indicated taxon than any other description available.
tpl	The specimen is a distinctive morphotype within the taxonomic level indicated.
L	The specimen is a larva.
P	The specimen is a pupa.
e.i.	The specimen is an early instar or immature, and therefore cannot be identified further.

Table 3. Total abundance m⁻², richness, and percentage composition of major taxonomic groups per site.

	Abundance m ⁻²	Total richness	EPT richness	Chironomidae richness	Oligochaeta richness	EPT percentage	Chironomidae percentage	Oligochaeta percentage
GUR07	9166	43	3	16	13	6.7	61.0	23.3
GUR08	9910	41	6	12	8	29.4	52.7	8.2
GUR11	46753	39	6	10	7	24.4	39.8	18.8
GUR13	25186	43	5	12	11	13.0	50.8	25.3
GUR15	14869	37	6	11	10	17.2	54.8	19.1
GUR17	12621	44	10	14	5	73.6	14.1	1.8
GUR22	20820	48	8	13	8	28.2	26.9	13.4
GUR24	19180	45	8	9	11	6.5	26.4	53.5
GUC02	29547	70	22	19	6	31.2	29.5	15.3
GUC03	35113	68	25	16	9	35.3	36.9	10.5
GUC04	20147	61	25	15	4	52.8	15.4	0.9
GUC06	13448	61	26	10	5	58.4	11.5	6.7
GUC07	17388	60	21	13	2	54.5	11.9	1.8
GUC09	11049	53	12	17	4	41.2	36.4	7.1
GUC11	7307	65	25	15	3	26.8	58.0	3.0
ALC01	36941	54	9	18	9	18.6	42.6	13.4
ALC03	30273	58	9	16	10	52.6	19.0	8.4
ALC05	28897	52	11	15	7	55.7	16.0	5.3
ALC07	35017	72	16	21	7	32.5	34.0	17.0
ALC10	12589	52	9	14	8	37.0	7.9	2.5
ALC12	27636	47	11	11	8	37.7	5.5	6.4
ALC14	34903	75	27	19	7	26.2	24.6	1.7
BAC01	11578	81	27	12	7	28.9	32.2	2.1
CAC00	6697	65	13	13	12	47.9	18.2	12.2
CAC02	12347	54	14	13	9	51.7	20.2	6.4
CAC04	9625	63	7	17	15	8.5	29.3	43.1
CAC06	17265	60	7	17	11	4.8	22.7	37.0
COC12	17047	45	3	12	21	2.9	6.5	87.5
COC16	6287	58	7	15	16	9.2	21.5	48.3
COC32	11106	47	8	9	9	54.3	22.0	5.3
COC35	19177	35	7	7	9	63.8	8.3	4.3
COC37	26463	36	7	9	7	54.2	17.2	2.7
COC50	17272	39	8	12	8	55.2	32.0	4.4
COC53	36764	37	7	14	5	25.7	20.3	32.3
COC54	42641	35	7	13	4	65.3	9.5	12.1
COC62	29554	38	7	11	5	58.7	16.6	11.9
COC83	23795	52	17	16	0	26.2	59.3	0.0
COC89	13347	52	22	15	1	45.1	48.0	0.2
PEC00	2971	50	12	11	12	12.2	62.0	19.5
PEC02	30868	55	14	12	8	24.8	33.9	19.6
PEC04	24146	46	14	10	7	58.4	23.6	4.4
PEC06	20592	63	18	24	2	47.5	22.0	0.6
PEC08	29535	56	16	16	2	47.9	13.3	0.5
PEC10	36103	61	18	15	3	61.1	14.0	1.5
PEC12	20652	55	25	14	2	27.6	60.9	0.8

Table 4. Total abundance and constancy per taxon across 44 sites. Constancy represents the number of sites in which the taxon was found.

Taxon	Authority	Total Abundance	Constancy
Coelenterata			
<i>Hydra</i> spp.		631	9
Platyhelminthes			
<i>Dugesia</i> spp.		9476	31
<i>Polycelis</i> sp.		17	1
Nemertea			
<i>Prostoma</i> sp.		2419	22
Nematoda		1083	16
Mermithidae		3092	26
Nematomorpha			
cf <i>Gordius</i> spp.		4	1
Ectoprocta			
<i>Fredericella sultana</i>	(Blumenbach, 1779)	88	2
<i>Plumatella</i> sp.		237	3
Annelida			
Polychaeta			
<i>Nereis limicola</i>	Johnson, 1903	200	5
Aphanoneura			
<i>Aeolosoma</i> spp.		1284	14
Oligochaeta			
Haplotaxida			
Haplotaxidae			
<i>Haplotaxis</i> sp.		34	1
Tubificida			
Enchytraeidae			
<i>Cernosvitoviella</i> sp.		26	1
cf <i>Enchytraeus</i> spp.		1409	9
Naididae			
<i>Bratislavia unidentata</i>	(Harman, 1973)	80	2
<i>Chaetogaster diaphanus</i>	(Gruithuisen 1828)	443	5
<i>Chaetogaster diastrophus</i>	(Gruithuisen, 1828)	11	1
<i>Dero digitata</i>	(Muller, 1773)	106	2
<i>Dero furcata</i>	(Muller, 1773)	22	1
<i>Dero nivea</i>	Aiyer, 1930	71	2
<i>Nais communis</i>	(Piquet, 1906)	27648	38
<i>Nais elinguis</i>	Muller, 1773	2064	3
<i>Nais pardalis</i>	(Piquet, 1906)	12850	20
<i>Nais simplex</i>	(Piquet, 1906)	4930	15
<i>Nais variabilis</i>	(Piquet, 1906)	36907	34
<i>Ophidonais serpentina</i>	(Muller, 1773)	12469	25
<i>Paranais frici</i>	(Hrabe, 1941)	218	5
<i>Pristina aequiseta</i>	Bourne, 1891	1815	17
<i>Pristina leidy</i>	(Smith, 1896)	764	8
<i>Pristinella jenkiniae</i>	(Stephenson, 1931)	198	4
<i>Pistinnella osborni</i>	(Walton, 1906)	585	11
<i>Slavina appendiculata</i>	(d'Udekem, 1855)	7666	23
<i>Stylaria lacustris</i>	(Linnaeus, 1767)	181	4
Tubificidae			
<i>Aulodrilus pluriset</i>	(Piquet, 1906)	73	3
<i>Bothrioneurum vej dovskyanum</i>	Stolc, 1886	4468	18
<i>Limnodrilus hoffmeisteri</i>	Claparede, 1862	54	1
<i>Limnodrilus udekemianus</i>	Claparede, 1862	866	2
<i>Potamotheirus bavaricus</i>	(Oschmann, 1913)	50	1
<i>Rhyacodrilus coccineus/montana</i>	(Vejdovsky, 1875)/(Brinkhurst, 1965)	434	3
<i>Tubifex tubifex</i>	(Muller, 1774)	2	1
<i>Quistadrilus multisetosus</i>	(Smith, 1900)	392	1
Tubificidae tp. 1		2162	7
Tubificidae tp. 2		4495	5
Lumbriculida			
Lumbriculidae			
cf <i>Kincaidiana</i> n. sp.		2	1
<i>Lumbriculus</i> cf <i>variegatus</i>	(Muller, 1774)	239	6
cf <i>Stylodrilus</i> n. sp.		2	1
<i>Trichodrilus</i> n. sp. 1		17	1
Lumbricina		8	2
Sparganophilidae			

Table 4. continued

Taxon	Authority	Total Abundance	Constancy
<i>Sparganophilus nr eiseni</i>	Smith, 1895	282	7
Ocnodrilidae			
<i>Eukerria saltensis</i>	(Beddard, 1892)	488	25
Lumbricidae			
<i>Allolobophora chlorotica</i>	(Savigny, 1826)	6	2
<i>Eiseniella tetraedra</i>	(Savigny, 1826)	469	18
cf <i>Dendrodrius rubidus</i>	(Savigny, 1826)	2	1
Branchiobdellida		11	1
Hirudinoidea			
Glossiphoniidae			
<i>Helobdella stagnalis</i>	(Linnaeus, 1758)	64	1
<i>Helobdella triserialis</i>	(Blanchard, 1849)	30	1
Erpobdellidae		45	3
Arthropoda			
Mandibulata			
Crustacea			
Cladocera			
Chydoridae		90	1
Daphnidae			
Ostracoda		8238	23
Eucopepoda			
Cyclopoida		1028	15
Calanoida			
Harpacticoida		41	1
Mysidacea			
Isopoda			
Isopoda sp. 1		60	2
Asellidae			
<i>Caecidotea</i> sp. 1		185	5
Sphaeromatidae			
Amphipoda			
Corophiidae			
<i>Corophium</i> cf <i>spinicornuae</i>	Stimpson, 1857	96	4
Crangonyctidae			
<i>Crangonyx</i> sp.		896	12
cf <i>Stygobromus</i> sp.		202	3
Talitridae			
<i>Hyaella azteca</i>	(Saussure)	2953	12
Decapoda			
Astacidae			
<i>Pacifastacus leniusculus</i>	(Dana, 1852)	10	4
Cambaridae			
Grapsidae			
Insecta			
Ephemeroptera			
Ameletidae			
<i>Ameletus</i> spp.		81	4
Siphonuridae			
<i>Siphonurus</i> sp.		10	2
Baetidae			
<i>Acentrella turbida</i>	(McDunnough) 1924	1275	2
<i>Baetis tricaudatus</i>	Dodds, 1923	162902	44
<i>Baetis</i> sp. 1		1188	4
<i>Centroptilum</i> spp.		369	2
<i>Dipheter hageni</i>	(Eaton, 1885)	9761	19
<i>Fallceon quillieri</i>	(Dodds, 1923)	27763	22
Heptageniidae			
<i>Epeorus</i> cf <i>albertae</i>	(McDunnough, 1924)	219	3
<i>Epeorus longimanus</i>	(Eaton, 1885)	32	4
<i>Ironodes</i> spp.		10	4
<i>Nixe</i> sp.		5764	20
Ephemerellidae			
<i>Druiella</i> cf <i>flavilinia</i>	(McDunnough, 1926)	1139	13
<i>Ephemerella</i> cf <i>infrequens</i>	McDunnough, 1924	2	1
<i>Ephemerella maculata</i>	Traver, 1934	1894	14
<i>Serratella micheneri</i>	(Traver, 1934)	7434	13
<i>Serratella teresa</i>	(Traver, 1934)	1668	8

Table 4. continued

Taxon	Authority	Total Abundance	Constancy
Tricorythidae			
<i>Tricorythodes cf minutus</i>	Traver, 1935	10313	28
Caenidae			
<i>Caenis</i> sp.		205	3
Leptophlebiidae			
<i>Paraleptophlebia cf debilis</i>	(Walker, 1853)	2099	16
<i>Paraleptophlebia cf memorialis</i>	(Eaton, 1884)	2	1
Odonata			
Anisoptera			
Aeshnidae			
Cordulegastridae			
<i>Cordulegaster dorsalis</i>	Hagen, 1895	17	1
Gomphidae			
Libellulidae			
Zygoptera			
Calopterygidae			
Lestidae			
Coenagrionidae		43	3
<i>Argia</i> sp.		552	11
Plecoptera			
Pteronarcyidae			
<i>Pteronarcys</i> sp. e.i.		2	1
Peltoperlidae			
<i>cf Yoraperla</i> sp. e.i.		2	1
Nemouridae			
<i>Malenka</i> spp.		18753	23
Leuctridae		42	2
Capniidae		43	1
Perlidae			
<i>Calineuria californica</i>	(Banks, 1905)	1806	15
<i>Hesperoperla pacifica</i>	Banks, 1900	200	5
Perlodidae			
<i>Isoperla</i> sp. 1		312	3
<i>Isoperla</i> sp. 2		2	1
<i>cf Kogotus</i> sp.		8	2
<i>cf Skwala</i> sp. e.i.		62	1
Chloroperlidae			
<i>Sinwallia cf pallidula</i>	Banks, 1904	464	5
<i>Swellia</i> spp.		45	5
Hemiptera			
Belostomatidae			
<i>Abedus</i> sp.		41	1
Corixidae			
<i>Sigara</i> sp.		480	9
Megaloptera			
Sialidae			
<i>Sialis</i> sp.		827	18
Corydalidae			
<i>cf Neohermes</i> sp.		48	5
Trichoptera			
Hydropsychoidea			
Philopotamidae			
<i>Dolophilodes</i> sp.		2	1
<i>Wormaldia gabriella</i>	(Banks, 1930)	758	10
Psychomyiidae			
Polycentropodidae			
<i>Polycentropus</i> sp.		34	5
Hydropsychidae			
Hydropsychidae spp. e.i.		46706	40
<i>Parapsyche almota</i>	Ross, 1938	76	4
<i>Cheumatopsyche mickeli</i>	Denning, 1942	18998	25
<i>Hydropsyche californica</i>	Banks, 1899	24660	37
<i>Hydropsyche oslari</i>	Banks, 1905	4745	15
Rhyacophilidae			
<i>Rhyacophila angelita</i>	Banks, 1911	6	1
<i>Rhyacophila cf arcella</i>	Denning, 1975	1985	16
<i>Rhyacophila pellisa</i>	Ross, 1938	15	1
Glossosomatidae			

Table 4. continued

Taxon	Authority	Total Abundance	Constancy
<i>Agapetus celatus</i> P	McLachlan, 1871	231	8
<i>Agapetus marlo</i> P	Milne, 1936	53	3
<i>Agapetus</i> spp.		1572	15
<i>Glossosoma pterna</i>	Ross, 1947	253	8
Hydroptilidae		17	1
<i>Hydroptila</i> spp.		3420	29
<i>Ithytrichia cf clavata</i>	Morton, 1905	668	2
<i>Metrichia</i> sp.		882	10
<i>Stactobiella</i> sp.		125	1
Limnephiloidea			
Brachycentridae			
<i>Amiocentrus aspilus</i>	(Ross, 1938)	69	3
<i>Micrasema</i> sp.		334	8
Lepidostomatidae			
<i>Lepidostoma</i> tp. 1		24	1
<i>Lepidostoma</i> tp. 2		314	2
<i>Lepidostoma cf cantha</i>	Ross, 1941	30	4
<i>Lepidostoma</i> spp.		2826	18
Limnephilidae			
<i>Psychoglypha cf bella</i>	(Banks, 1903)	6	1
Uenoidae			
<i>Neophylax cf rickert</i>	Milne, 1935	252	8
Sericostomatidae			
<i>Gunaga</i> sp.		497	3
Odontoceridae			
<i>Parthina</i> sp.		730	3
Leptoceridae			
<i>Oecetis</i> sp.		172	3
Lepidoptera			
Pyalidae			
<i>Petrophila</i> sp.		256	7
Coleoptera			
Adephaga			
Gyrinidae			
<i>Gyrinus</i> sp.		121	1
Halipilidae			
<i>Pelodytes</i> sp.		67	1
Dytiscidae			
<i>Agabus</i> sp.		153	6
<i>Nebrioporus/Stictotarsus</i> spp.		53	4
Polyphaga			
Hydrophilidae			
Hydrophilidae L		23	6
Hydraenidae			
<i>Hydraena</i> sp.		127	3
Psephenidae			
<i>Eubrianax</i> sp.		455	11
Dryopidae			
<i>Postelichus</i> sp.		39	1
Scirtidae			
Elmidae			
<i>Acneus</i> sp.		2	1
<i>Ampumixis dispar</i>	(Fall, 1925)	134	2
<i>Cleptelmis ornata</i>	(Schaeffer, 1911)	73	2
<i>Narpus concolor</i>	(LeConte, 1881)	58	3
<i>Optioservus cf serianus</i>	(LeConte, 1874)	4375	33
<i>Optioservus</i> spp.		12462	30
<i>Ordobrevia nubifera</i>	(Fall, 1901)	960	8
<i>Zaitzevia cf parvula</i>	(Horn, 1870)	2392	17
Diptera			
Nematocera			
Blephariceridae			
Tipulidae		105	5
<i>Antocha</i> sp.		1204	16
<i>Dicranota</i> sp.		1273	23
<i>Hexatoma</i> spp.		485	7
<i>Limonia</i> sp. 1		8	2
cf <i>Rhabdomastix</i> sp.		2	1

Table 4. continued

Taxon	Authority	Total Abundance	Constancy
<i>Tipula</i> spp.		30	4
Psychodidae			
<i>Maruia</i> sp.		47	2
<i>Pericoma/Telmatoscopus</i> sp.		88	4
Ceratopogonidae			
cf <i>Culicoides</i> sp.		26	1
cf <i>Palpomyia</i> spp.		458	8
Simuliidae			
<i>Simulium</i> cf <i>argus/vittatum</i>	Williston, 1893/Zetterstedt, 1838	53939	30
<i>Simulium aureum</i> cplx	Fries, 1824	7820	26
<i>Simulium canadense</i>	Hearle, 1932	2077	5
<i>Simulium piperi</i>	Dyar and Shannon, 1927	9827	20
<i>Simulium tuberosum</i> cplx	(Lundstrom, 1911)	23098	16
<i>Simulium</i> cf <i>virgatum</i>	Coquillett, 1902	697	7
Chironomidae			
Tanypodinae			
Macropelopiini			
<i>Alotanypus</i> sp.		13	1
cf <i>Bruidiniella</i> sp.		121	2
Procladiini			
<i>Procladius</i> (<i>Holotanypus</i>) sp.		4	2
Pentaneurini			
<i>Ablabesmyia</i> sp.		271	7
<i>Conchapelopia</i> sp.		1225	14
<i>Nilotanypus</i> sp.		342	4
<i>Pentaneura</i> sp.		4792	24
<i>Rheopelopia</i> sp.		4578	19
cf <i>Thienemannimyia</i> sp.		133	5
<i>Zavrelimyia</i> sp.		71	2
Diamesinae			
<i>Pagastia</i> sp.		2	1
<i>Poithastia gaedii</i> gr.		4729	3
Orthoclaadiinae			
Corynoneurini			
<i>Corynoneura</i> spp.		3048	19
<i>Thienemanniella</i> spp.		2627	19
Orthoclaadiini			
<i>Brillia</i> cf <i>retifinis</i>	Saether, 1969	4360	17
<i>Cardiocladius</i> sp.		693	10
<i>Cricotopus bicinctus</i>	(Meigen, 1918)	6081	24
<i>Cricotopus sylvestris</i> gr.		30	1
<i>Cricotopus tremulus</i> gr. spp.		26370	30
<i>Cricotopus trifascia</i> gr.		25221	29
<i>Cricotopus</i> sp. 1		1261	6
<i>Eukiefferiella brehmi</i> gr.		4949	16
<i>Eukiefferiella claripennis</i> gr.		2915	19
<i>Eukiefferiella devonica</i> gr.		2386	11
<i>Euryhopsis</i> sp.		34	1
<i>Heleniella</i> sp.		86	2
<i>Heterotrissocladius marcidus</i> gr.		80	2
<i>Krenosmittia</i> sp.		71	2
<i>Limnophyes</i> sp.		202	3
<i>Nanocladius bicolor</i> gr.		11	1
<i>Nanocladius parvulus</i> gr.		41	1
<i>Orthoclaadius</i> (<i>Euorthoclaadius</i>) tp. 2		277	2
<i>Parakiefferiella</i> sp.		30	1
<i>Parametriocnemus</i> sp.		9009	34
<i>Paraphaenocladius</i> sp.		43	1
<i>Rheocricotopus</i> sp.		30318	39
<i>Synorthoclaadius</i> sp.		1805	11
<i>Tvetenia bavarica</i> gr.		1266	9
Chironominae			
Chironomini			
cf <i>Chironomus</i> sp.		324	5
<i>Cryptochironomus</i> sp.		406	10
<i>Demicryptochironomus</i> sp.		32	1
<i>Dicrotendipes californicus</i>	(Johannsen, 1905)	592	8
<i>Dicrotendipes modestus</i>	(Say, 1823)	181	1

Table 4. continued

Taxon	Authority	Total Abundance	Constancy
<i>Microtendipes pedellus</i> gr.		3547	10
<i>Microtendipes rydalis</i> gr.		2379	14
<i>Paratendipes</i> sp.		144	3
<i>Phaenopsectra</i> sp.		1744	17
<i>Polypedium</i> cf <i>illinoense</i>	(Malloch, 1915)	790	9
<i>Polypedium aviceps</i>	Townes, 1945	44160	35
<i>Polypedium fallax</i>	Johannsen, 1905	28	1
Pseudochironomini			
<i>Pseudochironomus</i> sp.		1115	6
Tanytarsini			
<i>Microsectra</i> spp.		22789	39
<i>Paratanytarsus</i> sp.		660	6
<i>Rheotanytarsus</i> sp.		28638	39
<i>Stempellinella</i> sp.		981	6
<i>Subletta</i> sp.		390	1
<i>Tanytarsus</i> tp. 1		7310	10
<i>Tanytarsus</i> tp. 2		4687	8
Dixidae			
<i>Dixa</i> spp.		456	6
<i>Meringodixa</i> sp.		17	1
Brachycera			
Stratiomyidae			
cf <i>Caloparyphus</i> sp.		1432	13
cf <i>Euparyphus</i> sp.		219	7
<i>Odontomyia</i> sp.		105	2
cf <i>Oxycera</i> sp.		9	1
Tabanidae			
Pelecorhynchidae			
Dolichopodidae		69	10
Empididae			
<i>Chelifera</i> sp.		527	13
<i>Clinocera</i> sp.		267	11
<i>Hemerodromia</i> sp.		729	13
<i>Wiedemannia</i> sp.		23	4
Empididae tp. 1 P		608	12
Empididae tp. 2 P		519	11
Cyclorapha		127	4
Syrphidae			
Ephydriidae		17	4
Sciomyzidae			
Muscidae			
cf <i>Linnophora</i> tp. 1		202	11
cf <i>Linnophora</i> tp. 2		2	1
Chelicerata			
Arachnoidea			
Eylaidae			
Hydryphantidae			
<i>Protzia</i> sp.		90	3
<i>Wandesia</i> sp.		22	1
Spherchontidae			
<i>Sperchon</i> spp.		34880	42
Lebertiidae			
<i>Lebertia</i> sp.		1293	16
Torrenticolidae		5214	14
Limnesiidae			
Hygrobatidae			
<i>Atractides</i> sp.		5005	26
<i>Hygrobatas</i> sp.		84	2
Mideopsidae			
Oribatei		90	1
Mollusca			
Gastropoda			
Prosobranchia		278	3
Limnophila			
Physidae			
cf <i>Physella</i>		478	6
Lymnaeidae			
Planorbidae		678	8

Table 4. continued

Taxon	Authority	Total Abundance	Constancy
Pelecypoda			
Corbiculidae			
<i>Corbicula fluminea</i>	(Muller)	1999	8
Sphaeriidae			

Table 5. Estimated abundance of benthic macroinvertebrates m⁻² in riffles from Guadalupe River, May 1997.

Taxon	GUR07	GUR08	GUR11	GUR13	GUR15	GUR17	GUR22	GUR24
Coelenterata								
<i>Hydra</i> spp.		17		86			90	
Platyhelminthes								
<i>Dugesia</i> spp.	11	39	54	349	84	24	887	366
Nemertea								
<i>Prostoma</i> sp.	155	108	325	43		24	271	304
Nematoda	11		164	86				60
Mermithidae	230	17	54			24	121	30
Nematomorpha								
Ectoprocta								
<i>Plumatella</i> sp.						24		151
Annelida								
Polychaeta								
<i>Nereis limnicola</i>	50	2	2	2				
Aphanoncura								
<i>Aelosoma</i> spp.			54	304	84	24	181	30
Oligochaeta								
Haplotaxida								
Haplotaxidae								
Tubificida								
Enchytraeidae								
cf <i>Enchytraeus</i> spp.	11			174	394	45		
Naididae								
<i>Bratislavia unidentata</i>					56	24		
<i>Chaetogaster diaphanus</i>				86				60
<i>Chaetogaster diastrophus</i>	11							
<i>Nais communis</i>	207	17	1193	3126	730	24	362	
<i>Nais pardalis</i>	1457	37	3147	1042	168			181
<i>Nais simplex</i>					196		422	964
<i>Nais variabilis</i>	155	37	4069	956	1040	114	181	5937
<i>Ophidonais serpentina</i>	22	575	217	304			1175	2923
<i>Paranais frici</i>	52						60	
<i>Pristina aequiseta</i>	22		108	86			60	
<i>Pristina leidy</i>				43				
<i>Pistinnella osborni</i>	11				56			
<i>Slavina appendiculata</i>	125	108		521	112		512	90
<i>Stylaria lacustris</i>								60
Tubificidae								
<i>Bothrioneurum vej dovskyanum</i>	41				84	24		30
Lumbriculida								
Lumbriculidae								
<i>Lumbriculus</i> cf <i>variegatus</i>			54					
Lumbricina		4						
Sparganophilidae								
<i>Sparganophilus</i> nr <i>eiseni</i>			9					4
Ocnodrilidae								
<i>Eukerria saltensis</i>	11	26		2	2		22	9
Lumbricidae								
<i>Eiseniella tetraedra</i>	11	4		43				2
Branchiobdellida								
Hirudinoidea								
Glossiphoniidae								
<i>Helobdella triserialis</i>							30	
Erpobdellidae								
Arthropoda								
Mandibulata								
Crustacea								
Cladocera								
Chydoridae								
Daphnidae								
Ostracoda		90					30	60
Eucopepoda								
Cyclopoida	62	17	54	174				
Calanoida								
Harpacticoida	41							
Mysidacea								
Isopoda								

Table 5. continued

Taxon	GUR07	GUR08	GUR11	GUR13	GUR15	GUR17	GUR22	GUR24
Asellidae								
Sphaeromatidae								
Amphipoda								
Corophiidae								
Crangonyctidae								
<i>Crangonyx</i> sp.	2	2	592	47	4	114	2	4
Talitridae								
<i>Hyalella azteca</i>							293	2
Decapoda								
Astacidae								
Cambaridae								
Grapsidae								
Insecta								
Ephemeroptera								
Ameletidae								
Siphonuridae								
Baetidae								
<i>Baetis tricaudatus</i>	202	2136	10314	2555	2095	7513	2631	2
<i>Centroptilum</i> spp.						93		
<i>Dipheter hageni</i>			2					
<i>Fallceon quilleri</i>	260	336	547	129	28	50	1630	
Heptageniidae								
Ephemerellidae								
<i>Serratella micheneri</i>								2
Tricorythidae								
<i>Tricorythodes cf minutus</i>	153	344			56	233	973	926
Caenidae								
Leptophlebiidae								
<i>Paraleptophlebia cf debilis</i>						24		
Odonata								
Anisoptera								
Aeshnidae								
Cordulegastridae								
Gomphidae								
Libellulidae								
Zygoptera								
Calopterygidae								
Lestidae								
Coenagrionidae	11							
<i>Argia</i> sp.							93	
Plecoptera								
Pteronarcyidae								
Peltoperlidae								
Nemouridae								
<i>Malenka</i> spp.						45	93	
Leuctridae								
Capniidae								
Perlidae								
Perlodidae								
Chloroperlidae								
Hemiptera								
Belostomatidae								
Corixidae								
<i>Sigara</i> sp.							32	
Megaloptera								
Sialidae								
<i>Sialis</i> sp.		2	2	43		47		
Corydalidae								
Trichoptera								
Hydropsychoidea								
Philopotamidae								
Psychomyiidae								
Polycentropodidae								
Hydropsychidae								
Hydropsychidae spp. e.i.		17		172	84	226	30	30
<i>Cheumatopsyche mickeli</i>		2					129	60

Table 5. continued

Taxon	GUR07	GUR08	GUR11	GUR13	GUR15	GUR17	GUR22	GUR24
<i>Hydropsyche californica</i>		75	504	207	209	762	265	138
Rhyacophilidae								
Glossosomatidae								
Hydroptilidae								
<i>Hydroptila</i> spp.			54	217	84	316	123	95
Limnephiloidea								
Brachycentridae								
Lepidostomatidae								
<i>Lepidostoma</i> spp.						24		
Limnephilidae								
Uenoidae								
Sericostomatidae								
Odontoceridae								
Leptoceridae								
Lepidoptera								
Pyrilidae								
<i>Petrophila</i> sp.			54					101
Coleoptera								
Adephaga								
Gyrinidae								
Haliplidae								
Dytiscidae								
<i>Nebrioporus/Stictotarsus</i> spp.								
Polyphaga								
Hydrophilidae								
Hydrophilidae L.	11	2						
Hydraenidae								
Psephenidae								
Dryopidae								
Scirtidae								
Elmidae								
<i>Optioservus cf. seriatus</i>		19			28	90	685	189
<i>Optioservus</i> spp.			108		28		424	431
Diptera								
Nematocera								
Blephariceridae								
Tipulidae								
<i>Dicranota</i> sp.			4					
Psychodidae								
Ceratopogonidae								
Simuliidae								
<i>Simulium cf. argus/vittatum</i>		37	217	43	142	306	243	
<i>Simulium aureum</i> cplx				131		144		
Chironomidae								
Tanypodinae								
Macropelopiini								
Procladii								
<i>Procladius (Holotanypus)</i> sp.						2		
Pentaneurini								
<i>Ablabesmyia</i> sp.					30	24		
<i>Conchapelopia</i> sp.		54					30	
<i>Pentaneura</i> sp.		17	220	43	252	159	121	
<i>Rheopelopia</i> sp.						24		
<i>cf. Thienemannimyia</i> sp.	11							
Diamesinae								
Orthoclaadiinae								
Corynoneurini								
<i>Thienemannella</i> spp.	155	54	54					
Orthoclaadii								
<i>Cardiocladius</i> sp.							60	
<i>Cricotopus bicinctus</i>	105	431		174		24	663	663
<i>Cricotopus tremulus</i> gr. spp.	1582	1059	2984	2693	1079		1055	1662
<i>Cricotopus trifascia</i> gr.	52	1223	5371	2532	2973	45	1628	1675
<i>Eukiefferiella brehmi</i> gr.							90	
<i>Eukiefferiella claripennis</i> gr.			108	260	56			
<i>Nanocladius bicolor</i> gr.	11							
<i>Parametriocnemus</i> sp.			435	217		93		
<i>Rheocricotopus</i> sp.	288	538	5046	1520	2133	385	1266	482

Table 5. continued

Taxon	GUR07	GUR08	GUR11	GUR13	GUR15	GUR17	GUR22	GUR24
<i>Synorthocladus</i> sp.						24		
Chironominae								
Chironomini								
cf <i>Chironomus</i> sp.	15	19		4				
<i>Cryptochironomus</i> sp.	2	17					30	
<i>Dicrotendipes californicus</i>	26						30	2
<i>Phaenopsectra</i> sp.	22				112	252	60	30
<i>Polypedilum</i> cf <i>illinoense</i>	30					45		
<i>Polypedilum aviceps</i>	84		379		56	45	241	90
<i>Polypedilum fallax</i>					28			
Pseudochironomini								
<i>Pseudochironomus</i> sp.								30
Tanytarsini								
<i>Micropsectra</i> spp.	30	54	379	521	308	226		
<i>Paratanytarsus</i> sp.		71						
<i>Rheotanytarsus</i> sp.	217	1690	3634	4211	1124	433	332	422
<i>Sublettea</i> sp.				390				
<i>Tanytarsus</i> tp. 1				217				
<i>Tanytarsus</i> tp. 2	2964							
Dixidae								
Brachycera								
Stratiomyidae								
cf <i>Caloparyphus</i> sp.						24		
Tabanidae								
Pelecorhynchidae								
Dolichopodidae		2						
Empididae								
<i>Chelifera</i> sp.			108					
<i>Clinocera</i> sp.				45				
<i>Hemerodromia</i> sp.					28			
Empididae tp. 1 P			4	43				
Cyclorapha								
Syrphidae								
Ephydriidae								
Sciomyzidae								
Muscidae								
Chelicerata								
Arachnoidea								
Eylaidae								
Hydryphantidae								
Spherchontidae								
<i>Sperchon</i> spp.	237	90	6075	1302	786	385	1838	603
Lebertiidae								
<i>Lebertia</i> sp.			54		28	24		
Torrenticolidae								
Limnesiidae								
Hygrobatidae								
<i>Atractides</i> sp.						45		30
<i>Hygrobates</i> sp.								30
Mideopsidae								
Oribatei								
Mollusca								
Gastropoda								
Prosobranchia							211	
Limnophila								
Physidae								
cf <i>Physella</i>					112		95	151
Lymnaeidae								
Planorbidae				43			90	30
Pelecypoda								
Corbiculidae								
<i>Corbicula fluminea</i>		521				24	930	39
Sphaeriidae								
Abundance	9166	9910	46753	25186	14869	12621	20820	19180
Taxon Richness	43	41	39	43	37	44	48	45

Table 6. Estimated abundance of benthic macroinvertebrates m⁻² in riffles from Guadalupe Creek, May 1997.

Taxon	GUC02	GUC03	GUC04	GUC06	GUC07	GUC09	GUC11
Coelenterata							
Platyhelminthes							
<i>Dugesia</i> spp.	405	86			30	95	41
Nemertea							
<i>Prostoma</i> sp.	30				62		
Nematoda							
Mernithidae	185	43		155	62		
Nematomorpha							
Ectoprocta							
Annelida							
Polychaeta							
Aphanoneura							
<i>Aelosoma</i> spp.						39	
Oligochaeta							
Haplotaxida							
Haplotaxidae							
Tubificida							
Enchytraeidae							
cf <i>Enchytraeus</i> spp.		86		34			
Naididae							
<i>Nais communis</i>	1798	1259	62	620	217		13
<i>Nais simplex</i>	280		30	52			
<i>Nais variabilis</i>		1042		155	93	607	
<i>Ophidonais serpentina</i>		129				133	
<i>Paranais frici</i>	30						
<i>Pristina aequisetata</i>		43					
<i>Pristina leidy</i>	125						
<i>Pristinella jenkinsae</i>		86					
<i>Slavina appendiculata</i>	1860	825	93				
Tubificidae							
<i>Bothrioneurum vejovskyanum</i>	435					19	
<i>Rhyacodrilus coccineus/montana</i>							202
Tubificidae sp. 1				34			
Lumbriculida							
Lumbriculidae							
<i>Lumbriculus</i> cf <i>variegatus</i>						22	
Lumbricina							
Sparganophilidae							
Onerodrilidae							
<i>Eukerria saltensis</i>		11	2				
Lumbricidae							
<i>Eiseniella tetraedra</i>		200					2
Branchiobdellida							
Hirudinoidea							
Glossiphoniidae							
Erpobdellidae							
Arthropoda							
Mandibulata							
Crustacea							
Cladocera							
Chydoridae							
Daphnidae							
Ostracoda	67					2	
Eucopepoda							
Cyclopoida	30					95	
Calanoida							
Harpacticoida							
Mysidacea							
Isopoda							
Asellidae							
<i>Caecidotea</i> sp. 1				17			
Sphaeromatidae							
Amphipoda							
Corophiidae							
Crangonyctidae							
Talitridae							
<i>Hyaella azteca</i>						54	

Table 6. continued

Taxon	GUC02	GUC03	GUC04	GUC06	GUC07	GUC09	GUC11
Decapoda							
Astacidae							
<i>Pacifastacus leniusculus</i>			4		2		
Cambaridae							
Grapsidae							
Insecta							
Ephemeroptera							
Ameletidae							
<i>Ameletus</i> spp.			2	17			60
Siphonuridae							
Baetidae							
<i>Baetis tricaudatus</i>	3449	7713	4441	4355	4585	1828	123
<i>Baetis</i> sp. 1							15
<i>Diphetera hageni</i>	1057	217	155	243	248		15
Heptageniidae							
<i>Epeorus cf albertae</i>			30				
<i>Epeorus longinamus</i>			2	26	2		
<i>Ironodes</i> spp.			2	2	2		
<i>Nixe</i> sp.	418	217	478	73	258		99
Ephemerellidae							
<i>Drunella cf flavilinea</i>	17	211	116	146	121		73
<i>Ephemerella maculata</i>	282	310	65	47	43		62
<i>Serratella micheneri</i>	534	86					
<i>Serratella teresa</i>	37	652	530	299	62		
Tricorythidae							
<i>Tricorythodes cf minutus</i>	1270	43				19	
Caenidae							
Leptophlebiidae							
<i>Paraleptophlebia cf debilis</i>	93			4	32	228	69
Odonata							
Anisoptera							
Aeshnidae							
Cordulegastridae							
Gomphidae							
Libellulidae							
Zygoptera							
Calopterygidae							
Lestidae							
Coenagrionidae							
Plecoptera							
Pteronarcyidae							
<i>Pteronarcys</i> sp. e.i.							2
Peltoperlidae							
cf <i>Yoraperla</i> sp. e.i.							2
Nemouridae							
<i>Malenka</i> spp.	902	1830	2738	1673	2530	964	304
Leuctridae				2			
Capniidae							
Perlidae							
<i>Calineuria californica</i>	30	9	233	131	198		448
<i>Hesperoperla pacifica</i>				19	30		13
Perlodidae							
cf <i>Kogon</i> sp.		2					
cf <i>Skwala</i> sp. e.i.	62						
Chloroperlidae							
<i>Suwallia cf pallidula</i>							256
<i>Sweltsa</i> spp.		2	30	2	2		9
Hemiptera							
Belostomatidae							
Corixidae							
<i>Sigara</i> sp.	32						
Megaloptera							
Sialidae							
<i>Sialis</i> sp.	34					19	
Corydalidae							
cf <i>Neohermes</i> sp.				2			6
Trichoptera							
Hydropsychoidea							

Table 6. continued

Taxon	GUC02	GUC03	GUC04	GUC06	GUC07	GUC09	GUC11
Philopotamidae							
<i>Dolophilodes</i> sp.							2
<i>Wormaldia gabriella</i>			30	34			
Psychomyiidae							
Polycentropodidae							
Hydropsychidae							
Hydropsychidae spp. c.i.	805	346	340	120	125	75	
<i>Parapsyche almota</i>							2
<i>Cheumatopsyche mickeli</i>	62	11					
<i>Hydropsyche californica</i>	9	17	2	19		50	
<i>Hydropsyche oslari</i>	2	103	381	321	174		6
Rhyacophilidae							
<i>Rhyacophila</i> cf. <i>arcella</i>	6	88	187	209	661	58	67
<i>Rhyacophila pellisa</i>		15					
Glossosomatidae							
<i>Agapetus celatus</i> P	34	2	62				24
<i>Agapetus</i> spp.	69	325	631	19	62		194
<i>Glossosoma pterna</i>	30		34	17	2		24
Hydroptilidae				17			
<i>Hydroptila</i> spp.	30	43				151	
<i>Metrichia</i> sp.						95	
Limnephiloidea							
Brachycentridae							
<i>Amiocentrus asplius</i>		43				22	
<i>Micrasema</i> sp.		43	65		30		
Lepidostomatidae							
<i>Lepidostoma</i> tp.1						24	
<i>Lepidostoma</i> cf. <i>cantha</i>		24	2	2			
<i>Lepidostoma</i> spp.	30	43	62	17	280	1042	56
Limnephilidae							
Uenoidae							
<i>Neophylax</i> cf. <i>rickeri</i>			26	45	28		22
Sericostomatidae							
Odontoceridae							
<i>Parthina</i> sp.							13
Leptoceridae							
Lepidoptera							
Pyrilidae							
Coleoptera							
Adephaga							
Gyrinidae							
Halipilidae							
Dytiscidae							
<i>Agabus</i> sp.						2	
<i>Nebrioporus/Stictotarsus</i> spp.							
Polyphaga							
Hydrophilidae							
Hydraenidae							
Psephenidae							
<i>Eubrianax</i> sp.			2	22			6
Dryopidae							
Scirtidae							
Elmidae							
<i>Cleptelmis ornata</i>		43	30				
<i>Narpus concolor</i>		2		4			
<i>Optioservus</i> cf. <i>serianus</i>	329	396	62		95	56	15
<i>Optioservus</i> spp.	3171	2995	967	710	157		13
<i>Ordobrevia nubifera</i>				34	30		43
<i>Zaitzevia</i> cf. <i>parvula</i>	30	86	62	310	340		43
Diptera							
Nematocera							
Blephariceridae							
Tipulidae					30		13
<i>Antocha</i> sp.		129	30	34	32	56	15
<i>Dicranota</i> sp.	30	2		37	69	32	54
<i>Hexatoma</i> spp.							69
cf. <i>Rhabdomastix</i> sp.							2
<i>Tipula</i> spp.				2			

Table 6. continued

Taxon	GUC02	GUC03	GUC04	GUC06	GUC07	GUC09	GUC11
Psychodidae							
<i>Maruina</i> sp.					30		
<i>Pericoma/Telmatoscopus</i> sp.						39	13
Ceratopogonidae							
cf <i>Palpomyia</i> spp.				17	30		54
Simuliidae							
<i>Simulium</i> cf <i>argus/vittatum</i>	1709			2	2		
<i>Simulium aureum</i> cplx	360	129	95				
<i>Simulium canadense</i>					409		
<i>Simulium piperi</i>	30	2	1808	252	880	463	30
<i>Simulium tuberosum</i> cplx		650	1901	1089	1914	482	
<i>Simulium</i> cf <i>virgatum</i>					2		
Chironomidae							
Tanypodinae							
Macropelopiini							
Procladiini							
Pentaneurini							
<i>Couchapelopia</i> sp.	217						54
<i>Pentaneura</i> sp.	62						
<i>Rheopelopia</i> sp.	984	394	164	69	99		41
<i>Zavrelimyia</i> sp.							28
Diamesinae							
Orthoclaadiinae							
Corynoneurini							
<i>Corynoneura</i> spp.		390		17		56	258
<i>Thienemanniella</i> spp.	125		62		62		
Orthoclaadiini							
<i>Brillia</i> cf <i>retifinis</i>		521	248	75	159	22	1292
<i>Cardiocladius</i> sp.	97				2	39	
<i>Cricotopus bicinctus</i>	217					39	
<i>Cricotopus tremulus</i> gr. spp.	1210	1389	30				
<i>Cricotopus trifascia</i> gr.	1115					284	28
<i>Cricotopus</i> sp. 1	217	868	30	17			
<i>Eukiefferiella brehmi</i> gr.	30	43	30				
<i>Eukiefferiella claripennis</i> gr.	62	738	185		93	19	
<i>Eukiefferiella devonica</i> gr.	30	174				360	
<i>Heleniella</i> sp.						39	
<i>Heterotrissocladius marcidus</i> gr.						39	
<i>Krenosmittia</i> sp.							28
<i>Orthocladus</i> (<i>Euorthocladus</i>) tp. 2		174					
<i>Parakiefferiella</i> sp.			30				
<i>Parametriocnemus</i> sp.		1783	125	121	95	151	69
<i>Rheocricotopus</i> sp.	217	435	62		62	1156	
<i>Synorthocladus</i> sp.	837	217					
<i>Tvetenia bavarica</i> gr.			185	155	125	39	463
Chironominae							
Chironomini							
<i>Demicryptochironomus</i> sp.			32				
<i>Microtendipes pedellus</i> gr.	775						
<i>Microtendipes rydalenensis</i> gr.				52	62	56	136
<i>Phaenopsectra</i> sp.						133	
<i>Polypedilum</i> cf <i>illinoense</i>				52		19	136
<i>Polypedilum aviceps</i>	1365	5173	1119	794	682		756
Pseudochironomini							
Tanytarsini							
<i>Micropectra</i> spp.	745	390	527	189	465	1270	885
<i>Paratanytarsus</i> sp.	280						
<i>Rheotanytarsus</i> sp.	125	174	280		125	304	
<i>Stempellinella</i> sp.							13
<i>Tanytarsus</i> tp. 1		86					54
<i>Tanytarsus</i> tp. 2					30		
Dixidae							
<i>Dixa</i> spp.							295
Brachycera							
Stratiomyidae							
cf <i>Caloparyphus</i> sp.			30		2		
Tabanidae							
Pelecorhynchidae							

Table 6. continued

Taxon	GUC02	GUC03	GUC04	GUC06	GUC07	GUC09	GUC11
Dolichopodidae				17			15
Empididae							
<i>Chelifera</i> sp.		43				19	54
<i>Clinocera</i> sp.	62					2	13
<i>Hemerodromia</i> sp.					30		
<i>Wiedemannia</i> sp.	2						
Empididae tp. 1 P	30	93	4	19			
Empididae tp. 2 P	71					2	
Cyclorhapha						2	
Syrphidae							
Ephydriidae	2		2				
Sciomyzidae							
Muscidae							
cf <i>Limnophora</i> tp. 1	37						
Chelicerata							
Arachnoidea							
Eylaidae							
Hydriphantiidae							
<i>Prozia</i> sp.							13
Spherichontidae							
<i>Sperchon</i> spp.	125	564	775	327	900	170	69
Lebertiidae							
<i>Lebertia</i> sp.		43	125	17	93		13
Torrenticolidae	30	347	30		248		
Limnesiidae							
Hygrobatidae							
<i>Atractides</i> sp.	280	435	280	86	93	39	
Mideopsidae							
Oribatei							
Mollusca							
Gastropoda							
Prosobranchia							
Limnophila							
Physidae							
Lymnaeidae							
Planorbidae							
Pelecypoda							
Corbiculidae							
<i>Corbicula fluminea</i>						19	
Sphaeriidae							
Abundance	29547	35113	20147	13448	17388	11049	7307
Total Richness	70	68	61	61	60	53	65

Table 7. Estimated abundance of benthic macroinvertebrates m⁻² in riffles from Alamitos Creek and Barret Creek, May 1997.

Taxon	ALC01	ALC03	ALC05	ALC07	ALC10	ALC12	ALC14	BAC01
Coelenterata								
<i>Hydra</i> spp.					17	82		
Platyhelminthes								
<i>Dugesia</i> spp.	661	1647	217	332				
<i>Polycelis</i> sp.								17
Nemertea								
<i>Prostoma</i> sp.	54	108				82		
Nematoda	108							17
Mermithidae	54	325	164	706	34	41	41	
Nematomorpha								
Ectoprocta								
Annelida								
Polychaeta								
Aphanoneura								
Oligochaeta								
Haplotaxida								
Haplotaxidae								
<i>Haplotaxis</i> sp.								34
Tubificida								
Enchytraeidae								
Naididae								
<i>Chaetogaster diaphanus</i>		54		217				
<i>Dero nivea</i>						41		
<i>Nais communis</i>	650	325	543	2713	34	166	372	52
<i>Nais pardalis</i>	108	54	217	271	69	786	82	17
<i>Nais simplex</i>		435	164	1410	17			
<i>Nais variabilis</i>	3744	1139	108	1193	52	82		17
<i>Ophidonais serpentina</i>	108	54	379		86			
<i>Pristina aequiset</i>	108	271				41	41	
<i>Pristinella jenkiniae</i>			54					
<i>Pistinella osborni</i>			54	54				
<i>Slavina appendiculata</i>	108	217		108	34	620		
Tubificidae								
<i>Bothrioneurum vej dovskyanum</i>	54					41		
<i>Rhyacodrilus coccineus/montana</i>								103
Lumbriculida								
Lumbriculidae								
cf <i>Kincaidiana</i> n. sp.							2	
<i>Lumbriculus</i> cf <i>variegatus</i>	2							
cf <i>Stylodrilus</i> n. sp.								2
<i>Trichodrilus</i> n. sp. 1								17
Lumbricina								
Sparganophilidae								
<i>Sparganophilus</i> nr <i>eiseni</i>							82	
Ocnerodrilidae								
<i>Eukerria saltensis</i>	78	2			4		2	
Lumbricidae								
<i>Eiseniella tetraedra</i>		4			19	2	2	
Branchiobdellida								
Hirudinoidea								
Glossiphoniidae								
Erpobdellidae								
Arthropoda								
Mandibulata								
Crustacea								
Cladocera								
Chydoridae								
Daphnidae								
Ostracoda	2988	276	222	601		166		
Eucopepoda								
Cyclopoida					17	248	41	
Calanoida								
Harpacticoida								
Mysidacea								
Isopoda								
Isopoda sp. 1					17			
Asellidae								

Table 7. continued

Taxon	ALC01	ALC03	ALC05	ALC07	ALC10	ALC12	ALC14	BAC01
<i>Caecidotea</i> sp. 1	2				17		82	
Sphaeromatidae								
Amphipoda								
Corophiidae								
Crangonyctidae								
<i>Crangonyx</i> sp.	54	4						
cf <i>Stygobromus</i> sp.	112							88
Talitridae								
<i>Hyalella azteca</i>		114	2	9				
Decapoda								
Astacidae								
<i>Pacifastacus leniusculus</i>				2				
Cambaridae								
Grapsidae								
Insecta								
Ephemeroptera								
Ameletidae								
<i>Ameletus</i> spp.								2
Siphonuridae								
<i>Siphonurus</i> sp.						4		
Baetidae								
<i>Baetis tricaudatus</i>	868	3354	3989	3972	3643	8525	5507	618
<i>Baetis</i> sp. 1								17
<i>Centropilum</i> spp.				276				
<i>Dipheter hageni</i>			271	825			82	34
<i>Fallceon quillieri</i>	271	553	1216	1920				
Heptageniidae								
<i>Epeorus cf albertae</i>							133	56
<i>Epeorus longimanus</i>								2
<i>Nixe</i> sp.				2		84	41	34
Ephemerellidae								
<i>Drunella cf flavilinia</i>							228	24
<i>Ephemerella cf infrequens</i>							2	
<i>Serratella micheneri</i>	1335	3128	456	607				
<i>Serratella teresa</i>							41	
Tricorythidae								
<i>Tricorythodes cf minutus</i>	508	2		108			41	
Caenidae								
Leptophlebiidae								
<i>Paraleptophlebia cf debilis</i>				108	17	41	43	17
Odonata								
Anisoptera								
Aeshnidae								
Cordulegastridae								
<i>Cordulegaster dorsalis</i>								17
Gomphidae								
Libellulidae								
Zygoptera								
Calopterygidae								
Lestidae								
Coenagrionidae								
<i>Argia</i> sp.					2	2		2
Plecoptera								
Pteronarcyidae								
Peltoperlidae								
Nemouridae								
<i>Malenka</i> spp.			168	388	82	166	872	519
Leuctridae								40
Capniidae								
Perlidae								
<i>Calineuria californica</i>							95	41
<i>Hesperoperla pacifica</i>							136	2
Perlodidae								
<i>Isoperla</i> sp. 1							2	
<i>Isoperla</i> sp. 2					2			
Chloroperlidae								
<i>Suwallia cf pallidula</i>								2

Table 7. continued

Taxon	ALC01	ALC03	ALC05	ALC07	ALC10	ALC12	ALC14	BAC01
Hemiptera								
Belostomatidae								
Corixidae								
<i>Sigara</i> sp.	108	54		54				
Megaloptera								
Sialidae								
<i>Sialis</i> sp.			56	9	17	288		
Corydalidae								
Trichoptera								
Hydropsychoidea								
Philopotamidae								
<i>Wormaldia gabriella</i>			2					56
Psychomyiidae								
Polycentropodidae								
<i>Polycentropus</i> sp.							2	2
Hydropsychidae								
Hydropsychidae spp. e.i.	1085	3363	6022	2008	724	702	951	327
<i>Parapsyche alnota</i>							43	22
<i>Cheumatopsyche mickeli</i>	1989	4486	2951	325				
<i>Hydropsyche californica</i>	771	859	1008	245	171	635		
<i>Hydropsyche oslari</i>					2		260	155
Rhyacophilidae								
<i>Rhyacophila angelita</i>							6	
<i>Rhyacophila</i> cf. <i>arcella</i>					2		114	200
Glossosomatidae								
<i>Agapetus celatus</i> P							6	30
<i>Agapetus marlo</i> P						2		
<i>Agapetus</i> spp.		4		4			82	161
<i>Glossosoma pterna</i>								34
Hydroptilidae								
<i>Hydroptila</i> spp.	54	166	2	543	17		43	
<i>Metrichia</i> sp.				54		82	248	
<i>Stictobiella</i> sp.						125		
Limnephiloidea								
Brachycentridae								
<i>Amiocentrus aspilus</i>							4	
<i>Micrasema</i> sp.							41	69
Lepidostomatidae								
<i>Lepidostoma</i> tp. 2								17
<i>Lepidostoma</i> spp.						41	84	831
Limnephilidae								
Uenoidae								
<i>Neophylax</i> cf. <i>rickeri</i>							52	34
Sericostomatidae								
Odontoceridae								
Leptoceridae								
Lepidoptera								
Pyrallidae								
<i>Petrophila</i> sp.	56		2	2				
Coleoptera								
Adephaga								
Gyrinidae								
Haliplidae								
Dytiscidae								
<i>Agabus</i> sp.			56	9				17
<i>Nebrioporus/Stictotarsus</i> spp.					17			
Polyphaga								
Hydrophilidae								
Hydrophilidae L.		4		2				
Hydraenidae								
<i>Hydraena</i> sp.					52		41	34
Psephenidae								
<i>Eubrianax</i> sp.							174	127
Dryopidae								
Scirtidae								
Elmidae								
<i>Ampumixis dispar</i>							82	52
<i>Narpus concolor</i>								52

Table 7. continued

Taxon	ALC01	ALC03	ALC05	ALC07	ALC10	ALC12	ALC14	BAC01
<i>Optioservus cf. seriatius</i>	129	549	228	168	56	319	86	39
<i>Optioservus</i> spp.	409	230	65	280			581	138
<i>Ordobrevia nubifera</i>							372	52
<i>Zaitzevia cf. parvula</i>					2		332	56
Diptera								
Nematocera								
Blephariceridae								
Tipulidae							2	17
<i>Antocha</i> sp.		2		73		222	93	140
<i>Dicranota</i> sp.				2	170	183	127	54
<i>Hexatoma</i> spp.							4	39
Psychodidae								
<i>Maruina</i> sp.								17
<i>Pericoma/Telmatoctopus</i> sp.								34
Ceratopogonidae								
<i>cf. Palpomyia</i> spp.								86
Simuliidae								
<i>Simulium cf. argus/vittatum</i>	1574	1414	3003	2230	467	5266		
<i>Simulium aureum</i> cplx	222	56	723	56	394	1804		
<i>Simulium canadense</i>							553	69
<i>Simulium piperi</i>				54	1963	1053	1158	644
<i>Simulium tuberosum</i> cplx		4	383	54	3201	4036	8120	1122
<i>Simulium cf. virgatum</i>		164	338					
Chironomidae								
Tanypodinae								
Macropelopiini								
Procladiiini								
Pentaneurini								
<i>Conchapelopia</i> sp.		278		54		41		
<i>Pentaneura</i> sp.		54	4	164				
<i>Rheopelopia</i> sp.	2	54		465	34		207	
<i>cf. Thienemanniella</i> sp.	108							
Diamesinae								
<i>Pagastia</i> sp.							2	
<i>Potthastia gaedii</i> gr.	217							
Orthoclaadiinae								
Corynoneurini								
<i>Corynoneura</i> spp.			164	379			41	52
<i>Thienemanniella</i> spp.	379	54	108	650			82	103
Orthoclaadiiini								
<i>Brillia cf. retifinis</i>					103		168	461
<i>Cardiocladius</i> sp.	54	110			34		84	
<i>Cricotopus bicinctus</i>	1845	379		489				
<i>Cricotopus tremulus</i> gr. spp.	7433	1574	54	379	17	125		86
<i>Cricotopus trifascia</i> gr.	435	650	814	1085		166		
<i>Eukiefferiella brehmi</i> gr.	108		271	54	17		125	
<i>Eukiefferiella claripennis</i> gr.				54	69		82	
<i>Eukiefferiella devonica</i> gr.			108	650	121	166		
<i>Heterotrissocladius marcidus</i> gr.						41		
<i>Limnophyes</i> sp.					17			
<i>Nanocladius parvulus</i> gr.							41	
<i>Parametriocneme</i> sp.		217	108	217	69		413	138
<i>Rheocricotopus</i> sp.	1031	596	543	543	52	82	41	
<i>Synorthocladus</i> sp.	108	108	164	164				86
<i>Tvetenia bavarica</i> gr.						41	82	
Chironominae								
Chironomini								
<i>Dicrotendipes californicus</i>	271			108				
<i>Microtendipes pedellus</i> gr.	222	108	164	921				
<i>Microtendipes rydalsensis</i> gr.		54	108			41	1033	465
<i>Phaenopsectra</i> sp.	110						82	
<i>Polypedilum cf. illinoense</i>								86
<i>Polypedilum aviceps</i>	2605	868	977	1735	86	84	1653	741
Pseudochironomini								
<i>Pseudochironomus</i> sp.				164				
Tanytarsini								
<i>Micropsectra</i> spp.	108	164	435	2334	293	288	1158	792
<i>Paratanytarsus</i> sp.	54							

Table 7. continued

Taxon	ALC01	ALC03	ALC05	ALC07	ALC10	ALC12	ALC14	BAC01
<i>Rheotanytarsus</i> sp.	650	489	596	1031	52	454	2067	637
<i>Stempellinella</i> sp.							495	86
<i>Tanytarsus</i> tp. 1				271	34		745	
Dixidae								
<i>Dixa</i> spp.								17
<i>Meringodixa</i> sp.								17
Brachycera								
Stratiomyidae								
cf <i>Caloparyphus</i> sp.	222	2		108				17
cf <i>Euparyphus</i> sp.	54							2
Tabanidae								
Pelecorhynchidae								
Dolichopodidae				2				
Empididae								
<i>Chelifera</i> sp.		54			34	41	41	34
<i>Clinocera</i> sp.			4	4	34			
<i>Hemerodromia</i> sp.								34
<i>Wiedemannia</i> sp.		4	4					
Empididae tp. 2 P		2	174	4	19	6		
Cyclorhapha								
Syrphidae								
Ephydriidae	2			11				
Sciomyzidae								
Muscidae								
cf <i>Limnophora</i> tp. 1		2	2	6				
cf <i>Limnophora</i> tp. 2				2				
Chelicerata								
Arachnoidea								
Eylidae								
Hydriphantiidae								
<i>Protzia</i> sp.								17
Spherichontidae								
<i>Sperchon</i> spp.	2387	760	489	217	52		1985	534
Lebertiidae								
<i>Lebertia</i> sp.			54	108			372	121
Torrenticolidae				54			1240	327
Limnesiidae								
Hygrobatidae								
<i>Atractides</i> sp.	164	217	489	596	34	82	1033	207
Mideopsidae								
Oribatei								
Mollusca								
Gastropoda								
Prosobranchia		54						
Limnophila								
Physidae								
Lymnaeidae								
Planorbidae								
Pelecypoda								
Corbiculidae								
Sphaeriidae								
Abundance	36941	30273	28897	35017	12589	27636	34903	11578
Taxa Richness	54	58	52	72	52	47	75	81

Table 8. Estimated abundance of benthic macroinvertebrates m⁻² in riffles from Arroyo Calero, May 1997.

Taxon	CAC00	CAC02	CAC04	CAC06
Coelenterata				
<i>Hydra</i> spp.			164	121
Platyhelminthes				
<i>Dugesia</i> spp.	13	166		211
Nemertea				
<i>Prostoma</i> sp.	26	24	17	30
Nematoda			37	151
Mermithidae	39		17	181
Nematomorpha				
Ectoprocta				
Annelida				
Polychaeta				
Aphanoneura				
<i>Aeolosoma</i> spp.	65	24	37	
Oligochaeta				
Haplotaxida				
Haplotaxidae				
Tubificida				
Enchytraeidae				
<i>Cernosvitoviella</i> sp.	26			
Naididae				
<i>Nais communis</i>	26		254	90
<i>Nais pardalis</i>	375	448	127	
<i>Nais simplex</i>		24		
<i>Nais variabilis</i>	52		362	60
<i>Ophidonais serpentina</i>	26	164	2133	1537
<i>Paranais frici</i>	26			
<i>Pristina aequisetata</i>	13		37	
<i>Pristina leidy</i>			108	
<i>Pristinella jenkinsae</i>			54	
<i>Pistinella osborni</i>	13		73	
<i>Slavina appendiculata</i>		47	596	121
<i>Sylaria lacustris</i>		24	37	60
Tubificidae				
<i>Aulodrilus plurisetata</i>			17	
<i>Bothrioneurum vej dovskyanum</i>	116	47	235	2743
<i>Quistadrilus multisetosus</i>				392
Tubificidae tp. 1		24		1326
Tubificidae tp. 2	26			30
Lumbriculida				
Lumbriculidae				
<i>Lumbriculus</i> cf. <i>variegatus</i>			71	30
Lumbricina				
Sparganophilidae				
Ocnerodrilidae				
<i>Eukerria saltensis</i>	118	6	2	
Lumbricidae				
<i>Eiseniella tetraedra</i>	2	4	41	6
Branchiobdellida				
Hirudinoidea				
Glossiphoniidae				
<i>Helobdella stagnalis</i>				64
Erpobdellidae				4
Arthropoda				
Mandibulata				
Crustacea				
Cladocera				
Chydoridae				90
Daphnidae				
Ostracoda	13	71	452	2213
Eucopepoda				
Cyclopoida		47	17	60
Calanoida				
Harpacticoida				
Mysidacea				
Isopoda				
Asellidae				

Table 8. continued

Taxon	CAC00	CAC02	CAC04	CAC06
Sphaeromatidae				
Amphipoda				
Corophiidae				
<i>Corophium cf. spinicornae</i>				60
Crangonyctidae				
<i>cf. Stygobromus</i> sp.	2			
Talitridae				
<i>Hyaella azteca</i>		47	17	1935
Decapoda				
Astacidae				
Cambaridae				
Grapsidae				
Insecta				
Ephemeroptera				
Ameletidae				
Siphonuridae				
Baetidae				
<i>Baetis tricaudatus</i>	129	97		185
Heptageniidae				
Ephemerellidae				
<i>Serratella micheneri</i>	196	192	22	
Tricorythidae				
<i>Tricorythodes cf. minutus</i>	146	97	200	217
Caenidae				
<i>Caenis</i> sp.				123
Leptophlebiidae				
<i>Paraleptophlebia cf. debilis</i>	13		245	
Odonata				
Anisoptera				
Aeshnidae				
Cordulegastridae				
Gomphidae				
Libellulidae				
Zygoptera				
Calopterygidae				
Lestidae				
Coenagrionidae				2
<i>Argia</i> sp.	177	11	9	2
Plecoptera				
Pteronarcyidae				
Peltoperlidae				
Nemouridae				
<i>Malenka</i> spp.	13			
Leuctridae				
Capniidae				
Perlidae				
Perlodidae				
Chloroperlidae				
Hemiptera				
Belostomatidae				
Corixidae				
<i>Sigara</i> sp.			9	170
Megaloptera				
Sialidae				
<i>Sialis</i> sp.	54		149	
Corydalidae				
Trichoptera				
Hydropsychoidea				
Philopotamidae				
<i>Wormaldia gabriella</i>	4	60		
Psychomyiidae				
Polycentropodidae				
<i>Polycentropus</i> sp.		24		
Hydropsychidae				
Hydropsychidae spp. e.i.	1305	2633	37	60
<i>Cheumatopsyche mickeli</i>	646	377	2	
<i>Hydropsyche californica</i>	665	2738	17	60

Table 8. continued

Taxon	CAC00	CAC02	CAC04	CAC06
Rhyacophilidae				
Glossosomatidae				
<i>Agapetus</i> spp.		2		
Hydroptilidae				
<i>Hydroptila</i> spp.		47		123
<i>Metrichia</i> sp.	39	24		
Limnephiloidea				
Brachycentridae				
<i>Micrasema</i> sp.	13	71		
Lepidostomatidae				
<i>Lepidostoma</i> tp. 2			297	
<i>Lepidostoma</i> spp.	39	24		60
Limnephilidae				
Uenoidae				
Sericostomatidae				
Odontoceridae				
Leptoceridae				
Lepidoptera				
Pyralidae				
<i>Petrophila</i> sp.	39	2		
Coleoptera				
Adephaga				
Gyrinidae				
<i>Gyrinus</i> sp.				121
Haliplidae				
Dytiscidae				
<i>Agabus</i> sp.			2	67
<i>Nebrioporus/Stictotarsus</i> spp.				
Polyphaga				
Hydrophilidae				
Hydrophilidae L.	2			
Hydraenidae				
Psephenidae				
Dryopidae				
Scirtidae				
Elmidae				
<i>Optioservus</i> cf <i>seriatius</i>	30			37
<i>Optioservus</i> spp.	105	166	146	
Diptera				
Nematocera				
Blepharicidae				
Tipulidae				
<i>Antocha</i> sp.	43	127		
<i>Dicranota</i> sp.	22	78		
<i>Limonia</i> sp. 1	4	4		
<i>Tipula</i> spp.	24	2		
Psychodidae				
Ceratopogonidae				
cf <i>Palpomyia</i> spp.			37	
Simuliidae				
<i>Simulium</i> cf <i>argus/vittatum</i>				151
<i>Simulium aureum</i> cplx	13	2		211
<i>Simulium piperi</i>	13	24		
<i>Simulium tuberosum</i> cplx	13			
Chironomidae				
Tanypodinae				
Macropelopiini				
<i>Alotanytus</i> sp.	13			
cf <i>Bruidiniella</i> sp.			39	
Procladiini				
Pentaneurini				
<i>Ablabesmyia</i> sp.				90
<i>Conchapelopia</i> sp.			2	
<i>Pentaneura</i> sp.		71		
Diamesinae				
Orthoclaadiinae				
Corynoneurini				
<i>Corynoneura</i> spp.			144	

Table 8. continued

Taxon	CAC00	CAC02	CAC04	CAC06
<i>Thienemanniella</i> spp.				121
Orthoclaudiini				
<i>Brillia</i> cf <i>retifinis</i>		166	54	
<i>Cricotopus bicornatus</i>				121
<i>Cricotopus sylvestris</i> gr.				30
<i>Cricotopus tremulus</i> gr. spp.			90	301
<i>Cricotopus</i> sp. 1		47		
<i>Eukiefferiella brehmi</i> gr.	13			
<i>Eukiefferiella claripennis</i> gr.				30
<i>Heleniella</i> sp.		47		
<i>Parametriocnemus</i> sp.	286	822	325	90
<i>Rheocricotopus</i> sp.	131	258	144	90
<i>Synorthocladus</i> sp.	13	47	37	
Chironominae				
Chironomini				
cf <i>Chironomus</i> sp.				241
<i>Cryptochironomus</i> sp.			17	60
<i>Dicrotendipes modestus</i>				181
<i>Microtendipes pedellus</i> gr.	26			
<i>Microtendipes rydalisensis</i> gr.	245	24		
<i>Paratendipes</i> sp.		47	37	60
<i>Phaenopsectra</i> sp.	26	24	254	151
<i>Polypedilum aviceps</i>	26			
Pseudochironomini				
Tanytarsini				
<i>Micropsectra</i> spp.	336	846	1102	452
<i>Paratanytarsus</i> sp.			37	151
<i>Rheotanytarsus</i> sp.	26	47	108	482
<i>Stempellinella</i> sp.	52	47	288	
<i>Tanytarsus</i> tp. 1			108	
<i>Tanytarsus</i> tp. 2	26		37	1266
Dixidae				
<i>Dixa</i> spp.	13	26	17	
Brachycera				
Stratiomyidae				
Tabanidae				
Pelecorhynchidae				
Dolichopodidae			2	
Empididae				
<i>Chelifera</i> sp.	2	24		
<i>Clinocera</i> sp.			19	2
<i>Hemerodromia</i> sp.	26			
<i>Wiedemannia</i> sp.	13			
Empididae tp. 2 P	15		2	
Cyclorapha				
Syrphidae				
Ephyridae				
Sciomyzidae				
Muscidae				
Chelicerata				
Arachnoidea				
Eylaidae				
Hydriphantidae				
Spherchontidae				
<i>Sperchon</i> spp.	478	1671	108	30
Lebertiidae				
<i>Lebertia</i> sp.			54	
Torrenticolidae				
Limnesiidae				
Hygrobatidae				
<i>Atractides</i> sp.	129	164		
<i>Hygrobates</i> sp.			54	
Mideopsidae				
Oribatei			90	
Mollusca				
Gastropoda				
Prosobranchia	13			
Limnophila				

Table 8. continued

Taxon	CAC00	CAC02	CAC04	CAC06
Physidae				
<i>cf Physella</i>				90
Lymnaeidae				
Planorbidae	65		108	60
Pelecypoda				
Corbiculidae				
<i>Corbicula fluminea</i>			271	62
Sphaeriidae				
Abundance	6697	12347	9625	17265
Taxa Richness	65	54	63	60

Table 9. Estimated abundance of benthic macroinvertebrates m⁻² in riffles from Coyote Creek, May 1997.

Taxon	COC12	COC16	COC32	COC35	COC37	COC50	COC53	COC54	COC62	COC83	COC89
Coelenterata											
<i>Hydra</i> spp.		11									
Platyhelminthes											
<i>Dugesia</i> spp.		67	523	1386	65			125		30	
Nemertea											
<i>Prostoma</i> sp.	26		39	108							
Nematoda		56	19	181	30			62			
Mermithidae		131			30			71			
Nematomorpha											
Ectoprocta											
<i>Plumatella</i> sp.								62			
Annelida											
Polychaeta											
<i>Nereis limnicola</i>	144										
Aphanoneura											
<i>Aelosoma</i> spp.	26	22									
Oligochaeta											
Haplotaxidae											
Haplotaxidae											
Tubificidae											
Enchytraeidae											
cf <i>Enchytraeus</i> spp.	297	327									
Naididae											
<i>Chaetogaster diaphanus</i>	26										
<i>Dero digitata</i>	50	56									
<i>Dero furcata</i>		22									
<i>Dero nivea</i>						30					
<i>Nais communis</i>	297	1048	80	73	90	121	5425	3782	921		
<i>Nais elinguis</i>	1834	101									
<i>Nais pardalis</i>	4215	45									
<i>Nais simplex</i>	99						435	185			
<i>Nais variabilis</i>	2034	80			151	211	6004		2224		
<i>Ophidonais serpentina</i>		67	278	73	271	241		620	54		
<i>Paranais jrici</i>	50										
<i>Pristina aequiseta</i>	26	700				30					22
<i>Pristina leidy</i>	372	56	19		30						
<i>Pistinnella osborni</i>		125	19								
<i>Slavina appendiculata</i>			60	73		60		558	325		
Tubificidae											
<i>Bothrioneurum vejdozkyanum</i>	99	101	39	144	151						
<i>Limnodrilus hoffmeisteri</i>	54										
<i>Limnodrilus udekemianus</i>	844	22									
<i>Potamotheix bavaricus</i>	50										
Tubificidae tp. 1	646										
Tubificidae tp. 2	3856	258		325							
Lumbriculida											
Lumbriculidae											
<i>Lumbriculus cf variegatus</i>						60					
Lumbricina											
Sparganophilidae								4			
<i>Sparganophilus nr eiseni</i>	13		17	129	28						
Onciderilidae											
<i>Eukerria saltensis</i>	2	13	11	4	6	4	2		2		
Lumbricidae											
<i>Allolobophora chlorotica</i>				4							
<i>Eiseniella tetraedra</i>	50	13	62	2							
cf <i>Dendrodilus rubidus</i>	2										
Branchiobdellida		11									
Hirudinoidea											
Glossiphoniidae											
Erpobdellidae		2		39							
Arthropoda											
Mandibulata											
Crustacea											
Cladocera											
Chydoridae											
Daphnidae											

Table 9. continued

Taxon	COC12	COC16	COC32	COC35	COC37	COC50	COC53	COC54	COC62	COC83	COC89
Ostracoda				325	60	30	73				
Eucopepoda											
Cyclopoida	125	11								30	
Calanoida											
Harpacticoida											
Mysidacea											
Isopoda											
Asellidae											
Sphaeromatidae											
Amphipoda											
Corophiidae											
<i>Corophium cf. spinicornae</i>					30	4			2		
Crangonyctidae											
<i>Crangonyx</i> sp.		11			60						
Talitridae											
<i>Hyalella azteca</i>			19	459					2		
Decapoda											
Astacidae											
<i>Pacifastacus leniusculus</i>									2		
Cambaridae											
Grapsidae											
Insecta											
Ephemeroptera											
Ameletidae											
Siphonuridae											
<i>Siphonurus</i> sp.										6	
Baetidae											
<i>Acentrella turbida</i>							1167		108		
<i>Baetis tricaudatus</i>	461	467	2913	329	9240	4512	4226	15866	13162	370	1862
<i>Diphetor hageni</i>										60	62
<i>Fallceon quillieri</i>	2	2	1602	9653	1311	1100	2616	4295	54		
Heptageniidae											
<i>Nixe</i> sp.		2								2941	676
Ephemerellidae											
<i>Drunella cf. flavilinia</i>											45
<i>Ephemerella maculata</i>		2								840	144
<i>Serratella micheneri</i>								383	489		
<i>Serratella teresa</i>											45
Tricorythidae											
<i>Tricorythodes cf. minutus</i>			118	1307	880	364	217	248			
Caenidae											
<i>Caenis</i> sp.			80			2					
Leptophlebiidae											
<i>Paraleptophlebia cf. debilis</i>										155	995
Odonata											
Anisoptera											
Aeshnidae											
Cordulegastridae											
Gomphidae											
Libellulidae											
Zygoptera											
Calopterygidae											
Lestidae											
Coenagrionidae					30						
<i>Argia</i> sp.			207								
Plecoptera											
Pteronarcyidae											
Peltoperlidae											
Nemouridae											
<i>Malenka</i> spp.							2				
Leuctridae											
Capniidae											
Perlidae											
Perlodidae											
<i>Isoperla</i> sp. 1										99	211
<i>cf. Kogonis</i> sp.											6
Chloroperlidae											

Table 9. continued

Taxon	COC12	COC16	COC32	COC35	COC37	COC50	COC53	COC54	COC62	COC83	COC89
<i>Suwallia cf pallidula</i>										6	157
Hemiptera											
Belostomatidae											
Corixidae											
<i>Sigara</i> sp.			19					2			
Megaloptera											
Sialidae											
<i>Stalis</i> sp.		13		2		30			56		
Corydalidae											
cf <i>Neohermes</i> sp.										32	6
Trichoptera											
Hydropsychoidea											
Philopotamidae											
<i>Wormaldia gabriella</i>										6	164
Psychomyiidae											
Polycentropodidae											
Hydropsychidae											
Hydropsychidae spp. e.i.			19	362	1326	2139	867	3163	1410	452	476
<i>Cheumatopsyche mickeli</i>		2	125	37	2	4		6		517	125
<i>Hydropsyche californica</i>		24	1137	407	1535	1107	338	3877	2011	127	4
<i>Hydropsyche oslari</i>											297
Rhyacophilidae											
<i>Rhyacophila cf arcella</i>											2
Glossosomatidae											
<i>Agapetus marlo</i> P										45	6
<i>Agapetus</i> spp.											2
<i>Glossosoma pterna</i>										90	22
Hydroptilidae											
<i>Hydroptila</i> spp.	26	82	41	144	60	301			108	90	
<i>Ithytrichia cf clavata</i>										151	517
<i>Metrichia</i> sp.											22
Limnephiloidea											
Brachycentridae											
Lepidostomatidae											
Limnephilidae											
Uenoidae											
Sericostomatidae											
<i>Gumaga</i> sp.										271	185
Odontoceridae											
Leptoceridae											
Lepidoptera											
Pyalidae											
Coleoptera											
Adephaga											
Gyrinidae											
Haliplidae											
Dytiscidae											
<i>Nebrioporus/Stictotarsus</i> spp.										30	
Polyphaga											
Hydrophilidae											
Hydrophilidae L.			2								
Hydraenidae											
Psephenidae											
<i>Eubrianax</i> sp.							2				
Dryopidae											
<i>Postelichus</i> sp.										39	
Scirtidae											
Elmidae											
<i>Optioservus cf seriatus</i>			19	73		32		62	56		
<i>Optioservus</i> spp.	2	11	19				144		108		
<i>Ordobrevia nubifera</i>										30	65
<i>Zaitzevia cf parvula</i>	26	11								97	
Diptera											
Nematocera											
Blephariceridae											
Tipulidae											
<i>Antocha</i> sp.										4	
<i>Dicranota</i> sp.			41		2	67	2		54		

Table 9. continued

Taxon	COC12	COC16	COC32	COC35	COC37	COC50	COC53	COC54	COC62	COC83	COC89
<i>Hexatoma</i> spp.										220	30
<i>Tipula</i> spp.			2								
Psychodidae											
<i>Pericoma/Telmatoscopus</i> sp.		2									
Ceratopogonidae											
cf <i>Culicoides</i> sp.	26										
cf <i>Palpomyia</i> spp.										60	41
Simuliidae											
<i>Simulium</i> cf <i>argus/vittatum</i>	26	115	60		4770	773	6710	4582	2794	915	476
<i>Simulium aureum</i> cplx		93	19		60	2	454	185	515		
<i>Simulium pipert</i>		2									
<i>Simulium tuberosum</i> cplx					2	2			6		
<i>Simulium</i> cf <i>virgatum</i>					2			4	54		
Chironomidae											
Tanypodinae											
Macropelopiini											
Procladiini											
<i>Procladius (Holotanypus)</i> sp.									2		
Pentaneurini											
<i>Ablabesmyia</i> sp.		11				60	2		54		
<i>Conchapelopia</i> sp.							2			181	43
<i>Nilotanyptus</i> sp.										60	
<i>Pentaneura</i> sp.	28	34	977	362	153	60	506	878		121	
<i>Rheopelopia</i> sp.										60	22
cf <i>Thienemanniya</i> sp.		6						6			
Diamesinae											
<i>Potthastia gaedii</i> gr.										4469	43
Orthoclaadiinae											
Corynoneurini											
<i>Corynoneura</i> spp.					60			125	164		82
<i>Thienemanniella</i> spp.										151	103
Orthoclaadiini											
<i>Brillia</i> cf <i>retifinis</i>		4							114		
<i>Cardiocladius</i> sp.							151	62			
<i>Cricotopus bicinctus</i>	50	34	39	37	121	153			54	90	41
<i>Cricotopus tremulus</i> gr. spp.	174	124	179	110		151	217			93	373
<i>Cricotopus trifascia</i> gr.	52	73		506	1869	555	73		493	753	207
<i>Eukiefferiella brehmi</i> gr.							144			271	3348
<i>Eukiefferiella claripennis</i> gr.	127				60		579	62	54		103
<i>Eukiefferiella devonica</i> gr.					30	30			650		
<i>Euryhapsis</i> sp.		34									
<i>Orthocladus (Euorthocladus)</i> tp. 2											103
<i>Parametricnemus</i> sp.		45	198			515	144	62	271	60	248
<i>Rheocricotopus</i> sp.	273	646	818	37	904	2865	868	930	489		41
Chironominae											
Chironomini											
cf <i>Chironomus</i> sp.		45									
<i>Cryptochironomus</i> sp.	26	58		108				2			
<i>Dicrotendipes californicus</i>	133	11									
<i>Microtendipes pedellus</i> gr.					30					1180	
<i>Microtendipes rydalensis</i> gr.			19					2			
<i>Phaenopsectra</i> sp.		22				121		2			
<i>Polypedilum</i> cf <i>illinoense</i>	52						288				
<i>Polypedilum aviceps</i>	125	202	19				506	62		723	1356
Pseudochironomini											
Tanytarsini											
<i>Micropsectra</i> spp.	50		99			181	1085	930	2553	90	
<i>Rheotanytarsus</i> sp.			99	435	1326	753	2893	930		392	
<i>Tanytarsus</i> tp. 1										5425	288
<i>Tanytarsus</i> tp. 2	26					90					
Dixidae											
Brachycera											
Stratiomyidae											
cf <i>Caloparyphus</i> sp.			19							211	2
cf <i>Euparyphus</i> sp.											24
<i>Odontomyia</i> sp.										2	103
Tabanidae											
Pelecorhynchidae											

Table 9. continued

Taxon	COC12	COC16	COC32	COC35	COC37	COC50	COC53	COC54	COC62	COC83	COC89
Dolichopodidae			19	2							4
Empididae											
<i>Cheltifera</i> sp.			19								
<i>Clinocera</i> sp.							73		9		
<i>Hemerodromia</i> sp.		11	80		273					2	41
Empididae tp. 1 P		34							54	90	
Empididae tp. 2 P								202	22		
Cyclorapha							73			30	22
Syrphidae											
Ephydriidae											
Sciomyzidae											
Muscidae											
cf <i>Limnophora</i> tp. 1			19			30	37				
Chelicerata											
Arachnoidea											
Eylaidae											
Hydryphantidae											
<i>Prozia</i> sp.										60	
<i>Wandesia</i> sp.											22
Spherchontidae											
<i>Sperchon</i> spp.	125	687	857	1735	1417	422	362	248			22
Lebertiidae											
<i>Lebertia</i> sp.									54		
Torrenticolidae										1447	
Limnesiidae											
Hygrobatidae											
<i>Atractides</i> sp.			19	73		60	73			121	41
Mideopsidae											
Oribatei											
Mollusca											
Gastropoda											
Prosobranchia											
Limnophila											
Physidae											
cf <i>Physella</i>			19								
Lymnaeidae											
Planorbidae		22									
Pelecypoda											
Corbiculidae											
<i>Corbicula fluminea</i>				133							
Sphaeriidae											
Abundance	17047	6287	11106	19177	26463	17272	36764	42641	29554	23795	13347
Taxon Richness	45	58	47	35	36	39	37	35	38	52	52

Table 10. Estimated abundance of benthic macroinvertebrates m⁻² in riffles from Upper Penetencia Creek, May 1997.

Taxon	PEC00	PEC02	PEC04	PEC06	PEC08	PEC10	PEC12
Coelenterata							
<i>Hydra</i> spp.		43					
Platyhelminthes							
<i>Dugesia</i> spp.		1091	133	41	164	133	
Nemertea							
<i>Prostoma</i> sp.		260	269		54		
Nematoda	4	43			54		
Mermithidae	4		45	288			
Nematomorpha							
cf <i>Gordius</i> spp.							4
Ectoprocta							
<i>Fredericella sultana</i>		43	45				
Annelida							
Polychaeta							
Aphanoneura							
<i>Aelosoma</i> spp.	4	390					
Oligochaeta							
Haplotaxida							
Haplotaxidae							
Tubificida							
Enchytraeidae							
cf <i>Enchytraeus</i> spp.				41			
Naididae							
<i>Nais communis</i>	22	260	224		54	398	
<i>Nais elinguis</i>		129					
<i>Nais pardalis</i>	4						
<i>Nais simplex</i>		217					
<i>Nais variabilis</i>	237	4469	45	82	108	67	
<i>Ophidonais serpentina</i>	32	868					
<i>Pristina aequisetia</i>	164	43					
<i>Pristina leidy</i>	11						
<i>Pristinella jenkiniae</i>	4						
<i>Pristinella osborni</i>	4	43	133				
<i>Slavina appendiculata</i>			493				
Tubificidae							
<i>Anulodrilus plurisetia</i>	11		45				
<i>Bothrioneurum vej dovskyanum</i>	65						
<i>Rhyacodrilus coccineus/montana</i>							129
<i>Tubifex tubifex</i>	2						
Tubificidae sp. 1	22					67	43
Lumbriculida							
Lumbriculidae							
Lumbricina							
Sparganophilidae							
Ocnodrilidae							
<i>Eukerria saltensis</i>		24	123				
Lumbricidae							
<i>Allolobophora chlorotica</i>			2				
Branchiobdellida							
Hirudinoidea							
Glossiphoniidae							
Erpobdellidae							
Arthropoda							
Mandibulata							
Crustacea							
Cladocera							
Chydoridae							
Daphnidae							
Ostracoda	4	217	45	166		67	
Eucopepoda							
Cyclopoida							
Calanoida							
Harpacticoida							
Mysidacea							
Isopoda							
Isopoda sp. 1							43
Asellidae							

Table 10. continued

Taxon	PEC00	PEC02	PEC04	PEC06	PEC08	PEC10	PEC12
<i>Caecidotea</i> sp. 1						67	
Sphaeromatidae							
Amphipoda							
Corophiidae							
Crangonyctidae							
Talitridae							
Decapoda							
Astacidae							
Cambaridae							
Grapsidae							
Insecta							
Ephemeroptera							
Ameletidae							
Siphonuridae							
Baetidae							
<i>Baetis tricaudatus</i>	235	2635	4349	3190	5111	8450	695
<i>Baetis</i> sp. 1						801	355
<i>Dipheter hageni</i>		86	357	2200	1793	1664	390
<i>Fallceon quilleri</i>	11	177					
Heptageniidae							
<i>Ironodes</i> spp.							4
<i>Nixe</i> sp.	17	47	54	41	60	136	86
Ephemerellidae							
<i>Drunella</i> cf <i>flavilinia</i>				4	67	22	65
<i>Ephemerella maculata</i>	15	4	13	13	54		
<i>Serratella micheneri</i>				4			
<i>Serratella teresa</i>							2
Tricorythidae							
<i>Tricorythodes</i> cf <i>minutus</i>	15	1617	4	43	164		
Caenidae							
Leptophlebiidae							
<i>Paraleptophlebia</i> cf <i>debilis</i>	15						
<i>Paraleptophlebia</i> cf <i>memoralis</i>							2
Odonata							
Anisoptera							
Aeshnidae							
Cordulegastridae							
Gomphidae							
Libellulidae							
Zygoptera							
Calopterygidae							
Lestidae							
Coenagrionidae							
<i>Argia</i> sp.			45	2			
Plecoptera							
Pteronarcyidae							
Peltoperlidae							
Nemouridae							
<i>Malenka</i> spp.	4	226	90	422		3333	1389
Leuctridae							
Capniidae							43
Perlidae							
<i>Calineuria californica</i>	11	45	22	4	11	323	205
Perlodidae							
Chloroperlidae							
<i>Suwallia</i> cf <i>pallidula</i>							43
Hemiptera							
Belostomatidae							
<i>Abedus</i> sp.				41			
Corixidae							
Megaloptera							
Sialidae							
<i>Sialis</i> sp.		4	2				
Corydalidae							
cf <i>Neohermes</i> sp.							2
Trichoptera							
Hydropsychoidea							

Table 10. continued

Taxon	PEC00	PEC02	PEC04	PEC06	PEC08	PEC10	PEC12
Philopotamidae							
<i>Wormaldia gabriella</i>						159	243
Psychomyiidae							
Polycentropodidae							
<i>Polycentropus</i> sp.						2	4
Hydropsychidae							
Hydropsychidae spp. e.i.	15	739	1610	2151	4450	4855	1085
<i>Parapsyche almota</i>						9	
<i>Cheumatopsyche nickeli</i>	4	1074	4590	876	596		
<i>Hydropsyche californica</i>	15	670	2837	598	547		
<i>Hydropsyche oslari</i>			45	108	807	1765	319
Rhyacophilidae							
<i>Rhyacophila</i> cf <i>arcella</i>		2		4	4	73	308
Glossosomatidae							
<i>Agapetus celatus</i> P						71	2
<i>Agapetus</i> spp.					2	6	9
Hydroptilidae							
<i>Hydroptila</i> spp.		260	45	45	110		
<i>Metrichia</i> sp.			45	2		271	
Limnephiloidea							
Brachycentridae							
<i>Micrasema</i> sp.							2
Lepidostomatidae							
<i>Lepidostoma</i> cf <i>cantha</i>							2
<i>Lepidostoma</i> spp.	4				54	133	2
Limnephilidae							
<i>Psychoglypha</i> cf <i>bella</i>							6
Uenoidae							
<i>Neophylax</i> cf <i>rickeri</i>						2	43
Sericostomatidae							
<i>Gumaga</i> sp.				41			
Odontoceridae							
<i>Parthina</i> sp.					325		392
Leptoceridae							
<i>Oecetis</i> sp.		86	45	41			
Lepidoptera							
Pyrilidae							
Coleoptera							
Adephaga							
Gyrinidae							
Haliplidae							
<i>Peltodytes</i> sp.						67	
Dytiscidae							
<i>Nebrioporus/Stictotarsus</i> spp.				2	4		
Polyphaga							
Hydrophilidae							
Hydraenidae							
Psephenidae							
<i>Eubrianax</i> sp.	2			2	2	73	43
Dryopidae							
Scirtidae							
Elmidae							
<i>Acneus</i> sp.							2
<i>Optioservus</i> cf <i>seriatus</i>	52	263	2	47	54	67	43
<i>Optioservus</i> spp.	2	415	228	295	110	4	
<i>Ordobrevia nubifera</i>						334	
<i>Zaizevia</i> cf <i>parvula</i>	4	177	95			200	521
Diptera							
Nematocera							
Blephariceridae							
Tipulidae							
<i>Antocha</i> sp.					2	202	43
<i>Dicranota</i> sp.		45		47	58	93	
<i>Hexatoma</i> spp.						26	97
Psychodidae							
Ceratopogonidae							
cf <i>Palpomyia</i> spp.						133	
Simuliidae							

Table 10. continued

Taxon	PEC00	PEC02	PEC04	PEC06	PEC08	PEC10	PEC12
<i>Simulium cf argus/vittatum</i>			179	4049	6823	4861	
<i>Simulium aureum</i> cplx	4	129		250	1636	133	
<i>Simulium canadense</i>					1044	2	
<i>Simulium piperi</i>	2			2	601	411	435
<i>Simulium tuberosum</i> cplx					121		
<i>Simulium cf virgatum</i>					133		
Chironomidae							
Tanypodinae							
Macropelopiini							
cf <i>Brundiniella</i> sp.				82			
Procladiini							
Pentaneurini							
<i>Conchapelopia</i> sp.		129	47	93			
<i>Nilotanytus</i> sp.				41	108	133	
<i>Pentaneura</i> sp.				125	271	67	43
<i>Rheopelopia</i> sp.			2	594	982	338	43
cf <i>Thienemannimyia</i> sp.		2					
<i>Zavrelimyia</i> sp.							43
Diamesinae							
Orthoclaadiinae							
Corynoneurini							
<i>Corynoneura</i> spp.	88	260	90	125	379		174
<i>Thienemanniella</i> spp.		86	45	166		67	
Orthoclaadiini							
<i>Brillia cf retifinis</i>	19			82	4		868
<i>Cricotopus bicinctus</i>				125	54	133	
<i>Cricotopus tremulus</i> gr. spp.	11			82	54		
<i>Cricotopus trifascia</i> gr.		217	45	248	54		
<i>Cricotopus</i> sp. 1				82			
<i>Eukiefferiella brehni</i> gr.				41	164	200	
<i>Eukiefferiella claripennis</i> gr.							174
<i>Eukiefferiella devonica</i> gr.						67	
<i>Krenosmittia</i> sp.							43
<i>Linnophyes</i> sp.	11						174
<i>Parametriocnemus</i> sp.	82	129	90	125	435	267	564
<i>Paraphaenocladus</i> sp.							43
<i>Rheocricotopus</i> sp.	1111	3255	403	413	164		
<i>Tvetenia bavarica</i> gr.						133	43
Chironominae							
Chironomini							
<i>Cryptochironomus</i> sp.		86					
<i>Dicrotendipes californicus</i>	11						
<i>Microtendipes pedellus</i> gr.					54	67	
<i>Microtendipes rydalensis</i> gr.				82			
<i>Phaenopsectra</i> sp.	11			332			
<i>Polypedilum cf illinoense</i>				82			
<i>Polypedilum aviceps</i>	463	5690	4833	868	596	2127	7031
Pseudochironomini							
<i>Pseudochironomus</i> sp.		174		41	108	598	
Tanytarsini							
<i>Micropectra</i> spp.	32	304	90	82	54	598	2344
<i>Paratanytarsus</i> sp.						67	
<i>Rheotanytarsus</i> sp.	4	129	45	288	435	200	999
<i>Tanytarsus</i> tp. 1				82			
<i>Tanytarsus</i> tp. 2				248			
Dixidae							
<i>Dixa</i> spp.							88
Brachycera							
Stratiomyidae							
cf <i>Caloparyphus</i> sp.				248	4	543	
cf <i>Euparyphus</i> sp.			4	6	56	73	
cf <i>Oxycera</i> sp.							9
Tabanidae							
Pelecorhynchidae							
Dolichopodidae		2				4	
Empididae							
<i>Chelifera</i> sp.					54		
<i>Hemerodromia</i> sp.	4	2	90		108		

Table 10. continued

Taxon	PEC00	PEC02	PEC04	PEC06	PEC08	PEC10	PEC12
Empididae tp. 1 P		129		41		67	
Cyclorhapha							
Syrphidae							
Ephyridae							
Sciomyzidae							
Muscidae							
<i>cf. Limnophora</i> tp. 1		50		6	4	9	
Chelicerata							
Arachnoidea							
Eylaidae							
Hydryphantidae							
Spherochontidae							
<i>Sperchon</i> spp.	73	2908	2013	332	108	267	347
Lebertiidae							
<i>Lebertia</i> sp.	4	129					
Torrenticolidae		86	90	288	108	398	521
Limnesiidae							
Hygrobatidae							
<i>Atractides</i> sp.	15					200	
Mideopsidae							
Oribatei							
Mollusca							
Gastropoda							
Prosobranchia							
Limnophila							
Physidae							
<i>cf. Physella</i>	11						
Lymnaeidae							
Planorbidae		260					
Pelecypoda							
Corbiculidae							
Sphaeriidae							
Abundance	2971	30868	24146	20592	29535	36103	20652
Taxa Richness	50	55	46	63	56	61	55