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# Santa Fe River Aquatic Macroinvertebrate Monitoring

Report 2008

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Natural Heritage New Mexico Report – 09-GTR-342



NATURAL HERITAGE  
NEW MEXICO

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Cover: Transect No. 03SF010 along the Santa Fe River.

# Santa Fe River Aquatic Macroinvertebrate Monitoring<sup>1</sup>

*Report 2008*

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March 2009

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## **Introduction**

The Taos Field Office of the Bureau of Land Management (BLM) initiated a riparian vegetation monitoring program for its lands along the lower Santa Fe River just west of La Cienega in 2003. In 2008, monitoring for aquatic macroinvertebrates was conducted at the vegetation monitoring sites. Aquatic macroinvertebrates are an important indicator of the health of a system, and have long been used to evaluate water quality. They are present in almost all systems, are habitat specific, relatively easy to collect and identify, and a vital link in the food chain between primary producers and vertebrates. The habitat requirements of many taxa are well known, and this makes them excellent indicators of water quality and the status of the aquatic ecosystem. The intent of this monitoring is to provide an initial sample of the macroinvertebrate community within the Santa Fe River, which can be used to assess current water quality within the river, and provide a baseline against which to measure future improvements or declines. The sampling sites are located within a two-mile reach of the river that has been recently excluded from livestock grazing. Historically, the allotment was subject to livestock grazing year round. Starting in 2004 grazing within the allotment was limited, and in the summer of 2008 livestock had been removed from the allotment completely. We report here on the project design, methodologies, and the initial baseline data collected from 2008.

## **Methods**

### **Study area**

The study area is located 26 km (16 miles) southwest of Santa Fe within the lower portion of the Santa Fe River Area of Critical Environmental Concern (ACEC) managed by the BLM (Figure 1). The study reach is approximately 3.5 km (2.2 miles) long with elevations that range from 1768 m (5800 ft) upper end to 1737 m (5700 ft) at the lower end resulting in a gentle stream gradient (approximately 1%). The floodplain averages only about 100 m in width and is constrained within a deep canyon, bounded by mesas capped with ancient basalt lava flows. The river has a perennial flow sustained by a combination of natural discharge from a drainage basin

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<sup>1</sup> Final report Cooperative agreement No. GDA-070009

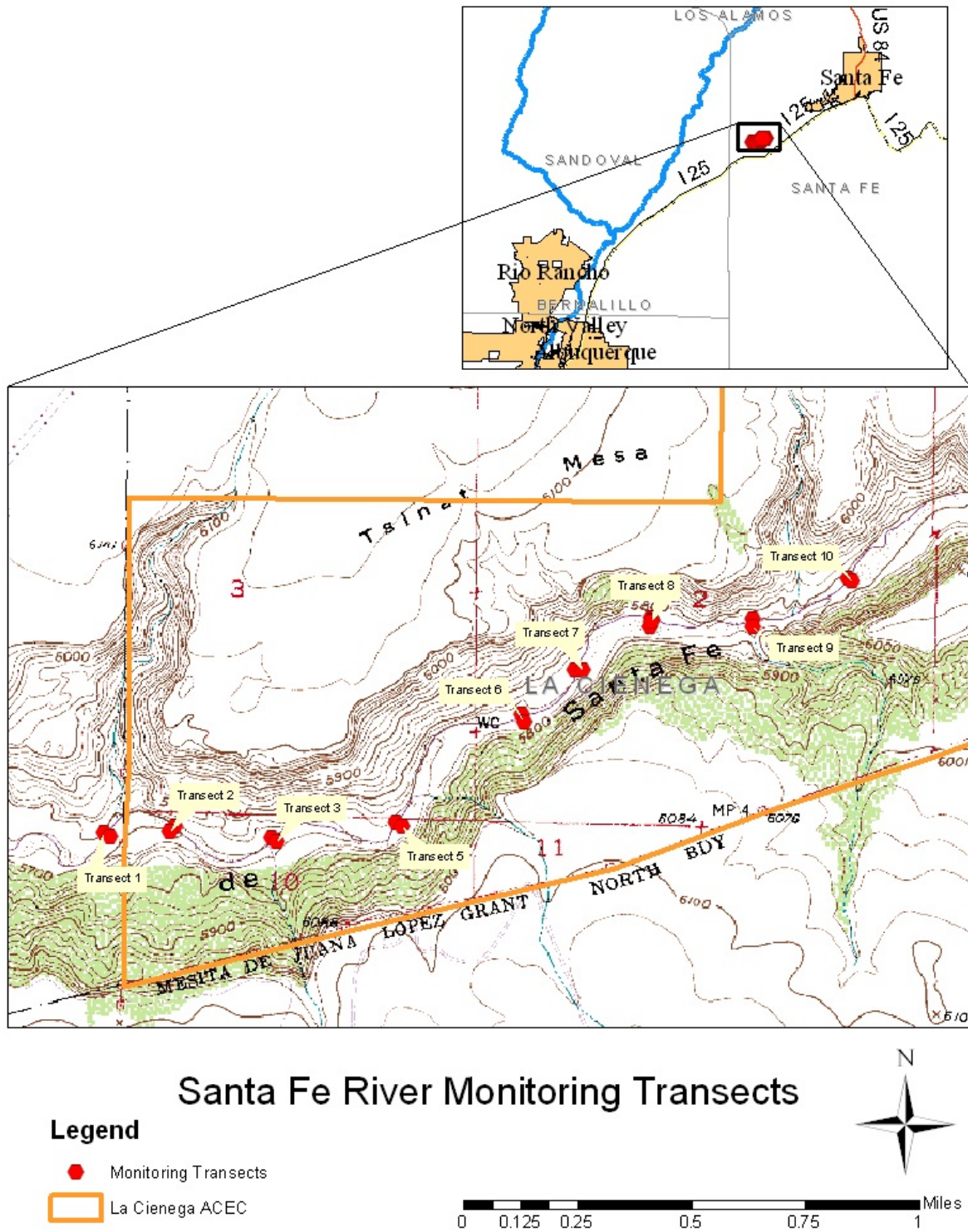


Figure 1. Study area for the Santa Fe River ACEC riparian monitoring program.

of 45.5 km<sup>2</sup> (18.20 sq mi) and from the City of Santa Fe sewage treatment facility south of town.

The study area has a long history of human use as evidenced by numerous archeological sites within the canyon. Over the past century, livestock grazing has been the primary land use, typically on a year-round basis, and the site is part of an active BLM grazing allotment. At the time NHNM began vegetation sampling in 2003, cattle had been heavily using the site through the summer season since forage elsewhere in the allotment was in short supply due to drought conditions. An attempt was made to limit grazing within the allotment starting in 2004. However, for several months during the summers of 2004-2006 cattle were present on the allotment and there was grazing within the active floodplain, again because of limited forage elsewhere. No grazing had occurred within the allotment during the summer of 2008, as of the macroinvertebrate sampling in early July, thus herbaceous vegetation was much taller and denser than in previous years (see transect photos in Appendix D).

## **Sampling design and analysis**

Nine vegetation monitoring transects were established in September 2003 along the lower two-mile stretch of the Santa Fe River within the ACEC (Figure 1). During 2003-2006 sampling was focused on riparian and wetland vegetation within the active floodplain with the intent of detecting major changes in species composition and structure. Hence, transects were more or less evenly distributed along the reach and generally across straight reaches between river bends where the widest zones of riparian vegetation occurred. Details on the vegetation sampling and transect layouts are available in Milford et al. 2006 and 2007.

Each year, including 2008, four monitoring photographs were taken along each transect: one from the start stake to end stake and vice-versa, then two more, one looking upstream and one downstream, taken from a point upstream of the transect at a distance measured and recorded off the right bank floodplain stake. Appendix D contains a series of three photos from 2003, 2005 and 2008 for each transect. These photos are down the transect lines from the start to end stakes. A complete set of digital monitoring photographs is provided on the CD included with this report.

In 2008 aquatic macroinvertebrate samples were collected at the nine existing vegetation transects. Both D-net and bottom (benthic) samples were taken. D-net samples were taken at each of the nine transects. The D-net is a bag made of canvas and 500-micron netting attached to a 12-inch diameter D-shaped metal ring on a five-foot handle. The standard procedure was to conduct 10 one-meter sweeps with the D-net per transect. This was then considered one sample. Sweeps within a sample were not repeated in an identical location, though they were all located within 12 feet of the transect line. Sweeps were conducted in both the center of the water column and within the water along the stream bank edge. Everything collected in the net was then transferred to labeled vials containing 90% ethyl alcohol.

A bottom sampler was used to collect macroinvertebrates at four of the vegetation transects (Transects 7, 8, 9 and 10). The bottom sampler was a canvas and 965-micron net bag attached to a 12 by 12-inch rectangular metal frame that anchored it to the stream bottom. The sampler was

placed on the stream bottom with the mouth of the bag directed upstream. The substrate within the frame was gently disturbed for one minute, allowing invertebrates to be swept into the net by the current. The bottom sampler was then removed from the stream and invertebrates were collected from the net and preserved in 90% ethyl alcohol. All the macroinvertebrate samples with their location and sampling information are listed in Table 1.

In the laboratory, plant material and dirt was removed from the samples. All samples were sorted and identified to the lowest practical taxonomic level. All samples were sorted at between three and eight times magnification to ensure that samples were as complete as possible. Because of the time of year these samples were collected, nearly all of the macroinvertebrates were early instar (very small) and difficult to identify to genus. Many of the identifications are only to the family level because of this. Samples were not sub sampled; all individuals present were identified and counted. See Appendix C for complete lists of taxa and individual counts by sample.

The Hilsenhoff Biotic Index (HBI) was calculated for all of the samples. Tolerance values (TV) were assigned to all taxa for which they were available. TV ranges from 0, for taxa known to occur only in high quality waters, to 10, for taxa known to occur in severely polluted waters. Tolerance values came from Davis et al. 2001 or Hilsenhoff 1988. The HBI for a given sample was calculated by multiplying the TV for each taxon by the number of individuals of that taxon present in the sample, then summing the products across all taxa in the sample and dividing by the total number of individuals in the sample. Taxa without a known TV were excluded from the calculation (Table 1).

The HBI has been used to detect nutrient enrichment, high sediment loads, low dissolved oxygen, and thermal impacts on freshwater streams. Primarily the HBI is used to evaluate the level of organic enrichment experienced by a given stream system (Table 2). Generally HBI values of 0-2 are considered clean, 2-4 slightly enriched, 4-7 enriched, and 7-10 polluted (Vinson 1994). The Hilsenhoff Biotic Index, while very commonly used, was developed in streams of the Upper Midwest. Davis et al. (2001) changed many of the tolerance values to better represent taxa found in wilderness streams of the Mountain West. While an improvement, these changes may still not reflect the full picture of the status of the Santa Fe River aquatic ecosystem, but until a more local alternative index is developed, it is the best available.

Percent dominance, percent filterer, percent scraper and percent shredder were also calculated for each sample per Davis et al. (2001). Percent dominance is a measure of a community's redundancy and evenness. It assumes that a highly redundant community, one with a high percent dominance and thus low diversity, is impaired. For this study it was calculated by summing the total number of the two most dominant taxa in a sample and then dividing by the total number of individuals in all taxa in the sample. Percent filterer is a measure of the abundance of the filtering functional feeding group. A large percentage of filterers may indicate excessive sediment or organic load and can be considered an indication of poor habitat quality. Percent scrapers is a measure of the relative abundance of the scraping functional feeding group. A high percentage of scrapers suggests good habitat quality. Percent shredder is a measure of the relative abundance of the shredder functional feeding group. A low number of shredders is considered to reflect poor or altered riparian habitat.

Table 1. Santa Fe River aquatic macroinvertebrate sample summaries for 2008. Samples are organized by transect location, and type of sample (D-net or Benthic (Bottom Sampler)) with average values given for all D-net samples, all Benthic samples and all samples over all. Two samples were considered non-quantitative due to errors in protocol, and are listed separately. Those samples are not included in any of the sample averages. HBI = Hilsenoff Biotic Index; Species Richness = count of individual taxa in the sample; % Dominance = total number of individuals in the two most common taxa divided by the total number of individuals in the sample; % Filterer = number of individuals in the filterer feeding groups divided by total number of individuals in the sample; % Scraper = number of individuals in the scraper feeding groups divided by total number of individuals in the sample; % Shredder = number of individuals in the shredder feeding groups divided by total number of individuals in the sample.

**Quantitative Samples:**

Transect	SampleID	Sample Date	Net Type	HBI	Species		%	%	%
					Richness	% Dominance	Filterer	Scraper	Shredder
03SF001	03SF001-1	09-Jul-08	D-Net	5.33	21	87.75%	0.15%	0.15%	
03SF002	03SF002-1	09-Jul-08	D-Net	7.10	19	80.78%	0.16%	0.09%	
03SF003	03SF003-1	03-Jul-08	D-Net	6.76	17	78.29%		0.07%	0.03%
03SF005	03SF005-1	03-Jul-08	D-Net	6.72	19	70.63%			0.14%
03SF006	03SF006-1	03-Jul-08	D-Net	5.24	18	79.51%	0.69%		
03SF007	03SF007-1	03-Jul-08	D-Net	7.13	17	64.85%	0.18%	1.93%	
03SF008	03SF008-1	02-Jul-08	D-Net	7.43	14	77.63%		0.19%	
03SF009	03SF009-1	02-Jul-08	D-Net	5.46	15	70.61%	0.88%		
<b>Average D-Net Samples:</b>				<b>6.40</b>	<b>17.5</b>	<b>76.26%</b>	<b>0.23%</b>	<b>0.27%</b>	<b>0.02%</b>
03SF007	03SF007-2	03-Jul-08	Bottom Sampler	5.93	13	77.26%	0.50%		
03SF009	03SF009-2	02-Jul-08	Bottom Sampler	7.17	10	59.18%	4.08%		
03SF010	03SF010-2	02-Jul-08	Bottom Sampler	6.65	21	44.60%	0.53%	11.02%	
<b>Average Benthic Samples:</b>				<b>6.58</b>	<b>14.7</b>	<b>60.35%</b>	<b>1.28%</b>	<b>2.75%</b>	<b>0.00%</b>
<b>Average all quantitative samples:</b>				<b>6.45</b>	<b>16.7</b>	<b>71.92%</b>	<b>0.65%</b>	<b>1.22%</b>	<b>0.02%</b>

**Non-Quantitative Samples:**

Transect	SampleID	Sample Date	Net Type	HBI	Species		%	%	%
					Richness	Dominance*	Filterer	Scraper	Shredder
03SF010	03SF010-1	02-Jul-08	D-Net	5.31	18	47.67%	1.47%	5.39%	0.25%
03SF008	03SF008-2	02-Jul-08	Bottom Sampler	6.89	15	58.70%		3.30%	1.10%

Table 2. Interpreting Hilsenhoff Biotic Index values. Table reproduced from Hilsenhoff 1988.

<b>Family Biotic Index</b>	<b>Water Quality</b>	<b>Degree of Organic Pollution</b>
0.00-3.75	Excellent	Organic pollution unlikely
3.76-4.25	Very good	Possible slight organic pollution
4.26-5.00	Good	Some organic pollution probable
5.01-5.75	Fair	Fairly substantial pollution likely
5.76-6.50	Fairly poor	Substantial pollution likely
6.51-7.25	Poor	Very substantial pollution likely
7.26-10.00	Very poor	Severe organic pollution likely

The data was entered using Microsoft Access into the NHNM ecology database with tables specifically designed for this project. Over the past decade the NHNM ecology database has been developed and populated with over 12,000 plot records from around the state and Southwest. Accordingly, there is a set of data entry protocols that have been implemented that ensure data quality, including independently proofreading the data for accuracy. The compact disk included with this report contains all of the raw data in MS Excel files, along with the photo files, and a PDF of this report.

## **Results and Discussion**

Ideally, macroinvertebrate monitoring programs include a temporal element of taking multiple samples throughout the year. Hence, the interpretations of the data in this report should be tempered with the understanding that there are limitations to a single date ‘snapshot’ sample of the invertebrate community. For example, because all of the samples were collected in early July, many of the taxa were not identifiable to genus (the mayfly family Leptohephidae, for example), and it is also likely that there are other taxa present in the Santa Fe River that were not encountered during this one sample period. This partial picture of the aquatic invertebrate community would have been true regardless of when a single sample was taken, as different invertebrate taxa have different life cycles

Given these considerations, our sample was relatively diverse and exhibited a wide range of Tolerance Values (TV). A total of 51 invertebrate taxa were identified (Appendix B), of these, 43 were arthropods, 38 of which were insects. Tolerance values among insect taxa ranged from one to nine, with most taxa falling in the three to seven range. All of the non-insect arthropod taxa had a high TV of eight, while the non-arthropod invertebrates were in the mid range of four to eight.

Percent dominance averaged 72% across all quantitative samples (Table 1). This shows a fairly high level of redundancy, and indicates an impaired community. With a few exceptions, the most dominant taxa on a transect were either mayflies (Baetidae or Leptohephidae families), or snails (Physidae family) (Appendix C).



Results with respect to quality metrics related to functional feeding groups were equivocal (Table 1). That is, the percentage of filterers was very low, potentially indicating good conditions with respect to sediment or organic load. At the same time percent scraper and shredder were also low suggesting degraded habitat. Hence, these metrics based on functional feeding groups are currently of limited indicator value other than telling us that the system does not currently favor any of these three feeding groups. Subsequent multi-temporal sampling will be needed to fully realize the trends.

With respect to HBI, individual sample scores ranged from 5.24 to 7.43 with an average of 6.45. This puts Santa Fe river in the fairly poor or organically enriched category (Table 1, Table 2). The river's enriched HBI score may be a reflection of the fact that the majority of flow within the canyon comes from the City of Santa Fe sewage treatment plant. The enriched HBI score may also be influenced by the historically heavy livestock usage in the floodplain. Although there was no active grazing within the study area at the time of sampling in 2008, livestock were present in the floodplain less than a year previous to the sampling. Organic input from old dung and urine still present in the floodplain may take years to be absorbed and flushed from the system. While there were still indications in 2008 of grazing effects from previous years, stream edge vegetation had significantly increased in abundance compared to 2003-2005. The effects of livestock trampling and de-vegetation of stream banks were still evident, but there were indications of stabilization of the channel and of improvement in overall stream morphology. This suggests that the overall HBI score may decrease as aquatic habitat improves with continued exclusion of livestock grazing within the floodplain, followed by recovery of stream vegetation and channel geomorphology.

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## Appendix A

UTM coordinates for the end-point rebar of all the transects.

### UTM locations for transect end-point rebars

Datum: NAD27 Zone: 13

<b>Transect</b>	<b>Rebar #</b>	<b>Easting</b>	<b>Northing</b>
03SF001	1	392051	3934550
03SF001	4	392073	3934538
03SF002	1	392302	3934572
03SF002	4	392286	3934558
03SF003	1	392643	3934534
03SF003	4	392662	3934518
03SF005	1	393083	3934587
03SF005	4	393102	3934574
03SF006	1	393524	3934969
03SF006	4	393532	3934941
03SF007	1	393711	3935125
03SF007	4	393739	3935123
03SF008	1	393982	3935310
03SF008	2b	393984	3935298
03SF008	3a	393981	3935293
03SF008	4	393979	3935275
03SF009	1	394340	3935302
03SF009	4	394339	3935279
03SF010	1	394674	3935447
03SF010	4	394688	3935437

## Appendix B

List of all invertebrate taxa for combined 2008 samples. The first page contains all non-arthropod phyla, while the following pages list all arthropods. Tolerance Values (TV) come from Davis et al. 2001 or Hilsenhoff 1988. Functional Feeding Group (FFG) assignments come from Davis et al. 2001, Merritt et al. 2008, Smith 2001, or Voshell 2002.

Order	Family	Genus	Taxon Name	Common name	TV	FFG Code	FFGName
<b>Phylum: Annelida</b>							
<b>Class: Clitellata</b>							
<b>SubClass: Hirudinea</b>							
			Hirudinea	leech	7	PP	piercer predator
<b>Class: Oligochaeta</b>							
			Oligochaeta	freshwater oligochaeta		CG	collector-gatherer
<b>Phylum: Mollusca</b>							
<b>Class: Gastropoda</b>							
	Limnophila	Physidae	Physa	Physa sp.	8	CG	collector-gatherer
	Limnophila	Planorbidae	Gyraulus	Gyraulus sp.	8	CG	collector-gatherer
<b>Class: Bivalvia</b>							
	Veneroida	Sphaeriidae	Sphaeriidae	pea clam	8	CF	collector-filterer
<b>Phylum: Nematoda</b>							
			Nematoda	round worm	5	F	filterer
<b>Phylum: Nematomorpha</b>							
			Nematomorpha	horsehair worm		PA	parasite
<b>Phylum: Platyhelminthes</b>							
<b>Class: Turbellaria</b>							
			Turbellaria	flatworm	4	PG	predator engulfer

Order	Family	Genus	Taxon Name	Common name	TV	FFG Code	FFGName
<b>Phylum: Arthropoda</b>							
<b>SubPhylum: Chelicerata</b>							
<b>Class: Arachnida</b>							
Acari	Hydracarina		Hydracarina	water mite	8	PP	piercer predator
<b>SubPhylum: Crustacea</b>							
<b>Class: Copepoda</b>							
			Copepoda	copepod	8	CG	collector-gatherer
<b>Class: Malacostraca</b>							
Amphipoda	Hyaellidae	Hyaella	Hyaella sp.	amphipod	8	CG	collector-gatherer
<b>Class: Ostracoda</b>							
			Ostracoda	ostracod	8	CG	collector-gatherer
<b>SubPhylum: Hexapoda</b>							
<b>Class: Entognatha</b>							
Collembola			Collembola	springtail		CG	collector-gatherer
<b>Class: Insecta</b>							
Coleoptera	Elmidae		Elmidae	riffle beetle	4	CG	collector-gatherer
Coleoptera	Elmidae	Hexacylloepus	Hexacylloepus sp.	riffle beetle	2	CG	collector-gatherer
Coleoptera	Elmidae	Stenelmis	Stenelmis sp.	riffle beetle	7	SC	scraper
Coleoptera	Haliplidae		Haliplidae	crawling water beetles	7	SH	shredder
Coleoptera	Hydrophilidae		Hydrophilidae	water scavenger beetle	5	PR	predator
Diptera	Ceratopogonidae	Bezzia	Bezzia sp.	biting midge	6	PG	predator engulfer
Diptera	Chironomidae		Chironomidae	midge	6	CG	collector-gatherer
Diptera	Simuliidae		Simuliidae	black fly	6	CF	collector-filterer
Diptera	Tipulidae		Tipulidae	crane fly	3	SH	shredder
Ephemeroptera	Baetidae		Baetidae	mayfly	4	CG	collector-gatherer
Ephemeroptera	Baetidae	Cloeodes	Cloeodes sp.	mayfly	4	CG	collector-gatherer
Ephemeroptera	Leptohyphidae		Leptohyphidae	mayfly	5	CG	collector-gatherer
Hemiptera	Corixidae		Corixidae	water boatman		PH	piercer herbivore
Hemiptera	Gerridae	Metrobates	Metrobates sp.	water strider	5	PP	piercer predator
Hemiptera	Naucoridae	Ambrysus	Ambrysus sp.	creeping water bug	5	PP	piercer predator
Hemiptera	Veliidae		Veliidae	broad-shouldered water strider		PP	piercer predator
Hemiptera	Veliidae	Microvelia	Microvelia sp.	broad-shouldered water strider		PP	piercer predator
Hemiptera	Veliidae	Rhagovelia	Rhagovelia sp.	broad-shouldered water strider		PP	piercer predator

Order	Family	Genus	Taxon Name	Common name	FFG	
					TV Code	FFGName
<b>Phylum: Arthropoda</b>						
<b>SubPhylum: Hexapoda</b>						
<b>Class: Insecta - cont.</b>						
			Homoptera	unidentified Homopteran		
			Zygoptera	unidentified damselfly nymph	PG	predator engulfer
	Calopterygidae		Calopterygidae	broad-winged damselfly	5 PG	predator engulfer
	Calopterygidae	Hetaerina	Hetaerina sp.	rubyspot damselfly	5 PG	predator engulfer
	Coenagrionidae		Coenagrionidae	narrow-winged damselfly	9 PG	predator engulfer
	Coenagrionidae	Amphiagrion	Amphiagrion sp.	red damselfly	9 PG	predator engulfer
	Coenagrionidae	Argia	Argia sp.	dancer damselfly	7 PG	predator engulfer
	Gomphidae	Erpetogomphus	Erpetogomphus sp.	ringtail dragonfly	1 PG	predator engulfer
	Gomphidae	Phyllogomphoides	Phyllogomphoides sp.	leaftail dragonfly	1 PG	predator engulfer
			Trichoptera	caddisfly	UN	unknown
			Trichoptera larval casing	caddisfly larval casing	UN	unknown
	Helicopsychidae	Helicopsyche	Helicopsyche sp.	snail-case caddisfly	3 SC	scraper
	Hydroptilidae		Hydroptilidae	microcaddisfly	4 PH	piercer herbivore
	Hydroptilidae	Ochrotrichia	Ochrotrichia sp.	microcaddisfly	4 PH	piercer herbivore
	Leptoceridae		Leptoceridae	longhorned caddisfly	4 CG	collector-gatherer
	Leptoceridae	Nectopsyche	Nectopsyche sp.	white miller caddisfly	3 SH	shredder
	Hydroptilidae		Hydroptilidae	microcaddisfly	4 PH	piercer herbivore
	Hydroptilidae	Ochrotrichia	Ochrotrichia sp.	microcaddisfly	4 PH	piercer herbivore
	Leptoceridae		Leptoceridae	longhorned caddisfly	4 CG	collector-gatherer
	Leptoceridae	Nectopsyche	Nectopsyche sp.	white miller caddisfly	3 SH	shredder

## **Appendix C**

Individual sample totals by taxa for 2008 aquatic invertebrate samples on the Santa Fe River. Within each sample arthropods are listed first, with other phyla following in alphabetical order. Tolerance Values (TV) come from Davis et al. 2001 or Hilsenhoff 1988. Functional Feeding Group (FFG) assignments come from Davis et al. 2001, Merritt et al. 2008, Smith 2001, or Voshell 2002.

Transect: 03SF001

Sample ID: 03SF001-1

Sample Type: Quantitative

Net Type: D-Net

Order	Family	Genus	Taxon name	Common name	# of Inds	TV	FFG
<b>Phylum: Arthropoda</b>							
<b>SubPhylum: Chelicerata</b>							
<b>Class: Arachnida</b>							
Acari	Hydracarina		Hydracarina	water mite	1	8	PP
<b>SubPhylum: Hexapoda</b>							
<b>Class: Insecta</b>							
Coleoptera	Elmidae		Elmidae	riffle beetle	4	4	CG
Coleoptera	Elmidae	Hexacylloepus	Hexacylloepus sp.	riffle beetle	10	2	CG
Coleoptera	Elmidae	Stenelmis	Stenelmis sp.	riffle beetle	1	7	SC
Diptera	Chironomidae		Chironomidae	midge	8	6	CG
Diptera	Simuliidae		Simuliidae	black fly	5	6	CF
Ephemeroptera	Baetidae		Baetidae	mayfly	42	4	CG
Ephemeroptera	Leptohyphidae		Leptohyphidae	mayfly	3250	5	CG
Hemiptera	Corixidae		Corixidae	water boatman	1		PH
Hemiptera	Naucoridae	Ambrysus	Ambrysus sp.	creeping water bug	5	5	PP
Hemiptera	Veliidae	Rhagovelia	Rhagovelia sp.	broad-shouldered water strider	9		PP
Odonata			Zygoptera	unidentified damselfly nymph	31		PG
Odonata	Calopterygidae	Hetaerina	Hetaerina sp.	rubyspot damselfly	55	5	PG
Odonata	Coenagrionidae	Argia	Argia sp.	dancer damselfly	2	7	PG
Trichoptera			Trichoptera	caddisfly	6		UN
Trichoptera	Helicopsychidae	Helicopsyche	Helicopsyche sp.	snail-case caddisfly	5	3	SC
<b>SubPhylum: Crustacea</b>							
<b>Class: Malacostraca</b>							
Amphipoda	Hyaellidae	Hyaella	Hyaella sp.	Amphipod	140	8	CG
<b>Class: Ostracoda</b>							
			Ostracoda	Ostracod	14	8	CG
<b>Phylum: Annelida</b>							
<b>Class: Clitellata</b>							
<b>SubClass: Hirudinea</b>							
			Hirudinea	leech	1	7	PP
<b>Class: Oligochaeta</b>							
			Oligochaeta	freshwater oligochaeta	2		CG
<b>Phylum: Mollusca</b>							
<b>Class: Gastropoda</b>							
Limnophila	Physidae	Physa	Physa sp.	snail	295	8	CG
	Planorbidae	Gyraulus	Gyraulus sp.	snail	47	8	CG
<b>Phylum: Nematoda</b>							
			Nematoda	round worm	1	5	F
<b>Phylum: Platyhelminthes</b>							
<b>Class: Turbellaria</b>							
			Turbellaria	flatworm	111	4	PG



Transect: 03SF002

Sample ID: 03SF002-1

Sample Type: Quantitative

Net Type: D-Net

Order	Family	Genus	Taxon name	Common name	# of Inds	TV	FFG
<b>Phylum: Arthropoda</b>							
<b>SubPhylum: Hexapoda</b>							
<b>Class: Insecta</b>							
Coleoptera	Elmidae		Elmidae	riffle beetle	1	4	CG
Coleoptera	Elmidae	Stenelmis	Stenelmis sp.	riffle beetle	1	7	SC
Diptera	Chironomidae		Chironomidae	midge	5	6	CG
Diptera	Simuliidae		Simuliidae	black fly	5	6	CF
Ephemeroptera	Baetidae		Baetidae	mayfly	35	4	CG
Ephemeroptera	Baetidae	Cloeodes	Cloeodes sp.	mayfly	11	4	CG
Ephemeroptera	Leptohyphidae		Leptohyphidae	mayfly	894	5	CG
Hemiptera	Naucoridae	Ambrysus	Ambrysus sp.	creeping water bug	7	5	PP
Hemiptera	Veliidae		Veliidae	broad-shouldered water strider	1		PP
Hemiptera	Veliidae	Rhagovelia	Rhagovelia sp.	broad-shouldered water strider	1		PP
Odonata			Zygoptera	unidentified damselfly nymph	12		PG
Odonata	Calopterygidae	Hetaerina	Hetaerina sp.	rubyspot damselfly	19	5	PG
Odonata	Coenagrionidae	Amphiagrion	Amphiagrion sp.	red damselfly	1	9	PG
Odonata	Coenagrionidae	Argia	Argia sp.	dancer damselfly	1	7	PG
Trichoptera			Trichoptera	caddisfly	6		UN
Trichoptera	Helicopsychidae	Helicopsyche	Helicopsyche sp.	snail-case caddisfly	3	3	SC
<b>SubPhylum: Crustacea</b>							
<b>Class: Malacostraca</b>							
Amphipoda	Hyaellidae	Hyaella	Hyaella sp.	Amphipod	196	8	CG
<b>Class: Ostracoda</b>							
			Ostracoda	Ostracod	44	8	CG
<b>Phylum: Annelida</b>							
<b>Class: Clitellata</b>							
<b>SubClass: Hirudinea</b>							
			Hirudinea	leech	1	7	PP
<b>Class: Oligochaeta</b>							
			Oligochaeta	freshwater oligochaeta	3		CG
<b>Phylum: Mollusca</b>							
<b>Class: Gastropoda</b>							
Limnophila	Physidae	Physa	Physa sp.	snail	2586	8	CG
Limnophila	Planorbidae	Gyraulus	Gyraulus sp.	snail	263	8	CG
<b>Phylum: Nematoda</b>							
			Nematoda	round worm	2	5	F
<b>Phylum: Platyhelminthes</b>							
<b>Class: Turbellaria</b>							
			Turbellaria	flatworm	216	4	PG

Transect: 03SF003

Sample ID: 03SF003-1

Sample Type: Quantitative

Net Type: D-Net

Order	Family	Genus	Taxon name	Common name	# of Inds	TV	FFG
<b>Phylum: Arthropoda</b>							
<b>SubPhylum: Hexapoda</b>							
<b>Class: Entognatha</b>							
	Collembola			springtail	3		CG
<b>Class: Insecta</b>							
	Coleoptera	Elmidae	Hexacylloepus	Hexacylloepus sp.	32	2	CG
	Coleoptera	Elmidae	Stenelmis	Stenelmis sp.	2	7	SC
	Coleoptera	Haliplidae		Haliplidae	1	7	SH
	Diptera	Chironomidae		Chironomidae	21	6	CG
	Ephemeroptera	Baetidae		Baetidae	38	4	CG
	Ephemeroptera	Leptohyphidae		Leptohyphidae	1056	5	CG
	Hemiptera	Naucoridae	Ambrysus	Ambrysus sp.	7	5	PP
	Homoptera			Homoptera	3		
	Odonata	Calopterygidae		Calopterygidae	1	5	PG
	Odonata	Calopterygidae	Hetaerina	Hetaerina sp.	7	5	PG
	Odonata	Coenagrionidae		Coenagrionidae	2	9	PG
	Odonata	Coenagrionidae	Argia	Argia sp.	5	7	PG
	Trichoptera			Trichoptera	35		UN
<b>SubPhylum: Crustacea</b>							
<b>Class: Copepoda</b>							
				Copepoda	1	8	CG
<b>Class: Malacostraca</b>							
	Amphipoda	Hyalellidae	Hyalella	Hyalella sp.	302	8	CG
<b>Class: Ostracoda</b>							
				Ostracoda	19	8	CG
<b>Phylum: Annelida</b>							
<b>Class: Oligochaeta</b>							
				Oligochaeta	4		CG
<b>Phylum: Mollusca</b>							
<b>Class: Gastropoda</b>							
	Limnophila	Physidae	Physa	Physa sp.	1335	8	CG
	Limnophila	Planorbidae	Gyraulus	Gyraulus sp.	174	8	CG
<b>Phylum: Platyhelminthes</b>							
<b>Class: Turbellaria</b>							
				Turbellaria	41	4	PG

Transect: 03SF005

Sample ID: 03SF005-1

Sample Type: Quantitative

Net Type: D-Net

Order	Family	Genus	Taxon name	Common name	# of Inds	TV	FFG
<b>Phylum: Arthropoda</b>							
<b>SubPhylum: Chelicerata</b>							
<b>Class: Arachnida</b>							
Acari	Hydracarina		Hydracarina	water mite	1	8	PP
<b>SubPhylum: Hexapoda</b>							
<b>Class: Entognatha</b>							
Collembola			Collembola	springtail	1		CG
<b>Class: Insecta</b>							
Coleoptera	Halipidae		Halipidae	crawling water beetle	2	7	SH
Diptera	Chironomidae		Chironomidae	midge	6	6	CG
Ephemeroptera	Baetidae		Baetidae	mayfly	55	4	CG
Ephemeroptera	Leptohyphidae		Leptohyphidae	mayfly	426	5	CG
Hemiptera	Gerridae	Metrobates	Metrobates sp.	water strider	1	5	PP
Hemiptera	Naucoridae	Ambrysus	Ambrysus sp.	creeping water bug	4	5	PP
Hemiptera	Veliidae	Microvelia	Microvelia sp.	broad-shouldered water strider	3		PP
Homoptera			Homoptera	unidentified Homopteran	3		
Odonata			Zygoptera	unidentified damselfly nymph	89		PG
Odonata	Coenagrionidae	Argia	Argia sp.	dancer damselfly	10	7	PG
Trichoptera			Trichoptera	caddisfly	1		UN
Trichoptera	Hydroptilidae		Hydroptilidae	microcaddisfly	1	4	PH
<b>SubPhylum: Crustacea</b>							
<b>Class: Copepoda</b>							
			Copepoda	copepod	4	8	CG
<b>Class: Malacostraca</b>							
Amphipoda	Hyalellidae	Hyalella	Hyalella sp.	Amphipod	120	8	CG
<b>Class: Ostracoda</b>							
			Ostracoda	Ostracod	12	8	CG
<b>Phylum: Mollusca</b>							
<b>Class: Gastropoda</b>							
Limnophila	Physidae	Physa	Physa sp.	snail	560	8	CG
Limnophila	Planorbidae	Gyraulus	Gyraulus sp.	snail	68	8	CG
<b>Phylum: Platyhelminthes</b>							
<b>Class: Turbellaria</b>							
			Turbellaria	flatworm	30	4	PG

Transect: 03SF006

Sample ID: 03SF006-1

Sample Type: Quantitative

Net Type: D-Net

Order	Family	Genus	Taxon name	Common name	# of Inds	TV	FFG
<b>Phylum: Arthropoda</b>							
<b>SubPhylum: Hexapoda</b>							
<b>Class: Entognatha</b>							
	Collembola		Collembola	springtail	2		CG
<b>Class: Insecta</b>							
	Coleoptera	Elmidae	Hexacylloepus	Hexacylloepus sp.	1	2	CG
	Diptera	Chironomidae		Chironomidae	54	6	CG
	Diptera	Simuliidae		Simuliidae	28	6	CF
	Ephemeroptera	Baetidae		Baetidae	1082	4	CG
	Ephemeroptera	Leptohyphidae		Leptohyphidae	2138	5	CG
	Hemiptera	Naucoridae	Ambrysus	Ambrysus sp.	1	5	PP
	Hemiptera	Veliidae	Microvelia	Microvelia sp.	2		PP
	Homoptera			Homoptera	6		
	Odonata	Calopterygidae	Hetaerina	Hetaerina sp.	4	5	PG
	Odonata	Coenagrionidae		Coenagrionidae	2	9	PG
	Odonata	Coenagrionidae	Argia	Argia sp.	12	7	PG
	Trichoptera			Trichoptera	4		UN
	Trichoptera	Hydroptilidae		Hydroptilidae	6	4	PH
<b>SubPhylum: Crustacea</b>							
<b>Class: Copepoda</b>							
				Copepoda	2	8	CG
<b>Class: Malacostraca</b>							
	Amphipoda	Hyaellidae	Hyaella	Hyaella sp.	50	8	CG
<b>Class: Ostracoda</b>							
				Ostracoda	16	8	CG
<b>Phylum: Mollusca</b>							
<b>Class: Gastropoda</b>							
	Limnophila	Physidae	Physa	Physa sp.	360	8	CG
	Limnophila	Planorbidae	Gyraulus	Gyraulus sp.	236	8	CG
<b>Phylum: Platyhelminthes</b>							
<b>Class: Turbellaria</b>							
				Turbellaria	48	4	PG

Transect: 03SF007

Sample ID: 03SF007-1

Sample Type: Quantitative

Net Type: D-Net

Order	Family	Genus	Taxon name	Common name	# of Inds	TV	FFG
<b>Phylum: Arthropoda</b>							
<b>SubPhylum: Hexapoda</b>							
<b>Class: Insecta</b>							
Coleoptera	Elmidae	Hexacylloepus	Hexacylloepus sp.	rifle beetle	6	2	CG
Diptera	Chironomidae		Chironomidae	midge	27	6	CG
Ephemeroptera	Baetidae		Baetidae	mayfly	3	4	CG
Ephemeroptera	Leptohyphidae		Leptohyphidae	mayfly	64	5	CG
Hemiptera	Naucoridae	Ambrysus	Ambrysus sp.	creeping water bug	6	5	PP
Odonata	Calopterygidae	Hetaerina	Hetaerina sp.	rubyspot damselfly	2	5	PG
Odonata	Gomphidae	Erpetogomphus	Erpetogomphus sp.	ringtail dragonfly	5	1	PG
Trichoptera			Trichoptera	caddisfly	98		UN
Trichoptera	Helicopsychidae	Helicopsyche	Helicopsyche sp.	snail-case caddisfly	11	3	SC
Trichoptera	Hydroptilidae	Ochrotrichia	Ochrotrichia sp.	microcaddisfly	1	4	PH
<b>SubPhylum: Crustacea</b>							
<b>Class: Malacostraca</b>							
Amphipoda	Hyaellidae	Hyaella	Hyaella sp.	Amphipod	10	8	CG
<b>Class: Ostracoda</b>							
			Ostracoda	Ostracod	11	8	CG
<b>Phylum: Annelida</b>							
<b>Class: Clitellata</b>							
<b>SubClass: Hirudinea</b>							
			Hirudinea	leech	10	7	PP
<b>Class: Oligochaeta</b>							
		Oligochaeta	Oligochaeta	freshwater oligochaeta	32		CG
<b>Phylum: Mollusca</b>							
<b>Class: Bivalvia</b>							
Veneroida	Sphaeriidae		Sphaeriidae	pea clam	1	8	CF
<b>Class: Gastropoda</b>							
Limnophila	Physidae	Physa	Physa sp.	snail	283	8	CG
Limnophila	Planorbidae	Gyraulus	Gyraulus sp.	snail	86	8	CG
<b>Phylum: Platyhelminthes</b>							
<b>Class: Turbellaria</b>							
			Turbellaria	flatworm	11	4	PG

C-7

Transect: 03SF007

Sample ID: 03SF007-2

Sample Type: Quantitative

Net Type: Bottom Sampler

Order	Family	Genus	Taxon name	Common name	# of Inds	TV	FFG
<b>Phylum: Arthropoda</b>							
<b>SubPhylum: Hexapoda</b>							
<b>Class: Insecta</b>							
Diptera	Chironomidae		Chironomidae	midge	5	6	CG
Diptera	Simuliidae		Simuliidae	black fly	3	6	CF
Ephemeroptera	Baetidae		Baetidae	mayfly	65	4	CG
Ephemeroptera	Leptohyphidae		Leptohyphidae	mayfly	304	5	CG
Odonata	Calopterygidae	Hetaerina	Hetaerina sp.	rubyspot damselfly	4	5	PG
Odonata	Coenagrionidae		Coenagrionidae	narrow-winged damselfly	2	9	PG
Trichoptera			Trichoptera	caddisfly	5		UN
<b>SubPhylum: Crustacea</b>							
<b>Class: Malacostraca</b>							
Amphipoda	Hyalellidae	Hyalella	Hyalella sp.	Amphipod	8	8	CG
<b>Class: Ostracoda</b>							
<b>Phylum: Annelida</b>							
<b>Class: Clitellata</b>							
<b>SubClass: Hirudinea</b>							
			Hirudinea	leech	2	7	PP
<b>Class: Oligochaeta</b>							
			Oligochaeta	freshwater oligochaeta	10		CG
<b>Phylum: Mollusca</b>							
<b>Class: Gastropoda</b>							
Limnophila	Physidae	Physa	Physa sp.	snail	158	8	CG
Limnophila	Planorbidae	Gyraulus	Gyraulus sp.	snail	12	8	CG
<b>Phylum: Platyhelminthes</b>							
<b>Class: Turbellaria</b>							
			Turbellaria	flatworm	5	4	PG

Transect: 03SF008

Sample ID: 03SF008-1

Sample Type: Quantitative

Net Type: D-Net

Order	Family	Genus	Taxon name	Common name	# of Inds	TV	FFG
<b>Phylum: Arthropoda</b>							
<b>SubPhylum: Hexapoda</b>							
<b>Class: Insecta</b>							
Coleoptera	Elmidae	Hexacylloepus	Hexacylloepus sp.	riffle beetle	38	2	CG
Coleoptera	Hydrophilidae		Hydrophilidae	water scavenger beetle	1	5	PR
Ephemeroptera	Leptohyphidae		Leptohyphidae	mayfly	2	5	CG
Hemiptera	Naucoridae	Ambrysus	Ambrysus sp.	creeping water bug	2	5	PP
Odonata	Calopterygidae	Hetaerina	Hetaerina sp.	rubyspot damselfly	12	5	PG
Odonata	Coenagrionidae	Argia	Argia sp.	dancer damselfly	2	7	PG
Trichoptera			Trichoptera	caddisfly	16		UN
Trichoptera	Helicopsychidae	Helicopsyche	Helicopsyche sp.	snail-case caddisfly	1	3	SC
<b>SubPhylum: Crustacea</b>							
<b>Class: Malacostraca</b>							
Amphipoda	Hyaellidae	Hyaella	Hyaella sp.	Amphipod	65	8	CG
<b>Class: Ostracoda</b>							
<b>Phylum: Annelida</b>							
<b>Class: Clitellata</b>							
<b>SubClass: Hirudinea</b>							
			Hirudinea	leech	4	7	PP
<b>Class: Oligochaeta</b>							
			Oligochaeta	freshwater oligochaeta	2		CG
<b>Phylum: Mollusca</b>							
<b>Class: Gastropoda</b>							
Limnophila	Physidae	Physa	Physa sp.	snail	348	8	CG
Limnophila	Planorbidae	Gyraulus	Gyraulus sp.	snail	51	8	CG
<b>Phylum: Platyhelminthes</b>							
<b>Class: Turbellaria</b>							
			Turbellaria	flatworm	3	4	PG

Transect: 03SF008

Sample ID: 03SF008-2

Sample Type: Non-quantitative

Net Type: Bottom Sampler

Order	Family	Genus	Taxon name	Common name	# of Inds	TV	FFG
<b>Phylum: Arthropoda</b>							
<b>SubPhylum: Hexapoda</b>							
<b>Class: Insecta</b>							
Coleoptera	Elmidae	Hexacylloepus	Hexacylloepus sp.	riffle beetle	8	2	CG
Diptera	Ceratopogonidae	Bezzia	Bezzia sp.	biting midge	1	6	PG
Diptera	Chironomidae		Chironomidae	midge	3	6	CG
Diptera	Tipulidae		Tipulidae	crane fly	1	3	SH
Ephemeroptera	Leptohephidae		Leptohephidae	mayfly	2	5	CG
Hemiptera	Naucoridae	Ambrysus	Ambrysus sp.	creeping water bug	1	5	PP
Odonata	Calopterygidae	Hetaerina	Hetaerina sp.	rubyspot damselfly	1	5	PG
Odonata	Gomphidae	Phyllogomphoides	Phyllogomphoides sp.	leaf-tail dragonfly	1	1	PG
Trichoptera			Trichoptera	caddisfly	11		UN
Trichoptera			Trichoptera larval casing	caddisfly larval casing	5		UN
Trichoptera	Helicopsychidae	Helicopsyche	Helicopsyche sp.	snail-case caddisfly	3	3	SC
<b>SubPhylum: Crustacea</b>							
<b>Class: Malacostraca</b>							
Amphipoda	Hyalellidae	Hyalella	Hyalella sp.	Amphipod	18	8	CG
<b>Class: Ostracoda</b>							
			Ostracoda	Ostracod	4	8	CG
<b>Phylum: Annelida</b>							
<b>Class: Clitellata</b>							
<b>SubClass: Hirudinea</b>							
			Hirudinea	leech	5	7	PP
<b>Class: Oligochaeta</b>							
			Oligochaeta	freshwater oligochaeta	1		CG
<b>Phylum: Mollusca</b>							
<b>Class: Gastropoda</b>							
Limnophila	Physidae	Physa	Physa sp.	snail	36	8	CG
Limnophila	Planorbidae	Gyraulus	Gyraulus sp.	snail	6	8	CG

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Transect: 03SF009

Sample ID: 03SF009-1

Sample Type: Quantitative

Net Type: D-Net

Order	Family	Genus	Taxon name	Common name	# of Inds	TV	FFG
<b>Phylum: Arthropoda</b>							
<b>SubPhylum: Chelicerata</b>							
<b>Class: Arachnida</b>							
Acari	Hydracarina		Hydracarina	water mite	1	8	PP
<b>SubPhylum: Hexapoda</b>							
<b>Class: Insecta</b>							
Diptera	Chironomidae		Chironomidae	midge	19	6	CG
Diptera	Simuliidae		Simuliidae	black fly	3	6	CF
Ephemeroptera	Baetidae		Baetidae	mayfly	105	4	CG
Ephemeroptera	Leptohyphidae		Leptohyphidae	mayfly	217	5	CG
Hemiptera	Naucoridae	Ambrysus	Ambrysus sp.	creeping water bug	1	5	PP
Homoptera			Homoptera	unidentified Homopteran	1		
Odonata	Calopterygidae	Hetaerina	Hetaerina sp.	rubyspot damselfly	4	5	PG
Odonata	Coenagrionidae	Argia	Argia sp.	dancer damselfly	2	7	PG
Trichoptera			Trichoptera	caddisfly	20		UN
<b>SubPhylum: Crustacea</b>							
<b>Class: Malacostraca</b>							
Amphipoda	Hyaellidae	Hyaella	Hyaella sp.	Amphipod	6	8	CG
<b>Class: Ostracoda</b>							
			Ostracoda	Ostracod	6	8	CG
<b>Phylum: Mollusca</b>							
<b>Class: Bivalvia</b>							
Veneroida	Sphaeriidae		Sphaeriidae	pea clam	1	8	CF
<b>Class: Gastropoda</b>							
Limnophila	Physidae	Physa	Physa sp.	snail	60	8	CG
Limnophila	Planorbidae	Gyraulus	Gyraulus sp.	snail	24	8	CG
<b>Phylum: Platyhelminthes</b>							
<b>Class: Turbellaria</b>							
			Turbellaria	flatworm	6	4	PG

Transect: 03SF009

Sample ID: 03SF009-2

Sample Type: Quantitative

Net Type: Bottom Sampler

Order	Family	Genus	Taxon name	Common name	# of Inds	TV	FFG
<b>Phylum: Arthropoda</b>							
<b>SubPhylum: Hexapoda</b>							
<b>Class: Insecta</b>							
Diptera	Chironomidae		Chironomidae	midge	21	6	CG
Ephemeroptera	Baetidae		Baetidae	mayfly	5	4	CG
Ephemeroptera	Leptohyphidae		Leptohyphidae	mayfly	6	5	CG
Trichoptera			Trichoptera	caddisfly	34		UN
<b>SubPhylum: Crustacea</b>							
<b>Class: Malacostraca</b>							
Amphipoda	Hyalellidae	Hyalella	Hyalella sp.	Amphipod	3	8	CG
<b>Class: Ostracoda</b>							
			Ostracoda	Ostracod	5	8	CG
<b>Phylum: Annelida</b>							
<b>Class: Oligochaeta</b>							
			Oligochaeta	freshwater oligochaeta	41		CG
<b>Phylum: Mollusca</b>							
<b>Class: Bivalvia</b>							
Veneroida	Sphaeriidae		Sphaeriidae	pea clam	6	8	CF
<b>Class: Gastropoda</b>							
Limnophila	Physidae	Physa	Physa sp.	snail	46	8	CG
Limnophila	Planorbidae	Gyraulus	Gyraulus sp.	snail	12	8	CG
<b>Phylum: Platyhelminthes</b>							
<b>Class: Turbellaria</b>							
			Turbellaria	flatworm	2	4	PG

Transect: 03SF010

Sample ID: 03SF010-1

Sample Type: Non-quantitative

Net Type: D-Net

Order	Family	Genus	Taxon name	Common name	# of Inds	TV	FFG
<b>Phylum: Arthropoda</b>							
<b>SubPhylum: Hexapoda</b>							
<b>Class: Insecta</b>							
Coleoptera	Elmidae	Hexacylloepus	Hexacylloepus sp.	riffle beetle	7	2	CG
Coleoptera	Elmidae	Stenelmis	Stenelmis sp.	riffle beetle	1	7	SC
Diptera	Chironomidae		Chironomidae	midge	171	6	CG
Diptera	Simuliidae		Simuliidae	black fly	12	6	CF
Ephemeroptera	Baetidae		Baetidae	mayfly	218	4	CG
Ephemeroptera	Leptohyphidae		Leptohyphidae	mayfly	95	5	CG
Hemiptera	Naucoridae	Ambrysus	Ambrysus sp.	creeping water bug	6	5	PP
Odonata	Calopterygidae	Hetaerina	Hetaerina sp.	rubyspot damselfly	1	5	PG
Odonata	Coenagrionidae		Coenagrionidae	narrow-winged damselfly	1	9	PG
Odonata	Coenagrionidae	Argia	Argia sp.	dancer damselfly	1	7	PG
Trichoptera			Trichoptera	caddisfly	712		UN
Trichoptera	Helicopsychidae	Helicopsyche	Helicopsyche sp.	snail-case caddisfly	43	3	SC
Trichoptera	Hydroptilidae		Hydroptilidae	microcaddisfly	2	4	PH
Trichoptera	Hydroptilidae	Ochrotrichia	Ochrotrichia sp.	microcaddisfly	2	4	PH
Trichoptera	Leptoceridae	Nectopsyche	Nectopsyche sp.	white miller caddisfly	2	3	SH
<b>SubPhylum: Crustacea</b>							
<b>Class: Malacostraca</b>							
Amphipoda	Hyaellidae	Hyaella	Hyaella sp.	Amphipod	18	8	CG
<b>Class: Ostracoda</b>							
			Ostracoda	Ostracod	1	8	CG
<b>Phylum: Annelida</b>							
<b>Class: Clitellata</b>							
<b>SubClass: Hirudinea</b>							
			Hirudinea	leech	4	7	PP
<b>Class: Oligochaeta</b>							
			Oligochaeta	freshwater oligochaeta	107		CG
<b>Phylum: Mollusca</b>							
<b>Class: Gastropoda</b>							
Limnophila	Physidae	Physa	Physa sp.	snail	72	8	CG
Limnophila	Planorbidae	Gyraulus	Gyraulus sp.	snail	33	8	CG
<b>Phylum: Platyhelminthes</b>							
<b>Class: Turbellaria</b>							
			Turbellaria	flatworm	19	4	PG

Transect: 03SF010

Sample ID: 03SF010-2

Sample Type: Quantitative

Net Type: Bottom Sampler

Order	Family	Genus	Taxon name	Common name	# of Inds	TV	FFG
<b>Phylum: Arthropoda</b>							
<b>SubPhylum: Hexapoda</b>							
<b>Class: Entognatha</b>							
	Collembola		Collembola	springtail	1		CG
<b>Class: Insecta</b>							
	Coleoptera	Elmidae	Elmidae	riffle beetle	1	4	CG
	Coleoptera	Elmidae	Hexacylloepus	Hexacylloepus sp.	3	2	CG
	Coleoptera	Elmidae	Stenelmis	Stenelmis sp.	1	7	SC
	Diptera	Chironomidae	Chironomidae	midge	164	6	CG
	Diptera	Simuliidae	Simuliidae	black fly	5	6	CF
	Ephemeroptera	Baetidae	Baetidae	mayfly	50	4	CG
	Ephemeroptera	Leptohyphidae	Leptohyphidae	mayfly	58	5	CG
	Hemiptera	Naucoridae	Ambrysus	Ambrysus sp.	7	5	PP
	Odonata	Coenagrionidae	Argia	Argia sp.	7	7	PG
	Odonata	Gomphidae	Erpetogomphus	Erpetogomphus sp.	3	1	PG
	Trichoptera		Trichoptera	caddisfly	860		UN
	Trichoptera	Helicopsychidae	Helicopsyche	Helicopsyche sp.	145	3	SC
	Trichoptera	Hydroptilidae	Hydroptilidae	microcaddisfly	2	4	PH
	Trichoptera	Hydroptilidae	Ochrotrichia	Ochrotrichia sp.	2	4	PH
	Trichoptera	Leptoceridae	Leptoceridae	longhorned caddisfly	10	4	CG
<b>SubPhylum: Crustacea</b>							
<b>Class: Malacostraca</b>							
	Amphipoda	Hyaellidae	Hyaella	Hyaella sp.	31	8	CG
<b>Class: Ostracoda</b>							
			Ostracoda	Ostracod	115	8	CG
<b>Phylum: Annelida</b>							
<b>Class: Clitellata</b>							
			Hirudinea	leech	3	7	PP
<b>Class: Oligochaeta</b>							
			Oligochaeta	freshwater oligochaeta	105		CG
<b>Phylum: Mollusca</b>							
<b>Class: Bivalvia</b>							
	Veneroida	Sphaeriidae	Sphaeriidae	pea clam	2		CF
<b>Class: Gastropoda</b>							
	Limnophila	Physidae	Physa	Physa sp.	424	8	CG
	Limnophila	Planorbidae	Gyraulus	Gyraulus sp.	167	8	CG
<b>Phylum: Nematomorpha</b>							
			Nematomorpha	horsehair worm	1		PA
<b>Phylum: Platyhelminthes</b>							
<b>Class: Turbellaria</b>							
			Turbellaria	flatworm	18	4	PG

C-14

## **Appendix D**

Monitoring photos down transects lines from zero to end point for all transects. Photos for 2003, 2005, 2008 shown.

Transect: 03SF001  
Position: 5m-26m  
Azimuth: 119°

September 2003



August 2005



July 2008



Transect: 03SF002  
Position: 23.4m-0m  
Azimuth: 40°

September 2003



August 2005



July 2008

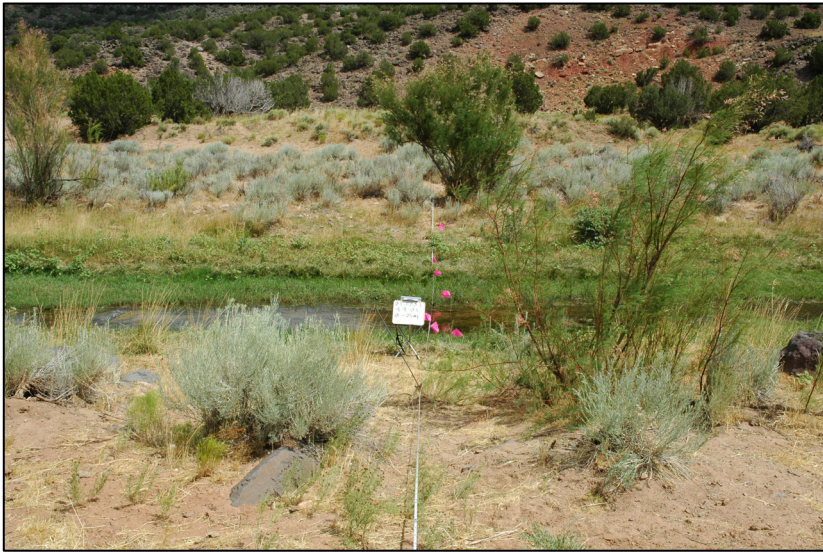


Transect: 03SF003  
Position: 0m-25m  
Azimuth: 130°

September 2003



August 2005



July 2008





Transect: 03SF005  
Position: 0m-23.1m  
Azimuth: 125°

September 2003



August 2005



July 2008



Transect: 03SF006  
Position: 24.5m-0m  
Azimuth: 350°

September 2003



July 2005



July 2008

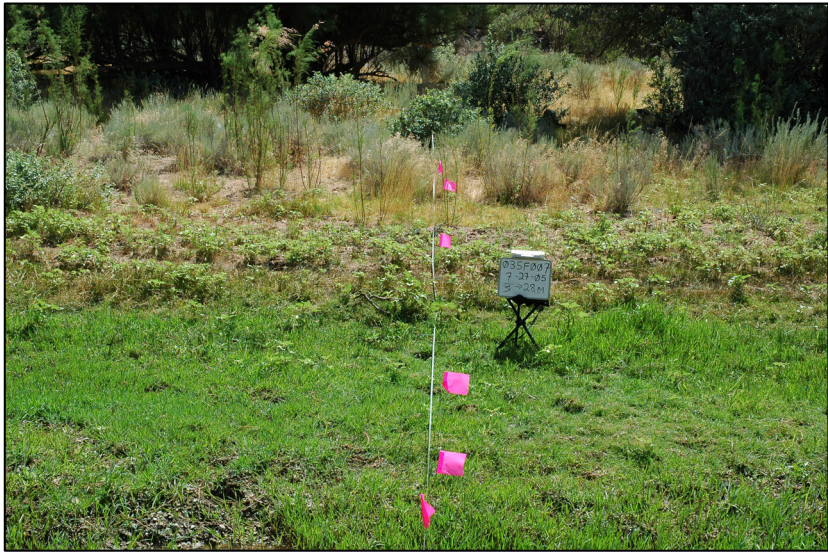


Transect: 03SF007  
Position: 2m-28.2m  
Azimuth: 95°

September 2003



July 2005



July 2008



Transect: 03SF008  
Position: 1m-38.2m  
Azimuth: 190°

September 2003



July 2005



July 2008



Transect: 03SF009  
Position: 3m-28.4m  
Azimuth: 170°

September 2003



July 2005



July 2008



Transect: 03SF010  
Position: 0m-16.8m  
Azimuth: 120°

September 2003



July 2005



July 2008

