

**- AQUATIC ECOSYSTEM INVENTORY  
Macroinvertebrate Analysis -**

**ENVIRONMENTAL PROTECTION AGENCY  
REGION 8 - UTAH  
1986**

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AQUATIC ECOSYSTEM ANALYSIS  
FOR SELECTED STREAMS FROM THE  
ENVIRONMENTAL PROTECTION AGENCY

REGION 8 - UTAH

1986

BACKGROUND AND METHODS

In recent years land managers on many of our forests and BLM districts in the west have improved the stability and reliability of land management plans and decisions by sampling aquatic organisms which act as natural monitors of management activities within the drainages on public lands.

During short-term exposure to water of poor quality or adverse changes in habitat, organisms that cannot tolerate the stress are destroyed and the aquatic macroinvertebrate community structure changes. Since aquatic organisms respond to their total environment, they can become an effective tool for detection of environmental changes.

Our analysis of aquatic ecosystems is based upon multiple factors including:

1. Various macroinvertebrate data - Community dry-weight biomass/sample expressed in gm/m<sup>2</sup>; number of individuals per taxa (resident populations?); DAT Diversity Index, which combines a measure of dominance and number of taxa; habit, habitat and feeding preferences of individual taxa or species; specific tolerances of taxa; community composition; and BCI (Biotic Condition Index), which indicates as a percentage how close an aquatic ecosystem is to its own potential.

2. Physical parameter data and

3. Water chemistry data

Effective use of the Biotic Condition Index (BCI) depends upon the availability of data on stream gradient, natural capability of instream substrate (may not be the composition present if man-influenced sedimentation is found at the sample

station), total alkalinity, and sulfate in mg/l.

Because of the way that macroinvertebrates occupy space within a stream, it generally takes at least three samples to represent the community accurately at a given station. One sample per station costs less but has little value for aquatic habitat assessment, one never knows if such single samples represent the best, the worst or an average of possible conditions at the sampling site. Also as a side benefit, three samples per station provides a basis for various statistical analyses, if random samples are all taken from a rubble substrate in as similar habitat as possible, taking into account mainly the velocity of flow and depth in the stream. Biologists have found that compared to other sampling devices, the Winget-modified surber net yields the highest coefficient of correlation (similarity of samples).

A stream's natural potential for productivity, habitat quality and water quality can be compared to the "actual" by taking quantitative samples of aquatic macroinvertebrates. Careful analysis of macroinvertebrate communities can reveal condition and trends in aquatic ecosystems. Sampling and analysis is conducted in accordance with procedures outlined in FSH R-4 2609.23, March 1985, Fisheries Habitat Surveys Handbook.

This report is based upon 68 aquatic macroinvertebrate samples from 17 stations on six Utah streams. Samples were taken as follows: four Surber net samples and one kick sample were taken from each of two stations on Box Elder Creek, three basket samples and one kick sample from each of four stations on Beer Creek, three basket samples and one kick sample from each of two stations on Mill Creek, three basket samples and one kick sample from each of two stations on the Weber River, sixteen basket samples and four kick samples from five stations on the Jordan River, and seven basket samples and one kick sample from two stations on the surplus canal were taken in August and September, 1986.

In the laboratory, samples were divided in an eight pan subsampler, which has proven to have high reliability. Numbers of organisms corresponding to the number in the original sample were determined from the subsets processed, and the balance of the sample was scanned. Each sample was checked then recorded by the lab's quality control technicians.

Samples were processed using Nikon zoom dissection microscopes (10X-40X) and a Swiss Wild Hebrugg dissection

microscope (10X-50X). The organisms were identified using state-of-the-art taxonomic keys including: Merritt and Cummins (1984), Wiggins (1977), Jensen (1966), Usinger (1971), Johannsen (1973), Edmunds Jr. (1976), Ward and Whipple (1959), Mason (1968), and Baumann (1977). Subset samples for each stream have been stored in 70% ethanol for reference.

High sulfate, averaging over 200 mg/l and up to 2100 mg/l at some of the Jordan River stations; averaging 157 mg/l on Mill Creek; and 102 mg/l on Beer Creek would have been limiting to some species in those communities.

High alkalinity, averaging 364 mg/l on Beer Creek and 260 mg/l on Mill Creek, would have been limiting to some species in those ecosystems.

## BEER CREEK

Four stations were sampled on this stream with those stations below and above the Salem waste water treatment plant being designated as Stations 1 and 2, respectively, and stations below and above the Payson waste water treatment plant designated as 3 and 4, respectively. A good quality mountain stream would have a CTQ<sub>p</sub> or potential community tolerance quotient of 50. Since this<sup>p</sup> stream does not have that potential, its CTQ<sub>p</sub> was designated as 7.2, due to limitations from low gradient<sup>p</sup>, low natural diversity of substrate composition, and less favorable water chemistry potential.

All of the analysis elements indicated that there were stress conditions in the stream above and below the Salem waste water treatment plant. However, there appeared to be comparatively extreme organic enrichment in the stream below the plant. This was indicated particularly by a Chironomid, Chironomus chironomus, which can compete best where there is extreme organic enrichment, that numbered over 200,000 organisms per square meter of stream bottom. Also superior in their ability to compete where there is organic enrichment are the Oligochates, which numbered over 15,000 organisms per square meter. Psychoda, which was present in high numbers, has been found more tolerant than most macroinvertebrates to toxic chemicals in the water. Other species in the community indicated that the stream bottom consisted primarily of sand and silt-sized substrate.

The imbalance in the community indicated a possible overburden of organic enrichment at the plant. There were just nine taxa in the community below the plant, compared to 25 in the stream above the plant. The DAT diversity index of 0.8 indicates an extreme dominance among limited species, and the standing crop of 20.6 g/m<sup>2</sup> was high because of the abundance of tolerant organisms. Analysis elements, including the DAT and BCI, indicated stress conditions in the stream above the plant, but conditions at the upper station were superior to those below the plant.

Analysis elements indicated that conditions were fairly similar above and below the Payson plant. Standing crop and the number of organisms indicated organic enrichment was higher below the plant than it was above, but the BCI values indicated that community diversity was about the same. It appeared that the Payson waste water treatment plant was more efficient than

the Salem plant.

USFS - INTERMOUNTAIN REGION - ANNUAL PROGRESS REPORT

MACROINVERTEBRATE ANALYSIS

Prior to field season fill in Sections A and C for each stream that will be sampled and forward to:

Aquatic Ecosystem Analysis Laboratory  
 105 Page School  
 Brigham Young University  
 Provo, Utah 84602

A. Investigator James Lazorchak  
 Forest/District Environmental Protection Agency  
 Stream Beer Creek  
 State/County Utah, Utah County  
 Forest Service Cat. No. \_\_\_\_\_

B.

# Taxa	Station #B-1	Date(s)	Diversity Index DAT (mean)	Standing Crop g/m <sup>2</sup> (mean)	Biotic Condition Index BCI 72	# organisms
9 blo.	Salem 1	8-11-86	0.8	20.6	78	224,35
25 abv.	Salem 2	8-11-86	8.7	5.3	78	4,117
13 blo.	Pysn. 3	8-11-86	3.9	5.6	78	13,687
11 abv.	Pysn. 4	8-11-86	3.3	1.2	79	2,217

Scale:

Excellent	DAT 18 - 26	Standing crop 4.0 - 12.0	BCI above 90
Good	11 - 17	1.6 - 4.0	80 - 90
Fair	6 - 10	0.6 - 1.5	72 - 79
Poor	0 - 5	0.0 - 0.5	below 72



TOTAL SAMPLE STATISTICS

DATE: 08 11 86

WWTP

BEER CREEK BELOW SALEM

EPA 495543

STATION: 1

REPL	TOTAL NO. SPECIES	MEAN /SQM	CONFIDENCE LIMITS (80 PERCENT) LL	STANDARD DEVIATION	PERCENT SE OF MEAN	COEFF. OF VARIATION	DBAR	R	CTQA	CTQD
3	9	224335.	63806. 384864.	*****	37.94	65.72	0.5462	0.8277	92.	91.

\* NUMBERS DATA

SPECIES ANALYSES

STATION: 1	EPA 499643	BEER CREEK BELOW SALEM	wwTP	DATE: 08 11 86	LOG10 X TQ	MEAN WT GM/SQM
CLASS	ORDER	FAMILY	GENUS	SPECIES	LOG10 NO/SQM	TOLERANCE QUOTIENT
INSECTA	COLEOPTERA	ELMIDAE			2.271	104.
INSECTA	COLEOPTERA	DYTIISCIDAE	AGABUS		1.759	72.
INSECTA	ODONATA	COENAGRIONIDAE	ARGIA		2.080	108.
INSECTA	DIPTERA	TIPULIDAE	HOLORUSIA		2.060	108.
INSECTA	DIPTERA	CHIRONOMIDAE	CHIRONOMUS		6.308	108.
INSECTA	DIPTERA	PSYCHODIDAE	PSYCHODA		3.713	36.
OLIGOCHAETA	DIPTERA				4.183	108.
NEMATODA					0.655	60.
TOTALS					5.351	31.70

TOTAL SAMPLE STATISTICS

STATION: 2

EPA 499545 HW 44 BEER CREEK ABOVE SALEM

DATE: 08 11 88

WWTP

REPL	TOTAL NO. SPECIES	MEAN /SQM	CONFIDENCE LIMITS (80 PERCENT)	STANDARD DEVIATION	PERCENT SE OF MEAN	COEFF. OF VARIATION	DBAR	R	CTQA	CTQD
			LL	UL						
3	25	4117.	1352.	6883.	2539.48	35.61	61.68	3.0584	0.3422	89. 92.

\* NUMBERS DATA

SPECIES ANALYSES

STATION: 2

EPA 499645 HW 44 BEER CREEK ABOVE SALEM

DATE: 08 11 88

WWT

CLASS	ORDER	FAMILY	GENUS	SPECIES	MEAN NO/SQM	LOG10 NO/SQM	TOLERANCE QUOTIENT	LOG10 X TQ	MEAN.WT GM/SQM
INSECTA	EPHEMEROPTERA	EPHEMERELLIDAE	EPHEMERELLA	GRANDIS	14.35	1.157	64.	74.	
INSECTA	EPHEMEROPTERA	EPHEMERELLIDAE	EPHEMERELLA		3.59	0.555	24.	13.	
INSECTA	EPHEMEROPTERA	TRICORYTHIDAE	TRICORYTHODES		7.17	0.856	108.	92.	
INSECTA	TRICHOPTERA	HYDROPSYCHIDAE	HYDROPSYCHE		14.35	1.157	108.	125.	
INSECTA	TRICHOPTERA	RHYACOPHILIDAE	RHYACOPHILA		7.17	0.856	18.	15.	
INSECTA	TRICHOPTERA	HYDROPTILIDAE			28.69	1.458	108.	157.	
INSECTA	TRICHOPTERA	HYDROPTILIDAE	ALISOTRICHIA		7.17	0.856	108.	92.	
INSECTA	COLEOPTERA	ELMIDAE			71.73	1.858	104.	193.	
INSECTA	ODONATA	COENAGRIONIDAE	ARGIA		7.17	0.856	108.	92.	
INSECTA	ODONATA	COENAGRIONIDAE	ENALLAGMA		129.12	2.111	72.	152.	
INSECTA	COLEOPTERA	HALIPLIDAE			28.69	1.458	54.	79.	
INSECTA	DIPTERA				14.35	1.157	108.	125.	
INSECTA	DIPTERA	SIMULIIDAE			14.35	1.157	108.	125.	
INSECTA	DIPTERA	CHIRONOMIDAE	DIAMESA	SPECIES	179.33	2.254	42.	95.	
INSECTA	DIPTERA	CHIRONOMIDAE	CHIRONOMUS	SPECIES	136.29	2.134	96.	205.	
INSECTA	DIPTERA	CHIRONOMIDAE	CHIRONOMUS	CHIRONOMUS	21.52	1.333	108.	144.	
INSECTA	DIPTERA	CHIRONOMIDAE	CHIRONOMUS		14.35	1.157	36.	42.	
INSECTA	DIPTERA	PSYCHODIDAE	PSYCHODA		157.81	2.198	108.	237.	
HIRUDINEA	ERPOBDELLA				954.05	2.980	108.	322.	
HIRUDINEA	HELOBDELLA				43.04	1.634	108.	178.	
CRUSTACEA	OSTRACODA				50.21	1.701	108.	184.	
PELECYPODA					1133.39	3.054	108.	330.	
OLIGOCHAETA					702.99	2.847	98.	279.	
CRUSTACEA	AMPHIPODA	TALITRIDAE	HYALELLA	AZTECA	373.01	2.572	98.	252.	
CRUSTACEA	AMPHIPODA	GAMMARIDAE	GAMMARUS		3.69	0.555	108.	60.	
CRUSTACEA	DECAPODA								
TOTALS					4117.49	3.615			5.30

TOTAL SAMPLE STATISTICS

STATION: 3 EPA 499540 BEER CREEK BELOW PAYSON *WWTP* DATE: 08 11 86

REPL	TOTAL NO. SPECIES	MEAN /SQM	CONFIDENCE LIMITS (80 PERCENT) LL	UL	STANDARD DEVIATION	PERCENT SE OF MEAN	COEFF. OF VARIATION	DBAR	R	CTQA	CTQD
* NUMBERS DATA	3	13687.	5197.	22176.	7796.30	32.89	56.96	2.8348	0.2342	98.	99.

SPECIES ANALYSES

STATION: 3 EPA 499540 BEER CREEK BELOW PAYSON WWTP DATE: 08 11 86

CLASS	ORDER	FAMILY	GENUS	SPECIES	MEAN NO/SQM	LOG10 NO/SQM	TOLERANCE QUOTIENT	LOG10 X TQ	MEAN WT GM/SQM
INSECTA	TRICHOPTERA	HYDROPSYCHIDAE	HYDROPSYCHE		229.55	2.361	108.	255.	
INSECTA	TRICHOPTERA	HYDROPSYCHIDAE	CHEUMATOPSYCHE		430.40	2.634	108.	284.	
INSECTA	TRICHOPTERA	HYDROPTILIDAE			28.89	1.458	108.	157.	
INSECTA	COLEOPTERA	ELMIDAE			57.39	1.759	104.	183.	
INSECTA	COLEOPTERA	HALIPLIDAE	HETERELMAS		1147.73	3.060	54.	165.	
INSECTA	COLEOPTERA	CHIRONOMIDAE	CHIRONOMUS		889.49	2.949	108.	319.	
INSECTA	DIPTERA	CHIRONOMIDAE	DIAMESA		28.89	1.458	42.	61.	
GASTROPODA	DIPTERA	PLANORBIDAE			1979.84	3.297	108.	356.	
OLIGOCHAETA					4361.39	3.640	108.	393.	
HIRUDINEA					2682.40	3.412	108.	388.	
CRUSTACEA	AMPHIPODA	TALITRIDAE	HELODDELLA		1233.81	3.091	98.	303.	
GASTROPODA		LYMNAEIDAE	HYALELLA		602.56	2.780	108.	300.	
GASTROPODA		PHYSIDAE	PHYSA		114.77	2.060	108.	222.	
									5.60
				TOTALS	13886.72	4.136			

555  
0.5  
5  
000000

TOTAL SAMPLE STATISTICS

DATE: 08 11 86

BEER CREEK ABOVE PAYSON WUJTP

EPA 499542 HW GG

STATION: 4

REPL	TOTAL NO. SPECIES	MEAN /SQM	CONFIDENCE LIMITS (80 PERCENT) LL	UL	STANDARD DEVIATION	PERCENT SE OF MEAN	COEFF. OF VARIATION	DBAR	R	CTQA	CTQD
3	11	2217.	-264.	4697.	2278.05	59.34	102.77	2.3140	0.3329	91.	89.

\* NUMBERS DATA

SPECIES ANALYSES

STATION: 4	EPA 499542 HW 00	BEER CREEK ABOVE PAYSON	WWTP	DATE: 08 11 86	LOG10 X TQ	MEAN WT GM/SQM
CLASS	ORDER	FAMILY	GENUS	SPECIES	LOG10 NO/SQM	TOLERANCE QUOTIENT
INSECTA	TRICHOPTERA	HYDROPSYCHIDAE	HYDROPSYCHE		2.326	108.
INSECTA	TRICHOPTERA	HYDROPTILIDAE			0.555	60.
INSECTA	COLEOPTERA	HALIPLIDAE			0.868	48.
INSECTA	DIPTERA	CHIRONOMIDAE	DIAMESA		2.548	42.
INSECTA	DIPTERA	CHIRONOMIDAE	CHIRONOMUS		0.858	96.
INSECTA	DIPTERA	CHIRONOMIDAE	CHIRONOMUS		1.858	108.
INSECTA	DIPTERA	CHIRONOMIDAE	TRICHOCLADIUS		2.541	72.
OLIGOCHAETA		LAEVAPEX			2.333	108.
GASTROPODA	ANCYLIDAE				2.991	287.
CRUSTACEA	DECAPODA				0.868	108.
CRUSTACEA	AMPHIPODA	TALITRIDAE	HYALELLA	AZTECA	1.157	98.
				TOTALS	2216.58	3.346
						1.20

*S* = Sediment Tolerant  
*O* = Organic Enrichment Tolerant  
*-1* = moderately tolerant  
*-* = clean water  
*Ch* = Toxic Chemical Tolerant



TABLE 1. BEER CREEK  
 LIST OF TAXA FOR QUALITATIVE KICK SAMPLES TAKEN 8-11-86

STATION	1	2	3	4
TAXA				
ORDER TRICHOPTERA				
<u>Cheumatopsyche</u>			+	
<u>Hydropsyche</u>				+
Hydroptilidae				+
ORDER COLEPTERA				
Elmidae		+		+
ORDER MEGALOPTERA				
<u>Dysmicohermes</u>			+	
ORDER ODNATA				
Coenagrionidae				
<u>Enallagma</u>		+		
ORDER DIPTERA				
Psychodidae				
<u>Psychoda</u>	+			
Chironomidae				
<u>Chironomus Sp.</u>			+	
<u>Chironomus chironomus</u>			+	
<u>Diamesa</u>				+
MISC. INVERT.				
Gastropoda				
<u>Physa</u>		+		
<u>Lymnea</u>		+		
Planorbidae		+	+	+
Limpets				+
Oligochaeta	+	+	+	+
Amphipoda				
<u>Gammarus</u>		+		
<u>Hyallolella azteca</u>	+	+	+	
Nematoda		+		
ORDER TRICLADIDA				
<u>Planaria</u>			+	+
Hirudinea				
<u>Helobdella</u>		+	+	
Decapoda				+

## BOX ELDER CREEK

The aquatic macroinvertebrate community in the stream above Brigham City waste water treatment plant was dominated by those taxa tolerant to sedimentation and organic enrichment. However, there were limited numbers of a cleanwater species and some moderately tolerant species present. The community was more diverse than that found below the water treatment plant. It appeared that the Brigham City water plant was efficient in removing organic enrichment because the standing crop and number of organisms were actually less below the plant than above. However, the treatment process was limiting to the members in the community, which was then dominated by sediment and organic enrichment tolerant species and toxic chemical tolerant species were present in low numbers. The CTQ or potential community tolerance quotient was set at 72 for this stream, and the BCI values of 85 below and 86 above the plant indicated that the efficiency of the system and the condition of the stream was better than that found in Beer Creek above and below the Salem water treatment plant.

USFS - INTERMOUNTAIN REGION - ANNUAL PROGRESS REPORT

MACROINVERTEBRATE ANALYSIS

Prior to field season fill in Sections A and C for each stream that will be sampled and forward to:

Aquatic Ecosystem Analysis Laboratory  
 105 Page School  
 Brigham Young University  
 Provo, Utah 84602

A. Investigator James Lazorchak  
 Forest/District Environmental Protection Agency  
 Stream Box Elder Creek  
 State/County Utah, Box Elder County  
 Forest Service Cat. No. \_\_\_\_\_

B.

# taxa	Station	Date(s)	Diversity Index DAT (mean)	Standing Crop g/m <sup>2</sup> (mean)	Biotic Condition Index BCI 72	# organisms
15 blo.	Brig. 1	8-6-86	2.4	1.3	85	9,103
1 abv.	Brig. 2	8-6-86	6.1	9.2	86	14,276

Scale:  
 Excellent      DAT      Standing crop      BCI  
 Good            18 - 26      4.0 - 12.0      above 90  
 Fair             11 - 17      1.6 - 4.0       80 - 90  
 Poor             6 - 10       0.6 - 1.5       72 - 79  
                    0 - 5         0.0 - 0.5       below 72

TOTAL SAMPLE STATISTICS

STATION: 1

EPA 490121 HW TE BOX ELDER CREEK BELOW BRIGHAM CITY WWT<sup>P</sup>

DATE: 08 08 88

REPL	TOTAL NO. SPECIES	MEAN /SQM	CONFIDENCE LIMITS (80 PERCENT) LL	UL	STANDARD DEVIATION	PERCENT SE OF MEAN	COEFF. OF VARIATION	DBAR	R	CTQA	CTQD
4	15	9103.	7632.	10574.	1796.20	9.87	19.73	1.9118	0.5114	85.	85.

\* NUMBERS DATA

SPECIES ANALYSES

STATION: 1 EPA 490121 HW TE BOX ELDER CREEK BELOW BRIGHAM CITY WWT<sup>P</sup> DATE: 08 08 86

CLASS	ORDER	FAMILY	GENUS	SPECIES	MEAN NO/SQM	LOG10 NO/SQM	TOLERANCE QUOTIENT	LOG10 X TQ	MEAN WT GM/SQM
INSECTA	EPHEMEROPTERA	BAETIDAE	BAETIS		10.76	1.032	72.	74.	
INSECTA	TRICHOPTERA	HYDROPSYCHIDAE	HYDROPSYCHE		10.76	1.032	108.	111.	
INSECTA	COLEOPTERA	ELMIDAE			395.43	2.597	104.	270.	
INSECTA	DIPTERA	SIMULIIDAE			61.87	1.791	108.	193.	
INSECTA	DIPTERA	CHIRONOMIDAE	PROCLADIUS		8.97	0.907	80.	54.	
INSECTA	DIPTERA	CHIRONOMIDAE	CHIRONOMUS	CHIRONOMUS	586.42	2.768	96.	286.	
INSECTA	DIPTERA	CHIRONOMIDAE	DIAMESA	SPECIES	5868.82	3.768	42.	158.	
INSECTA	DIPTERA	CHIRONOMIDAE	ORTHOCLADIUS		193.88	2.287	48.	110.	
INSECTA	DIPTERA	CHIRONOMIDAE	TRICHOCLADIUS		174.85	2.243	72.	161.	
INSECTA	DIPTERA	PSYCHODIDAE	PSYCHODA		94.15	1.974	36.	37.	
INSECTA	DIPTERA	PHYSIDAE	PHYSA		979.16	2.991	108.	213.	
GASTROPODA					32.28	1.509	108.	323.	
OLIGOCHAETA					677.88	2.831	98.	163.	
NEMATODA					8.07	0.907	108.	277.	
CRUSTACEA	AMPHIPODA	TALITRIDAE	HYALELLA	AZTECA					
GASTROPODA		PLANORBIDAE							

TOTALS 9102.96 3.959 1.30

TOTAL SAMPLE STATISTICS

EPA 490119 HW TE BOX ELDER CREEK ABOVE BRIGHAM CITY *WWTP* DATE: 08 08 86

STATION: 2

REPL	TOTAL NO. SPECIES	MEAN /SQM	CONFIDENCE LIMITS (80 PERCENT) LL	UL	STANDARD DEVIATION	PERCENT SE OF MEAN	COEFF. OF VARIATION	DBAR	R	CTQA	CTQD
4	22	20724.	14276.	27171.	7872.16	18.99	37.99	2.5244	0.4345	81.	84.

\* NUMBERS DATA

SPECIES ANALYSES

EPA 490119 HW TE 90X ELDER CREEK ABOVE BRIGHAM CITY WWTP DATE: 08 08 86

STATION: 2

CLASS	ORDER	FAMILY	GENUS	SPECIES	MEAN NO/SQM	LOG10 NO/SQM	TOLERANCE QUOTIENT	LOG10 X TQ	MEAN WT GM/SQM
INSECTA	EPHEMEROPTERA	HEPTAGENIIDAE	EPEORUS		21.52	1.333	21.	28.	
INSECTA	EPHEMEROPTERA	BAETIIDAE	BAETIS		1689.32	3.228	72.	232.	
INSECTA	PLECOPTERA				75.32	1.877	48.	90.	
INSECTA	PLECOPTERA	PERLIDIDAE	CULTUS		64.58	1.810	12.	22.	
INSECTA	TRICHOPTERA				21.52	1.333	72.	98.	
INSECTA	TRICHOPTERA	HYDROPSYCHIDAE	HYDROPSYCHE		7392.12	3.869	108.	418.	
INSECTA	COLEOPTERA	ELMIDAE			1388.04	3.142	104.	327.	
INSECTA	DIPTERA				10.76	1.032	108.	111.	
INSECTA	DIPTERA	SIMULIIDAE			269.00	2.430	108.	262.	
INSECTA	DIPTERA	CHIRONOMIDAE	CHRYPTOCHIRONOMUS		21.52	1.333	48.	64.	
INSECTA	DIPTERA	CHIRONOMIDAE	CHIRONOMUS	SPECIES	216.20	2.333	96.	224.	
INSECTA	DIPTERA	CHIRONOMIDAE	DIAMESA	SPECIES	204.44	2.311	42.	97.	
INSECTA	DIPTERA	CHIRONOMIDAE	ORTHOCLADIUS		236.72	2.374	48.	114.	
INSECTA	DIPTERA	CHIRONOMIDAE	PROCLADIUS		21.52	1.333	60.	80.	
INSECTA	DIPTERA	PLANORBIIDAE			53.80	1.731	108.	187.	
GASTROPODA	TRICLADIDA	PLANARIIDAE	PLANARIA		21.52	1.333	108.	144.	
TURBELLARIA					3970.44	3.599	108.	389.	
OLIGOCHAETA	HYDRACARINA				64.58	1.810	98.	177.	
ARACHNIDA					32.28	1.509	108.	163.	
NEMATODA					4895.80	3.690	98.	362.	
CRUSTACEA	AMPHIPODA	TALITRIDAE	HYALELLA	AZTECA	21.52	1.333	108.	144.	
CRUSTACEA		PHYSIDAE	PHYSA		32.28	1.509	108.	163.	
GASTROPODA			HELOBDELLA						
HIRUDINEA									
TOTALS					20723.76	4.316			9.20

50 - 53 0101100 5100 0 5/3 0 0 0

TABLE 2. BOX ELDER CREEK  
 LIST OF TAXA FOR QUALITATIVE KICK SAMPLES TAKEN 8-06-86

STATION	1	2
TAXA		
ORDER EPHEMEROPTERA		
Baetidae		+
ORDER PLECOPTERA		
Hesperoperla		+
ORDER TRICHOPTERA		
Hydropsyche		+
ORDER COLEPTERA		
Elmidae	+	
ORDER ODNATA	+	
ORDER DIPTERA		
Chironomidae		
Chironomus Sp.	+	+
Simuliidae	+	+
Holorusia		+
MISC. INVERT.		
Gastropoda		
Physa	+	+
Oligochaeta	+	+
Amphipoda		
Hyalolella azteca	+	+
Nematoda	+	+
ORDER HYDRACARINA		
Acarina		+



## JORDAN RIVER

Since the environment in this stream would be very limiting to cleanwater and moderately tolerant macroinvertebrate species, the CTO<sub>p</sub> was set at 80. The aquatic macroinvertebrate communities at each of the stations sampled were completely dominated by those taxa tolerant to sedimentation and organic enrichment. The number of taxa indicated that there were varying amounts of stress conditions from Bluffdale to Cudahy, as did the DAT diversity index values. Standing crop was extremely high, particularly at the Bluffdale, 7800 South and 4800 South stations. There appeared to be a particularly high influx of nutrients at the 4800 South station, where the standing crop was 57.1 g/m<sup>2</sup>. This was due particularly to the extreme abundance of Hydropsyche sp., a caddisfly which numbered over 81,000 organisms per square meter. The community composition at the Cudahy Lane station continued to show extreme organic enrichment and sedimentation with almost 16,000 Oligochates per square meter and over 11,000 Chironomis sp. most of which are often tolerant to organic enrichment.

Most mountain streams are considered adequately productive if the number of organisms is between 2,000 and 4,000 organisms per square meter, so the numbers from 15,000 to 95,000 found at the stations sampled in this stream are extremely high, and are generally found only in streams which have conditions where nutrients are extremely high and tolerant species are well-established. High numbers of species at Stations 3 and 1, corresponding to 4800 South and Cudahy, respectively, were due to high numbers of organisms for specific species that can compete where there are adverse conditions and reduced competition.

USFS - INTERMOUNTAIN REGION - ANNUAL PROGRESS REPORT

MACROINVERTEBRATE ANALYSIS

Prior to field season fill in Sections A and C for each stream that will be sampled and forward to:

Aquatic Ecosystem Analysis Laboratory  
 105 Page School  
 Brigham Young University  
 Provo, Utah 84602

A. Investigator James Lazorchak  
 Forest/District Environmental Protection Agency  
 Stream Jordan River  
 State/County Utah, Salt Lake County  
 Forest Service Cat. No. \_\_\_\_\_

B.

# taxa	Station	Date(s)	Diversity Index DAT (mean)	Standing Crop g/m <sup>2</sup> (mean)	Biotic Condition Index BCI 80	# organisms
9	Cudahy	1-9-10-86	1.1	4.4	84	3,123
16	500 N.	2-9-10-86	4.5	17.0	85	19,806
17	4800 S.	3-9-10-86	2.1	57.1	86	95,247
22	7800 S.	4-9-10-86	7.3	19.4	81	15,311
18	Bluffd.	5-9-10-86	6.0	24.6	79	95,499

Scale:  
 Excellent  
 Good  
 Fair  
 Poor

DAT  
 18 - 26  
 11 - 17  
 6 - 10  
 0 - 5

Standing crop  
 4.0 - 12.0  
 1.6 - 4.0  
 0.6 - 1.5  
 0.0 - 0.5

BCI  
 above 90  
 80 - 90  
 72 - 79  
 below 72

TOTAL SAMPLE STATISTICS

DATE: 09 10 86

JORDAN RIVER AT GUDAHY LANE

EPA 499182

STATION: 1

REPL	TOTAL NO. SPECIES	MEAN /SQM	CONFIDENCE LIMITS (80 PERCENT)	STANDARD DEVIATION	PERCENT SE OF MEAN	COEFF. OF VARIATION	D BAR	R	CTQA	CTQD
			LL	UL						
4	9	35223.	24748.	45698.	12789.83	18.16	36.31	1.7063	0.4619	90. 89.

\* NUMBERS DATA

SPECIES ANALYSES

STATION: 1

EPA 499162

JORDAN RIVER AT CUDAHY LANE

DATE: 09 10 86

CLASS	ORDER	FAMILY	GENUS	SPECIES	MEAN NO/SQM	LOG10 NO/SQM	TOLERANCE QUOTIENT	LOG10 X TQ	MEAN WT GM/SQM
INSECTA	TRICHOPTERA	HYDROPSYCHIDAE	HYDROPSYCHE		10.76	1.032	72.	74.	
INSECTA	TRICHOPTERA	CHIRONOMIDAE	CHIRONOMUS	S	129.12	2.111	108.	228.	
INSECTA	DIPTERA	CHIRONOMIDAE	TRICHOCLADIUS	S/O	11279.17	4.052	98.	389.	
INSECTA	DIPTERA	CHIRONOMIDAE	DIAMESA	S/O	648.29	2.812	72.	202.	
INSECTA	DIPTERA	CHIRONOMIDAE	DIAMESA	S/O	6972.48	3.843	42.	161.	
GASTROPODA	PLANORBIDAE	PLANORBIDAE	PLANARIA		86.08	1.935	108.	209.	
TURBELLARIA	TRICLADIDA	PLANARIIDAE	PLANARIA		43.04	1.634	108.	178.	
OLIGOCHEATA	ISOPODA	ASELLIDAE	ASELLUS	O/S	15935.56	4.202	108.	454.	
CRUSTACEA	ISOPODA	ASELLIDAE	ASELLUS	O/S	118.36	2.073	98.	203.	
TOTALS					35222.86	4.547			4.40

TOTAL SAMPLE STATISTICS

DATE: 09 10 86

JORDAN RIVER AT 500 NORTH

EPA 499189

STATION: 2

REPL	TOTAL NO. SPECIES	MEAN /SQM	CONFIDENCE LIMITS (80 PERCENT) LL	UL	STANDARD DEVIATION	PERCENT SE OF MEAN	COEFF. OF VARIATION	DBAR	R	CTQA	CTQD
3	16	19806.	5695.	33916.	12958.83	37.78	65.43	2.2947	0.4268	91.	94.

\* NUMBERS DATA

SPECIES ANALYSES

STATION: 2	EPA 499189	JORDAN RIVER AT 600 NORTH	DATE: 09 10 86						
CLASS	ORDER	FAMILY	GENUS	SPECIES	MEAN NO/SQM	LOG10 NO/SQM	TOLERANCE QUOTIENT	LOG10 X TQ	MEAN WT GM/SQM
INSECTA	EPHEMEROPTERA	TRICORYTHIDAE	TRICORYTHODES		71.73	1.856	108.	200.	
INSECTA	PLECOPTERA				28.69	1.458	48.	70.	
INSECTA	TRICHOPTERA				43.04	1.634	72.	118.	
INSECTA	TRICHOPTERA	HYDROPSYCHIDAE	HYDROPSYCHE		10057.01	4.002	108.	432.	
INSECTA	COLEOPTERA	ELMIDAE			28.69	1.458	104.	152.	
INSECTA	DIPTERA	CHIRONOMIDAE	DIAMESA	S	631.25	2.800	42.	118.	
INSECTA	DIPTERA	CHIRONOMIDAE	CHIRONOMUS	S	2403.07	3.381	96.	325.	
INSECTA	DIPTERA	CHIRONOMIDAE	CRICOTOPIUS	S	14.35	1.157	48.	56.	
INSECTA	DIPTERA	EMPIDIDAE			28.69	1.458	95.	138.	
INSECTA	ISOPODA	ASELLIDAE	ASELLUS	S	688.21	2.770	98.	271.	
GASTROPODA	TRICLADIDA	LYMNAEIDAE	LYMNAEA	S	28.69	1.458	108.	157.	
TURBELLARIA		PLANARIIDAE	PLANARIA	ch	114.77	2.060	108.	222.	
OLIGOCHAETA					2869.33	3.458	108.	373.	
GASTROPODA	ANCYLIDAE	LAEVAPEX			1463.36	3.165	98.	304.	
HIRUDINEA			ERPOBDELLA		1405.97	3.148	108.	340.	
HIRUDINEA			HELOBDELLA		28.69	1.458	108.	157.	
TOTALS					19805.57	4.297			17.00

TOTAL SAMPLE STATISTICS

DATE: 09 11 86

JORDAN RIVER AT 4800 SOUTH

EPA 499366

STATION: 3

REPL	TOTAL NO. SPECIES	MEAN /SQM	CONFIDENCE LIMITS (80 PERCENT) LL	UL	STANDARD DEVIATION	PERCENT SE OF MEAN	COEFF. OF VARIATION	DBAR	R	CTQA	CTQD
3	17	96247.	34313.	156182.	55960.63	33.92	58.75	0.8462	0.7932	92.	93.

\* NUMBERS DATA

SPECIES ANALYSES

STATION: 3

JORDAN RIVER AT 4800 SOUTH

EPA 499358

DATE: 09 11 86

CLASS	ORDER	FAMILY	GENUS	SPECIES	MEAN NO/SQM	LOG10 NO/SQM	TOLERANCE QUOTIENT	LOG10 X TQ	MEAN-WT GM/SQM
INSECTA	EPHEMEROPTERA	TRICORYTHIDAE	TRICORYTHODES		1032.96	3.014	108.	326.	
INSECTA	TRICHOPTERA	HYDROPSYCHIDAE	HYDROPSYCHE		172.16	2.236	72.	161.	
INSECTA	TRICHOPTERA	DYTISCIDAE			81431.68	4.911	108.	530.	
INSECTA	COLEOPTERA	DYTISCIDAE			114.77	2.060	72.	148.	
INSECTA	ODONATA	AGRIONIDAE			21.52	1.333	108.	144.	
INSECTA	ODONATA	GOMPHIDAE	OPHIOGOMPHUS		10.78	1.032	108.	111.	
INSECTA	DIPTERA	SIMULIIDAE			114.77	2.060	108.	222.	
INSECTA	DIPTERA	CHIRONOMIDAE	CHIRONOMUS	SPECIES	9698.35	3.987	96.	383.	
INSECTA	DIPTERA	CHIRONOMIDAE	ORTHOCLADIUS		229.55	2.361	48.	113.	
INSECTA	DIPTERA	CHIRONOMIDAE	CRYPTOCHIRONOMUS		57.39	1.759	48.	84.	
INSECTA	DIPTERA	CHIRONOMIDAE	DIAMESA		114.77	2.060	42.	87.	
GASTROPODA		PLANORBIDAE			114.77	2.060	108.	222.	
PELECYPODA					114.77	2.060	108.	222.	
TURBELLARIA	TRICLADIDA	PLANARIIDAE	PLANARIA		1549.44	3.190	108.	345.	
OLIGOCHAETA					229.55	2.361	108.	255.	
ARACHNIDA	HYDRACARINA				229.55	2.361	98.	231.	
HIRUDINEA			HELOBDELLA		10.78	1.032	108.	111.	

TOTALS

96247.51

57.10

4.979



TOTAL SAMPLE STATISTICS

DATE: 09 11 86

EPA 499417 JORDAN RIVER AT 7800 SOUTH

STATION: 4

REPL	TOTAL NO. SPECIES	MEAN /SQM	CONFIDENCE LIMITS (80 PERCENT) LL	UL	STANDARD DEVIATION	PERCENT SE OF MEAN	COEFF. OF VARIATION	DBAR	R	CTQA	CTQD
3	22	15311.	3118.	27505.	11198.61	42.23	73.14	3.0021	0.3276	99.	99.

\* NUMBERS DATA

SPECIES ANALYSES

STATION: 4 EPA 499417 JORDAN RIVER AT 7800 SOUTH DATE: 09 11 86

CLASS	ORDER	FAMILY	GENUS	SPECIES	MEAN NO/SQM	LOG10 NO/SQM	TOLERANCE QUOTIENT	LOG10 X TQ	MEAN WT GM/SQM
INSECTA	EPHEMEROPTERA	TRICORYTHIDAE	TRICORYTHOES		114.77	2.060	108.	222.	
INSECTA	EPHEMEROPTERA	BAETIDAE	BAETIS		28.69	1.458	72.	105.	
INSECTA	TRICHOPTERA				143.47	2.157	72.	155.	
INSECTA	TRICHOPTERA	HYDROPSYCHIDAE	HYDROPSYCHE		4418.77	3.645	108.	394.	
INSECTA	COLEOPTERA	ELMIDAE			14.35	1.157	104.	120.	
INSECTA	ODONATA	COENAGRIONIDAE	ENALLAGMA		129.12	2.111	72.	162.	
INSECTA	ODONATA	COENAGRIONIDAE	ARGIA		1306.55	3.116	108.	337.	
INSECTA	ODONATA	AGRIONIDAE			43.04	1.634	108.	176.	
INSECTA	ODONATA	GOMPHIDAE	OPHIOMPHUS		17.93	1.254	108.	135.	
INSECTA	DIPTERA				28.69	1.458	108.	157.	
INSECTA	DIPTERA	SIMULIIDAE			14.35	1.157	108.	125.	
INSECTA	DIPTERA	CHIRONOMIDAE	CHIRONOMUS		2209.39	3.344	96.	321.	
INSECTA	DIPTERA	CHIRONOMIDAE	DIAMESA		129.12	2.111	42.	89.	
INSECTA	DIPTERA	EMPIDIDAE			86.08	1.935	95.	184.	
HIRUDINEA	HELORDELLA				57.39	1.759	108.	190.	
HIRUDINEA	ERPOBDELLA				28.69	1.458	108.	157.	
GASTROPODA		PHYSIDAE	PHYSA		1922.45	3.284	108.	355.	
PELECYPODA					57.39	1.759	108.	190.	
TURBELLARIA	TRICLADIDA	PLANARIIDAE	PLANARIA		2008.53	3.303	108.	357.	
OLIGOCHAETA					2065.92	3.315	108.	358.	
GASTROPODA		PLANORBIDAE			301.28	2.479	108.	268.	
GASTROPODA		LYMNAEIDAE	LYMNAEA		186.51	2.271	108.	245.	
TOTALS					15311.48	4.185			19.40

50 544444  
50 544444  
50 544444  
50 544444  
50 544444

TOTAL SAMPLE STATISTICS

DATE: 09 11 88

JORDAN RIVER AT BLUFFDALE

EPA 499460

STATION: 5

REPL	TOTAL NO. SPECIES	MEAN /SQM	CONFIDENCE LIMITS (80% PERCENT) LL	UL	STANDARD DEVIATION	PERCENT SE OF MEAN	COEFF. OF VARIATION	DBAR	R	CTQA	CTQD
3	18	95499.	18731.	172266.	70501.09	42.62	73.82	1.6082	0.6145	102.	101.

\* NUMBERS DATA

SPECIES ANALYSES

DATE: 09 11 86

JORDAN RIVER AT BLUFFDALE

EPA 499460

STATION: 5

CLASS	ORDER	FAMILY	GENUS	SPECIES	MEAN NO/SQM	LOG10 NO/SQM	TOLERANCE QUOTIENT	LOG10 X TQ	MEAN WT GM/SQM
INSECTA	EPHEMEROPTERA	TRICORYTHIDAE	TRICORYTHODES		1520.75	3.182	108.	344.	
INSECTA	TRICHOPTERA	HYDROPSYCHIDAE	HYDROPSYCHE		57343.63	4.758	108.	514.	
INSECTA	ODONATA	COENAGRIONIDAE	ARGIA		57.39	1.759	108.	190.	
INSECTA	ODONATA	GOMPHIDAE	OPHIOGOMPHUS		57.39	1.759	108.	190.	
INSECTA	ODONATA	COENAGRIONIDAE			57.39	1.759	108.	190.	
INSECTA	DIPTERA				57.39	1.759	108.	190.	
INSECTA	DIPTERA	SIMULIIDAE			57.39	1.759	108.	190.	
INSECTA	DIPTERA	CHIRONOMIDAE	CHIRONOMUS	SPECIES	2862.16	3.457	98.	332.	
INSECTA	DIPTERA	CHIRONOMIDAE	DIAMESA	SPECIES	860.80	2.935	42.	123.	
INSECTA	DIPTERA	CHIRONOMIDAE			229.65	2.361	95.	224.	
INSECTA	DIPTERA	EMPIDIDAE			86.08	1.935	108.	209.	
HIRUDINEA	HELLOBELLA	LAEVAPEX			57.39	1.759	98.	169.	
GASTROPODA	ANCYLIDAE				28.69	1.458	108.	157.	
CRUSTACEA	OSTRACODA				200.85	2.303	108.	249.	
TURBELLARIA	TRICLADIDA	PHYSIDAE	PHYSA		27057.81	4.432	108.	479.	
OLIGOCHAETA	HYDRACARINA	PLANARIIDAE	PLANARIA		4447.47	3.648	108.	394.	
ARACHNIDA					315.63	2.499	98.	245.	
GASTROPODA		PLANORBIDAE			200.85	2.303	108.	249.	
TOTALS					95498.59	4.980			24.60

SS 225  
 00  
 5.0150050  
 0.5  
 5.0

TABLE 3. JORDAN RIVER  
LIST OF TAXA FOR QUALITATIVE KICK SAMPLES TAKEN 9-11-86

STATION	1	2	3	4	5
TAXA					
ORDER EPHEMEROPTERA					
<u>Cinygmula</u>		+			
<u>Tricorythodes</u>		+	+		+
ORDER TRICHOPTERA					
<u>Hydropsyche</u>		+	+	+	+
ORDER COLEPTERA					
Elmidae			+	+	+
ORDER ODNATA					
Gomphidae			+		
Argia				+	+
ORDER DIPTERA					
Psychodidae					
<u>Psychoda</u>		+			
Chironomidae					
<u>Chironomus</u> Sp.		+	+	+	+
Simuliidae					+
MISC. INVERT.					
Gastropoda					
<u>Physa</u>					+
<u>Lymnea</u>			+		+
Planorbidae					+
Oligochaeta		+		+	
Amphipoda					
<u>Hyallolela azteca</u>		+			
Limpet		+			
Ostracoda					+
ORDER TRICLADIDA					
<u>Planaria</u>			+		+
Hirudinea					
<u>Helobdella</u>		+	+		+
<u>Erpobdella</u>		+		+	
ORDER ISOPODA					
Asselidae					
<u>Asellus</u>		+		+	

## MILL CREEK

At the station above the Central Valley water treatment plant, the aquatic macroinvertebrate community in the stream was dominated by those taxa tolerant to sedimentation and organic enrichment. However, there were a limited number of cleanwater species present, which indicated that there was at least some suitable substrate and fair water quality. The shredders present in the community, including Zapada and Amphinemura, are often found where riparian habitat is in at least fair condition within or above the stream reach sampled. The observed community composition is often found where stream reaches within the drainage have been experiencing impacts from overgrazing of livestock.

Comparison of the communities above and below the water treatment plant indicates that the plant was quite efficient. The standing crop and number of organisms were actually reduced at the station below the plant compared to that above. There was still a dominance among those taxa tolerant to sedimentation and organic enrichment but they were not extreme. There was also some indication of toxic chemicals, but the impacts from those did not appear to be severe. It is interesting that the number of taxa is close to the same at each of the stations, but the extreme numbers of organisms was reduced by the plant's treatment process. The  $CTQ_p$  was set at 66 for this stream.



TOTAL SAMPLE STATISTICS

STATION: 1      EPA 499251 HW BH      MILL CREEK BELOW CENTRAL VALLEY WWTP      DATE: 09 11 86

REPL	TOTAL NO. SPECIES	MEAN /SQM	CONFIDENCE LIMITS (80 PERCENT)	STANDARD DEVIATION	PERCENT SE OF MEAN	COEFF. OF VARIATION	DBAR	R	CTQA	CTQD
			LL      UL							
3	16	3339.	1406.      5272.	1774.99	30.69	53.16	2.4275	0.3812	88.	88.

\* NUMBERS DATA



SPECIES ANALYSES

STATION: 1	EPA 499251 HW BH	MILL CREEK BELOW CENTRAL VALLEY WPTP	DATE: 09 11 86	LOG10 X	MEAN WT				
CLASS	ORDER	FAMILY	GENUS	SPECIES	MEAN NO/SQM	LOG10 NO/SQM	TOLERANCE QUOTIENT	LOG10 X TQ	MEAN WT GM/SQM
INSECTA	EPHEMEROPTERA	TRICORYTHIDAE	TRICORYTHODES		10.78	1.032	108.	111.	
INSECTA	EPHEMEROPTERA	BAETIIDAE	BAETIS		10.76	1.032	72.	74.	
INSECTA	TRICHOPTERA	HYDROPSYCHIDAE	HYDROPSYSCHE		100.43	2.002	108.	216.	
INSECTA	COLEOPTERA	ELMIDAE			53.80	1.731	104.	180.	
INSECTA	ODONATA	COENAGRIONIDAE	ARGIA		10.76	1.032	108.	111.	
INSECTA	DIPTERA	CHIRONOMIDAE	CHIRONOMUS	CHIRONOMUS	154.23	2.188	108.	238.	
INSECTA	DIPTERA	CHIRONOMIDAE	CHIRONOMUS	SPECIES	817.76	2.913	96.	280.	
INSECTA	DIPTERA	CHIRONOMIDAE	CRICOTOPUS		114.77	2.060	48.	99.	
INSECTA	DIPTERA	CHIRONOMIDAE	DIAMESA	SPECIES	308.45	2.489	42.	105.	
INSECTA	DIPTERA	CHIRONOMIDAE	TRICHOCLADIUS		57.39	1.759	72.	127.	
INSECTA	DIPTERA	PSYCHODIDAE	PSYCHODA		28.69	1.458	36.	52.	
INSECTA	DIPTERA	LYMNAEIDAE	LYMNAEA		43.04	1.634	108.	176.	
GASTROPODA	ISOPODA	PLANORBIDAE	ASELLUS		14.35	1.157	108.	125.	
OLIGOCHEATA		ASELLIDAE			75.32	1.877	98.	184.	
GASTROPODA									
CRUSTACEA									
TOTALS					3339.19	3.524			0.90

TOTAL SAMPLE STATISTICS

DATE: 09 10 86

MILL CREEK ABOVE CENTRAL VALLEY

EPA 492005 WWTP

STATION: 2

REPL	TOTAL NO. SPECIES	MEAN /SQM	CONFIDENCE LIMITS (80 PERCENT) LL	UL	STANDARD DEVIATION	PERCENT SE OF MEAN	COEFF. OF VARIATION	DBAR	R	CTQA	CTQD
3	17	27732.	21555.	33909.	5672.85	11.81	20.46	2.4741	0.3952	74.	80.

\* NUMBERS DATA



TABLE 4. MILL CREEK  
 LIST OF TAXA FOR QUALITATIVE KICK SAMPLES TAKEN 9-11-86

STATION	1	2
TAXA		
ORDER EPHEMEROPTERA		
<u>Ephemerella grandis</u>		+
<u>E. doddsi</u>		+
Baetidae		+
ORDER TRICHOPTERA		
<u>Hydropsyche</u>	+	+
<u>Arctopsyche</u>		+
ORDER COLEPTERA		
Elmidae		+
ORDER DIPTERA		
Chironomidae		+
<u>Chironomus Sp.</u>	+	
<u>Diamesa</u>	+	
MISC. INVERT.		
Gastropoda		
<u>Lymnea</u>	+	
Oligochaeta	+	+
Hirudinea		
<u>Helobdella</u>		+
ORDER ISOPODA		
Asselidae		
<u>Asellus</u>	+	+

## SURPLUS CANAL

At each of the stations sampled, the upper (2) being at 2100 South and the lower (1) at the airport, the macroinvertebrate communities were dominated by those taxa tolerant to sedimentation and organic enrichment. Extreme dominances among those species were found at the airport station, which resulted in a standing crop of 49.1 g/m<sup>2</sup> and over 164,000 organisms per square meter, which indicated a significant influx of organic nutrients and additional sedimentation in that stream reach. There was also an indication of at least moderate amounts of toxic chemicals at the lower station. The CTO<sub>p</sub> was set at 80.

USFS - INTERMOUNTAIN REGION - ANNUAL PROGRESS REPORT

MACROINVERTEBRATE ANALYSIS

Prior to field season fill in Sections A and C for each stream that will be sampled and forward to:

Aquatic Ecosystem Analysis Laboratory  
 105 Page School  
 Brigham Young University  
 Provo, Utah 84602

A. Investigator James Lazorchak  
 Forest/District Environmental Protection Agency  
 Stream Surplus Canal  
 State/County Utah, Salt Lake County  
 Forest Service Cat. No. \_\_\_\_\_

B.

# taxa	Station	Date(s)	Diversity Index DAT (mean)	Standing Crop g/m <sup>2</sup> (mean)	Biotic Condition Index BCI 80	# organisms	
14	Airport	1	9-10-86	1.9	49.1	85	16,810
15	22100 S.	2	9-10-86	4.0	1.9	86	81,374

Scale:  
 Excellent  
 Good  
 Fair  
 Poor

DAT  
 18 - 26  
 11 - 17  
 6 - 10  
 0 - 5

Standing crop  
 4.0 - 12.0  
 1.6 - 4.0  
 0.6 - 1.5  
 0.0 - 0.5

BCI  
 above 90  
 80 - 90  
 72 - 79  
 below 72

TOTAL SAMPLE STATISTICS

DATE: 09 10 88

SURPLUS CANAL AT AIRPORT

EPA 499131

STATION: 1

REPL	TOTAL NO. SPECIES	MEAN /SQM	CONFIDENCE LIMITS (80 PERCENT) LL	UL	STANDARD DEVIATION	PERCENT SE OF MEAN	COEFF. OF VARIATION	DBAR	R	CTQA	CTQD
4	14	164281.	81382.	247180.	*****	30.81	61.61	1.9075	0.4990	92.	94.

\* NUMBERS DATA

SPECIES ANALYSES

STATION: 1 EPA 499131 SURPLUS CANAL AT AIRPORT DATE: 09 10 86

CLASS	ORDER	FAMILY	GENUS	SPECIES	MEAN NO/SQM	LOG10 NO/SQM	TOLERANCE QUOTIENT	LOG10 X TQ	MEAN WT GM/SQM
INSECTA	EPHEMEROPTERA	TRICORYTHIDAE	TRICORYTHODES		4131.84	3.618	108.	391.	
INSECTA	TRICHOPTERA	HYDROPSYCHIDAE	HYDROPSYCHE		51389.77	4.711	108.	509.	
INSECTA	COLEOPTERA	ELMIDAE			215.20	2.333	104.	243.	
INSECTA	ODONATA	GOMPHIDAE	OPHIOGOMPHUS		8.07	0.907	108.	98.	
INSECTA	ODONATA	COENAGRIONIDAE			86.08	1.935	108.	209.	
INSECTA	ODONATA	GOMPHIDAE	PROGOMPHUS		86.08	1.935	72.	139.	
INSECTA	DIPTERA	CHIRONOMIDAE	CHIRONOMUS		34173.78	4.534	96.	435.	
INSECTA	DIPTERA	CHIRONOMIDAE	DIAMESA		2872.92	3.458	42.	145.	
INSECTA	DIPTERA	PSYCHODIDAE	PSYCHODA		86.08	1.935	36.	70.	
INSECTA	DIPTERA	EMPIDIDAE			86.08	1.935	95.	184.	
CRUSTACEA	ISOPODA	ASELLIDAE	ASELLUS		518.48	2.713	98.	286.	
TURBELLARIA	TRICLADIDA	PLANARIIDAE	PLANARIA		473.44	2.675	108.	289.	
OLIGOCHAETA					68605.76	4.838	108.	522.	
ARACHNIDA	HYDRACARINA				1549.44	3.190	98.	313.	
TOTALS					164280.98	5.216			49.10

Handwritten notes:   
 5/5/5/5/5   
 5/0   
 5/0   
 0.5/0   
 5/1



TOTAL SAMPLE STATISTICS

DATE: 09 10 88

EPA 4992 32 WBL HW SURPLUS CANAL AT 2100 SOUTH

STATION: 2

REPL	TOTAL NO. SPECIES	MEAN /SQM	CONFIDENCE LIMITS (80 PERCENT) LL	UL	STANDARD DEVIATION	PERCENT SE OF MEAN	COEFF. OF VARIATION	DBAR	R	CTQA	CTQD
3	15	81374.	52936.	109812.	26116.77	18.53	32.09	0.8620	0.7798	94.	93.

\* NUMBERS DATA

SPECIES ANALYSES

STATION: 2

EPA 4992 32 WBL HW SURPLUS CANAL AT 2100 SOUTH

DATE: 09 10 88

CLASS	ORDER	FAMILY	GENUS	SPECIES	MEAN NO/SQM	LOG10 NO/SQM	TOLERANCE QUOTIENT	LOG10 X TQ	MEAN WT GH/SQM
INSECTA	EPHEMEROPTERA	TRICORYTHIDAE	TRICORYTHODES		172.16	2.236	108.	241.	
INSECTA	EPHEMEROPTERA	BAETIIDAE	BAETIS		28.69	1.458	72.	105.	
INSECTA	TRICHOPTERA				143.47	2.157	72.	155.	
INSECTA	TRICHOPTERA	HYDROPSYCHIDAE	HYDROPSYCHE		68835.31	4.838	108.	522.	
INSECTA	COLEOPTERA	ELMIDAE			28.69	1.458	104.	152.	
INSECTA	DIPTERA				57.39	1.759	108.	190.	
INSECTA	DIPTERA	SIMULIIDAE			172.16	2.236	108.	241.	
INSECTA	DIPTERA	CHIRONOMIDAE	CHIRONOMUS	SPECIES	9267.95	3.967	96.	381.	
INSECTA	DIPTERA	CHIRONOMIDAE	DIAMESA	SPECIES	832.11	2.920	42.	123.	
INSECTA	DIPTERA	CHIRONOMIDAE	TRICHOCLADIUS		748.03	2.873	72.	207.	
INSECTA	DIPTERA	EMPIDIDAE			143.47	2.157	95.	205.	
INSECTA	DIPTERA	PLANORBIDAE			57.39	1.759	108.	190.	
GASTROPODA	TRICLADIDA	PLANARIIDAE	PLANARIA		28.69	1.458	108.	157.	
TURBELLARIA					774.72	2.889	108.	312.	
OLIGOCHAETA					88.08	1.935	98.	190.	
ARACHNIDA	HYDRACARINA								
TOTALS					81374.29	4.910			49.90

TABLE 5. SURPLUS CANAL  
 LIST OF TAXA FOR QUALITATIVE KICK SAMPLES TAKEN 9-10-86

STATION	1	2
TAXA		
ORDER EPHEMEROPTERA		
<u>Cinygmula</u>		+
<u>Callibaetis</u>		+
ORDER TRICHOPTERA		
<u>Hydropsyche</u>		+
ORDER ODONATA		
<u>Ophiogomphus</u>		+
ORDER DIPTERA		
<u>Holorusia</u>		+
Chironomidae		
<u>Chironomus Sp.</u>		+
MISC. INVERT.		
Oligochaeta		+
Amphipoda		
<u>Hyallolella azteca</u>		+

## WEBER RIVER

The aquatic macroinvertebrate community at the upper station (2) sampled was dominated by taxa tolerant to sedimentation and organic enrichment. There were a limited number of moderately tolerant taxa present in the community. At the Central Weber River station (1) at Plain City, conditions appeared to be slightly better than they were at the upper station. Diversity among the moderately tolerant species was higher at the lower station.

The data indicate that the water treatment plant was effective in removal of organic enrichment and that water quality was actually improved. The BCI values of 80 at the lower station and 78 at the upper are probably pretty accurate in reflecting the changes in water quality. Even though there was less diversity in the community, there were some species that indicated that conditions had improved in the stream at the lower station, where there were just 2,000 organisms per square meter. Chemical tolerant species in the community at the Plain City station (1) indicated there were moderate effects from chemicals in the water. The  $CTQ_p$  was set at 66 for this stream.

Kick samples taken along with the basket samples on these streams did not significantly add to the data or enhance the analysis or evaluation of stream conditions. A table showing taxa found in kick samples is included for each stream. It was of interest to note that some snails collected with a kick net may not be in basket samples and riffle beetles are often not included in basket samples but could be collected in kick or Surber samples. It appears that the basket samples alone would be sufficient for monitoring the streams sampled.

USFS - INTERMOUNTAIN REGION - ANNUAL PROGRESS REPORT

MACROINVERTEBRATE ANALYSIS

Prior to field season fill in Sections A and C for each stream that will be sampled and forward to:

Aquatic Ecosystem Analysis Laboratory  
 121 Page School  
 Brigham Young University  
 Provo, Utah 84602

A. Investigator James Lazorchak  
 Forest/District Environmental Protection Agency  
 Stream Weber River  
 State/County Utah, Salt Lake County  
 Forest Service Cat. No. \_\_\_\_\_

# taxa	Station	Date(s)	Diversity Index DAT (mean)	Standing Crop gm/m <sup>2</sup> (mean)	Biotic Condition Index BCI 66	# organisms
18 Plain	C. 1	9-10-86	4.8	2.5	80	2,059
22 abv.	2	9-10-86	7.1	9.1	78	5,186

<b>Scale:</b>	<b>DAT</b>	<b>Standing crop</b>	<b>BCI</b>
Excellent	18 - 26	4.0 - 12.0	above 90
Good	11 - 17	1.6 - 4.0	75 - 90
Fair	6 - 10	0.6 - 1.5	below 75
Poor	0 - 5	0.0 - 0.5	below 75

TOTAL SAMPLE STATISTICS

DATE: 09 10 86

WEBER RIVER AT PLAIN CITY

EPA 492006 HW BH

STATION: 1

REPL	TOTAL NO. SPECIES	MEAN /SQM	CONFIDENCE LIMITS (80 PERCENT) LL	UL	STANDARD DEVIATION	PERCENT SE OF MEAN	COEFF. OF VARIATION	DBAR	R	CTQA	CTQD
3	18	2059.	1688.	2461.	380.47	10.11	17.51	2.9607	0.2906	77.	82.

\* NUMBERS DATA

SPECIES ANALYSES

STATION: 1	EPA 492005 HW BH	WEBER RIVER AT PLAIN CITY	DATE: 09 10 86	LOG10 X	MEAN WT				
CLASS	ORDER	FAMILY	GENUS	SPECIES	MEAN NO/SQM	LOG10 NO/SQM	TOLERANCE QUOTIENT	TQ	GM/SQM
INSECTA	EPHEMEROPTERA	LEPTOPHLEBIIDAE	PARALEPTOPHLEBIA		25.11	1.400	24.	34.	
INSECTA	TRICHOPTERA	HYDROPSYCHIDAE	HYDROPSYCHE		3.59	0.555	108.	60.	
INSECTA	TRICHOPTERA	RHYACOPHILIDAE	RHYACOPHILA		3.59	0.555	18.	10.	
INSECTA	COLEOPTERA	HALIPLIDAE			3.59	0.555	64.	30.	
INSECTA	ODONATA	AGRIONIDAE	AGRION		57.39	1.759	108.	190.	
INSECTA	ODONATA	COENAGRIONIDAE			50.21	1.701	108.	184.	
INSECTA	ODONATA	COENAGRIONIDAE			14.35	1.157	108.	125.	
INSECTA	ODONATA	COENAGRIONIDAE	ARGIA		3.59	0.555	72.	40.	
INSECTA	DIPTERA	CHIRONOMIDAE	ENALLAGMA		147.05	2.167	96.	208.	
INSECTA	DIPTERA	CHIRONOMIDAE	CHIRONOMUS		35.87	1.555	48.	75.	
INSECTA	DIPTERA	CHIRONOMIDAE	ORTHOCLADIUS		373.01	2.572	108.	278.	
INSECTA	DIPTERA	CHIRONOMIDAE	CHIRONOMUS		164.99	2.217	52.	115.	
INSECTA	DIPTERA	CHIRONOMIDAE	DICROTENDIPES		218.79	2.340	42.	98.	
INSECTA	DIPTERA	CHIRONOMIDAE	DIAMESA		10.76	1.032	108.	111.	
INSECTA	DIPTERA	CERATOPOGONIDAE	ATHERIX		3.59	0.555	24.	13.	
GASTROPODA	ANCYLIDAE	RHAGIONIDAE			530.83	2.725	96.	282.	
OLIGOCHAETA		LAEVAPEX			408.88	2.612	108.	282.	
CRUSTACEA	DECAPODA	ASTACIDAE			3.59	0.555	108.	60.	
TOTALS					2058.75	3.314			2.50

TOTAL SAMPLE STATISTICS

EPA 492012 HW BH WWTP WEBER RIVER ABOVE CENTRAL VALLEY DATE: 09 10 88

STATION: 2

REPL	TOTAL NO. SPECIES	MEAN /SQM	CONFIDENCE LIMITS (80 PERCENT) LL	UL	STANDARD DEVIATION	PERCENT SE OF MEAN	COEFF. OF VARIATION	DBAR	R	CTQA	CTQD
3	22	5186.	2534.	7839.	2436.11	27.12	46.97	2.3447	0.4757	87.	84.

\* NUMBERS DATA



SPECIES ANALYSES

STATION: 2

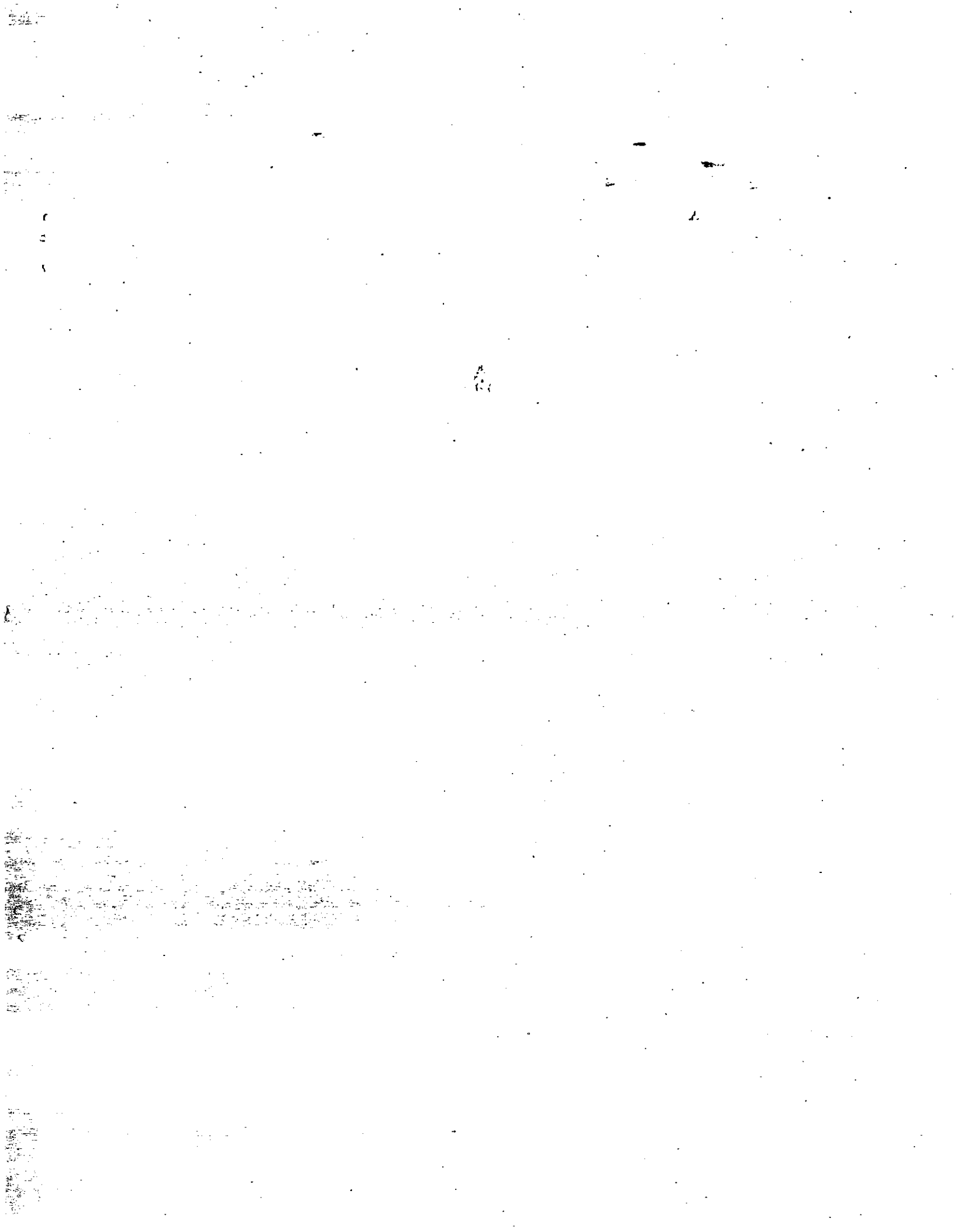
EPA 492012 HW BH WWTP WEBER RIVER ABOVE CENTRAL VALLEY

DATE: 09 10 88

CLASS	ORDER	FAMILY	GENUS	SPECIES	MEAN NO/SQM	LOG10 NO/SQM	TOLERANCE QUOTIENT	LOG10 X TQ	MEAN WT GM/SQM
INSECTA	EPHEMEROPTERA	HEPTAGENIIDAE	HEPTAGENIA		7.17	0.856	54.	46.	
INSECTA	EPHEMEROPTERA	TRICORYTHIDAE	TRICORYTHODES		10.76	1.032	108.	111.	
INSECTA	EPHEMEROPTERA	LEPTOPHLEBIIDAE	PARALEPTOPHLEBIA		3.59	0.555	24.	13.	
INSECTA	EPHEMEROPTERA	BAETIIDAE	BAETIS		7.17	0.856	72.	62.	
INSECTA	EPHEMEROPTERA	HEPTAGENIIDAE	STENONEMA		168.57	2.227	48.	107.	
INSECTA	TRICHOPTERA	HYDROPSYCHIDAE	HYDROPSYCHE		104.01	2.017	108.	218.	
INSECTA	ODONATA	COENAGRIONIDAE	ARGIA		82.49	1.916	108.	207.	
INSECTA	DIPTERA	SIMULIIDAE			3.59	0.555	108.	60.	
INSECTA	DIPTERA	CHIRONOMIDAE	DIAMESA		2334.92	3.368	42.	141.	
INSECTA	DIPTERA	CHIRONOMIDAE	PROCLADIUS		71.73	1.856	60.	111.	
INSECTA	DIPTERA	CHIRONOMIDAE	ORTHOCLADIUS		265.41	2.424	48.	116.	
INSECTA	DIPTERA	CHIRONOMIDAE	CHIRONOMUS		380.19	2.580	96.	248.	
INSECTA	DIPTERA	CHIRONOMIDAE	CHIRONOMUS		28.69	1.458	108.	157.	
INSECTA	DIPTERA	EMPIDIDAE			3.59	0.555	95.	53.	
INSECTA	DIPTERA	CERATOPOGONIDAE			10.76	1.032	108.	111.	
TURBELLARIA	TRICLADIDA	PLANARIIDAE	PLANARIA		3.59	0.555	108.	60.	
OLIGOCHAETA					1517.18	3.181	108.	344.	
ARACHNIDA	HYDRACARINA				10.76	1.032	98.	101.	
NEMATODA					43.04	1.634	108.	178.	
GASTROPODA	ANCYLIDAE				114.77	2.060	98.	198.	
CRUSTACEA	DECAPODA				7.17	0.856	108.	92.	
CRUSTACEA	COPEPODA				7.17	0.856	108.	92.	
	LAEVAPEX								
TOTALS					5186.32	3.715			9.10

TABLE 6. WEBER RIVER  
 LIST OF TAXA FOR QUALITATIVE KICK SAMPLES TAKEN 9-10-86

STATION	1	2
TAXA		
ORDER DIPTERA		
Chironomidae		
Chironomus Sp.	+	+
Chironomus chironomus	+	+
Ceratopogonidae	+	
MISC. INVERT.		
Planorbidae		+
Oligochaeta	+	+



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