

AQUATIC ECOSYSTEM INVENTORY
Macroinvertebrate Analysis

AQUATIC ECOSYSTEM ANALYSIS FOR SELECTED STREAMS
ON THE BLM ARIZONA STRIP DISTRICT
1988

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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^2 ; 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 30 aquatic macroinvertebrate samples from 10 stations on 8 streams and springs along with physical and chemical data provided by your aquatic specialists. Streams include Beaver Dam Wash, Buckhorn Spring, Bullrush Wash, Cottonwood Spring, Grapevine Spring, Paria River, Virgin River, and Whiskey Spring. These aquatic ecosystems are being monitored to evaluate water quality and possible trends in these ecosystems. These waters provide a lifeline for plant species which provide habitat for a variety of Aquatic and terrestrial animals that inhabit these ecosystems. It is important to know the composition of the flora and fauna in these vital resources located on the BLM Arizona Strip District. The aquatic macroinvertebrates that live in these streams and springs give an indication of the suitability of these waters for wildlife and even for human use. This data also helps to establish the value of these resources and help protect them from those who would petition to dry up some of the springs or adversely impact the stream ecosystems. The Virgin River also supports an endangered fish species, the ~~Spinedace~~.

Woundfin minnow

BEAVER DAM WASH

Moderately tolerant taxa present indicated fairly good water quality and the community had good diversity. Resident population numbers for most of the taxa indicated good stability. A mayfly, Tricorythodes, had a good resident population in the community. This species can compete best where there is a sandy substrate in the stream. The diversity of organic- nutrient-tolerant taxa indicated a good source of organic nutrients in this ecosystem.

When compared with data from 1987 it appeared that conditions were as good or possibly better in 1988. The macroinvertebrate biomass was triple that found in 1987 and the BCI value indicated that conditions were slightly better.

The BCI value of 79 indicated that this ecosystem was in fairly good condition. The water quality and nutrients were sufficient to sustain the flora and fauna in this ecosystem.

USFS - INTERMOUNTAIN REGION - ANNUAL PROGRESS REPORT

MACROINVERTEBRATE ANALYSIS

Aquatic Ecosystem Analysis Laboratory
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Provo, Utah 84602

A. Investigator Curtis Warrick
Forest/District BLM Arizona Strip
Stream BEAVER DAM WASH
State/County AZ
Forest Service Cat. No. _____

Station	Date(s)	Diversity Index DAT (mean)	Standing Crop g/m ² (mean)	Biotic Condition Index BCI 72
1	6-21-88	11.5	2.0	79
1	9-03-87	10.2	0.6	75

Scale:	DAT	Standing crop	BCI
Excellent	18 - 26	4.0 - 12.0	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

STATION: S1

BEAVER DAM WASH, BLM ARIZONA STRIP

DATE: 06 21 88

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							
* NUMBERS DATA											
3	20	16413.	14329.	18497.	1913.87	6.73	11.66	3.0656	0.2914	92.	91.

SPECIES ANALYSES

STATION: S1

BEAVER DAM WASH, BLM ARIZONA STRIP

DATE: 06 21 88

CLASS	ORDER	FAMILY	GENUS	SPECIES	MEAN NO/SQM	LOG10 NO/SQM	TOLERANCE QUOTIENT	LOG10 X TQ	MEAN WT GM/SQM
INSECTA	EPHEMEROPTERA	TRICORYTHIDAE	TRICORYTHODES	MINUTUS	5623.89	3.750	108.	405.	
INSECTA	EPHEMEROPTERA	BAETIDAE	BAETIS		3041.49	3.483	72.	251.	
INSECTA	TRICHOPTERA	HYDROPSYCHIDAE	HYDROPSYCHE		1979.84	3.297	108.	356.	
INSECTA	TRICHOPTERA	GLOSSOSOMATIDAE	GLOSSOSOMA		258.24	2.412	24.	58.	
INSECTA	TRICHOPTERA	HYDROPTILIDAE	HYDROPTILA		258.24	2.412	108.	260.	
INSECTA	TRICHOPTERA	HELICOPSYCHIDAE			86.08	1.935	18.	35.	
INSECTA	TRICHOPTERA	HYDROPTILIDAE	ALISOTRICHIA		143.47	2.157	108.	233.	
INSECTA	ODONATA				28.69	1.458	90.	131.	
INSECTA	ODONATA	COENAGRIONIDAE	ARGIA		28.69	1.458	108.	157.	
INSECTA	TRICHOPTERA	GLOSSOSOMATIDAE	PROTOPTILA		860.80	2.935	32.	94.	
INSECTA	DIPTERA				28.69	1.458	108.	157.	
INSECTA	DIPTERA	SIMULIIDAE			57.39	1.759	108.	190.	
INSECTA	DIPTERA	CHIRONOMIDAE			1061.65	3.026	108.	327.	
INSECTA	DIPTERA	EMPIDIDAE			86.08	1.935	95.	184.	
CRUSTACEA	OSTRACODA				344.32	2.537	108.	274.	
GASTROPODA		PHYSIDAE	PHYSA		487.79	2.688	108.	290.	
TURBELLARIA	TRICLADIDA	PLANARIIDAE	PLANARIA		315.63	2.499	108.	270.	
OLIGOCHAETA					832.11	2.920	108.	315.	
ARACHNIDA	HYDRACARINA				860.80	2.935	98.	288.	
NEMATODA					28.69	1.458	108.	157.	
TOTALS					18412.59	4.215			2.00

SPECIES ANALYSES

STATION: S1

BULLRUSH WASH, BLM ARIZONA STRIP

DATE: 06 14 88

CLASS	ORDER	FAMILY	GENUS	SPECIES	MEAN NO/SQM	LOG10 NO/SQM	TOLERANCE QUOTIENT	LOG10 X TQ	MEAN WT GM/SQM
INSECTA	EPHEMEROPTERA	BAETIDAE	BAETIS	S, 0	53.80	1.731	72.	125.	
INSECTA	COLEOPTERA	ELMIDAE			7.17	0.856	104.	89.	
INSECTA	COLEOPTERA	DYTISCIDAE			3.59	0.555	72.	40.	
INSECTA	ODONATA	COENAGRIONIDAE	ARGIA		28.69	1.458	108.	157.	
INSECTA	ODONATA	MACROMIIDAE	MACROMIA		10.76	1.032	90.	93.	
INSECTA	ODONATA	LIBELLULIDAE			10.76	1.032	72.	74.	
INSECTA	DIPTERA	CHIRONOMIDAE		S, 0	2205.80	3.344	108.	361.	
INSECTA	DIPTERA	CERATOPOGONIDAE		S, ch	21.52	1.333	108.	144.	
INSECTA	DIPTERA	CULICIDAE	AEDES	2	68.15	1.833	108.	198.	
CRUSTACEA	OSTRACODA				538.00	2.731	108.	295.	
OLIGOCHAETA				0,5	7.17	0.856	108.	92.	
TOTALS					2955.41	3.471			0.30

TOTAL SAMPLE STATISTICS

STATION: S2

BULLRUSH WASH, BLM ARIZONA STRIP

DATE: 06 14 88

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							
* NUMBERS DATA											
3	9	70629.	-29742.	170999.	92177.45	75.35	130.51	0.9819	0.6904	95.	100.

SPECIES ANALYSES

STATION: S2

BULLRUSH WASH, BLM ARIZONA STRIP

DATE: 06 14 88

CLASS	ORDER	FAMILY	GENUS	SPECIES	MEAN NO/SQM	LOG10 NO/SQM	TOLERANCE QUOTIENT	LOG10 X TQ	MEAN WT GM/SQM
INSECTA	EPHEMEROPTERA	BAETIDAE	BAETIS		57.39	1.759	72.	127.	
INSECTA	EPHEMEROPTERA	EPHEMERELLIDAE	EPHEMERELLA	HYSTRIX	28.69	1.458	24.	35.	
INSECTA	ODONATA	COENAGRIONIDAE			114.77	2.060	108.	222.	
INSECTA	DIPTERA	CHIRONOMIDAE			10939.33	4.039	108.	438.	
INSECTA	DIPTERA	CERATOPOGONIDAE			875.15	2.942	108.	318.	
INSECTA	DIPTERA	CULICIDAE	AEDES		2711.52	3.433	108.	371.	
INSECTA	DIPTERA	TABANIDAE			28.69	1.458	108.	157.	
CRUSTACEA	COPEPODA				35.87	1.555	108.	188.	
CRUSTACEA	OSTRACODA				55837.23	4.747	108.	513.	
				TOTALS	70628.64	4.849			2.10

COTTONWOOD SPRING

This ecosystem had a macroinvertebrate community with good diversity. Most were those which compete best where there is an abundance of fine sediment in the instream substrate and there were some indications of organic enrichment, however it did not appear to be severe. Water chemistry appeared to be fairly good as indicated by the diversity in the community and the water chemistry measured did not indicate a problem. Although cattle had grazed in this area it did not appear that impacts had exceeded natural limitations.

When compared with data from 1987 it appeared conditions were as good if not slightly better in 1988. The BCI value of 84 indicated fairly good conditions in this ecosystem and the standing crop was higher than that found in 1987.

In spite of the apparent impacts from grazing and recreation in the area the aquatic ecosystem still indicated fairly good conditions. The diversity of insects indicated that the water in this ecosystem was suitable for sustaining the wildlife in this ecosystem.

USFS - INTERMOUNTAIN REGION - ANNUAL PROGRESS REPORT

MACROINVERTEBRATE ANALYSIS

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

A. Investigator Curtis Warrick
Forest/District BLM Arizona Strip
Stream COTTONWOOD SPRING
State/County AZ
Forest Service Cat. No. _____

Station	Date(s)	Diversity Index DAT (mean)	Standing Crop g/m ² (mean)	Biotic Condition Index BCI 80
1	6-14-88	3.6	1.1	84
1	8-13-87	3.9	0.08	78

Scale:	DAT	Standing crop	BCI
Excellent	18 - 26	4.0 - 12.0	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

STATION: S1

COTTONWOOD SPRINGS, BLM ARIZONA STRIP

DATE: 06 14 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
* NUMBERS DATA										
3	22	14573.	164. 28981.	13232.67	52.43	90.80	0.9041	0.7985	96.	95.

SPECIES ANALYSES

STATION: S1

COTTONWOOD SPRINGS, BLM ARIZONA STRIP

DATE: 06 14 88

CLASS	ORDER	FAMILY	GENUS	SPECIES	MEAN NO/SQM	LOG10 NO/SQM	TOLERANCE QUOTIENT	LOG10 X TQ	MEAN WT GM/SQM
INSECTA	EPHEMEROPTERA	TRICORYTHIDAE	TRICORYTHODES	MINUTUS	32.28	1.509	108.	163.	
INSECTA	EPHEMEROPTERA	BAETIDAE	BAETIS		394.53	2.596	72.	187.	
INSECTA	TRICHOPTERA	HYDROPSYCHIDAE	HYDROPSYCHE		14.35	1.157	108.	125.	
INSECTA	TRICHOPTERA	HYDROPTILIDAE	HYDROPTILA		28.69	1.458	108.	157.	
INSECTA	TRICHOPTERA	HYDROPTILIDAE	ALISOTRICHIA		3.59	0.555	108.	60.	
INSECTA	ODONATA				200.85	2.303	90.	207.	
INSECTA	ODONATA	COENAGRIONIDAE	ARGIA		7.17	0.856	108.	92.	
INSECTA	DIPTERA	CHIRONOMIDAE			12872.55	4.110	108.	444.	
INSECTA	DIPTERA	EMPIDIDAE			14.35	1.157	95.	110.	
INSECTA	DIPTERA	CERATOPOGONIDAE			344.32	2.537	108.	274.	
INSECTA	DIPTERA	PSYCHODIDAE	PERICOMA		28.69	1.458	36.	52.	
INSECTA	DIPTERA	TABANIDAE			3.59	0.555	108.	60.	
INSECTA	DIPTERA	CULICIDAE			14.35	1.157	108.	125.	
INSECTA	COLEOPTERA	HYDROPHILIDAE	LACCOBIUS		254.65	2.406	72.	173.	
INSECTA	COLEOPTERA	GYRINIDAE			14.35	1.157	108.	125.	
CRUSTACEA	OSTRACODA				107.60	2.032	108.	219.	
GASTROPODA		PHYSIDAE	PHYSA		75.32	1.877	108.	203.	
OLIGOCHAETA					43.04	1.634	108.	176.	
ARACHNIDA	HYDRACARINA				71.73	1.856	98.	182.	
INSECTA	DIPTERA	STRATIOMYIDAE	EUPARYPHUS		3.59	0.555	108.	60.	
INSECTA	COLEOPTERA	DYTISCIDAE			14.35	1.157	72.	83.	
INSECTA	COLEOPTERA	DYTISCIDAE	HYDROPOROUS		28.69	1.458	72.	105.	
TOTALS					14572.63	4.164			1.10

GRAPEVINE SPRING

Fairly good diversity and resident population numbers for some benthic species indicated fairly good stability in this ecosystem. There was an abundance of *Argia*, a damselfly nymph, sediment tolerant Ostracods and organic enrichment tolerant *Lymnaea* snails. All of the species present were tolerant to sediment and organic enrichment.

Specific conductivity of 600 indicated that the chemical composition could be limiting to the most sensitive and moderately tolerant species.

The BCI value of 76 indicated just fair conditions in this ecosystem and probably reflected some grazing impacts in this ecosystem. However the species present indicated that the water was suitable for cattle and for wildlife in this ecosystem.

USFS - INTERMOUNTAIN REGION - ANNUAL PROGRESS REPORT

MACROINVERTEBRATE ANALYSIS

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Brigham Young University
Provo, Utah 84602

A. Investigator Curtis Warrick
Forest/District BIM Arizona Strip
Stream GRAPEVINE SPRING
State/County AZ
Forest Service Cat. No. _____

B.		Diversity Index DAT (mean)	Standing Crop g/m ² (mean)	Biotic Condition Index BCI 80
<u>Station</u>	<u>Date(s)</u>			
<u>1</u>	<u>6-28-88</u>	<u>7.0</u>	<u>2.4</u>	<u>76</u>
_____	_____	_____	_____	_____
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_____	_____	_____	_____	_____
_____	_____	_____	_____	_____

Scale:	DAT	Standing crop	BCI
Excellent	18 - 26	4.0 - 12.0	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

STATION: S1

GRAPEVINE SPRING, BLM ARIZONA STRIP

DATE: 06 28 88

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							
* NUMBERS DATA											
3	14	8987.	7816.	10117.	1058.31	6.80	11.78	2.3806	0.3754	104.	105.

SPECIES ANALYSES

STATION: S1

GRAPEVINE SPRING, BLM ARIZONA STRIP

DATE: 06 28 88

CLASS	ORDER	FAMILY	GENUS	SPECIES	MEAN NO/SQM	LOG10 NO/SQM	TOLERANCE QUOTIENT	LOG10 X TQ	MEAN WT GM/SQM
INSECTA	EPHEMEROPTERA	TRICORYTHIDAE	TRICORYTHODES	MINUTUS	14.35	1.157	108.	125.	
INSECTA	TRICHOPTERA	HYDROPTILIDAE	ALISOTRICHIA		28.69	1.458	108.	157.	
INSECTA	ODONATA	COENAGRIONIDAE	ARGIA		1506.40	3.178	108.	343.	
INSECTA	DIPTERA				14.35	1.157	108.	125.	
INSECTA	DIPTERA	TIPULIDAE	HOLORUSIA		14.35	1.157	72.	83.	
INSECTA	DIPTERA	SIMULIIDAE			14.35	1.157	108.	125.	
INSECTA	DIPTERA	CHIRONOMIDAE			2611.09	3.417	108.	369.	
INSECTA	DIPTERA	EMPIDIDAE			57.39	1.759	95.	167.	
INSECTA	DIPTERA	DIXIDAE			28.69	1.458	108.	157.	
INSECTA	DIPTERA	TABANIDAE			100.43	2.002	108.	216.	
CRUSTACEA	OSTRACODA				1463.36	3.165	108.	342.	
GASTROPODA		LYMNAEIDAE	LYMNAEA		2654.13	3.424	108.	370.	
OLIGOCHAETA					71.73	1.856	108.	200.	
ARACHNIDA	HYDRACARINA				387.36	2.588	98.	254.	
TOTALS					8966.67	3.953			2.40

PARIA RIVER

Two stations were sampled on this stream one near the Wilson Spring and the other at the wilderness boundary. At Station 2 near the wilderness boundary the macroinvertebrate community had very little diversity just 4 taxa in the community and they did not have resident population numbers which often is a sign of instability in an ecosystem.

At Station 1 there was an indication of more stability. There were two species, the moderately tolerant mayfly *Cynigula* and a clean water caddisfly *Arctopsyche*, with near resident population numbers which indicated fairly good water quality. There was still an indication of some instability even at this station.

When compared with data from the prior year it appears that the conditions were not quite as good in 1988. The DAT diversity index value was slightly lower but still indicated that there was instability in 1987 at each of the stations. Macroinvertebrates had a very low biomass at each station but it was higher at Station 1 than in 1987.

The BCI values indicate a more tolerant community at each of the Stations in 1988. The BCI values in the 60's indicated poor conditions at each of the stations, however some of the sensitive species present at Station 1 indicated good water quality, perhaps good enough for human consumption. Water chemistry data did not indicate water chemistry problems. It appeared that this aquatic ecosystem could provide water for the wildlife and possibly for human consumption in this ecosystem. The main problem appeared to be in habitat quality and possibly instability in this ecosystem.

MACROINVERTEBRATE ANALYSIS

A. Investigator Curtis Warrick
Forest/District BIM Arizona Strip
Stream PARIA RIVER
State/County AZ
Forest Service Cat. No. _____

[illegible]

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TOTAL SAMPLE STATISTICS

STATION: S1

PARIA RIVER, BLM ARIZONA STRIP

DATE: 07 07 88

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							
* NUMBERS DATA											
3	8	717.	-59.	1494.	712.87	57.38	99.38	1.3794	0.5444	80.	90.

SPECIES ANALYSES

STATION: S1

PARIA RIVER, BLM ARIZONA STRIP

DATE: 07 07 88

CLASS	ORDER	FAMILY	GENUS	SPECIES	MEAN NO/SQM	LOG10 NO/SQM	TOLERANCE QUOTIENT	LOG10 X TQ	MEAN WT GM/SQM
INSECTA	EPHEMEROPTERA	HEPTAGENIIDAE	CINYGMULA	1	3.59	0.555	30.	17.	
INSECTA	EPHEMEROPTERA	BAETIDAE	BAETIS	5,0	121.95	2.088	72.	150.	
INSECTA	TRICHOPTERA	HYDROPSYCHIDAE	HYDROPSYCHE	5	502.13	2.701	108.	292.	
INSECTA	TRICHOPTERA	HYDROPSYCHIDAE	ARCTOPSYCHE	5	3.59	0.555	18.	10.	
INSECTA	DIPTERA	CHIRONOMIDAE		5,0	64.56	1.810	108.	195.	
INSECTA	DIPTERA	EMPIDIDAE		5	3.59	0.555	95.	53.	
OLIGOCHAETA				0,5	7.17	0.856	108.	92.	
ARACHNIDA	HYDRACARINA			5,0	10.76	1.032	98.	101.	
				TOTALS	717.33	2.856			0.10

TOTAL SAMPLE STATISTICS

STATION: S2

PARIA RIVER, BLM ARIZONA STRIP

DATE: 07 07 88

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							
* NUMBERS DATA											
3	4	351.	280.	423.	65.74	10.60	18.70	1.5178	0.2469	97.	95.

SPECIES ANALYSES

STATION: S2

PARIA RIVER, BLM ARIZONA STRIP

DATE: 07 07 88

CLASS	ORDER	FAMILY	GENUS	SPECIES	MEAN NO/SQM	LOG10 NO/SQM	TOLERANCE QUOTIENT	LOG10 X TQ	MEAN WT GM/SQM
INSECTA	EPHEMEROPTERA	BAETIDAE	BAETIS	5,0	197.27	2.295	72.	165.	
INSECTA	TRICHOPTERA	HYDROPSYCHIDAE	HYDROPSYCHE	5,5	86.08	1.935	108.	209.	
INSECTA	DIPTERA	CHIRONOMIDAE		5,0	60.97	1.785	108.	193.	
ARACHNIDA	HYDRACARINA			5,0	7.17	0.856	98.	84.	
				TOTALS	351.49	2.546			0.04

VIRGIN RIVER

This community was dominated by the sediment and organic enrichment tolerant chironomids. The next most abundant was the mayfly ~~Tricorythodes~~, which competes best where there is a sandy substrate. The community was otherwise dominated by those taxa tolerant to sedimentation and organic enrichment. Indicating that the water chemistry was not severely limiting, was a small population of Capniid stoneflies, which being shredders also indicated that there was fairly good riparian habitat in the area.

When compared with the prior year sample the DAT diversity index value had dropped considerably. This was due mainly to the abundance of chironomids in the 1988 community. The standing crop was considerably higher than found in 1987 and the BCI value had dropped slightly.

The Virgin River is the home of a threatened fish species called the ~~Spinedace~~ ^{Roundfin Minnow}. The macroinvertebrate biomass of 1.5 g/m^2 could provide nutrients for this fish. The specific conductivity of 2000 micromhos/cm indicated that the water chemistry would be limiting to sensitive and moderately tolerant macroinvertebrate species. This along with the abundance of sand and silt in the instream substrate could explain the absence of these species.

The BCI value of 77 indicated that this ecosystem was in fair condition though it could be better. There was some concern that samples were taken in an area that may not have been in the main stream however the good biomass of the community indicated that this was part of the perennial stream. It appeared this ecosystem could provide a source of suitable water for not only the aquatic but also the terrestrial species of animals and plants in this ecosystem.

USFS - INTERMOUNTAIN REGION - ANNUAL PROGRESS REPORT

MACROINVERTEBRATE ANALYSIS

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

A. Investigator Curtis Warrick
Forest/District BLM Arizona Strip
Stream VIRGIN RIVER
State/County AZ
Forest Service Cat. No. _____

B.		Diversity Index DAT (mean)	Standing Crop g/m ² (mean)	Biotic Condition Index BCI 72
Station	Date(s)			
1	6-21-88	2.9	1.5	77
1	9-03-87	10.1	0.2	79

Scale:	DAT	Standing crop	BCI
Excellent	18 - 26	4.0 - 12.0	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

STATION: S1

VIRGIN RIVER, BLM ARIZONA STRIP

DATE: 06 21 88

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							
* NUMBERS DATA											
3	18	36268.	25980.	46557.	9448.96	15.04	26.05	1.0114	0.7579	92.	94.

SPECIES ANALYSES

STATION: S1

VIRGIN RIVER, BLM ARIZONA STRIP

DATE: 06 21 88

CLASS	ORDER	FAMILY	GENUS	SPECIES	MEAN NO/SQM	LOG10 NO/SQM	TOLERANCE QUOTIENT	LOG10 X TQ	MEAN WT GM/SQM
INSECTA	EPHEMEROPTERA	EPHEMERELLIDAE	EPHEMERELLA	INERMIS	57.39	1.759	48.	84.	
INSECTA	EPHEMEROPTERA	TRICORYTHIDAE	TRICORYTHODES	MINUTUS	2065.92	3.315	108.	358.	
INSECTA	EPHEMEROPTERA	BAETIDAE	BAETIS		1090.35	3.038	72.	219.	
INSECTA	PLECOPTERA	CAPNIIDAE			57.39	1.759	32.	56.	
INSECTA	TRICHOPTERA	HYDROPTILIDAE	HYDROPTILA		57.39	1.759	108.	190.	
INSECTA	COLEOPTERA	ELMIDAE			57.39	1.759	104.	183.	
INSECTA	ODONATA				57.39	1.759	90.	158.	
INSECTA	DIPTERA				57.39	1.759	108.	190.	
INSECTA	DIPTERA	SIMULIIDAE			172.16	2.236	108.	241.	
INSECTA	DIPTERA	CHIRONOMIDAE			30988.80	4.491	108.	485.	
INSECTA	DIPTERA	EMPIDIDAE			57.39	1.759	95.	167.	
INSECTA	DIPTERA	CERATOPOGONIDAE			57.39	1.759	108.	190.	
INSECTA	LEPIDOPTERA	PYRALIDAE	PARAGYRACTIS		114.77	2.060	72.	148.	
INSECTA	LEPIDOPTERA				57.39	1.759	72.	127.	
CRUSTACEA	COPEPODA				631.25	2.800	108.	302.	
CRUSTACEA	OSTRACODA				401.71	2.604	108.	281.	
ARACHNIDA	HYDRACARINA				57.39	1.759	98.	172.	
NEMATODA					229.55	2.361	108.	255.	
TOTALS					36288.38	4.560			1.50

WHISKEY SPRINGS

This sample was taken to indicate the community living in the waters of this spring. The mosquito, ~~Aedes~~, indicated that the sample sight was a pool less than 12 inches deep. The community had fairly good diversity as indicated on the attached species list.

MACROINVERTEBRATE ANALYSIS

A. Investigator Curtis Warrick
Forest/District BLM Arizona Strip
Stream WHISKEY SPRINGS TROUGH
State/County AZ
Forest Service Cat. No. _____

[illegible]

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TOTAL SAMPLE STATISTICS

STATION: S1

WHISKEY SPRING, BLM ARIZONA STRIP

DATE: 06 28 88

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							
* NUMBERS DATA											
3	10	796.	-84.	1676.	808.15	58.60	101.50	2.1428	0.3618	91.	94.

DATE: 06 28 88

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