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Revised 6/10/98

STATE OF NEW MEXICO PROCEDURES FOR
ASSESSING STANDARDS ATTAINMENT FOR
§303(d) LIST AND §305(b) REPORT

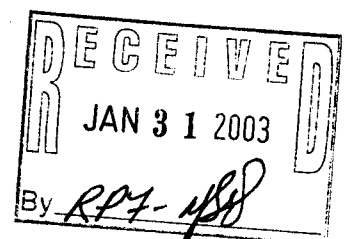
ASSESSMENT PROTOCOL

NEW MEXICO ENVIRONMENT DEPARTMENT
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JUNE 1998



3616



SECTION A. WATER BODY ASSESSMENT TABLES

Criteria for Determinations of Aquatic Life Use Support using differing monitored data types.

Table 1. Criteria for Assessment of Aquatic Life Use Support Using Biological Data from Rivers and Streams in New Mexico.¹

% Comparison to Reference	Degree of Aquatic Life Use Support	Attributes
> 79%	Full Support	Comparable to best situation to be expected within ecoregion (watershed reference site). Balanced trophic structure. Optimum community structure (composition & dominance) for stream size and habitat quality.
70-79%	Full Support, Impacts Observed	Community structure less than expected. Composition (species richness) lower than expected due to loss of some intolerant forms. Percent contribution of tolerant forms increases.
50-69%	Partial Support	Fewer species due to loss of most intolerant forms. Reduction in EPT index.
<50%	Not Supported	Few species present. If high densities of organisms, then dominated by one or two taxa.

¹ Biological attributes from EPA's "Rapid Bioassessment Protocols for Use in Stream and Rivers." The Surface Water Quality Bureau has begun a program of reassessing and refining the biomonitoring protocols and percentages used in this table to better reflect conditions in New Mexico waters.

Upper Canyon de Valle below MDA P

Station VA 2.6

12 May 97

	Q1	Q2	Q3	Total	#/m2	log x	TQ	log x *TQ
PLECOPTERA - stoneflies								
<i>Amphinemura banksi</i>	34	14	12	60	340	2.531	06	15.19
<i>Isoperla</i> sp.	5	7	0	12	68	1.833	48	87.96
EPHEMEROPTERA - mayflies								
<i>Ameletus</i> sp.	0	0	1	01	06	0.778	48	37.35
<i>Baetis tricaudatus</i>	41	29	39	109	618	2.791	72	200.95
TRICHOPTERA - caddisflies								
<i>Hydropsyche occidentalis</i>	28	44	6	78	442	2.645	108	285.71
<i>Hesperophylax</i> sp.	1	0	7	08	45	1.653	108	178.55
DIPTERA - true flies								
<i>Antocha monticola</i>	1	0	0	01	06	0.778	24	18.68
<i>Dicranota</i> sp.	4	0	0	04	23	1.362	24	32.68
<i>Holorusia grandis</i>	0	0	1	01	06	0.778	72	56.03
✓ <i>Dixidae</i>	1	1	0	02	11	1.041	108	112.47
✓ <i>Dixa</i> sp.	0	1	0	01	06	0.778	108	84.04
<i>Simuliidae</i>	19	3	8	30	170	2.230	108	240.89
<i>Simulium</i> sp.	20	3	0	23	130	2.114	108	228.31
<i>Diamesa</i> sp.	3	0	4	07	40	1.602	108	173.02
✓ <i>Pseudodiamesa</i> sp.	0	0	1	01	06	0.778	108	84.04
<i>Orthocladus</i> sp.	3	1	27	31	176	2.246	108	242.52
<i>Eukiefferiella</i> sp.	6	0	2	08	45	1.653	108	178.55
<i>Parametricnemus</i> sp.	0	0	1	01	06	0.778	108	84.04
<i>Cricotopus</i> sp.	1	0	10	11	62	1.792	108	193.58
✓ <i>Cladotanytarsus</i> sp.	8	0	28	36	204	2.310	108	249.44
<i>Tanytarsus</i> sp.	0	0	11	11	62	1.792	108	193.58
✓ <i>Paratanytarsus</i> sp.	0	0	2	02	11	1.041	108	112.47
✓ <i>Polypedilum</i> spp.	0	0	6	06	34	1.531	108	165.40
<i>Micropsectra</i> sp.	6	0	5	11	62	1.792	108	193.58
✓ <i>Pentaneura</i> sp.	1	0	14	15	85	1.929	108	208.38
✓ <i>Chelifera</i> sp.	5	2	17	24	136	2.134	95	202.69
✓ <i>Hemerodromia</i> sp.	0	1	1	02	11	1.041	95	98.93
ODONATA - damsel/dragonflies								
<i>Ophiogomphus</i> sp.	4	3	10	17	96	1.982	108	214.09
<i>Libellula</i> sp.	5	0	6	11	62	1.792	72	129.05
<i>Coenagrionidae</i>	4	0	0	04	23	1.362	108	147.07
COLEOPTERA - beetles								
✓ <i>Optioservus</i> sp.	12	2	0	14	79	1.898	108	204.94
LEPIDOPTERA - moths								
<i>Petrophila</i> sp.	1	1	2	04	23	1.362	72	98.04
MOLLUSCA - snails/clams								
<i>Sphaeriidae</i>	1	0	0	01	06	0.778	108	84.04
Totals	214	112	221	547	3100	52.909	3004	4836.23

Total Taxa 33
 CTQd 91.4
 Diversity Index 4.03

(24) (15) (24)
 $\sum(\text{Log } x * \text{TQ}) / \sum \text{Log } x = \text{community tolerance quotient}$
 $\bar{d} = - \sum(n_i / n) \log_2(n_i / n)$

Table **. Metric scoring criteria (based on those of Gam and Jacobi, in press).

Score:	Scoring Criteria			
	6	4	2	0
Standing Crop(No/m2) ^(a)	50-149%	35-49% or 150-199%	20-34% or 200-249%	<20% or >250%
No. of Taxa ^(a)	>80%	60-79%	40-59%	<40%
CTQ _d ^(b)	>85%	70-84%	50-69%	<50%
HBI ^(b)	>85%	70-84%	50-69%	<50%
EPT Index ^(a)	>90%	80-89%	70-79%	<70%
EPT/EPT+Chironomidae ^(a)	>75%	50-74%	25-49%	<25%
Community Loss ^(c)	<0.5	0.5-1.4	1.5-3.9	>4.0
Dominant Taxon ^(d)	<20%	20-29%	30-39%	>40%
Diversity ^(d)	>3.0	2.00-2.99	1.00-1.99	<1.00
Sc./Sc. + Fl. Cl. ^(a)	>50%	35-49%	20-34%	<20%
Shredders/Total ^(a)	>50%	35-49%	20-34%	<20%

- (a) score is a ratio of study site to reference site x 100.
- (b) score is a ratio of reference site to study site x 100.
- (c) range of values obtained-comparison to reference station.
- (d) actual % composition for study and reference station.

Table 6 Community Metric Comparisons for Upper Cañon de Valle vs Upper Guaje Canyon (Pajarito Plateau Reference condition)

Metric	Stations	
	GU 10.0 Reference	VA 2.6
Calculated Value		
Standing Crop (No./m2)	2809	3100
No. of Taxa	26	33
BCI(CTQd)	62.0	91.0
HBI	3.65	5.15
EPT Index	16	6
EPT/EPT + Chiron.	0.90	0.66
Community Loss	0	0.58
% Dominant Taxon	43	20
Diversity	3.00	4.03
Scra./Scra.+Filt. Coll.	0.889	0.145
Shredders/Total	0.179	0.165
Percent of Reference		
Standing Crop (No./m2)	100	110
No. of Taxa	100	126
BCI(CTQd)	100	68
HBI	100	70
EPT Index	100	37
EPT/EPT + Chiron.	100	73
Scra./Scra.+Filt. Coll.	100	16
Shredders/Total	100	91
Score		
Standing Crop (No./m2)	6	6
No. of Taxa	6	6
BCI(CTQd)	6	4
HBI	6	4
EPT Index	6	0
EPT/EPT + Chiron.	6	4
Community Loss	6	4
% Dominant Taxon	0	4
Diversity	6	6
Scra./Scra.+Filt. Coll.	6	0
Shredders/Total	6	6
Biological Condition		
Total	60	44
% of Reference	100	73

81.5%

Condition

Full Support, Impacts Observed Community structure less than expected. Condition (species richness) lower than expected due to loss of some intolerant forms. Percent contribution of tolerant forms increases.

Table 4 Community Metric Comparisons for Upper Cañon de Valle vs Upper Los Alamos Canyon (Pajarito Plateau Reference condition)

Metric	Stations	
	LA 13.0 Reference	VA 2.6
Calculated Value		
Standing Crop (No./m2)	10914	3100
No. of Taxa	42	33
BCI(CTQd)	71.0	91.0
HBI	6.05	5.15
EPT Index	18	6
EPT/EPT + Chiron.	0.25	0.66
Community Loss	0	0.91
% Dominant Taxon	32	20
Diversity	3.07	4.03
Scra./Scra.+Filt. Coll.	0.892	0.145
Shredders/Total	0.036	0.165
Percent of Reference		
Standing Crop (No./m2)	100	28
No. of Taxa	100	78
BCI(CTQd)	100	78
HBI	100	117
EPT Index	100	33
EPT/EPT + Chiron.	100	264
Scra./Scra.+Filt. Coll.	100	16
Shredders/Total	100	458
Score		
Standing Crop (No./m2)	6	2
No. of Taxa	6	4
BCI(CTQd)	6	4
HBI	6	6
EPT Index	6	0
EPT/EPT + Chiron.	6	6
Community Loss	6	4
% Dominant Taxon	2	4
Diversity	6	6
Scra./Scra.+Filt. Coll.	6	0
Shredders/Total	6	6
Biological Condition		
Total	62	42
% of Reference	100	67
Condition	Partial Support Fewer species due to loss of most intolerant forms. Reduction in EPT index. (Elevated Upper Los Alamos standing crop may overly influence this assessment)	

7 Sample Mean, 95% Confidence, Upper & Lower Bounds vs Upper Canyon de Valle

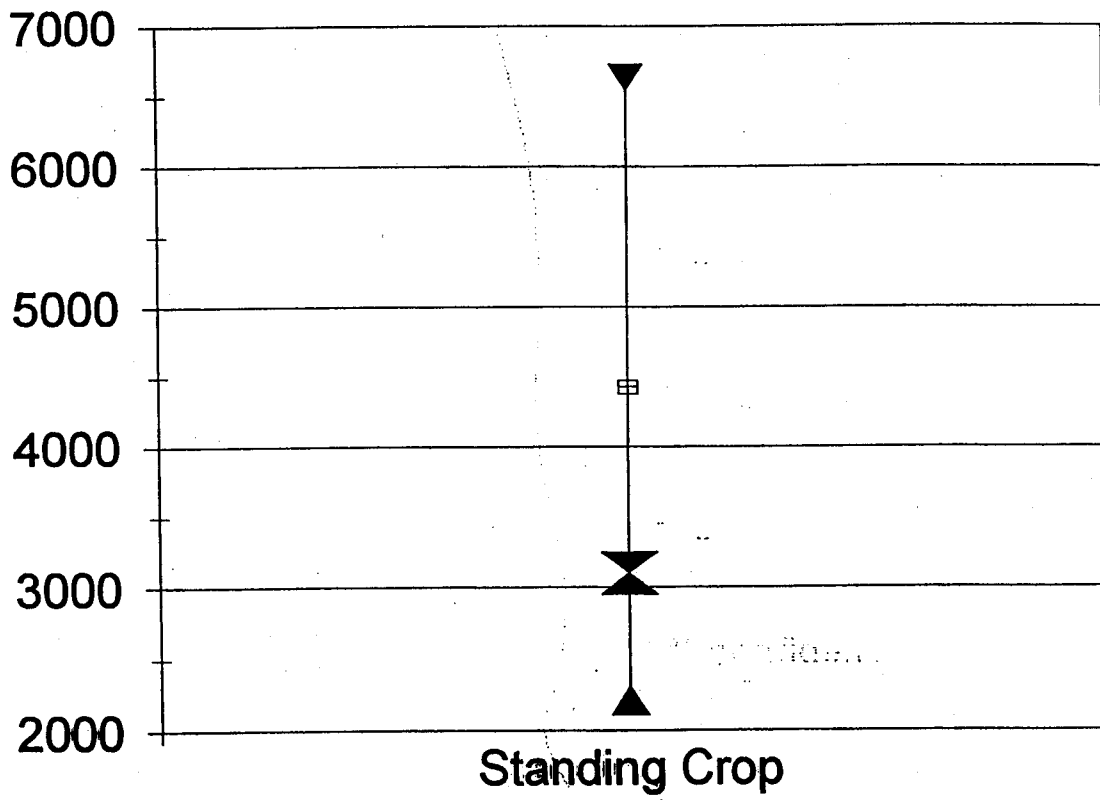
	7 Sample Mean	STD	0.05 confidence	Upper Range	Lower Range	Upper Canyon de Valle
Standing Crop (No./m2)	4426.29	2989.815	2214.8456	6641.1356	2211.4444	3100
No. of Taxa	33.29	5.8971	4.3685	37.6585	28.9215	33
BCI(CTQd)	64.14	5.1666	3.8274	67.9674	60.3126	91
HBI	4.11	0.9254	0.6855	4.7955	3.4245	5.15
EPT Index	16.86	2.8997	2.1481	19.0081	14.7119	6
EPT/EPT + Chiron.	0.78	0.252	0.1867	0.9667	0.5933	0.66
% Dominant Taxon	26.43	9.8104	7.2675	33.6975	19.1625	20
Diversity	3.55	0.424	0.3141	3.8641	3.2359	4.03
Scra./Scra.+Filt. Coll.	0.86	0.1324	0.0981	0.9532	0.757	0.145
Shredders/Total	0.09	0.0588	0.0436	0.1322	0.045	0.165

Table 7 Community Metric Comparisons for Upper Cañon de Valle vs
7 Reference Sample Mean (Pajarito Plateau Reference condition)

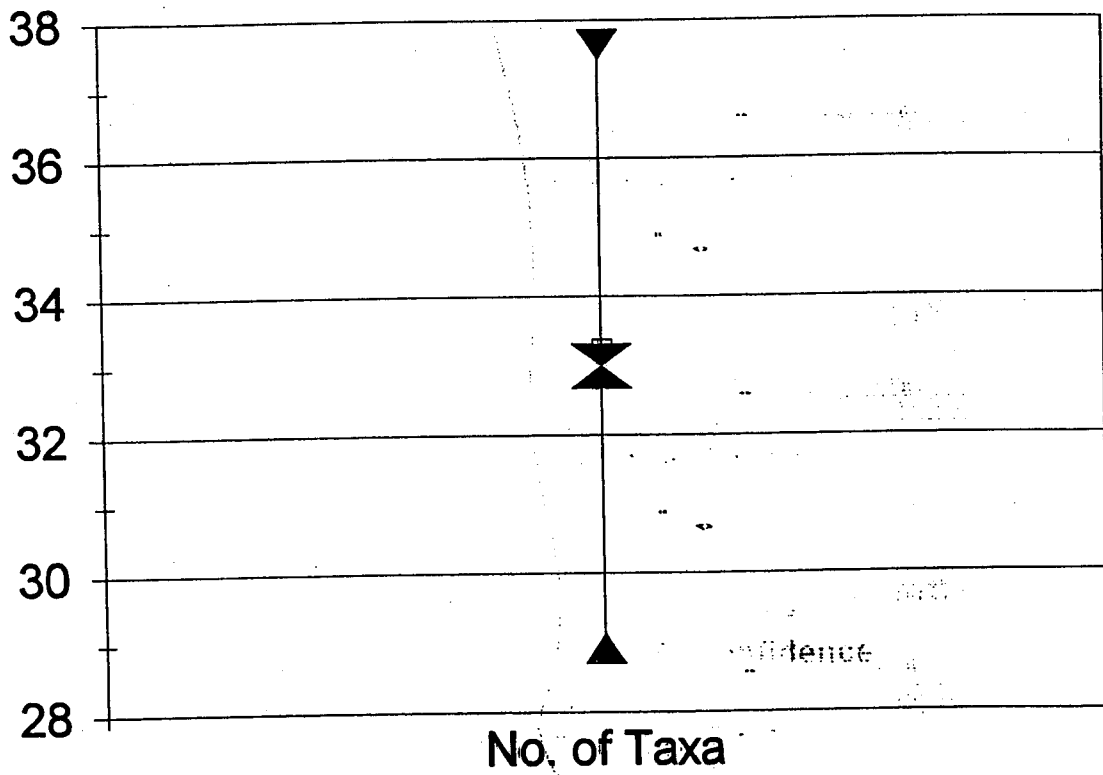
Metric	Stations	
	7 Reference Samples Mean	VA 2.6
Calculated Value		
Standing Crop (No./m2)	4426	3100
No. of Taxa	33	33
BCI(CTQd)	64	91.0
HBI	4.11	5.15
EPT Index	16	6
EPT/EPT + Chiron.	0.78	0.66
% Dominant Taxon	26	20
Diversity	3.55	4.03
Scra./Scra.+Filt. Coll.	0.855	0.145
Shredders/Total	0.088	0.165
Percent of Reference		
Standing Crop (No./m2)	100	70
No. of Taxa	100	100
BCI(CTQd)	100	70
HBI	100	79
EPT Index	100	37
EPT/EPT + Chiron.	100	84
Scra./Scra.+Filt. Coll.	100	16
Shredders/Total	100	187
Score		
Standing Crop (No./m2)	6	6
No. of Taxa	6	6
BCI(CTQd)	6	4
HBI	6	4
EPT Index	6	0
EPT/EPT + Chiron.	6	6
% Dominant Taxon	4	4
Diversity	6	6
Scra./Scra.+Filt. Coll.	6	0
Shredders/Total	6	6
	52	42
Biological Condition		
Total	58	42
% of Reference	100	72
Condition	Full Support, Impacts Observed	Community Structure less than expected. Composition (species richness) lower than expected due to loss of some intolerant forms. Percent contribution of tolerant forms increases.

80.7%

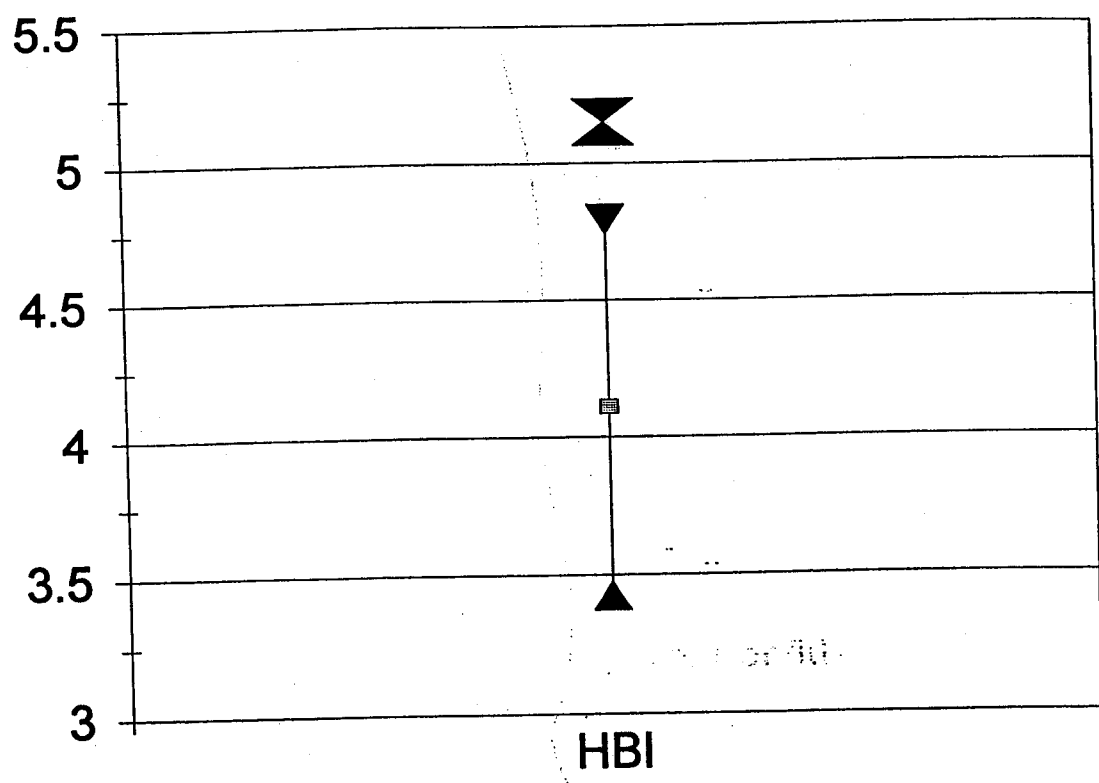
CDV vs Seven station 95 % confidence



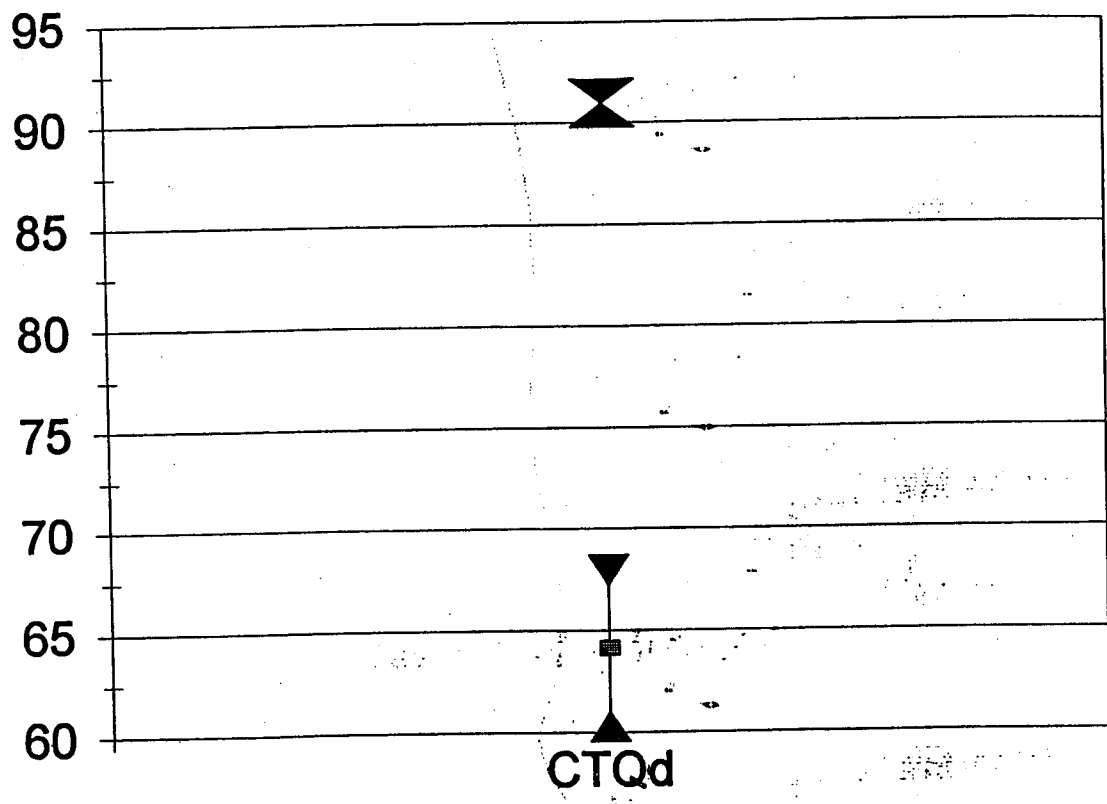
CDV vs Seven Station 95 % Confidence



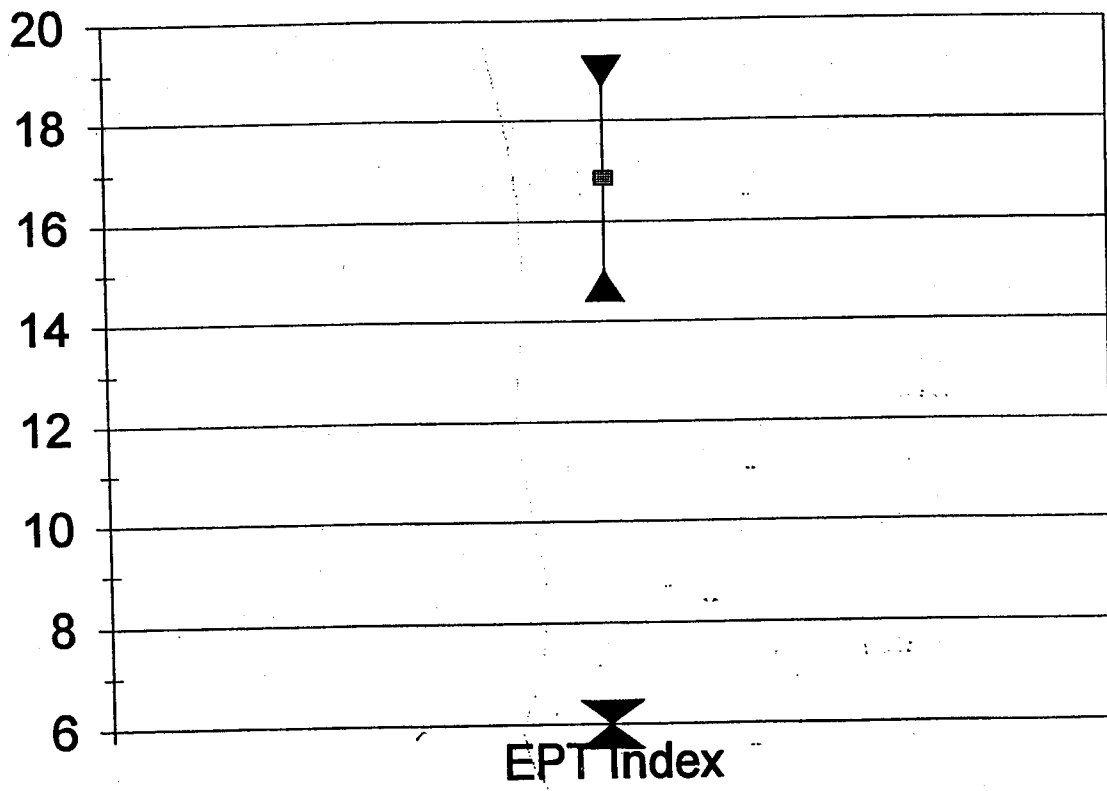
CDV vs Seven Station 95 % Confidence



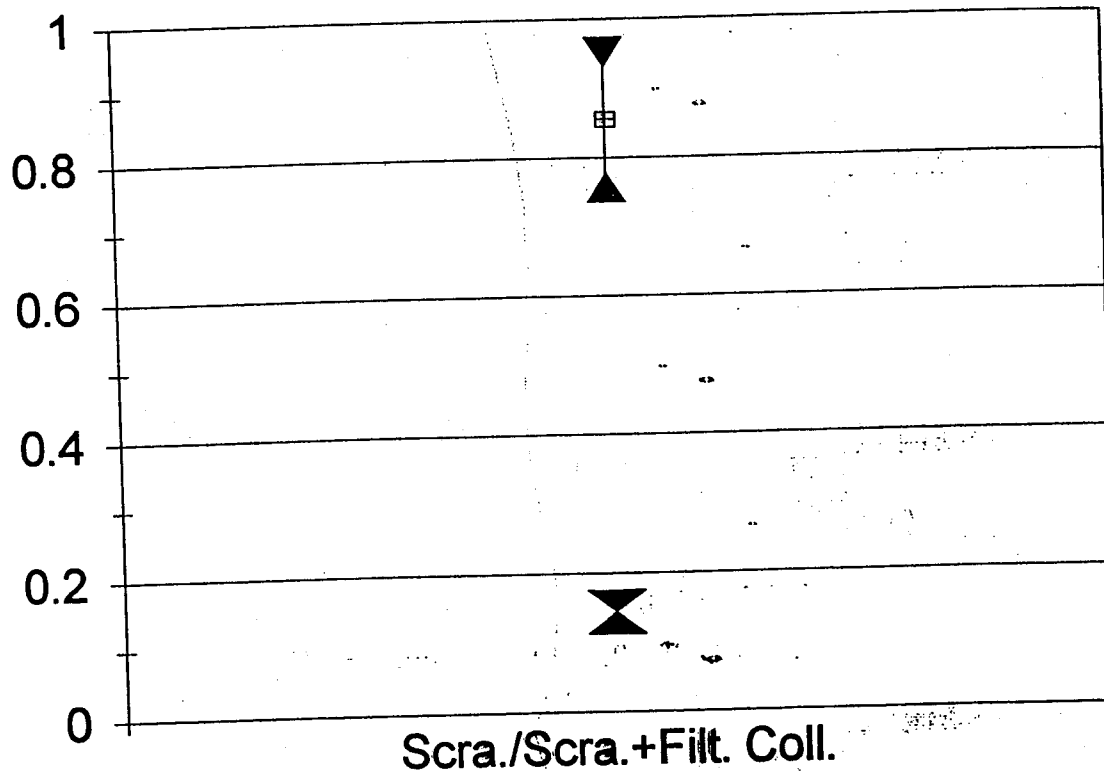
CDV vs Seven Station 95% confidence



CDV vs Seven Station 95 % Confidence



CDV vs Seven Station 95 % Confidence



APPENDIX V. CHARACTERISTICS OF HEADWATER STREAM SITES

Headwater stream sites are defined as first-order or second-order stream locations close to the stream-source, usually less than three miles. The natural characteristics of headwaters may sometimes result in an erroneous assessment of impacted water quality.

- 1) Headwater sites have reduced upstream recruitment resource populations to provide colonization by drift, and may have reduced species richness.
- 2) Headwater sites usually are nutrient-poor, lower in food resources, and less productive.
- 3) The reduced, simplified fauna of headwater sites may result in a community in which a few intolerant species may be very abundant. For 100-organism subsamples, this can affect many community indices: species richness, EPT richness, and percent model affinity. The dominant species averages 37% of the total fauna, and is an intolerant mayfly (e.g., Epeorus or Stenonema), stonefly (e.g., Leuctra), caddisfly (e.g., Brachycentrus or Chimarra), or riffle beetle (e.g., Optioservus or Promoresia).
- 4) Although headwater stream invertebrate communities are dominated by intolerant species, many community indices are low. Average index values are: species richness - 19, EPT richness - 8, Hilsenhoff biotic index - 3.05, and percent model affinity - 57. These indices are based on headwaters of these streams: Esopus Creek, Sauquoit Creek, Oriskany Creek, Quaker Creek, Salt Spring Brook, Tri-County Creek, and Rondout Creek.
- 5) Corrective action for data judged to be affected by headwater conditions is the adjustment of the water quality assessment up one category (e.g., slightly impacted to non-impacted) to reflect genuine water quality. Alternative corrective action for non-representative indices from headwater sites is to apply a correction factor of 1.5 to species richness, EPT richness, and percent model affinity. Criteria for the use of the correction factor or assessment adjustment are: the headwater location is as described above, the community is dominated by intolerant species, and the above indices (species richness, EPT richness, and percent model affinity) are judged to be non-representative of actual water quality.

Table 2 Community Metric Comparisons for Upper Cañon de Valle vs Upper Pajarito (LANL Reference condition)

Metric	Stations	
	PA 9.0 Reference	VA 2.6
Calculated Value		
Standing Crop (No./m2)	2589	3100
No. of Taxa	25	33
BCI(CTQd)	80.0	91.0
HBI	4.38	5.15
EPT Index	10	6
EPT/EPT + Chiron.	0.84	0.66
Community Loss	0	0.45
% Dominant Taxon	21	20
Diversity	3.53	4.03
Scra./Scra.+Filt. Coll.	0.948	0.145
Shredders/Total	0.051	0.165
Percent of Reference		
Standing Crop (No./m2)	100	119
No. of Taxa	100	132
BCI(CTQd)	100	88
HBI	100	85
EPT Index	100	60
EPT/EPT + Chiron.	100	78
Scra./Scra.+Filt. Coll.	100	15
Shredders/Total	100	323
Score		
Standing Crop (No./m2)	6	6
No. of Taxa	6	6
BCI(CTQd)	6	6
HBI	6	6
EPT Index	6	0
EPT/EPT + Chiron.	6	6
Community Loss	6	6
% Dominant Taxon	4	4
Diversity	6	6
Scra./Scra.+Filt. Coll.	6	0
Shredders/Total	6	6
Biological Condition		
Total	58	52
% of Reference	100	81
Habitat Condition		
Total	101	92
% of Reference	100	91

Full Support - Comparable to best situation to be expected within ecoregion (watershed reference site). Balanced trophic structure. Optimum community structure (composition & dominance) for stream size and habitat quality.

Condition - Comparable

Cañon de Valle vs Arroyo de Ladelfe

Stations

10-15
UPM
"Black Dog bunch"
TA=9
7 1/2
~~Stations?~~

~0.3
Miles downstream
9.0

Metric	BU 0.0 Reference	VA 2.6
Calculated Value		
Standing Crop (No./m2)	2351	3100
No. of Taxa	25	33
BCI(CTQd)	72.0	91.0
HBI	4.66	5.15
EPT Index	8	6
EPT/EPT + Chiron.	0.60	0.66
Community Loss	0	0.48
% Dominant Taxon	24	20
Diversity	3.52	4.03
Scra./Scra.+Filt. Coll.	0.637	0.145
Shredders/Total	0.012	0.165
Percent of Reference		
Standing Crop (No./m2)	100	131
No. of Taxa	100	132
BCI(CTQd)	100	79
HBI	100	90
EPT Index	100	75
EPT/EPT + Chiron.	100	110
Scra./Scra.+Filt. Coll.	100	22
Shredders/Total	100	1375
Score		
Standing Crop (No./m2)	6	6
No. of Taxa	6	6
BCI(CTQd)	6	4
HBI	6	6
EPT Index	6	2
EPT/EPT + Chiron.	6	6
Community Loss	6	6
% Dominant Taxon	4	4
Diversity	6	6
Scra./Scra.+Filt. Coll.	6	2
Shredders/Total	6	6
Biological Condition		
Total	64	54
% of Reference	100	84

MARK, FYI JIM

