

### **Biological and physical habitat conditions**

Benthic macroinvertebrate samples were assessed using procedures described by Barbour and others (1999), Klemm and others (1990), and Plafkin and others (1989). Using these methods, staff calculated a series of biological indexes for a stream and compared them to a reference station in the same region to determine the degree of impairment. The metrics used in this survey are summarized in Table 6. Metric 2 (Shannon Diversity Index) followed the methods described in Klemm and others (1990), and all other metrics were taken from Barbour and others (1999).

The 200-organism subsample data were used to generate scores for each of the seven metrics. Scores for metrics 1-4 were converted to a biological condition score, based on the percent similarity of the metric score, relative to the metric score of the reference site. Scores for metrics 5-7 were based on set scoring criteria developed for the percentages (Plafkin and others, 1989; Ohio Environmental Protection Agency, 1987b). The sum of the biological condition scores constituted the total biological score for the sample site, and total biological scores were used to assign each site to a biological condition category (Table 7). Habitat assessment scores of sample sites were compared to those of reference sites to classify each sample site into a habitat condition category (Table 8).

### **Trend analysis**

Long-term trend analysis has been performed on Group 1 streams that have been sampled since April 1986 to identify increases and decreases over time in total suspended solids, total ammonia, total nitrogen, total phosphorus, total chloride, total sulfate, total iron, total manganese, total aluminum, and the WQI. Overall these long-term trends do not change very much from year to year. Therefore, SRBC has decided to analyze for trends every five years. A trend analysis will not be performed in this report. The next trend analysis will be in the 2008 Interstate Report.

The nonparametric trend test used in previous reports was the Seasonal Kendall Test, which is described by Bauer and others (1984), and Smith and others (1982). For more information on this test and how it was used to assess trends in the data see Trends in Nitrogen, Phosphorus, and Suspended Sediment in the Susquehanna River Basin, 1974-93 (Edwards, 1995), LeFevre (2003), and other previous Interstate reports.

## **RESULTS**

### **Water Quality**

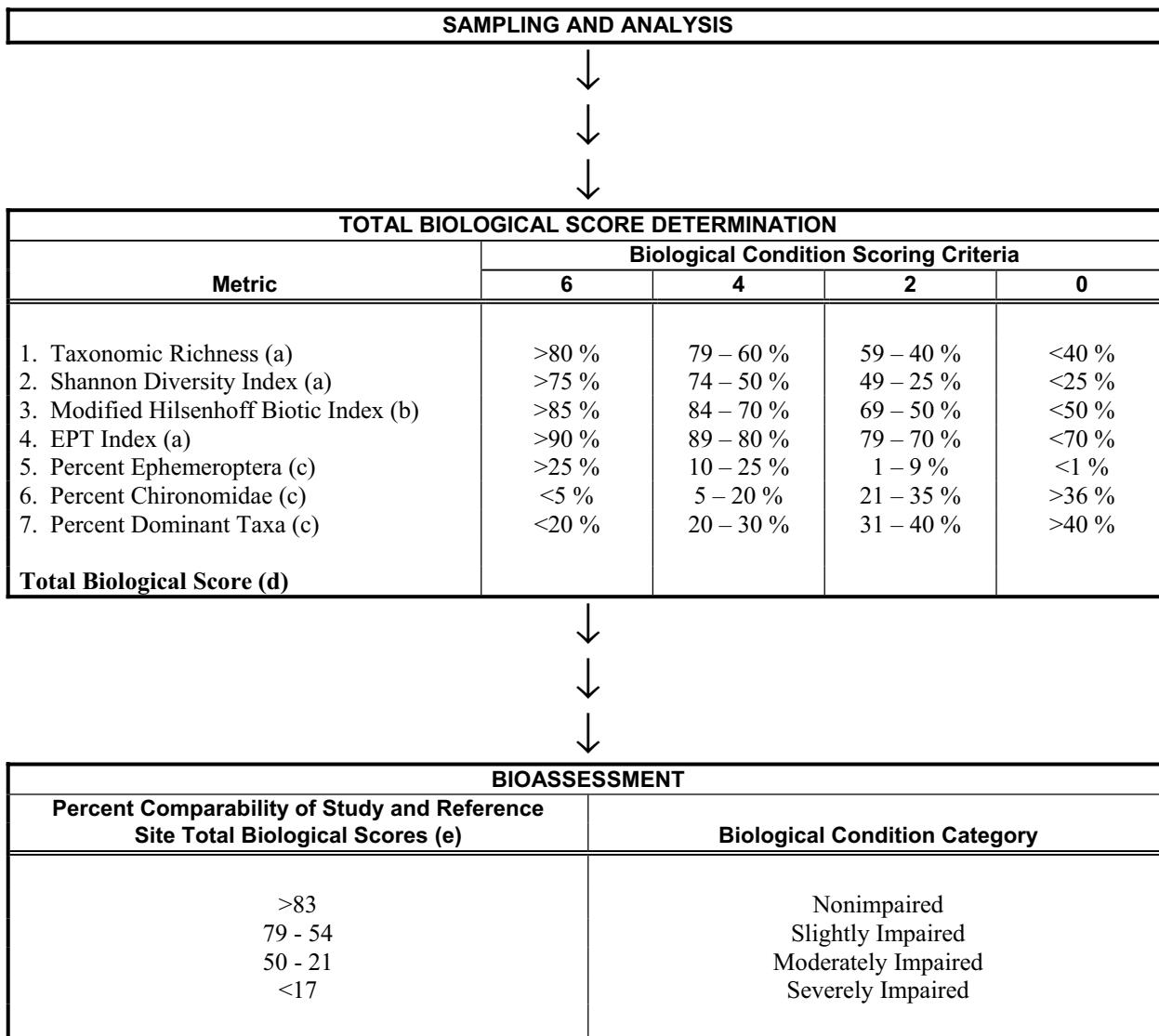
During fiscal year 2005, water quality in approximately 40 percent of the Group 1 and Group 2 interstate streams continued to meet designated use classes and water quality standards (Table 9, Appendix D). Nineteen out of the 32 sites had parameters exceeding water quality standards, with 16 of those having more than one violation. The parameter that most frequently exceeded water quality standards was total iron (Table 10, Figure 5). Seventy-two out the 734 possible observations (based on the number of applicable water quality standards of each state) exceeded water quality standards.

**Table 6. Summary of Metrics Used to Evaluate the Overall Biological Integrity of Stream and River Benthic Macroinvertebrate Communities**

Metric	Description
1. Taxonomic Richness (a)	The total number of taxa present in the 200 organism subsample. Number decreases with increasing stress.
2. Shannon Diversity Index (b)	A measure of biological community complexity based on the number of equally or nearly equally abundant taxa in the community. Index value decreases with increasing stress.
3. Modified Hilsenhoff Biotic Index (a)	A measure of the organic pollution tolerance of a benthic macroinvertebrate community. Index value increases with increasing stress.
4. EPT Index (a)	The total number of Ephemeroptera (mayfly), Plecoptera (stonefly), and Trichoptera (caddisfly) taxa present in the 200 organism subsample. Number decreases with increasing stress.
5. Percent Ephemeroptera (a)	The percentage of Ephemeroptera in the 200 organism subsample. Ratio decreases with increasing stress.
6. Percent Dominant Taxa (a)	Percentage of the taxon with the largest number of individuals out of the total number of macroinvertebrates in the sample. Percentage increases with increasing stress.
7. Percent Chironomidae (a)	The percentage of Chironomidae in a 200 organism subsample. Ratio increases with increasing stress.

Sources: (a) Barbour and others, 1999  
 (b) Klemm and others, 1990

**Table 7. Summary of Criteria Used to Classify the Biological Conditions of Sample Sites**



- (a) Score is study site value/reference site value X 100.
- (b) Score is reference site value/study site value X 100.
- (c) Scoring criteria evaluate actual percent contribution, not percent comparability to the reference station.
- (d) Total Biological Score = the sum of Biological Condition Scores assigned to each metric.
- (e) Values obtained that are intermediate to the indicated ranges will require subjective judgment as to the correct placement into a biological condition category.

**Table 8. Summary of Criteria Used to Classify the Habitat Conditions of Sample Sites**

DETERMINATION OF HABITAT ASSESSMENT SCORES				
Parameter	Habitat Parameter Scoring Criteria			
	Excellent	Good	Fair	Poor
Epifaunal Substrate	20-16	15-11	10-6	5-0
Instream Cover	20-16	15-11	10-6	5-0
Embeddedness/Pool Substrate	20-16	15-11	10-6	5-0
Velocity/Depth Regimes/Pool Variability	20-16	15-11	10-6	5-0
Sediment Deposition	20-16	15-11	10-6	5-0
Channel Flow Status	20-16	15-11	10-6	5-0
Channel Alteration	20-16	15-11	10-6	5-0
Frequency of Riffles/Channel Sinuosity	20-16	15-11	10-6	5-0
Condition of Banks (a)	20-16	15-11	10-6	5-0
Vegetative Protective Cover (a)	20-16	15-11	10-6	5-0
Riparian Vegetative Zone Width (a)	20-16	15-11	10-6	5-0
<b>Habitat Assessment Score (b)</b>				

HABITAT ASSESSMENT	
Percent Comparability of Study and Reference Site Habitat Assessment Scores	Habitat Condition Category
>90	Excellent (comparable to reference)
89-75	Supporting
74-60	Partially Supporting
<60	Nonsupporting

(a) Combined score of each bank

(b) Habitat Assessment Score = Sum of Habitat Parameter Scores

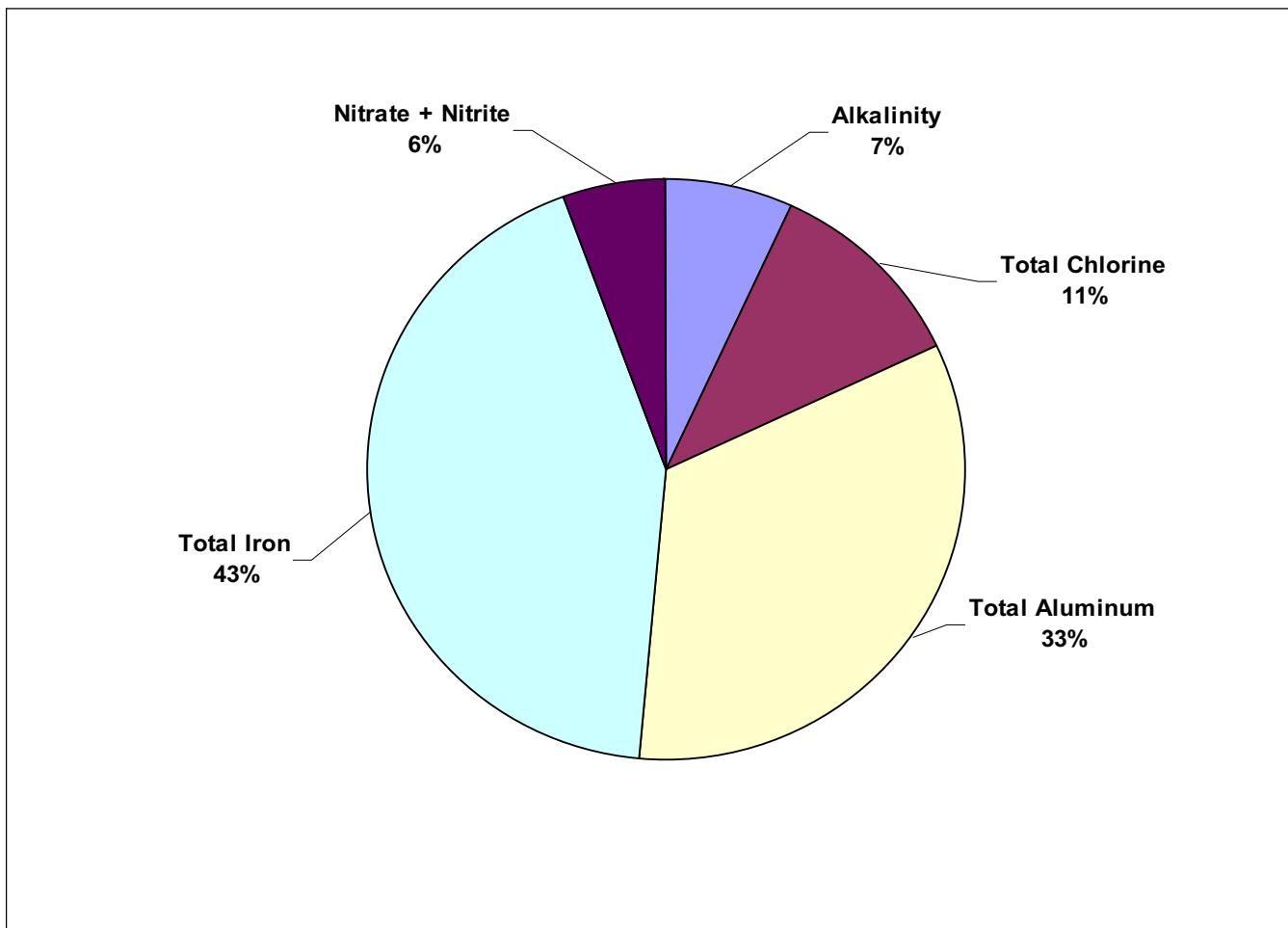
**Table 9. Stream Classifications**

<b>Stream</b>	<b>PA Classification *</b>	<b>NY Classification *</b>
Apalachin Creek	CWF	C
Babcock Run	CWF	C
Beagle Hollow	WWF	C
Bentley Creek	WWF	C
Bill Hess Creek	WWF	C
Bird Creek	CWF	C
Biscuit Hollow	CWF	C
Briggs Hollow	CWF	C
Bulkley Brook	WWF	C
Camp Brook	WWF	C
Cascade Creek	CWF	C
Cayuta Creek	WWF	B
Chemung River	WWF	A
Choconut Creek	WWF	C
Cook Hollow	CWF	C
Cowanesque River	WWF	C
Deep Hollow Brook	CWF	C
Denton Creek	CWF	C
Dry Brook	WWF	C
Little Snake Creek	CWF	C
Little Wappasening Creek	WWF	C
North Fork Cowanesque River	CWF	C
Parks Creek	WWF	C
Prince Hollow Run	CWF	C
Russell Run	CWF	C
Sackett Creek	WWF	C
Seeley Creek	CWF	C (T)
Smith Creek	WWF	C
Snake Creek	CWF	C
South Creek	CWF	C
Strait Creek	WWF	C
Susquehanna River	WWF	B
Tioga River	WWF	C
Trowbridge Creek	CWF	C
Troups Creek	CWF	C
Wappasening Creek	CWF	C
White Branch Cowanesque River	WWF	C
White Hollow	WWF	C
<b>Stream</b>	<b>PA Classification</b>	<b>MD Classification *</b>
Big Branch Deer Creek	CWF	III-P
Conowingo Creek	CWF	I-P
Deer Creek	CWF	III-P
Ebaugh's Creek	CWF	III-P
Falling Branch Deer Creek	CWF	IV-P
Long Arm Creek	WWF	I-P
Octoraro Creek	WWF-MF	IV-P
Scott Creek	TSF	I-P
South Branch Conewago Creek	WWF	I-P
Susquehanna River	WWF	I-P

\* See Appendix D for stream classification descriptions

**Table 10. Water Quality Standard Summary**

Parameter	Standard	Standard Value	Number of Observations	Number Exceeding Standards
Alkalinity	PA aquatic life	20 mg/l	91	5
Total Iron	NY aquatic (chronic)	300 µg/l	59	24
	PA aquatic life	1500 ug/l	91	7
Total Aluminum	NY aquatic (chronic)	100 µg/l	59	24
Total Chlorine	NY aquatic (acute)	0.019 mg/l	6	5
	MD aquatic life	0.019 mg/l	3	3
Nitrite plus Nitrate	PA public water supply	10 mg/l	91	4



**Figure 5. Parameters Exceeding Water Quality Standards**

## **Biological Communities and Physical Habitat**

RBP III biological data for NY-PA, PA-MD, river sites, and Group 3 streams are summarized in Tables 11 through 14, respectively. A high rapid bioassessment protocol score indicates a low degree of impairment and a healthy macroinvertebrate population. RBP III results for each site can be found in the “Bioassessment of Interstate Streams” section, beginning on page 38.

RBP III physical habitat data for NY-PA, PA-MD, river sites, and Group 3 streams are presented in Tables 15 through 18, respectively. A high score indicates a high-quality physical habitat. RBP III physical habitat and biological data are summarized in Figures 6 through 8.

### **New York-Pennsylvania streams**

New York-Pennsylvania sampling stations consisted of 14 sites located near or on the NY-PA border. The biological community of ten (71.4 percent) of these streams was nonimpaired, and four stream sites were slightly impaired (28.5 percent). None of the streams were moderately or severely impaired. Eight of the NY-PA sites had excellent habitats (57.1 percent), while six sites (42.9 percent) had supporting habitats. No sites had partially supporting or nonsupporting habitat.

### **Pennsylvania-Maryland streams**

The PA-MD interstate streams included nine stations (biological data were collected at eight sites during fiscal year 2005) located on or near the PA-MD border. Two streams (25 percent) were designated nonimpaired, using RBP III protocol designations. Six sites (75 percent) were slightly impaired. Seven (77.8 percent) of the PA-MD border sites had excellent habitats, while one site (11.1 percent) had supporting habitats, and one site (11.1 percent) had partially supporting habitat. Island Branch is not sampled due to its small size.

### **River sites**

River sites consisted of nine stations located on the Susquehanna, Chemung, Cowanesque, and Tioga Rivers. One station (SUSQ 10.0) is not sampled for macroinvertebrates due to deep water and a lack of riffle habitat at the site. During fiscal year 2005, high flows precluded macroinvertebrate sampling and habitat assessment of five stations: SUSQ 340.0, SUSQ289.1, SUSQ 44.5, CHEM 12.0, and TIOG 10.8. The biological community of the remaining stations, the Susquehanna River at Windsor, NY, and the two sites on the Cowanesque River, were compared to Cascade Creek, the reference site for the New York – Pennsylvania border streams. The biological communities of two of the river stations (SUSQ 365 and COWN 1.0) were designated as nonimpaired, while the Cowanesque River at Lawrenceville (COWN 2.2) was moderately impaired. The habitat for the Susquehanna River at Windsor, NY was rated as excellent, and the habitat at both Cowanesque River sites was rated as supporting.

### **Group 3 sites**

Group 3 sampling stations consisted of 20 sites on small streams located along the NY-PA border. Eight of the 20 sites sampled (40 percent) had nonimpaired biological conditions. Eight sites (40 percent) were slightly impaired, and four sites (20 percent) were moderately impaired. Four (20 percent) of the Group 3 sites had excellent habitat scores. Ten sites (50 percent) had supporting habitat conditions, while six sites (30 percent) were designated partially supporting, and no sites were nonsupporting.

**Table 11. Summary of New York-Pennsylvania Border RBP III Biological Data**

	APAL 6.9	BNTY 0.9	CASC 1.6	CAYT 1.7	CHOC 9.1	HLDN 3.5	LSNK 7.6	NFCR 10.3	SEEL 7.6	SNAK 2.3	SOUT 7.8	TROW 1.6	TRUP 4.5	WAPP 2.6
<b>Raw Summary</b>														
Number of Individuals	265	236	229	238	248	198	245	210	255	233	218	222	248	223
% Shredders	0	0.9	0.9	0.0	0.4	5.1	0.4	22.4	0.8	6.9	1.4	0.9	2.0	0.0
% Collector-Gatherers	30.2	15.3	8.7	10.5	16.1	37.4	8.6	16.2	41.2	31.8	7.8	41.4	69.4	57.9
% Filterer-Collectors	12.5	36.9	46.3	12.6	39.1	31.3	55.9	20.0	26.3	23.6	26.2	13.1	10.9	20.2
% Scrapers	32.8	14.4	10.9	67.2	24.6	15.7	8.6	19.1	21.2	15.0	38.1	19.4	10.1	16.6
% Predators	24.5	32.6	33.2	9.7	19.8	10.6	26.5	22.4	10.6	22.8	26.6	25.2	7.7	5.4
Number of EPT Taxa	12	16	12	14	13	16	11	10	12	17	9	13	11	13
Number of EPT Individuals	76	114	127	52	116	147	158	145	93	102	62	108	150	138
<b>Metric Scores</b>														
Taxonomic Richness	25	27	25	25	25	26	23	19	21	29	20	23	16	23
Shannon Diversity Index	2.49	2.7	2.7	2.3	2.7	2.4	2.4	2.5	2.2	2.7	2.2	2.4	1.9	2.3
Modified Hilsenhoff Biotic Index	4.51	4.2	3.8	4.3	4.3	4.5	3.8	3.2	5.1	3.9	4.0	4.4	5.0	4.8
EPT Index	12	16	12	14	13	16	11	10	12	17	9	13	11	13
Percent Ephemeroptera	12.1	19.9	12.2	5.0	12.5	36.4	2.0	17.6	15.7	12.5	1.8	20.7	47.9	52.5
Percent Chironomidae	24.2	9.3	7.9	3.8	10.5	7.6	5.7	6.2	34.1	24.9	6.4	15.8	34.3	23.3
Percent Dominant Taxa	24.2	20.3	15.7	27.7	18.9	20.2	26.9	21.2	34.1	24.9	24.8	19.4	34.3	27.8
<b>Percent of Reference or Percentage Score</b>														
Taxonomic Richness	100.0	108.0	100.0	100.0	100.0	104.0	92.0	76.0	84.0	116.0	80.0	92.0	64.0	92.0
Shannon Diversity Index	91.5	97.4	100.0	85.3	97.4	98.2	87.5	90.8	79.4	99.3	80.5	89.7	69.9	85.7
Hilsenhoff Index	84.1	89.5	100.0	89.1	87.9	84.6	98.9	120.1	75.0	96.8	94.0	86.4	75.9	79.7
EPT Index	100.0	133.3	100.0	116.7	108.3	133.3	91.7	83.3	100.0	141.7	75.0	108.3	91.7	108.3
Percent Ephemeroptera	12.1	19.9	12.2	5.0	12.5	36.4	2.0	17.6	15.7	12.5	1.8	20.7	48.0	52.5
Percent Chironomidae	24.2	9.3	7.9	3.8	10.5	7.6	5.7	6.2	34.1	24.9	6.4	15.8	34.3	23.3
Percent Dominant Taxa	24.2	20.3	15.7	27.7	19.0	20.2	26.9	21.9	34.1	24.9	24.8	19.4	34.3	27.8
<b>Biological Condition Scores</b>														
Taxonomic Richness	6	6	6	6	6	6	6	4	6	6	6	6	4	6
Shannon Diversity Index	6	6	6	6	6	6	6	4	6	6	6	6	4	6
Hilsenhoff Index	4	6	6	6	6	4	6	4	6	6	6	6	4	6
EPT Index	6	6	6	6	6	6	6	4	6	6	2	6	6	6
Percent Ephemeroptera	4	4	4	2	4	4	2	4	4	4	2	4	4	6
Percent Chironomidae	2	4	4	6	4	4	6	4	2	2	4	4	2	2
Percent Dominant Taxa	4	4	6	4	6	4	6	4	2	4	4	6	4	4
<b>Total Biological Score</b>														
Total Biological Score	32	36	38	36	38	36	36	30	30	34	30	38	30	36
Biological % of Reference	84	95	100	95	100	95	95	79	79	89	79	100	79	95

**Table 12. Summary of Pennsylvania-Maryland Border RBP III Biological Data**

	BBDC 4.1	CNWG 4.4	DEER 44.5	EBAU 1.5	LNGA 2.5	OCTO 6.6	SBCC 20.4	SCTT 3.0
<b>Raw Summary</b>								
Number of Individuals	218	263	269	231	150	259	217	126
% Shredders	22.0	0.0	2.2	1.3	7.3	4.3	4.2	9.5
% Collector-Gatherers	15.1	32.3	11.9	29.0	47.3	39.4	8.3	30.9
% Filterer-Collectors	23.9	31.6	41.3	43.7	8.7	23.6	44.7	53.9
% Scrapers	23.9	28.9	30.9	22.9	32.0	31.7	31.3	0.8
% Predators	15.1	7.2	13.8	3.0	4.7	1.2	11.5	4.8
Number of EPT Taxa	12	6	13	10	8	10	9	4
Number of EPT Individuals	96	142	151	140	68	171	133	83
<b>Taxonomic Richness</b>								
Shannon Diversity Index	2.6	2.0	2.6	2.1	2.0	2.2	1.9	2.1
Modified Hilsenhoff Biotic Index	3.7	5.3	4.4	4.7	4.8	5.1	4.3	5.0
EPT Index	12	6	13	10	8	10	9	4
Percent Ephemeroptera	9.2	21.3	12.3	16.9	32.7	48.3	10.6	13.5
Percent Chironomidae	4.1	9.9	3.4	8.7	6.7	5.4	0.5	11.9
Percent Dominant Taxa	21.6	27.0	19.7	29.4	32.7	32.8	35.5	31.8
<b>Taxonomic Richness</b>								
Shannon Diversity Index	104.0	52.0	100.0	72.0	64.0	76.0	56.0	48.0
Hilsenhoff Index	103.5	79.6	100.0	83.9	78.4	87.5	72.5	80.4
EPT Index	121.3	83.8	100.0	93.7	91.8	86.6	104.2	88.6
Percent Ephemeroptera	92.3	46.2	100.0	76.9	61.5	76.9	69.2	30.8
Percent Chironomidae	9.2	21.3	12.3	16.9	32.7	48.3	10.6	13.5
Percent Dominant Taxa	21.6	27.0	19.7	29.4	32.7	32.8	35.5	31.8
<b>Taxonomic Richness</b>								
Shannon Diversity Index	6	2	6	4	4	4	2	2
Hilsenhoff Index	6	6	6	6	6	6	4	6
EPT Index	6	4	6	6	6	6	6	6
Percent Ephemeroptera	2	4	4	4	6	6	4	4
Percent Chironomidae	6	4	6	4	4	6	6	4
Percent Dominant Taxa	4	4	6	4	2	2	2	2
Total Biological Score	36	24	40	30	28	32	24	24
Biological % of Reference	90	60	100	75	70	80	60	60

**Table 13. Summary of River RBP III Biological Data**

	COWN 1.0	COWN 2.2	SUSQ 365
<b>Raw Summary</b>			
Number of Individuals	242	210	324
% Shredders	5.0	12.9	0.3
% Collector-Gatherers	24.4	34.8	17.9
% Filterer-Collectors	38.0	50.0	39.8
% Scrapers	23.9	0.5	25.3
% Predators	8.7	1.9	16.7
Number of EPT Taxa	11	5	14
Number of EPT Individuals	120	109	186
<b>Metric Scores</b>			
Taxonomic Richness	20	13	23
Shannon Diversity Index	2.3	1.6	2.5
Modified Hilsenhoff Biotic Index	5.1	6.1	4.2
EPT Index	11	5	14
Percent Ephemeroptera	13.2	1.9	11.4
Percent Chironomidae	22.7	28.1	12.3
Percent Dominant Taxa	22.7	44.3	24.1
<b>Percent of Reference or Percentage Score</b>			
Taxonomic Richness	80.0	52.0	92.0
Shannon Diversity Index	83.1	59.6	91.9
Hilsenhoff Index	74.2	62.4	89.5
EPT Index	91.7	41.7	116.7
Percent Ephemeroptera	13.2	1.9	11.4
Percent Chironomidae	22.7	28.1	12.4
Percent Dominant Taxa	22.7	44.3	24.1
<b>Biological Condition Scores</b>			
Taxonomic Richness	6	2	6
Shannon Diversity Index	6	4	6
Hilsenhoff Index	4	2	6
EPT Index	6	0	6
Percent Ephemeroptera	4	2	4
Percent Chironomidae	2	2	4
Percent Dominant Taxa	4	0	4
<b>Total Biological Score</b>			
Total Biological Score	26	12	36
Biological % of Reference	68	32	95

**Table 14. Summary of Group 3 Sites RBP III Biological Data**

	BABC	BEAG	BILL	BIRD	BISC	BRIG	BULK	CAMP	COOK	DEEP	DENT
<b>Raw Summary</b>											
Number of Individuals	210	234	217	223	255	197	258	184	265	223	257
% Shredders	11.4	20.1	10.1	12.1	9.0	1.5	17.1	2.7	11.3	4.5	2.7
% Collector-Gatherers	58.6	47.0	86.2	74.9	59.2	82.7	62.0	83.7	67.6	51.1	50.9
% Filterer-Collectors	0.9	6.4	1.8	2.7	13.7	0.5	8.5	0.0	5.7	6.7	37.7
% Scrapers	8.6	6.4	0.9	2.2	10.6	0.0	2.7	1.6	3.8	22.9	0.0
% Predators	20.5	20.0	0.9	8.1	7.5	15.2	9.7	10.3	11.7	14.8	1.6
Number of EPT Taxa	18	16	10	16	16	12	12	10	19	16	5
Number of EPT Individuals	113	152	136	95	177	89	145	102	126	145	93
<b>Metric Scores</b>											
Taxonomic Richness	23	23	14	20	23	15	20	14	22	24	10
Shannon Diversity Index	2.2	2.5	1.8	1.7	2.3	1.7	2.1	1.8	1.9	2.66	1.5
Modified Hilsenhoff Biotic Index	4.0	25.	3.7	4.0	4.8	3.5	4.1	3.1	4.2	3.78	5.6
EPT Index	18	16	10	16	16	12	12	10	19	16	5
Percent Ephemeroptera	24.8	20.0	50.7	22.9	42.4	23.4	24.8	20.7	18.5	48.0	0.4
Percent Chironomidae	42.4	27.8	35.9	54.7	22.4	52.8	39.9	40.8	50.6	25.6	50.6
Percent Dominant Taxa	42.4	27.8	35.9	54.7	33.3	52.8	39.9	40.8	50.6	25.6	50.6
<b>Percent of Reference or Percentage Score</b>											
Taxonomic Richness	95.8	95.8	58.3	83.3	95.8	62.5	83.3	58.3	91.7	100.0	41.7
Shannon Diversity Index	81.6	94.0	67.7	65.0	86.8	62.8	77.8	68.0	72.9	100.0	57.9
Hilsenhoff Index	93.6	151.2	101.9	94.2	79.1	108.6	91.8	123.8	89.8	100.0	67.3
EPT Index	112.5	100.0	62.5	100.0	100.0	75.0	75.0	62.5	118.8	100.0	31.3
Percent Ephemeroptera	24.8	20.1	50.7	22.9	42.4	23.4	24.8	20.7	18.5	48.0	0.4
Percent Chironomidae	42.4	27.8	35.9	54.7	22.4	52.8	39.9	40.8	50.6	25.6	50.6
Percent Dominant Taxa	42.4	27.8	35.9	54.7	33.3	52.8	39.9	40.8	50.6	25.6	50.6
<b>Biological Condition Scores</b>											
Taxonomic Richness	6	6	2	6	6	4	6	2	6	6	2
Shannon Diversity Index	6	6	4	4	6	4	6	4	4	6	4
Hilsenhoff Index	6	6	6	6	4	6	6	6	6	6	2
EPT Index	6	6	0	6	6	2	2	0	6	6	0
Percent Ephemeroptera	6	6	4	6	4	4	4	4	4	6	0
Percent Chironomidae	0	2	0	2	0	0	0	0	0	2	0
Percent Dominant Taxa	0	4	2	0	2	0	2	0	0	4	0
<b>Total Biological Score</b>											
Total Biological Score	30	36	20	26	32	20	26	16	26	36	8
Biological % of Reference	83	100	56	72	89	56	72	44	72	100	22

**Table 14. Summary of Group 3 Sites RBP III Biological Data—Continued**

	LWAP	PARK	PRIN	RUSS	SACK	SMIT	STRA	WBCCO	WHIT
<b>Raw Summary</b>									
Number of Individuals	184	207	236	261	246	252	215	383	208
% Shredders	7.6	3.4	2.1	1.2	0.8	24.2	2.3	0.5	15.4
% Collector-Gatherers	70.1	75.4	64.8	64.4	83.7	10.3	81.8	64.0	40.4
% Filterer-Collectors	1.1	1.9	6.4	0.4	0.4	30.6	0.5	29.5	2.4
% Scrapers	1.6	0.0	15.3	7.7	4.5	12.3	5.1	1.8	1.9
% Predators	19.0	19.3	11.4	26.4	10.6	22.6	8.8	3.4	39.9
Number of EPT Taxa	12	11	13	12	7	15	16	6	13
Number of EPT Individuals	125	125	139	156	89	171	182	133	171
<b>Metric Scores</b>									
Taxonomic Richness	15	15	21	16	9	28	21	11	16
Shannon Diversity Index	2.1	2.0	2.3	1.9	1.2	2.6	2.3	1.3	2.2
Modified Hilsenhoff Biotic Index	3.0	2.5	4.2	3.0	4.0	2.1	2.8	5.7	1.1
EPT Index	12	11	13	12	7	15	16	6	13
Percent Ephemeroptera	41.3	29.0	42.4	33.3	21.1	4.8	69.8	5.2	36.5
Percent Chironomidae	30.4	33.3	32.2	37.2	63.4	8.7	12.1	60.3	5.8
Percent Dominant Taxa	30.4	33.3	32.2	37.2	63.4	25.8	26.5	60.3	29.8
<b>Percent of Reference or Percentage Score</b>									
Taxonomic Richness	62.5	62.5	87.5	66.7	37.5	116.7	87.5	45.8	66.7
Shannon Diversity Index	79.3	75.2	87.6	71.8	46.6	97.0	86.5	47.4	81.2
Hilsenhoff Index	125.1	148.8	89.7	125.7	93.9	177.7	133.7	66.2	333.2
EPT Index	75.0	68.8	81.3	75.0	43.8	93.8	100.0	37.5	81.3
Percent Ephemeroptera	41.3	29.0	42.4	33.3	21.1	4.8	69.8	5.2	36.5
Percent Chironomidae	30.4	33.3	32.2	37.2	63.4	8.7	12.1	60.3	5.8
Percent Dominant Taxa	30.4	33.3	32.2	37.2	63.4	25.8	26.5	60.3	29.8
<b>Biological Condition Scores</b>									
Taxonomic Richness	4	4	6	4	0	6	6	2	4
Shannon Diversity Index	6	4	6	4	2	6	6	2	6
Hilsenhoff Index	6	6	6	6	6	6	6	2	6
EPT Index	2	0	4	2	0	6	6	0	4
Percent Ephemeroptera	6	6	6	4	2	6	6	2	6
Percent Chironomidae	2	2	2	0	4	4	0	4	4
Percent Dominant Taxa	2	2	2	0	4	4	0	4	4
<b>Total Biological Score</b>									
Total Biological Score	28	24	32	24	12	34	38	8	34
Biological % of Reference	78	67	89	67	33	94	106	22	94

**Table 15. Summary of New York-Pennsylvania Sites Physical Habitat Data**

	BNTY 0.9	CASC 1.6	CAYT 1.7	CHOC 9.1	HLDN 3.5	LSNK 7.6	NFCR 7.6	SEEL 10.3	SNAK 2.3	SOUT 7.8	TROW 1.6	TRUP 4.5	WAPP 2.6
Epifaunal Substrate	17	15	16	17	17	16	17	16	18	16	18	12	17
Instream Cover	15	16	17	16	17	17	17	16	17	16	17	16	17
Embeddedness/Pool Substrate	16	17	16	16	17	16	17	15	17	17	17	15	16
Velocity/Depth Regimes/Pool Variability	17	15	15	17	15	15	17	16	15	15	15	16	18
Sediment Deposition	11	15	16	17	16	18	16	11	16	12	18	12	11
Channel Flow Status	15	14	17	15	14	17	15	15	15	13	18	15	16
Channel Alteration	10	16	11	11	15	11	15	15	15	12	10	14	13
Frequency of Riffles/Channel Sinuosity	17	17	17	16	17	17	16	16	16	16	17	15	16
Condition of Banks	6	14	11	10	14	15	15	10	10	14	10	10	10
Left Bank	2	7	6	4	7	8	7	5	5	7	4	3	5
Right Bank	4	7	5	6	7	7	8	5	5	7	6	7	5
Vegetative Protective Cover	6	16	10	14	16	16	16	16	14	14	11	14	13
Left Bank	3	8	5	8	8	8	8	8	7	7	6	7	6
Right Bank	3	8	5	6	8	8	8	8	7	7	5	7	7
Riparian Vegetative Zone Width	6	16	5	6	14	10	16	6	4	6	4	4	16
Left Bank	2	7	4	3	7	5	8	4	3	2	2	2	8
Right Bank	4	9	1	3	7	5	8	2	3	2	4	2	8
<b>Total Habitat Score</b>													
Total Habitat Score	136	171	151	155	172	168	175	153	160	149	157	143	163
Habitat Percent of Reference	80	100	88	91	101	98	102	89	94	87	92	84	95

**Table 16. Summary of Pennsylvania-Maryland Sites Physical Habitat Data**

	BBDC 4.1	CNWG 4.4	DEER 44.5	EBAU 1.5	FBDC 4.1	LNGA 2.5	OCTO 6.6	SBCC 20.4	SCTT 3.0
Epifaunal Substrate	17	17	16	15	16	7	17	16	14
Instream Cover	16	17	16	14	16	6	17	8	15
Embeddedness/Pool Substrate	15	15	15	14	15	8	13	14	14
Velocity/Depth Regimes/Pool Variability	14	17	16	14	15	12	17	14	15
Sediment Deposition	14	14	15	15	10	7	14	10	14
Channel Flow Status	15	16	17	17	15	16	16	14	14
Channel Alteration	15	15	15	15	15	13	15	15	11
Frequency of Riffles/Channel Sinuosity	16	15	16	15	16	10	16	15	14
Condition of Banks	10	12	11	11	15	14	12	12	10
Left Bank	6	7	7	7	9	7	6	6	6
Right Bank	4	5	4	4	6	7	6	6	4
Vegetative Protective Cover	14	14	15	16	16	14	13	12	10
Left Bank	7	7	9	8	8	7	7	6	7
Right Bank	7	7	6	8	8	7	6	6	3
Riparian Vegetative Zone Width	16	10	2	4	16	2	6	16	5
Left Bank	8	6	1	2	9	1	2	8	4
Right Bank	8	4	1	2	7	1	4	8	1
<b>Total Habitat Score</b>									
Total Habitat Score	162	162	154	150	165	109	156	146	136
Habitat Percent of Reference	105	105	100	97	107	71	101	95	88

**Table 17. Summary of River Sites Physical Habitat Data**

	APAL 6.9*	COWN 1.0	COWN 2.2	SUSQ 365
Epifaunal Substrate	15	16	12	18
Instream Cover	15	16	12	17
Embeddedness/Pool Substrate	15	15	14	17
Velocity/Depth Regimes/Pool Variability	16	16	14	17
Sediment Deposition	15	16	12	15
Channel Flow Status	17	16	16	17
Channel Alteration	14	14	14	16
Frequency of Riffles/Channel Sinuosity	5	5	5	8
Condition of Banks	11	10	12	11
Left Bank	6	5	6	5
Right Bank	5	5	6	6
Vegetative Protective Cover	12	16	16	14
Left Bank	6	8	8	7
Right Bank	6	8	8	7
Riparian Vegetative Zone Width	4	5	2	10
Left Bank	2	3	1	6
Right Bank	2	2	1	4
<b>Total Habitat Score</b>				
Total Habitat Score	139	145	129	160
Habitat Percent of Reference	81	85	75	94

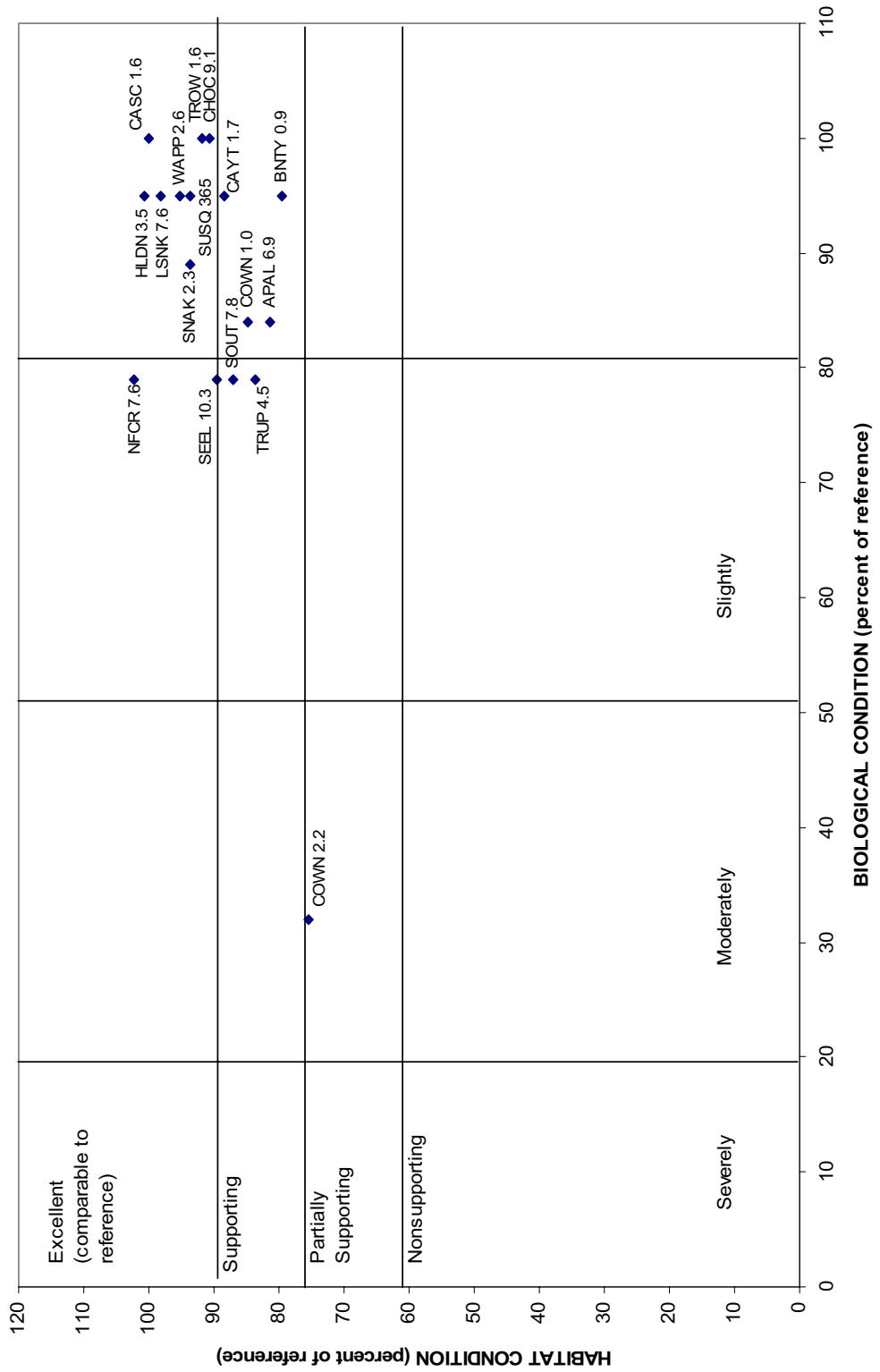
\*Apalachin Creek exhibited glide/pool habitat characteristics

**Table 18. Summary of Group 3 Sites Physical Habitat Data**

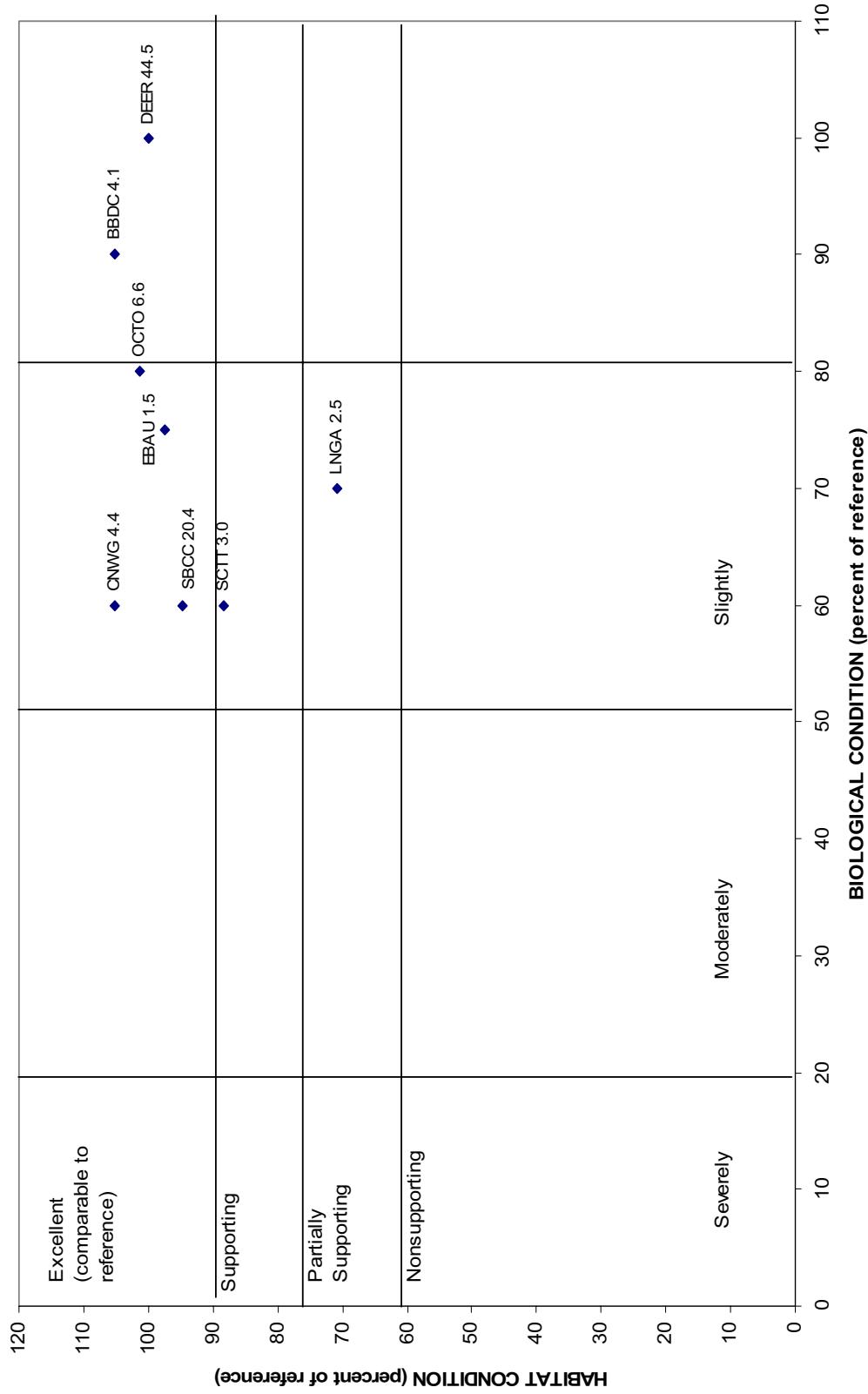
	BABC	BEAG	BILL	BIRD	BISC	BRIG	BULK	CAMP	COOK	DEEP	DENT
Epifaunal Substrate	15	16	13	10	13	10	15	13	15	14	10
Instream Cover	16	15	15	13	11	10	16	15	15	14	11
Embeddedness/Pool Substrate	16	15	12	11	8	12	13	12	12	16	15
Velocity/Depth Regimes/Pool Variability	10	8	9	10	10	11	10	8	12	10	7
Sediment Deposition	15	11	11	10	10	12	10	11	11	17	12
Channel Flow Status	11	10	10	13	8	5	12	10	11	11	9
Channel Alteration	14	13	10	11	12	10	11	12	12	16	13
Frequency of Riffles/Channel Sinuosity	15	16	16	16	16	10	13	16	16	16	10
Condition of Banks	10	8	5	6	14	10	10	10	12	11	14
Left Bank	4	4	3	3	7	5	6	7	6	5	7
Right Bank	6	4	2	3	7	5	4	3	6	6	7
Vegetative Protective Cover	16	16	16	16	10	18	16	18	16	16	16
Left Bank	9	8	8	8	8	5	9	8	9	8	8
Right Bank	7	8	8	8	8	5	9	8	9	8	8
Riparian Vegetative Zone Width	15	16	13	16	2	2	19	15	10	16	17
Left Bank	10	10	4	6	1	1	9	9	6	8	9
Right Bank	5	6	9	10	1	1	10	6	4	8	8
<b>Total Habitat Score</b>											
Total Habitat Score	153	144	130	129	121	105	140	143	157	134	
Habitat Percent of Reference	97	92	83	82	77	67	89	89	91	100	85

**Table 18. Summary of Group 3 Sites Physical Habitat Data - continued**

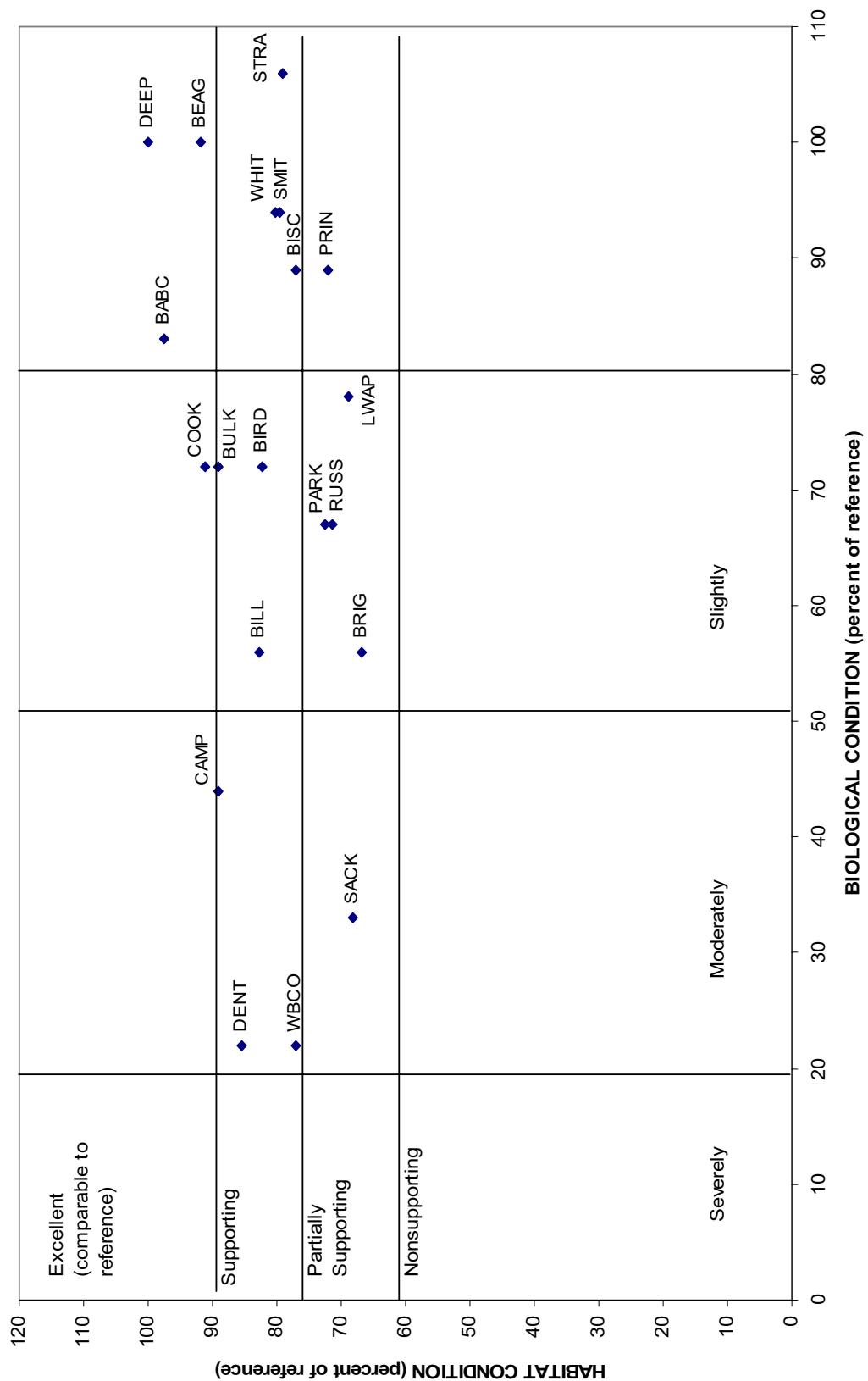
	LWAP	PARK	PRIN	RUSS	SACK	SMIT	STRA	WBCO	WHIT
Epifaunal Substrate	11	14	11	13	10	16	14	12	12
Instream Cover	13	15	14	13	11	14	12	14	14
Embeddedness/Pool Substrate	13	12	14	12	5	13	8	11	11
Velocity/Depth Regimes/Pool Variability	5	8	10	7	6	8	8	9	9
Sediment Deposition	5	6	6	7	5	11	11	10	5
Channel Flow Status	5	6	10	9	6	10	8	10	10
Channel Alteration	5	5	10	10	4	15	12	11	10
Frequency of Riffles/Channel Sinuosity	15	12	11	13	11	10	16	16	16
Condition of Banks	4	4	5	6	6	14	7	14	6
Left Bank	2	2	2	4	3	7	4	7	3
Right Bank	2	2	3	2	3	7	3	7	3
Vegetative Protective Cover	16	14	14	11	14	18	10	16	16
Left Bank	8	7	7	5	7	9	5	8	8
Right Bank	8	7	7	6	7	9	5	8	8
Riparian Vegetative Zone Width	16	18	8	10	16	16	9	2	16
Left Bank	8	9	4	4	7	9	4	1	6
Right Bank	8	9	4	6	9	7	5	1	10
<b>Total Habitat Score</b>									
Total Habitat Score	108	114	113	112	107	126	124	121	125
Habitat Percent of Reference	69	73	72	71	68	80	79	77	80



*Figure 6. Summary of New York-Pennsylvania Border Streams and River Habitat and Biological Condition Scores*



*Figure 7. Summary of Pennsylvania-Maryland Border Streams Habitat and Biological Condition Scores*



*Figure 8. Summary of Group 3 Streams Habitat and Biological Condition Scores*