Water Column Nutrient and Particulate Matter Concentrations

Reservoir: Safe Harbor

Date: 10/3-4/83

Station:	Wrights Span 5	Wrights Span 16	Trap Site Up Res	Trap Site Up Res
Time:	1247	1253	1030	1030
Depth:	0.7m	0.7m	Surface	Bottom
Variable				
NH_4 ug at N l^{-1}	1.2	1.4	1.2	26.5
NO_2 ug at N l^{-1}	0.81	0.84	0.89	1.02
NO_3 ug at N l^{-1}	47.3	36.8	32.2	33.7
DON ug at N l^{-1}	19.1	18.9	21.2	13.6
TDN ug at N l^{-1}	68.4	57.9	55.5	74.8
DIP ug at P l^{-1}	0.02	0.08	0.12	0.12
DOP ug at P l^{-1}	0.07	0.02	0.00	0.00
TDP ug at P l^{-1}	0.09	0.10	0.12	0.12
Chlorophyll a ug l^{-1}	60.6	56.1	29.2	30.3
Seston mg l^{-1}	11.2	12.8	4.0	10.4
Particulate N ug l^{-1}	450.0	417.0	329.0	294.0
Particulate C ug l^{-1}	3202.0	3078.0	1770.0	1782.0
Particulate P ug l^{-1}	51.3	41.8	25.2	38.9

Water Column Nutrient and Particulate Matter Concentrations

Reservoir: Safe Harbor

Date: 10/4/83

Station:	Trap Site Dam	Trap Site Dam	Discharge
Time:	1130	1130	1030
Depth:	Surface	Bottom	0.7m
Variable			
NH_4 ug at N l^{-1}	2.4	6.8	11.5
NO_2 ug at N l^{-1}	0.90	0.79	5.01
NO_3 ug at N l^{-1}	28.8	36.1	51.0
DON ug at N l^{-1}	24.8	18.3	14.4
TDN ug at N l^{-1}	56.9	62.0	91.9
DIP ug at P l^{-1}	0.06	0.27	0.41
DOP ug at P l^{-1}	0.00	0.00	0.00
TDP ug at P l^{-1}	0.06	0.27	0.41
Chlorophyll a ug l^{-1}	28.4	26.9	23.5
Seston mg l^{-1}	5.2	5.2	10.8
Particulate N ug l^{-1}	292.0	269.0	183.0
Particulate C ug l^{-1}	1681.0	1278.0	1446.0
Particulate P ug l^{-1}	24.3	29.9	30.0

Water Column Nutrient and Particulate Matter Concentrations

Reservoir: Holtwood

Date: 10/3-4/83

Station:	Trap Site	Trap Site	Discharge
Time:	1445	1445	0942
Depth:	Surface	Bottom	0.7m
Variable			
NH_4 ug at N l^{-1}	10.5	19.5	19.4
NO_2 ug at N l^{-1}	1.69	2.05	2.13
NO_3 ug at N l^{-1}	41.1	43.6	42.7
DON ug at N l^{-1}	18.3	21.8	20.2
TDN ug at N l^{-1}	71.6	86.9	84.4
DIP ug at P l^{-1}	0.07	0.37	0.28
DOP ug at P l^{-1}	0.00	0.21	0.02
TDP ug at P l^{-1}	0.07	0.58	0.30
Chlorophyll a ug l^{-1}	41.3	14.0	15.2
Seston mg l^{-1}	5.2	18.0	9.2
Particulate N ug l^{-1}	262.0	203.0	122.0
Particulate C ug l^{-1}	1771.0	1655.0	1084.0
Particulate P ug l^{-1}	28.5	43.6	22.2

Water Column Nutrient and Particulate Matter Concentrations

Reservoir: Conowingo

Date: 10/3/83

Station:	Cono Up Res	Cono Up Res	Cono Mid Res	Cono Mid res
Time:	0900	0900	1010	1010
Depth:	Surface	Bottom	Surface	Bottom
Variable				
NH_4 ug at N l^{-1}	12.7	13.7	2.4	3.2
NO_2 ug at N l^{-1}	2.74	2.79	3.67	3.31
NO_3 ug at N l^{-1}	48.3	51.0	61.6	64.0
DON ug at N l^{-1}	16.4	15.9	13.3	16.3
TDN ug at N l^{-1}	80.1	83.4	81.0	86.8
DIP ug at P l^{-1}	0.40	0.41	0.12	0.19
DOP ug at P l^{-1}	0.00	0.00	0.20	0.20
TDP ug at P l^{-1}	0.40	0.41	0.32	0.39
Chlorophyll a ug l^{-1}	12.1	11.7	27.1	12.7
Seston mg l^{-1}	3.2	4.4	2.8	6.0
Particulate N ug l^{-1}	117.0	120.0	171.0	112.0
Particulate C ug l^{-1}	591.0	866.0	1998.0	797.0
Particulate P ug l^{-1}	18.7	25.1	29.3	18.2

Water Column Nutrient and Particulate Matter Concentrations

Reservoir: Conowingo

Date: 10/3/83

Station:	Cono Dam	Cono Dam	Discharge
Time:	1100	1100	1230
Depth:	Surface	Bottom	
Variable			
NH_4 ug at N l^{-1}	1.1	4.1	4.7
NO_2 ug at N l^{-1}	5.77	5.80	5.29
NO_3 ug at N l^{-1}	60.5	60.2	59.9
DON ug at N l^{-1}	11.9	15.4	19.4
TDN ug at N l^{-1}	79.3	85.5	89.3
DIP ug at P l^{-1}	0.13	0.25	0.23
DOP ug at P l^{-1}	0.15	0.16	0.16
TDP ug at P l^{-1}	0.28	0.41	0.39
Chlorophyll a ug l^{-1}	8.1	8.6	12.2
Seston mg l^{-1}	1.6	4.0	10.8
Particulate N ug l^{-1}	105.0	102.0	129.0
Particulate C ug l^{-1}	432.0	524.0	1115.0
Particulate P ug l^{-1}	9.5	18.5	27.9

Water Column Nutrient and Particulate Matter Concentrations

Reservoir: York Haven

Date: 10/13/83

Station:	Harris E120	Harris E600	Harris E1180	Harris W600	Harris W1100	Harris W1320
Time:	1320	1325	1330	1405	1400	1350
Depth:	0.3m	0.3m	0.3m	0.3m	0.3m	0.3m
Variable						
NH_4 ug at N l^{-1}						
NO_2 ug at N l^{-1}						
NO_3 ug at N l^{-1}						
DON ug at N l^{-1}						
TDN ug at N l^{-1}	32.7	41.8	42.1	40.5	58.6	235.5
DIP ug at P l^{-1}						
DOP ug at P l^{-1}						
TDP ug at P l^{-1}	0.00	0.07	0.00	0.12	0.23	0.21
Chlorophyll a ug l^{-1}						
Seston mg l^{-1}	8.0	9.2	9.2	6.3	4.8	7.4
Particulate N ug l^{-1}	286.0	392.0	419.0	246.0	95.0	134.0
Particulate C ug l^{-1}	2083.0	2803.0	2419.0	1633.0	643.0	976.0
Particulate P ug l^{-1}	27.5	27.9	34.8	31.3	15.9	20.9

Water Column Nutrient and Particulate Matter Concentrations

Reservoir: York Haven

Date: 10/13/83

Station:	Trap Site	Discharge
Time:	1430	1150
Depth:	Surface	0.7m
Variable		
NH_4 ug at N l^{-1}		
NO_2 ug at N l^{-1}		
NO_3 ug at N l^{-1}		
DON ug at N l^{-1}		
TDN ug at N l^{-1}	55.5	52.8
DIP ug at P l^{-1}		
DOP ug at P l^{-1}		
TDP ug at P l^{-1}	0.24	0.40
Chlorophyll a ug l^{-1}		
Seston mg l^{-1}	12.0	12.4
Particulate N ug l^{-1}	442.0	265.0
Particulate C ug l^{-1}	2901.0	1681.0
Particulate P ug l^{-1}	48.8	60.9

Water Column Nutrient and Particulate Matter Concentrations

Reservoir: Safe Harbor

Date: 10/13/83

Station:	Wrights Span 5	Wrights Span 16	Trap Site	Trap Site	Discharge
Time:	1039	1100	1030	1030	1010
Depth:	0.7m	0.7m	Surface	Bottom	0.7m
Variable					
NH_4 ug at N l^{-1}					
NO_2 ug at N l^{-1}					
NO_3 ug at N l^{-1}					
DON ug at N l^{-1}					
TDN ug at N l^{-1}	82.0	68.4	61.3	63.0	63.7
DIP ug at P l^{-1}					
DOP ug at P l^{-1}					
TDP ug at P l^{-1}	0.14	0.00	0.13	0.13	0.18
Chlorophyll a ug l^{-1}					
Seston mg l^{-1}	17.6	16.8	7.8	18.0	12.4
Particulate N ug l^{-1}	476.0	431.0	241.0	366.0	206.0
Particulate C ug l^{-1}	3270.0	2847.0	1468.0	2543.0	1336.0
Particulate P ug l^{-1}	72.9	77.7	41.2	66.3	42.0

Appendix Table 2. Water Column Nutrient and Particulate Matter Concentrations; Spring 1984 Study.

Reservoir: York Haven

Date: 6/11/84

Station:	Harris. E120	Harris. E1180	Harris. W600	Harris. W1320
Time:				
Depth:				
Variable				
NH_4 ug at N l^{-1}	0.8	0.5	0.4	0.04
NO_2 ug at N l^{-1}	0.39	0.36	0.32	2.27
NO_3 ug at N l^{-1}	40.6	26.2	34.1	216.9
DON ug at N l^{-1}	12.9	27.0	27.4	0.0
TDN ug at N l^{-1}	54.7	54.1	62.2	219.2
DIP ug at P l^{-1}	0.05	0.03	0.06	0.58
DOP ug at P l^{-1}	0.09	2.26	1.61	1.77
TDP ug at P l^{-1}	0.14	2.29	1.67	2.32
Chlorophyll a ug l^{-1}	21.4	19.0	6.9	31.9
Seston mg l^{-1}	10.6	13.8	6.6	13.6
Particulate N ug l^{-1}	251.0	203.2	78.8	264.6
Particulate C ug l^{-1}	1982.3	1615.6	588.7	1671.3
Particulate P ug l^{-1}	19.8	27.6	14.7	39.1

Water Column Nutrient and Particulate Matter Concentrations

Reservoir: York Haven

Date: 6/11/84

Station:	Trap Site	Trap Site	Discharge
Time:	1930	1930	1300
Depth:	Surface	Bottom	
Variable			
NH_4 ug at N l^{-1}	0.5	0.02	0.5
NO_2 ug at N l^{-1}	0.34	0.28	0.38
NO_3 ug at N l^{-1}	31.1	28.9	27.4
DON ug at N l^{-1}	50.0	52.4	30.8
TDN ug at N l^{-1}	81.9	81.6	59.1
DIP ug at P l^{-1}	0.05	0.07	0.04
DOP ug at P l^{-1}	1.04	1.37	2.22
TDP ug at P l^{-1}	1.09	1.44	2.26
Chlorophyll a ug l^{-1}	11.9	11.9	19.3
Seston mg l^{-1}	5.5	4.2	6.2
Particulate N ug l^{-1}	106.3	88.7	156.4
Particulate C ug l^{-1}	850.5	725.2	969.2
Particulate P ug l^{-1}	11.7	13.0	20.7

Water Column Nutrient and Particulate Matter Concentrations

Reservoir: Safe Harbor

Date: 6/11/84

Station:	Wrights Span 2	Wrights Span 22	Trap Site Mid	Trap Site Mid
Time:			1615	1615
Depth:			Surface	Bottom
Variable				
NH_4 ug at N l^{-1}	0.7	1.6	0.1	11.3
NO_2 ug at N l^{-1}	1.33	1.01	0.86	0.69
NO_3 ug at N l^{-1}	80.3	89.2	61.7	37.8
DON ug at N l^{-1}	36.1	39.6	41.7	30.1
TDN ug at N l^{-1}	118.4	131.4	104.4	79.9
DIP ug at P l^{-1}	0.13	0.04	0.08	0.13
DOP ug at P l^{-1}	1.39	1.85	2.08	0.82
TDP ug at P l^{-1}	1.52	1.89	2.16	0.95
Chlorophyll a ug l^{-1}	26.9	27.7	47.4	19.2
Seston mg l^{-1}	15.8	7.8	8.4	11.2
Particulate N ug l^{-1}	259.8	216.3	295.7	187.6
Particulate C ug l^{-1}	1780.9	1277.1	1871.8	1221.2
Particulate P ug l^{-1}	40.9	26.6	25.7	35.2

Water Column Nutrient and Particulate Matter Concentrations

Reservoir: Safe Harbor

Date: 6/11/84

Station:	Trap Site Dam	Trap Site Dam	Discharge
Time:	1545	1545	1000
Depth:	Surface	Bottom	
Variable			
NH_4 ug at N l^{-1}	1.3	8.5	2.2
NO_2 ug at N l^{-1}	1.23	0.94	0.78
NO_3 ug at N l^{-1}	70.7	51.2	47.0
DON ug at N l^{-1}	45.2	21.8	14.6
TDN ug at N l^{-1}	118.4	82.4	64.6
DIP ug at P l^{-1}	0.13	0.26	0.09
DOP ug at P l^{-1}	1.15	2.89	4.83
TDP ug at P l^{-1}	1.48	3.15	4.92
Chlorophyll a ug l^{-1}	63.7	19.2	29.8
Seston mg l^{-1}	11.4	20.2	11.2
Particulate N ug l^{-1}	439.9	216.8	191.6
Particulate C ug l^{-1}	2703.8	1546.9	1212.6
Particulate P ug l^{-1}	43.2	50.5	28.3

Water Column Nutrient and Particulate Matter Concentrations

Reservoir: Holtwood

Date: 6/11/84

Station:	Trap Site	Trap Site	Discharge
Time:	1315	1315	
Depth:	Surface	Bottom	
Variable			
NH_4 ug at N l^{-1}	2.1	1.5	1.5
NO_2 ug at N l^{-1}	0.93	0.94	0.95
NO_3 ug at N l^{-1}	71.1	68.5	55.1
DON ug at N l^{-1}	14.7	9.3	25.6
TDN ug at N l^{-1}	88.8	80.2	83.2
DIP ug at P l^{-1}	0.04	0.04	0.03
DOP ug at P l^{-1}	0.28	1.51	1.08
TDP ug at P l^{-1}	0.32	1.55	1.11
Chlorophyll a ug l^{-1}	27.1	26.7	30.0
Seston mg l^{-1}	12.2	10.4	12.0
Particulate N ug l^{-1}	285.6	216.8	223.6
Particulate C ug l^{-1}	1786.4	1299.9	1377.9
Particulate P ug l^{-1}	32.7	28.4	37.8

Water Column Nutrient and Particulate Matter Concentrations

Reservoir: Conowingo

Date: 6/11/84

Station:	Trap Site Upper	Trap Site Upper	Trap Site Mid	Trap Site Mid
Time:	0700	0700	0930	0930
Depth:	Surface	Bottom	Surface	Bottom
Variable				
NH_4 ug at N l^{-1}	3.3	2.0	2.3	3.1
NO_2 ug at N l^{-1}	0.87	0.88	0.96	0.88
NO_3 ug at N l^{-1}	67.5	71.2	59.7	66.1
DON ug at N l^{-1}	19.7	11.7	9.2	13.1
TDN ug at N l^{-1}	91.4	85.8	72.2	83.2
DIP ug at P l^{-1}	0.03	0.06	0.03	0.03
DOP ug at P l^{-1}	0.85	0.95	1.86	0.69
TDP ug at P l^{-1}	0.87	1.01	1.89	0.72
Chlorophyll a ug l^{-1}	27.9	27.3	27.7	18.6
Seston mg l^{-1}	7.3	7.7	7.2	12.6
Particulate N ug l^{-1}	176.8	176.3	238.8	161.2
Particulate C ug l^{-1}	1025.7	1013.5	1330.5	1004.6
Particulate P ug l^{-1}	25.2	24.7	25.9	22.5

Water Column Nutrient and Particulate Matter Concentrations

Reservoir: Conowingo

Date: 6/11/84

Station:	Trap Site Dam	Trap Site Dam	Discharge
Time:	1030	1030	0810
Depth:	Surface	Bottom	
Variable			
NH_4 ug at N l^{-1}	1.8	7.3	2.8
NO_2 ug at N l^{-1}	0.88	1.12	1.31
NO_3 ug at N l^{-1}	61.2	60.6	62.1
DON ug at N l^{-1}	15.8	12.7	14.5
TDN ug at N l^{-1}	79.7	81.7	80.7
DIP ug at P l^{-1}	0.04	0.04	0.04
DOP ug at P l^{-1}	1.36	0.29	2.86
TDP ug at P l^{-1}	1.40	0.33	2.90
Chlorophyll a ug l^{-1}	20.1	13.3	10.7
Seston mg l^{-1}	8.0	29.6	9.4
Particulate N ug l^{-1}	247.9	175.3	141.7
Particulate C ug l^{-1}	1379.7	1431.8	922.9
Particulate P ug l^{-1}	30.5	58.3	34.3

Water Column Nutrient and Particulate Matter Concentrations

Reservoir: York Haven

Date: 6/14/84

Station:	Harris. E120	Harris. E1180	Harris. W600	Harris. W1320
Time:				
Depth:				
Variable				
NH_4 ug at N l^{-1}	7.3	0.4	0.5	1.4
NO_2 ug at N l^{-1}	0.29	0.41	0.36	2.47
NO_3 ug at N l^{-1}	29.0	20.6	34.6	241.7
DON ug at N l^{-1}	34.1	22.3	23.3	0.00
TDN ug at N l^{-1}	70.7	43.7	58.8	245.6
DIP ug at P l^{-1}	0.04	0.19	0.04	1.21
DOP ug at P l^{-1}	0.29	0.24	0.14	0.22
TDP ug at P l^{-1}	0.33	0.43	0.18	1.43
Chlorophyll a ug l^{-1}	36.8	29.2	12.5	20.1
Seston mg l^{-1}	11.8	12.0	6.2	21.6
Particulate N ug l^{-1}	272.5	256.8	112.5	249.5
Particulate C ug l^{-1}	2218.5	2148.8	864.8	1618.1
Particulate P ug l^{-1}	27.8	21.2	11.6	54.5

Water Column Nutrient and Particulate Matter Concentrations

Reservoir: York Haven

Date: 6/14/84

Station:	Trap Site	Trap Site	Discharge
Time:	1630	1630	
Depth:	Surface	Bottom	
Variable			
NH_4 ug at N l^{-1}	0.5	0.4	0.05
NO_2 ug at N l^{-1}	0.38	0.41	0.46
NO_3 ug at N l^{-1}	32.4	30.2	25.3
DON ug at N l^{-1}	15.9	15.2	47.2
TDN ug at N l^{-1}	49.2	46.2	73.0
DIP ug at P l^{-1}	0.03	0.06	0.06
DOP ug at P l^{-1}	0.00	1.36	0.27
TDP ug at P l^{-1}	0.03	1.42	0.33
Chlorophyll a ug l^{-1}	17.8	20.0	31.5
Seston mg l^{-1}	6.8	5.4	10.2
Particulate N ug l^{-1}	144.2	137.8	226.3
Particulate C ug l^{-1}	1202.0	1077.0	1611.6
Particulate P ug l^{-1}	14.7	16.6	17.6

Water Column Nutrient and Particulate Matter Concentrations

Reservoir: Safe Harbor

Date: 6/14/84

Station:	Wrights Span 2	Wrights Span 22	Trap Site mid	Trap Site mid
Time:			1415	1415
Depth:			Surface	Bottom
Variable				
NH_4 ug at N l^{-1}	8.9	1.5	2.3	21.7
NO_2 ug at N l^{-1}	6.44	1.12	0.85	1.01
NO_3 ug at N l^{-1}	102.5	83.6	31.0	38.0
DON ug at N l^{-1}	20.1	0.0	24.3	14.8
TDN ug at N l^{-1}	137.9	86.2	58.4	75.5
DIP ug at P l^{-1}	0.47	0.13	0.10	0.14
DOP ug at P l^{-1}	3.49	0.00	0.11	0.10
TDP ug at P l^{-1}	3.96	0.13	0.21	0.24
Chlorophyll a ug l^{-1}	25.0	59.9	52.0	21.3
Seston mg l^{-1}	22.8	13.6	14.4	14.0
Particulate N ug l^{-1}	300.3	361.3	382.2	283.5
Particulate C ug l^{-1}	1969.6	2256.5	2594.2	1654.3
Particulate P ug l^{-1}	87.8	42.0	39.2	43.5

Water Column Nutrient and Particulate Matter Concentrations

	Reservoir:	Safe Harbor	
	Date:	6/14/84	
Station:	Trap Site Dam	Trap Site Dam	Discharge
Time:	1345	1345	
Depth:	Surface	Bottom	
Variable			
NH_4 ug at N l^{-1}	2.9	2.5	3.0
NO_2 ug at N l^{-1}	0.80	0.79	0.90
NO_3 ug at N l^{-1}	31.2	34.3	39.3
DON ug at N l^{-1}	22.9	15.1	15.0
TDN ug at N l^{-1}	57.8	52.7	58.2
DIP ug at P l^{-1}	0.10	0.03	0.06
DOP ug at P l^{-1}	1.61	3.27	0.26
TDP ug at P l^{-1}	1.71	3.30	0.32
Chlorophyll a ug l^{-1}	59.2	57.6	47.8
Seston mg l^{-1}	13.2	13.6	13.8
Particulate N ug l^{-1}	356.1	342.8	320.6
Particulate C ug l^{-1}	2214.5	2066.8	1993.4
Particulate P ug l^{-1}	40.0	42.3	47.3

Water Column Nutrient and Particulate Matter Concentrations

Reservoir: Holtwood

Date: 6/14/84

Station:	Trap Site	Trap Site	Discharge
Time:	1130	1130	
Depth:	Surface	Bottom	
Variable			
NH_4 ug at N l^{-1}	2.7	3.2	3.3
NO_2 ug at N l^{-1}	0.98	1.07	1.09
NO_3 ug at N l^{-1}	47.2	45.5	54.0
DON ug at N l^{-1}	10.1	35.4	16.0
TDN ug at N l^{-1}	61.0	85.2	74.4
DIP ug at P l^{-1}	0.04	0.02	0.05
DOP ug at P l^{-1}	0.23	2.75	2.19
TDP ug at P l^{-1}	0.27	2.77	2.24
Chlorophyll a ug l^{-1}	38.3	40.2	35.3
Seston mg l^{-1}	10.8	15.2	10.0
Particulate N ug l^{-1}	298.0	260.4	250.7
Particulate C ug l^{-1}	1787.3	1693.6	1516.1
Particulate P ug l^{-1}	41.0	44.2	38.4

Water Column Nutrient and Particulate Matter Concentrations

Reservoir: Conowingo

Date: 6/14/84

Station:	Trap Site Upper	Trap Site Upper	Trap Site Mid	Trap Site Mid
Time:	0822	0822	0915	0915
Depth:	Surface	Bottom	Surface	Bottom
Variable				
NH_4 ug at N l^{-1}	0.6	3.0	1.6	2.8
NO_2 ug at N l^{-1}	1.09	1.18	1.07	0.84
NO_3 ug at N l^{-1}	57.5	60.8	56.1	61.4
DON ug at N l^{-1}	22.7	26.4	15.7	16.1
TDN ug at N l^{-1}	81.9	91.4	74.5	81.1
DIP ug at P l^{-1}	0.02	0.04	0.04	0.04
DOP ug at P l^{-1}	5.20	2.42	0.38	3.52
TDP ug at P l^{-1}	5.22	2.46	0.42	3.56
Chlorophyll a ug l^{-1}	33.4	21.0	47.9	23.5
Seston mg l^{-1}	9.4	9.0	8,0	11.2
Particulate N ug l^{-1}	235.6	167.7	172.2	176.8
Particulate C ug l^{-1}	1435.3	1060.4	1058.0	1138.1
Particulate P ug l^{-1}	28.3	32.0	23.9	24.9

Water Column Nutrient and Particulate Matter Concentrations

Reservoir: Conowingo

Date: 6/14/84

Station:	Trap Site Dam	Trap Site Dam	Discharge
Time:	0940	0940	
Depth:	Surface	Bottom	
Variable			
NH_4 ug at N l^{-1}	3.7	9.7	10.1
NO_2 ug at N l^{-1}	0.98	1.62	1.34
NO_3 ug at N l^{-1}	57.6	77.8	60.8
DON ug at N l^{-1}	15.6	21.5	6.0
TDN ug at N l^{-1}	77.9	110.6	78.2
DIP ug at P l^{-1}	0.01	0.11	0.07
DOP ug at P l^{-1}	0.48	0.39	0.08
TDP ug at P l^{-1}	0.49	0.50	0.15
Chlorophyll a ug l^{-1}	10.7	13.8	15.0
Seston mg l^{-1}	7.8	20.6	15.0
Particulate N ug l^{-1}	254.7	227.9	208.5
Particulate C ug l^{-1}	1401.0	1494.6	1241.3
Particulate P ug l^{-1}	21.6	53.8	42.2

APPENDIX B

CHARACTERIZATION OF THE SUSQUEHANNA RIVER DOWNSTREAM OF HARRISBURG, PA

Hydrology of the Reservoirs

The lower Susquehanna River is impounded by four hydroelectric dams south of Harrisburg, PA, at River Mile (RM) 69. The locations of the dams were shown in Fig. I-1, and a vertical profile of most of this river reach was shown in Fig. I-2. The four dams are:

- Conowingo (RM 10)
- Holtwood (RM 25)
- Safe Harbor (RM 33)
- York Haven (RM 59).

Major physiographic features of each dam and reservoir are listed in Table B-1.

The annual hydrologic cycle of the Susquehanna River dominates the runoff and transport of material from its 27,000 mi^2 watershed, and exerts a controlling influence on the behavior of this allochthonous material within the four reservoirs on the lower river. The annual average flow of the river (measured at the USGS gauge at Conowingo Dam) is 43,000 cfs, with a maximum monthly average flow of ~ 73,000 cfs in March-April and a minimum monthly average flow of 10,000 cfs in August-September. The 7-day, 10-year low flow (7Q10) is 2,700 cfs. Storm runoff events are superimposed on this average annual cycle.

The four dams and reservoirs exert substantial control over the flow of the river. On relatively long-time scales (days to months), the reservoirs impound water to slow the transport of water along the reach between Harrisburg and the river mouth. Since the volumes of the reservoirs are almost constant, time of travel in this reach under different flow conditions are inversely proportional to river flow (Fig. B-1). Generally, as flow increases, the reservoirs undergo transitions (at different rates depending on volume) from lacustrine to riverine conditions.

On shorter time scales (several minutes to a week), local river flows are controlled by the operations of the hydroelectric plants in the dams. Because the four reservoirs have relatively low storage capacities relative to river flow, their daily generation schedule is tied to the amount of water that can be stored in a 24-hour period. Electricity is more valuable during times of peak demand (generally 0900-1700 on weekdays), so all of the stored water is usually used for generation at those times, and the generators are shut down during off-peak times. This is the daily peaking power cycle. The water level of Conowingo (the largest of the four reservoirs) can be drawn down lower than the other three. Consequently, the hydroelectric plant can be shut down longer for off-peak periods when power

Table B-1. Major features of the four reservoirs

	Distance of dam from river mouth (statute miles)	Dam head (ft/m)	Drainage area above dam (mi^2/km^2)	Reservoir surface area (ft^2/m^3)	Reservoir volume (ft^3/m^3)
York Haven	56	21/6.4	25,000/64,800	$6.45 \times 10^7/6 \times 10^6$	$4.45 \times 10^8/1.26 \times 10^7$
Safe Harbor	33	55/16.8	26,000/67,400	$3.21 \times 10^8/2.98 \times 10^7$	$6.53 \times 10^9/1.85 \times 10^8$
Holtwood	25	50.6/15.4	26,800/69,400	$1.05 \times 10^8/9.72 \times 10^6$	$2.61 \times 10^9/7.40 \times 10^7$
Conowingo	10	89/27	27,100/70,200	$3.73 \times 10^8/3.47 \times 10^7$	$1.35 \times 10^{10}/3.82 \times 10^8$

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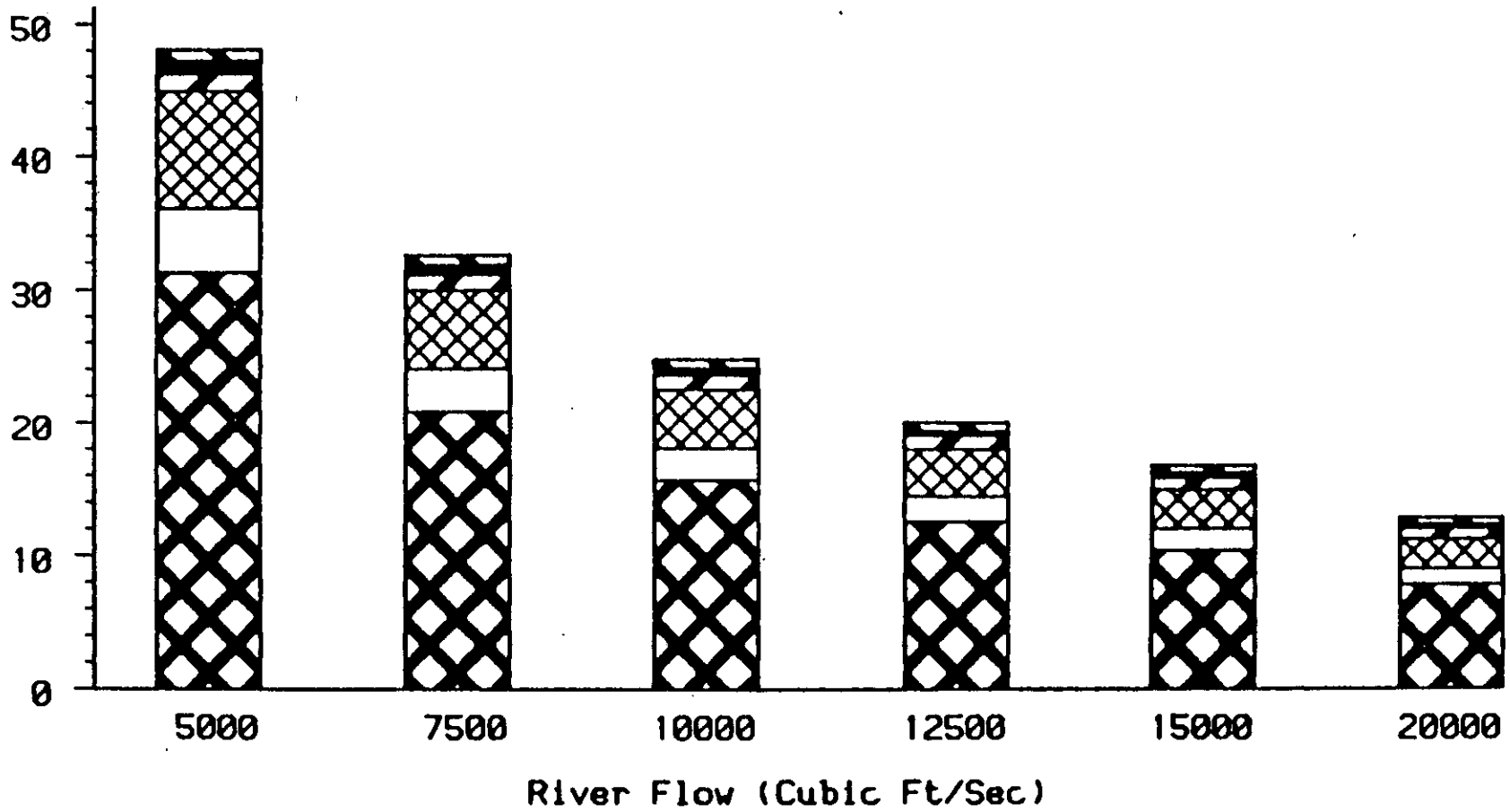
Lower Susquehanna River Residence Times (days)



LEGEND: REACH

- Conowingo Res.
- Safe Harbor Res
- York Haven Res.
- Holtwood Res.
- River-Safe Hrb.
- River-Harrisbrg

Figure B-1. Effect of river flow on water residence times (days) in the two riverine reaches and four reservoirs between Harrisburg, PA, and Conowingo, MD (see also Fig. I-1)

is of lower value (i.e., weekends), and can use this stored water for generation during weekly peaks. This results in a weekly peaking cycle in addition to the daily cycle.

The peaking power cycles, with their associated shutdowns and dewatering of the reaches downstream of some of the dams, have been associated with environmental impacts in these areas. However, the focus of this report is on longer-term processes that affect the DO dynamics of the reservior. Since discharge schedules are so closely tied to the run of river, and can affect flows only on localized and short-term bases, the report will ignore flow variations caused by peaking operations.

Descriptive Ecology of the Reservoirs

The four reservoir ecosystems are qualitatively similar in their biotic composition because one reservoir flows into the next one downstream. Only the relative dominance of species changes among the reservoirs. One exception to this similarity is the fish communities of the four reservoirs. The lack of fish passages over the four dams, and the stocking of game fish, have caused some persistent differences among the fish communities of the reservoirs.

The phytoplankton of the reservoirs are dominated by diatoms as well as green and blue-green algae (numbers in parentheses below represent the average percentage composition for June-October 1967-1969 in Conowingo Reservoir):

- Diatoms (49%): *Asterionella* sp., *Fragilaria* sp., and *Melosira* sp.
- Green Algae (27%): *Pandorina* sp., *Pediastrum* sp., *Pleodorina* sp., *Scenedesmus* sp., and *Sphaerocystis* sp.
- Blue-green algae (20%): *Anabaena* sp., *Anacystis* sp., *Aulosira* sp., *Coccochloris* sp., and *Oscillatoria* sp.

These data were summarized by Robbins and Mathur (1974); little quantitative data are readily available for the upstream reservoirs.

The zooplankton community of Conowingo Reservoir is dominated by *Diaphanosoma* sp., *Daphnia retrocurva*, *Daphnia galeata mendotae*, *Moina* sp., *Bosmina longirostris* (all cladocera), and the copepod *Cyclops vernalis*. These species comprised at least 90% of the population from July through October (Robbins and Mathur 1974). The zooplankton communities of the upstream reservoirs were qualitatively similar.

The first community of Conowingo Reservoir has been composed of white crappie (Poxomis annularis), channel catfish (Ictalurus punctatus), bluegill (Lepomis macrochirus), pumpkinseed (Lepomis gibbosus), and carp (Cyprinus carpio), with smallmouth bass (Micropterus dolomieui), largemouth bass, (M. salmoides), and walleye (Stizostedion vitreum) in lesser abundance. Recently, striped bass-white perch hybrids have been stocked in the reservoir, and gizzard shad (Dorosoma cepedianum) were introduced during the operation of the experimental fish lift, which began in 1972. The three upstream reservoirs had similar fish communities (Roy F. Weston, Inc. 1983; Skinner 1983).

Sources and Annual Budgets of Materials Entering the Reservoirs

The U.S. Geological Survey (USGS) has maintained a streamflow and constituent gauging station at the Walnut Street Bridge in Harrisburg since 1963. This transect serves as a convenient upstream boundary for the river reach discussed in this report (the downstream boundary in Conowingo Dam, 3 mi above the fall line). Under contract to EPA's Chesapeake Bay Program (U.S. EPA 1982), the USGS intensively monitored the fluxes of a number of constituents between 1 April 1980 and 31 March 1981 at the Harrisburg transect (Fishel 1984), and at Conowingo Dam (Lang 1982). Fluxes for the period for sediment (seston) and major nutrients are listed in Table B-2. The table also shows the loss in major constituents between Harrisburg and Conowingo. The fluxes and losses were not corrected for the other sediment and nutrient additions along the reach (discussed below). The reservoirs are generally considered to be the sinks for these constituents at low and average river flows (Williams and Reed 1972; Clark et al. 1974; Gross et al. 1978; Olsen et al. 1981; Meade 1982; Lang 1982). During storm events (discharges greater than 400,000 cfs) deposited sediment is scoured from the reservoirs and discharged into the upper Chesapeake Bay.

For this report, nutrient fluxes were also estimated at the discharges of Holtwood and Conowingo Dams between 1971 and 1980 from PECO's monitoring data. The fluxes were estimated by multiplying daily average flow at Conowingo by constituent concentrations interpolated between the approximately biweekly discharge samples. The fluxes and net losses for four major constituents are listed in Table B-3. The fluxes of constituents at Conowingo are generally within a factor of 2 of the USGS estimates. Gross et al. (1978) state that their sediment flux estimates are only good to an order of magnitude and perhaps one significant figure. The two estimates thus are reasonably close, given that the samples were analyzed by slightly different analytical methods and the flux calculations were each done using totally different methods.

Table B-2. Annual sediment and major nutrient fluxes (kg/yr) at USGS monitoring stations at Harrisburg, PA and Conowingo, MD, 1 April 1980 to 31 March 1981

Constituent	Harrisburg	Conowingo	Net Loss
Suspended Sediment (seston)	2,082,500,000	1,150,000,000	932,500,000
Nitrogen (total)	40,728,000	44,023,000	-3,295,000
Phosphorus (total)	2,735,000	1,830,000	905,000
Carbon (total organic)	107,435,000	91,690,000	15,744,000

Table B-3. Estimated annual fluxes (kg/yr) of seston (total suspended solids), total phosphorus, particulate carbon, and phytoplankton biomass at Holtwood and Conowingo Dam discharges. Difference is accumulation in Conowingo Reservoir.

SESTON				TOTAL PHOSPHORUS			
Year	Holtwood Flux (kg)	Conowingo Flux (kg)	Difference (kg)	Year	Holtwood Flux (kg)	Conowingo Flux (kg)	Difference (kg)
1971	127,000,000	78,300,000	48,700,000	1971	2,380,000	1,460,000	910,000
1972	3,920,000,000	1,480,000,000	2,440,000,000	1972	10,500,000	6,040,000	4,450,000
1973	2,770,000,000	1,300,000,000	1,470,000,000	1973	6,140,000	3,560,000	2,580,000
1974	727,000,000	454,000,000	273,000,000	1974	3,810,000	2,610,000	1,200,000
1975	1,330,000,000	640,000,000	690,000,000	1975	7,290,000	4,430,000	2,860,000
1976	1,080,000,000	634,000,000	446,000,000	1976	7,490,000	4,600,000	2,900,000
1977	2,990,000,000	1,790,000,000	1,200,000,000	1977	8,800,000	6,379,000	2,430,000
1978	2,740,000,000	1,130,000,000	1,610,000,000	1978	7,530,000	4,820,000	2,710,000
1979	992,000,000	862,000,000	130,000,000	1979	6,670,000	5,040,000	1,630,000
1980	401,000,000	752,000,000	-351,000,000	1980	2,950,000	4,120,000	-1,170,000

PARTICULATE CARBON				PHYTOPLANKTON BIOMASS			
Year	Holtwood Flux (kg)	Conowingo Flux (kg)	Difference (kg)	Year	Holtwood Flux (kg)	Conowingo Flux (kg)	Difference (kg)
1971	40,600,000	27,200,000	13,400,000	1971	50,600,000	32,800,000	17,800,000
1972	508,000,000	203,000,000	305,000,000	1972	47,600,000	39,300,000	8,300,000
1973	398,000,000	140,000,000	258,000,000	1973	36,000,000	27,900,000	8,100,000
1974	96,300,000	63,100,000	33,200,000	1974	31,500,000	22,400,000	9,100,000
1975	190,000,000	99,400,000	90,700,000	1975	64,400,000	37,700,000	26,700,000
1976	149,000,000	89,700,000	59,300,000	1976	44,600,000	29,900,000	14,700,000
1977	259,000,000	172,000,000	87,000,000	1977	43,000,000	29,100,000	13,900,000
1978	111,000,000	58,900,000	52,100,000	1978	50,500,000	28,000,000	22,500,000
1979	129,000,000	72,100,000	56,900,000	1979	40,200,000	24,200,000	16,000,000
1980	---	---	---	1980	57,800,000	104,000,000	-46,200,000

Tributaries also contribute large quantities of sediment and nutrients to the main channel of the river. For example, Clark et al. (1974) estimated that 2,000 tons of phosphorus were added during a 12-month period in 1971 and 1972 between Harrisburg and Conowingo. Most of this phosphorus apparently originated from municipal sewage treatment plants. Sewage treatment plants on the main river channel also add significant amounts of nitrogen and phosphorus.

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APPENDIX C

SUPPLEMENTAL INFORMATION ON PHOSPHORUS FLOW ANALYSES OF THE CONOWINGO RESERVOIR ECOSYSTEM

DETAILED DERIVATION OF THE FLOW ANALYSIS EQUATIONS

The total throughflow for compartment k (T_k) can be defined as internal consumption plus outflows:

$$T_j = \sum_{i=1}^{n} f_{ij} + y_j \qquad (C.1)$$

where

f_{ij} = an element of $\underline{F}$ (a matrix of intercompartmental flows) representing the flow from compartment j to compartment i

y_j = output from j to the environment.

If the nutrient flow into a compartment is proportional to the production of the compartment (i.e., its total throughflow, T_k), then:

$$f_{ij} = q_{ij} T_i \qquad (C.2)$$

where q^*_{ij}'s are elements of the intercompartmental flow matrix ($\underline{F}$) normalized by substituting Eq. C.2 into Eq. C.1:

$$T_j = \sum_i q^*_{ij} T_i + y_i \qquad (C.3)$$

or, in matrix notation:

$$\underline{T} = \underline{TQ}^* + \underline{Y} \qquad (C.4)$$

$$\underline{T} - \underline{TQ}^* = \underline{Y} \qquad (C.5)$$

$$\underline{T} (\underline{I} - \underline{Q}^*) = \underline{Y} \qquad (C.6)$$

where $\underline{I}$ = the identity matrix.

Premultiplying both sides by $(\underline{I} - \underline{Q}^*)^{-1}$ yields:

$$\underline{T} = \underline{Y} (\underline{I} - \underline{Q}^*)^{-1} \qquad (C.7)$$

Similar derivations can be done to yield the $(\underline{I} - \underline{Q}^{**})^{-1}$ matrix (see Eqs. II-5 to II-7).

ESTIMATION OF PHOSPHORUS FLUXES AT INFLOW AND OUTFLOW TO CONOWINGO RESERVOIR

The best estimate of the flux of phosphorus forms into and out of the reservoir involved the interpolation of daily values for each form of phosphorus from the PECO data, and multiplication by the daily-average river flow. This yielded flux values in kg of each phosphorus form per day.

The residence time of the water in the reservoir is similar to the travel time of water between Holtwood and Conowingo Dams. Thus, estimates of the input and output vectors ($\underline{Z}$, $\underline{Y}$) for flow analysis must account for the lagged nature of water transport. Accordingly, the following procedure was used to make the necessary estimates of input and output fluxes:

- The input and output flux time series were smoothed with a 7-day moving average (since the flows mix and disperse between the inflow and the internal sampling stations, and the internal stations and the outflow)
- The date of the midpoint of the sampling interval was determined
- An average residence time for the reservoir was determined by taking a 7-day moving average of daily river flow (Q_7) and calculating the residence time:

$$R = \frac{V}{Q_7} \times \frac{1}{86,400} \qquad (C.8)$$

where

V = volume of reservoir (1.35×10^{10} ft^3)

Q_7 = flow in ft^3/sec

86,400 = number of seconds/day

- The input fluxes were sampled at (midpoint - R/2) days
- The output fluxes were sampled at (midpoint - R/2) days
- The input and output flux estimates were normalized to units of fluxes per liter per day [the units of the intercompartmental flows ($\underline{F}$)].

ESTIMATES OF PHOSPHORUS INPUTS, OUTPUTS, AND INTERCOMPARTMENTAL FLOWS

Three tables present the estimates of phosphorus flows for the 53 time intervals analyzed using flow analysis. All units are μg P/L-day. Table C-1 presents the phosphorus input vectors, $\underline{Z}$. Table C-2 presents the phosphorus output vectors, $\underline{Y}$. Table C-3 presents the non-zero elements of the intercompartmental flow matrices, $\underline{F}$. The intercompartmental flows f_{13}, f_{21}, f_{42}, and f_{54} were the unknown flows estimated by solution of the $\underline{A}$ matrix (Eq. II-27).

PHOSPHORUS FLOW INDICES

Estimates of the Total System Throughflow (TST), Average Path Length ($\overline{PL}$), Straight-through Portion of Path Length (PL_S), and Cycling Index (CI) are presented in Table C-4.

Four flow indices were calculated for each of the 53 intervals. These were TST, PL, PL_S, and CI; they are tabulated in Table C-4. This section presents assessments of the relationships of the flow indices to selected environmental variables. (Their relationships to DO were discussed in Chapter III.)

Effect of River Flow

None of the four indices appear to show any relationship to weekly average river flow. Figures C-1 and C-2 are plots of CI and TST vs. river flow, respectively. Numbered points represent the last digit of the year of sampling ("1" = 1971, etc.); there is no apparent year-to-year pattern.

Effect of Time of Year

Several indices show weak relationships to time of year. A plot of CI vs. Julian date (Fig. C-3) shows maximum values from mid-July to mid-October (days 185-290), while spring and late fall values are very low. Since the cycling index is an indicator of the total phosphorus metabolism of the ecosystem (which would tend to increase phosphorus recycling relative to straight throughflow), the summertime increase in CI is consistent with increased metabolism due to high temperature and light levels. Large variations with time are again apparent.

Table C-1. Conowingo Reservoir phosphorus z vector inputs (µg P/L-day)

YEAR=1971

DATE	DISSOLVED P INPUT	PHYTO-PLANKTON P INPUT	ZOO-PLANKTON P INPUT	PARTICULATE P INPUT	SEDIMENT P INPUT
06OCT71	6.42673	8.6437	0.686100	1.59406	0
20OCT71	6.85442	9.5144	0.693544	1.75193	0
03NOV71	7.45650	10.1738	0.657858	1.77354	0
17NOV71	4.98766	7.6166	0.434054	1.18767	0

YEAR=1972

DATE	DISSOLVED P INPUT	PHYTO-PLANKTON P INPUT	ZOO-PLANKTON P INPUT	PARTICULATE P INPUT	SEDIMENT P INPUT
26JUL72	32.5172	18.7033	0.036211	37.0542	0
09AUG72	28.5200	18.7655	0.085525	37.3253	0
23AUG72	24.6129	18.6370	0.278975	33.7519	0
06SEP72	24.0085	14.3225	0.291131	32.5408	0
20SEP72	21.0783	12.2750	0.340015	31.6716	0
11OCT72	9.8737	6.4203	0.375951	8.1520	0
02NOV72	5.5033	4.2576	0.375475	3.4439	0

YEAR=1973

DATE	DISSOLVED P INPUT	PHYTO-PLANKTON P INPUT	ZOO-PLANKTON P INPUT	PARTICULATE P INPUT	SEDIMENT P INPUT
11JUL73	23.8263	14.6936	0.018971	20.1603	0
25JUL73	20.1241	14.9045	0.049544	18.3967	0
08AUG73	16.6531	12.4246	0.067715	14.2155	0
10OCT73	13.8997	23.7159	0.171763	6.1890	0

YEAR=1974

DATE	DISSOLVED P INPUT	PHYTO-PLANKTON P INPUT	ZOO-PLANKTON P INPUT	PARTICULATE P INPUT	SEDIMENT P INPUT
12JUN74	20.7247	11.3051	0.0047264	6.04073	0
17JUL74	20.6858	12.5910	0.0229654	4.33635	0
04AUG74	15.7688	11.9816	0.0272181	1.42265	0
22AUG74	15.1422	10.6272	0.0565495	0.94199	0
18SEP74	9.9948	5.8701	0.0725791	1.02021	0
02OCT74	9.5352	6.3716	0.0836108	1.40605	0
16OCT74	8.5557	6.7382	0.0795352	1.52416	0
30OCT74	6.8605	6.5161	0.0674049	1.12381	0

Table C-1. Continued

YEAR=1975

DATE	DISSOLVED P INPUT	PHYTO-PLANKTON P INPUT	ZOO-PLANKTON P INPUT	PARTICULATE P INPUT	SEDIMENT P INPUT
17JUL75	26.3566	17.2540	0.032123	3.40615	0
30JUL75	27.4618	17.6359	0.059514	3.51233	0
17SEP75	16.5476	11.0375	0.195036	1.53867	0

YEAR=1976

DATE	DISSOLVED P INPUT	PHYTO-PLANKTON P INPUT	ZOO-PLANKTON P INPUT	PARTICULATE P INPUT	SEDIMENT P INPUT
21JUL76	19.3178	13.3598	0.090654	5.21275	0
18AUG76	17.8841	13.4244	0.107347	4.38598	0
04SEP76	17.6267	11.2688	0.115366	4.30834	0
21SEP76	17.0195	9.0361	0.159814	4.02058	0

YEAR=1977

DATE	DISSOLVED P INPUT	PHYTO-PLANKTON P INPUT	ZOO-PLANKTON P INPUT	PARTICULATE P INPUT	SEDIMENT P INPUT
17MAY77	48.9733	14.6440	0.002389	35.9163	0
30MAY77	47.6943	15.6099	0.003176	35.5424	0
13JUN77	47.4524	16.3449	0.011080	35.5944	0
18JUL77	14.7923	11.7186	0.133855	3.7390	0
02AUG77	13.7878	12.5341	0.142680	3.0281	0
16AUG77	10.2657	8.9117	0.163821	1.9148	0

YEAR=1978

DATE	DISSOLVED P INPUT	PHYTO-PLANKTON P INPUT	ZOO-PLANKTON P INPUT	PARTICULATE P INPUT	SEDIMENT P INPUT
17JUL78	18.7093	21.1298	0.022182	4.44133	0
31JUL78	16.2599	21.8904	0.044430	2.41301	0
14AUG78	17.4338	23.3680	0.098530	3.05704	0
01SEP78	12.0507	16.1466	0.109141	2.46909	0
19SEP78	9.3369	10.1515	0.120593	2.08640	0
17OCT78	9.0761	8.8713	0.170497	3.61880	0
01NOV78	8.5333	8.5639	0.163144	3.77080	0
14NOV78	8.6629	9.8719	0.142414	3.62664	0
28NOV78	5.8789	7.5315	0.088181	2.96024	0

Table C-1. Continued

YEAR=1979

DATE	DISSOLVED P INPUT	PHYTO-PLANKTON P INPUT	ZOO-PLANKTON P INPUT	PARTICULATE P INPUT	SEDIMENT P INPUT
19JUN79	33.0830	16.8214	0.0210095	7.39049	0
03JUL79	31.7730	16.6781	0.0251810	7.12497	0
17JUL79	24.0516	17.3285	0.0519604	5.23166	0
01AUG79	21.0307	17.8562	0.0803336	3.21572	0
15AUG79	21.9520	18.1901	0.0965972	3.09453	0

YEAR=1980

DATE	DISSOLVED P INPUT	PHYTO-PLANKTON P INPUT	ZOO-PLANKTON P INPUT	PARTICULATE P INPUT	SEDIMENT P INPUT
22JUL80	5.29262	6.68753	0	5.03587	0
05AUG80	0.22507	6.09805	0	2.73932	0
18AUG80	0.00000	6.36284	0	2.36611	0

Table C-2. Conowingo Reservoir phosphorus Y vector outputs (µg P/L-day)

YEAR=1971

DATE	DISSOLVED P OUTPUT	PHYTO-PLANKTON P OUTPUT	ZOO-PLANKTON P OUTPUT	PARTICULATE P OUTPUT	F05
06OCT71	1.46404	3.60053	0.644208	0.488270	15.9885
20OCT71	2.00185	5.11014	0.778257	0.478348	13.6793
03NOV71	2.79054	5.91516	0.753453	0.749073	4.9246
17NOV71	3.46460	7.09841	0.629044	0.726199	8.0316

YEAR=1972

DATE	DISSOLVED P OUTPUT	PHYTO-PLANKTON P OUTPUT	ZOO-PLANKTON P OUTPUT	PARTICULATE P OUTPUT	F05
26JUL72	18.7873	14.1899	0.41986	18.0254	36.6820
09AUG72	13.4584	14.6924	0.60751	18.6246	35.3284
23AUG72	12.7447	13.0200	0.63356	15.8152	32.7515
06SEP72	12.0905	9.4641	0.57418	15.0984	36.0726
20SEP72	11.5064	8.2627	0.65141	14.8302	29.3698
11OCT72	3.9708	5.0893	0.92566	4.0868	10.5841
02NOV72	2.5598	2.8588	1.09139	1.4994	3.4949

YEAR=1973

DATE	DISSOLVED P OUTPUT	PHYTO-PLANKTON P OUTPUT	ZOO-PLANKTON P OUTPUT	PARTICULATE P OUTPUT	F05
11JUL73	10.0692	13.1527	0.157086	5.63111	28.5481
25JUL73	8.6304	12.8457	0.190582	4.98653	24.8975
08AUG73	7.1059	11.1543	0.212947	3.79736	27.9667
10OCT73	3.2777	2.9191	0.343779	0.97853	37.9774

YEAR=1974

DATE	DISSOLVED P OUTPUT	PHYTO-PLANKTON P OUTPUT	ZOO-PLANKTON P OUTPUT	PARTICULATE P OUTPUT	F05
12JUN74	18.6556	8.46011	0.146663	5.50921	3.5315
17JUL74	17.4293	8.65552	0.250715	4.14930	8.1024
04AUG74	12.7735	7.89321	0.273312	0.84641	8.0470
22AUG74	11.7088	6.89612	0.291308	0.36700	7.9084
18SEP74	6.6458	3.44965	0.342422	0.24592	1.8795
02OCT74	6.3807	3.86572	0.244589	0.20886	6.8411
16OCT74	4.4036	3.41434	0.248919	0.36337	2.0293
30OCT74	4.1500	3.54872	0.203867	0.35648	16.0541

Table C-2. Continued

YEAR=1975

DATE	DISSOLVED P OUTPUT	PHYTO-PLANKTON P OUTPUT	ZOO-PLANKTON P OUTPUT	PARTICULATE P OUTPUT	FOS
17JUL75	15.8267	9.94723	0.232031	1.18148	16.1900
30JUL75	14.5417	9.84113	0.272976	1.08382	17.7628
17SEP75	8.3820	5.26222	0.280415	0.44762	14.1803

YEAR=1976

DATE	DISSOLVED P OUTPUT	PHYTO-PLANKTON P OUTPUT	ZOO-PLANKTON P OUTPUT	PARTICULATE P OUTPUT	FOS
21JUL76	17.0780	10.1238	1.45188	4.16893	8.4634
18AUG76	12.8201	8.5077	1.52980	3.47716	3.6163
04SEP76	11.0119	6.0640	1.53596	3.07796	14.3263
21SEP76	8.7876	3.7890	1.52913	2.58027	15.8431

YEAR=1977

DATE	DISSOLVED P OUTPUT	PHYTO-PLANKTON P OUTPUT	ZOO-PLANKTON P OUTPUT	PARTICULATE P OUTPUT	FOS
17MAY77	38.9487	6.77713	0.005132	21.0577	31.2296
30MAY77	37.5385	6.74297	0.067250	20.8538	34.5048
13JUN77	37.1876	6.79628	0.082355	20.8495	36.1692
18JUL77	7.5487	3.78365	0.181896	1.4880	15.0495
02AUG77	5.9152	3.08098	0.190429	1.0361	22.9007
16AUG77	3.8047	1.77482	0.192287	0.5011	9.4072

YEAR=1978

DATE	DISSOLVED P OUTPUT	PHYTO-PLANKTON P OUTPUT	ZOO-PLANKTON P OUTPUT	PARTICULATE P OUTPUT	FOS
17JUL78	16.1254	6.57599	0.118207	3.89331	15.1358
31JUL78	13.1930	6.63523	0.132381	2.87699	20.5169
14AUG78	12.0773	6.10455	0.157330	2.68904	21.7314
01SEP78	5.0118	3.26905	0.153999	0.96935	16.4736
19SEP78	3.0657	1.98998	0.139007	0.81582	14.8984
17OCT78	1.6079	1.03521	0.095357	0.49330	20.6448
01NOV78	1.9818	2.00752	0.092382	0.48639	13.5011
14NOV78	2.6029	2.42243	0.079469	0.64404	20.7018
28NOV78	2.7061	2.46366	0.054583	0.62412	12.3765

Table C-2. Continued

YEAR=1979

DATE	DISSOLVED P OUTPUT	PHYTO-PLANKTON P OUTPUT	ZOO-PLANKTON P OUTPUT	PARTICULATE P OUTPUT	FOS
19JUN79	20.2629	7.54320	0.279508	4.17459	31.1345
03JUL79	20.0221	7.54302	0.295374	4.03517	24.0592
17JUL79	13.0124	7.59823	0.337109	2.61911	22.5476
01AUG79	10.9991	6.43014	0.340752	1.64984	21.6748
15AUG79	9.0919	3.17852	0.341716	0.95942	26.5819

YEAR=1980

DATE	DISSOLVED P OUTPUT	PHYTO-PLANKTON P OUTPUT	ZOO-PLANKTON P OUTPUT	PARTICULATE P OUTPUT	FOS
22JUL80	0.913061	9.6048	0.0393040	4.92573	-5.2526
05AUG80	0.000000	12.5818	0.0259214	2.17883	0.0038
18AUG80	0.000000	15.2373	0.0193356	1.17296	-7.1941

Table C-3. Conowingo Reservoir phosphorus F matrix intercompartmental flows (µg P/L-day)

YEAR=1971

DATE	F13	F14	F15	F21	F32	F34	F42	F43	F54
06OCT71	0.878899	10.7201	0.961622	23.5133	0.610087	0.357649	27.4822	1.02876	16.9502
20OCT71	0.000000	2.5445	0.766507	9.4118	0.497086	0.110745	13.7327	0.68745	14.4458
03NOV71	0.996537	5.1930	0.430121	7.8595	0.036471	0.008413	10.4047	0.04785	5.3547
17NOV71	0.000000	1.0100	0.205902	6.7468	0.015343	0.001258	7.7472	0.01888	8.2375

YEAR=1972

DATE	F13	F14	F15	F21	F32	F34	F42	F43	F54
26JUL72	-1.9833	4.94033	2.50200	19.6085	1.51254	0.288369	23.5902	1.90768	39.1840
09AUG72	-0.8429	8.72463	1.86075	24.4311	2.49390	0.576089	25.1657	3.19077	37.1892
23AUG72	0.0000	7.32366	2.14680	18.2308	2.38799	0.446635	21.5413	2.94618	34.8983
06SEP72	0.3810	4.89094	1.77798	20.6693	1.48443	0.162615	23.5314	1.70787	37.8506
20SEP72	-1.4105	6.79507	1.33091	16.3340	2.06431	0.478240	18.8543	2.67129	30.7007
11OCT72	0.0606	6.05806	3.07220	14.6160	1.51757	0.125786	13.8728	1.68133	13.6563
02NOV72	0.0000	3.85730	0.34633	6.0913	0.15657	0.018897	6.1650	0.18443	3.8412

YEAR=1973

DATE	F13	F14	F15	F21	F32	F34	F42	F43	F54
11JUL73	-0.64042	27.7363	2.53901	41.5740	0.67742	0.625230	45.3260	1.34388	31.0871
25JUL73	0.14184	9.2597	2.69327	22.9861	1.29506	0.108601	19.9745	1.42511	27.5908
08AUG73	0.00000	7.5864	3.03631	23.9065	0.71932	0.117732	27.2171	0.86544	31.0030
10OCT73	0.00000	9.7455	0.66341	21.7029	0.06757	0.072814	43.0617	0.15406	38.6408

YEAR=1974

DATE	F13	F14	F15	F21	F32	F34	F42	F43	F54
12JUN74	-0.98088	4.6669	1.89055	6.5036	1.56550	0.172607	6.3711	1.80576	5.4220
17JUL74	0.09730	5.2852	2.54207	11.2044	0.86653	0.121250	14.8141	1.02974	10.6444
04AUG74	-0.52155	2.9799	2.46968	8.2651	0.91462	0.104503	11.7815	1.08327	10.5167
22AUG74	0.00000	2.4904	2.87415	8.5303	0.71700	0.086435	11.8484	0.86692	10.7825
18SEP74	0.00000	7.3216	1.41620	10.5614	1.37760	0.208088	9.2949	1.63767	3.2957
02OCT74	0.06127	4.6166	0.66943	7.8927	0.49039	0.082925	10.3510	0.60618	7.5105
16OCT74	0.00000	16.0642	0.43012	17.7366	0.53564	0.357756	20.2241	0.93413	2.4594
30OCT74	0.34171	1.7598	0.54391	9.7843	0.07231	0.006534	13.4963	0.08563	16.5980

YEAR=1975

DATE	F13	F14	F15	F21	F32	F34	F42	F43	F54
17JUL75	0	14.2256	2.58527	24.0959	0.100055	0.041391	31.8222	0.146768	18.7752
30JUL75	0	30.6036	3.46784	44.9012	0.528616	0.173198	50.1201	0.712165	21.2306
17SEP75	0	6.1129	1.03066	16.1396	0.017781	0.001765	19.7658	0.020074	15.2110

Table C-3. Continued

YEAR=1976

DATE	F13	F14	F15	F21	F32	F34	F42	F43	F54
21JUL76	-2.2494	4.9269	2.21611	7.5141	1.03453	0.136746	12.9026	1.22205	10.6795
18AUG76	-1.0867	18.6342	2.10686	21.7117	0.94154	0.259587	24.1089	1.22661	5.7232
04SEP76	-1.5276	2.1507	1.72112	9.4399	0.69890	0.038275	14.8295	0.76973	16.0474
21SEP76	-1.0133	4.6506	2.05465	15.5553	0.09405	0.013853	21.2627	0.11335	17.8978

YEAR=1977

DATE	F13	F14	F15	F21	F32	F34	F42	F43	F54
17MAY77	-1.2377	7.9125	1.21837	18.4888	1.03863	0.324578	25.1993	1.43824	32.4480
30MAY77	0.1407	8.0627	1.57824	19.7277	0.55287	0.250050	28.7058	0.85965	36.0831
13JUN77	0.1138	2.0102	1.28929	15.4262	0.72944	0.044958	23.1538	0.81530	37.4585
18JUL77	0.4637	13.1047	3.41811	22.5054	0.15974	0.034081	30.0364	0.19858	18.4676
02AUG77	0.0000	2.1126	2.65465	14.6169	0.02564	0.001475	24.7455	0.02840	25.5553
16AUG77	0.0000	13.0101	2.53901	18.1273	0.05105	0.014620	24.7433	0.06772	11.9462

YEAR=1978

DATE	F13	F14	F15	F21	F32	F34	F42	F43	F54
17JUL78	-0.91770	4.6940	2.76222	8.8894	2.14365	0.148709	19.7290	2.35031	17.8980
31JUL78	0.55584	6.0655	2.91596	13.3733	0.23406	0.039940	29.8379	0.28604	23.4329
14AUG78	0.00000	9.7553	3.07827	18.0703	0.47037	0.081295	34.0479	0.56690	24.8097
01SEP78	0.00000	19.6437	2.41481	24.8368	0.32380	0.135399	37.4666	0.47181	18.8884
19SEP78	0.01059	39.7340	1.73778	52.7879	0.48561	0.214743	57.6406	0.71024	16.6362
17OCT78	0.10817	2.2723	0.61719	11.3049	0.04426	0.003449	18.7095	0.05049	21.2619
01NOV78	0.09676	7.3066	0.50602	13.8735	0.01582	0.003074	19.2582	0.01966	14.0071
14NOV78	0.07476	4.0330	0.43012	11.7671	0.00060	0.000126	21.3227	0.00079	21.1319
28NOV78	0.03410	1.4289	0.21041	5.5641	0.00010	0.000014	11.1805	0.00013	12.5869

YEAR=1979

DATE	F13	F14	F15	F21	F32	F34	F42	F43	F54
19JUN79	-1.6715	5.3126	1.83671	23.0060	0.714748	0.296665	32.0599	1.11356	32.9712
03JUL79	0.6650	4.3365	1.75882	17.8586	0.259300	0.081284	26.6605	0.37487	25.8180
17JUL79	0.1076	5.4687	3.13435	19.0972	0.094453	0.018991	28.3946	0.11980	25.6819
01AUG79	0.0000	9.5963	3.56949	22.3325	0.047622	0.013362	33.5328	0.06353	25.2443
15AUG79	0.0000	16.3869	1.81037	30.1854	0.019990	0.007379	43.9601	0.02819	28.3922

YEAR=1980

DATE	F13	F14	F15	F21	F32	F34	F42	F43	F54
22JUL80	0.0000000	10.0117	3.45285	11.7679	0.181522	0.0338845	7.27700	0.221597	-1.7998
05AUG80	0.0321131	6.9995	3.52338	15.7750	0.056069	0.0086914	9.60814	0.067031	3.5272
18AUG80	0.011678	12.7549	2.56049	15.3271	0.000592679	0.000655336	7.65381	0.001342	-4.6336

Table C-4. Conowingo Reservoir phosphorus flow indices

YEAR=1971

DATE	TOTAL SYSTEM THROUGHFLOW (UG P/L-DAY)	AVERAGE PATH LENGTH	STRAIGHT-THROUGH PORTION OF PATH LENGTH	CYCLING INDEX
06OCT71	106.741	4.40378	3.20302	0.272666
20OCT71	64.244	2.91386	2.64614	0.091877
03NOV71	51.480	2.43325	2.11597	0.130392
17NOV71	43.933	2.20216	2.12535	0.034878

YEAR=1972

DATE	TOTAL SYSTEM THROUGHFLOW (UG P/L-DAY)	AVERAGE PATH LENGTH	STRAIGHT-THROUGH PORTION OF PATH LENGTH	CYCLING INDEX
26JUL72	181.262	2.02050	1.97222	0.023896
09AUG72	187.485	2.21362	2.09769	0.052373
23AUG72	167.994	2.15177	2.04893	0.047791
06SEP72	166.268	2.25260	2.15311	0.044167
20SEP72	143.802	2.17935	2.08256	0.044413
11OCT72	80.352	3.12760	2.56185	0.180890
02NOV72	34.966	2.44431	2.10374	0.139331

YEAR=1973

DATE	TOTAL SYSTEM THROUGHFLOW (UG P/L-DAY)	AVERAGE PATH LENGTH	STRAIGHT-THROUGH PORTION OF PATH LENGTH	CYCLING INDEX
11JUL73	211.856	3.43991	2.62780	0.236085
25JUL73	141.403	2.52829	2.28345	0.096838
08AUG73	144.689	2.88011	2.54378	0.116776
10OCT73	159.605	3.50808	3.04327	0.132496

YEAR=1974

DATE	TOTAL SYSTEM THROUGHFLOW (UG P/L-DAY)	AVERAGE PATH LENGTH	STRAIGHT-THROUGH PORTION OF PATH LENGTH	CYCLING INDEX
12JUN74	67.0457	1.69186	1.62966	0.036762
17JUL74	85.1922	2.20779	2.01091	0.089174
04AUG74	67.6384	2.25126	2.07435	0.078584
22AUG74	65.6353	2.39202	2.16307	0.095714
18SEP74	52.3927	3.03206	2.28369	0.246817
02OCT74	50.4311	2.77856	2.38184	0.142782
16OCT74	75.8496	4.43366	2.56252	0.422030
30OCT74	67.0016	2.75578	2.60215	0.055746

YEAR=1975

DATE	TOTAL SYSTEM THROUGHFLOW (UG P/L-DAY)	AVERAGE PATH LENGTH	STRAIGHT-THROUGH PORTION OF PATH LENGTH	CYCLING INDEX
17JUL75	139.566	2.92140	2.39741	0.179365
30JUL75	200.631	4.10344	2.72588	0.335708
17SEP75	88.983	2.90000	2.51094	0.134160

Table C-4. Continued

YEAR=1976

DATE	TOTAL SYSTEM THROUGHFLOW (UG P/L-DAY)	AVERAGE PATH LENGTH	STRAIGHT-THROUGH PORTION OF PATH LENGTH	CYCLING INDEX
21JUL76	80.506	1.91121	1.83106	0.041936
18AUG76	109.789	3.03594	2.24324	0.261105
04SEP76	80.259	2.22381	2.13995	0.037710
21SEP76	93.412	2.84939	2.50419	0.121149

YEAR=1977

DATE	TOTAL SYSTEM THROUGHFLOW (UG P/L-DAY)	AVERAGE PATH LENGTH	STRAIGHT-THROUGH PORTION OF PATH LENGTH	CYCLING INDEX
17MAY77	186.938	1.86738	1.81545	0.027806
30MAY77	195.878	1.96040	1.88957	0.036133
13JUN77	183.218	1.79315	1.77342	0.011003
18JUL77	119.288	3.86044	2.82570	0.268036
02AUG77	102.864	3.10548	2.81363	0.093979
16AUG77	91.786	4.31193	2.86329	0.335961

YEAR=1978

DATE	TOTAL SYSTEM THROUGHFLOW (UG P/L-DAY)	AVERAGE PATH LENGTH	STRAIGHT-THROUGH PORTION OF PATH LENGTH	CYCLING INDEX
17JUL78	102.114	2.29903	2.16505	0.058277
31JUL78	120.218	2.76513	2.49028	0.099399
14AUG78	134.911	3.06398	2.61615	0.146160
01SEP78	135.090	4.37058	2.96342	0.321961
19SEP78	196.726	7.34915	3.29225	0.552023
17OCT78	78.636	3.24088	2.98980	0.077472
01NOV78	76.145	3.61596	2.87952	0.203663
14NOV78	85.212	3.22154	2.90315	0.098831
28NOV78	49.230	2.70125	2.57164	0.047980

YEAR=1979

DATE	TOTAL SYSTEM THROUGHFLOW (UG P/L-DAY)	AVERAGE PATH LENGTH	STRAIGHT-THROUGH PORTION OF PATH LENGTH	CYCLING INDEX
19JUN79	160.345	2.47808	2.35129	0.051162
03JUL79	134.494	2.37281	2.23954	0.056169
17JUL79	129.223	2.74327	2.46467	0.101556
01AUG79	136.846	3.22401	2.67663	0.169780
15AUG79	164.370	3.77175	2.92757	0.223817

YEAR=1980

DATE	TOTAL SYSTEM THROUGHFLOW (UG P/L-DAY)	AVERAGE PATH LENGTH	STRAIGHT-THROUGH PORTION OF PATH LENGTH	CYCLING INDEX
22JUL80	48.8454	2.75984	2.53545	0.081307
05AUG80	54.3875	3.67721	2.40672	0.345505
18AUG80	43.6388	4.38060	3.91610	0.106035

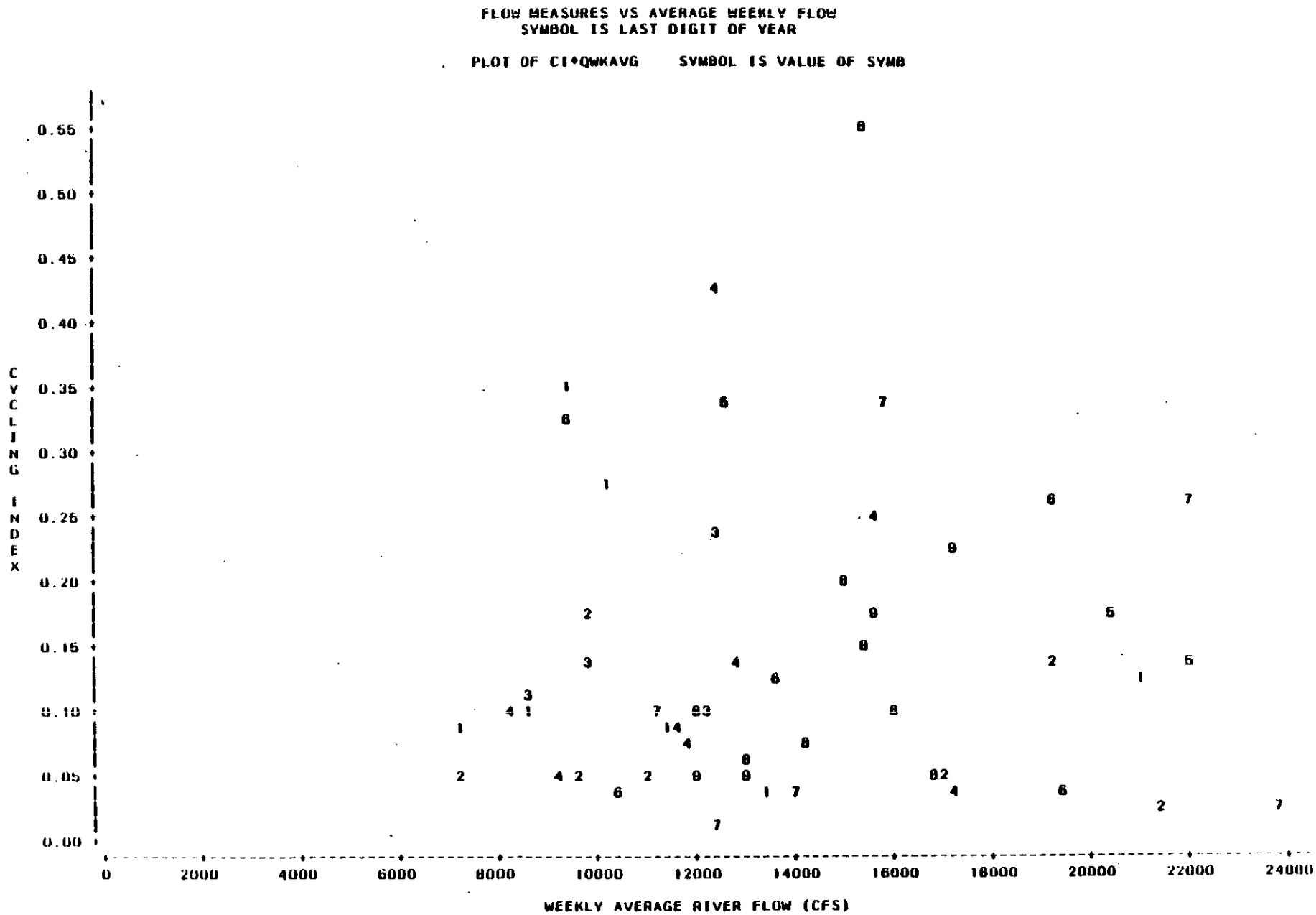

Figure C-1. Cycling index (CI) for phosphorus in Conowingo Reservoir vs. weekly average river flow (cfs), 1971-1980. Symbol is last digit of year.

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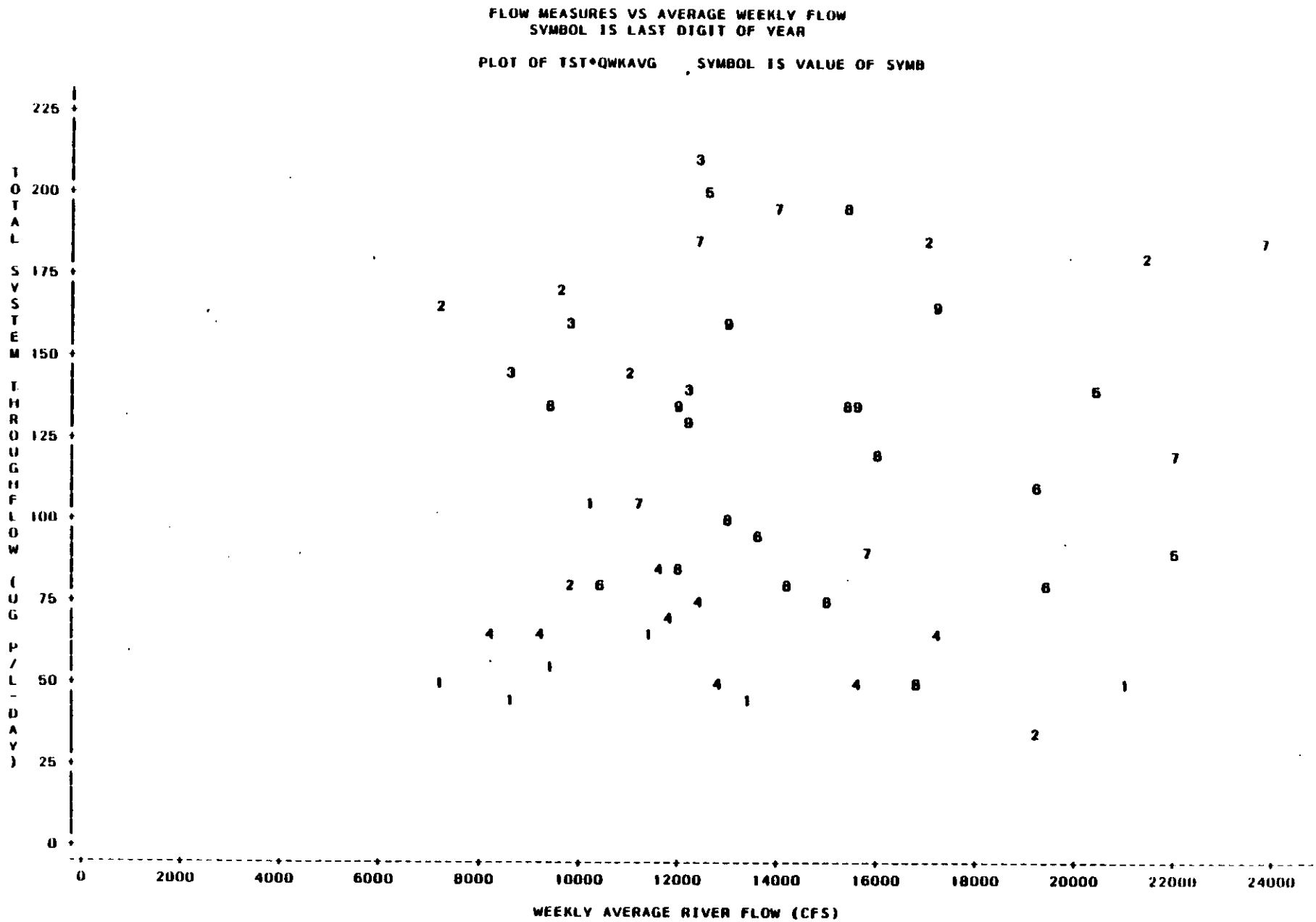

Figure C-2. Total system throughflow (TST) for phosphorus in Conowingo Reservoir vs. weekly average river flow (cfs), 1971-1980. Symbol is last digit of year.

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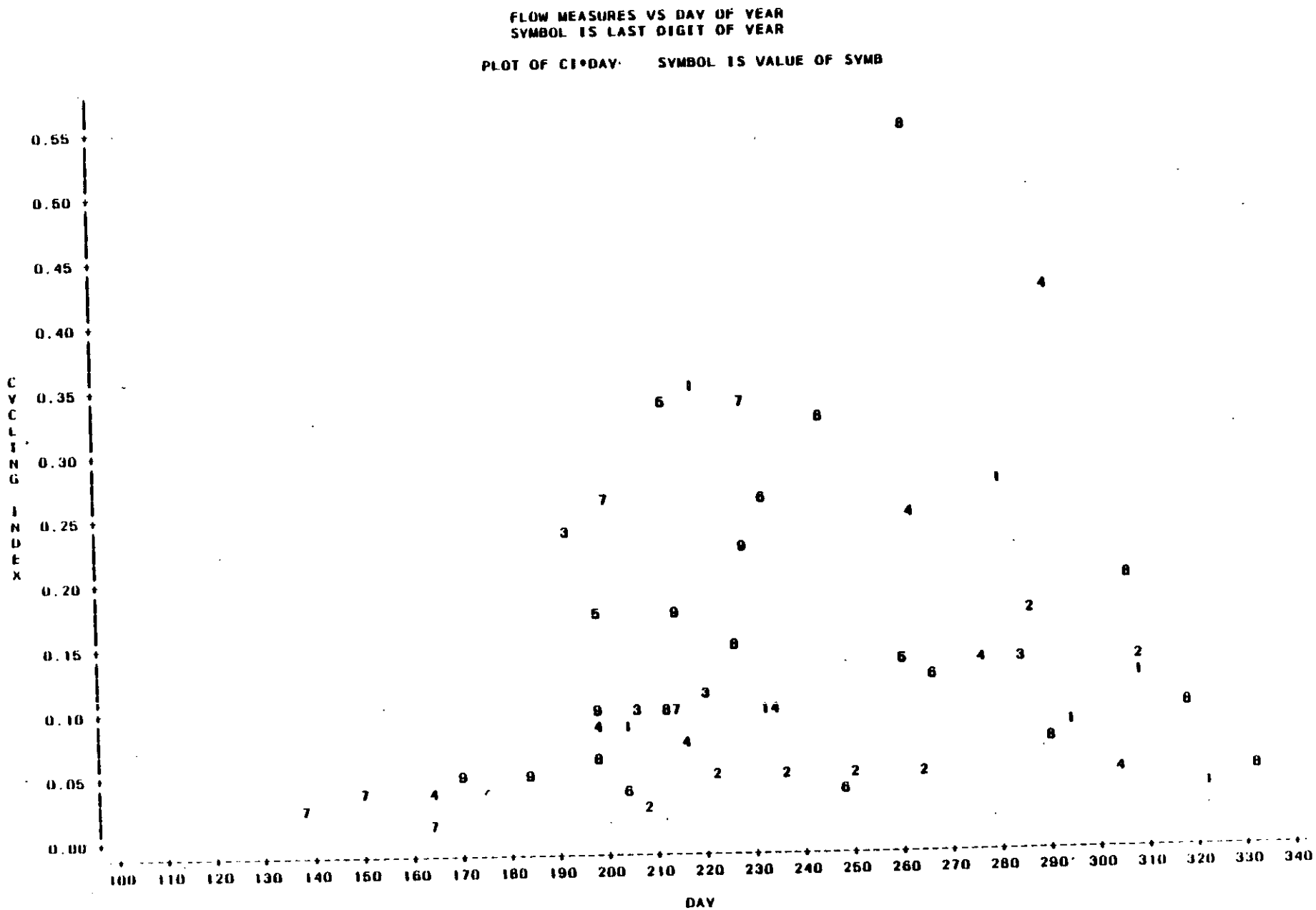

Figure C-3. Cycling index (CI) for phosphorus in Conowingo Reservoir vs. day of year, 1971-1980. Symbol is last digit of year.

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On the other hand, TST will increase when either the straight-through or cycled portion of total phosphorus throughflow is large. TST is thus high both during the spring (when inputs from upstream are large) and during the summer (when metabolic processes cause increased phosphorus cycling) (Fig. C-4). There is more consistency within years, even though year-to-year variations are still apparent. TST values for the summer of 1972 (the months immediately following Tropical Storm Agnes) and for the spring of 1977 are consistently high, both due to high runoff carrying large phosphorus loads. Conversely, TST values for 1971 and 1974 consistently remain low.

Average path length, PL, shows similar summertime increases (Fig. C-5) above a year-round baseline of 1 or 2 (the average number of compartments visited by phosphorus inputs prior to leaving the system). The straight-through average path length values, PL_S, fall mostly in the range of 2-3 compartments visited (Fig. C-6), which is indicative of the dominance of the phytoplankton → particulate detritus → sediment pathway in routing most incoming phosphorus. Again, as yet unexplained temporal variability dominates the distributions.

Effect of Water Temperature

Since community respiration dominates the oxygen metabolism of the system (Sanders et al. 1982a, 1982b) and is driven by water temperature, the flow indices were plotted against temperature. However, few patterns were evident. Only TST showed a weak relationship to temperature (Fig. C-7). The largest values of TST occurred under summertime temperatures (20-30°C).

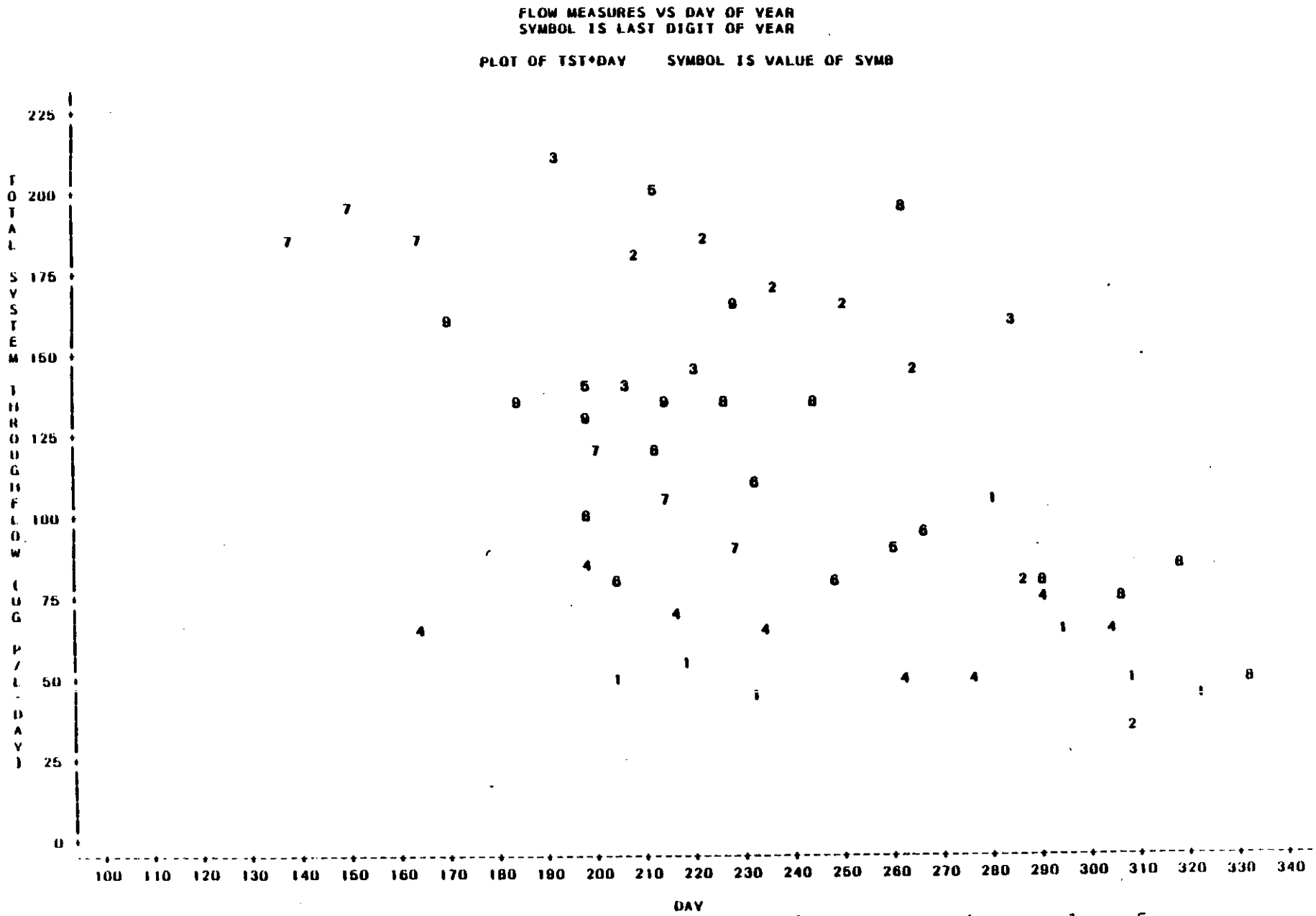

Figure C-4. Total system (TST) for phosphorus in Conowingo Reservoir vs. day of year, 1971-1980. Symbol is last digit of year.

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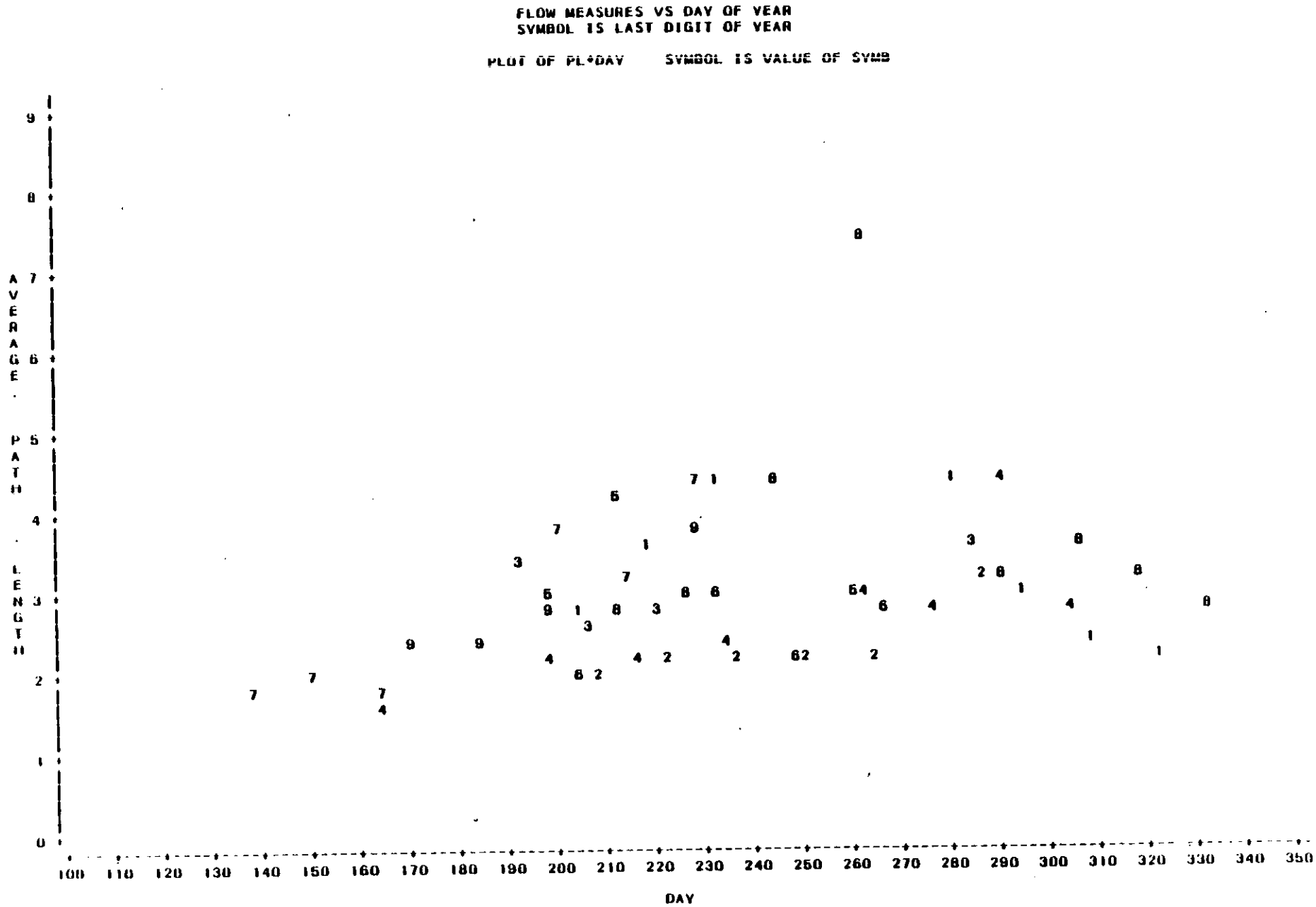

Figure C-5. Average path length (PL) for phosphorus in Conowingo Reservoir vs. day of year, 1971-1980. Symbol is last digit of year.

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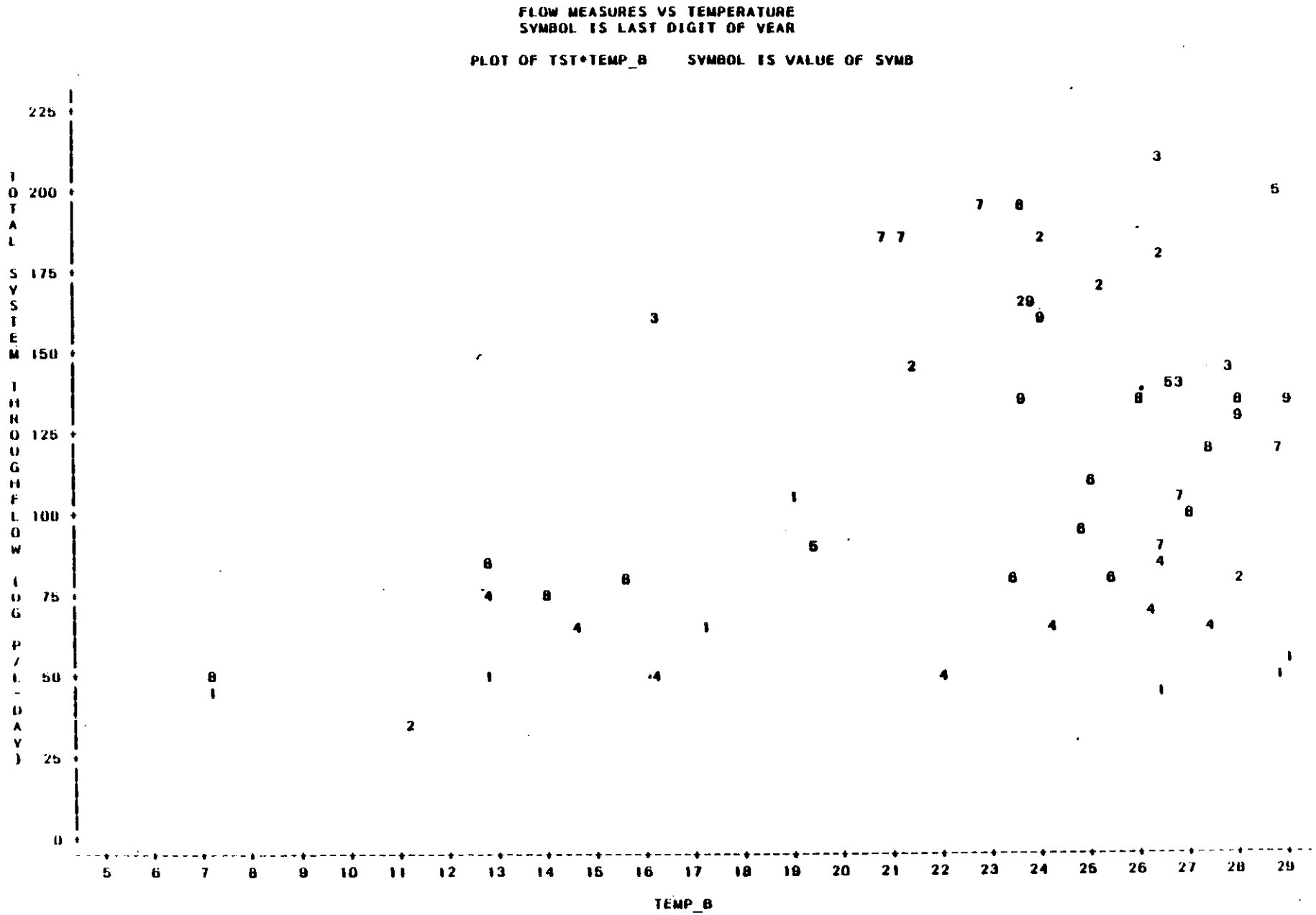

Figure C-7. Total system throughflow (TST) for phosphorus in Conowingo Reservoir vs. bottom water temperature (°C), 1971-1980. Symbol is last digit of year.

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REFERENCES -- APPENDIX C

Sanders, J.G., K.R. Kaumeyer, and W.R. Boynton. 1982a. Plankton metabolism and benthic respiration in the Conowingo Reservoir. Prepared for Radiation Management Corp. February 1982.

Sanders, J.G., K.R. Kaumeyer, and W.R. Boynton. 1982b. Plankton metabolism, benthic metabolism, and oxygen diffusion in the Conowingo Reservoir. Prepared for Radiation Management Corp. October 1982.

Appendix Table 3. Vertical profiles of temperature and dissolved oxygen, secchi disc, depth and surface current speed at each sediment trap station during the spring 1984 study.

LOCATION	DATE	DEPTH M	TEMPER-ATURE °C	DISSOLVED OXYGEN mg l^{-1}	SECCHI DISC m	SURFACE CURRENT m sec^{-1}
York Haven	6-11-84	0.5	27.0	9.8	2.1	0.15
		1.2	27.0	9.8		
		2.4	27.0	9.8		
	6-14-84	0.5	27.5	8.7	1.6	0.32
		1.5	27.5	8.6		
		2.1	27.3	8.6		
Safe Harbor (mid)	6-14-84	0.5	27.5	13.3	1.0	0.20
		1.5	26.5	10.2		
		3.0	26.2	9.1		
		4.5	26.2	8.7		
		6.0	26.1	8.1		
		7.5	26.0	7.6		
		9.0	24.0	4.9		
		10.5	23.6	4.4		
	6-14-84	0.5	28.0	9.4	0.8	0.40
		1.5	27.9	9.2		
		3.0	27.9	8.9		
		4.5	27.5	8.0		
		7.5	26.4	6.4		
		9.0	25.5	3.8		
		10.5	24.9	1.9		
Safe Harbor (dam)	6-11-84	0.5	28.5	13.0	0.7	0.44
		1.5	27.0	11.9		
		3.0	26.0	9.6		
		4.5	25.0	8.3		
		6.0	25.0	6.9		
		7.5	24.0	6.3		
	6-14-84	0.5	27.5	9.5	-	0.40
		1.5	27.5	9.3		
		3.0	27.0	9.0		
		4.5	27.0	8.7		
		6.0	27.0	9.4		
		7.5	27.0	8.8		
Holtwood	6-11-84	0.5	26.0	9.7	1.2	0.09
		1.5	25.6	9.8		
		3.0	25.5	9.8		
		4.5	25.5	9.4		
		6.0	25.5	9.1		
		7.5	25.3	8.9		
		9.0	25.3	7.9		
		10.5	25.4	7.7		
		12.0	25.4	7.4		

Appendix Table 3. Continued.

LOCATION	DATE	DEPTH M	TEMPER-ATURE °C	DISSOLVED OXYGEN mg l^{-1}	SECCHI DISC m	SURFACE CURRENT m sec^{-1}
	6-14-84	0.5	27.2	8.5	0.9	0.09
		1.5	27.2	8.6		
		3.0	27.2	8.5		
		4.5	27.2	8.6		
		6.0	27.2	8.5		
		7.5	27.1	8.5		
		9.0	27.1	8.5		
		10.5	27.1	8.5		
		12.0	27.1	8.4		
Conowingo (upper)	6-11-84	0.5	25.5	9.5	1.1	0.20
		1.0	25.5	9.5		
		2.0	25.2	9.1		
		3.0	25.1	8.9		
		4.0	25.1	9.0		
	6-14-84	0.5	26.0	8.3	1.2	0.19
		1.5	26.0	8.2		
		3.0	25.5	7.4		
Conowingo (mid)	6-11-84	0.5	25.2	11.0	1.3	0.13
		2.0	24.5	10.2		
		4.0	23.5	9.5		
		6.0	23.0	9.3		
		8.0	23.0	8.7		
		4.5	26.0	8.2		
		6.0	25.9	7.7		
		7.5	25.4	7.0		
Conowingo (dam)	6-11-84	0.5	26.0	12.2	1.4	0
		1.5	25.0	12.2		
		3.0	23.5	10.0		
		4.5	23.0	9.2		
		6.0	22.6	8.4		
		7.5	22.5	7.8		
		9.0	22.0	7.7		
		10.5	21.9	6.7		
		12.0	21.7	6.7		
		0.5	27.5	8.7	1.7	0
		1.5	27.5	8.7		
		3.0	27.1	8.8		
		4.5	26.8	8.7		
		6.0	26.3	8.5		
		7.5	26.0	8.2		
		9.0	25.9	7.8		
		10.5	25.7	7.0		
		12.0	25.2	4.2		

Table 7. Data summary of Susquehanna sediment trap cruise, September and October 1983.

STATION	SDATE	STIME	FDATE	FTIME	EXP/LEN	IBOTDEP	FBOTDEP	DEPTH	DSED[a] / SES	DSED[a] / CHL	DSED[a] / C	DSED[a] / N	DSED[a] / P
York Haven	04Oct83	183000	13Oct83	143000	8.83	3.6	3.5	2.88	124.2	0.0373	9.868	1.091	0.1597
									120.2	0.0336	9.227	1.063	0.1637
Safe Harbor (mid)	04Oct83	170000	13Oct83	103000	8.73	10.2	10.2	4.3	26.7	0.0227	1.895	0.2262	0.0476
								4.3	39.8	0.0267	2.775	0.3311	0.0702
								6.6	54.4	0.0350	3.888	0.4529	0.0948
								8.9	138.6	0.0603	8.772	1.012	0.225
								8.9	133.0	0.0638	8.263	0.954	0.226
Holtwood	20Sep83	161000	03Oct83	144500	12.94	11.7	11.7	4.4					
								7.5	18.9	0.00722	1.069	0.1109	0.0476
								10.5	68.8	0.0150	4.347	0.3972	0.1278
								10.5	99.1	0.0224	6.912	0.5565	0.1770
Conowingo Upper	20Sep83	140000	03Oct83	090000	12.79	3.8	4.5	2.8	45.1	0.00722	2.275	0.2105	0.0694
Conowingo Mid	20Sep83	130000	03Oct83	101000	12.88	7.5	8.1	3.18	42.8	0.00682	2.113	0.2162	0.0678
								3.18	38.3	0.00673	1.799	0.1823	0.0565
								4.68	56.3	0.00819	2.638	0.2508	0.0847
								6.51	117.4	0.01174	5.037	0.4618	0.1589
								6.51	130.6	0.01472	4.263	0.5473	0.1762
Conowingo Dam	20Sep83	103500	03Oct83	110000	13.02	12.8	13.8	4.9	33.4	0.00633	1.496	0.1589	0.0561
								4.9	27.9	0.00585	1.952	0.1996	0.0496
								7.9	40.7	0.00645	1.787	0.1920	0.0621
								11.0	86.2	0.01218	3.884	0.3964	0.1299
								11.0	77.7	0.01020	3.388	0.3404	0.1153

[a]Particulate matter depostied ($g\ m^{-2}\ d^{-1}$) is calculated as the amount of material reaching the depth indicated (i.e. depth from water surface) This is not an estimate of the amount of material reaching the sediment surface.

Appendix Table 5. Data summary from Susquehanna Reservoir systems sediment trap deployments; June 1983.

SEDIMENT TRAP DATA

Trap Location: Conowingo Dam

Deployment Dates: 6/11/84 (1030) - 6/14/84 (0940)
Deployment Period: 2.97 days
Total Water Depth: Initial - 13.3m; Final - 13.0m; $\bar{x}$ = 13.15m

NOTE: Particulate matter deposited (g m^{-2} d^{-1}) is calculated in these tables as the amount of material reaching the depth indicated (i.e. depth from water surface). This is not an estimate of the amount of material reaching the bottom.

Depth from Water Surface (m)	Particulate Matter Deposited (g m^{-2} day^{-1})				
	Seston	Chlorophyll a	Carbon	Nitrogen	Phosphorus
4.45	4.3	0.00229	0.373	0.0609	0.0096
	3.4	0.00218	0.236	0.0382	0.0088
7.5	5.4	0.00301	0.340	0.0509	0.0111
10.6	112.9	0.0259	4.830	0.527	0.148
	114.0	0.0284	4.698	0.507	0.146

Trap Location: Conowingo Mid

Deployment Dates: 6/11/84 (0930) - 6/14/84 (0915)
Deployment Period: 2.99 days
Total Water Depth: Initial - 8.2m; Final - 7.8m; $\bar{x}$ = 8.0m

Depth from Water Surface (m)	Particulate Matter Deposited (g m^{-2} day^{-1})				
	Seston	Chlorophyll a	Carbon	Nitrogen	Phosphorus
1.71	11.8	0.00432	0.775	0.0801	0.0143
	6.0	0.00446	0.483	0.0650	0.0097
4.07	8.0	0.00387	0.441	0.0488	0.0116
6.35	106.3	0.0221	4.505	0.421	0.131
	100.7	0.0226	4.533	0.440	0.114

Trap Location: Conowingo Upper

Deployment Dates: 6/11/84 (0845) - 6/14/84 (0830)
Deployment Period: 2.99 days
Total Water Depth: Intial - 4.4m; Final - 3.7m; $\bar{x}$ = 4.1

Depth from Water Surface (m)	Particulate Matter Deposited (g m^{-2} day^{-1})				
	Seston	Chlorophyll a	Carbon	Nitrogen	Phosphorus
3.0	87.3	0.0308	4.847	0.472	0.122
	89.2	0.0284	4.906	0.484	0.0648

Appendix Table 5. Continued.

Trap Location: Holtwood

Deployment Dates: 6/11/84 (1315) - 6/14/84 (1130)
Deployment Period: 2.93 days
Total Water Depth: Initial - 11.6m; Final - 13.1; $\bar{x}$ = 12.36

Depth from Water Surface (m)	Seston	Particulate Matter Deposited ($g\ m^{-2}\ day^{-1}$) Chlorophyll *a*	Carbon	Nitrogen	Phosphorus
5.16	147.4	0.0524	7.470	0.763	0.192
	159.8	0.0571	7.569	0.816	0.199
8.21	202.5	0.0613	7.287	0.919	lost
11.26	263.9	0.0811	8.165	1.133	0.321
	267.8	0.0740	9.076	1.184	0.309

Trap Location: Safe Harbor Dam

Deployment Dates: 6/11/84 (1545) - 6/14/84 (1345)
Deployment Period: 2.92 days
Total Water Depth: Initial - 7.3m; Final - 7.7m; $\bar{x}$ = 7.5m

Depth from Water Surface (m)	Seston	Particulate Matter Deposited ($g\ m^{-2}\ day^{-1}$) Chlorophyll *a*	Carbon	Nitrogen	Phosphorus
1.60	10.8	0.00998	0.620	0.0752	0.0156
	12.8	0.00829	0.750	0.104	0.0186
2.95	16.1	0.0105	0.947	0.120	0.0285
6.0	84.2	0.0262	3.751	0.437	0.0874
	73.7	0.0256	3.373	0.382	0.140

Trap Location: Safe Harbor Mid

Deployment Dates: 6/11/84 (1615) - 6/14/84 (1415)
Deployment Period: 2.92 days
Total Water Depth: Initial - 11.0m; Final - 11.3m; $\bar{x}$ = 11.15m

Depth from Water Surface (m)	Seston	Particulate Matter Deposited ($g\ m^{-2}\ day^{-1}$) Chlorophyll *a*	Carbon	Nitrogen	Phosphorus
6.20	48.0	0.0198	2.438	0.302	0.0568
	47.9	0.0210	2.328	0.275	0.0752
7.72	74.8	0.0263	3.468	0.377	0.0919
9.6	113.1	0.0390	5.593	0.590	0.117
	117.4	0.0376	5.543	0.583	lost