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AN ASSESSMENT OF SEASONAL SUBMERGED AQUATIC VEGETATION (SAV) EPIPHYTE LOADING AT BLOSSOM POINT, MARYLAND

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An Assessment of Seasonal Submerged Aquatic Vegetation (SAV) Epiphyte Loading at Blossom Point, Maryland 2001

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1. ABSTRACT

Measurements of epiphyte fouling rates were made at one location, along each of three permanent transects (PR5, BP3, and KC1) at Blossom Point Maryland in 2001. Measurements were made weekly for three consecutive weeks in the spring, summer, and fall using artificial substrates in the form of rectangular Mylar® strips. Epiphyte fouling rates (dry mass and chlorophyll-*a*) at stations BP3 and KC1 remained low throughout the year. Submerged Aquatic Vegetation (SAV) biomass was exceptionally high at those stations and probably shaded or scraped epiphytes from the artificial substrates. However, as expected, fouling rates at station PR5, (where SAV was much less dense) exhibited strong seasonal changes in both dry mass and chlorophyll-*a*. The lowest dry mass fouling rate was found in the spring (0.105 mg cm^{-2} $week^{-1}$), followed by the summer (1.015 mg cm^{-2} $week^{-1}$), and then the fall (1.923 mg cm^{-2} $week^{-1}$). In all seasons, fouling rates at PR5 remained within the range of conditions found among other locations (Tangier Sound and the Lower Potomac), sampled during the same time period. Light attenuation to the leaf surface at PR5 was greatest in the fall with an average of 10% of surface light reaching the leaf surface compared to 33% of surface light reaching that depth (0.7m). In comparison, the mean epiphyte accumulation rate at station SIBT in Tangier Sound reduced the available light through the water column from 14% of surface irradiances to 3% at the leaf surface after a week of exposure. At both locations SAV persisted, despite seasonal declines in light availability resulting from epiphyte light attenuation. This result suggest that a variety of SAV species are able to tolerate periods of depressed light availability if it does not occur during a critical time period for the SAV. An assessment of water quality conditions at Blossom Point was made by analyzing dissolved nutrient concentrations, chlorophyll-*a* and total suspended solids from samples collected approximately bi-weekly from April through October 2001. Median dissolved inorganic nitrogen (DIN) concentrations were significantly lower in 2001 (12.16 m Mol N) compared to 2000 (36.97mMol M, t-test $P < 0.001$). Median concentrations among all stations ranged from 0.33 mg l^{-1} (transect KC1) to 0.71 mg l^{-1} (transect PR5). Median dissolved inorganic phosphorus (DIP) concentrations were also significantly lower in 2001 (0.860 mMol P) compared to 2000 (1.188 mMol P, t-test $P < 0.05$). However for much of the SAV growing season, DIP concentrations remained above the 0.01 mg l^{-1} oligohaline habitat limit established by the USEPA. During the summer and fall, water column chlorophyll-*a* concentrations in samples collected by CBL (30-40 μg l^{-1}) were often dramatically higher than those collected by the US Army (8-10 μg l^{-1}) at stations BP3 and KC1. Because of the extremely dense SAV at those stations during the summer and fall sampling periods, reduced water circulation often led to strong stratification in waters as shallow as one meter. The Army monitoring program sampled surface water only while CBL's program sampled at 0.5 meter depth. Differences in chlorophyll-*a* concentrations may have been related to these seemingly minor differences in sampling technique.

2. INTRODUCTION

Chesapeake Bay, like many other shallow coastal estuaries worldwide, has experienced declines in SAV populations during the last half of the twentieth century (Den Hartog and Polderman, 1975; Kemp *et al*., 1983; Orth and Moore, 1983, 1984; and Cambridge *et al*., 1986). While overall, coverage of SAV in Chesapeake Bay and tributaries remains well below historic levels (Moore *et al*., 2000) certain areas have remained vegetated or have even recovered in recent years (Carter and Rybicki, 1986). Consequently, there is keen interest in preserving and protecting SAV populations where they exist.

A variety of studies have suggested that increased anthropogenic inputs of dissolved nutrients and particulate matter have been primarily responsible for degraded water quality conditions and reduced light availability to rooted macrophyte populations (*e.g.* Sand-Jensen, 1977; Cambridge *et al*., 1986; Kemp *et al*., 1983; Twilley *et al*., 1985; Silberstein *et al.*, 1986). While light availability is generally agreed to be the most critical resource limiting the extent and distribution of SAV populations, an understanding of what conditions are necessary and sufficient to provide adequate light has proven to be most elusive. For example, a number of studies have demonstrated that epiphytes can substantially reduce the amount of available light reaching the leaf surface (*e.g.* Burt *et al*., 1995; Stankelis *et al*., 1999). However, epiphyte loads can be modified to a great extent by a variety of factors such as: epiphyte grazer density (*e.g.* Neckles *et al*., 1993; Williams and Ruckelshaus, 1993), light availability (Stankelis *et al*., 1999), nutrient availability (Kemp *et al*., 1983; Burt *et al*., 1995), wave action (*e.g.* Koch and Beer, 1996) and leaf turnover rates. The proposed construction of off-shore breakwaters along portions of the shoreline at the Adelphi Laboratory's Blossom Research Facility have the potential to impact healthy SAV populations at this location by altering a variety of these parameters. However, the extent of this impact is uncertain. In order to properly evaluate this impact it is necessary to assess the baseline conditions at this site prior to construction. This portion of the assessment has focused on the contribution of epiphyte accumulation on light attenuation to SAV.

In 1999, three monitoring sites were established along each of three permanent transects (PR5, BP3, and KC1) at approximately one meter mean water depth to evaluate epiphyte accumulation rates. Epiphyte accumulation rate measurements were made in the summer and fall of 1999 and the spring, summer and fall of 2000 and 2001. As a part of this contract, water column dissolved nutrients were measured in 2001. This report provides an evaluation of epiphyte fouling rates, and dissolved nutrient concentrations at these sites, and compares these results to other regions within the Chesapeake Bay system.

3. METHODS

3.1. Water Quality Sampling

Water samples were collected independently by the US Army and Chesapeake Biological Laboratory (CBL) to insure that sufficient information was gathered for an adequate analysis of the SAV habitat throughout the growing season. The analysis of water column dissolved nutrient concentrations from both sets of samples were completed at the Nutrient and Analytical Services Laboratory (NASL) and are included in this report.

3.1.1 Station Locations

All water quality samples were collected along three fixed transects (KC1, BP3, and PR5) located at the Blossom Point Facility (Figure 3-1). The US Army collected water samples at two locations along each transect within and outside of existing SAV beds. Station codes for these data reflect the distance from shore at which water samples were collected. The Chesapeake Biological Laboratory (CBL) collected water quality samples (0.5m below surface) from a single location along each transect adjacent to each epiphyte collection array, which was located at a total water depth of approximately 1 meter average water depth (Table 3-1).

3.1.2. Sampling Frequency

Sampling by CBL was conducted for three consecutive weeks in the spring, as well as four consecutive weeks in the summer and fall of 2001. The exact sampling dates are shown in Table 3-2. This sampling was scheduled to coincide with the measurement of epiphyte fouling rates being conducted at other locations around Chesapeake Bay. A total of eleven water samples and nine epiphyte rate measurements were made during this time by CBL. The US Army collected water samples approximately bi-weekly from March 28, through December 6, 2001.

3.1.3. Water Quality Methods

The following field procedures apply to data collected by CBL. Water samples collected by the US Army may have followed separate procedures.

3.1.3.1. Physical Parameters

Temperature, salinity, conductivity, and dissolved oxygen measurements were measured at 0.5 meters below the water surface using a Yellow Springs International (YSI) 600R or YSI 6920 multi-parameter water quality monitor. Water column turbidity was estimated with a secchi disk where possible, while water column light flux, in the photosynthetically active frequency range,

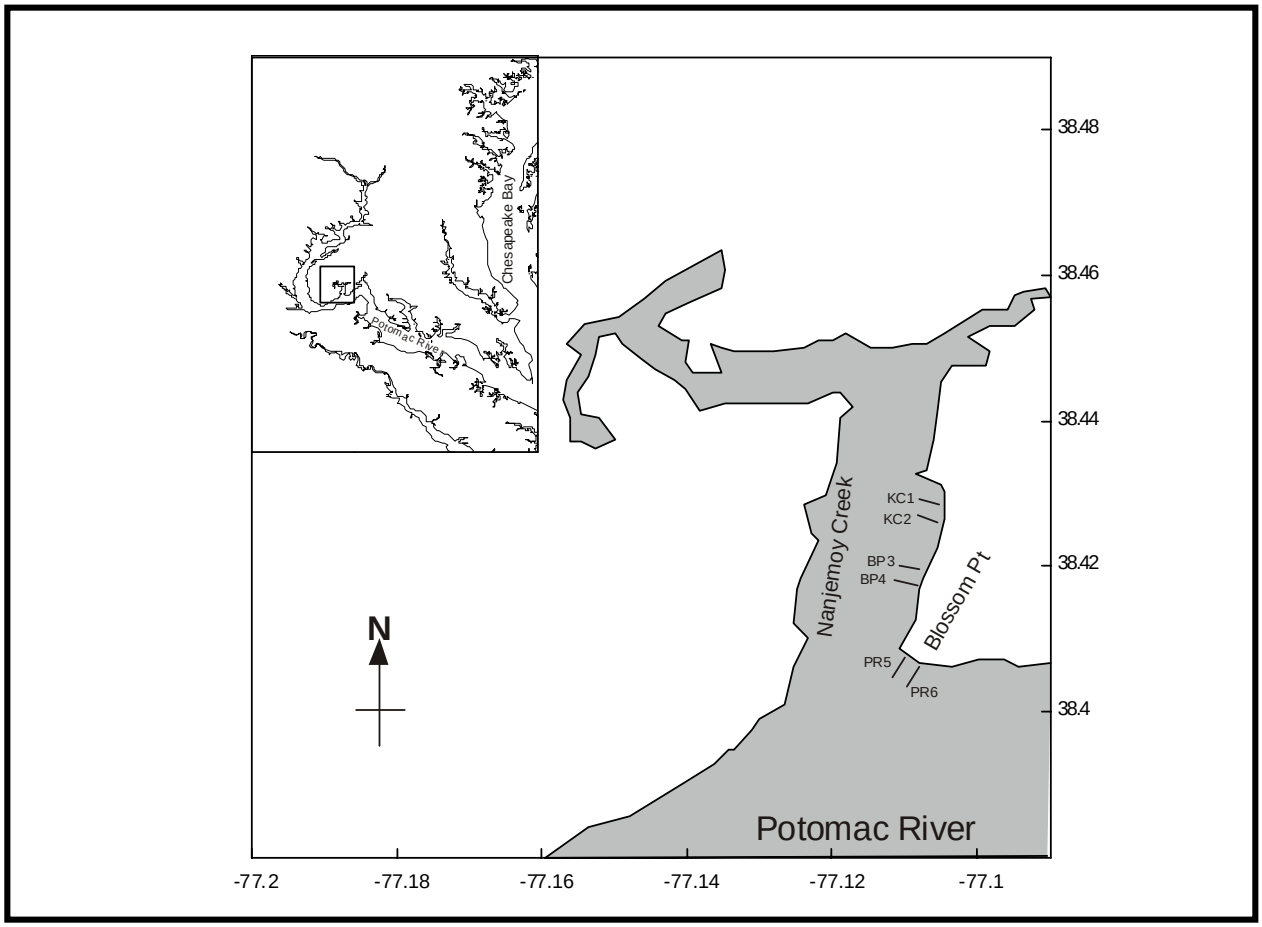

Figure 3-1. Location of Submerged Aquatic Vegetation (SAV) epiphyte monitoring stations at Blossom Point, MD.
Latitude and longitude are in decimal degrees.

Table 3-1. Blossom Point: Submerged aquatic (SAV) station code and geographical coordinates.

STATION CODE	LATITUDE (DGPS) NAD 83	LONGITUDE (DGPS) NAD 83
BP3	37° 58.249’	75° 52.609’
KC1	38° 01.620’	75° 50.509’
PR5	38° 08.835’	75° 50.349’

Table 3-2. Sampling dates for water quality measurements and epiphyte rate measurements collected by CBL at Blossom Point in 2001.

Stations	CBL Water Quality Measurements	Epiphyte Rate Measurements
BP3, KC1, PR5	5/17, 5/25, 6/1 7/13, 7/19, 7/27, 8/3 9/20, 9/27, 10/4, 10/11	5/17, 5/25, 6/1 7/19, 7/27, 8/3 9/27, 10/4, 10/11

(PAR) was measured with a *Li-Cor* LI-192SA underwater quantum sensor. When possible, measurements were collected at three discrete water depths in order to calculate water column light attenuation (Kd). Weather and sea-state conditions such as air temperature, percent cloud cover, wind speed and direction, total water depth, and wave height, were also recorded.

3.1.3.2. Water Column Nutrients, Chlorophyll-*a* and Suspended Solids

Whole water samples were collected by CBL at approximately 0.5 meters below the water surface by carefully dipping a sample bottle beneath the water surface. A portion was immediately filtered with a 25 mm, 0.7 µm (GF/F) glass fiber filter. Both the filtered portion and the remaining whole water samples were placed in coolers for transport back to the laboratory for further processing. The filtered portion was analyzed by the Nutrient Analytical Services Laboratory (NASL) for ammonium (NH_4^+), nitrate (NO_2^-), nitrite plus nitrate ($NO_2^- + NO_3^-$) and phosphate (PO_4^{-3}). Whole water portions were filtered in the laboratory using 47 mm, 0.7 µm (GF/F) glass fiber filters and were transferred to NASL for analysis of the following parameters: total suspended solids (TSS), total volatile solids (TVS), and total and active chlorophyll-*a* concentrations, where total chlorophyll-*a* includes chlorophyll-*a* plus breakdown products.

3.1.3.3. Chemical Analysis Methodology

Methods for the determination of dissolved nutrients collected by both CBL and the US Army were as follows: ammonium (NH_4^+), nitrite (NO_2^-), nitrite plus nitrate ($NO_2^- + NO_3^-$), and dissolved inorganic phosphorus (DIP or PO_4^-) were measured using the automated method of EPA (1979). Methods of Strickland and Parsons (1972) and Parsons *et al.* (1984) are followed for chlorophyll-*a* analysis. Total suspended solids (TSS) and total volatile solids (TVS) were measured with a gravimetric method.

3.2. Epiphyte Growth Survey

3.2.1. Epiphyte Station locations and Sampling Frequency

Epiphyte collection arrays were placed at a single location, on each of three fixed transects (BP3, KC1, PR5) in water averaging 1 meter depth at Blossom Point, Maryland (Figure 3-1, Table 3-1). Three week-long epiphyte fouling rate measurements were collected during spring, summer and fall of 2001. Sampling dates are shown in Table 3-2.

3.2.2. Epiphyte Growth Measurement Method

In order to assess the light attenuation potential of epiphytic growth on the leaves of submerged aquatic vegetation (SAV) artificial substrata, (thin strips of Mylar® polyester plastic), were deployed at a single location along each transect for a period of 6 to 8 days. The use of transparent Mylar® plastic provided a means to estimate light attenuation due to epiphytic growth and sediment accumulation, as well as to quantify the organic and inorganic components of the fouling.

3.2.3. Description of Epiphyte Collector Arrays

Each collector array (Figure 3-2) consisted of a square PVC frame with a vertical PVC shaft in the center of the square. A line was attached to the center shaft with a foam float at the end of the line that allowed for easy location of the collector. Each collector array hold up to six strips. Mylar® strips (2.5 cm wide x 51 cm long and 0.7 mil thick) were attached to the frame so that the top was allowed to move freely in the water column. Small foam floats (~3.5 x 3.3 cm) were attached to the top of the strip to help maintain the strip in a vertical position in the water column at all times.

3.2.4. Sampling the Epiphyte Collector Arrays

On each sampling date, six replicate Mylar® strips were collected. Three strips were analyzed for chlorophyll-*a*, and three for total dry mass/inorganic dry mass. While suspended in the water, Mylar® strips were gently removed from the array and cut with scissors to remove the middle 1/3 marked section (64.5 cm^2, Figure 3-2). This section was once again cut in half and placed in a 60 ml plastic centrifuge tube for transport back to the laboratory. The tube was then placed in a cooler for transport back to the laboratory. The samples were immediately frozen upon arrival at the laboratory prior to further processing.

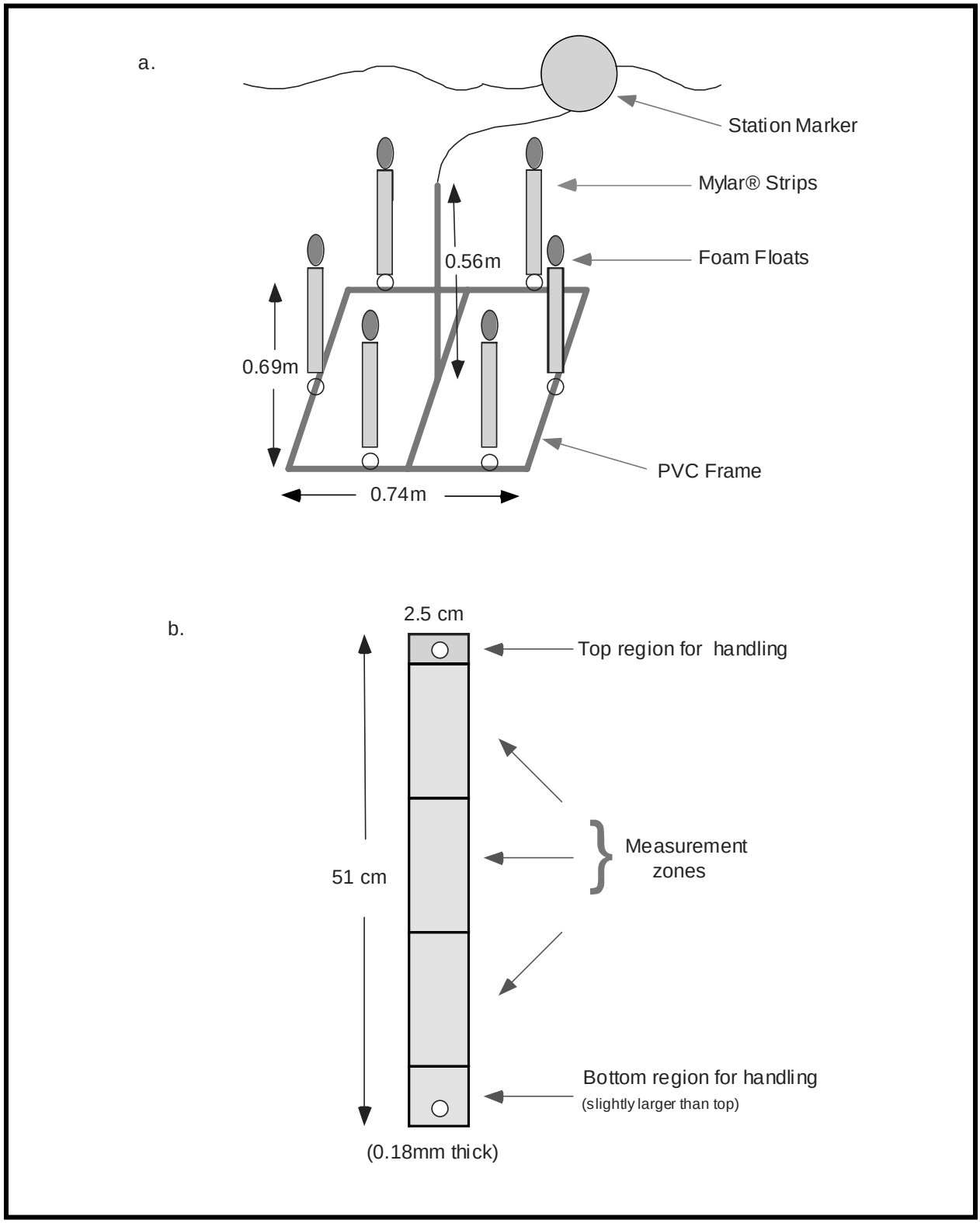

Figure 3-2. Diagram of SAV Epiphyte Collector Array.

a. Epiphyte Collector Array

b. Mylar® strips

3.2.5. Processing Organic/Inorganic Epiphyte Material

The Mylar® strip sections collected for dry mass/inorganic mass analysis were scraped of all material and rinsed with distilled water. Scraped material and rinse water were diluted to a fixed volume (300 - 500 ml). The solution was mixed as thoroughly as possible on a stir plate until homogenized. A small aliquot (10 to 50 ml) was then extracted with a glass pipette and filtered through a 47 mm, 0.7 µm (GF/F) glass fiber filter. Once filtered, the pads were immediately frozen and delivered to NASL for analysis.

3.3 Estimating light Attenuation

There are several trade-offs associated with using artificial substrates for an assessment of epiphyte fouling rates compared to using live SAV. Artificial substrates may not mimic the exact morphology of SAV blades and may not be exactly comparable to the specific species being considered. However, they can provide a first-order estimate of fouling rates that is much less costly than manipulating live SAV blades. In addition, standardization of these estimates allows more rigorous comparison among other locations and studies.

Estimates of light attenuation were made using measurements of epiphyte dry mass and calculating light attenuation from existing relationships between epiphyte dry mass and light attenuation (Figure 3-3 a, b). These relationships can be used to calculate the percentage of surface light reaching the depth of SAV blade through the water column (PLW) and the percentage of surface light reaching the blade of SAV through the epiphyte layer at the leaf surface (PLL). These parameters are explained in Table 3-3.

Table 3-3. Calculation of percentage of surface light reaching the leaf surface (PLL).

Calculation of % Surface Light Reaching Leaf Surface (PLL)	
$PLW = (I_Z/I_0)*100 = [e^{-kd*Z}]$	Where: Iz = Light flux (PAR) at depth
$PLL = [e^{-kd*Z}][1-LA/100]$	I_0 = Light flux (PAR) at surface LA = Epiphyte light attenuation Z = Observation depth (m)

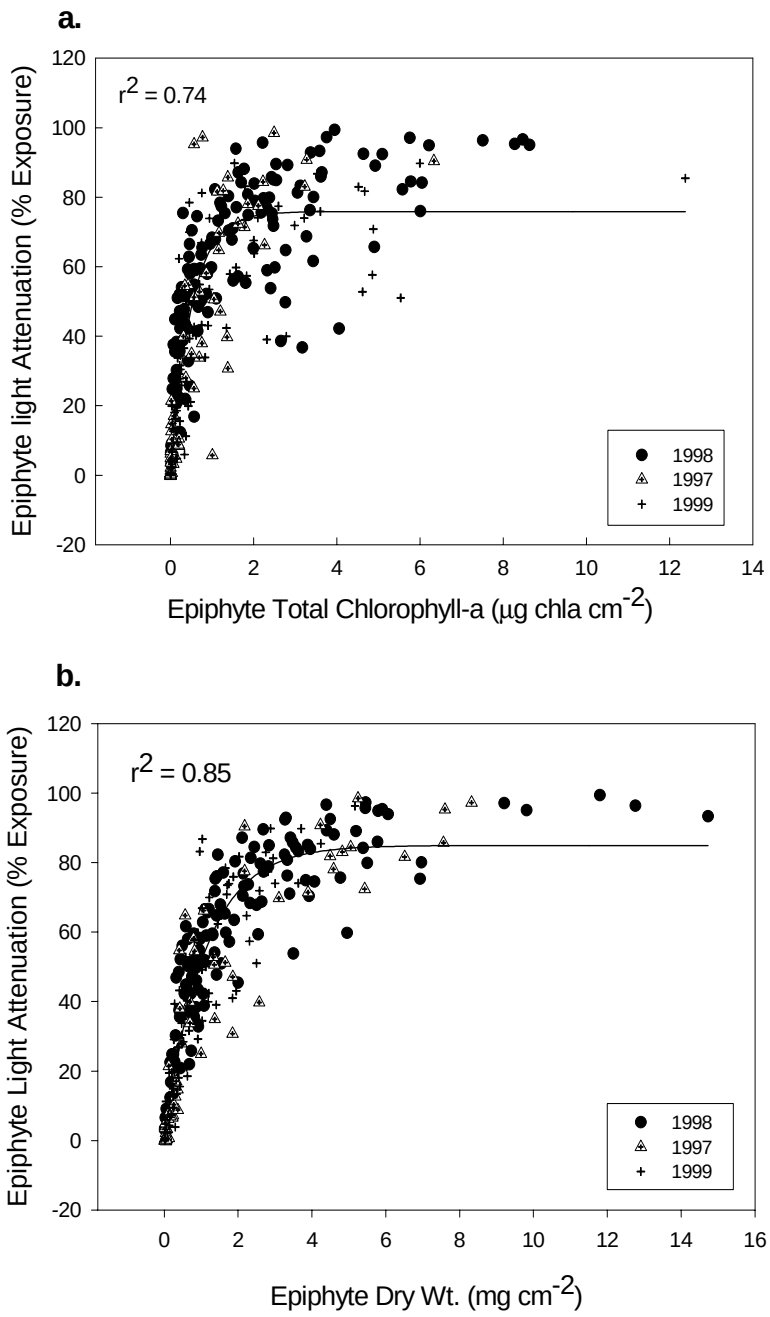

Figure 3-3. a. Epiphyte light attenuation vs. epiphyte chlorophyll-*a*, where light attenuation = $77.36*(1-e^{-2.082*Epi\ Chla})$ and b. epiphyte light attenuation vs. epiphyte dry mass where light attenuation = $84.634*(1-e^{-0.963*Epi\ drywt})$.

3.4 Data management procedures

All field data were recorded on specially prepared field data sheets. The initials of the person recording the data were entered on each data sheet. The raw data sheets were reviewed for possible missing data values due to sample collection problems prior to data entry. These sheets were filed in the laboratory.

3.4.1. Incorporation of Error Codes in Data Tables

In order to keep a record of problems experienced during data collection, an alphanumeric code was entered in the data table describing the problem associated with each questionable parameter value (Table 3-4).

3.4.2. Data Tables QA/QC Control

After data were entered into spreadsheet files, hard copies of the files were manually checked for errors against original data sheets. Any errors were corrected, and a second printout produced which was re-verified by a different staff member.

3.4.3. Blossom Point SAV Habitat Evaluation Data Sets

Data file names had a unique alphanumeric code reflecting the type of data and year (yyyy) data were collected.

WATER QUALITY MEASUREMENTS Filename: **BPWCNDyyyy,** (Appendix A-1) contains temperature, salinity and dissolved oxygen data measured at 0.5 meters below the water surface.

WATER COLUMN LIGHT ATTENUATION MEASUREMENTS Filename: **BPWCLTyyyy**, (Appendix A-2) contains photosynthetically active radiation (PAR) measurements at a minimum of two depths and the subsequent calculated Kd values for each station.

WATER COLUMN NUTRIENT MEASUREMENTS Filename: **BPWCNTyyyy**, (Appendix A-3) contains water column dissolved nutrient concentrations, chlorophyll-*a* (active and total) concentrations, and suspended solids concentrations (total and inorganic) in the surface waters at each station.

EPIPHYTE BIOMASS MEASUREMENTS Filename: **BPEPBMyyyy**, (Appendix A-4) contains epiphyte chlorophyll-*a* concentrations (total and active), total epiphyte dry weight and percent inorganic fractions.

Table 3-4. Analysis Problem Codes

ANALYSIS PROBLEM CODE	DESCRIPTION
D	Insufficient sample
N	Sample Lost
P	Lost results
R	Sample contaminated
S	Sample container broken during analysis
V	Sample results rejected due to QA/QC criteria
X	Sample not preserved properly
AA	Sample thawed when received
BB	Torn filter paper
DA	Damaged epiphyte array
DS	Damaged epiphyte strip
HH	Sample not taken
JJ	Amount filtered not recorded (Calculation could not be done)
LA	Lost epiphyte array
LL	Mislabeled
NI	Data non-interpretable
NR	No replicate analyzed for epiphyte strip chlorophyll-*a* concentration
SS	Sample contaminated in field
SW	Shallow water, light flux measured at two points only
TT	Instrument failure
TF	Instrument left at the laboratory
UU	Analysis discontinued
XX	Sampling for this variable was not included in the monitoring program at this time or was not monitored during a specific cruise
YY	Data not recorded

4. RESULTS AND DISCUSSION

4.1. Dissolved Nutrient Concentrations

As expected, strong seasonal gradients in ammonium as well as nitrite plus nitrate were observed in 2001 with higher concentrations in spring compared to summer and fall (Figures 4-1 and 4-2.). Since the number of samples collected in 2001 was greater than 2000, only those measurements made during the SAV growing season (April – October) were used to compare dissolved nutrient concentrations between years.

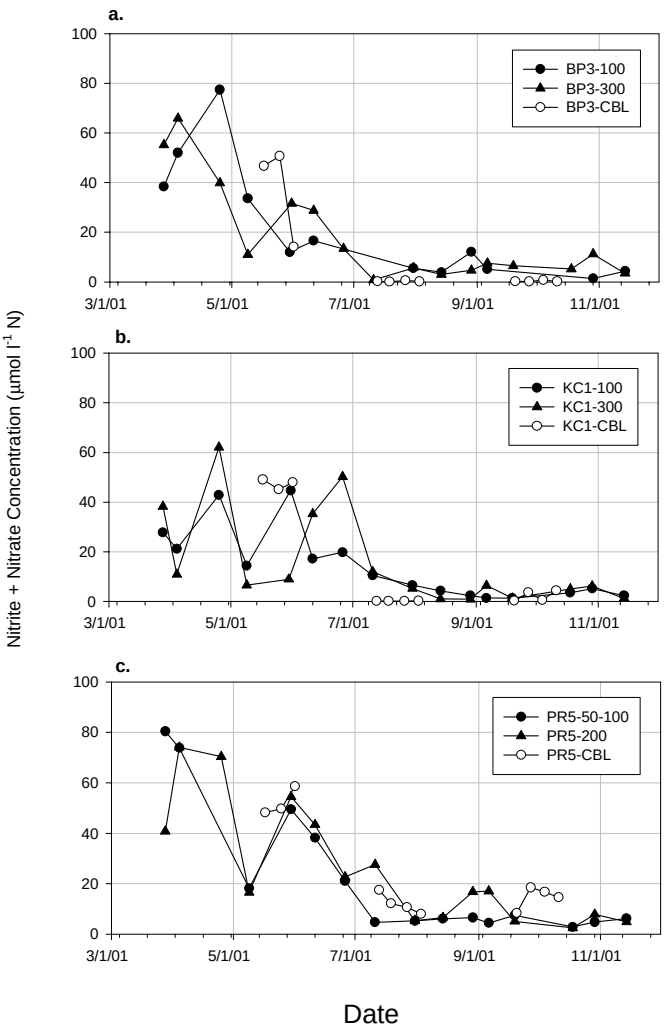

Figure 4-1. Dissolved nitrate plus nitrite concentrations at stations a. BP3, b. KC1, c. PR5 at Blossom Point in 2001.
Station suffixes are distance from shoreline.

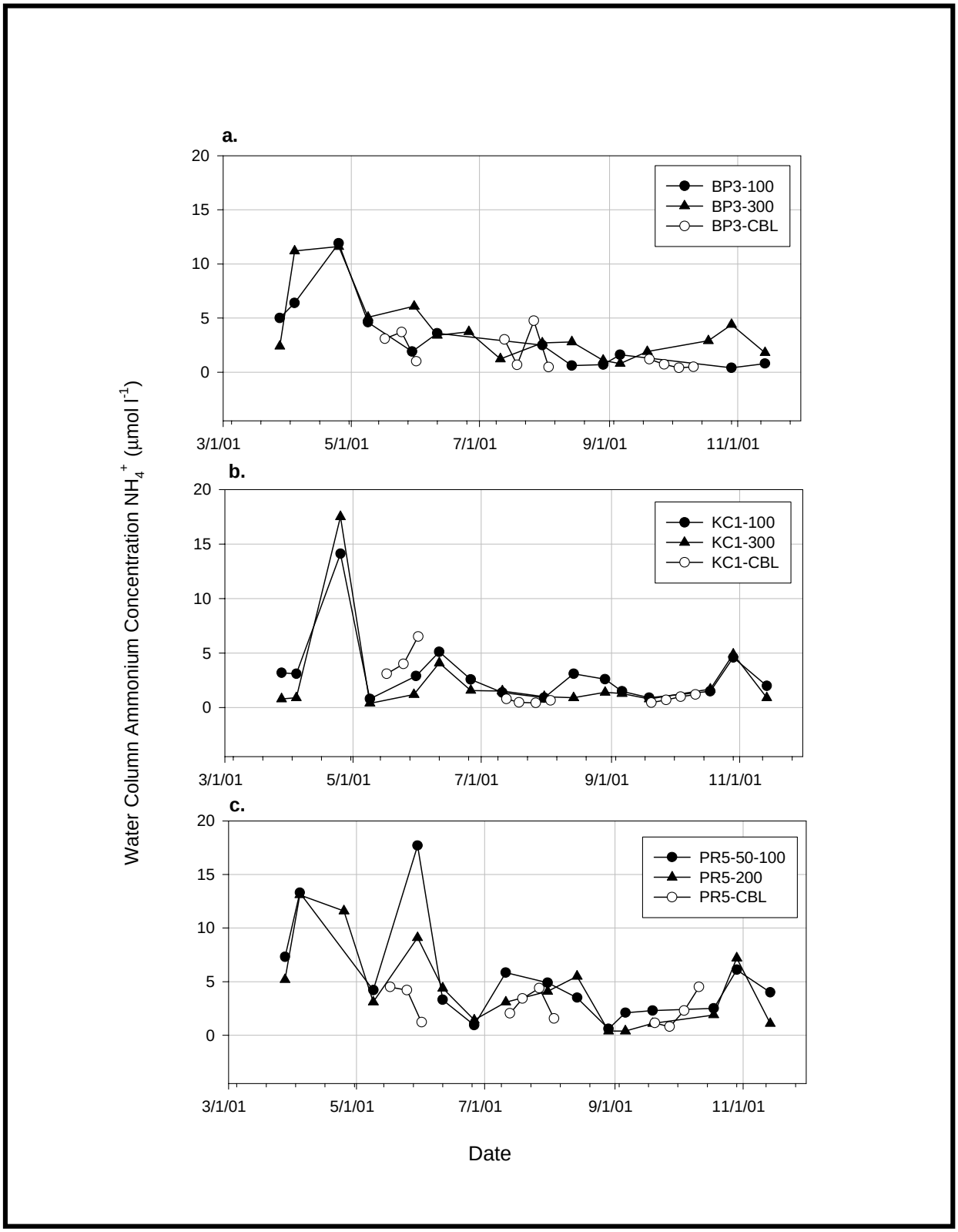

Figure 4-2. Dissolved ammonium concentrations at stations a. BP3, b. KC1 c. PR5 at Blossom Point in 2001.

Station suffixes are distance from shoreline.

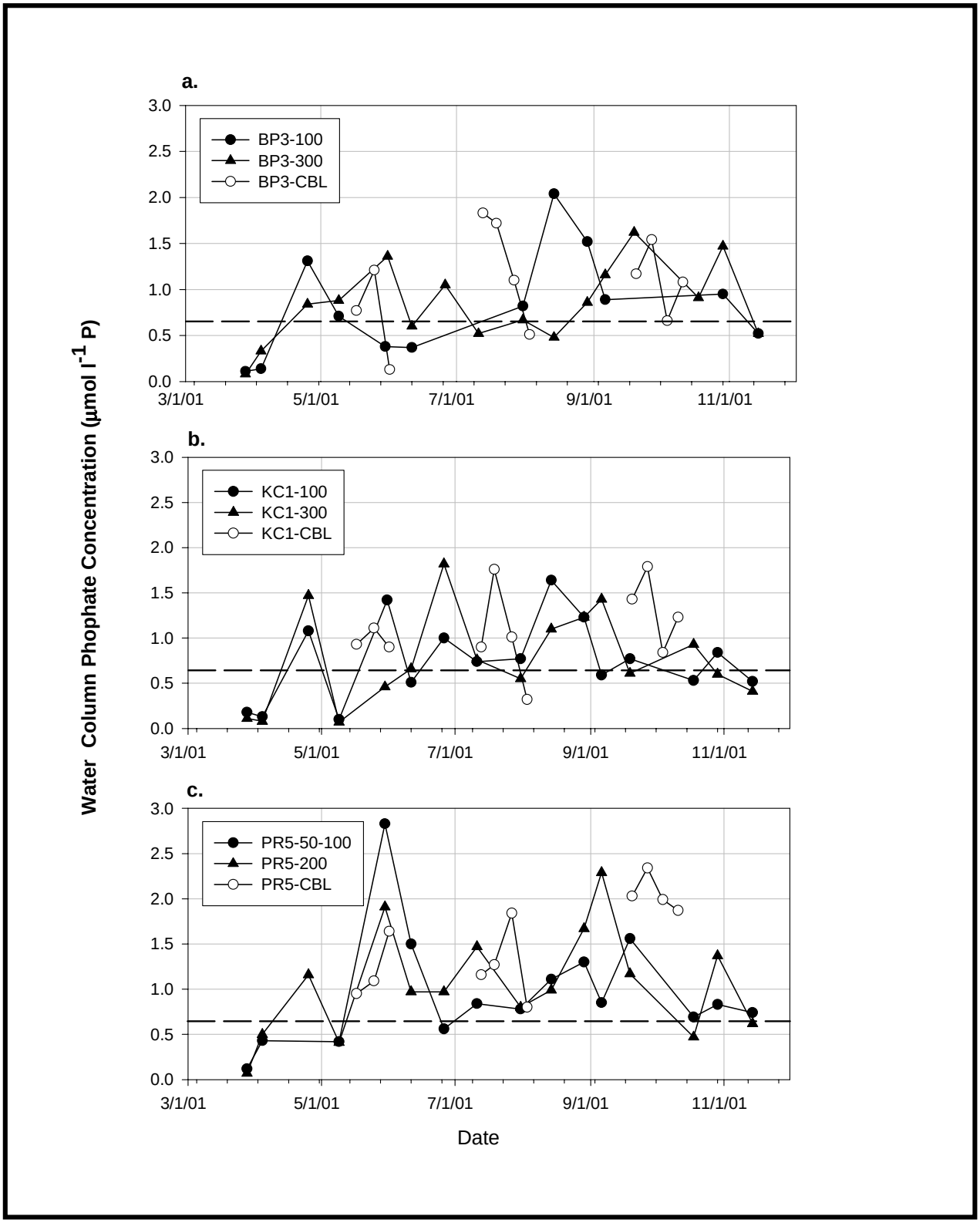

Figure 4-3. Dissolved inorganic phosphorus concentrations at stations a. BP3, b. KC1, c. PR5 at Blossom Point in 2001.
Station suffixes are distance from shoreline.

A summary of the minimum, maximum and median dissolved nutrient concentration at each station during the SAV growing season in 2000 and 2001 is shown in Table 4-1. Additional samples were collected in March of both years, as well as November and December of 2001 but were not used in calculating the summary statistics since the SAV growing season is defined as April through October. An inter-annual comparison of median concentrations (all locations, except BP3-100), indicate that DIN concentrations were significantly higher in 2000 (36.97 μ mol l^{-1} N) compared to 2001 (12.16, μ mol l^{-1} N, t-test $P < 0.001$).

Dissolved Inorganic phosphorus (DIP) concentrations did not exhibit a strong seasonal gradient in 2001, but were somewhat variable on a weekly basis over the course of the SAV growing season (Figure 4-3). Excluding station BP3-100, overall, median concentrations were significantly higher in 2000, (1.188 μ mol l^{-1} P) compared to 2001 (0.860 μ mol l^{-1} P, t-test $P < 0.05$).

Table 4-1. Maximum, minimum and median water column dissolved nutrient concentrations at Blossom Point, in 2000 and 2001 during the SAV growing season (April – October).
Additional sampling was conducted in March of both years as well as November and December of 2001 but was not used in the calculation of these summary statistics.
** Complete data set not available for station BP3-100.*

		2000						2001					
		PR5		BP3		KC01		PR5		BP3		KC1	
		50-100m	200m	100m	300m	100m	300m	50-100m	200m	100m*	300m	100m	300m
DIN (μmol N)	Max	93.30	101.4	96.70	97.90	94.30	96.40	87.20	87.20	89.30	77.10	57.00	79.60
	Min	6.25	13.20	19.40	17.60	4.34	6.82	5.36	4.41	1.77	2.04	2.25	1.95
	Median	38.50	43.95	30.20	38.05	21.25	43.10	10.50	18.6	13.4	12.0	10.80	8.90
DIP (μmol P)	Max	1.88	1.91	2.01	1.89	1.37	2.04	2.83	2.29	2.04	1.62	1.64	1.82
	Min	0.42	0.67	0.36	1.02	0.16	0.47	0.42	0.41	0.14	0.33	0.10	0.07
	Median	1.20	1.31	1.25	1.38	0.85	1.20	0.80	1.10	0.90	0.90	0.80	0.70

Water column chlorophyll-*a* concentrations collected by the Chesapeake Biological Laboratory (CBL) were often significantly higher than values recorded by the US Army at stations BP1 and KC1 (Figure 4-4). Although field techniques were similar, they were not identical. The water samples collected by the Army were done so from a small boat, while samples collected by CBL were accomplished by wading to the site. In both cases great care was taken to minimize disturbance to SAV and prevent release of excess material from SAV leaf surfaces. The samples collected by CBL were made at 0.5 meters below the water surface, while the Army collected surface samples only. In addition, station location did not exactly coincide. While both the in-shore stations, BP3-100 and KC1-100, were located in SAV beds they did not coincide exactly with CBL sites BP3 and KC1. The pattern of differences between data collected by CBL and the Army suggest these results are valid representations of an actual process rather than analytical or sampling error. Within these extremely dense SAV beds water circulation was very restricted, resulting in a highly stratified water column. Although we can only speculate, this stratification may be the reason for such divergent chlorophyll-*a* concentrations at the locations of dense SAV coverage. Further sampling in the next filed season would help to resolve this issue.

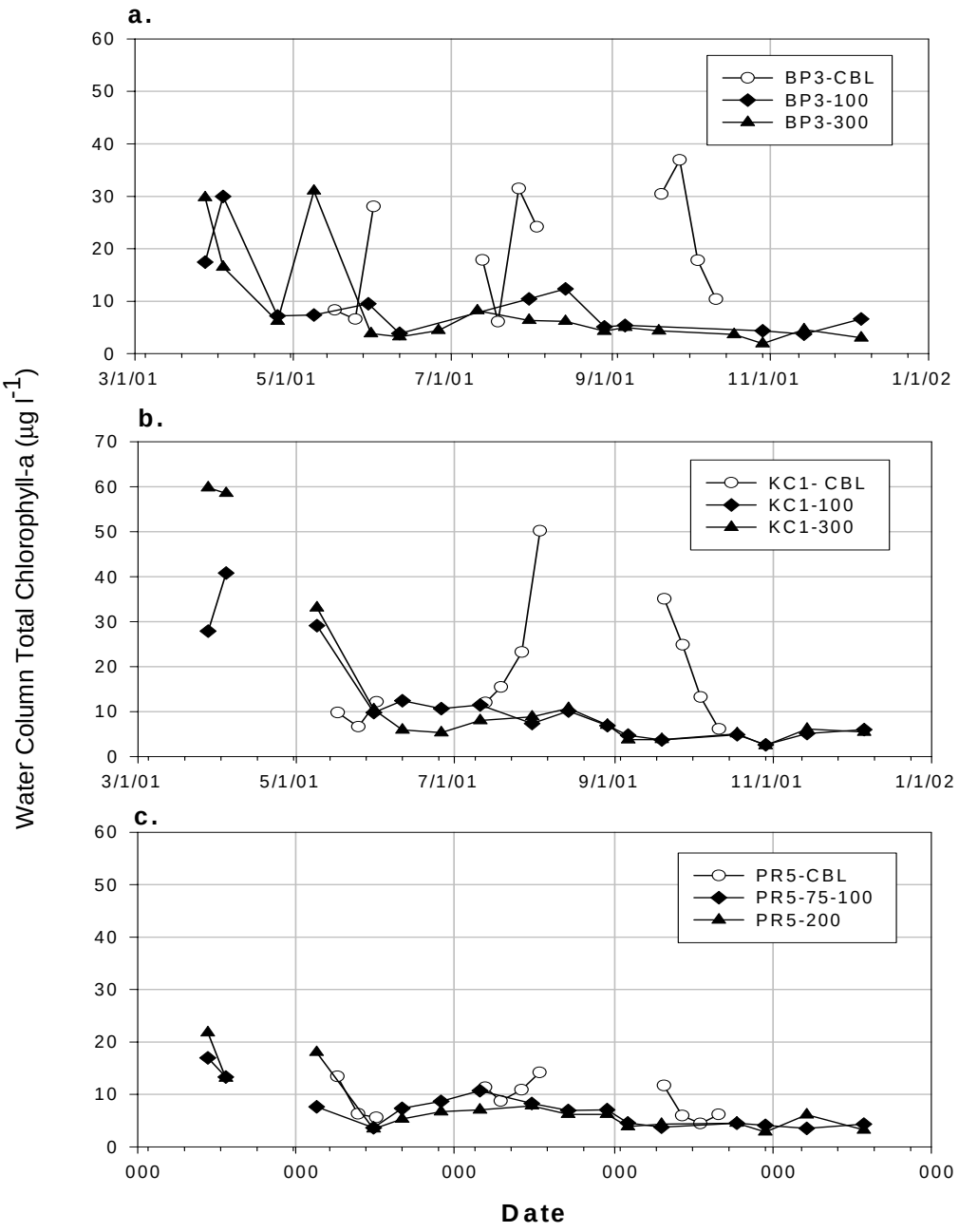

Figure 4-4. Water column total chlorophyll-*a* concentrations at stations a. BP3, b. KC1, c. PR5 at Blossom Point in 2001.

Station suffixes represent distance from shoreline.

4.2 Epiphyte Fouling Rates

Several spatial and temporal patterns in epiphyte fouling rates were found at Blossom Point in 2001 that were not observed in previous years. One example was an exceptionally high epiphyte chlorophyll-*a* fouling rate at station KC1 (9.5 μg chla cm^{-2} $week^{-1}$) during the first sampling interval (May 10 – 17, Figure 4-5). This accumulation rate was more than an order of magnitude greater than rates found at BP3 and PR5 (0.39 and 7.7 μg chla cm^{-2} $week^{-1}$) during the same deployment (Figure 4-5). No single factor appeared to be responsible for the difference between locations. However, unusually high epiphytic fouling rates have been observed in other areas during single deployments. An example of this was found at station MRGC in the Manokin River during the spring 2002 sampling period (Figure 4-7) indicating that short-term (days to weeks) periods can exist where various water quality parameters converge to create ideal conditions for extremely rapid epiphyte accumulation. The long-term effects of this short-term epiphyte loading are unknown.

During subsequent spring, summer, and fall sampling, epiphyte fouling rates at stations BP3 and KC1 remained exceptionally low. This is in contrast to most other locations around Chesapeake Bay, where epiphyte accumulation rates are higher in the summer and fall compared to the spring (Stankelis *et al*., 2002). The extremely low fouling rates during the summer and fall were likely the result of interactions with the extremely high SAV biomass present at those locations. Densities of the canopy forming species *Meriophyllum sp*. found at those sites were much higher in 2001 compared to previous years and probably scraped or shaded the Mylar strips. The method employed to estimate epiphytic fouling using Mylar® strips was originally designed for areas that were devoid of SAV, or for areas with meadow-forming species. Although not measured quantitatively, live plants at those sites were found to have high epiphyte accumulations on the upper levels of the SAV canopy and lower amounts below the canopy. As a result, low epiphyte biomass found at these sites did not reflect actual epiphyte fouling rates during the summer and fall periods across the entire vertical gradient. In previous years, fouling rates at those stations were elevated in the summer and fall compared to the spring because the epiphyte collectors were placed within small open patches that existed within the SAV bed mosaic. Epiphyte measurements made within the mosaic of the SAV bed would still be subject to the reduced flow and exchange rates of the larger bed but would not be subject to scraping or extreme shading, and thus would produce an intermediate fouling rate that would be found between the upper levels of the canopy and the lower portions of the SAV stem. As a result a multi-year comparison was not possible for those stations (Table 4-2). Only station PR5 exhibited increasing fouling rates, typical of most locations, during the summer and fall sampling blocks (Figure 4-4). Variation in fouling rates at station PR5, both within sampling intervals and within season, were similar to those found in previous years. In addition, epiphyte chlorophyll-a fouling rates at PR5 appeared to be relatively constant between years. In contrast, epiphyte dry mass was somewhat more variable during the last three years (Table 4-2).

Table 4-2. Mean summer epiphyte concentrations after approximately one week *in situ* exposure.

**** Data for those stations determined to be invalid.*

Year	Mean Epiphyte Chlorophyll-*a* (µg cm^{-2})			Mean Epiphyte Dry Mass (mg cm^{-2})		
	BP3	KC1	PR5	BP3	KC1	PR50
1999	1.437	0.822	2.687	1.500	1.002	1.680
2000	2.451	1.305	3.639	0.240	0.271	0.243
2001	***	***	3.097	***	***	0.979

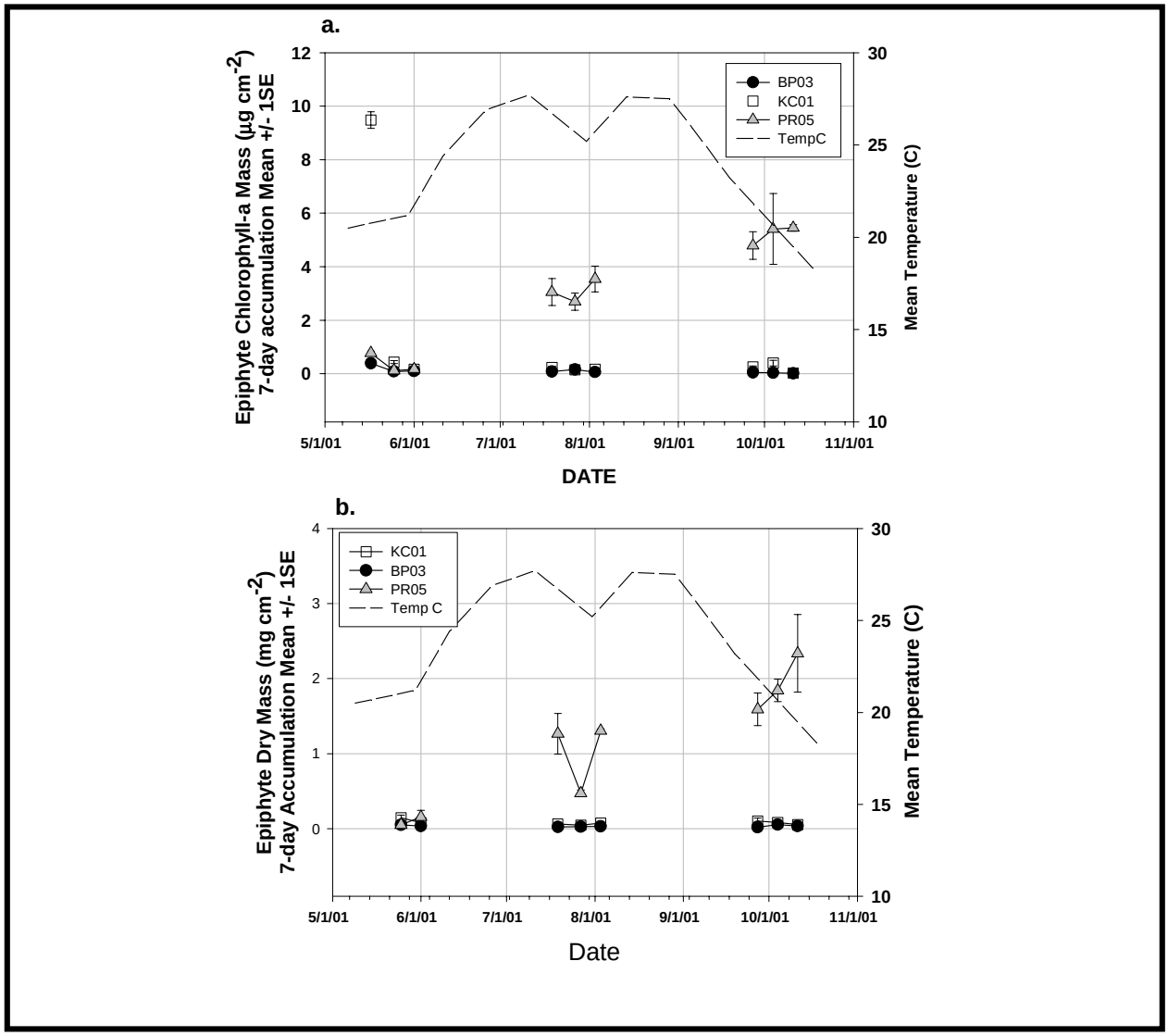

Figure 4-5. a. Epiphyte chlorophyll-*a* mass and b. epiphyte dry mass measured at Blossom Point, Maryland 2001.

In 2001, epiphyte dry mass fouling rates at station PR5 fell within the range found at other mesohaline locations around Chesapeake Bay (Figure 4-6). Variation among locations within each region was greatest during the summer sampling season, followed by the fall and spring. This pattern has been seen in previous years and was likely the result of lower water temperatures during the spring compared to either the summer or fall. However, the patterns observed for epiphyte chlorophyll-*a* fouling rates were different from dry mass both spatially and temporally. In all three seasons chlorophyll-*a* fouling rates at station PR5 were among the highest found (Figure 4-7).

4.3 Epiphyte Light Attenuation

Because of very little epiphyte accumulation at stations KC1 and BP3 during the summer and fall seasons, as well as difficulty obtaining accurate measurements of water column light attenuation, calculations of percent light at the leaf surface (PLL-with epiphytes) were not made for those stations. However, adequate measurements were made at station PR5 to calculate percent light through the water (PLW- without epiphytes) and and PLL. During each season, values for these statistics at PR5 fell within the variation observed among other mesohaline stations (Fig 4-8). The additional light attenuation resulting from epiphyte accumulation was smallest during the spring season and greatest during the fall. During the spring deployment, epiphytes did not make a significant contribution to light attenuation. After a week of accumulation, at a depth of 0.7meters, epiphytes only reduced the available light at the leaf surface to 18% of surface irradiance down from 19% reaching that depth. During the fall deployment, light available to the leaf surface was reduced to 10% of surface irradiance after a week of epiphyte accumulation compared to 33% surface light reaching that depth. While epiphyte accumulation at station PR5 had the potential to significantly reduce the amount of light reaching the blade surface, these estimates do not take into account the age of SAV blades at these locations or the blade turnover rate. As a consequence, whole shoots comprised of both older and younger blades will experience differences in light availability. Clearly, the persistence of SAV at this location suggests that light availability is adequate to sustain a SAV population.

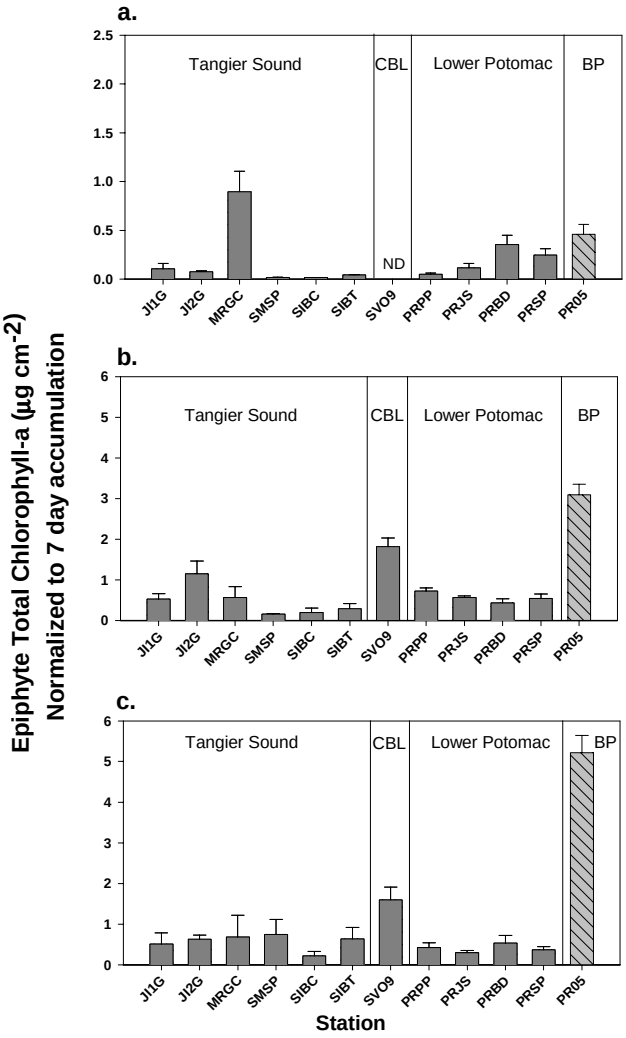

Figure 4-6. Comparison of seasonal epiphyte dry mass fouling rates among various locations within Chesapeake Bay during a. spring, b. summer, and c. fall.

Stations BP3 and KC1 omitted due to inaccurate data. Note change of Y-axis scale in panel a.

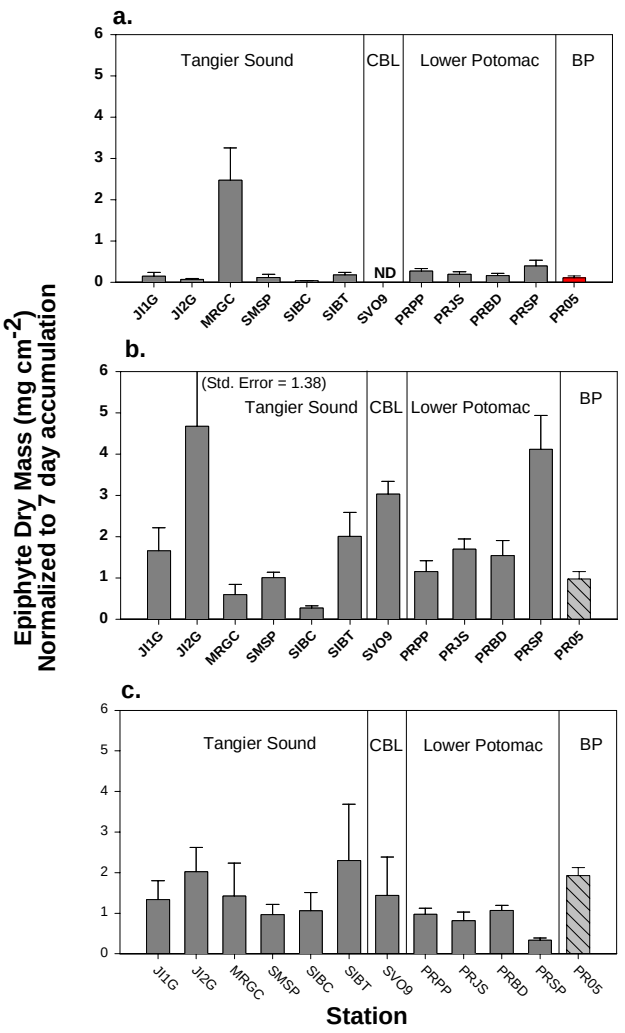

Figure 4-7. Comparison of seasonal epiphyte chlorophyll-a mass fouling rates among various locations within Chesapeake Bay during a. spring, b. summer, and c. fall.

Stations BP3 and KC1 omitted due to inaccurate data.

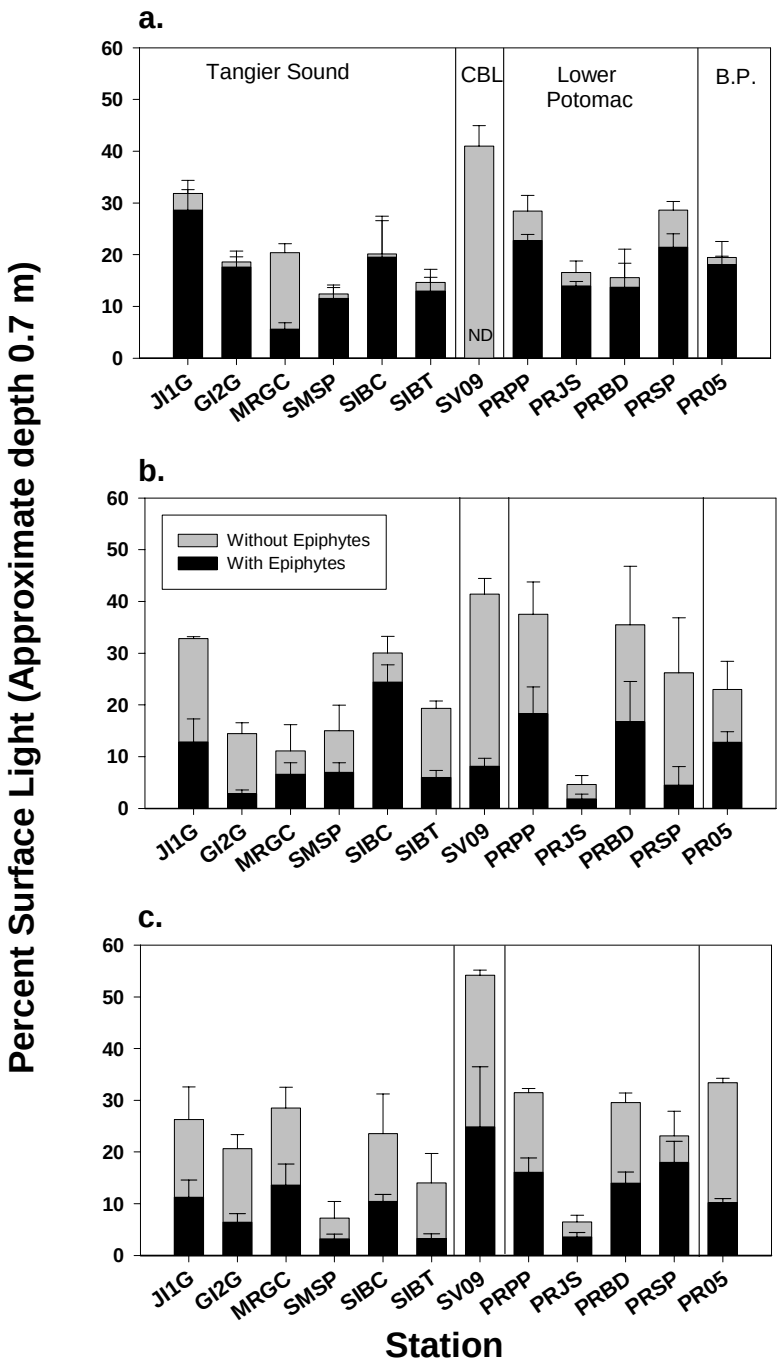

Figure 4-8. Comparison of seasonal light availability to the SAV leaf through the water column and through epiphytes among various locations within Chesapeake Bay during a. spring, b. summer, and c. fall.
Stations BP3 and KC1 omitted due to inaccurate data.

5. CONCLUSIONS

The magnitude of epiphyte fouling depends on a number of factors that may limit or control the accumulation of biomass on the leaves of SAV or artificial substrates. These include, but are not limited to: temperature, light, nutrient availability as well as mechanical abrasion. Small differences in any of these factors may work synergistically to amplify epiphyte fouling at any one time leading to high variability at a single location within a single season. Excellent examples of this are the extremely high fouling found at station KC1 during the first deployment of 2001, and the high fouling rates found at the Manokin River site MRGC (Tangier Sound) during the spring of 2001. Conversely, very low fouling rates have been found at location where high fouling is the norm. Short-term wind and weather events that can dramatically modify these shallow water environments by reducing light availability, and increasing shear and abrasion on the epiphytes. For this reason, an accurate assessment of epiphytic fouling rates for a specific location is most valuable if measurements can be taken during several seasons and years. Monitoring during 2000 and 2001 at Blossom Point has begun to provide the necessary data for a meaningful assessment of epiphytic fouling rates at this location.

Rectangular Mylar strips have been used to assess epiphytic fouling rates at Blossom Point, as well as other monitoring locations around Chesapeake Bay, during the last few years. The standardization of methods employed, while having some disadvantages, provides a powerful tool for comparison of fouling rates among seasons and locations. While the use of this technique can provide a good estimate of short-term fouling rates for certain meadow-forming SAV species (Stankelis *et al.*, 1999), it may not represent actual accumulation rates in dense beds of canopy forming species. This was found to be especially true in 2001 at stations BP3 and KC1 where epiphyte accumulation on the Mylar was lower than would be expected based upon observations of noticeable epiphyte accumulation in the upper levels of the SAV canopy. At station PR5 however, SAV was much less dense and of a different species (meadow forming compared to canopy forming), allowing epiphyte fouling to be measured with this technique more accurately. At station PR5, even during the highest fouling period, epiphytes only reduced the light to the leaf surface to 10% of surface irradiance down from 33% surface light reaching that depth. Such reductions, although substantial, still provide adequate light to the leaf for SAV growth and survival.

The persistence of SAV at Blossom Point over many years agrees well with epiphyte data that suggest epiphyte dry mass fouling and subsequent light attenuation at these locations are moderate compared to many other locations within Chesapeake Bay and it's tributaries where SAV are present. Additional monitoring in 2002 will provide a third year of data to better evaluate the pre-construction status of these SAV beds and the potential impact of shoreline revetment and breakwater construction. Finally, the deployment of epiphyte collectors that can more adequately mimic the morphology of dense canopy forming species in 2002 will provide a more accurate assessment at these locations.

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APPENDIX A

BLOSSOM POINT:
SUBMERGED AQUATIC VEGETATION (SAV) HABITAT STUDY
DATA FILES

BLOSSOM POINT:
SUBMERGED AQUATIC VEGETATION (SAV) HABITAT STUDY

Page No.

TABLE A-1. US ARMY RESEARCH LABORATORY, ADELPHI MD
BLOSSOM POINT:
SUBMERGED AQUATIC VEGETATION (SAV) HABITAT STUDY
WATER QUALITY CONDITIONS: Temperature, salinity, dissolved oxygen and other characteristics measured at 0.5m below surface at SAV stations

Note: Secchi depth reading noted with + symbol denotes max water column depth, true secchi depth actually greater than value listed

FILENAME: BPWCND2001
REVISED : 20020502

STATION	DATE	STATION DEPTH (m)	SECCHI DEPTH (m)	TEMP (ºC)	COND (mS)	SAL (ppt)	DO (mg l^{-1})	DO SAT (%)
BP03	20010511	1.00	0.35	20.65	6.41	3.85	6.65	75.90
KC01	20010511	1.00	0.60	21.68	6.83	3.99	6.69	77.90
PR05	20010511	0.95	0.80	YY	YY	YY	YY	YY
BP03	20010517	1.35	0.90	18.65	7.84	5.01	5.72	62.90
KC01	20010517	1.40	0.60	19.31	8.14	5.13	6.52	72.90
PR05	20010517	1.30	0.55	18.88	8.80	5.63	7.14	79.40
BP03	20010525	1.15	0.70	20.57	7.41	4.10	7.57	86.30
KC01	20010525	1.05	0.60	21.13	6.86	4.10	7.60	87.00
PR05	20010525	1.10	0.40	20.33	7.15	3.93	6.94	78.70
BP03	20010601	1.10	0.70	20.15	3.72	2.17	11.81	131.00
KC01	20010601	1.00	0.50	20.72	3.49	2.00	7.62	86.10
PR05	20010601	1.00	0.30	20.49	3.89	2.27	6.65	74.70
BP03	20010713	1.10	YY	25.59	9.77	5.42	11.73	147.10
KC01	20010713	1.00	YY	26.64	10.14	5.52	9.65	124.00
PR05	20010713	1.00	YY	25.86	10.39	5.76	7.98	101.40
BP03	20010719	0.75	YY	26.05	12.22	6.89	5.61	72.20
KC01	20010719	0.70	YY	26.12	12.12	6.76	7.47	93.00
PR05	20010719	0.70	0.70 +	25.83	12.50	7.03	6.25	80.00
BP03	20010727	0.90	SW	25.63	12.85	7.27	6.56	83.60
KC01	20010727	0.90	SW	25.70	11.69	6.56	11.10	141.00
PR05	20010727	0.90	0.50	26.33	12.81	7.15	6.56	84.70
BP03	20010803	0.80	0.80 +	25.85	12.13	6.80	10.26	131.10
KC01	20010803	0.70	0.70 +	26.24	10.35	5.68	10.16	129.90
PR05	20010803	0.75	0.45	25.37	10.03	5.61	7.66	41.00
BP03	20010920	HH	HH	HH	HH	HH	HH	HH
KC01	20010920	HH	HH	HH	HH	HH	HH	HH
PR05	20010920	HH	HH	HH	HH	HH	HH	HH

TABLE A-1. US ARMY RESEARCH LABORATORY, ADELPHI MD
BLOSSOM POINT:
SUBMERGED AQUATIC VEGETATION (SAV) HABITAT STUDY
WATER QUALITY CONDITIONS: Temperature, salinity, dissolved oxygen and other characteristics measured at 0.5m below surface at SAV stations

Note: Secchi depth reading noted with + symbol denotes max water column depth, true secchi depth actually greater than value listed

FILENAME: BPWCND2002
REVISED : 20020502

STATION	DATE	STATION DEPTH (m)	SECCHI DEPTH (m)	TEMP (ºC)	COND (mS)	SAL (ppt)	DO (mg l^{-1})	DO SAT (%)
BP03	20010927	1.00	YY	18.32	11.19	7.40	10.18	113.10
KC01	20010927	1.00	YY	20.25	11.99	7.61	11.64	134.67
PR05	20010927	1.00	0.80	21.00	11.92	7.43	7.62	89.30
BP03	20011004	0.75	0.75 +	20.85	13.80	8.87	9.34	110.00
KC01	20011004	0.65	0.65 +	20.79	13.33	8.44	8.38	98.10
PR05	20011004	0.75	0.75 +	19.76	11.76	7.54	7.94	90.70
BP03	20011011	0.95	YY	15.21	10.94	7.79	10.19	106.50
KC01	20011011	0.90	YY	17.07	12.49	8.61	9.12	99.40
PR05	20011011	0.85	0.80	17.63	14.17	9.72	7.99	88.20

BLOSSOM POINT:
SUBMERGED AQUATIC VEGETATION (SAV) HABITAT STUDY

Page No.

A-2. WATER COLUMN LIGHT ATTENUATION MEASUREMENTS:

FILE NAME: BPWCLTyyyy

TABLE A-2. US ARMY RESEARCH LABORATORY, ADELPHI MD
BLOSSOM POINT:
SUBMERGED AQUATIC VEGETATION (SAV) HABITAT STUDY
WATER COLUMN LIGHT ATTENUATION MEASUREMENTS:
Kd1 = Light attenuation coefficient calculated from PAR @ D1 and D2,
Kd2 = Light attenuation coefficient calculated from PAR @ D2 and D3.

FILENAME: BPWCLT2001
REVISED : 20011011

STATION	DATE	DEPTH NO	DEPTH (m)	PAR $\mu mol/m^2/s$	Kd1 (D1-D2)	Kd2 (D2-D3)	MEAN Kd
KC01	20010511	D1	0.10	1219.50	1.80	1.57	1.72
		D2	0.50	594.70			
		D3	0.70	434.40			
BP03	20010511	D1	0.10	1100.10	NI	NI	4.16
		D2	0.50	183.76			
		D3	0.70	90.69			
PR05	20010511	D1	0.10	1304.20	1.52	1.62	1.55
		D2	0.50	710.50			
		D3	0.70	513.50			
KC01	20010517	D1	0.10	176.00	1.41	1.98	1.73
		D2	0.50	100.08			
		D3	1.00	37.11			
BP03	20010517	D1	0.10	191.68	1.42	1.80	1.63
		D2	0.50	108.70			
		D3	1.00	44.26			
PR05	20010517	D1	0.10	250.80	2.02	1.98	2.00
		D2	0.50	111.91			
		D3	1.00	41.63			
PR05	20010525	D1	0.10	588.90	2.89	3.26	3.05
		D2	0.50	185.23			
		D3	0.80	69.68			
BP03	20010525	D1	0.10	1230.60	2.08	NI	NI
		D2	0.50	535.30			
		D3	0.80	180.39			
KC01	20010525	D1	0.10	383.10	NI	2.47	NI
		D2	0.50	192.08			
		D3	0.80	91.58			

TABLE A-2. US ARMY RESEARCH LABORATORY, ADELPHI MD
BLOSSOM POINT:
SUBMERGED AQUATIC VEGETATION (SAV) HABITAT STUDY
WATER COLUMN LIGHT ATTENUATION MEASUREMENTS:
Kd1 = Light attenuation coefficient calculated from PAR @ D1 and D2,
Kd2 = Light attenuation coefficient calculated from PAR @ D2 and D3.

FILENAME: BPWCLT2001
REVISED : 20011011

STATION	DATE	DEPTH NO	DEPTH (m)	PAR $\mu mol/m^2/s$	Kd1 (D1-D2)	Kd2 (D2-D3)	MEAN Kd
PR05	20010601	D1	0.10	292.40	3.17	2.97	3.08
		D2	0.50	82.31			
		D3	0.80	33.81			
BP03	20010601	D1	0.10	268.90	4.77	SW	SW
		D2	0.50	39.91			
		D3	SW	SW			
KC01	20010601	D1	0.10	145.41	2.73	2.66	2.70
		D2	0.50	48.88			
		D3	0.80	22.02			

TABLE A-2. US ARMY RESEARCH LABORATORY, ADELPHI MD
BLOSSOM POINT:
SUBMERGED AQUATIC VEGETATION (SAV) HABITAT STUDY
WATER COLUMN LIGHT ATTENUATION MEASUREMENTS:
Kd1 = Light attenuation coefficient calculated from PAR @ D1 and D2,
Kd2 = Light attenuation coefficient calculated from PAR @ D2 and D3.

FILENAME: BPWCLT2001
REVISED : 20011011

STATION	DATE	DEPTH NO	DEPTH (m)	PAR $\mu mol/m^2/s$	Kd1 (D1-D2)	Kd2 (D2-D3)	MEAN Kd
KC01	20010713	D1	0.10	1488.00	2.30	SW	SW
		D2	0.50	592.90			
		D3	SW	SW			
PR05	20010713	D1	0.10	1505.00	2.44	SW	SW
		D2	0.50	567.10			
		D3	SW	SW			
BP03	20010713	D1	0.10	1427.00	1.67	SW	SW
		D2	0.50	730.30			
		D3	SW	SW			
KC01	20010719	D1	0.10	YY	YY	YY	YY
		D2	0.50	YY			
		D3	1.00	YY			
PR05	20010719	D1	0.10	278.40	1.57	YY	YY
		D2	0.50	148.60			
		D3	YY	YY			
BP03	20010719	D1	0.10	399.50	2.49	YY	YY
		D2	0.40	189.47			
		D3	YY	YY			
KC01	20010727	D1	0.10	1159.50	9.03	YY	YY
		D2	0.50	31.31			
		D3	YY	YY			
PR05	20010727	D1	0.10	505.60	NI	3.00	NI
		D2	0.50	328.10			
		D3	1.00	73.10			
BP03	20010727	D1	0.10	574.20	3.42	YY	YY
		D2	0.50	146.10			
		D3	YY	YY			

TABLE A-2. US ARMY RESEARCH LABORATORY, ADELPHI MD
BLOSSOM POINT:
SUBMERGED AQUATIC VEGETATION (SAV) HABITAT STUDY
WATER COLUMN LIGHT ATTENUATION MEASUREMENTS:
Kd1 = Light attenuation coefficient calculated from PAR @ D1 and D2,
Kd2 = Light attenuation coefficient calculated from PAR @ D2 and D3.

FILENAME: BPWCLT2001
REVISED : 20011011

STATION	DATE	DEPTH NO	DEPTH (m)	PAR $\mu mol/m^2/s$	Kd1 (D1-D2)	Kd2 (D2-D3)	MEAN Kd
BP03	20010803	D1	0.10	NI	NI	NI	NI
		D2	0.50	NI			
		D3	1.00	NI			
KC01	20010803	D1	0.10	NI	NI	NI	NI
		D2	0.50	NI			
		D3	1.00	NI			
PR05	20010803	D1	0.10	883.40	4.06	YY	YY
		D2	0.50	174.00			
		D3	YY	YY			

TABLE A-2. US ARMY RESEARCH LABORATORY, ADELPHI MD
BLOSSOM POINT:
SUBMERGED AQUATIC VEGETATION (SAV) HABITAT STUDY
WATER COLUMN LIGHT ATTENUATION MEASUREMENTS:
Kd1 = Light attenuation coefficient calculated from PAR @ D1 and D2,
Kd2 = Light attenuation coefficient calculated from PAR @ D2 and D3.

FILENAME: BPWCLT2001
REVISED : 20011011

STATION	DATE	DEPTH NO	DEPTH (m)	PAR $\mu mol/m^2/s$	Kd1 (D1-D2)	Kd2 (D2-D3)	MEAN Kd
BP03	20010920	D1	0.10	NI	NI	NI	NI
		D2	0.50	NI			
		D3	1.00	NI			
KC01	20010920	D1	0.10	NI	NI	NI	NI
		D2	0.50	NI			
		D3	1.00	NI			
PR05	20010920	D1	0.10	104.92	NI	NI	1.84
		D2	0.50	57.59			
		D3	0.70	34.73			
BP03	20010927	D1	0.10	NI	NI	NI	NI
		D2	0.50	NI			
		D3	1.00	NI			
KC01	20010927	D1	0.10	NI	NI	NI	NI
		D2	0.50	NI			
		D3	1.00	NI			
PR05	20010927	D1	0.10	805.10	1.72	NI	NI
		D2	0.50	404.10			
		D3	0.70	259.10			

TABLE A-2. US ARMY RESEARCH LABORATORY, ADELPHI MD
BLOSSOM POINT:
SUBMERGED AQUATIC VEGETATION (SAV) HABITAT STUDY
WATER COLUMN LIGHT ATTENUATION MEASUREMENTS:
Kd1 = Light attenuation coefficient calculated from PAR @ D1 and D2,
Kd2 = Light attenuation coefficient calculated from PAR @ D2 and D3.

FILENAME: BPWCLT2001
REVISED : 20011011

STATION	DATE	DEPTH NO	DEPTH (m)	PAR $\mu mol/m^2/s$	Kd1 (D1-D2)	Kd2 (D2-D3)	MEAN Kd
BP03	20011004	D1	0.10	NI	NI	NI	NI
		D2	0.50	NI			
		D3	1.00	NI			
KC01	20011004	D1	0.10	NI	NI	NI	NI
		D2	0.50	NI			
		D3	1.00	NI			
PR05	20011004	D1	0.10	723.30	2.00	SW	SW
		D2	0.50	325.10			
		D3	SW	SW			
BP03	20011011	D1	0.10	NI	NI	NI	NI
		D2	0.50	NI			
		D3	1.00	NI			
KC01	20011011	D1	0.10	NI	NI	NI	NI
		D2	0.50	NI			
		D3	1.00	NI			
PR05	20011011	D1	0.10	636.90	1.87	SW	SW
		D2	0.50	302.00			
		D3	SW	SW			

BLOSSOM POINT:
SUBMERGED AQUATIC VEGETATION (SAV) HABITAT STUDY

Page No.

A-3. WATER COLUMN NUTRIENT DATA:

FILE NAME: BPWCNT2000

TABLE A-3. US ARMY RESEARCH LABORATORY, ADELPHI MD
BLOSSOM POINT:
SUBMERGED AQUATIC VEGETATION (SAV) HABITAT STUDY
WATER COLUMN NUTRIENT DATA: Dissolved and particulate nutrients measured at 0.5m below surface at SAV stations

FILENAME: BPWCNT2001
REVISED : 20020125

STATION	COLLECTION AGENCY	DATE	NH_4^+ ($\mu mol\ l^{-1}$)	NO_2^- ($\mu mol\ l^{-1}$)	$NO_2^-+NO_3^-$ ($\mu mol\ l^{-1}$)	DIP ($\mu mol\ l^{-1}$)	CHLA-T ($\mu g\ l^{-1}$)	CHLA-A ($\mu g\ l^{-1}$)	PHAEO ($\mu g\ l^{-1}$)	TSS ($mg\ l^{-1}$)	TVS ($mg\ l^{-1}$)
BP03-100	US Army	20010328	5.0	0.84	38.40	0.11	17.46	15.38	4.22	22.3	4.3
BP03-100	US Army	20010404	6.4	1.17	52.00	0.14	29.97	26.58	6.86	24.4	6.4
BP03-100	US Army	20010425	11.9	1.66	77.40	1.31	7.20	4.46	5.50	39.3	4.7
BP03-100	US Army	20010509	4.6	0.83	33.60	0.71	7.35	5.56	3.65	13.3	2.7
BP03-100	US Army	20010530	1.9	0.31	12.00	0.38	9.51	7.42	4.26	7.7	3.0
BP03-100	US Army	20010611	3.6	0.56	16.60	0.37	3.86	2.38	3.04	4.8	1.8
BP03-100	US Army	20010731	2.5	0.27	5.54	0.82	10.41	8.43	4.02	12.0	3.6
BP03-100	US Army	20010814	0.6	0.29	3.88	2.04	12.36	10.49	3.81	7.7	2.0
BP03-100	US Army	20010829	0.7	3.26	12.10	1.52	5.10	4.08	2.08	14.3	3.0
BP03-100	US Army	20010906	1.6	1.38	5.12	0.89	5.38	4.35	2.08	18.7	4.3
BP03-100	US Army	20011029	0.4	0.10	1.37	0.95	4.34	3.05	2.59	11.3	4.3
BP03-100	US Army	20011114	0.8	0.10	4.27	0.52	3.74	2.73	2.04	82.3	10.7
BP03-100	US Army	20011206	0.9	0.21	8.75	0.44	6.60	4.80	3.59	13.0	4.7
BP03-300	US Army	20010328	2.4	1.24	55.20	0.08	29.74	26.52	6.53	34.0	7.3
BP03-300	US Army	20010404	11.2	1.32	65.90	0.33	16.53	12.68	7.85	38.8	6.0
BP03-300	US Army	20010425	11.6	0.96	39.90	0.84	6.15	3.63	5.14	54.7	6.7
BP03-300	US Army	20010509	5.1	0.58	11.00	0.88	31.01	23.82	14.66	16.0	4.0
BP03-300	US Army	20010531	6.1	0.53	31.60	1.36	3.82	1.87	4.00	47.3	4.7
BP03-300	US Army	20010611	3.4	0.75	28.80	0.60	3.21	1.99	2.49	11.6	2.0
BP03-300	US Army	20010626	3.7	0.47	13.40	1.05	4.41	3.31	2.25	17.3	1.0
BP03-300	US Army	20010711	1.2	0.42	0.81	0.52	8.18	6.32	3.78	7.0	2.3
BP03-300	US Army	20010731	2.7	0.28	5.67	0.67	6.36	5.33	2.10	9.7	2.0
BP03-300	US Army	20010814	2.8	0.20	2.98	0.48	6.15	4.91	2.52	29.3	3.3
BP03-300	US Army	20010829	1.1	1.62	4.68	0.86	4.31	3.46	1.73	13.0	2.3
BP03-300	US Army	20010906	0.8	2.51	7.55	1.16	5.00	3.95	2.11	18.0	5.0
BP03-300	US Army	20010919	1.9	1.45	6.51	1.62	4.34	3.40	1.89	21.3	4.7
BP03-300	US Army	20011018	2.9	0.30	5.19	0.91	3.63	3.03	1.20	10.3	2.7
BP03-300	US Army	20011029	4.4	0.28	11.20	1.47	1.90	1.31	1.18	14.7	4.7
BP03-300	US Army	20011114	1.8	0.15	3.44	0.52	4.59	3.59	2.01	10.0	4.3
BP03-300	US Army	20011206	3.9	0.21	13.80	0.95	3.01	2.30	1.42	8.3	3.7

TABLE A-3. US ARMY RESEARCH LABORATORY, ADELPHI MD
BLOSSOM POINT:
SUBMERGED AQUATIC VEGETATION (SAV) HABITAT STUDY
WATER COLUMN NUTRIENT DATA: Dissolved and particulate nutrients measured at 0.5m below surface at SAV stations

FILENAME: BPWCNT2001
REVISED : 20020125

STATION	COLLECTION AGENCY	DATE	NH_4^+ ($\mu mol\ l^{-1}$)	NO_2^- ($\mu mol\ l^{-1}$)	$NO_2^-+NO_3^-$ ($\mu mol\ l^{-1}$)	DIP ($\mu mol\ l^{-1}$)	CHLA-T ($\mu g\ l^{-1}$)	CHLA-A ($\mu g\ l^{-1}$)	PHAEO ($\mu g\ l^{-1}$)	TSS ($mg\ l^{-1}$)	TVS ($mg\ l^{-1}$)
KC01-100	US Army	20020328	3.2	0.97	27.80	0.18	27.90	24.74	6.41	32.2	8.2
KC01-100	US Army	20010404	3.1	0.64	21.20	0.13	40.78	36.87	7.91	31.5	7.7
KC01-100	US Army	20010425	14.1	1.30	42.90	1.08	V	V	V	V	V
KC01-100	US Army	20010509	0.8	0.43	14.40	0.10	29.11	22.67	13.12	12.3	4.0
KC01-100	US Army	20010531	2.9	0.55	44.70	1.42	9.78	7.49	4.66	29.3	5.3
KC01-100	US Army	20010611	5.1	0.40	17.20	0.51	12.41	8.99	6.97	8.7	2.3
KC01-100	US Army	20010626	2.6	0.44	19.80	1.00	10.67	8.50	4.41	11.5	2.7
KC01-100	US Army	20010711	1.4	0.44	10.50	0.74	11.45	8.54	5.93	9.7	2.0
KC01-100	US Army	20010731	0.9	0.29	6.54	0.77	7.35	6.31	2.10	6.0	2.8
KC01-100	US Army	20010814	3.1	0.76	4.28	1.64	10.10	8.65	2.95	10.7	2.3
KC01-100	US Army	20010829	2.6	0.59	2.32	1.23	6.85	5.23	3.30	40.7	6.3
KC01-100	US Army	20010906	1.5	0.77	1.40	0.59	4.72	3.68	2.10	10.3	3.3
KC01-100	US Army	20010919	0.9	0.41	1.35	0.77	3.70	2.91	1.58	10.7	3.0
KC01-100	US Army	20011018	1.5	0.15	3.54	0.53	4.87	3.90	1.94	8.7	3.0
KC01-100	US Army	20011029	4.6	1.02	5.22	0.84	2.62	1.93	1.39	9.3	3.3
KC01-100	US Army	20011114	2.0	0.17	2.38	0.52	5.10	4.46	1.28	5.3	3.7
KC01-100	US Army	20011206	2.8	0.26	6.96	0.59	6.00	4.56	2.87	11.7	4.7
KC01-300	US Army	20010328	0.8	1.46	38.20	0.11	59.79	55.50	8.65	48.3	12.7
KC01-300	US Army	20010404	0.9	0.51	11.00	0.08	58.52	51.52	14.22	44.8	10.0
KC01-300	US Army	20010425	17.5	1.53	62.10	1.47	V	V	V	81.3	8.0
KC01-300	US Army	20010509	0.4	0.19	6.59	0.07	33.09	25.31	15.85	13.7	5.0
KC01-300	US Army	20010530	1.2	0.19	8.95	0.46	10.43	7.59	5.79	44.7	6.0
KC01-300	US Army	20010611	4.1	0.84	35.30	0.66	5.90	3.87	4.14	9.3	1.3
KC01-300	US Army	20010626	1.6	0.80	50.30	1.82	5.30	3.84	2.97	19.5	2.8
KC01-300	US Army	20011107	1.5	0.41	12.00	0.76	8.01	6.55	2.95	17.0	3.0
KC01-300	US Army	20010731	1.0	0.24	5.21	0.55	8.84	7.67	2.38	6.3	3.0
KC01-300	US Army	20010814	0.9	0.37	1.05	1.10	10.69	9.40	2.61	15.7	3.0
KC01-300	US Army	20010829	1.4	0.27	0.92	1.23	6.98	5.55	2.90	18.3	3.7
KC01-300	US Army	20010906	1.3	2.09	6.42	1.43	3.77	3.07	1.41	10.7	3.7
KC01-300	US Army	20010919	0.8	0.42	1.31	0.61	3.80	3.02	1.56	12.0	4.3
KC01-300	US Army	20011018	1.7	0.20	5.00	0.93	5.07	4.09	1.96	10.7	4.0
KC01-300	US Army	20011029	4.9	1.36	6.18	0.60	2.48	1.88	1.21	9.7	4.0
KC01-300	US Army	20011114	0.9	0.07	1.23	0.41	6.11	5.45	1.34	5.7	3.7
KC01-300	US Army	20011206	2.3	0.29	7.00	0.58	5.43	4.19	2.48	16.0	4.7

TABLE A-3. US ARMY RESEARCH LABORATORY, ADELPHI MD
BLOSSOM POINT:
SUBMERGED AQUATIC VEGETATION (SAV) HABITAT STUDY
WATER COLUMN NUTRIENT DATA: Dissolved and particulate nutrients measured at 0.5m below surface at SAV stations

FILENAME: BPWCNT2001
REVISED : 20020125

STATION	COLLECTION AGENCY	DATE	NH_4^+ ($\mu mol\ l^{-1}$)	NO_2^- ($\mu mol\ l^{-1}$)	$NO_2^-+NO_3^-$ ($\mu mol\ l^{-1}$)	DIP ($\mu mol\ l^{-1}$)	CHLA-T ($\mu g\ l^{-1}$)	CHLA-A ($\mu g\ l^{-1}$)	PHAEO ($\mu g\ l^{-1}$)	TSS ($mg\ l^{-1}$)	TVS ($mg\ l^{-1}$)
PR05-50	US Army	20010328	7.3	1.46	80.40	0.12	16.96	14.55	4.91	25.3	5.0
PR05-50	US Army	20010404	13.3	1.37	73.90	0.43	13.31	10.46	5.81	22.3	4.6
PR05-50	US Army	20010509	4.2	0.50	18.20	0.42	7.64	5.51	4.35	16.7	2.3
PR05-75	US Army	20010611	3.3	1.03	38.20	1.50	7.33	5.29	4.17	13.3	3.3
PR05-75	US Army	20010626	0.9	0.50	21.10	0.56	8.70	6.57	4.33	14.3	3.2
PR05-75	US Army	20010711	5.8	0.39	4.70	0.84	10.73	8.90	3.73	11.0	1.7
PR05-75	US Army	20010731	4.9	0.57	5.26	0.78	8.30	6.21	4.24	34.0	4.3
PR05-75	US Army	20010814	3.5	0.72	6.12	1.11	6.94	5.40	3.13	11.7	3.3
PR05-75	US Army	20010829	0.6	2.30	6.59	1.30	7.09	5.64	2.94	16.7	3.0
PR05-75	US Army	20010906	2.1	1.20	4.45	0.85	4.56	3.44	2.25	11.7	3.0
PR05-75	US Army	20010919	2.3	1.60	7.43	1.56	3.79	2.88	1.82	18.3	4.0
PR05-75	US Army	20011018	2.5	0.31	2.86	0.69	4.51	2.80	3.43	15.7	3.7
PR05-75	US Army	20011029	6.1	0.49	4.80	0.83	4.13	3.15	1.96	17.7	4.7
PR05-75	US Army	20011114	4.0	0.32	6.18	0.74	3.55	2.90	1.30	8.0	4.0
PR05-75	US Army	20011206	4.4	0.26	17.90	0.87	4.35	3.36	1.99	24.0	5.7
PR05-100	US Army	20010530	17.7	1.11	49.50	2.83	3.63	2.13	3.06	26.3	2.7
PR05-200	US Army	20010404	13.1	1.36	74.10	0.50	13.12	10.38	5.59	24.7	4.2
PR05-200	US Army	20010425	11.6	1.64	70.40	1.16	V	V	V	46.0	4.7
PR05-200	US Army	20010611	4.4	1.13	43.40	0.97	5.30	3.84	2.98	11.7	2.3
PR05-200	US Army	20010626	1.4	0.52	22.70	0.97	6.69	4.99	3.47	17.0	2.5
PR05-200	US Army	20010328	5.2	0.89	40.80	0.07	21.76	19.36	4.87	36.0	6.0
PR05-200	US Army	20010509	3.1	0.51	16.60	0.41	18.04	13.86	8.51	24.0	4.0
PR05-200	US Army	20010530	9.1	0.93	54.50	1.91	3.43	1.94	3.03	19.7	3.0
PR05-200	US Army	20010711	3.1	0.74	27.60	1.47	7.06	5.82	2.53	20.0	3.3
PR05-200	US Army	20010731	4.1	0.25	5.36	0.80	7.84	6.29	3.14	30.3	4.7
PR05-200	US Army	20010814	5.5	1.34	6.61	0.99	6.22	5.00	2.47	14.0	2.3
PR05-200	US Army	20010829	0.4	4.86	16.80	1.67	6.22	5.05	2.38	11.3	1.7
PR05-200	US Army	20010906	0.4	3.64	17.10	2.29	3.88	2.95	1.87	13.7	3.3
PR05-200	US Army	20010919	1.1	1.25	5.11	1.17	4.35	3.41	1.89	16.7	4.0
PR05-200	US Army	20011018	1.9	0.24	2.51	0.47	4.54	2.76	3.58	10.0	3.7
PR05-200	US Army	20011029	7.2	0.95	7.87	1.37	2.86	2.31	1.11	39.7	6.3
PR05-200	US Army	20011114	1.1	0.12	4.92	0.62	6.13	5.30	1.67	63.7	9.3
PR05-200	US Army	20011206	3.6	0.19	10.60	0.63	3.25	2.36	1.79	14.7	4.3

TABLE A-3. US ARMY RESEARCH LABORATORY, ADELPHI MD
BLOSSOM POINT:
SUBMERGED AQUATIC VEGETATION (SAV) HABITAT STUDY
WATER COLUMN NUTRIENT DATA: Dissolved and particulate nutrients measured at 0.5m below surface at SAV stations
* DIP values are salinity corrected; NC value not corrected salinity value not taken.

FILENAME: BPWCNT2001
REVISED : 20020125

	COLLECTION AGENCY	DATE	NH_4^+ ($\mu mol\ l^{-1}$)	NO_2^- ($\mu mol\ l^{-1}$)	$NO_2^-+NO_3^-$ ($\mu mol\ l^{-1}$)	CORR DIP ($\mu mol\ l^{-1}$)		CHLA-T ($\mu g\ l^{-1}$)	CHLA-A ($\mu g\ l^{-1}$)	PHAEO ($\mu g\ l^{-1}$)	TSS ($mg\ l^{-1}$)	TVS ($mg\ l^{-1}$)
BP03	CBL	20010517	3.1	0.54	46.70	0.77	*	8.31	6.10	4.51	12.1	2.1
KC01	CBL	20010517	3.1	0.59	49.10	0.93	*	9.75	7.49	4.60	19.7	2.6
PR05	CBL	20010517	4.5	0.64	48.20	0.95	*	13.44	11.61	3.71	18.6	3.2
BP03	CBL	20010525	3.7	0.54	50.70	1.21	*	6.57	5.23	2.74	14.6	2.6
KC01	CBL	20010525	4.0	0.49	45.20	1.11	*	6.62	4.57	4.19	23.6	3.0
PR05	CBL	20010525	4.2	0.53	49.80	1.09	*	6.28	4.15	4.35	36.8	4.0
BP03	CBL	20010601	1.0	0.64	14.20	0.13	*	28.04	25.26	5.63	9.6	2.8
KC01	CBL	20010601	6.5	1.05	48.00	0.90	*	12.15	10.14	4.09	13.6	2.6
PR05	CBL	20010601	1.2	1.06	58.70	1.64	*	5.61	3.61	4.09	36.0	3.8
BP03	CBL	20010713	3.0	0.09	0.18	1.83	*	17.87	11.97	12.05	20.2	6.0
KC01	CBL	20010713	0.8	0.03	0.22	0.90	*	11.98	8.74	6.62	13.8	4.6
PR05	CBL	20010713	2.0	0.53	17.50	1.16	*	11.35	9.12	4.56	13.2	3.6
BP03	CBL	20010719	0.7	0.05	0.13	1.71	*	6.06	4.78	2.62	8.6	2.6
KC01	CBL	20010719	0.5	0.06	0.14	1.75	*	15.44	12.93	5.11	8.4	3.6
PR05	CBL	20010719	3.4	0.49	12.20	1.26	*	8.73	7.17	3.17	11.6	3.2
BP03	CBL	20010727	4.7	0.17	0.58	1.09	*	31.47	28.58	5.85	15.2	6.2
KC01	CBL	20010727	0.4	0.04	0.19	1.00	*	23.20	20.81	4.85	8.8	3.8
PR05	CBL	20010727	4.4	0.30	10.70	1.83	*	10.88	9.41	2.98	20.6	3.8
BP03	CBL	20010803	0.5	0.04	0.15	0.50	*	24.17	20.79	6.85	24.3	7.7
KC01	CBL	20010803	0.7	0.14	0.23	0.32	*	50.16	44.67	11.13	29.0	8.0
PR05	CBL	20010803	1.5	0.34	8.07	0.80	*	14.20	10.91	6.70	35.8	5.3
BP03	CBL	20010920	1.2	0.19	0.23	1.17	NC	30.42	27.63	5.66	28.8	9.0
KC01	CBL	20010920	0.4	0.05	0.32	1.43	NC	35.04	33.07	3.97	14.8	4.8
PR05	CBL	20010920	1.1	1.95	8.38	2.03	NC	11.66	10.26	2.83	15.4	3.6
BP03	CBL	20010927	0.7	0.07	0.15	1.53	*	36.93	33.66	6.63	25.0	8.2
KC01	CBL	20010927	0.7	1.07	3.64	1.78	*	24.84	22.40	4.93	23.4	5.2
PR05	CBL	20010927	0.8	3.71	18.50	2.33	*	5.93	4.69	2.52	23.4	4.0
BP03	CBL	20011004	0.4	0.03	0.72	0.65	*	17.78	16.44	2.69	13.0	3.8
KC01	CBL	20011004	1.0	0.11	0.56	0.83	*	13.18	11.79	2.79	10.2	2.6
PR05	CBL	20011004	2.3	1.58	16.80	1.98	*	4.47	3.52	1.92	15.0	2.2
BP03	CBL	20011011	0.5	0.03	0.15	1.07	*	10.36	8.60	3.55	9.8	3.0
KC01	CBL	20011011	1.2	0.41	4.42	1.22	*	6.10	4.10	4.02	16.4	3.0
PR05	CBL	20011011	4.5	0.85	14.60	1.86	*	6.17	5.17	2.01	18.0	3.4

BLOSSOM POINT:
SUBMERGED AQUATIC VEGETATION (SAV) HABITAT STUDY

Page No.

TABLE A-4. US ARMY RESEARCH LABORATORY, ADELPHI MD
BLOSSOM POINT:
SUBMERGED AQUATIC VEGETATION (SAV) HABITAT STUDY
EPIPHYTE CHLOROPHYLL-*a* ACCUMULATION MEASUREMENTS:
Contains epiphyte chlorophyll-*a* concentrations (total and active).

FILENAME: BPECHL2001
REVISED: 20020111

STATION	DATE	TOTAL TCHL-*a* (µg/strip)	PHAEO (µg/strip)	ACTIVE ACHL-*a* (µg/strip)	STRIP AREA (cm^2)	TOTAL TCHL-*a* (µg cm^{-2})	ACTIVE ACHL-*a* (µg cm^{-2})	DAYS *In-situ*	EPIPHYTE ACCUMULATION RATES TCHL-*a* (µg cm^{-2} day^{-1})	EPIPHYTE ACCUMULATION RATES ACHL-*a* (µg $cm^{-2}day^{-1}$)	7-day EPITCHL-*a* (µg cm^{-2})
BP03	20010517	15.1056	3.6483	13.3076	64.5200	0.2341	0.2063	6	0.0390	0.0344	0.2731
BP03	20010517	22.7286	4.4165	20.5465	64.5200	0.3523	0.3185	6	0.0587	0.0531	0.4110
BP03	20010517	13.3632	3.3505	11.7126	64.5200	0.2071	0.1815	6	0.0345	0.0303	0.2416
BP03	20010517	22.6125	5.6685	19.8198	64.5200	0.3505	0.3072	6	0.0584	0.0512	0.4089
BP03	20010517	23.1933	5.3292	20.5654	64.5200	0.3595	0.3187	6	0.0599	0.0531	0.4194
BP03	20010517	31.6100	8.8255	27.2664	64.5200	0.4899	0.4226	6	0.0817	0.0704	0.5716
KC01	20010517	521.5923	113.9501	465.3708	64.5200	8.0842	7.2128	6	1.3474	D	D
KC01	20010517	471.5351	124.4071	410.2736	64.5200	7.3084	6.3589	6	1.2181	D	D
KC01	20010517	578.3955	138.4102	510.1730	64.5200	8.9646	7.9072	6	1.4941	D	D
KC01	20010517	532.3468	126.1992	470.1370	64.5200	8.2509	7.2867	6	1.3751	D	D
KC01	20010517	560.3084	128.7348	496.8276	64.5200	8.6843	7.7004	6	1.4474	D	D
KC01	20010517	482.1918	130.9844	417.7089	64.5200	7.4735	6.4741	6	1.2456	D	D
PR05	20010517	55.8275	12.7883	49.5212	64.5200	0.8653	0.7675	6	0.1442	0.1279	1.0095
PR05	20010517	34.7231	7.2050	31.1662	64.5200	0.5382	0.4830	6	0.0897	0.0805	0.6279
PR05	20010517	46.0313	10.3102	40.9458	64.5200	0.7134	0.6346	6	0.1189	0.1058	0.8323
PR05	20010517	36.0222	6.7575	32.6819	64.5200	0.5583	0.5065	6	0.0931	0.0844	0.6514
PR05	20010517	31.7630	5.6986	28.9445	64.5200	0.4923	0.4486	6	0.0820	0.0748	0.5743
PR05	20010517	52.0155	11.1127	46.5312	64.5200	0.8062	0.7212	6	0.1344	0.1202	0.9406

TABLE A-4. US ARMY RESEARCH LABORATORY, ADELPHI MD
BLOSSOM POINT:
SUBMERGED AQUATIC VEGETATION (SAV) HABITAT STUDY
EPIPHYTE CHLOROPHYLL-*a* ACCUMULATION MEASUREMENTS:
Contains epiphyte chlorophyll-*a* concentrations (total and active).

FILENAME: BPECHL2001
REVISED: 20020111

STATION	DATE	TOTAL TCHL-*a* (µg/strip)	PHAEO (µg/strip)	ACTIVE ACHL-*a* (µg/strip)	STRIP AREA (cm^2)	TOTAL TCHL-*a* (µg cm^{-2})	ACTIVE ACHL-*a* (µg cm^{-2})	DAYS *In-situ*	EPIPHYTE ACCUMULATION RATES TCHL-*a* (µg cm^{-2} day^{-1})	EPIPHYTE ACCUMULATION RATES ACHL-*a* (µg $cm^{-2}day^{-1}$)	7-day EPITCHL-*a* (µg cm^{-2})
BP03	20020525	8.5997	1.9593	7.6335	64.5200	0.1333	0.1183	8	0.0167	0.0148	0.1166
BP03	20020525	5.0094	1.1052	4.4642	64.5200	0.0776	0.0692	8	0.0097	0.0086	0.0679
BP03	20020525	4.3454	1.1812	3.7639	64.5200	0.0673	0.0583	8	0.0084	0.0073	0.0589
KC01	20020525	24.3200	7.4853	20.6390	64.5200	0.3769	0.3199	8	0.0471	0.0400	0.3298
KC01	20020525	38.5884	8.7342	34.2807	64.5200	0.5981	0.5313	8	0.0748	0.0664	0.5233
KC01	20020525	32.9662	7.9068	29.0690	64.5200	0.5109	0.4505	8	0.0639	0.0563	0.4471
PR05	20020525	11.5434	2.5846	10.2685	64.5200	0.1789	0.1592	8	0.0224	0.0199	0.1565
PR05	20020525	5.6744	1.0931	5.1343	64.5200	0.0879	0.0796	8	0.0110	0.0099	0.0770
PR05	20020525	9.1612	1.8203	8.2620	64.5200	0.1420	0.1281	8	0.0177	0.0160	0.1242

TABLE A-4. US ARMY RESEARCH LABORATORY, ADELPHI MD
BLOSSOM POINT:
SUBMERGED AQUATIC VEGETATION (SAV) HABITAT STUDY
EPIPHYTE CHLOROPHYLL-*a* ACCUMULATION MEASUREMENTS:
Contains epiphyte chlorophyll-*a* concentrations (total and active).

FILENAME: BPECHL2001
REVISED: 20020111

STATION	DATE	TOTAL TCHL-*a* (µg/strip)	PHAEO (µg/strip)	ACTIVE ACHL-*a* (µg/strip)	STRIP AREA (cm^2)	TOTAL TCHL-*a* (µg cm^{-2})	ACTIVE ACHL-*a* (µg cm^{-2})	DAYS *In-situ*	EPIPHYTE ACCUMULATION RATES TCHL-*a* (µg cm^{-2} day^{-1})	EPIPHYTE ACCUMULATION RATES ACHL-*a* (µg $cm^{-2}day^{-1}$)	7-day EPITCHL-a (µg cm^{-2})
BP03	20010601	5.0346	1.1722	4.4566	64.5200	0.0780	0.0691	7	0.0111	0.0099	0.0780
BP03	20010601	5.4934	1.3842	4.8115	64.5200	0.0851	0.0746	7	0.0122	0.0107	0.0851
BP03	20010601	8.3567	1.8875	7.4258	64.5200	0.1295	0.1151	7	0.0185	0.0164	0.1295
KC01	20010601	8.0751	1.8873	7.1446	64.5200	0.1252	0.1107	7	0.0179	0.0158	0.1252
KC01	20010601	4.1488	1.2393	3.5393	64.5200	0.0643	0.0549	7	0.0092	0.0078	0.0643
KC01	20010601	19.4810	3.9196	17.5452	64.5200	0.3019	0.2719	7	0.0431	0.0388	0.3019
PR05	20010601	6.6840	1.3532	6.0158	64.5200	0.1036	0.0932	7	0.0148	0.0133	0.1036
PR05	20010601	12.7631	2.4119	11.5710	64.5200	0.1978	0.1793	7	0.0283	0.0256	0.1978
PR05	20010601	13.8230	2.3765	12.6469	64.5200	0.2142	0.1960	7	0.0306	0.0280	0.2142

TABLE A-4. US ARMY RESEARCH LABORATORY, ADELPHI MD
BLOSSOM POINT:
SUBMERGED AQUATIC VEGETATION (SAV) HABITAT STUDY
EPIPHYTE CHLOROPHYLL-*a* ACCUMULATION MEASUREMENTS:
Contains epiphyte chlorophyll-*a* concentrations (total and active).

FILENAME: BPECHL2001
REVISED: 20020111

STATION	DATE	TOTAL TCHL-*a* (µg/strip)	PHAEO (µg/strip)	ACTIVE ACHL-*a* (µg/strip)	STRIP AREA (cm^2)	TOTAL TCHL-*a* (µg cm^{-2})	ACTIVE ACHL-*a* (µg cm^{-2})	DAYS *In-situ*	EPIPHYTE ACCUMULATION RATES TCHL-*a* (µg cm^{-2} day^{-1})	EPIPHYTE ACCUMULATION RATES ACHL-*a* (µg $cm^{-2}day^{-1}$)	7-day EPITCHL-*a* (µg cm^{-2})
BP03	20010719	4.6184	1.2736	3.9905	64.5200	0.0716	0.0618	6	0.0119	0.0103	0.0835
BP03	20010719	4.7058	1.3745	4.0283	64.5200	0.0729	0.0624	6	0.0122	0.0104	0.0851
KC01	20010719	17.3604	8.4054	13.2265	64.5200	0.2691	0.2050	6	0.0448	0.0342	0.3139
KC01	20010719	11.0354	4.7641	8.6914	64.5200	0.1710	0.1347	6	0.0285	0.0225	0.1995
KC01	20010719	11.8174	5.1626	9.2775	64.5200	0.1832	0.1438	6	0.0305	0.0240	0.2137
KC01	20010719	14.3704	5.5845	11.6216	64.5200	0.2227	0.1801	8	0.0278	0.0225	0.1949
KC01	20010719	2.7076	1.4985	1.9709	64.5200	0.0420	0.0305	8	0.0052	0.0038	0.0367
KC01	20010719	15.5664	5.9625	12.6314	64.5200	0.2413	0.1958	8	0.0302	0.0245	0.2111
PR05	20010719	130.9510	63.9198	99.5150	64.5200	2.0296	1.5424	6	0.3383	0.2571	2.3679
PR05	20010719	152.4541	74.1485	115.9872	64.5200	2.3629	1.7977	6	0.3938	0.2996	2.7567
PR05	20010719	223.0761	84.6069	181.4272	64.5200	3.4575	2.8120	6	0.5762	0.4687	4.0337

TABLE A-4. US ARMY RESEARCH LABORATORY, ADELPHI MD
BLOSSOM POINT:
SUBMERGED AQUATIC VEGETATION (SAV) HABITAT STUDY
EPIPHYTE CHLOROPHYLL-*a* ACCUMULATION MEASUREMENTS:
Contains epiphyte chlorophyll-*a* concentrations (total and active).

FILENAME: BPECHL2001
REVISED: 20020111

STATION	DATE	TOTAL TCHL-*a* (µg/strip)	PHAEO (µg/strip)	ACTIVE ACHL-*a* (µg/strip)	STRIP AREA (cm^2)	TOTAL TCHL-*a* (µg cm^{-2})	ACTIVE ACHL-*a* (µg cm^{-2})	DAYS *In-situ*	EPIPHYTE ACCUMULATION RATES TCHL-*a* (µg cm^{-2} day^{-1})	EPIPHYTE ACCUMULATION RATES ACHL-*a* (µg $cm^{-2}day^{-1}$)	7-day EPITCHL-a (µg cm^{-2})
BP03	20010727	3.0424	0.7943	2.6507	64.5200	0.0472	0.0411	8	0.0059	0.0051	0.0413
BP03	20010727	17.3926	6.8893	14.0018	64.5200	0.2696	0.2170	8	0.0337	0.0271	0.2359
BP03	20010727	13.6896	4.8773	11.2880	64.5200	0.2122	0.1750	8	0.0265	0.0219	0.1857
PR05	20010727	225.7165	54.3956	198.8749	64.5200	3.4984	3.0824	8	0.4373	0.3853	3.0611
PR05	20010727	151.5590	40.6296	131.5236	64.5200	2.3490	2.0385	8	0.2936	0.2548	2.0554
PR05	20010727	191.5799	41.9722	170.8550	64.5200	2.9693	2.6481	7	0.4242	0.3783	2.9693

TABLE A-4. US ARMY RESEARCH LABORATORY, ADELPHI MD
BLOSSOM POINT:
SUBMERGED AQUATIC VEGETATION (SAV) HABITAT STUDY
EPIPHYTE CHLOROPHYLL-*a* ACCUMULATION MEASUREMENTS:
Contains epiphyte chlorophyll-*a* concentrations (total and active).

FILENAME: BPECHL2001
REVISED: 20020111

STATION	DATE	TOTAL TCHL-*a* (µg/strip)	PHAEO (µg/strip)	ACTIVE ACHL-*a* (µg/strip)	STRIP AREA (cm^2)	TOTAL TCHL-*a* (µg cm^{-2})	ACTIVE ACHL-*a* (µg cm^{-2})	DAYS *In-situ*	EPIPHYTE ACCUMULATION RATES TCHL-*a* (µg cm^{-2} day^{-1})	EPIPHYTE ACCUMULATION RATES ACHL-*a* (µg $cm^{-2}day^{-1}$)	7-day EPITCHL-*a* (µg cm^{-2})
BP03	20010803	3.2890	1.2159	2.6904	64.5200	0.0510	0.0417	7	0.0073	0.0060	0.0510
BP03	20010803	3.4417	1.1851	2.8581	64.5200	0.0533	0.0443	7	0.0076	0.0063	0.0533
BP03	20010803	5.1520	2.1258	4.1059	64.5200	0.0799	0.0636	7	0.0114	0.0091	0.0799
KC01	20010803	15.8378	7.5457	12.1265	64.5200	0.2455	0.1879	7	0.0351	0.0268	0.2455
KC01	20010803	9.8026	4.8261	7.4292	64.5200	0.1519	0.1151	7	0.0217	0.0164	0.1519
KC01	20010803	7.3784	3.1401	5.8334	64.5200	0.1144	0.0904	7	0.0163	0.0129	0.1144
PR05	20010803	253.4030	56.8383	225.3423	64.5200	3.9275	3.4926	7	0.5611	0.4989	3.9275
PR05	20010803	265.8506	56.8738	237.7627	64.5200	4.1204	3.6851	7	0.5886	0.5264	4.1204
PR05	20010803	166.6847	29.8357	151.9286	64.5200	2.5835	2.3548	7	0.3691	0.3364	2.5835

TABLE A-4. US ARMY RESEARCH LABORATORY, ADELPHI MD
BLOSSOM POINT:
SUBMERGED AQUATIC VEGETATION (SAV) HABITAT STUDY
EPIPHYTE CHLOROPHYLL-*a* ACCUMULATION MEASUREMENTS:
Contains epiphyte chlorophyll-*a* concentrations (total and active).

FILENAME: BPECHL2001
REVISED: 20020111

STATION	DATE	TOTAL TCHL-*a* (µg/strip)	PHAEO (µg/strip)	ACTIVE ACHL-*a* (µg/strip)	STRIP AREA (cm^2)	TOTAL TCHL-*a* (µg cm^{-2})	ACTIVE ACHL-*a* (µg cm^{-2})	DAYS *In-situ*	EPIPHYTE ACCUMULATION RATES TCHL-*a* (µg cm^{-2} day^{-1})	EPIPHYTE ACCUMULATION RATES ACHL-*a* (µg $cm^{-2}day^{-1}$)	7-day EPITCHL-*a* (µg cm^{-2})
BP03	20010927	5.2238	2.4119	4.0374	64.5200	0.0810	0.0626	7	0.0116	0.0089	0.0810
BP03	20010927	2.7214	1.1330	2.1638	64.5200	0.0422	0.0335	7	0.0060	0.0048	0.0422
BP03	20010927	1.5143	1.0562	0.9954	64.5200	0.0235	0.0154	7	0.0034	0.0022	0.0235
KC01	20010927	13.7264	5.4673	11.0356	64.5200	0.2127	0.1710	7	0.0304	0.0244	0.2127
KC01	20010927	19.8030	6.7999	16.4542	64.5200	0.3069	0.2550	7	0.0438	0.0364	0.3069
KC01	20010927	16.7946	6.0934	13.7945	64.5200	0.2603	0.2138	7	0.0372	0.0305	0.2603
PR05	20010927	354.7621	42.7040	333.5505	64.5200	5.4985	5.1697	7	0.7855	0.7385	5.4985
PR05	20010927	244.5001	20.9345	234.0463	64.5200	3.7895	3.6275	7	0.5414	0.5182	3.7895
PR05	20010927	327.7362	-1.5045	328.2167	64.5200	5.0796	5.0871	7	0.7257	0.7267	5.0796

TABLE A-4. US ARMY RESEARCH LABORATORY, ADELPHI MD
BLOSSOM POINT:
SUBMERGED AQUATIC VEGETATION (SAV) HABITAT STUDY
EPIPHYTE CHLOROPHYLL-*a* ACCUMULATION MEASUREMENTS:
Contains epiphyte chlorophyll-*a* concentrations (total and active).

FILENAME: BPECHL2001
REVISED: 20020111

STATION	DATE	TOTAL TCHL-*a* (µg/strip)	PHAEO (µg/strip)	ACTIVE ACHL-*a* (µg/strip)	STRIP AREA (cm^2)	TOTAL TCHL-*a* (µg cm^{-2})	ACTIVE ACHL-*a* (µg cm^{-2})	DAYS *In-situ*	EPIPHYTE ACCUMULATION RATES TCHL-*a* (µg cm^{-2} day^{-1})	EPIPHYTE ACCUMULATION RATES ACHL-*a* (µg $cm^{-2}day^{-1}$)	7-day EPITCHL-*a* (µg cm^{-2})
BP03	20011004	1.8023	0.6527	1.4775	64.5200	0.0279	0.0229	7	0.0040	0.0033	0.0279
BP03	20011004	3.7196	0.9404	3.2515	64.5200	0.0576	0.0504	7	0.0082	0.0072	0.0576
BP03	20011004	1.5806	0.5162	1.3237	64.5200	0.0245	0.0205	7	0.0035	0.0029	0.0245
KC01	20011004	22.5400	7.1241	18.9946	64.5200	0.3493	0.2944	7	0.0499	0.0421	0.3493
KC01	20011004	16.2978	5.1024	13.7585	64.5200	0.2526	0.2132	7	0.0361	0.0305	0.2526
KC01	20011004	38.1984	8.3103	34.0620	64.5200	0.5920	0.5279	7	0.0846	0.0754	0.5920
PR05	20011004	183.5400	11.2541	177.9318	64.5200	2.8447	2.7578	7	0.4064	0.3940	2.8447
PR05	20011004	394.6441	32.7349	378.3385	64.5200	6.1166	5.8639	7	0.8738	0.8377	6.1166
PR05	20011004	468.7308	25.6835	455.9296	64.5200	7.2649	7.0665	7	1.0378	1.0095	7.2649

TABLE A-4. US ARMY RESEARCH LABORATORY, ADELPHI MD
BLOSSOM POINT:
SUBMERGED AQUATIC VEGETATION (SAV) HABITAT STUDY
EPIPHYTE CHLOROPHYLL-*a* ACCUMULATION MEASUREMENTS:
Contains epiphyte chlorophyll-*a* concentrations (total and active).

FILENAME: BPECHL2001
REVISED: 20020111

STATION	DATE	TOTAL TCHL-*a* (µg/strip)	PHAEO (µg/strip)	ACTIVE ACHL-*a* (µg/strip)	STRIP AREA (cm^2)	TOTAL TCHL-*a* (µg cm^{-2})	ACTIVE ACHL-*a* (µg cm^{-2})	DAYS *In-situ*	EPIPHYTE ACCUMULATION RATES TCHL-*a* (µg cm^{-2} day^{-1})	EPIPHYTE ACCUMULATION RATES ACHL-*a* (µg $cm^{-2}day^{-1}$)	7-day EPITCHL-*a* (µg cm^{-2})
BP03	20011011	0.9688	0.2875	0.8257	64.5200	0.0150	0.0128	7	0.0021	0.0018	0.0150
BP03	20011011	0.7848	0.2672	0.6518	64.5200	0.0122	0.0101	7	0.0017	0.0014	0.0122
BP03	20011011	0.6918	0.2166	0.5840	64.5200	0.0107	0.0091	7	0.0015	0.0013	0.0107
KC01	20011011	1.3432	0.3151	1.1864	64.5200	0.0208	0.0184	7	0.0030	0.0026	0.0208
KC01	20011011	2.0166	0.6015	1.7173	64.5200	0.0313	0.0266	7	0.0045	0.0038	0.0313
KC01	20011011	1.3138	0.3995	1.1150	64.5200	0.0204	0.0173	7	0.0029	0.0025	0.0204
PR05	20011011	345.3625	22.9656	333.9196	64.5200	5.3528	5.1754	7	0.7647	0.7393	5.3528
PR05	20011011	343.2299	24.9647	330.7926	64.5200	5.3197	5.1270	7	0.7600	0.7324	5.3197
PR05	20011011	367.1932	16.7853	358.8240	64.5200	5.6912	5.5614	7	0.8130	0.7945	5.6912

BLOSSOM POINT:
SUBMERGED AQUATIC VEGETATION (SAV) HABITAT STUDY

Page No.

TABLE A-5. US ARMY RESEARCH LABORATORY, ADELPHI MD
BLOSSOM POINT:
SUBMERGED AQUATIC VEGETATION (SAV) HABITAT STUDY
EPIPHYTE DRY MASS MEASUREMENTS: Contains total epiphyte dry weight and percent inorganic fractions.

FILENAME: BPEDRM2001
REVISED: 20021101

Station	Date	Strip Area (cm^2)	Dilution Volume (ml)	Filtered Volume (ml)	Dilution Volume (ml)	Days *in situ*	TSS ($mg\ l^{-1}$)	TVS ($mg\ l^{-1}$)	TSS dry Wt. ($mg\ cm^{-2}$)	TVS dry ORG wt. ($mg\ cm^{-2}$)	Epiphyte % Inorganic	Dry Wt. Accum Rate (mg cm-2 day-1)	Org Wt Accum Rate (mg cm-2 day-1)	7-day Accum (mg cm-2)
BP03	20010525	64.52	250.00	100.00	2.50	8	9.00	5.00	0.03	0.02	44.44	0.00	0.00	0.03
BP03	20010525	64.52	250.00	100.00	2.50	8	17.50	6.50	0.07	0.03	62.86	0.01	0.00	0.06
BP03	20010525	64.52	250.00	100.00	2.50	8	19.00	7.00	0.07	0.03	63.16	0.01	0.00	0.06
KC01	20010525	64.52	250.00	100.00	2.50	8	39.00	11.50	0.15	0.04	70.51	0.02	0.01	0.13
KC01	20010525	64.52	250.00	100.00	2.50	8	28.50	11.00	0.11	0.04	61.40	0.01	0.01	0.10
KC01	20010525	64.52	250.00	100.00	2.50	8	63.50	13.00	0.25	0.05	79.53	0.03	0.01	0.22
PR05	20010525	64.52	250.00	100.00	2.50	8	14.50	5.50	0.06	0.02	62.07	0.01	0.00	0.05
PR05	20010525	64.52	250.00	100.00	2.50	8	14.50	5.00	0.06	0.02	65.52	0.01	0.00	0.05
PR05	20010525	64.52	250.00	100.00	2.50	8	17.50	5.50	0.07	0.02	68.57	0.01	0.00	0.06
BP03	20010601	64.52	250.00	100.00	2.50	7	14.50	7.50	0.06	0.03	48.28	0.01	0.00	0.06
BP03	20010601	64.52	250.00	100.00	2.50	7	7.50	5.00	0.03	0.02	33.33	0.00	0.00	0.03
BP03	20010601	64.52	250.00	100.00	2.50	7	5.50	6.00	0.02	<<	<	0.00	<	0.02
KC01	20010601	64.52	250.00	100.00	2.50	7	52.00	14.00	0.20	0.05	73.08	0.03	0.01	0.20
KC01	20010601	64.52	250.00	100.00	2.50	7	3.50	4.00	0.01	<<	<	0.00	<	0.01
KC01	20010601	64.52	250.00	100.00	2.50	7	7.00	6.50	0.03	0.03	7.14	0.00	0.00	0.03
PR05	20010601	64.52	250.00	100.00	2.50	7	31.50	9.00	0.12	0.03	71.43	0.02	0.00	0.12
PR05	20010601	64.52	250.00	100.00	2.50	7	8.00	5.00	0.03	0.02	37.50	0.00	0.00	0.03
PR05	20010601	64.52	250.00	100.00	2.50	7	83.00	13.00	0.32	0.05	84.34	0.05	0.01	0.32

TABLE A-5. US ARMY RESEARCH LABORATORY, ADELPHI MD
BLOSSOM POINT:
SUBMERGED AQUATIC VEGETATION (SAV) HABITAT STUDY
EPIPHYTE DRY MASS MEASUREMENTS: Contains total epiphyte dry weight and percent inorganic fractions.

FILENAME: BPEDRM2001
REVISED: 20021101

Station	Date	Strip Area (cm^2)	Dilution Volume (ml)	Filtered Volume (ml)	Dilution Volume (ml)	Days *in situ*	TSS ($mg\ l^{-1}$)	TVS ($mg\ l^{-1}$)	TSS dry Wt. ($mg\ cm^{-2}$)	TVS dry ORG wt. ($mg\ cm^{-2}$)	Epiphyte % Inorganic	Dry Wt. Accum Rate (mg cm-2 day-1)	Org Wt Accum Rate (mg cm-2 day-1)	7-day Accum (mg cm-2)
BP03	20010719	64.52	150.00	50.00	3.00	6	5.00	8.00	0.01	<<	<	0.00	<	0.01
BP03	20010719	64.52	150.00	75.00	2.00	6	10.95	9.13	0.03	0.02	16.63	0.00	0.00	0.03
BP03	20010719	64.52	150.00	50.00	3.00	6	11.00	11.00	0.03	0.03	0.00	0.00	0.00	0.03
KC01	20010719	64.52	200.00	75.00	2.67	6	21.33	15.33	0.07	0.05	28.13	0.01	0.01	0.08
KC01	20010719	64.52	300.00	100.00	3.00	6	14.80	8.40	0.07	0.04	43.24	0.01	0.01	0.08
KC01	20010719	64.52	250.00	100.00	2.50	6	8.00	5.50	0.03	0.02	31.25	0.01	0.00	0.04
PR05	20010719	64.52	250.00	15.00	16.67	6	383.33	96.67	1.49	0.37	74.78	0.25	0.06	1.73
PR05	20010719	64.52	300.00	25.00	12.00	6	234.00	56.00	1.09	0.26	76.07	0.18	0.04	1.27
PR05	20010719	64.52	250.00	75.00	3.33	6	176.00	46.00	0.68	0.18	73.86	0.11	0.03	0.80
BP03	20010727	64.52	250.00	100.00	2.50	8	4.50	4.50	0.02	0.02	0.00	0.00	0.00	0.02
BP03	20010727	64.52	250.00	100.00	2.50	8	11.00	7.00	0.04	0.03	36.36	0.01	0.00	0.04
BP03	20010727	64.52	250.00	100.00	2.50	8	9.00	7.00	0.03	0.03	22.22	0.00	0.00	0.03
KC01	20010727	64.52	250.00	100.00	2.50	8	9.00	5.50	0.03	0.02	38.89	0.00	0.00	0.03
KC01	20010727	64.52	250.00	100.00	2.50	8	15.00	7.50	0.06	0.03	50.00	0.01	0.00	0.05
KC01	20010727	64.52	250.00	100.00	2.50	8	19.50	10.50	0.08	0.04	46.15	0.01	0.01	0.07
PR05	20010727	64.52	400.00	50.00	8.00	8	72.00	22.00	0.45	0.14	69.44	0.06	0.02	0.39
PR05	20010727	64.52	400.00	50.00	8.00	8	91.00	26.00	0.56	0.16	71.43	0.07	0.02	0.49
PR05	20010727	64.52	400.00	50.00	8.00	8	99.00	32.00	0.61	0.20	67.68	0.08	0.02	0.54

TABLE A-5. US ARMY RESEARCH LABORATORY, ADELPHI MD
BLOSSOM POINT:
SUBMERGED AQUATIC VEGETATION (SAV) HABITAT STUDY
EPIPHYTE DRY MASS MEASUREMENTS: Contains total epiphyte dry weight and percent inorganic fractions.

FILENAME: BPEDRM2001
REVISED: 20021101

Station	Date	Strip Area (cm^2)	Dilution Volume (ml)	Filtered Volume (ml)	Dilution Volume (ml)	Days *in situ*	TSS (mg l^{-1})	TVS (mg l^{-1})	TSS dry Wt. (mg cm^{-2})	TVS dry ORG wt. (mg cm^{-2})	Epiphyte % Inorganic	Dry Wt. Accum Rate (mg cm-2 day-1)	Org Wt Accum Rate (mg cm-2 day-1)	7-day Accum (mg cm-2)
BP03	20010803	64.52	250.00	100.00	2.50	7	9.50	5.50	0.04	0.02	42.11	0.01	0.00	0.04
BP03	20010803	64.52	300.00	100.00	3.00	7	8.50	9.50	0.04	<	<	0.01	<	0.04
BP03	20010803	64.52	200.00	75.00	2.67	7	6.67	11.33	0.02	0.04	-70.00	0.00	0.01	0.02
KC01	20010803	64.52	250.00	100.00	2.50	7	13.50	5.50	0.05	0.02	59.26	0.01	0.00	0.05
KC01	20010803	64.52	250.00	100.00	2.50	7	24.00	15.00	0.09	0.06	37.50	0.01	0.01	0.09
KC01	20010803	64.52	250.00	100.00	2.50	7	22.00	14.50	0.09	0.06	34.09	0.01	0.01	0.09
PR05	20010803	64.52	400.00	50.00	8.00	7	215.00	51.00	1.33	0.32	76.28	0.19	0.05	1.33
PR05	20010803	64.52	400.00	50.00	8.00	7	206.00	59.00	1.28	0.37	71.36	0.18	0.05	1.28
PR05	20010803	64.52	DS	50.00	DS	7	414.00	69.00	YY	YY	YY	YY	YY	YY
BP03	20010927	64.52	250.00	100.00	2.50	7	3.50	9.50	0.01	<	<	0.00	<	0.01
BP03	20010927	64.52	250.00	100.00	2.50	7	7.50	9.50	0.03	0.04	-26.67	0.00	0.01	0.03
BP03	20010927	64.52	250.00	100.00	2.50	7	5.50	10.00	0.02	<	<	0.00	<	0.02
KC01	20010927	64.52	250.00	100.00	2.50	7	5.00	10.50	0.02	<	<	0.00	<	0.02
KC01	20010927	64.52	250.00	100.00	2.50	7	38.00	19.00	0.15	0.07	50.00	0.02	0.01	0.15
KC01	20010927	64.52	250.00	75.00	3.33	7	36.00	22.67	0.14	0.09	37.04	0.02	0.01	0.14
PR05	20010927	64.52	250.00	50.00	5.00	7	327.00	64.00	1.27	0.25	80.43	0.18	0.04	1.27
PR05	20010927	64.52	250.00	50.00	5.00	7	387.00	74.00	1.50	0.29	80.88	0.21	0.04	1.50
PR05	20010927	64.52	250.00	50.00	5.00	7	518.00	97.00	2.01	0.38	81.27	0.29	0.05	2.01

TABLE A-5. US ARMY RESEARCH LABORATORY, ADELPHI MD
BLOSSOM POINT:
SUBMERGED AQUATIC VEGETATION (SAV) HABITAT STUDY
EPIPHYTE DRY MASS MEASUREMENTS: Contains total epiphyte dry weight and percent inorganic fractions.

FILENAME: BPEDRM200
REVISED: 20021101

Station	Date	Strip Area (cm^2)	Dilution Volume (ml)	Filtered Volume (ml)	Dilution Volume (ml)	Days *in situ*	TSS (mg l^{-1})	TVS (mg l^{-1})	TSS dry Wt. (mg cm^{-2})	TVS dry ORG wt. (mg cm^{-2})	Epiphyte % Inorganic	Dry Wt. Accum Rate (mg cm-2 day-1)	Org Wt Accum Rate (mg cm-2 day-1)	7-day Accum (mg cm-2)
PB03	20011004	64.52	250.00	100.00	2.50	7	7.00	7.00	0.03	0.03	0.00	0.00	0.00	0.03
PB03	20011004	64.52	250.00	100.00	2.50	7	11.50	10.00	0.04	0.04	13.04	0.01	0.01	0.04
PB03	20011004	64.52	250.00	100.00	2.50	7	23.00	12.50	0.09	0.05	45.65	0.01	0.01	0.09
KC01	20011004	64.52	250.00	100.00	2.50	7	19.50	12.00	0.08	0.05	38.46	0.01	0.01	0.08
KC01	20011004	64.52	250.00	100.00	2.50	7	21.50	12.50	0.08	0.05	41.86	0.01	0.01	0.08
KC01	20011004	64.52	250.00	100.00	2.50	7	22.50	15.00	0.09	0.06	33.33	0.01	0.01	0.09
PR05	20011004	64.52	300.00	50.00	6.00	7	433.00	77.00	2.01	0.36	82.22	0.29	0.05	2.01
PR05	20011004	64.52	250.00	50.00	5.00	7	399.00	82.00	1.55	0.32	79.45	0.22	0.05	1.55
PR05	20011008	64.52	250.00	50.00	5.00	7	508.00	91.00	1.97	0.35	82.09	0.28	0.05	1.97
PB03	20011011	64.52	250.00	100.00	2.50	7	4.00	6.50	0.02	<	<	0.00	<	0.02
PB03	20011011	64.52	250.00	100.00	2.50	7	4.50	7.00	0.02	<	<	0.00	<	0.02
PB03	20011011	64.52	250.00	100.00	2.50	7	20.00	24.00	0.08	<	<	0.01	<	0.08
KC01	20011011	64.52	300.00	100.00	3.00	7	2.50	6.00	0.01	<	<	0.00	<	0.01
KC01	20011011	64.52	350.00	100.00	3.50	7	13.00	16.00	0.07	<	<	0.01	<	0.07
KC01	20011011	64.52	250.00	100.00	2.50	7	20.50	9.00	0.08	0.03	56.10	0.01	0.00	0.08
PR05	20011011	64.52	250.00	50.00	5.00	7	379.00	65.00	1.47	0.25	82.85	0.21	0.04	1.47
PR05	20011011	64.52	250.00	50.00	5.00	7	841.00	106.00	3.26	0.41	87.40	0.47	0.06	3.26
PR05	20011011	64.52	250.00	50.00	5.00	7	589.00	88.00	2.28	0.34	85.06	0.33	0.05	2.28