Taxonomic Identification of Biological Samples Collected by the District of Columbia

FINAL Technical Report Prepared for

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Project Summary

This project coordinated the analysis of phytoplankton, zooplankton, and stream benthos samples collected by the District of Columbia water quality monitoring program between 1998 and 2001, and provided the results to the District in electronic formats.

In November 2001, staff of the Interstate Commission on the Potomac River Basin (ICPRB) acquired from DC DOH/EHA through a documented chain of custody process 917 samples collected by District monitoring program staff between the years 1998 and 2001. There were 20 benthic macroinvertebrates samples collected from free-flowing streams, and 661 phytoplankton, 119 microzooplankton, and 117 mesozooplankton samples collected from tidal waters. The cost of just analyzing all of the samples would have been over $140,000, however the Commission's two contracts were for a total of $80,000. The surplus of samples was delivered to ICPRB because not all were expected to be in good condition due to the lack of periodic re-preservation of the phytoplankton samples.

All of the 20 stream benthic macroinvertebrate samples were examined by ICPRB staff. Many were poorly preserved, and only 16 samples could be counted. The benthic data were entered into EDAS (Ecological Data Application System) and can be found in the Access file **<DCStreamBenthos_Tables.mdb>**. Indicator metrics used in bioassessment protocols by the EPA and/or the District were calculated by ICPRB from the data.

The subcontractor responsible for enumerating the phytoplankton samples had completed 77 counts when the draft of this report was submitted to DC DOH/EHA July 2004. Most of the counted samples were from Kingman Lake (Yrs 1998-2000). ICPRB staff examined 219 of the remaining 584 (~37.5%) uncounted phytoplankton samples in the spring of 2004 and found the following: 78.5% are in good or excellent condition, 13.2% are in marginal condition, and 8.2% are in poor (decomposed) condition and not worth enumerating. Samples from Yr 2000 have the highest frequency of decomposition, with 38.7% of the samples in poor condition. Samples from 1998, 1999, and 2001 have the lowest frequency of decomposition, with approximately 0%, 3.2%, and 4.0% in poor condition, respectively. Preservative strength in all uncounted phytoplankton samples was bolstered with 2 mls of 37% or 18.5% buffered formaldehyde on June 28, 2004. A second subcontract with ANS was implemented, and 82 spring and summer samples for spring and summer of the Yr 2001 were enumerated. The primary data for the 159 counted samples can be found in the Excel file **<Phytoplankton_I-II.xls>**. There remains at ICPRB 125 uncounted samples for Yr 1998, 156 for Yr 1999, and 152 for Yr 2000. An updated chain of custody for the phytoplankton samples is provided in Appendix A.

A total of 46 mesozooplankton samples were enumerated by the subcontractors. All of the Kingman Lake mesozooplankton samples (Yr 1999) are counted. All of the Yr 2000 and 2001 mesozooplankton samples from the Anacostia and Potomac rivers are counted. The data can be found in the Excel file **<Mesozooplankton I.xls>**. Information provided by DC staff about the plankton tow lengths for each sampling event can be found in **<Plankton Tow Lengths.xls>**. Seventy-one (71) mesozooplankton samples from Yr 1998 and 1999 remain to be counted: 24

from ANA14 in the Anacostia, and 47 from PMS10 and PMS37 in the Potomac mainstem. A total of 46 microzooplankton samples were evaluated by the subcontractors. A preservation problem was discovered, and some of the 46 samples and the remaining 73 samples were judged to be insufficiently preserved and not worth enumerating and identifying. Due to the suspected degradation of many samples, the data were not analyzed. An updated chain of custody for the zooplankton is provided in Appendix B.

Plankton indicator metrics currently used in Chesapeake Bay Program bioassessments were calculated from the available phytoplankton (Appendix C) and mesozooplankton (Appendix D) count data. Metrics for microzooplankton were not calculated due to poor sample preservation. Indicator metrics recommended by District of Columbia staff and/or used in the U. S. Environmental Protection Agency rapid bioassessment protocols (RBP) were calculated from the available stream benthic macroinvertebrate data (Appendix E). The CBP mesozooplankton metrics may be inappropriate to apply to the zooplankton populations of the fast-flowing upper Potomac mainstem since this reach is more riverine than estuarine. Benthic epifauna or night-time drift samplers rather than zooplankton nets may more accurately sample the invertebrate food web available to fish in this reach.

The plankton and stream benthos analysis results suggest that biological communities in the variety of District waters generally exhibit Poor status, however there are exceptions. The stream macroinvertebrate community sampled at Ft. Stanton exhibited a Fair condition, and the community sampled at Klingle Valley exhibited a Good-Fair condition. The phytoplankton Index of Biotic Integrity (IBI) exhibited a Good status at the upper Potomac and upper Anacostia stations during periods of low flow, probably reflecting a reduction in nutrient and sediment loadings to these areas. The zooplankton food availability index met the Minimal requirements for larval anadromous fish twice during the 2000-2001 period, at station ANA14 in the Anacostia River (near Pennsylvania Ave). The plankton results indicate that the District of Columbia's tidal plankton community will respond rapidly and positively to management-related nutrient and sediment reductions.

Project Tasks

Tasks identified in the completed Water Protection Division grant (01G-01-S319-WPD09) and Bureau of Environmental Quality, Water Quality Division grant (01A-02-WQD02 (APPR01)) are combined below, and discussed jointly.

TASK 1: Quality Assurance Project Plan and Counting Protocols (Completed)

Develop Quality Assurance Project Plans in accordance with US EPA guidelines (EPA QA/R-5) for phytoplankton, zooplankton, and benthic invertebrate sample counting and data entry procedures, and submit to DC DOH/EHA for approval prior to the start of these activities. These protocols may be refined in cooperation with the qualifying subcontractors and DC DOH/EHA staff:

> Quality Assurance Plans were provided by the contractors selected to identify and enumerate the phytoplankton and zooplankton samples. These QA Plans were submitted to the District during the DC/ICPRB proposal review process, and were identical to those used by the Chesapeake Bay Program at the time. A QA Plan for counting the 20 stream benthic macroinvertebrate samples is included in this report in Appendix F. The ICPRB staff who counted the samples (Jim Cummins) has received formal training in taxonomic identification of stream benthic macroinvertebrates from both the Maryland and Pennsylvania state agencies.
>
> Phytoplankton samples were subsampled and settled in a gridded settling chamber. They were first assessed as to whether the preservative was still effective. If the sample had deteriorated (i.e. active bacteria and/or decomposing algal cells are noted), the counting procedure was stopped and the sample recorded as not counted due to deterioration. If the sample was in good condition, the count proceeded. A minimum of 200 cells were identified to the lowest taxonomic level and counted. Cells in algal colonies and filaments were individually enumerated. The entire subsample was scanned for large, rare species. A 10% sample recount was performed for QA/QC purposes.
>
> Zooplankton samples were identified and counted using a hierarchical counting technique. At least 60 individuals of the most dominant forms were counted in a small subsample (usually 1-2 milliliters), followed by 5 and 10 milliliter subsamples from which all species that had counts less than 60 in the previous subsample were counted. Instead of a 10% sample recount for QA/QC purposes, additional samples were counted as part of a small study to determine if the low microzooplankton numbers were due to field collection .
>
> Stream benthic invertebrates were identified to at least family taxonomic level and all organisms in each sample were counted. A 10% sample recount was not required for QA/QC purposes since each sample was counted entirely. No marsh benthic macroinvertebrate samples were delivered to ICPRB.

TASK 2: Acquire Samples from DC DOH/EHA (Completed)

This was done between November 19 and 30, 2001, at DC DOH/EHA offices and ICPRB offices through a documented chain of custody process.

TASK 3: Taxonomic Identification of Samples

Subtask 3A: Obtain Bids (Completed)

Qualified organizations and/or individuals to perform phytoplankton and zooplankton taxonomic identifications and counts were identify through a bidding process. Bids from several vendors were reviewed during the January - March 2002 time period. In consultation with the District of Columbia, the Academy of Natural Sciences Estuarine Research Laboratory was selected to count the microzooplankton and phytoplankton samples, and Versar, Inc. was selected to count the mesozooplankton samples. Contracts were signed with each of these vendors. Due to the small number (20) of stream benthic macroinvertebrate samples acquired from the District of Columbia, it was decided that ICPRB personnel (Jim Cummins) would counted these samples.

Subtask 3B: Manage Subcontracts (Completed)

Subcontracts with the two vendors, Versar, Inc. and the Academy of Natural Sciences (ANS), were implemented. The subcontract with the ANS was ended before all assigned monies were spent due to ANS personnel problems that have since been resolved. A second subcontract was established with ANS to perform additional phytoplankton counts. Results were delivered to ICPRB before in the fall of 2004.

Subtask 3C: Submit Progress Reports to DC DOH/EHA (Completed)

Progress reports and emailed updates/requests for approval occurred on

- January 14, 2002
- March 28, 2002
- August 9, 2002
- December 31, 2002
- January 27, 2003
- April 30, 2003
- July 23, 2003
- September 26, 2003
- June 2, 2004

The zooplankton taxonomists at Versar, Inc. and the Academy of Natural Sciences Estuarine Research Center raised at number of issues in the summer of 2002 that needed to be addressed before the zooplankton counts could be completely entered into a database. They discussed some of these issues with DC staff directly. Their concerns and questions were summarized in ICPRB's August 9, 2002, progress report to the District. With DC staff help, ANS staff Ms. Stella Sellner determined the microzooplankton samples were being under-preserved in the field. She compared the conditions and densities of organisms in Potomac samples freshly collected by DC staff with those of samples collected in the late 1990s. She also tested the formalin strengths in the older samples. She concluded that many of the samples had some degree of decomposition. Preservative strengths recommended in Harris et al. (2000) were summarized in a April 30, 2003 email to District staff Jeffery Zahn (see Supporting Details).

TASK 4: Receive Data and Transmit Data to DC DOH/EHA

Subtask 4A: Receive Data from Subcontractors and Quality Check Data for Accuracy and Thoroughness (Completed)

Data quality was checked by the subcontractors in the normal course of their data entry procedures. Data quality was also checked by ICPRB staff during the data analyses.

Subtask 4B: Submit Data to DC DOH/EHA in Electronic Formats (Completed)

Benthic data were entered in EPA's Ecological Data Application System (EDAS).

Plankton data were entered into formats uploadable to the U. S. EPA Chesapeake Bay Program databases.

The data files provide the identifications and densities of benthic and plankton organisms by station and date.

Subtask 4C: Data Analysis (Completed)

Benthic invertebrate metrics agreed upon by DC DOH/EHA staff were calculated.

The suite of phytoplankton indicators and the indexes of biotic integrity developed for the Chesapeake Bay Program to assess the health of tidal waters were calculated.

The index developed for the Chesapeake Bay Program to evaluate mesozooplankton food densities available for anadromous fish larvae was calculated. Correlations between microzooplankton and eutrophication parameters could not be done because preservation problems with the microzooplankton samples prevented them from being counted.

The data analysis was updated after the phytoplankton sample enumerations for spring and summer of Yr 2001 were delivered by ANS and water quality data (includes chlorophyll a and pheophytin concentrations) were available on the Chesapeake Information Management System (CIMS) web site, or www.chesapeakebay.net. The results are included in this updated technical report.

TASK 5: Prepare and Submit Draft Technical Report (Completed)

The draft technical report was submitted to DC DOH/EHA. Their review comments have been incorporated into this updated and final technical report.

TASK 6: Return Sample Bottles to DC DOH/EHA (Completed)

Forty-six (46) mesozooplankton sample bottles were returned to DC via District staff person, Khin Sann.

One hundred and nineteen (119) microzooplankton sample bottles and ninety-three (93) phytoplankton sample bottles have been washed and dried, and have been shipped via ground transportation to the District, c/o Lucretia Brown.

Phytoplankton Analysis

Spring and Summer Phytoplankton Indexes of Biotic Integrity

Season- and salinity-specific indexes of biotic integrity (IBI) were recently developed for estuarine phytoplankton communities in Chesapeake Bay and its tidal tributaries (Lacouture *et al.* Submitted., see Appendix G). The indexes represent phytoplankton community health as it relates to water quality, or habitat, conditions. "Good" index scores reflect an unstressed phytoplankton community with no blooms and a desirable mixture of species. The indexes were applied to the available District of Columbia 1998-2000 phytoplankton monitoring data and all of the 2001 data.

Method Description

The spring and summer IBIs for tidal fresh waters are composed of several phytoplankton or phytoplankton-related metrics (Table 1, Appendix G). The metrics all discriminate between least-impaired and impaired water quality (Wilcoxon Sign Rank Test, $p<0.05$). Least-impaired habitat conditions have dissolved inorganic nitrogen (DIN) *and* orthophosphate (PO_4) concentrations at or approaching the phytoplankton growth-limiting thresholds *and* relatively good water clarity, as measured by Secchi depth. Impaired water quality conditions have excess DIN, excess PO_4, and shallow Secchi depths (Buchanan *et al.* 2005). Metrics were identified for spring (March - May) and summer (July - September), for each of the four salinity zones. Season- and salinity specific scoring criteria which produced approximately equal classification efficiencies in both impaired and least-impaired conditions were empirically determined for each metric using the Maryland and Virginia Chesapeake Bay Program (CBP) database. Metrics were scored on a scale of 1 - 3 - 5, with 1 representing the most degraded condition and 5 representing the least degraded condition. Some metrics with low values received no score ("null") because only high scores were indicative of impairment and low scores did not distinguish between impaired and least-impaired conditions. Numeric scores for the individual metrics were averaged to obtain a final phytoplankton IBI score for each sampling event. Classification efficiencies indicate the final IBI correctly identifies impaired and least-impaired habitat conditions 69% of the time in tidal fresh spring and 78% of the time in tidal fresh summer. The lower efficiency in spring is thought to reflect the seasonally higher freshwater inflow rates.

Two calculation methods were established because of past differences in the laboratory counting protocols of the Maryland and Virginia CBP monitoring programs. Method A is used when calculating IBIs for bay-wide comparison purposes. Method B includes more metrics, which produces a more robust index. Method B can presently be applied to the Maryland CBP and District of Columbia monitoring data. Evaluations produced by the two methods are typically very comparable.

The IBI score for a station sampling event is calculated only if sufficient numbers of scored metrics are available. In this analysis, four or more metrics were required to calculate an IBI score. Some metrics are naturally highly variable, and consequently have low classification efficiencies (high error rates) as individual metrics. They are kept in the suite of IBI metrics, however, because their presence serves to enhance the classification efficiency of the overall IBI score. Metrics for the IBI were selected because they can discriminate better than 50-50 (sometimes better than 80-20) between impaired and unimpaired conditions. Hence, metric scores tend to reenforce each other, and the error introduced by a single metric that mis-classifies the conditions is minimized. The IBI is a more accurate environmental tool than its individual metrics. IBI scores of 4 - 5 are "Good," scores of 3.3 - 4 are "Fair-Good," scores of 2.67 - 3.33 are "Fair," scores 2 - 2.67 of are "Fair-Poor," and scores of 1 - 2 are "Poor."

IBI scores can be used to quantify phytoplankton community status and characterize water bodies in different phases of recovery. Individual stations usually exhibit a range of IBI scores over the course of a year which relates to changes in water quality conditions. Health of open water communities can differ markedly from that of bottom layer communities. For example, CB5.2 in the Bay mainstem near the mouth of the Potomac River has some of the best surface water conditions in the Bay and corresponding high phytoplankton IBI scores (median = 3.4, "Fair-Good"). Waters below the pycnocline in this segment regularly experience summer anoxia and low benthic IBI scores (median = 2.0, "Severely Degraded").

Results

The phytoplankton IBI results indicate phytoplankton communities at District of Columbia monitoring stations are in Poor condition overall, but at times can rank Fair-Good or Good. The phytoplankton IBI results for 1998 - 2001 District of Columbia monitoring data are presented and discussed on a station-by-station basis in Appendix C. IBI metrics measured as part of the water quality monitoring program were obtained from the CBP web site and merged with the phytoplankton count-based metrics. "ND" indicates the IBI score could not be determined due to insufficient numbers of metrics - most frequently this was the lack of chlorophyll *a* and pheophytin data corresponding to the phytoplankton count data. For comparison purposes, the long-term average IBI scores for the Virginia and Maryland Chesapeake Bay phytoplankton monitoring stations are shown in Table 6 of Appendix G. Both sets of indicators were calculated with Method A.

Analysis results for 1998 - 2000 were focused primarily on Kingman Lake. Overall, Kingman Lake ranked Fair-Poor or Poor at this time, but showed occasional Fair-Good and Good rankings during the drought period of 1999 and early 2000. Spring blooms were often biomass-dominated by greens (*Ankistrodesmus, Sphaerocystis*), cryptomonads (*Cryptomonas*) and euglenoids (*Phacus*) rather than diatoms. Bluegreen taxa that normally appear in summer (*Agmenellum, Oscillatoria, Microcystis*) were commonly seen in spring as well in Kingman. The primary spring diatom taxa were an unidentified pennales and *Melosira* sp. Summer blooms were mostly biomass-dominated by bluegreens (*Agmenellum, Chroococcus, Oscillatoria, Anabaena*), euglenoids (*Euglena, Phacus*), greens (*Gloeocystis, Sphaerocystis*), and dinoflagellates (*Ceratium*). The primary summer diatom taxa were unidentified pennales, unidentified centrics, *Melosira*, *Cyclotella*, and *Aulacoseira granulata*. In 2001, Kingman Lake experienced a massive, diverse summer bloom event, culminating in a *Microcystis aeruginosa* bloom in September.

Phytoplankton IBIs were calculated for all the District monitoring stations for spring and summer 2001. The results are shown in Figure 1. Phytoplankton IBIs scores were generally Poor but Fair, Fair-Good, and Good scores were found at most monitoring stations in the Potomac and Anacostia (excludes Kingman) in August 2001. The phytoplankton metrics included in the IBIs are sensitive to water quality conditions (Buchanan *et al.* 2005, Lacouture et al. Submitted), which in turn are strongly affected by inputs delivered to the system by point and non-point sources. Spring and summer 2001 river flows were generally moderate in the Potomac and Anacostia, however the region experienced very dry conditions in 1999 and dry conditions in 2000 (M. Olson, pers. communication) as well as a dry January, February, April-May, and August in 2001 (Figure2) which could be expected to lower overall nutrient and sediment inputs. Average taxa biomasses of the spring and summer phytoplankton communities (Figure 3) demonstrate that bluegreen algal biomasses were low except in Kingman Lake and the Washington Tidal Basin. Biomasses of the often-dominant green (chlorophytes) and diatom taxonomic groups were high, but total biomass only scored "1," or poor, in 24 of the 43 spring samples (56%) and 19 of the 42 summer samples (45%). Cryptomonads, dinoflagellates and euglenoids, which are taxonomic groups that are indicative of or tolerant of eutrophic conditions or organic enrichment in freshwater, were very abundant in Kingman Lake during the summer and had substantial presences in the summer Anacostia, and spring Tidal Basin and TCO stations. Elsewhere, they were present in moderate-low densities. The August 2001 phytoplankton IBIs in the Potomac and Anacostia rivers indicate that the District tidal phytoplankton communities can respond quickly to changing water quality conditions, and achieve desirable statuses. This quick response capability could have an intermittent beneficial effect on organisms that graze on the phytoplankton.

Table 1. List of phytoplankton and phytoplankton-related metrics used in calculating the index of biotic integrity for spring (March - May) and summer (July - September) tidal fresh waters. Method A is used when calculating IBIs for bay-wide comparison purposes. Method B includes more metrics, and is used to calculate IBIs for the Maryland CBP and District of Columbia monitoring data (from Lacouture *et al.* in prep.). Phytoplankton metrics are derived from count data (P). Phytoplankton-related metrics are parameters measured in water quality monitoring (WQ).

Spring	**Summer**
Method A (for Bay-wide comparisons)	
Carbon:Chlorophyll *a* Ratio (P, WQ)	Surface Chlorophyll *a* (WQ)
Surface Chlorophyll *a* (WQ)	Cyanophyte Biomass (P)
Cyanophyte Biomass (P)	Diatom Biomass (P)
Dissolved Organic Carbon (WQ)	Dissolved Organic Carbon (WQ)
Pheophytin (WQ)	Pheophytin (WQ)
Total Nano-Micro Phytoplankton Biomass (P)	Total Nano-Micro Phytoplankton Biomass (P)
	Microcystis aeruginosa Abundance (P)
Method B (can be applied to Maryland CBP and District monitoring data) Includes all of the above metrics plus the following:	
Diatom Abundance (P)	Chlorophyte Abundance (P)
Total Abundance (P)	Total Abundance (P)

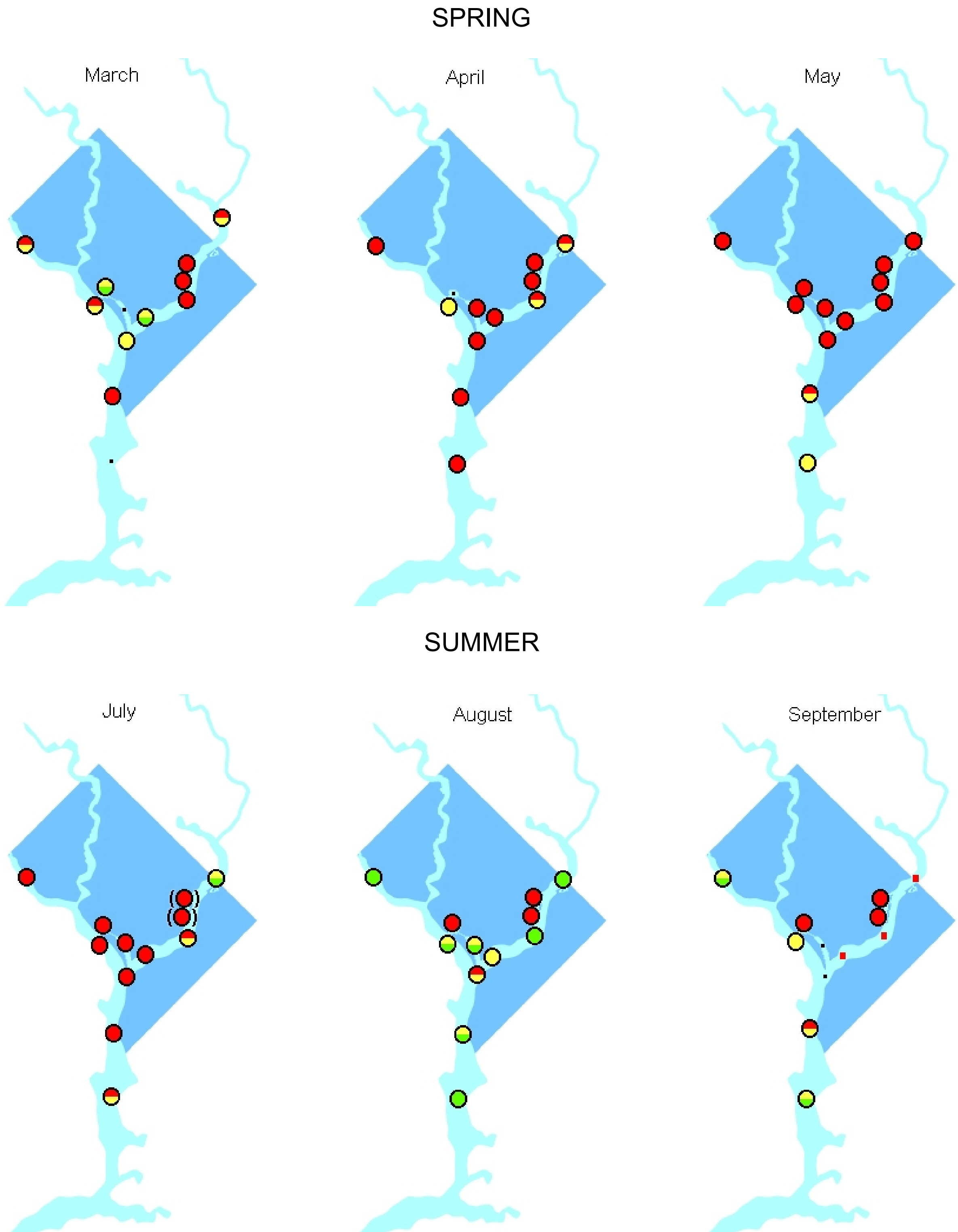
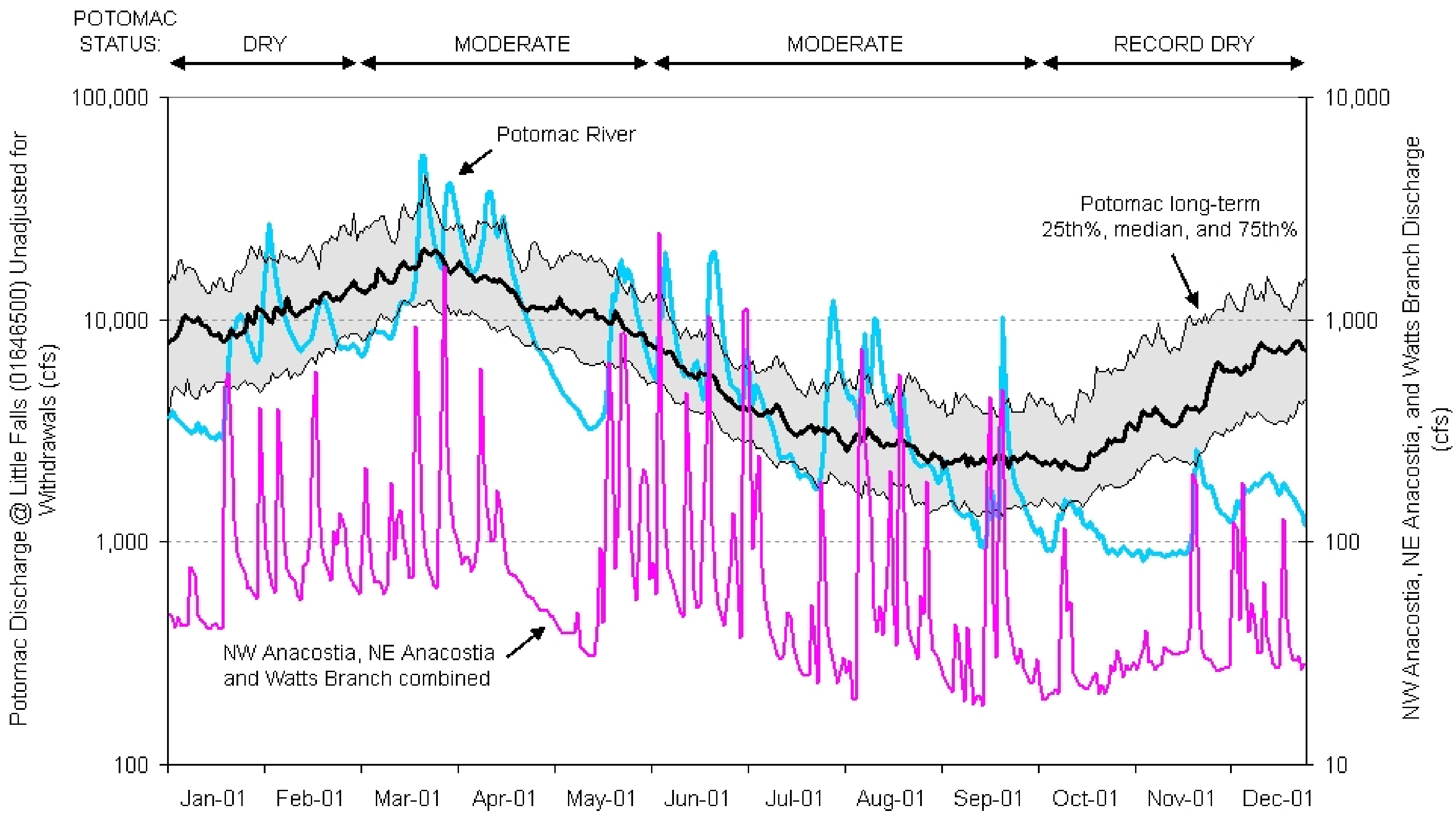


Figure 1. District of Columbia phytoplankton Indexes of Biotic Integrity (IBIs) for spring and summer, 2001. Key: red, IBI = 1 - 2 (Poor); red/yellow, IBI= >2 - 2.67 (Fair-Poor); yellow, IBI = >2.67 - <3.33 (Fair); yellow/green, IBI = 3.33 - <4 (Fair-Good); green, IBI = 4 - 5 (Good); circle, IBI calculated with Method A (Lacouture et al. Submitted); circle within brackets, IBI calculated with Method B (chlorophyll and pheophytin data not available); square, evaluation is based only on chlorophyll and pheophytin scores (phytoplankton count data not available).

Figure 2. Daily average flows in 2001 for the Potomac River at Little Falls (USGS 01646500) and the combined Anacostia River Northwest Branch (USGS 01651000), Northeast Branch (USGS 01649500), and Watts Branch (USGS 01651800) tributaries, in cubic feet per second (cfs). Potomac flow status is given for the winter (January through February), spring (March through May), summer (June through September), and Autumn (October through December) seasons of 2001 (Olson 2002). Data source: USGS http://waterdata.usgs.gov/nwis.



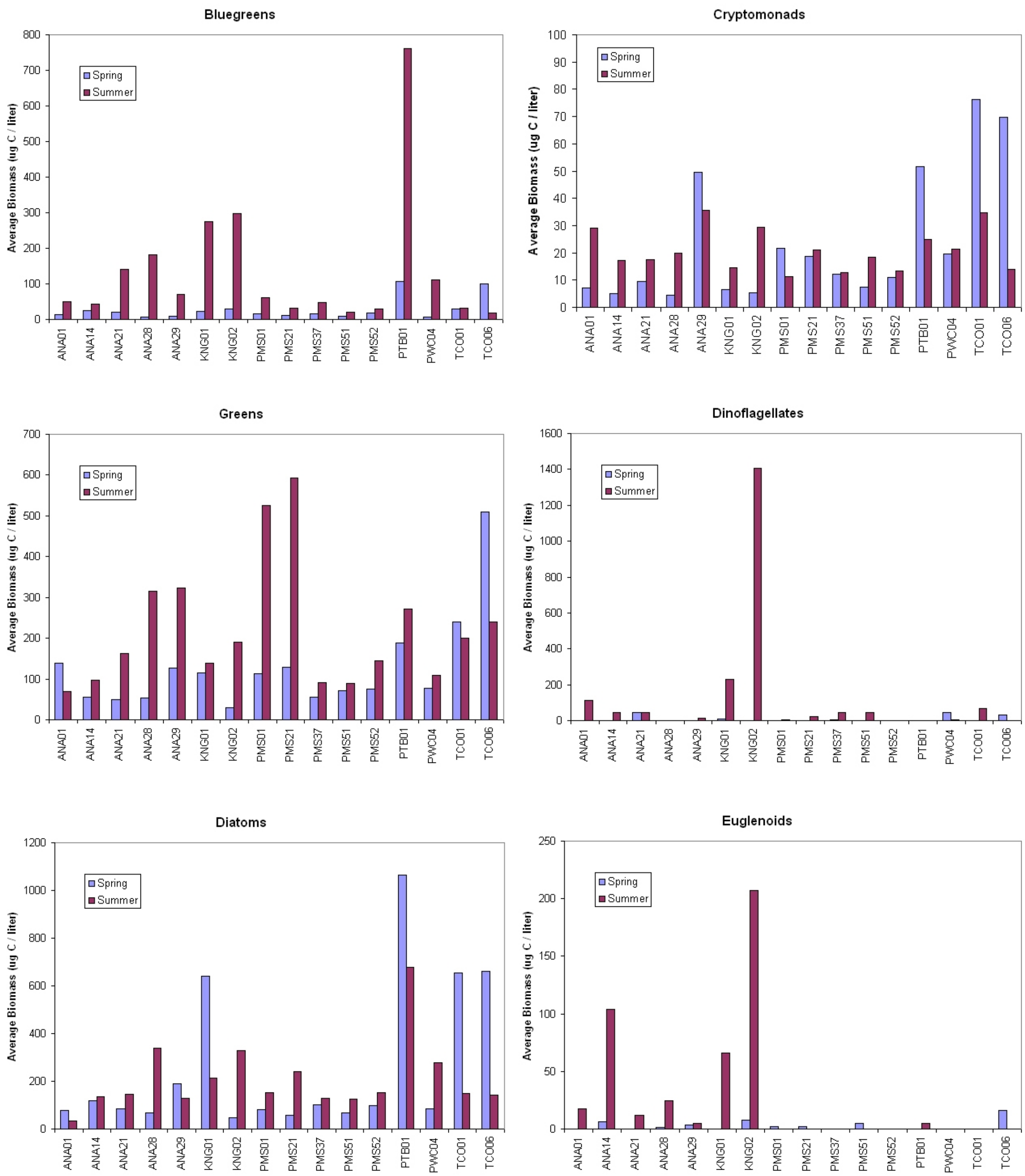


Figure 3. Average biomass (µg C liter^{-1}) of each of the six major taxonomic groups in the Anacostia River (ANA##), Kingman Lake (KNG##), Potomac River mainstem (PMS##), Washington, D.C. tidal basin (PTB01), Washington Channel (PWC04), and two tributary stations (TCO##). Seasons: spring = March-May; summer = July-September.

Autumn and Winter Phytoplankton Blooms

Kingman Lake

A total of 10 autumn and 12 winter samples from Kingman Lake from 1998-2000 were analyzed. A prolonged, extensive bloom was evident in Kingman Lake during the autumn and early winter of 1998, with total phytoplankton biomass averaging 2044 ug carbon liter^{-1}. The bloom was biomass-dominated by bluegreens (*Oscillatoris, Agmenellum*) and a mixture of diatom taxa in autumn, and by the centric diatoms *Leptocylindrus danicus* and *Melosira* sp. in winter. A shorter-lived bloom, biomass-dominated by the dinoflagellate *Protoperidinium crassipes* and several diatom taxa, was evident at KNG01 on November 6, 2000. Based on these few years of data, it would appear that Kingman Lake is prone to phytoplankton blooms in autumn and winter, and the blooms are composed of bluegreen and dinoflagellate taxa that could potentially disrupt the aquatic food web.

Potomac River

No IBIs have been developed yet for autumn (October-November) and winter (December-February) phytoplankton populations. Chlorophyll *a* in Chesapeake reference communities in tidal fresh waters (U.S. Environmental Protection Agency 2003, Buchanan *et al.* 2005) typically does not exceed the following concentrations:

Autumn: 18.2 ug liter^{-1} (tidal fresh), 25.0 ug liter^{-1} (oligohaline)
Winter: 8.0 ug liter^{-1} (tidal fresh), 16.1 ug liter^{-1} (oligohaline)

If these concentrations are applied as benchmarks to the 1837 District and Maryland Potomac chlorophyll *a* records from tidal fresh and oligohaline waters, for winters between 1984 and 2001, it appears that the frequency of winter algal blooms can be as high as 30% (Figure 4). An additional 1709 Potomac records indicate bloom frequencies are lower during autumn, especially in oligohaline waters. Autumn and winter chlorophyll *a* data for the Anacostia mainstem were sparse, and no conclusions can be drawn about their frequency at this time. The relatively high frequency of winter algal blooms in the Potomac suggest food web disruptions may be an issue in this season, and may impact the later development of spring zooplankton populations needed to support anadromous fish.

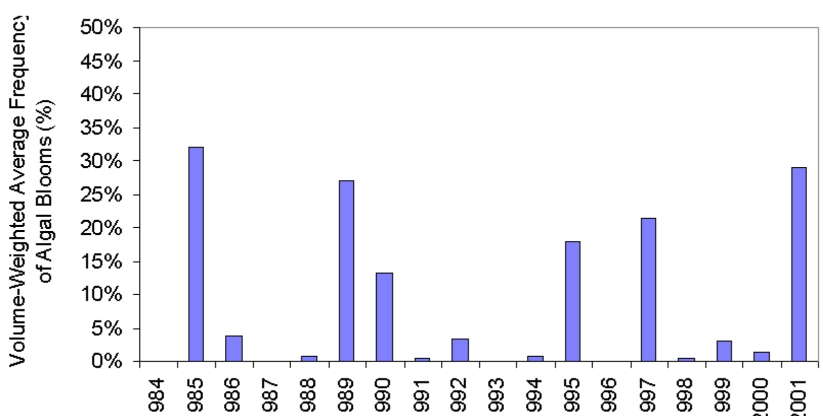


Figure 4. Frequency of winter algal blooms in the tidal fresh and oligohaline Potomac River estuary.

Zooplankton Analysis

Spring Food Availability Index

Spring mesozooplankton densities in the Potomac and Anacostia mainstems represent the amount of food available to larvae of anadromous fish that spawn in these waters. Mesozooplankton are free-floating organisms 20µm - 2cm long, comprised mostly of copepods, cladocerans, and larvae of benthic macroinvertebrates. Positive relationships between mesozooplankton food and larval fish survival and growth rates have been found in laboratory experiments (Cushing 1972; Houde 1978; Miller 1978; Beaven and Mihursky 1980; Hunter 1981; Kernehen et al. 1981; Setzler-Hamilton et al. 1981; Hjorth 1988; Uphoff 1989: Chesney 1989; Tsai 1991). As mesozooplankton density increases, larval growth improves and recruitment to juvenile life stages increases. This reflects "bottom-up" control of fish larvae survival by their mesozooplankton prey. *In situ*, this positive relationship is influenced by the effects of other factors such as temperature, turbidity, size of the spawning female population (brood stock), and predation losses. It also appears to be influenced by negative impacts of eutrophication on zooplankton.

The geometric mean of mesozooplankton densities in April, May and June can be used as a food availability index for larval striped bass and white perch during their critical first-feeding periods, as they drift in the water column. While clearly recognizing that other environmental factors greatly affect larval feeding rates, Versar, Inc. and PBS&J, Inc. (1999) derived scoring criteria from the literature and establish distinct feeding categories. The "optimal" category was a geometric mean density of greater than 25 organisms per liter. A "minimum" requirement of zooplankton fell between 15 and 25 organisms liter^{-1}; "below minimum" ranged from 5 to 15 liter^{-1}; and "poor" was less than 5 liter^{-1}. The geometric mean density for each year is calculated using the mesozooplankton densities at monitoring stations overlapping striped bass early life stage nursery areas. These typically are tidal fresh and oligohaline areas (<5.0 ppt salinity). In the Potomac River below the District, a significant ($p<0.05$) positive predator-prey correlation is found when the striped bass summer juvenile index (geometric mean catch per seine haul) is normalized by CPUE of the adult spawning stock in spring (average # caught per hour per 1000 square yard gill net) and regressed against spring food availability index (MDDNR data available at http://www.dnr.state.md.us/fisheries/). The relationship holds before and after 1993, when a striped bass resurgence began in the river (Figure 5).

Anacostia and Potomac Rivers
The average values and ranges of the food availability index for 2000 - 2001 District of Columbia monitoring data are presented in the following Station Summaries. There are insufficient numbers of counted samples at this time to make a broad evaluation of spring zooplankton food availability for larval striped bass and white perch in tidal waters of the District. The results suggest this area currently has a Poor status, however index values at the Anacostia station reached Minimal status in June 2000 and May 2001.

The mesozooplankton-based food availability index for larval striped bass and white perch may be inappropriate to use in the fast flowing upper Potomac River mainstem, above the Anacostia confluence. The riverine nature of the Potomac River below Great Falls rapidly flushes populations of free-floating zooplankton, which can require days to weeks to reproduce. Mean residence time is less than one day between Georgetown Reservoir and the Anacostia confluence. Residence time is about 1.4 days between the Anacostia confluence and Fort Foote, MD near the southeast border of the District (Table 2). Historically, the residence times in both these river reaches were significantly longer because the river was much deeper (e.g., Gottschalk 1945). Sediment and biological characteristics have also changed in the last century (e.g., Benedict Estuarine Research Laboratory 1976, DeFries 1980). The physical environment of the upper Potomac River mainstem in the District of Columbia may now be more likely to produce populations of benthic macroinvertebrate "collectors" than free-floating zooplankton, as suggested by the River Continuum Concept (Vannote *et al.* 1980). Collectors include insect and amphipod taxa, but are more commonly represented by tubificid worms in organically enriched areas. Collectors consume fine and ultra-fine particulate organic carbon (and their associated microbial biomass) that are transported from upstream sources. Estimates of these populations are best made with benthic epifaunal samplers or night-time drift samplers.

The mesozooplankton-based food availability index for larval striped bass and white perch is appropriate to use in the slower moving Anacostia River mainstem, where the average residence time is ~27 days. Residence times in other Chesapeake Bay tributaries supporting striped bass and white perch populations bracket the Anacostia residence time, e.g., ~5.4 days in the upper Bay tidal fresh segment and ~180 days in the Patuxent tidal fresh segment (Table 2). The Anacostia food availability index is significantly lower than index values for Indian Head and Possum Pt., MD, which reached Optimal levels several times during 2000-2002.

Table 2. Approximate mean residence time (days) in Potomac and Anacostia tidal fresh sub-segments approximately 9.26 km (5 nautical miles, 5.76 statute miles) long. Residence times were calculated by dividing segment volume by median freshwater inflow rate. The median long-term flow rate of 23.85 x 10^6 m^3 day^{-1} was used for the Potomac segments (USGS Little Falls gaging station) and 0.37 x 10^6 m^3 day^{-1} was used for the Anacostia tidal river (Behm et al. 2003). Potomac River segment volumes (circa 1970) were obtained from the Environmental Atlas of the Potomac Estuary (Lippson et al. 1979). The volume of the tidal Anacostia (1999-2000) was obtained from Behm et al. (2003). Residence times derived from long-term median daily flow rates (USGS) and the Chesapeake Bay Program 3-D Interpolator Model estimates of tidal fresh volume are shown for other Chesapeake Bay tributaries.

Mean Residence Time (Days)	Estimated Volume of Segment (million m^3)	Represent-ative Monitoring Station	River	River Segment
Potomac River tidal fresh sub-segments				
27.0	10.0	ANA14	Anacostia	District NE border to Potomac R.
0.8	20.0	PMS10	Potomac	Georgetown Reservoir to Anacostia confluence
1.4	32.9	PMS37	Potomac	Anacostia confluence to Fort Foote, MD
5.1	121.4	TF2.3	Potomac	Indian Head, MD
6.6	157.0	TF2.4	Potomac	Possum Pt., MD
Entire tidal fresh segments (CBP 1998 segmentation scheme)				
14	331.3		Potomac	CBP segment POTTF (excludes Anacostia R.)
5.4	360.0		upper Bay	CBP segment CB1TF
180	11.0		Patuxent	CBP segment PAXTF
85	15.3		Choptank	CBP segment CHOTF
22	28.6		Pamunkey	CBP segment PMKTF (in York R. system)
29	286.2		James	CBP segment JMSTF (excludes Appomatox R.)

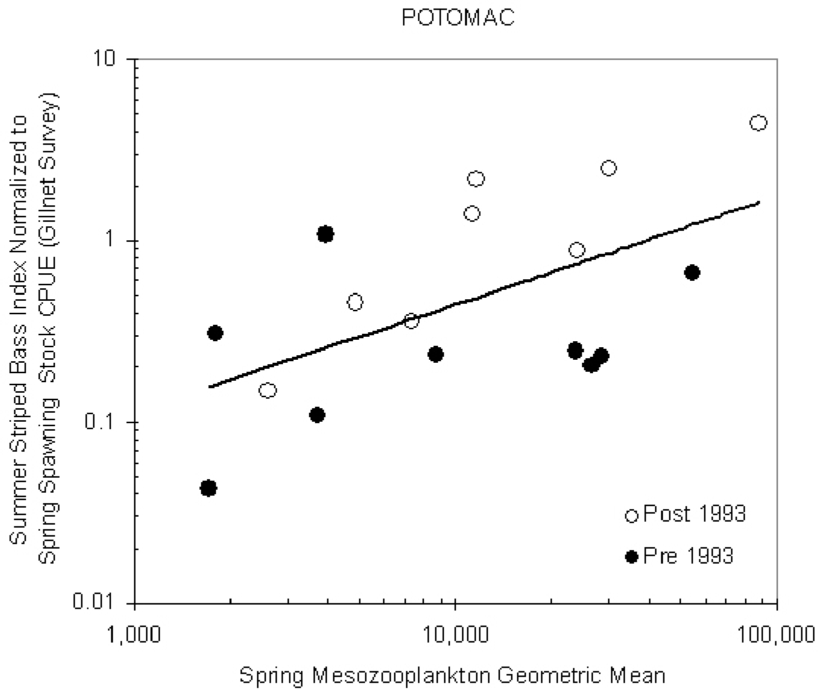


Figure 5. Relationship between mesozooplankton food densities available to larval striped bass in spring (geometric mean, # m^{-3}) and striped bass recruitment in summer ($r^2 = 0.333$, $p<0.05$). The summer striped bass juvenile index (geometric mean, catch per seine haul) is the measure of recruitment success. It is normalized to spring CPUE of spawning stock to remove the influence of parental stock size. Relatively high juvenile indexes occurred in 1993 and after, corresponding to an overall increase in Chesapeake Bay striped bass abundances. Data sources: mesozooplankton, Maryland Chesapeake Bay Program monitoring program; striped bass, Maryland Department of Natural Resources summer seine survey and spring gillnet survey. (Buchanan, unpublished data)

Summer Mesozooplankton Densities

A mesozooplankton-based index of food availability for summer has not been developed for larval fish and juvenile and adult plantivorous (plankton-eating) fish inhabiting Chesapeake tidal fresh and oligohaline waters. Fish data from MDDNR summer seine surveys and Gunston Cove Ecosystem Study seine and trawl surveys show that planktivorous species (Table 3) as a whole are common in the Potomac River and its tributaries downstream of the District of Columbia. Significant, *inverse* correlations are found in the tidal fresh Potomac River when the finfish planktivores indexes from these surveys are correlated with mesozooplankton densities obtained from the CBP monitoring program (C. Buchanan, unpublished data). As planktivore (predator) abundance increases, mesozooplankton (prey) abundance decreases (Figure 6). This suggests summer planktivorous fish as a whole are currently exerting strong “top-down” controls on their food organisms. Summer fish populations are comprised mostly of juveniles and adults, but also include larvae of resident species (e.g., bay anchovy, killifish, shiners). As water quality improves, the “bottom-up” impacts of poor water and phytoplankton food quality on zooplankton populations are expected to ease, resulting in higher zooplankton productivity and diversity. Hypothetically, this could allow the inverse relationship to shift up and to the right in Figure 6, i.e. more fish will be supported on somewhat higher abundances of mesozooplankton.

Anacostia and Potomac Rivers

Mean mesozooplankton summer abundances in the Anacostia (ANA14) are lower than those at Indian Head (TF2.3). Densities ranged from 161 m^{-3} - 14,321 m^{-3} in 2000 and 2001. Given the long residence times of the Anacostia (Table 2), higher mesozooplankton abundances could be expected. It is not known if these low levels are due to particularly strong top-down controls by planktivorous fish, or eutrophication impacts, or both. The generally Poor status of the Kingman Lake phytoplankton populations adjacent to the Anacostia (above) suggests eutrophication is the principal cause.

Six mesozooplankton samples were collected in Kingman Lake during the summer of 1999. All had low densities (15 m^{-3} - 3,787 m^{-3}).

Mesozooplankton population densities at PMS37 during the summers of 2000 and 2001 were approximately the same as those in Kingman Lake in 1999, ranging from 105 m^{-3} - 1,552 m^{-3}. Densities were lower than those in the Anacostia River during 2000 and 2001.

Summer mesozooplankton densities at PMS10 are extremely low (5 m^{-3} - 74 m^{-3}), which again suggests mesozooplankton may not be a significant component of the District’s upper Potomac mainstem due to the riverine nature of this reach. Bottom fauna that migrate at night into the water column may be more important as food sources for fish. Sampling would need to be done to confirm this community shift predicted by the River Continuum Concept (Vannote *et al.* 1980).

Table 3: Obligate planktivore finfish species currently found in Potomac tidal fresh waters. Key: *, more common; A, anadromous; R, resident).

Latin Name	*Common Name*	*Life cycle*
Alosa aestivalis	Blueback herring*	A
Alosa pseudoharengus	Alewife	A
Alosa sp.	Unidentified herring	A
Alosa sapidissima	American shad	A
Anchoa mitchilli	Bay anchovy*	R
Brevoortia tyrannus	Atlantic menhaden	A
Dorosoma cepedianum	Gizzard shad*	A
Fundulus diaphanus	Banded killifish*	R
Notemigonus crysoleucas	Golden shiner	R
Notropis hudsonius	Spottail shiner*	R

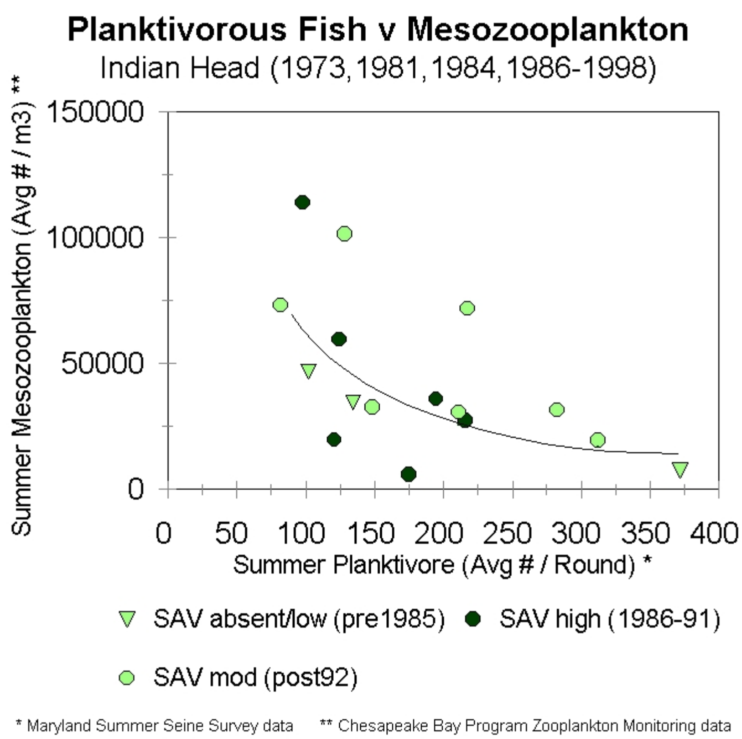


Figure 6. Inverse relationship between average planktivore and mesozooplankton abundances in summer at Indian Head (TF2.3), Potomac River ($r^2 = 0.71$, $p < 0.01$, $n = 16$). As planktivore predators increase, meso-zooplankton prey decrease, indicating “top-down” controls are strong. An outlier associated with the 1985 return of SAV to the Potomac is excluded. (C. Buchanan, unpublished data).

Stream Benthic Macroinvertebrate Analysis

Biological Metrics

Twenty biological metrics representing specific attributes of the benthic community were calculated for the available District of Columbia stream monitoring data for 1997-1998. The metrics are used in bioassessments because they change in some predictable way in response to increasing habitat impairment. Metric values suggest that macroinvertebrate communities at most sites were in Poor or Very Poor condition at the time of sampling, although some sites ranked Fair-Poor or Fair. It was difficult to evaluate whether these metrics accurately reflected health of benthic macroinvertebrates in District streams due to inadequate preservation of most samples.

Method Description

Benthic macroinvertebrate data (taxa identification and counts) from each station were used to calculate two sets of biological metrics. One metric set ("DC") consisted of measures specified by the District of Columbia for bioassessments. The second set ("RBP") was composed of those measures identified by Barbour et al. (1999) as the "best candidate metrics" for bioassessments. Some metrics (e.g. Taxa Richness) were common to both sets. The 20 metrics calculated from the District data are shown in Table 4. The taxonomic, trophic, habit, and tolerance information used in this analysis are contained in the table "Benthics_Master_Taxa" in the <DCStreamBenthos_Tables.mdb> database. Functional feeding group and mode-of-existence designations and tolerance values for calculating feeding and habit metrics and the Hisenhoff Biotic Index (HBI) were largely based on those drafted by the Data Management Committee of the Maryland Water Monitoring Council (MWMC) (available: http://mddnr.chesapeakebay.net/MWMC/MT_proposal.cfm). Information from the US EPA's Rapid Bioassessment Protocols (Barbour et al. 1999) was used for cases where these attributes were not recorded in the MWMC database. The "Crawler" habit designation developed by Smith and Voshell (1997) was also applied to the relevent taxa.

District of Columbia Streams

DC and RBP metric values for 1997-1998 District of Columbia macroinvertebrate data are presented in the following Station Summaries. Information on the specific scoring procedure used by the District of Columbia for achieving a single numeric assessment value was not available. Communities were evaluated based on metrics' "expected responses" to perturbation; i.e. high values for some metrics indicated an increasing level of disturbance (Percent Dominance, Percent Chironomidae, Hilsenhoff Biotic Index), while for other metrics high values indicated improving water quality (Percent EPT, Scrapers/ Scrapers + Filterers). Therefore the narrative descriptions of overall condition are not based upon numeric criteria, but only characterize general observed trends.

Table 4. Metrics calculated from the District of Columbia stream benthic macroinvertebrate samples.

Metric Name	Metric Group	Category	Description
Percent Dominance	DC, RBP	Composition	Proportion of individuals of the most abundant taxon
Percent Chironomidae	DC	Composition	Proportion of individuals of the midge family
Percent Collectors	DC	Feeding	Proportion of individuals in the collecting feeding group (gatherers+filterers)
Percent Clingers	RBP	Habit	Proportion of individuals who cling to firm substrate
Clinger Taxa	RBP	Habit	Number of clinging families
Percent Ephemeroptera	RBP	Composition	Proportion of mayfly individuals
Ephemeroptera Taxa	RBP	Richness	Number of Ephemeroptera (mayfly) families
Percent EPT	DC, RBP	Composition	Proportion of Ephemeroptera, Plecoptera, and Trichoptera individuals
EPT Taxa	DC, RBP	Richness	Number of Ephemeroptera, Plecoptera, and Trichoptera families
Percent Filterers	RBP	Feeding	Proportion of individuals who feed by filtering fine particulate matter
Hilsenhoff Biotic Index	DC	Tolerance	Abundance-weighted average tolerance of Families present
Hydropsychidae/EPT	DC	Composition	Proportion of hydropsychid caddisflies to total EPT individuals
Intolerant Taxa	RBP	Tolerance	Number of families with Tolerance values <3
Plecoptera Taxa	RBP	Richness	Number of Plecoptera (stonefly) families
Scrapers/Scrapers+Filterers	DC	Feeding	Proportion of scraper individuals to scrapers plus filterers
PercentScrapers	DC	Feeding	Proportion of individuals who feed by scraping algae from hard surfaces
Percent Shredders	DC	Feeding	Proportion of individuals which feed by shredding coarse organic matter
Percent Tolerant	DC	Tolerance	Proportion of individuals with high tolerance values
Taxonomic Richness	DC, RBP	Richness	Total count of distinct taxonomic groups
Trichoptera Taxa	DC, RBP	Richness	Number of Trichoptera (caddisfly) families

Data Files

Phytoplankton

Phytoplankton taxonomic counts and calculated metrics for 77 samples are in <Phytoplankton_I-II.xls>. Taxonomic serial numbers for each taxon are included. The data can be readily uploaded to the Chesapeake Bay Program database.

Zooplankton

Mesozooplankton taxonomic counts and calculated metrics for 46 samples are in <Zooplankton I.xls>. Taxonomic serial numbers for each taxon are included. The data can be readily uploaded to the Chesapeake Bay Program database.

Stream Benthic Macroinvertebrates

Five tables located in the Access database <DCStreamBenthos_Tables.mdb> contain the stream macrobenthic invertebrate data in a format uploadable to US EPA's EDAS. The tables are Stations, BenSamps, Benthics, BenReps and Benthic_Master_Taxa. They were generated by EDAS v3.02 during data entry, and the records in the tables can be directly appended to the corresponding tables in an empty EDAS v3.02 database structure. The Benthic_Master_Taxa table in the database contains information entered by ICPRB that is not in an empty EDAS database structure. Specifically, we have selected and entered feeding group (FFG), habit, and tolerance values assignments for each taxa, and we have incorporated the ITIS (Integrated Taxonomic Information System) Taxon Serial Number, Parent Taxon Serial Number, Phylum, Class, Order, and Family of each taxa. This information is needed to calculated the various biological metrics. The feeding group, habit, and tolerance assignments we have entered may differ from assignments used by the District, and they should be reviewed by District staff and manually changed if the District chooses different assignments.

These five data tables should not be directly appended onto their corresponding tables in an EDAS database which already contains data. The reason for this is numeric codes are arbitrarily assigned to each taxa during data entry and stored in both the Benthic_Master_Taxa and Benthics tables (field name BenTaxaID). Code differences with the existing database will need to be reconciled before the new records are appended.

The Access database <DCStreamBenthos_Tables.mdb> also includes a table with the metrics requested by the District (DCMetrics) with their calculated values for each site, a table with "best candidate" metrics as identified in the EPA Rapid Bioassessment Protocols (RBPBestCandidateMetrics) with their calculated values for each site, and a table of metric names and descriptions (AllMetricNames).

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Supporting Details

Email re: Formaline Preservative Strength

Date Sent: Wednesday, April 30, 2003 1:15 PM
From: CBUCHAN@icprb.org (Claire Buchanan)
To: Jeffrey Zahn <jeffrey.zahn@dc.gov>
Cc: Stella Sellner <Sellner@acnatsci.org>
Subject: formalin preservative strength needed for zooplankton samples

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Jeffery - here are the formalin preservative strengths recommended for meso and micro zooplankton samples by Harris et al (2000) in their zooplankton methods manual:

Mesozooplankton:
A formalin solution of 4% formaldehyde is recommended in Harris et al (2000). The formalin concentration in stocks purchased from supply companies is typically 40% formaldehyde. If this is the case, then 12.5 ml of the stock solution in a 125 ml sample jar will produce the recommended formalin solution of 4% formaldehyde when the sample material is added to the jar in the field. Lower formalin concentrations will adequately preserve organisms if the sample is sparse and does not contain a lot of detritus.

Microzooplankton:
A formalin solution of 1% - 1.5% formaldehyde is recommended in Harris et al (2000). If the stock formalin solution is 40% formaldehyde, then 4 ml (3.2 - 4.7 ml) of the stock 40% formaldehyde solution in a 125 ml sample jar will produce the recommended formalin solution of 1% - 1.5% when the sample material is added to the jar in the field.

Formaldehyde is a known carcinogen, and the stock formalin solution of 40% formaldehyde is often diluted in the laboratory if the formalin preservative is to be added to samples in the field after they have been collected. If the stock has been diluted, then more formalin solution needs to be added to samples in the field. For example, if the diluted formalin solution is 10% formaldehyde, then 1 part solution needs to be added to 9 parts sample to make the final formaldehyde concentration equal to 1% (sufficient for microzooplankton).

I spoke with Stella about your question re the affect of cold temperatures on preserved samples. She says temperatures around freezing can sometimes affect the formaldehyde molecule, i.e. polymerize it and take it out of solution, thereby making it useless as a preservative. So you are probably wise to try and keep the samples in away from freezing temperatures.

I'd be very interested to know if you think either the formalin strength or temperature could be underlying the preservation problems Stella has been seeing in the microzooplankton samples. The sooner we can correct the problem, the better the samples will be.

Enjoy your upcoming sampling day on the river - hope this good weather holds
for you!

Appendix A

Phytoplankton Sample Chain of Custody

May 31, 2005

Location Codes: ICPRB, Interstate Commission on the Potomac River Basin
ANS, Academy of Natural Sciences Estuarine Research Center

All remaining samples were reboxed in June 2004. Old and New box letters are recorded in the chain of custody. All remaining uncounted samples are located at ICPRB.

Year	Station	Date	Mon	Original Box	New Box	Location	Evaluation	Comments
1998	AAG02	04/14/98	4	Y	Discarded	ICPRB	Counted	
1998	AAG02	05/11/98	5	Y	Discarded	ICPRB	Counted	
1998	AAG02	07/14/98	7	Y	Discarded	ICPRB	Counted	
1998	AAG02	08/11/98	8	X	Discarded	ICPRB	Counted	
1998	AAG02	09/08/98	9	Y	Discarded	ICPRB	Counted	
1998	AAG06	06/15/98	6	Y	Discarded	ICPRB	Counted	
1998	ANA01	03/10/98	3	GG	GG	ICPRB		
1998	ANA01	04/07/98	4	GG	GG	ICPRB		
1998	ANA01	05/05/98	5	GG	GG	ICPRB		
1998	ANA01	06/02/98	6	GG	GG	ICPRB	Marginal	
1998	ANA01	07/07/98	7	GG	GG	ICPRB	Good	No Lugols
1998	ANA01	08/04/98	8	GG	GG	ICPRB	Good	
1998	ANA01	09/08/98	9	GG	GG	ICPRB	Good	
1998	ANA01	10/05/98	10	GG	GG	ICPRB		
1998	ANA01	11/02/98	11	GG	GG	ICPRB		
1998	ANA01	12/15/98	12	GG	GG	ICPRB		
1999	ANA01	02/09/99	2	U	U	ICPRB		
1999	ANA01	03/02/99	3	U	U	ICPRB		
1999	ANA01	04/13/99	4	U	U	ICPRB	Good	
1999	ANA01	05/11/99	5	U	U	ICPRB	Good	Many filaments
1999	ANA01	06/08/99	6	U	U	ICPRB		
1999	ANA01	07/12/99	7	U	U	ICPRB	Good	nice
1999	ANA01	08/03/99	8	U	U	ICPRB	Good	nice
1999	ANA01	09/13/99	9	U	U	ICPRB	Good	
1999	ANA01	10/05/99	10	U	Discarded	ICPRB	Poor	
1999	ANA01	11/02/99	11	U	U	ICPRB		
1999	ANA01	12/07/99	12	U	U	ICPRB		
2000	ANA01	03/14/00	3	A	A	ICPRB		
2000	ANA01	04/11/00	4	A	A	ICPRB		
2000	ANA01	05/09/00	5	A	A	ICPRB		
2000	ANA01	06/13/00	6	A	A	ICPRB		
2000	ANA01	07/11/00	7	A	A	ICPRB		
2000	ANA01	08/08/00	8	A	A	ICPRB		
2000	ANA01	09/12/00	9	A	A	ICPRB		
2000	ANA01	10/02/00	10	A	A	ICPRB		
2000	ANA01	11/14/00	11	A	A	ICPRB		
2001	ANA01	02/13/01	2	I	H	ICPRB	Good	

Year	Station	Date	Mon	Original Box	New Box	Location	Evaluation	Comments
2001	ANA01	04/03/01	4	I	Discarded	ANS	Counted	
2001	ANA01	05/08/01	5	I	Discarded	ANS	Counted	Bacterial
2001	ANA01	06/12/01	6	I	Discarded	ICPRB	Poor	Bacterial
2001	ANA01	07/10/01	7	I	Discarded	ANS	Counted	
2001	ANA01	08/14/01	8	I	Discarded	ANS	Counted	
2001	ANA01	10/16/01	10	I	H	ICPRB	Good	
2001	ANA01	11/06/01	11	I	H	ICPRB	Good	
1998	ANA14	03/10/98	3	GG	GG	ICPRB		
1998	ANA14	04/07/98	4	GG	GG	ICPRB		
1998	ANA14	05/05/98	5	GG	GG	ICPRB		
1998	ANA14	06/02/98	6	GG	GG	ICPRB	Good	chloroplasts well maintained, sparse
1998	ANA14	07/07/98	7	GG	GG	ICPRB		
1998	ANA14	08/04/98	8	GG	GG	ICPRB	Good	
1998	ANA14	09/08/98	9	GG	GG	ICPRB	Good	
1998	ANA14	10/05/98	10	GG	GG	ICPRB	Good	some deterioration
1998	ANA14	11/02/98	11	GG	GG	ICPRB		
1998	ANA14	12/15/98	12	GG	GG	ICPRB		
1999	ANA14	01/12/99	1	U	U	ICPRB		
1999	ANA14	02/09/99	2	U	U	ICPRB		
1999	ANA14	03/02/99	3	U	U	ICPRB		
1999	ANA14	04/13/99	4	U	U	ICPRB		
1999	ANA14	05/11/99	5	U	U	ICPRB		
1999	ANA14	06/08/99	6	U	U	ICPRB	Good	Many filaments
1999	ANA14	07/12/99	7	U	U	ICPRB	Good	
1999	ANA14	08/03/99	8	U	U	ICPRB	Marginal	Few filaments
1999	ANA14	09/13/99	9	U	U	ICPRB	Good	Many filaments
1999	ANA14	10/05/99	10	U	U	ICPRB		
1999	ANA14	11/02/99	11	U	U	ICPRB		
1999	ANA14	12/07/99	12	U	U	ICPRB		
2000	ANA14	02/15/00	2	B	B	ICPRB		
2000	ANA14	03/14/00	3	B	Discarded	ICPRB	Poor	Some bacteria, many empties, no good chloroplasts
2000	ANA14	04/11/00	4	B	B	ICPRB	Good	++euglenoids, good chloroplasts, flagella, colonies, no bacteria
2000	ANA14	05/09/00	5	B	B	ICPRB	Good	++euglenoids, good chloroplasts, flagella, colonies, no bacteria
2000	ANA14	06/13/00	6	B	B	ICPRB	Good	chloroplasts, colonies, flagella, organelles, pyrenoids, Phacus, rotifers
2000	ANA14	07/11/00	7	B	B	ICPRB	Good	chloroplasts, colonies, flagella, organelles, pyrenoids, Phacus, rotifers
2000	ANA14	08/08/00	8	B	B	ICPRB	Good	Deteriorated; may be some identifiable cells

Year	Station	Date	Mon	Original Box	New Box	Location	Evaluation	Comments
2000	ANA14	09/12/00	9	B	B	ICPRB	Good	Good chloroplasts, colonies, flagella, organelles, pyrenoids, no bacteria
2000	ANA14	10/02/00	10	B	B	ICPRB	Good	
2000	ANA14	11/14/00	11	B	B	ICPRB	Good	
2000	ANA14	12/12/00	12	B	B	ICPRB	Marginal	
2001	ANA14	01/09/01	1	I	H	ICPRB	Good	
2001	ANA14	02/13/01	2	I	H	ICPRB	Good	
2001	ANA14	03/06/01	3	I	Discarded	ANS	Counted	Sparse
2001	ANA14	04/03/01	4	I	Discarded	ANS	Counted	Lots of empty frustules
2001	ANA14	05/08/01	5	I	Discarded	ANS	Counted	Sparse
2001	ANA14	06/12/01	6	I	Discarded	ICPRB	Counted	
2001	ANA14	07/10/01	7	I	Discarded	ANS	Counted	
2001	ANA14	08/14/01	8	I	Discarded	ANS	Counted	
2001	ANA14	10/16/01	10	I	H	ICPRB	Good	
2001	ANA14	11/06/01	11	I	H	ICPRB	Good	Dense
1998	ANA21	03/10/98	3	HH	HH	ICPRB	Marginal	
1998	ANA21	04/07/98	4	HH	HH	ICPRB	Good	sparse
1998	ANA21	05/05/98	5	HH	HH	ICPRB	Good	sparse
1998	ANA21	06/02/98	6	HH	HH	ICPRB		
1998	ANA21	07/07/98	7	HH	HH	ICPRB	Good	
1998	ANA21	08/04/98	8	HH	HH	ICPRB	Good	
1998	ANA21	09/08/98	9	HH	HH	ICPRB	Good	
1998	ANA21	10/05/98	10	HH	HH	ICPRB	Good	
1998	ANA21	11/02/98	11	HH	HH	ICPRB	Good	
1998	ANA21	12/15/98	12	HH	HH	ICPRB	Good	
1999	ANA21	01/12/99	1	V	V	ICPRB	Marginal	Possibly salvageable
1999	ANA21	02/09/99	2	V	V	ICPRB		
1999	ANA21	03/02/99	3	V	V	ICPRB		
1999	ANA21	04/13/99	4	V	V	ICPRB		
1999	ANA21	05/11/99	5	V	V	ICPRB	Good	Many empty frustules
1999	ANA21	06/07/99	6	V	V	ICPRB	Good	
1999	ANA21	07/12/99	7	V	V	ICPRB	Good	nice
1999	ANA21	08/03/99	8	V	V	ICPRB	Good	Many filaments
1999	ANA21	09/13/99	9	V	V	ICPRB	Good	
1999	ANA21	10/05/99	10	V	V	ICPRB		
1999	ANA21	11/02/99	11	V	V	ICPRB	Good	
1999	ANA21	12/07/99	12	V	V	ICPRB		

Year	Station	Date	Mon	Original Box	New Box	Location	Evaluation	Comments
2000	ANA21	01/24/00	1	A	A	ICPRB		
2000	ANA21	02/15/00	2	A	A	ICPRB		
2000	ANA21	03/14/00	3	A	A	ICPRB		
2000	ANA21	04/11/00	4	A	A	ICPRB		
2000	ANA21	05/09/00	5	A	A	ICPRB		
2000	ANA21	06/13/00	6	A	A	ICPRB		
2000	ANA21	07/11/00	7	A	A	ICPRB		
2000	ANA21	08/08/00	8	A	A	ICPRB		
2000	ANA21	09/12/00	9	A	A	ICPRB		
2000	ANA21	10/02/00	10	A	A	ICPRB		
2000	ANA21	11/15/00	11	A	A	ICPRB		
2000	ANA21	12/12/00	12	A	A	ICPRB		
2001	ANA21	01/09/01	1	J	J	ICPRB		
2001	ANA21	03/06/01	3	J	Discarded	ANS	Counted	very junky
2001	ANA21	04/03/01	4	J	Discarded	ANS	Counted	very junky
2001	ANA21	05/08/01	5	J	Discarded	ANS	Counted	sparse
2001	ANA21	07/10/01	7	J	Discarded	ANS	Counted	
2001	ANA21	08/14/01	8	J	Discarded	ANS	Counted	sparse
2001	ANA21	10/16/01	10	J	J	ICPRB	Good	
2001	ANA21	11/06/01	11	J	J	ICPRB		
1998	ANA28	03/10/98	3	HH	HH	ICPRB	Good	sparse
1998	ANA28	04/07/98	4	HH	HH	ICPRB	Good	sparse
1998	ANA28	05/05/98	5	HH	HH	ICPRB	Good	sparse
1998	ANA28	06/02/98	6	HH	HH	ICPRB		
1998	ANA28	07/07/98	7	HH	HH	ICPRB		
1998	ANA28	08/04/98	8	HH	HH	ICPRB	Marginal	
1998	ANA28	09/08/98	9	HH	HH	ICPRB	Good	
1998	ANA28	10/05/98	10	HH	HH	ICPRB	Good	
1998	ANA28	11/02/98	11	HH	HH	ICPRB	Good	
1998	ANA28	12/15/98	12	HH	HH	ICPRB	Good	
1999	ANA28	01/12/99	1	V	V	ICPRB		
1999	ANA28	02/09/99	2	V	V	ICPRB		
1999	ANA28	03/02/99	3	V	V	ICPRB		
1999	ANA28	04/13/99	4	V	V	ICPRB		
1999	ANA28	05/11/99	5	V	V	ICPRB	Marginal	Very depauperate

Year	Station	Date	Mon	Original Box	New Box	Location	Evaluation	Comments
1999	ANA28	06/08/99	6	V	V	ICPRB	Good	
1999	ANA28	07/12/99	7	V	V	ICPRB	Good	nice
1999	ANA28	08/03/99	8	V	V	ICPRB	Good	
1999	ANA28	09/13/99	9	V	V	ICPRB	Marginal	Depauperate
1999	ANA28	10/05/99	10	V	V	ICPRB		
1999	ANA28	11/02/99	11	V	V	ICPRB		
1999	ANA28	12/07/99	12	V	V	ICPRB		
2000	ANA28	01/24/00	1	B	B	ICPRB		
2000	ANA28	02/15/00	2	B	B	ICPRB		
2000	ANA28	03/14/00	3	B	B	ICPRB	Marginal	
2000	ANA28	04/11/00	4	B	B	ICPRB		
2000	ANA28	06/13/00	6	B	B	ICPRB		
2000	ANA28	07/11/00	7	B	B	ICPRB	Good	Several rotifers
2000	ANA28	08/08/00	8	B	B	ICPRB		
2000	ANA28	09/12/00	9	B	B	ICPRB	Good	Somewhat deteriorated
2000	ANA28	10/02/00	10	B	B	ICPRB	Good	Somewhat deteriorated
2000	ANA28	12/12/00	12	B	B	ICPRB	Good	Somewhat deteriorated
2001	ANA28	01/09/01	1	J	J	ICPRB		
2001	ANA28	02/13/01	2	J	J	ICPRB		
2001	ANA28	03/06/01	3	J	Discarded	ANS	Counted	
2001	ANA28	04/03/01	4	J	Discarded	ANS	Counted	
2001	ANA28	05/08/01	5	J	Discarded	ANS	Counted	
2001	ANA28	06/12/01	6	J	J	ICPRB		
2001	ANA28	07/10/01	7	J	Discarded	ANS	Counted	
2001	ANA28	08/14/01	8	J	Discarded	ANS	Counted	
2001	ANA28	10/16/01	10	J	J	ICPRB		
2001	ANA28	11/06/01	11	J	J	ICPRB		
1998	ANA29	03/10/98	3	II	P	ICPRB		
1998	ANA29	04/07/98	4	II	P	ICPRB		
1998	ANA29	05/05/98	5	II	P	ICPRB		
1998	ANA29	06/02/98	6	II	P	ICPRB		
1998	ANA29	07/07/98	7	II	P	ICPRB		
1998	ANA29	08/04/98	8	II	P	ICPRB	Good	
1998	ANA29	09/08/98	9	II	P	ICPRB	Good	
1998	ANA29	10/05/98	10	II	P	ICPRB		
1998	ANA29	11/02/98	11	II	P	ICPRB		

Year	Station	Date	Mon	Original Box	New Box	Location	Evaluation	Comments
1998	ANA29	12/15/98	12	II	P	ICPRB		
1999	ANA29	01/12/99	1	W	W	ICPRB		
1999	ANA29	02/09/99	2	W	W	ICPRB		
1999	ANA29	03/02/99	3	W	W	ICPRB		
1999	ANA29	04/13/99	4	W	W	ICPRB		
1999	ANA29	05/11/99	5	W	W	ICPRB		
1999	ANA29	06/08/99	6	W	W	ICPRB	Good	Should be represerved
1999	ANA29	07/12/99	7	W	W	ICPRB	Good	Exceptional quality
1999	ANA29	08/03/99	8	W	W	ICPRB	Good	Exceptional quality
1999	ANA29	09/13/99	9	W	W	ICPRB		
1999	ANA29	10/05/99	10	W	W	ICPRB	Good	May be salvageable
1999	ANA29	11/02/99	11	W	W	ICPRB		
1999	ANA29	12/07/99	12	W	W	ICPRB	Good	
2000	ANA29	02/15/00	2	C	C	ICPRB		
2000	ANA29	03/14/00	3	C	C	ICPRB		
2000	ANA29	04/11/00	4	C	C	ICPRB		
2000	ANA29	05/09/00	5	C	C	ICPRB		
2000	ANA29	06/13/00	6	C	C	ICPRB		
2000	ANA29	07/11/00	7	C	C	ICPRB		
2000	ANA29	08/08/00	8	C	C	ICPRB		
2000	ANA29	09/12/00	9	C	C	ICPRB		
2000	ANA29	10/02/00	10	C	C	ICPRB		
2000	ANA29	11/14/00	11	C	C	ICPRB		
2000	ANA29	12/12/00	12	C	C	ICPRB		
2001	ANA29	02/13/01	2	K	J	ICPRB	Poor	Bacterial activity
2001	ANA29	03/06/01	3	K	Discarded	ANS	Counted	sparse
2001	ANA29	04/03/01	4	K	Discarded	ANS	Counted	
2001	ANA29	05/08/01	5	K	Discarded	ANS	Counted	
2001	ANA29	06/12/01	6	K	J	ICPRB	Good	starting bacterial action
2001	ANA29	07/10/01	7	K	Discarded	ANS	Counted	
2001	ANA29	08/14/01	8	K	Discarded	ANS	Counted	
2001	ANA29	10/16/01	10	K	J	ICPRB	Good	
2001	ANA29	11/06/01	11	K	J	ICPRB	Good	
2001	ANA30	03/06/01	3	I	Discarded	ANS	Counted	
1998	KNG01	04/13/98	4	Y	Discarded	ICPRB	Counted	
1998	KNG01	05/11/98	5	Y	Discarded	ICPRB	Counted	

Year	Station	Date	Mon	Original Box	New Box	Location	Evaluation	Comments
1998	KNG01	06/08/98	6	Y	Discarded	ICPRB	Counted	
1998	KNG01	07/13/98	7	Y	Discarded	ICPRB	Counted	
1998	KNG01	08/10/98	8	Y	Discarded	ICPRB	Counted	
1998	KNG01	09/15/98	9	Y	Discarded	ICPRB	Counted	
1998	KNG01	10/06/98	10	Y	Discarded	ICPRB	Counted	
1998	KNG01	11/03/98	11	Y	Discarded	ICPRB	Counted	
1998	KNG01	12/07/98	12	Y	Discarded	ICPRB	Counted	
1999	KNG01	01/04/99	1	X	Discarded	ICPRB	Counted	
1999	KNG01	02/01/99	2	X	Discarded	ICPRB	Counted	
1999	KNG01	03/08/99	3	X	Discarded	ICPRB	Counted	
1999	KNG01	04/05/99	4	X	Discarded	ICPRB	Counted	
1999	KNG01	05/03/99	5	X	Discarded	ICPRB	Counted	
1999	KNG01	06/14/99	6	X	Discarded	ICPRB	Counted	
1999	KNG01	07/13/99	7	X	Discarded	ICPRB	Counted	
1999	KNG01	07/14/99	7	X	Discarded	ICPRB	Counted	
1999	KNG01	08/09/99	8	X	Discarded	ICPRB	Counted	
1999	KNG01	10/12/99	10	X	Discarded	ICPRB	Counted	
1999	KNG01	11/15/99	11	X	Discarded	ICPRB	Counted	
1999	KNG01	12/13/99	12	X	Discarded	ICPRB	Counted	
2000	KNG01	01/10/00	1	D	Discarded	ICPRB	Counted	
2000	KNG01	02/07/00	2	D	Discarded	ICPRB	Counted	
2000	KNG01	03/06/00	3	D	Discarded	ICPRB	Counted	
2000	KNG01	04/03/00	4	D	Discarded	ICPRB	Counted	
2000	KNG01	05/01/00	5	D	Discarded	ICPRB	Counted	
2000	KNG01	06/05/00	6	D	Discarded	ICPRB	Counted	
2000	KNG01	07/17/00	7	D	Discarded	ICPRB	Counted	
2000	KNG01	08/14/00	8	D	Discarded	ICPRB	Counted	
2000	KNG01	09/18/00	9	D	Discarded	ICPRB	Counted	
2000	KNG01	11/06/00	11	D	Discarded	ICPRB	Counted	
2000	KNG01	12/14/00	12	D	Discarded	ICPRB	Counted	
2001	KNG01	02/05/01	2	L	J	ICPRB	Marginal	Dense
2001	KNG01	03/12/01	3	L	Discarded	ANS	Counted	
2001	KNG01	04/09/01	4	L	Discarded	ANS	Counted	
2001	KNG01	05/14/01	5	L	Discarded	ANS	Counted	
2001	KNG01	06/18/01	6	L	J	ICPRB	Marginal	Lots of junk
2001	KNG01	07/16/01	7	L	Discarded	ANS	Counted	

Year	Station	Date	Mon	Original Box	New Box	Location	Evaluation	Comments
2001	KNG01	08/20/01	8	L	Discarded	ANS	Counted	
2001	KNG01	09/17/01	9	L	Discarded	ANS	Counted	
2001	KNG01	10/22/01	10	L	J	ICPRB	Good	
2001	KNG01	11/26/01	11	L	J	ICPRB	Good	
1998	KNG02	04/13/98	4	Y	Discarded	ICPRB	Counted	
1998	KNG02	05/11/98	5	Y	Discarded	ICPRB	Counted	
1998	KNG02	06/08/98	6	Y	Discarded	ICPRB	Counted	
1998	KNG02	07/13/98	7	Y	Discarded	ICPRB	Counted	
1998	KNG02	08/10/98	8	Y	Discarded	ICPRB	Counted	
1998	KNG02	09/15/98	9	Y	Discarded	ICPRB	Counted	
1998	KNG02	10/06/98	10	Y	Discarded	ICPRB	Counted	
1998	KNG02	11/03/98	11	Y	Discarded	ICPRB	Counted	
1998	KNG02	12/07/98	12	Y	Discarded	ICPRB	Counted	
1999	KNG02	01/04/99	1	X	Discarded	ICPRB	Counted	
1999	KNG02	02/01/99	2	X	Discarded	ICPRB	Counted	
1999	KNG02	03/08/99	3	X	Discarded	ICPRB	Counted	
1999	KNG02	04/05/99	4	X	Discarded	ICPRB	Counted	
1999	KNG02	05/03/99	5	X	Discarded	ICPRB	Counted	
1999	KNG02	06/14/99	6	X	Discarded	ICPRB	Counted	
1999	KNG02	07/13/99	7	X	Discarded	ICPRB	Counted	
1999	KNG02	08/09/99	8	X	Discarded	ICPRB	Counted	
1999	KNG02	09/14/99	9	X	Discarded	ICPRB	Counted	
1999	KNG02	10/12/99	10	X	Discarded	ICPRB	Counted	
1999	KNG02	11/15/99	11	X	Discarded	ICPRB	Counted	
1999	KNG02	12/13/99	12	X	Discarded	ICPRB	Counted	
2000	KNG02	01/10/00	1	D	Discarded	ICPRB	Poor	empty of cells
2000	KNG02	03/06/00	3	D	Discarded	ICPRB	Counted	
2000	KNG02	04/03/00	4	D	Discarded	ICPRB	Counted	
2000	KNG02	05/01/00	5	D	Discarded	ICPRB	Counted	
2000	KNG02	06/05/00	6	D	Discarded	ICPRB	Counted	
2000	KNG02	07/17/00	7	D	Discarded	ICPRB	Counted	
2000	KNG02	08/14/00	8	D	Discarded	ICPRB	Counted	
2000	KNG02	09/18/00	9	D	Discarded	ICPRB	Counted	
2000	KNG02	11/06/00	11	D	Discarded	ICPRB	Counted	
2000	KNG02	12/14/00	12	D	Discarded	ICPRB	Counted	
2001	KNG02	02/05/01	2	L	Discarded	ICPRB	Poor	Lots of junk + empty cells

Year	Station	Date	Mon	Original Box	New Box	Location	Evaluation	Comments
2001	KNG02	03/12/01	3	L	Discarded	ANS	Counted	sparse
2001	KNG02	04/09/01	4	L	Discarded	ANS	Counted	beginning to deteriorate
2001	KNG02	05/14/01	5	L	Discarded	ICPRB	Counted	
2001	KNG02	06/18/01	6	L	Discarded	ICPRB	Counted	
2001	KNG02	07/16/01	7	L	Discarded	ANS	Counted	+++Dinos!!
2001	KNG02	08/20/01	8	L	Discarded	ANS	Counted	
2001	KNG02	09/17/01	9	L	Discarded	ANS	Counted	++++Microcystis
2001	KNG02	10/22/01	10	L	J	ICPRB	Good	++++Diatoms
2001	KNG02	11/26/01	11	L	J	ICPRB	Good	
1999	KNGLOWER	07/16/99	7	Y	Discarded	ICPRB	Counted	
1999	KNGLOWER	08/16/99	8	Y	Discarded	ICPRB	Counted	
1999	KNGLOWER	09/15/99	9	Y	Discarded	ICPRB	Counted	
1999	KNGUPPER	07/16/99	7	X	Discarded	ICPRB	Counted	
1999	KNGUPPER	08/16/99	8	Y	Discarded	ICPRB	Counted	
1999	KNGUPPER	09/15/99	9	X	Discarded	ICPRB	Counted	
1998	PMS01	04/06/98	4	DD	DD	ICPRB		
1998	PMS01	05/18/98	5	DD	DD	ICPRB		
1998	PMS01	06/15/98	6	DD	DD	ICPRB		
1998	PMS01	07/06/98	7	FF	FF	ICPRB		
1998	PMS01	08/17/98	8	DD	DD	ICPRB		
1998	PMS01	09/14/98	9	DD	DD	ICPRB		
1998	PMS01	10/26/98	10	DD	DD	ICPRB		
1998	PMS01	11/16/98	11	FF	FF	ICPRB		
1998	PMS01	12/14/98	12	DD	DD	ICPRB		
1999	PMS01	02/08/99	2	Z	Z	ICPRB		
1999	PMS01	03/01/99	3	Z	Z	ICPRB	Good	
1999	PMS01	04/12/99	4	Z	Z	ICPRB		
1999	PMS01	05/10/99	5	Z	Z	ICPRB		
1999	PMS01	06/07/99	6	Z	Z	ICPRB		
1999	PMS01	07/06/99	7	Z	Z	ICPRB	Marginal	Very depauperate
1999	PMS01	08/02/99	8	Z	Z	ICPRB	Marginal	May be salvageable
1999	PMS01	09/07/99	9	Z	Z	ICPRB		
1999	PMS01	10/04/99	10	Z	Z	ICPRB		
1999	PMS01	11/01/99	11	Z	Z	ICPRB		
1999	PMS01	12/06/99	12	Z	Z	ICPRB	Good	
2000	PMS01	01/18/00	1	E	E	ICPRB		

Year	Station	Date	Mon	Original Box	New Box	Location	Evaluation	Comments
2000	PMS01	02/14/00	2	E	E	ICPRB		
2000	PMS01	03/13/00	3	E	Discarded	ICPRB	Poor	
2000	PMS01	04/10/00	4	E	E	ICPRB	Marginal	
2000	PMS01	05/08/00	5	E	Discarded	ICPRB	Poor	
2000	PMS01	06/12/00	6	E	E	ICPRB		
2000	PMS01	07/10/00	7	E	E	ICPRB		
2000	PMS01	08/07/00	8	E	E	ICPRB		
2000	PMS01	09/11/00	9	E	E	ICPRB		
2000	PMS01	10/10/00	10	E	E	ICPRB		
2000	PMS01	11/13/00	11	E	E	ICPRB		
2000	PMS01	12/11/00	12	E	Discarded	ICPRB	Poor	
2001	PMS01	02/12/01	2	M	M	ICPRB	Good	
2001	PMS01	03/05/01	3	M	Discarded	ANS	Counted	
2001	PMS01	04/02/01	4	M	Discarded	ANS	Counted	
2001	PMS01	05/07/01	5	M	Discarded	ANS	Counted	
2001	PMS01	06/11/01	6	M	M	ICPRB	Good	
2001	PMS01	07/09/01	7	M	Discarded	ANS	Counted	
2001	PMS01	08/13/01	8	M	Discarded	ANS	Counted	could be salvaged
2001	PMS01	09/10/01	9	M	Discarded	ANS	Counted	
2001	PMS01	10/15/01	10	M	M	ICPRB	Good	
2001	PMS01	11/13/01	11	M	M	ICPRB	Good	
1998	PMS21	04/06/98	4	DD	DD	ICPRB		
1998	PMS21	05/18/98	5	FF	FF	ICPRB		
1998	PMS21	06/15/98	6	DD	DD	ICPRB		
1998	PMS21	07/06/98	7	FF	FF	ICPRB		
1998	PMS21	08/17/98	8	DD	DD	ICPRB		
1998	PMS21	09/14/98	9	DD	DD	ICPRB		
1998	PMS21	10/26/98	10	DD	DD	ICPRB		
1998	PMS21	11/16/98	11	FF	FF	ICPRB		
1998	PMS21	12/14/98	12	DD	DD	ICPRB		
1999	PMS21	01/11/99	1	Z	Z	ICPRB		
1999	PMS21	02/08/99	2	Z	Z	ICPRB		
1999	PMS21	03/01/99	3	Z	Z	ICPRB		
1999	PMS21	04/12/99	4	Z	Z	ICPRB		
1999	PMS21	05/10/99	5	Z	Z	ICPRB		

Year	Station	Date	Mon	Original Box	New Box	Location	Evaluation	Comments
1999	PMS21	06/07/99	6	Z	Z	ICPRB		
1999	PMS21	07/06/99	7	Z	Z	ICPRB		
1999	PMS21	08/02/99	8	Z	Z	ICPRB		
1999	PMS21	09/07/99	9	Z	Z	ICPRB		
1999	PMS21	10/04/99	10	Z	Z	ICPRB		
1999	PMS21	11/01/99	11	Z	Z	ICPRB		
1999	PMS21	12/06/99	12	Z	Z	ICPRB		
2000	PMS21	01/18/00	1	E	E	ICPRB		
2000	PMS21	02/14/00	2	E	E	ICPRB		
2000	PMS21	03/13/00	3	E	E	ICPRB		
2000	PMS21	04/10/00	4	E	Discarded	ICPRB	Poor	Somewhat deteriorated
2000	PMS21	05/08/00	5	E	E	ICPRB	Marginal	Extremely sparse, some good chloroplasts, may be okay
2000	PMS21	06/12/00	6	E	Discarded	ICPRB	Poor	Bacteria
2000	PMS21	07/10/00	7	E	Discarded	ICPRB	Poor	Very sparse - some chloroplasts, flagella, colonies, no bacteria - for this month and year (drought) this doesn't jive
2000	PMS21	08/07/00	8	E	Discarded	ICPRB	Poor	Very sparse - some chloroplasts, flagella, colonies, no bacteria - for this month and year (drought) this doesn't jive
2000	PMS21	09/11/00	9	E	E	ICPRB	Marginal	Very Depauperate; many ciliates
2000	PMS21	10/10/00	10	E	E	ICPRB		
2000	PMS21	11/13/00	11	E	E	ICPRB		
2000	PMS21	12/11/00	12	E	E	ICPRB		
2001	PMS21	01/08/01	1	M	M	ICPRB	Good	sparse
2001	PMS21	02/12/01	2	M	M	ICPRB	Good	sparse
2001	PMS21	03/05/01	3	M	Discarded	ANS	Counted	sparse
2001	PMS21	04/02/01	4	M	Discarded	ANS	Counted	sparse
2001	PMS21	05/07/01	5	M	Discarded	ANS	Counted	
2001	PMS21	06/11/01	6	M	M	ICPRB	Good	
2001	PMS21	07/09/01	7	M	Discarded	ANS	Counted	
2001	PMS21	08/13/01	8	M	Discarded	ANS	Counted	
2001	PMS21	09/10/01	9	M	Discarded	ANS	Counted	junky, sparse
2001	PMS21	10/15/01	10	M	M	ICPRB	Good	
2001	PMS21	11/13/01	11	M	M	ICPRB	Good	
1998	PMS37	04/06/98	4	EE	EE	ICPRB		
1998	PMS37	05/18/98	5	EE	EE	ICPRB		
1998	PMS37	06/15/98	6	EE	EE	ICPRB		
1998	PMS37	07/06/98	7	EE	EE	ICPRB		

Year	Station	Date	Mon	Original Box	New Box	Location	Evaluation	Comments
1998	PMS37	08/17/98	8	EE	EE	ICPRB		
1998	PMS37	09/14/98	9	EE	EE	ICPRB		
1998	PMS37	10/26/98	10	EE	EE	ICPRB		
1998	PMS37	11/16/98	11	EE	EE	ICPRB		
1998	PMS37	12/14/98	12	EE	EE	ICPRB		
1999	PMS37	01/11/99	1	AA	AA	ICPRB		
1999	PMS37	02/08/99	2	AA	AA	ICPRB		
1999	PMS37	03/01/99	3	AA	AA	ICPRB	Good	good chloroplasts, flagella, pyrenoids, ++junk
1999	PMS37	04/12/99	4	AA	AA	ICPRB	Marginal	++empty frustules and ++junk, but good chloroplasts
1999	PMS37	05/10/99	5	AA	AA	ICPRB	Good	very sparse, good chloroplasts, flagella
1999	PMS37	06/07/99	6	AA	AA	ICPRB	Good	good chloroplasts, flagella, colonies, pyrenoids
1999	PMS37	07/06/99	7	AA	AA	ICPRB	Good	good chloroplasts, flagella, colonies, pyrenoids - some decomposition
1999	PMS37	08/02/99	8	AA	AA	ICPRB	Good	good chloroplasts, flagella, colonies, pyrenoids, no bacteria
1999	PMS37	09/07/99	9	AA	AA	ICPRB	Good	good chloroplasts, flagella, colonies
1999	PMS37	10/04/99	10	AA	AA	ICPRB		
1999	PMS37	11/01/99	11	AA	AA	ICPRB		
1999	PMS37	12/06/99	12	AA	AA	ICPRB		
2000	PMS37	01/18/00	1	F	F	ICPRB		
2000	PMS37	02/14/00	2	F	F	ICPRB		
2000	PMS37	03/13/00	3	F	F	ICPRB	Good	chloroplasts, flagella, organelles, no bacteria
2000	PMS37	04/10/00	4	F	Discarded	ICPRB	Poor	diatom chloroplasts okay but soft-bodied cells missing - no bacteria
2000	PMS37	05/08/00	5	F	Discarded	ICPRB	Poor	diatom chloroplasts okay but soft-bodied cells missing - no bacteria
2000	PMS37	06/12/00	6	F	Discarded	ICPRB	Poor	diatom chloroplasts okay but soft-bodied cells missing - no bacteria
2000	PMS37	07/10/00	7	F	F	ICPRB		
2000	PMS37	08/07/00	8	F	F	ICPRB		
2000	PMS37	09/11/00	9	F	F	ICPRB		
2000	PMS37	10/10/00	10	F	F	ICPRB		
2000	PMS37	11/13/00	11	F	F	ICPRB		
2000	PMS37	12/11/00	12	F	F	ICPRB		
2001	PMS37	01/08/01	1	N	M	ICPRB		
2001	PMS37	02/12/01	2	N	M	ICPRB		
2001	PMS37	03/05/01	3	N	Discarded	ANS	Counted	
2001	PMS37	04/02/01	4	N	Discarded	ANS	Counted	
2001	PMS37	05/07/01	5	N	Discarded	ANS	Counted	
2001	PMS37	06/11/01	6	N	M	ICPRB		
2001	PMS37	07/09/01	7	N	Discarded	ANS	Counted	

Year	Station	Date	Mon	Original Box	New Box	Location	Evaluation	Comments
2001	PMS37	08/13/01	8	N	Discarded	ANS	Counted	
2001	PMS37	09/10/01	9	N	Discarded	ANS	Counted	
2001	PMS37	10/15/01	10	N	M	ICPRB		
2001	PMS37	11/13/01	11	N	M	ICPRB		
1998	PMS51	04/06/98	4	EE	EE	ICPRB		
1998	PMS51	05/18/98	5	EE	EE	ICPRB		
1998	PMS51	06/15/98	6	EE	EE	ICPRB		
1998	PMS51	07/06/98	7	EE	EE	ICPRB		
1998	PMS51	08/17/98	8	EE	EE	ICPRB		
1998	PMS51	09/14/98	9	EE	EE	ICPRB		
1998	PMS51	11/16/98	11	EE	EE	ICPRB		
1998	PMS51	12/14/98	12	EE	EE	ICPRB		
1998	PMS51	12/26/98	12	EE	EE	ICPRB		
1999	PMS51	02/08/99	2	AA	AA	ICPRB		
1999	PMS51	03/01/99	3	AA	AA	ICPRB		
1999	PMS51	04/12/99	4	AA	AA	ICPRB		
1999	PMS51	05/10/99	5	AA	AA	ICPRB		
1999	PMS51	07/06/99	7	AA	AA	ICPRB		
1999	PMS51	08/02/99	8	AA	AA	ICPRB		
1999	PMS51	09/07/99	9	AA	AA	ICPRB		
1999	PMS51	10/04/99	10	AA	AA	ICPRB		
1999	PMS51	11/01/99	11	AA	AA	ICPRB		
1999	PMS51	12/06/99	12	AA	AA	ICPRB		
2000	PMS51	03/14/00	3	C	C	ICPRB		
2000	PMS51	04/10/00	4	C	C	ICPRB		
2000	PMS51	05/08/00	5	C	C	ICPRB		
2000	PMS51	06/12/00	6	C	C	ICPRB		
2000	PMS51	07/10/00	7	C	C	ICPRB		
2000	PMS51	08/07/00	8	C	C	ICPRB		
2000	PMS51	09/11/00	9	C	C	ICPRB		
2000	PMS51	10/10/00	10	C	C	ICPRB		
2000	PMS51	11/13/00	11	C	C	ICPRB		
2000	PMS51	12/11/00	12	C	C	ICPRB		
2001	PMS51	02/12/01	2	N	M	ICPRB		
2001	PMS51	04/02/01	4	N	Discarded	ANS	Counted	

Year	Station	Date	Mon	Original Box	New Box	Location	Evaluation	Comments
2001	PMS51	05/07/01	5	N	Discarded	ANS	Counted	
2001	PMS51	06/11/01	6	N	M	ICPRB		
2001	PMS51	07/09/01	7	N	Discarded	ANS	Counted	
2001	PMS51	08/13/01	8	N	Discarded	ANS	Counted	
2001	PMS51	09/10/01	9	N	Discarded	ANS	Counted	
2001	PMS51	10/15/01	10	N	M	ICPRB		
2001	PMS51	11/13/01	11	N	M	ICPRB		
1998	PMS52	04/06/98	4	FF	FF	ICPRB		
1998	PMS52	05/18/98	5	FF	FF	ICPRB		
1998	PMS52	07/06/98	7	FF	FF	ICPRB		
1998	PMS52	08/17/98	8	FF	FF	ICPRB		
1998	PMS52	09/14/98	9	FF	FF	ICPRB		
1998	PMS52	10/26/98	10	FF	FF	ICPRB		
1998	PMS52	11/16/98	11	FF	FF	ICPRB		
1998	PMS52	12/14/98	12	FF	FF	ICPRB		
1999	PMS52	01/11/99	1	BB	BB	ICPRB		
1999	PMS52	02/08/99	2	BB	BB	ICPRB		
1999	PMS52	03/01/99	3	BB	BB	ICPRB	Marginal	Okay but many empties, good chloroplasts, flagella, colonies, no bacteria
1999	PMS52	04/12/99	4	BB	BB	ICPRB	Good	Sparse, but good chloroplasts, flagella
1999	PMS52	05/10/99	5	BB	Discarded	ICPRB	Poor	Extremely sparse, hard to tell, probably BAD
1999	PMS52	06/07/99	6	BB	BB	ICPRB	Good	Needs preserving soon - some bacteria - but still good
1999	PMS52	07/06/99	7	BB	BB	ICPRB	Good	good chloroplasts, flagella, organelles
1999	PMS52	08/02/99	8	BB	BB	ICPRB		
1999	PMS52	09/07/99	9	BB	BB	ICPRB		
1999	PMS52	10/04/99	10	BB	BB	ICPRB		
1999	PMS52	11/01/99	11	BB	BB	ICPRB		
1999	PMS52	12/06/99	12	BB	BB	ICPRB		
2000	PMS52	01/08/00	1	F	F	ICPRB		
2000	PMS52	01/18/00	1	F	F	ICPRB		
2000	PMS52	02/14/00	2	F	F	ICPRB		
2000	PMS52	03/13/00	3	F	F	ICPRB		
2000	PMS52	04/10/00	4	F	F	ICPRB		
2000	PMS52	05/08/00	5	F	F	ICPRB		
2000	PMS52	06/12/00	6	F	F	ICPRB		
2000	PMS52	07/10/00	7	F	F	ICPRB		
2000	PMS52	08/07/00	8	F	F	ICPRB		

Year	Station	Date	Mon	Original Box	New Box	Location	Evaluation	Comments
2000	PMS52	09/11/00	9	F	F	ICPRB		
2000	PMS52	10/10/00	10	F	F	ICPRB		
2000	PMS52	11/13/00	11	F	F	ICPRB		
2000	PMS52	12/11/00	12	F	F	ICPRB		
2001	PMS52	02/12/01	2	O	M	ICPRB	Good	
2001	PMS52	03/05/01	3	O	Discarded	ANS	Counted	
2001	PMS52	04/02/01	4	O	Discarded	ANS	Counted	junky
2001	PMS52	05/07/01	5	O	Discarded	ANS	Counted	
2001	PMS52	06/11/01	6	O	M	ICPRB	Good	
2001	PMS52	07/09/01	7	O	Discarded	ANS	Counted	
2001	PMS52	08/13/01	8	O	Discarded	ANS	Counted	junky
2001	PMS52	09/10/01	9	O	Discarded	ANS	Counted	sparse
2001	PMS52	10/15/01	10	O	M	ICPRB	Good	
2001	PMS52	11/13/01	11	O	M	ICPRB		
1998	PTB01	04/14/98	4	EE	EE	ICPRB		
1998	PTB01	05/12/98	5	EE	EE	ICPRB		
1998	PTB01	06/09/98	6	EE	EE	ICPRB		
1998	PTB01	07/14/98	7	EE	EE	ICPRB		
1998	PTB01	08/11/98	8	EE	EE	ICPRB		
1998	PTB01	09/21/98	9	EE	EE	ICPRB		
1998	PTB01	10/19/98	10	EE	EE	ICPRB		
1998	PTB01	11/09/98	11	EE	EE	ICPRB		
1998	PTB01	12/08/98	12	EE	EE	ICPRB		
1999	PTB01	01/05/99	1	CC	CC	ICPRB		
1999	PTB01	02/02/99	2	CC	CC	ICPRB		
1999	PTB01	03/19/99	3	CC	CC	ICPRB		
1999	PTB01	04/06/99	4	CC	CC	ICPRB		
1999	PTB01	05/04/99	5	CC	CC	ICPRB		
1999	PTB01	06/15/99	6	CC	CC	ICPRB	Good	
1999	PTB01	07/20/99	7	CC	CC	ICPRB	Good	
1999	PTB01	08/10/99	8	CC	CC	ICPRB	Good	
1999	PTB01	09/21/99	9	CC	CC	ICPRB		
1999	PTB01	10/25/99	10	CC	CC	ICPRB		
1999	PTB01	11/16/99	11	CC	CC	ICPRB		
1999	PTB01	12/14/99	12	CC	CC	ICPRB	Good	

Year	Station	Date	Mon	Original Box	New Box	Location	Evaluation	Comments
2000	PTB01	01/11/00	1	G	G	ICPRB		
2000	PTB01	03/07/00	3	G	G	ICPRB		
2000	PTB01	04/04/00	4	G	G	ICPRB		
2000	PTB01	05/02/00	5	G	G	ICPRB		
2000	PTB01	06/06/00	6	G	G	ICPRB		
2000	PTB01	07/18/00	7	G	G	ICPRB		
2000	PTB01	08/15/00	8	G	G	ICPRB		
2000	PTB01	09/19/00	9	G	G	ICPRB		
2000	PTB01	10/17/00	10	G	G	ICPRB		
2000	PTB01	11/07/00	11	G	G	ICPRB		
2000	PTB01	12/05/00	12	G	G	ICPRB		
2001	PTB01	01/16/01	1	K	J	ICPRB		
2001	PTB01	02/06/01	2	K	J	ICPRB		
2001	PTB01	03/13/01	3	K	Discarded	ANS	Counted	
2001	PTB01	04/10/01	4	K	Discarded	ANS		
2001	PTB01	05/15/01	5	K	Discarded	ANS	Counted	
2001	PTB01	06/19/01	6	K	J	ICPRB	Good	
2001	PTB01	07/17/01	7	K	Discarded	ANS	Counted	Preserved with Lugol's
2001	PTB01	08/21/01	8	K	Discarded	ANS	Counted	
2001	PTB01	09/18/01	9	K	Discarded	ANS	Counted	
2001	PTB01	10/23/01	10	K	J	ICPRB	Good	
2001	PTB01	11/27/01	11	K	J	ICPRB	Good	May not be salvageable
2001	PWC01	11/06/01	11	J	J	ICPRB		
1998	PWC04	03/10/98	3	DD	DD	ICPRB		
1998	PWC04	04/07/98	4	DD	DD	ICPRB		
1998	PWC04	05/05/98	5	DD	DD	ICPRB		
1998	PWC04	06/02/98	6	DD	DD	ICPRB		
1998	PWC04	07/07/98	7	DD	DD	ICPRB		
1998	PWC04	08/04/98	8	DD	DD	ICPRB		
1998	PWC04	09/08/98	9	DD	DD	ICPRB		
1998	PWC04	10/05/98	10	DD	DD	ICPRB		
1998	PWC04	11/02/98	11	DD	DD	ICPRB		
1998	PWC04	12/15/98	12	DD	DD	ICPRB		
1999	PWC04	01/12/99	1	W	W	ICPRB		
1999	PWC04	02/09/99	2	W	W	ICPRB		

Year	Station	Date	Mon	Original Box	New Box	Location	Evaluation	Comments
1999	PWC04	03/02/99	3	W	W	ICPRB		
1999	PWC04	04/13/99	4	W	W	ICPRB		
1999	PWC04	05/11/99	5	W	W	ICPRB	Marginal	May be salvageable
1999	PWC04	06/08/99	6	W	W	ICPRB	Good	
1999	PWC04	07/12/99	7	W	W	ICPRB	Good	
1999	PWC04	08/03/99	8	W	W	ICPRB	Good	
1999	PWC04	09/13/99	9	W	W	ICPRB	Good	
1999	PWC04	10/05/99	10	W	W	ICPRB	Good	
1999	PWC04	11/02/99	11	W	W	ICPRB	Good	
1999	PWC04	12/07/99	12	W	W	ICPRB	Good	
2000	PWC04	01/24/00	1	G	G	ICPRB		
2000	PWC04	02/15/00	2	G	G	ICPRB		
2000	PWC04	03/14/00	3	G	G	ICPRB		
2000	PWC04	04/11/00	4	G	G	ICPRB		
2000	PWC04	05/09/00	5	G	G	ICPRB		
2000	PWC04	06/13/00	6	G	G	ICPRB		
2000	PWC04	07/11/00	7	G	G	ICPRB		
2000	PWC04	08/08/00	8	G	G	ICPRB		
2000	PWC04	09/12/00	9	G	G	ICPRB		
2000	PWC04	10/02/00	10	G	G	ICPRB		
2000	PWC04	11/14/00	11	G	G	ICPRB		
2000	PWC04	12/12/00	12	G	G	ICPRB		
2001	PWC04	01/09/01	1	O	P	ICPRB		
2001	PWC04	02/13/01	2	O	P	ICPRB	Good	
2001	PWC04	04/03/01	4	O	Discarded	ANS	Counted	some deterioration
2001	PWC04	05/08/01	5	O	Discarded	ANS	Counted	
2001	PWC04	06/12/01	6	O	P	ICPRB	Good	
2001	PWC04	07/10/01	7	O	Discarded	ANS	Counted	Very nice
2001	PWC04	08/14/01	8	O	Discarded	ANS	Counted	
2001	PWC04	10/16/01	10	O	P	ICPRB	Good	nice
2000	RCR12	11/07/00	11	A	A	ICPRB		
1998	TCO01	04/14/98	4	FF	FF	ICPRB		
1998	TCO01	05/12/98	5	FF	FF	ICPRB		
1998	TCO01	06/09/98	6	FF	FF	ICPRB		
1998	TCO01	07/14/98	7	FF	FF	ICPRB		

Year	Station	Date	Mon	Original Box	New Box	Location	Evaluation	Comments
1998	TCO01	08/11/98	8	FF	FF	ICPRB		
1998	TCO01	10/19/98	10	FF	FF	ICPRB		
1999	TCO01	05/04/99	5	CC	CC	ICPRB		
1999	TCO01	06/15/99	6	CC	CC	ICPRB	Good	
1999	TCO01	07/20/99	7	CC	CC	ICPRB	Good	
1999	TCO01	08/10/99	8	CC	CC	ICPRB	Good	
1999	TCO01	09/21/99	9	CC	CC	ICPRB		
1999	TCO01	10/25/99	10	CC	CC	ICPRB		
1999	TCO01	11/16/99	11	CC	CC	ICPRB		
1999	TCO01	12/14/99	12	CC	CC	ICPRB	Good	
2000	TCO01	04/04/00	4	H	H	ICPRB		
2000	TCO01	05/02/00	5	H	H	ICPRB		
2000	TCO01	07/18/00	7	H	H	ICPRB		
2000	TCO01	08/15/00	8	H	H	ICPRB		
2000	TCO01	09/19/00	9	H	H	ICPRB	Marginal	
2000	TCO01	11/07/00	11	H	H	ICPRB		
2000	TCO01	12/05/00	12	H	H	ICPRB		
2001	TCO01	01/16/01	1	P	P	ICPRB		
2001	TCO01	02/06/01	2	P	P	ICPRB		
2001	TCO01	04/10/01	4	P	Discarded	ANS	Counted	
2001	TCO01	05/15/01	5	P	Discarded	ANS	Counted	
2001	TCO01	06/19/01	6	P	P	ICPRB		
2001	TCO01	07/17/01	7	P	Discarded	ANS	Counted	
2001	TCO01	08/21/01	8	P	Discarded	ANS	Counted	
2001	TCO01	10/23/01	10	P	P	ICPRB		
2001	TCO01	11/27/01	11	P	P	ICPRB		
1998	TCO06	04/14/98	4	FF	FF	ICPRB		
1998	TCO06	05/12/98	5	FF	FF	ICPRB		
1998	TCO06	06/09/98	6	FF	FF	ICPRB		
1998	TCO06	07/14/98	7	FF	FF	ICPRB		
1998	TCO06	08/11/98	8	FF	FF	ICPRB		
1998	TCO06	10/19/98	10	FF	FF	ICPRB		
1999	TCO06	06/15/99	6	BB	BB	ICPRB		
1999	TCO06	07/20/99	7	BB	BB	ICPRB		
1999	TCO06	08/04/99	8	BB	BB	ICPRB		

Year	Station	Date	Mon	Original Box	New Box	Location	Evaluation	Comments
1999	TCO06	08/10/99	8	BB	BB	ICPRB		
1999	TCO06	09/21/99	9	BB	BB	ICPRB	Marginal	Depauperate
1999	TCO06	10/25/99	10	BB	BB	ICPRB	Marginal	Depauperate
1999	TCO06	11/16/99	11	BB	BB	ICPRB		
1999	TCO06	12/14/99	12	BB	BB	ICPRB	Good	
2000	TCO06	04/04/00	4	H	H	ICPRB		
2000	TCO06	05/02/00	5	H	H	ICPRB		
2000	TCO06	06/06/00	6	H	H	ICPRB		
2000	TCO06	07/18/00	7	H	H	ICPRB		
2000	TCO06	09/19/00	9	H	H	ICPRB		
2000	TCO06	11/07/00	11	H	H	ICPRB		
2000	TCO06	12/05/00	12	H	H	ICPRB		
2001	TCO06	02/06/01	2	P	P	ICPRB		
2001	TCO06	04/10/01	4	P	Discarded	ANS	Counted	
2001	TCO06	05/15/01	5	P	Discarded	ANS	Counted	
2001	TCO06	06/19/01	6	P	P	ICPRB		
2001	TCO06	07/17/01	7	P	Discarded	ANS	Counted	
2001	TCO06	08/21/01	8	P	Discarded	ANS	Counted	
2001	TCO06	10/23/01	10	P	P	ICPRB		
2001	TCO06	11/27/01	11	P	P	ICPRB		
2000	TCO06(2)	06/06/00	6	H	H	ICPRB		

Appendix B

Zooplankton Sample Chain of Custody

May 31, 2005

Key: MI = microzooplankton
MZ = mesozooplankton

All remaining, uncounted samples are at the Interstate Commission on the Potomac River Basin.

Year	Station	Date	Type	Orig. Box	Status
1997	ANA14	03/11/97	MI	S	Discarded
1997	ANA14	04/08/97	MI	S	Discarded
1997	ANA14	05/06/97	MI	S	Discarded
1997	ANA14	06/03/97	MI	S	Discarded
1997	ANA14	07/08/97	MI	S	Discarded
1997	ANA14	08/05/97	MI	S	Discarded
1997	ANA14	09/02/97	MI	S	Discarded
1997	ANA14	10/07/97	MI	S	Discarded
1998	ANA14	02/10/98	MI	S	Discarded
1998	ANA14	04/07/98	MI	S	Discarded
1998	ANA14	05/05/98	MI	S	Discarded
1998	ANA14	06/02/98	MI	S	Discarded
1998	ANA14	07/07/98	MI	S	Discarded
1998	ANA14	08/04/98	MI	S	Discarded
1998	ANA14	09/08/98	MI	S	Discarded
1998	ANA14	10/05/98	MI	S	Discarded
1999	ANA14	03/02/99	MI	S	Discarded
1999	ANA14	04/13/99	MI	S	Discarded
1999	ANA14	05/11/99	MI	S	Discarded
1999	ANA14	06/08/99	MI	S	Discarded
1999	ANA14	07/12/99	MI	S	Discarded
1999	ANA14	08/03/99	MI	S	Discarded
1999	ANA14	09/13/99	MI	S	Discarded
1999	ANA14	10/05/99	MI	S	Discarded
2000	ANA14	03/14/00	MI	Q	Counted & Discarded
2000	ANA14	04/11/00	MI	Q	Counted & Discarded
2000	ANA14	05/09/00	MI	Q	Counted & Discarded
2000	ANA14	06/13/00	MI	Q	Counted & Discarded
2000	ANA14	07/11/00	MI	Q	Counted & Discarded
2000	ANA14	08/08/00	MI	Q	Counted & Discarded
2000	ANA14	09/12/00	MI	Q	Counted & Discarded
2000	ANA14	10/02/00	MI	Q	Counted & Discarded
2001	ANA14	05/08/01	MI	Q	Counted & Discarded
2001	ANA14	06/13/01	MI	Q	Counted & Discarded
2001	ANA14	07/10/01	MI	Q	Counted & Discarded
2001	ANA14	08/30/01	MI	Q	Counted & Discarded
2001	ANA14	10/16/01	MI	Q	Counted & Discarded
1999	KNGLOWER	07/16/99	MI	Q	Counted & Discarded
1999	KNGLOWER	08/16/99	MI	Q	Counted & Discarded
1999	KNGLOWER	09/15/99	MI	Q	Counted & Discarded
1999	KNGUPPER	07/16/99	MI	Q	Counted & Discarded
1999	KNGUPPER	08/16/99	MI	Q	Counted & Discarded
1999	KNGUPPER	09/15/99	MI	Q	Counted & Discarded
1997	PMS10	03/17/97	MI	S	Discarded
1997	PMS10	04/01/97	MI	S	Discarded
1997	PMS10	05/12/97	MI	S	Discarded
1997	PMS10	06/09/97	MI	S	Discarded
1997	PMS10	07/14/97	MI	S	Discarded
1997	PMS10	08/11/97	MI	S	Discarded
1997	PMS10	09/08/97	MI	S	Discarded
1997	PMS10	10/14/97	MI	S	Discarded
1998	PMS10	02/09/98	MI	S	Discarded

Year	Station	Date	Type	Orig. Box	Status
1998	PMS10	03/09/98	MI	S	Discarded
1998	PMS10	04/06/98	MI	S	Discarded
1998	PMS10	06/15/98	MI	S	Discarded
1998	PMS10	07/06/98	MI	S	Discarded
1998	PMS10	08/17/98	MI	S	Discarded
1998	PMS10	09/14/98	MI	S	Discarded
1998	PMS10	10/27/98	MI	S	Discarded
1999	PMS10	03/01/99	MI	S	Discarded
1999	PMS10	04/12/99	MI	S	Discarded
1999	PMS10	05/10/99	MI	S	Discarded
1999	PMS10	06/07/99	MI	S	Discarded
1999	PMS10	07/06/99	MI	S	Discarded
1999	PMS10	08/02/99	MI	S	Discarded
1999	PMS10	09/07/99	MI	S	Discarded
1996	PMS10	10/22/99	MI	S	Discarded
2000	PMS10	03/13/00	MI	Q	Counted & Discarded
2000	PMS10	04/10/00	MI	Q	Counted & Discarded
2000	PMS10	05/08/00	MI	Q	Counted & Discarded
2000	PMS10	06/12/00	MI	Q	Counted & Discarded
2000	PMS10	07/10/00	MI	Q	Counted & Discarded
2000	PMS10	08/07/00	MI	Q	Counted & Discarded
2000	PMS10	09/11/00	MI	Q	Counted & Discarded
2000	PMS10	10/10/00	MI	Q	Counted & Discarded
2001	PMS10	05/07/01	MI	Q	Counted & Discarded
2001	PMS10	06/11/01	MI	Q	Counted & Discarded
2001	PMS10	07/09/01	MI	Q	Counted & Discarded
2001	PMS10	08/30/01	MI	Q	Counted & Discarded
2001	PMS10	09/10/01	MI	Q	Counted & Discarded
2001	PMS10	10/15/01	MI	Q	Counted & Discarded
1996	PMS37	08/19/96	MI	S	Discarded
1997	PMS37	04/01/97	MI	S	Discarded
1997	PMS37	05/12/97	MI	S	Discarded
1997	PMS37	06/09/97	MI	S	Discarded
1997	PMS37	07/14/97	MI	S	Discarded
1997	PMS37	08/11/97	MI	S	Discarded
1997	PMS37	09/08/97	MI	S	Discarded
1997	PMS37	10/14/97	MI	S	Discarded
1998	PMS37	02/09/98	MI	S	Discarded
1998	PMS37	03/09/98	MI	S	Discarded
1998	PMS37	04/06/98	MI	S	Discarded
1998	PMS37	05/18/98	MI	S	Discarded
1998	PMS37	06/15/98	MI	S	Discarded
1998	PMS37	07/06/98	MI	S	Discarded
1998	PMS37	08/17/98	MI	S	Discarded
1998	PMS37	09/14/98	MI	S	Discarded
1998	PMS37	10/27/98	MI	S	Discarded
1999	PMS37	03/01/99	MI	S	Discarded
1999	PMS37	05/10/99	MI	S	Discarded
1999	PMS37	06/07/99	MI	S	Discarded
1999	PMS37	07/06/99	MI	S	Discarded
1999	PMS37	08/02/99	MI	S	Discarded
1999	PMS37	09/07/99	MI	S	Discarded

Year	Station	Date	Type	Orig. Box	Status
1999	PMS37	10/22/99	MI	S	Discarded
2000	PMS37	03/13/00	MI	Q	Counted & Discarded
2000	PMS37	04/10/00	MI	Q	Discarded
2000	PMS37	05/08/00	MI	Q	Counted & Discarded
2000	PMS37	06/12/00	MI	Q	Counted & Discarded
2000	PMS37	07/10/00	MI	Q	Counted & Discarded
2000	PMS37	08/07/00	MI	Q	Counted & Discarded
2000	PMS37	09/11/00	MI	Q	Counted & Discarded
2000	PMS37	10/10/00	MI	Q	Counted & Discarded
2001	PMS37	05/07/01	MI	Q	Counted & Discarded
2001	PMS37	07/09/01	MI	Q	Counted & Discarded
2001	PMS37	08/30/01	MI	Q	Counted & Discarded
2001	PMS37	09/10/01	MI	Q	Counted & Discarded
2001	PMS37	10/15/01	MI	Q	Counted & Discarded
1997	PMS37(2)	04/01/97	MI	S	Discarded
1997	ANA14	03/11/97	MZ	T	
1997	ANA14	04/08/97	MZ	T	
1997	ANA14	05/06/97	MZ	T	
1997	ANA14	06/03/97	MZ	T	
1997	ANA14	07/08/97	MZ	T	
1997	ANA14	08/05/97	MZ	T	
1997	ANA14	09/02/97	MZ	T	
1997	ANA14	10/07/97	MZ	T	
1998	ANA14	02/10/98	MZ	T	
1998	ANA14	04/07/98	MZ	T	
1998	ANA14	05/05/98	MZ	T	
1998	ANA14	06/02/98	MZ	T	
1998	ANA14	07/07/98	MZ	T	
1998	ANA14	08/04/98	MZ	T	
1998	ANA14	09/08/98	MZ	T	
1998	ANA14	10/05/98	MZ	T	
1999	ANA14	03/02/99	MZ	T	
1999	ANA14	04/13/99	MZ	T	
1999	ANA14	05/11/99	MZ	T	
1999	ANA14	06/08/99	MZ	T	
1999	ANA14	07/12/99	MZ	T	
1999	ANA14	08/03/99	MZ	T	
1999	ANA14	09/13/99	MZ	T	
1999	ANA14	10/08/99	MZ	T	
2000	ANA14	03/14/00	MZ	R	Counted & Discarded
2000	ANA14	04/11/00	MZ	R	Counted & Discarded
2000	ANA14	05/09/00	MZ	R	Counted & Discarded
2000	ANA14	06/13/00	MZ	R	Counted & Discarded
2000	ANA14	07/11/00	MZ	R	Counted & Discarded
2000	ANA14	08/08/00	MZ	R	Counted & Discarded
2000	ANA14	09/12/00	MZ	R	Counted & Discarded
2000	ANA14	10/02/00	MZ	R	Counted & Discarded
2001	ANA14	05/08/01	MZ	R	Counted & Discarded
2001	ANA14	06/13/01	MZ	R	Counted & Discarded
2001	ANA14	07/10/01	MZ	R	Counted & Discarded
2001	ANA14	08/30/01	MZ	R	Counted & Discarded

Year	Station	Date	Type	Orig. Box	Status
2001	ANA14	10/16/01	MZ	R	Counted & Discarded
1999	KNGLOWER	07/16/99	MZ	R	
1999	KNGLOWER	08/16/99	MZ	R	
1999	KNGLOWER	09/15/99	MZ	R	Counted & Discarded
1999	KNGUPPER	07/16/99	MZ	R	Counted & Discarded
1999	KNGUPPER	08/16/99	MZ	R	Counted & Discarded
1999	KNGUPPER	09/15/99	MZ	R	Counted & Discarded
1997	PMS10	03/17/97	MZ	T	
1997	PMS10	04/01/97	MZ	T	
1997	PMS10	05/12/97	MZ	T	
1997	PMS10	06/09/97	MZ	T	
1997	PMS10	07/14/97	MZ	T	
1997	PMS10	08/11/97	MZ	T	
1997	PMS10	09/08/97	MZ	T	
1997	PMS10	10/14/97	MZ	T	
1998	PMS10	02/09/98	MZ	T	
1998	PMS10	03/09/98	MZ	T	
1998	PMS10	04/06/98	MZ	T	
1998	PMS10	06/15/98	MZ	T	
1998	PMS10	07/06/98	MZ	T	
1998	PMS10	08/17/98	MZ	T	
1998	PMS10	09/14/98	MZ	T	
1998	PMS10	10/27/98	MZ	T	
1999	PMS10	03/01/99	MZ	T	
1999	PMS10	04/12/99	MZ	T	
1999	PMS10	05/10/99	MZ	T	
1999	PMS10	06/07/99	MZ	T	
1999	PMS10	07/06/99	MZ	T	
1999	PMS10	08/02/99	MZ	T	
1999	PMS10	09/07/99	MZ	T	
1999	PMS10	10/22/99	MZ	T	
2000	PMS10	03/13/00	MZ	R	Counted & Discarded
2000	PMS10	04/10/00	MZ	R	Counted & Discarded
2000	PMS10	05/08/00	MZ	R	Counted & Discarded
2000	PMS10	06/12/00	MZ	R	Counted & Discarded
2000	PMS10	07/10/00	MZ	R	Counted & Discarded
2000	PMS10	08/07/00	MZ	R	Counted & Discarded
2000	PMS10	09/11/00	MZ	R	Counted & Discarded
2000	PMS10	10/10/00	MZ	R	Counted & Discarded
2001	PMS10	05/07/01	MZ	R	Counted & Discarded
2001	PMS10	06/11/01	MZ	R	Counted & Discarded
2001	PMS10	07/09/01	MZ	R	Counted & Discarded
2001	PMS10	08/30/01	MZ	R	Counted & Discarded
2001	PMS10	09/10/01	MZ	R	Counted & Discarded
2001	PMS10	10/15/01	MZ	R	Counted & Discarded
1997	PMS37	03/17/97	MZ	T	
1997	PMS37	05/12/97	MZ	T	
1997	PMS37	06/09/97	MZ	T	
1997	PMS37	07/14/97	MZ	T	
1997	PMS37	08/11/97	MZ	T	
1997	PMS37	09/08/97	MZ	T	

Year	Station	Date	Type	Orig. Box	Status
1997	PMS37	10/14/97	MZ	T	
1998	PMS37	02/09/98	MZ	T	
1998	PMS37	03/09/98	MZ	T	
1998	PMS37	04/06/98	MZ	T	
1998	PMS37	05/18/98	MZ	T	
1998	PMS37	06/15/98	MZ	T	
1998	PMS37	07/06/98	MZ	T	
1998	PMS37	08/17/98	MZ	T	
1998	PMS37	09/14/98	MZ	T	
1998	PMS37	10/27/98	MZ	T	
1999	PMS37	03/01/99	MZ	T	
1999	PMS37	05/10/99	MZ	T	
1999	PMS37	06/07/99	MZ	T	
1999	PMS37	07/06/99	MZ	T	
1999	PMS37	08/02/99	MZ	T	
1999	PMS37	09/07/99	MZ	T	
1997	PMS37	10/22/99	MZ	T	
2000	PMS37	03/13/00	MZ	R	Counted & Discarded
2000	PMS37	04/10/00	MZ	R	Counted & Discarded
2000	PMS37	05/08/00	MZ	R	Counted & Discarded
2000	PMS37	06/12/00	MZ	R	Counted & Discarded
2000	PMS37	07/10/00	MZ	R	Counted & Discarded
2000	PMS37	08/07/00	MZ	R	Counted & Discarded
2000	PMS37	09/11/00	MZ	R	Counted & Discarded
2000	PMS37	10/10/00	MZ	R	Counted & Discarded
2001	PMS37	05/07/01	MZ	R	Counted & Discarded
2001	PMS37	07/09/01	MZ	R	Counted & Discarded
2001	PMS37	08/30/01	MZ	R	Counted & Discarded
2001	PMS37	09/10/01	MZ	R	Counted & Discarded
2001	PMS37	10/15/01	MZ	R	Counted & Discarded

Appendix C

Spring and Summer Phytoplankton Indexes of Biotic Integrity
Station Summaries

Appendix C Table of Contents

STATION AAG02

Location: A high marsh station location within Mass Fill I approximately 5 meters beyond the canoe launch area at the end of the dredged tidal gut (Anacostia River).
Latitude: 38.914; Longitude: -76.9422

Summary: Five (5) data records are available for Spring and Summer 1998. The three (3) summer records have sufficient data to calculate the phytoplankton IBIs. The indicators chlorophyll *a*, pheophytin, C:Chl a ratio, and dissolved organic carbon were not available to score. On average, the summer 1998 phytoplankton community was in **Poor** condition, indicated by excessive levels of chlorophytes, diatoms, and/or bluegreens. The nuisance bluegreen species, *Microcystis aeruginosa*, was not evident in July and August, and present in low levels in September.

Sample Status: Counted and discarded.

Sample Dates:

4/14/1998 Spring

IBI_Method	Evaluation	IBI Score
Method A	Too Few Data	ND
Method B	Too Few Data	ND

Available Metrics	*Metric Values*		*Metric Scores*
Cyanophyte Biomass	9	ug C liter^{-1}	null
Diatom Abundance	0.56	million cells liter^{-1}	1
Total Abundance	3.03	million cells liter^{-1}	null
Total Biomass	167	ug C liter^{-1}	1

5/11/1998 Spring

IBI_Method	*Evaluation*	*IBI Score*
Method A	Too Few Data	ND
Method B	Too Few Data	ND

Available Metrics	*Metric Values*		*Metric Scores*
Cyanophyte Biomass	59	ug C liter^{-1}	1
Diatom Abundance	0.71	million cells liter^{-1}	1
Total Abundance	12.61	million cells liter^{-1}	null
Total Biomass	261	ug C liter^{-1}	5

7/14/1998 Summer

IBI_Method	*Evaluation*	*IBI Score*
Method A	Fair-Poor	IBI Score = 2.3
Method B	Poor	IBI Score = 1.7

Available Metrics	*Metric Values*		*Metric Scores*
Chlorophyte Abundance	22.73	million cells liter^{-1}	1
Cyanophyte Biomass	9	ug C liter^{-1}	5
Diatom Abundance	8.22	million cells liter^{-1}	1
Diatom Biomass	406	ug C liter^{-1}	1
Microcystis aeruginosa	0	million cells liter^{-1}	null
Total Abundance	36.36	million cells liter^{-1}	1
Total Biomass	2,080	ug C liter^{-1}	1

Summer

8/11/1998

IBI_Method	*Evaluation*	*IBI Score*
Method A	Poor	IBI Score = 1.0
Method B	Poor	IBI Score = 2.0

Available Metrics	*Metric Values*		*Metric Scores*
Chlorophyte Abundance	2.09	million cells liter^{-1}	5
Cyanophyte Biomass	747	ug C liter^{-1}	1
Diatom Abundance	4.25	million cells liter^{-1}	3
Diatom Biomass	300	ug C liter^{-1}	1
Microcystis aeruginosa	0	million cells liter^{-1}	null
Total Abundance	64.15	million cells liter^{-1}	1
Total Biomass	1,086	ug C liter^{-1}	1

9/8/1998 **Summer**

IBI_Method	*Evaluation*	*IBI Score*
Method A	Poor	IBI Score = 1.0
Method B	Poor	IBI Score = 1.0

Available Metrics	*Metric Values*		*Metric Scores*
Chlorophyte Abundance	6.83	million cells liter^{-1}	1
Cyanophyte Biomass	230	ug C liter^{-1}	1
Diatom Abundance	4.63	million cells liter^{-1}	1
Diatom Biomass	206	ug C liter^{-1}	1
Microcystis aeruginosa	0.66	million cells liter^{-1}	1
Total Abundance	69.6	million cells liter^{-1}	1
Total Biomass	1,064	ug C liter^{-1}	1

STATION ANA01

Location: Head of the Anacostia River, 50 m upstream of the westbound New York Avenue Bridge. Latitude: 38.918167; Longitude:-76.94164

2001 Summary: Two (2) Spring and two (2) Summer records from 2001 were available to calculate phytoplankton IBIs for this station. Status of the phytoplankton community was highly variable in 2001, ranging from Poor (May) to Good (August). Total biomass of the community was dominated by the diatom taxa as a group in April, the green and diatom taxonomic groups in May, the dinoflagellate group in July, and the green group in August. A very low C:Chl ratio, high pheophytin, and contrasting statuses for chlorophyll *a* and total biomass in May suggest the spring phytoplankton community was stressed/inhibited by poor light caused by high turbidity. (Spring TSS concentrations averaged 20.3 mg liter^{-1} and Secchi depth averaged 0.45 m). Bluegreens (*Oscillatoria, Agmenellum*), diatoms (unid. pennate, unid. centric, *Fragilaria*), and a green (*Ankistrodesmus*) were the numerically-dominant taxa. The summer phytoplankton community status was Fair-Good on 7/10 and Good on 8/14, as indicated by high scores for chlorophyll *a*, pheophytin, and many taxa indicators. Cyanophyte (bluegreen) biomass was high on 7/10, but the nuisance bluegreen species, *Microcystis aeruginosa*, was not evident any time during the summer. Summer 2001 may not have been Good overall, however. On 4 of the 5 other summer sampling dates (6/12 7/23, 8/27, 9/24), chlorophyll *a* levels were excessive and scored “1," and pheophytin levels scored “3" or “1.”

Status of Samples: Counted and discarded.

Sample Dates:

4/3/2001 Spring

IBI_Method	*Evaluation*	*IBI Score*
Method A	Fair-Poor	IBI Score = 2.5
Method B	Fair	IBI Score = 3.0

Available Metrics	*Metric Values*	*Metric Score*
Carbon:Chlorophyll a Ratio	51.6 ratio	5
Surface Chlorophyll a	1.9 ug liter^{1}	1
Cyanophyte Biomass	23 ug C liter^{1}	Null
Pheophytin	1.7 ug liter^{1}	3
Total Biomass	98 ug C liter^{1}	1
Diatom Abundance	2.27 million cells liter^{1}	5
Total Abundance	6.27 million cells liter^{1}	Null

5/8/2001 Spring

IBI_Method	*Evaluation*	*IBI Score*
Method A	Poor	IBI Score = 2.0
Method B	Poor	IBI Score = 1.8

Available Metrics	*Metric Values*	*Metric Score*
Carbon:Chlorophyll a Ratio	12.3 ratio	1
Surface Chlorophyll a	31.4 ug liter-1	1
Cyanophyte Biomass	4 ug C liter	Null
Pheophytin	5.9 ug liter	1
Total Biomass	385 ug C liter^{1}	5
Diatom Abundance	10.13 million cells liter^{1}	1

Total Abundance	16.31 million cells liter-1	Null

7/10/2001 Summer

IBI_Method	*Evaluation*	*IBI Score*
Method A	Fair-Good	IBI Score = 3.8
Method B	Good	IBI Score = 4.1

Available Metrics	*Metric Values*	*Metric Score*
Surface Chlorophyll a	6.5 ug liter-1	5
Cyanophyte Biomass	77 ug C liter-1	1
Diatom Biomass	35 ug C liter-1	5
Pheophytin	3.1 ug liter-1	3
Total Biomass	335 ug C liter-1	5
Microcystis aeruginosa	0 million cells liter-1	Null
Chlorophyte Abundance	1.99 million cells liter-1	5
Total Abundance	17.52 million cells liter-1	5

8/14/2001 Summer

IBI_Method	*Evaluation*	*IBI Score*
Method A	Good	IBI Score = 4.5
Method B	Good	IBI Score = 4.3

Available Metrics	*Metric Values*	*Metric Score*
Surface Chlorophyll a	5.6 ug liter-1	5
Cyanophyte Biomass	20 ug C liter-1	5
Diatom Biomass	31 ug C liter-1	5
Total Biomass	174 ug C liter-1	3
Microcystis aeruginosa	0 million cells liter-1	Null
Chlorophyte Abundance	0.21 million cells liter-1	5
Total Abundance	7.28 million cells liter-1	3

STATION **ANA14**

Location: Anacostia River at Pennsylvania Avenue; Marina South Dock
Latitude: 38.877335; Longitude: -76.97553

2001 Summary: Three (3) Spring and three (3) Summer records from 2001 were available to calculate the IBIs. Status of the phytoplankton community was highly variable in 2001, ranging from Poor (March, May) to Good (August). Total biomass of the community was dominated by the diatom and bluegreen taxonomic groups in March, the diatom group in April, May, and July, and the green group in August. The phytoplankton community was depauperate in March and then dominated by a large diatom bloom (small unid. centric) in May. The C:Chl ratios and pheophytin levels indicate some light stress caused by turbidity. (Spring TSS concentrations averaged 22.8 mg liter^{-1} and Secchi depth averaged 0.38 m). Moderate-to-low levels of chlorophyll *a*, cyanophyte (bluegreen), diatoms, and chlorophytes (greens) resulted in a Fair-Good status in June and a Good status in August. However, status in July was Fair-Poor due to a diverse bloom of centric diatoms. Scores for chlorophyll *a* and pheophytin on 3 of 4 other summer sampling dates (7/23, 8/27, 9/24) were “1" and “3,” suggesting the overall summer condition of the phytoplankton community was Fair-Poor. Bluegreens were sometimes common, but the nuisance bluegreen species, *Microcystis aeruginosa*, was not evident.

Status of Samples: Counted and discarded.

Sample Dates:

3/6/2001 Spring

IBI_Method	*Evaluation*	*IBI Score*
Method A	Poor	IBI Score = 1.4
Method B	Poor	IBI Score = 2.0

Available Metrics	*Metric Values*	*Metric Score*
Carbon:Chlorophyll a Ratio	37.3 ratio	1
Surface Chlorophyll a	2.1 ug liter^{-1}	1
Cyanophyte Biomass	28 ug C liter^{-1}	1
Pheophytin	2.1 ug liter^{-1}	3
Total Biomass	78 ug C liter^{-1}	1
Diatom Abundance	2.88 million cells liter^{-1}	5
Total Abundance	7.95 million cells liter^{-1}	Null

4/3/2001 Spring

IBI_Method	*Evaluation*	*IBI Score*
Method A	Fair-Poor	IBI Score = 2.2
Method B	Fair	IBI Score = 2.7

Available Metrics	*Metric Values*	*Metric Score*
Carbon:Chlorophyll a Ratio	45.0 ratio	5
Surface Chlorophyll a	3.6 ug liter^{-1}	3
Cyanophyte Biomass	41 ug C liter^{-1}	1
Pheophytin	3.8 ug liter^{-1}	1
Total Biomass	162 ug C liter^{-1}	1
Diatom Abundance	2.97 million cells liter^{-1}	5
Total Abundance	10.36 million cells liter^{-1}	Null

5/8/2001 Spring

IBI_Method	*Evaluation*	*IBI Score*
Method A	Poor	IBI Score = 2.0
Method B	Poor	IBI Score = 1.7

Available Metrics	*Metric Values*		*Metric Score*
Carbon:Chlorophyll a Ratio	13.0	ratio	1
Surface Chlorophyll a	30.4	ug liter-1	1
Cyanophyte Biomass	7	ug C liter-1	Null
Pheophytin	3.4	ug liter-1	1
Total Biomass	394	ug C liter-1	5
Diatom Abundance	26.99	million cells liter-1	1
Total Abundance	33.31	million cells liter-1	1

6/12/2001 Summer

IBI_Method	*Evaluation*	*IBI Score*
Method A	Fair-Good	IBI Score = 3.4
Method B	Fair-Good	IBI Score = 3.9

Available Metrics	*Metric Values*		*Metric Score*
Surface Chlorophyll a	5.3	ug liter-1	3
Cyanophyte Biomass	36	ug C liter-1	5
Diatom Biomass	47	ug C liter-1	5
Pheophytin	6.6	ug liter-1	1
Total Biomass	152	ug C liter-1	3
Microcystis aeruginosa	0	million cells liter-1	Null
Chlorophyte Abundance	2	million cells liter-1	5
Total Abundance	3.94	million cells liter-1	5

7/10/2001 Summer

IBI_Method	*Evaluation*	*IBI Score*
Method A	Fair-Poor	IBI Score = 2.2
Method B	Fair	IBI Score = 3.0

Available Metrics	*Metric Values*		*Metric Score*
Surface Chlorophyll a	16.1	ug liter-1	1
Cyanophyte Biomass	64	ug C liter-1	3
Diatom Biomass	235	ug C liter-1	1
Pheophytin	5.3	ug liter-1	1
Total Biomass	474	ug C liter-1	5
Microcystis aeruginosa	0	million cells liter-1	Null
Chlorophyte Abundance	2	million cells liter-1	5
Total Abundance	16.26	million cells liter-1	5

8/14/2001 Summer

IBI_Method	*Evaluation*	*IBI Score*
Method A	Good	IBI Score = 4.6
Method B	Good	IBI Score = 4.4

Available Metrics	*Metric Values*		*Metric Score*
Surface Chlorophyll a	9.4	ug liter-1	5
Cyanophyte Biomass	22	ug C liter-1	5
Diatom Biomass	36	ug C liter-1	5

Pheophytin	2.4	ug liter-1	3
Total Biomass	283	ug C liter^{-1}	5
Microcystis aeruginosa	0	million cells liter^{-1}	Null
Chlorophyte Abundance	3.50	million cells liter^{-1}	3
Total Abundance	12.00	million cells liter^{-1}	5

STATION **ANA21**

Location: Anacostia River, 100m north of South Capitol Street Bridge.
Latitude:38.85289; Longitude:-77.0047

2001 Summary: Three (3) Spring and two (2) Summer records from 2001 were available to calculate the IBIs. Status of the phytoplankton community was highly variable in 2001, ranging from Poor (April, May, July) to Fair-Good (March). Total biomass of the community was dominated by the diatom taxonomic group in March and April, co-dominated by the diatom and green groups in May and July, and dominated by the green group in August. The phytoplankton community in March was represented by desirable taxa levels but became dominated by high levels of greens, diatoms, and bluegreens by May. The C:Chl ratios and pheophytin levels indicate some light stress caused by turbidity. (Spring TSS concentrations averaged 30.6 mg liter^{-1}, with a range of 9 - 78 mg liter^{-1}, and Secchi depth averaged 0.62 m). Chlorophyll *a* and pheophytin levels were high in June, scoring "1," and the IBI status in July was Poor due to a diverse bloom of centric diatoms, greens, and bluegreens. IBI status in August improved to Fair due to reduced diatom and chlorophyte levels. The nuisance bluegreen species *Microcystis aeruginosa* was a significant presence in July but not evident in August.

Status of Samples: Counted and discarded.

Sample Dates:

3/6/2001 Spring

IBI_Method	*Evaluation*	*IBI Score*
Method A	Fair-Good	IBI Score = 3.5
Method B	Fair-Good	IBI Score = 3.8

Available Metrics	*Metric Values*	*Metric Score*
Carbon:Chlorophyll a Ratio	39.2 ratio	3
Surface Chlorophyll a	5.4 ug liter-1	5
Cyanophyte Biomass	22 ug C liter^{1}	Null
Pheophytin	7.4 ug liter-1	1
Total Biomass	211 ug C liter^{1}	5
Diatom Abundance	6.13 million cells liter^{1}	5
Total Abundance	10.14 million cells liter^{1}	Null

4/3/2001 Spring

IBI_Method	*Evaluation*	*IBI Score*
Method A	Poor	IBI Score = 1.5
Method B	Fair-Poor	IBI Score = 2.2

Available Metrics	*Metric Values*	*Metric Score*
Carbon:Chlorophyll a Ratio	30.1 ratio	1
Surface Chlorophyll a	4 ug liter-1	3
Cyanophyte Biomass	4 ug C liter^{1}	Null
Pheophytin	2.8 ug liter-1	1
Total Biomass	120 ug C liter^{1}	1
Diatom Abundance	4.42 million cells liter^{1}	5
Total Abundance	7.07 million cells liter^{1}	Null

5/8/2001 Spring

IBI_Method	*Evaluation*	*IBI Score*
Method A	Poor	IBI Score = 1.8
Method B	Poor	IBI Score = 1.7

Available Metrics	*Metric Values*	*Metric Score*
Carbon:Chlorophyll a Ratio	11.2 ratio	1
Surface Chlorophyll a	18.3 ug liter-1	1
Cyanophyte Biomass	38 ug C liter^{1}	1
Pheophytin	3.9 ug liter-1	1
Total Biomass	206 ug C liter^{1}	5
Diatom Abundance	6.84 million cells liter^{1}	1
Total Abundance	15.85 million cells liter^{1}	Null

7/10/2001 Summer

IBI_Method	*Evaluation*	*IBI Score*
Method A	Poor	IBI Score = 1.0
Method B	Poor	IBI Score = 1.5

Available Metrics	*Metric Values*	*Metric Score*
Surface Chlorophyll a	41.2 ug liter-1	1
Cyanophyte Biomass	128 ug C liter^{1}	1
Diatom Biomass	260 ug C liter^{1}	1
Pheophytin	9.3 ug liter-1	1
Total Biomass	693 ug C liter^{1}	1
Microcystis aeruginosa	7.84 million cells liter^{1}	1
Chlorophyte Abundance	5.98 million cells liter^{1}	1
Total Abundance	29.1 million cells liter^{1}	5

8/14/2001 Summer

IBI_Method	*Evaluation*	*IBI Score*
Method A	Fair	IBI Score = 3.0
Method B	Fair-Good	IBI Score = 3.3

Available Metrics	*Metric Values*	*Metric Score*
Surface Chlorophyll a	21.2 ug liter-1	1
Cyanophyte Biomass	154 ug C liter^{1}	1
Diatom Biomass	32 ug C liter^{1}	5
Pheophytin	3.6 ug liter-1	3
Total Biomass	343 ug C liter^{1}	5
Microcystis aeruginosa	0 million cells liter^{1}	Null
Chlorophyte Abundance	2.82 million cells liter^{1}	3
Total Abundance	26.94 million cells liter^{1}	5

STATION **ANA28**

Location: Anacostia River
Latitude: UNKNOWN; Longitude: UNKNOWN

2001 Summary: The overall status of this station was probably Fair-Poor during spring and summer 2001, but the data are insufficient. Total biomass of the community was dominated by the diatom taxonomic group in March, co-dominated by the diatom and green groups in April and May, dominated by the diatom group in July, and by the green group in August. Total biomass was very low in March and April, and excessive in July and August. Numerically-dominant taxa were diatoms (small, unid. centrics and pennates), bluegreens (*Oscillatoria, Agmenellum, Raphidiopsis*), and greens (*Coelastrum, Scenedesmus, Sphaerocystis*). Bluegreens levels were high in July and August, scoring “1.” The nuisance bluegreen species, *Microcystis aeruginosa*, was not evident.

Status of Samples: Counted and discarded.

Sample Dates:

3/6/2001 Spring

IBI_Method	*Evaluation*	*IBI Score*
Method A	Too Few Data	ND
Method B	Too Few Data	ND

Available Metrics	*Metric Values*	*Metric Score*
Cyanophyte Biomass	12 ug C liter^{1}	Null
Total Biomass	50 ug C liter^{1}	1
Diatom Abundance	1.14 million cells liter^{1}	1
Total Abundance	3.33 million cells liter^{1}	Null

4/3/2001 Spring

IBI_Method	*Evaluation*	*IBI Score*
Method A	Too Few Data	ND
Method B	Too Few Data	ND

Available Metrics	*Metric Values*	*Metric Score*
Cyanophyte Biomass	0 ug C liter^{1}	Null
Total Biomass	130 ug C liter^{1}	1
Diatom Abundance	3.5 million cells liter^{1}	5
Total Abundance	5.05 million cells liter^{1}	Null

5/8/2001 Spring

IBI_Method	*Evaluation*	*IBI Score*
Method A	Too Few Data	ND
Method B	Too Few Data	ND

Available Metrics	*Metric Values*	*Metric Score*
Cyanophyte Biomass	5 ug C liter^{1}	Null
Total Biomass	254 ug C liter^{1}	5
Diatom Abundance	9.88 million cells liter^{1}	1
Total Abundance	14.87 million cells liter^{1}	Null

7/10/2001 Summer

IBI_Method	*Evaluation*	*IBI Score*
Method A	Too Few Data	ND
Method B	Poor	IBI Score = 1.0

Available Metrics	*Metric Values*	*Metric Score*
Cyanophyte Biomass	135 ug C liter[1]	1
Diatom Biomass	575 ug C liter[1]	1
Total Biomass	1,114 ug C liter[1]	1
Microcystis aeruginosa	0 million cells liter[1]	Null
Chlorophyte Abundance	12.4 million cells liter[1]	1
Total Abundance	40.26 million cells liter[1]	1

8/14/2001 Summer

IBI_Method	*Evaluation*	*IBI Score*
Method A	Too Few Data	ND
Method B	Poor	IBI Score = 1.8

Available Metrics	*Metric Values*	*Metric Score*
Cyanophyte Biomass	227 ug C liter[1]	1
Diatom Biomass	104 ug C liter[1]	5
Total Biomass	690 ug C liter[1]	1
Microcystis aeruginosa	0 million cells liter[1]	Null
Chlorophyte Abundance	6.04 million cells liter[1]	1
Total Abundance	43.3 million cells liter[1]	1

STATION ANA29

Location: At the mouth of the Anacostia River, at red and green flasher near Potomac confluence. Latitude:38.85067; Longitude: -77.0222

2001 Summary: Three (3) Spring and two (2) Summer records from 2001 were available to calculate the IBIs. Status of the phytoplankton community was variable in 2001, ranging from Poor (April, May, July) to Fair (March), and an algal bloom was evident in July. Total biomass of the community was dominated by the diatom taxonomic group in March and April, and the green group in May, July, and August. The phytoplankton community in March was represented by desirable levels but eventually became dominated by high levels of greens, diatoms, and cryptomonads in May. The C:Chl ratios and pheophytin levels indicate some light stress caused by turbidity. (Spring TSS concentrations averaged 9.0 mg liter^{-1} and Secchi depth averaged 0.68 m). Chlorophyll *a* and pheophytin levels were high in July and August, scoring "1." July had a diverse bloom of centric diatom (unid. centric, *Cyclotella, Skeletonema potomas*), green (*Scenedesmus, Actinastrum*), and bluegreen (*Agmenellum*) taxa; August was numerically dominated by bluegreen taxa (*Oscillatoria, Agmenellum, Microcystis* sp.). The greens *Scenedesmus* and *Closterium*, the small centric diatom, and *Oscillatoria* were the biomass-dominant taxa in summer. IBI status in August improved to Fair-Poor due to reduced diatom and chlorophyte levels and the nuisance bluegreen species *Microcystis aeruginosa* was not evident.

Status of Samples: Counted and discarded.

Sample Dates:

3/6/2001 Spring

IBI_Method	*Evaluation*	*IBI Score*
Method A	Fair	IBI Score = 3.0
Method B	Fair-Poor	IBI Score = 2.6

Available Metrics	*Metric Values*	*Metric Score*
Carbon:Chlorophyll a Ratio	32.7 ratio	1
Surface Chlorophyll a	11.6 ug liter-1	5
Cyanophyte Biomass	8 ug C liter^{1}	Null
Pheophytin	6.2 ug liter-1	1
Total Biomass	379 ug C liter^{1}	5
Diatom Abundance	9.16 million cells liter^{1}	1
Total Abundance	10.89 million cells liter^{1}	Null

4/3/2001 Spring

IBI_Method	*Evaluation*	*IBI Score*
Method A	Poor	IBI Score = 2.0
Method B	Fair-Poor	IBI Score = 2.6

Available Metrics	*Metric Values*	*Metric Score*
Carbon:Chlorophyll a Ratio	15.1 ratio	1
Surface Chlorophyll a	4.9 ug liter-1	5
Cyanophyte Biomass	2 ug C liter^{1}	Null
Pheophytin	3.5 ug liter-1	1
Total Biomass	74 ug C liter^{1}	1
Diatom Abundance	4.84 million cells liter^{1}	5
Total Abundance	8.08 million cells liter^{1}	Null

5/8/2001 Spring

IBI_Method	*Evaluation*	*IBI Score*
Method A	Poor	IBI Score = 1.5
Method B	Poor	IBI Score = 2.0

Available Metrics	*Metric Values*	*Metric Score*
Carbon:Chlorophyll a Ratio	19.2 ratio	1
Surface Chlorophyll a	32.5 ug liter-1	1
Cyanophyte Biomass	16 ug C liter[1]	Null
Pheophytin	7.5 ug liter-1	1
Total Biomass	623 ug C liter[1]	3
Diatom Abundance	3.65 million cells liter[1]	5
Total Abundance	20.73 million cells liter[1]	1

7/10/2001 Summer

IBI_Method	*Evaluation*	*IBI Score*
Method A	Poor	IBI Score = 1.4
Method B	Poor	IBI Score = 1.3

Available Metrics	*Metric Values*	*Metric Score*
Surface Chlorophyll a	31.2 ug liter-1	1
Cyanophyte Biomass	62 ug C liter[1]	3
Diatom Biomass	202 ug C liter[1]	1
Pheophytin	11.9 ug liter-1	1
Total Biomass	704 ug C liter[1]	1
Microcystis aeruginosa	0 million cells liter[1]	Null
Chlorophyte Abundance	9.12 million cells liter[1]	1
Total Abundance	36.09 million cells liter[1]	1

8/14/2001 Summer

IBI_Method	*Evaluation*	*IBI Score*
Method A	Fair-Poor	IBI Score = 2.6
Method B	Fair	IBI Score = 2.7

Available Metrics	*Metric Values*	*Metric Score*
Surface Chlorophyll a	19 ug liter-1	1
Cyanophyte Biomass	81 ug C liter[1]	1
Diatom Biomass	57 ug C liter[1]	5
Pheophytin	5.5 ug liter-1	1
Total Biomass	526 ug C liter[1]	5
Microcystis aeruginosa	0 million cells liter[1]	Null
Chlorophyte Abundance	3.9 million cells liter[1]	1
Total Abundance	22.35 million cells liter[1]	5

STATION **ANA30**

Location: Anacostia River across the main navigational channel and the most downstream dock of the Bladenburg Marina
Latitude: 38.93388; Longitude: -76.9381

2001 Summary: Only one sample was collected at this station. Small-sized diatoms were numerically dominant (*Cyclotella* sp#1 diam <10 microns, unid. centric diatom diam <10 microns, unid. pennate diatom <10 microns length, unid. pennate diatom 10-30 microns length), followed by small-sized bluegreens (*Oscillatoria* cells #1 diam <5 microns, unid. bluegreen trichome (cell) small). The biomass-dominant taxa were the pennate diatoms unid. pennate 10-30 microns length, *Synedra*, and *Fragilaria*. The juxtaposition of pheophytin and diatom abundance scoring 5 and chlorophyll *a*, total biomass, and C:Chl ratio scoring 3 or 1 suggests ANA30 was an unproductive site at this time. Water quality data for this date at ANA30 indicates TSS was 10 mg liter^{-1} (no Secchi depth data are available).

Status of Samples: Counted and discarded.

Sample Dates:
3/6/2001 Spring

IBI_Method	*Evaluation*	*IBI Score*
Method A	Fair-Poor	IBI Score = 2.5
Method B	Fair	IBI Score = 3.0

Available Metrics	*Metric Values*	*Metric Score*
Carbon:Chlorophyll a Ratio	20.9 ratio	1
Surface Chlorophyll a	3.7 ug liter-1	3
Cyanophyte Biomass	5 ug C liter^{1}	Null
Pheophytin	0.7 ug liter-1	5
Total Biomass	77 ug C liter^{1}	1
Diatom Abundance	2.43 million cells liter^{1}	5
Total Abundance	4.02 million cells liter^{1}	Null

STATION KNG01

Location: Kingman Lake upstream of the East Capital Street Bridge along the west bank
Latitude: 38.89039; Longitude: -76.94414

2001 Summary: Three (3) Spring and two (2) Summer records from 2001 were available to calculate the IBIs. Status of the phytoplankton community was consistently **Poor**, and a large algal bloom was evident from May through September. Total biomass of the community was dominated by the diatom taxonomic group in spring, co-dominated by the diatom, dinoflagellate, bluegreen, and green groups in July and August, and dominated by bluegreen group in September. The spring phytoplankton communities were numerically dominated by a mixture of pennate and centric diatom taxa and the bluegreen *Oscillatoria* in March and April, with the bluegreen taxa *Agmenellum* and *Microcystis* and the green taxa *Ankistrodesmus* gaining importance in May. C:Chl ratios and pheophytin levels indicate some light stress caused by turbidity. (Spring TSS concentrations averaged 48 mg liter^{-1}; Seechi depth data are not available). Total biomass was >>551 µg C liter^{-1} (summer threshold for score equals "1") for the entire summer, and chlorophyll *a* and pheophytin scored "1" in August and September. July had a diverse mixture of diatom (unid. pennate, *Melosira, Aulacoseira, Cyclotella*), green (*Microactinium, Crucigenia, Pediastrum*), and bluegreen (*Chroococcus, Raphidiopsis*) taxa but was biomass-dominated by the dinoflagellate taxa *Gymnodinium* and the euglenoid taxa *Phacus*. August and September were numerically-dominanted by bluegreen taxa (*Oscillatoria, Raphidiopsis, Agmenellum, Microcystis, Aphanocapsa*) and biomass-dominated by the green taxa *Eudorina*, the centric diatom taxa *Melosira* and *Cyclotella*, and the bluegreen taxa *Oscillatoria* and *Microcystis*. The nuisance bluegreen species *Microcystis aeruginosa* bloomed in September.

Long-term: Seventeen (17) data records are available for Spring and Summer 1998, 1999, and 2000. Fourteen (14) have sufficient data to calculate the phytoplankton IBIs. On average, the phytoplankton community appears to be in **Fair-Poor** condition, although several records ranked Fair-Good or Good in 1999 and 2000 due to moderate levels of total biomass and chlorophyll *a*, and low cyanophyte biomass. Most phytoplankton parameters showed a large degree of variability. Bluegreen (Cyanophyte) as a taxonomic group were numerically dominant in 6 of the 8 spring samples and all of the 9 summer samples, but were biomass dominant in none of the spring samples and only 5 of the 9 summer samples. Numerically dominant and subdominant genera were the bluegreens *Agmenellum, Oscillatoria, Chroococcus, Anabaena, Microcystis*, and unid. blue-green trichome, a *Cryptomonas* sp. <10 u, the green *Ankistrodesmus*, an unid. centric diatoms <10 u, and the green *Scenedesmus* spp. Greens, diatoms, and euglenoids as taxonomic groups were biomass dominants in spring and in 4 of the 9 summer samples. Bluegreens were biomass dominant in 5 of the 9 summer samples only. Biomass dominant and subdominant genera included the greens *Ankistrodesmus, Sphaerocystis, Coelastrum, Scenedesmus, Kirchneriella, Mougeotia,* and *Actinastrum*, the diatoms *Melosira*, unid. centrales <10u, unid. Pennate diatom, *Skeletonema*, and *Aulacoseira*, the bluegreens *Chroococcus* and *Oscillatoria*, a small cryptomonad sp., the dinoflagellate *Gymnodinium*, and the euglenoids *Phacus* and *Euglena*. The nuisance bluegreen species *Microcystis aeruginosa* was found only once (8/9/1999), and in low abundance, during the 1998, 1999, and 2000 summers.

Status of Samples: Counted and discarded.

Sample Dates:
4/13/1998 Spring

IBI_Method	*Evaluation*	*IBI Score*
Method A	Too Few Data	ND
Method B	Too Few Data	ND

Available Metrics	*Metric Values*		*Metric Score*
Cyanophyte Biomass	7	ug C liter^{-1}	null
Diatom Abundance	0.34	million cells liter^{-1}	1
Total Abundance	3.8	million cells liter^{-1}	null
Total Biomass	117	ug C liter^{-1}	1

5/11/1998 Spring

IBI_Method	*Evaluation*	*IBI Score*
Method A	Too Few Data	ND
Method B	Too Few Data	ND

Available Metrics	*Metric Values*		*Metric Scores*
Cyanophyte Biomass	69	ug C liter^{-1}	1
Diatom Abundance	1.02	million cells liter^{-1}	1
Total Abundance	12.43	million cells liter^{-1}	null
Total Biomass	295	ug C liter^{-1}	5

7/13/1998 Summer

IBI_Method	*Evaluation*	*IBI Score*
Method A	Poor	IBI Score = 1.7
Method B	Fair	IBI Score = 2.7

Available Metrics	*Metric Values*		*Metric Scores*
Chlorophyte Abundance	1.89	million cells liter^{-1}	5
Cyanophyte Biomass	305	ug C liter^{-1}	1
Diatom Abundance	1.69	million cells liter^{-1}	5
Diatom Biomass	183	ug C liter^{-1}	3
Microcystis aeruginosa	0	million cells liter^{-1}	null
Total Abundance	51.67	million cells liter^{-1}	1
Total Biomass	923	ug C liter^{-1}	1

8/10/1998 Summer

IBI_Method	*Evaluation*	*IBI Score*
Method A	Poor	IBI Score = 1.0
Method B	Poor	IBI Score = 1.0

Available Metrics	*Metric Values*		*Metric Scores*
Chlorophyte Abundance	7.33	million cells liter^{-1}	1
Cyanophyte Biomass	478	ug C liter^{-1}	1
Diatom Abundance	8.8	million cells liter^{-1}	1
Diatom Biomass	484	ug C liter^{-1}	1
Microcystis aeruginosa	0	million cells liter^{-1}	null
Total Abundance	93.12	million cells liter^{-1}	1
Total Biomass	1475	ug C liter^{-1}	1

9/15/1998 Summer

IBI_Method	*Evaluation*	*IBI Score*
Method A	Poor	IBI Score = 1.0
Method B	Poor	IBI Score = 1.0

Available Metrics	*Metric Values*		*Metric Scores*
Chlorophyte Abundance	27.17	million cells liter^{-1}	1
Cyanophyte Biomass	810	ug C liter^{-1}	1

Diatom Abundance	5.97	million cells liter^{1}	1
Diatom Biomass	637	ug C liter^{1}	1
Microcystis aeruginosa	0	million cells liter^{1}	null
Total Abundance	195.81	million cells liter^{1}	1
Total Biomass	2935	ug C liter^{1}	1

3/8/1999 Spring

IBI_Method	*Evaluation*	*IBI Score*
Method A	Too Few Data	ND
Method B	Too Few Data	ND

Available Metrics	*Metric Values*		*Metric Scores*
Cyanophyte Biomass	23	ug C liter^{1}	1
Diatom Abundance	3.13	million cells liter^{1}	5
Total Abundance	10.67	million cells liter^{1}	null
Total Biomass	190	ug C liter^{1}	5

4/5/1999 Spring

IBI_Method	*Evaluation*	*IBI Score*
Method A	Fair	IBI Score = 3.0
Method B	Fair-Good	IBI Score = 3.4

Available Metrics	*Metric Values*		*Metric Scores*
Carbon:Chlorophyll Ratio	35.5	ratio	1
Cyanophyte Biomass	13	ug C liter^{1}	null
Diatom Abundance	4.31	million cells liter^{1}	5
Pheophytin	14	ug liter^{1}	1
Surface Chlorophyll a	10	ug liter^{1}	5
Total Abundance	16.55	million cells liter^{1}	null
Total Biomass	356	ug C liter^{1}	5

5/3/1999 Spring

IBI_Method	*Evaluation*	*IBI Score*
Method A	Poor	IBI Score = 1.8
Method B	Fair-Poor	IBI Score = 2.1

Available Metrics	*Metric Values*		*Metric Scores*
Carbon:Chlorophyll Ratio	70.4	ratio	5
Cyanophyte Biomass	161	ug C liter^{1}	1
Diatom Abundance	2.73	million cells liter^{1}	5
Pheophytin	21	ug liter^{1}	1
Surface Chlorophyll a	16	ug liter^{1}	1
Total Abundance	17.79	million cells liter^{1}	1
Total Biomass	1127	ug C liter^{1}	1

7/13/1999 Summer

IBI_Method	*Evaluation*	*IBI Score*
Method A	Poor	IBI Score = 1.0
Method B	Poor	IBI Score = 1.0

Available Metrics	*Metric Values*		*Metric Scores*
Chlorophyte Abundance	26.7	million cells liter^{1}	1
Cyanophyte Biomass	994	ug C liter^{1}	1
Diatom Abundance	5.18	million cells liter^{1}	1
Diatom Biomass	293	ug C liter^{1}	1

Microcystis aeruginosa	0	million cells liter^{1}	null
Pheophytin	26	ug liter^{1}	1
Surface Chlorophyll a	66	ug liter^{1}	1
Total Abundance	146.04	million cells liter^{1}	1
Total Biomass	2134	ug C liter^{1}	1

7/14/1999 Summer

IBI_Method	*Evaluation*	*IBI Score*
Method A	Fair-Good	IBI Score = 3.7
Method B	Good	IBI Score = 4.3

Available Metrics	*Metric Values*		*Metric Scores*
Chlorophyte Abundance	2.03	million cells liter^{1}	5
Cyanophyte Biomass	94	ug C liter^{1}	1
Diatom Abundance	2.11	million cells liter^{1}	5
Diatom Biomass	84	ug C liter^{1}	5
Microcystis aeruginosa	0	million cells liter^{1}	null
Total Abundance	20.54	million cells liter^{1}	5
Total Biomass	376	ug C liter^{1}	5

8/9/1999 Summer

IBI_Method	*Evaluation*	*IBI Score*
Method A	Poor	IBI Score = 1.0
Method B	Poor	IBI Score = 1.0

Available Metrics	*Metric Values*		*Metric Scores*
Chlorophyte Abundance	22.83	million cells liter^{1}	1
Cyanophyte Biomass	3048	ug C liter^{1}	1
Diatom Abundance	10.8	million cells liter^{1}	1
Diatom Biomass	377	ug C liter^{1}	1
Microcystis aeruginosa	0.91	million cells liter^{1}	1
Pheophytin	12	ug liter^{1}	1
Surface Chlorophyll a	83	ug liter^{1}	1
Total Abundance	527.03	million cells liter^{1}	1
Total Biomass	4597	ug C liter^{1}	1

3/6/2000 Spring

IBI_Method	*Evaluation*	*IBI Score*
Method A	Good	IBI Score = 4.0
Method B	Fair-Good	IBI Score = 3.4

Available Metrics	*Metric Values*		*Metric Scores*
Carbon:Chlorophyll Ratio	50.1	ratio	5
Cyanophyte Biomass	20	ug C liter^{1}	null
Diatom Abundance	0.76	million cells liter^{1}	1
Pheophytin	3	ug liter^{1}	1
Surface Chlorophyll a	5	ug liter^{1}	5
Total Abundance	3.93	million cells liter^{1}	null
Total Biomass	250	ug C liter^{1}	5

4/3/2000 Spring

IBI_Method	*Evaluation*	*IBI Score*
Method A	Poor	IBI Score = 1.4
Method B	Poor	IBI Score = 1.3

Available Metrics	Metric Values		Metric Scores
Carbon:Chlorophyll Ratio	34.5	ratio	1
Cyanophyte Biomass	39	ug C liter^{-1}	1
Diatom Abundance	0.25	million cells liter^{-1}	1
Pheophytin	6	ug liter^{-1}	1
Surface Chlorophyll a	4	ug liter^{-1}	3
Total Abundance	6.34	million cells liter^{-1}	null
Total Biomass	138	ug C liter^{-1}	1

5/1/2000 Spring

IBI_Method	*Evaluation*	*IBI Score*
Method A	Fair-Good	IBI Score = 3.5
Method B	Fair	IBI Score = 3.0

Available Metrics	Metric Values		Metric Scores
Carbon:Chlorophyll Ratio	48.9	ratio	5
Cyanophyte Biomass	0	ug C liter^{-1}	null
Diatom Abundance	1.34	million cells liter^{-1}	1
Pheophytin	4	ug liter^{-1}	1
Surface Chlorophyll a	12	ug liter^{-1}	5
Total Abundance	12.33	million cells liter^{-1}	null
Total Biomass	587	ug C liter^{-1}	3

7/17/2000 Summer

IBI_Method	*Evaluation*	*IBI Score*
Method A	Fair-Poor	IBI Score = 2.6
Method B	Fair-Good	IBI Score = 3.5

Available Metrics	Metric Values		Metric Scores
Chlorophyte Abundance	1.7	million cells liter^{-1}	5
Cyanophyte Biomass	72	ug C liter^{-1}	1
Diatom Abundance	0.89	million cells liter^{-1}	5
Diatom Biomass	89	ug C liter^{-1}	5
Microcystis aeruginosa	0	million cells liter^{-1}	null
Pheophytin	6	ug liter^{-1}	1
Surface Chlorophyll a	16	ug liter^{-1}	1
Total Abundance	22.69	million cells liter^{-1}	5
Total Biomass	404	ug C liter^{-1}	5

8/14/2000 Summer

IBI_Method	*Evaluation*	*IBI Score*
Method A	Poor	IBI Score = 1.0
Method B	Poor	IBI Score = 1.3

Available Metrics	Metric Values		Metric Scores
Chlorophyte Abundance	3.37	million cells liter^{-1}	3
Cyanophyte Biomass	182	ug C liter^{-1}	1
Diatom Abundance	9.24	million cells liter^{-1}	1
Diatom Biomass	330	ug C liter^{-1}	1
Microcystis aeruginosa	0	million cells liter^{-1}	null
Pheophytin	9	ug liter^{-1}	1
Surface Chlorophyll a	32	ug liter^{-1}	1
Total Abundance	37.79	million cells liter^{-1}	1
Total Biomass	960	ug C liter^{-1}	1

9/18/2000 Summer

IBI_Method	*Evaluation*	*IBI Score*
Method A	Poor	IBI Score = 1.0
Method B	Poor	IBI Score = 1.0

Available Metrics	*Metric Values*		*Metric Scores*
Chlorophyte Abundance	7.56	million cells liter^{1}	1
Cyanophyte Biomass	105	ug C liter^{1}	1
Diatom Abundance	4.93	million cells liter^{1}	1
Diatom Biomass	263	ug C liter^{1}	1
Microcystis aeruginosa	0	million cells liter^{1}	null
Pheophytin	11	ug liter^{1}	1
Surface Chlorophyll a	38	ug liter^{1}	1
Total Abundance	34.79	million cells liter^{1}	1
Total Biomass	767	ug C liter^{1}	1

3/12/2001 Spring

IBI_Method	*Evaluation*	*IBI Score*
Method A	Poor	IBI Score = 1.4
Method B	Poor	IBI Score = 1.3

Available Metrics	*Metric Values*		*Metric Score*
Carbon:Chlorophyll a Ratio	9.6	ratio	1
Surface Chlorophyll a	15.7	ug liter-1	1
Cyanophyte Biomass	29	ug C liter^{1}	1
Pheophytin	2.1	ug liter-1	3
Total Biomass	150	ug C liter^{1}	1
Diatom Abundance	7.24	million cells liter^{1}	1
Total Abundance	10.69	million cells liter^{1}	null

4/9/2001 Spring

IBI_Method	*Evaluation*	*IBI Score*
Method A	Poor	IBI Score = 2.0
Method B	Fair-Poor	IBI Score = 2.6

Available Metrics	*Metric Values*		*Metric Score*
Carbon:Chlorophyll a Ratio	25.3	ratio	1
Surface Chlorophyll a	5.3	ug liter-1	5
Cyanophyte Biomass	18	ug C liter^{1}	Null
Pheophytin	4.4	ug liter-1	1
Total Biomass	134	ug C liter^{1}	1
Diatom Abundance	2.71	million cells liter^{1}	5
Total Abundance	5.6	million cells liter^{1}	Null

5/14/2001 Spring

IBI_Method	*Evaluation*	*IBI Score*
Method A	Poor	IBI Score = 2.0
Method B	Poor	IBI Score = 1.7

Available Metrics	*Metric Values*		*Metric Score*
Carbon:Chlorophyll a Ratio	83.0	ratio	5

Surface Chlorophyll a	25.2	ug liter-1	1
Cyanophyte Biomass	22	ug C liter[1]	Null
Pheophytin	16.5	ug liter-1	1
Total Biomass	2,092	ug C liter[1]	1
Diatom Abundance	130.5	million cells liter[1]	1
Total Abundance	146.5	million cells liter[1]	1

7/16/2001 Summer

IBI_Method	*Evaluation*	*IBI Score*
Method A	Too Few Data	ND
Method B	Poor	IBI Score = 1.8

Available Metrics	*Metric Values*		*Metric Score*
Cyanophyte Biomass	151	ug C liter[1]	1
Diatom Biomass	966	ug C liter[1]	1
Total Biomass	1,860	ug C liter[1]	1
Microcystis aeruginosa	0	million cells liter[1]	Null
Chlorophyte Abundance	8.68	million cells liter[1]	1
Total Abundance	28.87	million cells liter[1]	5

8/20/2001 Summer

IBI_Method	*Evaluation*	*IBI Score*
Method A	Poor	IBI Score = 1.0
Method B	Poor	IBI Score = 1.3

Available Metrics	*Metric Values*		*Metric Score*
Surface Chlorophyll a	19.1	ug liter-1	1
Cyanophyte Biomass	208	ug C liter[1]	1
Diatom Biomass	927	ug C liter[1]	1
Pheophytin	4.9	ug liter-1	1
Total Biomass	1,533	ug C liter[1]	1
Microcystis aeruginosa	0	million cells liter[1]	Null
Chlorophyte Abundance	3.00	million cells liter[1]	3
Total Abundance	44.42	million cells liter[1]	1

9/17/2001 Summer

IBI_Method	*Evaluation*	*IBI Score*
Method A	Poor	IBI Score = 1.0
Method B	Poor	IBI Score = 1.0

Available Metrics	*Metric Values*		*Metric Score*
Surface Chlorophyll a	37.4	ug liter-1	1
Cyanophyte Biomass	467	ug C liter[1]	1
Diatom Biomass	831	ug C liter[1]	1
Pheophytin	7.0	ug liter-1	1
Total Biomass	1,480	ug C liter[1]	1
Microcystis aeruginosa	28.39	million cells liter[1]	1
Chlorophyte Abundance	4.17	million cells liter[1]	1
Total Abundance	87.01	million cells liter[1]	1

STATION KNG02

Location: Kingman Lake upstream of the Benning Road Bridge along the west bank.
Latitude: 38.897614; Longitude: -76.965805

2001 Summary: Three (3) Spring and two (2) Summer records from 2001 were available to calculate the IBIs. Status of the phytoplankton community was consistently **Poor**, and a large algal bloom was evident from May through September. Total biomass of the community was co-dominated by the diatom, green, and bluegreen taxonomic groups in spring, dominated by the dinoflagellate group in July, and co-dominated by the diatom, bluegreen, and green groups in August and September. The spring phytoplankton communities were numerically dominated by the bluegreen taxa *Oscillatoria* and a mixture of pennate and centric diatom taxa in March and April, with the bluegreen taxa *Agmenellum* and *Microcystis* and the green taxa *Ankistrodesmus* gaining importance in May. C:Chl ratios and pheophytin levels indicate light stress caused by turbidity. (Spring TSS concentrations averaged 44 mg liter^{-1}; Seechi depth data are not available). Total biomass was >>551 µg C liter^{-1} (summer threshold for score equals "1") for the entire summer, and chlorophyll *a* and pheophytin scored "1" in August and September. July had a diverse mixture of diatom (unid. pennate, *Melosira, Aulacoseira, Cyclotella*), green (*Microactinium, Crucigenia, Pediastrum*), and bluegreen (*Chroococcus, Raphidiopsis*) taxa but it was biomass-dominated by the dinoflagellate taxa *Gymnodinium* and the euglenoid taxa *Phacus*. August and September were numerically-dominanted by bluegreen taxa (*Oscillatoria, Raphidiopsis, Agmenellum, Microcystis, Aphanocapsa*) and biomass-dominated by the green taxa *Eudorina*, the centric diatoms *Melosira* and *Cyclotella*, and the bluegreen taxa *Oscillatoria* and *Microcystis*. The nuisance bluegreen species *Microcystis aeruginosa* bloomed in September.

Long-term: Seventeen (17) data records are available for Spring and Summer 1998, 1999, and 2000. Fourteen (14) have sufficient data to calculate the phytoplankton IBIs. In general, the phytoplankton community appears to be in **Poor** condition. No records ranked Fair, Fair-Good, or Good. Most phytoplankton parameters showed a large degree of variability. Bluegreen (Cyanophyte) as a taxonomic group were numerically dominant in 4 of the 8 spring samples and all of the 9 summer samples, but were biomass dominant in only 2 of the spring samples and only 4 of the 9 summer samples. Numerically dominant and subdominant genera were the bluegreens *Agmenellum, Oscillatoria, Chroococcus, Anabaena, Microcystis*, and unid. blue-green trichome, *Cryptomonas* spp., the greens *Ankistrodesmus, Sphaerocystis,* Coelastrum, and *Scenedesmus*, and the diatoms unid. centric <10 u and *Aulacoseira*. Greens, diatoms, cryptomonads, and euglenoids as taxonomic groups were biomass dominants in spring and in 4 of the 9 summer samples. Bluegreens were biomass dominant in 5 of the 9 summer samples only. Biomass dominant and subdominant genera included the greens *Ankistrodesmus, Sphaerocystis, Closterium, Coelastrum, Gloeocystis,* and *Actinastrum*, the diatoms *Melosira*, unid. centrales <10u, unid. Pennate diatom, and *Aulacoseira*, the bluegreens *Agmenellum, Microcystis, Anabaena, Chroococcus* and *Oscillatoria*, a small cryptomonad sp., and the euglenoids *Phacus* and *Euglena*. The nuisance bluegreen species *Microcystis aeruginosa* was not found.

Status of Samples: Counted and discarded.

Sample Dates:
4/13/1998 Spring

IBI_Method	*Evaluation*	*IBI Score*
Method A	Too Few Data	ND
Method B	Too Few Data	ND

Available Metrics	*Metric Values*	*Metric Scores*

Cyanophyte Biomass	1 ug C liter-1	null
Diatom Abundance	1.42 million cells liter-1	1
Total Abundance	4.62 million cells liter-1	null
Total Biomass	390 ug C liter-1	5

Spring

5/11/1998

IBI_Method	*Evaluation*	*IBI Score*
Method A	Too Few Data	ND
Method B	Too Few Data	ND

Available Metrics	*Metric Values*	*Metric Scores*
Cyanophyte Biomass	11 ug C liter-1	null
Diatom Abundance	0.2 million cells liter-1	1
Total Abundance	3.1 million cells liter-1	null
Total Biomass	47 ug C liter-1	1

Summer

7/13/1998

IBI_Method	*Evaluation*	*IBI Score*
Method A	Poor	IBI Score = 1.7
Method B	Poor	IBI Score = 2.0

Available Metrics	*Metric Values*	*Metric Scores*
Chlorophyte Abundance	5.43 million cells liter-1	1
Cyanophyte Biomass	49 ug C liter-1	3
Diatom Abundance	7.12 million cells liter-1	1
Diatom Biomass	353 ug C liter-1	1
Microcystis aeruginosa	0 million cells liter-1	null
Total Abundance	28.3 million cells liter-1	5
Total Biomass	711 ug C liter-1	1

Summer

8/10/1998

IBI_Method	*Evaluation*	*IBI Score*
Method A	Poor	IBI Score = 1.5
Method B	Poor	IBI Score = 1.6

Available Metrics	*Metric Values*	*Metric Scores*
Chlorophyte Abundance	4.05 million cells liter-1	1
Cyanophyte Biomass	542 ug C liter-1	1
Diatom Abundance	3.78 million cells liter-1	3
Diatom Biomass	169 ug C liter-1	3
Microcystis aeruginosa	19.27 million cells liter-1	1
Total Abundance	103.52 million cells liter-1	1
Total Biomass	943 ug C liter-1	1

Summer

9/15/1998

IBI_Method	*Evaluation*	*IBI Score*
Method A	Poor	IBI Score = 1.0
Method B	Poor	IBI Score = 1.7

Available Metrics	*Metric Values*	*Metric Scores*
Chlorophyte Abundance	7.25 million cells liter-1	1
Cyanophyte Biomass	522 ug C liter-1	1
Diatom Abundance	3.03 million cells liter-1	5

Diatom Biomass	248	ug C liter-1	1
Microcystis aeruginosa	0	million cells liter-1	null
Total Abundance	156.39	million cells liter-1	1
Total Biomass	1482	ug C liter-1	1

Spring

3/8/1999

IBI_Method	*Evaluation*	*IBI Score*
Method A	Too Few Data	ND
Method B	Too Few Data	ND

Available Metrics	*Metric Values*		*Metric Scores*
Cyanophyte Biomass	54	ug C liter-1	1
Diatom AbuInsufficient Dataance	1.44	million cells liter-1	1
Total Abundance	15.83	million cells liter-1	null
Total Biomass	267	ug C liter-1	5

Spring

4/5/1999

IBI_Method	*Evaluation*	*IBI Score*
Method A	Poor	IBI Score = 1.8
Method B	Fair-Poor	IBI Score = 2.1

Available Metrics	*Metric Values*		*Metric Scores*
Carbon:Chlorophyll Ratio	26.2	ratio	1
Cyanophyte Biomass	72	ug C liter-1	1
Diatom Abundance	5.29	million cells liter-1	5
* Pheophytin	31	ug liter-1	1
* Surface Chlorophyll a	16	ug liter-1	1
Total Abundance	21.76	million cells liter-1	1
Total Biomass	419	ug C liter-1	5

Spring

5/3/1999

IBI_Method	*Evaluation*	*IBI Score*
Method A	Poor	IBI Score = 2
Method B	Fair-Poor	IBI Score = 2.3

Available Metrics	*Metric Values*		*Metric Scores*
Carbon:Chlorophyll Ratio	41.2	ratio	3
Cyanophyte Biomass	21	ug C liter-1	null
Diatom Abundance	2.8	million cells liter-1	5
* Pheophytin	26	ug liter-1	1
* Surface Chlorophyll a	20	ug liter-1	1
Total Abundance	20.52	million cells liter-1	1
Total Biomass	824	ug C liter-1	3

Summer

7/13/1999

IBI_Method	*Evaluation*	*IBI Score*
Method A	Poor	IBI Score = 1.0
Method B	Poor	IBI Score = 1.0

Available Metrics	*Metric Values*		*Metric Scores*
Chlorophyte Abundance	10.56	million cells liter-1	1
Cyanophyte Biomass	928	ug C liter-1	1
Diatom Abundance	4.77	million cells liter-1	1

Diatom Biomass	409	ug C liter^{1}	1
Microcystis aeruginosa	0	million cells liter^{1}	null
* Pheophytin	12	ug liter^{1}	1
* Surface Chlorophyll a	60	ug liter^{1}	1
Total Abundance	176.73	million cells liter^{1}	1
Total Biomass	1988	ug C liter^{1}	1

Summer

8/9/1999

IBI_Method	*Evaluation*	*IBI Score*
Method A	Poor	IBI Score = 1.0
Method B	Poor	IBI Score = 1.0

Available Metrics	*Metric Values*		*Metric Scores*
Chlorophyte Abundance	19.77	million cells liter^{1}	1
Cyanophyte Biomass	2575	ug C liter^{1}	1
Diatom Abundance	11.24	million cells liter^{1}	1
Diatom Biomass	529	ug C liter^{1}	1
Microcystis aeruginosa	0	million cells liter^{1}	null
* Pheophytin	22	ug liter^{1}	1
* Surface Chlorophyll a	81	ug liter^{1}	1
Total Abundance	393.16	million cells liter^{1}	1
Total Biomass	4829	ug C liter^{1}	1

Summer

9/14/1999

IBI_Method	*Evaluation*	*IBI Score*
Method A	Poor	IBI Score = 1.8
Method B	Poor	IBI Score = 2

Available Metrics	*Metric Values*		*Metric Scores*
Chlorophyte Abundance	6.93	million cells liter^{1}	1
Cyanophyte Biomass	132	ug C liter^{1}	1
Diatom Abundance	2.33	million cells liter^{1}	5
Diatom Biomass	70	ug C liter^{1}	5
Microcystis aeruginosa	0	million cells liter^{1}	null
* Pheophytin	10	ug liter^{1}	1
* Surface Chlorophyll a	18	ug liter^{1}	1
Total Abundance	59.31	million cells liter^{1}	1
Total Biomass	705	ug C liter^{1}	1

Spring

3/6/2000

IBI_Method	*Evaluation*	*IBI Score*
Method A	Poor	IBI Score = 1.8
Method B	Poor	IBI Score = 1.7

Available Metrics	*Metric Values*		*Metric Scores*
Carbon:Chlorophyll Ratio	14.6	ratio	1
Cyanophyte Biomass	56	ug C liter^{1}	1
Diatom Abundance	0.2	million cells liter^{1}	1
* Pheophytin	8	ug liter^{1}	1
* Surface Chlorophyll a	7	ug liter^{1}	5
Total Abundance	8.43	million cells liter^{1}	null
Total Biomass	102	ug C liter^{1}	1

Spring

4/3/2000

IBI_Method	*Evaluation*	*IBI Score*
Method A	Poor	IBI Score = 1.8
Method B	Poor	IBI Score = 1.7

Available Metrics	*Metric Values*		*Metric Scores*
Carbon:Chlorophyll Ratio	17.9	ratio	1
Cyanophyte Biomass	67	ug C liter^{1}	1
Diatom Abundance	0.19	million cells liter^{1}	1
* Pheophytin	28	ug liter^{1}	1
* Surface Chlorophyll a	6	ug liter^{1}	5
Total Abundance	9.16	million cells liter^{1}	null
Total Biomass	107	ug C liter^{1}	1

Spring

5/1/2000

IBI_Method	*Evaluation*	*IBI Score*
Method A	Poor	IBI Score = 1.5
Method B	Poor	IBI Score = 1.4

Available Metrics	*Metric Values*		*Metric Scores*
Carbon:Chlorophyll Ratio	19	ratio	1
Cyanophyte Biomass	13	ug C liter^{1}	null
Diatom Abundance	0.86	million cells liter^{1}	1
* Pheophytin	4	ug liter^{1}	1
* Surface Chlorophyll a	36	ug liter^{1}	1
Total Abundance	13.34	million cells liter^{1}	null
Total Biomass	683	ug C liter^{1}	3

Summer

7/17/2000

IBI_Method	*Evaluation*	*IBI Score*
Method A	Poor	IBI Score = 1.4
Method B	Fair-Poor	IBI Score = 2.3

Available Metrics	*Metric Values*		*Metric Scores*
Chlorophyte Abundance	2.44	million cells liter^{1}	5
Cyanophyte Biomass	65	ug C liter^{1}	3
Diatom Abundance	4.56	million cells liter^{1}	1
Diatom Biomass	258	ug C liter^{1}	1
Microcystis aeruginosa	0	million cells liter^{1}	null
* Pheophytin	9	ug liter^{1}	1
* Surface Chlorophyll a	45	ug liter^{1}	1
Total Abundance	27.1	million cells liter^{1}	5
Total Biomass	1114	ug C liter^{1}	1

Summer

8/14/2000

IBI_Method	*Evaluation*	*IBI Score*
Method A	Poor	IBI Score = 1
Method B	Poor	IBI Score = 2

Available Metrics	*Metric Values*		*Metric Scores*
Chlorophyte Abundance	1.55	million cells liter^{1}	5

Cyanophyte Biomass	201	ug C liter[1]	1
Diatom Abundance	5.29	million cells liter[1]	1
Diatom Biomass	221	ug C liter[1]	1
Microcystis aeruginosa	0	million cells liter[1]	null
Pheophytin	8	ug liter[1]	1
Surface Chlorophyll a	33	ug liter[1]	1
Total Abundance	27.13	million cells liter[1]	5
Total Biomass	686	ug C liter[1]	1

Summer

9/18/2000

IBI_Method	*Evaluation*	*IBI Score*
Method A	Poor	IBI Score = 1.8
Method B	Poor	IBI Score = 2.0

Available Metrics	*Metric Values*		*Metric Scores*
Chlorophyte Abundance	4.94	million cells liter[1]	1
Cyanophyte Biomass	31	ug C liter[1]	5
Diatom Abundance	5.7	million cells liter[1]	1
Diatom Biomass	335	ug C liter[1]	1
Microcystis aeruginosa	0	million cells liter[1]	null
Pheophytin	9	ug liter[1]	1
Surface Chlorophyll a	26	ug liter[1]	1
Total Abundance	22.36	million cells liter[1]	5
Total Biomass	667	ug C liter[1]	1

3/12/2001 Spring

IBI_Method	*Evaluation*	*IBI Score*
Method A	Poor	IBI Score = 1.4
Method B	Poor	IBI Score = 2.0

Available Metrics	*Metric Values*		*Metric Score*
Carbon:Chlorophyll a Ratio	25.0	ratio	1
Surface Chlorophyll a	4.2	ug liter-1	3
Cyanophyte Biomass	39	ug C liter[1]	1
Pheophytin	2.7	ug liter-1	1
Total Biomass	105	ug C liter[1]	1
Diatom Abundance	5.48	million cells liter[1]	5
Total Abundance	10.54	million cells liter[1]	null

4/9/2001 Spring

IBI_Method	*Evaluation*	*IBI Score*
Method A	Poor	IBI Score = 2.0
Method B	Fair-Poor	IBI Score = 2.6

Available Metrics	*Metric Values*		*Metric Score*
Carbon:Chlorophyll a Ratio	18.1	ratio	1
Surface Chlorophyll a	7.7	ug liter-1	5
Cyanophyte Biomass	19	ug C liter[1]	null
Pheophytin	4.1	ug liter-1	1
Total Biomass	139	ug C liter[1]	1
Diatom Abundance	2.53	million cells liter[1]	5
Total Abundance	6.29	million cells liter[1]	null

5/14/2001 Spring

IBI_Method	*Evaluation*	*IBI Score*
Method A	Poor	IBI Score = 1.8
Method B	Poor	IBI Score = 1.6

Available Metrics	*Metric Values*		*Metric Score*
Carbon:Chlorophyll a Ratio	17.2	ratio	1
Surface Chlorophyll a	33.0	ug liter-1	1
Cyanophyte Biomass	29	ug C liter^{1}	1
Pheophytin	14.2	ug liter-1	1
Total Biomass	568	ug C liter^{1}	5
Diatom Abundance	1.68	million cells liter^{1}	1
Total Abundance	23.46	million cells liter^{1}	1

7/16/2001 Summer

IBI_Method	*Evaluation*	*IBI Score*
Method A	Too Few Data	ND
Method B	Poor	IBI Score = 1.80

Available Metrics	*Metric Values*		*Metric Score*
Cyanophyte Biomass	180	ug C liter^{1}	1
Diatom Biomass	177	ug C liter^{1}	3
Total Biomass	3,638	ug C liter^{1}	1
Microcystis aeruginosa	0	million cells liter^{1}	Null
Chlorophyte Abundance	3.55	million cells liter^{1}	3
Total Abundance	51.47	million cells liter^{1}	1

8/20/2001 Summer

IBI_Method	*Evaluation*	*IBI Score*
Method A	Poor	IBI Score = 1.0
Method B	Poor	IBI Score = 1.0

Available Metrics	*Metric Values*		*Metric Score*
Surface Chlorophyll a	40.0	ug liter-1	1
Cyanophyte Biomass	278	ug C liter^{1}	1
Diatom Biomass	479	ug C liter^{1}	1
Pheophytin	11.8	ug liter-1	1
Total Biomass	1,502	ug C liter^{1}	1
Microcystis aeruginosa	0	million cells liter^{1}	Null
Chlorophyte Abundance	7.35	million cells liter^{1}	1
Total Abundance	76.68	million cells liter^{1}	1

9/17/2001 Summer

IBI_Method	*Evaluation*	*IBI Score*
Method A	Poor	IBI Score = 1.0
Method B	Poor	IBI Score = 1.5

Available Metrics	*Metric Values*		*Metric Score*
Surface Chlorophyll a	43.1	ug liter-1	1
Cyanophyte Biomass	443	ug C liter^{1}	1

Diatom Biomass	334	ug C liter-1	1
Pheophytin	8.4	ug liter-1	1
Total Biomass	812	ug C liter-1	1
Microcystis aeruginosa	22.56	million cells liter-1	1
Chlorophyte Abundance	0.58	million cells liter-1	5
Total Abundance	95.32	million cells liter-1	1

STATION KNGLOWER

Location: Kingman Lake
Latitude: UNKNOWN; Longitude: UNKNOWN

Summary: Three (3) data records are available for Summer 1999. All have sufficient data to calculate the phytoplankton IBIs. On average, the phytoplankton community appears to be in **Fair-Poor** condition. Total biomass of the community is dominated by the green taxonomic group in July, the bluegreen group in August, and the dinoflagellate and euglenoid groups in September. The numerically-dominant taxa were the bluegreen taxa *Agmenellum*, *Oscillatoria*, and *Chroococcus* in July and August, and *Agmenellum* and *Anabaena*, and the green taxa *Sphaerocystis* in September. The biomass-dominant taxa were several large unidentified centric and pennate diatoms, the euglenoids *Phacus* and *Euglena*, and the dinoflagellates *Ceratium* and *Gymnodinium*.

Status of Samples: Counted and discarded.

Sample Dates:

7/16/1999 Summer

IBI_Method	*Evaluation*	*IBI Score*
Method A	Poor	IBI Score = 1.0
Method B	Poor	IBI Score = 1.3

Available Metrics	*Metric Values*		*Metric Scores*
Chlorophyte Abundance	9.21	million cells liter^{1}	1
Cyanophyte Biomass	230	ug C liter^{1}	1
Diatom Abundance	4.34	million cells liter^{1}	3
Diatom Biomass	312	ug C liter^{1}	1
Microcystis aeruginosa	0	million cells liter^{1}	null
Total Abundance	44.55	million cells liter^{1}	1
Total Biomass	1151	ug C liter^{1}	1

Summer

8/16/1999

IBI_Method	*Evaluation*	*IBI Score*
Method A	Poor	IBI Score = 1.0
Method B	Poor	IBI Score = 1.0

Available Metrics	*Metric Values*		*Metric Scores*
Chlorophyte Abundance	19.91	million cells liter^{1}	1
Cyanophyte Biomass	1962	ug C liter^{1}	1
Diatom Abundance	10.46	million cells liter^{1}	1
Diatom Biomass	310	ug C liter^{1}	1
Microcystis aeruginosa	0	million cells liter^{1}	null
Total Abundance	282.24	million cells liter^{1}	1
Total Biomass	3248	ug C liter^{1}	1

9/15/1999 Summer

IBI_Method	*Evaluation*	*IBI Score*
Method A	Fair-Good	IBI Score = 3.7
Method B	Fair-Good	IBI Score = 3.7

Available Metrics	*Metric Values*		*Metric Scores*
Chlorophyte Abundance	4.08	million cells liter-1	1
Cyanophyte Biomass	38	ug C liter-1	5

Diatom Abundance	1.32	million cells liter-1	5
Diatom Biomass	93	ug C liter-1	5
Microcystis aeruginosa	0	million cells liter-1	null
Total Abundance	16.86	million cells liter-1	5
Total Biomass	1079	ug C liter-1	1

STATION KNGUPPER

Location: Kingman Lake
Latitude: UNKNOWN; Longitude: UNKNOWN

Summary: Three (3) data records are available for Summer 1999. All have sufficient data to calculate the phytoplankton IBIs. On average, the phytoplankton community appears to be in **Fair-Poor** condition. Total biomass of the community is dominated by the green taxonomic group in July, the bluegreen group in August, and the dinoflagellate and euglenoid groups in September. The numerically-dominant taxa were the bluegreen taxa *Agmenellum* and *Oscillatoria* in all three months. The biomass-dominant taxa were several large unidentified centric and pennate diatoms, *Melosira*, and the euglenoid *Phacus*.

Status of Samples: Counted and discarded.

Sample Dates:

7/16/1999 Summer

IBI_Method	*Evaluation*	*IBI Score*
Method A	Poor	IBI Score = 1.0
Method B	Poor	IBI Score = 1.0

Available Metrics	*Metric Values*		*Metric Scores*
Chlorophyte Abundance	10.82	million cells liter^{1}	1
Cyanophyte Biomass	486	ug C liter^{1}	1
Diatom Abundance	10.12	million cells liter^{1}	1
Diatom Biomass	455	ug C liter^{1}	1
Microcystis aeruginosa	0	million cells liter^{1}	null
Total Abundance	114.54	million cells liter^{1}	1
Total Biomass	1365	ug C liter^{1}	1

Summer

8/16/1999

IBI_Method	*Evaluation*	*IBI Score*
Method A	Poor	IBI Score = 1.0
Method B	Poor	IBI Score = 1.0

Available Metrics	*Metric Values*		*Metric Scores*
Chlorophyte Abundance	18.77	million cells liter^{1}	1
Cyanophyte Biomass	658	ug C liter^{1}	1
Diatom Abundance	9.13	million cells liter^{1}	1
Diatom Biomass	726	ug C liter^{1}	1
Microcystis aeruginosa	0	million cells liter^{1}	null
Total Abundance	121.26	million cells liter^{1}	1
Total Biomass	2997	ug C liter^{1}	1

Summer

9/15/1999

IBI_Method	*Evaluation*	*IBI Score*
Method A	Fair-Good	IBI Score = 3.7
Method B	Fair-Good	IBI Score = 3.7

Available Metrics	*Metric Values*		*Metric Scores*
Chlorophyte Abundance	0.99	million cells liter^{1}	5
Cyanophyte Biomass	218	ug C liter^{1}	1
Diatom Abundance	1.46	million cells liter^{1}	5

Diatom Biomass	46	ug C liter^{-1}	5
Microcystis aeruginosa	0	million cells liter^{-1}	null
Total Abundance	54.77	million cells liter^{-1}	1
Total Biomass	552	ug C liter^{-1}	5

STATION PMS01
Location: Fletcher's boathouse.
Latitude: 38.91789; Longitude: -77.1047

2001 Summary: Three (3) Spring and three (3) Summer records from 2001 were available to calculate the IBIs. Status of the phytoplankton community was highly variable, ranging from **Poor to Good**. An algal bloom was evident in May and July. Total biomass of the community was dominated by the diatom taxonomic group in March and April, by the green group in May, July, and September, and co-dominated by the diatom and green groups in August. Bluegreens were never biomass-dominant as a group. The spring phytoplankton communities were numerically dominated by a mixture of pennate and centric diatom taxa and the bluegreen *Oscillatoria*, with several green taxa (*Scenedesmus, Actinastrum*) gaining importance in May. C:Chl ratios and pheophytin levels indicate some light stress caused by turbidity. (Spring TSS concentrations averaged 28.7 mg liter-1; sufficient Seechi depth data are not available). Total biomass was only >551 µg C liter^{-1} (summer threshold for score equals "1") in July. July had a numerically diverse mixture of bluegreen, green, and diatom taxa but was biomass-dominated by the green taxa (*Actinastrum*, *Coelastrum*, *Scenedesmus*). August and September were numerically-dominanted by bluegreen taxa (*Anabaena*, *Oscillatoria*) and biomass-dominated by the green taxa *Scenedesmus* and *Ankistrodesmus*. The nuisance bluegreen species *Microcystis aeruginosa* was never evident.

Status of Samples: Counted and discarded.

Sample Dates:

3/5/2001 Spring

IBI_Method	*Evaluation*	*IBI Score*
Method A	Fair-Poor	IBI Score = 2.5
Method B	Fair	IBI Score = 3.0

Available Metrics	*Metric Values*	*Metric Score*
Carbon:Chlorophyll a Ratio	14.1 ratio	1
Surface Chlorophyll a	7.0 ug liter-1	5
Cyanophyte Biomass	10 ug C liter^{1}	Null
Pheophytin	1.6 ug liter-1	3
Total Biomass	99 ug C liter^{1}	1
Diatom Abundance	5.56 million cells liter^{1}	5
Total Abundance	7.19 million cells liter^{1}	Null

4/2/2001 Spring

IBI_Method	*Evaluation*	*IBI Score*
Method A	Poor	IBI Score = 1.8
Method B	Fair-Poor	IBI Score = 2.3

Available Metrics	*Metric Values*	*Metric Score*
Carbon:Chlorophyll a Ratio	8.7 ratio	1
Surface Chlorophyll a	8.1 ug liter-1	5
Cyanophyte Biomass	26 ug C liter^{1}	1
Pheophytin	6.4 ug liter-1	1
Total Biomass	70 ug C liter^{1}	1
Diatom Abundance	2.39 million cells liter^{1}	5
Total Abundance	4.89 million cells liter^{1}	Null

5/7/2001 Spring

IBI_Method	*Evaluation*	*IBI Score*
Method A	Poor	IBI Score = 2.0
Method B	Fair-Poor	IBI Score = 2.6

Available Metrics	*Metric Values*	*Metric Score*
Carbon:Chlorophyll a Ratio	16.7 ratio	1
Surface Chlorophyll a	25.4 ug liter-1	1
Cyanophyte Biomass	0 ug C liter-1	Null
Pheophytin	7.2 ug liter-1	1
Total Biomass	424 ug C liter[1]	5
Diatom Abundance	5.31 million cells liter[1]	5
Total Abundance	15.27 million cells liter[1]	Null

7/9/2001 Summer

IBI_Method	*Evaluation*	*IBI Score*
Method A	Poor	IBI Score = 1.0
Method B	Poor	IBI Score = 1.0

Available Metrics	*Metric Values*	*Metric Score*
Surface Chlorophyll a	38.8 ug liter-1	1
Cyanophyte Biomass	143 ug C liter[1]	1
Diatom Biomass	328 ug C liter[1]	1
Pheophytin	19.8 ug liter-1	1
Total Biomass	1754 ug C liter[1]	1
Microcystis aeruginosa	0 million cells liter[1]	Null
Chlorophyte Abundance	37.52 million cells liter[1]	1
Total Abundance	75.57 million cells liter[1]	1

8/13/2001 Summer

IBI_Method	*Evaluation*	*IBI Score*
Method A	Good	IBI Score = 4.2
Method B	Good	IBI Score = 4.1

Available Metrics	*Metric Values*	*Metric Score*
Surface Chlorophyll a	7.2 ug liter-1	5
Cyanophyte Biomass	24 ug C liter[1]	5
Diatom Biomass	102 ug C liter[1]	5
Pheophytin	7.3 ug liter-1	1
Total Biomass	240 ug C liter[1]	5
Microcystis aeruginosa	0 million cells liter[1]	Null
Chlorophyte Abundance	3.52 million cells liter[1]	3
Total Abundance	20.03 million cells liter[1]	5

9/10/2001 Summer

IBI_Method	*Evaluation*	*IBI Score*
Method A	Fair-Good	IBI Score = 3.8
Method B	Fair-Good	IBI Score = 3.9

Available Metrics	*Metric Values*	*Metric Score*
Surface Chlorophyll a	2.7 ug liter-1	3
Cyanophyte Biomass	16 ug C liter[1]	5

Diatom Biomass	28	ug C liter^{-1}	5
Pheophytin	3.3	ug liter-1	3
Total Biomass	133	ug C liter^{-1}	3
Microcystis aeruginosa	0	million cells liter^{-1}	Null
Chlorophyte Abundance	2.79	million cells liter^{-1}	5
Total Abundance	9.1	million cells liter^{-1}	3

STATION PMS21

Location: 14th Street Bridge
Latitude:38.87428; Longitude: -77.0422

2001 Summary: Three (3) Spring and three (3) Summer records from 2001 were available to calculate the IBIs. Status of the phytoplankton community was highly variable, ranging from **Poor to Fair-Good**. An algal bloom, dominated by the green *Actinastrum hantzschii*, was evident in May and July. Total biomass of the community was dominated by the diatom taxonomic group in March and April, by the green group in May, July, and September, and by the diatom group in August. Bluegreens were never the biomass-dominant group at this station, and only the numerically-dominant group once (April), however they were often a sub-dominant group. The spring phytoplankton communities were numerically dominated by a mixture of pennate and centric diatom taxa in March, the small unid. bluegreen trichome in April, and the green taxa *Actinastrum* in May. The pennate and centric diatom taxa were biomass-dominant in March and April, giving way to *Actinastrum* and *Ankistrodesmus* in May. C:Chl ratios and pheophytin levels indicate some light stress caused by turbidity. (Spring TSS concentrations averaged 21.7 mg liter-1; Secchi depth averaged 0.84 m). Total biomass was only >551 µg C liter^{-1} (summer threshold for score equals "1") in July. July had a diverse community that was both numerically- and biomass-dominated by the green taxonomic group, followed by the diatom group. Dominant species included *Actinastrum*, *Coelastrum*, and *Skeletonema*. August and September were numerically-dominanted by the small unid. pennate diatom and the green taxa *Crucigenia*, respectively. They were biomass-dominated by the green taxa *Actinastrum* and *Eudorina*, respectively. The nuisance bluegreen species *Microcystis aeruginosa* was never evident.

Status of Samples: Counted and discarded.

Sample Dates:

3/5/2001 Spring

IBI_Method	*Evaluation*	*IBI Score*
Method A	Fair-Poor	IBI Score = 2.5
Method B	Fair-Poor	IBI Score = 2.2

Available Metrics	*Metric Values*	*Metric Score*
Carbon:Chlorophyll a Ratio	13.6 ratio	1
Surface Chlorophyll a	9.2 ug liter-1	5
Cyanophyte Biomass	6 ug C liter^{1}	Null
Pheophytin	2.4 ug liter-1	3
Total Biomass	125 ug C liter^{1}	1
Diatom Abundance	7.26 million cells liter^{1}	1
Total Abundance	8.34 million cells liter^{1}	Null

4/2/2001 Spring

IBI_Method	*Evaluation*	*IBI Score*
Method A	Fair	IBI Score = 3.0
Method B	Fair-Good	IBI Score = 3.4

Available Metrics	*Metric Values*	*Metric Score*
Carbon:Chlorophyll a Ratio	16.4 ratio	1
Surface Chlorophyll a	10.6 ug liter-1	5
Cyanophyte Biomass	8 ug C liter^{1}	Null
Pheophytin	5.7 ug liter-1	1

Total Biomass	174 ug C liter^{1}	5
Diatom Abundance	2.58 million cells liter^{1}	5
Total Abundance	5.54 million cells liter^{1}	Null

5/7/2001 Spring

IBI_Method	*Evaluation*	*IBI Score*
Method A	Poor	IBI Score = 2.0
Method B	Poor	IBI Score = 1.8

Available Metrics	*Metric Values*	*Metric Score*
Carbon:Chlorophyll a Ratio	19.6 ratio	1
Surface Chlorophyll a	25.8 ug liter-1	1
Cyanophyte Biomass	18 ug C liter^{1}	Null
Pheophytin	8.1 ug liter-1	1
Total Biomass	506 ug C liter^{1}	5
Diatom Abundance	0.82 million cells liter^{1}	1
Total Abundance	14.09 million cells liter^{1}	Null

7/9/2001 Summer

IBI_Method	*Evaluation*	*IBI Score*
Method A	Poor	IBI Score = 1.8
Method B	Poor	IBI Score = 1.6

Available Metrics	*Metric Values*	*Metric Score*
Surface Chlorophyll a	40.4 ug liter-1	1
Cyanophyte Biomass	32 ug C liter^{1}	5
Diatom Biomass	500 ug C liter^{1}	1
Pheophytin	17.3 ug liter-1	1
Total Biomass	1,895 ug C liter^{1}	1
Microcystis aeruginosa	0 million cells liter^{1}	Null
Chlorophyte Abundance	32.18 million cells liter^{1}	1
Total Abundance	63.65 million cells liter^{1}	1

8/13/2001 Summer

IBI_Method	*Evaluation*	*IBI Score*
Method A	Fair-Good	IBI Score = 3.4
Method B	Fair-Good	IBI Score = 3.9

Available Metrics	*Metric Values*	*Metric Score*
Surface Chlorophyll a	6.1 ug liter-1	5
Cyanophyte Biomass	52 ug C liter^{1}	3
Diatom Biomass	168 ug C liter^{1}	3
Pheophytin	4.9 ug liter-1	1
Total Biomass	322 ug C liter^{1}	5
Microcystis aeruginosa	0 million cells liter^{1}	Null
Chlorophyte Abundance	2.61 million cells liter^{1}	5
Total Abundance	22.79 million cells liter^{1}	5

9/10/2001 Summer

IBI_Method	*Evaluation*	*IBI Score*
Method A	Fair	IBI Score = 3.0
Method B	Fair	IBI Score = 3.0

Available Metrics	*Metric Values*		*Metric Score*
Surface Chlorophyll a	12.9	ug liter-1	1
Cyanophyte Biomass	10	ug C liter^{-1}	5
Diatom Biomass	52	ug C liter^{-1}	5
Pheophytin	6.4	ug liter-1	1
Total Biomass	227	ug C liter^{-1}	3
Microcystis aeruginosa	0	million cells liter^{-1}	Null
Chlorophyte Abundance	4	million cells liter^{-1}	1
Total Abundance	13	million cells liter^{-1}	5

STATION PMS37
Location: 100m south of the Naval Research Lab pier
Latitude: 38.82178; Longitude: -77.03109

2001 Summary: Three (3) Spring and three (3) Summer records from 2001 were available to calculate the IBIs. Status of the phytoplankton community was highly variable, ranging from **Poor to Fair-Good**. An modest algal bloom composed of a diverse community dominated by the unidentified small centric diatom was evident in July. Total biomass of the community was dominated by the diatom taxonomic group in March and April, co-dominated by the diatom and green groups in May and July, dominated by the green group in August, and by diatoms again in September. Bluegreens were never the biomass-dominant group at this station, however they were numerically-dominant in August and September. The spring phytoplankton communities were numerically- and biomass-dominated by a mixture of pennate and centric diatom taxa, with the green taxa *Microactinium* gaining importance in May. The small centric and pennate diatoms were the biomass-dominants in March and April; the diatom Synedra was biomass-dominant in May. C:Chl ratios and pheophytin levels indicate some light stress caused by turbidity. (Spring TSS concentrations averaged 33 mg liter^{-1}; Secchi depth averaged 0.72 m). Total biomass was only >551 µg C liter^{-1} (summer threshold for score equals "1") in July. July had a diverse community that was both numerically- and biomass-dominated by the diatom taxonomic group. The numerical- and biomass-dominant taxa was the unidentified small centric diatom. August and September were numerically-dominanted by the bluegreen taxa *Oscillatoria* and *Gloeothece*, respectively. The months were biomass-dominated by the green taxa *Ankistrodesmus* and a large unidentified centric diatom, respectively. The nuisance bluegreen species *Microcystis aeruginosa* was never evident.

Status of Samples: Counted and discarded.

Sample Dates:

3/5/2001 Spring

IBI_Method	*Evaluation*	*IBI Score*
Method A	Poor	IBI Score = 2.0
Method B	Fair-Poor	IBI Score = 2.6

Available Metrics	*Metric Values*	*Metric Score*
Carbon:Chlorophyll a Ratio	11.6 ratio	1
Surface Chlorophyll a	10.1 ug liter-1	5
Cyanophyte Biomass	0 ug C liter^{-1}	Null
Pheophytin	4.7 ug liter-1	1
Total Biomass	117 ug C liter^{-1}	1
Diatom Abundance	4.23 million cells liter^{-1}	5
Total Abundance	4.7 million cells liter^{-1}	Null

4/2/2001 Spring

IBI_Method	*Evaluation*	*IBI Score*
Method A	Poor	IBI Score = 1.5
Method B	Fair-Poor	IBI Score = 2.2

Available Metrics	*Metric Values*	*Metric Score*
Carbon:Chlorophyll a Ratio	23.4 ratio	1
Surface Chlorophyll a	4.3 ug liter-1	3
Cyanophyte Biomass	1 ug C liter^{-1}	Null
Pheophytin	4.7 ug liter-1	1
Total Biomass	101 ug C liter^{-1}	1

Diatom Abundance	3.95 million cells liter[1]	5
Total Abundance	5.55 million cells liter[1]	Null

5/7/2001 Spring

IBI_Method	*Evaluation*	*IBI Score*
Method A	Fair-Poor	IBI Score = 2.6
Method B	Fair	IBI Score = 3.0

Available Metrics	*Metric Values*	*Metric Score*
Carbon:Chlorophyll a Ratio	30.5 ratio	1
Surface Chlorophyll a	11.0 ug liter-1	5
Cyanophyte Biomass	31 ug C liter[1]	1
Pheophytin	10.7 ug liter-1	1
Total Biomass	336 ug C liter[1]	5
Diatom Abundance	5.02 million cells liter[1]	5
Total Abundance	13.51 million cells liter[1]	Null

7/9/2001 Summer

IBI_Method	*Evaluation*	*IBI Score*
Method A	Poor	IBI Score = 1.4
Method B	Poor	IBI Score = 1.9

Available Metrics	*Metric Values*	*Metric Score*
Surface Chlorophyll a	31.0 ug liter-1	1
Cyanophyte Biomass	59 ug C liter[1]	3
Diatom Biomass	216 ug C liter[1]	1
Pheophytin	16.4 ug liter-1	1
Total Biomass	599 ug C liter[1]	1
Microcystis aeruginosa	0 million cells liter[1]	Null
Chlorophyte Abundance	9.28 million cells liter[1]	1
Total Abundance	25.25 million cells liter[1]	5

8/13/2001 Summer

IBI_Method	*Evaluation*	*IBI Score*
Method A	Fair-Good	IBI Score = 3.8
Method B	Good	IBI Score = 4.1

Available Metrics	*Metric Values*	*Metric Score*
Surface Chlorophyll a	5.9 ug liter-1	5
Cyanophyte Biomass	31 ug C liter[1]	5
Diatom Biomass	36 ug C liter[1]	5
Pheophytin	6.6 ug liter-1	1
Total Biomass	180 ug C liter[1]	3
Microcystis aeruginosa	0 million cells liter[1]	Null
Chlorophyte Abundance	2.31 million cells liter[1]	5
Total Abundance	9.88 million cells liter[1]	5

9/10/2001 Summer

IBI_Method	*Evaluation*	*IBI Score*
Method A	Fair-Poor	IBI Score = 2.2
Method B	Fair	IBI Score = 3.0

Available Metrics	*Metric Values*		*Metric Score*
Surface Chlorophyll a	20.4	ug liter-1	1
Cyanophyte Biomass	56	ug C liter[1]	3
Diatom Biomass	139	ug C liter[1]	3
Pheophytin	9.0	ug liter-1	1
Total Biomass	223	ug C liter[1]	3
Microcystis aeruginosa	0	million cells liter[1]	Null
Chlorophyte Abundance	0.33	million cells liter[1]	5
Total Abundance	17.16	million cells liter[1]	5

STATION PMS51

Location: across from Rosier Bluff; 100m west of bouy #88
Latitude: 38.770115; Longitude: -77.031364

2001 Summary: Two (2) Spring and three (3) Summer records from 2001 were available to calculate the IBIs. Status of the phytoplankton community was highly variable, ranging from **Poor** to **Good**. No algal blooms were evident in the spring or summer. Total biomass of the community was dominated by the diatom taxonomic group in April, July, and September, the green group in May, and co-dominated by the diatom and green groups in August. Bluegreens as a whole were never biomass-dominant at this station, however they were the numerically-dominant group in August and September. The April phytoplankton communities were numerically- and biomass-dominated by a mixture of pennate and centric diatom taxa. The green taxa *Microactinium* and *Ankistrodesmus* gaining numeric and biomass importance in May. C:Chl ratios and pheophytin levels indicate some light stress caused by turbidity. (Spring TSS concentrations averaged 23 mg liter^{-1}; Secchi depth averaged 0.65 m). Total biomass was never >551 µg C liter^{-1} (summer threshold for score equals "1") in summer. July had a diverse community that was numerically-dominated by *Microcystis* but biomass-dominated by the diatom *Cyclotella* and the small unidentified centric. August and September were numerically-dominanted by the bluegreen taxa *Oscillatoria* and *Agmenellum*, respectively. These months were biomass co-dominated by the green taxa *Closterium* and *Gloeocystis*, the small cryptomonad, the diatom *Melosira*, and the dinoflagellate *Glenodinium*. The nuisance bluegreen species *Microcystis aeruginosa* was never evident.

Status of Samples: Counted and discarded.

Sample Dates:

4/2/2001 Spring

IBI_Method	*Evaluation*	*IBI Score*
Method A	Poor	IBI Score = 2.0
Method B	Fair-Poor	IBI Score = 2.6

Available Metrics	*Metric Values*	*Metric Score*
Carbon:Chlorophyll a Ratio	15.2 ratio	1
Surface Chlorophyll a	6.2 ug liter-1	5
Cyanophyte Biomass	7 ug C liter^{-1}	Null
Pheophytin	3.6 ug liter-1	1
Total Biomass	95 ug C liter^{-1}	1
Diatom Abundance	2.96 million cells liter^{-1}	5
Total Abundance	4.55 million cells liter^{-1}	Null

5/7/2001 Spring

IBI_Method	*Evaluation*	*IBI Score*
Method A	Fair	IBI Score = 3.0
Method B	Fair-Good	IBI Score = 3.4

Available Metrics	*Metric Values*	*Metric Score*
Carbon:Chlorophyll a Ratio	22.2 ratio	1
Surface Chlorophyll a	10.2 ug liter-1	5
Cyanophyte Biomass	13 ug C liter^{-1}	Null
Pheophytin	10.9 ug liter-1	1
Total Biomass	226 ug C liter^{-1}	5
Diatom Abundance	3.44 million cells liter^{-1}	5

Total Abundance	10.55 million cells liter[1]	Null

7/9/2001 Summer

IBI_Method	*Evaluation*	*IBI Score*
Method A	Fair-Poor	IBI Score = 2.6
Method B	Fair	IBI Score = 2.7

Available Metrics	*Metric Values*	*Metric Score*
Surface Chlorophyll a	14.8 ug liter-1	1
Cyanophyte Biomass	7 ug C liter[1]	5
Diatom Biomass	198 ug C liter[1]	1
Pheophytin	12.8 ug liter-1	1
Total Biomass	362 ug C liter[1]	5
Microcystis aeruginosa	0 million cells liter[1]	Null
Chlorophyte Abundance	4.51 million cells liter[1]	1
Total Abundance	11.86 million cells liter[1]	5

8/13/2001 Summer

IBI_Method	*Evaluation*	*IBI Score*
Method A	Good	IBI Score = 4.2
Method B	Good	IBI Score = 4.4

Available Metrics	*Metric Values*	*Metric Score*
Surface Chlorophyll a	8.5 ug liter-1	5
Cyanophyte Biomass	38 ug C liter[1]	5
Diatom Biomass	113 ug C liter[1]	5
Pheophytin	6.4 ug liter-1	1
Total Biomass	322 ug C liter[1]	5
Microcystis aeruginosa	0 million cells liter[1]	Null
Chlorophyte Abundance	1.79 million cells liter[1]	5
Total Abundance	3.01 million cells liter[1]	5

9/10/2001 Summer

IBI_Method	*Evaluation*	*IBI Score*
Method A	Fair-Good	IBI Score = 3.8
Method B	Fair-Good	IBI Score = 3.9

Available Metrics	*Metric Values*	*Metric Score*
Surface Chlorophyll a	9.6 ug liter-1	5
Cyanophyte Biomass	16 ug C liter[1]	5
Diatom Biomass	65 ug C liter[1]	5
Pheophytin	5.8 ug liter-1	1
Total Biomass	119 ug C liter[1]	3
Microcystis aeruginosa	0 million cells liter[1]	Null
Chlorophyte Abundance	0.54 million cells liter[1]	5
Total Abundance	8.46 million cells liter[1]	3

STATION PMS52
Location: UNKNOWN
Latitude: UNKNOWN; Longitude: UNKNOWN

2001 Summary: No records from 2001 were available to calculate the IBIs because of a lack of corresponding chlorophyll *a* and pheophytin data. Status of the phytoplankton community appeared to be fairly **Good** based on the phytoplankton count information. No algal blooms were evident in the spring or summer. Total biomass of the community was dominated by the diatom taxonomic group in March, April, and September, and by the green group in May, July, and August. Bluegreens as a group were never biomass-dominant at this station, however they were a numerically co-dominant group in May and September, and they and the cryptomonads were usually a significant presence. The March and April phytoplankton communities were numerically- and biomass-dominated by a mixture of small unidentified pennate and centric diatom taxa. They were replaced by the numeric-dominant *Agmenellum* (bluegreen) and the biomass-dominants *Ankistrodesmus* and *Actinastrum* (greens) in May. No C:Chl ratios or pheophytin data are available. Total biomass was never >551 µg C liter^{-1} (summer threshold for score equals “1") in summer. July was numerically- and biomass-dominated by the green taxa *Actinastrum*. August was numerically-dominated by the small unidentified centric diatom, but biomass dominated by the green *Ankistrodesmus*. Similarly, September was numerically-dominated by the bluegreen taxa *Oscillatoria* but biomass-dominated by the small unidentified centric diatom. The nuisance bluegreen species *Microcystis aeruginosa* was never evident.

Status of Samples: Counted and discarded.

Sample Dates:
3/5/2001 Spring

IBI_Method	*Evaluation*	*IBI Score*
Method A	Too Few Data	ND
Method B	Too Few Data	ND

Available Metrics	*Metric Values*	*Metric Score*
Cyanophyte Biomass	0 ug C liter-1	Null
Total Biomass	194 ug C liter^{1}	5
Diatom Abundance	4.92 million cells liter^{1}	5
Total Abundance	5.85 million cells liter^{1}	Null

4/2/2001 Spring

IBI_Method	*Evaluation*	*IBI Score*
Method A	Too Few Data	ND
Method B	Too Few Data	ND

Available Metrics	*Metric Values*	*Metric Score*
Cyanophyte Biomass	4 ug C liter^{1}	Null
Total Biomass	82 ug C liter^{1}	1
Diatom Abundance	3.85 million cells liter^{1}	5
Total Abundance	5.01 million cells liter^{1}	Null

5/7/2001 Spring

IBI_Method	*Evaluation*	*IBI Score*
Method A	Too Few Data	ND
Method B	Too Few Data	ND

Available Metrics	*Metric Values*	*Metric Score*
Cyanophyte Biomass	30 ug C liter-1	1
Total Biomass	255 ug C liter-1	5
Diatom Abundance	5.13 million cells liter-1	5
Total Abundance	17.49 million cells liter-1	Null

7/9/2001 Summer

IBI_Method	*Evaluation*	*IBI Score*
Method A	Too Few Data	ND
Method B	Good	IBI Score = 4.2

Available Metrics	*Metric Values*	*Metric Score*
Cyanophyte Biomass	19 ug C liter-1	5
Diatom Biomass	92 ug C liter-1	5
Total Biomass	329 ug C liter-1	5
Microcystis aeruginosa	0 million cells liter-1	Null
Chlorophyte Abundance	6.33 million cells liter-1	1
Total Abundance	11.52 million cells liter-1	5

8/13/2001 Summer

IBI_Method	*Evaluation*	*IBI Score*
Method A	Too Few Data	ND
Method B	Good	IBI Score = 4.6

Available Metrics	*Metric Values*	*Metric Score*
Cyanophyte Biomass	12 ug C liter-1	5
Diatom Biomass	51 ug C liter-1	5
Total Biomass	296 ug C liter-1	5
Microcystis aeruginosa	0 million cells liter-1	Null
Chlorophyte Abundance	3.26 million cells liter-1	3
Total Abundance	11.34 million cells liter-1	5

9/10/2001 Summer

IBI_Method	*Evaluation*	*IBI Score*
Method A	Too Few Data	ND
Method B	Fair-Good	IBI Score = 3.8

Available Metrics	*Metric Values*	*Metric Score*
Cyanophyte Biomass	61 ug C liter-1	3
Diatom Biomass	312 ug C liter-1	1
Total Biomass	396 ug C liter-1	5
Microcystis aeruginosa	0 million cells liter-1	Null
Chlorophyte Abundance	0.35 million cells liter-1	5
Total Abundance	14.03 million cells liter-1	5

STATION PTB01

Location: Potomac tidal basin, off center of Constitution Avenue Bridge
Latitude: 38.88706, Longitude: -77.03942

2001 Summary: Two (2) Spring and three (3) Summer records from 2001 were available to calculate the IBIs. Status of the phytoplankton community began as **Fair-Good** in March, but was **Poor** the rest of the spring and summer. A large algal bloom persisted from May through September, with total biomass >>551 µg C liter^{-1} (summer threshold for score equals "1") . Total biomass of the community was dominated by the diatom taxonomic group in March, May, July and August, and shifted to the bluegreen group by September. The March phytoplankton community was numerically- and biomass-dominated by a mixture of centric and pennate diatom taxa. The May and July communities were biomass-dominated by the diatom taxa *Cyclotella* and the small unidentified centric but the months were numerically-dominated by the bluegreen taxa *Oscillatoria* and eventually *Agmenellum* and *Microcystis*. In August, *Oscillatoria* was both numerically- and biomass-dominant while Cyclotella and the small unidentified centric were reduced to a sub-dominant role. September was completely dominated by bluegreen taxa, including *Oscillatoria*, *Microcystis*, *Agmenellum*, and *Chroococcus*. The nuisance bluegreen species *Microcystis aeruginosa* was evident in August and was the numeric-dominant in September.

Status of Samples: Counted and discarded.

Sample Dates:

3/13/2001 Spring

IBI_Method	*Evaluation*	*IBI Score*
Method A	Fair-Good	IBI Score = 3.5
Method B	Fair	IBI Score = 3.0

Available Metrics	*Metric Values*		*Metric Score*
Carbon:Chlorophyll a Ratio	22.7	ratio	1
Surface Chlorophyll a	10.8	ug liter-1	5
Cyanophyte Biomass	1.4	ug C liter^{1}	Null
Pheophytin	2.5	ug liter-1	3
Total Biomass	245	ug C liter^{1}	5
Diatom Abundance	12.76	million cells liter^{1}	1
Total Abundance	14.4	million cells liter^{1}	Null

5/15/2001 Spring

IBI_Method	*Evaluation*	*IBI Score*
Method A	Poor	IBI Score = 1.4
Method B	Poor	IBI Score = 1.3

Available Metrics	*Metric Values*		*Metric Score*
Carbon:Chlorophyll a Ratio	39.9	ratio	3
Surface Chlorophyll a	65.2	ug liter-1	1
Cyanophyte Biomass	214	ug C liter^{1}	1
Pheophytin	19.9	ug liter-1	1
Total Biomass	1,901	ug C liter^{1}	1
Diatom Abundance	26.78	million cells liter^{1}	1
Total Abundance	63.88	million cells liter^{1}	1

7/17/2001 Summer

IBI_Method	*Evaluation*	*IBI Score*
Method A	Poor	IBI Score = 1.0
Method B	Poor	IBI Score = 1.0

Available Metrics	*Metric Values*	*Metric Score*
Surface Chlorophyll a	47.3 ug liter-1	1
Cyanophyte Biomass	130 ug C liter^{1}	1
Diatom Biomass	794 ug C liter^{1}	1
Pheophytin	16.6 ug liter-1	1
Total Biomass	1,314 ug C liter^{1}	1
Microcystis aeruginosa	0 million cells liter^{1}	Null
Chlorophyte Abundance	3.87 million cells liter^{1}	1
Total Abundance	50.92 million cells liter^{1}	1

8/21/2001 Summer

IBI_Method	*Evaluation*	*IBI Score*
Method A	Poor	IBI Score = 1.0
Method B	Poor	IBI Score = 1.25

Available Metrics	*Metric Values*	*Metric Score*
Surface Chlorophyll a	57.1 ug liter-1	1
Cyanophyte Biomass	674 ug C liter^{1}	1
Diatom Biomass	942 ug C liter^{1}	1
Pheophytin	13.6 ug liter-1	1
Total Biomass	1,710 ug C liter^{1}	1
Microcystis aeruginosa	6.21 million cells liter^{1}	1
Chlorophyte Abundance	2.92 million cells liter^{1}	3
Total Abundance	112.73 million cells liter^{1}	1

9/18/2001 Summer

IBI_Method	*Evaluation*	*IBI Score*
Method A	Poor	IBI Score = 1.0
Method B	Poor	IBI Score = 1.0

Available Metrics	*Metric Values*	*Metric Score*
Surface Chlorophyll a	125.3 ug liter-1	1
Cyanophyte Biomass	1,479 ug C liter^{1}	1
Diatom Biomass	301 ug C liter^{1}	1
Pheophytin	10.4 ug liter-1	1
Total Biomass	2,470 ug C liter^{1}	1
Microcystis aeruginosa	153.1 million cells liter^{1}	1
Chlorophyte Abundance	7.21 million cells liter^{1}	1
Total Abundance	219.2 million cells liter^{1}	1

STATION PWC04

Location: Washington Channel off the Potomac and Anacostia rivers
Latitude: UNKNOWN; Longitude: UNKNOWN

2001 Summary: Two (2) Spring and two (2) Summer records from 2001 were available to calculate the IBIs. Status of the phytoplankton community began as **Poor** in spring and early summer, but was **Fair-Good** in August despite a high bluegreen biomass. A large algal bloom occurred in July but was gone by August. Total biomass of the community was co-dominated by the diatom and green taxonomic groups in April and May, and dominated by the green group in July and the bluegreen group in August. The April and May phytoplankton communities were numerically-dominated by a mixture of centric and pennate diatom taxa and biomass-dominated by the green taxa *Ankistrodesmus*. In July, the community was numerically-dominated by the bluegreen taxa *Coelosphaerium* and *Agmenellum* and numerically-dominated by the diatom taxa *Cyclotella*, the small centric, and Aulacoseira granulata. In August, *Oscillatoria* was both numerically- and biomass-dominant. The nuisance bluegreen species *Microcystis aeruginosa* was evident in July but not in August.

Status of Samples: Counted and discarded.

Sample Dates:

4/3/2001 Spring

IBI_Method	*Evaluation*	*IBI Score*
Method A	Poor	IBI Score = 2.0
Method B	Fair-Poor	IBI Score = 2.6

Available Metrics	*Metric Values*	*Metric Score*
Carbon:Chlorophyll a Ratio	22.4 ratio	1
Surface Chlorophyll a	4.0 ug liter-1	3
Cyanophyte Biomass	0 ug C liter^{1}	Null
Pheophytin	1.7 ug liter-1	3
Total Biomass	90 ug C liter^{1}	1
Diatom Abundance	3 million cells liter^{1}	5
Total Abundance	4.56 million cells liter^{1}	Null

5/8/2001 Spring

IBI_Method	*Evaluation*	*IBI Score*
Method A	Poor	IBI Score = 2.0
Method B	Fair-Poor	IBI Score = 2.6

Available Metrics	*Metric Values*	*Metric Score*
Carbon:Chlorophyll a Ratio	20.8 ratio	1
Surface Chlorophyll a	16.2 ug liter-1	1
Cyanophyte Biomass	8 ug C liter^{1}	Null
Pheophytin	7.8 ug liter-1	1
Total Biomass	338 ug C liter^{1}	5
Diatom Abundance	6.05 million cells liter^{1}	5
Total Abundance	13.12 million cells liter^{1}	Null

7/10/2001 Summer

IBI_Method	*Evaluation*	*IBI Score*
Method A	Poor	IBI Score = 1.0

Method B	Poor	IBI Score = 1.0

Available Metrics	*Metric Values*	*Metric Score*
Surface Chlorophyll a	46.2 ug liter-1	1
Cyanophyte Biomass	118 ug C liter[1]	1
Diatom Biomass	ug C liter[1]	1
Pheophytin	9.2 ug liter-1	1
Total Biomass	991 ug C liter[1]	1
Microcystis aeruginosa	1.52 million cells liter[1]	1
Chlorophyte Abundance	6.36 million cells liter[1]	1
Total Abundance	34.72 million cells liter[1]	1

8/14/2001 Summer

IBI_Method	*Evaluation*	*IBI Score*
Method A	Fair-Good	IBI Score = 3.4
Method B	Fair-Good	IBI Score = 3.9

Available Metrics	*Metric Values*	*Metric Score*
Surface Chlorophyll a	9.9 ug liter-1	5
Cyanophyte Biomass	105 ug C liter[1]	1
Diatom Biomass	51 ug C liter[1]	5
Pheophytin	5.8 ug liter-1	1
Total Biomass	240 ug C liter[1]	5
Microcystis aeruginosa	0 million cells liter[1]	Null
Chlorophyte Abundance	2.53 million cells liter[1]	5
Total Abundance	26.73 million cells liter[1]	5

STATION TCO01

Location: UNKNOWN
Latitude: UNKNOWN; Longitude: UNKNOWN

2001 Summary: No records from 2001 were available to calculate the IBIs because of a lack of corresponding chlorophyll *a* and pheophytin data. Based on the phytoplankton count data, the station appears to have a highly variable status. A large diatom algal bloom was evident in May, and a smaller one dominated by greens was evident in July. Total biomass of the community was dominated by the diatom taxonomic group in April, May, and August, and by the green group in July. Bluegreens as a group were never biomass-dominant at this station, although they were numerically-dominant in August. The April and May phytoplankton communities were numerically- and biomass-dominated by a mixture of small unidentified pennate and centric diatom taxa and *Cyclotella*. In July, these were replaced by the numeric- and biomass-dominant taxa *Coelastrum* (green). By August, the bluegreen taxa *Oscillatoria* was the numeric-dominant and the small unidentified pennate diatom was the biomass-dominant. The nuisance bluegreen species *Microcystis aeruginosa* was never evident.

Status of Samples: Counted and discarded.

Sample Dates:

4/10/2001 Spring

IBI_Method	*Evaluation*	*IBI Score*
Method A	Too Few Data	ND
Method B	Too Few Data	ND

Available Metrics	*Metric Values*	*Metric Score*
Cyanophyte Biomass	30 ug C liter^{-1}	1
Total Biomass	245 ug C liter^{-1}	5
Diatom Abundance	5.10 million cells liter^{-1}	5
Total Abundance	8.97 million cells liter^{-1}	Null

5/15/2001 Spring

IBI_Method	*Evaluation*	*IBI Score*
Method A	Too Few Data	ND
Method B	Too Few Data	ND

Available Metrics	*Metric Values*	*Metric Score*
Cyanophyte Biomass	0 ug C liter^{-1}	Null
Total Biomass	1,756 ug C liter^{-1}	1
Diatom Abundance	23.84 million cells liter^{-1}	1
Total Abundance	51.09 million cells liter^{-1}	1

7/17/2001 Summer

IBI_Method	*Evaluation*	*IBI Score*
Method A	Too Few Data	ND
Method B	Fair-Good	IBI Score = 3.4

Available Metrics	*Metric Values*	*Metric Score*
Cyanophyte Biomass	12 ug C liter^{-1}	5
Diatom Biomass	79 ug C liter^{-1}	5
Total Biomass	656 ug C liter^{-1}	1

Microcystis aeruginosa	0 million cells liter-1	Null
Chlorophyte Abundance	10.25 million cells liter-1	1
Total Abundance	22.70 million cells liter-1	5

8/21/2001 Summer

IBI_Method	*Evaluation*	*IBI Score*
Method A	Too Few Data	ND
Method B	Fair-Good	IBI Score = 3.8

Available Metrics	*Metric Values*	*Metric Score*
Cyanophyte Biomass	51 ug C liter-1	3
Diatom Biomass	237 ug C liter-1	1
Total Biomass	347 ug C liter-1	5
Microcystis aeruginosa	0 million cells liter-1	Null
Chlorophyte Abundance	1.00 million cells liter-1	5
Total Abundance	17.17 million cells liter-1	5

STATION TCO06

Location: UNKNOWN
Latitude: UNKNOWN; Longitude: UNKNOWN

2001 Summary: No records from 2001 were available to calculate the IBIs because of a lack of corresponding chlorophyll *a* and pheophytin data. Based on the phytoplankton count data, the station appears to have a highly variable status. A large algal bloom was evident in May, and a smaller one was evident in July. Total biomass of the community was dominated by the diatom taxonomic group in April and August, co-dominated by the diatom and green groups in May, and dominated by the greens in July. Bluegreens as a group were never biomass-dominant at this station, although they were numerically-dominant in August. The April phytoplankton community was numerically- and biomass-dominated by the small unidentified centric diatom taxa and *Cyclotella*. The May community was numerically-dominated by *Micractinium pusillum* but biomass-dominated by the small unidentified centric diatom taxa and *Cyclotella*. In July, these were replaced by the numeric- and biomass-dominant taxa *Coelastrum* (green). By August, the bluegreen taxa *Agmenellum* and *Aphanocapsa* were the numeric-dominants and the diatom taxa *Melosira* was the biomass-dominant. The nuisance bluegreen species *Microcystis aeruginosa* was never evident.

Status of Samples: Counted and discarded.

Sample Dates:

4/10/2001 Spring

IBI_Method	*Evaluation*	*IBI Score*
Method A	Too Few Data	ND
Method B	Too Few Data	ND

Available Metrics	*Metric Values*	*Metric Score*
Cyanophyte Biomass	0 ug C liter^{-1}	Null
Total Biomass	205 ug C liter^{-1}	5
Diatom Abundance	7.17 million cells liter^{-1}	1
Total Abundance	7.88 million cells liter^{-1}	Null

5/15/2001 Spring

IBI_Method	*Evaluation*	*IBI Score*
Method A	Too Few Data	ND
Method B	Poor	IBI Score = 1.0

Available Metrics	*Metric Values*	*Metric Score*
Cyanophyte Biomass	99 ug C liter^{-1}	1
Total Biomass	2,449 ug C liter^{-1}	1
Diatom Abundance	22.37 million cells liter^{-1}	1
Total Abundance	70.60 million cells liter^{-1}	1

7/17/2001 Summer

IBI_Method	*Evaluation*	*IBI Score*
Method A	Too Few Data	ND
Method B	Fair	IBI Score = 3.0

Available Metrics	*Metric Values*	*Metric Score*
Cyanophyte Biomass	16 ug C liter^{-1}	5

Diatom Biomass	183	ug C liter[1]	3
Total Biomass	701	ug C liter[1]	1
Microcystis aeruginosa	0	million cells liter[1]	Null
Chlorophyte Abundance	12.93	million cells liter[1]	1
Total Abundance	28.29	million cells liter[1]	5

8/21/2001 Summer

IBI_Method	*Evaluation*	*IBI Score*
Method A	Too Few Data	ND
Method B	Good	IBI Score = 4.6

Available Metrics	*Metric Values*		*Metric Score*
Cyanophyte Biomass	25	ug C liter[1]	5
Diatom Biomass	99	ug C liter[1]	5
Total Biomass	137	ug C liter[1]	3
Microcystis aeruginosa	0	million cells liter-1	Null
Chlorophyte Abundance	0.63	million cells liter[1]	5
Total Abundance	14.03	million cells liter[1]	5

Appendix D

Spring and Summer Zooplankton Indexes
Station Summaries

Appendix D Table of Contents

Spring Food Availability Indexes

Station ANA 14
Location: Pennsylvania Ave, Marina South Dock, District of Columbia
Latitude: 38.877335, Longitude: -76.97553
geometric mean: 3,146 m^{-3} (**Poor**)
range: 111 m^{-3} (Poor) - 21,706 m^{-3} (Minimal)
(n = 6)

Station PMS 10
Location: upstream of Key Bridge, District of Columbia
Latitude: 38.902332; Longitude: -77.06942
geometric mean: 93 m^{-3} (**Poor**)
range: 12 m^{-3} (Poor) - 214 m^{-3} (Poor)
(n = 6)

Station PMS 37
Location: 100 m south of Naval Research Laboratory pier, District of Columbia
Latitude: 38.82178; Longitude: -77.03109
geometric mean: 481 m^{-3} (**Poor**)
range: 135 m^{-3} (Poor) - 1,027 m^{-3} (Poor)
(n = 5)

For comparison purposes, food availability index values in the Potomac River downstream of the District are presented. The values are calculated from 2000 - 2001 spring mesozooplankton samples collected for the Maryland Department of Natural Resources.

Station TF2.3
Location: bouy N 54 in midchannel off Indian Head, Maryland
Latitude: 38.608173; Longitude: -77.17387
geometric mean: 23,131 m^{-3} (**Minimal**)
range: 3,505 m^{-3} (Poor) - 549,679 m^{-3} (Optimal)
(n = 12)

Station TF2.4
Location: bouy 44 between Possum Pt. and Moss Pt.
Latitude: 38.529842; Longitude: -77.26526
geometric mean: 14,702 m^{-3} (**Below-Minimal**)
range: 3,163 m^{-3} (Poor) - 337,231 m^{-3} (Optimal)
(n = 10)

Summer Zooplankton Abundances
Station Summaries

Station ANA 14
Location: Pennsylvania Ave, Marina South Dock, District of Columbia
Latitude: 38.877335, Longitude: -76.97553
geometric mean: 618 m^{-3}
range: 161 m^{-3} - 14,321 m^{-3}
(n = 5, Yr: 2000, 2001)

Stations King Lower and **King Upper**
Location: unknown (Kingman Lake)
Latitude: unknown; Longitude: unknown
geometric mean: 249 m^{-3}
range: 15 m^{-3} - 3,787 m^{-3}
(n=6, Yr: 1999)

Station PMS 10
Location: upstream of Key Bridge, District of Columbia
Latitude: 38.902332; Longitude: -77.06942
geometric mean: 37 m^{-3}
range: 5 m^{-3} - 74 m^{-3}
(n = 6, Yr: 2000, 2001)

Station PMS 37
Location: 100 m south of Naval Research Laboratory pier, District of Columbia
Latitude: 38.82178; Longitude: -77.03109
geometric mean: 296 m^{-3}
range: 105 m^{-3} - 1,552 m^{-3}
(n = 6, Yr: 2000, 2001)

For comparison purposes, food availability index values in the Potomac River downstream of the District are presented. The values are calculated from 2000 - 2001 summer mesozooplankton samples collected for the Maryland Department of Natural Resources.

Station TF2.3
Location: bouy N 54 in midchannel off Indian Head, Maryland
Latitude: 38.608173; Longitude: -77.17387
geometric mean: 26,871 m^{-3}
range: 9,248 m^{-3} - 67,054 m^{-3}
(n = 6, Yr: 2000, 2001)

Appendix E

Stream Macrobenthic Invertebrate Indexes of Biotic Integrity
Station Summaries

Appendix E Table of Contents

Note: Where possible, waterbody name was determined from the station name provided by the District of Columbia.

STATION Broad Branch

Waterbody Name/Location **Broad Branch**

Latitude: 38.94563; Longitude: -77.051183

Collection Date 10/21/1998

Metric Group	*Metric Name*	*Metric Value*
DC	EPT Taxa	1
DC	Hilsenhoff Biotic Index	5
DC	Hydropsychidae/EPT	100
DC	Percent Chironomidae	14.29
DC	Percent Collectors	14.29
DC	Percent Dominance	57.14
DC	Percent EPT	57.14
DC	Percent Shredders	28.57
DC	Scrapers/Scrapers+Filterers	0
DC	Taxonomic Richness	3
DC	Trichoptera Taxa	1
RBP	Clinger Taxa	1
RBP	EPT Taxa	1
RBP	Intolerant Taxa	0
RBP	Percent Clingers	57.14
RBP	Percent Dominance	57.14
RBP	Percent Ephemeroptera	0
RBP	Percent EPT	57.14
RBP	Percent Filterers	57.14
RBP	Percent Tolerant	14.29
RBP	PercentScrapers	0
RBP	Plecoptera Taxa	0
RBP	Taxonomic Richness	3
RBP	Trichoptera Taxa	1

Taxonomist Comments:

Sample was in very poor shape, mostly disintegrated. The few specimens that could be identified were.

Analyst Comments:

Metric values from this site suggest that the benthic community may be in **Fair-Poor** condition. While Percent Dominance and Percent Chironomidae were low, Percent EPT was moderately high, and Percent Tolerant organisms was low, the Hilsenhoff Biotic Index was moderately high. and Taxonomic Richness was extremely low. More data are needed to confirm this evaluation.

STATION Dumbarton Oaks

Waterbody Name/Location

Latitude: 38.91547; Longitude: -77.06098

Collection Date 11/4/1998

Taxonomist Comments:

The sample was in an extremely poor state of preservation; a soup of stinky brown goo. The sample was in too poor a shape to identify any taxa.

Analyst Comments:

Benthic community condition could not be evaluated for this site.

STATION Klingle Valley

Waterbody Name/Location

Latitude: 38.93352; Longitude: -77.05307

Collection Date 10/22/1998

Metric Group	*Metric Name*	*Metric Value*
DC	EPT Taxa	1
DC	Hilsenhoff Biotic Index	6
DC	Hydropsychidae/EPT	100
DC	Percent Chironomidae	25
DC	Percent Collectors	45
DC	Percent Dominance	35
DC	Percent EPT	10
DC	Percent Shredders	35
DC	Scrapers/Scrapers+Filterers	0
DC	Taxonomic Richness	7
DC	Trichoptera Taxa	1
RBP	Clinger Taxa	2
RBP	EPT Taxa	1
RBP	Intolerant Taxa	0
RBP	Percent Clingers	15
RBP	Percent Dominance	35
RBP	Percent Ephemeroptera	0
RBP	Percent EPT	10
RBP	Percent Filterers	15
RBP	Percent Tolerant	45
RBP	PercentScrapers	0
RBP	Plecoptera Taxa	0
RBP	Taxonomic Richness	7
RBP	Trichoptera Taxa	1

Taxonomist Comments:

Sample was in fair preservation condition. One Oligochaeta was missing head and left uncounted.

Analyst Comments:

Metric values from this site suggest that the benthic community may be in **Good-Fair** condition. Taxonomic Richness was high and both Percent Chironomidae and Percent Dominance were low. The presence of 2 Clinger taxa may indicate good-quality instream conditions. More data are needed to confirm this evaluation.

STATION Popes (3 of 4)

Waterbody Name/Location **Popes Branch (3 of 4)**

Latitude: unknown; Longitude: unknown

Collection Date 10/29/1998

Metric Group	*Metric Name*	*Metric Value*
DC	EPT Taxa	0
DC	Hilsenhoff Biotic Index	7.67
DC	Hydropsychidae/EPT	0
DC	Percent Chironomidae	77.14
DC	Percent Collectors	99.4
DC	Percent Dominance	77.14
DC	Percent EPT	0
DC	Percent Shredders	0.2
DC	Scrapers/Scrapers+Filterers	0
DC	Taxonomic Richness	4
DC	Trichoptera Taxa	0
RBP	Clinger Taxa	0
RBP	EPT Taxa	0
RBP	Intolerant Taxa	0
RBP	Percent Clingers	0
RBP	Percent Dominance	77.14
RBP	Percent Ephemeroptera	0
RBP	Percent EPT	0
RBP	Percent Filterers	0
RBP	Percent Tolerant	99.8
RBP	PercentScrapers	0.4
RBP	Plecoptera Taxa	0
RBP	Taxonomic Richness	4
RBP	Trichoptera Taxa	0

Taxonomist Comments:

This is one of the group of four samples that make up Popes Branch collection on 10-29-98. The bottle had "Popes 3 of 4" affixed to it, but the sample also had a paper label inside with "tpb01" written on it. The sample was so full of Tubificidae/Chironomidae that it was quartered, by eye, and these two families were counted from that subsample.

Analyst Comments:

Metric values from this site suggest that the benthic community may be in **Very Poor** condition. Taxonomic Richness was low, while Percent Dominance and Percent Tolerant organisms were extremely high. More data are needed to confirm this evaluation.

STATION Sheila's Lost Stream

Waterbody Name/Location

Latitude: 38.98820; Longitude: -77.04312

Collection Date 11/4/1998

Metric Group	*Metric Name*	*Metric Value*
DC	EPT Taxa	1
DC	Hilsenhoff Biotic Index	6.21
DC	Hydropsychidae/EPT	100
DC	Percent Chironomidae	52.78
DC	Percent Collectors	56.94
DC	Percent Dominance	52.78
DC	Percent EPT	22.22
DC	Percent Shredders	2.78
DC	Scrapers/Scrapers+Filterers	0
DC	Taxonomic Richness	6
DC	Trichoptera Taxa	1
RBP	Clinger Taxa	1
RBP	EPT Taxa	1
RBP	Intolerant Taxa	0
RBP	Percent Clingers	22.22
RBP	Percent Dominance	52.78
RBP	Percent Ephemeroptera	0
RBP	Percent EPT	22.22
RBP	Percent Filterers	22.22
RBP	Percent Tolerant	56.94
RBP	PercentScrapers	0
RBP	Plecoptera Taxa	0
RBP	Taxonomic Richness	6
RBP	Trichoptera Taxa	1

Taxonomist Comments:

The sample was in poor state of preservation, very cloudy, but after several rinses the taxa identification was possible. There were no Tubificidae.

Analyst Comments:

Metric values from this site suggest that the benthic community may be in **Fair-Poor** condition. Although Taxonomic Richness was moderately good, Percent Chironomidae, Percent Dominance, and Percent Tolerant organisms were all somewhat high. More data are needed to confirm this evaluation.

STATION TPB01[1]

Waterbody Name/Location **Popes Branch (2 of 4)**

Latitude: 38.87743; Longitude: -76.96617

Collection Date 10/29/1998

Metric Group	*Metric Name*	*Metric Value*
DC	EPT Taxa	0
DC	Hilsenhoff Biotic Index	9.65
DC	Hydropsychidae/EPT	0
DC	Percent Chironomidae	9.68
DC	Percent Collectors	98.39
DC	Percent Dominance	88.71
DC	Percent EPT	0
DC	Percent Shredders	0.81
DC	Scrapers/Scrapers+Filterers	0
DC	Taxonomic Richness	4
DC	Trichoptera Taxa	0
RBP	Clinger Taxa	0
RBP	EPT Taxa	0
RBP	Intolerant Taxa	0
RBP	Percent Clingers	0
RBP	Percent Dominance	88.71
RBP	Percent Ephemeroptera	0
RBP	Percent EPT	0
RBP	Percent Filterers	0
RBP	Percent Tolerant	99.19
RBP	PercentScrapers	0
RBP	Plecoptera Taxa	0
RBP	Taxonomic Richness	4
RBP	Trichoptera Taxa	0

Taxonomist Comments:

The sample was in fair-poor preservation condition. The Tubificida colony's number of individuals was estimated due to fragmention/disintegration of sample. There were fragments of Cambaridae which were not included in the count.

Analyst Comments:

Metric values from this site suggest that the benthic community may be in **Very Poor** condition. Taxonomic Richness was low, and Percent Dominance, Percent Tolerant organisms, and the Hilsenhoff Biotic Index were extremely high. More data are needed to confirm this evaluation.

[1] Label on bottle read tbp01.

STATION TDA01

Waterbody Name **Dalecarlia**

Latitude: 38.94667; Longitude: -77.10650

Collection Date 11/12/1998

Taxonomist Comments: Sample was in very poor state of preservation, taxa could not be sufficiently identified.

Analyst Comments: Benthic community condition could not be evaluated for this site.

STATION TDU01

Waterbody Name/Location **Fort Dupont**

Latitude: 38.88240; Longitude: -76.96448

Collection Date 11/18/1997

Metric Group	*Metric Name*	*Metric Value*
DC	EPT Taxa	0
DC	Hilsenhoff Biotic Index	6.42
DC	Hydropsychidae/EPT	0
DC	Percent Chironomidae	72.5
DC	Percent Collectors	77.5
DC	Percent Dominance	72.5
DC	Percent EPT	0
DC	Percent Shredders	22.5
DC	Scrapers/Scrapers+Filterers	0
DC	Taxonomic Richness	3
DC	Trichoptera Taxa	0
RBP	Clinger Taxa	0
RBP	EPT Taxa	0
RBP	Intolerant Taxa	0
RBP	Percent Clingers	0
RBP	Percent Dominance	72.5
RBP	Percent Ephemeroptera	0
RBP	Percent EPT	0
RBP	Percent Filterers	0
RBP	Percent Tolerant	77.5
RBP	PercentScrapers	0
RBP	Plecoptera Taxa	0
RBP	Taxonomic Richness	3
RBP	Trichoptera Taxa	0

Taxonomist Comments:

The sample was a bit cloudy, but after several rinses was deemed in fair-good preservation condition.

Analyst Comments:

Metric values from this site suggest that the benthic community may be in **Poor** condition. Taxonomic Richness was extremely low while Percent Chironomidae, Percent Dominance, and Percent Tolerant organisms were quite high. More data are needed to confirm this evaluation.

STATION TFC01

Waterbody Name/Location **Fort Chaplin**

Latitude: 38.86807; Longitude: -76.95875

Collection Date 11/19/1997

Taxonomist Comments:

Sample was not preserved well, had completely spoiled, no identifications possible due to deterioration of sample.

Analyst Comments:

Benthic community condition could not be evaluated for this site.

STATION TFD01

Waterbody Name/Location **Ft. Davis**

Latitude: 38.86832; Longitude: -76.95825

Collection Date 11/19/1997

Metric Group	*Metric Name*	*Metric Value*
DC	EPT Taxa	1
DC	Hilsenhoff Biotic Index	6.64
DC	Hydropsychidae/EPT	100
DC	Percent Chironomidae	80.41
DC	Percent Collectors	83.51
DC	Percent Dominance	80.41
DC	Percent EPT	7.22
DC	Percent Shredders	5.15
DC	Scrapers/Scrapers+Filterers	0
DC	Taxonomic Richness	5
DC	Trichoptera Taxa	1
RBP	Clinger Taxa	1
RBP	EPT Taxa	1
RBP	Intolerant Taxa	0
RBP	Percent Clingers	7.22
RBP	Percent Dominance	80.41
RBP	Percent Ephemeroptera	0
RBP	Percent EPT	7.22
RBP	Percent Filterers	7.22
RBP	Percent Tolerant	83.51
RBP	PercentScrapers	0
RBP	Plecoptera Taxa	0
RBP	Taxonomic Richness	5
RBP	Trichoptera Taxa	1

Taxonomist Comments:

The sample was in a poor state of preservation and specimens were very fragemented. The Chironomidae were counted by heads. There was a piece of rotted white paper inside the jar, but no writing was discernible.

Analyst Comments:

Metric values from this site suggest that the benthic community may be in **Poor** condition. Taxonomic Richness was fair, although Percent Dominance, Percent Tolerant organisms, and Percent Chironomidae were quite high. More data are needed to confirm this evaluation.

STATION TFE01

Waterbody Name/Location

Latitude: 38.98845; Longitude: -77.04280

Collection Date 11/21/1998

Metric Group	*Metric Name*	*Metric Value*
DC	EPT Taxa	1
DC	Hilsenhoff Biotic Index	5.26
DC	Hydropsychidae/EPT	100
DC	Percent Chironomidae	1.72
DC	Percent Collectors	4.31
DC	Percent Dominance	90.52
DC	Percent EPT	90.52
DC	Percent Shredders	0.86
DC	Scrapers/Scrapers+Filterers	0
DC	Taxonomic Richness	5
DC	Trichoptera Taxa	1
RBP	Clinger Taxa	1
RBP	EPT Taxa	1
RBP	Intolerant Taxa	0
RBP	Percent Clingers	90.52
RBP	Percent Dominance	90.52
RBP	Percent Ephemeroptera	0
RBP	Percent EPT	90.52
RBP	Percent Filterers	90.52
RBP	Percent Tolerant	8.62
RBP	PercentScrapers	0
RBP	Plecoptera Taxa	0
RBP	Taxonomic Richness	5
RBP	Trichoptera Taxa	1

Taxonomist Comments:

Sample was in very poor condition, mostly fragments, apparently due to sample preparation. Smell was very bad. Hydropsychidae counted by heads only. .

Analyst Comments:

Metric values from this site suggest that the benthic community may be in **Fair-Poor** condition. Taxonomic Richness was fair and Percent Dominance was very high. However, Percent EPT was high and the Hilsenhoff Biotic Index Percent Tolerant organisms was quite low. More data are needed to confirm this evaluation.

STATION TFS01

Waterbody Name/Location **Ft. Stanton**

Latitude: 38.86402; Longitude: -76.97675

Collection Date 10/29/1998

Metric Group	*Metric Name*	*Metric Value*
DC	EPT Taxa	0
DC	Hilsenhoff Biotic Index	6.97
DC	Hydropsychidae/EPT	0
DC	Percent Chironomidae	32.35
DC	Percent Collectors	52.94
DC	Percent Dominance	32.35
DC	Percent EPT	0
DC	Percent Shredders	8.82
DC	Scrapers/Scrapers+Filterers	0
DC	Taxonomic Richness	9
DC	Trichoptera Taxa	0
RBP	Clinger Taxa	0
RBP	EPT Taxa	0
RBP	Intolerant Taxa	0
RBP	Percent Clingers	0
RBP	Percent Dominance	32.35
RBP	Percent Ephemeroptera	0
RBP	Percent EPT	0
RBP	Percent Filterers	11.76
RBP	Percent Tolerant	64.71
RBP	PercentScrapers	0
RBP	Plecoptera Taxa	0
RBP	Taxonomic Richness	9
RBP	Trichoptera Taxa	0

Taxonomist Comments:

The sample was very cloudy but was able to evaluate after rinsing several times. The paper label that was inside the sample jar was deteriorated but readible. There were no Trichoptera, which seemed odd. The sample also included three terrestrial ants.

Analyst Comments:

Metric values from this site suggest that the benthic community may be in **Fair** condition. Taxonomic Richness was good and Percent Chironomidae and Percent Dominance were low. More data are needed to confirm this evaluation.

STATION THR02

Waterbody Name **Hickey Run**

Latitude: 38.92035; Longitude: -76.97483

Collection Date 11/19/1997

Metric Group	*Metric Name*	*Metric Value*
DC	EPT Taxa	1
DC	Hilsenhoff Biotic Index	8.16
DC	Hydropsychidae/EPT	100
DC	Percent Chironomidae	52.47
DC	Percent Collectors	95.48
DC	Percent Dominance	52.47
DC	Percent EPT	0.43
DC	Percent Shredders	0.43
DC	Scrapers/Scrapers+Filterers	88.24
DC	Taxonomic Richness	7
DC	Trichoptera Taxa	1
RBP	Clinger Taxa	1
RBP	EPT Taxa	1
RBP	Intolerant Taxa	0
RBP	Percent Clingers	0.43
RBP	Percent Dominance	52.47
RBP	Percent Ephemeroptera	0
RBP	Percent EPT	0.43
RBP	Percent Filterers	0.43
RBP	Percent Tolerant	99.14
RBP	PercentScrapers	3.23
RBP	Plecoptera Taxa	0
RBP	Taxonomic Richness	7
RBP	Trichoptera Taxa	1

Taxonomist Comments:

The sample was in fair preservation condition but required several rinses. The Chironomidae/Tubificidae/lumbricidae colony was so large and intertwined that it was quartered, by eye, and these three families were identified, by heads, and the totals were combined.

Analyst Comments:

Metric values from this site suggest that the benthic community may be in **Fair-Poor** condition. Taxonomic Richness was fairly high, the ratio of scrapers to scraping and filtering individuals was high, and Percent Chironomidae and Percent Dominance were moderate. However, Percent Tolerant organisms and the Hilsenhoff Biotic Index were extremely high. More data are needed to confirm this evaluation.

STATION TNA01

Waterbody Name/Location **Tributary Nosh**

Latitude: 38.91005; Longitude: -76.94117

Collection Date 10/28/1998

Taxonomist Comments:

The sample was in very poor shape, had deteriorated too greatly to identify taxa.

Analyst Comments:

Benthic community condition could not be evaluated for this site.

STATION TNS01

Waterbody Name/Location **Norman Stone**

Latitude: 38.92020; Longitude: -77.05672

Collection Date 10/22/1998

Metric Group	*Metric Name*	*Metric Value*
DC	EPT Taxa	1
DC	Hilsenhoff Biotic Index	8.05
DC	Hydropsychidae/EPT	100
DC	Percent Chironomidae	10.53
DC	Percent Collectors	84.21
DC	Percent Dominance	73.68
DC	Percent EPT	5.26
DC	Percent Shredders	10.53
DC	Scrapers/Scrapers+Filterers	0
DC	Taxonomic Richness	4
DC	Trichoptera Taxa	1
RBP	Clinger Taxa	1
RBP	EPT Taxa	1
RBP	Intolerant Taxa	0
RBP	Percent Clingers	5.26
RBP	Percent Dominance	73.68
RBP	Percent Ephemeroptera	0
RBP	Percent EPT	5.26
RBP	Percent Filterers	5.26
RBP	Percent Tolerant	84.21
RBP	PercentScrapers	0
RBP	Plecoptera Taxa	0
RBP	Taxonomic Richness	4
RBP	Trichoptera Taxa	1

Taxonomist Comments:

Sample was in a fair state of preservation.

Analyst Comments:

Metric values from this site suggest that the benthic community may be in **Very Poor** condition. Taxonomic richness was low, and Percent Dominance, Percent Tolerant organisms, and the Hilsenhoff Biotic Index were quite high. More data are needed to confirm this evaluation.

STATION TPB01

Waterbody Name/Location **Popes Branch (2 of 4)**

Latitude: 38.87743; Longitude: -76.96617

Collection Date 10/29/1998

Metric Group	*Metric Name*	*Metric Value*
DC	EPT Taxa	0
DC	Hilsenhoff Biotic Index	9.65
DC	Hydropsychidae/EPT	0
DC	Percent Chironomidae	9.68
DC	Percent Collectors	98.39
DC	Percent Dominance	88.71
DC	Percent EPT	0
DC	Percent Shredders	0.81
DC	Scrapers/Scrapers+Filterers	0
DC	Taxonomic Richness	4
DC	Trichoptera Taxa	0
RBP	Clinger Taxa	0
RBP	EPT Taxa	0
RBP	Intolerant Taxa	0
RBP	Percent Clingers	0
RBP	Percent Dominance	88.71
RBP	Percent Ephemeroptera	0
RBP	Percent EPT	0
RBP	Percent Filterers	0
RBP	Percent Tolerant	99.19
RBP	PercentScrapers	0
RBP	Plecoptera Taxa	0
RBP	Taxonomic Richness	4
RBP	Trichoptera Taxa	0

Taxonomist Comments:

Sample was in fair-poor shape. Tubificidae's number of individuals was estimated due to fragmentation/disintegration of sample.

Analyst Comments:

Metric values from this site suggest that the benthic community may be in **Very Poor** condition. Taxonomic Richness was low, and Percent Dominance, Percent Tolerant organisms, and the Hilsenhoff Biotic Index were extremely high. More data are needed to confirm this evaluation.

STATION TPB01 (1 of 4)

Waterbody Name/Location **Popes Branch (1 of 4)**

Latitude: 38.87743; Longitude: -76.96617

Collection Date 10/29/1998

Taxonomist Comments:

Sample was in very poor state of preservation. Could only roughly identify two taxa, Oligochaeta and Tubificidae, but all were so fragmented and dissolved that individuals could not be identified/counted with any degree of certainty.

Analyst Comments:

Benthic community condition could not be evaluated for this site.

STATION TPB01 (4 of 4)

Waterbody Name/Location **Popes Branch (4 of 4)**

Latitude: 38.87743; Longitude: -76.96617

Collection Date 10/29/1998

Metric Group	*Metric Name*	*Metric Value*
DC	EPT Taxa	0
DC	Hilsenhoff Biotic Index	8.04
DC	Hydropsychidae/EPT	0
DC	Percent Chironomidae	61.6
DC	Percent Collectors	94.35
DC	Percent Dominance	61.6
DC	Percent EPT	0
DC	Percent Shredders	0
DC	Scrapers/Scrapers+Filterers	92.86
DC	Taxonomic Richness	5
DC	Trichoptera Taxa	0
RBP	Clinger Taxa	0
RBP	EPT Taxa	0
RBP	Intolerant Taxa	0
RBP	Percent Clingers	0
RBP	Percent Dominance	61.6
RBP	Percent Ephemeroptera	0
RBP	Percent EPT	0
RBP	Percent Filterers	0.39
RBP	Percent Tolerant	99.81
RBP	PercentScrapers	5.07
RBP	Plecoptera Taxa	0
RBP	Taxonomic Richness	5
RBP	Trichoptera Taxa	0

Taxonomist Comments:

The sample was in a fair state of preservation. The Chironomidae/Tubificidae were so large an intertwined colony that they were quartered, by eye, and these two families were identified and counted from that subsample and their total numbers were derived.

Analyst Comments:

Metric values from this site suggest that the benthic community may be in **Fair-Poor** condition. Taxonomic Richness was fair and Percent Dominance was moderate. There was a high ratio of scapers to scraping and filtering individuals. However, Percent Tolerant organisms and the Hilsenhoff Biotic Index were extremely high. More data are needed to confirm this evaluation.

STATION TPI01

Waterbody Name/Location **Pinehurst Tributary**

Latitude: 38.97137; Longitude: -77.04412

Collection Date 10/21/1998

Metric Group	*Metric Name*	*Metric Value*
DC	EPT Taxa	1
DC	Hilsenhoff Biotic Index	5
DC	Hydropsychidae/EPT	100
DC	Percent Chironomidae	0
DC	Percent Collectors	0
DC	Percent Dominance	50
DC	Percent EPT	50
DC	Percent Shredders	0
DC	Scrapers/Scrapers+Filterers	0
DC	Taxonomic Richness	2
DC	Trichoptera Taxa	1
RBP	Clinger Taxa	1
RBP	EPT Taxa	1
RBP	Intolerant Taxa	0
RBP	Percent Clingers	50
RBP	Percent Dominance	50
RBP	Percent Ephemeroptera	0
RBP	Percent EPT	50
RBP	Percent Filterers	50
RBP	Percent Tolerant	0
RBP	PercentScrapers	0
RBP	Plecoptera Taxa	0
RBP	Taxonomic Richness	2
RBP	Trichoptera Taxa	1

Taxonomist Comments:

There were only two specimens in the sample.

Analyst Comments:

Benthic community condition could not be evaluated for this site due to extremely low organism abundance and Taxa Richness.

STATION Upper Watts

Waterbody Name/Location **Upper Watts Branch**

Latitude: 38.89255; Longitude: -76.91562

Collection Date 10/28/1998

Metric Group	*Metric Name*	*Metric Value*
DC	EPT Taxa	1
DC	Hilsenhoff Biotic Index	7.38
DC	Hydropsychidae/EPT	100
DC	Percent Chironomidae	79.17
DC	Percent Collectors	95.83
DC	Percent Dominance	79.17
DC	Percent EPT	4.17
DC	Percent Shredders	0
DC	Scrapers/Scrapers+Filterers	0
DC	Taxonomic Richness	4
DC	Trichoptera Taxa	1
RBP	Clinger Taxa	1
RBP	EPT Taxa	1
RBP	Intolerant Taxa	0
RBP	Percent Clingers	4.17
RBP	Percent Dominance	79.17
RBP	Percent Ephemeroptera	0
RBP	Percent EPT	4.17
RBP	Percent Filterers	4.17
RBP	Percent Tolerant	95.83
RBP	PercentScrapers	0
RBP	Plecoptera Taxa	0
RBP	Taxonomic Richness	4
RBP	Trichoptera Taxa	1

Taxonomist Comments:

The paper label inside the sample jar had deteriorated so badly that the site/sample name could not be determined with 100% certainty by the taxa identifier. There was what appeared to be a 1 cm by 2.5 cm piece of cotton in the sample jar. A terrestrial spider was also in the sample.

Analyst Comments:

Metric values from this site suggest that the benthic community may be in **Poor** condition. Taxonomic Richness was low, and Percent Dominance, Percent Tolerant organisms, and the Hilsenhoff Biotic Index were high. More data are needed to confirm this evaluation.

STATION Watts Branch (Lower)

Waterbody Name/Location **Lower Watts Branch**

Latitude: 38.90768; Longitude: -76.95297

Collection Date 10/7/1998

Metric Group	*Metric Name*	*Metric Value*
DC	EPT Taxa	1
DC	Hilsenhoff Biotic Index	7.71
DC	Hydropsychidae/EPT	0
DC	Percent Chironomidae	64.29
DC	Percent Collectors	95.24
DC	Percent Dominance	64.29
DC	Percent EPT	2.38
DC	Percent Shredders	0
DC	Scrapers/Scrapers+Filterers	0
DC	Taxonomic Richness	6
DC	Trichoptera Taxa	0
RBP	Clinger Taxa	0
RBP	EPT Taxa	1
RBP	Intolerant Taxa	1
RBP	Percent Clingers	0
RBP	Percent Dominance	64.29
RBP	Percent Ephemeroptera	2.38
RBP	Percent EPT	2.38
RBP	Percent Filterers	0
RBP	Percent Tolerant	95.24
RBP	PercentScrapers	0
RBP	Plecoptera Taxa	0
RBP	Taxonomic Richness	6
RBP	Trichoptera Taxa	0

Taxonomist Comments:

The sample was in poor-fair shape. Many specimens were in fragments, identifications were often based upon heads. A Leptophlebiidae mayfly was in very poor shape but was able to be identified. The Empididae dance fly was kept by taxa identifier.

Analyst Comments:

Metric values from this site suggest that the benthic community may be in **Fair-Poor** condition. Taxonomic Richness was moderate and 1 Intolerant Taxon was identified. However, Percent Dominance and the Hilsenhoff Biotic Index were rather high, and Percent Tolerant organisms was quite high. More data are needed to confirm this evaluation.

Appendix F

Quality Assurance Plan
for Stream Macrobenthic Invertebrate Counts

This QA Plan describes the procedures followed by Interstate Commission on the Potomac River Basin staff for identifying and enumerating the District of Columbia stream macrobenthic invertebrate samples collected in 1997 and 1998. The preserved samples were obtain from District of Columbia staff. Samples were emptied into an 8" x 10" white enamel dish, and all individuals in each sample were enumerated. All taxa were identified to the lowest possible taxonomic level. Identifications were made at 40x magnification with a dissecting scope. Counts and identifications were performed by a trained ICPRB staff member, Jim Cummins. Mr. Cummins' skill in identifying stream macrobenthic invertebrates has been periodically retested in programs offered by the Maryland Biological Stream Survey and the Pennsylvania Department of Environmental Quality.

Appendix G

Manuscript submitted to the journal "Estuaries," May 2005

Phytoplankton Index of Biotic Integrity for Chesapeake Bay and its Tidal Tributaries
by Richard V. Lacouture, Jacqueline M. Johnson, Claire Buchanan, and Harold G. Marshall