The 1998 - 1999 Split Sample Study for Chesapeake Bay Program Phytoplankton, Microzooplankton and Mesozooplankton Monitoring Components

June 8, 2000

Prepared by

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Executive Summary

The Chesapeake Bay Program (CBP) Monitoring Program has included plankton components since it began in 1984, but it has never carried out quality assurance comparisons of the laboratory methods employed in each jurisdiction. These comparisons are needed to confirm that the various plankton laboratories are producing high quality data useful to CBP managers. A split sample study was done in 1998 and 1999 to compare the Maryland and Virginia monitoring results for phytoplankton, microzooplankton and mesozooplankton. The study indicated generally good comparability between the phytoplankton monitoring programs while pointing out several important differences in the programs' abilities to identify and enumerate certain small cells with precision. Discrepancies were known to occur in the microzooplankton data because sample collections were limited to the >44 micron size fraction at some Maryland stations and the laboratories used different procedures. The Split Sample Study confirmed that laboratory counts for two important microzooplankton categories are comparable, indicated where analysis adjustments were need to make the third important category directly comparable, and reiterated the need for genus-species enumerations in one laboratory and the need for enhanced sample collection and analysis in the other laboratory. The phytoplankton and microzooplankton programs as they presently exist should be able to meet most of the management information needs for phyto- and microzooplankton listed in the Chesapeake Bay Basin-wide Monitoring Strategy (Draft 1999)

State managers and program staff were aware that laboratory method differences, implemented at the start of the Maryland and Virginia monitoring programs, were probably affecting the mesozooplankton monitoring results. While the existing monitoring data provide meaningful status and trend assessments *within* each state, the monitoring programs recognized the growing CBP information needs for mesozooplankton data that are comparable *bay-wide*. The programs modified their laboratory methods in 1998 in order to better estimate species richness in Maryland and eliminate laboratory sieving losses of smaller mesozooplankton taxa and life stages in Virginia. The 1998 - 1999 Split Sample Study indicates the desired outcomes of the modifications were only partially accomplished. A single method needs to be selected and implemented because the modified laboratory methods of the two programs do not produce comparable results. A single method will allow the programs to calculate and use a diverse suite of bay-wide mesozooplankton indicators and more effectively address the information needs of the Program.

Plankton indicators are proving to be useful tools in measuring overall ecosystem health, targeting restoration efforts in open water habitats, and tracking food web responses to management actions such as nutrient and sediment reductions. Ongoing data analyses indicate all of the plankton monitoring programs, including the mesozooplankton, can presently provide the monitoring data required to calculate many important plankton indicators. The monitoring data are able to distinctly characterize the various segments of Chesapeake Bay and its tidal tributaries. They are being used to confirm and track strong plankton linkages to water quality and other living resources. They appear to be sensitive to ecosystem change in tidal waters. Program improvements stemming from the Split Sample Study should serve to further enhance the existing usefulness of the plankton data.

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Introduction

Zooplankton Method Modifications Made Prior to the Split Sample Study After long-running discussions and several meetings, the Maryland and Virginia mesozooplankton laboratories agreed to modify their current laboratory methods in order to resolve the suspected discrepancies and improve data comparability. For mesozooplankton, the Virginia laboratory (Old Dominion University) continued to use its customary Controlled Variability Sampling (CVS) apparatus to obtain an "old method count" and added a 72 micron mesh sieve at the bottom of the CVS apparatus to capture smaller-sized mesozooplankton taxa. A "new method count" would be obtained by combining enumerations from the old method and the 72 micron sieve. The Maryland laboratory (Versar, Inc.) continued to use its usual subsample counting method and obtain an "old method count" for mesozooplankton. The laboratory then filtered the whole sample through a large-size screen to concentrate and enumerate the rarer, large-sized individuals. Versar obtained a "new method count" by combining enumerations from the old method and the large size sieve. The advantage of using the original method and producing "old" and "new" method counts is that–if the modifications both worked--future data would be both backward compatible with pre-1998 data within each state as well as directly comparable between states in the future.

For microzooplankton, the monitoring staffs agreed that additions to Maryland's sample collection method and modifications to Virginia's sampling counting method could make Maryland and Virginia results directly comparable. The Maryland laboratory (Academy of Natural Sciences) was at that time pumping water through a 44 micron net in the field to concentrate and collect a >44 micron sample fraction. This method gives good abundance measurements for rotifers and copepod nauplii - taxa most important to higher trophic levels. In the spring of 1998, ANS began collecting an additional, a whole water sample and expanded its laboratory analyses to count protozoans - the taxa which best reflect the extent of the microbial loop and the impacts of eutrophication. The net sample count and the whole water sample count, combined, was to become the "new ANS method count" for the Maryland microzooplankton program. *Abundances* calculated with the "new ANS method" were expected to be directly comparable to those of the existing Virginia microzooplankton program. The Virginia laboratory, Old Dominion University, agreed it could improve the level of taxonomy of its counts with some staff training. This improvement would make the state programs' indices of *diversity* directly comparable, as well.

Phytoplankton counting protocols in Maryland and Virginia are very similar and probably produce directly comparable data. However, this had never been confirmed with split sampling and both laboratories were interested in documenting the data's comparability. The one known discrepancy between the two programs was the fact that the Virginia program includes a picoplankton component (very small phytoplankton) whereas Maryland's program does not. The close linkages between picoplankton, bacteria and nutrients makes this component a very good one to monitor for early ecosystem responses to nutrient reductions.

1998 - 1999 Split Sample Study A split sampling study was done in the spring and summer of 1998 to compare results of the Maryland and Virginia plankton monitoring programs. The Virginia laboratory (Old Dominion University (ODU)) and Maryland laboratories (Versar, Inc.; Academy of Natural Sciences Estuarine Research Center (ANS)) used 24 phytoplankton, 12 microzooplankton and 24 mesozooplankton samples collected in April, May and June, 1998, during the regular monitoring cruises. The preserved samples were split in half. One split was be enumerated by the originating laboratory as part of its monitoring program, and the other was enumerated by the corresponding lab in the other state. The sites investigated included locations the length of the Bay, having a range of salinities, with exposure to different river basins and environmental conditions. The river sites also varied considerably regarding salinity regions, local ecological factors, and biota.

Two counts were produced by Versar and ODU for each Maryland and Virginia mesozooplankton split sample: one count generated with the laboratory's old method and one generated with their modified method. Specifically, Versar produced a count with its original method and a count which *included* enumerations of mesozooplankton caught on the added large-size sieve. ODU produced a count with its original CVS method and a count which *included* enumerations of mesozooplankton caught on the added 72 micron sieve.

The ANS collected whole water microzooplankton samples for the split sample study[1] and sent 12 splits to ODU. It counted the corresponding splits with its "new ANS method" (see above). The laboratories enumerated all microzooplankton taxa their customary taxonomic levels, and produced one count for each split sample. After the split samples had been counted, ODU staff Alicia LoGalbo traveled to ANS for 4 days and worked with ANS staff Stella Sellner to improve the level of taxonomy in the ODU counts and ensure comparable species identifications.

The ANS and ODU laboratories used their standard counting protocols to produce one count for each Maryland and Virginia phytoplankton split sample. Preserved water samples (1 liter) were thoroughly mixed and divided into equal splits (500 ml each). One split was analyzed by each laboratory. In addition to identifying areas of mutual strength, the split sampling effort also benefitted the program by identifying algal categories that needed more attention.

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[1] Because ANS's *collection* method differed from ODU, ODU would have to collect an additional, net (>44 micron) sample for ANS in order to create a real split sample. This was judged too much effort, so ODU and ANS only performed split samples on whole water samples collected in Maryland.

All split sample enumerations and the data analyses performed on them to-date were discussed at a "Plankton Summit" held on September 11-12, 1998 at Old Dominion University. Further analyses were done and additional meetings convened after the September 1998 Plankton Summit. The results and conclusions of the Plankton Split Sample Study are described in detail in the following three chapters.

A REVIEW OF SPLIT SAMPLE RESULTS REGARDING PHYTOPLANKTON COMPOSITION AND ABUNDANCE IN SAMPLES EXAMINED BY OLD DOMINION UNIVERSITY AND THE ACADEMY OF NATURAL SCIENCE ESTUARINE RESEARCH CENTER

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August 2000*

*This report replaces, with editing and content changes of
a January/February 1999 copy previously released.

Participants and Purpose:

David Seaborn and Harold Marshall, Old Dominion University (ODU).
Richard Lacouture and Ann Marie Hartsig, Academy of Natural Science Estuarine Research Center (ANS).

The above participants met at the Phytoplankton Analysis Laboratory at Old Dominion University, Norfolk, Virginia on November 12, 1998. Both ANS and ODU representatives provided water samples that were previously examined in the Split Sampling study by the two laboratories. Sub-samples from these were then prepared for microscope analysis. Samples selected were those where differences in cell counts had been identified in the study. Side by side examinations of water samples by the participants were conducted. Results of the re-examination of these samples by those assembled are given below.

Differences Associated with Different Magnification Effects.

1. The identification of species above the cell size of 8 microns showed only minor taxonomic problems between the two laboratories. Little disagreement involving species categories or species identification was present. Identification questions were centered on only a few very small taxa (see #2 following).

RESOLUTION: None needed. The two laboratories will continue to work together on questions in the interpretation of species taxonomy in the future, as they have in the past.

2. Cells less than 8 microns in size. Several samples indicated the presence of 1 or 2 small algae, less than 6 microns in size, that were given different interpretations regarding their identity as either a diatom, a green cell (*Chlorella* sp.), or a cell placed in a general unidentified category of cells 3-5 microns in size. Microscopic analysis indicated some of these cells could be included in either one of these categories.

RESOLUTION: Differences in making calls of this type, of a very small cell with so few taxonomic features with light microscopy, is not uncommon. In an effort to resolve this particular question, ODU can conduct examinations of samples containing these cells with scanning electron microscopy which would clarify these identifications.

However, it should be noted that the present monitoring program does not support SEM analysis of cells within these small size categories, or where questionable identifications may be present. This is one reason a certain amount of lumping of cells into broader groups is often used for different levels of taxonomy, if essential identification characteristics are not discernable with light microscopy. In most cases, this lumping is found in cells belonging to one taxonomic category (e.g. pennate diatoms <10 microns in size), but it may also occur in mixed taxonomic categories (as in B-2 described below).

There are restraints that are imposed on monitoring phytoplankton populations as to the degree of species identification that can be expected. It should be understood that not every species can be identified using light microscopy alone.

COMMENT: There are differences in the initial amount of the water sample analyzed by the two laboratories and differences in the counting techniques between ODU and ANS regarding what magnifications are used. Both ODU and ANS identify taxa at 312x and 500x magnifications. In addition, ODU scans the entire sample at a lower magnification (125x) for species that were not noted at the other levels. The approaches vary in that ANS uses 500X as its primary magnification, while ODU uses 312X for the magnification containing the majority of species for its counting protocol. The combination of different sub-samples used in the analysis, the emphasis placed on the different magnifications, plus the additional lower magnification used by ODU will offer some bias between the results produced by the two laboratories. In spite of these differences, the two programs have mutual goals and overall a similar basis for species identification. There are also similar approaches used in the "lumping" of cells, within many of the specific taxonomic categories (e.g. pennate diatoms < 10 microns). Both of these laboratory approaches are well established in both programs, each with an extensive historical data base.

Taxonomic Evaluations

1. There is a difference in the nomenclature used by the two laboratories for species within the cyanobacteria genera *Merismopedia (ODU)* and *Agmenellum* (ANS). These genera are considered synonymous.

RESOLUTION: To be discussed within the two laboratoriers. Either one genus should be selected for use, or the taxonomic code numbers for similar species should be matched.

COMMENT: Both of the type species and genera for these two designations were established the same year (1839). The genus *Merismopedia* is used by Geitler (1932), Desikachary (1959), and in the revision of the cyanobacteria by Komarek and Anagnostidis (1986). We recommend this usage also.

2. The inclusion (lumping) of more than one generic group in the "small microflagellates" category was discussed. ANS counts all small flagellated cells noted within this size category, whereas, ODU will include small unidentifiable flagellated cells only if they contain an autotrophic (phytoplankton) characteristic (e.g. scales such as in coccolithophores, stained plastids). These differences result in higher counts in this category from ANS. The question raised is the lack of comparability in the counts in this group by the two labs, because past ANS records of this group would (may) include both heterotrophic and autotrophic cells.

Another factor in the discrepancy of microflagellates in the split samples counted by the two laboratories, is the inclusion of six different phyla and six taxa within the Chlorophyta in the microflagellate category by ANS. In contrast, ODU only includes two taxa into this category, placing other taxa included by ANS in specific phylogenetic categories, thereby creating a discrepancy simply based upon the different definitions of 'microflagellates' coined by the two laboratories.

RESOLUTION: Both ANS and ODU agree this category should not be included in the counts for the Bay Monitoring Program analysis for the Baywide indicators. However, both ODU and ANS will continue using their individual protocols for recording cells in this category.

3. *Microcystis* and the autotrophic picoplankton cell counts were discussed. The majority of the picoplankton cells are also cyanobacteria. Cells within these groups may be similar in appearance. Differences occur in many of the samples where Maryland's *Microcystis* cell counts are higher than ODU. During side by side comparisons of *Microcystis* colonies by personnel from the two labs, there were no differences in their identification. A possible variable in these counts is that ODU records the concentrations of the autotrophic picoplankton cells under a separate classification listing. These include clutches of cells that may not be identified as *Microcystis* by ODU under that category. ANS indicates they count small bluegreen spheres as *Microcystis* only when there is a colonial assemblage of cells. Both labs have the opinion that they have been calling the *Microcystis* colonies in the same way.

RESOLUTION: The laboratories concur on how they identify *Microcystis*. However, in the presence of these past differences in cell counts for *Microcystis*, it is not recommended to use cyanophyte densities as a Baywide indicator.

4. Maryland category #221 Blue Green Trichomes. The split samples indicated high concentrations of these trichomes reported by ANS in the Maryland samples, but that they were not reported by ODU in their examination of these samples. The original split water samples in which these were reported by ANS were re-examined at this time. These cells were not found in either the original Maryland or the ODU sample sets.

Comment: ANS believes there are optical resolution differences in the microscopes used by ODU and ANS that would explain the differences in counts of the thin filamentous cyanobacteria (1-2 um) and the interpretation differences in the identification of the small diatoms or chlorophyte cells. However, at ODU, in the search for these filamentous cells, 3 different Zeiss inverted plankton microscopes were used with the same negative results, with one microscope having higher magnification capabilities than that used at ANS.

RESOLUTION: Unresolved at this time, but further cell comparisons in this category are recommended. ANS indicated when these cells are noted again, they will provide samples to ODU. In addition, ANS has also invited an ODU representative to their lab to examine these at their facilities using their microscopes. (See Addendum)

Cell Count Differences Associated With Laboratory Protocols

1. Counts associated with cyanobacteria trichomes. ANS provides total cell counts for the cells in a cyanobacterium trichome. ODU records each trichome as 1 trichome, without cell number. This produces higher cell counts for the filamentous cyanobacteria in the Maryland data. For instance, this value may represent 35-40 cells per trichome for a particular cyanophyte, and be reported as such by Maryland, whereas, Virginia would record this as a single unit (trichome).

RESOLUTION: ANS will indicate the mean cell counts per trichome they have used for the filamentous cyanobacteria to ODU (Michael Lane, AMRL) . These cell values may be used to revise the past ODU Bay data set records for these species, and be used in future data entry by ODU.

2. Species Diversity. A comparison of the split samples indicated ODU includes a greater amount of species identified (44%) than ANS. Within the split samples analyzed, the range of

taxa identified was 10 to 47 for ANS, and 20 to 68 for ODU. There are two differences in the protocols used. One is in the sub-samples taken by the 2 labs to analyze, and the other is that ODU uses a 3rd level of lower magnification to scan the field for cells that are not included in the other magnification counts. There is an inherent difference between taxonomists in the degree of comfort that is felt in classifying organisms to the genus and species level. This variability occurs within some laboratories and between labs and could account for a certain degree of the differences within this parameter, in addition to the different protocols that are used by the two laboratories.

RESOLUTION: A third level of magnification (125x magnification scan) may increase the number of species recorded in the ANS analysis.

3. Autotrophic picoplankton analysis. This category represents one of the most important components and indicators of water quality in the Chesapeake Bay plankton community. Virginia has a long term data set for this category, yet it is lacking in the Maryland program. The incorporation of this component in the ANS analysis data set would be a valuable asset in the interpretation of health status and trends in the Bay estuarine system.

RESOLUTION: It is recommended that the analysis for the autotrophic picoplankton component be included in the Maryland plankton monitoring program.

Taxa Where Counts And Identifications Are Comparable For Indicator Purposes

Comparable results were found among the following taxonomic categories in both laboratories and which can be used for Chesapeake Bay-wide indicator purposes:

Diatom biomass
Dinoflagellate biomass
Chlorophyll a
Productivity

This does not mean the other taxonomic categories identified by both laboratories are not comparable, only that these categories mentioned above are considered to be the most useful in the development of a phytoplankton indicator system. ODU and ANS will examine the analysis results provided by this set in each of the salinity regimes, and make decisions if additional categories would be necessary.

Taxon Categories Not Considered Comparable Or Useful For Indicator Purposes

The following categories are not considered comparable for Bay wide analysis purposes:

Autotrophic Picoplankton *
Small microflagellates **
Cyanobacteria biomass***
Cyanobacteria cell concentrations***

* conducted only in Virginia
** different protocols used by the 2 labs
***After changes are made regarding cell counts/trichomes in the ODU data set.

Conclusions and Summary

1. The joint examination of the previously collected split samples took place by representatives of the two laboratories. Side by side comparisons were made of various taxa and their identifications.

2. Although there were a few differences in several calls of the very small taxa, there were suggestions as to how these differences would be resolved in future analyses by the two laboratories. There were no major differences noted in any of the other taxonomic categories examined. For instance, there were very close comparisons within the samples for diatoms and dinoflagellates.

3. Based on our discussions and the review of the data sets, ODU and ANS have made recommendations as to which components within the phytoplankton data set would be most suitable, and comparable across the Bay, for incorporation in the bio-indicator analysis program, in addition to those we do not recommend.

4. In addition, in order to provide closer, and continued agreement in phytoplankton identification between the two laboratories, it is recommended that: 1. Future discourse on matters of species identification between the two laboratories (ODU and ANS) be incorporated as an annual component of the Bay Monitoring Program, and this would include regular visitations by personnel to both laboratories; and 2. When needed, additional SEM analysis, or other protocols be incorporated to clarify any questions regarding the identification of major species within the Bay ecosystem.

5. The two laboratories (ODU and ANS) express their appreciation for the support of this project. The project was a worthwhile activity and the results of this interaction will enhance conformity in the analysis of the phytoplankton community within the Bay ecosystem.

ADDENDUM*

August 2000

*This addendum replaces, with editing and content changes, a previously modified release of the original February 1999 report.

Introduction

At the conclusion of the initial review of the split sample analysis between the two laboratories in November 1998, it was recommended by the participants that Old Dominion University (ODU) representatives meet at the Academy of Natural Sciences (ANS) to continue this review process. Scanning electron microscopy (SEM) examination was also suggested.

On February 4, 1999, the two ODU representatives traveled to the ANS laboratory to work with the ANS representatives to continue the split samples analysis. ODU also brought with them one of their laboratory microscopes.

Participants

David Seaborn and Harold Marshall, Old Dominion University

Richard Lacouture and Anne-Marie Hartsig, Academy of Natural Sciences.

Specific questions to be resolved were as follows:

Item 1. Clarify the status of the small size cells less than 6 microns in size. It was suggested that these cells be examined with SEM, and with the samples and microscopes at the ANS laboratory.

Item 2. Can the small #221 blue green (cyanobacteria) trichome category be identified with microscopes used in the different laboratories. Is there an optical resolution problem to be considered.

Results

Item 1. ODU conducted SEM analysis of the plankton samples originally examined in this study. The SEM micrographs indicated the size and occurrence of small centric diatoms, with cell diameters of 4 to 5 microns, and the presence of spherical, soft-bodied cells approximately 2 to 3 microns in size. These results indicated the presence of two categories of cells in the samples. The smaller soft-bodied cell could be classified as either a chlorophyte (e.g. *Chlorella* sp.) or placed in a size category of cells. Distinctions between these two groups were reviewed at this time with light microscopy.

Item 2. These blue green (cyanobacteria) trichomes were observed and identified with microscopes from both laboratories. Optical resolution using the different microscopes was not

an issue. The characteristics of these cells were reviewed and both groups agreed these cells should continue to be in the blue green trichome category. Its species identification will require further study. However, there was concern expressed by ANS that these trichomes were difficult to discern with the ODU microscope and that this may have been a factor in why the trichomes were not present as sub-dominants in the examination of samples at ODU (and were a common sub-dominant in the ANS analysis), and accounted for the discrepancies noted in comparing the split sample results for these blue green trichomes between the two labs. In response, the ODU laboratory staff has been made aware of the concern by ANS in regard to the differences in the counts of these blue green trichomes between our two labs, and although not finding any inaccuracies in their previous counts of this taxon, will take special attention in the future counts of this trichome . This is a positive and cooperative response exhibited by the laboratories to address either separate or mutual concerns by the laboratories regarding findings concerning taxon identification, or abundance, etc.

Further Activities

1. The ODU and ANS participants believe this past experience was very worthwhile and we plan to continue sample review and exchange practice this summer (1999). We will compare at least one set of water samples for phytoplankton at two mainstem stations, CB5.2 and CB6.1.

2. The two laboratories will continue to work closely on any future events related to the phytoplankton dynamics in the Bay, in addition to questions of species identifications, etc.

Recommendations

1. ODU and ANS recommend the continuation and financial support of future annual exchange visits by the laboratory participants to both the ODU and ANS phytoplankton laboratories.

2. ODU and ANS recommend further discussions between the two laboratories are essential regarding a continuous dialogue regarding species identifications, factors associated with algal bloom events, the presence of exotic and potentially toxic species in Chesapeake Bay, and ways in which our combined data sets and specific taxon groups will have broader application to the goals of the Chesapeake Bay Monitoring Program.

Analysis Protocols Followed by the Two Laboratories

I. Academy of Natural Science Estuarine Research Center

An appropriate subsample (generally 1 -10 ml) is pipetted from the 500 ml sample and placed in a one or two piece settling chamber (depending on the volume; 1-2 ml in a one piece chamber, > 2 ml in a two piece chamber). This subsample is allowed to settle for an appropriate amount of time (2-48 hrs.) If necessary, the upper settling column is slid from the bottom plate and placed on the microscope. The sample is initially analyzed at 500X, whereby > 200 individual cells are enumerated in at least 20 'randomly' selected fields. Additional fields are inspected, if necessary, until a minimum of 200 cells have been counted. Upon completion of this magnification, 20 random fields are inspected at 312.5X and any taxa not enumerated at 500X are done so at this lower magnification.

II. Old Dominion University Phytoplankton Analysis Lab

Two composite replicate 500 ml samples fixed in Lugol's solution are mixed (1000 ml) and a 500 ml sub-sample is obtained and preserved with buffered formalin. A procedure of settling (72 hours) followed by siphoning is repeated 3 times to reduce the original volume and its contents to a 40 ml concentrate of the original 500 ml sub-sample. A known volume of this concentrated 500 ml sample (e.g. 1.25, 2.5, etc. ml; determined by concentration of phytoplankton and silt) is transferred to an Utermöhl settling chamber and allowed to settle for 24-48 hours. At 312X magnification, a combined examination of at least10 random fields plus a minimum cell count of 200 is followed. If cell counts do not reach 200 cells from 10 random fields, additional fields are counted until that number is reached. The species counts are continued at 500X magnification for 10 additional fields. Species counted at this magnification are those not counted at 312X. The entire field of the counting chamber is then examined at 125X magnification for other species not counted with the other 2 magnifications.

Appendix: Summary of results of the phytoplankton split sample comparison between Old Dominion University and the Academy of Natural Sciences

Summary of results of the phytoplankton split sample comparison between Old Dominion University and the Academy of Natural Sciences

Elgin Perry

Using the dataset PHYTSUM.SD2 prepared by Jackie, the nodc codes that appeared to be used consistently between laboratories were selected. There are:

```
if nodccode = '03'      Blue Greens
or nodccode = '0701'    Diatoms
or nodccode = '1201'    Dinoflagellates
or nodccode = '0801';   Greens
```

The data from the two labs were then merged by date,station, layer, and nodccode. If a density for a taxanomic group appeared for on Lab and not the other, the Lab which did not have a density for that group was assigned a density of zero.

After matching the records, the difference between labs was computed as the density for ANS minus the density for ODU.

```
difdens = ansdens - odudens;
```

The percent difference is computed as the difference between the labs divided by the mean of the labs and scaled to percent.

```
difpct = 200 * difdens / (ansdens+odudens);
```

In addition, in an effort to achieve distributional properties more like the normal distribution, a difference variable was also computed in a logarithm metric.

```
lnoduden = log10(odudens+1);
lnansden = log10(ansdens+1);
lndifden = lnansden - lnoduden;
```

To compare the labs, this difference variable was subjected to the following statistical tests:

1. Shapiro-Wilks test for normality,
2. Paired t-test, and
3. Wilcoxon signed-rank test.

When it appeared that the normality assumption required by the paired t-test was not met, the results of the signed-rank test are reported.

Other summary statistics as shown in the results were also computed.

Because problems remain in the data - I've not spent any time on interpretation. The departure from normality in these data is due to heavy tailed distributions in the difference scores which I think will diminish when the mismatching due to layer is fixed.

Results:

TAXA=Blue Greens

OBS	DATE	STATION	NODC	LAYER	ANSDENS	ODUDENS	DIFDENS	DIFPCT
1	05/01/97	TF4.2	03	BP	566499	0	566499	200.000
2	04/06/98	CB6.4	03	BP	5533248	256	5532992	199.981
3	04/06/98	CB7.4	03	BP	4775720	24902	4750818	197.925
4	04/10/98	RET4.3	03	AP	368883	658048	-289165	-56.316
5	04/13/98	TF5.5	03	AP	396128	262400	133728	40.614
6	04/20/98	MLE2.2	03		0	54784	-54784	-200.000
7	04/20/98	MLE2.2	03	AP	5268107	0	5268107	200.000
8	04/21/98	MCB4.3C	03		0	424576	-424576	-200.000
9	04/21/98	MCB4.3C	03	AP	483360	0	483360	200.000
10	04/21/98	MWT5.1	03	AP	2915360	0	2915360	200.000
11	04/27/98	XDE5339	03	AP	5370400	128	5370272	199.990
12	05/01/98	RET3.1	03	BP	0	0	0	.
13	05/06/98	RET3.1	03	BP	0	12962120	-12962120	-200.000
14	05/06/98	TF4.2	03	BP	0	1757184	-1757184	-200.000
15	05/08/98	LE3.6	03	AP	31453880	0	31453880	200.000
16	05/18/98	CB6.1	03	AP	9749056	2367780	7381276	121.835
17	05/18/98	LE3.6	03	AP	0	507648	-507648	-200.000
18	05/19/98	MCB3.3C	03		0	315392	-315392	-200.000
19	05/19/98	MCB3.3C	03	AP	1994720	0	1994720	200.000
20	05/19/98	MET5.2	03		0	2304	-2304	-200.000
21	05/19/98	MET5.2	03	AP	3426827	0	3426827	200.000
22	05/19/98	MWT5.1	03	AP	147916160	768	147915392	199.998
23	05/26/98	PXT0402	03		0	740352	-740352	-200.000
24	05/26/98	PXT0402	03	AP	14730240	0	14730240	200.000
25	06/01/98	MCB5.2	03		0	232832	-232832	-200.000
26	06/01/98	MCB5.2	03	AP	4040587	0	4040587	200.000
27	06/01/98	WE4.2	03	BP	5269760	27520	5242240	197.922
28	06/01/98	XEA6596	03		0	11374848	-11374848	-200.000
29	06/01/98	XEA6596	03	AP	60915680	0	60915680	200.000
30	06/03/98	CB7.3	03	AP	0	1152	-1152	-200.000
31	06/03/98	CB7.3C	03	AP	1152760	0	1152760	200.000
32	06/08/98	XDE5339	03	AP	1315200	640	1314560	199.805
33	06/08/98	XED4892	03		0	113920	-113920	-200.000
34	06/08/98	XED4892	03	WC	613760	0	613760	200.000
35	06/23/98	RET5.2	03	AP	145659460	58754560	86904900	85.028
36	06/25/98	SBE5	03	BP	3557088	378096	3178992	161.568

TAXA=Diatoms

OBS	DATE	STATION	NODC	LAYER	ANSDENS	ODUDENS	DIFDENS	DIFPCT
37	05/01/97	TF4.2	0701	BP	424699	0	424699	200.000
38	04/06/98	CB6.4	0701	BP	3428462	6445834	-3017372	-61.116
39	04/06/98	CB7.4	0701	BP	1965050	2117190	-152140	-7.454
40	04/10/98	RET4.3	0701	AP	1744010	1297536	446474	29.358
41	04/13/98	TF5.5	0701	AP	6815530	6250752	564778	8.645
42	04/20/98	MLE2.2	0701		0	2642176	-2642176	-200.000
43	04/20/98	MLE2.2	0701	AP	24775235	0	24775235	200.000
44	04/21/98	MCB4.3C	0701		0	1974528	-1974528	-200.000
45	04/21/98	MCB4.3C	0701	AP	41505520	0	41505520	200.000
46	04/21/98	MWT5.1	0701	AP	10664080	880384	9783696	169.496
47	04/27/98	XDE5339	0701	AP	79665732	1649792	78015940	191.884
48	05/01/98	RET3.1	0701	BP	42305020	0	42305020	200.000
49	05/06/98	RET3.1	0701	BP	0	36889147	-36889147	-200.000
50	05/06/98	TF4.2	0701	BP	0	769664	-769664	-200.000
51	05/08/98	LE3.6	0701	AP	10097709	0	10097709	200.000
52	05/18/98	CB6.1	0701	AP	5536366	4745800	790566	15.377
53	05/18/98	LE3.6	0701	AP	0	3194112	-3194112	-200.000
54	05/19/98	MCB3.3C	0701		0	4866432	-4866432	-200.000
55	05/19/98	MCB3.3C	0701	AP	11891600	0	11891600	200.000
56	05/19/98	MET5.2	0701		0	1137152	-1137152	-200.000
57	05/19/98	MET5.2	0701	AP	25982507	0	25982507	200.000
58	05/19/98	MWT5.1	0701	AP	24611145	10274048	14337097	82.196
59	05/26/98	PXT0402	0701		0	4813568	-4813568	-200.000
60	05/26/98	PXT0402	0701	AP	23466855	0	23466855	200.000
61	06/01/98	MCB5.2	0701		0	8043648	-8043648	-200.000
62	06/01/98	MCB5.2	0701	AP	9769013	0	9769013	200.000
63	06/01/98	WE4.2	0701	BP	7062335	6910720	151615	2.170
64	06/01/98	XEA6596	0701		0	13241984	-13241984	-200.000
65	06/01/98	XEA6596	0701	AP	20589755	0	20589755	200.000
66	06/03/98	CB7.3	0701	AP	0	9192594	-9192594	-200.000
67	06/03/98	CB7.3C	0701	AP	5707282	0	5707282	200.000
68	06/08/98	XDE5339	0701	AP	5699200	1343488	4355712	123.695
69	06/08/98	XED4892	0701		0	4616960	-4616960	-200.000
70	06/08/98	XED4892	0701	WC	14474507	0	14474507	200.000
71	06/23/98	RET5.2	0701	AP	7001140	13938688	-6937548	-66.262
72	06/25/98	SBE5	0701	BP	2454180	2742214	-288034	-11.086

TAXA=Dinoflagellates

OBS	DATE	STATION	NODC	LAYER	ANSDENS	ODUDENS	DIFDENS	DIFPCT
73	05/01/97	TF4.2	1201	BP	0	0	0	.
74	04/06/98	CB6.4	1201	BP	236788	291403	-54615	-20.680
75	04/06/98	CB7.4	1201	BP	96586	28102	68484	109.849
76	04/10/98	RET4.3	1201	AP	0	41216	-41216	-200.000
77	04/13/98	TF5.5	1201	AP	0	0	0	.
78	04/20/98	MLE2.2	1201		0	208384	-208384	-200.000
79	04/20/98	MLE2.2	1201	AP	1380960	0	1380960	200.000
80	04/21/98	MCB4.3C	1201		0	140416	-140416	-200.000
81	04/21/98	MCB4.3C	1201	AP	460320	0	460320	200.000
82	04/21/98	MWT5.1	1201	AP	76720	27648	49072	94.036
83	04/27/98	XDE5339	1201	AP	4173252	1685504	2487748	84.924
84	05/01/98	RET3.1	1201	BP	0	0	0	.
85	05/06/98	TF4.2	1201	BP	0	128	-128	-200.000
86	05/08/98	LE3.6	1201	AP	1163058	0	1163058	200.000
87	05/18/98	CB6.1	1201	AP	433078	877716	-444638	-67.843
88	05/18/98	LE3.6	1201	AP	0	919168	-919168	-200.000
89	05/19/98	MCB3.3C	1201		0	55424	-55424	-200.000
90	05/19/98	MCB3.3C	1201	AP	337253	0	337253	200.000
91	05/19/98	MET5.2	1201		0	7724672	-7724672	-200.000
92	05/19/98	MET5.2	1201	AP	7927733	0	7927733	200.000
93	05/19/98	MWT5.1	1201	AP	153440	302592	-149152	-65.413
94	05/26/98	PXT0402	1201	AP	0	0	0	.
95	06/01/98	MCB5.2	1201		0	467072	-467072	-200.000
96	06/01/98	MCB5.2	1201	AP	255733	0	255733	200.000
97	06/01/98	WE4.2	1201	BP	392795	114816	277979	109.524
98	06/01/98	XEA6596	1201		0	15360	-15360	-200.000
99	06/01/98	XEA6596	1201	AP	0	0	0	.
100	06/03/98	CB7.3	1201	AP	0	228453	-228453	-200.000
101	06/03/98	CB7.3C	1201	AP	426842	0	426842	200.000
102	06/08/98	XDE5339	1201	AP	2149090	1851776	297314	14.862
103	06/08/98	XED4892	1201		0	256	-256	-200.000
104	06/08/98	XED4892	1201	WC	0	0	0	.
105	06/23/98	RET5.2	1201	AP	68990	64512	4478	6.709
106	06/25/98	SBE5	1201	BP	60532	48014	12518	23.065

TAXA=Greens

OBS	DATE	STATION	NODC	LAYER	ANSDENS	ODUDENS	DIFDENS	DIFPCT
107	05/01/97	TF4.2	0801	BP	92221	0	92221	200.000
108	04/06/98	CB6.4	0801	BP	32936	126924	-93988	-117.588
109	04/06/98	CB7.4	0801	BP	1600962	84415	1516547	179.965
110	04/10/98	RET4.3	0801	AP	161834	213171	-51337	-27.379
111	04/13/98	TF5.5	0801	AP	434404	1055974	-621570	-83.411
112	04/20/98	MLE2.2	0801		0	1740621	-1740621	-200.000
113	04/20/98	MLE2.2	0801	AP	1022933	0	1022933	200.000
114	04/21/98	MCB4.3C	0801		0	4532096	-4532096	-200.000
115	04/21/98	MCB4.3C	0801	AP	460320	0	460320	200.000
116	04/21/98	MWT5.1	0801	AP	2608480	0	2608480	200.000
117	04/27/98	XDE5339	0801	AP	2576530	0	2576530	200.000
118	05/01/98	RET3.1	0801	BP	950270	0	950270	200.000
119	05/06/98	RET3.1	0801	BP	0	3094328	-3094328	-200.000
120	05/06/98	TF4.2	0801	BP	0	345318	-345318	-200.000
121	05/08/98	LE3.6	0801	AP	1646800	0	1646800	200.000
122	05/18/98	CB6.1	0801	AP	32936	7428458	-7395522	-198.234
123	05/18/98	LE3.6	0801	AP	0	1328512	-1328512	-200.000
124	05/19/98	MCB3.3C	0801		0	2131942	-2131942	-200.000
125	05/19/98	MCB3.3C	0801	AP	351650	0	351650	200.000
126	05/19/98	MET5.2	0801		0	2706074	-2706074	-200.000
127	05/19/98	MET5.2	0801	AP	153440	0	153440	200.000
128	05/19/98	MWT5.1	0801	AP	856740	0	856740	200.000
129	05/26/98	PXT0402	0801		0	2163763	-2163763	-200.000
130	05/26/98	PXT0402	0801	AP	1380960	0	1380960	200.000
131	06/01/98	MCB5.2	0801		0	1138253	-1138253	-200.000
132	06/01/98	MCB5.2	0801	AP	409173	0	409173	200.000
133	06/01/98	WE4.2	0801	BP	0	871552	-871552	-200.000
134	06/01/98	XEA6596	0801		0	4557875	-4557875	-200.000
135	06/01/98	XEA6596	0801	AP	2896430	0	2896430	200.000
136	06/03/98	CB7.3	0801	AP	0	169087	-169087	-200.000
137	06/03/98	CB7.3C	0801	AP	0	0	0	.
138	06/08/98	XDE5339	0801	AP	0	0	0	.
139	06/08/98	XED4892	0801		0	1565952	-1565952	-200.000
140	06/08/98	XED4892	0801	WC	1235015	0	1235015	200.000
141	06/23/98	RET5.2	0801	AP	9429140	9750323	-321183	-3.349
142	06/25/98	SBE5	0801	BP	0	831969	-831969	-200.000

TAXA=Blue Greens

Univariate Procedure

Variable=LNDIFDEN

Moments

N	36	Sum Wgts	36
Mean	1.046857	Sum	37.68684
Std Dev	5.166423	Variance	26.69192
Skewness	-0.28234	Kurtosis	-1.51058
T:Mean=0	1.215762	Pr>|T|	0.2322
Sgn Rank	86	Pr>=|S|	0.1620
W:Normal	0.872352	Pr<W	0.0004

Stem	Leaf	#	Boxplot
7	258	3	
6	135567	6	
5	3788	4	+-----+
4	36	2	| |
3	3	1	| |
2	33	2	| |
1	0	1	*--+--*
0	0246	4	| |
-0	3	1	| |
-1			| |
-2			| |
-3	41	2	| |
-4	7	1	+-----+
-5	976541	6	|
-6	2	1	|
-7	11	2	|

----+----+----+----+

TAXA=Diatoms

Univariate Procedure

Variable=LNDIFDEN

Moments

Std Dev	5.720108	Variance	32.71964
CV	2298.605	Std Mean	0.953351
T:Mean=0	0.261028	Pr>|T|	0.7956
Num ^= 0	36	Num > 0	20
M(Sign)	2	Pr>=|M|	0.6177
Sgn Rank	63	Pr>=|S|	0.3292
W:Normal	0.836075	Pr<W	0.0001

Stem	Leaf	#	Boxplot
7	0012344466	10	+-----+
6	8	1	| |
5	6	1	| |
4			| |
3			| |
2			| |
1	17	2	| |
0	001146	6	*--+--*
-0	3300	4	| |
-1			| |
-2			| |
-3			| |
-4			| |
-5	9	1	| |
-6	97775431	8	+-----+
-7	610	3	|

----+----+----+----+

TAXA=Dinoflagellates

Univariate Procedure

Variable=LNDIFDEN

Moments

N	34	Sum Wgts	34
Mean	-0.28434	Sum	-9.66757
Std Dev	3.947704	Variance	15.58437
Skewness	0.233647	Kurtosis	-0.70135
T:Mean=0	-0.41998	Pr>|T|	0.6772
Sgn Rank	-1	Pr>=|S|	0.9823
W:Normal	0.894571	Pr<W	0.0031

Stem	Leaf	#	Boxplot
6	119	3	|
5	4567	4	|
4			|
3			|
2			|
1			|
0	0000000114455	13	+-----+
-0	331	3	| + |
-1			| |
-2	41	2	| |
-3			| |
-4	762	3	+-----+
-5	7431	4	|
-6	90	2	|

TAXA=Greens

Univariate Procedure

Variable=LNDIFDEN

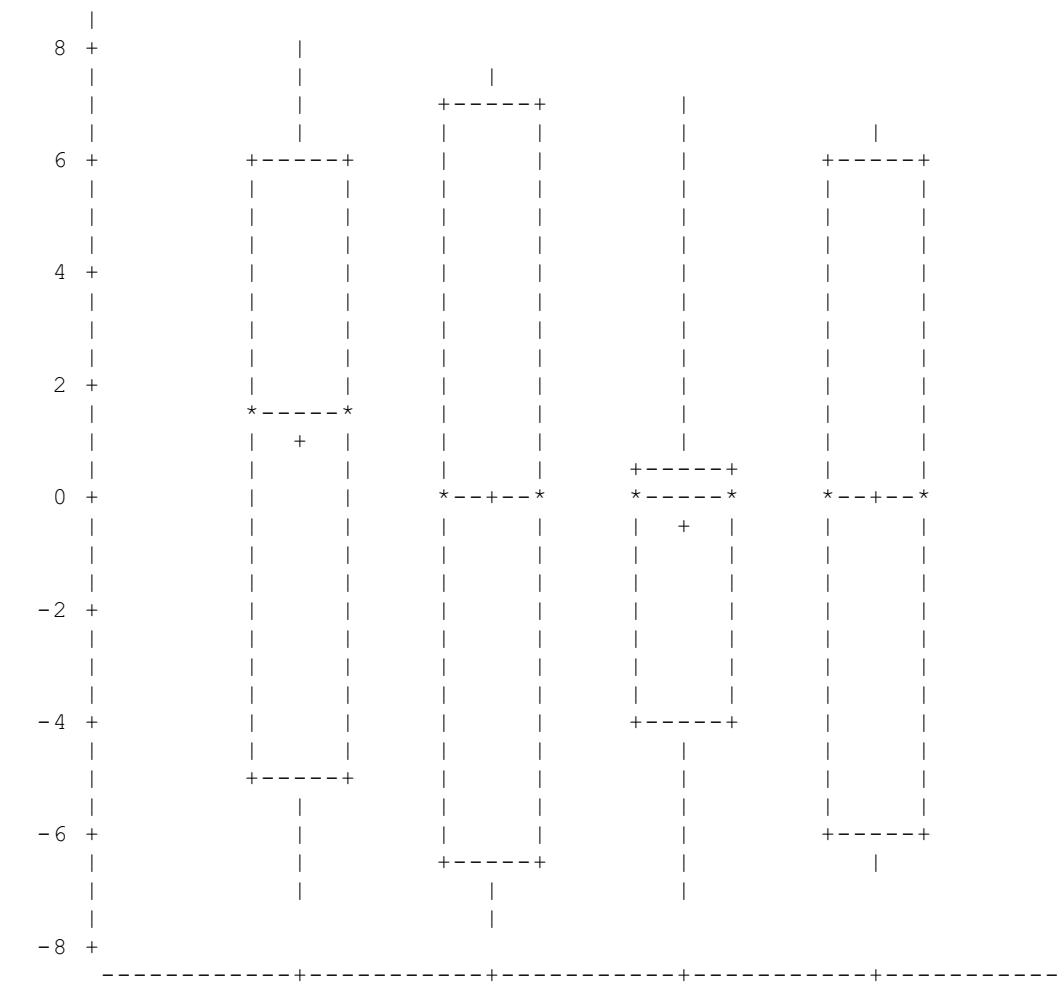
Moments

N	36	Sum Wgts	36
Mean	-0.15819	Sum	-5.69468
Std Dev	5.423099	Variance	29.41001
Skewness	0.019567	Kurtosis	-1.78465
T:Mean=0	-0.17501	Pr>|T|	0.8621
Sgn Rank	-37.5	Pr>=|S|	0.5295
W:Normal	0.797567	Pr<W	0.0001

Stem	Leaf	#	Boxplot
6	00112445	8	
5	025679	6	+-----+
4			| |
3			| |
2			| |
1	3	1	| |
0	00	2	| |
-0	6410	4	*--+--*
-1			| |
-2	4	1	| |
-3			| |
-4			| |
-5	9952	4	| |
-6	7754332211	10	+-----+

----+----+----+----+

Variable=LNDIFDEN



TAXA=Blue Greens

Variable	N	Mean	PCTDIF
ODUDENS	36	2526728.06	
ANSDENS	36	12707580.08	
DIFDENS	36	10180852.03	138

TAXA=Diatoms

Variable	N	Mean	PCTDIF
ODUDENS	36	4166066.97	
ANSDENS	36	10767692.56	
DIFDENS	36	6601625.58	88

TAXA=Dinoflagellates

Variable	N	Mean	PCTDIF
ODUDENS	34	443900.94	
ANSDENS	34	582152.06	
DIFDENS	34	138251.12	27

TAXA=Greens

Variable	N	Mean	PCTDIF
ODUDENS	36	1273239.08	
ANSDENS	36	787032.61	
DIFDENS	36	-486206.47	-47

ANS/ODU Microzooplankton Split Sampling Meeting
Data Review Report

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ANS/ODU Microzooplankton Split Sampling Meeting
Data Review Report

The microzooplankton component of the MD Water Quality Monitoring Program began in 1984. VA added microzooplankton to their program in 1993. At that time, the differences in methodology between the 2 programs were discussed and preliminary data were examined. It was evident from the onset that there were some major differences in sampling and counting techniques. Recently, the importance of compatibility of data from both programs to establish Bay wide indicators has been discussed. It is from these discussions and a prior split sampling meeting that the need to make the programs more comparable has become a priority.

Purpose

The purpose of the meeting was to assemble the microzooplankton taxonomists from both ANSERC and ODU to review the results of the Z score analysis Elgin Perry had run on the original split sample counts, discuss the differences in collection and counting techniques between the MD and VA programs and, using the Z scores, reexamine samples which showed the greatest differences between the 2 labs. Listed below are the concerns, results of discussion, conclusions and recommendations that came from this meeting, held on January 20-22, 1999.

Concerns

1. ODU netting of samples leads to possible breakage of fragile ciliates. ODU did a series of counts comparing whole water and netted samples. From a 2 liter water sample, 50ml of sample were removed for a whole water count. The remaining sample was handled in the usual way with the larger organisms caught on a 73µm mesh net and the water passing through subsampled and a count done for the smaller organisms. The 2 methods compared well for ciliates.
Conclusion- Methods compared well for ciliates which occurred in large numbers but greater discrepancies existed for those organisms found in low numbers. Netting is not a problem once samples have been fixed.

2. Discrepancies in grouping of organisms.
The following is a table which lists the differences between MD and VA in defining various taxonomic groups of microzooplankton:

Group	ODU	ANSERC
Copepod nauplii	all, length <200µm	all
Rotifers	all, length <200µm	all
Sarcodinids	all	all
Tintinnids	all >20µm in width, length doesn't matter	all in mesohaline all > 44 µm in others
Non loric ciliates	all > 20µm in width, less than 200µm in length	all in mesohaline all > 44 µm in others

Barnacle nauplii	all < 200µm in length	none
Polychaete larvae	all < 200µm in length	none
Pelecypod larvae	all < 200µm in length (In other category)	all
Gastropod larvae	all < 200µm in length (In other category)	all
Cladocerans	all < 200µm in length	none

ODU uses the classical definition of microzooplankton being zooplankton 20-200µm in size. ANSERC also counts the non-loricate ciliates and tintinnids that are less than 20µm in size. ANSERC considers barnacle nauplii, polychaete larvae and cladocerans to be mesozooplankton and does not count any organisms within these groups. These organisms are enumerated in the MD mesozooplankton program. ODU size cutoffs for tintinnids and non-loricate ciliates are based on widths while ANSERC's size categories are based on length. Example- A ciliate that is 15µm wide and 60µm long is not counted by ODU. ANSERC counts it and puts it into a size category of 50-99µm in length.
Conclusion- Using current techniques, rotifers and copepod nauplii are the only groups that compare well between the 2 labs. Sarcodinids are too low in numbers to use. Ciliates and tintinnids cannot be used because of differences in counting techniques (based on size).
Recommendation- ODU adopts ANSERC's method of enumerating all ciliates and does not drop any ciliates from counts that are less than 20µm in width.

3. Calculating densities of organisms in subsamples using large multipliers. Both counting techniques use multipliers to convert the number of organisms counted in the subsample (raw count) to the number of organisms per ml (standardized count). Some of the multipliers are quite large and a low number or organisms seen in a subsample may appear to represent a very high density.
Recommendation- Have Elgin review this to determine the error involved in these methods.

4. Differences in magnification used by the 2 labs when examining smaller organisms. When doing whole water counts, ANSERC uses a magnification of 312.5X while ODU uses 200X as their highest magnification for their groups 2 and 3 which are predominately made up of the smallest organisms counted.
Recommendation- For ODU to be able to accurately count the smaller ciliates less than 20µm in width, they begin to use the same magnification as ANSERC.

5. Preservative differences. ODU uses Lugol's which stains darkly and shrinks soft bodied organisms but is necessary to preserve fragile ciliates. ANSERC uses formalin for net samples and Lugol's for whole water samples. Rotifers are easier to identify using formalin than Lugol's. This became apparent in one comparison count in which a ciliate fixed in Lugol's was identified as a rotifer because it's internal structures could not be seen.
Recommendation- ODU look into using a narcotizing agent such as neosynefrin prior to fixation in Lugol's to relax rotifers. The effect of this on fragile ciliates would have to be

carefully evaluated. Cross checking between the 2 labs when there is a questionable organism would eliminate some of the potential identification problems.

6. Degree of identification and method of grouping organisms. ODU doesn't speciate organisms, using only very broad categories. ANSERC takes rotifers and tintinnids to lowest possible level of identification. ANSERC categorizes ciliates based on size and general groupings.
Recommendation- Currently, ODU groups all their non-loricate ciliates as oligotrichs. This is not necessarily accurate as not all non-loricate ciliates are in this group. In their data sets, ODU should not use this group name. It should be changed to non-loricate ciliates.

7. Data dictionaries do not define exactly what is being counted and included in the data sets (such as ciliates>20 µm in width).
Recommendation- Both labs should review and edit their data dictionaries and make them more specific in regards to what is included in the data sets. It should be suggested to Jackie Johnson that somewhere in the documentation that is on the web, the differences between the labs regarding the counting techniques and grouping of the organisms in the counts be specified.

8. Continuation of comparison of counts between the 2 labs. The statistics that Elgin Perry ran on the split samples were invaluable for the comparison of the 2 counting techniques. The split sampling and meetings to compare results also proved to be very helpful in trying to make the monitoring data more comparable.
Recommendation- Split sampling between the labs be done annually and the results be compared with Elgin's guidance. There should also be a continuation of "ongoing technical collaboration" between the labs along with an annual meeting to discuss results. The idea of a formal basic training program for new microzooplankton taxonomists coming into the monitoring program along with the writing of a guide to microzooplankton in the Chesapeake Bay (which could ultimately be put on the web) were also proposed and needs to be discussed further.

Summary of Counting Differences Based on Z Scores and Actual Percent Differences

The following comments and tables summarize statistical and 'arithmetic' comparisons of the microzooplankton split samples. In the table at the end of the discussion, the actual Z scores are reported. A Z score less than -2 or greater than 2 indicates a difference between the labs.
Note- The comparison split samples taken from MWT5.1 in June has been omitted from discussion because of a discrepancy in sampling dates between the replicate samples sent to ODU.

1. Copepod nauplii- Z scores indicated no significant difference between the labs for this group of organisms.

2. Rotifers- Two major disagreements
MCB2.1- This appeared to be a taxonomic problem in which a ciliate was counted as a rotifer because it was difficult to identify after being fixed with Lugol's. When these were removed from ODU counts, the densities were ANSERC=85/liter and ODU=114/liter (rather than 1994 /liter). Need to rerun with corrected data.
MET5.1 in May- Samples examined for id problems and none could be found. There may have been a sampling problem, such as patchiness of the organisms, when the split samples were taken.

3. Tintinnids- Over half the samples had significant differences between the labs. Samples were rechecked for identification and 2 differences became obvious. There is a genus of tintinnid called *Tintinnidium* which is difficult to identify and may have been overlooked in ODU samples. Small tintinnids which are less than 20µm in width would not be counted by ODU, and this probably led to most of the differences between the labs.
Recommendation- When there is a question in identification of a dominant organism, cross checking between labs should be done. ODU should drop their cutoff of 20µm for the width of the tintinnids and include all of these organisms in their counts.

4. Sarcodinids- Sarcodinids usually occur in very low numbers. They can also be extremely difficult to identify in samples with debris. The sample taken at XEA6596 in June was reexamined because of extremely high numbers of sarcodinids found by ODU. When the subsamples were examined, the sarcodinids could not be found.
Recommendation- Sarcodinids should not be included when analyzing results of split sampling.

5. Non-loricate Ciliates- This group had the most discrepancies. Two major differences were found. ODU does not count the non-loricate ciliates less than 20µm in **width**. ANSERC counts all ciliates, grouping them by **length**. As mentioned previously, a ciliate which is 15µm wide by 60µm in length would be counted by ANSERC and not by ODU. There is no way to remove these from the ANSERC counts since they are not grouped by width. Because of drawings made when the count was done, we were able to do this for MET5.1 in May. ANSERC removed the ciliates less than 20µm in width from the final count. The ANSERC density was 1700 (instead of 9800)/liter and the

ODU density was 1800/liter. The second difference was due to the presence of the photosynthetic ciliate *Myrionecta (*or *Mesodinium) rubra* which can occur in very high numbers. ANSERC counts them and puts them in a separate category and ODU excludes them from their data sets. ANSERC only identified the obvious ones that were in side view and put the questionable ones in the ciliate category. ODU didn't report any.
Recommendation-ODU counts all ciliates regardless of size as well *as Myrionecta*. This would allow ciliates to be used as a Baywide indicator.

Overall Recommendation-For current Baywide comparisons, copepod nauplii and rotifers should be used. It is important to revise the counting protocol of the labs so that ciliates can be used as a Baywide indicator in the future.

ANS/ODU Microzooplankton Split Sampling Results

Z Scores

Statistical significance of split samples between ANS and ODU
Values greater than 2 or less than -2 indicate a difference between labs

STATION	MONTH	NAUPLII	ROTIFERS	TINTINNIDS	CILIATES	SARCODIN.
MCB5.2	MARCH	-0.57	-1.79	14.37	2.10	*
MET5.2	MARCH	1.68	-0.58	3.67	-1.86	0.36
MCB5.2	APRIL	0.69	-0.81	-6.06	-1.09	0.81
MET5.1	APRIL	-0.77	-1.44	1.20	-4.05	1.63
MCB2.1	MAY	1.89	-13.34	-1.10	27.87	*
MCB3.3C	MAY	-0.15	-1.82	8.66	36.60	*
MET5.1	MAY	0.51	6.10	6.06	37.02	6.41
MLE2.2	MAY	1.98	0.62	-3.12	48.52	*
MCB4.3C	JUNE	2.00	-1.02	18.45	62.84	*
PXT0402	JUNE	0.92	-2.48	3.17	4.52	4.62
XEA6596	JUNE	0.74	-3.36	-3.00	-26.71	-10.80

(*) INDICATES NOT PRESENT IN SAMPLE

ANS/ODU Microzooplankton Split Sampling Results

% DIFFERENCE BETWEEN SAMPLES

STATION	MONTH	NAUPLII	ROTIFERS	TINTINNIDS	CILIATES
MCB5.2	MARCH	29.82	24.26	47.12	12.05
MET5.2	MARCH	26.25	36.00	69.16	10.26
MCB5.2	APRIL	28.82	18.16	23.42	5.82
MET5.1	APRIL	11.93	36.76	30.79	11.15
MCB2.1	MAY	25.95	95.68	9.12	52.03
MCB3.3C	MAY	3.76	36.25	43.90	95.65
MET5.1	MAY	8.00	39.70	24.99	81.63
MLE2.2	MAY	21.64	16.62	35.46	99.20
MCB4.3C	JUNE	20.51	57.30	71.85	76.19
PXT0402	JUNE	14.52	25.33	25.41	27.44
XEA6596	JUNE	21.60	28.27	20.85	82.16

Appendix: Analyses of Microzooplankton 1998 Split Sample Data

November 13, 1998

To: Stella Sellner (ANS) and Alicia Logalbo (ODU)

Fr: Elgin Perry

Re: Microzooplankton split sample analyses

I've been working on a comparison of the micro zoo split sample data data that uses the sampling variance as a benchmark of difference between labs. My first job is to come up with some comparable taxanomic groups. The SAS code (I hope you can read it) below shows how I am reassigning the taxonomy that you report with your data into groups for comparison. Would you two please review this with the idea of what revisions are needed to make the data more comparable.

After the SAS code is a listing of the results of the first run. You might also look this over an note any problems that you see. The first table in the results shows how the taxonomy was reassigned for ANS. The next table shows the ANS data summed by taxanomic group. The next tables shows the Raw data for ODU. The next table shows the ODU data summed over size fractions. The last table show the two data sets merged by date, station, and taxanomic group with the z-score comparisons by sample and taxonomic group. A z-score > 2.0 indicates a difference between the labs.

The code that re-assigns the taxonomy of the ANS data.

```
if 6117 <= spec4 <= 6120                then taxagrp = "COPEPODS";
if 4500 <= spec4 <= 4599                then taxagrp = "ROTIFERS";
if 3512 <= spec4 <= 3539                then taxagrp = "CILIATES";
if 3541 <= spec4 <= 3545                then taxagrp = "CILIATES";
if taxa = "NON-LORICATE CILIATES <20 UM" then taxagrp = "CILIATES";
if taxa = "NON-LORICATE CILIATES >20 UM" then taxagrp = "CILIATES";
if taxa = "NON-LORICATE CILIATES <20UM"  then taxagrp = "CILIATES";
if taxa = "NON-LORICATE CILIATES >20UM"  then taxagrp = "CILIATES";
if taxa = "NON-LORICATE CILIATES"        then taxagrp = "CILIATES";
if taxa = "MYRIONECTA-LIKE CILIATES"     then taxagrp = "CILIATES";
if taxa = "DIDINIUM"                     then taxagrp = "CILIATES";
if taxa = "DIDINIUM SP."                 then taxagrp = "CILIATES";
if spec4 = 3540                          then taxagrp = "TINTINNI";
if taxa  = "TINTINNIDS <44UM"            then taxagrp = "TINTINNI";
if taxa  = "TINTINNIDS >44UM"            then taxagrp = "TINTINNI";
if taxa  = "OTHER TINTINNIDS <44UM"      then taxagrp = "TINTINNI";
if taxagrp = "" then taxagrp = "DROP;
```

Here is the code that re-assigns the ODU taxonomy.

```
if lbl = 'TINTINNINA'    then taxagrp = "TINTINNI";
if lbl = 'COPEPODA'      then taxagrp = "COPEPODS";
if lbl = 'ROTIFERA'      then taxagrp = "ROTIFERS";
if lbl = 'OLIGOTRICHIDA' then taxagrp = "CILIATES";
if taxagrp = "" then taxagrp = "DROP";
```

assignment of taxa groups

OBS	SPECCODE	SPEC4	TAXA	TAXAGRP	RAW_CNT	P	NHAT	NVAR
1	4506130200003	4506	SYNCHAETA SPP. S-SMALL	ROTIFERS	226.00000	0.0075	30133.33	3987644.44
2	3540020100030	3540	TINTINNOPSIS SUBACUTA-HUGE	TINTINNI	210.00000	0.0075	28000.00	3705333.33
3	3540010100050	3540	TINTINNIDIUM SP.-LARGE	TINTINNI	114.00000	0.0075	15200.00	2011466.67
4	4506130200002	4506	SYNCHAETA SPP. M-MEDIUM	ROTIFERS	54.00000	0.0075	7200.00	952800.00
5	4506070100000	4506	TRICHOCERCA SP.	ROTIFERS	29.00000	0.0075	3866.67	511688.89
6	4506130200001	4506	SYNCHAETA SPP. L-LARGE	ROTIFERS	29.00000	0.0075	3866.67	511688.89
7	6117000000001	6117	COPEPOD NAUPLII	COPEPODS	5.00000	0.0075	666.67	88222.22
8	5100000000001	5100	GASTROPODA-LARVAE	DROP	1.00000	0.0075	133.33	17644.44
9		.	DIDINIUM	CILIATES	1.00000	1.0000	1.00	0.00
10		.	TINTINNIDS <44UM	TINTINNI	81.00000	1.0000	81.00	0.00
11		.	NON-LORICATE CILIATES <20 UM	CILIATES	21.00000	1.0000	21.00	0.00
12		.	NON-LORICATE CILIATES >20 UM	CILIATES	45.00000	1.0000	45.00	0.00
13	6117000000001	6117	COPEPOD NAUPLII	COPEPODS	352.00000	0.0440	8000.00	173818.18
14	4506130200001	4506	SYNCHAETA SPP. L-LARGE	ROTIFERS	17.00000	0.0660	257.58	3645.09
15	3540020123003	3540	TINTINNOPSIS FIMBRIATA-MEUNIERI GRP	TINTINNI	6.00000	0.0660	90.91	1286.50
16	4500000000000	4500	ROTIFERA- UNIDED ROTIFER	ROTIFERS	1.00000	0.0660	15.15	214.42
17	3442010000000	3442	DIFFLUGIIDAE	DROP	1.00000	0.0660	15.15	214.42
18	3540020100030	3540	TINTINNOPSIS SUBACUTA-HUGE	TINTINNI	1.00000	0.0660	15.15	214.42
19	4506130200003	4506	SYNCHAETA SPP. S-SMALL	ROTIFERS	1.00000	0.0660	15.15	214.42
20		.	TINTINNIDS <44UM	TINTINNI	2.00000	1.0000	2.00	0.00
21		.	NON-LORICATE CILIATES <20 UM	CILIATES	82.00000	1.0000	82.00	0.00
22		.	NON-LORICATE CILIATES >20 UM	CILIATES	63.00000	1.0000	63.00	0.00
23		.	MYRIONECTA-LIKE CILIATES	CILIATES	47.00000	1.0000	47.00	0.00
24	4506130200003	4506	SYNCHAETA SPP. S-SMALL	ROTIFERS	47.00000	0.0054	8703.70	1603093.28
25	4506070100000	4506	TRICHOCERCA SP.	ROTIFERS	40.00000	0.0054	7407.41	1364334.71
26	3540020100030	3540	TINTINNOPSIS SUBACUTA-HUGE	TINTINNI	37.00000	0.0054	6851.85	1262009.60
27	6117000000001	6117	COPEPOD NAUPLII	COPEPODS	6.00000	0.0054	1111.11	204650.21
28	6118290100001	6118	ACARTIA SP.-NAUPLII	COPEPODS	5.00000	0.0054	925.93	170541.84
29	4506130200020	4506	SYNCHAETA BALTICA	ROTIFERS	5.00000	0.0054	925.93	170541.84
30	4506130200002	4506	SYNCHAETA SPP. M-MEDIUM	ROTIFERS	4.00000	0.0054	740.74	136433.47
31	4506130200001	4506	SYNCHAETA SPP. L-LARGE	ROTIFERS	3.00000	0.0054	555.56	102325.10
32	3445040100000	3445	CYPODERIA SP.	DROP	1.00000	0.0054	185.19	34108.37
33	3540010100050	3540	TINTINNIDIUM SP.-LARGE	TINTINNI	25.00000	1.0000	25.00	0.00
34		.	OTHER TINTINNIDS <44UM	TINTINNI	117.00000	1.0000	117.00	0.00
35		.	NON-LORICATE CILIATES <20UM	CILIATES	627.00000	1.0000	627.00	0.00
36		.	NON-LORICATE CILIATES >20UM	CILIATES	94.00000	1.0000	94.00	0.00
37	6117000000001	6117	COPEPOD NAUPLII	COPEPODS	127.00000	0.0140	9071.43	638887.76
38	3540020123003	3540	TINTINNOPSIS FIMBRIATA-MEUNIERI GRP	TINTINNI	74.00000	0.0280	2642.86	91744.90
39	4506010406000	4506	BRACHIONUS ANGULARIS	ROTIFERS	23.00000	0.0280	821.43	28515.31
40	4506010100000	4506	KERATELLA SP.	ROTIFERS	18.00000	0.0280	642.86	22316.33

assignment of taxa groups

OBS	SPECCODE	SPEC4	TAXA	TAXAGRP	RAW_CNT	P	NHAT	NVAR
41	4507050100000	4507	FILINIA SP.	ROTIFERS	17.00000	0.0280	607.14	21076.53
42	4500000000000	4500	ROTIFERA- UNIDED ROTIFER	ROTIFERS	11.00000	0.0280	392.86	13637.76
43	4506130300000	4506	POLYARTHRA SP.	ROTIFERS	9.00000	0.0280	321.43	11158.16
44	3540010100050	3540	TINTINNIDIUM SP.-LARGE	TINTINNI	6.00000	0.0280	214.29	7438.78
45	4506130200001	4506	SYNCHAETA SPP. L-LARGE	ROTIFERS	5.00000	0.0280	178.57	6198.98
46	3442010000000	3442	DIFFLUGIIDAE	DROP	5.00000	0.0280	178.57	6198.98
47	3445040100000	3445	CYPHODERIA SP.	DROP	5.00000	0.0280	178.57	6198.98
48	4506010103020	4506	KERATELLA COCHLEARIS COCHLEARIS	ROTIFERS	4.00000	0.0280	142.86	4959.18
49	4506010203000	4506	NOTHOLCA ACUMINATA	ROTIFERS	3.00000	0.0280	107.14	3719.39
50	3540020100030	3540	TINTINNOPSIS SUBACUTA-HUGE	TINTINNI	1.00000	0.0280	35.71	1239.80
51	4506010402000	4506	BRACHIONUS CALYCIFLORUS	ROTIFERS	1.00000	0.0280	35.71	1239.80
52	4507040200000	4507	CONOCHILUS SP.	ROTIFERS	1.00000	0.0280	35.71	1239.80
53		.	TINTINNIDS <44UM	TINTINNI	33.00000	1.0000	33.00	0.00
54		.	NON-LORICATE CILIATES >20UM	CILIATES	38.00000	1.0000	38.00	0.00
55		.	NON-LORICATE CILIATES <20UM	CILIATES	28.00000	1.0000	28.00	0.00
56	3540020123003	3540	TINTINNOPSIS FIMBRIATA-MEUNIERI GRP	TINTINNI	289.00000	0.0110	26272.73	2362157.02
57	6118290100001	6118	ACARTIA SP.-NAUPLII	COPEPODS	224.00000	0.0110	20363.64	1830876.03
58	4506130200001	4506	SYNCHAETA SPP. L-LARGE	ROTIFERS	37.00000	0.0210	1761.90	82138.32
59	6117000000001	6117	COPEPOD NAUPLII	COPEPODS	36.00000	0.0210	1714.29	79918.37
60	4506130200003	4506	SYNCHAETA SPP. S-SMALL	ROTIFERS	25.00000	0.0210	1190.48	55498.87
61	4506130200002	4506	SYNCHAETA SPP. M-MEDIUM	ROTIFERS	4.00000	0.0210	190.48	8879.82
62	5500000000001	5500	PELECYPODA-LARVAE	DROP	1.00000	0.0210	47.62	2219.95
63	4500000000000	4500	ROTIFERA- UNIDED ROTIFER	ROTIFERS	1.00000	0.0210	47.62	2219.95
64	4506070100000	4506	TRICHOCERCA SP.	ROTIFERS	1.00000	0.0210	47.62	2219.95
65		.	TINTINNIDS <44UM	TINTINNI	8.00000	1.0000	8.00	0.00
66		.	MYRIONECTA-LIKE CILIATES	CILIATES	89.00000	0.5000	178.00	178.00
67		.	NON-LORICATE CILIATES	CILIATES	1210.00000	0.5000	2420.00	2420.00
68	3540020123003	3540	TINTINNOPSIS FIMBRIATA-MEUNIERI GRP	TINTINNI	534.00000	0.0190	28105.26	1451119.11
69	4506130200003	4506	SYNCHAETA SPP. S-SMALL	ROTIFERS	300.00000	0.0190	15789.47	815235.46
70	6118290100001	6118	ACARTIA SP.-NAUPLII	COPEPODS	196.00000	0.0370	5297.30	137872.90
71	4506130200001	4506	SYNCHAETA SPP. L-LARGE	ROTIFERS	31.00000	0.0370	837.84	21806.43
72	4506130200002	4506	SYNCHAETA SPP. M-MEDIUM	ROTIFERS	23.00000	0.0370	621.62	16178.96
73	6117000000001	6117	COPEPOD NAUPLII	COPEPODS	23.00000	0.0370	621.62	16178.96
74	3540010100050	3540	TINTINNIDIUM SP.-LARGE	TINTINNI	3.00000	0.0370	81.08	2110.30
75	4500000000000	4500	ROTIFERA- UNIDED ROTIFER	ROTIFERS	1.00000	0.0370	27.03	703.43
76		.	TINTINNIDS <44UM	TINTINNI	24.00000	1.0000	24.00	0.00
77		.	DIDINIUM	CILIATES	12.00000	1.0000	12.00	0.00
78		.	MYRIONECTA-LIKE CILIATES	CILIATES	99.00000	0.5000	198.00	198.00
79		.	NON-LORICATE CILIATES	CILIATES	731.00000	0.5000	1462.00	1462.00
80	4506010100000	4506	KERATELLA SP.	ROTIFERS	429.00000	0.0023	186521.74	80909886.58

assignment of taxa groups

OBS	SPECCODE	SPEC4	TAXA	TAXAGRP	RAW_CNT	P	NHAT	NVAR
81	4506010406000	4506	BRACHIONUS ANGULARIS	ROTIFERS	118.00000	0.0046	25652.17	5550907.37
82	6117000000001	6117	COPEPOD NAUPLII	COPEPODS	77.00000	0.0046	16739.13	3622202.27
83	3442010000000	3442	DIFFLUGIIDAE	DROP	60.00000	0.0046	13043.48	2822495.27
84	3540020123003	3540	TINTINNOPSIS FIMBRIATA-MEUNIERI GRP	TINTINNI	57.00000	0.0046	12391.30	2681370.51
85	4507050100000	4507	FILINIA SP.	ROTIFERS	44.00000	0.0046	9565.22	2069829.87
86	4506130300000	4506	POLYARTHRA SP.	ROTIFERS	43.00000	0.0046	9347.83	2022788.28
87	4507040200000	4507	CONOCHILUS SP.	ROTIFERS	38.00000	0.0046	8260.87	1787580.34
88	4506010203000	4506	NOTHOLCA ACUMINATA	ROTIFERS	36.00000	0.0046	7826.09	1693497.16
89	4506070100000	4506	TRICHOCERCA SP.	ROTIFERS	10.00000	0.0046	2173.91	470415.88
90	4500000000000	4500	ROTIFERA- UNIDED ROTIFER	ROTIFERS	6.00000	0.0046	1304.35	282249.53
91	4506130200003	4506	SYNCHAETA SPP. S-SMALL	ROTIFERS	5.00000	0.0046	1086.96	235207.94
92	4506130400000	4506	PLOESOMA SP.	ROTIFERS	5.00000	0.0046	1086.96	235207.94
93	4506120100000	4506	ASPLANCHNA SP.	ROTIFERS	4.00000	0.0046	869.57	188166.35
94	4506010402000	4506	BRACHIONUS CALYCIFLORUS	ROTIFERS	3.00000	0.0046	652.17	141124.76
95	4506010103060	4506	KERATELLA COCHLEARIS TECTA	ROTIFERS	2.00000	0.0046	434.78	94083.18
96	3445040100000	3445	CYPHODERIA SP.	DROP	2.00000	0.0046	434.78	94083.18
97	4508010100000	4508	COLLOTHECA SP.	ROTIFERS	2.00000	0.0046	434.78	94083.18
98	4506010106000	4506	KERATELLA VALGA	ROTIFERS	1.00000	0.0046	217.39	47041.59
99	4504000000000	4504	BDELLOIDA- UNIDED BDELLIOD ROTIFER	ROTIFERS	1.00000	0.0046	217.39	47041.59
100		.	TINTINNIDS <44UM	TINTINNI	95.00000	1.0000	95.00	0.00
101		.	NON-LORICATE CILIATES >20UM	CILIATES	98.00000	1.0000	98.00	0.00
102		.	NON-LORICATE CILIATES <20UM	CILIATES	2.00000	1.0000	2.00	0.00
103	6117000000001	6117	COPEPOD NAUPLII	COPEPODS	158.00000	0.0120	13166.67	1084055.56
104	4506130200003	4506	SYNCHAETA SPP. S-SMALL	ROTIFERS	64.00000	0.0230	2782.61	118200.38
105	3534030700000	3534	STAUROPHRYA SP.	CILIATES	58.00000	0.0230	2521.74	107119.09
106	3442010000000	3442	DIFFLUGIIDAE	DROP	43.00000	0.0230	1869.57	79415.88
107	4506130300000	4506	POLYARTHRA SP.	ROTIFERS	32.00000	0.0230	1391.30	59100.19
108	4506010103020	4506	KERATELLA COCHLEARIS COCHLEARIS	ROTIFERS	28.00000	0.0230	1217.39	51712.67
109	4507040200000	4507	CONOCHILUS SP.	ROTIFERS	23.00000	0.0230	1000.00	42478.26
110	4500000000000	4500	ROTIFERA- UNIDED ROTIFER	ROTIFERS	15.00000	0.0230	652.17	27703.21
111	4506010100000	4506	KERATELLA SP.	ROTIFERS	12.00000	0.0230	521.74	22162.57
112	4506010103060	4506	KERATELLA COCHLEARIS TECTA	ROTIFERS	9.00000	0.0230	391.30	16621.93
113	4506010402000	4506	BRACHIONUS CALYCIFLORUS	ROTIFERS	8.00000	0.0230	347.83	14775.05
114	3540020123003	3540	TINTINNOPSIS FIMBRIATA-MEUNIERI GRP	TINTINNI	3.00000	0.0230	130.43	5540.64
115	4506130200001	4506	SYNCHAETA SPP. L-LARGE	ROTIFERS	2.00000	0.0230	86.96	3693.76
116	4507050100000	4507	FILINIA SP.	ROTIFERS	2.00000	0.0230	86.96	3693.76
117	3442020100000	3442	ARCELLA SP.	DROP	2.00000	0.0230	86.96	3693.76
118	4506010203000	4506	NOTHOLCA ACUMINATA	ROTIFERS	1.00000	0.0230	43.48	1846.88
119	4506010403000	4506	BRACHIONUS HAVANAENSIS	ROTIFERS	1.00000	0.0230	43.48	1846.88
120	4507040100000	4507	CONOCCHILOIDES SP.	ROTIFERS	1.00000	0.0230	43.48	1846.88

OBS	SPECCODE	SPEC4	TAXA	TAXAGRP	RAW_CNT	P	NHAT	NVAR
121		.	TINTINNIDS <44UM	TINTINNI	15.00000	1.0000	15.00	0.00
122		.	NON-LORICATE CILIATES <20UM	CILIATES	143.00000	1.0000	143.00	0.00
123		.	NON-LORICATE CILIATES >20UM	CILIATES	173.00000	1.0000	173.00	0.00
124	4506010103060	4506	KERATELLA COCHLEARIS TECTA	ROTIFERS	724.00000	0.0045	160888.89	35592197.53
125	4506070100000	4506	TRICHOCERCA SP.	ROTIFERS	133.00000	0.0090	14777.78	1627197.53
126	4506130300000	4506	POLYARTHRA SP.	ROTIFERS	110.00000	0.0090	12222.22	1345802.47
127	4506010403000	4506	BRACHIONUS HAVANAENSIS	ROTIFERS	39.00000	0.0090	4333.33	477148.15
128	4506010103020	4506	KERATELLA COCHLEARIS COCHLEARIS	ROTIFERS	33.00000	0.0090	3666.67	403740.74
129	6117000000001	6117	COPEPOD NAUPLII	COPEPODS	31.00000	0.0090	3444.44	379271.60
130	4507050100000	4507	FILINIA SP.	ROTIFERS	31.00000	0.0090	3444.44	379271.60
131	4506010409000	4506	BRACHIONUS CAUDATUS	ROTIFERS	14.00000	0.0090	1555.56	171283.95
132	3442010000000	3442	DIFFLUGIIDAE	DROP	14.00000	0.0090	1555.56	171283.95
133	4506010402000	4506	BRACHIONUS CALYCIFLORUS	ROTIFERS	11.00000	0.0090	1222.22	134580.25
134	4506130400000	4506	PLOESOMA SP.	ROTIFERS	9.00000	0.0090	1000.00	110111.11
135	4506130200003	4506	SYNCHAETA SPP. S-SMALL	ROTIFERS	8.00000	0.0090	888.89	97876.54
136	4506010406000	4506	BRACHIONUS ANGULARIS	ROTIFERS	7.00000	0.0090	777.78	85641.98
137	4506010500000	4506	KELLICOTTIA SP.	ROTIFERS	4.00000	0.0090	444.44	48938.27
138	4506130200002	4506	SYNCHAETA SPP. M-MEDIUM	ROTIFERS	4.00000	0.0090	444.44	48938.27
139	4508010100000	4508	COLLOTHECA SP.	ROTIFERS	2.00000	0.0090	222.22	24469.14
140	4506010400000	4506	BRACHIONUS SP.	ROTIFERS	1.00000	0.0090	111.11	12234.57
141	4500000000000	4500	ROTIFERA- UNIDED ROTIFER	ROTIFERS	1.00000	0.0090	111.11	12234.57
142	4507040100000	4507	CONOCHILOIDES SP.	ROTIFERS	1.00000	0.0090	111.11	12234.57
143		.	TINTINNIDS <44UM	TINTINNI	35.00000	1.0000	35.00	0.00
144		.	NON-LORICATE CILIATES <20UM	CILIATES	899.00000	1.0000	899.00	0.00
145		.	NON-LORICATE CILIATES >20UM	CILIATES	39.00000	1.0000	39.00	0.00
146	6118290100001	6118	ACARTIA SP.-NAUPLII	COPEPODS	548.00000	0.0220	24909.09	1107322.31
147	4506130200003	4506	SYNCHAETA SPP. S-SMALL	ROTIFERS	30.00000	0.0220	1363.64	60619.83
148	5500000000001	5500	PELECYPODA-LARVAE	DROP	5.00000	0.0220	227.27	10103.31
149	3540020123003	3540	TINTINNOPSIS FIMBRIATA-MEUNIERI GRP	TINTINNI	4.00000	0.0220	181.82	8082.64
150	0000000000002	0	UNIDED. TROCHOPHORE LARVAE	DROP	3.00000	0.0220	136.36	6061.98
151	4506130200010	4506	SYNCHAETA BICORNIS	ROTIFERS	1.00000	0.0220	45.45	2020.66
152		.	TINTINNIDS <44UM	TINTINNI	13.00000	1.0000	13.00	0.00
153		.	DIDINIUM SP.	CILIATES	5.00000	1.0000	5.00	0.00
154		.	NON-LORICATE CILIATES <20UM	CILIATES	434.00000	1.0000	434.00	0.00
155		.	NON-LORICATE CILIATES >20UM	CILIATES	114.00000	1.0000	114.00	0.00
156	6118290100001	6118	ACARTIA SP.-NAUPLII	COPEPODS	385.00000	0.0110	35000.00	3146818.18
157	3540020123003	3540	TINTINNOPSIS FIMBRIATA-MEUNIERI GRP	TINTINNI	322.00000	0.0220	14636.36	650652.89
158	4506010401000	4506	BRACHIONUS PLICATILIS	ROTIFERS	115.00000	0.0220	5227.27	232376.03
159	6117000000001	6117	COPEPOD NAUPLII	COPEPODS	66.00000	0.0220	3000.00	133363.64
160	5500000000001	5500	PLELECYPODA-LARVAE	DROP	24.00000	0.0220	1090.91	48495.87

assignment of taxa groups

OBS	SPECCODE	SPEC4	TAXA	TAXAGRP	RAW_CNT	P	NHAT	NVAR
161	4506130200003	4506	SYNCHAETA SPP. S-SMALL	ROTIFERS	21.00000	0.022	954.55	42433.88
162	4506010402000	4506	BRACHIONUS CALYCIFLORUS	ROTIFERS	8.00000	0.022	363.64	16165.29
163	4506010100000	4506	KERATELLA SP.	ROTIFERS	6.00000	0.022	272.73	12123.97
164	4506130200002	4506	SYNCHAETA SPP. M-MEDIUM	ROTIFERS	2.00000	0.022	90.91	4041.32
165	4506070100000	4506	TRICHOCERCA SP.	ROTIFERS	2.00000	0.022	90.91	4041.32
166	4500000000000	4500	ROTIFERA- UNIDED ROTIFER	ROTIFERS	2.00000	0.022	90.91	4041.32
167	5100000000001	5100	GASTROPODA-LARVAE	DROP	1.00000	0.022	45.45	2020.66
168		.	TINTINNIDS <44UM	TINTINNI	37.00000	1.000	37.00	0.00
169		.	DIDINIUM SP.	CILIATES	1.00000	1.000	1.00	0.00
170		.	NON-LORICATE CILIATES <20UM	CILIATES	49.00000	1.000	49.00	0.00
171		.	NON-LORICATE CILIATES >20UM	CILIATES	250.00000	1.000	250.00	0.00
172		.	MYRIONECTA-LIKE CILIATES	CILIATES	69.00000	1.000	69.00	0.00
173	6117000000001	6117	COPEPOD NAUPLII	COPEPODS	264.00000	0.014	18857.14	1328081.63
174	4507050100000	4507	FILINIA SP.	ROTIFERS	92.00000	0.014	6571.43	462816.33
175	3442010000000	3442	DIFFLUGIIDAE	DROP	48.00000	0.014	3428.57	241469.39
176	3540020123003	3540	TINTINNOPSIS FIMBRIATA-MEUNIERI GRP	TINTINNI	36.00000	0.014	2571.43	181102.04
177	4506010400000	4506	BRACHIONUS SP.	ROTIFERS	12.00000	0.014	857.14	60367.35
178	4506010409000	4506	BRACHIONUS CAUDATUS	ROTIFERS	11.00000	0.014	785.71	55336.73
179	4506010406000	4506	BRACHIONUS ANGULARIS	ROTIFERS	7.00000	0.014	500.00	35214.29
180	4507040200000	4507	CONOCHILUS SP.	ROTIFERS	6.00000	0.014	428.57	30183.67
181	4506010203020	4506	KERATELLA COCHLEARIS COCHLEARIS	ROTIFERS	4.00000	0.014	285.71	20122.45
182	4506010100000	4506	KERATELLA SP.	ROTIFERS	2.00000	0.014	142.86	10061.22
183	4507040100000	4507	CONOCHILOIDES SP.	ROTIFERS	2.00000	0.014	142.86	10061.22
184	3442020100000	3442	ARCELLA SP.	DROP	2.00000	0.014	142.86	10061.22
185	4506070100000	4506	TRICHOCERCA SP.	ROTIFERS	1.00000	0.014	71.43	5030.61
186	4500000000000	4500	ROTIFERA- UNIDED ROTIFER	ROTIFERS	1.00000	0.014	71.43	5030.61
187	3445040100000	3445	CYPHODERIA SP.	DROP	1.00000	0.014	71.43	5030.61
188		.	TINTINNIDS <44UM	TINTINNI	25.00000	1.000	25.00	0.00
189		.	NON-LORICATE CILIATES <20UM	CILIATES	87.00000	1.000	87.00	0.00
190		.	NON-LORICATE CILIATES >20 UM	CILIATES	43.00000	1.000	43.00	0.00

Data after summing over taxa groups

TAXAGRP=CILIATES

OBS	CNT_LAB	DATE	STATION	AESTCNT	AESTSVAR
1	ANS	03/23/98	MCB5.2	67.00	0.00
2	ANS	03/24/98	MET5.2	192.00	0.00
3	ANS	04/06/98	MCB5.2	721.00	0.00
4	ANS	04/07/98	MET5.1	66.00	0.00
5	ANS	05/04/98	MLE2.2	2598.00	2598.00
6	ANS	05/05/98	MCB3.3C	1672.00	1660.00
7	ANS	05/05/98	MET5.1	100.00	0.00
8	ANS	05/06/98	MCB2.1	2837.74	107119.09
9	ANS	06/01/98	XEA6596	938.00	0.00
10	ANS	06/02/98	MCB4.3C	553.00	0.00
11	ANS	06/03/98	MWT5.1	369.00	0.00
12	ANS	06/08/98	PXT0402	130.00	0.00

TAXAGRP=COPEPODS

OBS	CNT_LAB	DATE	STATION	AESTCNT	AESTSVAR
13	ANS	03/23/98	MCB5.2	666.67	88222.22
14	ANS	03/24/98	MET5.2	8000.00	173818.18
15	ANS	04/06/98	MCB5.2	2037.04	375192.04
16	ANS	04/07/98	MET5.1	9071.43	638887.76
17	ANS	05/04/98	MLE2.2	22077.92	1910794.40
18	ANS	05/05/98	MCB3.3C	5918.92	154051.86
19	ANS	05/05/98	MET5.1	16739.13	3622202.27
20	ANS	05/06/98	MCB2.1	13166.67	1084055.56
21	ANS	06/01/98	XEA6596	3444.44	379271.60
22	ANS	06/02/98	MCB4.3C	24909.09	1107322.31
23	ANS	06/03/98	MWT5.1	38000.00	3280181.82
24	ANS	06/08/98	PXT0402	18857.14	1328081.63

TAXAGRP=ROTIFERS

OBS	CNT_LAB	DATE	STATION	AESTCNT	AESTSVAR
25	ANS	03/23/98	MCB5.2	45066.67	5963822.22
26	ANS	03/24/98	MET5.2	287.88	4073.92
27	ANS	04/06/98	MCB5.2	18333.33	3376728.40
28	ANS	04/07/98	MET5.1	3285.71	114061.22
29	ANS	05/04/98	MLE2.2	3238.10	150956.92
30	ANS	05/05/98	MCB3.3C	17275.96	853924.28
31	ANS	05/05/98	MET5.1	255652.17	95869111.53
32	ANS	05/06/98	MCB2.1	8608.70	365682.42
33	ANS	06/01/98	XEA6596	206222.22	40583901.23
34	ANS	06/02/98	MCB4.3C	1409.09	62640.50
35	ANS	06/03/98	MWT5.1	7090.91	315223.14
36	ANS	06/08/98	PXT0402	9857.14	694224.49

Data after summing over taxa groups

TAXAGRP=TINTINNI

OBS	CNT_LAB	DATE	STATION	AESTCNT	AESTSVAR
37	ANS	03/23/98	MCB5.2	43281.00	5716800.00

38	ANS	03/24/98	MET5.2	108.06	1500.92
39	ANS	04/06/98	MCB5.2	6993.85	1262009.60
40	ANS	04/07/98	MET5.1	2925.86	100423.47
41	ANS	05/04/98	MLE2.2	26280.73	2362157.02
42	ANS	05/05/98	MCB3.3C	28210.34	1453229.41
43	ANS	05/05/98	MET5.1	12486.30	2681370.51
44	ANS	05/06/98	MCB2.1	145.43	5540.64
45	ANS	06/01/98	XEA6596	35.00	0.00
46	ANS	06/02/98	MCB4.3C	194.82	8082.64
47	ANS	06/03/98	MWT5.1	14673.36	650652.89
48	ANS	06/08/98	PXT0402	2596.43	181102.04

assignment of taxa groups

OBS	DATE	STATION	TAXA	TAXAGRP	SIZE_FRA	RAW_CNT	P	NHAT	NVAR
1	03/23/98	MCB5.2	OLIGOTRICHIDA	CILIATES	31 TO 73 U	54.00000	0.050	1080	20520
2	03/23/98	MCB5.2	OLIGOTRICHIDA	CILIATES	< 30 U	212.00000	0.050	4240	80560
3	03/23/98	MCB5.2	OLIGOTRICHIDA	CILIATES	>73 U	74.00000	1.000	74	0
4	03/23/98	MCB5.2	COPEPODA	COPEPODS	31 TO 73 U	0.00000	0.050	0	0
5	03/23/98	MCB5.2	COPEPODA	COPEPODS	< 30 U	0.00000	0.050	0	0
6	03/23/98	MCB5.2	COPEPODA	COPEPODS	>73 U	19.00000	1.000	19	0
7	03/23/98	MCB5.2	BALANOMORPHA	DROP	31 TO 73 U	0.00000	0.050	0	0
8	03/23/98	MCB5.2	POLYCHAETA	DROP	31 TO 73 U	0.00000	0.050	0	0
9	03/23/98	MCB5.2	SARCODINA	DROP	31 TO 73 U	0.00000	0.050	0	0
10	03/23/98	MCB5.2	CLADOCERA	DROP	31 TO 73 U	0.00000	0.050	0	0
11	03/23/98	MCB5.2	BALANOMORPHA	DROP	< 30 U	0.00000	0.050	0	0
12	03/23/98	MCB5.2	POLYCHAETA	DROP	< 30 U	0.00000	0.050	0	0
13	03/23/98	MCB5.2	SARCODINA	DROP	< 30 U	0.00000	0.050	0	0
14	03/23/98	MCB5.2	CLADOCERA	DROP	< 30 U	0.00000	0.050	0	0
15	03/23/98	MCB5.2	BALANOMORPHA	DROP	>73 U	4.00000	1.000	4	0
16	03/23/98	MCB5.2	POLYCHAETA	DROP	>73 U	8.00000	1.000	8	0
17	03/23/98	MCB5.2	SARCODINA	DROP	>73 U	0.00000	1.000	0	0
18	03/23/98	MCB5.2	CLADOCERA	DROP	>73 U	0.00000	1.000	0	0
19	03/23/98	MCB5.2	ROTIFERA	ROTIFERS	31 TO 73 U	51.00000	0.050	1020	19380
20	03/23/98	MCB5.2	ROTIFERA	ROTIFERS	< 30 U	0.00000	0.050	0	0
21	03/23/98	MCB5.2	ROTIFERA	ROTIFERS	>73 U	170.00000	1.000	170	0
22	03/23/98	MCB5.2	TINTINNINA	TINTINNI	31 TO 73 U	19.00000	0.050	380	7220
23	03/23/98	MCB5.2	TINTINNINA	TINTINNI	< 30 U	266.00000	0.050	5320	101080
24	03/23/98	MCB5.2	TINTINNINA	TINTINNI	>73 U	468.00000	1.000	468	0
25	03/24/98	MET5.2	OLIGOTRICHIDA	CILIATES	31 TO 73 U	49.00000	0.025	1960	76440
26	03/24/98	MET5.2	OLIGOTRICHIDA	CILIATES	< 30 U	302.00000	0.025	12080	471120
27	03/24/98	MET5.2	OLIGOTRICHIDA	CILIATES	>73 U	1.00000	1.000	1	0
28	03/24/98	MET5.2	COPEPODA	COPEPODS	31 TO 73 U	0.00000	0.025	0	0
29	03/24/98	MET5.2	COPEPODA	COPEPODS	< 30 U	0.00000	0.025	0	0
30	03/24/98	MET5.2	COPEPODA	COPEPODS	>73 U	118.00000	1.000	118	0
31	03/24/98	MET5.2	BALANOMORPHA	DROP	31 TO 73 U	0.00000	0.025	0	0
32	03/24/98	MET5.2	POLYCHAETA	DROP	31 TO 73 U	0.00000	0.025	0	0
33	03/24/98	MET5.2	SARCODINA	DROP	31 TO 73 U	0.00000	0.025	0	0
34	03/24/98	MET5.2	CLADOCERA	DROP	31 TO 73 U	0.00000	0.025	0	0
35	03/24/98	MET5.2	BALANOMORPHA	DROP	< 30 U	0.00000	0.025	0	0
36	03/24/98	MET5.2	POLYCHAETA	DROP	< 30 U	0.00000	0.025	0	0
37	03/24/98	MET5.2	SARCODINA	DROP	< 30 U	0.00000	0.025	0	0
38	03/24/98	MET5.2	CLADOCERA	DROP	< 30 U	0.00000	0.025	0	0
39	03/24/98	MET5.2	BALANOMORPHA	DROP	>73 U	4.00000	1.000	4	0
40	03/24/98	MET5.2	POLYCHAETA	DROP	>73 U	0.00000	1.000	0	0

assignment of taxa groups

OBS	DATE	STATION	TAXA	TAXAGRP	SIZE_FRA	RAW_CNT	P	NHAT	NVAR
41	03/24/98	MET5.2	SARCODINA	DROP	>73 U	0.00000	1.000	0	0
42	03/24/98	MET5.2	CLADOCERA	DROP	>73 U	0.00000	1.000	0	0
43	03/24/98	MET5.2	ROTIFERA	ROTIFERS	31 TO 73 U	0.00000	0.025	0	0
44	03/24/98	MET5.2	ROTIFERA	ROTIFERS	< 30 U	0.00000	0.025	0	0
45	03/24/98	MET5.2	ROTIFERA	ROTIFERS	>73 U	9.00000	1.000	9	0
46	03/24/98	MET5.2	TINTINNINA	TINTINNI	31 TO 73 U	0.00000	0.025	0	0
47	03/24/98	MET5.2	TINTINNINA	TINTINNI	< 30 U	3.00000	0.025	120	4680
48	03/24/98	MET5.2	TINTINNINA	TINTINNI	>73 U	4.00000	1.000	4	0
49	04/06/98	MCB5.2	OLIGOTRICHIDA	CILIATES	31 TO 73 U	27.00000	0.050	540	10260
50	04/06/98	MCB5.2	OLIGOTRICHIDA	CILIATES	< 30 U	372.00000	0.050	7440	141360
51	04/06/98	MCB5.2	OLIGOTRICHIDA	CILIATES	>73 U	5.00000	1.000	5	0
52	04/06/98	MCB5.2	COPEPODA	COPEPODS	31 TO 73 U	0.00000	0.050	0	0
53	04/06/98	MCB5.2	COPEPODA	COPEPODS	< 30 U	0.00000	0.050	0	0
54	04/06/98	MCB5.2	COPEPODA	COPEPODS	>73 U	29.00000	1.000	29	0
55	04/06/98	MCB5.2	BALANOMORPHA	DROP	31 TO 73 U	0.00000	0.050	0	0
56	04/06/98	MCB5.2	POLYCHAETA	DROP	31 TO 73 U	0.00000	0.050	0	0
57	04/06/98	MCB5.2	SARCODINA	DROP	31 TO 73 U	0.00000	0.050	0	0
58	04/06/98	MCB5.2	CLADOCERA	DROP	31 TO 73 U	0.00000	0.050	0	0
59	04/06/98	MCB5.2	BALANOMORPHA	DROP	< 30 U	0.00000	0.050	0	0
60	04/06/98	MCB5.2	POLYCHAETA	DROP	< 30 U	0.00000	0.050	0	0
61	04/06/98	MCB5.2	SARCODINA	DROP	< 30 U	0.00000	0.050	0	0
62	04/06/98	MCB5.2	CLADOCERA	DROP	< 30 U	0.00000	0.050	0	0
63	04/06/98	MCB5.2	BALANOMORPHA	DROP	>73 U	4.00000	1.000	4	0
64	04/06/98	MCB5.2	POLYCHAETA	DROP	>73 U	10.00000	1.000	10	0
65	04/06/98	MCB5.2	SARCODINA	DROP	>73 U	0.00000	1.000	0	0
66	04/06/98	MCB5.2	CLADOCERA	DROP	>73 U	0.00000	1.000	0	0
67	04/06/98	MCB5.2	ROTIFERA	ROTIFERS	31 TO 73 U	19.00000	0.050	380	7220
68	04/06/98	MCB5.2	ROTIFERA	ROTIFERS	< 30 U	0.00000	0.050	0	0
69	04/06/98	MCB5.2	ROTIFERA	ROTIFERS	>73 U	68.00000	1.000	68	0
70	04/06/98	MCB5.2	TINTINNINA	TINTINNI	31 TO 73 U	27.00000	0.050	540	10260
71	04/06/98	MCB5.2	TINTINNINA	TINTINNI	< 30 U	719.00000	0.050	14380	273220
72	04/06/98	MCB5.2	TINTINNINA	TINTINNI	>73 U	93.00000	1.000	93	0
73	04/07/98	MET5.1	OLIGOTRICHIDA	CILIATES	31 TO 73 U	48.00000	0.025	1920	74880
74	04/07/98	MET5.1	OLIGOTRICHIDA	CILIATES	< 30 U	135.00000	0.025	5400	210600
75	04/07/98	MET5.1	OLIGOTRICHIDA	CILIATES	>73 U	1.00000	1.000	1	0
76	04/07/98	MET5.1	COPEPODA	COPEPODS	31 TO 73 U	0.00000	0.025	0	0
77	04/07/98	MET5.1	COPEPODA	COPEPODS	< 30 U	0.00000	0.025	0	0
78	04/07/98	MET5.1	COPEPODA	COPEPODS	>73 U	206.00000	1.000	206	0
79	04/07/98	MET5.1	BALANOMORPHA	DROP	31 TO 73 U	0.00000	0.025	0	0
80	04/07/98	MET5.1	POLYCHAETA	DROP	31 TO 73 U	0.00000	0.025	0	0

assignment of taxa groups

OBS	DATE	STATION	TAXA	TAXAGRP	SIZE_FRA	RAW_CNT	P	NHAT	NVAR
81	04/07/98	MET5.1	SARCODINA	DROP	31 TO 73 U	0.00000	0.025	0	0
82	04/07/98	MET5.1	CLADOCERA	DROP	31 TO 73 U	0.00000	0.025	0	0
83	04/07/98	MET5.1	BALANOMORPHA	DROP	< 30 U	0.00000	0.025	0	0
84	04/07/98	MET5.1	POLYCHAETA	DROP	< 30 U	0.00000	0.025	0	0
85	04/07/98	MET5.1	SARCODINA	DROP	< 30 U	0.00000	0.025	0	0
86	04/07/98	MET5.1	CLADOCERA	DROP	< 30 U	0.00000	0.025	0	0
87	04/07/98	MET5.1	BALANOMORPHA	DROP	>73 U	0.00000	1.000	0	0
88	04/07/98	MET5.1	POLYCHAETA	DROP	>73 U	0.00000	1.000	0	0
89	04/07/98	MET5.1	SARCODINA	DROP	>73 U	0.00000	1.000	0	0
90	04/07/98	MET5.1	CLADOCERA	DROP	>73 U	59.00000	1.000	59	0
91	04/07/98	MET5.1	ROTIFERA	ROTIFERS	31 TO 73 U	2.00000	0.025	80	3120
92	04/07/98	MET5.1	ROTIFERA	ROTIFERS	< 30 U	0.00000	0.025	0	0
93	04/07/98	MET5.1	ROTIFERA	ROTIFERS	>73 U	72.00000	1.000	72	0
94	04/07/98	MET5.1	TINTINNINA	TINTINNI	31 TO 73 U	9.00000	0.025	360	14040
95	04/07/98	MET5.1	TINTINNINA	TINTINNI	< 30 U	90.00000	0.025	3600	140400
96	04/07/98	MET5.1	TINTINNINA	TINTINNI	>73 U	1.00000	1.000	1	0
97	04/13/98	PXT0402	OLIGOTRICHIDA	CILIATES	31 TO 73 U	2.00000	0.025	80	3120
98	04/13/98	PXT0402	OLIGOTRICHIDA	CILIATES	< 30 U	22.00000	0.025	880	34320
99	04/13/98	PXT0402	OLIGOTRICHIDA	CILIATES	>73 U	0.00000	1.000	0	0
100	04/13/98	PXT0402	COPEPODA	COPEPODS	31 TO 73 U	0.00000	0.025	0	0
101	04/13/98	PXT0402	COPEPODA	COPEPODS	< 30 U	0.00000	0.025	0	0
102	04/13/98	PXT0402	COPEPODA	COPEPODS	>73 U	517.00000	1.000	517	0
103	04/13/98	PXT0402	BALANOMORPHA	DROP	31 TO 73 U	0.00000	0.025	0	0
104	04/13/98	PXT0402	POLYCHAETA	DROP	31 TO 73 U	0.00000	0.025	0	0
105	04/13/98	PXT0402	SARCODINA	DROP	31 TO 73 U	0.00000	0.025	0	0
106	04/13/98	PXT0402	CLADOCERA	DROP	31 TO 73 U	0.00000	0.025	0	0
107	04/13/98	PXT0402	BALANOMORPHA	DROP	< 30 U	0.00000	0.025	0	0
108	04/13/98	PXT0402	POLYCHAETA	DROP	< 30 U	0.00000	0.025	0	0
109	04/13/98	PXT0402	SARCODINA	DROP	< 30 U	0.00000	0.025	0	0
110	04/13/98	PXT0402	CLADOCERA	DROP	< 30 U	0.00000	0.025	0	0
111	04/13/98	PXT0402	BALANOMORPHA	DROP	>73 U	0.00000	1.000	0	0
112	04/13/98	PXT0402	POLYCHAETA	DROP	>73 U	0.00000	1.000	0	0
113	04/13/98	PXT0402	SARCODINA	DROP	>73 U	0.00000	1.000	0	0
114	04/13/98	PXT0402	CLADOCERA	DROP	>73 U	4.00000	1.000	4	0
115	04/13/98	PXT0402	ROTIFERA	ROTIFERS	31 TO 73 U	4.00000	0.025	160	6240
116	04/13/98	PXT0402	ROTIFERA	ROTIFERS	< 30 U	0.00000	0.025	0	0
117	04/13/98	PXT0402	ROTIFERA	ROTIFERS	>73 U	105.00000	1.000	105	0
118	04/13/98	PXT0402	TINTINNINA	TINTINNI	31 TO 73 U	2.00000	0.025	80	3120
119	04/13/98	PXT0402	TINTINNINA	TINTINNI	< 30 U	7.00000	0.025	280	10920
120	04/13/98	PXT0402	TINTINNINA	TINTINNI	>73 U	0.00000	1.000	0	0

assignment of taxa groups

OBS	DATE	STATION	TAXA	TAXAGRP	SIZE_FRA	RAW_CNT	P	NHAT	NVAR
121	04/13/98	XDE5339	OLIGOTRICHIDA	CILIATES	31 TO 73 U	5.00000	0.025	200	7800
122	04/13/98	XDE5339	OLIGOTRICHIDA	CILIATES	< 30 U	136.00000	0.025	5440	212160
123	04/13/98	XDE5339	OLIGOTRICHIDA	CILIATES	>73 U	0.00000	1.000	0	0
124	04/13/98	XDE5339	COPEPODA	COPEPODS	31 TO 73 U	0.00000	0.025	0	0
125	04/13/98	XDE5339	COPEPODA	COPEPODS	< 30 U	0.00000	0.025	0	0
126	04/13/98	XDE5339	COPEPODA	COPEPODS	>73 U	107.00000	1.000	107	0
127	04/13/98	XDE5339	BALANOMORPHA	DROP	31 TO 73 U	0.00000	0.025	0	0
128	04/13/98	XDE5339	POLYCHAETA	DROP	31 TO 73 U	0.00000	0.025	0	0
129	04/13/98	XDE5339	SARCODINA	DROP	31 TO 73 U	0.00000	0.025	0	0
130	04/13/98	XDE5339	CLADOCERA	DROP	31 TO 73 U	0.00000	0.025	0	0
131	04/13/98	XDE5339	BALANOMORPHA	DROP	< 30 U	0.00000	0.025	0	0
132	04/13/98	XDE5339	POLYCHAETA	DROP	< 30 U	0.00000	0.025	0	0
133	04/13/98	XDE5339	SARCODINA	DROP	< 30 U	0.00000	0.025	0	0
134	04/13/98	XDE5339	CLADOCERA	DROP	< 30 U	0.00000	0.025	0	0
135	04/13/98	XDE5339	BALANOMORPHA	DROP	>73 U	2.00000	1.000	2	0
136	04/13/98	XDE5339	POLYCHAETA	DROP	>73 U	4.00000	1.000	4	0
137	04/13/98	XDE5339	SARCODINA	DROP	>73 U	0.00000	1.000	0	0
138	04/13/98	XDE5339	CLADOCERA	DROP	>73 U	0.00000	1.000	0	0
139	04/13/98	XDE5339	ROTIFERA	ROTIFERS	31 TO 73 U	3.00000	0.025	120	4680
140	04/13/98	XDE5339	ROTIFERA	ROTIFERS	< 30 U	0.00000	0.025	0	0
141	04/13/98	XDE5339	ROTIFERA	ROTIFERS	>73 U	17.00000	1.000	17	0
142	04/13/98	XDE5339	TINTINNINA	TINTINNI	31 TO 73 U	1.00000	0.025	40	1560
143	04/13/98	XDE5339	TINTINNINA	TINTINNI	< 30 U	70.00000	0.025	2800	109200
144	04/13/98	XDE5339	TINTINNINA	TINTINNI	>73 U	5.00000	1.000	5	0
145	05/04/98	MLE2.2	OLIGOTRICHIDA	CILIATES	31 TO 73 U	2.00000	0.025	80	3120
146	05/04/98	MLE2.2	OLIGOTRICHIDA	CILIATES	< 30 U	93.00000	0.025	3720	145080
147	05/04/98	MLE2.2	OLIGOTRICHIDA	CILIATES	>73 U	95.00000	1.000	95	0
148	05/04/98	MLE2.2	COPEPODA	COPEPODS	31 TO 73 U	0.00000	0.025	0	0
149	05/04/98	MLE2.2	COPEPODA	COPEPODS	< 30 U	0.00000	0.025	0	0
150	05/04/98	MLE2.2	COPEPODA	COPEPODS	>73 U	346.00000	1.000	346	0
151	05/04/98	MLE2.2	BALANOMORPHA	DROP	31 TO 73 U	0.00000	0.025	0	0
152	05/04/98	MLE2.2	POLYCHAETA	DROP	31 TO 73 U	0.00000	0.025	0	0
153	05/04/98	MLE2.2	SARCODINA	DROP	31 TO 73 U	0.00000	0.025	0	0
154	05/04/98	MLE2.2	BALANOMORPHA	DROP	< 30 U	0.00000	0.025	0	0
155	05/04/98	MLE2.2	POLYCHAETA	DROP	< 30 U	0.00000	0.025	0	0
156	05/04/98	MLE2.2	SARCODINA	DROP	< 30 U	0.00000	0.025	0	0
157	05/04/98	MLE2.2	BALANOMORPHA	DROP	>73 U	20.00000	1.000	20	0
158	05/04/98	MLE2.2	POLYCHAETA	DROP	>73 U	2.00000	1.000	2	0
159	05/04/98	MLE2.2	SARCODINA	DROP	>73 U	0.00000	1.000	0	0
160	05/04/98	MLE2.2	ROTIFERA	ROTIFERS	31 TO 73 U	0.00000	0.025	0	0

assignment of taxa groups

OBS	DATE	STATION	TAXA	TAXAGRP	SIZE_FRA	RAW_CNT	P	NHAT	NVAR
161	05/04/98	MLE2.2	ROTIFERA	ROTIFERS	< 30 U	0.00000	0.025	0	0
162	05/04/98	MLE2.2	ROTIFERA	ROTIFERS	>73 U	54.00000	1.000	54	0
163	05/04/98	MLE2.2	TINTINNINA	TINTINNI	31 TO 73 U	9.00000	0.025	360	14040
164	05/04/98	MLE2.2	TINTINNINA	TINTINNI	< 30 U	73.00000	0.025	2920	113880
165	05/04/98	MLE2.2	TINTINNINA	TINTINNI	>73 U	13.00000	1.000	13	0
166	05/05/98	MCB3.3C	OLIGOTRICHIDA	CILIATES	31 TO 73 U	147.00000	0.050	2940	55860
167	05/05/98	MCB3.3C	OLIGOTRICHIDA	CILIATES	< 30 U	493.00000	0.050	9860	187340
168	05/05/98	MCB3.3C	OLIGOTRICHIDA	CILIATES	>73 U	33.00000	1.000	33	0
169	05/05/98	MCB3.3C	COPEPODA	COPEPODS	31 TO 73 U	1.00000	0.050	20	380
170	05/05/98	MCB3.3C	COPEPODA	COPEPODS	< 30 U	0.00000	0.050	0	0
171	05/05/98	MCB3.3C	COPEPODA	COPEPODS	>73 U	103.00000	1.000	103	0
172	05/05/98	MCB3.3C	BALANOMORPHA	DROP	31 TO 73 U	0.00000	0.050	0	0
173	05/05/98	MCB3.3C	POLYCHAETA	DROP	31 TO 73 U	0.00000	0.050	0	0
174	05/05/98	MCB3.3C	SARCODINA	DROP	31 TO 73 U	0.00000	0.050	0	0
175	05/05/98	MCB3.3C	CLADOCERA	DROP	31 TO 73 U	0.00000	0.050	0	0
176	05/05/98	MCB3.3C	BALANOMORPHA	DROP	< 30 U	0.00000	0.050	0	0
177	05/05/98	MCB3.3C	POLYCHAETA	DROP	< 30 U	0.00000	0.050	0	0
178	05/05/98	MCB3.3C	SARCODINA	DROP	< 30 U	0.00000	0.050	0	0
179	05/05/98	MCB3.3C	CLADOCERA	DROP	< 30 U	0.00000	0.050	0	0
180	05/05/98	MCB3.3C	BALANOMORPHA	DROP	>73 U	10.00000	1.000	10	0
181	05/05/98	MCB3.3C	POLYCHAETA	DROP	>73 U	25.00000	1.000	25	0
182	05/05/98	MCB3.3C	SARCODINA	DROP	>73 U	0.00000	1.000	0	0
183	05/05/98	MCB3.3C	CLADOCERA	DROP	>73 U	0.00000	1.000	0	0
184	05/05/98	MCB3.3C	ROTIFERA	ROTIFERS	31 TO 73 U	25.00000	0.050	500	9500
185	05/05/98	MCB3.3C	ROTIFERA	ROTIFERS	< 30 U	0.00000	0.050	0	0
186	05/05/98	MCB3.3C	ROTIFERA	ROTIFERS	>73 U	42.00000	1.000	42	0
187	05/05/98	MCB3.3C	TINTINNINA	TINTINNI	31 TO 73 U	30.00000	0.050	600	11400
188	05/05/98	MCB3.3C	TINTINNINA	TINTINNI	< 30 U	119.00000	0.050	2380	45220
189	05/05/98	MCB3.3C	TINTINNINA	TINTINNI	>73 U	29.00000	1.000	29	0
190	05/05/98	MET5.1	OLIGOTRICHIDA	CILIATES	31 TO 73 U	0.00000	0.025	0	0
191	05/05/98	MET5.1	OLIGOTRICHIDA	CILIATES	< 30 U	90.00000	0.025	3600	140400
192	05/05/98	MET5.1	OLIGOTRICHIDA	CILIATES	>73 U	1.00000	1.000	1	0
193	05/05/98	MET5.1	COPEPODA	COPEPODS	31 TO 73 U	0.00000	0.025	0	0
194	05/05/98	MET5.1	COPEPODA	COPEPODS	< 30 U	0.00000	0.025	0	0
195	05/05/98	MET5.1	COPEPODA	COPEPODS	>73 U	308.00000	1.000	308	0
196	05/05/98	MET5.1	BALANOMORPHA	DROP	31 TO 73 U	0.00000	0.025	0	0
197	05/05/98	MET5.1	POLYCHAETA	DROP	31 TO 73 U	0.00000	0.025	0	0
198	05/05/98	MET5.1	SARCODINA	DROP	31 TO 73 U	0.00000	0.025	0	0
199	05/05/98	MET5.1	CLADOCERA	DROP	31 TO 73 U	0.00000	0.025	0	0
200	05/05/98	MET5.1	BALANOMORPHA	DROP	< 30 U	0.00000	0.025	0	0

assignment of taxa groups

OBS	DATE	STATION	TAXA	TAXAGRP	SIZE_FRA	RAW_CNT	P	NHAT	NVAR
201	05/05/98	MET5.1	POLYCHAETA	DROP	< 30 U	0.00000	0.025	0	0
202	05/05/98	MET5.1	SARCODINA	DROP	< 30 U	0.00000	0.025	0	0
203	05/05/98	MET5.1	CLADOCERA	DROP	< 30 U	0.00000	0.025	0	0
204	05/05/98	MET5.1	BALANOMORPHA	DROP	>73 U	23.00000	1.000	23	0
205	05/05/98	MET5.1	POLYCHAETA	DROP	>73 U	0.00000	1.000	0	0
206	05/05/98	MET5.1	SARCODINA	DROP	>73 U	4.00000	1.000	4	0
207	05/05/98	MET5.1	CLADOCERA	DROP	>73 U	64.00000	1.000	64	0
208	05/05/98	MET5.1	ROTIFERA	ROTIFERS	31 TO 73 U	36.00000	0.025	1440	56160
209	05/05/98	MET5.1	ROTIFERA	ROTIFERS	< 30 U	0.00000	0.025	0	0
210	05/05/98	MET5.1	ROTIFERA	ROTIFERS	>73 U	1643.00000	1.000	1643	0
211	05/05/98	MET5.1	TINTINNINA	TINTINNI	31 TO 73 U	203.00000	0.025	8120	316680
212	05/05/98	MET5.1	TINTINNINA	TINTINNI	< 30 U	157.00000	0.025	6280	244920
213	05/05/98	MET5.1	TINTINNINA	TINTINNI	>73 U	38.00000	1.000	38	0
214	05/06/98	MCB2.1	OLIGOTRICHIDA	CILIATES	31 TO 73 U	22.00000	0.050	440	8360
215	05/06/98	MCB2.1	OLIGOTRICHIDA	CILIATES	< 30 U	809.00000	0.050	16180	307420
216	05/06/98	MCB2.1	OLIGOTRICHIDA	CILIATES	>73 U	3.00000	1.000	3	0
217	05/06/98	MCB2.1	COPEPODA	COPEPODS	31 TO 73 U	0.00000	0.050	0	0
218	05/06/98	MCB2.1	COPEPODA	COPEPODS	< 30 U	0.00000	0.050	0	0
219	05/06/98	MCB2.1	COPEPODA	COPEPODS	>73 U	194.00000	1.000	194	0
220	05/06/98	MCB2.1	BALANOMORPHA	DROP	31 TO 73 U	0.00000	0.050	0	0
221	05/06/98	MCB2.1	POLYCHAETA	DROP	31 TO 73 U	0.00000	0.050	0	0
222	05/06/98	MCB2.1	SARCODINA	DROP	31 TO 73 U	0.00000	0.050	0	0
223	05/06/98	MCB2.1	CLADOCERA	DROP	31 TO 73 U	0.00000	0.050	0	0
224	05/06/98	MCB2.1	BALANOMORPHA	DROP	< 30 U	0.00000	0.050	0	0
225	05/06/98	MCB2.1	POLYCHAETA	DROP	< 30 U	0.00000	0.050	0	0
226	05/06/98	MCB2.1	SARCODINA	DROP	< 30 U	0.00000	0.050	0	0
227	05/06/98	MCB2.1	CLADOCERA	DROP	< 30 U	0.00000	0.050	0	0
228	05/06/98	MCB2.1	BALANOMORPHA	DROP	>73 U	0.00000	1.000	0	0
229	05/06/98	MCB2.1	POLYCHAETA	DROP	>73 U	0.00000	1.000	0	0
230	05/06/98	MCB2.1	SARCODINA	DROP	>73 U	0.00000	1.000	0	0
231	05/06/98	MCB2.1	CLADOCERA	DROP	>73 U	0.00000	1.000	0	0
232	05/06/98	MCB2.1	ROTIFERA	ROTIFERS	31 TO 73 U	178.00000	0.050	3560	67640
233	05/06/98	MCB2.1	ROTIFERA	ROTIFERS	< 30 U	15.00000	0.050	300	5700
234	05/06/98	MCB2.1	ROTIFERA	ROTIFERS	>73 U	128.00000	1.000	128	0
235	05/06/98	MCB2.1	TINTINNINA	TINTINNI	31 TO 73 U	18.00000	0.050	360	6840
236	05/06/98	MCB2.1	TINTINNINA	TINTINNI	< 30 U	147.00000	0.050	2940	55860
237	05/06/98	MCB2.1	TINTINNINA	TINTINNI	>73 U	4.00000	1.000	4	0
238	06/01/98	XEA6595	OLIGOTRICHIDA	CILIATES	31 TO 73 U	20.00000	0.025	800	31200
239	06/01/98	XEA6595	OLIGOTRICHIDA	CILIATES	< 30 U	1073.00000	0.025	42920	1673880
240	06/01/98	XEA6595	OLIGOTRICHIDA	CILIATES	>73 U	7.00000	1.000	7	0

assignment of taxa groups

OBS	DATE	STATION	TAXA	TAXAGRP	SIZE_FRA	RAW_CNT	P	NHAT	NVAR
241	06/01/98	XEA6595	COPEPODA	COPEPODS	31 TO 73 U	0.00000	0.025	0	0
242	06/01/98	XEA6595	COPEPODA	COPEPODS	< 30 U	0.00000	0.025	0	0
243	06/01/98	XEA6595	COPEPODA	COPEPODS	>73 U	54.00000	1.000	54	0
244	06/01/98	XEA6595	BALANOMORPHA	DROP	31 TO 73 U	0.00000	0.025	0	0
245	06/01/98	XEA6595	POLYCHAETA	DROP	31 TO 73 U	0.00000	0.025	0	0
246	06/01/98	XEA6595	SARCODINA	DROP	31 TO 73 U	0.00000	0.025	0	0
247	06/01/98	XEA6595	BALANOMORPHA	DROP	< 30 U	0.00000	0.025	0	0
248	06/01/98	XEA6595	POLYCHAETA	DROP	< 30 U	0.00000	0.025	0	0
249	06/01/98	XEA6595	SARCODINA	DROP	< 30 U	123.00000	0.025	4920	191880
250	06/01/98	XEA6595	BALANOMORPHA	DROP	>73 U	0.00000	1.000	0	0
251	06/01/98	XEA6595	POLYCHAETA	DROP	>73 U	0.00000	1.000	0	0
252	06/01/98	XEA6595	SARCODINA	DROP	>73 U	0.00000	1.000	0	0
253	06/01/98	XEA6595	ROTIFERA	ROTIFERS	31 TO 73 U	127.00000	0.025	5080	198120
254	06/01/98	XEA6595	ROTIFERA	ROTIFERS	< 30 U	0.00000	0.025	0	0
255	06/01/98	XEA6595	ROTIFERA	ROTIFERS	>73 U	671.00000	1.000	671	0
256	06/01/98	XEA6595	TINTINNINA	TINTINNI	31 TO 73 U	7.00000	0.025	280	10920
257	06/01/98	XEA6595	TINTINNINA	TINTINNI	< 30 U	214.00000	0.025	8560	333840
258	06/01/98	XEA6595	TINTINNINA	TINTINNI	>73 U	4.00000	1.000	4	0
259	06/02/98	MCB4.3	OLIGOTRICHIDA	CILIATES	31 TO 73 U	64.00000	0.050	1280	24320
260	06/02/98	MCB4.3	OLIGOTRICHIDA	CILIATES	< 30 U	502.00000	0.050	10040	190760
261	06/02/98	MCB4.3	OLIGOTRICHIDA	CILIATES	>73 U	15.00000	1.000	15	0
262	06/02/98	MCB4.3	COPEPODA	COPEPODS	31 TO 73 U	1.00000	0.050	20	380
263	06/02/98	MCB4.3	COPEPODA	COPEPODS	< 30 U	0.00000	0.050	0	0
264	06/02/98	MCB4.3	COPEPODA	COPEPODS	>73 U	376.00000	1.000	376	0
265	06/02/98	MCB4.3	BALANOMORPHA	DROP	31 TO 73 U	0.00000	0.050	0	0
266	06/02/98	MCB4.3	POLYCHAETA	DROP	31 TO 73 U	0.00000	0.050	0	0
267	06/02/98	MCB4.3	SARCODINA	DROP	31 TO 73 U	0.00000	0.050	0	0
268	06/02/98	MCB4.3	CLADOCERA	DROP	31 TO 73 U	0.00000	0.050	0	0
269	06/02/98	MCB4.3	BALANOMORPHA	DROP	< 30 U	0.00000	0.050	0	0
270	06/02/98	MCB4.3	POLYCHAETA	DROP	< 30 U	0.00000	0.050	0	0
271	06/02/98	MCB4.3	SARCODINA	DROP	< 30 U	0.00000	0.050	0	0
272	06/02/98	MCB4.3	CLADOCERA	DROP	< 30 U	0.00000	0.050	0	0
273	06/02/98	MCB4.3	BALANOMORPHA	DROP	>73 U	0.00000	1.000	0	0
274	06/02/98	MCB4.3	POLYCHAETA	DROP	>73 U	8.00000	1.000	8	0
275	06/02/98	MCB4.3	SARCODINA	DROP	>73 U	0.00000	1.000	0	0
276	06/02/98	MCB4.3	CLADOCERA	DROP	>73 U	0.00000	1.000	0	0
277	06/02/98	MCB4.3	ROTIFERA	ROTIFERS	31 TO 73 U	3.00000	0.050	60	1140
278	06/02/98	MCB4.3	ROTIFERA	ROTIFERS	< 30 U	0.00000	0.050	0	0
279	06/02/98	MCB4.3	ROTIFERA	ROTIFERS	>73 U	6.00000	1.000	6	0
280	06/02/98	MCB4.3	TINTINNINA	TINTINNI	31 TO 73 U	2.00000	0.050	40	760

assignment of taxa groups

OBS	DATE	STATION	TAXA	TAXAGRP	SIZE_FRA	RAW_CNT	P	NHAT	NVAR
281	06/02/98	MCB4.3	TINTINNINA	TINTINNI	< 30 U	71.00000	0.050	1420	26980
282	06/02/98	MCB4.3	TINTINNINA	TINTINNI	>73 U	5.00000	1.000	5	0
283	06/02/98	MWT5.1	OLIGOTRICHIDA	CILIATES	31 TO 73 U	181.00000	0.050	3620	68780
284	06/02/98	MWT5.1	OLIGOTRICHIDA	CILIATES	< 30 U	931.00000	0.050	18620	353780
285	06/02/98	MWT5.1	OLIGOTRICHIDA	CILIATES	>73 U	24.00000	1.000	24	0
286	06/02/98	MWT5.1	COPEPODA	COPEPODS	31 TO 73 U	0.00000	0.050	0	0
287	06/02/98	MWT5.1	COPEPODA	COPEPODS	< 30 U	0.00000	0.050	0	0
288	06/02/98	MWT5.1	COPEPODA	COPEPODS	>73 U	74.00000	1.000	74	0
289	06/02/98	MWT5.1	BALANOMORPHA	DROP	31 TO 73 U	0.00000	0.050	0	0
290	06/02/98	MWT5.1	POLYCHAETA	DROP	31 TO 73 U	0.00000	0.050	0	0
291	06/02/98	MWT5.1	SARCODINA	DROP	31 TO 73 U	0.00000	0.050	0	0
292	06/02/98	MWT5.1	CLADOCERA	DROP	31 TO 73 U	0.00000	0.050	0	0
293	06/02/98	MWT5.1	BALANOMORPHA	DROP	< 30 U	0.00000	0.050	0	0
294	06/02/98	MWT5.1	POLYCHAETA	DROP	< 30 U	0.00000	0.050	0	0
295	06/02/98	MWT5.1	SARCODINA	DROP	< 30 U	0.00000	0.050	0	0
296	06/02/98	MWT5.1	CLADOCERA	DROP	< 30 U	0.00000	0.050	0	0
297	06/02/98	MWT5.1	BALANOMORPHA	DROP	>73 U	12.00000	1.000	12	0
298	06/02/98	MWT5.1	POLYCHAETA	DROP	>73 U	3.00000	1.000	3	0
299	06/02/98	MWT5.1	SARCODINA	DROP	>73 U	0.00000	1.000	0	0
300	06/02/98	MWT5.1	CLADOCERA	DROP	>73 U	0.00000	1.000	0	0
301	06/02/98	MWT5.1	ROTIFERA	ROTIFERS	31 TO 73 U	6.00000	0.050	120	2280
302	06/02/98	MWT5.1	ROTIFERA	ROTIFERS	< 30 U	0.00000	0.050	0	0
303	06/02/98	MWT5.1	ROTIFERA	ROTIFERS	>73 U	515.00000	1.000	515	0
304	06/02/98	MWT5.1	TINTINNINA	TINTINNI	31 TO 73 U	16.00000	0.050	320	6080
305	06/02/98	MWT5.1	TINTINNINA	TINTINNI	< 30 U	416.00000	0.050	8320	158080
306	06/02/98	MWT5.1	TINTINNINA	TINTINNI	>73 U	65.00000	1.000	65	0
307	06/04/98	MLE2.2	CLADOCERA	DROP	31 TO 73 U	0.00000	0.025	0	0
308	06/04/98	MLE2.2	CLADOCERA	DROP	< 30 U	0.00000	0.025	0	0
309	06/04/98	MLE2.2	CLADOCERA	DROP	>73 U	0.00000	1.000	0	0
310	06/08/98	PXT0402	OLIGOTRICHIDA	CILIATES	31 TO 73 U	4.00000	0.025	160	6240
311	06/08/98	PXT0402	OLIGOTRICHIDA	CILIATES	< 30 U	152.00000	0.025	6080	237120
312	06/08/98	PXT0402	OLIGOTRICHIDA	CILIATES	>73 U	0.00000	1.000	0	0
313	06/08/98	PXT0402	COPEPODA	COPEPODS	31 TO 73 U	1.00000	0.025	40	1560
314	06/08/98	PXT0402	COPEPODA	COPEPODS	< 30 U	0.00000	0.025	0	0
315	06/08/98	PXT0402	COPEPODA	COPEPODS	>73 U	283.00000	1.000	283	0
316	06/08/98	PXT0402	BALANOMORPHA	DROP	31 TO 73 U	0.00000	0.025	0	0
317	06/08/98	PXT0402	POLYCHAETA	DROP	31 TO 73 U	0.00000	0.025	0	0
318	06/08/98	PXT0402	SARCODINA	DROP	31 TO 73 U	0.00000	0.025	0	0
319	06/08/98	PXT0402	CLADOCERA	DROP	31 TO 73 U	0.00000	0.025	0	0
320	06/08/98	PXT0402	BALANOMORPHA	DROP	< 30 U	0.00000	0.025	0	0

assignment of taxa groups

OBS	DATE	STATION	TAXA	TAXAGRP	SIZE_FRA	RAW_CNT	P	NHAT	NVAR
321	06/08/98	PXT0402	POLYCHAETA	DROP	< 30 U	0.00000	0.025	0	0
322	06/08/98	PXT0402	SARCODINA	DROP	< 30 U	0.00000	0.025	0	0
323	06/08/98	PXT0402	CLADOCERA	DROP	< 30 U	0.00000	0.025	0	0
324	06/08/98	PXT0402	BALANOMORPHA	DROP	>73 U	0.00000	1.000	0	0
325	06/08/98	PXT0402	POLYCHAETA	DROP	>73 U	0.00000	1.000	0	0
326	06/08/98	PXT0402	SARCODINA	DROP	>73 U	0.00000	1.000	0	0
327	06/08/98	PXT0402	CLADOCERA	DROP	>73 U	60.00000	1.000	60	0
328	06/08/98	PXT0402	ROTIFERA	ROTIFERS	31 TO 73 U	3.00000	0.025	120	4680
329	06/08/98	PXT0402	ROTIFERA	ROTIFERS	< 30 U	0.00000	0.025	0	0
330	06/08/98	PXT0402	ROTIFERA	ROTIFERS	>73 U	271.00000	1.000	271	0
331	06/08/98	PXT0402	TINTINNINA	TINTINNI	31 TO 73 U	33.00000	0.025	1320	51480
332	06/08/98	PXT0402	TINTINNINA	TINTINNI	< 30 U	61.00000	0.025	2440	95160
333	06/08/98	PXT0402	TINTINNINA	TINTINNI	>73 U	8.00000	1.000	8	0

summed over size fractions

OBS	DATE	STATION	TAXAGRP	OESTCNT	OESTSVAR
1	03/23/98	MCB5.2	CILIATES	5394	101080
2	03/24/98	MET5.2	CILIATES	14041	547560
3	04/06/98	MCB5.2	CILIATES	7985	151620
4	04/07/98	MET5.1	CILIATES	7321	285480
5	04/13/98	PXT0402	CILIATES	960	37440
6	04/13/98	XDE5339	CILIATES	5640	219960
7	05/04/98	MLE2.2	CILIATES	3895	148200
8	05/05/98	MCB3.3C	CILIATES	12833	243200
9	05/05/98	MET5.1	CILIATES	3601	140400
10	05/06/98	MCB2.1	CILIATES	16623	315780
11	06/01/98	XEA6595	CILIATES	43727	1705080
12	06/02/98	MCB4.3	CILIATES	11335	215080
13	06/02/98	MWT5.1	CILIATES	22264	422560
14	06/08/98	PXT0402	CILIATES	6240	243360
15	03/23/98	MCB5.2	COPEPODS	19	0
16	03/24/98	MET5.2	COPEPODS	118	0
17	04/06/98	MCB5.2	COPEPODS	29	0
18	04/07/98	MET5.1	COPEPODS	206	0
19	04/13/98	PXT0402	COPEPODS	517	0
20	04/13/98	XDE5339	COPEPODS	107	0
21	05/04/98	MLE2.2	COPEPODS	346	0
22	05/05/98	MCB3.3C	COPEPODS	123	380
23	05/05/98	MET5.1	COPEPODS	308	0
24	05/06/98	MCB2.1	COPEPODS	194	0
25	06/01/98	XEA6595	COPEPODS	54	0
26	06/02/98	MCB4.3	COPEPODS	396	380
27	06/02/98	MWT5.1	COPEPODS	74	0
28	06/08/98	PXT0402	COPEPODS	323	1560
29	03/23/98	MCB5.2	ROTIFERS	1190	19380
30	03/24/98	MET5.2	ROTIFERS	9	0
31	04/06/98	MCB5.2	ROTIFERS	448	7220
32	04/07/98	MET5.1	ROTIFERS	152	3120
33	04/13/98	PXT0402	ROTIFERS	265	6240
34	04/13/98	XDE5339	ROTIFERS	137	4680
35	05/04/98	MLE2.2	ROTIFERS	54	0
36	05/05/98	MCB3.3C	ROTIFERS	542	9500
37	05/05/98	MET5.1	ROTIFERS	3083	56160
38	05/06/98	MCB2.1	ROTIFERS	3988	73340
39	06/01/98	XEA6595	ROTIFERS	5751	198120
40	06/02/98	MCB4.3	ROTIFERS	66	1140
41	06/02/98	MWT5.1	ROTIFERS	635	2280
42	06/08/98	PXT0402	ROTIFERS	391	4680
43	03/23/98	MCB5.2	TINTINNI	6168	108300
44	03/24/98	MET5.2	TINTINNI	124	4680
45	04/06/98	MCB5.2	TINTINNI	15013	283480
46	04/07/98	MET5.1	TINTINNI	3961	154440
47	04/13/98	PXT0402	TINTINNI	360	14040
48	04/13/98	XDE5339	TINTINNI	2845	110760
49	05/04/98	MLE2.2	TINTINNI	3293	127920
50	05/05/98	MCB3.3C	TINTINNI	3009	56620

summed over size fractions

OBS	DATE	STATION	TAXAGRP	OESTCNT	OESTSVAR
51	05/05/98	MET5.1	TINTINNI	14438	561600
52	05/06/98	MCB2.1	TINTINNI	3304	62700
53	06/01/98	XEA6595	TINTINNI	8844	344760
54	06/02/98	MCB4.3	TINTINNI	1465	27740
55	06/02/98	MWT5.1	TINTINNI	8705	164160
56	06/08/98	PXT0402	TINTINNI	3768	146640

TAXAGRP=CILIATES

OBS	STATION	DATE	AESTCNT	AESTSVAR	OESTCNT	OESTSVAR	DIFF	VARDIFF	Z_SCORE
1	MCB2.1	05/06/98	2837.74	107119.09	16623	315780	-13785.26	442359.83	-20.7266
2	MCB3.3C	05/05/98	1672.00	1660.00	12833	243200	-11161.00	259365.00	-21.9153
3	MCB4.3	06/02/98	.	.	11335	215080	.	.	.
4	MCB4.3C	06/02/98	553.00	0.00	.	.	.	.	.
5	MCB5.2	03/23/98	67.00	0.00	5394	101080	-5327.00	106541.00	-16.3202
6	MCB5.2	04/06/98	721.00	0.00	7985	151620	-7264.00	160326.00	-18.1415
7	MET5.1	04/07/98	66.00	0.00	7321	285480	-7255.00	292867.00	-13.4061
8	MET5.1	05/05/98	100.00	0.00	3601	140400	-3501.00	144101.00	-9.2227
9	MET5.2	03/24/98	192.00	0.00	14041	547560	-13849.00	561793.00	-18.4769
10	MLE2.2	05/04/98	2598.00	2598.00	3895	148200	-1297.00	157291.00	-3.2703
11	MWT5.1	06/02/98	.	.	22264	422560	.	.	.
12	MWT5.1	06/03/98	369.00	0.00	.	.	.	.	.
13	PXT0402	04/13/98	.	.	960	37440	.	.	.
14	PXT0402	06/08/98	130.00	0.00	6240	243360	-6110.00	249730.00	-12.2266
15	XDE5339	04/13/98	.	.	5640	219960	.	.	.
16	XEA6595	06/01/98	.	.	43727	1705080	.	.	.
17	XEA6596	06/01/98	938.00	0.00	.	.	.	.	.

TAXAGRP=COPEPOD NAUPLII

OBS	STATION	DATE	AESTCNT	AESTSVAR	OESTCNT	OESTSVAR	DIFF	VARDIFF	Z_SCORE
18	MCB2.1	05/06/98	13166.67	1084055.56	194	0	12972.67	1097416.22	12.3835
19	MCB3.3C	05/05/98	5918.92	154051.86	123	380	5795.92	160473.78	14.4684
20	MCB4.3	06/02/98	.	.	396	380	.	.	.
21	MCB4.3C	06/02/98	24909.09	1107322.31	.	.	.	.	.
22	MCB5.2	03/23/98	666.67	88222.22	19	0	647.67	88907.89	2.1721
23	MCB5.2	04/06/98	2037.04	375192.04	29	0	2008.04	377258.08	3.2693
24	MET5.1	04/07/98	9071.43	638887.76	206	0	8865.43	648165.18	11.0118
25	MET5.1	05/05/98	16739.13	3622202.27	308	0	16431.13	3639249.40	8.6131
26	MET5.2	03/24/98	8000.00	173818.18	118	0	7882.00	181936.18	18.4789
27	MLE2.2	05/04/98	22077.92	1910794.40	346	0	21731.92	1933218.32	15.6300
28	MWT5.1	06/02/98	.	.	74	0	.	.	.
29	MWT5.1	06/03/98	38000.00	3280181.82	.	.	.	.	.
30	PXT0402	04/13/98	.	.	517	0	.	.	.
31	PXT0402	06/08/98	18857.14	1328081.63	323	1560	18534.14	1348821.78	15.9586
32	XDE5339	04/13/98	.	.	107	0	.	.	.
33	XEA6595	06/01/98	.	.	54	0	.	.	.
34	XEA6596	06/01/98	3444.44	379271.60	.	.	.	.	.

TAXAGRP=ROTIFERS

OBS	STATION	DATE	AESTCNT	AESTSVAR	OESTCNT	OESTSVAR	DIFF	VARDIFF	Z_SCORE
35	MCB2.1	05/06/98	8608.70	365682.42	3988	73340	4620.70	451619.12	6.8758
36	MCB3.3C	05/05/98	17275.96	853924.28	542	9500	16733.96	881242.24	17.8259
37	MCB4.3	06/02/98	.	.	66	1140	.	.	.
38	MCB4.3C	06/02/98	1409.09	62640.50	.	.	.	.	.
39	MCB5.2	03/23/98	45066.67	5963822.22	1190	19380	43876.67	6029458.89	17.8688
40	MCB5.2	04/06/98	18333.33	3376728.40	448	7220	17885.33	3402729.73	9.6958
41	MET5.1	04/07/98	3285.71	114061.22	152	3120	3133.71	120618.94	9.0230
42	MET5.1	05/05/98	255652.17	95869111.53	3083	56160	252569.17	96184006.71	25.7531
43	MET5.2	03/24/98	287.88	4073.92	9	0	278.88	4370.80	4.2183
44	MLE2.2	05/04/98	3238.10	150956.92	54	0	3184.10	154249.01	8.1073
45	MWT5.1	06/02/98	.	.	635	2280	.	.	.
46	MWT5.1	06/03/98	7090.91	315223.14	.	.	.	.	.
47	PXT0402	04/13/98	.	.	265	6240	.	.	.
48	PXT0402	06/08/98	9857.14	694224.49	391	4680	9466.14	709152.63	11.2410
49	XDE5339	04/13/98	.	.	137	4680	.	.	.
50	XEA6595	06/01/98	.	.	5751	198120	.	.	.
51	XEA6596	06/01/98	206222.22	40583901.23	.	.	.	.	.

TAXAGRP=TINTINNI

OBS	STATION	DATE	AESTCNT	AESTSVAR	OESTCNT	OESTSVAR	DIFF	VARDIFF	Z_SCORE
52	MCB2.1	05/06/98	145.43	5540.64	3304	62700	-3158.57	71690.08	-11.7967
53	MCB3.3C	05/05/98	28210.34	1453229.41	3009	56620	25201.34	1541068.76	20.3008
54	MCB4.3	06/02/98	.	.	1465	27740	.	.	.
55	MCB4.3C	06/02/98	194.82	8082.64	.	.	.	.	.
56	MCB5.2	03/23/98	43281.00	5716800.00	6168	108300	37113.00	5874549.00	15.3122
57	MCB5.2	04/06/98	6993.85	1262009.60	15013	283480	-8019.15	1567496.45	-6.4051
58	MET5.1	04/07/98	2925.86	100423.47	3961	154440	-1035.14	261750.33	-2.0233
59	MET5.1	05/05/98	12486.30	2681370.51	14438	561600	-1951.70	3269894.81	-1.0793
60	MET5.2	03/24/98	108.06	1500.92	124	4680	-15.94	6412.98	-0.1990
61	MLE2.2	05/04/98	26280.73	2362157.02	3293	127920	22987.73	2519650.75	14.4819
62	MWT5.1	06/02/98	.	.	8705	164160	.	.	.
63	MWT5.1	06/03/98	14673.36	650652.89	.	.	.	.	.
64	PXT0402	04/13/98	.	.	360	14040	.	.	.
65	PXT0402	06/08/98	2596.43	181102.04	3768	146640	-1171.57	334106.47	-2.0269
66	XDE5339	04/13/98	.	.	2845	110760	.	.	.
67	XEA6595	06/01/98	.	.	8844	344760	.	.	.
68	XEA6596	06/01/98	35.00	0.00	.	.	.	.	.

TAXAGRP=CILIATES
Univariate Procedure
Variable=DIFF

Moments

N	9	Sum Wgts	9
Mean	-7727.7	Sum	-69549.3
Std Dev	4387.334	Variance	19248697
Skewness	-0.25196	Kurtosis	-0.98646
USS	6.9145E8	CSS	1.5399E8
CV	-56.7742	Std Mean	1462.445
T:Mean=0	-5.28409	Pr>|T|	0.0007
Num ^= 0	9	Num > 0	0
M(Sign)	-4.5	Pr>=|M|	0.0039
Sgn Rank	-22.5	Pr>=|S|	0.0039
W:Normal	0.935927	Pr<W	0.5332

Quantiles(Def=5)

100% Max	-1297	99%	-1297
75% Q3	-5327	95%	-1297
50% Med	-7255	90%	-1297
25% Q1	-11161	10%	-13849
0% Min	-13849	5%	-13849
		1%	-13849

Range	12552	Q3-Q1	5834	Mode	-13849

Extremes

Lowest	Obs	Highest	Obs
-13849(	9)	-7255(	7)
-13785.3(	1)	-6110(	14)
-11161(	2)	-5327(	5)
-7264(	6)	-3501(	8)
-7255(	7)	-1297(	10)

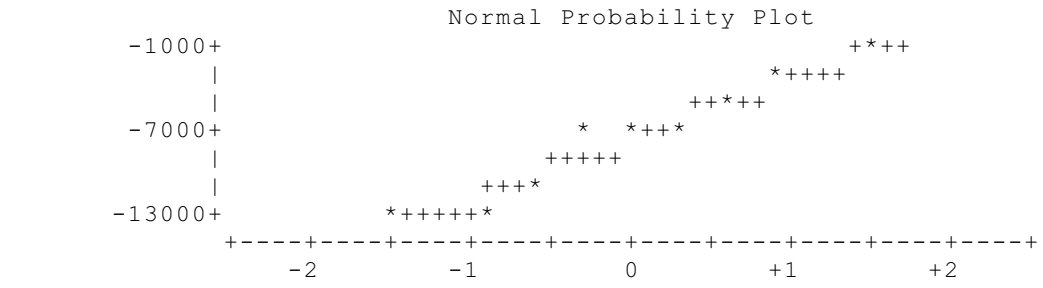
Missing Value	.
Count	8
% Count/Nobs	47.06

TAXAGRP=CILIATES

Univariate Procedure

Variable=DIFF

```
   Stem Leaf                     #  Boxplot
     -0 3                        1      |
     -2 5                        1      |
     -4 3                        1  +------+
     -6 331                      3  *--+--*
     -8                             |      |
    -10 2                        1  +------+
    -12 88                       2      |
        ----+----+----+----+
    Multiply Stem.Leaf by 10**+3
```



TAXAGRP=COPEPODS

Univariate Procedure

Variable=DIFF

Moments

N	9	Sum Wgts	9
Mean	10540.99	Sum	94868.91
Std Dev	7355.413	Variance	54102103
Skewness	0.165971	Kurtosis	-1.23572
USS	1.4328E9	CSS	4.3282E8
CV	69.77915	Std Mean	2451.804
T:Mean=0	4.299279	Pr>|T|	0.0026
Num ^= 0	9	Num > 0	9
M(Sign)	4.5	Pr>=|M|	0.0039
Sgn Rank	22.5	Pr>=|S|	0.0039
W:Normal	0.960806	Pr<W	0.8008

Quantiles(Def=5)

100% Max	21731.92	99%	21731.92
75% Q3	16431.13	95%	21731.92
50% Med	8865.429	90%	21731.92
25% Q1	5795.919	10%	647.6667
0% Min	647.6667	5%	647.6667
		1%	647.6667
Range	21084.26		
Q3-Q1	10635.21		
Mode	647.6667		

Extremes

Lowest	Obs	Highest	Obs
647.6667(	5)	8865.429(	7)
2008.037(	6)	12972.67(	1)
5795.919(	2)	16431.13(	8)
7882(	9)	18534.14(	14)
8865.429(	7)	21731.92(	10)

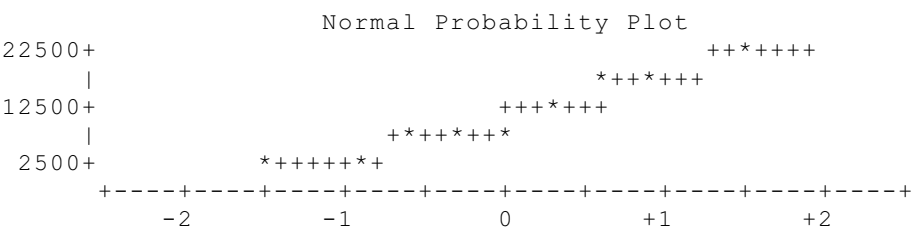
Missing Value	.
Count	8
% Count/Nobs	47.06

TAXAGRP=COPEPODS

Univariate Procedure

Variable=DIFF

```
   Stem Leaf                     #  Boxplot
      2 2                        1     |
      1 69                       2  +-----+
      1 3                        1  |  +  |
      0 689                      3  *-----*
      0 12                       2     |
        ----+----+----+----+
    Multiply Stem.Leaf by 10**+4
```



TAXAGRP=ROTIFERS

Univariate Procedure

Variable=DIFF

Moments

N	9	Sum Wgts	9
Mean	39083.18	Sum	351748.7
Std Dev	81163.26	Variance	6.5875E9
Skewness	2.852985	Kurtosis	8.300991
USS	6.645E10	CSS	5.27E10
CV	207.668	Std Mean	27054.42
T:Mean=0	1.444614	Pr>|T|	0.1866
Num ^= 0	9	Num > 0	9
M(Sign)	4.5	Pr>=|M|	0.0039
Sgn Rank	22.5	Pr>=|S|	0.0039
W:Normal	0.517725	Pr<W	0.0001

Quantiles(Def=5)

100% Max	252569.2	99%	252569.2
75% Q3	17885.33	95%	252569.2
50% Med	9466.143	90%	252569.2
25% Q1	3184.095	10%	278.8788
0% Min	278.8788	5%	278.8788
		1%	278.8788
Range	252290.3		
Q3-Q1	14701.24		
Mode	278.8788		

Extremes

Lowest	Obs	Highest	Obs
278.8788(	9)	9466.143(	14)
3133.714(	7)	16733.96(	2)
3184.095(	10)	17885.33(	6)
4620.696(	1)	43876.67(	5)
9466.143(	14)	252569.2(	8)

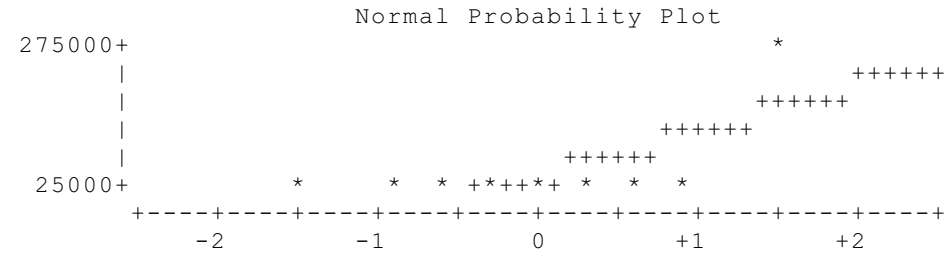
Missing Value	.
Count	8
% Count/Nobs	47.06

TAXAGRP=ROTIFERS

Univariate Procedure

Variable=DIFF

```
   Stem Leaf                     #  Boxplot
      2 5                        1     *
      2
      1
      1
      0
      0 00001224                 8  +--0--+
        ----+----+----+----+
    Multiply Stem.Leaf by 10**+5
```



TAXAGRP=TINTINNI

Univariate Procedure

Variable=DIFF

Moments

N	9	Sum Wgts	9
Mean	7772.223	Sum	69950.01
Std Dev	16115.94	Variance	2.5972E8
Skewness	0.9999	Kurtosis	-0.64631
USS	2.6215E9	CSS	2.0778E9
CV	207.353	Std Mean	5371.979
T:Mean=0	1.446808	Pr>|T|	0.1860
Num ^= 0	9	Num > 0	3
M(Sign)	-1.5	Pr>=|M|	0.5078
Sgn Rank	1.5	Pr>=|S|	0.9102
W:Normal	0.803049	Pr<W	0.0226

Quantiles(Def=5)

100% Max	37113	99%	37113
75% Q3	22987.73	95%	37113
50% Med	-1035.14	90%	37113
25% Q1	-1951.7	10%	-8019.15
0% Min	-8019.15	5%	-8019.15
		1%	-8019.15
Range	45132.15		
Q3-Q1	24939.42		
Mode	-8019.15		

Extremes

Lowest	Obs	Highest	Obs
-8019.15(	6)	-1035.14(	7)
-3158.57(	1)	-15.9394(	9)
-1951.7(	8)	22987.73(	10)
-1171.57(	14)	25201.34(	2)
-1035.14(	7)	37113(	5)

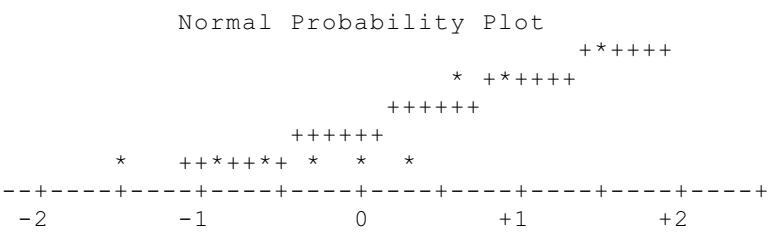
Missing Value	.
Count	8
% Count/Nobs	47.06

TAXAGRP=TINTINNI

Univariate Procedure

Variable=DIFF

```
   Stem Leaf                     #  Boxplot
      3 7                        1     |
      2 35                       2  +-----+
      1                             |     |
      0                             |  +  |
     -0 832110                   6  *-----*
        ----+----+----+----+
    Multiply Stem.Leaf by 10**+4
```



Univariate Procedure
Schematic Plots

Variable=DIFF