Quality Assurance Documentation Plan for the

Microzooplankton Component of the

Chesapeake Bay Water Quality Monitoring Program

Prepared by :

Richard V. Lacouture and Stella G. Sellner
The Academy of Natural Sciences Estuarine Research Center
10545 Mackall Road
St. Leonard, MD 20685
410-586-9700

26 June 2000

Table of Contents

Summary

The Plankton component of the Chesapeake Bay Water Quality Monitoring Program has been conducted by the Academy of Natural Sciences' Estuarine Research Center (ANSERC) since August, 1984. The Academy's plankton component includes several elements: microzooplankton and, in two separate quality assurance plans, phytoplankton and horizontal distributions of chlorophyll *a* in the upper Potomac River. The 2000 microzooplankton study is designed to include measurements of the dominant microzooplankton in various layers of the water column and in various size fractions at sampling stations in the Maryland portion of Chesapeake Bay and its tributaries (Figure 1). Techniques for microzooplankton collections and analyses are described below.

Project Objective

The objective of this component of the Chesapeake Bay Water Quality Monitoring Program is to characterize and enumerate the microzooplankton community of the Bay and its tributaries. The specific parameters measured include qualitative aspects of the microzooplankton communities (species composition) and quantitative measures (species abundance). From the species abundance data, microzooplankton biomass or the amount of carbon in the system which comes from this plankton component, can be calculated. The microzooplankton are the small animals in the plankton that measure between 20 and 200 μm in size. This portion of the plankton is important in linking phytoplankton to the higher trophic levels in the food web. As part of the plankton community, the microzooplankton, along with the phytoplankton, are extremely important because they should be the first communities within the biota to respond to changes in nutrient loads. These responses at the base of the food web could ultimately affect the food availability to higher organisms such as larval stages of fish and shellfish. The Maryland microzooplankton program data are conceivably comparable to the data collected by the Virginia microzooplankton component of the Monitoring Program. The Maryland microzooplankton are also used in the larval striped bass food availability index, devised by Versar, Inc.

Field Sampling

Samples are collected at 13 stations over the Maryland portion of the Chesapeake Bay and the Patuxent, Potomac, Choptank and Patapsco Rivers in conjunction with sampling programs by MDDNR and Versar, Inc. staff (Figure 1). From April - June, four additional fish spawning stations are sampled as part of the fish larval food availability analysis.

Net Samples

From January-June, microzooplankton samples are collected with a strategy

designed to maximize sampling during the peak period of fish spawning. Temporally, this translates into a concentrated sampling effort from late-April through mid-June (Table 1). Spatially, this means the addition of four secondary sampling stations, CB2.1, TF2.4, TF1.6 and ET5.0A which are located in historically prolific fish spawning areas (Figure 1).
One sampling occurs in the Patuxent River in either January or February. The thirteen primary plankton stations are sampled in March, while all seventeen sites are sampled once a month during April-June, with the tidal-fresh, oligohaline and secondary stations sampled on a second occasion in April and May. The stations which are sampled bi-monthly during this period are: TF2.3, TF1.5, ET5.1, RET2.2, TF1.7, CB2.2, TF2.4, TF1.6, ET5.0A and CB2.1. From July-December, microzooplankton samples are collected monthly (except for during November when no field sampling takes place) at 13 primary stations in the monitoring program.

At stratified mesohaline stations (CB3.3C, CB4.3C, CB5.2, LE1.1, LE2.2, ET5.2 and WT5.1), and tidal fresh Potomac station TF2.3, water from 5 depths above the pycnocline are sampled. At the stations typified by shallow depths and/or generally homogeneous water columns (CB2.1, CB2.2, TF1.5, TF1.6, TF1.7, TF2.4, RET2.2, ET5.0A and ET5.1,), water is pumped from each of 10 depths over the entire water column into the nets.

Samples are collected using a small diaphragm pump and hose connected to a sampling missile. Water is pumped from depth through a 44 μm mesh net.

All samples collected in 44 μm mesh nets are decanted into a jar containing buffered formaldehyde (final concentration of 2%) and transferred to the laboratory. Field collections result in 162 samples (including QA/QC samples) enumerated (Table 1).

In the laboratory, the dominant taxa (greater than 44μm in size) in each sample are identified and enumerated using a Leitz Laborlux compound microscope and a total magnification of 100x. Counting continues until at least 250 individuals have been enumerated, yielding a counting error of 10-15% (Venrick, 1978). Meroplankton and mesozooplankton forms are also noted.

Whole Water Samples

The ciliates are an important component of the microzooplankton assemblage in Chesapeake Bay. The net sampling is an inappropriate means of identifying and quantifying this important taxonomic group because of their size (often < 44μm) and their fragile nature. Therefore, beginning in March, 1998, whole water microzooplankton samples are taken at the mesohaline stations between March - September, in order to quantify the ciliates. The mesohaline stations samples are CB3.3C, CB4.3C, CB5.2, LE1.1, LE2.2, AND ET5.2. Beginning in March, 2000 samples are also taken at the tidal fresh stations TF2.3 and TF1.5. Samples are decanted from the replicate carboys that are collected at five discrete depths above the pycnocline. The whole water microzooplankton samples are preserved with acid Lugol's solution to a final concentration of 2 %. Field collections will result in 42 samples and 2 QA/QC

samples (Table 1).

In the laboratory, subsamples are added to settling chambers and examined on a Leitz Diavert inverted microscope at 200X magnification. A minimum of 100 individual cells or the individuals in 2 settling chambers are enumerated. Tintinnids are identified to the lowest possible taxonomic level based on lorica shape. The soft-bodied ciliates are identified to the lowest possible taxonomic level, based on morphology and size.

Zebra Mussel Samples

Water samples from CB1.1 are concentrated in a 44 μm mesh net for enumerating and identifying juvenile zebra mussels. Samples are collected once in April and September and bimonthly in May - August. One preserved and one viable sample (kept cool on ice) is returned to the laboratory. The live sample is scanned, using a polarized filter, within 24 h for identification of planktonic zebra mussel veliger larvae.

Laboratory Methods

Net Samples

Each sample is gently mixed and a 1 ml aliquot removed with a Stempel pipet and put into a Sedgwick-Rafter cell for enumeration with a compound microscope at 100X magnification. Beginning with samples collected in April, 1986, a small drop of concentrated Rose Bengal stain is added to the cell prior to addition of the sample. The sample is allowed to set for 10 minutes before counting. At least one chamber (1 ml) is counted for each sample and if the total count does not reach 250 organisms, subsequent 1 ml aliquots are also enumerated until a count of 250 or more organisms is obtained or 3 ml are examined. If a certain organism is abundant (more than 60 per chamber), it is not counted in the subsequent 1 ml aliquots for a given sample. For extremely abundant taxa, less than one ml could be counted. A count program which generates normalized counts of numbers per liter for individual species as well as groups (see section on formulas, calculations and conversions for more information) is used. The NODC taxonomic codes are used for the taxa that are enumerated. Microzooplankton smaller than 44 μm are noted on the original data sheet but not enumerated since estimates are not quantitative.

Whole Water Samples

In the lab, 5-25 ml are subsampled from the sample jar for settling. This amount depends on how much detritus and plankton are in the sample. If 25 ml are used, the bottle is shaken gently (slowly inverted 5 times) and 25 ml poured into a graduated cylinder. This is put into a 50 ml settling chamber and the graduated cylinder rinsed 3X. The sample is allowed to settle 48 h before being counted. If less than 25 ml aliquots are used, these are poured into 25 ml settling

chambers which settle for 24 hr before counting.

To count, the entire chamber is examined at 200X with an inverted microscope to obtain a minimum count of 100 organisms. If 100 organisms are not counted, another subsample is settled. Any organism that is abundant in the first aliquot (more than 60) is not counted. The count program used for the net samples (see above) is currently being adapted for use with whole water counts.

Zebra Mussel Samples

Upon returning to the lab, the viable zebra mussel sample is placed in the refrigerator. Prior to examination for the presence of zebra mussel veliger larvae, the sample is concentrated on a 44µm mesh screen and subsamples of the concentrate are rinsed into a petri dish with filtered station water. A dissecting microscope with polarizing filters is used to screen the entire sample for the presence of veliger larvae. If the fixed sample is to be examined, the sample is allowed to settle for 24 h and the supernatant is drawn off. The sample is then examined using the net sample procedure except 5 separate 1 ml samples are scanned for the larvae. The presence of zebra mussel larvae will be immediately reported to Renee Karrh at MDDNR.

QA/QC

Random sample recounts of previously counted microzooplankton samples are undertaken in order to determine counting error. One sample/20 samples is blindly selected and recounted. The recount total cell density must fall within 10 % of the total for the original count or the sample is counted again until 2 samples' total densities are within 10 % of one another. The recount and original sample data sheets are stored in a binder in the microscope laboratory at ANSERC.

Split Samples

Three split samples are taken to compare the techniques used for counting by ANSERC and ODU taxonomists. Net and whole water samples are taken (described above) at the selected stations to be counted by ANSERC. From the same carboys that the whole water samples for ANSERC are taken, 2 one liter samples are taken to be sent to ODU. These are preserved in acid Lugol's solution for a final concentration of 1%. The sample bottle lids are taped and each bottle is put in a separate plastic bag. The bottles are then packed in a box and are hand carried or shipped second day air to ODU.

Deliverables

Microzooplankton data are delivered to MDDNR in two ways, electronically by April 15, and October 15, and in reports due May 15, and November 15. The data analyzed for these two deliverables cover the period July-December, and January-June, respectively.

Literature Cited

Armengol-Diaz, J., A. Esparcia, E. Vicente and M. R. Miracle. 1993. Vertical distribution of planktonic rotifers in a karstic meromictic lake. Hydrobiologia 255/256:381-388.

Brownlee, D. C. and F. Jacobs. 1987. Mesozooplankton and microzooplankton in the Chesapeake Bay. In Contaminant Problems of Living Chesapeake Bay Resources. Edited by S. K. Majumdar, L. W. Hall and H. M. Austin. The Pennsylvania Academy of Sciences. (Pages 245-263)

Dolan, J. R. 1989. The ecology of ciliate microzooplankton in the Chesapeake Bay. PhD Dissertation. University of Maryland, College Park, MD. (Pages 20-21)

Stoecker, D. K., D. J. Gifford and M. Putt. 1994. Preservation of marine planktonic ciliates: losses and cell shrinkage during fixation. Mar. Ecol. Prog. Ser. 110:293-299.

Venrick, E.L. 1978. How many cells to count? Pages 167-180 in A. Sournia (ed.), Phytoplankton manual. UNESCO, Paris.

Data Deliverable Information:

Formulas, Calculations and Conversions

The following equation is used to convert **net sample** raw counts to density (#/L) for each taxon identified:

DENSITY=((RAWCT/MLSCNT)*CONCENTRATE VOLUME)/TOTAL SPLE VOL

where RAWCT= raw count of the organism
MLSCNT=number of ml of the concentrated sample counted
CONCENTRATE VOLUME=concentration of the sample after it is drawn down in the lab
TOTAL SPLE VOL=number of liters pumped through the net

The following equation is used to convert **whole water sample** counts to density (#/L) for each taxon identified:

DENSITY=(RAWCNT/#MLSETTLED)*1000*1.02 = #/L where 1.02 is the dilution factor because of the addition of Lugol's solution.

where RAWCNT= raw count of the organism
#MLSETTLED= number of ml of the sample put into the settling chamber

#/L=abundance of the organism in numbers per liter

Species Inhouse Code, Reference Code, and Scientific Name

The inhouse code is the same as the reference code with the addition of an inhouse modifier in column 13. The modifier in the 13th column has different meanings depending on the taxa being considered. For larger organisms, a one in this column indicates that the organism is in its larval or naupliar stage. For smaller microzooplankton such as rotifers and non-loricate ciliates, this modifier may indicate a size category within a taxon. The NODC Code does not distinguish between life history stages. For tintinninds (3540...) a 0,1,2 (or 3, 4, 5) in the 13th column indicates that is was not or could not be determined if the lorica contained a cell, that the lorica did contain a cell (full), or that the lorica did not contain a cell (empty), respectively. For an undescribed species, the code is given down to the lowest possible taxonomic level, the unknown levels are given zeros and a number is assigned in the subspecies columns (11-12) (e.g. Brachionus A = 4506010400010).

Only organisms greater than 44µm and less than 200 µm in their smallest dimension are included in the species list. The microzooplankton less than 44µm are noted and recorded as either rare, common, abundant or dominant.

NODC Code with in-house modifications (13th column) and scientific name:

DIGIT	REPRESENTS
1-2	Phylum
3-4	Class and Order
5-6	Family
7-8	Genus
9-10	Species
11-12	Subspecies
13	Special in-house modifier (for explanation , refer to data dictionary)

CODE	SPECIES
0000000000001	UNIDED LARVAE
0000000000002	UNIDED TROCHOPHORE LARVAE
3438000000000	SARCODINA-UNIDED SARCODINID
3442010000000	DIFFLUGIIDAE

3442010100000 DIFFLUGIA SPP.
3442010201000 LESQUEREUSIA GIBBOSA
3442020100000 ARCELLA SP.
3442030000000 CENTROPYXIDAE
3442030100000 CENTROPYXIS SP.
3442030101000 CENTROPYXIS ACULEATA
3442040000000 PARAQUADRULIDAE
3442040200000 QUADRULELLA SP.
3442050000000 HYALOSPHENIIDAE-TESTATED AMOEBA
3445020000000 EUGLYPHA SP.
3445040000000 CYPHODERIIDAE
3445040100000 CYPHODERIA SP.
3448000000000 FORAMINIFERIDA
3512000000000 CILIOPHORA-UNIDED CILIATE
3516000000000 HAPTORIDA
3516010100000 DIDINIUM SP.
3516010202000 MESODINIUM RUBRUM
3516020000001 TRACHELOCERCIDAE-LARGE
3517000000001 CYRTOPHORIDA-LARGE
3530000000001 PERITRICHIDA-LARGE
3531000000000 SESSILINA-UNIDED SESSILINE PERITRICH
3532000000000 MOBILINA-UNIDED MOBILINE PERITRICH
3533000000000 SUCTORIA-UNIDED SUCTORIAN
3534010100000 ACINETA SP.
3534030700000 STAUROPHRYA SP.
3534040100000 EPHELOTA SP.
3537000000000 HETEROTRICHINA-UNIDED HETEROTRICH
3539000000000 OLIGOTRICHINA-UNIDED OLIGOTRICH
3539020100000 STENTOR SP.
3539030000000 STROMBIDIDAE
3539030100000 STROMBIDIUM SP.
3539030200000 TONTONIA SP.
3540000000000 TINTINNINA-UNIDED TINTINNID
3540010100050 TINTINNIDIUM SP.-LARGE
3540010100051 TINTINNIDIUM SP.-LARGE-FULL
3540010100052 TINTINNIDIUM SP.-LARGE-EMPTY
3540020100000 TINTINNOPSIS SP.
3540020100001 TINTINNOPSIS SP.-FULL
3540020100002 TINTINNOPSIS SP.-EMPTY
3540020100030 TINTINNOPSIS SUBACUTA-HUGE
3540020100031 TINTINNOPSIS SUBACUTA-HUGE-FULL
3540020100032 TINTINNOPSIS SUBACUTA-HUGE-EMPTY
3540020100050 TINTINNOPSIS SP. A

3540020100051 TINTINNOPSIS SP. A-FULL
3540020100052 TINTINNOPSIS SP. A-EMPTY
3540020105000 TINTINNOPSIS DADAYI
3540020105001 TINTINNOPSIS DADAYI-FULL
3540020105002 TINTINNOPSIS DADAYI-EMPTY
3540020123000 TINTINNOPSIS FIMBRIATA
3540020123001 TINTINNOPSIS FIMBRIATA-FULL
3540020123002 TINTINNOPSIS FIMBRIATA-EMPTY
3540020123003 TINTINNOPSIS FIMBRIATA-MEUNIERI GRP
3540020123004 TINTINNOPSIS FIMBRIATA-MEUNIERI GRP-FULL
3540020123005 TINTINNOPSIS FIMBRIATA-MEUNIERI GRP-EMPTY
3540020129000 TINTINNOPSIS RADIX
3540020129001 TINTINNOPSIS RADIX-FULL
3540020129002 TINTINNOPSIS RADIX-EMPTY
3540020133000 TINTINNOPSIS SUBACUTA
3540020133001 TINTINNOPSIS SUBACUTA-FULL
3540020133002 TINTINNOPSIS SUBACUTA-EMPTY
3540020136000 TINTINNOPSIS MEUNIERI
3540020136001 TINTINNOPSIS MEUNIERI-FULL
3540020136002 TINTINNOPSIS MEUNIERI-EMPTY
3540020137000 TINTINNOPSIS KARAJACENSIS
3540020137001 TINTINNOPSIS KARAJACENSIS-FULL
3540020137002 TINTINNOPSIS KARAJACENSIS-EMPTY
3540020138000 TINTINNOPSIS NITIDA
3540020138001 TINTINNOPSIS NITIDA-FULL
3540020138002 TINTINNOPSIS NITIDA-EMPTY
3540030100010 STENOSEMELLA SP.A
3540030100011 STENOSEMELLA SP.A-FULL
3540030100012 STENOSEMELLA SP.A-EMPTY
3540050100020 METACYLIS SP. B
3540050100021 METACYLIS SP. B-FULL
3540050100022 METACYLIS SP. B-EMPTY
3540050100030 METACYLIS SP. C
3540050100031 METACYLIS SP. C-FULL
3540050100032 METACYLIS SP. C-EMPTY
3540050400000 CLIMACOCYLIS SP.
3540050400001 CLIMACOCYLIS SP.-FULL
3540050400002 CLIMACOCYLIS SP.-EMPTY
3540050501000 STYLICAUDA PLATENSIS
3540050501001 STYLICAUDA PLATENSIS-FULL
3540050501002 STYLICAUDA PLATENSIS-EMPTY
3540070100000 FAVELLA SP.
3540070100001 FAVELLA SP.-FULL

3540070100002 FAVELLA SP.-EMPTY
3540130100010 EUTINTINNUS SP.A
3540130100011 EUTINTINNUS SP.A-FULL
3540130100012 EUTINTINNUS SP.A-EMPTY
3543000000000 HYPOTRICHIDA
3545010000000 EUPLOTIDAE
3545010100001 EUPLOTES SPP.-LARGE
3545010100020 EUPLOTES SP. A
3545010100030 EUPLOTES SP. B
4400000000000 GASTROTRICHA
4500000000000 ROTIFERA-UNIDED ROTIFER
4500000000010 ROTIFER A
4500000000020 ROTIFER B
4500000000030 ROTIFER C
4500000000040 ROTIFER D
4500000000050 ROTIFER E
4500000000060 ROTIFER F
4504000000000 BDELLOIDA-UNIDED BDELLOID ROTIFER
4504020100000 ROTARIA SP.
4504020103000 ROTARIA CITRINUS
4504020104000 ROTARIA NEPTUNIA
4504020300000 MACROTRACHELA SP.
4506010100000 KERATELLA SP.
4506010100010 KERATELLA SP. A
4506010102000 KERATELLA QUADRATA
4506010103000 KERATELLA COCHLEARIS
4506010103020 KERATELLA COCHLEARIS COCHLEARIS
4506010103030 KERATELLA COCHLEARIS HISPIDA
4506010103040 KERATELLA COCHLEARIS MICRACANTHA
4506010103050 KERATELLA COCHLEARIS ROBUSTA
4506010103060 KERATELLA COCHLEARIS TECTA
4506010104000 KERATELLA CRASSA
4506010105000 KERATELLA EARLINAE
4506010106000 KERATELLA VALGA
4506010200000 NOTHOLCA SP.
4506010203000 NOTHOLCA ACUMINATA
4506010300000 COLURELLA SP.
4506010400000 BRACHIONUS SP.
4506010400010 BRACHIONUS SP. A
4506010400020 BRACHIONUS SP. B
4506010401000 BRACHIONUS PLICATILIS
4506010402000 BRACHIONUS CALYCIFLORUS
4506010403000 BRACHIONUS HAVANAENSIS

4506010404000 BRACHIONUS PTERODINOIDES
4506010405000 BRACHIONUS URCEOLARIS
4506010406000 BRACHIONUS ANGULARIS
4506010407000 BRACHIONUS BIDENTATA
4506010408000 BRACHIONUS BUDAPESTINENSIS
4506010409000 BRACHIONUS CAUDATUS
4506010410000 BRACHIONUS DIVERSICORNIS
4506010411000 BRACHIONUS QUADRIDENTATUS
4506010412000 BRACHIONUS RUBENS
4506010413000 BRACHIONUS VARIABILIS
4506010500000 KELLICOTTIA SP.
4506010501000 KELLICOTTIA LONGISPINA
4506010502000 KELLICOTTIA BOSTONIENSIS
4506010700000 LEPADELLA SP.
4506010704000 LEPADELLA PATELLA
4506010800000 ANURAEOPSIS SP.
4506010801000 ANURAEOPSIS FISSA
4506010900000 EPIPHANES SP.
4506011000000 EUCHLANIS SP.
4506011001000 EUCHLANIS DILATATA
4506011100000 LOPHOCHARIS SP.
4506011101000 LOPHOCHARIS SALPINA
4506011200000 MACROCHAETUS SP.
4506011300000 MYTILINA SP.
4506011400000 PLATYIAS SP.
4506011401000 PLATYIAS PATULUS
4506011402000 PLATYIAS QUADRICORNIS
4506011500000 TRICHOTRIA SP.
4506011501000 TRICHOTRIA TETRACTIS
4506020100000 LECANE SP.
4506020200000 MONOSTYLA SP.
4506020201000 MONOSTYLA BULLA
4506020202000 MONOSTYLA CLOSTEROCERCA
4506020203000 MONOSTYLA QUADRIDENTATA
4506040100000 ENCENTRUM SP.
4506040200000 PROALES SP.
4506040300000 CEPHALODELLA SP.
4506040302000 CEPHALODELLA GIBBA
4506040400000 NOTOMMATA SP.
4506040500000 MONOMMATA SP.
4506040600000 EOSPHORA SP.
4506070100000 TRICHOCERCA SP.
4506070102000 TRICHOCERCA CYLINDRICA

4506070103000 TRICHOCERCA LONGISETA
4506070104000 TRICHOCERCA MULTICRINIS
4506070105000 TRICHOCERCA SIMILIS
4506080100000 ASCOMORPHA SP.
4506080101000 ASCOMORPHA OVALIS
4506080102000 ASCOMORPHA SALTANS
4506080200000 GASTROPUS SP.
4506080201000 GASTROPUS MINOR
4506120100000 ASPLANCHNA SP.
4506120101000 ASPLANCHNA BRIGHTWELLI
4506120102000 ASPLANCHNA HERRICKI
4506120103000 ASPLANCHNA PRIODONTA
4506130200000 SYNCHAETA SP.
4506130200001 SYNCHAETA SPP. L-LARGE
4506130200002 SYNCHAETA SPP. M-MEDIUM
4506130200003 SYNCHAETA SPP. S-SMALL
4506130200010 SYNCHAETA BICORNIS
4506130200020 SYNCHAETA BALTICA
4506130204000 SYNCHAETA PECTINATA
4506130206000 SYNCHAETA OBLONGA
4506130207000 SYNCHAETA STYLATA
4506130300000 POLYARTHRA SP.
4506130302000 POLYARTHRA DISSIMULANS
4506130303000 POLYARTHRA DOLICHOPTERA
4506130304000 POLYARTHRA EURYPTERA
4506130305000 POLYARTHRA MAJOR
4506130306000 POLYARTHRA REMATA
4506130307000 POLYARTHRA VULGARIS
4506130400000 PLOESOMA SP.
4506130401000 PLOESOMA HUDSONI
4506130402000 PLOESOMA TRUNCATUM
4507010100000 TESTUDINELLA SP.
4507010101000 TESTUDINELLA PATINA
4507020100000 HEXARTHRA SP.
4507020101000 HEXARTHRA MIRA
4507040100000 CONOCHILOIDES SP.
4507040102000 CONOCHILOIDES DOSSUARIUS
4507040103000 CONOCHILOIDES NATANS
4507040200000 CONOCHILUS SP.
4507040201000 CONOCHILUS HIPPOCREPIS
4507040202000 CONOCHILUS UNICORNIS
4507050100000 FILINIA SP.
4507050101000 FILINIA LONGISETA

4507050102000 FILINIA BRACHIATA
4507050103000 FILINIA TERMINALIS
4508010100000 COLLOTHECA SP.
4508010101000 COLLOTHECA MUTABILIS
4508010102000 COLLOTHECA PELAGICA
4700000000000 NEMATODA
5100000000001 GASTROPODA-LARVAE
5500000000001 PELECYPODA-LARVAE
5515370301000 DREISSENA POLYMORPHA
5922000000000 ACARINA-MITE
6117000000001 COPEPOD NAUPLII
6117000000005 COPEPOD NAUPLII+PERITRICHS
6118180100001 DIAPTOMUS -NAUPLII
6118190200001 PSEUDODIAPTOMUS SP.-NAUPLII
6118200200001 EURYTEMORA SP.-NAUPLII
6118290100001 ACARTIA SP.-NAUPLII
6119050200001 SCOTTOLANA SP.-NAUPLII
6120080200001 CYCLOPS SP.-NAUPLII
6120080300001 MESOCYCLOPS SP.-NAUPLII
6120090100001 OITHONA SP.-NAUPLII
6120260100001 HEMICYCLOPS SP.-NAUPLII
7500000000000 TARTIGRADA

Numerical Variable Names

VARIABLE	VALID RANGE
DATE	840802-971218
TIME	0651-1935
TDEPTH	1.8-33
PDEPTH	0.5-22.0
VOLPDEPT	2-20
TOTVCOMP	12-200
SER_NUM	01001-240039
A_DEPTH1	0.2- 1.0
A_DEPTH2	0.4- 5.0
A_DEPTH3	0.5-10.0
A_DEPTH4	0.5-15.0

A_DEPTH5 0.5-21.5
B_DEPTH1 1-22.5
B_DEPTH2 1-25.0
B_DEPTH3 1-27.0
B_DEPTH4 1-29.0
B_DEPTH5 1-32.0
CONCENT 10-500
MLSCNT 0.01-10
RAWCT 1-9999
DENSITYV 0.05-10000.00
TDENSITY 1-999999.99

CHARACTER VARIABLES - VALID VALUES

VARIABLE	VALID VALUES
REPNUM	
	1
	2
	3
	4
	T
	B
	W
TRIB_COD	
	BAY
	PAX
	POT
	PAT
	CHS
	CHP
SPECCODE	
	0000000000001-7500000000000
STATION	
	CB1.1
	CB2.1
	CB2.2
	CB3.3C
	CB4.3C

CB5.2
LE1.1
TF1.7
TF1.6
TF1.5
TF2.3
TF2.4
RET2.2
LE2.2
ET4.2
ET5.1
ET5.0A
ET5.2
EE3.1
WT5.1

Station Names, Numbers and Descriptions

CB1.1 01 Mouth of Susquehanna River, main Bay
CB2.1 02 SW of Turkey Point, main Bay
CB2.2 03 W of Still Pond near Buoy R 50, main Bay
CB3.3C 07 N of Bay Bridge, main Bay
CB4.3C 16 E of Dares Beach near Buoy R 78, main Bay
CB5.2 20 E of Point No Point, main Bay
LE1.1 28 Between Jack Bay sandspit and Sandgates in mid channel, Patuxent River
TF1.7 30 ESE of Jacks Creek in mid channel, Patuxent River
TF1.6 31 Midchannel off the wharf at Lower Marlboro
TF1.5 32 At Nottingham in mid channel, Patuxent River
TF2.3 35 Off Indian Head at Buoy N 54, Potomac River
TF2.4 48 Buoy 44 between Possum Point and Moss Point
RET2.2 34 Off Maryland Point at Buoy 19, Potomac River
LE2.2 33 Off Ragged Point at buoy BW 51B, Potomac River (Prior to October 1988 data tape, this station was designated XBE9541)
ET4.2 37 South of Eastern Neck Island at Buoy 9, lower Chester River
ET5.1 38 Downstream of confluence with Tuckahoe Creek, upper Choptank River
ET5.0A 49 Midchannel off the mouth of King's Creek
ET5.2 39 Near Rt 50 bridge at Cambridge, lower Choptank River
EE3.1 40 North Tangier Sound North of Buoy R 16, main Bay
WT5.1 36 East of Hawkins Point at Buoy 5M, Patapsco River (Baltimore Harbor)

Station names, Latitudes, Longitudes and Total Depths (meters)

CB1.1	39-32.7	76-04.9	6.1
CB2.1	39-26.4	76-01.5	6.2
CB2.2	39-20.8	76-10.5	12.1
CB3.3C	38-59.7	76-21.6	23.7
CB4.3C	38-33.4	76-26.1	26.1
CB5.2	38-08.2	76-13.7	30.1
LE1.1	38-25.5	76-36.1	12.0
TF1.7	38-35.0	76-40.7	3.0
TF1.6	38-39.5	76-41.1	6.2
TF1.5	38-42.7	76-42.2	10.3
TF2.3	38-36.3	77-10.3	12.7
TF2.4	38-31.5	77-16.6	9.0
RET2.2	38-21.1	77-12.2	9.5
LE2.2	38-09.6	76-35.8	11.0
ET4.2	38-59	76-13	14.6
ET5.1	38-48.4	75-54.4	5.3
ET5.0A	38-46.5	75-58.1	11.0
ET5.2	38-34.8	76-02.5	12.3
EE3.1	38-12	75-58	13.7
WT5.1	39-12.7	76-31.4	15.7

Data Entry Method

Computer keyboard to disk from data sheets for sampling trips prior to April 1985, and keyboard to disk for trips from April 1985 through December 1994. Starting in January 1995, computer keyboard to inhouse computer network.

Data Verification

Visual inspection and computer verification program.

Variable Names, SAS Labels and Descriptions

ANSMZyyH.SD2 - common sample information may be merged with counts using SER_NUM
where yy is year of data set

List of Variables

VARIABLE	TYPE	LENGTH	POSITION	FORMAT	LABEL
TRIB_COD	CHAR	3	0		SPECIFIES TRIB. SAMPLED (OR MAIN BAY)
SER_NUM	NUM	8	3		SERIAL NUM. INCL.SAMPLING EFFORT NUM.
STATION	CHAR	7	11		STATION NAME
DATE	NUM	8	18	DATE7.	SAMPLE DATE
TIME	NUM	8	26	HHMM5.	SAMPLE TIME
GMETHOD	CHAR	1	34		GEAR METHOD CODE
TDEPTH	NUM	8	35		TOTAL DEPTH
PDEPTH	NUM	8	43		DEPTH INCLUDED IN SURFACE COMPOSITE
VOLPDEPT	NUM	8	51		VOLUME OF SAMPLE PER DEPTH
TOTVCOMP	NUM	8	59		TOTAL VOLUME OF COMPOSITE SAMPLE
A_DEPTH1	NUM	8	67		1st SAMPLE DEPTH ABOVE PDEPTH
A_DEPTH2	NUM	8	75		2nd SAMPLE DEPTH ABOVE PDEPTH
A_DEPTH3	NUM	8	83		3rd SAMPLE DEPTH ABOVE PDEPTH
A_DEPTH4	NUM	8	91		4th SAMPLE DEPTH ABOVE PDEPTH
A_DEPTH5	NUM	8	99		5th SAMPLE DEPTH ABOVE PDEPTH
B_DEPTH1	NUM	8	107		1st SAMPLE DEPTH BELOW PDEPTH
B_DEPTH2	NUM	8	115		2nd SAMPLE DEPTH BELOW PDEPTH
B_DEPTH3	NUM	8	123		3rd SAMPLE DEPTH BELOW PDEPTH
B_DEPTH4	NUM	8	131		4th SAMPLE DEPTH BELOW PDEPTH
B_DEPTH5	NUM	8	139		5th SAMPLE DEPTH BELOW PDEPTH
FC_INIT	CHAR	3	147		INITIALS OF FIELD COLLECTOR
LI_INIT	CHAR	3	150		INITIALS OF INDIVID. PERFORMING LAB ID.

ANSMZyyD.SD2 - counts data set

LIST OF VARIABLES AND ATTRIBUTES BY POSITION

VARIABLE	TYPE	LENGTH	POSITION	FORMAT	LABEL
SER_NUM	NUM	8	0		SERIAL NUM. INCL. SAMPLING EFFORT NUM.
STATION	CHAR	7	8		STATION NAME
DATE	NUM	8	15	DATE7.	SAMPLE DATE
TRIB_COD	CHAR	3	23		SPECIFIES TRIB. SAMPLED (OR MAIN BAY)
LAYER	CHAR	2	26		AP=ABOVE PYC,BP=BELOW PYC, WC= WATER COL
REPNUM	CHAR	1	28		REPLICATE NUMBER
CONCENT	NUM	8	29		VOLUME OF CONCENTRATED SAMPLE
MLSCNT	NUM	8	37		MILLILITERS COUNTED
SPECCODE	CHAR	13	45		SPECIES CODE
RAWCT	NUM	8	58		RAW COUNT
DENSITYV	NUM	8	66		DENSITY (# INDIV./L) OF GIVEN TAXON
TDENSITY	NUM	8	74		DENSITY (# INDIV./L) OF ALL ORGANISM

Appendix

Figure 1. Map of Station Sites

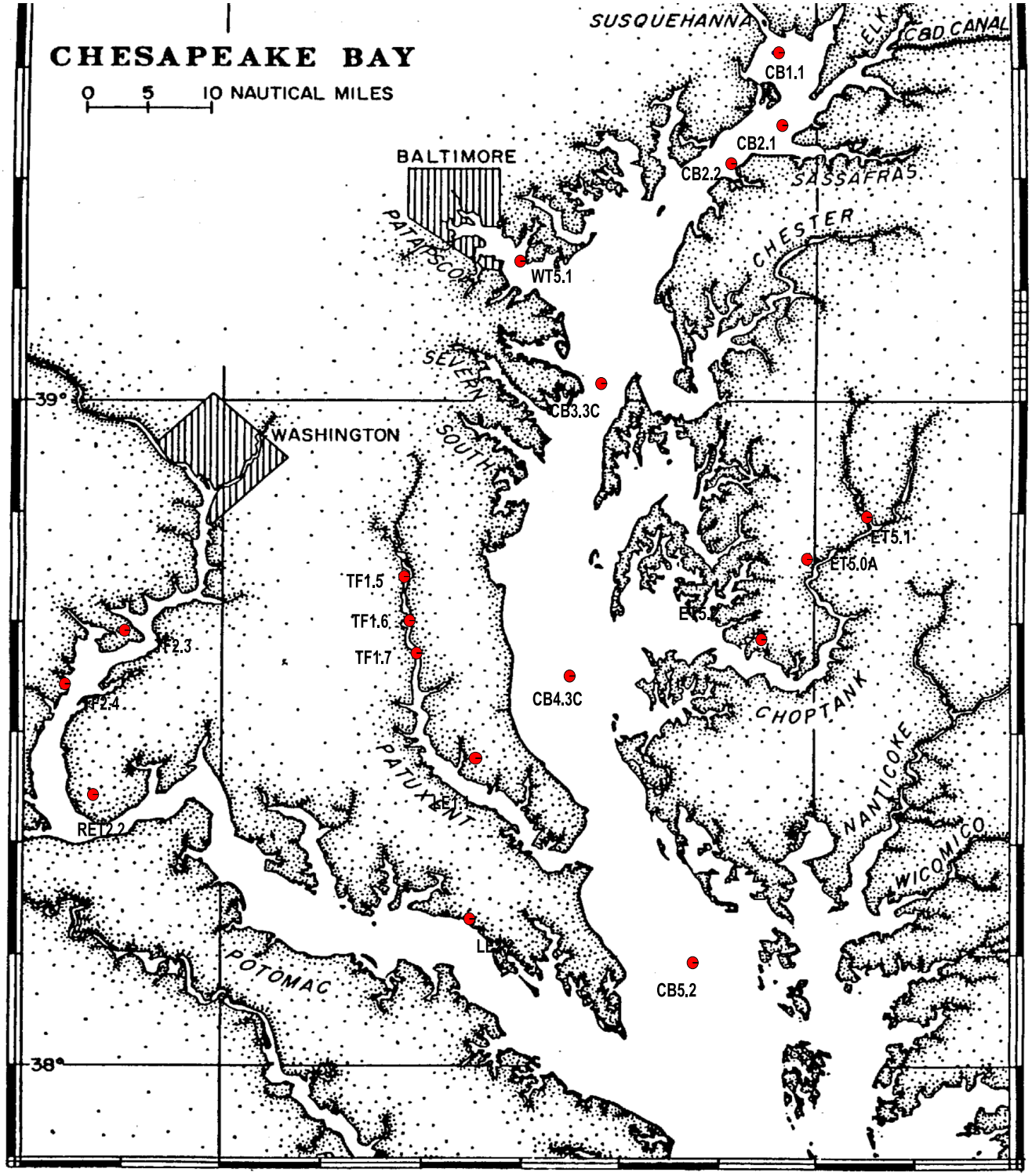

Table 1. Total Sample Numbers for Microzooplankton for the ANSERC Plankton Program

Measurements	J	A	S	O	N	D	J	F	M	A	M	J	QA/QC	Total
Net Samples	13	13	13	13	--	13	--	03	13	27	27	17	8	160
Whole Water Samples	08	08	08	--	--	--	--	--	08	08	08	08	3	59
Viable Zebra Mussels	02	02	01	--	--	--	--	--	--	01	02	01	--	9

Net Samples are taken from the following stations: CB2.2, CB3.3C, CB4.3C, CB5.2, WT5.2, ET5.1, ET5.2, TF1.5, TF1.7, LE1.1, TF2.3, RET2.2, LE2.2 and CB2.1, ET5.0A, TF2.4, TF1.6 during fish spawning season.

Whole water samples are taken from the following stations: CB3.3C, CB4.3C, CB5.2, ET5.2, LE1.1, LE2..2, TF2.3, TF1.5.

Zebra mussel samples are taken from station CB1.1.

Examples of Laboratory Data Sheet with Original Counts and Recounts

249003 MCB2.2 980708 MZP W

MICROZOOPLANKTON > 44 UM

NUMBER OF LITERS FILTERED	100.0
CONCENTRATE VOLUME (ML)	44.0

SPECIES CODE	SPECIES NAME	RAW CNT	#MLS CNTD	NORM CNT (#/L)
3540020123003	TINTINNOPSIS FIMBRIATA-MEUNIERI GRP	195	0.50	171.60
6118290100001	ACARTIA SP.-NAUPLII	41	1.00	18.04
4506130200003	SYNCHAETA SPP. S-SMALL	10	1.00	4.40
5500000000001	PELECYPODA-LARVAE	7	1.00	3.08
4506010103060	KERATELLA COCHLEARIS TECTA	6	1.00	2.64
4506130300000	POLYARTHRA SP.	6	1.00	2.64
6117000000001	COPEPOD NAUPLII	4	1.00	1.76
4506070100000	TRICHOCERCA SP.	3	1.00	1.32
4506010406000	BRACHIONUS ANGULARIS	3	1.00	1.32
4506130200010	SYNCHAETA BICORNIS	2	1.00	0.88
4506010103020	KERATELLA COCHLEARIS COCHLEARIS	2	1.00	0.88
4506010402000	BRACHIONUS CALYCIFLORUS	1	1.00	0.44

MICROZOOPLANKTON > 44UM RAW COUNT FOR ENTIRE SAMPLE 280

MICROZOOPLANKTON >44UM (#/L) FOR ENTIRE SAMPLE 209.0

249003 MCB2.2 980708 MZP W RECOUNT

MICROZOOPLANKTON > 44 UM

NUMBER OF LITERS FILTERED 100.0
CONCENTRATE VOLUME (ML) 44.0

SPECIES CODE	SPECIES NAME	RAW CNT	#MLS CNTD	NORM CNT (#/L)
3540020123003	TINTINNOPSIS FIMBRIATA-MEUNIERI GRP	171	0.50	150.48
6118290100001	ACARTIA SP.-NAUPLII	46	1.00	20.24
4506130200003	SYNCHAETA SPP. S-SMALL	18	1.00	7.92
4506010103060	KERATELLA COCHLEARIS TECTA	14	1.00	6.16
5500000000001	PELECYPODA-LARVAE	12	1.00	5.28
6117000000001	COPEPOD NAUPLII	12	1.00	5.28
4506010103020	KERATELLA COCHLEARIS COCHLEARIS	6	1.00	2.64
4506070100000	TRICHOCERCA SP.	6	1.00	2.64
4506010400000	BRACHIONUS SP.	3	1.00	1.32
4506130300000	POLYARTHRA SP.	2	1.00	0.88
4506010406000	BRACHIONUS ANGULARIS	2	1.00	0.88
4506130200010	SYNCHAETA BICORNIS	1	1.00	0.44
4506010409000	BRACHIONUS CAUDATUS	1	1.00	0.44

MICROZOOPLANKTON > 44UM RAW COUNT FOR ENTIRE SAMPLE 294

MICROZOOPLANKTON >44UM (#/L) FOR ENTIRE SAMPLE 204.6

Microzooplankton Data Dictionary

NAME OF DATA FILE DESCRIBED BY THIS DATA DICTIONARY FILE
ANSMZ84H.SD2, ANSMZ84D.SD2
ANSMZ85H.SD2, ANSMZ85D.SD2
ANSMZ86H.SD2, ANSMZ86D.SD2
ANSMZ87H.SD2, ANSMZ87D.SD2
ANSMZ88H.SD2, ANSMZ88D.SD2
ANSMZ89H.SD2, ANSMZ89D.SD2
ANSMZ90H.SD2, ANSMZ90D.SD2
ANSMZ91H.SD2, ANSMZ91D.SD2
ANSMZ92H.SD2, ANSMZ92D.SD2
ANSMZ93H.SD2, ANSMZ93D.SD2
ANSMZ94H.SD2, ANSMZ94D.SD2
ANSMZ95H.SD2, ANSMZ95D.SD2
ANSMZ96H.SD2, ANSMZ96D.SD2
ANSMZ97H.SD2, ANSMZ97D.SD2
ANSMZ28H.SD2, ANSMZ28D.SD2
MMZP.SD2
NAMES AND DESCRIPTIONS OF ASSOCIATED DATA DICTIONARY FILES
MZPDAT4.DIC, MZPDAT5.DIC, MZPDAT6.DIC, MZPDAT7.DIC
MZPDAT8.DIC, MZPDAT9.DIC, MZPDAT10.DIC, MZPDAT11.DIC
MZPDAT12.DIC, MZPDAT13.DIC, MZPDAT14.DIC, ANSMZP15.DIC
ANSMZP16.DIC, ANSMZP17.DIC, ANSMZP18.DIC, ANSMZP19.DIC
ANSMZP20.DIC, ANSMZP21.DIC, ANSMZP22.DIC, ANSMZP23.DIC
ANSMZP24.DIC, ANSMZP25.DIC, ANSMZP26.DIC, ANSMZP27.DIC
ANSMZP28.DIC
PROJECT TITLE
Chesapeake Bay Monitoring Program
Microzooplankton Study from August 1984 through December 1999
Field Collection by ANSERC staff.
Sample analysis by R. E. Jacobsen, S. G. Sellner (Brownlee), S. S. Hedrick,
B. B. Wagoner, James H. Sniezek, Kimberly M. Burke, Ralph Matos, Jr.
Data Files Verified by S. G. Sellner (Brownlee)
ANSERC
PRINCIPAL INVESTIGATORS
>PROGRAM MANAGER: R. V. Lacouture / K. G. Sellner
>MICROZOOPLANKTON: R. V. Lacouture/K. G. Sellner/D. C. Brownlee
>STATISTICIAN:
>PROGRAMMER/ANALYST: A. L. Imirie/ M. C. Marsh / S. E. Gunsalus
>DATA COORDINATOR: S. G. Sellner (Brownlee)
FUNDING AGENCIES
Maryland Department of Natural Resources

PROJECT COST
$292,430 (July 1,1999 - June 30, 2000)
QA/QC OFFICER

None
LOCATION OF STUDY
Chesapeake Bay and tributaries in State of Maryland
DATE INTERVALS:
840802 - 991213
ABSTRACT
Beginning in August, 1984, field collections of 2 surface and 2 bottom replicate samples of microzooplankton were made monthly (usually excluding February) at 16 stations in conjunction with 3 other plankton elements of ANS portion of the DNR Water Quality Program. From August of 1984 until November 1984, 25 L of water were filtered through the net per replicate. After this time, usually, for each surface and bottom replicate 10 l of water at each of 5 depths were pumped through a 44 um mesh net, resulting in 50 l being filtered for each sample. After June, 1986, stations MET4.2 and MEE3.1 were no longer sampled. After March, 1985, replicate surface samples were combined for each station yielding 1 surface composite sample that had 20 l of water filtered for each of 5 depths resulting in 100 l filtered for each sample; bottom replicates were also combined. Beginning July, 1989 entire water column samples of 10 l from each of 10 depths (total of 100 l) were collected for stations XDA1177, XED4892, PXT0402, MET5.1, MCB1.1 and MCB2.2. Between August, 1984 and September, 1985, 1 ml of 1% neosynephrine was added to each concentrated sample. The sample was allowed to set for about 30 min then formaldehyde was added. Following a study which showed no significant difference in contraction between microzooplankton treated or not treated with neosynephrine, the neosynephrine step was eliminated. Instead buffered formaldehyde (final concentration approximately 2.5%) was added to each sample jar prior to the addition of the sample. Numbers and species identifications were subsequently made using repeated counts on 1 ml aliquots in Sedgewick-Rafter cells and a compound microscope (total mag = 100X). Beginning with samples collected in April 1986, a small drop of concentrated Rose Bengal in formaldehyde was added to the Sedgewick-Rafter cell before adding the sample. The counting cell was allowed to set for 10 minutes before counting. The NODC species code was employed. Microzooplankton smaller than 44 um were noted but not enumerated in counts after March 1985 since estimates would be non-quantitative. In May, 1992, 1993 & 1994 microzooplankton samples for stations MCB1.1, MCB2.2, XED4892, PXT0402, XDA1177, XEA6596, MET5.1 and MET5.2 were sampled twice to coincide with white perch and striped bass spawning periods. From April, 1993 through June, 1993 and again in 1994 and 1995 for the same time period, an additional station, MCB2.1, in the upper Chesapeake Bay was also sampled to coincide with the spawning periods.

In April, 1996, 3 more tidal fresh stations XEA1840 in the Potomac River, XED9490 in the Patuxent River, and MET5.0 in the Choptank River were added for microzooplankton sampling in April, May, and June. Stations MCB2.2, MCB2.1, XEA6596, XEA1840, XDA1177, PXT0402, XED9490, XED4892, MET5.1, and MET5.0 were sampled twice in April and May, again to coincide with white perch and striped bass spawning periods. Main Bay stations MCB1.1 and MCB5.2 were no longer sampled as of March, 1996. Sampling in November was discontinued in 1996.
STATION NAMES NUMBERS AND DESCRIPTIONS
MCB1.1 01 Mouth of Susquehanna River, main Bay
MCB2.1 02 SW of Turkey Point, main Bay

MCB2.2 03 W of Still Pond near Buoy R 50, main Bay
MCB3.3C 07 N of Bay Bridge, main Bay
MCB4.3C 16 E of Dares Beach near Buoy R 78, main Bay
MCB5.2 20 E of Point No Point, main Bay
XDE5339 28 Between Jack Bay sandspit and Sandgates in mid channel, Patuxent River
XED4892 30 ESE of Jacks Creek in mid channel, Patuxent River
XED9490 31 Midchannel off the wharf at Lower Marlboro
PXT0402 32 At Nottingham in mid channel, Patuxent River
XEA6596 35 Off Indian Head at Buoy N 54, Potomac River
XEA1840 48 Buoy 44 between Possum Point and Moss Point
XDA1177 34 Off Maryland Point at Buoy 19, Potomac River
MLE2.2 33 Off Ragged Point at buoy BW 51B, Potomac River (Prior to October 1988 data tape, this station was designated XBE9541)
MET4.2 37 South of Eastern Neck Island at Buoy 9, lower Chester River
MET5.1 38 Downstream of confluence with Tuckahoe Creek, upper Choptank River
MET5.0 49 Midchannel off the mouth of King's Creek
MET5.2 39 Near Rt 50 bridge at Cambridge, lower Choptank River
MEE3.1 40 North Tangier Sound North of Buoy R 16, main Bay
MWT5.1 36 East of Hawkins Point at Buoy 5M, Patapsco River (Baltimore Harbor)
STATION NAMES, LATITUDES, LONGITUDES, AND TOTAL DEPTHS (METERS)
MCB1.1 39-32.7 76-04.9 6.1
MCB2.1 39-26.4 76-01.5 6.2
MCB2.2 39-20.8 76-10.5 12.1
MCB3.3C 38-59.7 76-21.6 23.7
MCB4.3C 38-33.4 76-26.1 26.1
MCB5.2 38-08.2 76-13.7 30.1
XDE5339 38-25.5 76-36.1 12.0
XED4892 38-35.0 76-40.7 3.0
XED9490 38-39.5 76-41.1 6.2
PXT0402 38-42.7 76-42.2 10.3
XEA6596 38-36.3 77-10.3 12.7
XEA1840 38-31.5 77-16.6 9.0
XDA1177 38-21.1 77-12.2 9.5
MLE2.2 38-09.6 76-35.8 11.0
MET4.2 38-59 76-13 14.6
MET5.1 38-48.4 75-54.4 5.3
MET5.0 38-46.5 75-58.1 11.0
MET5.2 38-34.8 76-02.5 12.3
MEE3.1 38-12 75-58 13.7
MWT5.1 39-12.7 76-31.4 15.7
METHODOLOGY DESCRIBING CHAIN OF CUSTODY FOR LAB SAMPLES
Microzooplankton samples were collected by a member of the Benedict Estuarine Research Center biomonitoring section. On return to the laboratory, the samples were transferred to the BERC plankton laboratory. Counts and identifications were then made and sample concentrates were subsequently archived.

MONITORING QA/QC PLAN FOR PROJECT

For each monthly microzooplankton collection, one sample was randomly selected as the QA/QC sample. Two separate counts were performed using the same enumeration techniques on 2 individual aliquots removed from the same jar.

>PARAMETER: Microzooplankton counts

- COLLECTION METHODS: Samples were pumped from 5 depths in the surface and 5 depths in the bottom layers and each composite was filtered through a 44 um mesh net and rinsed into a jar. After February, 1985, the 2 top surface layer replicates and 2 bottom layer replicates were each combined in the lab and counted as one sample. Beginning July, 1985, replicate samples were combined in the field with the five depths for the surface and bottom being pumped through the net and rinsed into their respective jars 2X.

Beginning July, 1989 entire water column samples from 10 depths were collected from stations XDA1177, XED4892, PXT0402, MET5.1, MCB1.1,MCB2.2, MCB2.1, XEA1840, XED9490, and MET5.0 (when sampled).

- SAMPLE PRESERVATIVES: Between August, 1984 and September, 1985, 1 ml of neosynephrine was added to each concentrated sample. The sample was allowed to set for 30 minutes and then buffered formaldehyde was added. The neosynephrine step was eliminated after this time and buffered formaldehyde was added to each sample jar prior to the addition of the sample (final concentration of fixative was approximately 2.5%).

-SAMPLE STORAGE ENVIRONMENT: Laboratory

-TIME IN STORAGE: Indefinite

-LAB TECHNIQUES WITH REFERENCES:

Standard Methods

>DATA ENTRY METHOD: Computer keyboard to disk from data sheets for sampling trips prior to April 1985, and keyboard to disk for trips from April 1985 through December 1994. Starting in January 1995, computer keyboard to inhouse computer network.

>DATA VERIFICATION: Visual inspection and computer verification program.

VARIABLE NAMES, SAS LABELS, AND DESCRIPTIONS

where yy is yy of data set

>ANSMZyyH.SD2 - common sample information maybe merged with counts using SER_NUM

----LIST OF VARIABLES AND ATTRIBUTES BY POSITION----

VARIABLE	TYPE	LENGTH	POSITION	FORMAT	LABEL
TRIB_COD	CHAR	3	0		SPECIFIES TRIB. SAMPLED (OR MAIN BAY)
SER_NUM	NUM	8	3		SERIAL NUM. INCL. SAMPLING EFFORT NUM.
STATION	CHAR	7	11		STATION NAME
DATE	NUM	8	18		DATE7. SAMPLE DATE
TIME	NUM	8	26		HHMM5. SAMPLE TIME
GMETHOD	CHAR	1	34		GEAR METHOD CODE
TDEPTH	NUM	8	35		TOTAL DEPTH
PDEPTH	NUM	8	43		DEPTH INCLUDED IN SURFACE COMPOSITE
VOLPDEPT	NUM	8	51		VOLUME OF SAMPLE PER DEPTH
TOTVCOMP	NUM	8	59		TOTAL VOLUME OF COMPOSITE SAMPLE

A_DEPTH1	NUM	8	67	1st SAMPLE DEPTH ABOVE PDEPTH
A_DEPTH2	NUM	8	75	2nd SAMPLE DEPTH ABOVE PDEPTH
A_DEPTH3	NUM	8	83	3rd SAMPLE DEPTH ABOVE PDEPTH
A_DEPTH4	NUM	8	91	4th SAMPLE DEPTH ABOVE PDEPTH
A_DEPTH5	NUM	8	99	5th SAMPLE DEPTH ABOVE PDEPTH
B_DEPTH1	NUM	8	107	1st SAMPLE DEPTH BELOW PDEPTH
B_DEPTH2	NUM	8	115	2nd SAMPLE DEPTH BELOW PDEPTH
B_DEPTH3	NUM	8	123	3rd SAMPLE DEPTH BELOW PDEPTH
B_DEPTH4	NUM	8	131	4th SAMPLE DEPTH BELOW PDEPTH
B_DEPTH5	NUM	8	139	5th SAMPLE DEPTH BELOW PDEPTH
FC_INIT	CHAR	3	147	INITIALS OF FIELD COLLECTOR
LI_INIT	CHAR	3	150	INITIALS OF INDIVID. PERFORMING LAB ID.

> ANSMZyyD.SD2 - counts data set

----LIST OF VARIABLES AND ATTRIBUTES BY POSITION----

VARIABLE	TYPE	LENGTH	POSITION	FORMAT	LABEL
SER_NUM	NUM	8	0		SERIAL NUM. INCL. SAMPLING EFFORT NUM.
STATION	CHAR	7	8		STATION NAME
DATE	NUM	8	15	DATE7.	SAMPLE DATE
TRIB_COD	CHAR	3	23		SPECIFIES TRIB. SAMPLED (OR MAIN BAY)
LAYER	CHAR	2	26		AP=ABOVE PYC,BP=BELOW PYC,WC=WATER COL
REPNUM	CHAR	1	28		REPLICATE NUMBER
CONCENT	NUM	8	29		VOLUME OF CONCENTRATED SAMPLE
MLSCNT	NUM	8	37		MILLILITERS COUNTED
SPECCODE	CHAR	13	45		SPECIES CODE
RAWCT	NUM	8	58		RAW COUNT
DENSITYV	NUM	8	66		DENSITY (# INDIV./L) OF GIVEN TAXON
TDENSITY	NUM	8	74		DENSITY (# INDIV./L) OFALL ORGANISMS

PHYSICOCHEMICAL VARIABLE NAMES, MEASUREMENT UNITS, AND DESCRIPTIONS

None

BIOLOGICAL ENUMERATION TECHNIQUES: Each sample was gently mixed and a 1 ml aliquot was removed with a Stempel pipet and put into a Sedgewick-Rafter cell for enumeration with a compound microscope at 100X magnification. Beginning with samples collected in April, 1986, a small drop of concentrated Rose Bengal stain was added to the cell prior to addition of the sample. The sample was allowed to set for 10 minutes before counting. At least one chamber (1 ml) was counted for each sample and if the total count did not reach 250 organisms, subsequent l ml aliquots were also enumerated until a count of 250 or more organisms was obtained or 3 ml were examined. If a certain organism was abundant (more than 60 per chamber), it was not counted in the subsequent 1 ml aliquots for a given sample. For extremely abundant taxa, less than one ml could be counted. Species identification was made using the NODC species code. Microzooplankton smaller than 44 um were noted on the original data sheet but not enumerated since estimates would not be quantitative.

#FORMULAS, CALCULATIONS, AND CONVERSIONS:

The following equation was used to convert raw counts to density (#/L) for each taxon identified:

DENSITYV=((RAWCT/MLSCNT)*CONCENT)/TOTVCOMP

If the sample was counted by rows MLSCNT is determined by dividing the number of rows by 28.4.

SPECIES CODE USED
NODC CODE WITH INHOUSE MODIFICATIONS (13th column) AND SCIENTIFIC NAME:

DIGIT	REPRESENTS
1-2	Phylum
3-4	Class and Order
5-6	Family
7-8	Genus
9-10	Species
11-12	Subspecies
13	Special inhouse modifier

SPECIES INHOUSE CODE, REFERENCE CODE, AND SCIENTIFIC NAME

INHOUSE CODE IS SAME AS REFERENCE CODE WITH THE ADDITION OF AN INHOUSE MODIFER IN COLUMN 13. THE MODIFIER IN THE 13TH COLUMN HAS DIFFERENT MEANINGS DEPENDING ON THE TAXA BEING CONSIDERED. FOR LARGER METAZOA, A ONE IN THIS COLUMN INDICATES THAT THE ORGANISM IS IN ITS LARVAL OR NAUPLIAR STAGE. FOR SMALLER METAZOA SUCH AS ROTIFERS AND FOR NON-TINTINNINE CILIATE PROTOZOA, THIS MODIFIER MAY INDICATE A SIZE CATEGORY WITHIN A TAXA. THE NODC CODE DOES NOT DISTINGUISH BETWEEN LIFE HISTORY STAGES. FOR TINTINNINE CILIATES (3540...),A 0, 1, 2 (OR 3, 4, 5)

IN THE 13TH COLUMN INDICATES THAT IT WAS NOT OR COULD NOT BE DETERMINED IF THE LORICA CONTAINED A CELL, THAT THE LORICA DID CONTAIN A CELL (FULL), OR THAT THE LORICA DID NOT CONTAIN A CELL (EMPTY), RESPECTIVELY. FOR AN UNDESCRIBED SPECIES, THE CODE IS GIVEN DOWN TO THE LOWEST POSSIBLE TAXONOMIC LEVEL, THE UNKNOWN LEVELS ARE GIVEN ZEROS AND A NUMBER IS ASSIGNED IN THE SUBSPECIES COLUMNS (11-12) (E.G. BRACHIONUS A = 4506010400010; ROTIFER A = 45000000010). THESE NUMBERS WILL BE COMPLETED WHEN MORE DETAILED TAXONOMIC INFORMATION IS OBTAINED.

ONLY THE ORGANISMS GREATER THAN 44 AND LESS THAN 200 UM IN SMALLEST DIMENSION ARE INCLUDED IN THE SPECIES LIST. THE MICROZOOPLANKTON LESS THAN 44 UM ARE NOTED AND RECORDED AS EITHER RARE, COMMON, ABUNDANT, OR DOMINANT. THE MACROZOOPLANKTON ARE ENUMERATED AND RECORDED SEPARATELY. HARD COPIES AND COPIES ON DISKETTES OF THESE DATA AS WELL AS THE SPECIES LISTS FOR THESE

GROUPS ARE AVAILABLE FROM S.G. BROWNLEE AT THE BENEDICT LAB.

CODE	SPECIES
0000000000001	UNIDED LARVAE
0000000000002	UNIDED TROCHOPHORE LARVAE
3438000000000	SARCODINA-UNIDED SARCODINID
3442010000000	DIFFLUGIIDAE
3442010100000	DIFFLUGIA SPP.
3442010201000	LESQUEREUSIA GIBBOSA
3442020100000	ARCELLA SP.
3442030000000	CENTROPYXIDAE
3442030100000	CENTROPYXIS SP.
3442030101000	CENTROPYXIS ACULEATA
3442040000000	PARAQUADRULIDAE
3442040200000	QUADRULELLA SP.
3442050000000	HYALOSPHENIIDAE-TESTATED AMOEBA
3445020000000	EUGLYPHA SP.
3445040000000	CYPHODERIIDAE
3445040100000	CYPHODERIA SP.
3448000000000	FORAMINIFERIDA
3512000000000	CILIOPHORA-UNIDED CILIATE
3516000000000	HAPTORIDA
3516010100000	DIDINIUM SP.
3516010202000	MESODINIUM RUBRUM
3516020000001	TRACHELOCERCIDAE-LARGE
3517000000001	CYRTOPHORIDA-LARGE
3530000000001	PERITRICHIDA-LARGE
3531000000000	SESSILINA-UNIDED SESSILINE PERITRICH
3532000000000	MOBILINA-UNIDED MOBILINE PERITRICH
3533000000000	SUCTORIA-UNIDED SUCTORIAN
3534010100000	ACINETA SP.
3534030700000	STAUROPHRYA SP.
3534040100000	EPHELOTA SP.
3537000000000	HETEROTRICHINA-UNIDED HETEROTRICH
3539000000000	OLIGOTRICHINA-UNIDED OLIGOTRICH
3539020100000	STENTOR SP.
3539030000000	STROMBIDIDAE
3539030100000	STROMBIDIUM SP.
3539030200000	TONTONIA SP.
3540000000000	TINTINNINA-UNIDED TINTINNID
3540010100050	TINTINNIDIUM SP.-LARGE
3540010100051	TINTINNIDIUM SP.-LARGE-FULL
3540010100052	TINTINNIDIUM SP.-LARGE-EMPTY

3540020100000 TINTINNOPSIS SP.
3540020100001 TINTINNOPSIS SP.-FULL
3540020100002 TINTINNOPSIS SP.-EMPTY
3540020100030 TINTINNOPSIS SUBACUTA-HUGE
3540020100031 TINTINNOPSIS SUBACUTA-HUGE-FULL
3540020100032 TINTINNOPSIS SUBACUTA-HUGE-EMPTY
3540020100050 TINTINNOPSIS SP. A
3540020100051 TINTINNOPSIS SP. A-FULL
3540020100052 TINTINNOPSIS SP. A-EMPTY
3540020105000 TINTINNOPSIS DADAYI
3540020105001 TINTINNOPSIS DADAYI-FULL
3540020105002 TINTINNOPSIS DADAYI-EMPTY
3540020123000 TINTINNOPSIS FIMBRIATA
3540020123001 TINTINNOPSIS FIMBRIATA-FULL
3540020123002 TINTINNOPSIS FIMBRIATA-EMPTY
3540020123003 TINTINNOPSIS FIMBRIATA-MEUNIERI GRP
3540020123004 TINTINNOPSIS FIMBRIATA-MEUNIERI GRP-FULL
3540020123005 TINTINNOPSIS FIMBRIATA-MEUNIERI GRP-EMPTY
3540020129000 TINTINNOPSIS RADIX
3540020129001 TINTINNOPSIS RADIX-FULL
3540020129002 TINTINNOPSIS RADIX-EMPTY
3540020133000 TINTINNOPSIS SUBACUTA
3540020133001 TINTINNOPSIS SUBACUTA-FULL
3540020133002 TINTINNOPSIS SUBACUTA-EMPTY
3540020136000 TINTINNOPSIS MEUNIERI
3540020136001 TINTINNOPSIS MEUNIERI-FULL
3540020136002 TINTINNOPSIS MEUNIERI-EMPTY
3540020137000 TINTINNOPSIS KARAJACENSIS
3540020137001 TINTINNOPSIS KARAJACENSIS-FULL
3540020137002 TINTINNOPSIS KARAJACENSIS-EMPTY
3540020138000 TINTINNOPSIS NITIDA
3540020138001 TINTINNOPSIS NITIDA-FULL
3540020138002 TINTINNOPSIS NITIDA-EMPTY
3540030100010 STENOSEMELLA SP.A
3540030100011 STENOSEMELLA SP.A-FULL
3540030100012 STENOSEMELLA SP.A-EMPTY
3540050100020 METACYLIS SP. B
3540050100021 METACYLIS SP. B-FULL
3540050100022 METACYLIS SP. B-EMPTY
3540050100030 METACYLIS SP. C
3540050100031 METACYLIS SP. C-FULL
3540050100032 METACYLIS SP. C-EMPTY
3540050400000 CLIMACOCYLIS SP.
3540050400001 CLIMACOCYLIS SP.-FULL
3540050400002 CLIMACOCYLIS SP.-EMPTY

3540050501000 STYLICAUDA PLATENSIS
3540050501001 STYLICAUDA PLATENSIS-FULL
3540050501002 STYLICAUDA PLATENSIS-EMPTY
3540070100000 FAVELLA SP.
3540070100001 FAVELLA SP.-FULL
3540070100002 FAVELLA SP.-EMPTY
3540130100010 EUTINTINNUS SP.A
3540130100011 EUTINTINNUS SP.A-FULL
3540130100012 EUTINTINNUS SP.A-EMPTY
3543000000000 HYPOTRICHIDA
3545010000000 EUPLOTIDAE
3545010100001 EUPLOTES SPP.-LARGE
3545010100020 EUPLOTES SP. A
3545010100030 EUPLOTES SP. B
4400000000000 GASTROTRICHA
4500000000000 ROTIFERA-UNIDED ROTIFER
4500000000010 ROTIFER A
4500000000020 ROTIFER B
4500000000030 ROTIFER C
4500000000040 ROTIFER D
4500000000050 ROTIFER E
4500000000060 ROTIFER F
4504000000000 BDELLOIDA-UNIDED BDELLOID ROTIFER
4504020100000 ROTARIA SP.
4504020103000 ROTARIA CITRINUS
4504020104000 ROTARIA NEPTUNIA
4504020300000 MACROTRACHELA SP.
4506010100000 KERATELLA SP.
4506010100010 KERATELLA SP. A
4506010102000 KERATELLA QUADRATA
4506010103000 KERATELLA COCHLEARIS
4506010103020 KERATELLA COCHLEARIS COCHLEARIS
4506010103030 KERATELLA COCHLEARIS HISPIDA
4506010103040 KERATELLA COCHLEARIS MICRACANTHA
4506010103050 KERATELLA COCHLEARIS ROBUSTA
4506010103060 KERATELLA COCHLEARIS TECTA
4506010104000 KERATELLA CRASSA
4506010105000 KERATELLA EARLINAE
4506010106000 KERATELLA VALGA
4506010200000 NOTHOLCA SP.
4506010203000 NOTHOLCA ACUMINATA
4506010300000 COLURELLA SP.
4506010400000 BRACHIONUS SP.
4506010400010 BRACHIONUS SP. A
4506010400020 BRACHIONUS SP. B

4506010401000 BRACHIONUS PLICATILIS
4506010402000 BRACHIONUS CALYCIFLORUS
4506010403000 BRACHIONUS HAVANAENSIS
4506010404000 BRACHIONUS PTERODINOIDES
4506010405000 BRACHIONUS URCEOLARIS
4506010406000 BRACHIONUS ANGULARIS
4506010407000 BRACHIONUS BIDENTATA
4506010408000 BRACHIONUS BUDAPESTINENSIS
4506010409000 BRACHIONUS CAUDATUS
4506010410000 BRACHIONUS DIVERSICORNIS
4506010411000 BRACHIONUS QUADRIDENTATUS
4506010412000 BRACHIONUS RUBENS
4506010413000 BRACHIONUS VARIABILIS
4506010500000 KELLICOTTIA SP.
4506010501000 KELLICOTTIA LONGISPINA
4506010502000 KELLICOTTIA BOSTONIENSIS
4506010700000 LEPADELLA SP.
4506010704000 LEPADELLA PATELLA
4506010800000 ANURAEOPSIS SP.
4506010801000 ANURAEOPSIS FISSA
4506010900000 EPIPHANES SP.
4506011000000 EUCHLANIS SP.
4506011001000 EUCHLANIS DILATATA
4506011100000 LOPHOCHARIS SP.
4506011101000 LOPHOCHARIS SALPINA
4506011200000 MACROCHAETUS SP.
4506011300000 MYTILINA SP.
4506011400000 PLATYIAS SP.
4506011401000 PLATYIAS PATULUS
4506011402000 PLATYIAS QUADRICORNIS
4506011500000 TRICHOTRIA SP.
4506011501000 TRICHOTRIA TETRACTIS
4506020100000 LECANE SP.
4506020200000 MONOSTYLA SP.
4506020201000 MONOSTYLA BULLA
4506020202000 MONOSTYLA CLOSTEROCERCA
4506020203000 MONOSTYLA QUADRIDENTATA
4506040100000 ENCENTRUM SP.
4506040200000 PROALES SP.
4506040300000 CEPHALODELLA SP.
4506040302000 CEPHALODELLA GIBBA
4506040400000 NOTOMMATA SP.
4506040500000 MONOMMATA SP.
4506040600000 EOSPHORA SP.
4506070100000 TRICHOCERCA SP.

4506070102000 TRICHOCERCA CYLINDRICA
4506070103000 TRICHOCERCA LONGISETA
4506070104000 TRICHOCERCA MULTICRINIS
4506070105000 TRICHOCERCA SIMILIS
4506080100000 ASCOMORPHA SP.
4506080101000 ASCOMORPHA OVALIS
4506080102000 ASCOMORPHA SALTANS
4506080200000 GASTROPUS SP.
4506080201000 GASTROPUS MINOR
4506120100000 ASPLANCHNA SP.
4506120101000 ASPLANCHNA BRIGHTWELLI
4506120102000 ASPLANCHNA HERRICKI
4506120103000 ASPLANCHNA PRIODONTA
4506130200000 SYNCHAETA SP.
4506130200001 SYNCHAETA SPP. L-LARGE
4506130200002 SYNCHAETA SPP. M-MEDIUM
4506130200003 SYNCHAETA SPP. S-SMALL
4506130200010 SYNCHAETA BICORNIS
4506130200020 SYNCHAETA BALTICA
4506130204000 SYNCHAETA PECTINATA
4506130206000 SYNCHAETA OBLONGA
4506130207000 SYNCHAETA STYLATA
4506130300000 POLYARTHRA SP.
4506130302000 POLYARTHRA DISSIMULANS
4506130303000 POLYARTHRA DOLICHOPTERA
4506130304000 POLYARTHRA EURYPTERA
4506130305000 POLYARTHRA MAJOR
4506130306000 POLYARTHRA REMATA
4506130307000 POLYARTHRA VULGARIS
4506130400000 PLOESOMA SP.
4506130401000 PLOESOMA HUDSONI
4506130402000 PLOESOMA TRUNCATUM
4507010100000 TESTUDINELLA SP.
4507010101000 TESTUDINELLA PATINA
4507020100000 HEXARTHRA SP.
4507020101000 HEXARTHRA MIRA
4507040100000 CONOCHILOIDES SP.
4507040102000 CONOCHILOIDES DOSSUARIUS
4507040103000 CONOCHILOIDES NATANS
4507040200000 CONOCHILUS SP.
4507040201000 CONOCHILUS HIPPOCREPIS
4507040202000 CONOCHILUS UNICORNIS
4507050100000 FILINIA SP.
4507050101000 FILINIA LONGISETA
4507050102000 FILINIA BRACHIATA

4507050103000 FILINIA TERMINALIS
4508010100000 COLLOTHECA SP.
4508010101000 COLLOTHECA MUTABILIS
4508010102000 COLLOTHECA PELAGICA
4700000000000 NEMATODA
5100000000001 GASTROPODA-LARVAE
5500000000001 PELECYPODA-LARVAE
5515370301000 DREISSENA POLYMORPHA
5922000000000 ACARINA-MITE
6117000000001 COPEPOD NAUPLII
6117000000005 COPEPOD NAUPLII+PERITRICHS
6118180100001 DIAPTOMUS -NAUPLII
6118190200001 PSEUDODIAPTOMUS SP.-NAUPLII
6118200200001 EURYTEMORA SP.-NAUPLII
6118290100001 ACARTIA SP.-NAUPLII
6119050200001 SCOTTOLANA SP.-NAUPLII
6120080200001 CYCLOPS SP.-NAUPLII
6120080300001 MESOCYCLOPS SP.-NAUPLII
6120090100001 OITHONA SP.-NAUPLII
6120260100001 HEMICYCLOPS SP.-NAUPLII
7500000000000 TARTIGRADA

THE ABOVE SPECIES LIST HAS BEEN INCLUDED ON THE DATA TAPE AS FILE MMZP.SD2.
4/15/92 - THE NAME OF SPECIES #4506130200010 HAS CHANGED FROM SYNCHAETA SP. A-LONG HORNS TO SYNCHAETA BICORNIS AND FOR SPECIES #4506130200020, THE NAME HAS CHANGED FROM SYNCHAETA SP. B-'PORKER' TO SYNCHAETA BALTICA.

NUMERICAL VARIABLE NAMES - WARNING AND ERROR BOUNDS

VARIABLE	VALID RANGE
DATE	840802-971218
TIME	0651-1935
TDEPTH	1.8-33
PDEPTH	0.5-22.0
VOLPDEPT	2-20
TOTVCOMP	12-200
SER_NUM	01001-240039
A_DEPTH1	0.2- 1.0
A_DEPTH2	0.4- 5.0
A_DEPTH3	0.5-10.0

A_DEPTH4 0.5-15.0
A_DEPTH5 0.5-21.5
B_DEPTH1 1-22.5
B_DEPTH2 1-25.0
B_DEPTH3 1-27.0
B_DEPTH4 1-29.0
B_DEPTH5 1-32.0
CONCENT 10-500
MLSCNT 0.01-10
RAWCT 1-9999
DENSITYV 0.05-10000.00
TDENSITY 1-999999.99

CHARACTER VARIABLES - VALID VALUES

VARIABLE	VALID VALUES
REPNUM	
	1
	2
	3
	4
	T
	B
	W
TRIB_COD	
	BAY
	PAX
	POT
	PAT
	CHS
	CHP
SPECCODE	0000000000001-7500000000000
STATION	
	MCB1.1
	MCB2.1
	MCB2.2
	MCB3.3C
	MCB4.3C
	MCB5.2
	XDE5339
	XED4892
	XED9490
	PXT0402

XEA6596
XEA1840
XDA1177
MLE2.2
MET4.2
MET5.1
MET5.0
MET5.2
MEE3.1
MWT5.1
GMETHOD P
FC_INIT
CVW
REJ
RVL
KGS
SGB
SSH
CRP
KRB
DCB
CF
MHB
ABT
BBW
JSH
ALI
DET
PHD
DCN
AMH
KAM
KMB
ALM
RMJ
SGS
KAR
SGS
JLG
LI_INIT
BBW
REJ
SGB
SSH
JHS

KAM
KMB
RMJ
KAR
SGS
JLG
KEY WORDS (EXCLUDING VARIABLE NAMES)
INITIALS OF SCIENTISTS IN DATA SET
CVW Carolyn V. Watson
REJ Richard E. Jacobsen
RVL Richard V. Lacouture
KGS Kevin G. Sellner
SGB Stella G. Brownlee
SGS Stella G. Sellner (Brownlee)
SH Sharyn S. Hedrick
SSH Sharyn S. Hedrick
CRP Charles R. Parrish
KB Kevin R. Braun
KRB Kevin R. Braun
DCB David C. Brownlee
CF Chris Frye
MHB Marie H. Bundy
ABT Allison B. Tate
BBW Bruce B. Wagoner
JSH Jeffrey S. Handen
ALI Amy L. Imirie
PHD Paul H. DiNunno
DET Douglas E. Talaber
DCN Donna C. Nicholson
AMH Ann Marie Hartsig
JHS James H. Sniezek
KAM Kimberly A. Morcom
KMB Kimberly Morcom Burke
ALM Andrea L. Morcom
RMJ Ralph Matos, Jr.
KAR Karen A. Rota
JLG Jennifer L. Gronefeld