# Chesapeake Bay Monitoring Program: Lower Chesapeake Bay Microzooplankton Study

## Metadata:



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*Identification_Information:*
*Citation:*
*Citation_Information:*
*Originator:* Kenneth Carpenter, Old Dominion University.
*Originator:* Ray Birdsong, Old Dominion University
*Originator:* Harold Marshall, Old Dominion University
*Publication_Date:* 20011031
*Title:*
Chesapeake Bay Monitoring Program: Lower Chesapeake Bay Microzooplankton Study
*Publication_Information:*
*Publication_Place:* Annapolis, Maryland
*Publisher:* U.S. Environmental Protection Agency, Chesapeake Bay Program administered by Virginia Department of Environmental Quality
*Online_Linkage:* www.chesapeakebay.net
*Larger_Work_Citation:*
*Citation_Information:*
*Originator:* Jacqueline Johnson
*Publication_Date:* 20080301
*Title:*
Chesapeake Bay Program Plankton Database
*Edition:* Version 3.0
*Geospatial_Data_Presentation_Form:* database
*Publication_Information:*
*Publication_Place:* Annapolis, MD
*Publisher:* US EPA Chesapeake Bay Program
*Other_Citation_Details:*
None
*Online_Linkage:* www.chesapeakebay.net
*Description:*
*Abstract:*
The initial objective of this study is to determine the seasonal composition and abundance of the microzooplankton in the lower Chesapeake Bay and 4 major

tributaries. This category includes zooplankton less than 200 microns in size. The first year of the research represented a preliminary study limited to 10 Stations (Park and Marshall, 1994). After the first year, the program was expanded to sample 14 stations. Emphasis is on the temporal and spatial distribution and composition patterns of the major microzooplankton categories, and their relationships to water quality variables and other plankton components. These microzooplankton include copepod nauplii, barnacle nauplii, rotifers, loricated and non-loricated ciliates, polychaete larvae, cladocerans, sarcodinids, and others. Note due to contract changes starting in January 1996, station LE5.5 had a coordinate change. This station move was not documented until August 2005. Due to this station relocation, all data collected at the altered location had the station name changed to LE5.5-W in August 2005. All sampling was discontinued in October 2002.

*Purpose:*

The Commonwealth of Virginia, in cooperation with the US EPA Chesapeake Bay Program, has monitored plankton species abundance and composition in the Virginia Chesapeake Bay mainstem and tributaries since 1985. This program is designed to give comprehensive spatial and temporal information on composition of the microzooplankton in the water column. The Microzooplankton in this survey refers to copepod nauplii, rotifers, and some protozoans. Sampling is performed in conjunction with the Virginia phytoplankton and water quality monitoring programs.

*Supplemental_Information:*

# STATION NAMES AND DESCRIPTIONS
CB6.1 -Main Channel, Mid-Bay
CB6.4 -Main Channel, Mid-Bay
CB7.3E-Eastern Shore Channel, Southern End
CB7.4 -Baltimore Channel, Bay Mouth
LE3.6-Off Mouth of Rappahannock River
WE4.2-Off Mouth of York River
LE5.5 -Off Mouth of James River
SBE2-South Branch Elizabeth River
SBE5-South Branch Elizabeth River,Off VEPCO
TF3.3-Rappahannock River, Buoy N40
RET3.1-Rappahannock River, N Buoy R10
TF4.2 -Pamunkey River, Off White House
RET4.3-York River, Buoy C57
TF5.5-James River, Red Buoy 107
RET5.2-James River, Off Swann's Point

*Time_Period_of_Content:*

*Time_Period_Information:*

*Range_of_Dates/Times:*

*Beginning_Date:* 19930101
*Ending_Date:* 20021031

*Currentness_Reference:*

ground condition

*Status:*

*Progress:* Complete
*Maintenance_and_Update_Frequency:* None planned

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*Theme_Keyword:* microzooplankton monitoring
*Theme_Keyword:* microzooplankton taxon
*Theme_Keyword:* microzooplankton counts
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*Place_Keyword:* Virginia
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*Point_of_Contact:*
*Contact_Information:*
*Contact_Person_Primary:*
*Contact_Person:* Jacqueline Johnson
*Contact_Organization:* Interstate Commission on Potomac River Basin
*Contact_Position:* Chesapeake Bay Program Living Resources Data Manager
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*Address_Type:* mailing and physical address
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410 Severn Avenue, Suite 109
*City:* Annapolis
*State_or_Province:* Maryland

*Postal_Code:* 21403
*Country:* USA
*Contact_Voice_Telephone:* 1-800-968-7229
*Contact_Voice_Telephone:* 410-267-5729
*Contact_Facsimile_Telephone:* 410-267-5777
*Contact_Electronic_Mail_Address:* jjohnson@chesapeakebay.net
*Hours_of_Service:* 8:00 a.m. to 4:00 p.m. Monday Through Friday
*Contact Instructions:*
unavailable
*Data_Set_Credit:*
US EPA Chesapeake Bay Program, Virginia Department of Environmental Quality and Investigators at Old
Dominion University
*Security_Information:*
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*Security_Classification:* Unclassified
*Security_Handling_Description:* None
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*Cross_Reference:*
*Citation_Information:*
*Originator:* Jacqueline Johnson
*Publication_Date:* 20080301
*Title:*
Chesapeake Bay Program Plankton Database
*Edition:* Version 3.0
*Geospatial_Data_Presentation_Form:* database
*Publication_Information:*
*Publication_Place:* Annapolis, MD
*Publisher:* US EPA Chesapeake Bay Program
*Other_Citation_Details:*
None
*Online_Linkage:* www.chesapeakebay.net

Back to Top

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*Data_Quality_Information:*
*Attribute_Accuracy:*
*Attribute_Accuracy_Report:*
After extensive examination of Chesapeake Bay Program (CBP) Virginia microzooplankton monitoring data, a number of major methodological and data quality issues have been identified. The Virginia microzooplankton were identified and counted using the following categories: copepod nauplii, barnacle nauplii, rotifers, tintinnids (loricated ciliates), oligotrichs (non-loricated ciliates), polychaete larvae, cladocerans, sarcodinids, and others. These grouping are incompatible with the Maryland counter part survey. The March 2002 Split Sample studies revealed that the members of phytoplankton genus Ceratium were being counted as rotifers in routine and split sample counts. This could have possibly impacted samples enumerated during the time period between July 1999-December 2001. ODU

taxonomists have also consistently found high counts of Oligotrichs in split samples where Maryland reported an absence of the group. No explanation for this has been determined to date. There for it is strongly recommended that this microzooplankton data should not be used with Maryland data and only be used for qualitative purposes.

*Positional_Accuracy:*

*Horizontal_Positional_Accuracy:*

*Horizontal_Positional_Accuracy_Report:*

Station positions in data set are approximations of actual positions in the field. Station latitudes and longitudes are input into a Loran-C/ GPS receiver and sampling begins when boat reaches preprogrammed coordinates. Loran-C is accurate to +/- 1500 ft. The actual Loran/GPS coordinates for each sampling event are not currently recorded in data set.

*Vertical_Positional_Accuracy:*

*Vertical_Positional_Accuracy_Report:*

Water column salinity, temperature and depth is recorded prior to zooplankton sampling. Pycnocline is used as the cutoff depth between upper and lower water column for composite samples. If a station has no pycnocline the water column is divided in to thirds by total depth and the top third of the water column is treated as the upper
water column. The pycnocline is determined as follows: ((Bottom Conductivity-Surface Conductivity)/ Bottom Depth)*2= Threshold. If Threshold is less than 500, then the station has no pycnocline if Threshold is greater than 500, then the pycnocline depth is determined to be the first depth at which the conductivity change is greater than the threshold value. Units of measurement: Conductivity- uhhos/cm Depth- meters
Prior to 1997 this depth was not recorded in the datasets and is reported as missing.

*Lineage:*

*Source_Information:*

*Source_Citation:*

*Citation_Information:*

*Originator:* Dan Dauer, Kenneth Carpenter, Harold Marshall, Old Dominion University.
*Publication_Date:* 20000101
*Title:*

Chesapeake Bay Monitoring Program: Lower Chesapeake Bay Microzooplankton Study (January 1993 through December 1998)

*Publication_Information:*

*Publication_Place:* Annapolis, Maryland
*Publisher:* U.S. Environmental Protection Agency, Chesapeake Bay Program administered by Virginia Department of Environmental Quality

*Online_Linkage:* www.chesapeakebay.net
*Online_Linkage:* ftp.chesapeakebay.net
*Larger_Work_Citation:*

*Citation_Information:*

*Originator:* Jacqueline Johnson
*Publication_Date:* 19981231
*Title:*

Chesapeake Bay Program Plankton Database

*Edition:* Version 2.0

*Geospatial_Data_Presentation_Form:* database
*Publication_Information:*
*Publication_Place:* Annapolis, MD
*Publisher:* US EPA Chesapeake Bay Program
*Other_Citation_Details:*
None
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*Type_of_Source_Media:* digital database file
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*Time_Period_Information:*
*Range_of_Dates/Times:*
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*Ending_Date:* Present
*Source_Currentness_Reference:*
ground condition
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*Source_Contribution:*
None
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Microzooplankton sampling procedures are same as with the phytoplankton collection and occurs at the same time as the mesozooplankton sampling. Two 15 liter carboys are filled on station with pump, taken from a vertical series of 5 depths above the pycnocline at all stations. The carboys are thoroughly mixed when filled, and a one liter subsample is taken from each. These two subsamples represent Bottle A and Bottle B and immediately preserved with 10 ml of Lugol's solution which is already in the bottle and is stored in the storage box at normal temperature.

Samples are returned to the laboratory. All the samples are settled for at least 72 hours in the laboratory before the first siphoning to make a 300 ml concentrate. These two concentrated replicates (300 ml each) are mixed (then 600 ml) and settled, to be siphoned again to make a 250 ml concentrate after 48 hours of settling. This 250 ml concentrate is transferred to 300 ml glass jar from one liter sampling bottle and settled for 48 hours. The third siphoning is applied to make 90 ml concentrate. The concentrate is filtered with 73 um mesh to separate relatively large detritus and plankters from the smaller ones. Most of rotifers, copepod nauplii, polychaete larvae, cladocerans and barnacle nauplii are trapped in the mesh and the materials on the screen are washed into a chamber which represents the "Group I" reading. A 2.5 or 5 percent aliquot is taken in the three different depths from the remaining concentrate in a 100 ml graduated cylinder after sieving. This aliquot is transferred to a second chamber, with enough buffered formalin solution added to the chamber to bring to a total of 25 ml volume. After 3-5 minutes, 15 ml of the 25 ml is removed from the surface of the second chamber and placed in a third chamber. Both chambers are brought to 25 ml final volume with 10% formalin and allowed to settle for 24 hours before examination with the inverted plankton microscope. The entire surface of the settling chamber is examined at 100X for chamber I, and at 200X for chamber II and III, respectively (see Table 5 for size ranges). The microzooplankton counts are given as the number of individuals per liter.

Group I - copepod nauplii, barnacle nauplii, polycheate larvae, Rotifers, and Cladocera nauplii over 73 um in size

Group II- Large tintinnids, oligotrichs, and small rotifers between 30 - 73 um

Group III-Small Ciliates below 30 um

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

GROUP II OR III ARE MULTIPLIED BY 10 IN MAINSTEM AND 20 IN TRIBS

SUM OF GROUP I +(GROUP II *MULTIPLIER)+(GROUP III* MULTIPLIER) DEN_L = DENSITY PER VOLUME ((RAWCOUNT/MILLILITERS OF SAMPLE) *CONCENTRATION) /TOTAL VOLUMEOF COMPOSITE SAMPLE

WHERE RAW COUNT= NUMBER OF ORGANISMS COUNTED IN A CHAMBER

CONCENTRATION=CONCENTRATION FACTOR {283.286}

*Process_Date:* Unknown
*Process_Contact:*
*Contact_Information:*
*Contact_Person_Primary:*
*Contact_Person:* Jacqueline Johnson
*Contact_Organization:* Interstate Commission on Potomac River Basin
*Contact_Position:* Chesapeake Bay Program Living Resources Data Manager
*Contact_Address:*
*Address_Type:* mailing and physical address
*Address:*
410 Severn Avenue, Suite 109
*City:* Annapolis
*State_or_Province:* Maryland
*Postal_Code:* 21403
*Country:* USA
*Contact_Voice_Telephone:* 1-800-968-7229
*Contact_Voice_Telephone:* 410-267-5729
*Contact_Facsimile_Telephone:* 410-267-5777
*Contact_Electronic_Mail_Address:* jjohnson@chesapeakebay.net
*Hours_of_Service:* 8:00 a.m. to 4:00 p.m. Monday Through Friday
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Back to Top

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Chesapeake Bay and its tidal tributaries in the Commonwealth of Virginia
*Direct_Spatial_Reference_Method:* Point
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*SDTS_Terms_Description:*
*SDTS_Point_and_Vector_Object_Type:* Area point
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*SDTS_Point_and_Vector_Object_Type:* Entity point

Back to Top

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*Depth_System_Definition:*
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*Depth_Encoding_Method:* Attribute values

Back to Top

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*Overview_Description:*
*Entity_and_Attribute_Overview:*
NOTE TO DATA USERS- ORGANISMS ARE ENUMERATED TO CLASS LEVEL ONLY
.
8/31/95- LBL all Latin Names and spelling for names have been corrected to the National Oceanographic Data Center accepted spelling.

8/31/95 Sampling from January 1993 thorough September 1993 was conducted only

at the following stations: CB6.1, CB6.4, CB7.4, LE3.6, WE4.2, LE5.5, SBE2, SBE5, TF4.2, RET4.3, TF5.5, and RET5.2. From September to the present, all stations in the current list were included in the sampling regime. During 1993 species counts were made only for large groups (SPECCODE 1 to 6). As a result, only density values for these 6 groups are included in the data set for 1993. During 1994, counts were made for Rotifers to the lowest possible taxonomic level and the data set structure reflects this change. The Rotifer spp. NAME and SPECCODE are total abundance of all rotifers.

The Chesapeake Bay Program office supplied 8/31/95- CRUISE NUMBERS - BAY171 - BAY211. See the Guide to Living Resources Data Sets for complete listing of Cruise periods.

8/31/95- SER_NUM Old Dominion University does not use a serial number system for sample tracking so this variable is not available

SUMMER 1997 - The Living Resources Data manager supplied salinity zones to the zooplankton Data based on salinity data collected by the Virginia Water Quality Monitoring Program. Values were derived from Water Quality Hydrographic data collected concurrently with the mesozooplankton. If data was not available for the of sampling but was collected within a one week window of sampling date, the water quality data was used to determine a salinity zone. However the salinity zone is marked with an E to denote being estimated.

02/01/98- The salinity zones appearing in the 1997 data are provisional. They have not yet been checked against the water quality data for validation. The 1997 Virginia Tributary water quality data will not be delivered to the CBPO until June 1998. After delivery of the water quality data, salinity zones will be confirmed.

07/01/1998- Analysis of the data as part of the CBP Zooplankton Indicator Program revealed a double counting rotifers in the 1994 data set rotifers were identified once as a group and then individually as species. Therefore all individual species counts were removed.

01/01/2000- As part of a migration to a FOXPRO database management system, the species coding system changed. Old codes were changed to the form ODU_## to clearly denote them from the new species list. It is recommended that only data from the online data system or ASCII files generated after October 2002 be used for analysis.

04/21/2000- Analysis of data noticed that in July-December 1999 data deliverables abnormally high counts of Oligotrichs were found at numerous stations. It is unclear whether this increase due to natural phenomena or some kind of taxonomist bias due to the introduction of new personnel.

03/27/2002- Annual Split Sample studies revealed that the members of phytoplankton genus Ceratium were being mistaken as rotifers in routine and split sample counts. Phytoplankton samples with high Ceratium counts were identified and the corresponding microzooplankton samples were recounted and resubmitted from the time period between July 1999-December 2001. ODU taxonomists were also noted finding high counts of Oligotrichs in split samples where Maryland personnel did not

find these. No explanation for this has been determined to date.

WINTER 2002- This monitoring program was terminated. The data record ends in October of 2002.

Winter 2002- For extensive details in regards to quality assurance issues and data comparability issues between Maryland and Virginia Programs please see the CBP Phytoplankton Split sample portion of the Chesapeake Bay Quality Assurance Program at:

http://www.chesapeakebay.net/qualityassurance.htm

08/11/2005. Note due to contract changes starting in January 1996, station LE5.5 had a coordinate change. This station move was not documented until August 2005. Due to this station relocation, all data collected at the altered location had the station name changed to LE5.5-W in August 2005.

*Entity_and_Attribute_Detail_Citation:*

Virginia Chesapeake Bay Program Water Quality
Monitoring- Microzooplankton Component

ftp.chesapeakebay.net/pub/living_resources/micro/vamidoc.pdf

Back to Top

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*Distribution_Information:*

*Distributor:*

*Contact_Information:*

*Contact_Organization_Primary:*

*Contact_Organization:* Environmental Protection Agency, Chesapeake Bay Program

*Contact_Person:* Jacqueline Johnson

*Contact_Position:* Living Resources Data Manager

*Contact_Address:*

*Address_Type:* mailing and physical address

*Address:*

410 Severn Avenue, Suite 109

*City:* Annapolis

*State_or_Province:* Maryland

*Postal_Code:* 21403

*Contact_Voice_Telephone:* 410-267-5729

*Contact_Electronic_Mail_Address:* jjohnson@chesie.ann.epa.gov

*Resource_Description:* Downloadable Data

*Distribution_Liability:*

I, the data requestor, agree to acknowledge the Chesapeake Bay Program and any other agencies and institutions as specified by the Chesapeake Bay Program Office as data providers. I agree to credit the data originators in any publications, reports or presentations generated from this data. I also accept that, although these data have been processed successfully on a computer system at the Chesapeake Bay Program, no warranty expressed or implied is made regarding the accuracy or utility of the data on any other system or for general or scientific purposes, nor shall the act of distribution constitute any such warranty.

This disclaimer applies both to individual use of the data and aggregate use with other data. It is strongly recommended that careful attention be paid to the contents of the data documentation file associated with these data. The Chesapeake Bay Program shall not be held liable for improper or incorrect use of the data described and/or contained herein.

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Back to Top

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*Contact_Person_Primary:*
*Contact_Person:* Jacqueline Johnson
*Contact_Organization:* Interstate Commission on Potomac River Basin
*Contact_Position:* Chesapeake Bay Program Living Resources Data Manager
*Contact_Address:*
*Address_Type:* mailing and physical address
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410 Severn Avenue, Suite 109
*City:* Annapolis
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Back to Top