Maryland Chesapeake Bay Water Quality Monitoring Program:Phytoplankton Primary Production Component

Metadata:

Identification_Information:
Citation:
Citation_Information:
Originator: Richard Lacouture
Originator: Stella Sellner
Originator: Academy of Natural Sciences Benedict Estuarine Reseach Labortory
Publication_Date: 20000101
Title:
Maryland Chesapeake Bay Water Quality Monitoring Program:Phytoplankton Primary Production Component
Publication_Information:
Publication_Place: Annapolis, MD
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none
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
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None
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Description:

Abstract:

The overall phytoplankton monitoring program is designed to detect and monitor changes in plankton production in relation to changing water quality conditions in Chesapeake Bay. Phytoplankton are the dominant producers in the Chesapeake Bay and are the base of the food chain for many higher tropic levels. Excessive blooms of plankton taxa are considered evidence of eutrophication in the bay and are known to degrade water quality and block light from submerged aquatic vegetation. Sampling is performed in conjunction with the Maryland phytoplankton, fluorometry, mesozooplankton, microzooplankton, jellyfish and water quality monitoring programs. Carbon fixation rates (C-14) were obtained from replicate surface layer composite samples at 16 stations in the Maryland portion of the Chesapeake Bay and its tributaries. Samples were collected 18 times over the year, with monthly samples in October through March, and biweekly samples in April through September. In January and February, the stations in the Choptank River and Baltimore Harbor are not sampled. After June, 1986 stations ET4.2 and EE3.1 were no longer sampled. Beginning in January 1996, there was no sampling done in February and November. Sampling was reduced to once a month in June and September. Sampling at Station CB1.1 was discontinued entirely.

Purpose:

The state of Maryland, in cooperation with the US EPA Chesapeake Bay Program, has monitored phytoplankton primary production in the Maryland mainstem and tributaries since August 1984. The program is designed to give comprehensive geographic and temporal information on primary production. Sampling is performed in conjunction with the Maryland phytoplankton, fluorometry, mesozooplankton, microzooplankton, jellyfish and water quality monitoring programs.

Supplemental_Information:

STATION NAMES AND DESCRIPTIONS

CB1.1 Mouth of Susquehanna River, main Bay
CB2.2 West of Still Pond near Buoy R 34, main Bay
CB3.3C North of Bay Bridge, main Bay
CB4.3C East of Dares Beach near Buoy R 64, main Bay
CB5.2 East of Point No Point, main Bay
LE1.1 Between Jack Bay sandspit and Sandgates in mid channel, Patuxent River
TF1.7 East South East of Jacks Creek in mid channel, Patuxent River
TF1.5 At Nottingham in mid channel, Patuxent River
TF2.3 Off Indianhead at Buoy N 54, Potomac River
RET2.2 Off Maryland Point at Buoy 19, Potomac River
LE2.2 Off Ragged Point at buoy BW 51B, Potomac River
ET5.1 Downstream of confluence with Tuckahoe Creek, upper Choptank River
ET5.2 Near Rt 50 bridge at Cambridge, lower Choptank River
WT5.1 East of Hawkins Point at Buoy 5M, Patapsco River (Baltimore Harbor)

Time_Period_of_Content:

Time_Period_Information:

Range_of_Dates/Times:

Beginning_Date: 19840701
Beginning_Time: unknown
Ending_Date: 20080630
Ending_Time: unknown

Currentness_Reference:

ground condition

Status:
Progress: Complete
Maintenance_and_Update_Frequency: None planned
Spatial_Domain:
Bounding_Coordinates:
West_Bounding_Coordinate: -77.2936
East_Bounding_Coordinate: -75.9222
North_Bounding_Coordinate: 39.4794
South_Bounding_Coordinate: 37.9947
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Theme_Keyword_Thesaurus: None
Theme_Keyword: Water
Theme_Keyword: Primary Production
Theme_Keyword: Water Quality
Theme_Keyword: Plankton
Place:
Place_Keyword_Thesaurus: None
Place_Keyword: Maryland
Place_Keyword: Chesapeake Bay
Place_Keyword: Potomac River
Place_Keyword: Patapsco River
Place_Keyword: Patuxent River
Place_Keyword: Chester River
Place_Keyword: Choptank River
Stratum:
Stratum_Keyword_Thesaurus: None
Stratum_Keyword: Water Column
Temporal:
Temporal_Keyword_Thesaurus: None
Temporal_Keyword: Bimonthly
Temporal_Keyword: Monthly
Access_Constraints: None
Use_Constraints:
Dataset credit required
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
Contact_Address:
Address_Type: mailing and physical address
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410 Severn Avenue, Suite 109
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State_or_Province: Maryland
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Hours_of_Service: 8:00 a.m. to 4:00 p.m. Monday Through Friday
Contact Instructions:
unavailable
Security_Information:
Security_Classification_System: None
Security_Classification: None
Security_Handling_Description: None
Native_Data_Set_Environment:
Relational Database
Cross_Reference:
Citation_Information:
Originator: Jacqueline Johnson
Publication_Date: 20000101
Publication_Time: Unknown
Title:
2000 Users' Guide to Chesapeake Bay Program Biological and Living Resources Data
Edition: Version 1
Publication_Information:
Publication_Place: Annapolis, MD
Publisher: USEPA CHESAPEAKE BAY PROGRAM OFFICE
Other_Citation_Details:
Unknown
Online_Linkage: https://archive.chesapeakebay.net/pub/living_resources/guide2000.pdf

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Data_Quality_Information:
Attribute_Accuracy:
Attribute_Accuracy_Report:
Primary production samples are collected by a member of the Benedict Estuarine Research Laboratory plankton section. At the end of the sampling cruise, the samples are transferred to the C14 laboratory staff. Production and alkalinity measurements are made within twenty-four hours of sample collection. All analysis run with standards and laboratory spikes as described in method references. Chlorophyll a measurements are immediately frozen until analysis is performed. All Chlorophyll samples are processed within 2 months of sample collection
Logical_Consistency_Report:
Not Applicable
Completeness_Report:
Visual inspection of field sheets and computer files and comparison to previous data.
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 or 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 conductivity is recorded immediately before plankton sampling. P_Depth is set at 0.5 meters above the Pycnocline and is used at the cutoff depth between upper and lower water column composite samples. The pycnocline is determined to be the depth at which the greatest conductivity change is observed. The minimum threshold change is 1000 uhhos/cm.

Lineage:

Source_Information:

Source_Citation:

Citation_Information:

Originator: Richard Lacouture
Originator: Stella Sellner
Publication_Date: 20000101
Publication_Time: Unknown
Title:
Maryland Chesapeake Bay Water Quality Monitoring Program:Mainstem and Tributary Living Resource Component
Publication_Information:
Publication_Place: Annapolis, Maryland USA
Publisher: US EPA Chesapeake Bay Program
Other_Citation_Details:
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Online_Linkage: http://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

Type_of_Source_Media: digital database file

Source_Time_Period_of_Content:

Time_Period_Information:

Range_of_Dates/Times:

Beginning_Date: 19840701
Beginning_Time: unknown
Ending_Date: 20080630
Ending_Time: unknown

Source_Currentness_Reference:

ground condition

Source_Citation_Abbreviation:

None

Source_Contribution:

None

Process_Step:

Process_Description:

Chesapeake Bay Program Analytical Method Code- PD101
At each station, two surface composite samples (15-l) composite samples(15-l) (5 depths above the pycnocline, five below the pycnocline) are collected using a small diaphragm pump and hose. Once collected, 500-ml subsamples from the surface layer are pooled, yielding one sample from the surface mixed layer. The samples for primary production are taken from the replicate surface composite carboys (15-l) which have been previously subsampled for the phytoplankton species composition samples. There is a period of 0.5-6 h between the time that the samples are collected and when they are processed. On the Patuxent River and mainstem Chesapeake Bay cruises, the carboys are kept in a flow-through box at ambient water temperature and light conditions. For the other stations, the carboys are kept in the shade at ambient air temperatures until being processed. At the end of a sampling day, four 100 ml sub samples per station are decanted from the two surface-layer composite samples (15 liters each) into sample-rinsed Pyrex milk dilution bottles (or polycarbonate bottles after July, 1989), one for time-zero C-14 blank (t0), one for alkalinity determination, and one from each composite for C-14 incubation. The two incubation samples per station are placed in a constant light incubator (>250 uE per sq m per sec) receiving running water from the study area for temperature control for an acclimation period >0.5 h. Then 1-2 uCi labeled NaHCO3 is added and samples are returned to the incubator for >1 h. After incubation, 15 ml is filtered through a 0.45 um Millipore membrane filter, rinsed with filtered sample water and fumed over concentrated HCl. Fifteen ml of t0 sample is similarly filtered and fumed, immediately following the addition of the radioisotope. The filters are placed in scintillation vials and stored in a freezer. Scintillation cocktail (Aquasol 8/84 - 10/94 and Cytoscint 10/94 - present) is added to the scintillation vials and the samples are run on a Packard Tri-Carb 2500TR Liquid Scintillation Analyzer equipped with internal quench standards and serviced twice a year by the Packard technician.

Field stock solutions of radiolabel NaHCO3 are obtained from mixing portions of 25 mCi C-14 NaCO3 stock solutions with pH of 10-10.2 deionized water. Final field stock activities approximate 2 uCi C-14 per ml, determined from liquid scintillation counting of field stocks in phenethylamine and Biofluor. Field stock activities for each dilution are then recorded in a laboratory log and are assigned a date interval corresponding to the period that the field stock is employed in the program. Because of problems with determinations of initial field stock activities for the time interval May 1993 - March 1994, activity of the field NaHCO3 stock was determined from the mean of six previous field NaHCO3 stocks mixed from the same 25 mCi stock solution.

Total alkalinity is calculated in the following manner: Initial pH is determined followed by the addition of 0.2 ml aliquot of 0.025N HCL until pH 3.8-4.2. Thereafter, pH is recorded for five cumulative additions of 0.025N HCL. Total alkalinity is derived from intercept produced from the linear regression of MLs of acid vs 10-pH.

Chlophyll a is determined from grab samples where a volume between 100-500 ml is filtered at < 10 p. s. i. vacuum pressure onto Whatman GF/F filters with ~ 10 drops of MgCO3 added just prior to completion of filtration. Spectrophotometric analysis of these grab samples is performed with a Milton Roy Spectronic 501. Each sample is first read at an absorbance of 750 nm. to determine turbidity and then read again at an absorbance of 665 nm. Each sample is then acidified with 3 drops of 2N HCl and reread at 665 nm and at 750 nm. Final chlorophyll a concentrations are then calculated using the formula outlined in Strickland and Parsons, Standard Methods for Seawater Analysis. Beginning in March, 1999, a new technique for determining chl a was initiated. The new procedure is as follows: The spectrophotometer is zeroed with the blank at 750nm. Each sample is read at this wavelength and the value is recorded in the data book. The spectrophotometer is then changed to a wavelength of 665nm and rezeroed. Then, the above process is repeated. After the initial reading at 665nm is recorded, 2 drops of 1N HCl is added to each sample. The spectrophotometer is then changed to a wavelength of 664nm and rezeroed. The samples are then read again at 664nm and 750nm. After this process is complete, the samples are removed from the cuvettes and each cuvette is rinsed with 90% acetone 3 times before being filled again. All values that have been recorded in the data book are entered into a spreadsheet that contains the formula for calculating chlorophyll concentration.

FORMULAS, CALCULATIONS, AND CONVERSIONS

*Calculation of Clorophylla

$$\text{chl a (mg/m3)} = 26.7((665b-750b)-(664a-750a)) * \frac{ve}{Vf * l}$$

where ve = volume of extracted sample
and Vf = volume filtered

*Calculation of Total alkalinity (mg CaCO3/L)

$$\text{CaCO3/L} = \frac{(2\ B - C)\ X\ N\ X\ 50\ 000}{\text{mL sample}}$$

where:

B = mL titrant to first recorded pH,
C = total mL titrant to reach pH 0.3 unit lower, and
N = normality of acid.

*Calculation of Carbon Fixation
The following equations were used to determine the rate of carbon fixation in ug/l/hr. Note that the raw data used in these calculations are not presented in the associated data set. Only the resulting carbon fixation rate is included.
1) CARBALK = 12000 * (Total Alkalinity)
2) CARBFIX = IVOL * ((DPMSAM/FVOL)-(DPMT0/FVOL)) * CARBALK
*

1.05 / DPMSP * (ETIME-BTIME)

Where

CARBFIX = Carbon fixation rate in ug C/l/hr

IVOL = Volume incubated

FVOL = Volume filtered

DPMSAM = Disintegrations per minute from incubated sample

DPMT0 = Disintegrations per minute from corresponding un-incubated (time zero - t0) sample

DPMSP = Total disintegrations per minute for C-14 spike

BTIME = Beginning time of incubation (h)

ETIME = Ending time of incubation (h)

CARBALK = Total inorganic carbonate from 1)

*Calculation of Assimilation Ratio

ASMRATIO = CARBFIX / CHLA - this ratio is calculated prior to rounding the CARBFIX value

Where

ASMRATIO = Assimilation ratio

CARBFIX = Carbon fixation in ug C/l/h from 2)

CHLA = Chlorophyll a in ug/l

Process_Date: ongoing

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

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410 Severn Avenue, Suite 109

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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

Process_Step:

Process_Description:

Metadata imported.

Source_Used_Citation_Abbreviation:

C:\DOCUME~1\jjohnson\LOCALS~1\Temp\xml261.tmp

Process_Date: 20081110

Process_Time: 11230400

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Spatial_Data_Organization_Information:
Indirect_Spatial_Reference_Method:
Chesapeake Bay and Its Tidal Tribuaries in the State of Maryland
Direct_Spatial_Reference_Method: Point
Point_and_Vector_Object_Information:
SDTS_Terms_Description:
SDTS_Point_and_Vector_Object_Type: Entity point
SDTS_Terms_Description:
SDTS_Point_and_Vector_Object_Type: Area point

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Spatial_Reference_Information:
Horizontal_Coordinate_System_Definition:
Geographic:
Latitude_Resolution: 30
Longitude_Resolution: 30
Geographic_Coordinate_Units: Decimal degrees
Geodetic_Model:
Horizontal_Datum_Name: North American Horizontal Datum of 1983
Ellipsoid_Name: Geodedic Reference System 80
Semi-major_Axis: 6378206.4
Denominator_of_Flattening_Ratio: 294.98
Vertical_Coordinate_System_Definition:
Depth_System_Definition:
Depth_Datum_Name: Chart datum; datum for sounding reduction
Depth_Resolution: .1
Depth_Distance_Units: meters
Depth_Encoding_Method: Attribute values

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Entity_and_Attribute_Information:
Overview_Description:
Entity_and_Attribute_Overview:
Maryland Water Quality Monitoring Program:Primary Monitoring Component Project Documentation

https://archive.chesapeakebay.net/pub/Living_Resources/plank/prod/mdpddoc.pdf *Entity_and_Attribute_Detail_Citation:*
5/31/95- CRUISE NUMBERS - BAY004 - BAY211 were supplied by the Chesapeake Bay Program office and modified by Amy Imirie and Elgin Perry to reflect true start and end dates with corresponding MSUP trip numbers. This prevents the occurrence of two sampling events for one station during a Bay Cruise period.

5/31/95- G_METHOD was changed to 7- refers to the methods Table 17, Appendix F of the Living Resources Data management plan, 1989. This is a change in reporting of GMETHOD in previous versions of the data set, not a change in collection method

5/31/95- SAMPLE_NUMBER - NOTE: 5,6,7 WERE PREVIOUSLY REPORTED AS T,B,W CHANGE IN designation was NECESSARY BECAUSE REP_NUM IS A NUMERIC FIELD
5 - combined 1 & 3 (top sample)
6 - combined 2 & 4 (bottom sample)
7 - whole water column

5/31/95 CARBFIX - For the period 1991-1993, the chlorophyll data in the vertical profiles from the tributaries (Potomac, Choptank, and Patapsco) was miscalculated as we subtracted the blank of the dissolved fraction twice from each sample. This mistake was realized and those data have been corrected as of the 4/15/95 data submittal. The implication of this mistake was also reflected in the productivity data set since assimilation ratios are calculated as part of this program. Discontinue use of all data with an R_Date prior to 05/31/95.

SUMMER 1997 - ICPRB Staff calculated Salinity zones from water quality data provided by the Maryland Department of the Environment. Values were derived from Water Quality Hydrographic data collected concurrently with the plankton when ever possible. 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.

01/01/98 - 1997 Primary Production monitoring data is being released without salinity zones. Salinity zones will be filled in when the corresponding Water Quality monitoring data becomes available.

01/01/2000- All Latitudes and Longitudes converted to NAD83 coordinates.

Summer 2003- It was determined Maryland and Virginia production measurements, should analyzed separately due shipboard methodology differences. The current Maryland protocol holds productivity samples at near-ambient temperatures and shipboard light conditions for 0.5 - 6 hours. Thus samples able to begin acclimating to relatively high light levels on shipboard and samples may experience above-ambient temperatures before they are placed in light-saturated, temperature-controlled incubation chambers in the laboratory. The current Virginia protocol maintains productivity samples in a closed cooler on ice prior to being sent to the laboratory for analysis. Virginia's samples experience below-ambient temperatures in all seasons but winter, and are acclimated to low light when they are placed in the incubation chambers.

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

09/01/2004- This program was conducted by the Academy of Natural Sciences (ANS) from August 1984 through August 2004. Morgan State University (MSU) took over the MSU laboratory in September, 2004, but the program and personnel remained the same. All data previously codes with the data source as ANS was updated to MSU.

06/10/2005- In June 2005, productivity measures were temporarily stopped because of isotope licensing issues with MSU and the state of Maryland.
12/13/2006- MSU regains isotope licensing and resumes productivity measurements.

07/30/2007-Between late July, 2007 and November, 2007, productivity data was not analyzed due to equipment issues.

11/06/2008-The productivity data from 01/01/2008-06/30/2008 were based on samples which were stored for 1-6 months because of problems with the liquid scintillation counter.

11/06/2008- Primary production measurement were not made at stations the following stations:
CB1.1 and LE2.2 in March 2008, LE1.1, TF1.7, TF1.5 in April 2008 and WT5.1 in May 2008

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Distribution_Information:
Distributor:
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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State_or_Province: Maryland
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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
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.

Standard_Order_Process:
Digital_Form:
Digital_Transfer_Information:
Format_Name: ASCII
Digital_Transfer_Option:
Online_Option:
Computer_Contact_Information:
Network_Address:
Network_Resource_Name: http:www.chesapeakebay.net
Offline_Option:
Offline_Media: CD-ROM
Recording_Format: ISO 9660
Compatibility_Information:
None
Fees: None
Ordering_Instructions:
All requests for data on media must be made in writing
Turnaround: 5 Working Days
Custom_Order_Process:
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Technical_Prerequisites:
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Available_Time_Period:
Time_Period_Information:
Range_of_Dates/Times:
Beginning_Date: 19840701
Beginning_Time: unknown
Ending_Date: 20000101
Ending_Time: unknown

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Metadata_Reference_Information:
Metadata_Date: 20000310
Metadata_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:
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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
Contact Instructions:
unavailable
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Metadata_Standard_Version: FGDC-STD-001-1998
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None
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Metadata_Security_Classification_System: None
Metadata_Security_Classification: Unclassified
Metadata_Security_Handling_Description:
None

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