Maryland Chesapeake Bay Mainstem Water Quality Monitoring Program - 2010

Metadata:

Identification_Information:
Citation:
Citation_Information:
Originator: Maryland Department Of Natural Resources, Resource Assessment Service
Publication_Date: 20110301
Title: MD Dept. of Natural Resources, Chesapeake Bay Mainstem Water Quality Monitoring 2010.
Geospatial_Data_Presentation_Form: Spatial dataset
Online_Linkage: <http://www.chesapeakebay.net/data/index.htm>

Description:
Abstract:
The physical/chemical component of the Maryland Chesapeake Bay Water Quality Monitoring Program consists of data collected at twenty-one stations located in Maryland's Chesapeake Bay mainstem.

Sampling was conducted twice monthly in June, and August of 2010, and once monthly during the remaining months, for a total of fourteen samplings in the period of 1-Jan-2010 through 31-Dec-2010. However, at eastern and western transect mainstem stations, samples were not collected November through February, resulting in only ten flanking station samplings a year.

The water quality monitoring program began in 1984 and is ongoing. The program assesses the water quality by evaluating the levels of nutrients and closely related habitat impacts such as dissolved oxygen and water clarity. One of the main goals of the Chesapeake Bay restoration is to reduce the impacts of excess nutrients on the Bay and these measures provide some of the most direct linkages to management programs that are achieving this goal. The Chesapeake Bay Program jurisdictions have agreed to reduce nitrogen, phosphorus and sediment pollution to the Bay.

Purpose:
The Maryland Department of Natural Resources Chesapeake Bay Water Quality Monitoring Program is part of a cooperative effort between the Federal government and State and local governments in the Chesapeake Bay watershed to assess the status and trends of nutrient and sediment concentrations in Maryland's Chesapeake Bay mainstem.

The information is integrated with data from other Bay water quality stations and living resources monitoring projects and used to understand linkages, temporal variation and long-term trends.

Water quality data are used to refine, calibrate and validate Chesapeake Bay ecological models. The models are used to develop and assess water quality criteria with the goal of removing the Chesapeake Bay and its tidal rivers from the list of impaired waters.

Supplemental_Information:
The target audiences for this information include Resource Managers, Technical/Scientific Users, Government, Educators, Students and General Public.

Data users who desire very detailed information about Water Quality Monitoring data-definition, sampling-procedures and data-processing are encouraged to refer to the two documents listed below. The documents may be obtained from The Chesapeake Bay Program Office.

Water Quality Database - Database Design and Data Dictionary, Prepared For: U.S. Environmental Protection Agency, Region III, Chesapeake Bay Program Office, January 2004. <http://archive.chesapeakebay.net/pubs/cbwqdb2004_RB.PDF>.

The most current version of the Water Quality Data Dictionary - Online may be found at: <http://archive.chesapeakebay.net/data/data_dict.cfm?DB_CODE=CBP_WQDB>.

The Quality Assurance Project Plan for the Maryland Department of Natural Resources Chesapeake Bay Water Quality Monitoring Program - Chemical and Physical Properties Component for the period July 1, 2010 - June 30, 2011
<http://mddnr.chesapeakebay.net/eyesonthebay/documents/QAPP_MainTrib_2010-2011_Draft1.pdf>.
Time_Period_of_Content:
Time_Period_Information:
Range_of_Dates/Times:
Beginning_Date: 20100101
Ending_Date: 20101231
Currentness_Reference: Ground Condition
Status:
Progress: Complete
Maintenance_and_Update_Frequency: As needed
Spatial_Domain:
Bounding_Coordinates:
West_Bounding_Coordinate: -80.53758
East_Bounding_Coordinate: -75.0405
North_Bounding_Coordinate: 39.7425
South_Bounding_Coordinate: 37.8713
Keywords:
Theme:
Theme_Keyword_Thesaurus: Olsen, L.M., G. Major, K. Shein, J. Scialdone, R. Vogel, S. Leicester, H. Weir, S. Ritz, T. Stevens, M. Meaux, C.Solomon, R. Bilodeau, M. Holland, T. Northcutt, R. A. Restrepo, 2007. NASA/Global Change Master Directory (GCMD) Earth Science Keywords. Version 6.0.0.0.0
[online:http://gcmd.nasa.gov/Resources/valids//gcmd_parameters.html]

Theme_Keyword: Biosphere > Aquatic Ecosystems > Estuarine Habitat
Theme_Keyword: Biosphere > Ecological Dynamics > Ecosystem Functions > Nutrient Cycling
Theme_Keyword: Biosphere > Ecological Dynamics > Ecosystem Functions > Primary Production
Theme_Keyword: Terrestrial Hydrosphere > Surface Water > Rivers/Streams
Theme_Keyword: Terrestrial Hydrosphere > Water Quality/Water Chemistry > Chlorophyll
Theme_Keyword: Terrestrial Hydrosphere > Water Quality/Water Chemistry > Conductivity
Theme_Keyword: Terrestrial Hydrosphere > Water Quality/Water Chemistry > Light Transmission
Theme_Keyword: Terrestrial Hydrosphere > Water Quality/Water Chemistry > Nitrogen Compounds
Theme_Keyword: Terrestrial Hydrosphere > Water Quality/Water Chemistry > Nutrients
Theme_Keyword: Terrestrial Hydrosphere > Water Quality/Water Chemistry > Oxygen
Theme_Keyword: Terrestrial Hydrosphere > Water Quality/Water Chemistry > pH
Theme_Keyword: Terrestrial Hydrosphere > Water Quality/Water Chemistry > Phosphorous Compounds
Theme_Keyword: Terrestrial Hydrosphere > Water Quality/Water Chemistry > Suspended Solids
Theme_Keyword: Terrestrial Hydrosphere > Water Quality/Water Chemistry > Turbidity
Theme_Keyword: Terrestrial Hydrosphere > Water Quality/Water Chemistry > Water Temperature
Place:
Place_Keyword_Thesaurus: Producer Defined
Place_Keyword: Chesapeake Bay
Place_Keyword: Maryland
Place_Keyword: Monitoring Segment
Place_Keyword: Tidal Tributaries
Access_Constraints: None
Use_Constraints: None
Point_of_Contact:
Contact_Information:
Contact_Person_Primary:
Contact_Person: Renee Karrh
Contact_Position: Program Manager
Contact_Address:
Address_Type: mailing and physical.
Address: 580 Taylor Avenue, D2
City: Annapolis
State_or_Province: Maryland
Postal_Code: 21401
Country: USA
Contact_Voice_Telephone: 410-260-8630
Contact_Electronic_Mail_Address: rkarrh_No_Spam_@dnr.state.md.us [Remove _No_Spam_ for valid email address]
Browse_Graphic:

Browse_Graphic_File_Name:
<http://mddnr.chesapeakebay.net/eyesonthebay/documents/metadata/MD_DNR_MainstemStns2010.pdf>
Browse_Graphic_File_Description: Map of twenty-one 2010 Maryland Chesapeake Bay Mainstem Water Quality Monitoring Sites.
Browse_Graphic_File_Type: PDF
Data_Set_Credit:
Maryland Department of Natural Resources (MDDNR) Resource Assessment Service (RAS) staff collected the majority of samples and processed the data. The Nutrient Analytical Services Laboratory (NASL) at the Chesapeake Biological Laboratory (Univ. of MD) analyzed chlorophyll, nutrient and suspended solids samples.

The project was made possible with funding provided by The State of Maryland, the United States Environmental Protection Agency Chesapeake Bay Program, and the National Atmospheric and Oceanic Administration Chesapeake Bay Program Office.

Data_Quality_Information:
Attribute_Accuracy:
Attribute_Accuracy_Report:
Quality Assurance/Quality Control. Maryland Department of Natural Resources followed specific procedures to ensure that the Mainstem component of the Chesapeake Bay Water Quality Monitoring Program design was properly implemented and managed with sufficient accuracy, precision and detection limits. Accuracy (closeness to the true value) of collected data was controlled and assured by proper use, calibration and maintenance of both field and laboratory equipment for the measurement of physical and chemical parameters.

The procedures to control and assure the accuracy of field measurements involved the calibration of field instruments, the verification of calibrations, and equipment maintenance. Most of the details of how data acquired with YSI sondes and Hydrolab sondes were quality assured and quality controlled are described in the process description elements in the Lineage portion of this metadata record.

Daily quality control checks which included the running of blanks and standards were used to control and assure laboratory accuracy.

Accuracy of Chesapeake Biological Laboratory, Nutrient Analytical Services Laboratory (CBL NASL) and Maryland Department of Health and Mental Hygiene Environmental Chemistry Division (DHMH ECD) laboratory results was also assessed through DNR's participation in the Chesapeake Bay Coordinated Split Sample Program (CSSP) a split sampling program in which five laboratories involved in Chesapeake Bay monitoring analyze the coordinated split samples. CSSP was established in June 1989 to establish a measure of comparability between sampling and analytical operations for water quality monitoring throughout the Chesapeake Bay and its tributaries. DNR followed the protocols in the Chesapeake Bay Coordinated Split Sample Program Implementation Guidelines (EPA 1991) and its revisions. Split samples were collected quarterly. Results were analyzed by appropriate statistical methods to determine if results differed

significantly among labs. If a difference occurred, discussions began regarding techniques and potential methods changes to resolve discrepancies.

Logical_Consistency_Report:

For logistical reasons, station LE2.3, a Potomac River sampling project station, is routinely sampled during Chesapeake Bay mainstem sampling cruises.

January 2010 - H2S odor, in bottom and below pycnocline sample water, was noted at station CB2.1.

February 2010 - Station CB3.1 was sampled at 39 13.592N 76 14.756W DUE TO ICE. Bottom and Below Pycnocline samples were collected from the same bottle.

March 2010 - The CB4.4 station log noted a helicopter on station stirring up surface water. Strong currents at stations Cb5.1 and CB5.2 may have affected meter readings. CB3.3C dissolved oxygen readings at 3m and 4m were double-checked. Flotsam noted at station CB2.1. Field log notes: heavy rains 13-Mar-2010 through 15-Mar-2010, twelve Conowingo Dam gates were opened 16-Mar-2010.

April 2010 - Rough seas were noted at station CB3.3C. Unstable meter readings were noted at CB3.3C, CB3.3E, CB3.3W, CB4.1W, CB4.1E and CB4.1W. Greater meter scope than normal was required at station CB4.1C. CB4.1C 9m dissolved oxygen reading was double checked. Barge passage prior to sampling was noted at station CB2.2.

May 2010 - Greater meter scope than normal required at stations CB4.4, CB5.1, CB5.2 and CB5.3. Surface and 1m water samples at stations CB4.2C, CB4.2W, CB4.3C, CB4.3E and CB4.3W were collected at the same depth. Debris in water was noted at station CB3.1.

June 1-3, 2010 - No known issues.

June 21-23, 2010 - H2S odor in bottom sample water was noted at stations CB3.3C, CB4.1C, CB4.1E and CB4.3C. Similarly, H2S odor in bottom and below pycnocline sample water collected at stations CB5.1, CB4.4, and CB4.3E.

PH post calibration readings that were 0.21 higher than the standard was noted at all stations except CB1.1, CB2.1, CB2.2, and CB3.2.

July 2010 - H2S odor was noted in bottom water samples collected at stations CB4.4, CB5.1, CB3.3C and CB4.2W. H2S odor was noted in bottom and below pycnocline water samples collected at stations CB4.1C, CB4.1E, CB4.2C,CB4.3C, and CB4.3E.

August 2-4, 2010 - Two water quality meters were used. The meter used to measure water quality at stations CB5.2, CB5.3, CB5.2 and CB5.1 was removed from service. Post calibration values were outside of acceptable range but the data appeared to be reasonable and was retained. The passage of a car carrier was noted at station CB4.4. H2S odor was noted in bottom and below pycnocline water samples collected at stations CB4.4, CB5.1, CB5.2, CB5.3, CB3.3C, CB4.1C, CB4.1E, CB4.3C and CB4.3E. Bottom and below pycnocline water samples were collected from

the same bottle at stations CB3.1 and CB3.2. The surface sample was collected from hull pump discharge at station CB3.3C.

August 23-25, 2010 - H2S odor was noted in stations CB3.3C, CB4.1C and CB4.2C bottom and below pycnocline sample water.

September 2010 - No known issues.

October 2010 - Greater meter scope than normal required at stations CB3.3C, CB4.1C and CB4.2C.

November 2010 - At station CB4.1C a note about 'sucking mud' at 32m was made in the log.

December 2010 - Station CB1.1 was not sampled due to ice. That pH was dropping was noted at station CB2.1. Unstable meter reading were remarked at stations CB3.1 and CB3.2.

Completeness_Report:

The 2010 Chesapeake Bay Mainstem Monitoring Program dataset includes physical and chemical water quality data along with ancillary information (weather, date, depth, etc.) acquired during monthly sampling cruises, between January and December 2010.

Sampling-event and physical properties, nutrient and suspended solid data from twenty-one Chesapeake Bay Mainstem stations are included in the dataset.

Prior to 2010, Photosynthetic Active Radiation (PAR) measurements were made on Mainstem surveys in order to calculate a light attenuation coefficient. PAR measurements were not made during 2010.

Silica samples were not collected at any stations July through December 2010.

January 2010 - Stations CB1.1, CB2.1, CB2.2, CB3.1 were not sampled due to ice.

February 2010 - Stations CB1.1, CB2.1, CB2.2, were not sampled due to ice.

September 2010 - Station CB5.3 was not sampled due to dangerous sea conditions.

December 2010 - Station CB1.1 was not sampled due to too much ice.

Lineage:

Process_Step:

Process_Description:

SONDE CALIBRATION and POST-CALIBRATION

The Yellow Springs Instrument (YSI) 6000 data sondes and HydroLabs were maintained and calibrated before and after each cruise in accordance with manufacturer's recommendations.

HYDROLAB PROFILE SAMPLING PROTOCOLS:

A profile of temperature, specific conductance, dissolved oxygen, and pH was obtained from the water column at 0.5 m, 1.0 m, 2.0 m and 3.0 m depth intervals below the surface. Thereafter readings were taken at 2.0 m intervals and at the bottom. Tributary bottom equals total depth minus one meter (not rounded). If the change in dissolved oxygen exceeded 1.0 mg/L or if the change in specific conductance equaled or exceeded 1,000 micromhos/cm over any 2.0 m interval, readings were taken at 1.0 m intervals between these two readings. For total depths less than or equal to 10.0 m, readings were taken at 1.0 m intervals.

GRAB SAMPLING DEPTH PROTOCOLS:

At stations where two depths were sampled, collections were taken at 0.5 m below the surface, and 1.0 m above the bottom. If the station total depth was equal to 1.5 m, the bottom sample was also collected at 0.5 m. Great caution was exercised when taking bottom samples; if the bottom was disturbed and bottom sediments appeared to have been included, the sample was dumped out and collected after the sediments had settled. Alternately, the sample was collected slightly higher in the water column and the new bottom sample depth was noted.

At stations where 4 depths were sampled and a pycnocline existed, collections were taken at 0.5 m below the surface, 1.5 m above the upper boundary of the pycnocline, 1.5 m below the lower boundary of the pycnocline, and 1.0 m above the bottom.

At stations where 4 depths were sampled and there was no discernable pycnocline, samples were taken at 0.5 m below the surface, at the closest profile depth one third the distance from the surface to the bottom, at the closest profile depth two thirds the distance from the surface to the bottom, and 1.0 m above the bottom.

SECCHI DEPTH:

Water transparency was determined, to the nearest 0.1 m using a 20-cm standard Secchi disc lowered into the water column with a calibrated rope. Observations were made on the shady side of the sampling location.

Process_Date: Unknown
Process_Contact:
Contact_Information:
Contact_Person_Primary:
Contact_Person: Sally Bowen
Contact_Position: Project Chief, Monitoring Field Office, DNR
Contact_Address:
Address_Type: mailing and physical
Address: 1919 Lincoln Drive
City: Annapolis
State_or_Province: Maryland
Postal_Code: 21401
Country: USA

Contact_Voice_Telephone: 410 263-3369
Contact_Electronic_Mail_Address: SBOWEN_nospam_@dnr.state.md.us[Remove _nospam_ for valid email address]

Process_Step:
Process_Description:
LABORATORY ANALYSIS - CBL

University of Maryland's Chesapeake Biological Laboratory (CBL), Nutrient Analytical Services Laboratory (NASL) analyzed total dissolved nitrogen, particulate nitrogen, nitrite, nitrite + nitrate, ammonium, total dissolved phosphorus, particulate phosphorus, particulate inorganic phosphorus, orthophosphate, dissolved organic carbon, particulate carbon, total suspended solids, and volatile suspended solids.

Beginning in 2009, the NASL also performed chlorophyll analyses. Prior to 2009, chlorophyll analyses were performed by the Maryland Department of Mental Health and Hygiene.

Further information about laboratory analytical procedures may be obtained from the "Process_Contact".
Process_Date: Unknown
Process_Contact:
Contact_Information:
Contact_Person_Primary:
Contact_Person: Carl Zimmerman
Contact_Position: Director of Chesapeake Biological Laboratory Analytical Services/Quality Assurance Officer
Contact_Address:
Address_Type: mailing and physical
Address: Chesapeake Biological Laboratory, Center for Environmental and Estuarine Studies, The University of Maryland System, 1 Williams St; P.O. Box 38
City: Solomons
State_or_Province: Maryland
Postal_Code: 20688
Country: USA
Contact_Voice_Telephone: 410 326-4281
Contact_Electronic_Mail_Address: carlz _nospam_@cbl.umces.edu[Remove _nospam_ for valid email address]

Process_Step:
Process_Description:
VERIFICATION AND DATA MANAGEMENT:

Each month DNR Tawes Office and Field Office personnel conduct data QA/QC procedures. All of the water quality calibration "grab" sample data are plotted. Outliers and anomalous values are thoroughly researched. Staff members compare unusual values to historic values from the site and values from nearby sites. Weather events are considered, event logs are reviewed and CBL

analytical laboratory staff members and DNR field staff members are consulted regarding possible legitimate causes for outlying values. In cases where values are not considered to be legitimate, they were masked in the published dataset with the approval of the field staff and the Quality Assurance Officer.

Process_Date: Unknown
Process_Contact:
Contact_Information:
Contact_Person_Primary:
Contact_Person: Renee Karrh
Contact_Position: Program Manager
Contact_Address:
Address_Type: mailing
Address: 580 Taylor Ave., D2
City: Annapolis
State_or_Province: MD
Postal_Code: 21401
Contact_Voice_Telephone: 410 260-8630
Contact_Electronic_Mail_Address: rkarrh _Nospam_@dnr.state.md.us [Remove _Nospam_ for valid email address]

Spatial_Data_Organization_Information:
Indirect_Spatial_Reference: Chesapeake Bay, Maryland
Direct_Spatial_Reference_Method: Point

Spatial_Reference_Information:
Horizontal_Coordinate_System_Definition:
Geographic:
Latitude_Resolution: 0.0001
Longitude_Resolution: 0.0001
Geographic_Coordinate_Units: Decimal degrees
Geodetic_Model:
Horizontal_Datum_Name: North American Datum of 1983
Ellipsoid_Name: Geodetic Reference System 80
Semi-major_Axis: 6378137
Denominator_of_Flattening_Ratio: 298.257

Entity_and_Attribute_Information:
Overview_Description:
Entity_and_Attribute_Overview:
This metadata record is a description of the Maryland Department of Natural Resources Chesapeake Bay Water Quality Monitoring Program - Chemical and Physical Properties Component Database for the Maryland Chesapeake Bay Mainstem. Project data are an aggregation of data collected at twenty one Maryland mainstem stations during 2010.

The data are contained in three related entities (tables): Station_Information, Monitoring_Event_Data, Water_Quality_Data and Light_Attenuation_Data. Each table contains attributes (fields).

The entity Station_Information is comprised of the attributes: STATION, DESCRIPTION, WATER_BODY, CBP_BASIN, TS_BASIN, BASIN, CBSEG_2003, CBSEG_2003_DESCRIPTION, HUC8, CATALOGING_UNIT_DESCRIPTION, HUC11, WATERSHED, FIPS, STATE, COUNTY/CITY, FALL_LINE, LATITUDE, LONGITUDE, LL_DATUM, UTM_X and UTM_Y

The entity Monitoring_Event_Data is comprised of the attributes: EVENT_ID, SOURCE, AGENCY, PROGRAM, PROJECT, STATION, EVENT_START_DATE, EVENT_START_TIME, CRUISE, TOTAL_DEPTH, UPPER_PYCNOCLINE, LOWER_PYCNOCLINE, AIR_TEMP, WIND_SPEED, WIND_DIRECTION, PRECIP_TYPE, TIDE_STAGE, WAVE_HEIGHT, CLOUD_COVER, GAGE_HEIGHT, PRESSURE, FLOW_STAGE, DETAILS and WATER_BODY.

The entity Water_Quality_Data is comprised of the attributes: EVENT_ID, SOURCE, PROJECT, STATION, SAMPLE_DATE, SAMPLE_TIME, DEPTH, LAYER, SAMPLE_TYPE, SAMPLE_ID, PARAMETER, QUALIFIER, VALUE, UNIT, METHOD, LAB, PROBLEM, DETAILS, TOTAL_DEPTH, UPPER_PYCNOCLINE, LOWER_PYCNOCLINE, LAT, and LONG.

Entity_and_Attribute_Detail_Citation:
Water Quality Database - Database Design and Data Dictionary Prepared For: U.S. Environmental Protection Agency, Region III, Chesapeake Bay Program Office, January 2004. <http://archive.chesapeakebay.net/pubs/cbwqdb2004_RB.PDF>

The most current version of the Water Quality Data Dictionary - Online may be found at: <http://archive.chesapeakebay.net/data/data_dict.cfm?DB_CODE=CBP_WQDB>.

The Quality Assurance Project Plan for the Maryland Department of Natural Resources Chesapeake Bay Water Quality Monitoring Program - Chemical and Physical Properties Component for the period July 1, 2010 - June 30, 2011
<http://mddnr.chesapeakebay.net/eyesonthebay/documents/QAPP_MainTrib_2010-2011_Draft1.pdf>.

Distribution_Information:
Distributor:
Contact_Information:
Contact_Person_Primary:
Contact_Person: Michael Mallonee
Contact_Position: Water Quality Data Manager
Contact_Address:
Address_Type: Mailing and Physical
Address: 410 Severn Avenue, Suite 109

City: Annapolis
State_or_Province: Maryland
Postal_Code: 21403
Country: USA
Contact_Voice_Telephone: 800-968-5785
Contact_Electronic_Mail_Address: mmallone@_no_spam_chesapeakebay.net[Remove _nospam_ for valid email address]
Resource_Description: Downloadable data
Distribution_Liability: None of the Chesapeake Bay Program partners nor any of their employees, contractors, or subcontractors make any warranty, expressed or implied, nor assume any legal liability or responsibility for the accuracy, completeness, or usefulness of any information or data contained within the web site. Reference to any specific commercial products, processes, or services or the use of any trade, firm, or corporation name is for the information and convenience of the public and does not constitute endorsement, recommendation or favoring by the Chesapeake Bay Program partners.

Standard_Order_Process:
Digital_Form:
Digital_Transfer_Information:
Format_Name: ASCII file, formatted for text attributes, declared format
Format_Information_Content: Station Information data, Monitoring Event data, and Water Quality data.
File_Decompression_Technique: No compression applied
Transfer_Size: 6.5
Digital_Transfer_Option:
Online_Option:
Computer_Contact_Information:
Network_Address:
Network_Resource_Name: <http://www.chesapeakebay.net/data_waterquality.aspx>
Access_Instructions: Data are available though the Chesapeake Bay Programs CIMS data hub. Select Water Quality Database (1984-Present). Access the data by following web site (see network resource name) instructions.
Fees: None

Metadata_Reference_Information:
Metadata_Date: 20110321
Metadata_Contact:
Contact_Information:
Contact_Person_Primary:
Contact_Person: Ben Cole
Contact_Organization: Maryland Department Of Natural Resources, Resource Assessment Service
Contact_Position: Natural Resource Biologist
Contact_Address:
Address_Type: Mailing and Physical
Address: 580 Taylor Avenue, D-2

City: Annapolis
State_or_Province: Maryland
Postal_Code: 21401
Country: USA
Contact_Voice_Telephone: 410-260-8630
Contact_Electronic_Mail_Address: bcole_Nospam_@dnr.state.md.us [Remove _Nospam_ for valid email address]
Metadata_Standard_Name: Content Standards for Digital Geospatial Metadata
Metadata_Standard_Version: FGDC-STD-001-1998