

Maryland Chesapeake Bay Mainstem Water Quality Monitoring Program - 2023

Metadata:

Identification_Information:

Citation:

Citation_Information:

Originator: Maryland Department of Natural Resources (MD DNR), Resource Assessment Service

Publication_Date: 20230510

Title: MD Dept. of Natural Resources, Chesapeake Bay Mainstem Water Quality Monitoring 2023

Geospatial_Data_Presentation_Form: Spatial dataset

Online_Linkage: [<https://www.chesapeakebay.net/what/data>]

Description:

Abstract:

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

In total, fifteen samplings were completed in the period of 9-Jan-2023 through 14-Dec-2023. Planned sampling was conducted twice monthly in June, July, August of 2023, and once monthly during January, February, March, April, May, September, October, November, and December.

Sampling during the second July cruise was limited to physical measurements only, collected to better assess dissolved oxygen levels in the mainstem deep waters. No samples were collected January, February, March, or December at eastern and western transect stations, resulting in only nine mainstem flanking station samplings during year 2023.

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 the 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 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. [https://archive.chesapeakebay.net/pubs/cbwqdb2004_RB.PDF]. An updated version of the data dictionary is a Chesapeake Bay Program work in progress.

Guide to Using Chesapeake Bay Program Water Quality Monitoring Data, EPA 903-R-12-001, February 2012, CBP/TRS 304-12 [https://d18lev1ok5leia.cloudfront.net/chesapeakebay/documents/wq_data_userguide_10feb12_mod.pdf].

Methods and Quality Assurance for Chesapeake Bay Water Quality Monitoring Programs. Chesapeake Bay Program, May 2017, CBP/TRS-319-17 [<https://d38c6ppuviqmfp.cloudfront.net/documents/CBPMMethodsManualMay2017.pdf>].

The Quality Assurance Project Plan for the Maryland Department of Natural Resources Chesapeake Bay Mainstem and Tributary Water Quality Monitoring Program - Chemical and Physical Properties Component, June 2023 [https://eyesonthebay.dnr.maryland.gov/eyesonthebay/documents/MdDNR_MTQAPP_May2023.pdf].

Time_Period_of_Content:

Time_Period_Information:

Range_of_Dates/Times:

Beginning_Date: 20230109

Ending_Date: 20231214

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: Global Change Master Directory (GCMD). 2024. GCMD Keywords, Version 17.9 Greenbelt, MD: Earth Science Data and Information System, Earth Science Projects Division, Goddard Space Flight Center (GSFC) National Aeronautics and Space Administration (NASA). URL (GCMD Keyword Forum Page):
[<https://forum.earthdata.nasa.gov/app.php/tag/GCMD+Keywords>].

Theme_Keyword: EARTH SCIENCE>BIOSPHERE>ECOSYSTEMS>MARINE ECOSYSTEMS>ESTUARY

Theme_Keyword: EARTH SCIENCE>BIOSPHERE>ECOLOGICAL DYNAMICS>ECOSYSTEM FUNCTIONS>NUTRIENT CYCLING

Theme_Keyword: EARTH SCIENCE>BIOSPHERE>ECOLOGICAL DYNAMICS>ECOSYSTEM FUNCTIONS>PRIMARY PRODUCTION

Theme_Keyword: EARTH SCIENCE>OCEANS>SALINITY/DENSITY>PYCNOCLINE

Theme_Keyword: EARTH SCIENCE>TERRESTRIAL HYDROSPHERE>SURFACE WATER>SURFACE WATER PROCESSES/MEASUREMENTS>WATER DEPTH

Theme_Keyword: EARTH SCIENCE>TERRESTRIAL HYDROSPHERE>WATER QUALITY/WATER CHEMISTRY>WATER CHARACTERISTICS>CHLOROPHYLL CONCENTRATIONS

Theme_Keyword: EARTH SCIENCE>TERRESTRIAL HYDROSPHERE>WATER QUALITY/WATER CHEMISTRY>WATER CHARACTERISTICS>CONDUCTIVITY

Theme_Keyword: EARTH SCIENCE>TERRESTRIAL HYDROSPHERE>WATER QUALITY/WATER CHEMISTRY>GASES>DISSOLVED NITROGEN

Theme_Keyword: EARTH SCIENCE>TERRESTRIAL HYDROSPHERE>WATER QUALITY/WATER CHEMISTRY>GASES>DISSOLVED OXYGEN

Theme_Keyword: EARTH SCIENCE>TERRESTRIAL HYDROSPHERE>WATER QUALITY/WATER CHEMISTRY>WATER CHARACTERISTICS>EUTROPHICATION

Theme_Keyword: EARTH SCIENCE>TERRESTRIAL HYDROSPHERE>WATER QUALITY/WATER CHEMISTRY>WATER CHARACTERISTICS>LIGHT TRANSMISSION

Theme_Keyword: EARTH SCIENCE>TERRESTRIAL HYDROSPHERE>WATER QUALITY/WATER CHEMISTRY>NUTRIENTS>NITROGEN

Theme_Keyword: EARTH SCIENCE>TERRESTRIAL HYDROSPHERE>WATER QUALITY/WATER CHEMISTRY>NUTRIENTS>NITROGEN COMPOUNDS

Theme_Keyword: EARTH SCIENCE>TERRESTRIAL HYDROSPHERE>WATER QUALITY/WATER CHEMISTRY>WATER CHARACTERISTICS>NITROGEN COMPOUNDS

Theme_Keyword: EARTH SCIENCE>TERRESTRIAL HYDROSPHERE>WATER QUALITY/WATER CHEMISTRY>WATER CHARACTERISTICS>pH

Theme_Keyword: EARTH SCIENCE>TERRESTRIAL HYDROSPHERE>WATER QUALITY/WATER CHEMISTRY>NUTRIENTS>PHOSPHOROUS

Theme_Keyword: EARTH SCIENCE>TERRESTRIAL HYDROSPHERE>WATER QUALITY/WATER CHEMISTRY>WATER CHARACTERISTICS>PHOSPHOROUS COMPOUNDS

Theme_Keyword: EARTH SCIENCE>TERRESTRIAL HYDROSPHERE>WATER QUALITY/WATER CHEMISTRY>WATER CHARACTERISTICS>SALINE CONCENTRATION

Theme_Keyword: EARTH SCIENCE>TERRESTRIAL HYDROSPHERE>WATER QUALITY/WATER CHEMISTRY>SOLIDS>SUSPENDED SOLIDS

Theme_Keyword: EARTH SCIENCE>TERRESTRIAL HYDROSPHERE>WATER QUALITY/WATER CHEMISTRY>SOLIDS>TOTAL DISSOLVED SOLIDS

Theme_Keyword: EARTH SCIENCE>TERRESTRIAL HYDROSPHERE>WATER QUALITY/WATER CHEMISTRY>WATER CHARACTERISTICS>WATER TEMPERATURE

Place:

Place_Keyword_Thesaurus: Common geographic areas

Place_Keyword: fUS = United States

Place_Keyword: fUS24 = Maryland

Place_Keyword: h02080101 = Lower Chesapeake Bay

Place_Keyword: h02060001 = Upper Chesapeake Bay

Place_Keyword: f24005 = Baltimore

Place_Keyword: f24029 = Kent

Place_Keyword: f24025 = Harford

Place_Keyword: f24035 = Queen Anne's

Place_Keyword: f24009 = Calvert

Place_Keyword: f24003 = Anne Arundel

Place_Keyword: f24015 = Cecil

Place_Keyword: f24019 = Dorchester

Place_Keyword: f24037 = Saint Mary's

Place_Keyword: f24039 = Somerset

Place_Keyword: f24041 = Talbot

Temporal:

Temporal_Keyword_Thesaurus: USGS Thesaurus

Temporal_Keyword: summer

Temporal_Keyword: spring (season)

Temporal_Keyword: autumn

Temporal_Keyword: winter

Access_Constraints: NONE

Use_Constraints: Acknowledgement of the MD Department of Natural Resources, Resource Assessment Service as a data source would be appreciated in products developed from these data. Please use the following citation: Maryland Department of Natural Resources, Resource Assessment Service. Eyes on the Bay. URL: [<http://www.eyesonthebay.net>].

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, C2

City: Annapolis

State_or_Province: Maryland

Postal_Code: 21401

Country: USA

Contact_Voice_Telephone: 410.260.8630

Contact_Electronic_Mail_Address: renee.karrh_nospam_@maryland.gov[Remove
nospam for valid email address]

Browse_Graphic:

Browse_Graphic_File_Name: MDDNR Mainstem Monitoring Project 2023 Station Map
[https://eyesonthebay.dnr.maryland.gov/eyesonthebay/documents/metadata/MdDNR_MainstemS
tns2023.pdf]. If the map URL raises a file not found error, drill down from
[http://www.eyesonthebay.net].

Browse_Graphic_File_Description: Map of twenty-two 2023 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 samples and processed the data. The Nutrient Analytical Services Laboratory (NASL) at the University of MD Center for Environmental Science, Chesapeake Biological Laboratory analyzed chlorophyll, nutrient, and suspended solids samples.

The project was made possible with funding provided by The State of Maryland and the United States Environmental Protection Agency Chesapeake Bay Program.

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 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) 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.

ADDITIONAL COMMENTS

January 2023: Foggy conditions were reported at CB3.1 and CB3.2. No pycnocline was reported at station CB5.1 and above pycnocline and below pycnocline water samples were collected at 1/3 and 2/3 of station total water column depth. Scattered showers occurred overnight before sampling at stations CB4.4 and CB5.2. Surface and above pycnocline water samples collected at stations CB3.2, CB3.3C, CB4.1C, and CB4.2C were taken from the same bottle. The sonde/bottle sampling array hit bottom at stations CB4.1C, CB4.2C, and CB4.4. Stations CB5.1 and CB5.2 also reported touching bottom. The pump hose used for sample collection at CB3.2 was frozen, but a sample was successfully obtained.

February 2023: There was no pycnocline at stations CB4.4, CB4.1C, and CB4.2, and above pycnocline and below pycnocline water samples were collected at 1/3 and 2/3 of station total water column depth. Rain showers occurred before sampling at stations CB3.3C, CB4.1C, and CB4.2C. Dredge work was reported upstream of station CB2.2.

March 2023: Scoping is a term used to describe situations when strong currents and or winds make it difficult to maintain the water quality data sonde at a depth long enough for readings to stabilize. Meter scoping was noted at station CB4.2C. A pycnocline was not evident at station CB5.3. Above pycnocline and below pycnocline water samples were collected at 1/3 and 2/3 of total water column depth at this station.

April 2023: There was no pycnocline at station CB2.2, and above pycnocline and below pycnocline water samples were collected at 1/3 and 2/3 of station total water column depth. Meter scoping was noted at stations CB3.3C, CB4.4, CB5.1, and CB5.3. Surface conductivity readings changed between the beginning and end of the hydrocast at stations CB4.1C.

May 2023: Early morning scattered showers were noted at stations sampled on 8-May and hazy conditions were reported at station CB2.1. Meter scoping was noted at station CB3.3C. Surface conductivity readings changed between the beginning and end of the hydrocast at station CB4.3C.

June 2023: The first June mainstem survey was conducted June 5-7. Hazy conditions from the Canadian wildfires were reported at stations sampled on June 6-7. Meter scoping was noted at stations CB3.3C, CB3.2, and CB2.2. There was no pycnocline at station CB2.2, and above pycnocline and below pycnocline water samples were collected at 1/3 and 2/3 of station total water column depth.

The second June mainstem survey was conducted June 26-28. Hazy conditions were reported at stations CB1.1, CB2.1, CB2.2, CB3.1, CB3.2, and CB3.3C. A pycnocline was not evident at station CB4.1E. Above pycnocline and below pycnocline water samples were collected at 1/3 and 2/3 of total water column depth at these stations. The water pump wasn't working at station LE2.3, so only water quality readings were taken. Surface algae mats were observed at station CB2.1. A ship passed when sampling at station CB5.2.

July 2023: The first July mainstem cruise was conducted July 10-12. There was no pycnocline at station CB2.2, and above pycnocline and below pycnocline water samples were collected at 1/3 and 2/3 of stations total water column depths. Hazy conditions were reported at stations CB1.1 and CB2.1. At station CB4.3W, the dissolved oxygen reading at 2m depth was double-checked. The bottom readings at station CB3.3W were also double-checked. The surface conductivity reading was unstable at CB3.3C as well as at CB4.1C.

Water column measurements only (no pigment or nutrient samples) were collected during the second July (27-28) mainstem survey.

August 2023: The first August mainstem cruise was conducted August 7-9 and overnight rain was reported on 8-Aug. There was no pycnocline at stations CB4.1C, CB4.1E, CB4.2C, CB4.3C, CB4.3E, CB4.4, CB5.1, CB5.2, and CB5.3, so above pycnocline and below pycnocline water samples were collected at 1/3 and 2/3 of stations total water column depth. Bottom and below pycnocline samples were collected from a single bottle at stations CB2.2 and CB3.2. Water pump issues arose mid-sampling at station CB5.3. The 0.5m and 1.0m water quality values at station CB4.1C were collected at one depth. A ship passed when sampling at station CB5.2.

The second August mainstem survey was conducted August 28-29. Scattered overnight thunderstorms were noted at stations sampled on 29-Aug. The 0.5m and 1.0m water quality values at stations CB4.4, CB5.1, CB5.3 were collected at one depth. Surface and above pycnocline water samples collected at station CB3.3C were taken from the same bottle.

September 2023: Overnight scattered thunderstorms were noted at stations sampled on 13-Sep. Surface conductivity readings changed between the beginning and end of the hydrocast at stations CB3.3C. Bottom and below pycnocline samples were collected from a single bottle at station CB2.2.

October 2023: Overnight scattered thunderstorms were noted at stations sampled on 6-Oct. No pycnocline was observed at stations CB4.1C and CB4.1E, so above pycnocline and below pycnocline water samples were collected at 1/3 and 2/3 of stations total water column depth. Bottom and below pycnocline samples were collected from a single bottle at station CB2.2. Surface and above pycnocline water samples collected at station CB3.1 were taken from the same bottle. At station CB3.2, the pH and dissolved oxygen readings at 4m depth were double-checked. A ship passed before sampling at station CB4.2C.

November 2023: Meter scoping was noted at station CB4.4. Surface conductivity readings changed between the beginning and end of the hydrocast at stations CB2.2. No pycnocline was

observed at stations CB3.3C, CB4.1C, CB4.4, CB5.1, and CB5.2, so above pycnocline and below pycnocline water samples were collected at 1/3 and 2/3 of stations total water column depth.

December 2023: Meter scoping was noted at stations CB4.3C, CB4.4, and CB5.1. No pycnocline was observed at stations CB4.4, CB5.1, CB5.2, and CB5.3, so above pycnocline and below pycnocline water samples were collected at 1/3 and 2/3 of stations total water column depth. The conductance failed post calibration checks at stations CB1.1, CB2.1, CB2.2, and CB3.2.

Logical Consistency Report:

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

Tributaries monitoring project boat stations are sampled using small boats for most of the year, however the larger mainstem sampling vessel is used when weather and safety are concerns. In addition to mainstem stations sampling, one or more of the following tributaries project stations may be sampled using the larger vessel during December, January and February surveys: EE1.1, EE2.2, EE2.1, ET4.2 and WT5.1.

For logistical reasons, water samples for mainstem project station CB5.1W are routinely collected on the Tributaries project Patuxent boat survey.

Two mainstem surveys were scheduled and conducted in each of the months: June, July and August 2023. Water column measurements only (no pigment or nutrient samples) were collected during the second July mainstem survey.

ADDITIONAL COMMENTS

January 2023: Due to the midship winch being broken, all readings and samples were taken off the stern on 9-Jan. The 0.5m and 1.0m water quality values at station CB5.3 were collected at one depth. The sonde/bottle sampling array hit bottom at stations CB4.1C, CB4.2C, and CB4.4 and samples were collected at 1m higher.

February 2023: Sampling planned for 13-Feb was postponed one day due to high winds. The above pycnocline sample at station CB2.2 should have been collected at 4.0m. The midship winch was broken so all readings and samples were taken off the stern on 14-Feb.

March 2023: Sampling was postponed due to gale-force winds on 14-Mar and 15-Mar.

April 2023: The above pycnocline composite plankton sample for station CB4.1C should have been collected at 11.0m depth.

June 2023: The below pycnocline sample at station CB5.2 should have been collected at 19.0m.

July 2023: The July 27-28 cruise was pushed to the end of the week due to a scheduling conflict with the R/V Rachel Carson. The sampling was condensed into a two-day cruise. CB4.3W and CB4.2W were sampled on 28-Jul on the R/V Seabiscuit.

August 2023: The bottom reading should have been taken at 8.0m at station CB5.1W.

September 2023: The above pycnocline composite plankton sample for station CB4.2C should have been collected at 5.0m depth, and for station CB5.2 should have been collected at 6.0m depth.

November 2023: Sampling was originally scheduled for 13-Nov through 15-Nov but was changed due to the boat maintenance. The above pycnocline composite plankton sample for station CB3.1 should have been collected at 5.0m and for station CB4.2C should have been collected at 4.0m. The below pycnocline sample at station CB2.2 should have been collected at 5.0m.

December 2023: Sampling was postponed to 12-Dec due to high winds on 11-Dec.

There were no known logical consistency issues for May and October 2023.

Completeness_Report:

Two mainstem surveys were conducted in each of months: June, July, and August 2023. Water column measurements only (no pigment or nutrient samples) were collected during the second July mainstem survey.

ADDITIONAL COMMENTS

January 2023: Rough conditions restricted the bottom sampling at station CB5.3. LI-COR samples were not collected at stations LE2.3, CB5.3, and CB5.1 due to rough conditions.

February 2023: Station CB5.3 was not sampled due to rough conditions. Conditions were too rough at stations LE2.3, CB5.2, CB5.1, and CB4.4 to collect LI-COR readings.

June 2023: LI-COR readings were not collected during the June 5-7 cruise at stations CB5.3, CB5.2, CB5.1, CB4.4, and LE2.3. During the June 26-28 cruise, LI-COR readings were not collected at stations CB5.3, CB5.2, CB5.1, and LE2.3 due to rough conditions. Station CB5.1W was not sampled due to rough conditions.

July 2023: Conditions were too rough during the July 10-12 cruise at stations LE2.3, CB5.3, CB4.3E, CB4.3C, CB4.3W, CB4.2W, CB4.2C, CB4.2E, CB4.1E, CB4.1C, CB4.1W, CB3.3E, CB3.3C, and CB3.3W to collect LI-COR readings. During the July 27-28 cruise, LI-COR readings were not collected at stations LE2.3, CB5.3, CB5.2, CB5.1, CB4.4, CB4.3E, and CB4.3C due to rough conditions. Station CB5.3 was not sampled due to rough conditions during both cruises.

August 2023: Conditions were too rough during the August 7-9 cruise at stations LE2.3, CB5.3, and CB5.2 to collect LI-COR readings. During the August 28-30 cruise, LI-COR

readings were not collected at stations LE2.3, CB5.3, CB5.2, CB5.1, CB4.4, CB4.3C, and CB4.2C due to rough conditions. Station CB5.3 was not sampled due to rough conditions.

December 2023: No LI-COR readings were taken during the December cruise, LI-COR was broken. The meter used at stations CB1.1, CB2.1, CB2.2, and CB3.2 failed post calibration checks for conductance. These results were deleted and flagged.

There were no known completeness issues for the months: March, April, May, September, October, and November 2023.

Lineage:

Process_Step:

Process_Description:

SONDE CALIBRATION and POST-CALIBRATION

The Yellow Springs Instrument (YSI) EXO2 data sondes were maintained and calibrated before and after each cruise in accordance with manufacturer's recommendations.

WATER COLUMN PROFILE SAMPLING PROTOCOLS:

A profile of temperature, specific conductance, dissolved oxygen, and pH was obtained from the water column by deploying the data sonde at 0.5 m, 1.0 m, 2.0 m and 3.0 m depth intervals below the surface. Thereafter readings were taken at 2.0m intervals and at the bottom. 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 10.0m, 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 of the distance from the surface to the bottom, at the closest profile depth two thirds of 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: Kristen Heyer

Contact_Position: Manager, Water Quality Monitoring

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: 410.990.4600

Contact_Electronic_Mail_Address: kristen.heyer_nospam_@maryland.gov[Remove _nospam_ for valid email address]

Process_Step:

Process_Description:

LABORATORY ANALYSIS - CBL

The University of Maryland Center for Environmental Science, Chesapeake Biological Laboratory, 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.

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: Jerry Frank

Contact_Position: Manager, Nutrient Analytical Services Laboratory

Contact_Address:

Address_Type: Mailing and physical

Address: University of Maryland Center for Environmental Science, Chesapeake Biological Laboratory, 146 Williams Street, P.O. Box 38

City: Solomons
State_or_Province: Maryland
Postal_Code: 20688
Country: USA
Contact_Voice_Telephone: 410.326.7252
Contact_Electronic_Mail_Address: frank_nospam_@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 and physical

Address: 580 Taylor Ave., C2

City: Annapolis

State_or_Province: MD

Postal_Code: 21401

Contact_Voice_Telephone: 410.260.8630

Contact_Electronic_Mail_Address: renee.karrh_nospam_@maryland.gov[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-two Maryland mainstem stations during 2023.

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

The entity Light_Attenuation_Data is comprised of the attributes: Agency, BiasPC, CBSeg2003, CBSegmentShed2009, Cruise, Depth, Details, EventId, FIPS, HUC8, HUC12, Lab, Latitude, Layer, Longitude, LowerPycnocline, MeasureValue, Method, MonitoringStation, Parameter, PrecisionPC, Problem, Program, Project, Qualifier, SampleDate, SampleReplicateType, SampleTime, SampleType, Source, Station, TierLevel, TotalDepth, Unit and UpperPycnocline.

The entity Monitoring_Event_Data is comprised of the attributes: Agency, AirTemp, CBSeg2003, CBSegmentShed2009, CloudCover, Cruise, Details, EventId, FieldActivityEventType, FieldActivityRemark, FieldActivitySiteTypeCodeDescription, FIPS, FlowStage, GaugeHeight, HUC8, HUC12, Latitude, Longitude, LowerPycnocline, MonitoringStation, PrecipType, Pressure, Program, Project, SampleDate, SampleTime, Source, Station, TideStage, TierLevel, TotalDepth, UpperPycnocline, WaveHeight, WindDirection and WindSpeed.

The entity Optical_Density is comprised of the attributes: Agency, BiasPC, CBSeg2003, CBSegmentShed2009, Cruise, Depth, Details, EventId, FIPS, HUC8, HUC12, Lab, Latitude, Layer, Longitude, LowerPycnocline, MeasureValue, Method, MonitoringStation, Parameter, PrecisionPC, Problem, Program, Project, Qualifier, SampleDate, SampleReplicateType, SampleTime, SampleType, Source, Station, TierLevel, TotalDepth, Unit and UpperPycnocline.

The entity Station_Information is comprised of the attributes: CBSeg2003, CBSeg2003Description, CBSegmentShed2009, CBSegmentShed2009Description, CountyCity, FallLine, FIPS, HUC12, HUC8, Latitude, LLDatum, Longitude, State, Station, StationDescription, USGSGage, UTMX and UTMY.

The entity Water_Quality_Data is comprised of the attributes: Agency, BiasPC, CBSeg2003, CBSegmentShed2009, Cruise, Depth, Details, EventId, FIPS, HUC8, HUC12, Lab, Latitude, Layer, Longitude, LowerPycnocline, MeasureValue, Method, MonitoringStation, Parameter, PrecisionPC, Problem, Program, Project, Qualifier, SampleDate,

SampleReplicateType, SampleTime, SampleType, Source, Station, TierLevel, TotalDepth, Unit and UpperPycnocline.

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. [https://archive.chesapeakebay.net/pubs/cbwqdb2004_RB.PDF]. An updated version of the data dictionary is a Chesapeake Bay Program work in progress.

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, 2022 - June 30, 2023. [https://eyesonthebay.dnr.maryland.gov/eyesonthebay/documents/MdDNR_MTQAPP2022_2023.pdf].

Methods and Quality Assurance for Chesapeake Bay Water Quality Monitoring Programs. Chesapeake Bay Program, May 2017, CBP/TRS-319-17 [<https://d38c6ppuviqmfp.cloudfront.net/documents/CBPMethodsManualMay2017.pdf>].

Distribution_Information:

Distributor:

Contact_Information:

Contact_Person_Primary:

Contact_Person: Mike Mallonee

Contact_Position: Water Quality Data Manager

Contact_Address:

Address_Type: Mailing and physical

Address: 1750 Forest Drive, Suite 130

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State_or_Province: Maryland

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Country: USA

Contact_Voice_Telephone: 410.267.5785

Contact_Electronic_Mail_Address: mmallone_no_spam_@chesapeakebay.net[Remove _nospan_ 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: Light_Attenuation_Data, Monitoring_Event_Data, Optical_Density, Station_Information, and Water_Quality_Data.

File_Decompression_Technique: No compression applied

Transfer_Size: 11.2

Digital_Transfer_Option:

Online_Option:

Computer_Contact_Information:

Network_Address:

Network_Resource_Name: [<https://www.chesapeakebay.net/what/data>]

Access_Instructions: Data are available through the Chesapeake Bay Program's 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: 20240628

Metadata_Contact:

Contact_Information:

Contact_Person_Primary:

Contact_Person: Mark Trice

Contact_Organization: Maryland Department of Natural Resources, Resource Assessment Service

Contact_Position: Chief, Water Quality Informatics

Contact_Address:

Address_Type: Mailing and physical

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City: Annapolis

State_or_Province: Maryland

Postal_Code: 21401

Country: USA

Contact_Voice_Telephone: 410.260.8630

Contact_Electronic_Mail_Address: mark.trice_nospam_@maryland.gov[Remove_nospam_ for valid email address]

Metadata_Standard_Name: Content Standards for Digital Geospatial Metadata

Metadata_Standard_Version: FGDC-STD-001-1998