Maryland Chesapeake Bay Mainstem Water Quality Monitoring Program - 2022

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 2022
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 25-Jan-2022 through 07-Dec-2022. Planned sampling was conducted twice monthly in June, July, August of 2022, 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, November, or December at eastern and western transect stations, resulting in only eleven mainstem flanking station samplings during year 2022.

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/CBPMethodsManualMay2017.pdf].

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].

Time_Period_of_Content:
Time_Period_Information:
Range_of_Dates/Times:
Beginning_Date: 20220125
Ending_Date: 20221207

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). 2023. GCMD Keywords, Version 16.0, 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 2022 Station Map [https://eyesonthebay.dnr.maryland.gov/eyesonthebay/documents/metadata/MdDNR_MainstemStns2022.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 2022 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 2022: 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 stations CB3.3C, CB4.1C, CB4.2C, and CB4.3C. There was no pycnocline at stations CB2.2, CB4.1C, CB4.2C, CB4.3C, CB4.4, CB5.1, and CB5.2, and above pycnocline and below pycnocline water samples were collected at 1/3 and 2/3 of station total water column depth.

February 2022: Meter scoping was noted at stations CB4.1C, CB4.2C, and CB4.3C. The surface conductivity changed at station CB5.2, so above pycnocline and below pycnocline water samples were collected at 1/3 and 2/3 of station total water column depth. Afternoon rain showers occurred the day before sampling at stations CB3.3C, CB4.1C, CB4.2C, and CB4.3C.

March 2022: A pycnocline was not evident at station CB2.2. Above pycnocline and below pycnocline water samples were collected at 1/3 and 2/3 of total water column depth at this station.

April 2022: 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 surface conductivity reading at station CB3.2 would not stabilize.

May 2022: Scattered overnight thunderstorms were noted at stations sampled on 16-May. Numerous afternoon thunderstorms, some severe, occurred the day before sampling activities on 17-May. There was no pycnocline at station CB2.2, so above pycnocline and below pycnocline water samples were collected at 1/3 and 2/3 of station total water column depth. Surface conductivity readings changed between the beginning and end of the hydrocast at stations CB3.2, BC3.3C, CB4.1E, and CB5.3.

June 2022: The first June mainstem survey was conducted June 6-8. There was no pycnocline at station CB3.1, 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 28-30. Station CB4.1C bottom and below pycnocline sample waters had hydrogen sulfide odors. Hazy conditions were reported at stations CB3.1 and CB3.2. At station CB3.1, the dissolved oxygen reading at 9m depth was double-checked. A pycnocline was not evident at stations CB2.2 and 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. Thin clouds were observed at stations CB5.1 and CB5.2.

July 2022: The first July mainstem cruise was conducted July 12-14. There was no pycnocline at stations CB2.2 and CB3.2, and above pycnocline and below pycnocline water samples were collected at 1/3 and 2/3 of the total water column depth at these stations. Hazy conditions were reported at stations CB4.4, CB5.1, CB5.2, and CB5.3. At station CB4.1W, the dissolved oxygen reading at 1m depth was double-checked. An odor of hydrogen sulfide, at times slight, was present in bottom and below pycnocline water samples collected at stations CB4.1C, CB4.1E, and CB4.2C.

Water column measurements only (no pigment or nutrient samples) were collected during the second July (26-27) mainstem survey.

August 2022: The first August mainstem cruise was conducted August 8-10 and hazy conditions were reported during this cruise. Stations CB4.1C and CB4.2C bottom and below pycnocline sample waters had a hydrogen sulfide odor. A hydrogen sulfide odor was noted in the bottom water sample collected at station CB3.3C. There was no pycnocline at stations CB2.2 and CB3.2, so above pycnocline and below pycnocline water samples were collected at 1/3 and 2/3 of the total water column depth, respectively. Water pump issues occurred while sampling station CB5.3.

The second August mainstem survey was conducted August 22-23. A hydrogen sulfide odor was noted in bottom and below pycnocline water samples collected at stations CB3.3C, CB4.1C, CB4.1E and CB4.3E. Station CB4.2C below pycnocline sample waters had a hydrogen sulfide odor. At station CB5.3, the dissolved oxygen readings at 6m and 7.8m depths were double-checked; and the secchi reading was double-checked at station CB4.2C. At station CB5.1, the water pump experienced mechanical issues at 16.0m.

September 2022: A hydrogen sulfide odor was noted in bottom water sample collected at station CB4.1C.

October 2022: Hurricane Ian passed through the region a few days before the October mainstem cruise. There was no pycnocline at stations CB2.2, CB4.1C, CB4.2C, CB4.3C, CB4.4, and CB5.1, so above pycnocline and below pycnocline water samples were collected at 1/3 and 2/3 of the total water column depth. The water pump hose came off at 11.0m on station CB3.2. A vessel passed during sampling at station CB4.2C.

November 2022: Overnight rain was noted at stations sampled on 16-November. There was no pycnocline 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 the total water column depth. A large cargo ship passed station CB5.2 prior to sampling.

December 2022: Very heavy fog was present during sampling on 6-December and 7-December. There was no pycnocline at stations CB4.2C, CB4.3C, 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 the total water column depth. The sonde/bottle sampling array touched bottom at stations CB3.3C and CB4.1C. It was noted that the Coast Guard changed buoys at or near station CB2.2, the bottom sample at station CB4.2C was very dark, and thin clouds were observed at station CB5.2.

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 months: June, July and August 2022. Water column measurements only (no pigment or nutrient samples) were collected during the second July mainstem survey.

ADDITIONAL COMMENTS

January 2022: The January cruise was originally scheduled for January 10-12, but was rescheduled twice due to weather and staffing issues. Station CB2.2 was sampled 500ft northeast of the station due to ice.

February 2022: The above pycnocline sample at station CB2.2 should have been collected at 4.0m.

April 2022: The below pycnocline sample at station CB4.1C should have been collected at 15m depth.

May 2022: The below pycnocline sample at station CB4.1E should have been collected at 14m depth.

July 2022: Due to weather and boat availability, sampling for the second July cruise was compressed into two days instead of three. The second July cruise used a different vessel – the RV Chesapeake (NOAA boat #5502).

August 2022: The above pycnocline sample at station CB4.2C should have been collected at 6.0m.

September 2022: Stations CB3.3E and CB3.3W were originally scheduled to be sampled on 13-September, but sampling was moved to 14-September to accommodate a delegation visit to station CB3.3C.

November 2022: The above pycnocline sample at station CB3.3C should have been collected at 10.0m depth.

December 2022: The starboard A-frame on the research vessel was broken, so sampling was conducted using the aft A-frame for the December cruise.

There were no known logical consistency issues for the months: March, June, and October 2022.

Completeness_Report:

Two mainstem surveys were conducted in each of months: June, July, and August 2022. Water column measurements only (no pigment or nutrient samples) were collected during the second July mainstem survey.

ADDITIONAL COMMENTS

January 2022: Stations CB1.1 and CB2.1 were not sampled due to ice. Conditions were too rough at stations CB3.3C, CB4.1C, CB4.2C, and CB4.3C to collect LI-COR readings. LI-COR readings were not collected at stations CB5.1W and CB3.2 due to instrument problems.

February 2022: LI-COR readings were not collected at station CB4.1C due to instrument problems.

May 2022: LI-COR readings were not collected at station CB5.1W due to rough conditions.

June 2022: LI-COR readings were not collected during the June 6-8 cruise at stations CB3.3C, CB3.3E, CB3.3W, CB4.1C, CB4.1E, CB4.1W, CB4.2C, CB4.2E, CB4.2W, CB4.3C, CB4.3E, and CB4.3W due to rough conditions. Rough conditions during the June 28-30 cruise prevented collection of LI-COR readings at stations CB5.1, CB5.2, and CB5.3.

July 2022: LI-COR readings were not collected at station CB5.1W in July, or during the July 12-14 cruise at stations CB4.4, CB5.1, CB5.2, and CB5.3 due to rough conditions. Due to weather and boat availability, sampling for the second July cruise was compressed into two days. Stations CB4.2E, CB4.2W, CB4.3E, CB4.3W, and CB5.3 were not sampled during the July 26-27 cruise due time constraints.

August 2022: LI-COR readings were not collected during the August 8-10 cruise at stations CB5.3, CB5.2, CB5.1, CB4.4, and CB3.3W. During the August 22-23 cruise, LI-COR readings were not collected at station CB3.2 due to an instrument malfunction.

October 2022: Stations CB4.1E, CB4.1W, CB4.2 E, CB4.2W, CB4.3E, CB4.3W, and CB5.3 were not sampled due to boat availability. The LI-COR instrument failed to log the readings at station CB3.2.

November 2022: Due to rough seas, LI-COR readings were not collected at stations CB5.3, CB5.2, CB4.3C, CB4.2C, CB3.2, CB3.1, and CB2.2.

December 2022: LI-COR readings were not collected at stations CB5.3, CB5.2, CB5.1, and CB4.4 due to cable issues.

There were no known completeness issues for the months: March, April and September 2022.

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 2022.

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, CBSeg2003, CBSegmentShed2009, CloudCover, Cruise, Details, EventId, FieldActivityEventType, FieldActivityRemark, 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
City: Annapolis
State_or_Province: Maryland
Postal_Code: 21401
Country: USA
Contact_Voice_Telephone: 410.267.5785
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: Light_Attenuation_Data, Monitoring_Event_Data, Optical_Density, Station_Information, and Water_Quality_Data.
File_Decompression_Technique: No compression applied
Transfer_Size: 10.8
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: 20230522
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
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: 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