Maryland Chesapeake Bay Tributary Water Quality Monitoring Program – 2018

Metadata:

Identification_Information:
Citation:
Citation_Information:
Originator: Maryland Department of Natural Resources, Resource Assessment Service
Publication_Date: 20190501
Title: MD DNR Chesapeake Bay Tributary Water Quality Monitoring Program 2018
Geospatial_Data_Presentation_Form: Spatial dataset
Online_Linkage: [http://www.chesapeakebay.net/data/index.htm]

Description:
Abstract:

One of the main goals of the Chesapeake Bay restoration is to reduce the impacts of excess nutrients on the Bay and its tributaries. In accordance with this goal, the Chesapeake Bay Program jurisdictions have agreed to reduce nitrogen, phosphorus and sediment pollution to the Bay. The Maryland Chesapeake Bay Tributary Water Quality Monitoring Program evaluates the physical/chemical component of water quality at fifty-nine tributary stations. By measuring levels of nutrients and closely related habitat characteristics such as dissolved oxygen and water clarity, the monitoring program provides some of the most direct linkages to management actions that are reducing nutrient loads to the Bay.

Samples are collected monthly at each tributary station with one exception: samples are not routinely collected at station EE3.3 in January and February.

Note that prior to 2017, sixty stations were included in the Tributary Monitoring Program. Due to funding constraints, the number of sites sampled was reduced by one in 2017. Tributary water quality monitoring project sampling ceased in January 2017 at station: XHH4742.

Note that prior to 2014, sixty-nine stations were included in the Tributary Monitoring Program. Due to funding constraints, the number of sites sampled was reduced by nine in 2014. Tributary water quality monitoring project sampling ceased in January 2014 at the following stations: BXK0031, CCM0069, MNK0146, XDJ9007, POK0087, XAK7810, TRQ0088, TRQ0146 and XCI4078.

Note that the year 2013 tributary project station count was sixty-nine. The number of project sampling stations was incorrectly listed as seventy, instead of sixty-nine, in metadata records describing project years preceding 2013.

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 and its tidal tributaries.

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 also 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 four documents listed below. The first three documents may be obtained from The Chesapeake Bay Program Office. The fourth document is available via The Maryland Department of Natural Resources "Eyes on the Bay" web site.

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]. 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 [http://www.chesapeakebay.net/documents/3676/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://www.chesapeakebay.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, 2018 - June 30, 2019 [http://eyesonthebay.dnr.maryland.gov/eyesonthebay/documents/MdDNR_MTQAPP2018.pdf].

Time_Period_of_Content:

Time_Period_Information:

Range_of_Dates/Times:

Beginning_Date: 20180116
Ending_Date: 20181213
Currentness_Reference: Ground Condition
Status:
Progress: Complete
Maintenance_and_Update_Frequency: As needed
Spatial_Domain:
Bounding_Coordinates:
West_Bounding_Coordinate: -79.4938
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). 2019. GCMD Keywords, Version 8.6. 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://wiki.earthdata.nasa.gov/display/gcmdkey]
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Theme_Keyword: EARTH SCIENCE>TERRESTRIAL HYDROSPHERE>WATER QUALITY/WATER CHEMISTRY>WATER CHARACTERISTICS>WATER TEMPERATURE
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Place_Keyword_Thesaurus: Producer Defined
Place_Keyword: Chesapeake Bay
Place_Keyword: Maryland
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Place_Keyword: Tidal Tributaries
Place_Keyword: Back River
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Place_Keyword: Susquehanna River
Place_Keyword: Tangier Sound
Place_Keyword: West River
Place_Keyword: Wicomico River

Temporal:
Temporal_Keyword_Thesaurus: USGS Thesaurus
Temporal_Keyword: autumn
Temporal_Keyword: spring (season)
Temporal_Keyword: summer
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
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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 Tributaries Monitoring Project 2018 Station Map [http://eyesonthebay.dnr.maryland.gov/eyesonthebay/documents/metadata/MdDNR_TribsStns2018.pdf].
Browse_Graphic_File_Description: Map of fifty-nine year-2018 Maryland Chesapeake Bay Tributary 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 University of Maryland Center for Environmental Science Chesapeake Biological Laboratory analyzed chlorophyll, nutrient and suspended solids samples. The Maryland Department of Health (MDH) analyzed biological oxygen demand, turbidity and alkalinity samples for Potomac River sites.

The project was made possible with funding provided by The State of Maryland.

Data_Quality_Information:
Attribute_Accuracy:
Attribute_Accuracy_Report:
QUALITY ASSURANCE/QUALITY CONTROL
Maryland Department of Natural Resources followed specific procedures to ensure that the Tributary 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 used 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) 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 2018: When the dissolved oxygen sensor, used for water quality measurements at stations LE1.4, LE1.3, LE1.2, LE1.1, RET1.1, TF1.7, TF1.6 and TF1.5, was post calibrated, results were determined to be 0.47mg/l higher than the calibration standard. The water at station ET3.1 was seventy percent ice covered. Station ET4.2 bottom and below pycnocline water samples were collected from the same bottle. Pycnoclines did not exist at stations: EE2.1 and EE1.1 and the above pycnocline and below pycnocline samples were collected from 1/3 and 2/3 of total station water column depth.

February 2018: The 0.5m and 1.0m water samples at stations: LE1.4 were collected from the same bottle. Above and below pycnocline samples were collected from 1/3 and 2/3 of total water column depths at stations EE2.1, EE3.1 and EE3.2 due to absence of pycnoclines. Station EE1.1 bottom and below pycnocline water samples were collected from different bottles. Overnight showers occurred prior to sampling at stations WT7.1, WT8.1, WT8.2 and WT8.3.

March 2018: The 0.5m and 1.0m water samples at station LE1.4 were collected from a single bottle. Samples at stations EE2.1, EE3.1 and EE3.2 were collected at 1/3 and 2/3 total station depths because there were no pycnoclines. The below pycnocline sample at station ET4.2 should have been collected at the 10m depth. Verification of station ET4.2 9m depth conductivity was not possible. Lots of debris was observed at station ET2.3.

April 2018: The Secchi disk depth measurement at station TF1.3 exceeded the station total water column depth. Pycnoclines were not evident at stations RET2.4, ET5.2, EE1.1, EE2.1, EE3.1, EE3.2 and ET4.2 and above pycnocline and below pycnocline water samples were collected from 1/3 and 2/3 of station total depths. Rain drizzle was noted prior to sampling at stations EE2.2 and EE2.1. Scattered showers occurred during the day preceding sampling at stations WXT0001 and TF1.3. Station WIW0141 samples were collected from the ferry.

May 2018: The bridge at station MAT0078 was being power-washed during sampling operations. Secchi disk depth measurement at station TF1.3 was greater than the station total water column depth. As no pycnoclines existed in water columns at stations ET5.2, EE2.1, EE3.1 and EE3.2, samples were collected at 1/3 and 2/3 of station water column depths. Dissolved oxygen readings at station ET6.2 were double-checked. A tugboat passed over station ET6.2 prior to sample collection.

June 2018: The 0.5m and 1.0m water samples were obtained from water collected at the same depth. Morning rain showers occurred prior to station RET2.4 sampling. Water samples for station TF1.3 were collected at the park upstream of the bridge. Remarks about overnight rain showers were included in the field sheet comments for stations EE3.1, ET7.1, ET6.2 and EE3.0. Station ET5.2, EE3.2 and LE2.2 above pycnocline and below pycnocline samples were collected at 1/3 and 2/3 station total depths because there were no pycnoclines.

July 2018: Scattered rain showers fell during the morning of sample collections at stations LE1.1, LE1.2, LE1.3, LE1.4, RET1.1, TF1.5, TF1.6 and TF1.7. Hydrogen sulfide odors were noted in the water collected from the bottom and below pycnocline water bottles at station LE1.1 and the bottom bottle at station RET1.1. Above pycnocline and below pycnocline samples were collected at 1/3 and 2/3 of total water column depths, respectively, at stations RET2.4, EE1.1, EE2.1, ET4.2, ET5.2, EE3.1 and EE3.2, because there were no pycnoclines. Afternoon thunderstorms occurred the day before samples were collected at stations ET1.1, ET2.1, ET2.2 and ET2.3. Station WIW0141 samples were collected from the dock because the ferry was closed. Green flocs, possibly microcystis, were observed in station TF2.4 surface waters. The river was very green when samples were collected at station ET3.1.

August 2018: A Patuxent Cruise Report note observed “super nasty water” at station RET1.1. Pycnoclines were not present at stations EE2.1, EE3.1, EE3.2 and ET5.2 and above pycnocline and below pycnocline water samples were collected at 1/3 and 2/3 of each station’s total station water column depth, respectively. Bottom water at station EE2.1 smelled of hydrogen sulfide. Dissolved oxygen results at 1m and 4m depths at station WT8.1 were re-checked with a second meter. Thunderstorms occurred during the night preceding sampling operations at stations ET1.1, ET2.1, ET2.2 and ET2.3. Samples for station ET3.1 were collected from pier B instead of pier A. Station ET3.1 waters were green.

September 2018: There was no pycnocline at station EE2.1, and above pycnocline and below pycnocline sample waters were collected from 1/3 and 2/3 of total station water column depth, respectively. Rain showers fell during the night prior to sample collection at stations LE1.1, LE1.2, LE1.3, LE1.4, RET1.1, TF1.5, TF1.6 and TF1.7.

October 2018: Pycnoclines were not extant at stations EE1.1, EE2.1, EE3.1, EE3.2, ET4.2, ET5.2, LE2.3 and RET2.4. Therefore, the above pycnocline and below pycnocline samples were collected from 1/3 and 2/3 of total water column depths, respectively, at each station.

November 2018: Snow was falling during sampling operations at station ET2.2. There were no pycnoclines at stations EE1.1, EE2.1, EE3.1, EE3.2, ET4.2, ET5.2, LE2.3 and RET2.4, and above pycnocline and below pycnocline samples were collected from 1/3 and 2/3 of total station water column depths, respectively. When Station ET10.1 was sampled, strong currents made it difficult to maintain the sampling pump and sonde array at the bottom depth. Station EE1.1 0.5m and 1m samples came from the same depth. Post-survey calibration tests of the conductivity sensor, used for station EE2.2 returned results 3,600 micro ohms/cm higher than the 24,280 micro ohms/cm standard. The water level at station PIS0033 was very high.

December 2018: When post-calibration tests were conducted on the sensor used to measure pH at stations TF1.0 and WXT0001, the results were outside of the acceptable range. Due to absence of pycnoclines at stations LE2.3, RET2.2 and RET2.4, at each station, above pycnocline and below pycnocline samples were collected from 1/3 and 2/3 of total water column depths, respectively. Ice was observed floating down river when station MON0528 was sampled. Skim ice was noted at station ET1.1 and skim ice on the edge was observed at station

CAC0031. Bottom and below pycnocline water samples at station EE2.1 were collected from the same bottle.

Logical_Consistency_Report:

January 2018: Station WIW0141 samples were collected from the ferry. Station ET7.1 was sampled from the pier.

February 2018: The ET7.1 surface sample was collected by bucket from the bulkhead 100 yards downstream of the ferry on the Whitehaven side. Samples at station ET5.1 were taken from the wharf due to an extremely low tide. Surface samples at stations ET6.1 and ET10.1 were collected from buckets.

March 2018: The station EE1.1 above pycnocline water sample should have been collected at 6m depth.

June 2018: Station WIW0141 water samples were collected from the ferry.

August 2018: Samples at station LE2.3 were collected using a small boat instead of RV Kerhin.

December 2018: Due to bridge construction, station MON0020 was sampled 2.1 miles upstream at station MON0041. Data were submitted as MON0020, noting the sampling site inconsistency.

There were no known issues during sampling conducted during April, May, July, September, October and November.

Completeness_Report:

Biological Oxygen Demand, turbidity and alkalinity samples are collected at a subset of Potomac River Tributaries project stations: MAT0016, MAT0078, PIS0033, RET2.4, RET2.2, RET2.1, TF2.4, TF2.3, TF2.2, TF2.1 and XFB1986. When the Monday following Biological Oxygen Demand sample collection was a holiday, samples were not collected.

January 2018: Station EE3.3 is not sampled in January. Total depths of stations WIW0141 and ET7.1 were not measured. The following stations were not sampled due to ice and wind: EE3.0, EE3.1, EE3.2, EE3.3, ET6.2, ET8.1 and ET9.1. Station LE3.2 LI-COR results were not collected.

February 2018: LI-COR was not measured at stations: LE1.4, LE1.3, LE1.2, LE1.1 and RET1.1 due to dangerous conditions. A very low tide rendered station TF1.5 inaccessible and samples were not collected at the site. Station CB5.1W was not sampled due to rough sea conditions and problems with the pump used to collect sample water. LI-COR was not measured at station LE1.4 due to rough conditions. Total depth was not recorded at station TF1.3. Collecting bottom water samples at stations ET10.1 and ET6.1 was not possible due to Kemmerer bottle failure. Secchi measurements were not recorded at stations RET2.1 and ET3.1. Station WT5.1 silicate samples 11 and 12 were not submitted.

March 2018: LI-COR was not measured at stations LE1.4 due to rough waters.

April 2018: LI-COR measurements were not taken at stations: LE1.4, LE1.3 and LE1.2 due to rough seas. Samples were not collected at station TF1.5 because the water was too shallow. The station ET5.1 silicate sample was lost. Total station depth was not measured at station WIW0141.

May 2018: No samples were collected at station TF1.5 because the water was too shallow. Strong currents at station ET10.1 prevented recording the water column profile and measurement of total station depth. Only surface water samples were collected at station ET10.1. Secchi disk depth measurements were not recorded at stations ET3.1 and ET4.1.

June 2018: Station LE2.3 was not sampled due to dangerous conditions. LI-COR was not sampled at station LE1.4. LI-COR measurements were not possible at station LE1.1 due to instrument failure. Secchi disk depth was not measured at stations WXT0001, TF1.4 and TF1.3. Station WIW0141 total station depth was not recorded.

August 2018: The water level at station TF1.5 was too shallow for the sampling vessel and samples were not collected. The water quality data sonde/pump array readings normally acquired at 10 meters depth, at station RET1.1 were not acquired because the pump hit bottom.

September 2018: Samples were not acquired at station LE2.3 due to schedule changes, vessel unavailability and dangerous sea conditions.

October 2018: LI-COR measurements were not taken at stations: LE1.1, LE1.2, LE1.3, LE1.4, RET1.1, TF1.5, TF1.6 and TF1.7. Total depth at station WIW0141 was not recorded.

November 2018: LI-COR readings were not measured at stations LE1.2, LE1.3 and LE1.4 due to rough conditions. Station MON0020 was not sampled because construction prevented access.

December 2018: Total depth was not recorded at station WIW0141.

There were no known completeness issues in July 2018.

Lineage:
Process_Step:
Process_Description:
SONDE CALIBRATION and POST-CALIBRATION

The Yellow Springs Instrument (YSI) data sondes and HydroLab multi-parameter sondes were maintained and calibrated before and after each cruise in accordance with manufacturer's recommendations. During 2018, YSI series 6820 V2, Hydrolab series 4A, series 5 and HL4 sondes were deployed. Field sheet dissolved oxygen method and equipment-set unit number values were used to track sondes used for station water quality measurements.

SONDE PROFILE SAMPLING PROTOCOLS:

A profile of temperature, specific conductance, dissolved oxygen, and pH was obtained from the water column at 0.5m, 1.0m, 2.0m and 3.0m depth intervals below the surface. Thereafter readings were taken at 2.0m 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 2.0m interval, readings were taken at 1.0m intervals between these two readings. For total depths less than or equal to 10.0m, readings were taken at 1.0m intervals.

GRAB SAMPLING DEPTH PROTOCOLS:

At stations where two depths were sampled, collections were taken at 0.5m below the surface, and 1.0m above the bottom. If the station total depth was equal to 1.5m, the bottom sample was also collected at 0.5m. 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 0.5m below the surface, 1.5m above the upper boundary of the pycnocline, 1.5m below the lower boundary of the pycnocline, and 1 m above the bottom.

At stations where 4 depths were sampled and there was no discernable pycnocline, samples were taken at 0.5m 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 1m above the bottom.

Note that six Patuxent River stations, at which samples are also collected from four depths, use a different fixed-depth protocol for sampling mid-water depths. At station TF1.5 and RET1.1, samples are collected at 3m and 6m. Mid-water-column samples at stations LE1.1 and LE1.4 are collected at 3m and 9m. Samples are collected at 3m and 12m depths at stations LE1.2 and LE1.3.

LIGHT ATTENUATION SENSOR CALIBRATION

Once every two years, per LI-COR® Bioscientific recommendations, the ambient and underwater sensors (used to measure Photosynthetic Active Radiation (PAR)) were factory re-calibrated. Upon return from the factory, updated, sensor specific, correction values were entered into the displays before the equipment was deployed. A LI-COR® equipment tracking maintenance log was used to provide a permanent record of all re-calibrations, battery replacements, lowering-line checks and equipment repairs.

LIGHT ATTENUATION SAMPLING PROTOCOLS

Vertical profiles of light penetration were obtained. An initial reading with the underwater sensor just below the surface of the water (0.1m) was followed by measurements at either 0.25m or 0.50m intervals until a value less than ten percent (10 %) of the surface reading (0.1 m) was attained.

SECCHI DEPTH:

Water transparency was determined, to the nearest 0.1m using a 20cm standard Secchi disk 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: 410.263.3369
Contact_Electronic_Mail_Address: kristen.heyer_nospam_@maryland.gov[Remove _nospam_ for valid email address]

Process_Step:
Process_Description:
LABORATORY ANALYSIS - CBL

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

The NASL began performing chlorophyll analyses in the year 2009. Prior to 2009, chlorophyll analyses were performed by the Maryland Department of Health and Mental 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 of Analytical Services
Contact_Address:
Address_Type: mailing and physical
Address: Chesapeake Biological Laboratory, Center for Environmental and Estuarine Studies, The University of Maryland System, 146 Williams St; P.O. Box 38
City: Solomons
State_or_Province: Maryland
P*ostal_Code:* 20688
Country: USA
Contact_Voice_Telephone: 410.326.7252
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Process_Step:
Process_Description:
VERIFICATION AND DATA MANAGEMENT:

Each month DNR Tawes Office and Field Office personnel conducted data QA/QC procedures. All of the water quality calibration "grab" sample data were plotted. Outliers and anomalous values were thoroughly researched. Staff compared unusual values to historic values from the site and values from nearby sites. Weather events were considered, event logs were reviewed and CBL analytical laboratory staff and DNR field staff members were consulted regarding possible legitimate causes for outlying values. In cases where values were not considered to be legitimate, they were masked from 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: Diana Domotor
Contact_Position: Data Analyst
Contact_Address:
Address_Type: mailing and physical
Address: 580 Taylor Ave., D2
City: Annapolis
State_or_Province: MD
Postal_Code: 21401
Contact_Voice_Telephone: 410.260.8630
Contact_Electronic_Mail_Address: diana.domotor_nospam_@maryland.gov[Remove _nospam_ for valid email address]

Process_Step:
Process_Description:
DHMH ECDL LABORATORY ANALYSIS

Maryland Department of Health and Mental Hygiene, Environmental Chemistry Division Laboratory, Baltimore, MD, analyzed biological oxygen demand, total alkalinity and turbidity for Potomac River stations.

Process_Date: Unknown
Process_Contact:
Contact_Information:
Contact_Person_Primary:
Contact_Person: Shahla Ameli
Contact_Position: Laboratory Scientist Supervisor
Contact_Address:
Address_Type: mailing and physical
Address: 1770 Ashland Ave.
City: Baltimore
State_or_Province: Maryland
Postal_Code: 21205
Country: USA
Contact_Voice_Telephone: 433.681.3855
Contact_Electronic_Mail_Address: shahla.ameli_nospam_@maryland.gov[Remove _nospam_ for valid email address]

Spatial_Data_Organization_Information:
Indirect_Spatial_Reference: Back River, Big Annemessex River, Bohemia River, Bush River, C&D Canal, Chesapeake Bay, Chester River, Choptank River, Corsica River, Eastern Bay, Elk River, Fishing Bay, Gunpowder River, Little Choptank River, Magothy River, Manokin River, Middle River, Nanticoke River, Northeast River, Patapsco River, Potomac River, Patuxent River, Pocomoke River, Pocomoke Sound, Rhode River, Sassafras River, Severn River, South River, Tangier Sound, West River and Wicomico River.
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 Tributaries. Project data are an aggregation of data collected at fifty-nine Maryland tributary stations during 2018.

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, Cruise, Depth, Details, EventId, Lab, Latitude, Layer, Longitude, LowerPycnocline, MeasureValue, Method, Station, Parameter, PrecisionPC, Problem, Program, Project, Qualifier, SampleDate, SampleReplicateType, SampleTime, SampleType, Source, Station, TotalDepth, Unit and UpperPycnocline.

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

The entity Optical_Density is comprised of the attributes: Agency, BiasPC, Cruise, Depth, Details, EventId, HUC8, Lab, Latitude, Layer, Longitude, LowerPycnocline, MeasureValue, Method, Parameter, PrecisionPC, Problem, Program, Project, Qualifier, SampleDate, SampleReplicateType, SampleTime, SampleReplicateType, SampleType, Source, Station, Station, 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, Cruise, Depth, Details, EventId, Lab, Latitude, Layer, Longitude, LowerPycnocline, MeasureValue, Method, MonitoringStation, Parameter, PrecisionPC, Problem, Program, Project, Qualifier, SampleDate, SampleReplicateType, SampleTime, SampleReplicateType, SampleType, Source, Station, 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. [http://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, 2018 - June 30, 2019. [http://eyesonthebay.dnr.maryland.gov/eyesonthebay/documents/MdDNR_MTQAPP2018.pdf]

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

Distribution_Information:
Distributor:
Contact_Information:
Contact_Person_Primary:
Contact_Person: Mike Mallonee
Contact_Position: Water Quality Database 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: 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_Data, Station_Information and Water_Quality_Data.
File_Decompression_Technique: No compression applied
Transfer_Size: 15

Digital_Transfer_Option:
Online_Option:
Computer_Contact_Information:
Network_Address:
Network_Resource_Name:
[http://www.chesapeakebay.net/data/downloads/cbp_water_quality_database_1984_present]
Access_Instructions: Data are available through 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: 20190520
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, D2
City: Annapolis
State_or_Province: Maryland
Postal_Code: 21401
Country: USA
Contact_Voice_Telephone: 410.260.8630
Contact_Electronic_Mail_Address: benjamin.cole_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