Maryland Shallow Water Monitoring Program – 2008 DATAFLOW

Metadata:

Identification_Information:
Citation:
Citation_Information:
Originator: Maryland Department of Natural Resources, Resource Assessment Service (MD DNR RAS)
Publication_Date: 20100615
Title: MD DNR Water Quality Mapping Project 2008
Geospatial_Data_Presentation_Form: Spatial dataset

Description:
Abstract:
This record describes one year of an on-going water quality monitoring project. Mapping surveys, with one exception, were performed monthly from April through October 2008. There was no cruise on the Sassafras River in June 2008.

A total of one hundred and fifty-three mapping cruises were conducted on Maryland water bodies. The spatial extent of water quality was measured on the following rivers: the Bohemia, Choptank, Corsica, Elk, Honga, Northeast, Potomac, Sassafras, St. Mary's, Wicomico (St. Mary's County), and Wicomico (Wicomico County). Breton Bay, St. Clement's Bay and Upper Chesapeake Bay were also surveyed.

Multiple surveys were required to map several of the larger water bodies. Mapping data acquired during four Choptank River surveys were combined. Data acquired during two surveys were combined to map the Upper and Lower Susquehanna Flats sections of the Upper Chesapeake Bay. Each month, Potomac River mapping surveys combined data collected on nine sections of the Potomac River and its major tributaries, including St. Mary's River, Breton Bay and St. Clement's Bays.

Water quality mapping was conducted using DATAFLOW, a compact, self-contained surface water quality mapping system deployed in a small boat operating at planing speeds of up km/hr (25 kts) or less. Measurements were made approximately every four seconds, or 30 meters (100 feet). Seven water quality parameters were measured: water temperature, salinity, conductivity, dissolved oxygen, turbidity, fluorescence and pH. Water depth was also measured. The DATAFLOW system sampled water at approximately 0.5-m depths below the surface.

Additional water-quality measurements were made at one hundred and fifteen calibration stations. During each mapping cruise, "grab" samples were collected at five or six stations per water body segment. Calibration samples were collected, after stopping the boat, at 0.5-m depth

and filtered on site. Secchi depth, HydroLab and photosynthetic active radiation measurements were made at the same time.

Laboratory analyses were performed on calibration samples. Chlorophyll a, 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 were determined.

Purpose:

The Maryland Department of Natural Resources Shallow Water 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 ambient water quality criteria for dissolved oxygen, chlorophyll and water clarity in shallow water habitats.

Water quality mapping provides data on variability and patchiness that is valuable in assessing water quality criteria, and in determining attainment of those criteria. For example, spatial information on turbidity can be correlated to the spatial coverage of living resources such as bay grasses - Submerged Aquatic Vegetation (SAV). This information can be used to determine and assess water clarity criteria necessary to support SAV growth, address the progress of meeting SAV restoration goals, and target specific locations for SAV restoration.

Spatially intensive data can also help pinpoint localized areas of water quality concern, such as areas of low dissolved oxygen that can cause fish kills, and their possible links to nearby land uses or point sources.

Water quality maps can capture localized areas of algae blooms, high turbidity, or low dissolved oxygen that may adversely affect living resources in shallow water habitats and spawning areas.

Spatial data can also be aggregated across watershed units to aid in the evaluation of entire systems. Water quality mapping data are integrated with data from other Bay water quality stations and living resources monitoring projects and used to understand linkages, temporal variation and long-term trends.

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

Supplemental_Information:

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

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

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

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

Time_Period_of_Content:
Time_Period_Information:
Range_of_Dates/Times:
Beginning_Date: 20080401
Ending_Date: 20081027
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: Olsen, L.M., G. Major, K. Shein, J. Scialdone, R. Vogel, S. Leicester, H. Weir, S. Ritz, T. Stevens, M. Meaux, C.Solomon, R. Bilodeau, M. Holland, T. Northcutt, R. A. Restrepo, 2007. NASA/Global Change Master Directory (GCMD) Earth Science Keywords. Version 6.0.0.0.0
[online: http://gcmd.nasa.gov/Resources/valids//gcmd_parameters.html]
Theme_Keyword: Biosphere > Aquatic Ecosystems > Estuarine Habitat
Theme_Keyword: Biosphere > Aquatic Ecosystems > Rivers/Stream Habitat
Theme_Keyword: Biosphere > Ecological Dynamics > Ecosystem Functions > Nutrient Cycling
Theme_Keyword: Biosphere > Ecological Dynamics > Ecosystem Functions > Primary Production
Theme_Keyword: Terrestrial Hydrosphere > Surface Water > Rivers/Streams
Theme_Keyword: Terrestrial Hydrosphere > Water Quality/Water Chemistry > Chlorophyll
Theme_Keyword: Terrestrial Hydrosphere > Water Quality/Water Chemistry > Conductivity
Theme_Keyword: Terrestrial Hydrosphere > Water Quality/Water Chemistry > Light Transmission
Theme_Keyword: Terrestrial Hydrosphere > Water Quality/Water Chemistry > Nitrogen Compounds
Theme_Keyword: Terrestrial Hydrosphere > Water Quality/Water Chemistry > Nutrients
Theme_Keyword: Terrestrial Hydrosphere > Water Quality/Water Chemistry > Oxygen
Theme_Keyword: Terrestrial Hydrosphere > Water Quality/Water Chemistry > pH
Theme_Keyword: Terrestrial Hydrosphere > Water Quality/Water Chemistry > Phosphorous Compounds

Theme_Keyword: Terrestrial Hydrosphere > Water Quality/Water Chemistry > Suspended Solids
Theme_Keyword: Terrestrial Hydrosphere > Water Quality/Water Chemistry > Turbidity
Theme_Keyword: Terrestrial Hydrosphere > Water Quality/Water Chemistry > Water Temperature

Place:
Place_Keyword_Thesaurus: Producer Defined
Place_Keyword: United States
Place_Keyword: Maryland
Place_Keyword: Chesapeake Bay Watershed
Place_Keyword: Caroline County
Place_Keyword: Cecil County
Place_Keyword: Charles County
Place_Keyword: Dorchester County
Place_Keyword: Prince George's County
Place_Keyword: Queen Anne's County
Place_Keyword: St. Mary's County
Place_Keyword: Somerset County
Place_Keyword: Talbot County
Place_Keyword: Wicomico County
Place_Keyword: District of Columbia
Place_Keyword: Fairfax County
Place_Keyword: Stafford County
Place_Keyword: Bohemia River
Place_Keyword: Breton Bay
Place_Keyword: Choptank River
Place_Keyword: Corsica River
Place_Keyword: Elk River
Place_Keyword: Honga River
Place_Keyword: Northeast River
Place_Keyword: Potomac River
Place_Keyword: Sassafras River
Place_Keyword: St. Clements's Bay
Place_Keyword: St. Mary's River
Place_Keyword: Wicomico River
Access_Constraints: None
Use_Constraints: None
Point_of_Contact:
Contact_Information:
Contact_Person_Primary:
Contact_Person: Mark Trice
Contact_Position: Program Chief, Water Quality Informatics, Tidewater Ecosystem Assessment
Contact_Address:
Address_Type: Mailing Address

Address: Tawes State Office Building, 580 Taylor Avenue, D2
City: Annapolis
State_or_Province: MD
Postal_Code: 21401
Contact_Voice_Telephone: 410 260-8630
Contact_Electronic_Mail_Address: MTRICE_nospam_@dnr.state.md.us[Remove _nospam_ for valid email address]
Browse_Graphic:
Browse_Graphic_File_Name:
http://mddnr.chesapeakebay.net/eyesonthebay/documents/metadata/MdDNR_DF2008stns.pdf
Browse_Graphic_File_Description: Overview map of one hundred and fifteen 2008 DATAFLOW calibration station sites located on Maryland Chesapeake Bay tributaries.
Browse_Graphic_File_Type: PDF
Data_Set_Credit:
Survey and calibration data were collected by Maryland Department of Natural Resources (MDDNR) and two partners. The Tidal-Fresh and Lower Potomac River section samples were collected by Chesapeake Biological Laboratory research staff. St. Mary's River, Wicomico River (St. Mary's County), St. Clement's and Breton Bays section samples were collected by St. Mary's College River Project research staff. All other data were acquired by MD DNR Resource Assessment Service (RAS) Annapolis Field Office staff.

The Maryland Department of Mental Health and Mental Hygiene (DHMH) analyzed pigments and turbidity samples. The Nutrient Analytical Services Laboratory (NASL) at the Chesapeake Biological Laboratory (University of Maryland) analyzed nutrient and suspended solids samples.

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

Data_Quality_Information:
Attribute_Accuracy:
Attribute_Accuracy_Report:
Quality Assurance/Quality Control. MD DNR followed specific procedures to ensure that the DATAFLOW component of the Shallow Water Quality Monitoring Program project 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 the proper use, calibration and maintenance of both field and laboratory equipment for the measurement of physical and chemical parameters.

YSI 6600 sondes were configured with the following probes: 6560, 6561, 6562, 6025 and 6136. Resolution, range and accuracy specifications for the sonde and probes may be obtained from the manufacturer. http://www.ysi.com/environmental-monitoring/data-acquisition.htm

The procedures to control and assure the accuracy of field measurements involved the calibration of field instruments, the verification of calibrations, equipment maintenance, and

collection of filter blanks. Most of the details of how data acquired with YSI sondes were quality assured and quality controlled are described in process description elements in the Lineage portion of this metadata record. The results of the water quality attributes analyzed in the laboratories were also used to calibrate and crosscheck the sonde data for accuracy.

PAR sensors were returned to LICOR, Inc. prior to the field season for factory calibration.

Daily quality control checks (including the running of blanks and standards) were used to control and assure laboratory accuracy.

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

Additionally, CBL NASL and DHMH ECD participated two times per year in the United States Geologic Survey (USGS) Standard Reference Sample Project.

Elevated turbidity readings during the 5-May-2008 Lower Choptank survey may have been caused by disturbance of the river bottom due to clamming operations. Similarly, during the 1-Oct-2008 Wicomico River survey, decreases in water clarity related to tug boat activities were observed between 09:11 and 09:13 and between 12:57 and 12:58. Increased turbidity due to nearby clam dredging activities was observed between 10:25 and 10:27 during the 7-Oct-2008 Choptank Tributaries cruise. High boat traffic due to bass tournament 14-Oct-2008 12:01 through 12:05 Upper Oligohaline cruise caused increased turbidity near boat ramp at Smallwood State Park. The survey vessel's motion through dense submerged aquatic vegetation may have increased turbidity readings during the 9-Oct-2008 Elk River survey at approximately 10:10. On numerous cruises, anomalous depth values may have been caused by the boat's motion at higher speeds in rough water and should be considered suspect.

Logical_Consistency_Report:

A substitute water intake ram was deployed during the 21-May-2008 Lower Potomac and 22-May-2008 Tidal Fresh Potomac surveys.

After a power failure during the 3-Jul-2008 Upper Choptank survey the primary DataFlow instrumentation was replaced with backup instrumentation.

During the 2-Sep-2008 Choptank Harris/Broad/Tred survey, due to water depth limitations, water quality calibration samples were collected approximately 200 yards east of station XFB5054 where they were normally collected.

Two different sondes were used during the 18-Sep-2008 Potomac Maryland Tributaries survey. Additional post processing of spCond data was necessary. In the first 1177 records, specific Conductance UM values were replaced with specific Conductance mS values.

During the 13-Oct-2008 Lower Potomac and 14-Oct-2008 Tidal Fresh Potomac surveys the data sonde was configured with a YSI 6136 turbidity sensor. All other surveys were conducted using sondes configured with YSI 6026 turbidity sensors.

Completeness_Report:

The 2008 DATAFLOW project dataset includes mapping and calibration data acquired during monthly sampling runs, between March and October 2008.

There are no June 2008 Sassafras River survey data. A Sassafras survey was conducted on the last day of the month but was scuttled due to hardware failure.

Sampling-event and water-quality-calibration pigment, nutrient and suspended solid data from one hundred and fifteen stations are included in the dataset.

Samples were collected at six sites on the Wicomico River. Five sites were sampled on the Bohemia, Corsica, Elk, Honga, Northeast and Sassafras Rivers. Eleven sites were sampled on the Susquehanna Flats. Twenty-two sites were sampled during Choptank River surveys and forty-six sites were sampled on Potomac River surveys.

Contour maps based on 2008 Dissolved Oxygen, Salinity, Turbidity, Temperature and Chlorophyll data acquired during DATAFLOW monthly mapping cruises are available on-line. [http://mddnr.chesapeakebay.net/sim/dataflow_data.cfm]

The user may discover a few interruptions in sonde datasets. These were related to short-term problems with flow, power or sonde operation.

Power failures during the 3-Apr-2008 Northern Susquehanna Flats, the 29-Apr-2008 Bohemia River, the 21-May-2008 Upper Oligohaline Potomac River, 23-Jul-2008 Elk River, 25-Jul-2008 Potomac River Dahlgren section, 22-Aug-2008 Potomac River Dahlgren section, 3-Sep-2008 Middle Choptank, 29-Sep-2008 Potomac River Dahlgren section surveys caused data gaps.

Deviations were made from normal cruise tracks due to low water conditions on four surveys: 1-Apr-2008 - Corsica River; 30-Apr-2008 - Sassafras River; 28-May-2008 Bohemia River; 29-May-2008 Elk River;

Heavy weather conditions made it necessary to modify cruise tracks during the following cruises: 1-May-2008 - Wicomico; 8-May-2008 Susquehanna Flats North and Susquehanna Flats South; and 19-Jun-2008 Upper Potomac.

Clearing submerged aquatic vegetation from the flow-through system on numerous occasions during the 25-Jun-08 Susquehanna Flats Northern survey resulted in gaps in the cruise track. Data gaps during the 26-Aug-2008 and 11-Sep-2008 Northern Flats and 15-Oct-2008 Southern Flats surveys were also caused by flow interruptions due to heavy submerged aquatic vegetation density.

An instrument configuration error resulted in missing fluorescence records during the 5-Aug-2008 Lower Choptank survey.

Depth data were not acquired during the 21-May-2008 Lower Potomac and 22-May-2008 Tidal Fresh Potomac surveys.

Calibration samples, (PC, PIP, PN, PP, TSS, and VSS), normally collected during the Lower Oligohaline survey at stations: XDB8278, XDB4877, XDB4544, RET2.2, and XDA0338 were analyzed but are not included with the published data due to sample preservation issues.

All other missing attribute values were masked because the data were determined to be unreliable during the quality control process.

Beginning in 2008 silicates were not included in the suite of samples collected at calibration sample stations.

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

YSI 6600 data sondes equipped with 6562 DO probe, a 6560 conductivity/temperature probe, a 6136 turbidity probe, and a 6025 chlorophyll probe were maintained and calibrated before and after each deployment in accordance with YSI recommendations.
http://www.ysi.com/environmental-monitoring/data-acquisition.htm

CONTINUOUS SURFACE WATER QUALITY MAPPING:

DATAFLOW Mapping System DATAFLOW is a compact, self-contained surface water quality mapping system, suitable for use in a small boat operating at planing speeds of about 25 knots. The system collects water through a pipe ("ram") deployed on the transom of the vessel, pumps it through an array of water quality sensors, then discharges the water overboard. Orientation of the sonde vertically, with probes upward, ensures that no air bubbles are conveyed to the sensors, preventing errors that might be caused by such bubbles.

Water quality instrumentation consisted of a YSI 6600 Sonde equipped with a flow-through chamber. Sensors included a Clark-type YSI 6562 DO probe, a YSI 6560 conductivity/temperature probe, a 6136 turbidity probe, and a 6025 chlorophyll probe. The sonde transmitted data collected from the sensors to a YSI 650 data logger.

Positioning and depth instrumentation consisted of a Garmin GPS/MAP 168 Sounder. The data logger matched the position data with water-quality sensor data for each observation. The Garmin 168 GPS transmitted NMEA data to a small form factor computer. A DATAFLOW/Labview program was used to merge position and depth data with data collected by the logger and create an output file.

The system was equipped with an inline flow meter. Although the flow rate did not affect sensor readings, decreased flow was an indication of either a partial blockage or an interruption of water flow to the instrument. Flow data was used in the field as a diagnostic tool to ensure that the system was working properly and, later, as a quality assurance tool to verify that water flow was uninterrupted. A boat horn was wired to the flow meter. If the flow-rate fell below 3.0 l s-1, the horn sounded and warned operators that a problem needed to be corrected.

Cruise tracks varied depending on the water body being mapped. In general, a square-wave pattern was followed by alternately sampling shallow shoreline areas, and open, deeper waters while traveling up and down river. Alternative cruise paths were followed if tributary size, shape impediments, or obstructions dictated otherwise. Cruise patterns were selected to obtain representative coverage of shallow water habitats and open waters so that segment-wide criteria could be assessed as accurately as possible. Navigational issues and placement of representative calibration sites also determined ultimate cruise tracks.

WATER QUALITY CALIBRATION SAMPLES:

At each calibration station, "grab" water quality samples were collected from the outflow of the DATAFLOW unit.

The samples were collected at the same time the HydroLab surface sample was recorded. Numbered two quart bottles were triple-rinsed and filled with water for "whole" and "filtered" nutrient and chlorophyll samples.

Nutrient, pigment and suspended-solid water-samples were filtered on station or shortly thereafter. Sample waters and filters were placed on ice immediately after filtration.

Particulate samples included: Chlorophyll, Particulate Carbon, Particulate Nitrogen, Particulate Phosphorus (PP), Particulate Inorganic Phosphorous (PIP), Total Suspended Solids (TSS) and Volatile Suspended Solids (VSS).

Filtrate collected from TSS/VSS or PP/PIP filtrations was used for dissolved nutrient samples. Total Dissolved Nitrogen and Total Dissolved Phosphorus, Nitrate, Nitrite, Ammonia, Orthophosphate and Dissolved Organic Carbon samples were collected.

HYDROLAB PROFILE:

The first reading of the HydroLab water-column profile at each Calibration station was recorded at the same time the water quality "grab" sample was collected. The first HydroLab record logged was for the 0.5-meter depth. The sonde was then lowered to the bottom. A reading was

taken at 0.3-meters above the bottom. The sonde was raised and measurements were recorded at 0.5-meter or 1.0-meter increments until it reached the surface. (In cases where station depth was greater than 3-meters, the sonde was raised in 1-meter increments).

SECCHI DEPTH:

Secchi Disk Depth was measured at each Calibration station. Readings with the Secchi disk were made in situ without the aid of sunglasses. The Secchi disk was lowered into the water, on the shady side of the boat, and the depth at which it was no longer visible was recorded. The Secchi depth reading was taken near the stern of the vessel and the time at which the reading was taken was noted (to the second) from the Global Positioning System. This facilitated later matching of Secchi depth readings with transmissometer and turbidity data.

PAR MEASUREMENT:

Underwater Photosynthetically Active Radiation (PAR, 400-700nm)

At each Calibration station, down-welling light penetrating the water column (PAR) was measured underwater at several depths to calculate the light attenuation coefficient, Kd. Simultaneous deck and submersed PAR intensity measurements were taken to account for variability in incident surface irradiance due to changes in cloud cover. Data collected from this procedure were used to estimate the depth of the photic zone.

The equipment used was manufactured by LI-COR, Inc. and consisted of a LI-192SA, flat cosine Underwater Quantum Sensor, a LI-190SA air (deck) reference sensor and a Data Logger (LI-1000 or LI-1400).

Deck and underwater readings were recorded simultaneously. Readings were allowed to stabilize before being recorded. If the station depth was less than 3 meters, readings were taken at 0.1 meter and at 0.25-meter intervals until 10% of the 0.1-meter reading was reached. If the station depth was greater than 3 meters, a reading was taken at 0.1-meter and at 0.5-meter intervals until 10% of the 0.1-meter reading was reached.

DATAFLOW FILE POST-PROCESSING:

Each raw .txt file, created by DATAFLOW/LabView during 2008 mapping cruises on all water bodies was post-processed in the following manner.

Each file was opened in Excel and renamed. Rows of data acquired before and after mapping were deleted. Records (if any) were also deleted if they did not have associated GPS values. A macro was executed. The macro rearranged columns and inserted error-tracking columns and headings. Next, negative values were flagged, and values outside each parameter's normal range were highlighted. The macro also returned a report summarizing exceedances. Finally, mapping cruise event and instrument information was appended to each record.

Flagged values were evaluated. Common anomalies included spikes in fluorescence and turbidity, dips in specific conductance, and extremely high dissolved oxygen readings. Instrument post-calibration results, in situ comparisons with HydroLab, LI-COR readings, historical data from nearby locations, and survey-crew remarks were used to determine whether sensor values were acceptable.

In cases where data were determined to be unreliable, the reason(s) values were determined to be "bad" were documented with error codes and comments. Unreliable data were masked. No data were discarded. All DATAFLOW data for each mapping cruise, both "good" and "bad", were retained in an archival file. Only data considered reliable were published in reports.

VERIFICATION AND DATA MANAGEMENT:

At the end of the monitoring season, DNR Tawes Office and Field Office personnel conducted additional 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 in the Bay. Weather events were considered, event logs were reviewed and field staff members were consulted regarding possible legitimate causes for the 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: Sally Bowen
Contact_Position: Project Chief, Monitoring Field Office, DNR
Contact_Address:
Address_Type: mailing and physical
Address: 1919 Lincoln Drive
City: Annapolis
State_or_Province: Maryland
Postal_Code: 21401
Country: USA
Contact_Voice_Telephone: 410 263-3369
Contact_Electronic_Mail_Address: SBOWEN_nospam_@dnr.state.md.us[Remove _nospam_ for valid email address]

Process_Step:
Process_Description:
Laboratory Analysis - MD DHMH
Active chlorophyll a for all grab samples was analyzed by DHMH.

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: Asoka Katumuluwa
Contact_Position: Chief, Division of Environmental Chemistry, Laboratory Administration, Maryland Department of Health and Mental Hygiene
Contact_Address:
Address_Type: mailing and physical
Address: Department of Health and Mental Hygiene, 201 West Preston Street
City: Baltimore
State_or_Province: Maryland
Postal_Code: 21201
Country: USA
Contact_Voice_Telephone: 410 767-5839
Contact_Electronic_Mail_Address: KatumuluwaA_nospam_@dhmh.state.md.us[Remove _nospam_ for valid email address]

Process_Step:
Process_Description:
Laboratory Analysis - CBL
University of Maryland's Chesapeake Biological Laboratory (CBL), Nutrient Analytical Services Laboratory 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.

Further information about laboratory analytical procedures may be obtained from the "Process_Contact".
Process_Date: Unknown
Process_Contact:
Contact_Information:
Contact_Person_Primary:
Contact_Person: Carl Zimmerman
Contact_Position: Director of Analytical Services/Quality Assurance Officer
Contact_Address:
Address_Type: mailing and physical
Address: Chesapeake Biological Laboratory, Center for Environmental and Estuarine Studies, The University of Maryland System, 1 Williams St; P.O. Box 38
City: Solomons
State_or_Province: Maryland
Postal_Code: 20688
Country: USA
Contact_Voice_Telephone: 410 326-7252
Contact_Electronic_Mail_Address: carlz _nospam_@cbl.umces.edu[Remove _nospam_ for valid email address]

Spatial_Data_Organization_Information:
Indirect_Spatial_Reference: Bohemia River, Breton Bay, Chester River, Chesapeake Bay, Choptank River, Corsica River, Elk River, Honga River, Northeast River, Potomac River, Sassafras River, St. Clement's Bay, St. Mary's River, Wicomico River (Eastern Shore), Wicomico River (Western Shore), Maryland, USA.
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 describes water collected during a water-quality mapping project. Project data are an aggregation of 2008 data collected during one hundred and fifty three DATAFLOW mapping cruises.

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

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

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

The entity Water_Quality_Data is comprised of the attributes: EVENT_ID, SOURCE, PROJECT, STATION, SAMPLE_DATE, SAMPLE_TIME, DEPTH, LAYER, SAMPLE_TYPE, SAMPLE_ID, PARAMETER, QUALIFIER, VALUE, UNIT, METHOD, LAB, PROBLEM,

DETAILS, TOTAL_DEPTH, UPPER_PYCNOCLINE, LOWER_PYCNOCLINE, LAT, and LONG.

The entity Light_Attenuation_Data is comprised of the attributes: EVENT_ID, SOURCE, PROJECT, STATION, SAMPLE_DATE, SAMPLE_TIME, SAMPLE_REPLICATE_TYPE, DEPTH, EPAR_S, EPARU_Z, EPARD_Z, UNIT, METHOD, DETAILS, WATER_BODY, TOTAL_DEPTH, UPPER_PYCNOCLINE, and LOWER_PYCNOCLINE.

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DRAFT -TO BE DETERMINED when data are served by Chesapeake Bay Program

The entity SONDE_DATA is comprised of the attributes: SAMPLE_DATE, SAMPLE_TIME, WATER_BODY, SECTION, PRI_SEG, SONDE, LATITUDE, LONGITUDE, TOTAL_DEPTH, BOAT_SPEED, BATT, WTEMP, SPCOND, SALINITY, DO_SAT, DO, PH, TURB_NTU, FLUOR, TCHL_PRE_CAL and COMMENTS.

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Maps created by interpolating the Dissolved Oxygen, Turbidity, Chlorophyll a, Salinity and Temperature data acquired during mapping cruises may be downloaded from http://mddnr.chesapeakebay.net/sim/dataflow_data.cfm

Entity_and_Attribute_Detail_Citation:

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

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

Quality Assurance Project Plan for the Maryland Department of Natural Resources, Chesapeake Bay Shallow Water Quality Monitoring Program, for the period July 1, 2008 - June 30, 2009. [http://mddnr.chesapeakebay.net/eyesonthebay/documents/SWM_QAPP_2008_draft2.pdf].

Distribution_Information:
Distributor:
Contact_Information:
Contact_Person_Primary:
Contact_Person: Michael Mallonee
Contact_Position: Water Quality Data Manager
Contact_Address:
Address_Type: mailing
Address: 410 Severn Avenue
City: Annapolis
State_or_Province: Maryland
Postal_Code: 21403
Contact_Voice_Telephone: 800 968-5785

Contact_Electronic_Mail_Address: mmallone@_no_spam_chesapeakebay.net[Remove _nospam_ for valid email address]

Resource_Description: Downloadable data
Distribution_Liability: None of the Chesapeake Bay Program partners nor any of their employees, contractors, or subcontractors make any warranty, expressed or implied, nor assume any legal liability or responsibility for the accuracy, completeness, or usefulness of any information or data contained within the web site. Reference to any specific commercial products, processes, or services or the use of any trade, firm, or corporation name is for the information and convenience of the public and does not constitute endorsement, recommendation or favoring by the Chesapeake Bay Program partners.
Standard_Order_Process:
Digital_Form:
Digital_Transfer_Information:
Format_Name: ASCII file, formatted for text attributes, declared format
Format_Information_Content: Station Information, Monitoring Event data, Light Attenuation data and Water Quality data.
File_Decompression_Technique: No compression applied
Transfer_Size: 5.8 UPDATE UPDATE
Digital_Transfer_Option:
Online_Option:
Computer_Contact_Information:
Network_Address:
Network_Resource_Name:
http://www.chesapeakebay.net/data/index.cfm?subjectarea=WATER_QUALITY
Access_Instructions: Data are available though the Chesapeake Bay Programs CIMS data hub. Select Water Quality Database (1984-Present). Access the data by following web site (see network resource name) instructions.
Digital_Form:
Digital_Transfer_Information:
Format_Name: ASCII file, formatted for text attributes, declared format
Format_Information_Content: Water quality mapping sonde data
File_Decompression_Technique: No compression applied
Transfer_Size: 86
Digital_Transfer_Option:
Online_Option:
Computer_Contact_Information:
Network_Address:
Network_Resource_Name:
http://www.chesapeakebay.net/data/index.cfm?subjectarea=WATER_QUALITY
Access_Instructions: UNKNOWN ++++++++++++++ TO BE DETERMINED when data are served by CBP
Fees: None

Metadata_Reference_Information:
Metadata_Date: 20100624

Metadata_Contact:
Contact_Information:
Contact_Person_Primary:
Contact_Person: Ben Cole
Contact_Address:
Address_Type: Mailing and physical address
Address: Maryland Department of Natural Resources, D-2 580 Taylor Avenue
City: Annapolis
State_or_Province: MD
Postal_Code: 21401
Contact_Voice_Telephone: (410) 260-8630
Contact_Electronic_Mail_Address: bcole_nospam_@dnr.state.md.us[Remove _nospam_ for valid email address]
Metadata_Standard_Name: FGDC Content Standards for Digital Geospatial Metadata
Metadata_Standard_Version: FGDC-STD-001-1998