Chesapeake Bay Maryland (CBM) NERR Water Quality Metadata
January 2004-December 2004
Latest Update: September 20, 2019

I. Data Set and Research Descriptors

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2) Entry verification

Raw data were uploaded from the YSI 6600EDS data loggers to an IBM compatible Personal Computer. Using EcoWatch software, data plots were produced and data were visually examined after each deployment. Data files were then exported from EcoWatch in a comma-delimited format (.CDF) into Microsoft Excel (for Windows 2000). The .CDF file is then formatted using the EQWinFormat.xls macro designed by CDMO to reformat the header columns, insert station codes, insert a corrected time column, and remove any pre- and post-deployment data. This .CDF file was then saved in .CSV format and archived as raw data.

The raw data file is then processed using an Excel macro developed by Mark Trice of Maryland DNR. This macro is used to discover possible data set outliers. Data is identified as a potential outlier by the following criteria: All negative data; Temp > 35 deg C; SpCond > 58mS/cm; Salinity > 35ppt; DO% > 200; DOconc > 17.5 mg/l; 2 < pH >10.5; Turbidity > 150 NTU. Data meeting these criteria were highlighted in the data set by the macro, and then visually inspected to determine whether they should be retained, deleted, or listed as suspect. Potential outliers are investigated for validity based on weather data, field observations, QA/QC checks, and instrument post-calibration. If data is to be deleted, an error code is placed in the adjacent field. If data is to be listed as suspect, notes are made in a separate field which will not delete the data. Where deployment overlap occurs between files, the data from the newly calibrated sonde is discarded. After all data has been inspected, the data set is processed through another step of the macro which replaces any data marked by an error code with a blank field. The file is then saved as a .CSV

file with a different filename and opened in Ecowatch for visual inspection. If this inspection yields any additional suspect data, the data may again be edited in Microsoft Excel. After the processed data is deemed acceptable, it is imported into EQWin database and submitted to CDMO. All raw .CSV files are also sent to the CDMO via FTP for archival. Chris Trumbauer and John Zimmerelli are responsible for these tasks.

3) Research objectives

One of the objectives of the monitoring program at CBM NERR is to conform to the NERR System Wide Monitoring Program (SWMP)where the overall goal is a long-term dataset providing baseline water quality information capable of tracking trends and identifying changes in water quality over temporal and spatial scales. In addition to the aforementioned NERR wide research objectives, reserve specific objections include understanding how anthropogenic activities affect water quality and examining the effects of submerged macrophyte communities on water quality. To accomplish this, monitoring sites were selected that characterize the variety of habitat and water quality conditions existing at two of the three components that makes up the CBM NERR, the Jug Bay and Otter Point Creek Component. At the Jug Bay component, three sites were selected that span the range of conditions thought to be typical of this site. These sites include a reference site, an impaired site and a mainstem site; where the reference site is thought to have little anthropogenic induced affect on water quality, an impaired site where anthropogenic activities strongly influence local water quality and a mainstem site-thought to be highly representative of mainstem water quality conditions at the Jug Bay Component. The fourth and final site is located at the Otter Point Creek Component, a much smaller component, and is thought to represent typical water quality conditions at this site. All four sites span the range of habitat conditions at these components to include varying abundances of submerged macrophyte communities as well as varying depth and energy regimes from shallow tidal creeks to proportionately deep tidal river systems to shallow open water embayments. Additional monitoring, outside the scope of this effort, is being done at both the Jug Bay and Otter Point Creek Component. These efforts use comparable field sampling methods, with high spatial resolution to better understand the spatial variability between and around the sites monitored in this effort.

4) Research methods

Water quality measurements were taken every 15 minutes from January through December 2004 at each station, weather permitting. One YSI6600EDS data logger is deployed at each station. All data are recorded in Eastern Standard Time. When a datasonde is retrieved, another one is deployed at the same time to ensure a continuous data set. During transport to and from the sampling sites, dataloggers are wrapped in a damp towel and placed horizontally in a cooler. The cooler lid is kept slightly ajar, to allow the datalogger to be in equilibrium with the ambient barometric pressure.

Deployment apparatus' are constructed out of 4" diameter PVC pipe and suspended vertically in the water column. 2" diameter holes are cut into the PVC pipes at 2" intervals to guarantee free flow of water through the PVC pipe. The pipe was painted with Interlux Micron Extra w/ Biolux antifouling paint. The pipe is attached to a 2X4 using copper plated clevis hangers. The 2X4 is bolted to a piling with the bottom of the PVC pipe resting on the bottom of the river. A stop bolt was placed 0.25 meters from the bottom of the pipe to keep the YSI instrument at a constant depth above bottom.

Measurements for temperature, specific conductance, salinity, percent oxygen saturation, dissolved oxygen concentration, water depth, pH, turbidity, and chlorophyll is recorded every 15 minutes. (Chlorophyll data are not included in this dataset but can be obtained by contacting the reserve.) Deployments range from one to three weeks, depending on biofouling intensity (temperature dependent) and availability of field personnel. When a deployment concludes, dataloggers are replaced with newly serviced and calibrated instruments. At the time of replacement two (2) simultaneous overlapping readings are taken between the old and new YSI instruments, as well as an in situ reading with a series 3 Hydrolab sonde. All simultaneous overlapping readings are taken prior to the previously deployed sonde being disturbed in any way. Once retrieved, the sondes are wrapped in a damp towel and placed in a cooler for transport back to the lab. The sondes are then stored in the cooler overnight at the lab, continuing to log data every 15 minutes. DO post-calibration record is taken from this logged data the following morning, using the

current barometric pressure reading from a mercury barometer. Logging is then stopped, and YSI sondes are post calibrated using the same standards as used in the calibration.

Deployment data is collected, data is uploaded into a PC, archived, and then visually examined. Efforts are made to relate sensor conditions to any apparent outliers or anomalies (eg. battery charge status, or normal DO data at the beginning of a deployment may be distinguished from erroneous data resulting from a known malfunction, such as a punctured DO membrane due to crabs). Data loggers and sensors are cleaned, serviced and calibrated according to the methods described in the YSI Operating Manual and SWMP Operating Procedures. Laboratory calibration procedures are carried out in accordance with the YSI operating manual methods. Standards for turbidity were purchased from YSI. Standards for pH and Chlorophyll were purchased from Fisher Scientific, a YSI approved vendor. Specific conductance standards were prepared in-house, from A.C.S. certified KCl. Data were reviewed and edited according to the YSI Data Review and Editing Protocol in Appendix B of the CDMO manual. After cleaning the data loggers, the dissolved oxygen (DO) membrane were replaced and allowed to stretch for at least 24 hours before calibration. The pH, specific conductance, depth, turbidity, and chlorophyll sensors were calibrated using the following methods: 2-point pH 7 and 10, specific conductance standard of the nearest concentration of river (ranging from 0.294 mS/cm to 58.64 mS/cm), zeroed depth in the air, 2-point turbidity standards of 0 (deionized water) and 123 NTUs for the 6136 turbidity sensor. The DO sensor was calibrated using the YSI recommended wet towel method. As a quality insurance check, YSI datalogger records during sonde deployment and retrieval are compared to the series 3 Hydrolab instrument. Post-deployment measurements of all the parameters are recorded before cleaning the data loggers. Sensors are immersed in the appropriate standard solutions (e.g., pH) and readings recorded using discreet sampling.

5) Site location and character

The Chesapeake Bay Maryland NERR is comprised of three components, Otter Point Creek, Jug Bay and Monie Bay, which are scattered throughout the Maryland portion of Chesapeake Bay. All three components are thought to represent the diverse estuarine environments of the Maryland portion of the Chesapeake Bay.

Otter Point Creek is a shallow, open water embayment located in the tidal headwaters of the Bush River-on the Upper Western Shore of the Chesapeake Bay. Otter Point Creek is the smallest and proportionately shallowest of the three components and consists of 672 acres of open water, tidal marshes, forested wetlands and upland hardwood forests surrounded by major highways, large residential communities, and heavy commercial and industrial development. The watershed draining into Otter Point Creek is rapidly being developed and urbanized. As such sediments are rapidly accreting into the marsh and are very fine and flocculent resulting in typically high turbidity when submerged macrophytes are not present. The non-native Hydrilla verticillata submerged macrophyte recently invaded the marsh in 2002 and has colonized most bottom substrates less then one half meter depth at low tide. There is one station (OC) located at the Otter Point Creek Component.

Jug Bay is a located in the upper tidal reaches of the Patuxent River and represents a river dominated tidal freshwater marsh with expansive emergent vegetation communities. The Patuxent River is located on the western shore of the Chesapeake Bay and drains highly urbanized areas of the Washington Metropolitan area. Jug Bay is a 722-acre tidal estuary providing a narrow transition zone between brackish marshes and upland freshwater wetlands. The broad, shallow waters of Jug Bay support a profusion of freshwater plants and animals. Emergent and submerged vegetation crowds the river channel and forms an interlaced pattern of tidal and nontidal marshes, swamps and forested wetlands surrounded by upland woods and fields. The component has deep water river dominated areas (>10m depth) as well as an extensive shallow water (<1m depth) network of tidal creeks and flooded mud flats. Submerged macrophytes are persistent along the shoreline of these creeks and within the flooded mud flats and the emergent marshes are extensive. There are three stations (MC, RR, IP) located at the Jug Bay Component.

Monie Bay is located on the lower Eastern Shore of the Chesapeake Bay at the mouth of the Wicomico River. The Monie Bay Component represents a mesohaline bay with primarily three tidal creeks representing a variety of agricultural input. The local area is largely undeveloped with varying agriculture

and rural residential land use. The component is dominated by salt marshes with tidal fresh marshes in the upper tidal reaches of the tributaries. Shallow water habitats give way to fringing submerged macrophyte communities. Currently no monitoring sites are located at this component.

The following is a list of the 4 sites as well as site characteristics

Mataponi Creek (MC)
38° 44.599'N, 76° 42.446'W (NAD83)
38.74331667, -76.70743333 (GIS format)

Site MC is located in a small tributary off the upper tidal headwaters of the Patuxent River, Maryland. MC is 2.4 km upstream of the mouth, midchannel in the creek, which is approximately 7m wide. The southern bank is steep and covered mainly with hardwood trees while the Northern bank is tidal marsh. The sonde was deployed vertically in a perforated PVC pipe. Average depth at this site is roughly 0.7 meters with a mean tidal fluctuation of approximately 0.6 m.. The YSI is deployed 0.25 m off of the creek bottom. Salinities at this site rarely exceed 0.1 ppt. The bottom habitat is soft sediment, and SAV grassbeds are abundant during the summer months. Because this site is located along the main channel of the Mataponi Creek, water quality is reflective of the general quality of water flowing along the main portion of the creek. The SAV community as this site is seasonally very dense and thus water quality is thought to be strongly influenced by the presence of SAV during the summer months. Freshwater inputs not quantified. Any pollutants would most likely be due to agricultural runoff.

Railroad Bridge (RR)
38° 46.877'N, 76° 42.822'W (NAD 83)
38.78128333, -76.7137 (GIS format)

Site RR is located in the mainstem of the upper tidal headwaters of the Patuxent River, Maryland. The site is slightly upstream (roughly 0.3km) from Jackson's Landing at the Patuxent River Park (previous PR site 2002). This section of the Patuxent River is approximately 70m wide and average depth at the site is 1.4m. The YSI is deployed 0.25 m off of the river bottom. Bottom habitat is soft sediment, and grassbeds are evident in the area during summer months. Mean tidal fluctuation is approximately 0.6 m. Salinities are typically less than 1 ppt at this site throughout the year. In 2003 this site was moved from 38° 46' 50.6" N, 76° 42' 29.1" W (Jug Bay) to its present location because of the shallow nature of the old site. The new site location (RR) is at the end of the old railroad bed and is deployed vertically in a perforated PVC pipe near midchannel of the Patuxent River. Because this site is located along the main channel of the Patuxent River, water quality is reflective of the general quality of water flowing along the main portion of the river. The site is roughly 1km downstream of the confluence of the Western Branch tributary and the Patuxent River Mainstem, thus water quality is influenced by Western Branch. A large wastewater treatment plant (averaging 10-20 mgd) discharges directly into the Western Branch tributary of the Patuxent River just upstream of IP. USGS streamflow stats for closest gauge (Latitude 38°57'21.3", Longitude 76°41'37.3" NAD83): yearly mean of approx 200 – 350 cfs.

Iron Pot Landing (IP)
38° 47.760'N, 76° 43.248' W (NAD 83)
38.796, -76.7208 (GIS Format)

Site IP is located 2.09km from the mouth of Western Branch. IP is attached vertically off of a small pier near midchannel of the river and has an average depth of 1.6m. The YSI is deployed 0.25 m off of the river bottom. The site is roughly 1km downstream of a large (10-20 mgd) wastewater treatment plant effluent. The river is approximately 15m wide and flows through extensive riparian buffers. Both banks of the river are flanked by hardwood flora. Tides are semi-diurnal and mean tidal fluctuation is approximately 0.6 m. Salinity at this site is generally 0.1 ppt. Bottom habitat is soft sediment, and grassbeds are evident during the summer months. USGS streamflow stats for closest gauge (Latitude 38°48'51.2", Longitude 76°44'55.4" NAD83): yearly mean of approx 50 – 100 cfs. In addition, a wastewater treatment plant

discharges approx 15 – 30 cfs about 1 km upstream of the site.

Otter Point Creek (OC)
39° 27.047'N, 76° 16.474'W (NAD 83)
39.45078333, -76.27456667 (GIS Format)

Site OC is located approximately 0.3km from the Anita C. Leight Estuary Center. OC is deployed vertically in a perforated PVC pipe and has an average depth of 0.7m. The YSI is deployed 0.25 m off of the creek bottom. Bottom habitat is extremely soft sediment, and grass beds inundate the site during summer months. Salinity at this station rarely rises above 0.1 ppt. Tides in Otter Point Creek are semi-diurnal and have a mean range of about 0.3 m. The average water levels are generally lower in the winter due to north and northwest winds that increase the egress from Chesapeake Bay. The sonde was periodically exposed to very low tides, and sediments at the site are extremely fine and flocculent. Because of the shallowness of the tidal marsh, coupled with the dramatic daily changes in the depth and width of the stream, deployments at the site presented many problems. These problems included periodic exposure of the sonde, very high turbidity and sedimentation rates associated with tidal infiltration and wind and wave generated resuspension which caused severe fouling of the probes. Water quality at the site represents extreme shallow water habitats. Thus it is not uncommon to see very large fluctuations in temperature and dissolved oxygen at this site ranging from complete anoxia to full saturation, due in part to the shallow nature of the site and the effects of marsh processes on water quality. Additionally, the site was seasonally dominated by dense SAV communities from June-October 2004 and thus water quality conditions were likely influenced by the presence of these macrophytes. USGS streamflow stats for closest gauge (Latitude 39°26'21.4", Longitude 76°18'21.7" NAD83): no yearly mean available but daily means for 2004 range from 20 – over 1000 cfs. Site is in relatively urban environment which accounts for its flashiness. Pollutants would be mostly urban run-off, with some industrial discharge possible.

6) Data collection period

Long-term data collection using sondes at Railroad Bridge (Jug Bay Wetlands Sanctuary) (RR) began on April 4, 2003; Mataponi Creek (MTI) began April 22, 2003; Iron Pot Landing (IP) began April 4, 2003; and Otter Point Creek (OC) began April 15, 2003.

2004 collection dates and times are as follows. All times are in Eastern Standard Time (EST).

Datalogger deployments:

Jug Bay @ Railroad Bridge (RR):

Deployment		Retrieval	
Date	Time	Date	Time
12/23/03	10:00	01/07/04	12:15
01/07/04	12:30	01/22/04	11:30
YSI removed from 1/22/04 – 2/10/04 due to ice formation at station.			
02/10/04	12:15	02/24/04	14:45
02/24/04	15:00	03/11/04	9:00
03/11/04	9:15	03/24/04	9:30
03/24/04	9:45	04/06/04	7:30
04/06/04	7:45	04/20/04	11:15
04/20/04	11:30	05/04/04	8:00
05/04/04	8:15	05/18/04	8:15
05/18/04	8:30	06/03/04	10:30

06/03/04	10:45	06/15/04	11:30
06/15/04	11:45	06/29/04	8:45
06/29/04	9:00	07/13/04	8:30
07/13/04	8:45	07/27/04	8:45
07/27/04	9:00	08/10/04	10:45
08/10/04	11:00	08/24/04	8:15
08/24/04	08:45	09/07/04	8:15
09/07/04	8:30	09/21/04	8:15
09/21/04	8:30	10/05/04	9:00
10/05/04	9:15	10/20/04	8:15
10/20/04	8:30	11/01/04	11:15
11/01/04	11:30	11/22/04	9:45
11/22/04	10:00	12/08/04	10:15
12/08/04	10:30	12/21/04	10:00
12/21/04	10:15	01/04/05	9:45

Mataponi Creek
MC

12/23/04	08:00	01/07/04	10:30

YSI removed from 1/07/04 – 2/24/04 due to ice formation at station.

02/24/04	13:15	03/11/04	11:45
03/11/04	12:00	03/24/04	12:00
03/24/04	12:15	04/08/04	11:15
04/08/04	11:30	04/20/04	8:45
04/20/04	9:00	05/04/04	10:30
05/04/04	10:45	05/18/04	9:45
05/18/04	10:01	06/03/04	13:16
06/03/04	13:30	06/15/04	9:00
06/15/04	9:15	06/29/04	12:15
06/29/04	12:30	07/13/04	11:00
07/13/04	11:15	07/27/04	11:00
07/27/04	11:16	08/10/04	13:46
08/10/04	14:00	08/24/04	11:15
08/24/04	11:30	09/07/04	11:00
09/07/04	11:15	09/21/04	11:00
09/21/04	11:15	10/05/04	13:00
10/05/04	13:15	10/20/04	11:15
10/20/04	11:30	11/01/04	14:00
11/01/04	14:15	11/22/04	12:30
11/22/04	12:45	12/08/04	13:30
12/08/04	13:45	12/21/04	12:45
12/21/04	13:00	01/04/05	12:00

Iron Pot Landing
IP

12/23/03	9:00	01/07/04	11:15
01/07/04	11:30	01/22/04	13:00

YSI removed from 1/22/04 – 2/10/04 due to ice formation at station.

02/10/04	13:45	02/24/04	13:45
02/24/04	14:00	03/11/04	10:30
03/11/04	10:45	03/24/04	11:00
03/24/04	11:15	04/06/04	9:15
04/06/04	9:30	04/20/04	10:00
04/20/04	10:15	05/04/04	9:15
05/04/04	9:30	05/18/04	11:00
05/18/04	11:16	06/03/04	12:01
06/03/04	12:15	06/15/04	10:15
06/15/04	10:30	06/29/04	10:45
06/29/04	11:01	07/13/04	9:46
07/13/04	10:00	07/29/04	9:30
07/29/04	10:00	08/10/04	12:30
08/10/04	12:45	08/24/04	10:00
08/24/04	10:15	09/07/04	9:45
09/07/04	10:00	09/21/04	9:45
09/21/04	10:00	10/05/04	10:15
10/05/04	10:30	10/20/04	9:45
10/20/04	10:00	11/01/04	13:00
11/01/04	13:15	11/22/04	12:30
11/22/04	12:45	12/08/04	13:30
12/08/04	12:00	12/21/04	11:30
12/21/04	11:45	01/04/05	11:00

Otter Point Creek
OC

Sonde not deployed until 2/26/04 due to ice.

02/26/04	12:30	03/10/04	8:45
03/10/04	9:00	03/23/04	9:15
03/23/04	9:30	03/30/04	8:30
03/30/04	8:45	04/14/04	7:30
04/14/04	7:45	04/27/04	7:30
04/27/04	7:45	05/11/04	8:30
05/11/04	8:45	05/25/04	9:15
05/25/04	9:30	06/08/04	8:15
06/08/04	8:30	06/22/04	9:15
06/22/04	9:30	07/07/04	9:00
07/07/04	9:15	07/20/04	8:30
07/20/04	8:45	08/03/04	8:00
08/03/04	8:15	08/17/04	10:00
08/17/04	10:15	08/31/04	7:30
08/31/04	7:45	09/14/04	7:30
09/14/04	7:45	09/29/04	8:45
09/29/04	9:00	10/13/04	9:00
10/13/04	9:15	10/26/04	8:15

10/26/04	8:30	11/30/04	10:15
11/30/04	10:30	12/16/04	10:45
12/16/04	11:00	01/04/05	10:15

7) Distribution

NOAA/ERD retains the right to analyze, synthesize and publish summaries of the NERRS System-wide Monitoring Program data. The PI retains the right to be fully credited for having collected and processed the data. Following academic courtesy standards, the PI and NERR site where the data were collected will be contacted and fully acknowledged in any subsequent publications in which any part of the data are used. Manuscripts resulting from this NOAA/OCRM supported research that are produced for publication in open literature, including refereed scientific journals, will acknowledge that the research was conducted under an award from the Estuarine Reserves Division, Office of Ocean and Coastal Resource Management, National Ocean Service, National Oceanic and Atmospheric Administration. The data set enclosed within this package/transmission is only as good as the quality assurance and quality control procedures outlined by the enclosed metadata reporting statement. The user bears all responsibility for its subsequent use/misuse in any further analyses or comparisons. The Federal government does not assume liability to the Recipient or third persons, nor will the Federal government reimburse or indemnify the Recipient for its liability due to any losses resulting in any way from the use of this data.

NERR water quality data and metadata can be obtained from the Research Coordinator at the individual NERR site (please see Section 2.2-1 Principal investigators and contact persons), from the Data Manager at the Centralized Data Management Office (please see personnel directory under the general information link on the CDMO home page) and online at the CDMO home page http://cdmo.baruch.sc.edu/. Data are available in text tab-delimited format, Microsoft Excel spreadsheet format and comma-delimited format.

8) Associated researchers and projects

The Jug Bay Wetlands Sanctuary staff collects weekly to monthly temperature, salinity, dissolved oxygen, and nutrient samples at four additional sites throughout the Jug Bay marsh in an effort to explore the affects of marsh processes on nutrient cycling. This data provide additional spatial coverage at this component. Additionally, the Anita C. Leight Estuary Center at Otter Point Creek, in conjunction with CBNERR/MD staff, collects bi-weekly temperature, salinity, dissolved oxygen, total suspended solids, chlorophyll a, and nutrient samples at the same location as datalogger OC, as well as 5 other sites throughout the OPC marsh. The goal of this effort is to provide enhanced spatial coverage at this component as well as provided ancillary data useful for submerged macrophyte related research. YSI vented depth sondes were also installed at sites RR and OC during 2004. This data can be made available via contacting the Principal Investigator.

Additional spatially explicit data is available through the Maryland Department of Natural Resources (MDNR), who conduct 'dataflow' cruises throughout the Bush and Patuxent Rivers (OC and JB components) in support of their Continuous Monitoring Program. These cruises employ the same YSI 6600 sondes that provide high resolution spatial data within these tributaries and include areas around the four CBM NERR stations (RR, IP, MC, OC). Cruises are conducted once monthly from April-October. In addition, MDNR also maintains nearly 32 other similar fixed stations throughout the Maryland portion of the Chesapeake Bay monitored and maintained in a similar fashion to CBM NERR sites from April 1-October 31. For more information about these additional sites or dataflow cruises, see www.eyesonthebay.net.

II. Physical Structure Descriptors

9) Sensor Specifications

YSI 6600EDS datalogger

Parameter: Temperature
Units: Celsius (C)
Sensor Type: Thermistor
Model#: 6560
Range: -5 to 45 °C
Accuracy: +/-0.15 °C
Resolution: 0.01°C

Parameter: Specific Conductance
Units: milli-Siemens per cm (mS/cm)
Sensor Type: 4-electrode cell with autoranging
Model#: 6560
Range: 0 to 100 mS/cm
Accuracy: +/-0.5% of reading + 0.001 mS/cm
Resolution: 0.001 mS/cm to 0.1 mS (range dependent)

Parameter: Salinity
Units: parts per thousand (ppt)
Sensor Type: Calculated from conductivity and temperature
Model#: 6560
Range: 0 to 70 ppt
Accuracy: +/- 1% of reading or 0.1 ppt, whichever is greater
Resolution: 0.01 ppt

Parameter: Dissolved Oxygen % saturation
Units: percent air saturation
Sensor Type: Rapid Pulse – Clark type, polarographic
Model#: 6562
Range: 0 to 500% air saturation
Accuracy: 0-200% air saturation, +/- 2% of the reading or 2% air saturation, whichever is greater; 200-500% air saturation, +/- 6% of the reading
Resolution: 0.1% air saturation

Parameter: Dissolved Oxygen mg/L (Calculated from % air saturation, temperature and salinity)
Units: milligrams per liter (mg/L)
Sensor Type: Rapid Pulse – Clark type, polarographic
Model#: 6562
Range: 0 to 50 mg/L
Accuracy: 0 – 20 mg/L, +/- 2% of the reading or 0.2 mg/L, whichever is greater; 20 – 50 mg/L, +/- 6 % of the reading
Resolution: 0.01 mg/L

Parameter: Non-Vented Level – Shallow (Depth)
Units: feet or meters (ft or m)
Sensor Type: Stainless steel strain gauge
Model#: n/a
Range: 0 to 30 ft (9.1 m)
Accuracy: +/-0.06 ft (0.018 m)
Resolution: 0.001 ft (0.001m)

Parameter: pH probe for EDS sonde
Units: units
Sensor Type: Glass combination electrode
Model#: 6561
Range: 0 to 14 units
Accuracy: +/- 0.2 units

Resolution: 0.01 units

Parameter: Turbidity
Units: nephlometric turbidity units (NTU)
Sensor Type: Optical, 90° scatter, with mechanical cleaning
Model#: 6136
Range: 0 to 1000 NTU
Accuracy: +/- 5% of the reading or 2 NTU (whichever is greater)
Resolution: 0.1 NTU

Dissolved Oxygen qualifier: The reliability of the Dissolved Oxygen (DO) data after 96 hours post-deployment for non-EDS (Extended Deployment System) datasondes may be problematic due to fouling which forms on the DO probe membrane during some deployments (Wenner et al., 2001). Many Reserves have upgraded to the YSI 6600 EDS data sondes, which increases DO accuracy and longevity by reducing the environmental effects of fouling. The user is therefore advised to consult the metadata and to exercise caution when using the DO data beyond the initial 96-hour time period. However, this potential drift is not always problematic for some uses of the data, i.e., periodicity analysis. It should also be noted that the amount of fouling is very site specific and that not all data are affected. The Research Coordinator at the specific NERR site should be contacted concerning the reliability of the DO data because of the site and seasonal variation in the fouling of the DO sensor.

Depth qualifier: The NERR System-Wide Monitoring Program uses YSI datasondes that can be equipped with either depth or water level sensors. Both sensors measure water depth, but by convention, level sensors refer to atmospherically-vented measurements and depth refers to non-vented measurements. Standard calibration protocols for the non-vented sensor use the atmospheric pressure at the time of calibration. Therefore, changes in atmospheric pressure between calibrations appear as changes in water depth. The error is equal to approximately 1.03 cm for every 1 millibar change in atmospheric pressure. This error is eliminated for level sensors because they are vented to the atmosphere throughout the deployment time interval. If proper atmospheric pressure data are available, non-vented sensor depth measurements can be corrected for deployments between calibrations. Reading for both vented and non-vented depth data are automatically compensated for water density changes due to variations in temperature and salinity. The Research Coordinator at the specific NERR site should be contacted in order to obtain information regarding atmospheric pressure data availability.

10) Coded variable indicator and variable code definitions

Sampling station:	Site code:	Station code:
Railroad Bridge	RR	cbmrrwq
Mattaponi Creek	MC	cbmmcwq
Iron Pot Landing	IP	cbmipwq
Otter Point Creek.	OC	cbmocwq

11) Anomalous/Suspect Data

Railroad Bridge
Specific Conductivity and salinity data suspect for the following period. Snow event during this time and rise in salinity may be due to salting of roadways.

01/19/04	02:00 to	02/22/04	11:30

Post calibration and field data suggest SpCond and Salinity may be reading lower than true value - data should be considered questionable for the following period:

05/18/04	8:30 to	06/03/04	10:30

Post calibration and field data suggest Dissolved Oxygen data should be considered questionable during the following period:

06/03/04 10:45 to 06/15/04 11:30

High turbidity values during the following period are likely related to major rain event:

06/17/04 23:00 to 06/18/04 11:00

Post calibrations for pH and SpCond/Salinity probes were out of range. The following data should be considered questionable for these parameters:

12/08/04 10:30 to 12/21/04 10:00

Iron Pot Landing

Specific Conductivity and salinity data suspect for the following period. Snow event during this time and rise in salinity may be due to salting of roadways.

01/19/04 02:00 to 02/22/04 11:30

Bio-fouling on datasonde. Post calibrations for DO and SpCond/salinity were slightly out of range. The following data should be considered questionable:

05/18/04 11:15 to 06/03/04 12:00

High turbidity values during the following period are likely related to major rain event:

06/17/04 20:45 to 06/18/04 13:45

Mataponi Creek:

Post calibration for turbidity probe indicates turbidity data may be questionable for the following period:

03/11/04 12:00 to 03/24/04 12:00

Post calibration for SpCond/salinity suggests turbidity data may be reading slightly low for the following period:

04/20/04 9:00 to 05/04/04 10:30

Field data indicates that pH data during the following period may be reading up to 0.4 units less than true values:

05/18/04 10:00 to 06/03/04 13:15

Magnitude of large turbidity value may be questionable:

11/30/04 00:30 to 12/01/04 02:45

Ice may have been present at the site during the following period.

12/08/04 13:00 to 12/31/04 23:45

Otter Point Creek

Specific Conductivity and salinity data suspect for the following period. Snow event during this time and rise in salinity may be due to salting of roadways.

01/19/04 02:00 to 02/22/04 11:30

Post calibration and field data indicate that DO may be reading higher than true value - consider DO questionable for the following period:

05/11/04 8:45:01 to 05/25/04 9:15:01

Magnitude of large turbidity value may be questionable:

11/08/04 22:45, 23:00, 23:15

11/14/04 7:00, 07:15
12/14/04 19:45

Ice may have been present at the site during the following period:
12/16/04 10:45 to 12/31/04 23:45

12) Deleted data
Outlier data were detected and considered for deletion from the edited data using combination of methods, including ECOWATCH graphical software, Microsoft Excel macros, and examination of field data and post-calibration results. All outliers are detailed below. According to the CDMO Operations Manual version 4.0, depth measurements taken with the non-vented level probe can be influenced by up to 0.39 m (1.3 ft) during some low-pressure hurricane events. Specific dates and time ranges of potentially influenced data are listed with each respective month.

January 1 – 31, 2004

Railroad Bridge

Turbidity spike deleted - likely biological interference
01/20/2004 02:15

Iron Pot Landing
Depth data for the following dates and times were deleted due to post calibration info out of range.
01/01/04 00:00 to 01/07/04 11:15

February 1 – 29, 2004

Railroad Bridge

pH data refuted by other field measurements. Probe response may have been slow in cold temperature.
02/10/2004 12:15 – 12:30

Iron Pot Landing
Depth data for the following dates and times were deleted due to post calibration info out of range.
02/10/04 13:45 to 02/24/04 13:45

pH data refuted by other field measurements. Probe response may have been slow in cold temperature.
02/10/2004 13:45 – 14:00

March 1 – 31, 2004

Railroad Bridge

pH data refuted by other field measurements. Probe response may have been slow in cold temperature.
03/11/2004 09:15
03/24/2004 09:45 – 10:00

Iron Pot Landing

Turbidity spikes deleted - likely biological interference
03/04/2004 21:45
03/07/2004 02:45

03/17/2004 16:30
03/21/2004 20:30
03/21/2004 21:45 to 03/22/2004 00:00
03/24/2004 12:30
03/25/2004 14:00
03/26/2004 00:15
03/27/2004 03:00

Turbidity data deleted - wiper became fouled during deployment
03/28/2004 03:15 to 03/31/2004 23:45

Mataponi Creek

Turbidity spikes deleted - likely biological interference
03/06/2004 22:45
03/16/2004 18:15
03/19/2004 15:15
03/20/2004 16:00
03/26/2004 05:00

Negative depth values removed
03/07/2004 23:45 to 03/8/2004 00:30
03/08/2004 10:45 to 03/08/2004 13:45

Otter Point Creek

Instrument out of water due to low water level – all data deleted.
03/03/2004 09:15 – 13:30
03/08/2004 13:45 – 17:45
03/13/2004 05:45 – 07:45
03/13/2004 19:00 to 03/14/2004 00:45
03/14/2004 02:30 – 09:45
03/16/2004 09:00 – 11:30
03/21/2004 15:00 – 18:00
03/21/2004 23:45 to 03/22/2004 18:15
03/23/2004 03:30 – 04:45
03/25/2004 18:15
03/27/2004 19:30 – 21:00
03/28/2004 04:30 – 08:30

Salintiy and Specific Conductance data deleted – probe likely out of water due to low water level
03/04/2004 00:30 – 01:45

Turbidity spike deleted - likely biological interference
03/16/2004 01:30
03/25/2004 19:45

Negative depth values removed

03/27/2004 17:45 – 19:15
03/27/2004 21:15 – 21:30

April 1 – 30, 2004

Railroad Bridge

DO% and DO mg/L deleted due to probe failure – probe not reading correctly.
04/04/2004 17:15 to 04/06/2004 07:30

Turbidity spikes deleted - likely biological interference

04/06/2004	23:30	04/29/2004	01:45
04/13/2004	06:30	04/29/2004	05:00 – 05:15
04/20/2004	07:00 – 07:15	04/29/2004	18:45
04/27/2004	15:45	04/30/2004	04:30
04/27/2004	22:15	04/30/2004	05:30 – 05:45
04/28/2004	00:30	04/30/2004	06:15
04/28/2004	02:15	04/30/2004	15:45
04/28/2004	04:00		

Iron Pot Landing

Turbidity data deleted - wiper became fouled during deployment
04/01/2004 00:00 to 04/06/2004 09:15
04/18/2004 23:30 to 04/19/2004 12:45
04/22/2004 22:15 to 04/30/2004 23:45

Turbidity spikes deleted - likely biological interference
04/18/2004 18:15 – 19:00

Turbidity data deleted – QA/QC checks indicate data is invalid
04/19/2004 13:00 to 04/20/2004 10:00

Mataponi Creek

Negative depth values removed
04/04/2004 20:30 to 04/05/2004 00:45
04/05/2004 07:45 – 14:45
04/05/2004 15:15
04/05/2004 18:15 to 04/06/2004 00:15
04/06/2004 11:30 - 13:30
04/06/2004 22:30 to 04/07/2004 00:45
04/07/2004 12:00 - 13:30
04/08/2004 00:15 - 01:15

Turbidity spikes deleted - likely biological interference
04/10/2004 03:15
04/13/2004 13:15
04/13/2004 15:30

04/13/2004 16:00
04/13/2004 17:45
04/13/2004 20:45

Turbidity data deleted - wiper became fouled during deployment
04/15/2004 03:15 to 04/20/2004 08:45

Otter Point Creek

Negative depth values removed
04/03/2004 12:45 – 13:30
04/04/2004 13:15 – 16:30, 17:45, 20:15 – 22:45
04/07/2004 02:45 – 04:30, 14:30 – 18:45
04/08/2004 02:15 – 05:45, 16:00 – 18:15
04/09/2004 04:45 – 05:00
04/14/2004 09:15 –13:45
04/14/2004 20:15 – 21:45
04/15/2004 04:15 – 06:00
04/20/2004 00:45 –04:45, 14:00 – 14:15 18:45 – 19:15
04/21/2004 15:45 – 17:30
04/22/2004 1630 - 1830
04/23/2004 02:30 – 05:30, 16:00 – 17:45
04/26/2004 20:00 – 23:00
04/27/2004 01:45 – 09:15

Instrument out of water due to low water level – all data deleted
04/04/2004 23:00 to 04/06/2004 05:45:45
04/06/2004 12:45 – 18:30
04/11/2004 20:00 – 21:45
04/12/2004 07:00 – 08:30
04/14/2004 22:00 to 04/15/2004 04:00
04/15/2004 06:15 to 04/16/2004 00:30
04/19/2004 01:15 – 02:45
04/20/2004 14:30 – 18:30
04/21/2004 01:45 – 04:15
04/23/2004 18:00 – 18:30
04/24/2004 04:00 – 05:45
04/28/2004 06:30 – 15:15

Turbidity spike deleted – likely biological interference
04/10/2004 14:15
04/30/2004 20:30

May 1 – 31, 2004

Railroad Bridge

Turbidity spikes deleted – likely biological interference

05/01/2004	03:30	05/14/2004	12:45
05/01/2004	15:45	05/30/2004	23:00
05/12/2004	21:00	05/31/2004	16:30 – 16:45
05/13/2004	15:30	05/31/2004	17:15
05/13/2004	21:30 – 23:30	05/31/2004	18:00
05/14/2004	16:30		

Turbidity data deleted - wiper became fouled during deployment

05/14/2004	17:15 to	05/18/2004	08:15

Iron Pot Landing

Turbidity data deleted - wiper became fouled during deployment

05/01/2004	00:00 to	05/04/2004	09:15
05/31/2004	19:00 – 23:45		

Turbidity spikes deleted - likely biological interference

05/16/2004	09:30 – 09:45

Mataponi Creek

Turbidity spikes deleted - likely biological interference

05/14/2004	07:15

Negative depth values removed

05/19/2004	23:00 – 23:15

Otter Point Creek

Instrument out of water due to low water level – all data deleted

05/03/2004	13:00 – 16:30		
05/03/2004	20:45 to	05/04/2004	02:45
05/04/2004	12:45 – 16:00		
05/08/2004	03:15 – 06:30		
05/16/2004	13:45 – 14:00		
05/17/2004	00:00 – 01:45		
05/19/2004	15:30 – 17:00		
05/20/2004	02:00 – 03:15		

Turbidity spikes deleted – likely biological interference

05/02/2004	09:30
05/15/2004	11:30
05/15/2004	16:15
05/15/2004	17:45
05/15/2004	18:15
05/15/2004	19:15 – 20:30
05/15/2004	21:15
05/15/2004	21:45 – 22:00

05/15/2004 23:45 to 05/16/2004 00:00
05/16/2004 00:45 - 01:00
05/16/2004 13:30

Negative depth values removed
05/03/2004 16:45
05/19/2004 14:00 – 15:15, 17:15 – 18:18
05/22/2004 02:45 – 05:00, 16:00 – 18:15
05/25/2004 05:15 – 07:00
05/31/2004 23:00 – 23:45

June 1 – 30, 2004

Railroad Bridge

Turbidity data deleted - wiper became fouled during deployment
06/01/2004 17:30 to 06/01/2004 20:45
06/02/2004 19:30 to 06/03/2004 10:30

Turbidity spike deleted - likely biological interference
06/02/2004 01:30 – 01:45
06/02/2004 06:30 – 06:45
06/02/2004 10:45
06/02/2004 12:45
06/02/2004 13:15
06/02/2004 15:00
06/03/2004 20:45
06/14/2004 01:30
06/21/2004 13:00

Probe post calibration out of range (likely bad calibration standard); SpCond and Salinity data deleted. The out of range post calibration readings were minimal, therefore the other parameters were not affected.
06/03/2004 10:45 to 06/15/2004 11:30

Iron Pot Landing

Turbidity data deleted - wiper became fouled during deployment
06/01/2004 00:00 to 06/02/2004 21:00

Turbidity outlier deleted due to blocked optic
06/05/2004 13:00

Probe post calibration out of range (likely bad calibration standard); SpCond and Salinity data deleted. The out of range post calibration readings were minimal, therefore the other parameters were not affected.
06/03/2004 12:15 to 06/15/2004 10:15

Mataponi Creek

Probe post calibration out of range (likely bad calibration standard); SpCond and Salinity data deleted. The out of range post calibration readings were minimal, therefore the other parameters were not affected.
06/03/2004 13:30 to 06/15/2004 09:00

Otter Point Creek

Negative depth values removed
06/01/2004 00:00 – 00:45
06/09/2004 19:45 – 21:45
06/10/2004 07:45 – 10:30, 19:00 – 23:15
06/11/2004 08:45 – 11:45
06/16/2004 00:00 – 02:15, 13:45 – 16:15
06/17/2004 01:00 – 02:30, 14:30 – 15:45
06/18/2004 01:45 – 03:15, 15:30 – 16:15
06/19/2004 01:45 – 04:15, 14:15 – 19:15
06/20/2004 01:15 – 04:00, 05:00 – 06:30, 15:15 – 18:15

Instrument out of water due to low water level – all data deleted
06/06/2004 04:45 – 05:45
06/20/2004 04:15 – 04:45

Turbidity spike deleted - likely biological interference
06/26/2004 00:15

July 1 – 31, 2004

Railroad Bridge

Turbidity spike deleted - likely biological interference
07/08/2004 00:30

Iron Pot Landing

Turbidity spike deleted - likely biological interference
07/17/2004 14:30

Otter Point Creek

Negative depth values removed
07/06/2004 05:30 – 06:00, 17:00 – 20:15
07/07/2004 06:30 – 06:45
07/13/2004 13:30 – 14:00
07/13/2004 21:15 to 07/14/2004 00:45
07/19/2004 03:45 – 04:00

Negative turbidity value removed
07/11/2004 05:15

August 1 – 31, 2004

Railroad Bridge

Turbidity spikes deleted - likely biological interference

08/06/2004	11:15	08/19/2004	08:30
08/06/2004	12:15 – 12:30	08/19/2004	09:15
08/06/2004	13:30	08/19/2004	11:00
08/08/2004	13:15	08/19/2004	22:30
08/13/2004	05:45	08/20/2004	00:45
08/13/2004	08:30	08/20/2004	09:45
08/13/2004	17:15	08/20/2004	11:15
08/13/2004	18:00 – 18:15	08/20/2004	22:00 – 22:15
08/13/2004	20:15	08/20/2004	22:45
08/13/2004	23:15	08/20/2004	23:15
08/15/2004	06:45	08/21/2004	13:45
08/16/2004	22:00	08/22/2004	00:15
08/17/2004	08:15	08/22/2004	11:15
08/17/2004	09:00	08/23/2004	13:30
08/17/2004	22:00	08/24/2004	03:00
08/17/2004	23:30	08/30/2004	18:30
08/18/2004	10:30	08/31/2004	02:45
08/18/2004	11:45	08/31/2004	04:15
08/18/2004	22:45	08/31/2004	16:15
08/19/2004	00:00		

Turbidity data deleted - wiper became fouled during deployment

08/21/2004	10:30 to	08/21/2004	12:00

Otter Point Creek

Negative depth values removed

08/05/2004	18:15 – 19:15
08/06/2004	06:30 – 09:45
08/20/2004	17:45 –18:15
08/21/2004	18:30 – 20:30
08/22/2004	05:15 – 08:00, 11:45 – 19:30

Instrument out of water due to low water level – all data deleted

08/22/2004	08:15 – 11:30

September 1 – 30, 2004

Railroad Bridge

Turbidity spike deleted - likely biological interference

09/05/2004	09:15	09/06/2004	19:30
09/05/2004	10:45	09/06/2004	22:00
09/05/2004	12:30	09/11/2004	08:15
09/05/2004	14:30		

Turbidity data deleted - wiper became fouled during deployment
09/04/2004 17:45 to 09/05/2004 00:15

Otter Point Creek

Negative depth values removed

09/17/2004 16:00 – 16:15
09/18/2004 14:45 – 20:00
09/29/2004 02:45 – 06:45, 12:30 – 17:00

Instrument out of water due to low water level – all data deleted
09/18/2004 20:15 to 09/19/2004 13:15

October 1 – 31, 2004

Railroad Bridge

Turbidity spike deleted - likely biological interference
10/05/2004 02:30

Iron Pot Landing

Turbidity spikes deleted - likely biological interference
10/02/2004 14:30 – 14:45
10/14/2004 22:30
10/16/2004 10:30

Mataponi Creek

Turbidity spike deleted - likely biological interference
10/15/2004 23:45

Otter Point Creek

Negative depth values removed
10/10/2004 12:30 – 13:30
10/11/2004 11:45 – 14:45
10/12/2004 13:15 – 14:15
10/14/2004 14:15 – 15:45
10/15/2004 03:00
10/17/2004 05:15 – 06:30, 12:30 – 18:15
10/18/2004 18:00
10/19/2004 18:15 – 19:45

Instrument out of water due to low water level – all data deleted
10/11/2004 00:45 – 03:00
10/18/2004 06:45 – 08:00

November 1 – 30, 2004

Railroad Bridge

Turbidity spike deleted - likely biological interference
11/12/2004 13:30
11/22/2004 18:45

Otter Point Creek

Negative depth values removed
11/05/2004 09:45 – 22:00
11/06/2004 09:45 – 10:00
11/07/2004 07:30 – 10:00, 13:15 – 16:15, 20:15 – 23:45
11/08/2004 00:00

Instrument out of water due to low water level – all data deleted
11/07/2004 10:15 – 13:00
11/08/2004 10:15 – 17:45
11/09/2004 12:00 – 13:45
11/13/2004 03:15 – 18:00
11/14/2004 04:45 – 06:00
11/24/2004 22:00 to 11/25 09:30
11/25/2004 18:30 to 11/26 14:45
11/29/2004 15:15 – 15:30

Turbidity data deleted – reading is out of sensor range.
11/14/2004 07:00

Turbidity spike deleted - likely biological interference
11/09/2004 18:15

December 1 – 31, 2004

Railroad Bridge

All parameters deleted - instrument out of water for maintenance
12/03/2004 10:15

Mataponi Creek

Turbidity data deleted - wiper became fouled during deployment
12/01/2004 03:00 to 12/08/2004 14:45
12/13/2004 22:15 to 12/14/2004 12:30
12/23/2004 02:45 to 12/31/2004 01:30

pH data deleted for entire deployment. pH data refuted by other field measurements.
12/08/2004 13:45 to 12/14/2004 21:30

Turbidity spike deleted - likely biological interference

12/10/2004 04:00

All parameters except depth deleted - ice formation disturbed bottom, affected probes coated in mud.
12/14/2004 21:45 to 12/21/2004 12:45

Turbidity value deleted – reading was near upper end of sensor range.
12/21/2004 13:00

All parameters except depth and temperature deleted - ice formation disturbed bottom, affected probes coated in mud
12/31/2004 01:45 to 12/31/2004 23:45

Otter Point Creek

Negative depth values removed
12/02/2004 02:45 – 21:00
12/03/2004 04:30 – 22:30
12/04/2004 05:15 – 10:15
12/05/2004 18:30 – 22:45
12/06/2004 06:15 – 12:00, 21:00 – 22:30
12/07/2004 08:15 – 11:15
12/08/2004 11:15 – 12:15
12/08/2004 22:00 to 12/09/2004 01:45
12/09/2004 09:00 – 13:45
12/09/2004 23:00 to 12/10/2004 03:45
12/10/2004 08:30 – 14:45
12/11/2004 00:15 – 02:30 11:15 – 14:15
12/12/2004 01:30 – 16:15
12/13/2004 02:45 – 04:45, 10:45 – 18:30
12/14/2004 00:45 – 12:45, 18:30 – 20:30
12/15/2004 01:00 – 03:00, 19:15 – 20:15
12/16/2004 04:45 – 08:15
12/18/2004 19:30 – 20:45
12/19/2004 22:00 – 23:00

Instrument out of water due to low water level – all data deleted
12/14/2004 13:00 – 18:15
12/15/2004 03:15 – 19:00
12/17/2004 18:30 – 21:00
12/18/2004 06:45 – 09:30
12/20/2004 03:30 to 12/21/2004 01:30
12/22/2004 10:00 – 11:45
12/24/2004 08:45 – 14:45
12/27/2004 02:15 – 19:15
12/30/2004 02:45 – 08:45, 16:45 – 17:00

Turbidity spike deleted - likely biological interference
12/23/2004 18:45 12/28/2004 23:15

12/29/2004	08:15	12/29/2004	12:15
12/29/2004	10:00	12/29/2004	14:00
12/29/2004	11:45		

Turbidity data deleted - wiper became fouled during deployment
12/29/2004 01:15 – 02:00

13) Missing data
Data are missing due to equipment or associated specific probes not being deployed, equipment failure, maintenance/calibration of equipment, or temporary removal of sampling station platform. For more details on deleted data, see the Deleted Data Section (12). To find out more details about missing data, contact the Research Coordinator at the reserve submitting the data.

Railroad Bridge:

Sampling equipment was removed due to ice formation at the site. No data during the following period:
01/22/2004 11:30 to 02/10/2004 12:15

Iron Pot Landing

Sampling equipment was removed due to ice formation at the site. No data during the following period:
01/22/2004 13:00 to 02/10/2004 13:45

Mataponi Creek

Sampling equipment was removed due to ice formation at the site. No data during the following period:
01/07/2004 10:15 to 02/24/2004 13:15

Otter Point Creek

Ice formation at site delayed deployment of sampling equipment. No data during the following period:
01/01/2004 00:00 to 02/26/2004 12:30

Power failure – no data.

11/24/2004	22:00 to	11/25/2004	09:30
11/25/2004	13:45		
11/25/2004	18:30 to	11/26/2004	08:15
11/28/2004	05:30 – 11:00		
11/29/2004	04:30 – 09:45		

14) Post Deployment Information
End of deployment Post-calibration Readings in Standard Solutions:
NA = no data available for that particular standard

Railroad Bridge

Date	Depth(0.0)	SpCond (0.294)	DO	pH (7 / 10)	Turbid (0 / 123)
Mm/dd/yy	m	mS/cm	%Air Sat	units	NTU
01/08/04	0.119	0.292	100.9	7.01 / 10.03	-0.2 / 113.5
01/23/04	-0.049	0.298	106.2	7.02 / 10.04	-0.7 / 123.6
02/26/04	0.056	0.297	104.6	7.01 / 10.00	0.2 / 126.8
03/12/04	-0.029	0.290	103.6	7.03 / 10.04	1.0 / 123.5
03/25/04	0.275	0.301	105.6	7.03 / 10.01	1.1 / 119.5

04/07/04	-0.100	0.294	109.0	7.01 / 10.01	0.0 / 121.9
04/21/04	0.102	0.293	103.3	7.08 / 10.05	-0.1 / 124.3
05/06/04	-0.018	0.283	97.6	7.11 / 10.11	0.8 / 127.5
05/21/04	0.047	0.299	101.9	7.03 / 10.02	1.3 / 120.9
06/04/04	-0.050	0.331	104.2	7.01 / 10.02	7.8 / 123.8
06/16/04	0.143	0.244	107.4	7.01 / 10.00	2.1 / 126.9
06/30/04	0.047	0.299	103.6	7.08 / 10.09	0.6 / 121.2
07/14/04	-0.145	0.296	103.3	7.02 / 10.01	0.0 / 117.2
07/29/04	0.002	0.294	105.8	7.08 / 10.08	-0.2 / 121.0
08/12/04	-0.094	0.309	103.6	7.00 / 9.92	2.3 / 126.3
08/26/04	0.046	0.284	106.8	7.07 / 10.08	0.8 / 124.1
09/08/04	-0.019	0.275	99.6	7.01 / 9.96	1.0 / 123.1
09/22/04	-0.004	0.292	101.6	6.96 / 9.96	1.3 / 125.6
10/07/04	0.028	0.273	103.1	6.95 / 9.95	0.4 / 121.2
10/21/04	0.001	0.300	100.9	6.98 / 10.03	1.7 / 116.3
11/03/04	-0.042	0.289	100.6	6.95 / 9.95	1.1 / 124.7
11/23/04	0.023	0.304	106.7	6.92 / 9.90	0.3 / 131.0
12/09/04	-0.652	0.287	104.3	6.95 / 9.96	-0.1 / 135.3
12/22/04	0.144	0.251	102.0	6.86 / 9.87	0.5 / 124.2
01/05/05	0.029	0.298	103.8	7.02 / 10.00	-0.1 / 122.0

Iron pot Landing

Date	Depth(0.0)	SpCond (0.294)	DO	pH (7 / 10)	Turbid (0 / 123)
mm/dd/yy	m	mS/cm	%Air Sat	units	NTU
01/08/04	0.467	0.295	104.7	7.00 / 10.00	1.0 / 113.3
01/23/04	-0.061	0.294	102.1	7.01 / 10.01	1.1 / 120.2
02/26/04	0.461	0.302	103.7	7.03 / 10.02	0.1 / 126.3
03/12/04	-0.006	0.282	101.0	7.04 / 10.02	0.9 / 123.0
03/25/04	0.269	0.300	104.7	7.00 / 9.99	0.1 / 120.3
04/07/04	-0.073	0.281	104.3	7.02 / 9.97	0.1 / 120.8
04/21/04	0.069	0.294	99.9	7.05 / 10.02	0.6 / 124.3
05/06/04	-0.011	0.295	104.2	7.03 / 9.97	0.2 / 124.4
05/21/04	0.045	0.290	102.2	7.01 / 10.00	2.1 / 120.6
06/04/04	-0.052	0.274	109.8	7.01 / 10.05	2.2 / 105.5
06/16/04	0.009	0.240	102.9	6.96 / 9.96	0.0 / 126.3
06/30/04	0.055	0.300	69.4	7.02 / 9.98	1.7 / 122.7
07/14/04	-0.151	0.298	101.7	7.03 / 10.01	0.0 / 116.2
07/30/04	0.054	0.298	102.8	7.01 / 10.02	2.3 / 125.2
08/12/04	-0.097	0.293	104.4	7.04 / 10.04	2.5 / 128.1
08/26/04	0.040	0.269	106.9	7.04 / 10.01	-0.1 / 119.6
09/08/04	-0.020	0.281	103.9	7.01 / 10.00	0.2 / 121.3
09/22/04	0.006	0.294	101.5	7.01 / 10.01	1.8 / 123.3
10/07/04	0.024	0.277	104.5	6.98 / 9.96	1.5 / 122.2
10/21/04	0.008	0.293	102.4	7.08 / 10.12	0.8 / 113.2
11/03/04	-0.037	0.286	100.4	7.02 / 10.02	-1.5 / 122.6
11/23/04	0.031	0.294	106.6	6.97 / 9.96	2.3 / 112.8
12/09/04	-0.090	0.279	103.6	7.02 / 9.99	0.0 / 138.9

12/22/04	0.120	0.280	104.3	NA	0.1 / 123.6
01/05/05	0.036	0.296	101.8	6.97 / 9.97	0.5 / 124.0

Date	Depth(0.0)	SpCond (0.294)	DO	pH (7 / 10)	Turbid (0 / 123)
mm/dd/yy	m	mS/cm	%Air Sat	units	NTU
01/08/04	0.520	0.298	103.8	7.07 / 10.08	-0.2 / 112.2
03/12/04	-0.093	0.294	102.2	7.05 / 10.02	-0.2 / 124.8
03/25/04	0.253	0.298	106.1	7.04 / 10.03	-.0.4 / 104.0
04/09/04	-0.143	0.291	100.6	6.96 / 9.95	0.0 / 121.7
04/21/04	0.082	0.291	102.3	7.04 / 10.00	0.2 / 126.4
05/06/04	-0.008	0.283	101.7	6.98 / 10.02	0.3 / 125.9
05/21/04	0.038	0.284	102.6	7.01 / 9.98	0.9 / 119.6
06/04/04	-0.053	0.294	107.0	6.97 / 10.00	6.0 / 125.3
06/16/04	0.141	0.242	108.8	7.02 / 9.98	-0.3 / 127.0
06/30/04	0.050	0.307	105.0	7.06 / 10.07	0.8 / 122.0
07/14/04	-0.157	0.299	104.1	6.99 / 9.97	-0.5 / 116.3
07/29/04	0.016	0.294	103.1	7.00 / 10.06	2.3 / 122.3
08/12/04	-0.102	0.308	106.9	7.01 / 9.96	4.1 / 126.2
08/26/04	-0.005	0.255	107.2	6.98 / 9.94	0.0 / 135.5
09/08/04	-0.021	0.287	103.6	6.93 / 9.91	0.5 / 121.2
09/22/04	-0.001	0.266	106.4	7.00 / 9.97	0.5 / 124.5
10/07/04	0.030	0.282	104.4	6.95 / 9.96	-0.8 / 103.3
10/21/04	-0.003	0.299	105.1	7.07 / 10.10	0.3 / 116.7
11/03/04	-0.037	0.284	101.1	7.00 / 10.01	-0.3 / 126.2
11/23/04	0.027	0.292	103.7	7.01 / 10.00	11.5 / 96.5
12/09/04	-0.094	0.280	102.9	6.96 / 9.96	0.3 / 138.0
12/22/04	0.113	0.255	107.6	6.97 / 9.91	4.3 / 127.9
01/05/05	0.027	0.296	102.3	7.02 / 9.99	1.6 / 122.5

Otter Point Creek

Date	Depth(0.0)	SpCond (0.294)	DO	pH (7 / 10)	Turbid (0 / 123)
mm/dd/yy	m	mS/cm	%Air Sat	units	NTU
03/11/04	0.413	0.292	103.0	7.04 / 10.02	-0.4 / 123.7
03/24/04	NA	0.293	102.9	7.04 / 10.04	0.3 / 121.9
04/01/04	-0.268	0.294	94.3	7.02 / 10.05	2.2 / 121.0
04/15/04	0.046	0.282	101.5	6.98 / 9.96	0.8 / 124.5
04/30/04	0.026	0.308	103.1	7.01 / 9.97	0.1 / 124.5
05/12/04	0.095	0.281	99.3	7.00 / 9.94	0.4 / 124.0
05/26/04	-0.124	0.302	106.0	7.04 / 10.10	0.9 / 125.7
06/09/04	0.111	0.305	98.8	6.98 / 9.98	0.1 / 126.3
06/24/04	-0.076	0.278	105.9	7.00 / 10.04	-0.4 / 128.1
07/08/04	-0.038	0.303	101.4	7.00 / 9.96	0.0 / 129.1
07/21/04	0.021	0.305	105.4	7.06 / 10.04	-1.1 / 125.3
08/04/04	-0.004	0.298	102.4	7.03 / 10.04	6.1 / 125.3
08/19/04	0.023	0.295	106.7	6.95 / 9.89	2.4 / 122.2

09/01/04	NA	0.298	101.5	7.03 / 10.03	-0.5 / 122.3
09/17/04	0.086	0.297	107.8	6.93 / 9.95	-0.2 / 123.4
09/30/04	-0.064	0.281	109.5	7.01 / 10.00	7.7 / 130.3
10/14/04	-0.183	0.305	100.8	7.02 / 10.02	2.8 / 126.0
10/27/04	0.035	0.278	101.9	7.04 / 10.06	-0.2 / 118.3
12/01/04	-0.165	0.293	103.2	7.05 / 10.02	0.3 / 111.7
12/17/04	-0.123	0.283	103.1	7.06 / 10.03	-0.1 / 138.4
01/05/05	0.006	0.304	99.8	6.98 / 9.95	0.1 / 122.4

15) Other Remarks/Notes

On 09/20/2019 this dataset was updated to include embedded QAQC flags for anomalous/suspect data. System-wide monitoring data beginning in 2007 were processed to allow for QAQC flags and codes to be embedded in the data files rather than detailed in the metadata alone (as in the anomalous/suspect, deleted, and missing data sections above). Prior to 2006, rejected data were deleted from the dataset so they are unavailable to be used at all, but suspect data were only noted in the metadata document. Suspect data flags <1> were embedded retroactively in order to allow suspect data to be easily identified and filtered from the dataset if desired for analysis and reporting purposes. No other flags or codes were embedded in the dataset and users should still refer to the detailed explanations above for more information.

In addition to the sampling described above, several other data sets were collected. These include chlorophyll and fluorescence data collected with the YSI6600EDS datasonde, using a 6025 optical probe. Photosynthetically active Radiation (PAR) was also collected using a LiCor 1400 display two sensors: one underwater quantum sensor and one ambient quantum sensor along with secchi depth. Additional nutrient samples were also collected during the months of April through October. This data is available through the Maryland Department of Natural Resources. Visit www.eyesonthebay.net for more information.

EQWin Rainfall Data:

The following rainfall data is being reported prior to our scheduled meteorological submission date and should be considered as provisional data. When this data has undergone the NERR recommended QA/QC procedures it will be updated. Daily and monthly rain totals for the dates of October through December are not representative of true daily and monthly values. Malfunction of CR10X and software is attributed to loss of data collection and data storage for these dates.

Daily, Monthly, and Annual Precipitation Totals

1/1/2004-12/31/2004

cbmjbmet	**Jug Bay Weather**
	Daily Precip Totals (mm)
01/03/2004	2.8
01/06/2004	7.9
01/19/2004	12.4
01/23/2004	0.3
01/29/2004	0.3
01/30/2004	5.8
Monthly Total (mm)	29.5
02/02/2004	0.8
02/04/2004	11.4

02/07/2004	39.6
02/25/2004	1.0
Monthly Total (mm)	52.8
03/03/2004	2.8
03/05/2004	2.5
03/06/2004	0.3
03/07/2004	21.3
03/08/2004	2.3
03/09/2004	0.3
03/11/2004	0.5
03/12/2004	0.3
03/17/2004	10.9
03/18/2004	1.5
03/19/2004	0.3
03/20/2004	5.3
03/21/2004	0.3
03/22/2004	0.5
03/26/2004	1.3
03/28/2004	2.3
03/31/2004	0.3
Monthly Total (mm)	53.0
04/01/2004	3.6
04/02/2004	16.3
04/03/2004	5.6
04/04/2004	0.5
04/05/2004	3.6
04/09/2004	0.5
04/10/2004	0.3
04/12/2004	0.8
04/13/2004	41.7
04/14/2004	6.4
04/15/2004	6.6
04/16/2004	0.3
04/24/2004	13.5
04/27/2004	6.4
04/28/2004	1.3
Monthly Total (mm)	107.4
05/03/2004	14.0
05/04/2004	12.7
05/08/2004	7.6
05/09/2004	0.3
05/11/2004	17.0
05/12/2004	3.8
05/16/2004	2.0
05/17/2004	0.3
05/18/2004	1.3
05/20/2004	3.0
05/26/2004	1.0
05/27/2004	0.5
05/28/2004	0.5

05/29/2004	6.4
05/31/2004	1.0
Monthly Total (mm)	71.4
06/01/2004	4.1
06/02/2004	0.5
06/05/2004	6.4
06/06/2004	74.4
06/07/2004	0.5
06/12/2004	23.4
06/13/2004	0.3
06/17/2004	5.3
06/18/2004	28.4
06/19/2004	0.3
06/20/2004	0.3
06/23/2004	13.2
06/24/2004	2.0
06/25/2004	0.3
06/26/2004	2.8
06/27/2004	0.8
06/30/2004	6.6
Monthly Total (mm)	169.6
07/02/2004	28.7
07/05/2004	4.8
07/08/2004	1.8
07/13/2004	2.0
07/15/2004	1.3
07/18/2004	5.3
07/19/2004	14.0
07/23/2004	3.3
07/25/2004	0.5
07/27/2004	1.8
07/28/2004	50.0
07/29/2004	6.9
Monthly Total (mm)	120.4
08/02/2004	31.0
08/03/2004	4.1
08/04/2004	0.8
08/05/2004	0.3
08/06/2004	0.5
08/07/2004	0.3
08/08/2004	0.3
08/09/2004	0.3
08/10/2004	0.3
08/11/2004	0.3
08/12/2004	0.3
08/13/2004	0.3
08/14/2004	0.3
08/15/2004	0.3
08/16/2004	0.3
08/17/2004	0.3

08/19/2004	0.8
08/20/2004	0.3
08/21/2004	0.3
08/22/2004	0.3
08/23/2004	0.3
08/25/2004	10.2
08/31/2004	1.5
Monthly Total (mm)	53.7
09/06/2004	3.3
09/08/2004	3.0
09/09/2004	1.3
09/10/2004	2.0
09/15/2004	1.5
09/16/2004	23.1
09/18/2004	5.3
09/28/2004	0.3
Monthly Total (mm)	39.8
10/01/2004	1.3
10/04/2004	6.4
10/08/2004	0.3
10/09/2004	0.3
10/14/2004	5.3
10/19/2004	4.1
Monthly Total (mm)	17.7
12/08/2004	10.7
12/09/2004	0.3
12/10/2004	16.8
12/11/2004	4.3
12/12/2004	5.1
Monthly Total (mm)	37.2
Annual Total (mm)	752.5