Jacques Cousteau (JAC) NERR Water Quality Metadata
(formerly known as Mullica River (MUL) NERR)
1 January 2005 – 31 December 2005
Latest Update: August 12, 2020

I. Data set and Research Descriptors

1) Principal investigator & contact persons

Principal investigator:
Dr. Michael Kennish
Research Coordinator JCNERR
Institute of Marine & Coastal Sciences, Rutgers University
71 Dudley Road
New Brunswick, NJ 08901
Voice: (732) 932-6555 x240
Fax: (732) 932-1821
kennish@marine.rutgers.edu

Contact Person:
Gregg P. Sakowicz
Field Researcher/SWMP Technician
Jacques Cousteau National Estuarine Research Reserve (JCNERR)
Rutgers University Marine Field Station (RUMFS)
800 Great Bay Blvd.
C/o 132 Great Bay Blvd.
Tuckerton, NJ 08087
Voice: (609) 296-5260 x267
Fax: (609) 296-1024
sakowicz@marine.rutgers.edu

2) Entry verification

The data are uploaded to the PC from the YSI sondes (also: "dataloggers") as .dat files and exported as .csv files. Graphs are automatically created from the .dat files using the EcoWatch software. The graphs are evaluated for suspect data, which appear as sudden spikes, flat lines, or other anomalies. If such anomalies can be identified as caused by sonde or probe failure, fouling, or some other equipment- or user-based error, they are noted and dealt with accordingly (either notation or deletion and notation) during data editing.

Pre-deployment and post-retrieval readings are identified by depth and salinity values near zero. Field data values are taken at the time of sonde deployment and retrieval with a YSI 600 sonde paired with a 610-DM or 650-MDS display. The comparisons are documented on tracking sheets.

Deployment files are exported from EcoWatch as ".csv" files and are then imported into an Excel macro (EQWinFormat.xls) created by the NERR Central Data Management Office (CDMO). This macro allows PC users with 30-minute data to automatically create a monthly Excel file from a deployment and produce single parameter and missing data point graphs on a monthly basis. These graphs are instrumental in identifying anomalous data between deployments. Spikes, flat lines, and other anomalies are identified on the graphs as row numbers on the Excel spreadsheet. After referencing the spreadsheet, data are either removed or retained and noted in the metadata. In some cases, dates of anomalous data are compared to tide charts, phases of the moon, and known climatic events to determine potential causes for anomalies.

The CDMO EQWinFormat.xls macro allows the user to automatically format column widths to the correct number of decimal places based on YSI sensor specifications. This action formats the data so that it can be imported into EQWin. Once in EQWin, the data are also QA/QC'ed using queries, specifically identifying missing data points and finding all data points that fall outside the range of what the data logger is designed to measure (outliers). Once checked for these errors and omissions, the data are added to the EQWin-based archive of yearly water-quality data from that station.

Missing data are denoted by blank cells ( ) and documented in section 13 (Missing data) of this document. Any erroneous data that are determined as being caused by probe failures, as determined upon examination of the data plots, are deleted and noted in Section 12 (Deleted Data). Symptoms of probe failure are extreme noise in the record, unrealistically high or negative data, and noisy or negative readings in standard solutions. Examples of many such failures are given in the CDMO Manual. Sensor readings that greatly deviate from known values of standards after deployments are not necessarily the result of probe failure. These erroneous readings may be the result of fouling. If fouling is known to be the reason for these aberrant data, they may be removed from the dataset and noted in Section 12 (Deleted Data) of this document. If fouling is only suspected to be the cause of the anomalous data, or if the specific cause of the anomalies cannot be identified, the data are not deleted and the date and timestamp of the questionable data/events are noted in Section 11 (Data Anomalies) of this document. Gregg Sakowicz is responsible for data management.

3) Research Objectives

The water quality of the Mullica River and Great Bay has traditionally been relatively clean and free of excessive nutrient loading from anthropogenic sources. This is due to the fact that there is very little development or industry within the drainage basin of the

Mullica River and its tributaries. Great Bay had a large source of nutrient loading coming from a menhaden fish processing factory that was in operation from the early 1930's to the early 1960's and affected the lower portion of the bay. The river is relatively deep, five to nine meters in the section that is monitored. Great Bay averages about two meters in depth. The river also has a dark color due to tannins and humic compounds that are a natural product coming from the Pine Barrens and are present in large amounts within the river. It is believed that nutrients entering the river upstream do not get utilized within the river because of the lack of light penetration. The great depth of the river and the dark color from the tannins flowing down the river from the Pine Barrens hinders the utilization of these nutrients by planktonic organisms. Where the river empties into the bay, light penetration reaches the bottom of the bay and allows the utilization of the nutrients by phytoplankton, making this region more productive (Durand 1979). Water circulation questions within this unique estuary can be addressed by the use of data loggers. Because of the close proximity of the lower station to Little Egg Inlet, the effects of an influx of ocean water can have dramatic effects on both the water quality and on the biological aspect of the region. Upwelling along the coast is a common occurrence during the summer months. The influx of this water into the bay can and does affect larval fish transport into and out of the bay. The cooler ocean waters can have dramatic effects on the growth rates of many different species living in the area. Data loggers have been useful in tracking the physical changes within the estuary due to occurrences such as upwelling and storm events and will be helpful in translating the resulting biological events.

4) Research Methods

The YSI dataloggers are programmed to record temperature, specific conductance, salinity, dissolved oxygen, depth, pH, and turbidity every 30 minutes. Presently, four SWMP monitoring sites are established in the Mullica River/Great Bay Reserve. These monitoring sites extend from the fresh water/salt water interface at Lower Bank, approximately 25 kilometers up the Mullica River from the point where it joins Great Bay to the mouth of Great Bay, a distance of eight kilometers. Thus the data loggers cover a total of 33 kilometers in this estuarine system.

Calibration standards required for pH were purchased from Y.S.I. (p/n 3821 (pH 4), 3822 (pH 7), 3823(pH 10)). A two point calibration was used for pH, the first being pH 7 followed by either pH 4 or pH 10 (it was recommended we substitute pH10 for pH 4, or add it as a third calibration point, in early 2005; this was adopted for the downriver sites (B6 and B9) immediately and upriver sites (NE and BA) mid-2005).

Calibration standards required for conductivity were purchased from Y.S.I. (p/n 3168). A standard of either 20,000 us/cm or 10,000uS/cm, approved by Y.S.I., Inc., was used to calibrate for conductivity. (Production of the 20,000 us/cm solution was ceased and replaced by the production of the 10,000uS/cm in early 2005; this use of the new solution was adopted for the downriver sites (B6 and B9) immediately and will be used for the upriver sites (NE and BA) in 2006).

Dissolved oxygen was calibrated via a calibration cup filled with about 1/4 inch tap water, which creates a 100% water-saturated air environment for the sensor. The sensors were allowed to equilibrate in the cup before DO (% saturation) was calibrated. DO calibrations were performed immediately before deployment. The membrane on the oxygen probe was changed when anomalous data was recorded or when bad diagnostic values were observed during calibration or post-calibration, and almost every deployment during the summer months. Installation of the D.O. membrane was as follows: the datalogger was inverted (probes facing upwards) and the reservoir of the DO probe was filled with the appropriate solution, allowing a meniscus bubble to form over the DO terminals. The DO membrane was then stretched over the face of the probe and secured using a rubber O-ring. The membrane was inspected for folds or trapped bubbles. The membrane was then "burned in" by allowing the data logger to run in an unattended sampling mode sampling every 30 minutes for at least six hours.

Calibration of the turbidity probe was performed with a 0 NTU (National Turbidity Units) standard (de-ionized water) and a 100/123 NTU standard (supplied by YSI, inc., p/n 6073G) in the datalogger cup/cap; the depth of each solution was always 3 inches or greater, as was the distance between the probe optics and the bottom of the calibration cup. For the Turbidity wipers were replaced after every deployment. The "old" gray turbidity probe (6026 series) were calibrated to 100 NTU's. The new black turbidity probes (6136 series) were calibrated to 123 NTU's. This discrepancy, despite the use of the same calibration solution, is due to the ability of the black probe to "see" the preservative in the solution; readings in the field by each probe type are comparable.

Used conductivity and pH standards were stored for rinsing probes and performing post-deployment calibrations after retrieval and prior to cleaning loggers. Great care was taken to clean the data loggers before calibration, and each used standard was used once as a post-calibration solution and once as a rinse solution before being discarded (unless egregious contamination was suspected). Servicing an instrument generally took about two hours for each data logger plus the time involved with retrieval and deployment.

Dataloggers were deployed by inserting them in PVC pipes that are affixed to a permanent structure (in this case, two US Coast Guard channel markers, one bridge, and one commercial dock). A line was used to lower and recover the dataloggers.A cross-pin (stainless steel bolt) was inserted across the bottom of the pipe and served as an end-stop for the datalogger during its descent, assuring a maximum fixed depth and retaining the datalogger if the line parted. Vent holes were drilled or cut in the bottom of the pipe to allow for circulation of water across the probes. An antifouling paint (Petit Trinidad SLR) was used to coat the last few meters of the PVC pipes, both inside and out, to retard biofouling and subsequent blockage of the holes/vents. A locking cap provided security.

Every thirty minutes (eastern standard time, EST) during each sampling period measurements of specific conductance, salinity, temperature, dissolved oxygen, (percent saturation and mg/L), water level, pH, and turbidity were recorded. After approximately 14 days (for non-EDS dataloggers) or 30 days (for the EDS dataloggers), the datalogger

was removed from the PVC pipe. Deployment periods were often extended during 2005 because of weather restrictions. A YSI 600 data logger attached to a YSI 610-DM or 650-MDS handheld unit was then lowered to depth in order to sample in-situ water conditions at approximately the same depth at which data was recorded. A different calibrated and programmed YSI datalogger was then switched with the data logger being recovered. The recovered data logger was brought back to the laboratory for downloading, post-deployment calibration checking, cleaning, and re-calibration. For some retrievals (due to one of our three 6600 dataloggers being out for repairs or our desire to keep the same datalogger at the same SWMP site for consistency), the datalogger was not replaced but rather brought back to the field station, processed as described above, and re-deployed or replaced the next day (or as sooner if possible).

Upon retrieval, dataloggers were wrapped in a white towel and placed in a cooler for transport back to the laboratory. Dataloggers were then placed in an aerated bucket of tap water overnight before post-processing according to SWMP standard operating procedures. Post-processing involves the placing of the un-cleaned datalogger in standards and recording of the displayed values, to judge how well the probes maintained calibration, determine the effect of bio-fouling (if any), and judge whether probe failure occurred during the deployment. After this post-deployment calibration check, probes were cleaned as per SWMP SOP's and either re-calibration for the next deployment or capped for storage for later calibration and deployment.

Data loggers were programmed to start recording data a few hours before they were deployed in the field and allowed to run, typically overnight, in an aerated bucket, so these deployment files often contained "tail ends" of out-of-water data, which were used to diagnose the probes but deleted before the data were processed for import into the yearly datasets. The beginning and end of each data file was compared to the YSI 600 values and the data were checked for probe failure and fouling.

5) Site Location and Character

The Jacques Cousteau National Estuarine Research Reserve (JCNERR) at Mullica River/Great Bay is located on the northeast coast of the United States on the Atlantic Ocean. The estuary is near Tuckerton, New Jersey about 14 kilometers north of Atlantic City. All four locations can be characterized by having little macroalgae (few to no established beds in the immediate locale; only occasional seasonal and structurally-dependent fouling-type macroalgal communities) and fast moving tidal currents. All sites are in an undisturbed area with little impact from development or pollution. There were four active sampling stations in 2003:

1) Buoy 126 (B6) - 39º 30.478' N, 74º 20.308' W- located three kilometers from Little Egg Inlet on the eastern side of Great Bay and is 100 meters from the nearest land that is a natural marsh island. This is a naturally deep area that has never been dredged. It is located about 0.5 kilometers from an area in the Intracoastal Waterway, which is dredged regularly. The dredged material is coarse sand. The data logger at this location is attached

to Intracoastal Waterway Buoy 126 and is the closest monitoring station to Little Egg Inlet. This site can be characterized by having strong tidal currents, 2-3 knots, fine to course sand bottom with an extensive blue mussel bed surrounding the area. Groundwater inputs from margins of the estuary as well as surface flow from Mullica River account for the majority of freshwater coming into the system at this site, followed by input from rainwater from the marsh surface and above. In 2005, the average recorded depth was 2.98 meters with a range of 1.58 - 4.19 meters. Salinity ranged from 18.2 - 31.4 parts per thousand.

2) Buoy 139 (B9) - 39º 29.883'N, 74º 22.873' W- is located 4 kilometers from Buoy 126 on the western side of Great Bay and is located about one to one and one-half kilometers from land. The closest landform is an extensive salt marsh about 1.5 kilometers wide, which borders the upland area. This area is dredged on a regular basis every five to six years to maintain the channel at a depth of eight feet by the U.S. Army Corp of Engineers. The surrounding depth of the bay is approximately 2 meters. This site is characterized by having maximum currents of about 1.5 knots with a muddy sand bottom and with little structure or shell. Groundwater inputs from margins of the estuary as well as surface flow from Mullica River account for the majority of freshwater coming into the system at this site, followed by input from rainwater from the marsh surface and above. In 2005, the average recorded depth was 1.59 meters with a range of 0.64 – 2.89 meters. Salinity ranged from 16.2 – 31.2 parts per thousand.

3) Chestnut Neck (NE) - 39º 32.872' N, 74º 27.676' W - located 12 kilometers up the Mullica River from the mouth of the river. The river begins at a line drawn between Graveling Point and Oysterbed Point on the northwestern side of Great Bay. The Mullica River at this location is quite wide, about 250 meters. The data logger is attached to the dock of a small marina along the southern shore of the river adjacent to the main channel. This location has never been dredged. The site is characterized by having tidal currents of less then one knot, during both ebb and flood tide, and has a sandy bottom. Freshwater input is primarily from groundwater and watershed runoff. In 2005, the average recorded depth was 1.51 meters with a range of 0.39 - 3.08 meters. Salinity ranged from 2.0 – 26.8 parts per thousand.

4) Lower Bank (BA) - 39º 35.618' N, 74º 33.091' W - located 13 kilometers upriver of the Chestnut Neck location. The Mullica River at this site is about two hundred meters wide. The data logger is attached to a bridge going over the Mullica River and is located in the center of the river. The northern bank of the river is sparsely developed with single-family houses and has a steep bank about five meters high. The southern shore has an extensive marsh and fresh water wetland area about three kilometers wide. This site can be characterized by having fast tidal currents, just over one knot, deep water, and fine sand sediment. Freshwater input is primarily from groundwater and watershed runoff. In 2005, the average recorded depth was 1.93 meters with a range of 0.70 - 3.05 meters. Salinity ranged from 0.0 – 19.4 parts per thousand.

6) Data Collection Period

Site	File Name	Deploy Date	Time	Retrieve Date	Time
B6	B6031805	03/18/05	16:00	04/21/05	12:30
	B6042105	04/21/05	13:00	06/08/05	14:00
	B6060805	06/08/05	14:30	07/20/05	13:30
	B6072005	07/20/05	14:30	09/08/05	11:00
	B6090805	09/08/05	12:30	10/10/05	14:00
	B6101005	10/10/05	14:30	12/01/05	11:30
	B6120105	12/01/05	12:00	01/17/06	11:00
B9	B9033005	03/30/05	15:30	05/12/05	10:00
	B9051205	05/12/05	11:00	06/19/05	16:30
	B9062205	06/22/05	14:30	07/22/05	15:00
	B9072205	07/22/05	15:30	08/25/05	12:30
	B9082505	08/25/05	13:00	10/05/05	12:00
	B9100505	10/05/05	12:30	11/14/05	13:30
	B9111405	11/14/05	14:00	01/10/06	11:30
NE	NE011805	01/18/05	13:30	02/08/05	11:00
	NE020805	02/08/05	11:30	02/22/05	10:00
	NE022205	02/22/05	16:00	03/08/05	10:30
	NE031005	03/10/05	10:00	03/22/05	10:00
	NE032205	03/22/05	15:30	04/05/05	09:00
	NE040505	04/05/05	14:30	04/19/05	09:00
	NE041905	04/19/05	14:30	05/05/05	09:30
	NE050505	05/05/05	16:30	05/17/05	08:00
	NE051705	05/17/05	15:00	05/31/05	07:30
	NE053105	05/31/05	15:00	06/14/05	07:00
	NE061405	06/14/05	13:00	06/28/05	08:00
	NE062805	06/29/05	15:30	07/11/05	08:00
	NE071105	07/11/05	13:30	07/26/05	08:30
	NE072605	07/26/05	14:30	08/08/05	08:00
	NE080805	08/09/05	15:00	08/22/05	08:30
	NE082205	08/22/05	15:00	09/07/05	08:30
	NE090705	09/07/05	14:30	09/21/05	09:00
	NE092105	09/21/05	15:30	10/05/05	09:00
	NE100505	10/05/05	14:30	10/19/05	14:30
	NE101905	10/21/05	11:00	11/02/05	13:30
	NE110405	11/04/05	15:00	11/16/05	10:00
	NE111605	11/16/05	16:30	11/30/05	08:30
	NE113005	11/30/05	15:00	12/14/05	09:30
	NE121405	12/14/05	15:00	12/28/05	09:30

	NE122805	12/28/05	16:00	01/11/06	08:30
BA	BA122204	12/22/04	12:00	01/11/05	14:30
	BA011105	01/11/05	15:00	01/20/05	13:00
	BA021505	02/15/05	14:00	02/22/05	10:30
	BA022205	02/22/05	11:30	03/10/05	10:00
	BA031005	03/10/05	10:30	03/22/05	14:30
	BA032205	03/22/05	15:00	04/05/05	15:00
	BA040505	04/05/05	15:30	04/19/05	13:30
	BA041905	04/19/05	14:00	05/05/05	15:30
	BA050505	data lost to format error; unable to recover			
	BA051705	05/17/05	14:30	05/28/05	21:00
	BA053105	05/31/05	15:00	06/14/05	13:00
	BA061405	06/14/05	13:30	06/28/05	14:30
	BA062805	06/28/05	15:30	07/11/05	12:30
	BA071105	07/11/05	13:30	07/26/05	13:30
	BA072605	07/26/05	14:00	08/09/05	13:30
	BA080805	08/09/05	14:30	08/22/05	14:00
	BA082205	08/22/05	14:30	09/07/05	11:30
	BA090705	09/07/05	12:00	09/21/05	11:30
	BA092105	09/21/05	12:30	10/05/05	12:00
	BA100505	10/05/05	13:00	10/19/05	13:30
	BA101905	10/19/05	14:30	11/02/05	13:00
	BA110205	11/02/05	13:30	11/16/05	13:00
	BA111605	11/16/05	14:00	11/30/05	12:30
	BA113005	11/30/05	13:00	12/16/05	14:30
	BA121405	12/16/05	15:00	12/28/05	13:30
	BA122805	12/28/05	14:00	01/11/06	12:30

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 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.

8) Associated Researchers and Projects

During 2005, weekly ichthyoplankton sampling at Little Sheepshead Creek Bridge (LSCB) continued as part of the long-term sampling conducted by RUMFS in the JCNERR. Presence and abundance of larval fishes are determined with a plankton net (1 m, 1 mm mesh) deployed during night flood tides from abridge near Little Egg Inlet (New Jersey) in the Great Bay/Little Egg harbor portion of the NERR. Wire-mesh trapping conducted in the Rutgers boat basin, and system-wide otter trawling also continued in 2005 as part of long-term sampling within the Reserve.

RUMFS faculty and staff conducted their annual trawl survey at numerous sites from offshore of Little Egg Inlet to the freshwater interface up the Mullica River. SWMP data will be used in the analysis of community composition and species assemblage.

Data from the Chestnut Neck (NE) and Lower Bank (BA) SWMP stations were used for comparative and ground-truthing purposes for numerous research activities by RUMFS at Hog Island, Lower Bank, and adjacent sites.

Drs. Kenneth W. Able and Thomas Grotheus, as well as Doctoral Candidate Clare Eng, from the Rutgers University Marine Field Station (RUMFS)are studying species distributions, daily movements, and seasonal migration patterns of striped bass using surgically implanted hydroacoustic transmitters and an array of buoy-mounted receivers. The study area includes the Mullica River/Great Bay estuary, the southern end of Barneget Bay, and the coastal ocean outside of Little Egg Inlet off Tuckerton, New Jersey. Dr. Thomas Grotheusis using the 2005 SWMP water quality data extensively in his multivariate statistical analyses. Visit www.stripertracker.org for more information.

Dr. Mark Sullivan, RUMFS, is conducting research concerning eel ontogeny and distributions in the Little Egg Harbor-Mullica River waters. SWMP data will be used in the analysis of his data.

Roger Hoden, RUMFS, continued long-term monitoring and evaluation of diamondback terrapin (Malaclemys terrapin terrapin) habitat utilization along Great Bay Boulevard, within the JCNERR. The Boulevard, which bisects a seven-mile long peninsula within

the Reserve, offers valuable insight into juvenile and adult terrapin behavior. Samples for mortality studies are collected daily along the boulevard by staff of the Rutgers field station on their way to and from the field station, located at the end of this road.

Stephanie Szerlag, a student from St. Joseph's University and a JCNERR summer intern, tagged adult female terrapins on Great Bay Boulevard and tracked their movements, both terrestrial and aquatic, for a second summer (2004 and 2005). SWMP water-quality data were used in her analysis of these data.

Master's student candidate Dana Rowles (Rutgers University) is studying the species distributions, daily movements, and seasonal migration patterns of summer flounder using implanted and bridled hydroacoustic transmitters. This study is being conducted in the same manner as the Striper Tracker study mentioned previously.

Master's student candidate Jackie Toth (Rutgers University) will use water-quality data from Buoy 126 (B6) in her analyses of Atlantic bottle-nose dolphin distributions and social behaviors observed in reserve waters.

Master's candidate Jaimie Tirado, (Rutgers University) and NERRS Graduate Research Fellow (GRF), conducted surveys of submerged aquatic vegetation (SAV) and epiphytic loading in the Little Egg Harbor estuary. Data from the lower-estuary dataloggers (B126 and B139) will be used to discern the effect of water quality, among other parameters, on SAV bed dynamics.

Beth Darrow Cannon, Virginia Institute of Marine Sciences, is using the 2005 SWMP (both Water Quality and Nutrient) data in her analysis of fluctuations of nutrients within east coast estuaries.

Other projects orchestrated in the year 2005 in the JCNERR include the continuation of a biofouling project that was initiated in 2003. Conducted by the Research Coordinator and JCNERR staff, several biofouling panels constructed of PVC plates were secured to cages and placed on the bottom. Many of these panels were deployed at and near SWMP sites. One set of panels was retrieved per month from June through the end of October and were processed for species content after the samples were preserved.

II. Physical Structure Descriptors

9) Sensor Specifications

YSI 6600/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: Conductivity
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/cm (range dependent)

Parameter: Salinity
Units: parts per thousand (ppt)
Sensor Type: Calculated from conductivity and temperature
Range: 0 to 70 ppt
Accuracy: +/- 1.0% 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 to 20 mg/L, +/- 2 % of the reading or 0.2 mg/L, whichever is greater; 20 to 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
Range: 0 to 30 ft (9.1 m)
Accuracy: +/- 0.06 ft (0.018 m)
Resolution: 0.001 ft (0.001 m)

Parameter: Vented Level – Shallow (Depth)

Units: feet or meters (ft or m)
Sensor Type: Stainless steel strain gauge
Range: 0 to 30 ft (9.1 m)
Accuracy 0-10 ft: +/- 0.01 ft (0.003 m)
Accuracy 10-30 ft: +/- 0.06 ft (0.018 m)
Resolution: 0.001 ft (0.001 m)

Parameter: pH
Units: units
Sensor Type: Glass combination electrode (glass "globe" type)
Model #: 6561
Range: 0 to 14 units
Accuracy: +/- 0.2 units
Resolution: 0.01 units

Parameter: pH
Units: units
Sensor Type: Glass combination electrode (flat glass type)
Model #: 605091
Range: 0 to 14 units
Accuracy: +/- 0.2 units
Resolution: 0.01 units

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

Parameter: Turbidity
Units: nephelometric turbidity units (NTU)
Sensor Type: Optical, 90 ° scatter, with mechanical cleaning
Model #: 6026 ("gray probe"); discontinued but still in rotation at the up-river sites (NE and BA) until mid-2005.
Range: 0 to 1000 NTU
Accuracy: +/- 5 % reading or 2 NTU (whichever is greater)
Resolution: 0.1 NTU

The reliability of the dissolved oxygen (DO) data after 96 hours post-deployment for non-EDS (Extended Deployment System) data sondes may be problematic due to fouling which forms on the DO probe membrane during some deployments (Wenner et al. 200*). Many reserves have upgraded to YSI 6600 EDS data sondes, which increase 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 utilizing the DO data beyond the initial 96-hour time period. However, this potential drift is not always problematic for some uses of the data, ie.- periodicity analysis. It should be noted that the amount of fouling is 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.

The NERRS System-Wide Monitoring Program utilizes YSI data sondes 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 atmosphere 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 1millibar 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 is available, non-vented sensor depth measurements can be corrected for deployments between calibrations. Readings for both vented and non-vented sensors 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.

Important Note: The two "downriver sites" (B6 and B9) were monitored using un-vented YSI 6600EDS (Extended Deployment System) dataloggers with deployment periods of approximately 30 days. The two "upriver sites" (NE and BA) were monitored using vented YSI6600 dataloggers (non-EDS) with deployment periods of approximately 14 days.

10) Coded Variable Definitions

Sampling Station:	Sampling Site Code	Station Code
Buoy 126	B6	jacb6wq
Buoy 139	B9	jacb9wq
Lower Bank	BA	jacbawq
Chestnut Neck	NE	jacnewq

jac = Jacques Cousteau National Estuarine Research Reserve (formerly Mullica River Reserve)

wq = water quality data

example 1: B6031805 = this demonstrates the naming convention for deployment files. This denotes a deployment at Buoy 126 starting on 03/18/05.

example 2: jacB6wq2005 = the Jacques Cousteau National Estuarine Research Reserve's water quality data from Buoy 126 for the year 2005

11) Anomalous/Suspect Data

B6

The depth and salinity values at the end of the B6072005 deployment mis-match with the same values in the beginning of the B6090805 deployment. The depth can be explained by the following: the installation of a new PVC pipe between these two deployments on 09/08/05. This pipe is higher off the bottom than the previous housing. The discrepancy in salinity is presumed to be due to either the missing hour of incoming tide (associated with increasing salinity) or heavy algal fouling of the salinity probe.

The calibration of the DO probe appeared to slowly degrade during the B6120105 deployment, post-calibration values were poor (84-86% in a 100% environment) and the post-calibration DO Gain value was high and just within the acceptable range. Therefore, all DO values (both DO% and DO Conc) 12/01/05 12:00 - 01/17/06 11:00 should be considered suspect but were not deleted.

There are numerous turbidity "spikes" well above neighboring turbidity values in the 2005 dataset for B6, which should be considered suspect but not deleted:

04/07/05 00:30 and 01:30
04/08/05 03:30, 07:00, 09:30
05/21/05 02:30 and 03:00
07/07/05 02:30
07/16/05 22:30
07/18/05 18:30
07/19/05 06:30
11/24/05 11:30

B9

DO values degraded during the B9051205 deployment due to biofouling and/or battery charge. The DO membrane also failed post-calibration. It is not clear when the membrane failure happened, so consider all DO values (DO Conc and DO%) from (approximately) 06/10/05 to the end of the deployment (06/19/05 16:30) to be suspect but not deleted.

The depth and salinity values at the end of the B9033005 deployment mis-match with the same values in the beginning of the B9051205 deployment. The depth can be explained

by the following: the pipe was quickly removed, cleaned, and reinstalled between the two deployments on 05/12/05.

DO values degraded during the B9062205 deployment due to biofouling and/or battery charge. The DO membrane also failed post-calibration. It is not clear when the membrane failure happened, so consider all DO values (DO Conc and DO%) from (approximately) 07/16/05 to the end of the deployment (07/22/05 15:00) to be suspect but not deleted.

The depth and salinity values at the end of the B9072205 deployment mis-match with the same values in the beginning of the B9082505 deployment. The depth can be explained by the following: the installation of a new PVC pipe between these two deployments on 08/25/05.

DO values during the B9111405 deployment appear to have slowly degraded over the duration of the deployment (11/14/05 14:00 – 01/10/06 11:30). However, all diagnostic values (DO charge, DO gain, membrane integrity test) were well within acceptable limits. It is also noted that this was a unusually long deployment, so the DO prob may have "fallen off calibration" due to its extended activity. All DO values (DO Conc and DO%) from this deployment should be considered suspect but were not deleted.

There are numerous turbidity "spikes" well above neighboring turbidity values in the 2005 dataset for B9, which should be considered suspect but not deleted:

05/05/05 14:30
07/07/05 11:30
07/20/05 04:30
07/21/05 00:00 – 01:00
07/22/05 01:30, 02:00, 06:00, 10:00, 11:00
10/05/05 15:30
10/11/05 17:00
12/10/05 21:00

NE

Depth data from the NE020805 deployment appear to be elevated, possibly due to an error in calibrating depth. Therefore, all depth data from this deployment (02/08/05 11:30 – 02/22/05 10:00) should be considered suspect but were not deleted.

Dissolved Oxygen values recorded during the NE080805 deployment appear low and mismatch with the previous deployment, but all diagnostic values and post-deployment calibration checks were satisfactory. Therefore all DO values (DO Conc and DO%) 08/09/05 14:30 - 08/22/05 14:00 should be considered suspect but were not deleted.

Dissolved Oxygen values recorded during the NE082205 deployment mismatch with the previous and next deployments, but all diagnostic values and post-deployment calibration checks were satisfactory. Therefore all DO values (DO Conc and DO%) 08/22/05 15:00 - 09/07/05 08:30 should be considered suspect but were not deleted.

Dissolved Oxygen values recorded during the NE090705 deployment mismatch with the previous and next deployments and read high compared to field values collected with a YSI 650MDS/YSI600 "handheld unit", but all diagnostic values and post-deployment calibration checks were satisfactory. Therefore all DO values (DO Conc and DO%) 09/07/05 14:30 - 09/21/05 09:00 should be considered suspect but were not deleted.

Dissolved Oxygen values recorded during the NE092105 deployment mismatch with the previous and next deployments. Unfortunately, no field data were collected at time of retrieval for comparison. Therefore all DO values (DO Conc and DO%) 09/21/05 15:30 - 10/05/05 09:00 should be considered suspect but were not deleted.

There are numerous turbidity "spikes" well above neighboring turbidity values in the 2005 dataset for NE, which should be considered suspect but not deleted:

07/06/05 00:30
07/25/05 19:30
08/06/05 05:30
10/04/05 06:30
10/15/05 18:00
10/27/05 12:00

There were numerous negative turbidity values of -3 and -4 NTU's that fall slightly below the acceptable error of the turbidity probe (+/- 2 NTU's). This was likely due to calibration error. Data retained but suspect.

BA

There is a period of elevated DO values recorded between 11:30 and 13:30 on 02/22/05 at BA (BA022205 deployment). The reason for this anomaly is questionable, so the DO data (% and mg/L) from this period should be considered suspect, but were not deleted.

Post-calibration DO values read a bit low for the BA031005 deployment. Therefore, DO% and DO conc for this deployment (03/10/05 10:30 - 03/22/05 14:30) are suspect but were not deleted.

Post-calibration DO values read a bit low for the BA032205 deployment. Therefore, DO% and DO conc for this deployment (03/22/05 15:00 - 04/05/05 15:00) are suspect but were not deleted.

DO values appear to have degraded during the BA040505 deployment, but it is not apparent when this trend/event started. The DO probe also passed post-calibration.

Therefore the DO% and DO conc from this deployment (04/05/05 15:30 – 04/19/05 13:30) are suspect but were not deleted.

DO values appear to have degraded during the BA041905 deployment, but it is not apparent when this trend/event started. The DO probe also passed post-calibration. Therefore the DO% and DO conc from this deployment (04/19/05 14:00 - 05/05/05 15:30) are suspect but were not deleted.

DO values appear to have degraded during the BA062805 deployment, but it is not apparent when this trend/event started. The DO probe also passed post-calibration. Therefore the DO% and DO conc from this deployment (06/28/05 15:30 – 07/11/05 12:30) are suspect but were not deleted.

DO values appear to have degraded during the BA071105 deployment, but it is not apparent when this trend/event started. The DO probe also passed post-calibration. Therefore the DO% and DO conc from this deployment (07/11/05 13:30 – 07/26/05 13:30) are suspect but were not deleted.

DO values appear to have degraded during the BA072605 deployment, but it is not apparent when this trend/event started. The DO probe also passed post-calibration. Therefore the DO% and DO conc from this deployment (07/26/05 14:00 – 08/09/05 13:30) are suspect but were not deleted.

The DO values recorded during the BA090705 deployment appear a little low, but the DO probe passed post-calibration. Therefore the DO% and DO conc from this deployment (09/07/05 12:00 – 09/21/05 11:30) are suspect but were not deleted.

The DO values recorded during the BA092105 deployment appear a little elevated, and the DO probe post-calibrated a little high but passed. Therefore the DO% and DO conc from this deployment (09/21/05 12:30 – 10/05/05 12:00) are suspect but were not deleted.

While the DO probe used for the BA111605 deployment performed questionably (good values but poor diagnostic values) during post-calibration, the values obtained during the deployment appear reasonable. Therefore, the data from this deployment (11/16/05 14:00 – 11/30/05 12:30) were not deleted but are considered suspect.

There are numerous turbidity “spikes” well above neighboring turbidity values in the 2005 dataset for BA, which should be considered suspect but not deleted:

03/14/05	16:00
05/28/05	01:30, 18:00, 20:00
06/04/05	18:00
06/16/05	10:30, 11:00
06/21/05	04:30
06/24/05	09:30
06/25/05	09:30, 17:00, 17:30

06/27/05	06:30
06/28/05	05:00
06/30/05	07:30
07/02/05	17:30
07/04/05	01:30
07/04/05	18:30
07/05/05	09:00, 13:00
07/07/05	19:00
07/08/05	04:30
07/09/05	02:00, 06:30
07/10/05	11:00
07/13/2005	07:30
07/13/2005	11:00
07/13/2005	12:00
07/13/2005	12:00 – 13:30
07/13/2005	23:00 - 07/14/2005 00:00
07/14/2005	05:00 - 05:30
07/14/2005	19:30 - 20:00
07/15/2005	07:00
07/15/2005	12:30 - 13:00
07/15/2005	15:30
07/15/2005	18:30 - 19:00
07/15/2005	20:00 - 20:30
07/16/2005	09:30
07/16/2005	13:30
07/16/2005	14:30- 15:00
07/16/2005	16:00:00
07/17/2005	14:30
07/17/2005	23:30
07/19/2005	01:00
07/19/2005	18:30
07/20/2005	02:00
07/20/2005	07:30
07/20/2005	10:00
07/20/2005	12:30
07/21/2005	07:30
07/23/2005	09:30
07/29/05	23:30
08/01/05	16:00
08/03/05	09:30, 10:00, 16:30
08/04/05	06:00
08/09/05	23:00
08/24/05	14:30
09/15/05	06:00
10/01/05	17:30
10/03/05	05:00

10/06/05 23:30
11/01/05 13:00

Additionally, high biofouling was noted towards the end of the BA072605 deployment. Apparently elevated turbidity values recorded towards the end of this deployment may be due to obstruction of the optics and should be considered suspect, but were not deleted.

Additionally, many erratic turbidity spikes were recorded during the BA080805 deployment between 08/13/05 19:30 and 08/22/05 14:00. It is suspected that something (filamentous alga, detritus, etc.) was attached to the sonde guard and periodically drifted in front of the turbidity optics.

The turbidity data from the entire BA111605 deployment appear a little "noisy" but fouling during the deployment was minimal and calibration and post-calibrations were acceptable. Therefore, all turbidity data from this deployment (11/16/05 14:00 – 11/30/05 12:30) were not deleted but are considered suspect.

There were numerous negative turbidity values between -3 and -7 NTU's that fall below the acceptable error of the turbidity probe (+/- 2 NTU's). This was likely due to calibration error. Data retained but suspect.

12) Deleted Data

B6

Deleted all values for 04/06/05 08:00; according to depth data, datalogger was lifted out of the water. It is unclear whether this was a maintenance check by JCNERR staff or tampering.

Deleted all DO data (DO% and DO Conc) 06/26/05 18:00 – 07/20/05 13:30; there was a steep drop in DO values at this time and it was discovered during post-calibration that the DO membrane was heavily fouled and had been perforated during post-calibration.

Deleted all DO data (DO% and DO Conc) 08/03/05 00:00 – 09/08/05 11:00. It was apparent that bio-fouling overwhelmed the DO membrane and compromised the values. NOTE: the date and time at which this event occurred, and from which point the data were deleted, was approximated; 08/03/05 00:00 was selected as a result of visual examination and not a definitive date and time of the beginning of this event.

Deleted all turbidity data 08/07/05 02:30 – 09/08/05 11:00 due to heavy biofouling (filamentous algae on turbidity wiper and sonde guard as well as sediment collection in the sonde guard).

B9

DO values suddenly dropped out during the B9072205 deployment on 08/05/05 17:30. A perforation was discovered during post-calibration. All DO data (DO Conc and DO%) from 08/05/05 17:30 to the end of the deployment (08/25/05 12:30) were deleted.

Deleted all turbidity data 09/22/05 05:00 – 10/05/05 12:00 due to biofouling (some filamentous algae on turbidity wiper and a film of algae on optic surface).

NE

DO data from the NE032205 deployment are suspiciously low, are much lower than previous and successive deployments, and the datalogger used for this deployment post-calibrated poorly, therefore all DO data (% and mg/L) from this deployment (03/22/05 15:30 – 04/05/05 09:00) were deleted.

Deleted all DO data from the NE062805 deployment. The values were extremely low during the deployment, and the probe failed the post-deployment calibration check. All DO data (DO Conc and DO%) 06/29/05 15:30 - 07/11/05 08:00 were deleted.

Deleted all DO data from the NE072605 deployment. The values were extremely low during the deployment, and the probe failed the post-deployment calibration check. All DO data (DO Conc and DO%) 07/26/05 14:30 - 08/08/05 08:00 were deleted.

All DO data during the NE101905 deployment appear high (150-180% saturation), but the field data suggest that these high values may be an accurate record of a supersaturation event. Therefore the DO data from 10/21/05 11:00 - 11/02/05 13:30 were not deleted.

BA

All DO data (DO% and DO Conc) were deleted for the BA061405 deployment. The DO probe/membrane failed post-calibration. Therefore the DO% and DO conc from this deployment (06/14/05 13:30 – 06/28/05 14:30) were deleted.

The pH probe used during the BA072605 deployment failed post-calibration. Therefore, all pH data from BA072605 (07/26/05 14:00 – 08/09/05 13:30) were deleted.

All DO data (DO% and DO Conc) were deleted for the BA082205 deployment. The DO probe/membrane failed post-calibration. Therefore the DO% and DO conc from this deployment (08/22/05 14:30 – 09/07/05 11:30) were deleted.

The turbidity data from the entire BA110205 deployment appears extremely “noisy”. While calibration and post-calibrations were acceptable, little to no fouling was observed

and this probe continued to record very erratic values between sonde retrieval and termination of the sampling period. It is obvious that there is a problem with this probe. Therefore, all turbidity data from this deployment (11/02/05 13:30 – 11/16/05 13:00) were deleted.

The turbidity data from the entire BA113005 deployment appears extremely "noisy". This is the same probe used, and same issues observed in, the BA110205 deployment. While calibration and post-calibrations were acceptable, little to no fouling was observed and this probe continued to record very erratic values between sonde retrieval and termination of the sampling period. It is obvious that there is a problem with this probe. Therefore, all turbidity data from this deployment (11/30/05 13:00 – 12/16/05 14:30) were deleted.

The DO values recorded dropped to impossibly low levels during the BA121405 deployment, and the DO probe charge fell below acceptable limits. All DO data (DO % and DO Conc) from the BA121405 deployment (12/16/05 15:00 – 12/28/05 13:30) were deleted.

13) Missing Data

B6

01/01/05 00:00 – 03/18/05 15:30 due to ice and damages from ice-floes.

07/20/05 14:00; Both dataloggers were out of the water during the swap.

09/08/05 11:30-12:00; both dataloggers were out of the water during the swap.

B9

01/01/05 00:00 –03/30/05 15:00 due to ice and damages from ice-floes.

05/12/05 10:30; both dataloggers were out of water during the swap.

06/19/05 17:00 – 06/22/05 14:00. Data are missing from the B9052105 deployment due to premature battery failure.

NE

01/01/05 00:00 – 01/18/05 13:00. Dataloggers were removed from water on 12/30/04 due to ice floes.

02/22/05 10:30 – 15:30; datalogger was brought back to station for download and re-calibration.

03/08/05 11:00 – 03/10/05 09:30; datalogger was brought back to station for download and re-calibration.

03/22/05 10:30 – 15:00; datalogger was brought back to station for download and re-calibration.

04/05/05 09:30 – 04/05/05 14:00; datalogger was brought back to station for download and re-calibration.

04/19/05 09:30 – 14:00; datalogger was brought back to station for download and re-calibration.

05/05/05 10:00 – 16:00; datalogger was brought back to station for download and re-calibration.

05/17/05 08:30 – 14:30; datalogger was brought back to station for download and re-calibration.

05/31/05 08:00 – 05/31/05 14:30; datalogger was brought back to station for download and re-calibration.

Missing all Specific Conductivity and DO% data for 05/31/05 15:00 – 06/14/05 07:00; these data were lost in a formatting error and were not able to be recovered.

06/14/05 07:30 – 06/14/05 12:30; datalogger was brought back to station for download and re-calibration.

06/28/05 08:30 – 15:00; datalogger was brought back to station for download and re-calibration.

07/11/05 08:30 – 13:00; datalogger was brought back to station for download and re-calibration.

07/26/05 09:00 – 14:00; datalogger was brought back to station for download and re-calibration.

08/08/05 08:30 – 14:30; datalogger was brought back to station for download and re-calibration.

08/22/05 09:00 – 14:30; datalogger was brought back to station for download and re-calibration.

09/07/05 09:00 – 14:00; datalogger was brought back to station for download and re-calibration.

09/21/05 09:30 – 15:00; datalogger was brought back to station for download and re-calibration.

10/05/05 09:30 – 14:00; datalogger was brought back to station for download and re-calibration.

10/19/05 15:00 – 10/21/05 10:30; datalogger was brought back to station for download and re-calibration.

11/02/05 14:00 – 11/04/05 14:30; datalogger was brought back to station for download and re-calibration.

11/16/05 10:30 – 16:00; datalogger was brought back to station for download and re-calibration.

11/30/05 09:00 -14:30; datalogger was brought back to station for download and re-calibration.

12/14/05 10:00 – 14:30; datalogger was brought back to station for download and re-calibration.

12/28/05 10:00 – 15:30; datalogger was brought back to station for download and re-calibration.

BA

01/20/05 13:30 – 02/15/05 13:30; Datalogger was removed from pipe due to winter freeze/heavy ice floes.

02/22/05 11:00; both dataloggers were out of water during the swap.

05/05/05 16:00 – 05/17/05 14:00; an error in formatting during the download of the BA050505 depployment resulted in the loss of data collected during this period.

05/28/05 21:30 – 05/31/05 14:30; both dataloggers out of water for maintenance?

06/28/05 15:00; both dataloggers were out of water during the swap.

07/11/05 13:00; both dataloggers were out of water during the swap.

08/09/05 14:00; both dataloggers were out of water during the swap.

09/21/05 12:00; both dataloggers were out of water during the swap.

10/05/05 12:30; both dataloggers were out of water during the swap.

10/19/05 14:00; both dataloggers were out of water during the swap.

11/16/05 13:30; both dataloggers were out of water during the swap.

14) Post-deployment information

The following are the end-of-deployment post-calibration readings in standard solutions prior to cleaning.

Deployment	#	D.O.%	Depth	SpCond	pH7	pH10	pH4	Turb 0	Turb 100/123
B6031805	13	99.8	-0.036	19.73*	7.05	NST	3.97	0.4	120.1
B6042105	11	106.4	-0.001	19.82*	7.05	NST	4.20	0.1	124.6
B6060805	14	US	-0.007	19.31*	6.88	NST	3.83	1.3	129.8
B6072005	13	90.9	0.017	8.530**	7.32	9.86	NST	385	NST
B6090805	14	108.7	-0.162	10.05	7.06	10.14	NST	0.1	110.3
B6101005	11	84.6	-0.017	9.943	7.05	10.05	NST	0.3	123.2
B6120105	13	84	-0.066	9.998	7.17	10.14	NST	0.1	122.9
B9033005	14	98.8	0.125	20.05*	7.05	NST	4.33	0.2	122.3
B9051205	13	US	-0.045	19.82*	7.35	NST	5.25	0.9	129.8
B9062205	11	US	0.029	19.44*	7.22	NST	3.92	0.4	125.2
B9072205	14	119	0.090	9.55	7.25	10.30	NST	-0.4	120.2
B9082505	11	103.3	0.056	10.02	6.99	10.00	NST	1.2	117.6
B9100505	13	96.8	-0.094	10.02	7.01	10.04	NST	1.5	122.8
B9111405	14	US	-0.061	10.13	7.03	10.01	NST	0.8	127.8
NE011805	5	102.8	-0.003	18.33*	7.05	NST	4.11	2.1	NST (g)
NE020805	X	114.4	0.958	20.05*	7.09	NST	4.17	0	NST
NE022205	X	98.7	-0.001	19.89*	7.04	NST	4.06	0.3	NST
NE031005	X	100.5	0.001	19.78*	7.08	NST	4.10	0	NST
NE032205	12	79.6	0.007	19.82*	7.1	NST	4.20	-1.1	120.2
NE040505	12	97	0.000	19.84*	6.95	NST	4.90	4.3	149.0
NE041905	12	100.5	NR	19.52*	6.33	9.44	3.37	1.0	120.8
NE050505	12	103	NR	19.62*	698	9.43	4.35	-1.0	113.8
NE051705	12	98.8	NR	20.04*	6.98	10.27	4.34	0.5	112.5
NE053105	5	99.2	-0.004	19.64*	6.97	10.04	4.80	4.5	92.3 (g)
NE061405	5	101.9	0.013	18.73*	7.21	9.93	NST	0.2	78.3 (g)
NE062805	5	NST	-0.001	20.86*	6.95	10.05	NST	13.1	123
NE071105	5	NST	0.007	19.85*	7.12	9.84	NST	-4.4	122.0
NE072605	12	83.1	0.008	19.96*	7.26	9.91	NST	1.2	106.1
NE080805	12	101.5	-0.001	19.41*	6.92	9.89	NST	2.3	118.4
NE082205	12	100.4	0.000	19.89*	7.02	9.97	NST	-0.4	100.9

NE090705	12	105.9	0.001	19.40*	7.08	9.92	NST	8.0	118.1
NE092105	12	94.6	0.000	18.23*	6.99	10.43	NST	-3.2	110
NE100505	12	108.5	-0.001	19.93*	6.99	9.91	NST	12.0	108
NE101905	12	103.2	-0.002	19.83*	6.89	9.89	NST	4.2	120.3
NE110405	12	93	0.002	20.16*	7.07	10.00	NST	-2.0	118.5
NE111605	12	92.5	-0.001	19.98*	6.97	9.99	NST	9.1	116.3
NE113005	12	99.2	-0.001	19.49*	6.98	10.04	NST	-3.1	137.5
NE121405	12	94.2	0.000	20.89*	6.93	10.05	NST	-2.1	119.4
NE122805	12	98.9	0.002	21.01	7.24	NST	NST	0.0	128.2
BA122204	5	101.7	-0.001	20.2*	7.03	NST	4.10	1.7	NR (g)
BA011105	12	99.9	-0.002	20.09*	6.95	NST	4.02	0.5	NR
BA021505	5	115.9	0.000	NR	7.03	NST	4.16	5.3	NR
BA022205	12	105.1	0.000	20.03*	7.01	NST	4.10	0.4	NR
BA031005	5	89	0.003	NR	7.81	NST	4.11	0.1	NR (g)
BA032205	X	88.9	0.000	19.92*	7.04	NST	4.12	0.7	22.5
BA040505	5	100.1	-0.013	19.90*	7.03	NST	4.45	0.0	121.3 (g)
BA041905	X	NR	0.002	19.77*	6.95	9.99	4.19	-1.9	115.9
BA050505	5	89.5	-0.540	19.98*	7.17	10.02	4.48	-0.3	92.8 (g)
BA051705	X	117.6	0.002	19.99*	6.92	9.83	4.36	1.4	118
BA053105	12	116.6	-0.002	NR	6.87	9.81	4.43	-2.8	119.1
BA061405	X	77.6	0.000	19.81*	7.07	9.81	NST	-2.1	125.2
BA062805	12	111.9	0.000	22.22*	7.11	9.89	NST	6.8	121.4
BA071105	X	91.1	0.004	19.72*	7.26	10.08	NST	-4.4	122.9
BA072605	5	103.1	0.000	19.14*	4.9	4.80	NST	0.0	134.0
BA080805	X	105.4	-0.002	20.00*	6.98	9.80	NST	5.1	115.4
BA082205	5	70.4	-0.006	19.97*	7.15	10.00	NST	4.3	114.4
BA090705	X	104.9	-0.001	19.97*	6.69	9.95	NST	-6.8	103.9
BA092105	5	129.32	0.000	20.32*	7.01	NST	NST	-5.00	119.7
BA100505	X	100.5	0.000	20.03*	7.02	9.98	NST	-3.1	138.0
BA101905	5	101.8	0.002	20.02*	7.15	9.87	NST	-2.9	112.8
BA110205	X	99.7	0.002	20.24*	7.02	9.90	NST	-4.2	119.4
BA111605	5	91.3	0.005	19.38*	6.89	10.04	NST	-0.1	119
BA113005	X	104.0	0.000	20.00*	6.87	10.20	NST	0.0	123.0
BA121405	X	101.7	-0.002	19.89*	7.01	10.05	NST	-0.4	118.7
BA122805	X	99.0	0.004	19.88*	7.2	10.23	NST	2.3	129

Deployment= deployment file name
#= datalogger ID number
D.O.%= datalogger output in a 100% Dissolved Oxygen-saturated environment
Depth= datalogger output in a depth=0.000m environment
SpCond= datalogger output in a 10 or 20 millisiemens per centimeter conductivity standard solution
pH7= datalogger output in a pH7 standard solution
pH10= datalogger output in a pH10 standard solution
pH4= datalogger output in a pH4 standard solution
Turb0= datalogger output in a 0 NTU turbidity standard (e.g.- Deionized water)
Turb100/123= datalogger output in either a 100 or 123 NTU turbidity standard

NR= Value not recoded for unspecified reason(s)

NST= No sample taken. This could be for a number of reasons: the appropriate calibration solution may not have been available, the standard had not yet been phased in or had been phased out, or recording of the particular parameter had not yet been adopted as SOP.

(g)= use of the "old" gray turbidity probe (6026 series) rather than the new black turbidity probes (6136 series); the gray probes should read 100 NTU's in post-calibration, while the black probes read 123 NTU's.

*= Used 20 ms/cm3 conductivity standard instead of the 10 ms/cm3 standard.
**= this post-calibration value was bad presumably due to heavy fouling. Once cleaned, this probe post-calibrated accurately.

The following are field data recorded with a YSI600XL sonde paired with a YSI650MDS display ("handheld") unit immediately before deployment and immediately after retrieving the YSI6600/YSI6600EDS unit (and prior to the deployment of its replacement). The 600XL sonde was lowered to approximately the same depth as the recovered sonde, preferably inside the PVC housing itself when practical.

File	Type	Temp (C)	SpCond (mS/cm)	Sal (ppt)	D.O. %	D.O. Conc (mg/L)	pH	Depth (m)
B6031805	D	4.2	47.08	29.88	105.3	11.23	6.32	3.4
	R	15.02	35.68	22.55	98.5	8.65	7.08	2.921
B6042505	D	15.02	35.68	22.55	98.5	8.65	7.08	2.921
	R	NSA	NSA	NSA	NSA	NSA	NSA	NSA
B6060805	D	NSA	NSA	NSA	NSA	NSA	NSA	NSA
	R	28.9	28.9	25.62	107.3	7.17	7.2	NR
B6072005	D	28.9	28.9	25.62	107.3	7.17	7.2	NR
	R	23.84	23.84	30.89	99.6	7.04	6.4	NR
B6090805	D	23.84	23.84	30.89	99.6	7.04	6.4	NR
	R	19.89	19.89	30.82	82.8	6.28	6.91	3.896
B6101005	D	19.89	19.89	30.82	82.8	6.28	6.91	3.896
	R	9.86	9.86	28.66	114.5	10.08	6.77	3.071
B6120105	D	9.86	9.86	28.66	114.5	10.08	6.77	3.071
	R	5.11	5.11	30.02	95.9	10	7.42	3.62
B9033005	D	8.57	36.91	23.20	110.4	11.09	7.19	1.931
	R	15.6	42.13	27.10	126.8	10.70	7.72	1.831
B9051205	D	15.6	42.13	27.10	126.8	10.70	7.72	1.831
	R	22.16	43.47	27.91	106.7	7.96	7.57	1.230
B9062205	D	22.16	43.47	27.91	106.7	7.96	7.57	1.230
	R	29.37	39.56	25.08	115.2	7.65	7.32	NR
B9072205	D	29.37	39.56	25.08	115.2	7.65	7.32	NR
	R	24.67	46.17	29.95	95.6	6.70	7.13	NR

B9082505	D	24.67	46.17	29.95	95.6	6.70	7.13	NR
	R	21.52	46.29	30.07	93.6	6.93	6.88	2.118
B9100505	D	21.52	46.29	30.07	93.6	6.93	6.88	2.118
	R	12.97	41.20	26.18	94.5	8.46	NR	1.341
B9111405	D	12.97	41.20	26.18	94.5	8.46	NR	1.341
	R	NSA	NSA	NSA	NSA	NSA	NSA	NSA
NE011805*	D	2.1	10.7	5.94	95	12.6	3.63	NR
	R	1.01	32.18	19.38	108.8	13.52	7.47	NR
NE020805*	D	1.02	32.18	19.38	108.8	13.52	7.47	NR
	R	3.09	16.3	17.31	119.8	13.93	7.1	NR
NE022205*	D	3.94	15.3	8.78	98.8	12.22	7.1	NR
	R	4.23	21.8	18.13	104.4	12.07	7.68	NR
NE031005*	D	1.7	24.9	14.7	98.8	12.5	7.5	NR
	R	6.44	26.05	15.97	99.5	11.04	7.57	NR
NE032205*	D	6.71	20.06	11.89	96.6	10.96	NST	NR
	R	9.27	19.78	8.06	81.24	7.54	6.91	NR
NE040505*	D	10.39	4.88	2.62	99.1	10.91	7.01	NR
	R	14.83	15.03	8.94	92.61	8.69	7.30	NR
NE041905*	D	13.67	11.07	6.32	90.7	9.05	7.23	NR
	R	14.03	19.87	13.06	92.8	9.04	NR	NR
NE050505*	D	14.71	13.45	7.8	73.7	7.13	6.19	NR
	R	17.8	19.565	11.69	105.2	9.32	7.23	NR
NE051705*	D	18.3	23.94	14.57	78.7	6.99	6.62	NR
	R	17.76	19.75	15.81	80.9	7.45	NR	NR
NE053105*	D	18.55	23.86	14.51	80.6	6.92	NR	NR
	R	26.11	21.12	12.63	77.3	5.83	6.99	NR
NE061405*	D	26.21	24.41	14.8	87.3	6.49	NR	NR
	R	24.75	26.999	16.55	94.2	7.12	NR	NR
NE062805*	D	25.44	28.44	17.51	79.3	5.88	NR	NR
	R	20.70	0.153	0.07	48.0	4.30	NR	NR
NE071105*	D	24.86	27.86	17.13	62.1	4.07	NR	NR
	R	27.75	21.810	13.06	92.6	6.77	NR	NR
NE072605*	D	28.10	29.66	18.28	79.8	NR	NR	NR
	R	27.78	25.683	14.81	48.5	3.55	NR	NR
NE080805*	D	27.54	28.06	17.22	55.3	4.23	NR	NR
	R	26.82	25.733	15.66	53.5	3.92	NR	NR
NE082205*	D	27.18	31.83	19.78	73.1	5.20	NR	NR
	R	23.89	30.12	18.09	82.5	6.25	NR	NR
NE090705*	D	24.54	35.18	22.15	96.9	7.72	NR	NR
	R	25.3	28.725	18.89	87.3	5.23	NR	NR
NE092105*	D	25.07	24.12	NR	131.3	9.45	NR	NR
	R	NSA	NSA	NSA	NSA	NSA	NSA	NSA
NE100505*	D	NSA	NSA	NSA	NSA	NSA	NSA	NSA
	R	16.47	26.125	16.02	8.34	7.70	NR	NR
NE101905*	D	15.59	27.928	18.24	142.8	14.82	NR	NR
	R	11.82	23.28	13.96	180.3	19.23	NR	NR
NE110405*	D	12.24	19.056	14.50	98	24.26	NR	NR
	R	13.82	30.71	18.92	49.32	13.48	NR	NR
NE111605*	D	14.37	22.321	14.31	160.2	16.1	NR	NR
	R	8.27	29.314	17.01	137.7	14.41	NR	NR

NE113005*	D	9.21	17.69	10.13	91.1	9.80	NR	NR
	R	0.82	30.812	19.10	124.2	15.89	NR	NR
NE121405*	D	0.81	20.96	12.17	137.1	18.00	NR	NR
	R	3.11	26.659	15.99	128.4	15.46	NR	NR
NE122805*	D	3.35	17.90	10.39	89.1	11.08	NR	NR
	R	5.07	22.93	13.68	100.1	11.08	NR	NR
BA122204*	D	0.24	0.457	0.22	97	14.06	NR	NR
	R	5.4	1.51	0.76	86.8	10.91	NR	NR
BA011105*	D	5.4	1.51	0.76	86.8	10.91	NR	NR
	R	0.15	0.07	0.04	93	13.6	NR	NR
BA021505*	D	4.97	0.290	0.14	102.6	13.1	NR	NR
	R	3.21	2.697	1.38	102.6	13.1	NR	NR
BA022205*	D	3.21	2.697	1.38	100.1	13.28	NR	NR
	R	1.5	3.6	1.8	95.2	13.2	NR	NR
BA031005*	D	1.5	3.6	1.8	95.2	13.2	NR	NR
	R	8.6	0.107	0.05	94.9	11.08	NR	NR
BA032205*	D	8.59	0.107	0.05	94.9	11.08	NR	NR
	R	11.14	0.076	0.03	88.3	9.73	NR	NR
BA040505*	D	11.14	0.076	0.03	88.3	9.73	NR	NR
	R	16.32	0.079	0.04	86.6	8.48	NR	NR
BA041905*	D	16.32	0.079	0.04	86.6	8.48	NR	NR
	R	14.53	0.069	0.03	75.4	7.67	NR	NR
BA050505*	D	14.53	0.069	0.03	75.4	7.67	NR	NR
	R	20.38	1.016	0.50	70.2	6.31	NR	NR
BA051705*	D	20.38	1.016	0.50	70.2	6.31	NR	NR
	R	20.33	0.638	0.31	69.0	6.22	NR	NR
BA053105*	D	20.33	0.638	0.31	69.0	6.22	NR	NR
	R	28.43	2.904	1.50	74.6	5.75	NR	NR
BA061405*	D	28.43	2.904	1.50	74.6	5.75	NR	NR
	R	27.35	8.705	4.83	88.3	6.81	NR	NR
BA062805*	D	27.35	8.705	4.83	88.3	6.81	NR	NR
	R	25.74	3.079	1.60	79.9	6.45	NR	NR
BA071105*	D	25.74	3.079	1.60	79.9	6.45	NR	NR
	R	28.53	9.332	5.20	70.6	NR	NR	NR
BA072605*	D	28.53	9.332	5.20	70.6	NR	NR	NR
	R	26.49	6.540	3.56	71.3	5.62	NR	NR
BA080805*	D	26.49	6.540	3.56	71.3	5.62	NR	NR
	R	27.55	11.38	6.45	74.9	5.70	NR	NR
BA082205*	D	27.55	11.38	6.45	74.9	5.70	NR	NR
	R	24.06	15.88	9.30	103.2	8.23	NR	NR
BA090705*	D	24.06	15.88	9.30	103.2	8.23	NR	NR
	R	25.13	17.06	12.85	117.6	9.01	NR	NR
BA092105*	D	25.13	17.06	12.85	117.6	9.01	NR	NR
	R	NSA	NSA	NSA	NSA	NSA	NSA	NSA
BA100505*	D	NSA	NSA	NSA	NSA	NSA	NSA	NSA
	R	16.23	3.042	1.60	82.0	7.18	NR	NR
BA101905*	D	16.23	3.042	1.60	82.0	7.18	NR	NR
	R	11.64	1.818	0.93	85.6	9.25	NR	NR
BA110205*	D	11.64	1.818	0.93	85.6	9.25	NR	NR
	R	14.33	7.268	4.03	86.2	9.41	NR	NR

BA111605*	D	14.33	7.268	4.03	86.2	9.41	NR	NR
	R	10.12	0.996	0.50	92.6	10.39	NR	NR
BA113005*	D	10.12	0.996	0.50	92.6	10.39	NR	NR
	R	0.24	1.37	0.67	121.1	17.5	NR	NR
BA121405*	D	0.24	1.37	0.67	121.1	17.5	NR	NR
	R	4.79	0.148	0.07	89.9	11.54	NR	NR
BA122805*	D	4.79	0.148	0.07	89.9	11.54	NR	NR
	R	5.62	0.92	0.04	88.1	11.04	NR	NR

D= deployment (data obtained just prior to deploying the datalogger)
R= retrieval (data obtained just after retrieving the datalogger)
Temp (c)= Temperature in degrees Celsius
SpCond (ms/cm)= Specific Conductivity in millisiemens per centimeter cubed
Sal (ppt)= Salinity in parts per thousand
D.O.(%)= Dissolved Oxygen in percent saturation
D.O.Conc (mg/L)= Dissolved Oxygen concentration in milligrams per Liter
pH= standard pH units
Depth(m)= Depth in meters

NSA= No Sonde Available to obtain field value(s)

NST= No sample taken for unspecified reason(s)

NR= Value not recoded for unspecified reason(s)

* All field data for the “upriver” SWMP sites (NE and BA) are considered suspect due to a faulty temperature/conductivity probe on the YSI 600 sonde used to obtain the values. This faulty prove remained on the probe for a large period of the 2005 season and it is not clear when it was replaced. The data above are being submitted as a formality; it is advised that they not be used as the only method of determining the accuracy of the actual deployment data (the post-calibration values would be more reliable for this effort)

15) Other Remarks

On 08/12/2020 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.

There were a few instances at this NERR site where turbidity recorded small negative values (-0001 and -0002). Because this data falls within the probes range of accuracy (+/- 2 NTU), the technician did not edit or delete these values in any way.

Note to users: When utilizing these data, it is always best to also review the SWMP Weather Station (MET) dataset from this reserve to provide weather conditions that may affect the SWMP Water Quality (WQ) data from this reserver. For example, strong precipitation and strong sustained winds may cause elevations in turbidity and alter dissolved oxygen levels. Periods of drought may alter salinity patterns and lead to anoxic conditions in poorly-circulated regions of reserve waters. Hurricane and Nor'easter events may alter WQ parameters in the above, and other, manners. The JAC MET data will be available at the CDMO website (http://cdmo.baruch.sc.edu/) approximately June 2006.