

Jobos Bay (JOB) NERR Water Quality Metadata
January to December 2005
Latest Update: October 1, 2019

I. Data Set & Research Descriptors

1. Principal investigator(s) and contact persons

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2. Entry verification

After retrieving and carefully cleaning the data loggers, they are examined to detect any structural damage to the body or to the probes. The DO membrane is checked for ruptures and then replaced if needed. The turbidity probe is examined to assure that no obstruction affects the wiper and that the sensor is clean. Manipulation and observations are registered in the field log for each deployment respectively.

The YSI is connected to a Pentium IV 3.2 MHz IBM compatible computer and the data is reviewed using the YSI computer program Ecowatch for Windows that accompanies the YSI 6600

data logger. The file is uploaded in two formats, one in YSI PC6600 format and the other in Comma "Delimited format then the file is renamed to have a ".csv" extension. The YSI Ecowatch for Windows program is used to plot the data and delete the pre and post deployment data that are not in range of the other readings. Notes are made of any unusual data during that deployment. Files are exported from EcoWatch in a comma-delimited format (CSV) and opened in Microsoft Excel for pre-processing with the EQWin format macro that was developed by the CDMO. Data files are revised using the EQWinformat.xls macro that: 1) ensure parameters are in the correct order; 2) convert depth in feet to depth in meters; 3) format the data to the correct number of decimal points; 4) inserts an identifying station code; 5) insert a corrected time column; and 6) allows the user to remove any pre- and post-deployment data from the file. Where deployment overlap occurs between files, the data produced by the newly calibrated sonde is accepted as being the most accurate.

The pre-processed data are then copied into EQWin where: 1) the station and parameters are verified against the database; 2) the file configurations are checked; 3) the date and time formats are verified; 4) data are checked for duplication; 5) the data are checked for outliers (data outside the acceptable range for the sensors) and outlier reports produced; and 6) graphs are generated. The reports and graphs are printed and the data reviewed. Data at the beginning and end of each data record when the instrument was out of the water are deleted. These data are identified by field notes that document the times of deployment and retrieval and by the sudden change in Specific Conductivity and Depth records. Data in the remainder of the record are not deleted unless supporting reasons can be documented. EQWin is also used to generate statistics, view graphs, create customized queries and reports of the data, cross query the water, weather and nutrient data and finally export the data to the CDMO.

The anomalous data are evaluated to determine whether to flag or delete the suspect data. Data are flagged if the values are: 1) outside the range expected for the site (see Site Location and Character, Section 5), 2) outside the range of measurements and accuracy established for the sensors (see Section 9), or 3) outside the range established for good water quality conditions (e.g., Turbidity >150 NTU, negative Turbidity, variable DO, or sudden data spikes). Data outside the acceptable range of water quality for a particular site are investigated for validity based on weather data, field observations, QC checks, data printouts, and instrument diagnostics. Data are deleted if the anomalies are attributed to: 1) sensor malfunction - if the voltage reading of the sensor is outside the range established for the sensor or the sensor will not calibrate, 2) exposure of sensors during low tide - identified by unusual Depth, Temperature, and Specific Conductivity data, or 3) fouling of sensors by aquatic organisms, debris or sediment - detected by comparing in situ sensor with measurements (see Section 4). Turbidity readings > 900 NTU are deleted. In addition, sensor readings that differ significantly (>10%) from standard solutions (e.g., Conductivity) suggest that the sensor was fouled during deployment. After corrections are made to the pre-processed data in Excel, it is imported into the EQWin database and text files are submitted to the CDMO. All raw .csv files are also sent to the CDMO via FTP for archival. The data is stored in Zip and CD disks. The person responsible for the data QA/QC is Luis A. Encarnación.

3. Research Objectives

Four data loggers are deployed in Jobos Bay. Two are deployed in inner lagoons of the Mar Negro Component and the other two in the Bay of the Jobos Bay National Estuarine

Research Reserve. The instruments are suspended from a pole at a distance of 0.3 meters from the bottom at each selected site. Data from stations 9, 10, 19 and 20 are being submitted to the Centralized Data Management Office as part of the System-Wide Monitoring Program. Measurements are taken at thirty-minute intervals for approximately two-week periods. The sites are identified as representative of areas within the reserve and comparable to the sites that may be receiving impact from human activities from surroundings areas or may act as a habitat gradient in the Bay.

Station number nine (9), the impacted site, collects water quality data in a site associated with runoff from littoral and basin mangrove areas. This sampling station is located in the most inland lagoon, closest to the Thermoelectric Power Plant. It is subjected to runoff, which may include potential oil spill contamination from this industrial facility. Information compiled from historical environmental documents, indicate that station nine (9) was used as a disposal site for residues of the previously operating sugar mill operation, and therefore might have high organic input into the sediments.

Station number ten (10), located in a mangrove lagoon area towards the southwestern section of Mar Negro is considered the reference or non-impacted site.

Station number (19) is located over a sea grass bed (*Thalassia testudinum*) in the inner western part of the bay just northeast of Cayo Colchones. This station is located near the thermal outfall and operating piers of the Aguirre Power Plant Complex, both activities may have significant effects on sea grass communities. This area is exposed to barge standings, sediment re-suspension and oil spills.

Station number (20) is located on the eastern inner bay section of the Cayos Caribe cays. This station is just south of the mangrove islets associated with the Reserve's coral reefs. Water streams coming through the coral platform may help characterize water conditions of the main marine currents reaching Jobos Bay, as well as, possible effects of industrial and chemical activities associated with Phillips Core, AES Coal Energy Plant and Pharmaceuticals located just east to this system.

4. Research methods

The National Estuarine Research Reserve Water Quality Monitoring Program began sampling at Station nine (9) on December 20, 1995 and Station ten (10) on February 1, 1996. Monitoring at station 19 began in April 2002 and at station 20 in May 2002. Long term water quality monitoring is being performed at these stations.

Before each YSI 6600 data logger is deployed, calibration and maintenance is performed following the manufacturer's instruction (YSI Manual addendum 7/94, sections 3, 4 and 7). Calibration standards are only required for pH, salinity, and turbidity, all other parameters are done as described in the manual. Buffer solutions for two-point calibration (pH 7 and pH 10) are purchased from a scientific supply company. Salinity is calibrated with a specific conductance standard 100 mS/cm and is purchased from a scientific supply company.

The two-point turbidity calibration is performed using a 0 NTU (DI water) and 100 NTU standard purchased from a scientific company. The dissolved oxygen membranes are replaced before deployment and are allowed to sit at least 24 hours prior to deployment. Weather conditions and tide stage are recorded in the field observation log during deployment.

Measurements of DO, pH, salinity, specific conductance, and temperature, are taken with other calibrated field instruments to check the accuracy of the instrumentation.

Each YSI data logger is tied with steel cable to a wrought iron galvanized pole, which is plunged into the sediments at each sampling area. Data loggers are suspended from a pole at 0.3 meter from the bottom of the selected site. Every 30 minutes during the sampling period, the following measurements are recorded: date, time, temperature, specific conductance, salinity, dissolved oxygen saturation, dissolved oxygen concentration, depth, pH, and turbidity. Every two weeks the data loggers are retrieved, uploaded, cleaned, inspected, and calibrated as noted previously. The data logger is then ready to be deployed again.

5. Site location and character

The Jobos Bay National Estuarine Research Reserve (JBNERR) is located on the southern coastal plain of the island of Puerto Rico, a reserve within the West Indies geographical area. JBNERR is composed of two major areas: (1) Mar Negro, located on the western margin of the Bay, and (2) Cayos Caribe, a chain of 15 tear-shaped islets located to the southeast. The Mar Negro area comprises the bulk of the Reserve, and consists of mangrove forests and a complex system of lagoons and channels interspersed with salt and mud flats. Coral reefs and sea grass beds, with small beach deposits and upland areas fringe Cayos Caribe mangrove islands.

Station 9 is an impacted site and is located on the northeastern section of the Mar Negro component. This sampling station is associated with mangrove lagoon areas and receives runoff from mudflats, the Thermoelectric Power Plant, and adjacent areas. The tidal range varies from 12 to 14 inches near the monitoring station. The salinity at the vicinity of the monitoring station varies from 26.0 ppt to 41.1 ppt. The average depth at station 09 is 1 meter. The bottom is covered by a thick layer of thin sediments with a high content of organic material. Brown and green algae are also present at this site, but a better assessment is needed. The station pole is located at 17° 56' 36.8" N and 66° 14' 18.5" W. Fresh water input to the station comes only from runoff and rain. There is not any direct source of fresh water.

Station 10 is located in a mangrove lagoon not impacted directly by any upland or marine activities. It provides a reference for comparison of data obtained in other stations, especially to the station in Mar Negro lagoon. The tidal range varies from 12 to 14 inches. The salinity at the vicinity of the monitoring station varies from 27.0 ppt to 41.7 ppt. The average depth at station 10 is 1 meter. The bottom is covered with a layer of fine sediments with organic material, followed by a layer of calcareous material mainly from shells and oysters. At this site, we can find sea grass (*Thalassia*), calcareous algae (*Halimeda* sp.), green algae (*Caulerpa* sp.) and brown algae (*Dictyota* sp.) among others. The pole is located at 17° 56' 20.3" N and 66° 45' 26.7" W. Fresh water input to the station comes only from runoff and rain. There is not any direct source of fresh water.

Station 19 is located on the western inner section of the bay at a distance of 233 meters from Cayo Colchones Mangroves over sea grass beds (*Thalassia testudinum*). Tidal ranges in this area vary from 12 to 14 inches. The salinity at the vicinity of the monitoring station varies from 30.0 ppt to 36.0 ppt. The average depth at this station is of 2 meters. The YSI sonde is deployed at about 1 foot from the bottom. The bottom is of sandy composition. Sea grass, algae, echinoderms and other related organisms could be found in the area. The pole is located at 17° 56' 28.15885" N and 66° 13' 45.28784" W. There is no freshwater input to this area.

Station 20 is located in the inner eastern section at about 190 meters of Cayos Caribe Mangrove islets and at about 688 meters from the coral reef barrier. This station is the closest to Mar Caribe. It has a sandy bottom, with calcareous and coral fragments, sea grass (*Thalassia*) communities, echinoderms and other associated organisms. Tidal ranges in this area vary from 12 to 14 inches. The salinity at the vicinity of the monitoring station varies from 30.0 ppt to 36.0 ppt. The average depth of the site is 2 meters. There is no freshwater input to this area. The pole is located at 17° 55' 49.14258" N and 66° 12' 41.29771" W.

Data from stations 9, 10, 19 and 20 is being submitted to the CDMO. Eight sondes are permanently devoted to taking readings from these two sites, to assure continuous readings while sondes are taken out of the water for data upload and maintenance. This will avoid data gaps for the stations between sonde maintenance procedures. Due to errors in calibration, turbidity data in these files is considered inadequate. All monitoring is considered long term.

6. Data collection period

Station nine (9) sampling with the YSI began on December 20, 1995.

Station ten (10) sampling with the YSI began on February 1, 1996.

Station nineteen (19) sampling with the YSI began on April 1, 2002.

Station twenty (20) sampling with the YSI began on May 13, 2002.

Began		Ended	
Station 09			
12/22/04	14:00	1/14/05	11:00
1/14/05	11:30	1/25/05	10:00
1/25/05	11:00	2/09/05	09:30
2/09/05	10:30	2/23/05	11:30
2/23/05	12:00	3/08/05	9:00
3/08/05	09:30	3/22/05	08:30
3/22/05	09:30	4/05/05	09:30
4/05/05	10:00	4/20/05	09:30
4/20/05	10:00	5/04/05	10:00
5/04/05	10:30	5/25/05	09:00
5/25/05	09:30	6/07/05	09:00
6/07/05	09:30	6/21/05	09:30
6/21/05	10:00	7/18/05	19:30
7/19/05	09:30	8/02/05	09:00
8/02/05	09:30	8/16/05	09:30
8/16/05	10:00	8/30/05	09:30
8/30/05	10:00	9/13/05	09:00
9/13/05	09:30	9/27/05	08:30
9/27/05	09:00	10/13/05	06:30
10/13/05	07:00	10/26/05	09:00
No data			

10/26/05	09:30	11/08/05	09:00
11/08/05	09:30	11/22/05	06:00
11/22/05	09:30	12/6/05	09:00
12/06/05	09:30	12/21/05	10:30
12/21/05	11:00	01/04/06	09:00

Station 10

12/22/04	14:30	1/14/05	10:30
1/14/05	11:30	1/25/05	10:00
1/25/05	10:30	2/09/05	09:00 *
2/09/05	09:30	2/23/05	11:00
2/23/05	11:30	3/08/05	09:30
3/08/05	10:00	3/22/05	08:00
3/22/05	08:30	4/05/05	09:00
4/05/05	09:30	4/20/05	08:30
4/20/05	09:00	5/04/05	10:00
5/04/05	10:30	5/25/05	08:30
5/25/05	09:00	6/07/05	08:00
6/07/05	08:30	6/21/05	08:30
6/21/05	09:00	7/19/05	09:00 No data
7/19/05	09:30	8/02/05	09:00
8/02/05	10:00	8/16/05	09:00
8/16/05	09:30	8/30/05	05:00
8/30/05	09:00	9/13/05	08:30
9/13/05	09:00	9/27/05	09:00
9/27/05	09:30	10/13/05	09:00
10/13/05	09:30	10/26/05	09:00
10/26/05	09:30	11/08/05	09:30
11/08/05	10:00	11/22/05	08:30
11/22/05	09:00	12/6/05	09:00
12/06/05	09:30	12/21/05	10:00
12/21/05	10:30	01/04/06	13:30

* intermittent data collected due to battery connection

Station 19

12/29/04	08:30	1/20/05	09:00
1/20/05	09:30	2/01/05	08:30
2/01/05	09:30	2/16/05	09:00
2/16/05	09:30	3/02/05	09:00
3/02/05	09:30	3/15/05	08:30
3/15/05	09:30	3/30/05	09:30
3/30/05	10:00	4/12/05	08:30
4/12/05	09:30	4/26/05	08:30
4/26/05	09:00	5/11/05	09:30

5/11/05	10:00	6/01/05	11:00
6/01/05	11:30	6/13/05	07:30
6/13/05	10:00	7/07/05	08:30
7/07/05	09:00	7/28/05	09:30
7/28/05	10:00	8/09/05	05:30
8/09/05	10:00	8/23/05	08:30
8/23/05	09:00	9/07/05	09:00
9/07/05	09:30	9/20/05	03:30
9/20/05	09:00	10/04/05	08:00
10/04/05	08:30	10/18/05	12:30
10/18/05	13:30	11/01/05	07:00
11/01/05	09:00	11/15/05	08:30
11/15/05	09:00	11/29/05	08:30
11/29/05	09:30	12/13/05	09:00
12/13/05	09:30	12/29/05	09:30
12/29/05	10:00	01/04/06	09:30

Station 20

12/29/04	09:00	1/20/05	10:00
1/20/05	10:30	2/01/05	10:30
2/01/05	11:00	2/16/05	10:00
2/16/05	10:30	3/02/05	09:00
3/02/05	09:30	3/15/05	09:00
3/15/05	09:30	3/30/05	12:30
3/30/05	13:00	4/12/05	08:30
4/12/05	09:00	4/26/05	08:30
4/26/05	09:00	5/11/05	10:00
5/11/05	10:30	6/01/05	11:00
6/01/05	11:30	6/13/05	09:30
6/13/05	10:30	7/07/05	09:30
7/07/05	10:00	7/28/05	10:00
7/28/05	10:30	8/09/05	10:00
8/09/05	10:30	8/23/05	10:30
8/23/05	11:00	9/07/05	09:00
9/07/05	10:00	9/20/05	10:30
9/20/05	11:00	10/04/05	08:00
10/04/05	08:30	10/18/05	12:30
10/18/05	13:30	11/01/05	10:00
11/01/05	10:30	11/15/05	09:00
11/15/05	09:30	11/29/05	09:00
11/29/05	09:30	12/13/05	02:30
12/13/05	10:00	12/29/05	09:00
12/29/05	09:30	01/04/06	09:30

No data

7. Distribution

According to the Ocean and Coastal Resource Management Data Dissemination Policy for the NERRS System-Wide Monitoring Program:

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 the NERR site where the data is collected will be contacted and fully acknowledge in any subsequent publication in which any part of the data are used. Manuscripts resulting from the NOAA/OCRM supported research that are produced for publication in open literature, including referenced scientific journals, will acknowledge that the research was conducted under an award from the Estuarine Reserves Division, Office of Ocean and Coastal Resources 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 analysis 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 1. Principal Investigator and contact persons), from the Data Manager at the Central Data Management Office, (please see personnel directory under general information link on CDMO homepage (<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

As part of the NERRS System-wide Monitoring Program, monthly samples for nutrients and chlorophyll were conducted from January to December 2004. Nutrient Sampling at Station 9 is conducted using an ISCO sampler, which collects samples every two hours during a twenty-four hour period. Grab samples are also collected in all four YSI monitoring stations. Analysis of the samples is being performed by the Virginia Institute of Marine Science, VIMS, in Virginia.

Another project is the water monitoring program for Ammonium, nitrate, nitrite, ortho-phosphate, chlorophyll and pheophytin. For this, an ISCO 6712 Portable Sampler is used. The sampler is an automatic instrument that can be easily moved from site to site. Constructed from durable, corrosion-resistant materials, the sampler withstands the hostile environments of industrial and municipal monitoring sites. It is located at one of our four principal, long-term stations and it is programmed to take samples every two hours. The samples are collected every month following an established protocol and sent to the Virginia Institute of Marine Sciences Lab for further analysis.

II. Physical Structure Descriptors

9) Sensor specifications

YSI 6600/YSI 6600EDS data logger

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: Vented Level – Deep (Depth)

Units: feet or meters (ft or m)

Sensor Type: Stainless steel strain gauge

Range: 0 to 656 ft (200 m)

Accuracy: +/- 1 ft (0.3 m)

Resolution: 0.001 ft (0.001 m)

Parameter: pH (specify whether EDS probe or not)

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: nephelometric turbidity units (NTU)

Sensor Type: Optical, 90 ° scatter, with mechanical cleaning

Model #: 6136

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. All data sondes used at JBNERR sites in 2004 were non-EDS models.

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 are 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. All data sondes used at the JBNERR sites in 2004 were non-vented models.

10. Coded variable indicator and variable code definitions

Sampling Station:	Sampling Site Code:	Station Code
Station 9	09	job09wq
Station 10	10	job10wq
Station 19	19	job19wq
Station 20	20	job20wq

11. Anomalous Data/Suspected Data

On 07/12/2019 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.

February 1-28, 2005

Negative values for DO% and DO mg/l sometimes occur due to anoxic conditions in the water column.

Station 09		DO%	DO mg/l
2/10/2005	00:01:00	-22.4	-1.54

May 1-31, 2005

Negative values for DO% and DO mg/l sometimes occur due to anoxic conditions in the water column.

Station 10		DO%	DO mg/l
5/25/2005	13:00:40	-2.7	-0.16

July 1-31, 2004

Negative values for DO% and DO mg/l sometimes occur due to anoxic conditions in the water column.

Station 09		DO%	DO mg/l
7/13/2005	14:31:00	-8.3	-0.54
7/13/2005	15:01:00	-9.9	-0.65
7/13/2005	15:31:00	-7.5	-0.49
7/13/2005	17:01:00	-3.2	-0.21
7/13/2005	18:01:00	-0.8	-0.06
7/13/2005	18:31:00	-2.4	-0.16
7/13/2005	20:31:00	-4.8	-0.31
7/14/2005	18:01:00	-2.5	-0.16
7/14/2005	18:31:00	-1.2	-0.08
7/14/2005	19:01:00	-3.6	-0.23
7/15/2005	19:01:00	-1.3	-0.09
7/15/2005	22:31:00	-7.4	-0.48

Station 10		DO%	DO mg/l
7/31/2005	6:30:40	-0.4	-0.02

Station 19

Anomalous DO% and DO mg/l product of a high energy wave.

		DO%	DO mg/l
7/4/2005	2:00:40	-50	-3.07
7/4/2005	2:30:40	-50	-3.06
7/4/2005	3:00:40	-50	-3.06
7/4/2005	3:30:40	-50	-3.1
7/4/2005	4:00:40	-46.1	-2.86
7/4/2005	4:30:40	-50	-3.07
7/4/2005	5:30:40	-50	-3.07
7/4/2005	6:30:40	-50	-3.07

7/4/2005	7:00:40	157.2	9.8
7/4/2005	8:00:40	-50	-3.07
7/4/2005	10:30:40	-50	-3.05
7/4/2005	12:00:40	-41.2	-2.52
7/4/2005	16:30:40	-50	-3.05
7/4/2005	17:00:40	-50	-3.05
7/4/2005	17:30:40	144.8	8.86
7/4/2005	18:00:40	500	30.92
7/4/2005	19:30:40	-50	-3.07
7/4/2005	20:00:40	483.6	29.97

August 1-30, 2005

Negative values for DO% and DO mg/l sometimes occur due to anoxic conditions in the water column.

Station 10		DO%	DO mg/l
8/31/2005	18:30:40	-50	-2.97
8/31/2005	19:00:40	-34	-2.03
8/31/2005	19:30:40	-12.8	-0.76
8/31/2005	20:00:40	-0.2	-0.01
8/31/2005	22:30:40	-9.2	-0.56

September 1-31, 2005

Negative values for DO% and DO mg/l sometimes occur due to anoxic conditions in the water column.

Station 09		DO%	DO mg/l
9/1/2005	09:00:00	-000.2	00.0

October 1-30, 2005

Negative values for DO% and DO mg/l sometimes occur due to anoxic conditions in the water column.

Station 09		DO%	DO mg/l
10/13/2005	3:31:00	-8.1	-0.41
10/13/2005	4:01:00	-6.7	-0.34
10/13/2005	5:01:00	-7.9	-0.4
10/13/2005	5:31:00	-33.4	-1.7
10/13/2005	6:01:00	-45.6	-2.31
10/13/2005	6:31:00	-21.8	-1.1

12. Deleted Data

January 1-31, 2005

Station 10

Depth data were deleted due to calibration problem.

1/14/2005 11:30:40 – 01/25/2005 10:00:

Station 20

Turbidity data deleted because it was out of the detection limit of the sensor.

1/20/2005	14:30:40	1042.7
1/21/2005	3:00:40	1035.4
1/21/2005	6:30:40	1033.5
1/21/2005	9:00:40	1033
1/21/2005	10:30:40	1034.3
1/21/2005	11:30:40	1036.3
1/21/2005	12:30:40	1038.6
1/21/2005	23:30:40	1037.3
1/22/2005	5:00:40	1033.6
1/22/2005	6:00:40	1031.1
1/22/2005	7:00:40	1016.7
1/22/2005	12:30:40	1039
1/22/2005	21:00:40	1042.1
1/22/2005	21:30:40	1041.5
1/22/2005	23:00:40	1039.4
1/23/2005	0:30:40	916.1
1/23/2005	2:00:40	1036.8
1/23/2005	7:30:40	1033.2
1/23/2005	13:30:40	1041
1/24/2005	21:00:40	1041
1/26/2005	8:30:40	1033
1/26/2005	17:30:40	1027.7
1/28/2005	10:00:40	1033.3

February 1-28, 2005

Station 09

Dissolved Oxygen data deleted due to bubble on membrane.

2/10/2005 00:01:00 – 2/23/2005 11:31:00

Station 19

Turbidity data deleted because it was out of the detection limit of the sensor.

2/6/2005	10:00:40	933.9
2/22/2005	21:00:40	924.6

Station 20

Turbidity data deleted because it was out of the detection limit of the sensor.

2/14/2005 5:30:40 1805.1

March 1-31, 2005

Station 19

Turbidity data deleted because it was out of the detection limit of the sensor.

3/27/2005 15:30:40 1061.1

Station 20

All data deleted because the sonde was out of the water.

3/30/2005 12:00:40 – 12:30:40

April 1-30, 2005

Station 19

Dissolved Oxygen deleted due to calibration problem.

4/12/2005 09:31:00 – 4/26/2005 08:31:00

May 1-31, 2005

Station 10

Dissolved Oxygen data deleted due to tear in membrane.

5/16/2005 03:30:40 – 5/25/2005 09:30:40

Station 19

Turbidity data deleted because it was out of the detection limit of the sensor.

5/4/2005	21:30:40	917.3
5/5/2005	1:00:40	3135.4
5/5/2005	9:00:40	1078
5/6/2005	9:30:40	1527.3
5/7/2005	20:30:40	2719.7
5/9/2005	5:00:40	1533.8
5/9/2005	17:30:40	1297.7
5/10/2005	4:30:40	1281.6
5/11/2005	5:00:44	1184
5/11/2005	5:30:40	1012.6

Station 20

Turbidity data deleted because it was out of the detection limit of the sensor.

5/9/2005 12:00:40 3088.5

June 1-30, 2005

Station 09

Turbidity data deleted because it was out of the detection limit of the sensor.

6/1/2005	20:00:40	1775
6/28/2005	10:30:21	1673.5
6/28/2005	10:00:20	1483
6/28/2005	14:30:27	1371.8
6/28/2005	15:00:28	1660.6
6/28/2005	20:30:37	1192.5
6/29/2005	2:30:27	1574.4
6/29/2005	3:00:27	1651.9
6/29/2005	7:00:39	1014.8
6/29/2005	7:30:36	1646.7

Station 10

All data deleted because the sonde was out of the water.

6/7/2005	8:30:40
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Turbidity data deleted because it was out of the detection limit of the sensor.

6/5/2005	18:30:40	1289.7
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Station 19

Turbidity data deleted because it was out of the detection limit of the sensor.

6/28/2005	1:00:40	1058.7
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Station 20

Turbidity data deleted because it was out of the detection limit of the sensor.

6/1/2005	11:00:40	957.4
6/5/2005	3:31:00	1904.7

July 1-31, 2005

Station 09

Turbidity data deleted because it was out of the detection limit of the sensor.

7/10/2005	1:30:33	1643.3
7/25/2005	1:30:40	3799.9

Station 19

Turbidity data deleted because it was out of the detection limit of the sensor.

7/13/2005	13:30:40	1927.1
7/27/2005	23:30:40	3799.9
7/28/2005	0:00:40	1723.2

Station 20

Turbidity data deleted because it was out of the detection limit of the sensor.

7/5/2005	5:00:40	995.1
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August 1-30, 2005

Station 09

Turbidity data deleted because it was out of the detection limit of the sensor.

8/9/2005 19:00:40 1363.4

Station 10

Dissolved Oxygen data were deleted due to a calibration problem.

8/30/2005 9:00:40 – 8/31/2005 23:30:40

Station 19

Turbidity data deleted because it was out of the detection limit of the sensor.

8/22/2005 1:30:40 900.3

Station 20

Dissolved Oxygen data were deleted due to a probe malfunction.

08/9/2005 10:30:40 – 08/23/2005 10:30:40

September 1-31, 2005

Station 09

Turbidity data deleted because it was out of the detection limit of the sensor.

9/19/2005 2:30:40 2323.4

All data deleted due to temperature probe failure.

9/28/2005 18:30:28 – 9/30/2005 23:30:38

Station 10

Dissolved Oxygen data were deleted due to a calibration problem.

9/1/2005 0:00:40 – 9/13/2005 8:30:40

Station 19

Turbidity data deleted because it was out of the detection limit of the sensor.

9/26/2005 4:00:40 1021.3

9/26/2005 6:30:40 1272.7

9/26/2005 8:00:40 2413.7

9/26/2005 9:30:40 3799.9

Station 20

Turbidity data deleted because it was out of the detection limit of the sensor.

9/15/2005 20:30:40 1030.2

9/16/2005 19:30:40 1029.6

October 1-30, 2005

Station 09

All data deleted due to temperature probe failure.

10/1/2005 00:00:39 - 10/13/2005 06:31:00

Station 20

Turbidity data deleted because it was out of the detection limit of the sensor.

10/8/2005	9:30:40	3352.6
10/9/2005	9:30:40	2300.1
10/9/2005	17:00:40	987.9
10/9/2005	20:30:40	1179.2
10/10/2005	2:30:40	1328
10/13/2005	0:30:40	2451.7
10/14/2005	11:00:40	1279.2
10/14/2005	17:00:40	2278
10/16/2005	0:00:40	1138.7
10/16/2005	2:00:40	1620
10/17/2005	8:30:40	1153.6

November 1-30, 2005

Station 19

Turbidity data deleted because it was out of the detection limit of the sensor.

11/1/2005	0:00:57	1562
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Station 20

Turbidity data deleted because it was out of the detection limit of the sensor.

11/30/2005	16:30:12	1508.1
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December 1-31, 2005

Station 10

Depth data deleted due to calibration problem.

12/21/2005 10:30:40 – 1/4/2005 23:30:40

All parameter data deleted because the sonde was out of the water.

12/22/2005	2:30:00
12/22/2005	3:00:00
12/22/2005	3:30:00

Station 19

Turbidity data deleted because it was out of the detection limit of the sensor.

12/13/2005	13:30:40	3094.9
12/15/2005	8:00:40	3799.9

Station 20

Turbidity data deleted because it was out of the detection limit of the sensor.

12/1/2005	16:30:13	1520.9
12/3/2005	6:30:35	1268.5

13. Missing data

Data are missing due to equipment failure where no probes deployed, maintenance/calibration of equipment, elimination of obvious outliers, or elimination of data due to calibration (both pre and post) problems. For more details on deleted data, see Deleted Data Section (12.) If additional information on missing data are needed, contact the Research Coordinator at the reserve submitting the data.

14. Post deployment information

End of deployment Post-calibration Readings in Standard Solution:

Site ID	Date (mm/dd/yy)	DO Air sat. std: 100%	pH std:7	pH10 std:10	Depth m	Conductivity (ms/cm) std. 92	Turbidity (NTU) std. 0	Turbidity (NTU) std. 123
St 9	1/14/2005	*	*	*	*	*	*	*
St 9	1/25/2005	100.6	6.99	10.18	0.02	89	0	120.4
St 9	2/9/2005	83.2	6.92	9.7	-0.034	86.6	0.2	122
St 9	2/23/2005	41.5	7.85	11.03	0.062	97.4	4.8	126.2
St 9	3/8/2005	92.3	7.07	9.98	-0.023	102.7	1.7	125.8
Site ID	Date (mm/dd/yy)	DO Air sat. std: 100%	pH std:7	pH10 std:10	Depth m	Conductivity (ms/cm) std. 95	Turbidity (NTU) std. 0	Turbidity (NTU) std. 123
St 9	3/22/2005	101.9	7.25	10.22	-0.006	96.3	4.4	124
St 9	4/5/2005	98	7.31	10.05	0.02	93.56	3.5	110
St 9	4/20/2005	89.7	7.02	10.02	-0.055	95.24	3.8	124
St 9	5/4/2005	86.7	6.9	9.86	0.036	97.37	43.8	165.3
St 9	5/25/2005	88.4	7.05	9.91	-0.02	99.2	3.8	120.3
St 9	6/7/2005	95.1	7.27	10.13	0.005	94.11	22	152
St 9	6/21/2005	103.4	6.95	9.74	0.01	93.2	4.3	125.8
St 9	7/19/2005	104.2	7	9.82	0.014	97.15	17.8	62.1
St 9	8/2/2005	61.4	7.6	10.42	0.002	91.81	5.6	120.6
St 9	8/16/2005	78	7.55	10.14	-0.015	91.3	1.8	126.4
St 9	8/30/2005	99	7.3	10.27	-0.038	95.82	0	123.9
St 9	9/13/2005	105.8	7.15	10.06	0	93.23	-0.9	118.7
Site ID	Date (mm/dd/yy)	DO Air sat. std: 100%	pH std:7	pH10 std:10	Depth m	Conductivity (ms/cm) std. 50	Turbidity (NTU) std. 0	Turbidity (NTU) std. 123
St 9	9/27/2005	0.4	7.1	10.01	-0.027	47.7	0.2	123.8
St 9	10/13/2005	47.8	4.61	4.67	-0.05	21.16	3	165.5
St 9	10/26/2005	*	*	*	*	*	*	*

St 9	11/8/2005	97.6	7	9.92	-0.023	49.41	11.6	131.8
St 9	11/22/2005	98.3	7.36	10.1	-0.054	49.6	5.1	128
St 9	12/6/2005	91.8	7.06	9.94	0.027	50.82	47.2	138.2
St 9	12/21/2005	94.8	7	9.87	0	49.02	3.4	121.6
St 9	1/4/2006	66.9	*	*	*	*	*	*

Site ID	Date (mm/dd/yy)	DO Air sat. std: 100%	ph7 std:7	pH10 std:10	Depth m	Conductivity (ms/cm) std. 92	Turbidity (NTU) std. 0	Turbidity (NTU) std. 123
St 10	1/14/2005	*	*	*	*	*	*	*
St 10	1/25/2005	80	7.01	10.13	0.013	90.07	0.8	118.8
St 10	2/9/2005	96	6.92	9.96	-0.026	88.1	-3	121.3
St 10	2/23/2005	71.3	6.55	9.78	0.06	96.46	3.3	122.8
St 10	3/8/2005	95.2	6.88	9.8	-0.03	104.5	0.9	124
Site ID	Date (mm/dd/yy)	DO Air sat. std: 100%	ph7 std:7	pH10 std:10	Depth m	Conductivity (ms/cm) std. 95	Turbidity (NTU) std. 0	Turbidity (NTU) std. 123
St 10	3/22/2005	86.4	7.05	10.02	0.015	95.2	-0.2	122.5
St 10	4/5/2005	86.2	7.08	10.27	0.004	94.17	0.7	122.8
St 10	4/20/2005	98.8	7.07	10.14	-0.04	96.85	-0.2	123.2
St 10	5/4/2005	66	6.94	9.65	0.032	96.91	4.4	123.2
St 10	5/25/2005	68.5	7.39	10.57	-0.056	99.1	1.6	120
St 10	6/7/2005	98.7	6.99	9.83	-0.003	92.19	6	126.2
St 10	6/21/2005	101.7	6.96	9.76	0.016	94.34	-0.4	121
St 10	7/19/2005	106.5	6.84	9.61	0.003	102.2	13.2	123.3
St 10	8/2/2005	106.5	6.91	9.78	0.003	92.75	8.8	128.3
St 10	8/16/2005	95.3	6.63	9.74	-0.002	96.36	1.2	131.5
St 10	8/30/2005	86.9	6.83	9.76	-0.025	94.36	9.3	129.2
St 10	9/13/2005	79.6	7.07	10	-0.004	92.24	0.9	122.4
Site ID	Date (mm/dd/yy)	DO Air sat. std: 100%	ph7 std:7	pH10 std:10	Depth m	Conductivity (ms/cm) std. 50	Turbidity (NTU) std. 0	Turbidity (NTU) std. 123
St 10	9/27/2005	91	6.31	10.02	-0.024	47.27	0.5	123.9
St 10	10/13/2005	89.5	7.08	10.02	-0.032	50.08	3.1	110
St 10	10/26/2005	96.4	6.84	9.48	0.032	45	0.5	123.7
St 10	11/8/2005	101	7.15	10.07	-0.028	49.64	3.9	123.3
St 10	11/22/2005	110.7	7.12	10.04	-0.074	49.2	3.1	127.6
St 10	12/6/2005	98.2	7.01	9.99	0.029	50.25	0	122.2
St 10	12/21/2005	96.8	7.04	9.91	0.013	49.98	1.4	124.6
St 10	1/4/2006	101.6	*	*	*	*	*	*

Site ID	Date (mm/dd/yy)	DO Air sat. std: 100%	ph7 std:7	pH10 std:10	Depth m	Conductivity (ms/cm)	Turbidity (NTU)	Turbidity (NTU)
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						std. 92	std. 0	std. 123
St 19	1/20/2005	97.8	6.95	10.17	-0.008	80.3	3.3	123.5
St 19	2/1/2005	96	5.76	8.9	-0.027	87.6	4.9	111.3
St 19	2/16/2005	85.8	7	9.72	-0.013	93.5	-3.6	124.8
St 19	3/2/2005	94.3	7.08	10.03	0.008	73.67	-0.4	123
Site ID	Date (mm/dd/yy)	DO Air sat. std: 100%	ph7 std:7	pH10 std:10	Depth m	Conductivity (ms/cm) std. 95	Turbidity (NTU) std. 0	Turbidity (NTU) std. 123
St 19	3/15/2005	62.5	6.89	9.76	-0.011	95.33	1.7	116.1
St 19	3/30/2005	74	6.98	10.01	0.023	99.95	4.1	122.4
St 19	4/12/2005	85.6	7.05	9.88	-0.052	91.15	0.4	122
St 19	4/26/2005	60.6	7.12	9.85	0.035	94.95	0.9	123
St 19	5/11/2005	94.8	7.1	10	-0.017	95.4	5.6	127.5
St 19	6/1/2025	98.4	7.16	10.13	-0.002	94.99	1.8	124.6
St 19	6/13/2005	73.3	7.1	10.14	-0.06	93.6	4.3	110
St 19	7/7/2005	96.3	6.85	9.68	0.028	94.72	2.1	123.3
St 19	7/28/2005	92	7.08	9.99	0.025	98.2	-3.6	123.5
St 19	8/9/2005	99.9	7.06	9.96	-0.015	94.5	0.6	121.8
St 19	8/23/2005	100	7.31	10.07	-0.033	95.55	1.6	123.5
St 19	9/7/2005	93.3	6.99	10.01	0.018	94.36	1.3	120.9
St 19	9/20/2005	97.1	6.91	9.8	-0.028	94.95	-0.1	124.3
Site ID	Date (mm/dd/yy)	DO Air sat. std: 100%	ph7 std:7	pH10 std:10	Depth m	Conductivity (ms/cm) std. 50	Turbidity (NTU) std. 0	Turbidity (NTU) std. 123
St 19	10/4/2005	88	7.14	9.97	0.007	46.47	4.7	142.1
St 19	10/18/2005	98.8	6.99	9.94	0.039	49.51	1.2	123.7
St 19	11/1/2005	89	7.24	9.02	0.006	47.9	4.9	127.1
St 19	11/15/2005	92.6	6.76	9.56	-0.024	52.45	4.5	124.3
St 19	11/29/2005	89.4	6.99	9.88	-0.035	49.01	7.2	132.7
St 19	12/13/2005	100	7.09	9.81	0.041	49.39	1.1	119.5
St 19	12/29/2005	94.3	7.12	9.87	-0.019	49.48	-3.2	127.4
St 19	1/4/2005	86	7.15	9.96	0.012	50.1	1.6	114.5

Site ID	Date (mm/dd/yy)	DO Air sat. std: 100%	ph7 std:7	pH10 std:10	Depth m	Conductivity (ms/cm) std. 92	Turbidity (NTU) std. 0	Turbidity (NTU) std. 123
St 20	1/20/2005	97	7.13	10.3	0	81.59	-1.5	121.6
St 20	2/1/2005	85.7	7.1	10.04	-0.023	88.83	-5.3	116
St 20	2/16/2005	68.5	6.95	9.91	-0.031	92.92	1.9	121
St 20	3/2/2005	84.3	7.28	10.29	0.012	103	0.6	126.3
Site ID	Date (mm/dd/yy)	DO Air sat. std: 100%	ph7 std:7	pH10 std:10	Depth m	Conductivity (ms/cm) std. 95	Turbidity (NTU) std. 0	Turbidity (NTU) std. 123

St 20	3/15/2005	68.5	6.79	9.82	0.024	91.89	10.4	100.1
St 20	3/30/2005	85	7.1	10.12	0.019	99.8	5.7	133.9
St 20	4/12/2005	94.3	6.98	9.92	-0.05	90.8	2.1	124.1
St 20	4/26/2005	53.6	7.65	10.63	0.007	94.24	-0.7	103.4
St 20	5/11/2005	87.1	7.09	9.8	-0.02	92.82	3.8	127
St 20	6/1/2005	79.6	7.21	10.17	0.005	95.31	4.4	125.2
St 20	6/13/2005	95.1	6.92	9.91	-0.049	96.1	2.3	113.9
St 20	7/7/2005	100.9	6.94	9.87	0.024	93.95	-0.2	123.1
St 20	7/28/2005	46.6	7.5	9.34	0.022	94.95	3.4	126.2
St 20	8/9/2005	101.4	7.09	9.92	-0.016	95.06	-1.4	118.6
St 20	8/23/2005	81.1	7.14	10.11	-0.014	94.22	0.9	123.8
St 20	9/7/2005	96.8	7.16	10.12	0.007	95.01	-0.1	118.2
St 20	9/20/2005	87.8	7.54	10.6	-0.037	94.37	2.1	139.2
Site ID	Date (mm/dd/yy)	DO Air sat. std: 100%	ph7 std:7	pH10 std:10	Depth m	Conductivity (ms/cm) std. 50	Turbidity (NTU) std. 0	Turbidity (NTU) std. 123
St 20	10/4/2005	95.4	7.11	10.05	0.009	45.9	0.9	124
St 20	10/18/2005	55.4	7.07	9.99	0.049	50.28	2.4	125.5
St 20	11/1/2005	97.5	6.95	9.95	0.017	50.36	3.5	106.1
St 20	11/15/2005	93.4	6.62	9.6	-0.026	54.07	12.4	107.8
St 20	11/29/2005	93.3	6.86	9.92	0.005	49.01	3.2	133.5
St 20	12/13/2005	95.3	7.24	10.42	0.028	49.13	7.5	116.4
St 20	12/29/2005	95.9	6.98	9.89	-0.024	49.38	-3.9	123
St 20	1/4/2006	73.1	7.04	9.64	0.016	50.59	-0.3	114.2

*NO DATA

15. Other remarks

On 10/01/2019 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.

During year 2005 three (3) important rainfall events occur that had effects in the measurements of the different parameters of the sondes. These events occur:

- 1) May 20 to 25 with 78.23mm of rainfall
- 2) September 16 to 21 with 164.3mm of rainfall
- 3) October 21 to 23 with 90.68mm of rainfall

Stations 19 and 20 were found at areas that receive strong waves. Stations 9 and 10 were more protected, receive less wave impact. The movement caused by the strong waves is causing the sonde in the Station 19 and 20 to stop taking data during short time periods and sporadically.