

**ACE Basin (ACE) National Estuarine Research Reserve Water Quality Metadata  
January-December 2007 Report  
Latest edit: 11/19/2009**

**I. Data Set and Research Descriptors**

**1) Principal investigator(s) and contact persons**

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**2) Entry verification**

Deployment data are uploaded from the YSI data logger to a Personal Computer (IBM compatible). Files are exported from EcoWatch in a comma-delimited format (.CDF) and uploaded to the CDMO where they undergo automated primary QAQC and become part of the CDMO's online provisional database. Excessive pre- and post-deployment data are removed from the file prior to upload with at least 2 hours of pre- and post-deployment data retained to assist in data management. During primary QAQC, data are flagged if they are missing, out of sensor range, or outside 2 or 3 standard deviations from the historical seasonal mean. The edited file is then returned to the Reserve where it is opened in Microsoft Excel and processed using the CDMO's NERRQAQC Excel macro. The macro inserts station codes, creates metadata worksheets for flagged data, and graphs the data for review. It allows the user to apply QAQC flags and codes to the data, remove remaining pre- and post-deployment data, append files, and export the resulting data file to the CDMO for tertiary QAQC and assimilation into the CDMO's authoritative online database. Where deployment overlap occurs between files, the data produced by the newly calibrated sonde is generally accepted as being the most accurate. Julie Dingle, Justin Hart, and Amy Whitaker Dukes were responsible for these tasks. For more information on QAQC flags and codes, see Sections 11 and 12.

**3) Research objectives**

Long-term water quality monitoring in the ACE Basin provides a unique opportunity to increase understanding of how various environmental factors influence estuarine processes. The

Reserve research staff has elected to compare water quality conditions in shallow creeks along a salinity gradient and at different levels of development. Based on discussions with local Coastal Zone Management (CZM) personnel and ACE Basin NERR staff knowledge of land use within the Reserve, the South Edisto River drainage basin was selected because it is well suited for studying contrasting hydrographic conditions and land use patterns. Two tributaries, St. Pierre Creek and Fishing Creek, are in areas where boat traffic is light and development is sparse, and they are designated as "control" sites. In contrast, the two "treatment" sites are in Big Bay Creek and Mosquito Creek where boat traffic is moderate to heavy and residential and commercial development is medium to dense. The four sites also are located along the salinity gradient in the South Edisto River watershed: Big Bay Creek and St. Pierre Creek are in the polyhaline zone (18-30 ppt), Mosquito Creek is in the mesohaline zone (5-18 ppt), and Fishing Creek is in the oligohaline zone. See *Section 5 - Site Location and Character* for detailed descriptions of the sites.

The water quality monitoring program began on March 3, 1995 at Big Bay Creek and St. Pierre Creek; in October 2002, a monitoring station was established in Fishing Creek and in Mosquito Creek. Initially, YSI electronic data loggers were deployed to monitor the water temperature, specific conductance, dissolved oxygen, water level, and pH conditions, approximately 0.5 meters above the creek bottom, at 15-minute intervals; on August 11, 1995, the sampling interval was changed to 30 minutes, and turbidity monitoring was added to the program on April 11, 1996. On December 12, 2007, the sampling interval was changed to 15 minutes.

#### **4) Research methods**

One data logger is deployed at each permanent monitoring station (Big Bay, St. Pierre, Fishing Creek, and Mosquito Creek). The data logger is attached to a deployment mount at each station to ensure that the sensor is positioned approximately 0.5 m from the creek bottom during a deployment. At each monitoring station, the deployment mount consists of a PVC pipe that is attached vertically to a galvanized pole, which is driven approximately 1 m into the sediment. To facilitate water flow across the sensors, approximately two-inch diameter holes are drilled into the PVC pipes. On April 14, 2006 at 10:30:00 the St. Pierre deployment mount was replaced with a new PVC pipe. On August 06, 2007, a new Mosquito Creek deployment mount was installed 0.5 meters away from the old mount.

A Sutron Sat-Link2 transmitter was installed at the Saint Pierre station on 06/28/06 and transmits data to the NOAA GOES satellite, NESDIS ID #3b02f20a. (Where 3b02f20a is the GOES ID for that particular station.) The transmissions are scheduled hourly and contain four (4) data sets reflecting fifteen minute data sampling intervals. Upon receipt by the CDMO, the data undergoes the same automated primary QAQC process detailed in Section 2 above. The "real-time" telemetry data become part of the provisional dataset until undergoing secondary and tertiary QAQC and assimilation in the CDMO's authoritative online database. Provisional and authoritative data are available at <http://cdmo.baruch.sc.edu>.

To minimize fouling (i.e. settlement of barnacles and sponges) of data loggers, new sensors and sensor guards are coated with a copper-based anti-fouling paint and periodically re-applied. A plastic mesh is wrapped around the sensor guard to keep out large animals (i.e. crabs, fish); the mesh is coated with anti-fouling paint. In addition, fouling organisms are removed from the PVC deployment mounts during monthly inspections.

The YSI data loggers are deployed for one to two weeks during the summer months, and the sampling period is extended up to one month during the cooler months. A data logger is retrieved and replaced with a newly calibrated data logger prior to a 15-minute reading to prevent interruption of data collection. After deploying the calibrated data logger, a water sample is collected from same depth as the sensor to measure several water quality parameters (water temperature, salinity, pH, dissolved oxygen [mg/l]). Water temperature, salinity, and pH are measured directly with a thermometer, refractometer and hand-held pH meter, respectively, dissolved oxygen, expressed at mg/l, is determined with a field Winkler titration kit. Water depth and meteorological conditions (i.e. precipitation and wind speed and direction) also are recorded. The in-situ measurements are used to determine if the sensor readings drifted significantly during deployment and to evaluate anomalous readings (<28% air saturation).

When the data loggers are retrieved, they are taken to the laboratory for cleaning, post-deployment calibration checks and servicing, in accordance with guidelines set by YSI Operating and Service Manual. Upon returning to the laboratory, the data are downloaded, and the dataset is reviewed to determine if any equipment malfunctions occurred during deployment that need immediate attention. Post-deployment calibration checks of all the parameters except turbidity are done before cleaning the data loggers. Turbidity checks are performed after cleaning the data loggers to prevent contamination of the standard. Sensors are immersed in the appropriate standard solutions (i.e. pH) and readings are recorded. A DO membrane integrity test also is conducted to determine if the membrane was damaged during deployment.

A series of diagnostic values, including dissolved oxygen charge, dissolved oxygen gain, and pH millivolt value at pH 7 and at pH 10, are recorded during calibration and post-deployment calibration checks of data loggers. These diagnostic values are strong indicators of the individual sensor performance, and they are used to determine the accuracy of the data.

Before the data loggers are deployed dissolved oxygen (DO) membranes are changed and allowed to stretch for 24 hours, and the voltage of the batteries are checked. Next, the pH, conductivity, and turbidity sensors are calibrated, using the following standards: pH 7 and 10, 50 mS/cm potassium chloride solution, and 0 and 123 NTU solutions, respectively. The water level sensor is zeroed in air, and the barometric pressure in the laboratory is recorded. Before leaving the laboratory the following day, the DO sensor is calibrated in air-saturated water at 760 mm barometric pressure. In addition to the procedures outlined in the CDMO manual, we conduct a DO membrane integrity test prior to deployment to determine if the membrane was installed properly or was damaged during calibration.

## **5) Site location and character –**

ACE Basin National Estuarine Research Reserve is one of the largest undeveloped estuaries on the East Coast. The study area encompasses the Ashepoo, Combahee and South Edisto River basins, which empty into St. Helena Sound. The NERR consists of approximately 150,000 acres of diverse estuarine wetlands providing preserved habitats for fish and wildlife.

Three monitoring stations are tributaries of the South Edisto River and one is in a tributary of both the S. Edisto and Ashepoo rivers, contributing to freshwater input to each site. The average tidal range at all stations is approximately 2.0 m (6.5 feet), with a maximum of 2.36 m (7.8 feet) and a minimum of 1.39 m (4.6 feet). The bottom habitat at each of the four sites consists of mud intermixed with dead shell hash. The descriptions of the sites are as follow:

**Big Bay** - GPS coordinates: 32.4941N and -80.3241W

This monitoring station is in Big Bay Creek proper, approximately 2 km (1.24 mi) from the mouth of the creek, and is located about 5 m (16.41 ft) from the southern bank of the creek. In 2007, the mean depth at the station was 2.3 m (7.54 ft), and the mean salinity was 31.78 parts per thousand (ppt).

The Big Bay monitoring station is designated as a "treatment" site because it is subject to nonpoint source pollution and has a high density of development. The southern bank of the creek is bordered by residential and commercial development, with little setback from the bordering *Spartina* marsh. For instance, there are over forty private docks, two commercial seafood docks and a marina with 75 slips, three paved boat ramps, and two fueling areas along the southern bank. Docks and bulkheads are constructed of concrete, or creosote, CCA-treated or Wolmanized material. Boat traffic is heavy, especially during the warmer months, and the creek is closed to shellfish harvesting because of the surrounding human activities. The major sources of nonpoint source pollution are surface runoff from lawns, golf courses, and paved ramps that contain fertilizers, pesticides, herbicides and PAHs. All of the high ground along the southern bank is developed (i.e. residential homes, condominiums and restaurants); and maritime plant communities have been replaced by golf courses, lawns and ornamental gardens. Small patches of a few maritime species (i.e. live oak, cabbage, and Southern red cedar) are found along the roads. In contrast, the northern bank is bordered by a wide expanse of *Spartina alterniflora* marsh, and no high ground is present. American oyster (*Crassostrea virginica*) forms a reef along the creek banks, especially the northern side, and on intertidal mud flats within the creek.

**St. Pierre** - GPS coordinates: 32.5233N and -80.3568W

This monitoring station is in a small tributary of St. Pierre Creek, approximately 0.25 km (0.16 mi) from the mouth of the creek, and it is about 5 m (16.41 ft) from the northern bank of the creek. The tributary flows through the southern portion of Bailey Island, and creek forms the eastern border of the island. The monitoring station is surrounded by a wide expanse of *Spartina alterniflora* marsh. Extensive mud flats and oyster reefs fringe the banks. Maritime forest communities comprised of species such as wax myrtles, live oaks, and palmettos dominate the upland areas. In 2007, the mean depth at the station was 2.53 m (8.30 ft), and the mean salinity was 30.73 parts per thousand (ppt).

The St. Pierre station is designated as a "control" site because development in the immediate area was sparse when the station was established on March 3, 1995, and the tributary is subject to relatively light boat traffic. In 1996, the 695-acre island was sold, and the owners partnered with The Nature Conservancy to design a conservation-based development. Four hundred and three acres in the center of Bailey Island were set aside as a nature preserve that is managed by The Nature Conservancy, and number of residential lots on the remaining 292 acres is limited to 67. Access to the island is limited to one bridge and all roads on the island are single lane and made of crushed seashells. In addition, a conservation manual was developed for the property owners that provide specific lot designs and construction guidelines as well as landscaping guidelines to protect the maritime and estuarine habitats.

**Fishing Creek** – GPS coordinates: 32.6358 N and -80.3655W

This monitoring station is in a tributary of Fishing Creek, approximately 1.79 km (1.11 mi) from the mouth of the creek, and is located approximately 5 m (16.41 ft) from the northern bank of the creek. The tributary flows through the eastern half of Jehossee Island, a protected USFWS

site, and Fishing Creek forms the northeast border of the island. The station is surrounded by extensive *Spartina cynosuroides* marsh and vast mud flats. The upland area is characterized by slash pine, live oak, and cabbage palmetto. In 2007, the mean depth at the station was 2.28 m (7.48 ft), and the mean salinity was 12.97 parts per thousand (ppt).

Fishing Creek monitoring station is designated as a “control” site because there is no development in the immediate area, and boat traffic is relatively light in the creek. The Wildlife Management Area contains impoundments (formerly rice fields) that are managed as wildlife habitat for endangered fauna and migratory waterfowl. No pesticides or herbicides are applied to the managed wetlands. Water level in the managed wetland is regulated by rice trunks that control the flow of water between the impoundment and the South Edisto River.

#### **Mosquito Creek – GPS coordinates: 32.5558 N and -80.4380W**

This monitoring station is in Mosquito Creek proper (a tributary of both the South Edisto and Ashepoo rivers), approximately 2.51 km (1.56 mi) from the Ashepoo River and 12 km (7.46 mi) from the South Edisto River, and it is about 5 m (16.41 ft) from the southern bank of the creek. In 2007, the mean depth at the station was 3.52 m (11.55 ft), and the mean salinity was 22.69 parts per thousand (ppt).

Mosquito Creek station is designated as a "treatment" site because of the land use practices in the surrounding area. Agriculture fields and impounded wetlands are found upstream of the monitoring station. Ten docks constructed of creosote, concrete and Wolmanized pilings; a public boat landing; a commercial seafood business with three commercial shrimp boats and a fueling area are located about 0.8 km (0.5 mi) downstream of the monitoring station. The major source of nonpoint source pollution to the monitoring station is surface runoff from the impoundments and agricultural lands that contain high levels of nutrients and, at times, herbicides and pesticides. Impoundment trunks open and drain into the creek increasing the nutrient load and possibly introducing herbicides and pesticides. Vegetation in the area includes salt marsh dominated by *Spartina alterniflora* and *Juncus roemerianus*. Upland fringe areas consist of cabbage palmetto, live oaks and pine trees.

#### **6) Data collection period –**

| <b>BEGAN</b>     | <b>Big Bay Site</b> | <b>ENDED</b>     |
|------------------|---------------------|------------------|
| 12/21/06 – 10:00 |                     | 01/17/07 – 10:30 |
| 01/17/07 – 10:45 |                     | 02/14/07 – 09:30 |
| 02/14/07 – 09:45 |                     | 03/15/07 – 08:45 |
| 03/15/07 – 09:00 |                     | 04/12/07 – 08:15 |
| 04/12/07 – 08:30 |                     | 05/01/07 – 10:00 |
| 05/01/07 – 10:15 |                     | 05/15/07 – 09:30 |
| 05/15/07 – 09:45 |                     | 05/29/07 – 09:30 |
| 05/29/07 – 09:45 |                     | 06/14/07 – 10:00 |
| 06/14/07 – 10:15 |                     | 07/11/07 – 08:00 |
| 07/11/07 – 08:15 |                     | 08/09/07 – 09:15 |
| 08/09/07 – 09:30 |                     | 09/06/07 – 08:00 |
| 09/06/07 – 08:15 |                     | 10/18/07 – 10:15 |
| 10/18/07 – 10:30 |                     | 11/15/07 – 10:15 |
| 11/15/07 – 10:30 |                     | 12/06/07 – 09:15 |
| 12/06/07 – 09:30 |                     | 01/07/08 – 11:45 |

### **St. Pierre Site**

|                   |                  |
|-------------------|------------------|
| 12/18/06 – 12 :00 | 01/17/07 – 11:00 |
| 01/17/07 – 11:15  | 02/14/07 – 10:00 |
| 02/14/07 – 10:15  | 03/15/07 – 09:15 |
| 03/15/07 – 09:30  | 04/12/07 – 09:00 |
| 04/12/07 – 09:15  | 05/15/07 – 10:15 |
| 05/15/07 – 10:30  | 05/29/07 – 10:00 |
| 05/29/07 – 10:15  | 06/14/07 – 10:45 |
| 06/14/07 – 11:00  | 07/11/07 – 08:30 |
| 07/11/07 – 08:45  | 07/14/07 – 21:15 |

No data was recorded from 07/14/07 at 21:45 thru 08/09/07 at 10:00

|                  |                  |
|------------------|------------------|
| 08/09/07 – 10:15 | 09/06/07 – 08:30 |
| 09/06/07 – 08:45 | 10/09/07 – 11:00 |
| 10/09/07 – 11:15 | 11/15/07 – 09:30 |
| 11/15/07 – 09:45 | 12/06/07 – 10:15 |
| 12/06/07 – 10:30 | 01/07/08 – 11:00 |

### **Fishing Creek**

|                  |                  |
|------------------|------------------|
| 12/18/06 – 13:00 | 01/17/07 – 12:45 |
| 01/17/07 – 13:00 | 02/14/07 – 11:45 |
| 02/14/07 – 12:00 | 03/15/07 – 10:30 |

No data was recorded from 03/15/07 at 10:45 thru 04/12/07 at 10:15

|                  |                  |
|------------------|------------------|
| 04/12/07 – 10:30 | 04/21/07 – 23:00 |
| 05/15/07 – 11:45 | 05/29/07 – 08:30 |
| 05/29/07 – 08:45 | 06/14/07 – 12:30 |
| 06/14/07 – 12:45 | 07/11/07 – 09:45 |
| 07/11/07 – 10:00 | 08/09/07 – 10:45 |
| 08/09/07 – 11:00 | 09/06/07 – 09:15 |
| 09/06/07 – 09:30 | 10/09/07 – 12:00 |
| 10/09/07 – 12:15 | 11/15/07 – 08:45 |
| 11/15/07 – 09:15 | 12/06/07 – 11:15 |
| 12/06/07 – 11:30 | 01/07/08 – 12:45 |

### **Mosquito Creek**

|                  |                  |
|------------------|------------------|
| 12/18/07 – 12:00 | 01/17/07 – 11:30 |
| 01/17/07 – 11:45 | 02/14/07 – 12:30 |
| 02/14/07 – 12:45 | 03/15/07 – 10:15 |
| 03/15/07 – 10:30 | 04/04/07 – 21:00 |

No data was recorded from 04/04/07 at 21:15 thru 04/12/07 at 10:00

|                  |                  |
|------------------|------------------|
| 04/12/07 – 10:15 | 05/15/07 – 11:00 |
|------------------|------------------|

|                                                                    |                  |
|--------------------------------------------------------------------|------------------|
| 05/15/07 – 11:15                                                   | 05/22/07 – 15:00 |
| No data was recorded from 05/22/07 at 15:15 thru 05/29/07 at 11:30 |                  |
| 05/29/07 – 11:30                                                   | 06/26/07 – 10:00 |
| 06/26/07 – 10:30                                                   | 08/09/07 – 10:30 |
| 08/09/07 – 10:45                                                   | 09/06/07 – 09:45 |
| 09/06/07 – 10:00                                                   | 10/16/07 – 12:15 |
| 10/16/07 – 12:30                                                   | 11/15/07 – 07:45 |
| No data was recorded from 11/15/07 at 08:00 thru 11/15/07 at 14:00 |                  |
| 11/15/07 – 14:30                                                   | 12/06/07 – 14:00 |
| 12/06/07 – 14:15                                                   | 01/07/08 – 14:00 |

## 7) Distribution

According to the Ocean and Coastal Resource Management Data Dissemination Policy for the NERRS System-wide Monitoring Program, is as follows.

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 the 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 of 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 (see *Section 1 - Principal Investigators and Contact Persons* for addresses), from the Data Manager at the Centralized Data Management Office (please see personnel directory under general information link on CDMO homepage) and online at the 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

Dr. Charles Wenner of SCDNR/Marine Resources Research Institute received funding through the National Marine Fisheries Service in January of 2001 to continue an ongoing survey of red drum (*Sciaenops ocellatus*) in the South Edisto and Combahee River basins, by electrofishing in tidal freshwater and low salinity brackish water. Although red drum is the target species, all species identified to species, measured and weighed.

The ACE Basin NERR received funding from the U.S. Environmental Protection Agency to establish a National Atmospheric Deposition Program site in the Reserve. Sampling efforts began on January 1, 2002 and will continue for five years. Weekly precipitation samples are collected and analyzed for atmospheric pollutants. The precipitation collector is located on Bear Island, a Wildlife Management Area inside the NERR.

In February 2006, the ACE Basin NERR installed a RASSL – Remote Access Satellite Sensor Link – transmitter unit to the deployment structure at the Mosquito Creek water quality sampling station, and in August 2006 installed an additional transmitter unit at the Big Bay station. North Star Science and Technology, funded by a CICEET grant, designed a compact and field rugged satellite communicator. The transmitter unit, compatible with YSI 6 series data sondes, communicates directly to the sonde and asks the sonde to take an additional reading once an hour. This additional reading is not stored by the data sonde and does not interfere with the scheduled SWMP data collection. The additional hourly reading is then transmitted via a satellite link. The provisional data are posted to a secure website provided and maintained by North Star Science and Technology. The RASSL project ended on January 2008 due to funding shortage.

On September 19, 2006 the Algal Ecology Lab began screening water samples from the ACE BASIN. Algal assemblages are being identified at these sites to monitor these areas and identify any harmful algal blooms. If a bloom is present, the fixed sample will be counted to determine algal density. These water samples are also being processed for HPLC (High Performance Liquid Chromatography), which will identify the pigments that are present in the water at that time, and can be later analyzed for estimates of algal community biomass.

As part of the System-wide Monitoring Program (SWMP), nutrient and weather data are gathered at the ACE NERR in conjunction with water quality data obtained by YSI 6600-EDS data loggers. Diehl nutrient samples are gathered once per month at the St. Pierre water quality monitoring station, and grab samples are obtained at each of the four sites once per month. The concentrations of the following parameters are measured and recorded for the nutrient monitoring program: ammonium (NH<sub>4</sub>), nitrite + nitrate (NO<sub>2</sub> + NO<sub>3</sub>), ortho-phosphate (PO<sub>4</sub>), and chlorophyll-A (Chl-a). Real-time weather data is gathered 24/7 and is transmitted to the Centralized Data Management Office (CDMO). Historic water quality, nutrient, and weather data can be obtained at [http://cdmo.baruch.sc.edu/QueryPages/viewstations.cfm?Site\\_ID=ace](http://cdmo.baruch.sc.edu/QueryPages/viewstations.cfm?Site_ID=ace).

Information about other studies conducted in the ACE Basin may be obtained from the Research Coordinator.

## II. Physical Structure Descriptors

### 9) Sensor specifications

YSI 6600EDS datalogger

Parameter: Temperature

Units: Celsius (C)

Sensor Type: Thermistor

Model #: 6560

Range: -5 to 45 °C

Accuracy: +/-0.15 °C

Resolution: 0.01 °C

Parameter: Conductivity

Units: milli-Siemens per cm (mS/cm)

Sensor Type: 4-electrode cell with auto-ranging

Model #: 6560

Range: 0-100 mS/cm

Accuracy: +/-0.5% of reading +0.001mS/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 50mg/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 (9.1m)  
Accuracy: +/- 0.06 ft (0.018m)  
Resolution: 0.001ft (0.001 m)

Parameter: pH  
Units: units  
Sensor Type: Glass combination electrode; flat glass electrode  
Model #: 6561; 6561FG  
Range: 0-14 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. 2001, 2002). 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 non-EDS 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 ACE NERR in 2007 were EDS models.**

The NERR 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. Readings for both vented and non-vented sensors are automatically compensated for water density change due to variations in temperature and salinity; but for all non-vented depth measurements, changes in atmospheric pressure between calibrations appear as changes in water depth. The error is equal to approximately 1.03 cm for every 1 millibar change in atmospheric pressure, and is eliminated for level sensors because they are vented to the atmosphere throughout the deployment time interval.

Beginning in 2006, NERR SWMP standard calibration protocol calls for all non-vented depth sensors to read 0 meters at a (local) barometric pressure of 1013.25 mb (760 mm/hg). To achieve this, each site calibrates their depth sensor with a depth offset number, which is calculated using the actual atmospheric pressure at the time of calibration and the equation provided in the SWMP calibration sheet or Digital Calibration Log. This offset procedure standardizes each depth calibration for the entire NERR System. If accurate atmospheric pressure data are available, non-vented sensor depth measurements at any NERR site can be corrected. The Research Coordinator at the specific NERR site should be contacted in order to obtain information regarding atmospheric pressure data availability.

**Probe Identification:**

Turbidity 6136 Probe

pH 116031 Probe

pH 6561FG Probe

Specific Conductivity 6030 Probe

**Standards for Calibration:**

YSI 6073G Turbidity Standard

123 NTU

RICCA CHEMICAL COMPANY LLC.

Buffer 7.00 and 10.00

RICCA CHEMICAL COMPANY LLC.

Buffer 7.00 and 10.00

YSI 3169 Conductivity Calibrator

50 mS/cm +/- 1%

## 10) Coded variable definitions

| Sampling Station: | Sampling site code: | Station Code: |
|-------------------|---------------------|---------------|
| St. Pierre        | SP                  | acespwq       |
| Big Bay           | BB                  | acebbwq       |
| Fishing Creek     | FC                  | acefcwq       |
| Mosquito Creek    | MC                  | acemcwq       |

## 11) QAQC flag definitions

QAQC flags provide documentation of the data and are applied to individual data points by insertion into the parameter's associated flag column (header preceded by an F\_). During primary automated QAQC (performed by the CDMO), -5, -4, -2, 2, and 3 flags are applied automatically to indicate data that is above or below sensor range, missing, or outside 2 or 3 standard deviations from the historical seasonal mean. All remaining data are then flagged 0, as "good". During secondary and tertiary QAQC 1, -3, and 5 flags may be used to note data as suspect, rejected due to QAQC, or corrected.

|    |                                                                      |
|----|----------------------------------------------------------------------|
| -5 | Outside High Sensor Range                                            |
| -4 | Outside Low Sensor Range                                             |
| -3 | Data Rejected due to QAQC                                            |
| -2 | Missing Data                                                         |
| -1 | <i>Open - reserved for later flag</i>                                |
| 0  | Good Data                                                            |
| 1  | Suspect Data                                                         |
| 2  | Data Outside 2 Standard Deviations from the historical seasonal mean |
| 3  | Data Outside 3 Standard Deviations from the historical seasonal mean |
| 4  | Historical Data: Pre-Auto QAQC                                       |
| 5  | Corrected Data                                                       |

## 12) QAQC code definitions

QAQC codes are used in conjunction with QAQC flags to provide further documentation of the data and are also applied by insertion into the associated flag column. There are three (3) different code categories, general, sensor, and comment. General errors document general problems with the deployment or YSI datasonde, sensor errors are sensor specific, and comment codes are used to further document conditions or a problem with the data. Only one general or sensor error and one comment code can be applied to a particular data point.

### General Errors

|     |                                   |
|-----|-----------------------------------|
| GIM | Instrument Malfunction            |
| GMT | Instrument Maintenance            |
| GNF | Deployment Tube Clogged / No Flow |
| GOW | Out of Water Event                |
| GPF | Power Failure / Low Battery       |

GQR Data Rejected Due to QA/QC Checks

Sensor Errors

SBO Blocked Optic  
 SCF Conductivity Sensor Failure  
 SDO DO Suspect  
 SDP DO Membrane Puncture  
 SIC Incorrect Calibration / Contaminated Standard  
 SNV Negative Value  
 SOW Sensor Out of Water  
 SPC Post Calibration Out of Range  
 SSD Sensor Drift  
 SSM Sensor Malfunction  
 SSR Sensor Removed / Not Deployed  
 STF Catastrophic Temperature Sensor Failure  
 STS Turbidity Spike  
 SWM Wiper Malfunction / Loss

Comments

CAF Acceptable Calibration/Accuracy Error  
 CBF Biofouling  
 CCU Cause Unknown  
 CDA DO hypoxia (<28% sat)  
 CDB Disturbed Bottom  
 CDF Data Appear to Fit Conditions  
 CFK Fish Kill  
 CLT Low Tide  
 CND New Deployment Begins  
 CRE Significant Rain Event  
 CSM See Metadata  
 CTS Turbidity Spike  
 CWD Data Collected at Wrong Depth

**13) Post deployment information –**

| Site ID | Date | DO%Air | pH(7.00) | Depth(m) | Turbid 0 NTU | SpCond<br>58.64mS/cm |
|---------|------|--------|----------|----------|--------------|----------------------|
|---------|------|--------|----------|----------|--------------|----------------------|

**BB**

|                                                  |       |      |        |      |       |  |
|--------------------------------------------------|-------|------|--------|------|-------|--|
| 01/17/07                                         | 95.4  | 7.05 | 0.190  | 0.0  | 61.00 |  |
| 02/14/07                                         | 88.6  | 7.43 | -0.176 | 0    | 58.49 |  |
| 03/15/07                                         | 100.8 | 7.15 | 0.071  | 0    | 58.39 |  |
| 04/12/07                                         | 98.4  | 6.90 | -0.137 | -0.1 | 57.56 |  |
| 05/01/07                                         | 87.2  | 7.00 | -0.003 | 0    | 61.84 |  |
| 05/15/07                                         | 100.7 | 6.75 | 0.049  | -0.1 | 58.57 |  |
| SpCond standard changed from 58.64 to 50.00mS/cm |       |      |        |      |       |  |
| 05/29/07                                         | 100.9 | 7.00 | -0.026 | -0.1 | 50.49 |  |
| 06/14/07                                         | 98.7  | 6.83 | -0.105 | 0.1  | 50.33 |  |
| 07/11/07                                         | 105.6 | 6.94 | 0.014  | -0.8 | 45.95 |  |
| 08/09/07                                         | 101.9 | 6.58 | -0.065 | -0.2 | 49.05 |  |

|          |       |      |        |      |       |
|----------|-------|------|--------|------|-------|
| 09/06/07 | 105.8 | 6.91 | 0.088  | -0.2 | 54.80 |
| 10/18/07 | 116.1 | 6.59 | -0.096 | -0.4 | 49.45 |
| 11/16/07 | 101.8 | 6.99 | 0.014  | 0.1  | 49.76 |
| 12/07/07 | 74.2  | 6.97 | 0.113  | 0.4  | 50.64 |
| 01/08/08 | 102.9 | 6.91 | 9.91   | 0.0  | 48.39 |

| Site ID | Date | DO%Air | pH(7.00) | Depth(m) | Turbid 0 NTU | SpCond<br>58.64mS/cm |
|---------|------|--------|----------|----------|--------------|----------------------|
|---------|------|--------|----------|----------|--------------|----------------------|

**SP**

|                                                  |       |      |        |      |       |
|--------------------------------------------------|-------|------|--------|------|-------|
| 01/17/07                                         | 102.7 | 6.93 | 0.126  | -1.0 | 60.20 |
| 02/14/07                                         | 67.2  | 7.26 | -0.163 | 0.0  | 58.70 |
| 03/15/07                                         | 100.4 | 7.02 | 0.039  | 0.1  | 57.81 |
| 04/12/07                                         | 96.1  | 7.04 | -0.137 | 0.3  | 58.48 |
| 05/15/07                                         | 98.5  | 6.84 | 0.023  | 0.3  | 59.39 |
| SpCond standard changed from 58.64 to 50.00mS/cm |       |      |        |      |       |
| 05/29/07                                         | 99.0  | 6.85 | -0.026 | -0.2 | 49.17 |
| 06/14/07                                         | 96.4  | 6.78 | -0.155 | -0.3 | 50.73 |
| 07/11/07                                         | 100.7 | 6.36 | 0.015  | 0.0  | 50.62 |
| 08/09/07                                         | 94.8  | 6.80 | -0.081 | -0.7 | 50.88 |
| 09/06/07                                         | 109.5 | 6.95 | 0.058  | 0.1  | 50.02 |
| 10/09/07                                         | 107.1 | 7.31 | -0.158 | 0.3  | 51.28 |
| 11/16/07                                         | 64.7  | 7.04 | 0.062  | 0.1  | 50.19 |
| 12/07/07                                         | 101.6 | 6.98 | 0.118  | 0.2  | 50.65 |
| 01/08/08                                         | 100.3 | 7.03 | -0.028 | 0.0  | 49.86 |

| Site ID | Date | DO%Air | pH(7.00) | Depth(m) | Turbid 0 NTU | SpCond<br>58.64mS/cm |
|---------|------|--------|----------|----------|--------------|----------------------|
|---------|------|--------|----------|----------|--------------|----------------------|

**FC**

|                                                  |                                                           |      |        |      |       |
|--------------------------------------------------|-----------------------------------------------------------|------|--------|------|-------|
| 01/17/07                                         | 103.2                                                     | 7.10 | 0.199  | 0.0  | 59.90 |
| 02/14/07                                         | 96.8                                                      | 7.04 | -0.158 | -0.1 | 58.40 |
| 03/15/07                                         | 104.5                                                     | 7.06 | 0.080  | 0.0  | 57.57 |
| 04/12/07                                         | No post cal data available due to data logger malfunction |      |        |      |       |
| 05/15/07                                         | No post cal data available due to data logger malfunction |      |        |      |       |
| SpCond standard changed from 58.64 to 50.00mS/cm |                                                           |      |        |      |       |
| 05/29/07                                         | 102.4                                                     | 7.10 | -0.020 | 0.1  | 50.51 |
| 06/14/07                                         | 99.7                                                      | *    | -0.108 | 0.7  | 50.12 |
| 07/11/07                                         | 113.1                                                     | 6.85 | 0.020  | 0.9  | 50.64 |
| 08/09/07                                         | 103.8                                                     | 6.92 | -0.053 | 0.1  | 48.80 |
| 09/06/07                                         | 102.9                                                     | *    | 0.067  | -0.7 | 49.63 |
| 10/09/07                                         | 101.1                                                     | 6.60 | -0.123 | 0.6  | 48.08 |
| 11/16/07                                         | 108.9                                                     | 7.17 | 0.013  | 2.9  | 50.28 |
| 12/07/07                                         | -0.6                                                      | 7.00 | 0.126  | 0.3  | 50.48 |
| 01/08/08                                         | 101.0                                                     | 7.06 | 0.086  | 0.0  | 49.73 |

| Site ID | Date | DO%Air | pH(7.00) | Depth(m) | Turbid 0 NTU | SpCond<br>58.64mS/cm |
|---------|------|--------|----------|----------|--------------|----------------------|
|---------|------|--------|----------|----------|--------------|----------------------|

#### MC

|          |                                                                                                     |      |        |      |       |
|----------|-----------------------------------------------------------------------------------------------------|------|--------|------|-------|
| 01/17/07 | 102.4                                                                                               | 6.89 | 0.185  | 0.1  | 59.72 |
| 02/14/07 | 98.5                                                                                                | 7.24 | -0.170 | 0.3  | 57.06 |
| 03/15/07 | 95.3                                                                                                | 7.07 | 0.072  | 0.4  | 58.08 |
| 04/04/07 | 96.3                                                                                                | 7.04 | -0.130 | 0.2  | 57.65 |
| 05/15/07 | 102.1                                                                                               | 7.00 | 0.057  | 0.2  | 58.90 |
| 05/29/07 | No post cal data due to data logger malfunction<br>SpCond standard changed from 58.64 to 50.00mS/cm |      |        |      |       |
| 06/26/07 | 105.4                                                                                               | 7.02 | 0.004  | -0.3 | 49.51 |
| 08/09/07 | 103.3                                                                                               | 6.89 | -0.116 | -0.1 | 51.46 |
| 09/06/07 | 93.0                                                                                                | 7.02 | 0.048  | -0.4 | 43.12 |
| 10/16/07 | 105.5                                                                                               | 6.75 | 0.000  | 0.2  | 46.28 |
| 11/15/07 | 105.8                                                                                               | 7.11 | -0.123 | 0.3  | 49.64 |
| 12/07/07 | 102.4                                                                                               | 6.63 | 0.206  | -0.5 | 46.92 |
| 01/08/08 | 101.0                                                                                               | 6.95 | -0.031 | 0.0  | 49.54 |

#### **14) Other remarks/notes**

Data are missing due to equipment or associated specific probes not being deployed, equipment failure, time of maintenance or calibration of equipment, or repair/replacement of a sampling station platform. If additional information on missing data is needed, contact the Research Coordinator at the reserve submitting the data.

#### **Blanket Statement(s)**

##### pH

The average pH reading between two consecutive deployments may differ by 0.5 units. The two probes calibrated and post-calibrated within range, indicating that the difference is probably due to variability between the pH probes.

##### Turbidity

Turbidity sensors for all sites provided unusually high values from the observed norm and have been marked as suspect data (Code: <1>). The cause of these irregular values above 200NTU is unknown (Code: CCU). However, these values could be attributed to boat traffic, low tide and/or rain events.

Turbidity sensors for all sites provided values over 1000 NTU. These values are outside the sensor specifications and the cause is unknown (Code: CCU). Therefore, these anomalous data points have been marked as suspect (Code: <1>).

#### **Big Bay**

Suspect Data (Flag Code: <1>)

a) SpCond/Salinity:

Pre and Post calibration sheets show that SpCond was calibrated to read approximately 4 mS/cm higher than it should have in field. Post Calibration reading was 54.8 mS/cm vs 50mS/cm. Data are considered good but is up to the discretion of the user if it is to be used for the following dates and times:

08/09/2007 09:30 through 09/06/2007 08:00

The data for the following dates and times were marked as suspect cause unknown (Code: CCU) since the data did not seem to fit the rest of the data set. Odd values could be attributed to freshwater input from residential sources or it could be an erroneous value provided by the probe.

05/13/2007 23:45

b) DO:

The values for the following dates and times are marked as suspect because salinity plays a minor role in their calculation. Since SpCond/Salinity values are marked as suspect, these values must be suspect as well. Data is considered good but is up to the discretion of the user if it is to be used.

05/13/2007 23:45

08/09/2007 09:30 through 09/06/2007 08:00

DO data are marked as suspect due to a high post calibration value of 116% instead of 100%, indicating that the DO probe's surface could have been compromised due to biofouling (Code: CBF). The DO values show a slow drift upward during the deployment, indicating that biofouling is the most likely cause for the higher than normal field readings for the following dates and times:

09/06/2007 08:15 through 10/18/2007 10:15

c) Depth:

The values for the following dates and times are marked as suspect because salinity plays a minor role in their calculation. Since SpCond/Salinity values are marked as suspect, these values must be suspect as well. Data is considered good but is up to the discretion of the user if it is to be used.

05/13/2007 23:45

08/09/2007 09:30 through 09/06/2007 08:00

d) pH:

Pre and Post calibrations show pH slope of 133mV to be outside suggested range (165-180mV), but Post calibration value (6.91) suggested the probe functioned properly during the deployment. The data points appeared to be approximately 0.4 units higher than values recorded during the previous and subsequent deployments. Data are considered good but is up to the discretion of the user if it is to be used for the following dates and times:

08/09/2007 09:30 through 09/06/2007 08:00

Rejected Data (Flag Code: <-3>)

a) DO:

Data for the following dates and times were deleted due to an observed sensor malfunction (Code: SSM) with the DO probe:

04/12/2007 09:15 through 05/01/2007 10:00

11/19/2007 08:15 through 12/06/2007 09:15

b) Turbidity:

Turbidity values were excessively high, and biofouling (Code: CBF) is the suspected cause because high readings were not observed with the following deployment. Biofouling elements could have been washed from the probe surface when the sonde was removed from the deployment tube since no biofouling was observed on the probe when inspected at the lab. The values for the following dates and times were deleted:

07/07/2007 07:45 through 07/11/2007 08:00

c) Depth:

The depth sensor was out of the water (Code: SOW) due to an extremely low tide event. Values were deleted during the following dates and times:

04/15/2007 23:45 through 04/16/2007 01:30

## **St. Pierre**

### Missing Data (Flag Code: <-2>)

a) All Data:

Data was not collected for the following dates and times due to low battery voltage.

07/14/2007 11:30

07/14/2007 12:30

07/14/2007 13:00

07/14/2007 13:30

07/14/2007 14:00

07/14/2007 14:30

07/14/2007 15:00

07/14/2007 15:30

07/14/2007 16:00

07/14/2007 16:30

07/14/2007 17:00

07/14/2007 17:30

07/14/2007 18:00

07/14/2007 18:30

07/14/2007 19:00

07/14/2007 19:30

07/14/2007 20:00

07/14/2007 20:15

07/14/2007 20:45

07/14/2007 21:00

07/14/2007 21:30 through 08/09/2007 10:00

#### Suspect Data (Flag Code: <1>)

a) All Data:

The temperature probe experienced a catastrophic failure toward the end of the November deployment. The data gathered prior to the failure is believed to be good but the data could be compromised since the temperature probe was close to failure. Due to the unknown quality of this deployment's data, all data has been marked suspect for the following dates and times:

11/15/2007 09:45 through 11/27/2007 16:45

11/27/2007 17:15 through 11/27/2007 22:30

#### Rejected Data (Flag Code: <-3>)

a) DO:

The DO probe experienced heavy downward drift (Code: SSD) throughout its January deployment. Data was deleted for the following dates and times:

01/17/2007 11:15 through 02/14/2007 10:15

The DO probe experienced heavy downward drift (Code: SSD) midway through its Oct. / Nov. deployment. Data was deleted for the following dates and times:

10/30/2007 16:45 through 11/15/2007 09:30

b) pH:

Pre and Post calibrations indicate pH probe was calibrated to read approximately 0.5 units higher than conditions provided. The post calibration slope value (35) indicated that the pH port was fouled or the sensor had malfunctioned during deployment. It is unknown when the probe failed during deployment. So, all data was rejected for the following dates and times:

09/06/2007 08:45 through 10/09/2007 11:15

#### **Fishing Creek**

#### Missing Data (Flag Code: <-2>)

a) All Data:

Data are missing for the following dates and times due to a loose battery connector within the data logger.

03/15/2007 10:45 through 04/12/2007 10:15

All data are missing due to water leaking into the battery port, causing intermittent electrical failures for the following dates and times:

04/18/2007 04:00 through 04/19/2007 19:00

04/19/2007 19:30 through 04/20/2007 00:30

04/21/2007 07:00 through 04/21/2007 09:45

04/21/2007 20:15 through 04/21/2007 21:30

04/21/2007 23:15 through 05/15/2007 11:30

All data are missing for the following dates and times due to the sonde not being deployed for the scheduled reading.

11/15/2007 09:00

Suspect Data (Flag Code: <1>)

a) All Data:

All data for the following dates and times were marked suspect (Code: <1>) due to water leaking into the battery compartment. The data logger would shut off intermittently, and the data collected may be compromised due to unknown issues associated with electronics being introduced to salt water.

04/19/2007 19:15

04/20/2007 00:45 through 04/21/2007 06:45

04/21/2007 10:00 through 04/21/2007 23:00

b) Depth:

The data logger was deployed at the wrong depth but the other recorded parameters were not affected. Values were recorded approximately 0.7 meters shallower than usual for the following dates and times.

10/09/2007 12:00 through 11/15/2007 08:45

Rejected Data (Flag Code: <-3>)

a) Temperature:

Values were deleted for the following dates and times due to an out of water event (Code: GOW).

04/16/2007 01:00 through 04/16/2007 01:45

10/25/2007 01:30

b) SpCond/Salinity:

Values were deleted for the following dates and times due to an out of water event (Code: GOW or Code: SOW).

04/16/2007 00:45 through 04/16/2007 01:45

10/25/2007 01:30

c) DO:

Values were deleted for the following dates and times due to an out of water event (Code: GOW or Code: SOW).

04/16/2007 00:45 through 04/16/2007 01:45

10/25/2007 01:30

The following DO values were deleted due to a sensor malfunction (Code: SSM).

11/26/2007 16:00 through 12/06/2007 11:15

d) Depth:

Values were deleted for the following dates and times due to an out of water event (Code: GOW) (Code: SOW).

04/16/2007 00:15 through 04/16/2007 02:00

04/16/2007 13:15 through 04/16/2007 14:15

06/03/2007 14:45 through 06/03/2007 17:00

06/04/2007 04:45 through 06/05/2007 05:30

06/05/2007 05:00 through 06/05/2007 05:30  
10/24/2007 00:15 through 10/24/2007 00:45  
10/25/2007 00:45 through 10/25/2007 01:45

e) pH:

The pH sensor malfunctioned (Code: SSM), resulting in extremely high values, and the data was deleted for the following dates and times.

04/12/2007 10:30 through 04/21/2007 20:00  
10/25/2007 01:30

The pH sensor malfunctioned (Code: SSM) during deployment and data were removed for the following dates and times.

06/10/2007 19:00 through 06/14/2007 12:30

f) Turbidity:

Values were deleted for the following dates and times due to an out of water event (Code: GOW).

04/16/2007 01:00 through 04/16/2007 01:45  
10/25/2007 01:30

## **Mosquito Creek**

### Data that Passed QC (Flag Code: <0>)

a) All Data:

The data logger was not fully deployed in its deployment tube during the following dates and times. Waters at this site are well-mixed and the data are considered representative of the dataset, despite being collected from the wrong depth (Code: CWD):

04/12/2007 10:00 through 05/15/2007 11:00  
06/26/2007 10:15 through 08/06/2007 09:45

b) Depth:

The data logger deployment mount was moved approximately 0.5 meters from old location. Depth at new location is approximately 1.5 meters deeper than that of old location. The data logger recorded data at the wrong depth while being deployed at 10:00. This event happened on the following date and time.

08/06/2007 10:00

c) Temperature:

Data for the following dates and times were collected at the wrong depth but are considered good.

04/12/2007 10:00 through 05/15/2007  
06/26/2007 10:15 through 08/09/2007

d) SpCond/Salinity:

Data for the following dates and times were collected at the wrong depth but are considered good.

04/12/2007 10:00 through 05/15/2007

06/26/2007 10:15 through 08/09/2007

e) DO:

Data for the following dates and times were collected at the wrong depth but are considered good.

04/12/2007 10:00 through 05/15/2007

06/26/2007 10:15 through 08/09/2007

f) pH:

Data for the following dates and times were collected at the wrong depth but are considered good.

04/12/2007 10:00 through 05/15/2007

06/26/2007 10:15 through 08/09/2007

g) Turbidity:

Data for the following dates and times were collected at the wrong depth but are considered good.

04/12/2007 10:00 through 05/15/2007

06/26/2007 10:15 through 08/09/2007

Missing Data (Flag Code: <-2>)

a) All Data:

Data missing due to instrument failure for the following dates and times:

04/04/2007 21:15 through 04/12/2007 10:00

05/22/2007 15:15 through 05/29/2007 11:15

Data missing due to data logger being removed from the water for on-site construction or during swaps:

06/26/2007 10:15

11/15/2007 08:00 through 11/15/2007 14:15

Suspect Data (Flag Code: <1>)

a) SpCond/Salinity:

Data are marked as suspect for the following dates and times due to the conductivity probe becoming fouled. Conductivity values were reading approximately 3 - 4 mS/cm lower than true conditions provided.

10/03/2007 17:45 through 10/16/2007 12:15

11/26/2007 11:30 through 12/06/2007 14:00

b) DO:

Data are marked as suspect for the following dates and times due to the conductivity probe becoming fouled. Conductivity values were reading approximately 10mS/cm lower than true conditions provided. Since conductivity values are used to calculate DO values, these DO values have been marked as suspect since the data may have been impacted due to the conductivity values becoming compromised from biofouling.

09/02/2007 16:15 through 09/06/2007 09:45

Data are marked as suspect for the following dates and times due to the conductivity probe becoming fouled. Conductivity values were reading approximately 3 - 4mS/cm lower than true conditions provided. Since conductivity values are used to calculate DO values, these DO values have been marked as suspect since the data may have been impacted due to the conductivity values becoming compromised from biofouling.

10/03/2007 17:45 through 10/16/2007 12:15

11/26/2007 11:30 through 12/06/2007 14:00

c) Depth:

Data are marked as suspect for the following dates and times due to the conductivity probe becoming fouled. Conductivity values were reading approximately 10mS/cm lower than true conditions provided. Since conductivity values are used to calculate DO values, these DO values have been marked as suspect since the data may have been impacted due to the conductivity values becoming compromised from biofouling.

09/02/2007 16:15 through 09/06/2007 09:45

Data are marked as suspect for the following dates and times due to the conductivity probe becoming fouled. Conductivity values were reading approximately 3 - 4mS/cm lower than true conditions provided. Since conductivity values are used to calculate DO values, these DO values have been marked as suspect since the data may have been impacted due to the conductivity values becoming compromised from biofouling.

10/03/2007 17:45 through 10/16/2007 12:15

11/26/2007 11:30 through 12/06/2007 14:00

The data logger was not fully deployed in its deployment tube during the following dates and times:

04/12/2007 10:00 through 05/15/2007 11:00

06/26/2007 10:15 through 08/06/2007 09:45

Rejected Data (Flag Code: <-3>)

a) All Data:

All data were rejected for the following dates and times because the data logger was removed from its deployment mount for repairs to be conducted on the deployment mount. Data integrity was not compromised when data logger was replaced.

09/27/2007 08:30 through 09/28/2007 15:45

For the following dates and time, the data logger was not fully deployed in the deployment mount when the reading was taken. All data were rejected.

08/06/2007 10:00

For the following dates & times, the data logger was not at the proper deployment depth (Code: CWD) during its new deployment (Code: CND). The data logger was removed from the deployment mount in order to check its final reading against the newly deployed

data logger's first reading in order to gather comparison data between the two data loggers. All data were rejected.  
12/06/2007 14:15

b) SpCond/Salinity:

Data for the following dates and times were deleted due to biofouling (Code: CBF) spurred from heavy rain events. Post calibration showed low readings from this probe (43.12mS/cm vs 50mS/cm).

09/02/2007 16:15 through 09/06/2007 09:45

c) Turbidity:

Turbidity data for the following dates and times have been deleted due to biofouling (Code: CBF) from sea squirts exaggerating true turbidity values.

08/17/2007 23:15 through 09/06/2007 09:45

09/18/2007 16:45 through 10/16/2007 12:15

**Rain Data**

| <b>Date</b> | <b>Total Precipitation (mm)</b> |
|-------------|---------------------------------|
| 1/4/2007    | 5.334                           |
| 1/5/2007    | 8.89                            |
| 1/8/2007    | 3.048                           |
| 1/22/2007   | 19.812                          |
| 2/13/2007   | 5.334                           |
| 2/14/2007   | 0.254                           |
| 2/21/2007   | 1.016                           |
| 2/22/2007   | 0.254                           |
| 2/25/2007   | 0.254                           |
| 3/1/2007    | 11.684                          |
| 3/2/2007    | 1.016                           |
| 3/10/2007   | 0.254                           |
| 3/16/2007   | 9.398                           |
| 4/11/2007   | 1.27                            |
| 4/14/2007   | 0.254                           |
| 4/15/2007   | 0.254                           |
| 4/19/2007   | 15.494                          |
| 4/20/2007   | 7.874                           |
| 5/6/2007    | 13.716                          |
| 5/9/2007    | 1.27                            |
| 5/13/2007   | 3.048                           |
| 5/17/2007   | 2.286                           |
| 6/2/2007    | 49.276                          |
| 6/3/2007    | 5.842                           |

|           |        |
|-----------|--------|
| 6/5/2007  | 33.528 |
| 6/11/2007 | 5.08   |
| 6/12/2007 | 0.508  |
| 6/13/2007 | 24.892 |
| 6/14/2007 | 1.524  |
| 6/15/2007 | 24.638 |
| 6/18/2007 | 2.286  |
| 6/20/2007 | 36.322 |
| 6/21/2007 | 0.254  |
| 7/1/2007  | 10.16  |
| 7/2/2007  | 57.404 |
| 7/7/2007  | 19.05  |
| 7/8/2007  | 2.032  |
| 7/9/2007  | 0.508  |
| 7/11/2007 | 1.778  |
| 7/14/2007 | 6.604  |
| 7/15/2007 | 0.508  |
| 7/25/2007 | 1.778  |
| 7/28/2007 | 8.89   |
| 7/30/2007 | 79.248 |
| 7/31/2007 | 0.508  |
| 8/3/2007  | 35.306 |
| 8/4/2007  | 0.254  |
| 8/9/2007  | 1.524  |
| 8/10/2007 | 5.588  |
| 8/11/2007 | 14.478 |
| 8/12/2007 | 1.27   |
| 8/23/2007 | 5.842  |
| 8/24/2007 | 13.716 |
| 8/25/2007 | 0.762  |
| 8/26/2007 | 2.286  |
| 8/27/2007 | 6.096  |
| 8/30/2007 | 8.382  |
| 8/31/2007 | 3.302  |
| 9/1/2007  | 40.132 |
| 9/2/2007  | 65.786 |
| 9/11/2007 | 0.508  |
| 9/12/2007 | 4.318  |
| 9/13/2007 | 2.032  |
| 9/14/2007 | 5.842  |
| 9/20/2007 | 10.16  |
| 9/21/2007 | 1.016  |
| 9/22/2007 | 0.508  |
| 10/2/2007 | 1.778  |
| 10/3/2007 | 70.358 |
| 10/4/2007 | 17.018 |

|            |        |
|------------|--------|
| 10/18/2007 | 0.508  |
| 10/24/2007 | 12.192 |
| 10/26/2007 | 9.144  |
| 11/19/2007 | 0.254  |
| 12/3/2007  | 0.254  |
| 12/15/2007 | 2.54   |
| 12/16/2007 | 17.018 |
| 12/21/2007 | 50.038 |
| 12/22/2007 | 0.254  |
| 12/23/2007 | 1.27   |
| 12/25/2007 | 0.762  |
| 12/29/2007 | 7.366  |
| 12/30/2007 | 2.032  |