ACE Basin (ACE) National Estuarine Research Reserve Water Quality Metadata
January-December 2010 Report
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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; automated depth/level corrections for changes in barometric pressure (cDepth or cLevel parameters); 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 up to 2 hours of pre- and post-deployment data retained to assist in data management. During primary QAQC, data are flagged if they are missing or out of sensor range. The edited file is then returned to the Reserve for secondary QAQC 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 summary statistics, 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 for upload to the CDMO. Upload after secondary QAQC results in ingestion into the database as provisional plus data, recalculation of cDepth or cLevel parameters, and finally tertiary QAQC by the CDMO 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. For more information on QAQC flags and codes, see Sections 11 and 12. Justin Hart was responsible for these tasks.

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 stable structure. To facilitate water flow across the sensors, approximately two-inch diameter holes are drilled into the PVC pipes.

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 wrapped in nonconductive copper tape. 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. Swap data are collected by taking readings at the same time with the retrieved and newly deployed data logger to determine how much drift occurred during the previous deployment. A secondary field reading is taken from time to time with in-situ measurements to serve as a secondary check. 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 oxygen readings (<28%).

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 the barometric pressure reading within the lab in mmHg. 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 (6.6 feet), with a maximum of 2.8 m (9.2 feet) and a minimum of 1.4 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 2010, the mean depth at the station was 2.34 m (7.67 ft), and the mean salinity was 30.8 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 (*Quercus virginiana*), cabbage

palmetto (*Sabal palmetto*), and Southern red cedar (*Juniperus silicicola*)) 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.

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, 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 2010, the mean depth at the station was 1.77 m (5.81 ft), and the mean salinity was 9.4 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 2010, the mean depth at the station was 3.71 m (12.17 ft), and the mean salinity was 18.2 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.

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 2010, the mean depth at the station was 2.00 m (8.69 ft), and the mean salinity was 29.7 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.

6) Data collection period –

Big Bay

BEGAN	ENDED
12/14/2009 – 10:15	01/12/2010 – 09:30
01/12/2010 – 09:45	02/03/2010 – 14:45
02/03/2010 – 15:15	03/10/2010 – 08:15

NO DATA COLLECTED DUE TO POOR BATTERY CONNECTION DURING 03/10 – 04/14.

04/14/2010 – 11:45	04/28/2010 – 10:15
04/28/2010 – 10:45	05/12/2010 – 10:15
05/12/2010 – 10:45	05/25/2010 – 11:00
05/25/2010 – 11:30	06/09/2010 – 08:15
06/09/2010 – 08:45	06/24/2010 – 11:30
06/24/2010 – 12:00	07/08/2010 – 08:00
07/08/2010 – 08:30	07/23/2010 – 10:00
07/23/2010 – 10:30	08/05/2010 – 07:00
08/05/2010 – 07:15	08/17/2010 – 10:45
08/17/2010 – 11:15	09/07/2010 – 09:45
09/07/2010 – 10:15	09/22/2010 – 10:00
09/22/2010 – 10:00	10/05/2010 – 08:30
10/05/2010 – 08:30	11/03/2010 **BATTERY FAILURE 11/2/2010 09:15**
11/03/2010 – 08:45	12/02/2010 – 08:45
12/02/2010 – 09:15	01/05/2011 – 12:15

Fishing Creek

BEGAN	ENDED
01/06/2010 – 12:45	01/12/2010 – 12:45
01/12/2010 – 13:00	02/03/2010 – 16:15
02/03/2010 – 16:45	03/10/2010 – 09:15
03/10/2010 – 09:45	04/14/2010 – 12:45
04/14/2010 – 13:15	04/28/2010 – 12:15
04/28/2010 – 12:45	05/12/2010 – 11:30
05/12/2010 – 12:00	05/25/2010 – 09:45
05/25/2010 – 10:15	06/09/2010 – 09:45
06/09/2010 – 10:15	06/24/2010 – 12:30
06/24/2010 – 13:00	07/08/2010 – 09:15
07/08/2010 – 09:45	07/23/2010 – 11:30
07/23/2010 – 12:00	08/05/2010 – 08:30
08/05/2010 – 09:00	08/17/2010 – 12:15
08/17/2010 – 12:45	09/07/2010 – 11:15
09/07/2010 – 11:45	09/22/2010 – 10:45
09/22/2010 – 11:15	10/05/2010 – 09:30
10/05/2010 – 10:00	11/03/2010 – 10:30

11/03/2010 – 11:00	12/02/2010 – 10:00
12/02/2010 – 10:15	01/05/2011 – 13:30

Mosquito Creek

BEGAN	ENDED
12/14/2009 – 13:00	01/12/2010 – 10:45
01/12/2010 – 11:15	02/03/2010 – 17:30
02/03/2010 – 18:00	03/10/2010 – 10:45
03/10/2010 – 11:15	04/14/2010 – 13:45
04/14/2010 – 14:15	04/28/2010 – 13:30
04/28/2010 – 14:00	05/12/2010 – 12:45
05/12/2010 – 13:15	05/25/2010 – 08:45
05/25/2010 – 09:15	06/09/2010 – 11:00
06/09/2010 – 11:30	06/24/2010 – 13:45
06/24/2010 – 14:15	07/08/2010 – 11:00
07/08/2010 – 11:30	07/23/2010 – 09:00
07/23/2010 – 09:30	08/05/2010 – 09:30
08/05/2010 – 10:00	08/17/2010 – 13:00
08/17/2010 – 13:30	09/07/2010 – 12:15
09/07/2010 – 12:45	09/22/2010 – 11:30
09/22/2010 – 12:00	10/05/2010 – 12:15
10/05/2010 – 12:45	11/03/2010 – 09:30
11/03/2010 – 10:00	12/02/2010 – 11:15
12/02/2010 – 11:45	01/05/2010 – 14:45

St. Pierre

BEGAN	ENDED
12/14/2010 – 09:30	01/12/2010 – 10:00
01/12/2010 – 10:30	02/03/2010 – 15:30
02/03/2010 – 16:00	03/10/2010 – 07:15
03/10/2010 – 07:45	04/14/2010 – 10:15
04/14/2010 – 10:45	04/28/2010 – 11:00
04/28/2010 – 11:30	05/12/2010 – 09:15
05/12/2010 – 09:45	05/25/2010 – 12:15
05/25/2010 – 12:45	06/09/2010 – 08:45
06/09/2010 – 09:15	06/24/2010 – 10:45
06/24/2010 – 11:15	07/08/2010 – 07:15
07/08/2010 – 07:45	07/23/2010 – 10:45
07/23/2010 – 11:15	08/05/2010 – 06:15
08/05/2010 – 06:45	08/17/2010 – 11:30
08/17/2010 – 12:00	09/07/2010 – 10:15
09/07/2010 – 10:45	09/22/2010 – 09:00
09/22/2010 – 09:30	10/05/2010 – 08:45
10/05/2010 – 09:15	11/01/2010 – 08:00

MISSING DATA 11/01 – 08:15 THROUGH 11/03 – 12:00 DUE TO SITE MAINTENANCE

11/03/2010 – 12:15	12/02/2010 – 08:00
12/02/2010 – 08:30	01/05/2010 – 11:15

7) Distribution

NOAA/ERD retains the right to analyze, synthesize and publish summaries of the NERRS System-wide Monitoring Program data. The PI retains the right to be fully credited for having collected and

processed the data. Following academic courtesy standards, the PI and NERR site where the data were collected will be contacted and fully acknowledged in any subsequent publications in which any part of the data are used. Manuscripts resulting from 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 are identified to species, measured and weighed.

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 (NH4), nitrite + nitrate (NO2 + NO3), ortho-phosphate (PO4), and chlorophyll-A (Chl-a). Real-time weather data are 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. 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 data sonde:

Parameter: Temperature
Units: Celsius (C)
Sensor Type: Thermistor
Model#: 6560
Range: -5 to 50 C
Accuracy: +/- 0.15
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 dependant)

Parameter: Salinity
Units: parts per thousand (ppt)
Sensor Type: Calculated from conductivity and temperature
Range: 0 to 70 ppt
Accuracy: +/- 1.0% of reading pr 0.1 ppt, whichever is greater
Resolution: 0.01 ppt

Parameter: Dissolved Oxygen % saturation
Units: percent air saturation (%)
Sensor Type: Rapid Pulse - Clark type, polargraphic
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 to 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/Liter (mg/L)
Sensor Type: Rapid Pulse - Clark type, polargraphic
Model#: 6562
Range: 0 to 50 mg/L
Accuracy: 0-20 mg/L: +/- 2% of the reading or 0.2 mg/L, whichever is greater
20 to 50 mg/L: +/- 6% of the reading
Resolution: 0.01 mg/L

Parameter: pH – bulb probe or EDS flat glass probe
Units: pH units
Sensor Type: Glass combination electrode
Model#: 6561 or 6561FG
Range: 0 to 14 units
Accuracy: +/- 0.2 units
Resolution: 0.01 units

Parameter: Turbidity
Units: nephelometric turbidity units (NTU)
Sensor Type: Optical, 90 degree scatter, with mechanical cleaning
Model#: 6136
Range: 0 to 1000 NTU
Accuracy: +/- 2% of reading or 0.3 NTU (whichever is greater)
Resolution: 0.1 NTU

Dissolved Oxygen Qualifier:

The reliability of the dissolved oxygen (DO) data after 96 hours post-deployment for non-EDS (Extended Deployment System) 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 2010 were YSI 6600 EDS models.

Depth Qualifier:
The NERR System-Wide Monitoring Program utilizes YSI data sondes that can be equipped with either vented or non-vented depth/level sensors. 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 vented 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 can be corrected.

In 2010, the CDMO began automatically correcting depth/level data for changes in barometric pressure as measured by the Reserve's associated meteorological station during data ingestion. These corrected depth/level data are reported as cDepth and cLevel, and are assigned QAQC flags and codes based on QAQC protocols. Please see sections 11 and 12 for QAQC flag and code definitions.

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, and -2 flags are applied automatically to indicate data that is missing and above or below sensor range. All remaining data are then flagged 0, passing initial QAQC checks. 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 Optional SWMP Supported Parameter
0 Data Passed Initial QAQC Checks
1 Suspect Data
2 *Open - reserved for later flag*
3 Calculated data: non-vented depth/level sensor correction for changes in barometric pressure
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, but some comment codes (marked with an * below) can be applied to the entire record in the F_Record column.

General Errors

GIC	No instrument deployed due to ice
GIM	Instrument malfunction
GIT	Instrument recording error; recovered telemetry data
GMC	No instrument deployed due to maintenance/calibration
GNF	Deployment tube clogged / no flow
GOW	Out of water event
GPF	Power failure / low battery
GQR	Data rejected due to QA/QC checks
GSM	See metadata

Corrected Depth/Level Data Codes

GCC	Calculated with data that were corrected during QA/QC
GCM	Calculated value could not be determined due to missing data
GCR	Calculated value could not be determined due to rejected data
GCS	Calculated value suspect due to questionable data
GCU	Calculated value could not be determined due to unavailable data

Sensor Errors

SBO	Blocked optic
SCF	Conductivity sensor failure
SDF	Depth port frozen
SDG	Suspect due to sensor diagnostics
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
SQR Data rejected due to QAQC checks

SSD Sensor drift
SSM Sensor malfunction
SSR Sensor removed / not deployed
STF Catastrophic temperature sensor failure
STS Turbidity spike
SWM Wiper malfunction / loss

Comments
CAB* Algal bloom
CAF Acceptable calibration/accuracy error of sensor
CAP Depth sensor in water, affected by atmospheric pressure

CBF Biofouling
CCU Cause unknown
CDA* DO hypoxia (<3 mg/L)
CDB* Disturbed bottom
CDF Data appear to fit conditions
CFK* Fish kill
CIP* Surface ice present at sample station
CLT* Low tide
CMC* In field maintenance/cleaning
CMD* Mud in probe guard
CND New deployment begins
CRE* Significant rain event
CSM* See metadata
CTS Turbidity spike
CVT* Possible vandalism/tampering
CWD* Data collected at wrong depth
CWE* Significant weather event

13) Post deployment information –

Probe Identification:	**Standards for Calibration:**
Turbidity 6136 Probe	YSI 6073G Turbidity Standard 123 NTU
pH 116031 Probe	RICCA CHEMICAL COMPANY LLC. Buffer 7.00 and 10.00
pH 6561FG Probe	RICCA CHEMICAL COMPANY LLC. Buffer 7.00 and 10.00
Specific Conductivity 6560 Probe	YSI 3169 Conductivity Calibrator 50 mS/cm +/- 1%

Big Bay

Deployment Date m/d/y	SpCond ms/cm	DO 1 (100%	DO 2 (100%	pH (7)	pH (10)	Turb NTU	Turb NTU	Depth m

		sat)	sat)					
12/14/2009	50.78	98.4	98.4	6.96	9.99	-0.1	133.0	0.115
1/12/2010	49.84	100.1	100.1	*	*	0.3	126.4	0.036
2/3/2010	50.50	99.2	99.2	7.07	10.02	0.4	128.4	-0.056
3/10/2010	*	*	*	*	*	*		*
4/14/2010	50.04	97.6	97.7	7.15	10.18	-1.9	125.0	-0.033
4/28/2010	50.22	101.5	101.5	7.06	10.05	-0.4	120.6	0.070
5/12/2010	50.43	105.2	105.5	6.92	9.93	-0.1	126.1	-0.011
5/25/2010	50.31	100.6	100.6	7.00	9.98	0.4	127.4	-0.001
6/9/2010	50.98	99.0	99.0	6.83	9.84	0.0	128.0	0.001
6/24/2010	50.22	96.1	96.2	6.97	9.96	0.3	124.3	-0.020
7/8/2010	49.36	104.8	105.0	6.94	9.92	0.9	126.0	-0.020
7/23/2010	50.33	96.2	96.2	7.01	9.94	1.2	125.2	-0.013
8/5/2010	50.46	102.2	102.7	6.92	9.92	-0.4	115.0	0.011
8/17/2010	50.58	101.4	101.6	*	*	-0.1	125.6	0.008
9/7/2010	50.62	102.0	102.3	6.77	9.77	-0.9	107.6	0.056
9/22/2010	51.37	105.1	105.1	6.97	9.91	0.3	122.3	0.037
10/5/2010	48.80	108.0	108.0	6.88	9.74	-34.0	*	-0.218
11/3/2010	51.41	98.9	98.9	6.81	9.86	0.4	125.7	0.035
12/2/2010	50.03	99.6	99.8	7.06	10.04	0.2	121.2	-0.139

Fishing Creek

Deployment Date	SpCond	DO 1 (100%	DO 2 (100%	pH	pH	Turb	Turb	Depth
m/d/y	ms/cm	sat)	sat)	(7)	(10)	NTU	NTU	m
1/6/2010	50.16	99.9	99.9	6.91	9.82	0.3	124.7	0.127
1/12/2010	49.80	103.0	102.9	7.01	9.88	0.0	123.7	0.037
2/3/2010	49.39	95.6	95.6	6.98	9.96	0.0	126.8	-0.018
3/10/2010	49.39	105.4	105.5	7.18	10.12	0.5	121.4	0.098
4/14/2010	50.80	81.8	81.7	7.02	10.03	-1.2	123.2	-0.353
4/28/2010	50.51	101.5	102.0	7.10	10.02	0.0	122.0	0.072
5/12/2010	50.29	101.6	102.0	6.84	9.80	0.0	123.5	-0.290
5/25/2010	49.42	102.9	102.9	7.06	9.96	1.5	128.5	-0.049
6/9/2010	49.62	84.0	84.4	7.01	9.62	3.7	66.8	-0.088
6/24/2010	49.78	99.6	99.6	6.98	9.97	-0.6	124.7	-0.032
7/8/2010	49.91	104.4	104.5	7.12	10.10	0.3	126.6	-0.036
7/23/2010	49.77	104,1	104.1	7.16	10.12	1.0	83.7	-0.018
8/5/2010	49.48	104.1	104.1	6.98	9.97	0.4	122.7	-0.045
8/17/2010	50.10	100.4	100.8	7.04	10.02	0.4	126.1	-0.018
9/7/2010	49.82	99.1	99.8	7.04	10.02	0.0	119.0	0.140
9/22/2010	50.53	101.7	102.2	6.99	9.94	0.5	122.2	0.020
10/5/2010	48.87	113.0	113.1	7.03	10.00	0.0	122.0	-0.156
11/3/2010	50.81	104.7	104.7	7.11	10.15	0.7	125.8	0.016
12/2/2010	49.76	100.5	100.5	7.09	10.08	0.5	123.5	-0.136

Mosquito Creek

Deployment Date	SpCond	DO 1	DO 2	pH	pH	Turb	Turb	Depth

		(100%	(100%					
m/d/y	ms/cm	sat)	sat)	(7)	(10)	NTU	NTU	m
12/14/2009	49.78	99.2	99.2	7.02	9.96	0.3	126.8	0.123
1/12/2010	50.01	102.8	102.8	7.25	10.25	0.1	126.0	0.064
2/3/2010	49.39	104.9	104.9	7.10	10.07	0.5	126.7	-0.057
3/10/2010	49.64	103.3	102.8	7.34	10.24	-0.1	120.9	0.120
4/14/2010	50.18	102.5	102.5	7.06	10.07	-0.1	122.6	-0.037
4/28/2010	51.41	99.7	99.7	6.86	9.84	-0.5	121.0	0.074
5/12/2010	49.91	101.8	101.8	7.06	10.02	0.5	124.6	-0.031
5/25/2010	50.02	106.5	106.4	7.01	9.14	0.2	126.7	-0.007
6/9/2010	50.81	102.9	102.9	6.96	9.94	0.7	127.0	-0.001
6/24/2010	49.64	100.5	100.5	*	*	0.3	125.4	-0.021
7/8/2010	48.78	102.8	103.0	7.06	10.04	1.6	125.2	0.043
7/23/2010	51.99	102.1	102.0	7.10	10.09	-0.4	126.1	-0.017
8/5/2010	50.32	99.1	99.1	7.00	9.97	0.8	124.3	0.005
8/17/2010	49.10	103.6	103.7	7.04	10.01	-0.5	126.6	0.010
9/7/2010	50.36	100.6	100.8	7.01	9.98	0.5	131.8	0.058
9/22/2010	50.98	98.3	98.1	7.07	10.06	-0.2	125.0	0.040
10/5/2010	50.67	107.5	107.6	7.06	10.02	0.2	129.4	-0.155
11/3/2010	51.33	104.3	104.3	7.02	10.02	0.8	123.4	0.041
12/2/2010	50.69	112.0	112.0	7.16	10.13	0.8	123.9	-0.137

St. Pierre

Deployment Date	SpCond	DO 1 (100%	DO 2 (100%	pH	pH	Turb	Turb	Depth
m/d/y	ms/cm	sat)	sat)	(7)	(10)	NTU	NTU	m
12/14/2009	50.87	98.0	98.0	*	*	0.5	125.5	0.130
1/12/2010	50.15	103.0	103.0	7.03	9.98	0.0	127.9	0.082
2/3/2010	51.28	96.4	96.4	6.90	9.84	0.0	127.9	-0.151
3/10/2010	50.38	103.4	103.9	6.95	9.88	0.1	123.1	0.120
4/14/2010	49.65	96.8	96.8	6.85	9.91	-1.2	121.4	-0.132
4/28/2010	53.20	103.2	103.2	7.04	10.05	-0.4	123.0	0.072
5/12/2010	50.52	97.5	97.6	6.76	9.72	0.6	125.3	-0.032
5/25/2010	51.28	102.0	102.0	7.08	10.06	-0.1	117.4	-0.026
6/9/2010	51.30	101.4	101.5	6.85	9.84	1.6	105..4	-0.019
6/24/2010	51.75	98.8	98.8	6.99	9.98	-0.1	125.8	-0.024
7/8/2010	48.57	104.3	104.1	6.66	9.55	3.4	115.0	-0.018
7/23/2010	51.59	102.7	102.7	6.89	9.86	0.0	125.0	-0.021
8/5/2010	49.55	104.4	104.4	6.58	9.48	-0.1	112.0	-0.003
8/17/2010	51.15	107.7	107.6	6.91	9.87	0.7	124.9	0.095
9/7/2010	49.50	100.6	101.4	*	*	0.4	114.5	0.012
9/22/2010	50.15	101.0	101.3	6.88	9.86	-0.1	121.3	-0.012
10/5/2010	49.64	104.7	104.7	7.35	10.05	3.2	98.5	0.066
11/3/2010	51.67	103.8	103.8	7.07	10.07	-0.1	126.0	0.024
12/2/2010	49.90	96.5	96.5	7.16	10.14	1.2	122.5	-0.174

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 are needed, contact the Research Coordinator at the reserve submitting the data.

ACE NERR Water Quality Site Histories

Big Bay:
1995- Big Bay water quality station was installed in **March**. (coordinates: 32 29.662N 80 19.427W)
2001- Big Bay station replaced in **October** due to old age and excessive biofouling of oysters (coordinates changed: 32 29 38.72125N 80 19 21.69864W very accurate)
2003- Big Bay station moved to new location in **July** after embankment collapsed near data logger, causing sedimentation issues and poor data.(coordinates: 32.4941N and 80.3241W)
2005- Big Bay station modified in **December**
2009- Big Bay site mount replaced in **January (**about 0.3 meters deeper).

Fishing Creek:
2002- Fishing Creek site installed in **October** (coordinates: 32.6358 N 80.3655W)
2009- Fishing Creek site mount replaced in **May** (about 0.2 meters deeper).
2009- Fishing Creek site destroyed in **October**.
2010- Fishing Creek site replaced with 40' pylon in **January**.

Mosquito Creek:
2002- Mosquito Creek site installed in **October** (coordinates: 32.5558 N 80.4380W)
2007- Mosquito Creek mount installed 0.5 meters away from old mount in **August**. Deeper location.
2008- Mosquito Creek site mount attached to original mount after new mount broke in **October (**about 0.2 meters shallower).
2008- Mosquito Creek site mount was destroyed and repaired in **December** (about 0.2 meters shallower).
2009- Mosquito Creek site mount moved due to demolition of old bridge and construction of new one at same location in **August** (about 0.2 meters deeper)

Rock Creek:
1996- Rock Creek water quality station was installed in **March**. (coordinates: XXXXXXXXXXXX)
1996- Rock Creek water quality station was vandalized in **July** and never replaced.

St. Pierre:
1995- St. Pierre water quality station was installed in **October**. (coordinates: 32 31.724N 81 21.573W)
1997- St. Pierre site moved away from bank in **February, March, and other times** due to sedimentation issues fouling readings
2000- St Pierre site moved to other side of channel and station modified in **April** (coordinates changed: 32 31 40.59518N 80 21 41.2548W very accurate)
2001- St. Pierre station replaced in **September**
2006- St. Pierre station PVC replaced in **April**.
2006- Sutron Sat-Link2 transmitter installed in **June** at St. Pierre to transmit real-time data
2009- St. Pierre site mount replaced in **June** (about 0.06 meters deeper).

Blanket Statement(s): All Stations

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Dissolved Oxygen Hypoxia Coding

Dissolved oxygen percent and mg/L is coded <0> (CDA) when a hypoxic event is recorded (< 3 mg/L).

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 300NTU is unknown (Code: CCU). However, these values could be attributed to low tide, max flood 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 rejected (Code: <-3>).

Data Editing/Flagging Notes: Organized by Station, Parameter, and Code

Big Bay

All Parameters Blanket Statement for Big Bay

Missing Data (Flag <-2>)

Data are missing due to a power failure [GPF] resulting from a poorly manufactured battery not maintaining a positive connection between the series of batteries and the battery terminal within the sonde battery compartment. The problem was corrected when new batteries were installed. Data are missing for the following dates and times:
03/10/2010 – 08:30 through 04/14/2010 – 11:15

Data are missing due to a power failure [GPF] resulting in a voltage draining issue. This event was caused by a malfunctioning turbidity probe [SSM]. Data are missing for the following dates and times:
11/02/2010 – 09:30 through 11/03/2010 – 08:15

Suspect Data (Flag <1>)

Data were marked suspect due to a turbidity probe sensor malfunction [SSM] that resulted in erroneous voltage readings and ultimately voltage depletion. These voltage issues have the potential to influence the accuracy of the data collected. Data seem to fit conditions but were flagged suspect <1> beginning with the first anomalous voltage reading due to unknown influences on the other probes by the malfunctioning turbidity probe and associated voltage issues. Data were marked suspect for the following dates and times:
10/17/2010 06:30 through 11/02/2010 – 09:15

Temperature

Rejected Data (Flag <-3>)
None

Missing Data (Flag <-2>)
See Big Bay blanket statement above.

Suspect Data (Flag <1>)
See Big Bay blanket statement above.

Specific Conductivity/Salinity

Rejected Data (Flag <-3>)
None

Missing Data (Flag <-2>)
See Big Bay blanket statement above.

Suspect Data (Flag <1>)
See Big Bay blanket statement above.

DO Percent/mg/L
Rejected Data (Flag <-3>)
Oxygen data were rejected due to a sensor malfunction [SSM] discovered during post-deployment calibration tests. The oxygen probe did not pass the high/low reading test; where the probe should initially read high and drift down to stabilize at correct oxygen readings. This issue lasted through multiple deployments until it was discovered that the sonde was malfunctioning. Data were rejected for the following dates and times:
06/24/2010 – 12:00 through 07/08/2010 – 08:00
07/23/2010 – 10:30 through 08/05/2010 – 07:00
08/17/2010 – 11:15 through 09/07/2010 – 09:45

Missing Data (Flag <-2>)
See Big Bay blanket statement above.

Suspect Data (Flag <1>)
See Big Bay blanket statement above.

Depth
Rejected Data (Flag <-3>)
Depth data were rejected throughout the year due to in-situ swap data not being recorded at the normal deployed depth. Other data not affected. See "All Station" blanket statement above for additional details.

Missing Data (Flag <-2>)
See Big Bay blanket statement above.

Suspect Data (Flag <1>)
See Big Bay blanket statement above.

pH
Rejected Data (Flag <-3>)
Data were rejected based on calibration values when compared to instrument specifications. In these cases, the mV slope was out of the desired range of 165-180 and post calibration values were outside the probe specifications of ±0.2 units within the 7 and/or 10 pH calibration standard. Data were rejected for the following dates and times:
01/01/2010 – 00:00 through 02/03/2010 – 14:45
08/17/2010 – 11:15 through 09/07/2010 – 09:45

Missing Data (Flag <-2>)
See Big Bay blanket statement above.

Suspect Data (Flag <1>)
Data were marked suspect based on calibration values when compared to instrument specifications. The mV slope is an indicator of how well the pH probe is performing. A slope with a range of 165-180 is desired and indicates a quick response and accurate pH probe. When the slope value falls

outside of this desired range, the probe will experience a retarded reaction to changing environmental conditions. Due to this slow response, the data are reporting a lagging value rather than the value of the environmental conditions at the time of reading. Therefore this data are considered good for long-term trend analysis, but should not be used for short term analysis (1 year or less). Data were marked suspect for the following dates and times:
02/03/2010 – 15:15 through 03/10/2010 – 08:00

Data were marked suspect due to a voltage issue resulting from a turbidity probe malfunction. Refer to this station's blanket statement for additional information. Data were marked suspect for the following dates and times:
10/17/2010 06:30 through 11/02/2010 – 09:15

Turbidity

Rejected Data (Flag <-3>)

Data were rejected due to biofouling (CBF). Biofouling is identified when a gradual climb in graphed NTU values is observed and the values fail to return to normal until a new sonde is deployed. Visual observations of the probe's cleanliness are also used to help identify biofouling as being the issue with poor turbidity data. Data were rejected for the following dates and times:
05/18/2010 – 23:30 through 05/25/2010 – 11:00
07/19/2010 – 07:00 through 07/23/2010 – 10:00
08/12/2010 – 04:00 through 08/17/2010 – 10:45
08/28/2010 – 07:30 through 09/07/2010 – 09:45

Data were rejected due to a sensor malfunction [SSM] which was attributed to water intrusion through the probes optic face. This malfunction is detailed in this station's blanket statement. Data were rejected for the following dates and times:
10/05/2010 – 08:45 through 11/02/2010 – 09:15

Missing Data (Flag <-2>)

See Big Bay blanket statement above.

Suspect Data (Flag <1>)

See Big Bay blanket statement above.
See "All Stations" blanket statement above.

Data were marked 1 SWM CSM during this time due to a wiper malfunction that was noticed during the post calibration. Data during this time was noisy and erratic.
09/07/2010 10:00 through 09/22/2010 10:00

Fishing Creek

All Parameters Blanket Statement for Fishing Creek

Missing Data (Flag <-2>)

Data are missing at this station for all data due to the original station being destroyed from a boat collision. The old station was constructed of a u-post driven into the hard sediment with a 4" diameter schedule 40 PVC pipe attached with stainless steel banding. The new site was installed on 01/06/2010 – 12:30 and is constructed with a 20 ft. pylon measuring 1-ft. in diameter with a 4" diameter schedule 40 PVC pipe attached with stainless steel banding. Data are missing for the following dates and times:
10/13/2009 – 08:45 through 01/06/2010 – 12:30

Temperature

Rejected Data (Flag <-3>)
None

Missing Data (Flag <-2>)
See Fishing Creek blanket statement above.

Suspect Data (Flag <1>)
None

Specific Conductivity/Salinity
Rejected Data (Flag <-3>)
None

Missing Data (Flag <-2>)
See Fishing Creek blanket statement above.

Suspect Data (Flag <1>)
None

DO Percent/mg/L
Rejected Data (Flag <-3>)
Biofouling from algae can cause extreme high and low readings. An oxygen sensor drift of 10% or more from the expected 100% lab reading suggests that biofouling (CBF) or a sensor malfunction [SSM] is the cause for abnormal readings. Post calibration values showed a lab reading of 84% DO at a barometric pressure of 760.2 mmHg. These readings along with the observation of algal growth points to biofouling as the cause for sensor drift. DO data were rejected for the following dates and times due to biofouling issues:
06/09/2010 – 11:00 through 06/24/2010 – 12:30

Sensor malfunctions [SSM] cause heavy sensor drift and erroneous oxygen readings that are not comparative to surrounding conditions. Post-calibration readings showed oxygen readings of 81.8% in 100% saturation at a barometric pressure of 756.8 mmHg. A post calibration reading greater or less than 10% of 100% oxygen saturation normally indicates biofouling, but the DO sensor charge was extremely out of range, indicating that other unknown issues were the cause. Data were deleted for the following dates and times due to a sensor malfunction:
04/14/2010 – 13:00 through 04/28/2010 – 12:15

Missing Data (Flag <-2>)
See Fishing Creek blanket statement above.

Suspect Data (Flag <1>)
None

Depth
Rejected Data (Flag <-3>)
Depth data were rejected throughout the year due to in-situ swap data not being recorded at the normal deployed depth. Other data not affected. See "All Station" blanket statement above for additional details.

Missing Data (Flag <-2>)
See Fishing Creek blanket statement above.

Suspect Data (Flag <1>)
None

pH
Rejected Data (Flag <-3>)
pH data were deleted due to a sensor malfunction [SSM]. Post calibration readings show a mV slope outside of the manufacturer's recommended range and initial calibration readings were not within the probe's ±0.2 accuracy rating, reading 5.98 in pH 7 buffer solution. Data were rejected for the following dates and times due to a sensor malfunction:
01/12/2010 – 13:00 through 02/03/2010 16:30

pH data were rejected due to a sensor malfunction [SSM]. Post calibration readings show a mV slope outside of the manufacturer's recommended range and the post-calibration readings were not within the probe's ±0.2 accuracy rating, reading 9.62 in pH 10 buffer solution. Data were rejected for the following dates and times due to a sensor malfunction:
06/09/2010 – 10:00 through 06/24/2010 – 12:30

Missing Data (Flag <-2>)
See Fishing Creek blanket statement above.

Suspect Data (Flag <1>)
None

Turbidity
Rejected Data (Flag <-3>)
Data were rejected due to biofouling (CBF). Biofouling is identified when a gradual climb in graphed NTU values is observed and the values fail to return to normal until a new sonde is deployed. Visual observations of the probe's cleanliness are also used to help identify biofouling as being the issue with poor turbidity data. Data were rejected for the following dates and times:
05/21/2010 – 13:15 through 05/25/2010 – 09:45
07/19/2010 – 12:15 through 07/23/2010 – 11:30
09/20/2010 – 02:15 through 09/22/2010 – 10:45

Missing Data (Flag <-2>)
See Fishing Creek blanket statement above.

Suspect Data (Flag <1>)
See "All Stations" blanket statement above.

Data were marked suspect due to the wiper brush falling off of the turbidity probe. This brush is responsible for keeping the face of the turbidity probe clean and to brush off growth on the surrounding probes. Data seem to fit conditions but were marked suspect due to the more than normal recorded turbidity spikes and other abnormal values that are not usually seen with the wiper brush installed. Data are considered good for long term analysis, but should not be used for short term analysis (1 year or less). Data were marked suspect for the following dates and times due to the wiper falling off:
07/23/2010 – 12:00 through 08/05/2010 – 08:30

Mosquito Creek

All Parameter Blanket Statement for Mosquito Creek
Rejected Data (Flag <-3>)

All data were rejected due to the sonde being pulled halfway up its deployment tube, causing it to record data from the stagnant water within the deployment tube. Erroneous data were clearly identifiable when graphed, showing a dramatic change in water quality when comparing data prior to the event and after the sonde was replaced and deployed at the correct depth. This stagnant water is not representative of the well mixed water conditions observed at this site and was therefore rejected. All data were rejected for the following dates and times:
10/22/2010 – 17:30 through 11/03/2010 – 09:30

Temperature
Rejected Data (Flag <-3>)
See Mosquito Creek blanket statement.

Missing Data (Flag <-2>)
None

Suspect Data (Flag <1>)
None

Specific Conductivity/Salinity
Rejected Data (Flag <-3>)
See Mosquito Creek blanket statement.

Missing Data (Flag <-2>)
None

Suspect Data (Flag <1>)
None

DO Percent/mg/L
Rejected Data (Flag <-3>)
See Mosquito Creek blanket statement.

Data were rejected due to sensor drift related to biofouling (CBF). Post-calibration oxygen readings were 112% in 100% air saturation. Sensor drift equal to or greater than 10% of 100% air saturation is investigated to determine if biofouling or sensor malfunction is the cause. All other sensor diagnostics passed calibration tests. Therefore, it was determined that biofouling caused the positive drift in reported oxygen values. Data were rejected for sensor drift relating to biofouling for the following dates and times:
12/18/2010 – 11:00 through 12/31/2010 – 23:45

Missing Data (Flag <-2>)
None

Suspect Data (Flag <1>)
None

Depth
Rejected Data (Flag <-3>)
See Mosquito Creek blanket statement.

Depth data were rejected throughout the year due to in-situ swap data not being recorded at the normal deployed depth (CWD). Other data not affected. See "All Station" blanket statement above for additional details.

Missing Data (Flag <-2>)
None

Suspect Data (Flag <1>)
None

pH
Rejected Data (Flag <-3>)
See Mosquito Creek blanket statement.

pH data were rejected due to a sensor malfunction [SSM]. The probe calibrated out of the suggested mV slope range (165-180mV) and pre-calibration and/or post calibration values were not within the manufacturer's specified accuracy rating for this probe of ±0.2 units within 7 and 10 buffer solutions. The slope range is important to determine how quickly the probe responds to changing conditions and the ±0.2 unit accuracy test is used to determine how much drift has occurred during deployment. When neither of the probes diagnostic tests pass QAQC, it gives the user very little reason to trust the data. Data for the following dates and times were rejected:
01/01/2010 – 00:00 through 02/03/2010 – 17:30
03/03/2010 – 11:15 through 04/14/2010 – 13:45
04/28/2010 – 13:45 through 05/12/2010 – 12:45
05/25/2010 – 09:00 through 06/09/2010 – 11:00
06/24/2010 – 14:00 through 07/08/2010 – 11:00

Missing Data (Flag <-2>)
None

Suspect Data (Flag <1>)
None

Turbidity
Rejected Data (Flag <-3>)
See Mosquito Creek blanket statement.

Data were rejected due to biofouling (CBF). Biofouling is identified when a gradual climb in graphed NTU values is observed and the values fail to return to normal until a new sonde is deployed. Visual observations of the probe's cleanliness are also used to help identify biofouling as being the issue with poor turbidity data. Data were rejected for the following dates and times:
06/14/2010 – 20:00 through 06/24/2010 – 13:45

Missing Data (Flag <-2>)
None

Suspect Data (Flag <1>)
See "All Stations" blanket statement above.

Data for the following dates and times were marked rejected due to recorded turbidity spikes [STS] (values > 1,000 NTU). The cause is unknown and values don't fit normal conditions. Therefore the data were left in as rejected.

06/06/2010 – 11:00
10/02/2010 – 04:00

St. Pierre

All Parameter Blanket Statement for St. Pierre
Missing Data (Flag <-2>)
Data were not collected due to intermittent battery failure due to low voltage issues [GPF]. Data are missing for the following dates and times:
01/03/2010 – 01:45 through 01/03/2010 – 05:30
01/04/2010 – 01:00 through 01/04/2010 – 07:45
01/04/2010 – 17:45 through 01/04/2010 – 22:00
01/05/2010 – 01:30 through 01/12/2010 – 10:00

Data were not collected due to site maintenance (GSM) required to replace the old deployment tube with a new one for the following dates and times:
11/01/2010 – 08:15 through 11/03/2010 – 12:00

Blanket Statement for SpCond/Salinity, DO mg/L, and Depth for St. Pierre
Suspect Data (Flag <1>)
A reduced salinity reading of 1ppt resulting from sensor drift [SSD] caused by moderate biofouling (CBF) within the conductivity sensor. Algal growth within the sensor were visually observed. The data were identified and marked suspect rather than rejected because the data are valued as good for long term data trends but may not be acceptable for short term trend analysis. Other parameters (DO mg/L, Depth) require salinity values for their calculations and were marked suspect as well even though they seem to fit conditions (CDF) and post-calibration values were acceptable. Data for the following dates and times were marked suspect:
07/18/2010 – 00:00 through 07/23/2010 – 10:45

Temperature
Rejected Data (Flag <-3>)
None

Missing Data (Flag <-2>)
See St. Pierre blanket statement.

Suspect Data (Flag <1>)
None

Specific Conductivity/Salinity
Rejected Data (Flag <-3>)
None

Missing Data (Flag <-2>)
See St. Pierre blanket statement.

Suspect Data (Flag <1>)
See St. Pierre blanket statement.

DO Percent/mg/L
Rejected Data (Flag <-3>)

None

Missing Data (Flag <-2>)
See St. Pierre blanket statement.

Suspect Data (Flag <1>)
See St. Pierre blanket statement **for mg/L values only.**

Depth
Rejected Data (Flag <-3>)
Depth data were rejected throughout the year due to in-situ swap data not being recorded at the normal deployed depth. Other data not affected. See "All Station" blanket statement above for additional details.

Missing Data (Flag <-2>)
See St. Pierre blanket statement.

Suspect Data (Flag <1>)
See St. Pierre blanket statement

pH
Rejected Data (Flag <-3>)
pH data were rejected due to a sensor malfunction [SSM]. The probe calibrated out of the suggested mV slope range (165-180mV) and pre-calibration and/or post calibration values were not within the manufacturer's specified accuracy rating for this probe of ±0.2 units within 7 and 10 buffer solutions. The slope range is important to determine how quickly the probe responds to changing conditions and the ±0.2 unit accuracy test is used to determine how much drift has occurred during deployment. When neither of the probes diagnostic tests pass QAQC, it gives the user very little reason to trust the data. Data for the following dates and times were rejected:
01/01/2010 – 00:00 through 01/05/2010 – 01:15
01/12/2010 – 10:15 through 02/03/2010 – 15:30
03/10/2010 – 07:30 through 04/28/2010 – 11:00
07/08/2010 – 07:30 through 07/23/2010 – 10:45
08/05/2010 – 06:30 through 08/17/2010 – 11:30
09/07/2010 – 10:30 through 09/22/2010 – 09:00
10/05/2010 – 09:15 through 11/01/2010 – 08:00

Data were rejected due to a sensor drift [SSD] or an incorrect calibration identified by lab calibration values. The probe initially calibrated within the recommended mV slope range of (165-180) but failed to meet the probe's accuracy specifications of ±0.2 units within 7 and 10 buffer solutions during post calibrations. Data were rejected for the following dates and times:
05/12/2010 – 09:30 through 05/25/2010 – 12:15
06/09/2010 – 09:15 through 06/24/2010 – 10:45

Missing Data (Flag <-2>)
See St. Pierre blanket statement.

Suspect Data (Flag <1>)
None

Turbidity
Rejected Data (Flag <-3>)

Data were rejected due to biofouling (CBF). Biofouling is identified when a gradual climb in graphed NTU values is observed and the values fail to return to normal until a new sonde is deployed. Visual observations of the probe's cleanliness are also used to help identify biofouling as being the issue with poor turbidity data. Data were rejected for the following dates and times:
08/14/2010 – 12:00 through 08/17/2010 – 11:30
10/24/2010 – 13:00 through 11/01/2010 – 08:00

Data were rejected due to a sensor malfunction [SSM] identified when the wiper brush failed to rotate. This indicated an internal probe issue with unknown data collection consequences. Data for the following dates and times was rejected:
07/08/2010 – 07:30 through 07/23/2010 – 10:45

Data were rejected due to a poor calibration [SIC] from contaminated standards or other obstruction (air bubble) on the probe optics. Initial calibration values seemed off but were believed to have been the result of a new turbidity probe being installed. The improper calibration resulted in poor data. Data were rejected for the following dates and times:
08/05/2010 – 06:30 through 08/17/2010 – 11:30

Data were rejected when turbidity spikes [STS] occurred during a deployment after a wiper brush fell off. Unknown material is suspected of causing this spike and the data are not believed to be representative of the conditions at these times. Data for the following dates and times were rejected:
09/10/2010 – 20:45
09/10/2010 – 22:30
09/15/2010 – 17:45
09/16/2010 – 12:15
09/17/2010 – 06:15 through 09/17/2010 – 06:30
09/17/2010 – 08:30
09/17/2010 – 15:15

Missing Data (Flag <-2>)
See St. Pierre blanket statement.

Suspect Data (Flag <1>)
See "All Stations" blanket statement above.

Data were marked suspect due to the wiper brush falling off [SWM] during deployment. Post calibration values were recorded without a wiper pad to simulate field readings. Post calibration values were much lower than expected in 123 NTU turbidity standard. It is unknown what affect the missing wiper brush had on the field readings, but the readings seemed to fit conditions and are believed to be good for long term analysis. Therefore, data for the following dates and times were marked suspect:
09/07/2010 – 10:30 through 09/22/2010 – 09:00
10/05/2010 – 09:00 through 10/24/2010 – 12:45

Data were marked suspect due to sensor drift/accuracy issues observed during post calibrations. This repeated issue was observed with a turbidity probe that was identified to have this issue after a couple of deployments, resulting in the probes removal. The probe would calibrate successfully but post calibration readings resulted in values >10 NTU below the expected 126 NTU value within the calibration standard. Data seemed to fit conditions for the most part. Data for the following dates and times were marked suspect due to unknown issues resulting in accuracy errors; however, data could be valuable for long term analysis:
06/09/2010 – 09:00 through 06/24/2010 – 10:45

Data for the following dates and times were marked rejected due to recorded turbidity spikes (values > 1,000 NTU) due to unknown causes (CCU). The data for the following dates and times was left in as rejected:
05/24/2010 – 22:30 through 05/24/2010 – 22:45

Rain Data: Bennetts Point Weather Station

Date	Total Precipitation (mm)
01/01	0.9
01/16	29.6
01/17	25.1
01/21	28.6
01/25	19.8
01/30	9.6
02/02	1.7
02/05	12.2
02/06	0.5
02/09	3.8
02/22	7
03/11	17.7
03/12	8
03/13	0.6
03/17	0.9
03/21	4.9
03/28	12.9
03/29	21.6
04/08	23.6
04/09	0.9
04/21	2
04/24	0.6
04/25	2.3
05/04	10.3
05/17	3.7
05/22	3.6
05/23	10.9
05/24	16.4
05/25	4.6
05/26	1.8
05/29	10.3
05/30	1.1
05/31	1.6
06/01	4.5

06/03	5.1
06/05	8
06/15	3.3
06/20	21.6
06/27	8.5
06/28	0.3
07/01	6.3
07/08	3.6
07/10	4.9
07/11	0.6
07/12	3.2
07/14	3.9
07/20	1.8
07/21	1.9
07/22	0.3
07/27	29.8
07/28	0.3
07/29	13.2
07/31	0.6
08/02	9.7
08/03	0.6
08/06	20.7
08/13	45.3
08/14	23.9
08/15	128.4
08/16	22.6
08/17	9.9
08/20	19.3
08/21	11.5
08/23	2.1
08/24	11
08/25	0.3
08/26	0.6
08/27	21
09/09	0.3
09/11	22.1
09/12	1
09/18	0.5
09/26	2.8
09/27	105.1
09/28	3.5
09/29	27.4
10/14	0.3

10/25	39
11/04	2.7
11/05	0.3
11/26	7.1
11/30	8.2
12/01	0.3
12/11	0.3
12/12	3.8
12/18	19.1