

North Carolina (NOC) NERR Water Quality Metadata
January 1, 2010 – December 31, 2010
Latest Update: October 21, 2014
I. Data Set and Research Descriptors

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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. All QA/QC are performed by Byron Toothman and Heather Wells.

3) Research objectives:

Four long-term water quality monitoring stations have been established within the estuaries bordering Masonboro and Zeke's Islands of North Carolina's National Estuarine Research Reserve. Instruments are deployed vertically at all sites except East Cribbings, which is anchored to the bottom. Measurements are taken at 15-minute intervals for approximately two to four week periods continuously throughout the year. Parameters measured include Depth, Temperature, Salinity, Specific Conductivity, pH, Dissolved Oxygen, and Turbidity. The goal is to assess short-term variability and long-term changes (i.e., localized impacts of seasonal

storm events, inter-annual differences from rainfall, magnitude of climatic influence from El Nino/La Nina events, etc.) in estuarine water parameters within relatively pristine sites.

4) Research methods:

The Estuarine Water Quality Monitoring Program began on March 2, 1992 at the Research Creek site of the Masonboro Island component. A second Masonboro Island site, Loosin Creek, was added on February 26, 2002. Data collection started on May 19, 1994 at the Zeke's Island component (East Cribbings site) and an additional site, Zeke's Basin, was added March 1, 2002. The procedures described below were instituted in June 1995 and thus do not cover data recorded previously.

Two data loggers are assigned to each of the four permanent monitoring stations and are generally not interchanged among sites unless malfunctions occur. Before each YSI 6600EDS is deployed, calibration and maintenance is performed following the manufacturer's instructions. Calibration standards are required for pH, turbidity and salinity; all other parameter calibrations are performed as described in the manual. Buffer solutions for a two-point pH calibration (pH 7 and 10) are purchased pre-made from a scientific supply house. The conductivity and turbidity standards are obtained from YSI. The rapid pulse dissolved oxygen probe membranes are replaced and allowed to settle at least 24 hrs prior to deployment. The optical dissolved oxygen probes (ROX) require membrane changes yearly unless scratches or malfunctions occur prior to that time. All sites have been monitored using ROX dissolved oxygen probes since 2009.

Data sondes are wrapped in a wet, white towel and placed in a cooler for transport to the site. Monitoring stations are accessed using a small boat equipped with an outboard motor. During deployment the weather conditions and tide stage are recorded in the field observation log. The water quality instrument is placed inside a locked PVC tube that is attached to a piling if vertical deployment, and a steel cage if anchored horizontally approximately (15cm off the bottom). Every 15 minutes measurements are taken for Temperature, Specific Conductance, Salinity, Dissolved oxygen saturation, Dissolved oxygen concentration, Depth, pH, and Turbidity. All data are recorded in Eastern Standard Time. Vertical deployment structures were utilized at Research Creek beginning in 2008-2009, at Loosin Creek in 2009, and at Zeke's Basin in August 2010.

At the end of the sample period the water quality instrument is exchanged with a freshly calibrated instrument and transported back to the laboratory wrapped in a wet, white towel. The weather and water quality measurements are again noted in the field observation log. The calibration drift and the effect of biofouling on the water quality instrument are documented by post-calibration protocols. The water quality data are then uploaded, and sent to CDMO for primary QAQC, and the instrument is cleaned and calibrated as noted previously.

A Sutron Sat-Link2 transmitter was installed at the Research Creek station on August 7, 2006, and at the Zeke's Basin station on November 3, 2008. Both transmit data to the NOAA GOES satellite, NESDIS ID #3B032698. 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>.

5) Site location and character:

The components of North Carolina's National Estuarine Research Reserve (from north to south) are: Currituck Banks, Rachel Carson, Masonboro Island, and Zeke's Island. They are located along the southeast Atlantic coast of the United States. Currently, only data from Masonboro Island and Zeke's Island components are transferred to the CDMO. The four monitoring sites are:

A. Research Creek, Masonboro Island

The first Masonboro Island site (formerly called Masonboro Island (MS)) is 0.72 km north east from the mouth of Whiskey Creek, and east of the Intracoastal Waterway (ICW), in a small navigable channel called Research Creek at 34°09'21.7" latitude and 77° 50'59.9" longitude. The site typically has a salinity range of 20-35 ppt and a

tidal range that averages around 1.2 meters. The sole source of freshwater is rain and salinity values as little as 10 ppt have been recorded during periods of heavy rain. The creek bottom is characterized by sand and detritus based sediment with areas of soft mud with a depth ranging from 0.2 to 2.6 m. *Spartina* spp. marsh and dunes surround the site, which is relatively unimpacted by manmade perturbations and it is not accessible to road traffic. The site experiences minimal boat traffic.

B. Loosin Creek, Masonboro Island

The second Masonboro Island site (added in 2002) is 1.2 km east of the ICW, and 2.5 km south west of Masonboro Inlet, in a small navigable channel called Loosin Creek at 34° 10'20.0" latitude and 77° 49'58.1" longitude. The site generally has a salinity range of 22-35 ppt and a tidal range that averages 1.2 meters. The sole source of freshwater is rain and salinity values as little as 15 ppt have been recorded during periods of heavy rain. The creek bottom is characterized by sand and detritus based sediment with areas of soft mud with a depth ranging from 0.1 to 2.5 m. *Spartina* spp. marsh and dunes surround the site, which is relatively unimpacted by manmade perturbations and it is not accessible to road traffic. The site experiences minimal boat traffic.

C. East Cribbings, Zeke's Island

The first Zeke's Island site (formerly called Zeke's Island (ZI)) is located 1.8 km south of Federal Point boat launch in a tidal basin estuary at 33° 56'23.5" latitude and 77° 56'28.1" longitude. This site receives minimal freshwater input from leakage of the Cape Fear River through the 5.6 km rock jetty that separates the two bodies of water. The site typically has a salinity range of 15-33 ppt, although values as little as 10 ppt have been recorded. Tidal range averages 1.2 meters. Depth varies, but usually can be found to range from 0.5 to 2.7 meters. Bottom type substratum consists of large rocks ("the cribbings") with sand and detritus based sediment. There are no pollutants from land. Marsh and dunes surround the site. It is not accessible to road traffic but experiences minimal boat traffic.

D. Zeke's Basin, Zeke's Island

The second Zeke's Island site (added in 2002) is located 0.8 km south east of the Federal Point boat launch in a tidal basin estuary at 33° 57'17.0" latitude and 77° 56'6.0" longitude. This site receives minimal freshwater input from leakage of the Cape Fear River through the 5.6 km rock jetty that separates the two bodies of water. The site has a characteristic salinity range of 12-30 ppt, but values below 10 ppt have been observed and are often associated with periods of heavy rainfall. Tidal range averages 1.2 meters. Depth varies, but typically it can be found to range from 0.1 to 1.8 meters. Bottom type substratum consists of sand and detritus based sediment with a layer of soft sulfuric mud. Marsh and dunes surround the site. It is not accessible to road traffic but experiences minimal boat traffic.

6) Data collection period:

Research Creek data collection began on March 2, 1992 while monitoring of Loosin Creek started on February 26, 2002. East Cribbing data collection commenced on May 19, 1994 and Zeke's Basin data collection began on March 1, 2002. All monitoring is considered long term.

Deployment Date and Time / Retrieval Date and Time for 2010:

East Cribbings

<u>Deployment Date</u>		<u>Retrieval Date</u>	
<u>m/d/y</u>	<u>time</u>	<u>m/d/y</u>	<u>time</u>
1/1/2010	00:00	1/7/2010	13:45
1/7/2010	14:00	3/5/2010	11:15
3/5/2010	11:30	4/15/2010	09:45
4/15/2010	10:00	5/13/2010	9:15
5/13/2010	9:30	6/4/2010	14:00

6/4/2010	14:15	6/17/2010	10:15
6/17/2010	10:30	6/30/2010	11:30
6/30/2010	11:45	7/16/2010	10:15
7/16/2010	10:30	7/28/2010	11:30
7/28/2010	11:45	8/17/2010	14:30
8/17/2010	14:45	9/13/2010	14:15
9/13/2010	14:30	10/8/2010	10:30
10/8/2010	10:45	11/8/2010	14:30
11/8/2010	14:45	12/6/2010	11:15
12/6/2010	11:30	1/11/2011	13:45

Loosin Creek

<u>Deployment Date</u>		<u>Retreival Date</u>	
<u>m/d/y</u>	<u>time</u>	<u>m/d/y</u>	<u>time</u>
1/1/2010	00:00	1/20/2010	11:45
1/20/2010	12:00	2/15/2010	11:00
2/15/2010	11:15	3/9/2010	12:15
3/9/2010	12:45	4/19/2010	13:30
4/19/2010	13:45	5/17/2010	13:15
5/17/2010	13:30	6/4/2010	15:30
6/4/2010	15:45	6/18/2010	11:00
6/18/2010	11:15	6/30/2010	13:45
6/30/2010	14:00	7/15/2010	10:30
7/15/2010	10:45	7/28/2010	1:30
7/28/2010	1:45	8/13/2010	11:45
8/13/2010	12:00	9/14/2010	14:00
9/14/2010	14:15	10/1/2010	13:15
10/1/2010	13:30	11/10/2010	14:00
11/10/2010	14:15	12/8/2010	12:00
12/8/2010	12:15	1/11/2011	12:30

Research Creek

<u>Deployment Date</u>		<u>Retreival Date</u>	
<u>m/d/y</u>	<u>time</u>	<u>m/d/y</u>	<u>time</u>
1/1/2010	00:00	1/20/2010	12:00
1/20/2010	12:15	2/15/2010	10:30
2/15/2010	10:45	3/9/2010	12:30
3/9/2010	12:45	4/19/2010	13:45
4/19/2010	14:00	5/19/2010	13:00
5/19/2010	13:15	6/4/2010	16:15
6/4/2010	16:30	6/18/2010	11:30
6/18/2010	11:45	6/30/2010	13:30
6/30/2010	13:45	7/15/2010	10:00
7/15/2010	10:15	7/28/2010	1:00
7/28/2010	1:15	8/13/2010	12:15
8/13/2010	12:30	9/14/2010	13:30
9/14/2010	13:45	10/1/2010	13:30
10/1/2010	13:45	11/10/2010	14:30
11/10/2010	14:45	12/8/2010	11:30
12/8/2010	11:45	1/11/2011	12:15

Zeke's Basin

<u>Deployment Date</u>	<u>Retreival Date</u>
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<u>m/d/y</u>		<u>m/d/y</u>	<u>time</u>
1/1/2010	00:00	1/7/2010	14:15
1/7/2010	14:30	3/5/2010	11:45
3/5/2010	12:00	4/15/2010	10:00
4/15/2010	10:15	5/13/2010	9:45
5/13/2010	10:00	6/4/2010	14:15
6/4/2010	14:30	6/17/2010	9:45
6/17/2010	10:00	6/30/2010	11:45
6/30/2010	12:00	7/16/2010	11:00
7/16/2010	11:15	7/28/2010	11:45
7/28/2010	12:00	8/17/2010	15:00
8/17/2010	17:15	9/13/2010	14:30
9/13/2010	14:45	10/8/2010	10:45
10/8/2010	11:00	11/8/2010	15:00
11/8/2010	15:15	12/6/2010	11:30
12/6/2010	11:45	1/11/2011	14:00.

7) Distribution :

NOAA 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. The NERRS retains the right to be fully credited for having collected and process the data. Following academic courtesy standards, the NERR site where the data were collected should be contacted and fully acknowledged in any subsequent publications in which any part of the data are used. The data set enclosed within this package/transmission is only as good as the quality assurance and quality control procedures outlined by the enclosed metadata reporting statement. The user bears all responsibility for its subsequent use/misuse in any further analyses or comparisons. The Federal government does not assume liability to the Recipient or third persons, nor will the Federal government reimburse or indemnify the Recipient for its liability due to any losses resulting in any way from the use of this data.

Requested citation format:

National Estuarine Research Reserve System (NERRS). 2012. System-wide Monitoring Program. Data accessed from the NOAA NERRS Centralized Data Management Office website: <http://cdmo.baruch.sc.edu/>; accessed 12 October 2012.

NERR water quality data and metadata can be obtained from the Research Coordinator at the individual NERR site (please see Principal Investigators and Contact Persons), from the Data Manager at the Centralized Data Management Office (please see personnel directory under the general information link on the CDMO home page) and online at the CDMO home page <http://cdmo.baruch.sc.edu/>. Data are available in comma delimited format.

8) Associated researchers and projects:

As part of the SWMP core monitoring program, the North Carolina Reserve also collects weather data from a meteorological station located at the Research Creek monitoring site and water chemistry/nutrient data from all 4 of the water quality monitoring sites. These data may be correlated with the water quality data.

Additional research projects are ongoing and continually changing. Check with the Research Coordinator or other contact person for an updated list of research.

II. Physical Structure Descriptors

9) Sensor specifications:

YSI 6600EDS data sonde:

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

Parameter: 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 mg/L (Calculated from % air saturation, temperature, and salinity)
Units: milligrams/Liter (mg/L)
Sensor Type: Optical probe w/ mechanical cleaning
Model#: 6150 ROX
Range: 0 to 50 mg/L
Accuracy: 0-20 mg/L: +/-0.1 mg/l or 1% of the reading, whichever is greater
20 to 50 mg/L: +/- 15% 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 (Rapid Pulse / Clark type sensor):

The reliability of dissolved oxygen (DO) data collected with the rapid pulse / Clark type sensor 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). Some Reserves utilize the YSI 6600 EDS data sondes, which increase DO accuracy and longevity by reducing the environmental effects of fouling. Optical DO probes have further improved data reliability. The user is therefore advised to consult the metadata for sensor type information and to exercise caution when utilizing rapid pulse / Clark type sensor DO data beyond the initial 96-hour time period. Potential drift is not always problematic for some uses of the data, i.e. periodicity analysis. It should also be noted that the amount of fouling is very site specific and that not all data are affected. If there are concerns about fouling impacts on DO data beyond any information documented in the metadata and/or QAQC flags/codes, please contact the Research Coordinator at the specific NERR site regarding site and seasonal variation in fouling of the DO sensor.

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.

Salinity Units Qualifier:

In 2013, EXO sondes were approved for SWMP use and began to be utilized by Reserves. While the 6600 series sondes report salinity in parts per thousand (ppt) units, the EXO sondes report practical salinity units (psu). These units are essentially the same and for SWMP purposes are understood to be equivalent, however psu is considered the more appropriate designation. Moving forward the NERR System will assign psu salinity units for all data regardless of sonde type.

Turbidity Qualifier:

In 2013, EXO sondes were approved for SWMP use and began to be utilized by Reserves. While the 6600 series sondes report turbidity in nephelometric turbidity units (NTU), the EXO sondes use formazin nephelometric units (FNU). These units are essentially the same but indicate a

difference in sensor methodology, for SWMP purposes they will be considered equivalent. Moving forward, the NERR System will use FNU/NTU as the designated units for all turbidity data regardless of sonde type. If turbidity units and sensor methodology are of concern, please see the Sensor Specifications portion of the metadata.

10) Coded variable definitions:

<u>Sampling station:</u>	<u>Sampling site code:</u>	<u>Station code:</u>
Research Creek	RC	nocrcwq
Loosin Creek	LC	noclcwq
East Cribbings	EC	nocecwq
Zeke's Basin	ZB	noczbwq

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:

East Cribbings

<u>Deployment Date</u>	<u>depth</u>	<u>DO 1</u>	<u>DO 2</u>	<u>Sp Cond</u>	<u>pH</u>	<u>pH</u>	<u>BP</u>	<u>turb</u>
<u>m/d/y</u>	<u>(meters)</u>	<u>(100% sat)</u>	<u>(100% sat)</u>	<u>(50 mS/cm)</u>	<u>(7)</u>	<u>(10)</u>	<u>(mmHg)</u>	<u>(0 NTU)</u>
1/7/2010	-0.005	100	100	49.34	7	10	761.238	0.7
3/5/2010	-0.004	98.9	98.9	49.55	6.98	10.05	760.476	0.1
4/15/2010	0.078	99.3	99.3	50.02	7.12	9.69	760.476	0.2
5/13/2010	0.022	99.6	99.5	50.17	6.81	9.65	762	3.5
6/4/2010	0.013	98.9	98.9	50.95	6.91	9.81	760.476	0
6/17/2010	0.063	99.6	99.6	50.52	6.96	10	765.048	-0.5
6/30/2010	0.035	108.1	107.2	48.3	6.85	9.88	762	-0.3
7/16/2010	-0.074	99.4	99.3	50.11	6.82	9.95	760	-0.1
7/28/2010	-0.015	101.1	101.2	1.325	6.89	9.85	758.952	4.2
8/17/2010	*	*	*	*	*	*	*	*
9/13/2010	-0.039	100.9	101	49.22	7.02	9.97	757.82	0.5
10/8/2010	0.036	101.4	101.4	51	6.97	9.77	768.096	1705
11/8/2010	-0.046	99.8	99.8	50.08	6.89	9.82	756.158	0.9

12/6/2010	0.029	98.6	98.7	50.5	7.06	9.87	760	0.5
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* data was not collected due to programming errors.

Loosin Creek

<u>Deployment Date</u>	<u>depth</u>	<u>DO 1</u>	<u>DO 2</u>	<u>Sp Cond</u>	<u>pH</u>	<u>pH</u>	<u>BP</u>	<u>turb</u>
<u>m/d/y</u>	<u>(meters)</u>	<u>(100% sat)</u>	<u>(100% sat)</u>	<u>(50 mS/cm)</u>	<u>(7)</u>	<u>(10)</u>	<u>(mmHg)</u>	<u>(0 NTU)</u>
1/20/2010	-0.123	99.3	99.4	46.99	6.75	9.67	759.8	1.5
2/15/2010	0.005	100.2	100.1	49.94	7.03	9.98	758.952	5.2
3/9/2010	-0.056	97.4	97.4	47.14	6.89	9.84	758.952	1.4
4/19/2010	0.055	98.4	98.4	49.34	7.19	10	763.524	0.7
5/17/2010	0.025	53.6	66.1	12.49	7.16	9.49	762	1.9
6/4/2010	0.008	100.3	100.3	49.65	6.89	9.96	760.476	-0.7
6/18/2010	0.068	101	101	51.44	7.1	10.08	765.048	0
6/30/2010	0.022	99.1	99.1	50.75	6.98	10.04	762	1.9
7/15/2010	-0.011	99.2	99.3	49.01	6.84	9.8	759.952	17.1
7/28/2010	0.018	100.6	100.5	49.02	7.09	10.03	761.235	6.3
8/13/2010	*	*	*	*	*	*	*	*
9/14/2010	0.026	99.1	99.1	50.01	7.16	10.2	762	0.2
10/1/2010	0.134	101.1	101.1	53.82	6.63	9.47	768.096	-16.8
11/10/2010	0.113	100.4	100.3	51.53	6.99	9.96	768.096	0.1
12/8/2010	0.016	99.1	98.8	53.99	7.15	10.12	762	0.9

* data was not collected due to programming errors.

Research Creek

<u>Deployment Date</u>	<u>depth</u>	<u>DO 1</u>	<u>DO 2</u>	<u>Sp Cond</u>	<u>pH</u>	<u>pH</u>	<u>BP</u>	<u>turb</u>
<u>m/d/y</u>	<u>(meters)</u>	<u>(100% sat)</u>	<u>(100% sat)</u>	<u>(50 mS/cm)</u>	<u>(7)</u>	<u>(10)</u>	<u>(mmHg)</u>	<u>(0 NTU)</u>
1/20/2010	-0.076	96.8	96.5	49.51	7	9.89	759.8	3.7
2/15/2010	0.001	99.7	99.7	49.08	7.06	10	758.952	7.4
3/9/2010	0.025	99.6	99.6	48.39	7.19	10.13	758.952	0.5
4/19/2010	0.04	47.9	47.9	49.07	7.1	10.02	763.5	7.5
5/19/2010	0.032	101.7	101	49.05	*	*	763.524	0.7
6/4/2010	0.011	100.6	102	49.82	6.95	9.77	760.476	22.2
6/18/2010	0.05	99.8	99.8	50.05	6.96	9.9	762.762	7.3
6/30/2010	0.023	0	0	48.96	7.02	9.95	762	1.4
7/15/2010	-0.009	100.4	100.3	50.15	6.82	9.9	758.952	-0.8
7/28/2010	0.01	99.9	99.9	49.02	6.95	9.85	761.235	9.1
8/13/2010	0.047	95.9	95.9	46.89	6.83	9.84	762.762	-0.2
9/14/2010	0.031	103.3	103.3	50.07	6.88	9.9	762	0.8
10/1/2010	-0.042	100.7	100.7	48.09	7.23	10.34	756.158	0.3
11/10/2010	0.116	100.7	100.6	50.24	7.28	9.96	768.096	0.5
12/8/2010	0.019	100.5	100.5	50.05	6.9	9.89	762	1.4

*pH bulb broken, no post-cal values

Zeke's Basin

<u>Deployment Date</u>	<u>depth</u>	<u>DO 1</u>	<u>DO 2</u>	<u>Sp Cond</u>	<u>pH</u>	<u>pH</u>	<u>BP</u>	<u>turb</u>
<u>m/d/y</u>	<u>(meters)</u>	<u>(100% sat)</u>	<u>(100% sat)</u>	<u>(50 mS/cm)</u>	<u>(7)</u>	<u>(10)</u>	<u>(mmHg)</u>	<u>(0 NTU)</u>
1/7/2010	-0.024	99.7	99.5	50.22	6.93	9.82	761.238	0.6
3/5/2010	-0.051	99.7	99.7	48.63	7.22	10.22	760.476	1.8
4/15/2010	0.051	104.8	104.8	37.38	7.22	7.16	765.048	0.9

5/13/2010	0.027	99.9	99.9	49.19	6.97	9.66	762	1.7
6/4/2010	0.007	101.1	100.7	49.44	6.87	9.87	760.476	0.7
6/17/2010	0.049	100.6	100.6	50.76	6.83	9.76	762.762	0.7
6/30/2010	0.023	100.8	100.9	48.02	6.87	9.88	760	1.6
7/16/2010	-0.024	99.7	99.8	52.63	7.02	10.03	759.952	0
<u>Deployment Date</u>	<u>depth</u>	<u>DO 1</u>	<u>DO 2</u>	<u>Sp Cond</u>	<u>pH</u>	<u>pH</u>	<u>BP</u>	<u>turb</u>
<u>m/d/y</u>	<u>(meters)</u>	<u>(100% sat)</u>	<u>(100% sat)</u>	<u>(50 mS/cm)</u>	<u>(7)</u>	<u>(10)</u>	<u>(mmHg)</u>	<u>(0 NTU)</u>
7/28/2010	-0.01	97.6	97.8	50.24	13.36	15.05	758.952	6.1
8/17/2010	*	*	*	*	*	*	*	*
9/13/2010	-0.031	100.5	100.5	49.77	6.9	9.96	757.682	1.2
10/8/2010	0.032	100.7	100.7	51.36	6.9	9.66	761.238	1.9
11/8/2010	-0.059	97.9	97.9	49.93	7.01	10.02	756.158	1.6
12/6/2010	0.0332	99.9	99.9	51	6.57	9.39	762	1.7

* data was not collected due to programming errors.

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. Any NANs in the dataset stand for “not a number” and are the result of low power, disconnected wires, or out of range readings. If additional information on missing data is needed, contact the Research Coordinator at the reserve submitting the data.

Record Precipitation

The remnant of Tropical Storm Nicole and another low pressure system dropped excessive rainfall in the Wilmington area at the end of September, 2010. Record 2 and 3 day rainfall occurred along the East Coast between Monday 9/27/10 and Friday 10/1/10 breaking records previously set in the area by Hurricane Floyd. Over 10 inches of rain was reported in the Wilmington area on September 27, 2010. Approximately 2 inches fell on September 28, and an additional 7 inches on September 29, 2010. The Cape Fear River reached flood stage and the high water was apparent within Zeke’s Basin and the Masonboro sites. As the salinity levels dropped, all records were marked with the flag (CRE), significant rainfall event, through the end of the deployment. The salinity and specific conductance values should be considered valid during this time, due to excessive rainfall.

For all data

Increased turbidity readings occurred throughout many deployments and were coded as such:

<-3> [STS] (CSM) = rejected turbidity spike >1000

<1> [STS] (CSM) = Suspect turbidity spike <1000

DO <3mg/L was coded <0> (CDA) along with corresponding values for DO% during hypoxic events

East Cribbings

General

The East Cribbings site was not accessible in early 2010 due to construction and redesign of the boat ramp. The instrument that was deployed on January 7, 2010 was left in the field until March 5, 2010. Data was collected until February 13, when batteries failed. Data is missing from February 13-March 5, 2010.

There were negative depth readings March 29, 2010 due to extremely low tides. These records did not appear to be out of water events and the negative depth readings were flagged as suspect, <1> [SNV] (CLT).

During the June 4, 2010 deployment, probes were covered with mud and data was rejected from June 9, 2010 through June 17, 2010. Depth data was retained and did not seem to be affected. Temperature data may have been affected and was flagged as suspect. All other parameters seemed to flat line and the corresponding data was rejected.

Following the July 28, 2010 deployment, turbidity and specific conductance did not meet post calibration standards. The records for the entire deployment were marked as suspect, post calibration out of range.

The sonde was programmed incorrectly prior to the August 17, 2010 deployment. Unfortunately no data was collected during this time and records are flagged as missing due to instrument error.

During the September 13, 2010 deployment, the remnants of Tropical Storm Nicole and another low pressure system dropped excessive rainfall in the area. Over 10 inches of rain was reported in the Wilmington area on September 27, 2010. Approximately 2 inches fell on September 28, and an additional 7 inches on September 29, 2010. The Cape Fear River reached flood stage and the high water was apparent within Zeke's Basin. As the salinity levels dropped, all records were marked with the flag (CRE), significant rainfall event, through the end of the deployment. The salinity and specific conductance values should be considered valid, due to excessive rainfall.

During the October 8, 2010 deployment, the temperature/conductivity probe failed resulting in rejection of all parameters for multiple readings. These occurrences began on October 15, 2010. Temperature data collected after this period was retained but listed as suspect, and depth data was retained. Conductivity/salinity, dissolved oxygen, pH and turbidity parameters were rejected due to probe malfunctions. Following the probe failures, battery voltage spiked then was depleted prior to servicing the sonde. Data was collected intermittently on November 3, 2010 and no data was collected from November 3-8, 2010.

The East Cribbings site was set up horizontally in 2010, with the sonde being weighted down with a cinderblock. This set up caused some issues with variability in depth data. In particular the following deployments saw high variability in depth data, most likely due to the station set up.

3/5 11:30 to 5/13 9:15

7/28 11:45 to 8/17 14:30

Salinity/SpCond

Salinity and specific conductance values were disjunct when sondes were swapped April 15, June 4 and June 30. The same probe was used for these three deployments and was replaced following the June 30, 2010 deployment. This was an older probe and though the data seems consistent for the site and the probe passed post calibration following each deployment, it may be possible that this probe was slow to respond (or have more variability than a newer probe).

Dissolved Oxygen

There were several incidences of dissolved oxygen hypoxia during the May through August, 2010 deployments. These events generally occurred during outgoing tidal cycles. The probes passed post calibration and data was retained and marked as <0> (CDA).

On December 19, 2010 at 2:30, dissolved oxygen readings dropped to zero when records before and after were near 90% saturation. The zero reading was rejected and cause for the anomalous data is unknown. Also at this time an elevated turbidity reading was rejected.

pH

pH post calibration was out of range following the April 15, 2010 and May 13, 2010 deployments. The slopes were also outside of the acceptable range. Though data seems to fit conditions for the site, pH values for both deployments were flagged as suspect.

The pH values for the June 30, 2010 deployment began 0.2 units below the last deployment values and when sondes were swapped, the next deployment was 0.2 units higher. These differences in values are within the sensitivity range of the sensor, and the probe calibrated and post calibrated within acceptable values. Data was

retained and not considered suspect, but it should be noted that bracketing data before and after this deployment was 0.2 units elevated.

Turbidity

Turbidity data was consistently elevated February 10-11, and intermittently on February 12-13, 2010. These values were flagged as suspect.

Elevated turbidity levels toward the end of the May 13, 2010 deployment were marked as suspect

Elevated turbidity values were observed in the latter part of the June 17, 2010 deployment. Intermittent high readings were flagged as suspect, turbidity spike and continuous elevated values and those above 1000 NTU were rejected. Within these elevated periods, occasional turbidity values of -1 were recorded. These were also rejected.

For the June 30, 2010 deployment, the turbidity wiper was not parking correctly but was deployed due to not having an additional probe available. Upon retrieval the motor was not turning the wiper at all, and the entire dataset for turbidity should be rejected through July 16, 2010.

Turbidity values were elevated frequently during the September 13, 2010 deployment. Some of these events may have been valid due to the heavy rainfall during this time and elevated river stage. Values that appeared to jump up quickly were marked as suspect/turbidity spike, while values that gradually increased were retained.

Throughout the November 8, 2010 deployment, there were many slightly negative values recorded for turbidity. These were within the acceptable calibration/accuracy of the sensor however these -1 and -2 NTU measurements were flagged as suspect. This probe passed the post calibration procedure with acceptable values. Values for the entire deployment may be affected though records were retained.

Loosin Creek

General

Out of water events (oows) occurred and data was rejected on:

January 3, 2010 from 3:00-3:30,
January 28-29, 2010 from 23:45-00:15,
February 10-11, 2010 from 22:30-0:15,
February 25, 2010 from 22:15-23:15,
February 26-27, 2010 from 23:15-00:30, and
March 1, 2010 from 1:15-2:30

Some individual probes may have been out of the water and data was flagged as suspect for these instances on:
February 26-28, 2010, and March 1-3, 2010.

July 14, 2010 at 3:30, salinity/SpCond, dissolved oxygen and depth were rejected.

July 20, 2010 at 8:45, data for salinity/SpCond, dissolved oxygen, and depth was flagged as suspect.

December 1, 2010 which resulted in rejected and suspect data from 20:45-23:15.

A reading was missed during a sonde swap on March 9, 2010 at 12:30.

Batteries began to fail on April 9, 2010, resulting in missing data at 4:45, 5:00, 16:00, 16:30-17:00, 17:30-18:15. Intermittent failure continued on April 10 and missing records include 0:00, 0:45, 1:45-2:15, 3:00-3:15. After this time the sonde did not report regularly and individual records that were reported should be considered suspect. No data was collected from April 11-19, 2010.

From April 25-30, 2010, there were occasional negative depth readings. The data from the probes does not indicate any out of water events during this time though tide chart estimates showed extremely low tides. In the

vertical orientation, the depth sensor becomes exposed well before the other sensors and is often the only data affected. In those cases ($\text{depth} \leq 0.00$) the depth data were coded with <1> [SNV] (CLT).

Following the May 19, 2010 deployment, several parameters were outside of the acceptable range for post calibration. Catastrophic temperature/conductivity probe failure occurred on May 31, 2010. All data was rejected during failure and marked as suspect when probe appeared to function intermittently from this point through the end of deployment.

On June 19, 2010 catastrophic temperature/conductivity failure occurred. The probed appears to function normally following this failure, but all data was marked as suspect for the remainder of the deployment.

Data is missing from August 13 – September 14, 2010 due to an error in programming the sonde. No data was collected for the deployment period.

During the September 13, 2010 deployment, the remnants of Tropical Storm Nicole and another low pressure system dropped excessive rainfall in the area. Over 10 inches of rain was reported in the Wilmington area on September 27, 2010. Approximately 2 inches fell on September 28, and an additional 7 inches on September 29, 2010. The salinity and specific conductance parameters fluctuated tidally but decreased overall, and dissolved oxygen levels and temperature decreased as well. Riverine and runoff influences were obvious due to water color during field operations following this substantial rain event. As the salinity levels dropped, all records were marked with the flag (CRE), significant rainfall event, through the end of the deployment.

During the October 1, 2010 deployment, the temperature/conductivity probe failed and pH and turbidity probes did not have acceptable post calibration values. Values for all parameters were rejected beginning on October 26, due to erratic readings and rejected through the end of deployment. Turbidity readings throughout the entire deployment were rejected due to negative and excessively high readings and failure of post calibration standards. Batteries failed during this deployment as well, resulting in missing data beginning November 1, 2010 intermittently until the next sonde deployment on November 10, 2010.

Salinity/Sp Cond

Specific conductance and salinity were elevated during the January 20, 2010 deployment and this probe did not pass post calibration with acceptable values. Data from the beginning of the deployment through January 25, 2010 were rejected, following that readings seemed to stabilize and were retained but marked as suspect from January 25 until February 15, 2010.

For the December 8, 2010 deployment, salinity and specific conductance seem to be elevated throughout the deployment. This sensor did not pass the post calibration procedures with acceptable values. All records for salinity and conductivity are marked as suspect from December 8th through the remainder of the year.

Dissolved Oxygen

Dissolved oxygen was rejected and suspect during the January 20, 2010 deployment due to SpCond/salinity probe malfunction.

Dissolved oxygen data was marked as suspect for March 9, 2010 through April 19, 2010. During post calibration, it was documented that the ROX membrane was scratched. This probe was reading low during the post cal and field readings were elevated at times.

On December 24, 2010, there was a drop in dissolved oxygen concentration. This did not occur at a low tide and cause is unknown. Several records were marked as suspect, though probe passed post calibration and no other dips in DO were recorded.

pH

pH data from 01/01/2010 – 01/20/2010 was elevated due to unexplained drift upward. The probe passed post calibration standards but data was flagged as suspect and coded <1> [SSD] (CSM).

Following the January 20, 2010 deployment, pH did not pass post calibration with acceptable values for pH standards 7 and 10. The data seem to fit the conditions for the site and were retained, but coded as suspect <1> [SPC] (CSM).

Following the April 19, 2010 deployment, the pH slope was out of range during post calibration. The pH values were within the acceptable range, so this probe was reconditioned prior to the next deployment.

Turbidity

Mild turbidity spikes occurred on January 26, 2010 and were marked as suspect. Later in the deployment on January 31, turbidity readings were excessively high and data was rejected intermittently until February 4, 2010. After this point all turbidity data was rejected due to excessive spikes until the end of deployment, February 15, 2010

Turbidity spikes occurred on February 18, 2010 and initial readings were marked as suspect. Continuously elevated turbidity readings were rejected through the end of the deployment. Upon recovering the sonde, *Enteromorpha sp.* was attached to the turbidity wiper and affected the readings.

Turbidity readings were elevated on March 14 and initial readings flagged as suspect. As readings became continuously elevated they were rejected from March 15-27, 2010. There was a short period of lower readings on March 27, flagged as suspect, then elevated readings returned and data was rejected through April 4, 2010. There were intermittent spikes, flagged as suspect, through the end of deployment.

During the April 19, 2010 deployment, the turbidity wiper became fouled with algae. After May 1, 2010 turbidity data for this deployment was rejected. Turbidity spikes prior to this time were marked as suspect unless outside of the sensor range (>1000 NTU), in which case they were rejected. Turbidity also failed to meet acceptable post calibration ranges following the May 19, 2010 deployment. There were also events of zero and negative turbidity, so the entire dataset was marked as suspect (unless values <100 NTU, rejected).

During the June 18, 2010 deployment, some turbidity readings were zero or -1. This probe passed calibration and post calibration and data was retained. Negative readings were flagged as suspect, acceptable calibration/accuracy error of the sensor (<CAF>).

The turbidity probe was parking correctly, but not completing the correct number of turns prior to the June 30, 2010 deployment. Upon retrieval, the probe did not pass acceptable post calibration values and the entire data set was rejected and marked as [SWM], wiper malfunction/loss.

There were numerous turbidity spikes during the July 15, 2010 deployment, beginning around July 20, 2010 through the end of deployment. The turbidity probe did not pass post calibration with acceptable values. The entire dataset was flagged as suspect [SPC], post calibration out of range except values over 1000 NTU, which were rejected.

For the July 28, 2010 deployment, the turbidity wiper was not functioning properly and resulted in a poor dataset. Many readings were taken with the wiper over the optics and these elevated values were rejected. The rest of the dataset was retained and flagged as suspect, but it should also be noted that the turbidity probe did not meet post calibration acceptable values.

There were lots of turbidity spikes during the November 11, 2010 deployment. The cause of spikes is unknown, perhaps a probe malfunction. These spikes were generally around 800 or between 1300-1400 NTU, the spikes were rejected did not correspond with depth changes. This sensor passed post calibration within acceptable range.

Research Creek

General

Battery failure occurred during the May 19, 2010 deployment. Data was missing beginning May 26, 2010 and rejected May 27, 2010 as data was sporadically collected as the batteries were failing. Missing data extends to June 4, 2010 at the time on the next deployment.

Gaps occurred in the data due to sonde failures during the 10/01/10 deployment. The battery hatch leaked causing battery failure. The following affected data were flagged <-2> [GIM] (CSM):

10/18/2010 08:00 - 10/18/2010 09:15

10/18/2010 12:15 - 10/19/2010 05:15

10/20/2010 22:30

10/21/2010 16:30 - 11/10/2010 14:30

Power failure due to leaking telemetry cable and subsequent power shortages occurred 12/04/2010 08:30 - 12/08/2010 11:45.

Depth

Out of water events occurred on occasion due to extremely low tides. In the vertical orientation, the sensor becomes exposed well before the other sensors and is often the only data affected. In those cases (depth ≤ 0.00) the depth data were coded with <-3> [SNV] (CLT). Other instances where it was determined that more probes were affected resulted in rejected data.

Salinity/SpCond

From January 1-20, 2010, SpCond/Salinity post calibration was unacceptable. Initial calibration changed by approximately the same value that the post calibration was over the standard. The cell constant recorded for the probe was above acceptable range. Other probes and sondes that were calibrated and post calibrated in the same standards were found to be within acceptable range. Salinity and specific conductance data was flagged suspect <1> for entire deployment.

DO

Following the April 19, 2010 deployment, the dissolved oxygen wiper was parking incorrectly and may have affected readings during the deployment. This probe did not meet acceptable ranges during the post calibration as well. The data seems to be consistent with normal ranges, but was marked <1> [SPC] (CSM).

Following the 08/13/2010 12:30 deployment DO failed post calibration. Data seemed to fit conditions. Flagged <0> [SPC] (CSM).

Following the 09/14/2010 13:45 deployment DO failed post calibration. Data seemed to fit conditions. Flagged <0> [SPC] (CSM).

pH

The pH probe failed during the May 19, 2010 deployment. The glass bulb was broken upon retrieval from the field. Data was obviously compromised beginning May 23, 2010 and was rejected, <-3> [SSM] (CSM). Earlier data should be considered suspect, <1> [SPC] (CSM), from the beginning of the deployment as well.

Following the 06/04/2010 16:30 deployment the pH 10 post calibration was not within acceptable range. Readings from this deployment may have been slightly elevated, but the probe post calibrated properly and data was not flagged as suspect <0> (CSM).

Turbidity

Following the January 20, 2010 deployment, the turbidity wiper was fouled by algae. Data began to appear abnormal 01/26/2010 and continued through the end of the deployment on 02/15/10. All data at the end of the deployment was rejected and coded <-3> [SBO] (CBF) due to biofouling.

The data from 03/07/2010 12:45 - 03/09/2010 12:30 was coded <1> [SPC] but not rejected. Post calibration was out of range and the data range is an estimate of the time period that was affected.

From 03/22/2010 02:45 - 03/27/2010 00:45, turbidity data was coded [STS] (CRE) due to large rainfall and associated runoff likely causing high turbidity. Values above 1000 were rejected.

There were several turbidity spikes outside the sensor range during the 04/19/2010 14:00 deployment. Following the deployment, the wiper was not parking in the correct position and may have affected data. This probe also did not pass post calibration, and was reading high in the zero standard. From April 19-25, 2010, the data seemed to fit conditions so it was retained and marked as <0> (CSM). Beginning April 25, the turbidity spikes ramped up and data throughout the remainder of the deployment should be considered suspect <1> [SPC] (CSM). Spikes above 1000 NTU were rejected<-3> [SPC] (CTS).

The turbidity wiper was not parking at 180 degrees from the sensor prior to the June 4, 2010 deployment. However, we did not have a back up probe and the malfunctioning probe calibrated properly and was deployed. There were several turbidity spikes that may have occurred due to the wiper parking over the optics. Also this probe failed to pass the post calibration. Data from the beginning of this deployment may be accurate, but the entire set was flagged as suspect since the wiper may not have been functioning properly from the beginning of the deployment. Data over 1000 NTU was rejected and all other data from this deployment should be considered suspect.

For the November 10, 2010 deployment, turbidity was rejected due to bad initial calibration and coded <-3> [SIC] (CSM) (incorrect calibration/contaminated standard) through December 8, 2010.

Zeke's Basin

General

The ZB station was converted to a vertical deployment station on 8/17/10. Some perceived out of water events have occurred following this transition. The depth sensor is located ~0.2m above the other water quality probes. While the measured water depth may be near or at 0.0, the probes are still likely to be immersed in the water and recording good data.

Battery failure: 01/02/2010 05:30 - 01/07/2010 14:15

Battery failure: 02/21/2010 00:00 - 03/05/2010 11:45

The April 15, 2010 deployment had several problems, including battery failure on May 9, 2010. No data was collected from May 9-13, 2010. Specific conductance, salinity, dissolved oxygen and pH all failed post calibration following the April 15, 2010 deployment. These parameters were flagged as suspect for entire portion of the deployment in which data was recorded. Specific conductance and salinity appear to be lower than average readings, dissolved oxygen was elevated and pH seemed elevated initially and low toward the end of the data collection period.

Following the May 13, 2010 deployment, pH and turbidity post calibration values were outside of acceptable range. Flagged <1> [SPC] (CSM) and data retained.

Deployment 08/17/2010 15:15 - 09/13/2010 14:45 experienced a programming error before deployment. No data was stored within the sonde. Telemetered data recorded during the deployment were downloaded and inserted into the dataset. Some gaps in data occurred due to transmission errors. Sutron error occurred while recording data resulting in DO, %, DO mg/L, Turbidity, and Battery being recorded under the wrong headings. These data were manually transposed to the correct data columns. This resulted in a loss of turbidity data for the whole deployment. All missing data flagged and coded as follows: <-2> [GIT] (CSM).

Record Precipitation

Record rainfall occurred along the East Coast between Monday 9/27/10 and Friday 10/1/10 breaking records previously set in the area by Hurricane Floyd. The effects of this precipitation on water quality in the Zeke's Basin area were experienced long after the rain stopped due to staging of the Cape Fear River. Low salinity persisted for several weeks following the event.

Depth

Out of water events occurred on occasion due to extremely low tides. In the vertical orientation, the sensor becomes exposed well before the other sensors and is often the only data affected. In those cases (depth ≤ 0.00) the depth data were coded with <-3> [SNV] (CLT). Other instances where it was determined that more probes were affected resulted in rejected data.

Conductivity probe contacts were likely exposed during extreme low tide water. Other, longer probes, including Temp, were still likely submerged. Data with conductivity affected was coded <-3> [SOW] (CLT).

SpCond/Salinity

During the 04/15/2010 10:15 - 05/13/2010 09:45 deployment, specific conductance/salinity failed post calibration following the deployment and was flagged as suspect.

Following the 07/16/2010 11:15 - 07/28/2010 12:00 deployment, conductivity probe post calibration was unacceptable. Std 50 = 52.63. Data seemed to fit conditions but it was flagged as suspect <1> [SPC] (CDF).

At the beginning of the 07/28/2010 12:00 - 08/17/2010 15:15 deployment, SpCond/Salinity dropped sharply upon deployment of new sonde. There was some precipitation around that time that *could* have been the cause. The values drifted upwards across the deployment and were seamless with the following sonde exchange on 8/17/10. The pre and post calibration records looked good. These records that showed decreased salinity were flagged as suspect: <1> [SSM] (CSM).

Conductivity probe contacts were likely exposed during extreme low tide water. Other, longer probes, including Temp, were still likely submerged. Data with conductivity affected was coded <-3> [SOW] (CLT).

pH

During 04/15/2010 10:15 - 05/13/2010 09:45 deployment, pH failed post calibration following the deployment and data was flagged as suspect.

Following the 06/17/2010 10:00 deployment, pH post calibration did not fall within acceptable range for the standard pH 10. Data looks good. These records were marked as <0> (CSM) and retained.

During deployment 07/28/2010 12:00 - 08/17/2010 15:15, a pH error occurred. Post calibration revealed substantial deviation from standards and allowable pH slope. Probe was replaced before next deployment. Slope = -938, pH 7 std = 13.36, pH 10 std = 15.05. All data during this time was rejected and coded: <-3> [SSM] (CSM).

Post cal was unacceptable for the 12/08/10 - 01/11/11 deployment. pH drops several tenths of a pH unit upon deployment. All pH data was labeled as suspect from December 8, 2010 through the end of the year.

Dissolved Oxygen

DO was periodically affected by out of water events (OOW). These data were rejected and coded <-3> [SOW] (CLT).

During the 04/15/2010 10:15 - 05/13/2010 09:45 deployment, dissolved oxygen failed post calibration and was flagged as suspect.

Turbidity

During the deployment 07/28/2010 12:00 - 08/17/2010 15:15, post calibration was unacceptable but data appear to fit conditions. Despite this data was marked 1 SPC CSM based on that post calibration value.

10/17/10 Any data out of range was rejected, all other was retained. Post calibration was acceptable. Other data during this time period were sporadically high but were likely real values due to combinations of low tide and strong, gusty, north winds.

For the 10/8/10 – 11/8/10 deployment, there was variable turbidity likely driven by wind. Any data out of range was rejected. All other was retained. Post calibration was acceptable.