

North Carolina (NOC) NERR Water Quality Metadata
January 1, 2011 – December 31, 2011
Latest Update: October 22, 2015

I. Data Set and Research Descriptors

1) Principal investigator(s) and contact persons

Dr. John Fear, Research Coordinator
400 Commerce Ave.
Morehead City, NC 28557
Phone: (252) 838-0884
Fax: (252) 247-3330
Email: john.fear(at)ncdenr.gov

Byron Toothman, Research Associate
5600 Marvin K. Moss Lane
Wilmington, NC 28409
Phone: (910) 962-2334
Fax: (910) 962-2410
Email: toothmanb(at)uncw.edu

Heather Wells, Research Associate
5600 Marvin K. Moss Lane
Wilmington, NC 28409
Phone: (910) 962-2335
Fax: (910) 962-2410
Email: wellsh(at)uncw.edu

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/.CSV) 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. All pre- and post-deployment data are removed from the file prior to upload. 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 any overlapping 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 by the Reserve 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 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, prior to that time rapid pulse dissolved oxygen probes were used. The rapid pulse membranes were replaced prior to each deployment and allowed to equilibrate prior to calibration.

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 2011:

East Cribbings

Deployment date	time	Retrieval date	time
12/06/2011	11:15	01/11/2011	13:45
01/11/2011	14:00	02/07/2011	12:00

02/07/2011	12:15	03/08/2011	12:15
03/08/2011	12:45	04/06/2011	09:30
04/06/2011	09:45	05/05/2011	10:00
05/05/2011	10:15	06/06/2011	13:00
06/06/2011	13:15	06/20/2011	13:15
06/20/2011	13:30	07/06/2011	14:15
07/06/2011	14:30	07/18/2011	12:45
07/18/2011	13:00	08/02/2011	11:15
08/02/2011	11:45	08/15/2011	11:15
08/15/2011	11:30	09/12/2011	09:30
09/12/2011	09:45	10/03/2011	13:45
10/03/2011	14:00	11/14/2011	12:15
11/14/2011	12:30	12/13/2011	13:15
12/13/2011	13:30	01/10/2012	11:45

Loosin Creek

Deployment date	time	Retrieval date	time
12/08/2010	12:00	01/11/2010	12:30
01/11/2011	12:45	02/07/2011	10:45
02/07/2011	11:15	03/08/2011	11:15
03/08/2011	11:30	04/06/2011	08:30
04/06/2011	08:45	05/04/2011	09:45
05/04/2011	10:00	06/07/2011	13:00
06/07/2011	13:30	06/24/2011	14:00
06/24/2011	14:15	07/08/2011	14:00
07/08/2011	14:30	07/19/2011	10:30
07/19/2011	10:45	08/16/2011	11:15
08/16/2011	11:30	09/14/2011	12:15
09/14/2011	12:30	10/03/2011	15:00
10/03/2011	15:30	11/14/2011	10:45
11/14/2011	11:00	12/13/2011	11:45
12/13/2011	12:00	01/10/2012	11:15

Research Creek

Deployment date	time	Retrieval date	time
12/08/2010	11:30	01/11/2011	12:15
01/11/2011	12:30	01/25/2011	12:00
01/25/2011	12:15	02/04/2011	11:15
02/04/2011	11:30	03/08/2011	11:15
03/08/2011	11:30	04/06/2011	08:15
04/06/2011	08:30	05/04/2011	10:00
05/04/2011	10:15	06/07/2011	12:45
06/07/2011	13:00	06/24/2011	14:45
06/24/2011	15:00	07/08/2011	14:15
07/08/2011	14:45	07/19/2011	10:00
07/19/2011	10:15	08/04/2011	11:00
08/04/2011	11:15	08/16/2011	10:45
08/16/2011	11:00	09/14/2011	12:30
09/14/2011	12:45	10/03/2011	15:30
10/03/2011	15:45	11/14/2011	11:00
11/14/2011	11:15	12/13/2011	11:30

12/13/2011	11:45	01/10/2012	09:45
------------	-------	------------	-------

Zeke's Basin

Deployment date	time	Retrieval date	time
12/06/2010	11:30	01/11/2011	14:00
01/11/2011	14:15	02/07/2011	12:15
02/07/2011	12:30	02/16/2011	09:15
02/16/2011	09:30	03/08/2011	12:45
03/08/2011	13:00	04/06/2011	09:45
04/06/2011	10:00	05/05/2011	10:15
05/05/2011	10:30	06/06/2011	13:15
06/06/2011	13:30	06/20/2011	13:30
06/20/2011	14:00	07/06/2011	14:30
07/06/2011	15:00	07/18/2011	12:30
07/18/2011	12:45	08/02/2011	11:45
08/02/2011	12:00	08/15/2011	11:30
08/15/2011	11:45	09/12/2011	09:45
09/12/2011	10:00	10/03/2011	14:00
10/03/2011	14:15	11/14/2011	12:45
11/14/2011	13:00	12/13/2011	13:45
12/13/2011	14:00	01/10/2012	09:45

7) Distribution:

NOAA retains the right to analyze, synthesize and publish summaries of the NERRS System-wide Monitoring Program 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:

NOC NERR deployed only 6600EDS data sondes in 2011. A vented 6600V2 sonde was deployed as a trial in January 2011 at the Research Creek site, but was compromised by water wicking into the cable connector and data was rejected during this deployment. ROX DO sensors were utilized at all sites.

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

Sensor Type: Optical probe w/ mechanical cleaning

Model#: 6150 ROX

Range: 0 to 500% air saturation

Accuracy: 0-200% air saturation: +/- 1% of the reading or 1% air saturation, whichever is greater 200-500% air saturation: +/- 15% of reading

Resolution: 0.1% air saturation

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.

Chlorophyll Fluorescence Disclaimer:

YSI chlorophyll sensors (6025 or 599102-01) are designed to serve as a proxy for chlorophyll concentrations in the field for monitoring applications and complement traditional lab extraction methods; therefore, there are accuracy limitations associated with the data that are detailed in the YSI manual including interference from other fluorescent species, differences in calibration method, and effects of cell structure, particle size, organism type, temperature, and light on sensor measurements.

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
SCS	Chlorophyll spike
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>
01/11/2011	0.025	100.5	*	50.41	7.06	9.80	759.0	1.3
02/07/2011	0.128	99.0	99.0	49.01	7.07	9.96	769.6	1.4
03/08/2011	0.025	110.9	110.9	50.18	6.93	9.74	762.0	2.5
04/06/2011	-0.006	100.3	100.2	50.02	7.38	9.86	759.7	25.7
05/05/2011	-0.500	99.4	99.5	51.63	6.91	9.91	762.0	-1.9
06/06/2011	-0.009	100.5	100.6	48.25	6.92	9.98	759.0	1.5
06/20/2011	-0.029	98.1	98.3	50.23	6.80	9.61	757.7	0.6
07/06/2011	0.006	98.7	98.6	51.22	6.88	9.95	759.7	-0.9
07/18/2011	-0.055	97.8	97.8	50.55	7.07	10.07	755.4	0.1
08/02/2011	-0.087	97.5	*	58.07	7.04	9.98	753.1	2.0
08/15/2011	0.671	98.7	98.6	49.62	7.06	9.93	760.5	0.4
09/12/2011	0.063	99.8	99.8	50.33	7.24	9.52	765.8	440.0
10/03/2011	0.027	99.5	99.5	50.87	6.96	9.75	762.8	-0.5
11/14/2011	0.153	104.8	*	50.66	7.26	10.06	771.1	-0.8
12/13/2011	-0.087	98.7	98.6	50.23	7.03	9.90	753.9	-3.3

*only one value recorded for dissolved oxygen post calibration

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>
01/11/2011	-0.064	98.7	98.7	50.69	6.82	9.69	755.4	2.6
02/07/2011	0.120	100.1	100.3	50.92	7.04	9.93	769.6	18.2
03/08/2011	0.022	98.7	98.7	50.56	7.16	10.02	762.0	-3.6
04/06/2011	0.017	98.8	98.9	50.01	7.19	10.19	761.2	-2.5
05/04/2011	0.003	98.3	98.4	43.45	7.35	9.75	760.5	-2.4
06/07/211	0.002	99.4	99.5	49.36	7.02	9.88	760.0	-1.7
06/24/2011	0.035	99.1	99.1	50.00	6.92	9.88	762.0	1.4
07/08/2011	-0.066	98.6	98.4	50.51	6.95	9.92	755.4	-1.1
07/19/2011	-0.041	98.6	98.6	36.88	6.80	9.58	758.0	0.3
08/16/2011	-0.019	97.7	97.8	49.38	7.06	9.91	758.2	0.5

09/14/2011	0.009	100.7	100.7	49.78	7.03	10.04	764.3	0.3
10/03/2011	0.030	99.0	99.0	47.69	7.00	9.80	762.8	0.7
11/14/2011	0.148	101.6	101.6	50.63	6.96	9.87	771.1	0.1
12/13/2011	-0.081	98.4	98.3	51.56	6.93	9.82	753.9	-4.6

Research Creek

<u>Deployment Date</u> <u>m/d/y</u>	<u>depth</u> <u>(meters)</u>	<u>DO 1</u> <u>(100% sat)</u>	<u>DO 2</u> <u>(100% sat)</u>	<u>Sp Cond</u> <u>(50 mS/cm)</u>	<u>pH</u> <u>(7)</u>	<u>pH</u> <u>(10)</u>	<u>BP</u> <u>(mmHg)</u>	<u>turb</u> <u>(0 NTU)</u>
01/11/2011	8.669	97.6	97.7	22.84	7.01	9.26	765.0	0.0
01/25/2011	-0.046	100.3	100.4	51.11	7.00	9.96	756.9	0.1
02/04/2011	0.130	102.1	102.1	52.12	6.97	9.91	769.6	1.9
03/08/2011	0.014	100.9	100.9	49.56	6.91	9.83	762.0	0.1
04/06/2011	0.010	99.3	99.3	48.17	6.96	9.95	761.2	-1.8
05/05/2011	0.006	100.7	100.7	51.69	6.84	9.20	759.0	53.5
06/07/2011	-0.011	99.5	99.5	47.49	6.93	9.87	759.7	0.8
06/24/2011	-0.028	96.9	96.3	48.61	6.93	9.94	762.0	2877.0
07/08/2011	-0.062	100.5	100.5	50.49	6.99	9.90	756.2	-0.3
07/19/2011	-0.082	97.4	97.3	49.94	7.02	10.00	754.6	0.1
08/04/2011	-0.017	98.6	98.6	49.23	6.80	9.65	758.0	0.0
08/16/2011	-0.033	99.1	99.2	50.20	6.94	9.83	758.2	-0.3
09/14/2011	0.018	100.9	100.1	51.73	6.87	9.95	764.3	0.5
10/03/2011	0.043	97.6	97.3	49.82	7.06	9.37	762.8	0.9
11/14/2011	0.151	102.1	101.9	49.99	6.89	9.71	771.1	0.4
12/13/2011	-0.084	99.3	99.3	50.24	7.10	9.95	753.9	-0.3

Zeke's Basin

<u>Deployment Date</u> <u>m/d/y</u>	<u>depth</u> <u>(meters)</u>	<u>DO 1</u> <u>(100%sat)</u>	<u>DO 2</u> <u>(100% sat)</u>	<u>Sp Cond</u> <u>(50mS/cm)</u>	<u>pH</u> <u>(7)</u>	<u>pH</u> <u>(10)</u>	<u>BP</u> <u>(mmHg)</u>	<u>turb</u> <u>(0 NTU)</u>
01/11/2011	0.109	99.5	99.3	50.21	6.97	10.02	759.0	-0.2
02/07/2011	0.116	101.9	102.0	50.21	7.02	10.04	769.6	-0.1
02/16/2011	0.122	101.9	102.0	50.68	7.05	10.00	769.6	-10
03/08/2011	0.003	99.1	99.1	50.84	7.02	9.81	762.0	1.0
04/06/2011	0.026	100.4	100.3	49.93	7.02	9.84	762.0	0.3
05/05/2011	0.025	99.2	99.1	49.82	7.11	9.55	762.0	-0.7
06/06/2011	-0.013	99.8	100.2	50.54	7.02	9.94	759.7	0.4
06/20/2011	0.037	99.0	99.0	50.77	6.86	9.81	757.7	1.9
07/06/2011	0.004	100.8	100.6	50.02	6.94	9.91	759.7	-4.0
07/18/2011	-0.067	98.1	98.2	50.07	6.92	9.93	755.4	0.7
08/02/2011	0.093	95.0	95.0	50.79	6.91	9.95	753.1	2.5
08/15/2011	-0.145	95.3	95.3	48.56	6.92	9.72	768.1	509.0
09/12/2011	0.066	100.2	99.9	50.18	7.00	9.93	765.8	0.4
10/03/2011	-0.069	98.3	98.2	49.14	6.98	9.61	756.2	-9.9
11/14/2011	0.154	101.4	101.2	21.50	6.76	9.64	771.1	1.2
12/13/2011	-0.072	98.9	98.9	51.14	6.83	9.67	753.9	0.6

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.

Storm Events

Hurricane Irene passed through North Carolina in August 26-28, 2011. Sondes were pulled from the water prior to the storm event due to the forecasted strength of the storm and potential for equipment loss. This area experienced approximately 6 inches of rain during this storm event. Sondes were returned to the field on August 29, 2011. Each sonde continued to record data while in the lab during the Hurricane and this time period was flagged as rejected data.

For all data

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

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

<1> [CTS] (CCU) = Suspect turbidity spike <1000

Small negative turbidity values <2 NTU were flagged as suspect, <1> (CAF).

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

Immediately prior to and following out of water events, low SpCond/Salinity values are often observed. These values are outliers from the norm but may be measuring a fresh water lens as the probes approach the surface. These values were retained but flagged as suspect <1> GSM CLT.

East Cribbings

General

The East Cribbings site had a horizontally oriented deployment structure in place in 2010, with the sonde attached to a metal frame and weighted by a cinderblock. This deployment method resulted in variability in depth data as the structure was anchored but could shift in location. In particular the following deployments saw high variability in depth data, most likely due to the movement of the deployment structure.

This site is within a shallow lagoonal system and the sonde is subject to our of water events, especially at spring low tides.

Data affected by low tide were coded (CLT). Lower salinity and SpCond was addressed with <1> (CLT) due to the probability of fresher surface waters being measured as the water level decreased. Salinities approaching zero or less were addressed as <-3> [GOW] (CLT) and affected data were also rejected accordingly. Temperature affected measurements were rejected as it became apparent that the Temp sensor was being affected (pronounced change in temp values during extreme low tide readings).

Battery failure occurred on 01/23/2011 05:00 and data was not restored until the following deployment 02/07/2011 12:15.

03/08/11 a reading was missed during a sonde swap at 12:30.

08/02/11 11:30 reading missed due to a sonde swap.

Sonde was removed from the field due to Hurricane Irene. The sonde was not turned off and deployment program was not interrupted. All data recorded during this time DO NOT reflect the

water conditions as the sondes were in temporarily stored on land from 08/25/2011 to 08/29/2011. Data was coded/flagged <-3> [GOW] (CSM).

10/27/2011 22:15 reading was missed due to low battery power. Also data was missing due to battery failure from 10/30/2011 02:30 - 10/30/2011 13:00 and 10/30/2011 17:00 - 11/14/2011 12:15, which was the end of the deployment.

Out of water events are described in Depth section.

Disjunct data may result from site conditions including settling of mud and/or fouling that occur during a deployment. Unless the post calibration values were outside of acceptable range, these data were retained and the first record of the new deployment was flagged. These conditions may influence all parameters but the following parameters were affected resulting in disjunct data at the following dates:

SpCond: 5/5, 6/6, 7/6, 7/18
DO 6/6

Depth

All negative depth flagged and rejected <-3> [SOW] (CLT) unless affected by barometric pressure and coded as suspect <1>[SNV](CAP).

Several out of water events occurred at low tide during the following deployments: 01/11/11 02/07/11, 03/08/11, 08/15/11, 10/03/11 and 11/14/11. Data during these events were rejected and data that may have been affected was flagged as suspect.

All depth data corresponding to rejected or suspect SpCond/Salinity data (due to low tide) was also rejected <-3> [SOW] (CLT) or flagged as suspect <1>[SOW](CLT). Due to the sondes horizontal placement, it is possible that some probes are still in the water during out of water events.

SpCond/Salinity

01/15/2011 00:00 - 01/16/2011 00:15 flagged <1> (CSM). Following exposure at low tide, SpCond/Sal never returned to expected values. Perhaps air was retained within the sensor.

06/06/11 – 06/20/11 deployment shows significant elevation of SpCond and Salinity. Probe did not pass post calibration and sand had accumulated within the probe. All data was flagged as suspect for this deployment.

Following a period of stormy weather around 07/19/11 the SpCond and Salinity dropped substantially and stayed low. The sonde was retrieved with mud caked on several probes and was likely due to sustained winds and high sediment loads suspended by the storm activity. SpCond/Sal probe post calibrated alright but data were not consistent with simultaneously recorded during retrieval (YSI 85). The data was more consistent with expectations at the beginning of the following deployment. Data were labeled suspect <1> (CSM) from 07/26/2011 00:00 through the end of the deployment 08/02/2011 11:15.

08/02/11 – 8/15/11 SpCond/Sal data was elevated and post calibration is outside of acceptable range with a high conductivity cell constant value. Data was rejected for entire deployment. Probe functioned properly following a deep cleaning and a recalibration.

Dissolved oxygen

03/08/11 deployment, post calibration values were high. Data was flagged as suspect, failed post cal for the entire deployment <1> [SPC] (CSM) unless data was rejected due to an out of water event.

04/29/2011 17:00 unknown errant data point. DO value = 0 and coincides with a turbidity spike. Cause unknown.

11/14/11 deployment, elevated percent dissolved oxygen during the post calibration. All records for this deployment were marked as <1> [SPC] (CSM).

pH

03/08/11 – 04/06/11 post calibration values low for pH 10, slope low. Data seems to fit conditions but was marked as suspect <1> [SPC] (CSM).

04/06/11 – 05/05/11 post calibration values not within acceptable range and slope was low. Data flagged as suspect <1> [SPC] (CSM).

06/06/11 – 06/20/11 slight elevation in pH but acceptable calibration and slope. Data left as is.

06/20/11 – 07/06/11 post calibration values were not within acceptable range and slope was low. Data flagged as suspect <1> [SPC] (CSM).

09/12/11 deployment, post calibration out of acceptable range for both standards and slope was very low. Data was flagged as suspect and coded <1> [SPC] (CDF).

10/03/11 – 10/30/11 post calibration values not within acceptable range and slope was low. Data flagged as suspect <1> [SPC] (CSM).

Turbidity

03/08/11 – 04/06/11 deployment, turbidity post calibration was unacceptable. Data looks fine except discrete a few negative values that may have been the result of an out of water event, which were rejected. All other data marked as suspect due to not falling within acceptable post calibration range <1> [SPC] (CSM).

04/06/11 10:00 - 05/05/2011 10:00 Turbidity drift occurred due to unknown causes. Subsequent deployments with this probe seem to be fine. Data flagged as suspect <1> [SSD] (CSM).

04/29/11 17:00 was an unknown errant data point. Turbidity spike coincides with a DO drop to 0 with cause unknown.

05/05/11 deployment had many negative values. Most were marked as suspect, but are within the calibration accuracy error of the sensor so they were not rejected and coded as <-1> [SNV] (CSM). Values below -2 were rejected and coded as <-3> [SNV] (CSM). Turbidity data for this deployment may have been slightly affected by a contaminated standard, though the probe passed post calibration.

07/13/11 – 07/17/11 turbidity spikes occurred with cause unknown, data flagged as suspect or rejected.

07/28/11 - 07/31/11 elevated turbidity values, cause unknown. Some values that jumped abruptly were rejected, though most were retained as suspect.

07/31/11 – 08/02/11 some negative values reported and rejected as sensor error, occurring intermittently with elevated values that were rejected or flagged as suspect. This probe passed post calibration with acceptable values.

9/12/11 – 10/03/11 post calibration failure and wiper was not parking properly. Probe malfunctioned at time of post calibration and had to be retired. Data does not seem to deviate

from average conditions for the site, but the deployment was flagged as suspect due to the wiper and post calibration failure.

10/03/11 deployment had several negative values. Values less than -1 were rejected. Several of these events were due to some of the probes being out of water. The turbidity probe passed calibration and post-calibration with acceptable values.

Negative turbidity readings were taken 11/21/2011 11:45, 11/22/2011 13:30 and 12/01/2011 07:45 - 12/01/2011 08:30, all were rejected.

12/03/11 – 12/13/11 intermittent turbidity spikes were rejected. The cause of these elevated readings is unknown, the probe passed post calibration with acceptable values.

12/13/11 – 12/31/11 deployment had negative turbidity readings and a failed post cal. Standard may have been contaminated and data was rejected.

Loosin Creek

General

This site typically has low turbidity values, occasionally these values approach zero and fit conditions of the site. Negative one readings were retained and marked as (CAF), acceptable calibration/accuracy error of the sensor.

Data affected by low tide were coded (CLT). Lower salinity and SpCond was addressed with <1> (CLT) due to the probability of fresher surface waters being measured as the water level decreased. Salinities approaching zero or less were addressed as <-3> [GOW] (CLT) and affected data were also rejected accordingly. Temperature affected measurements were rejected as it became apparent that the Temp sensor was being affected (pronounced change in temp values during extreme low tide readings). The vertical orientation of the probes means that shorter probes (pH, C/T) will be affected before longer probes (DO, turbidity).

02/07/11 11:00 records missing due to a sonde swap.

05/02/11 – 05/04/11 missing records resulting from battery failure.

05/25/11 an instrument malfunction or an out of water event occurred from 11:45-12:00. It was not during a low tide so the cause of this event is unknown. The affected data was rejected.

06/07/11 13:15 and 07/08/11 14:15 were missing records due to sonde swap.

Prior to Hurricane Irene making landfall, sondes were pulled from their locations to prevent property loss or damage. This resulted in a data gap from August 25, 2011, 12:30 through August 29, 2011, 11:30. This data is rejected and does not reflect field conditions. The same sonde was redeployed, so it is not flagged as the beginning of a new deployment. Data records during the time the sonde was in the laboratory were rejected and coded as <-3> [GOW] (CSM).

10/03/11 15:15 missing record due to a sonde swap.

11/06/11 – 11/14/11 batteries failed and no data was recorded from this time until the sonde swapped.

Out of water events are detailed in the depth section.

Temperature

03/28/11 – 04/01/11 dips in temperature may have been due to rainfall. Rain occurred in this area March 28 (0.3 in) and 30 (0.9 in), 2011. Data was not coded as significant rain or weather event since the total precipitation was not excessive.

Depth

Sonde is deployed in vertical position so the depth sensor becomes exposed before other probes. All negative depth flagged and coded <1> [SNV] (CAP) unless it is evident that sensors were exposed.

All data corresponding to SpCond/Salinity data that was rejected (due to low tide) was also rejected <-3> [SOW] (CLT). Depth sensor is located above CT sensor and will be exposed when SpCond approaches 0.0.

There were several periods of negative depth readings while the sensors appeared to be in the water. Depth may have been affected by a change in barometric pressure. These depth records were flagged a suspect, <1> [SNV] (CAP).

Out of water events occurred and resulted in rejected or suspect data in the following deployments: 12/08/10 (01/01/11), 01/11/11, 02/07/11, 03/08/11, 04/06/11. 05/04/11.

Sp Cond/Salinity

12/08/10 – 01/11/11 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 the beginning of the year through the remainder of the deployment.

05/04/11 deployment, post calibration was not within acceptable range. Data was flagged as suspect.

07/19/11 deployment, the conductivity/salinity values drifted lower than those generally found at this site. The sensor was outside the acceptable range for post-calibration and data should be considered suspect from August 5, 2011 through the end of deployment.

This site showed a lower salinity signal following rain in the area October 19, 2011.

10/03/11 deployment may have experienced some sensor drift or fouling. Salinity/specific conductivity data from October 28, 2011 through the end of deployment was flagged as suspect due to probe not passing post calibration within acceptable values. After the probe was cleaned, it read within acceptable range.

12/13/11 – 12/31/11 probe was slightly outside of acceptable post calibration values. Data was flagged as suspect.

Dissolved Oxygen

01/11/11 – 02/07/11 wiper for the dissolved oxygen probe was missing when the sonde was retrieved on February 7, 2011. Data seem to fit conditions and it is unknown if the wiper was present for the entire deployment (January 11-February 7, 2011).

07/08/11 – 07/19/11 the dissolved oxygen wiper was not functioning when sonde was retrieved from the field. The quality of the dissolved oxygen data does not seem to be affected and was retained <0> [SWM].

08/16/11 – 09/14/11 the dissolved oxygen wiper was not functioning properly upon retrieval of the sonde. There was algal growth on the wiper and membrane. The entire dataset was coded as suspect and drift was apparent at the end of the deployment.

11/14/11 deployment had dips in dissolved oxygen during low tide events. These were retained as good data, but marked as <0> (CLT). Also during this time there were a few events marked as suspect for depth when it was listed as negative but the probes appeared to be in the water (affected by fluctuations in barometric pressure).

pH

01/01/11 – 01/11/11 pH values were elevated and marked as suspect. The post calibration standard values were within acceptable range however the slope was not within range following the deployment.

01/11/11 deployment, pH did not pass post calibration. This sensor failed to calibrate properly following this deployment after reconditioning and was replaced. Data during the January 11-February 7 time frame seems low and should be considered suspect.

02/07/11 deployment, pH post calibration passed with acceptable values, but the slope was low. The values reported during this period seem to fit conditions other than during several out of water events.

05/04/11 deployment, pH did not have acceptable post calibration values or slope and data was flagged as suspect.

07/19/11 deployment, pH values were below acceptable range in the pH 10 standard and slope was also low. The entire data set was marked as suspect and flagged as <1> [SPC].

10/03/11 deployment, pH post calibration slope is a bit low, but values for post cal in standards 7 and 10 were acceptable. Data was retained.

11/14/11 deployment may have been some sensor drift occurring at the end deployment. The pH seems slightly elevated from December 11-13, 2011. This data was flagged as suspect.

Turbidity

01/11/11 – 02/07/11 deployment, turbidity data was rejected for the entire deployment. While there may be spots of data that are useful for trend analyses, the majority of this dataset was oscillating from negative readings to high turbidity spikes. This probe failed in a subsequent deployment and data seems to be compromised during this deployment as well.

02/07/11 deployment, turbidity failed post calibration. While there may be spots of data that are useful for trend analyses, the majority of this dataset was oscillating from negative readings to high turbidity spikes and was rejected.

03/08/11 deployment, turbidity probe failed post calibration. Data for this deployment appears very noisy and elevated. The entire dataset was rejected.

04/06/11 deployment, turbidity readings periodically dropped to negative readings, down to around -20 NTU. These data points were rejected due to sensor malfunction, but the rest of the dataset was retained but flagged as suspect. The sensor post calibrated slightly outside of acceptable range.

05/30/11 – 06/07/11 Elevated turbidity readings were recorded. These values were marked as suspect for the first few records then rejected for the rest of the dataset. Probes were heavily fouled with algae upon recovery.

06/07/11 – 06/24/11 deployment had the same turbidity probe that malfunctioned in the April deployed again in June. Though this probe passed calibration and post calibration ranges, there are many negative readings during the June 7-24 deployment that were rejected. Data that did not seem to be affected was retained since the probe passed post calibration with acceptable values.

07/08/11 deployment, the turbidity probe malfunctioned resulting in negative readings. On many occasions the value was approximately -20 NTU. These readings were followed by values that appeared to fit conditions for the site. Though the probe was sent in for repair following this deployment, the sensor passed post calibration and the remaining dataset was retained.

12/13/11 – 12/31/11 deployment may have been calibrated using a contaminated standard. All turbidity values from this deployment were rejected.

Research Creek

General

Disjunct data may result from site conditions including settling of mud and/or fouling that occur during a deployment. Unless the post calibration values were outside of acceptable range, these data were retained and the first record of the new deployment was flagged. These conditions may influence all parameters but the following parameters were affected resulting in disjunct data at the following dates:

SpCond: 5/4, 6/7, 8/4, 8/16

DO: 6/7

Data affected by low tide were coded (CLT). Lower salinity and SpCond was addressed with <1> (CLT) due to the probability of fresher surface waters being measured as the water level decreased. Salinities approaching zero or less were addressed as <-3> [GOW] (CLT) and affected data were also rejected accordingly. Temperature affected measurements were rejected as it became apparent that the Temp sensor was being affected (pronounced change in temp values during extreme low tide readings). The vertical orientation of the probes means that shorter probes (pH, C/T) will be affected before longer probes (DO, turbidity).

01/11/11 deployment, a vented sonde was deployed with a non vented cable. The cable may have had some wear or moisture in the connection which caused catastrophic temperature/conductivity failure approximately 12 hours into the deployment. The data appears to stabilize after 3 days, then the depth sensor malfunctioned, then the sonde experienced catastrophic temp/cond failure again and eventual battery failure. Though the probes post calibrated within acceptable range, the water within the cable/connection caused much of the data from this deployment to be rejected. When the sonde appeared to function intermittently, data was marked as suspect.

01/25/11 – 02/04/11 data is missing. This may have been a result of a short from a leaking telemetry cable or connection, or from batteries that reversed polarity.

02/20/11 – 03/08/11 batteries began to fail on February 20, 2011, resulting in missing data intermittently until March 1, 2011. No data was collected from March 1-8, 2011 due to battery failure.

04/04/11 – 04/06/11 batteries failed due to reversed polarity of one battery.

Prior to Hurricane Irene making landfall, sondes were pulled from their locations to prevent property loss or damage. This resulted in a data gap from August 25, 2011, 12:45 through August 29, 2011, 11:15. The same sonde was redeployed, so it is not flagged as the beginning of a new deployment. Data records were rejected and coded as <-3> [GOW] (CSM).

This site showed a lower temperatures and salinity signal following rainfall in the area October 19, 2011.

07/07/11 14:30 a reading was missed due to a sonde swap.

09/13/11 11:30 an out of water event caused data to be flagged as suspect or rejected.

Depth

Sonde is deployed in vertical position so the depth sensor becomes exposed before other probes. All negative depth flagged and coded <1> [SNV] (CAP) unless it is evident that sensors were exposed.

All data corresponding to SpCond/Salinity data that was rejected (due to low tide) was also rejected <-3> [SOW] (CLT). Depth sensor is located above CT sensor and will be exposed when SpCond approaches 0.0.

01/11/11 deployment, see above in general section. Depth data rejected for most of deployment.

Temperature

01/11/11 deployment, see above in the general section for detailed account of temperature failure.

Specific Conductance/Salinity

02/04/11 deployment, did not pass post calibration with acceptable values. 2 + inches of rain fell on Feb 4, 2011. There may have been a slow response signal that caused drop in salinity around 2/15/11. Also some jumpy readings occurred on 2/18/11 from 2:45 – 5:30.

06/07/11 deployment failed post calibration. Some readings seemed elevated, and entire deployment was flagged as suspect.

06/24/11 deployment failed post calibration and entire dataset was flagged as suspect.

09/14/11 deployment had elevated values and data was retained. There may have been high salinity due to warm temperatures and evaporation.

Dissolved Oxygen

02/04/11 deployment had several times that the dissolved oxygen levels dropped abruptly from near or above 100% to zero. This malfunction does not seem to be related to any other parameters and dissolved oxygen data was rejected during the following times:

02/4/11 11:30

02/5/11 14:30-14:45, 15:15- 18:15

02/6/11 12:45, 18:30-19:00

02/8/11 16:30-16:45

02/9/11 15:45-17:45, 22:30

02/11/11 2:15-2:30

02/12/11 23:45

02/13/11 0:00, 15:45, 22:00-22:30

02/14/11 6:30

02/17/11 13:00

02/18/11 13:15-13:45, 16:45
02/19/11 16:45-17:15
02/20/11 14:00-14:15, 16:30-17:15
02/21/11 15:30-16:30, 18:15-21:00, 23:15-23:45
02/25/11 1:30-2:00
02/28/11 11:00-12:15, 12:45, 14:15-17:15, 17:45-23:45
03/1/11 0:00-3:30, 3:45-4:45, 8:00

02/14/11 – 02/19/11 experienced a wide range of dissolved oxygen concentrations. There was 2+ inches of rain documented on February 4, 2011 and there may have been a delayed signal. Along with the variable DO levels, Salinity and SpCond fluctuated.

04/06/11 deployment, the dissolved oxygen sensor malfunctioned. Readings dropped to zero periodically with data that seem to fit conditions on either side of these drops. Affected data was rejected and coded as a sensor malfunction.

05/04/11 deployment, dissolved oxygen regularly dipped during the high tide readings. This sonde was heavily fouled with red algae upon retrieval. The dips in dissolved oxygen became more dramatic during the latter part of the deployment and may have been influenced by the algae. Hypoxic conditions were also reported periodically around or following low tide events.

06/07/11 deployment had the same dissolved oxygen probe that malfunctioned in the April deployment was deployed again. The data set from June 7-24 has episodes of the dissolved oxygen values dropping to zero. Affected records were rejected and the rest of the data set was retained.

07/19/11 deployment failed post calibration with slightly lower values for dissolved oxygen. Though it is difficult to know when sensor drift may have occurred, records were flagged beginning 07/22/11 through the remainder of the deployment as suspect.

pH

05/04/11 deployment, pH failed post calibration and slope was low. Data for the entire deployment was flagged as suspect though data in beginning of the deployment may be accurate.

08/04/11 deployment, pH post calibration was below acceptable range and slope was also low. Data for the entire deployment was flagged as suspect, though drift may have occurred sometime mid deployment.

10/03/11 deployment, pH was low in pH 10 solution during post calibration. Slope was outside of the acceptable range. There was light algae on the probe upon sonde retrieval, but since the point that data was compromised cannot be easily identified, the entire deployment was flagged as suspect, biofouling <1> (CFB) (CCU).

11/14/11 deployment, the post calibration for pH was a bit lower than acceptable ranges, with acceptable slope. Though this data appears to fit conditions for the site, the entire deployment was flagged as suspect <1> [SPC] (CSM).

Turbidity

01/01/11 – 01/11/11 had periods of elevated turbidity and most were retained. Most of these events drifted gradually up then decreased gradually indicating that this may have been a tidally influenced phenomena. There may be macroalgae present this time of year which could have affected some readings. Sharp increases were flagged as suspect.

02/11/11 – 02/15/11 there were some negative turbidity reading beginning on February 11, 2011. These were within the sensor error and the probe passed post calibration. There were also several readings with elevated turbidity on February 12, and February 15 2011 that were marked as suspect, cause unknown unless above the specifications of the sensor, in which case they were rejected.

03/13/11 – 03/29/11 experienced periods of elevated turbidity. When deploying the ISCO at this site on March 29, 2011, we removed algae that was wrapped around the wiper and the data shows a decrease in elevated readings from that point on.

05/04/11 deployment failed the post calibration. The beginning of the deployment seems to fit conditions for the site, but starting around May 27, 2011 readings were elevated. Data was marked as suspect on May 28-29, and then rejected as values increased from May 29 through the end of the deployment.

06/24/11 deployment, the turbidity failed during post calibration. Data does not seem to be affected other than a few turbidity spikes but entire dataset needed to be flagged as suspect due to the elevated post cal value.

09/11/11 – 09/14/11 elevated turbidity values were flagged as suspect.

09/24/11 – 10/02/11 elevated turbidity values were flagged as suspect or rejected.

10/23/11 – 10/30/11 elevated turbidity values were flagged as suspect or rejected.

11/22/11 – 11/24/11 elevated turbidity values were flagged as suspect or rejected.

Zeke's Basin

General

This site is within a shallow lagoonal system and the sonde is subject to our of water events, especially at spring low tides. The vertical deployment structure was lowered in July 2011 to try to minimize these events.

Data affected by low tide were coded (CLT). Lower salinity and SpCond was addressed with <1> (CLT) due to the probability of fresher surface waters being measured as the water level decreased. Salinities approaching zero or less were addressed as <-3> [GOW] (CLT) and affected data were also rejected accordingly. Temperature affected measurements were rejected as it became apparent that the Temp sensor was being affected (pronounced change in temp values during extreme low tide readings). The vertical orientation of the probes means that shorter probes (pH, C/T) will be affected before longer probes (DO, turbidity).

Temperature affected measurements (SpCond/sal, pH) were rejected anytime the temperature sensor was being affected (pronounced change in temp values during extreme low tide readings).

Especially during summer months, oxygen data can be quite variable. These cycles often correlate with tidal fluctuation, are likely driven by presence of drift algae (*Gracilaria*). Data was not flagged as suspect though some of the upper limits for percent saturation were surpassed. We will be working towards flagging these data in the future.

01/27/11 – 02/07/11 data was lost due to battery failure and/or water in the connection of the telemetry cable. Data was intermittent through the end of the deployment and should be considered suspect. Sonde telemetry cable connection was wet and corroded. Connections were dried and cleaned and functional for next deployment.

02/09/11 - 02/16/11 data was lost due to battery failure.

05/01/2011 – 05/05/11 batteries failed and data was lost through the end of the deployment.

06/20/11 13:45 reading missed during sonde swaps.

Reading missed 7/6/11 14:45 between deployments

07/18/11 ~13:00 deployment tube cleaned and lowered 2-3 inches in order to address repeated out of water events.

08/10/11 20:30 - 08/15/11 11:30, batteries failed. Data lost through the end of the deployment.

08/25/11 – 08/29/11 sonde removed from the field due to Hurricane Irene. The sonde was not turned off and deployment program was not interrupted. All data recorded DO NOT reflect the water conditions as the sondes were in temporarily stored on land from 08/25/2011 14:30 to 08/29/2011 13:00. All data flagged and coded <-3> [GMC] (CSM).

10/30/11 03:30 - 11/14/11 12:45, batteries failed. Data lost through the end of the deployment.

Depth

Sonde is deployed in vertical position so the depth sensor becomes exposed before other probes. All negative depth flagged and coded <1> [SNV] (CAP) unless it is evident that sensors were exposed.

07/18/11 ~13:00 deployment tube cleaned and lowered 2-3 inches in order to address repeated out of water events.

All data corresponding to SpCond/Salinity data that was rejected (due to low tide) was also rejected <-3> [SOW] (CLT). Depth sensor is located above CT sensor and will be exposed when SpCond approaches 0.0.

Temperature

01/11/11 deployment had several out of water events. Data affected during these events was rejected or flagged as suspect. There were some negative readings for temperature following these events that were retained.

SpCond/Salinity

11/14/11 – 12/13/11 deployment, SpCond post calibration unacceptable. Data appear to fit conditions and unacceptable values likely due to sediment accumulation within probe retaining freshwater from light rinse following sonde retrieval. Data was flagged as suspect and coded <1> [SPC] (CSM).

12/13/11 – 12/31/11 deployment, conductivity was slightly elevated in the post calibration. Data appears to fit conditions for the site and was flagged as <1> [SPC] (CDF).

Sporadic temporary small dips in salinity at low tide are assumed to be lower salinity surface waters. Often these were associated with out of water events and may be coded as suspect, low tide <1> CLT or as suspect sensor out of water <1> [SOW] (CLT).

Dissolved Oxygen

All data corresponding out of water events (due to low tide) was also rejected <-3> [SOW] (CLT) or flagged as suspect <1> [SOW] (CLT).

Spring and summer deployments, high values were recorded for dissolved oxygen, sometimes surpassing 200% saturation. These reflect conditions at the site, occurring at the same time as elevated pH values and data were retained (unless affected by out of water events). Drift algae (*Gracilaria*) is present at the site and most likely driving this phenomena. Data was not flagged as suspect though some of the upper limits for percent saturation were surpassed. We will be working towards flagging these data in the future.

Low dissolved oxygen values were reported in August and September. It is not uncommon for this site to experience hypoxic conditions during summer months.

pH

01/01/11 – 01/11/11 pH post – calibration unacceptable in standards 7 and 10. Slope was also outside of acceptable range. Data from this deployment should be rejected.

05/05/11 – 06/06/11 deployment, pH post-cal unacceptable for standard 10 and low slope was reported.

10/03/11 -11/14/11 deployment, pH post-cal unacceptable for standard 10 and low slope was reported. Data appear to fit conditions. Flagged as suspect and coded <1> [SPC] (CSM).

11/14/11 – 12/13/11 deployment, pH post-cal unacceptable for standard 10, yet slope was acceptable. Data appear to fit conditions. Flagged suspect and coded <1> [SPC] (CSM).

12/13/12 – 12/31/11 deployment, pH post-cal unacceptable for standard 10, yet slope was acceptable. Data appear to fit conditions. Flagged suspect and coded <1> [SPC] (CSM).

Turbidity

01/01/11 – 01/11/11 some elevated turbidity readings that may have been tidally influenced were retained.

01/15/11 – 01/17/11, data were flagged as suspect or rejected due to negative values. Those below the threshold of acceptable calibration were flagged <-3> [SNV] (CSM).

2/16/11 – 3/08/11 deployment, data rejected due to post cal failure. Extremely low post cal values (-10 NTU) in 0 standard.

05/05/2011 10:30 -06/06/2011 13:15 deployment, turbidity data contained spurious spikes near or above 1000 NTU. These may have been from accumulations of drift algae (*Gracilaria*). Spikes were identified and rejected <-3> [STS] (CCU).

07/06/2011 15:00 – 07/18/2011 12:30 deployment had possible incorrect calibration. New probe installed, calibration may be low by ~ 4 NTU due to contaminated standard.

07/18/11 deployment had elevated readings that were rejected or flagged as suspect. This probe failed later in the deployment and may have had the wiper or algae over the optics.

07/26/2011 18:30 - 08/02/2011 11:45 and

08/15/2011 11:45 - 09/12/2011 09:45

Rejected and flagged <-3> [SSM] (CSM), due to probe failure (Probe ID: 07G100667).

08/15/2011 11:45 - 09/12/2011 09:45 deployment, turbidity probe calibration was out of range. No replacement probe was available so calibration was accepted. Wiper was not operational. All data rejected.

10/03/11 -11/14/11 deployment, turbidity post-cal was unacceptable, possibly a calibration issue. All data rejected for this deployment.