

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. 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 Heather Wells and Byron Toothman.

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 was anchored to the bottom for the majority of 2012. The East Cribbings site was converted to a vertical deployment structure on December 4, 2012. 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.

During 2015, chlorophyll data was collected at East Cribbings and Loosin Creek stations. A one point (0 NTU) chlorophyll calibration using DI water was performed prior to sonde deployments. Chlorophyll spikes and negative values were rejected, while elevated values may be flagged as suspect depending on field conditions. We do not currently calibrate with a known concentration of phytoplankton from fluorometric analysis, Rhodamine solutions, or adjust the data with any correction.

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

East Cribbings

<u>Deploy Date</u>	<u>Deploy Time</u>	<u>Retrieve Date</u>	<u>Retrieve Time</u>	<u>Sonde Model Number (Nickname)</u>	<u>pH Model Number</u>	<u>roxDO Model Number</u>	<u>Turb Model Number</u>	<u>Cond Model Number</u>	<u>Chloro Model Number</u>
12/9/2013	15:30	1/16/2014	11:30	6600V2 (35V EC)	6561	6150	6136	6560	6025
1/16/2014	11:45	2/6/2014	15:00	6600V2 (33V)	6561	6150	6136	6560	6025
2/6/2014	15:15	3/5/2014	13:45	6600V2 (35V EC)	6561	6150	6136	6560	6025
3/5/2014	14:00	4/2/2014	11:30	6600V2 (33V)	6561	6150	6136	6560	6025
4/2/2014	11:45	5/14/2014	8:30	6600V2 (35V EC)	6561	6150	6136	6560	6025
5/14/2014	8:45	6/4/2014	14:00	6600V2 (33V)	6561	6150	6136	6560	6025
6/4/2014	14:15	6/17/2014	12:30	6600V2 (35V EC)	6561	6150	6136	6560	6025
6/17/2014	12:45	7/1/2014	12:30	6600V2 (33V)	6589	6150	6136	6560	6025
7/1/2014	12:45	7/15/2014	11:45	6600V2 (35V EC)	6561	6150	6136	6560	6025
7/15/2014	12:00	8/13/2014	12:00	6600V2 (33V)	6589	6150	6136	6560	6025
8/13/2014	12:15	9/9/2014	11:30	6600V2 (35V EC)	6561	6150	6136	6560	6025
9/9/2014	11:45	10/13/2014	13:00	6600V2 (35V EC)	6561	6150	6136	6560	6025
10/13/2014	13:30	11/12/2014	14:45	6600V2 (35V EC)	6561	6150	6136	6560	6025
11/12/2014	15:00	12/12/2014	12:00	6600V2 (33V)	6589	6150	6136	6560	6025
12/12/2014	12:15	1/7/2015	13:30	6600V2 (35V EC)	6561	6150	6136	6560	6025

Loosin Creek

<u>Deploy Date</u>	<u>Deploy Time</u>	<u>Retrieve Date</u>	<u>Retrieve Time</u>	<u>Sonde Model Number (Nickname)</u>	<u>pH Model Number</u>	<u>roxDO Model Number</u>	<u>Turb Model Number</u>	<u>Cond Model Number</u>
1/16/2014	10:30	2/5/2014	12:30	6600EDS (21)	6579	6150	6136	6560
2/5/2014	12:45	3/5/2014	12:45	6600V2 (34)	6561	6150	6136	6560
3/5/2014	13:00	4/2/2014	13:00	6600EDSV2 (20V)	6561	6150+	6136	6560
4/2/2014	13:15	5/14/2014	9:45	6600V2 (34)	6561	6150	6136	6560
5/14/2014	10:00	6/3/2014	11:00	6600EDSV2 (20V)	6561	6150+	6136	6560
6/3/2014	11:15	6/17/2014	10:15	6600V2 (34)	6561	6150	6136	6560
6/17/2014	10:30	7/1/2014	11:15	6600EDSV2 (20V)	6579	6150+	6136	6560
7/1/2014	11:30	7/15/2014	10:30	6600V2 (34)	6561	6150	6136	6560
7/15/2014	10:45	8/12/2014	11:30	6600EDSV2 (20V)	6579	6150+	6136	6560
8/12/2014	11:45	9/9/2014	10:30	6600V2 (34)	6561	6150	6136	6560
9/9/2014	10:45	10/14/2014	11:00	6600EDSV2 (20V)	6579	6150+	6136	6560
10/14/2014	11:15	11/12/2014	13:30	6600V2 (34)	6561	6150	6136	6560
11/12/2014	13:45	12/11/2014	13:30	6600EDSV2 (20V)	6579	6150+	6136	6560
12/11/2014	13:45	1/7/2015	11:30	6600V2 (34)	6561	6150	6136	6560

Research Creek

<u>Deploy</u>	<u>Deploy</u>	<u>Retrieve</u>	<u>Retrieve</u>	<u>Sonde Model</u>	<u>pH</u>	<u>roxDO</u>	<u>Turb Model</u>	<u>Cond</u>
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<u>Date</u>	<u>Time</u>	<u>Date</u>	<u>Time</u>	<u>Number</u> <u>(Nickname)</u>	<u>Model</u> <u>Number</u>	<u>Model</u> <u>Number</u>	<u>Number</u>	<u>Model</u> <u>Number</u>
1/16/2014	10:45	2/5/2014	12:15	6600EDS (17)	6561	6150	6136	6560
2/5/2014	12:30	3/5/2014	12:30	6600EDS (32)	6561	606150	606136	6560
3/5/2014	12:45	4/2/2014	12:45	6600EDSV2 (37V)	6561	606150	6136	6560
4/2/2014	13:00	4/9/2014	12:15	6600EDS (32)	6561	606150	606136	6560
4/9/2014	12:30	5/14/2014	10:45	6600EDSV2 (37V)	6589	606150	6136	6560
5/14/2014	11:00	6/3/2014	11:15	6600EDS (32)	6561	606150	606136	6560
6/3/2014	11:30	6/17/2014	10:30	6600EDSV2 (37V)	6589	606150	6136	6560
6/17/2014	11:00	7/1/2014	11:00	6600EDS (32)	6561	606150	606136	6560
7/1/2014	11:15	7/15/2014	10:45	6600EDSV2 (37V)	6589	606150	6136	6560
7/15/2014	11:00	8/12/2014	11:15	6600EDS (32)	6561	606150	606136	6560
8/12/2014	11:30	9/9/2014	10:15	6600EDSV2 (37V)	6589	606150	6136	6560
9/9/2014	10:30	10/14/2014	14:45	6600EDS (32)	6561	606150	606136	6560
10/14/2014	15:00	11/12/2014	13:45	6600EDSV2 (37V)	6589	606150	6136	6560
11/12/2014	14:00	12/11/2014	13:45	6600EDS (32)	6561	606150	606136	6560
12/11/2014	14:00	1/7/2015	11:45	6600EDSV2 (37V)	6561	606150	6136	6560

Zeke's Basin

<u>Deploy</u> <u>Date</u>	<u>Deploy</u> <u>Time</u>	<u>Retrieve</u> <u>Date</u>	<u>Retrieve</u> <u>Time</u>	<u>Sonde Model</u> <u>Number</u> <u>(Nickname)</u>	<u>pH</u> <u>Model</u> <u>Number</u>	<u>rpDO</u> <u>Model</u> <u>Number</u>	<u>roxDO</u> <u>Model</u> <u>Number</u>	<u>Turb</u> <u>Model</u> <u>Number</u>	<u>Cond</u> <u>Model</u> <u>Number</u>
1/16/2014	12:00	2/6/2014	16:15	6600EDSV2 (20V)	6579	6150+	6136	6560	6025
2/6/2014	16:30	3/5/2014	14:00	6600EDS (24)	6561	6150	6136	6560	
3/5/2014	14:15	4/2/2014	11:15	6600EDS (21)	6579	6150	6136	6560	
4/2/2014	11:30	5/14/2014	8:45	6600EDS (24)	6561	6150	6136	6560	
5/14/2014	9:00	6/4/2014	13:45	6600EDS (21)	6579	6150	6136	6560	
6/4/2014	14:00	6/17/2014	12:45	6600EDS (24)	6561	6150	6136	6560	
6/17/2014	13:00	7/1/2014	12:45	6600EDS (21)	6579	6150	6136	6560	
7/1/2014	13:00	7/15/2014	11:45	6600EDS (24)	6561	6150	6136	6560	
7/15/2014	12:15	8/13/2014	12:15	6600EDS (21)	6579	6150	6136	6560	
8/13/2014	12:30	9/9/2014	11:45	6600EDS (24)	6561	6150	6136	6560	
9/9/2014	12:00	10/13/2014	13:15	6600EDS (21)	6579	6150	6136	6560	
10/13/2014	13:30	11/12/2014	15:00	6600EDS (24)	6561	6150	6136	6560	
11/12/2014	15:15	12/11/2014	12:15	6600EDS (21)	6579	6150	6136	6560	
12/11/2014	12:30	1/21/2015	11:00	6600EDS (24)	6561	6150	6136	6560	

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:

NOAA National Estuarine Research Reserve System (NERRS). System-wide Monitoring Program. Data accessed from the NOAA NERRS Centralized Data Management Office website: <http://www.nerrsdata.org/>; 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) NOC NERR deployed 6600EDS at Research Creek and Zeke's Basin during 2014 and at East Cribbings and Loosin Creek for January – May 2014. 6600 V2 sondes were used at East Cribbings and Loosin Creek beginning May 14, 2014, with vented V2s at East Cribbings and non-vented at Loosin Creek. All sondes used at East Cribbings were vented.

YSI 6600EDS data sonde:

Parameter: Non-vented Level EDS-S

Units: meters

Sensor Type: Stainless steel strain gauge

Range: 0 to 10ft

Accuracy: +/- 0.06 ft (0.018 m)

Resolution: 0.001 ft (0.001 m)

YSI 6600V2-4 data sonde:

Parameter: Vented Level V2-SV

Units: meters

Sensor Type: Stainless steel strain gauge

Range: 0 to 10m

Accuracy: ±0.01 ft, 0.003 m

Resolution: 0.001 ft (0.001 m)

YSI 6600 V2 vented data sonde:

Parameter: Vented Level V2-SV

Units: meters

Sensor Type: Stainless steel strain gauge

Range: 0 to 10m

Accuracy: ± 0.06 ft, ± 0.02 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: $\pm 0.5\%$ 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: $\pm 1.0\%$ of reading pr 0.1 ppt, whichever is greater
Resolution: 0.01 ppt

Parameter: Dissolved Oxygen % Saturation
Sensor Type: Optical probe w/ mechanical cleaning
Model#: 6150 ROX
Range: 0 to 500% air saturation
Accuracy: 0-200% air saturation: $\pm 1\%$ of the reading or 1% air saturation, whichever is greater 200-500% air saturation: $\pm 15\%$ of reading
Resolution: 0.1% air saturation

Parameter: Dissolved Oxygen mg/L
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: $\pm 15\%$ of the reading
Resolution: 0.01 mg/L

Parameter: Non-vented Level – Shallow (0-10m)
Units: meters
Sensor Type: Stainless steel strain guage
Range 0-30ft
Accuracy: ± 0.06 ft (0.018m)
Resolution: 0.001 ft (0.001m)

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

Parameter: Chlorophyll
Units: µg/L
Sensor Type: Optical
Model#: 6025
Range: 0 – 400 µg/L
Resolution: 0.1 µg/L Chl

Dissolved Oxygen Qualifier:

The reliability of the dissolved oxygen (DO) data after 96 hours post-deployment for non-EDS (Extended Deployment System) data sondes may be problematic due to fouling which forms on the DO probe membrane during some deployments (Wenner et al. 2001). Many reserves have upgraded to the YSI 6600 EDS data sondes, which increases DO accuracy and longevity by reducing the environmental effects of fouling. The user is therefore advised to consult the metadata and to exercise caution when utilizing the DO data beyond the initial 96-hour time period. However, this potential drift is not always problematic for some uses of the data, 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. The Research Coordinator at the specific NERR site should be contacted concerning the reliability of the DO data because of the site and seasonal variation in the fouling of the DO sensor.

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
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>Deploy Date</u>	<u>Sonde</u>		<u>SpCond</u>	<u>ROXDO1</u>	<u>ROXDO2</u>	<u>pH7</u>	<u>pH10</u>	<u>Turb</u>	<u>Depth</u>	<u>CHL(0)</u>
	<u>Nickname</u>									
1/16/2014	33V		50.83	100.7	100.7	7.06	10.06	-1.6(0.0)	0.088	0.1
2/6/2014	35V		50.74	100.3	100.3	7.03	10.01	0.2(0.0)	0.008	0.2
3/5/2014	33V		49.15	99.5	91.5	7.14	9.96	-0.9(0.0)	0.067	-0.2
4/2/2014	35V		47.78	97.8	97.7	7.73*	9.40*	1.7(0.0)	0.104	0.7
5/14/2014	33V		49.12	98.8	98.8	7.02	9.73*	1.9(0.0)	0.115	-0.4
6/4/2014	35V		50.09	102.2	102.1	6.84	9.76	-4.9(0.0)*	0.277	0.2
6/17/2014	33V		47.51	100.5	100.3	7.06	10.06	0.6(0.0)	0.047	0.3
7/1/2014	35V		49.38	101.6	101.4	7.14	9.81	-0.6(0.0)	0.007	-0.3
7/15/2014	33V		46.31*	99.8	100.1	7.44*	8.85*	-1.3(0.0)	0.56	-0.4
8/13/2014	35V		47.05*	101.2	101.2	6.96	9.70	3.4(0.0)	0.055	0.5
9/9/2014	35V		46.17*	98.6	98.7	7.35*	9.00*	5.0(0.0)	-0.017	-0.3
10/13/2014	35V		49.65	99.9	100	6.91	9.90	-0.1(0.0)	0.017	-0.1
11/12/2014	33V		51.96	99.5	99.6	7.10	10.09	-3.3(0.0)	51.96	0.0
12/12/2014	35V		50.63	99.8	99.8	6.96	9.93	-0.2(0.0)	-0.042	0.9

* post calibration value outside of acceptable range

Loosin Creek

<u>Deploy Date</u>	<u>Sonde</u>		<u>SpCond</u>	<u>ROXDO1</u>	<u>ROXDO2</u>	<u>pH7</u>	<u>pH10</u>	<u>Turb</u>	<u>Depth</u>	<u>CHL(0)</u>
	<u>Nickname</u>									
1/16/2014	21		32.73*	100.3	-	7.03	10.01	1.3(0.0)	0.093	-
2/5/2014	34		50.81	98.8	98.8	7.04	9.91	0.9(0.0)	-0.100	-0.7
3/5/2014	20V		50.23	101.2	101.0	7.06	10.06	-3.9(0.0)*	-0.034	0.3
4/2/2014	34		45.72*	99.1	100.0	7.14	9.60*	100.4(0.0)*	0.061	1.2
5/14/2014	20V		50.78	99.3	99.3	7.09	9.94	4.0(0.0)*	0.178	2.2
6/3/2014	34		50.55	99.5	98.0	6.82	9.84	-1.9(0.0)	0.045	-0.5
6/17/2014	20V		47.10*	99.1	99.0	7.12	10.15	3.0(0.0)*	-0.010	2.1
7/1/2014	34		44.95*	99.7	99.8	7.17	10.12	-7.4(0.0)*	0.035	-1.2
7/15/2014	20V		50.14	98.7	98.6	7.20	9.27*	-0.5(0.0)	-0.003	0.4
8/12/2014	34		44.45*	100.7	100.5	6.96	9.89	-4.3(0.0)*	0.052	0.0
9/9/2014	20V		12.29*	98.0	98.5	7.76*	8.61*	-4.9(0.0)*	-0.045	0.2

10/14/2014	34	50.65	98.9	99.9	6.97	9.86	32.1(0.0)*	0.031	0.7
11/12/2014	20V	50.57	98.7	99.6	7.15	10.12	-1.8(0.0)	0.076	-1.3

* post calibration value outside of acceptable range

Research Creek

<u>Deploy Date</u>	<u>Sonde</u> <u>Nickname</u>	<u>SpCond</u>	<u>ROXDO1</u>	<u>ROXDO2</u>	<u>pH7</u>	<u>pH10</u>	<u>Turb</u>	<u>Depth</u>
1/16/2014	17	49.68	101.2	101.0	7.01	7.20*	0.9(0.0)	0.054
2/5/2014	32	54.40*	96.6	96.6	7.09	9.94	-0.2(0.0)	0.14
3/5/2014	37V	50.67	99.1	99.5	7.07	10.11	-0.6(0.0)	**
4/2/2014	32	50.64	99.8	-	7.03	9.95	0.0(0.0)	0.083
4/9/2014	37V	49.80	98.8	98.9	7.49*	9.33*	1.6(0.0)	0.05
5/14/2014	32	46.73*	98.3	98.3	7.01	9.95	1.2(0.0)	-0.027
6/3/2014	37V	49.62	98.3	98.9	6.97	9.95	-0.6(0.0)	-0.137
6/17/2014	32	50.70	100.6	100.4	7.09	10.05	2.2(0.0)*	-0.016
7/1/2014	37V	50.71	101.4	101.6	7.18	10.18	-0.3(0.0)	0.031
7/15/2014	32	49.98	99.2	100.3	6.94	9.90	0.1(0.0)	-0.002
8/12/2014**	37V	**	**	**	**	**	**	**
9/9/2014	32	47.51	98.1	98.2	6.98	9.73	-1.4(0.0)	0.017
10/14/2014	37V	49.91	98.6	98.5	7.02	10.03	0.4(0.0)	**
11/12/2014	32	49.77	98.3	98.3	6.81	9.81	-6.4(0.0)*	0.022
12/11/2014	37V	50.75	100.1	100.1	7.08	10.02	-4.3(0.0)	0.09

* post calibration value outside of acceptable range

**post calibration data not saved properly

Zeke's Basin

<u>Deploy Date</u>	<u>Sonde</u> <u>Nickname</u>	<u>SpCond</u>	<u>ROXDO1</u>	<u>ROXDO2</u>	<u>pH7</u>	<u>pH10</u>	<u>Turb</u>	<u>Depth</u>	<u>CHL(0)</u>
1/16/2014	20V	50.01	101.4	101.5	7.11	10.05	-1.9(0.0)	0.086	0
2/6/2014	24	47.32*	99.0	99.1	7.16	10.12	-3.1(0.0)*	0.067	-
3/5/2014	21	11.52*	100.6	100.6	6.96	9.90	-1.0(0.0)	0.017	-
4/2/2014	24	0.48*	98.9	98.9	7.13	10.00	-1.5(0.0)	0.057	-
5/14/2014	21	50.82	98.6	98.6	6.00*	9.86	0.2(0.0)	-0.029	-
6/4/2014	24	37.43*	86.1*	86.3*	7.45*	10.20*	0.5(0.0)	0.014	-
6/17/2014	21	49.03	98.8	98.5	6.99	9.96	-1.2(0.0)	-0.021	-
7/1/2014	24	50.77	102.1	102.1	6.98	9.91	0.4(0.0)	0.034	-
7/15/2014	21	48.67	99.7	99.6	6.92	9.96	1.7(0.0)	-0.024	-
8/13/2014	24	49.24	102.9*	102.8*	6.92	9.96	1.7(0.0)	0.053	-
9/9/2014	21	50.68	98.7	98.7	6.85	9.81	-5.0(0.0)*	-0.044	-
10/13/2014	24	49.79	99.0	99.0	7.02	10.00	-0.4(0.0)	0.121	-
11/12/2014	21	51.23	100.1	100.1	6.88	10.10	-7.4(0.0)*	0.023	-
12/11/2014**	24	**	**	**	**	**	**	**	-

* post calibration value outside of acceptable range

** programming error, no post calibration data

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.

For all data

New deployments were flagged as <0> (CND).

Temperature affected measurements (SpCond/Salinity, pH) were rejected anytime the temperature sensor was affected by out of water events (pronounced change in temp values during extreme low tide readings).

Data affected by low tide were coded (CLT). Lower SpCond/Salinity 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.

All depth data corresponding to rejected or suspect SpCond/Salinity data (due to low tide) were also rejected <-3> [SOW] (CLT) or flagged as suspect <1>[SOW](CLT). Depth sensor is located above Conductivity/Temperature (C/T) sensor and will be exposed when SpCond approaches 0.0. It is possible that some probes were still in the water during out of water events. The vertical orientation of the sondes means that shorter probes (pH, C/T) will be affected before longer probes (dissolved oxygen, turbidity).

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

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

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

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

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

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

Negative chlorophyll values were flagged as <-3> [SNV] (CSM).

Chlorophyll spikes were flagged as suspect <1> [SCS] (CCU), or rejected <-3> [SCS] (CCU).

East Cribbings

General

This site is within a shallow lagoonal system and the sonde is subject to out of water events, especially at spring low tides. (Vertical deployment has been in place since 12/04/12.)

Data were missing sporadically and flagged <-2> [GPF] (CSM), during the following time period due to power/battery failure: 05/01/2014 11:15 - 05/14/2014 8:30.

Data were missing due to a sonde swap at 10/13/2014 13:15.

Depth

Small negative depth values occurred due to changes in barometric pressure. Other sensors were not affected, but depth data were flagged as suspect <1> [SNV] (CAF) for the following times:

11/22/2014 02:45

11/22/2014 03:00

11/22/2014 03:15

SpCond/Salinity

Post calibration values were slightly below acceptable values for the 07/15/2014, 08/13/2014 and 09/09/2014 deployments. Data appears to fit conditions for the site and were flagged as <1> [SPC] (CDF) for all three deployments.

Dissolved Oxygen

Dissolved oxygen data can be quite variable. These cycles often correlate with tidal fluctuation, and may be accentuated by presence of invasive drift algae, *Gracilaria vermiculophylla*.

Values above 100% saturation are not uncommon and values above 200% may occur during warmer months. 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, potentially driven by *G. vermiculophylla* presence). Data were not flagged as suspect though some of the upper limits for percent saturation were surpassed.

pH

For the 04/02/14 - 05/14/14 deployment, pH post-calibration values were unacceptable including slope. Upon retrieval of the sonde the probes were fouled with filamentous algae and encrusting algae. This likely occurred during the power failure and did not impact the data collected while sonde was operational. This probe was cleaned and calibrated well for the next deployment suggesting that the poor post calibration was due to biofouling alone. Data seem to be accurate and were not disjunctive from the previous deployment but were flagged suspect <1> [SPC] (CBF).

The pH post-calibration values were unacceptable for several deployment periods. All data were flagged as suspect for the following affected deployments:

05/14/14 – 06/04/14 post cal value low for 10 standard and slope low

07/15/14 – 08/13/14 post cal values low and slope very low. Data were disjunct from other deployments by 0.2 -0.3

12/12/14 – 12/31/14 pH data disjunct from the prior deployment by 0.3. Both sondes post calibrated acceptably. The prior deployment post calibrated high by ~0.1 and the following post calibrated low by ~0.1. This difference is likely due to this discrepancy and is within the acceptable error of the probe.

pH data were rejected for the following deployment:

09/09/14 – 10/13/14 probe deployed after calibration with unacceptable slope value due to inability to replace probe. Readings likely 0.2 -0.3 lower than actual conditions.

pH data were not flagged for the following deployments, but slope measurements were outside optimal range:

06/17/14 - 07/01/14 post cal values within acceptable range, but slope was low.

07/01/14 - 07/15/14 post cal values within acceptable range, but slope was low.

Turbidity

06/04/14 deployment, turbidity post calibration was unacceptable. Data appear to fit conditions and were not disjunct from adjacent deployments, flagged <1> [SPC] (CSM).

08/13/14 deployment, turbidity post calibrated a little high (0 NTU std = 3 NTU). Data look fine but were flagged as suspect <1> [SPC] (CDF).

09/09/14 deployment contained repeated negative values and post calibrated a little high (0 NTU std = 5 NTU). Negative values >2 NTU were flagged as suspect <1> [SIC] and negative values < 2 NTU were rejected and flagged <-3> [SIC].

10/13/14 deployment continued to have some slightly negative lower values. All data were retained and negative values ≥ 2 NTU were flagged as suspect <1> [CAF].

11/12/14 deployment continued to have some slightly negative lower values and post calibrated a little low (0 NTU std = -3.3 NTU). Data for deployment were flagged as suspect <1> [SIC], likely due to contaminated standard in initial calibration.

Chlorophyll

Chlorophyll spike 04/06/2014 14:30, rejected and flagged <-3> [SCS] (CCU).

Between the 05/14/2014 deployment and 06/04/14 deployment chlorophyll data were disjunct. Data was retained.

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.

Missing records due to sonde swap: 01/16/14 10:15.

Missing records due to battery failure: 03/01/14 – 03/05/14
07/28/14 – 08/12/14
11/29/14 – 12/11/14.

Missing data due to programming error: 12/11/14 – 12/31/14.

Out of water events are described in the depth section.

Depth

Out of water events occurred and resulted in rejected or suspect data on 01/03/14.

An out of water event occurred resulting in rejected data on 03/30/14 13:00 – 14:15 and 3/31/14 1:45 – 2:30.

There were several times that changes in barometric pressure affected the depth sensor. The depth records were flagged as suspect, <1> [SNV] (CAP) when the values were negative but the sensors were still in the water.

10/14/14 deployment, values for SpCond/Salinity were highly variable with values much higher and then lower than normal conditions for this site. Depth data were rejected beginning 10/21/14 through the end of the deployment 11/12/14. QAQC procedures also require that data for dissolved oxygen and depth was also rejected during this time.

SpCond/Salinity

01/16/14 deployment, SpCond/Salinity failed post calibration, and data for the entire deployment were flagged as suspect.

04/02/14 – 05/14/14, SpCond/Salinity failed post calibration, and data for the entire deployment were flagged as suspect. Data from the end of this deployment were disjunct from the next deployment. Biofouling including encrusting algae was noted on probes upon sonde retrieval.

The following deployments were flagged as suspect due to SpCond/Salinity post calibration values that were outside the acceptable range:

06/17/14
07/01/14
08/12/14
09/09/14

10/14/14 deployment, values for SpCond/Salinity were highly variable with values much higher and then lower than normal conditions for this site. SpCond/Salinity data were rejected beginning 10/21/14 through the end of the deployment 11/12/14. QAQC procedures also require that data for dissolved oxygen and depth were also rejected during this time.

Dissolved Oxygen

08/12/14 deployment, low dissolved oxygen values were recorded beginning around 09/01/14 through the end of deployment 09/09/14. The end of this deployment values were disjunct from the next and data from this time flagged as suspect <1> [SDO] (CSM).

10/14/14 deployment, QAQC procedures require that data for dissolved oxygen and depth be rejected due to conductivity sensor failure. Affected data includes 10/21/14 - 11/12/14.

pH

12/10/13 deployment, pH did not pass post calibration with acceptable range. The values were elevated and the data for entire deployment were rejected. For this dataset, affected data includes 01/01/14 through 01/16/14.

04/02/14 – 05/14/14, the pH post-calibration values were unacceptable though data appear to fit conditions and were not disjunct from adjacent deployments. All data were flagged <1> [SPC] (CBF).

06/03/14 – 06/17/14 deployment, pH post calibration values were within acceptable range. Initial calibration slope value was slightly low and at the post the slope was slightly high. pH values are likely to be 0.1 – 0.2 higher than reported. Data from this period were retained but marked suspect.

07/15/14 deployment, pH post calibration values were outside acceptable range for the 10 standard. Data for the entire deployment were flagged as suspect.

09/09/14 deployment, post calibration values were outside acceptable range for both the 7 and 10 standards and slope low. Fouling was noted on the field sheet when sonde was retrieved, including a barnacle growing on the glass bulb.

Turbidity

02/05/14 deployment, turbidity values were negative. There may have been a contaminated standard used during calibration, though post calibration values were within acceptable range. While most values for the deployment were within the range for the sensor, the entire deployment may be slightly lower and data were flagged as suspect <1> [SIC](CSM). Data values lower than -2 were rejected and flagged as <-3> [SNV] (CSM).

03/05/14 deployment, turbidity failed to pass post calibration and some values during the deployment were negative. There may have been a contaminated standard used during calibration. Data for the entire deployment were flagged as suspect, <1> [SPC] (CSM) and values lower than -2 were rejected <-3> [SNV] (CSM).

04/02/14 – 05/14/14 turbidity post calibration was unacceptable though data appear to fit conditions and were not disjunct from adjacent deployments. Data were flagged as suspect <1> [SPC] (CBF) or rejected <-3> [SPC] (CBF).

05/14/14 deployment, flagged as suspect due to post calibration outside the acceptable range and biofouling.

06/03/14 deployment, the post calibration was acceptable though data were disjunct from following deployment. Biofouling may have caused elevated turbidity values and noisy data for 06/14/2014 02:45 through 06/17/2014 10:15. Data from this period were retained and flagged <1> (CBF).

06/17/14 deployment, the post calibration value was outside the acceptable range and data for the entire deployment were flagged as suspect.

07/01/14 deployment, the post calibration value was outside the acceptable range, values seem elevated, and data for the entire deployment were flagged as suspect.

07/15/15 deployment had lots of slightly negative values, flagged as <1> (CAF), and values below -2 were rejected <-3> [SNV] (CSM). Post calibration values were within acceptable range.

08/12/14 and 09/09/14 deployment had lots of negative values and post calibration values were outside acceptable ranges. Data for both deployments were rejected and flagged <-3> [SNV] (CSM).

10/14/14 deployment, data from the beginning of the deployment showed negative values and the post calibration value was outside acceptable range. Data for the entire deployment were rejected due to potential contamination of the standard. Also upon retrieval, the wiper had algae on it which may have elevated the values.

11/12/14 deployment, data had many negative values though most were within the specifications of the sensor. Most negative values were within the acceptable calibration/accuracy of the sensor <1> (CAF), but a few values were rejected if greater than -2 NTU, coded as <-3> [SNV].

Chlorophyll

Chlorophyll sensor was added on 5/14/13.

No chlorophyll data were collected for the 01/16/14 deployment.

Negative chlorophyll values were flagged as <-3> [SNV] (CSM).

Chlorophyll spikes were flagged as suspect <1> [SCS] (CCU), or rejected <-3> [SCS] (CCU).

03/05/14 deployment, elevated chlorophyll a levels were recorded and rejected.

04/02/14 deployment, flagged as suspect due to biofouling <1> [SPC] (CBF).

06/03/14 deployment, data were disjunct from following deployment. Biofouling may have caused elevated chlorophyll values and noisy data for 06/13/2014 05:15 through 06/17/2014 10:15. Data from this period were retained and flagged <1> [SPC] (CBF).

07/15/15 deployment had lots of slightly negative values that were rejected <-3> [SNV] (CSM).

11/12/14 deployment had lots of negative values, these were rejected and coded <-3> [SNV].

Research Creek

General

Missing due to sonde swap: 02/05/14 12:30, 06/17/14 10:45.

Missing data for unknown reason, potentially low battery or dampness in the connection:
11/02/2014 6:30.

Missing data due to battery failure: 12/10/14 – 12/11/14.

Post calibration data were not saved properly following the 08/12/14 deployment. Turbidity data were rejected and pH data were flagged as suspect (see below). Since all other probes calibrated well for the subsequent deployment, we have assumed that post calibration values were within acceptable ranges and data was retained.

SpCond/Salinity

Dips in salinity occurred during low tide. There may have been some stratification and sensors may be measuring a fresh water lens as approaching the surface.

02/05/14 deployment, SpCond/Salinity post calibration value was outside acceptable range. Though data appear to fit conditions for the site, data for entire deployment were flagged as suspect <1> [SPC] (CSM).

05/14/14 deployment, SpCond/Salinity post calibration value was outside acceptable range. Though data appear to fit conditions for the site, data for entire deployment were flagged as suspect <1> [SPC] (CSM).

Dissolved Oxygen

Dissolved oxygen dips occur often at this site and correlate with tidal cycles. These records were retained.

During the 02/05/14 deployment, there were several incidences of the DO dropping to zero during a turbidity spike. The cause is unknown, but values were rejected, <-3> [SSM] (CSM), potential sensor malfunction. Values following these events seem to fit conditions for the site and were retained.

05/19/14 9:15, dissolved oxygen levels dropped to zero. These values were rejected as levels were near 100 % saturation prior and after, cause unknown. This is the same sonde and probes as used in the February deployment and this DO drop also occurred during a turbidity spike.

pH

1/16/14 deployment, pH failed to post calibrate within an acceptable range for standard 10 and slope. Data were flagged as suspect <1> [SPC] (CSM), but seems to fit conditions for the site.

04/09/14 deployment, pH failed to post calibrate in acceptable range for standards 7 and 10 as well as slope. Data were flagged as suspect <1> [SPC] (CSM), but seems to fit conditions for the site.

08/12/14 deployment, post calibration data were not saved properly. The pH probe had to be reconditioned prior to acceptable calibration for the subsequent deployment and biofouling (algae and barnacles) were noted on the field sheet. It is our assumption that this probe may not have passed post calibration and data for the entire deployment were flagged as suspect.

09/09/14 deployment, pH post calibration values were not within an acceptable range for standard 10 and slope. Data were flagged as suspect <1> [SPC] (CSM), but seems to fit conditions for the site.

Turbidity

01/16/14 deployment had some negative values, but only a few below -2. Negative values were automatically flagged as suspect <1> (CAF) and those below -2 were rejected. Post calibration values were within acceptable range.

02/05/14 deployment also had some negative values, automatically flagged as suspect <1> (CAF), and some spikes about 1000 NTU, rejected <-3> [STS] (CCU). Post calibration values were slightly higher than normal reading 7.9. Data during this deployment has been marked <1> [GSM] (CCU).

03/05/14 deployment had some negative values, automatically flagged as <1> (CAF), and any values lower than -2 were rejected. Post calibration values were within acceptable range.

05/07/14 – 05/14/14 had elevated turbidity readings that were flagged as suspect. The probe post calibrated within acceptable range but filamentous algae was found on the pH probe upon retrieval. The elevated turbidity values may have been a result of macroalgae near the optics.

05/15/14 8:15 to 6/3/14 11:15 turbidity readings were affected by fouling and the loss of the wiper. However, we're unsure of when the wiper went missing.

06/03/14 deployment had some negative values, automatically flagged as <1> (CAF).

06/17/14 deployment, turbidity failed to post calibrate within an acceptable range. Data seem to fit conditions for the site but were flagged as suspect for the entire deployment. Turbidity spikes over 1000 NTU were rejected.

8/12/14 deployment, post calibration data were not saved properly. There were many negative values and data for entire deployment was rejected and flagged as possible contaminated standard.

10/14/14 deployment, lots of elevated turbidity values, and those over 1000 NTU were rejected.
[Note for CDMO: end of deployment readings elevated, would you prefer to suspect or reject more of this deployment than just the over 1000 NTU values?](#)

11/12/14 deployment, turbidity failed to pass post calibration within acceptable range and it is possible that the standard was contaminated. Data for the entire deployment were rejected.

12/11/14 deployment, turbidity failed to pass post calibration within acceptable range and it is possible that the standard was contaminated. Data for the entire deployment were 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.

Growth of invasive *Gracilaria vermiculophylla* has been heavy around this site. Increased biomass, sedimentation, and decaying organic material are becoming a chronic problem in this location. Optical probes are increasingly affected.

Data missing due to battery failures:

01/15/2014 1:00 – 01/16/2014 11:45

03/04/2014 17:00 – 21:15

03/05/2014 4:15 – 11:30

03/28/2014 10:15 – 04/02/2014 11:15

07/21/2014 12:45 - 08/13/2014 12:30

12/01/2014 23:30 - 12/02/2014 03:30

12/02/2014 04:15 - 12/02/2014 04:45

12/02/2014 05:15 – 12/11/2014 12:30

Data missing due to programming error: 12/11/2014 – 12/31/2014

Missing data due sonde swap: 07/15/2014 12:00

Out of water events are described in Depth section.

Depth

There were several times that changes in barometric pressure affected the depth sensor. The depth records were flagged as suspect, <1> [SNV] (CAP) when the values were negative but the sensors were still in the water.

Possible out of water event or sampling of fresh water lens occurred on 1/28/14 at 2:00. Data were flagged as suspect for negative depth readings and rejected for SpCond/Salinity.

SpCond/Salinity

Immediately prior and following out of water events, low SpCond/Salinity values were often observed. These values were 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.

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).

01/07/14 9:00 – 10:45 had anomalous depth values that were rejected, cause unknown, flagged as <-3> [SSM] (CCU).

1/24/14 9:45 – 11:00, 22:15 and 22:30 had anomalous depth values that were rejected, cause unknown, flagged as <-3> [SSM] (CCU).

1/28/14 2:00, 14:30-15:00, possible out of water event or sampling of fresh water lens at low tide. Values for SpCond/Salinity were rejected <-3> [SOW] (CLT).

2/04/14 8:15-8:30, possible out of water event or sampling of fresh water lens at low tide. Values for SpCond/Salinity were rejected <-3> [SOW] (CLT).

02/06/14 deployment, SpCond/Salinity did not post calibrate within acceptable range. Values for entire deployment were flagged as suspect. Initial post calibration reading may be result of dried debris in probe port following retrieval. Once the sand in probe was removed the reading was satisfactory. Data fit conditions for the site.

03/05/14 deployment, SpCond/Salinity did not initially post calibrate within acceptable range. Values for entire deployment were flagged as suspect. Initial post calibration reading may be result of dried debris in probe port following retrieval. Once the probe was cleaned, the reading was satisfactory. Data fit conditions for the site.

04/02/2014 deployment, SpCond/Salinity did not pass post calibration. Data flagged as suspect <1> [SPC] (CSM). Data were disjunct between this and subsequent deployment (05/14/14), but seem to fit conditions. Initial post calibration reading may be result of dried debris in probe port following retrieval as mud was covering the probes upon sonde retrieval.

06/04/14 – 06/17/14 SpCond/Salinity post calibration values outside acceptable range. Data for the entire deployment were flagged suspect, though data fit conditions for the site.

Dissolved Oxygen

Especially during summer months, oxygen data can be quite variable. These cycles often correlate with tidal fluctuation and were likely driven by presence of drift algae (*Gracilaria vermiculophylla*).

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, potentially driven by *G. vermiculophylla* presence). Data were retained.

12/09/13 deployment (affects data from 01/01/14 through 01/16/14), failed post calibration and all values were flagged as suspect for deployment.

04/02/14 deployment had many low values for dissolved oxygen and mud on the probes was noted on the field data sheet. The mud fouling had concentrated in the bottom of the guard. Post calibration values were within acceptable range. However, data was marked suspect until 4/29 and rejected until 5/14/14 as it was impacted by the mud fouling.

06/04/14 deployment, post calibration values were outside the acceptable range. Data for entire deployment were flagged suspect.

08/13/14 deployment, initial post calibration values were slightly higher than acceptable range. Dissolved oxygen levels appeared to stabilize and fell into acceptable range after a few minutes. Data for this period were retained and appear to fit conditions for the site.

pH

Several pH values >9.0 were associated with high dissolved oxygen concentrations and presumed to be resulting from high rates of photosynthesis and a large standing crop of macrophytic algae, *G. vermiculophylla*, in the area. The algal biomass is not ephemeral and therefore not considered an “algal bloom”. These data were closely scrutinized and retained after determining the cause.

12/09/13 deployment (affects data from 01/01/14 through 01/16/14), pH post calibration failure and values for the entire deployment were flagged as suspect.

05/14/14 deployment, pH post calibration values were not within acceptable range for standard 7. Data were flagged as suspect <1> [SPC] (CSM) and were disjunct from the following (06/04/14) deployment. pH data seemed 0.1-0.2 lower than expected but this falls within the range of the probes error.

06/04/14 – 06/17/14 pH post calibration failure. Data for entire deployment were flagged as suspect though data fit conditions.

09/09/14 – 10/13/14 deployment post calibration values were low but fell within the acceptable ranges for standards 7 and 10 but outside of acceptable range for slope. Data seem to fit conditions but were disjunct from prior deployment (lower by 0.2 – 0.3). Data for entire deployment were flagged as suspect, <1> [SPC] (CSM).

Turbidity

Periods of elevated turbidity values were crosschecked with weather data to determine if they were driven by weather. Turbidity at Zeke's Basin station is particularly sensitive to high or sustained winds due to winds during periods of low water and is a normal occurrence. All data above 1000 NTU were rejected <-3> [STS] (CSM).

12/09/13 deployment (affects data from 01/01/14 through 01/16/14), turbidity failed post calibration. There were many records mid deployment that were above the sensor range and rejected. The rest of the deployment was flagged as suspect. There were also several times the turbidity values dropped to zero or negative, most likely due to a partial out of water event. These values were rejected.

01/16/2013 deployment, turbidity had lots of negative values. Data for entire deployment were flagged suspect possibly due to contamination of the standard. Values below -2 and turbidity spikes were rejected.

02/06/14 deployment, turbidity post calibration value was outside the acceptable range. Data for entire deployment were flagged suspect though data fit conditions.

04/16/14 deployment, data did not reflect conditions and were rejected beginning on 04/16/14 and flagged as <-3> [SQR] (CSM). Elevated values were likely caused by a combination of sediment, silt, and macroalgae accumulation. This is congruent with the low dissolved oxygen data from this time. Data began to better reflect conditions following this time period through the end of the deployment and were flagged suspect. There were also many negative values throughout the last portion of the deployment that were rejected.

In both the 05/14/14 and 06/04/14 deployments, there were patterns of sustained elevated turbidity values followed by abrupt drops to zero or negative values. The elevated values may indicate the presence of mud within the guard or mud/sand covering the end of the turbidity probe.

06/04/14 deployment, negative values were observed beginning 06/05/14. Those within the sensor specification were retained and flagged as suspect. The values below -2 were rejected.

09/09/14 deployment, post calibration value was not within acceptable range. All data for this deployment were flagged as suspect except the elevated turbidity spikes or negative values that were rejected.

11/12/2014 deployment, post calibration value was not within acceptable range. There were many negative values during the deployment indicative of a sensor malfunction. All data were rejected from this deployment and flagged <-3> [SSM] (CSM) from 11/12/2014 15:15 through the end of the deployment.