Sapelo Island (SAP) NERR Water Quality Metadata
January-December 2010
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I. Data Set and Research Descriptors

1) Principal investigator(s) and contact persons

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2) Entry verification –

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

3) Research objectives –

Hydrological studies (Ragotskie and Bryson, 1955: Imberger et al., 1983) have shown that there are three tidal excursions along the length of the Duplin River, resulting in three distinct water masses. The two monitoring sites in the Duplin River, called the Lower Duplin site and the Hunt Dock site, are located within the lower and upper water masses, respectively. Water passing the Lower Duplin site during flood tide has come from Doboy Sound, which receives input from the Altamaha River via the Intra-Coastal Waterway and from the Atlantic Ocean. The water in the lower water mass is pushed further up the Duplin or up smaller tidal creeks and some is pushed onto the marsh surface by the flood tide and recedes into the main channel during ebb tide. The water in the upper water mass, which passes the Hunt Camp station, is pushed up small creek channels and onto the marsh at each high tide. Thus the two stations monitor conditions in two hydrological separate water masses, one of which is

heavily influenced by exchanges with Doboy Sound and the other, which is influenced by its twice-daily contact with the marsh surface.

Sapelo Island is only accessible by passenger ferry. Due to its isolation, the salt marsh and tidal waters of the SAP NERR show relatively little evidence of human impact. Thus the Marsh Landing dock, where the Lower Duplin site is located, the primary access point for the approximately 200-300 residents, commuters and daily visitors plus barge off loading was chosen as the most directly impacted site. The Lower Duplin site is also readily accessible and centrally located within the SAP NERR. The University of Georgia Marine Institute has used this as a monitoring site for years and SAP NERR continues to do so. The Hunt Dock site was selected in July 1999 for monitoring. It is a dock only used for transporting hunters during the fall season. It is further up the Duplin, where the primary usage of the river is for pleasure boating and crabbing. Therefore it is considered the least impacted site.

Two previously maintained stations in the Duplin River (Flume Dock and Marsh Landing) have been discontinued and moved to Cabretta Creek and Dean Creek; respectively. The addition of these two sites allow for collection of comparative water quality data across both a larger spatial domain and a wider salinity regime than the previous duplicative, near surface stations located at the discontinued sites. These sites are also different from the Duplin River sites as they are representative of poorly studied, small creek and salt marsh systems. The site changes in the Sapelo Island NERR water quality monitoring program allow for comparisons between larger, intensively studied, tidal river regimes (Duplin River) and smaller, lesser known, tidal creek systems of greater marine influence (Cabretta Creek and Dean Creek). These new sites differ from the Duplin River sites in both marine water delivery and dynamics associated with rainfall events. The marsh (watershed) to creek volume ratios within the new sites also differ with the Dean Creek site feeding into Doboy Sound with an extensive associated marsh hence, freshwater runoff. The Dean Creek site therefore displays highly dynamic shifts in salinity in response to rainfall events. By contrast, the Cabretta Creek site with its mouth feeding directly in to Cabretta inlet, located on Sapelo Island's Atlantic Ocean frontage, displays a much lower marsh to creek volume ratio therefore, reduced salinity dynamics associated with rainfall events by comparison to either the Dean Creek site or the Duplin River sites.

The long-term trends and short-term variability within the water quality and hydrodynamics of these differing water quality monitoring sites promote research questions and provide information related to differing temporal salinity dynamics and biological responses

4) Research methods

A Sutron Sat-Link2 transmitter was installed at the Lower Duplin station on March 18, 2007 and transmits data to the NOAA GOES satellite, NESDIS ID # 01 00 51 DE. 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.

Before each YSI 6600 data logger is deployed, calibration and maintenance is performed following the manufacturer's instructions. Calibration standards are only required for pH, conductivity, and turbidity, all other parameters are done as described in the manual. Buffer solutions for 2-point calibration (pH 7 and 10) are purchased from a scientific supply house. The conductivity standard is made using a 0.2 M solution of KCl (24.82mS/cm = 14.92 g/L) or from serial dilution of a certified conductivity standard.

The turbidity calibration uses a YSI produced solution. The dissolved oxygen membranes are replaced before deployment and are allowed to sit at least 24 hours prior to deployment. Calibration is then verified by running a standard as a sample after each calibration.

When deployed, the weather conditions and tidal stage are recorded in the field observation log. The data logger is placed inside a length of PVC pipe attached to the dock. The data logger is attached to a non-floating dock by a monofilament cable and run down a PVC pipe to rest 0.5m above the surface bottom. Because of the large tidal range, water is continually flushed through 2" holes in the PVC pipes at the sonde location, thus eliminating the problem of creating a stagnant column of water with in the pipe with data logger. Every 15 minutes during the sampling period measurements are taken for temperature, specific conductance, salinity, pH, dissolved oxygen concentration, percent saturation, depth and turbidity.

At the end of the sample period the data logger is retrieved and immediately replaced by another calibrated data logger. The data logger is then taken to the lab and runs QA/QC standards for pH, and conductivity, and dissolved oxygen, the data are uploaded, and the sonde is cleaned. Data are rejected if the post calibration standards fail or if technical problems are noted. All data removed is noted in the metadata.

5) Site location and character –

The Lower Duplin (LD) monitoring site (31 deg 25'4.59"N, 81 deg 17'45.77"W) is located on the Marsh Landing Dock in the DuplinRiver on Sapelo Island and consists of a muddy bottom habitat. Water passing the dock during flood tide originates from the Doboy Sound. The Doboy Sound receives input from the Atlantic Ocean, and the Altamaha River via the Intra-Coastal Waterway. The water is pushed up the river or up smaller tidal creeks and some is pushed onto the marsh surface by the flood tide and recedes into the main channel during ebb tide. The Marsh Landing dock is used as the main dock to the island where the ferry makes several daily runs, with several small boats that are docked there. The surrounding area vegetation is dominated by salt marsh with Spartina being the predominate flora. Normal tidal range for the site is 3meters and the salinity range is 5-35 ppt. The depth at this sampling station ranges from 2.5 meters to 6.0 meters depending on tide.

The Hunt Dock monitoring site (31 deg 28' 43", 81 deg 16' 23" W) is located on the Duplin River, off of Moses Hammock, which is separated from Sapelo Island by a small tidal channel. The primary runoff at the site is from tidal creeks flowing through Spartina marsh and through the mud. Bottom habitat at this site includes soft mud and some oyster bed building along the shoreline with an average tidal range of 3meters and a salinity range of 5-35 p pt. There is little human traffic this far up the Duplin and it is north of the people living on Sapelo. During the fall, the Hunt dock and Moses Hammock is the camping and docking site for deer hunters traveling to the island. These are controlled hunts and dates are available from the SAP NERR office if needed. The maximum depth at the Hunt Dock site is 4.27 meters.

Dean Creek (DC), (N 31 23 22.5W 81 16 44.2) is located on a small wooden bridge spanning Dean Creek, in close proximity to the adjacent Nannygoat Beach causeway. Dean Creek is a small tidal basin fed from the waters of Doboy Sound, which is located on Sapelo Island's south end. The creeks' salinity normally ranges between 5 and 30 ppt. The benthic community consists of a sandy-mud substrate with occasional, small, intertidal oyster reef community and mean tidal amplitude of approximately 3meters. The small creek feeds approximately 150 acres of Spartina alterniflora dominated salt marsh, which is interspersed with small 0.5-1 acre hammocks and saltpans. Fringe

community components range from Loblolly pine forests with a sub-canopy of Yaupon holly to Wax myrtle and Sable Palm.

The Cabretta Creek (CA) site coordinates are N 31 26 37.3W 81 14 23.7. The station is located on a small (one-lane), wooden, roadway bridge spanning Cabretta creek located on the island's extreme eastern side, bordering the Atlantic Ocean. The creek is fed directly from waters of the Atlantic Ocean. Cabretta experiences an average tidal range of approximately 3 meters. Salinity ranges with exception to major, long-term precipitation events, varies from 15-36 ppt., seasonally. The benthos is composed primarily of sand substrate with small, intertidal oyster reef conglomerate communities Adjacent to the site
is extensive, intertidal, bank stabilization (armoring) in the form of woven rip-rap fencing and granite rocks. This manipulation is slowly becoming stabilized via oyster reef community colonization. The adjacent marshes are dominated by Spartina alterniflora with occasional Juncus romerianus in the nearby fringe community habitat. The creek has very little adjacent uplands due to: 1) the low elevational gradient and 2) the areas geologically recent accretion genesis (Holocene) resulting in sandy soils; of which neither conditions allow for extensive floral colonization or stabilization.

There are no current studies on pollutants in this area. Sapelo Island is typically considered a pristine environment, with minimal pollutant input.

6) Data collection period – Data collection for Sapelo Began in 1995. The data collection periods for the 2010 is as follows:

Cabretta

Deployment	Retrieval
12/28/2009 10:45	01/06/2010 09:15 *
01/06/2010 09:30	01/21/2010 09:15 *
01/21/2010 09:30	02/01/2010 11:30 *
02/02/2010 09:45	02/16/2010 12:30 *
02/16/2010 12:45	03/05/2010 08:30 *
03/05/2010 08:45	03/17/2010 08:15 *
03/17/2010 08:30	03/31/2010 09:30 *
03/31/2010 09:45	04/03/2010 12:00 *
04/06/2010 11:30	04/12/2010 12:45 *
04/12/2010 13:00	04/30/2010 09:30 *
04/30/2010 09:45	05/11/2010 11:30 *
05/11/2010 11:45	05/27/2010 09:15 *
05/27/2010 09:30	06/09/2010 09:30 *
06/09/2010 09:45	06/23/2010 11:30 **
06/23/2010 11:45	07/07/2010 10:30 *
07/07/2010 10:45	07/23/2010 09:00 **
07/23/2010 09:15	08/06/2010 10:15 *
08/06/2010 10:30	08/18/2010 09:15 **
08/18/2010 09:45	08/30/2010 14:15 *
08/30/2010 14:30	09/16/2010 09:30 *
09/16/2010 09:45	09/30/2010 09:30 **
09/30/2010 09:45	10/13/2010 09:15 *

10/13/2010 09:30	10/27/2010 10:30 *
10/27/2010 10:45	11/10/2010 14:00 *
11/10/2010 14:30	11/23/2010 12:45 *
11/23/2010 13:15	12/09/2010 13:00 *
12/09/2010 13:15	12/20/2010 13:00 *
12/20/2010 13:15	01/05/2011 15:00 *

Dean Creek

Deployment	Retrieval
12/28/2009 10:00	01/04/2010 14:00 *
01/04/2010 14:15	01/19/2010 10:45 *
01/19/2010 11:00	02/02/2010 12:00 *
02/02/2010 12:15	02/16/2010 10:15 *
02/16/2010 10:30	03/02/2010 08:30 *
03/02/2010 08:45	03/19/2010 07:30 *
03/19/2010 07:45	03/30/2010 13:15 *
03/30/2010 13:30	04/13/2010 09:00 *
04/13/2010 09:15	04/29/2010 10:15 *
04/29/2010 10:30	05/11/2010 09:15 *
05/11/2010 09:30	05/25/2010 09:15 *
05/25/2010 09:30	06/08/2010 13:15 **
06/08/2010 13:30	06/22/2010 13:00 *
06/22/2010 13:15	07/06/2010 13:15 *
07/06/2010 13:30	07/20/2010 12:30 *
07/20/2010 12:45	08/02/2010 13:00 *
08/02/2010 13:15	08/18/2010 10:45 *
08/18/2010 11:00	08/30/2010 12:00 *
08/30/2010 12:15	09/15/2010 09:15 *
09/15/2010 09:30	09/30/2010 23:45 **
10/01/2010 00:00	10/12/2010 12:00
10/12/2010 12:15	10/27/2010 09:00 **
10/27/2010 09:15	11/10/2010 11:30 **
11/10/2010 11:45	11/23/2010 9:45 *
12/07/2010 12:45	12/20/2010 11:45 *
12/20/2010 12:00	01/05/2011 11:30 **

Hunt Dock

Deployment	Retrieval
12/28/2009 11:00	01/06/2010 09:30 *
01/06/2010 10:15	01/21/2010 09:15 *
01/21/2010 09:30	02/03/2010 09:30 *
02/03/2010 09:45	02/17/2010 11:45 *
02/17/2010 12:00	03/05/2010 08:30 *
03/05/2010 08:45	03/17/2010 08:00 *
03/17/2010 08:15	03/31/2010 07:00 *

03/31/2010 07:15	04/12/2010 12:15 *
04/12/2010 12:30	04/30/2010 09:15 *
04/30/2010 09:30	05/11/2010 12:00 *
05/11/2010 12:15	05/27/2010 13:00 *
05/27/2010 13:15	06/09/2010 09:15 *
06/09/2010 09:30	06/23/2010 11:15 **
06/23/2010 13:15	07/07/2010 10:45 **
07/07/2010 11:00	07/26/2010 10:15 *
07/26/2010 10:30	08/03/2010 09:00 **
08/03/2010 09:15	08/18/2010 09:15 *
08/18/2010 09:30	09/01/2010 09:15 **
09/01/2010 09:30	09/16/2010 09:15 *
09/16/2010 09:30	09/30/2010 09:15 *
09/30/2010 09:45	10/13/2010 10:15 *
10/13/2010 11:00	10/28/2010 09:30 **
10/28/2010 10:00	11/10/2010 14:30 **
11/10/2010 14:45	11/23/2010 12:45 **
11/23/2010 13:00	12/09/2010 13:15 **
12/09/2010 13:30	12/20/2010 12:30 **
12/20/2010 14:45	01/05/2011 13:15 *

Lower Duplin

Deplyoment	Retrieval
12/28/2009 11:15	01/04/2010 13:00
01/04/2010 13:30	01/19/2010 13:00
01/19/2010 13:15	01/29/2010 02:45
02/03/2010 09:15	02/17/2010 14:00
02/17/2010 14:15	03/02/2010 10:30
03/02/2010 11:00	03/19/2010 07:15
03/19/2010 07:30	03/30/2010 13:15
03/30/2010 13:30	04/09/2010 23:30
04/12/2010 16:15	04/29/2010 10:00
04/29/2010 10:15	05/13/2010 09:30
05/13/2010 10:00	05/24/2010 13:15
05/24/2010 13:30	06/08/2010 13:00
06/08/2010 13:15	06/23/2010 14:45
06/23/2010 15:00	07/06/2010 12:15
07/06/2010 12:30	07/20/2010 12:15
07/20/2010 12:30	08/06/2010 09:15
08/06/2010 09:30	08/17/2010 08:45
08/17/2010 09:00	09/01/2010 09:30
09/01/2010 09:45	09/15/2010 09:00
09/15/2010 09:15	09/30/2010 12:15
09/30/2010 12:45	10/12/2010 13:45
10/12/2010 14:00	10/28/2010 12:30
10/28/2010 12:45	11/10/2010 13:15

11/10/2010 13:30	11/23/2010 09:15
11/23/2010 09:30	12/07/2010 12:15
12/07/2010 12:30	12/20/2010 10:30
12/20/2010 10:45	01/04/2011 12:00

Both Rapid Pulse and ROX DO probes were used in 2010 (Only ROX probes were used at LD during 2010). When Rapid Pulse probes were used deployments are noted with a '*', when ROX DO probes were used deployments are noted with '**'.

7) Distribution

NOAA/ERD retains the right to analyze, synthesize and publish summaries of the NERRS System-wide Monitoring Program data. The PI retains the right to be fully credited for having collected and processed the data. Following academic courtesy standards, the PI and NERR site where the data were collected will be contacted and fully acknowledged in any subsequent publications in which any part of the data are used. Manuscripts resulting from this NOAA/OCRM supported research that are produced for publication in open literature, including refereed scientific journals, will acknowledge that the research was conducted under an award from the Estuarine Reserves Division, Office of Ocean and Coastal Resource Management, National Ocean Service, National Oceanic and Atmospheric Administration. The data set enclosed within this package/transmission is only as good as the quality assurance and quality control procedures outlined by the enclosed metadata reporting statement. The user bears all responsibility for its subsequent use/misuse in any further analyses or comparisons. The Federal government does not assume liability to the Recipient 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.

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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 text tab-delimited format.

8) Associated researchers and projects

The SWMP program in place on Sapelo also includes meteorological and nutrient datasets collected along with this water quality data. Furthermore Sapelo Island has a long history of maintaining research. In 1953, the University of Georgia Marine Institute (UGAMI) was formed and the island became a working laboratory for many. The research continues today with SAP NERR and UGAMI creating a unique partnership with much of the current research being done facilitated by SAP NERR and UGAMI together. Given UGAMI's long history on Sapelo, a bibliographic list of over 800 articles of current and previous research can be found on the UGAMI website: http://www.uga.edu/ugami and on the Sapelo Island NERR site: http://www.sapelonerr.org.

As part of the SWMP long-term monitoring program, SAP NERR also monitors Meteorological and Nutrient data which may be correlated with this Water Quality dataset. These data are available from the Research Coordinator or online at http://cdmo.baruch.sc.edu/.

II. Physical Structure Descriptors

9) Sensor specifications

SAP NERR deployed only 6600EDS data sondes in 2010. Rapid-pulse and ROX DO sensors were deployed at sites DC, HD, and CA. ROX DO sensors were deployed exclusively at LD for all of 2010.

YSI 6600EDS data sonde:

Parameter: Temperature
Units: Celsius (C)
Sensor Type: Thermistor
Model#: 6560
Range: -5 to 50 C
Accuracy: +/- 0.15
Resolution: 0.01 C

Parameter: Conductivity
Units: milli-Siemens per cm (mS/cm)
Sensor Type: 4-electrode cell with autoranging
Model#: 6560
Range: 0 to 100 mS/cm
Accuracy: +/- 0.5% of reading + 0.001 mS/cm
Resolution: 0.001 mS/cm to 0.1 mS/cm (range dependant)

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

Parameter: Dissolved Oxygen % saturation
Units: percent air saturation (%)
Sensor Type: Rapid Pulse - Clark type, polargraphic
Model#: 6562
Range: 0 to 500% air saturation
Accuracy: 0-200% air saturation: +/- 2% of the reading or 2% air saturation, whichever is greater; 200 to 500% air saturation: +/- 6% of the reading
Resolution: 0.1% air saturation

or

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% or reading
Resolution: 0.1% air saturation

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

or

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

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

Dissolved Oxygen Qualifier:
The reliability of the dissolved oxygen (DO) data after 96 hours post-deployment for non-EDS (Extended Deployment System) data sondes may be problematic due to fouling which forms on the DO probe membrane during some deployments (Wenner et al. 2001). 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.

10) Coded variable definitions – List the sampling station, sampling site code, and station code used in the data.

Sampling station:	Sampling site code:	Station code:
Cabretta Creek	CA	sapcawq
Dean Creek	DC	sapdcwq
Hunt Dock	HD	saphdwq

Lower Duplin	LD	sapldwq

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

Cabretta Creek

Deployment Date	SpCond	RP DO 1	RP DO 2	ROX DO 1	ROX DO 2	pH	pH	Turb	Turb	Depth
m/d/y	(24.82)	(100% sat)	(100% sat)	(100% sat)	(100% sat)	(7)	(10)	(0)	(123)	m
1216.9	25.11	71.8				7	9.94	-4.8	132	0.208
10610	24.48	160.5				7.06	10.14	5.2	117.2	-0.119
11910	24.86	92.3				7.03	9.94	-4.7	122.2	0.216
20110	24.5	150				7.21	10.04	-3.5	121.3	0
21610	19.63	79.8				7.02	10	-9	112	0.209
30210	25.23	116.6				6.94	10.6	-1.2	123.7	0.436
31509	24.86	98.3				7.06	10.11	0.02	120.2	0.012
33010	25.13	100.9		100.9		7.08	9.96	-0.4	117.6	0.367
41210	24.85	96.3				7.32	9.99	1.7	119.8	-0.065
42910	25.06	99.2				6.95	10	1.7	147.9	0.29
51010	22.21	n/a				6.98	9.98	-4.1	101.4	-0.02
52510	24.9	101.7				7.02	10.18	1	118	0.028
60810	25.08			100.6		6.22	10.31	-0.2	115.9	0.144
62310	24.69	102.8				6.86	9.92	0.2	116.5	-0.158
70610	24.69			100		7.29	9.88	7.2	91.6	0.052
72110	24.48			98.6		7.26	10.15	-3.7	140.6	-0.013
80310	24.1	83.1				7.12	10.15	-8.9	159.9	-0.037
81710	25.39	89.5				7.03	10.15	-2.9	90.3	0.222
83010	24.92	70.3				6.95	9.92	52	121.3	0.012
91510	24.65			99.2		7.08	10.01	1.6	124.6	-0.137
92810	24.8	95.5				7.06	9.58	n/a		0.174
101310	24.44	96.9				6.93	9.87	0.4	125.5	-0.028
102510	24.72	90.1				7.14	10.03	52.8	122.8	0.044
111010	24.62	109.7				6.94	9.94	1.1	121.5	0.003
112310	25.03	91.6				7.36	10.35	-0.1	106.3	0.097
120910	24.77			78.3		7.03	10.25	2.6	127.3	0.078
122010	24.78	103.2				7.1	9.87	-1.3	117.7	0.02

Dean Creek

Deployment Date	SpCond	RP DO 1	RP DO 2	ROX DO 1	ROX DO 2	pH	pH	Turb	Turb	Depth
m/d/y	(24.82)	(100% sat)	(100% sat)	(100% sat)	(100% sat)	(7)	(10)	(0)	(123)	m
122809	24.65	1.1.3				6.58	9.98	3.3	123.9	0.051
10410	24.53			101		6.74	9.99	3.9	124	0.061
11910	25.11	101.2				6.99	9.61	-3.1	-123	0.064
20210	24.07	97.4				7.12	10.04	5.7	122.4	0.106
21610	24.33	81				7.12	9095	-2.1	119.3	-0.522
30110	24.47	103.5				7.08	10.09	-3.1	126.1	0.015
31710	24.98	1.102				6.98	10.2	6.98	122.9	0.121
33010	24.4	117.4				7.14	9.96	-4.6	118.9	0.377
41210	25.56	107.5				6.91	10.07	1.4	106.5	-0.058
42710	23.91	86.4				7.16	9.78	-7	123.9	0.052
51010	24.36	126.7				7.13	10.17	-8	122.4	-0.138
52410	25.33			100.8		7.25	9.98	-0.7	117.4	0.163
60810	24.48	75.9				7.29	10.12	3.9	119.5	0.129
62210	24.3	69.5				7.28	910.05	6.2	120.4	0.046

70610	23.55	49.3			7.13	10.03	n/a	n/a	0.056
72010	25.23	94.8			7.11	10.12	0.3	120	-0.093
80210	21.35	79.7			7.06	9.89	3.6	120.9	0.041
81810	24.83	104.5			7.17	10.17	2.1	135.5	0.092
83010	23.27	75.2			7.05	10	4.7	126.9	0.057
91410	24.11		99.5		7.95	10.85	-1.7	122.8	0.004
93010	22.86	98.4			6.97	9.93	1.1	120.1	0.007
101110	25.88		99.1		7.36	10.27	0.3	127.3	-0.034
102510	24.47	101.5			7.35	10.17	1.6	125.2	0.058
111010	27.99	58.2			7.11	10.06	-0.8	125.4	0.003
112210									
120710	24.64	107.3			7.46	9.92	2.1	135.5	0.12
122010	25.3		100.2		6.92	9.9	-2.6	112.8	0.015

Hunt Dock

Deployment Date	SpCond	RP DO 1	RP DO 2	ROX DO 1	ROX DO 2	pH	pH	Turb	Turb	Depth
m/d/y	(12.82)	(100% sat)	(100% sat)	(100% sat)	(100% sat)	(7)	(10)	(0)	(123)	m
122809	25.05	96.4				7	10.05	-0.1	124.7	0.46
10610	23.97	n/a				7.1	10.25	4	121	0.028
11910	23.83	102.2				7.12	9.5	-202	119.9	0.256
20310	23.98	90.5				7.1	10.2	0.4	102.6	-0.154
21710	24.69	108.5				7.2	10.8	0.5	116.5	0.097
30210	25.05			96.4		7	10.05	-0.1	124.7	0.46
31510	24.25	98.5				6.89	10.11	-1.2	118.9	-0.025
33010	24.76	92.9				7.01	9.91	2.8	115.7	0.38
41210	24.66	113.3				6.94	9.9	3	120.2	-0.231
42910	23.91			105.8		7.43	9.99	2.5	111	0.294
51110	25.16	93.4				6.92	9.46	0.7	125.6	-0.428
52710	24.8	97.5				7.02	10.03	1.7	119.6	0.086
60810	25.83			100.2		6.9	9.9	0.3	118.4	0.072
62310	24.52			98.7		6.86	9.18	3.5	99	0.008
70710	24.52	34.6				7.13	9.99	0.8	140.9	0.016
72310	23.85			99.3		6.84	10.37	4.2	120.6	0.04
80210	24.67	91.2				6.92	9.77	3.8	123.2	0.076
81710	21.19			99.6		7.19	9.95	15.8	115.5	0.033
83010	23.52	108.8				7.07	9.85	n/a		-0.041
91510	26.21	97.8				7.2	10.15	-1.2	124.1	-0.137
92810	24.45	89.9				7.12	10.09	5,9	114.7	0.087
101310	24.54			100.3		6.99	10.35	-0.4	122.3	0.039
102710	23.17			101.5		7.3	9.95	2.4	116.7	0.035
111010	23.56			99.3		7.04	9.95	0.9	119.9	0.076
112310	24.35			93.2		7.25		n/a		0.133
120910	24.02			101		6.93	10.13	1.9	127.6	0.081
122010	24.71	93.3				7.17	9.95	-1.6	118.8	-0.001

Lower Duplin

Deployment	SpCond	RP DO 1	RP DO 2	ROX DO	ROX DO	pH	pH	Turb	Turb	Depth

Date				1	2					
m/d/y	(24.82)	(100% sat)	(100% sat)	(100% sat)	(100% sat)	(7)	(10)	(0)	(123)	m
122809	24.72			97		7.01	10.16	3.6	118.6	0.002
10410	24.4			102.9		7.21	10.06	3.8	130.2	0.021
11910	23.37			100.8		7.16	9.95	-1.8	118.3	0.257
20310	23.74			97.9		6.99	10.55	-1.2	127.3	-0.201
21710	28.47			99.9		7.32	9.9	0.4	114.2	-0.498
30110	24.72			97		7.01	10.16	3.6	118.9	0.002
31710	24.89			98.9		7.12	10.05	-0.1	122.2	0.101
33010	24.9			101.7		7.02	9.79	558	365	0.374
41210	24.52			93.3		6.93	10.07	25	113.6	-0.062
42710	24.04			100.9		7.49	9.44	1969	-999	0.685
51110	25.3			100.7		6.43	9.4	-1.8	126.2	-0.216
52410	24.27			99.7		7.17	11.37	-0.7	121	0.156
60810	23.09			104.5		7.33	10.01	1.4	116.5	0.07
62310	24.85			100.4		7.15	10.13	2.5	117.5	0.102
70610	23.54			100.1		7.09	9.86	-3.2	137.5	0.066
72071	24.6			98.9		6.87	9.85	2.7	128.3	-0.064
80310	24.41			98.6		6.99	10.04	7.3	132.3	0.024
81610	24.62		.	102.1		7.11	10.25	0.7	114.2	0.023
83010	25.16			100.1		7.2	10.21	0.4	130.1	0.062
91410	21.6			98.4		7.05	9.93	-0.8	127.8	0.003
93010	24.59			99.6		7.17	10.06	125.7	1.5	0.007
101110	25.11			103.4		7.04	10.19	-0.2	124.1	-0.036
102810	25.11			99.9		7.08	9.95	1.6	123.7	0.045
111010	24.11			104.1		6.91	7.89	934	936	0.006
112210	24.87			101.3		7.14	10.07	0.3	123.8	0.093
120710	24.55			100.7		7.31	9.91	3.3	131.9	0.079
122010	24.51			90.8		7.15	10.06	-1.9	120.1	0.042

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.

Cabretta Creek data from 4/3 @12:15 to 4/6 @11:15 tagged with the CSM (see metadata) flag were not collected because the deployment system was damaged by floating debris and was being replaced.

Cabretta Creek from 8/6/2010 10:30 to 13:45 SpCond and salinity data appear to have been affected by a slug of water most in the tube between deployments. In 2010 the tubes were not yet deployed with holes to encourage water movement through the tube. This at times affected data as seen during this time.

Cabretta Creek from 11/10 14:30 to 21:00 appears to have gotten stuck in the tube at the deployment. The sonde may have gotten hung up on fouling in the tube from soft fouling often seen at the site.

Dean Creek from 3/19 7:45 to 8:45 appears to have gotten stuck in the tube at the beginning of the deployment. It falls to the correct depth after one hour.

Hunt Dock station at the following dates/times appears to have gotten hung up in the tube potentially on fouling in the station tube.

3/5 8:45 to 9:15
3/31 7:15 to 9:15
6/9 9:30 to 13:30
11/10 14:45 to 22:00
12/9 13:30 to 21:30

Lower Duplin from 11/10 13:30 to 11/11 10:00 appears to have gotten stuck in the tube at the beginning of the deployment. After 11/11 10:00 the sonde goes down to the correct depth and matches up well at the next deployment. The sonde may have potentially gotten stuck on fouling in the tube.