~~Reserve Name (include 3 letter code here)~~Sapelo Island (SAP) **NERR Water Quality Metadata**
~~Months and year the documentation covers~~January – December 2023
Latest Update: ~~Date that the last edits were made~~04/01/2024

Note: This is a provisional metadata document; it has not been authenticated as of its download date. Contents of this document are subject to change throughout the QAQC process and it should not be considered a final record of data documentation until that process is complete. Contact the CDMO (cdmosupport@baruch.sc.edu) or reserve with any additional questions.

I. Data Set and Research Descriptors

1) Principal investigator(s) and contact persons –

~~[Instructions/Remove: List the staff members responsible for the design, implementation and continuation of the data set. Include name, title, mailing address, phone number, and email address for the Research Coordinator, SWMP technicians, and person(s) responsible for data management.]~~

Ivanna Knox, SWMP Manager (held position from 08/2022 - 05/31/2023)
E-mail: ivanna.knox@dnr.ga.gov
Phone: 828-448-0057

Dylan Bedortha, SWMP Manager (holds position from 06/01/2023 – present)
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Rachel Guy, Research Coordinator
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Phone: 912-485-2251

Address:
Georgia Department of Natural Resources
1 Long Tabby Lane
Sapelo Island, GA 31327
912-485-2251

2) Entry verification –

[Instructions/Remove: This section explains how the data were verified (QAQC'd) before being sent to the CDMO to be archived into the permanent database. Specifically, list how your data are acquired, validated, processed, and archived. Mention how your reserve deals with overlapping data, outliers, etc. Use the following statement or modify to fit your reserve. Remember to list the person(s) responsible for data management.]

Deployment data are uploaded from the YSI data logger to a personal computer with Windows 7 or newer operating system. Files are exported from EcoWatch in a comma-delimited format (.CDF), EcoWatch Lite in a comma separated file (CSV) or KOR Software in a comma separated file (CSV) and uploaded to the CDMO where they undergo automated primary QAQC; automated Depth/Level corrections for changes in barometric pressure (cDepth or cLevel parameters); and become part of the CDMO's online provisional database. All pre- and post-deployment data are removed from the file prior to upload. During primary QAQC, data are flagged if they are missing or out of sensor range. The edited file is then returned to the reserve for secondary QAQC where it is opened in Microsoft Excel and processed using the CDMO's NERRQAQC Excel macro. Data management and analysis for the majority of 2023 was done by Dylan Bedortha. This includes downloading data from the sondes after each deployment, removing pre- and post- deployment data, uploading raw file to the CDMO, and running secondary QAQC using the NERRQAQC Macro on the data once it is returned by the CDMO. After secondary QAQC is completed, the data is appended into quarterly sets and re-uploaded to the CDMO. These quarterly sets are then compiled into a yearly set and also re-uploaded to the CDMO. Some of this work was done by Ivanna Knox between 1/1/23 and 6/1/23. The majority of management

and analysis done by Ivanna Knox was reviewed by Dylan Bedortha before submission. 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.

3) Research objectives –

[Instructions/Remove: Describe briefly the nature of the monitoring program resulting in this data set (for example, control versus impacted site, long term monitoring, spatial or temporal coverage, etc.). Describe the goal or purpose of this research.]

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 Dock 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.

4) Research methods –

[Instructions/Remove: Detail the specifics of all YSI deployments, calibrations, and types of standards used in calibrations, the QAQC of the instruments (with roving data loggers, in-situ samples, etc.) and data collection intervals (include time zone for Local Standard Time, ie: Eastern Standard Time). If you are reporting chlorophyll fluorescence data, include a statement detailing your methodology and initial QA/QC of this parameter, including verification of accuracy. If you are reporting Level data, include the detailed information in the table below for the site(s) that reports Level. Include the following or similar excerpt (modify for additional real-time sites) regarding real-time data:]

Site name	
Site infrastructure description	*(address stability)*
Surveying equipment	*(model, specs, etc.)*
Survey monument used	
Survey occupation date	
Survey occupation duration	
Ellipsoid height	
"Quick Check" marker for deployment tube	*(provide details for this check, should be done at the beginning of each deployment)*

"Quick Check" for sonde being deployed at the same location	*(provide details for this check, should be done at the beginning of each deployment)*
Annual resurveying	*(include dates of surveys and verifications)*

Sapelo Island does not report Level data at this time.

Before each YSI EXO2 data sonde is deployed, calibration and maintenance are performed following the manufacturer's instructions and NERRS SWMP standard operating procedures. KOR software is used for the pre-deployment calibration. Calibration standards are only required for pH, conductivity, and turbidity, all other parameters are calibrated as described in the manual. The conductivity, pH, and turbidity calibrations use a YSI produced traceable solution.

When deployed, environmental data are recorded from the site and added to the deployment log. These data include water temperature, specific conductivity, salinity, dissolved oxygen percentage, and dissolved oxygen concentration. This data is recorded using a handheld YSI EXO1. The data sonde is placed inside a length of PVC pipe attached to the dock or other fixed structure. All sites in SAP are fixed. The data sonde is attached to a steel 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 1" holes in the PVC pipes at the sonde location, thus eliminating the problem of creating a stagnant column of water within the pipe. Every 15 minutes during the sampling period measurements are taken for temperature, specific conductivity, salinity, pH, dissolved oxygen concentration, percent saturation, depth and turbidity. At the end of the sample period the data sonde is retrieved and immediately replaced by another calibrated data sonde. The data sonde is then taken back to the lab and connected to KOR software and post-deployment readings are taken for each sensor. Data are rejected if the post-deployment readings are out of range or if technical problems are noted. All data rejected due to these issues are noted in the metadata. The data from the deployment is downloaded into KOR, exported as a .csv document, and uploaded to the CDMO website for initial QAQC. After post-deployment readings are taken and data is downloaded from sonde, the sensors are removed form the sonde and the sonde and sensors are cleaned of any biofouling or accumulated sediment. Data sondes are usually deployed for 2-3 weeks at time.

A YSI WaterLog Storm 3 *(or insert Sutron Sat-Link2)* transmitter was installed at the (~~*insert station name*~~)Lower Duplin station ~~on *mm/dd/yy*~~ in November 2021 and transmits data to the NOAA GOES satellite, NESDIS ID #~~XXXXXXXX~~010051DE. (Where XXXXXXXX is the GOES ID for that particular station.) The NESDIS ID is 3B0376E4. 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 www.nerrsdata.org.

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5) Site location and character –

[Instructions/Remove: Describe your NERR site in general and the sampling sites associated with each YSI data logger. Include the following table, one for *each site,* to describe the sampling locations.]

Site name	Lower Duplin
Latitude and longitude	31°25'04.3"N 81°17'45.4"W ~~*Decimal degrees* **or** *degrees, minutes, seconds format*~~
Tidal range *(meters)*	3 meters
Salinity range *(psu)*	15 – 35 psu

Type and amount of freshwater input	The Altamaha River drains into Doboy Sound which is the water body that influences the tidal fluctuation of the Duplin River. This site is close to the mouth of the Duplin River where it empties into Doboy Sound. Rainwater runoff also influences freshwater input.
Water depth (*meters, MLW*)	*Estimated at 3 meters. ~~(**Mean low water** depth at site, NOT depth of sonde deployment. Indicate if this is an estimate or if the site has been surveyed.)~~*
Sonde distance from bottom (*meters*)	*0.5 meters ~~Fixed distance sonde is deployed above the bottom~~*
Bottom habitat or type	*Soft, muddy bottom. Site is located on part of the dock used by the ferry which makes multiple scheduled trips on/off the island daily.~~Soft sediment, grassbed, oyster bar, etc~~*
Pollutants in area	none
Description of watershed	*~~(in reference to station)~~* This site is located on the Marsh Landing Dock in the Duplin River 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 freshwater 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. Primary freshwater input consists of rainwater runoff. The Marsh Landing dock is used as the main dock to the island where the ferry makes several daily runs. Small boats also dock here occasionally. The surrounding area vegetation is dominated by salt marsh with Spartina being the predominant flora.

Site name	Hunt Dock
Latitude and longitude	31°28'43.3"N 81°16'23.2"W
Tidal range *(meters)*	3 meters
Salinity range *(psu)*	10 – 30 psu
Type and amount of freshwater input	The Altamaha River drains into Doboy Sound which is the water body that influences the tidal fluctuation of the Duplin River. This site is approximately 5 miles up river from the mouth of the Duplin River where it empties into Doboy Sound, so input from the Altamaha is very minimal. Rainwater runoff is the primary input at this site.
Water depth (*meters, MLW*)	*Estimated at 2 meters.*
Sonde distance from bottom (*meters*)	*0.5 meters*
Bottom habitat or type	*Soft, muddy bottom with some oyster reefs towards the shore.*
Pollutants in area	none
Description of watershed	This site 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

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	tidal range of 3 meters and a salinity range of 5-35 ppt with normal levels falling between 20-30 ppt. Primary freshwater input consists of rainwater runoff.

Site name	Dean Creek
Latitude and longitude	31°23'41.2"N 81°16'11.5"W
Tidal range *(meters)*	2.5 meters
Salinity range *(psu)*	15 – 32 psu
Type and amount of freshwater input	Dean Creek is a small tidal basin fed from the waters of Doboy Sound, which is located on Sapelo Island's south end. Primary freshwater input is from rainfall.
Water depth (*meters, MLW*)	*Estimated at 0.35 meters*
Sonde distance from bottom (*meters*)	*0.5 meters*
Bottom habitat or type	*Soft, muddy bottom with interspersed oyster reefs along banks*
Pollutants in area	none
Description of watershed	The site is located on a small metal 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 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. Salinity at this site is especially influenced by rainfall due to its shallow depth.

Site name	Cabretta Creek
Latitude and longitude	31°26'19.2"N 81°14'19.5"W
Tidal range *(meters)*	3 meters
Salinity range *(psu)*	20 – 35 psu
Type and amount of freshwater input	The primary freshwater input at this site is rainwater. This site receives tidal influence from the Atlantic Ocean.
Water depth (*meters, MLW*)	*Estimated at 2.5 meters*
Sonde distance from bottom (*meters*)	*0.5 meters*
Bottom habitat or type	*Soft, muddy bottom with oyster reefs on banks.*
Pollutants in area	none

Description of watershed	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. 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 area's geologically recent accretion genesis (Holocene) resulting in sandy soils; of which neither conditions allow for extensive floral colonization or stabilization.

SWMP station timeline [Instructions/Remove: Include all stations currently in-use and any decommissioned sites in the table below. Include the site code (2 letter code), SWMP status P (primary) or S (secondary), the station name, location (latitude/longitude), active dates (note if current). For decommissioned sites include information on why the station was decommissioned and relevant notes.]

Station code	SWMP status	Station name	Location	Active dates	Reason decommissioned	Notes
CA	P	Cabretta	31°26'19.2" N 81°14'19.5" W	4/2004 - present	NA	NA
DC	P	Dean Creek	31°23'41.2" N 81°16'11.5" W	5/2004 - present	NA	NA
HD	P	Hunt Dock	31°28'43.3" N 81°16'23.2" W	7/1999 - present	NA	NA
LD	P	Lower Duplin	31°25'04.3" N 81°17'45.4" W	1/1999 - present	NA	NA
ML	S	Marsh Landing	31° 25' 04.23" N, 81° 17'46.30" W	5/1995 – 12/1998	Site character	Near surface deployment and the fouling with such a setup was too severe to harvest reliable data
FL	S	Flume Dock	31° 28'53.85" N, 81° 16'12.37" W	1/1995 – 12/1998	NA	NA

6) Data collection period –

[Instructions/Remove: Include each YSI deployment and retrieval date and time (**first** and **last** readings included in the dataset, where sonde was in the deployment tube at the correct depth) for each monitoring site for the year. Do not include times of pre- and post-deployment or datasondes' transport. If necessary, denote deployments that used a different sonde/sensor configuration than others (ex: if ROX and rapid-pulse probes were used, or if an EXO sonde was rotated in). If using the summary table option in the online deployment interface, you may copy and paste the exported tables here and edit them as necessary (please verify contents to ensure that no pre- or post-deployment data are included in the deployment intervals). **Also note when data collection began initially for your reserve or sample sites.**]

Example:

Deployment Date/Time	Retrieval Date/Time
1/02/2022 10:00	1/16/2022 11:00

Cabretta

Deploy Date	Deploy Time	Retrieve Date	Retrieve Time
12/07/2022	15:30	1/13/2023	13:00
01/13/2023	13:15	02/21/2023	11:15
02/21/2023	11:30	04/06/2023	13:00
04/06/2023	14:30	05/10/2023	11:00
05/10/2023	11:15	06/01/2023	10:15
06/01/2023	10:30	06/22/2023	10:30
06/22/2023	10:45	07/11/2023	12:30
07/11/2023	12:45	08/03/2023	11:15
08/03/2023	11:30	08/24/2023	11:15
08/24/2023	11:30	09/15/2023	11:00
9/15/2023	11:15	10/4/2023	11:00
10/4/2023	11:15	10/24/2023	10:30
10/24/2023	10:45	11/14/2023	10:45
11/14/2023	11:00	11/28/2023	11:30

Dean Creek

Deploy Date	Deploy Time	Retrieve Date	Retrieve Time
12/01/2022	15:00	1/04/2023	11:00
01/04/2023	11:15	2/7/23	14:30
02/07/2023	14:45	3/21/23	13:30
03/21/2023	13:30	05/01/2023	12:30
05/01/2023	12:45	05/30/2023	10:30
05/30/2023	10:45	06/16/2023	09:45
06/16/2023	10:00	07/07/2023	10:30
07/07/2023	10:45	07/31/2023	10:45
07/31/2023	11:00	08/21/2023	10:30
08/21/2023	10:45	09/07/2023	11:00
09/07/2023	11:15	09/29/2023	12:00
9/29/2023	12:15	10/10/2023	10:30
10/10/2023	10:45	10/23/2023	12:15
10/23/2023	12:30	11/6/2023	11:00
11/6/2023	11:15	11/22/2023	10:00
11/22/2023	10:15	12/8/2023	10:15
12/8/2023	10:30	12/18/2023	13:15
12/18/2023	13:30	1/4/2024	10:15

Hunt Dock

Deploy Date	Deploy Time	Retrieve Date	Retrieve Time
12/14/2022	11:45	1/24/2022	11:45

01/24/2023	12:00	3/9/23	10:45
03/09/2023	11:00	04/11/2023	10:45
04/11/2023	11:00	05/08/2023	09:30
05/08/2023	09:45	05/24/2023	10:30
05/24/2023	10:45	06/20/2023	09:30
06/20/2023	09:45	07/06/2023	10:15
07/06/2023	10:30	07/24/2023	12:30
07/24/2023	12:45	08/07/2023	13:00
08/07/2023	13:15	08/23/2023	12:30
08/23/2023	12:45	09/05/2023	13:00
09/05/2023	13:15	09/22/2023	12:15
9/22/2023	12:30	10/5/2023	13:00
10/5/2023	13:15	10/20/2023	11:45
10/20/2023	12:00	11/2/2023	11:00
11/2/2023	11:15	11/20/2023	12:30
11/20/2023	12:45	11/30/2023	10:30
11/30/2023	10:45	12/20/2023	13:30
12/20/2023	13:45	1/3/2024	13:00

Lower Duplin

Deploy Date	Deploy Time	Retrieve Date	Retrieve Time
12/12/2022	14:45	1/19/2023	13:00
01/19/2023	13:15	2/28/23	14:00
02/28/2023	14:00	04/13/2023	14:15
04/13/2023	14:30	05/18/2023	11:15
05/18/2023	11:30	06/09/2023	10:45
06/09/2023	11:00	06/27/2023	09:45
06/27/2023	10:00	07/21/2023	10:00
07/21/2023	10:15	08/11/2023	09:30
08/11/2023	09:45	09/01/2023	12:15
09/01/2023	12:30	09/14/2023	14:00
9/14/2023	14:15	10/6/2023	11:30
10/6/2023	11:45	10/30/2023	12:00
10/30/2023	12:15	11/21/2023	11:00
11/21/2023	11:15	12/1/2023	11:00
12/1/2023	11:15	12/15/2023	12:15
12/15/2023	12:30	12/29/2023	10:00

12/29/2023	10:15	1/12/2024	12:15

7) Distribution –
[Instructions/Remove: This section will address data ownership and data liability by including the following excerpt from the Ocean and Coastal Resource Management Data Dissemination Policy for the NERRS System-wide Monitoring Program in the metadata.]

> 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 processed 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 2023.

Also include the following excerpt in the metadata which will address how and where the data can be obtained.

> 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 www.nerrsdata.org. Data are available in comma delimited format.

8) Associated researchers and projects –
[Instructions/Remove: Describe briefly other research (data collection) that correlates or enhances the data collected by data loggers. At a minimum, mention the SWMP MET and NUT data sets.]

> As part of the SWMP long-term monitoring program, ~~XXX~~ SAP NERR also collects 15-minute meteorological data and monthly grab and diel samples for nutrient/pigment data which may be correlated with this water quality dataset. These data are available at www.nerrsdata.org.
> 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.

II. Physical Structure Descriptors

9) Sensor specifications –
[Instructions/Remove: Include the parameter description, units, sensor type, model #, range of measurement, accuracy and resolution for each sensor for all measuring devices (6600, 6600 EDS, 6600 EDS V2, 6600 V2, or EXO). ***Specify if all of your sondes are the same model and have the same configuration. If not, detail how many of each model you have, what different sensor configurations you use, and where the different***

models/configurations are deployed. See the following example, ***update for your sondes/sensors***, and include the disclaimers below.]

Example: DEL NERR deployed mainly EXO data sondes and one 6600 EDS data sonde in 2020. 6600 EDS deployments occurred at DS only and utilized ROX DO sensors, these deployments are marked with an asterisk in the data collection period section.

SAP NERR deployed YSI EXO2 sondes with identical sensor configurations at all sites in 2023.

All sondes used the following models of sensors:

model # 599827 sensors for temperature, salinity, and conductivity
model # 599100-01 for DO % saturation and mg/L
model #s 577602 and 599702 for pH
model # 599101-01 for turbidity

Of the eight active sondes that get rotated into and out of service, four (July, Sturgeon, Blackbeard, and Manatee) currently use model # 577602 pH sensor and four (Catherine, Amelia, Cumberland, and Simon) currently use model # 599702 pH sensor.

No chlorophyll data was taken during 2023.

~~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~~

~~Parameter: Chlorophyll Fluorescence~~

~~Units: micrograms/Liter~~
~~Sensor Type: Optical probe w/ mechanical cleaning~~
~~Model#: 6025~~
~~Range: 0 to 400 ug/Liter~~
~~Accuracy: Dependent on methodology~~
~~Resolution: 0.1 ug/L chl a, 0.1% FS~~

YSI EXO Sonde:

Parameter: Temperature
Units: Celsius (C)
Sensor Type: CT2 Probe, Thermistor
Model#: 599870
Range: -5 to 50 C
Accuracy: -5 to 35: +/- 0.01, 35 to 50: +/- 0.05
Resolution: 0.001 C

Parameter: Conductivity
Units: milli-Siemens per cm (mS/cm)
Sensor Type: CT2 Probe, 4-electrode cell with autoranging
Model#: 599870
Range: 0 to 200 mS/cm
Accuracy: 0 to 100: +/- 0.5% of reading or 0.001 mS/cm; 100 to 200: +/- 1% of reading
Resolution: 0.001 mS/cm to 0.1 mS/cm (range dependant)

Parameter: Salinity
Units: practical salinity units (psu)/parts per thousand (ppt)
Sensor Type: CT2 probe, Calculated from conductivity and temperature
Range: 0 to 70 psu
Accuracy: +/- 1.0% of reading pr 0.1 ppt, whichever is greater
Resolution: 0.01 psu

OR

Parameter: Temperature
Units: Celsius (C)
Sensor Type: Wiped probe; Thermistor
Model#: 599827
Range: -5 to 50 C
Accuracy: ±0.2 C
Resolution: 0.001 C

Parameter: Conductivity
Units: milli-Siemens per cm (mS/cm)
Sensor Type: Wiped probe; 4-electrode cell with autoranging
Model#: 599827
Range: 0 to 100 mS/cm
Accuracy: ±1% of the reading or 0.002 mS/cm, whichever is greater
Resolution: 0.0001 to 0.01 mS/cm (range dependent)

Parameter: Salinity
Units: practical salinity units (psu)/parts per thousand (ppt)
Model#: 599827

Sensor Type: Wiped probe; Calculated from conductivity and temperature
Range: 0 to 70 ppt
Accuracy: ±2% of the reading or 0.2 ppt, whichever is greater
Resolution: 0.01 psu

Parameter: Dissolved Oxygen % saturation
Sensor Type: Optical probe w/ mechanical cleaning
Model#: 599100-01
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: +/- 5% 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: Optical probe w/ mechanical cleaning
Model#: 599100-01
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: +/- 5% 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 33 ft (10 m)
Accuracy: +/- 0.013 ft (0.004 m)
Resolution: 0.001 ft (0.001 m)

Parameter: pH
Units: pH units
Sensor Type: Glass combination electrode
Model#: 599701(guarded) or 599702(wiped)
Range: 0 to 14 units
Accuracy: +/- 0.1 units within +/- 10° of calibration temperature, +/- 0.2 units for entire temperature range
Resolution: 0.01 units

Parameter: Turbidity
Units: formazin nephelometric units (FNU)
Sensor Type: Optical, 90 degree scatter
Model#: 599101-01
Range: 0 to 4000 FNU
Accuracy: 0 to 999 FNU: 0.3 FNU or +/-2% of reading (whichever is greater); 1000 to 4000 FNU +/-5% of reading
Resolution: 0 to 999 FNU: 0.01 FNU, 1000 to 4000 FNU: 0.1 FNU

~~Parameter: Chlorophyll~~
~~Units: micrograms/Liter~~
~~Sensor Type: Optical probe~~
~~Model#: 599102-01~~
~~Range: 0 to 400 ug/Liter~~
~~Accuracy: Dependent on methodology~~
~~Resolution: 0.01 ug/L chl a, 0.1% FS~~

Include the following Depth, Salinity and Turbidity data disclaimers:

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 1.02 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.

NOTE: older Depth data cannot be corrected without verifying that the depth offset was in place and whether a vented or non-vented depth sensor was in use. No SWMP data prior to 2006 can be corrected using this method. The following equation is used for corrected Depth/Level data provided by the CDMO beginning in 2010:
((1013-BP)*0.0102)+Depth/Level = cDepth/cLevel.

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 –
[Instructions/Remove: List the sampling station, sampling site code, and station code used in the data.]

Sampling station:	Sampling site code:	Station code:
~~Sengstacken Arm~~	~~SE~~	~~sossewq~~
~~Winchester Arm~~	~~WI~~	~~soswiwq~~
~~Valino Island~~	~~VA~~	~~sosvawq~~
~~Charleston Bridge~~	~~CH~~	~~soschwq~~
Cabretta Creek	CA	sapcawq
Dean Creek	DC	sapdcwq
Hunt Dock	HD	saphdwq
Lower Duplin	LD	sapldwq

11) QAQC flag definitions –
[Instructions/Remove: This section details the automated and secondary QAQC flag definitions. Include the following excerpt.]

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 –
[Instructions/Remove: This section details the secondary QAQC Code definitions used in combination with the flags above. Include the following excerpt.]

QAQC codes are used in conjunction with QAQC flags to provide further documentation of the data and are also applied by insertion into the associated flag column. There are three (3) different code categories, general, sensor, and comment. General errors document general problems with the deployment or YSI datasonde, sensor errors are sensor specific, and comment codes are used to further document conditions or a problem with the data. Only one general or sensor error and one comment code can be applied to a particular data point, but some comment codes (marked with an * below) can be applied to the entire record in the F_Record column.

General Errors
GIC No instrument deployed due to ice

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

Corrected Depth/Level Data Codes

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

Sensor Errors

SBO	Blocked optic
SCF	Conductivity sensor failure
SCS	Chlorophyll spike
SDF	Depth port frozen
SDG	Suspect due to sensor diagnostics
SDO	DO suspect
SDP	DO membrane puncture
SIC	Incorrect calibration / contaminated standard
SNV	Negative value
SOW	Sensor out of water
SPC	Post calibration out of range
SQR	Data rejected due to QAQC checks
SSD	Sensor drift
SSM	Sensor malfunction
SSR	Sensor removed / not deployed
STF	Catastrophic temperature sensor failure
STS	Turbidity spike
SWM	Wiper malfunction / loss

Comments

CAB*	Algal bloom
CAF	Acceptable calibration/accuracy error of sensor
CAP	Depth sensor in water, affected by atmospheric pressure
CBF	Biofouling
CCU	Cause unknown
CDA*	DO hypoxia (<3 mg/L)
CDB*	Disturbed bottom
CDF	Data appear to fit conditions
CFK*	Fish kill
CIP*	Surface ice present at sample station
CLT*	Low tide
CMC*	In field maintenance/cleaning
CMD*	Mud in probe guard
CND	New deployment begins
CRE*	Significant rain event
CSM*	See metadata
CTS	Turbidity spike
CVT*	Possible vandalism/tampering

CWD* Data collected at wrong depth
CWE* Significant weather event

13) Post deployment information –
[Instructions/Remove: Use this section for documentation of post calibration information for instruments deployed at each site. ***At a minimum, include: Date (specify if this is the deployment begin date or date of post calibration), SpCond, DO%, pH (7), and Turb (0 NTU).*** Depth and additional pH and Turb post cal information are also beneficial. If using the summary table option in the online deployment interface, you may copy and paste the exported tables here and edit them as necessary (please verify contents).]

*Note: pH post-deployment readings are temperature dependent and minor variations are expected as a result.

Cabretta

Deploy Date	Sonde Nickname	SpCond	ROXDO1	ROXDO2	pH7	pH10	Turb	Turb	Depth
12/7/2022	Wassaw	52.2(50.0)	104.9	102.9	7.15	9.89	1.5(0.0)	135.0(124.0)	0.177(0.0)
1/13/2023	july	47.89(50.0)	97.77	97.77	7.35	9.89	1.05(0.0)	123.5(124.0)	0.065(0.0)
2/21/2023	Amelia	49.9(50.0)	99.8	99.9	7.33	10.1	1.21(0.0)	125.6(124.0)	0.013(0.0)
4/6/2023	Manatee	50.414(50.0)	97.2	97.2	7.28	9.87	0.65(0.0)	115.6(124.0)	-0.071(0.0)
5/10/2023	Sturgeon	48.565(50.0)	91.4	97.1	7.28	10.19	0.78(0.0)	118.58(124.0)	-0.019(0.0)
6/1/2023	Blackbeard	50.552(50.0)	99.6	100.1	7.36	9.34	-0.36(0.0)	123.11(124.0)	0.164(0.0)
6/22/2023	Wassaw	49.668(50.0)	98.8	99.2	7.04	10.05	0.15(0.0)	125.17(124.0)	0.119(0.0)
7/11/2023	Cumberland	42.134(50.0)	31.5		7.85	8.59	95.95(0.0)	98.27(124.0)	0.053(0.065)
8/3/2023	Catherine	49.423(50.0)	99.6	99.8	7.04	10.15	0.35(0.0)	122.11(124.0)	0.039(0.051)
8/24/2023	Manatee	48.763(50.0)	94.8	98	7.12	10.13	-0.06(0.0)	124.36(124.0)	0.046(0.041)
9/15/2023	Wassaw	11.065(50.0)	101.6	101.3	7.31	9.17	1.16(0.0)	126.39(124.0)	0.072(0.068)
10/4/2023	Manatee	50.043(50.0)	101.5	102.8	7.1	10.1	1.01(0.0)	122.37(124.0)	0.132(0.138)
10/24/2023	Sturgeon	50.214(50.0)	102.1	102	7.03	10.05	1.21(0.0)	124.23(124.0)	0.128(0.134)
11/14/2023	Blackbeard	50.176(50.0)	100.5	100.4	6.97	9.98	0.27(0.0)	123.34(124.0)	0.093(0.1)

Dean Creek

Deploy Date	Sonde Nickname	SpCond	ROXDO1	ROXDO2	pH7	pH10	Turb	Turb	Depth
12/1/2022	july	58.12(50.0)	101.3	101.2	6.81	10.04	-5.29(0.0)	123.81(124.0)	-0.025(0.069)
1/4/2023	Amelia	56.96(50.0)	86.9	86.9	7.09	10.05	1.89(0.0)	125.18(124.0)	0.361(0.141)
2/7/2023	Manatee	54.687(50.0)	117	117	7.27	9.99	-1.2(0.0)	121.38(124.0)	0.017(0.0)
3/21/2023	Cumberland	55.4(50.0)	99.8	99.5	7.21	10.12	1.03(0.0)	128.4(124.0)	0.013(0.0)
5/1/2023	Blackbeard	48.462(50.0)	100.5	99.3	7.08	10.22	-0.09(0.0)	122.92(124.0)	0.159(0.0)
5/30/2023	Cumberland	(50.0)	93	97.1	7.12	10.4	14.58(0.0)	90.51(124.0)	0.012(0.0)
6/16/2023	Manatee	50.064(50.0)	79.2	86.7	7.23	9.93	78.01(0.0)	80.49(124.0)	0.012(0.003)
7/7/2023	simon	49.402(50.0)	98.2	99.5	7.17	10.17	0.99(0.0)	122.52(124.0)	0.034(0.044)
7/31/2023	Blackbeard	49.079(50.0)	99.2	99	7.2	10.22	0.07(0.0)	122.81(124.0)	0.382(0.082)
8/21/2023	Cumberland	49.645(50.0)	104.8	101.2	7.14	10.27	-1.05(0.0)	132.65(124.0)	0.001(0.01)
9/7/2023	Catherine	50.169(50.0)	101.6	101.9	6.96	10.11	0.5(0.0)	123.9(124.0)	0.049(0.037)
9/29/2023	Amelia	50.011(50.0)	98.2	99.2	7.07	10.08	0.66(0.0)	123.52(124.0)	0.015(0.027)
10/10/2023	Cumberland	50.253(50.0)	99.2	100.4	6.98	10.1	-1.28(0.0)	119.04(124.0)	0.092(0.093)

10/23/2023	Amelia	49.705(50.0)	102.8	102.9	7	10.11	0.62(0.0)	122.84(124.0)	0.066(0.076)
11/6/2023	Manatee	50.101(50.0)	100.2	100.4	7.05	10.07	2.27(0.0)	121.96(124.0)	-0.005(-0.004)
11/22/2023	Amelia	50.296(50.0)	103.6	105	7.01	10.14	0.68(0.0)	131.85(124.0)	0.12(0.12)
12/8/2023	Cumberland	49.968(50.0)	99.1	95.5	7.03	10.07	3.35(0.0)	115.31(124.0)	-0.033(-0.032)
12/18/2023	Catherine	50.186(50.0)	102.6	102.8	7.09	10.24	1.3(0.0)	124.99(124.0)	0.081(0.076)

Hunt Dock

Deploy Date	Sonde Nickname	SpCond	ROXDO1	ROXDO2	pH7	pH10	Turb	Turb	Depth
12/14/2022	Manatee	57.094(50.0)	97.2	99.9	7	10.02	1.12(0.0)	126.72(124.0)	0.027(0.0)
1/24/2023	Cumberland	53.4(50.0)	94.4	94.5	7.04	10.99	0.57(0.0)	126.5(124.0)	0.062(0.0)
3/9/2023	Wassaw	53.2(50.0)	99	99.4	7.16	10.02	2.4(0.0)	123.4(124.0)	0.024(0.0)
4/11/2023	Sturgeon	56.6(50.0)	104.6	104.5	7.14	9.98	2.56(0.0)	134.2(124.0)	-0.107(0.0)
5/8/2023	Cumberland	49.527(50.0)	95	93.5	7.14	10.17	4.62(0.0)	112.25(124.0)	-0.017(0.0)
5/24/2023	Wassaw	49.948(50.0)	95.9	96.6	7.14	10.06	0.34(0.0)	128.75(124.0)	0.053(0.0)
6/20/2023	Cumberland	49.906(50.0)	86.5	96.3	7.21	10.34	2.16(0.0)	115.49(124.0)	0.048(0.0)
7/6/2023	Sturgeon	49.48(50.0)	100.3	99	7.18	10.21	-0.42(0.0)	122.76(124.0)	0.033(0.062)
7/24/2023	Wassaw	48.739(50.0)	99.6	99.3	7.17	10.25	-0.09(0.0)	124.32(124.0)	0.028(0.034)
8/7/2023	Sturgeon	49.81(50.0)	97.1	98.1	7.08	10.42	0.56(0.0)	123.7(124.0)	0.048(0.041)
8/23/2023	Wassaw	49.77(50.0)	101.6	100.7	6.96	10.08	1.25(0.0)	124.17(124.0)	0.051(0.055)
9/5/2023	Sturgeon	49.402(50.0)	101	100.7	7.05	10.1	0.22(0.0)	121.65(124.0)	0.022(0.017)
9/22/2023	Cumberland	50.024(50.0)	104.2	103.1	6.99	10.08	16.6(0.0)	137.85(124.0)	0.024(0.027)
10/5/2023	Sturgeon	50.027(50.0)	103	102.8	7.02	10.06	-0.9(0.0)	120.84(124.0)	-0.074(-0.045)
10/20/2023	simon	50.22(50.0)	102.5	102.4	7.05	10.15	0.05(0.0)	123.86(124.0)	0.18(0.179)
11/2/2023	July	55.652(50.0)	100.4	100.7	7.14	10.2	1.16(0.0)	129.77(124.0)	0.074(0.065)
11/20/2023	Catherine	50.18(50.0)	103.4	103.1	7.07	10.19	0.92(0.0)	122.22(124.0)	0.125(0.127)
11/30/2023	Sturgeon	50.083(50.0)	101.9	101.8	7.04	10.15	2.85(0.0)	125.1(124.0)	0.189(0.189)
12/20/2023	simon	49.979(50.0)	102.7	102.4	7.07	10.19	-2.65(0.0)	121.48(124.0)	0.057(0.065)

Lower Duplin

Deploy Date	Sonde Nickname	SpCond	ROXDO1	ROXDO2	pH7	pH10	Turb	Turb	Depth
12/12/2022	Cumberland	51.6(50.0)	94.5	94.9	7.06	9.89	0.98(0.0)	122.3(124.0)	-0.023(0.0)
1/19/2023	Wassaw	47.8(50.0)	98.9	98.7	7.13	9.98	1.33(0.0)	123.5(124.0)	0.0235(0.0)
2/28/2023	july	54.3(50.0)	98.9	99.1	7.12	9.97	1.87(0.0)	136.8(124.0)	0.011(0.0)
4/13/2023	Wassaw	47.273(50.0)	107.2	107.5	7	9.91	0.67(0.0)	113.72(124.0)	0.095(0.0)
5/18/2023	Manatee	49.65(50.0)	99.8		6.91	10.02	-3.45(0.0)	125.32(124.0)	-0.066(0.0)
6/9/2023	Sturgeon	49.553(50.0)	109.6	106.7	7.02	10.24	3.1(0.0)	112.5(124.0)	0.026(0.0)
6/27/2023	Blackbeard	49.945(50.0)	98.4		7.11	10.23	1.1(0.0)	126.75(124.0)	-0.132(0.02)
7/21/2023	Manatee	48.726(50.0)	99.2		6.83	9.97	-0.34(0.0)	124.15(124.0)	0.029(0.027)

8/11/2023	simon	49.761(50.0)	100.5	100.4	7.03	9.99	0.21(0.0)	123.81(124.0)	0.088(0.089)
9/1/2023	Blackbeard	49.072(50.0)	101.8	100.9	7.18	10.26	0.19(0.0)	122.68(124.0)	0.061(-0.0)
9/14/2023	simon	42.393(50.0)	101.6	101.5	7.04	10.06	0.65(0.0)	122.68(124.0)	0.017(0.017)
10/6/2023	Catherine	49.741(50.0)	101.5	101.8	7.09	10.13	0.1(0.0)	124.45(124.0)	-0.02
10/30/2023	Cumberland	49.795(50.0)	102	102	6.94	10.07	0.49(0.0)	121.78(124.0)	0.05(0.058)
11/21/2023	simon	50.209(50.0)	103.3	102.9	7.08	10.09	0.25(0.0)	122.97(124.0)	0.081(0.089)
12/1/2023	July	50.27(50.0)	101.4	103.1	7.16	10.11	0.52(0.0)	126.37(124.0)	0.18(0.183)
12/15/2023	Manatee	49.902(50.0)	100	99.8	7.02	10.16	0.4(0.0)	123.44(124.0)	0.042(0.048)
12/29/2023	Amelia	49.881(50.0)	102	102.1	7.07	10.22	0.87(0.0)	123.32(124.0)	-0.032(-0.028)

14) Other remarks/notes –

[Instructions/Remove: Use this section for further documentation of the research data set. Include any additional notes regarding the data set in general, circumstances not covered by the flags and comment codes, or specific data that were coded with the CSM "See Metadata" comment code. You may include the metadata worksheets here if so desired. You may also include information on major storms or precipitation events that could have affected the data recorded. Include the following excerpt.]

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.

Specific conductance data is subject to occasional single 'dips' of reduced concentrations occurring anytime throughout a deployment. This decrease is most likely attributed to debris or organisms disrupting the signal being sent between the electrodes on the Conductivity/Temperature sensor during sample collection.

Turbidity occasionally experiences single data point spikes which are marked as suspect or rejected data. These spikes are likely due to debris or other types of fouling.

The inside of the PVC tubes that house the data sondes are cleaned regularly to reduce issues with bio-fouling impacting sonde retrieval.

Two sondes ("Ossabaw" and "July") have been out of commission for most of 2023. NaN readings appear when connected to Kor software, further troubleshooting is needed.
Update 10/2023: Both sondes have returned from repair. "July" is in regular rotation, "Ossabaw" is not in regular use as it is being used as a back-up.

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The sonde "Amelia" was returned from maintenance, but data from the deployment spanning from 2/21/23 – 4/6/23 was unable to be recovered.
Update 10/19/23: Data has been recovered from the 2/21/23 deployment and has been added into the annual report.

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Hurricane Idalia passed close to the reserve on 08/30/2023. A noticeable drop in water temperature across all sites can be seen in relation to this weather event. Depth values in the ensuing days are also affected at water quality sites.

Depth data for 2023 did not factor in BP offset until mid-June when the new SWMP Tech (Dylan Bedortha) realized that this value needed to be applied to the sonde prior to depth calibration. All depth data from late June through the end of 2023 use this offset and are accurate.

Hunt Dock:

Q1: January - March

The data from 12/14/22 to 1/24/23 is missing due to human error. A wildlife technician who had been previously trained by the SWMP Manager prior was asked to calibrate and deploy a sonde at Hunt Dock. Upon returning to the office, Ivanna found the data had not been correctly retrieved from the sonde collected at Hunt Dock and all of it was lost as a new deployment was started without correctly downloading. The retrieved sonde was also calibrated while dirty for the post deployment check rather than while in live view, so Ivanna chose to reset all of the sensors to factory settings.
Update: *3/26/24* This entire deployment's data has been recovered and added to the 2023 annual data set.

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During the deployment spanning 1/24/23 – 3/9/23, turbidity data began a slow upward trend in values starting around 2/24/23. Starting at this date, turbidity data were flagged as suspect due to sensor drift. Turbidity data from 2/27– 3/9 (end of deployment) were all flagged as rejected. This trend could suggest slow biofouling on the turbidity sensor, but the deployment log only mentions light barnacle fouling upon retrieval. Due to this, the flag was left as sensor drift rather than biofouling.
Also, during this deployment, all Salinity and Specific Conductivity data are flagged as rejected due to incorrect calibration. This deployment was calibrated by someone other than the SWMP tech and all salinity and specific conductivity data are well below acceptable range. No specifics were listed in the deployment log, so the incorrect calibration flag is a best guess.

All DO data are flagged as suspect in the 030923 deployment. These data are higher than what is to be expected with no explanation as to why. The contrast in DO values can easily be seen at the beginning of the deployment.

Biofouling in the sonde PVC housing began to increase in March – Hunt Dock experiences extreme biofouling that can affect depth readings if the growth occurs on the inside of the tube which could prevent the sonde from reaching the bottom of the housing. Retrieval of the sonde on 4/11/23 was difficult due to this growth and more frequent biofouling removal of the sonde housing is planned.

Q2: April - June

From the middle of April into the beginning of May (during deployment spanning from 4/11/23 – 5/8/23), regular out of water events associated with a clogged deployment tube affected depth data. All depth data during this deployment have been flagged as rejected. Biofouling is suspected to have been the cause for this. All data from the out of water events have also been flagged as rejected. To determine exactly when the sensors were out of the water, the salinity values were used. Any values of zero or close to zero signify the sensors out of water. All other data from this deployment have been flagged suspect as the data was taken at the wrong depth.

During summer months when biofouling is more prevalent, PVC housing cleaning frequency has been increased.

Q3: July - September

The data point from 08/23/23 12:30 is missing due to removal of biofouling within the sonde housing. This occurred at the end of the 080723 deployment/beginning of the 082323 deployment.

The lower than average depth seen on 8/31/23 is related to Hurricane Idalia passing close to the island the previous day.

Q4: October - December

The Sp. Cond. calibration for deployment 110223 (11/2/23 – 11/20/23) was done incorrectly. The sensor was calibrated as Conductivity rather than Specific Conductivity. This error wasn't realized until after the deployment. All Sp. Cond., Salinity, and pH data for this deployment has been flagged as suspect, incorrect calibration (SIC). Temperature data did not seem to be affected by this error and was not flagged.

Turbidity values for the deployment 122023 (12/20/23 – 1/3/24) are consistently very low, with most values under 5 and many flagged for being negative values (-1, -2). All negative values flagged as suspect.

Cabretta:

Q1: January - March

Data is missing from 2/14/23 until the end of Quarter 1 due to an instrument malfunction. Amelia sonde (2014) experienced an issue that did not allow data to be downloaded from the sonde. The sonde shows approximately 4000 data points were taken when on the deployment screen in KOR but download was not possible. Sonde was sent to YSI for repair/maintenance and to see if the data can be recovered. The sonde was returned from maintenance and is back to being operational, but no data from this deployment could be recovered.

- ***Update 10/19/23***: Data from this deployment was "stuck inside" the sonde and did not become available for download until the sonde completed another deployment. At this point, the 022123 deployment data was automatically downloaded by Kor. After speaking with YSI about this issue, it seems that the Kor software was out of date. The same issue happened with the first deployment after the sonde was returned from repair, but that data was recovered as well. The 022123 data will be added into the 2023 annual report.
- ***Update 03/05/24:*** The 022123 deployment data has been added to the annual .csv file for this site.

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Q2: April - June

Aside from data loss mentioned above, this site was not problematic during the second quarter of 2023.

Q3: July - September

Upon retrieval of the 071123 deployment, it was observed that all sensors were heavily biofouled. When back in the lab, the wiper brush was unresponsive in Kor and must have malfunctioned and stopped wiping during the deployment. After removing the brush head and manually freeing the rotating axle, the wiper responded in Kor, but continued to get hung up in the same spot during rotation. All data from this deployment spanning from 07/25/2023 05:45 – 07/30/2023 21:00 were flagged as suspect, **<1>[SWM](CSM).** DO and turbidity data spanning from 07/30/2023 21:15 – 08/03/2023 11:00 (end of deployment) were flagged as rejected, **<-3>[SWM](CSM).** Since the exact time of wiper failure is unknown, these flags were applied based on a best guess after looking through the data.

After looking through data from the 080323 deployment, the depth data suggest that the sonde was lodged/stuck on biofoul (oysters and/or barnacles) from the beginning of deployment (08/03/2023 11:15) until 08/15/2023 11:00. At this point in the deployment, the depth jumps approximately a meter, possibly indicating that the sonde fell through the biofoul and rested at the bottom of the deployment tube. All depth data spanning from 08/03/2023 11:15 – 08/15/202311:00 was flagged as rejected, **<-**

3>[GNF](CSM). All other data during this period is flagged as suspect due to data collection at the wrong depth.

The data point from 08/24/23 11:15 is missing due to removal of biofouling within the sonde housing. This occurred at the end of the 080323 deployment/beginning of the 082423 deployment.

Upon retrieval of 091523 deployment, it was observed that the temperature/conductivity sensor was heavily biofouled with encrusting bryozoan. This led to post readings that were way off. Salinity and Specific Conductivity data spanning from 09/28/2023 00:00 – 09/29/2023 22:00 are flagged as suspect, **<1>[SBO](CBF).** Salinity and Specific Conductivity data spanning from 09/29/2023 22:15 – 10/04/2023 11:00 (end of deployment) are flagged as rejected, **<-3>[SBO](CBF).** All temperature data spanning from 09/28/2023 00:00 – 10/04/2023 11:00 are flagged as suspect, **<1>[SBO](CBF).** These flags were applied based on a best guess after looking through the data. Encrusting bryozoan was also present is lesser amounts on pH sensor bulb, but did not seem to affect deployment data, although post readings were a bit off.

Q4: October – December

During deployment 100423, depth records spanning from 10/16/23 16:30 – 10/20/23 12:15 are flagged as rejected due to tampering. All other data during this period is flagged suspect due to data being collected at the wrong depth. While performing regular sonde housing maintenance (barnacle busting) on 10/20, I noticed that the rope attached to the sonde and housing was tight as opposed to having some slack as it should. I pulled up the sonde and realized the rope had tangled on the steel cable also connected to the sonde and therefore was suspending the sonde above the bottom of the housing. The tangle was undone, and the sonde returned to the bottom of the housing. I suspect someone pulled the sonde out of the housing (either completely or partially) on 10/16 and the rope became tangled as it was lowered back into the housing. No other parameters seem affected by this, so no other flags were used related to this event.

During deployment 111423**,** the batteries powering the sonde died during the deployment. Upon retrieving the sonde on 11/28/23, it was observed that the blinking red light that signifies an active deployment was not blinking. When brought back to the lab, sonde would not turn on with magnet or direct computer connection. Batteries were replaced and sonde awoke. Final reading from deployment was 11/23/23 16:15.

Depth values from this deployment (111423) seem to shift to shallower values starting on 11/17/23. There are no drastic jumps or declines in depth values to suggest tampering or other outside influence. Unclear if this shift is related to deployment tube failure mentioned below, but I wouldn't suspect it due to the depth values becoming shallower as opposed to deeper.

From same 111423 deployment, there was a catastrophic failure with the deployment tube. Upon retrieval, it was observed that the deployment tube had broken off above the water line. The sonde was still attached to the steel wire that secures it to the bridge but was freely dangling in the current still within the broken off piece of deployment tube. As the sonde was pulled in, the broken piece of tube was freed from the sonde and sunk. Due to this, no sonde was deployed after retrieving the 111423 deployment. Will update with repair timeline.
Update: A new deployment tube at the CA site was installed on 1/23/24 and a calibrated sonde was deployed on 1/24/24 11:30. A Compliance Log Request was filled out for the missing data spanning from 11/23/23 – 1/24/24.

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Dean Creek:

Q1: January - March

This site experienced no major issues related to data, sonde collection, sonde health, or sonde housing maintenance problems. Dean Creek sonde currently deployed as of 3/21/23 will be collected on 5/1/23 so that data is not included in the Q1 report.

Salinity, Specific Conductivity, and pH data from deployment 032123 spanning 3/21/23 13:30 – 5/1/23 12:30 have all been flagged as suspect. The pre- deployment pH slope was 153.4, below the suspect cutoff value of 155. The data also did not match up with the deployments prior to and post this deployment. The same can be said of the Salinity and Specific Conductivity data. The cell constant prior to deployment was 0.28, but there were no backup sensors to deploy in its place. The sensor was deployed with this error. All data are flagged suspect, and upon review may be changed to rejected.

Sporadically throughout the first and second quarter of 2023, depth readings at this site entered negative values. Upon review of this data, all data related to these negative values have been flagged as suspect. The reason these data were not rejected is that all other values seem unaffected by the negative depth readings. Even with the negative depth readings, it does not seem that the sensors were ever out of the water.

Q2: April - June

The deployment from 5/30 – 6/16 experienced some problems relating to the Sp.Cond/Sal/Temp sensor. After being calibrated successfully in the lab prior to deployment, the sonde's Sp.Cond/Sal/Temp sensor did not record data from 5/30 – 6/3. At 00:45 on 6/3, all three readings come back online and recorded data for the rest of the deployment. The salinity and specific conductivity data from this time have been flagged as suspect for this reason as well as the fact the wiper brush was parked on the sensor from 6/3 – 6/16.

When retrieving the sonde ("Cumberland") on 6/16, it was observed that the wiper brush was parked on the Sp.Cond/Sal/Temp sensor. After reviewing the data from the deployment, it was concluded from wiper position data that the wiper had been parking on that sensor from 6/3 – 6/16.

When taking post-deployment readings from the 5/30/23 deployment, KOR software did not detect SpCond sensor and solid red light was present while turned on and connected to KOR. No SpCond post-deployment readings were taken (reason for blank space in section 13).

Post deployment readings taken after the deployment from 6/16 – 7/7 were affected by biofouling on sensors. Upon retrieval, it was observed that the wiper brush was not present on wiper. Dissolved oxygen, pH, and turbidity sensors all had significant amounts of algae on them. This is believed to be the cause of out of normal range post deployment readings associated with these sensors. All DO, pH, and turbidity data spanning from 07/01/2023 17:30 – 07/07/2023 10:30 (end of deployment) are flagged as suspect, **<1>[SBO](CBF).** Since the exact time of wiper brush loss is unknown, these flags were applied based on a best guess after looking through the data.

Q3: July - September

Depth data from the entirety of the 073123 deployment seems above average when compared to other depth data from the Dean Creek site. The post depth reading was off as well. All depth data from this deployment flagged as suspect, **<1>[SPC](CSM).**

Q4: October - December

Salinity and Sp.Cond. data fluctuates quite a bit from 12/18 to around 12/23 before leveling out. I believe this reflects the creek catching up to the major rain event we had on 12/17. The end of the 120823 deployment (12/8/23 – 12/18/23) also shows this fluctuation beginning on 12/17. These data have been flagged as <0> (CRE) to signify the rain event producing large fluctuations in data values.

Lower Duplin:

Q1: January - March

pH data spanning from 1/1/23 00:00 – 1/19/23 (end of deployment) have been flagged as suspect due to sensor drift. This chunk of data does not fit with the rest of the year's trend or what is to be normally expected at this site.

Salinity and Specific Conductivity data from the deployment spanning 1/19/23 – 2/28/23 (sapldwq011923) have been flagged as suspect due to sensor drift. The data from this deployment do not seem to match up with the previous deployment or the next deployment's data trends. With no external factors like weather events or significant changes in water composition, this data seems off. Salinity readings from this site normally occur between low 20s and low 30s ppu. Flagged as suspect rather than rejected because no concrete evidence of sensor malfunction or calibration errors are present. DO data, both percent saturation and mg/L concentration, have been flagged as suspect DO. This deployment's data is abnormally and consistently high for what is normally expected at this site. There are big drop offs in values when comparing this deployment with the previous deployment. Towards the end of the deployment, the DO values start to look better, but I've flagged the entire deployment as a precaution.

Lower Duplin's telemetry station was successfully fixed in March of 2023 with the installation of a new SOA, rewiring the system, cleaning the fuses, and adding a new template to the system. The template for the telemetry had the depth and DO reversed so on 4/13/2023 a new template and sonde were deployed at the site. On 4/9/2023, the station lost shore power and the 12v battery was only able to keep the system alive for a couple days after the shore power failure. Data for Lower Duplin is missing from 4/11/23 through 4/13/2023.

Q2: April – June

Data sonde stopped logging from 4/11 – 4/13 due to loss of shore power to the telemetry station at Marsh Landing. The sonde began losing battery to power the telemetry system. 12v battery was not enough to keep the system communicating. See below.

Q3: July - September

The lower than expected depths that were recorded on 8/31/23 were effects felt from Hurricane Idalia which passed close to the island the previous day.

After an island-wide power outage on the evening of 9/12, power was restored to the island on the afternoon of 9/13. On 9/14, I noticed that the telemetry water quality data was flatlining and determined that the sonde at Lower Duplin was not recording data. Sonde was switched out on 09/14/2023 14:15. The sonde retrieved during this switch displayed a "failed SD card" which I think occurred during the power surge when electricity was restored to the island on 9/13. No data recorded spanning from 09/13/2023 15:30 – 09/14/2023 14:00 due to this issue. Since telemetry data was flatlined during this period, I did not attempt to recover telemetry data in place of recorded data.

Q4: October - December

During deployment 100623, both Temp./Cond. and pH sensors had moderate encrusting bryozoans present. Sal and Sp. Cond data from 10/1/23 7:00 – end of deployment flagged as suspect due to biofouling. Temp. and pH values do not seem to be affected by biofouling.

During the 120123 deployment, DO values were shown over a greater range than usual for this site. Some of the values were flagged as suspect <1>[SDO] when they were noticeably out of place, but this deployment's DO values may need further looking into.