Sapelo Island (SAP) **NERR Water Quality Metadata** - Annual
January – December 2022
Latest Update: December 16, 2024

I. Data Set and Research Descriptors

1) Principal investigator(s) and contact persons –

Ivanna Knox, SWMP Manager (8/22-current)
E-mail: ivanna.knox@dnr.ga.gov
Phone: (828) 448-0057

Rachel Guy, Research Coordinator
E-mail: rachel.guy@dnr.ga.gov
Phone: (912) 485-2251

Thompson Rose, SWMP Manager (1/22-3/22)
E-mail: douglas.rose@dnr.ga.gov

Georgia Department of Natural Resources
P.O. Box 15
Sapelo Island, GA 31327
(912) 485-2296

2) Entry verification –

Deployment data are uploaded from the YSI data logger to a Personal Computer (IBM compatible). Files are exported from Exo-Kor (CSV) or KOR Software in an Excel File (.XLS) and uploaded to the CDMO where they undergo automated primary QAQC; automated depth/level corrections for changes in barometric pressure (cDepth or cLevel parameters); and become part of the CDMO's online provisional database. All pre- and post-deployment data are removed from the file prior to upload. During primary QAQC, data are flagged if they are missing or out of sensor range. The edited file is then returned to the Reserve for secondary QAQC where it is opened in Microsoft Excel and processed using the CDMO's NERRQAQC Excel macro. The macro inserts station codes, creates metadata worksheets for flagged data and summary statistics, and graphs the data for review. It allows the user to apply QAQC flags and codes to the data, remove any overlapping deployment data, append files, and export the resulting data file for upload to the CDMO. Upload after secondary QAQC results in ingestion into the database as provisional plus data, recalculation of cDepth or cLevel parameters, and finally tertiary QAQC by the CDMO and assimilation into the CDMO's authoritative online database. Where deployment overlap occurs between files, the data produced by the newly calibrated sonde is generally accepted as being the most accurate. For more information on QAQC flags and codes, see Sections 11 and 12. Thompson Rose and Ivanna Knox were primarily responsible for all data acquisition and management with consultations and assistance from Rachel Guy

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.

4) Research methods –

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

When deployed, the weather conditions and tidal stage are recorded in the field observation log. The datalogger is placed inside a length of PVC pipe attached to the dock. The data logger is attached to a non-floating dock by 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 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 rejected is noted in the metadata.

A STORM3 transmitter was installed at the Lower Duplin station on November 2021 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.

5) Site location and character –

The Lower Duplin (LD) monitoring site (31° 25' 4.8792" N, 81° 17' 45.855" W) 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, 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 (HD) monitoring site (31 deg 28' 43"N, 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 ppt. Primary freshwater input consists of rainwater runoff. 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 22.5, W 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. Primary freshwater input consists of rainwater runoff. 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 37.3,W 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. Primary freshwater input consists of rainwater runoff. 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.

SWMP Station Timeline

Station Code	SWMP Status	Station Name	Location	Active Dates	Reason Decommissioned	Notes
CA	P	Cabretta	N 31 26 37.3W 81 14 23.7	4/2004-current	NA	NA
DC	P	Dean Creek	N 31 23 22.5W 81 16 44.2	5/2004-current	NA	NA
HD	P	Hunt Dock	31 deg 28' 43", 81 deg 16' 23" W	7/1999-current	NA	NA

LD	P	Lower Duplin	31 deg 25' 4" N, 81 deg 17' 46" W	1/1999-current	NA	Lower Duplin site move due to ferry dock construction
ML	S	Marsh Landing	31deg 25’ 04.23” N, 81deg 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	31deg 28’ 53.85”N, 81deg 16”12.37”W	1/1995-12/1998	NA	NA

6) Data collection period –

Cabretta

Deploy Date	Deploy Time	Retrieve Date	Retrieve Time
12/16/2021	13:15	01/19/2022	15:15
1/19/2022	15:30	2/21/2022	11:15
2/21/2022	11:45	3/22/2022	9:00
3/22/2022	9:30	4/21/2022	10:45
4/21/2022	11:15	6/9/2022	9:15
6/10/2022	9:15	7/7/2022	11:00
7/07/2022	11:15	7/25/2022	11:45
7/25/2022	12:00	8/24/2022	8:45
8/24/2022	9:00	9/19/2022	11:15
10/07/2022	09:00	11/02/2022	9:00
11/02/2022*	09:15	12/07/2022	15:00
12/07/2022	15:15	1/13/2023	12:45

*Sonde deployed but no data collected

Dean Creek

Deploy Date	Deploy Time	Retrieve Date	Retrieve Time
11/22/2021	13:45	1/06/2022	12:00
1/06/2022	12:15	2/03/2022	12:00
2/03/2022	12:15	3/03/2022	14:45
3/03/2022	15:00	3/23/2022	10:00
3/23/2022	10:15	5/2/2022	9:30
7/8/2022	11:00	7/25/2022	10:30
7/25/2022	11:00	8/30/2022	10:30
8/30/2022	10:45	9/26/2022	10:30
9/26/2022	10:45	10/27/2022	11:15

10/27/2022	11:30	12/01/2022	14:45
12/01/2022	15:00	1/04/2023	11:03

Hunt Dock

Deploy Date	Deploy Time	Retrieve Date	Retrieve Time
12/20/2021	10:45	1/19/2022	14:45
1/19/2022	15:00	2/17/2022	14:45
2/17/2022	15:00	3/16/2022	10:00
3/16/2022	10:15	4/4/2022	12:15
4/4/2022	12:30	5/16/2022	8:45
5/16/2022	9:15	6/14/2022	9:30
6/14/2022	9:45	7/01/2022	8:30
7/1/2022	8:45	7/20/2022	12:45
7/20/2022	13:00	8/12/2022	10:00
8/12/2022	10:15	9/2/2022	11:45
9/27/2022	8:45	10/06/2022	11:30
10/19/2022	13:45	11/14/2022	12:00
11/14/2022	12:30	12/14/2022	11:30
12/14/2022	11:45	1/24/2023	11:45

Lower Duplin

Deploy Date	Deploy Time	Retrieve Date	Retrieve Time
12/28/2021	12:30	1/21/2022	14:15
1/21/2022	14:30	2/15/2022	11:45
2/15/2022	12:15	3/15/2022	13:00
3/15/2022	13:30	4/4/2022	13:00
4/4/2022	13:30	5/16/2022	9:30
5/16/2022	10:00	6/10/2022	9:15
6/10/2022	9:30	7/1/2022	10:30
7/1/2022	10:45	7/20/2022	13:00
7/20/2022	13:30	8/12/2022	10:45
8/12/2022	11:00	8/22/2022	11:00
8/22/2022	11:30	9/9/2022	9:45
9/9/2022	10:00	10/6/2022	9:15
10/06/2022	9:30	11/08/2022	14:45
11/08/2022	15:15	12/12/2022	14:15
12/12/2022	15:00	1/19/2023	13:00

7) Distribution –

NOAA retains the right to analyze, synthesize and publish summaries of the NERRS System-wide Monitoring Program data. The NERRS retains the right to be fully credited for having collected and

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 2022.
.
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 (link to other products or programs) **–**

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

II. Physical Structure Descriptors

9) Sensor specifications –

SAP NERR deployed YSI EXO2 sondes at all sites for the entirety of 2022. An Exo1 plus handheld was used to collect field data.

YSI EXO2 Sonde:

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

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 –

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
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 – Cabretta

Deploy Date	Sonde Nickname	SpCond	ROXDO1	pH7	pH10	Turb	Turb	Depth
1/19/2023	Ossabaw, not sure if this sonde is the one that was deployed	50.4	Missing info	6.92	9.92	0.33	123.23	0.126
2/21/2022	Simon, not sure if this sonde is the one that was deployed	49.71	Missing info	7.07	10.02	0.77	123.22	0.062
3/22/2022	Blackbeard	See notes	97.0	7.34	9.21	See notes	See notes	0.094(0.083)
4/21/2022	Amelia	See notes	See notes	See notes	See notes	See notes	See Notes	See notes
6/10/2022	Catherine	See notes	63.4	7.79	8.04	-0.53(0.0)	128.32(124.0)	0.135(0.044)
7/7/2022	Simon	0.002	N/A	7.2	10.28	-0.44	124.33	0.153
7/25/2022	Amelia	39.417	97.7	7.75	8.37	26.68	100.06	-0.195
8/24/2022	Sapelo	48.484	98.4	See Notes	See Notes	0.62	131	0.035

9/19/2022	Ossabaw	See Notes	See Notes	See Notes	See Notes	See Notes	See Notes	See Notes
11/02/2022	Sapelo	44.486	99.4	7.34	10.19	2.57	121.73	0.028
12/07/2022	Wassaw	49.5759	98.5	6.82	10.1	0.8	123.63	0.246
01/13/2023	July	55.0882	85.2	6.77	10.05	-5.26	121.08	0.089

Dean Creek

Deploy Date	Sonde Nickname	SpCond	ROXDO1	pH7	pH10	Turb	Turb	Depth
1/6/2022	Catherine	50.59	102.0	6.99	10.0	0.23	123.67	0.232
2/1/2022	Amelia, sonde was not selected for this sheet, Amelia was chosen in order to finalize	50.11	100.2	7.06	10.03	0.68	125.07	0.124
3/1/2022	Ossabaw, unsure if this is the actual sonde that was deployed	49.84	99.5	7.03	10.0	-0.4	124.32	-0.054
3/23/2022	Catherine	See notes	98.5	7.37	10.02	See notes	See notes	0.089(0.068)
7/08/2022	Sapelo	0.01	100.5	7.02	10.1	-1.54	122.59	0.034
7/25/2022	Blackbeard	See Notes	See Notes	See Notes	See Notes	See Notes	See Notes	See Notes
8/30/2022	Amelia	54.724	101.6	6.51	10.78	1.84	117.24	-0.026
9/26/2022	Sapelo	55.224	97.3	7.03	9.83	2.3	117.5	0.66
10/27/2022	Wassaw	46.3786	94.2	7.15	10.0	0.44	118.24	0.099
12/01/2022	July	42.7191	106.3	7.39	10.14	4.45	124.55	0.283
1/04/2023	Amelia	52.5781	108.7	7.01	10.03	0.12	120.6	0.11

Hunt Dock

Deploy Date	Sonde Nickname	SpCond	ROXDO1	pH7	pH10	Turb	Turb	Depth
1/19/2022	Amelia, no sonde selected for	49.94	100.7	7.08	10.02	0.88	124.95	0.092

	deployment. Amelia was chosen only to finalize log							
2/17/2022	Catherine, unsure if this is the actual sonde that was deployed	49.2	100.2	7.12	10.08	0.22	No info, no turbidity standard	0.143
3/15/2022	Amelia	47.45(50)	96.2	7.17	10.0	See notes	See notes	-0.075(-0.063)
4/4/2022	Ossabaw	See notes	97.0	7.03	9.96	See notes	See Notes	0.037(0.017)
5/16/2022	Catherine	See notes	97.5	7.16	10.07	0.19(0.0)	124.76(124.0)	-0.009(0.075)
6/14/2022	Ossabaw	See notes	99.4	7.14	10.08	-0.8(0.0)	144.24(124.0)	0.113(0.055)
7/01/2022	Amelia	0.001	100.2	7.03	10.12	0.32	126.4	0.055
7/20/2022	Catherine	See Notes	See Notes	See Notes	See Notes	See Notes	See Notes	See Notes
8/12/2022	July	49.118	99.2	See Notes	See Notes	0.24	127.7	0.064
9/01/2022	Blackbeard	50.643	89.0	7.35	9.99	-0.83	135.64	0.117
10/18/2022	July	48.216		7.34	10.17	1.59	126.28	0.16
11/14/2022	Amelia							
12/14/2022	Manatee	57.094	97.2	7.0	10.02	1.12	126.72	0.027
1/24/2023	Cumberland	48.9	50.1	6.86	9.96	0.76	92.61	0.037

Lower Duplin

Deploy Date	Sonde Nickname	SpCond	ROXDO1	pH7	pH10	Turb	Turb	Depth
1/21/2022	Simon	50.41	No info	7.03	9.95	-0.76	123.71	0.18
2/15/2022	Blackbeard	50.3	No info	7.07	9.96	0.36	123.45	0.104
3/15/2022	Sapelo	See notes	99.7	7.08	10.11	-0.61(0.0)	124.4(124.0)	-0.026(0.027)
4/4/2022	simon	See notes	96.8	7.13	10.07	0.03(0.0)	116.54(124.0)	0.016(0.017)
5/16/2022	Blackbeard	See notes	99.0	7.0	9.85	0.75(0.0)	122.4(124.0)	0.059(-0.007)
6/10/2022	simon	51.95(50.0)	See notes	7.14	10.12	-1.33(0.0)	123.46(124.0)	0.196(0.055)
7/01/2022	Blackbeard	0.002	99.4	7.34	10.02	-0.98	125.55	0.046
7/20/2022	Ossabaw	0.006	98.6	7.33	10.13	-0.16	122.73	0.028
8/12/2022	Sapelo	0.002	102.5	7.06	10.09	0.4	122.5	-0.063
8/22/2022	Ossabaw	49.823	97.5	7.21	10.28	0.6	118.0	-0.136
9/9/2022	July	54.132	112.3	See Notes	See Notes	-0.76	193.96	0.185
10/6/2022	Amelia	49.468	102.8	7.13	10.15	0.27	119.65	0.037
11/08/2022	Manatee	46.8252	94.0	7.15	10.15	0.42	119.6	10.449
12/12/2022	Cumberland	57.9875	115.2	6.89	9.89	-0.05	125.05	0.002
1/19/2023	Wassaw	60.5939	98.5	7.01	10.14	-0.78	131.34	0.025

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.

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.

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.

On 4/1/2022, the SWMP Manager Douglas (Thompson) Rose left his position at SINERR and the Research Coordinator (Rachel Guy) assumed management of the SWMP WQ deployments and retrievals. A misreading of the SOPs for post-calibration methods for specific conductivity resulted in the collection of the wrong specific conductivity post calibration data.

It was also discovered that the laboratory was out of turbidity standard, and new standard did not arrive until the first week of May 2022. All turbidity data for this time period has been flagged suspect <1> [SIC] (CSM), nor are there post calibrated data for turbidity sensors for this time period. Impacted deployments are listed below for each site.

CA:
4/21

HD:
4/4

LD:
4/4

During the beginning of 2022, from January until April, there were issues with the consistency of the SWMP program. Deployment and retrieval information is missing from deployment logs during this time. The sensor inventory is also missing key information during this time and the reserve's sensors were allowed to become outdated without backups. During 2022 YSI also had supply chain issues. These combined issues led to multiple data gaps. There are limited notes available from 2022 Q1 as well. The data has been QAQC'd to the best of our ability given these constraints.

This year, there was a lot of instances of sensors and sondes breaking due to age or general wear and tear. One entire sonde unit is out of commission due to a hairline fracture in the plastic case causing flooding of the unit. Many sensors lost their metal ring that allowed them to be screwed into the sonde and a lot of 29 old sensors were sent to YSI for evaluation and repair. Due to backlogged items at YSI, the process to replace the sensors and sondes still has an extended fulfillment estimate. During 2022 there may have been some DO caps deployed that were expired. We are unable to confirm this, no data appear impacted due to this issue.

In 2022 the BIN files were archived as the reserve was best able to. If original raw data are needed please contact the reserve staff with specific questions.

PVC tubes were cleaned monthly to reduce issues with bio-fouling impacting sonde retrieval.

A new EXO2 sonde named "Manatee" was added this year into the SWMP program for use in deployment. An EXO1 sonde was added to replace our EXO2 as our handheld unit for collecting water quality information.

Lower Duplin:

During the deployment from 5/16/2022 the battery in the Lower Duplin site died, prematurely ending data logging on 6/7/2022. During the 6/10/2022 deployment, the ODO Sensor failed completely on 6/14/2022.

The Lower Duplin site (originally 31 deg 25' 4" N, 81 deg 17' 46" W) was removed on August 11, 2021 when the ferry dock the sonde was attached to was removed. With the demolition of the dock happening in unpredictable intervals, there was no way to have the new and old site functioning at the same time. In comparing average depths previous and post construction, we find the new site is a little less than 1 meter deeper than the previous site. However, none of the other parameters showed significant differences from their previous average readings. The sonde then began collecting data at its new location (31° 25' 4.8792" N, 81° 17' 45.855" W) on September 13, 2021.

User error: Appears the deployment was set to stop at 8/7/2022 at 8 AM. Will be 5 day gap in data.

July deployed on 9/9/22 was missing a pH Sensor.

In the third quarter, the Lower Duplin Telemetry was still down. A new flying lead from YI was received and installed. The station is now communicating but is not sending data from the sonde. More troubleshooting occurred in the next quarter to see if the problem can be fixed. The next avenue is to replace the wiring bridge.

On 8/16/22, Ivanna Knox took over as SWMP Manager. Lab inventory for sensors, mainly DO and pH were missing or in low inventory this quarter. New sensors began arriving in late September and October. Slowly, sensors and sondes are being updated with new sensors and probes. There were issues this quarter due to templates causing data to either not be collected or unable to be downloaded from the sonde, but should be solved as of 10/31/22.

Depth data during the 11/08/2022 deployment at LD was not calibrated correctly. The sonde was calibrated to 0 instead of using the offset based on barometric pressure. The offset that should have been used was 0.103m. Due to this issue at the calibration depth data are off during this deployment.

Bio-fouling of barnacle growth in the PVC tubes has begun to cause issues with deployment retrieval. PVC tubes will now be serviced and cleaned monthly to prevent extreme barnacle growth.

Missing data can be attributed to lack of sensor inventory, template issues, or sensor malfunctions.

Hunt Dock:
Catherine Sonde deployed on 7/20/2022 is missing post-deployment data.

July Sonde Deployed on 8/12/2022 is missing the pH Sensor due to low lab inventory.

Due to lack of lab inventory, one of the five complete sondes had a pH failure meaning there was missing pH for Hunt Dock from 8/12/2022 to 9/2/2022 and at Lower Duplin from 9/9/2022 to 10/6/2022.

There was a sonde deployed at HD on 09/02/2022. However, due to a malfunction the sonde did not start logging until 09/27/2022.

The sonde was sitting at the wrong depth during the 09/27/2022 deployment. We're unsure of the cause of this but ongoing fouling issues at HD caused multiple deployments to sit in the tube wrong.

Upon retrieval of the sonde deployed at Hunt Dock on 10/6/2022, it was discovered that the sonde was firmly stuck in the PVC tube due to biofouling/barnacle growth. The sonde was attempted to be removed for the next week, restricted by tide times as the access for the PVC tube is on a floating dock. The sonde, connected by a stainless-steel carabiner also snapped leaving the sonde stuck in the PVC tube and without a cable. The sonde was successfully retrieved on 10/14/22 but the PVC needed anti biofouling maintenance and an additional failsafe retrieval system was added. A new sonde was deployed at Hunt Dock on 10/18/2022.

Cabretta:
The 04/21 and 06/10 deployments were originally set to collect in UTC time and not EST time. The sonde time is set in KOR software, if not careful UTC time can be chosen instead of EST time. When this happens 5 hours must be subtracted from the date/time to get the 'correct' date and time that the data was collected. This has been done for both deployments. Due to this the RAW BIN and CSV files will not match the edited yearly file for CA.

In the second quarter, when the sonde was to be retrieved on 5/16/2022, it was discovered to no longer be attached to the end of the cable. It was uncertain if the sonde was still in the tube or if the tube itself had broken. A scuba diver was needed, and assisted on 6/9/2022 to assess, finding the tube in tact and the sonde still inside the tube at the correct depth. The RC, thinking she was clever in tidying up unneeded deployment logs, deleted the 5/16/2022 deployment log, which is where she had stored the post-calibration data. There is no post-calibration data for this time period.

On 6/10/2022 the sonde was redeployed but at some point during the deployment, the wiper brush (around 6/23/2022) came loose from the sonde, allowing fouling to significantly affect the sensors for the rest of the deployment. Impacted parameters have been rejected during this time period.

Retrieval of Sapelo Sonde at Cabretta on 9/19/2022, it was found the pH Sensor bulb was smashed so no post-deployment pH information is available.

The depth at Cabretta due to the sonde being stuck was noted in the data on 9/14/22. While the depth appears to mostly recover until the sonde was retrieved it is not fluctuating like normal. Depth data from 9/14 to 9/22 are marked 1 CSM and other parameters are marked 0 CSM.

Ossabaw Sonde deployed 9/19/2022 is stuck in the PVC tube at Cabretta due to extreme bio-fouling – the sonde was eventually recovered. The sonde was stuck in the tube at Cabretta during the 09/19/2022 deployment due to fouling. This caused the sonde to sit at the wrong depth from 10/15/22 to 11/2/22. Depth data during this time are marked -3 SCF CWD due to the SpCond and salinity data being rejected. The fouling impacted other parameters as well and they are marked accordingly.

Cabretta is missing information from 11/2/22 to 12/7/22 because the sonde had a hairline crack in the case which allowed the sonde to be flooded and subsequently ruined. Ivanna is in contact with YSI to retrieve the SD card to see if any data can be salvaged from that deployment date. A new sonde system is being ordered to replace the flooded sonde.

Dean Creek:

During the deployment from 5/16/2022 the battery in the Lower Duplin site died, prematurely ending data logging on 6/7/2022. During the 6/10/2022 deployment, the ODO Sensor failed completely on 6/14/2022.

Due to the shifting hydrology of Dean Creek, the sonde no longer remains in the thalweg and experienced many out of water events throughout the year. In addition, repair of the bridge and trail that was damaged during Hurricane Irma (2017) was on going, making site access difficult and at times entirely blocked by construction equipment. When the Research Coordinator retrieved the sonde on 5/2/2022, she found silt-sand in the guard cup, with the

central wiper unit entirely submerged in silt. Because of the ongoing issues of the site and the on going construction the sonde was pulled from the site and not redeployed until the construction on the bridge was complete and the new sonde tube re-established in the channel where it would remain submerged for the duration of the deployment. The new tube was installed and a sonde deployed in July 2022. Data from 4/25/2022 to 05/2/2022 are marked 1 GNF CSM to highlight the silt and sand in the sonde guard and potential impacts to data.

Retrieval information for Dean Creek, Blackbeard deployed on 7/25/2022 was not recorded – deployment log failed to save. Data failed to download from 9/26/22, Sapelo Sonde had an error in the deployment template.

Depth data was off compared to the deployments around it. We're unsure of what caused this shift or what might have happened at the site. In general DC has a solid station set up.