

ACE NERR Water Quality Metadata
January -December 2020
Latest Update: 08/24/2021

I. Data Set and Research Descriptors

1) Principal investigator(s) and contact persons –

Addresses:

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2) Entry verification –

Deployment data are uploaded from the YSI data logger to a Personal Computer (IBM compatible). Files are exported from EcoWatch in a comma-delimited format (CDF), EcoWatch Lite in a comma separated file (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, and append files. After secondary QAQC, files are uploaded and are ingested into the CDMO database as provisional plus data, and cDepth or cLevel parameters are re-calculated. A tertiary QAQC is done on the yearly files by the CDMO and then files are assimilated 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. Nicole King, Saundra Upchurch, and Denise Sanger were responsible for these tasks.

3) Research objectives –

Long-term water quality monitoring in the ACE Basin provides a unique opportunity to increase understanding of how various environmental factors influence estuarine processes. Based on discussions with local Coastal Zone Management (CZM) personnel and ACE Basin NERR staff knowledge of land use within the Reserve, the South Edisto River drainage basin was selected because it is well suited for studying contrasting hydrographic conditions and land use patterns.

The two major objectives of the ACE Basin monitoring program are to: 1) compare water quality conditions in shallow creeks along a salinity gradient and at different levels of development in the South Edisto River watershed and 2) track changes to the saltwater demarcation line in the South Edisto River as a result of prolonged drought, extraction of river water, and sea level rise.

The program began on March 3, 1995 in two tributaries of the South Edisto River, Big Bay Creek and St. Pierre Creek; in October 2002, monitoring stations were established in Fishing Creek and Mosquito Creek, tributaries

of the South Edisto River. In 2014, two sites were established in the South Edisto River proper at Jehossee Island and Grove Plantation.

Four primary monitoring stations (Edisto Island [replacement for Big Bay], Fishing Creek, Mosquito Creek and St. Pierre Creek) are used to study contrasting land use patterns in the reserve. The two “treatment” sites are Edisto Island and Mosquito Creek, where boat traffic is moderate to heavy and residential and commercial development is moderate. St. Pierre Creek and Fishing Creek, where boat traffic is light and development is sparse, are designated as “control” sites. The four sites are located along a salinity gradient ranging from the polyhaline (Edisto Island & St. Pierre Creek) to mesohaline (Mosquito Creek) to oligohaline (Fishing Creek). See *Section 5 – Site Location and Character* for detailed descriptions of the sites.

The secondary stations at Jehossee Island and Grove Plantation are used to track changes in the saltwater demarcation line. These two stations extend our coverage of the salinity gradient in the South Edisto River. The Jehossee Island station is in the mesohaline zone, and the Grove Plantation station is in the oligohaline to freshwater zone, approximately 0.16 km (0.1 nautical miles) downstream of the legal saltwater demarcation line. See *Section 5 – Site Location and Character* for detailed descriptions of the sites.

In July 2020, a station at the SCDNR Marine Resources Division campus was established, named Fort Johnson, in Charleston Harbor, which is approximately 53 km from St. Helena Sound estuary. This project strengthens the NERRS and IOOS collaborations and efforts to integrate long term monitoring data between the two programs. Funding for this station was provided by the SouthEast Coastal and Ocean Regional Association (SECOORA) through its’ IOOS grant. The establishment of a station in Charleston Harbor provides a multitude of benefits to a variety of stakeholders, including recreational and commercial boating interests, scientists, and managers. The deepening of Charleston Harbor Estuary to accommodate larger vessels will begin in early 2018, which may alter salinity regimes and circulation patterns within the harbor, and water quality data before and after this project will be of great value in assessing the project impacts.

YSI electronic data loggers are deployed to monitor the water temperature, specific conductance, dissolved oxygen, water level, pH and turbidity conditions, approximately 0.5 meters (1.64 ft) from the sediment. Turbidity monitoring was added to the program on April 11, 1996. Chlorophyll was added to the program with the Fort Johnson site. Initially the loggers measured the parameters at fifteen-minute intervals; on August 11, 1995, the sampling interval was changed to 30 minutes; and on December 12, 2007, the sampling interval was changed back to 15 minutes.

4) Research methods –

A single YSI sonde is attached to a deployment mount at each monitoring station in order to ensure that the sensors are positioned approximately 0.5 m (1.64 ft) from the creek bottom during a deployment. The deployment mount consists of a PVC pipe that is attached vertically to a stable structure. To facilitate water flow across the sensors, approximately two-inch diameter holes are drilled into the PVC pipes. In 2017-2018, additional holes were drilled into the new or refurbished tubes before they were swapped with existing tube on deployment mount. In 2019, the tubes were also painted with a copper-based antifouling paint on the bottom 1 m. (See Section 14 for more details on the history of deployment mounts at the monitoring stations.)

From 1995 to 2013, YSI 6600 series sondes were deployed at all monitoring stations. In 2019, YSI 6600 sondes were only deployed at Grove Plantation (replaced with EXO2 in December) and Jehossee Island; YSI EXO2 were deployed at the other four stations (Edisto Island, Fishing Creek, Mosquito Creek, and St. Pierre). We started to migrate to EXO2 sondes in 2014 when Edisto Island station came on online; Fishing Creek site was switched to an EXO2 sonde in 2016, St. Pierre Creek station in 2017, Mosquito Creek station in 2018, and Grove Plantation station in December 2019.

In 2018, ACE Basin Reserve started replacing the rapid pulse DO sensors with optical DO (ODO) sensors. The other stations were switched to ODO sensors during the following years: Fishing Creek station in 2016; Grove Plantation, Mosquito Creek, and St. Pierre stations in 2017; and Jehossee Island station in 2018. ODO sensor was always installed at the Edisto Island monitoring station.

A Sutron Sat-Link2 transmitter was installed at the St. Pierre station on 06/28/2006 and transmits data to the NOAA GOES satellite, NESDIS ID #3B02F20A; in 2017, the Sat-Link2 was replaced with a Storm3 transmitter. A Sutron Sat-Link2 transmitter was installed at the Fishing Creek station from 02/20/2013 to 08/31/2015 and transmitted to the NOAA GOES satellite, NESDIS ID #3B04B1CE. On June 8, 2018, Fishing Creek Sutron Sat-Link2 transmitter was installed at the Grove Plantation station and began transmitting data on 06/15/2016 to the NOAA GOES satellite, NESDIS ID #3B04B1CE; on 12/10/2019, the Sat-Link2 was replaced with a Storm3 transmitter in December 2019. On August 14, 2020, a telemetry unit was installed on the Fort Johnson site on and began transmitting data to the NOAA GOES satellite, NESDIS ID #3B008FBC. Transmissions from all stations 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>.

The Fort Johnson station also monitors chlorophyll fluorescence. Water samples taken near the sonde during a reading serves as the in-situ chlorophyll check. The samples are processed as follows:

The samples are filtered by ACE NERR staff within four hours of collection. While wearing gloves, 25 mm filters are placed on a clean manifold using clean forceps to prevent contamination, and the manifold is assembled. The sample bottle is gently agitated by 10 inversions to suspend the particulates and 40 mLs of agitated sample water is poured into a tube on the manifold. This process is repeated for all samples, rinsing the graduated cylinder with deionized water and sample water between bottles. The samples are then vacuum filtered and placed into scintillation vials, pigment filter side up. One mL of MgCO_3 is added to each scintillation vial. Filters are stored in a -20°C freezer until analysis. The ACE uses a modification of EPA Method 445.0 (EPA/600/R-92/121) to analyze the samples. Chlorophylls are analyzed using a Turner Trilogy Fluorometer with a non-acidification module. Thirty-six to 48 hours before analyzing the samples, 9 mL of acetone are added to each vial. The samples are vortexed and returned to the freezer. After 24 hours, the samples are removed from the freezer and vortexed again. Samples are analyzed 36-48 hours after initial acetone extraction.

Before the data loggers are deployed, the sondes are calibrated and programmed in accordance with guidelines set by CDMO and ACE Basin Reserve. The water depth sensor is zeroed in air by applying a depth offset during calibration that is calculated using the barometric pressure measured with a YSI handheld. The ROX DO sensors on the YSI 6600 and EXO2 sondes are calibrated by the air saturated water method, and the barometric pressure (mmHg) reading is measured with a YSI handheld. In prior years, the rapid pulse DO sensors on the YSI 6600 sondes were calibrated by the water saturated air method, and a DO membrane integrity test was performed on rapid pulse sensors to determine if the membrane was installed properly or was damaged during calibration. The pH sensor is calibrated by the two-point method (pH 7 and 10), and the turbidity sensor by the two-point method (0 standard and 124/126 NTU/FNU standard). In addition, a series of diagnostic values, including dissolved oxygen charge (rapid pulse only), dissolved oxygen gain, and pH millivolt value at pH 7 and at pH 10, and pH slope also are recorded during calibration process.

To minimize fouling (i.e., settlement of barnacles and sponges) of data loggers, sensors are wrapped in nonconductive copper tape. The inside of the PVC tube is brushed after every deployment to remove fouling organisms. The PVC tube is replaced with new or refurbished tube approximately once per year. Starting in 2019, the portions of the tubes that are always submerged were painted with copper-based anti-fouling paint (approximately 1 m from the bottom of the tube), and the fouling organisms growing on the outside of the tubes were scrapped off as needed. In 2019, we stopped wrapping a plastic mesh around the sensor guard.

The data loggers are deployed for one to two weeks during the summer months (April – September), and the sampling period is extended up to one month during the cooler months (October – March). A data logger is retrieved and replaced with a newly calibrated data logger prior to a 15-minute reading to prevent interruption of data collection. In-situ readings (water temperature, specific conductivity, salinity, and dissolved oxygen [% air sat and mg/L]) are measured with a hand-held YSI unit during the last 15-minute reading of the deployment

to determine how much drift in the readings occurred during the deployment. Ambient conditions (i.e., precipitation and cloud cover) also are recorded.

When the data loggers are retrieved, they are taken to the laboratory for cleaning, post-deployment checks and servicing, in accordance with guidelines set by CDMO and ACE Basin Reserve. Post-deployment checks of all the parameters are done before cleaning the sensors. Prior to April of 2019, sonde and sensors were cleaned before turbidity post-deployment checks. Wiper brushes and pads (ROX ODO only) are left on for the dissolved oxygen post-deployment check but removed prior to checking the remaining parameters. A clean wiper pad is installed on the 6600 turbidity sensor before the post-deployment checks. With the rapid pulse sensor, a DO membrane integrity test also was performed to determine if the membrane was damaged during deployment (no rapid pulse sensors were used in 2020). A series of diagnostic values, including dissolved oxygen charge (rapid pulse only), and pH millivolt value at pH 7 and at pH 10, and pH slope are recorded during post-deployment checks of data loggers. These diagnostic values are strong indicators of the individual sensor performance, and they are used to determine the accuracy of the data. The data are downloaded, and the dataset is reviewed to determine if any equipment malfunctions occurred during deployment that need immediate attention.

5) Site location and character –

ACE Basin National Estuarine Research Reserve is one of the largest undeveloped estuaries on the East Coast. The study area encompasses the Ashepoo, Combahee and South Edisto River basins, which empty into St. Helena Sound. The NERR consists of approximately 60,702 ha (150,000 acres) of diverse estuarine wetlands providing preserved habitats for fish and wildlife.

The South Edisto River has a drainage area of approximately 394,176 ha (974,030 ac), encompassing the area between Four Holes Swamp and St. Helena Sound. The river receives considerable input of freshwater (average annual streamflow is 74 m³/s, 2613.29 ft³/sec). The official saltwater-freshwater demarcation line on the river lies at river mile 20 (32.19 km); however, during periods of very low flow, the saltwater interface can intrude to river mile 32 (51.5 km), which is approximately 12 river miles (19.31 km) from the inland boundary of the reserve. Salt marshes of smooth cordgrass (*Spartina alterniflora*) dominate the wetlands in the euhaline, polyhaline, and mesohaline, while waterfowl impoundments are the dominant land cover in the oligohaline and fresh waters.

The average tidal range in the South Edisto River is approximately 2.0 m (6.6 ft), with a maximum of 2.8 m (9.2 ft) and a minimum of 1.4 m (4.6 ft). The bottom habitat at all stations consists of mud which is intermixed with dead shell hash at the saltwater sites.

Station Code	SWMP Status	Station Name	Location	Active Dates	Reason Decommissioned	Notes
aceeiwq	P	Edisto Island	32.5040 N -80.3247 W	01/01/2015 00:00 - current	NA	NA
acefcwq	P	Fishing Creek	32.63593 N -80.36556 W	10/01/2002 00:00 - current	NA	NA
acemcwq	P	Mosquito Creek	32.5558 N -80.4380 W	10/01/2002 00:00 - current	NA	NA
acespwq	P	St. Pierre	32.52800 N -80.36144 W	03/01/1995 00:00 - current	NA	NA
acegpwq	S	Grove Plantation	32.6637 N -80.4130 W	01/01/2015 00:00 - current	NA	NA
acejiwq	S	Jehossee Island	32.6209 N -80.3965 W	01/01/2015 00:00 - current	NA	NA
acefjwq	S	Fort Johnson	32.7533 N -79.8989 W	07/22/2020 15:15 – current	NA	NA
acechwq	S	Charleston Harbor	32.7573 N -79.8589 W	01/01/2018 00:00 – 08/30/2018	see Charleston Harbor description below	Data only avail. from ACE
acebbwq	P	Big Bay	32.4941 N -80.3241 W	03/01/1995 00:00 – 12/31/2014 00:00	see Big Bay description below	NA
acercwq	P	Rock Creek	32.54850 N -80.50361 W	03/01/1996 00:00 – 05/01/1996 00:00	see Rock Creek description	NA

Primary Monitoring Stations

Three of the four primary stations (Edisto Island, Fishing Creek, and St. Pierre Creek) are in tributaries of the South Edisto River and one station (Mosquito Creek) is in a tributary of both the South Edisto and Ashepoo rivers. The descriptions of the sites are as follow:

Edisto Island (EI) – GPS coordinates: 32.5040 N and -80.3247 W

On January 1, 2015, Edisto Island water quality station replaced the Big Bay station as a primary station. The Edisto Island station is approximately 1.27 km (0.68 nautical miles) upstream of the previous site (Big Bay) and is located on a dock at the Edisto Beach State Park. Water quality data was collected at both stations for 8 months and the overall results were very similar. Edisto Island station is also designated as a "treatment" site because of its proximity to developed areas. In 2020, the mean depth at the station was 2.66 m (8.9 ft), and the mean salinity was 27.50 practical salinity units (psu).

The eastern bank of the Big Bay creek, at the new station is bordered by *Spartina alterniflora* and *Salicornia virginica*. The high ground is dominated by maritime forest, characterized by live oak (*Quercus virginiana*), slash pine (*Pinus taeda*); and cabbage palmetto (*Sabal palmetto*). A marsh island with no high ground borders the western bank while American oyster (*Crassostrea virginica*) forms a reef along both creek banks. Boat traffic is heavy, especially during the warmer months, and the creek is closed to shellfish harvesting because of the surrounding human activities. Nonpoint sources of pollution, including fertilizers, pesticides, herbicides and PAHs, to the monitoring station are surface runoff from lawns, golf courses, and paved ramps. Docks and bulkheads are constructed of concrete or wood treated with creosote, CCA-treated, or Wolmanized process.

Fishing Creek (FC) – GPS coordinates: 32.63593 N and -80.36556 W

This monitoring station is in a tributary of Fishing Creek, approximately 2 km (1.08 nautical miles) from the mouth of the creek and is located approximately 5 m (16.41 ft) from the northern bank of the creek. The tributary flows through the eastern half of Jehossee Island, a Wildlife Management Area (WMA) protected by the USFWS, and Fishing Creek forms the northeast border of the island. The station is surrounded by extensive *Spartina cynosuroides* marsh and vast mud flats. The upland area is characterized by slash pine, live oak, and cabbage palmetto. In 2020, the mean depth at the station was 2.45 m (8.0 ft), and the mean salinity was 6.3 psu.

The Fishing Creek monitoring station is designated as a "control" site because there is no development in the immediate area, and boat traffic is relatively light in the creek. The WMA contains impoundments (formerly rice fields) that are managed as wildlife habitat for endangered fauna and migratory waterfowl. No pesticides or herbicides are applied to the wetlands. Water level in the wetland is regulated by rice trunks that control the flow of water between the impoundment and the South Edisto River.

Mosquito Creek (MC) – GPS coordinates: 32.5558 N and -80.4380 W

This monitoring station is in Mosquito Creek (a tributary of both the South Edisto and Ashepoo rivers), approximately 2.51 km (1.36 nautical miles) from the Ashepoo River and 12 km (6.48 nautical miles) from the South Edisto River, and it is approximately 5 m (16.41 ft) from the southern bank of the creek. In 2020, the mean depth at the station was 4.04 m (13.3 ft), and the mean salinity was 13.3 psu.

The Mosquito Creek station is designated as a "treatment" site because of the land use practices in the surrounding area. Agriculture fields and impounded wetlands are found upstream of the monitoring station. Approximately fifteen docks constructed of creosote, concrete, Wolmanized or CCA treated wood; a public boat landing; a commercial seafood business with commercial shrimp boats and a fueling dock are located approximately 1.00 km (0.54 nautical miles) downstream of the monitoring station. The major contributor of nonpoint source pollution to the monitoring station is surface runoff from the impoundments and agricultural lands that contain high levels of nutrients and, at times, herbicides and pesticides. Impoundment trunks open and drain into the creek increasing the nutrient load and possibly introducing herbicides and pesticides. Vegetation in the area includes salt marsh dominated by *Spartina alterniflora* and *Juncus roemerianus*. Upland fringe areas consist of cabbage palmetto, live oaks and pine trees.

St. Pierre Creek (SP) – GPS coordinates: 32.52800 N and -80.36144 W

This monitoring station is in a small tributary of St. Pierre Creek, approximately 0.25 km (0.13 nautical miles) from the mouth of the creek, and it is approximately 5 m (16.41 ft) from the northern bank of the creek. The tributary flows through the southern portion of Bailey Island, and the creek forms the eastern border of the island. The monitoring station is surrounded by a wide expanse of *Spartina alterniflora* marsh. Extensive mud flats and oyster reefs fringe the banks. Maritime forest communities comprised of species such as wax myrtles (*Morella cerifera*), live oaks (*Quercus virginiana*), and palmettos dominate the upland areas. In 2020, the mean depth at the station was 1.95 m (6.5 ft), and the mean salinity was 26.4 psu.

The St. Pierre Creek station is designated as a “control” site because development in the immediate area was sparse when the station was established on March 3, 1995, and the tributary is subject to relatively light boat traffic. In 1996, the 695-acre (281.26 ha) island was sold, and the owners partnered with The Nature Conservancy to design a conservation-based development. Four hundred and three acres in the center of Bailey Island were set aside as a nature preserve that is managed by The Nature Conservancy, and the number of residential lots on the remaining 292 acres (118.17 ha) is limited to 67 (27.11 ha). Access to the island is limited to one bridge and all roads on the island are single lane and made of crushed seashells. In addition, a conservation manual was developed for the property owners that provide specific lot designs and construction guidelines as well as landscaping guidelines to protect the maritime and estuarine habitats.

Secondary Monitoring Stations

Both secondary stations (Grove Plantation and Jehossee Island) are in the South Edisto River proper. The descriptions of the sites are as follow:

Grove Plantation (GP) – GPS coordinates: 32.6637 N and -80.4130 W

This monitoring station is in the South Edisto River located at the Grove Plantation unit of the ACE Basin National Wildlife Refuge, which is owned and managed by the US Fish and Wildlife Service (USFWS). The station is approximately 18 m (59 ft) from the eastern bank of the Edisto River. The station is surrounded by tidal freshwater fringe marsh and managed wetlands (aka “waterfowl impoundments”). The upland area is dominated by pine-mixed hardwood forest that is characterized by several species of oaks and pines. During years of normal rainfall, the salinity at this station generally is below 1 psu, but it will increase if rainfall is low. In 2020, the average depth at the station was 3.44 m (11.3 ft), and the mean salinity was 0.1 psu.

Jehossee Island (JI) – GPS coordinates: 32.6209 N and -80.3965 W

This monitoring station is in the South Edisto River. It is located at the Jehossee Island unit of the ACE Basin National Wildlife Refuge, which is owned and managed by the USFWS. The station is surrounded by *Spartina cynosuroides* fringe marsh and managed wetlands (aka “waterfowl impoundments”). The upland area is dominated by inland maritime forest that is characterized by slash pine, live oak, and cabbage palmetto. During years of normal rainfall, the salinity at this station generally is between 5 and 10 psu, and it will increase if rainfall is low. In 2020, the average depth at the station was 4.77 m (15.8 ft), and the mean salinity was 2.0 psu. Note: these averages are based four months of data (January-March and December) because the station was out of service.

Fort Johnson (FJ) – GPS coordinates: 32.7533 N and -79.8989 W

This monitoring station is in Charleston Harbor on the southern side near the confluence of the Ashley River. The deployment mount is attached to the outer piling of SC DNR/Marine Resources Division boat slip. In 2020, the average depth at the station was 1.75 m (5.9 ft), and the mean salinity was 24.7 psu.

Inactive Monitoring Stations

Big Bay, Charleston Harbor, and Rock Creek are inactive stations, and the descriptions of the sites are as follow:

Big Bay (BB) – GPS coordinates: 32.4941 N and -80.3241 W

This monitoring station was in Big Bay Creek proper, approximately 2 km (1.24 mi) from the mouth of the creek and was located about 5 m (16.41 ft) from the southern bank of the creek. It was a "treatment" site because it was subject to nonpoint source pollution and was surrounded by moderate level of development. The southern bank of the Big Bay Creek near this station was bordered by residential and commercial development, with little setback from the bordering *Spartina alterniflora* marsh. For instance, there are over forty private docks, two commercial seafood docks and a marina with 75 slips, three paved boat ramps, and two fueling areas along the southern bank. Docks and bulkheads are constructed of concrete, or creosote, CCA-treated or Wolmanized material. Boat traffic was heavy, especially during the warmer months, and the creek is closed to shellfish harvesting because of the surrounding human activities. The major sources of nonpoint source pollution were surface runoff from lawns, golf courses, and paved ramps that contain fertilizers, pesticides, herbicides and PAHs. All of the high ground along the southern bank was developed (i.e., residential homes, condominiums and restaurants); and maritime plant communities have been replaced by golf courses, lawns and ornamental gardens. Small patches of a few maritime species (i.e. live oak (*Quercus virginiana*), cabbage palmetto (*Sabal palmetto*), and Southern red cedar (*Juniperus silicicola*)) are found along the roads. In contrast, the northern bank was bordered by a wide expanse of *Spartina alterniflora* marsh, and no high ground is present. American oyster (*Crassostrea virginica*) forms a reef along the creek banks, especially the northern side, and on intertidal mud flats within the creek. The site was moved to Edisto Island due to the dock upon which it was located was owned by a private individual that was not maintaining the structure. Water quality data was collected at both stations for 8 months and the overall results were very similar.

Charleston Harbor (CH) – GPS coordinates: 32.7573 N and -79.8589 W

The Charleston Harbor station was about 85 meters from Fort Moultrie on Sullivans Island to the east, and about 0.8 km north from the mouth of Charleston Harbor Estuary. Fort Moultrie is a National Monument and part of the Fort Sumter National Park. The station was surrounded by water on three sides, and by beach to the east. The Charleston Harbor data and metadata are only available by contacting the reserve directly. Data was collected from 11/29/2017 to 08/30/2018. The site was destroyed on 08/30/2019. Data and metadata are only available directly from the ACE Basin NERR.

Rock Creek (RC) – GPS coordinates: 32.54850 N and -80.50361 W

The Rock Creek site was located near an impoundment on North Hutchinson Island. The site was surrounded by *Spartina alterniflora* marsh, and the upland areas were dominated by maritime forest with wax myrtles, live oaks, and palmettos. An impoundment (a managed wildlife habitat) bordered the *Spartina alterniflora* marsh near the site, and the outlet canal for the impoundment was about one meter away from the site. There was no development and very little boat traffic in this portion of the Reserve. The site was discontinued due to the loss of the deployment mount and data logger in July 1995.

6) Data collection period –

The end times below marked with an asterisk (*) coincide with the last actual reading in that deployment so the times will not be in consecutive order with the following deployment begin time. The gap between the end time of one deployment and the begin time of the next deployment is attributed to either missing or rejected data due to in field maintenance, battery failure, collector error, or sonde was lost. **Note:** see Section 14 for more information about the stations.

Edisto Island

BEGAN	ENDED	SONDE
12/10/2019 – 12:15	01/06/2020 – 11:45	EXO2
01/06/2020 – 12:00	02/05/2020 – 10:30	EXO2
02/05/2020 – 10:45	03/06/2020 – 10:45	EXO2
03/06/2020 – 11:00	03/18/2020 – 09:45	EXO2
03/18/2020 – 10:00	04/23/2020 – 08:45	EXO2
04/23/2020 – 09:00	05/21/2020 – 09:45	EXO2
05/21/2020 – 10:00	06/02/2020 – 10:15	EXO2
06/02/2020 – 10:30	06/17/2020 – 12:45	EXO2
06/17/2020 – 13:00	07/01/2020 – 10:30	EXO2
07/01/2020 – 10:45	07/17/2020 – 08:45	EXO2

07/17/2020 – 09:00	07/30/2020 – 09:00	EXO2
07/30/2020 – 09:15	08/12/2020 – 09:00	EXO2
08/12/2020 – 09:15	08/27/2020 – 09:30	EXO2
08/27/2020 – 09:45	09/10/2020 – 12:00	EXO2
09/10/2020 – 12:15	09/23/2020 – 11:45	EXO2
09/23/2020 – 12:00	09/30/2020 – 11:15	EXO2
09/30/2020 – 11:30	10/13/2020 – 09:45	EXO2
10/13/2020 – 10:00	11/13/2020 – 12:00*	EXO2
11/13/2020 – 12:30	12/09/2020 – 09:30	EXO2
12/09/2020 – 09:45	01/12/2021 – 11:00	EXO2

Fishing Creek

BEGAN	ENDED	SONDE
12/09/2019 – 12:15	01/06/2020 – 10:45*	EXO2
01/06/2020 – 11:15	02/05/2020 – 10:15	EXO2
02/05/2020 – 10:30	03/06/2020 – 12:30	EXO2
03/06/2020 – 12:45	03/18/2020 – 09:45	EXO2
03/18/2020 – 10:00	04/30/2020 – 12:00	EXO2
04/30/2020 – 12:15	06/02/2020 – 10:30	EXO2
06/02/2020 – 10:45	06/16/2020 – 11:30	EXO2
06/16/2020 – 11:45	07/01/2020 – 09:45	EXO2
07/01/2020 – 10:00	07/17/2020 – 11:30	EXO2
07/17/2020 – 11:45	07/30/2020 – 11:45	EXO2
07/30/2020 – 12:00	08/13/2020 – 11:00	EXO2
08/13/2020 – 11:15	08/27/2020 – 08:30	EXO2
NO DATA COLLECTED FROM 08/27/2020 – 08:45 to 09/10/2020 – 08:15		
09/10/2020 – 08:30	09/30/2020 – 12:00	EXO2
09/30/2020 – 12:15	10/13/2020 – 10:00	EXO2
10/13/2020 – 10:15	11/13/2020 – 11:45	EXO2
11/13/2020 – 12:00	12/10/2020 – 09:00	EXO2
12/10/2020 – 09:15	01/12/2021 – 09:30	EXO2

Grove Plantation

BEGAN	ENDED	SONDE
12/17/2019 – 13:00	01/06/2020 – 11:30	EXO2
01/06/2020 – 11:45	02/05/2020 – 10:45	EXO2
02/05/2020 – 11:00	03/06/2020 – 13:15	EXO2
03/06/2020 – 13:30	03/18/2020 – 10:15	EXO2
03/18/2020 – 10:30	04/30/2020 – 13:15*	EXO2
04/30/2020 – 13:45	06/02/2020 – 11:15	EXO2
06/02/2020 – 11:30	06/16/2020 – 12:00	EXO2
06/16/2020 – 12:15	07/01/2020 – 10:15	EXO2
07/01/2020 – 10:30	07/17/2020 – 12:00	EXO2
07/17/2020 – 12:15	07/30/2020 – 12:15	EXO2
07/30/2020 – 12:30	08/13/2020 – 10:30	EXO2
08/13/2020 – 10:45	08/27/2020 – 09:00	EXO2
08/27/2020 – 09:15	09/10/2020 – 08:45	EXO2
09/10/2020 – 09:00	09/30/2020 – 12:30	EXO2
09/30/2020 – 12:45	10/13/2020 – 10:30	EXO2
10/13/2020 – 10:45	10/29/2020 – 09:30	EXO2
10/29/2020 – 09:45	11/13/2020 – 12:15	EXO2
11/13/2020 – 12:30	12/10/2020 – 09:30	EXO2
12/10/2020 – 09:45	01/12/2021 – 13:00	EXO2

Jehossee Island

BEGAN	ENDED	SONDE
12/09/2019 – 11:30	01/01/2020 – 01:30*	6600 EDS/V2
01/06/2020 – 10:45	02/05/2020 – 09:45	6600 EDS/V2
02/05/2020 – 10:00	03/06/2020 – 12:00	6600 EDS/V2
NO DATA COLLECTED FROM 03/06/2020 – 12:15 to 12/11/2020 – 12:30		
12/11/2020 – 12:45	01/12/2021 – 10:00	6600EDS/V2

Mosquito Creek

BEGAN	ENDED	SONDE
12/09/2019 – 10:30	01/06/2020 – 09:00	EXO2
01/06/2020 – 09:15	02/05/2020 – 09:00	EXO2
02/05/2020 – 09:15	03/06/2020 – 10:45*	EXO2
03/06/2020 – 11:15	03/18/2020 – 08:45	EXO2
03/18/2020 – 09:00	04/27/2020 – 12:30	EXO2
04/27/2020 – 12:45	06/02/2020 – 09:30	EXO2
06/02/2020 – 09:45	06/16/2020 – 10:30	EXO2
06/16/2020 – 10:45	07/01/2020 – 08:45	EXO2
07/01/2020 – 09:00	07/17/2020 – 10:30	EXO2
07/17/2020 – 10:45	07/30/2020 – 10:45	EXO2
07/30/2020 – 11:00	08/13/2020 – 11:45	EXO2
08/13/2020 – 12:00	08/27/2020 – 07:30	EXO2
08/27/2020 – 07:45	09/10/2020 – 10:15	EXO2
09/10/2020 – 10:30	09/30/2020 – 11:00	EXO2
09/30/2020 – 11:15	10/13/2020 – 09:00	EXO2
10/13/2020 – 09:15	11/13/2020 – 11:00	EXO2
11/13/2020 – 11:15	12/10/2020 – 08:15	EXO2
12/10/2020 – 08:30	01/12/2021 – 11:30	EXO2

St. Pierre

BEGAN	ENDED	SONDE
12/09/2019 – 09:15	01/06/2020 – 08:15	EXO2
01/06/2020 – 08:30	02/05/2020 – 08:00	EXO2
02/05/2020 – 08:15	03/06/2020 – 09:45	EXO2
03/06/2020 – 10:00	03/18/2020 – 07:45	EXO2
03/18/2020 – 08:00	04/10/2020 – 02:15*	EXO2
04/27/2020 – 09:15	05/11/2020 – 23:30*	EXO2
05/20/2020 – 08:15	06/02/2020 – 08:30	EXO2
06/02/2020 – 08:45	06/16/2020 – 08:15	EXO2
06/16/2020 – 08:30	07/01/2020 – 07:45	EXO2
07/01/2020 – 08:00	07/17/2020 – 09:45	EXO2
07/17/2020 – 10:00	07/30/2020 – 10:00	EXO2
07/30/2020 – 10:15	08/12/2020 – 08:15	EXO2
08/12/2020 – 08:30	08/27/2020 – 06:45	EXO2
08/27/2020 – 07:00	09/10/2020 – 11:00	EXO2
09/10/2020 – 11:15	09/30/2020 – 10:15	EXO2
09/30/2020 – 10:30	10/13/2020 – 08:00	EXO2
10/13/2020 – 08:15	11/13/2020 – 10:15	EXO2
11/13/2020 – 10:30	12/09/2020 – 08:30*	EXO2
12/09/2020 – 09:00	01/12/2021 – 13:30	EXO2

Fort Johnson

BEGAN	ENDED	SONDE
07/22/2020 – 14:15	08/06/2020 – 11:15	EXO2
08/06/2020 – 11:30	08/14/2020 – 11:15	EXO2

08/14/2020 – 11:30	09/10/2020 – 11:15	EXO2
09/10/2020 – 11:30	09/23/2020 – 11:30	EXO2
09/23/2020 – 11:45	10/28/2020 – 11:15	EXO2
10/28/2020 – 11:30	11/19/2020 – 14:15	EXO2
11/19/2020 – 14:30	12/17/2020 – 13:45*	EXO2
12/17/2020 – 14:15	01/21/2021 – 15:00	EXO2

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 2020.

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 –

As part of the System-wide Monitoring Program (SWMP), nutrient and weather data are gathered at the ACE NERR in conjunction with water quality data obtained by YSI 6600-EDS or YSI EXO2 data loggers and meteorological data obtained by a Campbell Scientific CR1000 data logger. Diel nutrient samples are gathered once per month at the St. Pierre water quality monitoring station, and grab samples are obtained at each of the four sites once per month. The concentrations of the following parameters are measured and recorded for the nutrient monitoring program: ammonium (NH₄), nitrite + nitrate (NO₂ + NO₃), ortho-phosphate (PO₄), and chlorophyll-A (Chl-a). Real-time weather data are gathered 24/7 and is transmitted to the Centralized Data Management Office (CDMO). Historic water quality, nutrient, and weather data can be obtained at <http://cdmo.baruch.sc.edu>. Information about other studies conducted in the ACE Basin may be obtained from the ACE NERR Research Coordinator.

II. Physical Structure Descriptors

9) Sensor specifications –

ACE NERR deployed EXO2 data sondes and 6600 EDS/V2 data sondes in 2019: 6600 sondes at GP and JI monitoring stations, and EXO2 sondes at EI, FC, MC, and SP; Charleston Harbor station was not operational in 2019. GP was switched to EXO2 in December of 2019. The EXO2 data sondes were configured the same, and the 6600 data sondes were configured the same. Optical DO sensors were installed at all monitoring stations.

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, polarographic
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

Parameter: Dissolved Oxygen mg/L (Calculated from % air saturation, temperature, and salinity)
Units: milligrams/Liter (mg/L)
Sensor Type: Rapid Pulse – Clark type, polarographic
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

Parameter: Dissolved Oxygen % saturation
Units: percent air saturation (%)
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: 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
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

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: +/- .005
Resolution: 0.01 C

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: $\pm 1\%$ 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: $\pm 2\%$ 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: $\pm 1\%$ of the reading or 1% air saturation, whichever is greater 200-500% air saturation: $\pm 5\%$ 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: $\pm 5\%$ 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: ± 0.01 units within $\pm 10^\circ$ of calibration temperature, ± 0.02 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 $\pm 2\%$ of reading (whichever is greater); 1000 to 4000 FNU $\pm 5\%$ 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: 0.1 ug/L chl a, 0.1% FS

Dissolved Oxygen Qualifier (Rapid Pulse / Clark type sensor): The reliability of dissolved oxygen (DO) data collected with the rapid pulse / Clark type sensor after 96 hours post-deployment for non-EDS (Extended Deployment System) data sondes may be problematic due to fouling which forms on the DO probe membrane during some deployments (Wenner et al. 2001). Some Reserves utilize the YSI 6600 EDS data sondes, which increase DO accuracy and longevity by reducing the environmental effects of fouling. Optical DO probes have further improved data reliability. The user is therefore advised to consult the metadata for sensor type information and to exercise caution when utilizing rapid pulse / Clark type sensor DO data beyond the initial 96-hour time period. Potential drift is not always problematic for some uses of the data, i.e. periodicity analysis. It should also be noted that the amount of fouling is very site specific and that not all data are affected. If there are concerns about fouling impacts on DO data beyond any information documented in the metadata and/or QAQC flags/codes, please contact the Research Coordinator at the specific NERR site regarding site and seasonal variation in fouling of the DO sensor.

Depth Qualifier: The NERR System-Wide Monitoring Program utilizes YSI data sondes that can be equipped with either vented or non-vented depth/level sensors. Readings for both vented and non-vented sensors are automatically compensated for water density change due to variations in temperature and salinity; but for all non-vented depth measurements, changes in atmospheric pressure between calibrations appear as changes in water depth. The error is equal to approximately 1.02 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: $(1013 - BP) * 0.0102 + \text{Depth/Level} = \text{cDepth/cLevel}$.

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:

Edisto Island EI aceeiwq

Fishing Creek FC acefcwq

Grove Plantation GP acegpwq

Jehossee Island JI acejiwq

Mosquito Creek MC acemcwq

St. Pierre Creek SP acespwq

Fort Johnson FJ acefjwq

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 –

Edisto Island

Deployment	Post-Deployment Checks
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Date (m/d/y)	SpCond (ms/cm)	DO 1 (100% sat)	DO 2 (100% sat)	Depth (m)	pH (7)	pH (10)	Turb (FNU)	Turb (FNU)
12/10/2019	50.03	101.5	101.5	0.170	7.07	10.01	-0.02	127.05
01/06/2020	50.16	100.6	100.6	0.025	7.10	10.09	0.32	130.76
02/05/2020	50.03	100.4	100.4	0.206	7.06	10.09	0.54	123.78
03/06/2020	50.13	101.1	101.1	0.275	7.03	10.15	0.00	124.70
03/18/2020	49.59	100.4	100.5	0.001	7.14	10.19	1.38	125.53
04/23/2020	49.91	99.2	99.2	0.078	7.12	10.12	0.48	127.02
05/21/2020	46.24	99.1	99.1	0.051	6.97	9.99	-0.14	122.94
06/02/2020	49.85	99.5	99.5	0.102	7.07	10.10	-0.08	123.58
06/17/2020	49.69	98.3	98.3	0.004	7.06	10.08	0.14	122.19
07/01/2020	49.34	100.7	100.7	0.114	7.08	10.15	0.84	126.70
07/17/2020	50.25	100.2	100.2	0.035	7.01	10.08	0.23	126.70
07/30/2020	49.90	99.8	99.8	0.076	7.07	10.11	0.04	125.08
08/12/2020	49.53	99.4	99.4	0.015	7.10	10.08	-0.16	127.26
08/27/2020	49.56	99.4	99.4	0.098	7.12	10.08	0.14	127.73
09/10/2020	49.44	99.7	99.7	0.046	7.10	10.12	0.37	123.63
09/23/2020	49.99	99.3	99.3	0.043	7.06	10.10	-0.05	125.10
09/30/2020	50.17	99.6	99.6	0.056	7.16	10.20	0.16	127.41
10/13/2020	48.74	99.3	99.3	0.217	7.09	10.14	1.35	129.44
11/13/2020	50.26	98.1	98.1	-0.023	6.99	10.02	0.32	126.45
12/09/2020	50.18	99.9	99.9	0.261	7.24	10.27	1.30	125.32

Fishing Creek

Deployment Date (m/d/y)	Post-Deployment Checks							
	SpCond (ms/cm)	DO 1 (100% sat)	DO 2 (100% sat)	Depth (m)	pH (7)	pH (10)	Turb (FNU)	Turb (FNU)
12/09/2019	50.56	100.7	100.7	0.149	7.17	10.09	0.54	135.88
01/06/2020	50.20	99.8	99.8	-0.053	7.12	10.12	0.13	128.81
02/05/2020	50.17	100.3	100.3	0.192	7.47	10.43	0.42	123.62
03/06/2020	50.12	101.5	101.5	0.126	7.06	10.07	0.35	123.17
03/18/2020	49.29	99.9	99.9	-0.058	7.14	10.12	0.18	126.42
04/30/2020	49.55	99.7	99.7	0.047	7.06	10.08	0.07	122.78
06/02/2020	49.81	99.8	99.8	0.083	7.15	10.11	0.25	122.96
06/16/2020	49.55	98.1	98.1	0.006	7.04	10.07	0.47	122.72
07/01/2020	49.30	100.3	100.3	0.096	7.09	10.11	0.08	125.18
07/17/2020	50.34	99.9	99.9	0.032	7.11	10.08	0.22	126.43
07/30/2020	49.44	100.6	100.6	0.026	7.06	10.04	0.42	231.41
08/13/2020	49.75	98.6	98.6	0.018	7.06	10.05	-0.13	127.04
08/27/2020	49.46	100.1	100.1	0.057	7.09	10.08	0.19	127.63
09/10/2020	50.13	99.2	99.2	0.037	7.08	10.10	0.03	125.05
09/30/2020	48.85	99.9	99.9	0.057	7.07	10.09	-0.06	126.41
10/13/2020	49.67	99.5	99.5	0.112	7.11	10.12	0.07	127.85
11/13/2020	39.18	100.3	100.3	-0.028	7.09	10.13	0.21	126.15
12/10/2020	50.17	100.2	100.2	0.070	7.13	10.15	0.66	125.65

Grove Plantation

Deployment Date (m/d/y)	Post-Deployment Checks							
	SpCond (ms/cm)	DO 1 (100% sat)	DO 2 (100% sat)	Depth (m)	pH (7)	pH (10)	Turb (FNU)	Turb (FNU)
12/17/2019	50.25	101.9	101.9	0.176	7.21	10.15	0.12	126.89

01/06/2020	50.11	101.2	101.2	-0.043	7.07	10.07	0.72	129.04
02/05/2020	50.09	99.2	99.2	0.158	7.19	10.16	0.00	123.73
03/06/2020	50.14	102.8	102.8	0.142	7.02	10.07	0.04	123.25
03/18/2020	49.66	99.3	99.3	0.104	7.07	10.09	2.33	128.59
04/30/2020	49.55	99.8	99.8	0.058	7.13	10.14	0.62	123.11
06/02/2020	49.81	100.1	100.1	0.083	6.90	9.90	0.46	122.71
06/16/2020	49.77	98.7	98.7	-0.008	6.97	10.02	0.05	121.65
07/01/2020	48.19	100.9	100.9	0.069	7.09	10.09	1.53	125.50
07/17/2020	50.59	99.7	99.7	0.028	6.95	10.03	0.36	126.37
07/30/2020	49.42	99.6	99.6	0.017	7.09	10.12	1.40	124.60
08/13/2020	50.02	100.1	100.1	0.015	7.08	10.08	-0.11	123.97
08/27/2020	49.05	100.1	100.1	0.062	7.10	10.08	0.13	127.84
09/10/2020	50.24	100.1	100.1	0.026	7.09	10.08	-0.01	124.16
09/30/2020	50.34	99.9	99.9	0.053	7.28	10.23	0.14	127.51
10/13/2020	50.03	98.7	98.7	0.033	7.08	10.01	-0.49	127.09
10/29/2020	48.82	100.3	100.3	0.201	7.04	10.30	1.76	127.15
11/13/2020	49.77	100.4	100.4	-0.032	6.94	10.01	0.19	126.71
12/10/2020	51.40	102.9	102.9	0.043	7.20	10.16	0.20	125.00

Jehossee Island

Deployment Date (m/d/y)	Post-Deployment Checks							
	SpCond (ms/cm)	DO 1 (100% sat)	DO 2 (100% sat)	Depth (m)	pH (7)	pH (10)	Turb (NTU)	Turb (NTU)
12/09/2019	50.26	100.8	100.8	0.228	7.13	10.03	0.0	130.5
01/06/2020	50.05	100.7	100.7	-0.064	6.89	9.91	0.3	134.8
02/05/2020	49.86	106.9	106.9	0.210	7.28	10.33	0.8	126.1
12/11/2020	50.29	100.8	100.8	0.018	7.10	9.79	6.0	401.9

Mosquito Creek

Deployment Date (m/d/y)	Post-Deployment Checks							
	SpCond (ms/cm)	DO 1 (100% sat)	DO 2 (100% sat)	Depth (m)	pH (7)	pH (10)	Turb (FNU)	Turb (FNU)
12/09/2020	50.20	101.4	101.4	0.125	7.08	10.05	0.61	128.36
01/06/2020	50.52	116.1	116.1	-0.064	7.16	10.15	0.60	129.44
02/05/2020	50.13	100.8	100.8	0.254	7.09	10.12	-0.21	122.94
03/06/2020	50.11	102.2	102.2	0.139	7.00	10.04	0.13	123.75
03/18/2020	49.42	101.4	101.4	0.085	7.11	10.14	0.34	126.81
04/27/2020	46.06	99.8	99.8	0.036	7.26	10.27	0.23	122.62
06/02/2020	49.69	100.2	100.2	0.087	7.11	10.07	0.12	122.65
06/16/2020	49.97	99.2	99.2	-0.001	7.09	10.12	-0.01	121.54
07/01/2020	49.15	100.4	100.4	0.070	7.06	10.03	1.27	127.45
07/17/2020	50.82	99.6	99.6	0.039	7.03	10.04	-0.16	125.26
07/30/2020	49.57	99.1	99.1	0.027	7.13	10.16	1.31	126.10
08/13/2020	50.41	101.0	101.0	0.014	7.13	10.07	-0.28	128.31
08/27/2020	49.52	98.5	98.5	0.064	7.08	10.09	0.17	127.48
09/10/2020	49.79	100.0	100.0	0.056	7.13	10.13	-0.03	126.95
09/30/2020	50.38	99.9	99.9	0.057	7.06	10.09	0.03	126.96
10/13/2020	49.61	99.6	99.6	0.106	7.10	10.11	1.25	128.09
11/13/2020	49.56	100.2	100.2	-0.021	7.04	10.09	0.24	123.40
12/10/2020	50.04	100.5	100.5	0.054	7.07	10.07	1.86	125.83

St. Pierre

Deployment Date (m/d/y)	Post-Deployment Checks							
	SpCond (ms/cm)	DO 1 (100% sat)	DO 2 (100% sat)	Depth (m)	pH (7)	pH (10)	Turb (FNU)	Turb (FNU)

12/09/2019	50.08	102.5	102.5	0.165	7.10	10.05	0.05	127.40
01/06/2020	50.18	100.7	100.7	-0.076	7.11	10.12	0.02	129.04
02/05/2020	50.23	99.7	99.7	0.235	7.08	10.10	0.13	123.55
03/06/2020	50.11	102.4	102.4	0.168	7.08	10.09	0.45	123.03
03/18/2020	49.55	99.2	99.2	0.059	7.18	10.18	0.46	122.26
04/27/2020	49.97	98.6	98.6	0.056	7.08	10.09	0.05	125.67
05/20/2020	49.62	100.1	100.1	0.039	6.49	6.49	0.46	122.62
06/02/2020	49.61	100.3	100.3	0.096	7.02	10.01	0.34	123.23
06/16/2020	49.67	99.4	99.4	0.006	7.08	10.07	0.62	123.86
07/01/2020	49.22	100.6	100.6	0.104	7.07	10.07	0.64	125.06
07/17/2020	50.56	99.5	99.5	0.037	7.08	10.09	-0.36	126.73
07/30/2020	49.53	100.4	100.4	0.021	7.10	10.13	0.88	124.97
08/12/2020	50.01	99.6	99.6	0.012	7.05	10.07	-0.12	127.36
08/27/2020	49.70	100.6	100.6	0.076	7.10	10.11	0.07	127.37
09/10/2020	50.44	99.3	99.3	0.039	7.06	10.08	-0.03	122.47
09/30/2020	50.21	99.8	99.8	0.060	7.04	10.06	-0.03	125.32
10/13/2020	49.62	99.7	99.7	0.095	7.07	10.11	0.33	130.75
11/13/2020	49.93	100.3	100.3	-0.020	7.56	10.42	-0.15	126.75
12/09/2020	50.48	99.8	99.8	0.055	7.07	10.10	-1.01	125.71

Fort Johnson

Deployment Date (m/d/y)	Post-Deployment Checks								Chl (mg/L)
	SpCond (ms/cm)	DO 1 (100% sat)	DO 2 (100% sat)	Depth (m)	pH (7)	pH (10)	Turb (FNU)	Turb (FNU)	
07/22/2020	50.25	100.1	100.1	0.068	7.11	10.11	0.02	124.89	72.34
08/06/2020	49.56	100.1	100.1	0.010	7.08	10.05	0.64	126.07	81.48
08/11/2020	49.82	100.4	100.4	0.068	7.09	10.10	0.18	126.94	65.31
09/09/2020	50.10	100.1	100.1	0.041	7.18	10.18	-0.02	124.32	65.98
09/23/2020	47.92	100.4	100.4	0.024	7.19	10.13	0.23	125.54	67.91
10/28/2020	50.47	101.6	101.6	0.210	7.05	10.15	0.02	125.28	69.83
11/19/2020	49.17	101.0	101.0	0.217	7.02	10.04	0.22	126.93	69.32
12/17/2020	50.33	97.0	97.0	0.027	7.04	10.13	0.47	125.97	67.65

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.

ACE NERR Water Quality Site Histories

Primary Sites

Edisto Island:

2014 – Water quality station was installed in **May** – Fasteners used to attach tube to the dock.

2015 – Site officially went online on **January 1**. (Coordinates: 32.5040 N and -80.3247 W)

2017 – PVC tube swapped with new tube with more holes along the length of tube on **December 1**.

2019 – PVC tube swapped with new tube with antifouling paint near bottom and the bottom strut was replaced on **February 28**.

2020 – The PVC tube was not swapped in 2020 but the outside of PVC tube was scraped to remove biofouling on **December 9**.

Fishing Creek:

2002 – Fishing Creek site installed in **October** (Coordinates: 32.63593 N and -80.36556 W).

2010 – Fishing Creek sign post mount was replaced in **January** with a 40-ft, 8-in diameter pressure-treated piling.

2012 – Fishing Creek site PVC tube replaced on **May 31** – Fasteners used to attach tube to the piling.

2013 – Sutron Sat-Link2 transmitter installed in **March** at Fishing Creek to transmit real-time data.

2015 – Sutron Sat-Link2 telemetry equipment removed on **August 31**.

2016 – Fishing Creek site 6600 sondes were replaced with EXO2 sondes on **December 14**.

2017 – PVC tube swapped with new tube with more holes along the length of tube on **December 11**.

2019 – PVC tube swapped with new tube with antifouling paint near bottom on **March 28**.

2020 – The PVC tube was not swapped in 2020 but the outside of PVC tube was scraped.

Mosquito Creek:

2002 – Mosquito Creek site installed in **October** (Coordinates: 32.5558 N and -80.4380 W).

2007 – Deployment mount installed 0.5 meters away from old mount in **August**. This is a deeper location.

2009 – Site mount moved due to demolition of old bridge and construction of new one at same location in **August** (about 0.2 meters deeper).

2012 – Mosquito Creek site PVC tube was leaning during **May 2** and **May 16** deployments.

2012 – Mosquito Creek site PVC tube replaced on **May 31** – Fasteners used to attach tube to the bridge.

2016 – PVC tube was replaced, and a new mounting structure was installed on **May 17**.

2017 – Rapid Pulse DO sensors on YSI 6600 sondes were replaced with Optical DO sensors on **July 5**.

2018 – PVC tube swapped with new tube with more holes along the length of tube on **February 27**.

2018 – YSI 6600 sonde was replaced with EXO2 sonde on **November 5**.

2019 – PVC tube swapped with new tube with antifouling paint near bottom on **May 13**.

2020 – The PVC tube was not swapped in 2020 but the outside of PVC tube was scraped.

St. Pierre Creek:

1995 – Water quality station was installed in **March**. (Coordinates: 32.52800 N and -80.36144 W).

2000 – Site moved to other side of channel in **April** (Coordinates changed: 32.5279 N -80.3615 W).

2006 – Sign post mount was replaced in **May** – with a 40-ft, 8-in diameter pressure-treated piling.

2006 – Sutron Sat-Link2 transmitter was installed in **June**.

2009 – St. Pierre site PVC tube replaced in **June** (about 0.06 meters deeper).

2012 – St. Pierre site PVC tube replaced on **June 1** – Fasteners used to attach tube to the piling.

2016 – PVC tube was re-positioned on piling on **July 18**.

2016 – Yagi antenna was replaced with the top hat design on **September 12**.

2016 – ISCO platforms were removed, and one was installed at different position on **November 4**.

2017 – PVC tube was re-positioned on piling on **June 6** – sonde is now higher on piling.

2017 – Rapid Pulse DO sensors on YSI 6600 sondes were replaced with Optical DO sensors on **July 5**.

2017 – PVC tube swapped with new tube with more holes along the length of tube (see Section 3) on **June 6**.

2017 – YSI 6600 sonde was replaced with an EXO2 sonde and switched to YSI Storm 3 telemetry system on **November 15**.

2019 – PVC tube swapped with new tube with antifouling paint near bottom on **May 28**.

2020 – The PVC tube was not swapped in 2020 but the outside of PVC tube was scraped.

Secondary Sites

Fort Johnson – Charleston Harbor estuary:

2020 – A 40-ft, 8-in diameter treated pressure piling was installed on **November 8**.

2020 – YSI EXO2 sonde was deployed on **July 22**

2020 – YSI Storm telemetry unit was installed and began transmitting data on **August 14**.

Grove Plantation – St. Helena Sound estuary:

2013 – A 40-ft, 8-in diameter treated pressure piling was installed on **November 8**.

2014 – YSI sonde was deployed on **January 15**.

2015 – Grove Plantation site officially went online on **January 1** (Coordinates: 32.6637N and -80.4130W)

2016 – Grove Plantation telemetry system was installed in **June**.

2016 – Grove Plantation site began transmitting real-time data on **June 15**.

2017 – Rapid Pulse DO sensors on YSI 6600 sondes were replaced with Optical DO sensors on **December 4**.

2017 – PVC tube swapped with new tube with more holes along the length of tube on **December 11**.

2019 – PVC tube swapped with new tube with antifouling paint near bottom on **March 28**.

2019 – YSI 6600 sonde was replaced with an EXO2 sonde on **December 9**.
2019 – Switched to YSI Storm 3 telemetry system on **December 10**.
2020 – The PVC tube was not swapped in 2020 but the outside of PVC tube was scraped.

Jehossee Island – St. Helena Sound estuary:

2013 – Jehossee Island water quality station was installed on **August 19** – PVC tube attached to USFWS dock.
2015 – Jehossee Island site officially went online on **January 1** (Coordinates: 32.6209 N and -80.3965 W).
2018 – PVC tube swapped with new tube with more holes along the length of tube on **January 30**.
2018 – Rapid Pulse DO sensors on YSI 6600 sondes were replaced with Optical DO sensors on **November**.
2019 – PVC tube swapped with new tube with antifouling paint near bottom on **April 29**.
2020 – PVC broke prior to sonde retrieval on **March 6**.
2020 – PVC tube reinstalled on **December 11**.

Inactive Stations

Big Bay:

1995 – Big Bay water quality station was installed in tributary of Big Bay Creek in **March** (Coordinates: 32 29.662N and -80 19.427W)
2001- Big Bay station replaced in **October** due to old age and excessive biofouling of oysters (Coordinates: 32 29 38.72125N and -80 19 21.69864W)
2003 – Big Bay station moved to the creek proper in **July** after embankment collapsed near data logger (Coordinates: 32.4941N and -80.3241W)
2014 – Big Bay site officially went offline on **December 31**.

Charleston Harbor – Charleston Harbor Estuary:

2017 – Deployment mount was installed (PVC tube with holes along the length of the tube is mounted to a 40-ft, 8-in diameter treated pressure piling) in **October**.
2018 – Charleston Harbor site officially went online on **January 1** (Coordinates: 32.7573 N and -79.8589 W).
2018 – Telemetered transmission began on **January 4**.
2018 – Site was destroyed on **August 30**.
2019 – Data and metadata removed from CDMO. Only available directly from Reserve.

Rock Creek:

1996- Rock Creek water quality station was installed in **March** (Coordinates: 32.5404 N and -80.4821 W° [approximation because location was not measured while site was active])
1996 – Rock Creek water quality station went offline in **July**.

Blanket Statements: All Stations

Wiper Brush Malfunctioning Coding

Wiper brush used to clean sensors during deployment fell off during a number of deployments. All post calibration checks were in the acceptable range. Values are flagged as <1> [SWM]. Any other data concerns that occurred during the deployment are listed under the appropriate parameter heading.

Missing Data Coding

Sonde was not at the correct depth in the deployment tube for last reading of the deployment. This is caused by sonde being pulled prematurely or deployed during the first reading. These values are considered post deployment values. Values are flagged as <-2>.

Dissolved Oxygen Hypoxia Coding

Dissolved oxygen percent and mg/L readings are coded <0> (CDA) when a hypoxic event is recorded (≤ 3 mg/L).

Turbidity Spike Coding

For YSI 6000 series sondes, turbidity values between 300 and 1000 NTU are coded <1> [STS]. For YSI EXO series sondes, turbidity values between 300 and 4000 FNU are coded <1> [STS]. These spikes are typically observed during low tides, max flood tides, and/or rain events.

Turbidity readings above 1000 NTU for YSI 6000 series sondes and above 4000 FNU for YSI EXO series are rejected and are coded <-3> [STS]. These values are above the sensor specifications.

Turbidity Negative Readings Coding

Negative turbidity values are rejected and are coded <-3> [SNV]. These values are below the sensor specifications.

Data Editing/Flagging Notes: Organized by Station, Parameter, and Code

Significant Weather Events

No severe weather events directly impacted the ACE Basin NERR during 2020. Information about other areas that were affected by severe weather events is available at South Carolina Climatology Center.

According to SC Climatology Center, “Throughout the 2020 Hurricane Season, eight tropical cyclones impacted the Palmetto State, primarily in the mid- and upstate regions. The ones that made landfall in North Carolina did cause minor beach erosion, coastal flooding, heavy rain, and tornadoes in counties north of the ACE Basin.” A surface boundary that stalled over the state at the beginning of July caused heavy rainfall (over 9 inches over a 24-hour period) at Hunting Island in the ACE Basin NERR. The coastal flooding in the ACE was primarily due to increased freshwater input from the S. Edisto River, as a result of the above-normal rainfall in the upstate.

Effect of Freshwater Input on Water Quality

Water quality at the SWMP sites is influenced by the river water level and streamflow rate in the South Edisto River at the USGS gauging station at Givhans Ferry. We observe a negative correlation between salinity and the river stage – significant salinity decreases when river crests above flood level (+10 feet, 3.05 meters) and salinity increases when the river level falls below drought level (5 feet, 1.52 meters). The same negative correlation is observed between streamflow and salinity, regardless of the river stage – decreases in salinity when streamflow is above 15,000 ft³/sec (424.75 m³/sec) and increases when streamflow is below 5,000 ft³/sec (141.58 m³/sec).

Flood Stage Conditions

01/01/2020 – 00:00 to 01/04/2020 – 15:00

02/08/2020 – 03:45 to 03/18/2020 – 19:00

01/18/2020 – 23:15 to 01/22/2020 – 03:30

09/23/2020 – 14:30 to 10/06/2020 – 06:00

Drought Stage Conditions

05/10/2020 – 10:00 to 05/24/2020 – 19:45

07/22/2020 – 04:30 to 08/13/2020 – 18:15

06/10/2020 – 10:30 to 06/15/2020 – 21:45

10/29/2020 – 17:45 to 11/12/2020 – 08:30

The increased freshwater input to the S. Edisto River was due to the above-normal rainfall in the upstate, resulted in lower annual mean salinity levels at all SWMP stations than the previous year. At the stations nearest the ocean, Edisto Island and St. Pierre, the mean salinities were 2.0 and 2.3 psu lower, respectively. The mean salinity at Fishing Creek station was 3.4 psu lower, and it was 2.8 psu lower at the Mosquito Creek station. At the secondary station, Grove Plantation, the mean salinity was 1.1 psu lower than it was in 2019. The lowest salinities were recorded during the flood conditions on the river.

Effect of Significant Rain Events on Water Quality

Water quality at the SWMP sites also is influenced by rain events during low tides. Rain creates a fresher layer of water at the water surface and depending on the depth of this layer at low tide, the salinity at the station may be depressed by more than 2 psu during a 15-minute interval.

December 2019 to February 2020 was one of the wettest periods on record across South Carolina, and most of the rainfall totals across the state continued to be above normal through the end of September; December was the only month that recorded normal rainfall in the midlands and upstate of SC. The areas receiving the highest rainfall rates were mostly north and west of the Interstate 95 corridor. In our reserve, the monthly rainfall rates were generally within 2 inches of the monthly state's means; April and August were the wettest months; and January, May, October, and December were the driest months at the field station.

Jan: 44.7 mm (1.77 in) – below	May: 41.9 mm (1.65 in) – below	Sep: 96.7 mm (3.81 in) – below
Feb: 132.5 mm (5.2 in) – above	Jun: 151.0 mm (5.94 in) – at normal	Oct: 41.1 mm (1.61 in) – below
Mar: 127.1 mm (5.0 in) – above	Jul: 122.6 mm (4.84 in) – below	Nov: 84.2 mm (3.31 in) – below
Apr: 214.1 mm (8.42 in) – above	Aug: 208.2 mm (8.19 in) – above	Dec: 49.8 mm (1.97 in) – below

There were several significant rain events recorded by the Bennett's Point rain gauge. These events are marked by many hours of steady rain at a time. At the shallow sites, St. Pierre and Edisto Island, rain during a falling tide did lower salinity, and low salinity during falling tides also was observed after these events, possibly due subsequent runoff from the land.

04/13/2020 – 10:00 to 05/02/2020 – 00:00
11/30/2020 – 17:00 to 12/02/2020 – 06:45

08/24/2020 – 23:00 to 08/30/2020 – 16:00
12/24/2020 – 23:45 to 12/27/2020 – 03:00

Edisto Island

All Parameters Blanket Statement for Edisto Island

Rejected Data (Flag <-3>)

The data collected on 11/18/2020 – 14:15 during the November 13th deployment (11/13/2020 – 12:30 to 12/09/2020 – 09:30) were rejected due to sensor out of water. The depth was zero and the other readings were typical of out of water events. The sonde may have been tampered with. The values are flagged as <-3> [GOW] (CSM).

Missing Data (Flag <-2>)

The data collected on 07/19/2020 – 23:15 to 23:45 during the July 19 (07/17/2020 – 09:00 to 07/30/2020 – 09:00) were missing due to instrument malfunction. The values are flagged as <-2> [GIM] (CSM).

Suspect Data (Flag <1>)

Passed Initial QAQC Checks (Flag <0>)

Temperature

Rejected Data (Flag <-3>)

Missing Data (Flag <-2>)

The data collected from 11/26/2020 – 08:00 to 12/09/2020 – 09:30 during the November 13th deployment (11/13/2020 – 12:30 to 12/09/2020 – 09:30) were missing due to sensor failure. This is an EXO2 sonde, so rejected the values of all parameters but turbidity during this period because temperature values are used to calculate them. The values are flagged as <-2> [STF] (CSM).

Suspect Data (Flag <1>)

Passed Initial QAQC Checks (Flag <0>)

Specific Conductivity/Salinity

Rejected Data (Flag <-3>)

The data collected from 05/27/2020 – 15:15 to 06/02/2020 – 10:15 during the May 21st deployment (05/21/2020 – 10:00 to 06/02/2020 – 10:15) were rejected due to sensor failure. The post-deployment check of 46.24 mS/cm was out of range, and the values during this time slowly drift downward, indicating sensor biofouling. The values were

very unstable during the post-deployment check. Eggs were noted on the face of the sensor. Eggs were removed during a 15-minute vinegar soak. The sensor was checked again, and the values were still out of range and very unstable. After a factory reset, calibration of the sensor was attempted and failed. The readings were rejected because the values were outside the range typically observed at this site. The values are flagged as <-3> [SCF] (CSM).

The data collected during the following times were rejected due a sudden drop in values. The post-deployment check was within the accepted range, but the drop did not occur at or near low tide or during a rain event. The reason for the decrease is unknown but we suspect it was a temporary instrument malfunction, possibly due to blockage of cell contacts by debris. The data values were rejected because they were outside the range typically observed at this site. The values are flagged as <-3> [GSM] (CCU).

07/29/2020 – 17:45 (8.7 psu) 11/12/2020 – 11:15 (12.9 psu) 11/12/2020 – 14:00 (16.9 psu)

Missing Data (Flag <-2>)

The data collected from 11/26/2020 – 08:00 to 12/09/2020 – 09:30 during the November 13th deployment (11/13/2020 – 12:30 to 12/09/2020 – 09:30) were missing due to temperature and conductivity sensor failure. The values are flagged as <-2> [STF] (CSM).

Suspect Data (Flag <1>)

The data collected from 01/04/2020 – 13:00 to 01/06/2020 – 11:45 during December 10th deployment (12/10/2019 – 12:15 to 01/06/2020 – 11:45) were suspect due to mud in the guard. Mud in the sonde guard was recorded upon retrieval. During the period, the values were slightly elevated with a change to a lower value upon deployment of a new sonde. The turbidity levels were typical for this site. The values are flagged as <1> [GSM] (CMD).

The data collected from 05/21/2020 – 10:00 to 05/27/2020 – 15:00 during the May 21st deployment (05/21/2020 – 10:00 to 06/02/2020 – 10:15) were suspect due to post calibration out of range. The post-deployment check of 46.24 mS/cm is outside the accepted range of 47 – 53 mS/cm. The values were very unstable during the post-deployment check. Eggs were noted on the face of the sensor. Eggs were removed during a 15-minute vinegar soak. The sensor was checked again, and the values were still out of range and very unstable. After a factory reset, calibration of the sensor was attempted and failed. The values follow a tidal pattern and are within the range observed at this site. The end of the deployment was rejected. The values are flagged as <1> [SPC] (CSM).

The data collected during the following times were suspect due to cause unknown. Values did not occur at or near low tide and/or during a rain event. The reason for the decrease is unknown but we suspect it was either debris blocking the cell electrode or a temporary malfunction of the sonde and/or sensor. The values were not rejected because they were within the range typically observed at this site. The values are flagged as <1> [GSM] (CCU).

06/21/2020 – 10:15 (19.5 psu)	08/17/2020 – 19:00 (28.2 psu)	
08/21/2020 – 16:45 (27.3 psu)	08/22/2020 – 05:15 (25.7 psu)	08/22/2020 – 07:15 (26.6 psu)
08/23/2020 – 12:00 (27.1 psu)	08/30/2020 – 21:00 to 23:45	10/07/2020 – 16:00 (21.4 psu)
10/20/2020 – 05:15 (26.9 psu)	10/20/2020 – 20:15 (24.6 psu)	10/28/2020 – 07:30 (25.2 psu)

Passed Initial QAQC Checks (Flag <0>)

The data collected during the following times were not suspect. Values occurred at or near low tide and may have been the result of increased freshwater input, rain event, or runoff. The values are flagged as <0> [GSM] (CRE).

01/01/2020 – 08:15 to 08:30	01/03/2020 – 22:45 to 23:00	01/20/2020 – 00:15 to 00:30
07/01/2020 – 09:15 (23.3 psu)	08/18/2020 – 14:15 (24.0 psu)	08/18/2020 – 15:15 (27.3 psu)
08/23/2020 – 04:00 (28.4 psu)	10/24/2020 – 23:00 (27.6 psu)	

DO Percent/mg/L

Rejected Data (Flag <-3>)

The DO mg/L data collected during the following times were rejected due to conductivity sensor failure. However, the DO readings were within the range typically observed at this site. The values are flagged as <-3> [SCF] (CSM).

05/27/2020 – 15:15 to 06/02/2020 – 10:15 07/29/2020 – 17:45 11/12/2020 – 11:15 and 14:00

The dissolved oxygen data (both % air saturation and mg/L) collected from 11/26/2020 – 08:00 to 12/09/2020 – 09:30 during the November 13th deployment (11/13/2020 – 12:30 to 12/09/2020 – 09:30) were rejected due to temperature sensor failure. Temperature values are used to calculate these values. The values are flagged as <-3> [STF] (CSM).

Missing Data (Flag <-2>)

Suspect Data (Flag <1>)

Passed Initial QAQC Checks (Flag <0>)

Depth

Rejected Data (Flag <-3>)

The data collected from during the following times were rejected due to conductivity sensor failure. However, the depth readings were within the range typically observed at this site. The values are flagged as <-3> [SCF] (CSM).

05/27/2020 – 15:15 to 06/02/2020 – 10:15 07/29/2020 – 17:45 11/12/2020 – 11:15 and 14:00

The data collected on 07/19/2020 – 23:00 was rejected due to cause unknown. The reason for the increase is unknown but we suspect it was a temporary malfunction of the sonde and/or sensor. The sonde failed to record data for 45 minutes after this time. The data value (13.26 m) was rejected because it was outside the range typically observed at this site. The value is flagged as <-3> [GSM] (CCU).

The data collected from 11/26/2020 – 08:00 to 12/09/2020 – 09:30 during the November 13th deployment (11/13/2020 – 12:30 to 12/09/2020 – 09:30) were rejected due to temperature sensor failure. Temperature values are used to calculate these values. The values are flagged as <-3> [STF] (CSM).

Missing Data (Flag <-2>)

Suspect Data (Flag <1>)

Passed Initial QAQC Checks (Flag <0>)

pH

Rejected Data (Flag <-3>)

The data collected from 11/26/2020 – 08:00 to 12/09/2020 – 09:30 during the November 13th deployment (11/13/2020 – 12:30 to 12/09/2020 – 09:30) were rejected due to temperature sensor failure. Temperature values are used to calculate these values. The values are flagged as <-3> [STF] (CSM).

Missing Data (Flag <-2>)

The data collected during the January 6th deployment (01/06/2020 – 12:00 to 02/05/2020 – 10:30) were suspect due post calibration for depth was high (0.74 m) and a change of approximately 0.2 m was noticed during the swap. The data collected was within the range typically observed at this site. The values are flagged as <1> [SPC] (CSM).

The data collected during the March 6th deployment (03/06/2020 – 11:00 to 03/18/2020 – 09:45) were suspect due post calibration for depth was slightly higher (0.13 m) and a change of approximately 0.2 m was noticed during the swap. The data collected was within the range typically observed at this site. The values are flagged as <1> [SPC] (CSM).

Suspect Data (Flag <1>)

Passed Initial QAQC Checks (Flag <0>)

Turbidity

Rejected Data (Flag <-3>)

The data collected from 04/03/2020 – 07:15 to 04/23/2020 – 08:45 during the March 18th deployment (03/18/2020 – 10:00 to 04/23/2020 – 08:45) were rejected due to biofouling. The turbidity sensor passed QAQC after the extensive hydroid growth was removed. Hydroid growth was extensive after the 1.5-month deployment. During the period, the values do not reach low values and the change from this deployment (107 FNU) to the next deployment (23 FNU) was significant. The elevated turbidity levels were not typical for this site. The values are flagged as <-3> [GSM] (CBF).

The data collected from 05/11/2020 – 11:30 to 05/21/2020 – 09:45 during April 23rd deployment (04/23/2020 – 09:00 to 05/21/2020 – 09:45) were rejected due to biofouling. Hydroid growth was recorded as high on the sonde guard upon retrieval. During the period, the values do not reach low values and the change from this deployment (130 FNU) to the next deployment (29 FNU) was significant. The elevated turbidity levels were not typical for this site. The values are flagged as <-3> [GSM] (CBF).

The data collected during the following times were rejected due to a turbidity spike. Although the values are within the sensor specifications, there is a two or greater order of magnitude difference between the 15-minute intervals which is not typical for this site. The values are flagged as <-3> [STS] (CSM).

02/13/2020 – 08:15 (1100)	02/20/2020 – 03:30 (3044)	08/29/2020 – 20:00 (3706)
08/30/2020 – 13:45 (1609)	08/30/2020 – 15:00 (1519)	09/27/2020 – 21:00 (1529)
09/28/2020 – 13:45 (3609)	10/02/2020 – 23:30 (1015)	10/04/2020 – 17:45 (1156)
10/13/2020 – 08:45 (1392)	10/20/2020 – 04:45 (1644)	10/22/2020 – 03:45 (1260)
10/24/2020 – 03:45 (1007)	10/24/2020 – 18:15 (3000)	10/25/2020 – 17:45 (1745)
10/25/2020 – 1845 (3465)	10/25/2020 – 1945 (1966)	10/26/2020 – 18:30 (1030)
10/28/2020 – 07:30 (1010)	11/22/2020 – 09:30 (1042)	

The data collected from 11/26/2020 – 08:00 to 12/09/2020 – 09:30 during the November 13th deployment (11/13/2020 – 12:30 to 12/09/2020 – 09:30) were rejected due to temperature and conductivity sensors failure. Rejected the pH data because values from one or both sensors are used to calculate them. The values are flagged as <-3> [STF] (CSM).

Missing Data (Flag <-2>)

Suspect Data (Flag <1>)

Passed Initial QAQC Checks (Flag <0>)

Fishing Creek

All Parameters Blanket Statement for Fishing Creek

Rejected Data (Flag <-3>)

Missing Data (Flag <-2>)

The last record (01/06/2020 – 11:00) of the December 9th deployment (12/09/2019 – 12:15 – 01/06/2020 – 11:00) was missing due to low battery voltage. The missing values are flagged as <-2> [GPF] (CSM).

The data collected during the August 27 (08/27/2020 – 08:45 to 09/10/2020 – 08:15) deployment were missing due to operator error. The sonde was not set to log. The values are flagged as <-2> (CSM).

Suspect Data (Flag <1>)

Passed Initial QAQC Checks (Flag <0>)

Temperature

Rejected Data (Flag <-3>)

Missing Data (Flag <-2>)

Suspect Data (Flag <1>)

Passed Initial QAQC Checks (Flag <0>)

Specific Conductivity/Salinity

Rejected Data (Flag <-3>)

Missing Data (Flag <-2>)

Suspect Data (Flag <1>)

The data collected during the November 13th deployment (11/13/2020 – 12:00 to 12/10/2020 – 09:00) were suspect due post calibration out of range. The post-deployment check of 39.18 mS/cm was outside the accepted range. The data collected was within the range typically observed at this site. The values are flagged as <1> [SPC] (CSM).

Passed Initial QAQC Checks (Flag <0>)

DO Percent/mg/L

Rejected Data (Flag <-3>)

Missing Data (Flag <-2>)

Suspect Data (Flag <1>)

Passed Initial QAQC Checks (Flag <0>)

Depth

Rejected Data (Flag <-3>)

Missing Data (Flag <-2>)

Suspect Data (Flag <1>)

Passed Initial QAQC Checks (Flag <0>)

pH

Rejected Data (Flag <-3>)

The data collected at the following times were rejected due to a pH spikes. There is a 0.3-unit difference between the 15-minute intervals which is not typical for this site. The cause for the spike is unknown but thought to be attributed to acclimation of the probe. The values are flagged as <-3> [GSM] (CND).

01/06/2020 – 11:15

02/05/2020 – 10:30

04/30/2020 – 12:15

The data collected on 07/17/2020 – 18:15 to 20:30 during the July 17th deployment (07/17/2020 – 11:45 to 07/30/2020 – 11:45) were rejected due to cause unknown. All post-deployment values were within the accepted ranges. The values did not occur during a rain event. Following this event, the sensor recovered and continued to collect values within the range typically observed at this site. The cause for the sudden elevated values is unknown but thought to be attributed to a temporary instrument malfunction. The values at the highest point (pH 8.1, 8.4) were outside the range typically observed at this site. The values are flagged as <-3> [GSM] (CCU).

Missing Data (Flag <-2>)

Suspect Data (Flag <1>)

The data collected during the February 5th deployment (02/05/2020 – 10:30 to 03/06/2020 – 12:30) were suspect due to post calibration out of range. The post-deployment checks of 7.47 for pH 7 and 10.43 for pH 10 are outside the accepted ranges of 6.7 – 7.3 for pH 7 and 9.7 – 10.3 for pH 10. The pH mV of -71.3 for pH 7 and -234.7 for pH 10 were also outside the accepted ranges of 0 +/- 50 for pH 7 and -180 +/- 50 for pH 10. The values collected were within the range typically observed at this site. The values are flagged as <1> [SPC] (CSM).

Passed Initial QAQC Checks (Flag <0>)

Turbidity

Rejected Data (Flag <-3>)

The values collected at the following times were rejected due to a turbidity spike. Although the values are within the sensor specifications, there is a two or greater order of magnitude difference between the 15-minute intervals which is not typical for this site. The values are flagged as <-3> [STS] (CSM).

06/12/2020 – 05:15 (1850)

07/04/2020 – 13:15 (1719)

07/14/2020 – 02:15 (1032)

07/21/2020 – 14:30 (1194)

Missing Data (Flag <-2>)

Suspect Data (Flag <1>)

The data collected during the July 30th deployment (07/30/2020 – 12:00 to 08/13/2020 – 11:00) were suspect due to post calibration out of range. The post-deployment 124 FNU post-deployment check was outside the accepted range (231 FNU), but the 0 FNU post-deployment check was within the accepted range. The cause for the out of range value is unknown but thought to be attributed to the sensor face being compromised, either by biofouling or from bubbles on the sensor face while in the standard. The sensor guard was stuck on the sonde but was carefully cleaned before post-deployment checks. The values were not rejected because they were within the range typically observed at the site. The values collected are flagged as <1> [SPC] (CSM).

Passed Initial QAQC Checks (Flag <0>)

Grove Plantation

All Parameters Blanket Statement for Grove Plantation

Rejected Data (Flag <-3>)

Missing Data (Flag <-2>)

Suspect Data (Flag <1>)

Passed Initial QAQC Checks (Flag <0>)

Temperature

Rejected Data (Flag <-3>)

Missing Data (Flag <-2>)

Suspect Data (Flag <1>)

Passed Initial QAQC Checks (Flag <0>)

Specific Conductivity/Salinity

Rejected Data (Flag <-3>)

Missing Data (Flag <-2>)

Suspect Data (Flag <1>)

Passed Initial QAQC Checks (Flag <0>)

DO Percent/mg/L

Rejected Data (Flag <-3>)

Missing Data (Flag <-2>)

Suspect Data (Flag <1>)

Passed Initial QAQC Checks (Flag <0>)

Depth

Rejected Data (Flag <-3>)

Missing Data (Flag <-2>)

The data collected from 06/19/2020 – 16:15 to 07/01/2020 – 10:15 during the June 16th (06/16/2020 – 12:15 to 07/01/2020 – 10:15) were missing due to instrument malfunction. At 16:15 on 06/19/2020 the sonde suddenly stopped recording depth values. When the sonde was connected to the computer, depth was not showing in the list of parameters. In order to get depth back, the sonde needed a hard reset by removing the battery cap, counted to 10, then reinstalled the battery cap. The .BIN file was then sent to YSI for review, but nothing was discovered that may explain the cause for this missing data. The cause for this missing data is unknown but thought to be attributed to instrument malfunction. The values are flagged as <-2> [GIM] (CSM).

Suspect Data (Flag <1>)

Passed Initial QAQC Checks (Flag <0>)

pH

Rejected Data (Flag <-3>)

The first pH record of the following deployments was rejected due to a spike in pH. The cause for the spike in pH is unknown but thought to be attributed to acclimation of the probe. The post-deployment checks and sensor diagnostics were within the acceptable ranges. The values are flagged as <-3> [GSM] (CND).

01/06/2020 – 11:45	02/05/2020 – 11:00	03/06/2020 – 13:30	03/18/2020 – 10:30
06/02/2020 – 11:30	06/16/2020 – 12:15	07/01/2020 – 10:30	07/30/2020 – 12:30
08/13/2020 – 10:45	08/27/2020 – 09:15	09/10/2020 – 09:00	09/30/2020 – 12:45

The data collected at 12:00 on 01/06/2020 during the January 6th deployment (01/06/2020 – 11:45 to 02/05/2020 – 10:45) was rejected due to a spike in pH. The sensor used was brand new out of the box. The cause for the spike by a new pH sensor is unknown but thought to be attributed to acclimation of the probe. The post-deployment checks and sensor diagnostics were within the acceptable ranges. The values are flagged as <-3> [GSM] (CCU).

The data collected from 12:30 – 12:45 on 06/16/2020 during the June 16th deployment (06/16/2020 – 12:15 to 07/01/2020 – 10:15) were rejected due to a spike in pH. The sensor used was brand new out of the box. The cause for the spike by a new pH sensor is unknown but thought to be attributed to acclimation of the probe. The post-deployment checks and sensor diagnostics were within the acceptable ranges. The values are flagged as <-3> [GSM] (CCU).

Missing Data (Flag <-2>)

Suspect Data (Flag <1>)

The data collected from 06/02/2020 – 11:45 to 06/16/2020 – 12:00 during the June 2nd, 2020 deployment (06/02/2020 – 11:30 to 06/16/2020 – 12:00) were suspect because the pH sensor on this sonde was recording lower values than both the previous sonde and the next deployment. The variability in the data was also decreased compared to the other two deployments. The post-deployment checks were within the acceptable ranges. The cause for the lower values is unknown. The values are flagged as <1> [GSM] (CCU).

Passed Initial QAQC Checks (Flag <0>)

Turbidity

Rejected Data (Flag <-3>)

The data collected during the following times were rejected due to a turbidity spike. Although the values are within the sensor specifications, there is a two or greater order of magnitude difference between the 15-minute intervals which is not typical for this site. The values are flagged as <-3> [STS] (CMS).

07/03/2020 – 20:45 (1776)	07/08/2020 – 18:00 (1456)	07/17/2020 – 19:00 (1614)
12/20/2020 – 19:30 (1863)	12/27/2020 – 11:45 (1961)	

Missing Data (Flag <-2>)

Suspect Data (Flag <1>)

The data collected during the March 18th deployment (03/18/2020 – 10:30 to 04/30/2020 – 13:15) were suspect due to a post calibration out of range. The post-deployment check of 2.33 FNU in the 0 FNU standard is outside the accepted range of 0 +/- 2 FNU. The post-deployment check of 128.59 FNU in the 124 FNU standard is within the accepted range of 100 – 140 FNU. The values collected were well within the range typically observed at this site. The values are flagged as <1> [SPC] (CSM).

Passed Initial QAQC Checks (Flag <0>)

Jehossee Island

All Parameters Blanket Statement for Jehossee Island

The data were collected at the wrong depth from 01/26/2020 – 07:15 to 01/29/2020 – 13:00 during the January 6th deployment (01/06/2020 – 10:45 to 02/05/2020 – 09:45). The cause for the sonde being at the wrong depth is unknown but thought to be attributed to either the sonde floating up inside the tube or vandalism. The difference in the depth was not considered significant because the S. Edisto River is a well-mixed system and the sonde was in the same thermocline, as indicated by the water temperature readings. The depth values are flagged as <1> (CWD), and the other parameters are flagged as <0> (CWD). Other errors that occurred during this deployment are listed under the appropriate parameter heading or in a blanket statement. The F_Record column of these rows are flagged as {CSM}.

Rejected Data (Flag <-3>)

The data collected on 01/01/2020 – 01:30 from the December 9th deployment (12/09/2019 – 11:30 to 01/06/2020 – 10:30) is rejected due to low battery voltage. The value collected occurred after the initial power failure due to low battery voltage. The data collected were within the range typically observed at this site. The values are flagged as <-3> [GPF] (CSM).

Missing Data (Flag <-2>)

The missing data from 01/01/2020 – 00:00 to 01/06/2020 – 10:30 from the December 9th deployment (12/09/2019 – 11:30 to 01/06/2020 – 10:30) were due to low battery voltage. The missing values are flagged as <-2> [GPF] (CSM).

The missing data from 03/06/2020 – 12:15 to 12/11/2020 – 12:30 were missing because the deployment tube was not installed. The tube broke during the February deployment and was not replaced until December. COVID-19 prevented installation of a new tube. The values are flagged as <-2> [GMC] (CSM).

Suspect Data (Flag <1>)

Passed Initial QAQC Checks (Flag <0>)

Temperature

Rejected Data (Flag <-3>)

Missing Data (Flag <-2>)

Suspect Data (Flag <1>)

Passed Initial QAQC Checks (Flag <0>)

Specific Conductivity/Salinity

Rejected Data (Flag <-3>)

The data collected from 12/11/2020 – 12:45 to 12/22/2020 – 09:45 during the December 11th deployment (12/11/2020 – 12:45 to 01/12/2021 – 10:00) were rejected due to erratic data which is not typical of this site. A new PVC deployment tube was installed on 12/11/2020 using only bolts. Bandit straps were added on 12/22/2020 to stabilize the tube. The lack of bandit straps may have caused excessive wobble which resulted in specific conductivity/salinity and pH data values to be erratic. The data was rejected from the start of the deployment until the new straps were installed to be conservative. The values are flagged as <-3> [GSM] (CCU).

Missing Data (Flag <-2>)

Suspect Data (Flag <1>)

Passed Initial QAQC Checks (Flag <0>)

DO Percent/mg/L

Rejected Data (Flag <-3>)

The DO mg/L data collected from 12/11/2020 – 12:45 to 12/22/2020 – 9:45 during the December 11th deployment (12/11/2020 – 12:45 to 01/12/2021 – 10:00) were rejected due to erratic conductivity data which is not typical of this site. A new PVC deployment tube was installed on 12/11/2020 using only bolts. Bandit straps were added on 12/22/2020 to stabilize the tube. The lack of bandit straps may have caused excessive wobble which resulted in specific conductivity/salinity and pH data values to be erratic. The data was rejected due to conductivity sensor failure from the start of the deployment until the new straps were installed to be conservative. The values are flagged as <-3> [SCF] (CSM).

Missing Data (Flag <-2>)

Suspect Data (Flag <1>)

Passed Initial QAQC Checks (Flag <0>)

Depth

Rejected Data (Flag <-3>)

The data collected from 12/11/2020 – 12:45 to 12/22/2020 – 9:45 during the December 11th deployment (12/11/2020 – 12:45 to 01/12/2021 – 10:00) were rejected due to erratic conductivity data which is not typical of this site. A new PVC deployment tube was installed on 12/11/2020 using only bolts. Bandit straps were added on 12/22/2020 to stabilize the tube. The lack of bandit straps may have caused excessive wobble which resulted in specific conductivity/salinity and pH data values to be erratic. The data was rejected due to conductivity sensor failure from the start of the deployment until the new straps were installed to be conservative. The values are flagged as <-3> [SCF] (CSM).

Missing Data (Flag <-2>)

Suspect Data (Flag <1>)

Passed Initial QAQC Checks (Flag <0>)

pH

Rejected Data (Flag <-3>)

The data collected from 12/11/2020 – 12:45 to 12/22/2020 – 9:45 during the December 11th deployment (12/11/2020 – 12:45 to 01/12/2021 – 10:00) were rejected due to erratic data which is not typical of this site. A new PVC deployment tube was installed on 12/11/2020 using only bolts. Bandit straps were added on 12/22/2020 to stabilize the tube. The lack of bandit straps may have caused excessive wobble which resulted in specific conductivity/salinity and pH data values to be erratic. The data was rejected from the start of the deployment until the new straps were installed to be conservative. The values are flagged as <-3> [GSM] (CCU).

Missing Data (Flag <-2>)

Suspect Data (Flag <1>)

The data collected during the February 5th deployment (02/05/2020 – 10:00 to 03/06/2020 – 12:00) were suspect due to post calibration out of range. The post-deployment check of 10.33 for pH 10 is outside the accepted range of 9.7 – 10.3. The pH slope of 154.7 is also below the accepted threshold of 155.0. The values connected are within the range typically observed at this site. Values are flagged as <1> [SPC] (CSM).

The data collected from 12/22/2020 – 10:00 to 12/31/2020 – 23:45 during the December 11th deployment (12/11/2020 – 12:45 to 01/12/2021 – 10:00) were suspect due to sensor diagnostics out of range. The post-deployment voltage for pH 10 was outside the accepted range, and the pH slope fell below the accepted value of 155. The values collected are within the range typically observed at this site. The values are flagged as <1> [SDG] (CSM).

Passed Initial QAQC Checks (Flag <0>)

Turbidity

Rejected Data (Flag <-3>)

The data collected from 12/11/2020 – 12:45 to 12/31/2020 – 23:45 during the December 11th deployment (12/11/2020 – 12:45 to 01/12/2021 – 10:00) were rejected due to post calibration out of range and values not typical of site. The post-deployment check in the 0 and 126 NTU standards were outside the accepted ranges (6 and 401.9 NTU, respectively). The values collected are higher than typically observed at this site. The values are flagged as <-3> [SPC] (CSM).

Missing Data (Flag <-2>)

Suspect Data (Flag <1>)

Passed Initial QAQC Checks (Flag <0>)

Mosquito Creek

All Parameters Blanket Statement for Mosquito Creek

The data collected at the following dates and times were collected at the wrong depth. The cause for the sonde being at the wrong depth is unknown but thought to be attributed to either the sonde floating up inside the tube or vandalism. The difference in the depth was not considered significant because Mosquito Creek is a well-mixed system and the sonde was in the same thermocline, as indicated by the water temperature readings. The depth values are flagged as <1> (CWD), and the other parameters are flagged as <0> (CWD). Other errors that occurred during

this deployment are listed under the appropriate parameter heading or in a blanket statement. The F_Record column of these rows are flagged as {CSM}.

10/03/2020 – 12:00 to 12:30

10/15/2020 – 12:30 to 12:45

Rejected Data (Flag <-3>)

Missing Data (Flag <-2>)

Data were missing on 03/06/2020 – 11:00 due to instrument malfunction. The sonde failed to record data during this time. The cause for the delay is unknown but thought to be attributed to sensor wake-up time where the sensors took too long to wake-up thus causing the delayed reading. Sensor wake-up time could also be the cause for the missing data. The values are flagged as <-2> [GIM] (CSM).

Suspect Data (Flag <1>)

Passed Initial QAQC Checks (Flag <0>)

Temperature

Rejected Data (Flag <-3>)

Missing Data (Flag <-2>)

Suspect Data (Flag <1>)

Passed Initial QAQC Checks (Flag <0>)

Specific Conductivity/Salinity

Rejected Data (Flag <-3>)

Missing Data (Flag <-2>)

Suspect Data (Flag <1>)

The data collected during the April 27th deployment (04/27/2020 – 12:45 to 06/02/2020 – 09:30) were suspect due to sensor out of range. The post-deployment check of 46.06 mS/cm is outside the accepted range of 47 – 53 mS/cm. The cause for the out of range value is thought to be attributed to biofouling. Eggs were noted on the face of the sensor, after the sensor was cleaned and the eggs were removed the values returned to within the accepted range. The values collected during this time were within the range typically observed at this site. The values are flagged as <1> [SPC] (CSM).

Passed Initial QAQC Checks (Flag <0>)

DO Percent/mg/L

Rejected Data (Flag <-3>)

Missing Data (Flag <-2>)

Suspect Data (Flag <1>)

The data collected during the January 6th deployment (01/06/2020 – 09:15 to 02/05/2020 – 09:00) were suspect due to post calibration out of range. The post-deployment check of 116.1% is outside the accepted range of 90 – 110%. The pre-calibration value of 89.4% was also out of range but the sensor calibrated correctly to 100.2% and held calibration. On 02/07/2020 during post-calibration for the remaining sensors, dissolved oxygen was reading 200+% in an unoxxygenated bucket. A factory reset was preformed, but the value was still out of range at 124%. After two minutes the sensor was again reading over 200%. This sensor was from 2017 but had been sitting in the box unused until this deployment. Upon speaking with YSI regarding the issue they stated that they do not recommend storing

the dissolved oxygen sensor caps for more than 6 months. Values collected were within the range typically observed at this site. The values are flagged as <1> [SPC] (CSM).

Passed Initial QAQC Checks (Flag <0>)

Depth

Rejected Data (Flag <-3>)

Missing Data (Flag <-2>)

Suspect Data (Flag <1>)

Passed Initial QAQC Checks (Flag <0>)

pH

Rejected Data (Flag <-3>)

The first record of the April 27th deployment (04/27/2020 – 12:45 to 06/02/2020 – 09:30) was rejected due to a pH spike. There is a 0.5-unit difference between the 15-minute intervals which is not typical for this site. The cause for the spike in pH is unknown but thought to be attributed to acclimation of the probe. The value is flagged as <-3> [GSM] (CND).

Missing Data (Flag <-2>)

Suspect Data (Flag <1>)

Passed Initial QAQC Checks (Flag <0>)

Turbidity

Rejected Data (Flag <-3>)

The data collected during the following times were rejected due to a turbidity spike. Although the values are within the sensor specifications, they were out of line with surrounding data. There was a two or more order of magnitude difference between the 15-minute intervals which is not typical for this site. They did not occur at or near low tide or during a rain event. The values are flagged as <-3> [STS] (CSM).

02/03/2020 – 23:15 (2065)	02/13/2020 – 20:00 (1885)	03/28/2020 – 11:00 (1664)
04/18/2020 – 22:45 (1810)	06/26/2020 – 02:00 (1203)	07/05/2020 – 13:00 (1439)
09/11/2020 – 16:45 (2773)	12/05/2020 – 06:00 (1478)	12/09/2020 – 06:30 (2705)
12/10/2020 – 07:45 (1248)		

Missing Data (Flag <-2>)

Suspect Data (Flag <1>)

Passed Initial QAQC Checks (Flag <0>)

St. Pierre

All Parameters Blanket Statement for St. Pierre

Rejected Data (Flag <-3>)

Missing Data (Flag <-2>)

The data collected during the following periods were missing due to low battery voltage. The values are flagged as <-2> [GPF] (CSM).

04/10/2020 – 02:30 to 04/27/2020 – 09:00

05/11/2020 – 23:45 to 05/20/2020 – 08:00

Suspect Data (Flag <1>)

Passed Initial QAQC Checks (Flag <0>)

Temperature

Rejected Data (Flag <-3>)

Missing Data (Flag <-2>)

Suspect Data (Flag <1>)

Passed Initial QAQC Checks (Flag <0>)

Specific Conductivity/Salinity

Rejected Data (Flag <-3>)

The data collected on 08/24/2020 – 10:15 were rejected due to cause unknown. The dips in salinity did not occur at or near low tide. The reason for the decrease is unknown but we suspect it was due a temporary instrument malfunction, possibly due to blockage of cell contacts by debris. The values are flagged as <-3> [GSM] (CCU).

08/02/2020 – 03:45 to 04:00 (8.7, 8.1 psu) 08/24/2020 – 10:15 (9.5 psu) 12/06/2020 – 21:00 (6.6 psu)

Missing Data (Flag <-2>)

Suspect Data (Flag <1>)

The data collected on 07/04/2020 – 06:30 (22.3 psu) during the July 1st (07/01/2020 – 08:00 to 07/17/2020 – 09:45) deployment were suspect due to cause unknown. Values did not occur at or near low tide or during a rain event. The reason for the decrease is unknown but we suspect it was either debris blocking the cell electrode or a temporary malfunction of the sonde and/or sensor. The values were not rejected because they were within the range typically observed at this site. The values are flagged as <1> [GSM] (CCU).

Passed Initial QAQC Checks (Flag <0>)

The data collected during the following times were flagged were not suspect. They occurred at or during low tide and may have been the result of increased freshwater input, rain events, or runoff. The values are flagged as <0> [GSM] (CRE).

02/06/2020 – 23:30 to 02/07/2020 – 00:45	05/20/2020 – 10:00 to 11:30	06/23/2020 – 14:45 to 16:15
07/07/2020 – 02:30 to 04:15	07/07/2020 – 13:00 to 15:45	08/24/2020 – 18:15 to 21:45
08/25/2020 – 03:30 to 07:15		

DO Percent/mg/L

Rejected Data (Flag <-3>)

The DO mg/L data collected during the following periods were rejected due to conductivity sensor values. The readings were within the range typically observed at this site. The values are flagged as <-3> [SCF] (CSM).

08/02/2020 – 03:45 to 04:00 08/24/2020 – 10:15 12/06/2020 – 21:00

Missing Data (Flag <-2>)

Suspect Data (Flag <1>)

The data collected on 05/24/2020 – 15:45 during the May 20th deployment (05/20/2020 – 08:15 to 06/02/2020 – 08:30) were suspect due to DO spike (117%). Post-deployment checks were all within the accepted ranges. The cause for the spike is unknown but occurred during low tide. The values are flagged as <1> [SDO] (CSM).

Passed Initial QAQC Checks (Flag <0>)

Depth

Rejected Data (Flag <-3>)

The data collected during the following times were rejected due to sensor malfunction. During these times, the sensor recorded a value of 0.00 meters. The cause for the malfunction is thought to be attributed to high power draw from the central wiper. The values are flagged as <-3> [SSM] (CSM).

01/10/2020 – 08:30	01/11/2020 – 08:30	01/16/2020 – 15:45	03/12/2020 – 07:30
03/15/2020 – 10:00	03/15/2020 – 23:00	03/16/2020 – 08:45	07/12/2020 – 23:30
07/13/2020 – 17:30	12/08/2020 – 12:00	12/08/2020 – 15:30	12/09/2020 – 01:45
12/09/2020 – 05:15			

The data collected during the following periods were rejected due to conductivity sensor values. The readings were within the range typically observed at this site. The values are flagged as <-3> [SCF] (CSM).

08/02/2020 – 03:45 to 04:00	08/24/2020 – 10:15	12/06/2020 – 21:00
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Missing Data (Flag <-2>)

Suspect Data (Flag <1>)

Passed Initial QAQC Checks (Flag <0>)

pH

Rejected Data (Flag <-3>)

The data collected from 05/31/2020 – 01:00 to 06/02/2020 – 08:30 during the May 26th deployment (05/20/2020 – 08:15 to 06/02/2020 – 08:30) were rejected due to sensor malfunction. The pH values during this time period remain at 6.5 which is not typical for this site. The pH sensor was unresponsive during the post-deployment check reading 6.49 in the pH 7 and 10 solutions. The values are flagged as <-3> [SSM] (CSM).

The data collected on 12/03/2020 – 00:00 to 12/09/2020 – 08:30 during the November 13th deployment (11/13/2020 – 10:30 to 12/09/2020 – 08:30) were rejected due to post calibration out of range. The post-deployment checks of pH 7 and 10 were outside the accepted ranges at 7.56 and 10.42, respectively. The readings were outside the range typically observed at this site. The values are flagged as <-3> [SPC] (CSM).

Missing Data (Flag <-2>)

Suspect Data (Flag <1>)

The data collected from 05/20/2020 – 08:15 to 05/31/2020 – 00:45 during the May 26th deployment (05/20/2020 – 08:15 to 06/02/2020 – 08:30) were suspect due to post calibration out of range. There was a distinct failure of the probe after this time (7.9 to 6.6) which resulted in failing post-calibration. The data were not rejected because the readings were within the range typically observed at this site. The data after this time were rejected. The values are flagged as <1> [SPC] (CSM).

The data collected from 11/13/2020 – 10:30 to 12/02/2020 – 23:45 during the November 13th deployment (11/13/2020 – 10:30 to 12/09/2020 – 08:30) were suspect due to post calibration out of range. The post-deployment checks of pH 7 and 10 were outside the accepted ranges. The readings were within the range typically observed at this site. The pH data for the remaining part of the deployment were rejected. The values are flagged as <1> [SPC] (CSM).

Passed Initial QAQC Checks (Flag <0>)

The data collected on 08/24/2020 – 18:45 to 21:00 during the August 17th (08/12/2020 – 08:30 to 09/10/2020 – 11:00) were not suspect. The reason for the spike is unknown but the readings were not outside of the range typically observed at this site. The values are flagged as <0> [GSM] (CRE).

Turbidity

Rejected Data (Flag <-3>)

The data collected on 06/19/2020 – 04:45 during the June 16th deployment (06/16/2020 – 08:30 to 07/01/2020 – 07:45) was rejected due to a turbidity drop. The post-deployment checks were all within the accepted ranges. The

value of 0.08 FNU was rejected because it was not typical for this site. The cause for the sudden drop in turbidity is unknown but thought to be attributed to sensor malfunction. The value is flagged as <-3> [SSM] (CSM).

The data collected during the following times were rejected due to a turbidity spike. Although the values are within the sensor specifications, they were out of line with surrounding data. There was a two or more order of magnitude difference between the 15-minute intervals which is not typical for this site. They did not occur at or near low tide or during a rain event. The values are flagged as <-3> [STS] (CSM).

02/22/2020 – 10:00 (2203)

08/08/2020 – 21:00 (1396)

09/29/2020 – 02:30 (1746)

Missing Data (Flag <-2>)

Suspect Data (Flag <1>)

Passed Initial QAQC Checks (Flag <0>)

Fort Johnson

All Parameters Blanket Statement for Fort Johnson

Rejected Data (Flag <-3>)

Missing Data (Flag <-2>)

Suspect Data (Flag <1>)

Passed Initial QAQC Checks (Flag <0>)

Temperature

Rejected Data (Flag <-3>)

Missing Data (Flag <-2>)

Suspect Data (Flag <1>)

Passed Initial QAQC Checks (Flag <0>)

Specific Conductivity/Salinity

Rejected Data (Flag <-3>)

Missing Data (Flag <-2>)

Suspect Data (Flag <1>)

The data collected during the following times were suspect due to cause unknown. Values did not occur at or near low tide or during a rain event. The reason for the decrease is unknown but we suspect it was either debris blocking the cell electrode or a temporary malfunction of the sonde and/or sensor. The values were not rejected because they were within the range typically observed at this site. The values are flagged as <1> [GSM] (CCU).

07/27/2020 – 21:30 (20.5 psu)

10/26/2020 – 12:00 (17.3 psu)

Passed Initial QAQC Checks (Flag <0>)

DO Percent/mg/L

Rejected Data (Flag <-3>)

Missing Data (Flag <-2>)

Suspect Data (Flag <1>)

Passed Initial QAQC Checks (Flag <0>)

Depth

Rejected Data (Flag <-3>)

Missing Data (Flag <-2>)

Suspect Data (Flag <1>)

Passed Initial QAQC Checks (Flag <0>)

pH

Rejected Data (Flag <-3>)

Missing Data (Flag <-2>)

Suspect Data (Flag <1>)

Passed Initial QAQC Checks (Flag <0>)

Turbidity

Rejected Data (Flag <-3>)

The data collected during the following times were rejected due to a turbidity spike. Although the values are within the sensor specifications, they were out of line with surrounding data. There was a two or more order of magnitude difference between the 15-minute intervals which is not typical for this site. They did not occur at or near low tide or during a rain event. The values are flagged as <-3> [STS] (CSM).

10/21/2020 – 05:00 (556)

Missing Data (Flag <-2>)

Suspect Data (Flag <1>)

Passed Initial QAQC Checks (Flag <0>)