ACE Basin (ACE) National Estuarine Research Reserve Nutrient Metadata
January-December 2015
Latest Update: December 8, 2020

I. Data Set and Research Descriptors

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2) 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 in Mosquito Creek, tributaries of the South Edisto River. On January 1, 2015 the Edisto Island station replaced the Big Bay Creek station (which was discontinued) as a primary SWMP station. It is also located in Big Bay Creek, approximately 1.27 km upstream from the former Big Bay station, with similar water quality and influences.

The four 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 medium to dense. 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.

a) Monthly Grab Sampling Program

In February of 2002, the nutrient-monitoring component of SWMP was initiated at the ACE Basin NERR. The monitoring sites are currently located at the four primary SWMP stations: Edisto Island, St. Pierre Creek, Fishing Creek, and Mosquito Creek. These sites are also SWMP semi-continuous water quality monitoring stations. At each site YSI data loggers are deployed to monitor the water temperature, specific conductance, dissolved oxygen, water depth, pH and turbidity conditions every 15 minutes. Data are available online from the CDMO at www.nerrsdata.org. The objective of the nutrient study is to ascertain the annual and seasonal fluctuations in nutrient levels at the sites. Two samples are collected from each station during the mid-ebb to slack-low tide periods each month. The samples are then analyzed for ammonia, nitrite + nitrate, ortho-phosphate and chlorophyll-a concentrations. In addition to the required nutrient parameters the ACE Basin NERR also analyzes the samples from four sites (Grove Plantation, Jehossee Island, St. Pierre, and Edisto Island) for total suspended solids (TSS), total nitrogen (TN), and total phosphorus (TP) beginning in February of 2015 for TSS and January of 2016 for TN and TP. The data is available by request to the ACE Basin NERR Research Coordinator.

b) Diel Sampling Program

In July 1997, the Reserve staff initiated a nutrient diel study. The objective of the study was to ascertain the tidal fluctuations in nutrient levels. Big Bay and St. Pierre Creek water quality monitoring stations were selected as study sites. In February of 2002, St. Pierre Creek was designated as the SWMP diel site, and diel monitoring was discontinued at the Big Bay site. Nutrient samples are collected during one complete tidal cycle (24 hr 48 min) each month at each station. The samples are analyzed for ammonium, nitrite + nitrate, ortho-phosphate, and chlorophyll-a concentrations

3) Research methods

a) Monthly Grab Sampling Program

Water samples are taken monthly at the four NERR water quality stations: Edisto Island, St. Pierre Creek, Fishing Creek, and Mosquito Creek. Two samples are collected, consecutively, at a depth of 0.3-0.5 meters below the surface, using a water-sampler. The "grab" samples are taken on the same day and between mid-ebb and slack-low tide (within 3 hours before slack-low tide). No distinction is made between neap and spring tide conditions or between morning and afternoon tides.

All samples are collected in wide-mouth, clear polypropylene bottles that are acid washed (10% HCl solution), rinsed (6x) with distilled-deionized water, and dried prior to the sampling day. At each sampling site, sample bottles are rinsed with ambient water prior to sample collection. Samples are immediately removed from natural light and placed on ice, then returned to the laboratory. In the laboratory, samples are processed for nutrient and chlorophyll-a analyses (see Section 13 - *Analytical Methods*).

b) Diel Sampling Program

Diel monitoring occurs monthly at the St. Pierre Creek water quality station. Thirteen water samples are collected every 2 hours and 4 minutes over one lunar day (24 hr 48 min), using an ISCO auto-sampler. Sample collection begins at the predicted slack-low; and are collected at a depth of 0.5 meters below the surface. No distinction is made between neap and spring tide conditions.

All samples are collected in clear polypropylene bottles, which are acid washed (10% HCl solution), rinsed (6x) with distilled-deionized water, and dried prior to the sampling day. Due to the use of the ISCO auto-sampler, ambient water rinses prior to sample collection are not feasible. During the collection period, samples are kept cooled by ice stored in the enclosed ISCO. Within two hours of the last sample collection, samples are removed from the auto-sampler, placed on ice and returned to the laboratory for analysis. In the laboratory, samples are filtered through 25-mm glass fiber filter within three hours of sample retrieval, and then stored at 4°C (see Section 13 - *Analytical Methods*).

4) 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 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, encompassing the area between Four Holes Swamp and St. Helena Sound. The river receives considerable input of freshwater with an average annual streamflow of 74 m^3/s. The official saltwater-freshwater demarcation line on the river lies at river mile 20; however, during periods of very low flow, the saltwater interface can intrude to river mile 32, which is approximately 12 river miles from the inland boundary of the reserve. Salt marshes of smooth cordgrass (*Spartina alterniflora*) dominate the wetlands in the polyhaline and mesohaline, while waterfowl impoundments are the dominant land cover in the oligohaline and limnetic 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 that is intermixed with dead shell hash at the saltwater sites.

Monitoring Stations
Three of the four 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: 32.5040N and -80.3247W
On January 1, 2015, the 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. The Edisto Island station is also designated as a "treatment" site because of its proximity to developed areas. In 2015, mean depth at the station was 2.5 m (8.1 ft.) and mean salinity was 29.3 parts per thousand (ppt).

The eastern bank of the 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. 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. Major contributors of nonpoint source pollution to the monitoring station are surface runoff from lawns, golf courses, and paved ramps that contain fertilizers, pesticides, herbicides and PAHs. Docks and bulkheads are constructed of concrete, creosote wood, chromated copper arsenate (CCA) treated wood or Wolmanized wood.

Fishing Creek (FC) – GPS coordinates: 32.6358 N and -80.3655W
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 (16.4 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 2015, mean depth at the station was 2.4 m (7.7 ft.) and mean salinity was 8.8 ppt.

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 -80.4380W
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 (16.4 ft.) from the southern bank of the creek. In 2015, mean depth at the station was 3.6 m (11.8 ft.) and mean salinity was 14.2 ppt.

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 wood, concrete, Wolmanized wood, or

CCA treated wood; a public boat landing; a commercial seafood business with commercial shrimp boats and a fueling dock are located approximately 1.0 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 (SP) - GPS coordinates: 32.5279N and -80.3615W
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 5.4 m (17.8 ft.) from the southern 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, live oaks, and palmettos dominate the upland areas. In 2015, the mean depth at the station was 1.8 m (6.0 ft.) and mean salinity was 27.4 ppt.

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 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 is limited to 67. 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.

5) Coded variable definitions

Each individual sample is given a 3-part name code in addition to other codes. The three part name code gives the Reserve name, station name, and the SWMP program code.

Sampling Station:	Site code:
Edisto Island	EI
Fishing Creek	FC
Mosquito Creek	MC
St. Pierre	SP

aceeinut = ACE Basin Edisto Island nutrients
acefcnut = ACE Basin Fishing Creek nutrients
acemcnut = ACE Basin Mosquito Creek nutrients
acespnut = ACE Basin St. Pierre Creek nutrients

Monitoring Programs:
Monthly grab sample program = 1
Diel grab sample program = 2

6) Data collection period

a) Grab sampling (sample collection time listed in Eastern Standard Time)

The SWMP grab sample program began in 2002 for St. Pierre Creek, Big Bay Creek, Fishing Creek, and Mosquito Creek. In 2015, the Edisto Island station replaced Big Bay Creek which was decommissioned.

Site	Sample Date	Rep 1 Time	Sample Date	Rep 2 Time
EI	01/07/2015	12:30	01/07/2015	12:31
EI	02/23/2015	14:00	02/23/2015	14:01
EI	03/18/2015	10:45	03/18/2015	10:46
EI	04/08/2015	12:45	04/08/2015	12:46
EI	05/06/2015	12:45	05/06/2015	12:46
EI	06/17/2015	10:45	06/17/2015	10:46
EI	07/15/2015	10:30	07/15/2015	10:32
EI	08/12/2015	09:35	08/12/2015	09:37
EI	09/16/2015	13:06	09/16/2015	13:08
EI	10/14/2015	12:00	10/14/2015	12:01
EI	11/12/2015	12:30	11/12/2015	12:32
EI	12/14/2015	13:15	12/14/2015	13:17

Site	Sample Date	Rep 1 Time	Sample Date	Rep 2 Time
FC	01/07/2015	14:00	01/07/2015	14:01
FC	02/23/2015	14:30	02/23/2015	14:31
FC	03/18/2015	09:45	03/18/2015	09:46
FC	04/08/2015	14:30	04/08/2015	14:31
FC	05/06/2015	13:00	05/06/2015	13:01
FC	06/17/2015	10:45	06/17/2015	10:46
FC	07/15/2015	11:50	07/15/2015	11:51
FC	08/12/2015	10:15	08/12/2015	10:16
FC	09/16/2015	13:46	09/16/2015	13:47
FC	10/14/2015	12:30	10/14/2015	12:31
FC	11/12/2015	13:01	11/12/2015	13:02
FC	12/14/2015	13:45	12/14/2015	13:46

Site	Sample Date	Rep 1 Time	Sample Date	Rep 2 Time
MC	01/07/2015	15:00	01/07/2015	15:01
MC	02/23/2015	16:15	02/23/2015	16:16
MC	03/18/2015	12:00	03/18/2015	12:01
MC	04/08/2015	15:15	04/08/2015	15:16
MC	05/06/2015	14:04	05/06/2015	14:05
MC	06/17/2015	13:00	06/17/2015	13:02
MC	07/15/2015	12:23	07/15/2015	12:25
MC	08/12/2015	11:30	08/12/2015	11:33
MC	09/16/2015	14:30	09/16/2015	14:31
MC	10/14/2015	13:45	10/14/2015	13:46
MC	11/12/2015	14:31	11/12/2015	14:33
MC	12/14/2015	14:52	12/14/2015	14:53

Site	Sample Date	Rep 1 Time	Sample Date	Rep 2 Time
SP	01/07/2015	13:15	01/07/2015	13:16
SP	02/23/2015	13:30	02/23/2015	13:31
SP	03/18/2015	09:08	03/18/2015	09:09
SP	04/08/2015	13:45	04/08/2015	13:46
SP	05/06/2015	12:15	05/06/2015	12:16
SP	06/17/2015	10:15	06/17/2015	10:16
SP	07/15/2015	11:00	07/15/2015	11:01
SP	08/12/2015	09:30	08/12/2015	09:31
SP	09/16/2015	13:15	09/16/2015	13:16
SP	10/14/2015	12:00	10/14/2015	12:01
SP	11/12/2015	12:16	11/12/2015	12:17
SP	12/14/2015	13:30	12/14/2015	13:31

b) Diel sampling (sample collection time listed in Eastern Standard Time)

The SWMP diel sample program began in 2002 for the St. Pierre Creek site.

Site	Start Date	Start Time	End Date	End Time
SP	01/06/2015	02:43	01/07/2015	03:31
SP	02/19/2015	14:45	02/20/2015	15:33
SP	03/17/2015	00:04	03/18/2015	00:52
SP	04/06/2015	16:28	04/07/2015	17:16
SP	05/04/2015	15:23	05/05/2015	16:11
SP	06/16/2015	02:54	06/17/2015	03:42
SP	07/14/2015	01:45	07/15/2015	02:33
SP	08/11/2015	00:33	08/12/2015	01:21
SP	09/15/2015	04:09	09/16/2015	04:57
SP	10/13/2015	03:00	10/14/2015	03:48
SP	11/10/2015	13:25	11/11/2015	14:13
SP	12/11/2015	14:23	12/12/2015	15:11

7) Associated researchers and projects

The ACE Basin NERR continuous water quality monitoring sites are located at Edisto Island (on Big Bay Creek), St. Pierre Creek, Fishing Creek and Mosquito Creek. The principal objective of this study is to record long-term water quality data for ACE Basin NERR in order to observe any physical changes or trends in water quality over time. YSI data loggers are used to take measurements of dissolved oxygen, temperature, salinity, conductivity, pH and turbidity every 15 minutes at the four sites. Historical water quality data from these sites is available online at www.nerrsdata.org.

The ACE Basin NERR weather station is located at Bennett's Point. Parameters measured include: air temperature, humidity, barometric pressure, solar radiation (total and PAR), wind speed, wind direction, and precipitation. Historical meteorological data are available from Bennett's Point online at www.nerrsdata.org.

Dr. Charles Wenner of SCDNR/Marine Resources Research Institute received funding through the National Marine Fisheries Service in January of 2001 to continue an ongoing survey of red drum (*Sciaenops ocellatus*) in the South Edisto and Combahee River basins, by electrofishing in tidal freshwater

and low salinity brackish water. Although red drum is the target species, all species are identified, measured and weighed.

8) Distribution

NOAA retains the right to analyze, synthesize and publish summaries of the NERRS System-wide Monitoring Program data. The NERRS retains the right to be fully credited for having collected and process the data. Following academic courtesy standards, the NERR site where the data were collected should be contacted and fully acknowledged in any subsequent publications in which any part of the data are used. The data set enclosed within this package/transmission is only as good as the quality assurance and quality control procedures outlined by the enclosed metadata reporting statement. The user bears all responsibility for its subsequent use/misuse in any further analyses or comparisons. The Federal government does not assume liability to the Recipient or third persons, nor will the Federal government reimburse or indemnify the Recipient for its liability due to any losses resulting in any way from the use of this data.

Requested citation format:
NOAA National Estuarine Research Reserve System (NERRS). System-wide Monitoring Program. Data accessed from the NOAA NERRS Centralized Data Management Office website: www.nerrsdata.org; *accessed* 12 October 2012.

NERR nutrient 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 separated version format.

II. Physical Structure Descriptors

9) Entry verification

Nutrient data are entered into a Microsoft Excel worksheet and processed using the NutrientQAQC Excel macro. The NutrientQAQC macro sets up the data worksheet, metadata worksheets, and MDL worksheet; adds chosen parameters and facilitates data entry; allows the user to set the number of significant figures to be reported for each parameter and rounds using banker's rounding rules; allows the user to input MDL values and then automatically flags/codes measured values below MDL and inserts the MDL; calculates parameters chosen by the user and automatically flags/codes for component values below MDL, negative calculated values, and missing data; allows the user to apply QAQC flags and codes to the data; produces summary statistics; graphs selected parameters for review; and exports the resulting data file to the CDMO for tertiary QAQC and assimilation into the CDMO's authoritative online database.

The entered values are checked for transcription errors and edited as needed. The data are evaluated to determine whether to flag or delete suspect values. Data are flagged if the values are: 1) above upper limit of range detection, 2) below lower limit of range detection; 3) based on samples held beyond specified holding time; and 4) derived on lab analysis from improperly preserved samples. Amanda Fornal and

Meghan Miller are responsible for these tasks.

The SCDNR/Marine Resources Division and Baruch Marine Field Laboratory's chemistry laboratories calculate and report results in μM. For purposes of consistency in the NERR System, ACE Basin NERR staff calculate the concentrations as mg/L based on atomic masses of 14.00674 and 30.973762 for N and P, respectively. Therefore, ACE Basin NERR staff multiply the concentrations reported from the chemistry labs by 0.01400674 and 0.030973762 to yield concentrations in mg/L for N and P, respectively. CHLA_N sample concentrations are an average of two replicate subsamples per grab and diel sample, and are calculated in and reported as μg/L.

10) Parameter titles and variable names by data category

Data Category	Parameter	Variable Name	Units of Measure
Phosphorous:	Orthophosphate, Filtered	PO4F	mg/L as P
Nitrogen:	Ammonium, Filtered	NH4F	mg/L as N
	Nitrite + Nitrate, Filtered	NO23F	mg/L as N
	Dissolved Inorganic Nitrogen	DIN	mg/L as N
Plant Pigments:			
	Chlorophyll-a	CHLA_N	ug/L

Notes:

1. Time is coded based on a 2400 hour clock and is referenced to Eastern Standard Time.
2. Reserves have the option of measuring either NO2F or NO3F or they may substitute NO23F for individual analysis if they can show that NO2 is a minor component relative to NO3F. ACE NERR staff and the Analytical Laboratory staff determined that separate NO2F and NO3F data were not necessary. The concentration of NO2F is negligible when compared to the concentration of NO3F.

11) Measured and calculated laboratory parameters

a) Parameters measured directly

Nitrogen species:	NO23F, NH4F
Phosphorus species:	PO4F
Other:	CHLA_N

b) Calculated parameters

DIN	NO23F + NH4F

12) Limits of detection

The MDLs for NH4, NO23, and PO4 were calculated by analyzing 10 replicate aliquots of stock standards for each parameter. The following equation was then used MDL = St(n-1, 1-α=0.99). Where, t(n-1, 1-α=0.99) is the Student's t-value appropriate for a single-tailed 99th percentile t statistic and a standard deviation estimate with n-1 degrees of freedom; n is the number of replicates; and S is the standard deviation of the replicate analysis.

The MDL for chlorophyll a is calculated the same way, except using seven replicate aliquots of ambient water.

Table 1 lists the MDL values as provided by the SCDNR Algal Ecology Section from January through

September. Table 2 lists the MDL values as provided by the North Inlet - Winyah Bay NERR laboratory for December. Table 3 lists the MDL values as provided by the ACE Basin NERR SCDNR/MRD lab for January through December. These values are reviewed and revised annually.

Table 1. SCDNR AEL Method Detection Limits (MDL) for measured water quality parameters.

Parameter	Start Date	End Date	MDL in mg/L as N or P
PO4F	1/1/2015	09/30/2015	0.0006
NH4F	1/1/2015	09/30/2015	0.0020
NO23F	1/1/2015	09/30/2015	0.0021

Table 2. North Inlet - Winyah Bay NERR Method Detection Limits (MDL) for measured water quality parameters.

Parameter	Start Date	End Date	MDL in mg/L as N or P
PO4F	12/01/2015	12/31/2015	0.0017
NH4F	12/01/2015	12/31/2015	0.0006
NO23F	12/01/2015	12/31/2015	0.0010

Table 3. Method Detection Limits (MDL) for measured water quality parameters.

Parameter	Start Date	End Date	MDL in ug/L
CHL-A	1/1/2015	12/31/2015	0.06

13) Laboratory methods

a) Sampling preparation methods:

The supplies used by the ACE Basin NERR to collect and process water samples are: 1) 1000-ml wide-mouth clear polypropylene bottles; 2) 1000-ml clear polypropylene ISCO bottles, 3) 20-ml scintillation vials and caps; 4) 15-ml polypropylene centrifuge tubes and caps; 5) 20 mL borosilicate culture vials; 6) 60-ml filtering apparatus [polypropylene syringe, syringe plunger and syringe filter holder with 25mm pore size]; and 7) 25 mm glass microfiber filter paper.

Prior to sample collection, the sample bottles, scintillation vials and caps, and filtering apparatus are acid-washed with a 10% hydrochloric acid bath, rinsed (6x) with deionized water, and dried. The dried bottles are capped, and the filtering apparatus is covered and stored.

b) Filtering process:

The samples were filtered by ACE NERR staff within four hours of collection. A 25 mm diameter 0.7 μm (nominal) pore size glass fiber filter was used to separate the dissolved and particulate constituents of the sample. While wearing gloves one filter was placed in a filter holder using clean forceps to prevent contamination. The sample bottle was gently agitated by 10 inversions to suspend the particulates. The filter syringe was "seeded" with the sample water by rinsing it with sample water. The filter holder was attached to the syringe and 50 ml of agitated sample water was added to the filter apparatus (syringe with attached filter holder). The filter apparatus was positioned over a scintillation vial and filter plunger inserted and slowly pushed upon. Both scintillation vials were seeded with the sample water by filling them with filtered water and then discarded. After filtering the

50 ml, the filter holder was removed from the syringe, covered, and set aside. If sediments and other solids in the sample prevented the filtration of the entire 50 ml, the volume filtered was recorded on a laboratory sheet and the unfiltered portion discarded.

Using a clean filtering apparatus, the filtering process was repeated as above, with the filtered water retained in two scintillation vials. The samples contained in the scintillation vials were placed in a 4°C freezer and moved to a -20°C within 24 hours. They were analyzed within 28 days for dissolved inorganic nutrient concentrations.

The two filters were examined for similar color and coverage of particulates. If similar, then each filter was placed in a labeled centrifuge tube filled with 10 ml of 90% acetone. The tube was capped and covered with foil. If the density and coverage of particulates on one filter was noticeably different than the duplicate filter, both filters were discarded and the filtering process was repeated until two filters of similar color and coverage were obtained. After filtering all of the samples, the centrifuge tubes were placed in a refrigerator set at 4°C and analyzed within 24 hours for chlorophyll a.

c) Analytical methodology:

SCDNR Algal Ecology Laboratory
(Jan–Sept 2015 N/P samples, Jan 2015–Dec 2015 CHLA)

Nitrogen and phosphorus chemistry was determined with a Lachat™ QuikChem 8000 Flow Injection Nutrient Analyzer equipped with a data logger during 2015. The filtered water was then run through the autoanalyzer. At the beginning of each analysis, the autoanalyzer was calibrated by injecting calibration standards. The autoanalyzer and data logger system prepared a calibration curve by plotting sample response versus standard concentration. The filtered water was then run through the autoanalyzer. The data logger calculated the sample concentrations based on the regression equation and stored the values in a temporary file. At the end of the complete analysis run, the temporary file was then transferred to a computer.

Chlorophyll chemistry was determined by the acidification method using a Turner 10-AU-005-CE equipped with Turner Acidification Optical Kit (Daylight White Lamp). The fluorometer was checked with a solid chlorophyll standard before and after every analysis run.
The following formula was used to calculate chlorophyll-a:

((((calibration constant)*(acid ratio/ (acid ratio - 1))*(fluorescence before acidification - fluorescence after acidification))))*(volume of acetone/volume filtered)

i. Parameter: NH4F

Method reference: QuikChem® Method No. 31-107-06-1-B (2001)

Range: 0.355 - 42.836 μM N/L as NH4F

Method Descriptor: The fixed filtrate (<0.7 μm) is used in the procedure to determine the ammonia concentration. This method is dependent upon the Berthelot Reaction, during which a blue colored compound, closely related to indophenol, forms when an ammonium salt solution is added to sodium phenoxide, followed by the addition of sodium hypochlorite (Glibert and Loder 1977). A solution of potassium sodium tartrate and sodium citrate is added to the sample stream to eliminate the precipitation of the hydroxides of calcium and magnesium.

Preservation Method: Water was initially filtered through 25-mm (0.7 μm pore size) glass filter and stored at 4oC up to 24 hours. Samples were relocated to a freezer within 24 hours where they were stored at ≤ -20°C for up to 28 days.

Gilbert, P. and T. Loder: Automated analysis of nutrients in seawater. Technical report WHOI-11-41, 46 pp. Woods Hole, MA: Woods Hole Oceangr. Inst. 1977

ii. Parameter: NO2F, NO3F, and NO23F

Method Reference: QuikChem® Method No. 31-107-04-1-D (2000)

Range: 0.356 - 0.999 μM N/L as NO3F and/or NO2F

Method Descriptor: The fixed filtrate (<0.7 μm) is used in the procedure to determine the Nitrate and Nitrite concentrations. The combined nitrate-nitrite (NO3F + NO2F) value is obtained by passing a sample through a copper-cadmium reductor column that reduces the nitrate (NO3F) to nitrite (NO2F), and the nitrite is obtained by passing a sample through the auto-analyzer machine without the column. The nitrite ion reacts with sulfanilamide under acidic conditions to form a diazonium ion. This compound then couples with N-(1-napthylethyl) enediamine dihydrochloride to form a reddish-purple azo dye. The dye absorbs at 540 nm. The nitrate concentration is obtained by subtracting the nitrite value from the combined nitrate and nitrite value.

Preservation Method: Water was initially filtered through 25-mm (0.7 μm pore size) glass filter and stored at 4oC up to 24 hours. Samples were relocated to a freezer within 24 hours where they were stored at ≤ -20°C for up to 28 days.

iii. Parameter: PO4F

Method Reference: QuikChem® Method No. 31-115-01-1-H (2001)

Range: 0.161 - 0.12.914 μM N/L as PO4F

Method Descriptor: The fixed filtrate (<0.7 μm) is used in the procedure to determine the orthophosphate concentration. The QuikChem® Method is a modification of the Murphy and Riley (1962) single solution method. Ammonium molybdate and antimony potassium tartrate reacts in an acid medium with phosphate to form an antimonyphospho-molybdate complex. This complex is reduced to an intensely blue colored complex by ascorbic acid. The phosphomolybdate blue complex formed during the reaction is read at a wavelength of 880 nm to determine the value.

Preservation Method: Water was initially filtered through 25-mm (0.7 μm pore size) glass filter and stored at 4oC up to 24 hours. Samples were relocated to a freezer within 24 hours where they were stored at ≤ -20°C for up to 28 days.

iv. Parameter: CHLA_N

Method Reference: Modification of EPA Method 445.0 (EPA/600/R-92/121)

Method Descriptor: The extract is used in the procedure to determine the chlorophyll-a chemistry. Within a 24-hour period the samples were brought to room temperature, are centrifuged at 3000 rpm for 10 minutes and then 5 ml are transferred to culture tubes, using a pump pipettor. The extraction is read at 440 nm wavelength, and then the sample is acidified with 0.1 mL (two drops) of 0.1 N HCl solution and re-read at the same wavelength.

Preservation Method: The 25-mm (0.7 μm pore size) glass filters were placed in 15 mL centrifuge tubes (one filter/tube) filled with 10 ml of 90% acetone and stored in the freezer at ≤ -20°C for 18-24 hours.

Baruch Marine Field Laboratory Water Chemistry Laboratory
(Dec 2015 N/P samples; copied directly from NI-WB nutrient metadata)

Stock standards are prepared in 1liter batches, fixed with chloroform and stored at 4°C. Working standards for each sampling interval are prepared fresh each time from stock standards. The water samples are all analyzed at the same range for all sites and seasons with the exception of a higher standard set used for determination of NO23F at the NI-WB Thousand Acre (TA) site. The following standard concentrations are used:

Parameter	**Concentrations (mg/L) used for standard curve**
PO4F	0, 0.0496, 0.0744, 0.0992
NO23F	0, 0.028, 0.042, 0.056
NO2F	0, 0.0056, 0.0112, 0.0168, 0.0224
NH4F	0, 0.028, 0.056, 0.084, 0.112
NO23F (TA site)	0, 0.07, 0.14, 0.28

These concentrations are used to generate the standard curve from which sample concentrations are determined. Samples are generally processed within 48 hours of collection. Salinity values are measured with a Mettler SG7 handheld conductivity meter, calibrated prior to use. NO23F, PO4F, NO2F, and NH4F aliquots are analyzed with a Technicon AutoAnalyzer.

The Technicon produces output printouts with raw nutrient value concentrations. With the Technicon model used for this database, there are no peak heights; the Technicon converts the peak heights directly into a nutrient concentration. Results from all other analyses are recorded by hand.

i. Parameter: Ammonium (NH4F)

NH4F concentrations are determined on GF/F (0.7 micrometer nominal pore-size) filtered sample water. The method used is based on that of Grasshoff and Johannsen (1972) and O'Connor and Miloski (1974), with a few modifications. Essentially the method is depends on the Berthelot Reaction. First, the sample is turned basic by the addition of buffer containing sodium hydroxide; sodium citrate and boric acid are used to prevent precipitation of the hydroxides of calcium and magnesium. Next, a blue colored compound closely related to indophenol forms when the solution of an ammonium salt is added to sodium phenoxide, followed by the addition of sodium hypochlorite (Glibert and Loder 1977), the color of which is determined as absorbance at 630 nm wavelength.

Glibert, P.M. and T.C. Loder. 1977. Automated Analysis of Nutrients in Seawater: A Manual of Techniques. Publication Number WHOI-77-47. Woods Hole Oceanographic Institution, Woods Hole, Massachusetts 02543.

Grasshoff, K and J. Johannsen. 1972. A new sensitive and direct method for the automatic determination of ammonia in seawater. ICES Journal of Marine Science 34 (3): 516-521.

O'Connor, B. and W. Miloski. 1974. Ammonia analysis of seawater using a Technicon AutoAnalyzer II. Suffolk County Department of Environmental Control. Unpublished manuscript.

ii. Parameter: Nitrite (NO2F)

NO2F concentrations are determined on GF/F (0.7 micrometer nominal pore-size) filtered sample water. The basic method is Technicon Method No. 158-71W/B (Technicon Industrial Systems 1979). The nitrite ion reacts with sulfanilamide under acidic conditions to form a diazo compound. This compound then couples with N-1-napthylethylenediamine dihydrochloride to form a reddish-purple azo dye, the color of which is determined as absorbance at 550 nm wavelength. There are very few known interferences at concentrations less than 1000 times that of the nitrite; however, recent

addition of strong oxidants or reductants to the samples will readily affect the nitrite concentrations. High alkalinity (600 mgL-1) will give low results due to a shift in pH of the color reaction.

Technicon Industrial Systems. 1976. Technicon Industrial Method No. 161-71W/B; Nitrate-Nitrite in

Water and Seawater. Technicon Industrial Systems; a Division of Technicon Instruments Corporation, Tarrytown, NY 10591.

iii. Parameter: Nitrite + Nitrate (NO23F)

NO23F concentrations are determined on GF/F (0.7 micrometer nominal pore-size) filtered sample water. The basic method is Technicon Method No. 158-71W/B (Technicon Industrial Systems 1979). Nitrate is reduced to nitrite by a copper-cadmium reductor column. The nitrite ion then reacts with sulfanilamide under acidic conditions to form a diazo compound, which couples with N-1-napthylethylenediamine dihydrochloride to form a reddish-purple azo dye, the color of which is determined as absorbance at 550 nm wavelength. For a discussion of the problems associated with EDTA as the buffer choice (Brewer & Riley, 1965) refer to Gilbert & Mlodzinska (1977).

Technicon Industrial Systems. 1979. Technicon Industrial Method No. 158-71W/B; Nitrate-Nitrite in Water and Seawater. Technicon Industrial Systems; a Division of Technicon Instruments Corporation, Tarrytown, NY 10591.

Brewer, P.G. and J.P. Riley. 1965. The automatic determination of nitrate in sea water. Deep Sea Research and Oceanographic Abstracts 12 (6): 765-772.

Gilbert P.M., Z. Mlodzinska, and C.F. D'Elia. 1977. A semi-automated persulfate oxidation technique for simultaneous total nitrogen and total phosphorus determination in natural water samples. Woods Hole Oceanographic Institution Contribution Number 3954. Ocean Industry Program of the Woods Hole Oceanographic Institution, Woods Hole, Massachusetts 02543.

iv. Parameter: Orthophosphate (PO4F)

PO4F concentrations are determined on GF/F (0.7 micrometer nominal pore-size) filtered sample water. The basic method is the Technicon Industrial Method No. 155-71W (1973), which is a modification of the Murphy and Riley (1962) single solution method. The method depends on the formation of a phosphomolybdate blue complex, the color of which is determined as absorbance at 880 nm wavelength.

Technicon Industrial Systems. 1973. Technicon Industrial Method No. 155-71W; Ortho Phosphate in Water and Seawater. Technicon Industrial Systems; a Division of Technicon Instruments Corporation, Tarrytown, NY 10591.

Murphy, J. and J. P. Riley. 1962. A Modified Single Solution Method for the Determination of Phosphate in Natural Waters. Analytica Chimica Acta 27:31.

14) Field and laboratory QA/QC programs

a) Precision:

i) Field Variability - Grab samples are collected monthly at each of the four monitoring sites. A

water-sampler is used to collect two consecutive samples at a depth of 0.3-0.5 meters below the water surface. The grab samples are taken on the same day and between mid-ebb and slack-low water (~ 3 hrs before slack-low water to slack-low water). Grab samples do not have replicates. Diel samples are collected monthly in St. Pierre Creek near the water quality station. Samples are collected every 2 hours and 4 minutes over one lunar day (24 hr 48 min), using an ISCO auto-sampler. Sample collection begins at the predicted slack-low, and samples are collected at a depth of 0.5 meters below the water surface. Diel samples do not have replicates.

ii) **Laboratory Variability -** replication for grab/diel NH4F, NO23F, and PO4F; two filter replicates for CHLA_N.

iii) **Inter-organizational splits -** No splits: all samples are analyzed by the same lab

b) **Accuracy:**

i) **Sample Spikes -** The lab does not run sample spikes but does run known standards and blank checks (DI water) during the analysis.

ii) **Standard Reference Material Analysis -** Our lab is not an EPA lab, so they do not receive samples.

iii) **Cross Calibration Exercises -** ACE Basin NERR does not participate in the cross calibration exercises

15) 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_). QAQC flags are applied to the nutrient data during secondary QAQC to indicate data that are out of sensor range low (-4), rejected due to QAQC checks (-3), missing (-2), optional and were not collected (-1), suspect (1), and that have been corrected (5). All remaining data are flagged as having passed initial QAQC checks (0) when the data are uploaded and assimilated into the CDMO ODIS as provisional plus data. The historical data flag (4) is used to indicate data that were submitted to the CDMO prior to the initiation of secondary QAQC flags and codes (and the use of the automated primary QAQC system for WQ and MET data). This flag is only present in historical data that are exported from the CDMO ODIS.

-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
4 Historical Data: Pre-Auto QAQC
5 Corrected Data

16) 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 sample or sample collection, sensor errors document common sensor or parameter specific problems, 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. However, a record flag column (F_Record) in the nutrient data allows multiple comment codes to be applied to the entire data record.

General errors

GCM	Calculated value could not be determined due to missing data
GCR	Calculated value could not be determined due to rejected data
GDM	Data missing or sample never collected
GQD	Data rejected due to QA/QC checks
GQS	Data suspect due to QA/QC checks
GSM	See metadata

Sensor errors

SBL	Value below minimum limit of method detection
SCB	Calculated value could not be determined due to a below MDL component
SCC	Calculation with this component resulted in a negative value
SNV	Calculated value is negative
SRD	Replicate values differ substantially
SUL	Value above upper limit of method detection

Parameter Comments

CAB	Algal bloom
CDR	Sample diluted and rerun
CHB	Sample held beyond specified holding time
CIP	Ice present in sample vicinity
CIF	Flotsam present in sample vicinity
CLE	Sample collected later/earlier than scheduled
CRE	Significant rain event
CSM	See metadata
CUS	Lab analysis from unpreserved sample

Record comments

CAB	Algal bloom
CHB	Sample held beyond specified holding time
CIP	Ice present in sample vicinity
CIF	Flotsam present in sample vicinity
CLE	Sample collected later/earlier than scheduled
CRE	Significant rain event
CSM	See metadata
CUS	Lab analysis from unpreserved sample

Cloud cover

CCL	clear (0-10%)

CSP	scattered to partly cloudy (10-50%)
CPB	partly to broken (50-90%)
COC	overcast (>90%)
CFY	foggy
CHY	hazy
CCC	cloud (no percentage)

Precipitation

PNP	none
PDR	drizzle
PLR	light rain
PHR	heavy rain
PSQ	squally
PFQ	frozen precipitation (sleet/snow/freezing rain)
PSR	mixed rain and snow

Tide stage

TSE	ebb tide
TSF	flood tide
TSH	high tide
TSL	low tide

Wave height

WH0	0 to <0.1 meters
WH1	0.1 to 0.3 meters
WH2	0.3 to 0.6 meters
WH3	0.6 to > 1.0 meters
WH4	1.0 to 1.3 meters
WH5	1.3 or greater meters

Wind direction

N	from the north
NNE	from the north northeast
NE	from the northeast
ENE	from the east northeast
E	from the east
ESE	from the east southeast
SE	from the southeast
SSE	from the south southeast
S	from the south
SSW	from the south southwest
SW	from the southwest
WSW	from the west southwest
W	from the west
WNW	from the west northwest
NW	from the northwest
NNW	from the north northwest

Wind speed

WS0	0 to 1 knot
WS1	> 1 to 10 knots
WS2	> 10 to 20 knots
WS3	> 20 to 30 knots
WS4	> 30 to 40 knots
WS5	> 40 knots

17) Other remarks/notes

Data may be missing due to problems with sample collection or processing. Laboratories in the NERRS System submit data that are censored at a lower detection rate limit, called the Method Detection Limit or MDL. MDLs for specific parameters are listed in the Laboratory Methods and Detection Limits Section (Section II, Part 12) of this document. Concentrations that are less than this limit are censored with the use of a QAQC flag and code, and the reported value is the method detection limit itself rather than a measured value. For example, if the measured concentration of NO23F was 0.0005 mg/l as N (MDL=0.0008), the reported value would be 0.0008 and would be flagged as out of sensor range low (-4) and coded SBL. In addition, if any of the components used to calculate a variable are below the MDL, the calculated variable is removed and flagged/coded -4 SCB. If a calculated value is negative, it is rejected and all measured components are marked suspect. If additional information on MDL's or missing, suspect, or rejected data is needed, contact the Research Coordinator at the Reserve submitting the data.

Note: The way below MDL values are handled in the NERRS SWMP dataset was changed in November of 2011. Previously, below MDL data from 2007-2010 were also flagged/coded, but either reported as the measured value or a blank cell. Any 2007-2011 nutrient/pigment data downloaded from the CDMO prior to November of 2011 will reflect this difference.

Table 4. Nutrient sample analysis dates for all sites:

Filter Date Diel and Grab	Analysis Date PO4F; NH4F; NO23F	Analysis Date CHLA_N
01/07/2015	01/08/2015	01/08/2015
02/23/2015	02/27/2015	02/24/2015
03/18/2015	03/20/2015	03/19/2015
04/08/2015	04/10/2015	04/09/2015
05/06/2015	05/07/2015	05/07/2015
06/17/2015	06/18/2015	06/18/2015
07/15/2015	07/21/2015	07/16/2015
08/12/2015	08/18/2015	08/13/2015
09/16/2015	09/17/2015	09/17/2015
10/14/2015	Not analyzed	10/15/2015
11/12/2015	Not analyzed	11/13/2015
12/14/2015	12/15/2015	12/15/2015

ACE NERR Nutrient Equipment History

Turner 10-AU-005-CE Fluorometer

1994 – The 10-AU fluorometer (S/N: 0057 LRXX) was purchased in **April.**
2000 - Fluorometer was calibrated and new calibration coefficient and acid ratio values were calculated in **June**.
2002 - Fluorometer was calibrated and new calibration coefficient and acid ratio values were calculated in **July**.
2004 - Fluorometer was calibrated and new calibration coefficient and acid ratio values were calculated in **October**.
2004 – The 10-AU fluorometer was sent to Turner Designs for a standard repair (replace NVRAM memory, polarizer and light pipe, electrolytic capacitors on various PCB's, AC adaptor, and the neon lamp) in **December**.
2005 - Fluorometer was calibrated and new calibration coefficient and acid ratio values were calculated in **February**.
2007 - Fluorometer was calibrated and new calibration coefficient and acid ratio values were calculated in **August**.
2008 - Fluorometer was calibrated and new calibration coefficient and acid ratio values were calculated in **August**.
2012 – Fluorometer was calibrated and new calibration coefficient and acid ratio values were calculated in **July**.
2013 – Fluorometer was calibrated and new calibration coefficient and acid ratio values were calculated in **May**.
2014 – The 10-AU fluorometer was sent to Turner Designs in **October** due to a startup malfunction. A standard repair was done. Fluorometer was calibrated in **December**, but information was not saved so a new calibration coefficient and acid ratio values were not calculated.

Data Editing/Flagging Notes: Organized by Sample type, and Code

Precipitation Blanket Statement
The Reserve is over 72,846 ha, and it encompasses most of the estuarine portion of the 320,000-ha ACE Basin watershed, extending 27.14 km northward from the mouth of St. Helena Sound to its inland boundary at the defunct *SCCL* railroad. Due to the immense size of the Reserve it is not uncommon to observe heavy rainfall in one area of the Reserve but not in another area. However, we do assume that rain occurred at all the nutrient monitoring stations if rain was recorded by the Reserve weather station at Bennett's Point.

Chlorophyll-a Analysis Blanket Statement
All of the chlorophyll-a data are coded as suspect <1> (CSM) for the 2015 data set except for the diel samples from the June 2015 deployment, which is described below. The 2013 calibration coefficient and acid ratio were used for the 2015 data because the 2014 calibration information needed to calculate the calibration coefficient and acid ratio values were not written down. We assessed data from the past four calibration events and determined that the mean calibration coefficient and mean acid ratio values for the Turner AU-10 fluorometer were 1.0053+/-0.0109 and 1.7863+/-0.0338, respectively. Although the 2013 mean calibration coefficient and mean acid ratio of 1.0076 and 1.8152, respectively, were within one standard deviation of the calculated means, the data are flagged as suspect.

Diel Samples: St. Pierre Creek (monitoring program 2)

Rejected Data (Flag <-3>)

Missing Data (Flag <-2>)
The nutrient and chlorophyll-a data collected during the June 16, 2015 diel deployment (06/16/2015 at 02:54 to 06/17/2015 at 03:42) are missing due to an ISCO sampler equipment malfunction. The values are flagged as <-2> [GDM] (CSM). The DIN values for this time period are flagged as <-2> [GCM] (CSM) since the calculated values could not be determined due to the missing data.

The nutrient data collected during the October 13, 2015 diel deployment (10/13/2015 at 03:00 to 10/14/2015 at 03:48) are missing due to the samples were not analyzed or preserved within the allotted timeframe. Therefore, the samples were not analyzed. The values are flagged as <-2> [GDM] (CSM). The DIN values for this time period are flagged as <-2> [GCM] (CSM) since the calculated values could not be determined due to the missing data.

The nutrient data collected during the November 10, 2015 diel deployment (11/10/2015 at 13:25 to 11/11/2015 at 14:13) are missing due to an equipment malfunction with the Lachat™ QuikChem 8000 Flow Injection Nutrient Analyzer. There were no back up analyzers available. The values are flagged as <-2> [GDM] (CSM). The DIN values for this time period are flagged as <-2> [GCM] (CSM) since the calculated values could not be determined due to the missing data.

Suspect Data (Flag <1>)
See chlorophyll-a analysis blanket statement above. In addition, the chlorophyll-a data collected during the July diel deployment (7/14/2015 at 01:45 to 7/15/2015 at 02:33) were lower than generally observed in other sampling events. A 17.5 mm rainfall event occurred at the Bennett's Point weather station on 7/14/2015 starting at 13:15. It is unclear if this is related or not.

Passed Initial QAQC Checks (Flag <0>)

Grab Samples: St. Pierre Creek, Edisto Island, Fishing Creek, and Mosquito Creek (monitoring program 1)

Rejected Data (Flag <-3>)

Missing Data (Flag <-2>)
The nutrient data collected from the second grab at Edisto Island (aceeinut) on 2/23/2015 at 14:01 and at Mosquito Creek (acemcnut) on 2/23/2015 at 16:16 were misplaced and not analyzed. The values are flagged as <-2> [GDM] (CSM). The DIN values for this time period are flagged as <-2> [GCM] (CSM) since the calculated values could not be determined due to the missing data.

The nutrient data collected at all sites during the October 14, 2015 grab sampling are missing due to the samples were not analyzed or preserved within the allotted timeframe. Therefore, the samples were not analyzed. The values are flagged as <-2> [GDM] (CSM). The DIN values for this time period are flagged as <-2> [GCM] (CSM) since the calculated values could not be determined due to the missing data.

The nutrient data collected at all sites during the November 12, 2015 grab sampling are missing due to an equipment malfunction with the Lachat™ QuikChem 8000 Flow Injection Nutrient Analyzer. There were no back up analyzers available. The values are flagged as <-2> [GDM] (CSM). The DIN values for this time period are flagged as <-2> [GCM] (CSM) since the calculated values could not be determined due to the missing data.

Suspect Data (Flag <1>)

See chlorophyll-a analysis blanket statement above. In addition, the chlorophyll-a data collected at all sites during the July grab sampling were lower than generally observed in other sampling events. A 17.5 mm rainfall event occurred at the Bennett's Point weather station on 7/14/2015 starting at 13:15. It is unclear if this is related or not.

Orthophosphate replicate values differed substantially for the monthly grab samples listed below. The values are flagged as <1> [SRD].

Edisto Island: 12/14/2015 at 13:15 and 13:17

Passed Initial QAQC Checks (Flag <0>)