ACE Basin (ACE) NERR Nutrient Metadata
January-December 2005
Latest Update: May 14, 2025

I. Data Set & Research Descriptors

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2. Research Objectives:

Based on discussions with local Coastal Zone Management (CZM) personnel and our knowledge of land use within the Reserve, the South Edisto River drainage basin appears well suited for studying contrasting hydrographic conditions and land use patterns in the ACE Basin. The Big Bay monitoring station is located near Edisto Beach within a tributary of Big Bay Creek. Surrounded by residential and commercial development and subject to nonpoint source pollution, this station is designated as the "treatment" site. The second station is located near Bailey Island, within a tributary of St. Pierre Creek. Urban development in the immediate area of this station has been sparse to date so this station serves as the "control" site. The third NERR monitoring station is located within a tributary of Fishing Creek on Jehossee Island, and both the South Edisto and North Edisto rivers influence the creek. The island is owned and operated by the U.S. Fish and Wildlife Service and serves as a wildlife refuge for native and migrating birds and many of South Carolina's endangered species. This station will serve as a second "control" site. The fourth NERR monitoring station is situated in Mosquito Creek, a tributary of the Ashepoo River. Surrounded by rural development and

agriculture, Mosquito Creek is subject to increased nutrient loading and possibly herbicides and pesticides. This station will serve as a second "treatment" site.

a) Monthly Grab Sampling Program

In February of 2002, nutrient-monitoring component of SWMP was initiated at the ACE Basin NERR. The monitoring sites are located near the four existing YSI monitoring stations: Big Bay Creek, St. Pierre Creek, Fishing Creek and Mosquito Creek. The objective of the study is to ascertain the annual and seasonal fluctuations in nutrient levels near the data logger sites. Two samples are collected from the station during mid-ebb to slack-low water tide periods each month. The samples are analyzed for ammonia, nitrite + nitrate, nitrite, ortho-phosphate, and chlorophyll-A concentrations.

b) Diel Sampling Program

In July 1997, the Reserve staff initiated a nutrient diel study. The objective of the study is to ascertain the tidal fluctuations in nutrient levels near the Big Bay and St. Pierre YSI monitoring stations. 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. In February of 2002, St. Pierre Creek was designated as the SWMP diel site.

3. Research Methods:

a) Monthly Grab Sampling Program

Water samples are taken monthly at the four NERR data logger stations: Big Bay Creek, St. Pierre Creek, Fishing Creek, and Mosquito Creek. Two samples are collected, consecutively, at a depth of 0.5 meter below the surface, using a water-sampler. 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). No distinction is made between neap and spring tide conditions. An effort is made to allow for an antecedent dry period of 72 hours prior to sampling.

All samples are collected in wide-mouth, clear nalgene sample 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 8 - *Analytical Methods*).

In-situ measurements of dissolved oxygen (mg/L), salinity (ppt), pH, and air and water temperatures (degree C) are taken at the time of sample collection and at the same depth as the grab samples. Air and water temperatures, salinity, and pH are measured directly with a thermometer, a refractometer and a pH meter, respectively, and dissolved oxygen level is determined by the Winkler titration. This in-situ data is not included in this dataset but can be obtained from contacting the reserve.

b) Diel Sampling Program

Diel monitoring occurs monthly at the St. Pierre Creek YSI datalogger 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 surface. No distinction is made between neap and spring tide conditions. An effort is made to allow for an antecedent dry period of 72 hours prior to sampling.

All samples are collected in wide-mouth, clear nalgene sample 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 processed for nutrient and Chlorophyll-A analyses (see Section 8 - *Analytical Methods*).

4. Site Locations 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 and the Atlantic Ocean. The NERR consists of approximately 180,000 acres of diverse estuarine and freshwater wetlands and uplands, which provide habitats for fish and wildlife.

Two sampling sites are in tributaries of the South Edisto River. One site is in a tributary of the North Edisto River and one is in a tributary of both the South Edisto and Ashepoo rivers, contributing to freshwater input to each site. The average annual tidal range at all sites is approximately 2.0 m (6.5 feet), with a maximum of 2.48 m (8.2 feet) and a minimum of 1.45 m (4.8 feet). The bottom habitat at each of the four sites consists of mud intermixed with dead shell hash. A more detailed description of each site is provided below.

Station A (Big Bay Creek [BB]) - GPS coordinates: 32.4941N and -80.3241W

This site is in a tidal creek, which is a tributary of Big Bay Creek. Surrounded by residential and commercial development and subject to nonpoint source pollution, this station is designated as a "treatment" site. Pollution sources include houses bordering the creek, many of them with little setbacks from the bordering salt marsh; a marina with 75 slips, CCA treated bulkheads and fueling areas located about 0.5 miles downstream; two commercial seafood docks with 8-10 commercial shrimp boats; and three restaurants. There are forty docks in the area constructed of creosote, concrete and Wolmanized pilings; and a paved road and three boat ramps off the creek. Boat traffic is heavy through the creek, and the shellfish harvesting beds are closed because of the human development and activities in the vicinity. The salt marsh is dominated by smooth cordgrass (*Spartina alterniflora*); *Salicornia* spp. (saltwort) and *Borrichia frutescens* (sea ox-eye) are common at higher elevations. Upland fringe areas consist of cabbage palmetto (*Sabal palmetto*), live oak (*Quercus virginiana*), and red cedar (*Juniperus silicicola*). Reefs of American oyster (*Crassostrea virginica*) fringe the creek banks. In 2005, the mean depth at the station was 4.05 m (13.37 ft), and the mean salinity was 28.76 parts per thousand (ppt).

Station B (St. Pierre Creek [SP]) - GPS coordinates: 32.5233N and -80.3568W

This site is in a tidal creek, which is a tributary of St. Pierre Creek. It is surrounded by a wide expanse of smooth cordgrass (*Spartina alterniflora*) marsh. Extensive mud flats and oyster (*Crassostrea virginica*) reefs fringe the banks. Maritime forest communities are comprised of species such as wax myrtle (*Myrica cerifera*), live oak (*Quercus virginiana*), and cabbage palmetto (*Sabal palmetto*). This station is designated as a "control" site because development in the immediate area is sparse, and the creek is subject to relatively light boat traffic. In 2005, the mean depth at the station was 1.62 m (5.35 ft), and the mean salinity was 27.0 parts per thousand (ppt).

Station C (Fishing Creek [FC]) – GPS coordinates: 32.6358 N and -80.3655W

This site is in a tidal creek, which is a tributary of Fishing Creek. Located within the boundaries of Jehossee Island, a protected Wildlife Management Area, this site is surrounded by extensive big cordgrass (*Spartina cynosuroides*) marsh and vast mud flats. The upland area of the island is dominated by slash pine (*Pinus taeda*) and live oak (*Quercus virginiana*). The tidal wetlands on the island were rice fields during the Antebellum Era, and they are now managed as waterfowl habitat by the U.S. Fish and Wildlife Service. These managed wetlands, or impoundments, are not subject to pesticides and herbicides. With relatively light boat traffic and sparse development, this station is designated as a "control" site. In 2005, the mean depth at the station was 1.66 m (5.48 ft), and the mean salinity was 8.24 parts per thousand (ppt).

Station D (Mosquito Creek [MC]) – GPS coordinates: 32.5558 N and -80.4380W

This site is in Mosquito Creek, which is a tributary of both the South Edisto and Ashepoo rivers. Surrounded by agricultural lands and low-density residential housing, this station is designated as a "treatment" site. Sources of nonpoint source pollution along the creek include managed wetlands (impoundments); private docks that are constructed of creosote, concrete and Wolmanized pilings; public boat ramp and dock; and a commercial seafood and fueling area with three commercial shrimp boats. Several impoundment trunks drain into the creek, thus increasing the nutrient load and possibly introducing herbicides and pesticides to the water. The salt marsh at the site is dominated by smooth cordgrass (*Spartina alterniflora*) and black needlerush (*Juncus roemerianus*). Upland fringe areas consist of cabbage palmetto (*Sabal palmetto*), live oak (*Quercus virginiana*) and slash pine (*Pinus taeda*). In 2005, the mean depth at the station was 2.17 m (7.06 ft), and the mean salinity was 16.6 parts per thousand (ppt).

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.

BB = Big Bay
FC = Fishing Creek
MC = Mosquito Creek
SP = St. Pierre

acebbnut = ACE Basin Reserve nutrient data for Big Bay
acefcnut = ACE Basin Reserve nutrient data for Fishing Creek
acemcnut = ACE Basin Reserve nutrient data for Mosquito Creek
acespnut = ACE Basin Reserve nutrient data for St. Pierre

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)

Site	Start Date	Rep 1 Time	Start Date	Rep 2 Time
BB	01/20/2005	0950	01/20/2005	0951
BB	02/23/2005	1041	02/23/2005	1042
BB	03/23/2005	1039	03/23/2005	1040
BB	04/20/2005	0904	04/20/2005	0905
BB	05/18/2005	0825	05/18/2005	0826
BB	06/20/2005	0920	06/20/2005	0921
BB	07/20/2005	0950	07/20/2005	0951
BB	08/17/2005	0931	08/17/2005	0932
BB	09/29/2005	0929	09/29/2005	0930
BB	10/27/2005	0826	10/27/2005	0827
BB	11/30/2005	1037	11/30/2005	1038
BB	12/13/2005	1047	12/13/2005	1048

Site	Start Date	Rep 1 Time	Start Date	Rep 2 Time
SP	01/20/2005	1030	01/20/2005	1031
SP	02/23/2005	1113	02/23/2005	1114
SP	03/23/2005	1120	03/23/2005	1121
SP	04/20/2005	0933	04/20/2005	0934
SP	05/18/2005	0901	05/18/2005	0902
SP	06/20/2005	0948	06/20/2005	0949
SP	07/20/2005	1019	07/20/2005	1020
SP	08/17/2005	1020	08/17/2005	1021
SP	09/29/2005	0959	09/29/2005	1000
SP	10/27/2005	0915	10/27/2005	0916
SP	11/30/2005	1115	11/30/2005	1116
SP	12/13/2005	1111	12/13/2005	1112

Site	Start Date	Rep 1 Time	Start Date	Rep 2 Time
FC	01/20/2005	1225	01/20/2005	1226
FC	02/23/2005	1226	02/23/2005	1227
FC	03/23/2005	1248	03/23/2005	1249
FC	04/20/2005	1046	04/20/2005	1047

FC	05/18/2005	1006	05/18/2005	1007
FC	06/20/2005	1104	06/20/2005	1105
FC	07/20/2005	1148	07/20/2005	1149
FC	08/17/2005	1156	08/17/2005	1157
FC	09/29/2005	1120	09/29/2005	1121
FC	10/27/2005	1036	10/27/2005	1037
FC	11/30/2005	1236	11/30/2005	1237
FC	12/13/2005	1157	12/13/2005	1158

Site	Start Date	Rep 1 Time	Start Date	Rep 2 Time
MC	01/20/2005	1109	01/20/2005	1110
MC	02/23/2005	1223	02/23/2005	1225
MC	03/23/2005	1154	03/23/2005	1155
MC	04/20/2005	1014	04/20/2005	1015
MC	05/18/2005	0931	05/18/2005	0932
MC	06/20/2005	1049	06/20/2005	1050
MC	07/20/2005	1130	07/20/2005	1131
MC	08/17/2005	1022	08/17/2005	1023
MC	09/29/2005	1214	09/29/2005	1215
MC	10/27/2005	0958	10/27/2005	0959
MC	11/30/2005	1252	11/30/2005	1253
MC	12/13/2005	1254	12/13/2005	1255

b) Diel Sampling (Sample Collection Time listed in Eastern Standard Time)

Site	Start Date	Start Time	End Date	End Time
SP01/12/2005	0320		01/13/2005	0408
SP	02/09/2005	0153	02/10/2005	0241
SP	03/16/2005	0616	03/17/2005	0704
SP	04/13/2005	0459	04/14/2005	0547
SP	05/11/2005	0353	05/12/2005	0441
SP	06/08/2005	0311	06/09/2005	0359
SP	07/13/2005	0605	07/14/2005	0653
SP	08/10/2005	0450	08/11/2005	0539
SP	09/21/2005	0354	09/22/2005	0443
SP	10/12/2005	0850	10/13/2005	0938
SP	11/15/2005	0039	11/16/2005	0127
SP	12/07/2005	0608	12/08/2005	0656

7. Associated researchers and projects:

The ACE Basin NERR received initial funding from the U.S. Environmental Protection Agency to establish a National Atmospheric Deposition Program site in the Reserve. Sampling efforts began on January 1, 2002 and will continue for five years. Weekly precipitation samples are collected and analyzed for atmospheric pollutants. The precipitation collector is located on Bear Island, a Wildlife Management Area inside the NERR.

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 identified to species, measured and weighed.

Information about other studies conducted in the ACE Basin may be obtained from the Research Coordinator.

8. Distribution:

According to the Ocean and Coastal Resource Management, Data Dissemination Policy for the NERRS System-wide Monitoring Program as follows.

NOAA/ERD retains the right to analyze, synthesize and publish summaries of the NERRS System-wide Monitoring Program data. The PI retains the right to be fully credited for having collected and processed the data. Following academic courtesy standards, the PI and NERR site where the data were collected will be contacted and fully acknowledged in any subsequent publications in which any part of the data are used. Manuscripts resulting from the NOAA/OCRM supported research that are produced for publication in open literature, including refereed scientific journals. Will acknowledge that the research was conducted under an award from the Estuarine Reserves Division, Office of Ocean and Coastal Resource Management, National Ocean Service, National Oceanic and Atmospheric Administration. The data set enclosed within this package/transmission is only as good as the quality assurance and quality control procedures outlined by the enclosed metadata reporting statement. The user bears all responsibility for its subsequent use/misuse in any further analyses or comparisons. The Federal government does not assume liability to the Recipient or third persons, nor will the Federal government reimburse or indemnify the Recipient for its liability due to any losses resulting in any way from the use of this data.

NERR water quality data and metadata can be obtained from the Research Coordinator at the individual NERR site (See Section 1 *Principal Investigators and Contact Persons*), from the Data Manager at the Centralized Data Management Office (please see personnel directory under the general information link on the CDMO home page) and online at the CDMO home page http://cdmo.baruch.sc.edu. Data are available in text tab-delimited format, Microsoft Excel spreadsheet format and comma-delimited format.

II. Physical Structure Descriptors

9. Entry Verification:

The laboratory data sheets are checked against the laboratory analysis reports for transcription errors and edited as needed. The data are entered manually into an Excel spreadsheet and formatted in accordance with the CDMO guidelines. 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) calculated; 4) based on samples held beyond specified holding time; 5) based on samples taken within 72 hours of a rainfall event; and derived on lab

analysis from unpreserved samples. Amy Whitaker Dukes and Julie L. Dingle are responsible for these tasks.

10. Parameter Titles and Variable Names by Data Category:

Data Category	Parameter	Variable Name	Units of Measure
i) Phosphorous:	Orthophosphate	PO4F	mg/L as P
ii) Nitrogen:	Nitrite + Nitrate	NO23F	mg/L as N
	Ammonia	NH4F	mg/L as N
	Dissolved Inorganic Nitrogen	DIN	mg/L as N
iii) Other lab Parameters:			
	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 NO23 or NO3 or NO_2.

11. Measured and Calculated Laboratory Parameters:

i) Variables Measured Directly

Nitrogen species	NO23F, NH4F
Phosphorus species	PO4F
Other	CHLA_N

ii) Computed Variables

DIN	NO23F + NH4F

12. Limits of Detection:

The Hach/Lachet manufacturer established the Method Detection Limits (MDL), the lowest concentration of a parameter that an analytical procedure can reliably detect. Table 1 lists the current MDL values; these values are reviewed and revised periodically.

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

Parameter	Variable	Mean Conc. mg/l as N or P	Std. Dev.	MDL mg/l as N or P	Dates in use
Ammonia	NH4F	*	*	0.0007	Jan-Dec 2005
Nitrate + Nitrite	NO23F	*	*	0.0002	Jan-Dec 2005
Orthophosphate	PO4F	*	*	0.0010	Jan-Dec 2005

13. Laboratory Methods:

a) Sampling Preparation Methods:

The supplies used by the ACE Basin NERR to collect and process water samples are: 1) 500-ml wide-mouth clear nalgene bottles; 2) 1000-ml clear nalgene ISCO bottles, 3) 20-ml scintillation vials and caps; 4) 15-ml polypropylene centrifuge tubes and caps; 5)

borosilicate culture vials; 6) 60-ml filtering apparatus [Norm-Jet plastic syringe, syringe plunger and Pall Gelman Easy-Pressure syringe filter holder with 25mm pore size]; 7) 25 mum glass microfibre filter paper, 8) pump pipettor (variable volume: 0.5-5 ml) and plastic pipette tips, 8) hypochlorite-phenol solution; and 9) 90% acetone solution.

Prior to sample collection, the nalgene bottles, scintillation vials and caps, and filtering apparatus are acid-washed with 10% hydrochloric acid solutions, rinsed (6x) with distilled-deionized water, and dried. The dried bottles are capped, and the filtering apparatus is stored in a plastic re-sealable bag.

b) Filtering Process:

As described below the samples are filtered by NERR staff within four hours of collection. First, one 25 mm filter is placed in a filter holder using clean tweezers to prevent contamination. Gently agitate the sample bottle to suspend the particulates and "seed" the filter syringe with the sample water by filling it completely and then discarding water. Next, attach the filter holder to syringe and add 50 ml of sample water into the filter apparatus (syringe with attached filter holder). Position the filter apparatus over a scintillation vial and insert the filter plunger into syringe and slowly push down on the plunger. Samples are not forced through the filter. Seed both scintillation vials with the sample water by filling them with filtered water and then discarding the water. After filtering the 50 ml, remove the filter holder from the syringe, cover it and set it aside. (If sediments and other solids in the sample prevented the filtration of the entire 50 ml, note the volume that was filtered on laboratory sheet and discard unfiltered portion.)

Using a clean filtering apparatus, the filtering process is repeated, not discarding the filtered water collected in the scintillation vials. Three drops of hypochlorite-phenol solution are added to the NH_4 scintillation vial to preserve the sample until it is analyzed. After filtering the 50 ml, remove the filter holder from the syringe, set holder aside and cover. (If sediments and other solids in the sample prevented the filtration of the entire 50 ml, note the volume that was filtered on laboratory sheet and discard unfiltered portion.) Place vials in tray and set aside.

Next, examine the two filters. If the color and coverage of particulates on the two filters are similar, place them in centrifuge tubes (one filter per tube) filled with 10 ml of 90% acetone and cover tubes with foil. If the density and coverage of particulates on one filter is noticeably lighter than the other filter, cover filters and repeat the filtering process until two filters of similar color and coverage are obtained.

After filtering all of the samples, place the scintillation vials and centrifuge tubes in refrigerator set at 4^{o}C. Acid wash the filtering apparatus (syringe, syringe plunger and filter holder) and sample bottles with a 10% HCl solution, then rinse them six times with distilled-deionized water, and allow them to air-dry.

c) Analytical Methodology:

Nitrogen and phosphorus chemistry is determined with a Lachat™ QuikChem 8000 Flow Injection Nutrient Analyzer equipped with a data logger. A 0.7 μm (nominal pore size) glass fiber filter is used separate the dissolved and particulate constituents of the sample. The filtered water is then run through the autoanalyzer. The autoanalyzer is

calibrated at the beginning of an analysis run. Calibration is done by injecting standards. The system will then prepare a calibration curve by plotting sample response versus standard concentration. The data logger calculates the sample concentrations based on the regression equation and store the values in a temporary file. At the end of the analysis run, the temporary file is transferred to a computer that stores the concentrations in a file.

A Turner Model 450 Fluorometer, equipped with a 440 nm filter, is used to determined chlorophyll-A values. The fluorometer is calibrated regularly and the calibration is checked with solid chlorophyll standard before and after the analysis run. Corrected chlorophyll-A readings are calculated using the before and after acidification fluorescence readings. A Turner Model 700 Fluorometer, equipped with a 300-650nm filter, was used in January 2005. The Model 450 Fluorometer was sent to Turner Designs for repair and calibration. The fluorometer is calibrated regularly and a solid chlorophyll standard is used to check the calibration before and after the analysis run. When the Model 450 Fluorometer was returned, ACE NERR staff performed a comparative analysis between the two models, and after comparing the results, it was determined that there was no significant difference between the two fluorometers.

Corrected chlorophyll-A readings are calculated using the before and after acidification fluorescence readings, the flourometer's calibration constant and acid ratio, the volume of sample filtered and the volume of acetone used to break down the chlorophyll from the filter paper. The following formula is used:

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

i. Parameter: NH_4

Method reference: QuikChem® Method No. 31-107-06-1-B (2001)
Range: 0.355 - 42.836 μM N/L as NH_4
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: The water is initially filtered through a 25-mm glass filter, fixed with three drops of a hypochlorite-phenol solution, and stored at 4°C up to 14 days. Prior to analysis, the filtrate (25 mm) is passed through a 0.7 μm to separate the dissolved and particulate constituents of the sample.

ii. Parameter: NO2, NO3, and NO23

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

Range: 0.356 - 0.999 μM N/L as NO_3 and/or NO_2
Method Descriptor: The filtrate (<0.7 μm) is used in the procedure to determine the NN chemistry. The combined nitrate-nitrite (NO_3 + NO_2) value is obtained by passing a sample through a copper-cadmium reductor column that reduces the nitrate(NO_3) to nitrite(NO_2), 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 diazo compound. This compound then couples with N-1-napthylethylenediamine dihydrochloride to form a reddish-purple azo dye. The dye absorbs at 540 nm. The nitrate value is obtained by subtracting the nitrite value from the combined nitrate and nitrite value.
Preservation Method: Water is initially filtered through 25-mm glass filter and stored at 4ºC up to 14 days. Prior to analysis, the filtrate (25 mm) is passed through a 0.7 μm to separate the dissolved and particulate constituents of the sample.

iii. Parameter: PO_4

Method Reference: QuikChem® Method No. 31-115-01-1-H (2001)
Range: 0.161 - 0.12.914 μM N/L as PO_4
Method Descriptor: The filtrate (<0.7 μm) is used in the procedure to determine the OP chemistry. The QuikChem® Method is a modification of the Murphy and Riley (1962) single solution method. The phosphomolybdate blue complex formed during the reaction is read at a wavelength of 880nm to determine the value.
Preservation Method: Water is initially filtered through 25-mm glass filter and stored at 4ºC up to 14 days. Prior to analysis, the filtrate (25 mm) is passed through a 0.7 μm to separate the dissolved and particulate constituents of the sample.

iv. Parameter: CHLA

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 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 glass filters are placed in centrifuge tubes (one filter/tube) filled with 10 ml of 90% acetone solution and stored at 4ºC for 18-24 hours.

14. Reporting of Missing Data and Data with Concentrations Lower than Method Detection Limits:

Nutrient/Chla comment codes and definitions are provided in the following table. Missing data are denoted by a blank cell " " and commented coded with an "M". Laboratories in the NERRS System submit data that are censored at a lower detection rate limit, called the Method Detection Limit or MDL. MDL's for specific parameters are listed in the Laboratory Methods and Detection Limits Section (Section II, Part 14) of this document. Measured concentrations that are less than this limit are replaced with the minimum detection limit

value and comment coded with a "B" in the variable code comment column. For example, the measured concentration of NO23F was 0.0005 mg/L as N (MDL=0.0008), the reported value would be 0.0008 with a "B" placed in the NO23F comment code column. Calculated parameters are comment coded with a "C" and if any of the components used in the calculation are below the MDL, the calculated value is removed and also comment coded with a "B". If a calculated value is negative, the value is removed and comment coded with an "N".

Note: The way below MDL values are handled in the NERRS SWMP dataset was changed in November of 2011. Previously, below MDL data from 2002-2006 were also coded with a B, but replaced with -9999 place holders. Any 2002-2006 nutrient/pigment data downloaded from the CDMO prior to December November of 2011 will contain -9999s representing below MDL concentrations.

Comment Code	Definition
A	Value above upper limit of method detection
B	Value below method detection limit
C	Calculated value
D	Data deleted or calculated value could not be determined due to deleted data, see metadata for details
H	Sample held beyond specified holding time
K	Check metadata for further details
M	Data missing, sample never collected or calculated value could not be determined due to missing data
P	Significant precipitation (reserve defined, see metadata for further details)
U	Lab analysis from unpreserved sample
S	Data suspect, see metadata for further details

15. QA/QC Programs:

a) Precision:

i) Field Variability - Grab samples are collected monthly at each of the four monitoring site. A water-sampler is used to collect two consecutive samples at a depth of 0.5 meter below the 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 YSI datalogger 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 surface. Diel samples do not have replicates.

ii) Laboratory Variability - No replications

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 they do 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.

16. Other Remarks:

On May 14, 2025 this dataset was updated to include embedded QAQC flags and codes for anomalous/suspect, rejected, missing, and below detection limit data. System-wide monitoring data beginning in 2007 were processed to allow for QAQC flags and codes to be embedded in the data files rather than using the original single letter codes used for the nutrient and pigment dataset along with the detailed sections in the metadata document for suspect, missing, and rejected data. Please note that prior to 2007, rejected data were deleted from the dataset so they are unavailable to be used at all. Suspect, missing, rejected and below minimum detection flags and appropriate three letter codes were embedded retroactively for dataset consistency. The QAQC flag/codes corresponding to the original letter codes are detailed below.

Flag/code	*If also C*	Historic Letter Code	Historic Code Definition
<1> [SUL]		A	Value above upper limit of method detection
<-4> [SBL]	<-4> [SCB]	B	Value below method detection limit
no need to flag/code unless combined		C	Calculated value
<-3> [GQD]	<3> [GCR]	D	Data deleted or calculated value could not be determined due to deleted data, see metadata for details
<1> (CHB)		H	Sample held beyond specified holding time
<0> (CSM) unless other flag		K	Check metadata for further details
<-2> [GDM]	<-2> [GCM]	M	Data missing, sample never collected or calculated value could not be determined due to missing data
<-3> [SNV] and <1> [SCC] for components (CRE) or F_Record {CRE}		N	Negative calculated value
<0> (CUS)		P	Significant precipitation (reserve defined, see metadata for further details)
<1> (CSM)		U	Lab analysis from unpreserved sample
		S	Data suspect, see metadata for further details

1) 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 at all the weather stations in the Reserve.

Currently, the monitoring stations are within 9.0 km of a recording rain gauge. Mosquito Creek station is 1.7 km southeast of the SWMP rain gauge at Bennett's Point lab. Fishing Creek is 8.5 km NE of the NADP rain gauge on Bear Island Wildlife Management Area. Big Bay Creek is 3.2 km southeast and St. Pierre Creek station is 6.8 km NW of the NOAA weather station at Edisto Beach State Park.

2) Missing, Deleted, and Suspect Data:

a) Separate values for NO_2 and NO_3 are not reported. ACE NERR staff and the Analytical Laboratory staff determined that separate NO_2 and NO_3 were not necessary. The concentration of NO_2 is negligible when compared to the concentration of NO_3.

b) During the March 2005 St. Pierre nutrient diel samplings, the chlorophyll value for sample 13 collected on 03/17/05 at 07:04 was deleted. There was a strand of algae floating in the sample, which prevented ACE staff to get an accurate chlorophyll value.

c) During the June 2005 St. Pierre nutrient diel samplings, the sample 13 vial collected on 6/9/05 at 3:59 for NO23, PO4, and subsequently DIN was broken by the laboratory prior to sample analysis.

d) During the July 2005 Mosquito Creek nutrient grab sampling analysis, the value for NO23 that was above the upper limit of method detection. The sample was diluted and re-analyzed. The contracted laboratory has been unable to locate the value for the re-analyzed sample.

e) During the October 2005 Mosquito Creek chlorophyll analysis, the sample collected on 10/27/05 at 9:59 is not an average of two chlorophyll values as stated in the protocol. One of the two sample vials broke while the sample was centrifuging.

f) During the December 2005 St. Pierre nutrient diel samplings, the ISCO malfunctioned and samples number one (12/7/05 at 6:08) and sample number 13 (12/8/05 at 6:56) were not taken.