~~**Reserve Name** (include 3 letter code here)~~**Sapelo Island (SAP) NERR Nutrient Metadata**
Months and year the documentation covers: January 2023 – December 2023
Latest Update: ~~Date that the last edits were made~~06/06/2024

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

I. Data Set and Research Descriptors

1) Principal investigator(s) and contact persons –

~~[Instructions/Remove: List the reserve staff members responsible for the implementation and collection of the nutrient data. List the laboratory staff members responsible for processing of the samples and data output. Include name, title, mailing address, phone number, and email address for the Research Coordinator, SWMP technician(s), person(s) responsible for data management, and laboratory contact.]~~

Ivanna Knox ; SWMP Manager (Jan – May 2023)
ivanna.knox@dnr.ga.gov
828-448-0057

Dylan Bedortha; SWMP Manager (Jun – Dec 2023)
dylan.bedortha@dnr.ga.gov
412-370-1428

Rachel Guy; Research Coodinator
rachel.guy@dnr.ga.gov
912-262-3173

SINERR Address:
Shipping: 1766 Landing Rd SE, Darien, GA 31305
Physical: P.O. Box 15, Sapelo Island, GA 31327

Carol Pollard; Lab Contact
1370 Greate Rd, Gloucester Point, VA 23062
pollard@vims.edu
804-684-7213

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Dylan Bedortha was responsible for all data management for 2023. Ivanna Knox was responsible for samples collected from January 2023 – April 2023. Both Dylan and Ivanna completed the sampling for May 2023 together. Dylan was responsible for samples collected from June 2023 – December 2023.

2) Research objectives –

~~[Instructions/Remove: Describe briefly the nature of each monitoring program resulting in this data set (monitoring along land use, vertical, salinity or habitat gradients).]~~

The nutrient monitoring program is designed upon spatial deployment across a wide variety of marsh types with differing fresh and marine water mixing. These differing dynamics allow scientists and researchers to select from both a variety of research sites as well as tailor research programs to specific tidal dynamics and utilize the Reserves' SWMP data acquisitions to the maximum extent. Additionally, from a long-term trend perspective the variety of marsh types and hydrology being monitored allows for a better understanding of the different effects of sea-level rise upon marsh type. Due to a lack of residential development and very low human activity within the watersheds of the sites on Sapelo Island, they serve as a proxy for reference conditions with the various marsh and associated hydrology types for the creeks and river stations. All of the sites selected at the Sapelo Island reserve have very little

anthropogenic nutrient influences. The following brief descriptions are associated with each nutrient monitoring site on the island. For more detail please refer to the site descriptors located under section (4) of this document and/or contact the Research Coordinator at the SAP NERR for detailed information of any/all sites.

Lower Duplin: Located at the mouth of the Duplin River with large, rapid and near-complete hydraulic exchange with Doboy Sound within each diurnal cycle. Typical of a high salinity, well mixed estuary site.

Hunt Dock: Located on the upper Duplin (approx.. 5 miles upriver from Lower Duplin site) with relatively high hydraulic retention requiring an estimated 6-7 diurnal events to complete a total hydraulic exchange. Rainfall may drop salinity precipitously in the basin depending on tidal height, duration and volume of precipitation.

Cabretta Creek: Located on the eastern side of Sapelo Island with direct exchange with the Atlantic Ocean. Creek is typical of high salinity, high oceanic exchange and near complete hydraulic exchange with each diurnal event. Creek is extremely buffered from rainfall (event driven) fluctuations in salinity.

Dean Creek: Located on the southern end of Sapelo, this creek is the primary drainage of the inter-dune (located amid primary and secondary dune systems) meadow. This site is highly susceptible to very high salinity fluctuations associated with rainfall events on both seasonal and short –term, event driven scales. Tidal exchange is complete at each diurnal event and exchange water genesis is the Doboy Sound.

The Duplin River is a tidal basin with no freshwater influence within its headwaters apart from surficial aquifer weeping from the perched lens of water associated with Sapelo Island. This nutrient monitoring effort is tied into the Georgia Coastal Ecosystems, Long-Term Ecological Research (GCE-LTER) initiative and the University of Georgia Marine Extension Service water quality database whose collection and analysis of the water samples facilitates the database. This long-term data set is being developed to provide information on estuarine water mixing within the well-studied Duplin River basin in addition to providing a long-term characterization of water quality as related to nutrient loading within the Duplin River

a) Monthly grab sampling program: This program's focus is to establish baseline nutrient levels and trends at each site and create a long-term data set that reflects these.
b) Diel sampling program (mention if samples were taken over a lunar day): This program's focus is to observe nutrient level variation as it relates to a lunar tidal cycle. Over the course of 24 hours, 13 samples are taken 2 hours apart.

3) Research methods –

~~[Instructions/Remove: Detail the specifics of sample collection, collection intervals, sample processing, how samples are held, and QAQC of the equipment and analyzers for each program.]~~

a) Monthly grab sampling program

Grab samples are taken each month at four sites within the reserve. These are the same sites as the water quality monitoring program within SWMP; Lower Duplin (LD), Hunt Dock (HD), Dean Creek (DC), and Cabretta Creek (CA). Once a month, a bottom water sample is taken at each site, along with a duplicate taken sequentially. Sampling ideally happens around the same time each month but is tide-dependent and sometimes varies. These samples are taken using a Niskin-style sampling bottle. All grab samples are taken within 3 hours prior to that day's low tide. Tide charts from USHarbors.com at the location Old Tower, Sapelo Island, GA are used to determine low tide time. In addition to the water samples, the depth and time each sample was taken is recorded. The depth is measured to the closest half-meter and is determined by meter marks on the grab sampling bottle deployment rope. The grabs are taken approximately .5 meter off of the bottom to replicate water conditions experienced by the water quality sondes at each site. The grab samples are stored in dark Nalgene bottles to prevent sunlight altering them and immediately placed on ice inside of a cooler. Samples are taken back to the reserve lab to be filtered and frozen at -20°C. Filtering and freezing of samples occurs on the same day samples were taken.

Once all samples have been collected and are back in the lab, each sample is filtered two different times.

The first filtration is used for chlorophyll uses a glass microfiber filter (Whatman GF/F, diameter 47mm). 250 ml of well-mixed sample is poured into the filter tower with the filter in place and a beaker to collect the filtered sample underneath the filter. A Millipore pump is used to draw the sample through the filter into the beaker. A pressure of 40 kPa from the pump is maintained through this process. Once the sample has been completely drawn through the filter, the filter is removed from the tower and placed face side up in a prepared petri dish. The dish is immediately wrapped in foil and labeled with sample info and volume filtered. After each sample is filtered, the filter tower, the filter cap (where filter is placed), and the beaker that collects the filtered sample are all thoroughly rinsed with DI water before the next sample is filtered.

~~a)~~ The second filtration is used for the other nutrients that are reported here. This filtration uses a nitrocellulose membrane with 0.8µm pore size filter made by Millipore. 150 ml of well-mixed sample is poured into the filter tower with the filter in place and a beaker to collect the filtered sample underneath the filter. A Millipore pump is used to draw the sample through the filter into the beaker. A pressure of 40 kPa from the pump is maintained through this process. Once the sample has been completely drawn through the filter, the filtered sample is poured into a prepared Nalgene sample bottle and closed tightly. The bottle is labeled with sample info and volume filtered. After each sample is filtered, the filter tower, the filter cap (where filter is placed), and the beaker that collects the filtered sample are all thoroughly rinsed with DI water before the next sample is filtered.

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b) Diel sampling program

~~b)~~ The diel sampling program takes place over 24 hours to ensure samples are taken during every period of the tidal cycle. The day prior to taking grab samples, the ISCO 6712 sampler is deployed at the Lower Duplin site. During warmer weather months (when daytime temperatures are expected to be above75˚F), the inside of the ISCO is filled with ice to keep the samples cool until collection. The ISCO is programmed to take one 1,000ml water sample every two hours over a 24-hour period. The first sample is taken approximately two hours before a low tide and then every two hours until 13 samples are taken. Unlike the grab samples, the ISCO suction tube sits at a fixed depth near the surface of the water. The ISCO is deployed on a floating dock to keep the depth consistent over all 13 samples. The day after the ISCO deployment, the ISCO is retrieved after taking the last grab samples of the day at the Lower Duplin site. The sampler is turned off, all sample bottles are capped, and the ISCO is brought back to the lab for filtering. The filtering protocol used for the grab samples is exactly the same as for the diel samples collected by the ISCO.

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4) Site location and character –

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

Site name	Lower Duplin
Latitude and longitude	31°25'04.3"N 81°17'45.4"W ~~Decimal degrees or degrees, minutes, seconds format~~
Tidal range *(meters)*	3 meters
Salinity range *(psu)*	15 – 35 psu
Type and amount of freshwater input	The Altamaha River drains into Doboy Sound which is the water body that influences the tidal fluctuation of the Duplin River. This site is close to the mouth of the Duplin River where it empties into Doboy Sound. Rainwater runoff also influences freshwater input.
Water depth (*meters, MLW*)	~~*(**Mean low water** depth at site, NOT depth of sonde deployment. Indicate if this is an estimate or if the site has been surveyed.)*~~ Estimated at 3 meters

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Sonde distance from bottom (*meters*)	~~*Fixed distance sonde is deployed above the bottom*~~ 0.5 meters
Bottom habitat or type	~~*Soft sediment, grassbed, oyster bar, etc.*~~ Soft, muddy bottom. Site is located on part of the dock used by the ferry which makes multiple scheduled trips on/off the island daily.
Pollutants in area	None
Description of watershed	~~*(in reference to station)*~~ This site is located on the Marsh Landing Dock in the Duplin River on Sapelo Island and consists of a muddy bottom habitat. Water passing the dock during flood tide originates from the Doboy Sound. The Doboy Sound receives input from the Atlantic Ocean, and the freshwater Altamaha River via the Intra-Coastal Waterway. The water is pushed up the river or up smaller tidal creeks and some is pushed onto the marsh surface by the flood tide and recedes into the main channel during ebb tide. Primary freshwater input consists of rainwater runoff. The Marsh Landing dock is used as the main dock to the island where the ferry makes several daily runs. Small boats also dock here occasionally. The surrounding area vegetation is dominated by salt marsh with Spartina being the predominant flora.

Site name	Hunt Dock
Latitude and longitude	31°28'43.3"N 81°16'23.2"W
Tidal range *(meters)*	3 meters
Salinity range *(psu)*	10 – 30 psu
Type and amount of freshwater input	The Altamaha River drains into Doboy Sound which is the water body that influences the tidal fluctuation of the Duplin River. This site is approximately 5 miles up river from the mouth of the Duplin River where it empties into Doboy Sound, so input from the Altamaha is very minimal. Rainwater runoff is the primary input at this site.
Water depth *(meters, MLW)*	Estimated at 2 meters.
Sonde distance from bottom *(meters)*	0.5 meters
Bottom habitat or type	Soft, muddy bottom with some oyster reefs towards the shore.
Pollutants in area	none
Description of watershed	This site is located on the Duplin River, off of Moses Hammock, which is separated from Sapelo Island by a small tidal channel. The primary runoff at the site is from tidal creeks flowing through Spartina marsh and through the mud. Bottom habitat at this site includes soft mud and some oyster bed building along the shoreline with an average tidal range of 3 meters and a salinity range of 5-35 ppt with normal levels falling between 20-30 ppt. Primary freshwater input consists of rainwater runoff.

Site name	Dean Creek

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Latitude and longitude	31°23'41.2"N 81°16'11.5"W
Tidal range *(meters)*	2.5 meters
Salinity range *(psu)*	15 – 32 psu
Type and amount of freshwater input	Dean Creek is a small tidal basin fed from the waters of Doboy Sound, which is located on Sapelo Island's south end. Primary freshwater input is from rainfall.
Water depth (*meters, MLW*)	Estimated at 0.35 meters
Sonde distance from bottom (*meters*)	0.5 meters
Bottom habitat or type	Soft, muddy bottom with interspersed oyster reefs along banks.
Pollutants in area	none
Description of watershed	The site is located on a small metal bridge spanning Dean Creek, in close proximity to the adjacent Nannygoat Beach causeway. Dean Creek is a small tidal basin fed from the waters of Doboy Sound, which is located on Sapelo Island's south end. The small creek feeds approximately 150 acres of Spartina alterniflora dominated salt marsh, which is interspersed with small 0.5-1 acre hammocks and saltpans. Fringe community components range from Loblolly pine forests with a sub-canopy of Yaupon holly to Wax myrtle and Sable Palm. Salinity at this site is especially influenced by rainfall due to its shallow depth.

Site name	Cabretta Creek
Latitude and longitude	31°26'19.2"N 81°14'19.5"W
Tidal range *(meters)*	3 meters
Salinity range *(psu)*	20 – 35 psu
Type and amount of freshwater input	The primary freshwater input at this site is rainwater. This site receives tidal influence from the Atlantic Ocean.
Water depth (*meters, MLW*)	Estimated at 2.5 meters
Sonde distance from bottom (*meters*)	0.5 meters
Bottom habitat or type	Soft, muddy bottom with oyster reefs on banks.
Pollutants in area	none
Description of watershed	The station is located on a small (one-lane), wooden roadway bridge spanning Cabretta creek located on the island's extreme eastern side, bordering the Atlantic Ocean. The creek is fed directly from waters of the Atlantic Ocean. Adjacent to the site is extensive, intertidal, bank stabilization (armoring) in the form of woven rip-rap fencing and granite rocks. This manipulation is slowly becoming stabilized via oyster reef community colonization. The adjacent marshes are dominated by Spartina alterniflora with occasional Juncus romerianus

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	in the nearby fringe community habitat. The creek has very little adjacent uplands due to: 1) the low elevational gradient and 2) the area's geologically recent accretion genesis (Holocene) resulting in sandy soils; of which neither conditions allow for extensive floral colonization or stabilization.

All ~~[reserve name]~~ SAP-NERR historical nutrient/pigment monitoring stations:

Station Code	SWMP Status	Station Name	Location	Active Dates	Reason Decommissioned	Notes
CA	P	Cabretta Creek	31°26'19.2"N 81°14'19.5"W	~~mm/dd/yyyy –~~ ~~current~~04/2004 - current	NA	NA
DC	P	Dean Creek	31°23'41.2"N 81°16'11.5"W	05/2004 - current	NA	NA
HD	P	Hunt Dock	31°28'43.3"N 81°16'23.2"W	07/1999 - current	NA	NA
LD	P	Lower Duplin	31°25'04.3"N 81°17'45.4"W	01/1999 - current	NA	NA
ML	S (retired)	Marsh Landing	31° 25' 04.23" N, 81° 17' 46.30" W	05/1995 – 12/1998	Site character	Near surface deployment and the fouling with such a setup was too severe to harvest reliable data.
FL	S (retired)	Flume Dock	31° 28' 53.85"N 81° 16"12.37"W	01/1995 – 12/1998	NA	NA

5) Coded variable definitions –

~~[Instructions/Remove: Explain the station code names and monitoring program codes. Use the following format:]~~

~~ebvtcnut = Chesapeake Bay Virginia Taskinas Creek nutrients~~

…

monthly grab sample program = 1

diel grab sample program = 2

SAP = Reserve Code

NUT = Data Code (nutrient)

LD = Lower Duplin
HD = Hunt Dock
DC = Dean Creek
CA = Cabretta Creek

Sampling Site Codes

sapldnut = Sapelo Island nutrient data for Lower Duplin site

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saphdnut = Sapelo Island nutrient data for Hunt Dock site
sapdcnut = Sapelo Island nutrient data for Dean Creek site
sapcanut = Sapelo Island nutrient data for Cabretta Creek site

The monitoring codes are set as "1" to indicate grab samples and "2" to indicate diel samples. Replicates are also given specific codes. Grab samples in which duplicate field samples are taken utilize a "1" for the first sample and a "2" for the second sample under the "Rep" column in the data. Subsequent lab splits of each field replicate are labeled with an "S". Diel samples are always labeled with a "1" for the first lab replicate and an "S" for the second lab replicate. Only one actual sample is taken at each interval with the ISCO sampler. No lab splits were used in 2023's nutrient sampling data.

6) Data collection period –

~~[Instructions/Remove: List the date and time each sample was collected organized by station. For grab samples include replicate times or a general statement about the time frame for replicate collection. For diel samples, include start and end times for the sampling session.]~~

Diel Sampling

Location	Start Date	Start Time	End Date	End Time
LD	1/19/2023 (low tide @ 12:23)	12:00	1/20/2023	12:00
LD	2/20/2023 (low tide @14:41)	13:00	2/21/2023	13:00
LD	3/20/2023 (low tide @ 14:30)	11:30	3/20/2023	17:30
LD	4/17/2023 (low tide @ 13:12)	10:20	4/18/2023	10:20
LD	5/16/2023 (low tide @ 12:30)	10:30	5/17/2023	10:30
LD	6/14/2023 (low tide @ 12:17)	10:30	6/15/2023	10:30
LD	7/14/2023 (low tide @ 12:39)	10:30	7/15/2023	10:30
LD	MISSING	MISSING	MISSING	MISSING
LD	9/12/2023 (low tide @ 12:24)	10:30	9/12/2023	18:30
LD	10/10/2023 (low tide @11:08)	10:00	10/11/2023	10:00
LD	11/8/2023 (low tide @ 10:32)	8:30	11/9/2023	8:30
LD	12/11/2023 (low tide @ 13:16)	11:15	12/12/2023	11:15

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Highlighted diel collection periods represent partial data sets. These are explained in Section 17 of this document.

Grab Sampling

Date	LD1	LD2	HD1	HD2	CA1	CA2	DC1	DC2
1/20/2023 (low tide @ 13:19)	12:05	12:10	11:23	11:28	10:50	10:55	9:45	9:50
2/21/2023 (low tide @ 15:29)	12:45	12:50	12:15	12:20	12:00	12:05	13:05	13:10
3/21/2023 (low tide @ 15:15)	12:30	12:35	13:15	13:20	13:45	13:50	14:30	14:35
4/18/2023 (low tide @ 14:01)	11:30	11:35	13:55	14:00	13:20	13:25	14:25	14:30
5/17/2023 (low tide @ 13:32)	11:20	11:25	10:45	10:50	10:19	10:24	11:52	11:57
6/15/2023 (low tide @ 12:05)	10:45	10:50	10:10	10:15	9:40	9:45	9:05	9:10
7/15/2023 (low tide @ 12:26)	11:10	11:15	10:40	10:45	10:10	10:15	9:35	9:40
8/15/2023 (low tide @ 13:36)	12:00	12:05	11:30	11:35	11:05	11:10	10:25	10:30
9/13/2023 (low tide @ 13:08)	11:25	11:30	11:05	11:10	10:40	10:45	10:10	10:15
10/11/2023 (low tide @ 11:56)	10:30	10:35	9:55	10:00	9:30	9:35	9:00	9:05
11/9/2023 (low tide @ 11:22)	11:10	11:15	10:45	10:50	10:20	10:25	9:35	9:40
12/12/2023 (low tide @ 14:04)	12:20	12:25	11:55	12:00	11:30	11:35	11:05	11:10

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The site codes in this table refer to which site was sampled at the given times. For example, CA1 is the first grab sample at Cabretta Creek and CA2 is the duplicate sample taken at Cabretta Creek.

7) Associated researchers and projects–
~~[Describe briefly other research (data collection) that correlates or enhances the nutrient data. You may provide links to other products or programs. At a minimum, mention the SWMP MET and WQ datasets as below.]~~

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

8) Distribution –
~~[Instructions/Remove: This section will address data ownership and data liability by including the following excerpt.]~~

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: www.nerrsdata.org; *accessed* 12 October 2022.

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

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 –
~~[Instructions/Remove: This section explains how data acquisition, data entry, and data verification (QAQC) were performed before data were sent to the CDMO to be archived into the permanent database. Describe how your reserve receives data from the analytical laboratory, how it is entered into Excel, and how it is verified. If your reserve converts nutrient values to attain the required units of measurement, note that here and detail your process. List who was responsible for these tasks and include the following statement.]~~

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.

Ivanna Knox is responsible for data collection from 01/2023 – 05/2023. Dylan Bedortha is responsible for data collection from 6/2023 – 12/2023 and the entry of all data into the NutrientQAQC macro, applying flags to data, entering MDLs and significant figures, etc.

As data is returned to SAP NERR from the VIMS lab, it is saved and compiled by year in the nutrient files maintained by the reserve. The lab returns two separate documents for each month's samples. One is an Excel sheet with raw data results from the analysis. The other is a pdf with a sample by sample breakdown of nutrient values, detection limits, and dates of analysis. Once all the data from a given year is received and verified, it is all at once entered into the Nutrient QAQC macro and the macro steps are followed. The raw data results Excels received from the analytical lab are used to populate the Nutrient QAQC macro. These raw data Excels are also submitted to the CDMO. Summary statistics and graphs of different parameters provided by the macro, as well as field notes from sampling help determine any additional QAQC flags that need to be applied to the data. The year's filed notes are also compiled and added to the metadata document.

Nutrient values are returned from VIMS in the correct units of measurement so no conversion is needed.

~~[Example of conversion documentation, update for your laboratory results]~~ ~~The University of Washington Marine Chemistry Laboratory calculates and reports results in µM. For purposes of consistency in the NERR System, Padilla Bay NERR calculates the concentrations as mg/ l-1 based on atomic weights of 14.01, 30.97, 28.09, and 12.01 for N, P, Si, and C respectively. Therefore, Padilla Bay NERR staff multiplies the concentrations reported by the University of Washington Marine Chemistry Laboratory by 0.01401, 0.03097, 0.02809, and 0.01201 to yield concentrations in mg/L as N, P, Si, and C respectively.~~

10) Parameter titles and variable names by category –

~~[Instructions/Remove: ***Only list those parameters that are reported in the data submission.*** See Table 2 in the "Nutrient and Chlorophyll Monitoring Program and Database Design" SOP version 1.8 (March 2017) for a full list of available parameters. If NO2 and NO3 are not reported, modify note 2 to explain why.]~~

Required NOAA NERRS System-wide Monitoring Program nutrient parameters are denoted by an asterisk "*".

Data Category	Parameter	Variable Name	Units of Measure
Phosphorus and Nitrogen:			
	*Orthophosphate	PO4F	mg/L as P
	*Ammonium, Filtered	NH4F	mg/L as N
	*Nitrite, Filtered	NO2F	mg/L as N
	*Nitrate, Filtered	NO3F	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	µg/L
	Phaeophytin	PHEA	µg/L
~~Carbon:~~			
~~Other Lab Parameters:~~			
	~~Silicate, Filtered~~	~~SiO4F~~	~~mg/L as SI~~
~~Microbial:~~			
~~Field Parameters:~~			
	~~Water Temperature~~	~~WTEM_N~~	~~ºC~~

Notes:
1. Time is coded based on a 2400 clock and is referenced to Standard Time.
2. Reserves have the option of measuring either NO2 and NO3 or they may substitute NO23 for individual analyses if they can show that NO2 is a minor component relative to NO3.

11) Measured or calculated laboratory parameters –

~~[Instructions/Remove: This section lists all measured and calculated variables. Only list those parameters that are collected and reported, do not list field parameters. See Table 2 in the "Nutrient and Chlorophyll Monitoring Program and Database Design" SOP version 1.8 (March 2017) document for a full list of directly measured and computed variables. Do not include field parameters in this section.]~~

a) **Parameters measured directly**

Nitrogen species:	NH4F, NO2F, NO23F
Phosphorus species:	PO4F
Other:	CHLA_N, PHEA, ~~SiO4F~~

b) **Calculated parameters**

NO3F	NO23F-NO2F
DIN	NO23F+NH4F

12) Limits of detection –

~~[Instructions/Remove: This section explains how the laboratory determines the minimum detection limit (MDL). List the method detection limits used and dates they were in use. You may copy this data from the MDL sheet created in the NutrientQAQC macro. ***You must also include the date that each MDL was revisited by the lab for appropriateness (this should be done at least annually).***]~~

~~[Example, update for your laboratory]: Method Detection Limits (MDL), the lowest concentration of a parameter that an analytical procedure can reliably detect, have been established by the VIMS Nutrient~~

~~Analytical Laboratory. The MDL is determined as 3 times the standard deviation of a minimum of 7 replicates of a single low concentration sample. These values are reviewed and revised periodically.~~

~~Parameter~~	~~Start Date~~	~~End Date~~	~~MDL~~	~~Revisited~~
~~PO4F~~	~~01/01/21~~	~~05/31/21~~	~~0.0006~~	
~~PO4F~~	~~06/01/21~~	~~12/31/21~~	~~0.0008~~	~~06/01/21~~
~~NH4F~~	~~01/01/21~~	~~12/31/21~~	~~0.0015~~	~~03/01/21~~
~~NO2F~~	~~01/01/21~~	~~02/28/21~~	~~0.0002~~	
~~NO2F~~	~~03/01/21~~	~~12/31/21~~	~~0.0003~~	~~03/01/21~~
~~NO23F~~	~~01/01/21~~	~~12/31/21~~	~~0.0008~~	~~03/01/21~~
~~CHLA_N~~	~~01/01/21~~	~~12/31/21~~	~~0.02~~	~~06/15/21~~
~~PHEA~~	~~01/01/21~~	~~12/31/21~~	~~0.02~~	~~06/15/21~~

Parameter	Start Date	End Date	MDL	Revisited
NH_4	1/1/2023	12/31/2023	0.0062 mg/L	January 2023
NO_{23}	1/1/2023	12/31/2023	0.0055 mg/L	January 2023
NO_2	1/1/2023	12/31/2023	0.0016 mg/L	January 2023
PO_4	1/1/2023	12/31/2023	0.0029 mg/L	January 2023
CHLA_N	1/1/2023	12/31/2023	0.50 µg/L	January 2023
PHEA	1/1/2023	12/31/2023	0.50 µg/L	January 2023

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MDLs are verified annually, every January. If MDLs are at or less than the reported, they aren't changed. The following excerpt explains the analytical lab's protocol for determining MDLs.

Excerpt from VIMS Analytical Service Center Quality Manual:

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15.5.7.1 LODs (limit of detection) will be determined by the protocol in the mandated test method or applicable regulation. For chemistry testing, where applicable, procedure EPA 821-R-16-006, December 2016 Revision 2 will be used and verified on an annual basis.

15.5.7.2 MDLs for each analyte not applicable to the above LOD determination, are determined using the "Federal Register" (Appendix B) 131:4357. This evaluation is made yearly from a sample obtained from the Chesapeake Bay at low concentrations, or alternatively, a standard made up in synthetic seawater may be acceptable. The standard should be made at a concentration of 1-5 times the expected MDL.

15.5.7.2.1 The sample is filtered in-house as required into separate pre-cleaned containers for specific parameters.

15.5.7.2.2 Filter particulates onto appropriate filters.

15.5.7.2.3 Analyze all replicates. The first 7 replicates of reach will be used for the MDL determination.

15.5.7.2.4 To determine the MDL for an analyte, first calculate the standard deviation from the seven results. The standard deviations then multiplied by the "student t" value (3.113 or rounded to 3 for seven replicates).

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13) Laboratory methods –

~~[Instructions/Remove: This section lists the laboratory and reference method, the method reference, a brief description of method and a brief description of the sample preservation method used ***for each parameter that is directly determined.***]~~

~~a) **Parameter: NH4F**~~

~~VIMS Laboratory Method: *126*~~
~~EPA or other Reference Method: *170.1*~~
~~Method Reference: *US.EPA 1983. USEPA 600/4-79-020. Method 170.1*~~
~~Method Descriptor: *Filtered sample subjected to hypochlorite phenol…*~~

~~Preservation Method: *Samples filtered and stored at 4 °C up to 24 hours.*~~

~~b) **Parameter: NO2F**~~

~~VIMS Laboratory Method: *142*~~
~~EPA or other Reference Method: *167.1*~~
~~Method Reference: *US.EPA 1983. USEPA 600/4 79 020. Method 167.1*~~
~~Method Descriptor: *Filtered sample subjected to cadmium reduction column…*~~
~~Preservation Method: *Samples filtered and stored frozen at –20 °C up to 14 days.*~~

a) **Parameter: NH4F**

VIMS Laboratory Method: SA156-350.1
EPA or other Reference Method: SM 4500-NH_3- H
Method Reference:
Method Descriptor: A Skalar SANplus Continuous Flow Analyzer SA1050 Autosampler is used to analyze this parameter.
Preservation Method: Samples are filtered at the reserve on the day they are collected. Once filtered, all samples are stored in acid washed bottles provided by the VIMS lab and frozen at -20˚C in the reserve lab freezer. Samples are frozen at least overnight and sometimes longer depending on sampling date and when the samples are shipped for analysis. Samples are held in the reserve freezer until shipment for analyzation. The frozen samples are packed into a cooler with frozen ice packs and plenty of packing material (reusable paper and/or pieces of foam) to limit movement while in transit. Once packed and secured, the samples are shipped overnight via UPS to ensure VIMS receives them while they are still frozen. When samples are received by VIMS, the following excerpt explains their process of preservation and holding of samples:

17.4.2 The method of preservation for filtered water is freezing at -20˚C (+/- 2.0˚C) and analyzed within 28 days….Chlorophyll-a filters should be immediately wrapped in foil, labeled and frozen at -20˚C (+/- 2.0˚C) with analysis within 28 days.

b) **Parameter: NO2F**

VIMS Laboratory Method: SA467-353.2
EPA or other Reference Method: SM 4500-NO_3- F
Method Reference:
Method Descriptor: A Skalar SANplus Continuous Flow Analyzer SA1050 Autosampler is used to analyze this parameter.
Preservation Method: Samples are filtered at the reserve on the day they are collected. Once filtered, all samples are stored in acid washed bottles provided by the VIMS lab and frozen at -20˚C in the reserve lab freezer. Samples are frozen at least overnight and sometimes longer depending on sampling date and when the samples are shipped for analysis. Samples are held in the reserve freezer until shipment for analyzation. The frozen samples are packed into a cooler with frozen ice packs and plenty of packing material (reusable paper and/or pieces of foam) to limit movement while in transit. Once packed and secured, the samples are shipped overnight via UPS to ensure VIMS receives them while they are still frozen. When samples are received by VIMS, the following excerpt explains their process of preservation and holding of samples:

17.4.2 The method of preservation for filtered water is freezing at -20˚C (+/- 2.0˚C) and analyzed within 28 days….Chlorophyll-a filters should be immediately wrapped in foil, labeled and frozen at -20˚C (+/- 2.0˚C) with analysis within 28 days.

c) **Parameter: PO4**

VIMS Laboratory Method: SA503-365.1
EPA or other Reference Method: SM 4500-P F
Method Reference:

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Method Descriptor: A Skalar SANplus Continuous Flow Analyzer SA1050 Autosampler is used to analyze this parameter.
Preservation Method: Samples are filtered at the reserve on the day they are collected. Once filtered, all samples are stored in acid washed bottles provided by the VIMS lab and frozen at -20˚C in the reserve lab freezer. Samples are frozen at least overnight and sometimes longer depending on sampling date and when the samples are shipped for analysis. Samples are held in the reserve freezer until shipment for analyzation. The frozen samples are packed into a cooler with frozen ice packs and plenty of packing material (reusable paper and/or pieces of foam) to limit movement while in transit. Once packed and secured, the samples are shipped overnight via UPS to ensure VIMS receives them while they are still frozen. When samples are received by VIMS, the following excerpt explains their process of preservation and holding of samples:

17.4.2 The method of preservation for filtered water is freezing at -20˚C (+/- 2.0˚C) and analyzed within 28 days….Chlorophyll-a filters should be immediately wrapped in foil, labeled and frozen at -20˚C (+/- 2.0˚C) with analysis within 28 days.

d) **Parameter: CHLA_N**

VIMS Laboratory Method: Turner Designs Trilogy Laboratory Benchtop Fluorometer
EPA or other Reference Method: EPA 445.0 Rev 1.2
Method Reference:
Method Descriptor: A Turner Designs Trilogy Laboratory Benchtop Fluorometer is used to analyze this parameter. The acetone extraction method is used to extract the chlorophyll over 2-24 hours and a fluorometer is used to obtain readings, which are calculated into a final result.
Preservation Method: Samples are filtered at the reserve on the day they are collected. Once filtered, all filters are immediately placed in labeled petri dishes, wrapped in foil which is also labeled, and frozen at -20˚C in the reserve lab freezer. Samples are frozen at least overnight and sometimes longer depending on sampling date and when the samples are shipped for analysis. Samples are held in the reserve freezer sealed in a Ziploc bag until shipment for analyzation. The frozen samples are packed into a cooler with frozen ice packs and plenty of packing material (reusable paper and/or pieces of foam) to limit movement while in transit. Once packed and secured, the samples are shipped overnight via UPS to ensure VIMS receives them while they are still frozen. When samples are received by VIMS, the following excerpt explains their process of preservation and holding of samples:

17.4.2 The method of preservation for filtered water is freezing at -20˚C (+/- 2.0˚C) and analyzed within 28 days….Chlorophyll-a filters should be immediately wrapped in foil, labeled and frozen at -20˚C (+/- 2.0˚C) with analysis within 28 days.

e) **Parameter: PHEA**

VIMS Laboratory Method: Turner Designs Trilogy Laboratory Benchtop Fluorometer
EPA or other Reference Method: EPA 445.0 Rev 1.2
Method Reference:
Method Descriptor: A Turner Designs Trilogy Laboratory Benchtop Fluorometer is used to analyze this parameter.
Preservation Method: Samples are filtered at the reserve on the day they are collected. Once filtered, all filters are immediately placed in labeled petri dishes, wrapped in foil which is also labeled, and frozen at -20˚C in the reserve lab freezer. Samples are frozen at least overnight and sometimes longer depending on sampling date and when the samples are shipped for analysis. Samples are held in the reserve freezer sealed in a Ziploc bag until shipment for analyzation. The frozen samples are packed into a cooler with frozen ice packs and plenty of packing material (reusable paper and/or pieces of foam) to limit movement while in transit. Once packed and secured, the samples are shipped overnight via UPS to ensure VIMS receives them while they are still frozen. When samples are received by VIMS, the following excerpt explains their process of preservation and holding of samples:

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17.4.2 The method of preservation for filtered water is freezing at -20˚C (+/- 2.0˚C) and analyzed within 28 days….Chlorophyll-a filters should be immediately wrapped in foil, labeled and frozen at -20˚C (+/- 2.0˚C) with analysis within 28 days.

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14) Field and Laboratory QAQC programs –

~~[Instructions/Remove: This section describes field variability, laboratory variability, the use of inter-organizational splits, sample spikes, standards, and cross calibration exercises. Include any information on QAQC checks performed by your lab.]~~

a) **Precision**

i) **Field variability** – List the specific number (100%) of field replicates; describe how replicates are collected: true field replicates are successive grab samples, replicates split from a single field sample are considered laboratory replicates/splits. Field replicates are taken for every grab sample, at every site, every month. The first grab sample is taken and the sample is emptied. Then a successive grab sample is taken at the same depth within five minutes of the first.

ii) **Laboratory variability** – List specific number (10%) of laboratory replicates. 15.5.9.4 Analytical precision is the degree to which an analytical result can be reproduced. This can be determined by running 10-20% of samples in duplicate. Sediment samples are to be run in duplicate for 10% of the samples since we may not have the ability to spike a sediment.

~~ii)~~ 15.5.9.5 Relative percent difference = (absolute difference of the two values) ÷ (average of the replicate) x 100

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iii) **Inter-organizational splits** – Specify if samples were split and analyzed by two different labs. All samples from SAP NERR were analyzed by the VIMS Analytical Service Center lab.

b) **Accuracy**

i) **Sample spikes** – List the % recovery of field and laboratory samples (% recovery should be 100% under ideal conditions) – cannot be done on samples analyzed directly from filters. 15.5.9.2 Spiking a known amount of analyte into the sample itself will also allow us to measure accuracy. A small amount of high concentration standard is introduced into a sample aliquot. The spike is then carried through the entire procedure and % recovery is determined. Low spike recovery may indicate a methods problem or error or may also indicate matrix problems. % recovery = spike recovered ÷ spike true value (sample+addition) x 100. 10% of sample analyzed should be spiked for accuracy on samples which can be spiked.

ii) **Standard reference material analysis –** This will result from samples sent out from EPA to each lab. 16.4 To ensure accurate and precise measurements, the laboratory uses reference materials that are traceable to a national standard of measurement where commercially available, such as NIST, NELAC, or are traceable to certified reference materials. The laboratory retains the Certificates of Reference Materials to demonstrate traceability.

iii) **Cross calibration exercises** - *CBNERRVA participates in cross calibration exercises. Cross calibration exercises include the Chesapeake Bay Quarterly Split Sample Program and the US EPA Method Validation Studies.* SAP NERR does not participate in any cross calibration exercises.

15) QAQC flag definitions –

~~[Instructions/Remove: This section details the primary and secondary QAQC flag definitions and requires no additional information. Include the following excerpt.]~~

QAQC flags provide documentation of the data and are applied to individual data points by insertion into the parameter's associated flag column (header preceded by an F_). 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 –

~~[Instructions/Remove: This section details the secondary QAQC Code definitions used in combination with the flags above and requires no additional information. Include the following excerpt.]~~

QAQC codes are used in conjunction with QAQC flags to provide further documentation of the data and are also applied by insertion into the associated flag column. There are three (3) different code categories, general, sensor, and comment. General errors document general problems with the 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 –

~~[Instructions/Remove: Use this section for further documentation of the data set. Include any additional notes regarding the data set in general, circumstances not covered by the flags and comment codes, or specific data that were coded with the CSM "See Metadata" comment code. Any data coded CSM must have a corresponding statement in this section. You may include the metadata worksheets here if so desired. You may also include information on major storms or precipitation events that could have affected the data recorded.~~ ~~***You must include a table (not an image of a table) detailing sample/parameter collection and processing dates.***~~ ~~Include the following excerpt.]~~

Data may be missing due to problems with sample collection or processing. Laboratories in the NERR 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.

3/20/23	ISCO malfunction; only 4 samples collected.
8/15/23	ISCO did not collect any samples, "Distributor Jammed" listed as error on all 13 samples. Could have been due to jug of ice placed in middle of lower compartment to keep samples cool. ISCO distributor worked when tested in the lab after retrieval, both with and without jug in place. This was the first time trying to cool samples while in the field. After this method failed, loose ice was packed into the ISCO to keep bottles cool during sampling. This method is now standard procedure.
9/13/23	ISCO deployed on 9/12 @ 10:30 sdt. Only collected 5 samples due to island-wide power outage during deployment. Lost power sometime after 18:30 sdt on 9/12. Power remained down until evening of 9/13.

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9/28/23 ISCO desiccant replaced.

12/11/23 The third ISCO sample is missing due to power outage. Power outage was brief and came back on in time for the rest of the ISCO collection to proceed as planned.

The following is a list of rain events that may have potentially affected sample values. No data has been flagged in relation to these events, but will mention here:

- On 3/18/23, 15.5mm (0.6in) of rain was recorded at the Sapelo Island NERR Marsh Landing meteorological station.
- On 7/14/23, 5.6mm (0.22in) of rain was recorded at the Sapelo Island NERR Marsh Landing meteorological station.
- On 12/10/23, 9.1mm (0.35in) of rain was recorded at the Sapelo Island NERR Marsh Landing meteorological station.

Sample hold times for 2023: Samples are filtered at the reserve lab on the same day as collection. These filtered samples are frozen at -20˚C until shipped to the analytical lab. NERRS SOP allows nutrient samples to be held for up to 28 days (CHLA for 30) at -20°C, plus allows for up to 5 days for collecting, processing, and shipping samples. Filtered samples are held at the reserve lab for less than 5 days (actual hold time at reserve varies) and overnighted to the analytical lab in a cooler with ice packs to retain sample integrity. Samples held beyond that time period are flagged suspect <1>and coded (CHB). If measured values were below MDL, this resulted in <-4> [SBL] (CHB) flagging/coding. **All samples were analyzed within the specified holding time for 2023.** See table below for hold times for each month's sampling.

		Date of Analysis				
Month	**Sample Description**	**NH_4**	**NO_2**	**NO_{23}**	**PO_4**	**CHLA_N, PHEA**
January	1/20/23 grab	2/14/2023	2/14/2023	2/14/2023	2/14/2023	2/9/2023
	1/19-20/23, diel	2/14/2023	2/14/2023	2/14/2023	2/14/2023	2/9/2023
February	2/21/23, grab	3/9/2023	3/9/2023	3/9/2023	3/9/2023	3/13/2023
	2/20-21/23, diel	3/9/2023	3/9/2023	3/9/2023	3/9/2023	3/13/2023
March	3/21/23, grab	4/4/2023	4/4/2023	4/4/2023	4/4/2023	4/11/2023
	3/20/23, diel	4/4/2023	4/4/2023	4/4/2023	4/4/2023	4/11/2023
April	4/18/23, grab	5/2/2023	5/2/2023	5/2/2023	5/2/2023	5/1/2023
	4/17-18/23, diel	5/2/2023	5/2/2023	5/2/2023	5/2/2023	5/1/2023
May	5/17/23, grab	6/6/2023	6/6/2023	6/6/2023	6/6/2023	6/14/2023
	5/16-17/23, diel	6/6/2023	6/6/2023	6/6/2023	6/6/2023	6/14/2023
June	6/15/23, grab	7/12/2023	7/12/2023	7/12/2023	7/12/2023	6/26/2023
	6/14-15/23, diel	7/12/2023	7/12/2023	7/12/2023	7/12/2023	6/26/2023
July	7/15/23, grab	7/25/2023	7/25/2023	7/25/2023	7/25/2023	7/27/2023
	7/14-15/23, diel	7/25/2023	7/25/2023	7/25/2023	7/25/2023	7/27/2023
August	8/15/23, grab	9/12/2023	9/12/2023	9/12/2023	9/12/2023	9/13/2023
September	9/13/23, grab	10/4/2023	10/4/2023	10/4/2023	10/4/2023	9/20/2023

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	9/12/23, diel	10/4/2023	10/4/2023	10/4/2023	10/4/2023	9/20/2023
October	10/11/23, grab	10/31/2023	10/31/2023	10/31/2023	10/31/2023	10/26/2023
	10/10-11/23, diel	10/31/2023	10/31/2023	10/31/2023	10/31/2023	10/26/2023
November	11/9/23, grab	11/30/2023	11/30/2023	11/30/2023	11/30/2023	11/29/2023
	11/8-9/23, diel	11/30/2023	11/30/2023	11/30/2023	11/30/2023	11/29/2023
December	12/12/23, grab	1/3/2024	1/3/2024	1/3/2024	1/3/2024	1/2/2024
	12/11-12/23, diel	1/3/2024	1/3/2024	1/3/2024	1/3/2024	1/2/2024

[Example explanation, update for your sample storage protocols] **Sample hold times for 2022:** Samples are held at -20°C. NERRS SOP allows nutrient samples to be held for up to 28 days (CHLA for 30) at -20°C, plus allows for up to 5 days for collecting, processing, and shipping samples. Samples held beyond that time period are flagged suspect <1>and coded (CHB). If measured values were below MDL, this resulted in <-4> [SBL] (CHB) flagging/coding.

[Example explanation 2, update for your sampling protocols] **Sample hold times for 2022:** NERRS SOP allows nutrient samples to be held for up to 24 hours if held at 4°C with no preservation, for NH4F and NO23F up to 28 days if acidified and held at 4°C, and up to 28 days (CHLA for 30 days) if held at -20°C. Tier II parameters, with a few exceptions, are subject to the same sample hold times. In all cases, up to an additional 5 days is allowed for collecting, processing, and shipping samples. Samples held beyond that time period are flagged suspect and coded CHB in the data set.

[Example table, format however makes sense for your reserve but do not use an image of a table]

	Data of analysis					
Sample Descriptor	**PO4F**	**NH4F**	**NO2F**	**NO23F**	**CHLA_N, PHEA**	**SiO4F**
1/4/2022, all grabs	1/13/2022	1/13/2022	1/13/2022	1/13/2022	1/12/2022	1/21/2022
2/29/2022, all grabs	3/24/2022	3/24/2022	3/24/2022	3/24/2022	3/21/2022	4/1/2022
2/29-3/1/2022, all diels	3/24/2022	3/24/2022	3/24/2022	3/24/2022	3/21/2022	4/1/2022
3/28/2022, all grabs	4/22/2022	4/22/2022	4/22/2022	4/22/2022	5/10/2022*	5/10/2022*
3/30-3/31/2022, all diels	4/22/2022	4/22/2022	4/22/2022	4/22/2022	4/18/2022	5/4/2022
4/25/2022, all grabs	5/20/2022	5/20/2022	5/20/2022	5/20/2022	5/11/2022	5/23/2022
4/25-4/26/2022, all diels	5/20/2022	5/20/2022	5/20/2022	5/20/2022	5/17/2022	5/23/2022
5/2/2022, all grabs	5/20/2022	5/20/2022	5/20/2022	5/20/2022	5/24/2022	5/23/2022
5/16-17/2022, all diels	6/8/2022	6/8/2022	6/8/2022	6/8/2022	6/1/2022	6/10/2022
…						

*sample held longer than allowed by NERRS protocols