Apalachicola (APA) NERR Nutrient Metadata
January – December 2023
Latest Update: April 26, 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.]~~

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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).]~~

Previous studies have shown the importance of river flow and flushing rates on nutrients and primary productivity in Apalachicola Bay. Similar studies have determined nitrogen and phosphorus budgets as well as nutrient limitations related to seasonality and river flow (Elder and Mattraw 1982, Frick et al. 1996, Mortazavi 1998, Twilley et al. 1999, Mortazavi 2000a, b, Mortazavi et al. 2001, Putland 2005, Edmiston 2008, Caffrey et al. 2013). There has been an ongoing controversy between the states of Florida, Georgia, and Alabama over the upstream diversion of water for 25 years. Approximately 88% of the Apalachicola River and Bay drainage basin is in Georgia and Alabama and historical flows are being threatened by upstream use. A tri-state compact between the states and approved by the US Congress, required negotiations between the states to develop a water allocation formula. The states were unable to come to an agreement and the compact expired. In late 2014, the US Supreme Court agreed to hear the case and legal proceedings are currently underway. The research objectives of this study are to investigate short-term variability, long-term change, and the relationship of other environmental factors to the productivity of the Apalachicola Bay system as well as try to separate natural from man-made variability. Data from this monitoring project has also been used by Florida DEP in support of Numeric Nutrient Criteria development.

a) Monthly grab sampling program Samples are collected at 11 sites located across Apalachicola Bay to monitor spatial and temporal fluctuations in nutrient and chlorophyll-a concentrations across the bay. The stations were chosen to help determine the influence of the river, local rainfall, adjacent habitats, and anthropogenic impacts on the Bay. Sampling sites are in the lower Apalachicola River, in the coastal area, offshore of the barrier islands, at the SWMP datalogger locations (primary SWMP stations), and throughout the bay. Seasonal, climatic, and anthropogenic factors all impact river flow, which in turn affects nutrient and chlorophyll-a concentrations in the bay. Nutrient and chlorophyll-a concentrations are also influenced by biological activity, tidal action, wind direction and speed, and the hydrodynamics of the system.

b) Diel sampling program Diel sampling is performed once a month in conjunction with grab sampling for nutrients and chlorophyll-a concentration. The East Bay Surface water quality datalogger site (apaesnut) is utilized each month for placement of the sampler so that temporal water quality data may be compared with the spatial nutrient and chlorophyll-a data collected at this site. Studies by the Reserve and others have shown the influence of tidal action and runoff on other physical parameters in the bay (Estabrook 1973, Livingston 1978, Livingston and Duncan 1979, Edmiston 2008). Diel samples are collected over a 25-hour period thereby covering the lunar day of 24 hours 48 minutes.)

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 Monthly grab samples are collected at eleven stations (see Table 1) within and adjacent to Apalachicola Bay. All grab samples are collected on the same day. Because of the distance between the stations it is not always possible to collect all the samples several hours prior to low tide. Tidal condition, wave height, wind direction, speed, precipitation, and cloud cover are recorded for each station at the time of sampling but are not included in this dataset and are available upon request. Climatic data from the Apalachicola National Estuarine Research Reserve (ANERR) weather station is available online at www.nerrsdata.org. Sampling after heavy rains is avoided if possible. Water temperature, salinity, specific conductivity, dissolved oxygen, pH, total dissolved solids, and turbidity are measured at surface and bottom for each station with a YSI Pro DSS handheld meter. Surface measurements only are included in this dataset for temperature, salinity, pH, and dissolved oxygen (except for the East Bay Bottom station). Bottom measurements for temperature, salinity, specific conductivity, dissolved oxygen, pH, total dissolved solids, and turbidity are available on request. Secchi data is also included in this dataset. In addition to readings taken by the hand-held instrument, turbidity samples are collected at each site and are analyzed in the ANERR lab with a HR Scientific DRT-15CE Turbidimeter. Biochemical oxygen demand was measured from whole water samples for the months of March, June, September, and December (quarterly) at all stations except for apaebnut. These data are not included in the dataset but are available by contacting the Reserve directly. All grab samples are analyzed at the Florida Department of Environmental Protection laboratory (FLDEP).

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Additional samples are collected in conjunction with ANERR's nutrient grab sampling monthly at the West Pass (apawpnut), Dry Bar (apadbnut), Mid Bay (apambnut), East Bay Bridge (apaegnut), Sikes Cut (apascnut), and Cat Point (apacpnut) stations for the Florida Fish & Wildlife Conservation Commission (FWC) Red Tide Monitoring Program. Results may be obtained by contacting FWC directly at RTOMP_coordinator@myfwc.com.

Grab sample collection:
A submersible pump and flexible clear plastic tubing is used to collect water from a depth of 0.5 meters at all stations not associated with a SWMP datalogger site. At the Cat Point and Dry Bar SWMP datalogger stations, water samples are collected at a depth of approximately 1.5 meters below the surface to match the approximate depth of the probes of the data loggers deployed at these sites. At the East Bay datalogger station water samples are collected from surface (0.5 meters) and bottom (1.5 meters) depths, approximating the depths of the two dataloggers deployed at this site. Triplicate samples are collected every other month at one randomly selected primary SWMP station.

Grab sample filtration and handling:
Water from the submersible pump is delivered directly into the appropriate sample bottles. For samples requiring filtration, an in-line filter is attached to the end of the flexible tubing, and water filtered in this manner is delivered directly to the appropriate sample bottles. Necessary preservatives are added prior to water sample according to appropriate EPA protocols for nutrient sampling. Whole water samples for chlorophyll-a analysis are filtered at the FLDEP laboratory. All samples are placed on ice in the dark until delivery to the FLDEP laboratory. The submersible pump and tubing are flushed with ambient water prior to sample collection at each station. If an additional filter is needed at a site, either a new filter holder and filter will be used, or the current filter holder is rinsed with DI prior to addition of a new filter. A field blank is also run each month, using deionized water (DI) water for sample blank. The field blank is delivered using the pump, tubing and filter as described above. All grab samples are delivered to the FLDEP laboratory 24 to 36 hours after collection.

b) Diel sampling program Diel sampling is performed with an ISCO 3700 Portable Automated Sampler at the East Bay surface (apaesnut) station. The ISCO is deployed on a fixed platform located at the East Bay surface site. Generally, the ISCO is deployed at the beginning of the grab sample collection trip and retrieved the following morning. In some months, adverse weather conditions result in deployment of the ISCO sampler during a week other than the week of grab sample collection. The sampler is programmed to collect two 1000 ml water samples every 2.5 hours, over a 25-hour period at the same depth as the East Bay surface datalogger probes (0.5 m below surface). This captures a complete 24 hour 48-minute lunar-tidal cycle. The ISCO sampler is programmed to purge the suction line before and after each sample collection. The center of the ISCO sampler is filled with ice to aid in sample preservation. All samples are placed on ice upon retrieval of the ISCO sampler at the end of the sampling period. Nutrient sample filtration is performed at ANERR laboratory within one hour of retrieval from the ISCO sampler. Whole water samples for chlorophyll-*a* analysis are filtered at the FLDEP laboratory. All diel samples are delivered to the FLDEP laboratory within 36 hours of the first sample collection time. Note: No duplicate diel samples are taken, however there is some overlap with monthly grabs collected at the East Bay Surface station and deployment of the ISCO sampler.

Equipment QAQC and maintenance – Grab and Diel Sampling Program:

The submersible pump, tubing, and filter holders used in the field are acid rinsed with 10% Hydrochloric Acid and triple rinsed with ultra-pure DI water after each sampling trip. Laboratory items such as the filtration funnels and receivers are acid washed with 10% Hydrochloric Acid and triple rinsed with ultra-pure DI water after each sampling event. Diel sample collection bottles used in the ISCO automated sampler are acid washed and triple rinsed with ultra-pure DI water after each sampling event. The ISCO automated sampler tubing is acid washed and triple rinsed with ultra-pure DI water after each sampling event. The overall condition of the pump and tubing is checked each month prior to deployment and tubing is replaced as needed, and per the CDMO SOP replacement schedule. New, unused sample bottles are supplied by FLDEP laboratory for each grab sampling event. The YSI Pro DSS and Turbidimeter are calibrated before each sampling event.

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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~~	
~~Latitude and longitude~~	~~*Decimal degrees **or** degrees, minutes, seconds format*~~
~~Tidal range *(meters)*~~	
~~Salinity range *(psu)*~~	
~~Type and amount of 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.)*~~
~~Sonde distance from bottom (*meters*)~~	~~*Fixed distance sonde is deployed above the bottom*~~
~~Bottom habitat or type~~	~~*Soft sediment, grassbed, oyster bar, etc*~~
~~Pollutants in area~~	
~~Description of watershed~~	~~*(in reference to station)*~~

Site name	East Bay Bottom datalogger and nutrient station
Latitude and longitude	29.7858 N, 84.8752 W
Tidal range *(meters)*	Estimate: Mean Range of Tide (MN): 0.38 m
Salinity range *(psu)*	0 to 30 psu
Type and amount of freshwater input	Unquantified due to diverse runoff – Apalachicola River (and distributaries), East River, Tate's Hell and East River Marshes Runoff
Water depth (*meters, MLW*)	*Estimate: 1.7 m*
Sonde distance from bottom (*meters*)	*Sonde: 0.3 m; Depth Sensor: 0.5 m*
Bottom habitat or type	*Soft sediment, primarily silt and clay, no vegetation, historic oyster bar*

Pollutants in area	Wastewater, septic tanks
Description of watershed	*Bay station up near East River mouth*

Site name	East Bay Surface datalogger and nutrient station
Latitude and longitude	29.7858 N, 84.8752 W
Tidal range *(meters)**	Estimate: Mean Range of Tide (MN): 0.38 m
Salinity range *(psu)*	0 to 30 psu
Type and amount of freshwater input	Unquantified due to diverse runoff – Apalachicola River (and distributaries), East River, Tate's Hell and East River Marshes Runoff
Water depth (*meters, MLW*)*	*Estimate: 1.7 m*
Sonde distance from bottom (*meters*)	*Sonde: 1.7 m; Depth sensor: 1.9 m*
Bottom habitat or type	*Soft sediment, primarily silt and clay, no vegetation*
Pollutants in area	Wastewater, septic tanks
Description of watershed	*Bay station up near East River mouth*

Site name	Cat Point datalogger and nutrient station
Latitude and longitude	29.7021 N, 84.8802 W
Tidal range *(meters)*	Estimate: Mean Range of Tide (MN): 0.4 m
Salinity range *(psu)*	0 to 32 psu
Type and amount of freshwater input	Unquantified due to diverse runoff – Apalachicola River (and distributaries), Tate's Hell State Forest Runoff
Water depth (*meters, MLW*)	*Estimate: 1.8 m*
Sonde distance from bottom (*meters*)	*Sonde: 0.3 m; Depth Sensor: 0.5 m*
Bottom habitat or type	*Oyster bar, no vegetation except algae on oysters*
Pollutants in area	Wastewater, septic tanks
Description of watershed	*Bay station, historically important oyster bar*

Site name	Dry Bar datalogger and nutrient station
Latitude and longitude	29.6747 N, 85.0584 W

Tidal range *(meters)*	Estimate: Mean Range of Tide (MN): 0.33 m
Salinity range *(psu)*	0 to 34 psu
Type and amount of freshwater input	Unquantified due to diverse runoff – Apalachicola River (and distributaries), St. Vincent Island runoff, Apalachicola mainland area runoff
Water depth (*meters, MLW*)	*Estimate: 1.7 m*
Sonde distance from bottom (*meters*)	*Sonde: 0.3 m; Depth Sensor: 0.5 m*
Bottom habitat or type	*Oyster bar, no vegetation except algae on oysters*
Pollutants in area	Wastewater, septic tanks
Description of watershed	*Bay station, historically important oyster bar*

Site name	West Pass
Latitude and longitude	29.6379 N, 85.0890 W
Tidal range *(meters)*	Estimate: Mean Range of Tide (MN): 0.7
Salinity range *(psu)*	1.8 to 36.0 psu
Type and amount of freshwater input	Unquantified due to diverse runoff – Apalachicola River (and distributaries), East River, Tate's Hell and East River Marshes Runoff
Water depth (*meters, MLW*)	*Estimate: 5.0 m*
Sample depth (*meters*)	*0.5 m*
Bottom habitat or type	*Sand*
Pollutants in area	Wastewater, septic tanks
Description of watershed	This site is in the pass between two uninhabited barrier islands, the state owned and managed Cape St. George Island and St. Vincent National Wildlife Refuge. The sampling site is influenced by the flow of the Apalachicola River and high salinity water coming through West Pass.

Site name	Pilots Cove datalogger and nutrient station
Latitude and longitude	29.60133 N, 85.02765 W
Tidal range *(meters)*	Estimate: Mean Range of Tide (MN): 0.31 m
Salinity range *(psu)*	0 to 34 psu
Type and amount of freshwater input	Unquantified due to diverse runoff – Apalachicola River (and distributaries), St. Vincent Island runoff, Little St. George Island runoff

Water depth (*meters, MLW*)	*Estimate: 2.2 m*
Sonde distance from bottom (*meters*)	*Sonde: 0.3 m; Depth Sensor: 0.5 m*
Bottom habitat or type	*Sand bottom, seagrass bed (Halodule wrightii)*
Pollutants in area	Wastewater, septic tanks
Description of watershed	*Bay station, barrier island side*

Site name	Mid Bay
Latitude and longitude	29.6677 N, 84.9940 W
Tidal range *(meters)*	Estimate: Mean Range of Tide (MN): 0.7 m
Salinity range *(psu)*	0.2 to 35.2 psu
Type and amount of freshwater input	Unquantified due to diverse runoff – Apalachicola River (and distributaries), East River, Tate's Hell and East River Marshes Runoff
Water depth (*meters, MLW*)	*Estimate: 2.2 m*
Sample depth (*meters*)	*0.5 m*
Bottom habitat or type	*Sandy silt*
Pollutants in area	Wastewater, septic tanks
Description of watershed	This sampling site is in central Apalachicola Bay. The site is roughly equidistant from state owned and managed Cape St. George Island (four miles distant), St. Vincent National Wildlife Refuge (six miles distant), and single family residential and commercial use in the Apalachicola area (four miles distant). This site is approximately 2.5 kilometers from the intercoastal waterway channel. The sampling site is influenced by the flow of the Apalachicola River and high salinity water coming through Sikes Cut and West Pass.

Site name	East Bay Bridge
Latitude and longitude	29.7308 N, 84.9452 W
Tidal range *(meters)*	Estimate: Mean Range of Tide (MN): 0.7 m
Salinity range *(psu)*	0 to 30.7 psu
Type and amount of freshwater input	Unquantified due to diverse runoff – Apalachicola River (and distributaries), East River, Tate's Hell and East River Marshes Runoff
Water depth (*meters, MLW*)	*Estimate: 1.6 m*
Sample depth (*meters*)	*0.5 m*

Bottom habitat or type	*Silty Clay*
Pollutants in area	Wastewater, septic tanks
Description of watershed	This site is located near the western section of the US Highway 98 bridge connecting Apalachicola and Eastpoint. The bridge also serves as the boundary line between East Bay and Apalachicola Bay. Nearby upland areas consist of residential and commercial use in the areas surrounding the cities of Apalachicola and Eastpoint. The sampling site is influenced by flows from the Apalachicola River and distributaries including the Little St. Marks River, St. Marks River, and East River.

Site name	Sikes Cut offshore
Latitude and longitude	29.6067 N, 84.9467 W
Tidal range *(meters)*	Estimate: Mean Range of Tide (MN): 0.7 m
Salinity range *(psu)*	21.7 to 35.8 psu
Type and amount of freshwater input	Unquantified due to diverse runoff – Apalachicola River (and distributaries), East River, Tate's Hell and East River Marshes Runoff
Water depth *(meters, MLW)*	*Estimate: >5.0 m*
Sample depth *(meters)*	*0.5 m*
Bottom habitat or type	*Sand*
Pollutants in area	Wastewater, septic tanks
Description of watershed	This site was selected to characterize true marine water and is located south of Sikes Cut in the Gulf of Mexico. The site is near the eastern portion of state owned and managed Cape St. George Island and near the western end of St. George Island in an area consisting of single family and vacation homes. Sikes Cut allows tidal exchange of high salinity water from the Gulf of Mexico and lower salinity water from Apalachicola Bay. Sikes Cut is an important pass utilized by commercial and recreational vessels.

Site name	Nicks Hole
Latitude and longitude	29.6504 N, 84.9289 W
Tidal range *(meters)*	Estimate: Mean Range of Tide (MN): 0.7 m
Salinity range *(psu)*	0.5 to 35.4 psu
Type and amount of freshwater input	Unquantified due to diverse runoff – Apalachicola River (and distributaries), East River, Tate's Hell and East River Marshes Runoff
Water depth *(meters, MLW)*	*Estimate: 1.0 m*

Sample depth *(meters)*	*0.5 m*
Bottom habitat or type	*Sand bottom, seagrass bed (Halodule wrightii)*
Pollutants in area	Wastewater, septic tanks
Description of watershed	This site is near single family and vacation home use on St George Island. A small airport utilized by private aircraft is also located near Nicks Hole. The site is tidally influenced by high salinity water from Sikes Cut and by flows from the Apalachicola River

Site name	River
Latitude and longitude	29.7791 N, 85.0434 W
Tidal range *(meters)*	Estimate: Mean Range of Tide (MN): 0.7 m
Salinity range *(psu)*	0 to 0.1 psu
Type and amount of freshwater input	Unquantified due to diverse runoff – Apalachicola River (and distributaries), East River, Tate's Hell and East River Marshes Runoff
Water depth (*meters, MLW*)	*Estimate: 3.5 m*
Sample depth (*meters*)	*0.5 m*
Bottom habitat or type	*Sandy silt*
Pollutants in area	Wastewater, septic tanks
Description of watershed	This site was selected to characterize fresh water in the Apalachicola River. The site is in the central channel of the river approximately 9.5 kilometers north and upstream of the river mouth and the residential and commercial areas of Apalachicola. Adjacent areas are state owned and managed forested floodplain. The site is influenced by Apalachicola River flow.

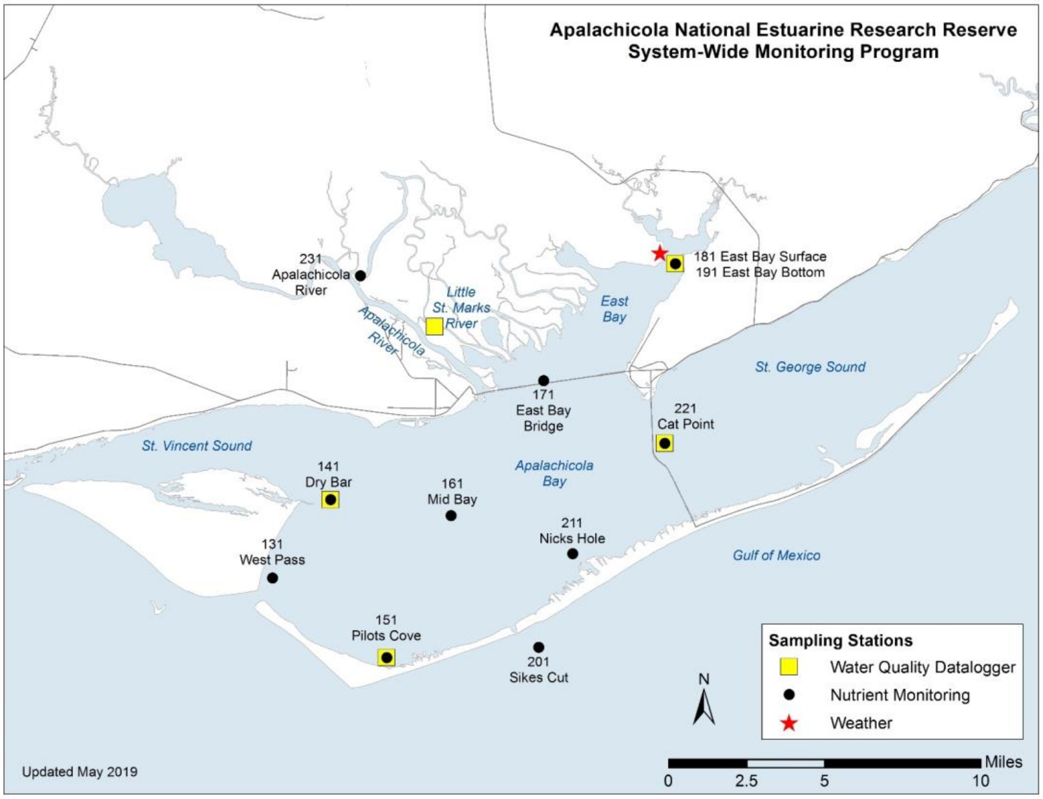
All [reserve name] NERR historical nutrient/pigment monitoring stations:

~~**Station Code**~~	~~**SWMP Status**~~	~~**Station Name**~~	~~**Location**~~	~~**Active Dates**~~	~~**Reason Decommissioned**~~	~~**Notes**~~
	~~P~~			~~mm/dd/yyyy - current~~	~~NA~~	~~NA~~

Station Code	SWMP Status	Station Name	Location	Active Dates	Reason Decommissioned	Notes
apawpnut	S	West Pass	29° 38' 16.44 N, 85° 5' 20.40 W	04/01/2002 - current	NA	NA
apadbnut	P	Dry Bar	29° 40' 28.92 N, 85° 3' 29.88 W	04/01/2002 - current	NA	NA
apapcnut	S	Pilot's Cove	29° 36' 28.44 N, 85° 1' 10.56 W	04/01/2002 – 11/27/2017	*See note	NA
apapcnut	S	Pilot's Cove	29° 36' 4.79 N, 85° 1' 39.54 W	1/10/2018 - current	NA	NA
apambnut	S	Mid Bay	29° 40' 3.72 N, 84° 59' 38.40 W	04/01/2002 - current	NA	NA
apaegnut	S	East Bay Bridge	29° 43' 50.88 N, 84° 56' 42.72 W	04/01/2002 - current	NA	NA
apaesnut	P	East Bay Surface	29° 47' 8.88 N, 84° 52' 30.72 W	04/01/2002 - current	NA	NA
apaebnut	P	East Bay Bottom	29° 47' 8.88 N, 84° 52' 30.72 W	04/01/2002 - current	NA	NA
apascnut	S	Sikes Cut Offshore	29° 36' 24.12 N, 84° 56' 48.12 W	04/01/2002 - current	NA	NA
apanhnut	S	Nick's Hole	29° 39' 1.44 N, 84° 55' 44.04 W	04/01/2002 - current	NA	NA
apacpnut	P	Cat Point	29° 42' 7.68 N, 84° 52' 48.72 W	04/01/2002 - current	NA	NA
aparvnut	S	River	29° 46' 44.76 N, 85° 2' 36.24 W	04/01/2002 - current	NA	NA

*The Pilot's Cove nutrient station was moved from its old location to the Pilots Cove water quality datalogger station, 1.2 km away that was approved by DMC as a secondary SWMP station in fall of 2016. The reason for the move is to have both the nutrients and water quality sampled at the same location, allowing us to more closely couple the nutrient data with the water quality readings that are now being collected at the new water quality site. ANERR sampled all nutrient and p-chem parameters at both stations monthly during 2017 to show that there is no statistically measurable difference in parameters between the locations, which is why the new location retained the Pilot's Cove station name and number rather than becoming a new station. This station move was approved by the CDMO Data Management Committee in late 2017 and took effect in January 2018.

Figure 1: ANERR SWMP Station locations.



5) Coded variable definitions –

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

~~cbvtcnut = Chesapeake Bay Virginia Taskinas Creek nutrients~~
~~…~~
~~monthly grab sample program = 1~~
~~diel grab sample program = 2~~

apacpnut = Apalachicola Reserve nutrient data for Cat Point
apadbnut = Apalachicola Reserve nutrient data for Dry Bar
apaebnut = Apalachicola Reserve nutrient data for East Bay Bottom
apaegnut = Apalachicola Reserve nutrient data for East Bay Bridge
apaesnut = Apalachicola Reserve nutrient data for East Bay Surface
apambnut = Apalachicola Reserve nutrient data for Mid Bay
apanhnut = Apalachicola Reserve nutrient data for Nicks Hole
apapcnut = Apalachicola Reserve nutrient data for Pilots Cove
aparvnut = Apalachicola Reserve nutrient data for River
apascnut = Apalachicola Reserve nutrient data for Sikes Cut
apawpnut = Apalachicola Reserve nutrient data for West Pass

Monthly grab samples = 1
Diel grab sampling = 2

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.]~~

Nutrient monitoring began in April 2002 at all stations listed. Sampling has been performed monthly at all stations, unless otherwise noted. This table lists collection times for all nutrient and chlorophyll-a samples in 2020. The Start and End date and times listed below reflect the times that the first and last diel samples were collected for each monthly diel sampling event. Grab sample end time is not recorded in the field. Grab sample collection, filtering, and icing are completed within 10 minutes or less depending upon field conditions at the time of sampling. Time is coded based on a 2400-hour clock and is referenced to Eastern Standard Time (EST), without Daylight Savings Time adjustments.

a) Samples date/times Monitoring Program 1 (Grab Samples)

Site	Date	Time	Site	Date	Time	Site	Date	Time
apacpnut	1/10/2023	11:46	apadbnut	1/10/2023	10:16	apaebnut	1/10/2023	8:24
apacpnut	1/10/2023	11:48	apadbnut	2/8/2023	10:38	apaebnut	2/8/2023	8:58
apacpnut	1/10/2023	12:00	apadbnut	2/28/2023	12:28	apaebnut	2/28/2023	8:44
apacpnut	2/8/2023	9:36	apadbnut	4/4/2023	8:38	apaebnut	2/28/2023	8:46
apacpnut	2/28/2023	10:00	apadbnut	5/23/2023	9:04	apaebnut	2/28/2023	8:48
apacpnut	4/4/2023	7:20	apadbnut	5/23/2023	9:06	apaebnut	4/4/2023	6:39
apacpnut	5/1/2023	8:53	apadbnut	5/23/2023	9:08	apaebnut	5/1/2023	8:19
apacpnut	5/30/2023	8:52	apadbnut	5/30/2023	11:28	apaebnut	5/30/2023	7:41
apacpnut	6/20/2023	8:01	apadbnut	6/20/2023	9:58	apaebnut	6/20/2023	7:00
apacpnut	8/1/2023	8:18	apadbnut	8/1/2023	10:09	apaebnut	6/20/2023	7:02
apacpnut	9/11/2023	8:56	apadbnut	9/11/2023	11:26	apaebnut	6/20/2023	7:04
apacpnut	10/6/2023	9:26	apadbnut	10/6/2023	7:15	apaebnut	8/1/2023	7:33
apacpnut	11/7/2023	9:30	apadbnut	11/7/2023	11:49	apaebnut	9/11/2023	7:30
apacpnut	12/18/2023	10:43	apadbnut	12/18/2023	10:12	apaebnut	9/11/2023	7:54
						apaebnut	9/11/2023	7:56
						apaebnut*	10/6/2023	9:48
						apaebnut	11/7/2023	8:27
						apaebnut	12/18/2023	11:18
Site	Date	Time	Site	Date	Time	Site	Date	Time
apaegnut	1/10/2023	8:47	apaesnut	1/10/2023	8:22	apambnut	1/10/2023	9:59
apaegnut*	2/8/2023	9:00	apaesnut	2/8/2023	8:56	apambnut	2/8/2023	11:03
apaegnut	2/28/2023	9:36	apaesnut	2/28/2023	8:42	apambnut	2/28/2023	12:57
apaegnut	4/4/2023	7:04	apaesnut	4/4/2023	6:37	apambnut	4/4/2023	8:50
apaegnut*	5/1/2023	10:30	apaesnut	5/1/2023	8:17	apambnut*	5/1/2023	12:45
apaegnut	5/30/2023	8:28	apaesnut	5/30/2023	7:39	apambnut	5/30/2023	12:00
apaegnut	6/20/2023	7:42	apaesnut	6/20/2023	6:58	apambnut	6/20/2023	10:22

apaegnut	8/1/2023	8:05	apaesnut	8/1/2023	7:31	apambnut	8/1/2023	10:30
apaegnut	9/11/2023	8:38	apaesnut	9/11/2023	7:50	apambnut	9/11/2023	12:00
apaegnut*	10/6/2023	9:36	apaesnut*	10/6/2023	9:46	apambnut*	10/6/2023	7:10
apaegnut	11/7/2023	9:23	apaesnut	11/7/2023	8:21	apambnut	11/7/2023	12:27
apaegnut	12/18/2023	10:57	apaesnut	11/7/2023	8:23	apambnut*	12/18/2023	9:12
			apaesnut	11/7/2023	8:25			
			apaesnut	12/18/2023	11:16			
Site	**Date**	**Time**	**Site**	**Date**	**Time**	**Site**	**Date**	**Time**
apanhnut	1/10/2023	11:31	apapcnut	1/10/2023	10:50	aparvnut	1/10/2023	12:20
apanhnut*	2/8/2023	9:45	apapcnut	2/8/2023	10:13	aparvnut*	2/8/2023	11:30
apanhnut	2/28/2023	10:31	apapcnut	2/28/2023	11:20	aparvnut	2/28/2023	13:34
apanhnut	4/4/2023	7:38	apapcnut	4/4/2023	8:16	aparvnut	4/4/2023	9:24
apanhnut*	5/1/2023	11:15	apapcnut	5/23/2023	8:36	aparvnut*	5/1/2023	13:15
apanhnut	5/30/2023	9:32	apapcnut	5/30/2023	10:24	aparvnut	5/30/2023	12:30
apanhnut	6/20/2023	8:26	apapcnut	6/20/2023	8:51	aparvnut	6/20/2023	10:49
apanhnut	8/1/2023	8:41	apapcnut	8/1/2023	9:28	aparvnut	8/1/2023	11:03
apanhnut	9/11/2023	9:38	apapcnut	9/11/2023	10:17	aparvnut	9/11/2023	12:33
apanhnut*	10/6/2023	8:46	apapcnut	10/6/2023	8:16	aparvnut*	10/6/2023	10:48
apanhnut	11/7/2023	10:09	apapcnut	11/7/2023	10:53	aparvnut	11/7/2023	13:05
apanhnut*	12/18/2023	10:40	apapcnut*	12/18/2023	10:32	aparvnut*	12/18/2023	12:18

Site	**Date**	**Time**	**Site**	**Date**	**Time**
apascnut	1/10/2023	11:12	apawpnut	1/10/2023	10:36
apascnut*	2/8/2023	10:00	apawpnut*	2/8/2023	10:23
apascnut	2/28/2023	10:56	apawpnut	2/28/2023	12:00
apascnut*	4/4/2023	7:45	apawpnut*	4/4/2023	8:20
apascnut*	5/1/2023	11:30	apawpnut*	5/1/2023	12:00
apascnut	5/30/2023	9:54	apawpnut	5/30/2023	11:02
apascnut*	6/20/2023	8:15	apawpnut	6/20/2023	9:32
apascnut	8/1/2023	9:01	apawpnut	8/1/2023	9:47
apascnut	9/11/2023	9:56	apawpnut	9/11/2023	11:03
apascnut*	10/6/2023	8:26	apawpnut*	10/6/2023	7:25
apascnut	11/7/2023	10:29	apawpnut	11/7/2023	11:25
apascnut*	12/18/2023	10:36	apawpnut*	12/18/2023	10:22
apascnut	11/1/2022	9:13	apawpnut	11/1/2022	10:13

*Samples marked with an * were not collected due to poor weather conditions.

b) Start and End Date/Time for Monitoring Program 2 (Diel Sampling)

Site	**Start Date**	**Start Time**	**End Date**	**End Time**
apaesnut	1/10/2023	8:30	1/11/2023	9:30
apaesnut	1/31/2023	9:00	2/1/2023	10:00

apaesnut	2/28/2023	8:45	3/1/2023	9:45
apaesnut	4/4/2023	6:45	4/5/2023	7:45
apaesnut	5/1/2023	8:30	5/2/2023	9:30
apaesnut	5/30/2023	7:45	5/31/2023	8:45
apaesnut	6/20/2023	7:15	6/21/2023	8:15
apaesnut	8/1/2023	7:45	8/2/2023	8:45
apaesnut	9/11/2023	8:00	9/12/2023	9:00
apaesnut	10/5/2023	6:45	10/6/2023	7:45
apaesnut	11/7/2023	8:30	11/8/2023	9:30
apaesnut	12/12/2023	8:30	12/13/2023	9:30

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 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.

Other ongoing projects or data that relate to the nutrient monitoring project include:

Apalachicola Bay Oyster Situation Report TP200. UF/IFAS, Sea Grant Florida. April 24, 2013.

Apalachicola River Discharge, U.S. Geological Survey, http://waterdata.usgs.gov/nwis/. Ongoing.

Bourque, E., Jackson, E. Garwood, J., Lamb, M., Harper, J., Apalachicola National Estuarine Research Reserve, System Wide Monitoring Program, Long-Term Water Quality Monitoring. Ongoing.

Caffrey, J. University of West Florida. Effect of diurnal and weekly water column hypoxic events on nitrification and nitrogen transformations in estuarine sediments. 2008.

Cannonier, S. Florida Agricultural and Mechanical University School of the Environment, Doctoral Dissertation, HAB Biotoxin Concentration in two NERR sites in correlation to nutrient concentrations. Ongoing.

Florida Fish and Wildlife Conservation Commission. Red Tide Monitoring Program. Ongoing.

Garwood, J., Lamb, M., Bourque, E., Jackson, E. Apalachicola National Estuarine Research Reserve, Distribution and density of fishes and benthic invertebrates in Apalachicola Bay. Ongoing.

Garwood, J., Lamb, M., Bourque, E., Jackson, E. Apalachicola National Estuarine Research Reserve, Effects of River Flow on Estuarine Primary Productivity and Macrozooplankton Communities. Ongoing.

Garwood, J., Bourque, E. Apalachicola National Estuarine Research Reserve, System Wide Monitoring Program, Long-Term Meteorological Monitoring. Ongoing.

Geyer, N. Florida State University, Doctoral Dissertation, Spatio-temporal dynamics of phytoplankton distribution in Apalachicola Bay. 2017.

Geyer, N., Huettel, M., Wetz, M. Biogeochemistry of a River-Dominated Estuary Influenced by Droughts and Storms. Estuaries and Coasts 41: 2009-2023.

Harper, J., Wren, K., Garwood, J., Snyder, C., Bourque, E., Lamb, M., Jackson, E. NERRS Sentinel Sites Program for Understanding Climate Change Impacts on Estuaries. Ongoing.

Hagen, S., DeLorme, D., Walters, L., Wang, D., Weishampel, J., Yeh, G., Huang, W., Slinn, D., Morris, J. Predicting impacts of sea level rise in the northern Gulf of Mexico. 2015.

Kimbro, D., Garland, H., Christopher, M., Cox, N., Yuan, S., Peter, K., Lamb, M., Harper, J. Apalachicola National Estuarine Research Reserve, Oyster reef research in Apalachicola Bay provided for the ACF lawsuit. 2013-2016.

Martínez-Colón, Michael. Florida Agricultural and Mechanical University. Benthic foraminifera and their microbiomes in oxic/anoxic estuaries. Ongoing.

Site-Specific Information in Support of Establishing Numeric Nutrient Criteria in Apalachicola Bay, Nutrient Criteria Technical Support Document. Division of Assessment and Restoration, Florida Department of Environmental Protection, July 2013.

Tucker, K., Florida Agricultural and Mechanical University Department of Civil and Environmental Engineering, Master's Thesis, Effects of river flow and rainfall on chlorophyll a in Apalachicola River. 2011.

Tucker, K., Florida Agricultural and Mechanical University Department of Civil and Environmental Engineering, Doctoral Dissertation, Nutrient input effects on Karenia brevis and Pseudo-nitzschia and subsequent marine mortalities in the Gulf of Mexico, Ongoing.

Viveros, P., NOAA Graduate Research Fellowship, University of Florida, Phytoplankton composition and abundance in relation to salinity, nutrient and light gradients in the Apalachicola National Estuarine Research Reserve. 2011.

Wang, H., W. Huang, M. Harwell, L. Edmiston, E. Johnson, P. Hsieh, K. Milla, J. Christensen, J. Stewart, X. Liu. 2008. Modeling oyster growth rate by coupling oyster population and hydrodynamic models for Apalachicola Bay, Florida, USA. Ecological Modeling 211:77-89.

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.]~~

ANERR personnel download data from the FLDEP laboratory roughly a month after sampling, following notification from the laboratory that sample results are available. Data and final reports are downloaded through the laboratory's in-house LIMS software program. Raw data and sample hold times are downloaded as Microsoft Excel 1997-2003 workbooks (.xls) files and final laboratory reports are downloaded as .pdf documents. Data are verified for completeness and notes are made of any communications with the laboratory regarding suspect data. On a quarterly basis, raw nutrient and chlorophyll-a data is copied and pasted into quarterly files and hand-held physical chemistry readings taken at the time of sampling are added to these files. Preliminary QAQC and samples falling below MDLs are noted on a quarterly basis. Units are consistent with those used by CDMO so unit conversion is not necessary. At the end of the calendar year, quarterly files are compiled and this data is copied into a single working file for secondary QAQC using the CDMO Nutrient QAQC Excel macro.

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.

From January 2018 to present, Ethan Bourque was responsible for these tasks.

~~[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 l 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
	Total Phosphorus	TP	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
	Total Kjeldahl Nitrogen whole	TKN	mg/L as N
	Total Nitrogen	TN	mg/L as N
Plant Pigments:			
	*Chlorophyll a	CHLA_N	μg/L
	Phaeophytin	PHEA	μg/L
	Uncorrected Chlorophyll-*a*	UncCHLA_N	μg/ L
~~Carbon:~~			
Other Lab Parameters:			
	Total Suspended Solids	TSS	mg/L
	~~Silicate, Filtered~~	~~SiO4F~~	~~mg/L as SI~~
~~Microbial:~~			
Field Parameters:			
	Water Temperature	WTEM_N	ºC
	Salinity	SALT_N	ppt
	Dissolved oxygen	DO_N	mg/L
	% Saturated dissolved oxygen	DO_S_N	%
	pH	PH_N	SU
	Turbidity	TURB_N	NTU
	Secchi Disk Depth	SECCHI	meters

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, TKN
Phosphorus species: PO4F, TP
Other: UncCHLA_N, CHLA_N, PHEA, TSS~~SiO4F~~

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b) **Calculated parameters**

~~NO3F~~	~~NO23F-NO2F~~
TN	NO23F + TKN
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~~

All information in this section is provided by FLDEP laboratory.

a) FLDEP laboratory MDL determination:

The MDL is defined as the minimum measured concentration of a substance that can be reported with 99% confidence that the measured concentration is distinguishable from the method blank result. MDLs are determined using the method specified in the Federal Register, 40 CFR Part 136 Appendix B Revision 2, using LCSs prepared near the estimated detection limit as surrogates to estimate methodological noise for actual method blanks to directly measure methodological noise. If none of the method blanks give numerical results for an individual analyte, method blanks are not required for the determination of the MDL. Where the possibility exists for significant systematic bias from sample preparation and handling or from the analytical determinative step (typically inorganic analyses), bias is considered when calculating detection limits. Published MDLs may be set higher than experimentally determined MDLs to (1) avoid observed positive interferences from matrix effects or common reagent contaminants or (2) for reporting convenience (i.e., to group common compounds with similar but slightly different experimentally determined MDLs). MDLs are determined in a suitable analyte-free matrix when possible. For certain analytes and matrices, no suitable, analyte-free matrix may be available. In those cases, MDLs are determined in the absence of any matrix, but in the presence of all preparatory reagents carried through the full preparatory and determinative steps. LOD verification procedures may be found in SOP LB-031, Limit of Detection Verification. (From page 42 of FLDEP Laboratory Quality Manual 2023. The most current version of the manual and individual method SOPs can be accessed at: https://floridadep.gov/dear/florida-dep-laboratory/content/dep-laboratory-quality-assurance-manual-and-sops).

b) 2023 base MDLs for Orthophosphate (PO4F), Nitrate + Nitrate (NO23F), ammonium (NH4F), Total Kjeldahl Nitrogen whole (TKN), and Total Suspended Solids (TSS), as reported by FLDEP laboratory. FLDEP SOPs state that the reported MDL for a sample may vary based on sample dilution. base MDLs for Total Phosphorus (TP) as reported by FLDEP laboratory. FLDEP SOP states that "the applicable range for" the SEAL Analytical AQ2 "method is from the practical quantitation limit (PQL) of 0.050 to 1.0 mg P/L. The method detection limit (MDL) is 0.005 mg P/L. The range may be extended by dilution. All samples with concentrations below the PQL on the AQ2 are analyzed using the" Bran Luebbe "segmented flow analyzer (see DEP SOP NU-082)." FLDEP SOPs state that the reported MDL for a sample may vary based on sample dilution.

Parameter	Start Date	End Date	Nominal (Base) MDL	MDL Range	Date Revisited	SOP Name
NH4F	10/10/2022	10/10/2023	0.002	_	8/31/2022	NH3_NU-104.1.3
NH4F	10/11/2023	Current as of 04/23/2024	0.002	_	10/10/2023	NH3_NU-104.1.4
NO23F	12/27/2021	7/20/2023	0.004	0.004	12/20/2021	Nitrate_Nitrite_NU-066-1.24
NO23F	7/21/2023	Current as of 04/23/2024	0.004	0.004	7/21/2023	Nitrate_Nitrite_NU-066-1.25
TKN	2/1/2022	7/9/2023	0.08	0.080-0.400	1/27/2022	TKN_NU-092-1.12
TKN	7/10/2023	Current as of 04/23/2024	0.08	0.080-0.400	6/27/2023	TKN_NU-092-1.13
PO4F	8/11/2022	8/17/2023	0.004	_	8/4/2022	PO4_NU_070-1.22
PO4F	8/18/2023	Current as of 04/23/2024	0.004	_	8/18/2023	PO4_NU_070-1.23
TP	12/27/2021	8/6/2023	0.002	0.002 - 0.010	12/27/2021	TP_NU-082-1.16
TP	8/7/2023	Current as of 04/23/2024	0.002	0.002 - 0.010	8/1/2023	TP_NU-082-1.17
TSS	10/3/2022	10/3/2023	2	_	10/3/2022	TSS_NU-051-3.26
TSS	10/4/2023	Current as of 04/23/2024	2	_	10/3/2023	TSS_NU-051-3.27

* FLDEP laboratory SOP statement regarding Total Suspended Solid (TSS) MDLs: "The practical range of determination is from the method detection limit (MDL) 2 mg/L (3.0 mg/L for samples with conductivity ≥ 15,000 µmhos/cm) to 20,000 mg/L."

c) FLDEP MDLs for the chlorophyll suite of components may change by station and month based on the need to dilute samples during processing. The base MDL listed in the FLDEP SOP is based on the maximum filtration volume and minimum extract volume and will therefore be the lowest MDL.

Base MDL values for ANERR 2023 plant pigment parameters:

Parameter	FLDEP SOP version	SOP Valid Dates		MDL	Units	Revisited
		Start Date	End Date			
Chlorophyll-a (Chla_N)	BB-029-2.9	2/16/2022	2/5/2023	0.82	ug/L	2/16/2022
Chlorophyll-a (Chla_N)	BB-029-2.10	2/6/2023	3/20/2023	0.82	ug/L	2/3/2023
Chlorophyll-a (Chla_N)	BB-029-2.11	3/21/2023	3/25/2024	0.82	ug/L	3/21/2023
Uncorrected Chlorophyll-a (UncChla_N)	BB-029-2.9	2/16/2022	2/5/2023	0.6	ug/L	2/16/2022
Uncorrected Chlorophyll-a (UncChla_N)	BB-029-2.10	2/6/2023	3/20/2023	0.6	ug/L	2/3/2023
Uncorrected Chlorophyll-a (UncChla_N)	BB-029-2.11	3/21/2023	3/25/2024	0.6	ug/L	3/21/2023
Phaeophytin (PHEA)	BB-029-2.9	2/16/2022	2/5/2023	0.9	ug/L	2/16/2022
Phaeophytin (PHEA)	BB-029-2.10	2/6/2023	3/20/2023	0.9	ug/L	2/3/2023
Phaeophytin (PHEA)	BB-029-2.11	3/21/2023	3/25/2024	0.9	ug/L	3/21/2023

The sample MDL is calculated based on the number of times a sample must be diluted. For example, if a CHL_A sample must be diluted to twice its volume, the base MDL of 0.55 ug/L is multiplied by a dilution factor of two (0.55 ug/L x 2) thus resulting in an MDL of 1.10 ug/L. For samples that fall below the MDL and their MDL is greater than the base MDL, individual sample MDLs are listed in the table below. These data have been flagged and coded as -4 SBL in the dataset.

2023 MDLs for Chlorophyll-*a* (CHLA_N), Uncorrected Chlorophyll-*a* (UncCHLA_N), and Phaeophytin (PHEA), as reported by FLDEP laboratory when values differ from base MDL values:

Paramter	**SateTimeStamp**	**Site**	**MDL**	**UNITS**
PHEA	1/10/2023 8:22	apaesnut	1.8	ug/L
PHEA	1/10/2023 8:30	apaesnut	2	ug/L
PHEA	1/10/2023 8:47	apaegnut	1.8	ug/L
PHEA	1/10/2023 11:00	apaesnut	2.4	ug/L
PHEA	1/10/2023 11:12	apascnut	1.8	ug/L
PHEA	1/10/2023 11:31	apanhnut	1.8	ug/L
PHEA	1/10/2023 11:46	apacpnut	1.8	ug/L
PHEA	1/10/2023 12:20	aparvnut	2.1	ug/L
PHEA	1/10/2023 13:30	apaesnut	1.8	ug/L
PHEA	1/10/2023 18:30	apaesnut	1.8	ug/L
PHEA	1/10/2023 21:00	apaesnut	1.8	ug/L
PHEA	1/10/2023 23:30	apaesnut	1.8	ug/L
PHEA	1/11/2023 2:00	apaesnut	1.8	ug/L
PHEA	1/11/2023 4:30	apaesnut	1.8	ug/L
PHEA	1/11/2023 9:30	apaesnut	1.8	ug/L
PHEA	2/1/2023 7:30	apaesnut	1.4	ug/L
PHEA	2/8/2023 8:56	apaesnut	3.5	ug/L
PHEA	2/28/2023 8:44	apaebnut	5.2	ug/L
PHEA	2/28/2023 10:31	apanhnut	1	ug/L
PHEA	2/28/2023 13:34	aparvnut	0.98	ug/L
PHEA	2/28/2023 18:45	apaesnut	15	ug/L
PHEA	3/1/2023 2:15	apaesnut	5.2	ug/L
PHEA	4/4/2023 8:20	apacpnut	3	ug/L
PHEA	4/4/2023 8:38	apanhnut	1.5	ug/L
PHEA	4/4/2023 22:45	apaesnut	2.2	ug/L
PHEA	5/1/2023 8:00	apaesnut	4.9	ug/L
PHEA	5/1/2023 8:00	apaesnut	4.9	ug/L
PHEA	5/1/2023 9:17	apaesnut	1.1	ug/L
PHEA	5/1/2023 9:17	apaesnut	1.1	ug/L
PHEA	5/1/2023 9:19	apaebnut	1.8	ug/L
PHEA	5/1/2023 9:19	apaebnut	1.8	ug/L
PHEA	5/2/2023 3:00	apaesnut	3	ug/L

PHEA	5/2/2023 3:00	apaesnut	3	ug/L
PHEA	5/2/2023 5:30	apaesnut	3.2	ug/L
PHEA	5/2/2023 5:30	apaesnut	3.2	ug/L
PHEA	5/2/2023 10:30	apaesnut	1.8	ug/L
PHEA	5/2/2023 10:30	apaesnut	1.8	ug/L
PHEA	5/23/2023 9:36	apapcnut	2.1	ug/L
PHEA	5/23/2023 10:06	apadbnut	3.8	ug/L
PHEA	5/23/2023 10:08	apadbnut	4.5	ug/L
PHEA	5/30/2023 8:39	apaesnut	1.5	ug/L
PHEA	5/30/2023 8:41	apaebnut	2.2	ug/L
PHEA	5/30/2023 8:45	apaesnut	1.8	ug/L
PHEA	5/30/2023 9:28	apaegnut	1.8	ug/L
PHEA	5/30/2023 9:52	apacpnut	2.1	ug/L
PHEA	5/30/2023 10:54	apascnut	1.6	ug/L
PHEA	5/30/2023 11:15	apaesnut	2	ug/L
PHEA	5/30/2023 11:24	apapcnut	1.1	ug/L
PHEA	5/30/2023 12:02	apawpnut	1.4	ug/L
PHEA	5/30/2023 12:28	apadbnut	3	ug/L
PHEA	5/30/2023 13:00	apambnut	1.5	ug/L
PHEA	5/30/2023 13:45	apaesnut	1.3	ug/L
PHEA	5/30/2023 16:15	apaesnut	1.5	ug/L
PHEA	5/30/2023 21:15	apaesnut	1.4	ug/L
PHEA	5/30/2023 23:45	apaesnut	1.4	ug/L
PHEA	5/31/2023 2:15	apaesnut	3.2	ug/L
PHEA	5/31/2023 4:45	apaesnut	1.4	ug/L
PHEA	5/31/2023 7:15	apaesnut	1.3	ug/L
PHEA	5/31/2023 9:45	apaesnut	1.4	ug/L
PHEA	6/20/2023 8:15	apaesnut	5.2	ug/L
PHEA	6/20/2023 10:32	apawpnut	1.5	ug/L
PHEA	8/1/2023 10:47	apawpnut	1	ug/L
PHEA	9/11/2023 8:50	apaesnut	1.8	ug/L
PHEA	9/11/2023 10:38	apanhnut	1	ug/L
PHEA	9/11/2023 10:56	apascnut	1	ug/L
PHEA	9/11/2023 11:17	apapcnut	1	ug/L
PHEA	9/11/2023 12:03	apawpnut	1	ug/L
PHEA	9/11/2023 13:00	apambnut	1	ug/L
PHEA	10/6/2023 3:45	apaesnut	1.5	ug/L
PHEA	10/6/2023 10:26	apacpnut	1.3	ug/L
PHEA	11/7/2023 8:23	apascnut	0.98	ug/L
PHEA	11/7/2023 8:30	apaesnut	1.8	ug/L

PHEA	11/7/2023 10:09	apanhnut	0.98	ug/L
PHEA	11/7/2023 10:29	apascnut	0.98	ug/L
PHEA	11/7/2023 10:53	apapcnut	0.98	ug/L
PHEA	11/7/2023 11:25	apawpnut	0.98	ug/L
PHEA	11/7/2023 13:05	aparvnut	0.98	ug/L
PHEA	12/18/2023 10:43	apacpnut	1.6	ug/L
PHEA	12/18/2023 10:57	apacgnut	1.2	ug/L

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.***]~~

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a) **Parameter: NH4F**

~~VIMS Laboratory Method: *126*~~

EPA ~~or other Reference~~ Method: ~~*170.1*~~*350.1* This SOP is based upon EPA Method 350.1, Rev. 2.0 (1993) and SEAL Auto Analyzer Method G-427-14 Rev. 3.

Method Reference: ~~*US EPA 1983. USEPA-600/4-79-020. Method 170.1*~~

Method Descriptor: *The sample is air-segmented and made alkaline in the donor stream. The ammonia molecules generated at this pH flow into the dialysis block holding the gas diffusion membrane. On the other side of the gas diffusion membrane is an acidic acceptor stream that the ammonia gas diffuses into. The ammonia reacts with salicylate and dichloro-isocyanuric acid at 37°C to produce a blue-green color proportional to the ammonia concentration. Sodium nitroprusside is used as a catalyst. The absorbance is measured at 660 nm.*~~*Filtered sample subjected to hypochlorite-phenol…*~~

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Preservation Method: *Samples are filtered in the field, acidified to pH <2, placed on ice in the dark and analyzed within 28 days.*~~*Samples filtered and stored at 4 °C up to 24 hours.*~~

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~~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.*~~

b) **Parameter: PO4**

EPA Method: *365.1*, Rev. 2.0 (1993), the Seal AutoAnalyzer3 method G-146-95 Rev. 3, and the Seal AutoAnalyzer 500 method A-036-19 Rev. 1.

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Method Descriptor: *Orthophosphate reacts with molybdenum (VI) and antimony (III) in an acid medium to form an antimony-phospho-molybdate complex. The complex is reduced with ascorbic acid to form a blue complex that absorbs at 880 nm.*

Preservation Method: *Samples are filtered in the field, placed on ice (not frozen), and analyzed within 48 hours of sample collection.*

c) **Parameter: TP**

EPA Method: *365.1*, Rev. 2.0 (1993) and Seal Method G-146-95 Rev. 3.

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Method Descriptor: *Prior to analysis the samples are prepared by autoclave digestion (DEP SOP NU-049) in which all phosphate containing compounds, both organic and inorganic, are hydrolyzed to generate orthophosphate ion (PO4 3-). During analysis orthophosphate forms a complex with molybdenum and antimony in an acid medium. This phosphoantimony/molybdenum complex is reduced with ascorbic acid and generates a blue colored solution. The intensity of this color is measured at 880 nm for total phosphate analysis.*

Preservation Method: *Samples are acidified in the field to pH <2, placed on ice (not frozen), and analyzed within 28 days of sample collection.*

d) **Parameter: NO23**

EPA Method: *353.2, Rev 2.0 (1993) and Lachat method10-107-04-1-C. Diethylenetriaminepentaacetic acid (DTPA) is used ascomplexing agent instead of ethylenediamine tetraacetic acid (EDTA).*
Method Descriptor: *A sample is passed through a column containing granular copper-cadmium catalyst, which reduces nitrate to nitrite. The nitrite originally present plus the reduced nitrate can then are determined by colorimetry. The nitrite is diazotized with sulfanilamide and coupled with N-(1-naphthyl) ethylenediamine dihydrochloride to form a highly colored azo dye, which is measured at a wavelength of 520 nm.*
Preservation Method: *Samples are filtered in the field, acidified to pH <2, placed on ice in the dark and analyzed within 28 days.*

e) **Parameter: TKN**

EPA Method: *351.2, Rev. 2.0 (1993) and Seal AQ2 method EPA-111-A Rev. 4.*
Method Descriptor: *Prior to analysis, digestion converts free ammonia and organic nitrogen compounds to ammonium sulfate (DEP SOP NU-091). Ammonium reacts with salicylate and hypochlorite in a buffered, alkaline solution in the presence of sodium nitroferricyanide (pH = 12.4-12.7) to form the salicylic acid analog of indophenol blue. The blue-green color produced is measured at 660 nm.*
Preservation Method: *Whole water is acidified in the field to pH <2, placed on ice in the dark and analyzed within 28 days.*

f) **Parameter: CHLA_N and UncCHLA_N and PHEA**

EPA Method: *446.0, and Standard Methods 10200H*
Method Descriptor: *This method is used to determine the amount of chlorophyll-a and pheophytin-a in marine and freshwater algae by visible spectrophotometry. Uncorrected chlorophyll-a is calculated using the trichromatic equation. Corrected chlorophyll-a and pheophytin are calculated using the monochromatic equation. The absorption-peak-ratio (chlorophyll/pheophytin) is also determined. A sample is vacuum filtered onto a glass fiber filter. The filter is then macerated with a tissue grinder and steeped in 90% acetone to extract chlorophyll from the algal cells. The sample is clarified through centrifugation. The absorbance of the clarified extract is then measured on a spectrophotometer at 750, 665, 664, 647 and 630 nm wavelengths before and after a 90 second Hydrochloric acid acidification step.*
Preservation Method: *Whole water is collected in brown Nalgene bottles, placed on ice in the dark, and delivered to the FLDEP lab within 36 hours for filtration.*

g) **Parameter: TSS**

Reference Method: *2540 D-2011*
Method Descriptor: *A well-mixed sample is filtered through a pre-weighed glass fiber filter. The filter and any residue are then dried to a constant weight at 103-105 °C. The filter is cooled in a desiccator, weighed and the result used to compute the TSS of the sample.*
Preservation Method: *Whole water is placed on ice in the dark for analysis within 7 days.*

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.~~
~~ii) **Laboratory variability** – List specific number (10%) of laboratory replicates.~~

~~iii) **Inter-organizational splits** – Specify if samples were split and analyzed by two different labs.~~

~~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.~~

~~ii) **Standard reference material analysis** – This will result from samples sent out from EPA to each lab.~~

~~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.*~~

a) **Precision**

i) **Field Variability** – Field blanks (using deionized water) are included in all monthly sampling events. ANERR staff collect field triplicate samples from a successive grab sample. Triplicate samples are collected from separate grabs at one primary SWMP sampling station selected at random every other month. There are no field triplicates collected during diel sampling, though the first diel sample is taken at a similar time frame to the grab sample at that station and can be compared for similarity.

ii) **Laboratory Variability** – Method blanks and duplicate samples are run with every sample batch. Batches are groups of 20 or less samples that are analyzed concurrently. Precision is measured by Relative Percent Difference (RPD).

iii) **Inter-organizational splits** – None.

b) **Accuracy**

i) **Sample Spikes** – At least two sample spikes are performed with each sample batch. The acceptance limits for sample or spike duplicates is a RPD of less than 20% if both results are above the PQL. Laboratory fortified blanks are run with each sample batch, acceptance limits for recovery are 85-115%.

ii) **Standard Reference Material Analysis** – Check standards are included in each batch and at the beginning and end of each run. Check standard acceptance limits are 85-115% recovery. (FLDEP Central Laboratory NU-043-2.24).

iii) **Cross Calibration Exercises** – FDEP laboratory participated in two rounds of performance testing (PT) in 2020. The studies are performed by many labs around the nation to and are required to maintain the lab's TNI certification. In addition to the PT studies the lab also participated in a round robin organized by North Carolina DEQ for chlorophyll analysis. In 2020, the round robin occurred at the end of July/beginning of August and the lab analyzed 8 split samples.

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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.

~~[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~~
~~...~~	-	-	-	-	-	-

		Date Analyzed					
Sample Descriptor	NH4F	NO23F	PO4F	CHLA_N, UncCHLA_N, PHEA	TKN	TP	TSS
01/10/2023 all grab samples, 01/10-11/2023 all diel samples	1/20/2023, 1/30/2023	1/18/2023, 1/25/2023	1/11/2023	1/13/2023, 1/17/2023, 1/19/2023	1/19/2023, 1/20/2023, 1/23/2023, 1/26-27/2023, 2/6/2023	1/17-18/2023, 1/24/2023	1/13/2023
01/31/2023-02/01/2023 all diel samples	2/9/2023 2/13/2023	2/3/2023, 2/9/2023	2/1/2023	2/3/2023	2/6/2023, 2/22/2023	2/8/2023, 2/13/2023, 2/15/2023	2/3/2023
02/08/2023 primary station grabs sampled	2/15/2023, 2/20/2023, 2/22/2023	2/14/2023, 2/17/2023, 2/22/2023	2/9/2023	2/14/2023	2/17/2023, 2/21/2023, 3/3/2023	2/16/2023, 2/21/2023, 2/23-24/2023	2/10/2023

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02/28/2023 all grab samples, 02/28/2023-03/01/2023 all diel samples	3/6-8/2023, 3/15/2023	3/3/2023, 3/6/2023, 3/9/2023, 3/15/2023, 3/27/2023	3/1/2023	3/2/2023, 3/6/2023	3/11/2023, 3/13/2023, 3/20-21/2023, 3/23/2023	3/6/2023, 3/14-15/2023, 3/17/2023	3/3/2023
04/04/2023 grab samples, 04/04-05/2023 all diel samples	4/6-7/2023, 4/12/2023	4/11-13/2023, 4/18/2023, 4/21/2023	4/5/2023	4/12-13/2023	4/13/2023, 4/7-18/2023	4/10/2023, 4/13/2023, 4/18/2023	4/10/2023
05/01/2023, 05/23/2023 primary station grabs sampled, 05/01-02/2023 diel samples	5/9/2023, 5/11/2023, 5/25/2023	5/8/2023, 5/15/2023	5/3/2023, 5/24/2023	5/11/2023, 6/5-6/2023	5/9/2023, 5/11-12/2023, 5/31/2023	5/9/2023, 5/12/2023, 5/31/2023, 6/7/2023	5/5/2023, 5/12/2023, 5/26/2023
05/30/2023 grab samples, 05/30-31/2023 all diel samples	6/5-6/2023, 6/13/2023	6/12/2023	5/31/2023	6/6-7/2023	6/6/2023, 6/12/2023, 6/14/2023, 6/19/2023	6/7/2023, 6/13/2023	6/2/2023
06/20/2023 grab samples, 06/20-21/2023 all diel samples	6/26/2023, 6/28/2023	6/7/2023, 6/12-13/2023	6/21/2023	6/27-28/2023	6/26/2023, 6/28-29/2023, 6/30/2023, 7/6/2023	6/26/2023, 6/28/2023	6/23/2023
08/01/2023 all grab samples, 08/01-02/2023 all diel samples	8/4/2023, 8/11/2023, 8/15/2023, 8/17-18/2023, 8/22/2023	6/28-30/2023	8/2/2023	8/3-4/2023, 8/7/2023	8/9-10/2023, 8/14/2023	8/7/2023, 8/9/2023	8/4/2023
09/11/2023 all grab samples, 09/11-12/2023 all diel samples	9/14/2023, 9/19/2023	8/4/2023, 8/8-9/2023, 8/21/2023	9/12/2023	9/13-14/2023	9/27/2023	9/18-19/2023	9/15/2023
10/06/2023 grab samples, 10/05-06/2023 all diel samples	10/13/2023, 10/19/2023	9/20-22/2023, 9/26/2023	10/6/2023	10/20/2023, 10/24/2023	10/12-13/2023, 10/16/2023, 10/18/2023	10/13/2023	10/11/2023
11/07/2023 grab samples, 11/07-08/2023 all diel samples	11/15/2023, 11/17/2023, 11/20-21/2023, 11/28/2023	10/11/2023, 10/16/2023	11/8/2023	11/15-16/2023	11/14/2023, 11/16-17/2023, 11/27/2023	11/16/2023, 11/21/2023	11/13/2023

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12/12-13/2023 all diel samples	12/20/2023	11/16-17/2023, 11/20/2023, 11/27/2023	12/13/2023	12/20/2023	12/19/2023, 12/22/2023, 12/27/2023	12/18/2023, 12/21/2023	12/15/2023
12/18/2023 grab samples	12/20/2023, 1/4/2024	12/18-19/2023, 12/21/2023	12/19/2023	1/3/2024	12/27-28/2023, 1/8/2024	12/22/2023, 1/8/2024	12/21/2023

*sample held longer than allowed by NERRS protocols

a) Information about flagged data and additional notes

February 2023:
- Suspect apapcnut TSS result may be biased because it was analyzed according to the field conductivity.

March 2023:
- 11:15 – 16:15 apaesnut samples had high particulates that settled out and clogged filters

April 2023:
- Chlorophyll-*a*, Uncorrected Chlorophyll-*a*, Phaeophytin no result for apaesnut, lab note says that during sample extraction tissue grinder tube broke and sample lost prior to analysis

May 2023:
- 11:00 - 18:30 apaesnut high particulates in samples
- 21:00 - 05/02/2023 02:00 apaesnut medium particulates in samples

July2023:
- 14:45 – 17:15 apaesnut high particulates in sample

November 2023:
- Blank show elevated readings, suspect possible bottle contamination
- Lab unable to analyze apaesnut and apacpnut Chlorophyll-*a*, Uncorrected Chlorophyll-*a*, Phaeophytin samples due to software malfunction

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