Hudson River (HUD) NERR Nutrient Metadata
January 1, 2022 – December 31, 2022
Latest Update: June 14~~9~~, 2023

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~~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.

Field Code Changed

I.~~–~~ Data Set and Research Descriptors

1)~~–~~ Principal investigator(s) and contact persons –

a) Reserve Contact:

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2) Research objectives –

a) Monthly Grab Sampling Program

The objective of this study is to monitor nutrient concentrations at ~~the four~~three of the four component sites of the Hudson River National Estuarine Research Reserve (HRNERR; the Reserve). Grab samples are taken from four freshwater tidal locations; Ferry Landing (FL; Stockport Flats Component), Tivoli North Bay and Tivoli South Bay (TN and TS, respectively; Tivoli Component), and Norrie Point (NP; Headquarters Location). Grab samples are also collected at Bear Mountain (BM; Iona Island Component), which~~), and Piermont Pier (PP; Piermont Marsh Component) the Bear Mountain station~~ is located in the typical geographic location of the salt front where the salinity gradient varies yearly~~y. Piermont Pier is located within the saline zone of the estuary~~. YSI datasondes are deployed at all grab sampling sites ~~(Piermont Pier is operated by a partner organization)~~ and meteorological data are collected continuously at the Norrie Point and Tivoli Components, thus relationships can be established between nutrient levels, the aquatic environment, and meteorological conditions. A concerted effort is made to collect samples on an ebb tide, which accounts for nutrient inputs to the wetlands via stream flow and tidal exchange and includes the influence of intertidal areas on nutrient levels; however, it should be noted that logistical challenges such as inclement weather events and unfeasible tide cycles may result in the collection of samples during a flood tide.

b) Diel Sampling Program

Monthly diel sampling is conducted at Tivoli South Bay. Diel sampling highlights the relative importance of tidal forcing on nutrient levels within Tivoli ~~North~~ South Bay through the inclusion of two complete tidal cycles (a lunar day). Sampling on a flood tide allows for isolation of nutrient inputs via tidal exchange. As with grab sampling, diel sampling on an ebb tide accounts for nutrient inputs via tidal exchange and stream flow and includes the influence of intertidal areas on nutrient levels. The combination of grab and diel sampling data will provide a better understanding of the relative importance of each water source in terms of nutrient delivery to Tivoli South Bay. In addition, these data will help us develop a better understanding of the effects of the intertidal area on nutrient dynamics

3) Research methods –

Monthly grab samples are collected near YSI data logger locations in the Stockport, Tivoli Bays, and Iona Island ~~, and Piermont~~ components of the ~~Hudson River National Estuarine Research Reserve~~Reserve and one additional location at the Norrie Point headquarters of the ~~Hudson River reserve~~Reserve. These sites include Ferry Landing, Tivoli ~~South~~ North Bay, Tivoli ~~North~~ South Bay, and Bear Mountain~~, and Piermont Pier~~. Monthly sampling at Tivoli North and South Bays~~the two~~ are conducted on the same day, typically during an ebb tide within and three hours of slack low-water. Efforts are made to avoid precipitation events within 48 hours of sampling. Two replicate samples are collected sequentially at each site using 1 L~~L~~ amber Nalgene bottles. Prior to sample collection, bottles are acid washed with 10% HCL and rinsed with distilled-deionized water. At each site, bottles are rinsed three times with ambient water just before sample collection. All sampling sites are highly ~~mixed~~mixed, and samples are collected at only one depth, approximately 15 cm below the surface.

At the time of sample collection, a handheld YSI ~~Professional Plus~~multiparameter digital meter is used to measure temperature, salinity, specific conductivity, field pH, and dissolved oxygen (% and mg/L), and the values are recorded. Grab samples are placed on ice and returned to the laboratory. Within 24 hours, pH and alkalinity are measured and samples are filtered for seston (TSS) and chlorophyll A (CHLA)/phaeophytin (PHEA). The filtrate is collected and transferred to 60 mL~~l~~ Nalgene bottles that have been acid washed, rinsed with distilled-deionized water, and rinsed three times with the filtrate. Filtered samples are stored ~~@~~ at 4°C until nutrient analysis and 1.8 ~~ml~~ mL of 1 N H_2SO_4~~H2SO4~~ is added to samples that will be analyzed for ammonium, orthophosphate, and ~~Nitrate~~nitrate/~~Nitrate~~nitrite. Filters for CHLA/PHEA analysis are placed in borosilicate vials and stored in a freezer at~~@~~ -4°C.

a) Diel Sampling

Monthly diel sampling ~~occurred~~ is conducted at Tivoli South Bay near the YSI datasonde location. An ISCO 6712 Portable Sampler equipped with a 25 ft siphoning tube is used for sample collection. The siphoning tube is deployed ~~approximately one meter~~approximately six inches from the datasonde. ~~from the datasonde and w~~Water is collected 25~~0~~ cm off the river bottom~~;~~ approximate sampling depths are 0.5 meters at low tide and 2.5 meters at high tide.

Until November 2002, two sequential samples were collected once every 2 hours for 22 hours. After November 2002, the protocol changed to collect two sequential samples once every 2.5 hours for 27.5 hours. ~~Two sequential samples were collected once every 2 hours for 22 hours until November 2002, when collection of the two sequential samples changed to once every 2.5 hours for 27.5 hours.~~ The first sample is always collected at slack low tide. Samples are collected in 1 ~~liter~~ L clear Nalgene bottles that are acid washed with 10% HCL and rinsed with distilled-deionized water prior to deployment of the ISCO. The second sample bottle in each sequence receives 3.6 ~~ml~~ mL of 10 N H_2SO_4 prior to deployment ~~in order~~ to preserve the sample for ammonium, orthophosphate, and nitrate/nitrite ~~analysis~~analyses. The inside of the ISCO is packed with ice to keep the samples cool until the instrument is retrieved. Samples are processed on the day of retrieval. Acidified samples, the second in each collection sequence, are filtered and the filtrate is collected and transferred to 60 ~~ml~~ mL Nalgene bottles that have been acid washed and rinsed as described previously. Non-acidified samples, the first in each collection sequence, are filtered for seston and CHLA/PHEA. The filtrate is collected and transferred to 60 ~~ml~~ mL Nalgene bottles that have been acid washed and rinsed as described previously. All filtered water samples are stored ~~@~~ at 4°C until nutrient ~~analysis~~ analyses ~~is~~ are conducted. Filters used for CHLA/PHEA analysis are placed in borosilicate vials and stored in a freezer ~~@~~ at -4°C.

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4)~~–~~ Site location and character –

The ~~Hudson River National Estuarine Research Reserve (HUDNERR)~~ HRNERR is a multi-component site totaling approximately 5,000 acres.~~—~~ Each component of the ~~reserve~~ Reserve is referenced by River Mile (RM) of the Hudson River in New York State proceeding north from the southern tip of Manhattan (RM 0).~~—~~ The ~~reserve~~ Reserve includes the following four component sites: Piermont Marsh, Rockland County (RM 24)(41°02'30"N 73°54'15"W), Iona Island, Rockland County (RM 45)(41°18'15"N 73°58'45"W), Tivoli Bays, Dutchess County (RM 98)(42°02'15"N 73°55'10"W), and Stockport Flats, Columbia County (RM 124)(42°02'30"N 73°46'00"W).~~—~~ The ~~reserve~~ Reserve also operates a station at ~~the reserve~~ its headquarters at Norrie Point, Dutchess County (RM 92~~) (~~) (41°49'54.0"N 73°56'31.0"W). The component sites include open water, tidal wetland, and adjacent upland buffer habitats and are representative of the diverse plant and animal communities that occupy the salinity gradient within the Hudson River Estuary.~~–~~ Development within the watersheds of the four component sites ranges from predominantly urban/suburban to forested/agricultural.

Historic Primary Sites

The primary tributaries to the Tivoli Bays are Stony Creek and Saw Kill Creek, respectively. High concentrations of nitrate and phosphate have previously been documented in both watercourses. Nutrient concentrations in the Saw Kill Creek appear to be strongly influenced by adjacent residential land use practices. Water quality monitoring stations were operated at both streams to evaluate and identify non-point sources of nutrient inputs at these sites; however, they are currently inactive. Descriptions of both sites are provided below.

Stony Creek (latitude 42° 02' 45.556" N, longitude 73° 54' 40.237" W; 2002-2022)

Stony Creek is the main tributary flowing into Tivoli North Bay, contributing non-tidal and freshwater inputs. The Stony Creek watershed is approximately 23 square miles and is dominated by agricultural land use. Characteristics of Stony Creek at the sampling location include a solid rock bottom and a depth range of 0.5 to 1.5 meters. Tributaries to Stony Creek consist of smaller creeks and streams within its watershed.

Saw Kill (latitude 42° 1' 1.82 N, longitude 73° 54' 53.86 W; 1995-2019)

The Saw Kill is the primary tributary flowing into Tivoli South Bay. With a watershed comprising approximately 26.6 square miles, land use within consists primarily of forested, agricultural, and urban areas. The substrate of the creek at the sampling location is characterized by rock and gravel, with a water depth ranging from 0.5 to 2.0 meters and discharge ranging from $2x10^{-5}$ to 1.2 m^3/sec.

Current Sites

Ferry Landing (latitude 42°21'14.36"N, 73°47'20.76"W) is located within a freshwater tidal portion of the Hudson River at RM 125. It has a tidal range of 1.19 m, with a soft, silty/clay bottom, and a depth range of 0.5 to 2.5 m at the sampling location. The sampling location is adjacent to a fishing pier located on the northern end of the Stockport Flats component site of the Reserve.

Tivoli North Bay (latitude 42° 02' 11.56464" N, longitude 73° 55' 31.16645" W) is a freshwater tidal marsh with emergent marsh vegetation dominated by narrowleaf cattail (*Typha angustifolia*). Tivoli North Bay has a tidal range of 1.19 m, a soft, silt/clay substrate, and a depth range from 0.5 to 2.5 m at the sampling location. The non-tidal freshwater inputs to Tivoli North Bay include a large upland tributary (Stony Creek; see above) and a few small perennial streams.

Tivoli South Bay (latitude 42° 01' 37.336" N, longitude 73° 55' 33.445" W) is a freshwater tidal wetland with intertidal mudflats exposed at low tide. During the growing season (June – September), the subtidal area of Tivoli South Bay is dominated by the invasive floating macrophyte water chestnut (*Trapa natans*). Tivoli South Bay has a tidal range of 1.19 m and a soft, silt/clay substrate. The depth at the sampling location ranges from 0.5 to 2.5 m. The non-tidal freshwater

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inputs to Tivoli South Bay include a large upland tributary (Saw Kill; see above) and a few small perennial streams.

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Bear Mountain (latitude 41° 18' 51.0” N, longitude 73° 59' 6.0" W) is situated approximately 700 m ~~adjacent to the~~ north of the Iona Island Marsh component site at RM 45. This is a tidal brackish wetland with emergent vegetation dominated by ~~cattail *Typha angustifolia*~~narrowleaf cattail~~,~~ and invasive common reed (*Phragmites australis*). A freshwater creek, Doodletown Brook, is the main tributary flowing into Iona Island Marsh. Bear Mountain sits at the foot of Bear Mountain ~~state park~~State Park, a mostly undeveloped, mountainous woodland. The Bear Mountain samples ~~is~~ are frequently in the salt frontal boundary in the Hudson River. This sampling location sees salinity ranges from 0.1 to 10 psu annually, which is driven by meteorological and tidal factors. The tidal range at this site is 1.0 to 1.5 m. ~~The typical tidal range of 1.0 to 1.5 meters can be found here.~~ An unnamed freshwater spring 100 m to the west ~~provides~~ contributes a slight freshwater signature to this sampling site.

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Known Pollutants

The entirety of the tidal portion of the Hudson River (i.e., south of the Troy Dam) is affected by historic polychlorinated biphenyls (PCBs). As a result, Tivoli North and South Bays have low sedimentary concentrations of these PCBs.

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~~Tivoli South Bay (latitude 42° 01' 37.336" N, longitude 73° 55' 33.445" W) is a tidal freshwater wetland with intertidal mudflats exposed at low tide. During the growing season (June – September), the subtidal area of Tivoli South Bay is dominated by the invasive floating macrophyte *Trapa natans*. Tivoli South Bay has a tidal range of 1.19 meters and a soft, silt/clay bottom type. The depth at the sampling location ranges from 0.5 to 2.5 meters. The non-tidal freshwater input to Tivoli South Bay includes that of a large upland tributary and a few small perennial streams.~~

~~Tivoli North Bay (latitude 42° 02' 11.56464" N, longitude 73° 55' 31.16645" W) is a freshwater tidal marsh with emergent marsh vegetation dominated by the cattail *Typha angustifolia*. Tivoli North Bay has a tidal range of 1.19 meters, a soft, silt/clay bottom type, and a depth range from 0.5 to 3.0 meters at the sampling location. The non-tidal freshwater input to Tivoli North Bay includes that of a large upland tributary and a few small perennial streams.~~

~~Ferry Landing (latitude 42°21'14.36"N, 73°47'20.76"W) is located in a freshwater tidal portion of the Hudson River at River Mile 125. It has a tidal range of 1.19 meters, with a soft, silty/clay bottom, and a depth ranger of 0.5 to 2.5 meters at the sampling location. The sampling location is adjacent to a fishing pier located on the northern end of the Stockport Flats component site of the Hudson River Research Reserve.~~

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~~The entire tidal Hudson River south of the Troy Dam is affected by polychlorinated biphenyls (PCBs), and Tivoli North and South Bays have low sedimentary concentrations of PCBs. Nutrient inputs to the Tivoli Bays via the non-tidal tributaries are the main concern in terms of pollutants. High concentrations of nitrate and phosphate have previously been documented in both Saw Kill Creek and Stony Creek. Saw Kill Creek appears to be strongly influenced by residential land use practices. This highlights the importance of continued monitoring and identification of non-point sources of pollution at these sites.~~

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~~All Hudson River NERR historical nutrient/pigment monitoring stations:~~

Station Code	**SWMP Status**	**Station Name**	**Location**	**Active Dates**	**Reason Decommissioned**	**Notes**
BM	P	Bear Mountain	41° 18' 51.0" N, 73° 59' 6.0" W	01/01/2020 - Current	N~~/~~A	N~~/~~A
TS	P	Tivoli Bay South	42° 1' 37.34 N, 73° 55' 33.45 W	05/01/1995 ~~00:00~~ – ~~current~~Current	NA	NA
TN	P	Tivoli Bay North	42° 2' 11.56 N, 73° 55' 31.17 W	07/01/1999 ~~00:00~~ – ~~current~~Current	NA	NA
SK	D	Saw Kill	42° 1' 1.82 N, 73° 54' 53.86 W	05/01/1995 ~~00:00~~ – 12/31/2019	Site to be altered due to removal of dam	NA
SC	D	Stony Creek	42° 2' 46.68 N, 73° 54' 38.88 W	04/01/2002 ~~00:00~~ – 12/31/2021	Location is no longer viable for sampling	NA
NP	S	Norrie Point	41°49'54.0"N 73°56'31.0"W	(06/27/2008) *01/01/2018 ~~00:00~~ - Current	NA	*Secondary SWMP status confirmed as of 01/01/2018, prior data may be available per request
FL	S	Ferry Landing	42°21'14.36"N 73°47'20.76"W	(04/01/2021) *04/01/2022 ~~00:00~~ – Current)	NA	*Secondary SWMP status confirmed as of 04/01/2022, prior data may be available on request

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5) Coded variable definitions –

hudbmnut = Hudson River Reserve nutrient data for Bear Mountain
hudscnut = Hudson River Reserve nutrient data for Stony Creek
hudtnnut = Hudson River Reserve nutrient data for Tivoli North Bay
hudtsnut = Hudson River Reserve nutrient data for Tivoli South Bay
hudnpnut = Hudson River Reserve nutrient data for Norrie Point (Secondary Station)
hudflnut = Hudson River Reserve nutrient data for Ferry Landing (Secondary Station)

Monitoring program codes:
1=Monthly grab sampling
2=Diel sampling

6) Data collection period –

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Monthly grab samples have been collected at the four monitored sites of the Tivoli Bays since 06/17/1991. Diel sampling at Tivoli South Bay began in June 2002. The exact dates and times for the 2022 Nutrient Data collection period are listed below. Data collection is hampered during the winter months (December-March) because snow and ice often prohibit safe access to the sites.

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a) Monthly sampling

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Site	Date	Rep 1 Time	Rep 2 Time
BM	4/11/2022	12:22	12:23
BM	5/24/2022	10:38	10:39
BM	6/22/2022	10:05	10:06
BM	7/25/2022	10:48	10:49
BM	8/18/2022	09:37	09:38
BM	9/19/2022	10:05	10:06
BM	10/20/2022	11:20	11:21
BM	11/22/2022	12:46	12:47
BM	12/20/2022	13:22	13:23

Site	Date	Rep 1 Time	Rep 2 Time
NP	04/04/2022	09:12	09:13
NP	05/20/2022	09:36	09:37
NP	06/21/2022	13:32	13:33
NP	07/21/2022	12:46	12:47
NP	08/30/2022	09:09	09:10
NP	09/27/2022	08:25	08:26
NP	10/25/2022	07:33	07:34
NP	11/28/2022	09:36	09:37
NP	12/27/2022	11:06	11:07

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Site	Date	Rep 1 Time	Rep 2 Time
FL	04/05/2022	11:40	11:41
FL	05/19/2022	12:15	12:16
FL	6/30/2022	12:00	12:01
FL	07/19/2022	13:32	13:33

FL	08/25/2022	10:51	10:52
FL	09/27/2022	08:23	08:24
FL	10/24/2022	08:36	08:37
FL	11/30/2022	15:14	15:15
FL	12/28/2022	11:39	11:40

Site	**Date**	**Rep 1 Time**	**Rep 2 Time**
TN	04/06/2022	10:47	10:48
TN	06/01/2022	09:48	09:49
TN	06/16/2022	09:49	09:50
TN	07/15/2022	09:17	09:18
TN	08/03/2022	10:10	10:11
TN	09/13/2022	09:31	09:32
TN	10/12/2022	09:45	09:46
TN	11/15/2022	12:00	12:01
TN	12/14/2022	11:42	11:43

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Site	**Date**	**Rep 1 Time**	**Rep 2 Time**
TS	04/06/2022	11:34	11:35
TS	06/01/2022	10:16	10:17
TS	06/16/2022	09:26	09:27
TS	07/15/2022	10:08	10:09
TS	08/03/2022	10:32	10:33
TS	09/13/2022	09:50	09:51
TS	10/12/2022	10:27	10:28
TS	11/15/2022	11:34	11:35
TS	12/14/2022	12:09	12:10

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b) Diel Sampling

Site	**GRAB**	**Start Date**	**Start Time**	**End Date**	**End Time**
TS		Not Deployed Due to Ice			
TS		Not Deployed Due to Ice			
TS		Not Deployed Due to Ice			
TS		04/05/2022	23:00	04/07/2022	02:30
TS		05/31/2022	21:00	06/02/2022	00:30
TS		06/14/2022	20:00	06/15/2022	23:30
TS		07/13/2022	20:00	07/14/2022	23:30
TS		08/03/2022	00:00	08/04/2022	03:30
TS		09/12/2022	22:00	09/14/2022	01:30
TS		10/11/2022	21:45	10/13/2022	01:15
TS		11/15/2022	00:15	11/16/2022	03:45
TS		Not Deployed Due to Ice			

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7) Associated researchers and projects–

As part of the SWMP long-term monitoring program, HUDNERR 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.

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8) Distribution –

NOAA retains the right to analyze, synthesize and publish summaries of the NERRS System-wide Monitoring Program data. The NERRS retains the right to be fully credited for having collected and 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.

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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.

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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.

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II. Physical Structure Descriptors

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9) Entry verification –

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Following sample analysis (ammonium, nitrate/nitrite, orthophosphate, chloride, sulfate), data files are transferred directly from analytical instruments to desktop computers. Reports are generated as Excel spreadsheets and verified by reserve staff. Data are examined for completeness, ~~consistency~~consistency, and outliers. Suspect data are flagged, and if possible, samples are analyzed a second time.

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For chlorophyll a and phaeophytin data, raw fluorescence data are entered by hand into spreadsheets that have been established to perform necessary calculations. Entered data are checked twice for errors and calculated values are examined for completeness, ~~consistency~~consistency, and outliers.

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~~Laboratory data are then assigned an ID and imported into an Access database. Field data are entered directly into Access with a corresponding sample ID. The field and laboratory data for the four sites described here are then queried out of Access, imported into Excel, reformatted and pre-processed.~~

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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

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The research coordinator, assistant, and SWMP technician are responsible for QA/QC of the data.

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10) Parameter titles and variable names by category –

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

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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 + Nitrate, Filtered	NO23F	mg/L as N
Plant Pigments:			
	*Chlorophyll a	CHLA_N	µg/L
	Phaeophytin	PHEA	µg/L
Carbon:			
Other Lab Parameters:			
	Chloride, Filtered	Cl	mg/L
	Sulfate, Filtered	SO4	mg/L
	Total Suspended Solids	TSS	mg/L
Field Parameters:			
	Water Temperature	WTEM_N	°C
	Specific Conductance	SCON_N	mS/cm
	Salinity	SALT_N	psu
	% Dissolved Oxygen Saturation	DO_S_N	%
	Dissolved Oxygen	DO_N	mg/L
	pH	PH_N	SU
	Air Temperature	ATEM_N	°C

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 –

a) **Parameters measured directly**

Nitrogen species:	NH4F, NO23F
Phosphorus species:	PO4F
Other:	CHLA_N, PHEA, Cl, SO4, TSS

b) **Calculated parameters**

None

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12) Limits of detection –

Method Detection Limits (MDL), the lowest concentration of a parameter that an analytical procedure can reliably detect, have been established by the Hudson River Research Reserve Laboratory. MDLs are established by Parameter ~~according~~according to the methodologies~~y~~ set forth by the equipment manufacturer. 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.

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***Beginning in 2022, HUDNERR began processing nutrient data in-house, and no longer utilizes the methodologies~~y~~ and MDLs provided by the Cary Institute of Ecosystem Studies Rachel L Carson Analytical Laboratory.**

Prior years MDLs and RLs are as follows:

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Parameter	**Variable**	**MDL**	**Reporting Limit**	**Dates in Use**	**Revisited**
Ammonium	NH4F	0.003 mg/L	0.02 mg/L as N	2009 – 2021	01/01/2021
Nitrate	NO3F	0.005 mg/L	0.02 mg/L as N	1991 – 2021	01/01/2021
Orthophosphate	PO4	0.0006 mg/L	0.002 mg/L as P	2009 – 2021	01/01/2021
Chloride	CL	0.074 mg/L	0.02 mg/L	1991 – 2021	01/01/2021
Sulphate	SO4	0.055 mg/L	0.02 mg/L	1991 – 2021	01/01/2021

Cary Institute of Ecosystem Studies Rachel L Carson Analytical Laboratory~~–~~ Annual Method Detection Limit~~s~~					
Test	NH4-N	Cl	NO3	SO4	PO4-P
Results_Units	mg/L	mg/L	mg/L	mg/L	mg/L
Reporting_Limit	0.02	0.02	0.02	0.02	0.002
Method	Colormetric	IC	IC	IC	Colormetric
2011	0.003	0.008	0.006	0.006	0.0005
2012	0.002	0.002	0.001	0.004	0.0004
2013	0.004	0.004	0.002	0.008	0.002
2014	0.004	0.004	0.002	0.008	0.002
2015	0.003	0.0020	0.0010	0.0010	0.0017
2016	0.0088	0.0098	0.0029	0.0074	0.0015
2017	0.0026	0.0038	0.0026	0.0041	0.0012
2018	0.0041	0.0250	0.0041	0.0102	0.0007
2019	0.0080	0.0250	0.040	0.0110	0.0013
2020	0.0080	0.0250	0.040	0.0110	0.0013
2021	0.003	0.074	0.005	0.055	0.006

Beginning with the 2022 Sample Year, HUDNERR utilizes MDLs established by the SEAL Analytical Detection Limit Studies.

Parameter	**Variable**	**MDL**	**Dates in Use**	**Revisited**
Ammonia	NH3F	0.003 mg/L	2022 - Current	01/01/2022
Nitrate + Nitrite	NO23F	0.002 mg/L	2022 - Current	01/01/2022
Orthophosphate	PO4	0.002 mg/L	2022 - Current	01/01/2022
Chlorophyll A	CHLA_N	0.02 ug/L	2004 – 2022	01/01/2022
Phaeophytin	PHEA_N	0.02 ug/L	2004 – 2022	01/01/2022
Total Suspend Solids	TSS	0.1 mg/L	1991 – 2022	01/01/2022
Chloride	CL	0.3 mg/L	2022 - Current	01/01/2022
Sulphate	SO4	0.09 mg/L	2022 - Current	01/01/2022

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13) Laboratory methods –

a) Parameter: NH3F

AQ300 HUDNERR Laboratory Method:~~–~~ 148 - Ammonia
EPA Reference Method: EPA-148-D Rev 1
Method Reference:~~–~~ Methods for the Determination of Inorganic Substances in Environmental Samples, EPA 600/R 93/100, August 1993: Method 350.1, Revision 2.0
Method Descriptor:~~–~~ At alkaline pH, ammonia in the sample reacts with hypochlorite (HClO-), as previously liberated from dichloroisocyanurate. The chloramine formed then reacts with salicylate, at pH at least 12.6, in presence of nitroferricyanide. During static incubation at 40°~~o~~C, a blue-green indophenol dye forms, which is measured photometrically at 660nm.
Preservation Method: Samples are filtered with gf/f filters, and preserved with 1.8 ml of 1N H2SO4 and stored at 4°~~C~~ .C.~~–~~ Samples are analyzed within 28 days

b) Parameter: NO23F

AQ300 HUDNERR Laboratory Method:~~–~~ 127 – NOx (Nitrate + Nitrite)
EPA Reference Method: EPA-127-D Rev 2A
Method Reference: Methods for the Determination of Inorganic Substances in Environmental Samples, EPA 600/R 93/100, August 1993: Method 353.2, Revision 2.0.
Standard Methods for the Examination of Water and Wastewater, APHA/AWWA/WEF, method 4500 NO3– F (2017 forward).
Method Descriptor:~~–~~ The sample is mixed with pH buffer and then transferred to a copperized cadmium coil, where nitrate is chemically reduced to nitrite. The ~~chemically-reduced~~chemically reduced sample is mixed with color reagent, prepared in dilute phosphoric acid. Original nitrite, plus nitrite from chemical reduction, reacts with sulfanilamide to form a diazonium compound. This species couples with N-(1-naphthyl)-ethylenediamine dihydrochloride to form a reddish-purple azo dye that is measured photometrically at 520nm. Separate results for nitrite are obtained using AQ method EPA-115.
Preservation Method: Samples are filtered with gf/f filters, and preserved with 1.8 ml of 1N H2SO4 and stored at 4°~~C~~ .C.~~–~~ Samples are analyzed within 28 days

c) Parameter: PO4F

AQ300 HUDNERR Laboratory Method:~~–~~ 118 – oPhosphate High
EPA Reference Method: EPA-118-D Rev 1
Method Reference:~~–~~ Methods for the Determination of Inorganic Substances in Environmental Samples, USEPA 600/R 93/100, August 1993: Method 365.1, Rev 2.0.
Standard Methods for the Examination of Water and Wastewater, APHA/AWWA/WEF, method 4500-P F (1999 forward).
Method Descriptor: Reaction with acidic molybdate in the presence of antimony forms an antimony phospho-molybdate complex. This complex is chemically reduced by ascorbic acid to an intensely blue complex: phosphomolybdenum blue. The absorbance of this complex is measured photometrically at 880nm.
Preservation Method: Samples are filtered with gf/f filters, and preserved with 1.8 ml of 1N H2SO4 and stored at 4°~~C~~ .C.~~–~~ Samples are analyzed within 48 Hours

d) Parameter: ClF

AQ300 HUDNERR Laboratory Method:~~–~~ 105 – Chloride
EPA Reference Method: EPA-105-D Rev 1A
Method Reference:~~–~~ Methods for Chemical Analysis of Waters and Wastes, US EPA 600/4-79-020, 1983: Method 325.2 Standards Methods for the Examination of Water and Wastewater, APHA/AWWA/WEF, method 4500-Cl-E (18th, 19th, 20th Ed.).

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Method Descriptor: The thiocyanate ion (SCN-) is liberated from mercuric thiocyanate through sequestration of mercury by the chloride ion to form non-ionized mercuric chloride. In the presence of ferric ions, the liberated thiocyanate ions ~~forms~~form a ~~highly-colored~~highly colored ferric thiocyanate. The absorbance of this complex is measured spectrophotometrically at 480nm.

Preservation Method: Samples are filtered with gf/f filters, and stored at 4°~~C .~~C. Samples are analyzed within 28 Days

e) **Parameter: SO4F**

AQ300 HUDNERR Laboratory Method: 105 – Chloride
EPA Reference Method: EPA-165-D Rev. 2A
Method Reference:

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ASTM D516-11, *Standard Test Methods for Sulfate Ion in Water,* ASTM International, West Conshohocken, PA, 2011, www.astm.org.

Standard Methods for the Examination of Water and Wastewater, APHA/AWWA/WEF, 4500-SO42- E (1997 forward).

ISO/DIS 15923-1, *Water Quality – Determination of selected parameters by a discrete analysis system – Part 1: Ammonium, nitrate, nitrite, chloride, orthophosphate, sulfate and silicate with photometric detection.*

Method Descriptor: Sulfate ion is converted to a barium suspension under controlled conditions. The resulting turbidity is determined using a filter photometer at 405 nm.

Preservation Method: Samples are filtered with gf/f filters, and stored at 4°~~C .~~C. Samples are analyzed within 28 Days

e) Parameter: CHLA_N and PHEA_N

Method references:

Holm-Hansen, O. and B. Riemann. 1978. Chlorophyll a determination: improvements in methodology. Oikos 30: 438-447.

Wetzel, R.G. and G.E. Likens. 1991. Limnological Analysis, 2nd ed. Springer-Verlag, New York: 168-169.

Method Descriptor: CHLA and PHEA are measured fluormetrically. Standards with known CHLA concentrations in 90% acetone are used to determine a relationship between CHLA and fluorescence (F). The standards are then acidified with 0.1 N HCL to determine the fluorescence ratio (t) of CHLA and PHEA for pure chlorophyll. Sample filters are extracted using basic methanol (5 ml) and the fluorescence is recorded (Rb). The samples are then acidified with 0.1 N HCL and the fluorescence is recorded (Ra). The following equations are used to determine CHLA and PHEA concentrations in samples:

CHLA (ug/L) = F*(t/t-~~1)*~~1) *(Rb-~~Ra)*~~Ra) *(v/V)
PHEA (ug/L) = F*(t/t-~~1)*~~1) *(tRa-~~Rb)*~~Rb) *(v/V)
Where v is the volume used for extraction (ml) and V is the volume filtered (~~ml~~mL).

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.]~~

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a) **Precision**

i) **Field variability** – All samples are collected successively. The replicates are taken at the same location, approximately 1~~2~~ minute~~s~~ apart.

ii) **Laboratory variability** – There is no variability performed during laboratory analysis. All samples are processed using the same extraction methodology and procedure.

iii) **Inter-organizational splits** – NA

b) **Accuracy**

i) **Sample spikes** – NA
ii) **Standard reference material analysis –** See below.
iii) **Cross calibration exercises** – See ~~Below~~below.

Standard Reference Material Analysis

A blind standard test was performed in December 2010 for NH4, NO3, NO3(as N), and PO4. A 1% dilution of a standard was utilized to perform said analysis. A duplicate of Standard A was also submitted as standard "B". The analyzed standard samples yielded the following results:

Nutrient	Standard Conc. Range (mg/L)	1% Dilution (10mL in 1L)	IES Results A (mg/L)	IES Results B (mg/L)	Pass/Fail
NH4	0.65 - 19 mg/l	0.0065 - 0.19	0.14	0.11	Pass
NO3 -(as N)	0.25 - 40 mg/l	0.0025 - 0.40	0.075	0.073	Pass
NO3+	0.25 - 40 mg/l	0.0025 - 0.40	0.33	0.32	Pass
PO4	0.5 - 5.5 mg/l	0.005 - 0.055	0.032	0.029	Pass
Cl	N/A	N/A	2.52	2.62	N/A
SO3	N/A	N/A	4.4	1.05	N/A

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All analyzed results were reported to be within acceptable range for the dilution. Both CL and SO3 were also analyzed; however, no concentration range was provided by the standard manufacturer for comparison.

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.

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-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

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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.]~~

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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

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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

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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

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CCL	clear (0-10%)
CSP	scattered to partly cloudy (10-50%)
CPB	partly to broken (50-90%)
COC	overcast (>90%)
CFY	foggy
CHY	hazy
CCC	cloud (no percentage)

Precipitation

PNP	none
PDR	drizzle

PLR	light rain
PHR	heavy rain
PSQ	squally
PFQ	frozen precipitation (sleet/snow/freezing rain)
PSR	mixed rain and snow

Tide stage

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

Wave height

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

Wind direction

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

Wind speed

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

17) Other remarks/notes –

Data may be missing due to problems with sample collection or processing. Laboratories in the 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~~rejected, and all measured components are marked suspect. If additional information on MDL's or

Formatted: Indent: Left: 0", First line: 0.5", Right: 0" missing, suspect, or rejected data is needed, contact the Research Coordinator at the reserve submitting the data.

> Note: The way in which below MDL values were 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.

Data coded ~~<~~(CDR~~>~~) Dilution

The following samples ~~had to be~~were diluted to achieve a measurement.~~:~~

~~Dilutions as follows:~~

Chlorophyll ~~Samples:~~

Station Code	Sample Date/Time	Monitoring Program	Rep	Dilution %
FL	06/30/2022 @ 12:00	1	A	25%
FL	06/30/2022 @ 12:01	1	B	25%
FL	07/29/2022 @ 13:33	1	B	25%
TS	10/11/2022 @ 21:45	2	NA	25%

Data coded (CSM)

Chloride

All chloride data for the months of April, May, June, and July are flagged <5> (CSM) as these data have been post-corrected. It was determined that these samples were analyzed using incorrect standards and, therefore, their raw values were inaccurate. These data were found to be consistently offset by approximately 56%. To account for this, staff have applied a post-correction multiplier of 0.56 to raw values, yielding the values represented in this dataset.

pH

All pH data for the months of April, May, June, July, August, and September are flagged <1> (CSM). The pH sensor on the handheld YSI multiparameter meter was failing and readings were found to take several minutes to nearly one-half hour to stabilize to ambient water conditions. Given the age and condition of this meter, these pH data are considered suspect, and are flagged as such. This handheld meter was intended to be replaced with a new YSI ProDSS multiparameter meter, however, due to supply chain complications and challenges following the 2020 coronavirus pandemic, this unit was not delivered in full until November 2022. All field parameters evaluated in November and December were obtained using the new handheld meter.

~~Data coded CSM~~

~~TSD~~

- ~~April: Programming error caused missing first sample (time stamp 4/15/2021 21:30, sample ID 21TSD01).~~
- ~~2-hour deployment used for May samples due to power failure and time restrictions to maximize sample collection~~

Sample hold times for 2022~~1~~:~~–~~ 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. However, available laboratory equipment at the Reserve only operates to a temperature of -4 °C. Per the Reserve's analysis method, PO4 must be analyzed within 48 hours at 4°C.

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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~~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 and coded CHB~~.

The following tables describe the analysis dates for both Tier I and Tier II parameters for SWMP monthly and diel samples collected in 2022. Parameters with a 28-day hold time are included in Table A, and those with a 48-hour hold time are included in Table B.

TABLE A~~*sample held longer than allowed by NERRS protocols~~

Sample Descriptor	**NH4F**	**NO23F**	**CLF**	**CHLA_N, PHEA**	**SO4F**
April 2022~~1~~, SWMP Monthly	04/21/2022~~4/26/21~~	04/26/2022~~4/26/21~~	04/27/2022~~4/26/21~~	06/09/2022*~~6/4/21~~	04/27/2022~~4/26/21~~
04/05~~14~~-04/07~~15~~, all diel samples	04/21/2022~~4/26/21~~	04/26/2022~~4/26/21~~	04/27/2022~~4/26/21~~	06/09/2022*~~6/4/21*~~	04/27/2022~~4/26/21~~
May ~~2021~~2022, SWMP Monthly	06/15/2022~~6/02/21~~	06/17/2022*~~5/28/21~~	06/21/2022*~~5/28/21~~	07/27/2022*~~6/4/21~~	06/21/2022*~~5/28/21~~
05/31~~13~~-06/02~~5/14~~, all diel samples	06/15/2022~~6/02/21~~	06/17/2022~~5/28/21~~	06/21/2022~~5/28/21~~	**~~6/4/21~~	06/21/2022~~5/28/21~~
June ~~2021~~2022, SWMP Monthly	07/05/2022~~07/08/21~~	07/26/2022*~~07/07/21~~	06/21/2022~~07/07/21~~ 07/07/2022	07/27/2022*~~7/14/21~~	06/21/2022~~07/07/21~~ 07/08/2022
06/14~~7~~-06/15~~9~~, all diel samples	07/05/2022~~07/08/21~~	07/26/2022*~~07/07/21~~	06/21/2022~~07/07/21~~	07/27/2022*~~7/14/21~~	06/21/2022~~07/07/21~~
July 2022~~1~~, SWMP Monthly	07/25/2022~~8/11/21~~	07/26/2022~~8/10/21~~	07/27/2022~~8/10/21~~	08/10/2022~~10/6/21*~~	07/26/2022~~8/10/21~~
07/13~~28~~ – 07/14~~29~~, all diel samples	07/25/2022~~8/11/21~~	07/26/2022~~8/10/21~~	07/27/2022~~8/10/21~~	08/10/2022~~10/6/21*~~	07/26/2022~~8/10/21~~
August 2022~~1~~, SWMP Monthly	09/02/2022*~~9/9/21~~	09/01/2022*~~10/1/21~~	09/21/2022*~~10/1/21~~	09/07/2022*~~10/6/21*~~ 09/27/2022	08/31/2022~~10/1/21~~
08/03~~11~~ – 08/04~~12~~, all diel samples	09/02/2022*~~9/9/21~~	09/01/2022*~~10/1/21~~	09/21/2022~~10/1/21~~	09/07/2022*~~10/6/21*~~	08/31/2022~~10/1/21~~
September 2022~~1~~ SWMP Monthly	09/28/2022~~10/7/21~~	09/29/2022~~10/6/21~~	09/29/2022~~10/6/21~~	09/27/2022~~11/19/21*~~ 10/24/2022	09/29/2022~~10/6/21~~
09/1~~2~~2-09/14~~23~~, all diel samples	09/28/2022~~10/7/21~~	09/29/2022~~10/6/21~~	09/29/2022~~10/6/21~~	09/27/2022~~11/19/21*~~	09/29/2022~~10/6/21~~
October 2022~~1~~, SWMP Monthly	10/26/2022~~11/15/21~~	10/27/2022~~11/11/21~~	11/01/2022~~11/11/21~~	10/24/2022~~11/19/21~~ 11/08/2022	10/27/2022~~11/11/21~~
10/11~~26~~-10/13~~27~~, all diel samples	10/26/2022~~11/15/21~~	10/27/2022~~11/11/21~~	11/01/2022~~11/11/21~~	10/24/2022~~11/19/21~~	10/27/2022~~11/11/21~~
November 2022~~1~~,	12/13/2022~~12~~	12/07/2022~~11/~~	12/02/2022~~11~~	12/08/2022	12/02/2022~~11~~

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Sample Descriptor	NH4F	NO23F	CLF	CHLA_N, PHEA	SO4F
SWMP Monthly	~~/1/21~~	~~23/21~~	~~/23/21~~	12/21/2022~~12/17/21~~	~~/23/21~~
11/15~~09~~-11/16~~0~~, all diel samples	12/13/2022~~12/1/21~~	12/07/2022~~11/23/21~~	~~11/23/21~~12/02/2022	12/08/2022~~12/17/21~~	~~11/23/21~~12/02/2022
December 2022~~1~~, SWMP Monthly	12/13/2022~~12/29/21~~	~~12/30/21~~12/07/2022	~~12/30/21~~12/02/2022	~~1/12/21~~***	~~12/30/21~~12/02/2022

* Sample held longer than allowed by NERRS and/or Reserve method protocols.
** Mishandling of samples resulted in the omission of CHLA/PHEA analysis for May diel samples.
*** Due to freezing temperatures, the ISCO unit was not deployed during the month of December.

TABLE B – PO4 Analyses

Month	Site*	Analysis Date	Month	Site*	Analysis Date
April 2022	FL	04/08/2022**	September 2022	FL	09/27/2022
	TN	04/08/2022		TN	09/15/2022
	TS	04/08/2022		TS	09/15/2022
	NP	04/08/2022**		NP	09/27/2022
	BM	04/08/2022		BM	09/20/2022
	All diels	04/08/2022**		All diels	09/15/2022**
May 2022	FL	06/13/2022**	October 2022	FL	10/25/2022
	TN	06/13/2022**		TN	10/13/2022
	TS	06/13/2022**		TS	10/13/2022
	NP	06/13/2022**		NP	10/25/2022
	BM	06/13/2022**		BM	10/21/2022
	All diels	06/13/2022**		All diels	10/13/2022
June 2022	FL	07/22/2022**	November 2022	FL	12/01/2022
	TN	07/18/2022**		TN	11/17/2022
	TS	07/18/2022**		TS	11/17/2022
	NP	07/22/2022**		NP	12/01/2022**
	BM	07/25/2022**		BM	11/22/2022
	All diels	07/18/2022**		All diels	11/17/2022
July 2022	FL	07/21/2022	December 2022	FL	12/29/2022
	TN	07/18/2022**		TN	12/16/2022
	TS	07/18/2022**		TS	12/16/2022
	NP	07/21/2022		NP	12/29/2022
	BM	07/25/2022		BM	12/21/2022
	All diels	07/18/2022**		All diels	***
August 2022	FL	08/26/2022			
	TN	08/04/2022			
	TS	08/04/2022			
	NP	08/30/2022			
	BM	08/22/2022**			
	All diels	08/04/2022			

* Includes both A and B reps for monthly samples
** Sample held longer than allowed by NERRS and/or Reserve method protocols.
*** Due to freezing temperatures, the ISCO unit was not deployed during the month of December.

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~~[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]~~

	~~**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~~

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