Jobos Bay NERR Nutrient Metadata
January 2005 to December 2005
Latest Update: July 22, 2025

I. Data Set and Research Descriptors

1) **Principal investigator(s) and contact persons**

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c) **Other Contacts and Programs:** **None**

2) Research objectives

Inorganic nutrients, particularly nitrogen and phosphorus are naturally found in mangrove and estuarine habitats. They can be significantly increased by human activities reaching the system through non-point source run-off or direct discharge. Eutrophication is defined as gradual accumulation of nutrients and organic biomass accompanied with an increase in photosynthesis and a decrease in the average deep of the water column caused by the accumulation of sediment.

The objective of this study is to provide baseline information on inorganic nutrients and chlorophyll levels in the Jobos Bay estuary. It will also assess nutrients and chlorophyll levels in areas within the reserve that may be receiving impact from human activities from surroundings areas or may act as a habitat gradient in the Bay. In order to compare these with physical water quality parameters, monitoring sites were established at the four YSI's datasonde stations.

Station number nine (9), the impacted site, collects water quality data in a site associated with runoff from littoral and basin mangrove areas. This sampling station is located in the most inland lagoon, closest to the Thermoelectric Power Plant. It is subjected to runoff, which may include potential oil spill contamination from this industrial facility. Information compiled from historical environmental documents, indicate that station nine (9) was used as a disposal site for residues of the previously operating sugar mill operation, and therefore might have high organic input into the sediments.

Station number ten (10), located in a mangrove lagoon area towards the southwestern section of Mar Negro is considered the reference or non-impacted site.

Station 19 is located in Jobos Bay surrounded by sea grass beds composed of Thallasia testudinum. This station is close to the Power Plant transit channel, which allows barges to bring oil and gas into the Power Plant pier. This area is exposed to barge standings, sediment re-suspension and oil spills.

Station 20 is located adjacent to Cayos Caribe reef. Water streams coming from the platform may bring to this station an indication of water conditions behind the coral reef wall. This water are part of the main marine current coming from the eastern side of Jobos Bay that runs along the coast, getting in contact with sensitive areas like coal plant, Phillips Core, Chemsource and other industries.

3) **Research methods**

a) **Monthly Grab Sampling Program**

Monthly grab samples are taken at the four datasonde stations. Grab samples are taken on the same day at or as near as possible to slack low-tide conditions. Efforts are made to collect samples at approximately monthly intervals. Samples are not influenced by previous storm events. Grab samples are reflective of the water mass sampled by the datasonde. Because we have shallow and well-mixed water on our stations, two surface grab samples are collected that are reflective of the datasonde sampling area. Replicate (N=2) sample were collected by hand at an approximate depth of 30 cm.

Grab samples are taken in duplicate (two separate sample collections not two samples from a single water sample); this will result in a total of eight samples. All samples were collected in amber, wide mouth, nalgene sample bottles that were previously acid washed (10%) rinsed (3x) with distilled-deionized water, dried and followed by rinsing (3x) of ambient water prior to collection of the sample. Samples were immediately placed on ice, in the dark and returned to the laboratory. All samples are filtered immediately after collection or as soon as possible. All samples were immediately placed on ice again, in the dark and sent to Virginia Institute of Marine Sciences (VIMS) laboratory.

b) **Diel Sampling Program**

Diel grab samples are taken in long-term datasonde stations 9. Samples are collected over a Full lunar day (24 hr:48min) time period at 2 hour intervals using ISCO auto-samplers. Efforts are made to collect samples at approximately monthly (30 days) interval. Samples are not influenced by previous storm events; <u>an antecedent dry period of 72 hours is desirable but may not be practical at all locations throughout the year.</u> Sampling depth follows the following designs; samples are collected at a fixed depth from the bottom, generally 0.5 meters, and reflect the water mass sampled by the data sonde. This device automatically samples 1000 ml of water every 2 hrs. All samples are pumped into polyethylene sample bottles that were previously acid washed (10%), rinsed (3x) with distilled-deionized water and dried. At the end of the 24 hr period, the 12 samples are kept in the dark and returned to the laboratory for immediate processing. All samples are filtered immediately after collection placed on ice, in the dark (cooler) and sent to Virginia Institute of Marine Sciences (VIMS) laboratory.

4) **Site location and character**

The Jobos Bay National Estuarine Research Reserve (JBNERR) is located on the southern coastal plain of the island of Puerto Rico, a reserve within the West Indies geographical area. JBNERR is composed of two major areas: (1) Mar Negro, located on the western margin of the Bay, and (2) Cayos Caribe, a chain of 15 tear-shaped islets located to the southeast. The Mar Negro area comprises the bulk of the Reserve, and consists of mangrove forests and a complex system of lagoons and channels interspersed with salt and mud flats. Coral reefs and sea grass beds, with small beach deposits and upland areas fringe Cayos Caribe mangrove islands.

Station 9 (09) is an impacted site and is located on the northeastern section of the Mar Negro component. This sampling station is associated with mangrove lagoon areas and receives runoff from mudflats, the Thermoelectric Power Plant, and adjacent areas. The tidal range varies from 12 to 14 inches in the vicinity of the monitoring station. The salinity at the vicinity of the monitoring station varies from 0.0 ppt to 41.1 ppt. The average depth at station 09 is 1 meter. A thick layer of thin sediments with a high content of organic material covers the bottom. Brown and green algae are also present at this site, but a better assessment is needed. The station pole is located at 17° 56' 36.8" N and 66° 14' 18.5" W.

Station 10 (10) is located in a mangrove lagoon not impacted directly by any upland or marine activities. It provides a reference for comparison of data obtained in other stations, especially to the station in Mar Negro lagoon. The tidal range varies from 12 to 14 inches. The salinity at the vicinity of the monitoring station varies from 0.0 ppt to 41.7 ppt. The average depth at station 10 is 1 meter. The bottom is covered with a layer of fine sediments with organic material, followed by a layer of calcareous material mainly from shells and oysters. At this site we can find sea grass (Thalassia), calcareous algae (Halimeda sp.), green algae (Caulerpa sp.) and brown algae (Dictyota sp.) among others. The pole is located at 17° 56' 20.3" N and 66° 45' 26.7" W.

Station 19 (19) is located in the Bay surrounded by sea grass beds (Thallasia testudinum). The tidal range varies from 12 in. to 14 in. in the vicinity of the monitoring station. No fresh water input in the vicinity of the station is probable. The salinity at the vicinity of the monitoring station is approximately 35 ppt. The pole is located at 17° 56' 28.15885" N and 66° 13' 45.28784" W.

Station 20 (20) is located near Cayos Caribe islets. The sonde is in contact with three streams of water that comes from Cayos Caribe reef platform. The tidal range varies from 12 in. to 14 in. in the vicinity of the monitoring station. No fresh water input in the vicinity of the station is probable. The salinity at the vicinity of the monitoring station is approximately 35 ppt. The pole is located at 17° 55' 49.14258" N and 66° 12' 41.29771" W.

5) **Code variable definitions:**

Each individual sample is given a 3 part name code in addition to other codes. The 3 part name code, “job09nut” for example, gives the reserve name (job = Jobos), station name (09 = station 9, etc), and SWMP program code (nut = nutrient monitoring program).

Sampling Site Codes:

job09nut = Jobos Bay Reserve nutrient data for station 09
job10nut = Jobos Bay Reserve nutrient data for station 10
job19nut = Jobos Bay Reserve nutrient data for station 19
job20nut = Jobos Bay Reserve nutrient data for station 20

The monitoring codes are set as “1” to indicate grab samples and “2” to indicate diel samples. Replicates are also given specific codes. Grab samples in which duplicates sample are taken utilize a “1” for the first sample and a “2” for the second sample. Diel samples are always labeled with a “1” since only one sample is taken at each 2.0 hr interval.

6) **Data collection period**

Station nine (9) sampling of nutrients began on January 19, 2005
Station nine (10) sampling of nutrients began on January 20, 2005
Station nine (19) sampling of nutrients began on January 20, 2005
Station nine (20) sampling of nutrients began on January 20, 2005

Diel Sampling (All times in EST)

Site	Start Date	Start Time	End Date	End Time
09	01/19/2005	0900	01/20/2005	0700
09	02/09/2005	0900	02/10/2005	0700
09	03/21/2005	0900	03/22/2005	0700
09	04/25/2005	1000	04/26/2005	0800
09	06/01/2005	1000	06/02/2005	0800
09	06/13/2005	1000	06/14/2005	0800
09	07/21/2005	1000	07/22/2005	0800
09	08/09/2005	1000	08/09/2005	0800
09	09/07/2005	1000	09/08/2005	0800
09	10/25/2005	1000	10/26/2005	0800
09	11/08/2005	1000	11/09/2005	0800
09	12/12/2005	1000	12/13/2005	0800

Grab Sampling (All times in EST)

Site	Start Date	Rep 1 Time	Start Date	Rep 2 Time
09	01/20/2005	0933	01/20/2005	0933
09	02/09/2005	0933	02/09/2005	0933
09	03/22/2005	0933	03/22/2005	0933
09	04/26/2005	0846	04/26/2005	0846
09	06/02/2005	0846	06/02/2005	0846
09	06/14/2005	0846	06/14/2005	0846

09	07/22/2005	0920	07/22/2005	0920
09	08/10/2005	0920	08/10/2005	0920
09	09/08/2005	0920	09/08/2005	0920
09	10/26/2005	0920	10/26/2005	0920
09	11/09/2005	0920	11/09/2005	0920
09	12/13/2005	0920	12/13/2005	0920

Site	Start Date	Rep 1 Time	Start Date	Rep 2 Time
10	01/20/2005	0900	01/20/2005	0900
10	02/09/2005	0900	02/90/2005	0900
10	03/22/2005	0900	03/22/2005	0900
10	04/26/2005	0811	04/26/2005	0811
10	06/02/2005	0811	06/02/2005	0811
10	06/14/2005	0811	06/14/2005	0811
10	07/22/2005	0855	07/22/2005	0855
10	08/10/2005	0855	08/10/2005	0855
10	09/08/2005	0855	09/08/2005	0855
10	10/26/2005	0855	10/26/2005	0855
10	11/09/2005	0855	11/09/2005	0855
10	12/13/2005	0855	12/13/2005	0855

Site	Start Date	Rep 1 Time	Start Date	Rep 2 Time
19	01/20/2005	0831	01/20/2005	0831
19	02/09/2005	0831	02/09/2005	0831
19	03/22/2005	0831	03/22/2005	0831
19	04/26/2005	0749	04/26/2005	0749
19	06/02/2005	0749	06/02/2005	0749
19	06/14/2005	0749	06/14/2005	0749
19	07/22/2005	0821	07/22/2005	0821
19	08/10/2005	0821	08/10/2005	0821
19	09/08/2005	0821	09/08/2005	0821
19	10/26/2005	0821	10/26/2005	0821
19	11/09/2005	0821	11/09/2005	0821
19	12/13/2005	0821	12/13/2005	0821

Site	Start Date	Rep 1 Time	Start Date	Rep 2 Time
20	01/20/2005	1025	01/20/2005	1025
20	02/09/2005	1025	02/09/2005	1025
20	03/22/2005	1025	03/22/2005	1025
20	04/26/2005	0927	04/26/2005	0927
20	06/02/2005	0927	06/02/2005	0927
20	06/14/2005	0927	06/14/2005	0927
20	07/22/2005	1002	07/22/2005	1002
20	08/10/2005	1002	08/10/2005	1002
20	09/08/2005	1002	09/08/2005	1002

20	10/26/2005	1002	10/26/2005	1002
20	11/09/2005	1002	11/09/2005	1002
20	12/13/2005	1002	12/13/2005	1002

7) **Associated researchers and projects**

A water quality monitoring using YSI 6600 data loggers started in December, 1995 to determine pH, salinity, turbidity, temperature, specific conductance, depth, dissolved oxygen saturation and concentration.

The study "Assessment of nitrate contamination in the Salinas area, Puerto Rico" started at 2001 by the US Geological survey had the objective of define potential sources of nitrogen and estimate the loads from the major sources, which have led to an increase in nitrate concentrations in the South Coastal Plain Aquifer. They found that nitrate concentration increased, compared to the results obtained in March 2002 in the majority of the wells sampled. In nitrogen stable isotope analysis they found values of §^{15}N that fall between 3 and 10 per mil, indicative of mixed inorganic and organic sources or soil organic source. We are still waiting for the final report.

A new study started during 2004 “Inventory of source of pollution of groundwater at las Mareas Community, Salinas Puerto Rico". The main objective of this study it's to identify sources of groundwater pollution and environmental health implications using georeferenced data on the preatic level, geohydrology, water quality and location of known drinking water wells. This community it's located at the vicinity of Jobos Bay NERR specifically in the coast line and have a direct impact on our water resources.

8) **Distribution**

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

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

II. Physical Structure Descriptors:

9) **Entry verification**

After the results of nutrients sampling arrives from VIMS laboratory to Jobos Bay NERR the data was verified before being sent to the CDMO to be archived into the permanent database. The person responsible of this task is the Research Coordinator of the reserve Iris L. Tirado.

10) **Parameter Titles and Variable Names by Data Category:**

Required NOAA/NERRS System-wide Monitoring Program water quality parameters are denoted by an asterisks "*".

Data Category	Parameter	Variable Name	Units of Measure
a) Phosphorus:	*Orthophosphate	PO4F	mg/L as P
b) Nitrogen:	*Nitrite + Nitrate, Filtered	NO23F	mg/L as N
	*Nitrite, Filtered	NO2F	mg/L as N
	*Nitrate, Filtered	NO3F	mg/L as N
	*Ammonium, Filtered	NH4F	mg/L as N
	*Dissolved Inorganic Nitrogen	DIN	mg/L as N
c) Plant Pigments:	*Chlorophyll a	CHLA_N	µg/L
	*Phaeophytin	PHEA	µg/L

d) Field Parameters: none

Notes:

1. Time is coded based on a 2400 hour clock and is referenced to Eastern Standard Time (EST).
2. Reserves have the option of measuring either NO23 or NO2 or NO3.

11) **Measured and calculated laboratory parameters:**

a) Variables Measured Directly:

Nitrogen Species:	NO2F, NO23F, NH4F
Phosphorus:	PO4F
Other:	CHLA_N, PHEA

b) Computed Variables:

Nitrogen Species:	NO3: (NO23F-NO2F) DIN: (NO23F+NH4F)

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 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. Table 1 presents the current MDL's; these values are reviewed and revised periodically.

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

Parameter	**Variable**	**Method Detection Limit**	**Dates in use**
Ammonium	NH4F	0.0054 mg/L as N	2005
Nitrate + Nitrite	NO23F	0.0010 mg/L as N	2005
Nitrite	NO2F	0.0002 mg/L as N	2005
Orthophosphate	PO4F	0.0015 mg/L as P	2005
Chlorophyll a	CHLA	0.50 ug/L	2005
Pheophytin	PHEA	0.50 ug/L	2005

Laboratory methods:

b) Parameter: Orthophosphate

<u>Method References:</u>

Virginia Institute of Marine Science Analytical Service Center.
SKALAR Method: O-Phosphate / Total Phosphate Catnr. 503-365.1, issue 042993/MH/93-Demo1.
Murphy, J. and J.P. Riley. 1962. A modified single solution method for the determination of phosphate in natural waters. Analytica Chim. Acta 27 : 31-36.
EPA 600/R-97/072 Method 365.5 Determination of Orthophosphate in Estuarine and Coastal Waters by Automated Colorimetric Analysis. IN: <u>Methods for the Determination of Chemical Substances in Marine and Estuarine Environmental Matrices - 2nd Edition.</u> National Exposure Research Laboratory, Office of

Research and Development . U.S. EPA, Cincinnati, Ohio 45268.

Method Descriptor:
Instrumentation: SKALAR San-Plus continuous flow autoanalyzer.
Ammonium molybdate and antimony potassium tartrate react in a sulfuric acid environment to form an antimony-phospho-molybdo complex, which is reduced to a blue colored complex by ascorbic acid. Reaction is heat catalyzed at 40°C and measured colorimetrically at 880nm. The range is 1-50 ppb.

Preservation Method:
100ml of a sample is filtered through 0.45um Millipore filters using a vacuum-pump and a filtering flask apparatus. If samples are extremely dirty a 47mm GF/C filter may be used to filter the sample prior to filtering through the 0.45um Millipore filter. The liquid volume of the filtered sample is collected into a Nalgene bottle and placed in the freezer until shipment time arrives the following day.

c) Parameter: Nitrite

Method References:
Virginia Institute of Marine Science Analytical Service Center.
SKALAR Method 467

Method Descriptor:
Instrumentation: SKALAR San-Plus continuous flow autoanalyzer.
An adaptation of the diazotization method. Under acidic conditions, nitrite ion reacts with sulfanilimide to yield a diazo compound which couples with N-1-napthylethylenediamine dihydrochloride to form a soluble dye which is measured colorimetrically at 540nm. The range is 0.001 to 0.050 mg/L.

Preservation Method:
100ml of a sample is filtered through 0.45um Millipore filters using a vacuum-pump and a filtering flask apparatus. If samples are extremely dirty a 47mm GF/C filter may be used to filter the sample prior to filtering through the 0.45um Millipore filter. The liquid volume of the filtered sample is collected into a Nalgene bottle and placed in the freezer until shipment time arrives the following day.

d) Parameter: Nitrate + Nitrite

Method References:
Virginia Institute of Marine Science Analytical Service Center.
SKALAR Method: Nitrate + Nitrite/ Total Dissolved Nitrogen Catnr. 461-353.2 issue 120293/MH/93128060.
U.S. EPA. 1974 Methods for Chemical Analysis of Water and Wastes, pp. 207 - 212.

Wood, E.D., F.A.G. Armstrong and F.A. Richards. 1967. Determination of nitrate in seawater by cadmium-copper reduction to nitrite. J. Mar. Biol. Assoc. U.K. 47: 23.
Grasshoff, K., M. Ehrhardt and K. Kremling. 1983. Methods of Seawater Analysis. Verlag Chemie, Federal Republic of Germany. 419 pp.
EPA 600/R-97/072 Method 353.4 Determination of Nitrate and Nitrite in Estuarine and Coastal Waters by Gas Segmented Flow Colorimetric Analysis. IN: Methods for the Determination of Chemical Substances in Marine and Estuarine Environmental Matrices - 2nd Edition. National Exposure Research Laboratory, Office of Research and Development U.S. EPA, Cincinnati, Ohio 45268.

Method Descriptor:
Instrumentation: SKALAR San-Plus continuous flow autoanalyzer.
Nitrate is reduced to nitrite by a copper/cadmium reductor column. The nitrite ion then reacts with sulfanilimide to form a diazo compound. This compound then couples with n-1-napthylenediamine dihydrochloride to form a reddish/purple azo dye and is read colorimetrical at 540 nm. Nitrate concentration is obtained by subtracting the corresponding nitrite value from the $NO_3^- + NO_2^-$ concentration. The color development chemistry is the same as that used in Nitrite. Range is 0 -1.2 mg/L.

Preservation Method:
100ml of a sample is filtered through 0.45um Millipore filters using a vacuum-pump and a filtering flask apparatus. If samples are extremely dirty a 47mm GF/C filter may be used to filter the sample prior to filtering through the 0.45um Millipore filter. The liquid volume of the filtered sample is collected into a Nalgene bottle and placed in the freezer until shipment time arrives the following day.

e) Parameter: Ammonia

Method References:
Virginia Institute of Marine Science Analytical Service Center.
U.S. EPA. 1974. Methods for Chemical Analysis of Water and Wastes, pp. 168-174.
Standard Methods for the Examination of Water and Wastewater, 14th edition. p 410. Method 418A and 418B (1975).
Annual Book of ASTM Standards, Part 31. "Water", Standard 1426-74, Method A, p 237 (1976).
EPA 600/R-97/072 Method 349.0. Determination of Ammonia in Estuarine and Coastal Waters by Gas Segmented Continuous Flow Colorimetric Analysis. IN: Methods for the Determination of Chemical Substances in Marine and Estuarine Environmental Matrices - 2nd Edition. National Exposure Research Laboratory, Office of Research and Development U.S. EPA, Cincinnati, Ohio 45268.

Method Descriptor:
Instrumentation: SKALAR San-Plus continuous flow autoanalyzer.
Alkaline phenol and hypochlorite react with ammonia to form indophenol blue that is proportional to the ammonia concentration. The blue color formed is intensified with sodium nitroprusside. Reaction is heat catalyzed at 37°C and is measured colorimetrically at 660 nm. The range is 0.01 - 2.0 mg/L.

Preservation Method:
100ml of a sample is filtered through 0.45um Millipore filters using a vacuum-pump and a filtering flask apparatus. If samples are extremely dirty a 47mm GF/C filter may be used to filter the sample prior to filtering through the 0.45um Millipore filter. The liquid volume of the filtered sample is collected into a Nalgene bottle and placed in the freezer until shipment time arrives the following day.

f) Parameter: Chlorophyll and Pheophytin

Method References:
Virginia Institute of Marine Science Analytical Service Center.
Strickland, J.D.H., and Parson, T.R. 1972. A Practical Handbook of Seawater Analysis. Fish. Res. Bd. Canada 167:310.
TD-700 Laboratory Fluorometer Operating Manual. Version 1.8. July 7, 1999. Turner Designs, 845 West Maude Avenue, Sunnyvale, CA 94086.
EPA /600/ R-97/072 - Method 445.0. In Vitro Determination of Chlorophyll a and Pheophytin a in Marine and Freshwater Algae by Fluorescence. Methods for the Determination of Chemical Substances in Marine and Estuarine Environmental Matrices Revision 1.2. September 1997.
Using the Turner Designs Model 10 Analog, The 10AU Digital, Or the TD-700 Fluorometer with EPA Method 445.0. January 19, 1999. Turner Designs, 845 West Maude Avenue, Sunnyvale, CA 94086.

Method Descriptor:
Instrumentation: Milton Roy Spectronic 1201 spectrophotometer or Turner Designs TD-700 fluorometer.
The two methods for determining Chlorophyll a given here are with 1) a scanning spectrophotometer and 2) a Turner Design fluorometer. The method used requires filtering a known quantity of water through a glass fiber filter (4.7 cm GF/F). This filter is later ground with a tissue grinder made of teflon/glass. Approximately 1-3mLs of 90% acetone are added to the filter before grinding. Acetone is also used to wash the filter into 17 x 150 test tube with tight fitting cap. The sample is steeped at least 2 hours and not exceeding 24 hours at 4°C, in the dark. The samples are centrifuged and read on a spectrophotometer or fluorometer. If the samples can not be read within that time period, storage in the freezer at -20°C for a few days is acceptable. If pheophytin measurements are desired, the sample is acidified and read again.

Preservation Method:

A 100ml sample is filtered through a 47mm Whatman GF/F filters using a vacuum-pump and filter flask apparatus. The Whatman type GF/F filter is folded immediately after sample filtering, enclosed in tinfoil, placed in a sealed bag, and placed in the freezer until it is sent off for analysis the following day.

14) **Reporting of missing data and data with concentrations lower than method detection limits:**

Nutrient/Chla comment codes and definitions are provided in the following table. Missing data are denoted by a blank cell " " and commented coded with an "M". Laboratories in the NERRS System submit data that are censored at a lower detection rate limit, called the Method Detection Limit or MDL. MDL's for specific parameters are listed in the Laboratory Methods and Detection Limits Section (Section II, Part 14) of this document. Measured concentrations that are less than this limit are replaced with the minimum detection limit value and comment coded with a "B" in the variable code comment column. For example, the measured concentration of NO23F was 0.0005 mg/L as N (MDL=0.0008), the reported value would be 0.0008 with a "B" placed in the NO23F comment code column. Calculated parameters are comment coded with a "C" and if any of the components used in the calculation are below the MDL, the calculated value is removed and also comment coded with a "B". If a calculated value is negative, the value is removed and comment coded with an "N".

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

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

15) QA/QC programs:

g) Precision:

i) Field Variability – True field replicates are taken at each site during grab sampling. The one replicate is a successive grab. Sample XXXXXX-G1 is taken and the sampler emptied. The grab sampler is deployed once again to acquire XXXXXX-G2.
ii) Laboratory Variability – none
iii) Inter-organizational splits – samples were not split or analyzed by two different labs

h) Accuracy:

i) Sample Spikes –information unavailable
ii) Standard Reference Material Analysis –information unavailable
iii) Cross Calibration Exercises – DNERR did not participate in cross calibration exercises.

16) Other remarks:

On 07/22/2025 this dataset was updated to include embedded QAQC flags and codes for anomalous/suspect, rejected, missing, and below detection limit data. System-wide monitoring data beginning in 2007 were processed to allow for QAQC flags and codes to be embedded in the data files rather than using the original single letter codes used for the nutrient and pigment dataset along with the detailed sections in the metadata document for suspect, missing, and rejected data. Please note that prior to 2007, rejected data were deleted from the dataset so they are unavailable to be used at all. Suspect, missing, rejected and below minimum detection flags and appropriate three letter codes were embedded retroactively for dataset consistency. The QAQC flag/codes corresponding to the original letter codes are detailed below.

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

All chlorophyll *a* and phaeophytin data prior to May 2007 were removed from the dataset (or rejected for 2007 data) on 10/22/2018 (07/2002-04/2007). These measured values were all very low with little to no fluctuation. A dramatic change is noticed in the May 2007 onward measured values, which exhibit results that align with expected pigment levels. It was ultimately discovered that the pre-May 2007 filters had been stored in 10% acetone prior to analysis, resulting in damaged samples and inaccurate measurements. Users of this data were notified of the update.