**Narragansett Bay (NAR) NERR Nutrient Metadata**

**January 2007 – December 2007**

**Latest Update: November 15, 2011**

# I. Data Set and Research Descriptors

1. **Principal investigator(s) and contact persons**
   1. **Reserve Contacts**

55 South Reserve Drive

Prudence Island, RI 02872

Fax: 401-682-7366

Kenneth Raposa, PhD, Research Coordinator

(401) 683-7849

[Kenny@nbnerr.org](mailto:Kenny@nbnerr.org)

Daisy Durant, PhD, Marine Research Specialist II

(401) 683-7368

[daisy@nbnerr.org](mailto:chris@nbnerr.org)

Rachel Dapp, (former) Reserve SWMP Technician

(401) 683-7368

[Rachel@nbnerr.org](mailto:chris@nbnerr.org)

* 1. **Laboratory Contact**

Amy Van Keuren – Lab manager

Marine Ecosystem Research Laboratory (MERL)

Graduate School of Oceanography

University of Rhode Island

Narragansett, Rhode Island 02882

###### Phone: (401) 874-6657

e-mail: [dandelionblue@hotmail.com](mailto:brooke@gso.uri.edu)

**2) Research objectives**

Nutrient and chlorophyll samples are being collected off Prudence Island in Narragansett Bay as part of the National Estuarine Research Reserve's (NERR) System Wide Water Quality Monitoring Program (SWMP). The goal is to develop long-term datasets for representative estuarine systems in order to track changes in water quality over time. Because Prudence Island is located in the geographic center of Narragansett Bay, it is an ideal location for monitoring the status and trends in water quality in the bay over time. One NERR monitoring station has been established at Potter's Cove, on the island's northeastern shore. This area is impacted by boat traffic and storm runoff from mainland urban and residential areas. Two NERR monitoring stations are located at T-Wharf, on the southeastern shore of the island facing the open waters of Rhode Island Sound. The two T-wharf stations (t-wharf surface and t-wharf bottom) measure conditions in the upper (~0.5 m from the surface) and bottom (~0.5 m from the bottom) layers of the water column, respectively. These stations are approximately 6 miles south of the Potter's Cove site. Boat traffic is sparse at t-wharf and storm runoff is less likely to have a significant impact on water quality. A fourth monitoring site is located in Nag Creek, a salt marsh tidal creek which flows into the West Passage of Narragansett Bay. The addition of this site completes our representation of dominant habitat types occurring in Narragansett Bay (i.e. marsh, cove, and open water).

* 1. **Monthly Grab Sampling Program**

Monthly grab samples are collected once per month from each of the four stations to quantify seasonal patterns of selected nutrient species and chlorophyll in different estuarine habitats (marsh creek, cove, open water surface, open water bottom).

* 1. **Diel Sampling Program**

Once per month, samples are collected at approximately 2 hour 15 minute intervals over a 24 hour cycle at the T-wharf bottom station to document changes in nutrients and chlorophyll in response to tidal forcing.

1. **Research methods** 
   1. **Monthly Grab Sampling Program**

Monthly grab samples were taken at the four permanent stations (Potter Cove, Nag Creek, T-wharf surface, and T-wharf bottom) each month throughout 2007. All grab samples were taken on the same day between +3 hrs before slack low-water and slack low-water. No distinction was made between neap and spring tide conditions. Replicate (N=2) samples were collected by hand ~0.5m from the bottom, except for the t-wharf surface collection at ~0.5m from the surface. All samples were collected in glass, wide-mouth sample bottles that were previously acid washed and 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. Samples were then transported as quickly as possible to laboratories at the Marine Ecosystems Research Laboratory (MERL) and Scott Nixon’s lab, both at the University of Rhode Island’s Graduate School of Oceanography (URI/GSO) for processing.

* 1. **Diel Sampling Program**

The diel sampling program was conducted once per month throughout 2007. For this program, an ISCO water sampler was deployed at the T-wharf bottom station. This device automatically samples 500 ml of water every 2 hrs 15 min. All samples are pumped into polyethylene sample bottles that were previously washed and rinsed (3x) with distilled-deionized water and dried. At the end of the 24 hr period, the 12 samples were kept in the dark, returned to the laboratory on Prudence Island for filtering, and then frozen. Samples were then transported as quickly as possible to laboratories at the Marine Ecosystems Research Laboratory (MERL) and Scott Nixon’s lab, both at the University of Rhode Island’s Graduate School of Oceanography (URI/GSO) for processing.

1. **Site location and character**

The NBNERR consists of 4376 acres of diverse estuarine and terrestrial habitats ranging from deep water to salt marshes to forested uplands. The land holdings include approximately 60% of Prudence Island, most of nearby Patience Island, and all of Hope and Dyer Islands. The Reserve is located close to the geographic center of Narragansett Bay in Rhode Island. The bay has a drainage basin of 1,800 square miles and there are numerous and substantial freshwater inputs to the Bay.

Tidal range: -0.2 to 1.7 meters MLW

Salinity: 15 to 32 ppt

Temperature: -1.0 to 26 C

Province: North temperate, Virginian bioregion

Lat. 41o38’30” Long. 71o20’30”

Specific characteristics of the Potter Cove site are:

Depth: 0.9 to 3.9 meters

Bottom habitat: sand, silt, some organic mud

Pollutants: Boaters’ wastes, storm runoff from mainland urban areas

Location: 41o38.435 N, 71o20.467 W

Specific characteristics of the Nag Creek site are:

Depth: 0.1 to 1.4 meters

Bottom habitat: Organic mud

Pollutants: negligible

Location: 41o37.486 N, 71o19.465 W

Specific characteristics of the T-wharf surface site are:

Depth: 0.2 to 0.9 meters

Bottom habitat: sand, silt, some organic mud

Pollutants: negligible

Location: 41o34.731 N, 71o19.287 W

Specific characteristics of the T-wharf bottom site are:

Depth: 4.6 to 6.9 meters

Bottom habitat: sand, silt, some organic mud

Pollutants: negligible

Location: 41o34.731 N, 71o19.287 W

1. **Coded variable code definitions**

Station Code Names

narpcnut = Narragansett Bay NERR Potter’s Cove nutrients

narncnut = Narragansett Bay NERR Nag Creek nutrients

nartsnut = Narragansett Bay NERR T-wharf surface nutrients

nartbnut = Narragansett Bay NERR T-wharf bottom nutrients

Monitoring Programs

1 = Monthly grab sample program

2 = Diel grab sample program

1. **Data collection period**

The Narragansett Bay National Estuarine Research Reserve started sampling nutrients at each of the four sites in the spring of 2002.

Monthly Grab Sampling

|  |  |  |  |
| --- | --- | --- | --- |
| Site | Start Date | Start Time | End Time |
| narpcnut | 1/16/2007 | 11:18 | 11:19 |
| narpcnut | 2/28/2007 | 10:01 | 10:03 |
| narpcnut | 3/27/2007 | 10:23 | 10:25 |
| narpcnut | 4/11/2007 | 9:59 | 10:03 |
| narpcnut | 5/16/2007 | 10:38 | 10:40 |
| narpcnut | 6/22/2007 | 9:51 | 9:53 |
| narpcnut | 7/11/2007 | 10:10 | 10:13 |
| narpcnut | 8/24/2007 | 10:49 | 10:51 |
| narpcnut | 9/21/2007 | 9:47 | 9:50 |
| narpcnut | 10/19/2007 | 9:45 | 9:48 |
| narpcnut | 11/26/2007 | 10:30 | 10:33 |
| narncnut | 1/16/2007 | 11:05 | 11:06 |
| narncnut | 2/28/2007 | 9:47 | 9:48 |
| narncnut | 3/27/2007 | 10:10 | 10:11 |
| narncnut | 4/11/2007 | 10:19 | 10:20 |
| narncnut | 5/16/2007 | 10:25 | 10:26 |
| narncnut | 6/22/2007 | 9:40 | 9:41 |
| narncnut | 7/11/2007 | 9:56 | 9:57 |
| narncnut | 8/24/2007 | 10:33 | 10:34 |
| narncnut | 9/21/2007 | 9:31 | 9:32 |
| narncnut | 10/19/2007 | 9:30 | 9:31 |
| narncnut | 11/26/2007 | 10:17 | 10:18 |
| nartsnut | 1/16/2007 | 10:41 | 10:44 |
| nartsnut | 2/28/2007 | 9:22 | 9:24 |
| nartsnut | 3/27/2007 | 9:33 | 9:35 |
| nartsnut | 4/11/2007 | 9:25 | 9:28 |
| nartsnut | 5/16/2007 | 9:51 | 9:54 |
| nartsnut | 6/22/2007 | 9:06 | 9:09 |
| nartsnut | 7/11/2007 | 9:32 | 9:34 |
| nartsnut | 8/24/2007 | 10:02 | 10:05 |
| nartsnut | 9/21/2007 | 9:00 | 9:03 |
| nartsnut | 10/19/2007 | 9:05 | 9:07 |
| nartsnut | 11/26/2007 | 9:50 | 9:53 |
| nartbnut | 1/16/2007 | 10:46 | 10:48 |
| nartbnut | 2/28/2007 | 9:27 | 9:30 |
| nartbnut | 3/27/2007 | 9:37 | 9:39 |
| nartbnut | 4/11/2007 | 9:30 | 9:32 |
| nartbnut | 5/16/2007 | 9:45 | 9:48 |

Monthly Grab Sampling (cont.)

|  |  |  |  |
| --- | --- | --- | --- |
| Site | Start Date | Start Time | End Time |
| nartbnut | 6/22/2007 | 9:00 | 9:02 |
| nartbnut | 7/11/2007 | 9:37 | 9:39 |
| nartbnut | 8/24/2007 | 10:08 | 10:10 |
| nartbnut | 9/21/2007 | 9:06 | 9:08 |
| nartbnut | 10/19/2007 | 9:10 | 9:13 |
| nartbnut | 11/26/2007 | 9:56 | 9:59 |

Diel Sampling

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Site | Start Date | Start Time | End Date | End Time |
| nartbnut | 1/31/2007 | 12:15 | 2/1/2007 | 13:00 |
| nartbnut | 2/28/2007 | 11:30 | 3/1/2007 | 12:15 |
| nartbnut | 3/28/2007 | 10:45 | 3/29/2007 | 11:30 |
| nartbnut | 4/25/2007 | 9:30 | 4/26/2007 | 10:15 |
| nartbnut | 5/31/2007 | 11:45 | 6/1/2007 | 12:30 |
| nartbnut | 6/27/2007 | 10:45 | 6/28/2007 | 11:30 |
| nartbnut | 7/31/2007 | 12:30 | 8/1/2007 | 13:15 |
| nartbnut | 8/28/2007 | 9:30 | 8/29/2007 | 10:15 |
| nartbnut | 10/1/2007 | 9:00 | 10/2/2007 | 9:45 |
| nartbnut | 10/31/2007 | 11:45 | 11/1/2007 | 12:30 |
| nartbnut | 11/14/2007 | 10:45 | 11/15/2007 | 11:30 |
| nartbnut | 12/13/2007 | 10:45 | 12/14/2007 | 11:30 |

Note: Time is coded based on a 2400 hour clock and is referenced to Eastern Standard Time (EST).

1. **Associated researchers and projects**

As part of the SWMP long-term monitoring program, NAR NERR also monitors Meteorological and Water Quality data which may be correlated with this Nutrient dataset. These data are available from the Research Coordinator or online at <http://cdmo.baruch.sc.edu/>.

In addition, the SWMP nutrient monitoring program is part of a larger, multi-institution effort to monitor water quality and other associated parameters in Narragansett Bay, RI called the Narragansett Bay Window. This includes monitoring efforts conducted by the University of Rhode Island’s Graduate School of Oceanography, the Narragansett Bay Estuary Program, and NMFS and EPA in Narragansett, RI, among others.

1. **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 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 [http://cdmo.baruch.sc.edu/](http://cfcdmo.baruch.sc.edu/). Data are available in text tab-delimited format.

**II. Physical Structure Descriptors**

1. **Entry verification**

Data were received from the analytical laboratory and were entered into a Microsoft Excel spreadsheet.The University of Rhode Island Marine Ecosystems Research Laboratory (MERL) calculates and reports results in µM. For purposes of consistency in the NERR System, Narragansett Bay NERR calculates the concentrations as mg/ l-1 based on atomic weights of 14.01, 30.97, and 28.09 for N, P, and Si respectively. Therefore, Narragansett Bay NERR staff multiply the concentrations reported by the University of Rhode Island MERL by 0.01401, 0.03097, and 0.02809 to yield concentrations in mg/L as N, P, and Si respectively.

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; 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 automatically flags and codes values below MDL; calculates parameters chosen by the user and automatically flags for component values below MDL and negative values; allows the user to apply QAQC flags and codes to the data; graphs selected parameters for review; append files; and export the resulting data files to the CDMO for tertiary QAQC and assimilation into the CDMO’s authoritative online database.

Conversions and data entry verification was completed Rachel Dapp. Final verification and this metadata documentation were checked by Dr. Kenneth Raposa, before being sent to the CDMO permanent database.

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

Required NOAA/NERRS System-wide Monitoring Program nutrient parameters are denoted by an asterisks “\*”.

Data Category Parameter Variable Name Units of Measure

**Phosphorus and Nitrogen**

\*Orthophosphate PO4F mg/l as P

\*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

**Plant Pigments**

\*Chlorophyll a CHLA\_N μg/l

Phaeophytin PHEA ug/l

**Other**

Silica, Filtered SiO4F mg/l as Si

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 and Calculated Laboratory Parameters**

* + 1. **Variables Measured Directly**

Nitrogen species: NO2F, NO23F, NH4F

Phosphorus species: PO4F

Other: SiO4F, CHLA\_N, PHEA

* + 1. **Computed Variables**

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 Marine Ecosystem Research Laboratory at the University of Rhode Island. Table 1 lists the current MDL values, which are reviewed and revised periodically.

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

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Parameter** | **Variable** | **MDL**  **μM** | **MDL**  **mg/l** | **Dates in use** |
| Ammonium | NH4F | 0.05 | 0.0007 | 1/1/07-12/31/07 |
| Nitrite | NO2F | 0.02 | 0.00028 | 1/1/07-12/31/07 |
| Nitrate\* | NO3F | 0.02 | 0.00028 | 1/1/07-12/31/07 |
| Nitrite + Nitrate | NO2F + NO3F | 0.02 | 0.00028 | 1/1/07-12/31/07 |
| Orthophosphate | PO4F | 0.01 | 0.0003 | 1/1/07-12/31/07 |
| Silica | SIO2F | 0.02 | 0.00028 | 1/1/07-12/31/07 |
|  |  | **g/L** | **g/L** |  |
| Chlorophyll | CHLA\_N | 0.036 | 0.036 | 2002-2007 |
| Phaeophytin | PHAE | 0.036 | 0.036 | 2002-2007 |

\* The lab supplied an independent MDL for NO3 (despite it being a calculated parameter). NAR used this value to reject additional NO3 data that are below the specified MDL despite their component values being above MDL (and therefore passing CDMO QC checks).

**13)** **Laboratory Methods**

1. **Parameter: NH4F**
   * 1. USEPA Reference Method: 365.3
     2. Method Reference: Grasshoff (1976)
     3. Method Descriptor:
     4. Preservation Method: Sample is filtered through a 0.45 um disposable disk filter and stored at –4oC until analyzed.

**II) Parameter: NO2F + NO3F, NO3F and NO2F**

* + 1. USEPA Reference Method: 353.4
    2. Method Reference: Grasshoff (1976)
    3. Method Descriptor:
    4. Preservation Method: Sample is filtered through a 0.45 um disposable disk filter and stored at –4oC until analyzed.

**III) Parameter: SIO2F**

* + 1. Method Reference: Parsons et al. (1984); Grasshoff (1976)
    2. Method Descriptor:
    3. Preservation Method: Sample is filtered through a 0.45 um disposable disk filter and stored at –4oC until analyzed.

**IV) Parameter: PO4F**

* + 1. USEPA Reference Method: 365.5
    2. Method Reference: Grasshoff (1976); Murphy and Riley (1962)
    3. Method Descriptor:
    4. Preservation Method: Sample is filtered through a 0.45 um disposable disk filter and stored at –4oC until analyzed.

**V) Parameter: Chlorophyll *a* (CHLA\_N), Phaeophytin (Phae)**

* + 1. Method References: Oviatt, C. A., and K. M. Hindle, 1994. Manual of biological and geochemical techniques in coastal areas. pp. 3-7.
    2. Method Descriptor: Chlorophyll *a* is extracted in 10 ml 90% acetone and fluorescence is measured and recorded (Fo). Two drops of 10% hydrochloric acid are added to convert the chl to phaeopigments (Phae). The fluorescence is again measured and recorded (Fa). The concentration (μg/L) of CHLA and PHAE are calculated using the Fo/Fa ratio.
    3. Preservation Method: 20 ml of sample is filtered onto a 25 mm GF/F filter, folded in half and wrapped in aluminum foil. Foil is stored at –4oC until analysis.

**14) Field and Laboratory QA/QC Programs**

* 1. **Precision**
     1. **Field Variability** - For the monthly grab sampling program, NBNERR collects two successive grab samples for the determination of water mass variability.
     2. **Laboratory Variability** – replicates of all nutrient samples are run.
     3. **Inter-organizational splits** – none
  2. **Accuracy**
     1. **Sample Spikes** – blanks
     2. **Standard Reference Material Analysis** – none
     3. **Cross Calibration Exercises** – A cross calibration of the Turner Designs Fluorometer was performed with Battelle Ocean Sciences.

**15) QAQC flag definitions**

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

\*The -4 Outside Low Sensor Range flag was added to the 2007 dataset in August of 2011. See the Other Remarks section for more details.

**16) QAQC code definitions**

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

Sensor errors

SBL Value below minimum limit of method detection

SCB Value calculated with a value that is below the MDL

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**

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

\*The 2007 dataset was updated on August of 2011 to include the -4 Outside Low Sensor Range flag. The 2007 data published prior to that time used the -3 Rejected data flag with the SBL and SCB QAQC codes to indicate that data were below the minimum detection limit. These flag code combinations were all replaced with the -4 SBL or SCB update as mandated by the Data Management Committee.

Rainfall totals from the NBNERR weather station by month for January – December 2007 are as follows:

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Monthly Total (mm) | | | Monthly total (inches) | |
| January | 92.2 | | 3.63 | |
| February | 52.8 | | 2.08 | |
| March | 141.9 | | 5.59 | |
| April | 159.2 | | 6.27 | |
| May | 47.2 | | 1.87 | |
| June | 67.1 | | 2.64 | |
| July | 47.8 | | 1.88 | |
| August | 33.5 | | 1.31 | |
| September | 46.5 | | 1.83 | |
| October | 67.6 | | 2.66 | |
| November | 76.2 | | 3.0 | |
| December | 77.7 | | 3.05 | |
| *Annual Total (mm)* | | *910.0* | *Annual Total (inches)* | *35.83* |

**Missing data**:

March

The lab that performs our analysis lost the chlorophyll sample from the tenth diel grab sample for the 03/01/2007 ISCO data. The reason for this is unknown.

The second nartbnut monthly grab sample for 03/27/2007 is missing for unknown reasons.

April

The first sample from the April ISCO diel sampling data is missing due to a malfunction with the ISCO.

May

The last sample from the May ISCO diel sampling data is missing due to a malfunction with the ISCO.

June

The lab that performs our analysis was unable to analyze two samples from the diel sampling for SiO4 for 06/01/2007. The reasons for this are unknown.

The last sample from the June ISCO diel sampling data are missing due to a malfunction with the ISCO.

July

The July monthly grab sample is missing NO23, hence NO3 and DIN could not be calculated for 07/11/2007. The cause for this is unknown. However, the lab that performs our analysis was having problems with their analysis equipment.

A few NO2 and NO23 samples from the July ISCO diel sampling data are missing for 7/31/2007 for unknown reasons.

August

A few NO2 and NO3 samples from the August ISCO and monthly grab sampling data are missing for the 08/24/2007 and 08/28/2007.

October

The first four samples from the October ISCO diel sampling data are missing due to a malfunction with the ISCO.

November

The lab that performs our analysis was unable to analyze one chlorophyll sample from the November ISCO diel sampling data on 11/15/2007. Reasons for this are unknown.

December

One sample from the December ISCO diel sampling is missing due to a malfunction with the ISCO.

Grab sampling corresponding to December was done on January 01, 2008 and can be found in the NAR 2008 data file. Nag Creek was not sampled due to the frozen condition of the creek.