

**Rookery Bay (RKB) NERR Nutrient Metadata**  
**(January 2006 – December 2006)**  
**Latest Update: May 19, 2025**

**I. Data Set and Research Descriptors**

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- 2) Research Objectives** – The four stations selected are in estuaries with different land-use patterns within their watersheds. Their placement addresses priority resource management issues that are identified in the Reserve's management plan. Specifically, the data from these stations are providing valuable information concerning the affects of land-use activities on the quantity, quality and timing of freshwater inflow into the Reserve.

- a) **Monthly grab-** The principal objective of the monthly grab sampling is to determine spatial and temporal differences in water quality within the Reserve.
- b) **Diel Sampling Program** – The principal objective of the diel sampling is to determine the impact of tidal water exchange within Henderson Creek (the main source of freshwater into Rookery Bay).

**3) Research Methods-** Samples are collected in coordination with the Southeastern Environmental Research Center (SERC) Water Quality Monitoring Program – Florida International University (FIU).

- a) **Monthly Grab Sampling Program** – Monthly grab samples are taken within 50 meters of all four SWMP water quality stations (Henderson Creek, Middle Blackwater River, Faka Union Bay and Fakahatchee Bay). Typically three types of water samples were taken 1) filtered soluble nutrient samples; 2) unfiltered total nutrient samples; and 3) chlorophyll-a samples. Clean 60 and 125 ml high density polyethylene (HDPE) bottles are used for filtered and total nutrient samples, respectively. These bottles, as well as all sample bottles are cleaned as per SOP SERC 004-98. Chlorophyll samples are stored in 1.8 ml microcentrifuge tubes, which are used once and then discarded. The unfiltered samples are collected 10 cm below the surface using 125 ml HDPE bottles and kept at ambient temperature in the dark. Duplicate (N=2) water samples for dissolved nutrient analysis are collected using acid washed and sample rinsed (x 3) 140 ml syringes and filtered in the field (SOP SERC 003-98) using 25 mm (0.7  $\mu$ ) glass fiber GF/F filters. The sample water was then stored in acetone-washed and sample rinsed 60 ml HDPE bottles, which were capped and immediately stored on ice in the dark – these are the filtered samples. The wet filters, used for chlorophyll a (Chl a) analysis, were placed in 1.8 ml plastic centrifuge tubes to which 1.5 ml of 90% acetone were added (Strickland and Parsons 1972); they were then capped and put into a dark bottle on ice for transport. (See SOP SERC 003-98). Surface salinity (ppt) and temperature ( $^{\circ}$ C) were measured using a combination salinity-conductivity-temperature probe (YSI model 6561). Dissolved oxygen (DO, mg/L) was measured at the surface and bottom using a YSI model 6562 rapid pulse oxygen probe. (See DEP SOP 001/01 FT1500).
- b) **Diel Sampling Program** - Monthly diel samples were collected every 2.5 hours over a lunar day (24hr:48 min) using an ISCO model 3700FR refrigerated autosampler. The sampler was stationed at the end of the Rookery Bay dock, approximately 100

meters from the water quality station. Collection of the samples began at slack low tide whenever possible. Prior to sampling the Polyethylene bottles were washed using (Liqui-Nox® soap), soaked in an acid bath (10% HCL) for at least 15 minutes and rinsed 3-6 times with tap water and distilled-deionized water, then air dried. The siphon hose is rinsed 3 times with ambient water prior to set up.

*Sample filtration:* Each polyethylene bottle was shaken to redistribute sediments in bottom. Using a large syringe (120 ml), sample water was filtered through a 25 mm (0.7µm) Glass Microfibre filter (Whitman GF/F) into a 30 ml Nalgene/HDPE sample bottle and labeled. This was done for all 10 water samples.

*Chlorophyll a:* The remainder of the water sample is passed through the filter along with an additional 60 mls for a total of 120ml (noted on Chain-of- Custody sheets). A known amount of air (66 cc) is forced through the filter twice to aid in drying. Using forceps, the filter is carefully folded and transferred to a 1.8 ml microcentrifuge tube and the tube is filled with 90% acetone (approx. 1.5 ml). The tube is labeled and placed in an Amber Nalgene HDPE bottle (dark). This procedure is repeated for all the water samples collected in the ISCO sampler. The samples are then transported in a cooler directly to the Analytical Laboratory at Florida International University (FIU).

#### **4) Site location and character-**

**Lower Henderson Creek (rkblhnut)**– This site is located at the mouth of Henderson Creek. While this station receives most of its freshwater from a canal system that drains a watershed area approximately 50% development versus natural landscape, a weir controls most of the freshwater flow. This structure has been upgraded to mimic more natural conditions. The water quality data logger is located within the creek channel at the “manatee caution” marker, The diel samples are taken off the Rookery Bay Dock located within Henderson Creek approximately 100 meters from the water quality station.

The salinity within the creek varies with season rains. The creek bottom is comprised mostly of fine sand and mud. The dominant vegetation near the sampling site is red mangrove. Watershed activities that potentially impact the site include non-point source pollution from road runoff, drift of mosquito control pesticides, and runoff from upstream agricultural areas as well as leachate from nearby residential septic systems.

Salinity Range: 0 – 38 ppt

Tidal Range: 0 – 2.7 meters

Average depth (mid-channel at MHW): 2.0 meters

Position: Latitude: N 26.0257  
Longitude: W-81.7332

**Middle Blackwater River (rkmbnut)** - This site is located mid-way down the river at navigational marker #17 within the channel. The “Middle” Blackwater labeling is to distinguish it from other historical sites.

The substrate within the channel is a mixture of silt, sand, and oyster shell. Red mangroves dominate the surrounding vegetation at the site. Upstream influences consist of the Collier-Seminole State Park’s boat basin, SR 41 canal, and some agricultural influences. Also, the historical flow seems to be altered by the Southern Golden Gate Estates Drainage Project.

Salinity Range: 0 – 40 ppt  
Tidal Range: 0.2 – 1.8 meters  
Average Depth at MHW: 2.0 meters  
Position: Latitude: N 25.9343  
Longitude: W-81.5956

**Faka Union Bay (rkbfunut)** – This site is located at the mouth of the Faka Union Canal at the “Manatee Caution” marker within the main channel.

The substrate within the channel is a mixture of sand and silt. Red mangrove forest and spoil islands dominate the area around the canal. Upstream influences consist of Port-of-the Islands development and marina. The upstream flow consists of an elaborated canal system (Southern Golden Gate Estates Drainage basin). This system has altered natural freshwater flow into Faka Union Bay and Blackwater River.

Salinity Range: 0 – 39 ppt  
Tidal Range: 0.2 – 1.6 meters  
Average Depth at MHW: 2.0 meters  
Position: Latitude: N25.9005  
Longitude: W-81.5159

**Fakahatchee Bay (rkbfbnut)**– This site is located between the mouths’ of the Fakahatchee River and the East River,

The substrate within the channel is a mixture of sand, shell and silt. Red mangrove dominates the area vegetation. Upstream influences consists of minimal effects of the Prairie Canal, I-75 and US 41. The majority of the watershed is within the Fakahatchee Strand Preserve and Big Cypress National Park.

Salinity Range: 0 – 40 ppt  
Tidal Range: 0.2 – 1.8 meters  
Average Depth at MHW: 2.0 meters  
Position: Latitude: N25.8922  
Longitude: W-81.4770

**5) Site Code variable definitions-**

rkblhnut = Lower Henderson Creek (monthly nutrients and diel sampling)

rkmbmbnut = Middle Blackwater River (monthly nutrients)

rkbfunuts = Faka Union Bay (monthly nutrients)

rkbfbnuts = Fakahatchee Bay (monthly nutrients)

**Monitoring Codes:**

Monitoring codes were established for the table to indicate which type of sampling procedure was used:

1 = Grab Samples

2 = Diel Samples

Replicate numbers were also noted in the table. Grabs having replicates 1 and 2; while the diel samples are collected 1 sample every 2.5 hrs and therefore the replicate number is always “1”.

**6) Data Collection Period-**

**Monthly Grab Sampling**

| Site     | Start Date | Start Time | End Date | End Time |
|----------|------------|------------|----------|----------|
| rkblhnut | 01/10/06   | 14:00      | 01/10/06 | 14:01    |
| rkblhnut | 02/07/06   | 14:38      | 02/07/06 | 14:39    |
| rkblhnut | 03/14/06   | 14:13      | 03/14/06 | 14:14    |
| rkblhnut | 04/11/06   | 14:23      | 04/11/06 | 14:24    |
| rkblhnut | 05/23/06   | 14:07      | 05/23/06 | 14:08    |
| rkblhnut | 06/13/06   | 15:21      | 06/13/06 | 15:22    |
| rkblhnut | 07/25/06   | 14:35      | 7/25/02  | 14:36    |
| rkblhnut | 08/08/06   | 14:11      | 08/08/06 | 14:12    |
| rkblhnut | 09/12/06   | 15:04      | 09/12/06 | 15:05    |
| rkblhnut | 10/24/06   | 14:33      | 10/24/06 | 14:34    |
| rkblhnut | 11/20/06   | 15:03      | 11/20/06 | 15:04    |
| rkblhnut | 12/11/06   | 13:28      | 12/11/06 | 13:29    |

|          |          |       |          |       |
|----------|----------|-------|----------|-------|
| rkbmbnut | 01/06/06 | 10:29 | 01/06/06 | 10:30 |
| rkbmbnut | 02/02/06 | 11:47 | 02/02/06 | 11:48 |
| rkbmbnut | 03/02/06 | 12:07 | 03/02/06 | 12:08 |
| rkbmbnut | 04/07/06 | 11:52 | 04/07/06 | 11:53 |
| rkbmbnut | 05/02/06 | 12:00 | 05/02/06 | 12:01 |
| rkbmbnut | 06/06/06 | 11:51 | 06/06/06 | 11:52 |
| rkbmbnut | 07/12/06 | 12:05 | 7/12/06  | 12:06 |
| rkbmbnut | 08/04/06 | 11:13 | 08/04/06 | 11:14 |
| rkbmbnut | 09/29/06 | 12:02 | 09/29/06 | 12:03 |
| rkbmbnut | 10/30/06 | 14:53 | 10/30/06 | 14:54 |
| rkbmbnut | 11/28/06 | 12:25 | 11/28/06 | 12:26 |
| rkbmbnut | 12/19/06 | 08:36 | 12/19/06 | 08:37 |
| rkbfunut | 01/06/06 | 09:59 | 01/06/06 | 10:00 |
| rkbfunut | 02/02/06 | 12:55 | 02/02/06 | 12:56 |
| rkbfunut | 03/02/06 | 13:01 | 03/02/06 | 13:02 |
| rkbfunut | 04/07/06 | 11:02 | 04/07/06 | 11:03 |
| rkbfunut | 05/02/06 | 12:57 | 05/02/06 | 12:58 |
| rkbfunut | 06/06/06 | 11:07 | 06/06/06 | 11:08 |
| rkbfunut | 07/12/06 | 13:07 | 07/12/06 | 13:08 |
| rkbfunut | 08/04/06 | 10:31 | 08/04/06 | 10:32 |
| rkbfunut | 9/29/06  | 11:22 | 09/29/06 | 11:23 |
| rkbfunut | 10/30/06 | 16:29 | 10/30/06 | 16:30 |
| rkbfunut | 11/28/06 | 09:16 | 11/28/06 | 09:17 |

|          |               |       |               |       |
|----------|---------------|-------|---------------|-------|
| rkbfunut | 12/19/06      | 10:41 | 12/19/06      | 10:42 |
| rkbfbnut | 01/06/06      | 09:45 | 01/06/06      | 09:46 |
| rkbfbnut | 02/02/06      | 13:11 | 02/02/06      | 13:12 |
| rkbfbnut | 03/02/06      | 13:15 | 03/02/06      | 13:16 |
| rkbfbnut | 04/07/06      | 10:46 | 04/07/06      | 10:47 |
| rkbfbnut | 05/02/06      | 13:10 | 05/02/06      | 13:11 |
| rkbfbnut | 06/06/06      | 10:51 | 06/06/06      | 10:52 |
| rkbfbnut | 07/12/06      | 13:21 | 07/12/06      | 13:22 |
| rkbfbnut | 08/04/06      | 10:17 | 08/04/06      | 10:18 |
| rkbfbnut | 09/29/06      | 11:12 | 09/29/06      | 11:13 |
| rkbfbnut | No<br>samples |       | No<br>samples |       |
| rkbfbnut | 11/28/06      | 09:43 | 11/28/06      | 09:44 |
| rkbfbnut | No<br>samples |       | No<br>samples |       |

### **Diel Sampling**

| <b>Site</b> | <b>Start<br/>Date</b> | <b>Start<br/>Time</b> | <b>End Date</b> | <b>End<br/>Time</b> |
|-------------|-----------------------|-----------------------|-----------------|---------------------|
| rkbhlhnut   | 01/15/06              | 08:00                 | 01/16/06        | 06:30               |
| rkbhlhnut   | 02/06/06              | 08:00                 | 02/07/06        | 06:30               |
| rkbhlhnut   | 03/13/06              | 08:00                 | 03/14/06        | 06:30               |
| rkbhlhnut   | 04/10/06              | 08:00                 | 04/11/06        | 06:30               |
| rkbhlhnut   | 05/22/06              | 08:00                 | 05/23/06        | 06:30               |
| rkbhlhnut   | 06/12/06              | 08:00                 | 06/13/06        | 06:30               |

|          |          |       |          |       |
|----------|----------|-------|----------|-------|
| rkblhnut | 07/24/06 | 08:00 | 07/25/06 | 06:30 |
| rkblhnut | 08/07/06 | 08:00 | 08/08/06 | 06:30 |
| rkblhnut | 09/11/06 | 08:00 | 09/12/06 | 06:30 |
| rkblhnut | 10/23/06 | 08:00 | 10/24/06 | 06:30 |
| rkblhnut | 11/25/06 | 08:00 | 11/25/06 | 06:30 |
| rkblhnut | 12/13/06 | 08:00 | 12/14/06 | 06:30 |

- 7) **Associated Researchers and Projects-** RKB SWMP nutrient data collection and analysis is also part of the Southeastern Environmental Research Center (SERC) Water Quality Monitoring Program. This program was established to address regional water quality concerns outside the boundaries of individual agencies. This “network” collects some 479 sites within the South Florida Region (for more information visit the website: <http://serc.fiu.edu>.)

As part of the SWMP long-term monitoring program, RKB 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/>.

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 Services, 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 Recipients 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/water quality data and metadata can be obtained from the Research Coordinator at Rookery Bay 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 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** – Nutrient data collection and analysis for Rookery Bay NERR is part of a partnership with Florida International University/ Southeast Environmental Research Center's Estuarine Water Quality Monitoring Network. Water quality data is collected monthly during the annual period of record (POR) from 28 stations in Florida Bay, 22 stations in Whitewater Bay, 25 stations in the Ten Thousand Islands, 25 stations in Biscayne Bay, and 28 stations in Cape Romano-Rookery Bay. The results and quarterly report (which includes Rookery Bay's SWMP sites) are submitted to Mike Shirley, Research Coordinator at RKBNERR and Vicki McGee, Water Quality Program Manager at RKBNERR as deliverables as per their annual purchase order agreement. For details on FIU/SERC laboratory QA/QC procedures please contact Dr. Joseph Boyer, Associate Director of SERC: [boyerj@fiu.edu](mailto:boyerj@fiu.edu). Upon receiving the quarterly reports Vicki McGee reviews and compiles the data according to CDMO Nutrient monitoring guidelines.

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

Required NOAA/NERRS System-wide Monitoring Program water quality parameters are denoted by and asterisks”\*”.

| Data Category                     | Parameter                 | Variable Name | Units of Measure |
|-----------------------------------|---------------------------|---------------|------------------|
| <b>Phosphorus &amp; Nitrogen:</b> | Total Phosphorus          | TP            | mg/L as P        |
|                                   | *Orthophosphate, Filtered | PO4F          | mg/L as P        |
|                                   | Total Nitrogen            | TN            | mg/L as N        |
|                                   | Total Organic Nitrogen    | TON           | mg/L as N        |

|                              |                              |         |                |
|------------------------------|------------------------------|---------|----------------|
|                              | *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           |
| <b>Plant Pigments:</b>       | *Chlorophyll a               | CHLA_N  | µg/L           |
| <b>Carbon:</b>               | Total Organic Carbon         | TOC     | mg/L           |
| <b>Other Lab Parameters:</b> | Silicate, Filtered           | SiO4F   | mg/L           |
| <b>Field Parameters:</b>     | Dissolved Oxygen             | DO_N    | mg/L           |
|                              | %Dissolved Oxygen            | DO_S_N  | SAT %          |
|                              | pH                           | PH_N    | standard units |
|                              | Salinity                     | SALT_N  | ppt            |
|                              | Water Temperature            | WTEMP_N | °C             |
|                              | Turbidity                    | TURB_N  | NTU            |

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

## 11) Measured and Calculated Laboratory Parameters –

### a) Variables Measured Directly-

|                      |                    |
|----------------------|--------------------|
| Nitrogen species:    | TN, NO2, NO23, NH4 |
| Phosphorous species: | TP, PO4            |
| Plant Pigments:      | CHLA               |
| Carbon:              | TOC                |
| Other:               | SiO4F              |

### b) Computed Variables-

|      |             |
|------|-------------|
| NO3: | NO23 –NO2   |
| DIN: | NO23 +NH4   |
| TON: | TN-NH4-NO23 |

## 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 Florida International University/ Southeastern Environmental Research Center Analytical Laboratory. Table 1 represents the current MDL's; these values are reviewed and revised periodically.

| Parameter         | Variable | MDL         | Date in Use |
|-------------------|----------|-------------|-------------|
| Ammonium          | NH4      | 0.0045 mg/L | 2005        |
| Nitrate + Nitrite | NO23     | 0.0020 mg/L | 2005        |
| Nitrite           | NO2      | 0.0003 mg/L | 2005        |
| Orthophosphate    | PO4      | 0.0016 mg/L | 2005        |
| Total Phosphorous | TP       | 0.0009 mg/L | 2005        |
| Total Organic     |          |             |             |

|                |      |             |      |
|----------------|------|-------------|------|
| Carbon         | TOC  | 0.07 mg/L   | 2005 |
| Total Nitrogen | TN   | 0.04 mg/L   | 2005 |
| Silica         | SI   | 0.0008 mg/L | 2005 |
| Chlorophyll a  | CHLA | 0.1 ug/L    | 2005 |

### 13) Laboratory Methods:

- a) **Laboratory Methods** – All laboratory analysis was preformed by Southeast Environmental Research Program Florida International University, Miami, Florida

#### i) Parameter: NH<sub>4</sub>

**EPA or other Reference Method:** EPA350.1

**Method Reference:** SERC SOP #002-98

**Method Description:** *Analysis for inorganic filtered nutrients (ammonium, nitrite, nitrate and soluble reactive phosphorus) are run simultaneously using a four-channel Alpkem RFA-300 (Rapid Flow Analyzer. The indophenol blue method for ammonium was used.*

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

#### ii) Parameter: NO<sub>2</sub>

**EPA or other Reference Method:** EPA353.2

**Method Reference:** SERC SOP #002-98

**Method Description:** *Nitrite is determined as an azo dye formed by the reaction of nitrite with sulfanilamide and subsequent coupling with N-1-naphthylethylenediamine (NEDA).*

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

#### iii) Parameter: NO<sub>3</sub>

**EPA or other Reference Method:** Substraction

**Method Reference:** SERC SOP #002-98

**Method Description:** *Nitrate is determined by the quantitative reduction of nitrate to nitrite using an activated cadmium column.*

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

#### iv) Parameter: Orthophosphate

**EPA or other Reference Method:** EPA365.1

**Method Reference:** SERC SOP #002-98

**Method Description:** *Soluble reactive phosphate is determined by reacting phosphate with molybdenum (IV) and antimony (III) in an acid medium to form a*

*phosphoantimonyl-molybdenum complex; this complex is reduced with ascorbic acid to form a colored dye.*

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

**v) Parameter: NO<sub>2</sub>**

**EPA or other Reference Method:** *EAP353.2*

**Reference Method:** *SM4500-NO<sub>3</sub>F*

**Method Description:**

**Preservation Method:** Samples are stored at 4°C for up to 24 hours.

**vi) Parameter: TN**

**EPA or other Reference Method:** *ANTEK 7000*

**Reference Method:**

**Method Description:** The procedure is a modification of the classical Dumas (1831) method of determining nitrogen by combustion technique with the addition of chemiluminescence. The method involves converting all forms of nitrogen into nitric oxide (NO) upon combustion of a sample with oxygen at a temperature in excess of 1000 °C. The NO is reacted with ozone (O<sub>3</sub>) to form a metastable form of nitrogen dioxide (NO<sub>2</sub><sup>\*</sup>). As the metastable form of nitrogen dioxide decays, a quantum of light is emitted in an amount directly proportional to the amount of nitrogen in the sample. The chemiluminescent emission is detected by a photomultiplier tube at a specific wavelength. An ANTEK Instrument, Inc, Model 7000N Nitrogen Analyzer is used to determine total nitrogen of a 5µl injection of a preserved water sample.

**Preservation Method:** Samples are stored at 4°C for up to 24 hours.

**vii) Parameter: TP**

**EPA or other Reference Method:** *EPA365.1*

**Reference Method:** *SECR #001-98*

**Method Description:** Total Phosphorous is determined by oxidizing and hydrolyzing all the phosphorus-containing compounds in a sample to soluble reactive phosphate. Soluble reactive phosphate then is determined by reacting phosphate with molybdenum (VI) and antimony (III) in an acid medium to form phosphoantimonymolybdenum complex; this complex is reduced with ascorbic acid to form a colored dye.

**Preservation Method:** Samples are stored at 4°C for up to 24 hours.

**viii) Parameter: TOC**

**EPA or other Reference Method:** *EPA415.1*

**Reference Method:** *SERC # 001-04*

**Method Description:** Samples are analyzed by hot-platinum catalyst combustion of the non-purgeable organic carbon in the sample to CO<sub>2</sub> on a Shimadzu TOC\_ VCSH Total Organic Carbon Analyzer.

**Preservation Method:** Samples are stored at 4°C for up to 24 hours. Samples should be processed within 28 days of collection,

**ix) Parameter: SiO<sub>4</sub>F**

**EPA or other Reference Method:** *EPA370.1(modified)*

**Reference Method:** *SERC #09-98*

**Method Description:** *Acidified (with sulfuric acid) ammonium molybdate is added to the water sample where it reacts with the silica in solution (silicate) to form  $\beta$ -molybdo-silicic acid. The complex is reduced by ascorbic acid to form molybdenum blue and the absorbance is then measured at 660 nm. Interference from phosphate is suppressed by the addition of oxalic acid.*

**Preservation Method:** Samples are stored at 4°C for up to 24 hours.

**x) Parameter: CHLA**

**EPA or other Reference Method:** *SM10200H*

**Method Reference:** *SERC SOP #009-98*

**Method Description:** *An extractive fluorometric technique is used to determine chlorophyll-a concentrations. Acetone extracts of suspended material collected on filters (saturated magnesium carbonate is not added to filters as a preservative since acetone is added immediately) and excited with 435 nm light, and the fluorescent emission of light at 667 nm is measured using a spectrofluorometer. The amount of fluorescence is directly proportional to chlorophyll concentration as determined by a standard curve of chlorophyll prepared in 90% acetone solution.*

**Preservation Method:** *Filters are stored in 90% acetone and placed in the dark and stored at 4°C for a minimum of 48 hours.*

**xi) Parameter: Field Measurements**

**EPA or other Reference Method:**

**Reference Method:** *SERC SOP #005-98*

**Method Description:** *This procedure applies to the measurements of temperature, pH, light, salinity/conductivity, and dissolved oxygen at the surface and bottom of the water column at each sampling station.*

#### **14) Reporting of Missing Data and Data with Concentrations Lower than Method Detection Limits-**

Nutrient/Chl<sub>a</sub> 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 NO<sub>2</sub>3F was 0.0005 mg/L as N (MDL=0.0008), the reported value would be 0.0008 with a “B” placed in the NO<sub>2</sub>3F 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** - For details on precision and accuracy see Table 6.1 in **Nutrient Chemistry Laboratory Quality Manual**. For specific QA/QC procedures for each parameter, see attached SOP's.

**a) Precision:**

i) **Field Variability** – Two successive grab samples are collected for each monthly sampling event. Field duplicates and splits are treated as individual samples and are not considered analytical duplicates.

ii) **Laboratory variability** – At least one replicate is ran per analytical batch and every 20 samples thereafter.

iii) **Inter-organizational splits** – see attached manual for details.

**b) Accuracy:**

i) **Sample spikes**- Matrix samples are generally used for this purpose. If the analyte concentration is <10 times the MDL, then a matrix spike duplicate maybe used instead.

ii) **Standard Reference material analysis** – Standard stocks are received by the laboratory staff, initialed, dated and stored in designated areas. The preparation dates of in-house primary stock solutions are recorded in a log book along with the following information: analyte, concentration, supplier, date opened, expiration data and date of disposal. Preparation logs are maintained for each standard stock.

iii) **Cross calibration exercised** – see attached SERC manual.

**16) Other Remarks –**

On 5/19/25 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.

| Flag/code                                                      | If also C | Historic 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                                                                     |
| <i>no need to flag/code unless combined</i>                    |           | C                    | Calculated value                                                                                       |
| <3> [GOD]                                                      | <3> [GOR] | 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> [GDM] | M                    | Data missing, sample never collected or calculated value could not be determined due to missing data   |
| <3> [SNV] and <1> [SCQ] for components (ORE) or F_Record (ORE) |           | N                    | Negative calculated value                                                                              |
|                                                                |           | 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                                                         |

**a) Missing data:**

The following parameters were not analyzed in the diel samples (TP, TN, TON, TOC and SiO<sub>4</sub>).

Samples were not collected in Fakahatchee during October and December, due to very low tides and site were inaccessible.

LH diel samples are missing for 7/24/06 at 23:00; 7/25/06 at 04:00 and 06:30.

Chlorophyll samples are missing for 11/25 08:00 – 11/26 06:30 LH diel samples.

**b) General weather patterns affecting the water quality sites:**

**January:** Considerably drier than normal conditions continued through out January. There was only one precipitation event around the 14<sup>th</sup> which produced less than 0.5 inches.

**February:** A strong cold front occurred during the first week of February, generating wide-spread rain across the region, producing > 3 inches of rain in the basin.

**March:** There was virtually no rain fall during the month of March, with only a single local rain event inland. Otherwise conditions were drier than normal.

**April:** Near drought hydrological conditions prevailed across southwest Florida in March. There was virtual absence of any rainfall activity throughout the Basin in April.

**May:** The continued drought-like conditions received some relief in May, but considerably drier than normal hydrological conditions prevailed across Southwest Florida. Warm humid conditions help generate some scattered thunderstorm activity during the second and fourth weeks in May (approx 0.28 inches).

**June:** The near drought-like conditions of May were broken by the onset of the Rainy season in June. Tropical Storm Alberto (second week) produced scattered amounts of rain between 4 – 9 inches.

**July:** Normal wet season hydrological conditions in July across Southwest Florida. Rain fall events were sporadic, but typical summer pattern.

**August:** Considerably wetter than normal hydrological conditions prevailed across southwest Florida in August. Tropical Storm Ernesto moved through Southwest Florida on August 30<sup>th</sup> generating heavy rainfall throughout the area.

**September:** Considerably wet hydrological conditions prevailed in early part of the month. Residual moisture from Tropical Storm Ernesto and an active system of the upper level atmosphere triggered the typical summer weather patterns through out the month.

**October:** An abrupt end to the rainy season caused considerably dryer conditions in South west Florida. The only exception being an early cold front near the end of the month.

**November:** Drier than normal conditions prevailed across the basin in November, with the exception of a mild cold front the first week of the month.

**December:** Drier than normal conditions prevailed across the basin with the exception of an El-Nino weather phenomenon that produced mild rainfall activity during the second half of the month.

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