**Guana Water Quality Project Metadata**

**Guana Tolomato Matanzas National Estuarine Research Reserve**

**July 2017 – May 2023**

**Latest Update: June 8, 2023**

Note: This is a provisional metadata document. Contents of this document are subject to change throughout the QAQC process, and this should not be considered a final record of data documentation until that process is complete.

**I. Data Set and Research Descriptors**

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## 2) Research Objectives and Background

The main objective of this study effort was to quantify spatial and temporal variability of selected water quality parameters within the Guana Estuary. Since water quality observations in this system have been limited historically, this study aimed to develop a baseline of water quality over a variety of seasonal conditions and a spatial gradient. Secondary objectives included assessing current water quality conditions and studying hydrologic connections at Mickler’s Weir and Guana Dam.

Inspired by momentous community interest in the health of Guana Estuary, multiple sponsors, including the Audubon Society and the Friends of the GTM Research Reserve, generously funded an initial year of water quality sampling and subsequent laboratory analyses starting in July 2017. A partnership between the Guana Tolomato Matanzas National Estuarine Research Reserve (GTMNERR), Northeast Florida Aquatic Preserves, and Florida Fish and Wildlife Conservation Commission (FWC) was formed to collect monthly water samples. After the one-year pilot study, additional resources were provided by the Florida Department of Environmental Protection’s Division of Environmental Assessment and Restoration and FWC, increasing the number of sampling stations to as many as 13 in 2022 (Figure 1).

Results from the first two years of sampling were summarized in Dix et al. (2019)[[1]](#footnote-1), available for download at <https://www.researchgate.net/publication/337257540_Guana_Water_Quality_Two-Year_Summary_Report_July_2017-June_2019>.

## 3) Research Methods

Chemical analyses measuring concentrations of nutrients, phytoplankton biomass, bacteria, and other compounds of interest were performed on water samples collected monthly at stations spaced approximately evenly apart along the two waterbodies of the estuary, Guana River and Guana Lake (Figure 1). Three stations (Mickler’s Weir, River North, and Lake South) were located near water control structures.

During the first year of monitoring (July 2017 to June 2018), five stations were sampled:

* Mickler’s Weir
* Lake Middle
* Lake South
* River North
* Guana River (Figure 1).

In July of 2018, five additional locations were included for a total of ten stations:

* Guana Lake 1 (GL1)
* Guana Lake 2 (GL2)
* Guana Lake 4 (GL4)
* Guana River 1 (GR1)
* Guana River 3 (GR3)

During the latter part of the 2021-2022 fiscal year, extra funding was available. Therefore, three additional stations were added in April 2022 and sampled through June 2022. These stations helped filled in the spatial gaps between other stations, which had previously been observed to be highest in nutrients and phytoplankton biomass.

* GL1.5
* GL2.5
* GL3.5

Beginning February of 2023, the number of lake and river sampling sites was reduced to five stations:

* GR
* RN
* LS
* LM
* MK

GL2 was again sampled in March and April of 2023

Monthly surface water samples were collected during the same ebb tide of each sampling day, from approximately 0.3 m depth, and within one to two days of the monthly collections for the GTMNERR System-Wide Monitoring Program. No distinction was made between neap and spring tide conditions. Efforts were made to allow for an antecedent dry period of 72 hours prior to sampling. All water samples were collected in 1-L Nalgene sample bottles that were double-acid washed with 10% hydrochloric acid and deionized water. The sample bottles were also rinsed or “seasoned” with ambient water prior to collection of the sample, following Florida Department of Environmental Protection (FDEP) Surface Water Sampling procedures (FS 2100[[2]](#footnote-2)).

Water samples were immediately placed on ice. Nitrite+nitrate, total phosphorus, total kjeldahl nitrogen, dissolved total kjeldahl nitrogen, and dissolved ammonium samples were also acidified to a pH of 2 using sulfuric acid. Fecal coliform and *Enterococcus* samples were preserved with sodium thiosulfate upon collection. Chlorophyll *a* and pheophytin samples were collected in a dark Nalgene bottle and were filtered immediately upon delivery to the laboratory before analysis.

During sample collection, the *in situ* parameters included water temperature, salinity, dissolved oxygen, pH, chlorophyll and phycoerythrin. These were measured with a YSI ProDSS handheld that was calibrated prior to each sampling event according to FDEP SOPs1. Wind speed, wind direction, and air temperature were measured with a Kestrel device. Light attenuation was estimated using a Secchi disk. Water depth was measured with a depth sounder at all stations except Lake South and Micklers, where water level was recorded from staff gauges.

## 4) Site Location and Character

The Guana Estuary is located in the Florida upper east coast drainage basin, within the Guana River Marsh Aquatic Preserve and the GTMNERR. The watershed includes publicly owned forested uplands, tidal wetlands, estuarine lagoons, and residential and commercial development. The headwaters originate in the Diego Plains drainage area in Ponte Vedra Beach. This drainage basin encompasses approximately 7,800 acres (3,157 hectares).

The Guana Estuary runs parallel to the Tolomato River (and Intracoastal Waterway) on the seaward side, with the two lagoons joining 7 miles (11.3 km) north of the St. Augustine Inlet. The natural hydrology of the Guana system has been altered by water control structures including dikes, inland wells, drainage ditches and the Guana Dam, which separates Guana Lake and Guana River. Guana Lake receives fresh water from the north at Mickler’s Weir, and depending on water level management and tidal conditions, water regularly exchanges with Guana River through the Guana Dam. As such, there is often a distinct latitudinal salinity gradient within the estuary.

Guana Lake and Guana River are separated by Guana Dam, constructed in 1957 as an earthen dam and later concreted around 1988. FWC manages the Guana Dam, including the operation of seven swing gates, which allow water exchange between Guana River and Guana Lake, primarily for waterfowl habitat, recreation, and flood control2. The northern section of Guana Lake is occasionally treated for invasive and nuisance species using pesticide sprays, prescribed fire, and salt water. Water depth and salinity in the lake vary depending on rainfall, lake-level management, and, to a lesser extent, tides. In Guana River, water depth and salinity are primarily driven by tides, wind, and water releases from Guana Lake. Guana River represents the last remaining natural section of Guana Estuary where numerous, dense oyster reefs and salt marshes line the riverbanks.

Guana Lake is classified as Class III Estuarine Waters (FDEP Waterbody ID 2320C). Guana River is classified as Class II Estuarine Waters (FDEP Waterbody ID 2320). Both waterbodies were designated by FDEP as “verified impaired” for nutrients in 2022. For more information about water quality assessments and the current status of waterbodies, see <https://floridadep.gov/dear/water-quality-assessment/content/impaired-waters-listing-process>.

The climate of Northeast Florida is classified as humid subtropical, which is characteristic of the Gulf and Atlantic coastal plain of the southeastern United States. The average annual rainfall is approximately 52 inches (132 cm) per year, with the wet season extending from June through September. Seasonal variation in temperature within the Reserve follows that of rainfall, with a summer period of high temperatures between June and September and a cooler period extending from December through March. The annual mean air temperature within the Reserve is approximately 21 ºC.

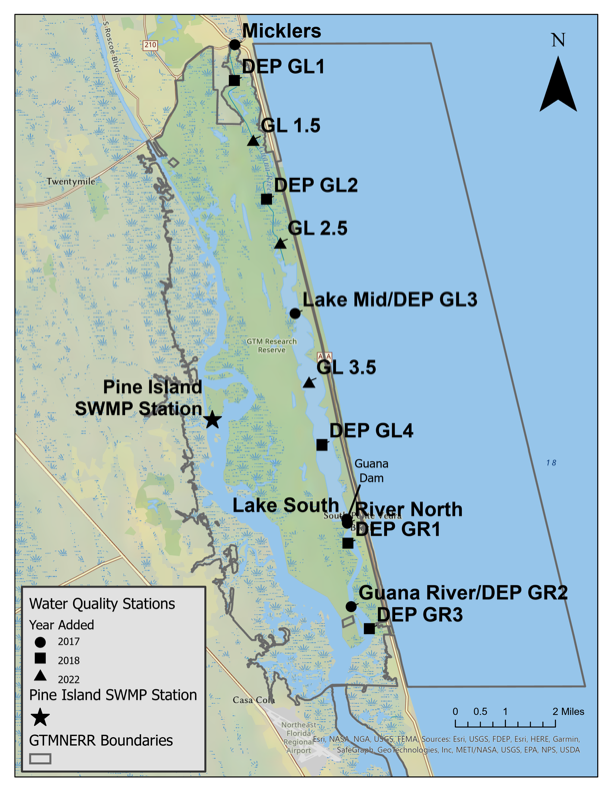


Figure 1: Map of northern extent of the GTMNERR, including the Guana Estuary, Guana Lake, and the Guana River, with sample stations demarcated with varying shapes based on year added to the project. The star on the left represents the SWMP reference site used for nutrient comparisons.

**5) Station Descriptions**

Table 1: Station codes and GPS location. Note: if two station codes are associated with one station, the latter is the current nomenclature.

|  |  |  |
| --- | --- | --- |
| Station | Station Code(s) | Location |
| Micklers | GTMMKNUT | 30.16073611°, -81.36027778° |
| Guana Lake 1 | GTMGL1NUT | 30.1504°, -81.3604° |
| Guana Lake 1.5 | GTMGL1.5NUT | 30.13339°, - 81.35495° |
| Guana Lake 2 | GTMGL2NUT | 30.1161°, -81.3511° |
| Guana Lake 2.5 | GTMGL2.5NUT | 30.1037°, - 81.34714° |
| Lake Middle | GTMOLNUT; GTMLMNUT | 30.08302°, -81.34286° |
| Guana Lake 3.5 | GTMGL3.5NUT | 30.06339°, - 81.33885° |
| Guana Lake 4 | GTMLSNUT | 30.0451°, -81.3351° |
| Lake South | GTMDNNUT; GTMLSNUT | 30.023763, -81.327928 |
| River North | GTMDSNUT; GTMRNNUT | 30.022421°, -81.327722° |
| Guana River 1 | GTMGR1NUT | 30.0168°, -81.3276° |
| Guana River | GTMGRNUT | 29.998466°, -81.326133° |
| Guana River 3 | GTMGR3NUT | 29.9921°, -81.3214° |

**Guana Lake**

1. **Micklers (GTMMKNUT)**

Coordinates: 30.16073611°, -81.36027778°

Location: at the water control structure at the head of Guana Lake just south of the intersection of Florida A1A and Mickler Road

Average water depth (July 2017 to June 2023): 1.15 m

Average salinity (July 2017 to June 2023): 0.45 ppt

Waters: mostly freshwater, rarely exceeding 0.50 ppt during the sampling period.

Bottom type: soft, muddy sand.

Vegetation: abundance of submerged aquatic vegetation, as well as great buildup of vegetation, water lettuce, water hyacinth flowing over the weir. Build up is occasionally cleared and can be affected by storms or high rain events.

1. **Guana Lake 1 (GTMGL1NUT)**

Coordinates: 30.1504°, -81.3604°

Location: approximately 1.19 km south of the Micklers station, near the west bank of the lake where a residential housing area is situated.

Average water depth (July 2018 to June 2023): 0.54 m

Average salinity (July 2018 to June 2023): 1.57 ppt

Waters: tends to be somewhat clear.

Bottom type: medium and fine clay.

Vegetation: submerged and floating aquatic vegetation is highly abundant. Duckweed, water lettuce, and water hyacinth are especially abundant during the summer months, with the latter two being invasive species.

1. **Guana Lake 1.5 (GTMGL1.5NUT)**

Coordinates: 30.13339°, - 81.35495°

Location: between GL1 and GL2.

Note: This station was added in May of 2022 and sampled for the last two months of the project. This station shares similar characteristics with Guana Lake 1.

Average water depth (May 2022 to June 2022): 0.77 m

Average salinity (May 2022 to June 2022): 12.03 ppt

Bottom type: mix of medium and coarse clay.

1. **Guana Lake 2 (GTMGL2NUT)**

Coordinates: 30.1161°, -81.3511°

Location: approximately 0.87 km northwest of Six Mile Landing boat launch

Average water depth (July 2018 to June 2023): 0.74 m

Average salinity (July 2018 to June 2023): 7.27 psu, with May and June of 2020 and June of 2021 reading above 25 psu.

Bottom type: mix of coarse or medium clay.

Vegetation: Accumulations of floating aquatic vegetation, mainly duckweed.

1. **Guana Lake 2.5 (GTMGL2.5NUT)**

Coordinates: 30.1037°, - 81.34714°

Location: between GL2 and LM.

Note: This station was added in April of 2022 for three months.

Average water depth: 0.72 m

Average salinity: 15.62.

Bottom type: mix of medium and coarse clay.

Vegetation: N/A

1. **Lake Middle (GTMOLNUT; GTMLMNUT)**

Coordinates: 30.08302°, -81.34286°

Location: in the middle of Guana Lake east of the Guana Wildlife Management Area’s observation tower.

Average water depth (June 2017 to June 2023): 0.87 m

Average salinity (June 2017 to June 2023): 11.98 psu, predominantly brackish

Bottom type: coarse clay.

Vegetation: N/A

1. **Guana Lake 3.5 (GTMGL3.5NUT)**

Coordinates: 30.06339°, - 81.33885°

Location: LM and GL4.

Note: This station was added in April of 2022 and sampled for three months.

Average water depth (April 2022 to May 2022): 0.85 m

Average salinity (April 2022 to May 2022): 21.4

Bottom type: coarse clay

Vegetation: N/A

1. **Guana Lake 4 (GTMGL4NUT)**

Coordinates: 30.0451°, -81.3351°

Location: the west side of the lake.

Average water depth (July 2018 to June 2022): 0.96 m

Average salinity (July 2018 to June 2022): 18.17 ppt, brackish water type

Bottom type: coarse clay

Vegetation: N/A

1. **Lake South (GTMDNNUT; GTMLSNUT)**

Coordinates: 30.023763°, -81.327928°

Location: the Guana Lake water gauge 3 m north of the Guana Dam off Guana River Road Average water depth (July 2017 to June 2022): 1.19 m. The FWC prefers to maintain marine-like waters at this station.

Salinity levels: ranged from 6.91 to 37.16, with an average of 18.83 ppt during the sampling period.

Bottom type: very fine sand or coarse silt.

**Guana River**

1. **River North (GTMDSNUT; GTMRNNUT)**

Coordinates: 30.022421°, -81.327722°

Location: the Guana River boat ramp 2 m south into the river

Average water depth (July 2017 to June 2022): 1.28 m

Average salinity level (July 2017 to June 2022): 24.70 ppt

Bottom type: very fine silt or coarse clay.

1. **Guana River 1 (GTMGR1NUT)**

Coordinates: 30.0168°, -81.3276°

Location: approximately 0.62 km south of the River North station.

Average water depth (July 2018 to June 2022): 1.74 m

Average salinity (July 2018 to June 2022): 26.09 ppt

Bottom type: very fine silt or coarse clay

1. **Guana River (GTMGRNUT)**

Coordinates: 29.998466°, -81.326133°

Location: approximately three km south of the Guana dam

Average water depth (July 2017 to June 2022): 4.36 m

Average salinity (July 2017 to June 2022): 27.97 ppt

Bottom type: medium or fine silt.

1. **Guana River 3 (GTMGR3NUT)**

Coordinates: 29.9921°, -81.3214°

Location: farthest south on Guana River, approximately 2 km from the mouth of the river, which flows into the Tolomato River

Average water depth (July 2018 to June 2022): 3.5 m

Average salinity (July 2018 to June 2022): 30.26 ppt

Bottom type: medium or fine silt.

**6) Associated Researchers and Projects**

At all stations, plankton samples were collected alongside water quality samples. Whole water grab samples were collected from the surface and preserved with Lugol’s iodine solution in amber glass bottles. Samples are archived at the GTMNERR, and plankton community composition is being identified as time allows.

As part of the national System Wide Monitoring Program (SWMP), the GTMNERR collects water quality and weather data. Water quality is measured at four stations: one in the Tolomato River, two in the Matanzas River, and one in Pellicer Creek. Measurements include (a) monthly analyses for nutrients, chlorophyll, bacteria, and solids from grab samples and (b) 15-min salinity, temperature, dissolved oxygen, turbidity, and pH measurements using YSI data sondes.

Weather parameters (air temperature, humidity, photosynthetically active radiation, wind speed, wind direction, and rainfall) are measured at one station near the mouth of Pellicer Creek. All SWMP data undergo a rigorous, standardized QAQC process and are available for download through the Centralized Data Management Office at [www.nerrsdata.org](http://www.nerrsdata.org).

GTMNERR has periodically surveyed oyster reefs in Guana River since 2014: <https://www.gtmnerr.org/oysters/>. Metrics such as percent cover, density, and size are indicators of oyster reef condition. Data are available at <https://data.florida-seacar.org/>.

The Florida Department of Agriculture and Consumer Services regularly collects samples of bacteria concentrations for public health considerations related to shellfish harvest in Guana River: <https://www.freshfromflorida.com/Business-Services/Aquaculture/Shellfish-Harvesting-Area-Classification>.

Nekton surveys have been conducted in Guana Lake at various times by Florida Fish and Wildlife Conservation Commission, FDEP’s Northeast Florida Aquatic Preserves, and the GTMNERR using seine nets close to shore.

Since 2001, the Florida Fish and Wildlife Conservation Commission and University of North Florida have conducted fisheries-independent monitoring at Guana Dam for American eel (*Anguilla rostrata*) glass eels every winter season for approximately three months. This sampling occurs during nighttime incoming tides for a minimum of three hours.

Since April 2021, the GTMNERR and University of Florida have been conducting a collaborative research project to identify sources of nitrogen pollution affecting the Guana River Estuary, map the current distribution of shellfish within it, and quantify the effect of shellfish on water quality, and vice versa.

For more information on these and other projects, contact Nikki Dix ([Nikki.Dix@FloridaDEP.gov)](mailto:Nikki.Dix@FloridaDEP.gov)).

**II. Physical Structure Descriptors**

**7) Entry Verification**

Nutrient results were sent to the GTMNERR in one of three formats, depending on the lab being used:

* ALS Environmental sent a PDF document
* The LIMS data management system provided a downloadable Excel spreadsheet for FDEP lab results
* AEL laboratory sent both a PDF document and an Excel spreadsheet

All three lab result formats were entered into a cumulative Masterdata Microsoft Excel spreadsheet for the Guana project. GTMNERR staff and volunteers entered and reviewed the data. Data entry, verification, and chain of custody procedures follow those specified in the Florida Department of Health NELAP QA/QC certification plan (<http://www.floridahealth.gov/licensing-and-regulation/environmental-laboratories/environmental-laboratory-certification/index.html>).

All data obtained during the study were internally quality checked and formatted in accordance with FDEP Watershed Information Network (WIN) guidelines and subsequently uploaded to WIN after the conclusion of the project in June 2022.

**8) Parameter Titles and Variable Names by Category**

|  |  |  |
| --- | --- | --- |
| **Field Parameters** | **Variable name** | **Unit** |
| Air Temperature | ATEMP | oC |
| Chlorophyll | CHL | RFU |
| Dissolved Oxygen | DO | mg/L |
| Dissolved Oxygen percent saturation | DO\_p | % |
| pH | pH | N/A |
| Phycoerythrin | PE | RFU |
| Salinity | SALT | ppt |
| Secchi Disk | SECCHI | m |
| Specific Conductance | SpCond | us/cm |
| Water temperature | WTEMP | oC |
| Wind Speed | WIND\_S | m/s |
| Wind Direction | WIND\_D | N/A |
| Water Depth | WDEPTH | m |

**Measured Laboratory Parameters**

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **CORE PARAMETERS** | **Variable Name** | **Units** | **Method Reference** | |  |
|  |  |  | ALS | DEP | AEL |
| Total Phosphorus | TP | mg/L as p | EPA 365.1 &  EPA 365.1 Rev. 2.0 |  | EPA 365.3 |
| Nitrite + Nitrate, Filtered | NO23F | mg/L as n | EPA 353.2 Rev. 2.0 |  |  |
| Ammonium, Filtered | NH4F | mg/L as n | 350.1 | EPA 350.1 Rev. 2.0 |  |
| Total Kjeldahl Nitrogen | TKN | mg/L as n | EPA 351.2 |  |  |
| Filtered Total Kjeldahl Nitrogen | TKNF | mg/L as n | 351.2 | EPA 351.2 Rev. 2.0 |  |
| Chlorophyll a, Corrected | CHLa\_C | ug/L | SM 10200 H |  |  |
| Chlorophyll a, Uncorrected | CHLa\_UnC | ug/L | SM 10200 H |  |  |
| Chlorophyll b | CHLb\_Tri\_N | ug/L | SM 10200 H |  |  |
| Chlorophyll c | CHLc\_Tri\_N | ug/L | SM 10200 H |  |  |
| OD664b/OD665a | OD664b/OD665a | NONE | SM 10200 H |  |  |
| Pheophytin a | PHEA | ug/L | SM 10200 H |  |  |
| Coliform, Fecal | FECCOL | CFU/100mL | SM 9222 D |  |  |
| Enterococcus | ENTERO | MPN/100mL | ASTM D6503-99 |  | Enterolert/Quanti-Tray |

**Calculated Parameters**

|  |  |  |  |
| --- | --- | --- | --- |
| **Calculated Parameters** | **Variable Name** | **Units** | **Formula** |
| Total Nitrogen | TN | mg/L as n | TKN + NO23F |
| Total Organic Nitrogen | TON | mg/L as n | TKN - NH4F |
| Dissolved Inorganic Nitrogen | DIN | mg/L as n | NO23F + NH4F |

**Occasionally Sampled Parameters**

\*following page

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **OCCASIONAL PARAMETERS** | **Variable Name** | **Units** | **Method Reference** | |
|  |  |  | **ALS** | **DEP** |
| 2, 4-Dichlorophenoxyacetic acid | 2, 4-D | ug/L |  | EPA 8321B |
| Acetaminophen | ACETA | ug/L |  | EPA 8321B |
| Bentazon | Bentazon | ug/L |  | EPA 8321B |
| Bird specific Helicobacter GFD genetic marker | GFD | ug/L |  | SOP-PCR-1.3 |
| Bromide | Bromide | mg Br/L |  | EPA 300.0 & EPA 300.0 Rev. 2.1 |
| Canine-specific DG3 Bacteroides genetic marker | DG3 | ug/L |  | SOP-PCR-1.5 |
| Carbamazepine | Carbamazepine | ug/L |  | EPA 8321B |
| Chloride | W-CL-IC | mg Cl/L |  | EPA 300.0 Rev. 2.1 |
| Coastal bird specific Catellicoccus marimammalium Gull2 genetic marker | GULL2 | ug/L |  | SOP-PCR-1.2 |
| Color (true) | W-COLOR | PCU |  | SM2120 B |
| Copper | Cu | ug/L | 6020B |  |
| Diuron | Diuron | ug/L |  | EPA 8321B |
| Escherichia Coli-Tuanti-Tray | ECOLI | MPN/100 mL |  | SM 9223 Quanti-Tray |
| Fenuron | Fenuron | ug/L |  | EPA 8321B |
| Fluoride | Fluoride | mg F/L |  | SM 4500-F-C-2011 |
| Fluridone | Fluridone | ug/L |  | EPA 8321B |
| Human-specific HF183 Bacteroides genetic marker | HF183 | ug/L |  | SOP-PCR-1.0 |
| Hydrocodone | Hydrocodone | ug.L |  | EPA 8321B |
| Ibuprofen | Ibuprofen | ug/L |  | EPA 8321B |
| Imazapyr | Imazapyr | ug/L |  | EPA 8321B |
| Imidacloprid | Imidacloprid | ug/L |  | EPA 8321B |
| Linuron | Linuron | ug/L |  | EPA 8321B |
| Methylchlorophenoxypropionic acid | MCPP | ug/L |  | EPA 8321B |
| Naproxen | Naproxen | ug/L |  | EPA 8321B |
| Organic Carbon | W-TOC | mg/L |  | SM 5310 B-00 |
| Orthophosphate, Filtered | PO4F | mg/L as p |  | EPA 365.1 Rev. 2.0 |
| Primidone | Primidone | ug/L |  | EPA 8321B |
| Pyraclostrobin | Pyraclostrobin | ug/L |  | EPA 8321B |
| **OCCASIONAL PARAMETERS** | **Variable Name** | **Units** | **Method Reference** | |
|  |  |  | **ALS** | **DEP** |
| Ruminant specific Bacteroidetes BacR genetic marker | BacR | ug/L |  | SOP-PCR-1.4 |
| Sucralose | Sucra | ug/L |  | EPA 8321B |
| Sulfate | W-SO4-IC | mg SO4/L |  | EPA 300.0 Rev. 2.1 |
| Total Dissolved Solids | W-TDS | mg/L |  | SM 2540 C-97 |
| Total Alkalinity | Alkalinity | mg CaCO3/L |  | SM 2320 B-97 |
| Total Suspended Solids | TSS | mg/L |  | SM 2540 D-97, -98, -99, -102, -103, -104, -105, -2011 |
| Triclopyr | Triclopyr | ug/L |  | EPA 8321B |
| Turbidity | Turbidity | NTU |  | EPA 180.1 Rev. 2.0, 2.1, 2.2, 2.5, 2.6, 2.7, 2.8 |

**9) Filtration Issues**

Over the course of this project three different labs were used for sample analysis:

1. The State of Florida DEP lab (public)
2. ALS Environmental (private)
3. Advanced Environmental Laboratories, or AEL (private).

The DEP lab samples and assesses all the state’s waterbodies on a rotating schedule, usually for five months out of the year. The Guana project was able to collaborate with the DEP lab for their sampling efforts and sent water samples to their lab in Tallahassee, FL for analysis.

During the other seven months of each year of this project, a private lab was used to test the same parameters. From June 2017 to September of 2021, samples were sent to the ALS Environmental in Jacksonville, FL. In October of 2021 ALS closed in Jacksonville, and the Guana project switched to AEL in Jacksonville, FL.

Throughout the project, all samples that required preservation were preserved with sulfuric acid, following specific parameter SOP methodology. Along with proper preservation, certain samples were filtered in the field before being sent to the lab for analysis. All three labs followed EPA protocols and SOP for surface water sampling; however, there were some filtration issues between samples and between labs.

After backtracking filtration of samples, it was noted that NO23 was not being filtered before analysis, and additionally, NH3 and PO4 were inconsistently filtered.

We caught this error and began filtering all three parameters in November of 2021. It should be noted all the data for NO23 before this day is considered suspect and labeled with a QAQC code of <1> (CUF) in the master data excel spreadsheet. With the help of fellow researchers at the University of Florida in Gainesville, FL, we were able to run filtration tests on NO23, NH3, and PO4 samples, which showed a slight increase in analyte presence in unfiltered samples. The most notable variation was seen at the Mickers station measuring for NO23 and at Lake Middle station measuring NH4 (see Appendix 1). We have noted this filtration issue to better inform the reader of this qualified data.

NH3 was only being filtered when it was sent to either of the two private labs. Thus, on DEP months NH3 was not being filtered until November of 2021. This issue was corrected similarly, and data collected prior to this error correction are qualified.

**10) Laboratory Methods**

The methods included are for core parameters only. Occasional parameter methods are available upon request. Although three different laboratories have been used for analysis, methods are fairly standardized between laboratories following via EPA standards and SOPs.

1. **Total Phosphorous (TP)**

Method Reference:

U.S. Environmental Protection Agency (EPA), 1993. Determination of Phosphorus by Semi-Automated Colorimetry, EPA Method 365.1 Revision 2.0. Cincinnati, OH and Bran+Lubbe method G-146-95 Rev. 3.

Method Descriptor:

A sample is appropriately treated to convert all phosphorus of interest to reactive orthophosphate. Ammonium molybdate and antimony potassium tartrate are added to the treated sample reacting with orthophosphate in an acidic medium to form an antimony-phospho-molybdate complex. This complex is reduced to an intensely blue-colored complex by ascorbic acid. The concentration of the orthophosphate is measured by detecting the absorbance of the complex with a spectrophotometer.

Preservation Method:

Samples are preserved with H2SO4 to a pH ≤2, stored at 4oC, and run within 48 hours.

1. **Nitrate + Nitrite (NO23)**

Method Reference:

U.S. Environmental Protection Agency (EPA), 1993. Nitrogen, Nitrate-Nitrite (Colorimetric, Automated, Cadmium Reduction), EPA Method 353.2 Revision 2.0. Cincinnati, OH and Seal Analytical AQ2 method EPA-137-A Rev. 1.

Method Descriptor:

A filtered sample is passed through a column containing granulated copper-cadmium to reduce nitrate to nitrite. The nitrite that was originally present plus reduced nitrate is determined by diazotizing with sulfanilamide and coupling with N-(1-naphthyl)-ethylenediamine dihydrochloride to form a highly colored azo dye which is measured colorimetrically. Separate, rather than combined nitrate-nitrite, values are readily obtained by carrying out the procedure first with, and then without, the Cu-Cd reduction step. Nitrate (NO3) value can be obtained by subtracting the nitrite (NO2) value from the combined nitrate-nitrite (NOx) value.

Preservation Method:

NO23 samples are preserved with H2SO4 to a pH ≤ 2, stored on ice and shipped, and analyzed within 28 days of collection.

1. **Ammonium, Filtered – Ammonia Nitrogen**

Method Reference:

U.S. Environmental Protection Agency (EPA) 1993. “Method 350.1: Nitrogen, Ammonia (Colorimetric, Automated Phenate),” Revision 2.0. Cincinnati, OH

Method Descriptor:

The sample is buffered at a pH of 9.5 with a borate buffer to decrease hydrolysis of cyanates and organic nitrogen compounds. Then sample is distilled into a solution of boric acid. 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 and measured colorimetrically.

Preservation Method:

Samples are collected in clean plastic bottles and preserved with H2SO4 to a pH of <2 and cooled to 4oC at time of collection. Sample should be analyzed as soon as possible after collection, if storage is required preserved samples maintained at 4oC may be held up to 28 days.

1. **Total Kjeldahl Nitrogen and Total Kjeldahl Nitrogen Filtered**

Method Reference:

U.S. Environmental Protection Agency (EPA), 1993. Determination of Total Kjeldahl Nitrogen by Semi-Automated Colorimetry, EPA Method 351.2 Revision 2.0. Cincinnati, OH and AQ2 method No: EPA-111-A Rev.4.

Method Descriptor:

The sample is heated in the presence of sulfuric acid, H2SO4 for two and one half hours. The residue is cooled, diluted to 25 mL and analyzed for ammonia. This digested sample may also be used for phosphorus determination. Total Kjeldahl nitrogen is the sum of free-ammonia and organic nitrogen compounds which are converted to ammonium sulfate (NH4)2SO4, under the conditions of digestion described. Organic Kjeldahl nitrogen is the difference obtained by subtracting the free ammonia value from the total Kjeldahl nitrogen value. Reduced volume versions of this method that use the same reagents and molar ratios are acceptable provided they meet the quality control and performance requirements stated in the method.

Preservation Method:

Whole water samples are collected and preserved with H2SO4 to a pH ≤2, stored for a maximum of 28 days and stored at 4oC. Sample to be used for TKN filtered, are filtered with a 0..45 µm pore size glass-fiber filter in the field after collection.

1. **Chlorophyll a (CHLa\_C), Uncorrected Chlorophyll a (CHLa\_UnC), Chlorophyll b (CHLb\_Tri\_N), Chlorophyll c (CHLc\_Tri\_N), OD664b/OD665a, Pheophytin a (PHEA)**

Method References:

APHA (American Public Health Association), 2001. Standard Methods for the Examination of Water and Wastewater, (SM 10200H). 20th Edition, Baltimore, Maryland: United Book Press, Inc. and U.S. Environmental Protection Agency (EPA), 1993. In Vitro Determination of Chlorophylls a, b, c1+c2 and Pheopigments in Marine and Freshwater Algae by Visible Spectrophotometry, EPA Method 446.0 Revision 1.2. Cincinnati, OH.

Method Descriptor:

Phytoplankton containing chlorophyll *a* in a measured volume of sample are concentrated by filtration through a glass fiber filter. The photo-pigments are extracted from the phytoplankton by grinding the filter with a tissue grinder and steeping the filter slurry in 90% aqueous acetone solution for at least 2hr at 4oC in the dark. The filter slurry is then centrifuged to clarify the solution and the supernatant is transferred to a glass spectrophotometric cell for analysis. For the pheophytin corrected chlorophyll *a*, the sample’s absorbance is measured at 750 and 664 nm before acidification and 750 and 665 nm after acidification with 0.1mL N HCl. No calibration of the instrument is required. Absorbance values are entered into a set of equations in the computer that utilize the extinction coefficients of the pure pigments in 90% acetone. Concentrations are reported in ug/L. Results are saved to an excel spreadsheet where calculations are performed to gain CHLa\_C and PHEA. Optical density readings are used to gain CHLa\_UnC, CHLb and CHLc.

Preservation Method:

Samples are collected as whole water samples and stored in a dark sampling bottle. Samples are filtered onto 0.45 µm pore size glass-fiber filter in the laboratory and run immediately upon receiving samples.

1. **Fecal Coliform**

Method References:

APHA (American Public Health Association), 1999. Standard Methods for the Examination of Water and Wastewater (SM9222D-1997). Baltimore, Maryland: United Book Press, Inc. APHA (American Public Health Association), 1999.

Method Descriptor:

Samples are collected as whole water samples in a sealed sterile sampling bottle. The water sample is filtered through a membrane that has a 0.45 μm pore size to capture bacteria. The membrane filter is placed on an absorbent pad containing M-FC broth, which is a selective medium for fecal coliforms. The dish is incubated for 24 hours at 44.5°C. Positive colonies have a blue color and are counted and recorded.

Preservation Method:

Whole water samples are collected and stored on ice. Then filtered and analyzed within 24-48 hours of collection.

1. **Enterococcus**

Method References:

ASTM D6503-99, Standard Test Method for Enterococci in Water Using EnterolertTM, ASTM International, West Conshohocken, PA, 1999, [www.astm.org](https://www.astm.org/)

Method Descriptor:

Contents of one Enterolert pack is added to 100 mL of sample water in a sterile vial. Sample/reagent mixture is shaken, poured into a Quanti-Tray, heat sealed and is incubated at 41°C ±0.5°C for 24 hours. Following incubation, a UV light is used to detect fluorescence and the number of positive wells are counted, recorded and referenced to a MPN table to obtain a Most Probable Number.

Preservation Method:

Whole water samples are in a sealed sterile sampling bottle preserved with sodium thiosulfate. Samples are incubated within 8 hours.

**11) Limits of Detection**

**Florida Department of Environmental Protection Central Laboratory (FDEP)**

The Florida Department of Environmental Protection’s Central Laboratory defines the Method Detection Limit (MDL) as the minimum measured concentration of a substance that can be reported with 99% confidence that the measured concentration is distinguishable from a method blank. A minimum of seven method blanks and seven laboratory fortified blanks (LFB) in three independent batches are prepared, and the LFBs are spiked at one to five times the estimated MDL concentration. The blanks and LFBs are then processed through the entire analytical method. The MDL or LFB cannot be prepared for some biological methods (e.g., BOD and chlorophyll); a substitute with at least seven replicates of a standard solution is used for these samples. The method blanks and LFBs are then distributed and analyzed on three separate days in three independent analytical runs.

Two MDL values are then derived, one based on the standard deviation and average concentration of the method blanks (MDLb), and the second based on the standard deviation of the LFBs (MDLs). The detection limit is then derived using (a) the Student’s *t* value appropriate for a 99% confidence level and (b) a standard deviation estimate with n - 1 degrees of freedom where *n* is the number of each type of blank. The larger of the two MDLs is set as the MDL for the method. In cases where the calculated MDL is more than 10 times lower than the concentration level of the LFB’s, the study may be performed again using a lower spiking level. For details, refer to the FDEP Quality Manual and Chapter 40, Part 136 Appendix B of the Code of Federal Regulations for “Definition and Procedure for the Determination of the Method Detection Limit—Revision 2 (August 2017).”

**ALS Environmental Laboratory**

The ALS laboratory defines Method Detection Limit (MDL) as the minimum concentration of a substance or analyte that can be measured and reported with 99% confidence that the analyte concentration is greater than zero and is determined from analysis of a sample in a given matrix type containing the analyte. The Method Reporting Limit (MRL) is defined as the minimum level, concentration, or quantity of a target analyte that can be reported with a specific degree of confidence and within the calibration range or equivalent to the low calibration point.

**12) Data Qualifiers**

[These are the located in the ‘Remark’ columns of the masterdata excel sheet.]

|  |  |
| --- | --- |
| **Qualifier** | **Definition** |
|  |  |
| A | Value reported in the arithmetic mean (average) of two or more determinations |
| B | Results based upon colony counts outside the acceptable range. |
| D | Measurement was made in the field. |
| H | Value based on field kit determination; results may not be accurate. |
| I | The reported value is between the laboratory method detection limit and the laboratory practical quantitation limit. |
| J | Estimated value (one of the following reasons is discussed in the project case narrative).  1. The result may be inaccurate because the surrogate recovery limits have been exceeded.  2. No known quality control criteria exists for the component.  3. The reported value failed to meet the established quality control criteria for either precision or accuracy.  4. The sample matrix interfered with the ability to make any accurate determination (e.g., primary and confirmation results show greater than 40% RPD).  5. The data is questionable because of improper laboratory or field protocols (e.g., GC/MS Tune did not meet method criteria). |
| K | Off scale low. The value is less than the lowest calibration standard but greater than the method reporting limit (MRL). |
| L | Off scale high. The analyte is above the upper limit of the linear calibration range. |
| M | The MDL/MRL has been elevated because the analyte could not be accurately quantified due to matrix interference. |
| N | Presumptive evidence of the analyte. Confirmation was not performed. |
| Q | Sample held beyond the accepted holding time. |
| T | Value reported is less than the laboratory method detection limit. The value is reported for informational purposes only. |
| U | Indicates that the compound was analyzed for but not detected. |
| V | Indicates that the analyte was detected in both the sample and the associated method blank. |
| Y | The laboratory analysis was from an improperly preserved sample. |
| Z | Too many colonies were present (TNTC). The numeric value represents the filtration volume. |

**13) QAQC Flag Definition**

QAQC flags provide documentation of the data and are applied to individual data points by insertion into the parameter’s associated flag column. QAQC flags are applied to the nutrient data during secondary QAQC to indicate data that are out of sensor range (-4), rejected due to QAQC checks (-3), missing (-2), optional and not collected (-1), suspect (1), and 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.

|  |  |
| --- | --- |
| **Flag** | **Description** |
| -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 |

**14) 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
* 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 in the nutrient data allows multiple comment codes to be applied to the entire data record.

|  |  |  |
| --- | --- | --- |
| **Category** | **Code** | **Definition** |
| General errors |  |  |
|  | GCM | Calculated value could not be determined due to missing data |
|  | GCR | Calculated value could not be determined due to rejected data |
|  | GDM | Data missing or sample never collected |
|  | GQD | Data rejected due to QA/QC checks |
|  | GQS | Data suspect due to QA/QC checks |
|  | GSM | See metadata |
| Sensor errors |  |  |
|  | SBL | Value below minimum limit of method detection |
|  | SCB | Calculated value could not be determined due to a below MDL component |
|  | SCC | Calculation with this component resulted in a negative value |
|  | SNV | Calculated value is negative |
|  | SRD | Replicate values differ substantially |
|  | SUL | Value above upper limit of method detection |
| **Category** | **Code** | **Definition** |
| 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 |
|  | CUF | Lab analysis from unfiltered sample |

**15) Other Remarks/Notes**

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 4) 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, which 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 1:** The method by which values are reported below the MDL within 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.

**Note 2:** Sample Holding Times

NERRS SOP allows nutrient samples to be held for up to 28 days (CHLA for 30 days) at -20°C, with up to 5 additional days for collecting, processing, and shipping samples. Samples held beyond that time period are flagged suspect and coded CHB. The sample hold times for 2018 are listed below. The NAs reported in the sample hold time tables represent missing and/or optional parameters that were not collected.

The FDEP Laboratory follows the EPA preservation and holding times (published in 40 CFR Part 136.3). NO2, NO3, and PO4 are preserved at 4°C (wet ice) and have holding times of 48 hours. Samples that are shipped overnight from the field on the day of collection are almost always received in time for analysis without concerns for expirations. Diel samples are processed immediately upon receiving due to the expiring hold times. The first diel sample is almost always received beyond its sample hold time for NO2, NO3 and PO4. These samples are flagged 1 CHB, but unless otherwise noted were still processed within allowable NERRS hold times.

**Note 3:** Masterdata remarks - See Metadata (CSM)

|  |  |  |
| --- | --- | --- |
| **Date** | **Location** | **Remarks** |
|  |  |  |
| February 2018 | Guana River | Suspect TKNF collected on 02/14/2018; laboratory indicated that the analyte was detected in both the sample and the associated method blank. |
| March 2018 | Guana River | Suspect OD664b/OD665a collected on 03/28/2018; laboratory indicated that the analyte was detected in both the sample and the associated method blank. |
|  | Lake Middle | Suspect OD664b/OD665a collected on 03/28/2018; laboratory indicated that the analyte was detected in both the sample and the associated method blank. |
|  | Lake South | Suspect OD664b/OD665a collected on 03/28/2018; laboratory indicated that the analyte was detected in both the sample and the associated method blank. |
|  | Micklers | Suspect OD664b/OD665a collected on 03/28/2018; laboratory indicated that the analyte was detected in both the sample and the associated method blank. |
|  | River North | Suspect OD664b/OD665a collected on 03/28/2018; laboratory indicated that the analyte was detected in both the sample and the associated method blank. |
| June 2018 | Guana River | Suspect TKNF collected on 06/11/2018; laboratory indicated that the analyte was detected in both the sample and the associated method blank. |
| July 2018 | GL4 | Suspect Alkalinity collected on 07/11/2018; laboratory indicated value reported is the arithmetic mean (average) of two or more determinations. |
|  | GR1 | Suspect TSS collected on 07/11/2018; laboratory indicated value reported is the arithmetic mean (average) of two or more determinations. |
|  | GR3 | Suspect CHLa\_C, CHLa\_UnC, PHEA, and Turbidity collected on 07/11/2018; laboratory indicated value reported is the arithmetic mean (average) of two or more determinations. |
|  | Lake Middle | Suspect Turbidity collected on 07/11/2018; laboratory indicated value reported is the arithmetic mean (average) of two or more determinations. |
| September 2018 | GL1 | Suspect Alkalinity collected on 09/06/2018; laboratory indicated value reported is the arithmetic mean (average) of two or more determinations. |
| **Date** | **Location** | **Remarks** |
| September 2018 (continued) | GL1 (continued) | Suspect TSS collected on 09/06/2018; laboratory indicated value reported is the arithmetic mean (average) of two or more determinations. |
|  |  | Suspect Bentazon collected on 09/06/2018; laboratory indicated estimated value and/or value did not meet established quality control procedures. |
|  | GL2 | Suspect Bentazon collected on 09/06/2018; laboratory indicated estimated value and/or value did not meet established quality control procedures. |
|  | GR1 | Suspect Bentazon collected on 09/06/2018; laboratory indicated estimated value and/or value did not meet established quality control procedures. |
|  | GR3 | Suspect Bentazon collected on 09/06/2018; laboratory indicated estimated value and/or value did not meet established quality control procedures. |
|  |  | Suspect FECCOL collected on 09/06/2018; laboratory indicated sample was held beyond accepted holding time and results based on colony counts were outside accepted range. |
|  | GL4 | Suspect Alkalinity collected on 09/06/2018; laboratory indicated value reported is the arithmetic mean (average) of two or more determinations. |
|  |  | Suspect Bentazon collected on 09/06/2018; laboratory indicated estimated value and/or value did not meet established quality control procedures. |
|  |  | Suspect GFD collected on 09/06/2018; laboratory indicated the material was analyzed but not detected. The value reported is the MDL. The estimated value and/or value did not meet established quality control procedures. |
|  | Guana River | Suspect Turbidity collected on 09/06/2018; laboratory indicated value reported is the arithmetic mean (average) of two or more determinations. |
|  |  | Suspect Bentazon collected 09/06/2018; laboratory indicated estimated value and/or value did not meet established quality control procedures. |
|  |  | Suspect HF183 collected on 09/06/2018; laboratory indicated the material was analyzed but not detected. The value reported is the MDL. The estimated value and/or value did not meet established quality control procedures. |
|  |  | Suspect FECCOL collected 09/06/2018; laboratory indicated sample held beyond accepted holding time and results based on colony counts were outside acceptable range. |
|  | Lake Middle | Suspect Bentazon collected on 09/06/2018; laboratory indicated estimated value and/or value did not meet established quality control procedures. |
|  | Lake South | Suspect OD664b/OD665a collected on 09/06/2018; laboratory indicated analyte was detected in both the sample and associated method blank. |
| **Date** | **Location** | **Remarks** |
| September 2018 (continued) | Micklers | Suspect OD664b/OD665a collected on 09/06/2018; laboratory indicated analyte was detected in both the sample and associated method blank. |
|  | River North | Suspect OD664b/OD665a collected on 09/06/2018; laboratory indicated analyte was detected in both the sample and associated method blank. |
| November 2018 | Guana River | Suspect TKNF collected on 11/07/2018; laboratory indicated that the analyte was detected in both the sample and associated method blank. |
| December 2018 | GL1 | Suspect W-TDS and TSS collected on 12/05/2018; laboratory indicated value reported is the arithmetic mean (average) of two or more determinations. |
|  | GL2 | Suspect W-Color collected on 12/05/2018; laboratory indicated value reported is the arithmetic mean (average) of two or more determinations. |
|  |  | Suspect FECCOL collected on 12/5/2018; laboratory indicated results based on colony count were outside acceptable range and the compound was analyzed for but not detected. |
|  | GL4 | Suspect W-Color collected on 12/05/2018; laboratory indicated value reported is the arithmetic mean (average) of two or more determinations. |
|  |  | Suspect FECCOL collected on 12/5/2018; laboratory indicated results based on colony count were outside acceptable range and the compound was analyzed for but not detected. |
|  | GR1 | Suspect FECCOL collected on 12/05/2018; laboratory indicated results based on colony count were outside acceptable range and the compound was analyzed for but not detected. |
|  | Guana River | Suspect FECCOL collected on 12/05/2018; laboratory indicated results based on colony count were outside acceptable range and the compound was analyzed for but not detected. |
|  | Lake Middle | Suspect Alkalinity collected on 12/05/2018; laboratory indicated value reported is the arithmetic mean (average) of two or more determinations. |
|  |  | Suspect FECCOL collected on 12/05/2018; laboratory indicated results based on colony count were outside acceptable range and the compound was analyzed for but not detected. |
|  |  | Suspect TSS collected on 12/05/2018; laboratory indicated value reported in arithmetic mean (average) of two or more determinations. |
|  | Lake South | Suspect NH4\_N collected on 12/05/2018; laboratory indicated that the analyte was detected in both the sample and associated method blank. |
|  |  | Suspect FECCOL collected on 12/05/2018; laboratory indicated results based on colony count were outside acceptable range and the compound was analyzed for but not detected. |
|  | Micklers | Suspect NH4\_N collected on 12/05/2018; laboratory that the analyte was detected in both the sample and associated method blank. Batch relative percent difference is unavailable because of low analyte concentration in the QC sample. |
| **Date** | **Location** | **Remarks** |
| December 2018 (continued) | River North | Suspect FECCOL collected on 12/05/2018; laboratory indicated results based on colony count were outside acceptable range and the compound was analyzed for but not detected. |
| February 2019 | GL1 | Suspect Imidacloprid collected on 02/04/2019; laboratory indicated estimated value and/or value did not meet established quality control procedures. |
|  | GR1 | Suspect TSS collected on 02/04/2019; laboratory indicated value reported is the arithmetic mean (average) of two or more determinations. |
|  | Lake Middle | Suspect Turbidity collected on 02/04/2019; laboratory indicated value reported is the arithmetic mean (average) of two or more determinations. |
| April 2019 | GR3 | Suspect TKNF collected on 04/02/2019; laboratory indicated the analyte was detected in both the sample and associated method blank. |
|  | River North | Suspect TKNF collected on 04/02/2019; laboratory indicated that the analyte was detected in both the sample and associated method blank. |
| May 2019 | GL2 | FECCOL value above upper limit of method detection |
|  | GL4 | Suspect Alkalinity collected on 05/02/2019; laboratory indicated value reported is the arithmetic mean (average) of two or more determinations. |
|  | GR1 | Suspect FECCOL collected on 05/02/2019; laboratory sample held beyond accepted holding time and results based on colony counts were outside acceptable range. |
|  | GR3 | Suspect TSS collected on 05/02/2019; laboratory indicated value reported is the arithmetic mean (average) of two or more determinations. |
|  |  | Suspect TP collected on 05/02/2019; laboratory indicated estimated value and/or value did not meet established quality control procedures. |
|  |  |  |
| June 2019 | Lake Middle | Suspect PHEA collected on 06/03/2019; laboratory indicated that the analyte was detected in both the sample and associated method blank. |
|  | Lake South | Suspect PHEA collected on 06/03/2019; laboratory indicated that the analyte was detected in both the sample and associated method blank. |
| July 2019 | GL1 | Suspect FECCOL collected 7/15/2019; laboratory indicated sample held beyond accepted holding time and results based on colony counts were outside acceptable range. |
|  | GL2 | Suspect FECCOL collected 7/15/2019; laboratory indicated sample was held beyond accepted holding time and value reported is the arithmetic mean (average) of two or more determinations. |
|  | GR1 | Suspect FECCOL collected 7/15/2019; laboratory indicated sample was held beyond accepted holding time and results based on colony counts were outside acceptable range. |
|  |  |  |
| **Date** | **Location** | **Remarks** |
| July 2019 (continued) |  | Suspect TKNF collected 7/15/2019; laboratory indicated data is questionable because of improper lab/field protocol. |
|  | GR3 | Suspect ECOLI collected 7/15/2019; laboratory indicated sampled was held beyond accepted holding time, and value reported is the arithmetic mean (average) of two or more determinations. |
|  | Guana River | Suspect FECCOL collected on 07/15/2019; laboratory indicated sample was held beyond accepted holding time and results based on colony counts were outside acceptable range. |
|  | Lake Middle | Suspect TSS collected on 7/15/2019; laboratory indicated value reported is a arithmetic mean (average) of two or more determinations |
|  |  | Suspect Turbidity collected on 7/15/2019; laboratory indicated value reported is a arithmetic mean (average) of two or more determinations. |
| August 2019 | GL1 | Suspect FECCOL collected 8/12/2019; laboratory indicated results based on colony counts were outside acceptable range. |
| September 2019 | GL2 | Suspect CHLa\_C, CHLa\_UnC and PHEA collected 9/10/2019; laboratory indicated value reported is the arithmetic mean (average) of two or more determinations. |
|  |  | Suspect FECCOL collected 9/10/2019; laboratory reported results based on colony counts were outside acceptable range. |
|  | GL4 | Suspect Turbidity collected 9/10/2019; laboratory indicated value reported is the arithmetic mean (average) of two or more determinations. |
|  | GR1 | Suspect FECCOL collected 9/10/2019; laboratory indicated results based on colony counts were outside acceptable range. |
|  | GR3 | Suspect FECCOL collected 9/10/2019; laboratory indicated results based on colony counts were outside acceptable range. |
|  | Guana River | Suspect FECCOL collected on 9/10/2019; laboratory indicated analyte results based on colony counts were outside acceptable range. |
|  | Lake Middle | Suspect FECCOL collected on 9/10/2019; laboratory indicated results based on colony counts were outside acceptable range. |
|  | Lake South | Rejected TP collected on 9/10/2019; laboratory indicated that the analyte was detected in both the sample and associated method blank. |
|  | Micklers | Suspect FECCOL collected on 9/10/2019; laboratory indicated results based on colony counts were outside acceptable range. |
|  | River North | Suspect FECCOL collected on 9/10/2019; laboratory indicated results based on colony counts were outside acceptable range. |
|  |  | Rejected CHLc\_Tri\_N collected on 9/10/2019; laboratory indicated that the analyte was detected in both sample and associated method blank. |
| October 2019 | GL1 | Suspect FECCOL collected 10/14/2019; laboratory indicated results based on colony counts were outside acceptable range. |
|  | GL2 | Suspect FECCOL collected 10/14/2019; laboratory indicated results based on colony counts were outside acceptable range. |
| **Date** | **Location** | **Remarks** |
| October 2019 (continued) | GR1 | Rejected TKNF collected 10/14/2019; laboratory indicated that the analyte was detected in both the sample and associated method blank. |
|  | GR3 | Rejected TKNF collected 10/14/2019; laboratory indicated that the analyte was detected in both the sample and associated method blank. |
|  | Guana River | Rejected TKNF collected on 10/14/2019; laboratory indicated sample was held beyond acceptable holding time. |
|  | Micklers | Suspect FECCOL collected on 10/14/2019; laboratory indicated results based on colony counts were outside acceptable range. |
|  | River North | Suspect FECCOL collected on 10/14/2019; laboratory indicated results based on colony counts were outside acceptable range. |
| November 2019 | GL1 | Suspect FECCOL collected on 11/12/2019; laboratory indicated results based on colony counts were outside acceptable range. |
|  | GL2 | Suspect FECCOL collected on 11/12/2019; laboratory indicated results based on colony counts were outside acceptable range. |
|  | GR1 | Suspect FECCOL collected on 11/12/2019; laboratory indicated results based on colony counts were outside acceptable range. |
|  | Micklers | Suspect FECCOL collected on 11/12/2019; laboratory indicated results based on colony counts were outside acceptable range. |
|  | River North | Suspect FECCOL collected on 11/12/2019; laboratory indicated results based on colony counts were outside acceptable range. |
| December 2019 | GL2 | Suspect Alkalinity and Turbidity collected on 12/16/2019; laboratory indicated value reported is the arithmetic mean (average) of two or more determinations. |
|  | GR3 | Suspect FECCOL collected on 12/16/2019; laboratory indicated results based on colony counts were outside acceptable range. |
|  | Guana River | Suspect FECCOL collected on 12/16/2019; laboratory indicated results based on colony counts were outside acceptable range. |
|  | Lake Middle | Suspect FECCOL collected on 12/16/2019; laboratory indicated results based on colony counts were outside acceptable range. |
|  | Lake South | Suspect FECCOL collected on 12/16/2019; laboratory indicated sample was held beyond accepted holding time and results based on colony counts were outside acceptable range. |
|  | Micklers | Suspect FECCOL collected on 12/16/2019; laboratory indicated results based on colony counts were outside acceptable range. |
|  | River North | Suspect FECCOL collected on 12/16/2019; laboratory indicated results based on colony counts were outside acceptable range. |
| January 2020 | GL1 | Suspect FECCOL collected on 1/28/2020; laboratory indicated results based on colony counts were outside acceptable range. |
|  | GL2 | Suspect FECCOL collected on 1/28/2020; laboratory indicated results based on colony counts were outside acceptable range. |
|  | GR1 | Suspect FECCOL collected on 1/28/2020; laboratory indicated results based on colony counts were outside acceptable range. |
|  | Lake South | Suspect FECCOL collected on 1/28/2020; laboratory indicated results based on colony counts were outside acceptable range. |
|  | Micklers | Suspect FECCOL collected on 1/28/2020; laboratory indicated results based on colony counts were outside acceptable range. |
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| **Date** | **Location** | **Remarks** |
| January 2020  (continued) | River North | Suspect FECCOL collected on 1/28/2020; laboratory indicated results based on colony counts were outside acceptable range. |
| February 2020 | GL1 | Suspect FECCOL collected on 2/10/2020; laboratory indicated results based on colony counts were outside acceptable range. |
|  | GL4 | Suspect FECCOL collected on 2/10/2020; laboratory indicated results based on colony counts were outside acceptable range. |
|  | GR1 | Suspect FECCOL collected on 2/10/2020; laboratory indicated results based on colony counts were outside acceptable range. |
|  | GR3 | Suspect TSS collected on 2/10/2020; laboratory indicated value reported is arithmetic mean (average) of two or more determinations. |
|  | Lake South | Suspect FECCOL collected on 2/10/2020; laboratory indicated results based on colony counts were outside acceptable range. |
|  | Micklers | Suspect FECCOL collected on 2/10/2020; laboratory indicated results based on colony counts were outside acceptable range. |
|  | River North | Suspect FECCOL collected on 2/10/2020; laboratory indicated results based on colony counts were outside acceptable range. |
| March 2020 | GL4 | Suspect FECCOL collected 3/9/2020; laboratory indicated results based on colony counts were outside acceptable range. |
|  | GR1 | Suspect FECCOL collected 3/9/2020; laboratory indicated results based on colony counts were outside acceptable range. |
|  | GR3 | Suspect FECCOL collected 3/9/2020; laboratory indicated results based on colony counts were outside acceptable range. |
|  | Lake Middle | Suspect AirTemp reading from the field collected on 3/9/2020; sampler indicated temperature reading seemed extremely low compared to other readings for that day. |
|  | Micklers | Suspect FECCOL collected on 3/9/2020; laboratory indicated results based on colony counts were outside acceptable range. |
|  | River North | Suspect FECCOL collected on 3/9/2020; laboratory indicated results based on colony counts were outside acceptable range. |
| April 2020 | GL1 | Suspect FECCOL collected on 4/21/2020; laboratory indicated results based on colony counts were outside acceptable range. |
|  | GL2 | Suspect FECCOL collected on 4/21/2020; laboratory indicated results based on colony counts were outside acceptable range. |
|  | Micklers | Suspect FECCOL collected on 4/21/2020; laboratory indicated results based on colony counts were outside acceptable range. |
| May 2020 | GL2 | Suspect FECCOL collected on 5/18/2020; laboratory indicated results based on colony counts were outside acceptable range. |
|  | Micklers | Suspect FECCOL collected on 5/18/2020; laboratory indicated results based on colony counts were outside acceptable range. |
|  | River North | Suspect FECCOL collected on 5/18/2020; laboratory indicated results based on colony counts were outside acceptable range. |
| June 2020 | GL1 | Suspect FECCOL collected on 6/3/2020; laboratory indicated results based on colony counts were outside acceptable range. |
| July 2020 | GL1 | Suspect FECCOL collected on 7/15/2020; laboratory indicated results based on colony counts were outside acceptable range. |
|  | GL2 | Suspect FECCOL collected on 7/15/2020; laboratory indicated results based on colony counts were outside acceptable range. |
| **Date** | **Location** | **Remarks** |
| July 2020 (continued) |  | Suspect Alkalinity collected on 7/15/2020; laboratory indicated value reported if the arithmetic mean (average) of two or more determinations. |
|  | GR1 | Suspect FECCOL collected on 7/15/2020; laboratory indicated sample held beyond accepted holding time and results based on colony counts were outside acceptable range. |
|  | GR3 | Suspect TSS collected 7/15/2020; laboratory indicated value reported is arithmetic mean (average) of two or more determinations. |
|  |  | Suspect Turbidity collected 7/15/2020; laboratory indicated value reported is arithmetic mean (average) of two or more determinations. |
|  |  | Suspect FECCOL collected 7/15/2020; laboratory indicated sample held beyond accepted holding time and value reported is arithmetic mean (average) of two or more determinations. |
|  | Micklers | Suspect FECCOL collected on 7/15/2020; laboratory indicated results based on colony counts were outside acceptable range. |
|  | River North | Suspect FECCOL collected on 7/15/2020; laboratory indicated sample held beyond accepted holding time and results based on colony counts were outside acceptable range |
| August 2020 | GR1 | Rejected NO23F collected on 8/17/2020; laboratory indicated that the analyte was detected in both the sample and associated method blank. |
|  | GR3 | Suspect FECCOL collected 8/17/2020; laboratory indicated results based on colony counts were outside acceptable range. |
|  |  | Rejected NO23F collected on 8/17/2020; laboratory indicated that the analyte was detected in both the sample and associated method blank. |
|  | Guana River | Rejected NO23F collected on 8/17/2020; laboratory indicated that the analyte was detected in both the sample and associated method blank. |
|  | Micklers | Suspect FECCOL collected on 8/17/2020; laboratory indicated results based on colony counts were outside acceptable range. |
| September 2020 | Lake South | Suspect FECCOL collected on 9/14/2020; laboratory indicated results based on colony counts were outside acceptable range. |
|  | Micklers | Suspect FECCOL collected on 9/14/2020; laboratory indicated results based on colony counts were outside acceptable range. |
|  | River North | Suspect FECCOL collected on 9/14/2020; laboratory indicated results based on colony counts were outside acceptable range. |
| October 2020 | GL1 | Suspect TSS collected on 10/13/2020; laboratory indicated value reported is the arithmetic mean (average) of two or more determinations. |
|  | GL4 | Suspect TSS collected on 10/13/2020; laboratory indicated value reported is the arithmetic mean (average) of two or more determinations. |
|  | GR1 | Suspect turbidity collected on 10/13/2020; laboratory indicated value reported is the arithmetic mean (average) of two or more determinations. |
| **Date** | **Location** | **Remarks** |
| October 2020 (continued) | GR3 | Rejected CHLa\_UnC collected 10/13/2020; laboratory indicated that the analyte was detected in both the sample and associated method blank. |
|  |  | Suspect FECCOL collected 10/13/2020; laboratory indicated results based on colony counts were outside acceptable range. |
|  | Guana River | Rejected CHLa\_UnC collected on 10/13/2020; laboratory indicated that the analyte was detected in both the sample and associated method blank. |
|  |  | Suspect FECCOL collected 10/13/2020; laboratory indicated results based on colony counts were outside acceptable range. |
|  | Lake Middle | Suspect CHLa\_C collected 10/13/2020; laboratory indicated value reported is the arithmetic mean (average) of two or more determinations. |
|  |  | Suspect CHLa\_UnC collected 10/13/2020; laboratory indicated value reported is the arithmetic mean (average) of two or more determinations. |
|  |  | Suspect PHEA collected 10/13/2020; laboratory indicated value reported is the arithmetic mean (average) of two or more determinations. |
|  | Lake South | Rejected TKNF collected on 10/13/2020; laboratory indicated that the analyte was detected in both the sample and associated method blank. |
|  | Micklers | Suspect FECCOL collected on 10/13/2020; laboratory indicated results based on colony counts were outside acceptable range. |
|  |  | Rejected TKNF collected on 10/13/2020; laboratory indicated that the analyte was detected in both the sample and associated method blank. |
|  | River North | Suspect FECCOL collected on 10/13/2020; laboratory indicated results based on colony counts were outside acceptable range. |
|  |  | Rejected TKNF collected on 10/13/2020; laboratory indicated that the analyte was detected in both the sample and associated method blank. |
| November 2020 | GL2 | Suspect TSS, CHLa\_C, CHla\_UnC, and PHEA collected on 11/16/2020; laboratory indicated value reported is the arithmetic mean (average) of two or more determinations |
|  |  | Suspect FECCOL collected on 11/16/2020; laboratory indicated results based on colony counts were outside acceptable range. |
|  | GL4 | Suspect Turbidity collected on 11/16/2020; laboratory indicated value reported is the arithmetic mean (average) of two or more determinations. |
|  | GR1 | Suspect FECCOL collected on 11/16/2020; laboratory indicated results based on colony counts were outside acceptable range. |
|  | GR3 | Suspect CHLa\_C collected 11/16/2020; laboratory indicated precision data not available due to small amount of analyte in the sample. |
|  |  | Suspect PHEA collected 11/16/2020; laboratory indicated precision data not available due to small amount of analyte in the sample. |
| **Date** | **Location** | **Remarks** |
| November 2020 (continued) | Guana River | Suspect TSS collected 11/16/2020; laboratory indicates value reported is the arithmetic mean (average) of two or more determinations. |
|  | Lake Middle | Suspect Alkalinity collected 11/16/2020; laboratory indicated value reported is the arithmetic mean (average) of two or more determinations. |
|  |  | Suspect FECCOL collected on 11/16/2020; laboratory indicated results based on colony counts were outside acceptable range. |
|  | Lake South | Suspect FECCOL collected on 11/16/2020; laboratory indicated results based on colony counts were outside acceptable range. |
|  | River North | Suspect FECCOL collected on 11/16/2020; laboratory indicated results based on colony counts were outside acceptable range. |
| December 2020 | GR1 | Suspect FECCOL collected on 12/1/2020; laboratory indicated results based on colony counts were outside acceptable range. |
|  | Lake South | Suspect FECCOL collected on 12/1/2020; laboratory indicated results based on colony counts were outside acceptable range. |
|  | Micklers | Suspect FECCOL collected on 12/1/2020; laboratory indicated results based on colony counts were outside acceptable range. |
|  | River North | Suspect FECCOL collected on 12/1/2020; laboratory indicated results based on colony counts were outside acceptable range. |
| January 2021 | GL1 | Suspect FECCOL collected on 1/11/2021; laboratory indicated results based on colony counts were outside acceptable range. |
|  | GR1 | Suspect FECCOL collected on 1/11/2021; laboratory indicated results based on colony counts were outside acceptable range. |
|  | River North | Suspect FECCOL collected on 1/11/2021; laboratory indicated results based on colony counts were outside acceptable range. |
| February 2021 | GL1 | Suspect FECCOL collected on 2/24/2021; laboratory indicated results based on colony counts were outside acceptable range. |
|  | GL2 | Suspect FECCOL collected on 2/24/2021; laboratory indicated results based on colony counts were outside acceptable range. |
|  | GR1 | Suspect FECCOL collected on 2/24/2021; laboratory indicated results based on colony counts were outside acceptable range. |
|  | GR3 | Suspect FECCOL collected 2/24/2021; laboratory indicated sample held beyond accepted holding time and results based on colony counts were outside acceptable range. |
|  | Guana River | Suspect FECCOL collected 2/24/2021; laboratory indicates sample was held beyond accepted holding time and results based on colony counts were outside acceptable range. |
|  | Lake Middle | Suspect FECCOL collected on 2/24/2021; laboratory indicated results based on colony counts were outside acceptable range. |
|  | Lake South | Suspect FECCOL collected on 2/24/2021; laboratory indicated results based on colony counts were outside acceptable range. |
|  | Micklers | Suspect FECCOL collected on 2/24/2021; laboratory indicated results based on colony counts were outside acceptable range. |
|  | River North | Suspect FECCOL collected on 2/24/2021; laboratory indicated results based on colony counts were outside acceptable range. |
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| **Date** | **Location** | **Remarks** |
| March 2021 | GL1 | Suspect FECCOL collected on 3/11/2021; laboratory indicated results based on colony counts were outside acceptable range |
|  | GL2 | Suspect FECCOL collected on 3/11/2021; laboratory indicated results based on colony counts were outside acceptable range |
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| March 2021 (continued) | GR1 | Suspect FECCOL collected 3/11/2021; laboratory indicated sample held beyond acceptable holding time and results based on colony counts were outside acceptable range. |
|  | GR3 | Suspect FECCOL collected 3/11/2021; laboratory indicated sample held beyond acceptable holding time and results based on colony counts were outside acceptable range. |
|  | Lake Middle | Suspect FECCOL collected on 3/11/2021; laboratory indicated results based on colony counts were outside acceptable range. |
|  | Lake South | Suspect FECCOL collected on 3/11/2021; laboratory indicated results based on colony counts were outside acceptable range. |
|  | Micklers | Suspect FECCOL collected on 3/11/2021; laboratory indicated results based on colony counts were outside acceptable range. |
|  | River North | FECCOL collected on 3/11/2021; laboratory indicated sample held beyond accepted holding time and results based on colony counts were outside acceptable range |
| April 2021 | GL1 | Suspect FECCOL collected on 4/7/2021; laboratory indicated results based on colony counts were outside acceptable range. |
|  | GL2 | Suspect FECCOL collected on 4/7/2021; laboratory indicated results based on colony counts were outside acceptable range. |
|  | GL4 | Suspect PO4F collected on 04/07/2021; lab indicated sample analyzed outside sample hold time and estimated value and/or value did not meet established quality control procedures |
|  | Guana River | Suspect FECCOL collected 4/7/2021; laboratory indicates results based on colony counts were outside acceptable range. |
|  | Lake South | Suspect PO4F collected on 04/07/2021; lab indicated sample analyzed outside sample hold time and estimated value and/or value did not meet established quality control procedures |
|  | Micklers | Suspect Cu collected 4/7/2021; laboratory indicated analyte detected was below quantitation limits |
|  |  | Suspect FECCOL collected on 4/7/2021; laboratory indicated results based on colony counts were outside acceptable range. |
|  | River North | Suspect FECCOL collected on 4/7/2021; laboratory indicated results based on colony counts were outside acceptable range. |
|  |  | Suspect PO4F collected on 04/07/2021; lab indicated sample analyzed outside sample hold time and estimated value and/or value did not meet established quality control procedures |
| May 2021 | GL2 | Suspect FECCOL collected on 5/10/2021; laboratory indicated results based on colony counts were outside acceptable range. |
|  | GR1 | Suspect FECCOL collected on 5/10/2021; laboratory indicated results based on colony counts were outside acceptable range. |
|  | Lake Middle | Suspect FECCOL collected on 5/10/2021; laboratory indicated results based on colony counts were outside acceptable range. |
| **Date** | **Location** | **Remarks** |
| May 2021  (continued) | Lake South | Suspect FECCOL collected on 5/10/2021; laboratory indicated results based on colony counts were outside acceptable range. |
|  | Micklers | Suspect FECCOL collected on 5/10/2021; laboratory indicated results based on colony counts were outside acceptable range. |
|  | River North | Suspect FECCOL collected on 5/10/2021; laboratory indicated results based on colony counts were outside acceptable range. |
| June 2021 | All Sites | Field Data: Started measuring bottom and surface with the ProDSS handheld in June 2021. |
|  | GL1 | Suspect FECCOL collected on 6/7/2021; laboratory indicated results based on colony counts were outside acceptable range. |
|  |  | Rejected OD664b/OD665a collected 6/7/2021; laboratory indicated that the analyte was detected in both the sample and associated method blank. |
|  | GL2 | Suspect FECCOL collected on 6/7/2021; laboratory indicated results based on colony counts were outside acceptable range. |
|  |  | Rejected OD664b/OD665a collected on 6/7/2021; laboratory indicated that the analyte was detected in both the sample and associated method blank. |
|  |  | Suspect PO4F collected on 06/07/2021; lab indicated sample analyzed outside sample hold time and estimated value and/or value did not meet established quality control procedures |
|  | GL4 | Suspect FECCOL collected on 6/7/2021; laboratory indicated results based on colony counts were outside acceptable range. |
|  |  | Rejected OD664b/OD665a collected on 6/7/2021; laboratory indicated that the analyte was detected in both the sample and associated method blank. |
|  |  | Suspect PO4F collected on 06/07/2021; lab indicated sample analyzed outside sample hold time and estimated value and/or value did not meet established quality control procedures |
|  | GR1 | Rejected OD664b/OD665a collected 6/7/2021; laboratory indicated that the analyte was detected in both the sample and associated method blank. |
|  |  | Suspect PO4F collected on 06/07/2021; lab indicated sample analyzed outside sample hold time and estimated value and/or value did not meet established quality control procedures |
|  | GR3 | Rejected OD664b/OD665a collected on 6/7/2021; laboratory indicated that the analyte was detected in both the sample and associated method blank. |
|  | Guana River | Rejected OD664b/OD665a collected on 6/7/2021; laboratory indicates that the analyte was detected in both the sample and associated method blank. |
|  |  | Suspect PO4F collected on 06/07/2021; lab indicated sample analyzed outside sample hold time and estimated value and/or value did not meet established quality control procedures |
|  | Lake Middle | Rejected OD664b/OD665a collected on 6/7/2021; laboratory indicated that the analyte was detected in both the sample and associated method blank. |
|  | Lake South | Rejected OD664b/OD665a collected on 6/7/2021; laboratory indicated that the analyte was detected in both the sample and associated method blank. |
|  |  |  |
| **Date** | **Location** | **Remarks** |
| June 2021  (continued) | Lake South  (continued) | Suspect PO4F collected on 06/07/2021; lab indicated sample analyzed outside sample hold time and estimated value and/or value did not meet established quality control procedures |
|  | Micklers | Suspect FECCOL collected on 6/7/2021; laboratory indicated results based on colony counts were outside acceptable range, and analyte is present at an estimated concentration between the MDL and Report Limit. |
|  |  | Rejected OD664b/OD665a collected on 6/7/2021; laboratory indicated that the analyte was detected in both the sample and associated method blank. |
|  | River North | Suspect FECCOL collected on 6/7/2021; laboratory indicated results based on colony counts were outside acceptable range. |
|  |  | Rejected OD664b/OD665a collected on 6/7/2021; laboratory indicated that the analyte was detected in both the sample and associated method blank. |
|  |  | Suspect PO4F collected on 06/07/2021; lab indicated sample analyzed outside sample hold time and estimated value and/or value did not meet established quality control procedures |
| July 2021 | GL1 | Rejected TKNF collected on 7/21/2021; laboratory results show analyte was detected in both the sample and method blank. |
|  | GL2 | Suspect PO4F collected on 07/21/2021; lab indicated sample analyzed outside sample hold time and estimated value and/or value did not meet established quality control procedures |
|  | GL4 | Rejected TKNF collected on 7/21/2021; laboratory results show analyte was detected in both the sample and method blank. |
|  | Guana River | Rejected TKNF collected on 7/21/2021; laboratory results show analyte was detected in both the sample and method blank. |
|  | GR1 | Rejected TKNF collected on 7/21/2021; laboratory results show analyte was detected in both the sample and method blank. |
|  |  | Suspect FECCOL collected on 7/21/2021; laboratory results indicate results based on colony counts were outside acceptable range. |
|  |  | Suspect PO4F collected on 7/21/2020; laboratory results indicate the value is based on a field kit determination and results may not be accurate. |
|  | GR3 | TKNF collected on 7/21/2021; laboratory results show analyte was detected in both the sample and method blank. |
|  |  | Rejected TKNF collected on 7/21/2021; laboratory results show analyte was detected in both the sample and method blank. |
|  | Lake Middle | Suspect FECCOL collected on 7/21/2021; laboratory results indicate results based on colony counts were outside acceptable range. |
|  | Lake South | Rejected TKNF collected on 7/21/2021; laboratory results show analyte was detected in both the sample and method blank. |
|  | River North | Rejected TKNF collected on 7/21/2021; laboratory results show analyte was detected in both the sample and method blank. |
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| **Date** | **Location** | **Remarks** |
| July 2021  (continued) | River North  (continued) | Suspect FECCOL collected on 7/21/2021; laboratory results indicate results based on colony counts were outside acceptable range. |
|  |  | Suspect PO4F collected on 7/21/2021; laboratory results indicate the value is based on a field kit determination and results may not be accurate. |
| August 2021 | GL2 | Suspect FECCOL collected on 8/18/2021; laboratory results indicate resulted based on colony count are outside acceptable range. |
|  | GL4 | Suspect FECCOL collected on 8/18/2021; laboratory results indicate resulted based on colony count are outside acceptable range. |
|  | GR1 | Suspect FECCOL collected on 8/18/2021; laboratory results indicate resulted based on colony count are outside acceptable range. |
|  | Guana River | Suspect FECCOL collected on 8/18/2021; laboratory results indicate resulted based on colony count are outside acceptable range. |
|  | Lake Middle | Suspect Cu collected on 8/18/2021; laboratory results indicate value is estimated due to results being tentative value or between MDL and MRL. |
|  |  | Suspect FECCOL collected on 8/18/2021; laboratory results indicate resulted based on colony count are outside acceptable range. |
|  | Lake South | Suspect FECCOL collected on 8/18/2021; laboratory results indicate resulted based on colony count are outside acceptable range. |
|  | Micklers | Suspect Cu collected on 8/18/2021; laboratory results indicate value is estimated due to results being tentative value or between MDL and MRL. |
|  | River North | Suspect FECCOL collected on 8/18/2021; laboratory results indicate resulted based on colony count are outside acceptable range. |
| September 2021 | GL4 | Suspect FECCOL collected on 9/7/2021; laboratory results indicate compound was analyzed for but not detected, and results based on colony counts were outside acceptable range. Outside low sensor range. |
|  | GR1 | Suspect FECCOL collected on 9/7/2021; laboratory results indicate resulted based on colony count are outside acceptable range. |
|  | GR3 | Suspect FECCOL collected on 9/7/2021; laboratory results indicate resulted based on colony count are outside acceptable range. |
|  | Guana River | Suspect FECCOL collected on 9/7/2021; laboratory results indicate resulted based on colony count are outside acceptable range. |
|  | Lake South | Suspect FECCOL collected on 9/7/2021; laboratory results indicate resulted based on colony count are outside acceptable range. |
|  | Micklers | Suspect FECCOL collected on 9/7/2021; laboratory results indicate resulted based on colony count are outside acceptable range. |
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| **Date** | **Location** | **Remarks** |
|  | River North | Suspect FECCOL collected on 9/7/2021; laboratory results indicate resulted based on colony count are outside acceptable range. |
| October 2021 | GL1 | Suspect ENTERO collected on 10/6/2021; laboratory results indicate sample was held beyond acceptable holding time and value reported is the mean of two or more determinations. |
|  |  | Suspect FECCOL collected on 10/6/2021; laboratory results indicate sample was held beyond acceptable holding time and results based on colony count are outside acceptable range. |
|  | GL2 | Suspect FECCOL collected on 10/6/2021; laboratory results indicate sample was held beyond acceptable holding time and results based on colony count are outside acceptable range. |
|  | GL4 | Suspect FECCOL collected on 10/6/2021; laboratory results indicate sample was held beyond acceptable holding time and results based on colony count are outside acceptable range. |
|  | GR1 | Suspect CHLa\_C and CHLa\_UnC collected on 10/6/2021; laboratory results indicate the value reported in the man of 2+ determinations. |
|  |  | Suspect FECCOL collected on 10/6/2021; laboratory results indicate sample was held beyond acceptable holding time and results based on colony count are outside acceptable range. |
|  | GR3 | Suspect TSS collected on 10/6/2021; laboratory results indicate reported value is between lab MDL and PQL and the value reported is a mean of two or more determinations. |
|  |  | Suspect FECCOL collected on 10/6/2021; laboratory results indicate sample was held beyond acceptable holding time and results based on colony count are outside acceptable range. |
|  | Guana River | Suspect TSS collected on 10/6/2021; laboratory results indicate reported value is between lab MDL and PQL and the value reported is a mean of two or more determinations. |
|  |  | Suspect FECCOL collected on 10/6/2021; laboratory results indicate sample was held beyond acceptable holding time and results based on colony count are outside acceptable range. |
|  | Lake Middle | Suspect FECCOL collected on 10/6/2021; laboratory results indicate sample was held beyond acceptable holding time and results based on colony count are outside acceptable range. |
| November 2021 | GL1 | Suspect FECCOL collected 11/3/2021; laboratory results indicate sample was held beyond acceptable holding time and results based on colony counts were outside the acceptable range. |
|  | GL2 | Suspect FECCOL collected 11/3/2021; laboratory results indicate sample was held beyond acceptable holding time and results based on colony counts were outside the acceptable range. |
|  | GL4 | Suspect FECCOL collected 11/3/2021; laboratory results indicate sample was held beyond acceptable holding time and results based on colony counts were outside the acceptable range. |
|  | GR3 | Suspect FECCOL collected 11/3/2021; laboratory results indicate sample was held beyond acceptable holding time and results based on colony counts were outside the acceptable range. |
|  |  | Suspect Alkalinity collected 11/3/2021; laboratory results indicate value reported in the mean of two or more determinations. |
| **Date** | **Location** | **Remarks** |
| November 2021  (continued) | Guana River | Suspect CHLa\_UnC collected on 11/3/2021; laboratory results indicate value reported is the mean of two or more determinations. |
|  |  | Suspect FECCOL collected 11/3/2021; laboratory results indicate sample was held beyond acceptable holding time and results based on colony counts were outside the acceptable range. |
|  | Micklers | Rejected PHEA collected on 11/3/2021; laboratory results indicated analyte was detected in both the sample and the method blank. |
| December 2021 | GL1 | Suspect FECCOL collected 12/1/2021; laboratory results indicate sample was held beyond acceptable holding time and results based on colony counts were outside the acceptable range. |
|  | GL2 | Suspect FECCOL collected 12/1/2021; laboratory results indicate sample was held beyond acceptable holding time and results based on colony counts were outside the acceptable range. |
|  |  | Suspect TSS collected on 12/1/2021; laboratory results indicate reported value is between the lab MDL and PQL and value reported in the mean of two or more determinations. |
|  | GR1 | Suspect FECCOL collected 12/1/2021; laboratory results indicate sample was held beyond acceptable holding time and results based on colony counts were outside the acceptable range. |
|  | GR3 | Suspect FECCOL collected 12/1/2021; laboratory results indicate sample was held beyond acceptable holding time and results based on colony counts were outside the acceptable range. |
|  |  | Suspect Turbidity collected on 12/1/2021; laboratory results indicate value reported is the mean of two or more determinations. |
|  | Guana River | Suspect FECCOL collected 12/1/2021; laboratory results indicate sample was held beyond acceptable holding time and results based on colony counts were outside the acceptable range. |
| January 2022 | GL1 | Missing data on 01/13/2022. Site not sampled |
|  | GL2 | Missing SECCHI data. |
| February 2022 | GL1 | Missing data on 02/14/2022. Site not sampled |
|  | GL2 | Suspect NO23 collected 2/14/2022; laboratory results indicate value reported is the mean of two or more determinations. |
|  |  | Suspect PO4 collected on 2/14/2022; laboratory results indicate sample was held beyond acceptable holding time and results based on colony counts are outside the acceptable range |
|  |  | Suspect PO4 collected on 2/14/2022; laboratory results indicate sample was held beyond acceptable holding time and results based on colony counts are outside the acceptable range |
|  |  | Suspect TKNF collected on 2/14/2022; laboratory results indicate value reported is the mean of two or more determinations. |
|  | GR1 | Suspect FECCOL collected 2/14/2022; laboratory results indicate sample was held beyond acceptable holding time and results based on colony counts were outside the acceptable range. |
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|  | Guana River | Suspect FECCOL collected 2/14/2022; laboratory results indicate sample was held beyond acceptable holding time and results based on colony counts were outside the acceptable range. |
| March 2022 | GL1 | Missing bottom read data on 03/01/2022. Water depth too shallow |
| **Date** | **Location** | **Remarks** |
| March 2022  (continued) | GL2 | Missing bottom read data on 03/01/2022. Water depth too shallow |
| April 2022 | GL1 | Missing bottom read data on 04/12/2022. Water depth too shallow |
|  | GL2 | Missing bottom read data on 04/12/2022. Water depth too shallow |
|  | GL2.5 | Missing bottom read data on 04/12/2022. Water depth too shallow |
|  |  |  |
| May 2022 | GL1 | Optional data on 05/12/2022. AEL and DEP both ran tests on the same parameters (CHLa\_C, CHLa\_UnC, ENTERO, NH4F, PHEA, PO4, TKN, TKNF, and TP). To keep consistent, DEP lab data should be used in analyses and visuals. AEL data has been marked as optional <-1> to and can be filtered out |
|  |  | Suspect FECCOL collected on 5/12/2022; laboratory results indicate sample was held beyond acceptable holding time and results based on colony counts are outside the acceptable range |
|  |  | Suspect TSS collected on 5/12/2022; laboratory results indicate reported value is between the lab MDL and the lab PQL and the value reported is the mean of two or more determinations |
|  |  | DG3 Estimated value and/or value did not meet established quality control procedures |
|  |  | Missing bottom read data on 05/12/2022. Water depth too shallow |
|  | GL2 | Optional data on 05/12/2022. AEL and DEP both ran tests on the same parameters (CHLa\_C, CHLa\_UnC, ENTERO, NH4F, PHEA, PO4, TKN, TKNF, and TP). To keep consistent, DEP lab data should be used in analyses and visuals. AEL data has been marked as optional <-1> to and can be filtered out |
|  |  | Suspect FECCOL collected on 5/12/2022; laboratory results indicate sample was held beyond acceptable holding time and results based on colony counts are outside the acceptable range |
|  |  | DG3, BacR, GULL2, & HF183 estimated values and/or values did not meet established quality control procedures |
|  | GL4 | Optional data on 05/12/2022. AEL and DEP both ran tests on the same parameters (CHLa\_C, CHLa\_UnC, ENTERO, NH4F, PHEA, PO4, TKN, TKNF, and TP). To keep consistent, DEP lab data should be used in analyses and visuals. AEL data has been marked as optional <-1> to and can be filtered out |
|  |  | Suspect FECCOL collected on 5/12/2022; laboratory results indicate sample was held beyond acceptable holding time and results based on colony counts are outside the acceptable range |
|  | GR1 | Optional data on 05/12/2022. AEL and DEP both ran tests on the same parameters (CHLa\_C, CHLa\_UnC, ENTERO, NH4F, PHEA, PO4, TKN, TKNF, and TP). To keep consistent, DEP lab data should be used in analyses and visuals. AEL data has been marked as optional <-1> to and can be filtered out |
|  | GR3 | Suspect Turbidity collected on 5/12/2022; laboratory results indicate value reported is the mean of two or more determinations |
|  |  |  |
|  |  | should be used in analyses and visuals. AEL data has been marked as optional <-1> to and can be filtered out |
|  |  |  |
| **Date** | **Location** | **Remarks** |
| May 2022  (continued) | GR3  (continued) | Optional data on 05/12/2022. AEL and DEP both ran tests on the same parameters (CHLa\_C, CHLa\_UnC, ENTERO, NH4F, PHEA, PO4, TKN, TKNF, and TP). To keep consistent, DEP lab data |
|  | Guana River | Optional data on 05/12/2022. AEL and DEP both ran tests on the same parameters (CHLa\_C, CHLa\_UnC, ENTERO, NH4F, PHEA, PO4, TKN, TKNF, and TP). To keep consistent, DEP lab data should be used in analyses and visuals. AEL data has been marked as optional <-1> to and can be filtered out |
|  | Lake Middle | Optional data on 05/12/2022. AEL and DEP both ran tests on the same parameters (CHLa\_C, CHLa\_UnC, ENTERO, NH4F, PHEA, PO4, TKN, TKNF, and TP). To keep consistent, DEP lab data should be used in analyses and visuals. AEL data has been marked as optional <-1> to and can be filtered out |
|  | Micklers | Missing PO4 data. Parameter not collected for this site. |
| June 2022 | GL1 | Suspect PO4 collected on 6/10/2022; laboratory results indicate analyte was detected in both the sample and the method blank and sample was held beyond accepted holding time |
|  | GL1.5 | Data missing on 05/12/2022. CHLa\_C, CHLa\_UnC, & PHEA not collected for this site. |
|  | GL2 | Suspect PO4 collected on 6/10/2022; laboratory results indicate analyte was detected in both the sample and the method blank, sample was held beyond accepted holding time and reported value is between the lab MDL and lab PQL |
|  |  | Suspect TKNF collected on 6/10/2022; laboratory results indicate reported value failed to meet established quality control for precision and accuracy |
|  | GL2.5 | Suspect PO4 collected on 6/10/2022; laboratory results indicate analyte was detected in both the sample and the method blank and sample was held beyond accepted holding time |
|  | GL3.5 | Suspect PO4 collected on 6/10/2022; laboratory results indicate analyte was detected in both the sample and the method blank and sample was held beyond accepted holding time |
|  | GL4 | Suspect PO4 collected on 6/10/2022; laboratory results indicate analyte was detected in both the sample and the method blank, sample was held beyond accepted holding time and reported value is between the lab MDL and lab PQL |
|  | GR1 | Suspect PO4 collected on 6/10/2022; laboratory results indicate analyte was detected in both the sample and the method blank and sample was held beyond accepted holding time |
|  | GR3 | Suspect PO4 collected on 6/10/2022; laboratory results indicate analyte was detected in both the sample and the method blank and sample was held beyond accepted holding time |
|  | Guana River | Suspect PO4 collected on 6/10/2022; laboratory results indicate analyte was detected in both the sample and the method blank and sample was held beyond accepted holding time |
|  | Lake Middle | Suspect PO4 collected on 6/10/2022; laboratory results indicate analyte was detected in both the sample and the method blank and sample was held beyond accepted holding time |
|  |  |  |
| **Date** | **Location** | **Remarks** |
| June 2022 (continued) | ALL SITES | CHL and PE data missing 07/11/2022. No total algae sensor attached. |
|  | Lake South | Suspect PO4 collected on 6/10/2022; laboratory results indicate analyte was detected in both the sample and the method blank and sample was held beyond accepted holding time |
|  | Micklers | Suspect PO4 collected on 6/10/2022; laboratory results indicate analyte was detected in both the sample and the method blank and sample was held beyond accepted holding time |
|  |  | Suspect TKNF collected on 6/10/2022; laboratory results indicate reported value failed to meet established quality control for precision and accuracy |
|  | River North | Suspect PO4 collected on 6/10/2022; laboratory results indicate analyte was detected in both the sample and the method blank and sample was held beyond accepted holding time |
| August 2022 | ALL SITES | CHL and PE data missing 08/09/2022. No total algae sensor attached. |
| September 2022 | ALL SITES | CHL and PE data missing on 09/07/2022. No total algae sensor attached. |
| October 2022 | ALL SITES | CHL and PE data missing on 10/06/2022. No total algae sensor attached. |
| November 2022 | ALL SITES | CHL and PE data missing on 11/07/2022. No total algae sensor attached. |
|  | GL1 | Suspect ENTERO on 11/07/2022; laboratory results indicate sample was held beyond acceptable holding time and value reported is the mean of two or more determinations. |
|  |  | Suspect FECCOL on 11/07/2022; lab results based on colony counts outside acceptable range, and sample was held beyond acceptable holding time. |
|  | GL2 | Suspect FECCOL on 11/07/2022; lab results based on colony counts outside acceptable range, and sample was held beyond acceptable holding time. |
|  | GL4 | Suspect CHLa\_C and CHLa\_UnC on 11/07/2022; laboratory results indicate result is the mean of 2 or more determinations |
|  | GR1 | Suspect FECCOL on 11/07/2022; lab results based on colony counts outside acceptable range, and sample was held beyond acceptable holding time. |
|  | GR3 | Suspect FECCOL on 11/07/2022; lab results based on colony counts outside acceptable range, and sample was held beyond acceptable holding time. |
|  |  | Reject DEPTH on 11/07/2022; malfunction with depth guage |
|  | Lake Middle | Suspect FECCOL on 11/07/2022; lab results based on colony counts outside acceptable range, and sample was held beyond acceptable holding time. |
| December 2022 | ALL SITES | CHL and PE data missing on 12/05/2022. No total algae sensor attached. |
|  |  | Bottom reading data missing on 12/05/2022. Forgot weight for sensors |
| January 2023 | ALL SITES | CHL and PE data missing on 01/05/2023. No total algae sensor attached. |
| March 2023 | GL2 | Bottom read field data missing. Too shallow for bottom read. |
| May 2023 | Guana River | PE and pH bottom read field data missing. Sampler oversight |
| June 2023 | ALL SITES | Suspect PO4 on 06/08/2023; Sample held beyond specified holding time. |
|  |  | Prep Date column added to Guana Master data to include lab analysis preparation date for analytes. |
| July 2023 | ALL SITES | Chlorophyll and Phycoerythrin field data missing due to failed calibration. |
|  |  | Changed Analysis Method from SM 4500PE to SM 4500- P E (48 hour hold time) per lab analysis methods. |
| August 2023 | Guana River | Used DEP acid (~1mL H2SO4 Lot # SA3013020) to preserve filtered sample. |
|  | LS | FWC discharging from Lake from 3ft to 2.6ft. |
| September 2023 | Mickler | Suspect NH3 on 9/18/2023; Matrix spike recoveries were outside control area (unknown amount). |
| October 2023 | ALL SITES | Chlorophyll and Phycoerythrin field data missing due to failed calibration. |
| December 2023 | GL2 | The water level was unusually low causing the FWC airboat to disturb the bottom. We waited for the muck to settle before collecting WQ readings. |
|  |  | Adjusted Date column added for chart visualization. |

**Appendix 1**

Box plot representation of the filtration tests done by University of Florida researchers. Three replicates were taken at each site for each filtration method (filtered and unfiltered).



1. Dix, N., S. Dunnigan, J. Lee, and J. Tomazinis. 2019. Guana Water Quality Two-Year Summary Report July 2017 - June 2019. Technical Report (2) 16 p. [↑](#footnote-ref-1)
2. https://floridadep.gov/dear/quality-assurance/content/dep-sops [↑](#footnote-ref-2)