**Biscayne Bay Aquatic Preserves (BBAP)** **Water Quality Metadata** **Report**

**January 2019 - December 2019**

**Latest Update:** 1.18.2021

Note: This is a provisional metadata document; it has not been authenticated as of its download date. Contents of this document are subject to change throughout the QAQC process and it should not be considered a final record of data documentation until that process is complete. Contact the Aquatic Preserve office general email at Biscayne.Bay@FloridaDEP.gov or the Water Quality Specialist at Aliza.Karim@FloridaDEP.gov with any additional questions.

**I. Data Set and Research Descriptors**

**1) Principal investigator and contact persons –**

Laura Eldredge - Biscayne Bay Aquatic Preserves Manager

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* Project supervisor, field assistance, datasonde deployment

Claire Burgett - Spatial Ecology Coordinator

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* Primary datasonde specialist, database manager, project development, field assistance, datasonde calibration & deployment

Aliza Karim - Water Quality Specialist

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* Secondary datasonde specialist, water quality data analyst, Quality Assurance/ Quality Control (QAQC) officer, field assistance, datasonde calibration & deployment, metadata report preparer

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* Data management, field assistance, data sonde calibration & deployment

**2) Entry verification –**

Deployment data are uploaded from the YSI data sonde to a Personal Computer (IBM compatible). Files are exported from EcoWatch in a comma-delimited format (.CDF), EcoWatch Lite in a comma separated file (.CSV) or KOR EXO v2.2.05 Software in a comma separated file (.CSV) and uploaded to the National Estuarine Research Reserve System (NERRS) Centralized Data Management Office (CDMO) Non-System Wide Monitoring Program (SWMP) Data Upload Service where data undergo automated primary QAQC. All pre- and post-deployment data are removed from the file prior to upload.

During primary QAQC, data are flagged if they are missing or out of sensor range. The edited file is then returned to the Office of Resilience and Coastal Protection (RCP) Data Coordinator and/or the Aquatic Preserve office for secondary QAQC where it is opened in Microsoft Excel and processed using the CDMO’s NERRQAQC Excel macro. The macro inserts station codes, creates metadata worksheet for flagged data and summary statistics, and graphs the data for review. It allows the user to apply QAQC flags and codes to the data, remove any overlapping deployment data, append files, and export the resulting data file for upload to the Aquatic Preserve (AP) database.

Upload after secondary QAQC results in incorporation into the AP database as provisional plus data, and finally tertiary QAQC by the RCP’s Data Coordinator and assimilation into the AP database as authenticated data. Where deployment overlap occurs between files, the data produced by the newly calibrated sonde is accepted as being the most accurate. For more information on QAQC flags and codes, see Sections 11 and 12.

Data was managed by Claire Burgett from January 2019 - January 2020 and then by Aliza Karim from February 2020 - present.

**3) Research objectives –**

This three-step research project was initiated in response to a 2,000-3,000-acre seagrass loss event in Northern Biscayne Bay, specifically in and around the Julie Tuttle Basin (Basin). Stations were chosen in an array to understand the relationship between the Little River flow into the Basin and across the large, central shoal containing seagrass habitat. Stations with historical data (not necessarily datasonde data) sampled by other agencies were chosen for this project, when appropriate. Not all parameters are taken at all sites across the project, however some stations included sampling for all three research steps.

* Currently, three deployed datasonde stations monitor abiotic parameters at 15-minute intervals.
* In addition to the datasondes, this project involves taking monthly water quality grab samples at 17 sites. The 31 parameters are collected during water quality grab sampling, including nutrients, pharmaceuticals, herbicides, fungicides, insecticides, and chlorophyll-a. All datasonde stations are also monthly water quality grab sampling stations.
* The 21 benthic assessment sites include seagrass and macroalgae tissue sampling for elemental analyses and stable isotopes, sediment sampling & depth, Braun-Blanquet & cover abundance surveys, and some abiotic factors. There is quarterly sampling of 11 benthic sites and all 21 sites are sampled semiannually.

**4) Research methods –**

YSI datasondes are deployed monthly at three locations, BBLR03, BBBB14, and BBJT71. Data is collected in 15 minute intervals. All sondes are calibrated before deployment and a pre-deployment calibration verification (ICV) is done as a QAQC check. Approximately every month, the deployed sondes are removed from the water and returned to the lab for data retrieval, cleaning, verifying post-deployment calibration (CCV) and conducting any necessary maintenance or repairs. Freshly calibrated sondes are either swapped at the time of retrieval or re-deployed within a week of retrieval.

All time is reported as Eastern Standard Time.

A YSI 6600 datasonde (site: BBBB14) has been operating in the Basin since January 2019. The sonde is placed into a horizontally deployed PVC piping unit with holes to allow for water flow. The unit is mounted to a concrete slab and submerged.

Two YSI EXO2 (10m Depth) datasondes (site: BBJT71) have been swapped in the southeast corner of the Basin since March 2019. The sonde is placed into a horizontally deployed PVC piping unit with holes to allow for water flow. The unit is mounted to a concrete slab and submerged.

In the Little River (site: BBLR03), two YSI 6920 sondes have been swapped since April 2019. The sonde is placed into a vertically deployed PVC piping unit with holes to allow for water flow. The unit is attached to a dock piling and the bottom portion, which contains the sonde, remains submerged year-round.

Specific conductance, pH, turbidity, depth, chlorophyll and dissolved oxygen are calibrated on the EXO2’s and the 6600. All the parameters except chlorophyll and DO are calibrated on the 6920s. Calibrations are conducted in the BBAP lab by BBAP staff. Specific conductance is 1-point calibrated with the 50,000 uS/cm standard (from Ricca). The ICV is done with the 1,000 uS/cm standard while the CCV is done with the 100,000 uS/cm standard. pH is 2-point calibrated with the pH7 standard and pH10 standard (from Fisher Scientific). The ICV and CCV are done with one of the 2 standards. Turbidity is 2-point calibrated with 0 FNU/NTU Milli-Q water and 124 FNU (exo)/126 NTU (6-series) standard (from YSI). The ICV and CCV are done with both the 0 and the 124/126 FNU/NTU standard. Chlorophyll is 2-point calibrated with 0 ug/L Milli-Q water and a rhodamine WT dye standard (from Kingscote). The 6-series is calibrated for chlorophyll-a (ug/L). The Tal-PE sensor on the EXO 2 is calibrated for chlorophyll-a (ug/L) and Blue-Green Algae – Phycoerythrin (BGA) (RFU and ug/L).

Deployments that occurred between January 2019- March 2019 were calibrated with a different protocol though the above protocol was adhered to after March 2019. The previous protocol differed in the standards used for specific conductivity and pH.

Chlorophyll calibrations using rhodamine WT dye allow for consistency in values across our sondes and deployments. During monthly water quality sampling, sonde readings are paired with water bottle grabs that are tested using a fluorometric method on filtered samples in a lab, allowing for verification and correction of sonde data.

**5) Site location and character –**

All sites are in relatively close proximity and part of the same watershed. The watershed is an urban, primarily residential part of Miami-Dade County. There are septic tanks in the watershed draining into this area and repeated issues with sewage overflows or other spills. Tidal Range is around 2 feet.

BBLR03 is in between the mouth of the Little River and an upriver, salinity control structure, and is therefore tidally influenced. The Little River is suspected to be a major source of nutrients and other pollutants into the Basin and generally has poorer water quality than the bay sites. This site was part of Miami-Dade County’s long-term water quality monitoring BayRun program but monitoring at this location was suspended. Freshwater inflow is determined by the salinity control structure and varies depending on management actions, rainfall, and timed releases of Lake Okeechobee water from the salinity control structures.

* Location: 25.846841, -80.182861
* Salinity range: 0.28-33.34 ppt
* Depth: about 10 feet in center of river; sonde is up against the seawall edge at around 4 feet deep
* Bottom habitat: bare muddy sediment
* Pollutants detected in 2019:
	+ Surface:
		- Pesticides: 2,4 D, AMPA, Bentazon, Clothianidin, Diuron, Dinotefuran, Fluridone, Glyphosate, Imazapyr, Imidacloprid
		- Pharmaceuticals: Acetaminophin, Carbamazepine, Ibuprofen, MCPP, Naproxen
		- Artificial Sweeteners: Acesulfame K, Sucralose
	+ Bottom
		- Pesticides: 2,4 D, AMPA, Bentazon, Clothianidin, Diuron, Dinotefuran, Fenuron, Fluridone, Glyphosate, Imazapyr, Imidacloprid
		- Pharmaceuticals: Acetaminophin, Carbamazepine, Ibuprofen, MCPP, Naproxen
		- Artificial Sweeteners: Acesulfame K, Sucralose

BBBB14 is in the Northern Biscayne Bay Basin in the northwest section of the shoal. This site was highly impacted by the seagrass die-off event in the northern portion of the shoal where full loss of the prior seagrass cover was observed. The seagrass loss event occurred as an edge-in effect, especially from the northern edge. BBBB14 was likely one of the first sites to switch to a macroalgal dominated bed. The site is part of Miami-Dade County’s long-term water quality monitoring BayRun program. Benthic sampling by BBAP at this site began in 2019 and involves cardinal direction quadrat throws. It’s a marine site with freshwater inflow primarily coming from rainfall and secondarily from the nearby Little River but also has exchange with other basins in Biscayne Bay influenced by other rivers and canals. Seagrass has never been observed in quadrats during our 2019 benthic surveys at this site, however extremely sparse *Syringodium filiforme* was seen in March 2020, while visiting the site. Historical benthic data was not taken at this station, however sites nearby showed high seagrass cover prior to the die-off event.

* Location: 25.830030, -80.158600
* Salinity range: 25.14-35.87 ppt
* Depth: 2-4 feet.
* Bottom habitat: Currently dominated by *Halimeda discoidea* (previously seagrass habitat). Sediment is largely made up of Halimeda hash (remains of calcified algal discs) at the surface in a muddy matrix.
* Pollutants detected in 2019:
	+ Bottom:
		- Pesticides: 2,4 D, Bentazon, Diuron, Fluridone, Imazapyr, Tolfenpyrad
		- Pharmaceuticals: Carbamazepine
		- Artificial Sweeteners: Sucralose

BBJT71 is in the Northern Biscayne Bay Basin in the southeast section of the shoal, further from the Little River than BBBB14. This site was chosen to observe the area where some seagrass still survived or potentially had not yet been impacted by the die-off event at the initiation of the project. The southeast interior section of the shoal in the Basin was previously fully covered by dense refugia of seagrasses, with the dominant species being *Syringodium filiforme*. While there is some seagrass remaining at this site, it is very patchy and sparse. This site was impacted later than BBBB14. Historical data showed averages of 50-75% *Syringodium filiforme* cover before the die-off event, but now has on average 1% *Syringodium filiforme* cover and 3% *Halodule wrightii* cover. Historical data at this site is primarily composed of benthic surveys, but there was a short term datasonde deployment by county researchers. This site was sampled originally by United States Geological Survey (USGS**)** during Fish and Invertebrate Assessment Network surveys in 2014. Miami-Dade County then resampled this location following the seagrass die-off event. Our program established a transect in 2018 at this location for quarterly benthic surveys.

* Location: 25.821730, -80.151250
* Salinity range: 25.91-36.14 ppt
* Depth: 3-5 feet.
* Bottom habitat: Currently dominated by *Halimeda discoidea* but has a mix of seagrasses and other macroalgal species. Sediment is muddy sand with some Halimeda hash (remains of calcified algal discs).
* Pollutants detected in 2019:
	+ Bottom:
		- Pesticides: 2,4 D, Acetamiprid, Bentazon, Diuron, Fenuron, Fluridone, Imazapyr
		- Pharmaceuticals: Carbamazepine
		- Artificial Sweeteners: Sucralose

BBAP Station Deployment Timeline:

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| Station Code | Station Name | Location | Active Dates | Reason Decommissioned | Notes |
| BBLR03 | Little River (LR03) | 25.846841, -80.182861 | 4/19/2019 | NA | Model 6920 |
| BBBB14 | Tuttle Basin NW (BB14) | 25.830030, -80.158600  | 1/18/2019 | NA | Model 6600V2-4 |
| BBJT71 | Tuttle Basin SE (JT71) | 25.821730, -80.151250 | 3/5/2019 | NA | Model EXO2 |

**6) Data collection period –**

|  |
| --- |
| **Little River- BBLR03** |
| **Deployment date/time** | **Retrieval date/time** | **Notes** |
| 4/19/19 11:45 | 5/26/19 4:45 | Site Installed  |
| 6/18/19 14:45 | 7/24/19 13:45 |  |
| 7/24/19 14:45 | 8/30/19 10:30 |  |
| 8/30/19 11:00 | 9/30/19 12:00 |  |
| 9/30/19 12:30 | 10/31/19 14:30 |  |
| 10/31/19 15:00 | 11/26/19 15:00 |  |
| 11/26/19 15:15 | 12/20/19 11:15 |  |
| 12/20/19 11:30 | 1/17/20 11:45  | No data recorded |

|  |
| --- |
| **Tuttle Basin NW- BBBB14** |
| **Deployment date/time** | **Retrieval date/time** | **Notes** |
| 1/18/19 11:45 | 3/5/19 10:00 | Site installed |
| 3/12/19 14:30 | 5/15/19 10:15 |  |
| 5/16/19 16:15 | 6/25/19 10:15 |  |
| 6/26/19 14:45 | 8/27/19 10:45 |  |
| 8/30/19 10:00 | 9/26/19 10:30 |  |
| 10/4/19 10:00 | 11/6/19 10:00 |  |
| 11/8/19 13:00 | 12/9/19 13:00 |  |
| 12/11/19 13:00 | 1/8/20 10:45 |  |

|  |
| --- |
| **Tuttle Basin SE- BBJT71** |
| **Deployment date/time** | **Retrieval date/time** | **Notes** |
| 3/5/19 12:15 | 5/15/19 20:15  | Site Install |
| 5/16/19 15:15 | 6/25/19 9:30 |  |
| 6/25/19 9:45 | 8/30/19 9:15 |  |
| 8/30/19 9:30 | 10/9/19 14:00 |  |
| 10/9/19 13:45 | 11/8/19 12:30 |  |
| 11/8/19 13:45 | 12/11/19 12:00 |  |
| 12/11/19 12:15 | 1/8/19 13:15 |  |

**7) Distribution –**

The Principle Investigator (PI) retains the right to be fully credited for having collected and process the data.  Following academic courtesy standards, the Aquatic Preserve site where the data were collected should be contacted and fully acknowledged in any subsequent publications in which any part of the data are used.  The data set enclosed within this package/transmission is only as good as the quality assurance and quality control procedures outlined by the enclosed metadata reporting statement.  The user bears all responsibility for its subsequent use/misuse in any further analyses or comparisons.

Aquatic Preserve water quality data and metadata can be obtained from the Manager at the individual Aquatic Preserve site (please see Principal Investigators and Contact Persons) and online at the Aquatic Preserves data portal home page [www.floridaapdata.org](http://www.floridaapdata.org). Data are available in comma delimited format.

**8) Associated researchers and projects** (link to other products or programs) **–**

There are several agencies conducting water quality monitoring within Biscayne Bay. The following are the projects that we are aware of though there may be more.

(This Project) Florida Department of Environmental Protection (FDEP) – Biscayne Bay Aquatic Preserve (BBAP)

* Currently, three deployed datasonde stations monitor abiotic parameters at 15-minute intervals.
* In addition to the datasondes, this project involves taking monthly water quality grab samples at 17 sites. The 31 parameters are collected during water quality grab sampling, include nutrients, pharmaceuticals, herbicides, fungicides, insecticides, and chlorophyll-a. All datasonde stations are also monthly water quality grab sampling stations.
* The 21 benthic assessment sites include seagrass and macroalgae tissue sampling for elemental analyses and stable isotopes, sediment sampling & depth, Braun-Blanquet & percent cover abundance surveys, and some abiotic factors. There is quarterly sampling of eleven benthic sites and all twenty-one sites are sampled semiannually.
* <https://floridadep.gov/rcp/aquatic-preserve/locations/biscayne-bay-aquatic-preserves>

Miami-Dade County Department of Environmental Resources Management (DERM)

* Long-term monitoring for environmental data and water quality parameters within Biscayne Bay, canals, and their tributaries (BayRun program)
* Data available via request and through .pdf reports
* <http://www.miamidade.gov/environment/surface-water-quality.asp>

South Florida Water Management District (SFWMD)

* Long-term surface water quality monitoring at coastal and canal sites in central and south Biscayne Bay
* Flow monitoring from canal and river outputs around Biscayne Bay
* Groundwater, sediment, rainfall and weather monitoring data available as well
* Data stored and accessible through DBHYDRO database
* <http://my.sfwmd.gov/dbhydroplsql/show_dbkey_info.main_menu>

Miami Waterkeeper (MWK) and Florida Department of Health (DOH)

* DOH Healthy Beaches program supplemented by bay sampling from Miami Waterkeeper
* Sample monitoring for fecal indicator bacteria
* <http://www.floridahealth.gov/environmental-health/beach-water-quality/index.html>

Florida International University (FIU)

* Upcoming project on water quality and flow regime monitoring within Biscayne Bay
* Long-term water quality sampling within Biscayne Bay as part of the Southeast Environmental Research Center (SERC) Water Quality Monitoring Network
* <http://serc.fiu.edu/wqmnetwork/>
* Continuous surface parameter data available via deployed buoys in Northern Biscayne Bay
* <https://newsarchives.fiu.edu/2018/10/monitoring-buoy-deployed-to-test-water-quality-near-haulover-inlet>

National Oceanic and Atmospheric Administration (NOAA)

* Long-term water quality sampling
* Turbidity study done in Northern Biscayne Bay, including a station in the Tuttle Basin that included instrument deployments and bottle grabs.
* <https://pdfs.semanticscholar.org/70c8/c68607f1bf40bc13c331fb2d8e09213f5658.pdf>

University of Florida, Institute of Food and Agricultural Sciences (IFAS) Sea Grant Extension Program

* Biscayne Bay Water Watch Program
* Community-based volunteer monitoring program to take over SFMWD and DERM sites that lost funding
* Abiotic, nutrient, and chlorophyll a data collected
* <https://sfyl.ifas.ufl.edu/miami-dade/natural-resources/biscayne-bay-water-watch-/>

**II. Physical Structure Descriptors**

**9) Sensor specifications –**

At BBLR03, two YSI 6920s are swapped monthly. At BBBB14, one YSI 6600 V2-4 is deployed monthly. At BBJT71, two YSI EXO2s are swapped monthly.

**YSI6600V2-4 data sonde:**

Parameter: Temperature

Units: Celsius (C)

Sensor Type: Thermistor and 4 electrode cell

Model#: YSI 6560

Range: -5 to +50 ºC

Accuracy: +/- 0.15 ºC

Resolution: 0.01 unit

Parameter: Conductivity

Units: milli-Siemens per cm (mS/cm)

Sensor Type: Thermistor and 4 electrode cell

Model#: YSI 6560

Range: 0 to 100 mS/cm

Accuracy: +/- 0.5% of reading + 0.001 mS/cm

Resolution: 0.001 to 0.1 mS/cm (range dependent)

Parameter: Salinity

Units: parts per thousand (ppt)

Sensor Type: Calculated from conductivity and temperature

Range: 0 to 70 ppt

Accuracy: +/- 1.0% of reading or 0.1 ppt, whichever is greater

Resolution: 0.01 ppt

Parameter: Chlorophyll-a

Units: micrograms/liter

Sensor Type: optical, fluorescence

Model#: YSI 6425-AF

Range: 0-200 micrograms/L

Accuracy: +/- 5% reading or 1 microgram/L, whichever is greater

Parameter: Optical DO % saturation

Units: percent air saturation

Sensor Type: optical, luminescence lifetime

Model#: YSI 6450-AF ROX

Range: 0 to 500%

Accuracy: 0 to 200: +/- 1% of reading or 1% air saturation, whichever is greater; 200 to 500%: +/1 15% of reading

Resolution: 0.01 mg/L

Parameter: Optical DO mg/L

Units: milligrams/Liter (mg/L)

Sensor Type: Optical probe w/ mechanical cleaning

Model#: YSI 6450-AF ROX

Range: 0 to 50 mg/L

Accuracy: 0-20 mg/L: +/-0.1 mg/l or 1% of the reading, whichever is greater; 20 to 50 mg/L: +/- 15% of the reading

Resolution: 0.01 mg/L

Parameter: pH

Units: pH units

Sensor Type: glass combination electrode

Model#: YSI 6561

Range: 0 to 14 units

Accuracy: +/- 0.2 units

Resolution: 0.01

Parameter: Turbidity

Units: nephelometric turbidity units (NTU)

Sensor Type: optical, 90 degrees scatter

Model#: YSI 6436-AF

Range: 0 to 1000 NTU

Accuracy: +/- 2% of reading or 0.3 NTU, whichever is greater

Resolution: 0.1 NTU

Parameter: Non-vented Level – Shallow (Depth)

Units: feet or meters (ft or m)

Sensor Type: Stainless steel strain gauge

Range: 0 to 30 ft (9.1 m)

Accuracy: +/- 0.06 ft (0.018 m)

Resolution: 0.001 ft (0.001 m)

**YSI 6920 data sonde:**

Parameter: Temperature

Units: Celsius (C)

Sensor Type: Thermistor and 4 electrode cell

Model#: YSI 6560

Range: -5 to +50 ºC

Accuracy: +/- 0.15 ºC

Resolution: 0.01 unit

Parameter: Conductivity

Units: milli-Siemens per cm (mS/cm)

Sensor Type: thermistor and 4 electrode cell

Model#: YSI 6560

Range: 0 to 100 mS/cm

Accuracy: +/- 0.5 of reading+/- 0.001 mS/cm

Resolution: 0.001 to 0.1 mS/cm

Parameter: Salinity

Units: parts per thousand (ppt)

Sensor Type: Calculated from conductivity and temperature

Range: 0 to 70 ppt

Accuracy: +/- 1.0% of reading pr 0.1 ppt, whichever is greater

Resolution: 0.01 ppt

Parameter: Turbidity

Units: nephelometric turbidity units (NTU)

Sensor Type: optical, 90 degrees scatter

Model#: 6436-AF

Range: 0 to 1000 NTU

Accuracy: +/- 2% of reading or 0.3 NTU, whichever is greater

Resolution: 0.1 NTU

Parameter: pH

Units: pH units

Sensor Type: glass combination electrode

Model#: 6561

Range: 0 to 14 units

Accuracy: +/- 0.2 units

Resolution: 0.01 units

Parameter: Depth

Units: feet or meters (ft or m)

Sensor Type: Stainless steel strain gauge

Range: 0 to 30 ft (9.1 m)

Accuracy: +/- 0.06 ft (0.018 m)

Resolution: 0.001 ft (0.001 m)

**YSI EXO2 (10m depth) data sonde:**

Parameter: Total algae

Units: micrograms/Liter

Sensor Type: optical sensor

Model#: YSI 599103-01

Range: 0 to 400 µg/L chl

Accuracy: Linearity: r2 ≥ 0.999 for Rhodamine WT across full range

Resolution: 0.01 RFU or 0.01 µg/L chl

Parameter: Conductivity

Units: milli-Siemens per cm (mS/cm)

Sensor Type: 4-electrode nickel cell

Model#: YSI 599827

Range:0 to 200 mS/cm

Accuracy: 0 to 100: +/- 0.5% of reading or 0.001 mS/cm, w.i.g.; 100 to 200 +/- 1% of reading

Resolution: 0.0001 to 0.01 mS/cm

Parameter: Temperature

Units: Celsius (C)

Sensor Type: 4-electrode nickel cell

Model#: YSI 599827

Range: -5 to 35 ºC, 35 to 50 ºC

Accuracy: -5 to 35 ºC: +/- 0.01 ºC2, 35 to 50 ºC: +/- 0.05 ºC2

Resolution: 0.001 ºC

Parameter: dissolved oxygen, % air saturation

Units: percent air saturation (%)

Sensor Type: optical sensor

Model#: YSI 599100-01

Range: 0 to 500% air saturation

Accuracy: 0 to 200%: +/1 1% of reading or 1% saturation, w.i.g.; 200 to 500% +/- 5% of reading

Resolution: 0.1% air saturation

Parameter: dissolved oxygen, mg/L

Units: mg/L

Sensor Type: optical sensor

Model#: YSI 599100-01

Range: 0 to 50 mg/L

Accuracy: 0 to 20 mg/L: +/- 0.1 mg/L or 1% of reading, w.i.g.; 20 to 50 mg/L: 5% of reading

Resolution: 0.01 mg/L

Parameter: pH

Units: pH units

Sensor Type: unguarded

Model#: YSI 599702

Range: 0 to 14 units

Accuracy: +/- 0.1 pH units within +/- 10ºC of calibration temp; +/- 0.2 pH units for entire temp range

Resolution: 0.01 units

Parameter: Turbidity

Units: FNU (formazin nephelometric units)

Sensor Type: optical sensor

Model#: YSI 599101-01

Range: 0 to 4000 FNU

Accuracy: 0 to 999 FNU: 0.3 FNU or +/- 2% of reading, w.i.g.; 1000 to 4000 FNU: +/- 5% of reading

Resolution: 0 to 999 FNU=0.01 FNU; 1000 to 4000 FNU=0.1 FNU

Parameter: Depth

Units: meters

Sensor Type: integral, non-vented depth sensor

Range: 0 to 10 m

Accuracy: +/- 0.04 FS (+/- 0.004m or +/-0.013ft)

Resolution: 0.001 ft (0.001 m)

**Sensor Disclaimers:**

**Dissolved Oxygen Qualifier (Rapid Pulse/ Clark type sensor):**

The reliability of dissolved oxygen (DO) data collected with the rapid pulse / Clark type sensor after 96 hours post-deployment for non-EDS (Extended Deployment System) data sondes may be problematic due to fouling which forms on the DO probe membrane during some deployments. Some Reserves utilize the YSI 6600 EDS data sondes, which increase DO accuracy and longevity by reducing the environmental effects of fouling. Optical DO probes have further improved data reliability. The user is therefore advised to consult the metadata for sensor type information and to exercise caution when utilizing rapid pulse/ Clark type sensor DO data beyond the initial 96-hour time period. Potential drift is not always problematic for some uses of the data, i.e. periodicity analysis. It should also be noted that the amount of fouling is very site specific and that not all data are affected. If there are concerns about fouling impacts on DO data beyond any information documented in the metadata and/or QAQC flags/codes, please contact the Research Coordinator at the specific NERR site regarding site and seasonal variation in fouling of the DO sensor.

**Depth Qualifier:**

YSI data sondes can be equipped with either vented or non-vented depth/level sensors.  Readings for both vented and non-vented sensors are automatically compensated for water density change due to variations in temperature and salinity; but for all non-vented depth measurements, changes in atmospheric pressure between calibrations appear as changes in water depth.  The error is equal to approximately 1.02 cm for every 1 millibar change in atmospheric pressure and is eliminated for vented sensors because they are vented to the atmosphere throughout the deployment time interval.

Standard calibration protocol calls for all non-vented depth sensors to read 0 meters at a (local) barometric pressure of 1013.25 mb (760 mm/hg).  To achieve this, each site calibrates their depth sensor with a depth offset number, which is calculated using the actual atmospheric pressure at the time of calibration and the equation provided in the Aquatic Preserve calibration sheet or digital calibration log.  This offset procedure standardizes each depth calibration. If accurate atmospheric pressure data are available, non-vented sensor depth measurements can be corrected. The Principal Investigator should be contacted in order to obtain information regarding atmospheric pressure data availability.

**Salinity Units Qualifier:**

The 6600 series sondes report salinity in parts per thousand (ppt) units, the EXO sondes report practical salinity units (psu). These units are essentially the same and for Aquatic Preserve purposes are understood to be equivalent, however psu is considered the more appropriate designation. Moving forward the Aquatic Preserve program will assign psu salinity units for all data regardless of sonde type.

**Turbidity Qualifier:**

The 6600 series sondes report turbidity in nephelometric turbidity units (NTU), the EXO sondes use formazin nephelometric units (FNU). These units are essentially the same but indicate a difference in sensor methodology, for Aquatic Preserve purposes they will be considered equivalent. Moving forward, the Aquatic Preserve program will use FNU/NTU as the designated units for all turbidity data regardless of sonde type. If turbidity units and sensor methodology are of concern, please see the Sensor Specifications portion of the metadata.

**Chlorophyll Fluorescence Disclaimer:**

YSI chlorophyll sensors (6025 or 599102-01) are designed to serve as a proxy for chlorophyll concentrations in the field for monitoring applications and complement traditional lab extraction methods; therefore, there are accuracy limitations associated with the data that are detailed in the YSI manual including interference from other fluorescent species, differences in calibration method, and effects of cell structure, particle size, organism type, temperature, and light on sensor measurements.

**10) Coded variable definitions –**

Sampling station: Sampling site code: Station code:

Little River SE BBLR03

JT71 WI BBJT71

BB14 VA BBBB14

**11) QAQC flag definitions –**

QAQC flags provide documentation of the data and are applied to individual data points by insertion into the parameter’s associated flag column (header preceded by an F\_). During primary automated QAQC (performed by the CDMO), -5, -4, and -2 flags are applied automatically to indicate data that is missing and above or below sensor range. All remaining data are then flagged 0, passing initial QAQC checks. During secondary and tertiary QAQC 1, -3, and 5 flags may be used to note data as suspect, rejected due to QAQC, or corrected.

-5 Outside High Sensor Range

-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

 2 *Open - reserved for later flag*

 3 Calculated data: non-vented depth/level sensor correction for changes in barometric pressure

 4 Historical Data: Pre-Auto QAQC

 5 Corrected Data

**12) 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 deployment or YSI datasonde, sensor errors are sensor specific, and comment codes are used to further document conditions or a problem with the data. Only one general or sensor error and one comment code can be applied to a particular data point, but some comment codes (marked with an \* below) can be applied to the entire record in the F\_Record column.

General Errors

 GIC No instrument deployed due to ice

 GIM Instrument malfunction

 GIT Instrument recording error; recovered telemetry data

 GMC No instrument deployed due to maintenance/calibration

 GNF Deployment tube clogged / no flow

 GOW Out of water event

 GPF Power failure / low battery

 GQR Data rejected due to QA/QC checks

 GSM See metadata

Corrected Depth/Level Data Codes

 GCC Calculated with data that were corrected during QA/QC

 GCM Calculated value could not be determined due to missing data

 GCR Calculated value could not be determined due to rejected data

 GCS Calculated value suspect due to questionable data

 GCU Calculated value could not be determined due to unavailable data

Sensor Errors

 SBO Blocked optic

 SCF Conductivity sensor failure

 SCS Chlorophyll spike

 SDF Depth port frozen

 SDG Suspect due to sensor diagnostics

 SDO DO suspect

 SDP DO membrane puncture

 SIC Incorrect calibration / contaminated standard

 SNV Negative value

 SOW Sensor out of water

 SPC Post calibration out of range

 SQR Data rejected due to QAQC checks

 SSD Sensor drift

 SSM Sensor malfunction

 SSR Sensor removed / not deployed

 STF Catastrophic temperature sensor failure

 STS Turbidity spike

 SWM Wiper malfunction / loss

Comments

 CAB\* Algal bloom

 CAF Acceptable calibration/accuracy error of sensor

 CAP Depth sensor in water, affected by atmospheric pressure

 CBF Biofouling

 CCU Cause unknown

 CDA\* DO hypoxia (<3 mg/L)

 CDB\* Disturbed bottom

 CDF Data appear to fit conditions

 CFK\* Fish kill

 CIP \* Surface ice present at sample station

 CLT\* Low tide

 CMC\* In field maintenance/cleaning

 CMD\* Mud in probe guard

 CND New deployment begins

 CRE\* Significant rain event

 CSM\* See metadata

 CTS Turbidity spike

 CVT\* Possible vandalism/tampering

 CWD\* Data collected at wrong depth

 CWE\* Significant weather event

**13) Post deployment information** –

CCV values in red did not pass the established acceptance criteria for the Florida AP database. Data from the deployments that did not pass CCV were labeled as suspect. CCV values in red that are bold and have a strikethrough fell beyond 2 x the acceptance criteria and were considered a significant sensor failure and therefore the data from the deployment was rejected. Values in italics are standard values. Standard values for DO (mg/L), Chlorophyll (ug/L), BGA (ug/L) and BGA (RFU) are determined by temperature.

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| **LR03** | **Parameter** | **Specific Conductivity (uS)** | **pH** | **Turbidity (NTU)** | **Dissolved Oxygen** **(%, mg/L)** | **Depth (m)** | **Temperature** |
| **Sonde**  | **CCV Date/ Standard** | **Sp Cond CCV** | ***Std*** | **7** | **0** | **126** | **100%** | **DO CCV**  | ***Std*** | **0** | **Sonde** | ***Thermometer*** |
| 3 | 6/18/2019 | 995 | *1000* | 7.16 | 0 | 131 | *23.7* | **~~2.11~~** | ***~~8.418~~*** | - | ­- | -­ |
| 2 | 7/24/2019 | 1005 | *1000* | **~~7.43~~** | -0.06 | 120.3 | *66.8* | **~~5.6~~** | ***~~8.418~~*** | -0.029 | ­- | ­- |
| 3 | 8/30/2019 | 97619 | *100000* | 6.91 | -3.6 | 127.3 | 209.5 | **~~16.56~~** | ***~~8.418~~*** | -0.006 | ­- | -­ |
| 2 | 9/30/2019 | 97382 | *100000* | 6.77 | -0.1 | 124.5 | ­- | ­- | ­- | 0.001 | 23.99 | *24.2* |
| 3 | 10/31/2019 | 95868 | *100000* | 7.06 | -0.7 | 125.9 | ­- | -­ | ­- | 0.011 | 27.73 | *27.9* |
| 2 | 11/26/2019 | 100507 | *100000* | **~~6.48~~** | 0.2 | 126.1 | ­- | ­- | ­- | 0.005 | 28.82 | *29* |
| 3 | 12/20/2019 | 99576 | *100000* | 7.37 | -0.2 | 125.7 | ­- | ­- | ­- | 0.076 | 21.66 | *22* |
| 2 | 1/17/2020 | 100007 | *100000* | 6.77 | 0 | 128.8 | ­- | -­ | ­- | 0.04 | 22.11 | *22.4* |

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **BB14** | **Parameter** | **Specific Conductivity (uS)** | **pH** | **Turbidity (NTU)** | **Chlorophyll (ug/L)** |
| **Sonde**  | **Date/Standard** | **Sp Cond CCV** | ***Std*** | **pH CCV** | ***Std*** | **0** | **126** | **0** | **Chl CCV** | ***Std*** |
| 1 | 3/8/2019 | 51474 | *50000* | 7.16 | *7* | 1.1 | 129.3 | -0.1 | 108.7 | *113* |
| 1 | 5/15/2019 | 10059 | *10000* | 10.13 | *10* | - | **~~119.3~~** | 0.3 | ­- | ­- |
| 1 | 6/25/2019 | 1012 | *1000* | 6.96 | *7* | 1.2 | 126.4 | -0.2 | 101 | *105.4* |
| 1 | 8/27/2019 | 1039 | *1000* | 6.99 | *7* | 4.3 | 127.2 | -0.2 | 152.4 | *108.6* |
| 1 | 9/26/2019 | 100297 | *100000* | **~~4.58~~** | *7* | 2.2 | 127.6 | -0.2 | 107.8 | *108* |
| 1 | 11/6/2019 | 97502 | *100000* | 7.07 | *7* | 2.1 | 125.3 | -0.2 | 106.6 | *105.4* |
| 1 | 12/9/2019 | 99823 | *100000* | 6.91 | *7* | -0.4 | 125.5 | -0.2 | 105.3 | *108.2* |
| 1 | 1/8/2019 | 98891 | *100000* | 6.99 | *7* | -2 | 124 | -0.2 | 106.5 | *108* |

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **BB14****Cont.** | **Parameter** |  | **Dissolved Oxygen (%, ug/L)** | **Depth (m)** | **Temperature** |
| **Sonde**  | **Date/Standard** |  | **100%** | **DO CCV**  | ***Std*** | **0** | **Sonde** | ***Thermometer*** |
| 1 | 3/8/2019 |  | 101.5 | 9.01 | *8.915* | - | ­- | -­ |
| 1 | 5/15/2019 |  | 100.8 | 8.4 | *8.263* | 0.082 | ­- | ­- |
| 1 | 6/25/2019 |  | 102 | 8.55 | *8.418* | 0.004 | ­- | -­ |
| 1 | 8/27/2019 |  | 98.8 | 7.9 | *7.968* | -0.061 | ­- | ­- |
| 1 | 9/26/2019 |  | 99.6 | 8.47 | *8.578* | 0.004 | 25.46 | *25.6* |
| 1 | 11/6/2019 |  | 97.8 | 8.42 | *8.578* | 0.042 | 24.05 | *24.3* |
| 1 | 12/9/2019 |  | 99.2 | 8.68 | *8.743* | 0.016 | 22.95 | *23.2* |
| 1 | 1/8/2019 |  | 100.3 | 9.13 | *9.092* | 0.059 | ­- | ­- |

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| **JT71** | **Parameter** | **Specific Conductivity (uS)** | **pH** | **Turbidity (FNU)** | **Chlorophyll-a (ug/L)** | **Chlorophyll- BGA (ug/L)** |
| **Sonde**  | **Date/****Standard** | **Sp Cond** **CCV** | ***Std*** | **pH CCV** | ***Std*** | **0** | **124** | **0** | **Chl CCV** | ***Std*** | **0** | **Chl CCV** | ***Std*** |
| 5/B | 5/17/2019 | 49352.2 | *50000* | **~~4.8~~** | ***~~7~~*** | 0.01 | 129.35 | - | 56.06 | *62.51* | ­- | ­- | ­- |
| 4/A | 6/25/2019 | 1003.2 | *1000* | 7.19 | *7* | -0.92 | 125.61 | *0.08* | 58.18 | *60.78* | ­- | -­ | ­- |
| 5/B | 8/30/2019 | 101597 | *100000* | 7.35 | *7* | 0.66 | 124.85 | -0.03 | 62.96 | *62.07* | ­- | ­- | ­- |
| 4/A | 10/10/2019 | 101243.2 | *100000* | 7.16 | *7* | 1.51 | 124.13 | 0.11 | 63.18 | *62.29* | -0.03 | 115.72 | *117.25* |
| 5/B | 11/8/2019 | 101764 | *100000* | 7.08 | *7* | 0.01 | 124.61 | -0.25 | 63.63 | *62.07* | -0.18 | 117.5 | *116.75* |
| 4/A | 12/12/2019 | 102218.2 | *100000* | 7.06 | *7* | 0.11 | 124.67 | 0.02 | 64.76 | *62.51* | -0.1 | 116.73 | *117.75* |
| 5/B | 1/8/2020 | 101890.7 | *100000* | 7.11 | *7* | 0.14 | 120.17 | 0.09 | 61.49 | *64.625* | -0.02 | 122.09 | *122.7* |

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **JT71 (Cont.)** | **Parameter** | **Chlorophyll- BGA (RFU)** | **Dissolved Oxygen (%, ug/L)** | **Depth (m)** | **Temperature** |
| **Sonde**  | **Date/Standard** | **0** | **Chl CCV** | ***Std*** | **100%** | **DO CCV**  | ***Std*** | **0** | **Sonde** | ***Thermometer*** |
| 5/B | 5/17/2019 | ­- | ­- | ­- | *101.9* | 8.263 | *8.19* | -0.021 | ­- | -­ |
| 4/A | 6/25/2019 | ­- | -­ | ­- | *101* | 8.55 | *8.418* | 0.028 | ­- | ­- |
| 5/B | 8/30/2019 | ­- | ­- | ­- | 100.1 | 8.09 | *8.113* | -0.028 | ­- | -­ |
| 4/A | 10/10/2019 | 0.01 | 41.29 | *41.9* | 100.5 | 8.45 | *8.418* | 0.016 | 22.249 | *26.3* |
| 5/B | 11/8/2019 | -0.03 | 42 | *41.7* | 99.6 | 8.42 | *8.915* | 0.004 | 23.393 | *23.5* |
| 4/A | 12/12/2019 | 0.004 | 41.49 | *42.1* | 101 | 8.61 | *8.578* | 0.021 | 23.868 | *24* |
| 5/B | 1/8/2020 | -0.03 | 44.4 | *43.9* | 101 | 8.99 | *8.915* | 0.089 | 21.015 | *21.3* |

**14) Other remarks/notes –**

Data are missing due to equipment or associated specific probes not being deployed, equipment failure, time of maintenance or calibration of equipment, or repair/replacement of a sampling station platform. If additional information on missing data is needed, contact the Aquatic Preserve office. Copies of the calibration/deployment logs can be obtained through the Water Quality Specialist.

All data files are QAQC’d using the 2012 CDMO Excel macro. This macro automatically flags DO values less than 3 mg/L as Passed Initial QAQC Checks with the comment DO Hypoxia (<3 mg/L) (0, CDA). The DO flag is based on Federal standards. During the primary QAQC session, any reading that falls outside a sensor’s range (see section II. Physical Structure descriptors) is rejected (-3). Additionally, negative turbidity readings between (0) and (-2) have been automatically flagged as suspect data (1, CAF) since the value is within the accuracy of the probe per the CDMO operations manual. All negative chlorophyll readings are labeled as (-4) since they fall outside the chlorophyll sensor range and are manually rejected during QAQC (-3, SNV). All the first data points for each new deployment are labeled (0, CND).

The only parameters that are QAQC’d are depth (m), temperature (°C), salinity (ppt), specific conductance (mS), turbidity (FNU/NTU), pH (SU), DO (mg/L and %) and chlorophyll (ug/L). All other parameters have not been QC’d.

All data collected after the 30-day mark on a deployment is noted in the F\_Record column of the dataset with {CSM}. No viable DO or Chlorophyll data exists for LR03 in 2019.

All turbidity readings over 124 FNU/126 NTU are rejected (-3, STS) since they are out of the calibration range that BBAP applies (0-124/126 FNU/NTU). All chlorophyll readings over the upper calibration value are rejected (-3, SCS) since they are out of the calibration range (varies by deployment). Additionally, for Biscayne Bay, anomalous turbidity and chlorophyll spikes are labeled suspect (1, STS/SCS) if BOTH of the following conditions apply:

1. Data point is not within a well-defined peak (e.g., there is no incremental increase before data point or decrease after data point based on the neighboring readings)
2. The previous and next data points are BOTH less than the data point by the calculated value: STANDARD DEVIATION\*3 (SD calculated after rejected data removed)

For LR03, turbidity values > 10.75 NTU from the previous and next data point were marked (1, STS).

For BB14, turbidity values > 32.06 NTU from the previous and next data point were marked (1, STS). Chlorophyll values > 11.51 ug/L from the previous and next data point were marked (1, SCS).

For JT71, turbidity values > 13.23 FNU from the previous and next data point were marked (1, STS). Chlorophyll values > 3.1 ug/L from the previous and next data point were marked (1, SCS).

These readings may either be caused by optical interference by animals or fouling, or an unknown local disturbance. Readings within a well-defined peak were maintained and given a (0) flag.

January 1-31, 2019

BBLR03

 (CSM) Missing: No sonde deployed

BBBB14

 (CSM) Missing: 1/1 0:00 - 1/18 9:00, No sonde deployed

 Suspect: Chlorophyll for 1/28 4:00, Anomalous chlorophyll spike

BBJT71

(CSM) Missing: No sonde deployed

February 1-28, 2019

BBLR03

 (CSM) Missing: No sonde deployed

BBBB14

 Suspect: Turbidity for 2/27 11:30, 2/28 9:45, 2/28 21:30 and 2/28 22:45, Anomalous turbidity spike

Reject: Turbidity for 2/3 23:30, 2/28 19:45, 2/28 21:15, 2/28 22:30 and 2/28 23:00, Outside calibration range turbidity spike (>124 FNU)

{CSM}: All parameters for 2/18 9:30 – 2/28 23:45, Deployment passed 30 days

BBJT71

(CSM) Missing: No sonde deployed

March 1-31, 2019

BBLR03

 (CSM) Missing: No sonde deployed

BBBB14

 Missing: 3/5 10:00 – 3/12 14:15, Sonde out for maintenance

Suspect: Turbidity for 3/1 2:30, 3/1 7:45, 3/1 8:00, 3/1 21:00, 3/1 21:30, 3/2 11:15, Anomalous turbidity spike

Suspect: Salinity and Specific conductivity for 3/29 9:15-9:45, Sensor malfunction

Reject: Turbidity for 3/1 7:15, 3/1 9:15 and 3/2 11:45, Outside calibration range turbidity spike (>124 FNU)

{CSM}: All parameters for 3/1 0:00 – 3/5 9:45, Deployment passed 30 days

BBJT71

Suspect: Turbidity for 3/25 11:00, Anomalous turbidity spike

Suspect: Chlorophyll for 3/25 11:00, Anomalous chlorophyll spike

Suspect: Salinity and Specific conductance for 3/27 2:30, Sensor malfunction

(CSM) Missing: 3/1 0:00 – 3/5 12:15, No sonde deployed

Reject: pH (SU and mV) for 3/5 12:15 – 3/31 23:45, Pre- and Post-deployment verification check out of range

April 1-30, 2019

BBLR03

 (CSM) Missing: 4/1 0:00 – 4/19 11:30, No sonde deployed

 Reject: DO (ug/L and %) for 4/19 11:30 – 4/30 23:45, Sensor malfunction

BBBB14

 Suspect: Turbidity for 4/10 15:00, Anomalous turbidity spike

 Reject: Turbidity for 4/20 6:45, Outside calibration range turbidity spike (>124 FNU)

 Reject: Turbidity for 4/21 0:00 – 4/30 23:45, Sensor drift

 {CSM}: All parameters for 4/12 14:45 – 4/30 23:45, Deployment passed 30 days

BBJT71

Reject: pH (SU and mV) for 4/1 0:00 – 4/30 23:45, Pre- and Post-deployment verification check out of range

{CSM}: All parameters for 4/5 12:30 – 4/30 23:45, Deployment passed 30 days

May 1-31, 2019

BBLR03

 Missing: 5/26 5:00 – 5/31 23:45, Battery failure

 Suspect: Turbidity for 5/20 12:45, 5/22 23:00, 5/23 5:30 and 5/26 4:30, Anomalous turbidity spike

 Reject: DO (ug/L and %) for 5/1 0:00 – 5/26 4:45, Sensor malfunction

 {CSM}: All parameters for 5/19 12:00 – 5/26 4:45, Deployment passed 30 days

BBBB14

 Missing: 5/15 10:30 – 5/16 16:00, Out for maintenance

 Suspect: Salinity and Specific conductivity for 5/14 3:15, Sensor malfunction

 Reject: Turbidity for 5/14 3:15, Outside calibration range turbidity spike (>124 FNU)

 Reject: Turbidity for 5/1 0:00 – 5/15 10:15, Sensor drift

{CSM}: All parameters for 5/1 0:00 – 5/15 10:15, Deployment passed 30 days

BBJT71

Missing: 5/15 20:30 – 5/16 15:00, Battery failure

Suspect: 5/6 14:00, 5/12 5:15 and 5/14 9:00 Anomalous turbidity spike

Suspect: Chlorophyll for 5/14 9:00, 5/15 20:00 and 5/22 13:45, Anomalous chlorophyll spike

Reject: pH (SU and mV) for 5/1 0:00 – 5/15 20:15, Pre- and Post-deployment verification check out of range

{CSM}: All parameters for 5/1 0:00 – 5/15 20:15, Deployment passed 30 days

June 1-30, 2019

BBLR03

 Missing: 6/1 0:00 – 6/18 14:30, Battery failure

 Suspect: Turbidity for 6/18 14:45 – 6/30 23:45, Post-deployment verification check out of range

 Suspect: pH (SU and mV) for 6/18 14:45 – 6/30 23:45, Sensor malfunction

Reject: DO (ug/L and %) for 6/18 14:45 – 6/30 23:45, Sensor malfunction

BBBB14

 Missing: 6/25 10:30 – 6/26 14:30, Out for maintenance

Suspect: Salinity and Specific conductivity for 6/2 4:30-4:45, 6/2 5:30-6:00 and 6/2 6:45, Sensor malfunction, historic precipitation data shows 0-in of rainfall

Reject: Turbidity for 6/7 22:45, Outside calibration range turbidity spike (>124 FNU)

{CSM}: All parameters for 6/16 16:30 – 6/25 10:15, Deployment passed 30 days

BBJT71

 Suspect: Salinity and Specific conductivity for 6/8 19:30, Sensor malfunction

 Suspect: Turbidity for 6/12 11:15, Anomalous turbidity spikw

 {CSM}: All parameters for 6/16 15:30 – 6/25 9:30, Deployment passed 30 days

July 1-31, 2019

BBLR03

 Missing: 7/24 14:00 – 7/24 14:30. Out for maintenance

Suspect: pH (SU and mV) for 7/1 0:00 – 7/24 13:45, Sensor malfunction

Suspect: Turbidity for 7/1 0:00 – 7/24 13:45, Post-deployment verification check out of range

 Reject: Turbidity for 7/27 2:00, Outside calibration range turbidity spike (>124 FNU)

Reject: DO (ug/L and %) for 7/1 0:00 – 7/24 13:45 and 7/24 14:45 – 7/31 23:45, Sensor malfunction

{CSM}: All parameters for 7/18 15:00 – 7/24 13:45, Deployment passed 30 day

BBBB14

Suspect: Chlorophyll for 7/16 1:45-2:00, Anomalous chlorophyll spike, Algae on probe

Suspect: Turbidity for 7/9 19:15, 7/10 18:45, 7/19 22:45, 7/20 1:00, 7/20 1:45, 7/20 5:00-5:30 and 7/31 00:45, Anomalous turbidity spike

Reject: Turbidity for 7/3 0:15, 7/4 3:45, 7/12 20:30, 7/19 4:15, 7/20 0:30, 7/20 0:45, 7/20 2:00, 7/20 3:00 and 7/31 0:30, Outside calibration range turbidity spike (>124 FNU)

{CSM}: All parameters for 7/26 15:00 – 7/31 23:45, Deployment passed 30 days

BBJT71

 Suspect: Turbidity for 7/13 4:00, Anomalous turbidity spike

Suspect: Chlorophyll for 7/12 5:00, Anomalous chlorophyll spike

{CSM}: All parameters for 7/25 10:00 – 7/31 23:45, Deployment passed 30 days

August 1-31, 2019

BBLR03

 Missing: 8/30 10:45, Out for maintenance

Suspect: Turbidity for 8/1 18:15, 8/2 19:00, 8/3 17:30, 8/4 12:15, 8/4 15:15, 8/9 8:45, 8/12 11:45, 8/14 8:45, 8/23 23:00, 8/25 10:45, 8/27 17:30, 8/29 9:30 and 8/29 18:00, Anomalous turbidity spike

Suspect: pH (SU and mV) for 8/30 11:00 – 8/31 23:45, Post-deployment verification check out of range

 Reject: Turbidity for 8/10 6:45, Outside calibration range turbidity spike (>124 FNU)

Reject: DO (ug/L and %) for 8/1 0:00 – 8/30 10:30 and 8/30 11:00– 8/31 23:45, Sensor malfunctioning, Probe removed after CCV

 {CSM}: All parameters for 8/24 15:00 – 8/30 10:30, Deployment passed 30 days

BBBB14

 Missing: 8/27 11:00 – 8/30 9:45, Out for maintenance

Suspect: Turbidity for 8/1 20:15, 8/1 21:45, 8/1 22:30, 8/2 1:15 and 8/11 16:45, Anomalous turbidity spike, Fish seen in mount at retrieval

Suspect: Chlorophyll-a for 8/3 13:30, 8/3 14:45, 8/22 22:15 and 8/26 15:15, Anomalous chlorophyll spike

Suspect: DO (ug/L and %) for 8/30 9:30, Sensor malfunciton

Reject: Turbidity for 179 data points within August, Outside calibration range turbidity spike (>124 FNU), Fish seen in mount at retrieval

Reject: Chlorophyll for 8/21 13:00, Outside calibration range chlorophyll spike (>62.18 ug/L)

 {CSM}: All parameters for 8/1 0:00 – 8/27 10:45, Deployment passed 30 days

BBJT71

Suspect: pH (SU and mV) for 8/21 23:45 – 8/30 9:15, Pre- and Post-deployment verification check out of range, Probe changed after CCV

Suspect: Turbidity for 8/10 5:45, 8/14 1:00, 8/15 5:30, 8/25 5:45, 8/26 7:45, 8/27 7:30, 8/28 4:15, 8/28 4:30, 8/30 4:00, 8/30 4:45, 8/31 19:30 and 8/31 19:45, Anomalous turbidity spike

Suspect: Chlorophyll for 8/14 8:45, 8/25 11:00, 8/26 17:30, 8/29 4:15, 8/30 3:45, 8/30 4:45 and 8/30 22:45, Anomalous chlorophyll spike

 {CSM}: All parameters for 8/1 0:00 – 8/30 9:15, Deployment passed 30 days

September 1-30, 2019

*Hurricane Dorian affected all data at all stations 09/03 through 09/05*

BBLR03

 Missing: 9/30 12:15, Out for maintenance

Suspect: pH (SU and mV) for 9/1 0:00 – 9/30 12:00, Post-deployment verification check out of range

Reject: Turbidity for 9/5 0:00, Outside calibration range turbidity spike (>124 FNU)

Reject: DO (ug/L and %) for 9/1 0:00 – 9/30 12:00 and 9/30 12:30 – 9/30 23:45, Probe removed

BBBB14

 Missing: 9/26 10:45 – 9/30 23:45, Out for maintenance

 Suspect: Turbidity for 9/12 17:00, 9/13 8:00, 9/14 5:45, 9/17 14:00, 9/21 12:15, 9/22 14:00, 9/22 14:45, 9/22 15:00, 9/23 15:15, 9/24 8:30 and 9/25 17:30, Anomalous turbidity spike

Suspect: Chlorophyll for 9/10 9:00, 9/13 5:00, 9/13 20:45, 9/18 20:15 and 9/19 3:30, Anomalous chlorophyll spike

Reject: Turbidity for 9/14 0:45, 9/16 5:30, 9/16 13:00,9/17 7:45, 9/17 11:15, 9/17 16:45, 9/17 17:00, 9/18 14:30, 9/21 16:45 and 9/23 15:00, Outside calibration range turbidity spike (>124 FNU) (fish seen in mount at deployment)

(CSM) Reject: pH (SU and mV) for 9/11 20:00 – 9/26 10:30, pH probe removed by biofouling and failed CCV

BBJT71

Missing: 9/10 9:00 – 9/12 10:00, Instrument malfunction, cause unknown

Suspect: Turbidity for 9/1 12:45, 9/1 14:45, 9/1 16:15, 9/11 17:30, 9/2 13:30, 9/7 3:45, 9/7 6:30, 9/7 18:00, 9/7 23:30, 9/8 10:15, 9/9 21:15, 9/10 6:30, 9/15 3:15, 9/16 22:15, 9/18 5:15, 9/18 16:15, 9/21 3:00, 9/22 12:15, 9/23 3:30, 9/26 21:15, 9/27 3:15, 9/278:00, 9/27 8:45, 9/27 13:30, 9/27 15:15, 9/28 2:00, 9/29 23:15 and 9/30 22:00, Anomalous turbidity spike

Suspect: Chlorophyll for 9/1 16:15, 9/14 21:15, 9/15 3:15, 9/18 4:30, 9/23 1:00, 9/24 2:30, 9/27 8:00, 9/28 1:45, 9/28 7:15 and 9/30 8:00, Anomalous chlorophyll spike

Reject: Turbidity for 9/10 7:30, 9/18 4:30, 9/24 12:00 and 9/27 9:45, Outside calibration range turbidity spike (>124 FNU)

(CSM) Reject: Specific conductance and salinity for 9/7 6:30, uncharacteristic salinity/conductivity drop– no associated weather event

 {CSM}: All parameters for 9/30 9:45 – 9/30 23:45, Deployment passed 30 days

October 1-31, 2019

BBLR03

 Missing: 10/31 14:45, Out for maintenance

Missing: 10/20 6:45, 10/20 7:00, 10/23 16:15, 10/27 0:45 and 10/27 1:00, Sonde malfunction, not sure why sonde stopped collecting data

 Suspect: Turbidity for 10/19 9:30, 10/22 7:45, 10/22 12:30 and 10/30 11:15, Anomalous turbidity spike

Suspect: pH (SU and mV) for 10/31 15:00 – 10/31 23:45, Post-deployment verification check out of range

Reject: DO (ug/L and %) for 10/1 0:00 – 10/20 6:30, 10/20 7:15 – 10/23 16:00, 10/23 16:30 – 10/27 0:30, 10/27 1:15 - 10/31 14:30 and 10/31 15:00 – 10/31 23:45, Probe removed

BBBB14

 Missing: 10/1 0:00 – 10/4 9:45, Out for maintenance

 Suspect: Chlorophyll for 10/15 7:45, Anomalous chlorophyll spike

Suspect: Turbidity for 10/8 9:15, Anomalous turbidity spike (Fish seen in mount at retrieval)

Reject: Turbidity for 10/8 3:15, Outside calibration range turbidity spike (>124 FNU)

BBJT71

Missing: 10/9 13:45 – 10/9 14:00, Out for maintenance

Suspect: Salinity and Specific conductivity for 10/30 17:15, Sensor malfunction

Suspect: Turbidity for 10/2 4:15, 10/4 3:15, 10/4 3:45, 10/7 9:00, 10/7 19:00, 10/8 15:00, 10/23 15:00, 10/23 17:45, 0/24 15:00, 10/24 16:00 and 10/25 17:30, Anomalous turbidity spike (Crabs seen in mount at deployment)

Suspect: Chlorophyll for 10/3 1:00, 10/4 18:30, 10/7 2:45, 10/7 4:00, 10/7 4:45, 10/8 0:15 and 10/9 7:30, Anomalous chlorophyll spike

Reject: Turbidity for 10/23 16:15, 10/23 16:45, 10/23 17:15, 10/24 17:30, 10/25 16:45, 10/25 17:45 and 10/30 17:15, Outside calibration range turbidity spike (>124 FNU) (Crabs seen in mount at deployment)

{CSM}: All parameters for 10/1 0:00 – 10/9 13:30, Deployment passed 30 days

November 1-30, 2019

BBLR03

Suspect: pH (SU and mV) for 11/1 0:00 – 11/26 15:00, Post-deployment verification check out of range

Reject: DO (ug/L and %) for 11/1 0:00 – 11/30 23:45, Probe removed

BBBB14

 Missing: 11/6 10:15 – 11/8 12:45, Out for maintenance

Suspect: Turbidity for 11/17 21:00, Anomalous turbidity spike

BBJT71

Suspect: Salinity and Specific conductivity for 11/5 10:15, Sensor malfunction

Suspect: Turbidity for 11/8 13:45, Anomalous turbidity spike

Suspect: Chlorophyll for 11/3 9:30 ad 11/8 2:45, Anomalous chlorophyll spike

Reject: Turbidity for 11/3 9:30, 11/7 8:15 and 11/7 16:45-17:45, Outside calibration range turbidity spike (>124 FNU)

December 1-31, 2019

BBLR03

 Missing: 12/20 11:30 – 12/31 23:45, Deployment failure

Reject: DO (ug/L and %) for 12/1 0:00 – 12/20 11:15, Probe removed

BBBB14

 Missing: 12/9 13:15 – 12/11 12:45, Out for maintenance

BBJT71

Suspect: Turbidity for 12/16 9:15, 12/16 14:00, 12/16 16:15 an d12/18 12:30, Anomalous turbidity spike

**15) Acknowledgement:**

The data included with this document were collected by the staff of the Florida Department of Environmental Protection at Biscayne Bay Aquatic Preserves. Any products derived from these data should clearly acknowledge this source (please use the attached logos). This recognition is important for ensuring that this long-term monitoring program continues to receive the necessary political and financial support.