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

**January 2022 – December 2022**

**Latest Update:** 10/30/2022

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 Ellyn.Willse@FloridaDEP.gov with any additional questions.

**I. Data Set and Research Descriptors**

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

Griffin Alexander - Biscayne Bay Aquatic Preserves Manager

(786) 798-4511, Griffin.N.Alexander@FloridaDEP.gov

1277 NE 79th St., Miami FL, 33138

* Project supervisor, field assistance, grant report writer

Ellyn Willse - Water Quality Specialist

(786) 798-4512, Ellyn.Willse@FloridaDEP.gov

1277 NE 79th St., Miami FL, 33138

* Datasonde specialist, telemetry coordinator, water quality data analyst, Quality Assurance/ Quality Control (QAQC) officer, data handling, field assistance, datasonde calibration & deployment, field and lab logistics manager, grant report writer, metadata report preparer

Leah Leyland – Water Quality Technician

(786) 798-4515, Leah.Leyland@FloridaDEP.gov

1277 NE 79th St, Miami, FL 33138

* Field assistance, datasonde calibration & deployment, data handling, grant report writer, lab maintenance and organization

**2) Entry verification –**

Deployment data are uploaded from the YSI datasonde 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), KOR EXO v2.3.10.0 , or KOR v1.2.18.0 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 datasonde is accepted as being the most accurate. For more information on QAQC flags and codes, see Sections 11 and 12.

Data was handled by Claire Burgett from January 2019 - January 2020 and then by Aliza Karim from February 2020 - May 2022. Data was handled by Ellyn Willse from May 2022 - 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, seven 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 22 sites with both surface and bottom samples taken at two sites, LR03, and MRSC. There are 38 parameters 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 31 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. All 31 sites are sampled semiannually.

**4) Research methods –**

YSI datasondes are deployed monthly at seven locations, BBLR03, BBBB14, BBJT71, BBMRSC, BBMRDW, BBMRRB and BBCWA4. 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 swapped at the time of retrieval.

All time is reported as Eastern Standard Time.

A YSI 6600 datasonde (site: BBBB14) was operating in the Basin until April 15th, 2020. Currently, YSI EXO2 sondes are swapped at each deployment. 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.

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 were operating in the Basin until March 17th, 2020. Currently, YSI EXO2 sondes are swapped at each deployment. 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.

BBAP was granted EPA funding to expand the water quality program into the Miami River and Rickenbacker basin in 2019. The seagrass in this basin showed resilience to the die-off event but there is more stakeholder/researcher concerns due to the outflow of water through the Government Cut inlet and onto the coral reef tracks.

With this EPA funding, we established two sites in the Miami River in March 2021 and two sites in the Rickenbacker basin in January 2022.

In the Miami River, downstream of a tributary that is known to release nutrient/metal pollutants, an EXO2 site was established on March 31st, 2021 (site: BBMRDW). The sonde is placed into a vertically deployed mount that is constructed from PVC (with flow through holes) and steel chain attached to a river anchor. The mount is attached to a dock and the sonde is retrieved by lifting the PVC mount out of the water.

At the salinity control structure of the Miami River, which is about 9 miles upriver, an EXO2 site was established on March 26th, 2021 (site: BBMRSC). The sonde is placed into a vertically deployed mount that is constructed from PVC (with flow through holes) and steel chain attached to a river anchor. The mount is attached to a concrete seawall and the sonde is retrieved by lifting the PVC mount out of the water.

Near the mouth of the Miami River, EXO2 site BBMRRB was established January 13th, 2022. The sonde is placed in a vertically deployed mount that is constructed from PVC (with flow through holes) attached to an FWC owned piling with custom brackets.

EXO2 Site BBCWA4 is located on the edge of the Bill Sadowski Critical Wildlife Area. It was established January 18th, 2022. The sonde is placed in a vertically deployed mount that is constructed from PVC (with flow through holes) attached to an FWC owned piling with custom brackets.

The locations for sites BBMRSC, BBMRDW, BBMRBB and BBCWA4 follow the path of water down the Miami River and out into the Bay.

Specific conductance, pH, turbidity, depth, chlorophyll and dissolved oxygen are calibrated on the EXO2s. 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 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 Tal-PE sensor on the EXO 2 is calibrated for chlorophyll-a (ug/L, RFU) and Blue-Green Algae – Phycoerythrin (BGA) (RFU).

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 for chlorophyll using a fluorometric method, allowing for verification of sonde chlorophyll readings.

**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: 0.0 – 35.0 ppt
* Depth: 0.01 – 1.48 m (it’s about 10 feet in center of river; sonde is up against the seawall)
* Bottom habitat: bare muddy sediment
* Pollutants detected in 2022:
	+ Surface:
		- **Pesticides:** 2,4 D, Bentazon, Clothianidin, Dinotefuran, Diuron, Fluridone, Imazapyr, Imidacloprid, Silvex
		- **Pharmaceuticals:** Acetaminophen, Carbamazepine, Primidone
		- **Artificial Sweeteners:** Acesulfame-K, Sucralose
	+ Bottom
		- **Pesticides**: 2,4 D, Bentazon, Clothianidin, Dinotefuran, Diuron, Fluridone, Imazapyr, Imidacloprid
		- **Pharmaceuticals:** Acetaminophen, Carbamazepine, Primidone
		- **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: 25.83003, -80.15860
* Salinity range: 14.6 – 36.0 ppt
* Depth: 0.12 – 2.0 m
* Bottom habitat: Currently dominated by *Halimeda discoidea* (previously seagrass habitat). Seagrass began reappearing at the site in early 2020 and there are currently patches of *Syringodium filiforme*. Sediment is largely made up of Halimeda hash (remains of calcified algal discs) at the surface in a muddy matrix.
* Pollutants detected in 2022:
	+ Bottom:
		- **Pesticides:** 2,4 D, Bentazon**,** Diuron**,** Fluridone, Imazapyr**,** Imidacloprid,
		- **Pharmaceuticals:** Acetaminophen, Carbamazepine
		- **Artificial Sweeteners:** Acesulfame -K, 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: 24.2 – 35.9 ppt
* Depth: 0.42 – 2.24 m
* 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 2022:
	+ Bottom:
		- **Pesticides:** 2,4 D,Bentazon**,** Diuron, Fluridone**,** Imazapyr**,** Imidacloprid
		- **Pharmaceuticals:** Acetaminaphen,Carbamazepine
		- **Artificial Sweeteners:** Sucralose

BBMRDW is located about 1.5-miles upriver from the mouth of the Miami River, downriver of the intersection with Wagner Creek, which is suspected to be a major source of nutrients and pollutants (such as heavy metals). The Miami River outflows into the Rickenbacker Basin shoal and then out the Government Cut inlet which leads out to an offshore coral reef tract. The site is tidally influenced in the wet season and well mixed in the dry season. Water quality in the area is poor with nutrient sources coming from urban run-off and development. There is also significant amount of cargo ship traffic through the Miami River.

* Location: 25.7773, -80.2040
* Salinity range: 0.7 – 34.2 ppt
* Depth: 0.35 – 1.92 m
* Bottom habitat: bare muddy sediment with some hard substrate lining the seawall
* Pollutants detected in 2021
	+ Bottom
		- **Pesticides**: 2,4 D, Bentazon, Dinotefuran, Diuron, Fenuron, Fluridone, Imazapyr, Imidacloprid
		- **Pharmaceuticals:** Acetaminophen, Carbamazepine, Ibuprofen, Naproxen
		- **Artificial Sweeteners:** Acesulfame-K, Sucralose

BBMRSC is located about 9.1-miles upriver from the mouth of the Miami River, downriver of a salinity control structure. The potential nutrient and pollutant sources are from urban run-off. The Miami River outflows into the Rickenbacker Basin shoal and then out the Government Cut inlet which leads out to an offshore coral reef tract. The site is tidally influenced in the wet season and well mixed in the dry season. Freshwater inflow from the salinity control structure varies depending on management actions, rainfall, and timed releases of Lake Okeechobee water.

* Location: 25.8072, -80.2599
* Salinity range: 0.2 – 26.2 ppt
* Depth: 0.89-2.48 m
* Bottom habitat: bare muddy sediment
* Pollutants detected in 2022
	+ Surface:
		- **Pesticides:** 2,4 D, Bentazon, Dinotefuran, Diuron, Fluridone, Imazapyr, Imidacloprid
		- **Pharmaceuticals:** Acetaminophen, Carbamazepine, Primidone
		- **Artificial Sweeteners:** Acesulfame-K, Sucralose
	+ Bottom
		- **Pesticides**: 2,4 D, Bentazon, Diuron, Fluridone, Imazapyr, Imidacloprid
		- **Pharmaceuticals:** Carbamazepine
		- **Artificial Sweeteners:** Sucralose

BBCWA4 is located in the Rickenbacker Basin shoal on the western edge of the Bill Sadowski Critical Wildlife Area. This site is tidally influenced and receives water from offshore via Government cut inlet and freshwater input from the Miami River. This site is adjacent to an area of dense seagrass habitat.

* Location: 25.758020, -80.167690
* Salinity range: 27.6-37.6
* Depth: 3.07-1.93
* Bottom habitat: mixed seagrass and sponge habitat, near dense seagrass
* Pollutants detected in 2022
	+ - **Pesticides:** 2,4 D, Bentazon, Fenuron, Imazapyr
		- **Pharmaceuticals:**
		- **Artificial Sweeteners:** Sucralose

BBMRRB is located in the Rickenbacker Basin at the confluence of the Miami River and the bay. This area receives heavy boat traffic. This site was selected to monitor water flowing out of the Miami River as it makes its way into the basin and offshore via Government cut inlet.

* Location: 25.769800, -80.180850
* Salinity range: 25.9-37.3 ppt.
* Depth: 2.65-1.40 m
* Bottom habitat: very sparse seagrass, mostly bare ground
* Pollutants detected in 2022
	+ - **Pesticides:** Bentazon, Imazapyr
		- **Pharmaceuticals:**
		- **Artificial Sweeteners:** Sucralose

BBAP Station Deployment Timeline:

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Station Code | Station Name | Location | Active Dates | Notes |
| BBLR03 | Little River (LR03) | 25.846841, -80.182861 | 4/19/2019 - present | Model 6920 (Jan 1-Mar 17, 2020),EXO2 (Mar 17, 2020-present) |
| BBBB14 | Tuttle Basin NW (BB14) | 25.830030, -80.158600 | 1/18/2019 - present | Model 6600V2-4 (Jan 1-Apr 15, 2020),EXO2 (Apr 15, 2020-present) |
| BBJT71 | Tuttle Basin SE (JT71) | 25.821730, -80.151250 | 3/5/2019 - present | Model EXO2 |
| BBMRDW | Miami River (MRDW) | 25.7773, -80.204 | 3/31/2021 – present | Model EXO2 |
| BBMRSC | Miami River (MRSC) | 25.8072, -80.2599 | 3/25/2021 - present | Model EXO2 |
| BBMRRB | Rickenbacker Basin (MRBB) | 25.76980, -80.18085 | 1/13/2022 - present | Model EXO2 |
| BBCWA4 | Rickenbacker Basin (CWA4) | 25.758020,-80.167690 | 1/18/2022 - present | Model EXO2 |

**6) Data collection period –**

**BBLR03**

|  |  |  |
| --- | --- | --- |
| **Deployment date/time** | **Retrieval date/time** | **Notes** |
| 12/15/2021 13:00 | 1/11/2022 10:00 | Some battery issues caused sonde to start and stop |
| 1/11/2022 10:30 | 2/3/2022 11:02 |  |
| 2/3/2022 11:18 | 3/4/2022 10:32 | data only goes to 2/14 |
| 3/4/2022 11:02 | 3/23/2022 13:25 | Sonde removed early due to telemetry draining battery, data not recovered |
| 3/30/2022 12:38 | 4/28/2022 10:03 |  |
| 4/28/2022 10:16 | 5/26/2022 8:48 |  |
| 5/26/2022 9:10 | 6/16/2022 10:18 |  |
| 6/16/2022 10:30 | 7/6/2022 10:23 |  |

|  |  |
| --- | --- |
| 7/6/2022 10:23 | 8/3/2022 8:20 |
| 8/3/2022 8:36 | 8/26/2022 8:34 |
| 8/26/22 9:58 | 9/22/2022 8:54 |
| 9/22/22 9:33 | 10/14/2022 8:47 |

|  |  |  |
| --- | --- | --- |
| 10/14/22 9:43 | 11/9/2022 8:03 |  |
| 11/9/22 8:18 | 12/5/2022 10:17 |  |
| 12/5/22 10:36 | 12/28/2022 9:20 |  |
|  |  |  |

**BBBB14**

|  |  |  |
| --- | --- | --- |
| **Deployment date/time** | **Retrieval date/ time** | **Notes** |
| 12/9/2021 10:30 | 1/19/2022 10:15 |  |
| 1/19/2022 10:45 | 2/24/2022 10:58 |  |
| 2/24/2022 11:09 | 3/25/2022 9:33 | data not found |
| 3/25/2022 9:49 | 5/12/2022 11:19 |  |
| 5/12/2022 12:07 | 6/24/2022 9:25 | Repeat data taken for same times due to telemetry-still usable |
| 6/24/2022 11:01 | 8/24/2022 9:20 | only a few days of data collected and sonde malfunctioning - telemetry |
| 8/24/2022 9:50 | 9/14/2022 8:53 |  |
| 9/14/2022 9:24 | 11/16/2022 9:49 | No data after 10/28 |
| 11/16/2022 10:28 | 12/13/2022 9:49 |  |
| 12/13/2022 10:05 | 1/11/2023 9:35 |  |

**BBJT71**

|  |  |  |
| --- | --- | --- |
| **Deployment date/time** | **Retrieval date/time** | **Notes** |
| 12/9/2021 11:15 | 1/19/2022 11:15 |  |
| 1/19/2022 11:45 | 2/24/2022 12:32 |  |
| 2/24/2022 12:47 | 3/25/2022 11:01 |  |
| 3/25/2022 11:30 | 5/12/2022 13:06 |  |
| 5/12/2022 13:25 | 6/24/2022 10:43 |  |
| 6/24/2022 11:09 | 8/24/2022 10:30 |  |
| 8/24/2022 12:12 | 9/14/2022 10:45 |  |
| 9/14/2022 12:11 | 11/16/2022 11:23 |  |
| 11/16/2022 11:57 | 12/13/2022 10:34 |  |
| 12/13/2022 10:46 | 1/11/2023 10:53 |  |

**BBMRDW**

|  |  |  |
| --- | --- | --- |
| **Deployment date/time** | **Retrieval date/time** | **Notes** |
| 12/22/2021 10:45 | 1/24/2022 10:45 |  |
| 1/24/2022 11:15 | 2/22/2022 10:47 |  |
| 2/22/2022 11:01 | 3/16/2022 10:19 |  |
| 3/16/2022 10:34 | 4/15/2022 10:20 |  |
| 4/15/2022 10:38 | 5/6/2022 8:10 | No data retrieved (corrupt file?) |
| 5/6/2022 8:50 | 5/30/22 9:49 |  |
| 5/30/2022 10:16 | 6/22/2022 8:50 |  |

|  |  |
| --- | --- |
| 6/22/2022 9:30 | 7/14/2022 9:49 |
| 7/14/2022 10:11 | 8/5/2022 9:18 |
| 8/5/2022 10:12 | 8/30/2022 9:20 |
| 8/30/2022 10:18 | 9/30/2022 9:03 |

|  |  |  |
| --- | --- | --- |
| 9/30/2022 10:02 |  11/4/22 9:38 |  Sonde mount hit by boat |
| 11/8/22 9:53 | 11/30/22 9:39 |  |
| 11/30/22 10:15 | 12/26/22 8:49 |  |
|  |  |  |

**BBMRSC**

|  |  |  |
| --- | --- | --- |
| **Deployment date/time** | **Retrieval date/time** | **Notes** |
| 12/22/2021 11:30 | 1/24/2022 11:45 |  |
| 1/24/2022 12:15 | 2/21/2022 11:35 |  |
| 2/21/2022 11:58 | 3/16/2022 11:33 |  |
| 3/16/2022 11:54 | 4/15/2022 11:35 |  |
| 4/15/2022 12:11 | 5/6/2022 10:51 |  |
| 5/6/2022 11:38 | 5/30/2022 11:06 |  |
| 5/30/2022 11:29 | 6/22/2022 12:00 |  |

|  |  |
| --- | --- |
| 6/22/2022 11:38 | 7/14/2022 10:50 |
| 7/14/2022 11:08 | 8/5/2022 11:02 |
| 8/5/2022 11:50 | 8/30/2022 11:21 |
| 8/30/2022 12:22 | 9/30/2022 10:47 |

|  |  |
| --- | --- |
| 9/30/2022 11:47 |  11/4/2022 12:00 |
| 11/4/22 12:52 | 11/30/2022 12:00 |
| 11/30/22 11:57 | 12/26/2022 11:00 |

**BBMRRB**

|  |  |  |
| --- | --- | --- |
| **Deployment date/time** | **Retrieval date/time** | **Notes** |
| 1/13/2022 8:55 | 2/11/2022 11:06 | First deployment at MRRB |
| 2/11/2022 11:12 | 3/8/2022 9:07 |  |
| 3/8/2022 9:34 | 4/8/2022 15:20 |  |
| 4/8/2022 15:37 | 4/29/2022 10:51 |  |
| 4/29/2022 11:14 | 5/18/2022 10:44 |  |
| 5/18/2022 11:05 | 6/14/2022 10:18 |  |
| 6/14/2022 10:30 | 7/19/2022 9:08 | Reading at wrong height- telemetry cord |
| 7/19/2022 9:22 | 8/19/2022 10:17 |  |
| 8/19/2022 11:19 | 9/8/2022 10:02 |  |
| 9/8/2022 10:40 | 10/6/2022 9:09 |  |
| 10/6/2022 9:56 | 11/14/2022 9:58 |  |
| 11/14/2022 10:34 | 12/8/2022 10:33 |  |
| 12/8/2022 10:58 | 1/2/2023 11:47 |  |

**BBCWA4**

|  |  |  |
| --- | --- | --- |
| **Deployment date/time** | **Retrieval date/time** | **Notes** |
| 1/18/2022 14:22 | 2/11/2022 11:47 | First deployment at CWA4 |
| 2/11/2022 11:56 | 3/8/2022 10:08 |  |
| 3/8/2022 10:32 | 4/8/2022 16:18 |  |
| 4/8/2022 16:32 | 4/29/2022 12:12 |  |
| 4/29/2022 12:31 | 5/18/2022 11:48 |  |
| 5/18/2022 12:45 | 6/14/2022 8:45 |  |
| 6/14/2022 9:41 | 7/19/2022 9:45 | Deployed out of water at low tide - telemetry cord |
| 7/19/2022 10:39 | 8/19/2022 11:50 |  |
| 8/19/2022 12:29 | 9/8/2022 11:24 |  |
| 9/8/2022 11:57 | 10/6/2022 10:50 |  |
| 10/6/2022 11:22 | 11/14/2022 11:07 |  |
| 11/14/2022 11:41 | 12/8/2022 12:15 | Sonde stuck in mount, very difficult to dislodge, cause still unknown |
| 12/8/2022 12:42 | 1/2/2023 12:48 |  |

**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 Florida Department of Environmental Protection and 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 Preserve’s data portal home page [www.floridaapdata.org](http://www.floridaapdata.org). Data are available in comma delimited format.

**8) Associated researchers and projects –**

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 (DEP) – Biscayne Bay Aquatic Preserves (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. Data can be acquired from Sarah Gumbleton.
* 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. Data can be acquired from Claire Burgett.
	+ In September 2020, an additional 10 benthic sites were added in the Rickenbacker Basin (the outflow basin of the Miami River). These sites will be sampled for all the above parameters, semi-annually.
	+ Sediment sulfide analyses have also been done in conjunction with the SAV sampling at all sites in September 2020.
	+ In April 2021, grain size analyses were conducted in the Rickenbacker basin and sedimentary iron sampling was done at all benthic sites in both basins.
* <https://floridadep.gov/rcp/aquatic-preserve/locations/biscayne-bay-aquatic-preserves>
* This project will be expanding to the Rickenbacker basin and Miami River starting in spring/summer 2021 under and EPA grant. Four EXO2 datasonde sites will be added: 1 in the basin, 1 at the intersection of the river mouth and boating channel and 2 upriver.
* BBAP has begun (in August 2020) monthly bird surveys on 4 islands within Northern Biscayne Bay in response to a bird rookery collapse on Bird Key island. Data can be acquired from Laura Eldredge.
* Telemetry will be added to all sites summer 2021 and live data will be available online through a DEP hosted website.

Florida Department of Environmental Protection (DEP) – Office of Resilience and Coastal Protection (ORCP)

* ORCP is handling the establishment and characterization of the Government Cut Inlet Contributing Area (ICA) that includes the upland watershed that flows into Biscayne Bay, Biscayne Bay itself, and the coastal reef area just offshore of the government cut inlet. The watershed will be characterized by partners at NOAA via increased water quality monitoring in collaboration with this BBAP project, Miami-Dade County’s BayRun project, and NOAA’s pollutant loading model development. Methodology development conversations are ongoing with a planned initiation in fall 2021. The program’s goals include addressing EPA’s 9 elements of a comprehensive Watershed Management Plan for the ICA.
* Further research will be initiated through a DEP Coral Reef Protection and Restoration Grant program that will be awarded in late 2020/early 2021

Florida International University (FIU)

* Datasonde monitoring via the Center for Aquatic Chemistry and Environment (CREST) program with live telemetry data available in sites located in the same basin and adjacent basins as the BBAP sondes available through Dr. Piero Gardinali.
* <https://crestcache.fiu.edu/research/research-buoys/index.html>
* 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/>
* EPA funded project on hydrodynamic modeling of Biscayne Bay with preliminary results available through Dr. Henry Briceno.
* FIU contract via the seagrass lab through Dr. Jim Fourqurean to assess BBAP collected samples of sediments and seagrass and algae tissues.
* Various graduate student projects within and around Biscayne Bay.

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>
* Continuous surface parameter data available via deployed buoys in Northern Biscayne Bay.
* <https://crestcache.fiu.edu/research/research-buoys/index.html>

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-/>

University of Central Florida

* eDNA analysis of surface waters at 8- ecologically different sites with Biscayne Bay (4 of which will be in Northern Biscayne Bay). Project to be initiated in Aug. 2020 by Dr. Michelle Gaither’s Lab.
* <https://sciences.ucf.edu/biology/gaitherlab/>
* Rapid Evaluation of Estrogenic Endocrine Disrupting Compounds sampling event through surface sampling at 10 sites in Biscayne Bay. Project to be initiated Fall 2020 by Dr. John Fauth’s Lab.

University of Miami

* Substrate and temporal viability of enterococci bacteria by Dr. Helena Solo-Gabriele and students.
* Various graduate student projects within and around Biscayne Bay.
* <https://www.rsmas.miami.edu/research/projects/index.html>

Kent State University

* Imaging and analysis of fluorescent pigment data collected through satellite imagery by Dr. Joseph Ortiz.
* In preliminary stages but intended to be able to determine the spatial extent of seagrass versus macro-algal dominated beds as well as chlorophyll blooms.

**II. Physical Structure Descriptors**

**9) Sensor specifications –**

Currently, we have 11 YSI EXO2 Sondes that are interchangeably swapped monthly at each station. At BBLR03, prior to March 17, 2020, two YSI 6920s were swapped monthly. At BBBB14, prior to April 15, 2020, one YSI 6600 V2-4 was deployed monthly.

**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:**

**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:

LR03 SE BBLR03

JT71 WI BBJT71

BB14 VA BBBB14

MRSC BBMRSC

MRDW BBMRDW

**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. AC was ±2% of standard value for specific conductance, turbidity, DO (mg/L) and chlorophyll. AC was ±5% for DO (%). AC was ±0.2 for pH and temperature (°C). CCV values in dark re~~d~~ that are bold, fell beyond 3x the acceptance criteria so 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.

Sondes A-K are EXO2s. Sonde A and B were previously called 4 and 5, respectively.















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

All data collected after the 30-days in each deployment is noted in the F\_Record column of the dataset with {CSM}.

All turbidity readings over 124 FNU are rejected (-3, STS) since they are out of the calibration range that BBAP applies (0-124 FNU). 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 BBAP, anomalous turbidity and chlorophyll spikes are labeled suspect (1, STS/SCS) if BOTH of the following conditions apply:

1. 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)
2. 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)

For BBLR03, turbidity values > 8.01 FNU from the previous and next data point were marked (1, STS). Chlorophyll values > 7.74 ug/L from the previous and next data point were marked (1, SCS).

For BBBB14, turbidity values > 5.46 FNU from the previous and next data point were marked (1, STS). Chlorophyll values > 12.36 ug/L from the previous and next data point were marked (1, SCS).

For BBJT71, turbidity values > 7.95 FNU from the previous and next data point were marked (1, STS). Chlorophyll values > 11.64 ug/L from the previous and next data point were marked (1, SCS).

For BBMRDW, turbidity values > 4.53 FNU from the previous and next data point were marked (1, STS). Chlorophyll values > 8.07 ug/L from the previous and next data point were marked (1, SCS).

For BBMRSC, turbidity values > 2.63 FNU from the previous and next data point were marked (1, STS). Chlorophyll values > 8.29 ug/L from the previous and next data point were marked (1, SCS).

For BBMRRB, turbidity values > 18.24 FNU from the previous and next data point were marked (1, STS). Chlorophyll values > 8.91 ug/L from the previous and next data point were marked (1, SCS).

For BBCWA4, turbidity values > 7.71 FNU from the previous and next data point were mark, (1, STS). Chlorophyll values > 7.02 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, 2022

BBLR03

Missing: 1/1-1/4 8:15, 1/12-1/31 No depth, possible interference of telemetry system with sonde.

Missing:1/4 00:30-8:15, 1/4 19:15-1/5 9:15, 1/5 18:45-1/6 8:00, 1/6 18:00-1/7 8:15, 1/7 18:15- 1/8, 8:00, 1/8 20:15- 1/9 8:45, 1/9 19:45- 1/10, 8:00, 1/10 8:15, 1/10 8:45, 1/10, 18:00- 1/11 8:00 data missing, possible battery connection issues, potentially telemetry related.

Missing 1/11 10:15 out for sonde exchange

Missing 1/21 4:00- 1/31 23:45 battery failure, telemetry possibly taking power from sonde

BBBB14

 Missing 1/19 10:15 -10:30 out for sonde exchange

Note: 1/9 8:30 – 1/19 10:00, Deployment passed 30 days

BBJT71

Missing 1/19 11:30 out for sonde exchange

Note: 1/9 11:00 – 1/19 11:30, Deployment passed 30 days

BBMRDW

Missing 1/24 11:00 out for sonde exchange

Note: 1/20 10:45 – 1/24 10:45, Deployment passed 30 days

BBMRSC

Missing 1/24 12:00 out for sonde exchange

Note: 1/20 11:45 – 1/24 11:45, Deployment passed 30 days

 BBCWA4

 Note: Site initiated 1/18 14:30

 BBMRRB

 Note: Site initiated 1/13 9:00

 Reject: Chlorophyll and turbidity spikes 1/24-1/31, possibly due to blocked optics, fish found in sensor guard at end of deployment

February 1-28, 2022

BBLR03

Missing: 2/1 0:00 – 2/3 11:15 battery failure, possibly telemetry related

Missing: 2/3 16:15 – 2/14 00:15 depth missing, possible interference with sonde by telemetry

Missing: 2/14 00:30- 2/28 23:45 battery failure, telemetry possibly taking power from sonde

.

BBBB14

Note: 2/19 10:45 – 2/24 10:45, Deployment passed 30 days

Missing: 2/24 11:00 -2/28 23:45, Sonde malfunction, no data recovered from deployment, possible file corruption

BBJT71

Note: 2/19 11:45 – 2/24 12:30, Deployment passed 30 days

Suspect: 12/24 6:00 drop in salinity and specific conductivity and spike in turbidity, possible blocked optics, fish found in guard at end of deployment

Suspect: 12/24 12:30 sonde on its way out of the water, in field cleaning

Missing: 2/24 12:45, Out for sonde exchange

BBMRDW

Missing: 2/22 11:00, Out for sonde exchange

BBMRSC

Missing: 2/21 11:45, Out for sonde exchange

 BBCWA4

Rejected: 2/27 23:00- 2/28 2:00 turbidity values outside of calibrated range. Large fish was found in mount

 BBMRRB

 Missing: 2/5 20:00 – 2/11 11:00, Power failure

March 1-31, 2022

BBLR03

Missing: 3/1 0:00 - 3/30 11:30, Power failure, probably telemetry related, sonde removed on the 23rd for repair and replaced on the 30th without telemetry.

BBBB14

Missing: 3/1 0:00- 3/25 8:45, Sonde malfunction, no data recovered from deployment, possible file corruption

BBJT71

Missing: 3/25 10:15, Out for sonde exchange

Suspect: 3/25 9:45, 10:00 disturbed bottom, in field cleaning and maintenance, 10:30, sonde entering water, not yet in mount

BBMRDW

 Missing: 3/10 10:30-11:15 Sonde out of water for maintenance, new mount and chain installed.

 Missing: 3/16 9:30, Out for sonde exchange

BBMRSC

Missing: 3/16 10:45, Out for sonde exchange

BBMRRB

Missing: 3/8 9:15,-9:30, Out for sonde exchange

BBCWA4

Missing: 3/8 10:15, Out for sonde exchange

Suspect: 3/9/8:00, 8:45, Drop in salinity and Specific conductivity, 3/12 9:15 Drop in salinity and Specific conductivity with turbidity spike, possible blocked optic. Turbidity and chlorophyll spikes occur throughout deployment, fish in guard or mount common at this site.

April 1-30, 2022

BBLR03

Missing: 4/28 9:15, Out for sonde exchange

BBBB14

Note: 4/26 9:15 – 4/30 23:45, Deployment passed 30 days

BBJT71

Note: 4/26 10:45 – 4/30 23:45, Deployment passed 30 days

BBMRDW

Missing: 4/15 9:30 – 4 /30 23:45, Sonde malfunction, no data recovered from deployment.

BBMRSC

 Missing: 4/15 10:45-11:00, Out for sonde exchange, maintenance on mount

BBMRRB

Reject: 4/7 20:15-21:00, Turbidity spikes out of calibration range, possible blocked optic, fish found in guard on 4/8

Missing: 4/8 14:30-14:45, Out for sonde exchange

Missing: 4/29 10:00, Out for sonde exchange

Reject 4/29 17:15 Drop in Specific Conductivity and Salinity with spike in turbidity, fish foun din guard at end of deployment

BBCWA4

Missing: 4/8 15:30, Out for sonde exchange

Suspect: 4/26 8:30, Drop in Salinity and Specific Conductivity not associated with rainfall

Reject: 4/10 19:30- 4/15 10:30, Multiple negative Chlorophyll values, sensor did not pass post calibration verification, entire deployment reads very low chlorophyll, possible sensor or calibration issue

 Reject: 4/8 15:45 -4/29 11:00 Many turbidity spikes throughout deployment, sensor passed post calibration verification, possible fish in guard, common at this site

Missing: 4/29 11:15-11:30, Out for sonde exchange

May 1-31, 2022

 BBLR03

Missing: 5/26 8:00, Out for sonde exchange

 BBBB14

Missing: 5/12 10:30-10:45, Out for sonde exchange

 BBJT71

Missing: 5/12 12:15, Out for sonde exchange

BBMRDW

 Missing: 5/1 0:00 – 5/6 7:45, Sonde malfunction, no data recovered from deployment.

Missing: 5/30 9:00-9:15, Out for sonde exchange

BBMRSC

Missing: 5/6 9:00-9:30, Out for sonde exchange and maintenance, replaced galvanized steel with stainless steel.

Missing: 5/30 10:15, Out for sonde exchange

BBMRRB

 Suspect: 5/2 10:15, 5/4 00:45, 5/28 8:45, Drop in Salinity and Specific Conductivity not associated with rainfall, usually accompanied by turbidity spikes around the same timeframe, possible debris or fish interference

Missing: 5/18 10:00, Out for sonde exchange

Reject: 5/1-5/18, Turbidity spikes throughout deployment, possibly caused by blocked optics, fish found in guard at end of deployment.

BBCWA4

Reject: 5/7 4:00-5/18 11:30 Turbidity increase due to fouling, wiper brush missing at end of deployment.

Suspect: 5/7 5:45, 5/12 11:00, 5/14 8:30, 5/19 0:45, 5/23 16:45, 5/28, 7:45, Drop in Salinity and Specific Conductivity not associated with rainfall, usually accompanied by turbidity spikes around the same timeframe, possible debris or fish interference

Reject: 5/11 19:30-5/18 11:30, Chlorophyll increase due to fouling, wiper brush missing at end of deployment.

Missing: 5/18 11:00-11:15, Out for sonde exchange

June 1-30, 2022

 BBLR03

Missing: 6/16 10:40, Out for sonde exchange

 BBBB14

 Missing: 6/29 13:30, Out for sonde exchange

Reject: 6/6 21:15- 6/14 2:30 Negative Dissolved oxygen values. Followed significant rainfall event, consistent across both sites in this basin.

Note: 6/12 11:00- 6/24 8:15, Deployment passed 30 days.

 BBJT71

 Missing: 6/2 10:15 and 6/29 12:00, Out for sonde exchange

Reject: 6/2 5:00 - 6/14 4:00 Negative Dissolved oxygen values. Followed significant rainfall event, consistent across both sites in this basin.

Note: 6/12 12:30- 6/24 9:30, Deployment passed 30 days.

BBMRDW

 Missing: 6/22 8:00-8:15, Out for sonde exchange.

BBMRSC

 Missing: 6/22 10:00-10:30, Out for sonde exchange.

BBMRRB

Suspect: 6/8 18:15, 6/12 8:00, 6/24 10:45, Drop in Salinity and Specific Conductivity and spike in turbidity preceded by multiple turbidity spikes, possible debris or fish interference

Missing: 6/14 9:30, Out for sonde exchange

Reject: 6/19 0:15-3:00 as well as throughout deployment, turbidity spikes out of sensor calibration range, possible blocked optic, fish found in guard at end of deployment

Reject: 6/20 11:00, Sonde out of water, being hooked up to telemetry

Note 6/20 11:15- 7/19 8:00, Sonde not reading at correct depth, telemetry work changed sonde set up, deployed shallower than before

BBCWA4

 Suspect: 6/2 3:00, 6/15 14:45, Drop in Salinity and Specific Conductivity not associated with rainfall.

 Note: 6/17 11:30- 6/30 23:45, Sonde hooked up to telemetry, telemetry work changed sonde set up, deployed too shallow, out of water at low tide for remainder of deployment.

 Reject: 6/17 14:00- 7/19 9:30, Sonde out of water at low tide.

July 1-31, 2022

BBLR03

 Missing: 7/6 9:15, Out for sonde exchange.

Missing: 7/10 6:00– 7/24 5:30, Depth missing, possible interference with sonde by telemetry.

 Missing: 7/24 5:54 – 8/3 7:30, Data missing for the rest of the deployment. Battery dead upon

retrieval, sonde not reading live data, was unable to be fixed and had to be replaced with brand new sonde. Most likely another telemetry induced issue.

 BBBB14

 BBJT71

 BBMRDW

 Missing: 7/14 9:00, Out for sonde exchange.

 BBMRSC

 Missing: 7/14 10:00, Out for sonde exchange.

 BBMRRB

Note/Reject: 7/1 12:00 – 7/17 5:00, Turbidity spikes, some out of calibration range, possible

blocked optic, fish found in guard at end of deployment.

Note: 7/14 9:30- 7/19 8:00, Deployment past 30 days.

Missing: 7/19 8:15, Out for sonde exchange.

Note: 7/19 8:30- 8/19 9:15 Maintenance done on brackets securing sonde. Sonde deployed very

shallow, possibly caused by tangling of telemetry cord.

 BBCWA4

Note: 7/14 8:45- 7/19 9:00, Deployment past 30 days.

Missing: 7/19 9:15 – 9:30, Out for sonde exchange.

Missing: 7/19 9:45– 7/26 5:45, Depth missing, possible interference with sonde by telemetry.

August 1-31, 2022

BBLR03

 Missing: 8/13 0:00– 8/26 7:30, Depth missing, possible interference with sonde by telemetry.

Reject: 8/15 1:00, Turbidity spike out of calibration range.

Missing: 8/26 7:45, Out for sonde exchange.

BBBB14

BBJT71

BBMRDW

 Missing: 8/5 8:30-9:00, Out for sonde exchange.

Reject: 8/13 22:45, Turbidity spike out of calibration range.

Missing: 8/30 8:30-9:00, Out for sonde exchange.

 BBMRSC

 Missing: 8/5 10:15-10:45, Out for sonde exchange.

 Missing: 8/30 10:30-11:15, Out for sonde exchange.

 BBMRRB

 Missing: 8/19 9:30-9:45, Out for sonde exchange.

Note: 8/19 10:15, Sonde deployed back at normal depth.

BBCWA4

 Reject: 8/15 19:30, Turbidity spike out of calibration range.

Missing: 8/19 11:00-11:15, Out for sonde exchange.

September 1-30, 2022

BBLR03

 Missing: 9/22 8:00-8:30, Out for sonde exchange.

Note: 9/26-9/30, Hurricane conditions.

BBBB14

Missing: 9/7 17:45 – 9/8 9:00 – Telemetry buoy related issue. Data from this deployment came

back out of order. This time period was not found in the data.

BBJT71

Reject: 9/8 19:45, 9/9 5:15, 9/10 19:15, 9/11 15:00, Turbidity spikes out of calibration range.

Probably due to biofouling, 4 small starfish found in guard at end of deployment.

BBMRDW

Reject: 9/25 9:45, Turbidity spike out of calibration range.

Note: 9/26-9/30, Hurricane conditions.

Note: 9/29 9:15 -9/30 8:00, Deployment passed 30 days.

 BBMRSC

 Reject: 9/24 18:30, Turbidity spike out of calibration range.

 Note: 9/26-9/30, Hurricane conditions.

Note: 9/29 11:30 -9/30 10:00, Deployment passed 30 days.

 BBMRRB

 Note: 9/2 0:00 – 9/8 9:00, Suspected Turbidity sensor drift.

Reject: 9/7 15:45, 9/10 17:00, 9/11 4:30, 11:30, 13:00, 9/20 10:15, Turbidity spikes out of

calibration range, 2 fish found in guard at end of deployment.

Missing: 9/8 9:15-9:30, Out for sonde exchange.

 Note: 9/12 0:00 – 9/30 23:45, Suspected Turbidity sensor drift.

Note: 9/26-9/30, Hurricane conditions.

 BBCWA4

Missing: 9/8 10:30-10:45, Out for sonde exchange.

Reject: 9/11 10:30- 9/12 18:15, Multiple negative Chlorophyll values, sensor did not pass post calibration verification, high variation in Chlorophyll values at this site is common.

Reject: 9/21 17:30, 9/28 12:15, Turbidity spike out of calibration range.

Note: 9/26-9/30, Hurricane conditions.

October 1-31, 2022

 BBLR03

 Missing: 10/3 6:45– 10/14 7:45, Depth missing, possible interference with sonde by telemetry.

 Missing: 10/14 8:00-8:30, Out for sonde exchange.

BBBB14

 Note: 10/14 8:30 -11/16 9:45, Deployment passed 30 days.

 Missing: 10/28 2:15- 11/16 9:45, Sonde malfunction, data not recovered from this part of

deployment. Most likely caused by telemetry.

BBJT71

 Reject: 10/6 9:15, Turbidity spike out of calibration range.

 Note: 10/14 11:30 -11/16 11:15, Deployment passed 30 days.

BBMRDW

 Suspect: 10/6 5:15, abrupt change in multiple parameters possible problem with conductivity

sensor or blocked optic.

Reject: 10/18 16:45, Turbidity spike out of calibration range.

Note: 10/22 06:45-11/4 09:30, Sonde mount and telemetry cord damaged. Sonde on riverbed out

of mount.

Note: 10/30 9:00 -11/4 10:45, Deployment passed 30 days.

 BBMRSC

 Note: 10/30 11:00 -11/4 10:45, Deployment passed 30 days.

 BBMRRB

 Missing: 10/6 8:15-8:45, Out for sonde exchange.

 Note: 10/6 9:00-11/14 9:45, Sonde deployed not at bottom of mount for this deployment,

readings taken slightly too shallow.

Reject: 10/8 10:30 – 10/18 18:30, Turbidity spike out of calibration range.

 Suspect: 10/12 17:30- 10/18 20:30, Drops in salinity and specific conductivity, drops in dissolved

oxygen and spikes in turbidity. Possible blocked optic due to biofouling.

 Reject: 10/25 8:15, Turbidity spike out of calibration range combined with drops in salinity and

specific conductivity. Possible blocked optic due to biofouling.

Reject: 10/28 13:30, Turbidity spike out of calibration range.

BBCWA4

Reject: 10/4 13:00 – 10/6 9:45, Conductivity sensor failure. Heavy fouling on sonde, conductivity

sensor not excessively dirty.

Suspect: 10/4 13:00 – 10/6 9:45: DO readings most likely incorrect due to incorrect conductivity

readings.

Missing: 10/6 10:00-10:15, Out for sonde exchange.

Reject: 10/9 9:30, 10/19 17:30-17:45, 10/21 10:45, 10/22 17:45, 10/25 18:00, 10/27 17:15, 10/30

23:30, Turbidity spikes out of calibration range. Animals commonly found in guard at this site.

Suspect: 10/31 17:45, 19:30, Drop in Salinity and Specific Conductivity and spike in turbidity.

Possible blocked optic.

November 1-30, 2022

BBLR03

 Missing: 11/9 8:15, Out for sonde exchange.

BBBB14

 Missing: 11/16 10:00-10:15, Out for sonde exchange.

BBJT71

 Missing: 11/16 11:30-11:45, Out for sonde exchange.

BBMRDW

 Missing: 11/4 09:45 – 11/8 10:00, Sonde out of water for repair of mount from damage that

occurred on 10/22.

Suspect: 11/16 16:00, abrupt change in multiple parameters, possible problem with conductivity

sensor or blocked optic.

 BBMRSC

Missing: 11/4 11:00 -11/30 11:45, Sonde malfunction, no data recovered from

deployment, possible file corruption

Missing: 11/30 9:45-10:00, Out for sonde exchange.

 BBMRRB

 Note: 11/5 9:00 -11/14 9:45, Deployment passed 30 days.

 Suspect: 11/13 9:00 – 15:30, Drops in salinity and specific conductivity not associated with rainfall

or turbidity spikes.

 Missing: 11/14 10:00-10:30, Out for sonde exchange.

Suspect/Reject: 11/25 13:00-13:30, Drop in salinity and specific conductivity followed by spikes in

turbidity outside calibration range, possible blocked optic.

 BBCWA4

 Reject: 11/1 3:45, Turbidity spike out of calibration range.

Note: 11/5 10:30 -11/14 11:00, Deployment passed 30 days.

Missing: 11/14 11:15-11:30, Out for sonde exchange.

December 1-31, 2022

BBLR03

 Missing: 12/5 10:30, Out for sonde exchange.

 Missing: 12/12 10:45 - 12/28 9:15, Sonde did not collect any more data for the deployment.

Probably telemetry related.

BBBB14

 Missing: 12/13 10:00, Out for sonde exchange.

BBJT71

Missing: 12/13 10:45, Out for sonde exchange.

BBMRDW

Suspect: 12/11 22:45, abrupt change in multiple parameters, possible problem with conductivity

sensor or blocked optic.

 BBMRSC

 BBMRRB

Missing: 12/8 10:45 -11:00, Out for sonde exchange.

Reject: 12/15 14:45, 12/17 15:00, 12/18 12:15, 12/20 7:30, 12/22 7:70, 12/24 8:15, Turbidity

spikes out of calibration range.

Suspect: 12/21 18:45, 12/27 23:45, Drops in salinity and specific conductivity not associated with

rainfall or turbidity spikes.

 BBCWA4

 Suspect: 12/8 12:15, Sonde reading taken while sonde was being removed from water.

Missing: 12/8 12:30, Out for sonde exchange.

**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.