**Guana Tolomato Matanzas National Estuarine Research Reserve (GTMNERR)**

**Water Quality Metadata Report**

**January – June 2021**

**Latest Update:** 07/29/2021

**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, therefore it should not be considered a final record of data documentation until that process is complete. Contact the CDMO ([cdmosupport@belle.baruch.sc.edu](mailto:cdmosupport@belle.baruch.sc.edu)) or the GTMNERR with any additional questions.

**I. Data Set and Research Descriptors**

**1) Principal investigator(s) and contact persons:**

Principal Investigator:

Nikki Dix, Research Coordinator

505 Guana River Road

Ponte Vedra Beach, FL 32082

(904) 823-4500

[nikki.dix@dep.state.fl.us](mailto:nikki.dix@dep.state.fl.us)

Other Contact Persons:

Shannon Dunnigan, SWMP Manager

505 Guana River Road

Ponte Vedra Beach, FL 32082

(904) 823-4500

[shannon.dunnigan@dep.state.fl.us](mailto:shannon.dunnigan@dep.state.fl.us)

Silas Tanner, SWMP Technician

505 Guana River Road

Ponte Vedra Beach, FL 32082

(904) 823-4500

[silas.tanner@dep.state.fl.us](mailto:silas.tanner@dep.state.fl.us)

Kathryn M. Petrinec, SWMP Data Specialist

9741 Ocean Shore Blvd.

St. Augustine, FL 32080

(904) 461-4054

[kathryn.petrinec@dep.state.fl.us](mailto:kathryn.petrinec@dep.state.fl.us)

**2) Entry verification:**

Data from each deployment are uploaded from the YSI data sonde to a computer with Windows 7 or newer operating system. Files are exported from KorEXO Software, the software platform used for managing the EXO data sonde and water quality data, in a comma separated file (CSV) and uploaded to the Centralized Data Management Office (CDMO) where they undergo automated primary QAQC; automated depth/level corrections for changes in barometric pressure (cDepth or cLevel parameters); and become part of the CDMO’s online provisional database. 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 Reserve 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 worksheets 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 to the CDMO. Upload after secondary QAQC results in ingestion into the database as provisional plus data, recalculation of cDepth or cLevel parameters, and finally tertiary QAQC by the CDMO and assimilation into the CDMO’s authoritative online database. Where deployment overlap occurs between files, the data produced by the newly calibrated sonde is generally accepted as being the most accurate. For more information on QAQC flags and codes, see Sections 11 and 12.

Anomalous data are evaluated to determine whether to flag or reject the suspect values. Data outside the "normal" range of water quality parameters for each site are investigated for validity based on weather data, field observations, QC checks, graphs and instrument diagnostics. Data are rejected if the anomalies are attributed to sensor malfunction and/or excessive fouling. In addition to observations of any physical damage (e.g., compromised DO probe membrane), sensor malfunctions are detected if the reading of the probe is outside the range established for the sensor or the sensor will not post calibrate. All raw “.bin” files are uploaded by Silas Tanner to the CDMO for archiving. Silas Tanner reviews the data files after each deployment and is responsible for performing QC checks on the chlorophyll data. Katie Petrinec is responsible for all other QC checks, data management and data submissions.

**3) Research objectives:**

The System-wide Monitoring Program (SWMP) water quality initiative within the GTMNERR consists of four fixed, permanent stations with YSI data sondes deployed for continuously monitoring a suite of selected abiotic parameters at 15 min intervals. Nutrient analyses are also performed on water samples collected monthly at each of these sites. The positions of these stations allow for comparisons between relatively pristine and more urbanized drainage basins, as well as higher versus lower salinity regions of the estuary (see “Station Descriptions” under “Site Location and Character”). The objective of this effort is to quantify temporal variability (and spatial variability to a lesser extent) in water quality within the Reserve. Studies of factors that influence and are influenced by changes in water quality complement this foundational dataset (see Section 8, Associated researchers and projects).

**4) Research methods:**

YSI 6600 EDS, V2 or EXO2 data sondes have been operating continuously at the Pine Island and Fort Matanzas monitoring stations since December 2000 and at the San Sebastian and Pellicer Creek monitoring stations since February 2002. At each station the data sonde is contained within a 10 cm (inside diameter) PVC housing pipe mounted vertically onto a piling. Historically, all of the stations were configured with the submerged portion of the pipe containing multiple 2-cm-diameter holes with the greatest hole density near the base of the pipe and a steel pin at the bottom of the pipe to hold the sonde at a position within 1 m from the bottom. As of April 2, 2003, at 16:30:00, deployment of the sonde at the Pine Island station was reconfigured using a PVC housing that does not have drilled holes or a steel pin at the bottom. The sonde is now suspended by a stainless-steel chain (attached to the cap of the PVC pipe) such that the sensor portion of the sonde extends beyond the end of the PVC housing at a position within 1 m from the bottom. As of February 7, 2014, 11:00:00, deployment of the sonde at the San Sebastian station was reconfigured using a PVC housing that has drilled holes in the tube but does not have a steel pin at the bottom. The sonde is now suspended by a rope attached to the cap of the PVC pipe such that the sensor portion of the sonde extends beyond the end of the PVC housing at a position within 1 m from the bottom. Changes have not been made to the configuration of the housing pipe at Fort Matanzas and Pellicer Creek stations.

As of January 21, 2004, all sondes were upgraded to the 6600 EDS models. These new models incorporated a specially-designed wiper apparatus attached to the turbidity probe that reduced the oxygen and pH sensor fouling and thereby improved the quality of data collected. In 2013, GTMNERR began using EXO2 data sondes at Pine Island, San Sebastian, and Fort Matanzas stations. As of September 10, 2015, sondes at all stations were upgraded to the EXO2 models. These EXO2 models come with wet-mateable connectors that resist corrosion (a problem with previous models). Additional anti-fouling improvements are titanium bulkheads as well as a single, central wiper apparatus that regularly wipes all sensors. These sondes also have lower power consumption which allows for longer deployments. Total algae (chlorophyll) and Fluorescent Dissolved Organic Matter (fDOM) sensors were added to sondes in 2019-2020 (see Section 9, Sensor specifications, for details).

Data sondes are calibrated in the laboratory for specific conductance, pH, dissolved oxygen, turbidity, chlorophyll *a*, fDOM, and depth in accordance with the methods outlined in the YSI Operating Service Manual as well as the NERRS SWMP YSI/Xylem EXO Multi-Parameter Water Quality Monitoring Standard Operating Procedure Version 2.1 manual (released in March 2021). A three-point calibration is used for pH (Fisher 7.00, 10.00 and 4.00 buffer solution), a two-point calibration for turbidity (0 NTU DI water & YSI 124 NTU standard), a two-point calibration for chlorophyll *a* (Rhodamine WT and DI water), a two-point calibration for fDOM (Quinine sulfate and DI water) and a one-point calibration for specific conductance (Ricca 50.00 mS/cm standard solution). Dissolved oxygen (DO) is calibrated in air saturated water, using a bucket and an aerator. The percent saturation value is determined by using the current barometric pressure to convert to the adjusted value and entered into KorEXO software. Depth is also calibrated by using the current barometric pressure to determine the depth offset value and entered into KorEXO. The temperature thermistor is confirmed using a NIST certified temperature probe.

Data sonde exchanges at all sites are made at approximately two-week intervals and usually take less than 5 minutes to complete the exchange (thus completed between sampling intervals and no data is lost). At the end of a sampling period, data sondes are returned to the laboratory where post-deployment readings and reconditioning take place in accordance with the methods outlined in the YSI Operating and Service Manual as well as the NERRS SWMP YSI/Xylem EXO Multi-Parameter Water Quality Monitoring Standard Operating Procedure Version 2.1 manual (released in March 2021).

The EXO2 wiper brush of the central wiper is removed to avoid contamination of standards during post deployment procedures. After a superficial rinse of the sonde in tap water, post deployment readings are recorded. Dissolved oxygen (DO%) data is recorded from the 2-hour post deployment data; pH (Fisher 7.00, 10.00 and 4.00 buffer solution), specific conductance (Ricca 50.00 mS/cm standard) and turbidity, chlorophyll and fDOM (DI water) are recorded from values collected in standards. The results of these post-deployment readings are used to evaluate the validity of data (See Tables 1-4). Whenever the DO membrane is replaced, it is allowed to equilibrate before the DO sensor is calibrated in air-saturated water for the following deployment.

The GTM NERR began reporting level data in place of depth at the Pellicer Creek station on March 17, 2021 at 10:15. Leveling was established using differential leveling. The published height of the benchmark (survey monument) is 0.631m NAVD88 and was determined in October 2015. The data sonde depth sensor elevation is -1.11427m. This was calculated by Pin Elevation + the known distance between the bottom of the sonde guard and the depth of the transducer. Additional detailed information regarding leveling in the station is found in the table below.

|  |  |
| --- | --- |
| Site Name | Pellicer Creek |
| Site infrastructure description | Schedule 40 PVC tube mounted to piling, metal pin at bottom of tube; Stability D |
| Surveying equipment | Leica Sprinter 250 Digital Level |
| Survey monument used | 873 0718A |
| Survey occupation date | 03/17/2021 |
| Survey occupation duration | Differential leveling using a 3-shot average |
| Ellipsoid height | N/A |
| “Quick Check” marker for deployment tube | In progress. Haven’t established method yet. |
| “Quick Check” for sonde being deployed at the same location | In progress. Haven’t established method yet. |
| Annual resurveying | Quarterly for fist year, then annually in March |

Data collected at the Pellicer Creek monitoring station are transmitted to the NOAA GOES satellite, NESDIS ID #3B02C790 (where #3B02C790 is the GOESID for the Pellicer Creek station) and are available in near real-time. A Sutron Sat-Link2 transmitter was used to transmit data from June 29, 2006 through September 10, 2015. The telemetry system stopped working on September 10, 2015 because the station instruments were upgraded from YSI 6600 models to YSI EXO2 models. On June 15, 2020, the Sutron Sat-Link2 transmitter was replaced by a WaterLOG Storm 3 data logger and the station began transmitting data at 15:00:00. Data transmissions are scheduled hourly and contain four data sets reflecting 15-min data sampling intervals. Upon receipt by the CDMO, the data undergo the same automated primary QAQC process detailed in Section 2 above. The “real-time” telemetry data become part of the provisional dataset until undergoing secondary and tertiary QAQC and assimilation in the CDMO’s authoritative online database. Provisional and authoritative data are available at <http://cdmo.baruch.sc.edu>.

**5) Site location and character:**

The GTMNERR (North section [NW and SE corners]: 30.1632º N, 81.3447º W and 29.9698º N, 81.2488º W; South section: 29.8295º N, 81.3294º W and 29.6017º N, 81.1936º W), located in the Florida upper east coast drainage basin, includes over 24,281 ha of publicly owned forested uplands, tidal wetlands, estuarine lagoons and offshore seas. Geographically separated by the greater St. Augustine area, the Reserve is associated with the riverine systems of the Tolomato and Guana River estuaries to the north and the Matanzas River estuary to the south. The Tolomato River Basin is about 18 miles (29 km) in length with a drainage area of approximately 53,802 acres (21,773 hectares); it converges with the Matanzas River and Salt Run from the south before flowing into the Atlantic Ocean at the St. Augustine Inlet. The headwaters of the Guana River originate in the Diego Plains drainage area in Ponte Vedra Beach. This drainage basin encompasses approximately 7,800 acres (3,157 hectares). The Guana River runs parallel to the Tolomato on the seaward side, with the two lagoons joining 7 miles (11.3 km) north of the St. Augustine Inlet. The Matanzas River estuary is approximately 20 miles (32 km) in length and extends 8 miles (13 km) south of the Matanzas Inlet. The Matanzas River sub-basin has a drainage area of approximately 103,615 acres (41,931 hectares) and is bounded to the west by the Atlantic Coastal Ridge, which separates it from the lower St. Johns River basin. Both the St. Augustine and Matanzas Inlets provide oceanic exchange to the system. The Matanzas Inlet, one of the last “natural” inlets on Florida’s east coast, has been unimproved and is suitable only for small watercrafts. The natural hydrology of the Guana Tolomato Matanzas system has been somewhat altered by water control structures, including dikes, inland wells, drainage ditches and a dam across a portion of the Guana River. In addition, the Intracoastal Waterway traverses both the Tolomato and Matanzas estuaries.

The climate of northeast Florida is classified as humid subtropical and is characteristic of the Gulf and Atlantic coastal plain of the southeastern United States. The average annual rainfall is approximately 52 inches (132 cm) per year, with the wet season extending from June through September. Seasonal variation in temperature within the Reserve follows that of rainfall with a summer period of high temperatures between June and September and a cooler period extending from December through March. The annual mean air temperature recorded at the GTMNERR SWMP weather station was 22.0C for 2020.

**Station Descriptions:**

The **Pine Island (PI)** station is at Channel Marker 25 (30 03.051´N; 81 22.048´W) in the Tolomato River. This site is located within the Guana River Marsh Aquatic Preserve in the northern section of the GTMNERR. Channel Marker 25 is adjacent to Pine Island near the mouth of Deep Creek, which provides freshwater drainage from silviculture-dominated uplands in the northwestern portion of the Tolomato River basin. The watershed of PI also includes rapidly developing portions of northern St. Johns County. The average depth at this site is approximately 3.3 m with a tidal range of about 1.6 m; the bottom type is muddy sand. Salinity ranged from 6.7 to 34.7 psu during the first half of 2021.

The **Fort Matanzas (FM)** station is located at Channel Marker 75 (29 44.222´N; 81 14.757´W) in the Matanzas River. This site is approximately 4 km north of the Matanzas Inlet and near a shoreline on Anastasia Island that is undergoing residential development. The average depth at this site is approximately 2.2 m with a tidal range of about 1.2 m; the bottom type is muddy sand. Salinity ranged from 25.8 to 35.9 psu during the first half of 2021.

The **San Sebastian (SS)** station is at Channel Marker 1 (29 52.131´N; 81 18.446´W) located at the confluence of the San Sebastian and Matanzas Rivers, approximately 4 km south of the St. Augustine Inlet. The San Sebastian River drains an urbanized watershed in the western portion of St. Augustine; it is characterized by both residential and commercial development including five marinas and two wastewater treatment facilities. The average depth at this site is approximately 5.3 m with a tidal range of about 1.5 m; the bottom type is muddy sand. Salinity ranged from 24.3 to 35.9 psu during the first half of 2021.

The **Pellicer Creek (PC)** station (29 40.024´N; 81 15.444´W) is at the end of a recreational dock in Faver-Dykes State Park located within the Pellicer Creek Aquatic Preserve in the southern section of the GTM Reserve. Pellicer Creek is tidal and bordered for much of its length by publicly-owned conservation lands, although much of the watershed is undergoing rapid development. The average depth at this site is approximately 1.2 m with a tidal range of about 0.5 m; the bottom type is muddy sand. Salinity ranged from 0.1 to 30.4 psu during the half quarter of 2021.

All stations are situated within Class II Shellfish Harvesting Waters. Pellicer Creek and San Sebastian are located in Prohibited harvest areas, Pine Island is in a Conditionally Restricted area, while Fort Matanzas is in a Conditionally Approved area. See <https://www.fdacs.gov/Agriculture-Industry/Aquaculture/Shellfish> for more shellfish harvest area information and daily status updates.

**SWMP Station Timeline:**

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| Station Code | SWMP Status | Station Name | Location | Active Dates | Reason Decommissioned | Notes |
| gtmfmwq | Primary (P) | Fort Matanzas | 29° 44' 13.20 N, 81° 14' 45.60 W | 01/01/2001 00:00 - current | NA | NA |
| gtmpcwq | Primary (P) | Pellicer Creek | 29° 40' 01 N,  81° 15' 27 W | 02/01/2002 00:00 - current | NA | NA |
| gtmpiwq | Primary (P) | Pine Island | 30° 3' 2.88 N, 81° 22' 3.00 W | 01/01/2001 00:00 - current | NA | NA |
| gtmsswq | Primary (P) | San Sebastian | 29° 52' 08 N,  81° 18' 27 W | 02/01/2002 00:00 - current | NA | NA |

**Coastal and Marine Ecological Classification Standard (CMECS):**

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Station Code | gtmfmwq | gtmpcwq | gtmpiwq | gtmsswq |
| Station Type | fixed near-bottom | fixed near-bottom | fixed near-bottom | fixed near-bottom |
| Realm | Temperate Northern Atlantic | Temperate Northern Atlantic | Temperate Northern Atlantic | Temperate Northern Atlantic |
| Province | Warm Temperate Northwest Atlantic | Warm Temperate Northwest Atlantic | Warm Temperate Northwest Atlantic | Warm Temperate Northwest Atlantic |
| Ecoregion | Carolinian | Carolinian | Carolinian | Carolinian |
| NERR Bio Region | Carolinian | Carolinian | Carolinian | Carolinian |
| EPAIII Code | 75 | 75 | 75 | 75 |
| EPAIII Name | Southern Coastal Plain | Southern Coastal Plain | Southern Coastal Plain | Southern Coastal Plain |
| EPAIV Code | 75d | 75d | 75d | 75d |
| EPAI Name | Eastern Florida Flatwoods | Eastern Florida Flatwoods | Eastern Florida Flatwoods | Eastern Florida Flatwoods |
| Aquatic System | Estuarine | Estuarine | Estuarine | Estuarine |
| Aquatic Subsystem | Estuarine Tidal Riverine Coastal | Estuarine Tidal Riverine Coastal | Estuarine Tidal Riverine Open Water | Estuarine Tidal Riverine Open Water |
| Water Column | Lower Water Column | Pycnocline | Lower Water Column | Lower Water Column |
| Salinity Regime | Euhaline Water | Mesohaline Water | Upper Polyhaline Water | Euhaline Water |
| Salinity Class | high salinity | brackish | high salinity | high salinity |
| Temp Regime | Moderately Tidal | Moderately Tidal | Moderately Tidal | Moderately Tidal |
| Residual Current Type | Well-mixed Domain | Salt Wedge Domain | Well-mixed Domain | Well-mixed Domain |
| Tidal Flow Type | Mixed Semi-diurnal Tidal Flow | Mixed Semi-diurnal Tidal Flow | Mixed Semi-diurnal Tidal Flow | Mixed Semi-diurnal Tidal Flow |
| Primary Water Source | Local Ocean Exchange | River | Local Estuary Exchange | Local Ocean Exchange |
| Tectonic Setting | Passive Continental Margin | Passive Continental Margin | Passive Continental Margin | Passive Continental Margin |
| Physiographic Setting | Lagoonal Estuary | Riverine Estuary | Lagoonal Estuary | Lagoonal Estuary |
| Geoform Origin | Geologic | Geologic | Geologic | Geologic |
| Level1 Geoform > 1km2 | Inlet | Channel | Channel | Inlet |
| Level1 Geoform Type > 1km2 | Tidal Inlet | Tidal Channel/Creek | Tidal Channel/Creek | Tidal Inlet |
| Level2 Geoform < 1km2 | Channel | Channel | Channel | Channel |
| Level2 Geoform Type < 1km2 | Tidal Channel/Creek | Tidal Channel/Creek | Tidal Channel/Creek | Tidal Channel/Creek |
| Dominant Land Cover | [land use TBD] | [land use TBD] | [land use TBD] | [land use TBD] |
| Substrate Origin | Biogenic Substrate | Biogenic Substrate | Biogenic Substrate | Biogenic Substrate |
| Substrate Class | Shell Substrate | Organic Substrate | Organic Substrate | Organic Substrate |
| Substrate Subclass | Shell Sand | Organic Mud | Organic Detritus | Organic Detritus |
| Biotic Setting | Benthic/Attached Biota | Benthic/Attached Biota | Benthic/Attached Biota | Benthic/Attached Biota |
| Biotic Class | Non-Tidal Scrub-Shrub | Emergent Wetland | Emergent Wetland | Emergent Wetland |
| Biotic Subclass | Mangrove Shrubland | Emergent Tidal Marsh | Emergent Tidal Marsh | Emergent Tidal Marsh |
| Station Description NO land cover | The Guana Tolomato Matanzas Fort Matanzas station is a fixed near-bottom water quality station (GTMFMWQ) in a Channel surrounded by Non-Tidal Scrub-Shrub. The station is located within a Moderately Tidal, high salinity Lagoonal Estuary. | The Guana Tolomato Matanzas Pellicer Creek station is a fixed near-bottom water quality station (GTMPCWQ) in a Channel surrounded by Emergent Wetland. The station is located within a Moderately Tidal, brackish Riverine Estuary. | The Guana Tolomato Matanzas Pine Island station is a fixed near-bottom water quality station (GTMPIWQ) in a Channel surrounded by Emergent Wetland. The station is located within a Moderately Tidal, high salinity Lagoonal Estuary. | The Guana Tolomato Matanzas San Sebastian station is a fixed near-bottom water quality station (GTMSSWQ) in a Channel surrounded by Emergent Wetland. The station is located within a Moderately Tidal, high salinity Lagoonal Estuary. |

**6) Data collection period:**

YSI data sondes have been operating continuously at the Pine Island and Fort Matanzas monitoring stations since December 2000 and at the San Sebastian and Pellicer Creek monitoring stations since February 2002. In 2013, GTMNERR began using EXO2 data sondes at Pine Island, San Sebastian, and Fort Matanzas monitoring stations and at Pellicer Creek in 2015. In 2020, the GTMNERR began collecting fDOM data. fDOM data are not submitted to the CDMO and are available upon request from the GTMNERR.

The deployment and retrieval date/times for the 2021 sampling season are listed below.

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| Pine Island | | | | | | | |
| Deployment  Date/Time | Retrieval  Date/Time | Data sonde Model Number | pH Model Number | DO Model Number | Turb Model Number | Cond Model Number | Chloro Model Number |
| 12/16/2020, 08:00 | 01/06/2021, 07:45 | EXO2  599090-01 (Pelican) | 599702 | 599100-01 | 599101-01 | 599827 | 599103-01 |
| 01/06/2021, 08:00 | 01/27/2021, 13:00 | EXO2  599090-01 (Spoonbill) | 599701 | 599100-01 | 599101-01 | 599827 | 599103-01 |
| 01/27/2021, 13:15 | 02/17/2021, 08:00 | EXO2  599090-01 (Pelican) | 599702 | 599100-01 | 599101-01 | 599827 | 599103-01 |
| 02/17/2021, 08:15 | 03/03/2021, 08:00 | EXO2  599090-01 (Spoonbill) | 599701 | 599100-01 | 599101-01 | 599827 | 599103-01 |
| 03/03/2021, 08:15 | 03/17/2021, 07:00 | EXO2  599090-01 (Pelican) | 599702 | 599100-01 | 599101-01 | 599827 | 599103-01 |
| 03/17/2021, 07:15 | 03/31/2021, 09:00 | EXO2  599090-01 (Spoonbill) | 599701 | 599100-01 | 599101-01 | 599827 | 599103-01 |
| 03/31/2021, 09:15 | 04/13/2021, 11:15 | EXO2  599090-01 (Pelican) | 599702 | 599100-01 | 599101-01 | 599827 | 599103-01 |
| 04/13/2021, 11:30 | 04/28/2021, 08:15 | EXO2  599090-01 (Spoonbill) | 599701 | 599100-01 | 599101-01 | 599827 | 599103-01 |
| 04/28/2021, 08:30 | 05/19/2021, 12:15 | EXO2  599090-01 (Pelican) | 599702 | 599100-01 | 599101-01 | 599827 | 599103-01 |
| 05/19/2021, 12:30 | 06/02/2021, 09:45 | EXO2  599090-01 (Spoonbill) | 599701 | 599100-01 | 599101-01 | 599827 | 599103-01 |
| 06/02/2021, 10:00 | 06/16/2021 07:15 | EXO2  599090-01 (Pelican) | 599702 | 599100-01 | 599101-01 | 599827 | 599103-01 |
| 06/16/2021 07:30 | 06/30/2021, 12:00 | EXO2  599090-01 (Spoonbill) | 599701 | 599100-01 | 599101-01 | 599827 | 599103-01 |

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| **San Sebastian** | | | | | | | |
| Deployment  Date/Time | Retrieval  Date/Time | Data sonde Model Number | pH Model Number | DO Model Number | Turb Model Number | Cond Model Number | Chloro Model Number |
| 12/16/2020, 10:15 | 01/06/2021, 09:45 | EXO2  599090-01 (Triton) | 599702 | 599100-01 | 599101-01 | 599827 | 599103-01 |
| 01/06/2021, 10:00 | 01/27/2021, 10:45 | EXO2  599090-01 (Megalops) | 599701 | 599100-01 | 599101-01 | 599827 | 599103-01 |
| 01/27/2021, 11:00 | 02/17/2021, 10:00 | EXO2  599090-01 (Triton) | 599702 | 599100-01 | 599101-01 | 599827 | 599103-01 |
| 02/17/2021, 10:15 | 03/03/2021, 09:00 | EXO2  599090-01 (Megalops) | 599701 | 599100-01 | 599101-01 | 599827 | 599103-01 |
| 03/03/2021, 09:00 | 03/17/2021, 09:15 | EXO2  599090-01 (Triton) | 599702 | 599100-01 | 599101-01 | 599827 | 599103-01 |
| 03/17/2021, 09:30 | 03/31/2021, 10:15 | EXO2  599090-01 (Megalops) | 599701 | 599100-01 | 599101-01 | 599827 | 599103-01 |
| 03/31/2021, 10:30 | 04/13/2021, 10:00 | EXO2  599090-01 (Triton) | 599702 | 599100-01 | 599101-01 | 599827 | 599103-01 |
| 04/13/2021, 10:15 | 04/28/2021, 09:15 | EXO2  599090-01 (Megalops) | 599701 | 599100-01 | 599101-01 | 599827 | 599103-01 |
| 04/28/2021, 09:30 | 05/19/2021, 11:15 | EXO2  599090-01 (Triton) | 599702 | 599100-01 | 599101-01 | 599827 | 599103-01 |
| 05/19/2021, 11:30 | 06/02/2021, 10:30 | EXO2  599090-01 (Megalops) | 599701 | 599100-01 | 599101-01 | 599827 | 599103-01 |
| 06/02/2021, 10:45 | 06/16/2021, 09:15 | EXO2  599090-01 (Triton) | 599702 | 599100-01 | 599101-01 | 599827 | 599103-01 |
| 06/16/2021, 09:30 | 06/30/2021, 13:15 | EXO2  599090-01 (Nemo) | 599701 | 599100-01 | 599101-01 | 599827 | 599103-01 |

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| **Fort Matanzas** | | | | | | | |
| Deployment  Date/Time | Retrieval  Date/Time | Data sonde Model Number | pH Model Number | DO Model Number | Turb Model Number | Cond Model Number | Chloro Model Number |
| 12/16/2020, 09:15 | 01/06/2021, 09:00 | EXO2 599090-01 (Flounder) | 599702 | 599100-01 | 599101-01 | 599827 | 599103-01 |
| 01/06/2021, 09:15 | 01/27/2021, 11:30 | EXO2 599090-01 (Nemo) | 599701 | 599100-01 | 599101-01 | 599827 | 599103-01 |
| 01/27/2021, 11:45 | 02/17/2021, 11:15 | EXO2 599090-01 (Flounder) | 599702 | 599100-01 | 599101-01 | 599827 | 599103-01 |
| 02/17/2021, 11:30 | 03/03/2021, 09:45 | EXO2 599090-01 (Nemo) | 599701 | 599100-01 | 599101-01 | 599827 | 599103-01 |
| 03/03/2021, 10:00 | 03/17/2021, 08:30 | EXO2 599090-01 (Flounder) | 599702 | 599100-01 | 599101-01 | 599827 | 599103-01 |
| 03/17/2021, 08:45 | 03/31/2021, 07:30 | EXO2 599090-01 (Nemo) | 599701 | 599100-01 | 599101-01 | 599827 | 599103-01 |
| 03/31/2021, 07:45 | 04/13/2021, 09:15 | EXO2 599090-01 (Flounder) | 599702 | 599100-01 | 599101-01 | 599827 | 599103-01 |
| 04/13/2021, 09:30 | 04/28/2021, 10:00 | EXO2 599090-01 (Nemo) | 599701 | 599100-01 | 599101-01 | 599827 | 599103-01 |
| 04/28/2021, 10:15 | 05/19/2021, 09:00 | EXO2 599090-01 (Flounder) | 599702 | 599100-01 | 599101-01 | 599827 | 599103-01 |
| 05/19/2021, 09:15 | 06/02/2021, 08:15 | EXO2 599090-01 (Nemo) | 599701 | 599100-01 | 599101-01 | 599827 | 599103-01 |
| 06/02/2021, 08:30 | 06/16/2021, 08:30 | EXO2 599090-01 (Flounder) | 599702 | 599100-01 | 599101-01 | 599827 | 599103-01 |
| 06/16/2021, 08:45 | 06/30/2021, 10:15 | EXO2 599090-01 (Megalops) | 599701 | 599100-01 | 599101-01 | 599827 | 599103-01 |

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| **Pellicer Creek** | | | | | | | |
| Deployment  Date/Time | Retrieval  Date/Time | Data sonde Model Number | pH Model Number | DO Model Number | Turb Model Number | Cond Model Number | Chloro Model Number |
| 12/15/2020, 12:00 | 01/05/2021, 13:15 | EXO2 599090-01 (Osprey) | 599702 | 599100-01 | 599101-01 | 599827 | 599103-01 |
| 01/05/2021, 13:30 | 01/27/2021, 09:15 | EXO2 599090-01 (Marlin) | 599701 | 599100-01 | 599101-01 | 599827 | 599103-01 |
| 01/27/2021, 09:30 | 02/17/2021, 13:30 | EXO2 599090-01 (Osprey) | 599702 | 599100-01 | 599101-01 | 599827 | 599103-01 |
| 02/17/2021, 13:45 | 03/02/2021, 13:15 | EXO2 599090-01 (Marlin) | 599701 | 599100-01 | 599101-01 | 599827 | 599103-01 |
| 03/02/2021, 13:30 | 03/17/2021, 09:45 | EXO2 599090-01 (Osprey) | 599702 | 599100-01 | 599101-01 | 599827 | 599103-01 |
| 03/17/2021, 10:15 | 03/31/2021, 11:30 | EXO2 599090-01 (Marlin) | 599701 | 599100-01 | 599101-01 | 599827 | 599103-01 |
| 03/31/2021, 11:45 | 04/13/2021, 13:45 | EXO2 599090-01 (Nautilus) | 599702 | 599100-01 | 599101-01 | 599827 | 599103-01 |
| 04/13/2021, 13:45 | 04/28/2021, 13:15 | EXO2 599090-01 (Marlin) | 599701 | 599100-01 | 599101-01 | 599827 | 599103-01 |
| 04/28/2021, 13:15 | 05/20/2021, 10:15 | EXO2 599090-01 (Nautilus) | 599702 | 599100-01 | 599101-01 | 599827 | 599103-01 |
| 05/20/2021, 10:15 | 06/02/2021, 11:45 | EXO2 599090-01 (Marlin) | 599701 | 599100-01 | 599101-01 | 599827 | 599103-01 |
| 06/02/2021, 11:45 | 06/16/2021, 10:45 | EXO2 599090-01 (Nautilus) | 599702 | 599100-01 | 599101-01 | 599827 | 599103-01 |
| 06/16/2021, 10:45 | 06/30/2021, 09:30 | EXO2 599090-01 (Marlin) | 599701 | 599100-01 | 599101-01 | 599827 | 599103-01 |

**7) Distribution:**

NOAA retains the right to analyze, synthesize and publish summaries of the NERRS System-wide Monitoring Program data.  The NERRS retains the right to be fully credited for having collected and process the data.  Following academic courtesy standards, the NERR 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.  The Federal government does not assume liability to the Recipient or third persons, nor will the Federal government reimburse or indemnify the Recipient for its liability due to any losses resulting in any way from the use of this data.

Requested citation format:

NOAA National Estuarine Research Reserve System (NERRS). System-wide Monitoring Program. Data accessed from the NOAA NERRS Centralized Data Management Office website: <http://www.nerrsdata.org/>; *accessed* 12 October 2021.

NERR water quality data and metadata can be obtained from the Research Coordinator at the individual NERR site (please see Principal Investigators and Contact Persons), from the Data Manager at the Centralized Data Management Office (please see personnel directory under the general information link on the CDMO home page) and online at the CDMO home page [www.nerrsdata.org](http://www.nerrsdata.org).  Data are available in comma delimited format.

**8) Associated researchers and projects:**

The St. Johns River Water Management District (SJRWMD) Northern Coastal Basin (NCB) Program, established in 1995, covers the watersheds along the Intracoastal Waterway from Ponce Inlet in Volusia County, north through Flagler and St. Johns Counties, to the Georgia border. This program was developed in response to concerns about the impacts of population growth and development on water quality in the NCB. Some of the major research activities conducted within the boundaries of the GTMNERR through the NCB program include hydrodynamic modeling; land use, emergent marsh vegetation, shoreline and oyster habitat mapping; and water quality monitoring. Many of the water quality monitoring and assessment activities of the NCB program are aimed at pollution source identification and the development of pollution load reduction goals.

Other significant water quality research and monitoring initiatives within the GTMNERR include regular monitoring by Florida Department of Environmental Protection’s Division of Environmental Assessment and Restoration (<https://floridadep.gov/DEAR>), studies of nutrient dynamics and plankton ecology by University of Florida and Flagler College, and regular monitoring of fecal coliform levels in shellfish harvesting waters by the Department of Agriculture and Consumer Services.

Associated projects conducted by GTMNERR include the following:

* monthly samples for nutrients, chlorophyll, bacteria, and total suspended solids at 14 stations monthly (the four SWMP water quality stations and 10 non-SWMP stations in the Guana River).
* short-term pollution source tracking studies (i.e., spatial surveys of chemical tracers and genetic markers)
* a national YSI EXO Total Algae sensor assessment (<http://nerrssciencecollaborative.org/project/Dix20>) to 1) assess the performance of new sensors by comparing field and laboratory sensor measurements with extracted chlorophyll concentrations; 2) identify sources of sensor interferences and develop standardized correction protocols for the new data streams; and 3) create and share tested protocols and recommendations for the NERRS.

All GTMNERR data and summaries are available upon request.

To complement the water quality data, the GTMNERR also operates a weather station (data available at [www.nerrsdata.org](http://www.nerrsdata.org/)) and monitors biological components of the estuary such as emergent vegetation, marsh sediment elevation, plankton, and oyster reefs. Biological data are available upon request (please see Principal Investigators and Contact Persons). In July 2020, an acoustic receiver was installed on the Pine Island water quality station as part of a network of 15 receivers to study fish migration patterns within the St. Augustine area. This project is run by Dr. James Liao at the University of Florida Whitney Laboratory for Marine Bioscience and is part of the Florida Atlantic Coast Telemetry Network (FACT; <https://secoora.org/fact/>).

A complete database of research conducted within the GTMNERR and a list of publications are available upon request and online at <https://www.gtmnerr.org/research/research-publications/>. For further information on the GTMNERR, see the Site Profile at: https://coast.noaa.gov/data/docs/nerrs/Reserves\_GTM\_SiteProfile.pdf

**II. Physical Structure Descriptors**

**9) Sensor specifications:**

GTMNERR deployed only YSI data sondes (EXO2) in 2020. All data sondes have the same basic probe configuration (Temperature, Conductivity, Salinity, Optical Dissolved Oxygen, Depth, pH and Turbidity). The standard temperature/conductivity probe (model #599870) and the wiped temperature/conductivity sensor (model#599827) were used at Pine Island, San Sebastian, and Fort Matanzas stations. The wiped temperature/conductivity sensor (model#599827) was the only temperature/conductivity sensor deployed at the Pellicer Creek station. A total algae PE (chlorophyll) (model #599103-01) sensor was added at the Pellicer Creek station on June 4, 2019 at 10:45, Fort Matanzas on July 30, 2019 at 10:00, Pine Island on November 12, 2019 at 12:30, and San Sebastian on May 5, 2020 10:00. In 2020, fDOM (model #599104-01) sensors were added to the basic probe configuration at Pine Island on May 5, 2020 at 11:30, San Sebastian on May 5, 2020 at 10:00, Fort Matanzas on May 5, 2020 at 8:45, and Pellicer Creek on May 6, 2020 at 10:45. The type of data sonde and sensors used for each deployment are defined in the data collection period section.

**YSI 6600 EDS and YSI 6600 EDS V2 data sonde (used from 2000-2015):**

Parameter: Temperature

Units: Celsius (°C)

Sensor Type: Thermistor

Model#: 6560

Range: -5 to 50°C

Accuracy: +/- 0.15

Resolution: 0.01°C

Parameter: Conductivity

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

Sensor Type: 4-electrode cell with auto ranging

Model#: 6560

Range: 0 to 100 mS/cm

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

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

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: Dissolved Oxygen % saturation

Units: percent air saturation (%)

Sensor Type: Optical probe w/ mechanical cleaning

Model#: 6150 ROX

Range: 0 to 500% air saturation

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

Resolution: 0.1% air saturation

Parameter: Dissolved Oxygen mg/L (Calculated from % air saturation, temperature, and salinity)

Units: milligrams/Liter (mg/L)

Sensor Type: Optical probe w/ mechanical cleaning

Model#: 6150 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: 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)

Parameter: pH – bulb probe or EDS flat glass probe

Units: pH units

Sensor Type: Glass combination electrode

Model#: 6561 or 6561FG

Range: 0 to 14 units

Accuracy: +/- 0.2 units

Resolution: 0.01 units

Parameter: Turbidity

Units: nephelometric turbidity units (NTU)

Sensor Type: Optical, 90 degree scatter, with mechanical cleaning

Model#: 6136

Range: 0 to 1000 NTU

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

Resolution: 0.1 NTU

**YSI EXO2 data sonde:**

Parameter: Temperature

Units: Celsius (°C)

Sensor Type: CT2, Thermistor

Model#: 599870

Range: -5 to 50°C

Accuracy: -5 to 35°C +/- 0.01°C; 35 to 50°C +/- 0.005°C

Resolution: 0.01°C

Parameter: Conductivity

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

Sensor Type: CT2 Probe, 4-electrode nickel cell

Model#: 599870

Range: 0 to 200 mS/cm

Accuracy: 0-100 mS/cm: +/- 0.5% of reading or 0.001 mS/cm, whichever is greater; 100-200 mS/cm: +/- 1% of reading

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

Parameter: Salinity

Units: practical salinity units (psu)/parts per thousand (ppt)

Sensor Type: CT2 probe, 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 psu

OR

Parameter: Temperature

Units: Celsius (C)

Sensor Type: Wiped probe; Thermistor

Model#: 599827

Range: -5 to 50 C

Accuracy: ±0.2 C

Resolution: 0.001 C

Parameter: Conductivity

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

Sensor Type: Wiped probe; 4-electrode cell with autoranging

Model#: 599827

Range: 0 to 100 mS/cm

Accuracy: ±1% of the reading or 0.002 mS/cm, whichever is greater

Resolution: 0.0001 to 0.01 mS/cm (range dependent)

Parameter: Salinity

Units: practical salinity units (psu)/parts per thousand (ppt)

Model#: 599827

Sensor Type: Wiped probe; Calculated from conductivity and temperature

Range: 0 to 70 ppt

Accuracy: ±2% of the reading or 0.2 ppt, whichever is greater

Resolution: 0.01 psu

Parameter: Dissolved Oxygen % saturation

Units: percent air saturation (%)

Sensor Type: Optical, luminescence lifetime

Model#: 599100

Range: 0 to 500% air saturation

Accuracy: 0-200% air saturation: +/- 1% of the reading or 1% air saturation, whichever is greater   
200-500% air saturation: +/- 5% or reading

Resolution: 0.1% air saturation

Parameter: Dissolved Oxygen mg/L (Calculated from % air saturation, temperature, and salinity)

Units: milligrams/Liter (mg/L)

Sensor Type: Optical, luminescence lifetime

Model#: 599100

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: +/- 5% of the reading

Resolution: 0.01 mg/L

Parameter: Non-Vented Level – Shallow – Depth

Units: meters (m)

Sensor Type: Stainless steel strain gauge

Range: Shallow: 0 to 33 ft (10 m)

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

Resolution: 0.001 ft (0.001 m)

Parameter: pH

Units: pH units

Sensor Type: Glass combination electrode

Model#: 599701 (guarded) or 599702 (wiped)

Range: 0 to 14 units

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

Resolution: 0.01 units

Parameter: Turbidity

Units: Formazin nephelometric units (FTU)

Sensor Type: Optical, 90-degree scatter,

Model#: 599101-01

Range: 0 to 4000 FNU

Accuracy: 0 to 999 FNU: 0.3 FNU or +/-2% of reading, whichever is greater; 1000 to 4000 FNU: +/-5% of reading

Resolution: 0-999 FNU: 0.1 FNU; 1000-4000 FNU: 0.1 FNU

Parameter: Total Algae PE (Chlorophyll)

Units: micrograms/Liter

Sensor Type: Optical probe

Model#: 599102-01

Range: 0 to 400 ug/Liter

Accuracy: Dependent on methodology

Resolution: 0.1 ug/L chl a, 0.1% FS

Parameter: Fluorescent Dissolved Organic Matter (fDOM)

Units: Quinine Sulfate Units (QSU), ppb

Sensor Type: Optical probe

Model#: 599104-01

Range: 0 to 300 ppb QSU

Accuracy: Dependent on methodology

Resolution: 0.01 ppb QSU

**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 (Wenner et al. 2001). The YSI 6600 EDS data sondes increased 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:**

The NERR System-Wide Monitoring Program utilizes YSI data sondes that 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.

Beginning in 2006, NERR SWMP 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 SWMP calibration sheet or digital calibration log.  This offset procedure standardizes each depth calibration for the entire NERR System.  If accurate atmospheric pressure data are available, non-vented sensor depth measurements at any NERR can be corrected.

In 2010, the CDMO began automatically correcting Depth/Level data for changes in barometric pressure as measured by the reserve’s associated meteorological station during data ingestion. These corrected Depth/Level data are reported as cDepth and cLevel and are assigned QAQC flags and codes based on QAQC protocols. Please see sections 11 and 12 for QAQC flag and code definitions.

**NOTE: older Depth data cannot be corrected without verifying that the depth offset was in place and whether a vented or non-vented depth sensor was in use. No SWMP data prior to 2006 can be corrected using this method.** The following equation is used for corrected Depth/Level data provided by the CDMO beginning in 2010: ((1013-BP)\*0.0102)+Depth/Level = cDepth/cLevel.

**Salinity Units Qualifier:**

In 2013, EXO sondes were approved for SWMP use and began to be utilized by reserves. While 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 SWMP purposes are understood to be equivalent, however psu is considered the more appropriate designation. Moving forward the NERR System will assign psu salinity units for all data regardless of sonde type.

**Turbidity Qualifier:**

In 2013, EXO sondes were approved for SWMP use and began to be utilized by reserves. While 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 SWMP purposes they will be considered equivalent. Moving forward, the NERR System 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. 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. Research is ongoing in the NERRS to compare sensor fluorescent measurements with extracted chlorophyll concentrations, test for interferences, and develop corrections (see <http://nerrssciencecollaborative.org/project/Dix20>).

**10) Coded variable definitions:**

Sampling station Sampling site code Station code

Pine Island PI gtmpiwq

San Sebastian SS gtmsswq

Fort Matanzas FM gtmfmwq

Pellicer Creek PC gtmpcwq

**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 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 QAQC checks

GSM See metadata

Corrected Depth/Level Data Codes

GCC Calculated with data that were corrected during QAQC

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:**

Note: pH post-deployment readings are temperature dependent and minor variations are expected as a result.

**Pine Island**

|  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **Deployment Date** | **Temp (°C)** | **SpCond (mS/cm)** | **ROX DO %** | **ROX DO %** | **pH** | **pH** | **pH** | **Turbidity (NTU)** | **Depth (m)** | **CHL**  **(ug/L)** |
|  | **°C** | **50.00** | **100.0** | **100.0** | **7.00** | **10.00** | **4.00** | **0.0** | **m** | **0.00** |
| 12/16/20 | 20.15 | 50.38 | 99.2 | 99.3 | 7.08 | 10.08 | 4.10 | 0.3 | 0.004 | 0.15 |
| 01/06/21 | 20.40 | 49.97 | 99.7 | 99.7 | 7.12 | 10.11 | 4.17 | 0.1 | 0.131 | 0.03 |
| 01/27/21 | 19.73 | 50.05 | 99.5 | 99.6 | 7.11 | 10.16 | 4.12 | 0.1 | 0.068 | 0.09 |
| 02/17/21 | 20.37 | 49.94 | 102.4 | 102.6 | 7.04 | 10.05 | 4.04 | 0.0 | 0.045 | 0.14 |
| 03/03/21 | 21.65 | 50.07 | 100.7 | 100.8 | 7.13 | 10.16 | 4.14 | 1.3 | -0.025 | 0.06 |
| 03/17/21 | 21.65 | 49.96 | 100.0 | 99.7 | 7.15 | 10.18 | 4.16 | 0.4 | 0.071 | 0.27 |
| 03/31/21 | 22.78 | 49.98 | 99.0 | 99.1 | 7.11 | 10.07 | 4.17 | 0.0 | 0.096 | 0.00 |
| 04/13/21 | 21.84 | 50.05 | 100.4 | 100.1 | 7.17 | 10.18 | 4.14 | 0.4 | 0.074 | 0.00 |
| 04/28/21 | 21.89 | 50.36 | 98.4 | 98.4 | 7.08 | 10.05 | 4.10 | 49.6 | 0.136 | 0.25 |
| 05/19/21 | 22.22 | 50.34 | 98.5 | 98.4 | 7.11 | 10.12 | 4.11 | 0.4 | 0.044 | 0.20 |
| 06/02/21 | 21.86 | 50.30 | 101.4 | 101.7 | 7.16 | 10.16 | 4.2 | 0.9 | 0.042 | 0.26 |
| 06/16/21 | 21.79 | 49.96 | 99.1 | 99.6 | 7.11 | 10.11 | 4.12 | 1.7 | 0.076 | 0.26 |

**San Sebastian**

|  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **Deployment Date** | **Temp (°C)** | **SpCond (mS/cm)** | **ROX DO %** | **ROX DO %** | **pH** | **pH** | **pH** | **Turbidity (NTU)** | **Depth (m)** | **CHL**  **(ug/L)** |
|  | **°C** | **50.00** | **100.0** | **100.0** | **7.00** | **10.00** | **4.00** | **0.0** | **m** | **0.00** |
| 12/16/20 | 20.31 | 49.88 | 99.0 | 98.9 | 7.28 | 10.33 | 4.28 | 0.2 | 0.007 | 0.17 |
| 01/06/21 | 20.38 | 50.01 | 101.6 | 101.6 | 7.05 | 10.06 | 4.10 | 0.1 | 0.140 | 0.00 |
| 01/27/21 | 19.84 | 50.04 | 99.5 | 99.4 | 7.07 | 10.12 | 4.03 | 0.1 | 0.069 | 0.54 |
| 02/17/21 | 19.49 | 50.00 | 102.8 | 102.7 | 7.17 | 10.18 | 4.18 | 0.1 | 0.078 | 0.03 |
| 03/03/21 | 21.56 | 49.98 | 100.8 | 100.9 | 7.19 | 10.16 | 4.12 | 0.2 | -0.019 | 0.35 |
| 03/17/21 | 21.68 | 49.97 | 102.2 | 102.2 | 7.11 | 10.11 | 4.12 | 0.3 | 0.078 | 0.15 |
| 03/31/21 | 22.71 | 50.03 | 100.5 | 100.4 | 7.16 | 10.08 | 4.19 | 0.1 | 0.094 | 0.04 |
| 04/13/21 | 21.82 | 50.05 | 101.5 | 101.5 | 7.10 | 10.12 | 4.13 | 0.4 | 0.055 | 0.08 |
| 04/28/21 | 21.79 | 50.33 | 100.5 | 100.5 | 7.08 | 10.03 | 4.08 | 2.6 | 0.135 | 0.63 |
| 05/19/21 | 22.16 | 50.35 | 100.1 | 100.2 | 7.01 | 9.93 | 4.05 | 0.0 | 0.061 | 0.05 |
| 06/02/21 | 21.76 | 50.30 | 101.8 | 101.8 | 7.03 | 9.98 | 3.99 | 0.2 | 0.046 | 0.36 |
| 06/16/21 | 21.78 | 50.12 | 101.7 | 101.6 | 7.17 | 10.16 | 4.13 | -0.1 | 0.068 | 1.04 |

**Fort Matanzas**

|  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **Deployment Date** | **Temp (°C)** | **SpCond (mS/cm)** | **ROX DO %** | **ROX DO %** | **pH** | **pH** | **pH** | **Turbidity (NTU)** | **Depth (m)** | **CHL**  **(ug/L)** |
|  | **°C** | **50.00** | **100.0** | **100.0** | **7.00** | **10.00** | **4.00** | **0.0** | **m** | **0.00** |
| 12/16/20 | 20.22 | 49.94 | 100.2 | 100.2 | 7.10 | 10.09 | 4.11 | 0.2 | 0.009 | 0.00 |
| 01/06/21 | 20.42 | 50.03 | 101.4 | 101.5 | 7.16 | 10.15 | 4.17 | 0.1 | 0.119 | 0.22 |
| 01/27/21 | 19.62 | 50.04 | 101.1 | 101.1 | 7.11 | 10.11 | 4.08 | 0.0 | 0.070 | 0.07 |
| 02/17/21 | 19.43 | 49.98 | 103.2 | 103.1 | 7.18 | 10.18 | 4.17 | 0.0 | 0.083 | 0.39 |
| 03/03/21 | 21.36 | 50.01 | 100.9 | 101.0 | 7.14 | 10.14 | 4.13 | 0.2 | 0.031 | 0.14 |
| 03/17/21 | 21.61 | 49.98 | 102.2 | 102.2 | 7.20 | 10.21 | 4.19 | 0.0 | 0.069 | 0.22 |
| 03/31/21 | 22.85 | 50.12 | 100.7 | 100.7 | 7.03 | 10.05 | 4.11 | 0.0 | 0.092 | 0.43 |
| 04/13/21 | 21.74 | 50.06 | 101.7 | 101.9 | 7.14 | 10.13 | 4.16 | 0.3 | 0.069 | 0.2 |
| 04/28/21 | 21.80 | 50.40 | 100.4 | 100.5 | 7.14 | 10.11 | 4.20 | 0.1 | 0.141 | 0.72 |
| 05/19/21 | 22.24 | 50.25 | 100.7 | 100.7 | 7.10 | 10.09 | 4.12 | 0.4 | 0.053 | 0.02 |
| 06/02/21 | 21.85 | 50.34 | 101.2 | 101.2 | 7.15 | 10.16 | 4.25 | 0.0 | 0.056 | 0.22 |
| 06/16/21 | 21.82 | 50.06 | 101.9 | 101.9 | 7.15 | 10.12 | 4.20 | -1.0 | 0.075 | 0.12 |

**Pellicer Creek**

|  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **Deployment Date** | **Temp (°C)** | **SpCond (mS/cm)** | **ROX DO %** | **ROX DO %** | **pH** | **pH** | **pH** | **Turbidity (NTU)** | **Depth/Level (m)** | **CHL**  **(ug/L)** |
|  | **°C** | **50.00** | **100.0** | **100.0** | **7.00** | **10.00** | **4.00** | **0.0** | **m** | **0.00** |
| 12/15/20 | 20.13 | 50.05 | 99.5 | 99.6 | 7.08 | 10.09 | 4.12 | -0.1 | 0.088 | 0.06 |
| 01/05/21 | 20.38 | 50.02 | 101.6 | 101.7 | 7.03 | 10.03 | 4.02 | 0.2 | 0.144 | 0.19 |
| 01/27/21 | 20.05 | 50.00 | 101.0 | 100.9 | 7.08 | 10.15 | 4.06 | 0.1 | 0.068 | 0.01 |
| 02/17/21 | 20.43 | 49.92 | 102.9 | 102.9 | 7.11 | 10.17 | 4.09 | 0.1 | 0.025 | 0.24 |
| 03/02/21 | 21.43 | 50.08 | 100.8 | 100.3 | 7.15 | 10.17 | 4.15 | 0.5 | -0.019 | -0.01 |
| 03/17/21 | NA | 50.01 | 101.3 | 101.2 | 7.13 | 10.14 | 4.11 | 0.4 | 0.098 | 0.19 |
| 03/31/21 | 22.86 | 50.06 | 100.5 | 100.4 | 7.09 | 10.11 | 4.12 | 0.5 | -1.021 | -0.01 |
| 04/13/21 | 21.85 | 50.14 | 101.1 | 101 | 7.08 | 10.15 | 4.07 | 0.9 | -1.036 | 0.66 |
| 04/28/21 | 22.16 | 50.30 | 101.2 | 101.2 | 7.08 | 10.09 | 4.09 | 0.1 | -0.956 | -0.03 |
| 05/20/21 | 22.29 | 50.35 | 100.3 | 100.3 | 6.95 | 9.99 | 3.96 | 1.4 | -1.002 | 0.59 |
| 06/02/21 | 21.85 | 50.33 | 101.6 | 101.6 | 7.03 | 10.08 | 4.03 | 0.9 | -1.063 | 0.17 |
| 06/16/21 | 21.89 | 50.15 | 102.0 | 102.1 | 7.03 | 10.07 | 4.04 | -0.2 | -334.3 | 0.69 |

**14) Other remarks/notes:**

1. Copies of calibration logs can be obtained through the CDMO.
2. Daily, Monthly, Annual Precipitation Totals are collected at the Pellicer Creek Weather Station (gtmpcmet) and are available below.

**Missing Data**

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. Any NANs in the dataset stand for “not a number” and are the result of low power, disconnected wires, or out of range readings. If additional information on missing data is needed, contact the Research Coordinator at the reserve submitting the data.

**March 1-31, 2021**

**PC**

1. Missing data (all parameters) 03/17; attributed to verification of station elevation for conversion of site from reporting water depth to reporting water level.

**June 1-30, 2021**

**PC**

1. Missing level data 06/17 19:15 through 06/30 09:15; attributed to level sensor malfunction.

**See Metadata “CSM” “GSM” Notes/Comments from Data Files**

**Note #1:** Slight shifts in data are sometimes correlated with sonde exchanges. These shifts are most noticeable in pH, specific conductivity, salinity, DO% and DO conc, and may be related to sensor drift (e.g., due to fouling) and/or calibration/performance differences between sondes.

**Note #2:** Turbidity “outliers” (i.e., values that are negative or greater than 1000 NTU for 6600 series sondes and 4000 NTU for EXO series sondes) were not deleted from the monthly records. Readings greater than 1000 NTU for 6600 series sondes and 4000 NTU for EXO series sondes are considered out of range and are rejected. They have been left in the database to provide users with a complete dataset and to allow true visual representation of the data in graphs. Negative turbidity values may occur throughout the year at all four sites. Some of these negative values are within the accuracy range of the sensor (+/- 2.0 %) and, therefore, were not removed from the dataset. They were marked suspect with the CAF code.

**Note #3**: Turbidity data is subject to single and clusters of spikes that occur in the beginning and middle of deployments. Turbidity values that fall between 500 and 1000 are not specifically indicated as suspect data, but possibly could be interpreted as suspect. Turbidity spikes may be associated with wiper malfunction but mostly the reason is unknown. Data users should exercise caution when interpreting turbidity data that fall within this range.

**Note #4:** Time series profiles of the dissolved oxygen data at all monitoring stations sometimes exhibits brief “spikes” of reduced DO concentrations. These events appear to be coupled with the occurrence of slack tide conditions as well as the level of fouling associated with the sonde.

**January 1-31, 2021**

**PI**

1. Reject Sp. Cond/Sal, DO mg/L, Depth, and Chlorophyll data 01/01 through 01/06 07:45; attributed to central wiper probe failure. Wiper got stuck inside Temp/Sp. Cond. probe channel.

**April 1-30, 2021**

**PI**

1. Turbidity data collected between 04/28 08:30 through 04/30 23:45 appear to fit conditions although post deployment value was out of range. Turbidity post deployment value out of range likely attributed to heavy biofouling and algae growth in front of optical sensors.

**May 1-31, 2021**

**PI**

1. Turbidity data collected between 05/01 00:00 through 05/15 14:45 appear to fit conditions although post deployment value was out of range. Turbidity post deployment value out of range likely attributed to heavy biofouling and algae growth in front of optical sensors.
2. Reject turbidity data collected between 05/15 15:00 through 05/19 12:15; attributed to heavy biofouling and algae growth in front of optical sensors.

**Daily, Monthly, and Annual Precipitation Totals (from raw data)**

Pellicer Creek Weather Station (gtmpcmet)

|  |  |
| --- | --- |
| **Date** | **Daily Precip. Totals (mm)** |
| 01/03/2021 | 0.254 |
| 01/08/2021 | 0.762 |
| 01/13/2021 | 0.254 |
| 01/15/2021 | 2.286 |
| 01/16/2021 | 0.254 |
| 01/23/2021 | 0.762 |
| 01/24/2021 | 1.778 |
| 01/27/2021 | 12.192 |
|  |  |
| **January Monthly Total** | **19.304** |
|  |  |
| 02/01/2021 | 1.524 |
| 02/06/2021 | 66.294 |
| 02/07/2021 | 11.430 |
| 02/11/2021 | 0.254 |
| 02/13/2021 | 10.160 |
| 02/14/2021 | 31.750 |
| 02/15/2021 | 27.178 |
| 02/16/2021 | 2.286 |
| 02/17/2021 | 0.254 |
| 02/19/2021 | 8.382 |
| 02/22/2021 | 2.540 |
|  |  |
| **February Monthly Total** | **162.052** |
|  |  |
| 03/02/2021 | 2.540 |
| 03/03/2021 | 11.430 |
| 03/06/2021 | 1.524 |
| 03/20/2021 | 3.556 |
| 03/21/2021 | 1.016 |
| 03/22/2021 | 1.016 |
| 03/31/2021 | 0.254 |
|  |  |
| **March Monthly Total** | **21.336** |
|  |  |
| 04/10/2021 | 5.334 |
| 04/11/2021 | 34.036 |
| 04/16/2021 | 14.986 |
| 04/17/2021 | 45.212 |
| 04/18/2021 | 39.624 |
| 04/19/2021 | 0.254 |
| 04/25/2021 | 22.606 |
|  |  |
| **April Monthly Total** | **162.052** |
|  |  |
| 05/02/2021 | 0.254 |
| 05/03/2021 | 0.254 |
| 05/06/2021 | 11.430 |
| 05/11/2021 | 0.254 |
| 05/13/2021 | 1.016 |
| 05/19/2021 | 1.524 |
| 05/28/2021 | 2.540 |
| 05/29/2021 | 0.762 |
|  |  |
| **May Monthly Total** | **18.034** |
|  |  |
| 06/03/2021 | 1.788 |
| 06/04/2021 | 1.016 |
| 06/05/2021 | 0.254 |
| 06/12/2021 | 0.254 |
| 06/13/2021 | 44.958 |
| 06/14/2021 | 20.574 |
| 06/15/2021 | 3.048 |
| 06/16/2021 | 1.016 |
| 06/17/2021 | 23.876 |
| 06/18/2021 | 1.524 |
| 06/19/2021 | 4.064 |
| 06/20/2021 | 3.302 |
| 06/21/2021 | 8.636 |
| 06/22/2021 | 16.002 |
| 06/23/2021 | 1.016 |
|  |  |
| **June Monthly Total** | **131.318** |
|  |  |
| **January – June Total** | **514.096** |