**Guana Tolomato Matanzas Nation Estuarine Research Reserve**

**Water Quality Metadata Report**

**January – December 2010**

**Latest Update:** 11/29/2012

**I. Data Set and Research Descriptors**

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

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**2) Entry verification:**

Data from each deployment are uploaded from the YSI data sonde to a Personal Computer (IBM compatible), and graphs are produced using EcoWatch software Version 3.18. These graphs are examined for suspect data that, for example, might derive from probe failure. Files are exported from EcoWatch in a comma-delimited format (.CDF) 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. Excessive pre- and post-deployment data are removed from the file prior to upload with up to 2 hours of pre- and post-deployment data retained to assist in data management. During primary QAQC, data are flagged if they are missing or out of sensor range. The edited file is then returned to the Reserve 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 remaining pre- and post-deployment data, append files, and export the resulting data file to the CDMO. Upload after secondary QAQC results in ingestion into the database a 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 a particular site were investigated for validity based on weather data, field observations, QC checks, EcoWatch printouts, 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., a torn 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 .cdf files are also sent to the CDMO via FTP for archiving. Katie Petrinec is responsible for these tasks.

**3) Research objectives:**

The System-wide Monitoring Program (SWMP) water quality initiative began within the GTMNERR in 2001. There are presently four permanent stations at which YSI 6600 EDS data sondes have been deployed for continuously monitoring a suite of selected abiotic parameters at 15 min intervals. The positions of these stations allow for comparisons between relatively pristine versus more urbanized drainage basins as well as higher versus lower salinity regions of the estuary (see “Station Descriptions” under “Site Location and Character”). Nutrient analyses are also performed on water samples collected monthly at each of these sites. The objective of this effort is to quantify the spatial/temporal variability and trends, both seasonally and as a function of tidal forcing, of selected abiotic and nutrient parameters within the Reserve, and to explore how these are related to concurrently generated meteorological data.

**4) Research methods:**

YSI 6600 EDS 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 site the sonde is contained within a 10 cm (inside diameter) PVC housing pipe mounted vertically onto a piling. A steel pin at the bottom of the pipe holds the sonde at a position within 1 meter from the bottom. To facilitate water flow across the sensors, several 2 cm diameter holes were drilled into the submerged portion of the pipe. Hole density is greatest near the base where the sonde sensors are located. 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 meter from the bottom. As of January 21, 2004, all sondes were upgraded to the 6600 EDS models. These new models incorporate a specially designed wiper apparatus attached to the turbidity probe that reduces the oxygen and pH sensor fouling and thereby improves the quality of data collected.

Sonde exchanges at all sites are made at approximately two week intervals and usually take less than 5 minutes. At the end of a sampling period, 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. The EDS turbidity wiper brush is removed and replaced with a clean wiper to avoid contamination of standards during post-calibration procedures. After a superficial rinse of the sonde in tap water, post deployment readings are recorded. Temperature and dissolved oxygen (DO) data are recorded from the 2-hour post deployment data; pH (Fisher 7.00 buffer solution) and conductivity (Exaxol 50.00 mS/cm standard) are recorded from values collected in standards; and a post-deployment turbidity reading in 0.0 NTU standard (DI water) is recorded after a wiper exchange and a more thorough rinse of the turbidity sensor. The results of these post-deployment readings are used to evaluate the validity of data (See Tables 1-4). Whenever the rapid pulse dissolved oxygen (DO) membrane is replaced, it is allowed to equilibrate before the DO sensor is calibrated in air-saturated water for the following deployment.

A Sutron Sat-Link2 transmitter was installed at the Pellicer Creek monitoring station on June 29, 2006 and transmits data to the NOAA GOES satellite, NESDIS ID #3B02C790 (Where #3B02C790 is the GOESID for that particular station). The transmissions are scheduled hourly and contain four (4) data sets reflecting fifteen minute data sampling intervals. Upon receipt by the CDMO, the data undergoes 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](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 60,000 acres (24,281 hectares) 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 within the Reserve is approximately 21°C.

**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 average depth at this site is approximately 3.8 m with a tidal range of about 1.6 m; the bottom type is muddy sand. Salinity ranged from 18.3 to 39.5 ppt during 2010. The **Fort Matanzas (FM)** site (in the southern section of the GTMNERR) 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 3.6 m with a tidal range of about 1.4 m; the bottom type is muddy sand. The salinity ranged from 23.1 to 38.2 ppt during 2010. Both the FM and PI stations are situated within Class II Shellfish Harvesting Waters. 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. The average depth at this site is approximately 4.4 m with a tidal range of about 1.7 m; the bottom type is muddy sand. The salinity range during 2010 was from 17.3 to 38.4 ppt. 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. The average depth at this site is approximately 2.3 m with a tidal range of about 0.6 m; the bottom type is muddy sand. The salinity ranged from 0.1 to 35.8 ppt during 2010.

**6) Data collection period:**

YSI 6600 EDS 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.

Individual sonde deployment and retrieval dates and times for 2010 are as follows:

|  |  |
| --- | --- |
| **BEGAN** | **ENDED** |
|  |  |
| **Pine Island Site** |  |
|  |  |
| 12/29/09, 10:45 | 01/13/10, 10:45 |
| 01/13/10, 11:00 | 01/27/10, 11:00 |
| 01/27/10, 11:15 | 02/16/10, 12:45 |
| 02/16/10, 13:00 | 03/05/10, 10:30 |
| 03/05/10, 10:45 | 03/16/10, 12:00 |
| 03/16/10, 12:15 | 03/31/10, 10:30 |
| 03/31/10, 10:45\*\* | 04/14/10, 11:00 |
| 05/25/10, 09:00 | 06/09/10, 07:45 |
| 06/09/10, 08:00 | 06/22/10, 08:15 |
| 06/22/10, 08:30 | 07/13/10, 10:15 |
| 07/13/10, 10:30 | 07/27/10, 08:15 |
| 07/27/10, 08:30 | 08/10/10, 10:30 |
| 08/10/10, 10:45 | 08/26/10, 08:45 |
| 08/26/10, 09:00 | 09/07/10, 10:00 |
| 09/07/10, 10:15 | 09/23/10, 08:15 |
| 09/23/10, 08:30 | 10/05/10, 08:30 |
| 10/05/10, 08:45 | 10/26/10, 08:45 |
| 10/26/10, 09:00 | 11/09/10, 13:00 |
| 11/09/10, 13:15 | 11/23/10, 10:45 |
| 11/23/10, 11:00 | 12/07/10, 11:45 |
| 12/07/10, 12:00 | 12/28/10, 11:30 |
| 12/28/10, 11:45 | 01/04/10, 10:00 |
|  |  |
| **San Sebastian Site** |  |
| 12/29/09, 11:30 | 01/13/10, 12:15 |
| 01/13/10, 12:30 | 01/27/10, 12:00 |
| 01/27/10, 12:15 | 02/16/10, 14:45 |
| 02/16/10, 15:00 | 03/05/10, 11:15 |
| 03/05/10, 11:30 | 03/16/10, 13:15 |
| 03/16/10, 13:30 | 03/31/10, 11:30 |
| 03/31/10, 11:45 | 04/14/10, 12:15 |
| 04/14/10, 12:30 | 04/20/10, 10:15 |
| 04/20/10, 10:30 | 05/11/10, 10:45 |
| 05/11/10, 11:00 | 05/25/10, 10:30 |
| 05/25/10, 10:45 | 06/09/10, 09:15 |
| 06/09/10, 09:30 | 06/22/10, 09:45 |
| 06/22/10, 10:00 | 07/13/10, 09:30 |
| 07/13/10, 09:45 | 07/27/10, 09:30 |
| 07/27/10, 09:45\*\* | 08/10/10, 11:45 |
| 08/10/10, 12:00 | 08/26/10, 10:00 |
| 08/26/10, 10:15\*\* | 09/07/10, 11:45 |
| 09/07/10, 12:00 | 09/23/10, 10:00 |
| 09/23/10, 10:15 | 10/05/10, 10:00 |
| 10/05/10, 10:15 | 10/26/10, 10:15 |
| 10/26/10, 10:30\*\* | 11/09/10, 14:00 |
| 11/09/10, 14:15 | 11/23/10, 11:45 |
| 11/23/10, 12:00\*\* | 12/07/10, 13:30 |
| 12/07/10, 13:45 | 12/28/10, 12:30 |
| 12/28/10, 12:45\*\* | 01/04/11, 12:00 |
|  |  |
| **Fort Matanzas Site** |  |
| 12/31/09, 10:00 | 01/13/10, 14:15 |
| 01/13/10, 14:30 | 02/02/10, 08:45 |
| 02/02/10, 09:00\*\* | 02/19/10, 09:45 |
| 02/19/10, 10:00 | 03/03/10, 09:45 |
| 03/03/10, 10:00 | 03/16/10, 08:45 |
| 03/16/10, 09:00 | 03/30/10, 08:45 |
| 03/30/10, 09:00 | 04/15/10, 10:00 |
| 04/15/10, 10:15 | 05/04/10, 08:45 |
| 05/04/10, 09:00 | 05/11/10, 12:00 |
| 05/11/10, 12:15 | 05/25/10, 12:00 |
| 05/25/10, 12:15 | 06/09/10, 10:15 |
| 06/09/10, 10:30 | 06/22/10, 11:00 |
| 06/22/10, 11:15 | 07/13/10, 08:45 |
| 07/13/10, 09:00 | 07/27/10, 10:30 |
| 07/27/10, 10:45 | 08/10/10, 13:00 |
| 08/10/10, 13:15 | 08/26/10, 11:15 |
| 08/26/10, 11:30 | 09/07/10, 13:00 |
| 09/07/10, 13:15 | 09/23/10, 11:00 |
| 09/23/10, 11:15 | 10/05/10, 11:30 |
| 10/05/10, 11:45 | 10/26/10, 11:15 |
| 10/26/10, 11:30 | 11/09/10, 15:00 |
| 11/09/10, 15:15 | 11/30/10, 09:45 |
| 11/30/10, 10:00 | 12/07/10, 14:45 |
| 12/07/10, 15:00 | 12/29/10, 10:00 |
| 12/29/10, 10:15 | 01/04/11, 12:45 |
|  |  |
| **Pellicer Creek Site** |  |
| 12/31/09, 11:15 | 01/12/10, 11:00 |
| 01/12/10, 11:15 | 01/26/10, 13:15 |
| 01/26/10, 13:30 | 02/15/10, 12:45 |
| 02/15/10, 13:00 | 03/03/10, 11:00 |
| 03/03/10, 11:15 | 03/16/10, 09:30 |
| 03/16/10, 09:45 | 03/30/10, 10:30 |
| 03/30/10, 10:45 | 04/13/10, 10:00 |
| 04/13/10, 10:15 | 05/04/10, 10:00 |
| 05/04/10, 10:15 | 05/24/10, 13:30 |
| 05/24/10, 13:45 | 06/08/10, 11:00 |
| 06/08/10, 11:15\*\* | 06/30/10, 11:30 |
| 06/30/10, 11:45 | 07/23/10, 10:30 |
| 07/23/10, 10:45 | 08/09/10, 12:45 |
| 08/09/10, 13:00 | 09/07/10, 10:30 |
| 09/07/10, 10:45 | 09/30/10, 14:00 |
| 09/30/10, 14:15 | 10/20/10, 10:45 |
| 10/20/10, 11:00 | 11/08/10, 14:15 |
| 11/08/10, 14:30 | 11/22/10, 13:15 |
| 11/22/10, 13:30 | 12/22/10, 10;15 |
| 12/22/10, 10:30 | 01/06/11, 14:45 |

\*\* See Section 14 Other Remarks/Notes: See Metadata “CSM” Notes/Comments from Data Files

**7) Distribution:**

According to the Ocean and Coastal Resource Management Data Dissemination Policy for the NERRS System-wide Monitoring Program, NOAA/ERD retains the right to analyze, synthesize and publish summaries of the NERRS System-wide Monitoring Program data. The Principal Investigator (PI) retains the right to be fully credited for having collected and processed the data. Following academic courtesy standards, the PI and NERR site where the data were collected will be contacted and fully acknowledged in any subsequent publications in which any part of the data are used. Manuscripts resulting from this NOAA/OCRM supported research that are produced for publication in open literature, including refereed scientific journals, will acknowledge that the research was conducted under an award from the Estuarine Reserves Division, Office of Ocean and Coastal Resource Management, National Ocean Service, National Oceanic and Atmospheric Administration. The data set enclosed within this package/transmission is only as good as the quality assurance and quality control procedures outlined by the enclosed metadata reporting statement. The user bears all responsibility for its subsequent use/misuse in any further analyses or comparisons. The Federal government does not assume liability to 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.

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 [http://cdmo.baruch.sc.edu/](http://cfcdmo.baruch.sc.edu/). Data are available in text tab-delimited format.

**8) Associated researchers and projects:**

The GTMNERR has formed partnerships with other agencies and organizations actively involved in resource protection in the GTMNERR watershed. Cooperating managers of lands within the NERR include the: 1) National Park Service (NPS), 2) St. Johns River Water Management District (SJRWMD), 3) Department of Environmental Protection (DEP) Division of Recreation and Parks/Florida Park Service (FPS), 4) Florida Fish and Wildlife Conservation Commission (FWC), 5) Florida Division of Forestry (DOF), and 6) Flagler County.

The SJRWMD Northern Coastal Basin 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 Guana River marshes at Ponte Vedra in southern Duval County. This program was developed in response to concerns about the impacts of population growth and development on water quality in the Northern Coastal Basin (NCB). Some of the major research activities conducted within the boundaries of the GTMNERR through the NCB program include: 1) a fisheries monitoring project in conjunction with the United States Geological Survey (USGS); 2) hydrodynamic modeling of the estuarine systems; 3) emergent marsh vegetation and oyster habitat mapping; and 4) 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: 1) studies of nutrient profiles by the laboratory of Dr. Edward Phlips at the University of Florida [This work includes GTMNERR-contracted nutrient analyses (part of SWMP) as well as separately-funded studies], and 2) regular monitoring of fecal coliform levels in shellfish harvesting waters by the Department of Agriculture and Consumer Services.

As part of the System-wide Monitoring Program (SWMP), the GTMNERR collects abiotic water quality and nutrient data within the Reserve. To complement the water quality data the GTMNERR also operates a weather station (part of SWMP). All SWMP data are available for download through the CDMO.

For further information on research and monitoring activities within the GTMNERR, see the GTMNERR Site Profile at: <http://nerrs.noaa.gov/Doc/PDF/Reserve/GTM_SiteProfile.pdf>

**II. Physical Structure Descriptors**

**9) Sensor specifications:**

GTMNERR deployed only 6600 EDS data sondes in 2009. Both Rapid-Pulse (RP) DO and ROX DO sensors were deployed at San Sebastian (SS) and Fort Matanzas (FM) sites, but only ROX DO data were reported in this data set unless otherwise specified. See Section 14: Other Remarks for dates that rapid-pulse data are also available. Only ROX DO sensors were deployed at Pellicer Creek (PC) and Pine Island (PI) for all of 2009.

YSI 6600 EDS data sonde:

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 autoranging

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: Rapid Pulse - Clark type, polargraphic

Model#: 6562

Range: 0 to 500% air saturation

Accuracy: 0-200% air saturation: +/- 2% of the reading or 2% air saturation, whichever is greater; 200 to 500% air saturation: +/- 6% of the reading

Resolution: 0.1% air saturation

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: Rapid Pulse - Clark type, polargraphic

Model#: 6562

Range: 0 to 50 mg/L

Accuracy: 0-20 mg/L: +/- 2% of the reading or 0.2 mg/L, whichever is greater

20 to 50 mg/L: +/- 6% of the reading

Resolution: 0.01 mg/L

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

**Dissolved Oxygen Qualifier:**

The reliability of the dissolved oxygen (DO) data 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). Many reserves have upgraded to the YSI 6600 EDS data sondes, which increases DO accuracy and longevity by reducing the environmental effects of fouling. The user is therefore advised to consult the metadata and to exercise caution when utilizing the DO data beyond the initial 96-hour time period. However, this 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. The Research Coordinator at the specific NERR site should be contacted concerning the reliability of the DO data because of the site and seasonal variation in the fouling of the DO sensor.

**Depth Qualifier:**

The NERR System-Wide Monitoring Program utilizes YSI data sondes that can be equipped with either depth or water level sensors.  Both sensors measure water depth, but by convention, level sensors refer to atmospherically vented measurements and depth refers to non-vented measurements.  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 1.03 cm for every 1 millibar change in atmospheric pressure, and is eliminated for level 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 site 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 metrological 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.

**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 –** This section details the automated and secondary QAQC flag definitions. Include the following excerpt**:**

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** – This section details the secondary QAQC Code definitions used in combination with the flags above. Include the following excerpt:

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

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:**

End of deployment post-calibration readings in standard solutions prior to probe cleaning. Dates provide are deployments beginning times.

**Table 1. Post-deployment readings of all sondes deployed at the Pine Island site during 2010.**

|  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **Date** |  | **Temp (°C)** | **SpCond (mS/cm)** | **RP DO %** | **ROX DO %** | **ROX DO %** | **pH** | **Turbidity (NTU)** | **Depth (m)** |
|  | **Std.** | **N/A** | **50.00** | **100.0** | **100.0** | **100.0** | **7.00** | **0.0** | **N/A** |
| 12/29/09 |  | N/A | 49.88 | N/A | 134.6 | 133.3 | 6.95 | 1.3 | 0.123 |
| 01/13/10 |  | N/A | 49.39 | N/A | 101.5 | 101.4 | 7.09 | 7.0 | 0.135 |
| 01/27/10 |  | N/A | 49.87 | N/A | 101.4 | 101.5 | 6.93 | 5.3 | 0.003 |
| 02/16/10 |  | N/A | 49.55 | N/A | 100.1 | 99.9 | 7.15 | -5.1 | 0.057 |
| 03/05/10 |  | N/A | 50.12 | N/A | 99.1 | 99.0 | 7.00 | 3.1 | 0.025 |
| 03/16/10 |  | N/A | 50.14 | N/A | 100.7 | 100.6 | 7.09 | 2.8 | 0.047 |
| 03/31/10 |  | N/A | 48.90 | N/A | 100.2 | 100.4 | 7.08 | 1.6 | 0.138 |
| 05/25/10 |  | N/A | 49.69 | N/A | 100.1 | 100.1 | 7.07 | 1.5 | 0.050 |
| 06/09/10 |  | N/A | 50.10 | N/A | 101.0 | 101.2 | 6.98 | 5.3 | 0.072 |
| 06/22/10 |  | N/A | 47.26 | N/A | 97.6 | 98.0 | 7.20 | 2.4 | 0.022 |
| 07/13/10 |  | N/A | 50.74 | N/A | 98.9 | 98.8 | 7.08 | 2.2 | 0.059 |
| 07/27/10 |  | N/A | 48.30 | N/A | 104.4 | 104.4 | 6.96 | 4.5 | 0.018 |
| 08/16/10 |  | N/A | 48.54 | N/A | 99.5 | 99.6 | 6.98 | -2.1 | 0.023 |
| 09/07/10 |  | N/A | 49.49 | N/A | 106.5 | 106.5 | 7.02 | 4.5 | 0.056 |
| 09/23/10 |  | N/A | 50.53 | N/A | 99.6 | 99.6 | 7.08 | 0.9 | 0.090 |
| 10/05/10 |  | N/A | 49.51 | N/A | 100.3 | 100.4 | 7.05 | 0.3 | 0.035 |
| 10/26/10 |  | N/A | 49.97 | N/A | 101.1 | 101.1 | 7.03 | 0.8 | 0.014 |
| 11/09/10 |  | N/A | 50.11 | N/A | 100.1 | 100.2 | 7.03 | 2.2 | 0.050 |
| 11/23/10 |  | N/A | 49.50 | N/A | 101.0 | 100.9 | 7.02 | 2.7 | 0.070 |
| 12/07/10 |  | N/A | 43.73 | N/A | 101.4 | 101.3 | 7.17 | -5.4 | 0.082 |
| 12/28/10 |  | N/A | 50.51 | N/A | 99.1 | 99.2 | 7.07 | -1.2 | 0.092 |

**Table 2. Post-deployment readings of all sondes deployed at the San Sebastian site during 2010.**

|  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **Date** |  | **Temp (°C)** | **SpCond (mS/cm)** | **RP DO %** | **RP DO %** | **ROX DO %** | **ROX DO %** | **pH** | **Turbidity (NTU)** | **Depth (m)** |
|  | **Std.** | **N/A** | **50.00** | **100.0** | **100.0** | **100.0** | **100.0** | **7.00** | **0.0** | **N/A** |
| 12/29/09 |  | N/A | 51.27 | 103.8 | 103.5 | 101.3 | 101.4 | 7.03 | 2.0 | 0.111 |
| 01/13/10 |  | N/A | 49.98 | 98.7 | 98.8 | 102.5 | 102.6 | 7.11 | 1.4 | 0.140 |
| 01/27/10 |  | N/A | 53.81 | 102.6 | 102.5 | 99.6 | 99.5 | 7.10 | 6.9 | -0.008 |
| 02/16/10 |  | N/A | 26.40 | 105.3 | 105.3 | 97.6 | 98.2 | 7.16 | -4.7 | 0.065 |
| 03/05/10 |  | N/A | 52.57 | N/A | N/A | 100.0 | 100.0 | 7.03 | 0.9 | 0.024 |
| 03/16/10 |  | N/A | 50.31 | 101.7 | 101.8 | 100.7 | 100.6 | 7.09 | -3.6 | 0.048 |
| 03/31/10 |  | N/A | 53.04 | 94.2 | 94.0 | 100.2 | 99.9 | 7.10 | 1.9 | 0.134 |
| 04/14/10 |  | N/A | 50.17 | 98.9 | 98.8 | 99.8 | 99.9 | 6.92 | 3.5 | 0.003 |
| 04/20/10 |  | N/A | 49.93 | N/A | N/A | 100.5 | 100.4 | 7.02 | -2.6 | 0.105 |
| 05/11/10 |  | N/A | 50.18 | N/A | N/A | 98.3 | 98.4 | 7.02 | 1.5 | 0.013 |
| 05/25/10 |  | N/A | 49.58 | N/A | N/A | 100.5 | 100.3 | 7.09 | 6.2 | 0.057 |
| 06/09/10 |  | N/A | 49.85 | N/A | N/A | 101.5 | 101.1 | 7.12 | 3.4 | 0.069 |
| 06/22/10 |  | N/A | 50.87 | N/A | N/A | 98.5 | 98.5 | 7.09 | 1.3 | 0.021 |
| 07/13/10 |  | N/A | 49.22 | N/A | N/A | 0.00 | 77.6 | 7.06 | -1.0 | 0.068 |
| 07/27/10 |  | N/A | 49.26 | N/A | N/A | 98.7 | 98.9 | 7.08 | 1.8 | 0.026 |
| 08/10/10 |  | N/A | 49.43 | N/A | N/A | 104.3 | 104.4 | 7.00 | 1.8 | 0.021 |
| 08/26/10\* |  | N/A | 51.14 | N/A | N/A | 104.7 | 104.7 | 7.09 | 3.2 | 0.051 |
| 09/07/10 |  | N/A | 49.11 | N/A | N/A | 101.3 | 101.4 | 6.99 | 1.3 | 0.089 |
| 09/23/10 |  | N/A | 49.75 | N/A | N/A | 100.8 | 100.9 | 7.13 | 0.6 | 0.035 |
| 10/05/10 |  | N/A | 49.42 | N/A | N/A | 100.7 | 101 | 6.86 | -5.4 | 0.006 |
| 10/26/10\* |  | N/A | 18.99 | N/A | N/A | 30.0 | 30.0 | 7.14 | 5.2 | 0.056 |
| 11/09/10 |  | N/A | 49.13 | N/A | N/A | 101.1 | 101.1 | 7.04 | 3.7 | 0.070 |
| 11/23/10 |  | N/A | 50.12 | N/A | N/A | 103.1 | 103 | 7.17 | -6.9 | 0.084 |
| 12/07/10 |  | N/A | 50.36 | N/A | N/A | 99.1 | 99.2 | 7.11 | 0.2 | 0.097 |
| 12/28/10 |  | N/A | 49.87 | N/A | N/A | 100.9 | 100.8 | 7.03 | 9.1 | 0.049 |

**Table 3. Post-deployment readings of all sondes deployed at the Fort Matanzas site during 2010.**

|  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **Date** |  | **Temp (°C)** | **SpCond (mS/cm)** | **RP DO %** | **RP DO %** | **ROX DO %** | **ROX DO %** | **pH** | **Turbidity (NTU)** | **Depth (m)** |
|  | **Std.** | **N/A** | **50.00** | **100.0** | **100.0** | **100.0** | **100.0** | **7.00** | **0.0** | **N/A** |
| 12/31/09 |  | N/A | 49.24 | 103.3 | 103.2 | 101.8 | 101.9 | 6.93 | 6.2 | 0.112 |
| 01/13/10 |  | N/A | 49.80 | N/A | N/A | 99.9 | 99.6 | 7.10 | 1.4 | 0.066 |
| 02/02/10\* |  | N/A | 50.71 | N/A | N/A | N/A | N/A | 7.10 | N/A | 0.058 |
| 02/19/10\* |  | N/A | 49.86 | N/A | N/A | 98.4 | 98.4 | 7.17 | -9.6 | -0.041 |
| 03/03/10 |  | N/A | 50.35 | 100.9 | 100.9 | 101.0 | 101.0 | 7.07 | -0.3 | 0.021 |
| 03/16/10 |  | N/A | 50.70 | N/A | N/A | 100.8 | 100.6 | 7.10 | -0.5 | 0.014 |
| 03/30/10 |  | N/A | 50.80 | 101.4 | 101.2 | 99.8 | 99.9 | 7.09 | 2.8 | 0.125 |
| 04/15/10 |  | N/A | 49.84 | N/A | N/A | 99.4 | 99.4 | 6.98 | -4.0 | -0.006 |
| 05/04/10 |  | N/A | 49.05 | N/A | N/A | 99.8 | 99.8 | 7.06 | 0.8 | 0.100 |
| 05/11/10 |  | N/A | 50.31 | N/A | N/A | 100.3 | 100.1 | 7.07 | 1.9 | 0.010 |
| 05/25/10 |  | N/A | 51.09 | N/A | N/A | 101.3 | 101.3 | 7.12 | 9.7 | 0.044 |
| 06/09/10 |  | N/A | 50.70 | N/A | N/A | 98.9 | 98.8 | 7.15 | 1.2 | 0.077 |
| 06/22/10 |  | N/A | 48.71 | N/A | N/A | 99.8 | 99.6 | 7.07 | 3.5 | 0.021 |
| 07/13/10 |  | N/A | 49.29 | N/A | N/A | 99.1 | 99.0 | 7.02 | -0.6 | 0.056 |
| 07/27/10 |  | N/A | 48.87 | N/A | N/A | 99.2 | 99.0 | 7.03 | -0.9 | 0.026 |
| 08/10/10 |  | N/A | 50.55 | N/A | N/A | 98.1 | 98.2 | 6.89 | -2.1 | 0.019 |
| 08/26/10 |  | N/A | 49.79 | N/A | N/A | 104.6 | 104.5 | 6.86 | 3.1 | 0.055 |
| 09/07/10 |  | N/A | 50.71 | N/A | N/A | 99.4 | 99.8 | 6.95 | -2.2 | 0.086 |
| 09/23/10 |  | N/A | 48.57 | N/A | N/A | 99.8 | 100.0 | 6.03 | 1.4 | 0.044 |
| 10/05/10 |  | N/A | 49.81 | N/A | N/A | 98.7 | 98.4 | 7.01 | -4.6 | 0.007 |
| 10/26/10 |  | N/A | 48.99 | N/A | N/A | 99.9 | 99.8 | 7.22 | 0.6 | 0.052 |
| 11/09/10 |  | N/A | 49.66 | N/A | N/A | 99.0 | 99.0 | 7.02 | -2.7 | 0.025 |
| 11/30/10 |  | N/A | 49.64 | N/A | N/A | 101.9 | 101.9 | 7.15 | -4.6 | 0.079 |
| 12/07/10 |  | N/A | 49.59 | N/A | N/A | 101.7 | 102.0 | 6.68 | -3.5 | 0.056 |
| 12/29/10 |  | N/A | 49.98 | N/A | N/A | 101.6 | 101.7 | 7.04 | 1.1 | 0.057 |

**Table 4. Post-deployment readings of all sondes deployed at the Pellicer Creek site during 2010.**

|  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **Date** |  | **Temp (°C)** | **SpCond (mS/cm)** | **RP DO %** | **ROX DO %** | **ROX DO %** | **pH** | **Turbidity (NTU)** | **Depth (m)** |
|  | **Std.** | **N/A** | **50.00** | **100.0** | **100.0** | **100.0** | **7.00** | **0.0** | **N/A** |
| 12/31/09 |  | N/A | 49.86 | N/A | 97.6 | 97.5 | 7.05 | 2.2 | 0.091 |
| 01/12/10 |  | N/A | 50.07 | N/A | 99.4 | 99.6 | 7.02 | 6.7 | 0.118 |
| 01/26/10 |  | N/A | 50.45 | N/A | 99.9 | 99.6 | 7.03 | 5.0 | -0.029 |
| 02/15/10 |  | N/A | 50.63 | N/A | 98.1 | 98.3 | 7.18 | -2.9 | -0.039 |
| 03/03/10 |  | N/A | 50.46 | N/A | 99.8 | 99.8 | 7.04 | 0.2 | 0.014 |
| 03/16/10 |  | N/A | 50.76 | N/A | 100.0 | 99.7 | 7.04 | -0.9 | 0.011 |
| 03/30/10\* |  | N/A | 50.13 | N/A | 23.1 | 34.8 | 7.03 | -1.5 | 0.127 |
| 04/13/10 |  | N/A | 50.67 | N/A | 99.2 | 99.0 | 7.00 | -1.1 | -0.008 |
| 05/04/10 |  | N/A | 50.58 | N/A | 100.3 | 100.4 | 7.08 | 2.6 | 0.011 |
| 05/24/10 |  | N/A | 50.59 | N/A | 96.1 | 96.6 | 6.76 | 1.4 | 0.065 |
| 06/08/10\* |  | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A |
| 06/30/10 |  | N/A | 49.53 | N/A | 97.9 | 98.3 | 7.09 | 2.8 | 0.053 |
| 07/23/10 |  | N/A | 50.00 | N/A | 97.9 | 98.4 | 7.04 | 2.2 | 0.014 |
| 08/09/10 |  | N/A | 50.19 | N/A | 94.3 | 94.5 | 7.11 | -4.7 | 0.048 |
| 09/07/10 |  | N/A | 52.65 | N/A | 98.0 | 98.3 | 7.15 | 2.2 | -0.050 |
| 09/30/10 |  | N/A | 49.53 | N/A | 110.2 | 110.0 | 7.05 | -0.5 | 0.030 |
| 10/20/10 |  | N/A | 49.85 | N/A | 99.1 | 99.2 | 7.03 | 2.2 | 0.043 |
| 11/08/10 |  | N/A | 49.11 | N/A | 100.2 | 100.1 | 7.01 | 2.2 | 0.083 |
| 11/22/10 |  | N/A | 50.43 | N/A | 99.3 | 99.5 | 6.89 | -5.4 | 0.071 |
| 12/22/10 |  | N/A | 51.44 | N/A | 98.6 | 98.7 | 7.06 | 0.2 | -0.038 |

**\*** **Indicates loss of data due to data sonde or sensor malfunction**

**14) Other remarks/notes:**

1. Calibration of DO was performed on the day of calibration and the day of deployment. Two DO values are recorded during the post-calibration process. The ODO (ROX) data was uploaded and submitted to the CDMO as the primary dissolved oxygen data. (See calibration logs for day of calibration (“1”) and day of deployment (“2”) values).
2. Calibration of depth was performed on the day of calibration and the day of deployment. (See calibration logs for day of calibration (“1”) and day of deployment (“2”) values).
3. Temperature, ODO (ROX) mg/L, and Salinity data were collected for all deployments at time of ODO (ROX) calibration. (See calibration logs for day of calibration (“1”) and day of deployment (“2”) values).
4. Additional 1-point calibration of Turbidity was performed to counteract the negative offset that can occur during the calibration process. (See calibration logs for additional turbidity data).
5. Copies of calibration logs can be obtained through the CDMO.
6. Daily, Monthly, Annual Precipitation Totals are collected at the Pellicer Creek Weather Station (gtmpcmet).

**Rapid Pulse Dissolved Oxygen Data**

During 2010, two dissolved oxygen probes the Rapid Pulse (RP) and Optical (ROX) were deployed simultaneously at San Sebastian and Fort Matanzas sites. The ROX dissolved oxygen data was uploaded and submitted to the CDMO as the primary dissolved oxygen data for all four sites. All additional (Rapid Pulse) dissolved oxygen data is available for the following deployments:

|  |  |
| --- | --- |
| **San Sebastian** | **Fort Matanzas** |
| 12/29/09 | 12/31/09 |
| 01/13/10 | 02/02/10 |
| 01/27/10 | 03/03/10 |
| 02/16/10 | 03/30/10 |
| 03/16/10 |  |
| 03/31/10 |  |
| 04/14/10 |  |

**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.

**February 1-28, 2010**

**FM**

1. Missing data (all parameters) 02/12 19:30, 02/12 20:00 through 02/18 20:00, and 02/18 20:45 through 02/19 09:45; attributed to major battery failure. Turbidity probe wiper (brush) became entangled in ODO (ROX) wiper and caused the batteries to fail.

**April 1-30, 2010**

**PI**

1. Missing data (all parameters) 04/14 11:15 through 05/25 08:45; attributed to data sonde tube replacement.

**June 1-30, 2010**

**PC**

1. Missing data (all parameters) 06/08 11:15 through 06/08 13:00, 6/10 15:00 through 6/10 15:45, and 6/27 12:30 through 6/30 11:30; attributed to data sonde communication malfunction upon retrieval. Telemetry data was recovered and submitted as valid data.

**See Metadata “CSM” 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 readings greater than 1000 NTU are considered out of range and 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 occur throughout the year at all four sites. Some of these negative values are within the accuracy range of the sensor (+/- 2.0 NTU) and, therefore, are considered suspect. Larger negative values are rejected.

**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, 2010**

**FM**

1. Suspect pH data 1/13 14:30 to 2/2 08:45; possibly attributed to a contaminated pH sensor port

**February 1-28, 2010**

**FM**

1. Suspect Dissolved Oxygen data 02/02 09:00 through 02/19 09:45; attributed to Turbidity probe malfunction. Turbidity wiper (brush) was entangled in ODO (ROX) wiper upon retrieval.
2. Suspect pH data 2/19 10:00 to 3/3 09:45; possibly attributed to a contaminated pH sensor port

**March 1-30, 2010**

**FM**

1. Suspect pH data 3/16 9:00 to 3/30 8:45; possibly attributed to a contaminated pH sensor port

**April 1-30, 2010**

**PI**

1. Suspect turbidity 04/08 15:15 through 04/14 11:00 possibly attributed to heavy fouling or improper data sonde placement outside of tube. Sonde tube lost bottom bracket and the entire tube shifted slightly. The position of instrument outside of the tube may have caused the optics to be blocked. All other data appear to fit conditions. Data was collected at correct depth.

**July 1-31, 2010**

**SS**

1. Suspect Specific Conductivity and Salinity data 07/27 09:45 at time of sonde exchange; reason unknown. Data appear to fit conditions throughout the rest of the deployment.

**August 1-31, 2010**

**SS**

1. Suspect Specific Conductivity and Salinity data 08/26 10:15 and 8/26 10:30 at time of sonde exchange; reason unknown.

**October 1-31, 2010**

**FM**

1. Suspect pH data 10/26 11:30 to 11/9 15:00; possibly attributed to a contaminated pH sensor port

**SS**

1. Suspect Specific Conductivity and Salinity data 10/26 10:30 at time of sonde exchange; reason unknown. Data appear to fit conditions throughout the rest of the deployment.

**November 1-30, 2010**

**FM**

1. Suspect pH data 11/30 9:45 to 12/7 14:45; possibly attributed to a contaminated pH sensor port

**SS**

1. Suspect Specific Conductivity and Salinity data 11/23 12:00 and 11/23 12:15 at time of sonde exchange; reason unknown. Data appear to fit conditions throughout the rest of the deployment.

**December 1-31, 2010**

**FM**

1. Suspect pH data 12/7 15:00 to 12/29 10:00; possibly attributed to a contaminated pH sensor port

**SS**

1. Suspect Specific Conductivity and Salinity data 12/28 12:45 through 12/28 13:30 at time of sonde exchange; reason unknown. Data appear to fit conditions throughout the rest of the deployment.

**Daily, Monthly, and Annual Precipitation Totals at the Pellicer Creek Weather Station (gtmpcmet).**

|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
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| |  |  | | --- | --- | | **Date** | **Daily Precip. Totals (mm)** | | 01/01/2010 | 23.622 | | 01/08/2010 | 0.762 | | 01/09/2010 | 0.254 | | 01/16/2010 | 5.588 | | 01/17/2010 | 3.048 | | 01/21/2010 | 115.570 | | 01/22/2010 | 10.160 | | 01/24/2010 | 0.508 | | 01/25/2010 | 9.652 | | 01/30/2010 | 6.096 | |  |  | | **Monthly Total (mm)** | **175.260** | |  |  | | 02/01/2010 | 9.906 | | 02/02/2010 | 15.748 | | 02/05/2010 | 10.922 | | 02/09/2010 | 6.604 | | 02/12/2010 | 29.972 | | 02/22/2010 | 9.906 | | 02/23/2010 | 0.762 | | 02/24/2010 | 2.540 | | 02/27/2010 | 2.540 | |  |  | | **Monthly Total (mm)** | **88.900** | |  |  | | 03/02/2010 | 9.144 | | 03/11/2010 | 50.038 | | 03/12/2010 | 4.826 | |  |  | | 03/17/2010 | 0.762 | | 03/21/2010 | 11.430 | | 03/22/2010 | 0.254 | | 03/25/2010 | 12.192 | | 03/28/2010 | 7.874 | | 03/29/2010 | 13.716 | |  |  | | **Monthly Total (mm)** | **110.236** | |  |  | | 04/04/2010 | 23.368 | | 04/09/2010 | 0.254 | | 04/12/2010 | 0.508 | | 04/13/2010 | 1.016 | | 04/19/2010 | 0.762 | | 04/20/2010 | 1.270 | | 04/21/2010 | 7.366 | | 04/25/2010 | 8.382 | | 04/27/2010 | 0.762 | |  |  | | **Monthly Total (mm)** | **43.688** | |  |  | | 05/01/2010 | 0.254 | | 05/03/2010 | 1.270 | | 05/04/2010 | 0.508 | | 05/05/2010 | 13.716 | | 05/17/2010 | 96.774 | | 05/25/2010 | 8.636 | | 05/31/2010 | 1.016 | |  |  | | **Monthly Total (mm)** | **122.174** | |  |  | | 06/03/2010 | 6.096 | | 06/04/2010 | 0.762 | | 06/06/2010 | 0.762 | | 06/17/2010 | 1.778 | | 06/19/2010 | 0.762 | | 06/27/2010 | 17.526 | |  |  | | **Monthly Total (mm)** | **27.686** | |  |  | | 07/01/2010 | 2.540 | | 07/02/2010 | 5.080 | | 07/03/2010 | 33.020 | | 07/04/2010 | 0.254 | | 07/11/2010 | 6.350 | | 07/15/2010 | 16.256 | | 07/16/2010 | 1.270 | | 07/24/2010 | 0.254 | | 07/29/2010 | 6.096 | |  |  | | **Monthly Total (mm)** | **71.120** | |  |  | | 08/01/2010 | 11.684 | | 08/02/2010 | 0.254 | | 08/07/2010 | 7.874 | | 08/09/2010 | 1.778 | | 08/10/2010 | 3.556 | | 08/11/2010 | 3.810 | | 08/18/2010 | 0.508 | | 08/19/2010 | 1.270 | | 08/20/2010 | 8.636 | | 08/21/2010 | 5.842 | | 08/23/2010 | 0.762 | | 08/24/2010 | 0.762 | | 08/25/2010 | 8.128 | | 08/26/2010 | 3.048 | | 08/27/2010 | 2.032 | | 08/29/2010 | 0.254 | |  |  | | **Monthly Total (mm)** | **60.198** | |  |  | | 09/05/2010 | 2.794 | | 09/06/2010 | 2.032 | | 09/09/2010 | 1.778 | | 09/12/2010 | 1.016 | | 09/13/2010 | 0.254 | | 09/23/2010 | 2.540 | | 09/24/2010 | 11.176 | | 09/27/2010 | 1.270 | | 09/28/2010 | 1.524 | | 09/29/2010 | 2.286 | |  |  | | **Monthly Total (mm)** | **26.670** | |  |  | | 10/02/2010 | 0.762 | | 10/25/2010 | 8.890 | | 10/26/2010 | 0.254 | |  |  | | **Monthly Total (mm)** | **9.906** | |  |  | | 11/02/2010 | 5.588 | | 11/04/2010 | 21.082 | | 11/16/2010 | 7.874 | | 11/30/2010 | 3.302 | |  |  | | **Monthly Total (mm)** | **37.846** | |  |  | | 12/01/2010 | 0.254 | | 12/05/2010 | 0.254 | | 12/10/2010 | 2.540 | | 12/12/2010 | 1.270 | | 12/25/2010 | 4.064 | | 12/26/2010 | 0.254 | |  |  | | **Monthly Total (mm)** | **8.636** | |  |  | | **Annual Total (mm)** | **782.320** | |  |