

## **Chesapeake Bay Virginia (CBV) NERR Water Quality Metadata**

January – December 2010

Latest Update: May 22, 2014

### **I. Data Set and Research Descriptors**

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

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Additional monitoring program support in addition to above stated:

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#### **2) Entry verification**

Deployment data are uploaded from the YSI data logger to a Personal Computer (IBM compatible). Files are exported from EcoWatch in a comma-delimited format (.CDF) and uploaded to the 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 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 remaining pre- and post-deployment data, append files, and export the resulting data file for upload 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. Joy Austin has been responsible for data management since January 2002.

#### **3) Research objectives**

**Goodwin Islands (GI) component:**

The Goodwin Islands represent marsh islands surrounded by intertidal flats, submerged aquatic vegetation (SAV) beds, oyster reefs, and shallow open estuarine waters. Because minimal human activities occur within upland portions, the Goodwin Islands are suitable as a reference or control site for non-point source water quality issues. Furthermore, due to extensive wetlands, intertidal, and submerged habitats, the Goodwin Islands are used extensively for SAV, material flux, fisheries science and trophic interaction research activities.

**Claybank (CB) component:**

The Claybank site represents a shallow (< 2m) littoral area approximately 300-400 meters in width and located within the mesohaline portion of the York River estuary. Prior to 1972, this area supported submersed aquatic vegetation (SAV) but current conditions are not conducive to SAV survival. This site is used extensively to study sediment dynamics and environmental stress on SAV.

**Taskinas Creek (TC) component:**

The Taskinas Creek watershed is representative of an inner coastal plain, rural watershed within the southern Chesapeake Bay system. This watershed is dominated by forested and agricultural land uses with an increasing urban land use component. The drainage basin is suited for investigating hydrologic and non-point source water quality issues associated with developing land use patterns.

**Sweet Hall Marsh (SH) component:**

Sweet Hall Marsh is the most downriver extensive tidal freshwater marsh located in the Pamunkey River, one of two major tributaries of the York River. Research activities are currently addressing the impacts of salinity intrusion due to relative sea level rise. In addition, Sweet Hall Marsh has been used extensively to study general ecology and material flux within tidal freshwater marshes.

#### **4) Research methods**

The following research methods apply for all stations.

A YSI 6600 EDS and a YSI 6600 V2 unvented dataloggers were used to measure specific conductivity, pH, depth, percent dissolved oxygen saturation, temperature, and turbidity at 15-minute intervals throughout the 2010 deployment year (see Section 6 for deployment intervals). Salinity and dissolved oxygen concentration are calculated parameters. At approximately one to two-week intervals, the datalogger was returned to the lab for downloading, cleaning, membrane replacement and recalibration. Maintenance intervals vary from year to year and site-to-site depending on the amount of biofouling and expected battery life. In general, YSI dataloggers were deployed for two-week intervals from mid-October to the end of June and one-week intervals from the beginning of July through mid-October. A second YSI datalogger was deployed following retrieval of the original YSI datalogger in order to maintain a continuous record.

Field verification samples for pH, dissolved oxygen, salinity, and temperature were taken during the deployment/retrieval procedure. Temperature, pH, salinity and dissolved oxygen were determined in the field by using the YSI 600 XLM sonde. All YSI procedures are in accordance with the YSI operating manual methods, in Chapter 3. Standards for pH were purchased from Fisher. Standards for specific conductivity and turbidity were purchased from YSI. Data are reviewed and edited according to the YSI Data Review and Editing Protocol in Chapter 5 of the CDMO manual version 6.3.

**Goodwin Islands (GI) component:**

The Chesapeake Bay Virginia NERR maintains a long-term water quality monitoring station at Goodwin Islands. This station is located on the southeastern side of the main island in a shallow embayment, approximately 400 meters from shore. The station was established in 1997 and consisted of a stable structure composed of a 4 inch PVC pipe housed within a galvanized steel tower. The lower portion of the PVC pipe was milled to allow for water circulation within the pipe and around the datalogger sensors. The datalogger was suspended so that the sensors are maintained 0.5 m from the bottom substrate. On July 22, 2004 (12:15 EST), the station was moved approximately 25 meters southwest of the previous station in order to address sand shoaling and station maintenance issues. Other than the datalogger being suspended 0.25 m above the bottom substrate, the construction design of the new station

is identical to the previous station. On March 25, 2009 (9:15 EST), the new station coordinates: Lat 37.215796; Long -76.392675 is now located approximately 400 feet south of the old station coordinates: Lat 37.217013; Long -76.392620. The station was moved in order to address sand shoaling and station maintenance issues. The construction design of the new station is a stable structure composed of a 4 inch PVC pipe bolted to 3 ½ inch blocks screwed into a 10 inch marine treated piling (16 feet in length and driven into the sediment approximately 6 ft. to 7ft.). PVC pipe is suspended to the blocks by hanger clamps which allow the tube to be switched and replaced easily for maintenance and for depth adjustments. The lower portion of the PVC pipe is milled to allow water to circulate within the pipe and around the datalogger sensors. The datalogger is currently suspended 10 cm above the bottom substrate.

#### **Claybank (CB) component:**

The Chesapeake Bay Virginia NERR maintains a long-term water quality monitoring station at Claybank. The station is located within a shallow (<2m) littoral area approximately 300-400 meters wide. A stable structure that consists of a 4 inch PVC pipe attached to a piling was built in January 2001. The lower portion of the PVC pipe was milled to allow for water circulation within the pipe and around the datalogger sensors. The datalogger is suspended so that sensors are located 0.25 m from the bottom substrate. On June 17, 2004 (13:15 EST) the station was moved approximately 100 meters offshore of the previous station in order to address sand shoaling and station maintenance issues. The new structure is composed of a 4 inch PVC pipe, with the lower portion milled to allow for uninhibited water circulation, housed within a galvanized steel tower. The datalogger is suspended 0.31 m above the bottom substrate. The new station results in sensors being maintained 9 cm deeper as compared to the previous station. Due to station stabilization issues, the Clay Bank station was reestablished on June 5, 2006 at 13:00. The new station coordinates: Lat 37.20800; Long 76.36673 is located approximately 3 meters down river of the old station coordinates: Lat 37.21739; Long 76.3954. The new station retained a similar water depth from the water surface to the bottom of the datalogger as the old station. On March 25, 2009 (10:45 EST), the new station coordinates: Lat 37.346665; Long -76.611263 is located approximately 5 meters west of the old station coordinates: Lat 37.346671; Long -76.611205. The station was moved in order to address station stability and station maintenance issues. The construction design of the new station is a stable structure composed of a 4 inch PVC pipe bolted to 3 ½ inch blocks screwed into a 10 inch marine treated piling (16 feet in length and driven into the sediment approximately 6 ft. to 7ft.). PVC pipe is suspended to the blocks by hanger clamps which allow the tube to be switched and replaced easily for maintenance of the tube and for depth adjustments. The lower portion of the PVC pipe is milled to allow water to circulate within the pipe and around the datalogger sensors. The datalogger is currently suspended 40 cm above the bottom substrate.

#### **Taskinas Creek (TC) component:**

The Chesapeake Bay Virginia NERR maintains a long-term water quality monitoring station at Taskinas Creek. The station is located near the mouth of Taskinas Creek where the tidal marsh creek converges with the York River estuary. A simple deployment, consisting of a suspended wire attached to an overhanging tree, was established in September 1995. The datalogger was suspended at a fixed depth approximately 0.5 m above the creek-bed. In September 1997, the deployment was modified so that the datalogger remained secure and stable at all times within a 4 inch PVC housing attached to a piling system. The lower portion of the PVC pipe was milled to allow for water circulation within the pipe and around the datalogger sensors. The datalogger was suspended so that the sensors are maintained 0.5 m above the bottom substrate. On May 19, 2009 (11:30 EST), the station coordinates: Lat 37.414986; Long -76.71442 is located approximately 2 feet away from old station Lat 37.41497; Long -76.71441. The station was moved in order to address station stability and station maintenance issues. The construction design of the new station is a stable structure composed of a 4 inch PVC pipe bolted to 3 ½ inch blocks screwed into a 10 inch marine treated piling (16 feet in length and driven into the sediment approximately 6 ft. to 7ft.). PVC pipe is suspended to the blocks by hanger clamps which allow the tube to be switched and replaced easily for maintenance of the tube and for depth adjustments. The lower portion of the PVC pipe is milled to allow water to circulate within the pipe and around the datalogger sensors. The datalogger is currently suspended 25 cm above the bottom substrate.

#### **Sweet Hall Marsh (SH) component:**

The Chesapeake Bay Virginia NERR maintains a long-term water quality station at Sweet Hall Marsh. This station, established in 2000, is located adjacent to a low-use boathouse where a 6-inch PVC pipe is attached to an adjacent pier piling. The datalogger was suspended so that the sensors remained 0.35m from the bottom substrate. In

contrast to above stations, the Sweet Hall Marsh station is maintained on a two-week deployment interval throughout the year. In order to prepare the Sweet Hall Marsh station for telemetry equipment, a new station platform was installed on May 4, 2006 at the exact location of the old station. All elevations, height off the bottom and total water depth remained the same as the old station platform.

A Sutron Sat-Link2 transmitter was installed at this station on 05/04/06 and transmits data to the NOAA GOES satellite, NESDIS ID #3B0116F6. The transmissions are scheduled hourly and contain four (4) datasets 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>.

## 5) Site location and character

In 2009 the Goodwin Island and Claybank stations were moved. We have reviewed the data from before and after this move. Note that the moves in space were on the order of 100m or less. There are no differences evident in the time series data (signals) for any of the parameters measured except for a slight increase in depths that are noted in the metadata (approximately 10-25 cm deeper). We also compared statistically the medians as well as the quartiles and other descriptors of the different parameters measured for several years before and after the switches with no significant differences found.

Below is a summary of the station locations and when they were moved:

| Site | Old Lat/Long (2009 and previous years) | Current Lat/Long (2009 to Present)                       |
|------|----------------------------------------|----------------------------------------------------------|
| GI   | 37.21739, -76.3954                     | 37.215796, -76.392675<br>Station moved 3/25/2009 09:15   |
| CB   | 37.34855, -76.61123                    | 37.346665, -76.611263<br>Station moved 3/25/2009 10:45   |
| TC   | 37.41497, -76.714414                   | 37.414986, -76.71442<br>Station rebuilt 05/19/2009 11:30 |
| SH   | 37.57138, -76.88424                    | 37.57138, -76.88424                                      |

### (a) Goodwin Islands (Lat 37.215796; Long -76.392675)

The Goodwin Islands component of CBNERRVA is located on the southern side of the mouth of the York River. The station is located approximately 400 meters from shore, with an average water depth on the order of 1 meter. MHW depth at the sample location is approximately 1.70 meters. Goodwin Islands are a 315 ha (777 acre) archipelago of salt-marsh islands surrounded by inter-tidal flats and extensive beds of submerged aquatic vegetation dominated by eelgrass (*Zostera marina*) and Widgeon grass (*Ruppia maritima*). Water circulation patterns around the island are influenced by York River discharge and wind patterns of the Chesapeake Bay. Tides at the Goodwin

Islands are semi-diurnal and display an average range of 0.7 m (range: 0.4 - 1.1 m). Mean seasonal water temperature values ranged from 13.7-15.6 °C for spring (March-May), 25.7-27.2 °C for summer (June-August), 18.0-19.2 °C for fall (September-November), and 4.7-8.2 °C for winter (January-February, and December). Mean seasonal salinity values ranged from 13.9-23.0 psu for spring, 17.2-23.0 psu for summer, 16.5-24.0 for fall, and 15.9-23.3 psu for winter. The data logger probes are located 0.10 m above the sandy substrate bottom. Potential activities that could impact the site include, light recreational and commercial boating activity.

**(b) Claybank (Lat 37.346665; Long -76.611263)**

The Claybank station is located within a shallow (<2m) littoral area approximately 300-400 meters wide along the mesohaline portion of the York River estuary. The site is approximately 26 km upriver from the mouth of the estuary. The shoreline consists of a narrow fringe of salt marsh with some areas armored with bulkhead or stone. Tidal range is on the order of 0.85 meters and depth at MHW is approximately 2.25 meters. This station is located along the north shoreline of the estuary in an area that historically (prior to 1972) supported submersed aquatic vegetation. The sampling station is influenced by a secondary turbidity maximum that moves back and forth in a region of about 20-40 km from the mouth of the York River estuary. The data logger probes are located 0.40m above the substrate; which varies from fine sediments to sand. The site is exposed to strong winds from the northwest and re-suspension of sediment during storm events can be high. There is no fresh water input at this site. Seasonal water quality conditions described here are from spring: March-May; summer: June-August; fall: September-November; winter: December-February. Mean seasonal water temperature ranged between 14.0-16.2 for spring; 26.1-27.7 for summer; 17.5-19.4 for fall; and 4.9-8.0 °C in winter. Mean seasonal salinity ranged between 15.7-20.3 for spring; 16.5-21.3 for summer; 13.2-21.6 for fall; and 14.3-20.0 ppt in winter. Potential activities that could impact the site include, light recreational and commercial boating activity.

**(c) Taskinas Creek (Lat 37.414986; Long -76.71442)**

Taskinas Creek Reserve, component of CBNERRVA, encompasses 397 ha (980 acres) and is located within the boundaries of York River State Park near the town of Croaker, Virginia. The small sub-estuary of the York River is located on the southern side of the river, approximately 37 km up river from the mouth of the York River. The Taskinas Creek watershed is representative of an inner coastal plain, rural watershed within the southern Chesapeake Bay system. The watershed is dominated by forested and agricultural land uses with an increasing residential land use component. The non-tidal portion of Taskinas Creek contains feeder streams that drain oak-hickory forests, maple-gum-ash swamps and freshwater marshes. Freshwater mixed wetlands are found in the upstream reaches of Taskinas Creek. The creek is roughly 2 meters deep and 20 meters wide towards the lower end of the creek where substrate is dominated by fine sediment. MHW depth at the sample location is approximately 2.0 meters and mean tide range is 0.85 meters. The datalogger probes are located approximately 0.25m above the bottom. Mean seasonal water temperature values ranged from 15.2-19.0 °C for spring, 26.8-28.2 °C for summer, 15.7-18.3 °C for fall, and 3.6-9.0 °C for winter. Located within the meso-polyhaline region of the York River estuary, mean seasonal salinity values ranged from 4.0-14.0 psu for spring, 7.0-18.2 psu for summer, 6.9-17.0 for fall, and 5.8-15.3 psu for winter. Potential activities that could impact the site include residential development, selective hardwood logging, and light recreational boating activity. Wildlife populations have been shown to influence microbiological water quality within the watershed.

**(d) Sweet Hall Marsh (Lat 37.57138; Long 76.88424)**

Sweet Hall Marsh is the most downriver extensive tidal freshwater marsh located in the Pamunkey River, one of two major tributaries of the York River. The marsh is located approximately 77 km upriver from the mouth of the York River estuary. The reserve is 353 ha (871 acres) in area and includes 331 ha (818 acres) of emergent fresh-water marsh, 14 ha (35 acres) of permanently flooded broad-leaved forested wetlands and approximately 4 ha (9 acres) of scrub-shrub. The marsh community is classified as freshwater mixed. Mean tidal range at Sweet Hall Marsh is on the order of 0.9 meters and MHW depth at the sample location is approximately 1.5 meters. The Pamunkey River, which surrounds Sweet Hall Marsh, can reach depths up to 15 meters. Substrate within the littoral zone and channel is dominated by fine sediment. The datalogger probes are located 0.35 m above the bottom. Mean seasonal water temperature values ranged from 14.7-16.7 °C for spring, 26.7-27.9 °C for summer, 18.6-19.1 °C for fall, and 4.7-6.3

°C for winter. Located within the oligohaline, lower freshwater reaches of the Pamunkey River, mean seasonal salinity values ranged from 0.1-3.4 psu for spring, 0.1-8.4 psu for summer, 0.3-8.4 psu for fall, and 0.1-3.2 psu for winter. Potential activities that could impact the site include minor municipal point source discharges above and below river of Sweet Hall Marsh, a major industrial discharge

## 6) Data collection period

### Claybank (CB)

| Deployment Date/Time<br>(MM/DD/YY) (HH:MM:SS) | Retrieval Date/Time<br>(MM/DD/YY) (HH:MM:SS) |
|-----------------------------------------------|----------------------------------------------|
| 12/18/09 11:30:00                             | 01/06/10 12:45:00                            |
| 01/06/10 13:00:00                             | 01/19/10 11:00:00                            |
| 01/19/10 11:15:00                             | 02/03/10 09:45:00                            |
| 02/03/10 10:00:00                             | 02/15/10 11:30:00                            |
| 02/15/10 11:45:00                             | 03/02/10 11:45:00                            |
| 03/02/10 12:00:00                             | 03/17/10 13:15:00                            |
| 03/17/10 13:30:00                             | 04/01/10 12:45:00                            |
| 04/01/10 13:00:00                             | 04/13/10 10:15:00                            |
| 04/13/10 10:30:00                             | 04/29/10 10:15:00                            |
| 04/29/10 10:30:00                             | 05/11/10 10:00:00                            |
| 05/11/10 10:15:00                             | 05/25/10 10:30:00                            |
| 05/25/10 10:45:00                             | 06/08/10 10:30:00                            |
| 06/08/10 10:45:00                             | 06/22/10 10:15:00                            |
| 06/22/10 10:30:00                             | 06/29/10 11:15:00                            |
| 06/29/10 11:30:00                             | 07/06/10 10:30:00                            |
| 07/06/10 10:45:00                             | 07/13/10 11:30:00                            |
| 07/13/10 11:45:00                             | 07/20/10 10:00:00                            |
| 07/20/10 10:15:00                             | 07/27/10 10:45:00                            |
| 07/27/10 11:00:00                             | 08/03/10 10:00:00                            |
| 08/03/10 10:15:00                             | 08/10/10 11:15:00                            |
| 08/10/10 11:30:00                             | 08/16/10 10:15:00                            |
| 08/16/10 10:30:00                             | 08/24/10 12:00:00                            |
| 08/24/10 12:15:00                             | 08/31/10 09:45:00                            |
| 08/31/10 10:15:00                             | 09/08/10 11:00:00                            |
| 09/08/10 11:15:00                             | 09/14/10 08:15:00                            |
| 09/14/10 08:30:00                             | 09/29/10 9:45:00                             |
| 09/29/10 10:00:00                             | 10/12/10 09:00:00                            |
| 10/12/10 09:15:00                             | 10/26/10 10:15:00                            |
| 10/26/10 10:30:00                             | 11/10/10 11:45:00                            |
| 11/10/10 12:00:00                             | 11/22/10 11:00:00                            |
| 11/22/10 11:15:00                             | 12/09/10 11:30:00                            |
| 12/09/10 11:45:00                             | 12/17/10 15:15:00                            |
| 12/17/10 15:30:00                             | 01/05/11 10:30:00                            |

### Goodwin Islands (GI)

| Deployment Date/Time<br>(MM/DD/YY) (HH:MM:SS) | Retrieval Date/Time<br>(MM/DD/YY) (HH:MM:SS) |
|-----------------------------------------------|----------------------------------------------|
| 12/18/09 09:45:00                             | 01/06/10 10:15:00                            |
| 01/06/10 10:30:00                             | 01/19/10 09:45:00                            |
| 01/19/10 10:15:00                             | 02/03/10 10:45:00                            |
| 02/03/10 11:00:00                             | 02/15/10 10:15:00                            |
| 02/15/10 10:30:00                             | 03/02/10 10:15:00                            |
| 03/02/10 10:30:00                             | 03/17/10 11:45:00                            |

|          |          |          |          |
|----------|----------|----------|----------|
| 03/17/10 | 12:00:00 | 04/01/10 | 09:30:00 |
| 04/01/10 | 09:45:00 | 04/13/10 | 08:30:00 |
| 04/13/10 | 08:45:00 | 04/29/10 | 08:45:00 |
| 04/29/10 | 09:00:00 | 05/11/10 | 08:15:00 |
| 05/11/10 | 08:30:00 | 05/25/10 | 09:15:00 |
| 05/25/10 | 09:30:00 | 06/08/10 | 09:15:00 |
| 06/08/10 | 09:30:00 | 06/22/10 | 09:15:00 |
| 06/22/10 | 09:30:00 | 06/29/10 | 09:15:00 |
| 06/29/10 | 09:30:00 | 07/06/10 | 09:15:00 |
| 07/06/10 | 09:30:00 | 07/13/10 | 09:30:00 |
| 07/13/10 | 09:45:00 | 07/27/10 | 09:15:00 |
| 07/27/10 | 09:30:00 | 08/03/10 | 09:00:00 |
| 08/03/10 | 09:15:00 | 08/10/10 | 09:30:00 |
| 08/10/10 | 09:45:00 | 08/16/10 | 09:15:00 |
| 08/16/10 | 09:30:00 | 08/31/10 | 09:00:00 |
| 08/31/10 | 09:15:00 | 09/08/10 | 09:15:00 |
| 09/08/10 | 09:30:00 | 09/14/10 | 09:15:00 |
| 09/14/10 | 09:30:00 | 10/05/10 | 09:15:00 |
| 10/05/10 | 09:30:00 | 10/12/10 | 10:00:00 |
| 10/12/10 | 10:15:00 | 10/26/10 | 09:00:00 |
| 10/26/10 | 09:15:00 | 11/10/10 | 10:30:00 |
| 11/10/10 | 10:45:00 | 11/22/10 | 10:00:00 |
| 11/22/10 | 10:15:00 | 12/09/10 | 10:30:00 |
| 12/09/10 | 10:45:00 | 12/17/10 | 14:30:00 |
| 12/17/10 | 14:45:00 | 01/05/11 | 09:30:00 |

### Sweet Hall Marsh (SH)

| Deployment Date/Time<br>(MM/DD/YY) (HH:MM:SS) | Retrieval Date/Time<br>(MM/DD/YY) (HH:MM:SS) |
|-----------------------------------------------|----------------------------------------------|
| 12/21/09                                      | 13:30:00                                     |
| 01/05/10                                      | 18:15:00                                     |
| 01/25/10                                      | 13:45:00                                     |
| 01/29/10                                      | 11:30:00                                     |
| 02/17/10                                      | 18:15:00                                     |
| 03/04/10                                      | 12:30:00                                     |
| 03/17/10                                      | 12:15:00                                     |
| 03/30/10                                      | 12:00:00                                     |
| 04/14/10                                      | 12:30:00                                     |
| 04/28/10                                      | 12:00:00                                     |
| 05/12/10                                      | 11:45:00                                     |
| 05/27/10                                      | 12:30:00                                     |
| 06/09/10                                      | 11:15:00                                     |
| 06/23/10                                      | 09:45:00                                     |
| 06/30/10                                      | 11:00:00                                     |
| 07/06/10                                      | 11:15:00                                     |
| 07/21/10                                      | 10:00:00                                     |
| 08/04/10                                      | 11:30:00                                     |
| 08/17/10                                      | 11:15:00                                     |
| 09/01/10                                      | 09:30:00                                     |
| 09/16/10                                      | 13:00:00                                     |
| 09/29/10                                      | 09:30:00                                     |
| 10/15/10                                      | 11:45:00                                     |
| 10/27/10                                      | 10:00:00                                     |
| 11/09/10                                      | 10:45:00                                     |
| 01/05/10                                      | 18:00:00                                     |
| 01/25/10                                      | 13:30:00                                     |
| 01/29/10                                      | 11:15:00                                     |
| 02/17/10                                      | 18:00:00                                     |
| 03/04/10                                      | 12:15:00                                     |
| 03/17/10                                      | 12:00:00                                     |
| 03/30/10                                      | 11:45:00                                     |
| 04/14/10                                      | 12:15:00                                     |
| 04/28/10                                      | 11:45:00                                     |
| 05/12/10                                      | 11:30:00                                     |
| 05/27/10                                      | 12:15:00                                     |
| 06/09/10                                      | 11:00:00                                     |
| 06/23/10                                      | 09:30:00                                     |
| 06/30/10                                      | 10:30:00                                     |
| 07/06/10                                      | 11:00:00                                     |
| 07/21/10                                      | 09:45:00                                     |
| 08/04/10                                      | 11:15:00                                     |
| 08/17/10                                      | 11:00:00                                     |
| 09/01/10                                      | 09:15:00                                     |
| 09/16/10                                      | 12:45:00                                     |
| 09/29/10                                      | 09:15:00                                     |
| 10/15/10                                      | 11:30:00                                     |
| 10/27/10                                      | 09:45:00                                     |
| 11/09/10                                      | 10:30:00                                     |
| 11/29/10                                      | 10:30:00                                     |

|          |          |          |          |
|----------|----------|----------|----------|
| 11/29/10 | 10:45:00 | 12/14/10 | 10:15:00 |
| 12/14/10 | 10:45:00 | 12/15/11 | 16:00:00 |
| 12/15/10 | 16:15:00 | 01/04/11 | 10:15:00 |

### **Taskinas Creek (TC)**

| Deployment Date/Time<br>(MM/DD/YY) (HH:MM:SS) | Retrieval Date/Time<br>(MM/DD/YY) (HH:MM:SS) |
|-----------------------------------------------|----------------------------------------------|
| 12/21/09                                      | 11:00:00                                     |
| 01/05/10                                      | 14:30:00                                     |
| 01/20/10                                      | 13:30:00                                     |
| 02/04/10                                      | 10:15:00                                     |
| 02/17/10                                      | 10:30:00                                     |
| 03/04/10                                      | 10:15:00                                     |
| 03/17/10                                      | 09:45:00                                     |
| 03/30/10                                      | 09:15:00                                     |
| 04/14/10                                      | 09:45:00                                     |
| 04/28/10                                      | 09:00:00                                     |
| 05/12/10                                      | 09:15:00                                     |
| 05/27/10                                      | 10:00:00                                     |
| 06/09/10                                      | 14:15:00                                     |
| 06/23/10                                      | 12:30:00                                     |
| 06/30/10                                      | 12:30:00                                     |
| 07/07/10                                      | 13:00:00                                     |
| 07/14/10                                      | 09:45:00                                     |
| 07/21/10                                      | 13:00:00                                     |
| 07/28/10                                      | 13:45:00                                     |
| 08/04/10                                      | 08:15:00                                     |
| 08/11/10                                      | 11:15:00                                     |
| 08/18/10                                      | 10:30:00                                     |
| 08/25/10                                      | 09:15:00                                     |
| 09/01/10                                      | 12:30:00                                     |
| 09/09/10                                      | 11:15:00                                     |
| 09/15/10                                      | 09:45:00                                     |
| 09/29/10                                      | 11:30:00                                     |
| 10/13/10                                      | 08:30:00                                     |
| 10/27/10                                      | 12:45:00                                     |
| 11/15/10                                      | 10:30:00                                     |
| 11/29/10                                      | 13:45:00                                     |
| 12/14/10                                      | 13:00:00                                     |
| 12/15/10                                      | 12:45:00                                     |
| 01/05/10                                      | 14:15:00                                     |
| 01/20/10                                      | 13:15:00                                     |
| 02/04/10                                      | 10:00:00                                     |
| 02/17/10                                      | 10:15:00                                     |
| 03/04/10                                      | 10:00:00                                     |
| 03/17/10                                      | 09:30:00                                     |
| 03/30/10                                      | 09:00:00                                     |
| 04/14/10                                      | 09:30:00                                     |
| 04/28/10                                      | 08:45:00                                     |
| 05/12/10                                      | 09:00:00                                     |
| 05/27/10                                      | 09:45:00                                     |
| 06/09/10                                      | 14:00:00                                     |
| 06/23/10                                      | 12:15:00                                     |
| 06/30/10                                      | 12:15:00                                     |
| 07/07/10                                      | 12:45:00                                     |
| 07/14/10                                      | 09:30:00                                     |
| 07/21/10                                      | 12:45:00                                     |
| 07/28/10                                      | 13:30:00                                     |
| 08/04/10                                      | 08:00:00                                     |
| 08/11/10                                      | 11:00:00                                     |
| 08/18/10                                      | 10:15:00                                     |
| 08/25/10                                      | 09:00:00                                     |
| 09/01/10                                      | 12:15:00                                     |
| 09/09/10                                      | 11:00:00                                     |
| 09/15/10                                      | 09:30:00                                     |
| 09/29/10                                      | 11:15:00                                     |
| 10/13/10                                      | 08:15:00                                     |
| 10/27/10                                      | 12:30:00                                     |
| 11/15/10                                      | 10:15:00                                     |
| 11/29/10                                      | 13:30:00                                     |
| 12/14/10                                      | 12:45:00                                     |
| 12/15/10                                      | 12:30:00                                     |
| 01/04/11                                      | 13:30:00                                     |

### **7) Distribution**

NOAA retains the right to analyze, synthesize and publish summaries of the NERRS System-wide Monitoring Program data. The PI retains the right to be fully credited for having collected and processed the 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:



National Estuarine Research Reserve System (NERRS). 2012. System-wide Monitoring Program. Data accessed from the NOAA NERRS Centralized Data Management Office website: <http://cdmo.baruch.sc.edu/>; accessed 12 October 2012.

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/>. Data are available in comma delimited format.

**8) Associated researchers and projects** (link to other products or programs) – Describe briefly other research (data collection) that correlates or enhances the data collected by data loggers. At a minimum, mention the SWMP MET and NUT data sets.

Additional water quality monitoring programs within the York River system include:

a) USEPA Chesapeake Bay Mainstem and Tributary Monitoring Program. Since 1984, biweekly to monthly water quality sampling at a series of sites located along the mid-river channel has been conducted as part of the Chesapeake Bay Program ([www.chesapeakebay.net](http://www.chesapeakebay.net)). Station ID's: York River proper (WE4.2, LE4.3, LE4.2, LE4.1, RET4.3), the Pamunkey River (RET4.1, TF4.2) and Mattaponi River (RET4.2 and TF4.4).

b) VIMS Shoal Survey. Since 1984, biweekly to monthly water quality sampling at a series of sites located along the shoal areas of the lower York River estuary has been conducted by the Biological Sciences Department at the Virginia Institute of Marine Science. Station ID's include: Guinea Marsh, Goodwin Island, VIMS, Yorktown, Mumfort Islands, Catlett Islands and Clay Bank.

c) Alliance for the Chesapeake Bay Volunteer Monitoring Program. Physical and chemical (limited nutrients) data are collected by a volunteer network along the York River system ([www.Acb-online.org](http://www.Acb-online.org)). Station ID's include: Thorofare Creek, Wormley Creek, Blackwell Landing, Pamunkey Trail, Timberneck Creek, Yorktown Naval Weapons Station, Gloucester Point, West Point and Croaker Landing. Note: Some stations may be inactive.

d) VIMS Juvenile Abundance Monitoring Survey. As part of their Juvenile Abundance Monitoring Surveys, water quality and hydrographic data has been collected since 1968 along a series of sites in the York River estuary (includes the Mattaponi and Pamunkey River systems) by the Fisheries Science Department ([www.fisheries.vims.edu/research.html](http://www.fisheries.vims.edu/research.html)) at the Virginia Institute of Marine Science. Surveys include the VIMS Trawl Survey, the Striped Bass Seine Survey and the Juvenile Shad/River Herring Pushnet Survey.

e) Virginia Department of Health. The Virginia Department of Health, Division of Shellfish Sanitation's ([www.vdh.state.va.us/shellfish](http://www.vdh.state.va.us/shellfish)) Seawater Sampling Program collects microbial and general water quality and hydrographic data along a series of sites in the York River estuary (includes lower portions of the Mattaponi and Pamunkey River systems).

f) USEPA Chesapeake Bay Shallow Water Monitoring Program. Since May 2003, CBNERRVA has maintained additional continuous (15 minute) fixed water monitoring stations within the York, Piankatank, James River, Rappahannock River, Potomac River, and Mobjack Bay estuary systems using YSI 6600 EDS Datasondes. Measurements for this program include: temperature, specific conductivity, dissolved oxygen, pH, turbidity, insitu fluorescence, and depth. York River stations are located at Gloucester Point and White House (Pamunkey River). Piankatank River stations are located at Burton's Point, Bland's Wharf, and Dragon Run. James River stations are located at Wythe Point, James River Country Club, 4H Club, Chickahominy Haven, Rice Center, Appomattox, and Osborne Landing. Rappahannock River stations are located at Hicks Landing, Kendale Farms, Bowler's Wharf, Christ Church, and Corrotoman River. Potomac River stations are located Potomac Creek, Colonial Beach, Yeocomico River, and Nomini Bay. Mobjack Bay stations are located in Back River, Dyer's Creek, Horn Harbor, Mobjack Bay, and Ware River. An additional surface water quality mapping program, which monitors the above stated parameters, at sub-surface depths of approximately 0.25 m along continuous cruise tracts, occurs on a

monthly basis in the York River estuary (see [www.VECOS.org](http://www.VECOS.org)). This sub-surface continuous sampling of water quality has been conducted since May 2003 on the York River until present, and for the Pamunkey and Mattaponi Rivers from May 2003 through October 2005. Rappahannock and Potomac Rivers were monitored 2007 through 2009. Mobjack Bay stations have been conducted since March 2010 to present.

g) Chesapeake Bay National Estuarine Research Reserve (CBV) Meteorological Monitoring Program. Since 2001, CBNERR-VA has maintained a meteorological monitoring station located at Taskinas Creek within the York River estuary system. Measurements for this program include: Air Temperature (degrees C), Relative Humidity (%), Barometric Pressure (mb), Wind speed (m/s), Wind Direction (degrees), PAR (mmol/m<sup>2</sup>), and Precipitation (mm) data.

h) Chesapeake Bay National Estuarine Research Reserve (CBV) Nutrient Monitoring Program. Since 2002, CBNERR-VA has maintained monthly grab samples and a Diel sampling program. Monthly grab samples were collected at the following sites: Goodwin Island, York River Bridge, Catlett Island, Claybank, Taskinas Creek, and Sweet Hall Marsh. On a monthly basis, the Diel sampling program collected samples at Taskinas Creek, a small tributary of the York River, every two and one-half hours throughout a complete tidal cycle in order to quantify the short-term temporal variability of selected nutrients and plant pigments in the water column.

## **II. Physical Structure Descriptors**

### **9) Sensor specifications**

CBV NERR deployed 6600EDS and 6600V2 data sondes in 2010. Rapid-pulse DO sensors were deployed at sites; CB, SH, and TC from January - December 2010. ROX DO sensors were deployed at GI from January through December 2010.

#### **YSI 6600EDS 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 dependent)

Parameter: Salinity

Units: parts per thousand (ppt)

Sensor Type: Calculated from conductivity and temperature

Range: 0 to 70 ppt

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

Resolution: 0.01 ppt

Parameter: Dissolved Oxygen % saturation

Units: percent air saturation (%)

Sensor Type: Rapid Pulse - Clark type, polarographic

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 mg/L (Calculated from % air saturation, temperature, and salinity)

Units: milligrams/Liter (mg/L)

Sensor Type: Rapid Pulse - Clark type, polarographic

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: 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

Parameter: Chlorophyll Fluorescence

Units: micrograms/Liter

Sensor Type: Optical probe w/ mechanical cleaning

Model#: 6025

Range: 0 to 400 ug/Liter

Accuracy: Dependent on methodology

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

### **YSI 6600V2 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 dependent)

Parameter: Salinity  
Units: parts per thousand (ppt)  
Sensor Type: Calculated from conductivity and temperature  
Range: 0 to 70 ppt  
Accuracy: +/- 1.0% of reading pr 0.1 ppt, whichever is greater  
Resolution: 0.01 ppt

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, polarographic  
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: 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 – hemispherical bulb probe  
Units: pH units  
Sensor Type: Glass combination electrode  
Model#: 6579  
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

Parameter: Chlorophyll Fluorescence  
Units: micrograms/Liter  
Sensor Type: Optical probe w/ mechanical cleaning  
Model#: 6025  
Range: 0 to 400 ug/Liter  
Accuracy: Dependent on methodology  
Resolution: 0.1 ug/L chl a, 0.1% FS

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

**Depth Qualifier:**

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 1.03 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.

**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.

### **10) Coded variable definitions – List the sampling station, sampling site code, and station code used in the data.**

| Sampling station: | Sampling site code: | Station code: |
|-------------------|---------------------|---------------|
| Claybank          | CB                  | cbvcbwq       |
| Goodwin Islands   | GI                  | cbvgiwq       |
| Sweet Hall Marsh  | SH                  | cbvshwq       |
| Taskinas Creek    | TC                  | cbvtcwq       |

### **11) QAQC flag definitions**

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

- 5 Outside High Sensor Range
- 4 Outside Low Sensor Range
- 3 Data Rejected due to QAQC
- 2 Missing Data
- 1 Optional SWMP Supported Parameter
- 0 Data Passed Initial QAQC Checks
- 1 Suspect Data
- 2 *Open - reserved for later flag*
- 3 Calculated data: non-vented depth/level sensor correction for changes in barometric pressure
- 4 Historical Data: Pre-Auto QAQC
- 5 Corrected Data

### **12) QAQC code definitions**

QAQC codes are used in conjunction with QAQC flags to provide further documentation of the data and are also applied by insertion into the associated flag column. There are three (3) different code categories, general, sensor, and comment. General errors document general problems with the deployment or YSI datasonde, sensor errors are sensor specific, and comment codes are used to further document conditions or a problem with the data. Only one general or sensor error and one comment code can be applied to a particular data point, but some comment codes (marked with an \* below) can be applied to the entire record in the F\_Record column.

#### **General Errors**

GIC No instrument deployed due to ice

|     |                                                       |
|-----|-------------------------------------------------------|
| GIM | Instrument malfunction                                |
| GIT | Instrument recording error; recovered telemetry data  |
| GMC | No instrument deployed due to maintenance/calibration |
| GNF | Deployment tube clogged / no flow                     |
| GOW | Out of water event                                    |
| GPF | Power failure / low battery                           |
| GQR | Data rejected due to QA/QC checks                     |
| GSM | See metadata                                          |

#### Corrected Depth/Level Data Codes

|     |                                                                  |
|-----|------------------------------------------------------------------|
| GCC | Calculated with data that were corrected during QA/QC            |
| GCM | Calculated value could not be determined due to missing data     |
| GCR | Calculated value could not be determined due to rejected data    |
| GCS | Calculated value suspect due to questionable data                |
| GCU | Calculated value could not be determined due to unavailable data |

#### Sensor Errors

|     |                                               |
|-----|-----------------------------------------------|
| SBO | Blocked optic                                 |
| SCF | Conductivity sensor failure                   |
| 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

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 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                             |
| 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                 |
| 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         |

### 13) Post deployment information

#### Claybank (CB):

| Deployment<br>Date<br>m/d/y | SpCond<br>10 | DO 1<br>(100%sat) | DO 2<br>(100%sat) | pH<br>7 | pH<br>10 | Turb<br>0 | Turb<br>126 | Depth<br>m |
|-----------------------------|--------------|-------------------|-------------------|---------|----------|-----------|-------------|------------|
| 12/18/2009                  | 9.978        | 88.2              | 100.5             | 7.07    | 10.07    | 0         | 124.5       | 0.137      |
| 1/6/2010                    | 10.19        | 80.2              | 100.1             | 7.06    | 10.09    | -0.1      | 122.1       | 0.034      |
| 1/19/2010                   | 10           | 102.3             | 101.6             | 7.01    | 10.09    | 0.3       | 123.5       | 0.147      |
| 2/3/2010                    | 9.998        | 103.1             | 99.1              | 7.11    | 10.1     | -0.3      | 122         | -0.056     |
| 2/15/2010                   | 9.893        | 99.2              | 98.6              | 7.04    | 10.02    | 0.5       | 124.1       | -0.133     |
| 3/2/2010                    | 3.929        | 29.7              | 99.9              | na      | na       | 0.3       | 201.6       | -0.022     |
| 3/17/2010                   | 9.97         | 92.1              | 100.6             | 7.12    | 10.14    | 0.2       | 123.5       | 0.068      |
| 4/1/2010                    | 10.07        | 102.7             | 102               | 7.03    | 10.05    | -0.1      | 126.3       | 0.216      |
| 4/13/2010                   | 9.651        | 100               | 100.1             | 7.07    | 9.99     | 0.3       | 125         | 0.003      |
| 4/29/2010                   | 9.631        | 96.1              | 100.5             | 7.08    | 9.73     | 0         | 126.3       | 0.085      |
| 5/11/2010                   | 8.98         | 94.6              | 100.1             | 7.11    | 9.9      | 0.1       | 125.4       | 0.036      |
| 5/25/2010                   | 9.867        | 48.7              | 100.7             | 6.98    | 9.98     | 0.1       | 128.3       | 0.043      |
| 6/8/2010                    | 9.376        | 102.4             | 100.3             | 7.11    | 9.97     | -0.2      | 119.4       | 0.029      |
| 6/22/2010                   | 9.619        | 100.6             | 100.4             | 7.02    | 9.99     | 0.7       | 126.7       | 0.06       |
| 6/29/2010                   | 9.934        | 89.6              | 100.3             | 7.07    | 10.08    | 0.2       | 123.6       | 0.037      |
| 7/6/2010                    | 10           | 99.9              | 100               | 7.02    | 10       | -0.5      | 125.7       | -0.01      |
| 7/13/2010                   | 9.864        | 78.6              | 100.3             | 7.06    | 10.05    | 0         | 124.4       | -0.003     |
| 7/20/2010                   | 9.978        | 84.6              | 100.5             | 6.96    | 10.09    | -0.1      | 126.1       | -0.047     |
| 7/27/2010                   | 9.957        | 97.1              | 100.1             | 6.94    | 10.08    | 0.2       | 124.7       | -0.044     |
| 8/3/2010                    | 10.1         | 99.4              | 99.8              | 6.97    | 9.95     | -0.2      | 128.2       | -0.022     |
| 8/10/2010                   | 9.956        | 98                | 100.3             | 7       | 10.06    | -0.1      | 127.9       | 0.019      |
| 8/16/2010                   | 10.03        | 83.9              | 100               | 6.97    | 10.04    | 0.4       | 125.7       | -0.053     |
| 8/24/2010                   | 10.08        | 99.6              | 100.6             | 6.97    | 9.96     | -0.7      | 124         | 0.07       |
| 8/31/2010                   | 10.02        | 91.2              | 100               | 6.99    | 10.01    | 0.3       | 125.9       | 0.134      |
| 9/8/2010                    | 9.94         | 100.3             | 100.6             | 6.96    | 10.01    | 0.2       | 123         | 0.085      |
| 9/14/2010                   | 9.888        | 64.5              | 98.9              | 7.03    | 9.99     | 0.3       | 126.1       | 0.717      |
| 9/29/2010                   | 10.06        | 91.8              | 100.1             | 7       | 10       | -0.1      | 123.4       | 0.034      |
| 10/12/2010                  | 10.01        | 127.8             | 100.1             | 6.81    | 9.81     | -3.2      | 125.4       | 0.022      |
| 10/26/2010                  | 10.01        | 97.9              | 101.2             | 7.01    | 10.05    | -0.4      | 125.2       | 0.141      |
| 11/10/2010                  | 10           | 101               | 100.4             | 6.96    | 10       | 0.4       | 127.1       | 0.038      |
| 11/22/2010                  | 10.02        | 98.6              | 101.5             | 6.97    | 9.98     | 0.6       | 107.8       | 0.117      |
| 12/9/2010                   | 10.09        | 98.3              | 100.3             | 6.98    | 10.04    | 0.7       | 125.7       | 0.033      |

|            |       |      |      |      |       |     |       |        |
|------------|-------|------|------|------|-------|-----|-------|--------|
| 12/17/2010 | 10.13 | 59.6 | 99.3 | 6.99 | 10.01 | 0.5 | 125.8 | -0.085 |
|------------|-------|------|------|------|-------|-----|-------|--------|

**Goodwin Islands (GI):**

Deployment

| Date       | SpCond | DO 1      | DO 2      | pH   | pH    | Turb | Turb  | Depth  |
|------------|--------|-----------|-----------|------|-------|------|-------|--------|
| m/d/y      | 10     | (100%sat) | (100%sat) | 7    | 10    | 0    | 126   | m      |
| 12/18/2009 | 10.03  | 100.2     | 100.5     | 7.01 | 10.04 | -0.4 | 125.3 | 0.054  |
| 1/6/2010   | 10.05  | na        | na        | 7.05 | 10.05 | -1.1 | 124.6 | na     |
| 1/19/2010  | 10.02  | 100.6     | 101.6     | 7    | 9.99  | 0.2  | 126.1 | 0.163  |
| 2/3/2010   | 10.09  | 99.1      | 99.1      | 7.18 | 10.2  | -5.3 | 124.9 | -0.093 |
| 2/15/2010  | 9.965  | 97.5      | 98.6      | 7.05 | 10.02 | 0.2  | 126.4 | -0.142 |
| 3/2/2010   | 10.11  | 99.1      | 99.9      | 7    | 9.92  | -0.1 | 125.7 | 0.011  |
| 3/17/2010  | 9.947  | 99.4      | 100.6     | 7.06 | 10.08 | -1.5 | 125.6 | 0.081  |
| 4/1/2010   | 9.872  | 101.9     | 102       | 7    | 10    | -0.6 | 125.6 | 0.203  |
| 4/13/2010  | 10.05  | 99.1      | 100.1     | 7.04 | 10.04 | 0.4  | 125.8 | -0.001 |
| 4/29/2010  | 9.685  | 99.7      | 100.5     | 7.01 | 9.99  | -0.7 | 125   | 0.057  |
| 5/11/2010  | 9.589  | 97.8      | 100.1     | 6.75 | 6.8   | 0    | 126.6 | 0.025  |
| 5/25/2010  | 9.827  | 100.1     | 100.7     | 7.04 | 10.03 | -0.7 | 126.2 | 0.07   |
| 6/8/2010   | 9.5    | 98.2      | 100.3     | 6.97 | 10    | 0.3  | 123.1 | 0.055  |
| 6/22/2010  | 9.697  | 100.1     | 100.4     | 6.98 | 9.94  | 0.7  | 126.3 | 0.057  |
| 6/29/2010  | 9.711  | 98.4      | 100.3     | 6.97 | 10    | -0.6 | 125.6 | 0.02   |
| 7/6/2010   | 9.983  | 99.8      | 99.98     | 6.98 | 9.96  | -0.3 | 126   | -0.014 |
| 7/13/2010  | 9.821  | 100.9     | 100.3     | 7.02 | 10.02 | 0.6  | 126.6 | 0.019  |
| 7/20/2010  | 9.921  | 100.2     | 100.5     | 7.01 | 10.08 | 0.5  | 125.7 | 0.049  |
| 7/27/2010  | 9.823  | 100.6     | 100.1     | 6.98 | 10.1  | -0.1 | 126   | 0.12   |
| 8/3/2010   | 9.944  | 99.7      | 99.8      | 6.9  | 9.92  | 0    | 128.7 | -0.028 |
| 8/10/2010  | 9.92   | 100.9     | 100.3     | 6.95 | 9.97  | -0.4 | 127.6 | 0.029  |
| 8/16/2010  | 9.572  | 999.99    | 100.6     | 6.91 | 8.88  | 0.1  | 126.8 | 0.06   |
| 8/31/2010  | 9.855  | 100.3     | 100       | 6.95 | 9.92  | 0.8  | 126.4 | -0.009 |
| 9/8/2010   | 9.94   | 100.6     | 100.6     | 6.89 | 9.94  | -0.4 | 125.9 | 0.064  |
| 9/14/2010  | 9.601  | na        | 100.2     | 7.05 | 10.11 | 0.9  | 126.4 | -0.012 |
| 10/5/2010  | 10.19  | 100.1     | 100.1     | 7.03 | 10.01 | -0.2 | 124.8 | 0.015  |
| 10/12/2010 | 9.96   | 102.6     | 99.9      | 6.97 | 9.99  | 0.3  | 124.8 | 0.001  |
| 10/26/2010 | 10.02  | 101.8     | 101.2     | 7.02 | 10.06 | -0.1 | 124.5 | 0.133  |
| 11/10/2010 | 10.05  | 101.6     | 100.4     | 7.03 | 10.01 | -0.4 | 126.9 | 0.059  |
| 11/22/2010 | 10.01  | 101.7     | 101.5     | 7.01 | 10.02 | 0.8  | 126.3 | 0.137  |
| 12/9/2010  | 10.06  | 100.5     | 100.3     | 7.03 | 10.03 | 1.4  | 123.8 | 0.024  |
| 12/17/2010 | 10.12  | na        | na        | 7.06 | 10.11 | 0.6  | 125.6 | -0.075 |

**Sweet Hall Marsh (SH):**

Deployment

| Date      | SpCond | DO 1      | DO 2      | pH   | pH    | Turb | Turb  | Depth  |
|-----------|--------|-----------|-----------|------|-------|------|-------|--------|
| m/d/y     | 10     | (100%sat) | (100%sat) | 7    | 10    | 0    | 126   | m      |
| 1/22/2010 | na     | na        | na        | na   | na    | na   | na    | na     |
| 2/12/2010 | 10.07  | 99.8      | 100.2     | 7    | 10.01 | 0    | 126.1 | 0.004  |
| 3/1/2010  | 10.07  | 99.6      | 99.9      | 7.04 | 10.08 | -0.7 | 125.6 | -0.054 |
| 3/16/2010 | 10.07  | 100.7     | 99.7      | 7.05 | 10.03 | 0.3  | 122.7 | -0.047 |
| 3/25/2010 | 10.01  | 101.5     | 101.6     | 7.03 | 10.05 | 0    | 123.7 | 0.163  |
| 4/9/2010  | 10.05  | 101.6     | 100.3     | 7.08 | 10.09 | 0.1  | 125.3 | 0.035  |
| 4/26/2010 | 10.03  | 104.4     | 101.2     | 7.04 | 10.07 | -0.3 | 125.2 | 0.123  |
| 5/11/2010 | 9.986  | 102.8     | 99.9      | 7.07 | 10    | 0.1  | 126.7 | -0.003 |
| 5/20/2010 | 9.984  | 105       | 99.9      | 6.96 | 10    | -0.2 | 122.9 | -0.015 |
| 6/3/2010  | 10.02  | 102.5     | 100       | 7.05 | 10.04 | 0.6  | 126.8 | -0.015 |

|            |       |       |       |      |       |      |       |        |
|------------|-------|-------|-------|------|-------|------|-------|--------|
| 6/18/2010  | 10.03 | 106.8 | 100.8 | 7.04 | 10.06 | -0.6 | 125.3 | 0.073  |
| 6/29/2010  | 10.06 | 101   | 100.3 | 7.03 | 10.03 | -3.5 | -24.7 | 0.033  |
| 7/1/2010   | 9.854 | 107.1 | 100.3 | 7.01 | 9.93  | 0.5  | 126.6 | 0.027  |
| 7/16/2010  | 9.891 | 85    | 99.6  | 7    | 10.01 | -0.2 | 125.8 | -0.056 |
| 8/2/2010   | 10.09 | 66.2  | 100.3 | na   | na    | 0.5  | 127.9 | 0.02   |
| 8/16/2010  | 9.948 | 100.6 | 100.2 | 7.05 | 9.82  | 0    | 125.6 | 0.011  |
| 8/25/2010  | 10.11 | 106.7 | 100   | 7.39 | 10.27 | -0.1 | 123.7 | 0.019  |
| 9/13/2010  | 9.935 | 69.9  | 98.9  | 7.05 | 9.99  | 0.3  | 125.7 | -0.122 |
| 9/28/2010  | 10.11 | 166.7 | 99.3  | 6.98 | 10.05 | -0.6 | 122.6 | -0.068 |
| 10/6/2010  | 10    | 101   |       | 7.04 | 10.05 | -0.6 | 123.9 | -0.025 |
| 10/25/2010 | 10.04 | 103.7 | 100.5 | 7.02 | 9.85  | -0.1 | 125.2 | 0.042  |
| 11/8/2010  | 10.02 | 70    | 101.2 | 7.03 | 10.02 | 0.2  | 126   | 0.118  |
| 11/18/2010 | 10.02 | 104.5 | 100.3 | 7.01 | 10.08 | 0    | 125.1 | 0.017  |
| 12/9/2010  | 9.975 | 99.4  | 100.4 | 7.05 | 10.07 | 0.1  | 125.8 | 0.043  |

#### Taskinas Creek (TC):

| Deployment | Date  | SpCond | DO 1      | DO 2      | pH    | pH   | Turb   | Turb   | Depth |
|------------|-------|--------|-----------|-----------|-------|------|--------|--------|-------|
|            | m/d/y | 10     | (100%sat) | (100%sat) | 7     | 10   | 0      | 126    | m     |
| 1/15/2010  | 10.09 | 102.1  | 101.1     | 7.01      | 9.98  | -0.3 | 122.8  | 0.111  |       |
| 2/2/2010   | 9.961 | 98.9   | 100.2     | 6.99      | 9.93  | 0    | 123.1  | 0      |       |
| 3/1/2010   | 10.06 | 98.2   | 99.9      | 7.06      | 10.03 | 0.9  | 126.9  | -0.035 |       |
| 3/15/2010  | 10.03 | 100.6  | 99.7      | 7         | 9.98  | -0.2 | 122.6  | -0.053 |       |
| 3/24/2010  | 9.978 | 106.4  | 101.6     | 7.06      | 10.07 | -0.5 | 126.4  | 0.164  |       |
| 4/9/2010   | 10.02 | 104.7  | 100.3     | 7.12      | 9.99  | 0.2  | 125.2  | 0.03   |       |
| 4/26/2010  | 7.052 | 109.9  | 101.2     | 6.97      | 9.95  | 0.4  | 125.4  | 0.116  |       |
| 5/11/2010  | 10.04 | 5.1    | 99.9      | 7.07      | 10    | 0    | 126.3  | -0.017 |       |
| 5/21/2010  | 9.739 | 104.1  | 99.1      | 7.12      | 9.99  | -0.9 | 125.89 | 0.008  |       |
| 6/3/2010   | 9.127 | 101.8  | 100       | 7.08      | 10.04 | 0.2  | 123.2  | -0.005 |       |
| 6/17/2010  | 10.1  | 54.4   | 100.8     | 6.85      | 9.92  | -0.6 | 125    | 0.075  |       |
| 6/25/2010  | 10.01 | 97.3   | 100.2     | 6.98      | 10.01 | 0.5  | 125.5  | 0.017  |       |
| 7/2/2010   | 10.04 | 100.7  | 100.4     | 7.11      | 10.11 | 0.4  | 126.3  | 0.043  |       |
| 7/9/2010   | 9.848 | 82     | 100.3     | 7.08      | 10.09 | 0.5  | 127.6  | 0.025  |       |
| 7/16/2010  | 9.988 | 53.7   | 99.9      | 7.08      | 10.13 | 0.2  | 125.9  | -0.002 |       |
| 7/26/2010  | 10.01 | 99     | 99.6      | 7         | 10.05 | -0.1 | 126.6  | -0.044 |       |
| 8/2/2010   | 9.943 | 49.6   | 99.5      | 7.06      | 10.11 | 0.1  | 128.7  | -0.06  |       |
| 8/6/2010   | 10.09 | 96.9   | 100       | 7         | 10.05 | 0.2  | 127.1  | 0.009  |       |
| 8/16/2010  | 10    | 98.2   | 100.3     | 7.3       | 10.28 | 0    | 127.3  | 0.027  |       |
| 8/24/2010  | 9.986 | 99.1   | 100.4     | 7.12      | 10.12 | 0.9  | 125.8  | 0.018  |       |
| 8/30/2010  | 9.83  | 98.4   | 100.1     | 7.23      | 10.31 | -0.1 | 126.4  | 0      |       |
| 9/3/2010   | 10.1  | 95.5   | 100.4     | 6.9       | 9.96  | 0    | 126.1  | 0.053  |       |
| 9/13/2010  | 10.05 | 101.3  | 98.9      | 7.27      | 10.03 | 0.1  | 127    | -0.11  |       |
| 9/28/2010  | 10.09 | 99.1   | 99.8      | 6.98      | 10.05 | -0.2 | 126.3  | -0.04  |       |
| 10/6/2010  | 10.05 | 102    | 100.1     | 6.82      | 9.93  | -0.1 | 124    | 0.006  |       |
| 10/25/2010 | 10.14 | 101.1  | 100.1     | 7.13      | 10.09 | 0.4  | 127.2  | -0.001 |       |
| 11/5/2010  | 10.02 | 102.4  | 101.2     | 7.07      | 10.03 | 0.1  | 125.7  | 0.112  |       |
| 11/18/2010 | na    | na     | na        | na        | na    | na   | na     | na     |       |
| 12/9/2010  | 10.03 | 100.1  | 100.4     | 7.04      | 10.07 | 0.1  | 127.1  | 0.041  |       |

**14) Other remarks/notes** – Use this section for further documentation of the research data set. Include any additional notes regarding the data set in general, circumstances not covered by the flags and comment codes, or specific data that were coded with the CSM “See Metadata” comment code. You may include the metadata

worksheets here if so desired. You may also include information on major storms or precipitation events that could have affected the data recorded at the sample sites. Include the following excerpt:

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.

## **Storm Events:**

### **January – Wind and Rain events**

#### **Claybank:**

For the following dates and times, all data values were influenced by a storm event which produced winds up to 25 mph and 1.10” of rain.

01/17/2010 00:00:00 – 01/17/2010 23:45:00

For the following dates and times, all data values were influenced by a storm event which produced winds up to 20 mph and 0.79” of rain.

01/20/2010 00:00:00 – 01/22/2010 23:45:00

For the following dates and times, all data values were influenced by a storm event which produced winds up to 35 mph and 1.64” of rain.

01/25/2010 00:00:00 – 01/25/2010 23:45:00

#### **Goodwin Island:**

For the following dates and times, all data values were influenced by a storm event which produced winds up to 25 mph and 1.10” of rain.

01/17/2010 00:00:00 – 01/17/2010 23:45:00

For the following dates and times, all data values were influenced by a storm event which produced winds up to 20 mph and 0.79” of rain.

01/20/2010 00:00:00 – 01/22/2010 23:45:00

For the following dates and times, all data values were influenced by a storm event which produced winds up to 35 mph and 1.64” of rain.

01/25/2010 00:00:00 – 01/25/2010 23:45:00

#### **Sweet Hall Marsh:**

For the following dates and times, all data values were influenced by a storm event which produced winds up to 15 mph and 1.80” of rain.

01/17/2010 00:00:00 – 01/17/2010 23:45:00

For the following dates and times, all data values were influenced by a storm event which produced winds 15-20 mph and 0.70" of rain.

01/20/2010 00:00:00 – 01/22/2010 23:45:00

For the following dates and times, all data values were influenced by a storm event which produced winds up to 25 mph and 1.20" of rain.

01/25/2010 00:00:00 – 01/25/2010 23:45:00

For the following dates and times, all data values were influenced by a rain event, 0.35" of rain.

01/31/2010 00:00:00 – 01/31/2010 23:45:00

#### **Taskinas Creek:**

For the following dates and times, all data values were influenced by a storm event which produced winds up to 15 mph and 1.80" of rain.

01/17/2010 00:00:00 – 01/17/2010 23:45:00

For the following dates and times, all data values were influenced by a storm event which produced winds 15-20 mph and 0.70" of rain.

01/20/2010 00:00:00 – 01/22/2010 23:45:00

For the following dates and times, all data values were influenced by a storm event which produced winds up to 25 mph and 1.20" of rain.

01/25/2010 00:00:00 – 01/25/2010 23:45:00

For the following dates and times, all data values were influenced by a rain event, 0.35" of rain.

01/31/2010 00:00:00 – 01/31/2010 23:45:00

### **February – Wind and Rain events**

#### **Claybank:**

For the following dates and times, all data values were influenced by a storm event which produced winds up to 15 mph and 0.25" of rain.

02/03/2010 00:00:00 – 02/03/2010 23:45:00

For the following dates and times, all data values were influenced by a storm event which produced strong winds 35-40 mph and 2.30" of snow/ice.

02/05/2010 00:00:00 – 02/06/2010 23:45:00

For the following dates and times, all data values were influenced by a rain event, 0.40" of rain.

02/09/2010 00:00:00 – 02/09/2010 23:45:00

#### **Goodwin Island:**

For the following dates and times, all data values were influenced by a storm event which produced winds up to 15 mph and 0.25" of rain.

02/03/2010 00:00:00 – 02/03/2010 23:45:00

For the following dates and times, all data values were influenced by a storm event which produced strong winds 35-40 mph and 2.30" of snow/ice.

02/05/2010 00:00:00 – 02/06/2010 23:45:00

For the following dates and times, all data values were influenced by a rain event, 0.40" of rain.

02/09/2010 00:00:00 – 02/09/2010 23:45:00

#### **Taskinas Creek:**

For the following dates and times, all data values were influenced by a storm event which produced winds up to 10 mph and 0.25" of rain.

02/22/2010 00:00:00 – 02/22/2010 23:45:00

### **March – Wind and Rain events**

#### **Claybank:**

For the following dates and times, all data values were influenced by a storm event which produced strong winds up to 35 mph and 1.00" of rain.

03/12/2010 00:00:00 – 03/12/2010 23:45:00

For the following dates and times, all data values were influenced by a storm event which produced winds up to 20 mph and 0.25" of rain.

03/14/2010 00:00:00 – 03/14/2010 23:45:00

For the following dates and times, all data values were influenced by a wind event, winds 25-35 mph.

03/22/2010 00:00:00 – 03/31/2010 23:45:00

#### **Goodwin Island:**

For the following dates and times, all data values were influenced by a storm event which produced strong winds up to 35 mph and 1.00" of rain.

03/12/2010 00:00:00 – 03/12/2010 23:45:00

For the following dates and times, all data values were influenced by a storm event which produced winds up to 20 mph and 0.25" of rain.

03/14/2010 00:00:00 – 03/14/2010 23:45:00

For the following dates and times, all data values were influenced by a wind event, winds 25-35 mph.

03/22/2010 00:00:00 – 03/31/2010 23:45:00

**Sweet Hall Marsh:**

For the following dates and times, all data values were influenced by a storm event which produced winds up to 20 mph and 0.90" of rain.

03/02/2010 00:00:00 – 03/03/2010 23:45:00

For the following dates and times, all data values were influenced by a storm event which produced winds 20-25 mph and 1.40" of rain.

03/11/2010 00:00:00 – 03/12/2010 23:45:00

For the following dates and times, all data values were influenced by a storm event which produced winds up to 25 mph and 1.60" of rain.

03/26/2010 00:00:00 – 03/26/2010 23:45:00

For the following dates and times, all data values were influenced by a storm event which produced winds up to 20 mph and 1.80" of rain.

03/29/2010 00:00:00 – 03/29/2010 23:45:00

**Taskinas Creek:**

For the following dates and times, all data values were influenced by a storm event which produced winds up to 20 mph and 0.90" of rain.

03/02/2010 00:00:00 – 03/03/2010 23:45:00

For the following dates and times, all data values were influenced by a storm event which produced winds 20-25 mph and 1.40" of rain.

03/11/2010 00:00:00 – 03/12/2010 23:45:00

For the following dates and times, all data values were influenced by a storm event which produced winds up to 25 mph and 1.60" of rain.

03/26/2010 00:00:00 – 03/26/2010 23:45:00

For the following dates and times, all data values were influenced by a storm event which produced winds up to 20 mph and 1.80" of rain.

03/29/2010 00:00:00 – 03/29/2010 23:45:00

**April – Wind and Rain events****Claybank:**

For the following dates and times, all data values were influenced by a storm event which produced strong winds up to 35 mph and 0.20" of rain.

04/06/2010 00:00:00 – 04/06/2010 23:45:00

For the following dates and times, all data values were influenced by a storm event which produced winds up to 20 mph and 0.52" of rain.

04/09/2010 00:00:00 – 04/09/2010 23:45:00

For the following dates and times, all data values were influenced by a storm event which produced winds up to 25 mph.

04/25/2010 00:00:00 – 04/25/2010 23:45:00

#### **Goodwin Island:**

For the following dates and times, all data values were influenced by a storm event which produced strong winds up to 35 mph and 0.20" of rain.

04/06/2010 00:00:00 – 04/06/2010 23:45:00

For the following dates and times, all data values were influenced by a storm event which produced winds up to 20 mph and 0.52" of rain.

04/09/2010 00:00:00 – 04/09/2010 23:45:00

For the following dates and times, all data values were influenced by a storm event which produced winds up to 25 mph.

04/25/2010 00:00:00 – 04/25/2010 23:45:00

#### **Sweet Hall Marsh:**

For the following dates and times, all data values were influenced by a storm event which produced winds up to 20 mph and 0.50" of rain.

04/09/2010 00:00:00 – 04/09/2010 23:45:00

For the following dates and times, all data values were influenced by a storm event which produced winds 15-20 mph and 0.50" of rain.

04/25/2010 00:00:00 – 04/26/2010 23:45:00

#### **Taskinas Creek:**

For the following dates and times, all data values were influenced by a storm event which produced winds up to 20 mph and 0.50" of rain.

04/09/2010 00:00:00 – 04/09/2010 23:45:00

For the following dates and times, all data values were influenced by a storm event which produced winds 15-20 mph and 0.50" of rain.

04/25/2010 00:00:00 – 04/26/2010 23:45:00

### **May – Wind and Rain events**



**Claybank:**

For the following dates and times, all data values were influenced by a storm event which produced strong winds up to 30 mph and 0.70" of rain.

05/12/2010 00:00:00 – 05/12/2010 23:45:00

For the following dates and times, all data values were influenced by a storm event which produced winds 15-25 mph and 3.5" of rain.

05/15/2010 00:00:00 – 05/18/2010 23:45:00

For the following dates and times, all data values were influenced by a storm event which produced winds up to 20 mph and 0.25" of rain.

05/23/2010 00:00:00 – 05/23/2010 23:45:00

For the following dates and times, all data values were influenced by a storm event which produced winds up to 20 mph and 0.90" of rain.

05/28/2010 00:00:00 – 05/28/2010 23:45:00

**Goodwin Island:**

For the following dates and times, all data values were influenced by a storm event which produced strong winds up to 30 mph and 0.70" of rain.

05/12/2010 00:00:00 – 05/12/2010 23:45:00

For the following dates and times, all data values were influenced by a storm event which produced winds 15-25 mph and 3.5" of rain.

05/15/2010 00:00:00 – 05/18/2010 23:45:00

For the following dates and times, all data values were influenced by a storm event which produced winds up to 20 mph and 0.25" of rain.

05/23/2010 00:00:00 – 05/23/2010 23:45:00

For the following dates and times, all data values were influenced by a storm event which produced winds up to 20 mph and 0.90" of rain.

05/28/2010 00:00:00 – 05/28/2010 23:45:00

**Sweet Hall Marsh:**

For the following dates and times, all data values were influenced by a storm event which produced winds up to 15 mph and 0.40" of rain.

05/12/2010 00:00:00 – 05/12/2010 23:45:00

For the following dates and times, all data values were influenced by a storm event which produced winds up to 20 mph and 01.80" of rain.

05/17/2010 00:00:00 – 05/18/2010 23:45:00

For the following dates and times, all data values were influenced by a storm event which produced winds up to 20 mph and 0.50” of rain.

05/28/2010 00:00:00 – 05/28/2010 23:45:00

#### **Taskinas Creek:**

For the following dates and times, all data values were influenced by a storm event which produced winds up to 15 mph and 0.40” of rain.

05/12/2010 00:00:00 – 05/12/2010 23:45:00

For the following dates and times, all data values were influenced by a storm event which produced winds up to 20 mph and 01.80” of rain.

05/17/2010 00:00:00 – 05/18/2010 23:45:00

For the following dates and times, all data values were influenced by a storm event which produced winds up to 20 mph and 0.50” of rain.

05/28/2010 00:00:00 – 05/28/2010 23:45:00

### **June – Wind and Rain events**

#### **Claybank:**

For the following dates and times, all data values were influenced by a wind event, winds up to 25 mph.

06/01/2010 00:00:00 – 06/01/2010 23:45:00

For the following dates and times, all data values were influenced by a storm event which produced winds 20-25 mph and 1.65” of rain.

06/12/2010 00:00:00 – 06/14/2010 23:45:00

#### **Goodwin Island:**

For the following dates and times, all data values were influenced by a wind event, winds up to 25 mph.

06/01/2010 00:00:00 – 06/01/2010 23:45:00

For the following dates and times, all data values were influenced by a storm event which produced winds 20-25 mph and 1.65” of rain.

06/12/2010 00:00:00 – 06/14/2010 23:45:00

#### **Sweet Hall Marsh:**

For the following dates and times, all data values were influenced by a storm event which produced winds up to 20 mph and 0.30" of rain.

06/06/2010 00:00:00 – 06/06/2010 23:45:00

For the following dates and times, all data values were influenced by a storm event which produced winds up to 20 mph and 0.90" of rain.

06/13/2010 00:00:00 – 06/14/2010 23:45:00

#### **Taskinas Creek:**

For the following dates and times, all data values were influenced by a storm event which produced winds up to 20 mph and 0.30" of rain.

06/06/2010 00:00:00 – 06/06/2010 23:45:00

For the following dates and times, all data values were influenced by a storm event which produced winds up to 20 mph and 0.90" of rain.

06/13/2010 00:00:00 – 06/14/2010 23:45:00

## **July – Wind and Rain events**

#### **Claybank:**

For the following dates and times, all data values were influenced by a storm event which produced winds up to 10 mph and 0.35" of rain.

07/10/2010 00:00:00 – 07/10/2010 23:45:00

For the following dates and times, all data values were influenced by a storm event which produced strong winds 25-35 mph and 1.10" of rain.

07/18/2010 00:00:00 – 07/19/2010 23:45:00

For the following dates and times, all data values were influenced by a storm event which produced strong winds up to 30 mph and 0.34" of rain.

07/29/2010 00:00:00 – 07/29/2010 23:45:00

#### **Goodwin Island:**

For the following dates and times, all data values were influenced by a storm event which produced winds up to 10 mph and 0.35" of rain.

07/10/2010 00:00:00 – 07/10/2010 23:45:00

For the following dates and times, all data values were influenced by a storm event which produced strong winds 25-35 mph and 1.10" of rain.

07/18/2010 00:00:00 – 07/19/2010 23:45:00

For the following dates and times, all data values were influenced by a storm event which produced strong winds up to 30 mph and 0.34" of rain.

07/29/2010 00:00:00 – 07/29/2010 23:45:00

**Sweet Hall Marsh:**

For the following dates and times, all data values were influenced by a storm event which produced 0.30” of rain.

07/05/2010 00:00:00 – 07/05/2010 23:45:00

For the following dates and times, all data values were influenced by a storm event which produced winds up to 10 mph and 0.80” of rain.

07/12/2010 00:00:00 – 07/12/2010 23:45:00

For the following dates and times, all data values were influenced by a storm event which produced winds up to 10 mph and 0.60” of rain.

07/19/2010 00:00:00 – 07/19/2010 23:45:00

For the following dates and times, all data values were influenced by a storm event which produced 0.65” of rain.

07/29/2010 00:00:00 – 07/29/2010 23:45:00

**Taskinas Creek:**

For the following dates and times, all data values were influenced by a storm event which produced winds up to 10 mph and 0.80” of rain.

07/12/2010 00:00:00 – 07/12/2010 23:45:00

For the following dates and times, all data values were influenced by a storm event which produced winds up to 10 mph and 0.60” of rain.

07/19/2010 00:00:00 – 07/19/2010 23:45:00

For the following dates and times, all data values were influenced by a storm event which produced 0.65” of rain.

07/29/2010 00:00:00 – 07/29/2010 23:45:00

**August - Wind and Rain events**

**Claybank:**

For the following dates and times, all data values were influenced by a storm event which produced winds up to 20 mph and 0.35” of rain.

08/01/2010 00:00:00 – 08/01/2010 23:45:00

For the following dates and times, all data values were influenced by a storm event which produced strong winds 20-40 mph and 0.80” of rain.

08/04/2010 00:00:00 – 08/05/2010 23:45:00

For the following dates and times, all data values were influenced by a storm event which produced strong winds up to 25 mph and 0.55” of rain.

08/12/2010 00:00:00 – 08/12/2010 23:45:00

For the following dates and times, all data values were influenced by a storm event which produced winds 15-20 mph and 1.00” of rain.

08/17/2010 00:00:00 – 08/19/2010 23:45:00

#### **Goodwin Island:**

For the following dates and times, all data values were influenced by a storm event which produced winds up to 20 mph and 0.35” of rain.

08/01/2010 00:00:00 – 08/01/2010 23:45:00

For the following dates and times, all data values were influenced by a storm event which produced strong winds 20-40 mph and 0.80” of rain.

08/04/2010 00:00:00 – 08/05/2010 23:45:00

For the following dates and times, all data values were influenced by a storm event which produced winds up to 25 mph and 0.55” of rain.

08/12/2010 00:00:00 – 08/12/2010 23:45:00

For the following dates and times, all data values were influenced by a storm event which produced winds 15-20 mph and 1.00” of rain.

08/17/2010 00:00:00 – 08/19/2010 23:45:00

#### **Sweet Hall Marsh:**

For the following dates and times, all data values were influenced by a storm event which produced winds 10-15 mph and 0.40” of rain.

08/01/2010 00:00:00 – 08/02/2010 23:45:00

For the following dates and times, all data values were influenced by a storm event which produced winds 15-20 mph and 0.35” of rain.

08/04/2010 00:00:00 – 08/05/2010 23:45:00

For the following dates and times, all data values were influenced by a storm event which produced winds up to 10 mph and 0.25” of rain.

08/18/2010 00:00:00 – 08/18/2010 23:45:00

#### **Taskinas Creek:**

For the following dates and times, all data values were influenced by a storm event which produced winds 10-15 mph and 0.40" of rain.

08/01/2010 00:00:00 – 08/02/2010 23:45:00

For the following dates and times, all data values were influenced by a storm event which produced winds 15-20 mph and 0.35" of rain.

08/04/2010 00:00:00 – 08/05/2010 23:45:00

For the following dates and times, all data values were influenced by a storm event which produced winds up to 10 mph and 0.25" of rain.

08/18/2010 00:00:00 – 08/18/2010 23:45:00

## **September - Wind and Rain events**

### **Claybank:**

For the following dates and times, all data values were influenced by a storm event which produced winds up to 15 mph and 0.25" of rain.

09/03/2010 00:00:00 – 09/03/2010 23:45:00

For the following dates and times, all data values were influenced by a storm event which produced winds up to 10 mph and 0.50" of rain.

09/12/2010 00:00:00 – 09/12/2010 23:45:00

For the following dates and times, all data values were influenced by a storm event which produced winds 15-20 mph and 11.00" of heavy rain.

09/26/2010 00:00:00 – 09/30/2010 23:45:00

### **Goodwin Island:**

For the following dates and times, all data values were influenced by a storm event which produced winds up to 15 mph and 0.25" of rain.

09/03/2010 00:00:00 – 09/03/2010 23:45:00

For the following dates and times, all data values were influenced by a storm event which produced winds up to 10 mph and 0.50" of rain.

09/12/2010 00:00:00 – 09/12/2010 23:45:00

For the following dates and times, all data values were influenced by a storm event which produced winds 15-20 mph and 11.00" of heavy rain.

09/26/2010 00:00:00 – 09/30/2010 23:45:00

### **Sweet Hall Marsh:**

For the following dates and times, all data values were influenced by a storm event which produced winds up to 20 mph and 0.25" of rain.

09/03/2010 00:00:00 – 09/03/2010 23:45:00

For the following dates and times, all data values were influenced by a storm event which produced winds up to 10 mph and 0.35" of rain.

09/12/2010 00:00:00 – 09/12/2010 23:45:00

For the following dates and times, all data values were influenced by a storm event which produced winds 15-20 mph and 11.5" of rain.

09/26/2010 00:00:00 – 09/30/2010 23:45:00

#### **Taskinas Creek:**

For the following dates and times, all data values were influenced by a storm event which produced winds up to 20 mph and 0.25" of rain.

09/03/2010 00:00:00 – 09/03/2010 23:45:00

For the following dates and times, all data values were influenced by a storm event which produced winds up to 10 mph and 0.35" of rain.

09/12/2010 00:00:00 – 09/12/2010 23:45:00

For the following dates and times, all data values were influenced by a storm event which produced winds 15-20 mph and 11.5" of rain.

09/26/2010 00:00:00 – 09/30/2010 23:45:00

### **October - Wind and Rain events**

#### **Claybank:**

For the following dates and times, all data values were influenced by a storm event which produced winds up to 15 mph and 0.30" of rain.

10/03/2010 00:00:00 – 10/03/2010 23:45:00

For the following dates and times, all data values were influenced by a storm event which produced winds up to 10 mph and 0.30" of rain.

10/14/2010 00:00:00 – 10/14/2010 23:45:00

For the following dates and times, all data values were influenced by a storm event which produced winds up to 20 mph and 0.20" of rain.

10/26/2010 00:00:00 – 10/26/2010 23:45:00

#### **Goodwin Island:**

For the following dates and times, all data values were influenced by a storm event which produced winds up to 15 mph and 0.30" of rain.

10/03/2010 00:00:00 – 10/03/2010 23:45:00

For the following dates and times, all data values were influenced by a storm event which produced winds up to 10 mph and 0.30" of rain.

10/14/2010 00:00:00 – 10/14/2010 23:45:00

For the following dates and times, all data values were influenced by a storm event which produced winds up to 20 mph and 0.20" of rain.

10/26/2010 00:00:00 – 10/26/2010 23:45:00

#### **Sweet Hall Marsh:**

For the following dates and times, all data values were influenced by a storm event which produced winds up to 15 mph and 0.30" of rain.

10/03/2010 00:00:00 – 10/03/2010 23:45:00

For the following dates and times, all data values were influenced by a storm event which produced winds up to 10 mph and 0.30" of rain.

10/14/2010 00:00:00 – 10/14/2010 23:45:00

For the following dates and times, all data values were influenced by a storm event which produced winds 15-20 mph and 1.10" of rain.

10/25/2010 00:00:00 – 10/28/2010 23:45:00

#### **Taskinas Creek:**

For the following dates and times, all data values were influenced by a storm event which produced winds up to 15 mph and 0.30" of rain.

10/03/2010 00:00:00 – 10/03/2010 23:45:00

For the following dates and times, all data values were influenced by a storm event which produced winds up to 10 mph and 0.30" of rain.

10/14/2010 00:00:00 – 10/14/2010 23:45:00

For the following dates and times, all data values were influenced by a storm event which produced winds 15-20 mph and 1.10" of rain.

10/25/2010 00:00:00 – 10/28/2010 23:45:00

### **November - Wind and Rain events**

#### **Claybank:**



For the following dates and times, all data values were influenced by a storm event which produced winds 10-15 mph and 0.45" of rain.

11/04/2010 00:00:00 – 11/04/2010 23:45:00

For the following dates and times, all data values were influenced by a wind event, strong winds 15-25 mph.

11/17/2010 00:00:00 – 11/17/2010 23:45:00

#### **Goodwin Island:**

For the following dates and times, all data values were influenced by a storm event which produced winds 10-15 mph and 0.45" of rain.

11/04/2010 00:00:00 – 11/04/2010 23:45:00

For the following dates and times, all data values were influenced by a wind event, strong winds 15-25 mph.

11/17/2010 00:00:00 – 11/17/2010 23:45:00

#### **Sweet Hall Marsh:**

For the following dates and times, all data values were influenced by a storm event which produced winds up to 15 mph and 0.50" of rain.

11/04/2010 00:00:00 – 11/04/2010 23:45:00

#### **Taskinas Creek:**

For the following dates and times, all data values were influenced by a storm event which produced winds up to 15 mph and 0.50" of rain.

11/04/2010 00:00:00 – 11/04/2010 23:45:00

### **December - Wind and Rain events**

#### **Claybank:**

For the following dates and times, all data values were influenced by a storm event which produced winds 15-25 mph and 1.2" of rain.

12/11/2010 00:00:00 – 12/13/2010 23:45:00

For the following dates and times, all data values were influenced by a storm event which produced winds up to 10 mph and 0.50" of rain.

12/17/2010 00:00:00 – 12/17/2010 23:45:00

#### **Goodwin Island:**

For the following dates and times, all data values were influenced by a storm event which produced winds 15-25 mph and 1.2" of rain.

12/11/2010 00:00:00 – 12/13/2010 23:45:00

For the following dates and times, all data values were influenced by a storm event which produced winds up to 10 mph and 0.50" of rain.

12/17/2010 00:00:00 – 12/17/2010 23:45:00

#### **Sweet Hall Marsh:**

For the following dates and times, all data values were influenced by a storm event which produced winds 15-20 mph and 1.2" of rain.

12/11/2010 00:00:00 – 12/13/2010 23:45:00

#### **Taskinas Creek:**

For the following dates and times, all data values were influenced by a storm event which produced winds 15-20 mph and 1.2" of rain.

12/11/2010 00:00:00 – 12/13/2010 23:45:00

### **Missing Data**

#### **January**

##### **Sweet Hall Marsh:**

For the following dates and times, datalogger was removed from the station due to freezing temperatures and extreme low tides.

01/05/2010 18:15:00 – 01/25/2010 13:30:00

##### **Taskinas Creek:**

For the following dates and times, datalogger was removed from the station due to freezing temperatures and extreme low tides.

01/05/2010 18:00:00 – 01/20/2010 13:15:00

#### **February**

##### **Sweet Hall Marsh:**

For the following dates and times, datalogger was removed from the station due to freezing temperatures and extreme low tides.

02/01/2010 00:00:00 – 02/17/2010 18:00:00

##### **Taskinas Creek:**

For the following dates and times, datalogger was removed from the station due to freezing temperatures and extreme low tides.

02/04/2010 10:15:00 – 02/17/2010 10:30:00

## **December**

### **Sweet Hall Marsh:**

For the following dates and times, datalogger was removed from the station due to freezing temperatures and extreme low tides.

12/15/2010 16:15:00 – 12/31/2010 23:15:00

### **Taskinas Creek:**

For the following dates and times, datalogger was removed from the station due to freezing temperatures and extreme low tides.

12/15/2010 12:45:00 – 12/31/2010 23:45:00

## **Suspect Data:**

## **February**

### **Goodwin Island:**

For the following dates and times, specific conductivity and salinity indicated a sudden increase in readings. Data suspect, data retained.

02/26/2010 14:15:00 – 02/28/2010 23:45:00

For the following dates and times, depth readings are erratic due to datalogger bouncing around inside of tube because of high winds. Data suspect, data retained.

02/05/2010 20:00:00 – 02/06/2010 07:15:00

## **March**

### **Goodwin Island:**

For the following dates and times, specific conductivity and salinity indicated a sudden increase in readings. Data suspect, data retained.

03/01/2010 00:00:00 – 03/02/2010 10:15:00

For the following dates and times, depth readings are erratic due to datalogger bouncing around inside of tube because of high winds. Data suspect, data retained.

03/26/2010 13:30:00 – 03/26/2010 19:45:00

## **May**

### **Claybank:**

For the following dates and times, turbidity readings were elevated due to windy conditions. Data suspect, data retained.

05/08/2010 20:45:00 – 05/09/2010 03:30:00

05/09/2010 09:30:00 – 05/09/2010 15:45:00

### **Goodwin Island:**

For the following dates and times, depth readings are erratic due to datalogger bouncing around inside of tube because of high winds. Data suspect, data retained.

05/17/2010 13:00:00 – 05/17/2010 15:30:00

05/17/2010 18:45:00 – 05/17/2010 23:45:00

### **July**

For the following dates and times, all readings indicated a decrease due to a rain event. Data suspect, data retained.

07/10/2010 18:00:00

### **Rejected Data:**

#### **January**

##### **Sweet Hall:**

For the following dates and times, depth readings were rejected due to sonde freezing in tube. Data rejected.

01/02/2010 20:45:00 – 01/02/2010 22:30:00

#### **February**

##### **Goodwin Island:**

For the following dates and times, turbidity probe malfunction, rejected entire deployment.

02/03/2010 11:00:00 – 02/05/2010 10:15:00

#### **April**

##### **Sweet Hall:**

For the following dates and times, all readings were rejected due to sonde hanging up inside of tube at the wrong depth. Data rejected.

04/28/2010 12:00:00 – 04/28/2010 14:00:00

### **Station Installation/Station Maintenance**

**November**

**Goodwin Island:**

On the following date and time, Goodwin Island's tube was replaced for maintenance. All data rejected.

11/19/2010 11:30:00 – 11/18/2010 11:45:00