**Central Panhandle Aquatic Preserves (CPAP)
Water Quality Metadata Report**

January - December 2007
Latest Update: 12/27/2018

Note: This is a provisional metadata document; it has not been authenticated as of its download date. Contents of this document are subject to change throughout the QAQC process and it should not be considered a final record of data documentation until that process is complete. Contact the Aquatic Preserve Office (jonathan.brucker@dep.state.fl.us) with any additional questions.

**I. Data Set and Research Descriptors**

1. **Principal investigator & contact persons:**

Principal Investigator:

Kim Wren, Aquatic Preserve Manager

350 Carroll Street

Eastpoint FL 32328

(850) 670-4783 ext. 104

Fax: (850) 670-4324

kim.wren@dep.state.fl.us

Other Contact Persons:

Jessica Avant, Research Assistant

E-mail: jessica.avant@dep.state.fl.us Phone: (850) 670-4783 ext. 121

1. **Entry verification:**

YSI data are downloaded directly from the YSI 6600 EDS (extended deployment system) into the EcoWatch (version 3.15) software, plotted, and initially analyzed for major anomalies and missing data. YSI raw data files are then downloaded as a comma delimited file (.cdf) and imported into Microsoft Excel as a comma-space delimited file (.csv). These raw data files are then organized into standardized monthly data sets. The monthly files are carefully edited by staff for data anomalies that are identified in the dataset and Section 14 of this document. Data are deleted or rejected when the sonde malfunctioned, probes malfunctioned, data are out of range for a particular site, or the sonde is out of the water.

Data are pre-processed in Excel using the macros to correct any time stamp errors, convert data into proper units, and make sure parameters are in the correct order. Anomalous data found during the initial QA/QC process are flagged and/or deleted in Excel. Jessica Avant is responsible for the initial QA/QC process and data management.

Beginning in July 2018, data underwent a two-step (primary and secondary) Quality Assurance/Quality Control (QA/QC) procedure as outlined in the NERRS CDMO Data Management Manual Version 6.6 (<http://cdmo.baruch.sc.edu/request-manuals/>).

The primary QA/QC process was performed by the CDMO and involved inserting flag columns into the data files for each water quality parameter, creating a flag record column, and creating an automated process that applied standardized flags to data if the values were outside sensor specifications as determined by YSI, the instrument manufacturer. Yearly data files that completed the primary QA/QC process were returned to FCO staff for secondary QA/QC. Data were evaluated, and standardized flags and codes were applied to individual data points by insertion into the flag columns using the CDMO’s NERRQAQC Excel macro to provide further documentation of the data. Data files were then returned to the CDMO for ingestion into the Florida Aquatic Preserves database as provisional data. For more information on QA/QC flags and codes, see Sections 11 and 12.

1. **Research objectives:**

Richardson’s Hammock station collects baseline water quality data in the southwestern area of St Joseph’s Bay. Richardson’s Hammock is surrounded by lush seagrass beds, known as a shark breeding ground, congregating snapper populations, and juvenile green turtle habitat. This southern portion of St Joe Bay has low flow compared to the northern portion of the Bay which Gulf water flushes out more frequently. Richardson’s Hammock is separated from the Gulf of Mexico by a narrow strip of land. In the event of a large storm, it is possible that this area could be washed out and the Gulf waters flow directly into the Bay at Richardson’s Hammock. Gathering baseline data are important in this event to compare before and after affects on this habitat.

Windmark station is located in the northeastern portion of St Joseph’s Bay. Windmark is a development of the St Joe Company and is in its early stages. This site is greatly influenced by the Gulf since Gulf water enters the Bay from the north and travels south. As development increases in this area we will be able to track changes in water quality and possibly link this to development.

Alligator Harbor station is located in the interior southeastern portion of Alligator Harbor. Baseline water quality data are gathered since little is known about the water quality in this Bay.

1. **Research Methods:**

The YSI monitoring program was started in July 2005 in association with the Aquatic Preserve statewide water quality monitoring effort which is modeled after the National Estuarine Research Reserve’s (NERR) System-Wide Monitoring Program (SWMP). CPAP began monitoring one station in the St Joseph’s Bay system beginning in July 2005, using YSI 6600 EDS model sondes. Another station in St Joseph’s Bay, Windmark, was added in August 2006. In September 2007 Windmark station was discontinued in order to expand water quality efforts into other bays within CPAP. In October 2007 the Alligator Harbor datalogger site was added to the program. YSI 6600 EDS model sondes are used to collect data at every site. Prior to deployment, YSI 6600 EDS’s are calibrated for conductivity, dissolved oxygen, depth, turbidity and pH following the procedures outlined in the YSI Operating and Service Manual (with addendum 5/99) and the NERR SWMP YSI 6-Series Multi-Parameter Water Quality Monitoring Procedure SOP Version 3.0 (with addendum 11/01) document. Lab grade conductivity standards (Fisher Brand) are initially used to calibrate the YSI’s, which are then used to check working standards made up and used for ongoing salinity calibration. Lab grade standards are also used periodically to check the accuracy of the working salinity standards.

The only variation from the manual is the use of two pH standards (pH 7 and pH 10) for two-point calibration of pH rather than three-point calibration. The membranes for the dissolved oxygen probe are installed at least 12 hours prior to calibration. Beginning January 31, 2006, depth has been set based on the barometric pressure the day of calibration. Prior to this, a default atmospheric pressure of 760 mmHg was used to calibrate the depth to 0 meters for pre- and post- calibration. Pressure is measured using a hand-held Garmin unit and the depth offset from zero meters is determined using the tables provided in the Water Quality SOP. The dissolved oxygen % is also calibrated based on the barometric pressure for the day, changing the standard each time it is calibrated. Prior to this, a default atmospheric pressure of 760 mmHg was used to calibrate the dissolved oxygen % to 100%. The 6136 turbidity probes are given a two-point calibration to 0 NTU using deionized water, and to 123 NTU using YSI standard. Following calibration, a guard is attached to the datalogger to protect the probes. A piece of plastic mesh is placed in the bottom of the guard and another one is attached to the outside of the guard to discourage any creatures from getting to the probes and to minimize fouling. The sondes are then programmed to begin recording data at 03:59:00 AM morning of deployment. Data are collected by sondes at 30-minute intervals. They are wrapped in white towels and placed in a 5-gallon bucket with water to sit overnight. The D.O. probe is re-calibrated before deployment and the sonde is checked to ensure that the instrument is working properly.

During deployment and retrieval of the sondes, measurements of dissolved oxygen concentrations and percent saturation, as well as salinity and temperature, are taken at the sites using a hand-held YSI 85 instrument.

YSI 6600 EDS dataloggers are deployed on the same piling within a five-inch diameter PVC tube with a locking cap. In order to maintain constant depth, the dataloggers are clamped to a PVC pipe and lowered into the tube, relinquishing the need for diving. Large holes are cut in the tube where the probes are located to insure adequate circulation. Every two to three weeks the dataloggers are retrieved, downloaded, cleaned, and inspected. Freshly calibrated units are deployed at the same time, resulting in little or no data gaps in collection intervals.

1. **Site location and character:**

The Central Panhandle Aquatic Preserve Office is located in northwest Florida and is part of the Department of Environmental Protection’s Office of Coastal and Aquatic Managed Areas (CAMA). The Preserve is responsible for the management of three Aquatic Preserves in Franklin and Gulf Counties. These include Alligator Harbor Aquatic Preserve (14,366 acres), Apalachicola Bay Aquatic Preserve (80,000 acres), and St. Joseph Bay Aquatic Preserve (73,000 acres).

St. Joseph Bay Aquatic Preserve is located in Gulf County along Highway 98 near the community of Port St. Joe, in Florida’s Northwest Panhandle approximately 35 miles southeast of Panama City and approximately 100 miles southwest of Tallahassee. St. Joseph Bay is bound on the eastern shoreline by the city of Port St. Joe and St. Joseph Bay State Buffer Preserve lands and on the west by the St. Joseph Peninsula and St. Joseph Peninsula State Park. The Bay is approximately 15 miles long north to south, with a maximum width of 6 miles, and opens north to the Gulf of Mexico, thru a relatively narrow opening. St. Joseph Bay Aquatic Preserve covers approximately 73,000 acres along the northern coast of the Gulf of Mexico. St. Joseph Bay is unique in being the only body of water in the eastern Gulf of Mexico that is not influenced by the inflow of fresh water. Because of this, these coastal waters tend to be clearer with sandier sediments than in the north central Gulf of Mexico. These conditions make the bay ideal habitat for the growth of lush seagrass communities. Much of the productivity of the region is attributed to the near shore saltmarsh and seagrass habitats that serve as nursery and foraging grounds for a variety of commercial and recreational fish and invertebrate species, sea turtles, scallops and birds. Seagrasses cover one-sixth of the bay bottom in St. Joseph Bay and expand approximately 9,669 acres. Salt marsh habitat spans approximately 762 acres.

The Richardson’s Hammock datalogger site in St. Joe Bay is in the southwestern portion of the Bay, furthest from the opening to the Gulf. The datalogger is attached at the end of a dock on state property accessed by car off Cape San Blas Road. This site in the Bay is separated from the Gulf by a very narrow strip of land (Cape San Blas). In the event of a large storm or hurricane it is possible, and has happened in the past, that the Gulf may wash into the Bay at this site. It is important to monitor this area to collect baseline data and, in the event, that the Gulf connects to the Bay at this spot, to monitor the changes that may occur.

The Windmark site in St. Joe Bay is located at the new St. Joe Company development of Windmark in the northeastern part of the Bay. Windmark site is located near where the Gulf waters enter St. Joe Bay. This area is flushed with Gulf water’s daily due to its location.

Alligator Harbor is located on the southeast coast of Franklin County just east of the Apalachicola estuary. The actual harbor is approximately 4,045 acres. Alligator Harbor is a shallow system with rather consistent salinity levels. There is little freshwater flow into the harbor and the rather stable salinity structure does not create the estuarine conditions characteristic of the waterbodies lying to the west. However, the seagrass habitat, oyster bars, beaches, saltmarshes, and bottom communities found associated with Alligator Harbor Aquatic Preserve make it a productive and integral part of the marine ecosystem in the Franklin County area. The datalogger site within Alligator Harbor is located in the southeastern portion of the Harbor at the end of a dock accessible by vehicle or boat when the tide permits (summer). This site was created to record baseline water quality data in Alligator Harbor. The Division of Aquaculture and Consumer Services (DACS) has an additional datalogger located in the central part of the harbor near aquaculture clam leases.

The Apalachicola Bay Aquatic Preserve is located within the Apalachicola National Estuarine Research Reserve boundaries and is located adjacent to the City of Apalachicola. The Reserve has been monitoring water quality through the use of dataloggers in bay since 1992. The Preserve currently does not have dataloggers located in the Apalachicola Preserve.

**Table 1: Station Descriptions**

Station Description information is currently unavailable

1. **Data collection period:**

The dataloggers were first deployed at the Richardson’s Hammock site on July 26th, 2005. Windmark sampling began on August 4th, 2006 and concluded on September 14th, 2007. Alligator Harbor site then started sampling on October 24th, 2007. During the year 2007, deployments utilized YSI 6600 EDS dataloggers. Deployment dates and times for 2007 follows.

# Richardson’s Hammock Station (RH)

BEGAN ENDED

12/22/06 12:30 01/04/07 14:30

01/04/07 15:30 01/19/07 11:00

01/19/07 11:30 02/17/07 09:30

02/19/08 12:00 03/02/07 15:00

03/02/07 15:30 03/16/07 10:00

03/16/07 11:30 03/28/07 11:00

03/28/07 11:30 04/12/07 11:00

04/12/07 12:30 04/26/07 09:00

04/26/07 09:30 05/11/07 11:30

05/11/07 13:00 05/24/07 10:00

05/24/07 10:30 06/06/07 12:00

06/06/07 14:00 06/21/07 10:00

06/21/07 10:30 07/03/07 10:30

07/03/07 11:00 07/19/07 11:30

07/19/07 13:30 08/03/07 09:00

08/03/07 09:30 08/17/07 08:30

08/17/07 10:30 08/31/07 08:30

08/31/07 09:00 09/14/07 10:00

09/14/07 10:30 09/26/07 16:00

09/28/07 09:30 10/12/07 11:30

10/12/07 13:00 10/26/07 11:00

10/26/07 11:30 11/08/07 12:00

11/08/07 12:30 11/21/07 09:00

11/21/07 10:00 12/14/07 11:00

12/14/07 11:30 01/03/08 09:00

# Windmark Station (WM)

BEGAN ENDED

12/22/06 11:30 01/04/07 12:30

01/04/07 14:00 01/19/07 11:00

01/19/07 13:00 02/17/07 03:00

02/19/07 11:00 03/02/07 13:30

03/02/07 14:00 03/16/07 09:00

03/16/07 10:30 03/28/07 11:00

03/28/07 11:30 04/12/07 10:00

04/12/07 12:00 04/26/07 09:30

04/26/07 10:00 05/11/07 09:30

05/11/07 11:30 05/22/07 16:00

05/24/07 10:00 06/11/07 11:00

06/11/07 11:30 06/22/07 13:00

06/22/07 14:30 07/05/07 10:30

07/05/07 11:00 07/19/07 09:30

07/19/07 10:00 08/03/07 10:00

08/03/07 10:30 08/17/07 10:00

08/17/07 11:00 08/31/07 10:00

08/31/07 10:30 09/14/07 09:30

**Alligator Harbor Station (AH)**

BEGAN ENDED

10/24/07 10:30 11/07/07 13:00

11/07/07 15:00 11/20/07 09:30

11/20/07 10:00 12/13/07 09:00

12/13/07 12:30 01/04/07 02:00

1. **Distribution:**

The Principle Investigator (PI) retains the right to be fully credited for having collected and processed the data. Following academic courtesy standards, the PI and Aquatic Preserve (AP) site where the data were collected will be contacted and fully acknowledged in any subsequent publications in which any part of the data are used. 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. Water quality data and metadata can be obtained from the PI (see section 1).

1. **Associated researchers and projects:**

Additional information is currently unavailable

**II. Physical Structure Descriptors**

1. **Sensor specifications**:

### Table 2. YSI 6600 EDS data sonde

Parameter: Temperature

Units: Celsius (C)

Sensor Type: Thermistor

Model #: 6560

Range: -5 to 45 °C

Accuracy: +/-0.15 °C

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 or 0.1 ppt, whichever is greater

Resolution: 0.01 ppt

Parameter: Dissolved Oxygen % saturation

Units: percent air saturation (%)

Sensor Type: Rapid Pulse – Clark type, 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; 200-500 % 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 per Liter (mg/L)

Sensor Type: Rapid Pulse – Clark type, polarographic

Model #: 6562

Range: 0 to 50 mg/L

Accuracy: 0 to 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 (specify whether EDS probe or not)

Units: units

Sensor Type: Glass combination electrode

Model #: 6561

Range: 0 to 14 units

Accuracy: +/- 0.2 units

Resolution: 0.01 units

Parameter: Turbidity

Units: nephelometric turbidity units (NTU)

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

Model #: 6136

Range: 0 to 1000 NTU

Accuracy: +/- 5 % reading or 2 NTU (whichever is greater)

Resolution: 0.1 NTU

Dissolved Oxygen Qualifier: The reliability of the dissolved oxygen (DO) data after 96 hours post-deployment for non-EDS (Extended Deployment System) data sondes may be problematic due to fouling which forms on the DO probe membrane during some deployments (Wenner et al. 2001). Many Aquatic Preserves have upgraded to YSI 6600 EDS data sondes, which increase DO accuracy and longevity by reducing the environmental effects of fouling. The user is therefore advised to consult the metadata and to exercise caution when utilizing the DO data beyond the initial 96-hour time period. However, this potential drift is not always problematic for some uses of the data (e.g., periodicity analysis). It should be noted that the amount of fouling is site specific and that not all data are affected. The Principal Investigator at should be contacted concerning the reliability of the DO data because of the site and seasonal variation in the fouling of the DO sensor.

Depth Qualifier: The water quality monitoring program utilizes YSI data sondes that can be equipped with either depth or water level sensors. Both sensors measure water depth, but by convention, level sensors refer to atmospherically vented measurements and depth refers to non-vented measurements. Standard calibration protocols for the non-vented sensor use the atmosphere pressure at the time of calibration. Therefore, changes in atmospheric pressure between calibrations appear as changes in water depth. The error is equal to approximately 1.03 cm for every 1millibar change in atmospheric pressure. This error is eliminated for level sensors because they are vented to the atmosphere throughout the deployment time interval. If proper atmospheric pressure data is available, non-vented sensor depth measurements can be corrected for deployments between calibrations. Readings for both vented and non-vented sensors are automatically compensated for water density changes due to variations in temperature and salinity. The Principal Investigator should be contacted in order to obtain information regarding atmospheric pressure data availability. All data sondes used at all 6600 sites in 2006 were non-vented models.

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

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

1. **Coded variable definitions:**

Raw file naming protocol: 6-numeral deployment site name/month/date of deployment/ /year (e.g. RH010307 = Richardson’s Hammock deployment beginning January 3, 2007).

Pre-processed file naming protocol: YSI deployment site/month/year (e.g. RH0107 = Richardson’s Hammock data from January 2007).

Site definitions:

Sampling Station: Sampling site code:

Richardson’s Hammock RH

Windmark WM

Alligator Harbor AH

1. **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

1. **QAQC code definitions:**

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

General Errors

 GIC No instrument deployed due to ice

 GIM Instrument malfunction

 GIT Instrument recording error; recovered telemetry data

GMC No instrument deployed due to maintenance/calibration

 GNF Deployment tube clogged / no flow

 GOW Out of water event

 GPF Power failure / low battery

 GQR Data rejected due to QA/QC checks

 GSM See metadata

 Corrected Depth/Level Data Codes

 GCC Calculated with data that were corrected during QA/QC

 GCM Calculated value could not be determined due to missing data

 GCR Calculated value could not be determined due to rejected data

 GCS Calculated value suspect due to questionable data

 GCU Calculated value could not be determined due to unavailable data

Sensor Errors

 SBO Blocked optic

 SCF Conductivity sensor failure

 SCS Chlorophyll spike

 SDF Depth port frozen

 SDG Suspect due to sensor diagnostics

 SDO DO suspect

 SDP DO membrane puncture

 SIC Incorrect calibration / contaminated standard

 SNV Negative value

 SOW Sensor out of water

 SPC Post calibration out of range

 SQR Data rejected due to QAQC checks

 SSD Sensor drift

 SSM Sensor malfunction

 SSR Sensor removed / not deployed

 STF Catastrophic temperature sensor failure

 STS Turbidity spike

 SWM Wiper malfunction / loss

Comments

 CAB\* Algal bloom

 CAF Acceptable calibration/accuracy error of sensor

 CAP Depth sensor in water, affected by atmospheric pressure

 CBF Biofouling

 CCU Cause unknown

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

 CDB\* Disturbed bottom

 CDF Data appear to fit conditions

 CFK\* Fish kill

 CIP\* Surface ice present at sample station

 CLT\* Low tide

 CMC\* In field maintenance/cleaning

 CMD\* Mud in probe guard

 CND New deployment begins

 CRE\* Significant rain event

 CSM\* See metadata

 CTS Turbidity spike

 CVT\* Possible vandalism/tampering

 CWD\* Data collected at wrong depth

CWE\* Significant weather event

1. **Post deployment information:**

End of deployment Post-calibration Readings in Standard Solutions:

# Site RH

Date DO % Salinity (ppt) pH Depth (m) Turbidity (NTU)

 (Std: varies) (Std: 18.3) (Std: 7) (Std: varies) (Std: 0)

01/03/07 103.8 17.84 7.05 0.044 0.0

01/19/07 45.4 19.31 7 0.095 4.7

 (Std: 19.3)

02/19/07 76.8 19.72 7.07 0.125 -3.0

03/02/07 97.1 17.87 7.03 0.072 3.1

03/16/07 96.2 18.81 7.13 -0.036 10.9

03/28/07 105 19.56 6.41 0.074 1.1

04/12/07 108.9 18.19 7.04 0.012 5.3

04/26/07 108.4 18.57 6.19 0.046 -11.3

05/11/07 92.1 20.38 7.39 -0.007 11.6

05/24/07 98.2 18.37 7.21 0.111 11.8

06/06/07 110.3 18.04 7 -0.03 1

06/21/07 88.5 19.08 7.01 0.02 -0.5

07/03/07 106.2 18.58 6.95 0.04 2.5

07/19/07 78.7 18.06 7.41 0.05 -0.2

08/03/07 136.2 19.55 7.11 0.03 0.9

08/17/07 67.7 20.67 7.14 0.05 -6.2

08/31/07 85.2 18.97 7.05 -0.003 0.4

09/14/07 OOR\* 18.85 7.41 0.05 0.7

09/28/07 109.7 19.39 6.79 0.06 -1.9

10/12/07 107.5 19.5 7.19 0.03 4.3

10/26/07 100.4 19.19 7.74 0.05 -0.4

11/08/07 102.7 18.84 6.77 0.24 1.6

11/21/07 103.6 20.42 7.05 0.09 -1.5

12/14/07 105.3 18.52 7.03 -0.02 2

01/03/08 111.7 19.4 6.95 0.25 -0.1

# Site WM

Date DO % Salinity (ppt) pH Depth (m) Turbidity (NTU)

 (Std: 100%) (Std: 18.3) (Std: 7) (Std: varies) (Std: 0)

01/03/07 107.9 17.75 7.13 0.045 -0.1

01/19/07 98.4 17.8 7.08 0.090 6.2

 (Std: 19.3)

02/19/07 106.3 19.01 6.19 0.110 -2.0

03/02/07 107.6 101.62\* 6.90 0.070 -5.5

03/16/07 81.7 19.31 7.20 -0.024 -3.3

03/28/07 97.7 19.78 6.81 0.100 -3.9

04/12/07 84.5 17.75 7.35 0.000 1.0

04/26/07 60.9 17.35 7.33 0.048 1.3

05/11/07 92.6 19.29 7.28 -0.012 3.3

05/24/07 101.2 17.98 6.56 0.105 3.8

06/11/07 100.3 17.75 7.52 0.010 0.4

06/22/07 88.7 20.68 6.99 0.090 -1.2

07/05/07 99.6 18.49 7.10 0.030 -0.8

07/19/07 92.4 18.61 7.11 0.050 -1.3

08/03/07 110.7 19.10 7.33 -0.090 1.6

08/17/07 105.7 18.76 7.04 0.050 -1.6

08/31/07 OOR\* 18.23 7.81 -0.040 1.6

09/14/07 75.3 17.98 7.09 0.050 2.0

# Site AH

Date DO % Salinity (ppt) pH Depth (m) Turbidity (NTU)

 (Std: 100%) (Std: 19.3) (Std: 7) (Std: varies) (Std: 0)

11/7/07 136.2 18.80 7.01 0.082 0.3

11/20/07 109.3 18.69 7.41 0.087 1.7

12/13/07 100.3 19.34 7.23 0.083 1.0

01/04/07 97.3 18.60 7.07 0.135 0.3

OOR = out of range

\*Did not post-calibrate and/or probe error.

1. **Other remarks/notes:**

**Missing Data**

Data are missing due to equipment or associated specific probes not being deployed, equipment failure, time of maintenance or calibration of equipment, or repair/replacement of a sampling station platform. Any NANs in the dataset stand for “not a number” and are the result of low power, disconnected wires, or out of range readings. If additional information on missing data is needed, contact the Principal Investigator.

**January 1-31, 2007**

**RH**

1. Data missing due to deployment/retrieval of instrument.

01/04/07 15:00

**WM**

1. Data missing due to deployment/retrieval of instrument.

01/04/07 13:00 – 13:30

01/19/07 11:30 – 12:30

1. Data missing due to programmed to record every 14 hours.

 01/19/07 13:30 – 01/20/07 02:30

 01/20/07 03:30 – 16:30

 01/20/07 17:30 – 01/21/07 06:30

 01/21/07 07:30 – 20:30

 01/21/07 21:30 – 01/22/07 10:30

 01/22/07 11:30 – 01/23/07 00:30

 01/23/07 01:30 – 14:30

 01/23/07 15:30 – 01/24/07 04:30

 01/24/07 05:30 – 18:30

 01/24/07 19:30 – 01/25/07 08:30

 01/25/07 09:30 – 22:30

 01/25/07 23:30 – 01/26/07 12:30

 01/26/07 13:30 – 01/27/07 02:30

 01/27/07 03:30 – 16:30

 01/27/07 17:30 – 01/28/07 06:30

 01/28/07 07:30 – 20:30

 01/28/07 21:30 – 01/29/07 10:30

 01/29/07 11:30 – 01/30/07 00:30

 01/30/07 01:30 – 14:30

 01/30/07 15:30 – 01/31/07 04:30

 01/31/07 05:30 – 18:30; 19:30 – 23:30

**February 1-28, 2007**

**RH**

1. Data missing due to deployment length exceeding data recording time span.

 02/17/07 10:00 – 02/19/07 11:30

**WM**

1. Data missing due to programmed to record every 14 hours.

 02/01/07 00:00 – 08:30

 02/01/07 09:30 – 23:00

 02/02/07 00:00 – 12:30

 02/02/07 13:30 – 02/03/07 02:30

 02/03/07 03:30 – 16:30

 02/03/07 17:30 – 02/04/07 06:30

 02/04/07 07:30 – 20:30

 02/04/07 21:30 – 02/05/07 10:30

 02/05/07 11:30 – 02/06/07 00:30

 02/06/07 01:30 – 14:30

 02/06/07 15:30 – 02/07/07 04:30

 02/07/07 05:30 – 18:30

 02/07/07 19:30 – 02/08/07 08:30

 02/08/07 09:30 – 22:30

 02/08/07 23:30 – 02/09/07 12:30

 02/09/07 13:30 – 02/10/07 02:30

 02/10/07 03:30 – 02/10/07 16:30

 02/10/07 17:30 – 02/11/07 06:30

 02/11/07 07:30 – 20:30

 02/11/07 21:30 – 02/12/07 10:30

 02/12/07 11:30 – 02/13/07 00:30

 02/13/07 01:30 – 14:30

 02/13/07 15:30 – 02/14/07 04:30

 02/14/07 05:30 – 02/14/07 18:30

 02/14/07 19:30 – 02/15/07 08:30

 02/15/07 09:30 – 22:.30

 02/15/07 23:30 – 02/16/07 12:30

 02/16/07 13:30 – 02/17/07 02:30

1. Data missing due to battery failure.

02/17/07 03:30 – 02/19/07 10:30

**March 1-31, 2007**

**RH**

1. Data missing due to deployment/retrieval of instrument.

 03/16/07 10:30 – 11:00

**WM**

1. Data missing due to deployment/retrieval of instrument.

 03/16/07 09:30 – 10:00

**April 1-30, 2007**

**RH**

1. Data missing due to deployment/retrieval of instrument.

 04/12/07 11:30 – 12:00

**WM**

1. Data missing due to deployment/retrieval of instrument.

 04/12/07 10:30 – 11:30

**May 1-31, 2007**

**RH**

1. Data missing due to deployment/retrieval of instrument.

 05/11/07 12:00 – 12:30

**WM**

1. Data missing due to deployment/retrieval of instrument.

05/11/07 10:00 – 11:00

1. Data missing due to battery failure.

05/22/07 16:30 – 05/24/07 09:30

**June 1-31, 2007**

**RH**

1. Data missing due to deployment/retrieval of instrument.

 06/06/07 12:30 – 13:30

**WM**

1. Data missing due to deployment/retrieval of instrument.

 06/22/07 13:30 – 14:00

**July 1-31, 2007**

**RH**

1. Data missing due to deployment/retrieval of instrument.

 07/19/07 12:00 – 13:00

**August 1-31, 2007**

**RH**

1. Data missing due to deployment/retrieval of instrument.

08/17/07 09:00 – 10:00

1. All data missing because datalogger was pulled out of the water for deployment site maintenance for the following date(s)/time(s).

08/28/07 12:30

**WM**

1. Data missing due to deployment/retrieval of instrument.

 08/17/07 10:30

**September, 2007**

**RH**

* 1. Depth, pH, and turbidity data missing for the following dates/times due to sonde malfunction.

09/26/07 16:30

* 1. Data missing for the following dates/times due to sonde malfunction.

09/26/07 17:00 – 09/28/07 09:00

**October 1-31, 2007**

**RH**

1. Data missing due to deployment/retrieval of instrument.

 10/12/07 12:00 – 12:30

**November 1-30, 2007**

**RH**

1. Data missing due to deployment/retrieval of instrument.

11/21/07 09:30

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

**Anomalous/Suspect data:**

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

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

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

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

**Note #5:** All times in data files at all sites had to be adjusted post-deployment; more specifically, times were altered such that the readings occurred on the hour and half hour. It has been determined that this clock error is a software issue and has been resolved.

**January 1-31, 2007**

**RH**

1. All depth data for the entire deployment considered suspect due to tube detaching from piling and slipping. Depth of sonde altered due to the tube’s temporary fix. Depth readings are 0.5m shallower than other deployments. Add 0.5m from depth readings from this deployment.

01/04/07 15:30 – 01/19/07 11:00

1. All DO (% sat and mg/L) for the entire deployment considered suspect due to readings not characteristic of the site based on historical data, possible drift at end of deployment, and low DO (% sat) reading at post-calibration. Possible red tide event.

01/04/07 15:30 – 01/19/07 11:00

**March 1-31, 2007**

**WM**

1. All DO (% sat and mg/L) for the entire deployment considered suspect due to readings not characteristic of the site based on historical data and compared to proceeding deployment.

 03/02/07 14:00 – 03/16/07 09:00

**April 1-30, 2007**

**RH**

1. Negative turbidity data throughout entire deployment considered good data because it falls within probes range of error.

04/01/07 00:00 – 04/12/07 11:00

1. pH data for entire deployment considered suspect due to possible probe error or calibration error. Deployment readings are significantly lower compared to end of previous deployment and start of next deployment.

04/12/07 12:30 – 04/26/07 09:00

**WM**

1. High turbidity value(s) for the following date(s)/time(s) are considered suspect. This/these single spike(s) represents a departure from the turbidity readings directly before and after this point in time, nor is this reading characteristic of the site based on historical data.

04/06/07 15:00 – 04/12/07 10:00;

04/13/07 00:00;

04/13/07 19:00 – 04/17/07 21:30

04/26/07 07:30

**May 1-31, 2007**

**RH**

1. Low DO (% sat and mg/L) data for the following deployment considered suspect due to possible probe error or calibration error. Deployment readings are significantly lower compared to start of next deployment.

 05/01/07 00:00 – 05/11/07 11:30

1. Negative turbidity data throughout entire month considered suspect but good data because they fall within probes range of error.

 05/01/07 00:00 – 05/31/07 19:00

1. Salinity and conductivity data for the following dates/times considered suspect. Significant decrease between end of last deployment and start of this deployment.

 05/11/07 13:00 – 05/14/07 11:00

**WM**

1. High DO (% sat and mg/L) data for the following dates/times considered suspect. Readings not characteristic of this site based on historical data and compared to preceding deployment and rest of this deployment. High calibration reading at pre-calibration.

 05/11/07 11:30 – 05/12/07 13:30

1. Low pH data considered suspect for length of deployment due to possible probe error or calibration error. Significant drop between this deployment and surrounding deployments.

 05/11/07 11:30 – 05/22/07 16:00

**June 1-30, 2007**

**RH**

1. Negative turbidity data throughout entire month considered suspect but good data because they fall within probes range of error. 06/01/07 00:00 – 06/30/07 23:30

**WM**

1. Low DO (% sat and mg/L) data for the entire deployment considered suspect due to reading not characteristic of the site based on historical data and compared to surrounding deployments.

 06/11/07 11:30 – 06/22/07 13:00

1. High turbidity value(s) for the following date(s)/time(s) are considered suspect. This/these single spike(s) represents a departure from the turbidity readings directly before and after this point in time, nor is this reading characteristic of the site based on historical data.

06/07/07 09:00;

06/19/07 21:30

**July 1-31, 2007**

**RH**

* 1. Salinity data for the following dates/times considered suspect due to possible probe error of calibration error. Significant increase between this deployment and end of last deployment.

 07/19/07 13:30 – 07/31/07 23:30

* 1. Negative turbidity data throughout entire month considered suspect but good data because they fall within probes range of error.

 07/01/07 00:00 – 07/31/07 23:30

**August 1-31, 2007**

**WM**

1. High pH readings for the entire deployment considered suspect due to possible probe error or calibration error. Deployment readings are significantly higher compared to end of previous deployment and start of next deployment.

08/17/07 11:00 – 08/31/07 23:30

**September 1-30, 2007**

**RH**

* 1. All dissolved oxygen (% sat and mg/L) data for the entire deployment considered suspect due to DO probe not post-calibrating.

09/01/07 00:00 – 09/14/07 10:00

**October 1-31, 2007**

**RH**

* 1. Dissolved oxygen readings (% and mg/L) considered suspect due to possible drift at end of deployment.

 10/12/07 01:30 – 10/12/07 11:30

**November 1-30, 2007**

**RH**

* 1. Salinity and conductivity data for the following dates/times considered suspect due to possible drift or fouling during deployment.

 11/08/07 12:30 – 11/21/07 09:00

**December 1-31, 2007**

**RH**

* 1. Salinity and conductivity data for the following dates/times considered suspect due to possible calibration or probe error. Significant increase in salinity readings compared with previous deployment.

 12/14/07 11:30 – 12/20/07 23:30

**Rejected Data:**

 Obvious outliers, data associated with probe malfunction, and/or calibration (both pre and post) problems are rejected as specified below. For more details about rejected data, contact the Principal Investigator.

**January 1-31, 2007**

**RH**

* 1. Salinity, conductivity, and temperature data for the following dates/times considered suspect and rejected due to sonde malfunction in conductivity/salinity/temperature port.

01/04/07 15:30 – 01/19/07 11:00

* 1. Temperature data for the entire deployment considered suspect and rejected due to probe malfunction.

01/04/07 15:30 – 01/19/07 11:00

* 1. High turbidity value(s) for the following date(s)/time(s) considered suspect and rejected. This/these single spike(s) represents a departure from the turbidity readings directly before and after this point in time, nor is this reading characteristic of the site based on historical data. Wiper brush may have parked in front of sensor.

01/06/07 7:30 – 01/19/07 11:00

* 1. Negative turbidity value(s) for the following date(s)/time(s) considered suspect and rejected. Out of instrument range.

01/19/07 11:30 – 01/31/07 23:30

**WM**

1. Low salinity and conductivity data for the following dates/times considered suspect and rejected. This/these single spike(s) represents a departure from the turbidity readings directly before and after this point in time, nor is this reading characteristic of the site based on historical data.

01/04/07 17:30 – 18:00

01/07/07 16:00

1. All turbidity data for the following dates/times considered suspect and rejected due to likely drift due to biological fouling or wiper parking over optic sensor. This/these single spike(s) represents a departure from the turbidity readings directly before and after this point in time, nor is this reading characteristic of the site based on historical data.

01/06/07 10:00 – 01/19/07 11:00

**February 1-28, 2007**

**RH**

* 1. Negative turbidity value(s) for the following date(s)/time(s) considered suspect and rejected. Out of instrument range.

02/01/07 00:00 – 02/17/07 09:30

 02/19/07 12:00 – 02/28/07 23:30

**WM**

* 1. Salinity, conductivity, and temperature data for the following dates/times considered suspect and rejected due to sonde malfunction in conductivity/salinity/temperature port.

 02/19/07 11:00 – 02/28/07 23:30

* 1. All DO (% sat and mg/L) data for the entire deployment considered suspect and rejected due to high readings not characteristic of the site based on historical data. Also, pre-calibration reading was high.

 02/20/07 07:30 – 02/28/07 23:30

* 1. All turbidity data considered suspect and rejected due to likely drift due to biological fouling or wiper parking over optic sensor. This/these single spike(s) represents a departure from the turbidity readings directly before and after this point in time, nor is this reading characteristic of the site based on historical data. Negative readings out of probes range of error.

02/02/07 13:00

02/19/07 11:00 – 02/28/07 23:30

**March 1-31, 2007**

**RH**

* 1. pH data for the entire deployment considered suspect and rejected due to broken pH bulb.

03/02/07 15:30 – 03/16/07 10:00

* 1. High turbidity value(s) for the following date(s)/time(s) considered suspect and rejected. This single spike represents a departure from the turbidity readings directly before and after this point in time, nor is this reading characteristic of the site based on historical data.

03/24/07 13:30

**WM**

* 1. Salinity, conductivity, and temperature data for the following dates/times considered suspect and rejected due to sonde malfunction in conductivity/salinity/temperature port.

 03/01/07 00:00 – 03/02/07 13:30

* 1. All DO (% sat and mg/L) data for the entire deployment considered suspect and rejected due to high readings not characteristic of the site based on historical data. Also, pre-calibration reading was high.

 03/01/07 00:00 – 03/02/07 13:30

* 1. All turbidity data considered suspect and rejected due to likely drift due to biological fouling or wiper parking over optic sensor. This/these single spike(s) represents a departure from the turbidity readings directly before and after this point in time, nor is this reading characteristic of the site based on historical data. Negative readings out of probes range of error.

 03/01/07 00:00 – 03/02/07 13:30;

 03/04/07 09:30 – 03/16/07 09:00;

 03/23/07 02:00;

 03/24/07 16:30

**April 1-30, 2007**

**RH**

* 1. Salinity, conductivity, and temperature data for the following dates/times considered suspect and rejected due to sonde malfunction in conductivity/salinity/temperature port.

 4/12/07 12:30 – 04/26/07 09:00

* 1. Negative DO (% sat and mg/L) value(s) for the following date(s)/time(s) considered suspect and rejected. Out of instrument range.

 04/27/07 18:00 – 18:30

* 1. High turbidity value(s) for the following date(s)/time(s) considered suspect and rejected. This/these single spike(s) represents a departure from the turbidity readings directly before and after this point in time, nor is this reading characteristic of the site based on historical data.

 04/15/07 02:00, 13:00-13:30, 17:00 –17:30, 19:30

* 1. Negative turbidity value(s) for the following date(s)/time(s) considered suspect and rejected. Out of instrument range.

 04/12/07 12:30 – 04/26/07 09:00

**WM**

1. High DO (% sat and mg/L) data for the entire deployment considered suspect and rejected due to high readings not characteristic of the site based on historical data and compared to surrounding deployments.

04/12/07 12:00 - 04/26/07 09:30

**May 1-31, 2007**

**WM**

* 1. Salinity, conductivity, and temperature data for the following dates/times considered suspect and rejected due to sonde malfunction in conductivity/salinity/temperature port.

 05/11/07 11:30 – 05/22/07 16:00

**June 1-30, 2007**

**WM**

* 1. High turbidity value(s) for the following date(s)/time(s) considered suspect and rejected. This/these single spike(s) represents a departure from the turbidity readings directly before and after this point in time, nor is this reading characteristic of the site based on historical data.

 06/04/07 20:00;

 06/05/07 14:00;

 06/09/07 06:30, 19:30;

 06/11/07 02:00, 09:00

**July 1-31, 2007**

**WM**

* 1. High and sporadic turbidity value(s) for the following date(s)/time(s) considered suspect and rejected. This/these single spike(s) represents a departure from the turbidity readings directly before and after this point in time, nor is this reading characteristic of the site based on historical data.

 07/01/07 01:00 – 07/03/07 01:30;

 07/15/07 20:30, 22:00;

 07/16/07 06:30

**August 1-31, 2007**

**RH**

* 1. High turbidity value(s) throughout this deployment considered suspect and rejected. This/these single spike(s) represents a departure from the turbidity readings directly before and after this point in time, nor is this reading characteristic of the site based on historical data. Wiper brush may have parked over sensor.

 08/03/07 09:30 - 08/17/07 08:30

**WM**

* 1. High turbidity value(s) for the following date(s)/time(s) considered suspect and rejected. This/these single spike(s) represents a departure from the turbidity readings directly before and after this point in time, nor is this reading characteristic of the site based on historical data.

 08/16/07 01:30;

 08/21/07 23:30

* 1. All dissolved oxygen data (% and mg/L) for length of deployment considered suspect and rejected due to possible drift or probe malfunction during deployment and probe not post calibrating.

 08/17/07 11:00 – 08/31/07 10:00

**September 1-30, 2007**

**WM**

* 1. High and sporadic turbidity value(s) for the following date(s)/time(s) considered suspect and rejected. This/these single spike(s) represents a departure from the turbidity readings directly before and after this point in time, nor is this reading characteristic of the site based on historical data.

 09/13/07 09:00 – 09/14/07 09:30

**October 1-31, 2007**

**RH**

* 1. High turbidity value(s) for the following date(s)/time(s) considered suspect and rejected. This/these single spike(s) represents a departure from the turbidity readings directly before and after this point in time, nor is this reading characteristic of the site based on historical data.

 10/04/07 04:00

 10/07/07 00:00

 10/26/07 20:00

**AH**

* 1. All data rejected due to low tide-induced out of water event(s).

 10/25/07 05:00 – 08:00

 10/26/07 06:30 – 10:00

 10/27/07 06:00 – 12:00

 10/28/07 07:00 – 12:30

 10/29/07 07:30 – 14:00

 10/30/07 09:00 – 14:30

 10/31/07 11:00 – 14:00

**November 1-30, 2007**

**AH**

* 1. All data rejected due to low tide-induced out of water event(s).

 11/01/07 12:00 – 15:00

 11/07/07 05:00 – 08:00

 11/08/07 07:30 – 09:00

 11/09/07 09:00 – 09:30

 11/10/07 08:00 – 11:00

 11/11/07 09:00 – 11:30

 11/12/07 10:00 – 11:00

 11/13/07 10:30 – 11:00

 11/14/07 11:00 – 12:30

 11/15/07 14:00 – 14:30

 11/16/07 10:00 – 15:30

 11/23/07 05:00 – 09:30

 11/24/07 05:30 – 10:30

 11/25/07 07:00 – 10:00

 11/26/07 09:00 – 11:00

 11/27/07 08:30 – 13:30

 11/28/07 09:00 – 13:30

 11/29/07 11:30 – 12:30

**December 1-31, 2007**

**RH**

* 1. High turbidity value(s) for the following date(s)/time(s) considered suspect and rejected. This/these single spike(s) represents a departure from the turbidity readings directly before and after this point in time, nor is this reading characteristic of the site based on historical data.

 12/04/07 00:30 – 01:00; 02:00; 06:00

**AH**

* 1. All data rejected due to low tide-induced out of water event(s).

 12/04/07 03:30 – 06:30

 12/06/07 06:00 – 07:30

 12/07/07 06:00 – 07:30

 12/08/07 06:30 – 09:30

 12/09/07 07:00 – 10:00

 12/10/07 07:00 – 10:30

 12/11/07 07:30 – 11:00

 12/12/07 08:30 – 11:30

 12/13/07 09:00 – 12:00

 12/14/07 09:30 – 13:00

 12/16/07 12:30 – 14:00; 23:30

 12/17/07 00:00 – 05:30; 11:30 – 14:30

 12/20/07 04:00 – 06:30

 12/21/07 06:00 – 07:00

 12/22/07 05:00 – 09:30

 12/23/07 06:30 – 09:30

 12/24/07 06:30 – 12:00

 12/25/07 07:30 – 12:00

 12/26/07 08:30 – 12:00