Tijuana River (TJR) NERR Water Quality Metadata
January to December 2011
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I. Data Set and Research Descriptors

1) Principal Investigators and contact persons


Jeff Crooks, Research Coordinator
301 Caspian Way
Imperial Beach, CA 91932
Phone: (619) 575-3613
Fax: (619) 575-6913
E-mail: jcrooks@trnerr.org

Clay Phillips, Reserve Manager
301 Caspian Way
Imperial Beach, CA 91932
Phone: (619) 575-3613
Fax: (619) 575-6913
E-mail: cphillip@parks.ca.gov

Holly Bellringer, Research Associate
301 Caspian Way
Imperial Beach, CA 91932
Phone: (619) 575-3613
Fax: (619) 575-6913
E-mail:hbellringer@trnerr.org


2) Entry Verification

Deployment data are uploaded from the YSI datasonde to a Personal Computer (IBM compatible). Files are exported from EcoWatch in a comma-delimited format (.CDF) and uploaded to the CDMO where they undergo automated primary QAQC 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 at least 2 hours of pre- and post-deployment data retained to assist in data management. During primary QAQC, data are flagged if they are missing, out of sensor range. The edited file is then returned to the Reserve where it is opened in Microsoft Excel and processed using the CDMO's NERRQAQC Excel macro. The macro inserts station codes, creates metadata worksheets for flagged data, and graphs the data for review. It allows the user to apply QAQC flags and codes to the data, remove remaining pre- and post-deployment data, append files, and export the resulting data file to the CDMO for tertiary QAQC and assimilation into the CDMO's authoritative online database. Where deployment overlap occurs between files, the data produced by the newly calibrated datasonde is generally accepted as being the most accurate. For more information on QAQC flags and codes, see Sections 11 and 12. The person responsible for data management is Holly Bellringer.

3) Research Objectives

The Tijuana River National Estuarine Research Reserve is impacted heavily by periodic raw sewage outflows and urban development. About a quarter of the reserve's 2,531 acres are tidally influenced and few channels are deep enough for datalogger deployment. Two stations were originally set up: a treatment station was set up close to the mouth on the Southern end of the Oneonta Slough, while a control station was set up on the northern end of Oneonta Slough. The treatment station location was chosen because it would be the site most affected by sewage outflow. Deployment at the treatment station, however, was continually halted by both shifting sediment and massive wracks of kelp (*Macrocystis pyrifera*), which would often bury the deployment set-up on incoming tides. After a number of different deployment equipment designs were implemented, with no success, logging at this site was terminated.

Two YSI datalogger stations are installed at the Tijuana River reserve and two datalogger stations are located off the reserve. Station locations are designed to investigate spatial gradients of water quality parameters across the reserve as well as document the water quality changes over time to areas in the reserve which have been restored to increase tidal flushing. The original control station in the northern end of Oneonta Slough is still in place. The second station was located at the inlet to the Model Marsh, a constructed 20-acre restoration site in the southern arm of the estuary. The Model Marsh was opened to tidal flushing in February 2000 and data logging at the station began in October 2000**.** The site was discontinued in January 2008 due to heavy sedimentation. A second datalogger, Boca Rio, was established in December 2004 and is located near the mouth of the Tijuana River. This station replaces the River Channel station, which was established in August 2002 to monitor the Tijuana River, the largest source of freshwater to the Reserve. This station was discontinued in November 2004 due to unusually heavy sedimentation from intense rainfall events. The South Bay datalogger was established in January 2008 and is located at the mouth of Otay River which flows into San Diego Bay. The last sonde location, Pond Eleven, is a salt pond adjacent from the South Bay logger. The Pond Eleven sonde was deployed from July 2008 to September 2010. The US Fish and Wildlife Service began a restoration of this salt pond in September 2010 and finished in October 2011. Sonde deployments began in January 2012 at a new location within Pond Eleven. The South Bay and Pond Eleven sites are not located in the reserve boundary.

4) Research Methods (Dataloggers)

Dataloggers at the Oneonta Slough, Boca Rio, South Bay, and Pond Eleven stations are deployed using a 4-inch diameter PVC pipe that is strapped vertically to two "rail" style fence posts driven into the sediment. Multiple 1.5 inch holes have been drilled around the bottom of the tube to permit unrestricted water flow to the sensors. During deployment the datalogger units are then placed into and rest on a bolt fixed across the bottom of the tubes.

The sampling period is between two and four weeks, with measurements taken every 15 minutes. Measurements for specific conductivity, salinity, dissolved oxygen (percent

saturation), dissolved oxygen (mg/l), temperature, turbidity, pH, chlorophyll and water level are recorded. At the end of each sampling period, the YSI dataloggers are brought back to the laboratory for data downloading, cleaning and recalibration. They are usually redeployed in the field within 24 hours. These procedures are carried out according to the methods described in the YSI Operations Manual (see sections 3 and 7). Calibration standards for specific conductivity are purchased from the Aurical Company, turbidity is purchased from YSI, and pH standards (7 and 10) are purchased from Clarkson Scientific, a local supplier. The QA/QC procedures for the collected data are followed from the CDMO Operations Manual version 6.3.

A Sutron Sat-Link2 transmitter was installed at the Oneonta Slough station on 12/20/2006 and transmits data to the NOAA GOES satellite, NESDIS ID #3B0252F2. The transmissions are scheduled hourly and contain four (4) datasets reflecting fifteen minute data sampling intervals. The telemetry data is "Provisional" data and not the "Authentic" dataset used for long term monitoring and study. This data can be viewed by going to http://cdmo.baruch.sc.edu.

5) Site location and character

**General site Characteristics (TRNERR)**

a) Tidal exchange (extremes): approx. -2 +7 MLLW,
b) Salinity: 4 ppt (extreme rain events) to 38 ppt (except Pond Eleven and South Bay)
c) Latitude and longitude: 32 deg. 34 min. N, 117 deg. 07 min. W
d) Potential impacts include runoff from the adjacent military airfield and residential area and sewage spills from Mexico into the Tijuana River. Approximately 2/3 of the watershed for the Tijuana River estuary is in Mexico. Vegetation in the area is dominated by common pickleweed (*Salicornia virginica*) and Pacific cordgrass *(Spartina foliosa*).
e) The dominant freshwater source to the estuary is the Tijuana River, which drains a 4,483 sq. km watershed. Stream flows in the river vary considerably from season to season and year to year with no flow during many months with a mean annual discharge of .82 cubic meters per second (cms). Additional freshwater sources are storm drains located mostly in the northern arm of the estuary. The entire estuary is shallow and has a relatively small tidal prism (0.36 $Mm^3$) so even low freshwater flows result in reduced salinity throughout the reserve. Estimated residence times for freshwater entering the estuary vary from 7 hours to a few days depending on the tide and mouth conditions. Rainfall within the watershed accounts for most of the freshwater entering the reserve with 90% of the mean annual rainfall falling between November and April. Freshwater discharges with untreated sewage occur year round, although these have decreased with the construction of binational water treatment plant.

**Specific Site Characteristics**

Boca Rio (BR)

a) Orientation of site: Datalogger station is located approximately 300 meters north of the Tijuana River mouth in the middle of a channel running north to south. Latitude is 32 deg 33 min 34.3 sec N, longitude is 117 deg 06 min 43.7 sec W. Channel width is approximately 20 meters.

b) Tidal range: approximately 2m
c) Salinity range: 0 to 37 ppt
d) Fresh water input is predominately urban runoff, from the US and Mexico, during rain events.
e) Depth: approximately 0 to 2m
f) Bottom type: Predominately sand with little mud.
g) Pollutants are those associated with urban runoff from the US and Mexico, agricultural runoff and
h) sewage spills. No specific data is available as to type or quantity.
i) Watershed draining site: The area surrounding the estuary is heavily developed with residential housing as is the watershed which drains into the estuary. Approximately 2/3 of the watershed is in Mexico. The North Eastern section of the reserve is bordered by a military helicopter training base. Vegetation in the area is dominated by common pickleweed (Salicornia virginica) and Pacific cordgrass (Spartina foliosa).

Oneonta Slough (OS)

a) Orientation of site: The Datalogger station is located on the upper portion of Oneonta Slough approximately 1km from mouth. The channel runs North to South and is located on the northwestern edge of the reserve. Latitude is 32 deg 34 min 05.84 sec N, longitude is 117 deg 07 min 52.57 sec W. Channel width is approximately 20 meters.
b) Tidal range: approximately 1.6m
c) Salinity range: 0 to 38 ppt
d) Freshwater input is predominately urban runoff, from the US, during rain events. No flow data is available.
e) Depth: approximately 0 to 1.6m; directly below the datalogger, is approx. 0.55m below Mean Sea Level
f) Bottom type: Sand and sediment.
g) Pollutants are those associated with urban runoff from the US, agricultural runoff and sewage spills. No specific data is available as to type or quantity.
h) Watershed draining site: The area surrounding the estuary is heavily developed with residential housing as is the watershed which drains into the estuary. Approximately 2/3 of the watershed is in Mexico. The North Eastern section of the reserve is bordered by a military helicopter training base. Vegetation in the area is dominated by common pickleweed (Salicornia virginica) and Pacific cordgrass (Spartina foliosa).

South Bay (SB)

a) Orientation of site: The datalogger is located at the mouth of Otay River where it flows into San Diego Bay. Latitude is 32 deg 36 min 0.49 sec N, longitude is 117 deg 06 min 56.49 sec W. Channel width is approximately 15m
b) Tidal range: approximately 2.5m
c) Salinity range: 1 to 55 ppt
d) Freshwater input: Runoff and the Otay River
e) Depth: approximately 0 to 2.5m
f) Bottom type: very fine mud.
g) Pollutants are those associated with urban and agricultural runoff. No specific data is available as to type or quantity.
h) Watershed draining site: The Otay River watershed encompasses 160 sq/mi of San Diego County and discharges into San Diego Bay. The South Bay datalogger is located at the confluence of the Otay River and South San Diego Bay.

6) Data Collection period

YSI model 6600 EDS dataloggers were used to collect data for the following dates and times.

Boca Rio

| Deployment Date | Deployment Time | Retrieval Date | Retrieval Time |
|---|---|---|---|
| 12/7/2010 | 16:00 | 1/5/2011 | 14:45 |
| 1/5/2011 | 15:00 | 2/3/2011 | 16:00 |
| 2/3/2011 | 16:15 | 3/4/2011 | 15:00 |
| 3/4/2011 | 15:15 | 3/30/2011 | 13:00 |
| 3/30/2011 | 13:15 | 4/26/2011 | 11:00 |
| 4/26/2011 | 11:15 | 5/23/2011 | 7:30 |
| 5/23/2011 | 7:45 | 6/20/2011 | 6:45 |
| 6/20/2011 | 7:00 | 7/18/2011 | 6:15 |
| 7/18/2011 | 6:45 | 8/3/2011 | 6:15 |
| 8/3/2011 | 6:30 | 9/27/2011 | 15:00 |
| 9/27/2011 | 15:15 | 10/24/2011 | 14:30 |
| 10/24/2011 | 15:00 | 11/22/2011 | 13:45 |
| 11/22/2011 | 14:00 | 12/9/2011 | 14:15 |
| 12/9/2011 | 14:45 | 1/11/2011 | 16:15 |

Oneonta Slough

| Deployment Date | Deployment Time | Retrieval Date | Retrieval Time |
|---|---|---|---|
| 12/6/2010 | 15:45 | 1/5/2011 | 15:15 |
| 1/5/2011 | 15:30 | 2/3/2011 | 14:15 |
| 2/3/2011 | 14:30 | 3/4/2011 | 14:30 |
| 3/4/2011 | 14:45 | 3/30/2011 | 13:15 |
| 3/30/2011 | 13:30 | 4/26/2011 | 10:15 |
| 4/26/2011 | 10:30 | 5/23/2011 | 8:00 |
| 5/23/2011 | 8:15 | 6/20/2011 | 7:15 |
| 6/20/2011 | 7:30 | 7/18/2011 | 7:30 |
| 7/18/2011 | 7:45 | 8/3/2011 | 6:30 |
| 8/3/2011 | 6:45 | 9/12/2011 | 14:15 |
| 9/12/2011 | 14:30 | 9/26/2011 | 14:45 |
| 9/26/2011 | 15:15 | 10/24/2011 | 13:30 |
| 10/24/2011 | 14:15 | 11/22/2011 | 13:00 |
| 11/22/2011 | 13:15 | 12/9/2011 | 13:30 |
| 12/9/2011 | 13:45 | 1/10/2012 | 15:00 |

South Bay

| Deployment Date | Deployment Time | Retrieval Date | Retrieval Time |
|---|---|---|---|
| 12/6/2010 | 15:00 | 1/5/2011 | 16:00 |
| 1/5/2011 | 16:30 | 2/3/2011 | 15:15 |
| 2/3/2011 | 15:30 | 3/2/2011 | 14:15 |

| | | | |
|---|---|---|---|
| 3/2/2011 | 14:30 | 3/30/2011 | 14:15 |
| 3/30/2011 | 14:30 | 4/28/2011 | 9:15 |
| 4/28/2011 | 9:45 | 5/23/2011 | 8:45 |
| 5/23/2011 | 9:00 | 6/21/2011 | 7:15 |
| 6/21/2011 | 7:30 | 7/18/2011 | 8:15 |
| 7/18/2011 | 8:30 | 8/3/2011 | 7:15 |
| 8/3/2011 | 7:30 | 8/30/2011 | 13:15 |
| 8/30/2011 | 13:30 | 9/26/2011 | 13:30 |
| 9/26/2011 | 13:45 | 10/24/2011 | 12:45 |
| 10/24/2011 | 13:00 | 11/22/2011 | 11:00 |
| 11/22/2011 | 11:15 | 12/9/2011 | 13:30 |
| 12/9/2011 | 13:45 | 1/10/2012 | 15:00 |

Pond Eleven

Sonde was not deployed in 2011

## 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

The research program at the TRNERR focuses on adaptive approaches to wetlands management, which involves coupling scientific investigation with management action. One focal area of research continues to be adaptive restoration, and the TRNERR has a long history of science-based restoration efforts. These programs incorporate descriptive and experimental approaches to investigate biotic and abiotic responses to marsh restoration, including ways to better achieve desired ecosystem responses. Two SWMP sites, based in South San Diego Bay, are associated with planned restoration of salt ponds in that area. Another active area of research is invasive species ecology and management. Although estuaries are typically invaded by a broad suite of species from many habitat types, current research is focusing on terrestrial and riparian invaders able to cross ecotones and invade salt marsh habitats. Researchers at the TRNERR are investigating mechanisms of invasions, impacts of invaders, and ecosystem recovery after exotic species control.

NERR SWMP water quality and weather data are used in a variety of reserve-based and external research and education programs. Water quality data from the Tijuana River, which rarely experiences mouth closure, provides an interesting contrast to data from other regional systems, which experience frequent closure events. Also, SWMP water quality data are incorporated into a high school curriculum developed at the reserve. Tier 1 nutrient sampling is being conducted at all water quality datalogger stations. NERR SWMP meteorological sampling is being conducted at 1 station which is located near the former Tidal Linkage water quality station. In addition, much of the reserve is used as a test bed for research related to adaptive marsh restoration, with recent attention on the Model Marsh.

## II. Physical Structure Descriptors

### 9) Sensor Specifications

YSI 6600EDS V2-4 datasondes were used at Oneonta Slough, South Bay and Pond Eleven. These datasondes had depth, temperature/conductivity, ROX, pH, turbidity, and chlorophyll probes. The Boca Rio site utilized an YSI 6600 EDS V2-2 datasonde with temperature/conductivity, rapid pulse DO, pH and turbidity probes.

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: Temperature
Units: Celsius (C)
Sensor Type: Thermistor
Model #: 6560
Range: -5 to 50C
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: Dissolved Oxygen % saturation
Units: percent air saturation (%)
Sensor Type: Optical probe w/ mechanical cleaning
Model#: 6150 ROX
Range: 0 to 500% air saturation
Accuracy: 0-200% air saturation: +/- 1% of the reading or 1% air saturation, whichever is greater
200-500% air saturation: +/- 15% of reading
Resolution: 0.1% air saturation

Parameter: Dissolved Oxygen mg/L (Calculated from % air saturation, temperature and salinity)
Units: milligrams/Liter (mg/L)
Sensor Type: Optical probe w/ mechanical cleaning
Model#: 6150 ROX
Range: 0 to 50 mg/L
Accuracy: 0-20 mg/L: +/-0.1 mg/l or 1% of the reading, whichever is greater
20 to 50 mg/L: +/- 15% of the reading
Resolution: 0.01 mg/L

Parameter: pH
Units: units
Sensor Type: Glass combination electrode
Model #: 6561 or 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 ° scatter, with mechanical cleaning
Model #: 6136
Range: 0 to 1000 NTU
Accuracy: +/- 5 % reading or 2 NTU (whichever is greater)
Resolution: 0.1 NTU

Parameter: Chlorophyll
Units: micrograms/Liter
Sensor Type: Optical probe w/mechanical cleaning
Model #: 6025
Range: 0 to 400 µg/Liter
Accuracy: Dependent on methodology
Resolution: 0.1 µg/Liter 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.

**Chlorophyll Fluorescence Disclaimer:**

YSI chlorophyll sensors (6025 or 599102-01) are designed to serve as a proxy for chlorophyll concentrations in the field for monitoring applications and complement traditional lab extraction methods; therefore, there are accuracy limitations associated with the data that are detailed in the YSI manual including interference from other fluorescent species, differences in calibration method, and effects of cell structure, particle size, organism type, temperature, and light on sensor measurements.

10) Coded variable definitions

| Sampling Station Name | Sampling Site Code | Station Code |
|---|---|---|
| Boca Rio | BR | tjrbrwq |
| Oneonta Slough | OS | tjroswq |
| Pond Eleven | PE | tjrpewq |
| South Bay | SB | tjrsbwq |

**11) QAQC flag definitions**

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

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

## 12) QAQC code definitions

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

General Errors

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

Corrected Depth/Level Data Codes

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

Sensor Errors

| | |
|---|---|
| SBO | Blocked optic |
| SCF | Conductivity sensor failure |
| SCS | Chlorophyll spike |
| SDF | Depth port frozen |
| SDG | Suspect due to sensor diagnostics |

| | |
|---|---|
| SDO | DO suspect |
| SDP | DO membrane puncture |
| SIC | Incorrect calibration / contaminated standard |
| SNV | Negative value |
| SOW | Sensor out of water |
| SPC | Post calibration out of range |
| SQR | Data rejected due to QAQC checks |
| SSD | Sensor drift |
| SSM | Sensor malfunction |
| SSR | Sensor removed / not deployed |
| STF | Catastrophic temperature sensor failure |
| STS | Turbidity spike |
| SWM | Wiper malfunction / loss |

Comments

| | |
|---|---|
| CAB* | Algal bloom |
| CAF | Acceptable calibration/accuracy error of sensor |
| CAP | Depth sensor in water, affected by atmospheric pressure |
| CBF | Biofouling |
| CCU | Cause unknown |
| CDA* | DO hypoxia (<3 mg/L) |
| CDB* | Disturbed bottom |
| CDF | Data appear to fit conditions |
| CFK* | Fish kill |
| CIP* | Surface ice present at sample station |
| CLT* | Low tide |
| CMC* | In field maintenance/cleaning |
| CMD* | Mud in probe guard |
| CND | New deployment begins |
| CRE* | Significant rain event |
| CSM* | See metadata |

| | |
|---|---|
| CTS | Turbidity spike |
| CVT* | Possible vandalism/tampering |
| CWD* | Data collected at wrong depth |
| CWE* | Significant weather event |

13) Post deployment information

NP = no probe installed
NC = no calibration done
ND= no data
numbers in parentheses are used if standard differs from those stated.

Boca Rio

| Deployment Date | SpCond | RP DO 1 (100% | pH | pH | Turb | Turb | Depth |
|---|---|---|---|---|---|---|---|
| m/d/y | 53 | sat) | (7) | (10) | 0 | 126 | m |
| 12/6/2010 | 50.82 | 82.5 | 7.06 | 9.97 | 1.9 | 119.7 | 0.031 |
| 1/5/2011 | 17.56 | 35 | 7 | 9.13 | 0.8 | 197.6 | 0.09 |
| 2/3/2011 | 46.21 | 93 | 7.13 | 9.86 | 1 | 125.4 | 0.054 |
| 3/4/2011 | 51.57 | 97.9 | 7.13 | 10.09 | 0.3 | 138 | -0.008 |
| 3/30/2011 | 52.23 | 99.4 | 7.09 | 10.1 | 0.1 | 134 | -0.047 |
| 4/26/2011 | 53.35 | 99.7 | 6.94 | 9.9 | 0.2 | 111 | 0.005 |
| 5/23/2011 | 49.13 | 101.4 | 7.13 | 9.93 | 1.3 | 131 | -0.04 |
| 6/20/2011 | 56.44 | 104 | 6.83 | 9.91 | 0.5 | 121.2 | -0.019 |
| 7/18/2011 | 50.77 | 97 | 7.08 | 9.89 | 0.5 | 134 | -0.027 |
| 8/3/2011 | 53.72 | 93.5 | 4.78 | 5.15 | -0.1 | 131 | -0.013 |
| 9/26/2011 | 53.46 | 101.6 | 7.08 | 10.04 | 0.1 | 143.2 | -0.076 |
| 10/24/2011 | 53.65 | 80.5 | 7.22 | 10.07 | 0.2 | 131.7 | 0.059 |
| 11/22/2011 | 52.2 | 109.3 | 6.9 | 9.88 | 0.6 | 123 | 0.034 |
| 12/9/2011 | 19 | | 6.86 | 9.1 | -2 | 133 | |

Oneonta Slough

| Deployment Date | SpCond | ROX DO 1 (100% | pH | pH | Turb | Turb | Depth | Chl |
|---|---|---|---|---|---|---|---|---|
| m/d/y | 53 | sat) | (7) | (10) | 0 | 126 | m | (0) |
| 12/6/2010 | 53.34 | 100.5 | 6.93 | 9.75 | 1.5 | 123.7 | 0.063 | -0.2 |
| 1/5/2011 | 53.9 | 99.9 | 6.97 | 9.89 | 0.6 | 121.5 | 0.126 | -0.3 |
| 2/3/2011 | 51.39 | 99 | 7.07 | 9.73 | 0.4 | 129.4 | 0.053 | -0.1 |
| 3/4/2011 | 52.5 | 100.4 | 7.11 | 10.02 | 1 | 129 | 0 | -0.1 |
| 3/30/2011 | 51.83 | 98.4 | 7.08 | 9.93 | 0.7 | 126.9 | -0.008 | -0.2 |
| 4/26/2011 | 52.54 | 100.1 | 7.12 | 9.94 | 0.5 | 129.3 | 0.026 | 0.3 |
| 5/23/2011 | 52.71 | 99.3 | 7.13 | 10.02 | 0.6 | 116 | -0.046 | 0 |
| 6/20/2011 | 56.57 | 101.6 | 6.9 | 9.78 | 0.1 | 126.6 | -0.014 | 0 |
| 7/18/2011 | 53.28 | 98.9 | 7.09 | 9.94 | 0.6 | 121.9 | -0.024 | -1.1 |

| | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| 8/3/2011 | 53.05 | 98.7 | 6.98 | 9.85 | 0.3 | 121.6 | 0.015 | 0.5 |
| 9/12/2011 | 52.75 | 99 | 7 | 9.95 | 0.4 | 117.7 | -0.004 | 0.04 |
| 9/26/2011 | 53.44 | 99.4 | 6.84 | 9.86 | 1 | 131.2 | 0.045 | |
| 10/24/2011 | 53.22 | 100.1 | 7.04 | 9.85 | 0.6 | 126.6 | 0.055 | 0.9 |
| 11/22/2011 | 53.42 | 100.6 | 6.96 | 9.75 | 2 | 119 | 0.034 | 0 |
| 12/9/2011 | 51.81 | 102.5 | 7.04 | 9.95 | -0.4 | 124.4 | 0.033 | -0.1 |

South Bay

| Deployment Date | SpCond | ROX DO 1 (100% sat) | pH | pH | Turb | Turb | Depth | Chl |
|---|---|---|---|---|---|---|---|---|
| m/d/y | 53 | | (7) | (10) | 0 | 126 | m | (0) |
| 12/6/2010 | 53.73 | 100.4 | 7.02 | 9.9 | 1.4 | 125.6 | 0.06 | -0.4 |
| 1/5/2011 | 50.49 | 101 | 6.86 | 9.12 | 2.4 | 125 | 0.098 | 0.1 |
| 2/3/2011 | 53.72 | 102.2 | 6.99 | 9.87 | 2.8 | 122.8 | 0.07 | 0.3 |
| 3/2/2011 | 48.46 | 0 | 6.93 | 9.77 | 1.3 | 122 | -0.01 | 720.6 |
| 3/30/2011 | 52.59 | 99.4 | 6.92 | 9.93 | 3 | 131 | 0.002 | -0.2 |
| 4/28/2011 | 52.86 | 102.7 | 7.4 | 9.99 | -0.5 | 123.5 | 0.022 | 0.1 |
| 5/23/2011 | 52.99 | 100.5 | 7.12 | 9.98 | -0.1 | 121 | -0.049 | -0.2 |
| 6/20/2011 | 56.44 | 99.7 | 6.98 | 9.92 | 0.3 | 124.4 | -0.021 | -0.3 |
| 7/18/2011 | 53.6 | 99 | 7.06 | 9.92 | 0.7 | 124.3 | -0.022 | -0.1 |
| 8/3/2011 | 52.19 | 96.9 | 6.92 | 9.6 | 3.5 | 47 | -0.057 | 3 |
| 8/30/2011 | 45.53 | 97.4 | 6.97 | 9.99 | 0 | 124.3 | -0.017 | 0.3 |
| 9/26/2011 | 53.32 | 99 | 6.74 | 9.8 | -0.1 | 129.5 | -0.079 | |
| 10/24/2011 | 53.39 | 100.4 | 7.11 | 9.83 | 1.4 | 123.6 | 0.06 | |
| 11/22/2011 | 17 | 26.6 | 6.92 | 9.08 | 1.6 | 184 | 0.034 | 0.5 |
| 12/9/2011 | 51.56 | 99.6 | 7.25 | 9.83 | 1.9 | 121.8 | 0.033 | 0.6 |

Pond Eleven

Sonde was not deployed in 2011

14) Other Remarks

Data are missing due to equipment or associated specific probes not being deployed, equipment failure, time of maintenance or calibration of equipment, or repair/replacement of a sampling station platform. If additional information on missing data is needed, contact the Research Coordinator at the reserve submitting the data.

From mid-August to the end of September depth data at BR and OS is elevated compared to the rest of the year. There was a large swell that occurred at the river mouth that affected both BR and OS. This was primarily seen in the depth data.

From 8/2 1:15 to 8/20 11:00 at SB all parameters and specifically SpCond and salinity data were affected by restoration going on near the site. This sonde is placed in the middle of the Otay River but there are levees that separate it from adjacent salt ponds that were undergoing restoration. During this time there was probably water release from the salt ponds which had very high salinity levels. Pre restoration Pond Eleven salinity was between 50-70 ppt. I believe the metadata was updated for 2012 and included a picture of

pre and post restoration showing the new Pond Eleven Restored site.  You can at least get an idea of the work that was done.

b) Precipitation Data observed at the Tijuana River Estuary Reserve (mm) - Data is provisional and has not undergone final QAQC

Please see 2011 Meteorological data for precipitation events.