

Tijuana River (TJR) NERR Water Quality Metadata
January to December 2009
Last Revised: May 31, 2022

I. Data Set and Research Descriptors

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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. All pre- and post-deployment data are removed from the file prior to upload. During primary QAQC, data are flagged if they are missing or out of sensor range. The edited file is then returned to the Reserve for secondary QAQC where it is opened in Microsoft Excel and processed using the CDMO's NERRQAQC Excel macro. The macro inserts station codes, creates metadata worksheets for flagged data and summary statistics, and graphs the data for review. It allows the user to apply QAQC flags and codes to the data, remove any overlapping deployment data, append files, and export the resulting data file 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. 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. 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 datalogger is located adjacent to the South Bay datalogger in a salt pond, Pond Eleven. This site was established in July 2008. The South Bay and Pond Eleven sites are not located on the reserve.

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 6.2.

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 Mm³) 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 1.8m
- c) Salinity range: 0 to 36 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 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*).

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 1.7m
- 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 1.7m; 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 2.7m
- c) Salinity range: 1 to 41 ppt
- d) Freshwater input: Runoff and the Otay River
- e) Depth: approximately 0 to 2.7m
- 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.

Pond Eleven (PE)

- a) Orientation of site: The datalogger is located on the eastern edge of the pond, approximately 6m from the shoreline at latitude 32 deg 35 min 46.03 N and longitude 117 deg 07 min 05.59 sec W. Channel width is approximately 15m.
- b) Tidal range: approximately 0.8m
- c) Salinity range: 43 to 54 ppt
- d) Freshwater input: Runoff and the Otay River
- e) Depth: approximately 0.1 to 0.9m
- 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: Pond eleven is a salt evaporation pond adjacent to the Otay River. The Pond Eleven datalogger receives input from a tide gate located along the Otay River. The Otay River watershed encompasses 160 sq/mi of San Diego County and discharges into San Diego Bay.

6) Data Collection period

YSI model 6600 EDS dataloggers were used to collect data for the following dates and times. Both ROX and Rapid pulse DO probes were used. With SB, PE and OS exclusively using ROX probes. BR used rapid pulse probes and ROX intermittently. Those deployments that used a rapid pulse probe are designated with an asterisk (*).

Boca Rio

Deployment Date	Deployment Time	Retrieval Date	Retrieval Time
12/11/2008	14:30	1/20/2009	12:15

1/20/2009*	12:30	2/4/2009	12:15
2/4/2009	12:30	2/23/2009	15:00
2/23/2009*	15:15	3/11/2009	15:15
3/11/2009	15:30	4/2/2009	10:45
4/2/2009*	11:00	4/20/2009	11:30
4/20/2009	12:00	5/5/2009	13:45
5/5/2009*	14:00	5/28/2009	7:30
5/28/2009	7:45	6/11/2009	6:45
6/11/2009*	7:00	6/27/2009	7:15
6/27/2009	7:30	7/11/2009	6:45
7/11/2009*	7:00	7/24/2009	6:15
7/24/2009	6:30	8/19/2009	14:15
8/19/2009*	14:30	9/17/2009	13:30
9/17/2009	13:45	10/16/2009	14:45
10/16/2009*	15:00	11/3/2009	15:45
11/3/2009	16:00	12/2/2009	15:45
12/2/2009*	16:00	12/30/2009	15:45
12/31/2009*	15:00	2/1/2010	16:30

Oneonta Slough

Deployment Date	Deployment Time	Retrieval Date	Retrieval Time
12/11/2008	15:00	1/20/2009	11:15
1/21/2009	13:45	2/4/2009	11:45
2/5/2009	13:15	2/23/2009	14:30
2/24/2009	15:30	3/11/2009	15:30
3/12/2009	15:00	4/1/2009	9:00
4/2/2009	10:45	4/19/2009	12:30
4/20/2009	13:15	5/4/2009	12:30
5/5/2009	13:30	5/28/2009	8:15
5/29/2009	9:15	6/11/2009	7:15
6/12/2009	8:15	6/27/2009	9:00
6/28/2009	10:15	7/11/2009	7:15
7/12/2009	6:45	7/24/2009	6:45
7/25/2009	6:45	8/19/2009	15:00
8/20/2009	16:30	9/16/2009	14:00
9/17/2009	15:30	10/15/2009	12:30
10/16/2009	13:45	11/2/2009	13:15
11/3/2009	15:30	12/2/2009	15:15
12/3/2009	16:00	12/30/2009	15:15
12/31/2009	14:00	2/1/2010	16:00

Pond Eleven

Deployment Date	Deployment Time	Retrieval Date	Retrieval Time
12/11/2008	16:00	1/6/2009	12:00
1/7/2009	13:15	2/4/2009	11:00
2/5/2009	12:45	2/23/2009	14:00

2/24/2009	16:15	3/12/2009	12:00
3/13/2009	15:00	4/1/2009	8:30
4/2/2009	10:15	4/19/2009	12:00
4/20/2009	12:45	5/4/2009	11:45
5/5/2009	13:00	5/28/2009	8:45
5/29/2009	8:30	6/11/2009	7:45
6/12/2009	7:45	6/27/2009	8:00
6/28/2009	8:00	7/11/2009	8:00
7/12/2009	7:30	7/24/2009	7:30
7/25/2009	7:30	8/19/2009	10:15
8/20/2009	15:00	9/16/2009	13:15
9/17/2009	14:45	10/15/2009	13:00
10/16/2009	14:15	11/2/2009	14:00
11/3/2009	15:00	12/2/2009	14:15
12/2/2009	14:30	12/30/2009	14:30
12/30/2009	14:45	2/1/2010	15:15

South Bay			
Deployment Date	Deployment Time	Retrieval Date	Retrieval Time
12/11/2008	15:45	1/6/2009	12:00
1/7/2009	13:00	2/4/2009	10:45
2/5/2009	12:30	2/23/2009	13:45
2/24/2009	16:15	3/12/2009	11:45
3/13/2009	14:45	4/1/2009	8:15
4/2/2009	10:00	4/19/2009	12:00
4/20/2009	12:30	5/4/2009	11:45
5/5/2009	12:45	5/28/2009	8:45
5/29/2009	8:30	6/11/2009	7:45
6/12/2009	7:30	6/27/2009	8:00
6/28/2009	8:00	7/11/2009	7:45
7/12/2009	7:15	7/24/2009	7:15
7/25/2009	7:30	8/19/2009	9:45
8/20/2009	14:15	9/16/2009	13:15
9/17/2009	14:30	10/15/2009	13:00
10/16/2009	14:15	11/2/2009	14:00
11/3/2009	15:00	12/2/2009	14:15
12/3/2009	16:30	12/30/2009	14:30
12/30/2009	14:45	2/1/2010	16:45

7) Distribution

NOAA/ERD 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. Following academic courtesy standards, the PI and NERR site where the data were collected will be contacted and fully

acknowledged in any subsequent publications in which any part of the data are used. Manuscripts resulting from this NOAA/OCRM supported research that are produced for publication in open literature, including refereed scientific journals, will acknowledge that the research was conducted under an award from the Estuarine Reserves Division, Office of Ocean and Coastal Resource Management, National Ocean Service, National Oceanic and Atmospheric Administration. The data set enclosed within this package/transmission is only as good as the quality assurance and quality control procedures outlined by the enclosed metadata reporting statement. The user bears all responsibility for its subsequent use/misuse in any further analyses or comparisons. The Federal government does not assume liability to the Recipient or third persons, nor will the Federal government reimburse or indemnify the Recipient for its liability due to any losses resulting in any way from the use of this data.

NERR water quality data and metadata can be obtained from the Research Coordinator at the individual NERR site (please see Principal Investigators and Contact Persons), from the Data Manager at the Centralized Data Management Office (please see personnel directory under the general information link on the CDMO home page) and online at the CDMO home page <http://cdmo.baruch.sc.edu/>. Data are available in text tab-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 turbidity, ROX, and Chlorophyll probes. The Boca Rio site utilized an YSI 6600 EDS V2-2. A turbidity and rapid pulse DO probe was used at the Boca Rio site.

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

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.

During the original calibration depth at all four sites was calibrated to zero. This error was realized in 2013. The depth was corrected for each deployment period by using the depth offset calculated from recorded barometric pressure in the calibration logs. The correction was automated in Microsoft Excel by using a lookup table which contained the start date and time, end date and time and depth offset for each deployment period. The depth offset was added to the depth to obtain the corrected depth.

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	tjrswbq

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

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

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

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

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

General Errors

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

Corrected Depth/Level Data Codes

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

Sensor Errors

SBO	Blocked optic
SCF	Conductivity sensor failure
SDF	Depth port frozen
SDG	Suspect due to sensor diagnostics
SDO	DO suspect
SDP	DO membrane puncture
SIC	Incorrect calibration / contaminated standard
SNV	Negative value
SOW	Sensor out of water
SPC	Post calibration out of range
SQR	Data rejected due to QAQC checks
SSD	Sensor drift
SSM	Sensor malfunction
SSR	Sensor removed / not deployed
STF	Catastrophic temperature sensor failure
STS	Turbidity spike
SWM	Wiper malfunction / loss

Comments

CAB*	Algal bloom
CAF	Acceptable calibration/accuracy error of sensor
CAP	Depth sensor in water, affected by atmospheric pressure
CBF	Biofouling
CCU	Cause unknown
CDA*	DO hypoxia (<3 mg/L)
CDB*	Disturbed bottom

CDF	Data appear to fit conditions
CFK*	Fish kill
CIP*	Surface ice present at sample station
CLT*	Low tide
CMC*	In field maintenance/cleaning
CMD*	Mud in probe guard
CND	New deployment begins
CRE*	Significant rain event
CSM*	See metadata
CTS	Turbidity spike
CVT*	Possible vandalism/tampering
CWD*	Data collected at wrong depth
CWE*	Significant weather event

13) Post deployment information

NP = no probe installed

NC = no calibration done

ND= no data

numbers in parentheses are used if standard differs from those stated.

Site	Date	SpCond (53)	DO %	pH (7)	pH (10)	Turb (0 NTU)	Turb (123 NTU)
Boca Rio	1/20/2009	52.33	97.00	7.06	9.78	8.30	134.70
	2/4/2009	51.82	97.50	7.05	10.06	1.00	111.70
	2/23/2009	51.19	100.40	7.03	9.94	1.90	129.60
	3/11/2009	53.12	78.30	7.06	10.04	1.70	121.90
	4/2/2009	52.70	100.30	7.09	9.96	1.30	120.80
	4/20/2009	53.19	50.2*	7.02	9.97	-3.70	115.00
	5/5/2009	52.74	100.10	7.15	10.05	0.30	120.30
	5/28/2009	53.41	99.10	7.01	10.02	-0.10	118.00
	6/11/2009	53.16	99.20	7.03	10.01	2.30	118.70
	6/27/2009	52.93	99.00	7.10	10.04	1.20	123.70
	7/11/2009	52.80	98.70	7.08	9.96	0.80	123.00
	7/24/2009	52.39	94.80	NP	NP	1.60	128.80
	8/19/2009	52.74	100.00	7.78	10.43	1.80	121.90
	9/17/2009	52.58	75.60	7.04	9.85	0.10	130.80
	10/16/2009	52.33	99.20	7.10	10.05	0.10	116.90
	11/3/2009	52.53	75.60	7.15	10.03	0.00	122.00
	12/2/2009	53.32	99.70	7.05	9.98	1.10	121.00
	12/30/2009	52.22	75.40	7.02	10.07	0.70	120.90
	2/1/2010	52.17	80.00	7.04	9.84	1.80	122.50

Site	Date	SpCond (53)	DO %	pH (7)	pH (10)	Turb (0 NTU)	Turb (123 NTU)
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Oneonta
Slough

1/20/2009	53.59	99.80	7.07	9.92	3.90	123.90
2/4/2009	53.38	97.00	7.07	9.96	0.30	121.00
2/23/2009	52.68	102.00	6.99	9.99	2.10	114.70
3/11/2009	52.83	100.00	7.04	10.05	-2.30	122.70
4/1/2009	52.93	100.20	6.97	9.92	6.60	120.40
4/19/2009	53.32	98.10	7.03	10.01	-0.30	116.90
5/4/2009	53.71	99.10	7.15	10.05	0.10	119.50
5/28/2009	52.78	99.30	7.05	9.99	0.50	119.60
6/11/2009	51.93	100.10	7.07	10.00	1.10	119.00
6/27/2009	53.58	98.60	7.01	9.98	2.70	122.50
7/11/2009	53.02	99.70	7.04	10.01	1.70	120.00
7/24/2009	53.18	101.40	7.05	10.02	0.90	125.20
8/19/2009	53.10	102.00	7.03	9.99	1.80	121.80
9/16/2009	53.07	97.10	7.09	9.94	0.50	126.90
10/15/2009	52.52	101.40	7.08	9.97	0.80	113.20
11/2/2009	53.07	100.10	7.00	9.89	0.90	125.10
12/2/2009	53.50	100.00	7.10	10.10	1.40	123.60
12/30/2009	53.50	100.20	7.04	10.13	0.60	120.20
2/1/2010	51.96	99.00	7.06	9.91	3.40	125.00

Site	Date	SpCond (53)	DO %	pH (7)	pH (10)	Turb (0 NTU)	Turb (123 NTU)
Pond Eleven	1/6/2009	53.12	100.40	7.02	9.88	-2.40	116.00
	2/4/2009	52.49	99.80	7.22	10.15	-4.00	122.00
	2/23/2009	53.85	100.50	7.04	9.95	-1.60	120.20
	3/12/2009	54.11	100.40	7.09	10.04	0.20	121.10
	4/1/2009	52.41	100.30	7.04	10.02	2.30	121.00
	4/19/2009	52.70	99.90	7.10	10.02	-0.40	120.80
	5/4/2009	53.27	99.40	7.09	10.03	3.10	123.10
	5/28/2009	52.39	99.90	7.07	10.00	0.50	122.00
	6/11/2009	54.22	102.70	7.03	10.04	0.10	124.20
	6/27/2009	53.23	99.70	7.12	10.08	2.50	123.00
	7/11/2009	53.00	99.40	7.05	9.96	-0.60	119.80
	7/24/2009	52.55	100.50	7.03	10.01	1.90	121.80
	8/19/2009	53.82	100.30	7.03	9.93	-1.90	116.00
	9/16/2009	53.29	99.90	6.96	9.89	0.20	124.50
	10/15/2009	52.94	100.50	7.17	10.06	-0.80	118.20
	11/2/2009	53.52	99.20	7.13	9.96	-1.20	131.10
	12/2/2009	52.95	100.20	7.04	9.98	2.20	125.50
	12/30/2009	54.00	101.00	7.19	10.28	-0.70	132.00
	2/1/2010	52.66	99.40	ND	ND	0.90	125.40

Site	Date	SpCond (53)	DO %	pH (7)	pH (10)	Turb (0 NTU)	Turb (123 NTU)
South Bay	1/6/2009	52.83	100.40	7.11	9.99	-4.00	114.70

2/4/2009	53.28	102.90	7.19	9.69	0.50	122.00
2/23/2009	53.60	102.50	7.06	9.93	1.00	125.30
3/12/2009	52.88	100.90	7.09	10.08	1.70	122.70
4/1/2009	52.41	99.50	7.15	9.84	4.40	123.20
4/19/2009	52.70	100.10	7.05	10.03	0.60	123.30
5/4/2009	53.92	100.20	7.09	9.95	0.60	113.00
5/28/2009	52.37	99.80	7.04	10.01	0.60	110.70
6/11/2009	53.14	100.30	6.87	9.92	-0.20	120.00
6/27/2009	52.80	100.80	7.06	9.88	-0.70	119.60
7/11/2009	52.91	99.20	7.00	9.88	0.60	120.90
7/24/2009	52.89	100.30	7.09	10.03	0.00	122.40
8/19/2009	52.14	99.30	7.04	9.94	-2.20	122.00
9/16/2009	53.04	100.30	6.95	9.79	-1.80	100.40
10/15/2009	52.94	100.20	7.07	9.96	0.70	113.30
11/2/2009	52.89	99.30	6.94	9.87	-0.90	118.50
12/2/2009	52.50	100.40	7.24	10.12	1.40	124.20
12/30/2009	52.89	101.20	7.26	10.06	0.30	123.00
2/2/2009	52.46	99.20	7.32	9.07	0.80	101.30

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. 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.

During the original calibration depth at all four sites was calibrated to zero. This error was realized in 2013. The depth was corrected for each deployment period by using the depth offset calculated from recorded barometric pressure in the calibration logs. The correction was automated in Microsoft Excel by using a lookup table which contained the start date and time, end date and time and depth offset for each deployment period. The depth offset was added to the depth to obtain the corrected depth.

Rain events and river flow primarily occur in the winter and early spring months. This can cause a decrease in conductivity and salinity. Turbidity will also be increased.

During the deployment including dates 4/11 to 4/19 specific conductivity and salinity were affected by a rain event at all four sites. Please see precipitation and flow data below.

Deployment 12/11/08-1/20/09 (1/1/09-1/20/09) at the BR and OS sites sondes were out for six weeks. Due to these sites being affected by sewage runoff after rain events it is not advisable to retrieve equipment until after the river has stopped flowing. Please see flow information below.

Depth Corrections:

In 2009 depth data were originally calibrated using an offset of 0 instead of an offset based on the barometric pressure for the day. Because the barometric pressure was recorded for each deployment the reserve was able to correct depth using this information. All depth data at all sites were corrected in 2009.

BR

9/8/09-9/15/09 – high turbidity readings were due to a large amount of kelp around and under the sonde holder.

Boca Rio and Oneonta Slough

These two sites are affected by rain and river flow events. This data is provided below. It is apparent when reviewing data when rain occurs due to lowered salinity, high turbidity and possibly low dissolved oxygen. Low dissolved oxygen can occur due to sewage that is flowing. These two events can occur simultaneously or river flow data can occur alone due to a breach in the water treatment plant which will release sewage.

Pond Eleven

Pond Eleven is a semi closed system that periodically receives water from the Otay River through a flood gate. It is not tidally influenced although will be affected by rain events causing lowered salinity and high turbidity.

South Bay

This sonde is situated in the Otay River and will be affected by rain events causing lowered salinity, high turbidity which could cause an increase of sediment in the holder lowering dissolved oxygen.

River Flow data is provided by the International Boundary Water Commission

IBWC Flow Gauge <http://www.ibwc.state.gov/wad/DDQTJRIB.HTM>

Date	m ³ /s
01/01/2009	0.81
01/02/2009	0.73
01/03/2009	0.66
01/04/2009	0.56
01/05/2009	0.76
01/06/2009	0.96
01/07/2009	1.03
01/08/2009	0.85

01/09/2009	0.77
01/10/2009	0.86
01/11/2009	0.97
01/12/2009	0.89
01/13/2009	0.76
01/14/2009	0.67
01/15/2009	0.82
01/16/2009	0.40
01/17/2009	0.13
01/18/2009	0.14
01/19/2009	0.16
01/20/2009	0.09
01/21/2009	0.12
01/22/2009	0.12
01/23/2009	0.52
01/24/2009	0.63
01/25/2009	0.63
01/26/2009	0.68
01/27/2009	0.72
01/28/2009	0.69
01/29/2009	0.34
01/30/2009	0.32
01/31/2009	0.27
02/01/2009	0.40
02/02/2009	0.52
02/03/2009	0.33
02/04/2009	0.18
02/05/2009	0.33
02/06/2009	1.81
02/07/2009	7.45
02/08/2009	2.67
02/09/2009	5.38
02/10/2009	3.12
02/11/2009	2.90
02/12/2009	2.25
02/13/2009	2.12
02/14/2009	2.20
02/15/2009	1.28
02/16/2009	8.57
02/17/2009	2.23
02/18/2009	2.55
02/19/2009	1.59
02/20/2009	1.34
02/21/2009	1.55
02/22/2009	1.37
02/23/2009	1.54

02/24/2009	1.24
02/25/2009	1.19
02/26/2009	1.26
02/27/2009	1.48
02/28/2009	1.51
03/01/2009	1.59
03/02/2009	1.27
03/03/2009	0.88
03/04/2009	0.18
03/05/2009	0.00
03/06/2009	0.00
03/07/2009	0.00
03/08/2009	0.00
03/09/2009	0.00
03/10/2009	0.00
03/11/2009	0.00
03/12/2009	0.00
03/13/2009	0.00
03/14/2009	0.00
03/15/2009	0.00
03/16/2009	0.00
03/17/2009	0.00
03/18/2009	0.00
03/19/2009	0.00
03/20/2009	0.00
03/21/2009	0.00
03/22/2009	0.00
03/23/2009	0.00
03/24/2009	0.00
03/25/2009	0.00
03/26/2009	0.00
03/27/2009	0.00
03/28/2009	0.00
03/29/2009	0.00
03/30/2009	0.00
03/31/2009	0.00
04/01/2009	0.00
04/02/2009	0.00
04/03/2009	0.00
04/04/2009	0.00
04/05/2009	0.00
04/06/2009	0.00
04/07/2009	0.00
04/08/2009	0.00
04/09/2009	0.00
04/10/2009	0.50

04/11/2009	1.74
04/12/2009	0.61
04/13/2009	0.22
04/14/2009	0.00
04/15/2009	0.00
04/16/2009	0.00
04/17/2009	0.00
04/18/2009	0.00
04/19/2009	0.00
04/20/2009	0.00
04/21/2009	0.00
04/22/2009	0.00
04/23/2009	0.00
04/24/2009	0.00
04/25/2009	0.00
04/26/2009	0.00
04/27/2009	0.00
04/28/2009	0.00
04/29/2009	0.00
04/30/2009	0.00
05/01/2009	0.00
05/02/2009	0.00
05/03/2009	0.00
05/04/2009	0.00
05/05/2009	0.00
05/06/2009	0.00
05/07/2009	0.00
05/08/2009	0.00
05/09/2009	0.00
05/10/2009	0.00
05/11/2009	0.00
05/12/2009	0.00
05/13/2009	0.00
05/14/2009	0.00
05/15/2009	0.00
05/16/2009	0.00
05/17/2009	0.00
05/18/2009	0.00
05/19/2009	0.00
05/20/2009	0.00
05/21/2009	0.00
05/22/2009	0.00
05/23/2009	0.00
05/24/2009	0.00
05/25/2009	0.00
05/26/2009	0.01

05/27/2009	0.01
05/28/2009	0.00
05/29/2009	0.00
05/30/2009	0.00
05/31/2009	0.00
06/01/2009	0.00
06/02/2009	0.00
06/03/2009	0.00
06/04/2009	0.00
06/05/2009	0.00
06/06/2009	0.00
06/07/2009	0.00
06/08/2009	0.00
06/09/2009	0.00
06/10/2009	0.00
06/11/2009	0.00
06/12/2009	0.00
06/13/2009	0.00
06/14/2009	0.00
06/15/2009	0.00
06/16/2009	0.00
06/17/2009	0.00
06/18/2009	0.00
06/19/2009	0.00
06/20/2009	0.00
06/21/2009	0.00
06/22/2009	0.00
06/23/2009	0.00
06/24/2009	0.00
06/25/2009	0.08
06/26/2009	0.35
06/27/2009	0.00
06/28/2009	0.98
06/29/2009	0.94
06/30/2009	0.07
07/01/2009	0.00
07/02/2009	0.00
07/03/2009	0.00
07/04/2009	0.00
07/05/2009	0.00
07/06/2009	0.00
07/07/2009	0.00
07/08/2009	0.00
07/09/2009	0.00
07/10/2009	0.00
07/11/2009	0.00

07/12/2009	0.00
07/13/2009	0.00
07/14/2009	0.00
07/15/2009	0.00
07/16/2009	0.00
07/17/2009	0.00
07/18/2009	0.00
07/19/2009	0.00
07/20/2009	0.00
07/21/2009	0.00
07/22/2009	0.00
07/23/2009	0.00
07/24/2009	0.00
07/25/2009	0.00
07/26/2009	0.00
07/27/2009	0.00
07/28/2009	0.00
07/29/2009	0.00
07/30/2009	0.00
07/31/2009	0.00
08/01/2009	0.00
08/02/2009	0.00
08/03/2009	0.00
08/04/2009	0.00
08/05/2009	0.00
08/06/2009	0.00
08/07/2009	0.00
08/08/2009	0.00
08/09/2009	0.00
08/10/2009	0.00
08/11/2009	0.00
08/12/2009	0.00
08/13/2009	0.00
08/14/2009	0.00
08/15/2009	0.00
08/16/2009	0.00
08/17/2009	0.00
08/18/2009	0.00
08/19/2009	0.00
08/20/2009	0.00
08/21/2009	0.00
08/22/2009	0.00
08/23/2009	0.00
08/24/2009	0.00
08/25/2009	0.00
08/26/2009	0.00

08/27/2009	0.00
08/28/2009	0.00
08/29/2009	0.00
08/30/2009	0.00
08/31/2009	0.00
09/01/2009	0.00
09/02/2009	0.00
09/03/2009	0.00
09/04/2009	0.00
09/05/2009	0.00
09/06/2009	0.00
09/07/2009	0.00
09/08/2009	0.00
09/09/2009	0.00
09/10/2009	0.00
09/11/2009	0.00
09/12/2009	0.00
09/13/2009	0.00
09/14/2009	0.00
09/15/2009	0.00
09/16/2009	0.00
09/17/2009	0.00
09/18/2009	0.00
09/19/2009	0.00
09/20/2009	0.00
09/21/2009	0.00
09/22/2009	0.00
09/23/2009	0.00
09/24/2009	0.00
09/25/2009	0.12
09/26/2009	0.00
09/27/2009	0.00
09/28/2009	0.00
09/29/2009	0.00
09/30/2009	0.00
10/01/2009	0.00
10/02/2009	0.00
10/03/2009	0.00
10/04/2009	0.00
10/05/2009	0.00
10/06/2009	0.00
10/07/2009	0.00
10/08/2009	0.00
10/09/2009	0.00
10/10/2009	0.01
10/11/2009	0.00

10/12/2009	0.00
10/13/2009	0.00
10/14/2009	0.00
10/15/2009	0.00
10/16/2009	0.00
10/17/2009	0.00
10/18/2009	0.00
10/19/2009	0.00
10/20/2009	0.00
10/21/2009	0.00
10/22/2009	0.00
10/23/2009	0.00
10/24/2009	0.00
10/25/2009	0.00
10/26/2009	0.00
10/27/2009	0.00
10/28/2009	0.00
10/29/2009	0.00
10/30/2009	0.00
10/31/2009	0.00
11/01/2009	0.00
11/02/2009	0.00
11/03/2009	0.00
11/04/2009	0.00
11/05/2009	0.00
11/06/2009	0.00
11/07/2009	0.00
11/08/2009	0.00
11/09/2009	0.00
11/10/2009	0.00
11/11/2009	0.00
11/12/2009	0.00
11/13/2009	0.00
11/14/2009	0.00
11/15/2009	0.00
11/16/2009	0.00
11/17/2009	0.01
11/18/2009	0.00
11/19/2009	0.00
11/20/2009	0.00
11/21/2009	0.00
11/22/2009	0.00
11/23/2009	0.00
11/24/2009	0.00
11/25/2009	0.00
11/26/2009	0.00

11/27/2009	0.00
11/28/2009	6.53
11/29/2009	1.47
11/30/2009	0.99
12/01/2009	0.97
12/02/2009	0.61
12/03/2009	0.13
12/04/2009	0.09
12/05/2009	0.23
12/06/2009	0.23
12/07/2009	378.00
12/08/2009	3.98
12/09/2009	1.84
12/10/2009	1.48
12/11/2009	1.60
12/12/2009	3.04
12/13/2009	19.90
12/14/2009	1.90
12/15/2009	1.43
12/16/2009	1.24
12/17/2009	1.10
12/18/2009	1.07
12/19/2009	0.99
12/20/2009	0.93
12/21/2009	0.70
12/22/2009	0.92
12/23/2009	0.48
12/24/2009	0.26
12/25/2009	0.29
12/26/2009	0.01
12/27/2009	0.18
12/28/2009	0.35
12/29/2009	0.13
12/30/2009	0.34
12/31/2009	0.18

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

Date	CumPrcp (mm)
1/4/2009	0.80
1/24/2009	3.80
1/26/2009	0.30
2/6/2009	2.80
2/7/2009	2.30

2/8/2009	23.40
2/9/2009	1.00
2/10/2009	10.90
2/14/2009	1.30
2/17/2009	6.90
2/18/2009	4.60
3/20/2009	0.30
3/23/2009	1.80
4/8/2009	0.30
4/9/2009	0.30
4/11/2009	0.30
4/12/2009	0.30
6/8/2009	0.50
6/20/2009	2.30
12/8/2009	44.45
12/12/2009	5.08
12/13/2009	6.35
12/14/2009	5.59
12/23/2009	1.27
12/31/2009	0.25