Tijuana River (TJR) NERR Water Quality Metadata
January to December 2019
Latest Update: August17, 2021

I. Data Set and Research Descriptors

1) Principal investigator(s) 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

Monica Almeida, Research Assistant
301 Caspian Way
Imperial Beach, CA 91932
Phone: (619) 575-3613
Fax: (619) 575-6913
E-mail: malmeida@trnerr.org

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) , EcoWatch Lite in a comma separated file (CSV) or KOR Software in an Excel File (.XLS) 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. Monica Almeida is responsible for data management.

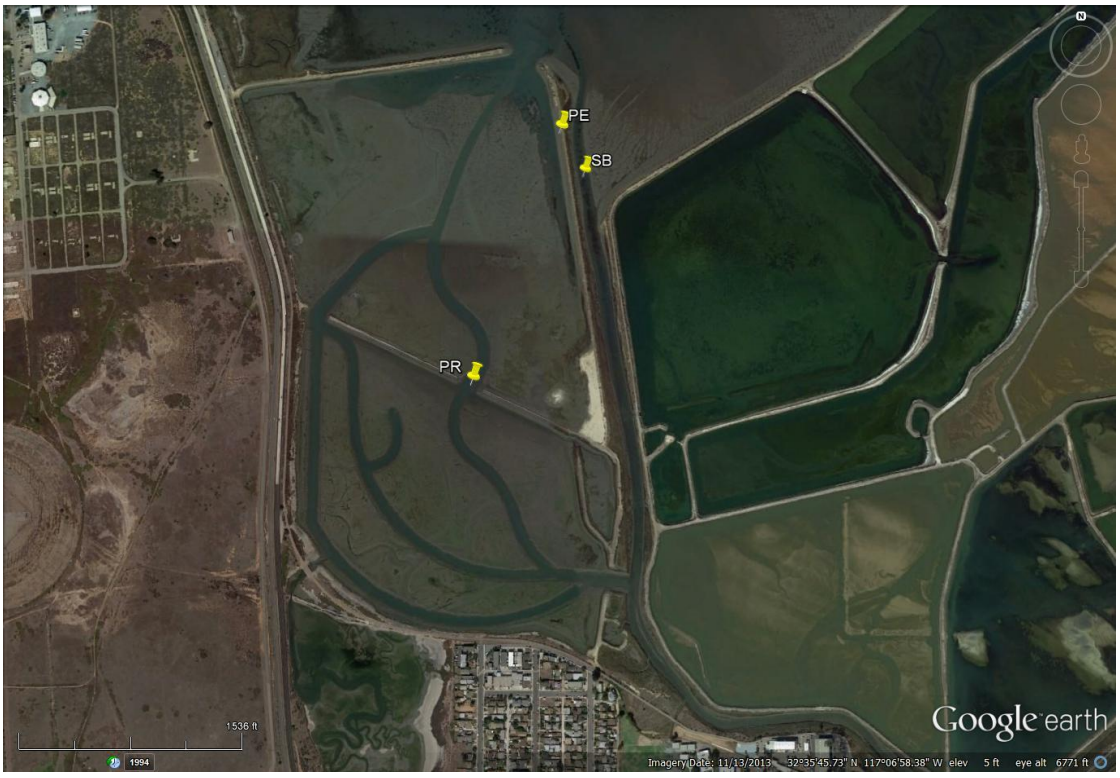
3) Research objectives –

The Tijuana River National Estuarine Research Reserve (TRNERR) is heavily impacted 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 (RC) was set up close to the river mouth on the southern end of the Oneonta Slough, while a control station (OS) 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, without success, logging at this site was terminated in 2004.Currently, there are two YSI datalogger stations installed at the TRNERR and two datalogger stations 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 that have been restored to increase tidal flushing. The original control station (OS) in the northern end of Oneonta Slough is still in place. Another station was located at the inlet to the Model Marsh (MM), 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. The second active datalogger site, Boca Rio (BR), was established in December 2004 and is located near the mouth of the Tijuana River. This station replaces the River Channel station (RC), which was established in August 2002 to monitor the Tijuana River, the largest source of freshwater to the reserve.

The South Bay (SB) datalogger was established in January 2008 and is located at the mouth of Otay River, which flows into South San Diego Bay. The fourth sonde location, Pond Eleven (PE), was located in a non-tidal salt pond adjacent to the South Bay logger. A flood gate was the only source of water into the pond. The Pond Eleven sonde was deployed from July 2008 to September 2010. The US Fish and Wildlife Service began restoration of this area, including Pond Eleven, from September 2010 to its completion in October 2011. Channels were dredged near the Pond Eleven site, the surrounding ponds and the adjacent Otay River. A levee was breached to open Pond Eleven to the bay, which made the area tidal. Due to extensive restoration, the datalogger site was relocated. Sonde deployments began in January 2012 at a new location site named Pond Restored (PR). The Pond Restored datalogger is located approximately 560 meters southwest from where the Pond Eleven datalogger was originally. The South Bay and Pond Restored sites are located within the San Diego National Wildlife Refuge Complex. The images below show pre- and post-restoration of the salt ponds and the datalogger sites. The post restoration photo includes the PE datalogger site as a reference to the new PR datalogger site. No sampling occurs at the PE site.

Pre Restoration

Post Restoration



4) Research methods –

Each datalogger deployment site is comprised of a 4-inch diameter PVC/ABS pipe strapped vertically to either two "rail" style fence posts or a 2-inch diameter galvanized steel pole, depending on the channel substrate (i.e. sand/cobble or silty/clayey sediment), that have been driven into the sediment. Multiple 1.5-inch diameter holes have been drilled around the bottom length of the PVC pipe to permit unrestricted water flow to the sensors. Upon deployment, the datalogger is placed into and rests on a bolt fixed across the bottom of the pipe.

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 (except at Boca Rio and Oneonta Slough) and water level are recorded. Prior to deployment, each sensor is calibrated with its associated calibration standard(s)/method in the laboratory.

At the end of each sampling period, the YSI dataloggers are brought back to the laboratory for data downloading, cleaning and recalibration. 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 (50mS/cm) and turbidity (126 NTU) are purchased from YSI, and pH standards (7 and 10) are purchased from Fisher Scientific. Chlorophyll probes, which were only deployed at Pond Restored and South Bay which are 6-series sondes, are calibrated in Type 1 reagent water (zero) filtered in house. The QA/QC procedures for the collected data are followed from the CDMO Operations Manual version 6.6 – February 2015.

In the field, concurrent with the datalogger's deployment, the YSI ProDSS multiparameter water quality meter is used to collect data for comparison. Parameters such as specific conductivity, salinity, DO (percent saturation and mg/l), temperature and barometric pressure, are measured and recorded. Once a month, the handheld meter is calibrated in the specific conductivity standard (50mS/cm) and 100% oxygen saturated water before each use. Once a year the optical DO probe is replaced..

In 2015, Tijuana River (TJR) NERR started to report level data. In January and February, datalogger holders were surveyed using the Spectra Precision Epoch real-time kinematic (RTK) GPS and calculations were done to find the correct depth offset. In December of 2017, Boca Rio and Oneonta Slough sondes were resurveyed after cleaning the logger holder and switching from YSI 6-series sondes to YSI EXO2. In all surveys, RTK GPS data used the NAD_1983_2011_StatePlane_California_VI_FIPS_0406 (meters) projected coordinate system, NAVD88 vertical datum (meters), and GEOID 12A model. Each datalogger specific offset is found in the Specific Site characteristics section of this document.

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. (where #3B0252F2 is the GOES ID for that particular station.) The transmissions are scheduled hourly and contain four (4) data sets reflecting fifteen minute data sampling intervals. Upon receipt by the CDMO, the data undergoes the same automated primary QAQC process detailed in Section 2 above. The "real-time" telemetry data become part of the provisional dataset until undergoing secondary and tertiary QAQC and assimilation into the CDMO's authoritative online database. Provisional and authoritative data are available at http://cdmo.baruch.sc.edu.

The following sites reported level (m). The methodology for reporting level is included in the table below.

Site Name	Boca Rio
Site infrastructure description	Datalogger is deployed in a PVC/ABS holder strapped vertically to two "rail" style fence posts driven into a sand (with some silt and clay) substrate
Surveying equipment	Spectra Precision Epoch50 real-time kinematic (RTK) GPS

Survey monument used	TJR NERR local benchmarks installed by a contractor company and leveled to the NGS reference benchmark U 1305 (PID - DC1330)
Survey occupation date	January 27, 2015
Survey occupation duration	Approx. 10 minutes
Ellipsoid height	-35.028 (from top of battery cap)
"Quick Check" marker for deployment tube	Mark on the pole
"Quick Check" for sonde being deployed at the same location	Sonde rest on a bolt
Annual resurveying	December 12, 2017

Site Name	Oneonta Slough
Site infrastructure description	Datalogger is deployed in a PVC/ABS holder strapped vertically to a 2-inch diameter galvanized steel pole driven into a silty clay substrate
Surveying equipment	Spectra Precision Epoch50 real-time kinematic (RTK) GPS
Survey monument used	TJR NERR local benchmarks installed by a contractor company and leveled to the NGS reference benchmark U 1305 (PID - DC1330)
Survey occupation date	January 23, 2015
Survey occupation duration	Approx. 10 minutes
Ellipsoid height	-34.677 (from top of battery cap)
"Quick Check" marker for deployment tube	Mark on the pole
"Quick Check" for sonde being deployed at the same location	Sonde rests on a bolt
Annual resurveying	December 5, 2017

Site Name	Pond Restored
Site infrastructure description	Datalogger is deployed in a PVC/ABS holder strapped vertically to a 2-inch diameter galvanized steel pole driven into a silty clay substrate)
Surveying equipment	Spectra Precision Epoch50 real-time kinematic (RTK) GPS
Survey monument used	Local benchmarks installed by a contractor company and leveled to the NGS reference benchmark U 1305 (PID - DC1330)
Survey occupation date	February 25, 2015
Survey occupation duration	Approx. 10 minutes
Ellipsoid height	-34.678 (from top of holder)
"Quick Check" marker for deployment tube	Mark on the pole

"Quick Check" for sonde being deployed at the same location	Sonde rests on a bolt
Annual resurveying	

Site Name	South Bay
Site infrastructure description	Datalogger is deployed in a PVC/ABS holder strapped vertically to a 2-inch diameter galvanized steel pole driven into a silt and clay substrate*)*
Surveying equipment	Spectra Precision Epoch50 real-time kinematic (RTK) GPS
Survey monument used	Local benchmarks installed by a contractor company and leveled to the NGS reference benchmark U 1305 (PID - DC1330)
Survey occupation date	February 25, 2015
Survey occupation duration	Approx. 10 minutes
Ellipsoid height	-35.276 (from top of holder)
"Quick Check" marker for deployment tube	Mark on the pole
"Quick Check" for sonde being deployed at the same location	Fixed length chain (always making sure it is fully extended)
Annual resurveying	

5) Site location and character –

General site Characteristics (TRNERR)
a) Latitude and longitude: 32º 34' N, 117º 07' W
b) Tidal exchange (extremes): approx. -2 +7 MLLW
c) Salinity: 4 ppt (extreme rain events) to 38 ppt (except Pond Restored and South Bay)
d) The dominant freshwater source to the estuary is the Tijuana River, which drains a 4,483km^2 watershed, approximately 2/3 of which resides in Mexico. Stream flows in the river vary considerably from season to season and year to year, with no flow during many months and a mean annual discharge of .82m^3/s. Additional freshwater sources are storm drains located mostly in the northern arm of the estuary from the adjacent military airfield and residential area. 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 occurring between November and April. Freshwater discharge with untreated sewage occurs year round, although these have decreased with the construction of a binational water treatment plant. Vegetation in the area is dominated by common pickleweed (*Salicornia pacifica*) and Pacific cordgrass *(Spartina foliosa*).

Specific Site characteristics: Boca Rio (BR)
a) Location of site: the datalogger station is located approximately 400m north of the Tijuana River in the middle of a channel which runs north-south; 32º 33' 33.7" N, 117º 7' 44.4" W.
b) Elevation of sonde:
January 27, 2015 - December 11, 2017: 0.053m NAVD88, approximately .5m above the channel bottom.

December 12, 2017 - present: -0.056m NAVD88, approximately .5m above the channel bottom.
c) Channel width: approximately 30 m.
d) Bottom type: sand, very little silt and clay.

Specific Site characteristics: Oneonta Slough (OS)
a) Location of site: the datalogger station is located on the upper portion of the Oneonta Slough in the northwest corner of the reserve, approximately 1.4km north of the Tijuana River in the middle of the same channel as the Boca Rio site; 32º 34' 6.0" N, 117º 7' 52.7" W.
b) Elevation of sonde:
January 23, 2015 - December 4, 2017: 0.332m NAVD88, approximately .5m above the channel bottom.
December 5, 2017 – present: 0.295m NAVD88, approximately .5m above the channel bottom.
c) Channel width: approximately 23 meters.
d) Bottom type: silty clay.
e) The area adjacent to the west side of the channel is developed. There is a 50+ meter buffer of natural vegetation between development and the channel. The area adjacent to the east side of the channel is relatively undisturbed.
f) Direct impacts may be runoff from streets into channel during rain events.

Specific Site Characteristics: Pond Restored (PR)
a) Location of site: The datalogger is located at the middle levee breach between Pond Eleven and Pond Ten, which is part of the South San Diego Bay Coastal Wetland Restoration and Enhancement Project ; 32º 35' 46.0", 117º 7' 5.5" W.
b) Elevation of sonde: -.310m NAVD88, approximately .5m above the channel bottom. Surveyed and measured on February 25, 2015.
c) Channel width: approximately 40m.
d) Bottom type: very fine mud.
e) Tidal Exchange (extremes): approximately -2 to +7 MLLW.
f) Salinity: 2ppt (extreme rain event) to 33 ppt.

Specific Site Characteristics: South Bay (SB)
a) Location of site: The datalogger is located at the mouth of Otay River where it flows into San Diego Bay; 32º 36' 3.6" N, 117º 06' 56.9" W.
b) Elevation of sonde: -0.379m NAVD88, approximately .5m above the channel bottom. Surveyed and measured on February 25, 2015.
c) Channel width: approximately 25m
d) Bottom type: very fine mud.
e) Tidal Exchange (extremes): approximately -2 to +7 MLLW.
f) Salinity: 2 ppt (extreme rain event) to 40 ppt

SWMP Station Timeline

Station Code	SWMP Status	Station Name	Location	Active Dates	Reason Decommissioned	Notes
tjrbrwq	P	Boca Rio	32° 33' 33.70 N, 117° 7' 44.30 W	12/23/2004 15:30	NA	NA
tjroswq	P	Oneonta Slough	32° 34' 6.00 N, 117° 7' 52.60 W	01/01/1996 00:00 -	NA	NA
tjrprwq	P	Pond Eleven Restored	32° 35' 45.90 N, 117° 07' 5.59 W	02/16/2012 11:00	NA	NA
tjrsbwq	P	South Bay	32° 36' 3.60 N, 117° 6' 57.00 W	01/02/2008 00:00 -	NA	NA
tjrmmwq	P	Model Marsh	32° 32' 52.08 N, 117° 7' 22.80 W	10/01/2000 00:00 - 01/17/2008 00:00	Heavy sedimentation compromised the station	
tjrpewq	P	Pond Eleven	32° 36' 3.54 N, 117° 06' 58.46 W	07/25/2008 00:00 - 09/29/2010 00:00	Deployments at this site were temporarily interrupted due to an extensive Restoration project	Restoration project was concluded in October 2011. Datalogger was relocated and renamed – Pond Eleven Restored, and deployments resumed in January 2012.
tjrrcwq	P	River Channel	32° 33' 28.08 N, 117° 6' 21.96 W	08/01/2002 00:00 - 11/11/2004 14:00	Heavy sedimentation compromised the station	Replaced by Boca Rio site
tjrtlwq	P	Tidal Linkage	32° 34' 27.84 N, 117° 7' 37.92 W	05/01/1997 00:00 - 10/08/2007 00:00	Heavy sedimentation compromised the station	

6) Data collection period –

Boca Rio

Deploy Date	Deploy Time	Retrieve Date	Retrieve Time
12/16/2018	11:00	4/12/2019	12:00
4/12/2019	12:15	6/13/2019	13:45
6/13/2019	14:00	7/17/2019	14:30
7/17/2019	15:00	8/14/2019	14:00
8/14/2019	14:15	9/19/2019	08:15
9/19/2019	08:30	10/15/2019	14:15
10/15/2019	14:30	11/13/2019	15:15
11/13/2019	15:30	02/19/2020	13:15

Oneonta Slough

Deploy Date	Deploy Time	Retrieve Date	Retrieve Time
12/16/2018	14:15	4/9/2019	09:30
4/9/2019	09:45	6/13/2019	14:30
6/13/2019	14:45	8/15/2019	14:00
8/15/2019	14:15	9/19/2019	09:00
9/19/2019	09:15	10/14/2019	13:30
10/14/2019	13:45	11/13/2019	14:15
11/13/2019	14:30	02/19/2020	14:00

Pond Restored

Deploy Date	Deploy Time	Retrieve Date	Retrieve Time
12/17/2018	09:45	1/30/2019	11:15
1/30/2019	11:30	2/27/2019	10:30
2/27/2019	10:45	3/20/2019	13:15
3/20/2019	13:30	4/17/2019	12:45
4/17/2019	13:00	5/30/2019	10:30
5/30/2019	10:45	6/26/2019	08:15
6/26/2019	08:30	7/18/2019	13:45
7/18/2019	14:00	8/15/2019	12:45
8/15/2019	13:00	9/11/2019	12:15
9/11/2019	12:30	10/16/2019	14:30
10/16/2019	14:45	11/14/2019	14:45
11/14/2019	15:00	12/12/2019	13:15
12/12/2019	13:30	01/23/2020	12:45

South Bay

Deploy Date	Deploy Time	Retrieve Date	Retrieve Time
12/17/2018	10:15	1/30/2019	10:45
1/30/2019	11:00	2/27/2019	10:00
2/27/2019	10:15	3/20/2019	12:45
3/20/2019	13:00	4/17/2019	12:15
4/17/2019	12:30	5/30/2019	11:00
5/30/2019	11:15	6/26/2019	08:45
6/26/2019	09:00	7/18/2019	13:15
7/18/2019	13:30	8/15/2019	13:15
8/15/2019	13:30	9/11/2019	12:45
9/11/2019	13:00	10/16/2019	15:00
10/16/2019	15:15	11/14/2019	14:15
11/14/2019	14:30	12/12/2019	13:45
12/12/2019	14:00	01/23/2019	13:30

7) Distribution –

NOAA retains the right to analyze, synthesize and publish summaries of the NERRS System-wide Monitoring Program 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:
NOAA National Estuarine Research Reserve System (NERRS). System-wide Monitoring Program. Data accessed from the NOAA NERRS Centralized Data Management Office website: http://www.nerrsdata.org/; *accessed* 12 October 2020.

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 www.nerrsdata.org. Data are available in comma delimited format.

8) Associated researchers and projects (link to other products or programs) **–**

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 experienced mouth closure prior to 2016, provided an interesting contrast to data from other regional systems, which experience frequent closure events. During the 2016 El Niño and until recently, the river mouth experienced few closures, and therefore the water quality and nutrient data were crucial to detect the imminent closures as well as to identify the effects on the system. Besides the importance of the SWMP data for Research and Stewardship purposes, SWMP water quality data are incorporated into a high school curriculum developed at the reserve, serving as a great tool for the Education and Outreach programs.
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. Furthermore, 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 sondes were used at South Bay and Pond Restored. These sondes had depth, temperature/conductivity, ROX DO, pH, turbidity, and chlorophyll probes. The Boca Rio and Oneonta Slough, site utilized YSI EXO2 sondes with depth, temperature/conductivity, ROX DO, pH and turbidity probes.

YSI 6600EDS data sonde:

Parameter: Temperature
Units: Celsius (C)
Sensor Type: Thermistor
Model#: 6560
Range: -5 to 50 C
Accuracy: +/- 0.15
Resolution: 0.01 C

Parameter: Conductivity
Units: milli-Siemens per cm (mS/cm)
Sensor Type: 4-electrode cell with autoranging
Model#: 6560
Range: 0 to 100 mS/cm
Accuracy: +/- 0.5% of reading + 0.001 mS/cm
Resolution: 0.001 mS/cm to 0.1 mS/cm (range dependant)

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

Parameter: Dissolved Oxygen % saturation
Units: percent air saturation (%)
Sensor Type: Rapid Pulse - Clark type, polargraphic
Model#: 6562
Range: 0 to 500% air saturation
Accuracy: 0-200% air saturation: +/- 2% of the reading or 2% air saturation, whichever is greater; 200 to 500% air saturation: +/- 6% of the reading
Resolution: 0.1% air saturation

or

Sensor Type: Optical probe w/ mechanical cleaning
Model#: 6150 ROX
Range: 0 to 500% air saturation
Accuracy: 0-200% air saturation: +/- 1% of the reading or 1% air saturation, whichever is greater 200-500% air saturation: +/- 15% or reading
Resolution: 0.1% air saturation

Parameter: Dissolved Oxygen mg/L (Calculated from % air saturation, temperature, and salinity)
Units: milligrams/Liter (mg/L)
Sensor Type: Rapid Pulse - Clark type, polargraphic
Model#: 6562
Range: 0 to 50 mg/L
Accuracy: 0-20 mg/L: +/- 2% of the reading or 0.2 mg/L, whichever is greater
20 to 50 mg/L: +/- 6% of the reading
Resolution: 0.01 mg/L

or

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

Parameter: Non-vented Level - Shallow (Depth)
Units: feet or meters (ft or m)
Sensor Type: Stainless steel strain gauge
Range: 0 to 30 ft (9.1 m)
Accuracy: +/- 0.06 ft (0.018 m)
Resolution: 0.001 ft (0.001 m)

Parameter: pH – bulb probe or EDS flat glass probe
Units: pH units
Sensor Type: Glass combination electrode
Model#: 6561 or 6561FG
Range: 0 to 14 units
Accuracy: +/- 0.2 units
Resolution: 0.01 units

Parameter: Turbidity
Units: nephelometric turbidity units (NTU)

Sensor Type: Optical, 90 degree scatter, with mechanical cleaning
Model#: 6136
Range: 0 to 1000 NTU
Accuracy: +/- 2% of reading or 0.3 NTU (whichever is greater)
Resolution: 0.1 NTU

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

YSI EXO Sonde:

Parameter: Temperature
Units: Celsius (C)
Sensor Type: CT2 probe, Thermistor
Model#: 599870
Range: -5 to 50 C
Accuracy: -5 to 35: +/- 0.01, 35 to 50: +/- .005
Resolution: 0.01 C

Parameter: Conductivity
Units: milli-Siemens per cm (mS/cm)
Sensor Type: CT2 probe, 4-electrode cell with autoranging
Model#: 599870
Range: 0 to 200 mS/cm
Accuracy: 0 to 100: +/- 0.5% of reading or 0.001 mS/cm; 100 to 200: +/- 1% of reading
Resolution: 0.001 mS/cm to 0.1 mS/cm (range dependant)

Parameter: Salinity
Units: practical salinity units (psu)/parts per thousand (ppt)
Sensor Type: CT2 probe, Calculated from conductivity and temperature
Range: 0 to 70 psu
Accuracy: +/- 1.0% of reading pr 0.1 ppt, whichever is greater
Resolution: 0.01 psu

OR

Parameter: Temperature
Units: Celsius (C)
Sensor Type: Wiped probe; Thermistor
Model#: 599827
Range: -5 to 50 C
Accuracy: ±0.2 C
Resolution: 0.001 C

Parameter: Conductivity
Units: milli-Siemens per cm (mS/cm)

Sensor Type: Wiped probe; 4-electrode cell with autoranging
Model#: 599827
Range: 0 to 100 mS/cm
Accuracy: ±1% of the reading or 0.002 mS/cm, whichever is greater
Resolution: 0.0001 to 0.01 mS/cm (range dependent)

Parameter: Salinity
Units: practical salinity units (psu)/parts per thousand (ppt)
Model#: 599827
Sensor Type: Wiped probe; Calculated from conductivity and temperature
Range: 0 to 70 ppt
Accuracy: ±2% of the reading or 0.2 ppt, whichever is greater
Resolution: 0.01 psu

Parameter: Dissolved Oxygen % saturation
Sensor Type: Optical probe w/ mechanical cleaning
Model#: 599100-01
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: +/- 5% or reading
Resolution: 0.1% air saturation

Parameter: Dissolved Oxygen mg/L (Calculated from % air saturation, temperature, and salinity)
Units: milligrams/Liter (mg/L)
Sensor Type: Optical probe w/ mechanical cleaning
Model#: 599100-01
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: +/- 5% 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 33 ft (10 m)
Accuracy: +/- 0.013 ft (0.004 m)
Resolution: 0.001 ft (0.001 m)

Parameter: pH
Units: pH units
Sensor Type: Glass combination electrode
Model#: 599701(guarded) or 599702(wiped)
Range: 0 to 14 units
Accuracy: +/- 0.1 units within +/- 10° of calibration temperature, +/- 0.2 units for entire temperature range
Resolution: 0.01 units

Parameter: Turbidity
Units: formazin nephelometric units (FNU)
Sensor Type: Optical, 90 degree scatter
Model#: 599101-01
Range: 0 to 4000 FNU
Accuracy: 0 to 999 FNU: 0.3 FNU or +/-2% of reading (whichever is greater); 1000 to 4000 FNU +/-5% of reading
Resolution: 0 to 999 FNU: 0.01 FNU, 1000 to 4000 FNU: 0.1 FNU

Parameter: Chlorophyll
Units: micrograms/Liter
Sensor Type: Optical probe
Model#: 599102-01
Range: 0 to 400 ug/Liter
Accuracy: Dependent on methodology
Resolution: 0.1 ug/L 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 1.02 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.

NOTE: older depth data cannot be corrected without verifying that the depth offset was in place and whether a vented or non-vented depth sensor was in use. No SWMP data prior to 2006 can be corrected using this method. The following equation is used for corrected depth/level data provided by the CDMO beginning in 2010:
((1013-BP)*0.0102)+Depth/Level = cDepth/cLevel.

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 Restored	PR	tjrprwq
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 –

Boca Rio – non-vented EXO2

Deploy Date	Deploy Time	Retrieve Date	Retrieve Time	Sonde Model Number	pH Model Number	ODO Model	Turb Model	Cond Model Number	EXO Model Number	
4/12/2019	12:15	6/13/2019	13:45	EXO2 (EXO_BR2)	599702	599100-01	599101-01	599827	599090-01	
6/13/2019	14:00	7/17/2019	14:30	EXO2 (BR)	599702	599100-01	599101-01	599827	599090-01	
7/17/2019	14:45	8/14/2019	14:00	EXO2 (EXO_BR2)	599702	599100-01	599101-01	599827	599090-01	
8/14/2019	14:15	9/19/2019	8:15	EXO2 (BR)	599702	599100-01	599101-01	599827	599090-01	
9/19/2019	8:30	10/15/2019	14:15	EXO2 (EXO_BR2)	599702	599100-01	599101-01	599827	599090-01	
10/15/2019	14:30	11/13/2019	15:15	EXO2 (BR)	599702	599100-01	599101-01	599827	599090-01	
11/13/2019	15:30	2/19/2020	13:15	EXO2 (EXO_BR2)	599702	599100-01	599101-01	599827	599090-01	
Deploy Date	Sonde Nic	SpCond	ODO1	pH7	pH10	pH4	Turb	Turb	Depth	Level
4/12/2019	EXO_BR2	49.21(50.0)	97.8	7.14	10.15		0.1(0.0)	122.8(124.0)	-0.015	(-0.041)
6/13/2019	BR	49.75(50.0)	98.2	7.2	10.08		0.4(0.0)	126.0(124.0)	(-0.0080)	-0.061(-0.064)
7/17/2019	EXO_BR2	49.66(50.0)	100.7	7.1	10.11		0.06(0.0)	127.0(124.0)	(-0.01)	-0.066(-0.066)
8/14/2019	BR	50.4(50.0)	99.1	7.14	10.13		0.5(0.0)	127.2(124.0)	(-0.016)	-0.072(-0.072)
9/19/2019	EXO_BR2	49.4(50.0)	98.7	7.26	10.22		0.7(0.0)	121.5(124.0)	(-0.035)	-0.097(-0.091)
10/15/2019	BR	49.95(50.0)	98.1	7.17	10.22		0.3(0.0)	121.0(124.0)	-0.041	-0.013(-0.015)
11/13/2019	EXO_BR2	50.14(50.0)	99.5	7.21	10.22		0.3(0.0)	125.9(124.0)	-0.045	-0.0050(-0.011)

Oneonta Slough – non-vented EXO2

Deploy Date	Deploy Time	Retrieve Date	Retrieve Time	Sonde Model Number	pH Model	ODO Model	Turb Model Number	Cond Model	EXO Model Number
4/9/2019	9:45	6/13/2019	14:30	EXO2 (OS_2_EXO)	599702	599100-1	599101-1	599827	599090-01
6/13/2019	14:45	8/15/2019	14:00	EXO2 (OS_EXO)	599702	599100-01	599101-01	599827	599090-01
8/15/2019	14:15	9/19/2019	9:00	EXO2 (OS_2_EXO)	599702	599100-1	599101-1	599827	599090-01
9/19/2019	9:15	10/14/2019	13:30	EXO2 (OS_EXO)	599702	599100-01	599101-01	599827	599090-01
10/14/2019	13:45	11/13/2019	14:15	EXO2 (OS_2_EXO)	599702	599100-1	599101-1	599827	599090-01
11/13/2019	14:30	2/19/2020	14:00	EXO2 (OS_EXO)	599702	599100-01	599101-01	599827	599090-01
Deploy Date	Sonde Nickname	SpCond	ODO1	pH7	pH10	Turb	Turb	Depth	Level
4/9/2019	OS_2_EXO	48.12(50.0)	99.2	7.17	10.16	1.0(0.0)	122.6(124.0)	-0.016	0.309(0.311)
6/13/2019	OS_EXO	49.15(50.0)	97.3	7.23	10.23	0.6(0.0)	122.8(124.0)	-0.007	0.3(0.302)
8/15/2019	OS_2_EXO	50.4(50.0)	98.7	7.01	10.09	0.3(0.0)	124.0(124.0)	(-0.018)	0.275(0.277)
9/19/2019	OS_EXO	50.48(50.0)	99.7	7.13	10.12	0.01(0.0)	127.8(124.0)	-0.014	0.313(0.309)
10/14/2019	OS_2_EXO	50.25(50.0)	98.8	7.08	10.09	0.1(0.0)	123.0(124.0)	-0.038	0.334(0.333)
11/13/2019	OS_EXO	49.75(50.0)	98.2	7.18	10.14	0.8(0.0)	123.5(124.0)	-0.045	0.348(0.34)

Pond Restored – non-vented 6600

Deploy Date	Deploy Time	Retrieve Date	Retrieve Time	Sonde Model Number (Nickname)	pH Model Number	Model Number	Turb Model Number	Model Number	Chloro Model Number	
1/30/2019	11:30	2/27/2019	10:30	6600EDSV2 (PR2)	6561	6150	6136	6560	6025	
2/27/2019	10:45	3/20/2019	13:15	6600EDSV2 (PR2)	6561	6150	6136	6560	6025	
3/20/2019	13:30	4/17/2019	12:45	6600EDSV2 (PR2)	6561	6150	6136	6560	6025	
4/17/2019	13:00	5/30/2019	10:30	6600EDSV2 (MM_2_(OS))	6561	6150	6136	6560	6025	
5/30/2019	10:45	6/26/2019	8:15	6600EDSV2 (PR2)	6561	6150	6136	6560	6025	
6/26/2019	8:30	7/18/2019	13:45	6600EDSV2 (MM_2_(OS))	6561	6150	6136	6560	6025	
7/18/2019	14:00	8/15/2019	12:45	6600EDSV2 (PR2)	6561	6150	6136	6560	6025	
8/15/2019	13:00	9/11/2019	12:15	6600EDSV2 (MM_2_(OS))	6561	6150	6136	6560	6025	
9/11/2019	12:30	10/16/2019	14:30	6600EDSV2 (PR2)	6561	6150	6136	6560	6025	
10/16/2019	14:45	11/14/2019	14:45	6600EDSV2 (MM_2_(OS))	6561	6150	6136	6560	6025	
11/14/2019	15:00	12/12/2019	13:15	6600EDSV2 (PR2)	6561	6150	6136	6560	6025	
12/12/2019	13:30	1/23/2019	12:45	6600EDSV2 (MM_2_(OS))	6561	6150	6136	6560	6025	

Deploy Date	Sonde Nickname	SpCond	ODO1	pH7	pH10	Turb	Turb	Depth	Level	CHL(0)
1/30/2019	PR2	47.4(50.0)	99.8	7.12	10	1.2(0.0)	125.0(126.0)	-0.053	-0.247(-0.257)	0.1
2/27/2019	PR2	50.41(50.0)	98.8	7	9.85	0.4(0.0)	126.2(126.0)	-0.072	-0.249(-0.238)	-0.1
3/20/2019	PR2	49.3(50.0)	99.7	7.21	9.95	1.8(0.0)	126.8(126.0)	-0.046	-0.229(-0.264)	0.6
4/17/2019	MM_2_(OS)	50.15(50.0)	99.1	7.2	10.19	0.1(0.0)	126.4(126.0)	(-0.024)	-0.324(-0.334)	0.2
5/30/2019	PR2	49.61(50.0)	99.5	7.18	10.14	0.3(0.0)	116.6(126.0)	-0.027	-0.265(-0.283)	0.2
6/26/2019	MM_2_(OS)	49.68(50.0)	99.8	7.2	10.1	0.4(0.0)	135.3(126.0)	(-0.0030)	-0.307(-0.313)	0.2
7/18/2019	PR2	48.04(50.0)	98	7.16	10.13	0.3(0.0)	126.8(126.6)	-0.008	-0.284(-0.302)	0.2
8/15/2019	MM_2_(OS)	49.2(50.0)	99.4	7.27	10.31	0.9(0.0)	121.5(126.0)	-0.003	-0.296(-0.307)	0.1
9/11/2019	PR2	49.5(50.0)	99.5	7.05	10.05	0.2(0.0)	126.6(126.0)	(-0.031)	-0.346(-0.341)	0
10/16/2019	MM_2_(OS)	50.9(50.0)	100.2	7.25	10.25	0.4(0.0)	125.6(126.0)	-0.023	-0.282(-0.287)	0.4
11/14/2019	PR2	47.65(50.0)	100.2	7.2	10.18	1.8(0.0)	126.3(126.0)	-0.044	-0.271(-0.266)	0.4
12/12/2019	MM_2_(OS)	49.0(50.0)	100.2	7.05	10.05	0.6(0.0)	127.4(126.0)	-0.024	-0.289(-0.286)	0.6

South Bay – non-vented 6600

Deploy Date	Deploy Time	Retrieve Date	Retrieve Time	Sonde Model Number (Nickname)	pH Model Number	ODO Model Number	Turb Model Number	Cond Model Number	Chloro Model Number	
1/30/2019	11:00	2/27/2019	10:00	6600EDSV2 (SB3)	6561	6150	6136	6560	6025	
2/27/2019	10:15	3/20/2019	12:45	6600EDSV2 (SB2)	6561	6150	6136	6560	6025	
3/20/2019	13:00	4/17/2019	12:15	6600EDSV2 (SB3)	6561	6150	6136	6560	6025	
4/17/2019	12:30	5/30/2019	11:00	6600EDSV2 (SB2)	6561	6150	6136	6560	6025	
5/30/2019	11:15	6/26/2019	8:45	6600EDSV2 (SB3)	6561	6150	6136	6560	6025	
6/26/2019	9:00	7/18/2019	13:15	6600EDSV2 (SB2)	6561	6150	6136	6560	6025	
7/18/2019	13:30	8/15/2019	13:15	6600EDSV2 (SB3)	6561	6150	6136	6560	6025	
8/15/2019	13:30	9/11/2019	12:45	6600EDSV2 (SB2)	6561	6150	6136	6560	6025	
9/11/2019	13:00	10/16/2019	15:00	6600EDSV2 (SB3)	6561	6150	6136	6560	6025	
10/16/2019	15:15	11/14/2019	14:15	6600EDSV2 (SB2)	6561	6150	6136	6560	6025	
11/14/2019	14:30	12/12/2019	13:45	6600EDSV2 (SB3)	6561	6150	6136	6560	6025	
12/12/2019	14:00	1/23/2019	13:30	6600EDSV2 (SB2)	6561	6150	6136	6560	6025	

Deploy Date	Sonde Nickname	SpCond	ODO1	pH7	pH10	Turb	Turb	Depth	Level	CHL(0)
1/30/2019	SB3	47.5(50.0)	100.5	7.14	10.22	-0.2(0.0)	124.2(126.0)	-0.056	-0.315(-0.323)	-0.2
2/27/2019	SB2	50.15(50.0)	100.4	7.1	10.02	0.5(0.0)	126.3(126.0)	-0.069	-0.328(-0.31)	0.3
3/20/2019	SB3	49.5(50.0)	99.4	7.27	10.27	0.3(0.0)	140.9(126.0)	-0.044	-0.341(-0.335)	0.4
4/17/2019	SB2	48.8(50.0)	98.8	7.16	10.18	0.1(0.0)	127.1(126.0)	(-0.023)	-0.466(-0.402)	0
5/30/2019	SB3	49.61(50.0)	98.2	7.22	10.23	0.3(0.0)	130.2(126.0)	-0.007	-0.371(-0.372)	0.2
6/26/2019	SB2	49.53(50.0)	98.9	7.08	10.06	0.3(0.0)	128.2(126.0)	(-0.0040)	-0.399(-0.383)	0.8
7/18/2019	SB3	47.9(50.0)	97.2	7.17	10.16	-0.1(0.0)	125.9(126.0)	-0.007	-0.377(-0.372)	0.4
8/15/2019	SB2	49.4(50.0)	99.1	7.13	10.13	0.3(0.0)	125.6(126.0)	-0.004	-0.385(-0.375)	0.4
9/11/2019	SB3	48.9(50.0)	98.4	6.97	9.98	0.2(0.0)	126.2(126.0)	(-0.031)	-0.413(-0.41)	0.2
10/16/2019	SB2	48.8(50.0)	100.7	7.18	10.17	0.5(0.0)	125.5(126.0)	-0.022	-0.369(-0.357)	0.5
11/14/2019	SB3	49.5(50.0)	100.9	7.15	10.18	0.2(0.0)	127.8(126.0)	-0.053	-0.314(-0.326)	0.1
12/12/2019	SB2	49.85(50.0)	99.4	7.16	10.13	0.0(0.0)	127.3(126.0)	-0.106	-0.266(-0.273)	0

14) Other remarks/notes –

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.

Precipitation and other events

1/4 flow in the Tijuana River into the US – approximately 9,000 gallons

1/5 - 1/6 rain 0.65in1/12 - 1/15 rain 1.03in

1/12 flow in the Tijuana River into the US – pump station turned off due to rain

1/25 flow in the Tijuana River into the US – approximately 35,000 gallons per minute

1/31 rain 0.41in

1/31 flow in the Tijuana River into the US – pump station turned off due to rain

2/1 - 2/4 rain 1.27in

2/4 - 2/5 rain 0.37 in

2/9 rain 0.06 in

2/13-2/14 rain 1.21 in

2/15-2/17 rain 0.21 in

3/2-3/3 rain 0.225 in

3/5 rain 0.01 in

3/6 rain 0.12 in

3/7 rain 0.10 in

3/9-10 rain 0.05 in

3/11 rain 0.75 in

3/28 flow in the Tijuana River into the US – approximately 24,000 gallons per minute

4/2 - 4/4 rain 0.25 in

4/6 rain 0.03 in

4/11 flow in the Tijuana River into the US – approximately 2 million gallons from 10pm to 6am

4/12 flow in the Tijuana River into the US – approximately 30,000 gallons from 11pm to 11:30pm

4/16 rain 0.05 in

4/16 flow in the Tijuana River into the US – approximately 27.8 million gallons

4/17 flow in the Tijuana River into the US – approximately 1.5 million gallons from 3pm-8pm

4/19 – 4/21 flow in the Tijuana River into the US – approximately 3.6 million gallons

4/24 flow in the Tijuana River into the US – approximately 551,000 gallons

4/25 flow in the Tijuana River into the US – approximately 5.3 million gallons

5/3 – 5/4 flow in the Tijuana River into the US – approximately 3.8 million gallons

5/6 rain 0.29 in

5/10 rain 0.07 in

5/11 – 5/14 flow in the Tijuana River into the US – approximately 56.7 million gallons

5/15 – 5/17 flow in the Tijuana River into the US – approximately 9.6 million gallons

5/16 - rain 0.35 in

5/22 rain 0.06 in

4/6 rain 0.04 in

6/20 – 6/21 flow in the Tijuana River into the US – approximately 1.8 million gallons

6/23 – 6/24 flow in the Tijuana River into the US – approximately 399,000 gallons

6/27 flow in the Tijuana River into the US – approximately 858,000 gallons

7/9 flow in the Tijuana River into the US – approximately 300,000 gallons

7/12 flow in the Tijuana River into the US – approximately 40,000 gallons

7/22 flow in the Tijuana River into the US – approximately 300,000 gallons

7/23 flow in the Tijuana River into the US – approximately 287,000 gallons

8/11 flow in the Tijuana River into the US – approximately 63,000 gallons around 3:30am (PST)

9/4 – 9/5 rainfall in the upper watershed, flow in the Tijuana River into the US - approx. 94.03 million gallons traveled approx. 1 mile north of border

9/11 – 9/12 @8:30pm – 8:15am (PST) flow in the Tijuana River into the US – approximately 3,834,908 gallons

9/13 @10am (PST) flow in the Tijuana River into the US – approximately 6,324,470 gallons

9/16 flow in the Tijuana River into the US – approximately 16,036,547 gallons

9/26 rainfall in the upper watershed, flow in the Tijuana River into the US - approx. 929,621 gallons recorded by 1:00pm PST

9/29 – 9/30 from 6:30pm to 9:00am PST flow in the Tijuana River into the US - approx. 7,810,247 gallons

10/12 – 10/14 from 8:00pm to 7:00pm PST (almost 48 hours) flow in the Tijuana River into the US - approx. 14.5 million gallons

10/21 – 10/22 from 10:00pm to 10:00am flow in the Tijuana River into the US - approx. 9.2 million gallons

11/19 - 11/20 rain 0.76in

11/20 -11/21 rain 0.31in

11/27 - 11/30 rain 2.05in

12/3 - 12/4 rain 1.06in

12/6 - 12/8 rain 0.50in

12/23 - 12/30 rain 2.38in

Since November, several rain events in the Tijuana River Basin have caused flood and infrastructure damage, preventing the water treatment plants to function properly. There's been a constant flow of contaminated water through January 2020, affecting the deployments of data loggers in two of the sites – Boca Rio and Oneonta Slough.

Site specific issues:

Boca Rio and Oneonta Slough

Because several rain events in the Tijuana River Basin have caused flood and infrastructure damage in the water treatment plants, there was an almost constant flow of untreated and contaminated water into the reserve, affecting our capability to swap the sondes within protocol time in these two SWMP sites.
Since transboundary flows of contaminated water are recurrent events affecting the Tijuana River NERR, in agreement with the CDMO SWMP Oversight Committee, we decided to test two month deployments at the telemetered site, Oneonta Slough, for couple of deployments.

January – April – Due to large amounts of rain and several untreated water transboundary flows, both sites had their loggers deployed for almost four months (deployment started mid December 2018), exceeding the protocol time. The only data that appear affected is pH at Boca Rio, which was flagged suspect due to sensor diagnostics after such a long deployment. The Oneonta Slough datalogger's batteries died and there are a few days of missing data.

April – June - Due to several untreated water transboundary flows, both sites had their loggers deployed for two months.

June - August – The telemetered site, Oneonta Slough, was deployed for two months as a test.

November – December – There was a constant flow of contaminated water, affecting the deployments at these two sites. The data loggers were deployed for two months (November 2019 – February 2020).

Pond Eleven Restored

August – Temperature data was odd during the August 15th deployment. The cause was unknown but data did not match up well on either end of the deployment.