**Mission Aransas (MAR) NERR NERR Water Quality Metadata**

**January – December 2021**

**Latest Update: 08/19/2022**

**I. Data Set and Research Descriptors**

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

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**2) Entry verification:**

Deployment data are uploaded from the YSI data logger to a personal computer with Windows 7 or newer operating system. Files are exported from EcoWatch in a comma-delimited format (.CDF), EcoWatch Lite in a comma separated file (CSV) or KOR Software in a comma separated file (CSV) 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. Cammie Hyatt is responsible for data management.

**3) Research objectives:**

Five long-term monitoring stations have been established along the Texas Coast in the Mission-Aransas estuary to collect baseline data on environmental conditions within the bay systems and to continue monitoring the water quality to see how it changes over time. These System Wide Monitoring Program Stations (SWMPs) provide continual monitoring of temperature, salinity, oxygen and other parameters that characterize the water quality of the bays. The primary research objective is to improve the knowledge of the Texas coastal zone ecosystems and to promote public appreciation and support for stewardship of coastal resources.

**4) Research methods:**

YSI EXO 2 data loggers (sondes) are deployed at each site in the Mission-Aransas estuary. The instruments are suspended by a chain that is bolted onto the platform and hangs within a PVC tube (4” schedule 40) that is mounted vertically onto the piling of the station. The deployment tubes have holes cut into the bottom half of the tube to allow for water exchange and a bolt is in the bottom of the tube for the sonde to rest on when it is deployed to ensure vertical control. Sondes are programmed to record water quality parameter measurements every 15 minutes over a 14-30 day period. Parameters measured include Temperature, Specific Conductivity, Salinity, Dissolved Oxygen (DO), Depth, pH, Turbidity, and Chlorophyll.

One data logger is deployed at each SWMP station within the Mission-Aransas estuary. All data are recorded in Central Standard Time. The sites are usually accessed by boat at low tide, but due to the large size of the reserve, this sometimes varies. Data loggers are swapped out every other week except in winter when they are generally swapped once per month. During transport, each sonde is wrapped in a tap water-soaked white towel and placed horizontally in a cooler to protect against jarring. During deployment, the sonde connector is lubed with silicone grease, as needed, and attached to the field cable. The chain is attached to the sonde and then lowered into the PVC tube. The tubes are painted (inside and out) with Trinidad SR anti-fouling paint to discourage growth of aquatic organisms that could block the passage of the sonde inside the tube as well as foul the water on the outside. Tubes are periodically cleaned by sending a concrete-filled PVC tube on a rope down into the deployment tube to knock out any fouling that occurs.

During retrieval, the data loggers are again wrapped in damp white towels and placed in a cooler for transport back to the lab. During this time, the sonde is still in unattended mode, collecting post-deployment dissolved oxygen in 100% water-saturated air. Once in the lab, the sensors are inspected for biofouling and then the sondes are placed in a 5-gallon bucket of aerated water until post-deployment calibration checks can be conducted. Before cleaning, the other post-deployment calibration checks are performed to determine if the sensors have drifted during deployment. Sonde cleaning and calibrations of DO, Depth, Conductivity, pH, Turbidity and Chlorophyll are all performed as described in the YSI manual. For Conductivity and Salinity, YSI calibration solution 3169 (50,000 µS/cm) is used. For pH calibrations, RICCA pH 7 (p/n 15515) and pH 10 (p/n 16015) solutions are used. A two-point calibration is used for Turbidity, with 0 NTU (deionized water) and 124 NTU (YSI 6073G). Aransas Bay and Copano East are currently measuring Depth. Copano West and Mesquite Bay have been set-up to measure Level for vertical control. Offset for these calibrations are determined using the Depth/Level Offset Calculator provided on the Deployment Log Interface. For Chlorophyll, deionized water is used as the 0 ug/L standard and 0.625 mg/L Rhodamine dye is used for the second calibration point. After retrieval, the deployment file is uploaded onto a PC and a graph of the data is used to determine the validity of the data during QAQC.

As a quality assurance check, a spare 6600 V2 sonde is used to record all parameters during deployment and retrieval to compare to the data of the retrieved sonde. These readings are collected at the same depth as the sonde, if possible. We also collect readings at the surface and at 0.5 m to determine if there is stratification. In some instances, strong tidal currents (mainly at the Ship Channel site) make it difficult to keep the probe in a vertical position; however, it still provides some useful information for comparison purposes. Cloud cover and wave height observations are also recorded as well as a secchi reading. Data collected from field readings may be obtained by contacting the Data Manager of the Reserve (see Section 1 for contact information).

|  |  |
| --- | --- |
| Site Name | Aransas Bay, Copano East, Copano West, Mesquite Bay |
| Site infrastructure description | Sonde deployment tube is attached to a wooden platform that has 50’ pilings that are embedded ~ 30’ into the bottom of the bay for stability. |
| Surveying equipment | NERR GPS Equipment (Unit A and C) – Trimble R8s GNSS Rover and Bases |
| Survey monument used | Rockport PID AN1877 and FAML PID AC8431 |
| Survey occupation date | AB: 6/16/20 - 06/17/20; CE: 06/03/20 – 06/05/20;  CW: 06/02/20 – 06/03/20; MB: 06/03/20 – 06/05/20 |
| Survey occupation duration | AB: 1 day 02:08; CE: 1 day 18:46; CW: 1 day 01:38  MB: 1 day 18:40 |
| Ellipsoid height | TBD |
| “Quick Check” marker for deployment tube | A hole is drilled into the piling at the top of the deployment tube. |
| “Quick Check” for sonde being deployed at the same location | A ziptie is attached to the chain holding the sonde inside the tube at the point where it is flush with the top of the tube. |
| Annual resurveying | Plan to resurvey platforms every 5 years |

Note: Level surveys were done at the above-mentioned sites; however, there have been difficulties in getting updated offsets for the stations. As a result, we have continued using previous Level offsets determined for CW and MB; AB and CE are still using Depth offsets as outlined in YSI SOPs.

A Sutron Sat-Link2 transmitter was installed at the Aransas Bay station on 11/15/2006 and transmitted data to the NOAA GOES satellite, NESDIS ID #3B038660, until destroyed by Hurricane Harvey on 08/25/2017. In 2018, the telemetry at all WQ sites was updated with Storm 3 dataloggers equipped with GOES satellite transmitters. Copano East, Copano West, and Mesquite Bay were installed on 08/03/2018 with NESDIS ID #3B009CCA, #3B00A950, and #3B00BA26, respectively. Aransas Bay was installed on 03/27/2019 after the station was rebuilt. 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 in the CDMO’s authoritative online database. Provisional and authoritative data are available at [www.nerrsdata.org](http://cdmo.baruch.sc.edu/).

**5) Site location and character:**

Mission-Aransas is an estuarine system composed of tertiary, secondary, and primary bays. Mission Bay is the only tertiary bay, and Copano, Port and St. Charles Bay are secondary bays. Mesquite, Aransas and Redfish Bay are primary bays because they are adjacent to the oceanic outlets. There is a salinity gradient which is highest at the Aransas Ship Channel and decreases into the upper bays. EXO 2 dataloggers are deployed 0.5 m off the bottom at all the sites except our deepest site, Ship Channel, where it will be deployed at 1.0 m off the bottom of the channel. The Ship Channel site has not been re-established since Hurricane Harvey destroyed it in 2017; however, construction has begun. The five sites within Mission-Aransas that are being monitored with YSI data loggers are:

1. Aransas Bay (AB): [27º 58’ 47.28 N, 97º 1’ 43.32 W]. This station is located in open water in the middle of Aransas Bay. Tidal range is approximately 1.0 meter, and yearly salinities ranged between 3-35 psu. Yearly temperatures ranged from 3-32 ºC. Aransas Bay is influenced by freshwater inflow from both San Antonio Bay (which has inflow from the San Antonio River and the Guadalupe River) and Copano Bay. The average water depth is 3.0 meters and the bottom is composed of soft sediment. The Texas Commission of Environmental Quality (TCEQ) has determined that there are no exceedences for pollutants in Aransas Bay. This station is primarily influenced by the watershed sub-basin in Aransas County with a hydrologic unit code (HUC) of 12100405.
2. Copano East (CE): [28º 7’ 56.28 N, 97º 2’ 3.84 W]. This station is located in open water on the east side of Copano Bay near the Copano Causeway. Tidal range is approximately 1.0 meter, and yearly salinities ranged between 1-30 psu. Yearly temperatures ranged from 3-33 ºC. Copano East is influenced by freshwater inflow from the Aransas River, Mission River, and Copano Creek. The average water depth is 2.5 meters and the bottom is composed of soft sediment. The TCEQ has determined that there are no exceedences for pollutants in Copano East. This station is influenced by three watershed sub-basins in several counties with HUC’s of 12100407, 12100406, and 12100405.
3. Copano West (CW): [28º 5’ 2.76 N, 97º 12’ 3.24 W]. This station is located in open water on the west side of Copano Bay near Bayside. Tidal range is approximately 1.0 meter, and yearly salinities ranged between 0-31 psu. Yearly temperatures ranged from 3-33 ºC. Copano West is primarily influenced by freshwater inflow from the Aransas River (See Table 1 in Section 14). The average water depth is 1.5 meters and the bottom is composed of soft sediment. The TCEQ has determined that there is an exceedence for enterococci bacteria in Copano West. This station is primarily influenced by the watershed sub-basin in San Patricio and Bee County with a HUC of 12100407 (see Figure 1 in Section 14).
4. Ship Channel (SC): [27º 50’ 17.88 N, 97º 3’ 0.0 W]. This station is located on the end of the UTMSI pier. Tidal range is approximately 1.0 meter, and yearly salinities ranged between 18-37 psu. Yearly temperatures ranged from 12-31 ºC. The Aransas Ship Channel is located on the Aransas Pass, which is the primary outlet to the Gulf of Mexico. This pass receives freshwater inflow from several bay systems, including Copano Bay, Aransas Bay, San Antonio Bay, and Corpus Christi Bay. The average water depth is 6.1 meters and the bottom is composed of soft sediment. The TCEQ currently has no exceedences for pollutants in the Aransas Ship Channel. This site is primarily influenced by the watershed sub-basin in Aransas County with a HUC of 12100405.
5. Mesquite Bay (MB): [28° 8’ 18.24 N, 96° 49’ 42.60 W]. This station is located in open water in Mesquite Bay which is within the Aransas National Wildlife Refuge. Tidal range is approximately 1.0 meter, and yearly salinities ranged between 6-32 psu. Yearly temperatures ranged from 1-33 ºC. Mesquite Bay is primarily influenced by freshwater inflow from San Antonio Bay, which has inflow from the San Antonio River and the Guadalupe River. The average water depth is 1.0 m and the bottom is composed of soft sediment. The TCEQ currently has no exceedences for pollutants in Mesquite Bay. The Mesquite SWMP station is influenced by the watershed sub-basin in Refugio and Calhoun County with a HUC of 12100404.

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| **Station Code** | **SWMP Status** | **Station Name** | **Location** | **Active Dates** | **Reason Decommissioned** | **Notes** |
| AB | P | Aransas Bay | 27º 58’ 28.56 N 97º 1’ 26.04 W | 04/24/07 – | NA | NA |
| CE | P | Copano East | 28º 7’ 56.28 N 97º 2’ 3.84 W | 04/24/07 – | NA | NA |
| CW | P | Copano West | 28º 5’ 2.76 N 97º 12’ 3.24 W | 07/11/07 – | NA | NA |
| SC | P | Ship Channel | 27º 50’ 17.88 N 97º 3’ 0.0 W | 08/24/07 – 08/28/17 | NA | NA |
| MB | P | Mesquite Bay | 28° 8’ 18.24 N 96° 49’ 42.60 W | 01/10/08 – | NA | NA |

**6) Data collection period:**

Initial water quality data collection for the Mission Aransas NERR began on 04/24/07 in Aransas and Copano Bays. Copano West collection began on 07/11/07 shortly followed by the Ship Channel on 08/24/07. Mesquite Bay sampling began on 01/10/08. **Due to destruction caused by Hurricane Harvey and its aftermath, water quality data collection is temporarily suspended at the Ship Channel.** EXO 2 datasondes were used at all sites in 2021.

**Aransas Bay**

Deployment Retrieval

Date/Time Date/Time

12/08/2020 09:30 01/21/2021 08:45

01/21/2021 09:00 02/24/2021 08:45

02/24/2021 09:00 03/23/2021 07:30

03/23/2021 07:45 04/08/2021 08:15

04/08/2021 08:30 04/20/2021 07:30

04/20/2021 07:45 05/04/2021 07:45

05/04/2021 08:00 06/02/2021 07:15

06/02/2021 07:45 06/15/2021 07:45

06/15/2021 08:00 07/01/2021 07:30

07/01/2021 08:00 07/20/2021 07:30

07/20/2021 07:45 08/03/2021 07:45

08/03/2021 08:15 08/24/2021 07:30

08/24/2021 08:00 09/09/2021 07:45

09/09/2021 08:00 10/05/2021 08:00

10/05/2021 08:15 10/20/2021 07:15

10/20/2021 07:45 11/09/2021 08:45

11/09/2021 09:15 12/02/2021 09:00

12/02/2021 09:15 01/25/2022 14:45

**Copano East**

Deployment Retrieval

Date/Time Date/Time

12/08/2020 12:15 01/21/2021 12:00

01/21/2021 12:15 02/24/2021 13:15

02/24/2021 13:30 03/23/2021 09:45

03/23/2021 10:00 04/08/2021 11:15

04/08/2021 11:30 04/20/2021 10:00

04/20/2021 10:15 05/04/2021 10:30

05/04/2021 10:45 06/02/2021 09:45

06/02/2021 10:00 06/15/2021 10:45 (stopped recording; partial telemetry)

06/15/2021 11:00 07/01/2021 10:45

07/01/2021 11:30 07/03/2021 20:15 (stopped recording; telemetry)

07/20/2021 08:45 08/03/2021 10:00

08/03/2021 10:15 08/24/2021 10:00 (jumbled file; partial telemetry)

08/24/2021 10:15 09/09/2021 10:15

09/09/2021 10:30 10/05/2021 11:30

10/05/2021 11:45 10/20/2021 09:45

10/20/2021 10:15 11/09/2021 10:45

11/09/2021 11:15 12/02/2021 11:30

12/02/2021 11:45 01/25/2022 11:30

**Copano West**

Deployment Retrieval

Date/Time Date/Time

12/08/2020 11:45 01/21/2021 10:15

01/21/2021 10:30 02/24/2021 11:45

02/24/2021 12:15 03/23/2021 08:45

03/23/2021 09:00 04/08/2021 10:00

04/08/2021 10:30 04/20/2021 09:15

04/20/2021 09:30 05/04/2021 09:30

05/04/2021 09:45 06/02/2021 08:45

06/02/2021 09:00 06/15/2021 09:00

06/15/2021 09:30 07/01/2021 10:00

07/01/2021 10:15 07/20/2021 11:30

07/20/2021 11:45 08/03/2021 09:15

08/03/2021 09:30 08/24/2021 08:45

08/24/2021 09:15 09/09/2021 09:15

09/09/2021 09:30 10/05/2021 10:15

10/05/2021 10:30 10/20/2021 09:15

10/20/2021 09:30 11/09/2021 10:00

11/09/2021 10:30 12/02/2021 10:15

12/02/2021 10:45 01/25/2022 10:15

**Mesquite Bay**

Deployment Retrieval

Date/Time Date/Time

12/08/2020 13:45 01/21/2021 13:45

01/21/2021 14:00 02/24/2021 15:00

02/24/2021 15:30 03/23/2021 11:00

03/23/2021 11:15 04/08/2021 12:45

04/08/2021 13:00 04/20/2021 11:00

04/20/2021 11:15 05/04/2021 12:15

05/04/2021 12:30 06/02/2021 11:00

06/02/2021 11:30 06/15/2021 12:00

06/15/2021 12:15 07/01/2021 12:00

07/01/2021 12:15 07/20/2021 13:00

07/20/2021 13:15 08/02/2021 09:00 (stopped recording; low power)

08/03/2021 11:45 08/11/2021 02:30 (stopped recording; low power)

08/24/2021 12:00 08/27/2021 11:45 (stopped recording; low power)

09/09/2021 12:15 10/05/2021 13:15

10/05/2021 13:30 10/20/2021 10:45

10/20/2021 11:00 11/09/2021 12:15

11/09/2021 12:30 12/02/2021 12:45

12/02/2021 12:45 01/25/2022 13:00

**Ship Channel**

No deployments in 2021 due to station being damaged in the aftermath of Hurricane Harvey in 2017. MSI pier where the station will be reestablished is under construction and hoping to be completed in 2022.

**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 processed 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 2021.

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](http://www.nerrsdata.org).  Data are available in comma delimited format.

**8) Associated researchers and projects:**

As part of the SWMP long-term monitoring program, MAR NERR also monitors 15-minute meteorological data (air temperature, humidity, barometric pressure, wind speed, wind direction, precipitation, and photosynthetically active radiation) along with monthly grab samples and diel sampling for nutrient data (chlorophyll *a*, orthophosphate, ammonium, and nitrogen and silicate), and total suspended solids which may be correlated with this water quality dataset. These data are available at [www.nerrsdata.org](http://www.nerrsdata.org). Mesozooplankton samples are also collected monthly and these data may be obtained by contacting the Research Coordinator (see Section I).

The MANERR water quality monitoring project has been incorporated into the Texas Coastal Oceanic Observation Network (TCOON).

The following researchers are currently using water quality data recorded at the SWMP stations in addition to collecting water and/or samples for their own projects:

Lisa Campbell, a research scientist from Texas A & M College Station, monitors an *in*-*situ* flowcytometer (FlowCytoBot) to study the phytoplankton at the Ship Channel site in order to detect potential harmful algal blooms (HABs). This work is being conducted in conjunction with Robert Olsen of Woods Hole Oceanographic Institute.

Xinping Hu, a research scientist from Texas A & M Corpus Christi, is collecting samples to monitor the carbon cycle within the NERR and will eventually create a model using these results.

Kaijun Lu, a PhD student at UTMSI, is collecting and filtering samples to analyze for dissolved organic carbon, total dissolved nitrogen, and dissolved amino acids. The filters are then analyzed for particulate organic matter, particulate pigment, and particulate amino acids.

Philip Souza, Davidson Fellowship recipient at UTMSI, is collecting and analyzing long-term passive acoustic data within the NERR to identify trends in sound pressure levels, vessel noise, and biological sound production.

Nikki Dix, Research Director at Guana Tolomato Matanzas (GTM) NERR, lead a Chlorophyll Catalyst nutrient project involving 13 NERR reserves.

The primary objective of the project was to compare in situ chlorophyll a readings collected using a YSI total algal sensor to that of extracted chlorophyll samples to determine a relationship between the two.

There were several Marine GEO projects conducted at MAR NERR in 2021: 1) biofouling plates deployed in the marina for varying lengths of time to take photographs and eDNA samples, 2) temperature loggers deployed around the biofouling plates, vegetation monitoring sites, and oyster reefs within the reserve to look at temperature changes, and 3) a tea bag decomposition study to measure decomposition rates and characterizing the microbial community.

**II. Physical Structure Descriptors**

**9) Sensor specifications:**

MAR NERR uses YSI EXO 2 datasondes at all monitoring stations; however, YSI 6600 V2 datasondes are used to record field readings and have on hand as spares.

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

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

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

Units: pH units

Sensor Type: Glass combination electrode

Model#: 6561

Range: 0 to 14 units

Accuracy: +/- 0.2 units

Resolution: 0.01 units

Parameter: Turbidity

Units: nephelometric turbidity units (NTU)

Sensor Type: Optical, 90 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#: 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:**

[Instructions/Remove: List the sampling station, sampling site code, and station code used in the data.]

Sampling station: Sampling site code: Station code:

Aransas Bay AB marabwq

Copano East CE marcewq

Copano West CW marcwwq

Ship Channel SC marscwq

Mesquite Bay MB marmbwq

**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**:

**Aransas Bay**

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| Deploy Date | SpCond | ROXDO1 | ROXDO2 | pH7 | Turb | Turb |
|  | 50 mS | % | % |  | 0 NTU | 124 NTU |
| 1/21/2021 | 48.14 | 100.1 | 100.1 | 7.05 | -0.11 | 122.40 |
| 2/24/2021 | 48.91 | 98.1 | 98.1 | 7.02 | 5.40 | 126.30 |
| 3/23/2021 | 49.81 | 99.4 | 99.3 | 7.01 | 0.01 | 123.62 |
| 4/8/2021 | 49.57 | 98.2 | 98.2 | 6.98 | 0.26 | 123.33 |
| 4/20/2021 |  |  |  |  |  |  |
| 5/4/2021 |  | 104.1 | 104.1 | 7.06 | 0.30 | 122.31 |
| 6/2/2021 | 48.80 | 98.9 | 98.8 | 7.08 | 0.45 | 125.00 |
| 6/15/2021 | 47.86 | 98.8 | 98.8 | 7.02 | 0.40 | 126.36 |
| 7/1/2021 | 48.50 | 99.0 | 99.0 | 6.96 | 1.70 | 125.52 |
| 7/20/2021 | 47.50 | 98.4 | 98.4 | 7.00 | 0.51 | 124.64 |
| 8/3/2021 | 49.70 | 98.9 | 99.0 | 6.95 | 0.21 | 125.78 |
| 8/24/2021 | 48.05 | 98.7 | 98.7 | 7.01 | 0.11 | 121.69 |
| 9/9/2021 | 48.37 | 99.4 | 99.5 | 7.07 | 0.33 | 118.60 |
| 10/5/2021 |  | 100.0 | 100.2 | 6.97 | 0.50 | 129.70 |
| 10/20/2021 | 48.03 | 103.1 | 103.2 | 7.49 | 3.60 | 123.40 |
| 11/9/2021 |  |  |  |  |  |  |
| 12/2/2021 | 47.04 | 100.0 | 100.0 | 7.29 | 0.66 | 123.65 |

**Copano East**

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| Deploy Date | SpCond | ROXDO1 | ROXDO2 | pH7 | Turb | Turb |
|  | 50 mS | % | % |  | 0 NTU | 124 NTU |
| 1/21/2021 | 48.22 | 100.0 | 100.0 | 7.21 | 1.03 | 123.20 |
| 2/24/2021 | 45.00 | 99.2 | 99.3 | 7.01 | 0.92 | 130.00 |
| 3/23/2021 | 46.95 | 99.0 | 99.0 | 7.27 | 1.40 | 118.90 |
| 4/8/2021 | 48.68 | 99.9 | 100.0 | 7.00 | 0.00 | 122.47 |
| 4/20/2021 | 48.33 | 98.7 | 98.7 | 6.88 | 1.20 | 126.50 |
| 5/4/2021 | 48.52 | 99.3 | 99.3 | 7.07 | 0.50 | 121.80 |
| 6/2/2021 | 48.67 |  |  | 10.51 | 1.10 | 126.50 |
| 6/15/2021 | 47.81 | 99.4 | 99.3 | 6.97 | 0.50 | 122.77 |
| 7/1/2021 |  |  |  |  |  |  |
| 7/20/2021 | 47.68 | 99.4 | 99.4 | 7.06 | 0.10 | 123.73 |
| 8/3/2021 |  |  |  |  |  |  |
| 8/24/2021 | 48.93 | 99.1 | 99.0 | 7.00 | 0.15 | 123.14 |
| 9/9/2021 | 48.30 | 100.0 | 99.9 | 7.05 | 0.98 | 117.28 |
| 10/5/2021 | 48.15 | 104.3 | 104.2 | 7.04 | 0.27 | 128.40 |
| 10/20/2021 | 44.95 | 99.8 |  | 6.97 | 0.11 | 123.54 |
| 11/9/2021 | 49.21 | 100.0 | 99.8 | 7.02 | -1.00 | 122.45 |
| 12/2/2021 | 46.10 | 101.9 | 101.9 | 7.05 | 0.50 | 121.80 |

**Copano West**

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| Deploy Date | SpCond | ROXDO1 | ROXDO2 | pH7 | Turb | Turb |
|  | 50 mS | % | % |  | 0 NTU | 124 NTU |
| 1/21/2021 | 49.28 | 100.8 | 100.8 | 6.91 | -0.07 | 112.40 |
| 2/24/2021 | 45.96 | 98.6 | 98.7 | 7.00 | 3.00 | 129.00 |
| 3/23/2021 | 48.28 | 99.0 | 99.0 | 7.04 | 1.50 | 121.68 |
| 4/8/2021 | 50.54 | 99.2 | 99.2 | 6.95 | 0.03 | 122.80 |
| 4/20/2021 | 47.59 | 98.7 | 98.6 | 7.00 | 0.92 | 126.30 |
| 5/4/2021 | 48.47 | 99.3 | 99.2 | 7.04 | 0.40 | 125.26 |
| 6/2/2021 | 48.96 | 98.7 | 98.8 | 7.12 | 0.09 | 125.04 |
| 6/15/2021 | 48.38 | 99.3 | 99.3 | 7.00 | 0.80 | 123.13 |
| 7/1/2021 | 48.58 | 100.0 | 100.0 | 7.06 | 0.31 | 126.04 |
| 7/20/2021 | 46.62 | 100.1 | 100.1 | 7.00 | -0.01 | 124.91 |
| 8/3/2021 | 49.51 | 99.7 | 99.7 | 7.03 | 0.04 | 124.40 |
| 8/24/2021 | 48.46 | 82.3 | 82.4 | 7.08 | -0.03 | 121.47 |
| 9/9/2021 |  | 93.6 | 93.8 | 7.23 |  |  |
| 10/5/2021 | 47.40 | 100.1 | 100.5 | 6.97 | 0.36 | 135.60 |
| 10/20/2021 | 47.21 | 101.0 | 101.0 | 7.03 | 0.55 | 121.87 |
| 11/9/2021 | 48.93 | 100.1 | 99.9 | 6.98 | -0.10 | 122.83 |
| 12/2/2021 | 48.02 | 101.1 | 101.2 |  | 0.40 | 120.53 |

**Mesquite Bay**

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| Deploy Date | SpCond | ROXDO1 | ROXDO2 | pH7 | Turb | Turb |
|  | 50 mS | % | % |  | 0 NTU | 124 NTU |
| 1/21/2021 | 49.14 | 98.9 | 98.9 | 6.98 | 0.05 | 123.40 |
| 2/24/2021 | 47.93 | 97.6 | 97.5 | 6.96 | 0.90 | 127.90 |
| 3/23/2021 | 47.65 | 98.3 | 98.3 | 6.98 | 0.22 | 116.80 |
| 4/8/2021 | 49.11 | 98.8 | 98.7 | 6.94 | -0.10 | 123.46 |
| 4/20/2021 | 48.51 | 97.9 | 97.9 | 7.01 | 0.51 | 122.94 |
| 5/4/2021 | 49.16 | 99.2 | 99.1 | 7.07 | 0.49 | 123.34 |
| 6/2/2021 | 49.17 | 98.7 | 98.9 | 7.04 | 0.83 | 126.40 |
| 6/15/2021 | 51.50 |  |  | 6.98 | 3.20 | 134.30 |
| 7/1/2021 | 47.45 | 98.6 | 98.7 | 7.08 | 0.98 | 127.28 |
| 7/20/2021 |  |  |  |  |  |  |
| 8/3/2021 | 49.24 |  | 90.1 | 7.10 | -0.08 | 125.45 |
| 8/24/2021 | 47.34 | 97.6 |  | 7.05 | 0.75 | 120.77 |
| 9/9/2021 | 46.86 | 0.02 | 0.02 | 6.36 | 0.50 | 118.23 |
| 10/5/2021 | 45.97 | 103.1 | 103.0 | 7.00 | 0.16 | 128.20 |
| 10/20/2021 | 48.10 | 100.8 | 100.8 | 6.91 | 0.12 | 122.08 |
| 11/9/2021 | 46.85 | 101.1 | 101.1 | 6.99 | 0.06 | 126.02 |
| 12/2/2021 | 47.29 | 100.8 | 100.8 | 7.24 | 1.01 | 123.75 |

\*Note: pH post-deployment readings are temperature dependent and minor variations are expected as a result.

Blank cells in the above table are due to either a sensor not working at the end of the deployment or the KOR software not recognizing the sensor.

**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.

Depth/Level readings may change abruptly due to large barges traveling back and forth through the Intercoastal Canal (AB) or across the bays (CE, CW, MB), displacing water near the station. Readings at the Ship Channel are most subject to abrupt changes due to large ships coming through the channel.

In general, salinity changes within 2 ppt in a 15 minute interval are accepted as being good since the water can sometimes become stratified; however, if the difference is greater than 2 ppt between 15 minute samplings, data are flagged suspect.

**Aransas Bay**

There were many instances where the salinity dropped > 2 psu within a 15-minute interval and may possibly be due to groundwater input. These data were flagged suspect since we have no way of verifying that input. 06/09/21 23:30; 06/12/21 04:45; 06/13/21 03:30; 06/14/21 00:45, 18:45, 20:45; 06/21/21 04:00, 06:00, 10:00-10:15; 06/22/21 01:45, 04:00; 06/25/21 05:15; 06/26/21 05:15, 16:45, 18:00-18:15, 22:45, 23:30; 06/27/21 01:15, 01:45; 09/07/21 06:00; 09/25/21 17:15, 23:45; 09/26/21 01:45, 02:45, 04:45, 19:00, 21:15; 09/27/21 08:30, 11:45, 16:15, 20:45; 09/28/21 11:30, 13:00, 18:30, 20:30, 21:30; 09/29/21 03:00, 20:30, 23:15-23:30

02/24/2021 09:00 – 03/23/2021 07:30 Raw file was broken into multiple segments with extra headers which had to be removed prior to upload as per CDMO advice; therefore, the raw .CSV file uploaded to the CDMO will not match the .BIN file.

04/20/2021 07:45 – 05/04/2021 07:45 Raw file was broken into multiple segments with extra headers which had to be removed prior to upload; therefore, the raw .CSV file uploaded to the CDMO will not match the .BIN file.

04/30/2021 02:15 – 05/04/2021 07:45 Instrument malfunctioned and only DO%, DO mg, and Depth were recorded after that. Since Temp was missing, all recorded parameters were rejected -3 GIM CSM.

05/04/2021 08:00 – 06/02/2021 07:15 Raw file was broken into multiple segments with extra headers which had to be removed prior to upload. In addition, the columns shifted, and data had to be moved to correspond with the correct header; therefore, the raw .CSV file uploaded to the CDMO will not match the .BIN file.

05/19/2021 04:15 – 06/02/2021 07:15 Temp sensor stopped recording; therefore, all parameters except Turbidity were rejected -3 STF CSM. There were a few Turbidty spikes which were flagged 1/-3 STS CCU.

07/20/2021 07:45 – 08/03/2021 07:45 Raw file was broken into multiple segments with extra headers which had to be removed prior to upload; therefore, the raw .CSV file uploaded to the CDMO will not match the .BIN file.

09/09/2021 08:00 – 10/05/2021 08:00 Raw file was broken into multiple segments with extra headers which had to be removed prior to upload; therefore, the raw .CSV file uploaded to the CDMO will not match the .BIN file.

10/16/2021 22:45 – 10/20/2021 07:15 SpCond and Salinity readings dropped low for no apparent reason and were rejected -3 SCF CSM (along with supported parameters). Shortly after the SpCond/Salinity readings dropped low, the Chlorophyll sensor jumped high until the end of the deployment; although, there was minimal fouling on the sonde and sensors. Chlorophyll readings after 10/17/2021 18:15 were rejected -3 SSD CSM. The sonde was sent in for repair and ports 3 & 6 were not working properly.

10/20/2021 07:45 – 11/09/2021 08:45 The depth offset was not calculated during calibration; therefore depth data were flagged suspect 1 SIC CSM. Except for the last week of data which were rejected due to SpCond sensor failure. In addition to this, the Chlorophyll sensor calibrated fine; however, readings were 0 throughout deployment. The raw file was broken into multiple segments with extra headers which had to be removed prior to upload; therefore, the raw .CSV file uploaded to the CDMO will not match the .BIN file.

11/02/2021 03:15 – 11/09/2021 08:45 SpCond and Salinity readings started dropping rapidly for no apparent reason. There was a moderate amount of fouling on post; however, it remains unclear since the post-calibration readings weren’t out of range. SpCond and Salinity data were initially flagged suspect 1 SSM CSM but then rejected -3 SCF CSM (along with supported parameters) starting on 11/02/2021 23:00 until the end of deployment. During this time, we were having an issue with our station antenna and suspect that it may have contributed to the C/T issues that we were seeing.

11/09/2021 09:15 – 12/02/2021 09:00 Depth not working during calibration despite trying to uncalibrate the sensor, and we didn’t have back-up sonde. Depth was reading high (or NAN) until 11/15/2021 01:00 when Depth stopped recording. Depth data were rejected -3 SSM CSM. The other parameters stopped recording on 11/15/2021 19:45; however, the battery started recording again on 11/15/2021 23:30. Raw file was broken into multiple segments with extra headers which had to be removed prior to upload; therefore, the raw .CSV file uploaded to the CDMO will not match the .BIN file.

11/15/2021 19:15 – 12/02/2021 09:00 Data are missing from all parameters except battery voltage and a couple of pH readings. Error message given by sonde upon retrieval: power/comms board FPGA failed; sensors drawing too much power.

**Copano East**

There were many instances where the salinity dropped > 2 psu within a 15-minute interval and may possibly be due to groundwater input. These data were flagged suspect since we have no way of verifying that input. 02/10/21 19:00; 03/07/21 18:30; 03/17/21 02:30; 03/20/21 05:00; 03/21/21 02:00; 03/27/21 20:00; 03/29/21 23:15; 04/01/21 04:45, 23:15; 04/07/21 12:30; 04/14/21 20:15; 05/17/21 09:30; 06/05/21 20:30; 06/11/21 07:00; 06/19/21 20:45; 06/20/21 20:45; 06/21/21 19:30; 06/24/21 07:45; 12/21/21 12:00

Salinity drops that were > 15 psu within a 15-minute interval and although they may possibly be due to groundwater input, these data were rejected along with supported parameters (Salinity, DO mg, Depth): 03/04/21 00:00

01/21/2021 12:15 – 02/24/2021 13:15 Raw file was broken into multiple segments with extra headers which had to be removed prior to upload as per CDMO advice; therefore, the raw .CSV file uploaded to the CDMO will not match the .BIN file.

04/22/2021 13:45 – 05/04/2021 10:30 The conductivity sensor started showing drift a few days after the start of the 04/20/2021 deployment. The same event was also noted at the CW site. We are unsure what caused this. We did note light biofouling upon retrieval but we are unsure how much that impacted data. Data were flagged 1 SSD CSM until a couple days before retrieval in which they were rejected -3 SSD CSM. Supported parameters (Salinity, DO mg, Depth) were rejected -3 SCF CSM.

05/04/2021 10:45 – 06/02/2021 09:45 Data were collected at the wrong Depth for the first 11 days but then went to correct Depth. Depth data were flagged 1 GSM CWD and all other data were left as <0>. Raw file was broken into multiple segments with extra headers which had to be removed prior to upload; therefore, the raw .CSV file uploaded to the CDMO will not match the .BIN file.

06/02/2021 10:00 – 06/15/2021 10:45 Raw file was broken into many segments with extra headers which had to be removed prior to upload. In addition, DO and Chl stopped recording, so the columns shifted over and had to be moved to correspond with the appropriate headers. Due to these manipulations, the raw .CSV file uploaded to the CDMO will not match the .BIN file. The sonde stopped recording on 06/12/2021 00:45; however, data after that were recovered via telemetry and uploaded separately. pH slope was out of range from the beginning of the deployment and initially lined up with the previous deployment until it totally failed. We have had pH sensors on order for a couple of months but there was a shipping delay due to the Covid-19 pandemic.

06/15/2021 11:00 – 07/01/2021 10:45 There was an instrument malfunction at 6/15/2021 19:45 in which the Depth and DO values were zero. Depth and DO data were rejected -3 GIM CSM. In addition to that, the next two lines contained an overlapping timestamp which had to be removed prior to upload; therefore, the raw .CSV uploaded to the CDMO will not match the .BIN file. The lines of data that should have been in that time slot were retrieved via telemetry.

07/01/2021 11:30 – 07/03/2021 20:15 Power pin 3 broke off the sonde (Vader) and we were unable to retrieve the file from the sonde. There were only a couple of days of data collected via telemetry. Sonde was sent in for repair.

08/03/2021 10:15 – 08/24/2021 10:00 There was an issue with the sonde in which the timestamp for the file was all jumbled up and had to be rearranged in the proper sequence; the rest of the data were missing and had to be collected via telemetry and uploaded separately. There were a couple of gaps in the data and then a malfunction on 08/23/21 20:45 where all the data after that were repeated until the end of the file. All data after the malfunction were rejected -3 GIM CSM. Due to the timestamp manipulations, the raw .CSV file uploaded to the CDMO will not match the .BIN file.

08/24/2021 10:15 – 09/09/2021 10:15 The file was broken into multiple sections with extra headers that had to be removed prior to upload; therefore, the raw .CSV file uploaded to the CDMO will not match the .BIN file.

09/09/2021 10:30 – 10/05/2021 11:30 Sonde used for this deployment had just been returned from repair at YSI and time was set 2 hours ahead; therefore, timestamp had to be corrected to CST by subtracting 2 hours. In addition to this, the file was broken into multiple sections with extra headers that had to be removed prior to upload. Due to these issues, the raw .CSV file uploaded to the CDMO will not match the .BIN.

10/05/2021 11:45 – 10/20/2021 09:45 Data were collected at the wrong Depth. Depth data were flagged suspect 1 GSM CWD and all other parameters left as 0 GSM CWD except for one Turbidity spike which was rejected -3 GSM CWD.

10/20/2021 10:15 – 11/09/2021 10:45 File was jumbled up with timestamp out of sequence and a lot of missing data. Sent .BIN file to YSI and they opened it using KOR 1 software and all the data were in the exported file. Timestamp had to be corrected to CST by subtracting 2 hours since it had never been reset after being repaired; therefore, the raw .CSV file uploaded to the CDMO will not match the .BIN file. Depth data are missing 10/23/2021 07:15 – 10/24/2021 12:45 and YSI tech believes that the issue with the file was a result of the DO sensor which kept resetting itself after each sample. During calibration, the CDMO website was down and the SWMP tech was unable to get the correct Depth offset; therefore, Depth data were flagged suspect 1 SIC CSM.

11/09/2021 11:15 – 12/02/2021 11:30 Data were collected at the wrong Depth. Depth data were flagged suspect 1 GSM CWD and all other parameters left as 0 GSM CWD.

**Copano West**

There were many instances where the salinity dropped > 2 psu within a 15-minute interval and may possibly be due to groundwater input. These data were flagged suspect 1 CSM since we have no way of verifying that input. 01/24/21 16:45; 02/05/21 19:30; 03/27/21 11:45; 03/29/21 00:45; 03/31/21 04:30; 05/10/21 08:00, 08:30; 05/12/21 03:00; 05/13/21 22:00; 05/14/21 21:00, 22:00; 05/16/21 15:30, 18:15, 18:45; 05/25/21 02:45; 06/11/21 21:30

Salinity drops that were > 15 psu within a 15-minute interval or appear to have been affected by the wiper were rejected along with supported parameters -3 SCF CSM: 05/10/21 07:45; 05/12/21 06:45

01/21/2021 10:30 – 02/24/2021 11:45 Data were collected at the wrong Depth; Level data were flagged suspect 1 GSM CWD and the other parameters were left as <0> since they don’t appear to be affected.

02/24/2021 12:15 – 03/23/2021 08:45 An incorrect offset was used during calibration of Level; therefore, Level data were corrected by adding -0.01 to the readings. Due to this, the raw .CSV file uploaded to the CDMO will not match the .BIN file.

07/01/2021 10:15 – 07/20/2021 11:30 Raw file was broken into multiple segments with extra headers which had to be removed prior to upload; therefore, the raw .CSV file uploaded to the CDMO will not match the .BIN file.

07/20/2021 11:45 – 08/03/2021 09:15 Data were collected at the wrong depth. Level data were flagged 1 GSM CWD; all other data were left as < 0> since they didn’t appear to have been affected. Raw file was broken into multiple segments with extra headers which had to be removed prior to upload; therefore, the raw .CSV file uploaded to the CDMO will not match the .BIN file.

08/24/2021 09:15 – 09/09/2021 09:15 Raw file was broken into multiple segments with extra headers which had to be removed prior to upload; therefore, the raw .CSV file uploaded to the CDMO will not match the .BIN file.

09/09/2021 09:30 – 10/05/2021 10:15 File was broken into multiple sections with extra headers that had to be removed; therefore, the raw .CSV file uploaded to the CDMO will not match the .BIN file. Depth stopped recording on 09/28/2021 18:00-19:00 for no apparent reason and then the C/T sensor failed on 09/28/2021 19:15. All data after that time except Turbidity were rejected -3 STF CSM and then Turbidity stopped recording on 09/29/2021 04:30.

10/20/2021 09:30 – 11/09/2021 10:00 Chlorophyll sensor was working fine and calibrated successfully; however, sensor was not recording in KOR. Possible issue with port?

11/09/2021 10:30 – 12/31/2021 23:45 There was a sonde guard stuck in the deployment tube from previous deployment. Due to this, the sonde wasn’t at the correct Depth; therefore, Level data were flagged suspect 1 GSM CWD. All other parameters were left as 0 GSM CWD, except for a stray Chlorophyll spike.

12/02/2021 10:45 – 12/31/2021 23:45 Two ports weren’t working on the sonde, one of which was for the pH sensor and we didn’t have a spare sonde. Ports were cleaned and still did not work; therefore, there were no readings for pH.

12/02/2021 10:45 – 12/31/2021 23:45 The sonde was sitting on the guard that had been stuck in the tube during the 11/9/21 deployment; therefore, level data need to be flagged 1 GSM CWD and all other parameters left as 0 GSM CWD.

**Mesquite Bay**

There were many instances where the salinity dropped > 2 psu within a 15-minute interval and may possibly be due to groundwater input. These data were flagged suspect since we have no way of verifying that input: 04/14/21 08:00; 05/08/21 20:45, 22:00; 05/09/21 03:15, 03:45, 06:15; 05/10/21 09:30; 05/13/21 02:45; 05/26/21 16:15

Salinity drops that were > 15 psu within a 15-minute interval or appear to have been affected by the wiper voltage were rejected along with supported parameters (Salinity, DO mg, Depth): 02/14/21 21:15, 23:15; 02/15/21 00:00, 00:45, 01:30, 02:00, 02:30, 03:00, 04:00, 04:45, 05:30, 06:00, 06:30, 07:15, 08:30, 09:15, 10:00, 10:45; 05/04/21 09:45; 05/06/21 11:15, 12:30; 05/09/21 08:30; 05/12/21 12:00, 18:45; 05/13/21 02:15, 04:30-04:45; 05/24/21 07:15, 13:45; 05/25/21 13:00, 13:30, 18:15; 05/26/21 09:45, 12:15, 13:15, 13:45, 15:45, 19:30, 23:45; 05/27/21 09:15, 11:30-11:45, 12:15; 05/28/21 03:30, 07:15, 23:00; 05/30/21 09:15

01/01/2021 00:00 – 06/16/2021 10:15 Deployment tube was at the incorrect position from October 2020 to June 2021; therefore Level data were flagged suspect 1 GSM CWD; all other parameters were left as <0>.

01/21/2021 14:00 – 02/24/2021 15:00 Raw file was broken into multiple segments with extra headers which had to be removed prior to upload; therefore, the raw .CSV file uploaded to the CDMO will not match the .BIN file.

05/04/2021 12:30 – 06/02/2021 11:00 Raw file was broken into multiple segments with extra headers which had to be removed prior to upload; therefore, the raw .CSV file uploaded to the CDMO will not match the .BIN file.

06/02/2021 11:30 – 06/15/2021 12:00 Raw file was broken into multiple segments with extra headers which had to be removed prior to upload; therefore, the raw .CSV file uploaded to the CDMO will not match the .BIN file.

06/15/2021 12:15 – 07/01/2021 12:00 Sonde was recording fine until 6/22/21 13:00 when the wiper stopped working and caused the file to break up into many sections with extra headers and the datetimestamp was all jumbled up. The datetimestamp had to be rearranged sequentially after removing the extra headers; therefore, the raw .CSV file uploaded to the CDMO does not match the .BIN file. Data prior to the wiper stopping were missing from the initial download, but Matt Longfield at YSI was able to retrieve it (using KOR 1 software) after I sent the raw file. Those data were uploaded as a separate file. The other half of the file had periodic lines of data that were missing but recovered via telemetry.

06/16/21 10:45 Data were rejected since the sonde had been pulled up while the crew adjusted the placement of the deployment tube which hadn’t been in the correct position since it fell in October 2020.

08/02/2021 09:00 – 08/03/2021 11:30 Data are missing during this time due to low battery. During retrieval, it was discovered that one of the wires on the flying lead cable had popped out of the SOA which has been the issue with the power drain of the sonde for the past 3 deployments. Data retrieved via telemetry consisted of NANs and readings outside the accuracy of the sensor due to the wire being outside the SOA.

08/11/2021 02:45 – 08/24/2021 11:45 Data are missing during this time due to low battery. During retrieval, it was discovered that one of the wires on the flying lead cable had popped out of the SOA which has been the issue with the power drain of the sonde for the past 3 deployments. Data retrieved via telemetry consisted of NANs and readings outside the accuracy of the sensor due to the wire being outside the SOA.

08/27/2021 12:00 – 09/09/2021 12:00 Data are missing during this time due to low battery. During retrieval, it was discovered that one of the wires on the flying lead cable had popped out of the SOA which has been the issue with the power drain of the sonde for the past 3 deployments. Data retrieved via telemetry consisted of NANs and readings outside the accuracy of the sensor due to the wire being outside the SOA.

09/09/2021 12:15 – 10/05/2021 13:15 File was broken into multiple segments with extra headers that had to be removed prior to upload; therefore, the raw .CSV file uploaded to the CDMO will not match the .BIN file.

09/12/2021 01:15 – 10/05/2021 13:15 DO stopped recording 3 days after deployment for no apparent reason; therefore, DO data are missing during this time.

10/05/2021 13:30 – 10/20/2021 10:45 There was an issue with the Depth sensor with high readings which went higher than the accuracy of the sensor at one point resulting in NANs. Depth data were rejected -3 SSM CSM and all other data left as <0>. In addition to this, the NANs caused an issue with the file during upload since those readings surpassed the number of characters allowed which in turn caused the parameters to shift columns. Amber truncated the decimal place to two which allowed the data to be ingested into the CDMO without further issue. Due to these slight manipulations, the raw .CSV file uploaded to the CDMO will be slightly different than the .BIN file.

10/20/2021 11:00 – 11/09/2021 12:15 Sonde had just returned from being repaired and the YSI tech had changed the timestamp. We had to correct the timestamp to CST by subtracting 2 hours; therefore, the raw .CSV file uploaded to the CDMO will not match the .BIN file.

Table 1. The mean daily discharge for 2021

|  |  |  |  |
| --- | --- | --- | --- |
| River | Location | USGS gauge | Discharge (ft3 s-1) |
| Aransas River | Skidmore, TX | 08189700 | 74.3 |
| Mission River | Refugio, TX | 08189500 | 218.1 |
| Copano Creek | Refugio, TX | 08189200 | 99 |
| San Antonio River | Goliad, TX | 08188500 | 949.9 |
| Guadalupe River | Victoria, TX | 08176500 | 1,793 |

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Map

Description automatically generated