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**Narragansett Bay (NAR)**

**National Estuarine Research Reserve Water Quality Metadata**

January to December 2011

Wednesday October 27, 2021

# **I. Data Set and Research Descriptors**

1. **Principal investigators and contact persons**

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1. **Entry verification**

Deployment data are uploaded from the YSI data logger to a laptop computer (IBM compatible). Files are exported from EcoWatch in a comma-delimited format (.CDF) and uploaded to the CDMO where they undergo automated primary QAQC; automated depth/level corrections for changes in barometric pressure (cDepth or cLevel parameters); and become part of the CDMO’s online provisional database. All pre- and post-deployment data are removed from the file prior to upload. During primary QAQC, data are flagged if they are missing or out of sensor range. The edited file is then returned to the Reserve for secondary QAQC where it is opened in Microsoft Excel and processed using the CDMO’s NERRQAQC Excel macro. The macro inserts station codes, creates metadata worksheets for flagged data and summary statistics, and graphs the data for review. It allows the user to apply QAQC flags and codes to the data, remove any overlapping deployment data, append files, and export the resulting data file for upload to the CDMO. Upload after secondary QAQC results in ingestion into the database as provisional plus data, recalculation of cDepth or cLevel parameters, and finally tertiary QAQC by the CDMO and assimilation into the CDMO’s authoritative online database. Where deployment overlap occurs between files, the data produced by the newly calibrated sonde is generally accepted as being the most accurate. For more information on QAQC flags and codes, see Sections 11 and 12. The person responsible for data management is Dr. Durant.

Sea-truthing was conducted by measuring water quality with an additional data logger taking real-time measurements at the time of deployment (except for the Nag Creek site). The data were recorded using a hand-held YSI 556-MPS data logger. Values for temperature, salinity, DO (% saturation and mg/L), pH, and time were recorded real-time at either 0.5 or 1.0 meter intervals between the surface and bottom at each deployment site. The preparation and post-deployment procedures for the data logger used in sea-truthing follows the same general procedure as that for data loggers used in deployments, and is the responsibility of the Reserve’s technician.

1. **Research objectives**

YSI 6600 data loggers are being deployed off Prudence Island in Narragansett Bay as part of the National Estuarine Research Reserve's (NERR) System Wide Monitoring Program (SWMP). The goal is to develop long-term data sets for representative estuarine systems in order to track changes in water quality over time. Because Prudence Island is located in the geographic center of Narragansett Bay, it is an ideal location for monitoring the status and trends in water quality in the Bay over time. One NERR water quality monitoring station has been established at Potter Cove, on the island's northeastern shore. This area is impacted by boat traffic and storm runoff from mainland urban and residential areas. The second NERR water quality monitoring station, T-Wharf, is situated on the southeastern shore of the island, facing the open waters of Rhode Island Sound. It is approximately 6 miles south of the Potter Cove site. Boat traffic is sparse at this site and storm runoff is less likely to have a significant impact on water quality. A third monitoring site was added in March 2002. This monitoring site is located in Nag Creek, a salt marsh tidal creek which flows into the West Passage of Narragansett Bay. The addition of this site completes our representation of dominant habitat types occurring in Narragansett Bay (i.e. marsh, cove, and open water). In July of 2002, the T-Wharf monitoring station was replaced with two new monitoring sites located a short distance from the original T-Wharf location. The new stations are situated on either side of a wharf support piling. One data logger records water quality near the surface while the second records water quality parameters approximately 0.5 meters off the bottom. This allows for the identification of both the frequency and duration of any stratification which may occur in the open waters of Narragansett Bay. The Narragansett Bay water quality monitoring program began in December 1995 at Potter Cove, and in September 1996 at T-Wharf (Section 5, Site Location and Character section for description of sites). YSI electronic data loggers were deployed to measure the water temperature, specific conductance, dissolved oxygen, pH, depth, and turbidity conditions at 30-minute intervals. However, since 2004, data have been collected at 15-minute intervals. With the exception of the T-Wharf Surface site, all data loggers are deployed approximately 0.5 meters off the bottom.

1. **Research Methods**

One data logger is deployed at each permanent monitoring station in Narragansett Bay. The instruments are deployed for approximately two weeks at a time, depending on the season, and measurements are taken every 15 minutes (see note below). The monitoring station at Potter Cove was originally constructed in 1995, and it consisted of a PVC pipe mounted vertically on a piling located approximately 6 feet west of a floating dock. To facilitate water flow across the sensors, openings were cut into the PVC pipes. The pipes were positioned to ensure that the sensors were less than 1 meter from the bottom. In 2006, the infrastructure at Potter Cove was replaced. It currently consists of a short PVC tube attached to an adjacent dock, with a line attached through the pipe to an anchor on the bottom. The sonde is attached to the anchor via a shackle and hook set-up, and a float is attached to the top of the sonde to keep it approximately 0.75 m off the bottom. With this setup, the sonde is free and clear of any pipe affects since the pipe does not extend to the bottom and serves only as a “decoy pipe” to prevent vandalism.

In 1996, the original T-Wharf station was put into service using a PVC pipe mounted on a piling attached to a pier. In 2002, the two replacement T-Wharf sites (surface and bottom) were also deployed in PVC pipes mounted to a piling. The sonde at the T-Wharf surface station is maintained just below the surface by means of a buoy attached by rope to the adjacent wharf; the sonde at T-wharf bottom is maintained approximately 0.5 m off the bottom. The pipes are cleaned monthly with a chimney brush during the summer to reduce the impact of biofouling on the data. On 10/11/06, the PVC deployment pipes and securing structures were replaced at the T-Wharf site. The design was similar to the previous pipe design and consisted of holes drilled through the pipe and large slits at the bottom of the pipe to allow for free water movement at the sonde. The T-Wharf Bottom pipe extends approximately 6 m though the water to the bottom of the site, where the sonde is kept approximately 1.0 m off the bottom. The T-Wharf Surface pipe extends approximately 2 m under the surface of the water (at low tide), where the sonde is attached to a float to keep it approximately 0.5 m below the surface of the water. After Tropical Storm Irene in August of 2011, the deploying structure was damaged; the PVC pipe was lost and the piling where it was attached to was damaged beyond repair. The Reserve made the arrangements to purchase and install a new piling by February 2012; PVC pipes will be used again as deploying structures; this is a work in progress. However, after the tropical storm, a temporary structure was build consisting of a steel cable attached to the wharf with an anchor at the end to keep the cable straight and in place. The Surface and Bottom sondes are attached to the cable for each deployment and lowered into the water with a security line. The sondes are secure and this structure has been working fine.

The Nag Creek sonde was originally deployed in a metal cage which was tethered to the bank. A permanent deployment structure was installed 12/31/02, consisting of a 4” x 4” pressure-treated post with a hinged 2” x 4” horizontal arm. On 09/08/06, the sonde deployment structure was redesigned and changed. The new structure consists of an L-shape wooden structure that held in place in the sediment by a large metal tripod sunk into the mud. The sonde is extended from the arm into the water via a cleat, eye and line system and hangs approximately 0.35 m from the bottom of the creek.

For each sampling period, the pH, salinity, depth, and turbidity sensors are calibrated, using the following standards: pH 7 and 10, specific conductivity standard of 50.00 mS/cm, depth in the air, and turbidity standards of 0 and 126 NTU. For EDS data loggers, the dissolved oxygen (DO) membrane is replaced and allowed to stretch for a minimum of 12 hours before the Rapid Pulse DO sensor is calibrated in water-saturated air. The sonde is programmed to begin taking measurements approximately 12 hours in advance of planned deployment, allowing the DO membrane to stabilize. The file is checked for DO sensor drift before the DO probe is calibrated. Calibration of the dissolved oxygen sensor is usually done within 2 hours of deployment. The V2 sondes have optical DO probes (DO ROX), therefore, there is no membrane to be changed and can be calibrated at the same time as the other sensors. At the end of each sampling period, the data loggers are retrieved and freshly calibrated instruments are deployed. The retrieved data loggers are brought back to the laboratory, post-deployment evaluations of the instrument are carried out, and the device is cleaned and serviced by methods outlined in the YSI Operating and Service Manual.

Note: Data from all stations was historically collected at 30-minute sampling intervals. In 2004, the Narragansett Bay NERR became involved with a statewide fixed site water quality monitoring program (refer to Section 8). Data collection at all stations was changed to 15 a minute sampling interval in order to be compliant with this local monitoring effort.

A Sutron Sat-Link2 transmitter was installed at the T-Wharf Bottom monitoring site on 07/27/06 and transmits data to the NOAA GOES satellite, NESDIS ID #3B0335EE. The transmissions are scheduled hourly and contain four (4) datasets 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 [http://cdmo.baruch.sc.edu](http://cdmo.baruch.sc.edu/).

1. **Site location and character**

The NBNERR consists of 4376 acres of diverse estuarine and terrestrial habitats ranging from deep water to salt marshes to forested uplands. The land holdings include 65% of Prudence Island, most of nearby Patience Island, and all of Hope and Dyer Islands. The Reserve is located close to the geographic center of Narragansett Bay in Rhode Island. The Narragansett Bay Watershed drains approximately 1,800 square miles and there are numerous and substantial freshwater inputs to the Bay.

Specific characteristics of the Narragansett Bay National Estuarine Research Reserve

Location: 41°38’30” N, 71°20’30” W

Tidal range: -0.2 to 1.7 meters MLW

Salinity: 15 to 32 ppt

Temperature: -1.0 to 26 C

Province: North temperate, Virginian bioregion

Specific characteristics of the Potters Cove site are:

Location: 41° 38.416’ N, 71° 20.450’ W

Depth: 0.9 to 3.9 meters

Bottom habitat: Sand, silt, some organic mud

Pollutants: Boaters’ wastes, storm runoff from mainland urban areas

Watershed: Narragansett Bay, North Prudence (4801 square km)

Specific characteristics of the Nag Creek site are:

Location: 41° 37.483’ N, 71° 19.450’ W

Depth: 0.1 to 1.4 meters

Bottom habitat: Organic mud

Pollutants: Negligible

Watershed: Narragansett Bay, West Passage

Specific characteristics of the T-Wharf Surface site are:

Location: 41° 34.700’ N, 71° 19.266’ W

Depth: 0.2 to 0.9 meters

Bottom habitat: Sand, silt, some organic mud

Pollutants: Negligible

Watershed: Narragansett Bay, South Prudence

Specific characteristics of the T-Wharf Bottom site are:

Location: 41° 34.700’ N, 71° 19.266’ W

Depth: 4.6 to 6.9 meters

Bottom habitat: Sand, silt, some organic mud

Pollutants: Negligible

Watershed: Narragansett Bay, South Prudence

1. **Data collection period**

Potter Cove (Data collection ongoing since 1995)

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Sonde | Deployment | | Retrieval | |
| Date | Time | Date | Time |
| 01E0876AB-V2 | 12/29/10 | 11:15 | 01/11/11 | 10:45 |
| 00E0937AB-V2 | 01/11/11 | 11:00 | 01/26/11 | 11:30 |
| 04C4394AA-EDS | 01/26/11 | 11:45 | 02/14/11 | 12:30 |
| 01E0566AD-EDS | 02/14/11 | 13:15 | 02/23/11 | 14:30 |
| 04C4394AA-EDS | 02/23/11 | 15:00 | 03/01/11 | 09:45 |
| 05E1300AE-EDS | 03/01/11 | 10:00 | 03/15/11 | 09:00 |
| 00E0937AB-V2 | 03/15/11 | 09:15 | 03/28/11 | 11:45 |
| 01E0876AB-V2 | 03/28/11 | 12:15 | 04/14/11 | 10:30 |
| 06C1207AA-V2 | 04/14/11 | 11:00 | 04/26/11 | 08:45 |
| 00E0937AD-V2 | 04/26/11 | 09:00 | 05/10/11 | 09:00 |
| 01E0566AA-V2 | 05/10/11 | 09:30 | 05/24/11 | 09:15 |
| 06C1207AA-V2 | 05/24/11 | 09:45 | 06/07/11 | 09:15 |
| 00E0937AD-V2 | 06/07/11 | 09:30 | 06/21/11 | 08:30 |
| 01E0566AA-V2 | 06/21/11 | 09:00 | 07/06/11 | 13:00 |
| 05E1065AE-V2 | 07/06/11 | 13:30 | 07/19/11 | 09:30 |
| 00E0937AB-V2 | 07/19/11 | 09:45 | 08/02/11 | 11:00 |
| 01E0876AB-V2 | 08/02/11 | 11:15 | 08/16/11 | 09:30 |
| 05E1065AE-V2 | 08/16/11 | 10:00 | 08/26/11 | 08:30 |
| 05E1065AE-V2 | 09/02/11 | 10:30 | 09/13/11 | 09:15 |
| 01E0566AD-EDS | 09/13/11 | 09:30 | 09/27/11 | 08:45 |
| 06C1207AA-V2 | 09/27/11 | 09:00 | 10/12/11 | 08:45 |
| 00E0937AD-V2 | 10/12/11 | 09:00 | 10/25/11 | 08:30 |
| 02A0229AA-EDS | 10/25/11 | 09:15 | 11/08/11 | 09:30 |
| 00E0937AD-V2 | 11/08/11 | 10:00 | 11/22/11 | 09:30 |
| 01E0566AA-V2 | 11/22/11 | 09:45 | 12/06/11 | 10:15 |
| 05E1065AE-V2 | 12/06/11 | 10:30 | 12/20/11 | 09:15 |
| 06C1207AA-V2 | 12/22/11 | 14:45 | 1/5/2012 | 09:30 |

Nag Creek (Data collection ongoing since 2002)

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Sonde | Deployment | | Retrieval | |
| Date | Time | Date | Time |
| 01E0876AB-V2 | 12/14/10 | 12:30 | 01/03/11 | 12:15 |
| 04C4394AA-EDS | 03/15/11 | 12:15 | 03/28/11 | 11:30 |
| 01E0566AD-EDS | 03/28/11 | 11:45 | 04/14/11 | 10:00 |
| 05E1065AE-V2 | 04/14/11 | 10:15 | 04/26/11 | 09:30 |
| 00E0937AB-V2 | 04/26/11 | 13:30 | 05/10/11 | 09:30 |
| 01E0876AB-V2 | 05/10/11 | 09:45 | 05/24/11 | 09:45 |
| 05E1065AE-V2 | 05/24/11 | 10:00 | 06/07/11 | 09:45 |
| 00E0937AB-V2 | 06/07/11 | 10:00 | 06/21/11 | 09:00 |
| 01E0876AB-V2 | 06/21/11 | 09:15 | 07/06/11 | 13:30 |
| 06C1207AA-V2 | 07/06/11 | 14:15 | 07/19/11 | 10:00 |
| 00E0937AD-V2 | 07/19/11 | 10:30 | 08/02/11 | 11:15 |
| 01E0566AA-V2 | 08/02/11 | 11:45 | 08/16/11 | 09:00 |
| 06C1207AA-V2 | 08/16/11 | 09:30 | 08/26/11 | 09:00 |
| 01E0566AA-V2 | 09/07/11 | 09:30 | 09/13/11 | 09:30 |
| 02A0229AA-EDS | 09/13/11 | 09:45 | 09/27/11 | 09:15 |
| 01E0876AB-V2 | 09/27/11 | 09:30 | 10/12/11 | 09:15 |
| 01E0566AA-V2 | 10/12/11 | 09:30 | 10/25/11 | 08:45 |
| 05E1065AE-V2 | 10/25/11 | 09:15 | 11/08/11 | 09:45 |
| 06C1207AA-V2 | 11/08/11 | 10:15 | 11/22/11 | 10:00 |
| 00E0937AD-V2 | 11/22/11 | 10:30 | 12/06/11 | 10:45 |
| 02A0229AA-EDS | 12/06/11 | 11:00 | 12/20/11 | 09:45 |
| 01E0876AB-V2 | 12/20/11 | 10:00 | 01/05/12 | 10:15 |

T-Wharf Surface (Data collection ongoing since 2002)

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Sonde | Deployment | | Retrieval | |
| Date | Time | Date | Time |
| 01E0566AD-EDS | 12/22/11 | 11:45 | 01/04/11 | 10:15 |
| 04C4394AA-EDS | 01/04/11 | 10:30 | 01/20/11 | 10:30 |
| 00E0937AD-V2 | 01/20/11 | 10:45 | 02/03/11 | 11:30 |
| 05E1300AE-EDS | 02/03/11 | 11:45 | 02/23/11 | 10:30 |
| 00E0937AB-V2 | 02/23/11 | 10:45 | 03/08/11 | 09:45 |
| 01E0566AD-EDS | 03/08/11 | 10:15 | 03/22/11 | 09:15 |
| 05E1065AE-V2 | 03/22/11 | 09:30 | 04/06/11 | 08:45 |
| 04C4394AA-EDS | 04/06/11 | 09:15 | 04/19/11 | 08:45 |
| 01E0566AD-EDS | 04/19/11 | 09:15 | 05/03/11 | 10:00 |
| 05E1065AE-V2 | 05/03/11 | 10:30 | 05/18/11 | 09:15 |
| 00E0937AB-V2 | 05/18/11 | 09:45 | 06/01/11 | 09:30 |
| 01E0566AA-V2 | 06/01/11 | 09:45 | 06/15/11 | 08:45 |
| 06C1207AA-V2 | 06/15/11 | 10:00 | 06/28/11 | 13:15 |
| 00E0937AB-V2 | 06/28/11 | 13:30 | 07/12/11 | 13:15 |
| 01E0876AB-V2 | 07/12/11 | 13:30 | 07/26/11 | 13:00 |
| 06C1207AA-V2 | 07/26/11 | 13:45 | 08/10/11 | 13:15 |
| 00E0937AD-V2 | 08/10/11 | 13:45 | 08/24/11 | 08:30 |
| 01E0566AA-V2 | 08/24/11 | 10:45 | 10/04/11 | 11:15 |
| 02A0229AA-EDS | 10/04/11 | 09:45 | 10/18/11 | 08:15 |
| 06C1207AA-V2 | 10/18/11 | 09:15 | 11/01/11 | 08:15 |
| 00E0937AD-V2 | 11/01/11 | 08:45 | 11/15/11 | 09:15 |
| 02A0229AA-EDS | 11/15/11 | 09:45 | 11/29/11 | 09:30 |
| 01E0876AB-V2 | 11/29/11 | 10:00 | 12/13/11 | 09:30 |
| 01E0566AA-V2 | 12/13/11 | 10:45 | 12/28/11 | 09:30 |
| 05E1300AE-EDS | 12/28/11 | 10:15 | 01/10/12 | 10:15 |

T-Wharf Bottom (Data collection ongoing since 2002)

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Sonde | Deployment | | Retrieval | |
| Date | Time | Date | Time |
| 06C1207AA-V2 | 12/22/10 | 12:45 | 01/04/11 | 10:15 |
| 01E0876AB-V2 | 01/04/11 | 10:30 | 01/20/11 | 10:30 |
| 06C1207AA-V2 | 01/20/11 | 10:45 | 02/03/11 | 11:15 |
| 01E0876AB-V2 | 02/03/11 | 11:45 | 02/23/11 | 13:45 |
| 06C1207AA-V2 | 02/23/11 | 14:00 | 03/08/11 | 09:45 |
| 01E0876AB-V2 | 03/08/11 | 10:00 | 03/23/11 | 10:30 |
| 06C1207AA-V2 | 03/23/11 | 10:45 | 04/06/11 | 08:45 |
| 00E0937AB-V2 | 04/06/11 | 09:00 | 04/19/11 | 08:45 |
| 01E0876AB-V2 | 04/19/11 | 09:15 | 05/03/11 | 10:00 |
| 06C1207AA-V2 | 05/03/11 | 10:30 | 05/18/11 | 09:15 |
| 00E0937AD-V2 | 05/18/11 | 09:30 | 06/01/11 | 09:30 |
| 01E0876AB-V2 | 06/01/11 | 10:00 | 06/15/11 | 09:00 |
| 05E1065AE-V2 | 06/15/11 | 10:00 | 06/28/11 | 13:15 |
| 00E0937AD-V2 | 06/28/11 | 13:45 | 07/12/11 | 13:15 |
| 01E0566AA-V2 | 07/12/11 | 13:30 | 07/26/11 | 13:00 |
| 05E1065AE-V2 | 07/26/11 | 13:30 | 08/10/11 | 13:15 |
| 00E0937AB-V2 | 08/10/11 | 14:00 | 08/24/11 | 08:30 |
| 01E0876AB-V2 | 08/24/11 | 10:45 | 08/26/11 | 11:15 |
| 05E1065AE-V2 | 10/04/11 | 09:15 | 10/18/11 | 08:15 |
| 01E0876AB-V2 | 10/18/11 | 09:15 | 11/01/11 | 08:15 |
| 01E0566AA-V2 | 11/01/11 | 08:45 | 11/15/11 | 09:15 |
| 05E1065AE-V2 | 11/15/11 | 10:00 | 11/29/11 | 09:15 |
| 06C1207AA-V2 | 11/29/11 | 09:45 | 12/13/11 | 09:15 |
| 00E0937AD-V2 | 12/13/11 | 10:45 | 12/28/11 | 09:30 |
| 05E1065AE-V2 | 12/28/11 | 10:15 | 01/10/12 | 10:15 |

1. **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 2021.

1. **Associated researchers and projects**

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.

In 2004, the NBNERR became involved in the Bay Window Monitoring Program, which is a Bay-wide water quality monitoring program. Although the NBNERR is no longer involved with managing data from the Bay window program, NBNERR SWMP data are still shared with and used for analysis in the program. The NBNERR also provides SWMP data to:

Dr. Candace Oviatt at URI-GSO is using NAR NERR chlorophyll data to track the timing and magnitude of winter/spring blooms in Narragansett Bay.

Ms. Heather Stoffel at URI-GSO is using NAR NERR data from T-Wharf Surface, T-Wharf Bottom, and Potter's Cove stations in a local monitoring network strategy partially funded through Bay Window and headed by RIDEM-OWR.

Dr. Steve D’Hondt at URI-GSO is using the NAR NERR water quality data collected at Potter Cove to study the factors affecting pH around Narragansett Bay.

PhD student Ms. Courtney Schmidt from the University of RI, Graduate School of Oceanography, is using meteorological data from the NAR NERR weather station to examine patterns in atmospheric deposition of nitrogen.

**II. Physical Structure Descriptors**

1. **Sensor specifications**

NAR NERR deployed YSI 6600, 6600EDS, 6600V2 data loggers from January through December 2011. Only optical DO ROX sensors were deployed at T-Wharf Bottom during the year. Optical DO ROX sensors were deployed alternating with Rapid-pulse DO, at T-Wharf Surface, Potter Cove and Nag Creek.

Parameter: **Temperature**

Units: Celsius - oC

Sensor Type: Thermistor

Model #: 6560

Range: -5 to 50 °C

Accuracy: ± 0.15 °C

Resolution: 0.01 °C

Parameter: **Conductivity**

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

Sensor Type: 4-electrode cell with autoranging

Model #: 6560

Range: 0 to 100 mS/cm

Accuracy: ± 0.5% of reading + 0.001 mS/cm

Resolution: 0.001 mS/cm to 0.1 mS/cm (range dependent)

Parameter: **Salinity**

Units: Parts per thousand (ppt)

Sensor Type: Calculated from conductivity and temperature

Range: 0 to 70 ppt

Accuracy: ± 1.0% of reading or 0.1 ppt, whichever is greater

Resolution: 0.01 ppt

Parameter: **Dissolved Oxygen**

Units: Percent air saturation (%)

Sensor Type: Rapid Pulse – Clark type, Polarographic

Model #: 6562

Range: 0 to 500 % air saturation

Accuracy: 0-200 % air saturation, ± 2 % of the reading or 2 % air saturation, whichever is

greater; 200 to 500 % air saturation, ± 6 % of the reading

Resolution: 0.1 % air saturation

- or -

Sensor Type: Optical probe with mechanical cleaning

Model #: 6150 ROX

Range: 0 to 500% air saturation

Accuracy: 0-200% air saturation: ± 1% of the reading or 1% air saturation, whichever is

greater; 200 500% air saturation: ± 15% of reading

Resolution: 0.1% air saturation

Parameter: **Dissolved Oxygen** (Calculated from % air saturation, temperature and salinity)

Units: milligrams per Liter (mg/L)

Sensor Type: Rapid Pulse – Clark type, polarographic

Model #: 6562

Range: 0 to 50 mg/L

Accuracy: 0 to 20 mg/L, ± 2 % of the reading or 0.2 mg/L, whichever is greater; 20 to 50

mg/L, ± 6 % of the reading

Resolution: 0.01 mg/L

- or -

Sensor Type: Optical probe with 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: meters (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 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° scatter, with mechanical cleaning

Model #: 6136

Range: 0 to 1000 NTU

Accuracy: ± 2 % reading or 0.3 NTU (whichever is greater)

Resolution: 0.1 NTU

Parameter: **Chlorophyll Fluorescence**

Units: micrograms/Liter

Sensor Type: Optical probe with mechanical cleaning

Model#: 6025

Range: 0 to 400 µg/Liter

Accuracy: Dependent on methodology

Resolution: 0.1 µg /L chl *a*, 0.1% FS

Dissolved Oxygen Qualifier:

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

Depth Qualifier:

The NERR System-Wide Monitoring Program utilizes YSI data sondes that can be equipped with either vented or non-vented depth/level sensors. Readings for both vented and non-vented sensors are automatically compensated for water density change due to variations in temperature and salinity; but for all non-vented depth measurements, changes in atmospheric pressure between calibrations appear as changes in water depth.  The error is equal to approximately 1.03 cm for every 1 millibar change in atmospheric pressure, and is eliminated for vented sensors because they are vented to the atmosphere throughout the deployment time interval.

Beginning in 2006, NERR SWMP standard calibration protocol calls for all non-vented depth sensors to read 0 meters at a (local) barometric pressure of 1013.25 mb (760 mm/hg). To achieve this, each site calibrates their depth sensor with a depth offset number, which is calculated using the actual atmospheric pressure at the time of calibration and the equation provided in the SWMP calibration sheet or digital calibration log. This offset procedure standardizes each depth calibration for the entire NERR System. If accurate atmospheric pressure data are available, non-vented sensor depth measurements at any NERR can be corrected.

In 2010, the CDMO began automatically correcting depth/level data for changes in barometric pressure as measured by the Reserve’s associated meteorological station during data ingestion. These corrected depth/level data are reported as cDepth and cLevel, and are assigned QAQC flags and codes based on QAQC protocols. Please see sections 11 and 12 for QAQC flag and code definitions.

1. **Coded variable definitions**

|  |  |  |
| --- | --- | --- |
| Sampling station | Sampling site code | Station code |
| Potter Cove | PC | narpcwq |
| Nag Creek | NC | narncwq |
| T-Wharf Surface | TS | nartswq |
| T-Wharf Bottom | TB | nartbwq |

1. **QAQC flag definitions**

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

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

1. **QAQC code definitions**

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

GIC No instrument deployed due to ice

GIM Instrument malfunction

GIT Instrument recording error; recovered telemetry data

GMC No instrument deployed due to maintenance/calibration

GNF Deployment tube clogged / no flow

GOW Out of water event

GPF Power failure / low battery

GQR Data rejected due to QA/QC checks

GSM See metadata

Corrected Depth/Level Data Codes

GCC Calculated with data that were corrected during QA/QC

GCM Calculated value could not be determined due to missing data

GCR Calculated value could not be determined due to rejected data

GCS Calculated value suspect due to questionable data

GCU Calculated value could not be determined due to unavailable data

Sensor Errors

SBO Blocked optic

SCF Conductivity sensor failure

SCS Chlorophyll spike

SDF Depth port frozen

SDG Suspect due to sensor diagnostics

SDO DO suspect

SDP DO membrane puncture

SIC Incorrect calibration / contaminated standard

SNV Negative value

SOW Sensor out of water

SPC Post calibration out of range

SQR Data rejected due to QAQC checks

SSD Sensor drift

SSM Sensor malfunction

SSR Sensor removed / not deployed

STF Catastrophic temperature sensor failure

STS Turbidity spike

SWM Wiper malfunction / loss

Comments

CAB\* Algal bloom

CAF Acceptable calibration/accuracy error of sensor

CAP Depth sensor in water, affected by atmospheric pressure

CBF Biofouling

CCU Cause unknown

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

CDB\* Disturbed bottom

CDF Data appear to fit conditions

CFK\* Fish kill

CIP \*Surface ice present at sample station

CLT\* Low tide

CMC\* In field maintenance/cleaning

CMD\* Mud in probe guard

CND New deployment begins

CRE\* Significant rain event

CSM\* See metadata

CTS Turbidity spike

CVT\* Possible vandalism/tampering

CWD\* Data collected at wrong depth

CWE\* Significant weather event

1. **Post deployment information**

Readings were taken using calibration standards immediately after retrieval. Subscript numbers used for clarification. Blue cells indicate the use of Rapid pulse DO probe, while green cells indicate the use of Turbidity Standard 123.

Potter Cove

|  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Deployment Date | SpCond | ROX DO 1 | ROX DO 2 | pH | pH | Turb | Turb | Depth | Chl |
| mm/dd/yy | (50) | (100% sat) | (100% sat) | (7) | (10) | (0) | (126) | (m) | (0) |
| 01/11/11 | 53.02 | 106.8 | 106.7 | 7.14 | 10.17 | 1 | 127 | -0.037 | -0.9 |
| 01/26/11 | 48.18 | 121.5 | 121.5 | 7.06 | 10.35 | 0 | 126 | 0.007 | 0.2 |
| 02/07/11 | 50.00 | 107.2 | 107.1 | 7.15 | 10.16 | 1 | 126 | -0.201 | 0.3 |
| 02/14/11 | 51.43 | 94.2 | 94.0 | 7.10 | 10.21 | -1 | 124 | 0.083 | -0.3 |
| 03/01/11**1** | 50.23 | 94.2 | 94.0 | 7.19 | 10.18 | -1 | 122 | 0.027 | -0.1 |
| 03/15/11 | 50.55 | 100.6 | 100.6 | 7.07 | 10.13 | 0 | 124 | -0.070 | -0.3 |
| 03/28/11 | 49.35 | 100.3 | 100.3 | 7.01 | 10.05 | 0 | 112 | 0.006 | 0.7 |
| 04/14/11 | 51.09 | 99.5 | 99.4 | 7.06 | 10.05 | -2 | 123 | 0.007 | 0.1 |
| 04/26/11 | 49.31 | 101.1 | 101.0 | 7.06 | 10.12 | 0 | 123 | 0.004 | 0.0 |
| 05/10/11 | 50.45 | 98.1 | 98.1 | 7.03 | 10.08 | -2 | 123 | -0.058 | 0.1 |
| 05/24/11 | 49.96 | 99.6 | 99.6 | 7.09 | 10.19 | 0 | 124 | -0.015 | 0.6 |
| 06/07/11 | 49.86 | 97.0 | 97.0 | 7.11 | 10.17 | 0 | 126 | -0.009 | 0.0 |
| 06/21/11 | 49.77 | 100.3 | 100.3 | 7.06 | 10.09 | 1 | 127 | -0.023 | 0.4 |
| 07/06/11 | 50.27 | 96.4 | 96.4 | 7.07 | 10.07 | 1 | 124 | -0.055 | 0.4 |
| 07/19/11 | 49.93 | 99.2 | 99.2 | 6.95 | 9.97 | 0 | 119 | -0.123 | -0.8 |
| 08/02/11 | 49.72 | 92.6 | 92.6 | 7.09 | 10.09 | 0 | 124 | -0.043 | 0.1 |
| 08/16/11 | 50.54 | 97.2 | 97.2 | 7.08 | 10.10 | 1 | 127 | 0.027 | 0.2 |
| 09/02/11 | 49.16 | 99.9 | 99.9 | 7.06 | 10.09 | 0 | 125 | -0.008 | 0.0 |
| 09/13/11 | 49.85 | 100.0 | 100.0 | 7.14 | 10.18 | 0 | 123 | 0.013 | 0.2 |
| 09/27/11 | 50.23 | 98.5 | 98.5 | 6.97 | 10.05 | 0 | 124 | 0.069 | 0.7 |
| 10/12/11 | 49.72 | 100.9 | 100.9 | 7.06 | 10.10 | 0 | 125 | -0.032 | -0.5 |
| 10/25/11 | 50.12 | 102.7 | 102.7 | 7.08 | 10.11 | 0 | 128 | 0.088 | 0.1 |
| 11/08/11 | 50.05 | 102.5 | 102.5 | 7.09 | 10.11 | -1 | 128 | 0.134 | 1.2 |
| 11/22/11 | 50.46 | 100.6 | 100.6 | 7.11 | 10.11 | 0 | 126 | 0.029 | 1.3 |
| 12/06/11**2** | 19.00 | 31.3 | 31.3 | 7.11 | 9.50 | 0 | 187 | 0.058 | -0.5 |
| 12/22/11 | 50.37 | 101.7 | 101.7 | 7.02 | 10.08 | -1 | 126 | -0.052 | -1.3 |

**1** Wiper fell off during deployment.

**2** Temperature probe failed approximately during the second half of the deployment.

Nag Creek

|  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Deployment Date | SpCond | ROX DO 1 | ROX DO 2 | pH | pH | Turb | Turb | Depth | Chl |
| mm/dd/yy | (50) | (100% sat) | (100% sat) | (7) | (10) | (0) | (126) | (m) | (0) |
| 03/15/11 | 50.02 | 102.9 | 102.9 | 7.08 | 10.27 | -1 | 125 | -0.07 | 1.2 |
| 03/28/11 | 49.16 | 99.3 | 99.2 | 7.10 | 10.14 | 0 | 123 | 0.003 | 0.2 |
| 04/14/11 | 51.24 | 101.5 | 101.5 | 6.99 | 10.10 | -1 | 121 | 0.006 | -0.7 |
| 04/26/11 | 49.90 | 98.0 | 98.0 | 7.03 | 10.05 | -1 | 122 | 0.008 | 1.0 |
| 05/09/11 | 50.45 | 97.5 | 97.5 | 7.08 | 10.12 | 0 | 125 | -0.06 | 1.2 |
| 05/24/11 | 49.96 | 95.9 | 95.9 | 7.01 | 10.10 | 2 | 127 | -0.01 | 0.1 |
| 06/07/11 | 49.80 | 104.4 | 104.4 | 7.12 | 10.19 | -1 | 117 | -0.02 | 2.6 |
| 06/21/11 | 49.95 | 94.3 | 94.3 | 7.15 | 10.22 | 0 | 125 | -0.03 | 0.2 |
| 07/06/11 | 49.83 | 93.9 | 93.9 | 7.09 | 10.13 | 1 | 103 | -0.06 | 0.9 |
| 07/19/11 | 50.37 | 98.6 | 98.6 | 7.08 | 10.27 | 0 | 126 | -0.11 | -0.1 |
| 08/02/11 | 51.07 | 98.9 | 98.9 | 7.08 | 10.13 | 0 | 126 | -0.05 | 0.1 |
| 08/16/11 | 49.11 | 102.7 | 102.6 | 7.12 | 10.13 | 1 | 124 | 0.013 | 0.2 |
| 09/07/11 | 49.80 | 101.1 | 101.1 | 7.09 | 10.11 | 1 | 125 | -0.02 | 0.7 |
| 09/13/11 | 49.10 | 107.5 | 107.5 | 7.14 | 10.18 | 0 | 123 | 0.011 | 0.2 |
| 09/27/11 | 49.76 | 103.1 | 103.1 | 7.11 | 10.15 | 1 | 124 | 0.061 | 1.3 |
| 10/12/11 | 50.33 | 101.7 | 101.7 | 7.08 | 10.15 | 0 | 126 | -0.02 | 0.0 |
| 10/25/11 | 49.82 | 103.7 | 103.7 | 7.10 | 10.19 | 0 | 127 | 0.084 | -0.3 |
| 11/08/11 | 46.29 | 103.7 | 103.7 | 7.04 | 10.10 | 0 | 127 | 0.138 | -0.4 |
| 11/22/11 | 50.84 | 101.4 | 101.4 | 7.03 | 10.13 | 0 | 127 | 0.031 | -0.5 |
| 12/06/11 | 50.50 | 84.6 | 84.6 | 7.07 | 10.11 | 0 | 127 | 0.056 | 0.4 |
| 12/20/11**1** | 50.35 | 98.7 | 98.7 | 7.07 | 10.14 | 0 | 127 | -0.05 | 0.6 |

**1** ice on site

T-Wharf Surface

|  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Deployment Date | SpCond | ROX DO 1 | ROX DO 2 | pH | pH | Turb | Turb | Depth | Chl |
| mm/dd/yy | (50) | (100% sat) | (100% sat) | (7) | (10) | (0) | (126) | (m) | (0) |
| 01/03/11 | 50.88 | 99.1 | 98.8 | 7.14 | 10.19 | 0 | 125 | -0.004 | 2.6 |
| 01/19/11 | 50.46 | 104.1 | 104.1 | 7.11 | 10.07 | 0 | 124 | 0.092 | 0.9 |
| 02/03/11 | 48.21 | 207.5 | 206.5 | 7.21 | 10.29 | 0 | 124 | 0.083 | 0.7 |
| 02/23/11 | 52.04 | 100.0 | 100.0 | 7.13 | 10.14 | 0 | 123 | 0.189 | 0.8 |
| 03/08/11 | 49.58 | 102.4 | 102.3 | 7.13 | 10.20 | 0 | 126 | -0.060 | -0.1 |
| 03/22/11 | 50.37 | 102.3 | 102.3 | 7.10 | 10.09 | 1 | 124 | -0.006 | -0.1 |
| 04/06/11 | 49.00 | 94.5 | 94.3 | 7.05 | 10.21 | 0 | 123 | 0.068 | 1.8 |
| 04/19/11 | 51.40 | 100.3 | 100.3 | 7.11 | 10.11 | 0 | 123 | 0.063 | 0.0 |
| 05/03/11 | 49.96 | 102.8 | 102.8 | 7.05 | 10.10 | -1 | 122 | 0.064 | 0.0 |
| 05/18/11 | 50.65 | 100.3 | 100.2 | 7.05 | 10.06 | 0 | 124 | 0.038 | 1.9 |
| 06/01/11 | 50.08 | 95.4 | 95.4 | 7.05 | 10.12 | 0 | 128 | -0.039 | -0.1 |
| 06/15/11 | 49.37 | 98.1 | 98.1 | 7.13 | 10.18 | 0 | 119 | -0.024 | 1.9 |
| 06/28/11 | 49.31 | 99.5 | 99.5 | 7.13 | 10.11 | 3 | 124 | -0.107 | -1.6 |
| 07/12/11 | 50.14 | 85.2 | 85.2 | 6.98 | 9.99 | 0 | 122 | -0.086 | -0.1 |
| 07/26/11 | 50.00 | 96.8 | 96.8 | 7.10 | 10.13 | 1 | 107 | -0.131 | -0.6 |
| 08/10/11 | 50.43 | 107.2 | 107.2 | 7.15 | 10.17 | 0 | 125 | 0.046 | -0.1 |
| 08/24/11 | 50.11 | 102.0 | 102.0 | 7.11 | 10.14 | 0 | 125 | 0.007 | 2.7 |
| 10/04/11 | 50.04 | 103.7 | 103.7 | 7.01 | 10.08 | 2 | 120 | -0.023 | 1.6 |
| 10/18/11 | 49.78 | 101.6 | 101.6 | 7.03 | 10.10 | 1 | 122 | 0.124 | 0.3 |
| 11/01/11 | 49.14 | 99.6 | 99.6 | 7.09 | 10.12 | 0 | 128 | -0.071 | -1.1 |
| 11/15/11 | 49.73 | 101.7 | 101.7 | 7.03 | 10.09 | 1 | 125 | 0.035 | -0.1 |
| 11/29/11 | 50.78 | 104.2 | 104.2 | 7.15 | 10.23 | 0 | 127 | 0.108 | -0.6 |
| 12/13/11 | 50.27 | 99.8 | 99.7 | 7.08 | 10.12 | 0 | 126 | -0.193 | 0.1 |
| 12/28/11 | 50.08 | 104.4 | 104.4 | 7.00 | 10.07 | 0 | 127 | -0.025 | -0.4 |

T-Wharf Bottom

|  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Deployment Date | SpCond | ROX DO 1 | ROX DO 2 | pH | pH | Turb | Turb | Depth | Chl |
| mm/dd/yy | (50.00) | (100% sat) | (100% sat) | (7) | (10) | (0) | (126) | (m) | (0) |
| 01/04/11 | 49.63 | 97.4 | 97.4 | 7.02 | 10.05 | -1 | 123 | 0.010 | -0.9 |
| 01/20/11 | 50.37 | 106.9 | 106.8 | 7.03 | 10.02 | 1 | 125 | 0.079 | 0.6 |
| 02/03/11 | 48.25 | 101.5 | 101.5 | 7.09 | 10.13 | 1 | 125 | 0.103 | -0.9 |
| 02/23/11 | 51.68 | 97.9 | 97.9 | 7.08 | 10.13 | -1 | 123 | 0.181 | -1.1 |
| 03/08/11 | 50.05 | 101.5 | 101.5 | 7.10 | 10.15 | 0 | 126 | -0.075 | 0.0 |
| 03/23/11 | 50.52 | 93.2 | 93.2 | 7.50 | 10.06 | -1 | 123 | 0.043 | 0.6 |
| 04/06/11 | 49.41 | 101.3 | 101.2 | 7.11 | 10.14 | 0 | 124 | 0.061 | 0.7 |
| 04/19/11 | 51.68 | 102.1 | 102.1 | 7.02 | 10.06 | 1 | 124 | 0.067 | 0.2 |
| 05/03/11 | 49.73 | 102.1 | 102.1 | 7.08 | 10.10 | 0 | 123 | 0.067 | 0.4 |
| 05/18/11 | 50.26 | 101.4 | 101.3 | 7.05 | 10.09 | -1 | 126 | 0.014 | -0.1 |
| 06/01/11 | 50.26 | 97.9 | 97.9 | 7.06 | 10.14 | 0 | 128 | -0.083 | -0.3 |
| 06/15/11 | 49.54 | 98.9 | 98.9 | 7.06 | 10.09 | 17 | 124 | -0.026 | 0.0 |
| 06/28/11 | 49.63 | 99.6 | 99.5 | 7.13 | 10.15 | 0 | 125 | -0.124 | 0.3 |
| 07/12/11 | 49.84 | 101.6 | 101.6 | 7.11 | 10.12 | -1 | 125 | -0.102 | 0.3 |
| 07/25/11 | 50.32 | 97.3 | 97.3 | 7.08 | 10.11 | 18 | 135 | 50.32 | 0.4 |
| 08/10/11 | 49.74 | 101.3 | 101.3 | 6.94 | 9.99 | 824 | 825 | 0.053 | 853 |
| 08/24/11 | 50.41 | 100.3 | 100.3 | 7.09 | 10.12 | 0 | 126 | 0.011 | 0.1 |
| 10/04/11 | 48.79 | 101.7 | 101.7 | 6.84 | 9.95 | 2 | 128 | -0.033 | 0.0 |
| 10/18/11 | 50.31 | 104.6 | 104.6 | 7.10 | 10.12 | 1 | 126 | 0.113 | 0.4 |
| 11/01/11 | 49.85 | 99.3 | 99.3 | 7.12 | 10.15 | 1 | 128 | -0.067 | 0.2 |
| 11/15/11 | 50.60 | 103.0 | 103.0 | 7.00 | 10.06 | 1 | 126 | 0.044 | 0.0 |
| 11/29/11 | 50.88 | 102.2 | 102.2 | 7.03 | 10.01 | 0 | 125 | 0.115 | 0.3 |
| 12/13/11**1** | 60.00 | 118.8 | 117.5 | 7.06 | 10.17 | 0 | 117 | -0.201 | 1.5 |
| 12/28/11 | 50.04 | 99.2 | 99.2 | 6.95 | 10.04 | 0 | 127 | -0.046 | 0.4 |

**1** Temperature probe failed.

1. **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.

Slight depth anomalies occurred at the T-Wharf Surface monitoring station. The datalogger at this station is suspended from the bottom of a buoy attached by rope to the adjacent wharf. On occasion it became apparent that the sonde and/or buoy had become caught up in the rope, but never to such an extent that the sonde came out of the water unless otherwise noted. Wave action during periods of high winds may be responsible for some of the depth variation. Because this sonde is attached to a float it is readily impacted by heavy wave action. Deployment near the surface also allows for depth measurements to be altered by changes in atmospheric pressure. At no time were the variations in depth considered sufficient to alter the validity of the data.

Slight depth anomalies frequently occur at the Nag Creek deployment location. Depth at this site may have been influenced to some extent by changes in atmospheric pressure because the sonde was situated in very shallow waters. On occasion, the combination of low atmospheric pressure and shallow water resulted in negative depth values. Weather station data appear to support this theory. It is also suspected that due to its shallow location and location in a salt marsh, freshwater runoff from the island may affect specific conductivity/salinity readings several days after a rain event has occurred. Specific conductivity, salinity, and dissolved oxygen can also vary greatly in Nag Creek over tidal and diel cycles. Nag creek is a very shallow site and is highly affected by tides and rain events. On some occasions, dissolved oxygen is recorded as negative values at the Nag Creek deployment location. DO frequently ranges between supersaturation and complete anoxic conditions (DO = 0 % saturation) at this site during the summer months. Ice is also common in Nag Creek. There have been occasions where ice has affected all sonde parameters and are marked in the data as “see metadata”.

Chlorophyll and fluorescence data were collected along with the data represented in this document, but because chlorophyll and fluorescence are not part of the NERR SWMP Water Quality Program, the data are not reported within this dataset. Chlorophyll fluorescence data are available upon request by contacting the Reserve.

The following are description of different events that happened and explanations to the CSM (Comment-See Metadata) code for the four water quality station data files of 2011.

Potter Cove

* Jan 01 to Jan 05 12:00, Sep 6 - 10, and Sep 28 to Oct 05, Nov 23-26: Record column - data coded CSM. Apparently, the sonde got tangled and was not able to move with the tides in the water column affecting depth data. However, we strongly believe that the other parameters were not affected since this is a shallow, well mixed site Variations in depth were considered suspect and flagged and coded as 1 GSM CWD. Parameters not affected by the depth variations were flagged and coded 0 GSM CWD.
* Aug 26 to Sep 02: Record column - data coded CWE (comment, weather event) due to the passing of Tropical Storm Irene. Data coded CSM (comment, see metadata) - data missing because the sonde was pulled out early during the deployment due to the storm. The deployment structure was damaged during the storm, but then secured.
* Dec 20 – 22: Data coded CSM (comment, see metadata). Data is missing because the sonde was pulled out of the water due to the replacement of the floating dock at Potter Cove were the deploying structure is attached.

Nag Creek

* Throughout the year there are small turbidity spikes marked 1 STS CSM. Due to the sonde being deployed in a horizontal position, there is, at times, drift algae that gets caught up on the station and affects the turbidity data.
* Jan 03 to Mar 15 - the sonde was out of the water due to ice formation in the creek.
* Aug 26 to Sep 07: Record column - data coded CWE (comment, weather event) due to the passing of Tropical Storm Irene. Data coded CSM (comment, see metadata) - data missing because the sonde was pulled out early during the deployment due to the storm. The deployment structure was damaged during the storm, but then secured.
* Dec 28 – 31: Record column – data coded CIP (comment, ice present at station) because there was ice in the creek at the end of the deployment. Data coded CSM (comment, see metadata) – due to the presence of ice in the creek, the deployment structure was knocked over, and the data appeared to reflect this fact; data was rejected.

T-Wharf Surface-

* June 20 14:15 – 17:00, August 14 23:00-23:45, 08/15 00:00-00:15, 08/17 00:00-00:45. Slight depth anomalies occurred at the T-Wharf Surface monitoring station. The datalogger at this station is suspended from the bottom of a buoy attached by rope to the adjacent wharf. On occasion it became apparent that the sonde and/or buoy had become caught up in the rope, but never to such an extent that the sonde came out of the water unless otherwise noted. Wave action during periods of high winds may be responsible for some of the depth variation. Because this sonde is attached to a float it is readily impacted by heavy wave action. Deployment near the surface also allows for depth measurements to be altered by changes in atmospheric pressure. At no time were the variations in depth considered sufficient to alter the validity of the data. These variations in depth were considered suspect and flagged and coded as 1 GSM CWD. Parameters not affected by the slight depth variations were flagged and coded 0 GSM CWD.
* Aug 26 to Oct 04: Record column - data coded CWE (comment, weather event) due to the passing of Tropical Storm Irene. Data coded CSM (comment, see metadata) - data missing because the sonde was pulled out early during the deployment due to the storm. Part of the deployment structure was lost during the storm, but then replaced.
* Oct 04 -18, Oct 24-28, Dec 08-13: with the new sonde setup, the sonde was getting tangled with the security line. This can be seen in the depth column; however, we believe the data was not affected. Variations in depth were considered suspect and flagged and coded as 1 GSM CWD. Parameters not affected by the slight depth variations were flagged and coded 0 GSM CWD.
* Oct 18 14:00: sonde was retrieved for maintenance of the deploying structures and lines holding the sonde. The sonde collected data while out of the water. Data were rejected and flagged and coded -3 GSM CWD.

T-Wharf Bottom

* Aug 26 to Oct 04: Record column - data coded CWE (comment, weather event) due to the passing of Tropical Storm Irene. Data coded CSM (comment, see metadata) - data missing because the sonde was pulled out early during the deployment due to the storm. Part of the deployment structure was lost during the storm, but then replaced.
* Dec 08-13: The anchor was missing during this time period and depth readings may be off. The cable was tangled around the piling causing small variations in depth. Variations in depth were considered suspect and flagged and coded as 1 GSM CWD. Parameters not affected by depth by the slight depth variations were flagged and coded 0 GSM CWD.