Jacques Cousteau (JAC) NERR Water Quality Metadata
1 January 2023 – 31 December 2023
Latest Update: August 11, 2025

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 datasonde to a Personal Computer (IBM compatible). Files are exported from 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. Data management is handled by the JCNERR's SWMP Technician, Gregg P. Sakowicz.

3) Research objectives –

The water quality of the Mullica River and Great Bay has traditionally been relatively clean and free of excessive nutrient loading from anthropogenic sources. This is due to the fact that there is very little development or industry within the drainage basin of the Mullica River and its tributaries. Great Bay had a large source of nutrient loading coming from a menhaden fish processing factory that was in operation from the early 1930's to the early 1960's and affected the lower portion of the bay. The river is relatively deep, three to nine meters in the section that is monitored. Great Bay averages about two meters in depth. The river also has a dark color due to tannins and humic compounds that are a natural product coming from the Pine Barrens and are present in large amounts within the river. It is believed that nutrients entering the river upstream do not get utilized within the river because of the lack of light penetration. The great depth of the river and the dark color from the tannins flowing down the river from the Pine Barrens hinders the utilization of these nutrients by planktonic organisms. Where the river empties into the bay, light penetration reaches the bottom of the bay and allows the utilization of the nutrients by phytoplankton, making this region more productive (Durand 1979). Water circulation questions within this unique estuary can be addressed by the use of datasondes. Because of the close proximity of the lower station (site name: B6) to Little Egg Inlet, the effects of an influx of ocean water can have dramatic effects on both the water quality and on the biological aspect of the region. Upwelling along the coast is a common occurrence during the summer months. The influx of this water into the bay can and does affect larval fish transport into and out of the bay. The cooler ocean waters can have dramatic effects on the growth rates of many different species living in the area. Datasondes have been useful in tracking the physical changes within the estuary due to occurrences such as upwelling and storm events and will be helpful in translating the resulting biological events.

4) Research methods –

YSI datasondes (a.k.a. "dataloggers") are programmed to record temperature, specific conductance, salinity, dissolved oxygen, depth, pH, and turbidity every 15 minutes. Exo2 datasondes were utilized at the JC NERR. Presently, four SWMP monitoring stations are established in the Mullica River/Great Bay Reserve. These monitoring sites extend from the fresh water/salt water interface at Lower Bank, approximately 25 kilometers up the Mullica River from the point where it joins Great Bay to the mouth of Great Bay, a distance of eight kilometers. Thus the datasondes cover a total of 33 kilometers in this estuarine system.

Calibration standards required for pH were purchased from Y.S.I. (p/n 003822 (pH 7) and 003823(pH 10)). A two-point calibration was employed for pH, the first being pH 7 followed by pH 10. Calibration of the pH probe (p/n 599702) was performed via immersion in the standard and using the calibration feature of the KOR software and accepting the set-point after stable readings were obtained.

Calibration standards required for conductivity were purchased from Y.S.I.. A standard of 10 mS/cm (p/n 060911) was used to calibrate for conductivity. Calibration of the conductivity probe (p/n 599872) was performed via immersion in the standard and using the calibration feature of the KOR software and accepting the set-point after stable readings were obtained.

Dissolved oxygen was calibrated via immersion in a bucket of oxygen-saturated tap water and utilizing the dissolved oxygen calibration function of the datasonde(s). Oxygenation of the water was accomplished via aeration with an aquarium pump and air-stone for a minimum of 2 hours to saturate tap water prior to calibration. Calibration of the dissolved oxygen probe (p/n 599100-01) was performed via immersion in the aerated water and using the calibration feature of the EcoWatch or Kor software and accepting the set-point after stable readings were obtained.

Calibration of the turbidity probe (p/n 599101-01) was performed with a 0 FNU (Formazin Nephelometric Units) solution (e.g.-de-ionized water) and a 124 FNU standard (supplied by YSI, Inc., p/n 607300). Calibration of the Turbidity probe was performed via immersion in each standard and using the calibration feature of the KOR software and accepting the set-point after stable readings were obtained.

Used conductivity and pH standards were stored for rinsing probes and performing post-deployment calibration-checks after retrieval and prior to cleaning loggers. Great care was taken to clean the datasondes before calibration, and each used standard was used once as a post-calibration solution and once as a rinse solution before being discarded (unless contamination or dilution was observed or suspected).

Datasondes were deployed by inserting them in PVC pipes that are affixed to a permanent structure (i.e. two US Coast Guard channel markers (jacb6wq and jacb9wq), one commercial dock (jacnewq), and one bridge (jacbawq). The bottoms of the pipes were situated between approximately 0.5 and 1m above the sediment (the variability is the result of currents and shoaling leading to variability of the relative level of sediment below the sonde tubes). A line was used to lower and recover the datasondes within the pipes. A cross-pin (stainless steel or titanium bolt) was inserted across the bottom of the pipe and served as an end-stop for the datasonde during its descent, assuring a maximum fixed depth and retaining the datasonde if the line parted. Two-inch vent holes were drilled every 6 inches of the pipe and four two- by ten-inch-wide slots were cut in the bottom of the pipe to allow for circulation of water in the pipe and across the probes. An antifouling paint (Petit Trinidad SLR) was used to coat the last few meters of the PVC pipes, both inside and out, to suppress biofouling and subsequent blockage of the holes/vents. A section of 4" copper pipe, vented as described above, was coupled to the lower end of some pipes, serving as an additional antifouling measure. A locking cap provided security.

In 2023, two methods of deployment and data collection were employed. The first being a stand-alone deployment during which a datasonde autonomously collected data on 15-minute intervals on Eastern Standard Time (EST) and record these data internally, to later be downloaded onto a desktop/laptop computer post-retrieval. This method was employed at stations jacb9wq, jacnewq, and jacbawq. The second method employed was the pairing of datasondes with telemetry equipment that received data from the datasondes and broadcast it to the GOES satellite for receipt by the NOAA Hydrometeorological Automated Data System (HADS) as well as an independent array at the NERRS CDMO. These data were also recorded independently every 15 minutes in Eastern Standard Time (EST) by the datasondes for redundancy and to continue with the pre-existing NERRS SOP. Such telemetry was employed at jacb6wq. For more detail concerning these telemetered datasonde stations, see below:

The Sutron Sat-Link2 transmitter was installed at this Buoy 126 (B6) on 06/22/06 and transmits data to the NOAA GOES satellite, NESDIS ID #3B00C264. 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 http://cdmo.baruch.sc.edu.

The Sutron Sat-Link2 transmitter was installed at Chestnut Neck (NE) on 09/19/06 and transmits data to the NOAA GOES satellite, NESDIS ID #3B03E386. Telemetry was, however, not active at Chestnut Neck for this reporting period due to ongoing rebuilding of infrastructure. 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 http://cdmo.baruch.sc.edu.

During each sampling period, measurements of specific conductance, salinity, temperature, dissolved oxygen, (percent saturation and concentration measured in mg/L), water level (depth), pH, and turbidity were recorded. After approximately 28 days datasondes were retrieved from the PVC pipe. Deployment periods were occasionally extended because of weather-related restrictions of access. An EXO2 datasonde attached to a hand-held display was then lowered to depth in order to sample in-situ water conditions at approximately the same depth at which data was recorded. A different calibrated and programmed YSI datasonde was then deployed to replace the datasonde being recovered. The recovered datasonde was brought back to the laboratory for downloading, post-deployment calibration checking, cleaning, and re-calibration.

Upon retrieval, datasondes were wrapped in a white towel and placed in a short section of PVC pipe or a cooler for transport back to the laboratory. Datasondes were then placed in an aerated bucket of tap water overnight before post-processing according to SWMP standard operating procedures. Post-processing involves the placing of the un-cleaned datasonde in standards and recording of the displayed values, to judge how well the probes maintained calibration, determine the effect of bio-fouling (if any), and judge whether probe failure occurred during the deployment. After this post-deployment calibration check, probes were cleaned as per SWMP standard operating procedures and either re-calibrated for the next deployment or capped for storage for later calibration and deployment.

Datasondes were programmed to start recording data (ranging from one sample period to a few hours) before they were deployed in the field and allowed to run in either a wet, enclosed environment or an aerated water-filled bucket, so these deployment files often contained "tail ends" of non-deployment data, which were used to diagnose the probes but deleted before the data were processed for import into the yearly datasets. The beginning and end of each in-situ data file was compared to the handheld unit values and the data were checked for probe failure and fouling.

5) Site location and character –

The Jacques Cousteau National Estuarine Research Reserve (JCNERR) at Mullica River/Great Bay is located on the northeast coast of the United States on the Atlantic Ocean. The estuary is near Tuckerton, New Jersey about 14 kilometers north of Atlantic City. There were four active sampling stations in 2023. All four locations can be characterized by having little macroalgae (few to no established beds in the immediate locale; seasonal and structurally-dependent fouling-type communities (macroalga, barnacles, shellfish, etc.) fast moving tidal currents, and daily tidal ranges of approximately 1m and annual tidal ranges of 2m (although this can vary significantly depending on moon state, storm events, and coastal wind conditions (e.g.- "blow out tides" associated with strong

offshore winds). All sites are in a relatively undisturbed area with minimal impact from development or pollution.

Site name	Jacb6wq, a.k.a "Buoy 126"
Latitude and longitude	39.50790, -74.33850
Tidal range *(meters)*	2.09m
Salinity range *(psu)*	21.3-31.9psu
Type and amount of freshwater input	Minimal- dilute from Mullica River, local rain
Water depth (*meters, MLW*)	*2.69m (estimated)*
Sonde distance from bottom (*meters*)	0.5-1.0m, contingent on sediment movement and seasonal mussel bed growth
Bottom habitat or type	*Soft sediment, seasonal mussel bed*
Pollutants in area	None of note; boat traffic may suspend sediment periodically and an aggregation of seals on a nearby island may be a source of bacteria during winter months
Description of watershed	The closest monitoring station to Little Egg Inlet. This site can be characterized by having strong tidal currents, 2-3 knots, fine to coarse sand bottom with an extensive blue mussel bed surrounding the area. Groundwater inputs from margins of the estuary as well as surface flow from Mullica River account for the majority of freshwater coming into the system at this site, followed by input from rainwater from the marsh surface. NOTE: Despite the name, this station is a tripod United States Coast Guard channel marker, not a "buoy"

Site name	Jacb9wq, a.k.a. "Buoy 139"
Latitude and longitude	39.49794, -74.38113
Tidal range *(meters)*	1.95m
Salinity range *(psu)*	19.7-31.9m
Type and amount of freshwater input	Minimal- dilute from Mullica River, local rain
Water depth (*meters, MLW*)	*2.31m (estimated)*
Sonde distance from bottom (*meters*)	*0.5m*
Bottom habitat or type	*Muddy sand*

Pollutants in area	None of note; boat traffic may suspend sediment periodically
Description of watershed	Located 4 kilometers from Buoy 126 on the western side of Great Bay and is located about one to one and one-half kilometers from land. The datasonde at this location is attached to Intracoastal Waterway Channel Marker 139. The closest landform is an extensive salt marsh approximately 1.5 kilometers wide, which borders the upland area. This area is dredged by the U.S. Army Corp of Engineers approximately every five to six years to maintain the channel at a depth of approximately 2.5 meters. The surrounding depth of the bay is approximately 1.5 to 2 meters. This site is characterized by having maximum currents of about 1.5 knots with a muddy sand bottom and with little structure or shell. Groundwater inputs from margins of the estuary as well as surface flow from Mullica River account for the majority of freshwater coming into the system at this site, followed by input from rainwater from the marsh surface and above. NOTE: Despite the name, this station is a tripod United States Coast Guard channel marker, not a "buoy"

Site name	Jacnewq, a.k.a. "Chestnut Neck"
Latitude and longitude	39.54790, -74.46080
Tidal range *(meters)*	2.05m
Salinity range *(psu)*	2.2-27.3psu
Type and amount of freshwater input	Moderate- mid-river station and local rainfall/runoff
Water depth (*meters, MLW*)	2.04m (estimated)
Sonde distance from bottom (*meters*)	*0.5m*
Bottom habitat or type	mixed organic mud/sand bottom
Pollutants in area	None of note; potential runoff from marina lot, organic offal from nearby fish cleaning stations
Description of watershed	Located 12 kilometers up the Mullica River from the mouth of the river. The river begins at a line drawn between Graveling Point and Oysterbed Point on the northwestern side of Great Bay. The Mullica River at this location is quite wide, about 250 meters. The datasonde is attached to the dock of a small marina along the southern shore of the river adjacent to the main channel. This location has never been dredged. The site is characterized by having tidal currents of less then one knot, during both ebb and flood tide, and has a mixed organic

	mud/sand bottom. Freshwater input is primarily from groundwater and watershed runoff.

Site name	Jacbawq, a.k.a. “Lower Bank”
Latitude and longitude	39.59370, -74.55150
Tidal range *(meters)*	2.13m
Salinity range *(psu)*	0.0-19.4psu
Type and amount of freshwater input	Maximum among stations; upper-river station, local rainfall and runoff
Water depth (*meters, MLW*)	*2.19m (estimated)*
Sonde distance from bottom (*meters*)	*0.5m*
Bottom habitat or type	fine mixed organic mud and sandy sediment, concrete from bridge footers
Pollutants in area	None to note
Description of watershed	Located 13 kilometers upriver of the Chestnut Neck location. The Mullica River at this site is about two hundred meters wide. The datasonde is located at the center of a bridge spanning the Mullica River. The northern bank of the river is sparsely developed with single-family houses and has a steep bank about five meters high. The southern shore has an extensive marsh and fresh water wetland area about three kilometers wide. This site can be characterized by having fast tidal currents, just over one knot, deep water, and fine mixed organic mud and sandy sediment. Freshwater input is primarily from groundwater and watershed runoff.

SWMP station timeline

Station code	**SWMP status**	**Station name**	**Location**	**Active dates**	**Reason decommissioned**	**Notes**
jacb6wq	Active	Buoy 126	39.50790, -74.33850	August 1996-present	NA	NA
jacb9wq	Active	Buoy 139	39.49794, -74.38113	August 1996-December 1998; May 2002-present	NA	NA

jacnewq	Active	Chestnut Neck	39.54790, -74.46080	August 1996-present	NA	NA
jacbawq	Active	Lower Bank	39.59370, -74.55150	October 1996-present	NA	NA

6) Data collection period –

Site	Filename	Deploy Date	Time	Retrieve Date	Time
B6					
	jacb6wq121322	12/13/2022	14:45	01/24/2023	14:15
	jacb6wq012423	01/24/2023	14:45	02/21/2023	16:30
	jacb6wq022123	02/21/2023	17:00	04/05/2023	12:30
	jacb6wq040523	04/05/2023	12:45	05/15/2023	12:30
	jacb6wq051523	05/15/2023	12:45	06/19/2023	13:30
	jacb6wq061923	06/19/2023	13:45	07/31/2023	12:00
	jacb6wq073123	07/31/2023	12:15	09/13/2023	12:45
	jacb6wq091323	09/13/2023	13:00	10/24/2023	10:45
	jacb6wq102423	10/24/2023	11:00	12/05/2023	11:30
	jacb6wq120523	12/05/2023	11:45	01/18/2024	13:45
B9					
	jacb9wq121322	12/13/2022	15:00	01/25/2023	11:00
	jacb9wq012523	01/25/2023	11:15	03/01/2023	10:15
	jacb9wq030123	03/01/2023	10:30	04/07/2023	12:45
	jacb9wq040732	04/07/2023	13:00	05/19/2023	10:45
	jacb9wq051932	05/19/2023	11:00	06/30/2023	12:30
	jacb9wq063023	06/30/2023	13:00	08/10/2023	12:30
	jacb9wq081023	08/10/2023	12:45	10/02/2023	13:30
	jacb9wq100223	10/02/2023	13:45	11/07/2023	13:30
	jacb9wq110723	11/07/2023	13:45	12/20/2023	09:45
	jacb9wq122023	12/20/2023	10:00	01/24/2024	14:45
NE					
	jacnewq120122	12/01/2022	11:45	01/16/2023	14:45
	jacnewq011623	01/16/2023	15:00	02/16/2023	17:00
	jacnewq021623	02/16/2023	17:15	03/30/2023	13:45
	jacnewq033023	03/30/2023	14:00	04/27/2023	14:30
	jacnewq042723	04/27/2023	14:45	06/09/2023	10:30

	jacnewq060923	06/09/2023	10:45	07/20/2023	10:15
	jacnewq072023	07/20/2023	10:30	08/28/2023	15:15
	jacnewq082823	08/28/2023	15:30	10/05/2023	11:30
	jacnewq100523	10/05/2023	11:45	11/20/2023	16:15
	jacnewq112023	11/20/2023	16:30	01/04/2024	15:15
BA					
	jacbawq120122	12/01/2022	12:15	01/17/2023	11:45
	jacbawq011723	01/17/2023	12:00	02/14/2023	15:30
	jacbawq021423	02/14/2023	15:45	03/27/2023	14:45
	jacbawq032723	03/27/2023	15:00	05/01/2023	13:30
	jacbawq050123	05/01/2023	13:45	06/09/2023	11:00
	jacbawq060923	06/09/2023	11:15	07/20/2023	10:45
	jacbawq072023	07/20/2023	11:00	08/28/2023	15:45
	jacbawq082823	08/28/2023	16:00	10/10/2023	14:00
	jacbawq101023	10/10/2023	14:15	11/20/2023	16:00
	jacbawq112023	11/20/2023	16:15	01/02/2024	15:30

7) Distribution –

NOAA retains the right to analyze, synthesize and publish summaries of the NERRS System-wide Monitoring Program data. The NERRS retains the right to be fully credited for having collected and 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 2023.

NERR water quality data and metadata can be obtained from the Research Coordinator at the individual NERR site (please see Principal Investigators and Contact Persons), from the Data Manager at the Centralized Data Management Office (please see personnel directory under the general information link on the CDMO home page) and online at the CDMO home page www.nerrsdata.org. Data are available in comma delimited format.

8) Associated researchers and projects –

As part of the SWMP long-term monitoring program, JAC NERR also collects 15-minute meteorological data and monthly grab and diel samples for nutrient/pigment data which may be correlated with this water quality dataset. These data are available at www.nerrsdata.org.

During 2023, weekly ichthyoplankton sampling at Little Sheepshead Creek Bridge (LSCB) continued as part of the long-term sampling conducted by the Rutgers University Marine Field Station (RUMFS) in the Jacques Cousteau National Estuarine Research Reserve (JCNERR). Presence and abundance of larval fishes are determined with a plankton net (1m, 1mm mesh) deployed during night flood tides from a bridge near Little Egg Inlet (New Jersey) in the Great Bay/Little Egg harbor portion of the JCNERR.

RUMFS conducts annual trawl survey at numerous sites from offshore of Little Egg Inlet to the freshwater interface up the Mullica River ("Mullica River-Great Bay Estuary"). SWMP data are regularly used in the analysis of community composition and species assemblage.

A wire-mesh trapping survey of fish and crustaceans conducted by RUMFS within the RUMFS boat basin also continued in 2023 as part of long-term sampling within the Reserve.

Dr. Mark Sullivan's class at Stockton University has extensively utilized the JCNERR's SWMP dataset, including WQ data, in their curriculum.

Dr. Paul Jivoff of Rider University conducts regular surveys of local crab populations and utilizes the SWMP dataset.

Over-wintering populations of seals near the B6 site were observed/studied over the winter of 2022-2023 and 2023-2024 as a joint Rutgers University/Stockton College program; SWMP data from B6 are utilized in these observations/study.

II. Physical Structure Descriptors

9) Sensor specifications –

JAC NERR utilizes EXO data sondes exclusively to conduct SWMP monitoring.

YSI EXO Sonde:

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

Parameter: Conductivity
Units: milli-Siemens per cm (mS/cm)
Sensor Type: Wiped probe; 4-electrode cell with autoranging
Model#: 599827

Range: 0 to 100 mS/cm
Accuracy: ±1% of the reading or 0.002 mS/cm, whichever is greater
Resolution: 0.0001 to 0.01 mS/cm (range dependent)

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

Parameter: Dissolved Oxygen % saturation
Sensor Type: Optical probe w/ mechanical cleaning
Model#: 599100-01
Range: 0 to 500% air saturation
Accuracy: 0-200% air saturation: +/- 1% of the reading or 1% air saturation, whichever is greater
200-500% air saturation: +/- 5% or reading
Resolution: 0.1% air saturation

Parameter: Dissolved Oxygen mg/L (Calculated from % air saturation, temperature, and salinity)
Units: milligrams/Liter (mg/L)
Sensor Type: Optical probe w/ mechanical cleaning
Model#: 599100-01
Range: 0 to 50 mg/L
Accuracy: 0-20 mg/L: +/-0.1 mg/l or 1% of the reading, whichever is greater
20 to 50 mg/L: +/- 5% of the reading
Resolution: 0.01 mg/L

Parameter: Non-vented Level - Shallow (Depth)
Units: feet or meters (ft or m)
Sensor Type: Stainless steel strain gauge
Range: 0 to 33 ft (10 m)
Accuracy: +/- 0.013 ft (0.004 m)
Resolution: 0.001 ft (0.001 m)

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

Parameter: Turbidity
Units: Formazin Nephelometric Units (FNU)
Sensor Type: Optical, 90 degree scatter
Model#: 599101-01

Range: 0 to 4000 FNU
Accuracy: 0 to 999 FNU: 0.3 FNU or +/-2% of reading (whichever is greater); 1000 to 4000 FNU +/-5% of reading
Resolution: 0 to 999 FNU: 0.01 FNU, 1000 to 4000 FNU: 0.1 FNU

Depth Qualifier:

The NERR System-Wide Monitoring Program utilizes YSI data sondes that can be equipped with either vented or non-vented depth/level sensors. Readings for both vented and non-vented sensors are automatically compensated for water density change due to variations in temperature and salinity; but for all non-vented depth measurements, changes in atmospheric pressure between calibrations appear as changes in water depth. The error is equal to approximately 1.02 cm for every 1 millibar change in atmospheric pressure, and is eliminated for vented sensors because they are vented to the atmosphere throughout the deployment time interval.

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

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

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

((1013-BP)*0.0102)+Depth/Level = cDepth/cLevel.

Salinity Units Qualifier:

In 2013, EXO sondes were approved for SWMP use and began to be utilized by reserves. While the 6600 series sondes report salinity in parts per thousand (ppt) units, the EXO sondes

report practical salinity units (psu). These units are essentially the same and for SWMP purposes are understood to be equivalent, however psu is considered the more appropriate designation. Moving forward the NERR System will assign psu salinity units for all data regardless of sonde type.

Turbidity Qualifier:

In 2013, EXO sondes were approved for SWMP use and began to be utilized by reserves. While the 6600 series sondes report turbidity in nephelometric turbidity units (NTU), the EXO sondes use formazin nephelometric units (FNU). These units are essentially the same but indicate a difference in sensor methodology, for SWMP purposes they will be considered equivalent. Moving forward, the NERR System will use FNU/NTU as the designated units for all turbidity data regardless of sonde type. If turbidity units and sensor methodology are of concern, please see the Sensor Specifications portion of the metadata.

Chlorophyll Fluorescence Disclaimer:

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

10) Coded variable definitions –

Sampling station:	Sampling site code:	Station code:
Buoy 126	B6	jacb6wq
Buoy139	B9	jacb9wq
Chestnut Neck	NE	jacnewq
Lower Bank	BA	jacbawq

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 –

Deployment filename Datasonde ID#, Dissolved Oxygen #1 depth measured/expected offset, Specific Conductivity, pH7, pH10, Turbidity0

Deployment Name	Sonde Serial #	DO 100%	Depth m (measured/ expected)	SpCond 10mS/cm3	pH* (7)	pH* (10)	Turb 0NTU
jacb6wq121322	14A100683	100.7	-0.008/0.119	9.993	7.05	10.10	-0.08
jacb6wq012423	16J100913	98.0	-0.061/-0.095	9.872	7.12	10.16	0.01
jacb6wq022123	14A100679	98.7	0.101/0.088	9.987	7.06	10.05	-0.05
jacb6wq040523	16J100912	99.7	0.095/0.088	10.059	7.07	10.03	0.94
jacb6wq051523	14A100678	99.6	0.043/0.088	10.001	7.13	10.10	0.66
jacb6wq061923	14A100679	100.5	0.142/0.027	9.97	7.10	10.06	0.33
jacb6wq073123	16J100912	93.4	-0.039/TBD	9.975	7.07	10.03	1.22
jacb6wq091323	16J100913	101.3	0.274/0.160	9.875	6.96	10.01	0.19
jacb6wq102423	14A100683	99.4	0.055/0.048	10.012	6.92	9.91	0.07

jacb6wq120523	14A100679	97.8	0.079/0.068	10.024	6.91	9.84	0.33
jacb9wq121322	16J100912	100.7	0.111/0.119	9.967	7.00	9.95	0.25
jacb9wq012523	14A100680	101.0	0.123/0.078	10.002	7.13	10.20	0.63
jacb9wq030123	16J100913	102.4	0.211/0.190	9.884	7.06	10.13	0.94
jacb9wq040732	14A100683	100.4	0.141/0.150	10.028	7.10	10.12	0.22
jacb9wq051932	14A100680	92.9	0.042/-0.024	9.883	7.11	10.11	0.15
jacb9wq063023	14A100678	98.7	-0.092/-0.092	10.178	7.20	10.21	0.35
jacb9wq081023	14A100679	101.3	0.092/0.088	9.997	7.04	10.07	0.12
jacb9wq100223	16J100912	98.7	-0.045/-0.054	9.854	6.95	9.95	0.67
jacb9wq110723	14A100678	99.4	0.185/0.170	9.823	7.11	10.15	0.17
jacb9wq122023	14A100683	102.2	0.149/0.150	9.987	6.93	9.89	-0.06
jacnewq120122	14A100680	100.1	0.307/-0.117	10.160	7.10	10.18	0.13
jacnewq011623	14A100679	99.4	0.073/0.017	10.058	7.11	10.23	0.17
jacnewq021623	14A100683	102.6	0.157/0.129	10.046	7.17	10.25	0.41
jacnewq033023	14A100678	100.8	0.088/0.068	9.992	7.08	10.12	0.40
jacnewq042723	16J100913	98.7	-0.076/-0.054	10.18	7.11	10.13	1.23
jacnewq060923	16J100912	99.1	0.016/0.027	9.781	7.13	10.10	0.56
jacnewq072023	14A100680	99.7	0.039/0.027	10.058	7.12	10.11	0.88
jacnewq082823	14A100683	99.5	0.104/0.089	9.997	7.07	10.06	0.47
jacnewq100523	14A100680	101.1	0.255/0.170	10.009	6.98	9.97	0.09
jacnewq112023	16J100913	102.4	0.221/0.150	9.96	7.13	10.28	0.22
jacbawq120111	16J100913	101.0	0.106/-0.117	10.182	7.10	10.23	0.13
jacbawq011723	14A100678	101/0	0.137/0.058	9.901	7.06	10.13	0.87
jacbawq021423	16J100912	101.4	0.154/0.129	10.226	7.12	10.19	1.24
jacbawq032723	14A100680	99.5	0.080/-0.198	10.052	7.08	10.16	-0.12
jacbawq050123	14A100679	98.8	-0.062/-0.054	10.011	7.13	10.12	1.17
jacbawq060923	14A100683	97.6	0.036/0.027	9.85	7.08	10.05	0.34
jacbawq072023	16J100913	99.2	0.056/0.027	9.898	7.14	10.12	1.01
jacbawq082823	14A100678	97.4	-0.028/-0.044	10.045	6.92	9.98	0.88
jacbawq101023	14A100679	100.9	0.192/0.170	10.024	7.07	10.04	1.37
jacbawq112023	16J100912	99.6	0.053/0.037	9.952	7.00	10.05	0.84

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

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.

Buoy 126

The datasonde collecting data during the jacb6wq022123 deployment (02/21/2023 17:00 - 04/05/2023 12:30) returned a partitioned and out-of-sequence dataset. The data were recovered and returned to chronological order, but it is unclear of the accuracy of these measurements were affected by the error (a malfunctioning central wiper is suspected) that caused the file error.

The jacb6wq102424 deployment was logging in DLST instead of EST; timestamp correction was made at the time of the quarterly report and upload in January 2024.

Buoy 139

The jacb9wq081023 and jacb9wq100223 deployments overlapped at the time of deployment on 10/02/2023 13:45; the data from the jacb9wq081023 deployment were over-written (and therefore eliminated from the dataset).

Chestnut Neck

During the jacnewq082823 deployment the datasonde was logging in DLST (rather than EST); this error was corrected during the 3rd quarter data submission on 31 October 2023.

Lower Bank

None