Kachemak Bay (KAC) NERR Water Quality Metadata
January – December 2024
Latest Update: 04/11/2025

Note: This is a provisional metadata document; it has not been authenticated as of its download date. Contents of this document are subject to change throughout the QAQC process and it should not be considered a final record of data documentation until that process is complete. Contact the CDMO (cdmosupport@baruch.sc.edu) or reserve with any additional questions.

I. Data Set and Research Descriptors

1) Principal investigator(s) and contact persons –

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. Lauren Sutton and Chris Guo were responsible for data management.

3) Research objectives –

In Kachemak Bay, there are two permanent water quality monitoring stations (Homer and Seldovia), each having two data sondes. One site is located on the northeast side of the bay at the end of the Homer Spit, and the other on the southwest side of the bay in Seldovia. At each site, one data logger is suspended 1-meter below the surface ("Surface"), and one data logger is suspended 1-meter from the bottom ("Deep"). At both locations the surface sondes are horizontally within 100 meters of the deep sondes. The circulation in Kachemak Bay is driven primarily by an 8-meter tidal flux. Regional circulation is characterized by generally cyclonic ocean currents in the Gulf of Alaska flowing onto the shelf off Cook Inlet. Nutrient rich bottom water is upwelled and mixed with surface water. These enriched waters may enter into Kachemak Bay, the inflow tending to stay along the southern shore flowing past the Seldovia instruments, while water flowing out of the bay stays along the north shore, flowing past the Homer instruments. Additionally, trapped coastal flows separate the bay into two

distinct ecosystems (inner vs outer bay), and the instruments are positioned to reflect this distinction. Within each system there is vertical stratification of the water. The vertical placement of the sondes is designed to help elucidate the differences in circulation of the surface and deep waters. As the inflowing water proceeds up the bay, freshwater runoff from the surrounding ice fields and watersheds dilute the salinity and increase the sediment load in the path of the Homer instruments. The in-flowing water, in the path of the Seldovia instruments, initially supports a marine system, while the northern out-flowing water of the Homer instruments is more estuarine. The Kachemak Bay water quality instruments capture this difference with deployments along the north and south shores. These data are meant to supplement studies on primary productivity, larval distribution, settlement, recruitment, growth rates, community dynamics, and biodiversity in the bay.

4) Research methods –

Both telemetered instruments ("Deep") are stationary and housed in ABS pipe mounted vertically on the ferry docks of Homer and Seldovia. The pipes are positioned to ensure that the sensors are approximately 1-meter above the bottom of the ocean floor (actual depth changes with respect to the tides). The surface sondes are attached to a buoy and a sonde guard that slides vertically on a cable to ensure that the sonde remains 1-meter below the surface as the tide is changing. Calibration and deployment were performed monthly using methods outlined in the YSI Operations Manual. The following sensors are calibrated using standards purchased from YSI: pH (7 and 10), conductivity (50 mS/cm), and turbidity (124 FNU). Depth is calibrated at zero compensating for barometric pressure. The Chlorophyll probe is calibrated in DI water (0 RFU) and Rhodamine solution compensating for temperature (16.4 RFU at 22 °C). QA/QC of this parameter is conducted by comparing sonde data to our monthly grab samples that are analyzed on a Turner 10-AU Spectrophotometer. Data are collected at fifteen-minute sampling intervals on the hour in Alaska Standard Time.

A YSI WaterLog Storm 3 transmitter was installed at the Homer Deep station on 12/10/2020 and transmits data to the NOAA GOES satellite, NESDIS ID # 3B00077A WQ. A YSI WaterLog Storm 3 transmitter was installed at the Seldovia Deep station on 06/16/2024 and transmits data to the NOAA GOES satellite, NESDIS ID # 3B040240 WQ. 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.

5) Site location and character –

Site name	Homer Surface	Homer Deep
Latitude and longitude	59° 36' 7.38 N, 151° 24' 33.90 W	59° 36' 7.24 N, 151° 24' 31.61 W
Tidal range *(meters)*	8.9	
Salinity range *(psu)*	10.2 – 32.2	24.9 – 32.7
Type and amount of freshwater input	Precipitation, glacial/snow melt, sea ice at times; Amount of freshwater input differs between surface and deep stations due to stratification	
Water depth (*meters, MLW*)	0.505 surveyed	
Sonde distance from bottom (*meters*)	1 (from sea surface)	1

Bottom habitat or type	Primarily sand
Pollutants in area	None known
Description of watershed	These stations are positioned at the middle of Kachemak Bay, downstream of inner bay circulation comprised of mixed freshwater sources as well as some oceanic input

Site name	Seldovia Surface	Seldovia Deep
Latitude and longitude	59° 26' 27.56 N, 151° 43' 15.46 W	59° 26' 27.56 N, 151° 43' 15.46 W
Tidal range *(meters)*	9.1	
Salinity range *(psu)*	19.3 – 32.7	24.5 – 36.0
Type and amount of freshwater input	Precipitation, snow melt, submerged groundwater discharge, sea ice at times; Amount of freshwater input differs between surface and deep stations due to stratification	
Water depth (*meters, MLW*)	0.517 surveyed	
Sonde distance from bottom (*meters*)	1 (from sea surface)	1
Bottom habitat or type	Primarily sand	
Pollutants in area	None known	
Description of watershed	These stations are positioned near the mouth of Kachemak Bay on the southern coast, downstream of outer bay circulation comprised of oceanic input (Alaska Coastal Current) as well as some freshwater sources	

SWMP station timeline-

Station Code	SWMP Status	Station Name	Location	Active Dates	Reason Decommissioned	Notes
kach3wq	p	Homer Surface 3	59° 36' 7.38 N, 151° 24' 33.90 W	05/31/2012 12:15 – current	NA	NA
kachdwq	P	Homer Dolphin Deep	59° 36' 7.24 N, 151° 24' 31.61 W	01/01/2003 00:00 – current	NA	NA
kacsdwq	P	Seldovia Deep	59° 26' 27.56 N, 151° 43' 15.46 W	01/01/2004 00:00 – current	NA	NA
kacsswq	P	Seldovia Surface	59° 26' 27.56 N, 151° 43' 15.46 W	01/01/2004 00:00 – current	NA	NA

kacbcwq	P	Bear Cove	59° 42' 20.41 N, 151° 3' 33.84 W	06/18/2002 11:30 - 09/24/2003 17:30	Change in research questions and difficult access.	Site was seasonal, because access was too difficult in winter.
kacdlwq	P	Homer Dolphin	59° 36' 7.24 N, 151° 24' 31.61 W	10/24/2002 10:00 - 12/31/2002 23:30	Just renamed to kachdwq.	Exact same site as kachdwq. Naming convention changed when installing paired surface-deep sondes.
kachowq	P	Homer	59° 36' 8.34 N, 151° 24' 36.00 W	07/12/2001 07:45 - 11/20/2002 12:30	On city dock. City built a newer dock surrounding old one.	1 meter off bottom, 62 meters from current kachdwq site. Data overlaps kacdlwq site in late 2002. Old mount destroyed by storm November 2002.
kachswq	P	Homer Dolphin Surface	59° 36' 7.24 N, 151° 24' 31.61 W	02/13/2004 09:30 - 11/28/2011 16:00	Sonde was getting destroyed by banging against pilings. Moved 35 meters.	Essential equivalent to kach3wq. Site was relocated to a safer location for the sonde in rough seas.
kacpgwq	P	Port Graham	59° 22' 13.91 N, 151° 53' 46.03 W	06/21/2002 10:00 - 09/24/2003 15:30	Change in research questions and difficult access.	Site was seasonal, because access was too difficult in winter.
kacsewq	P	Seldovia	59° 26' 27.56 N, 151° 43' 15.46 W	08/17/2001 15:15 - 12/31/2003 23:30	Just renamed to kacsdwq.	Exact same site as kacsdwq. Naming convention changed when installing paired surface-deep sondes.

6) Data collection period –

Homer Surface (H3)

Deploy Start Time		Retrieve End Time		Sonde	pH		DO	Turb	Cond	Chl	EXO Model	Notes
12/05/2023	12:45	1/3/2024	14:45	EXO2 (Papa)	599702		599100	599101	599827	599103	599502-01	
1/3/2024	15:15	3/28/2024	NA	EXO2 (X-Ray)	599702		599100	599101	599827	599103	599502-01	See section 14
2/19/2024	15:45	3/5/2024	14:15	EXO2 (Papa)	599702		599100	599101	599827	599103	599502-01	
3/19/2024	10:00	4/1/2024	9:15	EXO2 (Quebec)	599702		599100	599101	599870	599103	599502-02	
4/1/2024	10:00	5/6/2024	9:15	EXO2 (Papa)	599702		599100	599101	599827	599103	599502-01	
5/6/2024	9:45	5/27/2024	9:45	EXO2 (X-Ray)	599702		599100	599101	599827	599103	599502-01	
5/27/2024	11:00	7/2/2024	12:30	EXO2 (Papa)	599702		599100	599101	599827	599103	599502-01	
7/2/2024	13:00	8/1/2024	12:15	EXO2 (X-Ray)	599702		599100	599101	599827	599103	599502-01	
8/1/2024	12:45	9/2/2024	11:00	EXO2 (Papa)	599702		599100	599101	599827	599103	599502-01	
9/2/2024	11:30	10/1/2024	9:00	EXO2 (X-Ray)	599702		599100	599101	599827	599103	599502-01	
10/1/2024	9:30	11/4/2024	11:15	EXO2 (Papa)	599702		599100	599101	599827	599103	599502-01	
11/4/2024	12:00	12/4/2025	13:00	EXO2 (X-Ray)	599702		599100	599101	599827	599103	599502-01	
12/4/2024	14:15	1/7/2025	13:45	EXO2 (Papa)	599702		599100	599101	599827	599103	599502-01	

Homer Deep (HD)

Deploy Start Time		Retrieve End Time		Sonde	pH		DO	Turb	Cond	Chl	EXO Model	Notes
12/5/2023	12:30	1/3/2024	14:30	EXO2 (Sierra)	599702		599100	599101	599827		599502-02	
1/3/2024	14:45	2/12/2024	15:00	EXO2 (Romeo)	599702		599100	599101	599827		599502-02	
2/12/2024	15:30	3/5/2024	14:00	EXO2 (Sierra)	599702		599100	599101	599827		599502-02	
3/5/2024	14:15	4/1/2024	9:15	EXO2 (Romeo)	599702		599100	599101	599827		599502-02	
4/1/2024	10:30	5/6/2024	9:00	EXO2 (Sierra)	599702		599100	599101	599827		599502-02	
5/6/2024	9:30	5/27/2024	9:45	EXO2 (Quebec)	599702		599100	599101	599827		599502-02	
5/27/2024	10:00	7/2/2024	12:30	EXO2 (Sierra)	599702		599100	599101	599827		599502-02	
7/2/2024	12:45	8/1/2024	12:15	EXO2 (Romeo)	599702		599100	599101	599827		599502-02	
8/1/2024	12:30	9/2/2024	10:45	EXO2 (Sierra)	599702		599100	599101	599827		599502-02	
9/2/2024	11:00	10/1/2024	9:00	EXO2 (Romeo)	599702		599100	599101	599827		599502-02	
10/1/2024	9:15	11/4/2024	11:15	EXO2 (Sierra)	599702		599100	599101	599827		599502-02	
11/4/2024	11:30	12/4/2025	13:00	EXO2 (Romeo)	599702		599100	599101	599827		599502-02	
12/2/2024	13:15	1/7/2025	13:30	EXO2 (Sierra)	599702		599100	599101	599827		599502-02	

Seldovia Surface (SS)

Deploy Start Time		Retrieve End Time		Sonde	pH		DO	Turb	Cond	Chl	EXO Model	Notes
12/1/2024	12:30	1/5/2024	12:15	EXO2 (Quebec)	599702		599100	599101	599827	599103	599502-02	
1/5/2024	12:30	2/2/2024	12:00	EXO2 (Gandalf)	599702		599100	599101	599827	599103	599502-01	
2/2/2024	12:15	3/6/2024	13:30	EXO2 (Whiskey)	599702		599100	599101	599827	599103	599502-01	
3/6/2024	13:45	4/3/2024	11:15	EXO2 (Gandalf)	599702		599100	599101	599827	599103	599502-01	
4/3/2024	11:45	5/3/2024	9:45	EXO2 (Whiskey)	599702		599100	599101	599827	599103	599502-01	
5/3/2024	10:15	5/29/2024	10:00	EXO2 (Gandalf)	599702		599100	599101	599827	599103	599502-01	
5/29/2024	10:30	7/2/2024	8:45	EXO2 (Whiskey)	599702		599100	599101	599827	599103	599502-01	
7/2/2024	9:15	8/1/2024	9:00	EXO2 (Gandalf)	599702		599100	599101	599827	599103	599502-01	
8/1/2024	9:30	9/4/2024	8:15	EXO2 (Whiskey)	599702		599100	599101	599827	599103	599502-01	
9/4/2024	8:45	10/2/2024	8:45	EXO2 (Gandalf)	599702		599100	599101	599827	599103	599502-01	
10/2/2024	9:15	11/1/2024	10:00	EXO2 (Whiskey)	599702		599100	599101	599827	599103	599502-01	
11/1/2024	10:30	12/3/2025	11:00	EXO2 (Gandalf)	599702		599100	599101	599827	599103	599502-01	
12/3/2024	11:30	1/8/2025	11:00	EXO2 (Whiskey)	599702		599100	599101	599827	599103	599502-01	

Seldovia Deep (SD)

Deploy Start Time		Retrieve End Time		Sonde	pH		DO	Turb	Cond	Chl	EXO Model	Notes
12/1/2023	12:15	1/5/2024	12:00	EXO2 (Taxi)	599702		599100	599101	599827		599502-02	
1/5/2024	12:15	2/2/2024	11:45	EXO2 (Valence)	599702		599100	599101	599827		599502-02	
2/2/2024	12:00	3/6/2024	13:30	EXO2 (Taxi)	599702		599100	599101	599827		599502-02	
3/6/2024	13:45	4/3/2024	13:15	EXO2 (Valence)	599702		599100	599101	599827		599502-02	
4/3/2024	13:30	5/3/2024	9:45	EXO2 (Taxi)	599702		599100	599101	599827		599502-02	
5/3/2024	10:00	5/29/2024	9:45	EXO2 (Valence)	599702		599100	599101	599827		599502-02	
5/29/2024	10:00	7/2/2024	8:45	EXO2 (Taxi)	599702		599100	599101	599827		599502-02	
7/2/2024	9:00	8/1/2024	9:00	EXO2 (Valence)	599702		599100	599101	599827		599502-02	
8/1/2024	9:15	9/4/2024	8:15	EXO2 (Quebec)	599702		599100	599101	599827		599502-02	
9/4/2024	8:30	10/2/2024	8:30	EXO2 (Valence)	599702		599100	599101	599827		599502-02	
10/2/2024	8:45	11/1/2024	10:00	EXO2 (Quebec)	599702		599100	599101	599827		599502-02	
11/1/2024	10:15	12/3/2025	11:00	EXO2 (Valence)	599702		599100	599101	599827		599502-02	
12/3/2024	11:15	1/8/2025	11:00	EXO2 (Quebec)	599702		599100	599101	599827		599502-02	

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 2024.

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, KAC 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.

II. Physical Structure Descriptors

9) Sensor specifications –

KAC NERR deployed EXO data sondes in 2024, of which four are model# 599502-01 (depth range 0-10 meters) and five are model# 599502-02 (depth range 0-100 meters). Sondes of model# 599502-02 are only deployed at Homer Deep and Seldovia Deep stations. Sondes of model# 599502-01 are primarily used at "Surface" stations, but sometimes model# 599502-02 are used when 0-10 meter sondes are not available. For one deployment a CT2 probe model# 599870 was used instead of a wiped probe model# 599827 for temperature/conductivity. Sonde and sensor models are noted in the data collection period section 6.

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: +/- 0.05
Resolution: 0.001 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)

or

Range: 0 to 328 ft (100 m)
Accuracy: +/- 0.13 ft (0.04 m)
Resolution: 0.001 ft (0.001 m)

Parameter: pH
Units: pH units
Sensor Type: Glass combination electrode
Model#: 599702
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: 0.01 ug/L chl a, 0.1% FS

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

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

System. If accurate atmospheric pressure data are available, non-vented sensor depth measurements at any NERR can be corrected.

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

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

Salinity units qualifier:
In 2013, EXO sondes were approved for SWMP use and began to be utilized by reserves. While the 6600 series sondes report salinity in parts per thousand (ppt) units, the EXO sondes report practical salinity units (psu). These units are essentially the same and for SWMP purposes are understood to be equivalent, however psu is considered the more appropriate designation. Moving forward the NERR System will assign psu salinity units for all data regardless of sonde type.

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

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

10) Coded variable definitions –

Sampling station:	Sampling site code:	Station code:
Homer Surface	H3	kach3wq
Homer Deep	HD	kachdwq
Seldovia Surface	SS	kacsswq
Seldovia Deep	SD	kacsdwq

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 Depth collected from surface or near surface sonde
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
SXD	Depth from a surface or near surface sonde deployed at a fixed depth, offset to substrate may be applied

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 –

Homer Surface (H3)

Deploy Date	Sonde	SpCond (50mS/cm)	DO (%)	pH (7)	pH (10)	Turb (0 NTU)	Turb (124 FNU)	Depth (m)	Chl (0 ug/L)	Chl (66 ug/L)
12/5/2023	Papa	50.687(50.0)	100	7.08	10.17	0.09(0.0)	124.65(124.0)	0.199(-0.02)	-0.08	72.47
1/3/2024	X-Ray	50.006(50.0)	99.4	6.87	9.8	0.66(0.0)	115.24(124.0)	0.034(-0.005)	-0.02	67.59
2/19/2024	Papa	49.938(50.0)	97.8	7.12	10.18	0.32(0.0)	123.62(124.0)	-0.105(-0.266)	-0.5	68.97
3/19/2024	Quebec	50.027(50.0)	102.5	7.02	9.98	0.2(0.0)	124.4(124.0)	0.067(-0.007)	-0.15	68.85
4/1/2024	Papa	49.852(50.0)	101.3	7.03	10.1	0.01(0.0)	124.17(124.0)	0.232(96.444)	-0.01	69.95
5/6/2024	X-Ray	49.845(50.0)	101.3	7.07	10.09	0.02(0.0)	112.75(124.0)	-0.115(0.022)	0.07	67.76
5/27/2024	Papa	49.971(50.0)	100	7.11	10.16	3.03(0.0)	123.62(124.0)	0.251(0.163)	0.15	66.63
7/2/2024	X-Ray	49.953(50.0)	97.4	7.02	10.04	0.47(0.0)	124.56(124.0)	-0.105(0.0)	0.03	100.81
8/1/2024	Papa	49.898(50.0)	98	7.07	10.16	-0.22(0.0)	125.29(124.0)	-0.166(-0.179)	-0.02	51.32
9/2/2024	X-Ray	50.078(50.0)	98.7	7.03	10.08	0.62(0.0)	124.01(124.0)	-0.238(-0.189)	-0.1	75.28
10/1/2024	Papa	50.17(50.0)	97.1	7.02	10.05	0.56(0.0)	125.8(124.0)	-0.191(-0.241)	-0.05	68.95
11/4/2024	X-Ray	49.877(50.0)	99.5	7.04	10.06	0.65(0.0)	123.43(124.0)	-0.161(-0.204)		
12/4/2024	Papa	49.727(50.0)	96.4	7.03	10.05	1.52(0.0)	125.52(124.0)	-0.375(-0.309)		

Homer Deep (HD)

Deploy Date	Sonde	SpCond (50mS/cm)	DO (%)	pH (7)	pH (10)	Turb (0 NTU)	Turb (124 FNU)	Depth (m)	Chl (0 ug/L)	Chl (66 ug/L)
12/5/2023	Sierra	50.737(50.0)	100	7.08	10.15	0.28(0.0)	121.08(124.0)	0.103(-0.029)		
1/3/2024	Romeo	50.278(50.0)	100.4	7.04	10.08	0.24(0.0)	125.26(124.0)	0.118(-0.027)		
2/12/2024	Sierra	49.992(50.0)	97.6	7.1	10.14	0.19(0.0)	123.96(124.0)	-0.205(-0.265)		
3/5/2024	Romeo	49.913(50.0)	101.2	7.07	10.03	0.08(0.0)	124.68(124.0)	0.231(-0.02)		
4/1/2024	Sierra	49.765(50.0)	100.9	7.04	10.13	0.2(0.0)	123.04(124.0)	0.033(-0.092)		
5/6/2024	Quebec	49.949(50.0)	105.7	7.07	10.09	0.01(0.0)	112.98(124.0)	-0.03(0.024)		
5/27/2024	Sierra	49.855(50.0)	100.2	7.03	10.07	0.49(0.0)	124.12(124.0)	0.145(0.163)		
7/2/2024	Romeo	49.955(50.0)	98.9	7.04	10.05	0.31(0.0)	122.25(124.0)	0.004(-0.033)		
8/1/2024	Sierra	50.049(50.0)	97	7.03	10.09	-0.07(0.0)	126.35(124.0)	-0.282(-0.201)		
9/2/2024	Romeo	50.228(50.0)	98.7	7.11	10.15	-0.07(0.0)	118.24(124.0)	-0.13(-0.177)		
10/1/2024	Sierra	50.08(50.0)	97	7.01	10.06	0.16(0.0)	125.04(124.0)	-0.261(-0.227)		
11/4/2024	Romeo	49.944(50.0)	98.5	7.09	10.11	0.25(0.0)	124.15(124.0)	-0.062(-0.211)		
12/2/2024	Sierra	50.157(50.0)	97.8	7.03	10.08	0.14(0.0)	124.44(124.0)	-0.494(-0.322)		

Seldovia Surface (SS)

Deploy Date	Sonde	SpCond (50mS/cm)	DO (%)	pH (7)	pH (10)	Turb (0 NTU)	Turb (124 FNU)	Depth (m)	Chl (0 ug/L)	Chl (66 ug/L)
12/1/2023	Quebec	51.037(50.0)	101	7.08	10.08	0.38(0.0)	123.86(124.0)	0.19(-0.031)	-0.01	72.46
1/5/2024	Gandalf	50.002(50.0)	99.6	7.07	10.09	0.09(0.0)	125.23(124.0)	0.013(-0.03)	-0.04	69.52
2/2/2024	Whiskey	49.897(50.0)	98	6.93	10.05	0.11(0.0)	125.52(124.0)	-0.094(-0.272)	-0.02	70.11
3/6/2024	Gandalf	49.906(50.0)	101.2	7.05	10.12	0.88(0.0)	123.95(124.0)	0.122(-0.016)	0.02	68.63
4/3/2024	Whiskey	49.848(50.0)	100.8	7.02	10.08	0.34(0.0)	124.77(124.0)	0.213(-0.073)	0.04	72
5/3/2024	Gandalf	49.683(50.0)	100.8	7	10.05	1.33(0.0)	114.41(124.0)	-0.12(0.018)	0.05	67.98
5/29/2024	Whiskey	49.683(50.0)	98.4	6.97	10.02	0.81(0.0)	123.36(124.0)	0.25(0.163)	0.37	65.15
7/2/2024	Gandalf	49.769(50.0)	97.2	7	10.04	0.32(0.0)	124.78(124.0)	-0.102(-0.03)	0.02	94.52
8/1/2024	Whiskey	49.943(50.0)	99.6	7.01	10.04	0.58(0.0)	124.08(124.0)	-0.108(-0.122)	0.03	51.63
9/4/2024	Gandalf	50.231(50.0)	97.3	7	10.01	0.48(0.0)	121.67(124.0)	-0.27(-0.238)	-0.05	69.23
10/2/2024	Whiskey	50.098(50.0)	97.6	7.03	10.1	0.63(0.0)	124.85(124.0)	-0.137(-0.22)	0.03	67.34
11/1/2024	Gandalf	50.543(50.0)	98.6	7.09	10.12	0.5(0.0)	124.34(124.0)	-0.177(-0.223)		
12/3/2024	Whiskey	50.07(50.0)	97.7	7.03	10.05	0.12(0.0)	124.79(124.0)	-0.375(-0.313)		

Seldovia Deep (SD)

Deploy Date	Sonde	SpCond (50mS/cm)	DO (%)	pH (7)	pH (10)	Turb (0 NTU)	Turb (124 FNU)	Depth (m)	Chl (0 ug/L)	Chl (66 ug/L)
12/1/2023	Taxi	50.763(50.0)	100.2	7.08	10.15	0.02(0.0)	125.0(124.0)	0.222(-0.023)		
1/5/2024	Valence	49.99(50.0)	98.4	7.5	10.53	-0.02(0.0)	110.67(124.0)	0.039(-0.033)		
2/2/2024	Taxi	50.201(50.0)	98.5	7.1	10.15	2.64(0.0)	123.44(124.0)	-0.101(-0.26)		
3/6/2024	Valence	49.653(50.0)	99.6	7.03	10.02	0.15(0.0)	124.2(124.0)	0.147(-0.019)		
4/3/2024	Taxi	49.794(50.0)	101.1	7.07	10.08	0.0(0.0)	124.97(124.0)	0.163(-0.09)		
5/3/2024	Valence	49.828(50.0)	100.9	7	10.02	-0.48(0.0)	112.24(124.0)	-0.117(0.023)		
5/29/2024	Taxi	No post-deployment data available								
7/2/2024	Valence	49.938(50.0)	98.6	7.06	10.05	0.09(0.0)	124.02(124.0)	-0.053(-0.03)		
8/1/2024	Quebec	49.89(50.0)	97.1	7.08	10.08	-0.33(0.0)	125.41(124.0)	-0.228(-0.189)		
9/4/2024	Valence	50.193(50.0)	97.3	7.08	10.11	0.56(0.0)	123.002(124.0)	-0.302(-0.227)		
10/2/2024	Quebec	50.052(50.0)	97.5	7.05	10.1	-0.07(0.0)	124.08(124.0)	-0.314(-0.216)		
11/1/2024	Valence	50.214(50.0)	96.7	7.01	10.05	0.42(0.0)	124.4(124.0)	-0.186(-0.231)		
12/3/2024	Quebec	50.091(50.0)	97.4	7.03	10.06	0.11(0.0)	123.05(124.0)	-0.494(-0.318)		

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.

Homer Surface (H3)

General
02/02/24 17:30 – 02/19/24 15:30, <-3> GIC, sonde X-ray went missing due to sea ice damage to anchoring structure.
02/19/24 15:45 – 03/05/24 14:15, {CIP}, sea ice affects all parameter trends (except turbidity at a noticeable level) during entire deployment of sonde Papa. Conditions indicate sensors were sometimes in a freshwater lens from ice or snow melt, i.e., decreased Temp, SpC/Sal, Depth, and pH coupled with increased DO. Data rejected when Depth < 0.
03/19/24 10:00 – 04/01/24 09:15, {CWD}, there were issues with entire deployment (Quebec), where sonde gets hung up on new anchor structure, causing data to be collected at wrong depth often. Data rejected where Depth < 0.

Depth
Homer Surface site moves up and down on a cable. Sometimes the sonde gets hung-up on the cable, causing out of water events. Depth 0.1 > 1.0 m data are retained.

Homer Deep (HD)

Conductivity/Salinity
02/29/24 13:45, <-3> SQR, rejected due to fresh spike, potentially caused by wiper blockage

05/26/24 21:45, <-3> SQR, rejected due to fresh spike, cause unknown

09/19/24 02:30. <-3> SQR, rejected due to fresh spike, cause unknown

11/25/24 02:30. <-3> SQR, rejected due to fresh spike, cause unknown

Dissolved Oxygen
03/26/24, <1>, suspect spike in mg/L value which aligns with wiper voltage out of range, but no effect on % value.

Seldovia Surface (SS)

General
07/01/24 07:15 – 14:15, <0> CDF, values show increased depth but associated parameters appear unaffected.
07/22/24 06:15, <1> CSM, Conductivity/Salinity, DO, and pH data indicate freshwater conditions, however no weather data to provide evidence for this, so data flagged suspect.

09/19/24 11:00 – 19:00, <-3> SBO, data rejected during periods of depth > 1 meter, likely caused by floating kelp accumulating around the station mooring, evidenced by increased Turbidity an hour before and after depth affected. Other parameters appear unaffected and flagged <0> CDF during this period.

Depth

Commented [CG1]: Not sure whether rest of data should be rejected or suspect

Commented [CG2]: Not sure whether rest of data should be rejected or suspect

Commented [CG3]: See comment on SS depth

Seldovia Surface site moves up and down on a cable. Sometimes the sonde gets hung-up on the cable, causing out of water events. Depth 0.1 > 1.0 m data are retained.

Commented [CG4]: I'd like to change this to 0 - 2.0 m bc the sensors are supposed to sit ~1.0 m so we do get >1.0 m depth sometimes due to waves but the data are still within trend

03/14/24 01:15 – 03/22/24 03:15, <1> CWD, sonde possible stuck on anchor line but other params do not appear affected.

06/05/2024 04:30 – 04:45, 06/06/2024 05:30, 06/26/2024 09:45 – 13:15, 06/27/2024 11:15 – 13:15, 07/02/2024 04:15 – 06:45, <0> CWD, sonde hung up on cable led to measurements of shallow freshwater lens conditions inconsistent with the rest of the data; during these periods other parameters were either flagged <-3> SQR CWD when values differed from trend, or otherwise flagged <1> CWD when data was consistent with expected conditions.

Seldovia Deep (SD)

General
01/05/24 12:15 – 02/02/24 11:45, the entire deployment (Valence) affected likely by out-of-range CT sensor (cell constant = 0.52). Data at deployment start (CND) rejected due to sensors equilibrating. For all other data: Temp, SpCon/Sal and pH values rejected; DO and Depth values suspect but appear to fit conditions; Turbidity was not affected. See 2023 metadata for more information about issues with deployments of sonde Valence.

06/18/2024 18:00 – 07/02/2024 08:45, centralized wiper was incorrectly parked discovered at end of deployment (Taxi); affected parameters include Temp, SpCon/Sal, DO, and Turb; these parameters were flagged <1> SWM since values appear to reflect normal conditions but variability was not consistent with expected conditions.

07/01-09/24, 07/12/24, 07/21-22/24, QAQC revealed periods of incorrect wiper position during July deployment (Valence). When WiperPositionVolts were outside of 1.076 – 1.096 V, these data were flagged <1> SWM CDF. Affected parameters were Turbidity, DO, and Conductivity/Salinity and some cases of elevated Temperature. These values were rejected and flagged <-3> SWM during the periods with bad wiper position.

During the September deployment (Valence), the central wiper became stuck at 09/08/24 13:45. At time of retrieval, the wiper was found parked over the CT sensor with heavy corrosion around the pin. At 09/08/24 14:00 the turbidity sensor stopped recording and data were flagged <-3> SSM. Conductivity/Salinity and DO mg/L were also affected and were flagged <-3> SWM until end of deployment. DO % appeared mostly unaffected but a few values were flagged <-3> SWM. Prior to the wiper becoming stuck starting at 09/06/24 08:30 Turbidity, Conductivity/Salinity, and DO mg/L were sporadically affected and data flagged <-3> SWM. Temperature, Depth, and pH appeared unaffected and data were accepted with flag <0> CDF.

Conductivity
10/06/24 05:45, <-3> SQR, rejected due to fresh spike, potentially caused by wiper blockage
10/07/24 19:00, <-3> SQR, rejected due to fresh spike, potentially caused by wiper blockage

Dissolved oxygen
10/08/24 06:00, <-3> SQR, spike in mg/L but not % saturation, potentially caused by wiper blockage