

Kachemak Bay Research Reserve (KAC) NERR Water Quality Metadata
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I. Data Set and Research Descriptors

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2) Entry verification

Deployment data are uploaded from the YSI data logger to a Personal Computer (IBM compatible). Files are exported from EcoWatch in a comma-delimited format (.CDF) 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.

3) Research objectives

The YSI electronic data loggers are programmed to measure the water temperature, specific conductivity, dissolved oxygen, depth, pH, and turbidity conditions at 15-minute intervals. 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"). The deep site is in the same location as the previous Homer Dolphin site. The Seldovia Deep

site is at the previous Seldovia site. At both locations the surface sondes are horizontally within a couple meters of the deep sondes.

The circulation in Kachemak Bay is driven primarily by the 8-meter tidal flux. Regional circulation is characterized by generally cyclonic ocean currents in the Gulf of Alaska flowing onto the shelf off of 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 Inner Bay and north shore, flowing past the Homer instruments. These trapped coastal flows separate the bay into two distinct ecosystems, 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, fresh water 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 will be used 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. After cleaning the data loggers, the dissolved oxygen (DO) membrane is replaced and allowed to season in water for at least 6 hours before the DO sensor is calibrated. The following sensors are calibrated using standards purchased from YSI: pH (7 and 10), conductivity (50 mS/cm), and turbidity (123 NTU). Depth is calibrated at zero.

A Sutron Sat-Link2 transmitter was installed at the Homer Dolphin Deep (NESDIS ID # 3B00077A WQ) station on 12/13/05 and at the Seldovia Deep (NESDIS ID # 3B040240 WQ) site on 07/31/2007, and these transmitters send data to the NOAA GOES satellite. 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>.

A 1-point calibration curve using deionized water is used to calibrate the chlorophyll probe. The chlorophyll probe estimates the phytoplankton content in water by detecting the fluorescence from the chlorophyll, however, it is important to remember that any compounds which are present in the water sample (either in chemical or biological form), and fluoresce under the optical constraints of the sensor, will contribute to the readings. The KBRR also takes grab samples each month and uses a Turner Fluorometer 10-AU to analyze for chlorophyll content (see corresponding nutrient metadata report for more details). For the 2008 grab samples, the highest chlorophyll value was 9.5 µg/L in Homer, and 5.5 µg/L in Seldovia. From 2003-2009, the highest value encountered in a grab sample was 25 µg/L. The chlorophyll data from the sonde are reported as raw values and have not been adjusted. Values were flagged from 50-99 µg/L as being suspect and values above 100 µg/L were rejected.

5) Site location and character

Kachemak Bay is located approximately 200 kilometers south of Anchorage on the western shore of the Kenai Peninsula. Kachemak Bay, at 59.6° N and 151.5° W, is a temperate regional fjord with hydrographic conditions unique among the NERR system estuaries. The tidal range of 8-meters is among the largest in the world, and salinity ranges from near zero at stream mouths to 33.0 PSU at the entrance to the inner Bay. The bay is 35 kilometers wide at its mouth and approximately 57 kilometers long. The head of Kachemak Bay is located to the northeast at the Fox River Flats, and the mouth lies to the southwest, along a line between Anchor Point and Point Pogibshi. The 6-kilometer long Homer Spit that extends into the Bay from the northern shoreline splits Kachemak Bay into inner and outer bays. The Kachemak Bay NERR encompasses both the inner and outer bays. Water flows between the inner and outer Bays through a narrow opening formed between the Spit and the southern shoreline. The Bay has an average depth of 45-meters, and a maximum of 200-meters. Fresh water introduced primarily by the Fox, Bradley, and Martin Rivers and Sheep Creek at the head of the Bay, flows along the northwest shore of the inner Bay.

The Homer YSI data logger site is located on the north side of Kachemak Bay at 59.60203°N 151.40877°W. The “deep” sonde is deployed at a depth 1 meter from the bottom, in water fluctuating between 7.5 and 16.8 meters. The “surface” data sonde is deployed at a nominal depth of 1 meter. The bottom habitat is predominantly sand. Pollutants in the area are from the excessive boat traffic at the entrance of the Homer harbor, and a nearby fish waste outfall line. Throughout the year, salinity has ranged from 20.5 to 32.4 ppt, as the instrument's location in the stratified water column is dependent on tide height, with a tidal range of 8.1 meters. It is predominately an estuarine environment during summer months when glacial runoff is highest, and during the winter months it reverts to a more marine-like system with glacial runoff at a minimum.

The Seldovia YSI data logger site is located on the south side of Kachemak Bay at 59.44097°N 151.72089°W, approximately 25 kilometers southwest of the Homer site. As with the Homer site, the data loggers are situated on the ferry terminal dock, with one instrument 1 meter below the surface, and one 1 meter above the bottom, in water fluctuating between 4.3 and 13.0 meters. The access to Seldovia is limited to boat or air, as the site is located off the highway system. The bottom habitat is predominantly sand.

Pollutants in the area are minimal. Throughout the year, salinity has ranged from 25.0 to 33.9 ppt at this site with a tidal range of 8.0 meters.

6) Data collection period

Monitoring at Homer Deep, Seldovia Deep, and Seldovia Surface was continuous throughout 2009. The Homer Surface site was sampled continuously from 03/10/09 – 12/16/09, and was removed during the winter months when ice formed on the surface waters at this site. Deployment and retrieval dates and times for 2009 are listed below:

Station	Start Date	Start Time	End Date	End Time	Sonde ID	Comments
Homer Surface	1/1/09	--	3/10/09	--	--	Not deployed (ice)
Homer Surface	3/10/09	11:15	4/2/09	08:00	Nautilus	
Homer Surface	4/2/09	11:00	5/6/09	11:45	Calypso	
Homer Surface	5/6/09	12:30	6/2/09	09:00	Nautilus	
Homer Surface	6/2/09	09:30	6/13/09	20:15	Carson	Anchor broke, sonde floated free ~6/11/09; beached 6/13/09; returned to KBRR 6/17/09
Homer Surface	6/19/09	16:00	7/2/09	09:15	Carson	Re-deployed with new anchor
Homer Surface	7/2/09	09:30	8/4/09	12:15	Amundsen	
Homer Surface	8/4/09	12:30	9/4/09	03:00	Nautilus	Power failure at end of deployment
Homer Surface	9/4/09	12:30	10/2/09	10:00	Amundsen	
Homer Surface	10/2/09	10:30	10/30/09	16:00	Nautilus	Anchor broke, sonde remained on cable but was banging against piling; sonde stopped on 10/30/09
Homer Surface	11/12/09	10:45	12/16/09	14:15	Amundsen	Anchor too light, sonde banging against piling
Homer Surface	12/16/09	--	12/31/09	--		Not deployed (ice)
Homer Deep	1/1/09	00:00	1/7/09	12:45	Cortez	
Homer Deep	1/7/09	--	2/5/09	--	Kozloff	Sonde malfunction, no data in file.
Homer Deep	2/5/09	10:45	2/20/09	14:15	Cortez	2/20/09 Deployed new com cable. Power failure until 2/22/09
Homer Deep	2/22/09	15:00	3/6/09	09:30	Vitus	
Homer Deep	3/6/09	--	3/10/09	--	Kozloff	Sonde malfunction, no data in file
Homer Deep	3/10/09	10:30	4/2/09	08:15	Zeus	
Homer Deep	4/2/09	11:00	5/6/09	12:15	Amundsen	
Homer Deep	5/6/09	12:30	6/2/09	08:45	Kozloff	
Homer Deep	6/2/09	09:00	7/2/09	09:15	Nansen	
Homer Deep	7/2/09	09:45	8/4/09	12:15	Alpha	
Homer Deep	8/4/09	12:45	9/4/09	10:30	Kozloff	
Homer Deep	9/4/09	12:00	10/2/09	09:00	Neptune	
Homer Deep	10/2/09	09:15	11/12/09	10:00	Kozloff	
Homer Deep	11/12/09	10:15	12/16/09	14:30	Neptune	
Homer Deep	12/16/09	15:00	1/25/10	11:45	Vitus	

Data collection period (continued)

Station	Start Date	Start Time	End Date	End Time	Sonde ID	Comments
Seldovia Surface	1/1/09	00:00	1/8/09	11:30	Nautilus	
Seldovia Surface	1/8/09	12:00	2/6/09	10:30	Carson	
Seldovia Surface	2/6/09	10:45	3/5/09	08:45	Nautilus	
Seldovia Surface	3/5/09	11:15	4/6/09	12:00	Carson	
Seldovia Surface	4/6/09	12:30	5/4/09	11:30	Nautilus	
Seldovia Surface	5/4/09	12:00	6/1/09	09:30	Carson	
Seldovia Surface	6/1/09	10:00	7/1/09	10:00	Amundsen	
Seldovia Surface	7/1/09	10:30	7/30/09	10:30	Nautilus	
Seldovia Surface	7/30/09	11:00	9/1/09	10:15	Carson	
Seldovia Surface	9/1/09	11:45	10/1/09	11:45	Alpha	
Seldovia Surface	10/1/09	12:00	11/13/09	10:30	Carson	
Seldovia Surface	11/13/09	10:45	12/15/09	15:00	Alpha	
Seldovia Surface	12/15/09	15:15	01/13/10	12:00	Carson	
Seldovia Deep	1/1/09	00:00	1/8/09	11:45	Amundsen	
Seldovia Deep	1/8/09	12:00	2/6/09	10:15	Vitus	
Seldovia Deep	2/6/09	10:45	3/5/09	08:45	Zeus	
Seldovia Deep	3/5/09	09:30	4/6/09	12:00	Cortez	
Seldovia Deep	4/6/09	12:30	5/4/09	11:30	Zeus	
Seldovia Deep	5/4/09	12:00	6/1/09	09:30	Nansen	
Seldovia Deep	6/1/09	10:00	7/1/09	10:00	Alpha	
Seldovia Deep	7/1/09	10:30	7/30/09	10:45	Kozloff	
Seldovia Deep	7/30/09	11:00	9/1/09	01:15	Nansen	Power failure at end of deployment
Seldovia Deep	9/1/09	11:45	10/1/09	11:45	Vitus	
Seldovia Deep	10/1/09	12:15	11/13/09	10:30	Nansen	
Seldovia Deep	11/13/09	11:00	12/15/09	14:45	Vitus	
Seldovia Deep	12/15/09	15:15	1/13/10	11:45	Kozloff	

7) Distribution

NOAA/ERD retains the right to analyze, synthesize and publish summaries of the NERRS System-wide Monitoring Program data. The PI retains the right to be fully credited for having collected and processed the data. Following academic courtesy standards, the PI and NERR site where the data were collected will be contacted and fully acknowledged in any subsequent publications in which any part of the data are used. Manuscripts resulting from this NOAA/OCRM supported research that are produced for publication in open literature, including refereed scientific journals, will acknowledge that the research was conducted under an award from the Estuarine Reserves Division, Office of Ocean and Coastal Resource Management, National Ocean Service, National Oceanic and Atmospheric Administration. 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.

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 <http://cdmo.baruch.sc.edu/>. Data are available in text tab-delimited format.

8) Associated researchers and projects

The USGS, in conjunction with the Kachemak Bay Research Reserve and the City of Homer, is conducting a sediment transport monitoring program at Munson Point in Homer. This study uses an ARGUS camera array that collects hourly images of the beach area each day. More information about this project can be found at <http://zuma.nwra.com/homer/>.

The data are being combined with hydrographic survey data to examine water exchange between Kachemak Bay and Lower Cook Inlet. The sonde data provides the temporal context while the survey data provides the spatial information.

In addition, these data complement the other concurrent System-Wide Monitoring Program modules such as meteorological and nutrient data collection.

II. Physical Structure Descriptors

9) Sensor specifications

The Kachemak Bay NERR deployed nine 6600EDS sondes in 2009 and two 6600 sondes (Calypso & Zeus). All sondes were deployed with Temperature/Conductivity, pH, and turbidity probes. Sondes deployed at Homer Deep and Seldovia Deep had rapid-pulse DO probes, whereas the surface sondes usually had ROX probes. For the first few months of the year, the Homer and Seldovia Deep sites also had Chlorophyll-a probes, but we were not able to replace these probes once they broke.

Sensor specifications, continued (YSI 6600EDS and 6600 data sonde):

Parameter	Units	Sensor Type	Model	Range	Accuracy	Resolution
Temperature	Celsius (C)	Thermistor	6560	-5 to 50 °C	+/-0.15 °C	0.01 °C
Conductivity	milli-Siemens per cm (mS/cm)	4-electrode cell with autoranging	6560	0 to 100 mS/cm	+/-0.5% of reading + 0.001 mS/cm	0.001 mS/cm to 0.1 mS/cm (range dependent)
Salinity	parts per thousand (ppt)	Calculated from conductivity and temperature		0 to 70 ppt	+/- 1.0% of reading or 0.1 ppt, whichever is greater	0.01 ppt
Dissolved Oxygen %	percent air saturation (%)	Rapid Pulse – Clark type, polarographic	6562	0 to 500 % air saturation	0-200 % air saturation, +/- 2 % of the reading or 2 % air saturation, whichever is greater; 200-500 % air saturation, +/- 6 % of the reading	0.1 % air saturation
Dissolved Oxygen mg/L	milligrams per Liter (mg/L); Calculated from % air saturation, temp and salinity	Rapid Pulse – Clark type, polarographic	6562	0 to 50 mg/L	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	0.01 mg/L
Dissolved Oxygen %	% Saturation	Optical probe w/ mechanical cleaning	6150 ROX	0 to 500% air saturation	0-200% air saturation: +/- 1% of the reading or 1% air saturation, whichever is greater; 200-500% air saturation: +/- 15% of reading	0.1% air saturation
Dissolved Oxygen mg/L	milligrams/Liter (mg/L)	Optical probe w/ mechanical cleaning	6150 ROX	0 to 50 mg/L	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	0.01 mg/L
Depth	feet or meters (m)	Stainless steel strain gauge		0 to 30 ft (9.1 m)	+/- 0.06 ft (0.018 m)	0.001 ft (0.001 m)
pH	units	Glass combination electrode	6561 and 6561FG	0 to 14 units	+/- 0.2 units	0.01 units
Turbidity	nephelometric turbidity units (NTU)	Optical, 90 ° scatter, with mechanical cleaning	6136	0 to 1000 NTU	+/- 2 % reading or 0.3 NTU (whichever is greater)	0.1 NTU
Chlorophyll Fluorescence	micrograms/Liter	Optical probe w/ mechanical cleaning	6025	0 to 400 µg/Liter	Dependent on methodology	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.

10) Coded variable definitions

File name definitions: Reserve/deployment site/file definition/year
(ex: kacsswq2007 = Kachemak Bay/Seldovia Surface/WaterQuality/2007).

Sampling station	Sampling site code	Station code
Homer Surface	HS	kachswq
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 *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
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

Homer Surface (HS):

Site	Deploy Date	Retrieval Date	Sonde	DO (%)	Depth (m)	SpCond (50 mS/cm)	pH (7)	pH (10)	Turb (0 NTU)	Turb (123 NTU)	Comments
HS	1/7/09	2/6/09	--	--	--	--	--	--	--	--	No sonde deployed due to ice
HS	2/6/09	3/6/09	--	--	--	--	--	--	--	--	No sonde deployed due to ice
HS	3/6/09	3/10/09	--	--	--	--	--	--	--	--	No sonde deployed due to ice
HS	3/10/09	4/2/09	Nautilus	100.8	0.106	49.67	7.02	10.12	2.0	116.0	
HS	4/2/09	5/6/09	Calypso	25.8	-0.003	19.71	7.10	9.71	1.3	161.1	DO and Temp/SpCond probe malfunction
HS	5/6/09	6/2/09	Nautilus	100.4	0.235	49.12	7.01	10.12	10.5	130.7	
HS	6/2/09	6/17/09	Carson	93.2	-0.106	50.76	7.04	10.02	0.7	164.3	Anchor broke, sonde (Carson) floated free around 6/11/09, found later on beach & returned to KBRR 6/17
HS	6/19/09	7/2/09	Carson	106.2	0.124	51.14	6.93	9.97	-2.1	--	Recalibrated and redeployed on 6/19, with new anchor setup.
HS	7/2/09	8/4/09	Amundsen	-1.4	-0.057	55.84	7.12	10.00	-22.2	--	Turbidity wiper fell off and fouling affected DO and Turbidity data.
HS	8/4/09	9/4/09	Nautilus	98.7	-0.060	50.86	7.07	10.03	7.6	123.9	
HS	9/4/09	10/2/09	Amundsen	106.2	0.074	48.89	7.00	9.92	11.3	127.4	
HS	10/2/09	11/12/09	Nautilus	98.2	-0.389	50.45	6.78	9.81	--	--	Anchor broke, sonde was banging into piling during storm, caused turbidity probe to fall off.
HS	11/12/09	12/16/09	Amundsen	--	-0.221	50.83	5.41	8.46	--	--	Light anchor and more storms caused banging against piling. Sonde lost Rox DO and Turb. Probes, pH broken.
HS	12/16/09	12/31/09	--	--	--	--	--	--	--	--	No sonde deployed due to ice

Homer Deep (HD):

Site	Deploy Date	Retrieval Date	Sonde	DO (%)	Depth (m)	SpCond (50 mS/cm)	pH (7)	pH (10)	Turb (0 NTU)	Turb (123 NTU)	Chl (µg/L)	Comments
HD	1/1/09	1/7/09	Cortez	69.2	-0.154	50.8	7.00	10.01	3.7	117.5	0.1	DO would not stabilize
HD	1/7/09	2/5/09	Kozloff	97.8	-0.240	--	--	--	--	--	--	Sonde malfunction, no data in file. Post-cal not completed
HD	2/5/09	2/20/09	Cortez	69.4	-0.215	50.12	7.09	9.98	2.2	114.5	285.3	DO would not stabilize, chl not parking correctly
HD	2/20/09	3/6/09	Vitus	77.5	-0.065	50.05	7.11	10.18	0.1	134.6	294.5	DO drift, Chl malfunction
HD	3/6/09	3/10/09	Kozloff	59.4	-0.030	50.16	7.00	10.04	0.3	120.9	--	Sonde malfunction, no data in file
HD	3/10/09	4/2/09	Zeus	151.5	0.018	50.39	7.01	10.05	1.0	129.5	--	Chl malfunction
HD	4/2/09	5/6/09	Amundsen	65.0	-0.148	--	6.84	9.80	9.5	143.6	--	Turbidity Wiper fell off
HD	5/6/09	6/2/09	Kozloff	95.6	0.080	49.16	6.90	9.81	1.9	121.3	--	
HD	6/2/09	7/2/09	Nansen	82.6	0.129	51.51	6.99	10.01	-1.0	--	--	DO drift
HD	7/2/09	8/4/09	Alpha	73.1	-0.029	49.85	7.01	9.88	1.5	--	--	DO would not stabilize
HD	8/4/09	9/4/09	Kozloff	103.5	-0.064	51.79	7.04	10.03	3.5	122.1	--	
HD	9/4/09	10/2/09	Neptune	96.7	0.046	50.53	7.07	9.86	5.3	104.7	--	
HD	10/2/09	11/12/09	Kozloff	1.4	-0.396	53.23	7.14	10.00	2.5	128.9	--	DO Probe membrane was torn upon retrieval.
HD	11/12/09	12/16/09	Neptune	65	-0.218	50.06	6.89	9.81	1.5	99.9	--	Turb probe 6026 (calibrate to 100 ntu)
HD	12/16/09	1/25/10	Vitus	103.4	-0.200	50.71	7.07	10.06	0.4	77.4	--	Turb probe 6026 (calibrate to 100 ntu)

Seldovia Surface (SS):

Site	Deploy Date	Retrieval Date	Sonde	DO (%)	Depth (m)	SpCond (50 mS/cm)	pH (7)	pH (10)	Turb (0 NTU)	Turb (123 NTU)	Comments
SS	1/1/09	1/8/09	Nautilus	99.9	-0.188	50.20	7.01	9.96	5.0	102.3	
SS	1/8/09	2/6/09	Carson	103.0	-0.177	50.50	7.07	10.08	6.5	142.9	
SS	2/5/09	3/5/09	Nautilus	100.3	0.124	49.86	7.08	10.03	3.7	132.3	
SS	3/5/09	4/6/09	Carson	97.4	-0.024	50.13	7.07	10.18	2.1	150.9	No Wiper on DO Probe
SS	4/6/09	5/4/09	Nautilus	98.7	-0.487	57.33	7.02	9.95	1.5	137.7	Sonde reporting DO mg/L as the same as temp. YSI helped to correct
SS	5/4/09	6/1/09	Carson	103.6	0.104	50.12	7.06	9.98	0.0	134.4	
SS	6/1/09	7/1/09	Amundsen	100.3	0.111	56.70	7.14	10.10	1.3	--	
SS	7/1/09	7/30/09	Nautilus	103.6	-0.098	51.63	7.08	9.96	2.1	--	
SS	7/30/09	9/1/09	Carson	99.4	-0.111	54.38	7.02	10.01	2.2	123.1	
SS	9/1/09	10/1/09	Alpha	79.6	0.047	50.97	7.06	10.01	2.7	129.4	DO drift (rapid pulse probe)
SS	10/1/09	11/13/09	Carson	96.5	-0.395	50.36	7.04	10.05	5.4	122.5	
SS	11/13/09	12/15/09	Alpha	97.8	-0.342	50.17	7.08	10.11	-0.3	129.0	
SS	12/15/09	1/13/10	Carson	98.2	-0.232	49.58	7.12	10.14	2.7	124.7	

Seldovia Deep (SD):

Site	Deploy Date	Retrieval Date	Sonde	DO (%)	Depth (m)	SpCond (50 mS/cm)	pH (7)	pH (10)	Turb (0 NTU)	Turb (123 NTU)	Chl (µg/L)	Comments
SD	1/1/09	1/8/09	Amundsen	73.9	-0.180	50.90	7.01	9.98	4.8	121.9	--	DO would not stabilize
SD	1/8/09	2/6/09	Vitus	88.7	-0.171	50.30	7.06	9.98	4.2	148.0	-6.00	
SD	2/6/09	3/5/09	Zeus	59.0	-0.032	49.61	7.13	10.03	-5.6	--	--	Chl probe malfunction
SD	3/5/09	4/6/09	Cortez	100.5	-0.029	49.49	7.33	10.3	-3.6	5.7	0.30	Turbidity Probe malfunction
SD	4/6/09	5/4/09	Zeus	97.5	-0.151	57.51	7.15	10.18	1.2	137.7		
SD	5/4/09	6/1/09	Nansen	100.1	0.084	46.67	7.07	--	0.7	133.4		DO would not stabilize.
SD	6/1/09	7/1/09	Alpha	63.7	0.107	53.79	6.92	9.82	0.5	--		DO drift
SD	7/1/09	7/30/09	Kozloff	96.2	-0.105	52.75	7.11	9.97	3.9	--		
SD	7/30/09	9/1/09	Nansen	99.0	-0.102	49.09	7.09	10.11	1.2	118.6		
SD	9/1/09	10/1/09	Vitus	61.0	0.046	51.19	6.96	9.92	4.4	107		Turb probe 6026 (calibrate to 100 ntu); DO failed warm up test
SD	10/1/09	11/13/09	Nansen	74.1	-0.398	50.02	7.12	10.06	2.4	128.3		DO drift
SD	11/13/09	12/15/09	Vitus	36.1	-0.344	49.98	7.15	10.27	0.9	101.7		DO probe malfunction
SD	12/15/09	1/13/10	Kozloff	42.8	-0.283	50.37	7.14	10.12	2.6	123.3		DO failed warm up test

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.

The sondes at SS and HS would often get hung up on the cable and then get freed again (as tide comes in and out). Data within the top 2m are accepted (as that is the normal range of our surface sonde). Everything outside of that range was rejected.

There were some issues with pH matching up at switch-outs throughout the year at the SD site. The cause of these issues is unknown in origin.

For the HD station depth is marked 1 GSM CWD and all other parameters are marked 1 CWD from 2/5 10:45 to 2/20 14:15. The communications cable went bad and we purchased a new one. The new one that was purchased ended up being too short (deployed on 2/5/09), it was 50 feet long instead of 100 feet. The sonde was deployed on the 50 ft cable until a new (100 ft) cable could be purchased. Data were collected at the wrong depth until the new cable arrived and was deployed on 2/20/09.

On July 15th, 2009, we used divers to look at our Homer and Seldovia deep sondes while they were deployed. The deployment cables at both sites were slightly adjusted. As noted in our data collection table and post-deployment table, we had trouble anchoring the Homer Surface sonde in 2009. This site is subject to strong currents and storms and we subsequently had two anchors break and our third anchor was not heavy enough to hold the sonde down during a storm. This site is also subject to heavy icing during the winter, so we removed the sonde and anchor during January, February, and December.

On 6/5 19:45 the sonde at the HS station became entangled and hung up in the deployment cable. During the time period from 6/5 19:45 to 6/11 22:00 as the tide would come in the buoy that the sonde was attached to would sink. This resulted in the sonde incorrectly recording data at a deeper depth. As the tide went out the buoy and sonde would surface and begin to once again collect data at the correct depth. This cycle repeated itself during the aforementioned time period.

The strain on the anchor at HS during this cycling up and down during the tides caused the buoy to break free. Starting on 6/22 22:15 all data is rejected as the buoy and sonde were free floating in the ocean and not at the correct site.

For the HS station the sonde was located too close to a dock piling in 2009 and would bang against it and get highly beat up. (especially during high tide). (We have since moved the site so this doesn't happen anymore). All data from 10/21/09 19:15-10/30/09 16:00 is rejected (-3 SSM) for SpCond, Sal and dependent parameters. pH was also affected by this and is marked -3 SSM during the same time. Turbidity is coded -3 SSR during this time because the probe was actually knocked out of the port while banging up against the piling.