

Kachemak Bay Research Reserve (KAC) NERR Water Quality Metadata
January - December 2004
Latest update: August 13, 2020

1) Data Set and Research Descriptors

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2) Entry Verification

For the Homer and Seldovia sites, the 15-minute data are uploaded to the PC from both the YSI Model 6200 Data Acquisition System via modem at 60-minute intervals, and the YSI 6600 Sonde Data Logger upon recovery. The text files are initially viewed with Ecowatch software, and graphs are produced to look for suspect data as may result from probe failure. Notes are made of any unusual data, and sensors are reconditioned as necessary.

The text data files are run through a Matlab routine created by Scott Pegau for processing. This routine is attached at the end of this report. The routine is set to output data every 15 minutes to match data collection intervals. The routine looks for data collected within 7.5 minutes of the desired output time. Data that were recorded when the instruments were out of the water are deleted from the beginning and end of each record. These data are identified by unusual depth and salinity data (usually near zero). The routine outputs a data file listing the missing data points, fills all cells that do not contain data with blanks, and finds and removes all data points that fall outside the range of what the data logger is designed to measure, or are out of realistic ranges for Kachemak Bay. The routine then processes the data through several filters to flag suspect data points that are greater than 4 standard deviations from data gathered in the 24-hour period surrounding the point. It can remove the data point or just flag it as suspicious. In addition, a graphing capability is included to produce single and multi-parameter graphs on a monthly or yearly basis. The routine outputs monthly files with column widths formatted to the correct number of decimal places based on YSI sensor specifications.

Anomalous data are evaluated to determine whether to flag or delete the suspect values. Data are flagged if they fall outside the normal values seen at the site, or outside the range of measurements and accuracy established for the sensors. Data outside the "normal" range of water quality for a particular site were investigated for validity based on weather data, field observations, QC checks, and instrument diagnostics. Data are deleted if anomalies are attributed to sensor malfunction or fouling of the sensors by aquatic organisms, debris, or sediment. In addition, sensor readings that differ significantly (>10%) from calibration standards suggest that the sensor was fouled during deployment. After corrections are made to the text files, and anomalies noted in the metadata report, the edited files are exported as tab delimited (*.txt). The monthly text files are then combined to produce the yearly data file that is sent to the CDMO. Raw (*.csv) files are also sent to the CDMO for archival. Scott Pegau is responsible for these tasks.

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. There are four permanent data logger sites at two locations in Kachemak Bay. 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 a data logger is suspended 1-meter below the surface, and one data logger 1-meter from the bottom. 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 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 inflowing water, in the path of the Seldovia instruments initially supports a marine system, while the north 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

The permanent sites of the Homer and Seldovia instruments have YSI 6600 Sonde Data Loggers connected to 6200 Data Acquisition Systems that are used for data collection. The Data Acquisition System is connected via modem to a computer at the Research Reserve. The raw data is collected in 15-minute intervals, stored on the 6200 DCP and interrogated, or downloaded, by our office computer hourly. Both instruments are 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.

Calibration and deployment occurred monthly using methods outlined in the YSI Operating and Service Manual. After cleaning the data loggers, the dissolved oxygen (DO) membrane is replaced and allowed to season in water-saturated air for 12 hours before the DO sensor is calibrated. The pH, conductivity, depth, and turbidity sensors are calibrated using the following standards purchased from YSI (except depth): pH 7 and 10, conductivity standards of 50 mS/cm, respectively, and depth of 0. Turbidity standard of 123 NTU is purchased from YSI.

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 comprises the entire inner Bay and the outer Bay. 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 m. 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 59.6028°N and 151.4081°W. Data for the Homer instruments was collected from January through December 2004, at a depth 1 meter from the bottom, in water fluctuating between 8.0 and 17.0 meters. The surface data sonde was deployed in February 2004 and ran through December 2004 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 31.7 ppt, as the instrument's location in the stratified

water column is dependent on tide height, with a tidal range of 8.1m. 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 59.4413°N, 151.7186°W, approximately 15 miles west 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 5 and 13.3 meters. The access to Seldovia is limited to boat or air, as the site is located off the highway system. The power and phone line connection are occasionally inoperative due to the remote location and position at the end of the power grid. The bottom habitat is predominantly rocky substrate. Pollutants in the area are minimal. Throughout the year, salinity has ranged from 25 to 32.9 PSU at this site with a tidal range of 8m.

6) Data Collection Period

Monitoring at the Homer Dolphin Deep and both Seldovia sites was continuous throughout 2004. The sonde at the Homer Dolphin Surface location was deployed February 13, 2004 and has run continuously since then. Deployment and retrieval dates and times for the following months are listed below:

Began	Ended	Sonde	Comments
Homer Dolphin Deep			
1/19/04, 13:01	2/13/04, 09:01	Nautilus	connection problems during recal, 2 sea stars, 1 urchin
2/17/04, 09:15	3/09/04, 11:00	Nansen	
3/09/04, 11:16	4/11/04, 20:46	Calypso	all data suspicious, DO membr worn in one section
4/12/04, 08:46	5/17/04, 08:46	Neptune	chgd pH probe before deploy
5/17/04, 09:00	6/21/04, 10:45	Nansen	changed Turb probe to 6130
6/21/04, 11:01	7/27/04, 08:46	Calypso	DO membr punctured
7/27/04, 09:16	8/16/04, 08:46	Neptune	increasing Turb in postcal
8/16/04, 09:00	9/05/04, 14:15	Calypso	Turb and Chl probes mis-parking, replace Turb
9/21/04, 09:46	10/19/04, 9:01	Neptune	pH bulb broken, repl pH probe, DO membr punct, light barnacle fouling
10/19/04, 9:15	11/12/04, 11:00	Calypso	
11/12/04, 11:16	11/15/04, 9:31	Neptune	Turb probe chg'd to 6026
11/15/04, 10:01	12/20/04, 11:00	Calypso	
12/20/04, 11:30	01/17/05, 11:01	Neptune	

Homer Dolphin Surface

2/13/04, 09:31 3/09/04, 11:01 post cal	3/09/04, 10:46 4/05/04, 10:16	Zeus Kozloff	Turb probe is 6026 6026 Turb probe fell off, no cal, repl Turb probe, needs connector repair both ends heavy fouling, very low batt odd Turb reads mid-month, chg'd Turb to 6130, heavy fouling all probes
4/12/04, 11:46 5/20/04, 12:16	5/11/04, 01:01 6/21/04, 10:31	Nautilus Zeus	
6/21/04, 11:00 7/27/04, 09:45 8/16/04, 09:31 9/20/04, 14:00	7/27/04, 09:15 8/16/04, 08:45 9/20/04, 13:46 10/19/04, 9:00	Amundsen Kozloff Zeus Kozloff	DO membr worn but intact very hvy fouling all probes DO o-ring mis-shapen, repl, 2 shrimp in guard, hvy foul DO membrane fouled
10/19/04, 9:31 11/12/04, 11:15 12/20/05, 11:16 range	11/12/04, 10:46 12/20/04, 10:45 01/17/04, 10:31	Zeus Kozloff Zeus	pH mv voltage was out of
Seldovia Deep 1/20/04, 11:16	2/12/04, 11:31	Kozloff	DO membr scratched, dead batteries replaced
2/12/04, 11:46 3/10/04, 11:00 4/13/04, 09:00	3/10/04, 10:46 4/13/04, 08:30 5/18/04, 09:01	Neptune Nansen Calypso	SpC off, chg'd cond probe Turb probe is 6026 bryozoan fouling in guard, Turb wiper repl in field before deployment
5/18/04, 09:30	6/22/04, 10:01	Neptune	Chl wpr fell off in guard, chg'd pH probe, Turb reads look flat, bryozoan fouling
6/22/04, 10:30 7/28/04, 08:31	7/28/04, 08:15 8/09/04, 09:45	Nansen Calypso	comm prob, retrieved early, hi Turb reads, some water in connector/loose connection
8/17/04, 07:45 9/17/04, 14:00	9/17/04, 13:46 10/20/04, 9:30	Neptune Nansen	light barnacle fouling, connector port rusty inside chg'd connector o-ring
10/20/04, 9:46 11/11/04, 13:00 12/21/04, 11:01	11/11/04, 12:31 12/21/04, 10:30 01/18/05, 10:31	Neptune Nansen Calypso	DO membr punctured
Seldovia Surface 1/20/04, 11:00 2/12/04, 11:45 3/10/04, 11:01 4/13/04, 09:15	2/12/04, 11:30 3/10/04, 10:30 4/13/04, 08:16 5/18/04, 09:15	Nansen Amundsen Zeus Amundsen	light fouling DO membr lightly fouled Turb probe is 6026 heavy fouling all probes

5/18/04, 09:45	6/22/04, 10:30	Kozloff	3 crabs and alaria in guard hi Turb reads mid-month, hvy fouling on all equip
6/22/04, 11:16	7/28/04, 08:16	Zeus	heavy fouling
7/28/04, 08:30	8/17/04, 07:45	Amundsen	
8/17/04, 08:15	9/17/04, 13:45	Kozloff	
9/17/04, 14:00	10/20/04, 9:30	Amundsen	light fouling, barnacles on shuttle
10/20/04, 10:00	11/11/04, 12:30	Kozloff	chg'd connector o-ring DO membr fouled
11/11/04, 12:45	12/21/04, 10:30	Amundsen	DO chrg reads suspicious
12/21/04, 10:45	01/18/05, 10:15	Kozloff	

7) Distribution

According to the Ocean and Coastal Resource Management Data Dissemination Policy for the NERRS System-wide Monitoring Program, NOAA/ERD retains the rights 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 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 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, 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, Microsoft Excel spreadsheet format, and comma-delimited format.

8) Associated Researchers and Projects

The USGS, in conjunction with KBBR 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. To better understand the forces associated with the sediment transport, a wave gauge is moored in

3 m MLLW of water. More information about this project can be found at <http://zuma.nwra.com/homer/>.

A non-indigenous species monitoring being conducted by the Smithsonian Environmental Research Center used the sites and data. Settling plates were co-located with the SWMP instrument sites in Homer and Seldovia. Baited crab traps were also deployed in the Homer area. For more information on this project, contact Catherine E. deRivera [cderivera@earthlink.net].

The data is 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.

II. Physical Structure Descriptors

9) Sensor Specifications:

YSI 6600/YSI 6600EDS data logger

Parameter: Temperature
Units: Celsius (C)
Sensor Type: Thermistor
Model #: 6560
Range: -5 to 45 °C
Accuracy: +/-0.15 °C
Resolution: 0.01 °C

Parameter: Conductivity
Units: milli-Siemens per cm (mS/cm)
Sensor Type: 4-electrode cell with autoranging
Model #: 6560
Range: 0 to 100 mS/cm
Accuracy: +/-0.5% of reading + 0.001 mS/cm
Resolution: 0.001 mS/cm to 0.1 mS/cm (range dependent)

Parameter: Salinity
Units: parts per thousand (ppt)
Sensor Type: Calculated from conductivity and temperature
Range: 0 to 70 ppt
Accuracy: +/- 1.0% of reading or 0.1 ppt, whichever is greater
Resolution: 0.01 ppt

Parameter: Dissolved Oxygen % saturation
Units: percent air saturation (%)
Sensor Type: Rapid Pulse – Clark type, polarographic
Model #: 6562

Range: 0 to 500 % air saturation

Accuracy: 0-200 % air saturation, +/- 2 % of the reading or 2 % air saturation, whichever is greater; 200-500 % air saturation, +/- 6 % of the reading

Resolution: 0.1 % air saturation

Parameter: Dissolved Oxygen mg/L (Calculated from % air saturation, temperature and salinity)

Units: milligrams per Liter (mg/L)

Sensor Type: Rapid Pulse – Clark type, polarographic

Model #: 6562

Range: 0 to 50 mg/L

Accuracy: 0 to 20 mg/L, +/- 2 % of the reading or 0.2 mg/L, whichever is greater; 20 to 50 mg/L, +/- 6 % of the reading

Resolution: 0.01 mg/L

Parameter: Vented Level – Deep (Depth)

Units: feet or meters (ft or m)

Sensor Type: Stainless steel strain gauge

Range: 0 to 656 ft (200 m)

Accuracy: +/- 1 ft (0.3 m)

Resolution: 0.001 ft (0.001 m)

Parameter: pH (specify whether EDS probe or not)

Units: units

Sensor Type: Glass combination electrode

Model #: 6561

Range: 0 to 14 units

Accuracy: +/- 0.2 units

Resolution: 0.01 units

Parameter: Turbidity

Units: nephelometric turbidity units (NTU)

Sensor Type: Optical, 90 ° scatter, with mechanical cleaning

Model #: 6136

Range: 0 to 1000 NTU

Accuracy: +/- 5 % reading or 2 NTU (whichever is greater)

Resolution: 0.1 NTU

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. 200*). Many reserves have upgraded to YSI 6600 EDS data sondes, which increase 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, ie. periodicity analysis. It should be noted that the

amount of fouling is 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. All data sondes used at DNERR sites in 2002 were non-EDS models.

The NERRS System-Wide Monitoring Program utilizes YSI data sondes that can be equipped with either depth or water level sensors. Both sensors measure water depth, but by convention, level sensors refer to atmospherically vented measurements and depth refers to non-vented measurements. Standard calibration protocols for the non-vented sensor use the atmosphere pressure at the time of calibration. Therefore, changes in atmospheric pressure between calibrations appear as changes in water depth. The error is equal to approximately 1.03 cm for every 1millibar change in atmospheric pressure. This error is eliminated for level sensors because they are vented to the atmosphere throughout the deployment time interval. If proper atmospheric pressure data are available, non-vented sensor depth measurements can be corrected for deployments between calibrations. Readings for both vented and non-vented sensors are automatically compensated for water density changes due to variations in temperature and salinity. The Research Coordinator at the specific NERR site should be contacted in order to obtain information regarding atmospheric pressure data availability. All data sondes used at the DNERR sites in 2002 were non-vented models.

10) Coded variable indicator and variable code definitions

File definitions: Reserve/deployment site/file definition/year
(ex: kacsswq2004 = Seldovia surface water quality data from 2004).

Sampling station:	Sampling site code:	Station code:
Homer Dolphin Surface	HS	kachswq
Homer Dolphin Deep	HD	kachdwq
Seldovia Surface	SS	kacsswq
Seldovia Deep	SD	kacsdwq

11) Data anomalies

Note: Outliers in the data are defined to be any point greater than 4 standard deviations from the mean of the 24-hour period surrounding that point. Turbidity outliers are most commonly related to fish and invertebrates within the sonde guard. The turbidity outliers were deleted and are marked in section 12.

Note: Between sonde rotations we typically encounter the following jumps in data as a result of calibration offsets and probe accuracy:

pH:	+/- 0.02
DO %:	+/- 10

DO Conc: +/- 1 mg/l

January 1-31, 2004

11) Data anomalies

Note: Outliers in the data are defined to be any point greater than 4 standard deviations from the mean of the 24-hour period surrounding that point. Turbidity outliers are most commonly related to fish and invertebrates within the sonde guard. The turbidity outliers were deleted and are marked in section 12.

Note: Between sonde rotations we typically encounter the following jumps in data as a result of calibration offsets and probe accuracy:

pH: +/- 0.02
DO %: +/- 10
DO Conc: +/- 1 mg/l

January 1-31, 2004

Homer Dolphin Deep

- a) DO Percent Outlier: 01/18/2004: 10:00, 01/19/2004: 13:00, 01/20/2004: 19:30 - 19:45, 01/28/2004: 06:45
- b) DO Conc Outlier: 01/19/2004: 13:00, 01/20/2004: 19:30- 9:45, 01/22/2004: 13:45, 14:30

Seldovia Deep

- a) DO readings are about 20% too high. The scratched membrane may have created an offset in the calibrations: 01/20/2004 11:15 – 02/12/2004 11:30

February 1-29, 2004

Homer Dolphin Deep

- a) DO Percent Outlier: 02/17/2004: 09:15
- b) DO Conc Outlier: 02/17/2004: 09:15

Seldovia Surface

- a) DO Conc Outlier: 02/19/2004: 20:30, 02/22/2004: 23:30

March 1-31, 2004

Homer Dolphin Deep

- a) DO Percent Outlier: 03/03/2004: 18:45

- b) 3/26 18:15 - 4/11 21:00 The YSI sonde operated erratically. The samples collected are within expected ranges; however, the erratic operation makes us suspicious of data collected during this time period.

Seldovia Deep

- a) DO Percent Outlier: 03/10/2004: 11:00

Seldovia Surface

- a) DO Conc Outlier: 03/02/2004: 21:00, 03/07/2004: 21:45

April 1-30, 2004

Homer Dolphin Deep

- a) DO Percent Outlier: 04/13/2004: 15:00 - 15:15, 04/23/2004: 22:00, 04/26/2004: 23:30, 04/27/2004: 14:00 - 14:15, 04/28/2004: 22:15
- b) DO Conc Outlier: 04/13/2004: 15:00 - 15:15, 04/23/2004: 22:00, 04/26/2004: 23:30, 04/27/2004: 14:00 - 14:15, 04/28/2004: 22:15

Homer Dolphin Surface

- a) DO Conc Outlier: 04/01/2004: 15:00
- b) pH Outlier: 04/02/2004: 15:45, 04/12/2004: 11:45
- c) All data 04/02/2004 00:00 – 04/04/2004 07:45 suspicious due to sonde operating irregularities.

Seldovia Deep

- a) DO Percent Outlier: 04/03/2004: 19:15
- b) DO Conc Outlier: 04/03/2004: 19:15

Seldovia Surface

- a) DO Percent Outlier: 04/13/2004: 09:3
- b) DO Conc Outlier: 04/07/2004: 09:30, 04/13/2004: 09:30

May 1-31, 2004

Homer Dolphin Deep

- a) DO Percent Outlier: 05/07/2004: 20:15, 05/25/2004: 10:45, 05/30/2004: 04:15 - 04:45
- b) DO Conc Outlier: 05/07/2004: 20:15, 05/12/2004: 14:00, 05/16/2004: 06:15, 05/25/2004: 10:45, 05/28/2004: 14:45 - 15:00, 05/30/2004: 04:15-04:45

Homer Dolphin Surface

- a) DO Conc Outlier: 05/30/2004: 19:00

Seldovia Surface

- a) DO Percent Outlier: 05/11/2004: 01:00, 05/31/2004: 05:30
- b) DO Conc Outlier: 05/30/2004: 04:45, 05/31/2004: 05:30

June 1-30, 2004

Homer Dolphin Deep

- a) DO readings all high 06/21/04 11:00 – 07/27/04 08:45. During this deployment all readings are about 20% higher than is expected.
- b) DO Percent Outlier: 06/03/2004: 18:45, 19:15 - 19:30, 06/04/2004: 09:00, 06/13/2004: 04:45 - 05:00, 06/14/2004: 05:45, 06/17/2004: 06:00 - 06:45, 06/18/2004: 08:30 - 08:45, 06/23/2004: 11:15
- c) DO Conc Outlier: 06/01/2004: 06:30, 19:00, 06/03/2004: 18:45, 19:15 - 19:30, 06/04/2004: 09:00, 06/11/2004: 15:30, 06/13/2004: 04:45 - 05:00, 06/14/2004: 05:45, 06/17/2004: 06:00 - 06:45, 06/18/2004: 08:30 - 08:45, 06/21/2004: 11:00, 06/23/2004: 11:15 - 11:30, 06/25/2004: 13:00, 06/29/2004: 04:45
- d) pH Outlier: 06/17/2004: 06:30 - 06:45

Homer Dolphin Surface

- a) DO Conc Outlier: 06/08/2004: 04:45
- b) Unusually low DO readings 06/10/2004 03:00 – 12:00, no sensor failure evident.

Seldovia Deep

- a) DO Percent Outlier: 06/17/2004: 21:45, 06/19/2004: 04:15
- b) DO Conc Outlier: 06/17/2004: 21:45, 06/19/2004: 04:15

Seldovia Surface

- a) Unusually low DO readings 06/01/2004-06/22/2004 possibly due to biofouling on the probe.
- b) DO Percent Outlier: 06/01/2004: 22:45, 06/04/2004: 14:30, 06/06/2004: 02:45, 06/12/2004: 17:30
- c) DO Conc Outlier: 06/01/2004: 22:45, 06/04/2004: 14:30, 06/06/2004: 02:45, 06/12/2004: 17:30

July 1-31, 2004

Homer Dolphin Deep

- a) DO Percent Outlier: 07/01/2004: 06:00, 07/03/2004: 08:15, 07/04/2004: 09:15, 07/07/2004: 11:45, 07/08/2004: 12:15, 12:45, 07/13/2004: 05:15 - 05:45, 07/15/2004: 07:00, 07/17/2004: 08:30, 07/18/2004: 08:30, 07/26/2004: 14:00, 07/27/2004: 04:00, 07/30/2004: 06:45, 07/31/2004: 05:45
- b) DO Conc Outlier: 07/01/2004: 06:00, 07/02/2004: 07:45, 07/03/2004: 08:15, 07/04/2004: 09:15 - 09:30, 07/05/2004: 22:30, 07/06/2004: 10:30, 07/07/2004: 01:45, 07/08/2004: 12:15, 12:45, 07/10/2004: 02:30, 07/13/2004: 05:15 - 05:45,

- 07/15/2004: 07:00, 07/17/2004: 08:30, 07/18/2004: 08:30, 07/26/2004: 13:45 - 14:00, 07/27/2004: 04:00, 07/29/2004: 05:45, 07/30/2004: 06:45
- c) pH Outlier: 07/01/2004: 05:45, 06:30, 07/07/2004: 11:45 - 12:00, 07/15/2004: 07:00 - 07:15

Homer Dolphin Surface

- a) DO Percent Outlier: 07/15/2004: 01:45

Seldovia Deep

- a) DO Percent Outlier: 07/26/2004: 15:15

Seldovia Surface

- a) DO Percent Outlier: 07/27/2004: 03:15
b) DO Conc Outlier: 07/27/2004: 03:15

August 1-31, 2004

Homer Dolphin Deep

- a) DO Percent Outlier: 08/02/2004: 21:30 - 21:45, 08/05/2004: 11:30, 08/07/2004: 00:15, 08/11/2004: 04:45 - 05:15, 08/12/2004: 05:45 - 06:15, 18:45, 08/14/2004: 06:30, 08/16/2004: 08:00 - 08:15, 08/23/2004: 00:45, 08/24/2004: 01:30, 08/29/2004: 07:00-07:15
- b) DO Conc Outlier: 08/02/2004: 21:30 - 21:45, 08/05/2004: 11:30, 08/07/2004: 00:15, 08/11/2004: 04:45 - 05:15, 08/12/2004: 05:45 - 06:15, 18:45, 08/14/2004: 06:30, 08/16/2004: 08:00 - 08:15, 08:45, 08/23/2004: 00:30 - 00:45, 08/24/2004: 01:30, 08/29/2004: 07:00 - 07:15
- c) pH Outlier: 08/02/2004: 21:30 - 21:45, 08/11/2004: 05:15 - 05:30, 08/12/2004: 06:00 - 06:15, 08/29/2004: 07:00 - 07:15

Homer Dolphin Surface

- a) DO from 08/01/2004 00:00 – 08/16/2004 08:45 has a suspicious downward trend

September 1-30, 2004

Homer Dolphin Deep

- a) DO Percent Outlier: 09/02/2004: 22:45, 09/21/2004: 10:15, 09/23/2004: 03:15, 11:15, 09/28/2004: 07:15, 20:30
- b) DO Conc Outlier: 09/02/2004: 22:45, 09/21/2004: 10:15, 09/23/2004: 03:15, 11:15, 09/28/2004: 07:15, 20:30
- c) pH Outlier: 09/02/2004: 22:30-22:45

Homer Dolphin Surface

- a) DO Percent Outlier: 09/01/2004: 11:30, 23:45, 09/07/2004: 20:45, 09/15/2004: 12:00, 09/17/2004: 03:15
- b) DO Conc Outlier: 09/01/2004: 11:30, 23:45 - 09/02/2004: 00:00, 09/07/2004: 20:45, 09/17/2004: 03:15

Seldovia Surface

- a) DO Percent Outlier: 09/06/2004: 12:00
- b) DO Conc Outlier: 09/06/2004: 12:00

October 1-31, 2004

Homer Dolphin Deep

- a) DO Percent Outlier: 10/01/2004: 12:00, 10/02/2004: 10:30, 10/03/2004: 04:30, 16:15, 10/04/2004: 05:15, 05:45, 10/06/2004: 00:45 - 01:00, 10/13/2004: 06:15, 19:15 - 19:30, 10/14/2004: 20:15, 10/15/2004: 19:00, 10/16/2004: 07:00, 19:00, 10/17/2004: 08:30, 10/26/2004: 18:45 - 19:15, 10/27/2004: 19:30 - 19:45, 10/28/2004: 20:00 - 20:30
- b) DO Conc Outlier: 10/01/2004: 12:00, 10/02/2004: 10:30, 10/04/2004: 05:15, 05:45, 10/06/2004: 01:00, 10/13/2004: 19:15 - 19:30, 10/14/2004: 20:15, 10/15/2004: 19:00, 10/16/2004: 07:00, 19:00, 10/26/2004: 18:45 - 19:15, 10/27/2004: 19:30 - 19:45, 10/28/2004: 20:00 - 20:30
- c) pH Outlier: 10/27/2004: 19:45

Homer Dolphin Surface

- a) DO Percent Outlier: 10/05/2004: 11:30, 10/12/2004: 11:45, 14:30
- b) DO Conc Outlier: 10/05/2004: 11:30, 10/12/2004: 11:45, 14:30
- c) DO values are unusually high 10/19/2004 09:30 – 11/12/2004 11:00 calibration errors for deployment.

Seldovia Surface

- a) DO Percent Outlier: 10/01/2004: 07:30 - 07:45, 10/07/2004: 10:45, 10/08/2004: 7:45, 12:15
- b) DO Conc Outlier: 10/01/2004: 07:30 - 07:45, 10/07/2004: 10:45, 10/15/2004: 21:30, 10/16/2004: 21:30 - 21:45, 10/25/2004: 08:00

November 1-30, 2004

Homer Dolphin Deep

- a) DO Percent Outlier: 11/09/2004: 05:30 - 05:45, 17:45, 11/10/2004: 18:15 - 18:45, 11/11/2004: 18:45 - 19:30, 11/13/2004: 20:15 - 20:45, 11/14/2004: 21:30, 11/15/2004: 21:30, 11/23/2004: 16:30 - 17:00
- b) DO Conc Outlier: 11/09/2004: 05:30, 17:45, 11/10/2004: 18:15 - 18:45, 11/11/2004: 18:45 - 19:30, 11/13/2004: 20:15 - 20:45, 11/14/2004: 21:30, 11/23/2004: 16:45
- c) pH Outlier: 11/10/2004: 18:15 - 18:45, 11/11/2004: 19:00 - 19:30

Seldovia Surface

- a) DO Conc Outlier: 11/12/2004: 08:45

December 1-31, 2004

Homer Dolphin Deep

- a) DO Percent Outlier: 12/06/2004: 15:15, 12/08/2004: 05:00, 17:15, 12/09/2004: 17:15, 17:30, 12/10/2004: 18:30 - 19:00, 12/11/2004: 19:00 - 19:15, 12/12/2004: 20:15 - 20:30, 12/13/2004: 21:00 - 21:15, 12/14/2004: 21:15, 12/15/2004: 01:30, 12/20/2004: 11:15 12/22/2004: 17:30 - 18:00, 12/26/2004: 02:15, 12/27/2004: 00:00, 12/28/2004: 14:30, 12/30/2004: 22:00 - 22:15
- b) DO Conc Outlier: 12/06/2004: 15:15, 12/08/2004: 17:15, 12/09/2004: 17:15, 12/10/2004: 18:30 - 19:00, 12/11/2004: 19:00, 12/12/2004: 20:15 - 20:30, 12/22/2004: 17:30 - 18:00, 12/26/2004: 02:15, 12/27/2004: 00:00, 12/28/2004: 14:30, 12/30/2004: 22:00 - 22:15,
- c) pH Outlier: 12/20/2004: 11:15

Seldovia Surface

- a) DO Conc Outlier: 12/08/2004: 07:00

12) Deleted Data

January 1-31, 2004

Homer Dolphin Deep

- a) Turbidity Outlier: 01/01/2004: 19:30, 01/06/2004: 23:30, 01/19/2004: 13:00, 01/22/2004: 13:45 - 14:00, 14:30

Seldovia Deep

- a) Turbidity Outlier: 01/18/2004 09:15

March 1-31, 2004

Homer Dolphin Deep

- a) High Turbidity: 03/16/2004: 10:30, 12:00, 03/17/2004: 05:45
- c) Turbidity Outlier: 03/19/2004: 01:15, 03/20/2004: 18:15, 03/23/2004: 03:30

Homer Dolphin Surface

- a) High Turbidity: 03/03/2004: 01:00, 03/29/2004: 18:00, 03/30/2004: 03:00, 12:30
- b) Turbidity Outlier: 03/05/2004: 11:30, 03/16/2004: 09:30, 03/26/2004: 22:00, 03/28/2004: 15:45, 03/31/2004: 23:45

Seldovia Deep

- a) Turbidity Outlier: 03/10/2004: 11:00
- b) Failed temperature probe all data deleted 03/09/2004 04:00 –03/10/2004 10:45

April 1-30, 2004

Homer Dolphin Deep

- a) Turbidity Outlier: 04/02/2004: 11:45

Homer Dolphin Surface

- a) Salinity/SpCond Out of Range: 04/01/2004: 15:00
- b) High Turbidity: 04/01/2004: 15:00,
- c) Bad Turbidity 04/03/2004: 03:15 – 04/04/2004: 07:30
- d) 04/04/2004 07:45 – 04/05/2004 10:15 Data deleted due to the erratic behavior of the sonde appearing to have affected temperature and salinity measurements.

May 1-31, 2004

Homer Dolphin Deep

- a) High Turbidity: 05/04/2004: 21:45
- b) Turbidity Outlier: 05/08/2004: 23:30, 05/16/2004: 19:30

Homer Dolphin Surface

- a) High Turbidity: 05/09/2004: 20:00, 05/10/2004: 06:45, 05/30/2004: 20:00
- b) Turbidity Outlier: 05/31/2004: 12:15

Seldovia Deep

- a) Turbidity Outlier: 05/09/2004: 02:45

Seldovia Surface

- a) Bad Turbidity: 05/04/2004 02:00 - 05/18/2004 09:15, 05/28/2004: 00:00 – 05/31/2004 23:45
- b) Turbidity Outlier: 05/02/2004: 04:30, 05/03/2004: 08:00 - 08:15

June 1-30, 2004

Homer Dolphin Deep

- a) High Turbidity: 06/03/2004: 21:15, 06/11/2004: 05:00, 14:15, 06/16/2004: 18:00, 06/17/2004: 08:45, 11:45, 12:30, 06/18/2004: 00:15 - 00:30, 03:00, 05:30 - 05:45, 06/19/2004: 14:30, 06/26/2004: 04:15
- b) Turbidity Outlier: 06/21/2004: 11:00, 06/22/2004: 01:15

Homer Dolphin Surface

- a) High Turbidity: 06/02/2004: 19:15, 06/04/2004: 05:30, 07:30, 18:45, 06/05/2004: 07:45, 12:00, 14:45, 21:30, 06/06/2004: 06:15, 07:45, 08:30, 09:00, 10:15, 10:45 - 11:30, 12:15 - 12:30, 13:00 - 14:15, 15:00 - 15:15, 15:45 - 16:45, 18:45, 19:30, 20:45, 21:30, 22:00 - 23:00, 06/07/2004: 01:45 - 02:00, 06:00, 06:30, 07:45, 09:45, 10:15, 11:30, 14:15, 20:45, 06/08/2004: 08:30, 11:30, 12:00, 06/10/2004: 00:45, 12:00, 06/11/2004: 01:30, 03:15, 16:00, 06/14/2004: 04:15, 06/15/2004:

05:30, 06:45, 06/16/2004: 05:45, 06:30, 07:15, 18:15, 06/26/2004: 09:15, 16:30, 06/27/2004: 17:30, 18:00, 06/28/2004: 05:15, 05:45, 08:00, 14:15, 18:15, 19:45, 06/29/2004: 12:00 - 06/30/2004: 23:45

- b) Turbidity Outlier: 06/03/2004: 08:45, 06/09/2004: 12:00, 06/12/2004: 05:45, 06/13/2004: 01:30, 06/18/2004: 06:15, 06:45, 06/21/2004: 10:00, 06/24/2004: 13:00, 06/25/2004: 10:15

Seldovia Deep

- a) Turbidity Outlier: 06/03/2004: 23:15, 06/18/2004: 18:45

Seldovia Surface

- a) Bad Turbidity: 06/01/2004: 00:00 – 06/12/2004 23:45; 06/14/2004: 04:00, 04:30, 06/15/2004: 03:00, 04:00, 04:30, 19:00, 06/18/2004: 17:45, 06/21/2004: 05:15
- b) Turbidity Outlier: 06/19/2004: 19:45, 20:15

July 1-31, 2004

Homer Dolphin Deep

- a) High Turbidity: 07/09/2004: 17:45, 07/13/2004: 07:00, 07/20/2004: 01:15, 07/23/2004: 12:45, 07/26/2004: 22:45, 07/29/2004: 06:45
- b) Turbidity Outlier: 07/01/2004: 09:30, 07/05/2004: 03:15, 07/07/2004: 16:30, 07/09/2004: 04:30, 07/10/2004: 20:00, 07/12/2004: 17:30, 07/22/2004: 03:15, 07/25/2004: 00:15, 01:45
- c) Dissolved Oxygen data deleted 07/26/2004 13:00 – 07/27/2004 08:45 due to punctured membrane.

Homer Dolphin Surface

- a) Bad Turbidity: 07/01/2004: 00:00 – 07/27/2004 09:15

Seldovia Surface

- a) High Turbidity: 07/03/2004: 03:00, 07/12/2004: 11:30, 07/15/2004: 13:45, 07/16/2004: 12:00, 07/26/2004: 03:30 - 04:00
- b) Turbidity Outlier: 07/22/2004: 06:00, 12:15, 07/24/2004: 18:00, 07/28/2004: 06:00

August 1-31, 2004

Homer Dolphin Deep

- a) High Turbidity: 08/06/2004: 14:15, 08/07/2004: 14:00
- b) Negative Turbidity: 08/16/2004: 09:00 – 08/31/2004 23:45
- c) Turbidity Outlier: 08/05/2004: 15:45, 08/07/2004: 12:30, 08/12/2004: 05:15, 08:00, 08/14/2004: 13:45

Homer Dolphin Surface

- a) High Turbidity: 08/29/2004: 05:00

- b) Turbidity Outlier: 08/30/2004: 02:30, 08/31/2004: 07:30, 08:00, 12:15

Seldovia Deep

- a) High Turbidity: 08/05/2004: 16:45

Seldovia Surface

- a) High Turbidity: 08/16/2004: 14:15, 08/26/2004: 10:45, 08/27/2004: 03:30 - 03:45, 04:30, 07:00, 15:30, 08/30/2004: 03:45, 05:45, 11:00 - 11:15
- b) Turbidity Outlier: 08/23/2004: 23:15, 08/25/2004: 15:00, 08/31/2004: 22:45

September 1-30, 2004

Homer Dolphin Deep

- a) Negative Turbidity: 09/01/2004: 00:00 – 09/15/2004 14:15
- b) Turbidity Outlier: 09/26/2004: 05:45, 09/27/2004: 10:15
- c) DO Percent and conc Out of Range: 09/29/2004: 22:15-22:45

Homer Dolphin Surface

- a) Bad Turbidity: 09/01/2004: 00:00 – 09/20/2004: 13:45

Seldovia Surface

- a) High Turbidity: 09/01/2004: 06:15 - 06:30, 08:30, 17:30 - 17:45, 18:30 - 18:45, 19:30, 20:15 - 20:45, 09/02/2004: 15:45, 09/03/2004: 06:30, 09/08/2004: 17:15, 17:45 - 18:30, 19:30, 20:45, 21:15, 09/09/2004: 19:00, 09/10/2004: 10:00, 21:45, 22:15, 09/11/2004: 11:30 - 12:00, 15:00, 22:00, 22:30, 23:45, 09/12/2004: 03:15 - 03:30, 12:30 - 12:45, 16:00 - 16:15, 17:00 - 17:15, 23:30 - 09/13/2004: 00:00, 14:45, 18:30 - 18:45, 22:30, 09/14/2004: 05:30 - 05:45, 07:30, 10:30, 11:30, 12:15, 12:45, 14:00, 15:15 - 15:45, 16:30, 18:30 - 18:45, 19:45, 22:00, 09/15/2004: 02:45, 03:30, 04:00, 05:30 - 05:45, 08:30, 10:30 - 10:45, 14:30, 15:00 - 15:15, 16:15, 17:30, 18:00, 19:30, 20:00, 23:45, 09/16/2004: 05:45, 06:30, 07:30 - 07:45, 08:30 - 08:45, 12:45, 15:15, 15:45, 09/17/2004: 05:00, 11:30
- b) Turbidity Outlier: 09/03/2004: 13:00, 09/06/2004: 17:00

October 1-31, 2004

Homer Dolphin Deep

- a) High Turbidity: 10/01/2004: 16:45, 10/03/2004: 07:45, 10/08/2004: 19:00, 10/15/2004: 14:45, 10/30/2004: 22:30
- b) Turbidity Outlier: 10/07/2004: 18:15, 10/10/2004: 06:15, 10/16/2004: 15:45, 10/17/2004: 16:30, 10/19/2004: 02:45, 03:30, 10/22/2004: 10:00, 10/31/2004: 19:30
- c) pH probe failure 10/01/2004 01:00 – 10/19/2004 09:00
- d) Suspiciously high Dissolved Oxygen: 10/19/2004 09:15 – 12:30

Homer Dolphin Surface

- a) Turbidity Outlier: 10/29/2004: 23:15

Seldovia Deep

- a) High Turbidity: 10/16/2004: 05:45
- b) Turbidity Outlier: 10/26/2004: 13:15

Seldovia Surface

- a) High Turbidity: 10/06/2004: 18:45, 10/09/2004: 20:45-21:00
- b) Turbidity Outlier: 10/11/2004: 13:15

November 1-30, 2004

Homer Dolphin Deep

- a) High Turbidity: 11/14/2004: 05:15, 11/23/2004: 16:15, 11/26/2004: 19:00, 19:45 - 20:00, 11/27/2004: 01:15, 05:15, 11/29/2004: 23:30
- b) Turbidity Outlier: 11/03/2004: 11:30, 11/07/2004: 19:15, 11/24/2004: 15:30, 11/30/2004: 17:30

Homer Dolphin Surface

- a) Turbidity Outlier: 11/12/2004: 17:30

December 1-31, 2004

Homer Dolphin Deep

- a)** High Turbidity: 12/03/2004: 18:45, 12/10/2004: 18:45, 20:00, 12/14/2004: 23:15, 12/15/2004: 17:15, 12/19/2004: 18:00, 12/23/2004: 13:45, 21:15, 12/24/2004: 03:45, 12/26/2004: 05:45, 12/29/2004: 10:30
- b)** Turbidity Outlier: 12/19/2004: 03:15, 12/20/2004: 15:30, 12/28/2004: 21:30

Seldovia Deep

- a) Turbidity Outlier: 12/07/2004: 20:15

13) Missing Data

Data are missing due to equipment failure where no probes deployed, maintenance/calibration of equipment (See Section 6), or elimination of data due to calibration (both pre and post) problems. For more details about missing data, contact the Research Coordinator at the Kachemak Bay Research Reserve.

January 1-31, 2004

None

February 1-29, 2004

None

March 1-31, 2004

Homer Dolphin Deep

- a) 03/26/2004 18:15 – 03/27/2004 18:00
- b) 03/27/2004 18:30 - 03/28/2004 18:15
- c) 03/29/2004 02:15 – 03/30/2004 02:00
- d) 03/30/2004 03:30 – 03/31/2004 03:15
- e) 03/31/2004 05:15 – 04/01/2004 05:00

Homer Dolphin Surface

- a) 03/19/2004 00:45, 03:30, 13:15, 15:30, 16:15
- b) 03/20/2004 01:00, 04:00 – 04:15
- c) 03/21/2004 00:30, 05:00, 14:30
- d) 03/26/2004 05:00, 05:45 – 06:00, 06:30 – 06:45, 07:15
- e) 03/28/2004 05:45, 07:45

April 1-30, 2004

Homer Dolphin Deep

- a) 04/01/2004 09:15 – 04/02/2004 09:00
- b) 04/02/2004 18:15 – 04/03/2004 18:00
- c) 04/03/2004 19:45 – 04/04/2004 19:30
- d) 04/04/2004 20:00 – 04/05/2004 19:45
- e) 04/05/2004 20:30 – 04/06/2004 20:15
- f) 04/06/2004 22:30 – 04/07/2004 22:15
- g) 04/08/2004 02:45 – 04/09/2004 02:30
- h) 04/09/2004 04:15 – 04/10/2004 04:00
- i) 04/10/2004 12:30 – 04/11/2004 12:15

Homer Dolphin Surface

- a) 04/01/2004 09:00, 10:00, 14:45, 15:30, 16:45, 18:30 – 19:00, 20:00
- b) 04/01/2004 20:45 04/03/2004 02:15

May 1-31, 2004

Homer Dolphin Surface

- a) 05/10/2004 23:45

Seldovia Surface

- a) 05/05/2004 06:30 – 10:45
- b) 05/06/2004 07:15

June 1-30, 2004

Seldovia Surface

- a) 06/02/2004 05:30 - 09:15
- b) 06/04/2004 07:00 - 11:15

July 1-31, 2004

Homer Dolphin Deep

- a) 07/27/2004 09:00

Homer Dolphin Surface

- a) 07/01/2004 03:30 – 04:00

August 1-31, 2004

Seldovia Surface

- a) 08/15/2004 10:45

September 1-30, 2004

Homer Dolphin Deep

- a) 09/05/2004 05:45 – 09/05/2004 14:00

Homer Dolphin Surface

- a) 09/17/2004 07:15

October 1-31, 2004

Homer Dolphin Surface

- a) 10/28/2004 14:45

Seldovia Surface

- a) 10/20/2004 09:45

November 1-30, 2004

None

December 1-31, 2004

None

14) Post Deployment Information

End of Deployment Post-Calibration Readings in Standard Solutions:

** n/r = not recorded**

Site	Date	Conductivity (Std:50.0)	pH (Std:7)	Turbidity (Std:0)	DO (Air Sat) (Std:100%)	Depth (m)
HD	01/19/04	49.40	7.14	-0.1	106.5	-0.015
	02/13/04	49.43	6.93	-2.8	101.2	-0.124
	02/17/04	50.20	7.03	0.2	119.3	0.035
	03/09/04	49.41	7.05	0.9	101.5	-0.019
	04/12/04	50.03	7.05	-0.1	156.8	0.00
	05/17/04	48.47	7.10	0.1	123.2	0.071
	06/21/04	42.40	7.12	1.6	142.0	0.270
	07/27/04	49.30	6.97	-0.1	151.0	-0.221
	08/16/04	49.83	7.06	110.0	122.5	0.051
	09/21/04	49.63	6.97	-5.3	123.2	-0.060
	10/19/04	50.87	5.49	1.3	110.3	-0.017
	11/12/04	50.39	6.56	1.2	111.5	-0.201
	12/20/04	50.05	7.12	-1.0	99.4	-0.129
	01/17/04	50.53	7.04	0.4	112.6	0.045
HS	03/09/04	49.48	6.85	-2.7	98.6	-0.068
	04/05/04	**	**	**	**	**
	05/20/04	49.21	7.07	0.5	100.2	0.569
	06/21/04	47.82	7.00	34.8	113.6	0.036
	07/27/04	46.16	6.90	2.4	133.7	-0.212
	08/16/04	47.11	6.99	6.0	79.8	0.389
	09/20/04	46.97	6.81	16.7	108.8	-0.365
	10/19/04	48.28	6.97	0.5	15.4	-0.048
	11/12/04	48.36	6.85	24.6	101.1	-0.198
	12/20/04	49.94	7.04	0.6	101.2	0.72
	01/17/04	50.66	7.07	-0.1	114.3	0.04
SD	01/20/04	48.90	7.18	0.2	138.6	-0.042
	02/12/04	49.64	7.07	0.4	116.0	-0.073
	03/10/04	-150	7.09	0.1	143.0	0.036
	04/13/04	49.07	6.99	-0.6	100.8	0.225
	05/18/04	49.69	7.06	0.0	121.3	0.148
	06/22/04	48.72	7.08	0.0	137.5	-0.033
	07/28/04	49.20	6.95	-0.2	115.5	-0.137
	08/09/04	50.47	7.12	27.5	146.0	0.183
	09/17/04	49.62	7.04	-0.5	104.5	-0.048
	10/20/04	49.67	6.88	2.7	114.5	-0.042
	11/11/04	50.39	6.93	0.0	105.5	-0.038
	12/21/04	49.45	7.01	2.8	102.1	0.129
	01/18/04	50.05	6.97	0.2	89.4	0.222

SS	01/20/04	49.76	7.06	1.4	152.0	-0.131
	02/12/04	49.25	7.12	-0.6	102.5	0.046
	03/10/04	49.38	7.11	0.1	119.1	0.013
	04/13/04	49.93	7.10	-0.3	104.6	0.231
	05/18/04	48.38	6.91	1.2	97.1	0.165
	06/22/04	47.83	7.25	4.0	103.8	-0.113
	07/28/04	45.75	7.03	0.7	83.6	-0.132
	08/17/04	47.0	6.98	0.2	104.4	0.130
	09/17/04	50.12	6.97	0.0	79.9	-0.168
	10/20/04	48.73	7.15	0.5	136.7	-0.028
	11/11/04	49.28	6.94	7.2	95.4	-0.133
	12/21/04	49.44	7.08	1.1	110.0	0.144
	01/18/04	49.64	7.07	0.0	98.5	-0.726

15) Other Remarks/Notes

On 08/13/2020 this dataset was updated to include embedded QAQC flags for anomalous/suspect data. System-wide monitoring data beginning in 2007 were processed to allow for QAQC flags and codes to be embedded in the data files rather than detailed in the metadata alone (as in the anomalous/suspect, deleted, and missing data sections above). Prior to 2006, rejected data were deleted from the dataset so they are unavailable to be used at all, but suspect data were only noted in the metadata document. Suspect data flags <1> were embedded retroactively in order to allow suspect data to be easily identified and filtered from the dataset if desired for analysis and reporting purposes. No other flags or codes were embedded in the dataset and users should still refer to the detailed explanations above for more information.

a) There were a few instances at this NERR site where turbidity recorded small negative values (-0001 and -0002). Because turbidity has a range of accuracy of +/-2 NTU, the technician did not edit or delete these values in any way.

b) Below is the matlab routine used to process water quality data. An electronic copy is available from Scott Pegau at scott_pegau@fishgame.state.ak.us

```
% kbsonde.m This routine converts the sonde data the CDMO format
% W. Scott Pegau 1/10/2003
```

```
%modifications as 1/22/04 -changed the program to pull data within 15 minutes every
1/2 hour
% dissabled many filters to reduce confusion at CDMO
```

```
%modification on 12/06/04 - add minimum spike size to the spike filters.
```

%modifications on 12/29/04 - change output format to align with the new CDMO format, remove the access database output

clear all

%Adding some operating triggers 1= yes 0=no
print_graphs=0;
process_monthly=1;
chl_on=0;
fluor_on=0;
tmint=15; % this is the binning time interval
tstp=15; %this is the time step
minspike=5; %what percentage of the mean does a spike need to be before being rejected
st_id='sswq'; % the letter designator for the station

%set up variables and matrix needed to parse the data
date_time=[]; temper=[]; cond=[]; sal=[]; doperc=[]; doconc=[]; pH=[]; depth=[];
turb=[]; chl=[]; fluor=[]; errcode = [];
w='';
fignumber = 2;

% Read in all *.cdf comma delimited files

[file_list,n_file]=list_file('*.cdf'); %currently assumes that list_file.m and all *.cdf files are in the working directory

for i=1:n_file %Begin loop to read in the data and append into a single matrix
file_name_current_in=file_list(i,:);

%chl_on=1; % to re-turn on switches, if were turned off in prior loop
%fluor_on=1;

% remove empty characters from each filename
fname_length=size(file_name_current_in,2);
j=0;
while file_name_current_in(1,fname_length-j)==' '
file_name_current_in=file_name_current_in(1,1:fname_length-j-1);
j=j+1;
end

fname_length=size(file_name_current_in,2); %let the user know the file being processed
fprintf('%s\n',file_name_current_in);

```

%Begin reading the data in
    fid=fopen(file_name_current_in);

%assume 2 lines of header in a .cdf file
HDR=fgetl(fid); %DETERMINE THE NUMBER AND NAME OF VARIABLES
HERE
units=fgetl(fid); %DETERMINE THE UNITS OF THE VARIABLES HERE

%determine the variables in the file
    ww=findstr(HDR,w); %find commas in the header
    ww=[ww length(HDR)]; %accounts for a header beyond the last comma
    fprintf(' %d Variables in the file \r\n',length(ww))
%determine the variables of interest
%this set of routines looks through the header to determine where the desired data is
    dc=findstr(HDR,'Date'); dcc=find(ww>dc); date_col=dcc(1);
    dc=findstr(HDR,'Time'); dcc=find(ww>dc); time_col=dcc(1);
    dc=findstr(HDR,'Temp'); dcc=find(ww>dc); temp_col=dcc(1);
    dc=findstr(HDR,'SpCond'); dcc=find(ww>dc); cond_col=dcc(1);
    dc=findstr(HDR,'Salinity'); dcc=find(ww>dc); sal_col=dcc(1);
    dc=findstr(HDR,'DO%'); if ~isempty(dc); dcc=find(ww>dc); doperc_col=dcc(1); end;
    dc=findstr(HDR,'DO %'); if ~isempty(dc); dcc=find(ww>dc); doperc_col=dcc(1); end;
    dc=findstr(HDR,'DO Conc'); dcc=find(ww>dc); doconc_col=dcc(1);
    dc=findstr(HDR,'Depth'); dcc=find(ww>dc); depth_col=dcc(1);
    dc=findstr(HDR,'pH'); dcc=find(ww>dc(1)); pH_col=dcc(1);
    dc=findstr(HDR,'Turbidity'); dcc=find(ww>dc); turb_col=dcc(1);
    dc=findstr(HDR,'Chloro');
        if isempty(dc);
            no_chl=1;
            fprintf('No chlorophyll data. Chlorophyll processing off. \r\n');
        else;
            no_chl=0;
            dcc=find(ww>dc); chl_col=dcc(1);
        end;
    dc=findstr(HDR,'Fluor');
        if isempty(dc);
            no_fluor=1;
            fprintf('No fluorescence data. Fluor turned off \r\n');
        else;
            no_fluor=0;
            dcc=find(ww>dc); fluor_col=dcc(1);
        end;

clear ww;

```

```

while 1; %read in each line of data and parse the data out
    a=fgetl(fid);
    if ~ischar(a), break, end;
    a=strcat(' ',a,' '); %add commas at the beginning and end of the string for parsing
    ww=findstr(a,w); %find commas

    %separate the date information
    if strcmp(a(ww(date_col)+1),''); %this if statement is necessary if a file was
manipulated in excel prior to being input into this routine
        d=datenum(a(ww(date_col)+2:ww(date_col+1)-
2))+datenum(a(ww(time_col)+2:ww(time_col+1)-2)); %reads in date and time columns
        date_time=[date_time;d]; %store as number in a vector
    else
        d=datenum(a(ww(date_col)+1:ww(date_col+1)-
1))+datenum(a(ww(time_col)+1:ww(time_col+1)-1)); %reads in date and time columns
        date_time=[date_time;d]; %store as number in a vector
    end

    %read in the data
    tt=str2num(a(ww(temp_col)+1:ww(temp_col+1)-1)); temper=[temper;tt];
    tt=str2num(a(ww(cond_col)+1:ww(cond_col+1)-1)); cond=[cond;tt];
    tt=str2num(a(ww(sal_col)+1:ww(sal_col+1)-1)); sal=[sal;tt];
    tt=str2num(a(ww(doperc_col)+1:ww(doperc_col+1)-1)); doperc=[doperc;tt];
    tt=str2num(a(ww(doconc_col)+1:ww(doconc_col+1)-1)); doconc=[doconc;tt];
    tt=str2num(a(ww(depth_col)+1:ww(depth_col+1)-1)); depth=[depth;tt];
    tt=str2num(a(ww(pH_col)+1:ww(pH_col+1)-1)); pH=[pH;tt];
    tt=str2num(a(ww(turb_col)+1:ww(turb_col+1)-1)); turb=[turb;tt];
    if chl_on
        if no_chl;
            tt=NaN;
            chl=[chl;tt];
        else;
            tt=str2num(a(ww(chl_col)+1:ww(chl_col+1)-1));
            chl=[chl;tt];
        end;
    end;
    if fluor_on;
        if no_fluor;
            tt=NaN;
            fluor=[fluor;tt];
        else;
            tt=str2num(a(ww(fluor_col)+1:ww(fluor_col+1)-1));
            fluor=[fluor;tt];
        end;
    end;
end;

```

```
end;  
fclose(fid);
```

```
end
```

```
%SORT THE DATA BY DATE
```

```
tdata=[date_time temper cond sal doperc doconc depth pH turb chl ]; % removed fluoro  
tdata=sortrows(tdata,1);  
date_time=tdata(:,1); temper=tdata(:,2); cond=tdata(:,3); sal=tdata(:,4);  
doperc=tdata(:,5); doconc=tdata(:,6); depth=tdata(:,7); pH=tdata(:,8);  
turb=tdata(:,9);  
if chl_on; chl=tdata(:,10); end;  
if fluor_on; fluor=tdata(:,11); end;
```

```
%BEGIN CLEANING UP THE DATA
```

```
%throw out obvious bad or missing data  
%the limits are in part from CDMO absolute rejection criteria  
%I trust the calcs on temperature the most so if it is out the rest of the data is assumed to  
be garbage  
good_data=find(temper>-5&temper<40&cond>10&depth>0); %finding "good"  
temperature and conductivity data (conductivity test to ensure in water)
```

```
date_time=date_time(good_data); %only keep "good" data  
temper=temper(good_data);  
cond=cond(good_data);  
sal=sal(good_data);  
doperc=doperc(good_data);  
doconc=doconc(good_data);  
depth=depth(good_data);  
pH=pH(good_data);  
turb=turb(good_data);  
if chl_on; chl=chl(good_data); end;  
if fluor_on; fluor=fluor(good_data); end;
```

```
%identify gaps caused by bad or missing data  
kk=find(diff(date_time)>(tstp*.0104166667/15+.001));  
fnamr=fopen('report.txt','w');  
for i=1:length(kk);  
fprintf(fnamr,'Data gap between %s %s  
\r\n',datestr(date_time(kk(i))),datestr(date_time(kk(i)+1)));
```

end

%print the time covered by this data

fprintf('\r\n Beginning date %s \r\n',datestr(date_time(1)));

fprintf('End date %s \r\n',datestr(date_time(end)));

%PROBABLY WANT PLOTS OF LARGE DATA SET TO IDENTIFY PROBLEMS

%process complete months of data

[Y,M,D,H,MI,S]=datevec(date_time); %separate out the date info

%begin looping over years

for I=Y(1):Y(end); %loop over years

yyy=find(Y==I);

%plot the years worth of data to look for oddities

yjd=date_time(yyy)-datenum(I-1,12,31);

stdate=min(yjd); endate=max(yjd);

figure;

subplot(7,1,1); plot(yjd,temper(yyy),'k'); axis([stdate endate -2 15]);

ylabel('Temperature');

subplot(7,1,2); plot(yjd,sal(yyy),'k'); axis([stdate endate 22 33]); ylabel('Salinity');

subplot(7,1,3); plot(yjd,doperc(yyy),'k'); axis([stdate endate 80 130]); ylabel('DO
percent');

subplot(7,1,4); plot(yjd,depth(yyy),'k'); axis([stdate endate 2 17]); ylabel('Depth');

subplot(7,1,5); plot(yjd,pH(yyy),'k'); axis([stdate endate 7.5 8.5]); ylabel('pH');

subplot(7,1,6); plot(yjd,turb(yyy),'k'); axis([stdate endate -100
200]);ylabel('Turbidity');

if chl_on; subplot(7,1,7); plot(yjd,chl(yyy),'k'); axis([stdate endate -10
30]);ylabel('Chlorophyll'); xlabel('Julian day'); end;

set(gcf,'Paperposition',[.5 .5 7 10])

year_title=num2str(Y(yyy(1))); subplot(7,1,1); title(year_title);

pause(5);

if print_graphs; print; end

for J=1:12; %loop over months

mmm=find(M(yyy)==J); %find data within a month

if ~isempty(mmm)&process_monthly; %continue if data in the month is available

mmm=mmm+yyy(1)-1; %adjust month pointer to full data set

ftemper=[]; fcond=[]; fsal=[]; fdoperc=[]; fdoconc=[]; fdepth=[]; fpH=[]; fturb=[];

fchl=[]; fjcd=[]; %ffluor=[];

```

mdate_time=date_time(mmm); %pull out the single month of data to work
with
    mtemper=temper(mmm);
    mcond=cond(mmm);
    msal=sal(mmm);
    mdoperc=doperc(mmm);
    mdoconc=doconc(mmm);
    mdepth=depth(mmm);
    mpH=pH(mmm);
    mturb=turb(mmm);
    if chl_on; mchl=chl(mmm); end;
    if fluor_on; mfluor=fluor(mmm); end;
    mjd=mdate_time-datenum(I-1,12,31);

    %save monthly data in matlab file
    fnm=datestr(datenum(I,J,1),2);
    fnam=strcat(st_id,fnm(1:2),fnm(7:8));
    fprintf('Year is %u and month is %u \r\n',Y(mmm(1)),M(mmm(1)));
    if chl_on; eval(['save ' fnam ' mjd mdate_time mtemper mcond msal
mdoperc mdoconc mdepth mpH mturb mchl']);
    else eval(['save ' fnam ' mjd mdate_time mtemper mcond msal mdoperc
mdoconc mdepth mpH mturb']);
    end;

    %loop through the month averaging available data into proscribed time step
intervals and filling gaps with NaN
    %also applying a filter to the data
    date_int=tstp*.0104166667/15; %interval that averages are collected
    t_int=tmint*.0104166667/15; %interval around the time step within which
data is averaged
    fnamo=strcat(fnam,'.txt');
    fido=fopen(fnamo,'w');

    fprintf(fido,'STNCODE\tSMPLDATE\tUSRCODES\tSMPLTIME\tTemp\tSpCond\tSal\t
DO_pct\tDO_mgl\tDepth\tpH\tTurb\r\n');
    %
    fprintf(fido,'MM/DD/YYYY \t hh:mm:ss \t C \t mS/cm \t ppt \t percent \t
mg/L \t m \t \t NTU \r\n');
    stncode = strcat('kac',st_id);
    for II=datenum(I,J,1):date_int:datenum(I,J+1,1);
        cdate=datestr(II,23); ctime=datestr(II,15);
        cjd=II-datenum(I-1,12,31);
        ll=find(mdate_time>(II-t_int/2)&mdate_time<=(II+t_int/2)); %find data +-
1/2 the time interval minutes from desired output time
        lm=find(mdate_time>(II-.5)&mdate_time<=(II+.5)); %find data within 12
hours for filtering purpose (should expand to allow data out of the month)

```

```

        if ~isempty(l1); %ensure there is some data
            utime=datestr(mdate_time(l1(1)),13); % pulls out the actual time for the
usrcodes column

            ctemper=nanmean(mtemper(l1)); ccond=nanmean(mcond(l1));
csal=nanmean(msal(l1)); cdoperc=nanmean(mdoperc(l1));
            cdoconc=nanmean(mdoconc(l1)); cdepth=nanmean(mdepth(l1));
cpH=nanmean(mpH(l1)); cturb=nanmean(mturb(l1));
            if chl_on; cchl=nanmean(mchl(l1)); end;
%            if fluor_on; cfluor=nanmean(mfluor(l1)); end;

%ADDING INDIVIDUAL COMPONENT FILTERS
%BEWARE OF ALL FILTERS
%absolute data rejection filters as specified by CDMO or more
restrictive based on realistic values
            if ctemper<-2|ctemper>25; ctemper=NaN; errcode=[errcode; 1,II]; end;
%CDMO -5 to 45
            if ccond<0|ccond>100; ccond=NaN; errcode=[errcode; 2,II];
end;%CDMO cond 0 to 100
            if csal<10|csal>36; csal=NaN; errcode=[errcode; 3,II]; end; %CDMO
salinity 10 to 36
            if cdoperc<0|cdoperc>199; cdoperc=NaN; cdoconc=NaN;
errcode=[errcode; 4, II]; end; %CDMO doperc 0 to 200
            if cpH<4|cpH>12; cpH=NaN; errcode=[errcode; 5,II]; end; %CDMO
pH 2 to 14

            if cturb>400; cturb=NaN; errcode=[errcode;6,II]; end;
            if cturb<-2; cturb=NaN; errcode=[errcode;7,II]; end;
            if chl_on&cchl>50; cchl=NaN; errcode=[errcode;8 ,II]; end;
            if chl_on&cchl<0; cchl=NaN; errcode=[errcode; 9,II]; end;
%            if fluor_on&cfluor<0; cfluor=NaN; fprintf(fnamr,'negative
fluorescence on %s \r\n',datestr(II)); end;

%outlier filter; the filter looks for data within 12 hours of the data
point and removes the data point if it is
% more than 4 standard deviations from the mean (not applied to
temperature and salinity because of the two layer system)

%1/22/04 many of these filters commented out to ease getting
CDMO approval
%I am reporting the out data as suspicious

            if
(cdoperc>(nanmean(mdoperc(lm))+4*nanstd(mdoperc(lm)))|cdoperc<(nanmean(mdoperc
(lm))-4*nanstd(mdoperc(lm))))&(abs(nanmean(mdoperc(lm))-
cdoperc)>(nanmean(mdoperc(lm))*minspike/100));

```

```

        % cdoperc=NaN;
        errcode=[errcode; 10,II];
    end;
    if
        (cdoconc>(nanmean(mdoconc(lm))+4*nanstd(mdoconc(lm)))|cdoconc<(nanmean(mdoconc(lm))-4*nanstd(mdoconc(lm))))&(abs(nanmean(mdoconc(lm))-cdoconc)>(nanmean(mdoconc(lm))*minspike/100));
        % cdoconc=NaN;
        errcode=[errcode; 11,II];
    end;
    if
        (cpH>(nanmean(mpH(lm))+4*nanstd(mpH(lm)))|cpH<(nanmean(mpH(lm))-4*nanstd(mpH(lm))))&(abs(nanmean(mpH(lm))-cpH)>(nanmean(mpH(lm))*minspike/100));
        % cpH=NaN;
        errcode=[errcode; 12,II];
    end;
    if
        (cturb>(nanmean(mturb(lm))+4*nanstd(mturb(lm)))|cturb<(nanmean(mturb(lm))-4*nanstd(mturb(lm))))&(abs(nanmean(mturb(lm))-cturb)>25); %using a different
        minimum spike measure
        cturb=NaN;
        errcode=[errcode; 13 ,II];
    end;
    if
        (chl_on&(cchl>(nanmean(mchl(lm))+4*nanstd(mchl(lm)))|cchl<(nanmean(mchl(lm))-4*nanstd(mchl(lm))))&(abs(nanmean(mchl(lm))-cchl)>(nanmean(mchl(lm))*minspike/100));
        cchl=NaN;
        errcode=[errcode; 14,II];
    end;
    %
    if
        fluor_on&(cfluor>(nanmean(mfluor(lm))+4*nanstd(mfluor(lm)))|cfluor<(nanmean(mchl(lm))-4*nanstd(mfluor(lm)))));
        %
        cfluor=NaN;
        %
        fprintf(fnamr,'Fluorescence outlier on %s \r\n',datestr(II));
        %
        end;

    %Print out the data in CDMO format

    fprintf(fido,'%s\t%s\t%s\t%s\t%04.1ft%06.2ft%04.1ft%05.1ft%04.1ft%05.2ft%04.1ft%04.0f\r\n',stncode, cdate, utime, ctime, ctemper, ccond, csal, cdoperc, cdoconc, cdepth, cpH, cturb);

    %save filtered data to compare against raw data

```

```

        ftemper=[ftemper;ctemper]; fcond=[fcond;ccond]; fsal=[fsal;csal];
fdoperc=[fdoperc;cdoperc]; fjd=[fjd;cjd];
        fdoconc=[fdoconc;cdoconc]; fdepth=[fdepth;cdepth]; fpH=[fpH;cpH];
fturb=[fturb;cturb];
        if chl_on; fchl=[fchl;cchl]; end;
%        if fluor_on; ffluor=[ffluor;cfluor]; end;
        end;
    end;
    fclose(fid);

%plot the monthly data

figure(fignumber);
subplot(3,1,1); plot(mjd,mdepth,'-k',fjd,fdepth,'.r'); ylabel('Depth');
subplot(3,1,2); plot(mjd,mtemper,'-k',fjd,ftemper,'.r'); ylabel('Temperature');
subplot(3,1,3); plot(mjd,msal,'-k',fjd,fsal,'.r'); ylabel('Salinity'); xlabel('Julian
Day');

set(gcf,'Paperposition',[.5 .5 7 10])
subplot(3,1,1); title(fnam);
plotfnam1= strcat(fnam, '1');
if print_graphs; print; end;
fignumber=fignumber+1;

figure(fignumber);
subplot(4,1,1); plot(mjd,mdoperc,'-k',fjd,fdoperc,'.r'); ylabel('DO percent');
subplot(4,1,2); plot(mjd,mpH,'-k',fjd,fpH,'.r'); ylabel('pH');
subplot(4,1,3); plot(mjd,mturb,'-k',fjd,fturb,'.r'); ylabel('Turbidity');
if chl_on; subplot(4,1,4); plot(mjd,mchl,'-k',fjd,fchl,'.r');
ylabel('Chlorophyll'); xlabel('Julian Day'); end;
set(gcf,'Paperposition',[.5 .5 7 10])
subplot(4,1,1); title(fnam);
plotfnam2= strcat(fnam, '2');
if print_graphs; print; end;
fignumber=fignumber+1;
pause(5)

end
end
end;
for errloop=1:14;
    % Finds all errcodes of each number
    kk=find(errcode(:,1)==errloop);
    % Assigning messages for error codes
    if errloop==1; errprint='Temperature Out of Range';end;
    if errloop==2; errprint='Sp Cond Out of Range';end;

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```

if errloop==3; errprint='Salinity Out of Range';end;
if errloop==4; errprint='DO Percent Out of Range';end;
if errloop==5; errprint='pH Out of Range';end;
if errloop==6; errprint='High Turbidity';end;
if errloop==7; errprint='Negative Turbidity';end;
if errloop==8; errprint='High Chlorophyll';end;
if errloop==9; errprint='Negative Chlorophyll';end;
if errloop==10; errprint='DO Percent Outlier';end;
if errloop==11; errprint='DO Conc Outlier';end;
if errloop==12; errprint='pH Outlier';end;
if errloop==13; errprint='Turbidity Outlier';end;
if errloop==14; errprint='Chlorophyll Outlier';end;
% Prints error code message
fprintf(fnamr, '\r\n %s %s \r\n', errprint, ':');
% Cycles through errors of same errcode
for count=1:length(kk);

    if count == 1;
        fprintf(fnamr, '\r\n %s: ', datestr(errcode(kk(count),2),23));
        if length(kk)==1;
            fprintf(fnamr, '%s, ', datestr(errcode(kk(count),2),15));
        else
            if (errcode(kk(count+1),2)-errcode(kk(count),2)) >
(tstp*.0104166667/15+.001);
                fprintf(fnamr, '%s, ', datestr(errcode(kk(count),2),15));
            else
                begseq=errcode(kk(count),2); %start of sequence
                begcount=count;
            end
        end
    end

    elseif count==length(kk);
        if (errcode(kk(count),2)-errcode(kk(count-1),2)) <
(tstp*.0104166667/15+.001); %is sequential with previous
            endseq=errcode(kk(count),2);
            if begcount>1 & (floor(begseq)-floor(errcode(kk(begcount-1),2)))<1;
                if (floor(endseq)-floor(begseq))>=1;
                    fprintf(fnamr, '%s - %s: %s', datestr(begseq,15), datestr(endseq,23),
datestr(endseq,15));
                else;
                    fprintf(fnamr, '%s - %s, ', datestr(begseq,15), datestr(endseq,15));
                end;
            else
                if (floor(errcode(kk(count),2))-floor(errcode(kk(count-1),2)))>=1;
                    fprintf(fnamr, '\r\n %s: %s, ', datestr(errcode(kk(count),2),23),
datestr(errcode(kk(count),2),15));
                end;
            end;
        end;
    end;
end;

```

```

        else;
            fprintf(fnamr,'%s, ', datestr(errcode(kk(count),2),15));
        end;

        end;
    elseif (floor(errcode(kk(count),2))-floor(errcode(kk(count-1),2)))>1;
        fprintf(fnamr,'\r\n %s: %s, ',datestr(errcode(kk(count),2),23),
datestr(errcode(kk(count),2),15));
    else;
        fprintf(fnamr,'%s, ', datestr(errcode(kk(count),2),15));
    end;
else;
    if (errcode(kk(count),2)-errcode(kk(count-1),2)) <
(tstp*.0104166667/15+.001); %is sequential with previous
        if (errcode(kk(count+1),2)-errcode(kk(count),2)) >
(tstp*.0104166667/15+.001); %check if at end of sequence
            endseq=errcode(kk(count),2);
            if begcount>1;
                if (floor(begseq)-floor(errcode(kk(begcount-1),2)))<1;
                    if (floor(endseq)-floor(begseq))>=1;
                        fprintf(fnamr,'%s - %s: %s, ', datestr(begseq,15),
datestr(endseq,23), datestr(endseq,15));
                    else;
                        fprintf(fnamr,'%s - %s, ', datestr(begseq,15), datestr(endseq,15));
                    end;
                else;
                    if (floor(errcode(kk(count),2))-floor(errcode(kk(count-1),2)))>=1;
                        fprintf(fnamr,'\r\n %s: %s - %s: %s, ',datestr(begseq,6),
datestr(begseq,15),datestr(endseq,6), datestr(endseq,15));
                    else;
                        fprintf(fnamr,'\r\n %s: %s - %s, ', datestr(begseq,23),
datestr(begseq,15),datestr(endseq,15));
                    end;
                end;
            else;
                if (floor(endseq)-floor(begseq))>=1;
                    fprintf(fnamr,'\r\n %s: %s - %s: %s, ',datestr(begseq,23),
datestr(begseq,15),datestr(endseq,6), datestr(endseq,15));
                else;
                    fprintf(fnamr,'%s - %s, ', datestr(begseq,15),datestr(endseq,15));
                end;
            end;
        end;
    else; %not in sequence with previous
        if (errcode(kk(count+1),2)-errcode(kk(count),2)) <
(tstp*.0104166667/15+.001); %check if at begining of sequence

```

```

        begseq=errcode(kk(count),2); %start of sequence
        begcount=count;
    else;
        if (floor(errcode(kk(count),2))-floor(errcode(kk(count-1),2)))>=1;
            fprintf(fnamr,'\r\n %s: %s, ',datestr(errcode(kk(count),2),23),
datestr(errcode(kk(count),2),15));
            else;
                fprintf(fnamr,'%s, ', datestr(errcode(kk(count),2),15));
            end;
        end;
    end;
end;
end;
end;
end;

fclose(fnamr);

```