



Fixed-Station Water-Quality Monitoring at Canaveral National Seashore

2005 to 2009 Data Summary

Natural Resource Data Series NPS/SECN/NRDS—2013/507



ON THE COVER

Continuous water-quality monitoring station at Canaveral National Seashore.
Photograph by: Aaron Rinehart, SECN staff.

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The Natural Resource Data Series is intended for the timely release of basic data sets and data summaries. Care has been taken to assure accuracy of raw data values, but a thorough analysis and interpretation of the data has not been completed. Consequently, the initial analyses of data in this report are provisional and subject to change.

All manuscripts in the series receive the appropriate level of peer review to ensure that the information is scientifically credible, technically accurate, appropriately written for the intended audience, and designed and published in a professional manner.

Data in this report were collected and analyzed using methods based on established, peer-reviewed protocols and were analyzed and interpreted within the guidelines of the protocols.

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Summary and Key Findings

In 2005 the National Park Service (NPS) Southeast Coast Network (SECN) began collecting water-quality data in the estuarine waters of Canaveral National Seashore as part the NPS Vital Signs monitoring program. The scope of the monitoring program includes Mosquito Lagoon and is comprised of continuous water-quality monitoring conducted by the SECN at one site and is augmented with monthly data collected at five stations by St. Johns River Water Management District (SJRWMD). The continuous-monitoring data station is located at the Canaveral National Seashore visitor center dock and collects pH, dissolved oxygen, temperature, salinity, turbidity and water-level data every 30 minutes. The five stations located throughout Mosquito Lagoon are sampled by Volusia County for the SJRWMD as part of the District's Indian River Lagoon Water-Quality Monitoring Network; data at these five stations include monthly measurements of water-clarity conditions, nutrients, and chlorophyll *a* levels. Both the SECN and the SJRWMD programs use methods adapted from, or compatible with, the water-quality monitoring program established by the National Estuarine Research Reserve Program (Wenner and Geist 2001). The Canaveral National Seashore fixed-station water-quality monitoring site is part of the SECN estuarine water- and sediment-quality monitoring efforts, which routinely collects data in the vicinity of seven park units along the southeastern U.S. coast (DeVivo et al. 2008, Gregory et al. 2013). Information collected by this monitoring program will be used to help managers make better-informed decisions by understanding trends and variability related to water-quality conditions in park waters. This report only addresses the continuous data collected at one site at the Canaveral National Seashore Visitors Center.

- Mean monthly temperatures ranged from 16.6 °C in January and February of 2009 to 31.4 °C in August 2007. Highest water temperatures at CANA were typically observed during the late summer months of July and August with the coolest temperatures in January and February.
- Mean monthly salinity values averaged 35.5 ppt for this period and ranged from 27.6 ppt in June 2009 to 44.0 ppt in June 2008. Typically, lower salt concentrations were common in the winter and higher during the summer months. Rainfall events, tropical storms, and periods of drought influence salinities.
- Mean monthly dissolved oxygen levels ranged from 3.8 mg/L in June 2007 to 8.1 mg/L during January 2008. Mean monthly dissolved oxygen levels were typically lowest from June to October. Mean daily dissolved oxygen levels occasionally dropped below 3 mg/L during summer 2007 and fall 2009.
- Mean monthly pH values averaged 8.01 during this period. Almost all daily average values were between 7.5 and 8.5 except for several days during August when pH values briefly dropped below 7.0.
- Mean monthly turbidity ranged from 1.6 NTU in January 2008 to 34 NTUs in June 2008. Mean monthly average turbidity level for the period was 11.4 NTUs; however, mean daily turbidity values were highly variable.
- Water depth at the sampling site varied by 0.5 meters during the period of monitoring.

- From July 2005 until April 2007 and during July 2007 all data collected were flagged due to lack of proper calibration procedures and instrument failures and are not shown in this report. Excluding this period, the average percentage of valid data (all parameters) collected monthly ranged from 14 % to 100 %. During this same period approximately 83 % of all data collected at this site is available for use.

Introduction

Because of the importance of water resources to park management from ecological, regulatory, and visitor experience perspectives, marine water quality in and around parks was selected as one of several Vital Signs to be monitored by the National Park Service Inventory and Monitoring (I&M) program (DeVivo et al. 2008). Data collected as a part of this effort are intended to foster a better understanding of water resources in and around parks, contribute to a better understanding of park ecological processes and physical systems (Gregory et al. 2013).

To effectively monitor the diverse and dynamic water resources at Canaveral National Seashore (CANA), the Southeast Coast Network (SECN) has implemented a two-pronged monitoring approach consisting of collecting data from continuously recording fixed stations located in each park and also collecting periodic discrete water samples for nutrient analysis (Gregory et al. 2013). When combined, these two sampling approaches give a more complete picture of physical processes, diurnal and seasonal variations, and spatial patterns during critical portions of the year.

The SECN I & M Program has identified four overall monitoring objectives for which water quality data are collected and analyzed as part of its Coastal Water and Sediment Quality Monitoring effort (Gregory et al. 2013):

1. Determine daily and seasonal water-quality patterns for five core parameters (dissolved oxygen, salinity, temperature, pH, and turbidity) at fixed monitoring stations using continuous data loggers.
2. Determine monthly and seasonal patterns in nutrients (nitrogen, phosphorus, and chlorophyll *a*) by collecting discrete water samples.
3. Determine status and spatial variability of water and nutrient chemistry conditions in estuarine waters every five years.
4. Determine status and spatial variability of benthic sediment quality (organic contaminants, carbon, and metal levels) every ten years in estuarine waters.

This report addresses only objective 1 and provides a historical summary of continuous fixed-station water-quality monitoring data collected to at Canaveral National Seashore (CANA) since the beginning of monitoring efforts on July 21, 2005 to December 31, 2009 when summary reports for each park began publication. Data from CANA collected in 2010, 2011, and 2012 have been published in the NPS NRDS Report series (Gregory et al. 2011, Wright et al. 2012, Rinehart et al. 2013)

Canaveral National Seashore

Natural resources at CANA (Figure 1) include a diverse assemblage of wildlife species, plant communities, geophysical features and natural processes reflecting the complexity of the land/lagoon/sea interface of east central Florida. Throughout the Seashore, the relationship between land and water is paramount. Unlike many barrier islands along the South Atlantic Coast, Canaveral National Seashore has only a single dune ridge, averaging 12 feet in height.

For the vast majority of its length the dune is quite stable, backed by a dense growth of saw palmetto (*Serenoa repens*) and several other species of hardy shrubs and grasses. Mosquito Lagoon, extending along the backside of Canaveral National Seashore's barrier island, is the northernmost part of the Indian River Lagoon. Containing the most diverse assemblage of aquatic species on the entire eastern seaboard, this 155-mile long lagoon has been designated as an Estuary of National Significance by the Environmental Protection Agency and an Outstanding Florida Water by the State of Florida. Commercial shell fishing is extremely important to the local economy; recreational fishing and shrimping in the lagoon support a multimillion-dollar tourist industry. The estuary also acts as an important nursery area for a number of commercially important ocean-going species such as flounder, mullet, black drum and shrimp.

Canaveral National Seashore faces a number of complex issues regarding water quality in Mosquito Lagoon. The water in Mosquito Lagoon is designated by the State of Florida as Class II, which is suitable for shellfish propagation and harvesting. As shellfish have been depleted along other portions of the Atlantic coast, harvesting pressure has increased significantly in Mosquito Lagoon. Additionally, the park has long been concerned about the impact of commercial harvesting on hard clams (*Mercenaria* spp.) and eastern oysters (*Crassostrea virginica*). Fishermen are coming into Canaveral National Seashore in increasing numbers due to the growing popularity of fly-fishing for redfish causing harvesting concerns and potential problems related to seagrass scarring by boat propellers. Oyster reefs along major boat channels have also been reported to be stressed or dying (J. Stiner, resource manager Canaveral National Seashore, personal communication). Currently, park waters are closed to shell fishing when rainfall exceeds 1.5 inches in a 72-hour period, due to high fecal coliform levels. Mosquito control is another issue at Canaveral National Seashore. In the designation of lands for NPS management, both NASA and the State of Florida stipulated that CANA must cooperate with the local mosquito control districts to control salt marsh mosquitoes (Walters et al. 2001).

The Indian River Lagoon and Mosquito Lagoon is a complex system where water-quality conditions exhibit a large degree of both temporal and spatial variability. Water-quality data for this area were summarized for the years 1988–1994 by the St. Johns River Water Management District (Sigua et al. 1999) and were generally described as *good* overall except for occasional periods of increased turbidity caused by storms that stir up the lagoon's sediments. Higher concentrations of total phosphorus and chlorophyll *a* were found to be more common in the southern sections of the lagoon where watershed runoff amounts are larger (Sigua et al. 1999), and flushing of the estuary is less efficient (J. Stiner, Resource Manager, personal communication). A more recent synoptic survey was conducted by the Southeast Coast Network (SECN) vital sign monitoring program at 30 sites during the summer of 2009 (Gregory and Smith 2011). This study indicated overall *fair* water-quality conditions across Mosquito Lagoon although nitrogen levels at 90% of sampled sites were measured at levels categorized as *poor* according to United States Environmental Protection Agency (United States Environmental Protection Agency 2012) water-quality criteria.

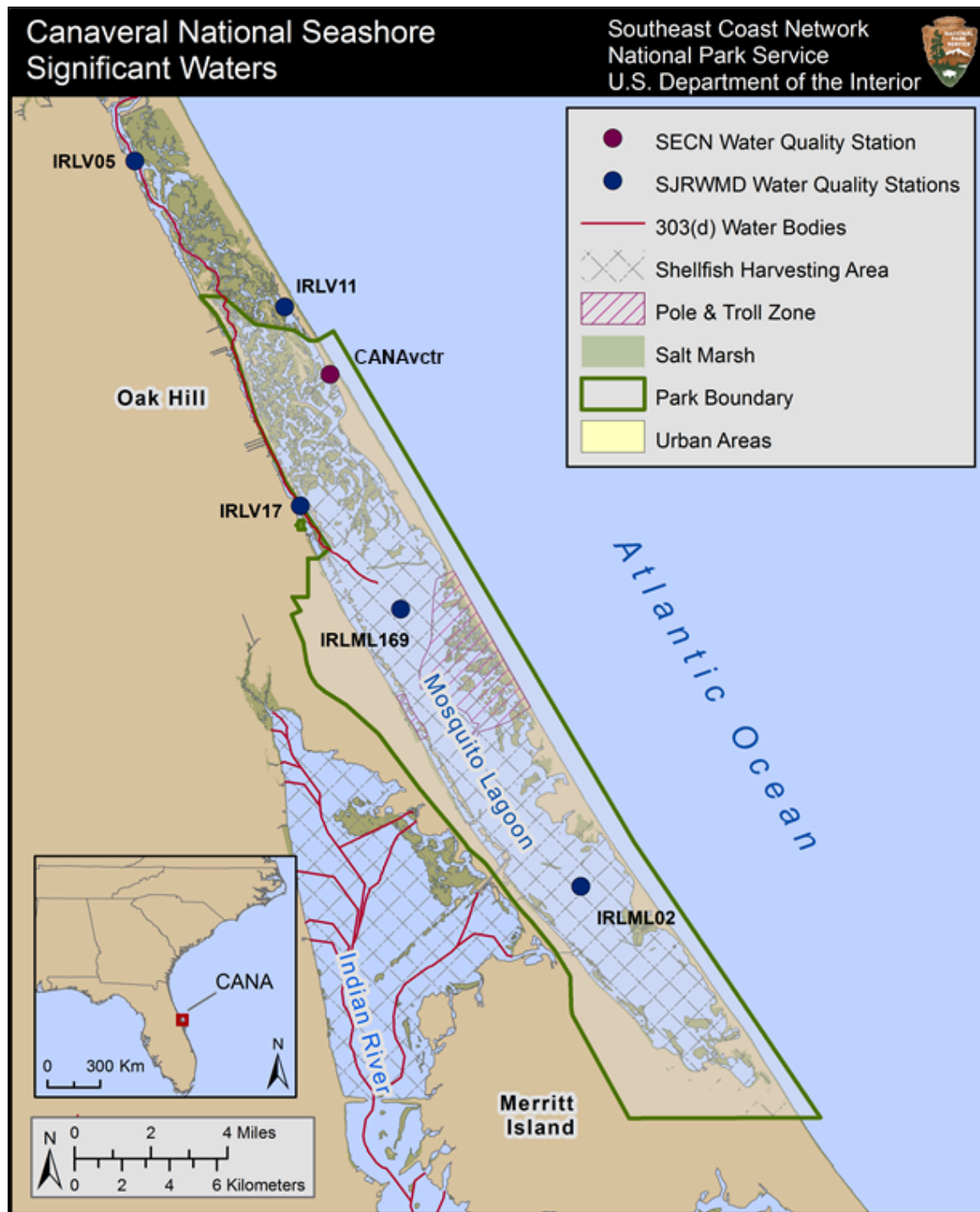


Figure 1. Estuarine and marine water resources in the vicinity of Canaveral National Seashore in Florida. Indicated are areas of salt marsh (U.S. Fish and Wildlife Service 2013), urbanization (United States Census Bureau 2013), 303(d) water bodies (United States Environmental Protection Agency 2013), shellfish harvesting areas and pole and troll zones (Florida Department of Environmental Protection 2013).

Methods

Continuous water quality data is collected using permanently deployed data sondes at near-shore locations selected to be representative of areas near parks. Monitoring data are collected using methods adapted from the NOAA National Estuarine Research Reserve Program (Wenner and Geist 2001). Detailed field and lab standard operating procedures and methods have been reported for the continuously collected data in Gregory et al. (2013).

Sampling Locations

The fixed monitoring station at CANA is located on the visitor center dock, on the northeast side of Mosquito Lagoon. Primary emergent vegetation along the shoreline is salt marsh cordgrass (*Spartina alterniflora*) and black mangrove (*Avicennia germinans*). The area on either side of the dock is covered with rip-rap (broken pieces of concrete) to minimize erosion. Just landward of the emergent vegetation, Groundsel (*Baccharis* spp.) is the dominant plant species. Boat traffic in the lagoon is very heavy on weekends and moderate to light during the week. Occasionally boats will pull up to the dock where the monitoring station is located. The main boat ramp is just to the north of the visitor center dock. No fishing or crabbing is allowed from the visitor center dock.

Water quality in this area is designated as Fair and Class II, which is suitable for shellfish propagation and harvesting. Normal tide fluctuation is only a matter of inches, and currents in the lagoon are primarily wind driven. The water in the lagoon can become highly saline for an estuary when freshwater inputs are low, and water temperatures can exceed 29°C in summer months. Submerged vegetation consists primarily of manatee grass (*Syringodium filiforme*) and shoalweed (*Halode wrightii*). Oyster reefs and salt marsh islands are located nearby. Marsh species include saltgrass (*Distichlis spicata*), seashore paspalum (*Paspalum varigatum*), seashore dropseed (*Sporobolus virginicus*), saltwort (*Batis maritima*), glasswort (*Sarcocornia perrennis*), annual glasswort (*Salicornia bigelowii*) and salt marsh cordgrass.

Table 1. Monitoring location for continuous fixed-station in the Canaveral National Seashore water-quality monitoring network.

Site Name	Latitude (decimal degrees)	Longitude (decimal degrees)	Site location and description
CANA Visitor Center	28.926856	-80.825027	Located on the northeast side of Mosquito Lagoon on the dock behind the Canaveral National Seashore visitor center.



Figure 2. Continuous data collection platform at Canaveral National Seashore visitor center dock showing sonde housing and locking cap. Photo by Aaron Rinehart, SECN staff.

Continuous Data

Continuously collected data includes dissolved oxygen, pH, specific conductance (to compute salinity), water temperature, depth and turbidity. Readings for these parameters are collected at 30-minute intervals using YSI data sondes (Model 6600) which are deployed in 3- to 5-week intervals depending on routine instrument maintenance schedules. The data collection platform consists of a 4-inch diameter PVC tube attached vertically to a piling on the visitor center dock with the sonde suspended within and approximately one meter from the bottom (Figure 2). Water is allowed to freely circulate via openings cut into the PVC housing. A locking cap on the top of the PVC tube prevents unwanted tampering, and a carriage bolt inserted through the housing at the submerged end prevents instrument loss should the attachment hardware fail. Anti-fouling paint is used on the PVC tube to extend deployment intervals which are sometimes shortened due to excessive biofouling. The sonde guard is covered with 0.25-inch plastic mesh screen to prevent fish, crabs, and detritus from entering the protective housing which could skew measurements or damage the instrument's probes.

Prior to deployment, the data sonde is calibrated according to YSI recommendations for pH, dissolved oxygen, specific conductance (for salinity measurements), depth and turbidity (YSI Incorporated 2011). After instrument retrieval, data sondes are returned to the laboratory where post-deployment readings are made using calibration standards to evaluate the accuracy and validity of the data collected for that deployment period. All pre-deployment and post-retrieval calibration information is recorded on calibration data sheets that are archived at SECN office locations. After post-retrieval processing is complete, the sonde is cleaned, reconditioned, and readied for re-deployment with methods published by YSI (2011). Performance specifications of the YSI 6600 sondes are shown in Table 2.

Table 2. Performance specifications of YSI 6600 EDS data logger deployed at continuous monitoring site (YSI Incorporated 2011).

Parameter	Range	Resolution	Accuracy
Dissolved Oxygen (% saturation)	0–500%	0.1%	0 to 200%: +/- 2% of reading or 2% air saturation, whichever is greater.
Dissolved Oxygen (mg/L)	0–50 mg/L	0.01 mg/L	0 to 20 mg/L: +/- 2% of reading or 0.2 mg/L whichever is greater.
Conductivity	0–100 mS/cm	0.001 to 0.1 mS/cm; range dependent	+/- 0.5% of reading + 0.001 mS/cm
Temperature	-5–50 °C	0.01 °C	+/- 0.15 °C
pH	0 to 14 units	0.01 units	+/- 0.2 unit
Depth	0–9 m (0–30 ft)	0.001m (0.001ft)	+/- 0.018m (+/- 0.06 ft.)
Salinity	0–70 ppt	0.01 ppt	+/- 1% of reading or 0.1 ppt, whichever is greater.
Turbidity	0–1000 NTU	0.1 NTU	+/- 2% of reading or 0.3 NTU, whichever is greater.

Data generated during the deployment period are reviewed and certified by SECN staff prior to being made available to park staff. During the data review process data may be flagged (marked as suspect) for a variety of reasons including: the presence of heavy fouling on equipment, lack of post-calibration data, readings outside of equipment specifications, calibration errors, and extended deployment times. All flagged data remain in the data set but are excluded from all

analyses and reports (tables, charts and graphs). Data may also be deleted from the data set on occasions such as probe failure or the sonde being out of the water during deployment.

Results

Mean monthly water temperatures ranged from 16.6 °C in January and February of 2009 to 31.4 °C in August 2007. Highest temperatures at CANA were typically observed during the late summer months of July and August with the coolest temperatures in January and February. Mean monthly salinity values averaged 35.5 ppt for this period and ranged from 27.6 in June 2009 to 44 ppt in June 2008. Typically, lower salt concentrations were common in the winter and higher during the summer months. Rainfall events, tropical storms, and periods of drought influence salinities. Mean monthly dissolved oxygen levels ranged from 3.8 mg/L in June 2007 to 8.1 mg/L during January 2008. Mean monthly dissolved oxygen levels were typically lowest from June to October. Mean daily dissolved oxygen levels occasionally dropped below 3 mg/L during the summer of 2007 and fall 2009. Mean monthly pH values averaged 8.01 during this period. Almost all daily average values were between 7.5 and 8.5 except for several days during August when pH values briefly dropped below 7.0. Mean monthly turbidity ranged from 1.6 NTU in January 2008 to 34 NTUs in June 2008. Mean monthly average turbidity level for the period was 11.4 NTUs; however, mean daily turbidity values were highly variable. Water depth at the sampling site varied by 0.5 meters during the period of monitoring.

Figures 3 through 8 depict the daily mean data for the entire data collection period by parameter. Relative water depths collected by SECN staff at the site (Figure 8) are included in this section as an aid to data interpretation.

Minimum and maximum values for the month with the mean and standard deviation are provided in Table 3. The percentage of values field indicates the level of completeness of the monthly data sets used for calculating mean, maximum and minimum statistics, and equals the number of data points collected (i.e., not missing or flagged) divided by the total number of expected points for a complete month of data. For those months where all of the data was either missing and/or flagged, the percentage of values is 0% and no statistics (mean, maximum or minimum) are presented. When the percentage of values is low, the statistics (mean, maximum and minimum) may be less accurate than months where all data were used in the calculation of summary statistics.

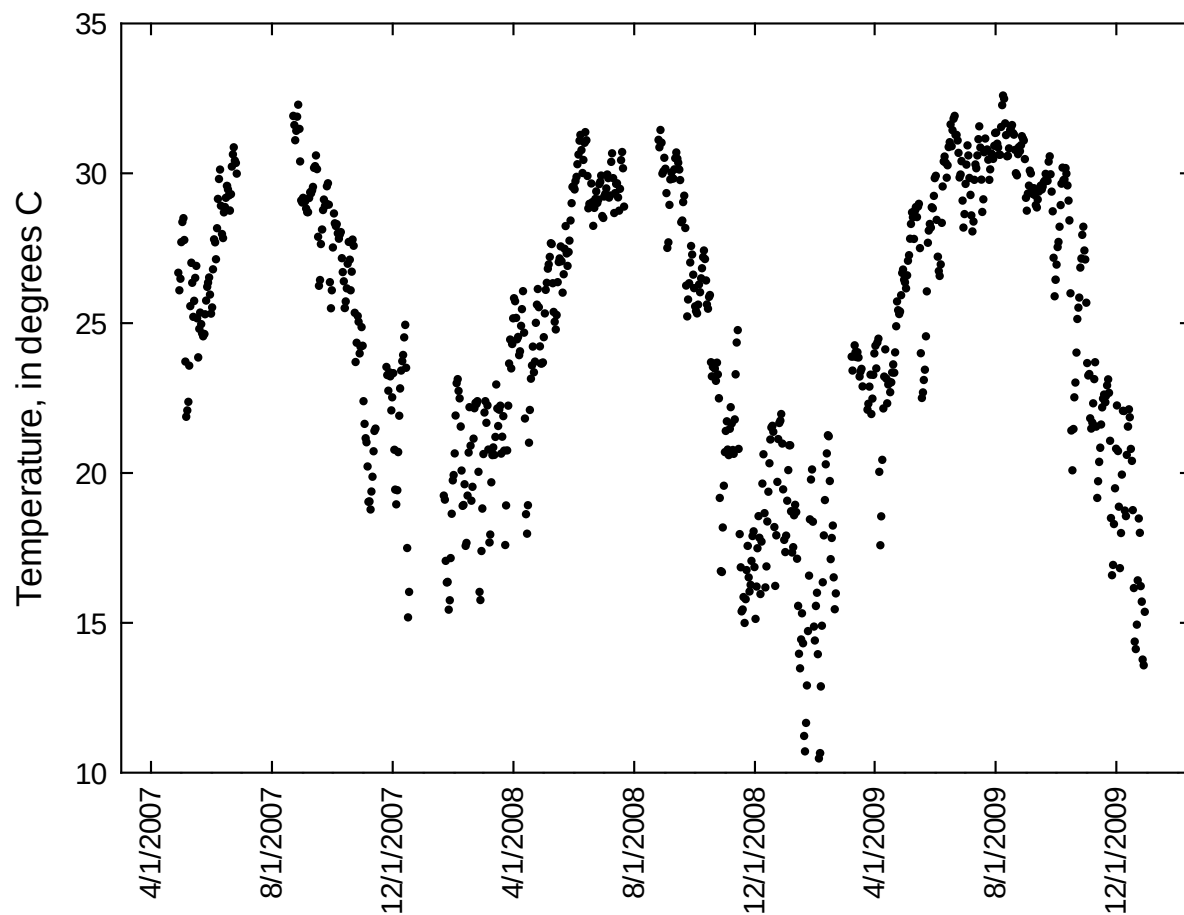


Figure 3. Mean daily water temperature at Canaveral National Seashore visitor center dock during 2005-2009. Breaks in data record indicate missing and/or flagged data.

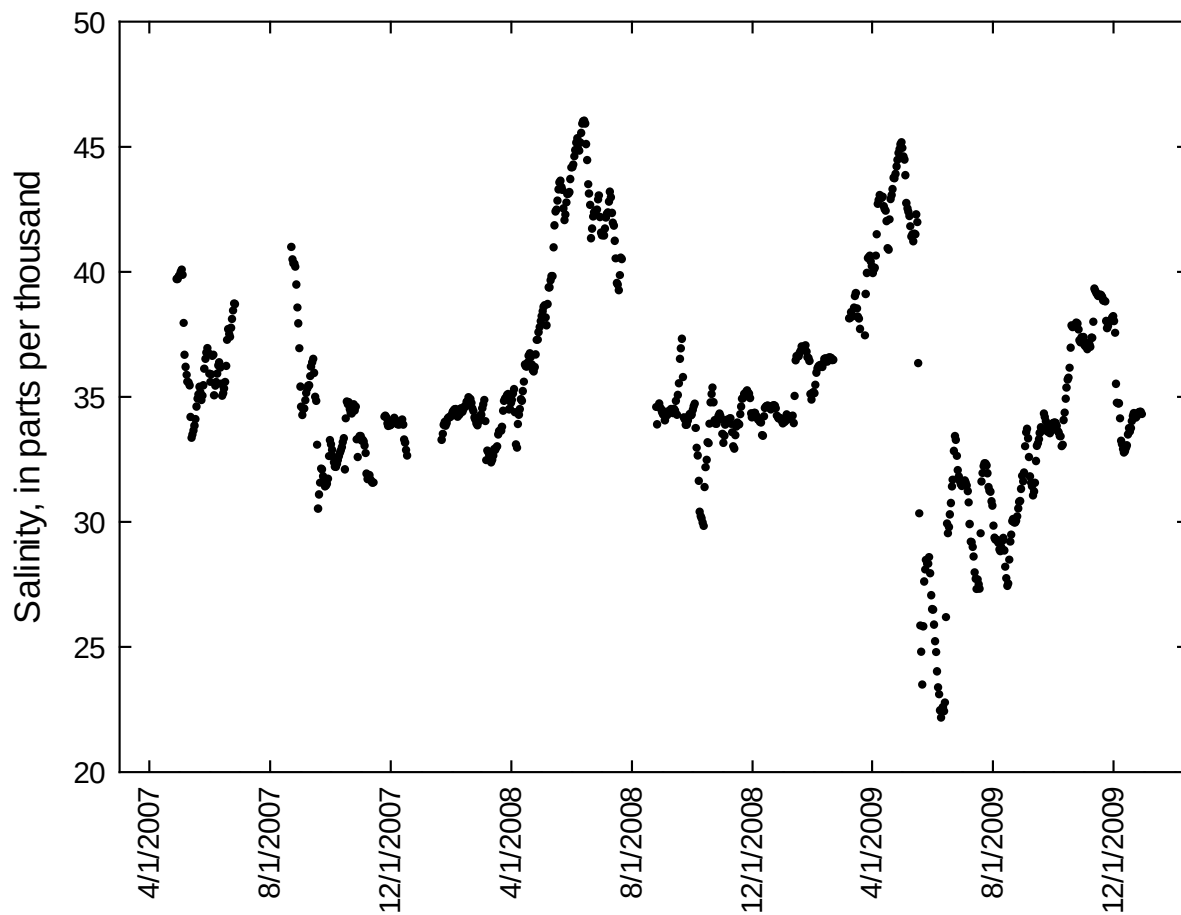


Figure 4. Mean daily salinity at Canaveral National Seashore visitor center dock during 2005-2009. Breaks in data record indicate missing and/or flagged data.

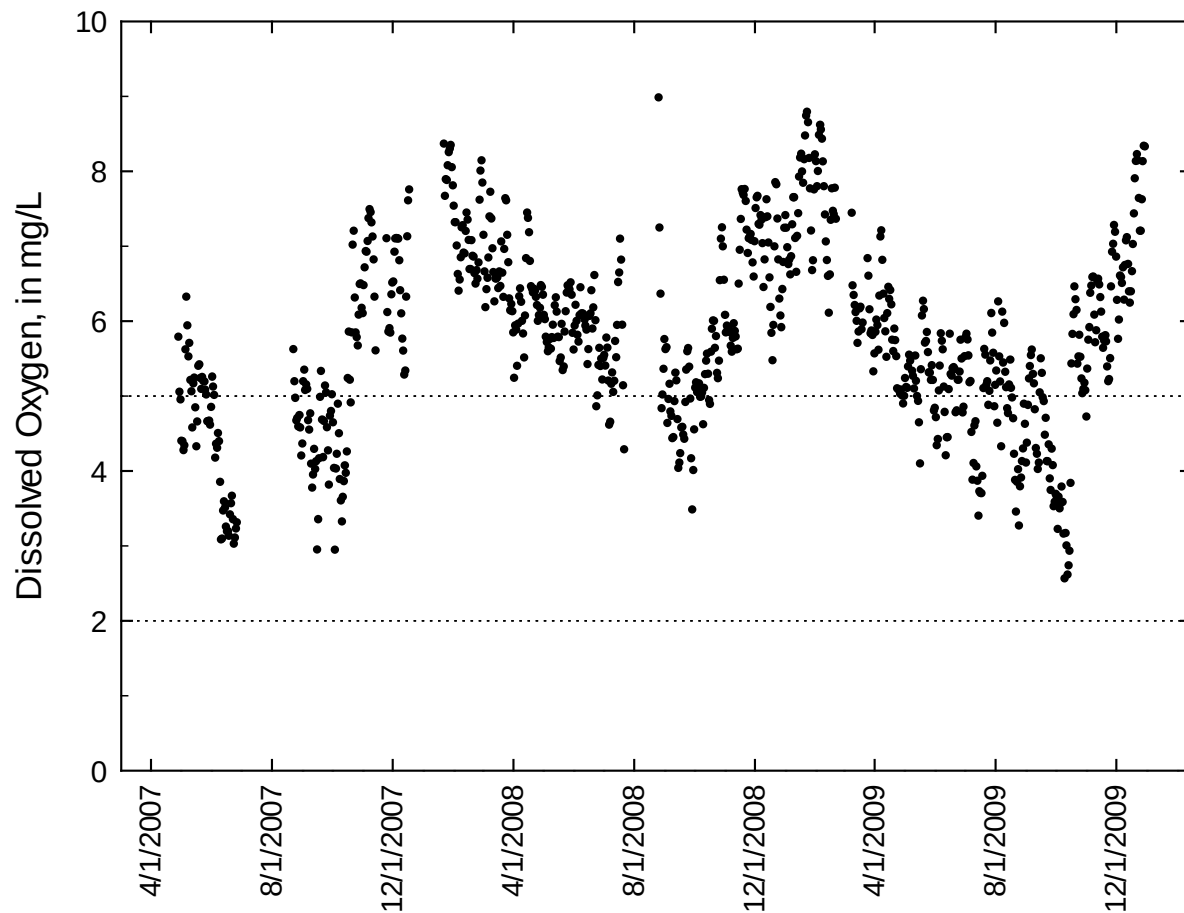


Figure 5. Mean daily dissolved oxygen at Canaveral National Seashore visitor center dock during 2005-2009. Concentrations above 5 mg/L are considered *good* and concentrations below 2 mg/L are considered *poor* based on EPA National Coastal Assessment Criteria (United States Environmental Protection Agency 2012). Breaks in data record indicate missing and/or flagged data.

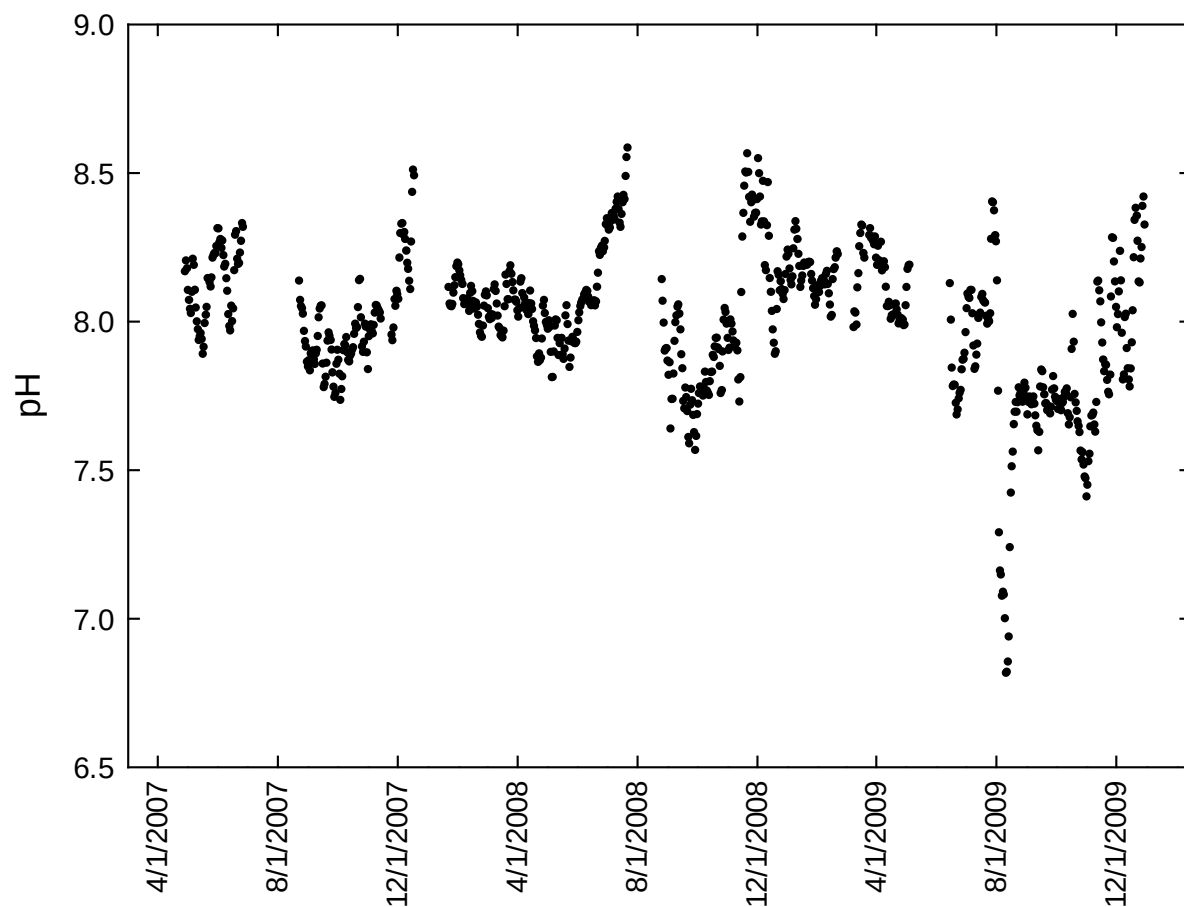


Figure 6. Mean daily pH at Canaveral National Seashore visitor center dock during 2005-2009. Breaks in data record indicate missing and/or flagged data.

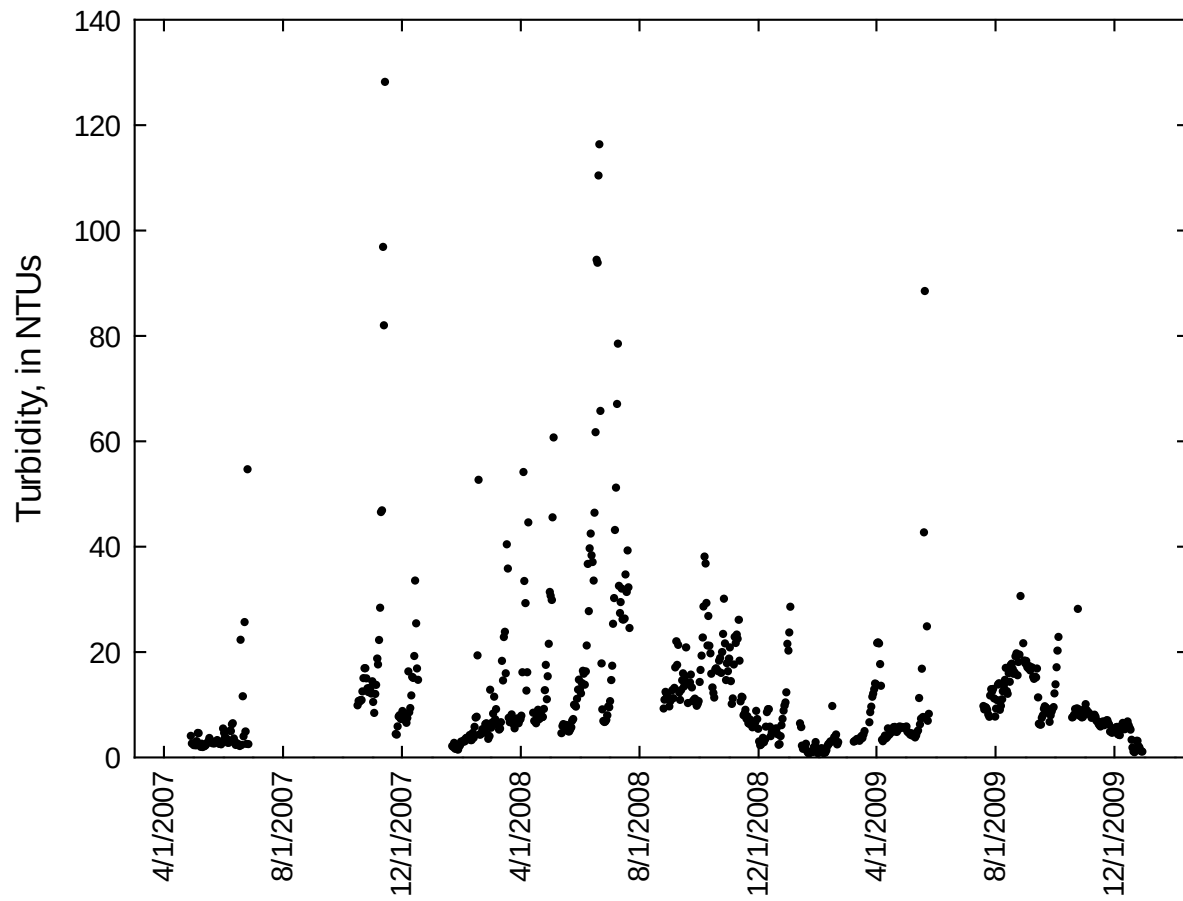


Figure 7. Mean daily turbidity at Canaveral National Seashore visitor center dock during 2005-2009. Breaks in data record indicate missing and/or flagged data.

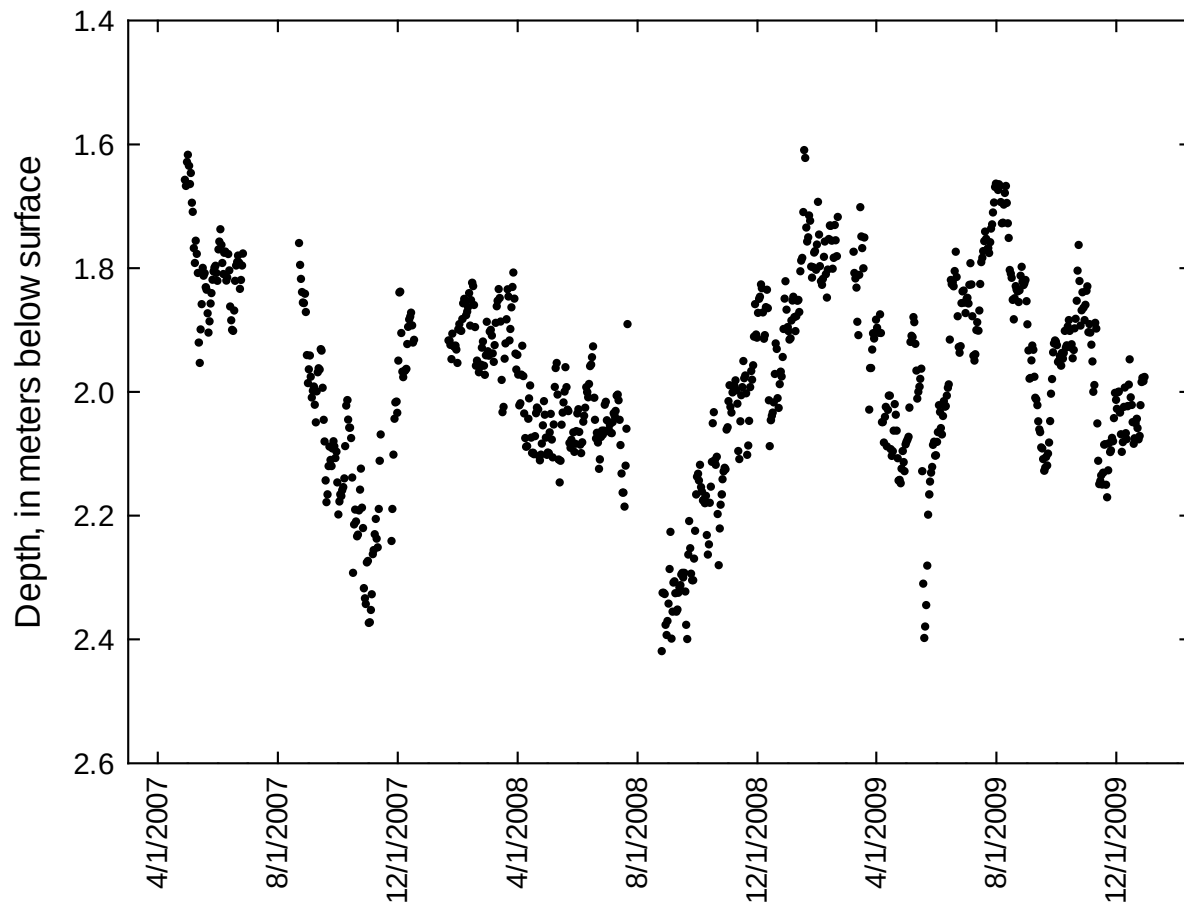


Figure 8. Mean daily depth at Canaveral National Seashore visitor center dock during 2005-2009. Breaks in data record indicate missing and/or flagged data.

Table 3. Monthly minimum, maximum and mean values for parameters collected by the YSI 6-series data sonde at Canaveral National Seashore visitor center dock. Standard deviation (stdev) of the mean values are provided in parentheses. Percent of values for each month indicates the number data points collected during one calendar month of data collection / total number of expected points for a complete month of data. Data from July 21, 2005 through April 30, 2007 are not included due to post-calibration issues.

	Temp (°C)	Salinity (ppt)	Dissolved Oxygen (mg/L)	Depth (m)	pH	Turbidity (NTU)
April 2007 (Expected count 1,440)						
Actual Count	21	21	21	21	21	21
Minimum	25.71	39.220	5.24	1.58	7.97	1.70
Mean (stdev)	26.6 (0.4)	39.7 (0.2)	5.8 (0.2)	1.7 (0.1)	8.2 (0.1)	3.8 (2.3)
Maximum	27.15	39.88	6.14	1.79	8.22	12.40
Percentage	1%	1%	1%	1%	1%	1%
May 2007 (Expected count 1,488)						
Actual Count	1,488	1,488	1,488	1,488	1,488	1,488
Minimum	20.90	32.930	2.47	1.50	7.77	0.00
Mean (stdev)	25.4 (1.9)	36.1 (2.1)	5.0 (0.9)	1.8 (0.1)	8.1 (0.1)	2.5 (1.6)
Maximum	29.96	40.38	7.03	2.07	8.36	19.80
Percentage	100%	100%	100%	100%	100%	100%
June 2007 (Expected count 1,440)						
Actual Count	1,310	1,310	1,310	1,310	1,310	1,295
Minimum	23.88	34.410	0.16	1.66	7.82	0.00
Mean (stdev)	28.6 (1.7)	36.4 (1.1)	3.8 (1.2)	1.8 (0.1)	8.2 (0.1)	6.9 (44.0)
Maximum	31.92	38.95	6.80	2.01	8.45	792.60
Percentage	91%	91%	91%	91%	91%	90%
July 2007 (Expected count 1,488)						
Actual Count	0	0	0	0	0	0
Minimum						
Mean (stdev)						
Maximum						
Percentage	0%	0%	0%	0%	0%	0%
August 2007 (Expected count 1,488)						
Actual Count	363	363	363	363	363	0
Minimum	29.65	37.330	0.70	1.66	7.80	
Mean (stdev)	31.4 (0.9)	39.7 (1.1)	4.8 (1.2)	1.8 (0.1)	8.0 (0.1)	
Maximum	33.54	41.35	7.09	1.98	8.19	
Percentage	24%	24%	24%	24%	24%	0%
September 2007 (Expected count 1,440)						
Actual Count	1,440	1,440	1,440	1,440	1,440	0
Minimum	25.32	30.120	1.19	1.84	7.62	
Mean (stdev)	28.8 (1.2)	33.9 (2.0)	4.5 (1.2)	2.0 (0.1)	7.9 (0.1)	
Maximum	31.86	37.86	7.53	2.28	8.13	
Percentage	100%	100%	100%	100%	100%	0%
October 2007 (Expected count 1,488)						
Actual Count	1,473	1,475	1,473	1,473	1,473	637
Minimum	23.12	0.000	0.50	1.93	7.59	6.70
Mean (stdev)	26.5 (1.5)	33.3 (1.5)	4.9 (1.5)	2.2 (0.1)	7.9 (0.1)	12.8 (3.2)
Maximum	29.57	34.88	9.92	2.47	8.23	24.20
Percentage	99%	99%	99%	99%	99%	43%

Table 3. Continued.

	Temp (°C)	Salinity (ppt)	Dissolved Oxygen (mg/L)	Depth (m)	pH	Turbidity (NTU)
November 2007 (Expected count 1,440)						
Actual Count	913	913	913	913	913	912
Minimum	17.72	30.260	4.50	1.90	7.75	0.40
Mean (stdev)	21.5 (1.9)	32.8 (1.0)	6.6 (0.8)	2.2 (0.1)	8.0 (0.1)	27.8 (39.7)
Maximum	25.58	34.36	8.58	2.45	8.24	325.50
Percentage	63%	63%	63%	63%	63%	63%
December 2007 (Expected count 1,488)						
Actual Count	898	898	898	898	898	898
Minimum	14.06	31.950	3.63	1.75	8.02	3.90
Mean (stdev)	21.3 (2.8)	33.7 (0.5)	6.5 (0.9)	1.9 (0.1)	8.2 (0.1)	12.6 (16.2)
Maximum	25.82	34.29	8.63	2.11	8.55	381.80
Percentage	60%	60%	60%	60%	60%	60%
January 2008 (Expected count 1,488)						
Actual Count	398	398	398	398	398	398
Minimum	14.20	33.100	6.87	1.77	7.99	0.60
Mean (stdev)	17.0 (1.4)	33.9 (0.2)	8.1 (0.5)	1.9 (0.1)	8.1 (0.1)	1.6 (0.6)
Maximum	20.24	34.18	9.42	2.06	8.22	5.30
Percentage	27%	27%	27%	27%	27%	27%
February 2008 (Expected count 1,392)						
Actual Count	1,392	1,392	1,392	1,392	1,392	1,386
Minimum	14.63	33.470	5.14	1.71	7.88	1.40
Mean (stdev)	20.4 (2.1)	34.4 (0.3)	7.0 (0.7)	1.9 (0.1)	8.1 (0.1)	6.2 (33.2)
Maximum	24.44	35.29	9.02	2.08	8.24	1,152.70
Percentage	100%	100%	100%	100%	100%	100%
March 2008 (Expected count 1,488)						
Actual Count	1,488	1,488	1,488	1,488	1,488	1,485
Minimum	15.72	31.800	4.42	1.71	7.84	2.00
Mean (stdev)	21.0 (2.0)	33.7 (0.9)	6.8 (0.8)	1.9 (0.1)	8.1 (0.1)	10.7 (32.7)
Maximum	25.33	35.23	9.06	2.14	8.22	748.20
Percentage	100%	100%	100%	100%	100%	100%
April 2008 (Expected count 1,440)						
Actual Count	1,440	1,440	1,440	1,440	1,440	1,126
Minimum	16.29	31.830	2.94	1.78	7.81	3.70
Mean (stdev)	23.6 (2.4)	35.5 (1.2)	6.3 (0.8)	2.0 (0.1)	8.0 (0.1)	13.1 (13.6)
Maximum	27.91	37.99	8.05	2.67	8.23	78.30
Percentage	100%	100%	100%	100%	100%	78%
May 2008 (Expected count 1,488)						
Actual Count	1,486	1,486	1,486	1,486	1,486	1,124
Minimum	22.43	36.870	3.16	1.86	7.71	1.20
Mean (stdev)	26.5 (1.6)	40.9 (2.1)	6.0 (0.8)	2.1 (0.1)	7.9 (0.1)	14.0 (20.6)
Maximum	30.67	43.71	8.03	2.25	8.08	508.00
Percentage	100%	100%	100%	100%	100%	76%
June 2008 (Expected count 1,440)						
Actual Count	1,440	1,440	1,440	1,440	1,440	1,436
Minimum	26.64	40.390	3.25	1.83	7.85	3.00
Mean (stdev)	29.8 (1.2)	44.0 (1.4)	5.8 (1.1)	2.0 (0.1)	8.1 (0.1)	34.4 (54.8)
Maximum	32.86	47.24	8.96	2.24	8.37	489.00
Percentage	100%	100%	100%	100%	100%	100%

Table 3. Continued.

	Temp (°C)	Salinity (ppt)	Dissolved Oxygen (mg/L)	Depth (m)	pH	Turbidity (NTU)
July 2008 (Expected count 1,488)						
Actual Count	1,186	1,186	1,186	1,186	1,186	1,154
Minimum	26.97	38.180	2.65	1.63	8.15	5.00
Mean (stdev)	29.6 (1.0)	41.3 (1.2)	5.6 (1.2)	2.1 (0.1)	8.4 (0.1)	30.9 (42.6)
Maximum	32.34	43.41	9.95	2.28	8.63	816.70
Percentage	80%	80%	80%	80%	80%	78%
August 2008 (Expected count 1,488)						
Actual Count	215	216	215	215	215	215
Minimum	29.31	0.000	3.42	2.22	7.73	6.60
Mean (stdev)	30.8 (0.8)	34.4 (2.4)	6.2 (1.7)	2.3 (0.1)	8.0 (0.1)	11.3 (2.7)
Maximum	32.59	34.82	9.82	2.47	8.28	18.40
Percentage	14%	15%	14%	14%	14%	14%
September 2008 (Expected count 1,440)						
Actual Count	1,440	1,440	1,440	1,440	1,440	1,440
Minimum	24.14	32.910	1.20	2.08	7.45	4.50
Mean (stdev)	28.8 (1.7)	34.6 (0.9)	4.8 (1.1)	2.3 (0.1)	7.8 (0.2)	13.3 (10.8)
Maximum	31.89	38.20	8.40	2.49	8.16	305.90
Percentage	100%	100%	100%	100%	100%	100%
October 2008 (Expected count 1,488)						
Actual Count	1,488	1,488	1,488	1,488	1,488	1,483
Minimum	15.14	29.190	2.59	1.92	7.53	4.80
Mean (stdev)	24.2 (3.0)	33.1 (1.7)	5.4 (0.9)	2.2 (0.1)	7.8 (0.1)	19.5 (9.2)
Maximum	28.37	35.45	8.39	2.39	8.09	76.40
Percentage	100%	100%	100%	100%	100%	100%
November 2008 (Expected count 1,440)						
Actual Count	1,440	1,440	1,440	1,440	1,440	1,440
Minimum	13.81	32.130	4.32	1.79	7.61	3.20
Mean (stdev)	19.2 (2.9)	34.1 (0.7)	6.5 (0.9)	2.0 (0.1)	8.2 (0.3)	12.3 (8.0)
Maximum	25.66	35.33	8.38	2.23	8.61	163.00
Percentage	100%	100%	100%	100%	100%	100%
December 2008 (Expected count 1,488)						
Actual Count	1,488	1,488	1,488	1,488	1,488	1,488
Minimum	13.38	32.750	4.59	1.74	7.85	1.40
Mean (stdev)	18.9 (2.1)	34.2 (0.3)	6.9 (0.8)	1.9 (0.1)	8.2 (0.2)	5.4 (3.3)
Maximum	22.93	34.82	8.85	2.21	8.61	23.70
Percentage	100%	100%	100%	100%	100%	100%
January 2009 (Expected count 1,488)						
Actual Count	1,488	1,488	1,488	1,488	1,488	994
Minimum	9.47	33.590	5.30	1.52	8.01	0.30
Mean (stdev)	16.6 (2.9)	35.4 (1.3)	7.5 (0.8)	1.8 (0.1)	8.2 (0.1)	4.9 (7.7)
Maximum	21.97	37.22	9.65	2.05	8.36	32.70
Percentage	100%	100%	100%	100%	100%	67%
February 2009 (Expected count 1,344)						
Actual Count	1,017	1,017	1,016	1,017	1,017	1,017
Minimum	8.70	34.680	5.42	1.61	7.97	0.10
Mean (stdev)	16.6 (3.2)	36.1 (0.5)	7.6 (0.8)	1.8 (0.1)	8.1 (0.1)	2.2 (6.2)
Maximum	22.63	36.86	9.57	1.97	8.28	171.20
Percentage	76%	76%	76%	76%	76%	76%

Table 3. Continued.

	Temp (°C)	Salinity (ppt)	Dissolved Oxygen (mg/L)	Depth (m)	pH	Turbidity (NTU)
March 2009 (Expected count 1,488)						
Actual Count	705	705	702	705	705	705
Minimum	20.20	37.140	4.30	1.62	7.83	1.50
Mean (stdev)	23.3 (1.0)	39.0 (1.0)	6.1 (0.7)	1.8 (0.1)	8.2 (0.1)	5.6 (4.1)
Maximum	25.50	41.04	8.02	2.18	8.51	22.00
Percentage	47%	47%	47%	47%	47%	47%
April 2009 (Expected count 1,440)						
Actual Count	1,440	1,440	1,440	1,440	1,440	1,440
Minimum	15.61	39.070	2.64	1.65	7.91	0.70
Mean (stdev)	23.3 (2.2)	42.4 (1.5)	5.8 (0.9)	2.0 (0.1)	8.1 (0.1)	7.6 (6.8)
Maximum	27.92	45.07	8.27	2.28	8.48	66.40
Percentage	100%	100%	100%	100%	100%	100%
May 2009 (Expected count 1,488)						
Actual Count	1,488	1,488	1,487	1,488	270	1,203
Minimum	21.94	22.550	1.98	1.55	7.89	0.00
Mean (stdev)	26.9 (2.1)	36.6 (7.7)	5.3 (0.9)	2.1 (0.2)	8.1 (0.1)	11.4 (41.7)
Maximum	30.49	45.28	7.59	2.50	8.24	487.60
Percentage	100%	100%	100%	100%	18%	81%
June 2009 (Expected count 1,440)						
Actual Count	1,440	1,440	1,410	1,440	694	0
Minimum	25.22	21.330	1.91	1.64	7.58	
Mean (stdev)	29.9 (1.7)	27.6 (4.0)	5.1 (1.0)	1.9 (0.1)	7.8 (0.1)	
Maximum	33.59	33.74	7.96	2.20	8.20	
Percentage	100%	100%	98%	100%	48%	0%
July 2009 (Expected count 1,488)						
Actual Count	1,488	1,488	1,387	1,488	1,488	505
Minimum	26.67	26.800	1.83	1.61	7.60	4.80
Mean (stdev)	30.0 (1.3)	30.3 (1.7)	4.8 (1.3)	1.8 (0.1)	8.1 (0.2)	10.0 (3.2)
Maximum	33.27	32.50	7.55	2.03	8.50	20.90
Percentage	100%	100%	93%	100%	100%	34%
August 2009 (Expected count 1,488)						
Actual Count	1,488	1,488	1,330	1,488	1,488	1,354
Minimum	28.53	26.700	1.83	1.57	6.64	3.90
Mean (stdev)	31.1 (1.0)	29.4 (1.0)	4.7 (1.4)	1.8 (0.1)	7.5 (0.4)	14.6 (13.4)
Maximum	33.85	31.94	7.59	2.00	8.36	232.10
Percentage	100%	100%	89%	100%	100%	91%
September 2009 (Expected count 1,440)						
Actual Count	1,440	1,440	1,426	1,440	1,440	1,440
Minimum	26.50	26.950	1.80	1.72	7.42	1.90
Mean (stdev)	29.4 (0.8)	32.9 (1.1)	4.6 (1.0)	2.0 (0.1)	7.7 (0.1)	12.0 (11.2)
Maximum	31.49	34.41	7.49	2.22	7.92	251.20
Percentage	100%	100%	99%	100%	100%	100%
October 2009 (Expected count 1,488)						
Actual Count	1,488	1,488	1,417	1,488	1,488	800
Minimum	18.56	32.190	1.79	1.70	7.42	1.90
Mean (stdev)	26.8 (2.8)	35.5 (1.8)	4.4 (1.4)	1.9 (0.1)	7.7 (0.1)	11.3 (32.2)
Maximum	31.07	37.98	7.58	2.06	8.07	911.80
Percentage	100%	100%	95%	100%	100%	54%

Table 3. Continued.

	Temp (°C)	Salinity (ppt)	Dissolved Oxygen (mg/L)	Depth (m)	pH	Turbidity (NTU)
November 2009 (Expected count 1,440)						
Actual Count	1,440	1,440	1,440	1,440	1,440	1,440
Minimum	15.97	35.020	3.16	1.70	7.35	2.00
Mean (stdev)	21.7 (2.3)	38.0 (0.9)	6.0 (0.7)	2.0 (0.1)	7.8 (0.2)	6.9 (2.1)
Maximum	27.88	39.39	8.51	2.26	8.33	17.30
Percentage	100%	100%	100%	100%	100%	100%
December 2009 (Expected count 1,488)						
Actual Count	1,488	1,488	1,488	1,488	1,488	1,488
Minimum	12.20	32.660	4.96	1.82	7.73	0.40
Mean (stdev)	18.4 (2.8)	34.4 (1.5)	7.1 (0.8)	2.0 (0.1)	8.1 (0.2)	3.8 (2.2)
Maximum	23.36	38.61	9.27	2.17	8.47	10.30
Percentage	100%	100%	100%	100%	100%	100%

Anomalies and Missing Data

The period of data collection presented in this report is July 21, 2005 at 00:00 to December 31, 2009 at 23:30. Missing or anomalous data during the reporting period may be due to several factors, including equipment malfunction, calibration errors, excessive biofouling, or periods of time when equipment is not deployed (such as during extreme storm events or routine equipment swaps). From July 2005 until April 2007 and during July 2007 all data collected were flagged due to lack of proper calibration procedures and instrument failures and are not shown in this report. Excluding this period, the average percentage of valid data (all parameters) collected monthly ranged from 14 % to 100 %. During this same period approximately 83 % of all data collected at this site is available for use. No corrections were applied to data as per data analysis procedures (Gregory et al. 2013).

Table 4. Description of anomalous and deleted data and associated periods of record for the data collection platform at Canaveral National Seashore visitor center dock from 2005 to 2009.

Parameter	Description	Start Date	End Date
ALL	MISSING DATA	1/1/2005 12:00 AM	7/21/2005 4:00 PM
		8/22/2005 2:00 PM	8/22/2005 5:00 PM
		9/14/2005 10:00 AM	9/19/2005 3:00 PM
		11/1/2005 2:30 PM	11/1/2005 4:30 PM
		11/1/2005 6:00 PM	11/1/2005 6:00 PM
		11/1/2005 7:30 PM	11/1/2005 7:30 PM
		11/1/2005 9:00 PM	11/1/2005 9:00 PM
		11/1/2005 10:30 PM	11/1/2005 10:30 PM
		11/17/2005 1:30 PM	11/17/2005 3:00 PM
		12/9/2005 11:30 AM	12/9/2005 1:00 PM
		1/10/2006 2:30 PM	5/26/2006 8:00 AM
		7/31/2006 2:30 PM	8/16/2006 1:30 PM
		11/6/2006 4:00 PM	1/29/2007 2:30 PM
		6/28/2007 7:00 AM	6/29/2007 5:00 PM
		7/29/2007 5:00 AM	8/24/2007 10:00 AM
		10/18/2007 11:00 AM	10/18/2007 5:00 PM
		11/15/2007 2:30 PM	11/26/2007 1:30 PM
		12/19/2007 5:00 PM	1/23/2008 4:30 PM
		5/14/2008 3:00 PM	5/14/2008 3:30 PM
		2/22/2009 4:30 AM	3/10/2009 3:00 PM
		3/20/2009 3:30 PM	3/20/2009 9:30 PM
		3/21/2009 12:30 AM	3/26/2009 5:00 PM
		3/26/2009 6:00 PM	3/26/2009 7:30 PM
		3/26/2009 8:30 PM	3/26/2009 11:00 PM
		3/27/2009 12:00 AM	3/27/2009 12:00 AM
		3/27/2009 1:00 AM	3/27/2009 4:30 AM
		3/27/2009 6:00 AM	3/27/2009 11:30 AM
		3/27/2009 12:30 PM	3/27/2009 1:00 PM
	Data marked suspect because no post calibration was performed and data quality cannot be verified.	7/21/2005 4:30 PM	8/22/2005 1:30 PM
		8/22/2005 5:30 PM	9/14/2005 9:30 AM
		9/19/2005 3:30 PM	11/1/2005 2:00 PM
		11/1/2005 5:00 PM	11/1/2005 5:30 PM
		11/1/2005 6:30 PM	11/1/2005 7:00 PM
		11/1/2005 8:00 PM	11/1/2005 8:30 PM
		11/1/2005 9:30 PM	11/1/2005 10:00 PM
		11/1/2005 11:00 PM	11/17/2005 1:00 PM
		11/17/2005 3:30 PM	12/9/2005 11:00 AM
		12/9/2005 1:30 PM	1/10/2006 2:00 PM
		5/26/2006 8:30 AM	7/31/2006 2:00 PM
		8/16/2006 2:00 PM	11/6/2006 3:30 PM
		1/29/2007 3:00 PM	4/30/2007 1:00 PM
		6/29/2007 5:30 PM	7/29/2007 4:30 AM

Battery	Data was deleted due to a temperature probe failure. All parameters have to be deleted because they are temperature dependent.	10/7/2005 9:30 PM 7/23/2008 8:30 AM 8/28/2008 12:00 AM	11/1/2005 2:00 PM 8/27/2008 5:30 PM 8/28/2008 12:00 AM
	Data was deleted due to YSI 6600 data sonde being out of water. The salinity and dissolved oxygen readings indicated that the sonde was out of water.	10/17/2007 3:30 PM	10/17/2007 4:00 PM
	Data was deleted due to a temperature probe failure. All parameters have to be deleted because they are temperature dependent.	7/23/2008 8:30 AM 8/28/2008 12:00 AM	8/27/2008 5:30 PM 8/28/2008 12:00 AM
	Data was deleted due to YSI 6600 data sonde being out of water. The salinity and dissolved oxygen readings indicated that the sonde was out of water.	10/17/2007 3:30 PM	10/17/2007 4:00 PM
Dissolved Oxygen		2/18/2009 2:30 PM	2/18/2009 2:30 PM
		3/10/2009 5:30 PM	3/10/2009 6:00 PM
		3/10/2009 7:30 PM	3/10/2009 7:30 PM
		5/9/2009 6:00 PM	5/9/2009 6:00 PM
		6/9/2009 5:30 PM	6/9/2009 6:30 PM
		6/10/2009 6:30 PM	6/10/2009 7:00 PM
		6/16/2009 4:30 PM	6/16/2009 6:00 PM
		6/20/2009 5:00 PM	6/20/2009 5:30 PM
		6/21/2009 6:00 PM	6/21/2009 6:30 PM
		7/3/2009 1:00 PM	7/3/2009 4:00 PM
	Dissolved Oxygen (DO) readings are suspect because readings are above 120% saturation	7/3/2009 5:30 PM	7/3/2009 6:00 PM
		7/4/2009 2:00 PM	7/4/2009 4:30 PM
		7/4/2009 5:30 PM	7/4/2009 7:30 PM
		7/5/2009 4:30 PM	7/5/2009 5:00 PM
		7/7/2009 3:30 PM	7/7/2009 6:00 PM
		7/21/2009 5:00 PM	7/21/2009 5:00 PM
		7/22/2009 3:30 PM	7/22/2009 3:30 PM
		7/22/2009 4:30 PM	7/22/2009 7:30 PM
		7/28/2009 10:30 AM	7/28/2009 9:00 PM
		7/29/2009 11:00 AM	7/29/2009 11:30 AM
		7/29/2009 2:30 PM	7/29/2009 6:00 PM
		7/29/2009 7:00 PM	7/29/2009 7:30 PM
		7/30/2009 3:30 PM	7/30/2009 4:30 PM
		7/31/2009 11:30 AM	7/31/2009 12:00 PM

	7/31/2009 1:30 PM	7/31/2009 1:30 PM
	7/31/2009 5:00 PM	7/31/2009 5:00 PM
	8/2/2009 3:00 PM	8/2/2009 3:30 PM
	8/4/2009 1:30 PM	8/4/2009 11:00 PM
	8/5/2009 1:30 PM	8/5/2009 5:30 PM
	8/6/2009 1:00 PM	8/6/2009 9:30 PM
	8/8/2009 1:00 PM	8/9/2009 12:30 AM
	8/9/2009 1:30 PM	8/9/2009 2:00 PM
	8/9/2009 3:00 PM	8/9/2009 8:30 PM
	8/10/2009 1:30 PM	8/10/2009 3:00 PM
	8/10/2009 4:00 PM	8/10/2009 9:30 PM
	8/11/2009 12:00 AM	8/11/2009 12:30 AM
	8/12/2009 4:00 PM	8/12/2009 4:00 PM
	8/13/2009 1:30 PM	8/13/2009 1:30 PM
	8/14/2009 2:00 PM	8/14/2009 2:00 PM
	8/15/2009 5:30 PM	8/15/2009 6:00 PM
	8/15/2009 7:00 PM	8/15/2009 7:00 PM
	8/16/2009 1:30 PM	8/16/2009 2:30 PM
	8/16/2009 3:30 PM	8/16/2009 8:30 PM
	8/17/2009 2:30 PM	8/17/2009 6:00 PM
	8/17/2009 7:30 PM	8/17/2009 7:30 PM
	8/18/2009 4:00 PM	8/18/2009 4:00 PM
	8/18/2009 5:30 PM	8/18/2009 6:30 PM
	8/19/2009 4:00 PM	8/19/2009 4:00 PM
	8/20/2009 5:30 PM	8/20/2009 6:00 PM
	9/6/2009 3:30 PM	9/6/2009 4:00 PM
	9/6/2009 6:30 PM	9/6/2009 6:30 PM
	9/7/2009 4:30 PM	9/7/2009 5:00 PM
	9/7/2009 6:00 PM	9/7/2009 6:00 PM
	9/8/2009 5:30 PM	9/8/2009 6:00 PM
Dissolved Oxygen (DO) readings are suspect because readings are below 28% saturation	6/4/2009 9:00 AM	6/4/2009 9:00 AM
	6/5/2009 7:00 AM	6/5/2009 7:00 AM
	6/11/2009 3:30 AM	6/11/2009 3:30 AM
	6/12/2009 3:30 AM	6/12/2009 3:30 AM
	6/12/2009 10:30 PM	6/12/2009 10:30 PM
	6/13/2009 4:00 AM	6/13/2009 4:30 AM
	6/13/2009 11:30 AM	6/13/2009 11:30 AM
	6/13/2009 11:30 PM	6/13/2009 11:30 PM
	6/14/2009 4:00 AM	6/14/2009 4:30 AM
	6/15/2009 5:00 AM	6/15/2009 5:30 AM
	6/15/2009 12:30 PM	6/15/2009 12:30 PM
	6/16/2009 12:30 AM	6/16/2009 12:30 AM
	6/16/2009 6:30 AM	6/16/2009 7:00 AM
	7/11/2009 4:00 AM	7/11/2009 4:00 AM
	7/11/2009 9:30 AM	7/11/2009 9:30 AM
	7/12/2009 4:00 AM	7/12/2009 4:00 AM
	7/14/2009 4:00 AM	7/14/2009 4:00 AM
	7/16/2009 1:30 AM	7/16/2009 1:30 AM

		7/17/2009 3:00 AM	7/17/2009 3:30 AM
		7/17/2009 6:00 AM	7/17/2009 6:00 AM
		7/17/2009 8:00 PM	7/17/2009 8:00 PM
		7/18/2009 5:30 AM	7/18/2009 6:00 AM
		7/18/2009 4:00 PM	7/18/2009 4:00 PM
		7/18/2009 9:00 PM	7/18/2009 9:00 PM
		7/19/2009 6:00 AM	7/19/2009 8:00 AM
		7/19/2009 4:30 PM	7/19/2009 4:30 PM
		7/20/2009 6:30 AM	7/20/2009 6:30 AM
		7/20/2009 9:30 AM	7/20/2009 9:30 AM
		7/21/2009 12:00 AM	7/21/2009 12:00 AM
		7/21/2009 11:00 AM	7/21/2009 11:00 AM
		8/19/2009 5:30 AM	8/19/2009 5:30 AM
		8/22/2009 2:00 AM	8/22/2009 2:30 AM
		8/22/2009 8:30 AM	8/22/2009 8:30 AM
		8/22/2009 9:00 PM	8/22/2009 9:00 PM
		8/24/2009 3:00 AM	8/24/2009 3:00 AM
		8/24/2009 10:00 AM	8/24/2009 10:00 AM
		8/27/2009 12:00 AM	8/27/2009 12:30 AM
		8/27/2009 5:30 AM	8/27/2009 5:30 AM
		8/28/2009 6:30 AM	8/28/2009 6:30 AM
		8/29/2009 7:30 AM	8/29/2009 8:00 AM
		8/30/2009 3:30 AM	8/30/2009 4:00 AM
		8/30/2009 7:30 AM	8/30/2009 8:00 AM
		9/28/2009 3:00 AM	9/28/2009 3:00 AM
		9/28/2009 7:30 AM	9/28/2009 7:30 AM
		9/29/2009 8:00 AM	9/29/2009 8:00 AM
		9/30/2009 4:00 AM	9/30/2009 4:00 AM
		9/30/2009 9:30 AM	9/30/2009 10:00 AM
		10/1/2009 4:30 AM	10/1/2009 4:30 AM
		10/11/2009 1:30 AM	10/11/2009 1:30 AM
		10/11/2009 4:00 AM	10/11/2009 7:00 AM
		10/12/2009 1:00 AM	10/12/2009 2:30 AM
		10/12/2009 3:30 AM	10/12/2009 9:00 AM
		10/13/2009 2:30 AM	10/13/2009 2:30 AM
		10/13/2009 5:30 AM	10/13/2009 8:30 AM
		10/14/2009 2:30 AM	10/14/2009 10:00 AM
		10/15/2009 2:30 AM	10/15/2009 11:00 AM
		10/16/2009 5:00 AM	10/16/2009 6:30 AM
pH	Data was deleted due to a temperature probe failure. All parameters have to be deleted because they are temperature dependent.	7/23/2008 8:30 AM	8/27/2008 5:30 PM
		8/28/2008 12:00 AM	8/28/2008 12:00 AM
	Data was deleted due to YSI 6600 data sonde being out of water. The salinity and dissolved	10/17/2007 3:30 PM	10/17/2007 4:00 PM

	oxygen readings indicated that the sonde was out of water.		
	pH data was deleted due to probe failure during the deployment.	5/6/2009 3:00 PM	6/16/2009 12:30 PM
Salinity	Data was deleted due to a temperature probe failure. All parameters have to be deleted because they are temperature dependent.	7/23/2008 8:30 AM	8/27/2008 5:30 PM
Specific Conductance	Data was deleted due to a temperature probe failure. All parameters have to be deleted because they are temperature dependent.	7/23/2008 8:30 AM	8/27/2008 5:30 PM
Temperature	Data was deleted due to a temperature probe failure. All parameters have to be deleted because they are temperature dependent.	7/23/2008 8:30 AM	8/27/2008 5:30 PM
		8/28/2008 12:00 AM	8/28/2008 12:00 AM
	Data was deleted due to YSI 6600 data sonde being out of water. The salinity and dissolved oxygen readings indicated that the sonde was out of water.	10/17/2007 3:30 PM	10/17/2007 4:00 PM
Turbidity	Data was deleted due to a temperature probe failure. All parameters have to be deleted because they are temperature dependent.	7/23/2008 8:30 AM	8/27/2008 5:30 PM
		8/28/2008 12:00 AM	8/28/2008 12:00 AM
	Data was deleted due to YSI 6600 data sonde being out of water. The salinity and dissolved oxygen readings indicated that the sonde was out of water.	10/17/2007 3:30 PM	10/17/2007 4:00 PM
	Turbidity data is marked suspect due to calibration error. Small negative turbidity values indicate a calibration error.	6/17/2007 5:00 AM	6/17/2007 5:00 AM
		6/18/2007 4:00 AM	6/18/2007 4:00 AM
		6/18/2007 5:00 AM	6/18/2007 5:00 AM
		6/19/2007 4:30 AM	6/19/2007 4:30 AM
		6/27/2007 10:00 AM	6/27/2007 10:00 AM
		8/24/2007 10:30 AM	10/17/2007 3:00 PM

	10/17/2007 4:30 PM	10/18/2007 10:30 AM
	6/16/2009 1:00 PM	7/7/2009 6:30 AM
	11/14/2007 12:00 AM	11/14/2007 12:00 AM
	3/11/2008 2:00 PM	3/11/2008 2:00 PM
	3/17/2008 3:30 AM	3/17/2008 3:30 AM
	3/20/2008 1:00 AM	3/20/2008 1:00 AM
Turbidity data marked suspect due to spikes of 1000 NTU or higher. Spiking turbidity data could be a result of direct interference from a foreign body and/or the EDS wiper parking over the optics.	7/13/2008 1:30 AM	7/13/2008 1:30 AM
	7/18/2008 5:00 AM	7/18/2008 5:00 AM
	7/18/2008 6:00 PM	7/18/2008 6:30 PM
	7/19/2008 4:00 AM	7/19/2008 4:00 AM
	10/8/2008 8:30 AM	10/8/2008 8:30 AM
	10/8/2008 9:30 AM	10/8/2008 9:30 AM
	10/8/2008 11:30 AM	10/8/2008 11:30 AM
	10/9/2008 12:00 AM	10/9/2008 12:00 AM
	10/9/2008 8:30 AM	10/9/2008 8:30 AM
	8/13/2009 5:00 PM	8/13/2009 5:00 PM
	8/17/2009 2:00 PM	8/17/2009 2:00 PM
	10/26/2009 2:30 PM	10/26/2009 2:30 PM
Intermittent turbidity data marked suspect due to spikes of 1000 NTU or higher. Spiking turbidity data could be a result of direct interference from a foreign body and/or the EDS wiper parking over the optics.	6/18/2007 10:30 PM	6/27/2007 2:30 PM
	2/16/2008 12:30 AM	2/19/2008 5:30 AM
	4/15/2008 12:00 AM	4/15/2008 3:00 PM
	5/6/2008 6:30 PM	5/14/2008 2:30 PM
	6/17/2008 7:30 PM	6/21/2008 6:30 PM
	7/4/2008 11:00 AM	7/11/2008 11:30 PM
	4/9/2008 2:30 AM	4/9/2008 11:30 PM
Turbidity readings marked suspect due to heavy fouling on and around probes during deployment.	4/10/2008 12:30 AM	4/14/2008 11:30 PM
	1/4/2009 5:30 AM	1/14/2009 12:00 PM
	5/26/2009 1:30 AM	6/16/2009 12:30 PM
	7/7/2009 7:00 AM	7/21/2009 11:00 AM
	8/28/2009 8:00 PM	8/31/2009 1:30 PM
	10/6/2009 7:00 AM	10/20/2009 2:00 PM
Intermittent turbidity readings marked suspect due to heavy fouling on and around probes during deployment.	4/15/2008 1:30 AM	4/16/2008 12:00 AM
	5/6/2008 7:00 PM	5/15/2008 12:00 AM

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