ACE Basin National Estuarine Research Reserve
January-December 1998 Water Quality Metadata Report
Lastest Update: September 26, 2001

I. Data Set & Research Descriptors

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2. Entry verification:

The data are directly downloaded from the YSI Model 6000 sonde to comma-delimited files (*.csv) and PC6000 files (*.dat). The comma-delimited files are imported into Excel 97 where they are formatted and processed by macros that are supplied by the CDMO. Various macros are designed to: 1) check data files for missing data points, 2) fill all cells that do not contain data with periods (.), 3) convert the data columns to the CDMO-approved formats for time, date and numeric variables, 4) find all data that are out of acceptable range for the data logger's sensors and out the anomalous data to an output file (*.dat), and 5) save the files as Excel worksheets (*.xls).

The anomalous data are evaluated to determine whether to flag or delete the suspect data. Data are flagged if the values are: 1) outside the range expected for the site, 2) outside the range established for the sensors, or 3) outside the range established for good water quality conditions (i.e., dissolved oxygen <28%). Data are deleted if the anomalies are attributed to: 1) a sensor malfunction, 2) exposure of sensors during low tide, or 3) fouling of sensors by aquatic organisms, debris, or sediment. Sensor malfunctions are detected if the voltage reading of the sensor is outside the range established for the sensor or the sensor will not calibrate. Fouling of sensors is detected by comparing in-situ sensor readings with measurements (see Research Methods

section). In addition, sensor readings that differ significantly (>10%) from standard solution (i.e., conductivity) suggest that the sensor was fouled during deployment. After corrections are made to the Excel worksheet (*.xls), the files are exported as tab-delimited files (*.txt) to the CDMO. Christopher Graffeo, Mark Thompson, and Saundra Upchurch are responsible for these tasks.

3. Research Objectives:

Based/ on discussions with local CZM personnel and our knowledge of land use within the Reserve, the South Edisto River drainage basin appears well suited for studying contrasting hydrographic conditions and land use patterns. One NERR water quality monitoring station has been established near Edisto Beach within a tributary of Big Bay Creek. Surrounded by residential and commercial development and subject to nonpoint source pollution, this station is designated as the "treatment" site. The second NERR water quality monitoring station has been situated near Bailey Island, within a tributary of St. Pierre Creek. Urban development in the immediate area of this station has been sparse to date so this station will serve as our "control" site.

The ACE Basin water quality monitoring program began on March 3, 1995 at two tributaries off Big Bay and St. Pierre creeks (see Site Location and Character section for description of sites). YSI electronic data loggers were deployed to measure the water temperature, specific conductance, dissolved oxygen, pH, and turbidity conditions, approximately 0.1 meters above the creek bottom, at 30 minute intervals. Change in water level was also recorded.

4. Research methods

Data loggers are deployed at a permanent monitoring station constructed at each site. The station at Big Bay Creek was constructed in 1995, and it consists of a PVC pipe mounted vertically on 12-foot galvanized pole. To facilitate water flow across the sensors, approximately two-inch diameter holes are drilled into the PVC pipes. The pipes are also positioned to ensure that the sensors are approximately 0.1 meters from the creek bottom. In 1997, the

St. Pierre Creek station was modified: the PVC pipe is now mounted horizontally in a pyramid-shaped cage (2.5 ft long by 1.5 ft high) tethered to the original 12-foot galvanized pole. Later that year, we began to put the data loggers in 1/8-inch mesh net bags before placing them in the PVC pipe to reduce damage by crabs and fish. During the summer, the data loggers are left at the sites for one week, and the sampling period is extended to one month during the cooler months.

At the end of the sampling period, the data loggers are brought back to the laboratory for cleaning, calibration, and servicing, by methods outlined in the YSI Operating and Service Manual. Downtime for doing these procedures ranges from 24 to 48 hours. After cleaning the data loggers, the pH, conductivity, depth, and turbidity sensors are calibrated, using the following standards: pH 7 and 10, conductivity standard of 58.64mS/cm depth in the air, and turbidity standards of 0 and 100 NTU, respectively. The dissolved oxygen (DO) membrane is replaced and is allowed to stretch for 24 hours before the DO sensor is calibrated in air-saturated water. In addition the procedures outlined in the manual, we conduct a DO membrane integrity test to determine if the membrane was punctured during deployment.

Several quality assurance checks are used to determine if the sensor readings drifted significantly during deployment. In-situ measurements of dissolved oxygen, expressed in mg/L, salinity, and water temperature are taken during the first and last sampling interval. Water samples are collected at the same depth as the sensors. Water temperature and salinity are measured directly with a thermistor and refractometer, respectively, and dissolved oxygen level is determined by the Winkler procedure. Post- deployment measurements of all the parameters are taken before cleaning the data loggers. Sensors are immersed in the appropriate standard solutions (i.e., pH) and readings are recorded. The results of these checks are used to evaluate the validity of the data (see Entry Verification section).

5. Site location and character:

The two sampling sites are in separate tributaries of the South Edisto River. The descriptions of the sites are as follows:

Station A--this site is in a tidal marsh creek off Big Bay Creek (GPS coordinates: 32 29.662N and 80 19.427W). Surrounded by residential and commercial development and subject to nonpoint source pollution, this station is designated as the "treatment" site. Pollution sources include houses bordering the creek, many of them with little setbacks from the bordering Spartina marsh; forty docks in the area constructed of creosote, concrete and Wolmanized pilings; boat dockage and heavy boat traffic through the creek; a paved road and three boat ramps off the creek; a marina with 75 slips, CCA treated bulkheads and fueling areas located about 0.5 miles downstream; two commercial seafood docks with 8-10 commercial shrimp boats; and three restaurants. The creek is closed to shellfish harvesting because of the human development in the vicinity. Vegetation in the area includes salt marsh dominated by Spartina alterniflora with isolated areas of Salicornia. Upland fringe areas consist of cabbage palmetto, live oak and cedars. Reefs of American oyster (Crassostrea virginica) fringe the creek banks. At the time of reconnaissance, depth of the creek midway through ebb tide was 5 feet and salinity was 23 parts per thousand (ppt).

Station B--this site is in a tidal creek off St. Pierre Creek (GPS coordinates: 32 31.724N and 80 21.573W). It is surrounded by a wide expanse of Spartina alterniflora marsh. Extensive mud flats and oyster reefs fringe the banks. Maritime forest communities comprised of species such as wax myrtles, live oaks, and palmettos dominate the upland areas. Development in the immediate area is sparse. This creek is subject to relatively light boat traffic. At the time of reconnaissance, depth at low tide was 2.5 feet and salinity was 21 ppt.

The following discussions of trends in water quality at the monitoring stations are based on data collected from March 1995 through December 1997. During this period, water temperature at both monitoring sites exhibited a

seasonal pattern with lowest values occurring in December-January. The lowest monthly water temperature observed was 8.9oC which occurred in February 1996 at St. Pierre Creek. Temperature maxima occurred in July and August with the highest monthly water temperature (30.9oC) occurring in July 1995 at Big Bay Creek. Diurnal variation in temperature was evident with warmest temperatures occurring from 1300 hr to 1800 hr at both sites. Salinity also exhibited seasonal variability during the same period, with lowest values occurring in March at Big Bay and St. Pierre creeks. Another period of low average monthly salinity occurred at Big Bay Creek in December 1997. Average annual salinity for both sites was in the polyhaline regime, with a mean of 29.4 at Big Bay Creek and 26.3 at St. Pierre Creek; however, for all years, salinity ranged from 0.3-41.7 at Big Bay and from 0- 41.7 at St. Pierre Creek. Local precipitation and evaporation conditions are most likely the major contributors to monthly variability in salinity. Analysis of the data indicates that tidal stage strongly influences salinity. As expected, highest values of salinity occurred on the flood tide.

It appears that tidal stage also influences pH. Spectral analysis revealed a periodicity for pH and water depth with a sinusoidal period at ~ 12 hrs., representing tidal periodicity. Time series plots of pH indicated variability of ~1 standard unit (su) on a daily basis. The pH at both sites was very similar, ranging from 5.3-8.4; however, the preponderance of measurements were >7 at both sites. The pH observed at the two monitoring sites appear to be attributable to natural conditions. Marked variations in pH can also occur diurnally due to changes in primary production and respiration.

Dissolved oxygen concentrations appear to tracked depth for part of the cycle, with lowest values occurring on low tides. Afternoon and evening values were not as low as early morning values, suggesting a diurnal component. Dissolved oxygen values at the two monitoring sites were generally high throughout the year with averages of 83.6% saturation and 6.6 mg/l for Big Bay Creek and 78.5% saturation and 6.3 mg/l for St. Pierre Creek. However, hypoxic

events, as indicated by points below the reference line at 28% air saturation, were observed in every season but summer was clearly the season with the greatest percent of time that DO was ó 28%. There were clearly differences among the sites with hypoxic conditions occurring over a greater percent of time at St. Pierre Creek. Seasonal periodicity explains most of the variations in dissolved oxygen concentrations at both sites, with highest mean concentrations in winter and lowest DO values in summer.

Unlike the other parameters monitored at Big Bay and St. Pierre creeks, there appears to be no distinct seasonal trend in turbidity; however, monthly variability appeared greater at the St. Pierre site. This may be due to fluctuations in the amount of detritus being washed form the extensive salt marsh and upland sites that surround St. Pierre Creek.

6. Data collection period:

BEGAN	ENDED
Big Bay	
01/01/98, 00:00:00	01/06/98, 09:00:00
01/13/98, 10:30:00	01/31/98, 23:30:00
02/01/98, 00:00:00	02/05/98, 12:00:00
02/10/98, 12:00:00	02/28/98, 23:30:00
03/01/98, 00:00:00	03/10/98, 08:30:00
03/16/98, 12:30:00	03/31/98, 23:30:00
04/01/98, 00:00:00	04/07/98, 07:30:00
04/10/98, 09:00:00	04/30/98, 23:30:00
05/01/98, 00:00:00	05/05/98, 09:00:00
05/08/98, 12:30:00	05/31/98, 23:30:00
06/01/98, 00:00:00	06/02/98, 08:00:00
06/05/98, 11:00:00	06/24/98, 10:30:00
06/30/98, 10:00:00	06/30/98, 23:30:00
07/01/98, 00:00:00	07/07/98, 08:00:00
07/09/98, 11:00:00	07/22/98, 10:30:00
07/24/98, 10:00:00	07/31/98, 23:30:00
08/01/98, 00:00:00	08/04/98, 09:00:00
08/06/98, 11:30:00	08/19/98, 09:30:00
08/21/98, 09:30:00	08/24/98, 15:00:00
09/02/98, 10:30:00	09/16/98, 08:30:00
09/18/98, 09:00:00	09/30/98, 09:00:00
10/02/98, 09:00:00	10/20/98, 09:00:00
10/22/98, 09:30:00	10/31/98, 23:30:00
11/01/98, 00:00:00	11/09/98, 09:30:00
11/11/98, 10:00:00	11/30/98, 23:30:00
12/01/98, 00:00:00	12/02/98, 09:30:00
12/04/98, 10:30:00	12/16/98, 10:00:00
12/21/98, 11:00:00	12/31/98, 23:30:00
St. Pierre	

01/01/98, 00:00:00	01/06/98, 09:30:00
01/13/98, 09:30:00	01/31/98, 23:30:00
02/01/98, 00:00:00	02/05/98, 12:00:00
02/10/98, 12:00:00	02/28/98, 23:30:00
03/01/98, 00:00:00	03/10/98, 09:00:00
03/16/98, 13:00:00	03/31/98, 23:30:00
04/01/98, 00:00:00	04/07/98, 08:00:00
04/10/98, 09:30:00	04/30/98, 23:30:00
05/01/98, 00:00:00	05/05/98, 08:30:00
05/08/98, 13:00:00	05/31/98, 23:30:00
06/01/98, 00:00:00	06/02/98, 08:30:00
06/05/98, 12:00:00	06/24/98, 11:30:00
06/30/98, 11:00:00	06/30/98, 23:30:00
07/01/98, 00:00:00	07/07/98, 08:30:00
07/09/98, 11:30:00	07/22/98, 10:30:00
07/24/98, 09:30:00	07/31/98, 23:30:00
08/01/98, 00:00:00	08/04/98, 10:00:00
08/06/98, 10:00:00	08/19/98, 08:30:00
08/21/98, 10:30:00	08/24/98, 16:00:00
09/02/98, 09:30:00	09/16/98, 09:00:00
09/18/98, 08:30:00	09/30/98, 09:00:00
10/02/98, 09:30:00	10/20/98, 08:30:00
10/22/98, 09:00:00	10/31/98, 23:30:00
11/01/98, 00:00:00	11/09/98, 09:00:00
11/11/98, 10:30:00	11/30/98, 23:30:00
12/01/98, 00:00:00	12/02/98, 08:30:00
12/04/98, 11:00:00	12/16/98, 10:00:00
12/21/98, 10:30:00	12/31/98, 23:30:00

7. Associated researchers and projects:

In 1993, the Reserve staff initiated a long-term survey of the decapod crustaceans and juvenile fish that utilize the estuarine waters of the Reserve as a nursery ground. There are four sampling stations in each of the three major rivers, Ashepoo, Combahee and South Edisto, of the Reserve. Stations are located along a salinity gradient, ranging from polyhaline to oligohaline or limnetic. Sampling is done each month during daylight flood tide. Trawls are 10 minutes long and tows are made against the tide. Several physical parameters are measured at each station: air and water temperature, salinity, wind speed and direction, water depth and tidal stage. Cloud cover and rainfall conditions are also recorded at each station. To date, we have caught seventy-one species of fish and twenty-eight species of decapod crustacean species.

Drs. Geoff Scott and Tom Mathews are assessing the distribution ofcontaminants (i.e., trace metals, PAHs, pesticides) in sediments within the

rivers of the Reserve. Surface sediment grabs were collected from twelve sites
in the Reserve. Ten sites are located along a salinity gradient in Ashepoo,
Combahee and South Edisto rivers, and two sites are located in the vicinity of
our data logger sites. Surface sediment grabs were collected in 1996 from each
site, and the samples will be analyzed for trace metals (Al, As, Cd, Cr, Cu, Pb,
Zn, etc.), PAHs and pesticides.

II. Physical Structure Descriptors

8. Variable sequence, range of measurements, units, resolution, and accuracy:

Variable Name	Range of Measurements (Units)	Resolution	Accuracy
DATE	1-12, 1-31, 00-99 (mo,day,yr)	1 mo, 1d, 1 y	N/A
HOUR	0-24, 0-60, 0-60 (hr,min,sec)	1 hr, 1 min, 1 s	N/A
TEMP	-5 to +45oC	0.01oC	+/- 0.15oC
SPCOND	0-100 mS/cm	0.01 mS/cm	+/- 0.5% of reading + 0.001 mS/cm
SALINITY	0-70 parts per thousand (ppt)	0.01 ppt	+/- 1% or reading or 0.1 ppt or whichever is greater
DO	0-200 % air saturation (air sat)	0.1 % air sat	+/-2% air sat
DO	200-500 % air saturation (air sat)	0.1 % air sat	+/-6% air sat
DO	0-20 mg/L	0.01 mg/L	+/- 0.2 mg/L
DO	20-50 mg/L	0.01 mg/L	+/- 0.6 mg/L
DEPTH	0-9.1 meters	0.001 m	+/- 0.018 m
pH	2-14 units	0.01 units	+/- 0.2 units
TURBIDITY	0-1000 NTU@	0.1 NTU	+/- 5% of reading or 2 NTU or whichever is greater

@As of March 16, our data loggers have the capability to record turbidity readings greater than 1000 NTU.

9. Coded variable indicator and variable code definitions:

SP=St. Pierre BB=Big Bay

10. Data anomalies:

January 1-31, 1998 Sampling Period

Big Bay

a) The following records include low salinity readings that are less than 18

ppt. These readings are not within normal polyhaline/euhaline salinity range (18
and 40 ppt) for this site. The low readings were probably due to extremely low
tides or heavy rainfall events.

01/01/98	00:00:00-07:00:00	13:30:00-19:30:00
01/02/98	01:00:00-05:00:00	06:30:00-08:00:00
14:00:00-17:00:00		
19:00:00-20:30:00		
01/03/98	02:00:00-04:00:00	08:00:00-08:30:00
15:00:00-17:30:00		
20:00:00-21:00:00		
01/04/98	03:00:00-04:30:00	09:00:00-09:30:00
15:30:00-22:00:00		
01/05/98	10:00:00-10:30:00	17:00:00-17:30:00
22:30:00-23:00:00		
01/14/98	05:30:00	
01/16/98	20:00:00-20:30:00	
01/17/98	07:30:00-08:30:00	14:00:00-15:30:00
20:00:00-20:30:00		
01/18/98	01:30:00-02:00:00	08:30:00-09:00:00
15:00:00-17:30:00		
01/19/98	09:30:00-10:00:00	14:00:00-15:00:00
21:00:00-21:30:00		
01/20/98	05:30:00-07:00:00	
01/23/98	06:30:00-12:30:00	19:00:00-23:30:00
01/24/98	00:00:00-02:00:00	08:30:00-13:30:00
20:00:00-23:30:00		
01/25/98	00:00:00-03:00:00	09:30:00-12:00:00
14:30:00		
22:30:00		
01/26/98	02:30:00-03:00:00	
01/28/98	04:30:00-05:30:00	11:30:00-12:30:00
17:30:00-19:00:00		
23:00:00-23:30:00		
01/29/98	00:00:00-06:30:00	17:30:00-19:00:00
01/30/98	06:00:00-07:00:00	18:30:00-19:30:00
01/31/98	06:30:00-07:30:00	19:30:00-20:00:00

b) From 00:00 on January 1 to 09:00 on January 6, pH data were deleted because
sensor malfunctioned during the December 11, 1997-January 6, 1998 deployment.
c) From 10:30 on January 13 to 23:30 on January 31, pH data were deleted because
probe malfunctioned during the January 13-February 5 deployment.
d) The following records include dissolved oxygen readings that are less than
28% air saturation. The low readings occurred during late ebb tides and early
flood tides.

01/14/98	05:00:00
01/26/98	02:00:00

St. Pierre

a) During the following period, the dissolved oxygen (DO) data were deleted because the sensor was fouled during the December 11, 1997-January 6, 1998 deployment by sediment from the nearby eroding bank. DO readings were extremely low (<1.0 mg/L), indicating that the DO membrane was blocked by debris or sediment. Post-deployment DO calibration check indicated that the DO membrane was not damaged by the fouling.

01/01/98	00:00:00 THRU 01/06/98	09:30:00

b) During the following period, the specific conductance and salinity data were deleted. The readings drifted downward during similar time period as the DO downward drift, suggesting that the sediment from the eroding bank was the cause of the low readings.

01/01/98	00:00:00 THRU 01/06/98	09:30:00

c) The following records include low salinity readings that are less than 18 ppt. These readings are not within normal polyhaline/euhaline salinity range (18 and 40 ppt) for this site. The low readings were probably due to extremely low tides or heavy rainfall events.

01/13/98	13:00:00-18:00:00	23:30:00
01/14/98	00:00:00-05:30:00	14:00:00-18:30:00
01/15/98	02:30:00-06:30:00	
01/16/98	06:00:00-07:00:00	19:00:00-21:30:00
01/17/98	02:00:00-08:00:00	14:30:00-21:00:00
01/18/98	03:30:00-09:00:00	
01/19/98	18:30:00-19:00:00	21:30:00
01/25/98	01:30:00-03:00:00	13:30:00-15:00:00
01/26/98	00:00:00-03:30:00	
01/28/98	16:30:00-18:30:00	
01/29/98	01:00:00-06:30:00	16:30:00-19:00:00
01/30/98	02:30:00-07:30:00	17:00:00-19:30:00
01/31/98	04:30:00-08:00:00	19:00:00-20:30:00

d) From 00:00 on January 1 to 09:30 on January 6, the turbidity data were deleted because the wiper malfunctioned during the December 11, 1997-January 6, 1998 deployment.

e) The following records include negative turbidity readings ranging from -700 to -001; however, the data were not deleted. The negative readings were caused by debris on the lens, a wiper malfunction, or animal interference. The post-deployment check indicated that the turbidity functioned properly during deployment: turbidity read 0.4 NTU in 0 NTU standard and 112 NTU in 100 NTU standard.

01/16/98	02:00:00
01/18/98	16:00:00-16:30:00

01/21/98	06:00:00	20:00:00
01/22/98	17:30:00	
01/23/98	18:30:00	
01/24/98	05:30:00	

February 1-28, 1998 Sampling Period

Big Bay

a) The following records include low salinity readings that are less than 18 ppt. These readings are not within normal polyhaline/euhaline salinity range (18 and 40 ppt) for this site. The low readings were probably due to extremely low tides or heavy rainfall events.

02/01/98	07:30:00-08:30:00	20:00:00-21:00:00
02/02/98	08:30:00-09:30:00	20:30:00-21:30:00
02/03/98	22:00:00-23:00:00	
02/04/98	11:30:00-23:30:00	
02/05/98	00:00:00-12:00:00	
02/10/98	16:00:00-17:00:00	
02/11/98	04:00:00-05:00:00	16:30:00-17:30:00
02/12/98	00:00:00-02:00:00	05:30:00-07:00:00 11:30:00-23:30:00
02/13/98	00:00:00-07:00:00	13:00:00-19:00:00
02/14/98	00:30:00-07:30:00	13:00:00-19:30:00
02/15/98	02:00:00-07:30:00	15:00:00-19:00:00
02/16/98	07:30:00-08:00:00	15:00:00-20:30:00
02/17/98	03:00:00-09:30:00	15:00:00-23:00:00
02/18/98	02:30:00-23:30:00	
02/19/98	00:00:00-00:30:00	03:00:00-11:30:00 15:30:00-23:30:00
02/20/98	00:00:00	04:30:00-23:30:00
02/21/98	00:00:00-01:00:00	05:30:00-13:30:00 17:30:00-23:30:00
02/22/98	00:00:00-01:00:00	07:30:00-12:00:00 20:00:00-23:30:00
02/23/98	00:00:00-00:30:00	
02/24/98	02:30:00-03:30:00	09:30:00-12:00:00 14:30:00-16:30:00 21:00:00-23:30:00
02/25/98	00:00:00-04:00:00	15:30:00-16:30:00

b) From 00:00 on February 1 to 12:00 on February 5, pH data were deleted because sensor malfunctioned during the January 13-February 5 deployment.

c) The following records include negative depth readings. The depth data were not deleted because the salinity and dissolved oxygen readings indicate the data logger was submerged during these periods. The negative depth values may be correlated to low barometric pressure weather systems.

02/04/98	20:30:00-21:00:00
02/23/98	22:30:00-23:30:00
02/24/98	00:00:00-00:30:00

d) The following records include dissolved oxygen readings that are less than
28% saturation. The low readings occurred during late ebb tides and early flood
tides.

02/21/98	07:30:00-10:30:00	19:30:00-22:00:00
02/22/98	02:00:00	09:30:00-12:00:00
23:30:00		
02/23/98	00:00:00-01:00:00	09:00:00-10:30:00

e) During the following period, the dissolved oxygen (DO) data gradually drifted
upward with each successive tidal cycle. The high DO readings occurred during a
period of intense rainfall and during spring tide.

02/23/98	12:30:00	THRU	02/28/98 23:30:00

f) During the following period, the salinity data gradually drifted downward
with each successive tidal cycle. The low salinity readings occurred during a
period of intense rainfall and during spring tide.

02/27/98	16:00:00	THRU	02/28/98 23:30:00

St. Pierre

a) The following records include salinity readings that are less than 18 ppt.
These readings are not within normal polyhaline/euhaline salinity range (18 and
40 ppt) for this site. The low readings were probably due to extremely low tides
or heavy rainfall events.

02/01/98	06:30:00-09:00:00		18:00:00-21:30:00
02/02/98	05:30:00-10:00:00		18:30:00-22:00:00
02/03/98	08:00:00-11:00:00		21:30:00-23:00:00
02/04/98	09:00:00-13:00:00		17:00:00-23:30:00
02/05/98	00:00:00-12:00:00		
02/10/98	12:00:00-23:30:00		
02/11/98	00:00:00-05:30:00		11:30:00-19:00:00
22:30:00-23:30:00			
02/12/98	00:00:00	THRU	02/15/98 10:00:00
02/17/98	05:30:00	THRU	02/23/98 03:00:00
02/24/98	18:00:00	THRU	02/25/98 18:30:00
02/25/98	22:00:00	THRU	02/26/98 05:30:00
02/26/98	12:00:00-17:30:00		
02/27/98	01:00:00-05:30:00		14:30:00-18:00:00
02/28/98	02:00:00-06:30:00		13:30:00-19:30:00

b) The following records include negative turbidity data. The negative readings
were caused by debris on the lens, a wiper malfunction, or animal interference.

02/12/98	21:00:00	22:00:00
02/13/98	22:30:00	
02/16/98	15:30:00	
02/21/98	16:30:00	
02/26/98	16:30:00	

02/27/98 02:00:00
02/28/98 15:30:00

d) During the following period, the dissolved oxygen (DO) data were deleted because the sensor was fouled during the deployment.

02/10/98 12:00:00 THRU 02/28/98 23:30:00

e) During the following period, the specific conductance and salinity data were deleted. The readings drifted downward and did not exhibit the diurnal cyclic pattern during similar time periods as the DO downward drift, suggesting that the sediment from the eroding bank was the cause of the low readings.

02/13/98 16:00:00 THRU 02/25/98 21:00:00

f) The following records include dissolved oxygen (DO) readings that are less than 28% air saturation.

The low readings occurred during late ebb tides and early flood tides.

02/13/98 14:30:00-15:30:00
02/26/98 07:00:00-08:00:00

March 1-31, 1998

Big Bay

a) During the following period, the dissolved oxygen (DO) data gradually drifted upward with each successive tidal cycle. The high DO readings occurred during a period of intense rainfall and during spring tide. Post-deployment calibration check of 108.4% indicated that the unit was working properly.

03/01/98 00:00 THRU 03/10/98 08:30

b) The following records include turbidity readings greater than 1000 NTU. These high values reflect the very turbid conditions that exist during heavy rainfall and high wind events. Heavy rainfall during February 28 and March 17-18 may explain the spikes in turbidity data on March 1 and March 18, respectively.

03/01/98 23:00:00 - 23:30:00
03/02/98 01:30:00 - 05:00:00 09:00:00 16:30:00
03/18/98 16:00:00 - 16:30:00

c) The following records include salinity readings that are less than 18 ppt. These readings are not within normal polyhaline/euhaline salinity range (18 and 40 ppt) for this site. The low readings were probably due to extremely low tides or heavy rainfall events.

03/02/98 21:00:00 THRU 03/10/98 08:30:00
03/16/98 13:00:00-16:00:00 17:30:00-18:30:00
03/17/98 07:30:00 19:00:00-20:00:00

03/18/98 03:00:00-20:30:00
03/19/98 02:30:00-11:00:00 13:30:00-22:30:00
03/20/98 03:30:00-11:00:00 14:30:00-23:30:00
03/21/98 00:00:00-23:30:00
03/22/98 00:00:00-13:00:00 17:00:00-23:30:00
03/23/98 00:00:00-01:00:00 06:30:00-12:00:00
19:30:00-23:30:00
03/24/98 00:00:00-01:30:00 09:30:00-14:00:00
20:30:00-23:30:00
03/25/98 01:30:00-02:30:00 14:00:00-14:30:00
03/26/98 03:00:00 15:30:00
03/27/98 03:30:00-04:00:00 16:30:00-17:00:00
03/28/98 04:30:00-05:30:00 17:00:00-17:30:00
03/29/98 05:30:00-06:30:00 18:00:00-18:30:00
03/30/98 06:30:00-07:30:00 14:00:00
18:30:00-19:30:00
03/31/98 07:30:00-08:00:00 19:00:00-20:00:00

d) The following records include negative depth readings. The depth data were not deleted because the salinity and dissolved oxygen readings indicate the data logger was submerged during these periods.

Low barometric pressure may account for the negative values.

03/02/98 17:30:00 - 18:00:00
03/03/98 06:00:00 - 06:30:00

St. Pierre

a) During the following period, the dissolved oxygen (DO) data were deleted because the sensor was fouled during the deployment.

03/01/98 08:30:00 THRU 03/10/98 09:00:00

b) During the following period, the specific conductance and salinity data were deleted. The readings drifted downward and did not exhibit the diurnal cyclic pattern during similar time periods as the DO downward drift, suggesting that the sediment from the eroding bank was the cause of the low readings.

03/01/98 08:30:00 THRU 03/10/98 09:00:00

c) The following records include salinity readings that are less than 18 ppt. These readings are not within normal polyhaline/euhaline salinity range (18 and 40 ppt) for this site. The low readings were probably due to extremely low tides or heavy rainfall events.

03/16/98 13:00:00-19:00:00
03/17/98 01:00:00-08:00:00 12:30:00-19:30:00
03/18/98 02:00:00-08:30:00 13:00:00-21:30:00
03/19/98 02:00:00-11:30:00 13:00:00-22:30:00
03/20/98 02:30:00 THRU 03/22/98 23:30:00
03/23/98 00:00:00-01:00:00 05:30:00-12:30:00
19:00:00-23:30:00
03/24/98 00:00:00-01:30:00 08:00:00-15:00:00

19:30:00-23:30:00
   03/25/98 00:00:00-02:30:00 09:00:00-15:30:00
21:00:00-23:30:00
   03/26/98 00:00:00-03:30:00 10:00:00-16:30:00
22:30:00-23:30:00
   03/27/98 00:00:00-05:00:00 11:00:00-17:30:00
23:30:00
   03/28/98 00:00:00-05:30:00 11:30:00-18:00:00
   03/29/98 00:30:00-07:00:00 12:00:00-19:00:00
   03/30/98 01:00:00-07:30:00 12:30:00-19:30:00
   03/31/98 02:00:00-08:30:00 13:00:00-20:30:00

d) The following records include negative turbidity readings. The negative readings were caused by debris on the lens, a wiper malfunction, or animal interference.

   03/02/98 16:00:00
   03/03/98 04:00:00
   03/07/98 15:00:00
   03/09/98 00:00:00 03:00:00-03:30:00
04:30:00
   03/16/98 20:00:00
   03/18/98 15:00:00-17:00:00 21:30:00-22:00:00
   03/19/98 02:00:00-03:30:00 18:30:00
23:00:00
   03/22/98 20:00:00
   03/23/98 13:30:00-14:00:00 22:00:00
   03/24/98 02:00:00 14:30:00
   03/25/98 02:30:00-03:00:00
   03/26/98 03:30:00-04:00:00
   03/27/98 16:30:00
   03/28/98 06:00:00 18:00:00
   03/29/98 06:00:00 18:30:00
   03/30/98 06:00:00
   03/31/98 20:30:00

April 1-30, 1998 Sampling Period

   Big Bay

a) The following records include salinity readings that are less than 18 ppt. These readings are not within normal polyhaline/euhaline salinity range (18 and 40 ppt) for this site. The low readings were probably due to extremely low tides or heavy rainfall events.

   04/01/98 08:00:00-09:00:00 14:30:00- 15:30:00
20:00:00 - 21:30:00
   04/02/98 03:30:00-06:00:00 09:00:00- 10:00:00
15:00:00 - 18:00:00
21:00:00 - 22:00:00
   04/03/98 04:30:00-06:00:00 10:00:00-11:00:00
16:00:00 - 22:30:00
   04/04/98 06:00:00-14:00:00
16:00:00 - 23:30:00

04/05/98 00:00:00 07:30:00-10:00:00
11:30:00 - 12:00:00
04/06/98 00:00:00-01:00:00

b) The following records include dissolved oxygen readings that are less than 28% saturation. The low readings occurred during late ebb tides and early flood tides.

04/01/98 20:00:00
04/02/98 08:30:00-09:00:00
04/03/98 09:30:00
04/07/98 00:00:00

c) The following records include turbidity readings greater than 1000 NTU. These high values reflect the very turbid conditions that exist during heavy rainfall and high wind events.

04/03/98 18:30:00-19:30:00

St. Pierre

a) The following records include salinity readings that are less than 18 ppt. These readings are not within normal polyhaline/euhaline salinity range (18 and 40 ppt) for this site. The low readings were probably due to extremely low tides or heavy rainfall events.

04/01/98 02:30:00-09:00:00 13:30:00-21:30:00
04/02/98 02:30:00-10:00:00 14:00:00-22:00:00
04/03/98 03:30:00-11:00:00 15:30:00-23:00:00
04/04/98 05:00:00-13:00:00 19:00:00-23:30:00
04/05/98 00:00:00-12:30:00 18:00:00-23:30:00
04/06/98 00:00:00-00:30:00 07:30:00-13:00:00
19:30:00-23:30:00
04/07/98 00:00:00-01:30:00 08:00:00
04/10/98 10:00:00-16:30:00 23:30:00
04/11/98 00:00:00-04:00:00
04/15/98 19:00:00
04/16/98 19:30:00-20:00:00
04/17/98 21:00:00
04/18/98 08:30:00-09:30:00

b) The following records include negative turbidity readings. The negative readings were caused by debris on the lens, a wiper malfunction, or animal interference.

04/01/98 18:00:00
04/03/98 16:00:00-23:30:00
04/04/98 00:00:00 03:00:00-06:00:00
07:00:00
04/05/98 00:30:00 01:30:00 20:00:00
04/06/98 14:30:00-23:30:00
04/07/98 00:00:00-07:30:00

c) The following records include turbidity readings that are greater than 1000
NTU. These high values reflect the very turbid conditions that exist during
heavy rainfall and high wind events.

04/14/98	08:30:00-09:00:00	12:30:00	14:30:00	15:30:00-16:00:00	
	17:00:00-17:30:00	23:00:00			
04/15/98	00:00:00	02:00:00-02:30:00	03:30:000	7:00:00	
	11:30:00	14:00:00	22:30:00		
04/16/98	06:00:00	08:30:00-09:00:00	22:00:00		
04/17/98	13:30:00	17:00:00			
04/18/98	12:30:00	18:00:00-18:30:00	20:30:00-21:00:00		
04/19/98	01:00:00-01:30:00	02:30:00-04:00:00	12:00:00	13:00:00	
	22:00:00				
04/20/98	21:00:00	23:00:00			
04/21/98	23:00:00				
04/23/98	03:00:00-04:00:00				
04/26/98	00:00:00-00:30:00	07:30:00	09:00:00	11:00:00	
	12:00:00	14:00:00	17:00:00	19:30:00	
	20:00:00-21:00:00				
04/27/98	23:30:00				
04/28/98	01:00:00	06:00:00	07:00:00	12:00:00-12:30:00	
	13:30:00				
04/29/98	02:00:00	03:00:00	06:30:00		
04/30/98	02:30:00-03:00:00	04:00:00-04:30:00	05:30:00-09:00:00	16:00:00	17:30:00

d) The following records include dissolved oxygen (DO) reading that are less
than 28% air saturation. The low readings occurred during late ebb tides and
early flood tides.

04/04/98	00:30:00-02:30:00		
04/29/98	00:30:00-08:30:00	11:30:00-12:00:00	15:30:00-20:00:00

e) From 09:00 on April 10 to 23:30 on April 30, pH data were deleted because the
probe malfunctioned during deployment.

f) During the following period, the dissolved oxygen (DO) data were deleted
because the sensor was fouled during the deployment.

04/25/98	16:30:00	THRU	04/30/98	23:30:00

May 1-31, 1998 Sampling Period

Big Bay

a) The following records include salinity readings that are less than 18 ppt.
These readings are not within normal mesohaline/polyhaline salinity range (18
and 35 ppt) for this site. The low readings were probably due to extremely low
tides or heavy rainfall events.

05/16/98	19:30:00-20:00:00		
05/17/98	20:30:00-21:30:00		
05/18/98	09:30:00	21:30:000-22:00:00	
05/21/98	00:00:00	12:30:00	

b) The following records include dissolved oxygen readings that are less than
28% air saturation. The low readings occurred during late ebb tides and early
flood tides.

05/17/98	07:30:00	19:30:00-20:00:00	
05/18/98	08:30:00	20:30:00-21:00:00	
05/19/98	21:30:00		
05/20/98	22:00:00-23:00:00		
05/21/98	22:00:00		23:30:00
05/22/98	00:00:00-00:30:00		12:00:00-12:30:00
05/23/98	01:00:00		
05/24/98	02:30:00		
05/25/98	03:30:00		
05/26/98	04:30:00		
05/27/98	05:30:00		
05/28/98	06:00:00		
05/29/98	06:00:00-06:30:00		18:30:00
05/30/98	06:30:00-07:30:00		19:00:00-19:30:00
05/31/98	07:00:00-08:00:00		19:30:00-20:00:00

St. Pierre

a) The following records include salinity readings that are less than 18 ppt.
These readings are not within normal mesohaline/polyhaline salinity range (18
and 35 ppt) for this site. The low readings were probably due to extremely low
tides or heavy rainfall events.

05/01/98	16:30:00-21:30:00		
05/02/98	04:30:00-11:00:00		16:00:00-22:30:00
05/03/98	05:30:00-11:30:00		17:00:00-23:00:00
05/04/98	05:30:00-12:30:00		18:00:00-23:30:00
05/05/98	00:00:00-01:00:00		06:30:00-08:30:00
05/08/98	13:30:00-15:00:00		22:30:00-23:30:00
05/09/98	00:00:00-04:30:00		09:30:00-16:00:00
05/10/98	01:00:00-05:00:00		12:00:00-16:30:00
05/11/98	01:00:00-05:30:00		13:00:00-17:00:00
05/12/98	05:00:00	16:00:00-18:00:00	
05/13/98	06:00:00	17:00:00-18:00:00	
05/14/98	06:30:00	18:30:00	
05/15/98	18:30:00-19:30:00		
05/16/98	04:00:00-09:00:00		14:30:00-21:30:00

05/17/98	03:30:00-11:00:00	14:30:00-23:00:00
05/18/98	04:00:00-11:30:00	15:30:00-23:30:00
05/19/98	05:30:00-12:00:00	17:30:00-23:30:00
05/20/98	00:00:00 06:00:00-13:30:00	18:30:00-23:30:00
05/21/98	00:00:00-02:30:00	06:30:00-14:30:00 20:00:00-23:30:00
05/22/98	00:00:00-03:00:00	08:00:00-14:30:00 22:30:00-23:30:00
05/23/98	00:00:00-03:00:00	10:30:00-15:30:00
05/24/98	01:00:00-04:30:00	11:30:00-16:30:00
05/25/98	16:30:00	
05/26/98	17:00:00-18:00:00	
05/27/98	03:30:00-08:00:00	16:00:00-20:00:00

b) From 00:00 on May 1 to 08:30 on May 5, pH data were deleted because the probe malfunctioned during the April 10-May 5 deployment.

c) During the following period, the dissolved oxygen (DO) data were deleted because the sensor was fouled during the deployment.

05/01/98	00:00:00 THRU	05/05/98 08:30:00
05/23/98	08:30:00-15:00:00	20:30:00-23:30:00
05/24/98	00:00:00-04:30:00	09:00:00-15:30:00 21:30:00-23:30:00
05/25/98	00:00:00-06:00:00	09:00:00-15:30:00 22:30:00-23:30:00
05/26/98	00:00:00-18:30:00	22:30:00-23:30:00
05/27/98	00:00:00 THRU 05/31/98	23:30:00

d) The following records include turbidity readings that are greater than 1000 NTU. These high values reflect the very turbid conditions that exist during heavy rainfall and high wind events.

05/23/98	21:00:00 22:00:00	23:30:00
05/24/98	01:00:00 02:00:00	23:00:00-23:30:00
05/28/98	22:30:00-23:30:00	

e) The following records include dissolved oxygen readings that are less than 28% air saturation. The low readings occurred during late ebb tides and early flood tides.

05/25/98	16:30:00-17:00:00

June 1-30, 1998 Sampling Period

Big Bay

a) The following records include dissolved oxygen (DO) readings that are less than 28% air saturation.

The low values occurred during late ebb tides and early flood tides.

06/01/98	08:30:00-09:30:00	21:00:00
06/08/98	02:30:00	
06/09/98	03:00:00-03:30:00	
06/10/98	04:00:00-04:30:00	15:30:00-16:30:00
06/12/98	03:30:00-05:30:00	

06/13/98 05:00:00-07:00:00 16:00:00
06/14/98 03:30:00-08:00:00 15:30:00-16:30:00
18:30:00-19:00:00
06/18/98 16:00:00 21:00:00-23:30:00
06/19/98 23:00:00-23:30:00
06/20/98 00:00:00
06/21/98 00:30:00-01:00:00
06/24/98 03:30:00-04:00:00

b) From 11:00 on June 5 to 10:30 on June 24, pH data were deleted because the sensor malfunctioned during deployment.

c) The following records include salinity readings that are less than 18 ppt. These readings are not within normal mesohaline/polyhaline salinity range (18 and 35 ppt) for this site. The heavy rainfall events during June may have caused the low salinity conditions.

6/10/98 15:30:00-16:00:00
6/11/98 00:00:00-03:30:00

d) The following records include turbidity readings that are greater than 1000 NTU. These high values reflect the very turbid conditions that exist during heavy rainfall and high wind events.

06/10/98 15:30:00
06/10/98 16:30:00
06/14/98 13:00:00

e) During the following period, the dissolved oxygen (DO) data were deleted because the sensor was fouled during the deployment.

06/16/98 06:30:00 THRU 06/17/98 23:00:00

f) From 10:00 to 23:30 on June 30, dissolved oxygen (DO) data were deleted because the DO membrane was damaged during deployment.

St. Pierre

During the following period, the dissolved oxygen (DO) data were deleted because the sensor was fouled during the deployment.

06/01/98 00:00:00 THRU 06/02/98 13:30:00

July 1-31, 1998 Sampling Period

Big Bay

a) From 00:00 on July 1 to 08:00 on July 7, dissolved oxygen (DO) data were deleted because the membrane was damaged during the June 5-July 7 deployment.

b) The following records include turbidity readings that are greater than 1000 NTU. These high values reflect the very turbid conditions that exist during heavy rainfall and high wind events.

07/01/98 00:30:00

07/06/98 23:30:00
07/18/98 01:30:00
07/28/98 19:30:00

c) The following records include salinity readings that are less than 18 ppt. These readings are not within normal polyhaline/euhaline salinity range (18 and 40 ppt) for this site. The low readings were probably due to extremely low tides or heavy rainfall events.

07/05/98 08:00:00-09:30:00
07/26/98 18:30:00
07/27/98 02:00:00-05:00:00
07/28/98 20:00:00-20:30:00
07/29/98 03:00:00-07:00:00

d) The following records included dissolved oxygen (DO) readings that are less than 28% air saturation.

The low readings occurred during late ebb tides and early flood tides.

07/10/98 04:00:00-04:30:00
07/11/98 04:30:00-05:00:00
07/12/98 05:30:00
07/14/98 07:00:00-07:30:00
07/15/98 07:30:00-08:00:00 20:00:00
07/16/98 08:00:00-08:30:00 21:00:00
07/17/98 21:30:00
07/18/98 22:30:00-23:30:00
07/20/98 00:00:00-01:00:00
07/21/98 01:00:00-02:00:00
07/22/98 02:00:00-03:00:00

e) From 10:00 on July 24 to 23:30 on July 31, dissolved oxygen (DO) data were deleted because the DO membrane was accidentally punctured prior to deployment.

St. Pierre

a) The following records included dissolved oxygen (DO) readings that are less than 28% air saturation. Most of the low readings occurred during late ebb tides and early flood tides; a few low readings occurred during other tidal cycles (see section c)).

07/12/98 02:30:00 08:30:00-09:00:00 10:00:00 11:00:00
12:00:00 20:30:00
07/13/98 19:00:00-20:00:00
07/15/98 07:30:00
07/16/98 02:00:00 05:30:00 07:00:00 08:00:00
09:00:00-12:00:00 13:00:00 14:00:00 19:30:00
21:30:00-23:30:00

07/17/98 00:00:00 08:00:00 21:30:00
22:30:00
23:30:00
07/18/98 00:00:00-16:30:00 22:30:00
23:30:00
07/19/98 00:00:00-07:30:00 08:30:00-12:30:00
15:00:00
16:00:00-17:00:00
18:00:00
07/29/98 17:00:00 18:00:00

b) The following records include dissolved oxygen (DO) readings that remain low during two successive tidal cycles, and many of the readings are less than 28% air saturation. It does not appear that the DO membrane was fouled, and a post-deployment DO calibration check of 90% air saturation indicates that membrane was damaged during the deployment. Further investigations are required to ascertain the cause of the anomalous events.

07/12/98 02:00:00-12:00:00
07/16/98 02:00:00-14:30:00
07/18/98 00:00:00-17:00:00
07/19/98 00:00:00-17:00:00

c) The following record includes a turbidity readings greater than 1000 NTU. The high value reflects the very turbid conditions that exist during heavy rainfall and high wind events.

07/16/98 00:30:00

August 1-31, 1998 Sampling Period

Big Bay

a) From 00:00 on August 1 to 09:00 on August 4, dissolved oxygen (DO) data were deleted because the DO membrane was accidentally punctured prior to the July 24-August 4 deployment period.

b) The following records include negative turbidity readings. The negative readings were caused by debris on the lens, a wiper malfunction, or animal interference.

08/17/98 10:30:00
08/18/98 00:00:00-01:00:00 04:30:00-05:00:00
06:00:00
08/18/98 12:30:00 18:00:00
08/19/98 00:00:00-01:30:00

c) The following record includes a turbidity reading that is greater than 1000 NTU. The high values reflect the very turbid conditions that exist during heavy rainfall and high wind events.

08/16/98 18:00:00

St. Pierre

The following records include dissolved oxygen (DO) readings that are less than 28% air saturation. The low readings occurred during late ebb tides and early flood tides.

08/15/98	07:30:00-08:00:00	
08/18/98	00:30:00	23:00:00-23:30:00

September 1-30, 1998 Sampling Period

Big Bay

The following records include negative depth readings. The depth data were not deleted because the salinity and dissolved oxygen readings indicate the data logger was submerged during these periods.

The negative depth values may be correlated to low barometric pressure weather systems.

09/04/98	00:30:00-01:00:00	10:30:00-13:00:00
09/05/98	01:00:00	
09/08/98	03:30:00-04:00:00	15:00:00-16:30:00
09/09/98	03:30:00-04:00:00	

St. Pierre

a) The following records include negative turbidity readings. The negative readings were caused by debris on the lens, a wiper malfunction, or animal interference.

09/09/98	00:30:00	21:30:00
09/10/98	04:30:00	06:30:00
09/12/98	09:00:00	
09/13/98	14:30:00	
09/16/98	09:30:00-10:00:00	

b) The following records include turbidity readings that are greater than 1000 NTU. The high values reflect the very turbid conditions that exist during heavy rainfall and high wind events.

09/04/98	05:00:00	
09/09/98	03:30:00-05:00:00	20:30:00
09/10/98	10:30:00	13:30:00
09/11/98	00:00:00	16:00:00
09/12/98	14:00:00	
09/13/98	07:30:00	10:00:00-10:30:00
09/14/98	14:30:00	15:30:00
09/15/98	05:30:00	07:00:00
09/19/98	16:00:00	

b) At 16:30 on September 19, the dissolved oxygen (DO) reading was less than 28% air saturation. The low reading occurred during an ebb tide.

October 1-31, 1998 Sampling Period

Big Bay

a) The following records include negative turbidity readings. The negative readings were caused by debris on the lens, a wiper malfunction, or animal interference.

10/23/98	00:30:00	01:30:00-02:00:00	04:30:00
10/24/98	01:00:00-01:30:00	02:30:00	03:30:00-05:00:00
22:30:00	23:30:00		
10/25/98	00:30:00-04:30:00	05:30:00-06:00:00	22:30:00-23:30:00
10/26/98	00:00:00-06:30:00	23:30:00	
10/27/98	00:00:00-06:30:00	07:30:00-08:30:00	
10/28/98	00:30:00-02:30:00	03:30:00-08:00:00	21:00:00
10/29/98	01:30:00-06:30:00	08:00:00	
10/30/98	03:30:00	10:00:00	16:30:00
10/31/98	04:30:00	17:30:00	

b) During the following period, the pH data were deleted because the sensor malfunctioned during the October 22-November 9 deployment

10/22/98	09:30:00	THRU	10/31/98 23:30:00

St. Pierre

a) The following records include dissolved oxygen (DO) readings that are less than 28% saturation. The low readings occurred during late ebb tides and early flood tides.

10/05/98	13:30:00	16:30:00-17:00:00	22:30:00
10/06/98	05:30:00-06:00:00	10:30:00	19:30:00
10/07/98	00:00:00	08:30:00	

b) The following records include turbidity readings that are greater than 1000 NTU. These high values reflect the very turbid conditions that exist during heavy rainfall and high wind events.

10/06/98	01:30:00	12:00:00	18:00:00
10/07/98	11:00:00-11:30:00		
10/11/98	00:00:00	10:00:00	
10/12/98	23:30:00		
10/15/98	05:00:00	16:30:00	
10/16/98	16:00:00	17:00:00	18:00:00-18:30:00
10/18/98	15:00:00-15:30:00	23:30:00	
10/19/98	06:30:00	19:30:00	

c) During the following period, the dissolved oxygen (DO) data were deleted because the readings were negative.

10/07/98 00:30:00 08:00:00

November 1-30, 1998 Sampling Period
Big Bay
a) During the following period, the pH data were deleted because the sensor
malfunctioned during the October 22-November 9 deployment
11/01/98 00:00:00 THRU 11/09/98 09:30:00
b) The following records include negative turbidity readings. The negative
readings were caused by debris on the lens, a wiper malfunction, or animal
interference.
11/01/98 06:00:00 18:30:00
11/04/98 21:00:00
11/07/98 23:30:00
11/09/98 07:30:00
11/11/98 22:30:00
11/12/98 02:30:00-03:30:00 04:30:00-06:00:00 10:30:00
22:00:00
23:30:00
11/15/98 00:30:00-01:00:00
11/16/98 01:30:00
11/17/98 13:00:00 19:00:00
11/18/98 01:30:00 02:30:00-03:00:00 08:00:00
11/20/98 00:00:00 03:30:00-04:00:00
11/21/98 20:30:00 21:30:00
11/22/98 22:00:00
11/23/98 05:30:00-06:00:00 22:30:00
11/24/98 00:00:00 11:30:00 22:30:00-23:30:00
11/25/98 00:00:00 01:00:00 03:00:00-03:30:00 07:30:00
20:00:00
11/26/98 00:00:00
11/27/98 05:00:00 09:00:00-09:30:00 14:00:00 22:00:00-
22:30:00
11/28/98 03:00:00 10:30:00
11/29/98 04:00:00 10:30:00-11:30:00 16:30:00
11/30/98 12:00:00
c) From 10:00 on November 11 to 23:30 on November 30, dissolved oxygen (DO) data
were deleted because the membrane was damaged at the beginning of the November
11-December 2 deployment.
d) From 10:00 on November 11 to 23:30 on November 30, pH data were deleted
because sensor was fouled during the November 11-December 2 deployment.

St. Pierre

a) The following records include turbidity readings that are greater than 1000 NTU. These high values reflect the very turbid conditions that exist during heavy rainfall and high wind events.

11/06/98	16:30:00
11/17/98	08:30:00
11/18/98	08:30:00

b) From 10:30 on November 11 to 23:30 on November 30, dissolved oxygen (DO) data were deleted because the DO membrane was damaged during the November 11-December 2 deployment.

c) From 10:30 on November 11 to 23:30 on November 30, pH data were deleted because the sensor malfunctioned during the November 11-December 2 deployment.

December 1-31, 1998 Sampling Period

Big Bay

a) From 00:00 on December 1 to 17:30 on December 1, dissolved oxygen (DO) data were deleted because the membrane was damaged during the November 11-December 2 deployment.

b) From 00:00 on December 1 to 17:30 on December 1, pH data were deleted because the sensor malfunctioned during the November 11-December 2 deployment.

c) The following records include negative turbidity readings. The negative readings were caused by debris on the lens, a wiper malfunction, or animal interference.

12/01/98	13:00:00	14:00:00

d) From 10:30 on December 4 to 10:00 on December 16, pH data were deleted because the sensor malfunctioned during deployment.

e) From 11:00 on December 21 to 23:30 on December 31, turbidity data were deleted because the sensor's wiper malfunctioned during the December 21, 1998-January 20, 1999 deployment.

f) The following record include a negative depth reading. The depth datum was not deleted because the salinity and dissolved oxygen readings indicate the data logger was submerged during this periods. The negative depth value may be correlated to a low barometric pressure weather system.

12/29/98	23:00:00

St. Pierre

b) From 00:00 on December 1 to 08:30 on December 2, dissolved oxygen (DO) data

were deleted because the DO membrane was damaged during deployment. A DO spike
and subsequent very high readings indicated the membrane was punctured at the
beginning of the deployment; however, a membrane integrity test was not performed during post-deployment calibration check.
b) From 00:00 on December 1 to 08:30 on December 2, pH data were deleted because
the sensor malfunction during the November 11-December 2 deployment.
c) From 11:00 on December 4 to 09:00 on December 7, pH data were deleted because
the sensor malfunctioned during deployment.
d) The following records include pH readings that are higher than expected for
this site (pH 8.5-10).
   However, the data were not deleted because the pH calibration held through
the December 21, 1998-January 20, 1999 deployment. The cause of the high readings are not known at this time.
   12/21/98 10:30:00 THRU 12/31/98 23:30:00

11. Missing data
January 1-31, 1998 Sampling Period
   Big Bay
a) From 00:00 on January 1 to 23:30 on January 31, turbidity sensor was not
installed. The sensor was sent to YSI for repairs to the wiper gear box.
b) From 00:00 on January 1 to 09:00 on January 6, pH data were deleted because
sensor malfunctioned during the December 11, 1997-January 6, 1998 deployment.
The malfunction was probably caused by faulting controlling circuit of pH probe
port. Data logger returned to YSI for repair, and another unit (#95a28372) was
deployed at site.
c) From 09:30 on January 6 to 10:00 on January 13, no data are available due to
downtime for servicing and calibrating of data loggers.
d) From 10:30 on January 13 to 23:30 on January 31, pH data were deleted because
probe malfunctioned during the January 13-February 5 deployment, as determined
by post-deployment check. The probe read pH 7 while immersed in the pH 10 standard solution.

   St. Pierre
a) During the following period, the dissolved oxygen (DO) data were deleted
because the sensor was fouled during the December 11, 1997-January 6, 1998
deployment by sediment from the nearby eroding bank. DO readings were extremely

low (<1.0 mg/L), indicating that the DO membrane was blocked by debris or sediment. However, a post-deployment DO calibration reading of 102% air sat.
indicated that the DO membrane was not damaged by the fouling.
01/01/98 00:00:00 THRU 01/06/98 09:30:00
b) During the following period, the specific conductance and salinity data were
deleted. The readings drifted downward during similar time periods as the DO
downward drift, suggesting that the sediment from the eroding bank was the cause
of the low readings.
01/01/98 00:00:00 THRU 01/06/98 09:30:00
c) From 00:00 on January 1 to 09:30 on January 6, turbidity data were deleted
because the wiper malfunctioned during the December 11, 1997-January 6, 1998
deployment. The gear box jammed, preventing the wiper from clearing the lens.
d) From 10:00 on January 6 to 09:00 on January 13, no data are available due to
downtime for servicing and calibrating of data loggers.

February 1-28, 1998 Sampling Period
Big Bay
a) From 00:00 on February 1 to 11:30 on February 10, turbidity sensor not installed. The sensor was sent to YSI for repairs to the wiper gear box.
b) From 12:00 on February 1 to 12:00 on February 5, pH data were deleted because
the sensor malfunctioned during the January 13-February 5 deployment, as determined by post-deployment check. The probe read pH 7 while immersed in the
pH 10 standard solution.
c) From 12:30 on February 5 to 11:30 on February 10, no data are available due
to downtime for servicing and calibrating of data loggers.
d) From 12:00 on February 10 to 23:30 on February 28, pH sensor was not installed because sensor malfunctioned during previous deployment. Replacement
sensor was ordered.

St. Pierre
a) From 12:30 on February 5 to 11:30 on February 10, no data are available due
to downtime for servicing and calibrating of data loggers.
b) During the following period, the dissolved oxygen (DO) data were deleted
because the sensor was fouled during the deployment.
02/10/98 12:00:00 THRU 02/28/98 23:30:00
c) During the following period, the specific conductance and salinity data were
deleted. The readings drifted downward and did not exhibit the diurnal cyclic

pattern during similar time periods as the DO downward drift, suggesting that
the sediment from the eroding bank was the cause of the low readings.
02/13/98 16:00:00 THRU 02/25/98 21:00:00

March 1-31, 1998 Sampling Period
Big Bay
a) The pH sensor was not installed during March because sensor malfunctioned
during previous deployment. Replacement sensor was ordered.
b) From 09:00 on March 10 to 12:00 on March 16, no data are available due to
downtime for servicing and calibrating of data loggers.

St. Pierre
a) During the following period, the dissolved oxygen (DO) data were deleted
because the sensor was fouled during the deployment. Most of the DO readings
were extremely low (<2.0 mg/L), indicating that the DO membrane was blocked by
debris or sediment. However, a post-deployment DO calibration reading of 104.6.%
air sat. indicated that the DO membrane was not damaged by the fouling.
03/01/98 00:00:00 THRU 03/10/98 09:00:00
b) During the following period, the specific conductance and salinity data were
deleted. The readings drifted downward and did not exhibit the diurnal cyclic
pattern during similar time periods as the DO downward drift, suggesting that
the sediment from the eroding bank was the cause of the low readings.
03/01/98 08:30:00 THRU 03/10/98 09:00:00
c) From 09:30 on March 10 to 12:30 on March 16, no data are available due to
downtime for servicing and calibrating of data loggers.

April 1-30, 1998 Sampling Period
Big Bay
a) From 00:00 on April 1 to 07:30 on April 7, pH sensor was not installed.
Replacement sensor was ordered.
b) From 08:00 on April 7 to 08:30 on April 10, no data are available due to
downtime for servicing and calibrating of data loggers.
c) From 09:00 on April 10 to 23:30 on April 30, no data were collected because
data logger did not start recording data at the preset start-time for the April
10-May 5 deployment. We do not know why the unattended mode was not initiated
during the April 10-May 5 deployment; however, the logger work properly during
the next deployment period.

St. Pierre

a) From 08:30 on April 7 to 09:00 on April 10, no data are available due to downtime for servicing and calibrating of data loggers.

b) From 09:30 on April 10 to 23:30 on April 30, no depth data were collected because the sensor was accidentally deactivated before data logger was deployed.

c) From 09:00 on April 10 to 23:30 on April 30, pH data were deleted because the probe malfunctioned during deployment, as determined by post-deployment check. The probe read pH 7 while immersed in the pH 10 standard solution.

d) During the following period, the dissolved oxygen (DO) data were deleted because the sensor was fouled during the deployment. DO readings were low (<4.0 mg/L), indicating that the DO membrane was blocked by debris or sediment. However, a post-deployment DO calibration reading of 104.6.% air sat. indicated that the DO membrane was not damaged by the fouling.

04/25/98 16:30:00 THRU 04/30/98 23:30:00

May 1-31, 1998 Sampling Period

Big Bay

a) From 00:00 on May 1 to 09:00 on May 5, no data was collected because data logger did not start recording data at the preset time. We do not know why the unattended mode was not initiated during the April 10-May 5 deployment; however, the logger work properly during the next deployment period.

b) From 09:30 on May 5 to 12:00 on May 8, no data are available due to downtime for servicing and calibrating of data loggers.

c) From 12:30 on May 8 to 23:30 on May 31, pH sensor was not installed because the data logger could not calibrate sensor during pre-deployment calibration procedures.

St. Pierre

a) From 00:00 on May 1 to 08:30 on May 5, no depth data were collected because the sensor was accidentally deactivated before data logger was deployed on April 10.

b) From 00:00 on May 1 to 08:30 on May 5, pH data were deleted because the probe malfunctioned during deployment, as determined by post-deployment check. The probe read pH 7 while immersed in the pH 10 standard solution.

c) During the following period, the dissolved oxygen (DO) data were deleted
because the sensor was fouled during the deployment. The DO exhibited little or
no cyclic pattern, and many of the DO readings were low (<4.0 mg/L), indicating
that the DO membrane was blocked by debris or sediment.
However, a post-deployment DO calibration reading of 101.1% air sat. indicated that the DO membrane was not damaged by the fouling.

05/01/98	00:00:00	THRU	05/05/98 08:30:00
05/23/98	08:30:00-15:00:00		20:30:00-23:30:00
05/24/98	00:00:00-04:30:00		09:00:00-15:30:00 21:30:00-23:30:00
05/25/98	00:00:00-06:00:00		09:00:00-15:30:00 22:30:00-23:30:00
05/26/98	00:00:00-18:30:00		22:30:00-23:30:00
05/27/98	00:00:00	THRU 05/31/98	23:30:00

d) From 09:00 on May 5 to 12:30 on May 8 , no data are available due to downtime
for servicing and calibrating of data loggers.
e) From 13:00 on May 8 to 23:30 on May 31, pH sensor was not installed because
the sensor malfunctioned during previous deployment. Replacement sensor was
ordered.

June 1-30, 1998 Sampling Period
Big Bay
a) From 00:00 on June 1 to 08:00 on June 2, pH sensor was not installed because
the data logger could not calibrate sensor during pre-deployment calibration
procedures on May 8.
b) From 08:30 on June 2 to 10:30 on June 5 , no data are available due to downtime for servicing and calibrating of data loggers.
c) From 11:00 on June 5 to 10:30 on June 24, pH data were deleted because the
sensor malfunctioned during deployment, as determined by post-deployment check.
The sensor read pH 8.7 while immersed in the pH 7 standard solution. During
deployment, the pH increased from 7.74 to 16.44 and did not exhibit normal
diurnal fluctuations. The sensor was re-conditioned and worked properly during
the next deployment.
d) During the following period, the dissolved oxygen (DO) data were deleted
because the sensor was fouled during the deployment. The low readings and lack
of a cyclic pattern indicated that the DO membrane was blocked by debris or
sediment. However, a post-deployment DO calibration reading of 109% air sat.

indicated that the DO membrane was not damaged by the fouling.
   06/16/98 06:30:00 THRU 06/17/98 23:00:00
e) From 11:00 on June 24 to 09:30 on June 30, no data are available due to
downtime for servicing and calibrating of data loggers.
f) From 10:00 to 23:30 on June 30, dissolved oxygen (DO) data were deleted
because the DO membrane was damaged during deployment, as determined by post-
deployment check. The high DO readings during the membrane integrity test
indicated that the membrane was punctured.

   St. Pierre
a) During the following period, the dissolved oxygen (DO) data were deleted
because the sensor was fouled during the deployment. The DO exhibited little or
no cyclic pattern, and many of the DO readings were low (<4.0 mg/L), indicating
that the DO membrane was blocked by debris or sediment.
   However, a post-deployment DO calibration reading of 101.1% air sat.
indicated that the DO membrane was not damaged by the fouling.
   06/01/98 00:00:00 THRU 06/02/98 13:30:00
b) From 00:00 on June 1 to 13:30 on June 2, pH sensor was not installed because
probe could not calibrate before sonde was deployed on May 8. Replacement sensor
was ordered.
c) From 09:00 on June 2 to 11:30 on June 5 , no data are available due to
downtime for servicing and calibrating of data loggers.
d) From 12:00 on June 5 to 11:30 on June 24, no data were collected because data
logger did not start recording data at the preset time. We do not know why the
unattended mode was not initiated during the June 5-24 deployment; however, the
logger work properly during the next deployment period.
e) From 12:00 on June 24 to 10:30 on June 30, no data are available due to
downtime for servicing and calibrating of data loggers.

July 1-31, 1998 Sampling Period
   Big Bay
a) From 00:00 on July 1 to 08:00 on July 7, dissolved oxygen (DO) data were
deleted because the membrane was damaged during the June 5-July 7 deployment, as
determined by post-deployment check. The high DO readings recorded during the
membrane integrity test indicated that the membrane was punctured.
b) From 08:30 on July 7 to 10:30 on July 9, no data are available due to
downtime for servicing and calibrating of data loggers.
c) From 11:00 on July 22 to 09:30 on July 24, no data are available due to

downtime for servicing and calibrating of data loggers.
d) From 10:00 on July 24 to 23:30 on July 31, dissolved oxygen (DO) data were
deleted because the DO membrane was accidentally punctured prior to deployment.
Unfortunately, a membrane integrity test was not conducted; however similar
results occurred when the DO sensor was switched from the air saturated storage
cup to the saltwater environment and then back to an air saturated storage
cup. The reading immediately rose from 100% to 600% air saturation when the data
logger was deployed at the site, and immediately dropped to 100% air saturation
when switched from the saltwater to the air saturated environment.

St. Pierre
a) From 09:00 on July 7 to 11:00 on July 9, no data are available due to
downtime for servicing and calibrating of data loggers.
b) From 19:30 on July 20 to 10:30 on July 22, no data were collected because the
logger stopped working when battery voltage dropped below 10 volts; however,
reason for premature drain on battery is not known.
c) From 11:00 on July 22 to 09:00 on July 24, no data are available due to
downtime for servicing and calibrating of data loggers.

August 1-31, 1998 Sampling Period
Big Bay
a) From 00:00 on August 1 to 09:00 on August 4, dissolved oxygen (DO) data were
deleted because the DO membrane was accidentally punctured prior to the July 9-
August 4 deployment. Unfortunately, a membrane integrity test was not conducted; however similar results occurred when the DO sensor was switched from
the air saturated storage cup to the saltwater environment and then back to an
air saturated storage cup. The reading immediately rose from 100% to 600% air
saturation when the data logger was deployed at the site, and immediately dropped to 100% air saturation when switched from the saltwater to the air
saturated environment. deployment.
b) From 09:30 on August 4 to 12:00 on August 6, no data are available due to
downtime for servicing and calibrating of data loggers.
c) From 09:30 on August 19 to 09:00 on August 21, no data are available due to
downtime for servicing and calibrating of data loggers.
d) At 15:00 on August 24, data logger was retrieved because Hurricane Bonnie and

Hurricane Earl were expected to come ashore near the deployment site. Logger was
not deployed during the remainder of the month.

St. Pierre
a) From 10:00 on August 4 to 09:30 on August 6, no data are available due to
downtime for servicing and calibrating of data loggers.
b) From 09:00 on August 19 to 10:00 on August 21, no data are available due to
downtime for servicing and calibrating of data loggers.
c) At 16:00 on August 24, data logger was retrieved because Hurricane Bonnie and
Hurricane Earl were expected to come ashore near the deployment site. Logger was
not deployed during the remainder of the month.

September 1-30, 1998 Sampling Period
Big Bay
a) From 00:00 on September 1 to 10:00 September 2, data logger was not deployed
because Hurricane Bonnie and Hurricane Earl were expected to come ashore near
the deployment site.
b) From 09:00 on September 16 to 08:30 on September 18, no data are available
due to downtime for servicing and calibrating of data loggers.
c) From 09:30 on September 30 to 23:30 on September 30, no data are available
due to downtime for servicing and calibrating of data loggers.

St. Pierre
a) From 00:00 on September 1 to 09:00 on September 2, data logger was deployed
because Hurricane Bonnie and Hurricane Earl were expected to come ashore near
the deployment site. Logger was not deployed during the remainder of the month.
b) From 09:30 on September 16 to 08:00 on September 18, no data are available
due to downtime for servicing and calibrating of data loggers.
c) From 21:30 on September 21 to 09:00 on September 30, data logger stopped
because battery voltage dropped below 10 volts.
d) From 09:30 on September 30 to 23:30 on September 30, no data are available
due to downtime for servicing and calibrating of data loggers.

October 1-31, 1998 Sampling Period
Big Bay
a) From 00:00 on October 1 to 08:30 on October 2, no data are available due to
downtime for servicing and calibrating of data loggers.

b) From 09:30 on October 20 to 09:00 on October 22, no data are available due to
downtime for servicing and calibrating of data loggers.
c) During the following period, the pH data were deleted because the sensor
malfunctioned during the October 22-November 9 deployment, as determined by
post-deployment check. The probe read pH 7 while immersed in the pH 10 standard
solution.
10/22/98 09:30:00 THRU 10/31/98 23:30:00

St. Pierre
a) From 00:00 on October 1 to 09:00 on October 2, no data are available due to
downtime for servicing and calibrating of data loggers.
b) During the following period, the dissolved oxygen (DO) data were deleted
because the readings were negative. The negative readings were probably caused
by debris on the DO membrane.
10/07/98 00:30:00 08:00:00
c) From 09:00 on October 20 to 08:30 on October 22, no data are available due to
downtime for servicing and calibrating of data loggers.

November 1-30, 1998 Sampling Period
Big Bay
a) During the following period, the pH data were deleted because the sensor
malfunctioned during the October 22-November 9 deployment, as determined by
post-deployment check. The probe read pH 7 while immersed in the pH 10 standard
solution.
11/01/98 00:00:00 THRU 11/09/98 09:30:00
b) From 10:00 on November 9 to 09:30 on November 11, no data are available due
to downtime for servicing and calibrating of data loggers.
c) From 10:00 on November 11 to 23:30 on November 30, dissolved oxygen (DO) data
were deleted because the membrane was damaged at the beginning of the
deployment. DO spike and subsequent high readings indicated a punctured
membrane at the beginning of deploy; however, the membrane integrity test was
not performed.
d) From 10:00 on November 11 to 23:30 on November 30, pH data were deleted
because sensor was fouled during deployment. The probe read pH 7 while immersed
in the pH 10 standard solution.

St. Pierre

a) From 09:30 on November 9 to 10:00 on November 11, no data are available due to downtime for servicing and calibrating of data loggers.

b) From 10:30 on November 11 to 23:30 on November 30, dissolved oxygen (DO) data were deleted because the DO membrane was damaged during deployment. A spike in DO readings and subsequent high readings indicated that membrane was punctured membrane at the beginning of deployment. However, the membrane integrity test was not performed during post-deployment calibration check.

c) From 10:30 on November 11 to 23:30 on November 30, pH data were deleted because the sensor malfunction during deployment, as determined by post-deployment check. The probe read pH 7 while immersed in the pH 10 standard solution.

December 1-31, 1998 Sampling Period

Big Bay

a) From 00:00 on December 1 to 17:30 on December 1, dissolved oxygen (DO) data were deleted because the membrane was damaged during the November 11-December 2 deployment. DO spike and subsequent high readings indicated that membrane was punctured at the beginning of the deployment; however, the membrane integrity test was not performed during post-deployment calibration check.

b) From 00:00 on December 1 to 17:30 on December 1, pH data were deleted because the sensor malfunctioned during the November 11-December 2 deployment. The probe read pH 7 while immersed in the pH 10 standard solution. The sensor was re-conditioned, as per YSI instruction, after the deployment; the sensor calibrated properly prior to the next deployment.

c) From 18:00 on December 1 to 09:30 on December 2, no data were collected because the data logger's memory was full.

d) From 10:00 on December 2 to 10:00 on December 4, no data are available due to downtime for servicing and calibrating of data loggers.

e) From 10:30 on December 4 to 10:00 on December 16, pH data were deleted because the sensor malfunctioned during deployment, as determined by post-deployment check. The probe read pH 7 while immersed in the pH 10 standard solution. The sensor was re-conditioned, as per YSI instruction after the deployment; the sensor calibrated properly prior to the next deployment.

f) From 10:30 on December 16 to 10:30 on December 21, no data are available due
to downtime for servicing and calibrating of data loggers.
g) From 11:00 on December 21 to 23:30 on December 31, turbidity data were deleted because the sensor's wiper malfunctioned during the December 21, 1998-
January 20, 1999 deployment. It was discovered during the post-deployment
check that the wiper was jammed. Note: all readings during this period exceeded 1600 NTU.

St. Pierre
a) From 00:00 on December 1 to 08:30 on December 2, pH data were deleted because
the sensor malfunction during deployment, as indicated by the post-deployment
check. The sensor read pH 7 while immersed in the pH 10 standard solution.
b) From 00:00 on December 1 to 08:30 on December 2, dissolved oxygen (DO) data
were deleted because the DO membrane was damaged during deployment. A DO spike
and subsequent very high readings indicated the membrane was punctured at the
beginning of the deployment; however, a membrane integrity test was not performed during post-deployment calibration check.
c) From 09:00 on December 2 to 10:30 on December 4, no data are available due to
downtime for servicing and calibrating of data loggers.
d) From 11:00 on December 4 to 09:00 on December 7, pH data were deleted because
the sensor malfunctioned during deployment, as indicated by the post-deployment
check.
The sensor read pH 7 while immersed in the pH 10 standard solution.
e) From 09:30 on December 7 to 11:00 on December 16, no data were collected
because the logger stopped working when battery voltage dropped below 10 volts;
however, reason for premature drain on battery is not known.
f) From 10:30 on December 16 to 10:00 on December 21, no data are available due
to downtime for servicing and calibrating of data loggers.