

North Inlet-Winyah Bay (NIW) NERR Water Quality Metadata  
January - December 1999  
Updated: July 24, 2000

## I. Data Set & Research Descriptors

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### 2. Entry verification

The .dat and .csv versions of the raw data files were uploaded to a PC from either YSI or Hydrolab dataloggers. Data plots were produced and examined for any anomalies using the CDMO graphing Macro. Comma delimited files are opened in Microsoft EXCEL 5.0 and edited by removing unnecessary headers, footers and spaces. Suspect data were evaluated as to being either good or bad based on criteria outlined in the CDMO manual ver. 3.0. If the data were determined to be bad, they were deleted from the final edited .txt file and then documented in the metadata. If it could not be determined whether or not suspect data were bad (as was often the case with turbidity) the data was left in the final edited .txt file and noted in the metadata as anomalous. Missing data due to equipment failure or maintenance were deleted from the final edited .txt file and were replaced with periods (.). Edited (.txt) and raw (.csv) files were then FTP'd to our Sun Sparc II server and archived. The bi-weekly edited (.csv) files are merged to contain one full month of data. All 1999 Thousand Acre, Debordieu Creek and Oyster Landing data were verified using the CDMO 5.0 Microsoft Excel outlier macro which is designed to kick out any outliers (values which fall outside the range that the instrument is designed to measure - see section II.8

of this document) and other erroneous data. Outliers were determined according to the instrument manufacturers' manual. After the CDMO Excel 5.0 macros were run, files with suspicious data were graphed using the latest version of the CDMO graphing macro to determine whether there were any problems with the probes. The dissolved oxygen (DO) and Turbidity (Turb) probes were the most problematic. In instances where data values increased or decreased in an exponential fashion and or intermittently went outside the accepted range for that instrument and never returned to normal, the data was considered suspect, noted in the metadata, and removed from the final edited data file. The date/hour and column reformat macros were then run on the data files before being saved in their final edited form (.txt). The most current CDMO macros are available on the NERRS CDMO home page. Chris Aadland edited and archived the 1999 data for Thousand Acre, Debordieu Creek and Oyster Landing.

### 3. Research Objectives

The principal objective of this study is to record long-term water quality data for North Inlet/Winyah Bay in order to observe any physical changes or trends in water quality over time. Three sites were chosen one to represent our pristine site and the other two to represent impacted sites. The Oyster Landing site is located near the center of the Reserve and is considered pristine. Debordieu Creek and Thousand Acre are both located in waterways which receive run off from heavily developed areas. Measurements were taken every 30 minutes over two week collecting periods at the Oyster Landing, Debordieu Creek and Thousand Acre sites.

### 4. Research methods (YSI 6000 dataloggers)

YSI dataloggers are currently mounted in a 4" diameter PVC pipe which is strapped to a treated 2" X 6" board; and then attached via stainless steel bands to a piling at both the Thousand Acre, Debordieu Creek and Oyster Landing sites. The PVC pipe which houses the data loggers has two large windows cut out near the bottom for the probes to have direct contact with the water column. A stop bolt placed through the PVC pipe below the cut out windows keeps the datalogger

exactly one foot (30 cm) above the creek bottom. Every 30 minutes measurements of specific conductivity, salinity, percent saturation, dissolved oxygen, water temperature, pH, turbidity, and water level are recorded. The two week sampling interval has been selected due to biofouling of the individual probes and expected battery life. At the end of each sampling interval, the dataloggers are brought back to the laboratory to be downloaded, cleaned and recalibrated. Before the instruments are cleaned and recalibrated a post calibration reading is taken from each instrument in fresh standard to see if any of the instruments exhibit drift. The pH probe was calibrated using a two point method and either 4,7 or 7,10 standards. The turbidity probe calibration also used a two point method using 0 & 100 NTU standards. Specific Conductivity was calibrated using a one point method and a 10 ms/cm standard which was purchased through Fisher Scientific. These procedures were carried out according to the methods described in the YSI Operators Manual (see sections 3 and 7). After approximately 24 hours of down time for cleaning and overnight relaxing of the DO membrane, the YSI dataloggers were redeployed

##### 5. Site location and character

The North Inlet-Winyah Bay National Estuarine Research Reserve is located on the Southeastern Atlantic coast of the United States in two tidal estuaries, North Inlet and Winyah Bay, near Georgetown, South Carolina. The North Inlet estuary, located approximately 10 km east of Georgetown, is a bar-built Class C type estuary (Pritchard, 1955)<sup>1</sup>. The North Inlet estuary is composed of numerous winding tidal creeks, and is considered a pristine tidal estuary due to minimal anthropogenic impacts. The watershed drains a 24.8 km<sup>2</sup> area of mostly pine forest and a moderately developed residential watershed to the north. The Winyah Bay estuary, classified as a Class B type estuary by Pritchard (1955)<sup>1</sup>, which originates in the Blue Ridge Mountains of North Carolina, is one of the largest river-estuary ecosystems on the Eastern Seaboard. It is located 14.4 km

south of North Inlet. Winyah Bay drains the sub-basins of 6 major rivers, which are heavily impacted by agriculture, mining, and industry. The rivers drain approximately 46,736 km<sup>2</sup> of uplands and marshes. Descriptions of the three sampling stations are as follows:

1) Thousand Acre (TA) - (lat. 33:18:22; long. 79:15:4) The Thousand Acre monitoring site is located in Thousand Acre marsh tidal creek approximately 30 meters northeast of the west bridge of Thousand Acre marsh. The creek empties into the northeastern side of the mid portion of Winyah Bay and directly drains pine forested upland and wetlands. Salinity ranges from 0 to 15 ppt. and tidal flux is approximately 1m. The bottom is most composed of fine sediments and detritus. Georgetown, 5 km upstream from the Thousand Acre site and on the southern side of Winyah Bay, is the home port for a number of heavy industries including a steel plant, paper mill, chemical plant, and a coal fired power plant. A public sewage treatment plant which discharges into the bay is also located in Georgetown.

2) Oyster Landing (OL) - (lat 33:21:03; long. 79:11:24). The Oyster Landing monitoring site is considered a fairly pristine and undisturbed area located at the end of the Oyster Landing pier which is also where the NI/Winyah Bay NERR weather station site is located. The pier stretches into the upper reaches of Crabhaul Creek in the mid western portion of North Inlet. Crabhaul Creek directly drains pine forested uplands and wetlands. Salinity can range from 0-32 ppt. and average tidal flux is approximately 1.4m. The bottom mostly is comprised of oyster shell hash with some fine sediment and detritus.

3) Debordieu Creek (DC) - (lat 33:21:33, long 79:10:05). The Debordieu Creek monitoring site is considered an impacted site which is located approximately 1k south of the Debordieu Colony which is a large development built on man made canals which drain directly into the northern portion of Debordieu Creek. The DC site is also located in an ocean-dominated *Spartina* marsh which was formerly surrounded by pine-dominated uplands. Salinity can range from 0 to full

strength sea water and an average tidal flux of approximately 2 meters. The bottom is mostly comprised of oyster shell hash with some fine sediment and detritus.

#### 6. Data collection period

Thousand Acre and Oyster Landing data collection both began January 1, 1995. Debordieu Creek sampling began March 5, 1998. All sampling is ongoing.

#### 7. Associated researchers and projects

A water chemistry program is associated with the NIW core monitoring program. Variables sampled include: chlorophyll, dissolved organic carbon, nitrate-nitrite, orthophosphate, and ammonia. (See documentation on the NIW WWW home page for further details). Thousand Acre is our permanent monitoring station for the NERR monitoring program, but Oyster Landing and Debordieu Creek were also sampled during 1998. These stations are also included in our NIW core monitoring program.

## II. Physical Structure Descriptors

#### 8. Variable sequence, column format, range of measurements, units, resolution, and accuracy

YSI 6000 datalogger

| Variable Name   | Format   | Range of Measurements (Units)        | Resolution             | Accuracy                                              |
|-----------------|----------|--------------------------------------|------------------------|-------------------------------------------------------|
| DATE            | (MMDDYY) | 1-12, 1-31, 00-99 (Month, Day, Year) | (1 month, 1 day, 1 yr) | NA                                                    |
| HOUR            | (HHMMSS) | 0-24, 0-60, 0-60 (Hr, Min, Sec)      | (1 hr, 1 min, 1 sec)   | NA                                                    |
| WTEMP           |          | -5 to 45 (C)                         | 0.01C                  | ±0.15C                                                |
| SPCOND          |          | 0-100 (mS/cm)                        | 0.01mS/cm              | ±(0.5% of reading+0.001mS/cm)                         |
| SALINITY        |          | 0-70 parts per thousand (ppt)        | 0.01 ppt               | ±1.0% of reading or 0.1ppt, (or whichever is greater) |
| DO Sat          |          | 0-200 (% Saturation)                 | 0.1% @air saturation   | ±2.0 % @air sat                                       |
| DO Sat          |          | 200-500 (% Saturation)               | 0.1% @air saturation   | ±6% @air sat                                          |
| DO mg 0-20      | (mg/l)   | 0.01mg/l                             |                        | ±0.2mg/l                                              |
| DO mg 20-50     | (mg/l)   | 0.01mg/l                             |                        | ±0.6mg/l                                              |
| Depth (shallow) |          | 0-9.1(m)                             | 0.001m                 | ±0.018m                                               |
| pH              |          | 2-14 units                           | 0.01units              | ±0.2units                                             |

TURB 0-1000 NTU 0.1 NTU ±5% reading or 2.0 NTU (whichever is greater)

Data columns are separated by 1 tab.

9. Coded variable indicator and variable code definitions

Site definitions: OL = Oyster Landing; TA = Thousand Acre, DC = Debordieu Creek

10. Data anomalies (suspect data)

Any questionable outlying data points between January 1, 1999 and December 31, 1999, not addressed below, have been checked and correspond to probable rainfall or other weather related events. Much of the Turb. data (especially in the Fall) which was negative or greater than 1000 was probably due to the large amounts of detritus in the water.

DEBORDIEU CREEK (DC)

| Date | Time | Variable | Reason |
|------|------|----------|--------|
|------|------|----------|--------|

|         |                 |       |                                                                 |
|---------|-----------------|-------|-----------------------------------------------------------------|
| 1/04/99 | 03:30           | Depth | Depth 0                                                         |
| 1/04/99 | 04:00           | Depth | Depth zero                                                      |
| 3/04/99 | 03:30           | Depth | Depth zero                                                      |
| 4/03/99 | 00:00           | Turb  | Turb >1000                                                      |
| 4/14/99 | 00:00           | Turb  | Turb >1000                                                      |
| 4/22/99 | 01:30           | Turb  | Turb negative                                                   |
| 4/23/99 | 15:00           | Turb  | Turb 0                                                          |
| 5/04/99 | 23:30           | Turb  | Turb negative                                                   |
| 5/08/99 | 02:00           | Turb  | Turb 0                                                          |
| 5/09/99 | 03:00           | Turb  | Turb 0                                                          |
| 5/12/99 | 16:00 - 5/24/99 | 8:30  | DO%, Domg suspect high DO readings, possible membrane puncture. |
| 5/29/99 | 20:30           | Turb  | Turb 0                                                          |
| 7/25/99 | 08:00           | Turb  | Turb >1000                                                      |
| 7/25/99 | 16:00           | Turb  | Turb >1000                                                      |
| 7/28/99 | 09:30           | Turb  | Turb >1000                                                      |
| 8/2/99  | 21:00 - 8/10/99 | 11:00 | DO%, Domg suspect high DO readings, possible membrane puncture. |
| 8/4/99  | 20:00 - 8/10/99 | 11:00 | Turb Very noisy (high) turbidity readings                       |
| 8/10/99 | 11:30           | Depth | Depth zero                                                      |
| 8/10/99 | 12:00           | Depth | Depth zero                                                      |
| 8/10/99 | 13:30           | Depth | Depth zero                                                      |
| 8/10/99 | 14:00           | Depth | Depth zero                                                      |
| 8/10/99 | 14:30           | Depth | Depth zero                                                      |
| 8/05/99 | 21:00 -8/10/99  | 11:00 | Turb Intermittent turb. Outliers, (148)                         |

turb. Values > 1000.  
 9/14/99 23:30 -09/24/99 10:30 Turb Intermittent turb. Outliers, (129)  
 turb. Values > 1000.

# OYSTER LANDING (OL)

| Date | Time | Variable | Reason |
|------|------|----------|--------|
|------|------|----------|--------|

|         |                 |       |                                                                              |
|---------|-----------------|-------|------------------------------------------------------------------------------|
| 1/1/99  | 00:00 - 1/14/99 | 16:00 | pH values unusually high.                                                    |
| 5/25/99 | 15:00 - 5/31/99 | 23:30 | DO%, D0mg (141) Negative values, possible membrane failure; DO data deleted  |
| 5/27/99 | 01:30           | Turb  | Turb >1000                                                                   |
| 5/27/99 | 18:30           | Turb  | Turb >1000                                                                   |
| 5/28/99 | 18:30           | Turb  | Turb 0                                                                       |
| 5/28/99 | 19:00           | Turb  | Turb 0                                                                       |
| 5/29/99 | 06:30           | Turb  | Turb >1000                                                                   |
| 5/29/99 | 07:30           | Turb  | Turb >1000                                                                   |
| 5/29/99 | 19:00           | Turb  | Turb 0                                                                       |
| 5/29/99 | 19:30           | Turb  | Turb negative                                                                |
| 5/30/99 | 19:30           | Turb  | Turb negative                                                                |
| 5/30/99 | 20:00           | Turb  | Turb negative                                                                |
| 5/30/99 | 20:30           | Turb  | Turb negative                                                                |
| 5/31/99 | 08:30           | Turb  | Turb negative                                                                |
| 5/31/99 | 20:00           | Turb  | Turb negative                                                                |
| 5/31/99 | 20:30           | Turb  | Turb negative                                                                |
| 5/31/99 | 21:00           | Turb  | Turb negative                                                                |
| 5/31/99 | 21:30           | Turb  | Turb 0                                                                       |
| 6/1/99  | 00:00 - 6/14/99 | 13:00 | DO%, D0mg (209) Negative values, potential membrane failure; DO data deleted |
| 6/01/99 | 08:30 - 6/14/99 | 08:30 | Turb Intermittent turb. Outliers, (69) Turb. values either negative or 0.    |
| 6/04/99 | 16:30           | Turb  | Turb >1000                                                                   |
| 6/11/99 | 19:30           | Turb  | Turb >1000                                                                   |
| 6/14/99 | 09:00           | Turb  | Turb >1000                                                                   |
| 7/17/99 | 08:00 - 7/19/99 | 10:30 | DO%, D0mg suspect data; possible membrane puncture                           |
| 7/11/99 | 17:00           | Turb  | Turb >1000                                                                   |
| 7/17/99 | 14:30           | Turb  | Turb >1000                                                                   |
| 7/25/99 | 12:00           | Turb  | Turb >1000                                                                   |
| 7/28/99 | 05:30           | Turb  | Turb >1000                                                                   |
| 7/28/99 | 10:00           | Turb  | Turb >1000                                                                   |
| 7/29/99 | 11:00           | Turb  | Turb >1000                                                                   |
| 7/30/99 | 09:00           | Turb  | Turb >1000                                                                   |
| 7/30/99 | 09:30           | Turb  | Turb >1000                                                                   |
| 7/30/99 | 11:00           | Turb  | Turb >1000                                                                   |
| 7/31/99 | 01:30           | Turb  | Turb >1000                                                                   |
| 7/31/99 | 09:30           | Turb  | Turb >1000                                                                   |
| 7/31/99 | 16:30           | Turb  | Turb >1000                                                                   |
| 8/25/99 | 01:30           | DO%   | DO% negative DO deleted                                                      |
| 8/26/99 | 02:00           | DO%   | DO% negative DO deleted                                                      |

|                 |        |          |                                                                       |
|-----------------|--------|----------|-----------------------------------------------------------------------|
| 8/25/99         | 01:30  | DOMg     | DOMg negative DO deleted                                              |
| 8/26/99         | 02:00  | DOMg     | DOMg negative DO deleted                                              |
| 8/30/99         | 10:00  | Depth    | Depth zero                                                            |
| 8/01/99         | 10:30  | Turb     | Turb >1000                                                            |
| 8/01/99         | 11:30  | Turb     | Turb >1000                                                            |
| 8/01/99         | 17:00  | Turb     | Turb >1000                                                            |
| 8/02/99         | 07:00  | Turb     | Turb >1000                                                            |
| 8/02/99         | 07:30  | Turb     | Turb >1000                                                            |
| 8/02/99         | 10:30  | Turb     | Turb >1000                                                            |
| 8/09/99         | 23:00  | Turb     | Turb >1000                                                            |
| 9/03/99         | 14:00  | -        | 9/22/99 15:00 DO%, DOMg possible membrane failure;                    |
| DO data deleted |        |          |                                                                       |
| 10/16/99        | 12:30- | 10/31/99 | 23:30 DO%, Domg suspect high DO readings, possible membrane puncture. |
| 10/31/99        | 01:30  | Turb     | Turb 0                                                                |
| 11/1/99         | 00:30- | 11/3/99  | 14:00 Extremely high DO%, Domg values. Suspect DO.                    |
| 12/03/99        | 18:00  | Turb     | Turb 0                                                                |
| 12/04/99        | 05:30  | Turb     | Turb 0                                                                |
| 12/04/99        | 06:00  | Turb     | Turb 0                                                                |
| 12/14/99        | 12:30- | 12/31/99 | 23:30, Extremely high DO%, Domg values. Suspect DO.                   |

#### THOUSAND ACRE (TA)

| Date                     | Time  | Variable        | Reason                                                                                     |
|--------------------------|-------|-----------------|--------------------------------------------------------------------------------------------|
| 1/18/99                  | 19:30 | -1/31/99 23:30  | possible membrane puncture. Suspect DO.                                                    |
| 1/20/99                  | 15:00 | - 01/24/99      | 06:00 Turb Intermittent turb.                                                              |
| Outliers,                |       |                 |                                                                                            |
| (73) Turb values > 1000. |       |                 |                                                                                            |
| 2/4/99                   | 15:00 | - 2/14/99 23:30 | Abnormally low salinity.                                                                   |
| 4/2/99                   | 12:00 | - 4/19/99       | 9:30 DO%, DOMg, turb Deleted due to mud contamination                                      |
| 5/6/99                   | 15:30 | - 5/21/99       | 6:00 DO%, DOMg, turb Deleted due to mud contamination                                      |
| 5/21/99                  | 11:30 | - 5/22/99       | 6:30 DO%, DOMg, turb Deleted due to mud contamination                                      |
| 5/22/99                  | 11:00 | - 5/24/99       | 9:30 DO%, DOMg, turb Deleted due to mud contamination                                      |
| 5/26/99                  | 13:30 | - 5/31/99       | 23:30 DO%, Domg suspect high DO readings, possible membrane puncture or mud contamination. |
| 5/27/99                  | 01:30 |                 | DO%, Domg/L DO data deleted due to negative values                                         |
| 6/01/99                  | 04:00 | - 6/30/99       | 23:30 Turb Intermittent turb.                                                              |
| Outliers,                |       |                 |                                                                                            |
| (453) Turb values >1000  |       |                 |                                                                                            |

|          |         |          |                                 |                                                   |
|----------|---------|----------|---------------------------------|---------------------------------------------------|
| 6/17/99  | 13:00 - | 6/30/99  | 23:30 DO%, D0mg, turb           | Deleted due to mud contamination                  |
| 7/1/99   | 00:00 - | 7/5/99   | 10:00 DO%, D0mg, turb           | Deleted due to mud contamination                  |
| 7/7/99   | 13:00 - | 7/19/99  | 08:00 DO%, D0mg, turb           | Deleted due to mud contamination                  |
| 7/30/99  | 4:00    | Turb     | Turb. >1000                     |                                                   |
| 8/3/99   | 19:00 - | 8/11/99  | 10:30 DO%, D0mg                 | Deleted due erratic readings (>500 and negative). |
| 8/21/99  | 15:00 - | 8/21/99  | 16:00 DO%, D0mg                 | (3) Values deleted due negative readings.         |
| 8/22/99  | 18:30 - | 8/22/99  | 19:00 DO%, D0mg                 | (2) Values deleted due negative readings.         |
| 8/10/99  | 04:00 - | 8/29/99  | 20:30 Turb                      | Intermittent turb. Outliers,                      |
|          |         |          | (110) Turb readings >1000.      |                                                   |
| 09/10/99 | 09:00   | Turb     | Turb >1000                      |                                                   |
| 09/10/99 | 20:30   | Turb     | Turb >1000                      |                                                   |
| 09/11/99 | 08:30   | Turb     | Turb >1000                      |                                                   |
| 09/14/99 | 18:30   | Turb     | Turb >1000                      |                                                   |
| 09/15/99 | 11:00   | Turb     | Turb >1000                      |                                                   |
| 11/03/99 | 16:30 - | 11/04/99 | 11:00 Abnormal DO%, D0mg spike, | probe may have been out of the water.             |
| 11/03/99 | 14:00   | Turb     | Turb negative                   |                                                   |
| 11/03/99 | 14:30   | Turb     | Turb negative                   |                                                   |
| 11/03/99 | 15:00   | Turb     | Turb negative                   |                                                   |
| 11/03/99 | 15:30   | Turb     | Turb negative                   |                                                   |
| 11/03/99 | 16:00   | Turb     | Turb negative                   |                                                   |
| 11/03/99 | 17:00   | Turb     | Turb 0                          |                                                   |
| 11/03/99 | 22:30   | Turb     | Turb 0                          |                                                   |
| 11/03/99 | 23:30   | Turb     | Turb 0                          |                                                   |
| 11/04/99 | 00:30   | Turb     | Turb 0                          |                                                   |
| 11/04/99 | 01:30   | Turb     | Turb 0                          |                                                   |
| 11/04/99 | 02:00   | Turb     | Turb 0                          |                                                   |
| 11/04/99 | 03:00   | Turb     | Turb negative                   |                                                   |
| 11/04/99 | 03:30   | Turb     | Turb 0                          |                                                   |
| 11/04/99 | 04:00   | Turb     | Turb 0                          |                                                   |
| 11/04/99 | 04:30   | Turb     | Turb 0                          |                                                   |
| 11/04/99 | 05:00   | Turb     | Turb 0                          |                                                   |
| 11/04/99 | 05:30   | Turb     | Turb 0                          |                                                   |
| 11/04/99 | 06:00   | Turb     | Turb negative                   |                                                   |
| 11/04/99 | 06:30   | Turb     | Turb 0                          |                                                   |
| 11/04/99 | 07:00   | Turb     | Turb negative                   |                                                   |
| 11/04/99 | 07:30   | Turb     | Turb negative                   |                                                   |
| 11/04/99 | 08:00   | Turb     | Turb negative                   |                                                   |
| 11/04/99 | 08:30   | Turb     | Turb 0                          |                                                   |
| 11/04/99 | 09:00   | Turb     | Turb 0                          |                                                   |
| 11/04/99 | 09:30   | Turb     | Turb 0                          |                                                   |

11/04/99 10:00 Turb Turb 0  
 11/04/99 10:30 Turb Turb 0  
 11/04/99 11:00 Turb Turb negative  
 11/04/99 11:30 - 11/04/99 15:30 Data deleted because all probes  
 may  
 have been completely out of the water.  
 11/16/99 03:30 Turb Turb >1000

## 12. Missing Data

Every two weeks at TA, DC and OL, there is a period of approximately 24  
 hours of  
 missing data due to maintenance and calibration.

### DEBORDIEU CREEK (DC)

| Date     | Time    | Variable | Reason                |
|----------|---------|----------|-----------------------|
| 1/14/99  | 11:00 - | 1/17/99  | 14:30 all Maintenance |
| 2/3/99   | 11:00 - | 2/6/99   | 13:30 all Maintenance |
| 2/22/99  | 14:00 - | 2/24/99  | 15:30 all Maintenance |
| 3/11/99  | 15:30 - | 3/12/99  | 15:30 all Maintenance |
| 4/1/99   | 14:30 - | 4/2/99   | 10:30 all Maintenance |
| 4/20/99  | 12:00 - | 4/21/99  | 12:30 all Maintenance |
| 5/5/99   | 10:30 - | 5/6/99   | 12:00 all Maintenance |
| 5/24/99  | 9:00 -  | 5/25/99  | 15:00 all Maintenance |
| 6/14/99  | 11:30 - | 6/30/99  | 23:30 all Maintenance |
| 7/1/99   | 00:00 - | 7/7/99   | 14:00 all Maintenance |
| 7/22/99  | 10:30 - | 7/24/99  | 10:00 all Maintenance |
| 8/10/99  | 11:30 - | 8/19/99  | 8:00 all Maintenance  |
| 9/1/99   | 12:30 - | 9/3/99   | 13:30 all Maintenance |
| 9/22/99  | 9:30 -  | 9/30/99  | 23:30 all Maintenance |
| 10/1/99  | 00:00 - | 10/16/99 | 12:00 all Maintenance |
| 11/3/99  | 15:30 - | 11/5/99  | 10:30 all Maintenance |
| 11/22/99 | 12:00 - | 11/24/99 | 12:30 all Maintenance |
| 11/28/99 | 21:30 - | 11/30/99 | 23:30 all Maintenance |
| 12/1/99  | 00:00 - | 12/14/99 | 12:00 all Maintenance |

### OYSTER LANDING (OL)

| Date    | Time    | Variable | Reason                |
|---------|---------|----------|-----------------------|
| 1/14/99 | 16:30 - | 1/17/99  | 14:30 all Maintenance |
| 2/3/99  | 11:00 - | 2/4/99   | 16:00 all Maintenance |
| 2/22/99 | 16:00 - | 2/24/99  | 15:30 all Maintenance |
| 3/11/99 | 12:30 - | 3/12/99  | 15:30 all Maintenance |
| 4/1/99  | 00:00 - | 4/2/99   | 15:30 all Maintenance |
| 4/19/99 | 13:30 - | 4/22/99  | 8:00 all Maintenance  |
| 5/5/99  | 10:00 - | 5/6/99   | 15:00 all Maintenance |
| 5/24/99 | 9:30 -  | 5/25/99  | 14:30 all Maintenance |

|                 |         |                                                    |                 |                                  |
|-----------------|---------|----------------------------------------------------|-----------------|----------------------------------|
| 5/25/99         | 15:00 - | 5/31/99                                            | 23:30 DO%, D0mg | Possible membrane failure;       |
| DO data deleted |         |                                                    |                 |                                  |
| 6/1/99          | 00:00 - | 6/14/99                                            | 13:00 DO%, D0mg | Possible membrane failure;       |
| DO data deleted |         |                                                    |                 |                                  |
| 6/14/99         | 13:30 - | 6/17/99                                            | 10:30 all       | Maintenance                      |
| 7/5/99          | 12:30 - | 7/7/99                                             | 13:00 all       | Maintenance                      |
| 7/19/99         | 11:00 - | 7/21/99                                            | 7:30 all        | Maintenance                      |
| 8/10/99         | 8:30 -  | 8/13/99                                            | 15:30 all       | Maintenance                      |
| 8/25/99         | 01:30   | DO%, D0mg/L DO data deleted due to negative values |                 |                                  |
| 8/26/99         | 02:00   | DO%, D0mg/L DO data deleted due to negative values |                 |                                  |
| 8/30/99         | 10:00 - | 8/30/99                                            | 10:00 all       | Instrument was out of the water. |
| 9/1/99          | 12:30 - | 9/3/99                                             | 13:30 all       | Maintenance                      |
| 9/3/99          | 14:00 - | 9/22/99                                            | 15:00 DO%, D0mg | Possible membrane failure;       |
| DO data deleted |         |                                                    |                 |                                  |
| 9/22/99         | 15:30 - | 9/24/99                                            | 14:30 all       | Maintenance                      |
| 10/13/99        | 12:30 - | 10/16/99                                           | 12:30 all       | Maintenance                      |
| 11/3/99         | 14:30 - | 11/4/99                                            | 16:00 all       | Maintenance                      |
| 11/23/99        | 11:00 - | 11/24/99                                           | 12:30 all       | Maintenance                      |
| 12/13/99        | 12:30 - | 12/14/99                                           | 12:00 all       | Maintenance                      |

#### THOUSAND ACRE (TA)

| Date    | Time    | Variable                                           | Reason                                                 |
|---------|---------|----------------------------------------------------|--------------------------------------------------------|
| 1/15/99 | 10:00 - | 1/17/99                                            | 14:00 all Maintenance                                  |
| 2/3/99  | 12:00 - | 2/4/99                                             | 14:30 all Maintenance                                  |
| 2/14/99 | 15:30 - | 2/14/99                                            | 16:00 all Low battery                                  |
| 2/15/99 | 00:00 - | 2/24/99                                            | 14:30 all Low battery                                  |
| 3/11/99 | 12:00 - | 3/12/99                                            | 16:30 all Maintenance                                  |
| 3/31/99 | 15:30 - | 3/31/99                                            | 23:30 all Maintenance                                  |
| 4/1/99  | 00:00 - | 4/2/99                                             | 11:30 all Maintenance                                  |
| 4/2/99  | 12:00 - | 4/19/99                                            | 9:30 DO%, D0mg, turb Deleted due to mud contamination  |
| 4/19/99 | 10:00 - | 4/21/99                                            | 15:00 all Maintenance                                  |
| 5/5/99  | 9:30 -  | 5/6/99                                             | 15:00 all Maintenance                                  |
| 5/6/99  | 15:30 - | 5/21/99                                            | 6:00 DO%, D0mg, turb Deleted due to mud contamination  |
| 5/21/99 | 6:30 -  | 5/21/99                                            | 11:00 all Low battery                                  |
| 5/21/99 | 11:30 - | 5/22/99                                            | 6:30 DO%, D0mg, turb Deleted due to mud contamination  |
| 5/22/99 | 7:00 -  | 5/22/99                                            | 10:30 all Low battery                                  |
| 5/22/99 | 11:00 - | 5/24/99                                            | 9:30 DO%, D0mg, turb Deleted due to mud contamination. |
| 5/24/99 | 10:00 - | 5/25/99                                            | 14:00 all Maintenance                                  |
| 5/27/99 | 01:30   | DO%, D0mg/L DO data deleted due to negative values |                                                        |

|          |         |          |                       |                                                   |
|----------|---------|----------|-----------------------|---------------------------------------------------|
| 6/14/99  | 12:30 - | 6/17/99  | 12:30 all             | Maintenance                                       |
| 6/17/99  | 13:00 - | 6/30/99  | 23:30 DO%, DOmg, turb | Deleted due to mud contamination                  |
| 6/17/99  | 13:00 - | 6/30/99  | 23:30 pH              | No pH probe                                       |
| 7/1/99   | 00:00 - | 7/5/99   | 10:00 DO%, DOmg, turb | Deleted due to mud contamination                  |
| 7/1/99   | 00:00 - | 7/5/99   | 10:00 pH              | No pH probe.                                      |
| 7/5/99   | 10:30 - | 7/7/99   | 12:30 all             | Maintenance                                       |
| 7/7/99   | 13:00 - | 7/19/99  | 8:00 pH               | No pH probe                                       |
| 7/7/99   | 13:00 - | 7/19/99  | 8:00 DO%, DOmg, turb  | Deleted due to mud contamination                  |
| 7/19/99  | 8:30    | 7/22/99  | 13:30 all             | Maintenance                                       |
| 8/3/99   | 19:00 - | 8/11/99  | 10:30 DO%, DOmg       | Deleted due erratic readings (>500 and negative). |
| 8/11/99  | 11:00   | 8/13/99  | 14:30 all             | Maintenance                                       |
| 8/21/99  | 15:00 - | 8/21/99  | 16:00 DO%, DOmg       | Deleted due negative readings.                    |
| 8/22/99  | 18:30 - | 8/22/99  | 19:00 DO%, DOmg       | Deleted due negative readings.                    |
| 9/1/99   | 9:00    | 9/3/99   | 14:00 all             | Maintenance                                       |
| 9/22/99  | 9:00    | 9/24/99  | 13:30 all             | Maintenance                                       |
| 10/13/99 | 13:30   | 10/16/99 | 12:30 all             | Maintenance                                       |
| 11/4/99  | 11:30 - | 11/4/99  | 15:30 all             | Probes may have been out of the water             |
| 11/23/99 | 11:30   | 11/30/99 | 23:30 all             | Unit did not record data.                         |
| 12/1/99  | 00:00   | 12/14/99 | 15:00 all             | Maintenance                                       |

#### Other Remarks:

#### Thousand Acre

- 1) File ending 5/24/99 Turbidity wiper motor was spinning uncontrollably, and the probe guard was full of mud.
- 2) File starting 5/25/99 probes were covered in mud, Turbidity wiper was parked over the lens. Do membrane was covered in barnacles.
- 3) File starting 6/17/99 There was no pH probe, all spare pH probes were broken.
- 4) File ending 7/20/99 There was no pH probe, all spare pH probes were broken.
- 5) On 7/19/99 TA site was moved approximately 30 feet down stream and attached to the Thousand Acres Rice field bridge in order to eliminate probes being buried in mud.
- 6) File ending 8/12/99 there was fouling on all probes by barnacles and filamentous algae. Small crabs were also found in probe cage.
- 7) File ending 9/2/99 probes had heavy fouling.
- 8) 11/24/99- 12/13/99 Unit failed to collect data.

#### Oyster Landing

- 1) File starting 5/25/99 all probes were fouled.
- 2) File ending 6/16/99 pH port was not working.
- 3) File ending 8/12/99 there was fouling on all probes by barnacles and filamentous algae. Small crabs were also found in probe cage.
- 4) File ending 9/2/99 probes had heavy fouling.
- 5) File ending 12/13/99 Cracked bulkhead was found with water leaking into the battery compartment.

#### Debordieu Creek

- 1) File starting 5/25/99 all probes were fouled.
- 2) File starting 6/16/99 Turbidity wiper was blocked by bio-fouling.
- 3) File ending 7/6/99 Turbidity wiper motor stripped.
- 4) Evening of 8/10/99 Extremely high tide uprooted PVC mounting tube from the site. PVC mounting was reinstalled 8/19/99 at 9:45AM.
- 5) File ending 8/12/99 there was fouling on all probes by barnacles and filamentous algae. Small crabs were also found in probe cage.
- 6) File ending 9/2/99 probes had heavy fouling.
- 7) File starting 9/24/99 had no data; instrument failed to record data.
- 8) File ending 12/13/99 battery died four days into the deployment.