

North Inlet-Winyah Bay (NIW) NERR Water Quality Metadata

January - December 1997

Updated: August 24, 2001

## I. Data Set & Research Descriptors

### 1. Principal investigator(s) & contact persons

Dr. Dennis Allen, Manager

Christopher Aadland, Research Specialist

Ginger Ogburn-Matthews, Research Data Manager

E-mail:

dallen@belle.baruch.sc.edu Baruch Marine Laboratory

caadland@belle.baruch.sc.edu University of South Carolina

ginger@belle.baruch.sc.edu PO Box 1630, Georgetown, SC 29442

Phone: (843) 546-6219

Baruch Institute home page: <http://inlet.geol.sc.edu>.

CDMO home page: <http://inlet.geol.sc.edu/cdmohome.html>

### 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 PC6000 software. 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 are 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 is 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 1997 Thousand Acre and Oyster Landing data were verified using the CDMO 5.0 Microsoft Excel outlier macro which are designed to detect 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 macros were run, files with suspicious data were charted in Microsoft Excel 5.0 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 1997 data for Thousand Acre 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. Measurements were taken every 30 minutes over two week collecting periods at the Oyster Landing and Thousand Acre sites.

#### 4. Research methods (YSI and Hydrolab dataloggers)

YSI and/or Hydrolab 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 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 10micromhos standard. 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 and/or Hydrolab dataloggers were redeployed. YSI dataloggers are normally used, although on occasion due to repairs etc., a backup Hydrolab datalogger was substituted for a YSI unit. All downtime due to maintenance and repair is recorded on a log sheet and then transferred to the metadata.

## 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 two 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.

#### 6. Data collection period

Thousand Acre and Oyster Landing data collection both began January 1, 1995.

All sampling is ongoing.

A Hydrolab DataSonde was used to collect data at Thousand Acre during the following date and times:

06/26/97 15:30-07/02/97 11:00

07/04/97 7:00- 7/16/97 13:00

#### 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. This station is also included in our NIW core monitoring program.

## II. Physical Structure Descriptors

8. Variable sequence, 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       |
| HOURL (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)         |          |

Hydrolab DataSonde 3

| Variable Name | Range of Measurement (Units)       | Resolution             | Accuracy  |
|---------------|------------------------------------|------------------------|-----------|
| Date          | 1-12, 1-31, 00-99 (Month, Day, Yr) | 1 month, 1 day, 1 year | NA        |
| Time          | 0-24, 0-60, 0-60 (Hr, Min, Sec)    | 1 hr, 1 min, 1 sec     | NA        |
| Temp          | -5 to 50 (c)                       | 0.01 (c)               | ±0.15 (c) |

Sp. Cond    0-100 (mS/cm)        0.01 (mS/cm)  $\pm$ 0.5%

Sal    0-70 Parts per thousand (ppt)        0.1ppt         $\pm$ 0.2ppt

DO    0-200(%air sat)    0.1% @ air saturation     $\pm$  2% @air saturation

DO    0-20 (mg/l)    0.01mg/l         $\pm$ 0.2mg/l

Level 0-10 (m)        0.01m  $\pm$ 0.09m

pH    2-14 units    0.01units         $\pm$ 0.2units

Data columns are separated by tabs.

#### 9. Coded variable indicator and variable code definitions

Site definitions: OL = Oyster Landing; TA = Thousand Acre

#### 10. Data anomalies (suspect data)

Any questionable outlying data points between January 1, 1997 and December 31, 1997, not addressed below, have been checked and correspond to probable rainfall or other weather related events.

#### OYSTER LANDING (OL)

Jan-97

#### Oyster Landing (OL)

| Date     | Time            | Variable | Reason     |
|----------|-----------------|----------|------------|
| 01/30/97 | 19:00:00        | Turb.    | >1000      |
| 01/30/97 | 20:30:00        | Turb.    | neg. Turb. |
| 01/30/97 | 22:00:00        | Turb.    | >1000      |
| 01/30/97 | 23:00:00        | Turb.    | neg. Turb. |
| 01/31/97 | 00:00:00- 01:30 | Turb.    | neg. Turb. |

|          |          |       |            |
|----------|----------|-------|------------|
| 01/31/97 | 05:00:00 | Turb. | neg. Turb. |
| 01/31/97 | 17:30:00 | Turb. | neg. Turb. |

Feb-97

Oyster Landing (OL)

| Date     | Time               | Variable | Reason                    |
|----------|--------------------|----------|---------------------------|
| 02/01/97 | 00:30:00           | Turb.    | neg. Turb.                |
| 02/02/97 | 09:30:00- 10:00:00 | Turb.    | >1000                     |
| 02/03/97 | 18:30:00           | Turb.    | >1000                     |
| 02/06/97 | 08:30:00           | Turb.    | >1000                     |
| 02/06/97 | 09:00:00-10:30:00  | Turb.    | neg. Turb.                |
| 02/21/97 | 09:00:00           | 02/21/97 | 10:30:00 all weak battery |
| 02/22/97 | 08:30:00           | 02/25/97 | 15:00:00 all weak battery |

Mar-97

Oyster Landing (OL)

| Date     | Time               | Variable | Reason         |
|----------|--------------------|----------|----------------|
| 03/07/97 | 20:30:00- 21:00:00 | %DO      | unusually high |
| 03/08/97 | 08:00:00- 10:30:00 | %DO      | unusually high |
| 03/08/97 | 15:30:00           | Turb.    | neg. Turb.     |
| 03/08/97 | 23:30:00           | Turb.    | neg. Turb.     |
| 03/09/97 | 02:30:00           | Turb.    | >1000          |
| 03/09/97 | 10:30:00- 11:00:00 | Turb.    | >1000          |
| 03/09/97 | 12:30:00           | Turb.    | >1000          |
| 03/09/97 | 13:30:00           | Turb.    | neg. Turb.     |

|          |                    |             |            |
|----------|--------------------|-------------|------------|
| 03/09/97 | 15:00:00           | Turb.       | neg. Turb. |
| 03/09/97 | 16:00:00           | Turb.       | neg. Turb. |
| 03/09/97 | 17:00:00           | Turb. >1000 |            |
| 03/09/97 | 17:30:00- 18:30:00 | Turb.       | neg. Turb. |
| 03/09/97 | 21:30:00- 22:30:00 | Turb.       | neg. Turb. |
| 03/10/97 | 08:30:00           | Turb.       | neg. Turb. |
| 03/10/97 | 10:30:00           | Turb.       | neg. Turb. |
| 03/10/97 | 11:30:00- 12:30:00 | Turb.       | neg. Turb. |
| 03/13/97 | 16:30:00           | Turb.       | neg. Turb. |

April-97

Oyster Landing (OL)

| Date     | Time     | Variable | Reason     |
|----------|----------|----------|------------|
| 04/25/97 | 22:30:00 | Turb.    | neg. Turb. |

May-97

Oyster Landing (OL)

| Date     | Time               | Variable | Reason                  |
|----------|--------------------|----------|-------------------------|
| 05/01/97 | 09:00:00- 09:30:00 | %DO      | unusually high readings |

June-97 (OL)

Oyster Landing (OL)

| Date     | Time     | Variable | Reason                  |
|----------|----------|----------|-------------------------|
| 06/04/97 | 10:00:00 | Turb.    | neg. Turb.              |
| 06/11/97 | 11:30:00 | %DO      | unusually high readings |

|          |                                    |
|----------|------------------------------------|
| 6/13/97  | 07:30 DO%, DOmg/l Neg. DO readings |
| 6/14/97  | 07:30 DO%, DOmg/l Neg. DO readings |
| 06/17/97 | 11:00:00 Turb. neg. Turb.          |
| 06/30/97 | 23:00:00 Turb. neg. Turb.          |

Jul-97

Oyster Landing (OL)

| Date               | Time                  | Variable          | Reason              |
|--------------------|-----------------------|-------------------|---------------------|
| 07/11/97           | 12:30:00              | Turb.             | neg. Turb.          |
| 07/13/97           | 07:30:00              | Turb.             | neg. Turb.          |
| 07/13/97           | 23:30:00              | Turb.             | >1000               |
| 07/22/97           | 15:30:00              | Turb. neg.        | Turb.               |
| 07/27/97           | 09:30:00              | Turb.             | neg. Turb.          |
| 07/27/97           | 10:00:00              | Turb.             | >1000               |
| 07/28/97           | 01:00:00              | Turb.             | neg. Turb.          |
| 07/29/97           | 06:30:00              | Turb.             | neg. Turb.          |
| 07/30/97           | 05:30:00              | Turb.             | >1000               |
| 7/31/97<br>deleted | 11:00 through 7/31/97 | 23:45 DO%, DOmg/l | Erratic DO readings |

Aug-97

Oyster Landing (OL)

| Date               | Time                  | Variable          | Reason              |
|--------------------|-----------------------|-------------------|---------------------|
| 8/01/97<br>deleted | 00:00 through 8/13/97 | 10:00 DO%, DOmg/l | Erratic DO readings |
| 08/02/97           | 12:30:00              | Turb.             | neg. Turb.          |
| 08/04/97           | 04:30:00              | Turb.             | neg. Turb.          |

|          |       |          |       |             |                     |
|----------|-------|----------|-------|-------------|---------------------|
| 08/05/97 | 16:30 | 08/13/97 | 09:30 | DO%, DOmg/l | Erratic DO readings |
| 08/21/97 | 09:30 | 08/31/97 | 23:30 | DO%, DOmg/l | Erratic DO readings |

Sep-97

Oyster Landing (OL)

| Date     | Time          | Variable | Reason                                                                                                  |
|----------|---------------|----------|---------------------------------------------------------------------------------------------------------|
| 9/01/97  | 00:00         | 9/02/97  | 9:00 DO%, DOmg/l Erratic DO reading                                                                     |
| 9/16/97  | 10:30         | 9/29/97  | 07:00 DO%, DOmg/l Erratic DO reading                                                                    |
| 09/16/97 | 10:30 - 14:30 |          | Very low spcond/salinity and depth readings; Specific conductivity port may have come out of the water. |

Oct-97 (OL)

| Date     | Time     | Variable | Reason                             |
|----------|----------|----------|------------------------------------|
| 10/01/97 | 00:00:00 | 10/15/97 | 14:00:00 DO%,DOmg erratic readings |
| 10/14/97 | 10:30:00 | 10/15/97 | 14:00:00 pH unusually low readings |

Nov-97 (OL)

| Date     | Time     | Variable | Reason                                                                               |
|----------|----------|----------|--------------------------------------------------------------------------------------|
| 11/26/97 | 10:00:00 | 12/12/97 | 10:00:00 Depth unit was not in mounting pipe. See other remarks section for details. |

THOUSAND ACRE (TA)

Feb-97

Thousand Acre (TA)

| Date     | Time     | Variable | Reason     |
|----------|----------|----------|------------|
| 02/21/97 | 18:00:00 | Turb.    | >1000      |
| 02/25/97 | 22:30:00 | Turb.    | neg. Turb. |

Mar-97

Thousand Acre (TA)

| Date     | Time     | Variable | Reason     |
|----------|----------|----------|------------|
| 03/07/97 | 07:00:00 | Turb.    | neg. Turb. |
| 03/08/97 | 19:00:00 | Turb.    | neg. Turb. |
| 03/09/97 | 06:00:00 | Turb.    | neg. Turb. |
| 03/09/97 | 17:00:00 | Turb.    | neg. Turb. |

May-97

| Date   | Time  | Variable               | Reason                         |
|--------|-------|------------------------|--------------------------------|
| 5/9/97 | 12:30 | 5/22/97 07:30 %DO,mg/l | bad DO probe; all data deleted |

Jul-97

Thousand Acre (TA)

| Date     | Time     | Variable  | Reason       |
|----------|----------|-----------|--------------|
| 07/17/97 | 15:00:00 | DO%, DOfg | out of range |

Oct-97

Thousand Acre (TA)

| Date     | Time     | Variable | Reason           |
|----------|----------|----------|------------------|
| 10/12/97 | 07:00:00 |          | Turb. neg. Turb. |

Dec-97

Thousand Acre (TA)

| Date     | Time              | Variable | Reason     |
|----------|-------------------|----------|------------|
| 12/03/97 | 20:30:00          | Turb.    | neg. Turb. |
| 12/11/97 | 05:00:00          | Turb.    | neg. Turb. |
| 12/11/97 | 08:30:00          | Turb.    | neg. Turb. |
| 12/18/97 | 22:30:00          | Turb.    | >1000      |
| 12/19/97 | 15:00:00          | Turb.    | >1000      |
| 12/20/97 | 15:30:00          | Turb     | >1000      |
| 12/20/97 | 16:30:00          | Turb     | >1000      |
| 12/24/97 | 06:30:00          | Turb     | >1000      |
| 12/24/97 | 07:30:00-8:00:00  | Turb     | >1000      |
| 12/24/97 | 09:00:00-11:30:00 | Turb     | >1000      |
| 12/24/97 | 12:30:00-13:30:00 | Turb     | >1000      |
| 12/24/97 | 14:30:00-16:00:00 | Turb     | >1000      |
| 12/24/97 | 17:00:00          | Turb     | >1000      |
| 12/24/97 | 19:00:00          | Turb     | >1000      |
| 12/25/97 | 08:30:00          | Turb     | >1000      |
| 12/27/97 | 20:00:00          | Turb     | >1000      |
| 12/28/97 | 01:30:00          | Turb     | >1000      |
| 12/29/97 | 17:30:00          | Turb     | >1000      |
| 12/31/97 | 23:00:00-23:30:00 | Turb     | >1000      |

## 12. Missing Data

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

### OYSTER LANDING (OL)

Jan-97

#### Oyster Landing (OL)

| Date    | Time  | ---Date | Time  | Variable | Reason      |
|---------|-------|---------|-------|----------|-------------|
| 1/1/97  | 00:00 | 1/8/97  | 13:30 | all      | maintenance |
| 1/21/97 | 12:30 | 1/24/97 | 12:30 | all      | maintenance |

Feb-97

#### Oyster Landing (OL)

| Date    | Time  | ---Date | Time  | Variable | Reason       |
|---------|-------|---------|-------|----------|--------------|
| 2/6/97  | 11:00 | 2/7/97  | 11:00 | all      | maintenance  |
| 2/21/97 | 09:00 | 2/21/97 | 10:30 | all      | weak battery |
| 2/22/97 | 08:30 | 2/25/97 | 15:00 | all      | weak bettery |

Mar-97

#### Oyster Landing (OL)

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

|         |       |         |       |     |             |
|---------|-------|---------|-------|-----|-------------|
| 3/10/97 | 13:00 | 3/13/97 | 15:30 | all | maintenance |
| 3/26/97 | 15:30 | 3/27/97 | 13:00 | all | maintenance |

Apr-97

Oyster Landing (OL)

| Date    | Time  | ---Date | Time     | Variable | Reason      |
|---------|-------|---------|----------|----------|-------------|
| 4/10/97 | 08:00 | 4/11/97 | 13:30:00 | all      | maintenance |
| 4/24/97 | 08:00 | 4/25/97 | 12:00    | all      | maintenance |

May-97

Oyster Landing (OL)

| Date    | Time  | ---Date | Time  | Variable | Reason      |
|---------|-------|---------|-------|----------|-------------|
| 5/8/97  | 08:30 | 5/9/97  | 11:30 | all      | maintenance |
| 5/22/97 | 08:00 | 5/23/97 | 12:30 | all      | maintenance |

Jun-97

Oyster Landing (OL)

| Date    | Time  | ---Date                      | Time  | Variable | Reason      |
|---------|-------|------------------------------|-------|----------|-------------|
| 6/5/97  | 08:00 | 6/6/97                       | 13:00 | all      | maintenance |
| 6/13/97 | 07:30 | DO%, DOmg/l Neg. DO readings |       |          |             |
| 6/14/97 | 07:30 | DO%, DOmg/l Neg. DO readings |       |          |             |
| 6/19/97 | 08:00 | 6/20/97                      | 13:00 | all      | maintenance |

Jul-97

Oyster Landing (OL)

| Date    | Time  | ---Date | Time  | Variable    | Reason                      |
|---------|-------|---------|-------|-------------|-----------------------------|
| 7/2/97  | 11:30 | 7/7/97  | 11:00 | all         | maintenance                 |
| 7/16/97 | 12:30 | 7/17/97 | 09:30 | all         | maintenance                 |
| 7/30/97 | 12:30 | 7/31/97 | 10:30 | all         | maintenance                 |
| 7/31/97 | 11:00 | 7/31/97 | 23:45 | DO%, DOmg/l | Erratic DO readings deleted |

Aug-97

Oyster Landing (OL)

| Date    | Time  | ---Date | Time  | Variable    | Reason                      |
|---------|-------|---------|-------|-------------|-----------------------------|
| 8/1/97  | 00:00 | 8/13/97 | 10:00 | DO%, DOmg/l | Erratic DO readings deleted |
| 8/13/97 | 10:00 | 8/21/97 | 09:00 | all         | maintenance                 |
| 8/21/97 | 09:30 | 8/31/97 | 23:30 | DO%, DOmg/l | Erratic DO readings         |

Sep-97

Oyster Landing (OL)

| Date    | Time  | ---Date | Time  | Variable    | Reason              |
|---------|-------|---------|-------|-------------|---------------------|
| 9/1/97  | 00:00 | 9/2/97  | 9:00  | DO%, DOmg/l | Erratic DO readings |
| 9/2/97  | 09:30 | 9/3/97  | 9:30  | all         | maintenance         |
| 9/15/97 | 08:30 | 9/16/97 | 10:00 | all         | maintenance         |
| 9/16/97 | 10:30 | 9/29/97 | 07:00 | DO%, DOmg/l | Erratic DO readings |
| 9/29/97 | 07:30 | 9/30/97 | 09:30 | all         | maintenance         |

Oct-97

Oyster Landing (OL)

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

|          |        |          |       |           |                  |
|----------|--------|----------|-------|-----------|------------------|
| 10/01/97 | 00:00: | 10/15/97 | 14:00 | DO%, D0mg | erratic readings |
| 10/15/97 | 14:30  | 10/16/97 | 14:30 | all       | maintenance      |
| 10/29/97 | 09:30  | 10/30/97 | 11:00 | all       | maintenance      |

Nov-97

Oyster Landing (OL)

| Date     | Time  | ---Date  | Time  | Variable | Reason      |
|----------|-------|----------|-------|----------|-------------|
| 11/8/97  | 09:00 | 11/08/97 | 11:30 | all      | maintenance |
| 11/8/97  | 20:00 | 11/13/97 | 11:30 | all      | maintenance |
| 11/24/97 | 12:30 | 11/26/97 | 10:30 | all      | maintenance |

Dec-97

Oyster Landing (OL)

| Date     | Time  | ---Date  | Time  | Variable | Reason                                 |
|----------|-------|----------|-------|----------|----------------------------------------|
| 12/12/97 | 10:30 | 12/16/97 | 14:00 | all      | maintenance                            |
| 12/16/97 | 16:00 | 12/17/97 | 10:30 | all      | Not deployed due to possible vandalism |

THOUSAND ACRE (TA)

d

Jan-97

Thousand Acre (TA)

| Date    | Time  | ---Date | Time  | Variable | Reason      |
|---------|-------|---------|-------|----------|-------------|
| 1/1/97  | 00:00 | 1/8/97  | 14:00 | all      | maintenance |
| 1/22/97 | 16:00 | 1/31/97 | 23:30 | all      | maintenance |

Feb-97

Thousand Acre (TA)

| Date    | Time  | --- | Date    | Time  | Variable | Reason      |
|---------|-------|-----|---------|-------|----------|-------------|
| 2/1/97  | 00:00 |     | 2/7/97  | 11:30 | all      | maintenance |
| 2/22/97 | 08:30 |     | 2/25/97 | 15:30 | all      | maintenance |

Mar-97

Thousand Acre (TA)

| Date    | Time  | --- | Date    | Time  | Variable | Reason      |
|---------|-------|-----|---------|-------|----------|-------------|
| 3/10/97 | 12:00 |     | 3/13/97 | 16:00 | all      | maintenance |
| 3/26/97 | 10:30 |     | 3/27/97 | 11:00 | all      | maintenance |

Apr-97

Thousand Acre (TA)

| Date    | Time | --- | Date    | Time  | Variable | Reason      |
|---------|------|-----|---------|-------|----------|-------------|
| 4/10/97 | 8:30 |     | 4/11/97 | 13:30 | all      | maintenance |
| 4/24/97 | 8:30 |     | 4/30/97 | 23:30 | all      | maintenance |

May-97

Thousand Acre (TA)

| Date   | Time  | --- | Date   | Time  | Variable | Reason      |
|--------|-------|-----|--------|-------|----------|-------------|
| 5/1/97 | 00:00 |     | 5/1/97 | 13:30 | all      | maintenance |

|                   |       |         |       |          |                        |
|-------------------|-------|---------|-------|----------|------------------------|
| 5/8/97            | 09:00 | 5/9/97  | 12:00 | all      | maintenance            |
| 5/9/97<br>deleted | 12:30 | 5/22/97 | 07:30 | %DO,mg/l | bad DO probe; all data |
| 5/22/97           | 08:00 | 5/23/97 | 13:00 | all      | maintenance            |

Jun-97

Thousand Acre (TA)

| Date    | Time | --- | Date    | Time  | Variable | Reason      |
|---------|------|-----|---------|-------|----------|-------------|
| 6/5/97  | 9:00 |     | 6/6/97  | 12:00 | all      | maintenance |
| 6/19/97 | 8:30 |     | 6/30/97 | 23:30 | all      | maintenance |

Jul-97

Thousand Acre (TA)

| Date                 | Time  | --- | Date    | Time  | Variable  | Reason              |
|----------------------|-------|-----|---------|-------|-----------|---------------------|
| 7/1/97               | 00:00 |     | 7/4/97  | 06:30 | all       | maintenance         |
| 7/4/97<br>istalled   | 07:00 |     | 7/16/97 | 13:00 | Turb., Ph | hydrolab, no probes |
| 7/16/97              | 13:30 |     | 7/17/97 | 9:30  | all       | maintenance         |
| 7/17/97<br>installed | 10:00 |     | 7/30/97 | 13:00 | Turb., Ph | hydrolab, no probes |
| 7/17/97              | 15:00 |     |         |       | DO%, DOmg | out of range        |
| 7/30/97              | 13:30 |     | 7/31/97 | 9:30  |           | maintenance         |

Aug-97

Thousand Acre (TA)

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

|         |      |         |      |     |             |
|---------|------|---------|------|-----|-------------|
| 8/13/97 | 9:00 | 8/19/97 | 9:00 | all | maintenance |
|---------|------|---------|------|-----|-------------|

Sep-97

Thousand Acre (TA)

| Date    | Time | ---Date | Time  | Variable | Reason      |
|---------|------|---------|-------|----------|-------------|
| 9/2/97  | 9:00 | 9/3/97  | 10:00 | all      | maintenance |
| 9/15/97 | 8:00 | 9/16/97 | 10:30 | all      | maintenance |
| 9/29/97 | 8:00 | 9/30/97 | 10:30 | all      | maintenance |

Oct-97

Thousand Acre (TA)

| Date     | Time  | ---Date  | Time  | Variable | Reason      |
|----------|-------|----------|-------|----------|-------------|
| 10/15/97 | 14:00 | 10/16/97 | 14:30 | all      | maintenance |
| 10/29/97 | 09:30 | 10/30/97 | 11:30 | all      | maintenance |

Nov-97

Thousand Acre (TA)

| Date     | Time  | ---Date  | Time     | Variable | Reason      |
|----------|-------|----------|----------|----------|-------------|
| 11/12/97 | 09:30 | 11/13/97 | 12:30:00 | all      | maintenance |
| 11/24/97 | 12:00 | 11/26/97 | 11:00:00 | all      | maintenance |

Dec-97

Thousand Acre (TA)

| Date     | Time  | ---Date  | Time  | Variable | Reason      |
|----------|-------|----------|-------|----------|-------------|
| 12/12/97 | 10:30 | 12/16/97 | 13:30 | all      | maintenance |

#### Other Remarks:

Sometime during the period from 11/26/97-12/12/97 at our OL site, vandals removed the YSI from its PVC mounting and threw the unit underneath the pier. Since the instrument was still located in close proximity to the mounting pipe we chose to keep the data.

At OL from 8/21/97 9:30:00-9/27/97 9:30:00 the time was off by 35 seconds.

At OL from 12/16/97 16:00:00-12/17/97 10:30:00 unit was not put out due to vandalism.

#### Deployment and Retrieval Log

#### Oyster Landing

| Retrieval Date/Time | Deployment Date/Time |
|---------------------|----------------------|
| 1/2/97 9:00:00      | 1/8/97 13:30:00      |
| 1/21/97 12:30:00    | 1/24/97 12:30:00     |
| 2/6/97 11:00:00     | 2/7/97 11:00:00      |
| 2/22/97 9:00:00     | 2/25/97 15:00:00     |
| 3/10/97 13:00:00    | 3/13/97 15:30:00     |
| 3/26/97 15:30:00    | 3/27/97 13:00:00     |
| 4/10/97 8:00:00     | 4/11/97 13:30:00     |
| 4/24/97 8:00:00     | 4/25/97 12:00:00     |
| 5/8/97 8:30:00      | 5/9/97 11:30:00      |

|          |          |          |          |
|----------|----------|----------|----------|
| 5/22/97  | 8:30:00  | 5/23/97  | 12:30:00 |
| 6/5/97   | 8:00:00  | 6/6/97   | 13:00:00 |
| 6/19/97  | 8:00:00  | 6/20/97  | 13:00:00 |
| 7/2/97   | 11:30:00 | 7/7/97   | 11:00:00 |
| 7/16/97  | 12:30:00 | 7/17/97  | 9:30:00  |
| 7/30/97  | 12:30:00 | 7/31/97  | 10:30:00 |
| 8/13/97  | 10:00:00 | 8/21/97  | 9:00:00  |
| 9/2/97   | 9:30:00  | 9/3/97   | 9:30:00  |
| 9/15/97  | 8:30:00  | 9/16/97  | 10:00:00 |
| 9/29/97  | 7:30:00  | 9/30/97  | 9:30:00  |
| 10/15/97 | 14:30:00 | 10/16/97 | 14:30:00 |
| 10/29/97 | 9:30:00  | 10/30/97 | 11:00:00 |
| 11/8/97  | 20:00:00 | 11/13/97 | 11:30:00 |
| 11/24/97 | 12:30:00 | 11/26/97 | 10:30:00 |
| 12/12/97 | 10:30:00 | 12/17/97 | 10:30:00 |

Thousand Acres

| Retrieval Date/Time | Deployment Date/Time |
|---------------------|----------------------|
| 1/22/97 16:00:00    | 2/7/97 11:30:00      |
| 2/22/97 8:30:00     | 2/25/97 16:00:00     |
| 3/10/97 12:00:00    | 3/13/97 16:00:00     |
| 3/26/97 10:30:00    | 3/27/97 11:00:00     |
| 4/10/97 8:30:00     | 4/11/97 13:30:00     |
| 4/24/97 8:30:00     | 5/1/97 13:30:00      |
| 5/8/97 9:00:00      | 5/9/97 12:00:00      |

|          |          |          |          |
|----------|----------|----------|----------|
| 5/22/97  | 8:00:00  | 5/23/97  | 13:00:00 |
| 6/5/97   | 9:00:00  | 6/6/97   | 12:00:00 |
| 6/19/97  | 8:30:00  | 7/4/97   | 6:30:00  |
| 7/16/97  | 13:30:00 | 7/31/97  | 9:30:00  |
| 8/13/97  | 9:00:00  | 8/19/97  | 9:00:00  |
| 9/2/97   | 9:00:00  | 9/3/97   | 10:00:00 |
| 9/15/97  | 8:00:00  | 9/16/97  | 10:30:00 |
| 9/29/97  | 8:00:00  | 9/30/97  | 10:30:00 |
| 10/15/97 | 14:00:00 | 10/16/97 | 14:30:00 |
| 10/29/97 | 9:30:00  | 10/30/97 | 11:30:00 |
| 11/12/97 | 9:30:00  | 11/13/97 | 12:30:00 |
| 11/24/97 | 12:00:00 | 11/26/97 | 11:00:00 |
| 12/12/97 | 10:30:00 | 12/16/97 | 13:30:00 |