Tijuana River (TJR) NERR Water Quality Metadata
January to December 2002
Last Revised: September 25, 2003

I. Data Set and Research Descriptors

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2. Entry Verification:

The data are uploaded directly from the YSI model 6000 or 6600 data loggers to the YSI Ecowatch for windows software into a file appended with the suffix ".dat". The data are also downloaded directly from the datalogger into a spreadsheet importable file appended with the suffix ".csv". The data are then reviewed for major problems (i.e. logger out of water, probe malfunction, battery failure, etc.) using the YSI Ecowatch for windows plotting software. The resulting plot is printed out and saved in a folder named "datalogger deployment log". The .csv file is imported into Excel 2000 for Windows, where it is edited and formatted. The tails of each sampling period are deleted and any suspect data are identified with the aid of CDMO Excel macros. Suspect data are evaluated and dealt with according to CDMO Operations Manual (ver.4.0) guidelines. The parameter columns are checked for proper order and correct heading labels and formatted to the correct decimal places using the "column reformat" macro

supplied by the CDMO. Missing data fields are inserted into the Excel spreadsheet and are denoted by periods (.). Reasons for any missing or anomalous data are entered directly into the data file and the edited file is saved as a two-week excel file. When an entire month of two-week edited data files have been collected, the files are edited and combined into a 1 month excel file using the excel import.xls macro. All editing and missing data documentation are also recorded in an excel file named "missing data log". The information in the "missing data log" is transferred to the metadata form. The edited and raw files are archived on a Sun Sparc 20 workstation and backed up to tape weekly. Data and metadata files are uploaded via ftp to the CDMO. The person responsible for the data management is Michelle Cordrey.

3. Research Objectives:

The Tijuana Estuarine Research Reserve is impacted heavily by both periodic raw sewage outflows and urban development. Only about a quarter of the reserve's 2,531 acres are tidally influenced, with few channels deep enough for datalogger deployment. Two stations were originally set up: a treatment station was set up close to the mouth on the Southern end of the Oneonta Slough, while a control station was set up on the northern end of Oneonta Slough. The treatment station location was chosen because it would be the site most affected by sewage outflow. Deployment at the treatment station, however, was continually halted by both shifting sediment and massive wracks of kelp (Macrocystis pyrifera), which would often bury the deployment set-up on incoming tides. After a number of different deployment equipment designs were implemented, with no success, logging at this site was terminated.

We currently have four YSI datalogger stations installed at the reserve. The siting of the stations is designed to investigate spatial gradients of water quality parameters across the reserve as well as document the water quality changes over time to areas in the reserve which have been restored to increase tidal flushing. The original control station in the northern end of Oneonta Slough is still in place. The second station, Tidal Linkage, is located in the

North arm of the reserve in a constructed channel designed to increase tidal exchange in that portion of the reserve. Data logging at the Tidal Linkage station began in May 1997 but has not been continuous due to episodic sedimentation events. A third datalogger station is located at the inlet to the Model Marsh, a recently constructed 20-acre restoration site in the southern arm of the estuary. The Model Marsh was opened to tidal flushing in February 2000 and data logging at the station began in October 2000. The most recent station to be added was the River Channel. The station is located on a tidally influenced section of the Tijuana River, the largest source of freshwater to the reserve. Data logging at the River Channel station began in August 2002.

4. Research Methods (Dataloggers)

Until October 2000, the Model Marsh and Oneonta Slough deployment stations were identical. A 4-inch diameter PVC pipe was strapped to two 6-foot lengths of 4in diameter aluminum pipe driven into the sediment in the center of the channel until refusal.

The bottom of the pvc pipe is raised 1 foot off of the channel bottom and is open. Multiple 1.5 inch holes have been drilled around the bottom of the tube to permit unrestricted water flow to the sensors. During deployment the datalogger units are then placed into and rest on a bolt fixed across the bottom of the tubes.

Beginning on October 16, 2000 at the Oneonta Slough station and on October 25, 2000 at the Model Marsh station a 5-inch diameter PVC pipe was strapped to a 4 inch diameter aluminum pipe driven into the sediment in the center of the channel until refusal. A "snorkel" tube is also strapped to the 4 inch diameter aluminum pipe to allow for the shallow level vented sensor on the YSI model 6600 sondes to compensate for barometric changes in the atmosphere.

The YSI model EDS 6600 sondes do not require venting, however, so vent tubes are not used when it was indicated that the EDS sondes were deployed. The Tidal Lonkage and River Channel stations are similarly deployed, however, 2 "rail"

style steel fence posts are used instead of aluminum pipe to secure a 5-inch
diameter PVC pipe above the channel bottom.
The sampling period is two weeks for non-EDS loggers and between three and four
weeks when using EDS loggers, with measurements taken every 30 minutes.
Measurements for specific conductivity, salinity, dissolved oxygen (percent
saturation), dissolved oxygen (mg/l), temperature, turbidity and water level
are recorded. At the end of each two week period, the YSI data logger units
are brought back to the laboratory for downloading, cleaning and recalibration
and are usually redeployed in the field within 24 to 48 hours. These procedures
are carried out according to the methods described in the YSI Operations Manual
(see sections 3 and 7). Calibration standards for specific conductivity are
purchased from YSI and pH and turbidity are purchased pre-made from VWR
scientific. The QA/QC procedures for the collected data are followed as given
in the CDMO Operations Manual version 4.0.

5. Site location and character
General site Characteristics (TJE)
a) Tidal exchange (extremes): approx. -2 +7 MLLW,
b) Salinity: 4 ppt (extreme rain events) to 38 ppt
c) Latitude and longitude: 32 deg. 34 min. N, 117 deg. 07 min. W
d) Potential impacts: storm drain runoff from military airfield and adjacent
residential areas, occasional sewage spills (10-15 MGD) into the Tijuana River
from Mexico. The area surrounding the estuary is heavily developed by
residential housing as is the watershed which drains into the estuary.
Approximately 2/3 of the watershed is in Mexico. The North Eastern section of
the reserve is bordered by a military helicopter training base. Vegetation in
the area is dominated by common pickleweed (Spartina virginica) and Pacific
cordgrass (Spartina foliosa).
e) The dominant freshwater source to the estuary is the Tijuana River, which
drains a 4,483 sq. km watershed. Streamflows in the river vary considerably
from season to season and year to year with no flow during many months with
a mean annual discharge of .82 cubic meters per second (cms). Additional
freshwater sources are stormdrains located mostly in the northern arm of the

estuary. The entire estuary is shallow and has a relatively small tidal prism (0.36 Mm3) so even low freshwater flows result in reduced salinity throughout the reserve. Estimated residence times for freshwater entering the estuary vary from 7 hours to a few days depending on the tidal and mouth conditions. Rainfall within the watershed accounts for most of the freshwater entering the reserve with 90 percent of the mean annual rainfall falling between November and April. Discharges of freshwater with untreated sewage occur year round although these have decreased with the construction of binational water treatment plant.

Specific Site characteristics: Oneonta Slough (OS)
a) Orientation of site: The Datalogger station is located on the upper portion of Oneonta Slough. The channel runs North to South and is located on the northwestern edge of the reserve. Latitude is 32 deg 34 min 04.8 sec N, longitude is 117 deg 07 min 52.3 sec W.
b) The elevation of the channel bottom directly below the datalogger is approx. 0.55m below Mean Sea Level.
c) Channel width is approx. 20 meters. Datalogger site is located 1km from mouth
d) Bottom type: sand and sediment
e) Area adjacent to west side of channel is developed. There is a 50 meter buffer of natural vegetation between development and the channel. Area adjacent to east side of channel is relatively natural.
f) Direct impacts are estimated to be runoff from streets into channel during rain events.

Specific Site Characteristics: Model Marsh (MM)
a) Orientation of site: The datalogger station is located in the middle of a natural channel which runs north to south. The channel is approximately 20 meters north of a newly constructed 20 acre mudflat restoration area in the southern section or the reserve. Latitude is 32 deg 32 min 52.5 sec N, longitude is 117 deg 07 min 22.9 sec W.
b) The elevation of the channel bottom: -.39 NGVD (last reading: 2001)
c) Channel width: 5 meters
d) Bottom type: Mostly mud with some sand

Specific Site Characteristics: Tidal Linkage (TL)
a) Orientation of site: Datalogger station is located in the middle of the
constructed channel known as the Tidal Linkage. The channel runs Northwest
to Southwest and is located adjacent to the visitor's center in the
northeastern section of the reserve. Latitude is 32 deg 34 min 27.9 sec N,
longitude is 117 deg 07 min 37.8 sec W.
b) The elevation of the channel bottom: no survey data available.
c) Channel width: Approximately 5 meters at both the old and new sites
d) Bottom type: very fine mud.

Specific Site Characteristics: River Channel (RC)
a) Orientation of site: Datalogger station is located in the main channel of
the Tijuana River, the main drainage of the watershed. The channel runs East to
West. Latitude is 32 deg 33 min 28.4 sec N, longitude is 117 deg 06 min 21.8 sec
W,
b) The elevation of the channel bottom: no survey data available.
c) Channel width: Approximately 10 meters
d) Bottom type: mostly sand, some mud.

6. Data Collection period:

Unless otherwise noted, YSI model 6600upg dataloggers were used to collect data
for the following dates and times.

Oneonta Slough

Began		Ended	
Date	Time	Date	Time
12/21/2001	17:00	01/09/2002	14:00
1/10/2002	17:30	01/23/2002	10:30
1/25/2002	17:30	02/11/2002	13:00
2/12/2002	17:00	02/25/2002	13:30
2/26/2002	18:30	03/12/2002	13:00
3/13/2002	14:00	03/26/2002	12:00
3/28/2002	15:30	04/09/2002	13:00
4/10/2002	15:30	04/25/2002	11:00
4/27/2002	15:00	05/08/2002	11:00
5/11/2002	07:30	05/28/2002	06:30
5/29/2002	13:00	06/12/2002	07:30
6/13/2002	12:00	06/25/2002	14:30
6/26/2002	16:30	07/16/2002	12:30
07/19/2002	13:00	07/30/2002	09:00
07/31/2002	11:30	08/13/2002	14:30
08/15/2002	11:30	09/04/2002	12:30
09/05/2002	15:00	09/20/2002	15:30
09/23/2002	17:00	10/03/2002	12:30
10/04/2002	14:30	10/22/2002	14:30
10/24/2002	17:00	11/13/2002	14:00

11/14/2002	16:00	12/02/2002	15:30	
12/06/2002	17:00	01/07/2003	16:30	6600 EDS

Model Marsh

Began		Ended		
Date	Time	Date	Time	
12/21/2001	15:30	01/09/2002	15:00	
01/10/2002	16:30	01/23/2002	11:00	
01/25/2002	16:30	02/11/2002	13:30	
02/12/2002	16:00	02/25/2002	12:30	
02/26/2002	19:30	03/12/2002	10:30	
03/13/2002	15:00	03/26/2002	11:00	
03/28/2002	16:30	04/09/2002	12:00	
04/10/2002	14:30	04/25/2002	11:00	
04/27/2002	14:00	05/08/2002	10:30	
05/14/2002	14:00	05/28/2002	05:30	6000 used
05/29/2002	13:30	06/12/2002	07:30	6000 used
06/13/2002	13:00	06/25/2002	14:30	6000 used
06/26/2002	15:30	07/19/2002	11:00	6000 used
07/19/2002	11:30	07/30/2002	10:00	
07/31/2002	11:30	08/13/2002	12:30	
08/15/2002	10:00	09/04/2002	11:30	
09/05/2002	13:00	09/20/2002	14:30	
09/23/2002	14:30	10/03/2002	14:00	
10/04/2002	16:30	10/22/2002	13:00	
10/24/2002	15:30	11/13/2002	12:30	
11/14/2002	15:00	12/02/2002	15:00	
12/06/2002	16:30	01/07/2003	14:30	6600 EDS used

Tidal Linkage

Began		Ended		
Date	Time	Date	Time	
09/27/2002	07:30	10/03/2002	13:00	6000
10/04/2002	14:30	10/22/2002	15:00	6000

River Channel

Began		Ended		
Date	Time	Date	Time	
08/08/2002	16:30	08/13/2002	15:30	6000
08/20/2002	14:30	09/04/2002	12:30	6000
09/05/2002	14:00	09/20/2002	13:30	6000
09/23/2002	15:30	10/03/2002	14:30	6000
10/04/2002	15:00	10/22/2002	14:00	6000
10/24/2002	14:30	11/10/2002	18:00	6000
11/14/2002	14:00	12/02/2002	14:00	6000
12/09/2002	10:00	01/07/2003	15:01	6600 EDS

7. Distribution:

According to the Ocean and Coastal Resource Management Data Dissemination Policy
for the NERRS System-wide Monitoring Program, NOAA/ERD retains the right to

analyze, synthesize and publish summaries of the NERRS System-wide Monitoring Program data. The PI retains the right to be fully credited for having collected and processed the data. Following academic courtesy standards, the PI and NERR site where the data were collected will be contacted and fully acknowledged in any subsequent publications in which any part of the data are used. Manuscripts resulting from the NOAA/OCRM supported research that are produced for publication in open literature, including refereed scientific journals, will acknowledge that the research was conducted under an award from the Estuarine Reserves Division, Office of Ocean and Coastal Resource Management, National Ocean Service, National Oceanic and Atmospheric Administration. The data set enclosed within this package/transmission is only as good as the quality assurance and quality control procedures outlined by the enclosed metadata reporting statement. The user bears all responsibility for its subsequent use/misuse in any further analyses or comparisons. The Federal government does not assume liability to the Recipient or third persons, nor will the Federal government reimburse or indemnify the Recipient for its liability due to any losses resulting in any way from the use of this data. NERR water quality data and metadata can be obtained from the Research Coordinator at the individual NERR site (please see section 1. Principal investigators and contact persons), from the Data Manager at the Centralized Data Management Office (please see personnel directory under general information link on CDMO homepage) and online at the CDMO homepage http://cdmo.baruch.sc.edu. Data are available in text tab-delimited format, Microsoft Excel spreadsheet format and comma-delimited format.

8. Associated researchers and projects

NERR SWMP tier 1 nutrient sampling is being conducted at all water quality datalogger stations. NERR SWMP meteorological sampling is being conducted at 1 station which is located near the Tidal Linkage water quality station. Within the watershed, above the River Channel site, nutrient sampling and flow

studies are being conducted by Dr. Richard Gersberg of the San Diego State
University Department of Public Health. The Model Marsh is the ongoing site of
research being conducted by PERL which focuses on methods for increasing the
success of saltmarsh revegetation projects.

II. Physical Structure Descriptors

9. Variable Sequence, range of measurements, units, resolution, and accuracy:

YSI 6000/6600 datalogger

Variable	Range of Measurements	Resolution	Accuracy
Date	1-12, 1-31, 00-99 (Mo,Day,Yr)	1 mo, 1 day, 1 yr	NA
Time	0-24, 0-60, 0-60 (Hr,Min,Sec)	1 hr, 1 min, 1 s	NA
Temp	-5 to 45 (c)	0.01 C	+/- 0.15C
Sp COND	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% of Reading or 0.1 ppt, (whichever is greater)
DO	0-200 (% air saturation)	0.1% @air sat	+/-2% @air Saturation
DO	200-500 (% air saturation	0.1% @ air sat	+/- 6% @ Saturation
DO	0-20 (mg/l)	0.01 mg/l	+/- 0.2mg/l
DO	20-50 (mg/l)	0.01 mg/l	+/- 0.6mg/l
Depth (shallow)	0-9.1 (m)	0.001m	+/- 0.018m
PH	2-14 units	0.01 units	+/- 0.2units
Turb	0-1000 NTU	0.1 NTU	+/- 5% of Reading or 2 NTU (whichever is greater)

Data columns are separated by tabs. Each file contains a two line column header at the top of the page which identifies measurements and units for each column.

10. Coded variable indicator and variable code definitions Site definitions:
OS = Oneonta Slough MM = Model Marsh TL = Tidal Linkage RC = River Channel

11. Data anomalies (suspect data):

January 2002
OS
a) 01/25/2002 17:30:00 - 01/31/2002 23:30:00, Many negative turbidity values recorded which were less than negative 5. This was determined to be too large a deviation from 0 so data were removed. Calibration error suspected as cause.
b) 01/03/2002 15:00:00 - 01/08/2002 04:30:00, Below average values for Specific Conductivity and Salinity were recorded. Likely correlated to rain event which began 1/3/2002.
c) 01/28/2002 13:30:00 - 01/31/2002 23:30:00, Below average values for Specific Conductivity and Salinity were recorded. Likely correlated to rain event which began 1/28/02.

MM
a) The following highly positive turbidity values were recorded which were not consistent with the overall data set. A probable cause for these values was not found so data were not removed.

Date	Time	Turbidity
01/03/2002	18:00:00	243
01/08/2002	14:30:00	178
01/30/2002	7:30:00	368
01/30/2002	13:00:00	440

b) 01/03/2002 04:00:00 - 05:00:00 and 07:00:00 - 07:30:00, Below average values for Specific Conductivity and Salinity were recorded. Likely correlated to rain event which began 1/3/2002.
c) 01/29/2002 20:30:00 - 01/30/2002 08:00:00, Below average values for Specific Conductivity and Salinity were recorded. Likely correlated to rain event which began 1/28/02.
d) Negative or 0 depth values were recorded during the following dates and times. Sensors were out of water so data were removed.
01/03/2002 05:30:00 - 06:30:00
01/29/2002 17:00:00 - 20:00:00
e) Negative or 0 depth values were recorded during the following dates and times. Sensors were not out of water so data were not removed.
01/01/2002 02:30:00 - 05:00:00
01/01/2002 17:30:00 - 21:30:00
01/02/2002 03:30:00 - 05:30:00
01/02/2002 17:30:00 - 22:00:00

01/03/2002 17:30:00 - 23:00:00
01/04/2002 06:30:00 - 08:30:00
01/04/2002 06:30:00 - 07:30:00
01/04/2002 17:30:00 - 23:30:00
01/05/2002 07:00:00 - 11:00:00
01/05/2002 17:00:00 - 01/06/2002 00:30:00
01/06/2002 08:00:00 - 13:30:00
01/06/2002 18:30:00 - 01/07/2002 01:00:00
01/07/2002 10:00:00 - 15:00:00
01/07/2002 21:30:00 - 01/08/2002 00:30:00
01/08/2002 13:00:00 - 15:00:00
01/10/2002 17:30:00
01/11/2002 15:30:00 - 18:30:00
01/12/2002 03:00:00 - 03:00:00
01/12/2002 16:30:00 - 19:30:00
01/13/2002 02:30:00
01/13/2002 17:00:00 - 20:00:00
01/14/2002 02:30:00 - 04:00:00
01/14/2002 17:00:00 - 20:30:00
01/15/2002 03:30:00 - 04:30:00
01/15/2002 17:00:00 - 21:00:00
01/16/2002 03:30:00 - 05:30:00
01/16/2002 16:00:00 - 22:00:00
01/17/2002 03:30:00 - 06:30:00
01/17/2002 16:00:00 - 22:30:00
01/18/2002 05:00:00 - 07:00:00
01/18/2002 16:00:00 - 23:00:00
01/19/2002 05:30:00 - 08:00:00
01/19/2002 15:30:00 - 23:00:00
01/20/2002 07:00:00 - 10:00:00
01/20/2002 16:00:00 - 23:30:00
01/21/2002 07:30:00 - 01/22/2002 00:00:00
01/22/2002 09:00:00 - 16:00:00
01/22/2002 20:00:00 - 23:00:00
01/23/2002 10:30:00 - 11:00:00
01/25/2002 16:30:00 - 19:00:00
01/25/2002 22:30:00 - 01/26/2002 02:30:00
01/26/2002 14:00:00 - 19:00:00
01/26/2002 23:30:00 - 01/27/2002 03:00:00
01/27/2002 15:00:00 - 19:00:00
01/28/2002 01:00:00 - 03:30:00
01/28/2002 17:00:00 - 19:30:00
01/29/2002 01:00:00 - 05:00:00
01/30/2002 01:30:00 - 05:30:00
01/30/2002 17:00:00 - 21:00:00
01/31/2002 02:30:00 - 07:00:00
01/31/2002 16:30:00 - 21:30:00

February 2002
OS
a) 02/01/2002 00:00:00 - 02/11/2002 13:00:00, Turbidity values missing. Many
negative values recorded which were less than negative 5. This was determined -

be too large a deviation from 0 so data were removed. Calibration error suspected as cause.
b) 02/12/2002 21:30:00 - 02/25/2002 05:00:00, Slightly negative turbidity values
recorded. Calibration practices suspected as cause. Values were not less than
negative 5 so data were not removed.
c) 02/01/2002 00:00:00 - 02/07/2002 16:00:00, Below average values for Specific
Conductivity and Salinity were recorded. Likely correlated to rain event which
began 1/28/2002.
d) 02/17/2002 14:00:00 - 02/23/2002 05:00:00, Below average values for Specific
Conductivity and Salinity were recorded. Likely correlated to rain event which
began 2/17/2002.
e) 02/12/2002 17:00:00 - 02/25/2002 13:30:00, Average values for pH were too
high. Data were removed.
f) Negative or 0 depth values were recorded during the following dates and
times. Sensors were not out of water so data were not removed.
02/03/2002 16:00:00 - 23:00:00
02/04/2002 06:30:00 - 23:30:00
02/05/2002 08:00:00 - 17:00:00
02/05/2002 17:30:00 - 02/06/2002 00:30:00
02/06/2002 09:30:00 - 17:30:00
02/06/2002 21:00:00 - 02/07/2002 01:00:00
02/09/2002 13:30:00 - 18:30:00
02/10/2002 00:00:00 - 04:00:00
02/10/2002 13:00:00 - 19:30:00
02/11/2002 00:00:00 - 04:30:00
02/13/2002 01:30:00 - 05:30:00
02/14/2002 02:30:00 - 06:00:00
02/14/2002 15:00:00 - 20:00:00
02/15/2002 03:00:00 - 06:30:00
02/15/2002 15:00:00 - 20:30:00
02/16/2002 03:30:00 - 07:30:00
02/16/2002 15:00:00 - 20:30:00
02/17/2002 04:30:00 - 08:00:00
02/17/2002 15:30:00 - 20:30:00
02/18/2002 16:00:00 - 21:00:00
02/19/2002 06:00:00 - 21:30:00
02/20/2002 07:00:00 - 22:00:00
02/21/2002 08:30:00 - 17:30:00
02/22/2002 09:30:00 - 17:30:00
02/23/2002 11:30:00 - 17:30:00
g) Negative or 0 depth values were recorded during the following dates and
times. Sensors were not out of water so data were not removed.
02/01/2002 19:30:00 - 21:00:00
02/02/2002 19:30:00 - 21:30:00
02/03/2002 20:00:00 - 21:30:00

02/04/2002 11:00:00 - 12:00:00
02/05/2002 12:30:00 - 14:00:00
02/06/2002 13:30:00 - 15:30:00
02/07/2002 14:30:00 - 16:30:00
02/08/2002 16:00:00 - 17:00:00
02/20/2002 11:30:00 - 12:30:00
02/21/2002 13:00:00 - 14:30:00
02/22/2002 14:00:00 - 15:30:00
02/23/2002 15:30:00 - 16:00:00

MM
a) The following highly positive turbidity values were recorded which were not
consistent with the overall data set. A probable cause for these values was not
found so data were not removed.

Date	Time	Turbidity
02/13/2002	14:00:00	377
02/21/2002	18:30:00	164
02/28/2002	16:00:00	126

b) Negative or 0 depth values were recorded during the following dates and
times. Sensors were out of water so data were removed.
02/03/2002 16:00:00 - 23:00:00
02/04/2002 06:30:00 - 23:30:00
02/05/2002 08:00:00 - 02/06/2002 00:30:00
02/06/2002 09:30:00 - 17:30:00
02/06/2002 21:00:00 - 02/07/2002 01:00:00
02/09/2002 13:30:00 - 18:30:00
02/10/2002 00:00:00 - 04:00:00
02/10/2002 13:00:00 - 19:30:00
02/11/2002 00:00:00 - 04:30:00
02/13/2002 01:30:00 - 05:30:00
02/14/2002 02:30:00 - 06:00:00
02/14/2002 15:00:00 - 20:00:00
02/15/2002 03:00:00 - 06:30:00
02/15/2002 15:00:00 - 20:30:00
02/16/2002 03:30:00 - 07:30:00
02/16/2002 15:00:00 - 20:30:00
02/17/2002 04:30:00 - 08:00:00
02/17/2002 15:30:00 - 20:30:00
02/18/2002 16:00:00 - 21:00:00
02/19/2002 06:00:00 - 21:30:00
02/20/2002 07:00:00 - 22:00:00
02/21/2002 08:30:00 - 17:30:00
02/22/2002 09:30:00 - 17:30:00
02/23/2002 11:30:00 - 17:30:00
c) Negative or 0 depth values were recorded during the following dates and
times. Sensors were not out of water so data were not removed.
02/01/2002 03:00:00 - 08:00:00
02/01/2002 15:30:00 - 22:00:00
02/02/2002 04:30:00 - 09:30:00
02/02/2002 15:30:00 - 22:30:00

02/03/2002 05:30:00 - 11:30:00
02/07/2002 10:30:00 - 17:30:00
02/07/2002 23:00:00 - 02/08/2002 02:00:00
02/08/2002 13:00:00 - 18:00:00
02/09/2002 00:00:00 - 02:30:00
02/12/2002 16:00:00 - 19:30:00
02/13/2002 15:00:00 - 20:00:00
02/18/2002 07:00:00 - 08:30:00
02/21/2002 21:30:00 - 23:30:00
02/22/2002 23:00:00 - 02/23/2002 00:00:00
02/24/2002 00:00:00 - 01:00:00
02/24/2002 13:30:00 - 18:00:00
02/25/2002 00:00:00 - 03:00:00
02/27/2002 01:30:00 - 04:30:00
02/27/2002 17:00:00 - 19:00:00
02/28/2002 02:30:00 - 06:00:00
02/28/2002 17:00:00 - 19:30:00

March 2002
OS
a) The following highly positive turbidity values were recorded which were not
consistent with the overall data set. Data were removed.
Date Time Turbidity
03/23/2002 17:30:00 1239
b) Negative or 0 depth values were recorded during the following dates and
times. Sensors were not out of water so data were not removed.
03/04/2002 09:00:00 - 10:00:00
03/05/2002 10:00:00 - 12:00:00
03/06/2002 11:00:00 - 14:00:00
03/07/2002 13:00:00 - 15:00:00
03/08/2002 14:00:00 - 15:30:00
03/09/2002 14:30:00 - 16:30:00
03/10/2002 15:00:00 - 17:00:00
03/11/2002 16:00:00 - 17:00:00
03/20/2002 10:00:00 - 11:00:00
03/21/2002 10:30:00 - 13:00:00
03/22/2002 12:00:00 - 14:30:00
03/23/2002 14:00:00 - 15:00:00
03/24/2002 15:30:00 - 15:30:00
c) 03/08/2002 12:30:00 - 03/12/2002 13:00:00, Below average values for Specific
Conductivity and Salinity were recorded. Likely correlated to rain event which
began 3/7/2002.
d) 03/16/2002 19:00:00 - 03/26/2002 12:00:00, Below average values for Specific
Conductivity and Salinity were recorded. Likely correlated to rain event which
began 3/16/2002.

MM

a) Beginning 03/28/2002 16:00:00 minimum depth values are higher than average.
Possibly correlated to increased sediment deposition at mouth of estuary.
b) Negative or 0 depth values were recorded during the following dates and
times. Sensors were out of water so data were removed.
03/02/2002 15:00:00 - 20:30:00
03/03/2002 04:30:00 - 10:00:00
03/03/2002 15:30:00 - 21:00:00
03/04/2002 05:00:00 - 11:30:00
03/04/2002 16:00:00 - 21:00:00
03/05/2002 06:00:00 - 15:00:00
03/06/2002 07:30:00 - 16:00:00
03/07/2002 08:30:00 - 16:30:00
03/08/2002 10:00:00 - 17:00:00
03/09/2002 11:00:00 - 18:00:00
03/09/2002 23:00:00 - 03/10/2002 03:00:00
03/10/2002 11:30:00 - 18:00:00
03/11/2002 00:00:00 - 04:00:00
03/11/2002 12:30:00 - 18:00:00
03/12/2002 00:30:00 - 04:30:00
03/13/2002 15:30:00 - 18:00:00
03/14/2002 15:00:00 - 18:30:00
03/15/2002 02:30:00 - 06:30:00
03/15/2002 14:30:00 - 19:00:00
03/16/2002 03:00:00 - 07:30:00
03/16/2002 14:30:00 - 19:30:00
03/17/2002 03:00:00 - 08:30:00
03/17/2002 14:30:00 - 20:00:00
03/18/2002 04:00:00 - 09:00:00
03/18/2002 15:00:00 - 20:00:00
03/19/2002 04:00:00 - 21:00:00
03/20/2002 04:00:00 - 20:30:00
03/21/2002 05:30:00 - 21:00:00
03/22/2002 07:00:00 - 17:30:00
03/23/2002 09:00:00 - 17:00:00
03/24/2002 11:00:00 - 17:00:00
03/25/2002 12:30:00 - 17:30:00
03/25/2002 23:30:00 - 03/26/2002 03:30:00
c) Negative or 0 depth values were recorded during the following dates and
times. Sensors were not out of water so data were not removed.
03/01/2002 03:30:00 - 07:00:00
03/01/2002 16:30:00 - 19:30:00
03/02/2002 04:30:00 - 08:00:00
03/05/2002 18:00:00 - 21:30:00
03/06/2002 22:00:00 - 22:00:00
03/08/2002 00:00:00 - 00:00:00
03/08/2002 23:30:00 - 03/09/2002 02:00:00
03/14/2002 02:30:00 - 05:00:00
03/23/2002 23:30:00 - 03/24/2002 00:30:00
03/24/2002 23:30:00 - 03/25/2002 02:00:00

April 2002

OS
a) 04/06/2002 00:00:00 - 04/09/2002 13:00:00, Below average values for Specific
Conductivity and Salinity were recorded. Likely correlated to rain event which
began 4/6/2002.
b) 04/10/2002 15:30:00 - 04/25/2002 11:00:00, All parameters missing.
Programming error during deployment resulted in unit not logging.
c) The following highly positive turbidity values were recorded which were not
consistent with the overall data set. A probable cause for these values was not
found so data were not removed.

Date	Time	Turbidity
04/27/2002	18:30:00	242

d) The following highly positive turbidity values were recorded which were not
consistent with the overall data set. Data were removed.

Date	Time	Turbidity
04/07/2002	18:00:00	1655

MM
a) 4/23/2002 6:30:00 - 4/28/2002 20:00:00, Specific Conductivity and Salinity
values lower than average. Likely correlated to rain events. Rain was recorded
on 4/24/02 and 4/26/02, lowered salinity values prior - this may have been
caused by flow in river caused by rain in other parts of watershed or sewage
spill/release within watershed.

May 2002
OS
a) The following highly positive turbidity values were recorded which were not
consistent with the overall data set. A probable cause for these values was not
found so data were not removed.

Date	Time	Turbidity
05/03/2002	15:30:00	257
05/19/2002	5:30:00	106

b) 05/29/2002 13:00:00 - 05/31/2002 23:30:00, Turbidity missing. No probe
installed.
c) 05/06/2002 13:30:00 - 15:30:00, Negative or 0 depth values were recorded.
Sensors were not out of water so data were not removed.

MM
a) 05/14/2002 14:00:00 - 05/28/2002 05:30:00 and 05/29/2002 13:30:00 -
05/31/2002 23:30:00, pH values missing. Recorded values were well above
average.

Likely caused by probe malfunction during deployment so data were removed.
b) Turbidity values missing between the following dates and times. No probe was
installed.
05/14/2002 14:00:00 - 05/28/2002 05:30:00
05/29/2002 13:30:00 - 05/31/2002 23:30:00

June 2002
OS
a) Turbidity values missing between the following dates and times. No probe was
installed.
06/01/2002 00:00:00 - 06/12/2002 07:30:00
06/13/2002 12:00:00 - 06/25/2002 14:30:00
06/26/2002 16:00:00 - 06/30/2002 23:30:00

MM
a) pH values missing between the following dates and times. Recorded values were
too high due - probe malfunction so data were removed
06/01/2002 00:00:00 - 06/12/2002 07:30:00
06/13/2002 13:00:00 - 06/25/2002 14:30:00

b) 06/26/2002 15:30:00 - 06/30/2002 23:30:00, pH values missing. No probe was
installed.
c) Turbidity values missing between the following dates and times. No probe was
installed.
06/01/2002 00:00:00 - 06/12/2002 07:30:00
06/13/2002 13:00:00 - 06/25/2002 14:30:00
06/26/2002 15:30:00 - 06/30/2002 23:30:00

July 2002
OS
a) Turbidity values missing between the following dates and times. No probe was
installed.
07/01/2002 00:00:00 - 07/16/2002 12:30:00
07/19/2002 13:00:00 - 07/30/2002 09:00:00
b) 07/31/2002 11:30:00 - 23:30:00, All parameters missing due - programming
error on deployment.

MM
a) 07/01/2002 00:00:00 - 07/19/2002 11:00:00, pH values missing. No probe was
installed.
b) Turbidity values missing between the following dates and times. No probe was
installed.
07/01/2002 00:00:00 - 07/19/2002 11:00:00
07/19/2002 11:30:00 - 07/30/2002 10:00:00

07/31/2002 11:30:00 - 23:30:00
c) Depth values missing between the following dates and times. Depth probe
malfunctioned causing very negative values so data were removed.
07/19/2002 11:30:00 - 07/30/2002 10:00:00
07/31/2002 11:30:00 - 23:30:00
d) 07/05/2002 15:30:00 - 07/06/2002 21:30:00, Below average values for Specific
Conductivity and Salinity were recorded. No rain was recorded during this time.

August 2002
OS
a) 08/01/2002 00:00:00 - 08/13/2002 14:30:00, All parameters missing. Programming error during deployment resulted in unit not logging.
b) 08/15/2002 11:30:00 - 08/31/2002 23:30:00, Turbidity values missing. No
probe was installed.

MM
a) 08/01/2002 00:00:00 - 08/13/2002 12:30:00, Turbidity values missing. No
probe was installed.
b) Depth missing for all deployment dates and times during month. Probe not
working due to prior malfunction so data were removed.
c) 08/15/2002 10:00 - 08/31/2002 23:30:00, All parameters missing due - error in
programming. Time interval was set to be approx. 12 hrs between samples so data
were removed.

RC
a) 08/01/2002 00:00:00 - 08/08/2002 16:00:00, All parameters missing as station
had not yet been established.
b) 08/08/2002 16:30:00 - 08/13/2002 15:30:00, All parameters missing. Deployment
holder was too high and sensors were out of water too often during deployment
period so data were removed.
c) 08/20/2002 14:30:00 - 08/31/2002 23:30:00, pH values missing. No probe was
installed.
d) 08/20/2002 14:30:00 - 08/31/2002 23:30:00, Turbidity values missing. No
probe was installed.

September 2002
OS
a) Turbidity values missing for all deployment dates and times during month. No
probe was installed

b) 09/07/2002 03:30:00 - 09/09/2002 06:30:00, Below average values for Specific
Conductivity and Salinity were recorded. Likely correlated to rain event which
began 9/6/2002.
c) 09/23/2002 17:00:00, Negative depth or 0 value recorded. Sensors were not
out of water so data were not removed.

MM
a) Depth missing for all deployment dates and times during month. Probe not
working due - prior malfunction so data were removed.
b) Turbidity values missing for all deployment dates and times during month. No
probe was installed
c) 09/01/2002 00:00:00 - 09/04/2002 11:30:00, All parameters missing due - error
in programming. Time interval was set - be approx. 12 hrs between samples so
data were removed.
e) 09/06/2002 20:30:00 - 09/08/2002 00:00:00, Below average values for Specific
Conductivity and Salinity were recorded. Likely correlated to rain event which
began 9/6/2002.

RC
a) Turbidity values missing for all deployment dates and times during month. No
probe was installed
b) 09/01/2002 00:00:00 - 09/04/2002 12:30:00, pH values missing. No probe was
installed.
c) 09/05/2002 14:00:00 - 09/20/2002 13:30:00, pH missing. values too high. Cause
not determined..

TL
a) 09/01/2002 00:00:00 - 09/27/2002 07:00:00, All parameters missing as station
had not yet been established
b) 09/27/2002 07:30:00 - 09/30/2002 23:30:00, pH values missing. No probe was
installed..
c) 09/27/2002 07:30:00 - 09/30/2002 23:30:00, Turbidity values missing. No probe
installed.

October 2002
OS
a) Turbidity values missing for all deployment dates and times during month. No

probe was installed
b) Negative or 0 depth values were recorded during the following dates and
times. Sensors were not out of water so data were not removed.
10/04/2002 14:30:00 - 15:00:00
10/05/2002 15:30:00 - 16:30:00
10/06/2002 16:00:00 - 17:00:00

MM
a) Depth values missing for all deployment dates and times during month. Probe
not working due - prior malfunction so data were removed.
b) Turbidity values missing for all deployment dates and times during month. No
probe was installed

RC
a) Turbidity values missing for all deployment dates and times during month. No
probe was installed
b) 10/24/2002 14:30:00 - 10/31/2002 23:30:00, pH values missing. Probe malfunctioned and was removed before deployment.
c) The following dates and times DO readings were outliers, however, they have
been retained because the values recorded are within the manufacturer's stated
accuracy specifications for the sensor (+/-2% for DO% and +/- 0.2 for mg/l).
DO%
10/26/2002 03:30:00 -000.2
10/26/2002 04:00:00 -000.2
10/26/2002 04:30:00 -000.3
10/26/2002 05:00:00 -000.4
10/26/2002 05:30:00 -000.4
10/26/2002 06:00:00 -000.5
10/26/2002 06:30:00 -000.5
10/26/2002 07:00:00 -000.5
10/26/2002 07:30:00 -000.5
10/27/2002 02:30:00 -000.1
10/27/2002 03:00:00 -000.2
10/27/2002 03:30:00 -000.2
10/27/2002 04:00:00 -000.3
10/27/2002 04:30:00 -000.4
10/27/2002 05:00:00 -000.4
10/27/2002 05:30:00 -000.4
10/27/2002 06:00:00 -000.4
10/27/2002 06:30:00 -000.5
10/27/2002 07:00:00 -000.5
10/27/2002 07:30:00 -000.6
10/28/2002 04:00:00 -000.2
10/28/2002 04:30:00 -000.3
10/28/2002 05:00:00 -000.3
10/28/2002 05:30:00 -000.3
10/28/2002 06:00:00 -000.5

10/28/2002 06:30:00 -000.5
10/28/2002 07:00:00 -000.6
10/28/2002 07:30:00 -000.5
10/28/2002 08:00:00 -000.6
10/28/2002 08:30:00 -000.1
DO mg/L
10/27/2002 07:30:00 -00.1
10/28/2002 07:00:00 -00.1
10/28/2002 08:00:00 -00.1

TL
a) pH and Turbidity values missing for all deployment dates and times. No probe was installed.
b) Negative or 0 depth values were recorded during the following dates and times. Sensors were not out of water so data were not removed.
10/05/2002 05:00:00
10/06/2002 04:30:00 - 05:00:00
10/07/2002 06:00:00 - 06:00:00
10/07/2002 17:30:00 - 19:30:00
10/08/2002 03:30:00 - 06:30:00
10/08/2002 17:30:00 - 20:30:00
10/09/2002 05:00:00 - 06:30:00
10/09/2002 19:00:00 - 22:00:00
10/16/2002 00:00:00 - 04:30:00
10/17/2002 01:00:00 - 04:30:00
10/20/2002 03:30:00 - 05:00:00
10/20/2002 15:30:00 - 18:00:00
10/21/2002 03:00:00 - 05:00:00
c) 10/17/2002 15:00:00 - 10/22/2002 15:00:00; DO% and DOmg values exceeded stated limits for sensor and post calibration showed probe readings were not stable so data were removed.
d) 10/22/2002 15:30:00 - 10/31/2002 23:30:00, All parameters missing. Logger not deployed due to heavy sedimentation at site.
e) Below average values for Specific Conductivity and Salinity were recorded for the following dates/times. Cause could not be determined. Data retained.
10/13/2002, 02:00:00 - 02:30:00
10/19/2002, 03:00:00 - 05:00:00
10/21/2002, 04:00:00 - 05:00:00

November 2002
OS
a) Turbidity values missing for all deployment dates and times during month. No probe was installed

b) 11/01/2002 00:00:00 - 11/13/2002 14:00:00, Below average values for Specific
Conductivity and Salinity were recorded. Likely correlated to rain event which
began 11/08/2002.

MM
a) Depth values missing for all deployment dates and times during month. Probe
not working due - prior malfunction so data were removed.
b) Turbidity values missing for all deployment dates and times during month. No
probe was installed

RC
a) Turbidity values missing for all deployment dates and times during month. No
probe was installed
b) 11/01/2002 00:00:00 - 11/10/2002 18:00:00, pH values missing. Probe
malfunctioned and was removed before deployment.
c) 11/14/2002 14:00:00 - 11/30/2002 23:30:00, All parameters missing. Water
leakage in battery compartment caused power loss, recorded data not reliable so
data were removed.
d) The following dates and times DO readings were outliers, however, they have
been retained because the values recorded are within the manufacturer's stated
accuracy specifications for the sensor (+/-2% for DO% and +/- 0.2 for mg/l).

	DO%
11/05/2002 04:30:00	-000.1
11/05/2002 05:00:00	-000.2
11/05/2002 05:30:00	-000.2
11/05/2002 06:00:00	-000.4
11/06/2002 05:00:00	-000.1
11/06/2002 06:00:00	-000.1
11/06/2002 06:30:00	-000.3
11/10/2002 01:30:00	-000.1
11/10/2002 02:00:00	-000.1
11/10/2002 02:30:00	-000.2
11/10/2002 08:00:00	-000.2
11/10/2002 08:30:00	-000.2
11/10/2002 09:00:00	-000.2
11/10/2002 09:30:00	-000.3
11/10/2002 10:00:00	-000.5
11/10/2002 10:30:00	-000.4
11/10/2002 11:00:00	-000.3

TL

a) All parameters missing. Logger not deployed due to heavy sedimentation at
site.

December 2002
OS
a) 12/01/2002 00:00:00 - 12/02/2002 15:30:00, Turbidity values missing. No
probe was installed..
b) Rain was recorded on the following dates which likely caused the higher than
average depth and turbidity values and lower than average specific conductivity
and salinity values recorded during and following those dates:12/16/2002,
12/17/2002, 12/18/2002, 12/20/2002, 12/21/2002, 12/22/2002, 12/23/2002,
12/29/2002, 12/30/2002.
c) The following highly positive turbidity values were recorded which were not
consistent with the overall data set. A probable cause for these values was the
recorded rainfall during this period (see above for rainfall data)

Date	Time	Turbidity
12/16/2002	23:00:00	103.2
12/18/2002	12:30:00	186.2
12/21/2002	07:30:00	113.8
12/21/2002	08:00:00	117.2
12/26/2002	02:00:00	252.4
12/26/2002	20:30:00	299.9
12/30/2002	23:00:00	329.5
12/31/2002	02:30:00	157.1

MM
a) 12/01/2002 00:00:00 - 12/02/2002 15:00:00, Depth values missing. Probe not
working due - prior malfunction so data were removed.
b) 12/01/2002 00:00:00 - 12/02/2002 15:00:00, Turbidity values missing. No
probe was installed..
c) 12/16/2002 23:00:00 - 12/31/2002 23:30:00, Turbidity values higher than
average. Likely correlated to rain which was recorded on 12/16/2002,
12/17/2002, 12/20/2002, 12/22/2002, and 12/29/2002
d) 12/16/2002 23:00:00 - 12/31/2002 23:30:00, Specific Conductivity and Salinity
unusually lower than average. Likely correlated to rain which was recorded on
12/16/2002, 12/17/2002, 12/20/2002, 12/22/2002, and 12/29/2002.

RC
a) 12/01/2002 00:00:00 - 12/02/2002 14:00:00, All parameters missing. Water
leakage in battery compartment caused power loss, recorded data not reliable so
data were removed.

b) 12/16/2002 10:00:00 - 12/31/2002 23:30:00, Higher than average turbidity
values recorded. Likely correlated to rain which was recorded on 12/16/2002
12/17/2002, 12/20/2002, 12/22/2002, and 12/29/2002
c) 12/16/2002 23:30:00 - 12/31/2002 23:30:00, Specific Conductivity and Salinity
values below average. Likely correlated to rain events, which were recorded on
12/16/2002 12/17/2002 12/20/2002 12/22/2002 and 12/29/2002.
d) 12/16/2002 23:30:00 - 12/31/2002 23:30:00, Dissolved Oxygen values below
average. Likely correlated to rain events, which were recorded on 12/16/2002
12/17/2002 12/20/2002 12/22/2002 and 12/29/2002.
e) 12/16/2002 02:30:00 - 12/31/2002 23:30:00, Depth values above average. Likely
correlated to rain events, which were recorded on 12/16/2002 12/17/2002
12/20/2002 12/22/2002 and 12/29/2002.
f) 12/09/2002 09:30:00 - 12/16/2002 17:30:00, Depth values lower than average.
Likely cause could not be determined.
g) 12/09/2002 09:30:00 - 12/31/2002 23:30:00, Time values offset by +1min, data
were corrected - closest 00:00 or 00:30 min interval.
h) pH data missing 12/09/02 10:00:00 – 12/31/02 23:30:00 due to probe malfunction.

TL
a) All parameters missing. Logger not deployed due to heavy sedimentation at
site.

12. Missing Data

Missing data are denoted by a period in the data set. Data are missing due to
equipment failure where no probes were deployed, maintenance/calibration of
equipment, elimination of obvious outliers or elimination of data due to
calibration problems (both pre and post). For more details on deleted data, see
the Data Anomalies Section. To find out more details about missing data,
contact the Research Coordinator at the site submitting the data.

13. Post deployment information:

np = no probe installed
nc = no calibration done

Site	Date	SpCond	DO%	Depth	pH	Turb
		Std(50)	std(100)	std(0)	std(7)	std(0)

OS	01/09/2002	50.15	098.3	-0.001	6.99	0.0
	01/23/2002	49.98	100.9	-0.002	6.99	-1.5
	02/25/2002	49.47	103	0.001	7.33	-3.3
	03/11/2002	50.23	100.9	-0.008	7.26	-0.2
	03/26/2002	50.12	103.2	0.002	7.04	0.02
	04/09/2002	49.57	102.7	0.002	6.92	1.6
	05/08/2002	50.1	99.7	0.002	7.01	0.3
	05/28/2002	49.47	101.9	0.003	np	0.6
	06/12/2002	49.85	104.8	0	7.02	np
	06/25/2002	49.99	125	0.002	7.15	np
	07/16/2002	49.98	98.5	0.003	7.05	np
	07/30/2002	50.02	101.2	-0.073	6.73	np
	09/20/2002	50.37	98.8	0	7.03	np
	10/03/2002	50.22	99.8	0.18	6.92	np
	10/22/2002	50.23	98.9	0.001	7	np
	11/13/2002	49.46	98.6	0	7.1	np
	12/02/2002	50.52	98.2	-0.002	6.94	np
	01/10/2003	50.36			7.13	-0.2
MM	01/09/2002	50.02	102.7	0.001	7.01	0.1
	01/23/2002	49.63	104.9	-0.002	6.98	-3.1
	02/25/2002	49.83	104.5	0	7.04	-1.4
	03/12/2002	49.95	99.9	0.002	7.07	-0.2
	03/26/2002	49.83	101	0.001	7.03	0.1
	04/09/2002	49.7	100.3	0.001	7.05	0.1
	04/25/2002	48.08	101.6	0.002	7.02	-0.3
	05/08/2002	50.07	92.2	0.001	7.12	0
	05/28/2002	49.87	99	0.031	6.95	3.5
	06/12/2002	49.3	99.8	0.021	np	np
	06/25/2002	49.69	97.6	0	np	np
	07/19/2002	49.71	97.3	-0.03	np	np
	07/30/2002	49.48	97.9	np	7.09	np
	08/13/2002	49.15	99.6	np	7	np
	09/04/2002	NC	NC	np	NC	NC
	09/20/2002	49.95	dns	np	6.89	np
	10/03/2002	50.08	99.6	np	6.95	np
	10/22/2002	50.48	100.5	np	7.09	np
	11/13/2002	49.51	dns	np	7.06	np
	12/02/2002	50.9	100.2	np	6.96	np
	01/10/2003	49.96	98.9	0.003	7.06	0.3
RC	08/13/2002	50.33	105.8	-0.011	np	np
	09/04/2002	49.81	90.5	0.021	np	np
	09/20/2002	49.71	93.8	-0.009	np	np
	10/03/2002	50.35	98.5	0.078	7.19	np
	10/22/2002	49.74	100.3	0.085	7.11	np
	11/13/2002	49.36	102.1	0.047	np	np
	12/02/2002	50.94	104	0.003	np	np
	01/03/2003	12.03	99.8	-0.056	7.17	0
TL	10/03/2002	49.94	96.2	0.074	np	np
	10/22/2002	49.89	65.7	0.035	np	np

14. Other Remarks:

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

b) Hypoxic (< 20%) and super-saturation (>100%) dissolved oxygen events were
recorded at all sites. The events were cyclic (primarily diel) and the duration
of each event was less than 24hrs.

c) On March 28, 2002 the deployment holder at the Model Marsh station was
lowered 21.0 cm in the water column. This was done to reduce the periods the
sensors were out of the water at low tides.