

Tijuana River Estuary (TJR) NERR Water Quality Metadata
January to December 1999
Last Revised August 16, 2000

I. Data Set and Research Descriptors

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2. Entry Verification:

The data are uploaded directly from the YSI model 6000upg dataloggers to the YSI PC6000 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 PC6000 plotting software. The resulting plot is printed out and saved in a folder named "datalogger deployment log". The .csv file is imported into Excel 5.0 for Macintosh and is edited and formatted.

The tails of each sampling period are deleted and any suspect data is identified with the aid of Excel CDMO 5.0 macros and are evaluated and dealt with according to CDMO Operations Manual (ver.3.0) guidelines. The parameter columns are checked for proper order 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 combined into a 1 month excel file. Any dates and times when data was not collected are inserted and the reason for the missing data (from the deployment log) are entered directly into the excel file along with the editing information from the two week files. 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 deployment of dataloggers.

Initially two stations were set up; the "treatment" station was set up close to the mouth on the Southern end of the Oneonta Slough. It was thought that this location would be best suited for monitoring changes caused by sewage outflow events. The "control" station was set up on the northern end of Oneonta Slough. 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. Recently, however, a new channel was dredged in the northeast section of the estuary to increase tidal flushing. This restoration site named the "Tidal Linkage" will be the new location of the "treatment" site. Comparisons will be made with the natural site as the hydrology of the constructed treatment site changes over time.

4. Research Methods (Dataloggers)

A 4 inch diameter PVC pipe was strapped to a 6 ft length of steel fencing post and driven into the sediment until refusal prior to datalogger deployment in the center of the channel. The bottom of the pipe is raised 1' off of the channel bottom and is capped. Multiple 1.5" holes have been drilled in the bottom cap and sides to permit unrestricted flow to the sensors. The datalogger units are then placed into and rest on the bottom of the tubes during deployment. The sampling period is two weeks with measurements being 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 unit is replaced by another YSI datalogger unit and brought back to the laboratory for downloading, cleaning and recalibration. These procedures are carried out according to the methods described in the YSI Operations Manual version 3.0 (see sections 3 and 7). Calibration standards for Specific Conductivity, 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 3.0.

In May 1997 sampling at the "Tidal Linkage" station began. All deployment, calibration and QA/QC procedures were followed exactly as they are at the Oneonta Slough station.

Additionally, starting on May 23, 1997 plastic mesh sleeves were placed on sondes at both stations to inhibit crabs from interfering with the sensors.

5. Site location and character

General site Characteristics (TJE)

- a) Tidal exchange (extremes): approx. -2 MLLW,
 - b) Salinity: 4 ppt (extreme rain events) to 38 ppt
 - c) 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*).

Specific Site characteristics: Oneonta Slough

- a) Orientation of site: Datalogger 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: The Tidal Linkage

- a) Orientation of site: Datalogger 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 24.9 sec N, longitude is 117 deg 07 min 32.2 sec N. In November of 1999 the datalogger site was moved approximately 180 meters northwest to a deeper section of the same channel. The latitude of the new site is 32 deg 34 min 27.9 sec N, the longitude is 117 deg 07 min 37.8 sec W.
- b) The elevation of the channel bottom at the site prior to November 1999 is approximately 0.9m below Mean Sea Level. The depth at the new site has not yet been surveyed.
- c) Channel width: Approximately 5 meters at both the old and new sites
- d) Bottom type: mostly mud at both old and new sites.
- e) Direct impacts: none that are specific to the Tidal Linkage and not to the estuary as a whole. i.e. urban development, high periodic sewage inputs from

Mexico, etc.

6. Data Collection period:

Oneonta Slough

Began	Ended
12/21/98, 14:00:00	01/07/99, 15:00:00
01/07/99, 15:30:00	01/20/99, 15:00:00
01/20/99, 15:30:00	02/08/99, 12:30:00
02/09/99, 15:30:00	02/26/99, 13:00:00
02/26/99, 13:30:00	03/12/99, 17:00:00
03/12/99, 17:19:03	03/29/99, 14:49:03
03/29/99, 15:00:00	04/20/99, 10:30:00
04/20/99, 11:00:00	05/11/99, 15:30:00
05/11/99, 16:00:00	05/26/99, 14:30:00
05/26/99, 15:00:00	06/08/99, 13:00:00
06/08/99, 13:30:00	07/08/99, 13:00:00
07/08/99, 13:30:00	08/05/99, 12:00:00
08/05/99, 12:30:00	08/20/99, 07:30:00
08/20/99, 08:16:57	09/03/99, 09:46:57
09/03/99, 10:00:00	09/24/99, 14:30:00
09/24/99, 15:00:00	10/07/99, 14:00:00
10/07/99, 14:30:00	10/26/99, 14:00:00
10/26/99, 14:30:00	11/23/99, 15:30:00
11/23/99, 16:00:00	12/20/99, 14:30:00
12/21/99, 16:00:00	12/31/99, 23:30:00

Tidal Linkage

Began	Ended
12/22/98, 15:30:00	01/06/99, 14:00:00
01/06/99, 14:30:00	01/26/99, 14:30:00
12/03/99, 16:30:00	12/23/99, 23:30:00

7. Associated researchers and projects

Sharook Madon (PERL) is using temperature data from the dataloggers in a model to evaluate the value of marsh surface access in killi fish growth. Greg Williams and Janelle West (PERL) are looking at shifts in fish and invertebrate assemblages associated with the 1997 - 1998 el nino event. The Tidal Linkage channel 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

8. Variable sequence, column format, range of measurements, units for:

YSI 6000upg datalogger:

Variable Name	Range of Measurements (units)	Resolution
Accuracy		

Date	1-12,1-31,00-99 (Mo,Day,Yr)	1 month,1 day, 1 year	
Time	0-24,0-60,0-60 (Hr,Min,Sec)	1 hour, 1 minute, 1 second	
Temp	-5 TO 45 (C)	0.01 C	
SpCond	0-100 (mS/cm)	0.01 mS/cm	
Sal	0-70 parts per thousand (ppt)	0.1 ppt	
DO	0-200 (% air Saturation)	0.1% @air saturation	
DO	200-500 (% air saturation)	0.1% @air saturation	
DO	0-20 (mg/l)	0.01 mg/l	0.2 mg/l
DO	20-50 (mg/l)	0.01 mg/l	0.6 mg/l
Depth(shallow)	0-9.1(m)	0.001m	
pH	2-14 units	0.01 units	0.2 units
Turbidity	0-1000 (NTU)	0.1 NTU	
	5% of reading		or 2 NTU

(whichever is greater)

data columns are separated by tabs

9. Coded variable indicator and variable code definitions
Site definitions: OS = Oneonta Slough TL = Tidal Linkage

10. Data anomalies (suspect data):

January 1999

Oneonta Slough

a) 01/07(15:30) - 01/20(15:00), depth converted from ft to m
b) 01/28 (04:30) - 01/31(23:30) , average DO% and DOMg values show anomalous decline. May be due to storm event. Data were left in.
The following negative turbidity values were removed:

Date	Time	Turb
01/26/99	03:30:00	-0702
01/26/99	04:00:00	-0017
01/26/99	23:00:00	-0008
01/26/99	23:30:00	-0886
01/27/99	00:00:00	-0045
01/27/99	03:30:00	-0293
01/27/99	04:00:00	-0122
01/27/99	04:30:00	-0118

01/28/99 04:00:00 -0245
01/28/99 05:00:00 -0038

Tidal Linkage

a) Negative Depths

Date	Time
01/06/99	16:30-23:00
01/07/99	07:00-08:00, 17:00-23:30
01/08/99	09:00, 18:30-23:30
01/09/99	00:00, 20:00-23:30
01/10/99	00:00-01:00, 15:00-15:30, 20:00-23:30
01/11/99	00:00-01:00, 14:30-16:00, 22:30-23:30
01/12/99	00:00-01:00, 12:00-13:00, 17:00
01/13/99	00:00-01:30
01/14/99	00:30-02:30

b) 01/01(00:00) - 01/06(14:00), all parameters missing - sediment covered sensors. data were removed

c) 01/16(00:00) - 01/26(14:30), all parameters missing - sediment covering

bottom of deployment holder and sensors. Data were removed

February 1999

Oneonta Slough

02/01(00:00) - 02/08(12:30), DO% and DOmg anomalously low. May be due to storm

event. Data were not removed.

02/04(18:00) - 02/08(12:30), pH values anomalously low. May be due to storm

event. Data were not removed.

The following negative turbidity value was removed:

02/05/99 0:00:00 -0143

Tidal Linkage

no sonde deployed

March 1999

Oneonta Slough

03/12(17:30) - 03/29(15:00), time offset by -10min 57sec. Time values were

adjusted to nearest :00 or :30 min interval.

The following positive turbidity spikes removed:

Date	Time	Turb
03/10/99	13:30:00	0206
03/10/99	15:30:00	0282
03/13/99	17:30:00	0992

The following slightly negative turbidity value was recorded and not removed:

03/13/99 18:00:00 -0001

Tidal Linkage

no sonde deployed

April 1999

Oneonta Slough

04/20(11:00) - 04/30(23:30), DO% and DOmg missing - values fell below range of sensor. Data were removed.

04/20(11:00) - 04/30(23:30), pH missing - probe failed during deployment. Data were removed.

Tidal Linkage

no sonde deployed

May 1999

Oneonta Slough

05/01(00:00) - 05/11(15:30), DO% and DOmg missing - values fell below sensor range. Data were removed.

05/01(00:00) - 05/11(15:30), pH missing post calibration too low. Data were removed.

05/11(16:30) - 05/12(17:30), DO% and DOmg average values were anomalously high.

No reason found

Tidal Linkage

no sonde deployed

June 1999

Oneonta Slough

06/08(14:00) - 06/30(23:30), DO% and DOmg missing - values fell below range of

sensor early in deployment. Data were removed.

06/28(16:30) - 06/30(23:30), Turbidity missing - wiper parked over optics. Data were removed.

The following slightly negative turbidity values were recorded but not removed:

Date	Time	Turb	
06/04/99	00:00:00	-0001	
06/09/99	19:30:00	-0001	
06/10/99	20:30:00	-0001	
06/13/99	10:30:00	-0001	
06/13/99	16:00:00	-0001	
06/15/99	12:00:00	-0001	
06/20/99	17:00:00	-0001	
06/22/99	05:30:00	-0001	

Tidal Linkage
no sonde deployed

July 1999

Oneonta Slough

07/01(00:00) - 07/08(13:00), turbidity missing - wiper parked over optics. Data were removed

07/01(00:00) - 07/08(13:00), DO% and DOmg missing - data removed -values fell

below sensor range during deployment

07/19(22:30) - 07/31(23:30), ph missing - post cal showed probe decline. Data

were removed.

07/29(18:00) - 08/05(12:00), Turbidity missing - wiper parked over optics. Data were removed.

The following slightly negative turbidity values were recorded but not removed:

Date	Time	Turb
07/13/99	10:30:00	-0001
07/14/99	11:00:00	-0001
07/15/99	12:30:00	-0001
07/16/99	13:00:00	-0001
07/18/99	14:30:00	-0001
07/18/99	15:00:00	-0001
07/19/99	16:00:00	-0001
07/20/99	08:30:00	-0001

Tidal Linkage
no sonde deployed

August 1999

Oneonta Slough

08/01(00:00) - 08/05(12:00), specific conductance, salinity, DO%, DOmg and pH

missing - drift was too large towards end of deployment. Data were removed

08/05(12:30) - 01/00(17:31), Depth converted from ft to meters

08/05(12:30) - all parameters missing. Reading was taken too close to sonde

deployment. Data were removed.

08/20(08:30) - 08/31(23:30), time offset by (- 00:13:03). times corrected to

nearest 00:00:00 or 00:30:00 interval

08/22(20:00) - 08/31(23:30), DO% and DOmg missing - puncture in membrane suspected. Data were removed.

Tidal Linkage

no sonde deployed

September 1999

Oneonta Slough

09/01(00:00) - 09/03(09:30), DO% and DOmg missing - puncture in membrane suspected. Data were removed.

09/01(00:00) - 09/03(10:00), time offset by - 00:13:03 times corrected to nearest 00:00:00 or 00:30:00 interval

09/03(10:30) - 09/24(14:30), depth converted from ft to meters

09/24(15:00) - 09/30(23:30), pH data missing - probe malfunctioned during deployment. Data were removed

The following positive turbidity spikes were recorded and removed:

Date	Time	Turb
09/01/99	03:00:00	0314
09/01/99	03:30:00	0314
09/01/99	04:00:00	0314
09/01/99	04:30:00	0314
09/01/99	05:00:00	0314
09/01/99	05:30:00	0314
09/01/99	12:00:00	0314
09/01/99	12:30:00	0314
09/01/99	13:00:00	0314
09/01/99	13:30:00	0314
09/01/99	14:00:00	0314
09/01/99	14:30:00	0314
09/01/99	15:30:00	0314
09/01/99	16:00:00	0314
09/01/99	16:30:00	0314
09/01/99	17:00:00	0314
09/01/99	17:30:00	0314
09/02/99	18:30:00	0314
09/02/99	19:00:00	0314
09/02/99	19:30:00	0314
09/02/99	20:30:00	0314

Tidal Linkage

no sonde deployed

October 1999

Oneonta Slough

10/01(00:00) - 10/07(14:00), pH missing - probe malfunctioned during deployment.

Data were removed.

10/07(14:30) - 10/26(14:00), Depth values converted from feet to meters

Negative Turbidity

Date	Time
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10/26	19:30
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10/26	20:00
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Tidal Linkage

no sonde deployed

November 1999

Oneonta Slough

11/13(00:00) - 11/23(15:00), specific conductance, salinity, DO% and DOmg were removed. drift too large towards end of deployment.

Tidal Linkage

no sonde deployed

December 1999

Oneonta Slough

12/10(00:00) - 12/20(14:30), specific conductance, salinity, DO% and DOmg missing - Drift was too high towards end of deployment. Data were removed.

12/21(16:30) - 12/31(23:30) - depth converted from ft to meters

12/21 (16:30) -12/31(23:30), pH missing - probe malfunction.

The following negative turbidity (-0001) remain in the data set:

Date	Time
12/22	20:30-21:30
12/23	19:30, 23:00-23:30
12/24	10:30
12/26	00:30
12/27	11:00-12:00, 13:00-13:30
12/28	03:00, 13:30-14:00
12/30	04:30-05:00, 14:30
12/31	00:00, 06:00

Tidal Linkage

The following positive turbidity spikes were recorded and removed:

Date	Time	Turb
12/07/99	04:30:00	0155
12/15/99	15:30:00	1600
12/18/99	17:30:00	0136
12/18/99	19:00:00	0304
12/31/99	22:00:00	0274

The following negative depths remain in the data set:

Date	Time
12/04/99	02:30-03:30
12/07/99	18:00-19:30
12/09/99	19:30-20:30
12/10/99	18:30-21:00
12/16/99	21:30-23:30
12/17/99	00:00-02:30, 23:00-23:30
12/18/99	00:00-02:30, 14:30-16:30, 23:00-23:30
12/19/99	00:00-03:00, 16:00-17:00
12/20/99	01:00-03:00, 17:00-18:00
12/21-99	01:30-03:30, 17:30-18:30
12/29/99	20:30-22:00, 23:30

12/30/99 00:00-01:30

11. Missing Data:

January 1999

Oneonta Slough

01/01(00:00) - 01/07(15:00), pH missing - no probe installed.

01/20(15:30) - 01/31(23:30), pH missing - no probe installed.

The following negative turbidity values were removed:

Date	Time	Turb
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01/26/99	03:30:00	-0702
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01/26/99	04:00:00	-0017
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01/26/99	23:00:00	-0008
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01/26/99	23:30:00	-0886
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01/27/99	00:00:00	-0045
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01/27/99	03:30:00	-0293
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01/27/99	04:00:00	-0122
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01/27/99	04:30:00	-0118
----------	----------	-------

01/28/99	04:00:00	-0245
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01/28/99	05:00:00	-0038
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Tidal Linkage

01/01(00:00) - 01/06(14:00), all parameters missing - sediment covered sensors.

data were removed

01/06/99(15:00) - 01/15/99(23:30), Turbidity missing - no probe installed.

01/06(14:30), all parameters missing - first reading too close to the deployment. data were removed.

01/16(00:00) - 01/26(14:30), all parameters missing - sediment covering bottom

of deployment holder and sensors. Data were removed

01/26(15:00) - 01/31(23:30), all parameters missing - logger could no longer be

deployed at site due to slumping of banks which caused site to become too shallow.

February 1999

Oneonta Slough

The following negative turbidity value was removed:

02/05/99	0:00:00	-0143
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Tidal Linkage

02/01(00:00) - 02/28(23:30), all parameters missing - no sonde deployed.

02/08(13:00) - 02/09(15:00), all parameters missing - maintenace and calibration

March 1999

Oneonta Slough

03/29(15:30) - 03/31(23:30), all parameters missing- internal error, unit logged

but data file was corrupted and could not be downloaded.

Turbidity spikes removed:

Date Time Turb

03/10/99 13:30:00 0206

03/10/99 15:30:00 0282

03/13/99 17:30:00 0992

Tidal Linkage

03/01(00:00) - 03/31(23:30), all parameters missing - no sonde deployed.

April 1999

Oneonta Slough

04/01(00:00) - 04/20(10:30), all parameters missing- internal error, unit logged

but data file was corrupted and could not be downloaded.

04/20(11:00) - 04/30(23:30), DO% and DOmg missing - values fell below range of

sensor. Data were removed.

04/20(11:00) - 04/30(23:30), pH missing - probe failed during deployment.

Data

were removed.

Tidal Linkage

04/01(00:00) - 04/30(23:30), all parameters missing - no sonde deployed.

May 1999

Oneonta Slough

05/01(00:00) - 05/11(15:30), DO% and DOmg were removed - values fell below

sensor range

05/01(00:00) - 05/11(15:30), pH missing, post calibration readings too low. Data

were removed.

05/11(16:00), all parameters missing - maintenance and calibration

Tidal Linkage

05/01(00:00) - 05/31(23:30), all parameters missing - no sonde deployed.

June 1999

Oneonta Slough

06/08(14:00) - 06/30(23:30), DO% and DOmg missing - values fell below range of

sensor early in deployment. Data were removed.

06/28(16:30) - 06/30(23:30), Turbidity missing - wiper parked over optics. Data were removed.
06/08(13:30) - all parameters missing - maintenance and calibration

Tidal Linkage

06/01(00:00) - 06/30(23:30), all parameters missing - no sonde deployed.

July 1999

Oneonta Slough

07/01(00:00) - 07/08(13:00), DO% and DOmg missing - values fell below sensor range during deployment. Data were removed.
07/01(00:00) - 07/08(13:00), turbidity missing - wiper parked over optics. Data were removed
07/08(13:30) - 07/08(16:00), all parameters missing - maintenance and calibration
07/19(22:30) - 07/31(23:30), ph missing - post calibration readings too low.
07/29(18:00) - 08/05(12:00), Turbidity removed - wiper parked over optics

Tidal Linkage

07/01(00:00) - 07/31(23:30), all parameters missing - no sonde deployed.

August 1999

Oneonta Slough

08/01(00:00) - 08/05(12:00), specific conductance, salinity, DO%, DOmg and pH missing - drift was too large towards end of deployment. Data were removed.
08/05(12:30) - all parameters missing. Reading was taken too close to sonde deployment. Data were removed.
08/20(08:00) - all parameters missing - there was a time offset (as recorded in the anomalies section) and the times were changed to the nearest :30 or :00 interval causing a gap in the data.
08/22(20:00) - 08/31(23:30), DO% and DOmg missing - puncture in membrane suspected. Data were removed.

Tidal Linkage

08/01(00:00) - 08/31(23:30), all parameters missing - no sonde deployed.

September 1999

Oneonta Slough

09/01(00:00) - 09/03(09:30), DO% and DOmg missing - puncture in membrane

suspected. Data were removed.

09/03(10:00) - all parameters missing - maintenance and calibration

09/24(15:00) - 09/30(23:30) pH data missing - probe malfunctioned during deployment. Data were removed****

The following positive turbidity spikes were recorded and removed:

Date Time Turb

09/01/99	03:00:00	0314
09/01/99	03:30:00	0314
09/01/99	04:00:00	0314
09/01/99	04:30:00	0314
09/01/99	05:00:00	0314
09/01/99	05:30:00	0314
09/01/99	12:00:00	0314
09/01/99	12:30:00	0314
09/01/99	13:00:00	0314
09/01/99	13:30:00	0314
09/01/99	14:00:00	0314
09/01/99	14:30:00	0314
09/01/99	15:30:00	0314
09/01/99	16:00:00	0314
09/01/99	16:30:00	0314
09/01/99	17:00:00	0314
09/01/99	17:30:00	0314
09/02/99	18:30:00	0314
09/02/99	19:00:00	0314
09/02/99	19:30:00	0314
09/02/99	20:30:00	0314

Tidal Linkage

09/01(00:00) - 09/30(23:30) , all parameters missing - no sonde deployed.

October 1999

Oneonta Slough

10/01(00:00) - 10/07(14:00), pH missing - probe malfunctioned during deployment.

Data were removed.

10/26(14:30) - 10/31(23:30), pH missing - no probe deployed.

Tidal Linkage

10/01(00:00) - 10/30(23:30) , all parameters missing - no sonde deployed.

November 1999

Oneonta Slough

11/23(15:30) - all parameters missing - maintenance and calibration

11/13(00:00) - 11/23(15:00), specific conductance, salinity, DO% and Dmg.

Drift too large towards end of deployment. Data were removed.

11/13(00:00) - 11/23(15:00), no pH - no probe installed.

Tidal Linkage

11/01(00:00) - 11/30(23:30), all parameters missing - no sonde deployed.

December 1999

Oneonta Slough

12/10(00:00) - 12/20(14:30), specific conductance, salinity, DO% and DOMg missing - Drift was too high towards end of deployment. Data were removed.

12/20(15:00) - 12/21(16:00), all parameters missing - maintenance and calibration.

12/21(16:30) -12/31(23:30), pH missing - probe malfunction. Data were removed.

Tidal Linkage

12/01(00:00)-12/03(16:00), all parameters missing - no sonde deployed.

12/03(16:30)-12/31(23:30), pH missing - no probe installed

The following positive turbidity spikes were recorded and removed:

Date	Time	Turb
12/07/99	04:30:00	0155
12/15/99	15:30:00	1600
12/18/99	17:30:00	0136
12/18/99	19:00:00	0304
12/31/99	22:00:00	0274