Jobos Bay (JOB) NERR WATER QUALITY METADATA
JANUARY 1999 TO DECEMBER 1999
Latest Update: September 27, 2001

I. Data Set & Research Descriptors

1. Principal investigator(s) and contact persons

Principal Investigator:
Carmen González
Manager, JBNERR
carmen.gonzalez@noaa.gov

Contact Persons:
Pedro Robles
Research Coordinator, JBNERR
pedro.robles@noaa.gov

Lic. Enid Malavé
Chemist I, JBNERR

Luis A. Encarnación
GIS Coordinator, JBNERR

Mailing Address:
Call Box B
Aguirre, Puerto Rico 00704
Phone: (787) 853-4617
Fax: (787) 853-4618

2. Entry verification:

After retrieving and carefully cleaning the dataloggers, they are examined to detect any structural damage to the body or to the probes. The DO membrane is checked for ruptures and then replaced if needed. The turbidity probe is examined to assure that no obstruction affects the wiper and that the sensor is clean. Manipulation and observation are registered in the field log for each deployment respectively.

The YSI is connected to a Pentium II 400 MHz IBM compatible computer and the data are reviewed using the YSI computer program Ecowatch for Windows that accompanies the YSI 6000 datalogger. The file is uploaded in two formats, one in YSI PC6000 format and the other in Comma Delimited format then the file is renamed to have a ".txt" extension. The YSI Ecowatch for Windows program is used to plot the data and delete the pre- and post deployment data that are not in range of the other readings. The program is used to perform basic statistical analysis (i.e., min., max., mean, std. dev.). Data is initially reviewed using the Ecowatch graphing tool. Data for a month is compiled into one single

Excel 97 data sheet for further examination to detect gross outliers, data recorded during instrument retrieval or caused by instrument failure.

Missing dates and times are checked before submitting the data to the Centralized Data Management Office. CDMO Excel macros are provided to assist in data review and data editing. Data is opened into this program and empty or unrecorded data spaces are filled with periods. Columns are formatted to have a specific size and specific number of decimal place holders as specified by the NERR CDMO. Date and time readings are also checked and outliers are identified. The outliers file is saved and printed for revision of each file. Missing data and explanatory reasons are recorded in the metadata missing data section.

Data that was found to be out of the instrument range or normal parameters for each sampling station is removed from the file and a period is inserted to the cell (s). Explanation for changes in data is also included in the metadata. Data that were outside the "normal" range of water quality for a particular site is investigated for validity based on filed observation, QC check, Ecowatch for Windows printouts, and the instrument diagnostics. The metadata form is submitted with the data to the CDMO. Data is stored in zip disks. Dr. Pedro Robles, Research Coordinator, is responsible for data management.

3. Research Objectives:

Three dataloggers are deployed at Mar Negro area, major component of Jobos Bay Estuarine Research Reserve, and are suspended from a pole at 0.3 meter from the bottom of the selected site. Only data from stations 9 and 10 will be submitted to the Centralized Data Management Office as part of the System-Wide Monitoring Program. Measurements are taken in thirty (30) minute intervals for approximately two-week periods. The sites are identified as representative of areas within the reserve and comparable to the sites that may be receiving impact from human activities in the surroundings areas.

Station number nine (9), the impacted site, collects water quality data in a site associated with runoff from littoral and basin mangroves areas. This sampling station is closer to the Electric Power Thermoelectric Plant, which makes it subject to runoff and potential spills contamination from this industrial facility. Information compiled from historical environmental documents indicate that station nine (9) was used as a disposal site for the residues of the previously operating sugar mill operation, which might have been a high organic input to the sediments.

Station number ten (10), located in the mangrove lagoon area is the reference or non-impacted site.

4. Research methods:

The Estuarine Water Quality Monitoring began on December 20, 1995 at Station nine (9), February 1, 1996 at Station ten (10). At this time we are only performing long term water quality monitoring.

Before each YSI 6000 datalogger is deployed, calibration and maintenance is performed following the manufacturer's instruction (YSI Manual addendum 7/94, sections 3,4 and 7). Calibration standards are only required for pH, salinity, and turbidity, all other parameters are done as described in the manual. Buffer solutions for two-point calibration (pH 7 and pH 10) are purchased from a scientific supply house. Salinity is calibrated via a specific conductance standard 1000 µs/cm and is purchased from a scientific supply house. This solution is also prepared in the laboratory of Department of Natural and Environmental Resources (DNER) utilizing KCl following specification of EPA methods.

The two-point turbidity calibration (as of January 01, 1997) was performed using a 0 NTU standard using lab grade DI water made at the DNER laboratory and 40 NTU standard purchased from a scientific supply house. We are now using (since Jan 01, 1997) a 200 NTU standard purchased from a scientific company. The dissolved oxygen membranes are replaced before deployment and are allowed to sit at least 24 hours prior to deployment.

The weather conditions and tide stage during deployment are recorded in the field observation log. Measurements of DO, pH, salinity, specific conductance, temperature, are taken with other calibrated field instruments to check the accuracy of the instrumentation.

Each YSI datalogger is tied with steel cable to a wrought iron galvanized pole, which is plunged into the sediments of each sampling area. Dataloggers are suspended from a pole at 0.3 meter from the bottom of the selected site. Every 30 minutes during the sampling period measurements are taken for date, time, temperature, specific conductance, salinity, dissolved oxygen saturation, dissolved oxygen concentration, depth, pH, and turbidity. Every two weeks the dataloggers are retrieved, uploaded, cleaned, inspected, and calibrated as noted previously. The datalogger is then ready to be deployed.

5. Site location and character:

The Jobos Bay National Estuarine Research Reserve (JOBNERR) is located on the southern

coastal plain of the island of Puerto Rico, a reserve within the West Indies geographical area. JOBNERR is composed of two major areas: (1) Mar Negro, located on the western margin of the Bay, and (2) Cayos Caribe, a chain of 15 tear-shaped islets located to the southeast. The Mar Negro area comprises the bulk of the Reserve, and consists of mangrove forests and a complex system of lagoons and channels interspersed with salt and mud flats. Coral reefs and seagrass beds, with small beach deposits and upland areas fringe Cayos Caribe mangrove islands.

Station 9 is an impacted site and is located at the northeastern part of the Mar Negro unit. The sampling station is associated with the mangrove lagoon area and received the Thermoelectric Power Plant runoff through mudflats and areas adjacent. The tidal range varies from 12 in. to 14 in. in the vicinity of the monitoring station. No fresh water input in the vicinity of the station is probable. The salinity at the vicinity of the monitoring station varies from 0.0 ppt to 41.1 ppt. The station pole is located at 17° 56' 36.8" N and 66° 14' 18.5" W.

Station 10 is located in a mangrove lagoon not impacted from upland or marine activities. It provided a reference for comparison of the data obtained in other stations, especially to the stations in Mar Negro lagoon environment. The tidal range varies from 12 in. to 14 in. in the vicinity of the monitoring station. No fresh water input in the vicinity of the station is probable. The salinity at the vicinity of the monitoring station varies from 0.0 ppt to 41.7 ppt. The pole is located at 17° 56' 20.3" N and 66° 45' 26.7" W.

Station 11 datalogger is tied to a small pier stand in the westernmost lagoon in the Mar Negro unit. Although a chain from a small pier suspends this datalogger, and it has been deployed at the same depth of the other dataloggers. Non point sources of contaminants from residences and boating activities in the vicinity are probable. The lagoon is characterized by dark bottom, tidal range from 12 in. to 14 in., allegedly related to long-term deposition of organic wastes from the sugar mill operation when the mill was operating. No fresh water input in the vicinity of the station is probable. The salinity at the vicinity of the monitoring station varies from 0.0 ppt to 36.7 ppt. The datalogger is suspended by a chain and localized at 17° 56' 41.8" N and 66° 15' 46.0" W.

Data from stations 9 and 10 are the only one to be submitted to the CDMO. Of five sondes we have, two will be permanently devoted to take reading from this two sites, while other two will serve as replacement when sondes are taken out of the water for data upload and maintenance. This will avoid data

gaps for station 9 and 10 between sonde maintenance procedures. Data collected by station 11 will not be submitted because of gaps that will result at sonde retrieval for data uploading and maintenance. All monitoring is considered long term.

6. Data collection period:

Station nine (9) sampling with the YSI began on December 20, 1995.
Station ten (10) sampling with the YSI began on February 1, 1996.

7. Associated researchers and projects:

A water quality and plankton monitoring scheme was initiated in 1995, to monitor 12 stations in the Jobos Bay system. This effort, conducted by the Department of Natural and Environmental Resources Laboratory began in March 1995, using a Hydrolab Data sonde 3 with a Surveyor 3 readout system, monitoring the water column on a bimonthly time basis for abiotic parameter similar to the YSI. Monthly samples for nutrients, plankton and chlorophyll were conducted from March to October (Water Quality Monitoring-Spatial and temporal variations of main abiotic and plankton components in JOBNERR, 1996). Samplings were resumed in January 1996 and will be conducted until March 1997).

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

Variable Name	Range of Measurements (units)	Resolution	Accuracy
Date	1-12, 1-31, 00-99 (month, Day, Year)	(1 month, l day, and 1 year)	NA
Time	0-24, 0-60, 0-60 (Hr, Min, Sec)	(1 hour, 1minute, 1second)	NA
Temp	-5 to 45 (degrees °C)	0.01 °C	+/- 0.15 °C of reading
SPCond	0-100 (mS/cm)	0.01mS/cm	+/- 0.5% of reading + 0.001 ms/cm
Salinity	0-70 (parts per thousand, ppt)	0.01ppt or 0.1ppt, Whichever is greater	+/- 1% of reading
Dosat	0-200 (% saturation)	0.1% air saturation	+/- 2% air saturation
Dosat	200-500 (% saturation)	0.1% air saturation	+/- 6% air saturation

Domg 0-20 (mg/1) 0.01 mg/L +/- 0.2
mg/L
Domg 20-50 (mg/1) 0.01 mg/L +/- 0.6
mg/L
Depth 0-9.1 (meters) 0.00l meters +/-
0.018 meters
pH 2-14 0.01 units +/- 0.2 reading
Turbidity 0-1000 NTU 0.1 NTU +/- 5%
of reading
2 NTU, Whichever
is greater

9. Coded variable indicator and variable code definitions:
Site definitions: S09 = Station 9
Site definitions: S10 = Station 10
File definitions: site/month/year (ex: XXaug95 = Station data from August of 1995).

10. Data anomalies:

January 1999
Station 09
None

Station 10
Negative and zero turbidity values were recorded sporadically throughout 1/22-1/31; data were deleted

February 1999
Station 09
None

Station 10
Negative and zero turbidity values were recorded sporadically throughout 2/1-2/11; data were deleted

March 1999
Station 09
Negative turbidity values were deleted on the following dates:
3/21/1999 12:00:00
3/22/1999 20:30:00-21:30:00

Station 10
Negative and zero turbidity values were recorded sporadically throughout 3/12-3/23; data were deleted

April 1999
Station 09
Negative turbidity values were deleted on the following dates:

4/18/1999 18:00:00
4/24/1999 19:30:00
4/28/1999 05:00:00
4/28/1999 15:00:00
DO membrane appears compromised possibly due to membrane puncture; data deleted from 4/30/1999
14:00:00-23:30:00.

Station 10
None

May 1999
Station 09
DO membrane appears compromised possibly due to membrane puncture; data deleted from 5/1/1999
00:00:00-5/8/1999 06:00:00
All data was deleted from 5/14/1999 16:00:00-5/15/1999 13:30:00; data was very low and suspect
Turbidity very high (>1000 NTU) and erratic during the month

June 1999
Station 09
The following negative turbidity values were deleted:
06/12/1999 21:30:00-22:00:00
06/13/1999 04:00:00, 09:30:00
06/14/1999 08:30:00, 10:00:00-11:00;00, 12:30:00-13:00:00, 14:30:00
06/15/1999 07:00;00, 08:00:00, 11:00:00

DO data deleted 06/14/1999 10:30:00 – 06/15/1999 15:30:00 and from 6/29/1999 19:30:00 – 06/30/1999
23:30:00 due to a DO membrane puncture.

Specific conductivity and salinity was very low beginning 6/25/1999 16:00:00 throughout 07/21/1999
09:30:00 possibly due to a bad calibration standard. Data was retained.

Station 10
Negative and zero turbidity values were recorded sporadically throughout 6/4-6/30; data deleted.
DO data deleted due to a bad DO probe from 6/25/1999 16:00:00 through 06/30/1999 23:30:00.

Specific conductivity and salinity was very low beginning 6/01/1999 00:00:00 throughout 06/02/1999
09:30:00 possibly due to a bad calibration standard. Data was retained.

Specific conductivity and salinity was very low beginning 6/25/1999 16:00:00 throughout 07/21/1999
09:30:00 possibly due to a bad calibration standard. Data was retained.

July 1999
Station 09

Negative turbidity values deleted: 07/05/1999 03:00:00, 07/14/1999 03:00:00. Negative turbidity values deleted sporadically from 07/23/1999 – 07/29/1999.

Specific conductivity and salinity was very low beginning 6/25/1999 16:00:00 and lasted throughout 07/21/1999 09:30:00 possibly due to a bad calibration standard. Data was retained. Possible bad calibration standard was used again for second deployment starting 07/23/1999 16:00:00 through 08/09/1999 09:00:00 were specific conductivity and salinity data were very high for the month.

Station 10
DO data deleted due to DO membrane puncture from 7/01/1999 00:00:00 through 07/21/1999 09:30:00
Negative turbidity values were recorded sporadically throughout 07/1-07/20; data deleted.
High turbidity values (>1000 NTU) were recorded from 07/12/1999 – 07/20/1999; data retained.

Specific conductivity and salinity was very low beginning 6/25/1999 16:00:00 throughout 07/21/1999 09:30:00 possibly due to a bad calibration standard. Data was retained.

August 1999
Station 09
Negative and zero turbidity values were recorded sporadically throughout 8/1-8/28; data deleted.
DO data deleted from 8/9/1999 01:00:00 – 09:00:00 due to DO membrane puncture

Possible bad calibration standard was used again for second deployment starting 07/23/1999 16:00:00 through 08/09/1999 09:00:00 were specific conductivity and salinity data were very high for the month.

Station 10
Turbidity values >1000 NTU were recorded at the following times; data RETAINED:
08/21/1999 22:30:00
08/25/1999 01:00:00
08/26/1999 03:30:00

Low DO data deleted on 08/17/1999 00:00:00 and from 08/22/1999 04:00:00 – 10:00:00 due to temporal fouling.

September 1999
Station 09
The following negative turbidity values were deleted:
09/05/1999 06:00:00-06:30:00, 07:30:00, 10:00:00-11:00:00, 12:00:00, 13:00:00-13:30:00, 21:00:00-22:00:00, 23:00:00

09/06/1999 05:00:00

November 1999
Station 09
The following negative turbidity values were deleted:
11/03/1999 16:00:00
11/04/1999 00:00:00, 13:00:00, 15:00:00
11/06/1999 13:00:00
11/11/1999 13:30:00
11/30/1999 07:30:00

DO data compromised due to possible membrane puncture and was deleted from 11/06/1999 09:30:00 –
11/22/1999 08:00:00.

Sonde malfunction occurred at 11/14/1999 14:30:00 where depth, pH and turbidity were not recorded. All
data deleted at this time.

December 1999
Station 09
Negative and zero turbidity values were recorded sporadically throughout 12/3-12/6; data were deleted

11. Missing data:

January 1999
Station 09
01/01/1999 00:00:00 through 01/20/1999 08:00:00 no data due to battery problems; sonde recorded no data
during deployment
01/20/1999 08:30:00 through 01/22/1999 15:30:00 no data due to sonde maintenance

Station 10
01/01/1999 00:00:00 through 01/20/1999 08:00:00 no data due to battery problems; sonde recorded no data
during deployment
01/20/1999 08:00:00 through 01/22/2000 15:30:00 no data due to sonde maintenance
Negative and zero turbidity values were recorded sporadically throughout 1/22-1/31; data were deleted

February 1999
Station 09
02/16/1999 04:00:00 through 02/28/1999 23:30:00 no data due to sonde maintenance

Station 10
02/16/1999 09:30:00 through 02/17/1999 10:30:00 no data due to sonde maintenance

02/17/1999 11:00:00 through 02/28/1999 23:30:00 sonde did not collect data due to an error in the
calibration procedure
Negative and zero turbidity values were recorded sporadically throughout 2/1-2/11; data were deleted

March 1999
Station 09
03/01/1999 00:00:00 through 03/10/1999 08:30:00 sonde did not collect data due to an error in the
calibration procedure
03/10/1999 09:00:00 through 03/12/1999 15:30:00 no data due to sonde maintenance
03/23/1999 09:00:00 through 03/26/1999 09:00:00 no data due to sonde maintenance
03/30/1999 18:00:00 through 03/31/1999 23:30:00 no data due to malfunctioning datasonde
Negative turbidity values were deleted on the following dates:
3/21/1999 12:00:00
3/22/1999 20:30:00-21:30:00

Station 10
03/01/1999 00:00:00 through 03/12/1999 15:30:00 sonde did not record any data
03/23/1999 09:00 through 03/26/1999 15:30:00 no data due to sonde maintenance
Negative and zero turbidity values were recorded sporadically throughout 3/12-3/23; data were deleted

April 1999
Station 09
04/01/1999 00:00:00 through 04/09/1999 11:30:00 no data due to sonde maintenance; sensors were painted
with anti-fouling spray to avoid biofouling.
Negative turbidity values were deleted on the following dates:
4/18/1999 18:00:00
4/24/1999 19:30:00
4/28/1999 05:00:00
4/28/1999 15:00:00
DO membrane appears compromised possibly due to membrane puncture; data deleted from 4/30/1999
14:00:00-23:30:00.

Station 10
04/07/1999 09:30:00 through 04/09/1999 11:30:00 no data due to sonde maintenance
04/09/1999 12:00:00 through 04/30/1999 23:30:00 file was lost due to computer failure

May 1999
Station 09
DO membrane appears compromised possibly due to membrane puncture; data deleted from 5/1/1999
00:00:00-5/8/1999 06:00:00

05/08/1999 06:30:00 through 05/31/1999 23:30:00 no data due to battery problems
All data was deleted from 5/14/1999 16:00:00-5/15/1999 13:30:00; data was very low and suspect

Station 10
No data; file was lost due to computer failure.

June 1999
Station 09
06/01/1999 00:00:00 through 06/04/1999 15:30:00 no data due to sonde maintenance
06/15/1999 16:00:00 through 06/25/1999 15:30:00 no data; file was lost due to computer failure

The following negative turbidity values were deleted:
06/12/1999 21:30:00-22:00:00
06/13/1999 04:00:00, 09:30:00
06/14/1999 08:30:00, 10:00:00-11:00;00, 12:30:00-13:00:00, 14:30:00
06/15/1999 07:00;00, 08:00:00, 11:00:00

DO data deleted 06/14/1999 10:30:00 – 06/15/1999 15:30:00 and from 6/29/1999 19:30:00 – 06/30/1999
23:30:00 due to a DO membrane puncture.

Station 10
Negative and zero turbidity values were recorded sporadically throughout 6/4-6/30; data were deleted
06/02/1999 10:00:00 through 06/04/1999 15:30:00 no data due to sonde maintenance
06/23/1999 15:00:00 through 06/25/1999 15:30:00 no data due to sonde maintenance
DO data deleted due to a bad DO probe from 6/25/1999 16:00:00 through 06/30/1999 23:30:00
No pH probe from 06/04/1999 16:00:00 through 06/23/1999 13:30:00

July 1999
Station 09
Negative turbidity values deleted: 07/05/1999 03:00:00, 07/14/1999 03:00:00. Negative turbidity values
deleted sporadically from 07/23/1999 – 07/29/1999.
07/21/1999 10:00:00 through 07/23/1999 15:30 no data due to sonde maintenance

Station 10
DO data deleted due to DO membrane puncture from 7/01/1999 00:00:00 through 07/21/1999 09:30:00
07/21/1999 10:00:00 through 07/23/1999 15:30 no data due to sonde maintenance
07/23/1999 16:00:00 through 07/31/1999 23:30:00 no data due to a corrupted file

August 1999
Station 09

Negative and zero turbidity values were recorded sporadically throughout 8/1-8/28; data were deleted
DO data deleted from 8/9/1999 01:00:00 – 09:00:00 due to DO membrane puncture
08/09/1999 09:30:00 through 08/11/1999 15:30:00 no data due to sonde maintenance

Station 10
08/01/1999 00:00:00 through 08/09/1999 08:00:00 no data due to corrupted file
08/09/1999 08:30:00 through 08/11/1999 15:30:00 no data due to sonde maintenance
08/26/1999 09:00:00 through 08/30/1999 09:00:00 no data; file was lost due to computer failure
08/30/1999 09:30:00 through 08/31/1999 23:30:00 sonde not deployed because bad weather

Low DO data deleted on 08/17/1999 00:00:00 and from 08/22/1999 04:00:00 – 10:00:00 due to temporal
fouling.

September 1999
Station 09
The following negative turbidity values were deleted:
09/05/1999 06:00:00-06:30:00, 07:30:00, 10:00:00-11:00:00, 12:00:00, 13:00:00-13:30:00, 21:00:00-
22:00:00, 23:00:00
09/06/1999 05:00:00

09/07/1999 09:00:00 through 09/10/1999 15:30:00 no data due to sonde maintenance
09/10/1999 16:00:00 through 09/30/1999 23:30:00 no data due to the sonde remaining in the water a long
time due to of bad weather; sonde lost all data due to battery failure

Station 10
No data; file was lost due to computer failure

October 1999
Station 09
No data; file was lost due to computer failure

Station 10
No data; file was lost due to computer failure

November 1999
Station 09
The following negative turbidity values were deleted:
11/03/1999 16:00:00
11/04/1999 00:00:00, 13:00:00, 15:00:00
11/06/1999 13:00:00
11/11/1999 13:30:00
11/30/1999 07:30:00

DO data compromised due to possible membrane puncture and was deleted from 11/06/1999 09:30:00 –
11/22/1999 08:00:00.

Sonde malfunction occurred at 11/14/1999 14:30:00 where depth, pH and turbidity were not recorded. All
data deleted at this time.

11/19/1999 04:30:00 through 11/19/1999 10:30:00 sonde did not record data for this period
11/22/1999 08:30:00 through 11/24/199915:30:00 no data due to sonde failure

Station 10
No data; file was lost due to computer failure

December 1999
Station 09
Negative and zero turbidity values were recorded sporadically throughout 12/3-12/6; data were deleted
12/14/1999 12:00:00 through 12/16/1999 15:30:00 no data due to sonde maintenance
12/16/1999 16:00:00 through 12/31/1999 23:00:00 no data; file was lost due to computer failure

Station 10
No data; file was lost due to computer failure

12. Other remarks
Several files were lost when our hard disk crashed. In most occasions a file had information that was part of
two months. Backup copies were available for most files but not all.

During the following date and times, depth was recorded in feet instead of meters. Data were later
converted to meters for Station 10 on the following dates:
1/22/99 16:00 – 02/16/99 09:00
04/01/99 00:00 – 04/07/99 09:00
06/01/99 00:00 – 06/02/99 09:30