NOC NERR Metadata Water Quality Form

January - December 1996

Revised January 11, 2011

I. Data Set & Research Descriptors

1)Principal Investigator(s) and Contacts:

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2)Entry Verification Process:

The data are reviewed using the computer program PC6000 that accompanies the YSI 6000 datalogger. After the file is uploaded from the water quality instrument, PC6000 is used to plot the data and perform basic statistical analysis (i.e., min., max., mean, std. dev.). This information is printed out and attached to the Field Log for the particular deployment. This printout is used during file review to detect any gross outliers such as data taken when the water quality instrument was removed from the water or those caused by instrument failure. The data are imported into a Microsoft Excel file that contains the current month's cumulative recordings. When a complete month of data has been recorded the file is ready for review. The data review includes several steps. The first step is to format the data so that the parameter columns are in the correct order and the data have the correct number of decimal place holders. Secondly, an Excel macro is used to check for any dates and times that data were not recorded due to maintenance, battery failure, or other causes. Missing dates and times are inserted into the file and a period is inserted into the cells where data would normally be. An explanation for the missing data is recorded onto the Water Quality Editing Log. Next, the data are filtered using an Excel macro to find readings outside the instrument measurement range and the "normal" range

for the site in question. Data outside the instrument range are removed from the file and a period is inserted into the cell(s). An explanation for the missing dates and times are recorded onto the Water Quality Editing Log. Data outside the "normal" range of water quality for a particular site were investigated for validity based on weather data, field observations, QC checks, PC6000 printouts, and instrument diagnostics. If the data are rejected from the file a period is inserted into the cell(s) and an explanation for the missing dates and times are recorded onto the Water Quality Editing Log. The information recorded on the Water Quality Editing Log is transferred to the metadata form. The metadata form is then submitted with the data file to the CDMO. Paul Grimshaw initially reviewed and edited the 1996 data. William Thompson reviewed and re-edited the 1996 data and metadata.

3)Research Objectives:

Water quality instruments are deployed at the Masonboro Island and Zeke's Island components of North Carolina's National Estuarine Research Reserve and are anchored to the bottom of the selected sites. Measurements are taken at 30 minute intervals for approximately two week periods. These sites are relatively unimpacted by manmade perturbations.

4)Research Methods:

The Estuarine Water Quality Monitoring Program began on 2 March 1992 at the Masonboro Island component, and 19 May 1994 at the Zeke's Island component. The procedures described below were instituted in June 1995 and thus do not cover data recorded previously. At this time we are only performing long term water quality monitoring and not a specific experiment.

Before each YSI 6000 is deployed, calibration and maintenance is performed following the manufacturer's instructions (YSI Manual addendum 7/94, sections 3,4, and 7). Calibration standards are only required for pH, turbidity and salinity; all other parameters are done as described in the manual. Buffer solutions for 3 point pH calibration (pH 4,7 and 10) are purchased premade from a scientific supply house. Turbidity standards are also purchased premade from a scientific supply house. The salinity standard is obtained from filtered seawater taken from Masonboro Sound and analyzed at the Center for Marine Science Research (CMSR)in Wilmington, NC using an osmometer. The dissolved oxygen membranes are replaced before deployment and are allowed to sit at least 24 hrs prior to deployment.

During deployment the weather conditions and tide stage are recorded in the field observation log. Measurements of DO, pH, salinity, specific conductance, and temperature are taken with a calibrated YSI 6000 or other field instruments to check the

accuracy of the instrumentation before deployment (as of October 1995). The water quality instrument is placed inside a locked steel cage, then anchored to the bottom, and chained to a post at the monitoring site. Every 30 minutes during the sampling period measurements are taken for temperature, specific conductance, salinity, dissolved oxygen saturation, dissolved oxygen concentration, depth, pH, and turbidity.

At the end of the sample period the water quality instrument is either brought back to the laboratory or serviced in the field. If the water quality instrument is serviced in the field the DO sensor is either replaced with one that has a new membrane or the old membrane is wiped with lens paper moistened with tap water to remove biofouling. The weather and water quality measurements are again noted in the field observation log. The calibration drift and the effect of biofouling on the water quality instrument are checked by comparing data readings in calibration standards or against a recently calibrated YSI 6000. The water quality data Is then uploaded, and the instrument is cleaned and calibrated as noted previously. The water quality instrument is then ready to be redeployed.

5)Site Location and Character:

The four components of North Carolina's National Estuarine Research Reserve (from north to south) are: Currituck Banks, Rachel Carson, Masonboro Island and Zeke's Island. They are

located along the southeastern coast of the United States in the Atlantic Ocean. Currently, only data from Masonboro and Zeke's Island components are transferred to the CDMO. The two sites are:

1. Research Creek, Masonboro Island

The Masonboro Island site is 0.72 km north east from the mouth of Whiskey Creek, and east of the Intracoastal Waterway (ICW), in a small navigable channel called Research Creek at 34 deg 09'21.7" latitude and 77 deg 50'59.9" longitude (GPS position). The site has a salinity range of 18-35 ppt and a tidal range that averages 1.2 meters.

2. East Cribbing, Zeke's Island

The Zeke's Island site is located 1.8 km south of Federal Point boat launch in a tidal basin estuary at 33 deg 56'23.5" latitude and 77 deg 56'28.1" longitude (GPS position). This site receives minimal freshwater input from leakage of the Cape Fear River through the 5.6 km rock jetty that separate the two bodies of water. Thus, the ocean tidal input through New Inlet is a major factor in maintaining the high salinity; however during rainy periods major drops in salinity may occur. The site has a salinity range of 15-35 ppt and a tidal range that averages 2 meters.

6)Data Collection Period

Research Creek data collection began on 2 March 1992, while East Cribbing data collection commenced on 19 May 1994. All

monitoring is considered long term.

7)Associated Researchers and Projects

Lancaster, J./UNC Chapel Hill

Ross, S./NOC NERR

Masonboro Island surf zone fish survey

NOC NERR

Climatological monitoring

Ross, S./NOC NERR

Grimshaw, P./NOC NERR

Effects of non-point source pollution on estuarine water quality

Ross, S./NOC NERR

Grimshaw, P./NOC NERR

Bichy, J./NOC NERR

Water quality & nekton monitoring

Ross, S./NOC NERR

Stokesbury, K./NOC NERR

EMAP - Estuaries

Mallin, M./UNC-Wilmington

Tidal creek survey

II. Physical Structure Descriptors

8) Sensor specifications, range of measurements, units, resolution, and accuracy:

YSI 6000 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

9) Coded variable indicator and variable code definitions:

Site definitions: RC=South Research Creek, Masonboro Island*

EC=East Cribbing, Zeke's Island*

File definitions: site/month/year (ex.: ZI0895 = Zeke's Island data from August of 1995).

*The RC site was formerly designated as Masonboro Island (MS) and EC was formerly designated as Zeke's Island (ZI). Name changes were made on 1/11/2011 to be consistent with later station designations made necessary by the addition of an additional station in each component, and to clearly indicate that the station location throughout the North Carolina Reserve's historical data set. Raw file names were not changed. Please contact the Reserve directly or the NERRS Centralized Data Management Office for more information on this update.

10) Data anomalies (suspect data):

This section lists data that are extreme for the aquatic system being monitored or are outside the measurement range of the instrument. The cause of such anomalies may be a bad calibration, boat traffic disturbances, or a malfunction of the instrument.

January 1996

File Name MS0196

1/5 1100- 1/18 1530 Damage to pH probe was discovered at end of deployment, data after the last "normal" sample were removed.

File Name ZI0196

1/20 0400 Datalogger partially exposed at low tide, all data removed.

February 1996

File Name MS0296

2/8 1530-1700	Datalogger partially exposed at low tide, all data removed.
2/9 0400-0600	Datalogger partially exposed at low tide, all data removed.

March 1996

File name MS0396

3/7 1800	High turbidity event, see Section 12.

File Name ZI0396

3/4 0530- 3/5 0730	Specific conductivity/salinity sensor malfunction may have influenced DO readings during corresponding interval. However, data within typical range for station.
3/4 0530- 3/5 0730	Specific conductance/salinity data removed because of probe malfunction.
3/5 0800- 3/22 1430	Specific conductance/salinity/oxygen

data removed because of probe malfunction.

April 1996

File Name MS0496

4/9 2230 High turbidity event, see Section 12.

4/14 1300- 4/16 1030 DO% and DO mg/l readings removed because they were out of instrument range.

4/18 0800- 2030 Erratic turbidity readings. Probable probe malfunction.

4/19 1330- 4/30 1030 Erratic turbidity readings. Probable probe malfunction.

File Name ZI0496

4/3 1900- 4/5 1100 Turbidity probe failure. Wiper parking over optics.

May 1996

File Name MS0596

5/2 0130-0200 & Instrument moved to shallow water and

	1300-1400	thus partially exposed at low tide. See missing data section.
5/3	0230-0300 & 1400-1500	Instrument moved to shallow water and thus partially exposed at low tide. See missing data section.
5/4	0230-0400 & 1430-1700	Instrument moved to shallow water and thus partially exposed at low tide. See missing data section.
5/5	0330-0500 & 1500-1700	Instrument moved to shallow water and thus partially exposed at low tide. See missing data section.
5/6	0430-0530	Instrument moved to shallow water and thus partially exposed at low tide. See missing data section.
5/8	0730-0900 1000-1130, 1600-2100, 2200	High turbidity event, see Section 12.
5/18	1830	High turbidity event, see Section 12.
5/19	1230	High turbidity event, see Section 12.
5/22	1500-1700	Instrument moved to shallow water and thus partially exposed at low tide. All

data were removed.

File ZI0596

5/12 2100 High turbidity event, see Section 12.

5/26 0800- 5/31 2330 Puncture in DO membrane, all data removed.

June 1996

File ZI0696

6/1 0000- 6/13 0830 Puncture in DO membrane, all data removed.

6/1 0000- 6/13 0830 Erratic turbidity readings. Probe malfunction.

July 1996

MS0796

7/12 1830- 7/14 1530 DO % and DO mg/l values above instrument top range, however the times recorded correlate with Hurricane Bertha. See missing data section.

7/14 1600 Out of range DO reading.

7/16 0930- 1230

0100, 0200 Out of range DO reading.

7/17 0000-0130 0230, 0630, 0800 Low DO event, DO % and DO mg/l below instrument range. All other data during interval in normal range and post calibration check satisfactory.

ZI0796

7/2 1900 High turbidity event, see Section 12.

7/27 1100 High turbidity event, see Section 12.

7/31 1500, 1600, & 1700 High turbidity event, see Section 12.

August 1996

MS0896

8/12 0830 High turbidity event, see Section 12.

8/13 1300- 8/19 1100 Erratic turbidity readings. Probable probe failure.

ZI0896

8/1 0200- 8/2 0630 Erratic turbidity readings, probe fouling.

8/13 1200 High turbidity event, see Section 12.

8/14 0730 High turbidity event, see Section 12.

8/17 0700 High turbidity event, see Section 12.

8/18 1130 High turbidity event, see Section 12.

8/20 1000 High turbidity event, see Section 12.

8/26 1300- 8/31 2330 Erratic turbidity readings.

September 1996

ZI0996

9/1 0000- 9/11 1300 Erratic and negative turbidity readings. Probable probe failure.

9/21 1030 High turbidity events, see Section 12.

9/23 1630- 9/30 2330 DO % and DO mg/l erratic, all data removed. Sulfur bacteria slime deposits found on datalogger.

9/24 1630-1700 High turbidity events, see Section 12.

9/25 0530- 9/30 2330 Turbidity wiper parked over optics causing probe malfunction, see Section 12.

October 1996

MS1096

10/11 1300- 10/12 2200 DO readings erratic, removed.

10/15 2200- 10/23 1100 DO % and DO mg/l erratic, puncture found in membrane.

10/30 1900 Probe appeared to be partially buried in sediments, depth, ph, and turbidity data was not removed. DO/salinity/temp probe appeared unaffected.

ZI1096

10/1 0000- 10/9 1130 DO %, DO mg/l and turbidity data erratic, sensor may have been partially covered in sediment. Turbidity wiper parking problem.

November 1996

MS1196

11/1 1230,1530 High turbidity events, see Section 12.

11/3 0300 High turbidity events, see Section 12.

11/6 1100, 1230-1300 High turbidity events, see Section 12.

11/8 0230,0400,0600, 0730,2200 High turbidity events, see Section 12.

11/12 1630 Instrument lifted from water during sample for unknown reason.

11/26 1130-11/27 0130 Depth sensor malfunction.

ZI1196

11/27 0200- 11/30 2330 Depth sensor malfunctioned early in deployment, but seem to recover to normal operation.

December 1996

MS1296

12/7 0530 High turbidity events, see Section 12.

ZI1296

12/14 1430- 12/19 0300 DO % and DO mg/l data removed because of negative readings and calibration check was off by 1.58 mg/l at end of deployment.

12/16 1730- 12/19 0300 Turbidity wiper parked over optics causing probe malfunction, see Section 12.

12/31 1600-2330 pH sensor failed.

11) Missing data:

Approximately every 2-3 weeks, there is a period of between 1 to 24 hrs (occasionally longer) of missing data due to maintenance and calibration. During the maintenance period all parameters will be missing.

A record and explanation of missing data that are not related to routine maintenance is kept in the field log for the particular deployment. All parameters recorded when the water quality instrument is exposed to air during a sample, either by an extremely low tide or physical displacement from its original location, are removed. Special note should be made regarding missing dissolved oxygen (DO) saturation (%), DO concentration (mg/l), specific conductance, salinity, and temperature measurements. If the DO saturation (%) data are removed, due to sensor malfunction or other circumstances, the DO concentration (mg/l) will also be missing. The DO concentration (mg/l) is calculated from DO saturation (%) and temperature data. This is also true for specific conductance and salinity data. Salinity (ppt) is determined by the YSI 6000 using specific conductance and temperature data. If the temperature sensor malfunctions and the corresponding data are removed, all parameters requiring these data (DO saturation, DO concentration, specific conductance, salinity, and pH) will also be removed.

January 1996

File Name MS0196

1/1 0000- 1/31 2330	Instrument deployed without turbidity sensor.
1/5 1100- 1/18 1530	pH probe found damaged at end of deployment and thus suspect data removed after last normal reading.
1/18 1600-1630	Maintenance.
1/22 1330-1/30 1430	Maintenance, no data collected.

File Name ZI0196

1/1 0000- 1/3 1500	Data not recorded because of sample program timeout.
1/3 1530- 1/31 2330	Turbidity data not recorded because instrument deployed without turbidity probe.
1/20 0400	Data removed because datalogger partially exposed at low tide.

February 1996

File Name MS0296

2/1 0000- 2/27 0900	Turbidity data not recorded because instrument deployed without turbidity probe.
2/8 1530-1700	Data removed because datalogger partially exposed at low tide.
2/9 0400-0600	Data removed because datalogger partially exposed at low tide.
2/16 1630- 2/19 1430	Data not collected because telemetry system had a data format error.
2/21 1100	Maintenance.
2/27 0930	Maintenance.

File Name ZI0296

2/1 0000- 2/27 1400	Turbidity data not recorded because instrument deployed without turbidity probe.
2/4 0030- 2/9 1100	Data not collected because of powerloss

to datalogger.

2/27 1430 Maintenance

March 1996

File Name MS0396

3/14 1600- 3/31 2330 No turbidity probe deployed.

File Name ZI0396

3/4 0530- 3/5 0730 Specific Conductance/Salinity data removed because of probe malfunction See notes section.

3/5 0800- 3/22 1430 Specific Conductance/Salinity/Oxygen data removed because of probe malfunction. See notes section.

April 1996

MS0496

4/9 0800 YSI 6000 skipped sample.

4/14 1300- 4/16 1030 DO % and DO mg/l readings removed because they were out of instrument range.

4/16 1100	YSI 6000 skipped sample.
4/18 0800- 2030	Erratic turbidity readings. Probable probe malfunction.
4/19 1330- 4/30 1030	Erratic turbidity readings. Probable probe malfunction.

File Name ZI0496

4/3 1900- 4/5 1100	Turbidity probe failure. Wiper rotor failure.
4/5 1100	Maintenance.
4/5 1130- 4/30 2330	Turbidity data not recorded because instrument deployed without turbidity probe.
4/16 1130- 4/17 1130	Maintenance.

May 1996

File Name MS0596

5/2 0130-0200, 1300-1400	Instrument moved to shallow water and thus partially exposed at low tide. All data were removed.
5/3 0230-0300,	Instrument moved to shallow water and

1400-1500	thus partially exposed at low tide. All data were removed.
5/4 0230-0400, 1430-1700	Instrument moved to shallow water and thus partially exposed at low tide. All data were removed.
5/5 0330-0500, 1500-1700	Instrument moved to shallow water and thus partially exposed at low tide. All data were removed.
5/6 0430-0530	Instrument moved to shallow water and thus partially exposed at low tide. All data were removed.
5/20 1630-1600	Maintenance.
5/20 1630- 5/31-2330	Turbidity probe failure. All data removed.
5/22 1500-1700	Instrument moved to shallow water and thus partially exposed at low tide. All data were removed.

File ZI0596

5/1 0000- 5/3 1500	Turbidity data not recorded because instrument deployed without turbidity probe.

5/17 1500-1600	Maintenance.
5/17 1630- 5/31 2330	Turbidity data not recorded because instrument deployed without turbidity probe.
5/26 0800- 5/31 2330	DO % and DO mg/l data removed because of puncture in membrane.

June 1996

File MS0695

6/12 1100- 6/14 1130	Maintenance.

File ZI0696

6/1 0000- 6/13 0830	DO calibration check out of range. DO % and DO mg/l data removed due to puncture in probe membrane.
6/1 0000- 6/13 0830	Erratic turbidity. Probe fouled when retrieved.
6/13 0900-1130	Maintenance.
6/13 1200- 6/28 1030	Turbidity data not recorded because instrument deployed without turbidity probe.

6/28 1100- 6/29 1330 Maintenance.

July 1996

MS0796

7/1 1400- 7/2 0930 Maintenance.

7/14 1600 Out of range DO reading.

7/16 0930- 1230

0100, 0200 Out of range DO reading.

7/17 0000- 0130, 0230, 0630, 0800 Low DO event, DO % and DO mg/l below instrument range. All other data during interval in normal range and post calibration check satisfactory.

7/17 1330- 7/23 0830 Data not collected because YSI 6000 telemetry system malfunction.

7/28 1230-1400 Data not collected because Instrument switched from unattended logging mode to SDI-12 telemetry mode.

7/29 1500- 7/31 2030 Data not collected because of telemetry

system malfunction.

ZI0796

7/7 1930- 7/10 1330 No data collected because of powerloss to datalogger.

7/17 0930-1030 Maintenance.

August 1996

MS0896

8/7 0000-2330 Maintenance.

8/13 1300- 8/19 1100 Erratic turbidity readings. Probe failure.

8/19 1130- 8/31 2330 Unit incorrectly programmed for telemetry mode.

ZI0896

8/1 0200- 8/2 0630 Erratic turbidity readings, probable probe failure. Probe replaced.

8/2 0700- 8/5 1100 Maintenance.

8/20 1430 Maintenance.

8/26 1300- 8/31 2330 Turbidity probe possibly buried in

sediments. Erratic and negitive readings.

September 1996

MS0996

9/5 0730- 9/12 1530	Datalogger 6000 removed from water with the approach of Hurricane Fran.
9/24 1230	Maintenance.

ZI0996

9/1 0000- 9/11 1300	Turbidity erratic with negative readings. Probe possibly buried in sediments.
9/11 1330	Maintenance.
9/23 1630- 9/30 2330	DO data removed, possible inteference from Hydrogen sulfide. Sulfur bacteria slime deposits found on datalogger.
9/25 0530- 9/30 2330	Turbidity wiper parked over optics causing probe malfunction.

October 1996

MS1096

10/8 1430	Maintenance.
10/11 1300- 10/12 2200	DO readings erratic, removed.
10/15 2200- 10/23 1100	DO data removed, possible puncture in membrane.
10/23 1130	Maintenance.

ZI1096

10/1 0000- 10/9 1130	DO and turbidity data removed, sensor may have been partially covered in sediment as indicated by high turbidity data. Turbidity wiper parked over optics.
10/9 1200-1230	Maintenance.
10/23 1330	Datalogger skipped reading.

November 1996

MS1196

11/12 1630	All data was removed, instrument removed from water for unknown reason.
11/23 2200- 11/26	Maintenance.

1100

11/26 1130- 11/27 Depth sensor malfunction.
0130

ZI1196

11/6 1500-1530 Maintenance.

11/20 2230- 11/21 No data collected because of powerloss
1100 to datalogger.

11/21 1100-1130 Maintenance

December 1996

MS1296

12/11 1200-1300 Maintenance.

12/23 1300 Maintenance.

ZI1296

12/5 1500 Maintenance.

12/14 1430- 12/19 DO readings removed, some data negative
0300 and the calibration check was off by 1.58
mg/l at the end of the deployment.

12/16 1730- 12/19 Turbidity wiper parked over optics causing probe

300 malfunction, see Section 12

12/19 0330- 12/23 No data collected because of powerloss to

1000 datalogger.

12/23 1030 Maintenance

12/31 1600-2330 pH sensor failed.

12) Notes:

High turbidity values above the instrument's top range (1000

NTU), caused