NOC NERR Water Quality Metadata Form
January - December 1994
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 or Microsoft Excel for Hydrolab DataSonde 3 data. 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, the CDMO Excel 5.0 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 the CDMO 5.0 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 was responsible for data management in 1994.

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. Before a formal protocol was established for NERR water quality monitoring, hourly data at Masonboro and Zeke's Island were recorded as detailed in section 12. 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. At this time we are only performing long term water quality monitoring and not a specific experiment.

Before each YSI 6000 or Hydrolab DataSonde 3 are deployed, calibration and maintenance is performed following the manufacturer's instructions (YSI Manual addendum 7/94, sections 3,4, and 7 and Hydrolab Manual Revision B 4/91, part 3). Calibration standards are only required for pH and salinity; all other parameters are done as described in the manual. Buffer solutions for 2 point calibration (pH 7 and 10) are 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. 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, and pH.

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 water quality instrument is then uploaded, 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 Saturation	0-200 (% air saturation)	0.1% @air sat	+/-2% @air
DO Saturation	200-500 (% air saturation	0.1% @ air sat	+/- 6% @
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

Hydrolab DataSonde 3

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 50 (C)	0.01 C	+/- 0.15C
Sp COND	0-100(mS/cm)	0.01mS/cm	+/-0.5%
Salinity	0-70 Parts per thousand (ppt)	0.1 ppt	+/- 0.2ppt
DO Saturation	0-200 (% air saturation)	0.1% @air sat	+/-2% @air
DO	0-20 (mg/l)	0.01 mg/l	+/- 0.2mg/l
DO	20-50 (mg/l)	0.01 mg/l	+/- 0.6mg/l
Level	0-10 (m)	0.01m	+/- 0.09m
PH	2-14 units	0.01 units	+/- 0.2units

Data columns are separated by tabs

9) Coded variable indicator and variable code definitions:

Site definitions: RC=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):

January 1994

File MS0194

1/1 0000- 1/2 1100	Specific conductance and salinity data higher than historical record for this site.
1/25 0330-1/31 2300	pH data much lower than historical record, possibly due to calibration error or sensor malfunction. Data removed.

March 1994

File MS0394

3/1 0000-3/31 2330	pH data much lower than historical record, possibly due to calibration error or sensor malfunction. Data removed.
3/4 1500- 3/9 0900	Specific conductance and salinity data removed, out of instrument range.
3/14 1700-3/19 0200	Specific conductance and salinity data removed, out of instrument range.
3/29 1400-3/31 2200	Specific conductance, salinity, DO, and pH data removed, out of instrument range.

April 1994

File MS0494

4/1 0000-4/20 1600	Specific conductance, salinity, DO, and pH data removed, out of instrument range.
4/21 1900-4/29 2330	DO data removed, readings erratic.

4/21-1900-4/29 2330 pH probe malfunction. Data removed.

May 1994

File MS0594
5/1 0000 - 5/31 2330 pH data much lower than historical record, possibly due to calibration error or sensor malfunction. Data removed.

June 1994

File MS0694

6/1 0000-6/30 2330 pH data much lower than historical record, possibly due to calibration error or sensor malfunction. Data removed.

July 1994

File MS0794
7/1 0000-7/31 2330 pH data much lower than historical record, possibly due to calibration error or sensor malfunction. Data removed.

File Name ZI0794

7/9 1330-1930	Datalogger exposed at low tide. Data removed.
7/10 0230-0830, 1330-2030	Datalogger exposed at low tide. Data removed.
7/11 0330-0930 1430-2030	Datalogger exposed at low tide. Data removed.
7/12 0330-0930, 1530-2130	Datalogger exposed at low tide. Data removed.
7/13 0430-1030	Datalogger exposed at low tide. Data removed.

August 1994

File Name MS0894
8/1 0000-8/15 0600 pH data much lower than historical record, possibly due to calibration

	error or sensor malfunction. Data removed.
8/15 0630-8/26 1100	All data except temperature and depth removed due to datalogger malfunction.

October 1994

File Name MS1094

10/24 1900-10/31 2330	DO data removed from file because readings were continuously above 175% saturation and values dropped to normal range after 7 November maintenance.

November 1994

File Name MS1194

11/1 0000-11/7 1200	DO data removed from file because readings were continuously above 175% saturation and values dropped to normal range after 7 November maintenance.

File ZI1194

11/3 0330-0430	Datalogger out of water. Data removed.
11/4 0430-0530	Datalogger out of water. Data removed.

11) Missing data:

Approximately every 2-3 weeks, there is a period of between 1 to 24 hrs of missing data due to maintenance and calibration.

January 1994

File MS0194

No depth or turbidity probe deployed.

1/2 1130-1/5 1030	Maintenance.
1/16 1030-1/25 0300	Maintenance.
1/25 0330-1/31 2300	pH data much lower than historical

record, possibly due to calibration

error or sensor malfunction.
1/26 1800-1/31 2330 Data not collected.

File Name ZI0194
1/1 0000 - 1/31 2330 Data not collected.

February 1994

File MS0294
No depth or turbidity probe deployed.
2/1 0000 - 2/14 1500 Data not collected.

File Name ZI0294
2/1 0000 - 2/28 2330 Data not collected.

March 1994

File MS0394
No turbidity probe deployed.
3/1 0000-1400 Depth data not collected.
3/1 1430-3/4 1430 Maintenance.
3/1 0000-3/31 2330 pH data much lower than historical

record, possibly due to calibration

error or sensor malfunction.
3/4 1500- 3/9 0900 Specific conductance and salinity data

removed, out of instrument range.
3/9 0930-3/14 1630 Maintenance.
3/14 1700-3/19 0200 DO, specific conductance and salinity data
removed, out of instrument range.
3/19 0230-3/24 1630 Maintenance.
3/29 1400-3/31 2200 Specific conductance, salinity, DO

data removed, out of instrument range.
3/31 2230-2330 No data collected.

File Name ZI0394
3/1 0000-3/31 2330 Data not collected.

April 1994

File MS0494
No turbidity probe deployed.
4/1 0000-4/20 1600 Specific conductance, salinity, DO, and

pH data removed, out of instrument range.
4/2 0030-4/3 0030 No data collected
4/13 1330-1830 Maintenance.
4/20 1630-4/21 1830 Maintenance.
4/21 1900-4/29 2330 DO data removed, readings erratic.

4/21-1900-4/29 2330 pH probe malfunction.
4/29 2330-4/30 2330 No data collected.

File Name ZI0494
4/1 0000 to 4/30 2330 Data not collected.

May 1994

File MS0594
No turbidity probe deployed.
5/1 0000 - 5/31 2330 pH data much lower than historical

record, possibly due to calibration

error or sensor malfunction.
5/6 1230-1730 Maintenance.
5/16 1230-1730 Maintenance.
5/23 1030-5/24 1430 Maintenance.
5/31 1230-2330 Maintenance.

File Name ZI0594
No turbidity or depth probe deployed.
5/1 0000-5/19 1730 Data not collected.
5/26 0830-5/27 1430 Maintenance.

June 1994

File MS0694
No turbidity probe deployed.
6/1 0000-6/30 2330 pH data much lower than historical

record, possibly due to calibration

error or sensor malfunction.
6/7 0830-6/8 1130 Maintenance.
6/17 1030-1730 Maintenance.
6/29 1030-6/30 1130 Maintenance.

File Name ZI0694
No depth or turbidity probe deployed.
6/3 1230-6/6 1000 Powerloss.
6/6 1030-1430 Maintenance.
6/18 1530-6/22 1400 Powerloss.
6/22 1430-6/24 1430 Maintenance.

July 1994

File MS0794
No turbidity probe deployed.

7/1 0000-7/31 2330 pH data much lower than historical record, possibly due to calibration error or sensor malfunction.

7/8 1030-7/9 1730 Maintenance.
7/19 1030-7/20 1430 Maintenance.
7/28 0930-1730 Maintenance.

File Name ZI0794
No turbidity or depth probe deployed.
7/9 1330-1930 Datalogger exposed at low tide.
7/10 0230-0830, 1330-2030 Datalogger exposed at low tide.
7/11 0330-0930 1430-2030 Datalogger exposed at low tide.
7/12 0330-0930, 1530-2130 Datalogger exposed at low tide.
7/13 0430-1030 Datalogger exposed at low tide.
7/13 1530-7/18 1330 Powerloss.
7/18 1400-1730 Maintenance.
7/29 1430-7/30 1530 Maintenance.

August 1994

File Name MS0894
No turbidity probe deployed.
8/1 0000-8/15 0600 pH data much lower than historical record, possibly due to calibration error or sensor malfunction.
8/15 0630-8/26 1100 All data except temperature and depth removed due to datalogger malfunction.
8/26 1130-8/31 2330 Datalogger sent back to manufacturer for service. No data collected.

File Name ZI0894
No depth or turbidity probe deployed.
8/12 1130-8/13 1430 Maintenance.

September 1994

File Name MS994

9/1 0000-9/30 2330 Datalogger sent back to manufacturer for service. No data collected.

File Name ZI0994
No turbidity or depth sensor deployed.
9/2 1130-9/3 1730 Maintenance.
9/16 1030-1830 Maintenance.
9/30 1430-2330 Maintenance.

October 1994

File Name MS1094
No turbidity probe deployed.
10/1 0000-10/24 1830 Datalogger sent back to manufacturer for service. No data collected.
10/24 1900-10/31 2330 DO data removed from file because readings were continuously above 175% saturation and values dropped to normal range after 7 November maintenance.

File Name ZI1094
No depth or turbidity probe deployed.
10/1 0000-1730 Maintenance.
10/18 1630-10/20 1130 Maintenance.

November 1994

File Name MS1194
No turbidity probe deployed.
11/1 0000-11/7 1200 DO data removed from file because readings were continuously above 175% saturation and values dropped to normal range after 7 November maintenance.
11/7 1230-1830 Maintenance.
11/11 1930-11/13 1830 Maintenance.

File ZI1194
No depth or turbidity probe deployed.
11/3 0330-0430 Datalogger out of water.
11/4 0430-0530 Datalogger out of water.
11/4 1230-11/5 1630 Maintenance.
11/21 1430-11/30 2330 Powerloss.

December 1994

File Name MS1294

No turbidity probe deployed.
12/1 0930-1830 Maintenance.
12/20 1130-1630 Maintenance.

File Name ZI1294
No turbidity or depth probe deployed.
12/1 0000-12/6 1630 Power failure.
12/6 1700-12/7 1830 Maintenance.
12/21 1030-1630 Maintenance.

12) Notes:

1. Data from Research Creek during the time period of 1 January to 4 March 1994 was collected using a Hydrolab DS3 which was not equipped with a level or turbidity sensor. After 4 March 1994 data at Research Creek was collected with a YSI 6000 that was not equipped with a turbidity sensor.

2. Data from East Cribbing was collected using a Hydrolab DS3 that was not equipped with a level sensor or turbidity sensor

3. Data collection began in May at East Cribbing.

4. Data collection at the Research Creek site from March 4, 1500 to December were in one hour intervals which were corrected to half hour intervals.

5. Data collection at the East Cribbing site from May to December were in one hour intervals which were corrected to half hour intervals.

6. Data collected from 12/1/95 0038 - 12/8 1538 at Research Creek was off by 8 minutes from the top and bottom of the hour. The instruments were programmed to start at the top of the hour, however there was an unexplainable delay. Data were corrected to read on the half hour.