TABLE OF CONTENTS

1. DATA SET IDENTIFICATION
2. INVESTIGATOR INFORMATION
3. DATA SET ABSTRACT
4. OBJECTIVES AND INTRODUCTION
5. DATA ACQUISITION AND PROCESSING METHODS
6. DATA MANIPULATIONS
7. DATA DESCRIPTION
8. GEOGRAPHICAL AND SPATIAL INFORMATION
9. QUALITY CONTROL/QUALITY ASSURANCE
10. DATA ACCESS
11. REFERENCES
12. TABLE OF ACRONYMS
13. PERSONNEL INFORMATION

1. DATA SET IDENTIFICATION

1.1 Title of Catalog Document

EMAP-Estuaries Province Level Database
Carolinian Province
Surface and Bottom Water Quality Data

1.2 Authors of the Catalog entry

Timothy R. Snoots,
Dr. Jeffrey L. Hyland

1.3 Catalog Revision Date

February 20, 1998

1.4 Data Set Name

CP_WQ_S.DAT, CP_WQ_B.DAT
1.5 Task Group

Estuaries

1.6 Data set identification codes

2, 3

1.7 Version

001

1.8 Requested Acknowledgment

If you plan to publish these data in any way, EPA requires a standard statement for work it has supported:

"Although the data described in this article have been funded wholly or in part by the U. S. Environmental Protection Agency through its EMAP-Estuaries Program, it has not been subjected to Agency review, and therefore does not necessarily reflect the views of the Agency and no official endorsement should be inferred."

2. INVESTIGATOR INFORMATION

2.1 Principal Investigator

J. Hyland (NOAA/NOS/NCCOS/CCMA) - Carolinian Province Manager
A. Ringwood (SCDNR) - Lead P.I. for SC/GA region team
C. Hackney (UNC-W) - Lead P.I. for NC region team
G. McRae, G. Nelson, J. McKenna, J. Landsberg (FLDEP) - Lead P.I.s for FL region team (depending on year)

2.2 Investigation Participant - Sample Collection

Field Sample Collection

T. Alphin, S. Bowen, C. Byrum, D. Dye, A. Gospodarek, J. Grace, J. Grimley, C. Hackney, C. Powell, C. Preziosi, H. Riley, S. Roberts, M. Smith, K. Stokesbury, D. Tremain, T. Wheeler (UNC-W); S. Ross (NCNERR);

Field Training and Coordination

S. Kokkinakis (NOAA/NOS/ORCA); J. Macauley (EPA-GED);
T. Heitmuller (USGS-GB); D. Keith (EPA-AED)
2.3 Sampling Processing - Principal Investigator

Program Management and Coordination

J. Hyland, A. Robertson (NOAA/NOS/NCCOS/CCMA); K. Summers (EPA);
F. Holland, A. Ringwood (SCDNR); C. Hackney,
T. Wheeler (UNC-W); S. Ross (NCNERR);
J. Landsberg, J. McKenna, G. McRae, G. Nelson,
R. Paperno (FLDEP)

QA/QC

T. Heitmuller (USGS-GB), S. Kokkinakis (NOAA/NOS/ORCA)

Data Management and Statistical Support

T. Snoots, F. Holland, R. VanDolah (SCDNR); L. Balthis,
T. Herrlinger (UC); J. Rosen, L. Zimmerman (TPMC);
S. Rathbun (UGA); M. Adams, L. Harwell (JCWS);
V. Engle (EPA-GED); Z. Malaeb (USGS-GB);
S. Hale (EPA-AED); K. Summers (EPA); T. Wilson (CU)

3. DATA SET ABSTRACT

3.1 Abstract of the Data set

The Water Quality Vertical Profile data sets are summaries of the physio-chemical properties of the water at a station at the time of sampling. A Hydrolab DataSonde 3 was used to record water quality parameters at regular intervals from the surface to the bottom of the water column. Salinity, temperature, pH, dissolved oxygen, and specific conductance were measured and are reported for each station. Sigma t density, calculated from salinity and temperature, is also reported. In these summary data sets, only surface and bottom observations are reported. Surface and bottom observations were taken within 0.5 m of the surface and bottom respectively.

The following reports are products of these and other data collected during the 1994-1997 Sampling season in the Carolinian Province. These reports may contain additional information and summary statistics that are not contained in this data set catalog or its respective data sets. We therefore recommend referring to them when using this data.


3.2 Keywords for the Data Set

water quality, temperature, dissolved oxygen, pH, salinity, specific conductance, sigma t density, hydrographic data

EMAP Carolinian Province

4. OBJECTIVES AND INTRODUCTION

4.1 Program Objective

EMAP has three primary objectives:

1. To estimate the current status, extent, changes, and trends in indicators of the Nation's ecological resources on a regional basis;

2. To monitor indicators of pollutant exposure and habitat condition, and to seek correlative relationships between human-induced stresses and ecological condition that identify possible causes of adverse effects; and

3. To provide periodic statistical summaries and interpretive reports on ecological status and trends to the EPA Administrator and to the public.

4.2 Data Set Objective

The objective of the vertical profile water quality summary data sets is to provide an instantaneous "snapshot" of surface and bottom values of specific water column parameters at each station in the Carolinian Province.

4.3 Data Set Background Information

NA

4.4 Summary of Data Set Parameters

Salinity, temperature, pH, dissolved oxygen, and specific conductance were measured and are reported for each station. Sigma t density, calculated from salinity and temperature, is
also reported. In these summary data sets, only surface and bottom observations are reported. Surface and bottom observations were taken within 0.5 m of the surface and bottom respectively.

4.5 Year-Specific Information about Data

Methods and equipment were the same for all years.

5. DATA ACQUISITION AND PROCESSING METHODS

5.1 Data Acquisition

5.1.1 Sampling Objective

Collect water quality data suitable for describing the conditions that organisms are exposed to in surface and bottom waters of Carolinian Province estuaries.

5.1.2 Sample Collection Method Summary

Dissolved Oxygen (mg/L), Temperature (C), pH, Salinity (ppt), Specific Conductance (mS/cm @ 25C), and Depth (m) were recorded electronically with a DataSonde 3 (DS3) multiprobe data logger manufactured by Hydrolab Corporation. Observations were recorded vertically through the water column, at 0.5 m depth intervals for depths < 3 m, and 1.0 m intervals for depths > 3 m. Two profiles were recorded at each station, one on the downcast (stopping for observations while lowering), and one on the upcast (stopping for observations while raising the instrument back to the surface).

5.1.3 Beginning Sampling Dates

<table>
<thead>
<tr>
<th>Date</th>
</tr>
</thead>
<tbody>
<tr>
<td>30 June 1994</td>
</tr>
<tr>
<td>05 July 1995</td>
</tr>
<tr>
<td>09 July 1996</td>
</tr>
<tr>
<td>07 July 1997</td>
</tr>
</tbody>
</table>

5.1.4 Ending Sampling Dates

<table>
<thead>
<tr>
<th>Date</th>
</tr>
</thead>
<tbody>
<tr>
<td>31 August 1994</td>
</tr>
<tr>
<td>14 September 1995</td>
</tr>
<tr>
<td>19 September 1996</td>
</tr>
<tr>
<td>25 August 1997</td>
</tr>
</tbody>
</table>

5.1.5 Platform

Samples were collected from various gasoline or diesel powered boats equipped with at least the following equipment: "A" frame boom or davit, winch, LORAN-C or GPS for location, and a depth finder.

5.1.6 Sampling Equipment

DataSonde 3 (DS3) multiprobe data loggers manufactured by Hydrolab Corporation.
5.1.7 Manufacturer of Sampling Equipment

Hydrolab Corporation, TX

5.1.8 Key Variables

5.1.9 Sample Collection Method Calibration

DataSonde 3 multiprobes were maintained and calibrated per manufactures instructions.

See: Hyland et al. (1996), Hyland et al. (1998), Kokkinakis et al. (1994b)

5.1.10 Sample Collection Quality Control

Quality control procedures for water quality measurements included pre-deployment calibration of the DataSonde sensors against standards, and pre- and post-deployment precision checks based on side-by-side comparisons with other calibrated instruments.

See: Hyland et al. (1996), Hyland et al. (1998), Kokkinakis et al. (1994b)

5.1.11 Sample Collection Method References

See: Hyland et al. (1996), Hyland et al. (1998), Kokkinakis et al. (1994b)

5.1.12 Sample Collection Method Deviations

None

5.2 Data Preparation and Sample Processing

5.2.1 Sample Processing Objective

NA

5.2.2 Sample Processing Methods Summary

5.2.2.1 Field Summary

NA

5.2.2.2 Laboratory Summary

NA

5.2.3 Sample Processing Method Calibration

NA
5.2.4 Sample Processing Quality Control
NA

5.2.5 Sample Processing Method Reference
NA

5.2.6 Sample Processing Method Deviations
None

6. DATA ANALYSIS AND MANIPULATIONS

6.1 Name of New or Modified Value

DENS  Sigma t Density

6.2 Data Manipulation Description

DENS  Sigma t Density was calculated as follows:

\[
DENS = \left( [1.0281045] - [0.0000535633*T] - [0.0000678195*{T^2}] + [0.00000070517*{T^3}] - [0.0000000084794*{T^4}] + [0.00000000005057*{T^5}] \right) \\
+ \left( [0.00080792] - [0.0000032481*T] + [0.000000006423*{T^2}] - [0.000000000649*{T^3}] \right) *[S-35] \\
+ \left( 0.00000002045 *[S-35]^2 \right) \\
\right) *1000 \\
-1000
\]

where:  
\( T = \) Temperature (C)  
\( S = \) Salinity (ppt)
6.3 Data Manipulation Examples

6.3.1 DENS

Where TEMP = 28.4 and SAL = 24.2, DENS = 14.13

7. DATA DESCRIPTION

7.1 Description of Parameters

Surface Data (CP_WQ_S.DAT)

<table>
<thead>
<tr>
<th>Variable</th>
<th>Type</th>
<th>Format</th>
<th>Label</th>
</tr>
</thead>
<tbody>
<tr>
<td>STA_NAME</td>
<td>Char</td>
<td>7</td>
<td>Carolinian Province Office Station Name</td>
</tr>
<tr>
<td>DATE</td>
<td>Date</td>
<td>YYMMDD</td>
<td>Profile Date</td>
</tr>
<tr>
<td>TIME</td>
<td>Time</td>
<td>HH:MM</td>
<td>Profile Start Time</td>
</tr>
<tr>
<td>DO</td>
<td>Num</td>
<td>4.1</td>
<td>Surface D.O. (mg/L)</td>
</tr>
<tr>
<td>TEMP</td>
<td>Num</td>
<td>4.1</td>
<td>Surface Temperature (°C)</td>
</tr>
<tr>
<td>SAL</td>
<td>Num</td>
<td>4.1</td>
<td>Surface Salinity (ppt)</td>
</tr>
<tr>
<td>PH</td>
<td>Num</td>
<td>4.1</td>
<td>Surface pH</td>
</tr>
<tr>
<td>SPCOND</td>
<td>Num</td>
<td>4.1</td>
<td>Surface Specific Conductance (mS/cm 25°C)</td>
</tr>
<tr>
<td>DENS</td>
<td>Num</td>
<td>6.2</td>
<td>Surface Sigma t Density</td>
</tr>
</tbody>
</table>

Bottom Data (CP_WQ_B.DAT)

<table>
<thead>
<tr>
<th>Variable</th>
<th>Type</th>
<th>Format</th>
<th>Label</th>
</tr>
</thead>
<tbody>
<tr>
<td>STA_NAME</td>
<td>Char</td>
<td>7</td>
<td>Carolinian Province Office Station Name</td>
</tr>
<tr>
<td>DATE</td>
<td>Date</td>
<td>YYMMDD</td>
<td>Profile Date</td>
</tr>
<tr>
<td>TIME</td>
<td>Time</td>
<td>HH:MM</td>
<td>Profile Start Time</td>
</tr>
<tr>
<td>DO</td>
<td>Num</td>
<td>4.1</td>
<td>Bottom D.O. (mg/L)</td>
</tr>
<tr>
<td>TEMP</td>
<td>Num</td>
<td>4.1</td>
<td>Bottom Temperature (°C)</td>
</tr>
<tr>
<td>SAL</td>
<td>Num</td>
<td>4.1</td>
<td>Bottom Salinity (ppt)</td>
</tr>
<tr>
<td>PH</td>
<td>Num</td>
<td>4.1</td>
<td>Bottom pH</td>
</tr>
<tr>
<td>SPCOND</td>
<td>Num</td>
<td>4.1</td>
<td>Bottom Specific Conductance (mS/cm 25°C)</td>
</tr>
<tr>
<td>DENS</td>
<td>Num</td>
<td>6.2</td>
<td>Bottom Sigma t Density</td>
</tr>
<tr>
<td>DEPTH</td>
<td>Num</td>
<td>4.1</td>
<td>Depth (m) of near-bottom observation</td>
</tr>
</tbody>
</table>

Note the conventions used in the Format column above:

For character (Char) variables, the number given is the maximum width (number of characters) for that variable.

For numeric (Num) variables, the format is given in W.D format, where W = maximum width (number of characters) for the number (including all digits and the decimal point), and D = number of digits to the right of the decimal point.
7.1.6 Precision to which values are reported

Variables DO, TEMP, SAL, PH, SPCOND, and DEPTH are reported to, and are valid to 0.1 units. Variable DENS is reported to 0.01, but is only valid to 0.1.

7.1.7 Minimum Value in Data Set

Surface (CP_WQ_S.DAT)

<table>
<thead>
<tr>
<th>Variable</th>
<th>Minimum</th>
</tr>
</thead>
<tbody>
<tr>
<td>DO</td>
<td>3.4</td>
</tr>
<tr>
<td>TEMP</td>
<td>19.6</td>
</tr>
<tr>
<td>SAL</td>
<td>0</td>
</tr>
<tr>
<td>PH</td>
<td>5.9</td>
</tr>
<tr>
<td>SPCOND</td>
<td>0.1</td>
</tr>
<tr>
<td>DENS</td>
<td>-4.34</td>
</tr>
</tbody>
</table>

Bottom (CP_WQ_B.DAT)

<table>
<thead>
<tr>
<th>Variable</th>
<th>Minimum</th>
</tr>
</thead>
<tbody>
<tr>
<td>DO</td>
<td>0.3</td>
</tr>
<tr>
<td>TEMP</td>
<td>19.6</td>
</tr>
<tr>
<td>SAL</td>
<td>0.0</td>
</tr>
<tr>
<td>PH</td>
<td>5.9</td>
</tr>
<tr>
<td>SPCOND</td>
<td>0.1</td>
</tr>
<tr>
<td>DENS</td>
<td>-3.83</td>
</tr>
<tr>
<td>DEPTH</td>
<td>0.1</td>
</tr>
</tbody>
</table>

7.1.8 Maximum Value in Data Set

Surface (CP_WQ_S.DAT)

<table>
<thead>
<tr>
<th>Variable</th>
<th>Maximum</th>
</tr>
</thead>
<tbody>
<tr>
<td>DO</td>
<td>10.8</td>
</tr>
<tr>
<td>TEMP</td>
<td>33.3</td>
</tr>
<tr>
<td>SAL</td>
<td>39.1</td>
</tr>
<tr>
<td>PH</td>
<td>9.2</td>
</tr>
<tr>
<td>SPCOND</td>
<td>58.6</td>
</tr>
<tr>
<td>DENS</td>
<td>26.48</td>
</tr>
</tbody>
</table>
7.2 Data Record Example

7.2.1 Column Names for Example Records

Surface (CP_WQ_S.DAT)

STA_NAME;DATE;TIME;DO;TEMP;SAL;PH;SPCOND;DENS

Bottom (CP_WQ_B.DAT)

STA_NAME;DATE;TIME;DO;TEMP;SAL;PH;SPCOND;DENS;DEPTH

7.2.2 Example Data Records

Surface (CP_WQ_S.DAT)

CP94001;940815;12:31;6.7;28.4;24.2;7.8;38.1;14.13
CP94002;940815;15:43;6.5;29.1;4.0;7.7;7.3;-1.07
CP94003;940816;12:31;7.9;28.8;26.5;7.9;41.4;15.72
CP94004;940816;14:02;7.2;29.3;30.8;8.0;47.1;18.82

Bottom (CP_WQ_B.DAT)

CP94001;940815;12:31;6.7;28.4;24.3;7.8;38.2;14.24;1.2
CP94002;940815;15:43;3.4;27.8;19.9;7.6;30.1;11.10;3.0
CP94003;940816;12:31;7.5;28.8;26.6;7.9;41.4;15.83;1.7
CP94004;940816;14:02;6.7;29.3;30.8;8.0;47.3;18.82;1.0

8. GEOGRAPHIC AND SPATIAL INFORMATION

8.1 Minimum Longitude

-81 Degrees, 43.83 Minutes West Longitude

8.2 Maximum Longitude

-75 Degrees, 33.82 Minutes West Longitude

8.3 Minimum Latitude

27 Degrees, 12.07 Minutes North Latitude
8.4 Maximum Latitude

36 Degrees, 43.43 Minutes North Latitude

8.5 Name of area or region

Coastal distribution of sampling is along the southeastern US from Cape Henry, VA, through St. Lucie Inlet, FL. States represented: Virginia, North Carolina, South Carolina, Georgia, and Florida.

9. QUALITY CONTROL/QUALITY ASSURANCE

9.1 Measurement Quality Objectives

See section 5.1.9 (Sample Collection Method Calibration) and section 5.1.10 (Sample Collection Quality Control) above.

9.2 Quality Assurance/Control Methods

See section 5.1.9 (Sample Collection Method Calibration) and section 5.1.10 (Sample Collection Quality Control) above.

9.3 Quality Assessment Results

Unless specifically mentioned in this section (9.3), or in the accompanying QA data set CP_WQ_Q.TXT, all data reported in the CP_WQ_S.DAT and CP_WQ_B.DAT data sets fully met the QA/QC guidelines given above and are acceptable without further qualification.

10. DATA ACCESS

10.1 Data Access Procedures

Data can be downloaded from the WWW site.

10.2 Data Access Restrictions

Data can only be accessed from the WWW site.

10.3 Data Access Contact Persons

For programmatic/policy matters, contact:
Dr. Jeffrey L. Hyland
NOAA/NOS National Centers for Coastal Ocean Science
Center for Coastal Monitoring and Assessment - Charleston Lab
217 Fort Johnson Rd. (P.O. Box 12559)
Charleston, SC 29422-2559
(843)762-5415 (Tel.)
(843)762-5110 (FAX)
jeff.hyland@noaa.gov (e-mail)
10.4 Data file Format

Delimited ASCII Text

10.5 Information Concerning Anonymous FTP

Not accessible

10.6 Information Concerning Gopher and WWW

Data can be downloaded from the WWW.

10.7 EMAP CD-ROM Containing the Data file

Data not available on CD-ROM.

11. REFERENCES


Ringwood, A.H., R. Van Dolah, A.F. Holland, and M.G. Delorenzo. 1995. Year one demonstration project studies conducted in the Carolinian Province by Marine Resources Research Institute: Results and summaries. Final Annual Report under NOAA Cooperative Agreement No. NA470A0177. South Carolina Department of Natural Resources, Marine Resources Research Institute, Charleston, S.C.
Ringwood, A.H., R. Van Dolah, A.F. Holland, M.G. Delorenzo, C. Keppler, P. Maier, J. Jones, and M. Armstrong-Taylor. 1997. Year two demonstration project studies conducted in the Carolinian Province by Marine Resources Research Institute: Results and summaries. Final Annual Report under NOAA Cooperative Agreement No. NA470A0177. South Carolina Department of Natural Resources, Marine Resources Research Institute, Charleston, SC.


12. TABLE OF ACRONYMS

- C: Degrees Celsius
- cm2: Square centimeters
- CMBAD: Coastal Monitoring and Bioeffects Assessment Division
- CU: Clemson University
- EMAP: Environmental Monitoring and Assessment Program
- EPA: U.S. Environmental Protection Agency
- EPA-AED: EPA-Atlantic Ecology Division
- EPA-GED: EPA-Gulf Ecology Division
- EPA-RTP: EPA-Research Triangle Park, NC
- FLDEP: Florida Dept. of Environmental Protection
- FMRI: Florida Marine Research Institute
- FTP: File Transfer Protocol
- GIS: Geographical Information System
- JCWS: Johnson Controls Word Services
- km2: Square kilometers
- m2: Square meters
- mg/L: Milligrams per liter
- mS/cm: MilliSiemens per centimeter (equiv. to milliohms/cm)
- MRRI: Marine Resources Research Institute
- NCNERR: North Carolina National Estuarine Research Reserve
- NCSU: North Carolina State University, NC
- NA: Not Applicable
- ng/g: Nanograms per gram
- NOAA: National Oceanic and Atmospheric Administration
- NOS: National Ocean Service
- ORCA: Office of Ocean Resources Conservation and Assessment
QA/QC Quality Assurance/Quality Control
ppb Parts per billion (equiv. to ng/g)
ppm Parts per million (equiv. to ug/g)
ppt Parts per thousand
SAIC Science Applications International Corporation
SCDNR South Carolina Dept. of Natural Resources
TOC Total Organic Carbon
TAMU/GERG Texas A&M University, Geochemical and Environmental Research Group
TPMC Technology Planning and Management Corporation
ug/g Micrograms per gram
um Micrometers
UC University of Charleston, SC
UGA University of Georgia, GA
UNC-W University of North Carolina - Wilmington, NC
USGS-GB US Geological Survey - Gulf Breeze, FL
wt. Weight
WWW World Wide Web - Internet

13. PERSONNEL INFORMATION

Dr. Courtney T. Hackney
University of North Carolina - Wilmington,
Wilmington, NC

Melissa M. Hughes
Data Librarian, EMAP-Estuaries
OAO Corporation
U.S. EPA NHEERL-AED
27 Tarzwell Drive
Narragansett, RI  02882-1197
(401) 782-3184 (Tel.)
(401) 782-3030 (FAX)
hughes.melissa@epa.gov (e-mail)

For programmatic/policy matters, contact:
Dr. Jeffrey L. Hyland
NOAA/NOS National Centers for Coastal Ocean Science
Center for Coastal Monitoring and Assessment - Charleston Lab
219 Fort Johnson Rd.
Charleston, SC  29412-9110
(843)762-8652 (Tel.)
(843)762-8700 (FAX)
jeff.hyland@noaa.gov (e-mail)

For data-related questions, contact:
Dr. W. Leonard Balthis
NOAA/NOS National Centers for Coastal Ocean Science
Center for Coastal Monitoring and Assessment - Charleston Lab
219 Fort Johnson Rd.
Charleston, SC  29412-9110
(843)762-8654 (Tel.)
(843)762-8700 (FAX)
len.balthis@noaa.gov (e-mail)
Jan Landsberg
Florida Dept. of Environmental Protection
Florida Marine Research Institute
St. Petersburg, FL

James McKenna
Florida Dept. of Environmental Protection
Florida Marine Research Institute
St. Petersburg, FL

Dr. Gil McRae
Florida Dept. of Environmental Protection
Florida Marine Research Institute
St. Petersburg, FL

Gary A. Nelson
Florida Dept. of Environmental Protection
Florida Marine Research Institute
St. Petersburg, FL

Dr. Amy H. Ringwood
South Carolina Dept. of Natural Resources,
Marine Resources Research Institute
Charleston, SC