CATALOG DOCUMENTATION
MAIA-ESTUARIES SUMMARY DATABASE
1997 and 1998 STATIONS
WATER QUALITY - PHYSICAL DATA: “WATRPHYS”

TABLE OF CONTENTS

1. DATASET IDENTIFICATION

1.1 Title of Catalog document
MAIA-Estuaries Summary Database
1997 and 1998 Stations
Water Quality - Physical Data

1.2 Authors of the Catalog entry
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Harry Buffum, OAO Corp.

1.3 Catalog revision date
April 30, 2000

1.4 Dataset name
WATRPHYS

1.5 Task Group
MAIA Estuaries

1.6 Dataset identification code
003

1.7 Version
001

1.8 Request for Acknowledgment
EMAP requests that all individuals who download EMAP data acknowledge the source of these data in any reports, papers, or presentations. If you publish these data, please include a statement similar to: "Some or all of the data described in this article were produced by the U. S. Environmental Protection Agency through its Environmental Monitoring and Assessment Program (EMAP)”.

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2.3 Sample Processing Investigators
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3. DATASET ABSTRACT

3.1 Abstract of the Dataset
The WATRPHYS data file reports physical water quality parameters: dissolved oxygen, pH, conductivity, salinity, temperature and Secchi depth, measured in MAIA estuaries during the Summers of 1997 and 1998. One record is presented per sampling event. Generally, all parameters were measured in both the surface and bottom layers of the water column. At some shallow stations (designated with a QACODE = WTR-A), measurements were performed at only one intermediate water depth and values reported identically in both surface-layer and bottom-layer parameters.

3.2 Keywords for the Dataset
Water quality, physical parameters, temperature, dissolved oxygen, pH, depth, conductivity, salinity, Secchi depth, surface layer, bottom layer

4. OBJECTIVES AND INTRODUCTION

4.1 Program Objective
The main objectives of the MAIA-Estuaries program are: (1) to evaluate the ecological condition of the Mid-Atlantic estuaries by measuring key properties of the water, sediment, and the community of organisms; (2) to focus attention on small estuaries in order to develop better monitoring approaches for these critical systems; and (3) to develop partnerships among federal and state environmental organizations.

The Environmental Monitoring and Assessment Program (EMAP) is an EPA research and monitoring program designed to provide unbiased assessments of the condition of selected resources over a wide region. A key feature of the program is a probabilistic sampling strategy that randomly selects sampling sites and assigns weighting factors based on area to all measured results. EMAP's strategy was adopted by the Mid-Atlantic Integrated Assessment (MAIA) program, which was designed to assess the conditions of the estuaries, forests, streams and lakes, and agricultural lands in the eight-state Mid-Atlantic region. This file contains data measured in MAIA estuaries during the Summers of 1997 and 1998. Samples were collected for water and sediment analyses primarily in 1997, with a few additional sites sampled in 1998. Fish samples were collected

only in 1998. Several estuaries were designated as intensive sites and were sampled in greater detail (see STATIONS file).

The partners in MAIA-Estuaries program are: (1) The U.S. Environmental Protection Agency (USEPA), including both the Atlantic Ecology Division (AED) and the Gulf Ecology Division (GED); (2) National Park Service (NPS) under their project "Maryland Coastal Bays Monitoring"; (3) National Oceanographic and Atmospheric Administration (NOAA) which conducted sampling both in the Delaware Bay (DB) under their "National Status and Trends Program" and in the Carolinian Province (CP); and (4) The Chesapeake Bay Program (CBP), which is a consortium of federal, state, and local governments and nongovernmental organizations. Each partner was responsible for collecting, processing, and reviewing data. The USEPA Atlantic Ecology Division was responsible for final assembly and review of all data. Laboratories contracted to process samples are specified by the parameter LABCODE included in all data files (Section 4.4). Details regarding use of partner and LABCODE information are presented in the EVENTS metadata file.

4.2 Dataset Objective

The objective of the WATRPHYS data file is to report values of physical water quality parameters measured in the surface and bottom layers of the water column.

4.3 Dataset Background Discussion

Physical water parameters provide information about the habitat of resident organisms. Many plants and animals have preferences or requirements regarding water temperature, salinity, dissolved oxygen concentrations, and water clarity. For instance, the distribution of submerged aquatic vegetation (SAV) largely reflects the availability of light, which in turn depend on water depth and clarity. Also, low levels of dissolved oxygen can force mobile organisms to relocate or may severely stress or even kill immobile organisms such as shellfish. Monitoring physical water parameters may therefore indicate important changes in the environmental condition of the estuaries.

Both surface and bottom layers parameters were measured. The surface layer properties most directly affect the productivity of plants in the sun-lit surface waters, while the bottom layer parameters report conditions that affect bottom dwelling organisms. Detailed vertical-profiles of conductivity, temperature, DO, and pH were measured at most stations, but only surface and bottom values (measured at one meter below the surface and one meter above the bottom) were reported.

4.4 Summary of Dataset Parameters

*STATION	Station name	
*EVNTDATE	Event date	
SECCHI_D	Secchi depth (meters)	
SL_TEMP	Water temperature (deg. C) in the surface layer	
SL_SAL	Salinity (ppt) in the surface layer	
SL_OXY	Dissolved oxygen concentration (mg/L) in the surface layer	
SL_PH	pH in the surface layer	
BL_TEMP	Water temperature (deg. C) in the bottom layer	
BL_SAL	Salinity (ppt) in the bottom layer	
BL_OXY	Dissolved oxygen concentration (mg/L) in the bottom layer	
BL_PH	pH in the bottom layer	
QACODE	QACODE	
	<blank>	No qualification
	WTR-A	Indicates shallow stations (<3m) which were sampled only at mid-depth. Parameter values are reported identically in both the surface and bottom layer.
	WTR-B	The calculated salinity is between -0.1 and 0.1 ppt. The reported value is set to zero (see Section 6.2).
YEAR	Sampling Year	1997 or 1998

* denotes parameters that should be used as key fields when merging data files

5. DATA ACQUISITION AND PROCESSING METHODS

5.1 Data Acquisition

The sample collection methods used by USEPA field crews will be described here. Any significant variations by other MAIA partners are noted in Section 5.1.12. Details regarding MAIA partners are reported in the EVENTS data file.

5.1.1 Sampling Objective

Obtain *in situ* measurements of temperature, salinity, conductivity, dissolved oxygen, pH and secchi depth in the surface and bottom layers of estuaries in the MAIA region.

5.1.2 Sample Collection: Methods Summary

Temperature, salinity, conductivity, dissolved oxygen, and pH were measured with a Hydrolab Datasonde, and water clarity was measured using a Secchi disk. The Hydrolab was lowered through the water column, and parameter values were recorded every meter for the first five meters and every two meters thereafter, including a value one meter above the bottom. Only the parameter values measured one meter below the surface and one meter above the bottom are reported in this data file. At some shallow stations (water depth less than 3m), measurements were performed at only one intermediate water depth and the values reported identically in both surface-layer and bottom-layer parameters.

5.1.3 Beginning Sampling Dates

8 July 1997
13 July 1998

5.1.4 Ending Sampling Dates

8 October 1997
8 October 1998

5.1.5 Sampling Platform

Samples were collected from gasoline or diesel powered boats, 18 to 133 feet in length

5.1.6 Sampling Equipment

Hydrolab DataSonde 3 multi-probe data logging units were used. The software program Procomm was used to set up and download profile logging runs to a laptop computer. A YSI dissolved oxygen meter (Model M58) was used to check the Hydrolab DO and temperature readings. Hand-held refractometers were used to QC the Hydrolab salinity measurements. A 20 cm diameter Secchi disk was used with a line marked in 0.2 m intervals.

5.1.7 Manufacturer of Sampling Equipment

Data logger: Hydrolab Corp., Austin, TX.
Dissolved Oxygen probe: YSI Inc.

5.1.8 Key Variables

Not applicable

5.1.9 Sample Collection: Calibration

Calibration of the Hydrolab dissolved oxygen sensor was performed using the air calibration method as described by the manufacturer. The pH probe was calibrated using pH 7 and 10 standard buffer solutions. The salinity sensor was calibrated against a standard whose salinity was measured by a laboratory salinometer (Guildline AutoSal Model 8400) calibrated with IAPSO Standard Seawater ("Copenhagen water"). The salinity measurements were also checked in the field against a hand-held refractometer as a rough check. The YSI dissolved oxygen meters were

calibrated immediately prior to each station using the water-saturated air calibration procedure recommended by the manufacturer. The refractometers were calibrated using deionized water and a higher salinity standard traceable to "Copenhagen water".

5.1.10 Sample Collection: Quality Control

Surface values of temperature, salinity and dissolved oxygen measured by the Hydrolab were routinely compared with independent measurements performed on a bucket of surface water (see Section 5.1.2). The Hydrolab values were considered acceptable if the following criteria were met: the two temperature values agree to within two degrees Celsius, salinity values agree to within three ppt, and dissolved oxygen values agree to within 0.5 mg/L. The Secchi depth values were independently measured by independent crew members until values agreed within 0.1 meter.

5.1.11 Sample Collection: References

Strobel, C.J. 1998. Environmental Monitoring and Assessment Program - Mid-Atlantic Integrated Assessment. Estuaries Component, Field Operations and Safety Manual. U.S. EPA, Office of Research and Development, NHEERL-AED, Narragansett, RI. July 1998.

Kokkinakis, S.A., J.L. Hyland, and A. Robertson. 1994. Carolinian Demonstration Project - 1994 Field Operations Manual. Joint National Status and Trends/Environmental Monitoring and Assessment Program. NOAA/NOS/ORCA, Silver Spring, MD.

5.1.12 Sample Collection: Alternate Methods

Consult the EVENTS data file for PARTNER information.
PARTNER code = ODU, BNT-ODU: only bottom layer values were measured and reported.
PARTNER code = BNT-ODU, BNT-Versar, CP, ODU, Versar: Secchi depths were not measured.
PARTNER code = DC: salinity values were not measured directly, but were calculated from conductivity and temperature measurements. All calculated salinity values were between -0.1 and 0.1 ppt, with an average value of zero. Therefore all these salinity values were set to zero and were flagged with QACODE = WTR-B. It is reasonable to consider these fresh-water sites to have salinity values less than 0.1 ppt.

5.2 Data Preparation and Sample Processing

No analytical processing was involved for the WATRPHYS parameters.

5.2.1 Sample Processing Objective

Not applicable

5.2.2 Sample Processing: Methods Summary

Not applicable

5.2.3 Sample Processing: Calibration

Not applicable

5.2.4 Sample Processing: Quality Control

Not applicable

5.2.5 Sample Processing: References

Not applicable

5.2.6 Sample Processing: Alternate Methods

Not applicable

6. DATA ANALYSIS AND MANIPULATIONS

6.1 Name of New or Modified Value
Not applicable

6.2 Data Manipulation Description
Not applicable

7. DATA DESCRIPTION

7.1 Description of Parameters

7.1.1 Components of the Dataset

PARAMETER	TYPE	LENGTH	LABEL
STATION	Char	10	Station Name
EVNTDATE	Num	8	Event Date
SECCHI_D	Num	8	Secchi Depth (m)
SL_TEMP	Num	8	Surface Temperature (deg. C)
SL_SAL	Num	8	Surface Salinity (ppt)
SL_OXY	Num	8	Surface Dissolved Oxygen (mg/L)
SL_PH	Num	8	Surface Layer-pH (pH units)
BL_TEMP	Num	8	Bottom Temperature (deg. C)
BL_SAL	Num	8	Bottom Salinity (ppt)
BL_OXY	Num	8	Bottom Dissolved Oxygen (mg/L)
BL_PH	Num	8	Bottom Layer-pH (pH units)
QACODE	Char	5	QA Qualifier
YEAR	Char	4	Year of Sampling

7.1.2 Precision of Reported Values

PARAMETER	PRECISION	MIN	MAX	UNITS
SECCHI_D	0.1	0.1	6.0	meter
SL_TEMP	0.1	16.6	31.6	deg C
SL_SAL	0.1	0.0	34.8	ppt
SL_OXY	0.1	1.7	14.2	mg/L
BL_TEMP	0.1	16.4	31.6	deg C
BL_SAL	0.1	0.0	35.0	ppt
BL_OXY	0.1	0.0	13.9	mg/L
SL_PH	0.01	4.0	9.62	pH unit
BL_PH	0.01	5.9	9.50	pH unit

7.1.3 Minimum Value in Dataset
See Section 7.1.2

7.1.4 Maximum Value in Dataset
See Section 7.1.2

7.2 Data Record Example

7.2.1 Column Names for Example Records

STATION	EVNTDATE	SECCHI_D	SL_TEMP	SL_SAL	SL_OXY	SL_PH
BL_TEMP	BL_SAL	BL_OXY	BL_PH	QACODE	YEAR	

7.2.2 Example Data Records

STATION	EVNTDATE	SECCHI_D	SL_TEMP	SL_SAL	SL_OXY	SL_PH
MA97-0431	09/18/97	0.2	24.1	5.0	6.4	
MA98-0091	07/30/98	1.0	28.9	12.4	6.8	8.27
MA97-0276	08/12/97	1.2	25.5	13.2	7.2	8.20
MA97-0271	08/12/97	1.4	25.8	13.2	7.9	8.30

BL_TEMP	BL_SAL	BL_OXY	BL_PH	QACODE	YEAR
24.1	5.0	0.0			1997
27.4	13.8	0.0	8.31		1998
24.9	19.8	0.1	7.40		1997
24.8	19.9	0.1	7.40		1997

8. GEOGRAPHIC AND SPATIAL INFORMATION

8.1 Minimum Longitude (Westernmost)
-77.4339 decimal degrees

8.2 Maximum Longitude (Easternmost)
-74.7230 decimal degrees

8.3 Minimum Latitude (Southernmost)
34.9670 decimal degrees

8.4 Maximum Latitude (Northernmost)
40.1470 decimal degrees

8.5 Name of area or region
MAIA estuary region, consisting of Delaware Bay, Chesapeake Bay, the Delmarva coastal bays, Albemarle-Pamlico Sound, and contiguous estuaries.

9. QUALITY CONTROL AND QUALITY ASSURANCE

9.1 Measurement Quality Objectives
The measurement quality objectives of the EMAP-Estuaries program specify accuracy and precision requirements of 10% in the water physical parameters (see Valente and Strobel, 1993)

9.2 Data Quality Assurance Procedures
The data were reviewed to assure consistency among partners regarding sampling procedures, reporting format, *etc*. All measurements were performed in the field

9.3 Actual Measurement Quality
No field replicates were measured for these parameters

10. DATA ACCESS

10.1 Data Access Procedures
Data can be downloaded from the web

10.2 Data Access Restrictions
None

10.3 Data Access Contact Persons
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10.4 Dataset Format
ASCII (CSV) and SAS Export files

10.5 Information Concerning Anonymous FTP
Not available

10.6 Information Concerning WWW
See Section 10.1 for WWW access

10.7 EMAP CD-ROM Containing the Dataset
Data not available on CD-ROM

11. REFERENCES

Holland, A.F., ed. 1990. Near Coastal Program Plan for 1990: Estuaries. EPA 600/4-90/033. U.S. EPA, Office of Research and Development, NHEERL-AED, Narragansett, RI. November 1990.

Kokkinakis, S.A., Hyland, J.L., and Robertson, A. 1994. Carolinian Demonstration Project - 1994 Field Operations Manual. Joint National Status and Trends/Environmental Monitoring and Assessment Program. NOAA/NOS/ORCA, Silver Spring, MD.

Plumb, R.H. 1981. Procedures for Handling and Chemical Analysis of Sediment and Water Samples. Prepared for the U.S. Environmental Protection Agency/Corps of Engineers Technical Committee on Criteria for Dredge and Fill Material. Published by Environmental Laboratory, U.S. Army Waterways Experiment Station, Vicksburg, MS. Technical Report EPA/CE-81-1.

Strobel, C.J. 1998. Environmental Monitoring and Assessment Program - Mid-Atlantic Integrated Assessment. Estuaries Component, Field Operations and Safety Manual. U.S. EPA, Office of Research and Development, NHEERL-AED, Narragansett, RI. Forthcoming.

Strobel, C.J. 1998. Mid Atlantic Integrated Assessment / Environmental Monitoring and Assessment Program - Estuaries: Virginian Province Quality Assurance Project Plan. U.S. EPA, Office of Research and Development, NHEERL-AED, Narragansett, RI. June 1998.

U.S. EPA. 1995. Environmental Monitoring and Assessment Program (EMAP): Laboratory Methods Manual-Estuaries, Volume 1: Biological and Physical Analyses. U.S. Environmental Protection Agency, Office of Research and Development, Narragansett, RI. EPA/620/R-95/008.

Valente, R. and Strobel, C.J. 1993. Environmental Monitoring and Assessment Program- Estuaries: 1993 Virginian Province Quality Assurance Project Plan. U.S. EPA,NHEERL-AED, Narragansett, RI. May 1993

12. TABLE OF ACRONYMS

AED	Atlantic Ecology Division
C	Degrees Celsius
CP	Carolinian Province
CBP	Chesapeake Bay Program
CTD	Conductivity, Temperature, and Depth
DB	Delaware Bay
DO	Dissolved Oxygen
EMAP	Environmental Monitoring and Assessment Program
EPA	U.S. Environmental Protection Agency
GED	Gulf Ecology Division
MAIA	Mid-Atlantic Integrated Assessment
m	Meter
mg/L	Milligrams per liter
NHEERL	National Health and Environmental Effects Research Laboratory
NOAA	National Oceanic and Atmospheric Administration
NPS	National Park Service
ODU	Old Dominion University
QA/QC	Quality Assurance/Quality Control
ppt	Parts per thousand
SAV	Submerged Aquatic Vegetation
USEPA	United States Environmental Protection Agency
VER	Versar, Inc.
WWW	World Wide Web

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