CATALOG DOCUMENTATION
EMAP-ESTUARIES PROGRAM LEVEL DATABASE
1991 VIRGINIAN PROVINCE
STATION LOCATION DATA

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. GEOGRAPHIC 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 Program Level Database
1991 Virginian Province
Station Location Data

1.2 Authors of the Catalog entry

Charles Strobel, U.S. EPA NHEERL-AED
Melissa Hughes, CSC

1.3 Catalog revision date

18 March 1996

1.4 Data set name

STATIONS

1.5 Task Group

Estuaries

1.6 Data set identification code

0021

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

Darryl Keith
U. S. Environmental Protection Agency
NHEERL-AED

2.2 Investigation Participant-Sample Collection

Charles J. Strobel
U.S. Environmental Protection Agency
NHEERL-AED

3. DATA SET ABSTRACT

3.1 Abstract of the Data Set

The EMAP-Estuaries STATIONS data set contains geographic and statistical information on stations in the Virginian Province having a Station Classification Code of Base Sampling Site (BASE). If a BASE station also met the criteria for another station classification, then other monitoring activities were included in the suite of samples expected for the station. These stations were randomly located, based on a nationwide grid. The unique geographic coordinates of a site are given.

Some variables present descriptive geographic information. The two (2) character mailing code for the State inside whose geopolitical boundaries the station lies is reported. The system code indicates the large body of water or watershed in which the station site is located. Estuary defines the specific river, bay, creek or other small water body in which the station is located.

Other variables are present for statistical purposes. Strata indicates a broad water body category assigned to a station. These include Large Estuary (L), Small Estuary or Tidal River (O) or large Tidal River (TR). These categories serve to aggregate and/or segregate the data for statistical purposes. A station area is calculated for each station for weighting the data collected at a station on a parameter basis. The value is the actual area represented by a station.

3.2 Keywords for the Data Set

Base Sampling Sites, water body system, estuary, latitude, longitude, state, station location, EPA region

4. OBJECTIVES AND INTRODUCTION

4.1 Program Objective

The Environmental Monitoring and Assessment Program (EMAP) was designed to periodically estimate the status and trends of the Nation's ecological resources on a regional basis. EMAP provides a strategy to identify and bound the extent, magnitude and location of environmental degradation and improvement on a regional scale.

4.2 Data Set Objective

The STATIONS data set provides statistical and geographical characterization of the Base Sampling Sites (BASE) sampled in the estuaries of the Virginian Province.

4.3 Data Set Background Discussion

An unbiased sampling design has been used in the EMAP-Estuaries Provinces so that estuarine resources and characteristics were sampled in proportion to their areal distribution (Overton et al., 1991; Stevens et al., 1991). This sampling design makes it possible to estimate, with known confidence, the proportion or amount of area having defined environmental characteristics. A series of indicators that were representative of the overall health of estuarine resources was measured at each site. These indicators were designed to address three major attributes of concern to estuarine scientists, environmental managers and the public: 1) biotic integrity or the existence of healthy, diverse and sustainable biological communities; 2) pollutant exposure or the condition of the physico-chemical environment in which biota live and 3) societal values or indicators related to public use of estuarine resources.

4.4 Summary of Data Set Parameters

STATIONS data set values were based on the geographic location of the station, independent of the station visit. A Geographical Information System (GIS) was used to determine a station's geographical location (not coordinates), its statistical area and strata (i.e., large estuary, large tidal river, or small estuary).

5. DATA ACQUISITION AND PROCESSING METHODS

5.1 Data Acquisition

5.1.1 Sampling Objective

Sampling protocol dictates the navigation goal was to be within 100 m of the assigned latitude and longitude of a sampling site. Unless the computer navigation system had failed, the system had to be used to navigate to a station. Additional information on this system is included in Sections 5.1.4 and 5.1.5.

5.1.2 Sample Collection Methods Summary

SAMPLING DESIGN

A complete description of the sampling design can be found in the Near Coastal Program Plan (Holland, 1990). Base Sampling Sites (BASE) were the unbiased sampling sites forming the core of the EMAP monitoring design for estuaries. The sampling design for BASE sites was divided by size into three strata: large estuaries, large tidal rivers and small tidal rivers and estuarine systems. Stratification permitted customizing the sampling frame to the specific geographic features of these different classes of estuaries. It also allowed allocation of a strata-specific number of samples so that class estimates could be derived with a desired level of precision. The boundaries of these strata were defined using National Oceanic and Atmospheric Administration nautical charts, resulting in 12 large estuaries, five large tidal rivers and 144 small estuarine systems. Sampling was spread out over four years, with approximately 1/4 of the stations sampled each year.

A summary of the characteristics of the estuarine STRATA in the Virginian Province follows:

LARGE:	Surface area:	> 100 mi2 or > 260 km2;
	Aspect Ratio (Length/Avg Width):	< 20;
	Per Cent of Area:	70;
LARGE TIDAL RIVER	Surface area:	> 100 mi2 or > 260 km2;
	Aspect Ratio (Length/Avg Width):	> 20;
	Per Cent of Area:	13;
SMALL:	Surface area:	2.6 - 260 km2;
	Aspect Ratio (Length/Avg Width):	Any;
	Per Cent of Area:	17.

Methods for selecting sampling sites within each system follow. LARGE ESTUARY BASE SAMPLING SITES were selected using an enhancement of the systematic sampling grid proposed for use throughout EMAP (Overton, 1989). This grid was placed randomly over a map of the Unites States and intensified to make 70 km2 hexagonal grids. In 1990, fifty-four base sampling sites were selected using this grid. The remaining stations were sampled in 1991, 1992, or 1993. The sampling sites were the center points of the hexagons, which were 18 km apart. BASE SAMPLING SITES IN LARGE TIDAL RIVERS were selected using a "spine" and "rib" approach that is a linear analog of the sampling grid for large estuaries. The starting point of the spine was at the mouth of the river and the first transect ("rib") was located at a randomly selected river-kilometer between 0 and 25. Additional upstream transects were placed every 25 km from the first. Each segment was further subdivided into four sections, with one being sampled each year within the four-year cycle. Sampling sites were selected at random along the rib of each subsegment. A list frame was used to select SMALL ESTUARINE SYSTEMS for sampling each year. To ensure that all systems were dispersed geographically, all small estuarine systems were listed in order of latitude from north to south and combined into groups of four. Each year one system was selected at random (without replacement) from each group.

For 1991, sampling took place in the EMAP-Estuaries Virginian Province during an index period from July 22, 1991 through September 1, 1991. The index period was divided into six-day "windows", corresponding to crews' six-day work periods. Within each window crews sampled a predetermined cluster of stations. Sampling was planned at 156 stations during the season.

BASE SAMPLING SITES (BASE) were the probability-based sites used to characterize the water quality of the Province. These stations were visited twice within a specific sampling window; during the first visit a water quality datalogger was deployed, while during the second visit (about three days later) the unit was retrieved. Other activities performed at the station included a CTD cast (one per visit); collection of a water sample for total suspended solids analysis (TSS, one per station); collection of benthic biology and grain size samples (three samples of each per station collected during one visit); collection of surficial sediment for grain size, chemistry, and acid volatile sulfides (AVS) analysis and for toxicity testing (one of each per station); and performance of a fish trawl for species composition and abundance determination, for collection of gross external pathology information, and collection of the tissue chemistry samples (one per station). Additional trawls were conducted as necessary for the collection of additional samples for fish tissue chemistry.

5.1.3 Sampling Start Date

22 July 1991

5.1.4 Sampling End Date

13 September 1991

5.1.5 Platform

Stations were located from 8 m (24 ft), twin-engine Chesapeake style work boats.

5.1.6 Sampling Equipment

Navigation to a station was conducted using an integrated data management/navigation system loaded on a GRiD model 1530 laptop computer. The navigation system can receive data from that boat's LORAN and GPS (Global Positioning System) units, can store the coordinates and can assist in navigation to the station. This system can integrate data from the LORAN and GPS receivers, or use either instrument separately in order to determine the latitude and longitude coordinates associated with a station location.

5.1.7 Manufacturer of Sampling Equipment

Computer Navigation System:
Science Applications International Corporation (SAIC)
Newport, RI

LORAN:
Northstar

GPS:
Raytheon

5.1.8 Key Variables

The latitude and longitude of the station location were determined at the time of sampling. According to EPA Locational Policy: 1. Latitude is always presented before longitude; 2. Latitude and longitude are recorded as decimal degrees. The specific method, Loran or GPS, of determining the latitude and longitude is also recorded.

5.1.9 Sampling Method Calibration

Depending on the navigation mode, the navigation system on the GRiD 1530 should be calibrated prior to use. The primary mode of calibration employed in 1991 was a "point calibration". The crew identified a fixed point as close as possible to each station for which they determined the exact coordinates from a nautical chart. Upon arrival at that location they fed the coordinates into the computer and it determined an offset (i.e., calibration factors) to correct for local perturbations in the LORAN signals.

5.1.10 Sample Collection Quality Control

Field personnel were trained on field computer/navigation system. The software used was a modification of the Integrated Navigation and Survey System (INSS) developed by SAIC. The INSS is an automated, menu-driven software package with complete logging facility. By the end of the field training session, all crew members had to demonstrate proficiency in locating stations using the appropriate navigation system, i.e., LORAN.

5.1.11 Sample Collection Method Reference

Strobel, C. J. and S. C. Schimmel, 1991. Environmental Monitoring and Assessment Program, Near Coastal Component, 1991 Virginian Province Effort, Field Operations and Safety Manual. U.S. EPA NHEERL-AED, Narragansett, RI. June 1991.

5.2 Data Preparation and Sample Processing

Not applicable

6. DATA MANIPULATIONS

Most values in the Stations data set were assigned, based on geographic location. The areas for stations in tidal rivers and small estuaries were calculated.

6.1 Name of new or modified values

Station Area

6.2 Data Manipulation Description

STATION AREA: In order to use the data collected by the EMAP-Estuaries Resource Group in a CDF, an area represented by a station must be calculated. The statistical area for a station in a large estuary was assigned, while the areas of the other two (2) strata were calculated using different methods.

The area represented by a station in a LARGE ESTUARINE SYSTEM is based on the size of a hexagon in a grid used to randomly determine station locations. The size of a hexagon was 70 km2 and this was the area assigned to a station in a large estuarine system based on an interpenetrating design.

The area represented by a station in a LARGE TIDAL RIVER is based on the area of a 6.25 km subsegment of the river. The area of each 6.25 km segment is calculated as: LENGTH X WIDTH of the segment and is generated using a Geographic Information System (GIS) technology. The area between the seaward boundary and the randomly chosen first transect will NEVER be sampled. This area MUST be included in the area of the seaward 25 km segment. The design allows for up to five 25 km segments per river between the seaward boundary and its landward boundary. Landward boundaries are defined as the maximum inland extent of the tide. If the maximum extent of the tide is more than 125 km from the first random transect, then the landward boundary is set at 125 km upriver of the first randomly placed transect.

The area represented by a station in a SMALL ESTUARINE SYSTEM is based on the actual area of the small system. All small systems must have first met the size criterion of having an area > 2.5 km2. A seaward boundary must be established as defined under tidal rivers. Once these have been established, the surface area was generated using GIS technology.

6.3 Data Manipulation Examples

Not applicable.

7. DATA DESCRIPTION

7.1 Description of Parameters

#	Parameter SAS Name	Data Type	Len	Format	Parameter Label
1	STA_NAME	Char	8	F8.	Station Identifier
2	RESOURCE	Char	10	8	Resource Group Conducting Sampling
3	PROVINCE	Char	4	4.	Code for Province Conducting Sampling
4	DEPTH	Num	8	5.1	Depth (m) at Station
5	SYS_CODE	Char	15	15.	System Where Samples Were Collected
6	ESTUARY	Char	25	25.	Estuary Where Samples Were Collected
7	CLASCODE	Char	18	18.	Station Class-Determines Sampling Regime
8	LATDEG	Num	8	9.4	Latitude Decimal Degrees
9	LNGDEG	Num	8	9.4	Longitude Decimal Degrees (negative)
10	STA_AREA	Num	7	7.2	Statistical Area of Station (sq. km)
11	STRATA	Char	6	6.	Design Strata: Large/ Small/Tidal River

7.1.6 Precision to which values are reported

Latitude and Longitude have a precision of 100 ft.

7.1.7 Minimum value in data set

Not applicable

7.1.8 Maximum value in data set

Not applicable

7.2 Data Record Example

7.2.1 Columnm Names for Example Records

```
STA_NAME     LATDEG     LNGDEG     DEPTH   SYSTEM
CLASCODE     STRATA     STA_AREA   ESTUARY
```

7.2.2 Example Data Records

```
STA_NAME     LATDEG     LNGDEG     DEPTH   SYSTEM
VA91-261    36.9402   -76.2135       5.4   CHESAPEAKE BAY
VA91-262    36.9563   -76.0082      21.8   CHESAPEAKE BAY
VA91-263    36.9767   -76.4833       3.5   CHESAPEAKE BAY

CLASCODE         STRATA     STA_AREA   ESTUARY
BASE               L         70.00     CHESAPEAKE BAY
BASE               L         70.00     CHESAPEAKE BAY
BASE               TR        39.06     JAMES RIVER
```

8. GEOGRAPHIC AND SPATIAL INFORMATION

8.1 Minimum Longitude

-77 Degrees 19 Minutes 30.00 Decimal Seconds

8.2 Maximum Longitude

-70 Degrees 01 Minutes 00.00 Decimal Seconds

8.3 Minimum Latitude

36 Degrees 56 Minutes 24.60 Decimal Seconds

8.4 Maximum Latitude

42 Degrees 08 Minutes 00.00 Decimal Seconds

8.5 Name of area or region

Virginian Province

Stations were located in estuaries along the East Coast of the United States from Cape Cod, Massachusetts, to Cape Henry, Virginia, at the mouth of the Chesapeake Bay. The area includes the District of Columbia and the states of Virginia, Maryland, Delaware, New Jersey, Pennsylvania, New York, Connecticut, Rhode Island and Massachusetts.

9. QUALITY CONTROL AND QUALITY ASSURANCE

9.1 Data Quality Objectives

Not Applicable

9.2 Data Quality Assurance Procedures

Field site audits were conducted during the 1991 field season by the Quality Assurance Officer and the Logistics Coordinator to determine compliance with the Quality Assurance plan and field operations document. Corrective action was initiated if discrepancies were noted. Computer equipment was regularly checked and/or serviced to maintain operation readiness.

10. DATA ACCESS

10.1 Data Access Procedures

A Data Request Package can be requested from a contact listed in Section 10.3. Data can be downloaded from the WWW site.

10.2 Data Access Restrictions

10.3 Data Access Contact Persons

John Paul, Ph.D.
U.S. EPA NHEERL-AED
(401) 782-3037 (Tele)
(401) 782-3030 (FAX)
paul.john@epa.gov

Data Librarian EMAP-Estuaries
U.S. EPA NHEERL-AED
(401) 782-3184 (Tele)
(401) 782-3030 (FAX)
hughes.melissa@epa.gov

10.4 Data Set Format

Data can be transmitted in a variety of formats derived from SAS data sets when a Data Request Form is submitted.

10.5 Information Concerning Anonymous FTP

Data cannot be accessed via ftp.

10.6 Information Concerning WWW

Data can be downloaded from the WWW

10.7 EMAP CD-ROM Containing the Data Set

Data are not available on CD-ROM

11. REFERENCES

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USEPA, 1989. Draft EPA Locational Data Policy. U. S. EPA, Washington, D. C.

Valente, R. and J. Schoenherr. 1991. Environmental Monitoring and Assessment Program, Near Coastal Virginian Province. Quality Assurance Project Plan. U.S. Environmental Protection Agency. NHEERL-AED. Narragansett, RI.

Weisberg, S.B., J.B. Frithsen, A.F. Holland, J.F. Paul, K.J. Scott, J.K. Summers, H.T. Wilson, R. Valente, D.G. Heimbuch, J. Gerritsen, S.C. Schimmel and R.W. Latimer, 1993. EMAP-Estuaries Virginian Province 1990 Demonstration Project Report. EPA 620/R-93/006. U.S. Environmental Protection Agency, NHEERL-AED, Narragansett, RI 02882-1197.

12. TABLE OF ACRONYMS

13. PERSONNEL INFORMATION

Virginian Province Manager
Darryl Keith
U. S. EPA NHEERL-AED
27 Tarzwell Drive
Narragansett, RI 02882-1197
(401)782-3135 (Tel.)
(401)782-3030 (FAX)
keith.darryl@epa.gov

Investigation Participant-Sample Collection
Charles J. Strobel
U.S. EPA NHEERL-AED
27 Tarzwell Drive
Narragansett, RI 02882-1197
(401)782-3180 (Tel.)
(401)782-3030 (FAX)
strobel.charles@epa.gov

John Paul, Ph.D.
U.S. EPA NHEERL-AED
27 Tarzwell Drive
Narragansett, RI 02882-1197
(401) 782-3037 (Tele)
(401) 782-3030 (FAX)
paul.john@epa.gov

Data Librarian EMAP-Estuaries
CSC c/o U.S. EPA NHEERL-AED
27 Tarzwell Drive
Narragansett, RI 02882-1197
(401) 782-3184 (Tele)
(401) 782-3030 (FAX)
hughes.melissa@epa.gov