# CATALOG DOCUMENTATION
# EMAP-ESTUARIES PROGRAM LEVEL DATABASE
# 1990 VIRGINIAN PROVINCE
# STATION LOCATION DATA

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## 1. DATA SET IDENTIFICATION

### 1.1 Title of Catalog document

EMAP-Estuaries Program Level Database
1990-1993 Virginian Province
Station Location Data

### 1.2 Authors of the Catalog entry


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### 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**

**0001**

**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

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## 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 Section 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 1990, sampling took place in the EMAP-Estuaries Virginian Province during an index period from July 19,1990 through September 24, 1990. The index period was divided into two intervals. Specific suites of samples were collected at stations during each interval. Stations were sampled more than once during the sampling season. However, data from only one visit date is presented in each data set. Sampling was conducted at 217 stations during the season.

The station classifications were as follows:

BASE: The probability-based Base Sampling Sites were used to characterize the water quality of the province. These stations were visited for the purpose of collecting monitoring samples. These samples included: a CTD cast, collection of three samples for benthic biology and grain size, collection of sediment for chemical analyses, grain size characterization

**and toxicity testing, performance of a fish trawl for determination of species composition and abundance and for collection of samples observed as having one or more gross external pathologies.**

**LTDO: Twenty-four of the BASE Sampling Sites were also chosen as Long-Term Dissolved Oxygen (LTDO) Sites. Sites were selected from all strata and represented a range of estuarine habitats as defined by salinity, sediment type and depth. Hydrolab DataSonde III data loggers were deployed at these sites for up to 60 days. Sites were visited every ten (10) days to retrieve a Hydrolab and deploy a new one. An additional fish trawl was also conducted.**

**ITE: Eight (8) BASE Sampling Sites were also chosen as Indicator Testing and Evaluation (ITE) Sites. These sites were chosen for specific combinations of geographic location, salinity, concentrations of sediment contaminants and dissolved oxygen concentrations. These sites were sampled to investigate the reliability of indicator responses for discriminating between degraded and non-degraded sites across the range of habitats that occurs throughout a Province. An additional fish trawl was also conducted and a water sample was collected for total suspended solids analysis (one per station).**

**5.1.3 Sampling Start Date**

**19 July 1990**

**5.1.4 Sampling End Date**

**30 September 1990**

**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**

**The navigation system on the GRiD 1530 must be calibrated prior to use. Point calibration was used in the Virginian Province in 1990. The boat was positioned at a location of known coordinates, such as the end of a dock shown on a nautical chart. The known latitude and longitude were entered into the computer system, TDs (Time Delays) were averaged and a calibration factor was determined to calculate latitude and longitude from the TDs. The calibration factor was stored and could be used for stations in close proximity, depending upon the body of water in which the boat was operating.**

**5.1.10 Sample Collection Quality Control**

**Field personnel were trained on the 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.**

**5.1.11 Sample Collection Method Reference**

**Beaulieu, J., 1991. Users guide for the EMAP Near Coastal Field Data Acquisition System. Computer Sciences Corporation, Narragansett, RI.**

**SAIC, 1991. User Guide for Environmental Data Acquisition System (EDAS V1.01). Science Applications International Corp., Newport, RI.**

**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

### 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 Column Names for Example Records

```
STA_NAME RESOURCE PROVINCE SYS_CODE ESTUARY  DEPTH
CLASCODE LATDEG   LNGDEG   STRATA   STA_AREA
```

### 7.2.2 Example Data Records

```
STA_NAME RESOURCE PROVINCE SYS_CODE ESTUARY                DEPTH

VA90-021 ESTUARIES   VA      LIS    LONG ISLAND SOUND       35.9
VA90-022 ESTUARIES   VA      LIS    LONG ISLAND SOUND       13.7
VA90-023 ESTUARIES   VA      LIC    GREAT SOUTH BAY          2.9
VA90-024 ESTUARIES   VA      LIS    LONG ISLAND SOUND       39.8

CLASCODE    LATDEG     LNGDEG    STRATA  STA_AREA

BASE        41.0303   -72.8038      L     70.00
BASE/LTDO   41.1662   -72.9258      L     70.00
BASE        40.7408   -72.9978      L     70.00
BASE        41.0213   -73.0232      L     70.00
```

## 8. GEOGRAPHIC AND SPATIAL INFORMATION

### 8.1 Minimum Longitude

-77 Degrees 23 Minutes 37.20 Decimal Seconds

### 8.2 Maximum Longitude

-69 Degrees 56 Minutes 27.6 Decimal Seconds

### 8.3 Minimum Latitude

36 Degrees 49 Minutes 54.60 Decimal Seconds

### 8.4 Maximum Latitude

42 Degrees 08 Minutes 15.49 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 1990 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 server.

### 10.2 Data Access Restrictions

Data can only be accessed from the WWW server.

### 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.

### 10.5 Information Concerning Anonymous FTP

Data cannot be accessed via ftp.

### 10.6 Information Concerning WWW

Data can be downloaded from the WWW servers.

### 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., C.J. Strobel, J.E. Pollard, K.M. Peres, T.C. Chang and J. Rosen. 1990. Quality Assurance Project Plan forEMAP Near Coastal: 1990 Demonstration Project. 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

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