CATALOG DOCUMENTATION
MAIA-ESTUARIES SUMMARY DATABASE
1997 and 1998 STATIONS
BENTHIC GRAIN-SIZE DATA: “BENGRAIN”

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1. DATASET IDENTIFICATION

1.1 Title of Catalog document
MAIA-Estuaries Summary Database
1997 and 1998 Stations
Benthic Grain-Size Data

1.2 Authors of the Catalog entry
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1.3 Catalog revision date
April 30, 2000

1.4 Dataset name
BENGRAIN

1.5 Task Group
MAIA Estuaries

1.6 Dataset identification code
008

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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3. DATASET ABSTRACT

3.1 Abstract of the Dataset
The BENGRAIN data file reports the grain size of sediments collected in MAIA estuaries during the Summers of 1997 and 1998. Grain size is reported as percent silt/clay or percent sand, representing particles that are less than 63 microns or greater than 63 microns, respectively. One record is presented for each sampling event. These measurements were performed on the same sediment samples used to describe community structure, and are therefore complimentary to the abundance and biomass data reported in the BEN_ABUN and BEN_BIOM files.

3.2 Keywords for the Dataset
Percent sand, percent silt-clay, benthic grain size, estuarine sediment composition

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 sediment grain size measurements are reported for MAIA sediments collected in 1997 and 1998. These measurements complement the measurements of invertebrate abundance and biomass performed on the same sediment samples.

4.3 Dataset Background Discussion

The grain size of sediment particles is a simple characteristic that describes an important factor affecting sediment quality and benthic community structure. Small grain size may enhance the adsorption of chemical contaminants or may reflect a high content of organic material that serves as a food source for benthic organisms. A coarser grain size may provide a greater number of micro-habitats for interstitial species or allow greater exchange of oxygen and nutrients at depth in the sediment (Hyland et al 1991, Weston 1988).

Notes: (1) The grain-size parameters are labeled SAND and SILTCLAY because of the strong correlation between size and composition. Particles larger than 63 microns are defined to be sand, while particles smaller than 63 microns are considered to be silt-clay; however, the mineralogical composition of the sediment particles was not analyzed directly.

(2) Either one, two or three grab samples were processed at a station. The parameter BENGRAB identifies the grab sample associated with the record (either 1, 2, or 3), and is reported consistently in the BEN_ABUN, BEN_BIOM , and BENGRAIN data files.

(3) There are two measures of sediment grain size reported in the MAIA-Estuaries database: BENGRAIN and SEDGRAIN. The BENGRAIN values reported in this file were measured using sediment grabs which were collected to characterize the abundance and biomass of organisms in the benthos. The SEDGRAIN values were measured on grabs specifically collected to measure chemical and toxicological properties. While the two measures appear to be comparable (see Section 9.2), a difference in the two measurement protocols should be noted. Sediments used in the BENGRAIN measurements were obtained from undisturbed subsamples of each benthic grab, whereas the sediments used in the SEDGRAIN measurements were taken from a homogenate of the upper two centimeters of several grab samples.

4.4 Summary of Dataset Parameters

*STATION	Station name
*EVNTDATE	Event date
*BENGRAB	Identifier for grab sample at a station; either 1, 2, or 3. These BENGRAB values are identically reported in the BEN_ABUN and BEN_BIOM files.
SAND	Grain-size of sediment particles, reported as the percent of sediment dry weight that is composed of particles *larger* than 63 microns.
SILTCLAY	Grain-size of sediment particles, reported as the percent of sediment dry weight that is composed of particles *smaller* than 63 microns.

4.4 Summary of Dataset Parameters, continued

LABCODE	A code identifying the contract laboratory responsible for data processing:	
	GRN-1	USEPA contractor: TAMU/GERG
	GRN-3	Chesapeake Bay Program contractor: Versar, Inc. (1997 only)
QACODE	Quality assurance/quality control codes:	
	<blank>	No qualification
YEAR	Year of sample collection: 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 / Field Sampling

The sample collection methods used by USEPA field crews are described here. 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

The sampling objective was to collect sub-samples for sediment grain-size analysis. Sub-samples were taken from one to three replicate grab samples collected at each station. The remaining portions of the grabs were used for the identification and enumeration of benthic species.

5.1.2 Sample Collection: Methods Summary

One to three replicate grab samples were collected from each station using a Young-modified Van Veen sampler. The grab sample was nominally 440 cm^2 in area and 10 cm deep. Each replicate grab was assigned an identification number (1, 2, or 3) that is reported as the BENGRAB parameter in this and other data files. A sub-sample 2.5 cm in diameter and the depth of the grab was taken from each grab for grain-size analysis, and was stored on ice prior to analysis.

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

A 1/25 m2, stainless steel (coated with Kynar), Young-modified Van Veen grab sampler was used to collect sediments

5.1.7 Manufacturer of Sampling Equipment

Young's Welding, Sandwich, MA

5.1.8 Key Variables

Not applicable

5.1.9 Sample Collection: Calibration

The sampling gear does not require any calibration, although it was inspected regularly for damage by mishandling or impact on rocky substrates

5.1.10 Sample Collection: Quality Control

Care was taken to minimize disturbance to the sediment grab samples. Grabs that were incomplete, slumped, less than 7 cm in depth, or comprised chiefly of shelly substrates were discarded. The chance of sampling the same location was minimized by repositioning the boat five meters downstream after three coring attempts. The repeatability of the sampling procedure was assessed both by evaluating the precision of any replicate BENGRAIN measurements performed at a station, and also by comparing BENGRAIN and SEDGRAIN values when both parameters were measured at the same station. Details on these comparisons are contained in Section 9.3.

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

PARTNER = VERSAR and ODU: Samples were frozen prior to analysis. Replicate precision may be degraded on samples frozen in storage.

5.2 Data Preparation and Sample Processing

The processing methods used by USEPA contracts will be described here (LABCODE = GRN-1). Any significant variations by other MAIA partners are noted in Section 5.2.6.

5.2.1 Sample Processing Objective

Sediment samples were analyzed to measure the sediment grain size.

5.2.2 Sample Processing: Methods Summary

For the grain size analysis, sediments were homogenized and diluted to a suspended slurry with the aid of chemical dispersant, and the suspension passed through a 63 micron sieve. The fine fraction passing through the sieve (<63 micron) and the coarse fraction retained on the filter (>63 micron) were separately dried and weighed. A small correction to the weight was applied to account for the salt and dispersant residue remaining after evaporation. SILTCLAY was calculated as the salt-free weight of the fine fraction divided by the combined fine plus coarse salt-free weights (the result expressed as a percentage). SAND was calculated as 100% minus SILTCLAY. See USEPA, 1995 for details.

5.2.3 Sample Processing: Calibration

Not applicable

5.2.4 Sample Processing: Quality Control

Duplicate analyses were performed on 10% of the samples. Blank and spiked analyses were also performed with each batch of samples. All QC analyses agreed to within about 3%, exceeding QA/QC objectives of agreement to within 10% (Valente and Strobel, 1993).

5.2.5 Sample Processing: References

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

Texas A & M University, Geochemical and Environmental Research Group. 1990. NOAA Status and Trends, Mussel Watch Program, Analytical Methods. Submitted to NOAA. Rockville (MD): U.S. Dept. of Commerce, National Oceanic & Atmospheric Administration, Ocean Assessment Division.

5.2.6 Sample Processing: Alternate Methods

Consult the EVENTS data file for PARTNER information.

PARTNER = CP: grain-size measurements were not performed at these stations. The best approximation for the missing sediment grain-size values are reported in the SEDGRAIN data file (see Section 9.3 regarding comparability of SEDGRAIN and BENGRAIN measurements).

PARTNER = VERSAR and ODU: Samples were frozen prior to analysis. Replicate precision may be degraded on samples frozen in storage.

6. DATA ANALYSIS AND MANIPULATIONS

6.1 Name of New or Modified Values

Not applicable

6.2 Description of Data Manipulation

No 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
BENGRAB	Num	8	Identifier of Grab Sample
SAND	Num	8	Sand Content (%)
SILTCLAY	Num	8	Silt-clay Content (%)
LABCODE	Char	5	Laboratory Code
QACODE	Char	5	QA Code
YEAR	Num	4	Year of Sampling

7.1.2 Precision of Reported Values

SAND and SILTCLAY are reported as percentages to 0.01%.

7.1.3 Minimum Value in Dataset

SAND	0.15%
SILTCLAY	0.00%

7.1.4 Maximum Value in Dataset

SAND	100%
SILTCLAY	99.85%

7.2 Data Record Example

7.2.1 Column Names for Example Records

STATION	EVNTDATE	BENGRAB	SAND	SILTCLAY	LABCODE	QACODE	YEAR

7.2.2 Example Data Records

STATION	EVNTDATE	BENGRAB	SAND	SILTCLAY	LABCODE	QACODE	YEAR
MA97-0001	08/25/97	1	69.62	30.38	GRN-1		1997
MA97-0001	08/25/97	2	68.47	31.53	GRN-1		1997
MA97-0001	08/25/97	3	67.02	32.98	GRN-1		1997
MA97-0003	08/26/97	1	92.93	7.07	GRN-1		1997
MA97-0003	08/26/97	2	93.83	6.17	GRN-1		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)
34.8702 decimal degrees

8.4 Maximum Latitude (Northernmost)
40.1470 decimal degrees

8.5 Name of 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
Measure replicate grain size of samples with a precision of 10% or better (see Valente and Strobel, 1993).

9.2 Data Quality Assurance Procedures
Two QA checks were performed to evaluate the reliability of the reported SAND and SILTCLAY data. The first involved calculating the precision of all analysis performed on replicate grab samples taken at a station (typically three grabs per station). The second test involved calculating the median difference between BENGRAIN and SEDGRAIN analyses for stations where both parameters were measured.

9.3 Actual Measurement Quality

Since SAND and SILTCLAY values are complementary, only statistics for SAND are considered. The standard deviation of all available replicate analysis was 3.1%. The median difference between BENGRAIN and SEDGRAIN analyses for stations where both parameters were measured was 2.7%. Both of these QA checks suggest that BENGRAIN measurements are generally reliable to within a few percentage units, *i.e.*, relatively good precision.

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

No gopher access, see Section 10.1 for WWW access

10.7 EMAP CD-ROM Containing the Dataset

Data not available on CD-ROM

11. REFERENCES

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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.

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.

Texas A & M University, Geochemical and Environmental Research Group. 1990. NOAA Status and Trends, Mussel Watch Program, Analytical Methods. Submitted to NOAA. Rockville (MD): U.S. Dept. of Commerce, National Oceanic & Atmospheric Administration, Ocean Assessment Division.

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.

Weston, D.P. 1988. Macrobenthos-sediment relationships on the continental shelf off Cape Hatteras, North Carolina. Contin. Shelf Res. 8:267-286.

12. TABLE OF ACRONYMS

AED	Atlantic Ecology Division
CP	Carolinian Province
CBP	Chesapeake Bay Program
DB	Delaware Bay
EMAP	Environmental Monitoring and Assessment Program
EPA	U.S. Environmental Protection Agency
GED	Gulf Ecology Division
GERG	Geochemical and Environmental Research Group
MAIA	Mid-Atlantic Integrated Assessment
NHEERL	National Health and Environmental Effects Research Laboratory
NOAA	National Oceanic and Atmospheric Administration
NOS	National Ocean Service
NPS	National Park Service
ODU	Old Dominion University
ORCA	Office of Ocean Resources Conservation and Assessment
ORD	Office of Research and Development
QA/QC	Quality Assurance/Quality Control
TAMU	Texas A&M University
USEPA	United States Environmental Protection Agency
VER	Versar, Inc.
WWW	World Wide Web

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