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REGIONAL ENVIRONMENTAL MONITORING AND ASSESSMENT PROGRAM - REGION 6
1993-1994 TEXAS COAST RIVERS AND ESTUARIES STUDY
BENTHIC SPECIES DATA

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1. DATA SET IDENTIFICATION

1.1 Title of Catalog Document

Regional Environmental Monitoring And Assessment Program - Region 6
1993-1994 Texas Coast Rivers And Estuaries Study
Benthic Species Data

1.2 Authors of the Catalog entry

Melissa M. Hughes, OAO Corp.

1.3 Catalog Revision Date

March 31, 1998

1.4 Data File Name

BEN_SPEC

1.5 Task Group

Region 6

1.6 Data set identification code

00008

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 R-EMAP 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

Charlie Howell
U. S. Environmental Protection Agency - Region 6
Environmental Services Division

2.2 Investigation Participant-Sample Collection

Not applicable

3. DATA FILE ABSTRACT

3.1 Abstract of the Data File

The BENTHIC SPECIES data file presents summary data on each benthic taxon identified across all acceptable grabs collected at a station.

A count of organisms of the taxon identified from all grabs (either 1 or 3) is recorded. The mean abundance and standard deviation of the mean abundance is reported when three grabs were collected. Each taxon is identified by a unique code which can be cross-referenced to the taxon phylogeny. Physical constraints or quality assurance problems precluded the collection or analysis of all samples at a few stations.

3.2 Keywords for the Data file

Benthic Species, Mean Species Abundance, Species Abundance, Species Composition, Taxon Abundance, Benthic Taxon Abundance, Mean Benthic Taxon Abundance

4. OBJECTIVES AND INTRODUCTION

4.1 Program Objective

The R-EMAP Texas Coast project will:

1. Determine the extent and magnitude of tri-butyl tin (TBT) contamination in Galveston Bay sediment and water column.
2. Determine the extent and magnitude of contaminant levels in the fish and sediment of the East Bay Bayou of Galveston Bay and whether the incidence of fish pathologies is correlated with sediment contamination.
3. Determine the levels of chlorinated hydrocarbons in fish tissue, conduct chemical and toxicity tests of sediments and determine benthic community structure in the tidal reaches of the Arroyo Colorado and the Rio Grande Rivers.
4. Determine the extent and magnitude of anoxia and concentrations of agriculture-related contaminants found in the tidal reaches of the Arroyo Colorado and Rio Grande Rivers.

4.2 Data Set Objective

The objective of the Benthic Species data file is to provide summary data at the individual taxon level about the bottom dwelling (benthic macroinvertebrate) communities at each station sampled in the south Texas coast in 1993-94.

4.3 Data Set Background Information

Benthic invertebrates are important secondary consumers in most estuarine systems, represent the largest living reservoir of organic carbon in many estuarine systems, contain many important commercial and recreational species and are prey for critical life stages of other important commercial and recreational species.

Benthic invertebrate assemblages are sensitive to disturbance and stress from both natural and anthropogenic origins because of their taxonomic diversity, wide range of physiological tolerances to stress, and multiple feeding modes and trophic levels. The health of these communities is a reflection of local environmental conditions because members of benthic assemblages generally have limited mobility. The communities respond to both sediment and water column conditions and contain long-lived species. Consequently, benthic community inventories have been used in many regional estuarine monitoring programs and have proven to be effective as an indicator of the extent and magnitude of pollution impacts in estuarine ecosystems.

Benthic monitoring data describing species composition, abundance and biomass were used as indicators of the biological conditions in the rivers and estuaries of the south Texas coast. These descriptions, along with additional measurements in other data files describing habitat indicators (depth, salinity) and pollution exposure indicators (oxygen concentrations, sediment toxicity, sediment contaminant concentrations) were used to develop a benthic index of environmental condition for the south Texas coast area.

4.4 Summary of Data Set Parameters

Total and mean abundance of each taxa were estimated from all grabs (either one or three) collected at a station. Standard deviation of the mean abundance is also reported. Each taxon is identified by a unique code which is cross-referenced to the taxon phylogeny.

4.5 Year-Specific Information about Data

None

5. DATA ACQUISITION AND PROCESSING METHODS

5.1 Data Acquisition

5.1.1 Sampling Objective

Collect three sediment grab samples suitable for the analysis of benthic assemblage data.

5.1.2 Sample Collection Method Summary

Each acceptable benthic grab sample was rinsed into a plastic dishpan for transport to the sieving station for immediate, on-board processing. The sediment from an individual grab was sieved through a 500 m sieve to wash away sediments and leave organisms, detritus, sand and shell particles larger than 500 m. The contents on the sieve were rinsed with site water, into 500-ml wide-mouth polypropylene jar(s). The contents of each jar were preserved by adding 100 ml of formalin:seawater (50:50) containing Rose Bengal vital stain to yield a final formalin concentration of 10% by volume.

5.1.3 Beginning Sampling Dates

24 September 1993
10 August 1994

5.1.4 Ending Sampling Date

10 October 1993
16 August 1994

5.1.5 Platform

Each team was supplied with a 25-foot SeaArk work boat equipped with a 7.5 L gas engine fitted with a Bravo outdrive, an "A" frame boom assembly and hydraulic winch. On-board electronics consist of: a Loran C unit, GPS, radar unit, 2 VHF radios, cellular phone, compass, a depth finder, a tool kit, and all required and suggested safety equipment.

5.1.6 Sampling Equipment

A 1/25 m2, stainless steel, Young-modified Van Veen Grab sampler was used to collect sediment grabs for benthic analyses. This grab sampled an area of 413 cm2 with a maximum depth of penetration in the sediment of 10 cm.

5.1.7 Manufacturer of Sampling Equipment

NA

5.1.8 Key Variables

NA

5.1.9 Sampling Method Calibration

The sampling gear did not require any calibration. It required inspection for deformities incurred due to mishandling or impact on rocky substrates.

5.1.10 Sample Collection Quality Control

To ensure the integrity of the sediment samples collected, the interior surfaces of the grab sampler (including the underside of the hinged top) were rinsed prior to use to assure that no sediment remained from the previous station. To minimize the effects of bow wave disturbance to surficial sediments, the speed of grab through the water column was reduced as it neared the bottom. To minimize the chance of sampling the exact same location twice, after three (3) grabs were taken, the boat was moved five (5) meters downstream by letting out the appropriate length of anchor line. Sediment grabs used for benthic samples were randomly interspersed with the grabs used for sediment chemistry/toxicity samples.

A successful grab had relatively level, intact sediment over the entire area of the grab and a sediment depth at the center of between 7-10 centimeters. Unacceptable grabs included those containing no sediments and those which were partially filled or had shelly substrates or grossly slumped surfaces. Grabs that were overfilled in which excessive amounts of sediment extruded from the hinged top were also unacceptable. The sieve was inspected immediately following the removal of the sample to ensure no organisms were left clinging to the sieve. Any organisms found were placed in the sample jar. The sieve was also thoroughly scrubbed with a stiff brush between samples.

Additionally, each crew was visited during the sampling period by the QA Coordinator or Logistics Coordinator. Part of the review included observing sample collection procedures to ensure samples were being processed properly.

5.1.11 Sample Collection Method References

Macauley, J.M. 1991. Environmental Monitoring and Assessment Program-Near Coastal Louisianian Province: 1991 Monitoring Demonstration. Field Operations Manual. EPA/600/X-91/XXX. U.S. Environmental Protection Agency, Office of Research and Development, Environmental Research Laboratory, Gulf Breeze, FL 32561.

Macauley, J.M. 1992. Environmental Monitoring and Assessment Program: Louisianian Province: 1992 Sampling: Field Operations Manual. EPA/ERL-GB No. SR-119. U.S. Environmental Protection Agency, Office of Research and Development, Environmental Research Laboratory, Gulf Breeze, FL 32561.

5.1.12 Sample Collection Method Deviations

None

5.2 Data Preparation and Sample Processing

5.2.1 Sample Processing Objective

Process sediment samples to accurately identify and enumerate all macrobenthic organisms found to the lowest practical taxonomic category.

5.2.2 Sample Processing Methods Summary

5.2.2.1 Field Summary

See Section 4.1.2 Collection Method Summary

5.2.2.2 Laboratory Summary

BENTHIC SAMPLES: The samples were washed through 500 um mesh sieves. Benthic fauna were sorted from the sediments, identified to lowest practical taxa, and enumerated. Only benthic macrofauna were identified. Meiofauna and taxonomic groups having only planktonic forms were excluded from the identification process. Benthic fauna were identified to the lowest practical taxonomic level.

5.2.3 Sample Processing Method Calibration

NA

5.2.4 Sample Processing Quality Control

NA

5.2.5 Sample Processing Method Reference

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, NHEERL-AED, Narragansett, RI.EPA/620/R-95/008.

6. DATA ANALYSIS AND MANIPULATIONS

6.1 Name of New or Modified Value

BSPECABN	Organisms of the Taxon:Total #
BSPEC_MA	Organisms of the Taxon:Mean #/Grab
BSPECSTD	Organisms of the Taxon:STD of Mean/Grab

6.2 Data Manipulation Description

Measurements on a 'per grab' basis were received from taxonomic laboratories. Values in this data set were calculated by 1) Summing replicate abundance over 'n' grabs, 2) taking the mean of the abundance across 'n' replicates and 3) generating a standard deviation based on the replicate abundances for each taxon.

6.3 Data Manipulation Examples

6.3.1 Total abundance for a taxon

BSPECABN represents the arithmetic sum of the number of individuals of each taxa identified in each grab. The number of individuals of each unique taxa (identified by EMAP SPECCODE) were combined from all of the successful grabs as follows:

SPECCODE	Grab 1	Grab 2	Grab 3	BSPECABN
ACTECANA	1	.	.	1
PARAPINN	66	116	125	307
CERAXXXX	3	1	.	4

6.3.2 Mean and Standard Deviation (SD) values for abundance

BSPEC_MA represents the arithmetic mean of the number of individuals of each taxa identified in each grab. The number of individuals of each unique taxa (identified by EMAP SPECCODE) were combined from all of the successful grabs as follows:

SPECCODE	Grab 1	Grab 2	Grab 3	BSPEC_MA
ACTECANA	1	.	.	1
PARAPINN	66	116	125	102
CERAXXXX	3	1	.	2

If all three grabs were successful, the mean is represented as: (Grab1 + Grab2 + Grab3) / 3 where a missing value for a taxon/grab combination is interpreted as a 0.

6.3.3 Mean and Standard Deviation (SD) values for abundance

BSPECSTD represents the standard deviation of the arithmetic mean of the number of individuals of each taxa identified in each grab. The number of individuals of each unique taxa (identified by EMAP SPECCODE) were combined from all of the successful grabs as follows:

SPECCODE	Grab 1	Grab 2	Grab 3	BSPECSTD
ACTECANA	1	.	.	.
PARAPINN	66	116	125	32
CERAXXXX	3	1	.	1

In this case, all three grabs were successful so the mean is represented as:

(Grab1 + Grab2 + Grab3) / 3

where a missing value for a taxon/grab combination is interpreted as a 0.

The standard deviation is calculated as:
sqrt[((Grab1-Mean)**2+(Grab2-Mean)**2+(Grab3-Mean)**2)/2]

7. DATA DESCRIPTION

7.1 Description of Parameters

Field Name	Data Type	Field Len	Format	Variable Field Label
STA_NAME	Char	8	8.	The Station Identifier
VST_DATE	Num	8	YYMMDD6.	The Date the Sample was Collected
SPECCODE	Char	8	8.	EMAP Taxon Code
BSPECABN	Num	8	6.	Total # Organisms of the Taxon
BSPEC_MA	Num	8	8.2	Mean # Organisms of the Taxon
BSPECSTD	Num	8	6.2	Standard Deviation of Mean/Grab
QA_CODE	Char	15	15.	QA Code for Number of Grabs

7.1.6 Precision to which values are reported

Total abundance is reported as a whole number.
Mean abundance and standard deviation (SD) are reported to 2 decimal places.

7.1.7 Minimum Value in Data Set

Variable	Minimum
BSPECABN	0
BSPEC_MA	0.00
BSPECSTD	0.00

7.1.8 Maximum Value in Data Set

Variable	Maximum
BSPECABN	1070
BSPEC_MA	356.66
BSPECSTD	92.20

7.2 Data Record Example

7.2.1 Column Names for Example Records

STA_NAME VST_DATE SPECCODE BSPECABN BSPEC_MA BSPECSTD QA

7.2.2 Example Data Records

STA_NAME	DATE	LATIN NAME	#GRABS	BSPECABN	BSPEC_MA	BSPECSTD	QA
LA93AC1	931007	NO ORGANISMS PRESENT	.	0	.	.	
LA93AC10	931008	NO ORGANISMS PRESENT	.	0	.	.	
LA93AC2	931007	CARAZZIELLA HOBSONAE	1	12	.	.	
LA93AC2	931007	NOTOMASTUS	1	1	.	.	

8. GEOGRAPHIC AND SPATIAL INFORMATION

8.1 Minimum Longitude

-97 Degrees 36 Minutes 16.20 Decimal Seconds

8.2 Maximum Longitude

-94 Degrees 24 Minutes 33.00 Decimal Seconds

8.3 Minimum Latitude

25 Degrees 57 Minutes 28.80 Decimal Seconds

8.4 Maximum Latitude

29 Degrees 43 Minutes 49.80 Decimal Seconds

8.5 Name of area or region

Coastal distribution of sampling is in Galveston Bay, the East Bay Bayou of Galveston Bay and the Arroyo Colorado and the Rio Grande River systems in Texas.

9. QUALITY CONTROL/QUALITY ASSURANCE

9.1 Measurement Quality Objectives

Measurement Quality Objectives were outlined in the Quality Assurance Project Plan. Accuracy and precision goals are outlined below:

Benthic Species Composition	Accuracy Goal	Completeness Goal
Sorting	10%	100%
Counting	10%	100%
Taxonomy	10%	100%

9.2 Quality Assurance/Control Methods

Quality control for processing grab samples involves both sorting and counting check systems. A check on the efficiency of the sorting process was required to document the accuracy of the organism extraction process. Checks on the accuracy of sample counting were conducted in conjunction with taxonomic identification and used the same criteria.

The Quality control check on each technician's efficiency at sorting (i.e., separating organisms from sediment and debris) consists of a independent re-sort by a second, experienced sorter. To pass QC, the sorter's efficiency must be at least 90%, meaning no more than 10% of the organisms in the sample were missed. A minimum of 10 percent of samples processed by a given sorter should be subjected to a QC sort at regular intervals during sample processing. If a sorter fails QC sorts, then all samples processed from the last successful QC check were resorted and any additional organisms found were added to each sample. If QC sorting passes, but some organisms were found, these animals WERE NOT added to the original sample sort.

9.3 Actual Measurement Quality

The field sample collection and laboratory processing (i.e., sorting, identifying, and enumeration) of the benthic community assemblages fully met the prescribed QA/QC guidelines and all macrobenthic community data were acceptable without further qualification for EMAP assessments.

9.4 Sources of Error

Not applicable.

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

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10.4 Data file Format

Data can be downloaded as ASCII fixed format files.

10.5 Information Concerning Anonymous FTP

Not accessible

10.6 Information Concerning 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

Heitmuller, P.T. and R. Valente. 1991. Environmental Monitoring and Assessment Program: EMAP-Estuaries Louisianian Province: 1991 quality assurance project plan. EPA/ERL-GB No. SR-120. U.S. Environmental Protection Agency, Office of Research and Development, Environmental Research Laboratory, Gulf Breeze, FL 32561.

Macauley, J.M. 1991. Environmental Monitoring and Assessment Program-Near Coastal Louisianian Province: 1991 Monitoring Demonstration. Field Operations Manual. EPA/600/X-91/XXX. U.S. Environmental Protection Agency, Office of Research and Development, Environmental Research Laboratory, Gulf Breeze, FL 32561.

Macauley, J.M. 1992. Environmental Monitoring and Assessment Program: Louisianian Province: 1992 Sampling: Field Operations Manual. EPA/ERL-GB No. SR-119. U.S. Environmental Protection Agency, Office of Research and Development, Environmental Research Laboratory, Gulf Breeze, FL 32561.

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

12. TABLE OF ACRONYMS

ACRONYM	DESCRIPTION
EMAP	Environmental Monitoring and Assessment Program
EPA	Environmental Protection Agency
FTP	File Transfer Protocol
GPS	Global Positioning System
REMAP	Regional Environmental Monitoring and Assessment Program
WWW	World Wide Web

13. PERSONNEL INFORMATION

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