CATALOG DOCUMENTATION
NATIONAL COASTAL ASSESSMENT DATABASE
NORTHEAST REGION 2000-2002
SEDIMENT TOXICITY TEST DATA

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## 1. DATASET IDENTIFICATION

### 1.1 Title of Catalog document

National Coastal Assessment Database
Northeast Region 2000-2002
Sediment Toxicity Test Data

### 1.2 Authors of the Catalog entry

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### 1.3 Catalog revision date

August 2007

### 1.4 Dataset name

Sediment Toxicity Test

### 1.5 Task Group

National Coastal Assessment-Northeast

### 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)".

## 2. INVESTIGATOR INFORMATION

### 2.1 Principal Investigators

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2.2 Sample Collection Investigators
Donald Cobb, U.S. EPA NHEERL-AED

2.3 Sample Processing Investigators
John Kiddon, U.S. EPA NHEERL-AED

## 3. DATASET ABSTRACT

3.1 Abstract of the Dataset

The Sediment Toxicity Test data report results and biological significance of sediment toxicity tests performed for the National Coastal Assessment (Northeast component) during the summers of 2000-02. Toxicity was determined by exposing the marine amphipod *Ampelisca abdita* to whole sediment samples in static ten-day toxicity tests. The result is expressed as mean survival as per cent of control survival. One record is presented per sampling event.

3.2 Keywords for the Dataset

Sediment toxicity, *Ampelisca abdita*, amphipod, amphipod survival

## 4. OBJECTIVES AND INTRODUCTION

4.1 Program Objective

The National Coastal Assessment (NCA) is a national monitoring and assessment program with the primary goal of providing a consistent evaluation of the estuarine condition in U.S. estuaries. It is an initiative of the Environmental Monitoring and Assessment Program (EMAP), and is a partnership of several federal and state environmental agencies, including: EPA's Regions, Office of Research and Development, and Office of Water; state environmental protection agencies in the 24 marine coastal states and Puerto Rico; and the United States Geological Survey (USGS) and the National Oceanic and Atmospheric Agency (NOAA). The five-year NCA program was initiated in 2000.

Stations were randomly selected using EMAP's probabilistic sampling framework and were sampled once during a summer index period (June to October). A consistent suite of indicators was used to measure conditions in the water, sediment, and in benthic and fish communities. The measured data may be used by the states to meet their reporting requirements under the Clean Water Act, Section 305(b). The data will also be used to generate a series of national reports characterizing the condition of the Nation's estuaries.

4.2 Dataset Objective

The purpose of the sediment toxicity test data are to report the results and biological significance of the sediment toxicity test (*Ampelisca* mortality assay).

4.3 Background Discussion

A two-year sampling design was employed for 2000-2001 NCA program in the Northeast. Analysts may therefore wish to consider the two years of data together.

The toxicity of sediments was evaluated by measuring the survival rate of the marine amphipod *Ampelisca abdita* exposed to whole sediments in static 10-day laboratory tests. The tests were run at 20 oC and 30 ppt salinity. Sediments were considered to be toxic if the survival rate of the amphipods relative to a control was less than 80%. Whether or not the measured

survival rate was statistically distinct from a control group (significant at a = 0.05) is indicated.

These samples were collected in 2000-02 from the Northeast component of the NCA in the estuaries of the states Maine through Delaware. Nine federal-state cooperative agreements were formed to conduct the NCA program in Northeast U.S. Samples collected were analyzed either by a national lab under contract to the EPA or by in-state labs. In 2002, Massachusetts and Rhode Island did not collect samples for analyses, and CT sampled at an abbreviated number of in-shore stations.

NCA planners provide two alternate locations for a station location in the event that the original location cannot be sampled. Whether the station location was the original site (-A), first alternate (-B), or second alternate (-C) is indicated. Also refer to discussion in the Stations metadata file regarding use of this parameter during analysis of the data.

4.4 Summary of Dataset Parameters

Sediment was collected for use in measuring toxicological characteristics. The results of sediment toxicity tests are reported.

## 5. DATA ACQUISITION AND PROCESSING METHODS

### 5.1 Data Acquisition / Field Sampling

#### 5.1.1 Sampling Objective

Sediment was collected for the characterization of toxicity in sediments collected from the northeast United States.

#### 5.1.2 Sample Collection: Methods Summary

Sediment was collected with a 0.04-m2 Young-modified Van-Veen grab or similar sampler. Only the top two centimeters of a grab were retained for physical, chemical, and toxicological analyses. A sufficient number of grabs were processed to provide three liters of the 2-cm composite material. The composite was homogenized and separated into two fractions for storage until analysis. One fraction was frozen and used in the measurement of total organic carbon (TOC) and concentrations of chemical contaminants. The second fraction was chilled but not frozen during storage, and was used for grain-size and toxicity analyses. Separate sediment grabs were taken for benthic macro faunal analysis. This file describes the toxicological analysis, i.e., the amphipod mortality assay.

#### 5.1.3 Beginning Sampling Dates

7 July 2000
25 June 2001
25 June 2002

#### 5.1.4 Ending Sampling Dates

20 October 2000
31 October 2001
31 October 2002

#### 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: Methods Calibration
The sampling gear does not require 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 grabs. 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 sampling attempts.

5.1.11 Sample Collection: References Strobel, C.J. 2000. Environmental Monitoring and Assessment Program: Coastal 2000 - Northeast component: field operations manual. Narragansett (RI): U.S. Environmental Protection Agency, National Health and Environmental Effects Research Laboratory, Atlantic Ecology Division. Report nr EPA/620/R-00/002. 68 p.

5.1.12 Sample Collection: Alternate Methods
Different grab samplers used by NCA partners include the Smith-MacIntyre and Ponar grab samplers.

5.2 Data Preparation and Sample Processing
5.2.1 Sample Processing Objective
Determine the toxicity of sediment samples using a 10-day Ampelisca abdita mortality assay performed on whole sediments.

5.2.2 Sample Processing: Methods Summary
In the 10-day *Ampelisca abdita* assay, amphipods were exposed to sediments for 10 days under static conditions following EMAP procedures (EPA 1994, 1995). Sediment samples were stored in the dark at 4 oC prior to analysis. Control sediments were obtained from a clean site in Perdido Bay. Each sediment sample was passed through a 1 mm mesh to remove resident organisms, pebbles, etc., and was stirred to homogenize. Five replicate tests were performed with each field sample along with a test using the control sediment. For each test, 200 mL of sediment sample were placed in a glass container and covered with 600 mL of clean, filtered water (maintained at 20 oC, a salinity of 30 ppt, and a dissolved oxygen concentration >60% of saturation). Total ammonia concentration was measured colorimetrically on filtered pore water taken from a sixth replicate. For concentrations greater than 20 mg/L, the sediment was flushed until ammonia levels fell below 20 mg/L. Twenty juvenile amphipods (between 0.7 and 1.5 mm in length) were added to each test chamber for a ten-day exposure. The surviving amphipods were counted, and the results reported as the average number of amphipods surviving in the sample tests divided by the number of amphipods surviving in the control sediment, expressed as a percent. Lower values of this result indicate higher toxicity. The result was considered to be statistically significant if sample and control values were distinct with a p-value < 0.05 in a one-tailed t-test. The assay was taken to indicate toxicity if the survival rate was less than 80% of the control and the test was statistically significant.

5.2.3 Sample Processing: Methods Calibration
Not applicable

5.2.4 Sample Processing: Quality Control
Positive controls for the amphipod assays were performed as follows. Representative amphipods were routinely tested for response by determining the LC50 concentration of the reference toxicant sodium dodecyl sulfate.

The amphipods were considered viable if the measured LC50 fell within the 95% confidence interval of previous QC checks. Each batch of assays was also accompanied by a negative control assay, which was identical to the routine procedures but the amphipods were exposed to sediments that were certified as clean. Five replicates were included in the control run. Batch results were accepted if the mean survival was equal to or greater than 85% and survival in the individual replicate chambers was not less than 80% (ASTM 1993).

5.2.5 Sample Processing: References

U.S. EPA. 1994. Methods for Assessing the Toxicity of Sediment-Associated Contaminants with Estuarine and Marine Amphipods. Narragansett, RI: U.S. Environmental Protection Agency, Office of Research and Development. EPA/600/R-94/025.

U.S. EPA. 1995. Environmental Monitoring and Assessment Program (EMAP): 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.

## 6. DATA ANALYSIS AND MANIPULATIONS

### 6.1 Name of New or Modified Values

Not applicable

### 6.2 Data Manipulation: Description

Survival as percent of control (result for amphipod survival assay) was calculated as the average number of amphipods surviving in the five replicate sample tests divided by the number of amphipods surviving in the control sediment, expressed as a percent.

Statistical significance of amphipod survival result is reported as 'Significant' if the survival as percent of control was statistically significant as indicated by a p-value less than 0.05 in Dunnett's multiple range test, and 'Not Significant' if otherwise.

## 7. DATA DESCRIPTION

### 7.1 Description of Parameters

#### 7.1.1 Components of the Dataset

| Attribute Name | Format | Description |
|---|---|---|
| Data Group | VARCHAR2(4) | Data Group Conducting Sampling |
| Sampling Year | NUMBER(4.0) | Year When Data Were Collected |
| Station Name | VARCHAR2(20) | The Station Identifier |
| Sampling Collection Date | DATE | Date of Sample Collection |
| Toxicity Test Type | VARCHAR2(10) | Type of Test - Sediment or Microtox |
| Test Species | VARCHAR2(30) | Species (Latin name) used in test |
| Result Unit Measured | VARCHAR2(40) | Unit of Result (Growth/Survival) |
| Result Value | NUMBER(8.3) | Test Result Value |
| Test Status | VARCHAR2(3) | Significant/Not significant from Control |
| P Value | NUMBER(7.4) | P-value for statistical test |
| Total Ammonia (mg/L) | NUMBER(8.2) | Total Ammonia (mg/L) in Pore Water |
| Unionized Ammonia (mg/L) | NUMBER(8.3) | Un-Ionixed Ammonia (mg/L) in Pore Water |
| Moisture (%) | NUMBER(11.1) | Moisture Content (%) |

#### 7.1.2 Precision of Reported Values

The values are reliable to no more than three significant digits; however more significant digits may be reported in the dataset because of formatting restrictions.

7.1.3 Minimum Value in Dataset
Ampelisca Survival as % of Control 0

7.1.4 Maximum Value in Dataset
Ampelisca Survival as % of Control 109

7.2 Data Record Example
7.2.1 Column Names for Example Records
Data Group,Sampling Year,Station Name,Sampling Collection Date,
Latitude Decimal Degrees,Longitude Decimal Degrees,Toxicity Test Type,
Test Species,Result Unit Measured,Result Value,Test Status,QA Code

7.2.2 Examples of Data Records
National Coastal Assessment-Northeast/Connecticut,2000,CT00-0001-A,
17-AUG-2000,41.151,-73.22,Sediment,Ampelisca abdita,
Mean survival as % of control,104.0,Not significant,,
National Coastal Assessment-Northeast/Connecticut,2000,CT00-0005-A,
18-SEP-2000,41.274,-72.327,Sediment,Ampelisca abdita,
Mean survival as % of control,95.7,Not significant,,
National Coastal Assessment-Northeast/Connecticut,2000,CT00-0007-A,
10-AUG-2000,41.298,-73.066,Sediment,Ampelisca abdita,
Mean survival as % of control,81.7,Significant,,

## 8. GEOGRAPHIC AND SPATIAL INFORMATION

8.1 Minimum Longitude (Westernmost)
-75.774 decimal degrees

8.2 Maximum Longitude (Easternmost)
-66.98 decimal degrees

8.3 Minimum Latitude (Southernmost)
38.452 decimal degrees

8.4 Maximum Latitude (Northernmost)
45.185 decimal degrees

8.5 Name of area or region
The National Coastal Assessment Northeast Region covers the northeastern US coastline from Maine to Delaware.

## 9. QUALITY CONTROL AND QUALITY ASSURANCE

9.1 Measurement Quality Objectives
The measurement quality objectives of the NCA program do not specify accuracy or precision requirements for toxicity measurements.

9.2 Data Quality Assurance Procedures
QA procedures include running a positive reference toxicant (sodium dodecyl sulfate) and a negative reference sample (clean sediment from Perdido Bay).

9.3 Actual Measurement Quality
All of the data reported in this data file met the QA specifications listed in Section 5.2.4.

## 10. DATA ACCESS

10.1 Data Access Procedures
Data can be downloaded from the web at: http://www.epa.gov/emap/nca/html/data/

10.2 Data Access Restrictions
None

10.3 Data Access Contact Persons

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10.4 Dataset Format

Tab-delimited ASCII 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

Strobel, C.J. 2000. Environmental Monitoring and Assessment Program: Coastal 2000 - Northeast component: field operations manual. Narragansett (RI): U.S. Environmental Protection Agency, National Health and Environmental Effects Research Laboratory, Atlantic Ecology Division. EPA/620/R-00/002. 68 p.

U.S. EPA. 2001. National Coastal Assessment: Field Operations Manual. U.S. Environmental Protection Agency, Office of Research and Development, National Health and Environmental Effects Research Laboratory, Gulf Ecology Division, Gulf Breeze, FL. EPA/620/R-01/003. 72 p.

U.S. EPA. 2001. Environmental Monitoring and Assessment Program (EMAP): National Coastal Assessment Quality Assurance Project Plan 2001-2004. U.S. Environmental Protection Agency, Office of Research and Development, National Health and Environmental Effects Research Laboratory, Gulf Ecology Division, Gulf Breeze, FL. EPA/620/R-01/002. 189 p./620/R-95/008.

U.S. EPA. 1995. Environmental Monitoring and Assessment Program (EMAP): 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.

## 12. TABLE OF ACRONYMS

| | |
|---|---|
| AED | Atlantic Ecology Division |
| deg C | Degree Centigrade |
| EMAP | Environmental Monitoring and Assessment Program |
| EPA | Environmental Protection Agency |
| mL | Milliliter |
| mg/L | Milligram per Liter |
| NCA | National Coastal Assessment |
| NHEERL | National Health and Environmental Effects Research Laboratory |
| ppt | Parts per thousand |
| m | Meter |
| TOC | Total Organic Carbon |
| QA/QC | Quality Assurance/Quality Control |
| WWW | World Wide Web |

13. PERSONNEL INFORMATION

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