

US EPA ARCHIVE DOCUMENT

CATALOG DOCUMENTATION  
EMAP-GREAT LAKES PROGRAM LEVEL DATABASE  
1994 LAKE SUPERIOR NEARSHORE  
GRAIN SIZE COMPOSITION 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-Great Lakes Program Level Database  
1994 Lake Superior Nearshore  
Grain Size Composition

1.2 Author of the Catalog entry

Greg Elonen, ILS

1.3 Catalog revision date

24 April 1997

1.4 Data set name

LSPART94

## 1.5 Task Group

Great Lakes

## 1.6 Data set identification code

522

## 1.7 Version

001

## 1.8 Requested Acknowledgment

These data were produced as part of the U.S. EPA's Environmental Monitoring and Assessment Program (EMAP). 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 has been funded wholly or in part by the U.S. Environmental Protection Agency through its EMAP-Great Lakes 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

Stephen Lozano  
U.S. Environmental Protection Agency  
NHEERL-MED

### 2.2 Investigation Participant - Sample Collection

Floyd Boetcher  
U.S. Environmental Protection Agency  
NHEERL-MED

### 2.3 Investigation Participant - Sample Collection

Gary Phipps  
U.S. Environmental Protection Agency  
NHEERL-MED

### 2.4 Investigation Participant - Sample Collection

James Gangl  
SAIC  
(Currently, University of Minnesota)

### 2.5 Investigation Participant - Sample Processing

Jill Scharold  
U.S. Environmental Protection Agency  
NHEERL-MED

### 3. DATA SET ABSTRACT

#### 3.1 Abstract of the Data Set

Sediment grain size analyses were conducted on each EMAP station's sediment sample homogenate. The samples were obtained from the top 2 cm of sediment grab samples, representing the most recent depositional layer. The grain size composition analysis included measurements of per cent sand, per cent silt, and per cent clay.

#### 3.2 Keywords for the Data Set

Lake Superior, sediment, sand, silt, clay, grain size, nearshore.

### 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 based on station sites randomly located in the Great Lakes. Base grid and three-fold enhanced sampling sites from nearshore and offshore regions of Lake Superior are included in this data set.

#### 4.2 Data Set Objective

The objective of the sediment grain size data set is to characterize the grain size distribution of sediments collected from the nearshore region of Lake Superior. These samples represent the top 2 cm of sediment.

#### 4.3 Background Discussion

The structural characteristics of the sediment is used as the primary physical habitat indicator for all resource classes considered. Physical habitat quality characterizes the physical conditions that may limit the biological components from reaching their full potential expected for an ecological zone within a lake.

#### 4.4 Summary of Data Set Parameters

Grain size characterized as clay, silt, and sand.

### 5. DATA ACQUISITION AND PROCESSING METHODS

#### 5.1 Data Acquisition

##### 5.1.1 Sampling Objective

Collect sediment samples suitable for the analysis of sediment constituents. One (1) or two (2) sediment samples were expected to be collected at each station.

#### 5.1.2 Sample Collection Methods Summary

For successful box core samples the overlying water was allowed to settle for a few minutes before being siphoned off. Four core tubes were then placed into the sediment. The core tubes were then capped and removed one at a time. The top 2 cm of sediment was extruded, composited, then homogenized. A subsample was removed and placed into 60 mL Whirlpak bags and refrigerated for laboratory analysis. Ponar sediment samples were obtained by removing the top 2-3 cm, homogenizing the sample then removing a subsample. The subsample was then placed in a 60 mL Whirlpak bag and refrigerated for laboratory analysis.

#### 5.1.3 Beginning Sampling Date

9 August 1994

#### 5.1.4 Ending Sampling Date

20 August 1994

#### 5.1.5 Platform

Sampling was conducted from a 76 meter research vessel, the R/V Explorer, owned and operated by the U.S. EPA, NHEERL-MED.

#### 5.1.6 Sampling Equipment

Standard size Ponar and 15"x 15"x 20" box core sampler.

#### 5.1.7 Manufacturer of Instruments

Wildco Manufacturing Company

#### 5.1.8 Key Variables

Not applicable.

#### 5.1.9 Collection Method Calibration

The sampling gear did not require any calibration beyond inspection for damage due to rough handling or rock damage.

#### 5.1.10 Collection Quality Control

Criteria for rejection of Ponar samples: Soft bottom- sampler must be at least 3/4 full and show minimal signs of disturbance. Hard bottom- presence of rocks, signs of disturbance, or sampler less than 1/4 full. Criteria for rejection of box core sampler: sampler must show minimal disturbance, or less than 30 cm of sediment or less than 15 cm of overlying water are present.

#### 5.1.11 Sample Collection Method Reference

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

### 5.2 Data Processing and Sample Processing

#### 5.2.1 Sample Processing Objective

Process sediment samples to characterize the grain size composition of surface sediments.

#### 5.2.2 Sample Processing Methods Summary

The sediment samples were homogenized with a spatula before removing an aliquot for analysis. Approximately 10-40 g of material was removed and placed in 60 mL polyethylene bottles and weighed. Empty contents of bottle onto 75 um sieve. Use a 0.2% sodium hexametaphosphate solution to rinse any remaining material onto sieve from the bottle. Record volume of elutriate, place in churn splitter and agitate vigorously. Pour 150 mL of suspension into a beaker and stir on a magnetic stirrer. Remove three 15.0 ml sub-samples and place into three pre-weighed weigh pans. Dry at 1000 C and weigh. The procedure for the portion >75 um was to decant the sediment remaining in the sieve onto a series of stainless steel sieves. Wash sediment with distilled water. Dump washings from each sieve into pre-weighed weigh pans, dry at 1000 C and weigh.

#### 5.2.3 Sample Processing Method Calibration

Not applicable.

#### 5.2.4 Sample Processing Quality Control

The sum of the three fractions must be between 90%-110%.

#### 5.2.5 Sample Processing Method Reference

Integrated Laboratory Systems grain size analysis standard operating procedure #ILS-PS-001.

#### 5.2.6 Sample Processing Method Deviations

None reported.

### 6. DATA ANALYSIS AND MANIPULATIONS

#### 6.1 Name of New or Modified Values

SAND%, SILT%, CLAY%

## 6.2 Data Manipulation Description

The per cent sand fraction was determined to be the sum of the per cent fractions greater than 60 um. The per cent silt fraction was determined to be the sum of the per cent fractions between 2 um and 60 um. The per cent clay fraction was determined to be the sum of the per cent fractions less than 2 um.

## 6.3 Data Manipulation Examples

### 6.3.1 Per Cent Sand

$$\text{Sand\%} = \left( \frac{\text{Sum of all size fractions } >60 \text{ um}}{\text{Total weight of all size fractions}} \right) * 100$$

### 6.3.2 Per Cent Silt

$$\text{Silt\%} = \left( \frac{\text{Sum of all size fractions } >2 \text{ um and } <60 \text{ um}}{\text{Total weight of all size fractions}} \right) * 100$$

### 6.3.3 Per Cent Clay

$$\text{Clay\%} = \left( \frac{\text{Sum of all size fractions } <2 \text{ um}}{\text{Total weight of all size fractions}} \right) * 100$$

## 7. DATA DESCRIPTION

### 7.1 Description of Parameters

| # | Name     | Type | Length | Format | Parameter Label                |
|---|----------|------|--------|--------|--------------------------------|
| 1 | STA_NAME | Char | 10     | 10.    | Station Name                   |
| 2 | DATE     | Num  | 6      | 6.     | Sampling Date (YYMMDD)         |
| 3 | CLAY%    | Num  | 4      | 2.2    | % Clay in sediment sample      |
| 4 | SILT%    | Num  | 4      | 2.2    | % Silt in sediment sample      |
| 5 | SAND%    | Num  | 4      | 2.2    | % Sand in sediment sample      |
| 6 | TOTAL%   | Num  | 8      | 6.2    | Sum of sand, silt and clay (%) |

#### 7.1.1 Precision to which values are reported

Per cent clay, silt, and sand are reported to 2 decimal places.

#### 7.1.2 Minimum Value in Data Set

|       |      |
|-------|------|
| SAND% | 8.42 |
| SILT% | 3.54 |
| CLAY% | 1.02 |

#### 7.1.3 Maximum Value in Data Set

|       |       |
|-------|-------|
| SAND% | 95.43 |
| SILT% | 81.73 |
| CLAY% | 36.06 |

## 7.2 Data Record Example

### 7.2.1 Column Names for Example Records

STA\_NAME, DATE, SAND%, SILT%, CLAY%, TOTAL%

### 7.2.2 Example Data Records

|            |        |       |       |       |        |
|------------|--------|-------|-------|-------|--------|
| LS94-76401 | 940816 | 21.36 | 66.17 | 12.47 | 100.00 |
| LS94-77980 | 940816 | 60.67 | 30.77 | 8.55  | 100.00 |

## 8. GEOGRAPHIC AND SPATIAL INFORMATION

### 8.1 Minimum Longitude

-91 deg 29.456'W

### 8.2 Maximum Longitude

-84 deg 45.036'W

### 8.3. Minimum Latitude

46 deg 26.420'N

### 8.4 Maximum Latitude

47 deg 18.180'N

### 8.5 Name of Area or Region

Stations were located along the southern shore of the Nearshore resource class of Lake Superior from Duluth, Minnesota to Sault Ste. Marie, Michigan. Nearshore sites were located within the 100 meter depth contour. The area includes the States of Minnesota, Wisconsin, and Michigan.

## 9. QUALITY CONTROL/QUALITY ASSURANCE

### 9.1 Measurement Quality Objectives

The maximum allowable precision goal for sediment grain composition was 10%.

### 9.2. Data Quality Assurance Procedures

Data validation by Principal Investigator.

### 9.3 Actual Measurement Quality

Not reported.

## 10. DATA ACCESS

### 10.1 Data Access Procedures

Data can be downloaded from the EMAP Website.

## 10.2 Data Access Restrictions

Not applicable.

## 10.3 Data Access Contact Persons

Stephen J. Lozano  
U.S. E.P.A. NHEERL-MED  
(218)720-5594  
(218)720-5539 (FAX)  
lozano.stephen@epa.gov

## 10.4 Data Set Format

Data from the Website are in ASCII fixed format.

## 10.5 Information Concerning Anonymous FTP

Not accessible.

## 10.6 Information Concerning WWW

Data can be downloaded from the EMAP Website.

## 10.7 EMAP CD-ROM Containing the Data Set

Data are not available on CD-ROM.

## 11. REFERENCES

Hedtke, S., A. Pilli, D. Dolan, G. McRae, B. Goodno, R. Kreis, G. Warren, D. Swackhamer, and M. Henry. 1992. Great Lakes Monitoring and Research Strategy: Environmental Monitoring and Assessment Program. USEPA, Office of Research and Development, ERL-Duluth, Duluth, Minnesota. EPA/602/R-92/001. 204 p.

## 12. TABLE OF ACRONYMS

## 13. PERSONNEL INFORMATION

Stephen J. Lozano  
U.S. Environmental Protection Agency  
NHEERL-MED  
6201 Congdon Blvd  
Duluth, MN 55804  
(218)529-5205  
(218)529-5003 (FAX)  
lozano.stephen@epa.gov

Gary L. Phipps  
U.S. Environmental Protection Agency  
NHEERL-MED  
6201 Congdon Blvd  
Duluth, MN 55804  
(218)529-5205  
(218)529-5003 (FAX)  
phipps.gary@epa.gov

Jill V. Scharold  
U.S. Environmental Protection Agency  
NHEERL-MED  
6201 Congdon Blvd  
Duluth, MN 55804  
(218)529-5205  
(218)529-5003 (FAX)  
scharold.jill@epa.gov

Floyd L. Boettcher  
U.S. Environmental Protection Agency  
NHEERL-MED  
6201 Congdon Blvd  
Duluth, MN 55804  
(218)529-5205  
(218)529-5003 (FAX)  
boettcher.floyd@epa.gov