

US EPA ARCHIVE DOCUMENT

CATALOG DOCUMENTATION
EMAP- GREAT LAKES PROGRAM LEVEL DATABASE
1994 LAKE SUPERIOR NEARSHORE
TOTAL SUSPENDED SOLIDS DATA

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1. DATA SET IDENTIFICATION

1.1 Title of Catalog document

EMAP-Great Lakes Program Level Database
1994 Lake Superior Nearshore
Total Suspended Solids Data

1.2 Authors of the Catalog entry

Jenny Kysely, ILS

1.3 Catalog revision date

30 December 1996

1.4 Data set name

LSss94

1.5 Task Group

Great Lakes

1.6 Data set identification code

523

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

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3. DATA SET ABSTRACT

3.1 Abstract of the Data Set

The Lake Superior Total Suspended Solids data set provides the total suspended solids values at twenty-seven sampling locations located along the southern shore of the nearshore region of Lake Superior. Total suspended solids was analyzed from composite samples collected at the surface, mid-epilimnion, and upper hypolimnion. For isothermal conditions, composite samples were collected from one and ten meters.

A two liter portion of the composite sample was filtered through a pre-weighed 1.0 glass fiber filter using a vacuum filtration apparatus. The filter was placed in a plastic petri dish and frozen.

3.2 Keywords for the Data Set

Total suspended solids, composite sample, nearshore region, Lake Superior

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 Lake Superior are included in this data set.

4.2 Data Set Objective

The primary objective of the total suspended solids data set is to characterize the trophic status endpoint by providing estimates of the mass of suspended matter per unit volume of sample which can reduce light transmission, therefore, causing an effect on photosynthesis. Thus, it is a stressor indicator of water column optical characteristics.

4.3 Background Discussion

Stressor indicators provide important information concerning changes that occur in the condition of an ecological resource, which are influenced by natural and anthropogenic causes. Total suspended solids is an important factor addressing the trophic status of an ecosystem. Total suspended solids is defined as the mass of suspended matter per unit volume of sample and it is expressed in units of mg per liter. It is also referred to as "residue" which is material left in a vessel after evaporation of a water sample.

Turbidity in water is caused by suspended matter and it is an expression of the optical property of the water column which can effect light penetration and the trophogenic zone.

Water column optical characteristics are important factors determining the condition and productivity of an aquatic system, thus, total suspended solids addresses the trophic status endpoint and it is a

stressor indicator because it can elicit a change in photosynthesis (i.e. chlorophyll a is a condition indicator). Other water chemistry parameters, and biotic and abiotic parameters were measured which will be helpful with total suspended solids data interpretation.

4.4 Summary of Data Set Parameters

Total suspended solids values are reported for composite samples for each sampling station.

5. DATA ACQUISITION AND PROCESSING METHODS

5.1 Data Acquisition

5.1.1 Sampling Objective

To collect water samples from 27 sampling sites from the nearshore region of Lake Superior. A 4 Liter Van Dorn water sampler was used to collect water samples from a thermally (surface, mid-epilimnion, and upper hypolimnion) or isothermally (one and ten meters) stratified water column. The discrete samples were mixed for composite samples.

5.1.2 Sample Collection Methods Summary

The water samples were subsampled for total suspended solids measurements by obtaining a two liter portion from the composite sample. Each sample was filtered through a pre-weighed 1.0 glass fiber filter using a vacuum filtration apparatus. The filter was placed in a plastic dish and frozen until laboratory analysis.

5.1.3 Beginning Sampling Date

8 August 1994

5.1.4 Ending Sampling Date

20 August 1994

5.1.5 Platform

Sampling was conducted from a 28 meter research vessel, the R/V Explorer, owned and operated by the U.S. EPA, NHEERL-MED.

5.1.6 Sampling Equipment

A 4 Liter Van Dorn water sampler was used to collect water samples. A 2 Liter graduated cylinder was used for measuring the subsample volume for filtering. A filtering apparatus with a vacuum pump was used for filtering samples. Pre-weighed Millipore, 1.0 type PFG5 glass fiber filters, were used for collecting total suspended solids.

5.1.7 Manufacturer of Instrument

5.1.8 Key Variables

This data set contains composite water sample values. Two sites had duplicate field samples and are averaged for the composite depth.

5. 1. 9 Collection Method Calibration

The sampling gear required no calibration.

5. 1. 10 Collection Quality Control

Duplicate field samples at two sites (10% of sites) were taken.

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

To process total suspended solids for the trophic status endpoint and evaluate as a stressor indicator.

5. 2. 2 Sample Processing Methods Summary

Filters were pre-washed with 100 mL of distilled water using a vacuum apparatus. Filters were placed in aluminum weighing pans and dried to 103-105 deg C for approximately one hour in a drying oven. Filters were placed in a desiccator after drying. Filters were weighed after removal from desiccator. After collection, samples were stored as frozen filters in plastic petri dishes until laboratory analysis. Filters were dried for approximately one hour at 103-105 deg C. Samples were cooled in desiccator and weighed.

5. 2. 3 Sample Processing Method Calibration

Total suspended solids concentration was calculated in mg/L with the following calculation:

$$((A-B) * 1000) / (\text{mL sample filtered})$$

where A = weight of filter + sample in mg

B = weight of filter in mg

5. 2. 4 Sample Processing Quality Control

5. 2. 5 Sample Processing Method Reference

APHA Standard Methods 1985; EPA Methods 160. 2, 160. 4

5. 2. 6 Sample Processing Method Deviations

6. DATA ANALYSIS AND MANIPULATIONS

6. 1 Name of New or Modified Values

6. 2 Data Manipulation Description

6.3 Data Manipulation Examples

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	YYMMDD6.	Date sample collected
3	DEPTH_C	Char	3	3.	Depth category (C-composite, CAB-mean)
4	TSS	Num	4	4.	Total suspended solids (mg/L)

7.1.1 Precision to which values are reported

Values reported to two decimal places.

7.1.2 Minimum Value in Data Set

TSS 0.06

7.1.3 Maximum Value in Data Set

TSS 1.54

7.2 Data Record Example

7.2.1 Column Names for Example Records

7.2.2 Example Data Records

STA_NAME	DATE	DEPTH_C	TSS
LS94-76401	940816	C	0.63
LS94-77980	940816	C	0.56
LS94-77981	940816	C	0.09

8. GEOGRAPHIC AND SPATIAL INFORMATION

8.1 Minimum Longitude

-91 deg 43.516' 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

Nearshore Lake Superior

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 Minnesota, Wisconsin, and Michigan.

9. QUALITY CONTROL/QUALITY ASSURANCE

9.1 Measurement Quality Objectives

9.2. Data Quality Assurance Procedures

9.3 Actual Measurement Quality

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

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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.

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