CATALOG DOCUMENTATION
EMAP SURFACE WATERS PROGRAM LEVEL DATABASE
1993-1996 MID-ATLANTIC STREAMS DATA
STREAM BENTHOS METRICS 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 Surface Waters Stream Database
1993-1996 Mid-Atlantic Streams
Stream Benthos Metrics Data Summarized by Stream

1.2 Authors of the Catalog Entry
U.S. EPA NHEERL Western Ecology Division
Corvallis, OR

1.3 Catalog Revision Date
June 1999

1.4 Data Set Name
BENMET

1.5 Task Group
Surface Waters

1.6 Data Set Identification Code
0121

1.7 Version
002

1.8 Requested Acknowledgment
These data were produced as part of the U.S. EPA's Environmental Monitoring and Assessment Program (EMAP). If you publish these data or use them for analyses in publications, 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 EMAP Surface Waters Program, it has not been subjected to Agency review, and therefore does not necessarily reflect the views of the Agency and no official endorsement of the conclusions should be inferred."

2. INVESTIGATOR INFORMATION

2.1 Principal Investigator

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2.2 Investigation Participant - Sample Collection

Oregon State University
State of Virginia
State of West Virginia
State of Maryland
State of Pennsylvania
University of Maine
U.S. Fish and Wildlife Service
U.S. Environmental Protection Agency
Office of Research and Development
Region III

3. DATA SET ABSTRACT

3.1 Abstract of the Data Set

The primary function of the stream benthos data are to provide a snapshot of the benthos assemblage present in the stream at the time of sampling. The benthos community represents an integral component of stream biological integrity.

3.2 Keywords for the Data Set

Benthos assemblage, benthos community, benthos species identification

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 a probability-based statistical survey design.

4.2 Data Set Objective

This data set is part of a demonstration project to evaluate approaches to monitoring streams in EMAP. The data set contains the results of multi-habitat sample of the benthos assemblage taken during spring low-flow.

4.3 Data Set Background Discussion

The benthos community within a stream is an integral component of stream biological integrity. This data set contains a list of metrics derived from the species composition within the stream at the time of sampling. The metrics summarize the species relative abundance information by collapsing it into a series of metrics representing trophic guilds, habitat preferences, tolerance capacities and measures of biodiversity.

4.4 Summary of Data Set Parameters

Benthic macroinvertebrate parameters include individual counts and percentages of the sample for certain families of taxa, trophic function groups, and pollution tolerant and intolerant taxa. In addition, for each sample the Modified Hilsenhoff Biotic Index and the Shannon-Weaver diversity index are reported.

5. DATA ACQUISITION AND PROCESSING METHODS

5.1 Data Acquisition

5.1.1 Sampling Objective

To obtain a sample of the benthos assemblage within a stream during a two month sampling window from April through mid-June.

5.1.2 Sample Collection Methods Summary

The assemblage was sampled using modified kicknet with 595 micron mesh distributed in multiple habitats throughout the stream.

5.1.3 Sampling Start Date

April 1993

5.1.4 Sampling End Date

September 1996

5.1.5 Platform

NA

5.1.6 Sampling Gear

Modified kicknet with 595 micron mesh

5.1.7 Manufacturer of Instruments

NA

5.1.8 Key Variables

NA

5.1.9 Sampling Method Calibration

NA

5.1.10 Sample Collection Quality Control
See Klemm and Lazorchak 1994.

5.1.11 Sample Collection Method Reference
Lazorchak, J.M., Klemm, D.J., and Peck D.V. (editors). 1998. Environmental Monitoring and Assessment Program- Surface Waters: Field Operations and Methods for
Measuring the Ecological Condition of Wadeable Streams. EPA/620/R-94/004F. U.S. Environmental Protection Agency, Washington, D.C.

Chaloud, D.J. and D.V. Peck. 1994. Environmental Monitoring and Assessment Program - Surface Waters: Integrated Quality Assurance Project Plan for the Surface Waters Resource Group.

5.1.12 Sample Collection Method Deviations
NA

5.2 Data Preparation and Sample Processing
5.2.1 Sample Processing Objective
See Lazorchak, et al. (1998) and Chaloud and Peck (1994).

5.2.2 Sample Processing Methods Summary
See Lazorchak, et al. (1998) and Chaloud and Peck (1994).

5.2.3 Sample Processing Method Calibration
See Lazorchak, et al. (1998) and Chaloud and Peck (1994).

5.2.4 Sample Processing Quality Control
See Lazorchak, et al. (1998) and Chaloud and Peck (1994).

5.2.5 Sample Processing Method Reference
See Lazorchak, et al. (1998) and Chaloud and Peck (1994).

6. DATA MANIPULATIONS

6.1 Name of New or Modified Values
None.

6.2 Data Manipulation Description
See Chaloud and Peck (1994).

7. DATA DESCRIPTION

7.1 Description of Parameters

Parameter SAS Name	Data Type	Len	Format	Parameter Label
CHIRPIND	Num	8		Chironomid % Individuals
CHIRPTAX	Num	8		Chironomid % Distinct Taxa
CHIRRICH	Num	8		Chironomid Distinct Taxa Richness
COFIPIND	Num	8		Collector-Filter % Individuals
COFIPTAX	Num	8		Collector-Filter % Distinct Taxa
COFIRICH	Num	8		Collector-Filter Distinct Taxa Richness
COGAPIND	Num	8		Collector-Gather % Individuals
COGAPTAX	Num	8		Collector-Gather % Distinct Taxa
COGARICH	Num	8		Collector-Gather Distinct Taxa Richness
DOM1PIND	Num	8		% of Indiv. in Dominant Distinct Taxa
DOM1TAXA	Char	50		Most Abundant Distinct Taxaname
DOM3PIND	Num	8		% of Indiv. in Top 3 Distinct Taxa
DOM5PIND	Num	8		% of Indiv. in Top 5 Distinct Taxa
EPHEPIND	Num	8		Ephemeroptera % Individuals
EPHEPTAX	Num	8		Ephemeroptera % Distinct Taxa
EPHERICH	Num	8		Ephemeroptera Distinct Taxa Richness
EPT_PIND	Num	8		EPT % Individuals
EPT_PTAX	Num	8		EPT % Distinct Taxa
EPT_RICH	Num	8		EPT Distinct Taxa Richness
FACLPIND	Num	8		Facultative % Individuals
FACLPTAX	Num	8		Facultative % Distinct Taxa
FACLRICH	Num	8		Facultative Distinct Taxa Richness
FLOWTYPE	Char	1	$CHAR	Stream Habitat P)ool,R)iffle,C)omposite
HBI	Num	8		Hilsenhoff Biotic Index
HPRIME	Num	8		Shannon Diversity
INTLPIND	Num	8		Intolerant % Individuals
INTLPTAX	Num	8		Intolerant % Distinct Taxa
INTLRICH	Num	8		Intolerant Distinct Taxa Richness
MEGLPIND	Num	8		Megaloptera % Individuals
MEGLPTAX	Num	8		Megaloptera % Distinct Taxa
MEGLRICH	Num	8		Megaloptera Distinct Taxa Richness
MIXDPIND	Num	8		Mixed Functional % Individuals
MIXDPTAX	Num	8		Mixed Functional % Distinct Taxa
MIXDRICH	Num	8		Mixed Functional Distinct Taxa Richness
NOINPIND	Num	8		Non-Insect % Individuals
NOINPTAX	Num	8		Non-Insect % Distinct Taxa
NOINRICH	Num	8		Non-Insect Distinct Taxa Richness
NUM_SAMP	Num	8		Number of Kick Samples in Composite
OLLEPIND	Num	8		Oligochaete/Leech % Individuals
OLLEPTAX	Num	8		Oligochaete/Leech % Distinct Taxa
OLLERICH	Num	8		Oligochaete/Leech Distinct Taxa Richness
OMNIPIND	Num	8		Omnivore % Individuals
OMNIPTAX	Num	8		Omnivore % Distinct Taxa
OMNIRICH	Num	8		Omnivore Distinct Taxa Richness
PARAPIND	Num	8		Parasite % Individuals
PARAPTAX	Num	8		Parasite % Distinct Taxa
PARARICH	Num	8		Parasite Distinct Taxa Richness

7.1 Description of Parameters, continued

PIERPIND	Num	8	Piercer-Herbivore % Individuals
PIERPTAX	Num	8	Piercer-Herbivore % Distinct Taxa
PIERRICH	Num	8	Piercer-Herbivore Distinct Taxa Richness
PLECPIND	Num	8	Plecoptera % Individuals
PLECPTAX	Num	8	Plecoptera % Distinct Taxa
PLECRICH	Num	8	Plecoptera Distinct Taxa Richness
PREDPIND	Num	8	Predator % Individuals
PREDPTAX	Num	8	Predator % Distinct Taxa
PREDRICH	Num	8	Predator Distinct Taxa Richness
QUALSAMP	Char	1	Qualitative (hand-picked) Sample (Y/N)?
SAMPLED	Char	30	Site Sampled Code
SCAVPIND	Num	8	Scavenger % Individuals
SCAVPTAX	Num	8	Scavenger % Distinct Taxa
SCAVRICH	Num	8	Scavenger Distinct Taxa Richness
SCRPPIND	Num	8	Scraper % Individuals
SCRPPTAX	Num	8	Scraper % Distinct Taxa
SCRPRICH	Num	8	Scraper Distinct Taxa Richness
SHRDPIND	Num	8	Shredder % Individuals
SHRDPTAX	Num	8	Shredder % Distinct Taxa
SHRDRICH	Num	8	Shredder Distinct Taxa Richness
SIMPSON	Num	8	Simpson Index
SQ_POSS	Num	8	Squares Possible
SQ_SORT	Num	8	Squares Sorted
STRM_ID	Char	8	EMAP Stream Identifer
TOLRPIND	Num	8	Tolerant % Individuals
TOLRPTAX	Num	8	Tolerant % Distinct Taxa
TOLRRICH	Num	8	Tolerant Distinct Taxa Richness
TOTLDENS	Num	8	Macroinvertebrate Density (number/m2)
TOTLNIND	Num	8	Total Number of Individuals
TOTLRICH	Num	8	Total Distinct Taxa Richness
TRICPIND	Num	8	Trichoptera % Individuals
TRICPTAX	Num	8	Trichoptera % Distinct Taxa
TRICRICH	Num	8	Trichoptera Distinct Taxa Richness
UNKNPIND	Num	8	Unknown Function % Individuals
UNKNPTAX	Num	8	Unknown Function % Distinct Taxa
UNKNRICH	Num	8	Unknown Function Distinct Taxa Richness
VISIT_NO	Num	8	Sample Visit Number
YEAR	Num	8	Year sampled

7.1.6 Precision to which values are reported

7.1.7 Minimum Value in Data Set

Name	Min
CHIRPIND	0
CHIRPTAX	0
CHIRRICH	0
COFIPIND	0
COFIPTAX	0
COFIRICH	0
COGAPIND	0

7.1.7 Minimum Value in Data Set, continued

```
COGAPTAX 0
COGARICH 0
DOM1PIND 6.5972222222
DOM3PIND 17.013888889
DOM5PIND 26.388888889
EPHEPIND 0
EPHEPTAX 0
EPHERICH 0
EPT_PIND 0
EPT_PTAX 0
EPT_RICH 0
FACLPIND 0.5934718101
FACLPTAX 12.5
FACLRICH 1
HBI      2.7018292683
HPRIME   0
INTLPIND 0
INTLPTAX 0
INTLRICH 0
MEGLPIND 0
MEGLPTAX 0
MEGLRICH 0
MIXDPIND 0
MIXDPTAX 0
MIXDRICH 0
NOINPIND 0
NOINPTAX 0
NOINRICH 0
NUM_SAMP 1
OLLEPIND 0
OLLEPTAX 0
OLLERICH 0
OMNIPIND 0
OMNIPTAX 0
OMNIRICH 0
PARAPIND 0
PARAPTAX 0
PARARICH 0
PIERPIND 0
PIERPTAX 0
PIERRICH 0
PLECPIND 0
PLECPTAX 0
PLECRICH 0
PREDPIND 0
PREDPTAX 0
PREDRICH 0
SCAVPIND 0
SCAVPTAX 0
SCAVRICH 0
SCRPPIND 0
SCRPPTAX 0
```

7.1.7 Minimum Value in Data Set, continued

```
SCRPRICH 0
SHRDPIND 0
SHRDPTAX 0
SHRDRICH 0
SIMPSON  0.0309606481
SQ_POSS  40
SQ_SORT  2
TOLRPIND 0
TOLRPTAX 0
TOLRRICH 0
TOTLDENS 1.3333333333
TOTLNIND 1
TOTLRICH 1
TRICPIND 0
TRICPTAX 0
TRICRICH 0
UNKNPIND 0
UNKNPTAX 0
UNKNRICH 0
VISIT_NO 1
YEAR     1993
```

7.1.7 Maximum Value in Data Set

```
Name     Max
------------
CHIRPIND 100
CHIRPTAX 100
CHIRRICH 41
COFIPIND 100
COFIPTAX 100
COFIRICH 15
COGAPIND 94.444444444
COGAPTAX 75
COGARICH 26
DOM1PIND 100
DOM3PIND 100
DOM5PIND 100
EPHEPIND 78.291814947
EPHEPTAX 60
EPHERICH 18
EPT_PIND 95.505617978
EPT_PTAX 87.5
EPT_RICH 32
FACLPIND 100
FACLPTAX 100
FACLRICH 43
HBI      7.823964497
HPRIME   3.8106122818
INTLPIND 90.747330961
INTLPTAX 75
INTLRICH 35
```

7.1.7 Maximum Value in Data Set, continued

```
MEGLPIND 20.805369128
MEGLPTAX 25
MEGLRICH 3
MIXDPIND 59.433962264
MIXDPTAX 27.272727273
MIXDRICH 9
NOINPIND 99.40652819
NOINPTAX 53.846153846
NOINRICH 14
NUM_SAMP 9
OLLEPIND 85.50295858
OLLEPTAX 37.5
OLLERICH 12
OMNIPIND 99.40652819
OMNIPTAX 50
OMNIRICH 4
PARAPIND 10.763888889
PARAPTAX 4.5454545455
PARARICH 1
PIERPIND 5.3691275168
PIERPTAX 3.5714285714
PIERRICH 1
PLECPIND 88.601036269
PLECPTAX 40
PLECRICH 10
PREDPIND 83.035714286
PREDPTAX 46.153846154
PREDRICH 21
SCAVPIND 85.50295858
SCAVPTAX 37.5
SCAVRICH 12
SCRPPIND 65.68627451
SCRPPTAX 50
SCRPRICH 15
SHRDPIND 89.119170984
SHRDPTAX 45.454545455
SHRDRICH 10
SIMPSON  1
SQ_POSS  360
SQ_SORT  90
TOLRPIND 99.40652819
TOLRPTAX 50
TOLRRICH 17
TOTLDENS 44320
TOTLNIND 659
TOTLRICH 72
TRICPIND 52.631578947
TRICPTAX 50
TRICRICH 12
UNKNPIND 51.428571429
UNKNPTAX 40
UNKNRICH 7
```

7.1.7 Maximum Value in Data Set, continued

VISIT_NO 9
YEAR 1996

7.2 Data Record Example

7.2.1 Column Names for Example Records

"CHIRPIND","CHIRPTAX","CHIRRICH","COFIPIND","COFIPTAX","COFIRICH","COGAPIND",
"COGAPTAX","COGARICH","DOM1PIND","DOM1TAXA","DOM3PIND","DOM5PIND","EPHEPIND",
"EPHEPTAX","EPHERICH","EPT_PIND","EPT_PTAX","EPT_RICH","FACLPIND","FACLPTAX",
"FACLRICH","FLOWTYPE","HBI","HPRIME","INTLPIND","INTLPTAX","INTLRICH",
"MEGLPIND","MEGLPTAX","MEGLRICH","MIXDPIND","MIXDPTAX","MIXDRICH","NOINPIND",
"NOINPTAX","NOINRICH","NUM_SAMP","OLLEPIND","OLLEPTAX","OLLERICH","OMNIPIND",
"OMNIPTAX","OMNIRICH","PARAPIND","PARAPTAX","PARARICH","PIERPIND","PIERPTAX",
"PIERRICH","PLECPIND","PLECPTAX","PLECRICH","PREDPIND","PREDPTAX","PREDRICH",
"QUALSAMP","SAMPLED","SCAVPIND","SCAVPTAX","SCAVRICH","SCRPPIND","SCRPPTAX",
"SCRPRICH","SHRDPIND","SHRDPTAX","SHRDRICH","SIMPSON","SQ_POSS","SQ_SORT",
"STRM_ID","TOLRPIND","TOLRPTAX","TOLRRICH","TOTLDENS","TOTLNIND","TOTLRICH",
"TRICPIND","TRICPTAX","TRICRICH","UNKNPIND","UNKNPTAX","UNKNRICH","VISIT_NO",
"YEAR"

7.2.2 Example Data Records

78.571428571,54.054054054,20,4.8872180451,2.7027027027,1,31.578947368,
21.621621622,8,28.138528139,"CHIRONOMUS SP.",58.874458874,70.562770563,
0,0,0,0.3759398496,2.7027027027,1,48.496240602,59.459459459,22,"P",6.312406015,
2.5512936769,0.7518796992,5.4054054054,2,0,0,0,6.3909774436,10.810810811,4,
4.8872180451,16.216216216,6,9,3.3834586466,10.810810811,4,1.5037593985,
5.4054054054,2,0.3759398496,2.7027027027,1,0,0,0,0,0,0,45.864661654,
43.243243243,16,"N","Yes",3.007518797,8.1081081081,3,3.3834586466,2.7027027027,
1,0,0,0,0.1392964899,360,52,"DE750S",50.751879699,35.135135135,13,818.46153846,
266,37,0.3759398496,2.7027027027,1,3.007518797,2.7027027027,1,1,1994

11.214953271,25.925925926,7,4.6728971963,18.518518519,5,7.476635514,
18.518518519,5,44.660194175,"LEUCTRA SP.",67.961165049,73.786407767,
1.8691588785,7.4074074074,2,77.570093458,48.148148148,13,44.859813084,
66.666666667,18,"R",3.5476635514,2.2013542148,54.205607477,29.62962963,8,0,0,
0,2.8037383178,3.7037037037,1,2.8037383178,7.4074074074,2,9,0,0,0,2.8037383178,
7.4074074074,2,0,0,0,0,0,0,61.682242991,11.111111111,3,12.14953271,
25.925925926,7,"N","Yes",0,0,0,8.4112149533,7.4074074074,2,59.813084112,
14.814814815,4,0.234800641,120,40,"MD003S",0.9345794393,3.7037037037,1,
142.66666667,107,27,14.018691589,29.62962963,8,1.8691588785,3.7037037037,1,1,1995

57.228915663,45.652173913,21,15.361445783,17.391304348,8,56.024096386,
39.130434783,18,22.257053292,"STEMPELLINELLA SP.",36.05015674,46.70846395,
18.373493976,15.217391304,7,34.337349398,34.782608696,16,68.373493976,
58.695652174,27,"R",4.3759036145,3.1353361059,30.421686747,39.130434783,18,0,
0,0,6.0240963855,6.5217391304,3,0,0,0,9,0,0,0,0,0,0,0,0,0,0,0,0,13.253012048,
10.869565217,5,7.5301204819,17.391304348,8,"N","Yes",0,0,0,5.1204819277,
8.6956521739,4,9.6385542169,8.6956521739,4,0.0776427118,120,14,"MD005S",
1.2048192771,2.1739130435,1,1264.7619048,332,46,2.7108433735,8.6956521739,
4,0.3012048193,2.1739130435,1,1,1995

8. GEOGRAPHIC AND SPATIAL INFORMATION

8.1 Minimum Longitude
-83 Degrees 14 Minutes 39 Seconds West (-83.24444 Decimal Degrees)

8.2 Maximum Longitude
-74 Degrees 15 Minutes 32 Seconds West (-74.25890 Decimal Degrees)

8.3 Minimum Latitude
36 Degrees 33 Minutes 12 Seconds North (36.55350 Decimal Degrees)

8.4 Maximum Latitude
42 Degrees 21 Minutes 20 Seconds North (42.35566 Decimal Degrees)

8.5 Name of Area or Region
Mid Atlantic: EPA Region III which includes Delaware, Maryland, New York, Virginia, and West Virginia

9. QUALITY CONTROL / QUALITY ASSURANCE

9.1 Data Quality Objectives
See Chaloud and Peck (1994)

9.2 Quality Assurance Procedures
See Chaloud and Peck (1994)

9.3 Unassessed Errors
NA

10. DATA ACCESS

10.1 Data Access Procedures

10.2 Data Access Restrictions

10.3 Data Access Contact Persons

10.4 Data Set Format

10.5 Information Concerning Anonymous FTP

10.6 Information Concerning WWW

10.7 EMAP CD-ROM Containing the Data

11. REFERENCES

Chaloud, D.J. and D.V. Peck. 1994. Environmental Monitoring and Assessment Program - Surface Waters: Integrated Quality Assurance Project Plan for the Surface Waters Resource Group. U.S. Environmental Protection Agency. Office of Research and Development. Washington, D.C.

Lazorchak, J.M., Klemm, D.J., and Peck D.V. (editors). 1998. Environmental Monitoring and Assessment Program- Surface Waters: Field Operations and Methods for Measuring the Ecological Condition of Wadeable Streams. EPA/620/R-94/004F. U.S. Environmental Protection Agency, Washington, D.C.

12. TABLE OF ACRONYMS

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