CATALOG DOCUMENTATION
REGIONAL ENVIRONMENTAL MONITORING AND ASSESSMENT PROGRAM - REGION 10
1994-1995 WASHINGTON/OREGON COASTAL STREAMS AND YAKIMA RIVER BASIN STREAMS
BENTHIC MACROINVERTEBRATE METRICS DATA

TABLE OF CONTENTS

1.   DATA SET IDENTIFICATION

1.1 Title of Catalog Document

Regional Environmental Monitoring and Assessment Program - Region 10
1994-1995 Washington/Oregon Coastal Streams and Yakima Basin Streams
Benthic Macroinvertebrate Metrics Data Set

1.2 Authors of the Catalog Entry

U.S. EPA NHEERL Western Ecology Division
Corvallis, OR

1.3 Catalog Revision Date

23 March 1999

1.4 Data Set Name

BENMET

1.5 Task Group

Region 10

1.6 Data Set Identification Code

00006

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 publish these data or use them for
analyses in publication, 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 Regional 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 Investigators

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2.2 Investigation Participant - Sample Collection

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    Office of Research and Development
    Region 10
Oregon Department of Environmental Quality
Washington State Department of Ecology
Oregon State University
University of Washington
Yakama Indian Nation Environmental Protection Program

3. DATA SET ABSTRACT

3.1 Abstract of the Data Set

The Benthic Macroinvertebrate Metrics data set contains metrics calculated
from the raw benthic macroinvertebrate data. The metrics are based on
species and counts of numbers of individuals of each species collected
at each stream sampled.

3.2 Keywords for the Data Set

Benthos assemblage, benthos community, benthos species identification

4. OBJECTIVES AND INTRODUCTION

4.1 Program and Project Objectives

4.1.1 Program Objective

The Regional Environmental Assessment and Monitoring Program (R-EMAP) was initiated to test the applicability of the EMAP approach to answer questions about ecological conditions at regional and local scales. Using EMAP's statistical design and indicator concepts, R-EMAP conducts projects at smaller geographic scales and in shorter time frames.

4.1.2 Project Objective

The objectives of Region 10 1994-1995 Washington/Oregon Coastal Streams and Yakima Basin Streams R-EMAP project were to:

1. Determine the ecological condition of wadeable, 1st-order through 3rd-order streams of the Coast Range Ecoregion and the Yakima River Basin (Columbia Basin Ecoregion).
2. Determine the relationship between the ecological condition of these streams and the predominant land used of the watersheds.
3. Provide the states of Washington and Oregon with information that would assist in the development of water quality biological criteria using indices based on fish/amphibian and invertebrate taxa assemblage information.
4. Determine the applicability of EMAP-derived methods for assessments of ecological condition within streams in the states of Washington and Oregon.

4.2 Data Set Objective

The primary function of the Benthic Macroinvertebrate Metrics Data are to provide a snapshot of the benthos assemblage present in the stream at the time of sampling.

4.3 Data Set Background Discussion

Benthic macroinvertebrate assemblages in streams reflect the overall biological integrity of the benthic community. Monitoring these assemblages are useful in assessing the status of the stream and monitoring trends.

4.4 Summary of Data Set Parameters

This data set contains metrics based on species and counts of numbers of individuals of each species collected at each stream sampled.

5. DATA ACQUISITION AND PROCESSING METHODS

  5.1 Data Acquisition

    5.1.1 Sampling Objective

    To collect representative samples of benthic macroinvertebrates
    from the study streams.

    5.1.2 Sample Collection Methods Summary

    Benthic macroinvertebrates were collected using a fine-mesh (500 micron)
    D-frame kick net. One kick sample (0.186 square meter; 2 square feet)
    was collected at each transect and designated by its dominant habitat as
    either "pool" or "riffle". A composite sample was created by mixing all
    kicks from pools; another was created by mixing all kicks from riffles.

    5.1.3 Sampling Start Date

    May 1994
    May 1995

    5.1.4 Sampling End Date

    Oct 1994
    Sept 1995

    5.1.5 Platform

    NA

    5.1.6 Sampling Equipment

    D-frame kick net with 500 micron mesh openings and closed bag, pole
    attachment for kick net sampler (four foot length), spare nets fro kick
    net sampler or extra sampler, sieve bucket with 500 micron mesh
    openings, two plastic with eight to ten quart capacity, forceps, wash
    bottle, ethanol, funnel, small spatula.

    5.1.7 Manufacturer of Sampling Equipment

    NA

    5.1.8 Key Variables

    NA

    5.1.9 Sampling Method Calibration

    NA

5.1.10   Sample Collection Quality Control

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.

Hayslip, G. A. (editor). 1993. EPA Region 10 In-stream Biological Monitoring Handbook (for wadeable streams in the Pacific Northwest). U. S. Environmental Protection Agency - Region 10, Environmental Services Division, Seattle, WA 98101. EPA-910/9-92-013.

Merritt, G.D. 1994. Biological Assessment of wadeable Streams in the Coast Range Ecoregion and the Yakima River Basin: Final Quality Assurance Project Plan. Washington State Department of Ecology, Environmental Investigations and Laboratory Services, Olympia, WA, 15 pp.

5.1.11   Sample Collection Method Reference

Hayslip, G. A. (editor). 1993. EPA Region 10 In-stream Biological Monitoring Handbook (for wadeable streams in the Pacific Northwest). U. S. Environmental Protection Agency - Region 10, Environmental Services Division, Seattle, WA 98101. EPA-910/9-92-013.

Hayslip, G., D.J. Klemm, J.M. Lazorchak. 1994. Environmental Monitoring and Assessment Program Surface Waters and Region 10 Regional Environmental Monitoring and Assessment Program: 1994 Pilot Field Operations and Methods Manual for Streams on the Coast Range Ecoregion of Oregon and Washington and the Yakima River Basin. Office of Research and Development, U.S. Environmental Protection Agency, Cincinnati, OH.

Plafkin, J.L., M.T. Barbour, K.D. Porter, S.K. Gross, and R.M Hughes. 1989. Rapid Bioassessment Protocols for Use in Streams and Rivers: Benthic Macroinvertebrates and Fish. EPA 440/4-89/001. U.S. Environmental Protection Agency, Office of Water, Washington, D.C.

5.1.12   Sample Collection Method Deviations

NA

5.2   Data Preparation and Sample Processing

5.2.1   Sample Processing Objective

See Hayslip et al. (1994) and Hayslip (1993).

5.2.2   Sample Processing Methods Summary

See Hayslip et al. (1994) and Hayslip (1993).

5.2.3   Sample Processing Method Calibration

See Hayslip et al. (1994) and Hayslip (1993).

5.2.4 Sample Processing Quality Control

See Chaloud and Peck (1994), Merritt (1994), and Hayslip (1993).

5.2.5 Sample Processing Method Reference

See Hayslip et al. (1994) and Hayslip (1993).

6.   DATA MANIPULATIONS

6.1 Name of New or Modified Values

NA

6.2 Data Manipulation Description

NA

6.3 Data Manipulation Examples

NA

7.   DATA DESCRIPTION

7.1 Description of Parameters

#	Parameter SAS Name	Data Type	Len	Format	Parameter Label
40	CF_PCT	Num	8		% Collector-filterer
41	CF_R	Num	8		Collector-filterer taxa richness
38	CG_PCT	Num	8		% Collector-gatherer
39	CG_R	Num	8		Collector-gatherer taxa richness
16	CHIPCT	Num	8		% Chironomids
4	DATE_COL	Num	8	DATE	Date Sample Collected
17	DOMPCT	Num	8		OR % dom. taxa (1)
29	DOM_PCT	Num	8		WA % dom. taxa(looks like the top 3)
49	EPHDAE_R	Num	8		Ephemerellidae taxa richness
7	EPHTAXA	Num	8		Ephemeroptera Taxa Richness
18	EPTPCT	Num	8		% EPT Individuals
8	EPTTAXA	Num	8		EPT Taxa Richness
24	E_PCT	Num	8		% Ephemeroptera
19	FILPCT	Num	8		% Fileterers
14	FLOWTYPE	Char	1		Flow Habitat Class
53	GLOS_PCT	Num	8		% Glossosomatidae
6	HBIAVG	Num	8		OR HBI index
30	HBI_WA	Num	8		WA modified Hislsenhoffs Biotic Index
44	HYDROPCT	Num	8		% Hydrophyschidae
45	HYDRPPCT	Num	8		% Hydroptilidae
47	IDIP_PCT	Num	8		% Intolerant diptera
26	IEPT_PCT	Num	8		% intolerant EPT
25	IEPT_R	Num	8		Intolerant EPT richness

```
9    INTOLTAX   Num      8         Intolerant Taxa Richness
56   LAT_DD     Num      8         Latitude (decimal degrees)
55   LON_DD     Num      8         Longitude (decimal degrees)
51   MV_PCT     Num      8         % Multivoltine
50   PHILDPCT   Num      8         % Philopotamidae
10   PLECTAXA   Num      8         Plecoptera Taxa Richness
31   PRED_PCT   Num      8         % Predator
32   PRED_R     Num      8         Predator taxa richness
13   PTERONP    Num      8         Pteronarcys
27   P_PCT      Num      8         % Plecoptera
37   RHY_R      Num      8         Rhyacophilidae taxa richness
54   SAMPLED    Char     30        Site Sampled Code
20   SCRPCT     Num      8         % Scrappers
33   SCR_R      Num      8         Scraper taxa richness
11   SDINTTAX   Num      8         Number Sediment Intolerant Taxa
21   SDTOLPCT   Num      8         % Sediment Tolerant
22   SHRPCT     Num      8         % Shredders
48   SHRPT_R    Num      8         Plecoptera/Trichoptera shredder richness
34   SHR_R      Num      8         Shredder taxa richness
46   SIM_PCT    Num      8         % Simuliidae
1    STRM_ID    Char     7 $       REMAP Stream Identifier
52   SV_PCT     Num      8         % Semivoltine
43   TAMP_PCT   Num      8         % Tolerant amphipods
5    TAXARICH   Num      8         Total Invert. Taxa Richness
23   TOLPCT     Num      8         % Tolerants
36   TOL_R      Num      8         Tolerant taxa richness
12   TRITAXA    Num      8         Trichoptera Taxa Richness
42   TSNL_PCT   Num      8         % Tol. snails (and other molluscs ?)
3    TYPE       Num      8         Bug Collection Type - DEQ
28   T_PCT      Num      8         % Trichoptera
2    VISIT_NO   Num      8 F       Sample Visit Number
35   XYL_R      Num      8         Xylophage taxa richness
15   YEAR       Num      8         Year sampled
```

7.1.1 Precision to which values are reported

7.1.2 Minimum Value in Data Set

```
Name       Min
------------
CF_PCT    0
CF_R      0
CG_PCT    0
CG_R      0
CHIPCT    0
DATE_COL  05/16/1994
DOMPCT    8.2
DOM_PCT   0
EPHDAE_R  0
EPHTAXA   0
EPTPCT    0
EPTTAXA   0
E_PCT     0
FILPCT    0
GLOS_PCT  0
```

```
HBIAVG   2.22
HBI_WA   0
HYDROPCT 0
HYDRPPCT 0
IDIP_PCT 0
IEPT_PCT 0
IEPT_R   0
INTOLTAX 0
LAT_DD   42.1114
LON_DD   -124.5862217
MV_PCT   0
PHILDPCT 0
PLECTAXA 0
PRED_PCT 0
PRED_R   0
PTERONP  0
P_PCT    0
RHY_R    0
SCRPCT   0
SCR_R    0
SDINTTAX 0
SDTOLPCT 0
SHRPCT   0
SHRPT_R  0
SHR_R    0
SIM_PCT  0
SV_PCT   0
TAMP_PCT 0
TAXARICH 0
TOLPCT   1.4
TOL_R    0
TRITAXA  0
TSNL_PCT 0
TYPE     10
T_PCT    0
VISIT_NO 1
XYL_R    0
YEAR     1994
```

7.1.3 Maximum Value in Data Set

```
Name     Max
------------
CF_PCT   46.042003231
CF_R     4
CG_PCT   97.080291971
CG_R     16
CHIPCT   94.4
DATE_COL 09/29/1995
DOMPCT   75.9
DOM_PCT  97.080291971
EPHDAE_R 10
EPHTAXA  12
EPTPCT   97.455470738
EPTTAXA  40
```

```
E_PCT     73.144104803
FILPCT    58.1
GLOS_PCT  12.693498452
HBIAVG    7.618
HBI_WA    7.9367396594
HYDROPCT  30.578512397
HYDRPPCT  5.5
IDIP_PCT  8.0939947781
IEPT_PCT  90.804597701
IEPT_R    21
INTOLTAX  25
LAT_DD    48.1784
LON_DD    -119.5619
MV_PCT    99.513381995
PHILDPCT  16.666666667
PLECTAXA  17
PRED_PCT  46.296296296
PRED_R    15
PTERONP   1
P_PCT     44.181034483
RHY_R     5
SCRPCT    95.6
SCR_R     16
SDINTTAX  4
SDTOLPCT  75
SHRPCT    82.436260623
SHRPT_R   8
SHR_R     8
SIM_PCT   42.326332795
SV_PCT    45.806451613
TAMP_PCT  39.182692308
TAXARICH  67
TOLPCT    95.6
TOL_R     12
TRITAXA   16
TSNL_PCT  27.413793103
TYPE      12
T_PCT     83.002832861
VISIT_NO  3
XYL_R     2
YEAR      1995
```

7.2 Data Record Example

7.2.1 Column Names for Example Records
```
"CF_PCT","CF_R","CG_PCT","CG_R","CHIPCT","DATE_COL","DOMPCT","DOM_PCT",
"EPHDAE_R","EPHTAXA","EPTPCT","EPTTAXA","E_PCT","FILPCT","FLOWTYPE",
"GLOS_PCT","HBIAVG","HBI_WA","HYDROPCT","HYDRPPCT","IDIP_PCT","IEPT_PCT",
"IEPT_R","INTOLTAX","LAT_DD","LON_DD","MV_PCT","PHILDPCT","PLECTAXA",
"PRED_PCT","PRED_R","PTERONP","P_PCT","RHY_R","SAMPLED","SCRPCT","SCR_R",
"SDINTTAX","SDTOLPCT","SHRPCT","SHRPT_R","SHR_R","SIM_PCT","STRM_ID",
"SV_PCT","TAMP_PCT","TAXARICH","TOLPCT","TOL_R","TRITAXA","TSNL_PCT","TYPE",
"T_PCT","VISIT_NO","XYL_R","YEAR"
```

7.2.2   Example Data Records

```
.,.,.,.,78.5,21JUL1995,35.9,.,.,.,4,8.6,7.00,.,.,1.5,"P",.,.,6.35,.,.,.,.,.,.,.,.,2,
45.991677169,-122.8964313,.,.,.,0,.,.,.,0,.,.,.,"Yes",9.2,.,.,0,4.9,8,.,.,.,.,.,
"OR001S",.,.,.,32,21.8,.,.,3,.,.,12.00,.,.,1,.,.,1995

.,.,.,.,66.1,21JUL1995,15.1,.,.,.,5,19.8,15.00,.,.,1,"R",.,.,4.95,.,.,.,.,.,.,.,.,2,
45.991677169,-122.8964313,.,.,.,5,.,.,.,0,.,.,.,"Yes",0.7,.,.,1,1.3,16.4,.,.,.,.,.,
"OR001S",.,.,.,45,12.4,.,.,5,.,.,12.00,.,.,1,.,.,1995

.,.,.,.,80.9,06SEP1995,18.1,.,.,.,1,2.6,4.00,.,.,1.6,"P",.,.,6.46,.,.,.,.,.,.,.,.,1,
45.991677169,-122.8964313,.,.,.,0,.,.,.,0,.,.,.,"Yes",19.4,.,.,0,4.9,2.9,.,.,.,.,.,
"OR001S",.,.,.,33,24.9,.,.,3,.,.,11.00,.,.,2,.,.,1995
```

8.   GEOGRAPHIC AND SPATIAL INFORMATION

  8.1 Minimum Longitude

    -124 Degrees 35 Minutes 10 Seconds West (-124.5862217 Decimal Degrees)

  8.2 Maximum Longitude

    -119 Degrees 33 Minutes 42 Seconds West (-119.5619 Decimal Degrees)

  8.3 Minimum Latitude

    42 Degrees 6 Minutes 41 Seconds North (42.1114 Decimal Degrees)

  8.4 Maximum Latitude

    48 Degrees 10 Minutes 42 Seconds North (48.1784 Decimal Degrees)

  8.5 Name of Area or Region

    EPA Region 10
    The sampling area included the Coast Range Ecoregion and the Yakima River
    Basin (Columbia Basin Ecoregion).

9.   QUALITY CONTROL / QUALITY ASSURANCE

  9.1 Data Quality Objectives

    See Chaloud and Peck (1994), Merritt (1994), and Hayslip (1993).

  9.2 Quality Assurance Procedures

    See Chaloud and Peck (1994), Merritt (1994), and Hayslip (1993).

  9.3 Unassessed Errors

    NA

10. DATA ACCESS

   10.1 Data Access Procedures

      Data can be downloaded from the WWW site or contact personnel listed in
      Section 10.3.

   10.2 Data Access Restrictions

      Data can only be accessed from the WWW server.

   10.3 Data Access Contact Persons

         Gretchen Hayslip
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         Region 10
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         Corvallis, OR 97333
         541-754-4467
         541-754-4716(FAX)
         cappaert@mail.cor.epa.gov

   10.4 Data Set Format

      Data files are in ASCII comma-delimited format.

   10.5 Information Concerning Anonymous FTP

      Data cannot be accessed via ftp.

   10.6 Information Concerning WWW

      Data can be downloaded from the WWW site.

   10.7 EMAP CD-ROM Containing the Data

      Data are not available on CD-ROM.

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.

Hayslip, G. A. (editor). 1993. EPA Region 10 In-stream Biological Monitoring Handbook (for wadeable streams in the Pacific Northwest). U. S. Environmental Protection Agency - Region 10, Environmental Services Division, Seattle, WA 98101. EPA-910/9-92-013.

Hayslip, G., D.J. Klemm, J.M. Lazorchak. 1994. Environmental Monitoring and Assessment Program Surface Waters and Region 10 Regional Environmental Monitoring and Assessment Program: 1994 Pilot Field Operations and Methods Manual for Streams on the Coast Range Ecoregion of Oregon and Washington and the Yakima River Basin. Office of Research and Development, U.S. Environmental Protection Agency, Cincinnati, OH.

Merritt, G.D. 1994. Biological Assessment of wadeable Streams in the Coast Range Ecoregion and the Yakima River Basin: Final Quality Assurance Project Plan. Washington State Department of Ecology, Environmental Investigations and Laboratory Services, Olympia, WA, 15 pp.

Plafkin, J.L., M.T. Barbour, K.D. Porter, S.K. Gross, and R.M Hughes. 1989. Rapid Bioassessment Protocols for Use in Streams and Rivers: Benthic Macroinvertebrates and Fish. EPA 440/4-89/001. U.S. Environmental Protection Agency, Office of Water, Washington, D.C.

12. TABLE OF ACRONYMS

13. PERSONNEL INFORMATION

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  200 S.W. 35th Street
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  541-754-4716(FAX)
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