CATALOG DOCUMENTATION
EMAP-ESTUARIES PROGRAM LEVEL DATABASE
1993 FISH COMMUNITY DATA

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1. DATA SET IDENTIFICATION

1.1 Title of Catalog Document

EMAP-Estuaries Program Level Database
1993 Virginian Province
1993 Fish Abundance, Diversity, Pathology and Trash Data Summarized for a Station

1.2 Authors of the Catalog entry

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1.3 Catalog revision date

12 April 1996

1.4 Data set name

FISH_SUM

1.5 Task Group

Estuaries

1.6 Data set identification code

00107

1.7 Version

001

1.8 Requested Acknowledgment

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 have been funded wholly or in part by the U. S. Environmental Protection Agency through its EMAP-Estuaries 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

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2.2. Investigation Participant-Sample Collection

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3. DATA SET ABSTRACT

3.1 Abstract of the Data Set

The Fish Community data set is a synopsis of one successful standard trawl conducted at a station. The total number of fish species and individuals of all species caught in the standard trawl is reported. Material of anthropogenic or natural origins may have been collected (Y/N) in the trawl. Manmade trash includes: plastics, cans, tires, glass, paper, wood, medical waste, metal objects, balls or fishing gear. Natural material includes dead fish and natural wood. The gross external body pathology data are presented for 1993.

3.2 Keywords for the Data Set

Fish species, natural material, species abundance, trash, body pathology

4. OBJECTIVES AND INTRODUCTION

4.1 Project and Investigation 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 randomly located station sites.

4.2 Data Objective

The objective of the Fish Community data set was to collect information to characterize fish assemblages in the estuaries of the Virginian Provinces. Only the randomly located Base Sampling Sites (BASE) are included in this data set.

4.3 Background Discussion

Estuarine fish have economic, recreational, and ecological value. Some are harvested; others serve as forage for predatory organisms that have great aesthetic value (e.g., birds, sport fish, mammals). Most fish species hold a position near the top of the food chain. The impact of anthropogenic activities on fish concerns the public.

There are several advantages to using fish as potential indicators of estuarine condition. Because of their longevity and dominant position at the upper end of the food web, fish responses integrate many short-term and small-scale environmental perturbations. Fish are known to respond to most of the major environmental perturbations of concern in estuaries, including eutrophication, habitat modification and pathogenic or toxic contamination. Eutrophication can affect fish adversely by reducing dissolved oxygen below levels that are critical for growth or survival. Habitat modification, such as the loss of submerged aquatic vegetation, has been linked to decreased fish productivity through loss of important nursery areas. Toxic and pathogenic contaminants can decrease fish growth, reproduction or survival and can make fish unsafe for human consumption. Fish also are valuable as indicators because of their importance for determining the public perception of estuarine quality.

Factors controlling species composition and abundance of estuarine fish communities are complex and not well understood. However, most fish ecologists agree that the assemblage of fish that occurs at a sampling site is affected by water and sediment quality parameters, including contaminant concentrations and inputs, and habitat conditions. For example, polluted sites are thought to contain less diverse and less stable fish assemblages than unpolluted sites and are dominated by pollution-tolerant species, such as mummichogs and carp. The degree to which information on fish community composition can be used to assess the status of estuarine environments on regional scales is unknown. A major purpose of evaluating fish community composition was to determine whether regional scale information on fish community characteristics could be used as indicator of environmental quality. If fish community data could be used in this manner, it would be particularly meaningful to a broad range of audiences, especially the public.

The incidence of gross pathological disorders in fish such as fin erosion, somatic ulcers, cataracts, and axial skeletal "aesthetic" abnormalities is a major means used by the public to judge the environmental quality of a water body. Gross pathological disorders have a scientific base; severely polluted habitats have a higher frequency of gross pathological disorders than similar, less polluted habitats. Laboratory exposures to contaminants such as PCBs, petroleum products, and pesticides, also suggest that many gross pathological disorders are associated with contaminant exposure.

4.4 Summary of Data Set Parameters

The raw data for species composition and abundance and trash collected were recorded in the field after the completion of one successful standard trawl. Body pathologies confirmed by experts are presented here.

5. DATA ACQUISITION AND PROCESSING METHODS

5.1 Data Acquisition

5.1.1 Sampling Objective

Conduct one (1) successful standard fish trawl at a BASE Sampling Site suitable for the characterization of fish species composition, abundance and length and the processing of samples for examination for gross body pathologies.

5.1.2 Sample Collection Method Summary

A fish trawl is a funnel-shaped net that filters fish from the near bottom waters. Fish are herded by ground wire and doors into the mouth of the funnel where fish were captured. Fish are prevented from escaping over the top panel of the trawl by an overhanging panel. The net was towed for 10 + 2 minutes with a towing speed of 2-3 knots through the water against the prevailing current. Speed over the bottom was 1-3 knots.

All fish in the net were sorted by species and enumerated. All species considered to be rare, threatened, or endangered were processed immediately and released alive. Thirty individuals of a species (or all individuals if less than 30 were caught) were measured (fork length) to the nearest millimeter and the length was recorded.

As fish were measured, specimens greater than 75 mm in fork length were examined for evidence of gross pathological conditions. While fish were still alive or freshly dead, the skin, fins, eyes, and branchial chambers were inspected for evidence of disease. Abnormalities were noted on a data sheet. Fish with abnormalities were saved and preserved for histopathological analysis. The entire length of the abdominal cavity of pathology fish samples was carefully opened without injuring the visceral organs to allow proper preservation of the sample. If an external growth was present, it was measured and sliced open with one clean cut using a sharp razor blade. Either the entire fish (fish less than 15 cm) or the head, visceral cavity, and organs (fish over 15 cm total length) was placed in a perforated plastic bag. The bag was then placed in a bucket containing Dietrich's fixative. Reference (non-diseased) fish were also collected at some stations and processed

as pathology samples.

All fish species were examined for evidence of gross external pathologies. For fish with pathologies, one or two cuts were made through the livers of specimens larger than 15 cm and opercula were removed prior to immersion in fixative.

5.1.3 Beginning Sampling Date

27 July 1993

5.1.4 Ending Sampling Date

31 August 1993

5.1.5 Platform

Sampling was conducted from 8 m (24 ft), twin-engine Chesapeake style work boats.

5.1.6 Sampling Equipment

The trawl net was a funnel-shaped high rise sampling trawl with a 16-meter footrope with a chain sweep. The trawl net had 5 cm mesh wings and a 2.5 cm cod end.

5.1.7 Manufacturer of Equipment

Not Applicable

5.1.8 Key Variables

The total count of individuals of a taxon collected at a station, species identification information and individual length were recorded after sample collection.

5.1.9 Collection Method Calibration

The sampling gear did not require calibration. It required inspection for tears and proper assemblage.

5.1.10 Collection Quality Control

A trawl was considered void if one or more of the following conditions occurred:

1. A tow could not be completed because of hangdown, boat malfunction, vessel traffic, or major disruption of gear. However, a tow was considered acceptable if it was necessary to retrieve the net after at least eight minutes due to impending hazards, as long as the net was retrieved in the standard manner.

2. Boat speed or speed over the bottom was beyond the prescribed, acceptable range.

3. The cod-end of the net was not tied shut.

4. The trawl continued for more than twelve minutes or less than

eight minutes.

5. The net was filled with mud or debris.

6. A portion of the catch was lost prior to processing.

7. The tow wire, bridle, headrope, footrope, or up and down lines parted.

8. The net was torn in a way that may have significantly altered the efficiency of the net.

If, due to repeated snags, a successful trawl could not be performed within 1 1/2 hours of starting, no further attempts were made and the Field Operations Center was notified.

Quality assurance audits were performed by qualified personnel to verify the enumeration of fish by the field crews. The accuracy goal for the fish abundance data was that the original results and the results of the field QA audit should agree within ten percent. In addition, the first one or two individual fish caught of any species were sent to the laboratory for taxonomic verification. All fish species should have been correctly identified. If these goals were not met, corrective actions included re-training the field crew and flagging the previous data from that crew for those species which had been misidentified. A random subset of the fish measured in the field was set aside for duplicate measurements by a second technician. The acceptable error in this procedure was + 5 mm. If this re-measurement procedure could not be followed due to logistical constraints, then quality assurance documentation of fish length was accomplished during field auditing.

The first two individuals of each species collected (except threatened or endangered species) were preserved and returned to ERL-N for expert identification. Fish sent in were preserved for the EMAP fish reference collection to be used for future training. If corrections to the fish data base were necessary due to the mis-identification of a species, these corrections were carefully documented. Field crews were also notified of their misidentification to avoid any further ID problems for that species.

5.1.11 Sample Collection Method Reference

Reifsteck, D. R., Strobel, C.J. and D. J. Keith. 1993. Environmental Monitoring and Assessment Program-Estuaries: 1993 Virginian Province Effort Field Operations and Safety Manual. U.S. EPA NHEERL-AED, Narragansett, RI. June 1993.

5.2 Data Preparation and Sample Processing

5.2.1 Sample Processing Objective

Process specimens for presence of gross external pathologies.

5.2.2 Sample Processing Methods Summary

Fish pathology specimens were subjected to a critical gross external examination. The presence or absence of many types of body surface and fin gross pathologies, including body lumps, growths, and ulcerations and fin erosion, was noted.

5.2.3 Sample Processing Method Calibration

NA

5.2.4 Sample Processing Quality Control

Pathology fish samples sent to the analytical laboratory were subjected to a critical gross examination. The findings of this examination were compared to the findings from the field examination.

5.2.5 Sample Processing Method Reference

U.S. EPA. 1995. Environmental Monitoring and Assessment Program (EMAP): Laboratory Methods Manual-Estuaries, Volume 1: Biological and Physical Analyses. U.S. Environmental Protection Agency, Office of Research and Development, Narragansett, RI. EPA/620/R-95/008.

6. DATA MANIPULATIONS

6.1 Name of New of Modified Values

FSP_TOT	Total Fish Taxa (#) in 'n' Trawls
FSP_ABN	Total Individual Fish (#) in 'n' Trawls
MNMDTRSH	Plastic/Cans/Tires/etc in Trawl (Y/N)
NATLMTRL	Dead Fish/Natural Wood in Trawl (Y/N)

6.2 Data Manipulation Description

FSP_TOT	Total number of taxon collected at a station
FSP_ABN	Total number of individuals collected at a station
MNMDTRSH	Presence/absence of material of anthropogenic or
NATLMTRL	natural origin

6.3 Data Manipulation Examples

FSP_TOT (Total Fish Taxon/Trawl) =
Summation of the unique taxon codes in the first successful trawl at a station

FSP_ABN (Total Individuals/Trawl) =
Sum of the abundances of all taxa in the first successful trawl at a station

MNMDTRSH (Manmade trash in trawl)
Y/N - plastic, medical waste, can, tires, glass, paper, manmade wood, sports balls, fishing gear or other manmade trash

NTRLMATL (Natural material in trawl)
Y/N - dead fish and natural wood

FSPECBOD
All body pathologies on all individuals of a taxon collected at a station were summed

7. DATA DESCRIPTION

7.1 Description of Parameters

#	Parameter SAS Name	Data Type	Len	Format	Parameter Label
1	STA_NAME	Char	8	8.	The Station Identifier
2	VST_DATE	Num	8	YYMMDD6.	The Date the Sample was Collected
3	FSP_TOT	Num	8	5.	Total Fish Taxa (#) in 'n' Trawls
4	FSP_ABN	Num	8	5.	Total Individual Fish (#) in 'n' Trawls
5	MNMDTRSH	Char	3	$3.	Plastic/Cans/Tires/etc in Trawl (Y/N)
6	NATLMTRL	Char	3	$3.	Dead Fish/Natural Wood in Trawl (Y/N)
7	BODYPATH	Num	8	4.	Gross Body Path (#): all Fish
8	OCU_PATH	Num	8	4.	Gross Eye path (#): all Fish
9	BRNCPATH	Num	8	4.	Gross Branchial Path (#): all Fish
10	BUCCPATH	Num	8	4.	Gross Buccal Path (#): all Fish
11	FSP_TRWL	Num	8	2.	Trawls (#) included in Summary Data

7.1.6 Precision to which values are reported

Total abundance and total number of taxa for a station are reported as whole numbers. Only body pathology values are reported.

7.1.7 Minimum Value in Data Set

FSP_TOT	0
FSP_ABN	0

7.1.8 Maximum Value in Data Set

FSP_TOT	17
FSP_ABN	1244

7.2 Data Record Example

7.2.1 Column Names for Example Records

STA_NAME VST_DATE FSP_TOT FSP_ABN MNMDTRSH NATLMTRL BODYPATH OCU_PATH BRNCPATH BUCCPATH FSP_TRWL

7.2.2 Example Data Records

OBS	STA_NAME	VST_DATE	FSP_TOT	FSP_ABN	MNMDTRSH	NATLMTRL	BODYPATH	OCU_PATH	BRNCPATH	BUCCPATH	FSP_TRWL
1	VA93-601	930918	17	166	N	N	0	0	0	0	1
2	VA93-602	930813	5	308	N	N	1	0	0	0	1
3	VA93-604	930726	1	3	N	N	0	0	0	0	1
4	VA93-606	930814	5	135	N	N	0	0	0	0	1
5	VA93-607	930827	4	14	N	N	0	0	0	0	1

8. GEOGRAPHIC AND SPATIAL INFORMATION

8.1 Minimum Longitude

-77 Degrees 23 Minutes 37.20 Decimal Seconds

8.2 Maximum Longitude

-70 Degrees 01 Minutes 9.00 Decimal Seconds

8.3 Minimum Latitude

36 Degrees 56 Minutes 54.00 Decimal Seconds

8.4 Maximum Latitude

42 Degrees 11 Minutes 30.00 Decimal Seconds

8.5 Name of area or region

Virginian Province

Stations were located in estuaries along the East Coast of the United States from Cape Cod, Massachusetts, to Cape Henry, Virginia, at the mouth of the Chesapeake Bay. The area includes the District of Columbia and the States of Virginia, Maryland, New Jersey, Delaware, Pennsylvania, New York, Connecticut, Rhode Island and Massachusetts.

9. QUALITY CONTROL/QUALITY ASSURANCE

9.1 Measurement Quality Objectives

Measurement quality objectives were outlined in the Quality Assurance Project Plan (Valente and Strobel, 1993). Accuracy and precision goals are outlined below:

Fish Community Composition	Accuracy Goal	Completeness Goal
Counting	10 %	90 %
Taxonomic Identification	10 %	90 %
Length Determinations	+ 5 mm	90 %

9.2 Quality Assurance/Control Methods

Data from trawls which did not meet the requirements of a standard trawl were not included in this data set.

To further validate the identification of fish species, range checks were performed for species in the data base to assure that fish captured at a given station met certain criteria:

Salinity: For each station, bottom salinity was determined from the CTD cast and compared to the expected salinity range (based on historic data) for each species of fish captured at that station. Species records

falling out of the salinity range were flagged.

Species location: A latitude range for each species captured by EMAP field crews was established based on historic data and fish keys. Each system that a particular species occurred in was compared to that range to determine inclusion. Latitudes where fish were reported captured were compared to expected latitudes for that species and flagged if there were discrepancies.

Length: Maximum length for each species was determined from fish keys. A QA length was calculated as 50% of the maximum length and outliers were flagged. Flagged data records were then investigated on a case by case basis to determine the cause of discrepancy and recommend a course of action.

9.3 Quality Assessment Results

As a result of the 1990-1992 data, and the fact that chemistry fish were no longer to be collected, the QA process for pathology data changed after the 1992 field season. Starting in 1993, the results on the prevalence of pathologies in fish of the Virginian Province are based on the laboratory examination, NOT the field exam. Crews were instructed to examine all fish and ship every one suspected of having a pathology to the laboratory for confirmation. In 1993, the examination by the pathologist was no longer "blind". Fish received at the laboratory were coded as "pathology" or "reference" fish. If the pathologist disagreed with the crew's observation (i.e., he felt a pathology fish did not have a pathology or a reference fish was found to have one), a second pathologist was consulted and their collective decision entered into the database. Although data from 1990 through 1992 show the crews to be efficient at not missing many pathologies (i.e., low incidence of false negatives), the pathologist's review of reference fish continued. The results of the laboratory examinations are presented in Table 9-3. The high rate of "false positives" is likely the result of the crews being overly conservative following instruction to ship any fish SUSPECTED of having a pathology.

Table 9-3. 1993 Pathology QA results based on laboratory examination of fish crews believed to have a pathology and reference, "pathology-free" fish (n=620).

Pathology Type	False Positives1	False Negatives2
Body Ulcerations	10/12 (83.3%)	1/608 (0.2%)
Body Lumps	5/5 (100.0%)	0/615 (0.0%)
Body Growths	4/11 (36.4%)	2/609 (0.3%)
Fin Erosion	1/4 (25.0%)	0/616 (0.0%)

1 False Positives: The denominator in this column is the total number of fish identified by the field crews as having a given pathology. The numerator is the number of these fish for which the pathology was not confirmed by the pathologist.

2 False Negatives: The denominator in this column is the total number of fish identified by the field crews as not having a given pathology. The numerator is the number of these fish for which the pathology was observed by the pathologist.

10. DATA ACCESS

10.1 Data Access Procedures

Data can be downloaded from the WWW server.

10.2 Data Access Restrictions

10.3 Data Access Contact Persons

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10.4 Data Set Format

Data can be downloaded in several formats from the web application and web site.

10.5 Information Concerning Anonymous FTP

Not accessible

10.6 Information Concerning WWW

Data can be downloaded from the WWW server.

10.7 EMAP CD-ROM Containing the Data Set

Data not available on CD-ROM.

11. REFERENCES

Holland, A.F., ed. 1990. Near Coastal Program Plan for 1990: Estuaries. EPA 600/4-90/033. U.S. EPA, Environmental Research Laboratory, Office of Research and Development, Narragansett, RI. November 1990.

Reifsteck, D.R., Strobel, C.J., and D.J. Keith. 1993. Environmental Monitoring and Assessment Program-Estuaries: 1993 Virginian Province Effort Field Operations and Safety Manual. U.S. EPA NHEERL-AED, Narragansett, RI. June 1993.

Valente, R. and C.J. Strobel. 1993. Environmental Monitoring and Assessment Program-Estuaries: 1993 Virginian Province Quality Assurance Project Plan. U.S. EPA, NHEERL-AED, Narragansett, RI. May 1993.

12. TABLE OF ACRONYMS

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