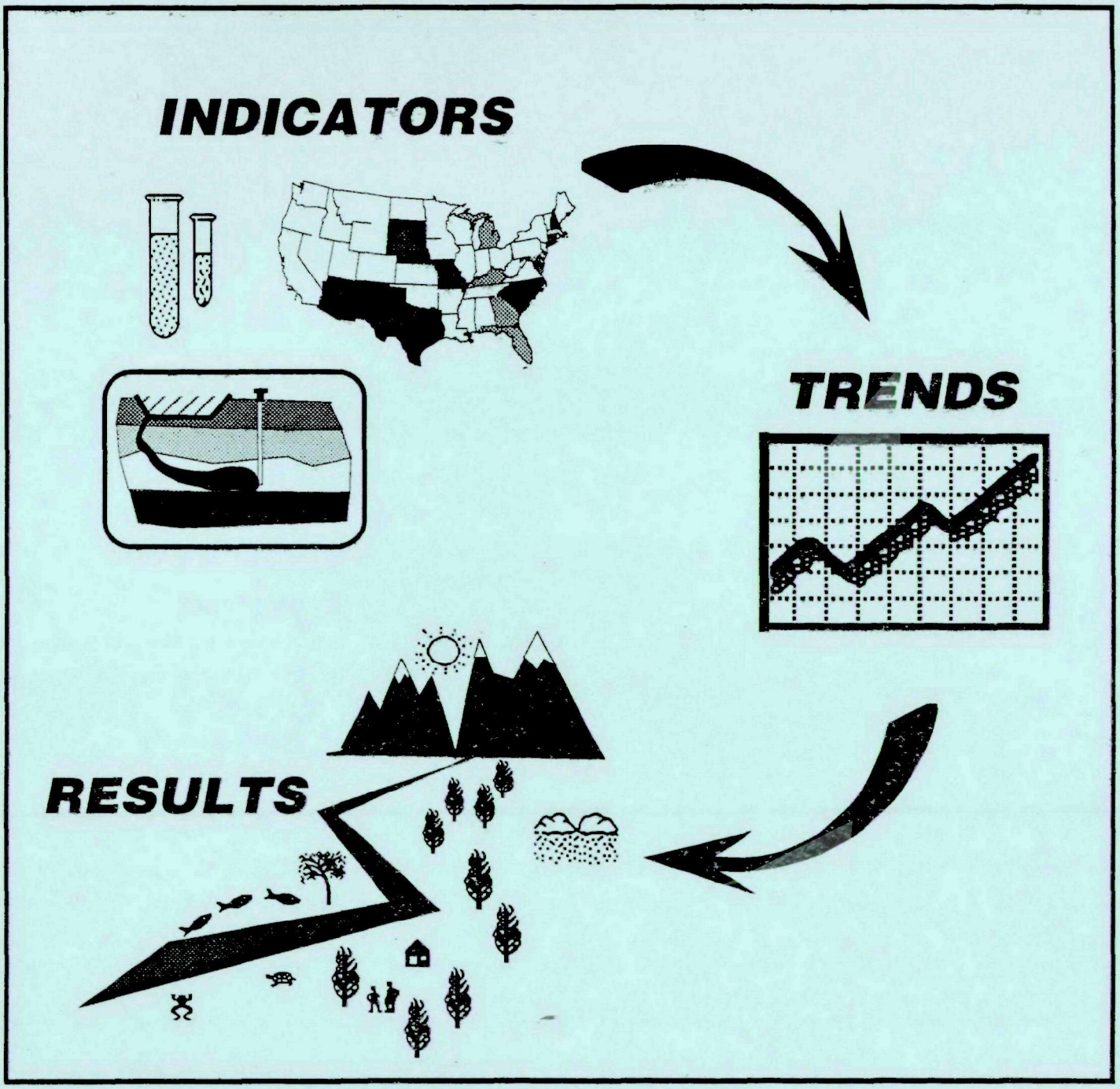
ENVIRONMENTAL INDICATORS



Environmental Results and Forecasting Branch, February 1991

Environmental Indicators

Data Notebook

ERFB/OPPE/USEPA
February 1991

CONTENTS

CONTENTS (Continued)

Foreword

Environmental indicators combined with measures of activity accomplishments are expected to become an integral part of all the Agency's strategic planning. These indicators will become the barometer of status and trends of environmental quality and ultimately become the tool to evaluate success of our programs. This indicators data notebook marks the first effort to assemble data reported by the program offices in FY 90, the first indicator reporting year. In addition, proposed indicators are listed and indicator data from other sources are described. Environmental Results and Forecasting Branch (ERFB), Strategic Planning and Management Division (SPMD), Office of Policy, Planning and Evaluation (OPPE), has prepared this notebook so that program managers can easily judge the progress and future direction of Agency indicators. It is our intention to annually update this document as the program offices report new data.

The notebook begins with our vision of what environmental indicators should be and what they are meant to accomplish. This is followed by five major sections: the four media Offices (Offices of Air and Radiation (OAR), Office of Water (OW), Office of Solid Waste (OSWER), Office of Pesticides and Toxic Substances (OPTS)), and a fifth section for cross media initiatives.

The four program office sections are each divided into four "data type" sections. The first is on environmental indicators data reported by program offices for FY 90. The second is not actual data, but a listing of proposed indicators drawn from the programs' strategic plans and/or ATS commitments for indicator reporting. Some of these proposed indicators represent commitments to report with a listing of planned reporting dates. Others do not represent commitments, and should be regarded only as indicators the offices are considering until such time as reporting commitments are made. The third section, potential indicators, contains examples of data found from a variety of sources by ERFB. We suggest these might be considered by the program offices for use as environmental indicators. The fourth section, regional indicators, contains one or two examples of regional data pertinent to some offices.

Program data type sections are further divided in 1) the OSWER program area into Resource Conservation Recovery Act (RCRA) and Superfund indicators and 2) the OPTS program area into Office of Toxics Substance (OTS) and Office of Pesticide Programs (OPP) indicators. The fifth major section contains a variety of projects which yield indicator data relevant to some of the Agency's key cross media programs and initiatives.

ERFB gratefully appreciates the contributions provided by the program and regional offices, other agencies and contractors in preparing this notebook. For further details or comments contact ERFB at 382-4900.

INTRODUCTION

INTEGRATING ENVIRONMENTAL INDICATORS INTO STRATEGIC PLANNING: A VISION STATEMENT FOR THE AGENCY

Vision

EPA will use environmental indicators combined with measures of activity accomplishments to evaluate the success of our programs, and to report status and trends in U.S. environmental quality to the public, Congress, states, the regulated community, and the international community. National program managers will use environmental indicators to determine where their programs are achieving the desired environmental results, and where inadequate results indicate that strategies need to be changed. Over time, as more data are reported, environmental indicators will become increasingly important as measures of success.

Definitions

Environmental Indicator: either a direct measure of environmental quality (e.g., chemical and physical conditions), ecological health, or human health; or an indirect measure, such as an emissions amount, that measures the amount of pollution or other harmful factors to which the environment is subjected. (See OPPE concept paper, "Environmental Indicators and Activity Measures in the EPA Management System" for more detailed description of types of data that may be used as indicators.)

Activity Measure: the amount of a given function accomplished by EPA or our state or other partners, such as the numbers of pollutant abatement or pollution prevention permits issued or revised, inspections completed, chemicals reviewed and acted upon, etc. (Activity Measures are the traditionally used STARS measures of program accomplishment.)

Relationship of Environmental Indicators to External Factors (Outside of EPA)

EPA will use environmental indicators primarily as we use activity measures, to evaluate the success of our own programs. In addition, our indicator reporting system will identify some environmental improvements and problems affected by the actions of other agencies, together with factors beyond federal or other government control. Where appropriate, EPA may use information of this kind to advise other agencies, Congress, states or other nations of environmental problems that may warrant increased attention on their parts. Where problems are due to circumstances beyond anyone's control, EPA may use the information to recommend new strategies to accommodate to the inevitable circumstances.

Once Programs are Reporting on Environmental Indicators and Activity Measures, How Will the Two Types of Results Be Used? How Will They Relate to Each Other?

Comparison to Targets and Goals: Program Evaluation. Once indicator reporting is in place, program evaluation can be based on a much more complete understanding of how our activities actually relate to our ultimate "outputs", the environmental results. This in turn will allow strategic planning to focus more clearly on what approaches are and are not working well, and to adjust our activities accordingly.

The process will work as follows. Programs will continue to be evaluated according to how well they meet activity measure targets each year. Environmental indicators will be expected to correspond to measurable goals set forth in strategic plans, so these goals will in essence provide "targets" for the indicators. However, in keeping with the difficulties of projecting exactly how the environment will respond to program activities, programs will not be held as strictly accountable for meeting these goals as they are for activity measure targets. Program offices and Regions will be held strictly accountable for reporting on their indicators. Then, if environmental goals are not met, they will be accountable for providing timely, technically sound explanations of why they were not, and for promptly developing and implementing new approaches to meet the goals in the future (for example, controls on a type of source that has proven to contribute more to an environmental problem than was previously understood). Activity measure(s) corresponding to these approaches should be adjusted accordingly. Provided that legislative or judicial constraints allow, targets for other activities that have proven relatively less important in terms of environmental impact and risk could be lowered for future reporting periods to allow greater emphasis on the higher impact/higher risk activities.

If a program lacks a technical understanding of why an environmental goal hasn't been met, it will be held accountable for starting new research, modeling or other activities to develop the necessary understanding of what is going wrong, and for setting reasonable activity measure targets for completing such research in timely fashion. In the meantime, it will still be expected to try to set revised environmental goals based on best professional judgement, with the understanding that these may be adjusted when the research is completed.

Spatial Scope of Indicators: Headquarters and Regional Responsibilities

Headquarters: National Indicators. Each media office is responsible to identify environmental indicators for each of the environmental problem areas addressed by its strategic plan. Whenever possible, these indicators should be national in coverage. They should also be adequately representative of the entire resource to be protected or major risks to be avoided, not just of some problem locations or causes (e.g. not just some airsheds or watersheds, or just pollutants with high health risks but not those with high ecological risks, etc.). Where there

are data gaps, offices should report partial data at first, while developing ways to eventually fill data gaps (e.g. working with states that don't monitor or report, to encourage them to do so).

Regional Indicators. Where Regions do not differ from Headquarters in identifying or developing strategies for environmental problems, indicators for their programs will be provided by the national indicator data base. Where a Region needs to address a problem for which there are no national indicators, or for which it feels additional Regional indicators would be appropriate, the Region should identify in its strategic plan or risk management strategy an indicator(s) by which environmental reults can be evaluated for that activity.

Special Studies. Indicators will be used to evaluate progress of geographicaly targetted special studies, such as the Great Lakes Program, or other special focus activities such as the Agency-wide lead strategy. It will be the responsibility of the special group or task force managing the project to identify suitable indicators, and make commitments to ensure needed data are obtained and reported.

Support Offices' Respon-sibilities for Indicator Development and Reporting

OPPE Strategic Planning and Management Division (SPMD). SPMD will maintain an information system to receive, store, and produce reports summarizing environmental indicator data reported by Headquarters and Regional offices. SPMD will provide technical assistance to media offices in identifying potential indicator data sets, conducting feasibility studies, and developing techniques for data analysis, display and evaluation. In addition, SPMD may identify data sets not in use by any program office as environmental indicators but potentially relevant as indicators for EPA, and would obtain data on these as additional indicators of interest.

OPPE Center for Environmental Statistics (CES). The CES mission will be to analyze and report status and trends in U.S. environmental conditions, explicitly including factors affected by EPA's programs, factors addressed by other agencies, and natural environmental characteristics. Where data obtained and analyzed by the CES are considered useful as indicators of EPA program success, CES can serve as an intermediate data source, helping programs to obtain data if the primary source is outside EPA, and can provide assistance with statistical analysis and data presentation. CES State of the Environment reports will be separate from but complementary to the program environmental indicator summary reports compiled by OPPE/SPMD and program offices, with some data sets most relevant to one or another report, and some data sets presented in both types of report.

ORD's Environmental Monitoring and Assessment Program (EMAP). EMAP is a new national-scale monitoring program coordinated by EPA/ ORD. It will be implemented by ORD and other federal agencies, with additional field work conducted in some cases by interested states, universities and other cooperators. EMAP will collect data on a wide variety of environmental quality factors and ecological conditions in all media: water, terrestrial environments, and air deposition. EMAP will be a potential source of environmental indicator data for many EPA programs, particularly those addressing area-wide impacts or cumulative impacts of multiple sources.

Data Sources for Indicators

Wherever possible, environmental indicators should be data that are already collected by EPA, states or other federal agencies (or, in a few cases, other organizations with consistent national data gathering programs). It is not expected that EPA programs will need to start new monitoring programs to provide indicator data. In many cases, however, EPA programs will have to develop new ways to obtain, organize and analyze data that are already being collected and managed in inconsistent ways from Region to Region or state to state. And in a few cases, new monitoring or changes in monitoring approaches may be needed to fill gaps in national data sets.

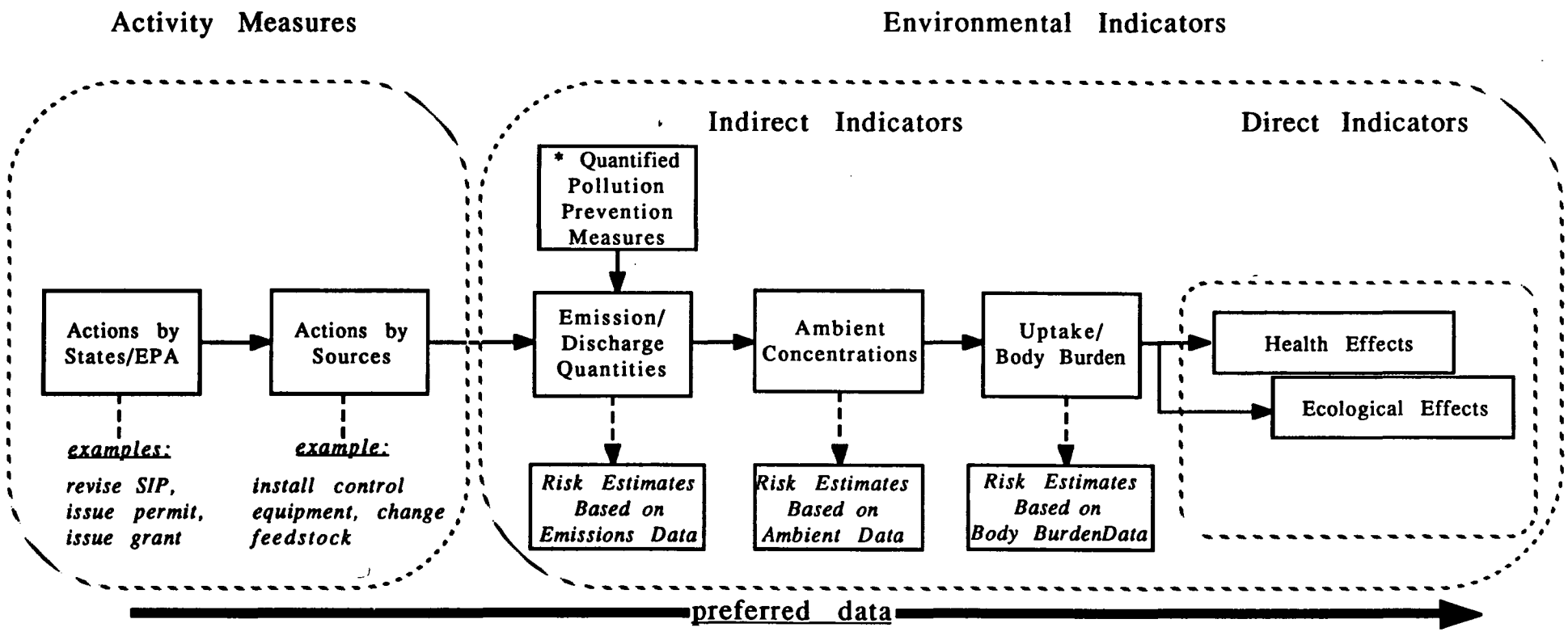
How Will Indicators be Reported?

Reporting System. Program offices will report national indicator data using the STARS system maintained by OPPE. This will be a companion to the STARS activity measure reporting component. The format will be flexible, to accommodate differences in types of data and formats that are most useful to the offices doing the reporting.

Regional Reporting. Regions will report on any Region-specific activity measures and indicators using Regional components of STARS. (This should not be confused with the fact that Regions participate in reporting on national activity measures and may also be encouraged by Headquarters offices to help report on national indicators.)

Reporting Frequency. Environmental indicator data will be reported as frequently as suitable for each indicator, typically much less frequently than the quarterly reporting cycle for activity measures. Annual reporting may be the most common approach.

CONTINUUM OF MEASURES OF ENVIRONMENTAL PROGRAM EFFECTIVENESS



Theme 1: Managing for Environmental Results. Data to the right are closer to the "adverse ultimate impacts of pollution" that the States and EPA are charged with preventing or mitigating. All else being equal, data further to the right are better indicators of environmental result than data further to the left.

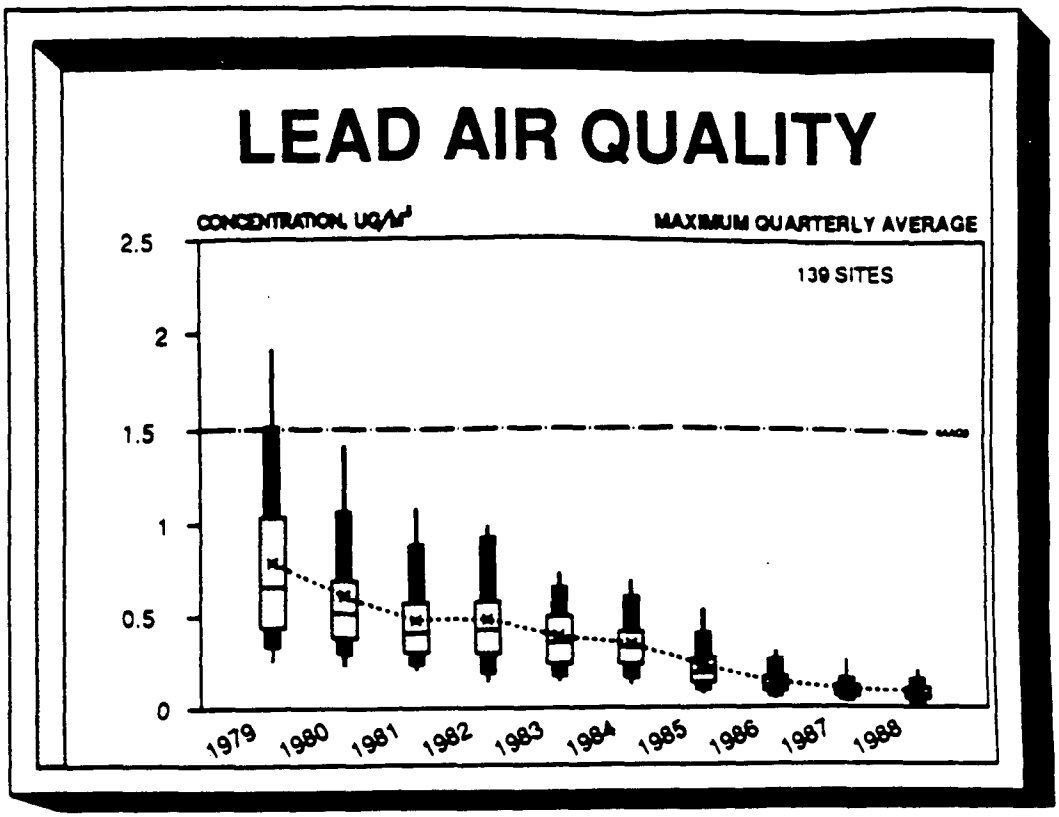
Theme 2: Emphasizing Pollution Prevention. Pollution prevention should result in the same kinds of environmental improvements as all Agency programs, so all these indicator types may be used to reflect pollution prevention successes. However, to prove the results are due to pollution prevention, data would be needed on the box marked with a *.

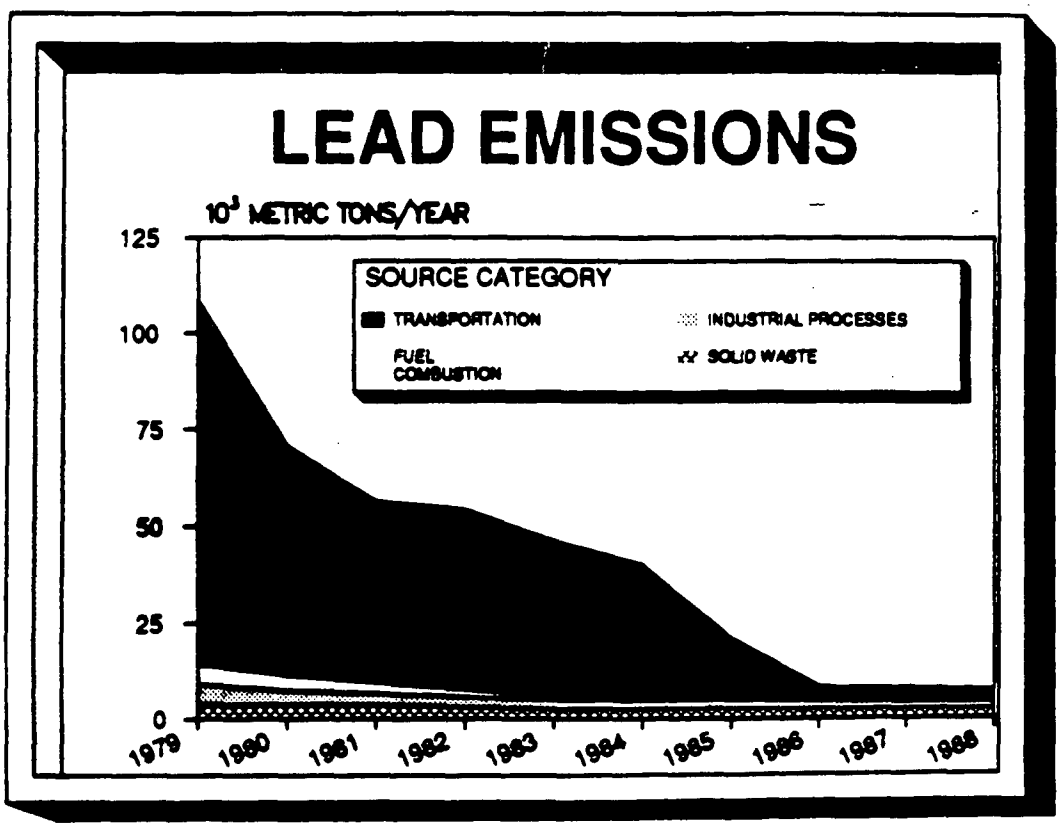
OAR

Reported Indicators

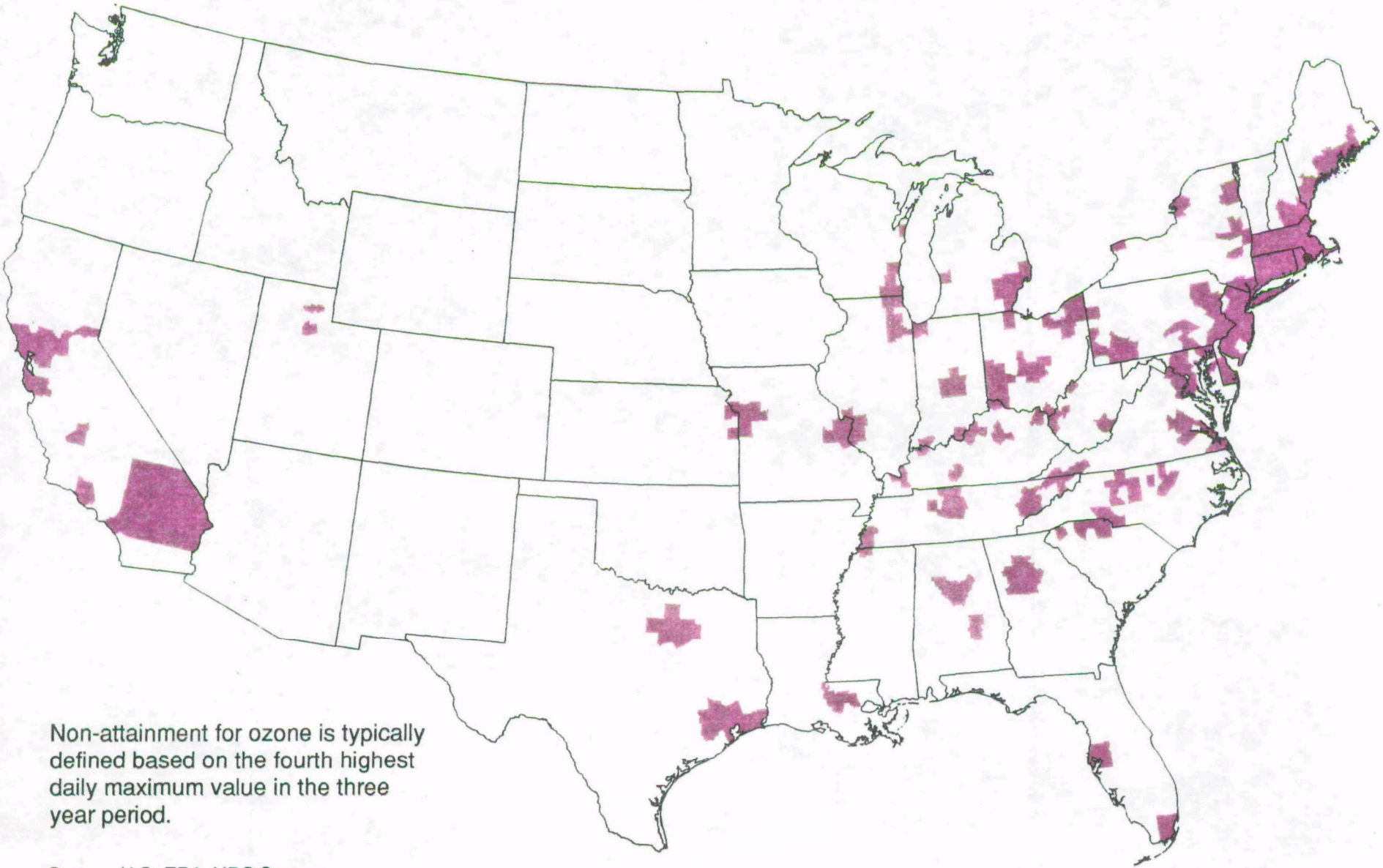
OAR Reported Indicators

Under the National Ambient Air Quality Standards (NAAQS) program, OAR has reported indicators for criteria air pollutants (NO_2, SO_2, Lead, CO, TSP, and Ozone) since the 1970s as illustrated on the following six pages.


LEAD AIR QUALITY
CONCENTRATION, UG/M³
MAXIMUM QUARTERLY AVERAGE
139 SITES
2.5
2
1.5
1
0.5
0
1979
1980
1981
1982
1983
1984
1985
1986
1987
1988


LEAD EMISSIONS
10³ METRIC TONS/YEAR
125
100
75
50
25
0
SOURCE CATEGORY
TRANSPORTATION
INDUSTRIAL PROCESSES
FUEL COMBUSTION
SOLID WASTE
1979
1980
1981
1982
1983
1984
1985
1986
1987
1988

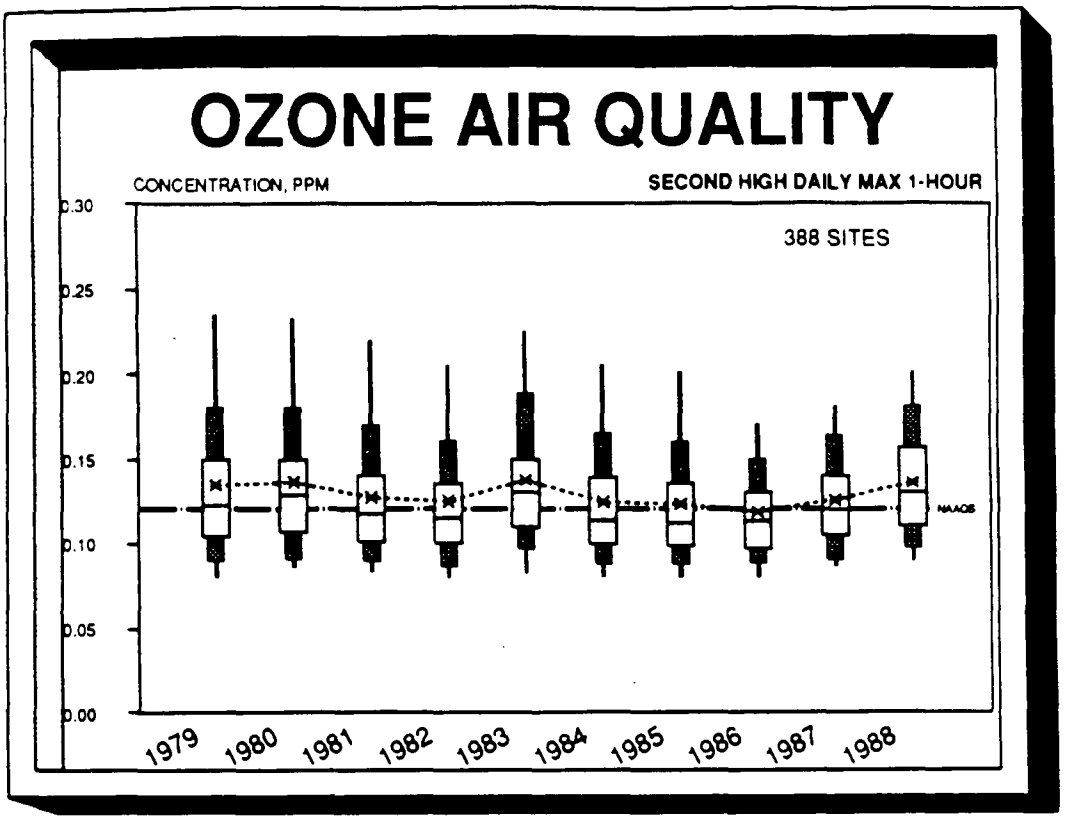
Areas In Non-Attainment For Ozone, 1987-1989



Non-attainment for ozone is typically defined based on the fourth highest daily maximum value in the three year period.

Source: U.S. EPA AIRS System

Environmental Results and Forecasting Branch/February 1991


OZONE AIR QUALITY
CONCENTRATION, PPM
SECOND HIGH DAILY MAX 1-HOUR
388 SITES
0.30
0.25
0.20
0.15
0.10
0.05
0.00
1979
1980
1981
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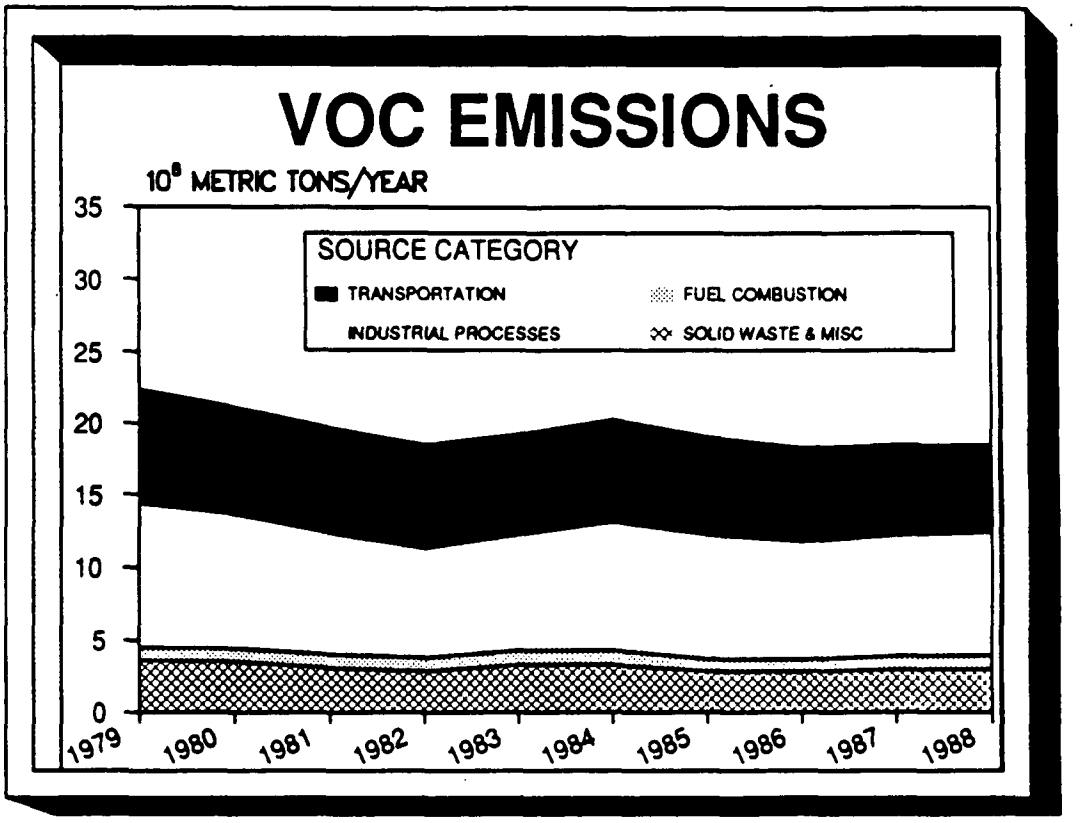
VOC EMISSIONS
10⁹ METRIC TONS/YEAR
SOURCE CATEGORY
TRANSPORTATION
FUEL COMBUSTION
INDUSTRIAL PROCESSES
SOLID WASTE & MISC
35
30
25
20
15
10
5
0
1979
1980
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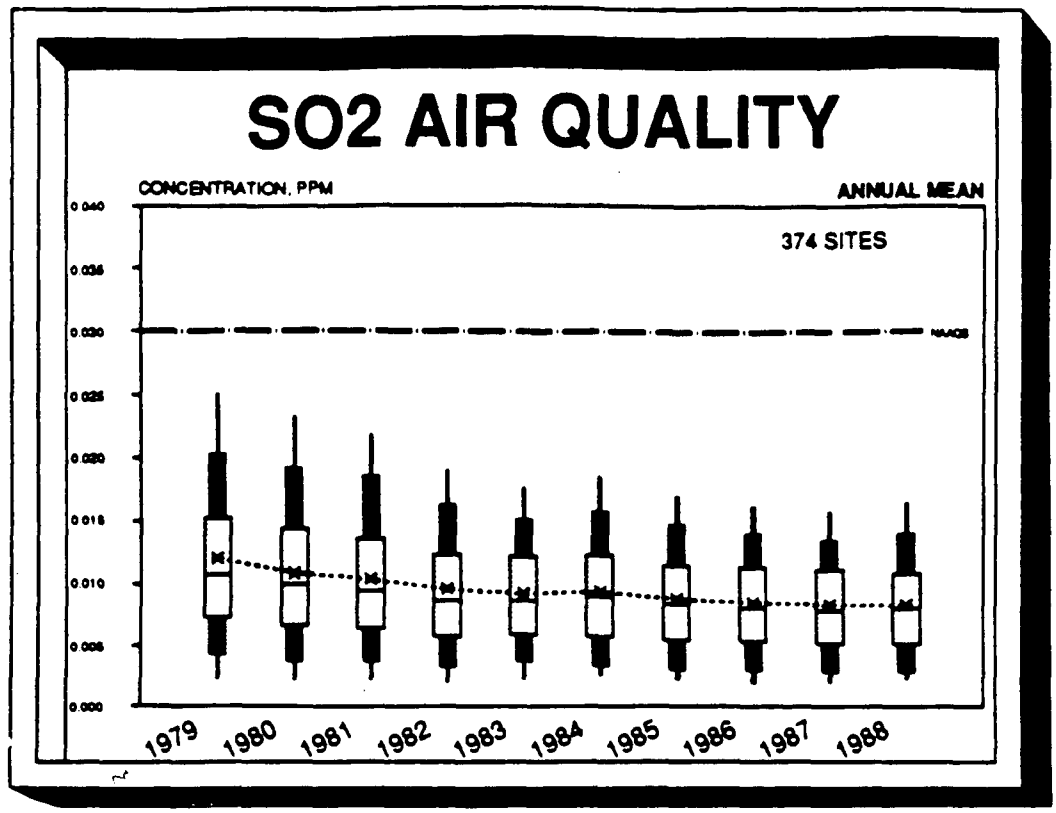
1986
1987
1988


SO2 AIR QUALITY
CONCENTRATION, PPM
ANNUAL MEAN
374 SITES
NAAQS
0.040
0.035
0.030
0.025
0.020
0.015
0.010
0.005
0.000
1979
1980
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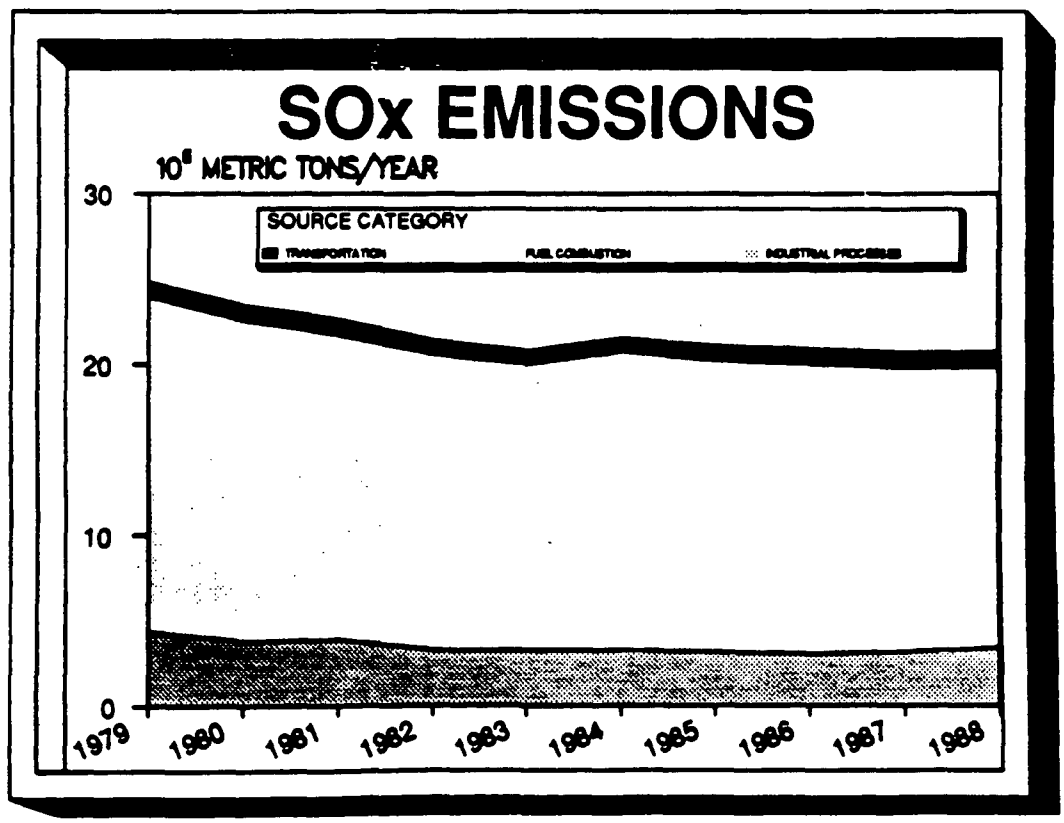
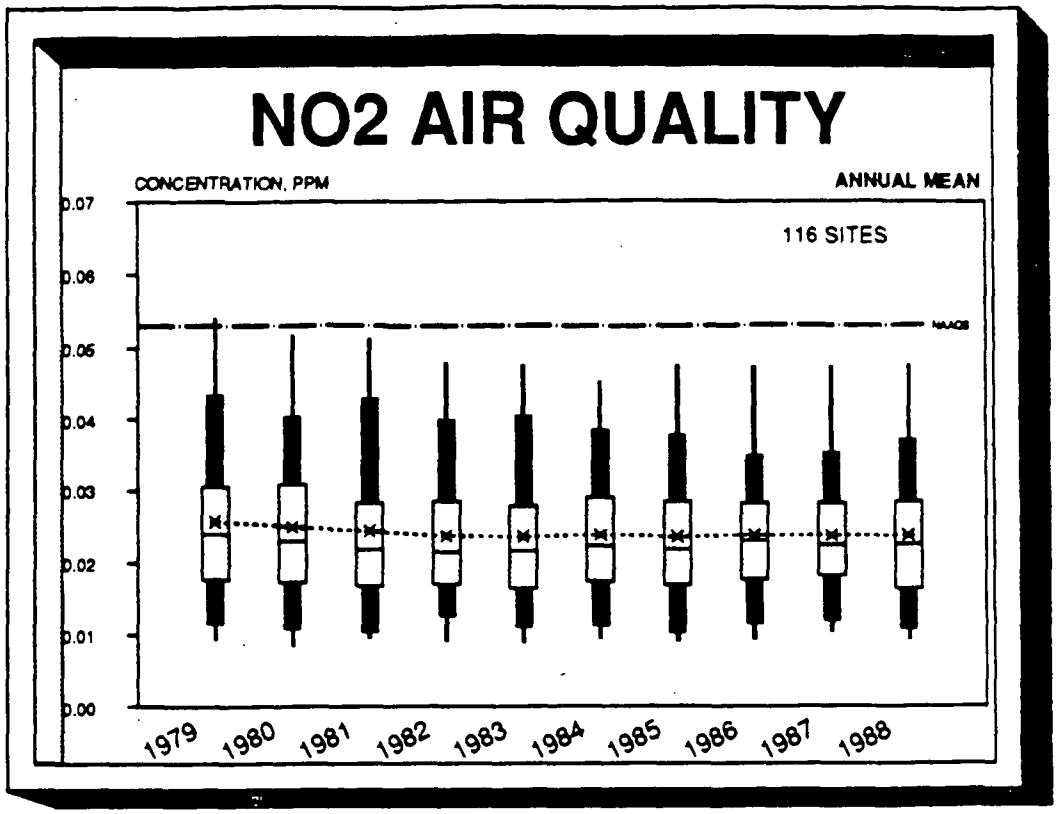

SOx EMISSIONS
10⁶ METRIC TONS/YEAR
SOURCE CATEGORY
TRANSPORTATION
FUEL COMBUSTION
INDUSTRIAL PROCESSES
30
20
10
0
1979
1980
1981
1982
1983
1984
1985
1986
1987
1988


NO2 AIR QUALITY
CONCENTRATION, PPM
ANNUAL MEAN
116 SITES
NAAQS
0.07
0.06
0.05
0.04
0.03
0.02
0.01
0.00
1979
1980
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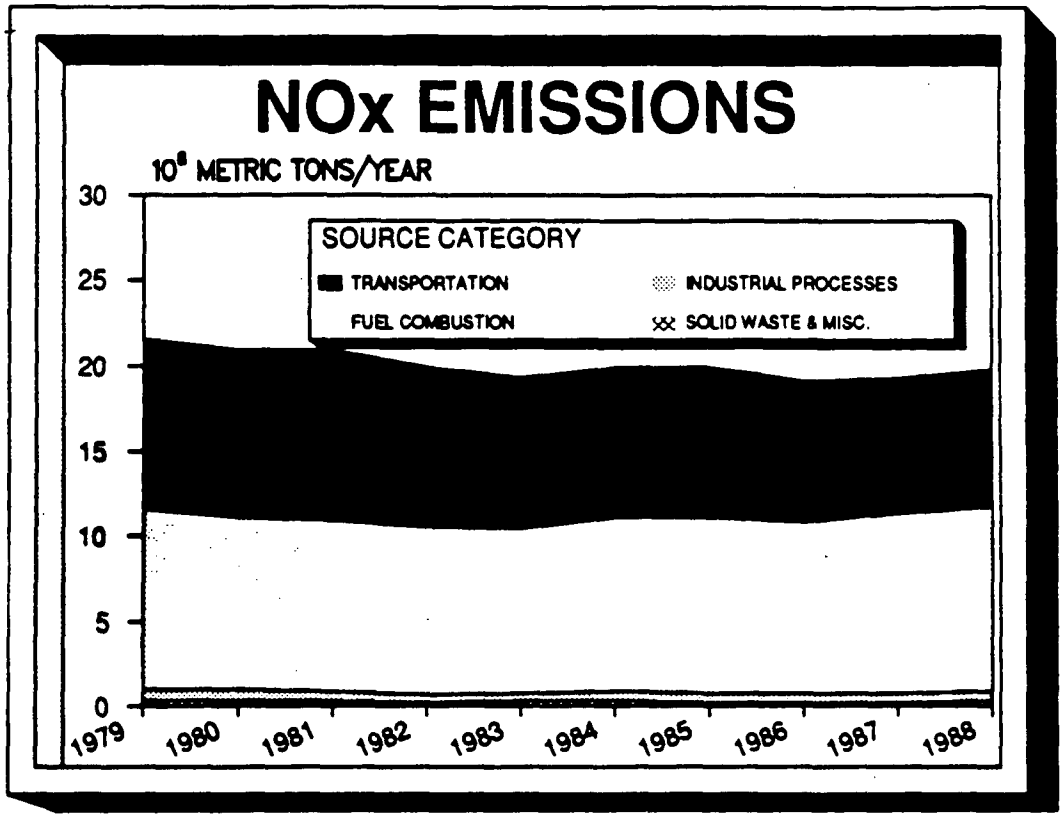
NOx EMISSIONS
10⁶ METRIC TONS/YEAR
SOURCE CATEGORY
TRANSPORTATION
INDUSTRIAL PROCESSES
FUEL COMBUSTION
SOLID WASTE & MISC.
30
25
20
15
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5
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1979
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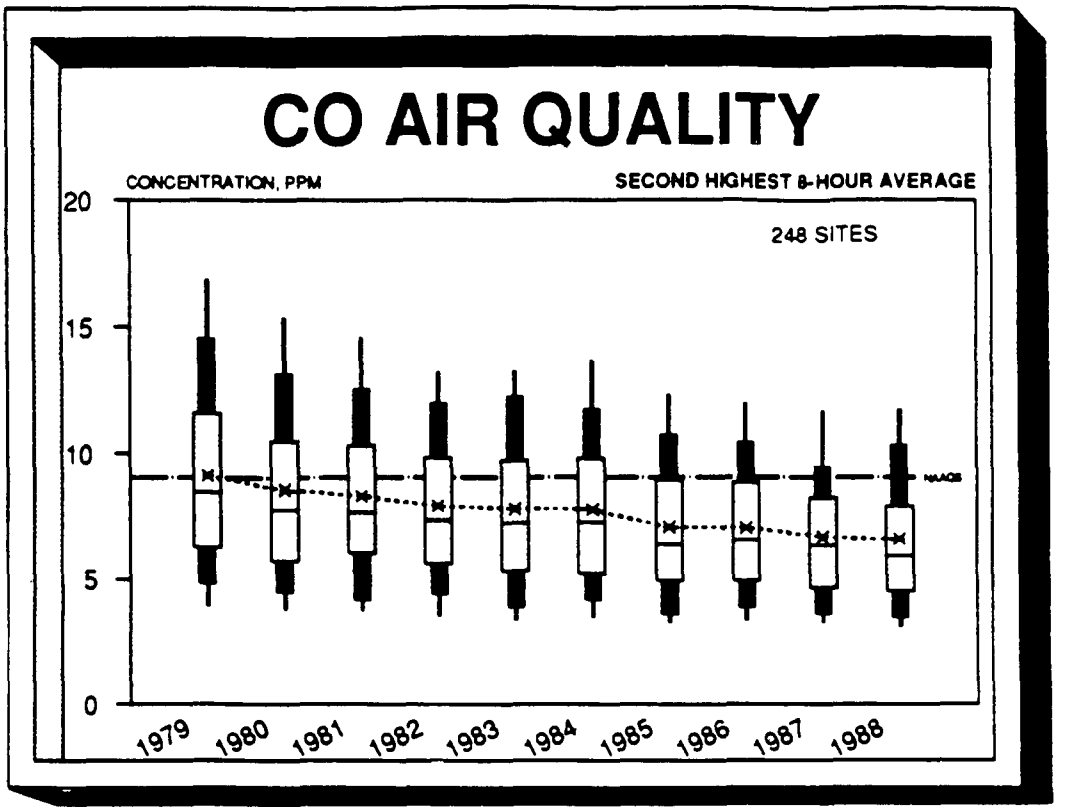
CO AIR QUALITY
CONCENTRATION, PPM
SECOND HIGHEST 8-HOUR AVERAGE
248 SITES
20
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10
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1979
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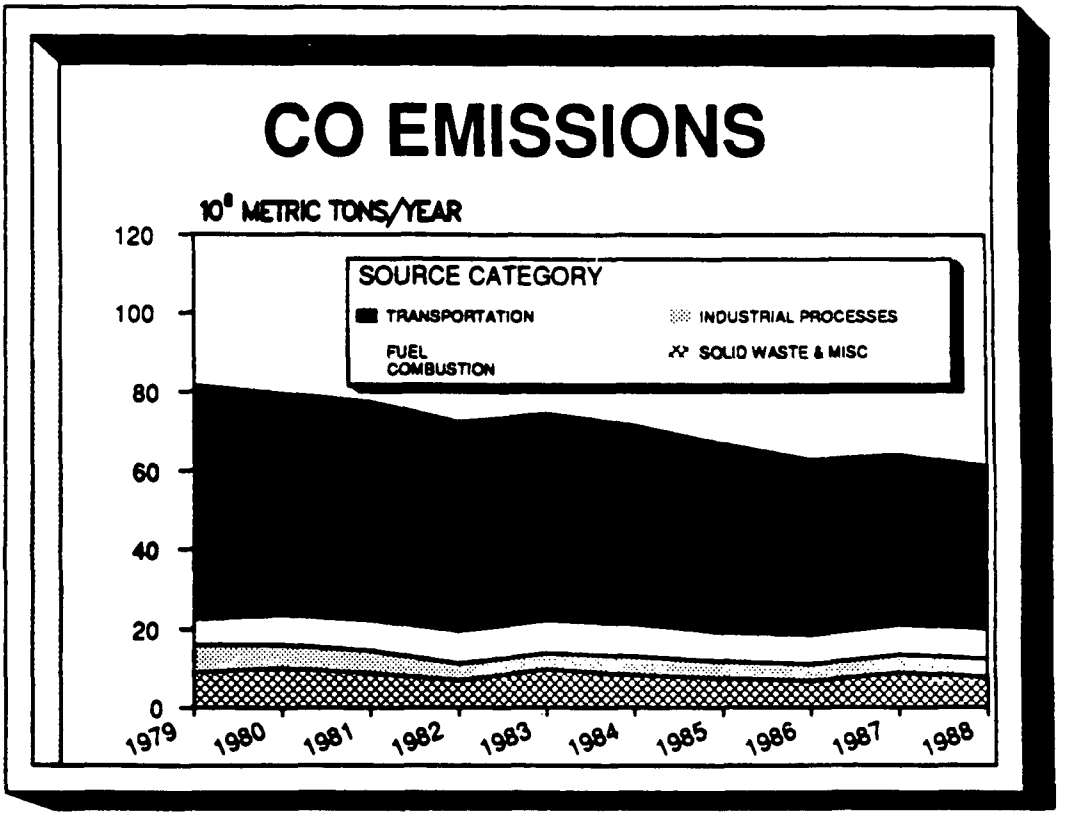
1988


CO EMISSIONS
10⁶ METRIC TONS/YEAR
120
100
80
60
40
20
0
SOURCE CATEGORY
TRANSPORTATION
FUEL COMBUSTION
INDUSTRIAL PROCESSES
SOLID WASTE & MISC
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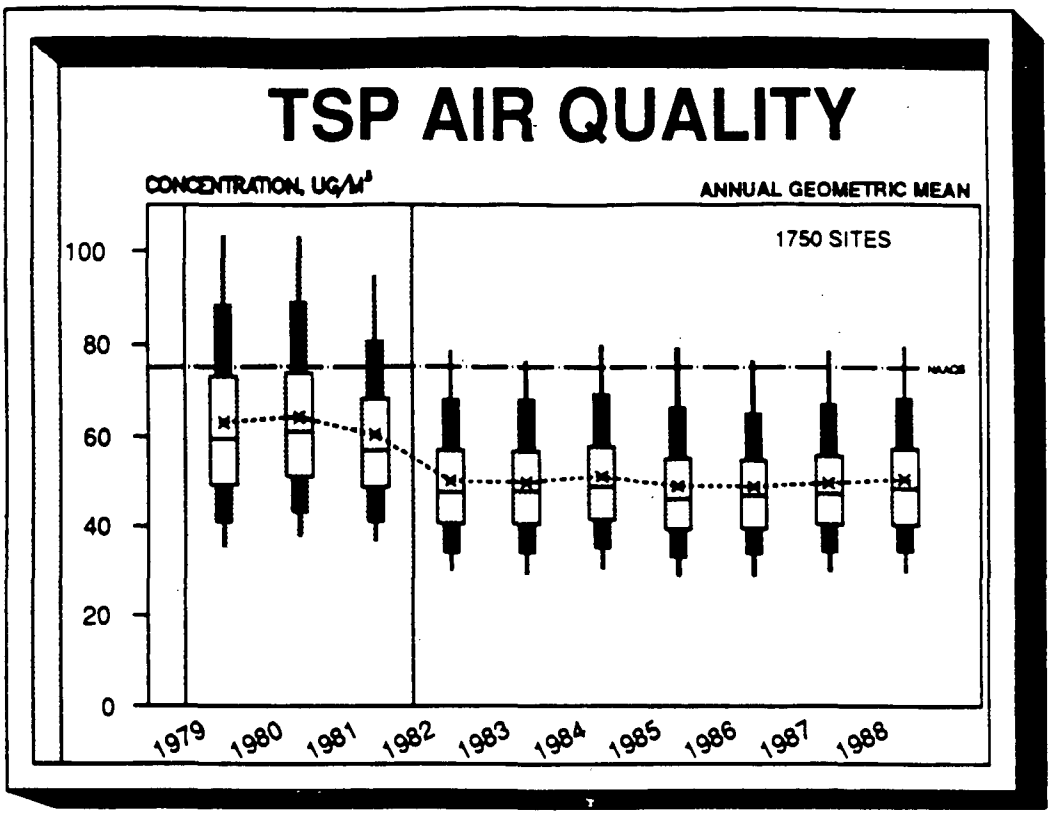
TSP AIR QUALITY
CONCENTRATION, UG/M³
ANNUAL GEOMETRIC MEAN
1750 SITES
100
80
60
40
20
0
1979
1980
1981
1982
1983
1984
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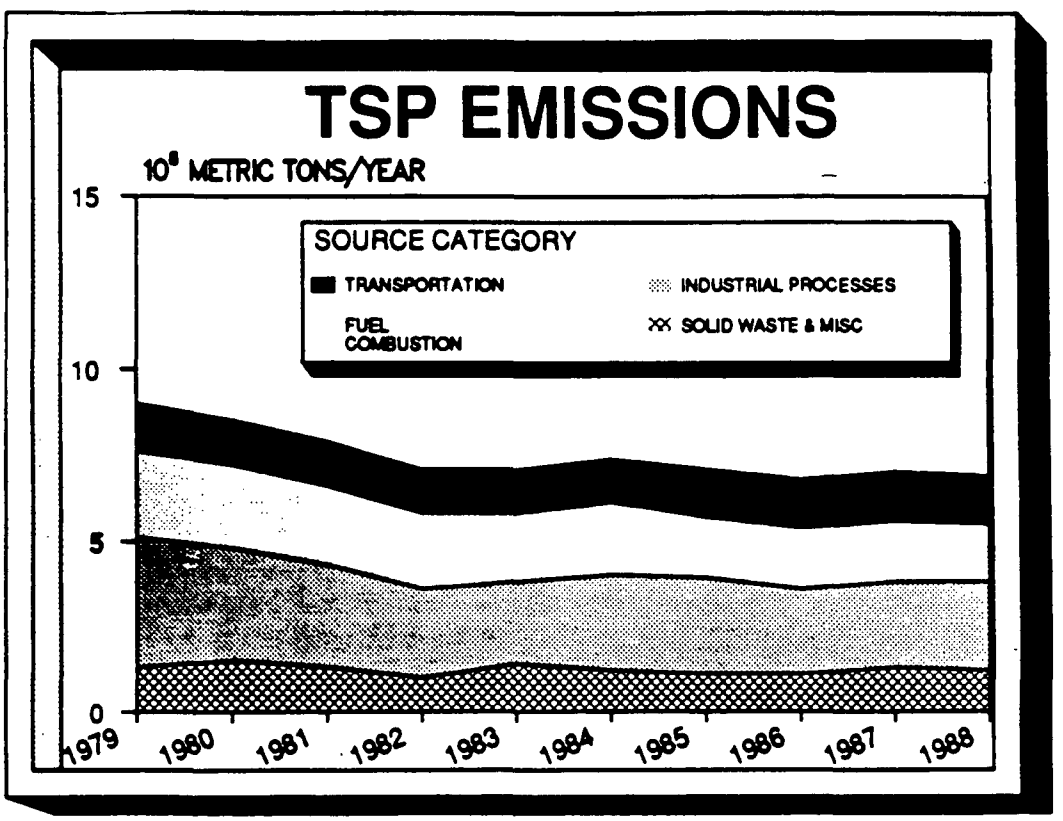
1986
1987
1988


TSP EMISSIONS
10⁶ METRIC TONS/YEAR
15
10
5
0
SOURCE CATEGORY
TRANSPORTATION
FUEL COMBUSTION
INDUSTRIAL PROCESSES
SOLID WASTE & MISC
1979
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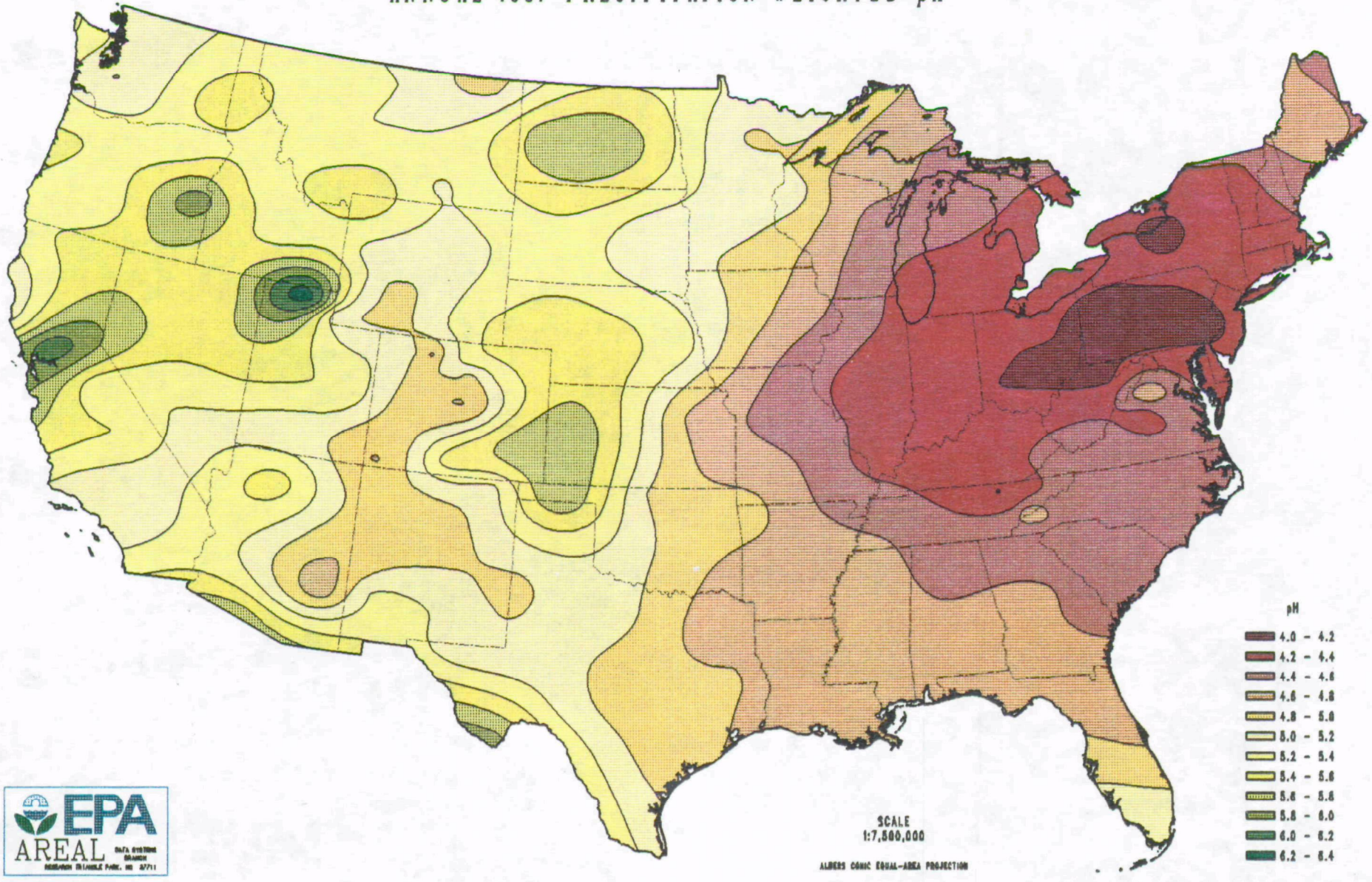
1988

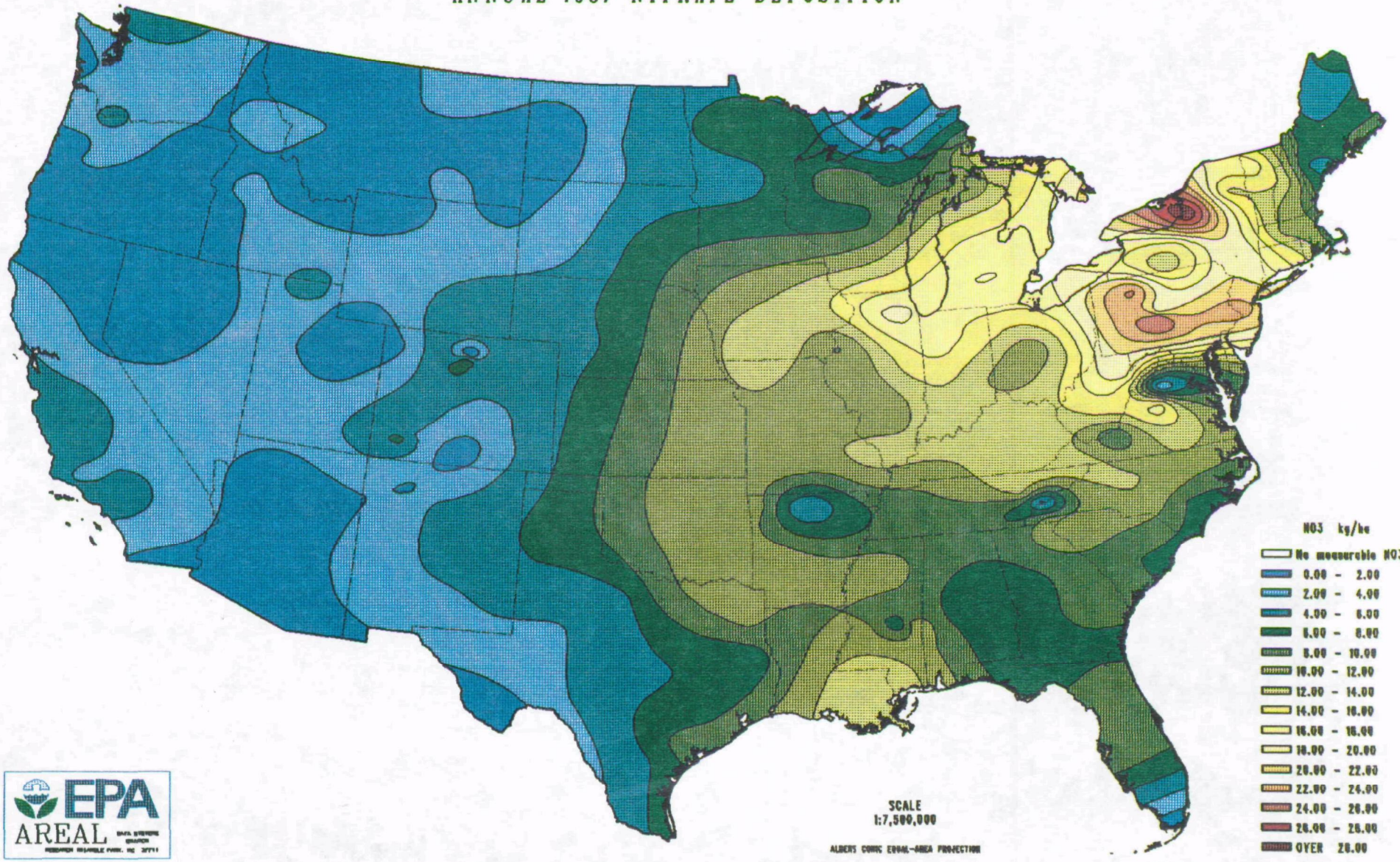
OAR Reported Indicators/ Acid Deposition:

Nitrate Deposition, and Precipitation pH (Acidity)

ANNUAL 1987 PRECIPITATION WEIGHTED pH



ANNUAL 1987 NITRATE DEPOSITION



Proposed Indicators

Office of Air and Radiation Proposed Indicators

Stratospheric Ozone:

Stratospheric concentrations of chlorine reduced based on direct monitoring

Stratospheric concentrations of chlorine reduced based on NOAA emissions modeling

Production/consumption of ozone-depleting chemicals eliminated in the U.S. and internationally

Monitoring of UV-B levels at Earth's surface demonstrate ozone shield restored to effective levels

Global Warming:

Carbon dioxide emissions (worldwide) reduced

Methane emissions reduced and atmospheric concentration stabilized

Average global temperature does more rise by more that 0.3 ^{O}C by year 2050

Acid Rain:

Sulfur dioxide emissions reduced 10 million tons below the 1980 baseline

Sulfur dioxide and nitrogen oxide deposition is reduced

pH of x number of streams and lakes increase by x points or x percent within x timeframe

"x" number of streams and lakes are restored to productivity due to reductions in sulfur dioxide and/or nitrogen oxide emissions yielding x tons incremental increase in fish and other biomass

Visibility in ("x" geographic area) increases by X percent

Ambient levels of acidic aerosols (in x deposition areas) decline by x amount or x percent in x time after controls are implemented

Air Toxics Reductions:

Actual on-site measurements indicate reduced emissions of toxics from major stationary sources

Actual measurements at points of human exposure indicate reduced ambient amounts of toxics

Estimates of risk reduction

Estimates of reductions in toxics emissions based on: the number of sources estimates to be in compliance with MACT standards, the number of sources with voluntary reductions, estimates from the Motor Vehicle Control Program, state and local regulatory information, and estimates based on the SARA 313 -- Toxics Release Inventory [TRI] database

Radon and Indoor Air:

Number of new homes/buildings constructed with radon-resistant techniques or design features

Number os existing homes tested nationwide

Number of existing homes tested in targeted areas

Number of homes testes with radon level about the action level that are mitigated

Number of comprehensive state radon programs established

Number of state/local building codes amended to require radon-resistant techniques or design features

Number of states/localities requiring radon inspections or other action as a part of real estate transactions

Indoor air trends analysis, based on actual measurements, shows lowered levels of pollutants in indoor ambient air

Indoor air trends analysis, based on review of building parameters show more building with acceptable parameters

Cross Media Radioactive Waste and Emergency Response:

Indicators of effectiveness of the radioactive waste disposal regulatory program include:

-the number and substance of the regulatory standards established

-results of actual monitoring of released at disposal sites

Indicators of effectiveness of radiological emergency response planning and preparedness include:

-the promptness of response to any emergency

-the post-hoc analysis of actual casualties and estimation of casualties avoided due to the response

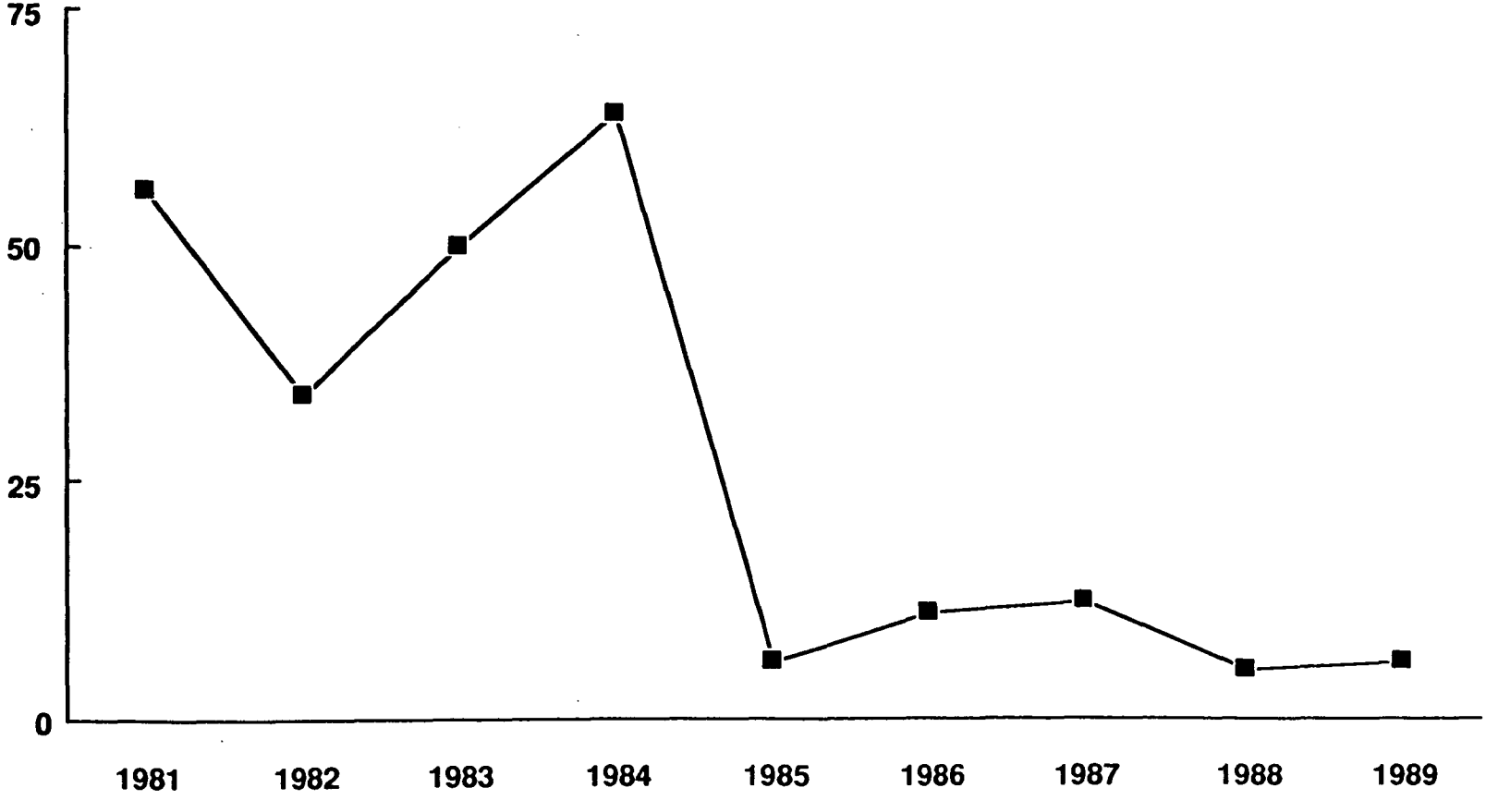
Potential Indicators

Note:

In the first year of Regional Strategic Planning, Regions have not been required to propose or report environmental indicators, but may do so if they choose. OPPE has not yet comprehensively recorded the indicator lists being developed by Regions; a few Regional indicators or data that seem appropriate as potential indicators are provided throughout the notebook for illustrative purpose only. This does not reflect the significant amount of on-going Regional work developing indicators, and the actual reporting of indicator type data by a number of Regions. Region 10 in particular has reported on a comprehensive set of environmental indicators since 1988.

Exceedances In The Carbon Monoxide Standard Dropped Significantly In Region 3 Since The Mid -1980's

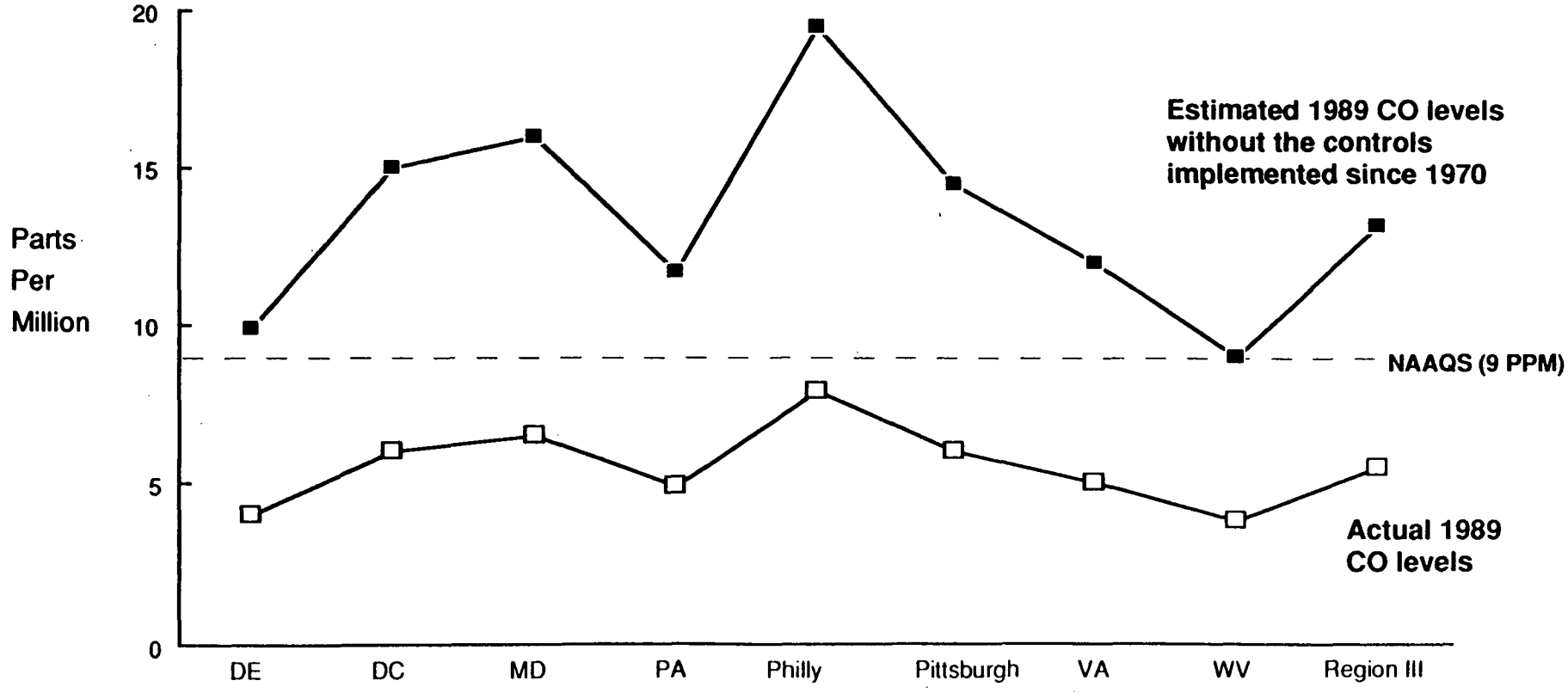
The number of exceedances of the 8 hour carbon monoxide (CO) standard (9 ppm) has dropped significantly since the mid-80's when motor vehicle emission inspections were started in several areas in Region III.



Source: EPA Region III 1990 Air Quality Trends Report

Region 3 Estimates That Carbon Monoxide Levels Would Be 140 Percent Higher Without The Controls That Have Been Implemented Since 1970.

These figures are even more impressive when you consider that the number of cars on the road has increased twice as fast as population.



Source: EPA Region III 1990 Air Quality Trends Report

OW

Reported Indicators

Office of Water: Reported Indicators

Drinking Water

Significant Non-compliance of Community Water Systems

Rivers and Streams

Designated Use Support (See Figure)

Coastal

Shellfish Harvest Area Classifications (See Figure)

General

Number of Waters on Toxic Impact Lists *

Lakes

Numbers/acres of Lakes in Various Trophic States (See Table)

Wetlands

Wetland Acreage * *

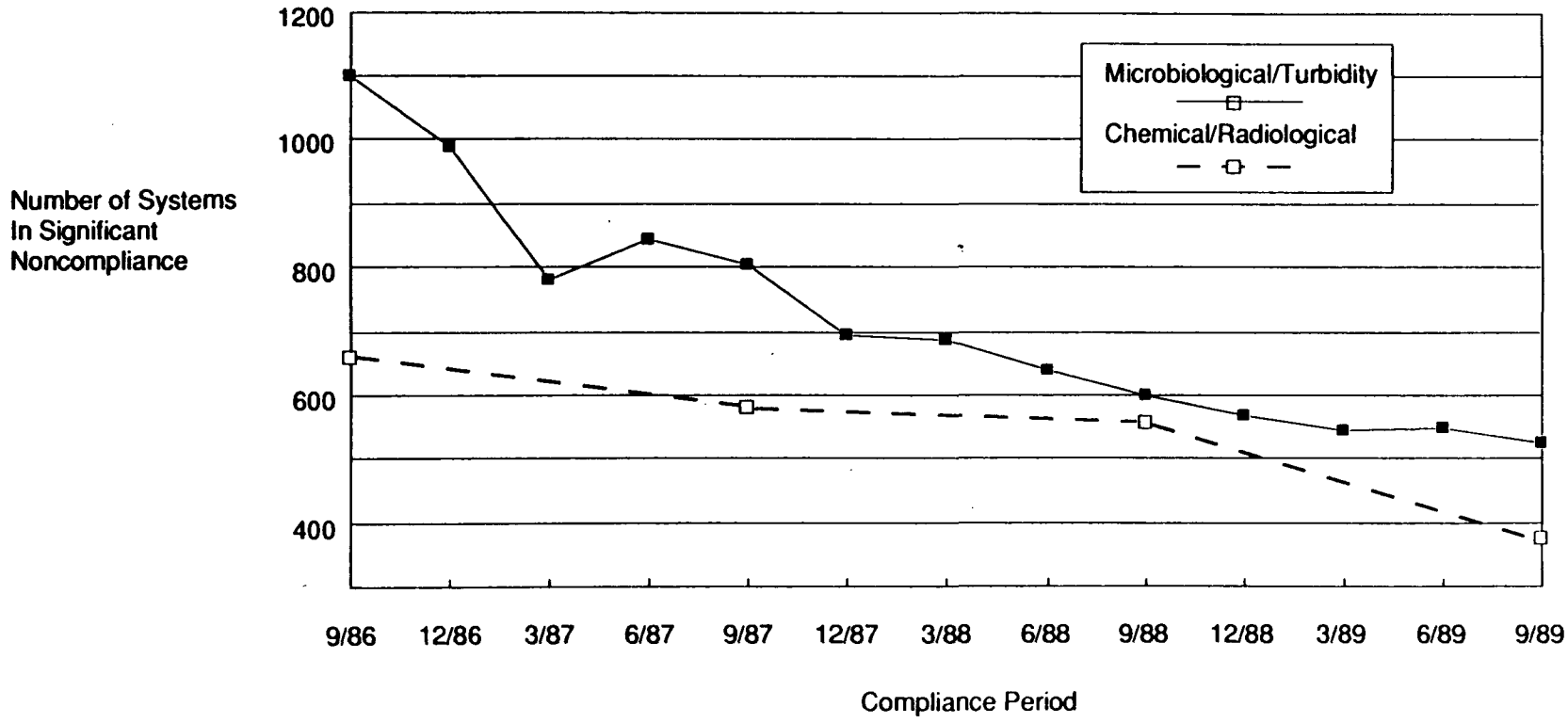
* Tables not included in notebook. This indicator is partially based on environmental data, but state to state administrative differences are so major OPPE is concerned it may not be fair to some states to consider it an environmental indicator.

** Tables show discrepancies between State-reported data and data from the USFWS National Wetlands Inventory.

Number of Public Water Systems in Significant Noncompliance with Drinking Water Standards

The Office of Drinking Water (ODW) has been reporting this indicator in their National Compliance Reports (see figure next page). In the future, ODW and OPPE will work together to report an improved indicator -- populations exposed to drinking water standard violations, using data that are already reported to the Federal Reporting Data System (FRDS).

Trends in Significant Noncompliance of Community Water Systems FY 1987-89

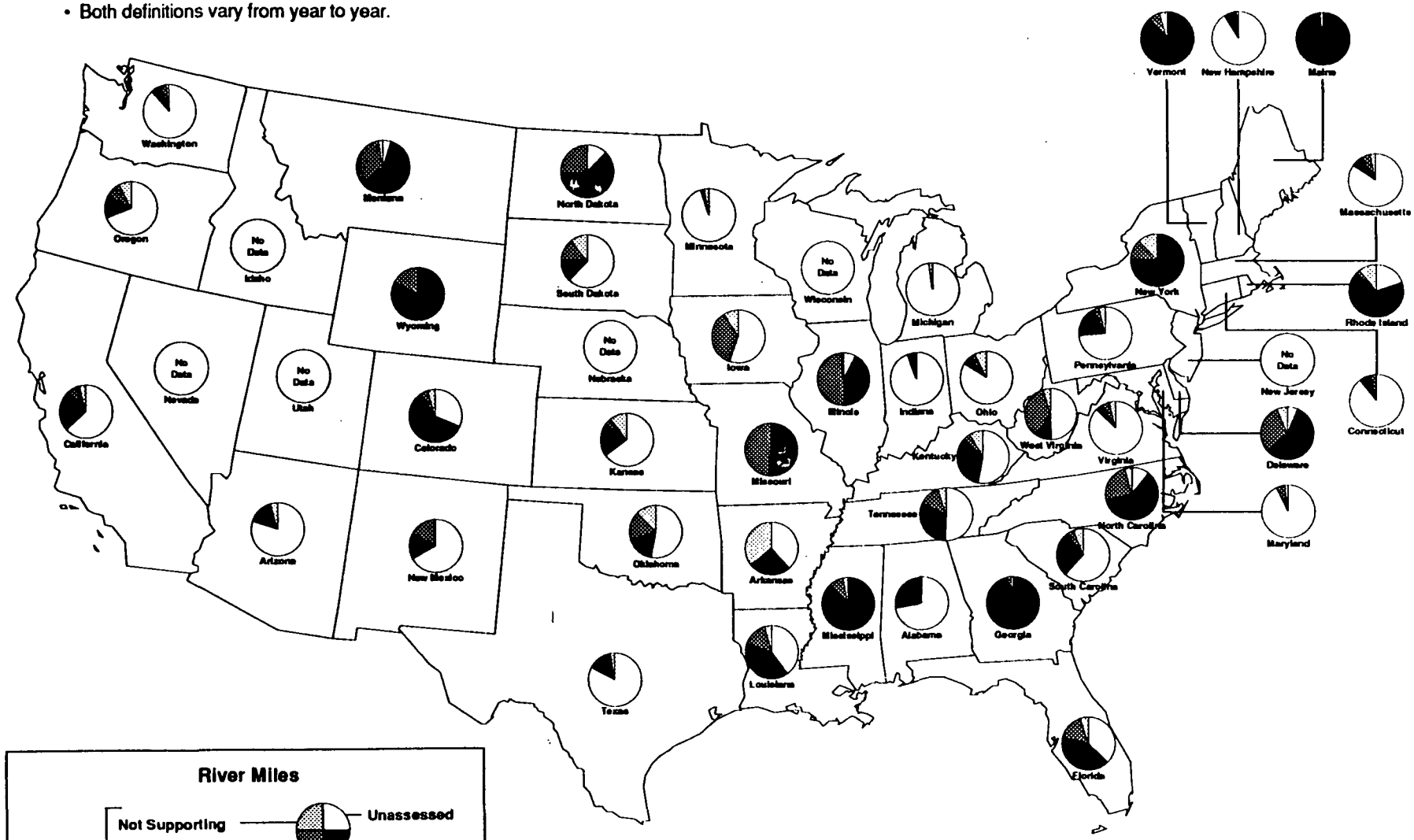


Source: U.S. EPA, "The National Public Water System Program FY 1989 National Compliance Report"

Percentage of River Miles Supporting Designated Use in 1988

Caveats: These data are not comparable from state to state or from year to year because:

- Definitions of "supporting use" vary from state to state.
- Definitions of what counts as adequate data vary from state to state.
- Both definitions vary from year to year.



River Miles

Assessed
- Not Supporting
- Partially Supporting
- Fully Supporting

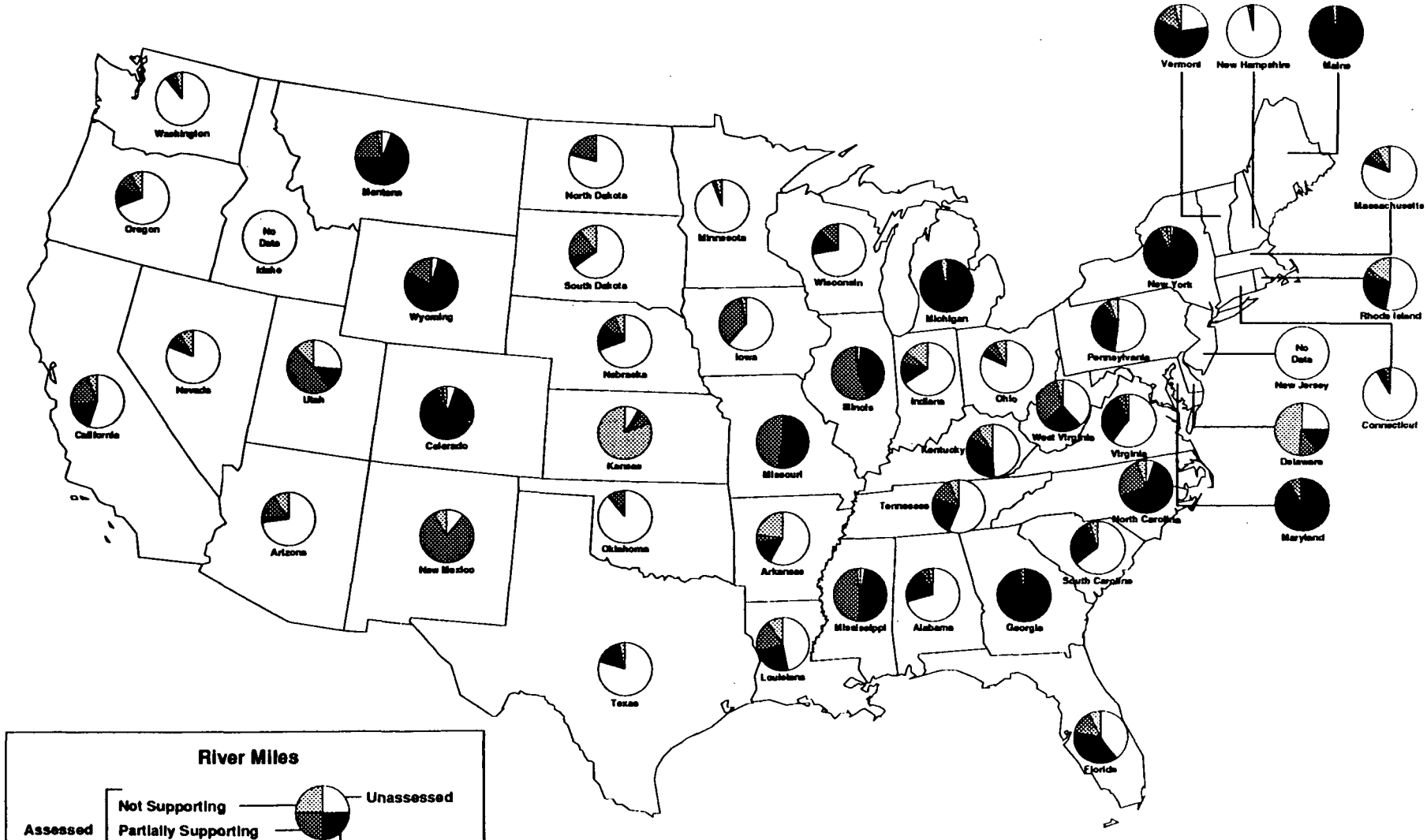
Unassessed

Source: 1988 305(b) Report

Percentage of River Miles Supporting Designated Use in 1990

Caveats: These data are not comparable from state to state or from year to year because:

- Definitions of "supporting use" vary from state to state.
- Definitions of what counts as adequate data vary from state to state.
- Both definitions vary from year to year.



Source: 1988 305(b) Report

Shellfish Harvest Area Affected by Pollution Sources

Total Harvest-Limited Area includes Conditional, Restricted, and Prohibited waters.

Conditional: waters do not meet criteria at all times, but shellfish may be harvested when criteria are met

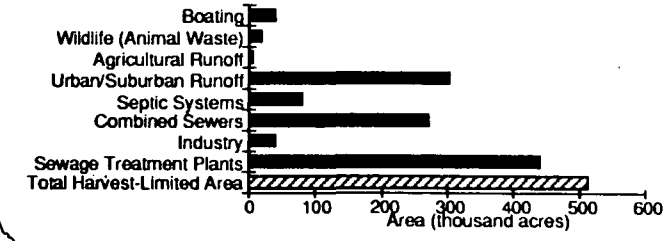
Restricted: shellfish may be harvested if subjected to a suitable purification process

Prohibited: harvest for human consumption cannot occur at any time

Multiple pollution sources are often identified for a single Harvest-Limited Area, therefore the sum of the area affected by sources in an estuary is usually greater than the amount of Harvest-Limited Area.

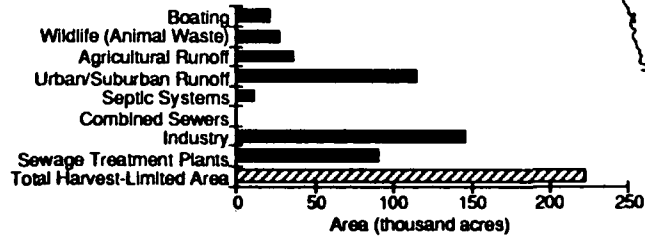
The Northeast Region (Maine to New York)
2,267,698 total acres are classified for shellfish harvest (23% are Harvest-Limited)

The Northeast Region is highly developed and is affected by a combination of sources associated with urban areas - Sewage Treatment Plants (STPs), Combined Sewer Overflows, and Urban/Suburban Runoff. The Northeast is the only region where Combined Sewer Overflows are a major pollution source.



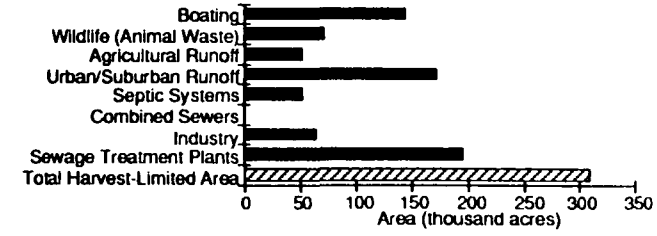
The West Coast
325,723 total acres are classified for shellfish harvest (68% are Harvest-Limited)

The West Coast, due to geographic differences, has fewer estuaries and shellfish beds than either the East Coast or the Gulf of Mexico. The major pollution sources are industry (primarily San Francisco Bay) and Urban/Suburban Runoff.



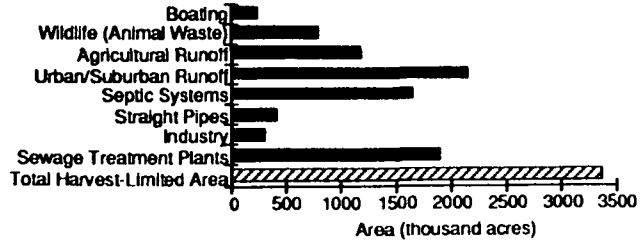
The Mid-Atlantic Region (New Jersey to Virginia)
3,229,349 total acres are classified for shellfish harvest (10% are Harvest-Limited)

The Mid-Atlantic Region includes the Chesapeake Bay, the largest estuary in the U.S. STPs, Urban/Suburban Runoff and Recreational Boating are the largest pollution sources.



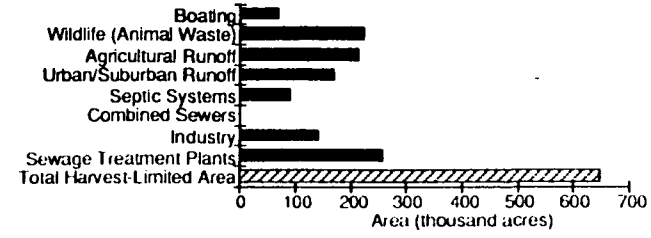
The Gulf of Mexico
5,926,262 total acres are classified for shellfish harvest (57% are Harvest-Limited)

The Gulf of Mexico is the fastest growing coastal region in the U.S. and Urban/ Suburban Runoff, Septic Systems and STPs are the three major sources of shellfish harvest area restrictions.



The Southeast Region (North Carolina to Florida)
2,588,458 total acres are classified for shellfish harvest (25% are Harvest-Limited)

The Southeast Region is the most rural region on the east coast and it is dependent on agriculture and silviculture. In the past few years, the Southeast has been experiencing rapid population growth and Urban/Suburban Runoff, Septic Systems, and STPs are all increasing as pollution sources.



Source: NOAA National Estuarine Inventory 1988

OW: Reported Indicator

LAKE TROPHIC STATUS

The identification of trophic status is the most commonly used indicator of lake water quality and provides a scientifically well understood, if not complete, measure of the ecological health of a waterbody. Despite its well-sounding prefix, a eutrophic lake is often one with poor or declining water quality. When a lake is eutrophic, the presence of excessive quantities of nutrients leads to algal blooms which can, when decayed, deplete the waterbody of oxygen, rendering it unsuitable for aquatic life. While eutrophication is a natural aging process, it can be accelerated by nutrient enrichment from sewage discharge and run-off from agricultural fertilizers, feedlots, detergents and other sources. In most cases, phosphorous is the primary nutrient which affects algal production.

States report on the trophic status of publicly owned lakes in their 305(b) reports and in Clean Lake Classification reports that States file under Section 314 of the Clean Water Act. The trophic of a waterbody is generally, though not uniformly, reported in the following categories, in order of increasing eutrophication: oligotrophic, mesotrophic, eutrophic, hypertrophic, or dystrophic (low in nutrients, but colored with dissolved humic organic mater). (See tables on following pages.)

Trophic Status of the Nation's Lakes

STATE	TOTAL LAKES ASSESSED	OLIG.	MESO.	EUTR.	HYPER.	DYS	OTHER	
CONNECT.	204	38	95	29	11	0	31	
MAINE	1882	154	1075	653	0	0	0	
MASSACHU.	414	28	124	202	59	1	0	
RHODE IS.	56	5	21	14	0	0	16	
VERMONT	184	28	104	38	0	14	0	
NEW JERSEY	21	0	0	21	0	0	0	
PUERTO RICO	18	4	2	12	0	0	0	
DELAWARE	30	0	0	30	0	0	0	
DIST. COL.	3	0	2	1	0	0	0	
MARYLAND	62	2	15	45	0	0	0	
PENNSYL.	53	1	39	13	0	0	0	
VIRGINIA	219	23	65	130	0	1	0	
WEST VIRG.	76	18	29	29	0	0	0	
ALABAMA	34	2	21	6	0	0	5	
FLORIDA	142	84	30	28	0	0	0	
KENTUCKY	99	12	31	56	0	0	0	
MISSISSIPPI	33	0	0	33	0	0	0	
N. CAROLINA	120	27	28	44	9	12	0	
S. CAROLINA	40	0	4	36	0	0	0	
TENNESSEE	109	19	33	50	7	0	0	
ILLINOIS	278	3	17	136	122	0	0	
MICHIGAN	684	99	357	228	0	0	0	
MINNESOTA	1563	202	529	539	293	0	0	
OHIO	125	0	30	69	26	0		
WISCONSIN	578	16	332	230	0	0	0	
LOUISIANA	101	0	0	101	0	0	0	
NEW MEXICO	55	5	9	31	0	1	9	
OKLAHOMA	67	8	17	35	7	0	0	
IOWA	114	0	0	114	0	0	0	
KANSAS	217	0	56	97	64	0	0	
MISSOURI	103	8	36	56	3	0	0	
NEBRASKA	45	0	2	31	12	0	0	
COLORADO	65	8	25	32	0	0	0	
MONTANA	48	6	21	16	0	0	5	
NORTH DAKOTA	149	0	12	58	79	0	0	
SOUTH DAKOTA	129	0	8	121	0	0	0	
UTAH	62	10	36	15	1	0	0	
TOTALS	8182	810	3205	3379	693	29	66	
	% (100)	(9.9)	(39.2)	(41.3)	(8.5)	(<1)	(<1)	

Trophic Status of the Nation's Lakes by EPA Region

[Optional -- also final version of table on previous page would likely be put in alphabetical order]

	TOTAL LAKES ASSESSED	OLIG.	MESO.	EUTR.	HYPER	DYS	OTHER
REGION 1	2740	253	1419	936	70	15	47
%	(100)	(9.2)	(51.8)	(34.2)	(2.6)	(<1)	(1.7)
REGION 2	39	4	2	33	0	0	0
%	(100)	(10.3)	(5.1)	(84.6)	(0)	(0)	(0)
REGION 3	443	44	150	248	0	1	0
%	(100)	(9.9)	(33.9)	(56.0)	(0.0)	(<1)	(0.0)
REGION 4	577	144	147	253	16	12	5
%	(100)	(25.0)	(25.5)	(43.8)	(2.8)	(2.1)	(<1)
REGION 5	3228	320	1265	1202	441	0	0
%	(100)	(9.9)	(39.2)	(37.2)	(13.7)	(0.0)	(0.0)
REGION 6	223	13	26	167	7	1	9
%	(100)	(5.8)	(11.7)	(74.9)	(3.1)	(<1)	(4.0)
REGION 7	479	8	94	298	79	0	0
%	(100)	(1.7)	(19.6)	(62.2)	(16.5)	(0.0)	(0.0)
REGION 8	453	24	102	242	80	0	5
%	(100)	(5.3)	(22.5)	(53.4)	(17.7)	(0.0)	(1.1)
NATION	8182	810	3205	3379	693	29	66
%	(100)	(9.9)	(39.2)	(41.3)	(8.5)	(<1)	(<1)

Amount of Wetlands (Coastal and Freshwater) in Each Reporting State, as Reported in State 305(b) Reports

Note: There are discrepancies in accounting/reporting between these data and USFWS data (shown in next table)

	Wetlands (acres)	Total Surface Area (acres)	% of Surface Area covered by Wetlands
AL	3,000,000	32,490,880	9.2
AK	>170,000,000	375,040,000	45.3
AZ	*		*
AR	800,000	33,920,000	2.4
CA	*		*
CO	*		*
CT	469,156	3,205,760	14.6
DE	221,800	1,267,840	17.5
FL	11,400,000	37,544,700	30.4
GA	5,000,000	38,341,760	13
HI	101,749	4,112,000	2.5
ID	*		*
IL	1,175,000	36,060,800	3.3
IN	*		*
IA	36,852	36,016,000	0.1
KS	34,256	52,657,500	0.07
KY	*		*
LA	5,882,070	30,477,440	19.3
ME	5,199,360	21,289,600	24.4
MD	*		*
MA	588,486	5,301,760	11.1
MI	*		*
MN	5,020,000	54,686,080	9.2
MS	642,000	30,521,200	2.1
MO	*		*
MT	1,882,176	94,108,800	2
NE	361,842	49,425,280	0.7
NV	136,650	70,758,900	0.2
NH	102,941	5,954,560	1.7
NJ	900,000	4,983,900	18.1

* Not reported

Source 1990 State Section 305(b) reports

	Wetlands (acres)	Total Surface Area (acres)	% of Surface Area covered by Wetlands
NM	*		*
NY	1,025,000	31,728,640	3.2
NC	3,392,000	33,735,680	10
ND	2,000,000	45,225,600	4.4
OH	*		*
OK	356,647	44,748,160	0.8
OR	161,844	62,126,720	0.3
PA	498,000	29,013,120	1.7
RI	60,873	775,900	7.8
SC	4,700,000	19,329,920	24.3
SD	1,332,562	49,310,080	2.7
TN	787,000	27,036,160	2.9
TX	6,976,000	167,690,880	4.1
UT	1,000,000	52,526,720	1.9
VT	220,000	6,149,760	3.6
VA	1,044,900	26,122,880	4
WA	1,500,000	42,743,040	3.5
WV	102,000	15,508,100	0.7
WI	5,331,392	35,938,560	14.8
WY	940,000	62,664,960	1.5
DC	49	44,160	0.1
PR	*		*
VI	3,408	178,080	2.2

* Not reported

Source 1990 State Section 305(b) reports

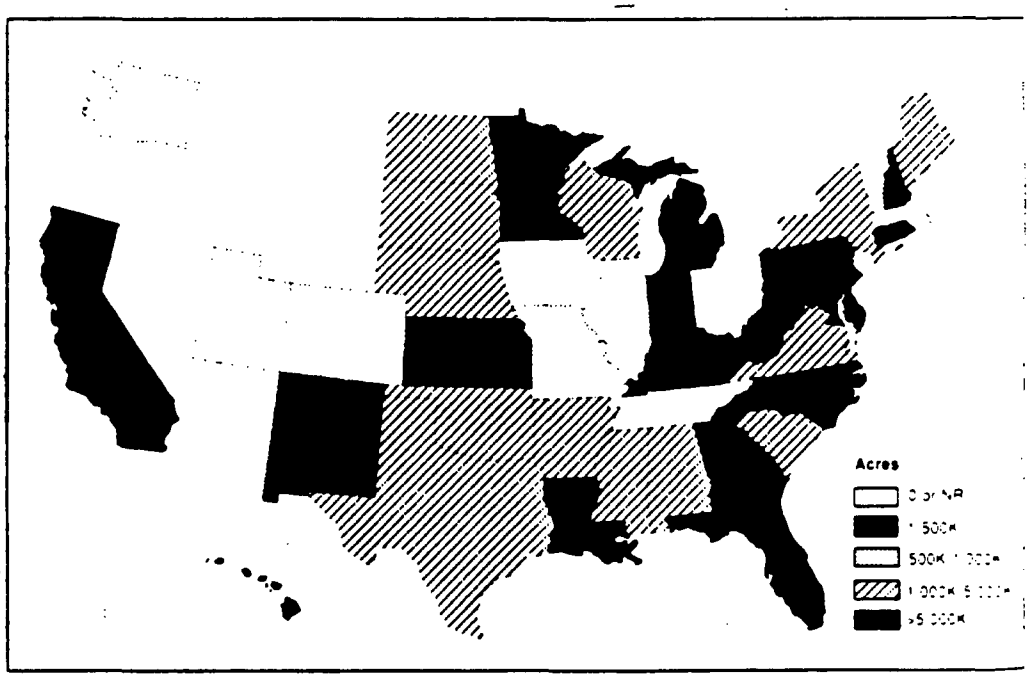
The National Wetlands Inventory

The National Wetlands Inventory (NWI) is a long-term program of the U.S. Fish and Wildlife Service to map the Nation's coastal and inland wetlands. Wetland maps developed by the NWI provide important information on the extent of State wetland resources and provide a basis for a wide variety of regulatory and nonregulatory activities. The NWI also provides a consistent way of reporting the extent of wetlands by State.

Wetlands are mapped primarily by the use of good-quality, high-altitude aerial photography. Wetlands are identified from these photos, and their boundaries are transferred to maps. Wetland acreage is then estimated from the completed maps. To date, approximately 60 percent of the lower 48 States, 100 percent of Hawaii, and 16 percent of Alaska have been mapped.

Table 5-2 summarizes wetland acreage by State. Six States have greater than 5 million acres of wetlands, 12 States have between 1 and 5 million acres, 8 States have between 500,000 and 1 million acres, and 13 States have less than 500,000 acres of wetlands (see Figure 5-4). Reliable data are not available for 11 States.

As discussed earlier in this report, several States provided estimates of current wetland acreage in their 305(b) reports. In order to provide a consistent basis for comparing wetland acreage between States, Table 5-2 includes wetland acreage estimates provided only by NWI. No attempt has been made to compare what the States reported in 1988 against the findings of the NWI.



Source: 1988 National Wetlands Inventory.

Figure 5-4. Wetlands Acreage Distribution Nationwide

Table 5-2. Estimated Wetland Area by State

State	Acres (in thousands)	Percent of Total State Land Area
Alabama	3,069	9
Alaska	—	—
Arizona	—	—
Arkansas	2,764	8
California	389	1
Colorado	675	1
Connecticut	261	8
Delaware	223	18
Florida	11,333	33
Georgia	5,298	14
Hawaii	110	—
Idaho	—	—
Illinois	712	2
Indiana	285	1
Iowa	—	—
Kansas	435	1
Kentucky	205	1
Louisiana	8,674	30
Maine	1,731	9
Maryland	438	7
Massachusetts	542	11
Michigan	5,583	15
Minnesota	7,540	15
Mississippi	4,067	13
Missouri	836	2
Montana	—	—
Nebraska	1,906	4
Nevada	—	—
New Hampshire	190	3
New Jersey	918	19
New Mexico	482	1
New York	1,184	4
North Carolina	5,690	18
North Dakota	2,868	7
Ohio	—	—
Oklahoma	1,270	3
Oregon	—	—
Pennsylvania	498	2
Rhode Island	84	13
South Carolina	4,659	24
South Dakota	1,548	3
Tennessee	787	3
Texas	3,957	2
Utah	584	1
Vermont	—	—
Virginia	1,045	4
Washington	748	2
West Virginia	102	>1
Wisconsin	4,410	13
Wyoming	—	—

— Reliable wetland area data not available.

Source: U.S. Fish and Wildlife Service, *National Wetlands Inventory*, June 1988

Office of Water: Reported Indicator, But Not in Strategic Plan

Attainment of Clean Water Act goals

Note: Although not included in the OW Strategic Plan, OW provided data on attainment of "fishable" and "swimmable" goals as part of the 1990 national 305(b) report. Indicator can take into account information different from that used in assessing designated use support (e.g. fishery closures) and is easily understood by public. However, due to inconsistent determinations of "fishable" and "swimmable" among states, OW decided to omit this indicator from their Strategic Plan.

Proposed Indicators

Office of Water: Proposed Indicators

Coastal

Dead Zones
Biological Community Integrity
Habitat
Designated Use Support
Shellfish Bed Closure Base
Finfish Ban Baseline
Beach Closure Baseline
Toxics in Fish and Shellfish
Marine Debris Baseline
Industrial Waste Baseline
Dredged Material Baseline

Rivers and Streams

Biological Community Integrity
Extent of Hypoxia/Anoxia
Wetlands Acreage
Fishing Bans
Adoptions of Biocriteria by States
Designated Use Support

Lakes

Biological Community Integrity
Lake Trophic Status
Wetland Acreage
Designated Use Support
Toxics in Fish and Shellfish

Wetlands

Acreage
Functional Integrity
Landscape Integrity

Note: No reporting dates established on any of the above indicators.

Office of Water: Indicators Proposed and Planned Reporting Dates from ATS

Drinking Water: Underground Injection Control

Number of mechanical integrity tests conducted, test results (passed or failed), and whether appropriate action was taken, 12/31/90

Drinking Water: Public Water Supply

Number of people exposed to Phase I VOCs, 10/31//93

People exposed to poorly filtered water 10/31/93

People exposed to coliform bacteria, 10/31/93

Number of violation of rules for lead, phase II VOCs, radionuclides, 10/31/93

Office of Water: Proposed Indicators

Ground Water: Number of public water supplies with MCL violations, 6/15/92

Hazardous waste sites with on and off-site G.W. contamination, 6/15/92

Waste sites and industrial sites with VOC contamination, 6/15/92

Area-wide sources of nitrate contamination, 6/15/92

Area-wide sources of pesticide contamination, 6/15/92

Note: Dates shown are targets for potential inclusion in the 1992 Association of State and Interstate Water Pollution Control Administrators (ASWIPCA) report.

Potential Indicators

OW: Potential Indicator

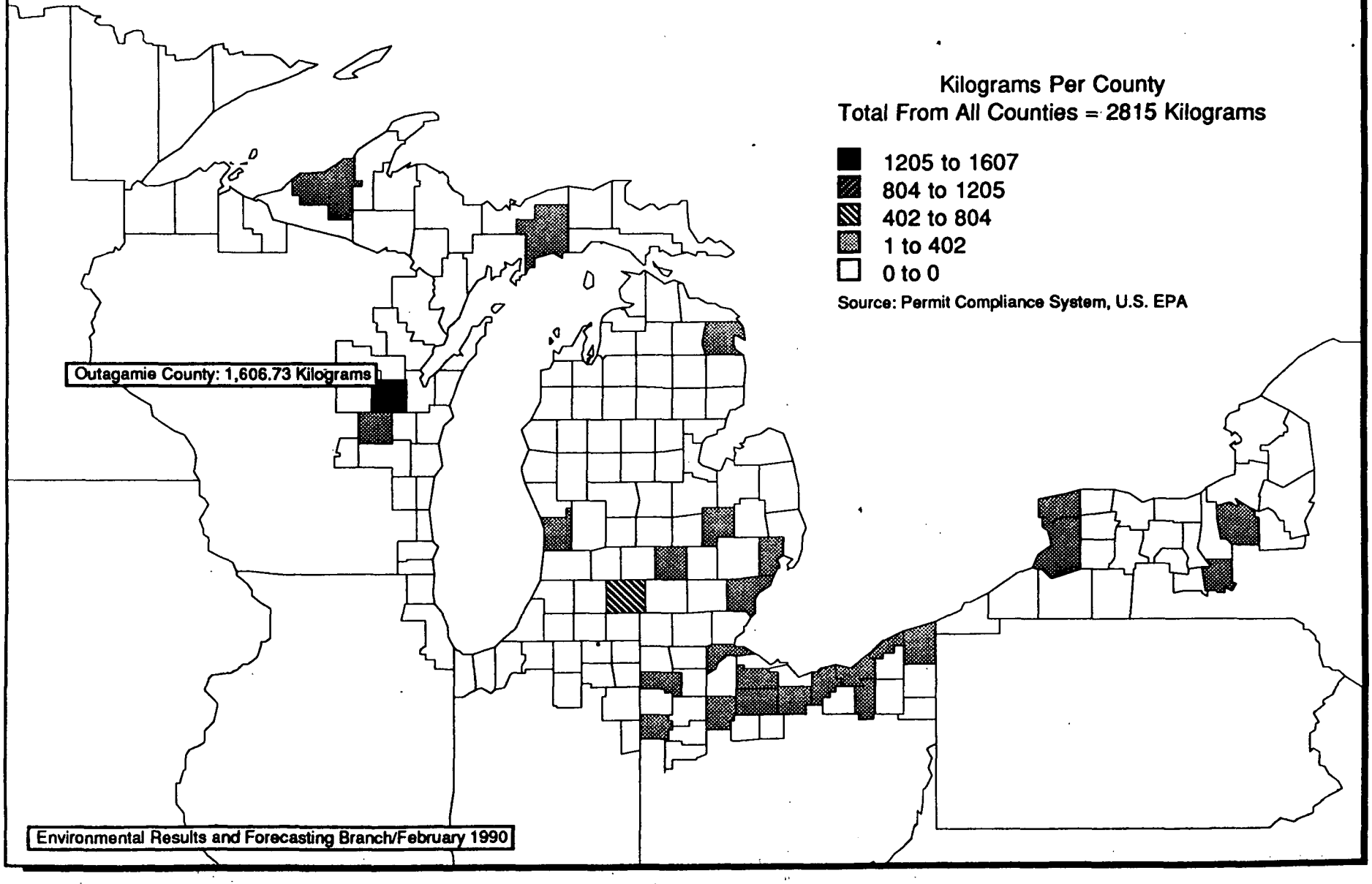
ESTIMATING POLLUTANT LOADS FROM THE PERMIT COMPLIANCE SYSTEM (PCS) USING THE EFFLUENT DATA STATISTICS (EDS) PROGRAM

EPA's Permit Compliance System (PCS) data base was initially created to track the compliance of facilities regulated under the National Pollutant Discharge Elimination System (NPDES). The monitoring data stored in PCS is taken from monthly or quarterly Discharge Monitoring Reports (DMRs) submitted by each facility, and represents averaged discharge values (usually based on a combination of daily, weekly, and monthly self-monitoring) for the pollutants specified in the NPDES permit.

Region 5, in cooperation with a Region 2 computer specialist, has been pilot testing a PCS program called the Effluent Data Statistics (EDS) that uses data from DMRs. EDS can be used to analyze and graph DMR data, generate loadings estimates from this data, and aggregate the estimates for a specified time period by outfall, facility, city, county, state, or river basin. The map shown on the following page displays PCS reported

While the load estimation component of this program is still in the developmental stages, it has the potential to be a very useful tool for compiling and presenting the loading estimates on a national basis. The capability to depict national trends using PCS data is dependent on Regional and State participation (both past and present) in the data base and efforts to improve the quality, consistency and comparability of PCS data. In the future, the ability to generate trend information should improve as participation in the data base increases and if OW invests considerable resources into PCS data management improvements.

PCS Reported Mercury Releases
In The Great Lakes Watershed - 1988



Note:

In the first year of Regional Strategic Planning, Regions have not been required to propose or report environmental indicators, but may do so if they choose. OPPE has not yet comprehensively recorded the indicator lists being developed by Regions; a few Regional indicators or data that seem appropriate as potential indicators are provided throughout the notebook for illustrative purpose only. This does not reflect the significant amount of on-going Regional work developing indicators, and the actual reporting of indicator type data by a number of Regions. Region 10 in particular has reported on a comprehensive set of environmental indicators since 1988.

Region 10 Water Quality Index: Parameters Included in Index

Region 10 Water Quality Index: Parameters Included in Index

Criteria Categories for River Water Quality

Temperature. Water temperature influences the type of fish and other aquatic life that can survive in a river. High temperature can be detrimental to fish spawning and rearing.

Dissolved Oxygen. Fish and aquatic life must have certain levels of oxygen in the water to survive. Low oxygen concentration or saturation levels can be detrimental to these organisms.

ph. ph is the measure of hydrogen ion concentration in water and determines whether the water is acidic or basic. Extreme levels of either can imperil fish and aquatic life.

Bacteria. Bacteria indicate probable presence of disease-related organisms and viruses from human sewage or animal waste.

Trophic. Indicates the extent of algae or nutrients in water. Nutrients promote algal growth. When algae flourish they make the water murky and the growths make swimming and fishing unpleasant. Decomposition of dead algae can decrease dissolved oxygen concentrations to levels harmful to fish.

Aesthetics. Refers to oil, grease, turbidity and algal blooms which are visually unpleasant. Generally this group is represented by either turbidity or chlorophyll a. Turbidity is a measure of the clarity of the water. Chlorophyll a provides a measure of suspended algae in the water.

Solids. Dissolved minerals or suspended material such as mud or silt. Excess dissolved minerals interfere with agricultural, industrial and domestic use. Excess suspended solids adversely affect fish feeding and spawning.

Metals Toxicity. Excess concentrations of heavy metals such as arsenic, cadmium, chromium, copper, lead, mercury and zinc are toxic to human, aquatic and other life forms.

Organic Toxicity. Excess concentrations of pesticides, herbicides, PCBs and other organic substances that are toxic to humans, mammals, birds, fish and other water dependent life forms.

Ammonia Toxicity. Excess concentrations of ammonia in its un-ionized form are toxic to fish and other aquatic life forms.

Figure 1.2(a)

Water Quality Index Tables for the State of Washington

Current Status and Trends

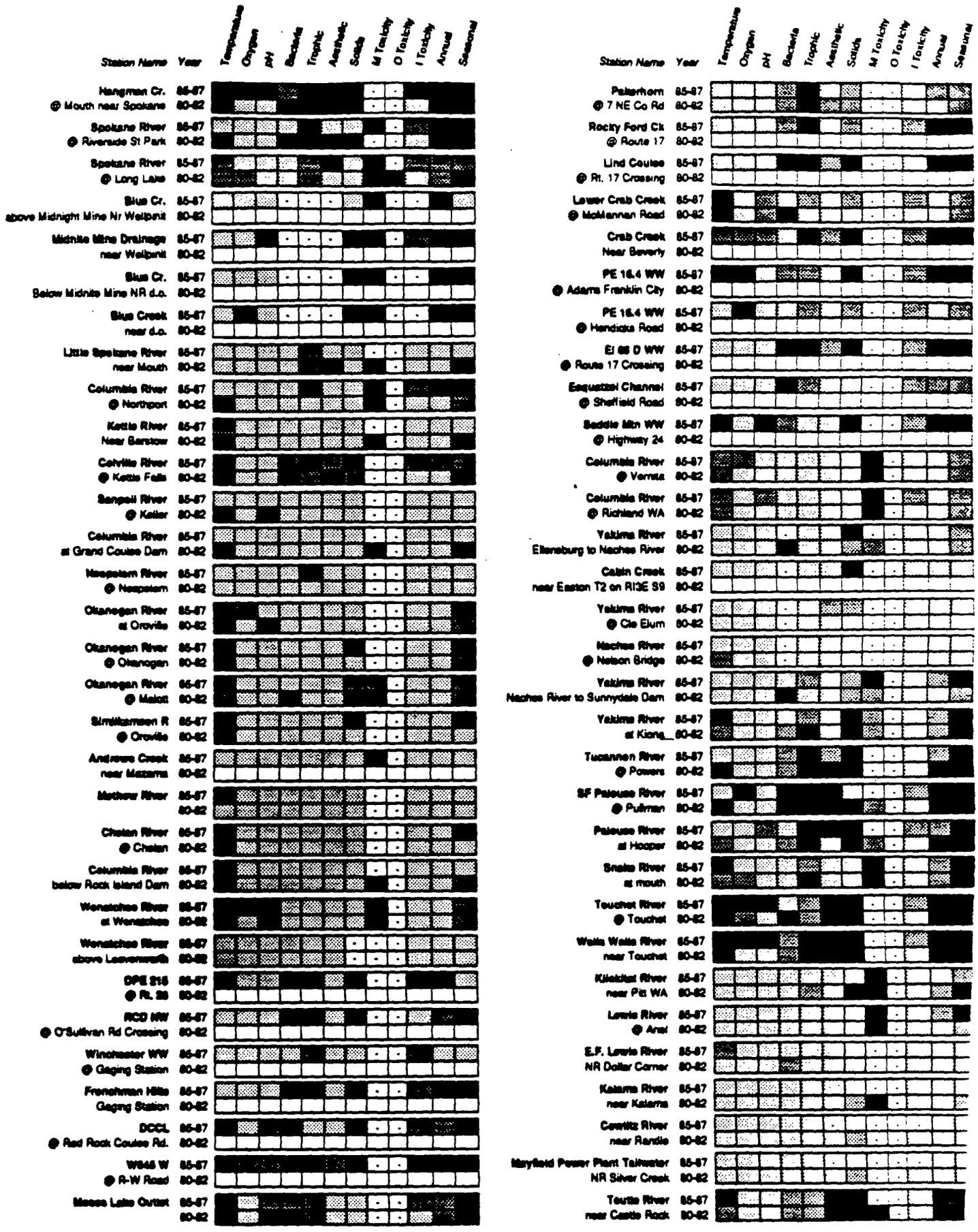


Figure 1.2(a)

Water Quality Index Tables for the State of Washington

Current Status and Trends *(Cont.)*

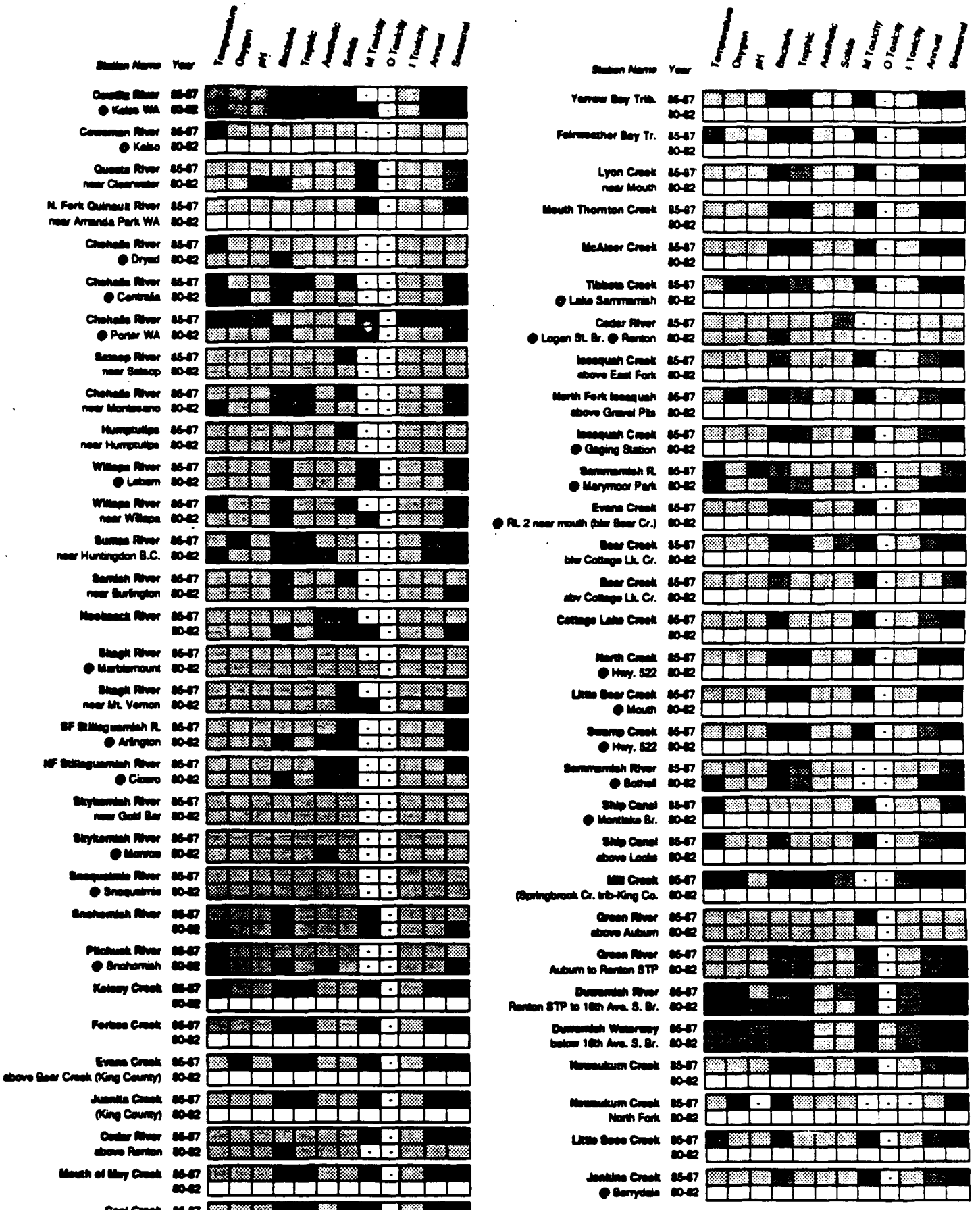


Figure 1.2(a)
Water Quality Index Tables for the State of Washington
Current Status and Trends *(Cont.)*

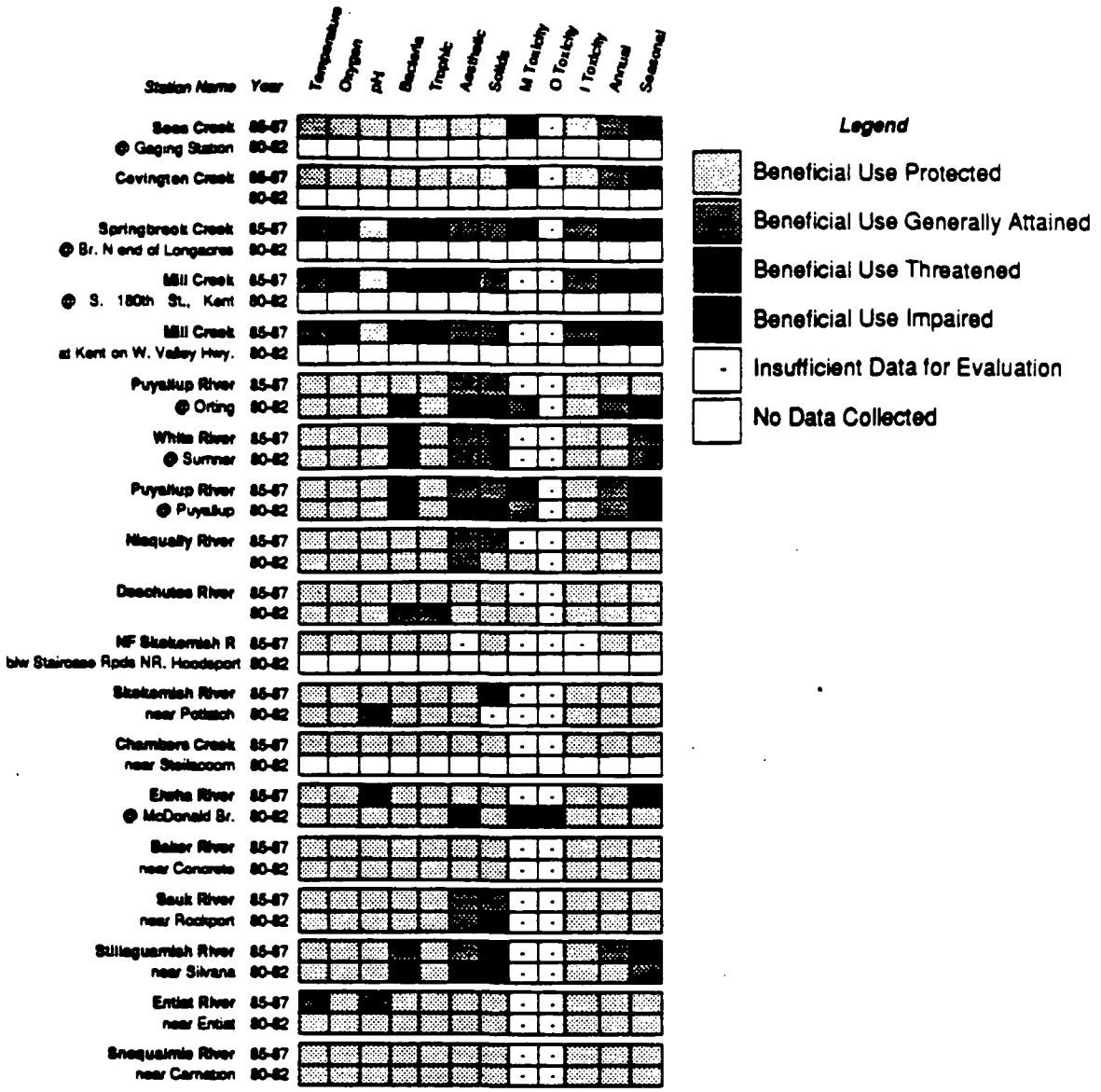


Figure 1.2(b)
Washington Water Quality, Based on Region 10 Water Quality Index

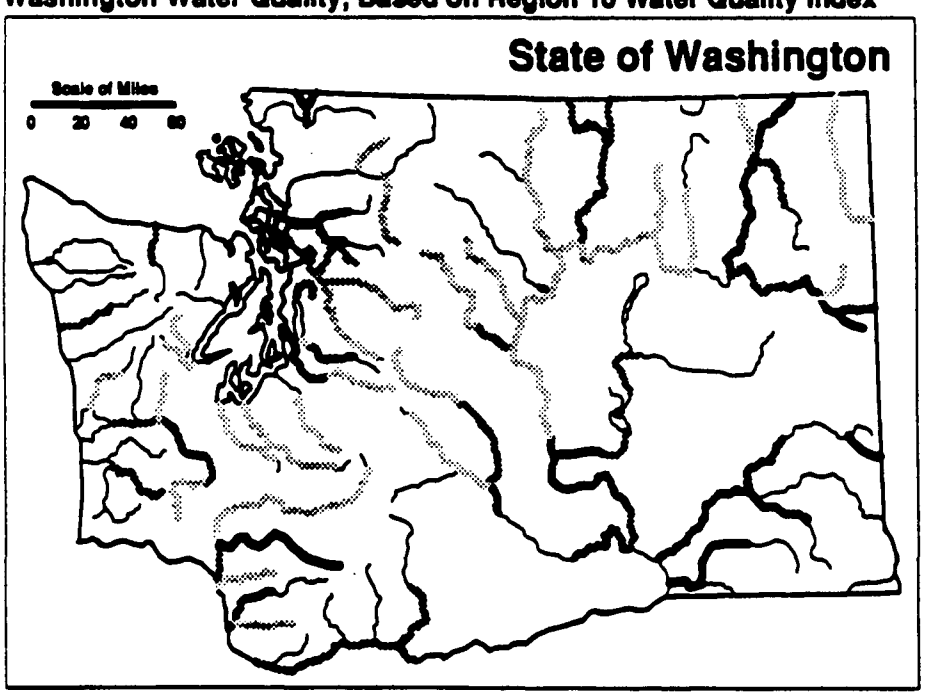


Figure 1-2(a)

Water Quality Index Tables for the State of Oregon

Current Status and Trends

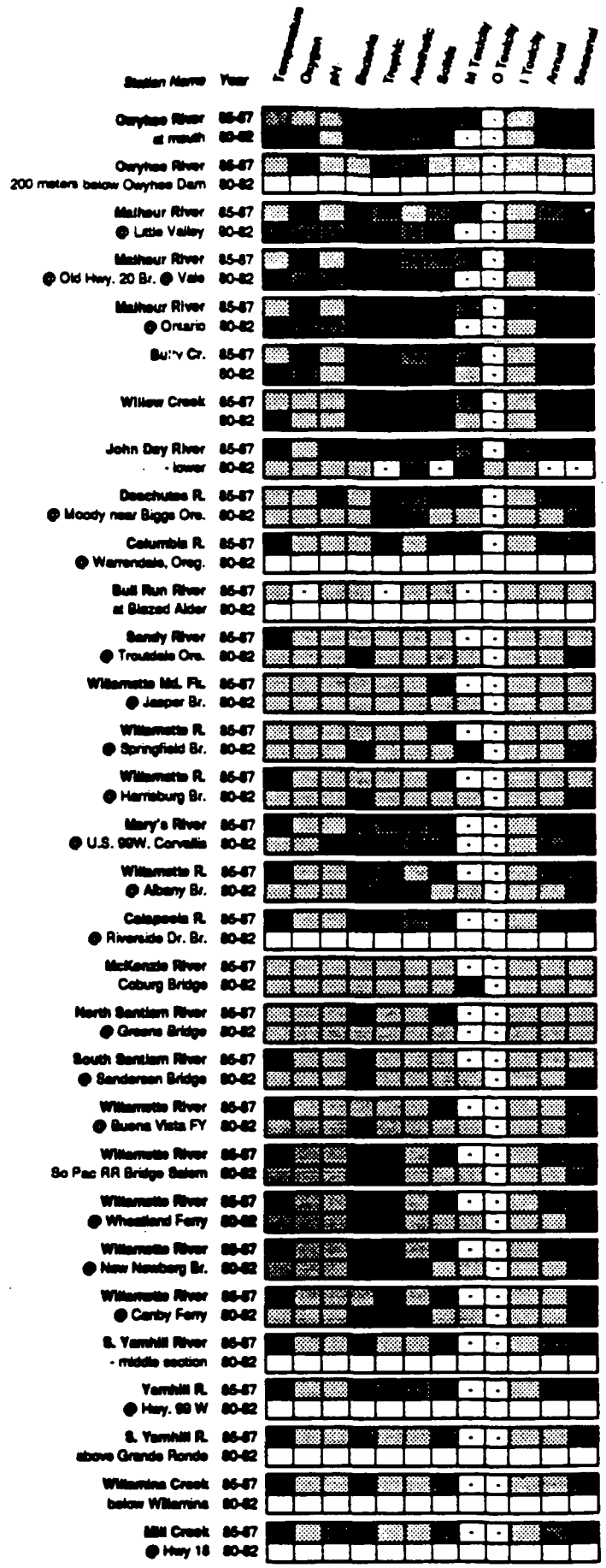


Figure 1.3(a)
Water Quality Index Tables for the State of Oregon
Current Status and Trends *(Cont.)*

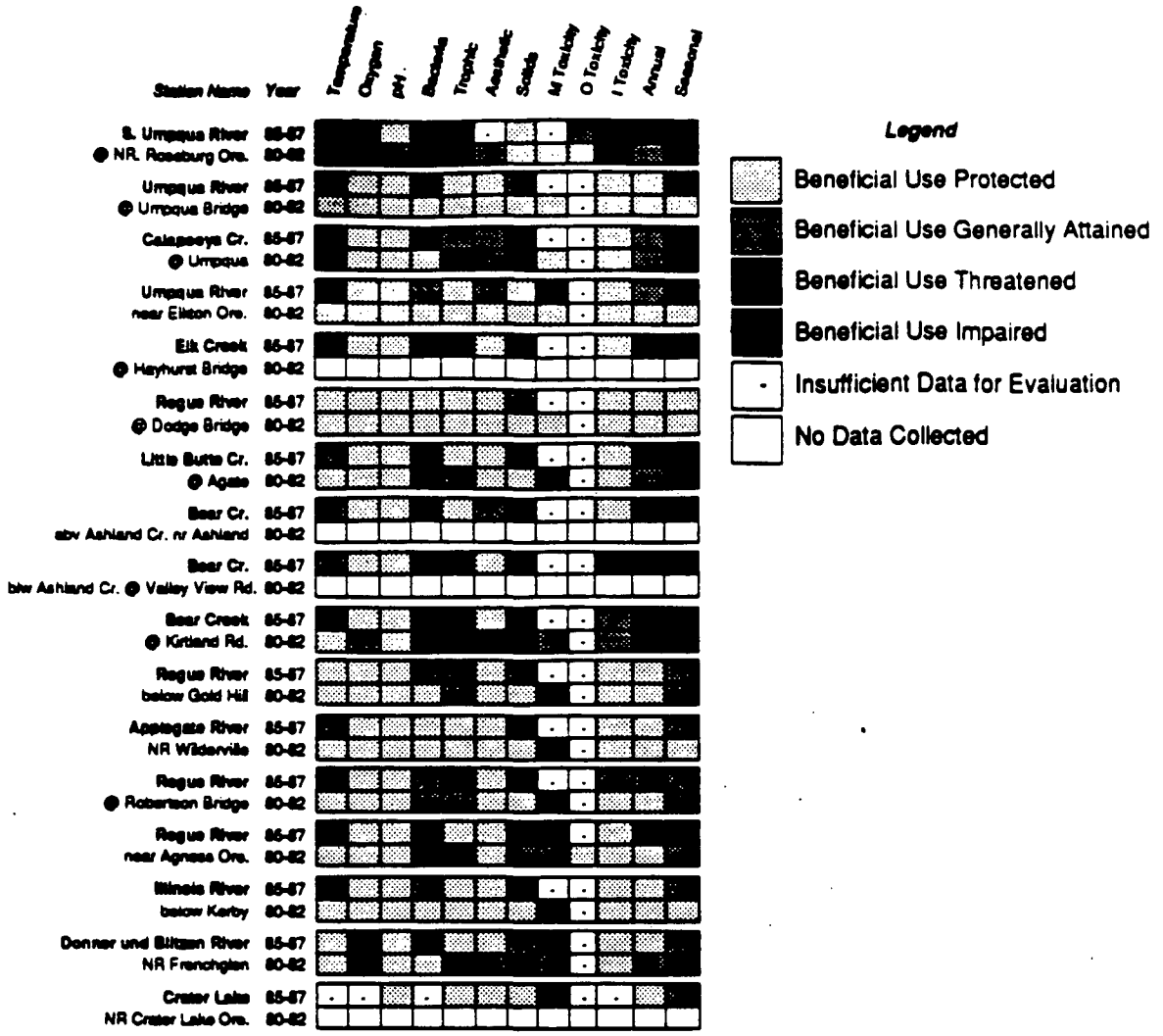


Figure 1.3(b)
Oregon Water Quality, Based on Region 10 Water Quality Index

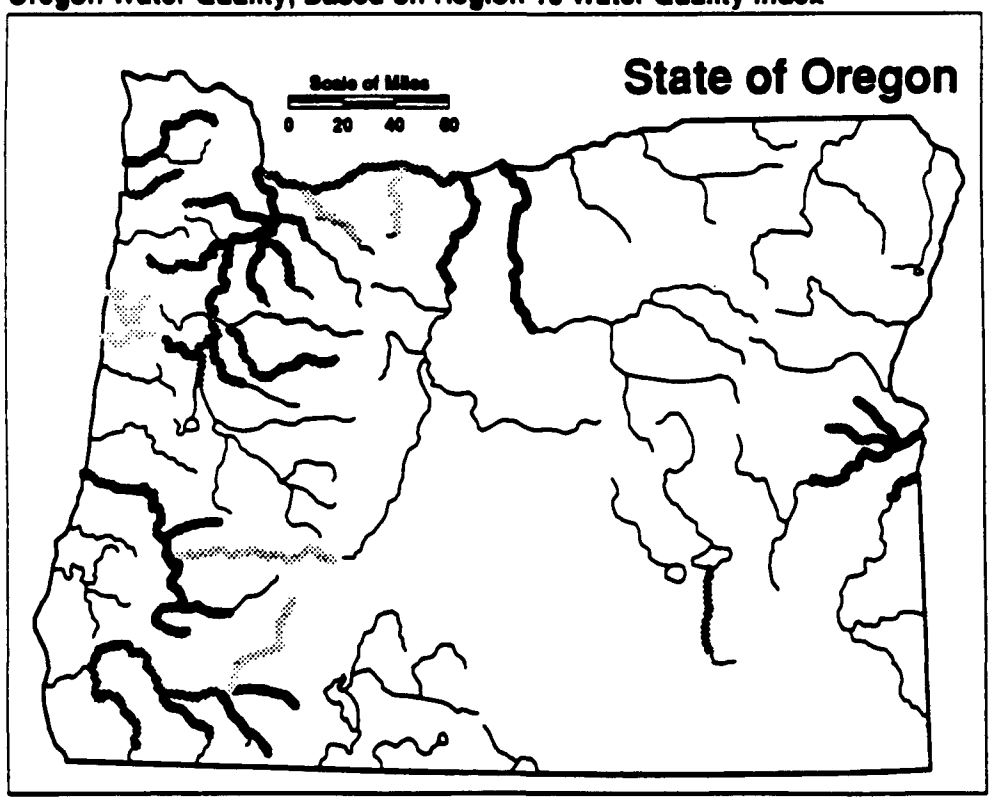


Figure 1.4(a)

Water Quality Index Tables for the State of Idaho

Current Status and Trends

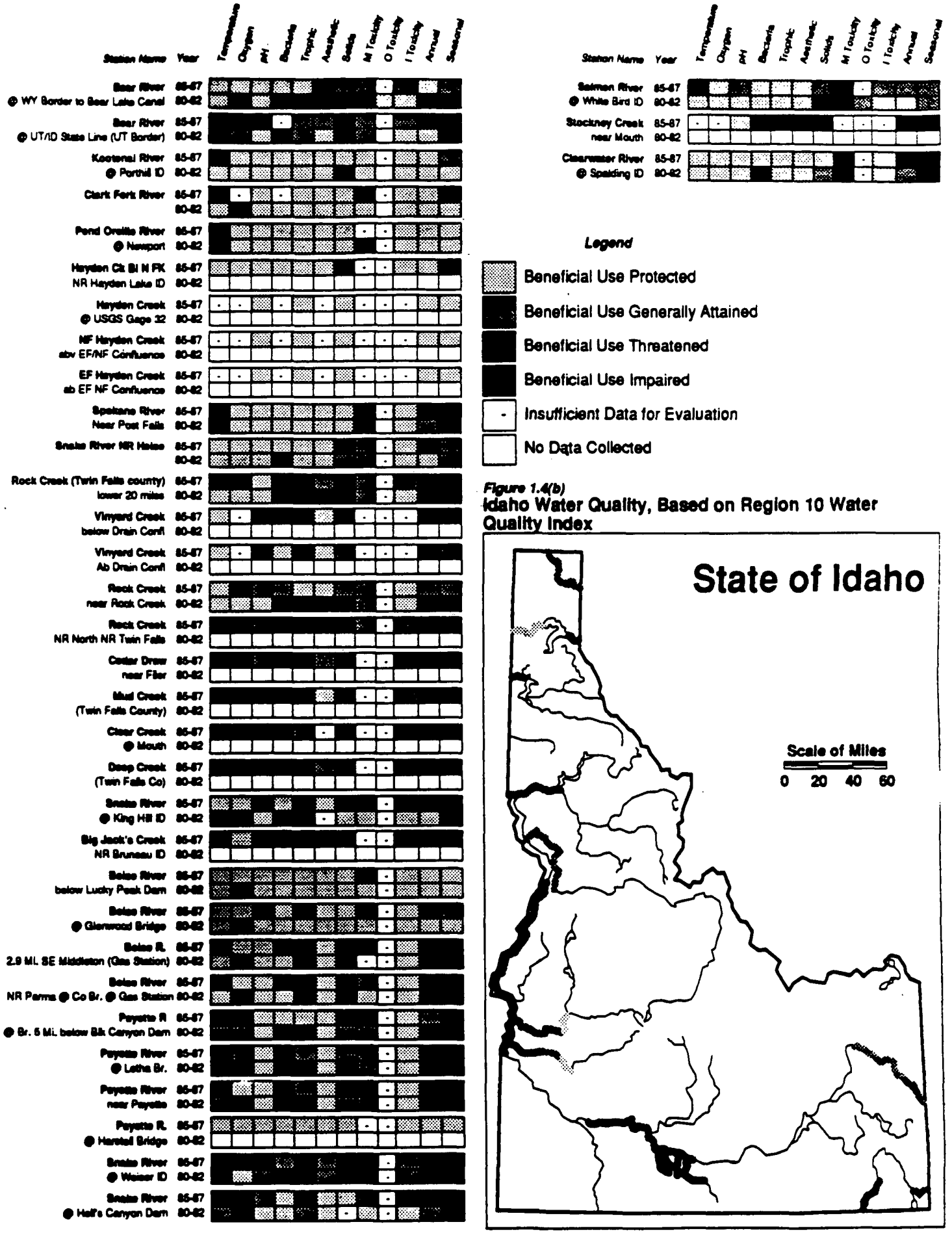


Figure 1.4(b)

Idaho Water Quality, Based on Region 10 Water Quality Index

Reported Indicators

Superfund

Reported Data

Superfund Indicators Reported in FY 90

As shown in the following figures, environmental progress was documented during FY 90 for 604 Superfund sites. This data reflects progress to date in the Superfund program. Specifically, progress was reported in terms of these three indicators:

Addressing Acute Threats: This indicator describes the number of sites where immediate actions to protect nearby populations and to control the threat of exposure to hazardous contaminants have been taken. It includes all emergency actions at NPL sites and emergency actions that cost more than $200,000 at non-NPL sites.

Achievement of Health and Environmental Goals: This measure reports progress at sites toward the "goals" established in the appropriate Record of Decision (ROD). For example, if ground water at a particular site is contaminated, the goals will usually be expressed in terms of the concentration of key contaminants that must be achieved before the subsurface water is considered clean. In some cases - particularly for the land surface - varying goals are established for different areas of a given site. In addition, different parts of a site may be at different stages of cleanup. In 1990, progress was reported in two categories:

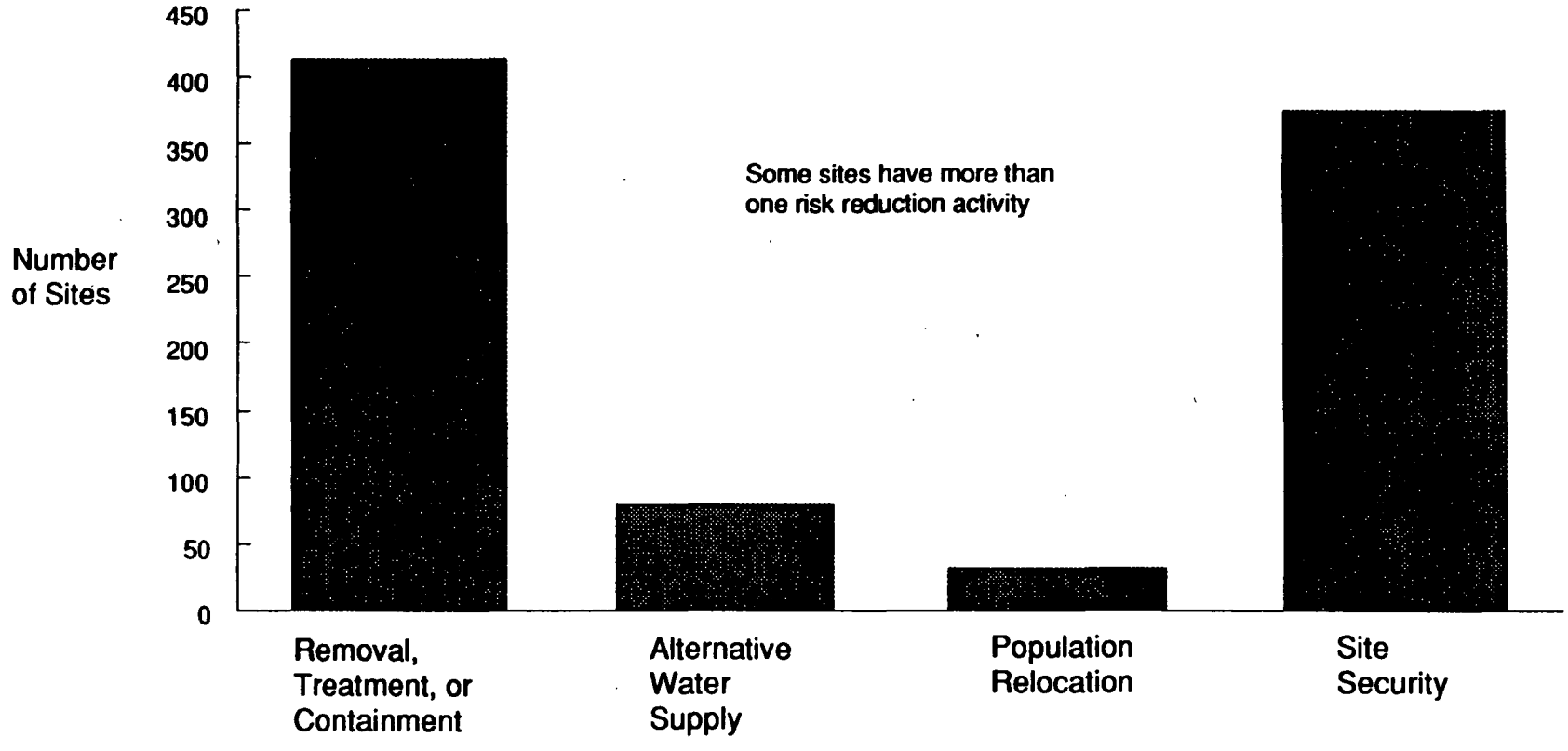
- Cleanup Initiated: This measures the number of sites where hazardous wastes or contaminated water or soil have actually been addressed at a site or medium (i.e., actual physical cleanup has begun), but work has not gone far enough to claim with any certainty a great deal of progress.

- Progress Toward Cleanup: This describes the number of sites where one or more contaminated areas - such as two out of three lagoons, or the northern section but not the southern section of a site - have been cleaned up to meet permanent health and environmental standards, but not all of the work for the particular site or medium has been done. This also includes cases where cleanup goals for a site or medium have been fully achieved, i.e., the land is clean, the surface water is clean, and so on.

Quantities of Waste Managed: This measure reports the sheer volume of hazardous waste that has been moved in cleaning up sites. Absolute information about volumes and quantities is not always available, and the amount of waste handled to date is only rarely reported as a comparison to the total amount of waste to be addressed. Therefore, this information is provided only as a general progress indicator. In addition, although physical volumes are a poor measure of actual risk reduction, they provide a useful measure by which to understand the magnitude of the Superfund program and help explain its duration and cost.

Superfund Indicator Reported in 1990

Actions Ranging From Waste Treatment to Site Security Have Addressed Acute Threats At 538 Superfund Sites*

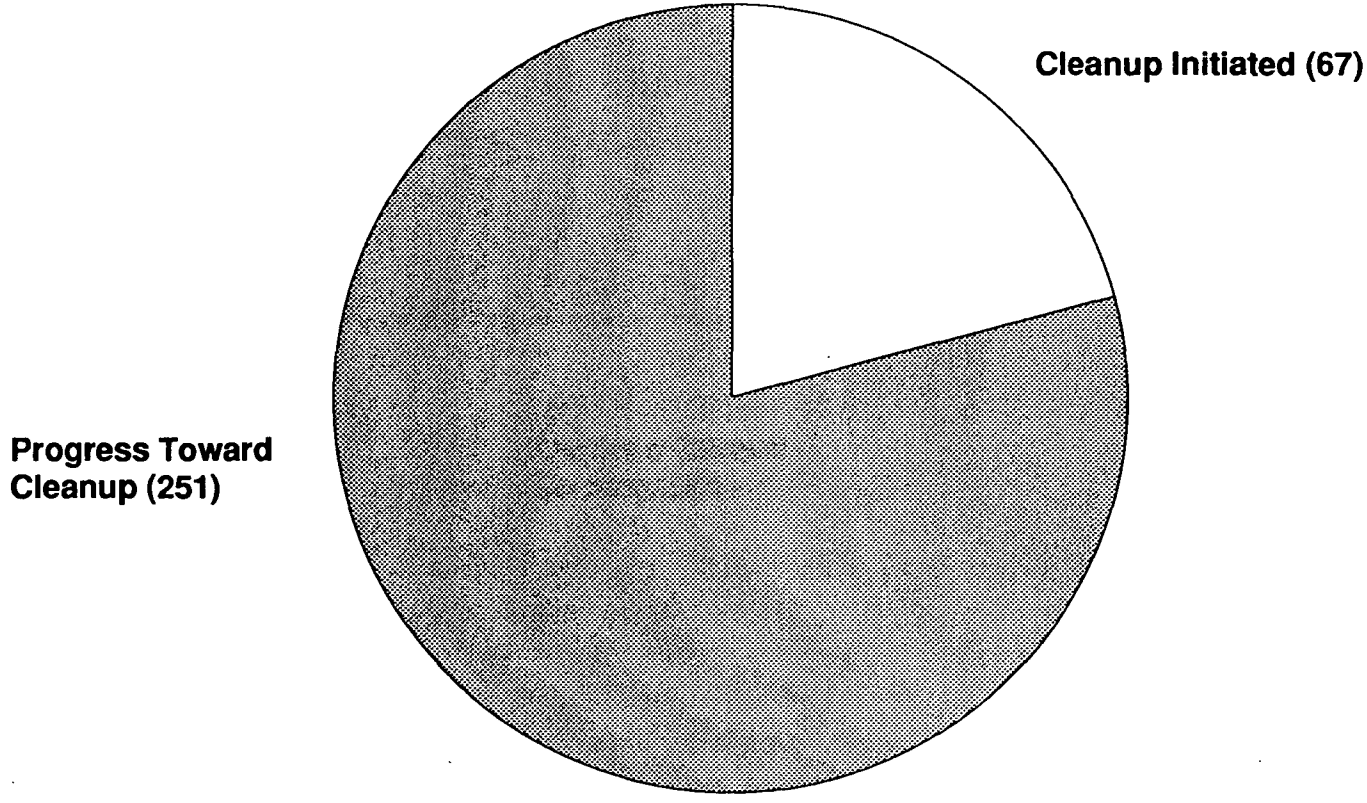


*The total number of Superfund sites was not given in the source report.

Source: U.S. EPA, SUPERFUND: "Reporting on Progress Through Environmental Indicators," October 1990

Superfund Indicator Reported in 1990

317 NPL Sites Are Moving Toward Achieving Cleanup Goals

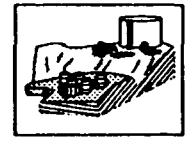
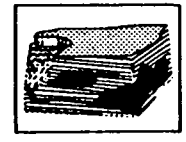
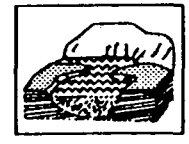


Source: SUPERFUND: Reporting on Progress Through Environmental Indicators October 1990

Superfund Indicator Reported in 1990

The volume of materials handled at Superfund sites* indicates the magnitude of the program

Quantities of Waste Managed

Pathway		Volumes Addressed
	**Land Surface:**	
	Soil	4,130,000 cubic yards
	Solid Waste	5,270,000 cubic yards
	Liquid Waste	1,000,000,000 gallons
	Groundwater:	3,880,000,000 gallons
	**Surface Water:**	104,000,000 gallons

*Data on volumes of material handled was compiled for 499 sites (329 NPL sites and 170 non-NPL sites)

Source: SUPERFUND: Reporting on Progress Through Environmental Indicators October 1990

Resource Conservation Recovery Act

Reported Data

Office of Solid Waste Indicators Reported in 1990

The data source used in reporting on the environmental indicators for hazardous waste was the 1987, "National Survey of Hazardous Waste Generators," known as the Generator Survey. As OSW acknowledged in its November 1990 ATS submission, the Generator Survey includes data on wastes other than RCRA hazardous waste (e.g. PCBs, state regulated hazardous wastes, etc.). In future reporting on these indicators, OSW will use the Biennial Report and other data sources to avoid the problem of non-RCRA hazardous wastes being included in the data. It is unlikely that data reported in 1990 can be used as a baseline for future environmental indicator reporting or trend analysis.

Three indicators were reported on by OSW in 1990. Highlights of reported data include the following:

(1) Quantity of hazardous waste generated:

- 744,348,187 tons of hazardous waste were generated by 16,028 generators
- 455 million tons (60%) was managed in exempt units only
- 289 million tons (40%) was managed in RCRA regulated units
- 30% of all generators accounted for 46% of all the hazardous waste generated in the U.S. and are located in five states (Texas, New Jersey, Michigan, California, and Virginia)
- Industrial organic chemicals accounted for 18% of all wastes generated, even though they comprise less that 2% of all generators
- Approximately 40% of all hazardous waste generated were either solely corrosive waste (D002) or D002 mixed with other waste
- The largest source processes of hazardous waste were (in millions of tons):
  - Other production processes (14.4)
  - Wastewater treatment - exempt (10.7)
  - Electroplating (9,.0)
  - Hydrogenation (7.1)
  - Distillation and fractionation (7.0)

(2) Ratio of hazardous waste generated to production quantity ratio:

The purpose of this indicator was to capture the quantity of waste generated that cannot be explained by changes in production. The method used in this calculation was to calculate "value added" because data on production levels were not reported in the Generator Survey. This indicator revealed that the industries generating the greatest quantity of hazardous wastes did not necessarily generate the greatest amount of hazardous waste per unit of production.

The six industries with the largest ratio of hazardous waste generated to value added were:

- Explosives (42.1)
- Industrial organic chemicals (11.4)
- Cyclic crudes and intermediates (10.7)
- Inorganic pigments (9.3)
- Small arms ammunition (9.3)
- Pulp mills (9.1)

(3) Number of hazardous waste generators reporting waste minimization activities:

The data reported were the number of generators with waste minimization programs, defined as a reduction in volume or toxicity of waste.

Number of respondents in the Generator Survey = 16,028
Generators with waste minimization programs: 13,036
Generators without waste minimization programs: 2,992
Generators implementing programs: 7,053
25% implementing programs report decreases in quantity of waste generated
80% implementing programs report decreases in toxicity levels

Proposed Indicators

Superfund

Proposed Indicators

Proposed Indicators for OERR (Based on ATS*)

Population protected from current and future threat (feasibility study to be completed in FY 1991 - 1992)

Reduced concentrations of contaminants/comparison with health standards (feasibility study to be completed in FY 1992)

Ecological Indicator (not yet defined)

During FY 1991, OERR will examine feasibility of indicators recommended by OPPE:

1) reduced contaminant stress,
2) improved biological health and,
3) reduced threats to sensitive environments

*While these indicators are included in OERR's ATS commitments, they are not mentioned in OSWER's strategic plan.

Resource Conservation Recovery Act

Potential Indicators

Future Environmental Indicators Proposed by OSW in ATS

OSW proposed to continue reporting on the environmental indicators reported on this year, with some modifications. Note: The data source for future reporting on these indicators will be the Biennial Report.

- Quantity of hazardous waste generated:
  Continues

- Ratio of hazardous waste generated to production quantity:
  Continues

- Quantity of hazardous waste prevented due to waste minimization activities:
  Improved over 1990 in that actual quantities of waste will be reported

New Addition to OSW ATS Environmental Indicators Reporting Schedule:

- Identify additional environmental indicators for waste minimization, waste management, and corrective action

Future OSW Environmental Indicators Proposed in OSWER's 1993-1996 Strategic Plan

Goal 1: Waste Minimization

- Continual reduction in the volume of hazardous and industrial solid waste generated per capita

- Continual reduction in the toxicity of targeted waste streams

- Annual increases in the amount of municipal solid waste recycled

- Annual reduction in the quantity of municipal solid waste disposed of or sent to incinerators and landfills

- Annual increases by state in the amount of municipal solid waste recycled

- Reduced volumes and toxicity of waste in industries targeted for combined enforcement and permit activities

Goal 2: Environmentally Sound Management

No environmental indicators proposed by OSW in the plan

Goal 3: Prevent Harmful Releases

- The environmental damage resulting from these releases declines over time

Goal 4: Prepare for and Respond to Hazardous Releases

No environmental indicators proposed by OSW in the plan

Potential indicators

Resource Conservation Recovery Act

Potential Indicators

The Universe of Wastes Regulated Under RCRA

The volumes of non-hazardous waste regulated under Subtitle D of RCRA are very large compared to the volumes of hazardous waste managed at Subtitle C regulated facilities. Due to the Toxicity Characteristic Rule, which became effective in September 1990, some of the Subtitle D industrial wastes (an estimated 0.81 billion tons) are now categorized as hazardous wastes.

Hazardous Waste (Subtitle C)
Approximately .26 Billion tons per year are managed in regulated units

Non-Hazardous Waste (Subtitle D)
Municipal Solid Waste: .18 billion tons per year
Industrial and special wastes: 12 billion tons per year

Sources: U.S. EPA , TSDR Survey, 1986
Franklin Associates, "Characterization of Municipal Solid Waste in the United States, 1960 to 2010," March 1990.

Hazardous Waste Incinerated

According to the National Survey of Hazardous Waste Treatment, Storage, Disposal, and Recycling Facilities (TSDR Survey), 1.1 million tons of hazardous waste were incinerated in 1986

Alaska: none
Hawaii: none
Puerto Rico: 6 facilities (22,065 tons)

Top Six Industries Incinerating the Largest Quantities of Hazardous Waste

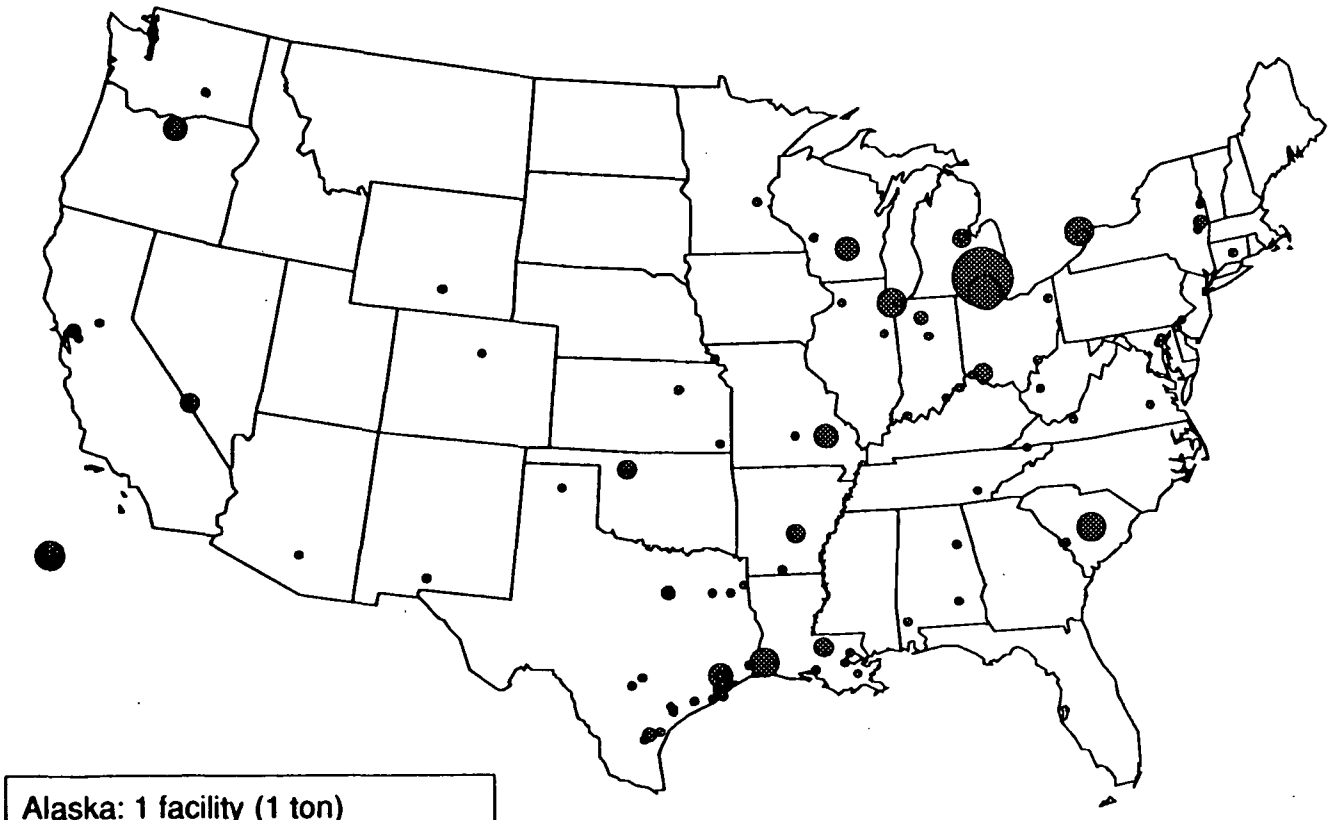
- Chemical Products 92%
- 4% Petroleum & Coal Products
- 1% Electrical & Electronic Machinery, Equipment, & Supplies
- 1% Electrical, Gas, & Sanitary Services
- 1% Instruments
- 1% Printing & Writing Paper

Tons
- 150,000
- 75,000
- 1

There are 163 incinerator facilities in the TSDR Survey, 6 of which are not shown on this map due to incorrect latitude and longitude coordinates.

Hazardous Waste Landfilled

According to the National Survey of Hazardous Waste Treatment, Storage, Disposal, and Recycling Facilities (TSDR Survey), 3.2 million tons of hazardous waste were disposed in landfills in 1986



Alaska: 1 facility (1 ton)
Hawaii: none
Puerto Rico: 2 facilities (206 tons)

There are 99 landfill facilities in the TSDR Survey, 3 of which are not shown on this map due to incorrect latitude and longitude coordinates.

The Five Most Common Types of Hazardous Waste Landfilled

- 16.3% Electroplating Wastewater Treatment Sludge
- 5.9% Lead
- 5.9% Chromium
- 4.4% Electric Steel Furnace Sludge
- 3.8% Petroleum Refinery Wastes

Top Five Industries

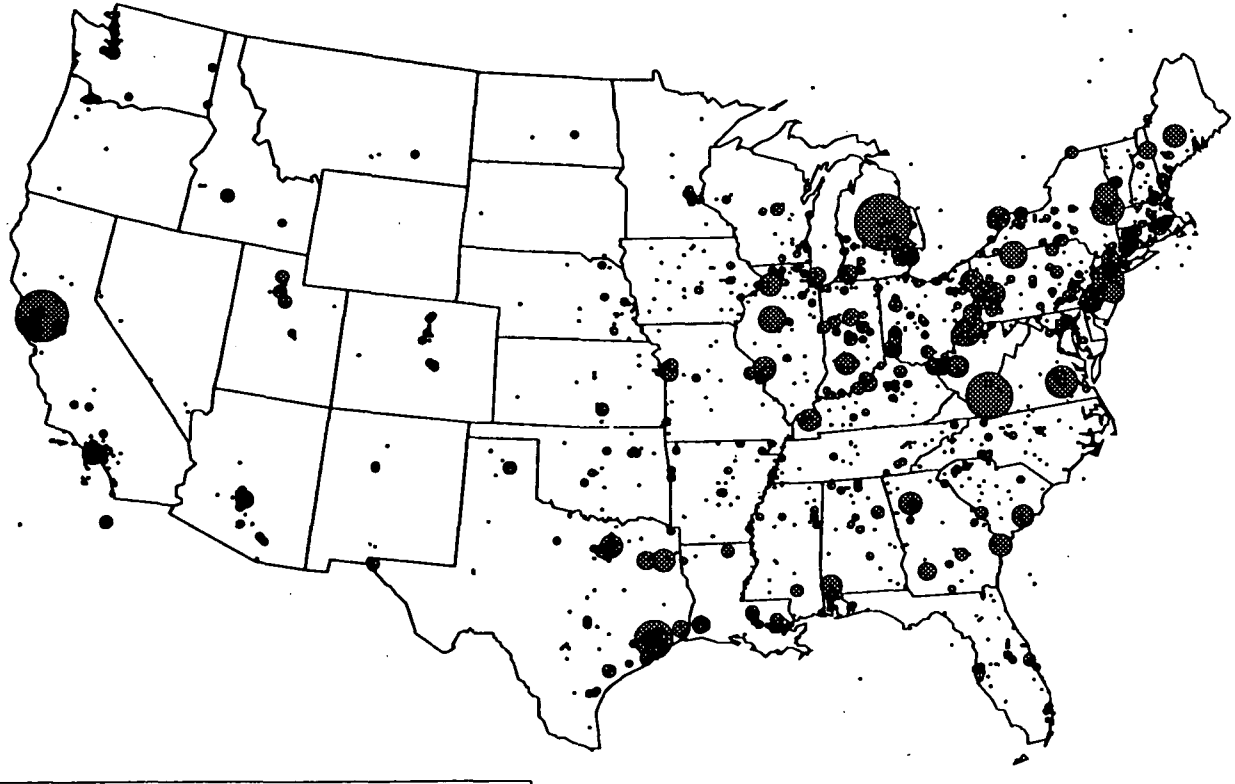
- 61% Electrical, Gas, & Sanitary Services
- 11% Miscellaneous Services
- 6% Chemical Products
- 5% Air, Water, & Solid Waste Management
- 5% Business Services

Tons
600,000
300,000
1

Environmmental Results and Forcasting Branch, Feb. 1991

RCRA Exempt Wastewater

According to the National Survey of Hazardous Waste Treatment, Storage, Disposal, and Recycling Facilities (TSDR Survey), 493 million tons of RCRA exempt wastewater entered treatment units in 1986. Units such as treatment tanks are exempt from RCRA Subtitle C controls because the effluent is regulated under the Clean Water Act through NPDES permits.



The Top Five Industrial Sources that Send Hazardous Waste to Wastewater Treatment Units

37%	Chemical Products
15%	Electrical Machninery, Equipment, & Supplies
11%	Primary Metal Industries
10%	Transportation Equipment
9%	Petroleum & Coal Products

Alaska: 1 facility (13 tons)
Hawaii: 4 facilities (44,500 tons)
Puerto Rico: 31 facilities (1.7 million tons)

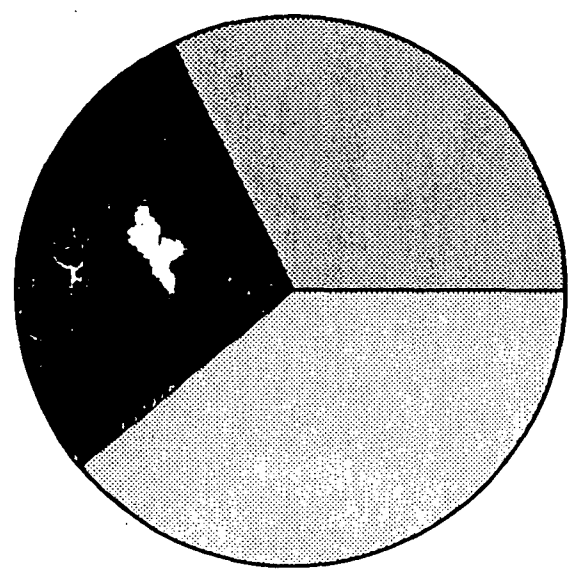
Tons
32 Million
15 Million
1

There are 2,146 facilities in the TSDR Survey, 202 of which are not shown on this map due to incorrect latitude and longitude coordinates.

Environmental Results and Forcasting Branch/February 1991

Results of Ground-water Monitoring at 112 Industrial Subtitle D "Non-Hazardous Waste" Facilities in California and New Jersey

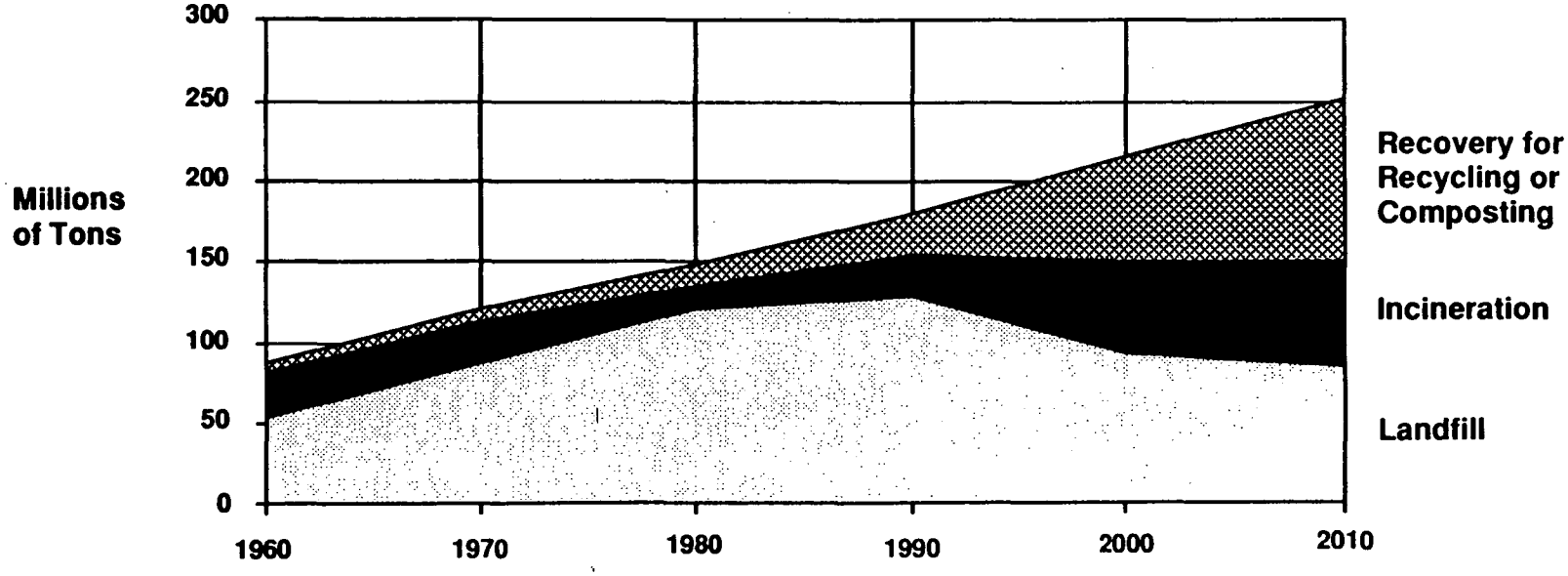
Ground-water contamination has occurred at 68 (61 percent) of 112 industrial non-hazardous waste management units for which ground-water monitoring data are readily available. At 32 of these facilities, industrial landfills and surface impoundments handling Subtitle D wastes from the processing and manufacturing of food, chemicals, rubber, paper, paint, metals, and construction/demolition debris were identified as the source of contamination. At the other 36 non-hazardous waste facilities with ground-water contamination, either the source was unknown or the contamination was attributed to an adjacent hazardous waste management unit, underground storage tank, or other adjacent facility. GAO found that states regarded the threat to ground water as "moderate to severe" at more than half of the facilities where Subtitle D (non-hazardous) landfills or surface impoundments were the known or suspected source.



Source: GAO, "Non-Hazardous Waste: Environmental Sageguards for Industrial Facilities Need to be Developed," April 1990

Municipal Solid Waste Management Trends and Projections, 1960-2010

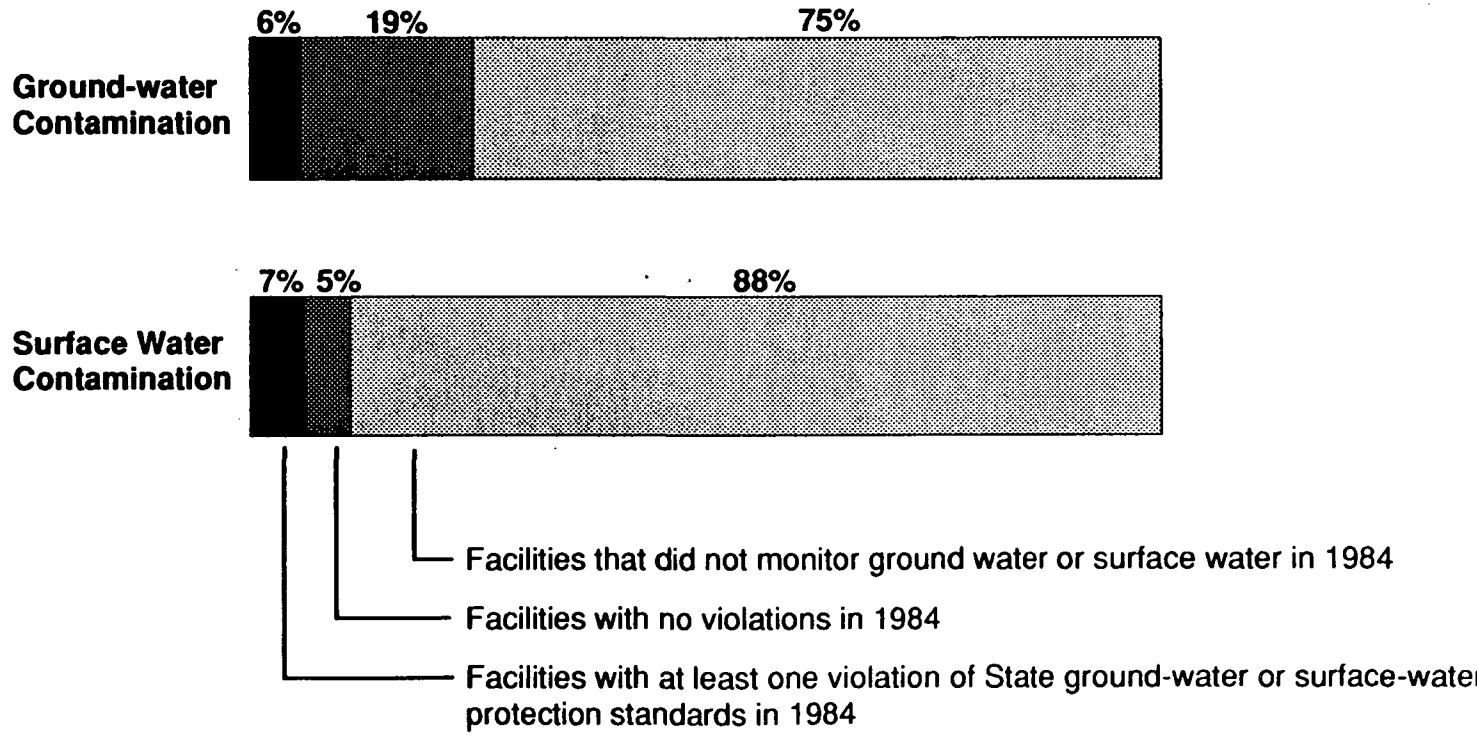
Projected municipal solid waste generation in the year 2010 will be over 250 million tons (4.9 pounds per person per day). Based on current trends and information, the total quantity of waste landfilled will decrease to 85 million tons by 2010 (34 percent), the quantity incinerated will rise to 65 million tons (26 percent), and the amount recovered for recycling and composting will reach 100 million tons (40 percent).



Source: Franklin Associates, "Characterization of Municipal Solid Waste in the United States, 1960 to 2010," March 1990.

Environmental Contamination at Municipal Solid Waste Landfills in 1984

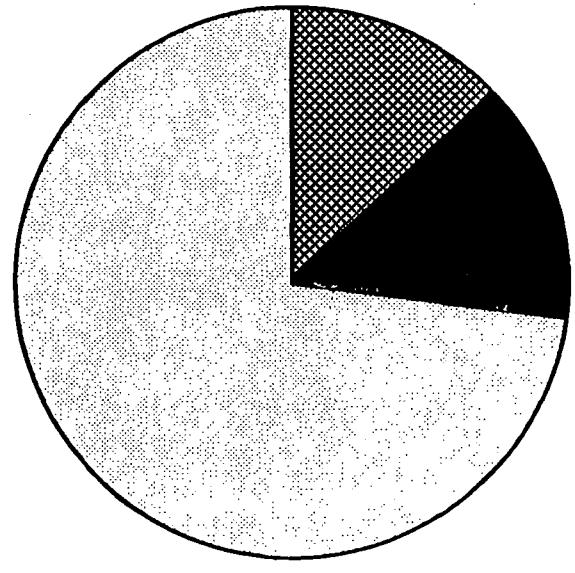
Most landfills did not monitor ground water or surface water in 1984. 25 percent of landfills with ground-water monitoring had at least one violation of State ground-water protection standards, and 58 percent of those monitoring surface water violated State surface water protection standards. The nature and extent of these violations are unknown. The proportion of landfills with monitoring systems is currently higher than shown here.



Source: U.S. EPA, "Census of State and Territorial Subtitle D Non-Hazardous Waste Programs," October 1986

Municipal Solid Waste Generation and Management

An estimated 180 million tons of municipal solid waste were generated in the United States in 1988, or 4 pounds per person per day. About 73 percent of this waste was disposed in landfills.



Recovered for Recycling or Composting

23.5 million tons (13 percent)

Landfilled

131 million tons (73 percent)

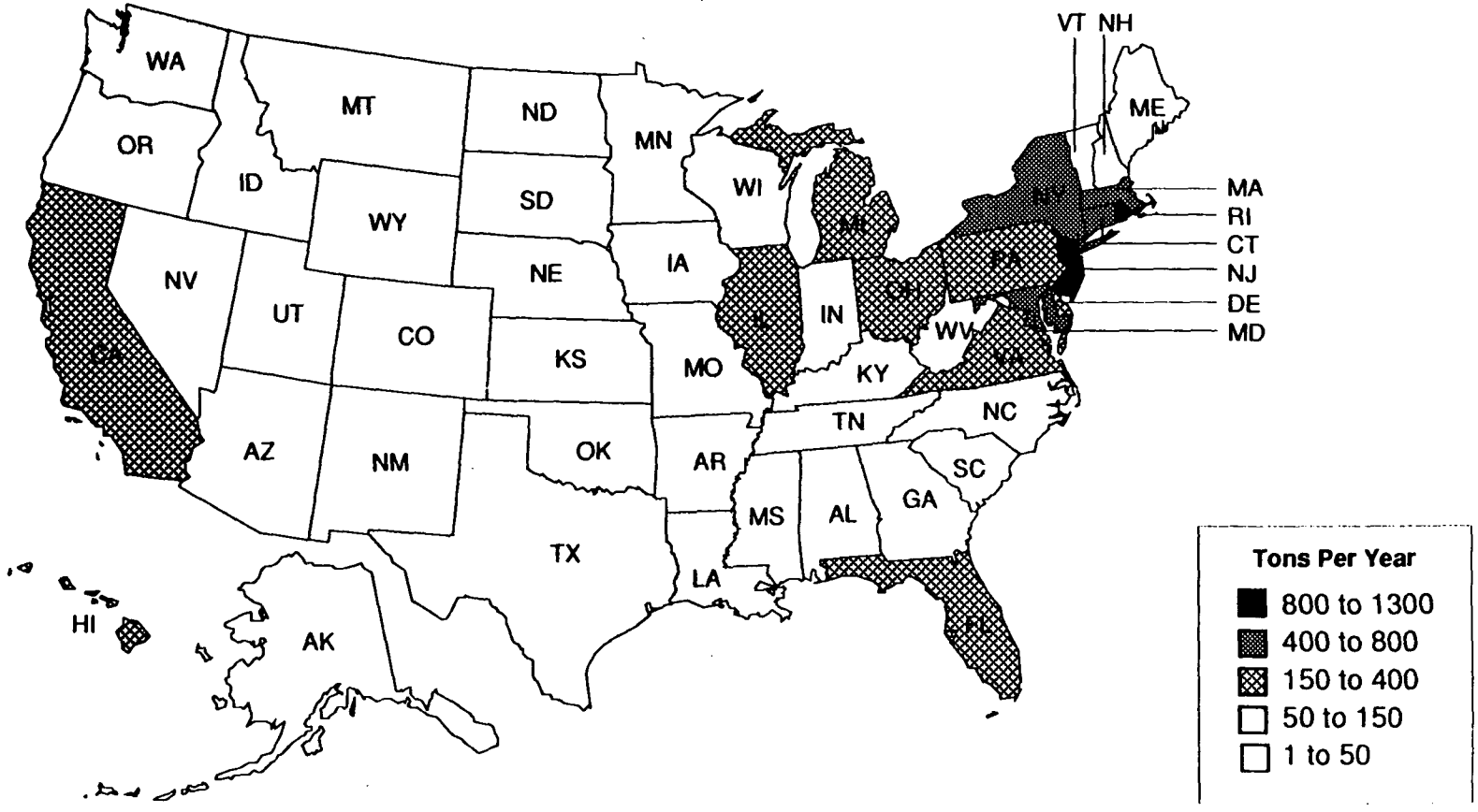
Incinerated

25.5 million tons (14 percent)

Source: U.S. EPA, "Characterization of Municipal Solid Waste in the United States: 1990 Update, Executive Summary," June 1990.

Municipal Solid Waste Generation Per Square Mile

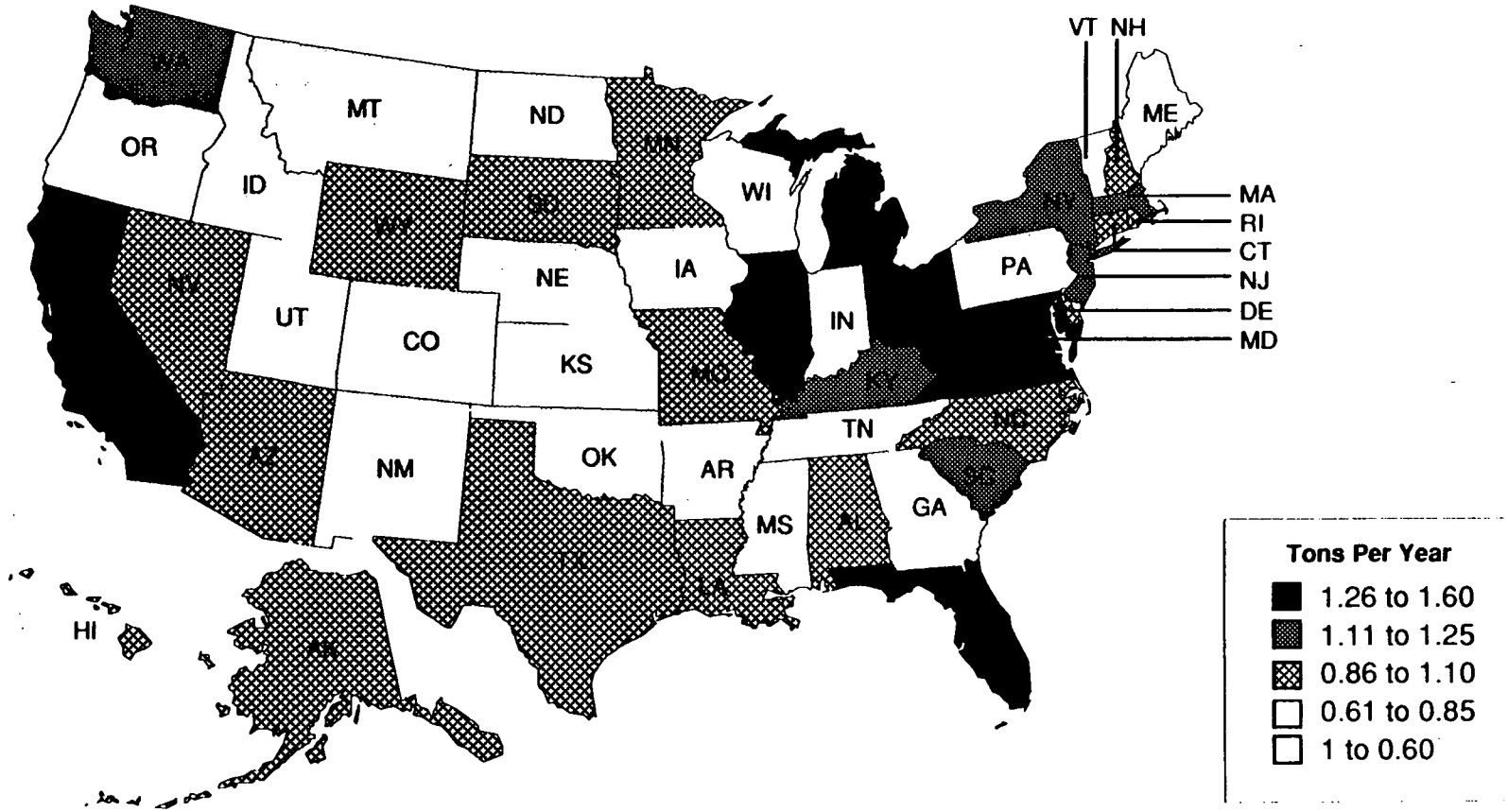
The national average per square mile is74.4 tons per year.



Source: Glenn, J. 1990. "The State of Garbage in America." Biocycle March 1990.

Municipal Solid Waste Generation Per Capita

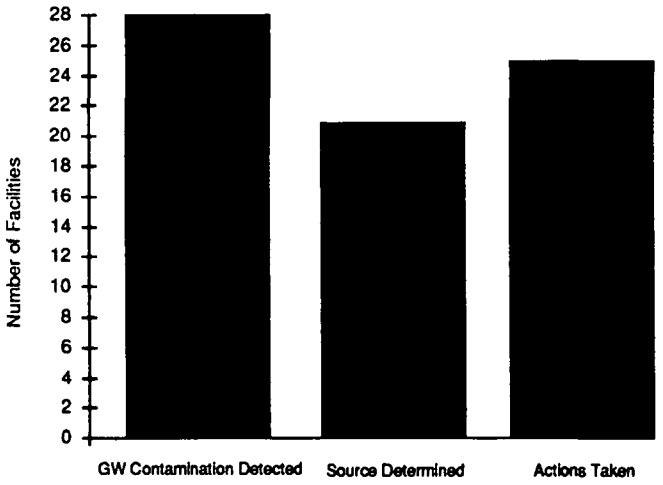
The national per capita average is 1.11 tons per year.



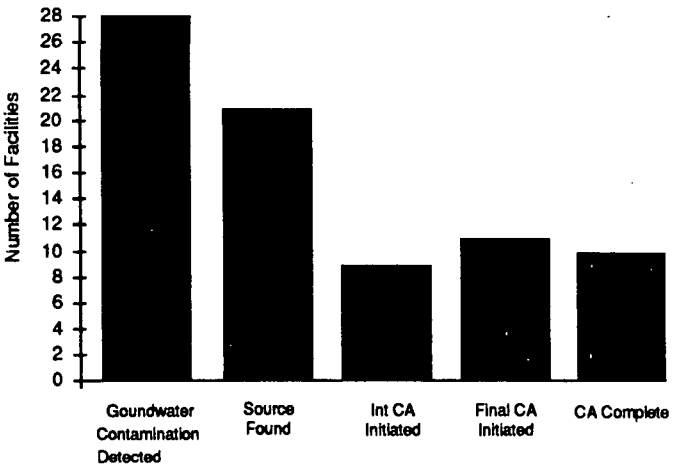
Source: Glenn, J. 1990. "The State of Garbage in America." Biocycle March 1990.

RCRA Facilities and Groundwater Contamination

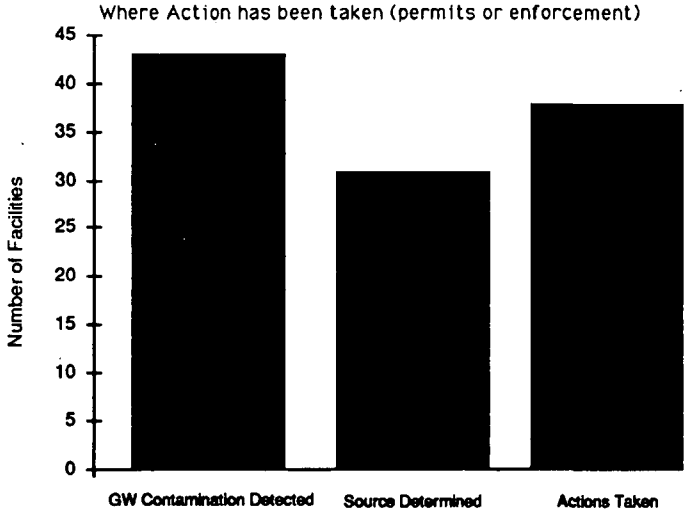
Land Disposal Facilities (LDF's) with Groundwater Contamination
Where Action has been taken (permits or enforcement)



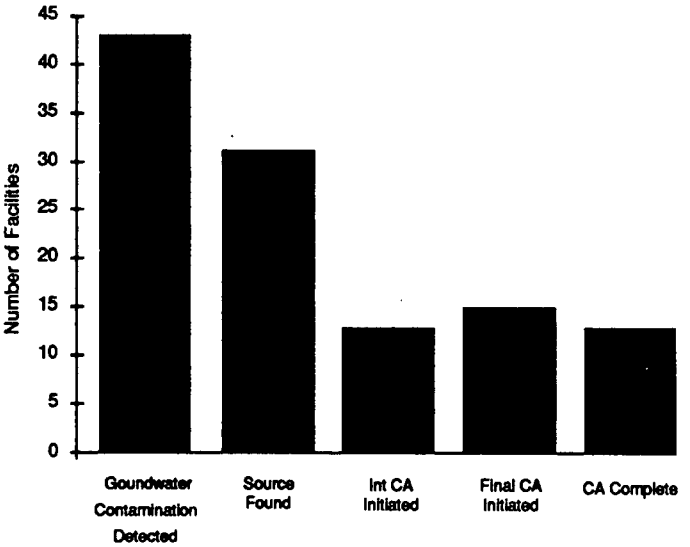
Land Disposal Facilities (LDF's) Physical Clean-Up Activities Initiated
Where Groundwater Contamination Has Been Found



Treatment, Storage, Disposal Facilities (TDS) with Groundwater Contamination
Where Action has been taken (permits or enforcement)



Treatment, Storage, Disposal Facilities (TDS) Physical Clean-Up Activities Initiated
Where Groundwater Contamination Has Been Found



Hazardous Waste Environmental Indicators

Description & Results

The ground-water hazardous waste environmental indicator is a classification scheme for all hazardous waste sites and facilities in Region 10. Starting in 1988, RCRA-regulated land disposal facilities (LDFs) Superfund sites on the National Priorities List (NPL) and federal facilities were categorized in one of several ways describing the impact of the site on ground-water or ground-water based drinking water supplies. The classification was done by polling all EPA Hazardous Waste Division staff familiar with site status. Staff members were asked to complete a questionaire describing the nature of ground-water contamination for each site.

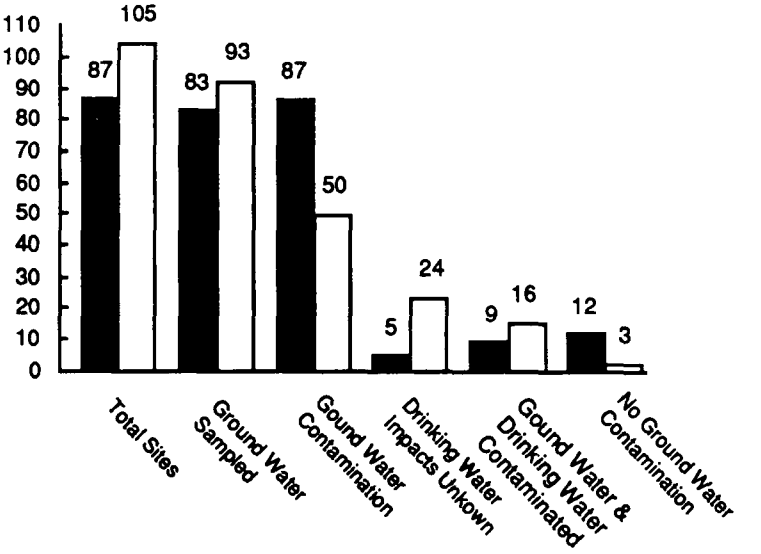
Sites or facilities were categorized into one of four possible categories based on whether the ground-water at the site had been assessed for contamination. If a ground-water assessment had been conducted, the site or facility was placed into one of the following categories:

1) No ground-water contamination found associated with the site;
2) Ground-water contamination associated with the site, but no drinking water contamination;
3) Ground-water contamination associated with the site, but impacts on drinking water supplies unknown; and
4) Ground-water and drinking water contamination attributed to the site.

Summary of Ground-Water Contamination Status For Region 10 CERCLA, RCRA and Federal Facilities

Ground Water Contamination Status	No. of Sites	No. of Sites Above LOC	Population at Risk
Total Sites -FY89	105		
Assessment of GW contamination done	93		
No known GW contamination associated with site	3		
GW contamination but *no drinking water* contamination	50	26	
GW contamination; drinking water impacts unknown	24	17	
GW and drinking water contamination associated wit site	16	14	1,114,855

Site Ground-Water Contamination Status



Note:

In the first year of Regional Strategic Planning, Regions have not been required to propose or report environmental indicators, but may do so if they choose. OPPE has not yet comprehensively recorded the indicator lists being developed by Regions; a few Regional indicators or data that seem appropriate as potential indicators are provided throughout the notebook for illustrative purpose only. This does not reflect the significant amount of on-going Regional work developing indicators, and the actual reporting of indicator type data by a number of Regions. Region 10 in particular has reported on a comprehensive set of environmental indicators since 1988.

OPTS

Reported Indicators

Office of Pesticides Programs

Potential Indicators

Potential Indicator Data for Office of Pesticide Programs

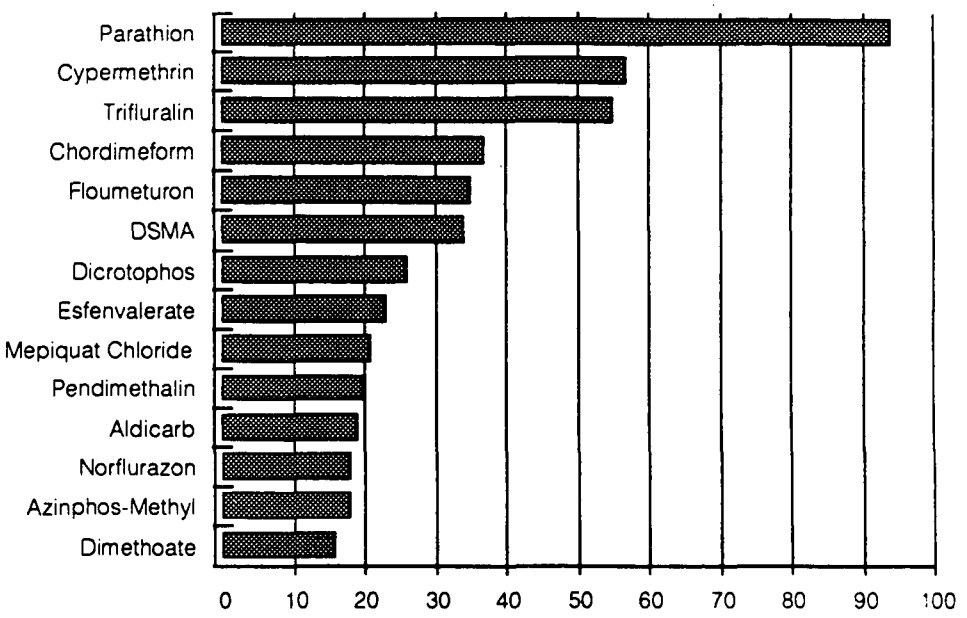
The following two maps show estimates of average total annual use (in pounds) by county of the herbicide atrazine and the insecticide carbofuran. Use in agricultural crop production by county has been quantified for one year circa the late 1980s. Non-crop land uses are not accounted for. Publicly available reports from federal and state agencies were used to determine the extent of use of each of these pesticides for all crops for each county with significant acreage. For counties and crops for which there is little or no publicly available use data, the estimates were based on a survey of state Cooperative Extension Service personnel.

Mapping of this sort of pesticide use information over time would clearly portray trends in pesticides use not only by changes in volume applied but also changes in geographic distribution of pesticide use.

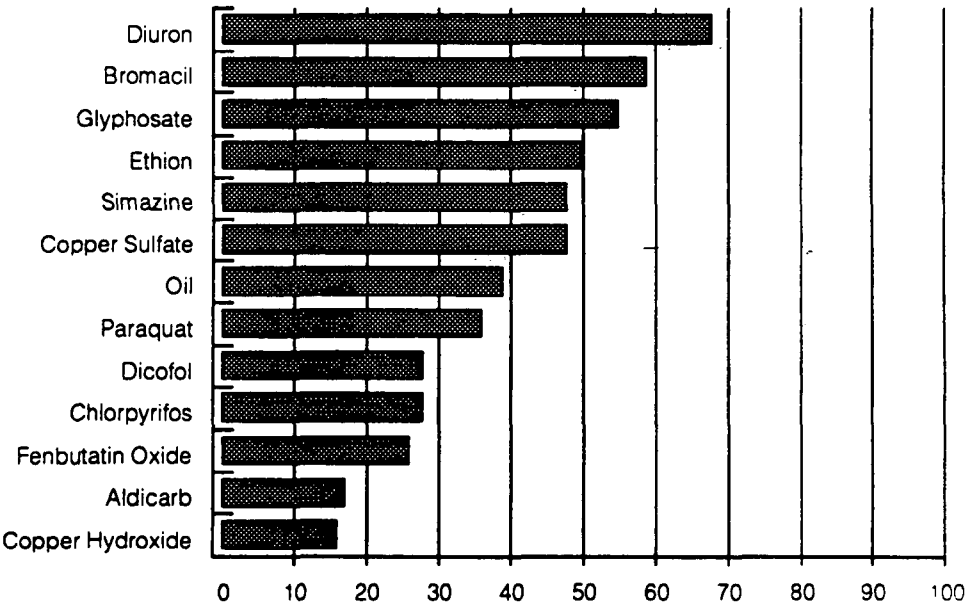
Pesticide Indicator Reported for the First Time in 1990

Percentage of Selected Crops on Which Pesticides are Used

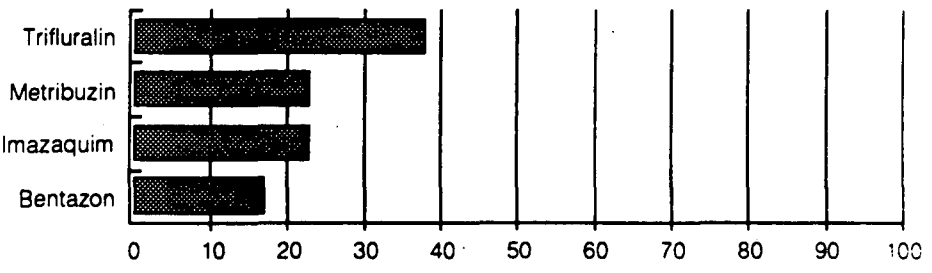
Cotton



Citrus



Soybeans

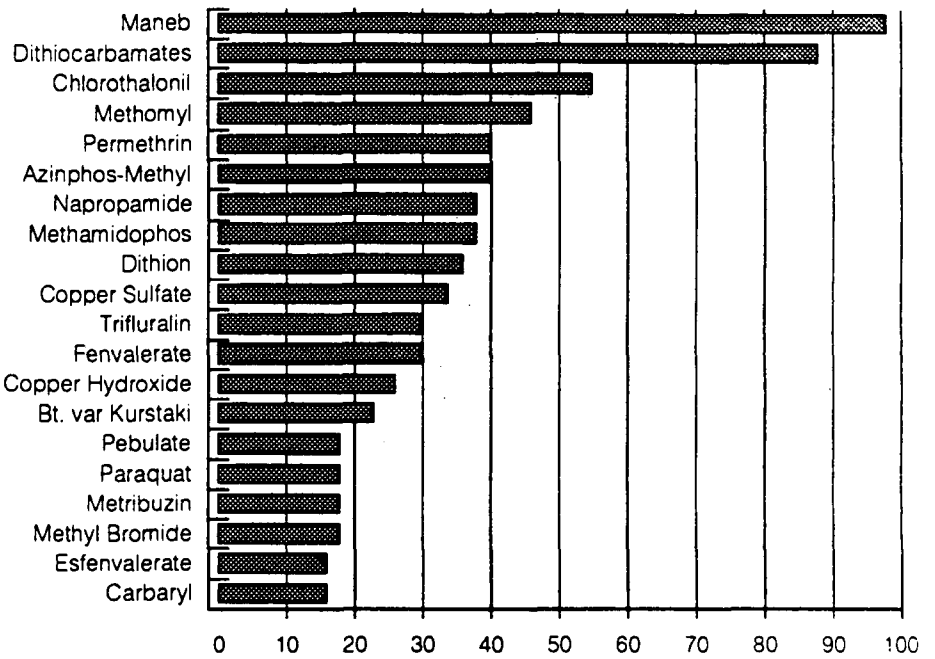


Environmental Results and Forecasting Branch/January 1991

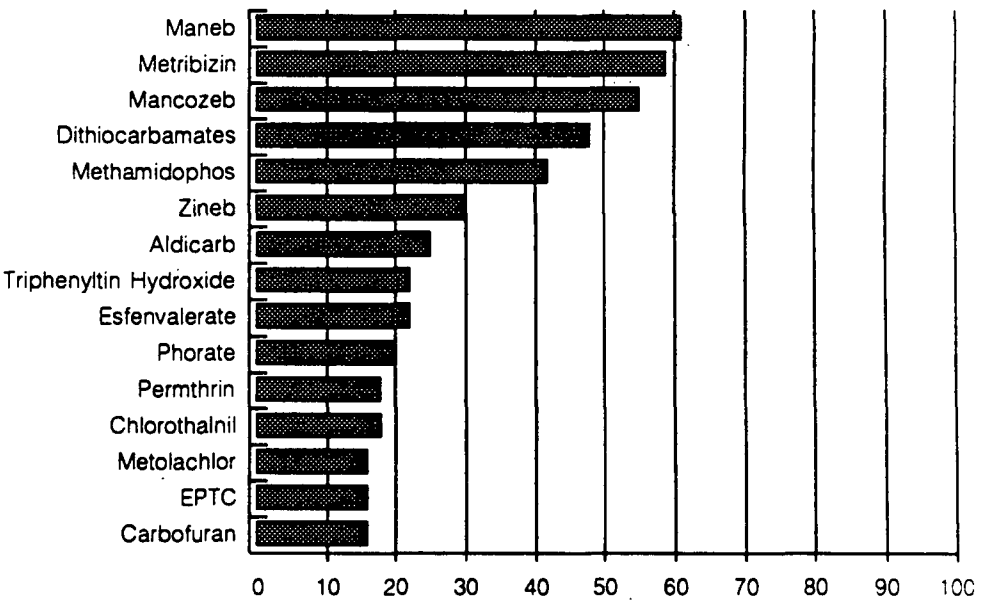
Pesticide Indicator (Continued)

Percentage of Selected Crops on Which Pesticides are Used

Tomatoes



Potatoes



Corn

Office of Toxic Substances

Reported Indicators

OPTS/OTS Reported Indicators

OTS has no reported indicators at this time. They have an ATS commitment to report on two indicators in 1992 (see "OTS Proposed Indicators")

Office of Pesticides Programs Proposed Indicators

1. Workgroup to develop environmental indicators pilot program. September 1991.

   Note:Reporting dates for the following indicators have not been established

2. Pesticide Usage/Human and Ecological Risk Index.
3. Poisoning Incidence Reporting (human and ecological incidence).
4. Commodities Residue Levels.
5. Field Residue Monitoring of Environmental Matrices.
6. Pesticide container Reuse/Recycle.
7. Indoor Exposure to Pesticides.
8. Ecological Community Monitoring.
9. Ground Water Quality Monitoring.

Office of Toxic Substances Proposed Indicators

TOXIC CHEMICAL RELEASE INDEX

The Index is intended to reflect trends in industrial emissions of toxic chemicals and their risks. It will be constructed from data on releases for a large set of TRI chemicals. Release quantities will be adjusted by factors which account for toxicity and exposure, and then combined into national indices--one of human health risks and one of environmental risks. The Index (indices) would be reported annually.

Difficult decisions lie ahead: which chemicals to use in the Index; how to estimate and score exposures and toxicities; how to "index" the combined release, toxicity and exposure scores.

The ATS schedule calls for construction of the Index by October 31, 1991, testing (i.e. data reporting) and evaluation by December 31, 1991, and further revisions as necessary one year later (December 31, 1992).

PCBs INDICATOR: AMOUNT OF PCBs TAKEN OUT OF SERVICE COMPARED WITH AMOUNT PROPERLY DISPOSED OF

This indicator is intended to reflect the amount of PCBs that currently pose unacceptable risk, i.e. the difference between the amount of PCBs in leaking transformers ("taken out of service") and the amount of these that no longer pose an unacceptable risk ("properly disposed of").

The ATS schedule calls for the first annual report on this indicator by February 1992.

Potential Indicators

Office of Pesticides Programs

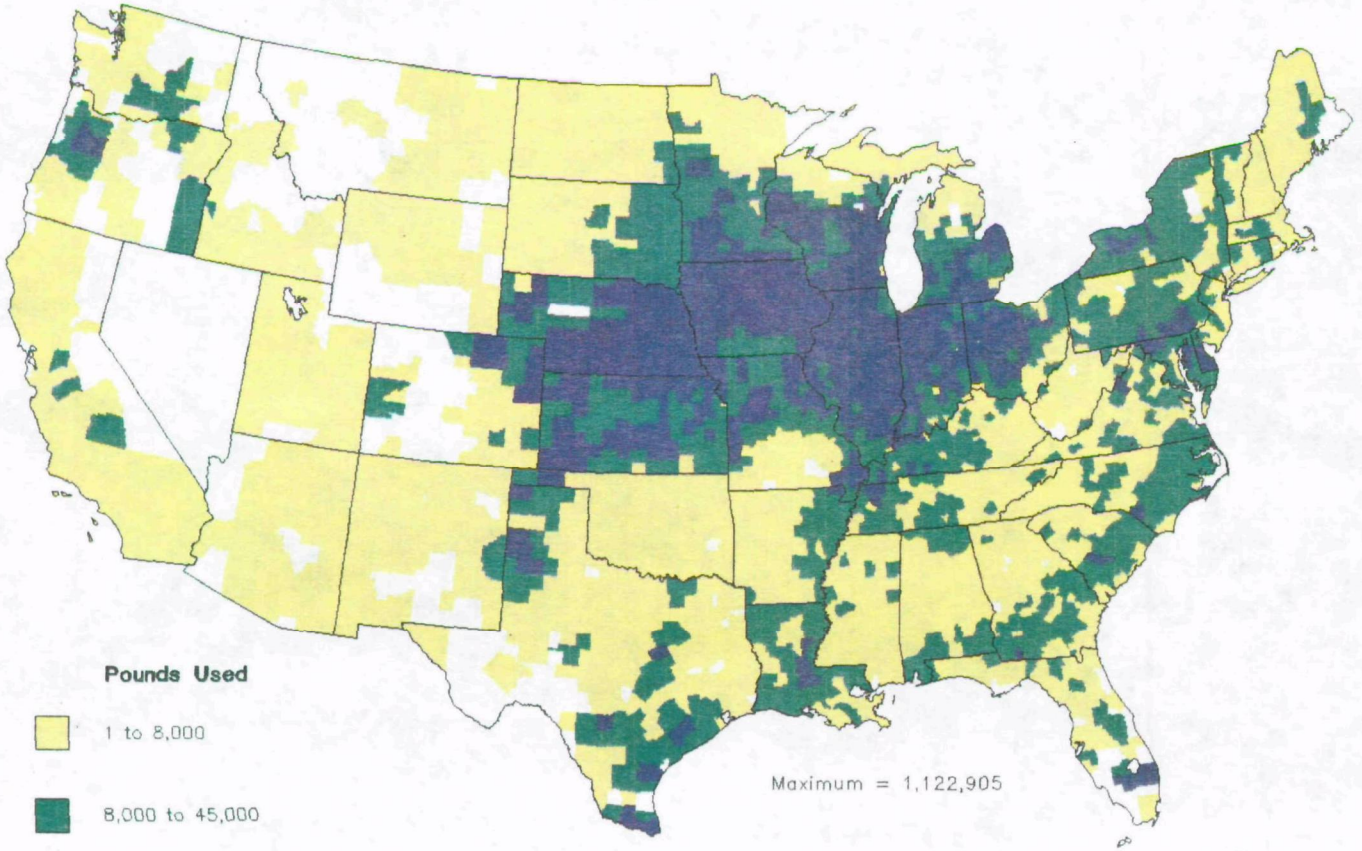
Potential Indicators

Potential Indicator Data for Office of Pesticide Programs

The following three maps show estimates of average total annual use (in pounds) by county of the herbicide atrazine and the insecticides aldicarb and carbofuran. Use in agricultural crop production by county has been quantified for one year circa the late 1980s. Non-crop land uses are not accounted for. Publicly available reports from federal and state agencies were used to determine the extent of use of each of these pesticides for all crops for each county with significant acreage. For counties and crops for which there is little or no publicly available use data, the estimates were based on a survey of state Cooperative Extension Service personnel.

Mapping of this sort of pesticide use information over time would clearly portray trends in pesticides use not only by changes in volume applied but also changes in geographic distribution of pesticide use.

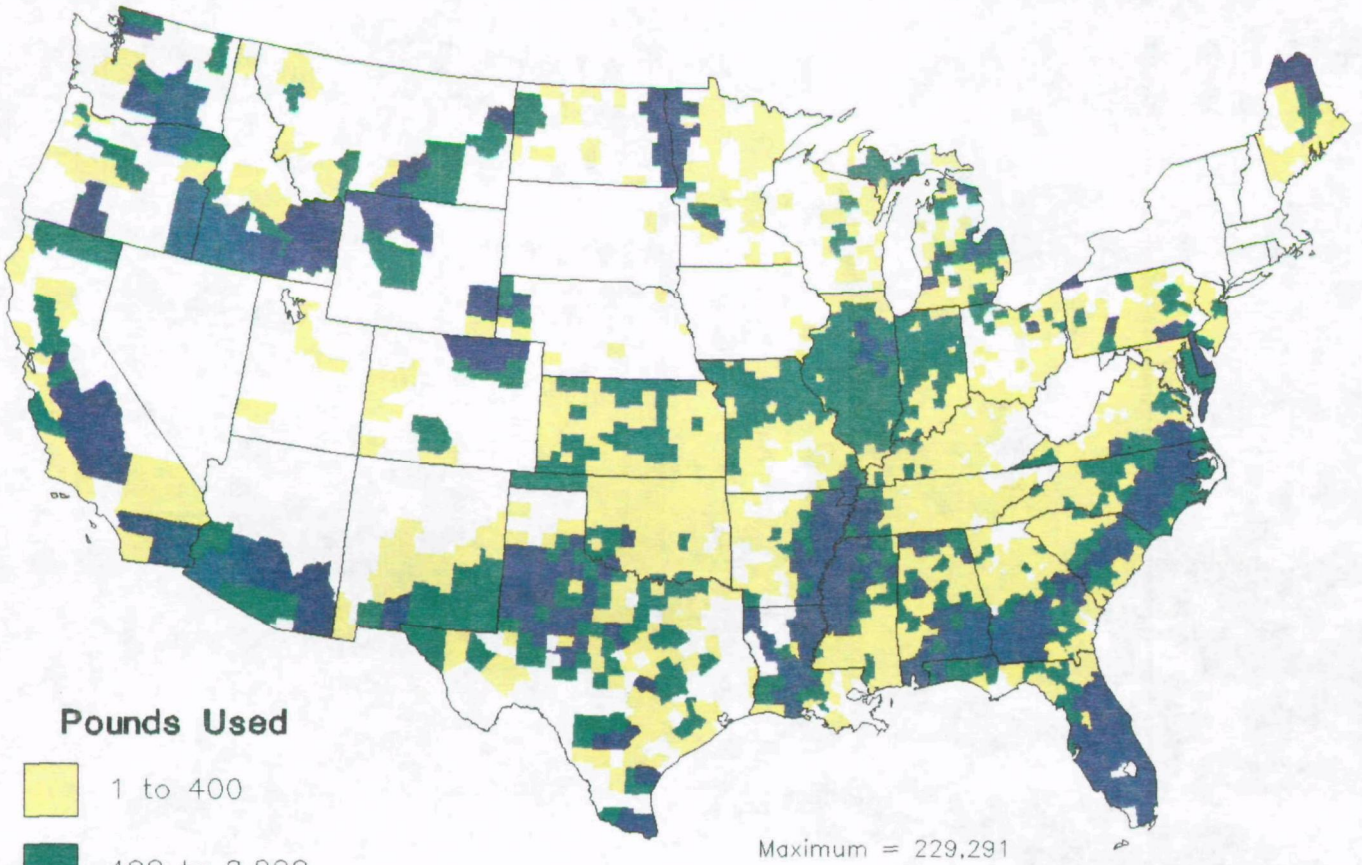
Pesticide Use by County: Atrazine



SOURCE: Resources for the Future

GENERATED BY: DataTree Services, BRG (800) 477-8194

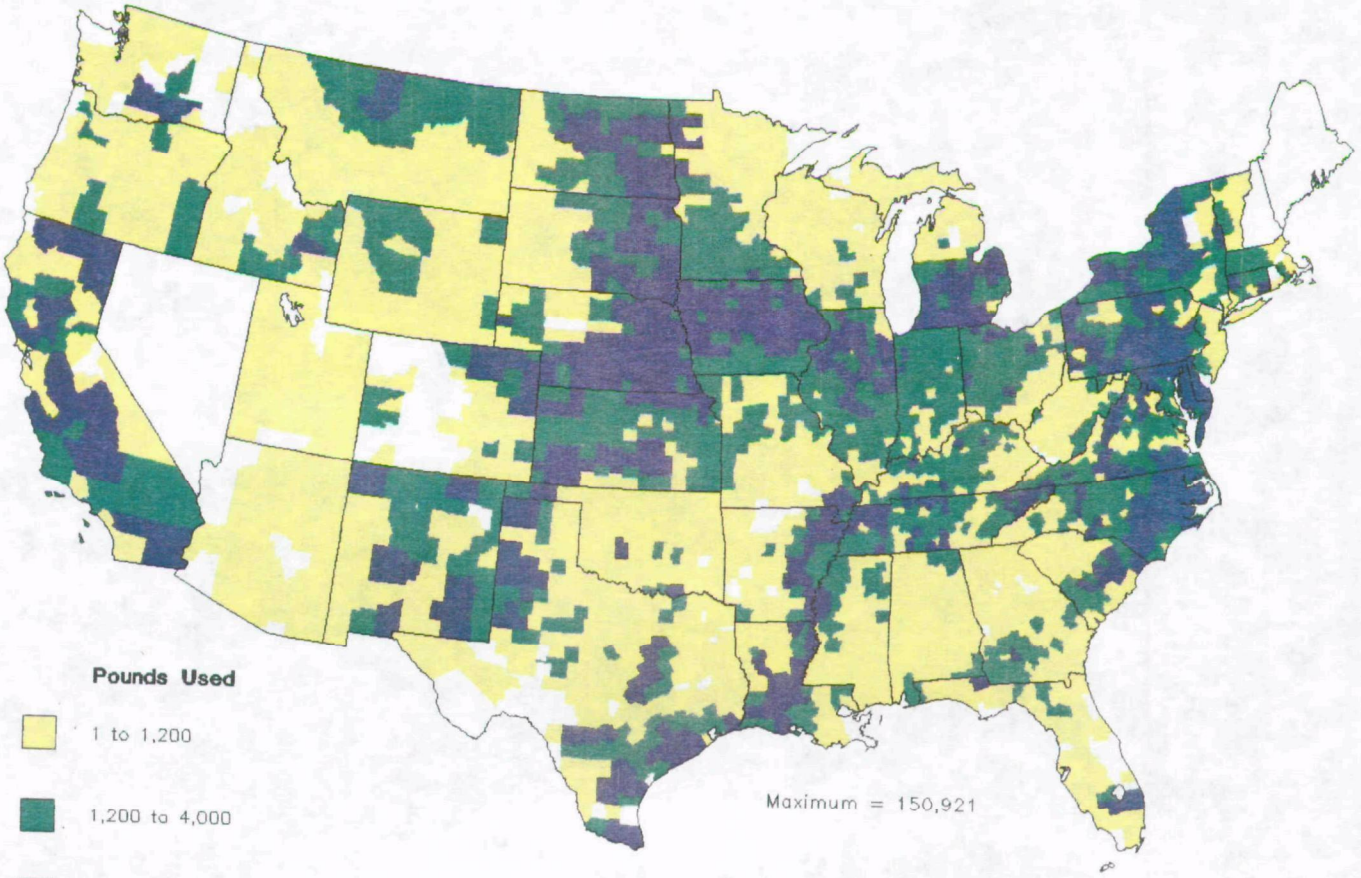
Pesticide Use by County: Aldicarb



SOURCE: Resources for the Future

GENERATED BY: DataTree Services, BRG (800) 477-8194

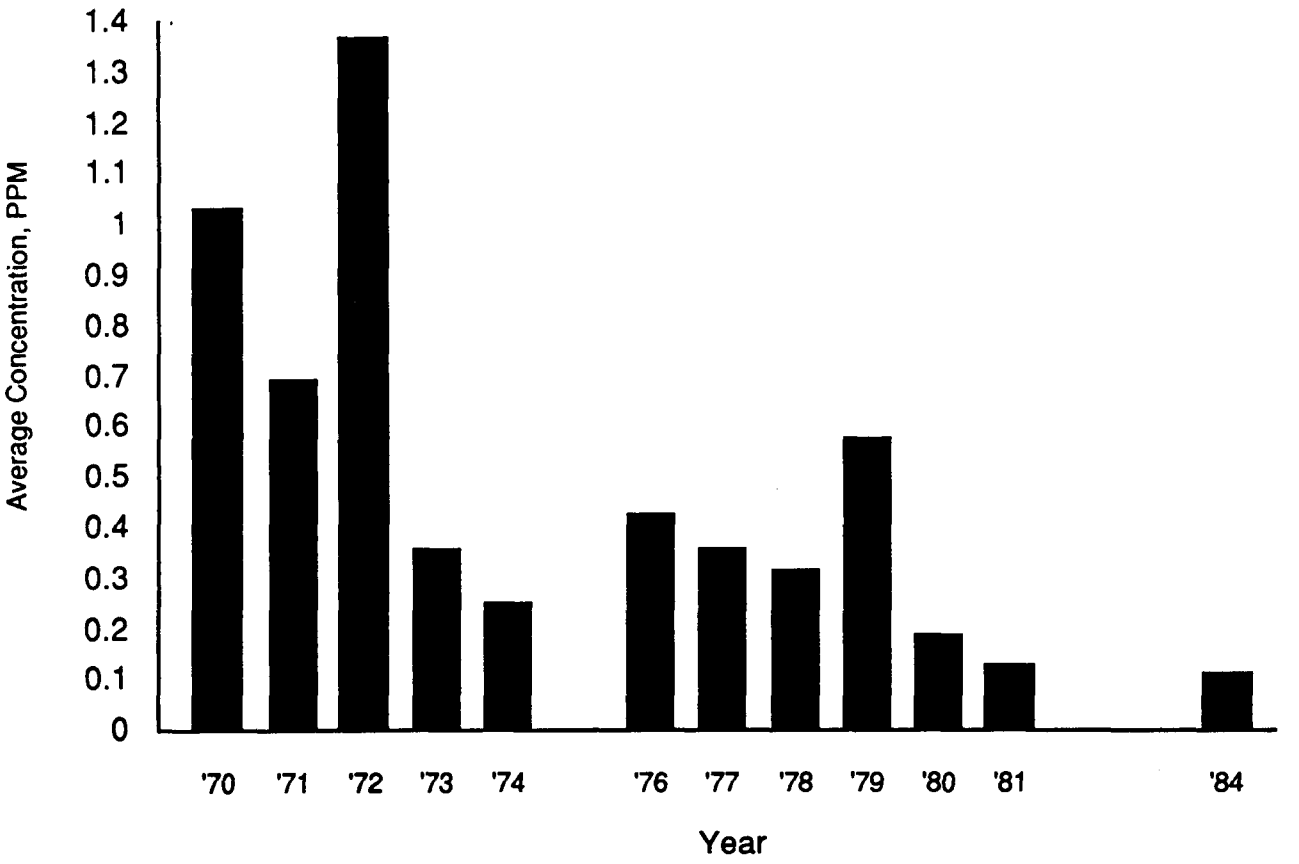
Pesticide Use by County: Carbofuran



SOURCE: Resources for the Future

GENERATED BY: DataTree Services, BRG (800) 477-8194

PCB's in Freshwater Fish Tissue, Region 10



Concentrations of Pesticides in Puget Sound Reconnaissance Survey of Pesticides in Sediments (1988)
(ug/Kg Dry Wt)

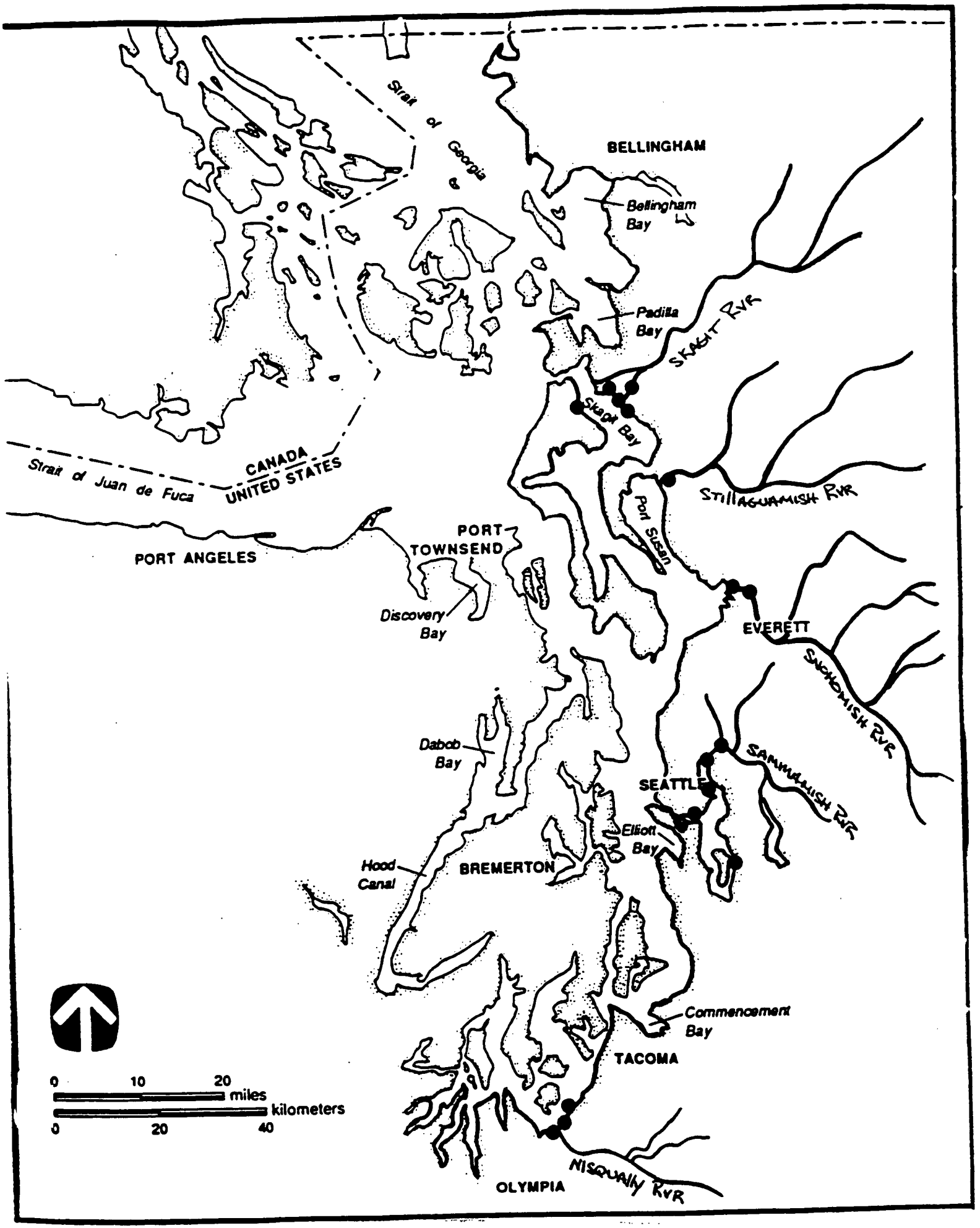
Pesticides	Category	GC Detector	Detection Limit ug/Kg Dry Wt	Site: Lk. Wash. Sta. 1	Lk. Wash. Sta. 2	Lk. Wash. Sta. 3	Lk. Wash. Sta. 4	Lk. Wash. Sta. 5	Lk. Wash. Sta. 6
Atrazine	N	NPD	1	ND	ND	ND	ND	ND	ND
Butylate	N	NPD	1.6	ND	ND	ND	ND	ND	ND
Diazinon (a)	N,P	NPD	--	ND	ND	ND	ND	ND	ND
Disulfoton (a)	P	NPD	3.0	ND	ND	ND	ND	ND	ND
Ethyl Parathion(b)	N	NPD	1.6	ND	ND	ND	ND	ND	ND
Methyl Parathion	N	NPD	2.6	ND	ND	ND	ND	ND	ND
Phorate	P	NPD	1.3	ND	ND	ND	ND	ND	ND
Prometon	N	NPD	1.3	ND	ND	ND	ND	ND	ND
Pronamide	N	NPD	4.8	ND	ND	ND	ND	ND	ND
Simazine	N,Cl	NPD	2.4	ND	ND	ND	ND	ND	ND
Trifluralin	N	NPD	2.2	ND	ND	ND	ND	ND	ND
Vernolate	N	NPD	1.4	ND	ND	ND	ND	ND	ND
Chlordane	Cl	ECD	55	ND	ND	ND	ND	ND	ND
Chlorpyrifos (b)	Cl,N,P	ECD	2.1	2.7 QI	ND	ND	7.6 QI	3.0 QI	ND
Dicamba	Cl	ECD	0.02	ND	ND	ND	ND	ND	ND
Dichobenil	Cl	ECD	1.4	ND	2.0	2.3	4.9	3.8	ND
2,4-D	Cl	ECD	0.06	ND	ND	ND	ND	ND	ND
Fenvalerate	Cl,N	ECD	13.2	ND	ND	ND	ND	ND	ND
Lindane	Cl	ECD	2.1	ND	20	7.1	ND	3.5	ND
Pentachlorophenol	Cl	ECD	0.01	31 QM	56 QM	14 QM	53 QM	12 QM	32 QM

Pesticides	Site: Stillaguamish River	Nisqually Sta. 1	Nisqually Sta. 2	Snohomish Sta. 1	Snohomish Sta. 2	Dugualla Bay	Skagit Sta. 1	Skagit Sta. 2	Skagit Sta. 3	Skagit Sta. 4	Sequalitchew Creek
Atrazine	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Butylate	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Diazinon (a)	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Disulfoton (a)	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Ethyl Parathion(b)	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Methyl Parathion	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Phorate	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Prometon	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Pronamide	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Simazine	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Trifluralin	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Vernolate	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Chlordane	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Chlorpyrifos (b)	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Dicamba	ND	1.5 QM	12 QM	ND	ND	ND	ND	ND	ND	ND	ND
Dichobenil	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
2,4-D	ND	ND	ND	ND	ND	ND	ND	31 QM	17 QM	43 QM	12 QM
Fenvalerate	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Lindane	8.4	2.2	11	5.9	ND	ND	ND	ND	2.8	6.7	ND
Pentachlorophenol	11 QM	6.7 QM	7.5 QM	24 QM	7.8 QM	9.5 QM	15 QM	7.9QM	10 QM	16 QM	46 QM

(a) Diazinon and Disulfoton co-elute, therefore all reported concentrations represent a summed result.
(b) Ethyl Parathion and Chlorpyrifos co-elute, therefore all reported concentrations represent a summed result.

N = Nitrogen
P = Phosphorus
Cl = Chlorine
NPD = Nitrogen phosphorus detector
ECD = Electron capture detector
ND = Not detected at the given detection limit in column 4.
QM = Qualified as data possibly lower than actual value because of low matrix spike recoveries.
QI = Qualified as unreliable data because of matrix interferences in matrix spike recovery test.

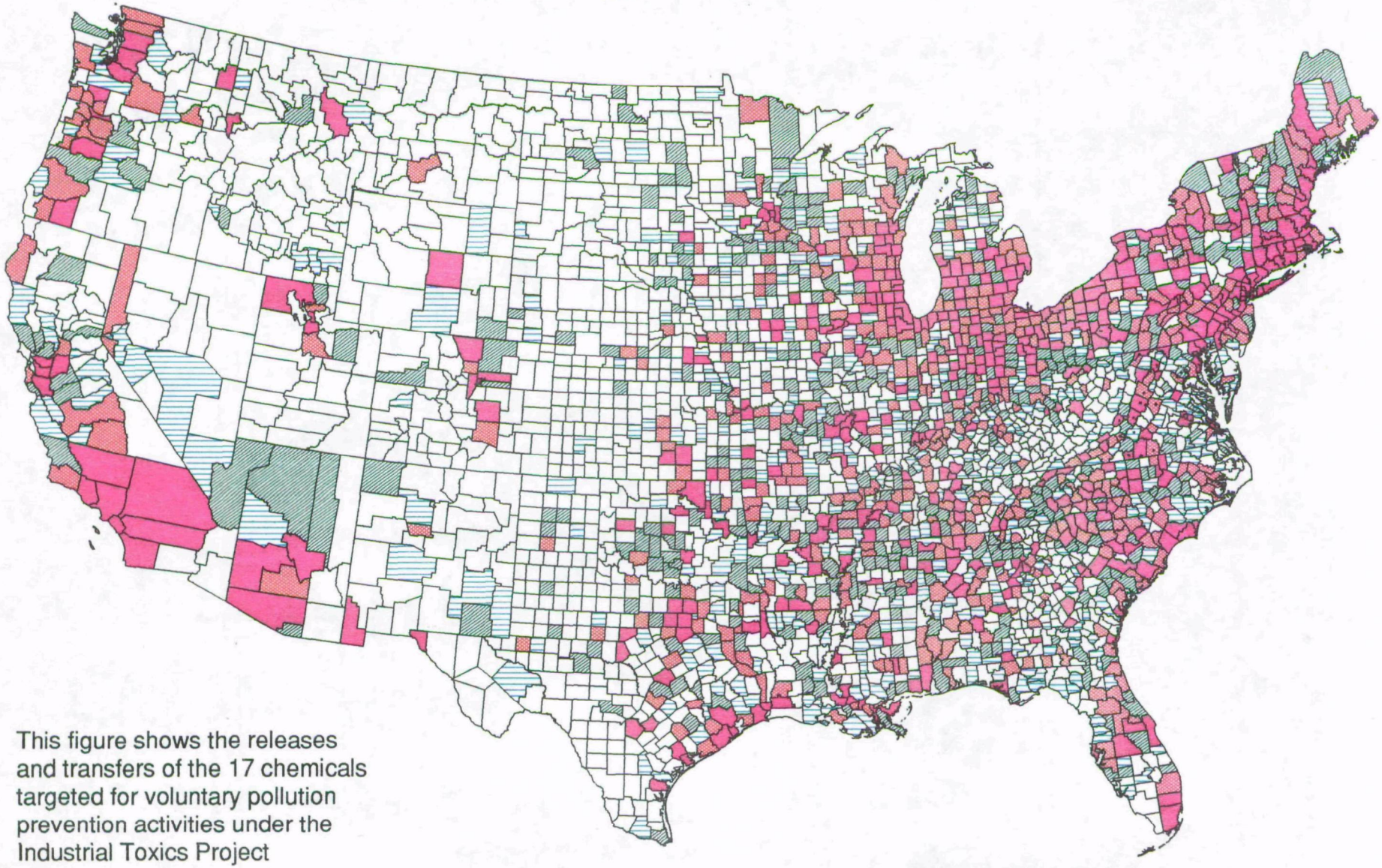
Pesticides of Concern in Puget Sound - 1988 Sampling Sites



Note:

In the first year of Regional Strategic Planning, Regions have not been required to propose or report environmental indicators, but may do so if they choose. OPPE has not yet comprehensively recorded the indicator lists being developed by Regions; a few Regional indicators or data that seem appropriate as potential indicators are provided throughout the notebook for illustrative purpose only. This does not reflect the significant amount of on-going Regional work developing indicators, and the actual reporting of indicator type data by a number of Regions. Region 10 in particular has reported on a comprehensive set of environmental indicators since 1988.

Subset of OTS Toxics Release Inventory Data Relevant to Pollution Prevention Strategy



This figure shows the releases and transfers of the 17 chemicals targeted for voluntary pollution prevention activities under the Industrial Toxics Project

0-41 | 41-187 | 187-630 | 630-31399

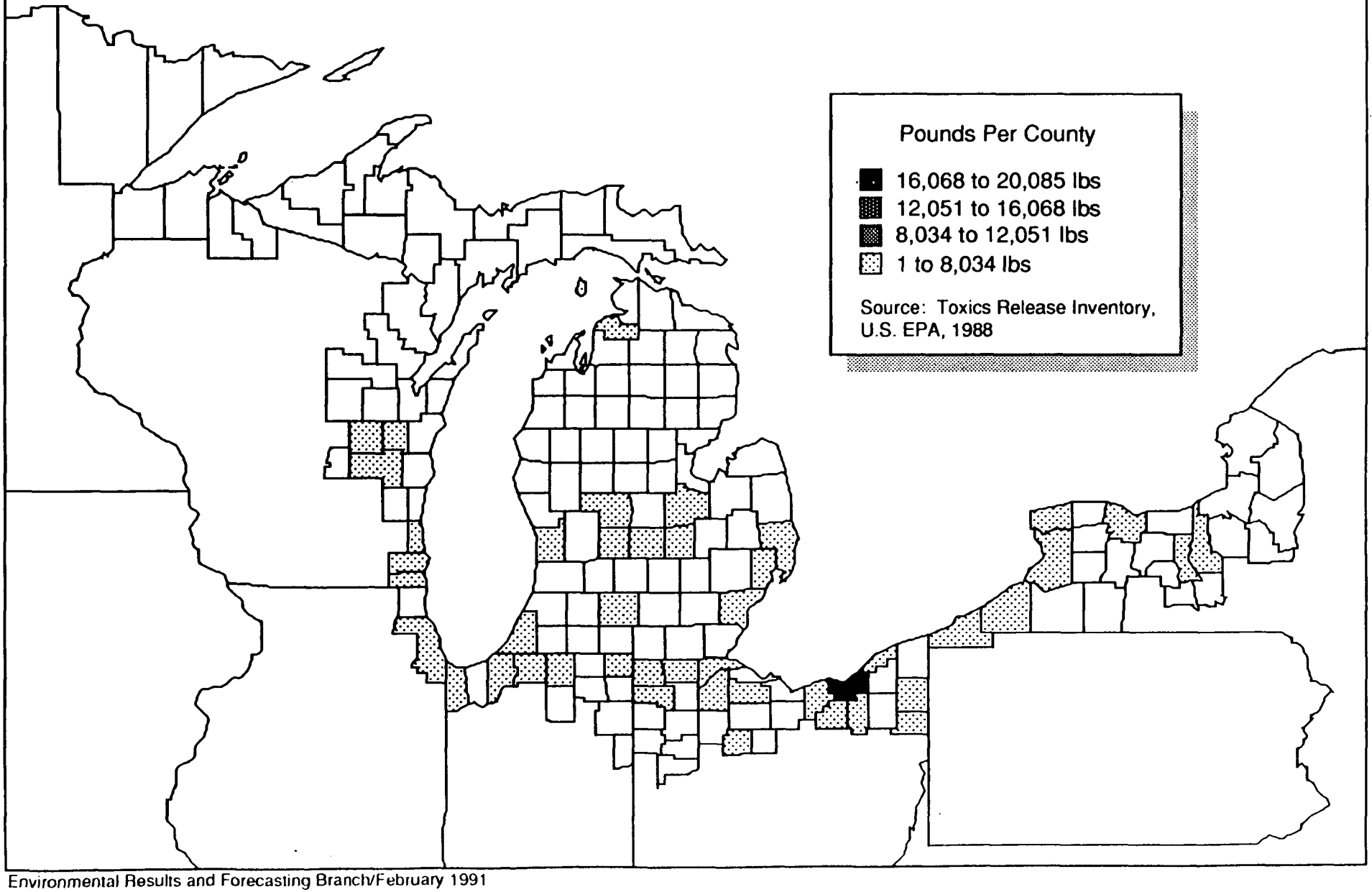
Regional County Quartiles, in thousands of pounds

Environmental Results and Forecasting Branch/February 1991

Lead Strategy

Lead Stack Air

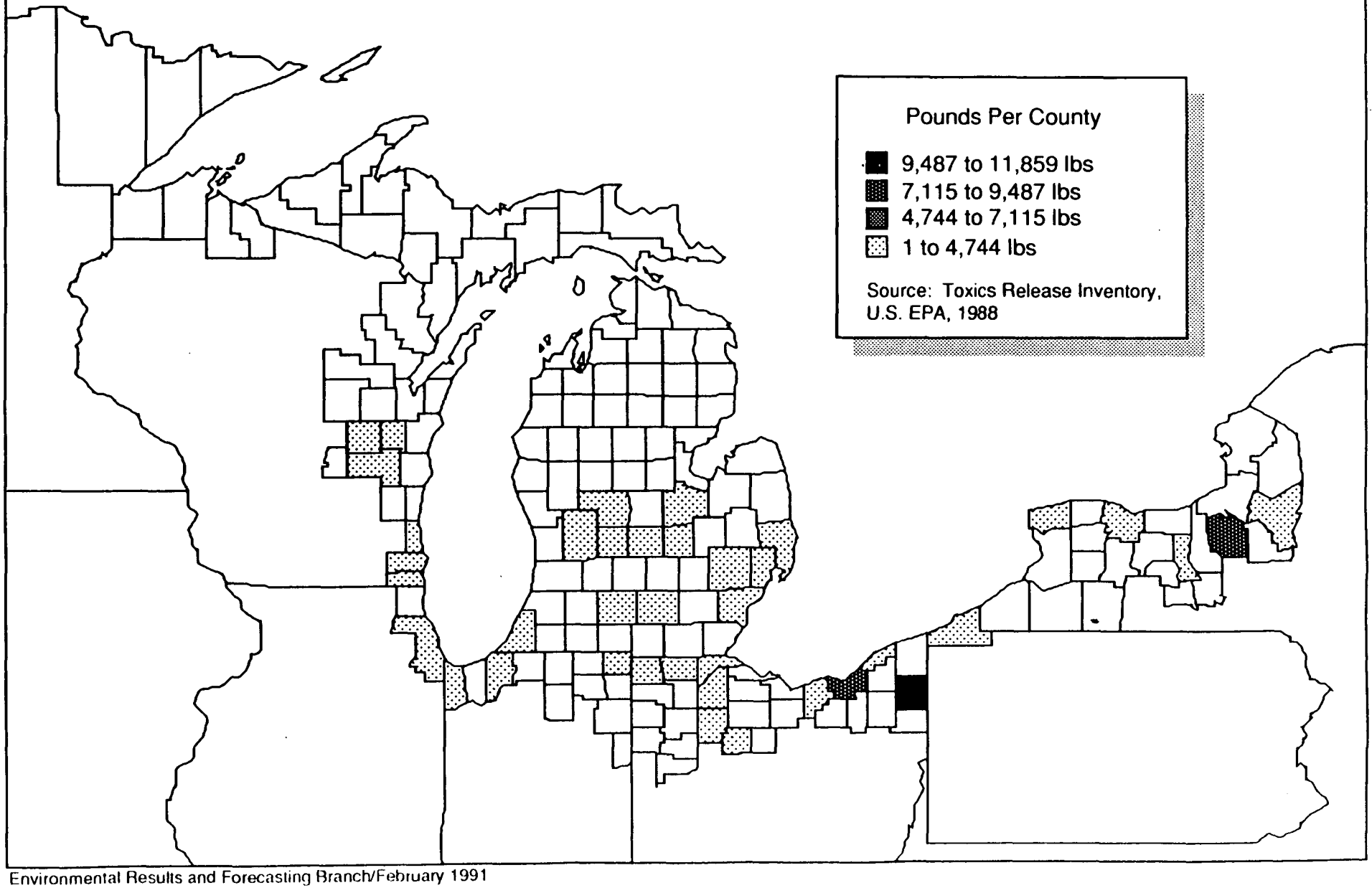
Lead Stack Air emissions reported to TRI for 176 counities in the Great Lakes Watershed.
Total Releases From All Counities equals **74,132** Lbs.



Environmental Results and Forecasting Branch/February 1991

Lead: Fugitive Air Releases

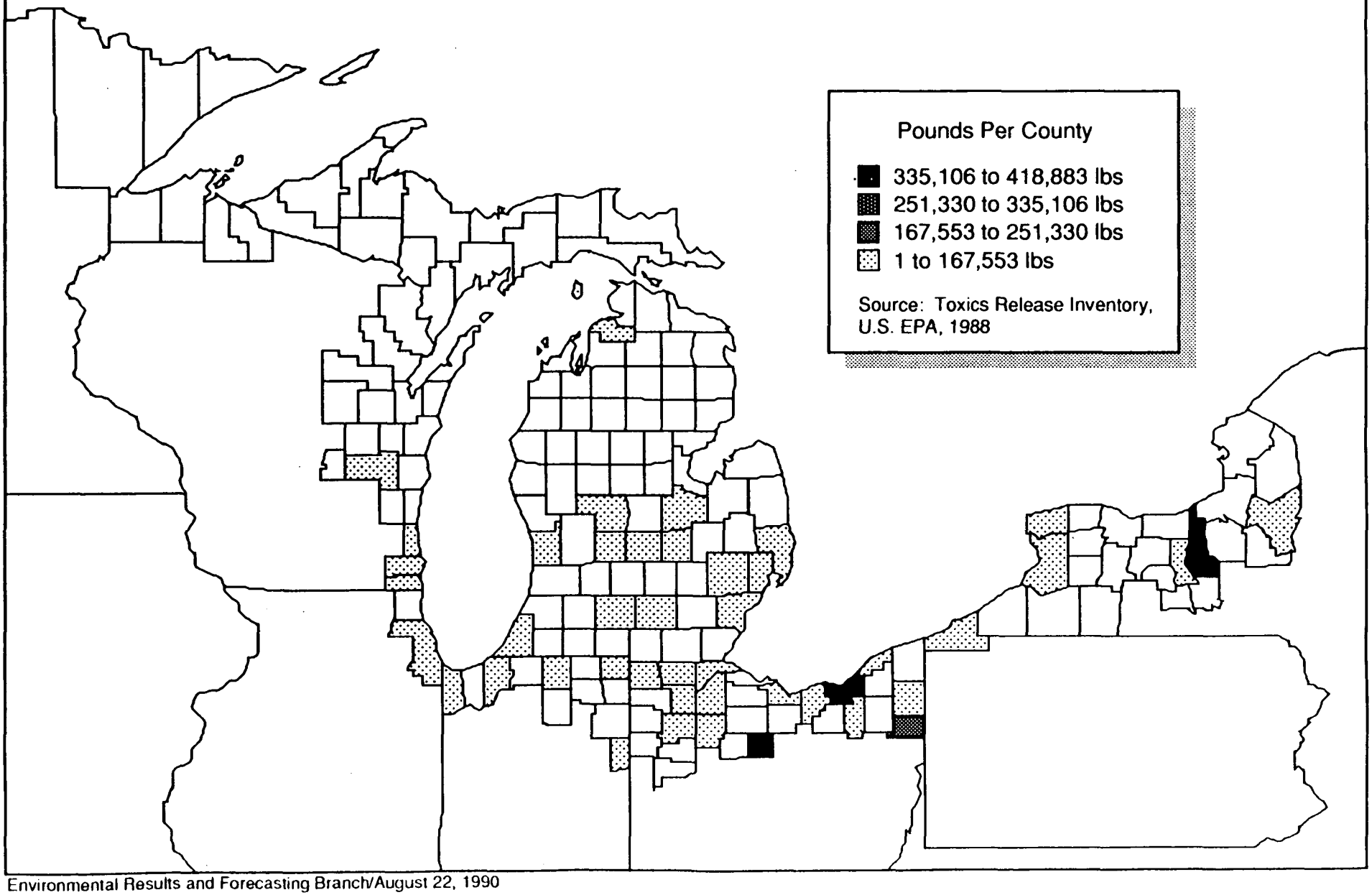
Lead Fugitive Air emissions reported to TRI for 176 counities in the Great Lakes Watershed.
Total Releases From All Counities equals **49,526** Lbs.



Environmental Results and Forecasting Branch/February 1991

Transfer of Lead for Off-site Treatment and Disposal

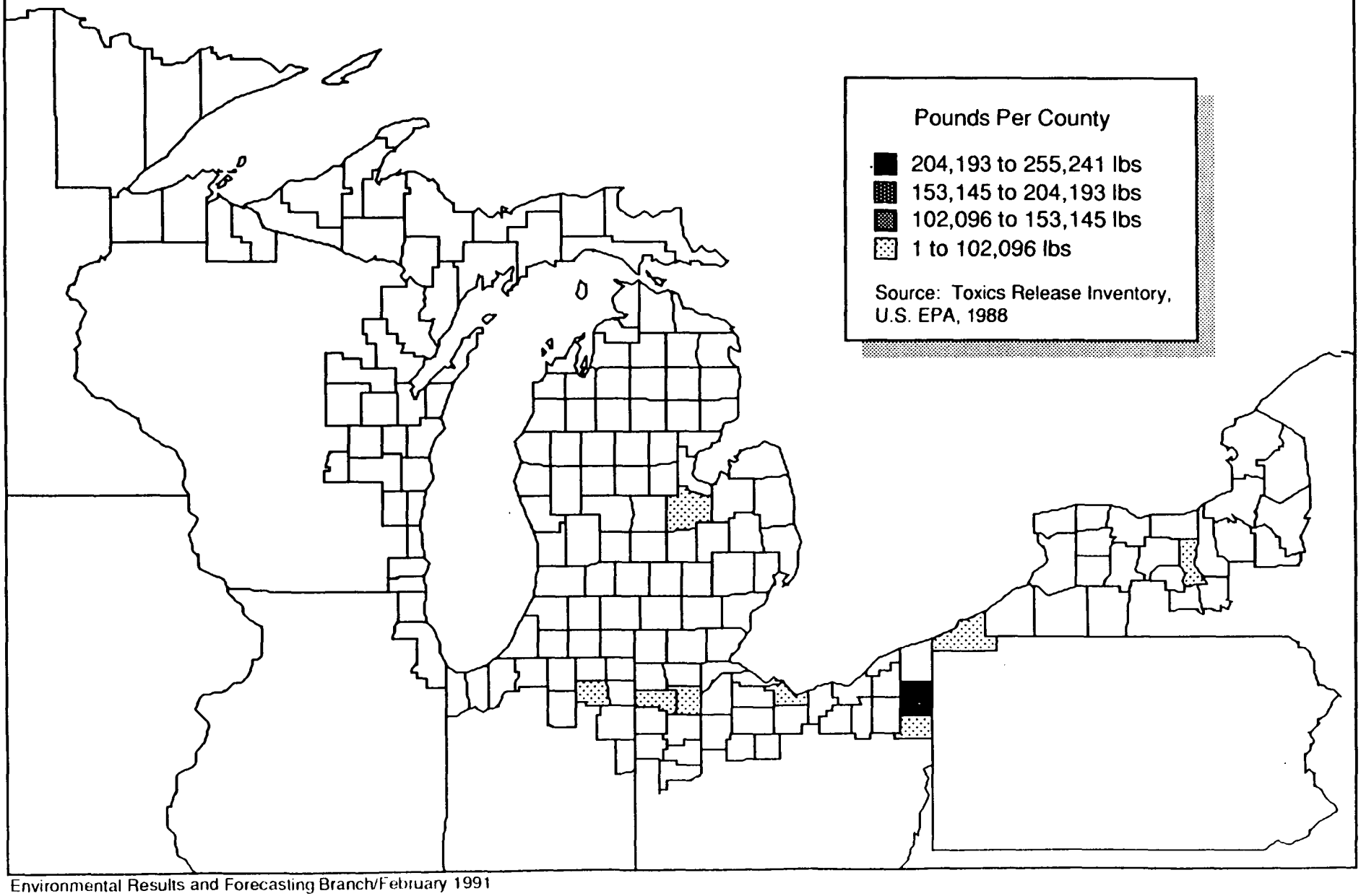
Transfer of lead for off-site treatment and disposal reported to TRI for 176 counities in the Great Lakes Watershed. Total Releases From All Counities equals **1,908,709** Lbs.



Environmental Results and Forecasting Branch/August 22, 1990

Lead: Land Disposal

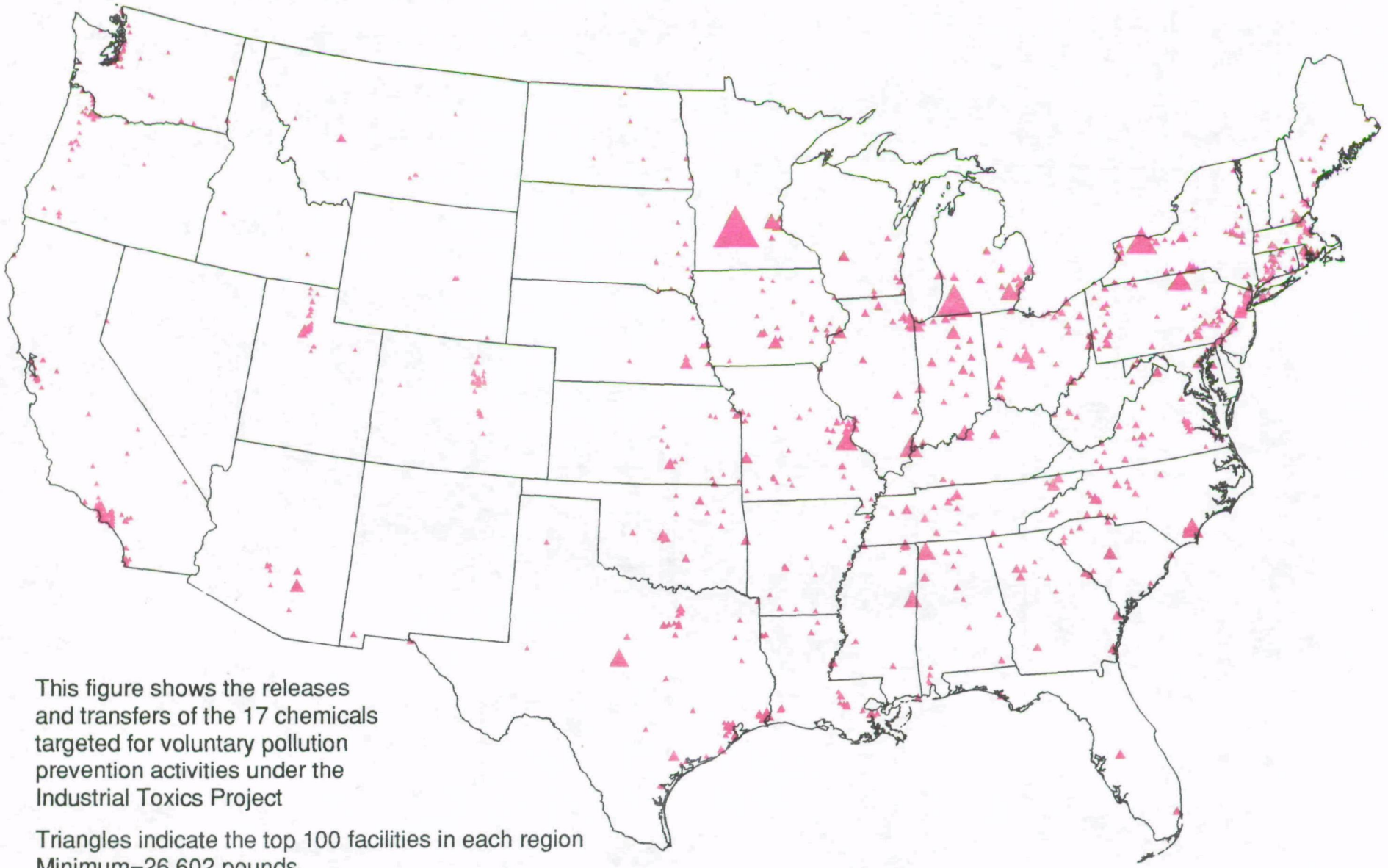
Lead land dispoal reported to TRI for 176 counities in the Great Lakes Watershed.
Total Releases From All Counities equals **367,098** Lbs.



Environmental Results and Forecasting Branch/February 1991

Pollution Prevention

Subset of OTS Toxics Release Inventory Data Relevant to Pollution Prevention Strategy



This figure shows the releases and transfers of the 17 chemicals targeted for voluntary pollution prevention activities under the Industrial Toxics Project

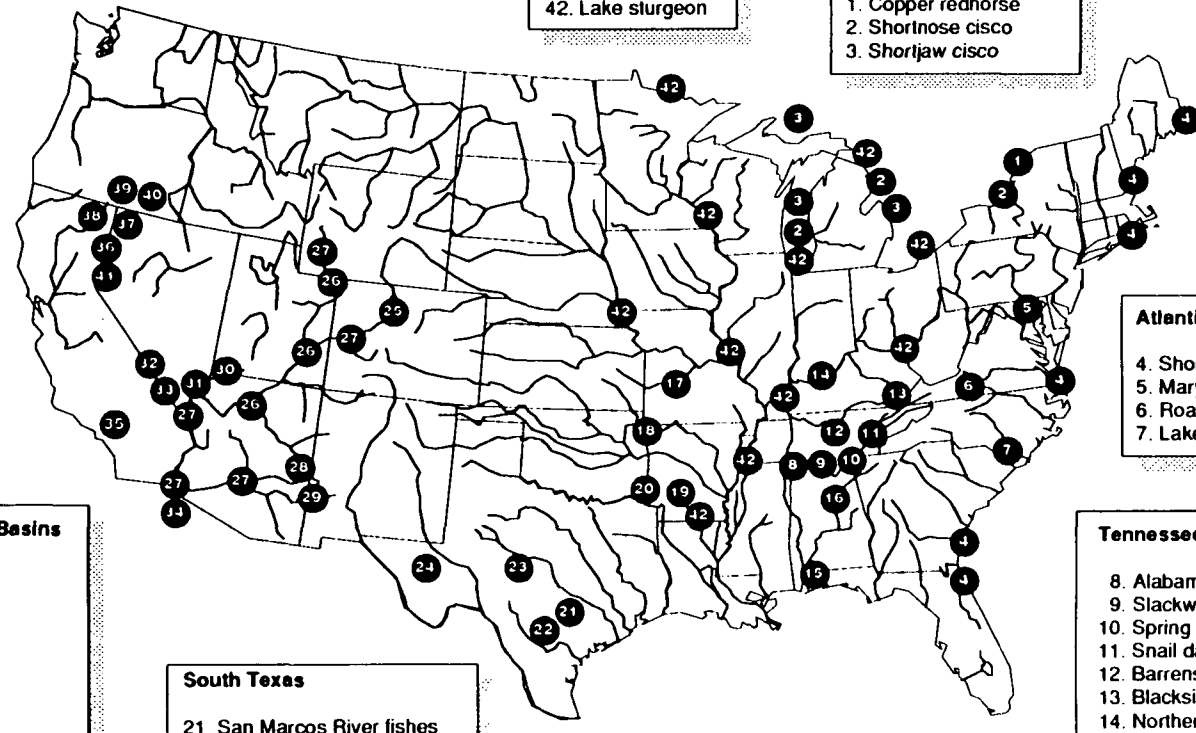
Triangles indicate the top 100 facilities in each region
Minimum=26,602 pounds
Maximum=16,320,413 pounds

Environmental Results and Forecasting Branch/February 1991

Biodiversity and Habitat

Endangered and Threatened Fish as of 1983

The 42 species of fish shown here were considered endangered or threatened by the American Fisheries Society (AFS) as of 1983. Since then the list has grown substantially, due to new data and actual increases in threats. Of the approximately 1,000 existing species,103 are currently listed by AFS as endangered, 114 as threatened to become endangered in the near future, and 147 are of special concern because minor disturbances to their habitat could place them in danger. Habitat destruction and modification is considered the most widespread threat to North American fish. Pollution, introduced species, overfishing, disease, and hybridization also contribute to extinction and population decline. Nearly 40 species and subspecies of freshwater fish in North America have become extinct in the past 100 years.



Widely Distributed

42. Lake sturgeon

Great Lakes and St. Lawrence River Basins

1. Copper redhorse
2. Shortnose cisco
3. Shortjaw cisco

Great Basin

36. Cui-ui
37. Desert dace
38. Modoc sucker
39. Warner sucker
40. Borax Lake chub
41. Lahontan cutthroat trout

Atlantic Coast and River Basins

4. Shortnose sturgeon
5. Maryland darter
6. Roanoke fishes
7. Lake Waccamaw fishes

Colorado River and Pacific Coastal Basins

25. Greenback cutthroat trout
26. Humpback chub
27. Bonytail chub, Colorado squawfish, razorback sucker
28. Apache trout
29. Gila trout
30. Woundfin
31. Moapa dace
32. Ash Meadows fishes
33. Pahrump killifish
34. Totoaba
35. Unarmored threespine stickleback

South Texas

21. San Marcos River fishes
22. Texas blindcats
23. Clear Creek gambusia
24. Comanche Springs pupfish

Tennessee and Ohio River Basins

8. Alabama Cavefish
9. Slackwater darter
10. Spring pygmy sunfish
11. Snail darter
12. Barrens topminnow
13. Blackside dace
14. Northern cavefish

Mississippi River Basins

17. Niangua darter
18. Ozark cavefish
19. Peppered shiner
20. Leopard darter

Tombidgbee and Alabama River Basins

15. Okaloosa darter
16. Watercress darter

Source: Ono, Williams, and Wagner, 1983. "Vanishing Fishes of North America. Washington, DC: Stone Wall Press.

Environmental Results and Forecasting Branch/February 1991

Declining Waterfowl in North America

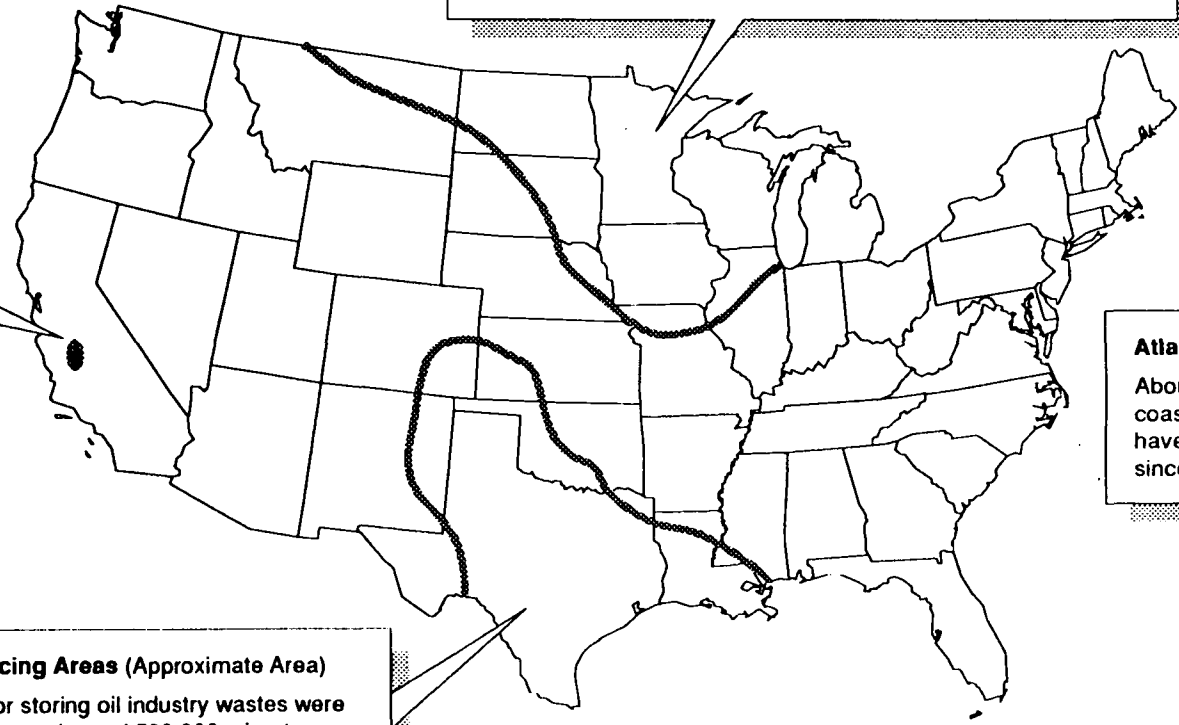
Certain waterfowl populations have declined steadily during the past three decades, due mostly to the loss of wetlands in the northern U. S. and Canada. The 1989 spring breeding population for ducks was 24% below the 30 year average. Acid rain has also harmed waterfowl by releasing naturally occuring metals into streams and lakes that can bioaccumulate in aquatic food chains. Overcrowding from habitat loss increases the spread of disease. Outbreaks of avian botulism in western North America have killed tens of thousands of waterfowl in a few months.

Prarie Potholes (Approximate Area)

Agricultural filling and drought caused the loss of 40% of the prarie potholes during the 1980's, resulting in extreme crowding and increased disease. Waterfowl breeding habitat has decreased by 90% in Iowa and 50% in North Dakota.

Kesterton Wildlife Refuge

Irrigation is leaching naturally occuring selenium from the soil, causing severe reproductive affects. Wetlands have decreased throughout the Central Valley during the drought of the past five years as water has been diverted for irrigation.



Atlantic Flyway

About 50% of the coastal wetlands have been destroyed since the early 1950's.

Southwest Oil Producing Areas (Approximate Area)

Pits and ponds used for storing oil industry wastes were responsible for killing an estimated 500,000 migratory waterfowl in 1989 alone. Flying birds are attracted to uncovered oil pits, mistaking them for fresh water.

Lower Mississippi Valley

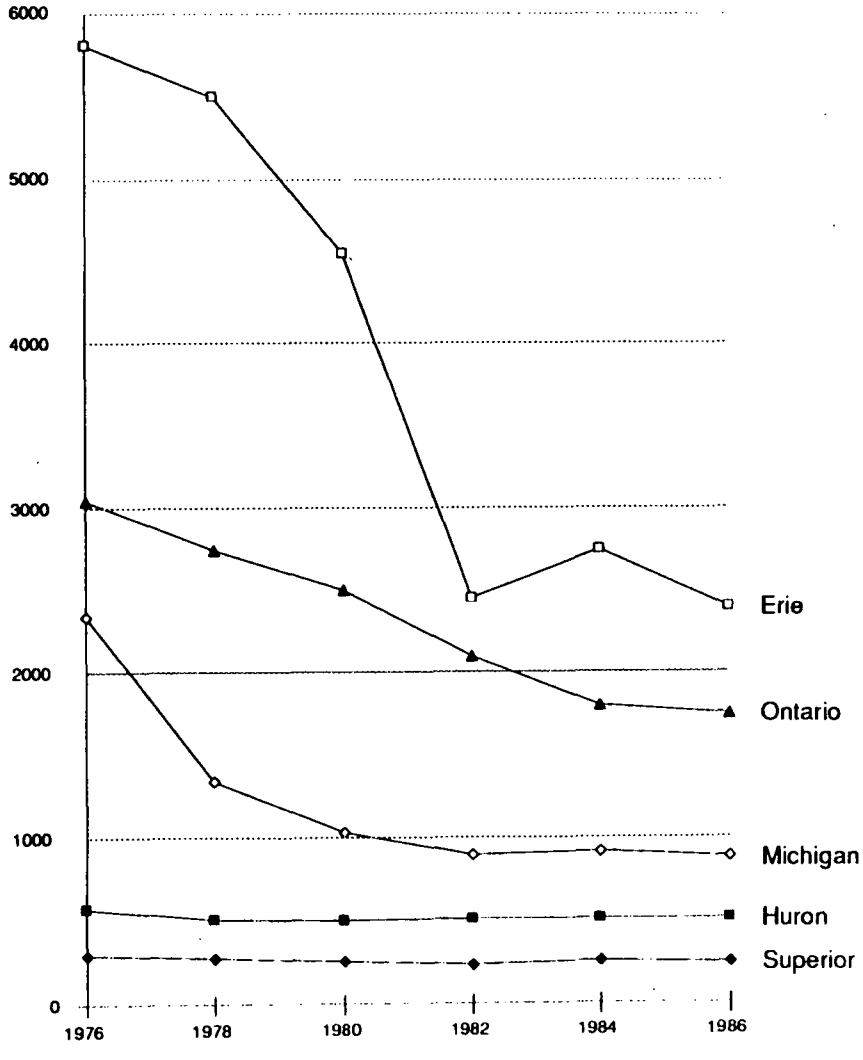
200,000 to 300,000 acres of bottomland hardwood wetlands have been cleared each year since the late 1930's.

Source: Multiple sources compiled by the Environmental Results and Forecasting Branch and published in "Identification of Biological Indicators of Environmental Quality," 1991

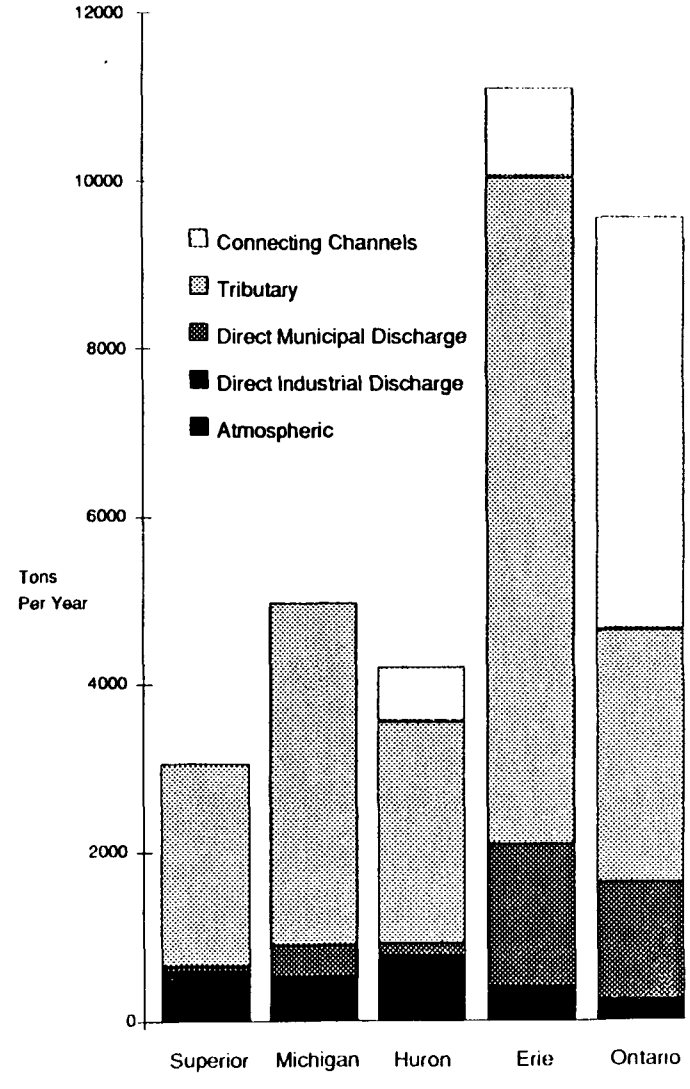
Great Lakes

Municipal Phosphorus Loadings To the Great Lakes Have Decreased

Municipal Phosphorus Loadings To the Great Lakes 1976 - 1986



1986 Estimated Phosphorus Loads To The Great Lakes From Major Source Categories



Source: U.S.EPA, Great Lakes National Program Office