United States
Environmental Protection
Agency

Office of Water
Washington DC 20460

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EPA

National Water Quality Inventory

1988 Report to Congress

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This report was prepared pursuant to Section 305(b) of the Clean Water Act, which states:
"(b)(1) Each State shall prepare and submit to the Administrator by April 1, 1975, and shall bring up to date by April 1, 1976, and biennially thereafter, a report which shall include—

"(A) a description of the water quality of all navigable waters in such State during the preceding year, with appropriate supplemental descriptions as shall be required to take into account seasonal, tidal, and other variations, correlated with the quality of water required by the objective of this Act (as identified by the Administrator pursuant to criteria published under section 304(a) of this Act) and the water quality described in subparagraph (B) of this paragraph;

"(B) an analysis of the extent to which all navigable waters of such State provide for the protection and propagation of a balanced population of shellfish, fish, and wildlife, and allow recreational activities in and on the water;

"(C) an analysis of the extent to which the elimination of the discharge of pollutants and a level of water quality which provides for the protection and propagation of a balanced population of shellfish, fish, and wildlife and allows recreational activities in and on the water, have been or will be achieved by the requirements of this Act, together with recommendations as to additional action necessary to achieve such objectives and for what waters such additional action is necessary;

"(D) an estimate of (i) the environmental impact, (ii) the economic and social costs necessary to achieve the objective of this Act in such State, (iii) the economic and social benefits of such achievement; and (iv) an estimate of the date of such achievement; and

"(E) a description of the nature and extent of nonpoint souces of pollutants, and recommendations as to the programs which must be undertaken to control each category of such sources, including an estimate of the costs of implementing such programs.

"(2) The Administrator shall transimit such State reports, together with an analysis thereof, to Congress on or before October 1, 1975, and October 1, 1976, and biennially thereafter."

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United States
Environmental Protection
Agency

Office of
Public Affairs (A-107)
Washington DC 20460

EPA Environmental News

EPA RELEASES 1988 NATIONAL WATER QUALITY INVENTORY

May 9, 1990

Sean McElheny (202)-382-4387

Many water quality problems in the United States have been reduced as a result of pollution control programs, but serious problems remain, EPA told Congress in a recent report. The Agency said that non-point source pollution (e.g., runoff from agricultural lands and urban streets), toxic pollutants, groundwater contamination and wetland losses are among the important remaining problems affecting the nation's waters.

The report notes that the United States has substantially cleaned up many waterways once severely polluted. About three-fourths of all surface waters assessed by the states fully meet their water quality standards and the beneficial uses for which they are designated, such as fishing, swimming and drinking.

More than $50 billion has been spent in the last 20 years by the federal government to upgrade and construct municipal sewage treatment plants. The report notes that 87 percent of all municipal sewage treatment plants and 93 percent of major industrial facilities met federal and state water pollution control requirements. The result has been a marked decline in pollution from "point sources," such as sewers and industrial discharge pipes. Pollutants from point sources include metals, bacteria and oxygen-demanding organic materials.

The leading water quality problems now stem from non-point source pollution, according to information developed by the states. Non-point source pollution comes from urban and suburban stormwater runoff and from activities such as farming, grazing, construction, forestry, stream channelization and mining. Non-point pollutants include soil, nutrients, toxics and pesticides. Some non-point source pollution may be on the rise and some may have been made more evident through improved monitoring capabilities and the decrease in point-source pollution.

(more)

The report, entitled "National Water Quality Inventory: 1988 Report to Congress," is the seventh in a series of biennial inventories submitted to Congress since 1975. It is based on water quality analyses provided by 55 states, territories and jurisdictions on their rivers, lakes, estuaries, coastal waters, wetlands and groundwater. The 1988 report is derived from data collected in 1986 and 1987.

RIVERS, LAKES AND ESTUARIES

The states assessed about 30 percent of river miles, 40 percent of lake acres and 76 percent of estuary square miles for the 1988 inventory, a substantial increase over the 1986 inventory. Some information was also provided on the status of the Great Lakes.

States determine to what extent their assessed rivers, lakes and estuaries support the designated beneficial use(s) of fishing, swimming and drinking. Assessed waterways are grouped into one of three categories: fully supporting designated beneficial use(s), partially supporting or non-supporting. Partially supporting and non-supporting waterways are considered impaired. States list pollutants and sources of use impairment. (See attached chart for the above information on rivers, lakes and estuaries.)

The most commonly reported pollutants affecting impaired waters include nutrients, soil, pathogens and oxygen-demanding materials. Nutrients affect half of impaired lake acres and impaired estuarine square miles and 27 percent of impaired river miles. Siltation affects 42 percent of impaired river miles and 25 percent of impaired lake acres. Pathogens affect 48 percent of impaired estuarine square miles and 19 percent of impaired river miles. Oxygen-demanding materials affect 29 percent of impaired estuarine square miles and 25 percent of impaired lake acres.

Nutrients, such as nitrates in fertilizers and phosphates in detergents, can deplete a waterbody's oxygen supply through the overstimulation of plant and algal growth. Soil from fields, urban areas and construction sites can smother aquatic habitats and impair fish respiration and plant productivity. Pathogens are disease-causing bacteria or viruses from untreated sewage. Decomposing, organic, oxygen-demanding materials also deplete oxygen in waterways.

The states reported that agricultural runoff accounted for over half of the pollution in rivers and lakes and that municipal discharges were a leading cause of estuarine pollution.

Nearly 3,800 coastal shoreline miles, 20 percent of the

nation's coastline, were also assessed in 1988. Designated beneficial uses were supported by 89 percent of assessed coastline miles. The report also showed that only 8 percent of the assessed shoreline miles of the Great Lakes supported designated beneficial uses.

WETLANDS

Water quality reports on wetlands are sparse. EPA and the states currently are working to improve standards and analyses affecting wetlands.

Wetlands are lost at the rate of 458,000 acres per year. EPA estimates that over half of the country's original wetlands have been lost. Residential and commercial land development is the most often cited cause of wetland loss reported by the states; other causes include agricultural and resource extraction activities. Some states have enacted legislation effective in protecting wetlands and halting their destruction and degradation.

Wetlands are marshes, swamps, bogs and similar areas that are often saturated by water. Once considered wastelands to be drained or filled, wetlands now are recognized as extremely productive ecosystems. Wetlands provide multiple benefits such as flood control, pollution filtration, coastal storm protection, commercial fish production, waterfowl habitat and recreational opportunities.

GROUNDWATER

The states identified several major threats to groundwater quality such as underground storage tanks, septic systems, agricultural activities, municipal landfills, surface impoundments and abandoned hazardous waste sites. Contaminants of concern include nitrates, pesticides, volatile organic compounds, petroleum products, metals and brine.

Groundwater is a vital natural resource that is used for drinking water by more than half of the nation's population and for irrigation, industrial use and livestock watering. In rural areas, the vast majority of the population relies on groundwater for domestic water uses.

PUBLIC HEALTH AND AQUATIC LIFE CONCERNS

States also reported pollution's effects on public health and aquatic life including fish kills, beach closures and fish contamination.

Nearly 1,000 pollution-caused fish kills, totalling roughly

36 million fish, were reported by 37 states. Leading causes were oil, gas, pesticides, ammonia, chlorine and oxygen-demanding materials from sources such as agriculture, spills and municipal and industrial discharges.

Over 200 beach closures were reported by 31 states. Most were of short duration and resulted from pathogens such as fecal coliform bacteria from sewage, urban runoff and spills.

The states reported that, in general, toxic substances affect less water area than other types of pollution such as siltation and nutrients. Where they occur, however, toxic substances can cause or contribute to locally severe public health and aquatic life effects.

States provided specific information on toxic substances in their rivers, lakes, wetlands, estuaries and coastal waters; in the bottom sediment of these waters and in fish and shellfish. Elevated levels of toxics were reported in one-third of monitored river miles, lake acres and coastal waters. About a fourth of monitored estuarine waters and 90 percent of Great Lakes shoreline miles were reported as having elevated toxic levels.

Forty-seven states and territories reported a total of 586 fishing advisories and 135 fishing bans. PCBs, chlordane, mercury, dioxin and DDT were the most commonly cited causes. Industrial discharges and land disposal were the most common sources of such contamination. Thirty-five states reported 533 incidents of sediment contamination by toxics.

PROGRESS

The 1988 National Water Quality Report to Congress shows that the nation's water pollution control programs have achieved significant results. In 1972, 85 million people were served by secondary sewage treatment facilities; today, 144 million are served by such facilities. EPA reports that the vast majority of municipal and industrial facilities are in compliance with their discharge permit limits.

A variety of local, state and federal activities have led to progress in addressing non-point source pollution. The states are developing and implementing numerous groundwater protection programs. States are also implementing control programs for waterways impaired by toxic and non-point source pollution.

Reporters interested in a copy of the report should call Sean McElheny, EPA Press Office, (202)-382-4387. Others can obtain the report by writing to: Alice Mayio, Office of Water (WH-553), U.S. EPA, 401 M St. S.W., Washington, D.C. 20460.

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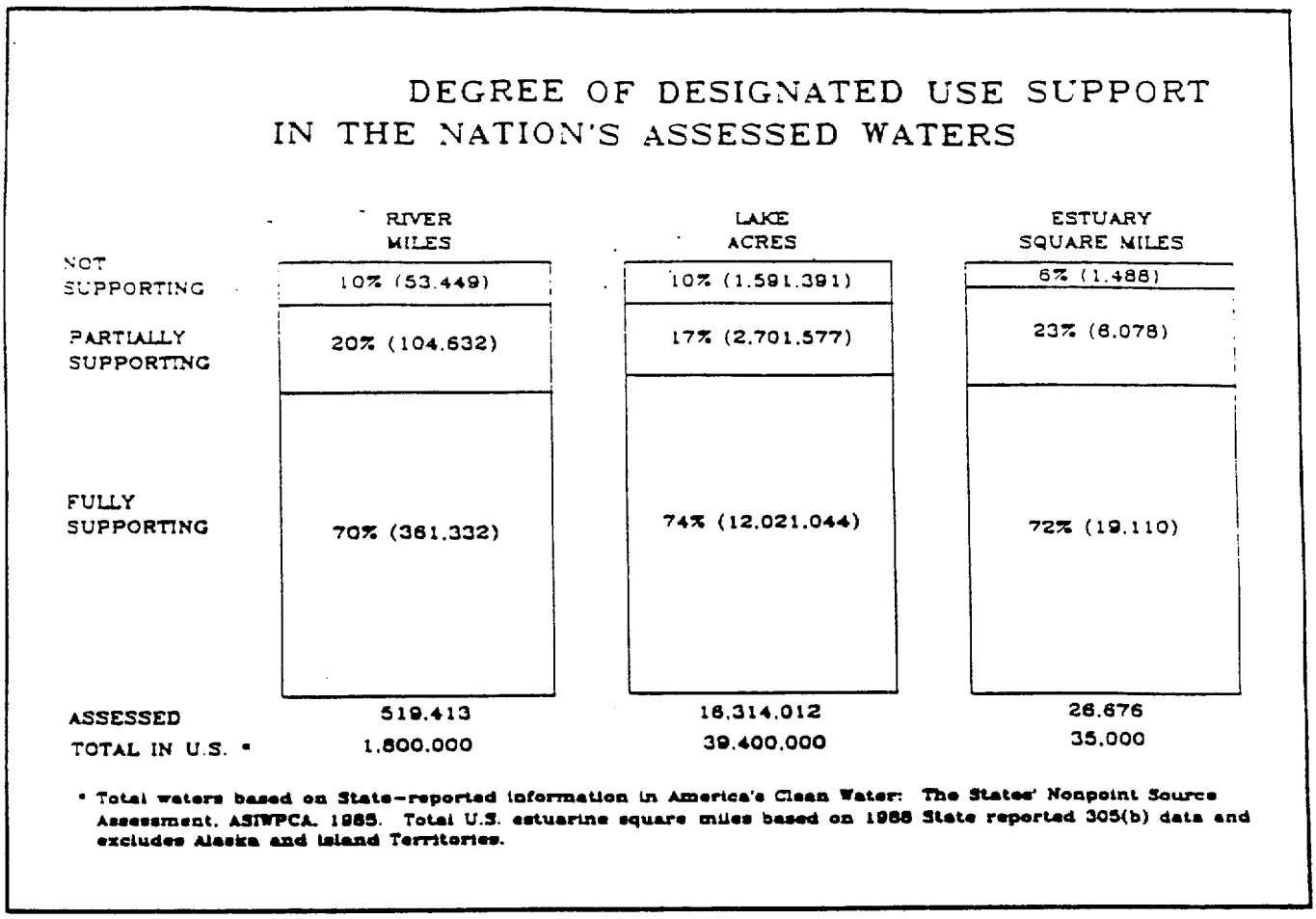

SUMMARY OF CAUSES AND SOURCES OF POLLUTION, BY WATERBODY TYPE

Waterbody Type	Leading Causes of Impairment*	Leading Sources of Impairment*
Rivers	Siltation Nutrients Pathogens Organic enrichment	Agriculture Municipal discharges Resource extraction Habitat modification
Lakes	Nutrients Siltation Organic enrichment Salinity	Agriculture Habitat modification Storm sewers/runoff Land disposal
Estuaries	Nutrients Pathogens Organic enrichment Oil and grease	Municipal discharges Resource extraction Storm sewers/runoff Land disposal

*Four leading causes and sources are listed; determined by total size affected.

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
WASHINGTON, D.C. 20460

THE ADMINISTRATOR

Dear Mr. President:
Dear Mr. Speaker:

As required by Section 305(b) of the Federal Water Pollution Control Act, I am transmitting to the Congress the 1988 National Water Quality Inventory Report. This report is the seventh in a series of national water-quality assessments published since 1975. It is based primarily on reports submitted by the States in 1988; in some cases, State-reported information has been supplemented by data developed by the U.S. Environmental Protection Agency (EPA). Although EPA has analyzed and summarized the water quality information in the State reports, the views and recommendations presented are those of individual States, not those of EPA or the Administration. The individual 1988 State reports are being transmitted to the Congress in their entirety.

The message presented by the States in these reports is that many point source-related surface water-quality problems, such as bacteria and oxygen-demanding materials discharged by sewage treatment plants, appear to be diminishing as a result of pollution control programs. At the same time, the pollution problems that are most difficult to assess and control—e.g., sedimentation, nutrient enrichment, polluted runoff from farmlands, and toxic contamination of fish tissue and sediments—are becoming more evident.

About 30 percent of U.S. river miles, 40 percent of lake acres, and 70 percent of estuarine square miles were assessed by the States in 1988, a significant increase over previous years. Of these assessed waters, most are supporting the uses for which they have been designated by the States. These uses, such as drinking water supply, swimming, and the propagation of aquatic life, were found to be supported in 70 percent of assessed river miles, 74 percent of assessed lake acres, and 72 percent of assessed estuarine square miles.

A variety of pollution problems remain in the Nation's waters. The leading causes of pollution cited by the States in impaired rivers and lakes are siltation and nutrients; in impaired estuarine waters, nutrients and fecal coliform bacteria are most commonly cited. Agricultural activities are the most extensively reported source of pollution in rivers and lakes, and municipal discharges are cited as the leading source of pollution in estuaries. Wetland loss is also a significant problem reported by the States. Land development for residential or commercial uses is cited as the leading cause of loss of wetland acreage.

Major threats to ground-water quality, as reported by the States, include underground storage tanks, septic systems, agricultural activities, municipal landfills, surface impoundments, and abandoned hazardous waste sites. Nitrates, pesticides, volatile organic compounds, petroleum products, metals, and brine are cited as the leading contaminants of concern in ground water.

Nevertheless, as this report shows, the Nation's water pollution control programs have achieved significant results. Expenditures to construct and upgrade sewage treatment facilities have substantially increased the population served by higher levels of treatment. Municipal and industrial facilities are at a high rate of compliance with the conditions of their permit limits. A variety of State and Federal programs have led to progress in reducing the impacts of diffuse sources of pollution such as agricultural runoff. The States are engaged in a number of ground-water protection activities such as development of wellhead protection programs and ground-water mapping.

In addition, under the impetus provided by the Water Quality Act of 1987, the States have identified specific waters with impairments due to toxic contaminants and diffuse sources of pollution. EPA and the States are beginning to develop and implement control programs for these waters. In future editions of this report, EPA will be reporting on the progress achieved by these programs.

EPA is continuing to work with the States to improve the consistency and comprehensiveness of the Section 305(b) reporting process. A computerized data system has been developed to better manage State water-quality assessments and facilitate State reporting. EPA is developing guidance for the States to help them build effective, forward-looking monitoring programs. Future reports in this series should reflect these improvements.

Sincerely,

William K. Reilly

William K. Reilly

Honorable J. Danforth Quayle
President of the Senate
Washington, DC 20510

Honorable Thomas Foley
Speaker of the House of Representatives
Washington, DC 20515

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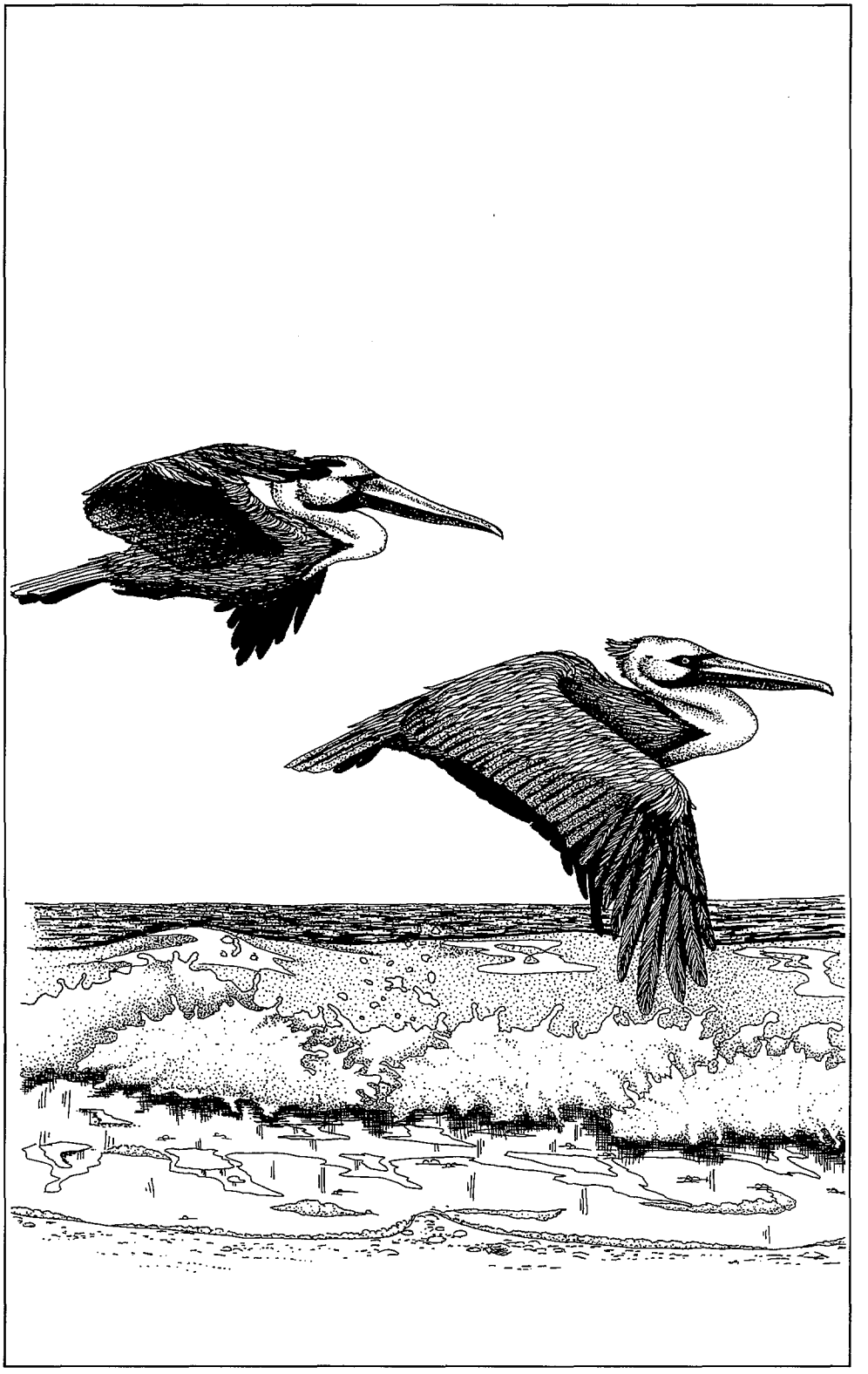
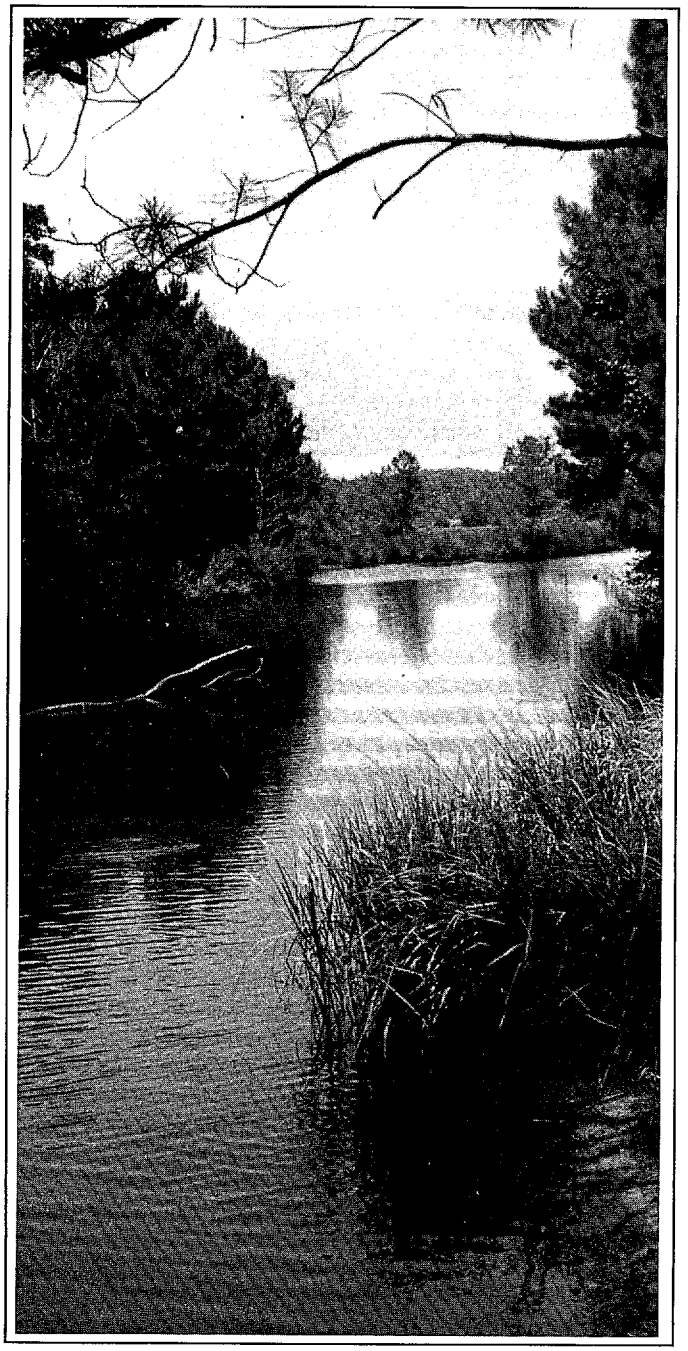


Introduction



NC Dept. of Environment, Health, and Natural Resources

Executive Summary

The State Section 305(b) reports have become increasingly comprehensive water quality assessments. More and more information is becoming available on waters that were previously unassessed; on the specific causes of impairment and sources of pollution; on public health and aquatic life impacts such as fishing advisories; on ground-water conditions; and on efforts under way to evaluate and address water quality problems.

However, in reviewing the information presented, the reader should keep in mind that not all waterbodies have been assessed. Because governmental monitoring efforts tend to focus on problem areas, it is likely that unassessed waters are not as polluted as assessed waters. Many States are just beginning to study nonpoint source impacts that may affect areas that have been thought to have good water quality. The reader should also keep in mind that this 1988 report summarizes water quality data collected by the States in 1986 and 1987.

The information presented in this report reveals that many point source-related surface water quality problems—for example, conventional pollutants such as bacteria and oxygen-demanding materials discharged by sewage treatment plants—appear to be diminishing as a result of pollution control programs. On the other hand, problems that are harder to assess and control, such as sedimentation, nutrient enrichment, runoff from farmlands, and toxic contamination of fish tissue and sediments, are becoming more evident. Some of these problems may be on the rise. Others may just be more evident as point sources

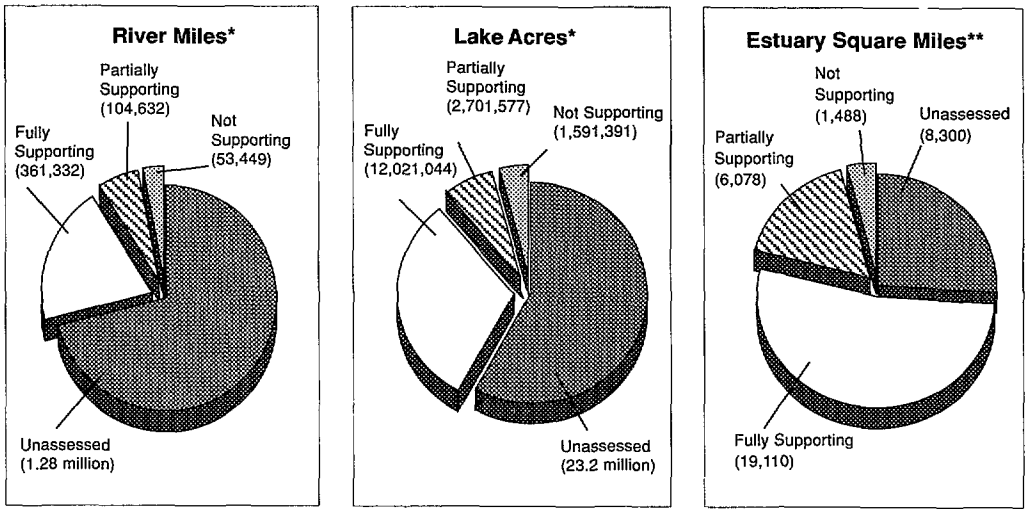
come under control and as we develop improved monitoring capabilities to identify them. To some extent, it is certainly true that the more we look, the more we find.

What Do the States Report on the Quality of Their Rivers?

Nearly 520,000 river miles were assessed by 48 States, Territories, and jurisdictions in 1988. This reflects 29 percent of the total river miles in the U.S., or 45 percent of the total river miles in the States that reported. This is an increase of nearly 150,000 miles over the number of river miles assessed in 1986. States used chemical/biological monitoring and other types of data such as surveys of fisheries biologists, predictive water quality models, and information from citizens to assess their waters.

The States designate their waterbodies for beneficial uses (such as drinking water supply, contact recreation, and warm and cold water fisheries) as part of their EPA-approved water quality standards. Among the States that reported on support of these beneficial uses, a combined total of about 360,000 river miles were found to support beneficial uses, or 70 percent of the river miles assessed in these States (see Figure ES-1). Including unassessed waters, it might alternatively be stated that 31 percent of the *total* river miles in these States were known to support uses, 14 percent were known to be impaired, and the remaining 55 percent were not assessed. These numbers should be interpreted with care and should not be compared to those of previous reporting cycles, as wide variations exist among States in methods used to determine support of beneficial uses.

The most extensive causes of impairment in the Nation's rivers are siltation (affecting 42 percent of impaired river miles), nutrients (affecting 27 percent), fecal coliform bacteria (affecting 19 percent), and organic enrichment/low dissolved oxygen (affecting 15 percent). Agricultural runoff is by far the most extensive source of pollution, affecting 55 percent of impaired river miles. Other sources include municipal discharges (affecting 16 percent of impaired waters), resource extraction and hydrological habitat modification (each affecting 13 percent), and storm sewers/runoff (affecting 9 percent) (see Table ES-1).



Source: 1988 State Section 305(b) reports.

*Total water based on State-reported information in America's Clean Water; The States' Nonpoint Source Assessment, ASIWPCA, 1985.
**Total US estuary square miles based on 1988 State-reported 305(b) data and excludes Alaska and Island Territories.

Figure ES-1. Degree of Designated Use Support in the Nation's Assessed Waters

What Do the States Report on the Quality of Their Lakes?

About 16 million lake acres (excluding the Great Lakes) were assessed by 40 States, Territories, and jurisdictions in 1988. This reflects 41 percent of the total lake acres in the U.S., or 73 percent of the total lake acres in the States reporting. This is an increase of about 3.8 million lake acres over the number assessed in 1986.

Among the States that reported on support of designated beneficial uses, a combined total of about 12 million lake acres were found to support those uses, or 74 percent of the assessed lake acres in those States (see Figure ES-1). Including unassessed waters, it might alternatively be stated that about 53 percent of the total lake acres in those States are known to support uses, 19 percent are known to be impaired, and the remaining 28 percent were not assessed.

The most extensive causes of use impairment in lakes are nutrients (affecting 49 percent of impaired acres), siltation (affecting 25 percent), and organic enrichment/low dissolved oxygen (also affecting 25 percent) (see Table ES-1). Nutrients such as phosphorus and nitrogen are the main cause of cultural eutrophication—a major alteration of lake ecology characterized by the excessive growth of aquatic weeds and algae. The States reported that about a third of all lakes assessed for trophic status are classified as eutrophic. The most extensive sources of pollution in lakes are agriculture (affecting 58 percent of impaired lake acres), hydrologic/habitat modification (affecting 33 percent), storm sewers/runoff (affecting 28 percent), land disposal (affecting 26 percent), and municipal discharges (affecting 15 percent) (see Table ES-1).

About 4,500 Great Lakes shoreline miles were assessed by six of the eight Great Lakes States in 1988. This reflects 87 percent of the total Great Lakes shoreline miles in the U.S. and all the shoreline miles in these six States. This is the first time sufficient use support information has been available for the Great Lakes. A combined total of about 370 Great Lakes shoreline miles were found to support designated beneficial uses, only 8 percent of assessed shoreline miles. This low rate of use support is attributed largely to fish consumption restrictions in place throughout nearshore waters of the lakes. The most extensive causes of nonsupport are synthetic organic chemicals, metals, and nutrients.

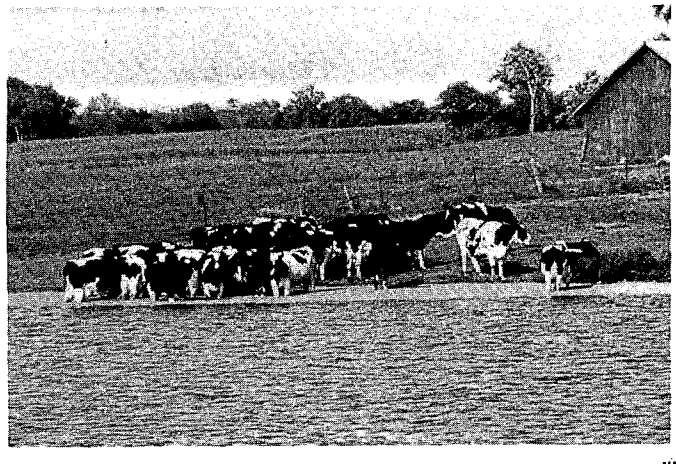
Table ES-1. Leading Causes and Sources of Impairment

Type of Waterbody	Leading Causes*	Leading Sources*
Rivers	Siltation Nutrients	Agriculture Municipal Discharges
Lakes	Nutrients Siltation	Agriculture Hydro/Habitat Mod.
Estuaries	Nutrients Pathogens	Municipal Discharges Resource Extraction

*Determined by size affected.

Source: 1988 State Section 305(b) reports.

Agricultural activities are the most extensive sources of pollution in lakes.



What Do States Report on the Quality of Their Estuaries and Coastal Waters?

About 26,700 square miles of estuaries were assessed by 23 States, Territories, and jurisdictions in 1988. This reflects about 76 percent of the estuarine area assessed in these States. Roughly 9,000 more estuarine square miles were assessed in 1988 than in 1986.

Among the States that reported on support of designated beneficial uses, a combined total of about 19,000 square miles were found to support uses, or 72 percent of estuarine square miles assessed in those States (see Figure ES-1). Including unassessed waters, it might alternatively be stated that 54 percent of *total* estuarine square miles in these States are known to meet designated uses, 21 percent are known to be impaired, and the remaining 25 percent were not assessed.

The most extensive causes of use impairment in estuaries are nutrients and pathogens (affecting 50 and 48 percent of impaired square miles, respectively) and organic enrichment/low dissolved oxygen (affecting 29 percent). The most extensive sources of pollution in estuaries, as cited by the States, are municipal discharges (affecting 53 percent of impaired estuarine square miles), resource extraction (affecting 34 percent), and storm sewers/runoff (affecting 28 percent) (see Table ES-1).

Coastal shoreline water quality is reported separately from estuarine water quality. Nearly 3,800 coastal shoreline miles were assessed by 12 States and Territories in 1988. This reflects only about 20 percent of the Nation's 19,200 miles of ocean coastline, and 73 percent of the coastline miles in these States. The 1988 reporting cycle is the first time sufficient use support information has been available for the Nation's coastal shoreline. Among the States that reported on support of beneficial uses, a combined total of about 3,300 miles were found to fully support uses, or 89 percent of coastline miles assessed in these States.

Steve Delaney

Baltimore's Inner Harbor.

What Do the States Report on the Status of Their Wetlands?

State reporting on their status in 1988 was sparse and uneven. Roughly one-quarter of the States and Territories provided information on wetland acreage, causes of loss, wetland legislation, and State programs. Furthermore, even where information was provided, it was often incomplete. States generally did not report on wetland quality (i.e., support of designated uses).

This incompleteness can be attributed to the complexity and expense of wetland monitoring, the lack of a complete data base on wetland acreage, the lack of State water quality standards for wetlands, and insufficient EPA guidance on wetland reporting. Future State 305(b) reporting on wetlands should be improved as activity increases in all these areas.

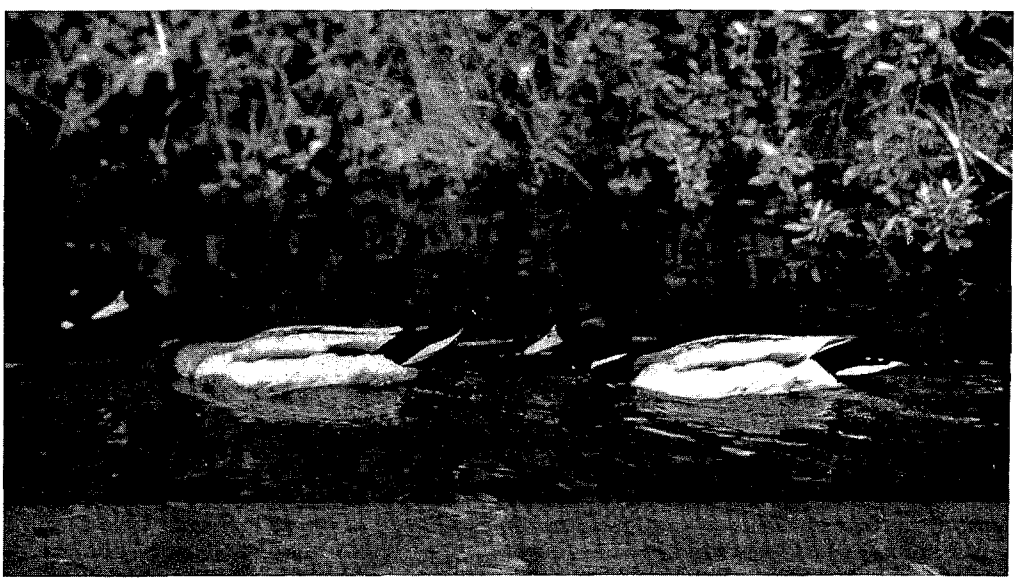
By far the most often cited cause of wetland loss reported by the States is land development for residential or commercial purposes. Second-home development and urban encroachment are commonly cited. Other reported causes include agricultural and resource extraction activities; agriculture is reported as a major historical cause of wetland loss but appears to be a lesser current threat.

A variety of State wetland protection legislation and programs are discussed by the States. In many cases, these State efforts appear to be effective in protecting wetlands and halting their destruction and degradation.

What Public Health/Aquatic Life Impacts Are Reported by the States?

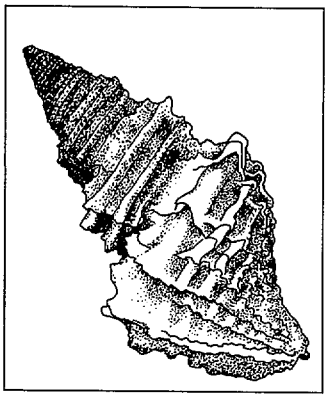
In general, the information reported by the States shows that toxic substances are somewhat less prevalent, in terms of areal extent, than other types of pollution problems such as siltation and nutrients. However, where they occur, toxic substances can cause or contribute to locally severe public health and aquatic life impacts.

Our understanding of the prevalence of toxic substances, exposure routes, and levels of concern is limited by the difficulty and expense of monitoring and conducting long-term health effect studies. Nevertheless, we have gained considerable experience over the last decade in monitoring for



Al Peoples

Wetlands provide many benefits including food and habitat for fish and wildlife.



toxic substances and in targeting monitoring to areas most likely to be contaminated. In 1988, the number of States providing data on toxic substances in their waters increased substantially compared to previous reporting cycles.

States provided specific information on toxic substances in their rivers, lakes, wetlands, estuaries, and coastal waters; in the bottom sediments of these waters; and in the tissue of fish and shellfish. Toxics-related impacts such as fish consumption advisories and other public health or aquatic life impacts (such as fish kills and beach closures) were also discussed by the States.

Where States monitored for toxic substances (usually a subset of waters most likely to have problems with toxics), they were asked to report on the extent to which elevated levels were found. These elevated levels are defined as exceedances of State water quality standards; criteria developed by EPA under Section 304(a) of the Clean Water Act; Water Quality Advisories developed by EPA; or "levels of State concern" where numeric criteria do not exist. The States reported elevated levels of toxics in one-third of monitored river miles, lake acres, and coastal waters. About a fourth of monitored estuarine waters and 90 percent of Great Lakes shoreline miles were reported as having elevated levels of toxics.

Forty-seven States and Territories reported on fishing advisories and bans; 586 fishing advisories and 135 bans were identified. PCBs, chlordane, mercury, dioxin, and DDT were the most commonly cited causes; industrial discharges and land disposal were the most common sources of contamination leading to fishing restrictions.

Sediment contamination by toxics was discussed by 37 States. Five hundred thirty-three incidents were reported, primarily caused by heavy metals, PCBs, and pesticides.

Nearly a thousand pollution-caused fish kills were reported by 35 States, with roughly 36 million fish killed. Biochemical oxygen demanding substances/low levels of dissolved oxygen, oil and gas, pesticides, temperature changes, ammonia, and chlorine were leading causes cited by the States. Commonly cited sources include agriculture, spills, and municipal and industrial discharges.

Information on the closure of swimming areas due to pollution is limited in the State reports. Over 200 beach closure incidents were reported, most of short-term duration and attributed to pathogen indicators such as fecal coliform bacteria from sewage treatment plants, combined sewer overflows, urban runoff, and spills.

Chesapeake Bay Foundation

What Do the States Report on Ground-Water Quality?

Ground water is a vital natural resource that is withdrawn for drinking water, irrigation, industrial use, and livestock watering. In many parts of the United States, ground water is the only reliable source of water. As result of a growing awareness of the important nature of this resource and its vulnerability, many States and Territories are developing and expanding legislation, regulations, and programs to protect ground water. Ground-water protection is especially important because of the difficulty and expense involved in cleaning up contaminated aquifers, providing alternative water supplies, or adding treatment to public water systems.

Many States and Territories are engaging in studies to better understand the quality of their ground water, identify and map their ground-water resources, identify potential sources of contamination, and determine the vulnerability of the resources to pollution. Many States have also begun developing more innovative approaches to ground-water protection, such as Wellhead Protection (WHP) Programs.

Over half of the States and Territories classified underground storage tanks, septic systems, agricultural activities, municipal landfills, surface impoundments, and abandoned hazardous waste sites as major threats to ground-water quality. With very minor differences, these are the same sources of concern reported in the 1986 State Section 305(b)reports. More than half of the States and Territories identified nitrates, pesticides, volatile organic compounds, petroleum products, metals, and brine as contaminants of concern (see Table ES-2). Other contaminants reported include bacteria, solvents, acids, and tanning wastes. These findings generally parallel the findings of the 1986 reports except for a reduction in the number of States reporting ground-water impacts from sewage.

What Is the Status of Ground-Water Protection Programs?

The States and Territories are currently engaged in a number of ground-water protection activities to address identified contaminants and their sources. At least 49 States and Territories have developed or are in the

Table ES-2. Leading Sources and Contaminants Affecting Ground Water

Leading Sources of Ground-Water Contamination	Leading Ground-Water Contaminants of Concern
• Underground Storage Tanks • Septic Systems	• Nitrates • Pesticides
• Agricultural Activities • Municipal Landfills	• Volatile Organic Compounds • Petroleum Products
• Surface Impoundments • Abandoned Hazardous Waste Sites	• Metals • Brine

Source: 1988 State Section 305(b) reports.

NC Solid Waste Management Division

process of developing Ground-Water Protection Strategies. Many of these State Strategies have also been accompanied by changes in State laws or regulations to bolster ground-water protection activities. At least 31 States have adopted specific ground-water protection legislation. Other States rely on generic water or public health statutes. This legislation has led to the promulgation of regulations, which, in many States, stipulate controls for the management of specific sources of contamination and standards for ground-water quality protection. Sources of ground-water contamination have historically been regulated by many different agencies within the States. Coordinating the activities of these agencies to ensure an effective ground-water protection program is a priority in at least 12 States.

Since the reauthorization of the Safe Drinking Water Act in 1986, many State and local governments have been actively moving to develop and implement WHP Programs. Section 1428 of the Safe Drinking Water Act specifies that each State must prepare a WHP Program and submit it to EPA by June 19, 1989. Many of the States and local governments are already conducting specific WHP activities. Twenty-seven States submitted WHP programs by the deadline, and additional States are pursuing other wellhead protection initiatives.

Over 40 States and Territories report active programs to classify their ground waters and to map vulnerable sources of ground-water supply. Many of the State classification programs have been designed to support the application of ground-water quality standards.

In recent years, the Federal Government has joined the States in their efforts to protect the Nation's ground water through programs mandated by the Clean Water Act, the Safe Drinking Water Act, the Resource Conservation and Recovery Act, the Comprehensive Environmental Response, Compensation, and Liability Act, and the Federal Insecticide, Fungicide, and Rodenticide Act. In 1984, EPA developed a Ground-Water Protection Strategy that provides an approach to integrating source-specific control and cleanup programs into a comprehensive policy and institutional framework for protecting the resource from unacceptable levels of contamination. EPA is also working to strengthen ground-water data management through activities such as developing a minimum set of data elements for ground water, thus facilitating entry and retrieval of ground-water data.

NC Solid Waste Management Division

Abandoned hazardous waste sites are among the many threats to ground-water quality.

Are the Nation's Surface Water Pollution Control Programs Working?

The Clean Water Act (CWA) of 1972 provided the basic framework for Federal and State programs to regulate point and nonpoint sources of pollution. Although revised by amendments in 1977, 1981, and 1987, the basic framework embodied in the original Act continues to guide the Nation's water pollution control programs.

Point sources of pollution are regulated through permits issued by either EPA or the States. These permits contain limits on the amount and types of pollutants that may be discharged.

To control pollution from municipal dischargers, the CWA authorized EPA to provide grants and loans to the States. Expenditures under the construction grants program have produced significant gains for wastewater treatment. In 1972, 85 million people were served by secondary treatment or better; today, treatment facilities serving 144 million people have secondary or more advanced levels of treatment. According to EPA data, 87 percent of the Nation's municipal sewage treatment plants were in compliance with existing permit limits as of July 1, 1988. The States provide a number of examples of water quality improvements resulting from municipal construction and upgrading.

The Water Quality Act of 1987 includes a number of provisions to further improve municipal wastewater treatment. For example, control strategies must be developed for plants contributing to toxic problems in surface waters; EPA is directed to develop numerical limits for toxic pollutants of concern in sludge, the residual material from the wastewater treatment process; timetables were established for EPA to develop permits for storm water management; and a State Revolving Fund program was developed as a new financing mechanism for wastewater treatment.

In the early 1980s, significant backlogs of unissued permits for industrial dischargers had an adverse effect on water quality in the United States. EPA data reveal that efforts to remedy these backlogs have been largely successful; a 13 percent backlog currently exists for major sources. The data also show that industrial permittees have achieved a higher rate of compliance than municipal permittees: 93 percent of major industrial facilities were meeting their permit limits as of December 1988, compared to 87 percent of major municipal facilities.

Nonpoint sources of pollution are primarily addressed through programs at the State and local levels of government. Nonpoint source (NPS) management activities focus primarily on pollution prevention, as opposed to restoration. Approaches range from land use management to the implementation of structural and cultural practices designed to reduce the environmental impacts of human activities. Examples

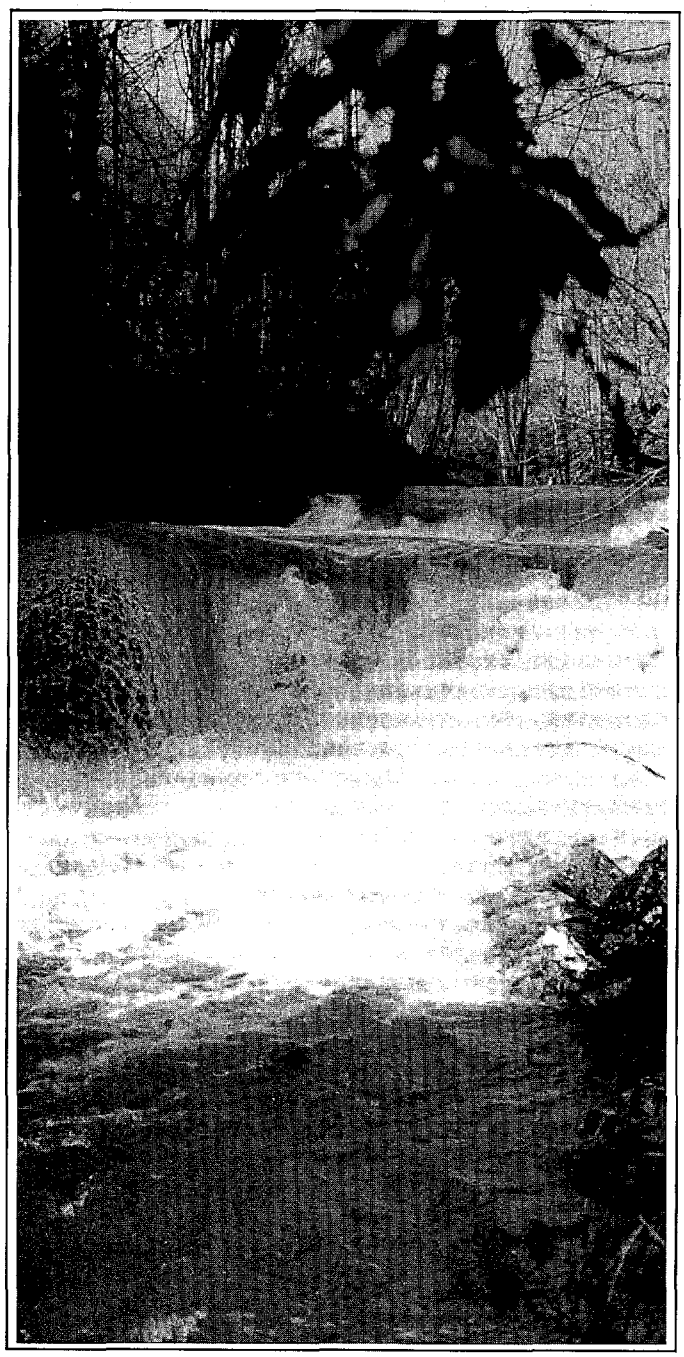
Mike McCarthy

of NPS management activities include preserving wetlands; managing nutrients and pesticides on farms; creating wet detention basins in urban areas; controlling stream acidification caused by abandoned coal mines; protecting salmonid fisheries from sediment entering streams from logging areas; and protecting and reestablishing riparian habitats. These activities may be imposed through regulatory or voluntary programs and are generally developed and applied on a site-specific basis.

Section 319 of the Water Quality Act of 1987 included provisions for the assessment and management of nonpoint sources. In its second NPS report to Congress entitled *A Report to The Congress: Activities and Programs Implemented Under Section 319 of the Clean Water Act—Fiscal Year 1988*, EPA reports that a variety of State and Federal activities have led to progress in reducing the impacts of NPS in specific waters. At the same time, several States have identified constraints affecting the implementation of NPS programs.

In January 1989, EPA completed a National NPS Agenda that will serve as the framework for the Agency NPS program over the next 5 years. The goal of the Agenda is to protect and restore the quality of U.S. waters through strong National leadership and by helping State and local governments overcome barriers to the successful implementation of NPS measures.

EPA has also initiated an NPS Agenda Task Force to explore new and creative approaches to achieving the goal of the Agenda. Likely approaches include raising public awareness of NPS; providing States and local governments with information on NPS solutions and incentives for their implementation; and developing water quality criteria and monitoring protocols specifically designed to assess NPS problems and evaluate NPS control activities.



West Virginia Dept. of Natural Resources

Introduction

Background

The Federal Water Pollution Control Act (commonly known as the Clean Water Act or CWA) has been the primary regulatory force protecting the Nation's water resources. A number of other statutes—for example, the Safe Drinking Water Act, the Marine and Estuarine Protection Act, and the Resource Conservation and Recovery Act—also directly address water quality issues. The objective of the Clean Water Act is to "restore and maintain the chemical, physical, and biological integrity of the Nation's waters." An interim goal established to achieve this objective is that "wherever attainable . . . water quality which provides for the protection and propagation of fish, shellfish, and wildlife and provides for recreation in and on the water be achieved by July 1, 1983."

In response to the Act, in the early 1970s the Federal government and the States developed new water pollution control programs and strengthened existing efforts to deal with the myriad sources adversely affecting water quality. The problems were daunting: industries and municipalities were discharging inadequately treated or raw wastes into rivers, lakes, and estuaries; the disposal of hazardous materials in landfills and dumpsites occurred without regulation or control; and little or no consideration was given to methods to control surface runoff of pesticides, fertilizers, and sediments.

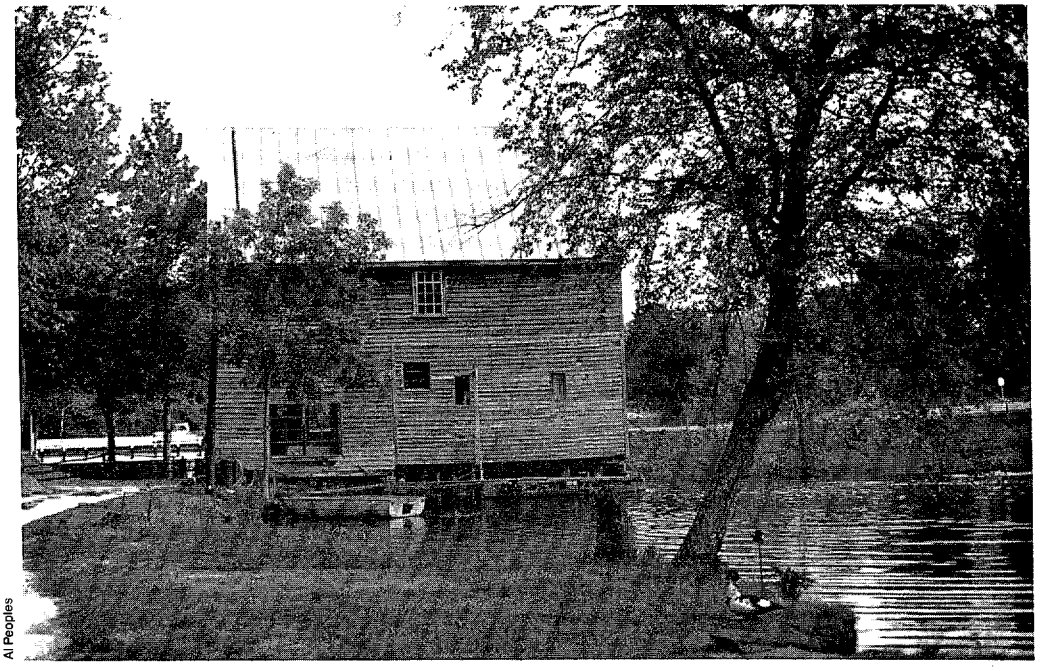
Significant progress was achieved under the CWA in the 1970s and 1980s in cleaning up the most pressing and obvious pollution problems. Industries and municipal sewage treatment plants were brought under regulation and achieved increasingly more stringent levels of control. State water pollution abatement and assessment programs grew more comprehensive. Yet along with the rising sophistication of these efforts came the realization that some problems were not being adequately addressed. Among these problems were sources of pollution that were difficult to identify and manage, such as runoff from agricultural lands and city streets; toxic contaminants for which methods of detection and control were highly expensive; and degradation of waters such as lakes, estuaries, and wetlands, which, because of their characteristics and uses, required unique approaches to pollution control.

Amendments to the Clean Water Act, passed in 1987, sought to address these problems. Among other things, the amendments require identification of specific degraded waters, development of strategies to control pollution in those waters, and application of additional resources to impaired estuaries and lakes. First-stage results of these new initiatives are included in this report.

Methodology

Section 305(b) of the Clean Water Act requires States to report to EPA on the extent to which their surface waters are meeting the goals of the Act and to recommend how the goals can be achieved. EPA, in turn, is to analyze these reports and transmit them and this national report to Congress. This report summarizes the States' 1988 reports, which contain data collected in 1986-1987.

A number of variables are involved in defining water quality, collecting monitoring data, and compiling and reporting on that information. EPA seeks to establish consistency among these variables by preparing guidelines for States' use in reporting water quality information. For example, these guidelines promote the use of a consistent measure of water quality based on the degree to which a waterbody is in compliance with the State water quality standards established for that waterbody. State water quality standards consist of the water quality objective, expressed as the "beneficial use," and numeric and narrative "criteria" designed to ensure maintenance of the beneficial use. EPA's Section 305(b) reporting guidelines require that States report on water quality in terms of the degree that beneficial uses are supported. Degree of use support is divided into four categories: fully supporting, fully supporting but threatened, partially supporting, and not supporting uses. Limited criteria for defining these categories have been developed, but States have considerable discretion in determining exactly how decisions about the degree of use support are made. Thus, the data reported by the States should be considered to represent State judgments about water quality.



Al Peoples

Another method of defining water quality, as mentioned above, is by determining progress toward the goals of the CWA—that waters be of fishable and swimmable quality. EPA guidelines encourage reporting on this measure and seek to establish baseline definitions of fishability and swimmability.

Ideally, the State assessments should contain two types of water quality information: waterbody—specific and summary. This dual approach allows the State reports to serve various functions. The identification of specific problem areas and pollutants increases the usefulness of the reports in determining State management needs and pollution control priorities; summary data permit a "big picture" of State and national water quality to be drawn. In general, it is the State summary information that has been extracted and analyzed for this 1988 *National Water Quality Inventory*. In future 305(b) reporting cycles, considerably more emphasis will be placed on waterbody-specific information that will be managed using a computerized data system.

Some of the major data elements that were used in this report include the following:

- Total sizes of assessed waterbodies (in river miles, lake acres, estuarine square miles, coastal and Great Lake shoreline miles) per State that are fully, partially, or not supporting designated beneficial uses, and those that are threatened;

- Major causes of use impairment (i.e., pollutants or processes such as siltation causing degradation);

- Sources of pollution in those waters not fully supporting their uses; and

- Number of waters adversely affected by toxic pollutants.

Although many States have provided most or all of the summary data requested in the guidelines, others have not done so. For example, out of the 53 States, Territories, and jurisdictions that submitted water quality assessments in 1988 in time for their inclusion in this report:

- 48 provided information that could be used to derive the overall degree of designated use support for 519,412 stream miles, or 45 percent of the stream miles in these States;

- 40 provided information on designated use support for 16,313,962 acres of lakes and reservoirs, 73 percent of lake acres in these States;

- 23 out of 27 coastal States provided information on designated use support for 26,628 square miles of estuaries, 76 percent of the estuaries in these States;

- 15 States provided information on their existing wetland acreage and State wetland programs (no States assessed the quality of their wetlands);

- 38 reported on causes of nonsupport in impaired rivers, 33 reported on causes in impaired lakes, and 16 reported on causes in impaired estuarine waters;

- 37 reported usable information on sources of pollution in impaired rivers, 28 reported on sources in impaired lakes, and 14 reported on sources in impaired estuaries;

- 12 States reported on the extent of their wetland resources and the factors affecting those resources, 10 reported on their wetland protection programs; and

Ed Lui USEPA

The goal of the Clean Water Act is that the waters of the U.S. be fishable and swimmable.

■ 35 provided data on the total number of river miles affected by toxics; 28 reported on the number of lake acres affected by toxics, and 13 reported on the number of estuarine square miles affected by toxics.

However, despite incomplete reporting, the continuing effort to improve and better manage water quality data is succeeding. In 1988, the States provided more data on many topics of concern than in previous years. The number of waters assessed by the States has risen significantly. Current State and EPA initiatives to further improve water monitoring and reporting include implementing a computerized water quality data system to manage State information on the causes, sources, and magnitude of degradation in individual waterbodies, and developing more cost-effective monitoring techniques. EPA is also in the process of examining EPA and State monitoring efforts as part of planned revisions to program guidance for monitoring.

Nevertheless, the absence of data for some States limits EPA's ability to analyze the data over time and creates gaps in our understanding of water quality conditions nationwide. Another obstacle arises because of inconsistencies among States in how these data were generated. These inconsistencies are themselves the result of different State approaches to monitoring, different pollution problems and program needs, and the lack of generally accepted assessment methodologies.

For example, as mentioned previously, the standard measure for evaluating water quality is the degree to which designated uses are supported in a given waterbody. Determining the degree of use support involves a considerable amount of judgment, particularly for the aquatic life uses. It also may involve going beyond examination of the specific chemical criteria contained in State water quality standards. Such criteria are designed to support the use but are often incomplete compared to the range of potential pollutants and phenomena that adversely affect water quality and, ultimately, the degree of use support.

A wide degree of variation is evident among States in the number of river miles, lake acres, and estuarine square miles assessed for designated use support (see Table 1). Some States provided rather low estimates of their total number of waters; therefore, their percentages of total waters

NC NRCD

The number of waters assessed by the States has risen significantly.

Table 1. Percentage of Waters Assessed for Rivers, Lakes, and Estuaries*

State	Rivers		Lakes		Estuaries	
	Total Miles	Percent Assessed	Total Acres	Percent Assessed	Total Sq. Miles	Percent Assessed
Alabama	40,600	28	504,336	97	625	8
Arizona	6,671	34	—	—	NA	NA
Arkansas	11,508	36	—	—	NA	NA
California	26,970	37	1,417,540	76	1,598	69
Colorado	14,655	68	265,982	47	NA	NA
Connecticut	8,400	10	82,900	26	601	100
Delaware	500	93	—	—	—	—
Delaware River Basin	206	100	—	—	866	100
District of Columbia	36	72	377	36	6	100
Florida	12,659	63	2,085,120	45	4,298	62
Georgia	20,000	100	417,730	100	594	100
Hawaii	349	100	—	—	134	100
Illinois	14,080	92	247,188	74	NA	NA
Indiana	90,000	6	104,540	100	NA	NA
Iowa	18,300	45	81,400	99	NA	NA
Kansas	19,791	35	175,189	99	NA	NA
Kentucky	18,465	47	228,385	94	NA	NA
Louisiana	14,180	60	713,719	73	7,656	64
Maine	31,672	100	994,560	100	1,633	100
Maryland	9,300	100	17,448	100	1,981	100
Massachusetts	10,704	15	—	—	171	100
Michigan	36,350	100	840,960	50	NA	NA
Minnesota	91,944	5	3,411,200	42	NA	NA
Mississippi	15,623	100	500,000	100	133	100
Missouri	19,630	100	288,012	100	NA	NA
Montana	20,532	95	756,450	88	NA	NA
Nebraska	10,212	56	145,300	59	NA	NA
New Hampshire	14,544	9	151,000	99	27	63
New Jersey	—	—	—	—	420	62
New Mexico	3,500	33	126,500	95	NA	NA
New York	70,000	100	750,000	100	1,564	100
North Carolina	37,378	89	305,367	100	3,200	100
North Dakota	11,284	87	625,503	99	NA	NA
Ohio	43,917	16	117,323	77	NA	NA
Ohio River Valley	981	100	—	—	NA	NA
Oklahoma	19,791	47	—	—	NA	NA
Oregon	90,000	31	610,808	83	—	—
Pennsylvania	50,000	26	—	—	NA	NA
Puerto Rico	5,373	100	11,146	100	—	—
Rhode Island	724	80	16,520	97	192	100
South Carolina	9,900	38	525,000	78	2,155	29
South Dakota	9,937	38	1,598,285	41	NA	NA
Tennessee	19,124	49	538,657	100	NA	NA
Texas	80,000	17	1,410,240	100	1,990	100
Vermont	5,162	100	229,146	99	NA	NA
Virgin Islands	—	—	—	—	29	100
Virginia	27,240	13	161,562	100	2,382	76
Washington	40,492	11	613,582	26	2,943	72
West Virginia	28,361	50	19,171	100	NA	NA
Wisconsin	—	—	971,000	100	NA	NA
Wyoming	19,437	100	427,219	100	NA	NA
Totals	1,150,482	45	22,486,365	73	35,198	76

*Based on State estimates of total waters. — Not reported. Source: 1988 State Section 305(b) reports.

assessed may appear high by comparison with other States. Some States actually assessed a very high percentage of their waters because they used best professional judgment, information from citizens and other State agencies, and computer modeling to supplement actual chemical, biological, and physical monitoring data. Other States assessed a smaller percentage of their total stream miles because they preferred to rely almost exclusively on actual water quality monitoring data such as chemical and biological information from fixed stations and special surveys, and may have excluded supplemental sources of information.

Why do State monitoring strategies vary? Clearly, some States have more funds than others for these activities, just as some have more waters to deal with and some have more severe water quality problems. States heavily affected by diffuse and difficult-to-locate nonpoint sources may have to rely on other than traditional fixed station monitoring of chemical pollutants to determine water quality conditions.

On the other hand, States with high concentrations of industries and cities may find it more effective to rely on biological surveys and various chemical monitoring methods to assess water quality. Traditionally, then, each State weighs its needs and judges how it can best use its monitoring resources.

One drawback of this approach is that it results in a relatively small percentage of the Nation's waters being assessed. We assume that since States generally focus their monitoring resources on waters most likely to have problems—e.g., urban waters or those that are intensively used for recreational purposes—the remaining unassessed waters may be of better quality. EPA is encouraging increased water quality assessment in order to verify this and gain a more accurate picture of the Nation's waters as a whole. EPA has also asked States to identify which of their waterbodies were assessed using biological or chemical data (termed "monitored") and which were assessed using other types of data (termed "evaluated").

In addition to the problem of variations in the number of waters assessed, there are basic inconsistencies involving how support of designated uses is determined. Variability exists among States in defining the characteristics a waterbody must have to be fully, partially, or not supporting its uses and even what those uses should

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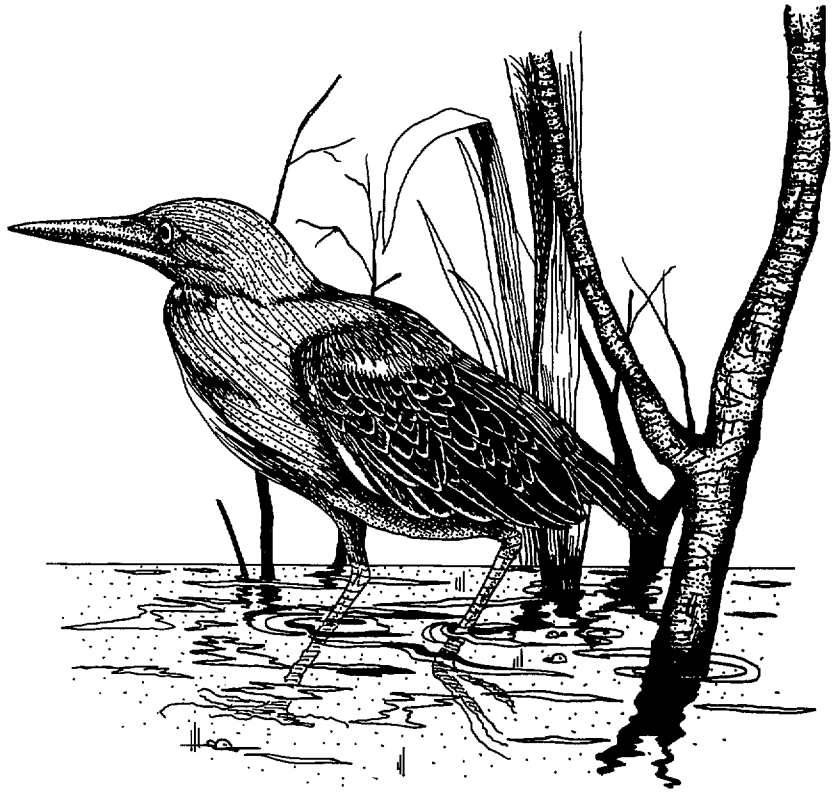
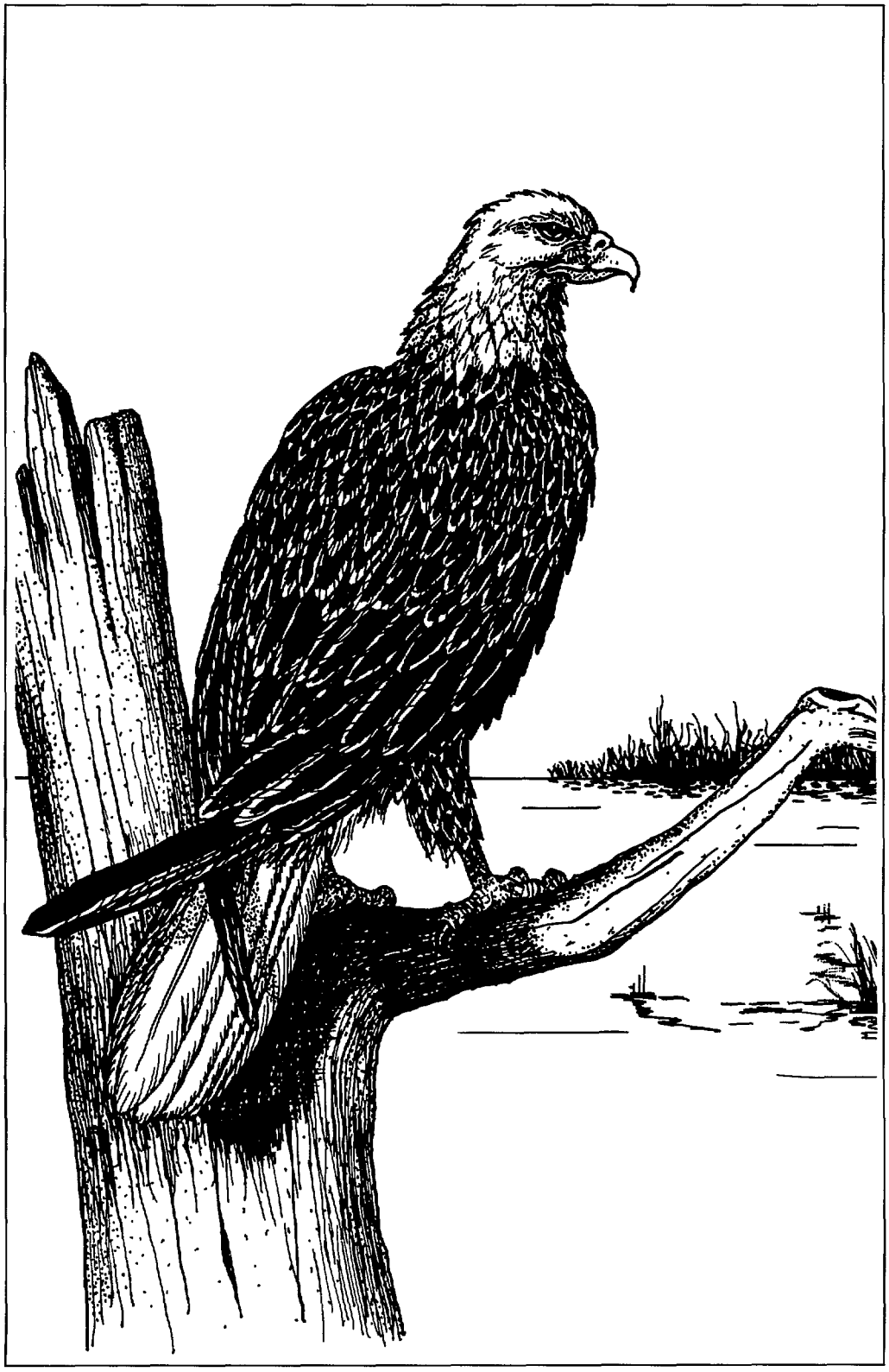
States use a variety of methods to monitor their waters.

be. In part, this variability arises from the range of methods the States use to assess water quality. In many cases, biological, chemical, and evaluative data must all be weighed before a use support decision can be made. Other factors contributing to inconsistencies include widely divergent natural conditions among States and vast differences in the States' monitoring capabilities and resources. To address these problems, EPA is working with the States to develop improved guidance on making use support decisions. This guidance should greatly increase the consistency of State assessments of water quality. Other EPA activities include developing a consistent and accepted baseline of total State waters and encouraging the use of the Section 305(b) reporting process as a tool in managing toxicants, nonpoint sources, and lake/estuary/wetland protection programs.

To further improve the Section 305(b) reporting process and to manage the various new assessments required by the Water Quality Act of 1987, EPA has developed a data system for managing water quality information for specific waterbodies. Design of the system—called the Section 305(b) Waterbody System (WBS)—began in 1986. The system was partially completed in late 1987, and eight States were able to use the WBS for their 1988 reports. Those States reported that the system was useful for organizing and analyzing their information and simplified the preparation of waterbody listings required by the Water Quality Act.





Surface Water Quality

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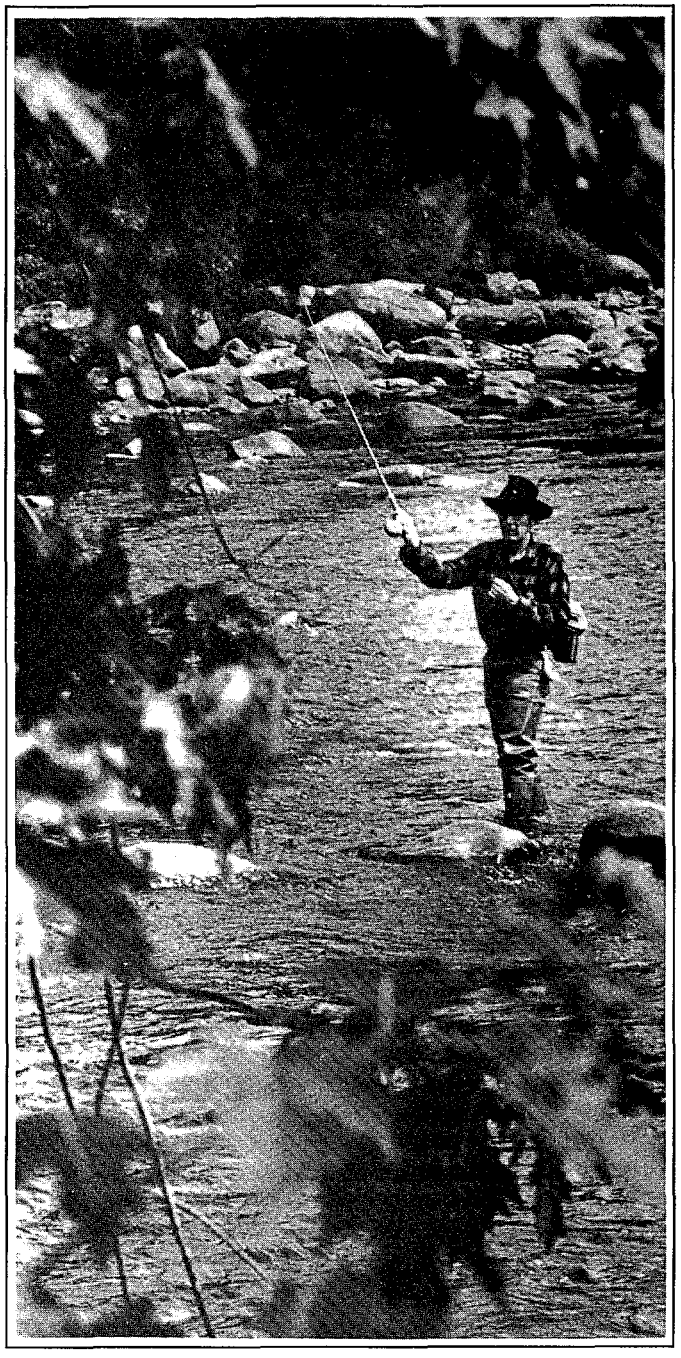


Rivers and Streams

Support of Designated Uses

The standard measure of water quality reported by the States is the degree to which waters support the uses for which they have been designated, such as high-quality cold water fishery, contact recreation, or drinking water supply. In their 1988 State Section 305(b) reports, 48 States, Territories, jurisdictions, and Interstate Commissions (referred to, hereafter, as States) provided this information (see Table 1-1). These States assessed a total of 519,413 river miles—45 percent of the total stream miles estimated for these States and 29 percent of the Nation's estimated 1.8 million stream miles.*

Of those assessed waters, 361,332 miles, or 70 percent, were found to be fully supporting their designated uses. Ten percent of those fully supporting waters, or 36,038 stream miles, were identified as threatened waters that could soon become impaired if pollution control actions were not taken. Twenty percent of assessed waters, or 104,632 miles, were reported as partially supporting uses, and 10 percent, or 53,449 stream miles, were reported as not supporting uses (see Figure 1-1). Thirty-eight States specified the basis of their assessment decisions. In these States, 60 percent of assessed waters were evaluated using mathematical models, citizen complaints, questionnaires, etc., and

*Estimate from ASIWPCA, *America's Clean Water: The States' Nonpoint Source Assessment*, 1985.

Table 1-1. Designated Use Support in Rivers and Streams

State	Total River Miles	Miles Assessed: Total	Miles Assessed: Percent Evaluated	Miles Assessed: Percent Monitored	Miles Fully Supporting	Miles Threatened*	Miles Partially Supporting	Miles Not Supporting
Alabama	40,600	11,174	85	15	10,118	—	625	431
Arizona	6,671	2,279	—	—	1,583	400	207	489
Arkansas	11,508	4,107	46	54	1,714	—	29	2,364
California	26,970	9,885	—	—	6,578	—	2,219	1,088
Colorado	14,655	10,000	54	46	8,605	403	708	687
Connecticut	8,400	880	33	68	582	238	239	59
Delaware	500	467	0	100	280	—	156	31
Delaware River Basin	206	206	—	—	194	—	0	12
District of Columbia	36	26	0	100	0	0	0	26
Florida	12,659	7,943	27	73	5,287	—	2,021	635
Georgia	20,000	20,000	66	34	19,443	—	383	174
Hawaii	349	349	28	72	265	0	80	4
Illinois	14,080	12,970	23	77	5,783	172	7,001	186
Indiana	90,000	5,181	28	72	3,519	636	982	680
Iowa	18,300	8,235	75	25	69	69	6,503	1,663
Kansas	19,791	6,888	57	43	3,994	3,994	760	2,134
Kentucky	18,465	8,653	63	37	6,176	719	878	1,599
Louisiana	14,180	8,483	—	—	5,730	141	2,146	607
Maine	31,672	31,672	—	—	31,278	—	0	394
Maryland	9,300	9,300	84	16	8,635	—	504	161
Massachusetts	10,704	1,646	0	100	713	—	598	335
Michigan	36,350	36,350	—	—	35,567	—	0	783
Minnesota	91,944	4,443	0	100	1,553	—	564	2,326
Mississippi	15,623	15,623	87	13	13,850	359	1,331	442
Missouri	19,630	19,630	77	23	10,147	—	9,445	38
Montana	20,532	19,505	85	15	12,261	359	6,630	614
Nebraska	10,212	5,690	—	—	3,244	—	1,202	1,244
New Hampshire	14,544	1,331	77	23	950	—	210	171
New Mexico	3,500	1,152	—	—	576	—	554	22
New York	70,000	69,988	95	5	53,394	3,740	8,087	8,507
North Carolina	37,378	33,275	45	55	22,375	10,427	9,152	1,748
North Dakota	11,284	9,850	44	56	6,834	5,992	3,016	0
Ohio	43,917	7,045	0	100	2,256	—	1,501	3,288
Ohio River Valley	981	981	17	83	0	—	981	0
Oklahoma	19,791	9,248	36	64	3,306	2,442	3,512	2,430
Oregon	90,000	27,738	—	—	12,546	—	8,497	6,695
Pennsylvania	50,000	13,242	39	61	9,642	—	1,770	1,830
Puerto Rico	5,373	5,373	67	33	2,459	478	1,143	1,771
Rhode Island	724	581	43	57	489	271	14	78
South Carolina	9,900	3,795	0	100	2,824	—	395	576
South Dakota	9,937	3,750	18	82	1,387	484	1,260	1,103
Tennessee	19,124	9,428	—	—	5,976	1,598	2,484	968
Texas	80,000	13,998	0	100	12,169	0	0	1,829
Vermont	5,162	5,162	83	17	4,534	908	379	249
Virginia	27,240	3,532	0	100	1,210	—	1,401	921
Washington	40,492	4,621	22	78	2,295	1,269	1,608	718
West Virginia	28,361	14,301	46	54	2,862	128	10,107	1,332
Wyoming	19,437	19,437	67	33	16,080	811	3,350	7
Totals	1,150,482	519,413			361,332	36,038	104,632	53,449

*Miles Threatened is a subset of Miles Fully Supporting. — Not reported. Source: 1988 State Section 305(b) reports.

40 percent were monitored using ambient chemical and biological data (see *Making Assessment Decisions* for further discussion).

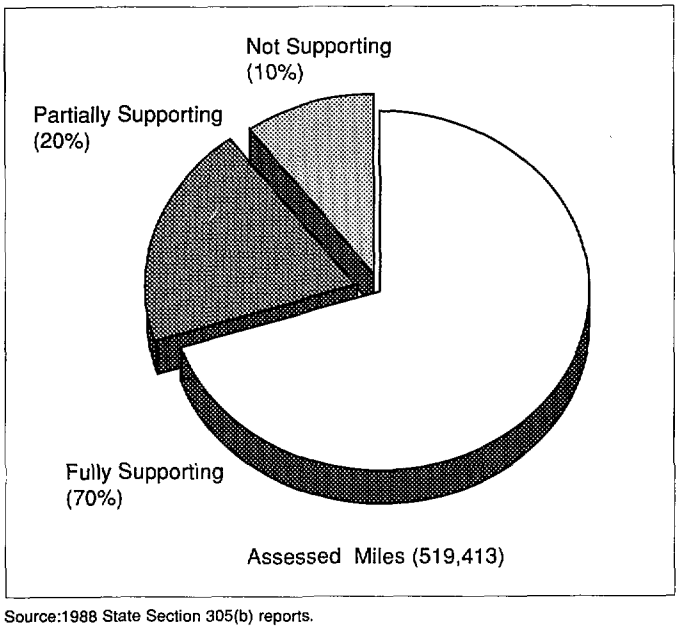
Table 1-1 illustrates some of the inconsistencies that hamper the Section 305(b) reporting and assessment process. First, ten States failed to provide usable information on support of designated uses. Second, of those States that provided data, variations exist in the percent of total State waters assessed and in the methods of assessing use support. For example, four States assessed 10 percent or less of their total waters, while ten States reported that they assessed all or nearly all of their waters. Similarly, miles fully supporting uses ranged from zero to 99 percent of assessed State waters, a variation more likely attributable to the portion of the State's waters assessed and different methodologies than to radically different water quality.

Caution should therefore be used in interpreting these numbers: they should not be compared to those of previous 305(b) reporting cycles, nor should they be used to draw comparisons among States. Differences in any given State's summary information from one year to the next may be due to the State's reporting on different waters or to changes in methods of assessing use support.

Causes of Impairment

States were asked to identify the causes of nonsupport in waters not fully supporting uses. Causes of nonsupport are those pollutants (such as pesticides or nutrients) or pollution processes (such as habitat destruction) that are impairing the waterbodies. In 1988, 38 States provided data on the number of stream miles affected by the different causes of nonsupport (see Table 1-2).

Any given stream mile can be affected by many causes. Therefore, States were asked to include each stream mile under each of the cause categories that contributes to impairment, also assigning a degree of impact, reported here as major or moderate/minor. (Data from States that did not specify degree of impact are depicted in Figure 1-2 as "unspecified." In Table 1-2, they are included under the "Major" heading.) Therefore, a single river mile is counted under several categories if it is affected by multiple causes. The values reported are the total number of river miles affected by a particular cause of impairment, according to whether the cause is a major or moderate/minor contributor to impairment. The relative extent of each cause of nonsupport can be determined by dividing the



Source:1988 State Section 305(b) reports.

Figure 1-1. Designated Use Support in Assessed Rivers and Streams

Sediments and nutrients, both predominantly from diffuse sources such as agriculture, are leading causes of impairment in streams.

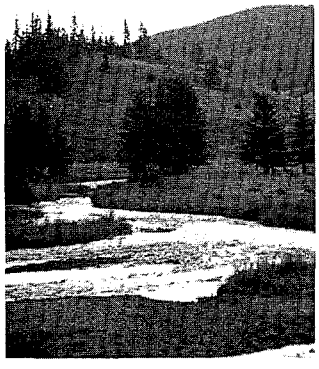


Table 1-2. Impaired River Miles Affected by Causes of Pollution

State	Total Impaired Waters*	Siltation		Nutrients		Pathogens		Organic Enrichment	
		Major	Mod/Min	Major	Mod/Min	Major	Mod/Min	Major	Mod/Min
Alabama**	1,056	57	—	879	—	—	—	931	—
Arkansas	2,393	—	—	—	—	1,759	199	56	—
Colorado	1,395	—	—	—	—	176	505	21	—
Connecticut	298	—	12	119	44	112	64	85	71
Delaware**	187	—	—	126	—	144	—	76	—
District of Columbia	26	—	—	—	—	7	18	—	—
Florida**	2,656	376	—	992	—	376	—	990	—
Georgia	557	—	—	—	—	9	183	163	192
Illinois	7,187	129	6,660	375	7,095	147	241	155	1,270
Indiana	1,662	14	167	82	173	413	375	192	320
Iowa	8,166	6,751	1,408	42	8,107	1,190	141	25	1,431
Kansas	2,894	—	35	—	49	1,238	741	81	406
Kentucky	2,477	724	126	100	4	969	—	300	114
Louisiana	2,753	—	22	513	808	405	1,451	514	1,086
Maryland	665	157	16	259	93	102	144	43	42
Minnesota**	2,890	1,870	—	1,567	—	2,196	—	1,999	—
Mississippi	1,773	415	181	595	911	—	28	78	423
Missouri	9,483	6	8,299	—	—	—	—	1	58
Montana	7,244	394	6,441	310	2,895	79	410	22	92
New Hampshire	381	—	—	—	—	136	232	69	62
New Mexico	576	108	313	31	193	11	71	—	—
New York	16,594	126	44	8	151	15	144	66	122
North Carolina**	10,900	6,299	—	—	—	77	—	115	—
North Dakota	3,016	1,396	748	1,286	1,725	289	1,110	210	156
Ohio River Valley	981	—	981	—	—	162	26	—	250
Oklahoma**	5,942	2,804	—	2,582	—	1,180	—	518	—
Oregon**	15,192	1,260	—	745	—	885	—	603	—
Pennsylvania**	3,600	—	—	368	—	194	—	278	—
Puerto Rico	2,914	224	151	91	368	383	228	34	283
Rhode Island	92	—	—	16	4	20	33	17	18
South Carolina**	971	—	—	—	—	618	—	321	—
South Dakota	2,363	110	275	—	232	150	1,003	—	161
Tennessee	3,452	1,426	952	245	969	546	831	504	1,224
Vermont	628	342	123	205	122	64	174	132	256
Virginia	2,322	—	—	—	—	820	1,016	20	90
Washington	2,326	425	376	238	251	805	865	184	364
West Virginia	11,439	846	4,405	383	1,602	57	363	627	2,948
Wyoming	3,357	—	2,623	—	—	—	273	—	—
Totals	142,808	26,259	34,358	12,157	25,796	15,734	10,869	9,430	11,439
Combined Totals			60,617		37,953		26,603		20,869
Percent of Impaired Waters			42.4%		26.6%		18.6%		14.6%

*The sum of partially and nonsupporting river miles (Table 1-1).

**These States did not specify the degree of impact (i.e., Major or Moderate/Minor); river miles were placed in the "Major" column for national reporting purposes.

Metals		Pesticides		Suspended Solids		Salinity		Flow Alteration		Habitat Modification		pH		Thermal Modification	
Major	Mod/Min	Major	Mod/Min	Major	Mod/Min	Major	Mod/Min	Major	Mod/Min	Major	Mod/Min	Major	Mod/Min	Major	Mod/Min
51	—	—	—	—	—	—	—	155	—	—	—	21	—	—	—
—	—	—	—	—	—	—	15	—	—	—	—	56	62	—	—
527	767	—	—	—	—	—	—	—	—	—	—	—	—	—	—
69	29	—	—	—	11	—	—	—	—	10	101	—	—	—	—
24	—	19	—	—	—	—	—	—	—	—	—	16	—	—	—
24	3	—	—	—	—	—	—	—	—	—	—	—	7	—	—
280	—	—	—	—	—	259	—	—	—	—	—	—	—	—	—
—	8	—	—	—	—	—	—	—	—	—	—	—	—	—	—
23	908	—	131	—	—	—	18	—	701	371	1,242	14	141	—	—
66	194	68	232	—	—	—	—	4	13	14	—	44	113	—	6
2,358	213	545	7,603	—	—	—	—	—	—	3	86	92	—	—	—
114	—	—	—	—	—	800	141	89	294	—	—	22	30	—	—
370	125	28	—	—	—	158	50	—	—	111	20	185	—	—	—
26	5	—	103	339	646	18	323	—	22	—	—	—	—	—	20
—	—	—	13	—	—	—	—	—	7	—	—	49	67	—	—
—	—	—	—	—	—	—	—	—	—	—	—	354	—	—	—
83	306	162	628	—	—	11	5	—	—	—	—	—	172	—	—
—	24	—	883	—	—	—	—	—	—	—	180	15	40	—	—
284	606	—	—	—	—	140	2,981	231	2,312	—	1,510	614	97	213	1,441
—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
82	35	—	—	—	—	56	—	72	30	275	108	27	60	—	—
11	88	5	47	—	—	9	13	56	95	—	—	60	—	103	10
246	—	—	—	—	—	—	—	—	—	—	—	48	—	—	—
255	321	31	—	1,041	363	426	459	234	100	—	—	—	—	—	—
981	—	—	981	—	—	—	—	—	—	—	—	—	—	—	—
684	—	2,381	—	1,969	—	1,154	—	22	—	—	—	22	—	—	—
—	—	52	—	—	—	—	—	1,355	—	1,480	—	455	—	1,320	—
834	—	175	—	544	—	—	—	—	—	—	—	730	—	16	—
12	33	14	86	—	—	1	—	300	1	43	—	—	—	—	—
70	4	—	—	—	—	—	—	—	—	—	—	—	—	—	—
—	—	—	—	—	—	—	—	—	—	—	—	2	—	—	—
11	—	—	—	772	964	—	—	—	—	—	—	—	656	5	4
87	548	60	205	848	706	8	11	144	250	113	172	150	336	14	39
10	17	—	—	—	—	—	—	168	89	259	150	16	3	116	358
—	—	—	—	—	—	—	—	—	—	—	—	81	256	—	39
187	632	120	43	224	469	—	58	201	65	289	26	135	136	248	874
1,308	1,544	—	2	—	—	80	648	356	538	135	724	1,031	866	94	665
7	—	—	130	—	—	—	811	—	347	—	741	—	—	—	—
9,084	6,410	3,660	11,087	5,737	3,159	3,120	5,533	3,387	4,864	3,103	5,060	4,239	3,042	2,129	3,456
	15,494		14,747		8,896		8,653		8,251		8,163		7,281		5,585
	10.8%		10.3%		6.2%		6.1%		5.8%		5.7%		5.1%		3.9%

— Zero or not reported.

Source: 1988 State Section 305(b) reports.

total number of miles affected by each cause category by the total miles impaired (see Figure 1-2).

Figure 1-2 illustrates that siltation, the smothering of stream beds by sediments (usually from accelerated soil erosion), is the most commonly reported cause of nonsupport in the Nation's rivers and streams, affecting 42 percent of impaired river miles. Nutrients, the second most commonly reported cause, affect 27 percent of impaired river miles and most often consist of phosphorus and nitrogen compounds such as those used in agricultural fertilizers. Both siltation and nutrients are predominantly from diffuse sources.

Fecal coliform bacteria are organisms commonly monitored as indicators of possible pathogen contamination of waters. Pathogen contamination (cited as the third leading cause of impairment nationwide) may impair drinking water supply and contact recreation uses. Such contamination may come from inadequately treated sewage or runoff from pastures, feedlots, and urban areas. These pathogen indicators were found to affect 19 percent of impaired waters.

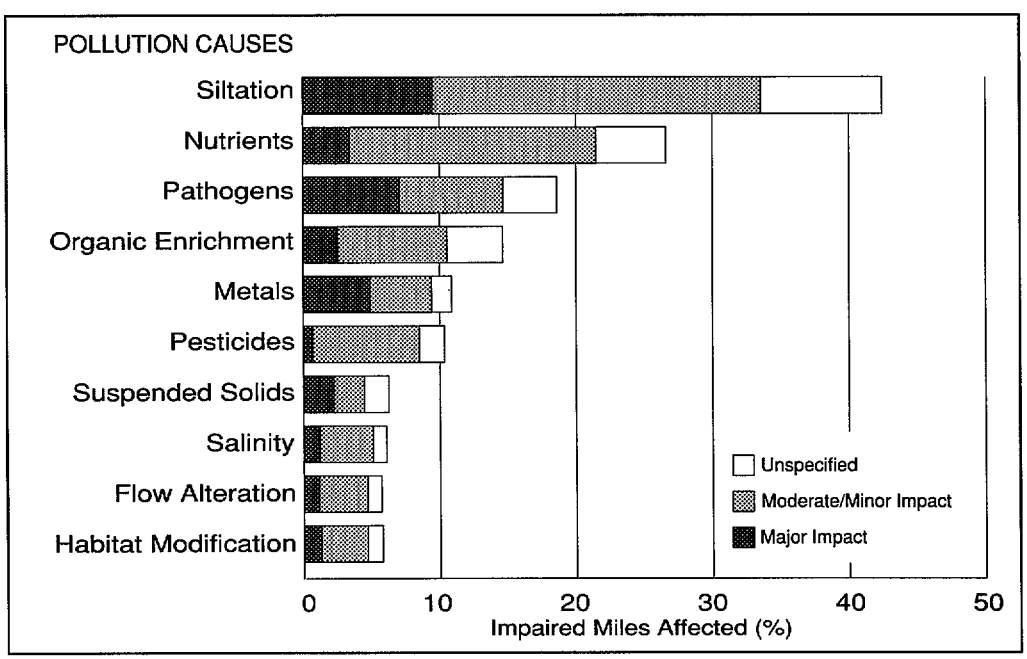
The next most common cause is organic enrichment/low dissolved oxygen, affecting 15 percent of impaired river miles. This cause may be closely linked to sewage treatment plants, feedlots, and nutrients. Nutrients can stimulate the growth of algae, which often leads to a drop in levels of dissolved oxygen.

The fifth and sixth most commonly reported causes of impairment are metals (such as lead, copper, and mercury) and pesticides (such as chlordane, dieldrin, and DDT), respectively. Other significant causes include suspended solids, salinity, flow alteration, other habitat modification, pH, and thermal modification.

These national summary figures should be interpreted with care, as a close look at Table 1-2 reveals that certain States are reporting a large proportion of the impact from these causes of impairment. For example, Iowa alone accounts for over half of the total river miles affected by pesticides, and Montana accounts for about a third of all stream miles affected by salinity and flow alteration. Reporting inconsistencies influence these findings.

Twenty-nine States specified the degree of impact (i.e., major or moderate/minor) of the causes affecting their rivers and streams. For most categories of causes, there were more waters in which the cause was a moderate/minor contributor to impairment than a major contributor. For only two categories of causes—metals and suspended solids—did major impacts outweigh moderate/minor impacts. In 52 percent of the waters affected by metals, the impact of metals was considered major, as was the impact of suspended solids in 51 percent of affected waters.

Other causes with a high percentage of major impact include pathogens (major impact in 48 percent of affected waters), pH (major impact in 46 percent), and siltation (major impact in 28 percent).



Source: 1988 State Section 305(b) Reports.

Figure 1-2. Percent of Impaired River Miles Affected by Each Pollution Cause

Sources of Impairment

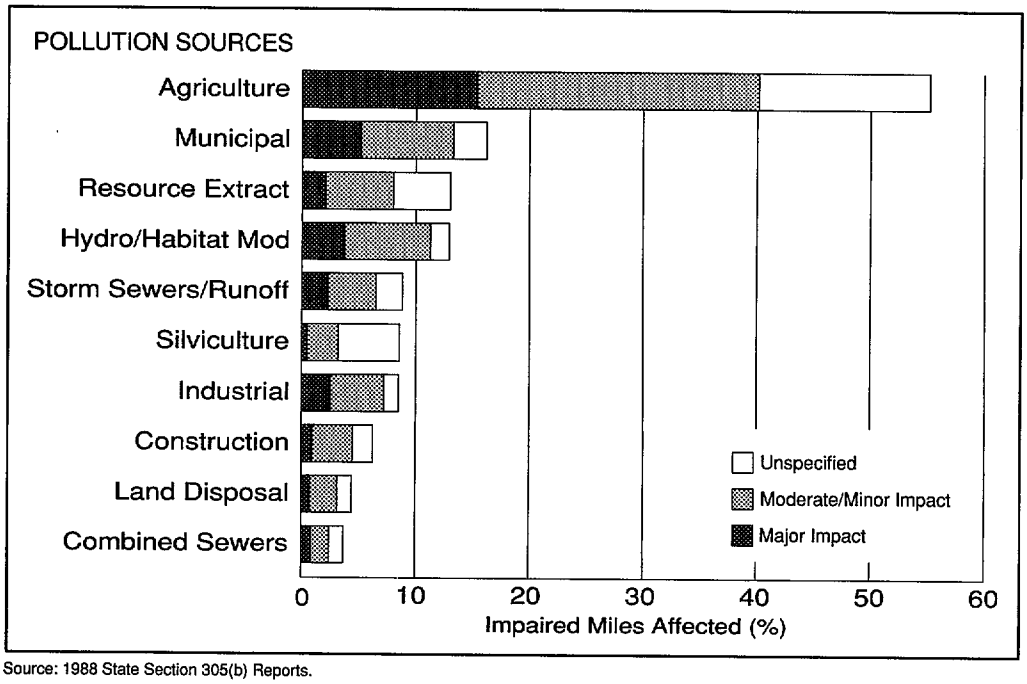
In their 1988 State Section 305(b) reports, 37 States provided information on the various sources of pollution contributing to use impairment in rivers, such as municipal discharges and agricultural runoff. Sources of impairment are those activities that contribute pollutants or result in harmful processes such as siltation (see *Highlight—Sources of Pollution Reported by the States).* Table 1-3 displays the categories of sources and the size of waters affected by each.

As with causes of impairment, any given stream mile can be affected by many sources. Therefore, States were asked to include each stream mile under each source category that contributes to impairment, also assigning a degree of impact, reported here as major or moderate/minor. (Data from States that did not specify degree of impact are depicted in Figure 1-3 as "unspecified." In Table 1-3, they are included under the "Major" column heading.) As a result, a single river mile will be counted under several categories if it is affected by multiple sources. The values reported are the total number of river miles affected by a particular source of impairment according to whether the source is a major or moderate/minor contributor to impairment. The relative extent of each source of nonsupport can be determined by dividing the total number of miles affected by each source category by the total miles impaired (see Figure 1-3.)

Some ambiguity occurs when defining the source categories used in Table 1-3. For example, States were asked to report separately on stream miles affected by storm sewers and miles affected by urban runoff (primarily surface runoff). Some States made this distinction, while others did not and chose to report only in the urban runoff category. Since separate storm sewers are designed to convey urban surface runoff, it is very difficult to distinguish between storm sewer discharges and urban runoff. Therefore, for purposes of analysis, these numbers were combined into one category reflecting waters affected by storm sewers/runoff. Entries in this category in Table 1-3 may also reflect additional information provided by some States subsequent to their 305(b) submission. This problem has been corrected for the next reporting cycle.

Table 1-3 reveals that the most extensive source of pollution reported for the Nation's rivers is agricultural runoff, which affects 55 percent of impaired river miles. Other extensive sources include municipal dischargers, affecting 16 percent; resource extraction and hydrologic/habitat modification, affecting 13 percent; and storm sewers/runoff, industrial dischargers, and silviculture, each affecting about 9 percent of impaired river miles.

As was the case with causes of impairment, this source information should be



Source: 1988 State Section 305(b) Reports.

Figure 1-3. Percent of Impaired River Miles Affected by Each Pollution Source

Table 1-3. Impaired River Miles Affected by Sources of Pollution

State	Total Impaired Waters*	Agriculture		Municipal		Resource Extraction		Hydrologic/ Habitat Modification	
		Major	Mod/Min	Major	Mod/Min	Major	Mod/Min	Major	Mod/Min
Alabama**	1,056	35	—	694	—	76	—	160	—
Arkansas	2,393	1,722	174	294	—	117	85	—	—
California**	3,307	395	—	51	—	301	—	—	—
Connecticut	298	—	102	212	52	—	44	10	69
Delaware**	187	146	—	35	—	—	—	—	—
District of Columbia	26	—	—	4	—	—	—	—	3
Florida**	2,656	1,711	—	785	—	464	—	880	—
Georgia	557	—	—	140	189	—	—	—	—
Illinois	7,187	144	6,964	371	2,405	14	1,211	223	3,526
Indiana	1,662	47	934	285	217	49	121	—	—
Iowa	8,166	7,395	753	524	828	—	103	—	86
Kansas	2,894	918	677	512	546	229	12	89	280
Maryland	665	172	133	33	94	49	84	—	5
Mississippi	1,773	933	288	135	345	—	—	19	—
Missouri	9,483	—	8,267	16	58	22	88	—	189
Montana	7,244	420	5,603	43	118	319	1,385	171	1,299
Nebraska**	2,446	1,394	—	441	—	—	—	196	—
New Hampshire	381	—	—	92	190	—	—	—	—
New Mexico	576	36	374	34	—	37	21	87	13
New York	16,594	33	22	153	130	1	16	97	41
North Carolina**	10,900	5,559	—	635	—	19	—	—	—
North Dakota	3,016	1,539	1,472	12	1,339	—	255	1,228	589
Ohio	4,789	917	1,724	2,831	929	649	328	931	1,203
Ohio River Valley	981	350	280	—	—	350	280	—	—
Oklahoma**	5,942	3,986	—	—	—	2,302	—	1,103	—
Oregon**	15,192	7,605	—	1,062	—	2,280	—	—	—
Pennsylvania**	3,600	464	—	378	—	1,775	—	31	—
Puerto Rico	2,914	294	684	79	34	—	—	49	—
Rhode Island	92	16	2	18	32	—	—	—	—
South Carolina**	971	364	—	170	—	—	—	2	—
South Dakota	2,363	1,187	1,022	11	43	—	62	—	—
Tennessee	3,452	1,289	1,269	628	924	360	700	847	1,102
Vermont	628	510	—	86	—	42	—	326	—
Virginia	2,322	453	801	229	145	—	—	—	—
Washington	2,326	1,049	564	143	694	27	54	522	581
West Virginia	11,439	517	2,748	535	2,281	645	2,953	220	1,501
Wyoming	3,357	2,192	734	6	110	54	770	569	378
Totals	143,835	43,792	35,591	11,677	11,703	10,181	8,572	7,760	10,865
Combined Totals			79,383		23,380		18,753		18,625
Percent of Impaired Waters			55.2%		16.3%		13.0%		12.9%

*The sum of partially and nonsupporting river miles (Table 1-1).

**These States did not specify the degree of impact (i.e., Major or Moderate/Minor); river miles were placed in the "Major" column for national reporting purposes.

Storm Sewers/ Runoff		Silviculture		Industrial		Construction		Land Disposal		Combined Sewers	
Major	Mod/Min	Major	Mod/Min	Major	Mod/Min	Major	Mod/Min	Major	Mod/Min	Major	Mod/Min
69	—	—	—	406	—	6	—	—	—	—	—
—	—	—	—	115	39	—	—	—	—	—	—
—	—	—	—	8	—	—	—	—	—	—	—
—	148	—	—	69	48	—	16	13	111	126	11
99	—	—	—	37	—	4	—	—	—	69	—
—	26	—	—	1	—	—	1	—	13	—	26
1,786	—	63	—	578	—	792	—	947	—	—	—
9	183	—	—	24	11	—	—	—	—	—	—
38	112	—	—	14	1,201	—	470	14	16	113	692
145	112	—	—	165	225	26	56	12	1	386	130
680	1,234	—	—	219	221	—	16	3	165	—	—
37	13	—	—	124	92	—	—	—	—	—	—
15	108	—	—	2	—	—	—	22	—	—	12
46	97	—	—	103	214	—	—	—	—	—	—
—	154	—	—	—	10	—	—	—	1	—	—
27	61	44	806	—	233	5	762	22	154	—	—
24	—	—	—	49	—	—	—	—	—	—	—
—	—	—	—	38	36	—	—	—	92	10	78
—	—	3	76	—	—	3	87	3	15	—	—
1	98	—	32	28	90	—	32	62	133	36	70
274	—	48	—	159	—	79	—	59	—	—	—
12	31	—	—	—	91	—	—	—	—	—	—
503	883	9	29	1,061	629	9	85	243	977	10	26
150	—	—	—	—	—	—	—	—	—	—	—
853	—	20	—	—	—	271	—	666	—	—	—
—	—	7,580	—	368	—	1,420	—	—	—	1,675	—
49	—	—	—	201	—	—	—	169	—	39	—
302	223	—	—	58	126	—	—	208	466	—	1
62	9	—	—	1	69	16	—	16	2	15	3
157	—	4	—	55	—	4	—	—	—	—	—
47	215	—	—	11	—	—	26	—	26	—	—
252	796	76	64	191	386	110	822	14	155	78	22
55	—	23	—	16	—	142	—	32	—	—	—
87	69	—	—	48	13	—	—	—	—	—	4
354	103	100	138	113	246	239	89	201	228	12	31
489	1,133	426	2,728	856	2,674	446	1,769	224	878	428	1,233
10	282	58	65	334	169	362	858	—	—	—	—
6,632	6,090	8,454	3,938	5,452	6,823	3,934	5,089	2,930	3,433	2,997	2,339
	12,722		12,392		12,275		9,023		6,363		5,336
	8.8%		8.6%		8.5%		6.3%		4.4%		3.7%

— Zero or not reported.

Source: 1988 State Section 305(b) reports.

Sources of Pollution Reported by the States

Point and nonpoint source categories of pollution are not clearly defined in all cases: many source categories have significant point and nonpoint elements. For example, storm sewers/runoff and resource extraction are sources that may be addressed both via point source control measures (i.e., permits) or nonpoint source best management plans. The following categories were used in the analysis of State data and are not intended as legal definitions.

Point Sources

- Discharge into waterways via a discrete "point" such as a pipe or ditch.
- Are subject to permits issued by the State or EPA that limit allowable amounts of pollutants.
- Are also subject to enforcement action if their permit limits are violated.

Nonpoint Sources

- Enter waterways generally as runoff from widespread (i.e., "nonpoint") areas.
- Are addressed via voluntary controls, best management practices, incentive programs, demonstration programs, and to some extent by regulatory programs at State or local level.

Source Categories Used in This Report

Industrial (e.g., pulp and paper mills, chemical manufacturers, steel plants, textile manufacturers, food processing plants, etc.);

Municipal (e.g., publicly owned sewage treatment plants which may receive indirect discharges from small factories or businesses);

Combined Sewers (storm and sanitary sewers combined, which may discharge untreated wastes during storms);

Storm sewers/runoff (runoff from streets, paved areas, lawns, etc., that enters a sewer, pipe, or ditch before discharge);

Agricultural (e.g., crop production, pastures, rangeland, feedlots);

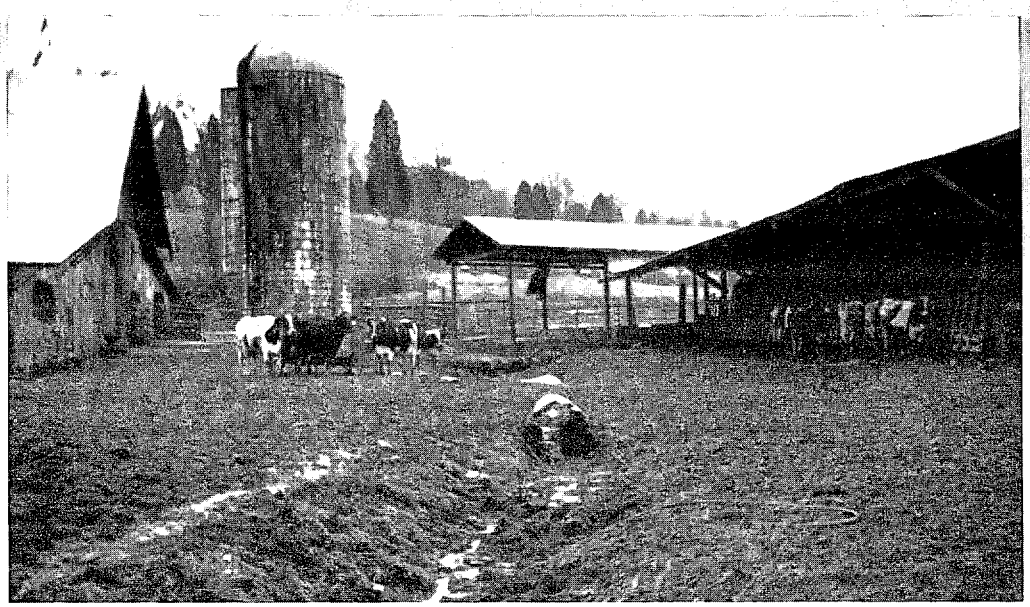
Silvicultural (e.g., forest management, harvesting, road construction);

Construction (e.g., highway building, land development);

Resource extraction (e.g., mining, petroleum drilling, runoff from mine tailing sites);

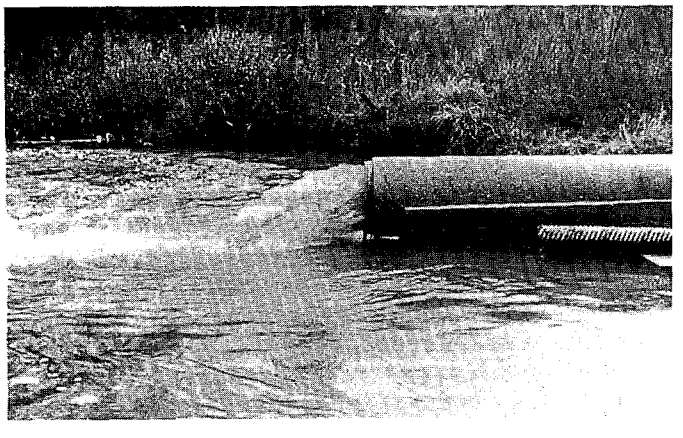
Land disposal (e.g., leachate or discharge from septic tanks, landfills, hazardous waste disposal sites); and

Hydromodification (e.g., channelization, dredging, dam construction, streambank modification).



interpreted with care; a close look at Table 1-3 reveals that some States appear to predominate over others in the number of miles with impacts due to the various sources. For example, 61 percent of the river miles with silvicultural impacts are in Oregon alone.

Twenty-seven States specified the degree of impact (i.e., major or moderate/minor) of the pollution sources affecting their rivers. For no source category did major impacts outweigh moderate/minor impacts. The two sources that had the greatest percentage of miles with major impacts are municipal and agricultural sources, with 39 and 38 percent, respectively. In 35 percent of the miles with storm sewers/ runoff impacts, these impacts are considered major, as they are in 34 percent of the miles in the industrial category. Other sources with a high percentage of major impacts include combined sewer overflows and hydrologic/habitat modification, with major impacts in 34 percent and 33 percent of impaired river miles, respectively.



NC NRCD

Attainment of the Clean Water Act Goals

As stated at the beginning of the Clean Water Act, "It is the national goal that, wherever attainable, an interim goal of water quality which provides for the protection and propagation of fish, shellfish, and wildlife and provides for recreation in and on the water be achieved by July 9, 1983." Most U.S. waters are classified to reflect these benchmarks, which are commonly referred to as the fishable and swimmable goals of the Clean Water Act (CWA). Support of CWA goals is considered a separate and independent criterion from the degree of designated use support.

Meeting the fishable goal is defined by EPA for the purpose of the 305(b) process as providing a level of water quality consistent with the goal of protection and propagation of a balanced population of shellfish, fish, and wildlife. Fishing advisories, consumption bans, and high incidences of fish abnormalities are indications that waters are not supporting healthy aquatic populations and do not support the fishable goal. Meeting the swimmable goal is defined by EPA as providing a level of water quality that allows for recreational activities *in and on* the water.

In some cases, the achievement of the CWA goals is precluded by physical constraints, irrevocable water quality impacts, and severe socioeconomic impacts. In these cases, State water quality standards may exclude the fishable or swimmable goal based on the results of a special study of use attainability. Thus, there are three possible outcomes for any waterbody when the question of CWA goal support is considered, as follows:

- Fishable and/or swimmable goals are supported;
- Fishable and/or swimmable goals are not supported but are attainable; and
- State water quality standards do not include fishable and/or swimmable uses (i.e., the CWA goals are not attainable).

In their 1988 water quality assessments, 44 States provided data on the attainment of the fishable and swimmable CWA goals in their rivers and streams (see Table 1-4). A total of 480,503 river miles were assessed for the fishable goal; 86 percent were found to be attaining the use, 11 percent were currently not attaining but could sometime in the future, and 3 percent were determined to be "not attainable" (see Figure 1-4).

Progress toward the CWA swimmable goal was assessed in 414,923 stream miles. Eighty-five percent were found to be attaining the swimmable goal, 11 percent were currently not attaining

Table 1-4. Attainment of Clean Water Act Goals in Rivers and Streams

	Fishable Goal (miles)				Swimmable Goal (miles)			
State	Assessed	Meeting	Not Meeting	Not Attainable	Assessed	Meeting	Not Meeting	Not Attainable
Alabama	11,174	9,925	801	448	11,174	9,925	801	448
Arkansas	10,820	10,581	239	—	10,099	8,107	1,992	—
Colorado	10,823	8,960	1,040	823	10,000	9,474	526	0
Connecticut	880	738	140	2	880	682	196	2
Delaware	467	349	118	—	467	309	158	—
Delaware River Basin	206	206	0	0	206	194	12	—
District of Columbia	26	0	26	0	26	0	26	0
Florida	7,943	7,308	600	35	7,943	7,308	600	35
Georgia	20,000	19,443	557	—	—	—	—	—
Hawaii	349	349	0	0	349	349	0	0
Illinois	12,970	12,488	482	0	2,994	730	2,189	75
Indiana	5,181	4,089	1,015	77	5,181	4,269	835	77
Iowa	8,235	6,714	1,497	24	8,235	1,638	580	6,017
Kansas	6,910	6,590	320	—	5,079	4,027	1,052	—
Kentucky	8,633	7,841	792	—	2,406	1,308	1,098	—
Louisiana	8,483	8,458	25	—	8,483	8,390	93	—
Maine	31,672	31,377	295	0	31,672	31,377	295	0
Maryland	9,300	8,660	640	—	9,300	9,286	14	—
Massachusetts	1,646	1,498	148	—	1,646	760	886	—
Mississippi	15,622	15,200	422	0	15,622	14,785	837	0
Missouri	19,630	10,147	1,037	8,446	19,630	10,147	1,037	8,446
Montana	19,505	18,891	614	0	19,505	19,505	0	0
Nebraska	5,690	4,476	1,214	—	2,264	810	1,454	—
New Hampshire	1,331	1,160	171	0	1,331	950	334	47
New Jersey	1,867	1,463	404	—	592	91	501	—
New Mexico	576	554	22	0	576	576	0	0
New York	70,000	53,700	15,000	1,300	70,000	69,200	800	0
North Carolina	33,275	22,375	10,900	—	33,275	22,375	10,900	—
North Dakota	9,851	9,389	462	0	9,851	9,287	564	0
Ohio River Valley	981	941	40	0	981	819	162	0
Oklahoma	19,791	18,834	436	521	19,791	17,663	2,128	0
Oregon	27,738	26,197	1,541	—	27,738	26,772	966	—
Pennsylvania	13,242	9,642	3,600	—	13,242	9,642	3,600	—
Puerto Rico	5,373	3,687	1,359	327	5,373	3,650	1,151	572
Rhode Island	581	465	27	89	581	465	27	89
South Carolina	3,795	3,477	318	—	3,795	2,199	1,596	—
South Dakota	3,750	2,840	910	0	939	659	280	0
Tennessee	11,081	10,857	224	—	11,081	10,420	661	—
Texas	13,998	13,843	155	—	13,998	12,616	1,382	—
Vermont	5,162	4,990	172	0	5,162	4,787	132	243
Virginia	3,532	1,210	2,322	—	3,532	1,210	2,322	—
Washington	4,637	3,168	1,469	0	4,637	2,898	1,739	0
West Virginia	14,340	13,005	1,335	0	14,340	13,005	1,335	0
Wyoming	19,437	19,430	7	0	947	947	0	0
Totals	480,503	415,515	52,896	12,092	414,923	353,611	45,261	16,051

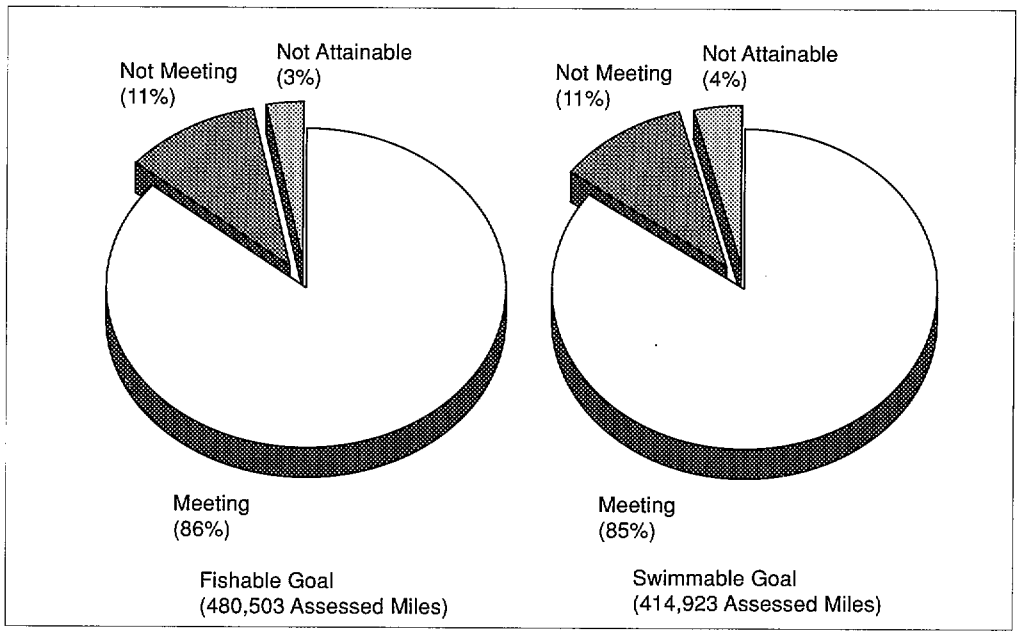
— Not reported.

Source: 1988 State Section 305(b) reports.

the swimmable goal but could sometime in the future, and 4 percent were categorized as "not attainable" (see Figure 1-4). Fewer waters were assessed for the swimmable goal than for the fishable goal, at least in part because some States do not include swimming uses in their standards.

From these figures, it appears that proportionately more waters meet each Clean Water Act goal than fully support their designated uses. This may be because some States are reluctant to indicate that a waterbody is not fishable or swimmable when impacts in that waterbody are slight or moderate. Clearly, definitions of CWA goal attainment vary among States as widely as do definitions of use support: the percent of waters meeting goals varies from zero to 100 percent. For example, some States do not adhere to EPA's definition of fishability and consider waters fishable if they support aquatic life (thereby excluding fish consumption considerations). EPA is working to better define attainment of the CWA goals for future reporting.

Eleven States reported that the fishable goal was not attainable in 12,092 stream miles, and 11 States found the swimmable goal not attainable in 16,051 miles. Reasons cited include naturally occurring physical limitations and extensive land uses such as row crop agriculture that would be prohibitively expensive to control.



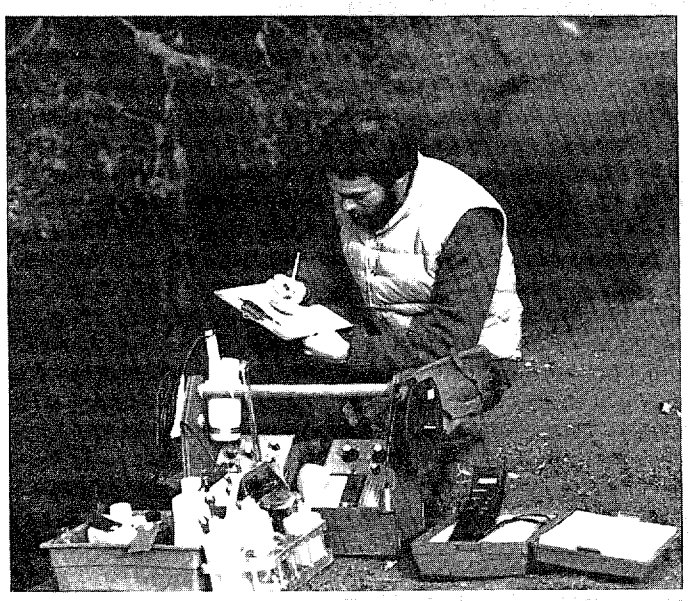
Source: 1988 State Section 305(b) reports.

Figure 1-4. Attainment of Clean Water Act Goals in Assessed Rivers and Streams

Making Assessment Decisions

How do we know what it means for a waterbody to support or not support its designated uses? What kinds of data are used? How are these data interpreted? Do all States use the same methods?

The answers to these questions are key to understanding the water quality findings reported by the States and summarized in this document. In many cases, the answers are not simple: State methodologies vary widely and may not be clearly documented. However, EPA is engaged in efforts to catalog State methodologies and develop recommended guidelines which, if followed, should result in more uniform water quality assessments among States.



States collect a broad range of information on conditions in their rivers, lakes, and estuaries. EPA asks the States to report based on two categories of assessment data. **Monitoring data** can be provided by networks of chemical or biological sampling stations located near dischargers or at other strategic points along waterbodies, and by short-term or one-time intensive or special surveys designed to provide water quality "snapshots" for discrete areas or to answer questions about specific problem sources or conditions. The data collected may be chemical (e.g., the concentration of a given pollutant in water, sediment, or fish/shellfish tissue) or biological (e.g., counts of the number of certain indicator species in a given sample or testing the toxicity of river or wastewater samples). Their common elements are that they are scientifically collected by the State pollution control agency, local governments, or Federal authorities using quality control procedures and involve actual observations and water/sediment/tissue/organism samples from aquatic sites.

Evaluative data, on the other hand, are collected from a variety of sources that may not use quality control procedures or involve site-specific sampling. Examples of this type of data include information provided by citizens, reports of pollution-caused fish kills, predictive modeling based on knowledge of sources, land use types, etc., surveys of fisheries personnel, and certain kinds of volunteer monitoring.

The degree to which States use these different types of data varies greatly. Some States rely almost exclusively on fixed station monitoring data or a combination of fixed station and intensive survey data. Other States may use rotating basin surveys in which a limited number of basins are studied intensively. Others with limited monitoring resources may find that their evaluative data provide a more realistic picture of water quality conditions than does a small network of infrequently sampled stations. Most States use a combination of data types to reach their assessment decisions.

Designated use support information for rivers shows that in the 38 States that specified data types, 386,530 stream miles were assessed, 40 percent using monitoring data and 60 percent using evaluative approaches. Of the 258,060 miles supporting uses in these States, 67 percent were evaluated and

33 percent were monitored. However, nearly the reverse of this applies in the 41,147 miles not supporting uses: 32 percent of waters were evaluated and 68 percent were monitored. Two different conclusions could be drawn from these findings: that States concentrate their monitoring efforts in their most degraded waters or that where States monitor they tend to find problems. Many States have indicated that the former argument is true. Faced with diminishing resources for monitoring, States have traditionally focused monitoring stations and intensive surveys on those areas most likely to have problems. Nevertheless, perhaps a combination of the two may apply, since reliance on models, questionnaires, and citizen complaints may fail to reveal certain types of water quality problems. In any case, EPA continues to support both types of assessment activities as the best available and most practical way to expand coverage of the Nation's waters.

Once data are collected by the States, they must be analyzed using established criteria in order for decisions to be made on support of designated uses. In an attempt to encourage consistency among States in how these decisions are made, EPA has issued general guidelines on criteria States might use to determine degree of use support. Table 1-5 illustrates key elements of these guidelines, which were developed jointly with the Association of State and Interstate Water Pollution Control Administrators for a 1984 assessment of trends in water quality.

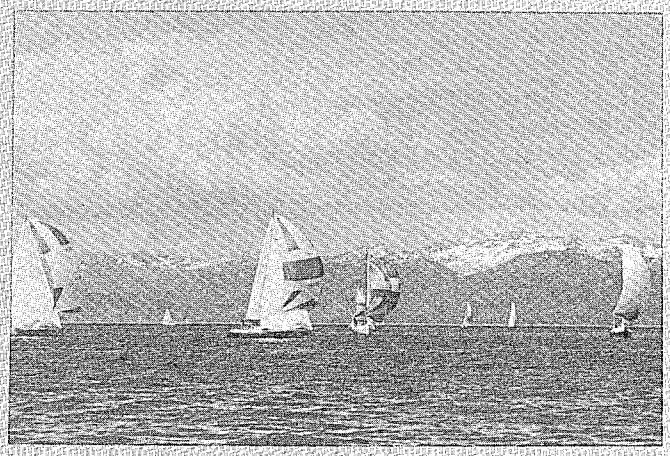
State adoption of these guidelines has been limited. A preliminary survey of the 1988 State Section 305(b) reports shows that about 15 States used these guidelines, numerous States used variants of these guidelines, and a handful did not specify which criteria they used in making their use support decisions. Many States feel that these criteria are too rigid and do not lead to accurate overall judgments about water quality conditions. Clearly, the EPA guidelines do not allow for much flexibility in making determinations where chemical data alone are used; do not address the issue of how to weigh contradictory evidence (e.g., results of biological studies that disagree with the results of chemical analyses); and do not address how many data points are actually required before a decision can be made. Until more widely acceptable and comprehensible guidelines are developed and adopted by the States, State-to-State inconsistencies in use support determinations will doubtless continue to hamper national analyses.

EPA is taking steps to develop assessment guidance that will provide a basis for greater consistency. Several new developments have occurred that need to be considered, such as toxicological specifications for the duration and frequency of concentrations of chemicals; the increased use of toxicity testing and biological monitoring; and a greater awareness of the prevalence of impacts caused by habitat alterations.

Table 1-5. EPA-Issued Guidelines on Making Use Support Decisions*

Basis for Assessment	Full, Partial, or Nonsupport of Uses Determined by:
Evaluative Data	Presence of sources and predictions, based on professional judgment, as to whether sources impair uses.
Chemical Monitoring Data	Percentage of criteria exceedances and the mean of the measurements (i.e., whether or not the mean is less than or greater than the criteria).
Biological Monitoring Data	Whether or not evidence exists that the biological community in a waterbody has suffered slight or substantial modification.

*Derived from 1986, 1988, and 1990 guidelines.



Lake Tahoe Visitors Authority