

*T H E*  
U.S. GEOLOGICAL SURVEY  
FEDERAL-STATE COOPERATIVE  
WATER - RESOURCES  
PROGRAM

*FISCAL YEAR 1992*

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by B.K. Gilbert and W.B. Mann IV

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THE U.S. GEOLOGICAL SURVEY FEDERAL-STATE  
COOPERATIVE WATER-RESOURCES PROGRAM  
FISCAL YEAR 1992

by Bruce K. Gilbert and William B. Mann IV

ABSTRACT

The Federal-State Cooperative Program is a major U.S. Geological Survey activity for the collection, analysis, and reporting of information on the quantity, quality, and use of the Nation's water resources. The fundamental characteristic of the program is that most of the work is undertaken by the U.S. Geological Survey through joint-funding agreements, with State, regional, and local agencies providing at least one-half the funds. The main objectives of the program are (1) to collect, on a systematic basis, data needed for the continuing determination and evaluation of the quantity, quality, and use of the Nation's water resources; and (2) to appraise the availability and the physical, chemical, and biological characteristics of surface and ground water through data analysis and interpretive water-resources investigations and research. During fiscal year 1992, Cooperative Program activities were underway in offices in every State, Puerto Rico, and several territories in concert with more than 1,000 cooperating agencies. In fiscal year 1992, Federal funding of almost \$63 million was matched by cooperating agencies, which also provided almost \$21 million unmatched for a total program of about \$147 million. This amounted to nearly 42 percent of the total funds for the U.S. Geological Survey's water-resources activities.

This report presents examples of current (1992) investigations, as well as updated information on hydrologic data-collection operations. Information also is provided with respect to activities in the Cooperative Program that are related to the National Water-Quality Assessment Program.

## INTRODUCTION

Federal, State, regional, and local agencies share keen interests in appraising the Nation's water resources and in seeking solutions to water-related problems. Because of a variety of missions and areas of responsibility, agencies at times have diverse perceptions of need, priorities, and approaches. One of the principal strengths of the U.S. Geological Survey's (USGS) Federal-State Cooperative Program is that this diversity can be accommodated through joint planning and funding of hydrologic data collection, investigations, and research.

The Cooperative Program, a partnership between the USGS and State and local agencies, provides a balanced approach to water-resources investigations. It is a major part of the USGS's coordinated program of water-resources investigations and research. The principal program objectives are (1) to collect, on a systematic basis, data needed for the continuing determination and evaluation of the quantity, quality, and use of water resources in the United States; and (2) to appraise the availability and the physical, chemical, and biological characteristics of surface and ground water through data analysis and interpretive water-resources investigations and research. The resulting information forms the foundation for many of the Nation's water-resources management and planning activities. In addition, the information can help identify emerging water problems at an early stage.

The Cooperative Program has contributed directly to water-resources knowledge for almost 100 years by fostering a working partnership between the Federal and State governments in the advancement of earth science, and by compiling a major part of the Nation's hydrologic information. From its earliest days, the program has been responsible directly for the development of procedures for streamgaging, concepts of surface-water and ground-water flow, and analytical techniques for investigations of water quality.

The first USGS cooperative water-resources investigation was with the State of Kansas in 1895. In 1905, Congress appropriated funds specifically for cooperative studies, marking the official beginning of the program. In 1928, Congress gave formal recognition to the Federal-State partnership and limited the Federal financial contribution for cooperative water-resources studies to no more than 50 percent of the total funds for each investigation.

During fiscal year (FY) 1992, hydrologic data collection, interpretive investigations, and research were conducted under the provisions of the Cooperative Program by USGS Water Resources Division personnel in offices in every State, in Puerto Rico, and in several territories in concert with more than 1,000 cooperating agencies (see appendix A). The locations of principal Water Resources Division offices are shown in figure 1. State, county, and municipal agencies participate in the program, as do interstate-compact organizations, State universities, conservation districts, sanitary districts, drainage districts, flood-control districts, and other similar organizations. In FY 1992, Federal funding of more than \$63 million was matched by cooperating agencies, which also provided almost \$21 million unmatched, for a total of about \$147 million. This total constituted nearly 42 percent of the total funds for the USGS's program of water-resources activities (figure 2).

The fundamental characteristic of the Federal-State Cooperative Program is that local and State agencies provide at least one-half the funds, but the USGS does most of the work. At times, the cooperator's contribution to the program may be partly in the form of

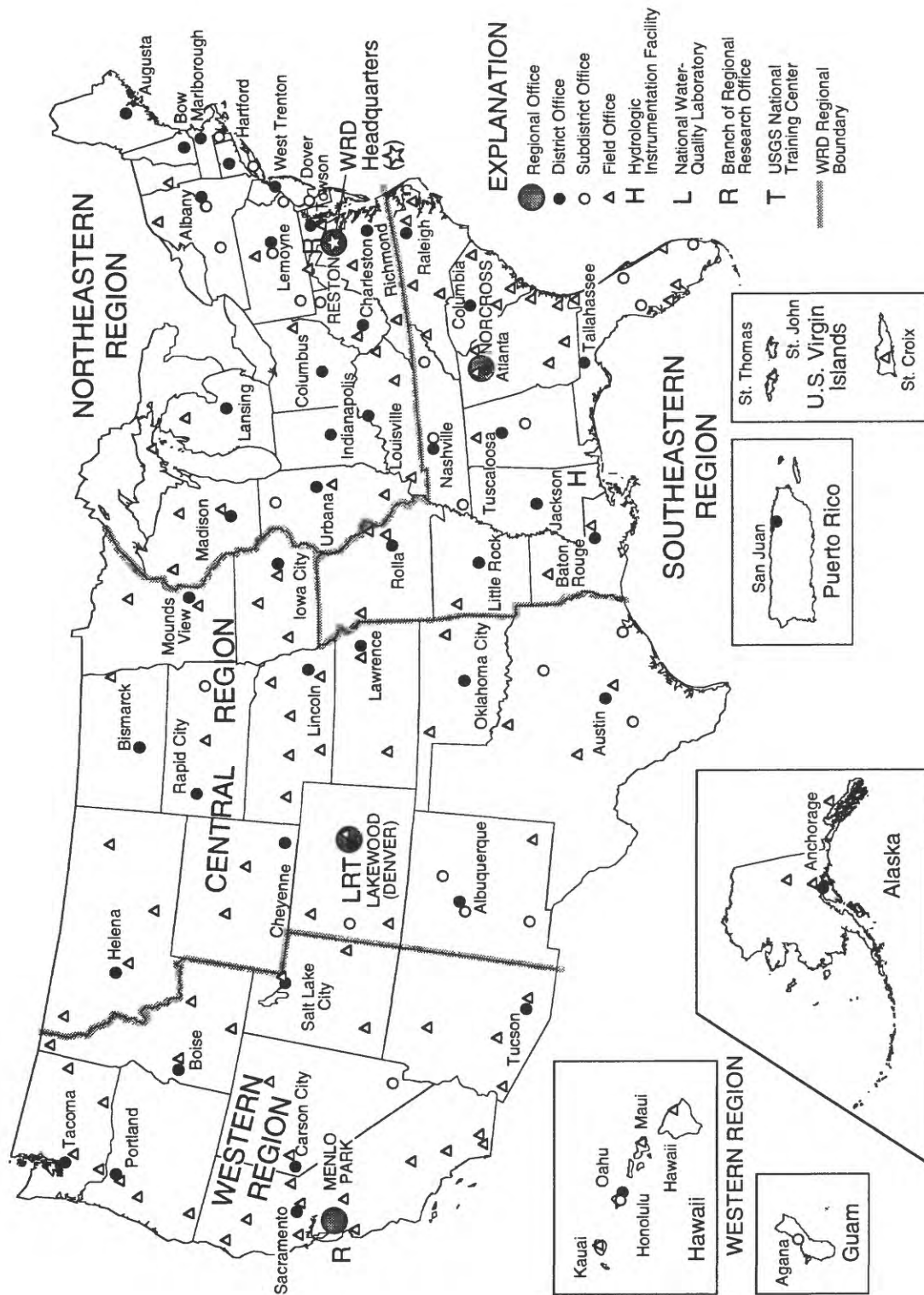


Figure 1.—U.S. Geological Survey Water Resources Division regional boundaries and location of principal offices

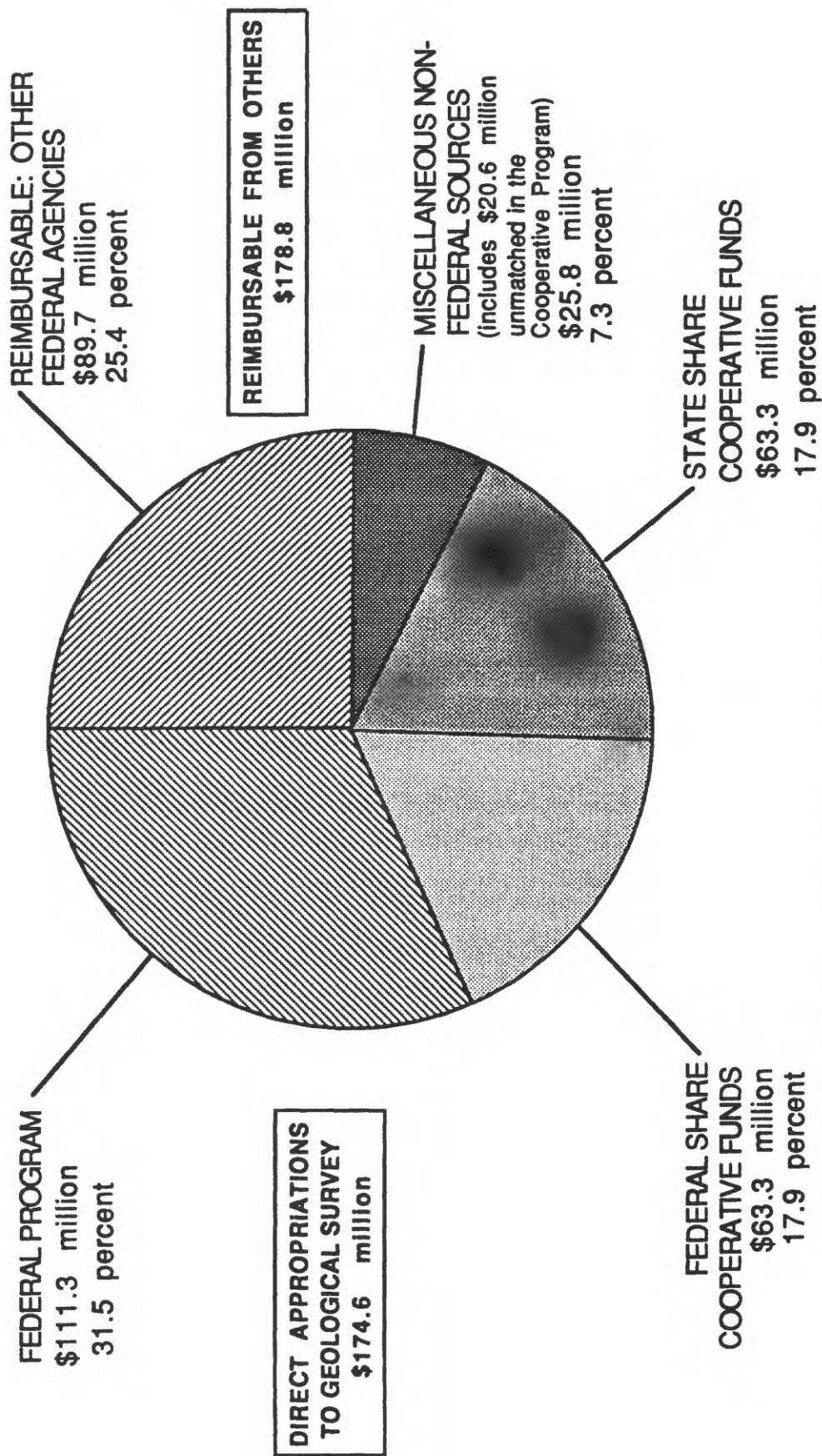


Figure 2 - Actual obligations of the U.S. Geological Survey  
Water Resources Division, fiscal year 1992



support known as direct expenditures, rather than funds. This refers to mutually agreed-upon work or material contributions for which dollar-value credit is given by the USGS for services rendered by the cooperator in support of program objectives.



## FUNCTIONS OF THE COOPERATIVE PROGRAM

In fulfilling its water-resources mission, the USGS performs four principal functions:

- It collects data needed for the continuing determination and evaluation of the quantity, quality, and use of the Nation's water resources.
- It conducts analytical and interpretive appraisals to describe the occurrence, availability, and physical, chemical, and biological characteristics of surface and ground water.
- It conducts research in hydraulics, hydrology, and related scientific and engineering fields.
- It disseminates water data and the results of investigations and research.

The collection of surface-water and ground-water data on a systematic basis under the provisions of the Federal-State Cooperative Program is a major part of the USGS's coordinated water-resources activities. The resulting information provides a continuing record of the quantity, quality, and use of the Nation's water resources. In FY 1992, the Federal-State Cooperative Program served as the sole source of funding for the operation of more than 4,000 continuous streamflow stations and partially funded an additional 700 continuous streamflow stations. These stations constitute almost 65 percent of the continuous streamflow stations operated by the USGS. The program also provided funds for the collection of ground-water levels at approximately 26,000 wells and the collection of water-quality data at about 2,600 surface-water stations and 6,200 ground-water well and spring stations. These data provide information necessary for the determination of water suitability for various uses, identification of trends, and evaluation of the effects of stresses on the Nation's surface- and ground-water resources. Additional information on this topic is provided in the section of this report entitled "Hydrologic Data Collection".

Within the Cooperative Program, typically about half of the funds support the collection of hydrologic data; the remaining half support hydrologic investigations and research. During FY 1992, the USGS was involved in about 500 research projects and investigations as part of the Cooperative Program. Investigations encompass areas that range in size from a square mile or less to multistate regions. In these investigations, USGS scientists bring together information to define, characterize, and evaluate the areal extent, quality, and availability of the water resource. Since the early 1970's, there has been an increase in the number of investigations that have emphasized water-quality issues, such as aquifer contamination, river quality, storm runoff quality, and the effects of acid rain, coal mining, and agricultural chemicals and practices on the hydrologic system.

In 1977, the Congress of the United States recognized the need for uniform, current, and reliable information on water use and directed the USGS to establish a National Water-Use Information Program to complement the Survey's data on the availability and quality of the Nation's water resources. Thus, the National Water-Use Information Program became part of the USGS's Federal-State Cooperative Program (Mann and others, 1982). As of 1992, all 50 States and Puerto Rico participate in the program at various levels of involvement.

All data and results of analytical studies are made available to cooperating agencies and to the public through published reports (about 1,500 in FY 1992), and through

computerized information programs, such as the National Water Information System (NWIS) and the National Water Data Exchange (NAWDEX) Program. Abstracts of completed reports are made available through the USGS Water Resources Scientific Information Center (WRSIC). Hydrologic data can be accessed by computer terminals at offices in every State.

In many places, the Cooperative Program provides the only source of support for water-data collection and investigations required to assess, on a continuing basis, the status of the Nation's water resources. Information developed in the Cooperative Program has relevance to potential and emerging long-term problems, such as water supply, waste disposal, energy development, and environmental management and protection. Because common analytical methods and techniques are used, the information also is relevant to problems having interstate, regional, national, or international significance. The information furnishes the basis required to abide by interstate and international compacts and Federal law and court decrees, and to carry out congressionally mandated studies, regional and national water-resources assessments, and planning activities.

## PROGRAM PRIORITIES

Program priorities are based on national needs that have been identified by the President and Administration advisors, by the Congress, by the Department of the Interior, by other Federal agencies, and from information the USGS has received from cooperating agencies and other interested parties. Issues that are identified through the National Water Summary (U.S. Geological Survey, 1984, 1985, 1986, 1988, 1990, and 1991) also are taken into consideration. As a result, the priorities are developed in response to mutual Federal, regional, State, and local requirements.

Thus, the USGS and its cooperating agencies work together in a continuing process that leads to adjustments in the program each year. The number of requests for scientific and technical assistance continues to grow from State agencies responsible for ground-water protection and for controlling and mitigating contamination. State offerings typically exceed Federal matching funds by as much as \$20 million or more each year (almost \$22 million in FY 1992) and reflect the increasing emphasis on water-quality issues, as well as other concerns regarding the availability, distribution, and use of the resource.

The strong linkage between the Cooperative Program, the Federal Program, and the Other Federal Agency Program is clearly reflected in the issues identified for FY 1993. The National Water-Quality Assessment (NAWQA) Federal Program, for example, will continue to build on water-quality information developed over many decades within the Cooperative Program. In turn, cooperative interests already are developing because of the new information emerging in the pilot NAWQA Program studies, as described in a subsequent section of this report entitled "Activities Related to the National Water-Quality Assessment Program." Data collection supported by the Federal Program and by other Federal agencies provides additional information. Ground-water contamination studies funded by military and civilian Federal agencies are providing valuable hydrologic information and research in basic physical processes. The USGS's National Research Program helps develop and refine hydrologic principles and methods for use in the Federal-State Cooperative Program. These are but a few examples of the interdependence among programs.

The following topics have been identified as highest priority in developing the FY 1993 Cooperative Program:

**GROUND-WATER QUALITY**--Concern continues over the vulnerability of the Nation's ground water to waste-disposal activities, nonpoint-source contamination, and saltwater intrusion. Of special concern are contamination sources related to agriculture. Further investigation of natural processes, such as flow dynamics, solute-transport and geochemical reactions, and the effects of subsurface biota that can alter, add, or remove contaminants, is needed in addition to studies of the effects of human activities. In some areas, improved definition of current ground-water quality is needed as a baseline for evaluation of future changes.

**WATER SUPPLY AND DEMAND**--The future health and economic welfare of the Nation's population depend on a continuing supply of uncontaminated fresh water. Increasing withdrawals and diversions of water for an ever-growing variety of users stress the quantity and quality of existing supplies. Recent drought in many areas of the country has accentuated the need to seek additional water supplies and to gather new information. Improved water-use information is needed to quantify the stresses on existing supplies and to refine possible demand-management options to supplement the traditional supply options. Improved flow-system definition and simulation also are

needed to manage aquifers that serve as important local or regional sources of water supply.

**STREAM QUALITY**--Assessment of the quality of the Nation's streams continues to be a priority component of the Cooperative Program. Improved information is needed on stream quality and sediment chemistry as related to land use, stream biota, groundwater contributions, and overland runoff. The effects of contamination from agricultural and urbanized areas on stream quality are issues of special national concern.

**WETLANDS, LAKES, AND ESTUARIES**--These valuable ecosystems merit special attention because of their importance as fish and wildlife habitat, sources of water supply, and recreational areas. Although these areas are particularly sensitive to the effects of human activities, they continue to be subject to development pressures. An improved understanding of the physical, chemical, and biological processes is needed to manage and protect these valuable resources.

**HYDROLOGIC HAZARDS**--Economic losses from floods, lake-level changes, mud and debris flows, erosion and sedimentation, and other hydrologic hazards can amount to billions of dollars annually. Studies are needed to improve the understanding of processes underlying these events and the likely magnitudes and effects of hydrologic hazards. Studies involving the use of newly available precipitation data from the National Weather Service Next Generation Radar to improve flood modeling and estimating are encouraged.

**NONPOINT-SOURCE POLLUTION**--Nonpoint-source pollution is the by-product of a variety of land use factors ranging from urbanization to cultivation for agriculture. The types and extent of nonpoint-source contamination as well as the effectiveness of potential solutions to contamination are poorly understood. Technical information is needed to conduct effective monitoring programs and to identify effective management practices.

**HYDROLOGIC DATA COLLECTION**--The hydrologic data program of the USGS continues to be the foundation for present and future interpretive studies. Large amounts of data and specialized interpretation are required to resolve conflicts among State and Federal agencies regarding Federal reserved water rights, particularly Indian water rights. The NAWQA Program and other USGS initiatives will rely heavily on past, present, and future data-collection efforts.

**INDIAN WATER RIGHTS**--The USGS has long assisted in appraising the water resources of Indian lands as part of the Cooperative Program. The protection and management of the Indian tribes' natural resources are essential elements of the Secretary of the Interior's trust responsibility to the tribes. Priorities in the Cooperative Program will continue to emphasize hydrologic data collection and investigations in this regard.

## HYDROLOGIC DATA COLLECTION

The collection of surface-water and ground-water data on a systematic basis through the Federal-State Cooperative Program is a major part of the USGS's coordinated water-resources activities. Table 1 summarizes the numbers of stations operated through funding from the Federal, Cooperative, and Other Federal Agency Programs. The resulting information provides a continuing record of the quantity, quality, and use of the Nation's water resources. The data are available for use by Federal, State, and local agencies in developing, utilizing, conserving, and managing water and related land resources to meet the Nation's need for clean water. The data are also the basis for continuing analytical, interpretive, and predictive studies and appraisals of water resources. The number of continuous and scheduled long-term surface-water, ground-water, and water-quality stations operated by the USGS in FY 1992 are shown by sources of support in figure 3.

In FY 1992, the Federal-State Cooperative Program funded totally the operation of 4,048 continuous stream discharge stations (table 1) and funded in combination with other sources another 675 continuous stream discharge stations. Virtually all the stations serve several purposes. In addition to meeting State and local needs, for example, the Federal-State Cooperative Program stations provide information required by many Federal agencies--for flood prediction, land-use planning, streamflow regulation, hydroelectric power production, waste disposal standards, pollution regulation, highway and bridge structure design, coal mine permits, and land reclamation. Specifically, about 3,000 stations are currently used by the National Weather Service for flood and flow forecasting.

The program funded fully or in part the collection of ground-water levels at 22,058 scheduled, long-term sites and 3,574 short-term or project sites, as shown in table 2. Each year from 1988 through 1992, the Cooperative Program supported data collection at between 25,600 and 29,900 public and privately owned wells (long-term and short-term sites) where information was collected on ground-water levels. Water-level data are used to assess changes in ground-water storage that can result from natural causes or from man's activities. These data are necessary to determine suitability of water for various uses, to identify trends, and to evaluate the effects of stresses on aquifers. Overall in FY 1992, the Cooperative Program accounted for more than 80 percent of the USGS's activities in ground-water data collection.

The FY 1992 program also provided for collection of water-quality data at a total of 2,577 surface-water stations and a total of 6,231 ground-water stations. From 1988 through 1992, selected water-quality constituents were determined annually from samples collected at 5,400 to 6,400 wells.

The Program has been adjusted at times in response to changing requirements for hydrologic data, as reflected in the summary information of table 2. For example, from fiscal year 1988 to 1992, the number of continuous surface-water discharge stations declined by 208 sites; the total number of surface-water quality stations increased by 615; total ground-water level stations declined by 3,687; and total ground-water quality stations decreased by 118. These changes have been produced by the need to adapt program content to the availability of funds and evolving priorities, and are composites of increases in some States and decreases in others.

The use of satellite-telemetry technology continues to increase to meet needs for near real-time hydrologic data for flood-forecasting and water-management purposes, and for monitoring the operation of critical data-collection stations. As of FY 1992, largely

Table 1--Water-data collection activities of the  
U.S. Geological Survey, fiscal year 1992

Types of Stations <sup>1</sup>	Number of Stations <sup>2</sup>				
	A. Federal Program	B. Federal-State Cooperative Program	C. Other Federal Agency Program	D. Combined Support	Total
<b>SURFACE WATER</b>					
<u>Discharge</u>					
Continuous Record	531	4,048	1,889	825	7,293
Partial Record	132	2,451	369	47	2,999
<u>Stage only--Streams</u>					
Continuous Record	13	239	311	47	610
Partial Record	9	264	56	18	347
<u>Stage only--Lakes and Reservoirs</u>					
Continuous Record	14	392	389	24	819
Partial Record	11	296	76	15	398
<u>Quality</u>					
Scheduled, Long-Term	432	1,449	346	111	2,338
Short-Term or Project	143	961	184	80	1,368
<b>GROUND WATER</b>					
<u>Water Levels</u>					
Scheduled, Long-Term	2,162	21,648	1,021	410	25,241
Short-Term or Project	555	3,255	1,669	319	5,798
<u>Quality</u>					
Scheduled, Long-Term	253	3,846	175	162	4,436
Short-Term or Project	448	1,990	634	233	3,305

<sup>1</sup> Types of Stations

CONTINUOUS RECORD: The station is instrumented to monitor hydrologic conditions continually and, in some instances, to transmit data soon after collection.

PARTIAL RECORD: Hydrologic information is collected only during selected periods, for example, during floods.

SCHEDULED, LONG-TERM: Hydrologic information is collected on a fixed schedule for a long period to detect trends. With respect to surface-water quality and ground-water levels, continuous-recording stations are included in this category.

SHORT-TERM OR PROJECT: Hydrologic information is collected to meet the needs of a specific study. Data supplement those available from scheduled, long-term; continuous-record; and partial-record stations.

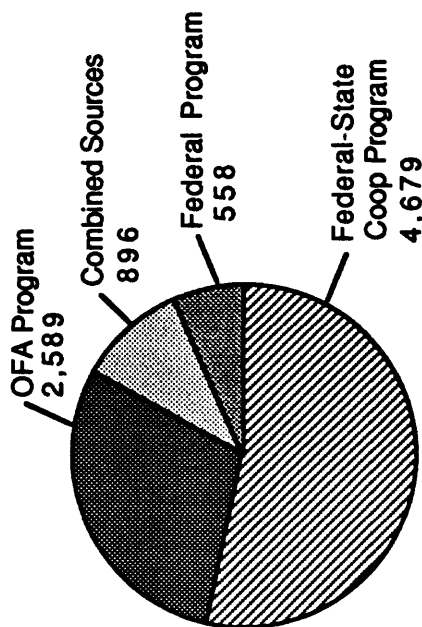
<sup>2</sup> Number of Stations

COLUMN A--Stations totally supported by funds appropriated to the USGS for the Federal Program.

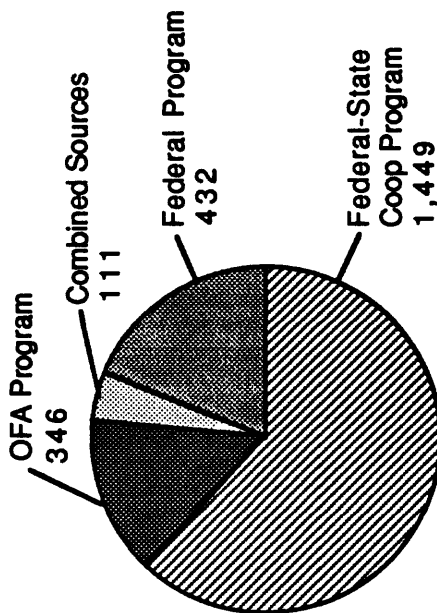
COLUMN B--Stations partly supported by funds appropriated to the USGS for the Federal-State Cooperative Program.

COLUMN C--Stations totally supported by reimbursements as part of the Other Federal Agency Program.

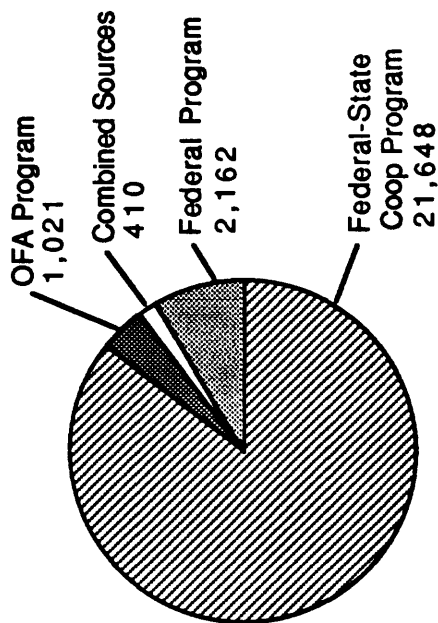
COLUMN D--Stations supported by a combination of two or more of the above.



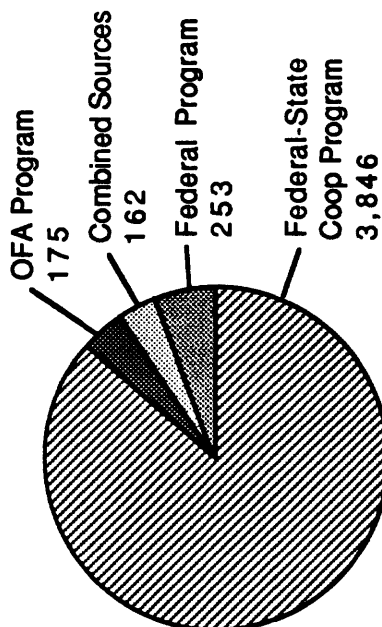
**STREAM DISCHARGE: STREAM, LAKE  
AND RESERVOIR STAGE--8,722**



**SURFACE-WATER QUALITY--2,338**



**GROUND-WATER LEVELS--25,241**



**GROUND-WATER QUALITY--4,436**

Figure 3 - Number of continuous and scheduled, long-term surface-water, ground-water, and water-quality stations, by sources of support, that were operated by the U.S. Geological Survey in fiscal year 1992. The sources of support include the Federal-State Cooperative Program, the Federal Program, and the Other Federal Agency (OFA) Program.



Table 2--Water-data collection stations supported fully or in part by the  
U.S. Geological Survey Federal-State Cooperative Program,  
fiscal years 1988 through 1992

Types of Stations <sup>1</sup>	Fiscal Year				
	1988	1989	1990	1991	1992
<b>SURFACE WATER</b>					
<u>Discharge</u>					
Continuous record	4,931	4,691	4,840	4,813	4,723
Partial record	3,393	3,073	3,051	2,739	2,476
<u>Stage only--Streams</u>					
Continuous record	244	259	236	292	279
Partial record	206	260	300	352	281
<u>Stage only--Lakes &amp; Reservoirs</u>					
Continuous record	423	426	441	420	416
Partial record	236	255	243	227	310
<u>Quality</u>					
Scheduled, long-term	1,344	1,430	1,454	1,583	1,536
Short-term or project	618	900	745	622	1,041
<b>GROUND WATER</b>					
<u>Water Levels</u>					
Scheduled, long-term	21,801	22,997	22,123	22,381	22,058
Short-term or project	7,518	6,681	7,825	5,624	3,574
<u>Quality</u>					
Scheduled, long-term	3,257	3,870	3,802	3,775	4,008
Short-term or project	3,092	2,552	2,607	2,619	2,223

<sup>1</sup> Types of Stations

**CONTINUOUS RECORD:** The station is instrumented to monitor hydrologic conditions continually and, in some instances, to transmit data soon after collection.

**PARTIAL RECORD:** Hydrologic information is collected only during selected periods, for example, during floods.

**SCHEDULED, LONG-TERM:** Hydrologic information is collected on a fixed schedule for a long period to detect trends. With respect to surface-water quality and ground-water levels, continuous-recording stations are included in this category.

**SHORT-TERM OR PROJECT:** Hydrologic information is collected to meet the needs of a specific study. Data supplement those available from scheduled, long-term; continuous-record; and partial-record stations.

through reimbursements from other Federal, State, and local agencies, satellite data-relay platforms have been installed in about 3,500 USGS stations and are providing information variously on stream discharge, stream or reservoir stage, selected water-quality characteristics, or precipitation quantity. About 2,700 of the platforms are operated by the USGS and the remaining 800 are operated by others. More than one-quarter of the platforms receive support from the Federal-State Cooperative Program and approximately two-thirds of the funding is derived from other Federal agencies. It is anticipated that by FY 1994, satellite data-relay platforms will be in operation at as many as 4,200 USGS stations.

## ACTIVITIES RELATED TO THE NATIONAL WATER-QUALITY ASSESSMENT PROGRAM

The USGS National Water-Quality Assessment (NAWQA) Program is designed to describe status and trends in the quality of the Nation's surface-water and ground-water resources (Leahy and others, 1990). The program, fully funded by Federal appropriations, also will provide an improved understanding of the natural and human factors that affect the quality of these resources. Water-quality information will be integrated at different spatial scales, such as, local, study-unit, regional, and national, to achieve program objectives. In addition, the program will address those water-quality conditions that affect large areas or recur at the local scale.

The program includes 60 study-unit investigations of areas located throughout the Nation that provide a framework for an aggregation of findings on regional and national scales. Collectively, the study units encompass an area which accounts for 60 to 70 percent of the total ground-water and surface-water use and population served by public water supply systems.

In 1986, the NAWQA Program pilot studies were started in seven areas. The program was well received and in late 1989 the Administration requested that Congress fund the transition to a full-scale NAWQA Program. Congress appropriated \$18 million in FY 1991.

As a result of the positive reactions to the planned program, the pilot studies, and the appropriation by Congress in the FY 1991 budget to begin the full program, interest surfaced for enhancing the NAWQA Program with investigations in the Cooperative Program. The companion studies are providing additional knowledge and information that might not have been available otherwise. The number of these Cooperative Program studies and their complexity continue to increase.

The following are examples of the types of NAWQA-related studies conducted as part of the Cooperative Program.

- **Kansas: Degradation of Atrazine in Ground Water**

A cooperative project between the USGS and Kansas State University has been initiated at a farm plot scale to: (1) determine the degradation rates of the atrazine herbicide in ground-water systems; (2) determine whether the principal degradation pathways are chemical or microbiological; (3) determine, to the extent possible, the principal degradation products of atrazine in ground water; and (4) conduct a parallel study of the degradation of atrazine in unsaturated soil environments. This information is necessary to understand the transport, persistence, and long-term effects of atrazine in ground-water systems.

- **Kansas: Pesticide Movement in Surface and Ground Water**

A cooperative project among the USGS, the Kansas State Board of Agriculture, and Kansas State University is designed to determine the potential to decrease the transport of herbicides, such as atrazine and other organo-nitrogen herbicides, into surface and ground water. Specific objectives are to: (1) measure atrazine, alachlor, and their selected metabolites and suspended-sediment concentrations in surface runoff under different land-management practices, such as terraced, clean-tilled, and ridge-tilled cornfields with and without grassed filter strips; and (2) evaluate the difference in infiltration volume and soil-water quality among the different land-management practices.

- **Arkansas: Flow Systems in Carbonate-Rock Aquifers**

On local and regional scales, flow systems and solute transport mechanisms are poorly defined for most carbonate aquifers. A cooperative study among the USGS, the Arkansas Soil and Water Conservation Commission, and the University of Arkansas is designed to develop a more complete understanding of the processes and controls that affect the flow distribution and permeability in carbonate aquifers in a 16-county area of northern Arkansas. Investigators will refine existing conceptual-flow models and develop appropriate tools to quantitatively assess ground-water resources and contaminant-transport potential in carbonate rock terrains at scales ranging from regional to site specific. Wells, springs, and surface-karst features will be inventoried and selectively sampled to address transport mechanisms involving both point- and nonpoint-source contaminants using a multidisciplinary approach.

- **Colorado: Ground-Water Discharge to the South Platte River**

Concentrations of dissolved oxygen in some parts of the South Platte River between Denver and Ft. Lupton fall below regulatory limits. Effluent discharge has been identified as an important factor in dissolved oxygen depletion but other processes also contribute to low dissolved oxygen conditions. Preliminary findings indicate that ground-water discharge is a significant source of water to the river during low-flow periods. This ground-water is depleted in dissolved oxygen and nitrate relative to surface water, and thus may have a significant adverse impact on the surface-water quality. Objectives of the cooperative study between the USGS and the Metropolitan Wastewater Reclamation District include providing direct measurement of the quantity and quality of ground-water discharging to the river, identifying chemical and biological processes in streambed sediments that affect the chemistry of ground water discharging to the river, and measuring the rates of microbial nitrification and aerobic respiration in the South Platte River bed sediments.

- **Delaware: Herbicides in Shallow Ground Water**

Several herbicides commonly used on corn and soybean crops were detected in shallow ground water at two agricultural sites in Delaware as part of a cooperative study with the Delaware Geological Survey from 1988 to 1991. Atrazine was detected most frequently and commonly at higher concentrations than cyanazine, simazine, metolachlor, and alachlor. Concentrations of herbicides were below the health limits set by the U.S. Environmental Protection Agency, with the exception of one detection of atrazine and one of alachlor. Highest concentrations of herbicides were measured near the water-table surface beneath areas of intense agricultural land use. Herbicides were not detected in deeper, down gradient parts of the flow systems, although nitrate concentrations remained high.

- **Illinois: Sedimentation of the Kankakee River**

Sedimentation in the Kankakee River has been a major concern to Illinois residents for many years. Early studies showed that extensive drainage of the wetlands and channelization of the Kankakee River caused increased sedimentation, but, by the early 1950's, the river had reached equilibrium and further sedimentation was not observed. Illinois residents, however, who use the river continue to be concerned about whether or not sedimentation has continued to increase. As a result of this concern, the USGS, in cooperation with the Kankakee Soil and Water Conservation District, began a study to (1) determine the long-term sedimentation rate in the flood plain and compare rates in channelized and natural reaches of the river, (2) determine changes in channel geometry and volume over the past 30 years from the dam at Kankakee to the State line, and (3) determine a suspended-sediment budget for the central portion of the Kankakee River basin.

- **Kentucky: Effects of Oil Production on Water Resources in the Kentucky River Basin**

An area of intensive oil-production activity in the Kentucky River basin has been investigated by the USGS in cooperation with the Kentucky Geological Survey to describe the chemical character of ground and surface water, and to assess the effects of brine discharges on receiving waters. About 10 barrels of saline water are produced with each barrel of oil; the saline water is either reinjected to enhance oil recovery or discharged to the land surface. Ground-water samples obtained in oil-production watersheds indicated that (1) shallow ground water in valley alluvium probably has not been widely affected, and (2) secondary recovery of oil by water flooding had decreased the dissolved-solids concentration of water in the oil-bearing formations but not in the overlying formations.

- **Minnesota: Recharge to Aquifers in the Southern Red River Valley**

Water levels in buried sand and gravel aquifers have declined as much as 50 feet near Wahpeton, North Dakota, and Breckenridge, Minnesota, and 30 feet near Moorhead, Minnesota, as a result of ground-water withdrawals for these cities. This has caused concern about future availability of good-quality ground water. Some of the recharge to the aquifers near Wahpeton and Breckenridge could come from saline ground water in a deeper Dakota Sandstone aquifer. Both aquifers receive some recharge from infiltration through chemically-treated cropland or feedlots. The USGS in cooperation with the Minnesota Department of Natural Resources is delineating boundaries for these aquifers and will estimate relative amounts of recharge from shallow and deeper sources that could degrade the water supplies. The results of this study will help water-resource managers to better plan ground-water resource development, particularly across State boundaries.

- **Oregon: Water Quality in the Willamette River Basin**

The Oregon Department of Environmental Quality (ODEQ) must renew point-source permits in the Willamette River basin in 1994, and they need improved water-quality information to support the renewals. The ODEQ asked the USGS to cooperate in a water-quality study that will provide information on streamflow, sediment transport, and hydrophobic and hydrophilic contaminants (both metallic and organic) in water and bed sediment. Objectives of the study are: (1) to better characterize low-flow conditions and simulate streamflows in the main stem and major tributaries of the Willamette River by calibrating and verifying hydrologic (rainfall-runoff) and hydraulic (channel routing) models, (2) to measure suspended-sediment concentration and calculate loads and yields for nine locations below existing dams and compare these to pre-dam conditions, and (3) to perform reconnaissance-level water-quality sampling for organic contaminants and trace elements.

- **Virginia: Quality of Ground-Water Discharge**

The effects of nitrate in ground water, discharging to estuaries and their tributaries, on the aquatic organisms in the estuaries is a major concern in the Mid-Atlantic States. The USGS in cooperation with the Accomack-Northampton Planning District Commission and the Virginia State Water Control Board, is studying the effects of different geohydrologic environments on the quality of ground-water discharge. The study emphasizes the effects that differences in geology, topography, and vegetation have on ground-water flow, geochemistry, and nitrate concentrations.

## EXAMPLES OF CURRENT INVESTIGATIONS

Several additional examples of recent cooperative investigations follow:

- **California: Ground-Water Quality in an Artificial Recharge Basin**

In southern California, 240,000 acre-feet per year of the locally supplied water comes from reclaimed water, with 183,000 acre-feet per year being used to recharge local ground-water basins. The USGS, in cooperation with the Water Replenishment District of Southern California, is studying how this reclaimed water affects ground-water quality. Reclaimed water commonly has elevated nitrogen-species concentrations, a variety of organic compounds, and suspended colloidal material, including bacteria and viruses. The objectives of the investigation include determining the amount of denitrification and total organic carbon removal that occurs, determining the occurrence of physical or biogeochemical transformations of the organic compounds, and determining the fates of colloidal materials as water percolates through the unsaturated zone to the water table.

- **Georgia: Potential for Contamination of a Limestone Aquifer**

The sinks, caves, solution channels, and cavities of limestone aquifers in karst terranes result in complex ground-water flow paths. This makes evaluation of the potential for contamination of ground water difficult in such settings. Tracers of ground-water flow, such as tritium and other environmental isotopes, have proven inadequate in some karst areas. The USGS, in cooperation with the city of Valdosta, is investigating the use of chlorofluorocarbons as a tracer of ground-water flow in south-central Georgia. Data collected to date indicate the ground water is a mixture of regional ground-water flow and relatively young water from the Withlacoochee River.

- **Hawaii: Ground-Water Availability**

Most ground water used on Oahu, the most-populated island in Hawaii, is withdrawn from the central corridor between the island's two mountain ranges. Withdrawal is regulated by the State to prevent salt-water intrusion, but the regulations are based on limited information about the ground-water flow system. The objective of a USGS cooperative study with the Honolulu Board of Water Supply is to quantify the ground-water resources of the northern part of the central corridor. A digital computer model of the freshwater/saltwater flow system in the entire central corridor has been constructed, and analyses from the model have helped identify the additional data needed to support decisions about management of the aquifer.

- **Kentucky: Water-Quality Trends in the Kentucky River Basin**

Detection of water-quality trends for trace elements and insecticides in many streams is often hampered because of sparse data and typically low constituent concentrations. Fresh-water mussels accumulate insecticides and trace elements in their shells and tissues at concentrations easily detected by readily available laboratory methods. The USGS, in cooperation with the Kentucky Natural Resources and Environmental Protection Cabinet and Kentucky State University, is investigating the correlation between concentrations of selected contaminants in mussel shell and tissue and long-term, water-quality trends at fixed monitoring stations in the Kentucky River basin. Results of the relation may be applicable to streams in the basin for which water-quality data are sparse.

- **Michigan and Wisconsin: Quality of Lake Superior Tributary Streams**

The USGS, in cooperation with the Michigan and Wisconsin Departments of Natural Resources, is using state-of-the-art technology to obtain estimates of contaminant loads from major tributaries to Lake Superior. Data are being collected

throughout the Lake Superior region using uniform field and laboratory techniques. A computerized long-term data base, now accessible to every agency involved in studying the Great Lakes, provides information that can be used to evaluate State and Federal efforts to mitigate the impacts of selected constituents in Lake Superior.

- **Nevada: Sediment-Transport Dynamics in the Lower Virgin River Basin**

The southern Nevada Cooperative Water Project (CWP) has proposed diversion of about 70,000 acre-feet of water from the lower Virgin River, about 40 percent of the long-term average flow. The USGS, in cooperation with the Las Vegas Water District, has begun a study to assess how the proposed diversions would change the hydraulics and sediment-transport dynamics in the highly unstable 7-mile reach of Virgin River channel between the diversion point and Lake Mead. The U.S. Fish and Wildlife Service, the National Park Service, Bureau of Reclamation, and Bureau of Land Management are interested in how the diversions and changes in sediment regime might affect the habitat in the lower river and sediment loads to Lake Mead. This study will employ intensive monitoring of sediment transport and surveying of channel geometry to support development of hydraulic and sediment-transport models to simulate potential hydrologic impacts of the proposed diversion.

- **New Jersey: Modeling Contaminant Movement in Ground Water**

Few tools are readily available to evaluate ground-water flow and potential contaminant movement in aquifer systems with secondary permeability, such as dipping layered fractured rocks. The USGS, in cooperation with Rutgers University, is investigating a ground-water plume of volatile organic compounds, to determine if ground-water flow in layered fracture rocks can be simulated satisfactorily by use of a classic porous-media ground-water-flow model.

- **New Mexico: Recharge in Arroyo Channels, Albuquerque**

The USGS, in cooperation with the city of Albuquerque, is investigating the quantity and quality of recharge to the Albuquerque-Belen ground-water basin through arroyo channels. A water-budget analysis is underway for Tijeras Arroyo at Four Hills Bridge, Albuquerque. These data are important to the development of a ground-water model for use by the city of Albuquerque in the management of the water resource.

- **North Dakota: Water-Quality of Devils Lake**

Devils Lake, typical of many closed-basin lakes, is characterized by large fluctuations in water level and in concentrations of dissolved solids. State government, local government, and water-resource management groups are concerned about the adverse effects that declining water levels and deterioration of water quality may have on sport fishing, migratory waterfowl, and recreation. In an investigation undertaken by the USGS in cooperation with the North Dakota State Department of Health, the chemical exchange between the bottom sediments and the water in the lake has been investigated. The analyses indicate that bottom-sediment processes are an important control on water quality in the lake, and that a reduction in the dissolved solids in the tributary inflow would not significantly improve water quality. This type of information is essential to water-resources managers in their development of plans for controlling water quality.

- **Oklahoma: Source of Brine Contamination in Ground Water**

The USGS, in cooperation with the Sac and Fox Nation, is conducting a ground-water quality study of the shallow fresh-water aquifer underlying the tribal lands in Lincoln County. The purpose of this study is to characterize the quality of the fresh ground water and determine if the aquifer is contaminated by brines from oil producing



activities in the area. Borehole geophysical logs from oil wells were used to construct a subsurface map indicating areas of abnormally shallow brines in the fresh-water aquifer. Ground-water sampling from test holes and geochemical modeling of the ionic species and the stable environmental isotopes indicate that the source of brine in the shallow fresh-water aquifer is from a deep oil producing formation. The information obtained from this study is being used by the U.S. Department of Justice to determine if oil producing activities have caused the degradation of the aquifer.

- Oregon: Tualatin River Water Quality

Excessive loading of phosphorus to the Tualatin River has resulted in nuisance growths of planktonic algae and periodically low concentrations of dissolved oxygen in the lower river. Previously it was thought that water-quality problems could be solved by eliminating phosphorus from waste-water treatment plants and surface runoff from urban and agricultural lands. However, the USGS investigation in cooperation with the Unified Sewerage Agency of Washington County has shown that ground water discharging to the river and its tributaries contains phosphorus concentrations 5 to 100 times larger than expected, and may hamper clean-up efforts. Phosphorus in ground water comes from both human activities and natural sources, but some of the highest concentrations seem to occur naturally in an aquifer that contains large amounts of organic matter buried by catastrophic floods during the Pleistocene Epoch. Results up to this point have prompted agencies to review remediation strategies for the Tualatin River, so that spending millions of dollars on ineffectual "best management practices" in urban and agricultural areas can be avoided.

- South Carolina: Rates of Petroleum Hydrocarbon Degradation

The USGS, in cooperation with the South Carolina Water Resources Commission, is investigating an extensively contaminated shallow water-table aquifer underlying a fuel tank farm in Hanahan, South Carolina. Data collected to date have revealed that petroleum hydrocarbons in the aquifer are being degraded anaerobically in a complex pattern of zones dominated by iron-reducing, sulfate-reducing, and methanogenic conditions that change dynamically in both time and space. Further investigation is designed to determine relative rates of hydrocarbon degradation under these conditions and how degradation rates are affected by continuous changes in conditions. This information should benefit the design of bioremediation strategies at this and similar sites nationwide.

- Tennessee: Effects of Agricultural Practices on Water Quality in the Beaver Creek Drainage Basin

Agricultural operations have been identified as the largest contributor to water quality degradation in the intensively farmed areas of west Tennessee. The purposes of this investigation, conducted by the USGS in cooperation with the Tennessee Department of Agriculture, are to document the impacts of various agricultural practices on surface and subsurface water quality and to assess the effectiveness of implementing various best management practices (BMP's). The study will determine the current quality of surface and subsurface waters in the Beaver Creek drainage basin of west Tennessee and document changes in sediment, nutrient, and pesticide levels subsequent to BMP implementation. The results are expected to show the effectiveness of different agricultural BMP's for water-quality improvement and may be transferable to other agricultural areas of Tennessee and the United States.

- Texas: Wastewater Injection, El Paso

The El Paso area in Texas is water short and ground-water levels are declining. The Hueco Bolson aquifer furnishes a portion of El Paso's water supply. About 8 billion gallons of tertiary-treated, chlorinated wastewater were injected into the aquifer from

1985 through 1991 to slow the aquifer's rate of depletion. The potential for contamination by trihalomethane (THM) compounds, potentially carcinogenic by-products of treated-water chlorination, had not been defined. In cooperation with the El Paso Water Utilities, the Texas Water Development Board, and the Bureau of Reclamation, the USGS is investigating the movement and fate of injected water in the aquifer. Results show that THM compounds in the treated water are decreased by natural processes to less than current and proposed maximum contaminant levels in public water supplies as established by the U.S. Environmental Protection Agency. These findings indicate that the present injection process can continue to extend the life of the resource without major modification and without great additional expense.

- Wisconsin: Algal Dynamics in Transport of PCB's in the Milwaukee River  
Algal uptake of polychlorinated biphenyls (PCB's) and subsequent cycling of PCB-laden algal biomass may play an important role in determining the residence time and bioavailability of these organic compounds in streams and sediments. The USGS, in cooperation with the Wisconsin Department of Natural Resources, is investigating the significance of algal uptake on advective transport of PCB's in the Milwaukee River. The study will also characterize the areal extent of sediments contaminated with PCB's in the Milwaukee River, as well as predict PCB transport and fate in the river system.

## SUMMARY AND CONCLUSIONS

The USGS's Federal-State Cooperative Program has responded to national needs for hydrologic information since 1895. During FY 1992, water-resources data collection, investigations, and research were conducted in cooperation with more than 1,000 State, regional, and local agencies in every State, Puerto Rico, and several Territories. Cooperative Program funding in FY 1992 totaled about \$147 million and accounted for nearly 42 percent of the total obligations for the USGS's Water Resources Division. The Cooperative Program provides much of the information required by those responsible for water-resources planning and management, water-supply development, and environmental improvement through hydrologic data collection, investigations, and research. The program is a unique activity in that, although the cooperating agencies provide more than half the funds, the USGS performs most of the work. The program is also a primary source for knowledge concerning techniques for collecting and analyzing data on the quantity, quality, use, and movement of surface water and ground water.

Because the availability of high-quality water is a fundamental limiting factor to population growth, a comprehensive and forward-looking program of hydrologic data collection and investigations is needed to provide the information necessary for the wise development and use of the Nation's water resources. The job is too large to be supported at either Federal or State level alone. The jointly planned and funded Cooperative Program provides convincing assurance that the work is designed to meet national and local needs.

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## Appendix A--Cooperators by State, Fiscal Year 1992

### Alabama:

Alabama Department of--  
 Economic and Community Affairs  
 Emergency Management  
 Environmental Management  
 Highways  
 Anniston, City of  
 Birmingham, City of  
 Coffee County Commission  
 Geological Survey of Alabama  
 Huntsville, City of  
 Jefferson County Commission  
 Mobile, City of  
 Montgomery, City of  
 Parrish, Town of  
 Sumter County  
 Tuscaloosa, City of

### Alaska:

Alaska Department of--  
 Fish and Game  
 Natural Resources, Division of--  
 Water  
 Transportation  
 Alaska Energy Authority  
 Alaska Indust. Dev. & Export Authority  
 Anchorage, Municipality of  
 Cordova, City of  
 Juneau, City and Borough of  
 Kenai Peninsula Borough  
 Sitka, City and Borough of  
 University of Alaska, Fairbanks

### Arizona:

Arizona Department of--  
 Environmental Quality  
 Water Resources  
 Cochise County Flood Control District  
 Gila Valley Irrigation District  
 Gila Water Commissioner, Office of  
 Hualapai Indian Tribe  
 Hopi Tribe Dept. of Natural Resources  
 Maricopa County--  
 Flood Control District  
 Water District  
 Metro. Water District of So. California  
 Navajo Nation  
 Pima County Dept. of Transportation  
 Safford, City of--  
 Water, Gas & Sewer Dept.  
 Salt River Project  
 Scottsdale, City of--  
 Water Resources Dept.  
 Show Low Irrigation Company  
 Tucson, City of

### Arkansas:

Arkansas Department of--  
 Highway and Transportation  
 Parks and Tourism  
 Pollution Control and Ecology  
 Arkansas Game and Fish Commission--  
 Fisheries Division

### Arkansas--Continued

Arkansas Geological Commission  
 Arkansas Soil and Water Cons. Comm.  
 Arkansas-Oklahoma  
 Arkansas River Compact Commission  
 Fort Smith, City of, Utility Dept.  
 Independence, County of  
 Little Rock, City of  
 Department of Public Works  
 Municipal Water Works  
 Rogers, City of, Water Utilities Department  
 Saline County Rural Development Authority  
 University of Arkansas--  
 at Fayetteville  
 at Little Rock

### California:

Adelanto, City of  
 Alameda County--  
 Flood Control & Water Cons. District  
 Water District  
 Antelope Valley-East Kern Water Agency  
 California Department of--  
 Boating and Waterways  
 Fish and Game  
 Parks and Recreation  
 Pesticide Regulation  
 Transportation  
 Water Resources  
 California Water Resources Control Board  
 Calleguas Municipal Water District  
 Carpinteria County Water District  
 Casitas Municipal Water District  
 Channel Islands Beach Comm. Services  
 Coachella Valley Water District  
 Contra Costa County Flood Control and  
 Water Conservation District  
 Crestline-Lake Arrowhead Water Agency  
 Desert Water Agency  
 East Bay Municipal Utility District  
 Eastern Municipal Water District  
 Georgetown Divide Public Utility District  
 Humboldt Bay Municipal Water District  
 Imperial County Dept. of Public Works  
 Imperial Irrigation District  
 Indian Wells Valley Water District  
 Los Angeles County of  
 Madera Irrigation District  
 Marin Municipal Water District  
 Mendocino County Water Agency  
 Merced, City of  
 Merced Irrigation District  
 Metropolitan Water District of So. California  
 Mojave Water Agency  
 Mono County  
 Montecito Water District  
 Monterey County Water Resources Agency  
 Monterey Peninsula Water Mgmt. District  
 Orange County Water District  
 Pechanga Indian Reservation  
 Riverside County Flood Control and Water  
 Conservation District  
 Sacramento County Dept. of Public Works

California--Continued

Sacramento Municipal Utility District  
San Benito County Water District  
San Bernardino County Flood Control District  
San Bernardino Valley Municipal Water District  
San Diego, City of  
San Diego County Dept. of Public Works  
San Francisco, City and County of  
San Francisco Water Department  
San Luis Obispo County Eng. Department  
San Mateo County Dept. of Public Works  
Santa Barbara, City of, Dept. of Pub. Works  
Santa Barbara County--  
Flood Control & Water Cons. District  
Water Agency  
Santa Clara Valley Water District  
Santa Cruz, City of  
Santa Cruz County Flood Control and Water Conservation District  
Santa Maria Valley Water Cons. District  
Santa Ynez River Water Cons. District  
Scotts Valley Water District  
Sonoma County--  
Planning Department  
Water Agency  
Tahoe Regional Planning Agency  
Tulare County Flood Control District  
Turlock Irrigation District  
United Water Conservation District  
Ventura County Public Works Agency  
Water Master--Santa Margarita  
Water Replenishment Dist. of So. California  
Woodbridge Irrigation District  
Yolo County Flood Control and Water Conservation District  
Yuba County Water Agency

Colorado:

Arapahoe County Water and Wastewater  
Arkanasa River Compact Administration  
Aspen, City of  
Aurora, City of  
Bent, County of  
Boulder, City of  
Boulder, County of  
Breckenridge, Town of  
Centennial Water and Sanitation District  
Cherokee Water and Sanitation District  
Colorado Department of--  
Health  
Natural Resources, Oil and Gas  
Conservation Commission  
Transportation  
Colorado, Division of--  
Water Resources, Office of the State Engineer  
Wildlife  
Colorado River Water Conservation District  
Colorado Springs, City of--  
Department of Public Utilities  
Engineering Division  
Colorado Water Conservation Board

Colorado--Continued

Delta County Board of Commissioners  
Denver Board of Water Commissioners  
Eagle County Board of Commissioners  
East Grand County Water Quality Board  
Englewood, City of  
Evergreen Metropolitan District  
Fort Collins, City of, Water and Wastewater  
Fountain Valley Authority  
Fremont Sanitation District  
Garfield, County of  
Glendale, City of  
Glenwood Springs, City of  
Lakewood, City of  
Lamar, City of  
Las Animas, City of  
Longmont, City of  
Loveland, City of  
Lower Fountain Water-Qual. Mgmt. Assoc.  
Metro. Wastewater Reclamation District  
Mountain Ute Indian Tribe  
Moffat, County of  
No. Colorado Water Conservation District  
Pueblo Board of Water Works  
Pueblo, City of, Department of Utilities  
Pueblo County Commissioners  
Pueblo West Metropolitan District  
Rio Blanco, County of  
Rio Blanco Water Conservation District  
Rio Grande Water Conservation District  
Rocky Ford, City of  
St. Charles Mesa Water District  
Southern Ute Indian Tribe  
Southeastern CO Water Conservancy District  
Southwestern Colorado Water Conservation District  
Steamboat Springs, City of--  
Public Works Department  
Teller-Park Soil Conservation District  
Thornton, City of  
Trinchera Water Conservation District  
Uncompahgre Valley Water Users Assoc.  
Upper Arkansas Council of Governments  
Upper Arkansas River Water Cons. District  
Upper Eagle Regional Water Authority  
Upper Gunnison River Water Conservancy Dist.  
Upper Yampa Water Conservancy District  
Urban Drainage and Flood Control District  
Vail Valley Conservation Water District  
Westminster, City of  
Yellow Jacket Water Conservancy District

Connecticut:

Connecticut Department of--  
Environmental Protection  
Fairfield, Town of, Cons. Department  
Meridan, City of  
New Britain, City of--  
Board of Water Commissioners  
South Central CT Regional Water Authority  
Torrington, City of

Delaware:

Delaware Geological Survey

District of Columbia:

Department of Public Works

Florida:

Bay County Utilities  
Boca Raton, City of  
Bradenton, City of  
Broward, County of  
Cape Coral, City of  
Cocoa, City of  
Daytona Beach, City of  
Deerfield Beach, City of  
Florida Department of--  
Environmental Regulation  
Natural Resources--  
Bureau of Marine Resource & Eval.  
Transportation  
Florida Institute--  
Phosphate Research  
Florida Keys Aqueduct Authority  
Fort Lauderdale, City of  
Game and Freshwater Fish Commission  
Hallandale, City of  
Highland Beach, Town of  
Hillsborough, County of  
Hollywood, City of  
Jacksonville, City of, Dept. of Public Utilities  
Jacksonville Electric Authority  
Joshua Water Control District  
Lake, County of, Water Authority  
Lake Mary, City of  
Lee, County of  
Manatee County--  
Board of County Commissioners  
Environmental Action Commission  
Metropolitan Dade County  
Miami-Dade Water and Sewer Authority  
Northwest Florida Water Mgmt. District  
Orange County  
Perry, City of  
Pinellas, County of  
Polk, County of  
Pompano Beach, City of  
Port Orange, City of  
Quincy, City of  
Reedy Creek Improvement District  
Sarasota, City of  
Sarasota, County of  
South Florida Water Management District  
Dept. of Research and Evaluation  
South Indian River Water Control District  
Southwest Florida Water Mgmt. District  
St. Johns River Water Management District  
St. Petersburg, City of  
Stuart, City of  
Suwannee River Water Mgmt. District  
Tallahassee, City of--  
Electric Department  
Water Quality Laboratory  
Tampa, City of  
Tampa Bay Regional Planning Council  
Tampa Port Authority  
Volusia, County of

Florida--Continued

Volusia City-County Water Supply Cooperative  
Walton, County of  
West Coast Reg. Water Supply Authority  
Winter Park, City of

Georgia:

Albany, City of  
Albany Water, Gas, and Light Commission  
Attapulgus, City of  
Bibb, County of  
Blairsville, Town of  
Brunswick, City of  
Chatham County-Savannah Metropolitan  
Planning Commission  
Chestatee-Chattahoochee Resource  
Conservation and Dev. Center  
Clayton County Water Authority  
Covington, City of  
DeKalb County Public Works Department  
Georgia Department of--  
Water Protection Branch, EPD  
Geologic Survey  
Transportation--  
at Atlanta  
at Forest Park  
Gwinnett, County of, Preconstruction  
Division  
Helena, City of  
Macon County Water Authority  
Monroe Water, Light and Gas Commission  
Moultrie, City of  
Springfield, City of  
Thomaston, City of  
Thomasville, City of  
Tift County Commission  
Tifton, City of  
Valdosta, City of  
Zebulon, City of

Hawaii:

Hawaii, County of, Dept. of Water Supply  
Hawaii Department of--  
Agriculture, Division of Agriculture  
Resource Management  
Hawaiian Home Lands  
Land and Natural Resources  
Water and Natural Resources  
Transportation  
Honolulu Board of Water Supply  
Honolulu, City and County of, Dept. of  
Public Works  
Hawaii, County of, Dept. of Water Supply  
Kauai, County of, Dept. of Water Supply  
Maui, County of, Dept. of Water Supply

Idaho:

Bonner County Commissioners  
Coeur d'Alene Tribe of Idaho  
Idaho Department of--  
Health and Welfare  
Water Resources  
Salmon River Canal Co., Ltd.  
Shoshone, County of



Idaho--Continued

Southwest Irrigation District  
Teton, County of  
Water District No. 01 (Idaho Falls)  
Water District No. 32D (Dubois)  
Water District No. 31 (Dubois)

Illinois:

Bloomington and Normal Sanitary District  
Cook County Forest Preserve District  
Danville Sanitary District  
Decatur, City of  
DeKalb, City of, Public Works Department  
DuPage County Forest Preserve, Planning  
and Development Section  
DuPage County Department of  
Environmental Concerns  
Illinois Department of--  
Energy and Natural Resources--  
State Water Survey  
Transportation--  
Division of Water Resources  
Illinois Environmental Protection Agency  
Lake County Department of Planning,  
Zoning, and Environmental Quality  
Metropolitan Water Reclamation District of  
Greater Chicago  
Northern Illinois University  
Springfield, City of  
State Water Survey, University of IL  
Wisconsin Dept. of Natural Resources

Indiana:

Carmel, Town of, Utilities  
Elkhart, City of, Water Works  
Indiana Department of--  
Environmental Management  
Natural Resources, Division of Water  
Transportation  
Indianapolis, City of, Dept. of Public Works  
Muncie Sanitary Dist., Bureau of Water  
Quality

Iowa:

Ames, City of  
Cedar Rapids, City of; Engineering Dept.  
Clinton, City of  
Davenport, City of  
Des Moines, City of  
Fort Dodge, City of  
Iowa Department of--  
Transportation, Highway Division  
Natural Resources--  
Geological Survey Bureau  
Iowa State University  
Muscatine Water and Light Board  
University of Iowa--  
Dept. of Preventive Medicine  
Institute of Hydraulic Research  
Hygienic Laboratory

Kansas:

Arkansas River Compact Administration  
Emporia, City of, Dept. of Public Works

Kansas--Continued

Franklin, County of  
Harvey, County of; Conservation District  
Hays, City of  
Iowa Tribe of Kansas and Nebraska  
Kansas City-Wyandotte Co. Health Dept.  
Kansas Department of--  
Transportation  
Kansas Geological Survey  
Kansas State Board of Agriculture--  
Div. of Water Resources  
Kansas State Conservation Comm.  
Kansas State University Dept. of Agronomy  
Kansas University Center for Research, Inc.  
Kansas Water Office  
Kickapoo Tribe of Kansas  
Linn, County of  
Olathe, City of  
Prairie Band of Potawatomi Tribe  
Sac and Fox Tribe of Missouri  
Wichita, City of

Kentucky:

Campbellsville Municipal Water  
Elizabethtown, City of  
Glasgow Water Company  
Kentucky Dept. of Natural Resources &  
Environmental Protection Cabinet  
Metropolitan Sewer District  
Owensboro, City of  
University of Kentucky--  
Kentucky Geological Survey  
University of Louisville

Louisiana:

Caddo Parish  
Capital-Area Groundwater Cons. Comm.  
East Baton Rouge Parish  
Jefferson Parish Dept. of Public Utilities  
Louisiana Department of--  
Environmental Quality  
Justice  
Natural Resources  
Transportation and Development  
Louisiana Office of Emergency Preparedness  
Minden, City of  
Plaquemines Parish  
Sabine River Compact Administration  
St. John the Baptist Parish  
Terrebonne Parish  
West Monroe, City of

Maine:

Caboosee Watershed District  
Greater Portland Council of Governments  
Maine Department of--  
Conservation, Geological Survey  
No. Kennebec Valley Reg. Planning Comm.  
No. Maine Regional Planning Commission  
University of Maine

Maryland:

Baltimore, City of--  
Water Quality Management

Maryland--Continued

Delaware Geological Survey  
Delaware River Basin Commission  
Hyndman, Borough of  
Maryland Department of--  
Environment  
Maryland Geological Survey  
Salisbury, City of

Massachusetts:

Cape Cod Commission  
Massachusetts Department of--  
Environmental Mgmt.--  
Division of Resource Conservation  
Environmental Protection--  
Division of Water Pollution Control  
Environmental Protection  
Bureau of Waste Site Cleanup  
Environmental Protection--  
Water Supply Division  
Massachusetts Highway Department  
Metropolitan District Commission--  
Parks, Engineering & Construction Div.  
Watershed Management Division

Michigan:

Adrian, City of  
Ann Arbor, City of  
Antrim County Drain Commission  
Battle Creek, City of  
Beaverton, City of  
Board of--  
Public Utilities  
Water and Light  
Cadillac, City of, Wastewater Trtmt. Plant  
Clare, City of  
Consumers Power Company  
Elsie, Village of, Dept. of Public Works  
Flint, City of, Water Plant  
French Paper Company  
Huron-Clinton Metropolitan Authority  
Imlay, City of  
Indian Lake Property Owners  
Kalamazoo, City of, Dept. of Public Works  
Keweenaw Bay Indian Community  
Macomb, County of  
Mead Paper  
Michigan Department of--  
Natural Resources--  
Office of Budget and Federal Aid  
Transportation, Design Division  
Michigan Power Company  
Monroe County Health Department--  
Environmental Health Division  
Negaunee, City of, Water and Wastewater  
Treatment Plant  
Norway, City of  
Oakland County Drainage Commission  
Otsego County Road Commission  
Portage, City of  
Portland, City of  
STS Hydropower Ltd.  
Tri-County Regional Planning Commission  
Upper Peninsula Power Company

Michigan--Continued

Wayne, County of--  
Div. of Environmental Health  
Wisconsin Electric Power Company  
Wolverine Hydroelectric  
Wolverine Power Supply Cooperative  
Ypsilanti Community Utility Authority

Minnesota:

Beltrami County SWCD  
Elm Creek Cons. Mgmt. & Planning Comm.  
Grand Portage Reservation Government  
Hubbard County Soil and Water  
Lower Red River Watershed Mgmt. Board  
Metropolitan Waste Control Commission  
Mille Lacs Reservation Band Government  
Minnesota Department of--  
Health, Division of Environmental Health  
Natural Resources  
Transportation  
Minnesota Pollution Control Agency  
Northwest MN Gr. Water Steering Comm.  
Snake River Watershed Planning Committee  
University of MN, Dept. of Soil Science  
Whitewater Joint Powers Board

Mississippi:

Harrison County Development Commission  
Jackson, City of  
Jackson County Port Authority  
Mississippi Department of--  
Agriculture and Commerce  
Environmental Quality--  
Office of Geology  
Office of Land and Water Resources  
Office of Pollution Control  
Transportation  
Pat Harrison Waterway District  
Pearl River Basin Development District  
Pearl River Valley Water Supply District  
Yazoo MS Delta Joint Water Mgmt. District

Missouri:

Cape Girardeau, City of  
Cass County SWCD  
Independence, City of  
Jackson County Parks and Recreation  
Mid-America Regional Council  
Missouri Department of--  
Conservation  
Health  
Natural Resources--  
Division of Environmental Quality  
Div. of Geological and Land Survey  
Missouri Highway and Trans. Comm.  
Rolla, City of  
Rolla Municipal Utilities  
Springfield, City of, City Utilities  
St. Francis County Environmental Corp.  
Sullivan, City of  
Watershed Commission of the Ozarks  
U. of Missouri-Columbia, Dept. of Geology

Montana:

Blackfeet Nation  
Fort Peck Reservation  
Greenfield Irrigation District  
Helena, City of  
Lower Musselshell Conservation District  
Montana Bureau of Mines and Geology  
Montana Department of--  
    Fish, Wildlife, and Parks  
    Health and Environmental Sciences  
    Natural Resources and Conservation  
    Transportation  
Northern Cheyenne Tribe  
Salish & Kootenai Tribes--Flathead Res.  
Wyoming State Engineer

Nebraska:

Central Platte Natural Resources District  
Kansas-Nebraska Big Blue River Compact  
    Administration  
Lincoln, City of  
Little Blue Natural Resources District  
Lower Platte South Natural Resources District  
Lower Republican Natural Resources District  
Middle Republican Natural Resources District  
Nebraska Department of--  
    Water Resources  
Nebraska Natural Resources Commission  
Nemaha Natural Resources District  
North Platte Natural Resources District  
Omaha, City of  
Papio-Missouri River Natural Resources District  
South Platte Natural Resources District  
U. of Nebraska, Cons. and Survey Division  
Upper Elkhorn Natural Resources District  
Upper Niobrara-White Natural Res. District  
Upper Republican Natural Resources District

Nevada:

Carson City/County Department of Public Works  
Clark County Regional Flood Control District  
Clark County Sanitation District  
Douglas, County of  
Duck Valley Reservation  
Henderson, City of  
Las Vegas, City of  
Las Vegas Valley Water District  
Nevada Bureau of Mines and Geology  
Nevada Department of--  
    Conservation and Natural Resources--  
        Division of Environmental Projects  
        Division of Water Resources  
    Transportation  
    Wildlife  
Summit Lake Paiute Indian Tribe  
Tahoe Regional Planning Agency  
Washoe County

New Hampshire:

New England Interstate Water Pollution Control  
    Commission  
New Hampshire Department of--  
    Environmental Services  
Vermont Department of Environmental  
    Conservation

New Jersey:

Bergen, County of  
Brick Township Municipal Utility Authority  
Gloucester County Planning Commission  
Mercer County Park Commission  
Morris County Municipal Utility Authority  
New Brunswick, City of  
New Jersey Dept. of Environmental Protection  
New Jersey Water Supply Authority  
North Jersey District Water Supply Commission  
Passaic Valley Water Commission  
Pinelands Commission  
Rutgers State University  
Somerset County Board of Chosen Freeholders  
Washington Township Municipal Utility Authority  
West Windsor, Township of

New Mexico:

Albuquerque, City of--  
    Hydrology Division  
    Utility Planning Division  
    Waste Water Utility  
Albuquerque Metro. Arroyo Flood Control  
    Authority  
Arizona Department of Environmental Quality  
Bernalillo, County of  
Canadian River Municipal Water Authority  
Costilla Creek Compact Commission  
Elephant Butte Irrigation District  
Highway and Transportation Department  
La Cienega Acequia Association  
Las Cruces, City of  
Las Vegas, City of  
Navajo Indian Nation, Department of  
    Environmental Protection  
New Mexico Environment Department  
New Mexico State University, Water Resources  
    Research Institute  
Office of the State Engineer  
Pecos River Commission  
Pueblo of Zuni  
Raton, City of  
Rio Grande Compact Commission  
Rio San Jose Flood Control District  
Ruidoso, Village of  
Santa Rosa, City of

New York:

Amherst, Town of, Engineering Department  
Auburn, City of  
Batavia, City of  
Chautauqua, County of, Department of Planning  
    and Development  
Cheektowaga, Town of  
Cornell University  
Cortland, County of  
Essex, County of, Planning Department  
Hudson-Black River Regulation District  
Kiryas Joel, Village of  
Monroe, County of, Dept. of Environmental  
    Health  
Nassau, County of--  
    Department of Health

New York--Continued

Department of Public Works  
New England Interstate Water Pollution Control  
Commission  
New York City Dept. of Env. Protection--  
Bureau of Water Supply  
New York State Department of--  
Env. Cons. Planning and Restoration  
Transportation  
New York State Power Authority  
Nyack, Village of, Board of Water Comms.  
Onodaga, County of--  
Department of Drainage and Sanitation  
Water Authority  
Orange County Water Authority  
Saratoga Springs, City of  
Schuyler County Department of Planning and  
Economic Development  
State University of New York, Syracuse  
Suffolk, County of--  
Department of Health Services  
Water Authority  
Tompkins, County of, Department of Planning  
Ulster, County of  
Victor, Village of

North Carolina:

Asheville, City of  
Bethel, Town of  
Brevard, City of  
Chapel Hill, Town of  
Charlotte, City of  
Danville, City of  
Durham, City of  
Fayetteville, City of  
Greensboro, City of  
Lexington, City of  
Lumber River Council of Governments  
Mecklenburg, County of  
Morganton, City of  
North Carolina Cooperative Extension Service  
North Carolina Department of--  
Environment, Health, and Natural Resources  
Transportation  
North Carolina Wildlife Resources Commission  
Orange, County of  
Raleigh, City of  
Rocky Mount, City of  
Triangle Area Water Supply Monitoring, Project  
Steering Committee  
Western Piedmont Council of Governments

North Dakota:

Devils Lake Sioux Tribe  
Dickinson, City of  
Lower Heart Water Resources District  
Minot, City of  
North Dakota Department of--  
Game and Fish  
Health, Water Supply, and Pollution Control  
Parks and Recreation  
Transportation  
North Dakota Geological Survey  
State Water Commission  
Three Affiliated Tribes

Ohio:

Akron, City of  
Canton, City of  
Columbus, City of  
Franklin, County of  
Fremont, City of  
Lima, City of  
Madison, County of  
Miami Conservancy District  
N.E. Ohio Regional Sewer District  
Ohio Department of--  
Natural Resources  
Transportation  
Ohio Environmental Protection Agency  
Ohio State University, Department of Agronomy  
Ross, County of  
Seneca Soil and Water District  
Summit County Engineers  
Toledo Metropolitan Area Council of Govs.  
University of Toledo

Oklahoma:

Ada, City of  
Cheyenne and Arapaho Tribes  
McGee Creek Authority  
Oklahoma Conservation Commission  
Oklahoma Department of--  
Agriculture  
Health  
Oklahoma Geological Survey  
Oklahoma Pollution Control Board  
Oklahoma Water Resources Board  
Sac and Fox Nation

Oregon:

Albany, City of  
Ashland, City of  
Clark County, Washington--  
Intergovernmental Resources Center  
Confederated Tribes of the Warm Springs Res.  
Coos Bay-North Bend Water Board  
Coos, County of  
Douglas, County of  
Eugene, City of, Water and Electric Board  
Gresham, City of  
Jackson, County of  
Josephine County Department of Public Works  
McMinnville, City of, Water and Light Dept.  
Oregon Department of--  
Environmental Quality  
Human Resources, State Health Division  
Metropolitan Service District  
Transportation, Highway Commission  
Water Resources  
Portland, City of--  
Bureau of--  
Environmental Services  
Water Works  
Rogue Valley Council of Governments  
Umatilla Indian Reservation  
United Sewerage Agency  
Washington State Department--  
Ecology  
Wildlife

**Pennsylvania:**

Allentown, City of, Engineering Department  
Alliance for the Chesapeake Bay  
Bethlehem, City of  
Bucks, County of  
Chester, County of, Water Resources Authority  
Delaware County Solid Waste Authority  
Delaware River Basin Commission  
Fairfax County Water Authority  
Harrisburg, City of, Department of Public Works  
Hazelton City Authority Water Department  
Letort Regional Authority  
Media Borough Water Department  
New York State Dept. of Env. Conservation  
North Penn Water Authority  
North Wales Water Authority  
Philadelphia, City of, Water Department  
Pennsylvania Department of--  
    Environmental Resources--  
        Bureau of Community Env. Control  
        Bureau of Mining and Reclamation  
        Bureau of Soil and Water Conservation  
        Bureau of Topographic & Geologic Survey  
        Bureau of Water Quality Management  
        Bureau of Water Resources Management  
Pennsylvania State University  
Pike County Planning Commission  
Reading, City of  
Somerset Conservation District  
Susquehanna River Basin Commission  
Tinicum, Township of  
University Area Joint Authority  
University of Delaware, Geological Survey  
West Bradford, Township of  
Williamsport, City of

**Rhode Island:**

Providence, City of, Water Supply Board  
Rhode Island State Department of Env. Mgmt.--  
    Division of Water Resources  
State Water Resources Board

**South Carolina:**

Beaufort-Jasper County Water and Sewer Auth.  
Camden, City of  
Charleston Harbor Project  
Charleston Public Works  
Clarendon/Sumter Soil & Water Cons. District  
Myrtle Beach, City of  
Oconee County Sewer Commission  
Pageland, Town of  
Pickens, County of  
South Carolina Department of--  
    Health and Env. Control  
    Highways and Public Trans.  
So. Carolina Public Service Authority  
So. Carolina Water Resources Commission  
South Carolina Sea Grant Consortium  
Spartanburg Sanitary Sewer District  
Spartanburg Water System  
University of South Carolina--  
    Department of Env. and Health Services  
Waccamaw Regional Planning and

**South Carolina--Continued**

Development Council  
Western Carolina Regional Sewer Authority

**South Dakota:**

Area II Minnesota River Basin  
Beadle Conservation District  
Belle Fourche Irrigation District  
East Dakota Water Development District  
Lower Brule Sioux Tribe  
Mellette County  
Oglala Sioux Tribe, Pine Ridge  
Rapid City, City of  
Rosebud Sioux Tribe  
Sioux Falls, City of--  
    Utilities Department  
    Water Purification Plant  
South Dakota Department of--  
    Environment and Natural Resources--  
        Geological Survey Division  
        Water Resource Management Division  
        Water Quality Division  
        Water Rights Division  
        Game, Fish, and Parks  
        Transportation  
South Dakota School of Mines and Technology  
South Dakota State University  
Spearfish, City of  
Stanley County Conservation District  
Watertown, City of  
West Dakota Water Development District  
West River Water Development District  
Wyoming, State of

**Tennessee:**

Alcoa, City of  
Alpha Talbott Utility District  
Bartlett, City of  
Camden, City of  
Chattanooga, City of, Dept. of Public Works  
Clemson U. Det. of Environmental Toxicology  
Columbia, City of  
Crossville, City of  
Dickson, City of  
Eastside Utility District  
Franklin, City of  
Germantown, City of  
Grainger County Government  
Hamilton County Office of Emergency Mgmt.  
Humphreys, County of  
Johnson City, City of, Public Works Department  
Knoxville, City of  
Lawrenceburg, City of  
Lincoln, County of, Board of Public Utilities  
Memphis, City of--  
    Light, Gas, and Water Division  
Memphis State University  
Metropolitan Governments, Nashville, City of,  
    and Davidson, County of  
Murfreesboro, City of, Water and Sewer Dept.  
Pigeon Forge, City of  
Rogersville, Town of  
Savannah Valley Utility District  
Sevierville, City of

Tennessee--Continued

Shelby County Government  
Tennessee Department of--  
Agriculture  
Environment and Conservation--  
Office of Water Programs  
Transportation--  
Division of Planning  
Division of Structures  
Tennessee State Planning Office  
Tennessee Wildlife Resources Agency  
Tulahoma Utilities Board  
Union City, City of  
University of Tennessee  
Upper Duck River Development Agency  
Wartrace, City of

Texas:

Abilene, City of  
Alamo Water Reuse Conservation District  
Arlington, City of  
Austin, City of  
Barton Springs/Edward Aquifer Cons. District  
Bexar-Medina-Atascosa Counties  
Brazos River Authority  
Coastal Water Authority  
Colorado River Municipal Water District  
Corpus Christi, City of  
Dallas, City of  
Dallas, City of, Public Works Department  
Edwards Underground Water District  
El Paso, City of, Public Service Board  
Fort Bend Subsidence District  
Fort Worth, City of, Water Pollution Control  
Gainesville, City of  
Galveston, County of  
Garland, City of, Department of Public Works  
Georgetown, City of  
Graham, City of  
Greenbelt Municipal and Industrial Water Auth.  
Guadalupe-Blanco River Authority  
Harris, County of, Flood Control District  
Harris-Galveston Coastal Subsidence District  
Houston, City of  
Lavaca-Navidad River Authority  
Lower Colorado River Authority  
Lower Neches Valley Authority  
Lubbock, City of  
Nacogdoches, City of  
North Central Texas Council of Governments  
North Central Texas Municipal Water Authority  
North Texas Municipal Water District  
Northeast Texas Municipal Water Authority  
Orange, County of  
Pecos River Commission  
Red River Authority  
Sabine River Authority of Texas  
Sabine River Compact Administration  
San Angelo, City of  
San Antonio, City of--  
Public Service Board  
Water Board  
San Antonio River Authority  
San Jacinto River Authority

Texas--Continued

Somerville County Water District  
Tarrant, County of, Water Control and  
Improvement District No. 1  
Texas Soil and Water Conservation Board  
Texas State Dept. of Highways and Trans.  
Texas Water Development Board  
Titus, County of, Fresh Water Supply Dist. No. 1  
Trinity River Authority  
Upper Guadalupe River Authority  
Upper Neches River Municipal Water Authority  
West Central Texas Municipal Water District  
Wichita, Co. of, Water Improvement Dist. No. 2  
Wichita Falls, City of

Utah:

Bear River Commission  
Central Utah Water Conservation District  
Ogden River Water Users Association  
Salt Lake, County of, Division of Flood Control  
Tooele, City of  
Utah Department of--  
Health, Division of Environmental Health  
Natural Resources--  
Geological and Mineral Survey  
Oil, Gas, and Mining Division  
Water Resources Division  
Water Rights Division  
Weber Basin Water Conservancy District  
Weber River Water Users Association

Vermont:

Department of--  
Environmental Conservation

Virginia:

Accomack-Norhampton Planning Dist. Comm.  
Alexandria, City of  
Delaware Geological Survey  
Hampton Roads Planning District Commission  
James City, County of  
Maryland, Department of--  
Environment  
State Highway Administration  
Newport News, City of  
Northern Virginia Planning District Commission  
Prince William Health District  
Roanoke, City of  
Southeastern Public Service Auth. of Virginia  
University of Virginia, Dept. of Env. Sciences  
Virginia Department of Transportation  
Virginia Beach, City of, Water Resources Div.  
Virginia Institute of Marine Science  
Virginia State Water Control Board  
York, County of

Washington:

Aberdeen, City of  
Bellevue, City of  
Chelan, County of, Public Utility District No. 1  
Confederated Tribes and Bands of the Yakima  
Indian Nation  
Douglas, County of, Public Utility District No. 1  
Hoh Indian Tribe

Washington--Continued

King, County of, Department of Public Works  
Lewis, County of--  
    Board of Commissioners  
Nisqually Indian Tribe  
Oregon Department of Fish and Wildlife  
Pacific County  
Pierce, County of  
Quinault Indian Business Committee  
Seattle, City of  
Seattle-King County Department of--  
    Health  
Skagit, County of, Department of Public Works  
Skagit Conservation District  
Snohomish, County of--  
    Board of Commissioners  
    Public Utilities District No. 1  
Spokane County Engineers Office  
Tacoma, City of, Department of--  
    Public Utilities  
    Public Works  
Thurston, County of  
    Board of Commissioners  
    Department of Public Works  
Umatilla Indian Nation  
Washington Department of--  
    Ecology  
    Fisheries  
    Natural Resources  
    Wildlife  
Washington State Emergency Services  
Whatcom, County of

West Virginia:

Morgantown, City of, Utility Board  
New Martinsville, City of  
West Virginia Department of--  
    Commerce, Tourism, and Parks Section  
    Highways  
West Virginia Office of Water Resources  
West Virginia Geological and Economic Survey

Wisconsin:

Balsam Lake Protection and Rehab. District  
Barron, City of  
Bear Lake, Town of  
Beaver Dam, City of  
Big Muskego Lake District  
Brown County Planning Commission  
Dane, County of--  
    Department of Public Works  
    Lakes and Watershed Management  
    Regional Planning Commission  
Darboy Sanitary District  
Delavan, Town of  
Druid Lake Inland Protection and Rehab. District  
Eagle Springs Lake Sanitary District  
East Central Wisconsin Reg. Planning Comm.  
Fond Du Lac, City of  
Fowler Lake Management District  
Galena, City of  
Green Bay Metropolitan Sewerage District  
Green Lake Sanitary District  
Hillsboro, City of

Wisconsin--Continued

Hooker Lake District  
Hubbard, Township of  
Illinois Department of Transportation  
Kaukauna Electric and Water Utilities  
Kimberly Water Works Department  
Lac Du Flambeau Indians  
Lake Nebagamon, Village of  
Little Arbor Vitae Protection and Rehab. District  
Little Green Lake Protection and Rehab. District  
Little Chute, Village of  
Little St. Germain Lake District  
Loon Lake/Wescot Management District  
Madison Engineering Department  
Madison Metropolitan Sewerage District  
Marinette County Land Conservation  
Mead, Township of  
Menasha, Town of, Sanitary Dist. Number Four  
Menominee Indian Tribe of Wisconsin  
Merton, Township of  
Muskego, City of  
Norway, Town of  
Oconomowoc Lake, Village of  
Okauchee Lake Management District  
Oneida Indian Tribe of Wisconsin  
Oshkosh, City of  
Peshtigo, City of  
Powers Lake Management District  
Red Cliff Indians  
Rock, County of, Public Works Department  
SE Wisconsin Regional Planning Commission  
Sparta, City of  
St. Germain, Town of  
Stockbridge-Munsee Indians  
Sumit, Town of  
Thorp, City of  
Troy, Town of  
University of Wisconsin, Extension, Geological  
    & Natural History Survey  
Walworth County Land Conservation Comm.  
Waupun, City of  
Whitewater-Rice Lake Management District  
Wind Lake Management District  
Wisconsin Department of--  
    Justice  
    Natural Resources  
    Transportation  
Wisconsin Geological Survey  
Wittenberg, Village of

Wyoming:

Cheyenne, City of  
Evanston, City of  
Freemont, County of  
Midvale Irrigation District  
Northern Arapahoe Tribe  
Sheridan Area Water Supply Joint Power Board  
Shoshone Tribe  
Teton, County of  
Water Development Commission  
Wyoming Department of--  
    Agriculture  
    Environmental Quality  
    Game and Fish



**Wyoming--Continued**

Highways

Wyoming State Engineer  
Wyoming Water Research Center

**American Samoa:**

American Samoa EPA  
American Samoa Power Authority

**Guam:**

Guam, Government of, Environmental  
Protection Agency

**Trust Territory of the Pacific Islands:**

Commonwealth Utilities Corporation, Saipan  
Northern Mariana Islands, Commonwealth of--  
Department of Public Health and  
Environmental Services  
Municipality of--  
Tinian  
Pohnpei State Government  
Republic of Palau

**Puerto Rico:**

Puerto Rico Aqueduct and Sewer Authority  
Puerto Rico Department of Natural Resources  
Puerto Rico Electric Power Authority  
Puerto Rico Environmental Quality Board  
Puerto Rico Industrial Development Company  
University of the Virgin Islands  
Virgin Islands Water and Power Authority