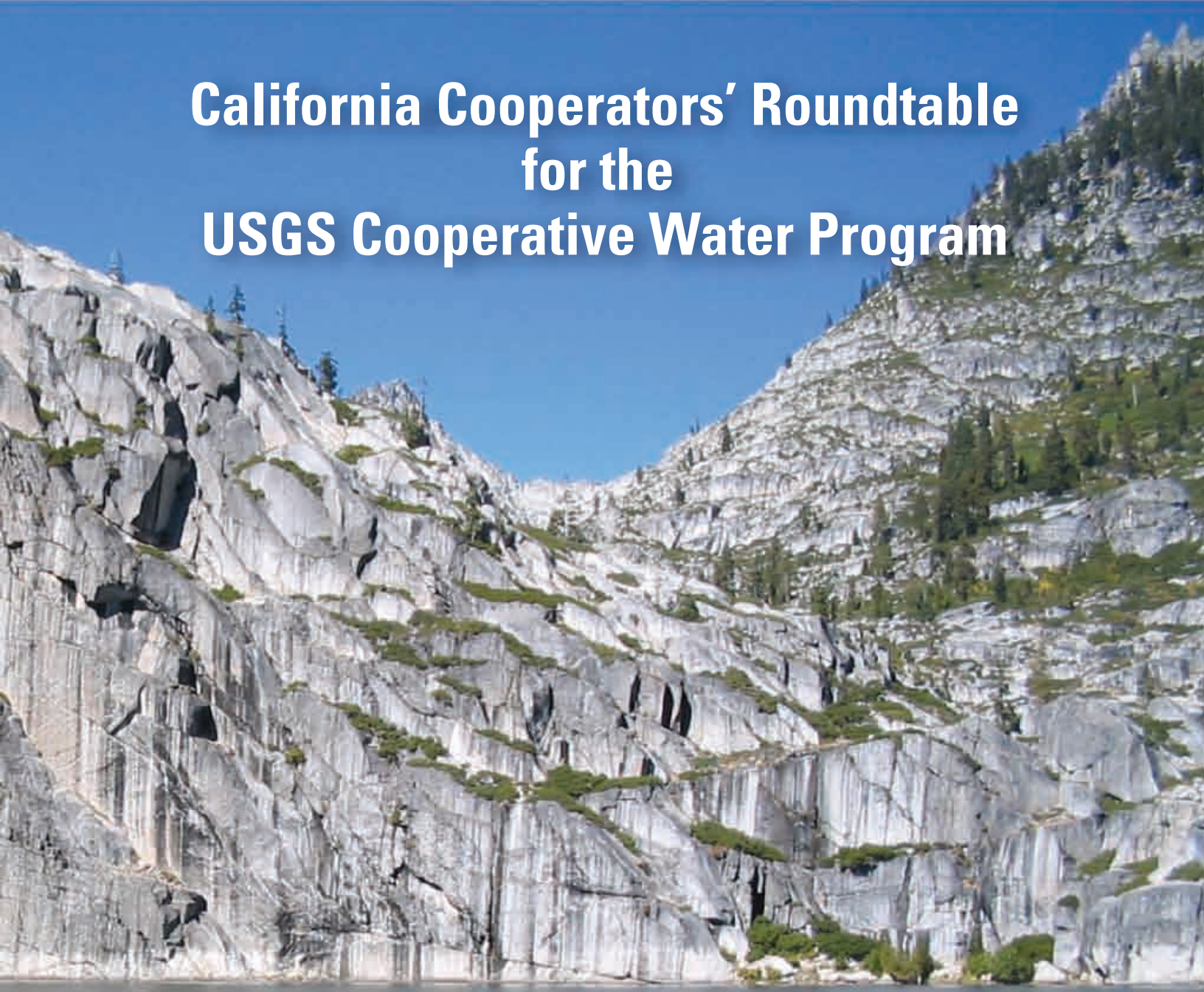
California Cooperators' Roundtable for the USGS Cooperative Water Program



Understanding and Guiding a Reliable Science Program for Making Sound Water Resource Management Decisions in California

ICWP
Interstate Council on Water Policy

ACWA
Association of California Water Agencies
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Leadership
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Information

USGS
science for a changing world

Sue Lowry
Chair, Board of Directors
307-777-5927
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Executive Director
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California Cooperators' Roundtable
for the
USGS Cooperative Water Program

It is a great pleasure to welcome you to the Regional Roundtable Meeting for Cooperators in the USGS Cooperative Water Program! There are more to come and we will help you track the results on our website.

As you will learn in the course of our meeting and in the materials collected here, this meeting presents a very important opportunity to help shape and guide the USGS Cooperative Water Program (CWP). This meeting is the result of many efforts among many water users, scientists and policy leaders to make sure that one of the best sources of reliable water information will continue to meet the need. The ICWP is fortunate to have many strong and active partners in sustaining these meetings, starting with the USGS leadership and including the leaders from the Western States Water Council, the Association of State Flood Plain Managers and other leading water organizations.

The need for accurate streamflow, groundwater and other water resource data seems to continue increasing as our population, our economy and our many uses of land and water continue to expand. Information from the CWP and National Streamflow Information Program (NSIP) is needed on a regular basis by federal, state, tribal, and local agencies and by many private businesses, landowners, public interest organizations and individuals. These two USGS programs have a proven record of providing reliable information that is essential to public and private decision makers for a wide variety of planning, design and management functions that include:

- identifying flood risk areas for protection of lives and property and reducing disaster relief expenses forecasting of flood and drought conditions and issuing emergency advisories;
- projecting future water needs and availability for agricultural, municipal, and industrial uses;
- designing of bridges, dams and other critical infrastructure;
- managing hydropower, water supply, environmental and navigation releases from reservoirs;
- managing fisheries and protecting endangered species and their habitat;
- protecting water quality; and
- planning water-related recreation.

Making intelligent decisions about water resources and their management for the benefit of our communities and the ecosystem around us is becoming more complex and will depend on sustaining our monitoring, modeling and analytical science for the foreseeable future. As you know, agency budgets at every level are likely to remain very tight for the foreseeable future and our gaging networks are dropping hundreds of stations each year. Fortunately, the cost-share partners in the CWP have continued increasing their support, even though our Congress has fallen short. Even more fortunately, the Cooperators' support combines funding, creative ideas and hard work directed toward stretching the CWP capabilities as far as possible within the available budgets.

Thanks for investing your time and sharing your ideas at this important time; this great science program needs you!

Sue Lowry, Chair
Chair

Peter Evans
Director

California CWP Cooperator's Roundtable

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Interstate Council on Water Policy
Association of California Water Agencies
&
U. S. Geological Survey

Monday, May 7 — **Hyatt Regency Sacramento**
1209 L Street, on Capitol Park

In Conjunction with the ACWA Spring 2007 Meeting
May 8-11, 2007

Registration 8:00am

Welcome and Program Overview 10:00am
Peter Evans, Director, Interstate Council on Water Policy
Mike Shulters, Director, USGS California Water Science Center

Keynote Address 10:15am
Bob Hirsch, Associate Director, USGS Water Resources

Cooperative Streamgaging Network in California
Overview 10:45am
Mike Shulters, Director, USGS California Water Science Center

California Gages in the National Context
Ward Staubitz, National Coordinator, USGS Cooperative Water Program

Data Network and Emerging Water Management Challenges
Noah Knowles, Research Hydrologist, USGS National Water Resources Research Program

Luncheon 12:00 Noon
Introduction: Tim Petty, Deputy Assistant Secretary for Water and Science, US Department of the Interior

Luncheon Keynote: USGS Science and Sacramento-San Joaquin Delta Management Issues
Joe Grindstaff, Director, California Bay Delta Authority

MONDAY, MAY 7 — AFTERNOON

USGS Cooperative Water Program: Science in Support of California Water Management — 1:00pm

Mike Shulters	Director, USGS California Water Science Center (Panel Facilitator)
Dennis Bostad	General Manager, Sweetwater Authority
Jay Jasperse	Deputy Chief Engineer, Engineering & Resource Planning Sonoma County Water Agency
Ted Johnson	Chief Hydrologist, Water Replenishment District of Southern California
Adam Ariki	Assistant Deputy Director, Waterworks Division Los Angeles County Public Works Department
Eric Reichard	Coastal Program Chief, USGS California Water Science Center
Brian Bergamaschi	Research Chemist, USGS California Water Science Center

National Cooperators' Overview & Organization of Break-Out Sessions — 2:30pm

Peter Evans — Director, Interstate Council on Water Policy

Break — **2:45pm**

Facilitated Break-Out Group Discussion of Opportunities & Priorities — 3:00pm

Discussion in break-out groups will be facilitated to provide strategic guidance for USGS leadership, State officials, Cooperators and potential Cooperators.
Responses to two questions will be prioritized by the participating Cooperators:

- What can the USGS do to make the Cooperative Water Program better?
- What can the Cooperators do to make the Cooperative Water Program better?

Synthesis of Results and Next Steps - highlights from break-out groups — 4:15pm

Sue Lowry, Chair, Interstate Council on Water Policy (Panel Moderator)

Adjourn — 5:00pm

Poster Session and Buffet Reception — **5:30pm**

Speakers & Biographical Sketches

California CWP
Cooperators' Roundtable
Speakers & Biographical Sketches

Adam Ariki
Assistant Deputy Director
Waterworks Division
Los Angeles County Public Works Department

Adam Ariki is a registered Civil Engineer in the State of California. He graduated from New Mexico State University with a B.S. and M.S. degree in Civil Engineering. He has been working for the Los Angeles County Department of Public Works for 18 years; 15 years in the Waterworks Division and three in the Watershed Management Division as the Manager for the Department's NPDES program. He is currently the Division Chief for the Waterworks Division which operates five Los Angeles County Waterworks Districts with approximately 56,000 service connections.

Brian Bergamaschi
Research Chemist
USGS Sacramento CA

Brian Bergamaschi graduated in 1995 with a PhD in Chemical Oceanography from the University of Washington. His research there focused on the sources, functions, and fates of natural organic material in rivers, estuaries, and oceans, and he still continues research on this topic from a variety of directions related to water quality. He has received numerous awards, including a national citation for an outstanding dissertation in chemical oceanography, the Barbara McClintock fellowship from the Carnegie Geophysical Institute, and the USGS Excellence in Science Award. He is currently a research chemist with the USGS California Water Science Center, where he leads the Aquatic Organic Carbon Research Group. He has recently been investigating the use of optical sensors for continuous water quality monitoring applications.

Dennis Bostad
General Manager
Sweetwater Authority

Dennis Bostad has been employed with Sweetwater Authority for the past 29 years and

became General Manager in December 2002. Sweetwater Authority is a publicly owned water agency providing water service to approximately 180,000 people in National City, Bonita and the western and central portions of Chula Vista, California.

Mr. Bostad attended Hilltop High School and is a graduate of San Diego State University where he earned a Bachelor of Science degree in Biology. In 1998, he completed a Master of Arts degree in Organizational Management from the University of Phoenix.

Mr. Bostad is a past president of the National City Kiwanis Club and was National City Chamber of Commerce President in 2002. In 2003, Mr. Bostad was named National City Chamber Business Person of the Year. He was recently inducted into the Hilltop High School Hall of Fame for 2007.

Peter Evans
Executive Director
Interstate Council on Water Policy

Peter Evans is an environmental strategist with 25 years experience as a scientist, an attorney, a project manager, and an advocate of natural resource stewardship. He has been Director of the Interstate Council on Water Policy (ICWP) since May 2005, where his top priorities include support for the USGS streamgaging programs and for interstate water organizations.

He started his career in 1976 doing geochemical and geophysical measurements, lab analysis and computer simulations for the USGS and NASA. Attracted to natural resources management tensions, he applied his scientific background to the regulation and reclamation of mining operations by the Colorado Department of Natural Resources, especially in efforts to help small mining companies comply with new environmental requirements.

Peter practiced law in Colorado for 5 years, counseling municipal and corporate clients on natural resource development protection, wildlife management, hazardous waste disposal, mined land reclamation and public disclosure laws. Between 1990 and 2000, he served as Legal Counsel to the Executive Director of the Colorado Dept. of Natural Resources and as Director of the Colorado Water Conservation Board, leading its development of state water policy, promulgation of rules and oversight of integrated water resources development, flood protection and environmental protection programs. He represented the State of Colorado in federal and interstate commissions responsible for wildlife and water resources management.

He holds a BA in Geology from Pomona College (Claremont CA, 1976) and a JD from the University of Denver (Denver CO, 1985).

Joseph Grindstaff
Director
California Bay Delta Authority

Joe Grindstaff was appointed by Gov. Arnold Schwarzenegger as Director for the CALFED Bay-Delta Program in June 2006. He had been acting director for the prior year, leading efforts for a Program review, assessment and 10-year action plan called for in the Governor's May '05 budget revision. He was appointed Chief Deputy Director of the California Department of Water Resources by Governor Arnold Schwarzenegger on August 6, 2004. Grindstaff, 52, has broad experience in the water industry, having worked for more than 25 years at the local and regional level. Prior to his appointment, Grindstaff served as General Manager of the Santa Ana Watershed Project Authority (SAWPA), a regional water agency having responsibility for over 2,650 square miles that includes parts of San Bernardino, Riverside, Los Angeles, and Orange counties. The watershed is home to more than 5 million people. At SAWPA, Grindstaff diligently worked to build a regional effort to drought-proof the watershed. Grindstaff earned a Bachelor of Arts degree from Brigham Young University and a Master of Business Administration degree from the University of Phoenix.

Robert Hirsch
Associate Director for Water
U.S. Geological Survey, Reston Virginia

Bob Hirsch was born in Highland Park, Illinois. He received his BA in Geology from Earlham College, an MS in Geology from the University of Washington, and a Ph.D. in Geography and Environmental Engineering from Johns Hopkins University.

Dr. Hirsch began his career with the USGS in 1976 as a Hydrologist. He conducted and directed research leading to methods for analysis of: the risk of water-supply shortages, water-quality trends, transport of pollutants in rivers, and flood frequency. He also was instrumental in the design and initiation of USGS programs including the National Water-Quality Assessment Program, Global Change Hydrology Program, and Watershed Modeling Systems Program. He has served as Chief, Branch of Systems Analysis of the Water Resources Division, USGS; Staff Assistant to the Assistant Secretary for Water and Science; and Assistant Chief Hydrologist for Research and External Coordination of the USGS. From August 1993 to March 1994, he served as the Acting Director of the USGS. In June 1994, he became Chief Hydrologist of the Water Resources Division.

Dr. Hirsch is a recipient of the Department of the Interior Distinguished Service Award, has twice been awarded the rank of Meritorious Executive by the President of the United States, and is a Fellow of the American Association for the Advancement of Science.

In addition to his responsibilities as the Associate Director for Water, he has since 2003, served as Co-Chair of the Sub-Committee on Water Availability and Quality for the

Committee of Environmental Natural Resources. This Sub-Committee is charged by the White House Science Office to coordinate water research across the Federal Government.

Jay Jasperse
Deputy Chief Engineer
Engineering and Resources Planning
Sonoma County Water Agency

Mr. Jasperse is a registered civil engineer and has been with the Sonoma County Water Agency since 1998. Prior to joining the Agency, he worked as an environmental engineering consultant specializing in groundwater characterization and design of remediation systems. His responsibilities include oversight of capital projects for water supply, flood control, and sanitation facilities in addition to supervising water supply planning programs. Mr. Jasperse has authored several papers pertaining to riverbank filtration processes and surface water and groundwater interactions. Mr. Jasperse received a Bachelor of Science degree in geology from the University of California at Davis and Master's degree in civil engineering from the University of California at Berkeley. Mr. Jasperse is an active member of the National Groundwater Association and the American Chemical Society.

Ted Johnson
Chief Hydrogeologist
Water Replenishment District of Southern California

Ted Johnson is the Chief Hydrogeologist at the Water Replenishment District of Southern California. He leads the Basin Management and Water Quality Department, providing technical analysis, review, and oversight for projects related to artificial recharge, seawater intrusion, groundwater quality, conjunctive use, computer modeling, recycled water, tracer tests, and groundwater production. Ted received his B.S. and M.S. degrees from the California State University at Fullerton and is a California Registered Geologist and Certified Hydrogeologist with over 20 years of experience in Southern California groundwater investigations.

Noah Knowles
Research Hydrologist
USGS Menlo Park CA

Noah Knowles received a Ph.D. from Scripps Institution of Oceanography in 2000, where his dissertation topic was "Modeling the Hydroclimate of the San Francisco Bay-Delta Estuary and Watershed". He has since served as a postdoctoral researcher at SIO, then as a National Research Council Research Associate with the U.S. Geological Survey

in Menlo Park, CA. His research topics have included historical trends in precipitation form in the western U.S., and the influence of projected climate change in California, including changes in snowpack, runoff timing, and Bay-Delta water quality. He is currently a Research Hydrologist on a term appointment with the USGS, and his research interests include continued hydrologic and estuarine model development, the role of vegetation in shaping the hydrologic response to climate change, and changes in estuarine water quality and spatial extent due to sea level rise.

Sue Lowry
Administrator,
Interstate Streams Division
Wyoming State Engineers Office

Sue Lowry received her B.S. in agricultural economics in 1981, and her M.S. in range management and water resources in 1988, both from the University of Wyoming. Since 1988 she has been working on interstate water compacts and decrees for the Wyoming State Engineers Office. Her work has focused on compacts in the Bear, Yellowstone, Snake, and Belle Fourche river basins. Since 2003, she has served as Administrator of the Interstate Streams Division.

Sue served on the 2004 External Review Task force to Review the USGS Cooperative Water Program, and in October 2005, she was elected to chair the Interstate Council on Water Policy.

Tim Petty
Deputy Assistant Secretary
Water and Science
US Department of the Interior

Mr. Tim Petty had a Masters degree in Executive International Business Management from the University of Maryland's University College and a bachelor's degree in Geosciences from Purdue University. He is a native of Indiana, where he grew up on a farm.

He worked in the private sector for more than 10 years in California and Indiana as a geologist and a hydrogeologist specializing in structural geology, aquifer testing, ground water well installation, environmental risk assessment, underground water contamination and cleanup. Mr. Petty's experience has taken him from the farmland of Indiana, the mountains and beaches of southern California to living in Russia in the early to mid 1990's.

Upon his return back to the U.S. in 1997, Mr. Petty served as a senior analyst working at the U.S. Department of Energy, assisting the director of Non proliferation/National Security. Most recently, Mr. Petty has worked for the U.S. Senate to enhance communications systems using advanced technology resources.

In his current position with the Department of Interior, Mr. Petty is the Deputy Assistant Secretary for Water and Science with his oversight of the U.S. Geological Survey.

Eric Reichard
Program Chief
Coastal and Inland Basin
USGS San Diego CA

Eric Reichard is the Program Chief for Coastal Projects and a research hydrologist at the U.S. Geological Survey, California Water Science Center. He received a B.A. in Economics from the University of Rochester, and an M.S. and Ph.D. in Hydrogeology from Stanford. His areas of interest include ground-water management, conjunctive use, and seawater intrusion. His professional activities include serving as an associate editor of the Journal of Water Resources Planning and Management and as a Director of the Groundwater Resources Association of California.

Mike Shulters
Director
USGS California Water Science Center
Sacramento CA

Mike Shulters has been the Director of the USGS California Water Science Center (CAWSC) in Sacramento, California since 1993. The CAWSC operates a diverse and complex water resources program in cooperation with the State of California, other Federal Agencies, and over 100 municipal and county governments. The California program includes a wide range of multi-discipline research activities, hydrologic investigations, and surface- and ground-water monitoring networks supported by about 300 people in 13 locations.

Prior to this position, Mike was the Director of the USGS Nebraska Water Science Center (1988-1993), project chief and section chief in the USGS Sacramento Office (1981-1988), and project chief in the USGS Portland OR office (1972-1981) where he led a variety of water quality studies.

Ward W. Staubitz
Cooperative Water Program Coordinator
U.S. Geological Survey, Reston Virginia

Ward Staubitz serves as the USGS Cooperative Water Program Coordinator in Reston Virginia. Mr. Staubitz began his career with the USGS in the Maryland Water Science Center in 1978 where he began the Chesapeake Bay River Input Monitoring Program. From 1978-1997 Mr. Staubitz was the principal investigator of numerous surface and ground water quality investigations in Maryland, New York, and Washington State. While in Washington, Mr. Staubitz served as a principal advisor to the USEPA on environmental restoration of the DOE Hanford site and as the Puget Sound NAWQA study unit chief. Mr. Staubitz also was Director of the Virginia Water Science Center from 1997 to 2005.

Mr. Staubitz was born in Buffalo NY in 1952 and received a BS in Chemistry and Biology from American University in 1975 and a MS in Soil and Water Science from the University of Nevada-Reno in 1978. He also participated in a year of USGS sponsored graduate training at Cornell University in 1983.

COOPERATIVE WATER PROGRAM (CWP)

USGS
science for a changing world

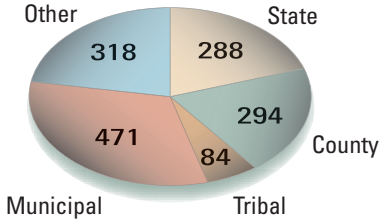
Cooperative Water Program—
A Partnership in the Nation's Water-Resources Program

By Bruce E. Taggart

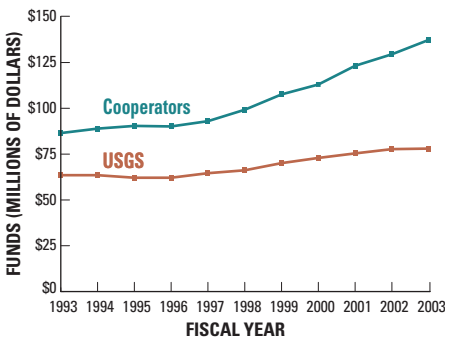
Increasingly, the Nation's water resources are vital to the long-term health of our citizens and the stability of our economy. These resources—our rivers, lakes, and aquifers—supply our drinking water, support our industries, transport our products, and provide us with recreational opportunities. Management of these resources is a complex task involving all levels of government and a multitude of laws, regulations, and competing interests. The U.S. Geological Survey (USGS) Cooperative Water Program has been providing basic scientific information needed by water-resources managers across the Nation since 1895.

> *"The USGS surpassed our expectations. Other state and federal agencies instantly recognized the credibility that USGS brought to the project, enabling us to more quickly utilize the results of the modeling work. We look forward to partnering with USGS on future projects."*
>
> — Tim Harbaugh, Director, Kane County, Illinois Department of Environmental Management

The USGS Cooperative Water Program is an ongoing partnership between the USGS and non-Federal agencies. The program jointly funds water-resources projects in every State, Puerto Rico, and several other U.S. Trust territories. USGS employees use nationally consistent procedures and quality-assurance protocols in conducting cooperative projects. These standards ensure that all data from the Cooperative Water Program are directly comparable from one region to another and available from USGS databases for use by citizens, public officials, industry, and scientists nationwide. Agencies, or "Cooperators," that participate in the Cooperative Water Program are primarily State, Tribal, county, and municipal agencies with water-resources management and policy responsibilities. In 2003, more than 1,400 Cooperators participated in the program.



Number of cooperators in 2003.



In terms of funding, the USGS contribution to the Cooperative Water Program in federal fiscal year 2003 was $78.4 million; $64.4 million is from the Cooperative Water Program federal appropriations, and an additional $14.0 million is from two USGS bureau-level appropriations. These other two appropriations cover some of the administrative and facilities costs attributable to the Cooperative Water Program. Although the Program originated as a 50:50 fund-matching arrangement, Cooperator funds have grown faster than USGS funds in recent years. In 2003, Cooperative Water Program funds totaled $215.8 million. Cooperators contributed $137.3 million, or nearly two-thirds of that total.

Valued Cooperation

The USGS and Cooperators jointly plan the scientific work performed in the Cooperative Water Program. This ensures that this work simultaneously meets the mission objectives of the USGS and the data and information needs of the Cooperators. The result is a national program with broad relevance and widespread use of its products. This significant tie to local and State water-resources needs also creates a program that responds quickly to emerging issues. Cooperators choose to work with the USGS because of the agency's broad technical expertise, its long-standing record of performing high-quality measurements and assessments, and its commitment to providing public access to data collected by the Cooperative Water Program. The scientific, non-regulatory mission of the USGS means that parties in many types of regulatory and jurisdictional disputes accept its data and analyses as valid. To ensure that these activities do not infringe on work more appropriately done by the private sector,

Monitoring the health of the Nation's water supply. Measuring river flow along a tag line.

U.S. Department of the Interior
U.S. Geological Survey

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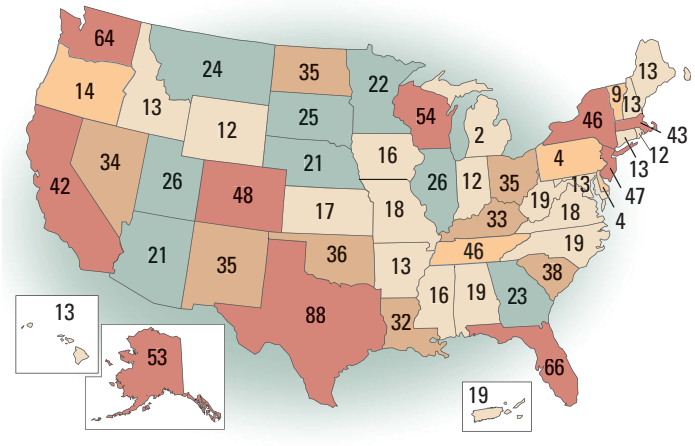
Fact Sheet 2004–3068
July 8, 2004



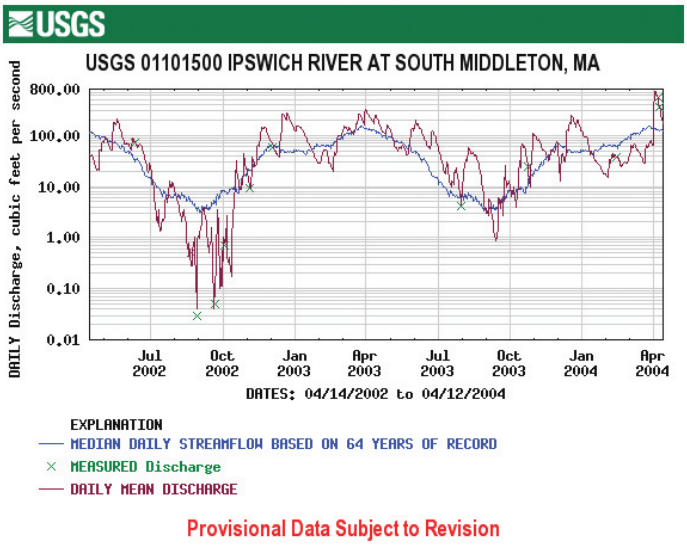
During 2003, the U.S. Geological Survey was actively engaged in over 1,400 Cooperative Water Program funded water-resources monitoring efforts and investigative studies in every State, Puerto Rico, and several other U.S. Trust territories.

the USGS distributes a list of activities that should be excluded from the Program, and works through the Federal Advisory Committee Act to obtain advice from both government and non-government entities.

Data and Information for Many

The Cooperative Water Program supports the collection of basic hydrologic data, studies of specific water-resources problems, and hydrologic research. In 2003, for example, Cooperative Water Program funds supported about 4,200 stream-gaging stations. The program also funds approximately 750 interpretative projects annually targeted at specific issues, such as the effects of urbanization, dam removal, agricultural practices, and energy development on the quality and quantity of the Nation's water resources.

Because data collected in the Cooperative Water Program are directly comparable at the local, regional, and national levels, large-scale syntheses and application of these data to pressing societal and environmental issues are possible. Examples of these syntheses include using historical streamflow information to evaluate regional drought and climate variability, and developing a technique for estimating time of travel for rivers, which provides information for estimating the arrival time for accidental chemical spills.



A hydrograph retrieved from the National Water Information System (NWIS), which includes online access to millions of water records. (http://waterdata.usgs.gov/nwis)

More recently, data from Cooperative Water Program interpretive projects continue to contribute significantly to emerging water-resources issues across the Nation. Examples include an improved understanding of the links between land-use changes and the physical habitat of streams (USGS Circular 1175), the behavior of freshwater-saltwater interactions in ground-water environments along the Atlantic coast (USGS Circular 1262), and the role of science in managing ground-water resources (USGS Circular 1247). Hydrologic data and results of interpretive projects are published as USGS reports, which are publicly available. In addition, more and more projects result in Internet products ranging from descriptive home pages and online reports, to interactive interfaces that allow users to run predictive models and conduct sophisticated statistical analyses by using data available online. Results from many of these interpretive projects, which are local or regional in scope, have broad transferability to other parts of the Nation where similar water-resources issues exist.

> *"Here's a Federal agency willing and enthusiastic to work with the states and local partners to use science to solve real-life problems. The USGS gets it, and the State of Washington is better off for it."*
>
> — Dr. Jeff Koenings, Director
> Washington Department of Fish and Wildlife

Data collected by the Cooperative Water Program are incorporated into the National Water Information System (NWIS). The NWIS contains hydrologic information collected by the USGS during the past 120 years. It includes streamflow data from 21,000 sites, water levels from over 1,000,000 wells, and chemical data from rivers, streams, lakes, springs, and ground water at 338,000 sites. All of these data are publicly available, and can be readily accessed on the Internet at *http://waterdata.usgs.gov/nwis/*. During 1999, the Cooperative Water Program underwent an extensive review by stakeholders external to the USGS—the first such review in the program's history. The Review Committee provided many insightful observations and recommendations, found at *http://water.usgs.gov/coop/review.html,* about the Cooperative Water Program that will help the USGS to maintain the Program's core strengths while leading to significant improvements. More detailed information describing the mission, goals, activities, and accomplishments of the Cooperative Water Program can be found at *http://water.usgs.gov/coop/*.

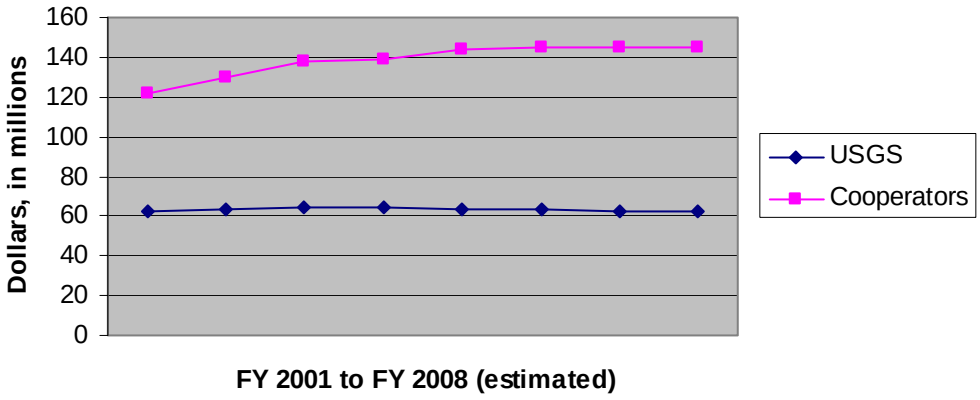
For more information contact:
Ward Staubitz
Cooperative Water Program Coordinator
U.S. Geological Survey
409 National Center, Reston, VA 20192
(703) 648-5061, email: staubitz@usgs.gov

The U.S. Geological Survey Cooperative Water Program
FY 2008

The USGS Cooperative Water Program (CWP), the largest single source of hydrologic data and information in the country, is a 112-year-old, jointly funded partnership between the U.S. Geological Survey (USGS) and State, Tribal, and local cooperators to collect water data and conduct interpretive hydrologic studies in support of sound water-management decisions. The USGS and about 1400 State, Tribal, regional, and local government partners jointly fund costs for the program. Further information on the CWP is available at http://water.usgs.gov/coop.

Fiscal limitations are reflected in the funding ratio for the CWP, which has evolved from its original level of 50:50 to the present where non-Federal cooperators provide 67 percent of program and the USGS provides 33 percent.

Recent Funding History, USGS Cooperative Water Program



The FY 2008 proposed appropriation for the USGS Cooperative Water Program is $62.38 million, which amounts to a net decrease of about $2 million compared to the FY 2007 enacted appropriation of $ 64.35 million. The FY 2008 budget reflects an allowance of $2.41 million to cover the impacts of inflation and a reduction of $4.4 million in program funds to support interpretive studies. The $4.4 million reduction in USGS funding for interpretive studies will be accompanied by a loss of as much as $8.8 million in cooperator matching funds. The USGS anticipates that this combined $13.2 million reduction would result in a net loss of 100-120 hydrologic investigations, or nearly one-half of all new projects due to start in 2008.

While we cannot predict which specific new studies would not be funded under the proposed 2008 budget for the USGS Cooperative Water Program, the following examples typify the type of investigations that are currently underway.

Water Availability: The availability of water to meet the needs of growing communities, agriculture, energy production, and critical ecosystems continues to be a nationwide challenge. The Cooperative Water Program provides essential hydrologic information needed to assess the quantity of water available to communities to support water-supply planning and allocation to a wide range of users. In 2008, the Cooperative Water Program will support thousands of stream gages and ground-water observation wells that define the availability of surface and ground waters, and conduct numerous hydrologic investigations needed to evaluate the quantity of available ground water. A recent example of this work includes completion of a sophisticated computer ground-water flow model of the Virginia Coastal Plain, an important water supply for over 2 million people. This work includes detailed characterization of the newly discovered Chesapeake Bay Impact Crater and its influence on the regional ground-water system. See http://va.water.usgs.gov/projects/va089.html

Drinking Water Quality: Providing clean, safe drinking water to citizens is a high national priority, and the Cooperative Water Program works with State and local governments to assess the quality of the Nation's drinking water supply. In 2008, the USGS will work with the California Water Resources Control Board to continue an assessment of 116 of California's priority ground-water basins. With many partners, the USGS is developing an understanding of natural and human factors that affect ground-water quality, providing early indications of potential water-quality problems, and contributing to the long-term management and protection of ground-water resources affecting one in eight Americans. See http://ca.water.usgs.gov/gama/

Ecosystems: One of the most pressing ecosystem questions that the Nation faces is how to preserve and enhance the quality of aquatic and riparian ecosystems in the face of increasing pressure to withdraw surface and ground water. Under the Cooperative Water Program, the USGS is working with State and local agencies to evaluate the instream flow requirements of aquatic ecosystems. This effort entails the development of both new information and new techniques. A recent notable example is the USGS effort to develop a Hydroecological Integrity Assessment Process for New Jersey, which should provide a prototype for broad applicability nationwide. A report describing this new tool can be found at http://www.fort.usgs.gov/products/publications/21598/21598.pdf.

In Reply Refer To:
National Coordinator – Cooperative Water Program
Mail Stop 409
Sunset Date: October, 2008

March 26, 2007

WATER RESOURCES DISCIPLINE INFORMATIONAL MEMORANDUM NO. 2007.01

Subject: Priority Issues for the Cooperative Water Program, Fiscal Years 2007/2008

This memorandum describes priority water issues to be used in planning the Cooperative Water (Coop) Program for fiscal year (FY) 2007 and beyond, a discussion of current national synthesis topics, and a reminder regarding competition with the private sector. Recent Water Science Center program reviews have revealed the growing diversity of resource issues being addressed at the State and local levels. Cooperator interests and needs are touching all four of the U.S. Geological Survey (USGS) disciplines. As Water Science Center scientists look to other USGS disciplines for expertise and assistance in solving the broadening needs of water-resource cooperators, we recommend that each Water Science Center seek assistance from their regional offices to help identify needed expertise and associated funding support from other programs. We anticipate that these connections will engender fruitful discussions on potential inter-disciplinary activities among regional executives and field office managers as they seek funding and plan work in the coming years.

High-Priority Issues for Coop Program Involvement

The USGS water-resources senior water-discipline leaders, in consultation with Water Science Center and regional managers, external organizations, and cooperators have identified seven water-related issues that closely align with USGS mission goals that most require USGS involvement at State and local levels.

Hydrologic Hazards—Economic losses from riverine and storm surge floods, debris flows, and droughts amount to hundreds of millions of dollars annually. Monitoring the occurrence and magnitude of these extreme events and studying the basic processes underlying these hazards will lead to improving the ability to forecast probability of occurrence and likely magnitudes, and help prepare for and prevent disasters. Needs in this category also include development and public dissemination of near-real time and forecast inundation maps for specific floods, studies of increased flood potential following large-scale forest fires, and studies of the effects of changes in dam operations, including decommissioning of dams and studies of the impact of urbanization. Revision of flood insurance rate maps is a national priority, that provides an opportunity to develop improved information on regional flood characteristics and more efficient methods of flood-plain mapping. The Hazards issue has taken on additional importance in keeping with the USGS selection of Natural Hazards as the Bureau-wide initiative in FY 2005.

Water Quality—The need to provide information to better define and protect the quality of the Nation's water resources remains among the highest Coop Program priorities. Water-quality activities that support Federal, State, or local efforts to improve water quality and stream ecosystems in degraded watersheds across the country and to improve the availability and dissemination of water-quality information to all potential users are of vital interest. Through partnerships with State and local agencies, the Coop Program can assist efforts by addressing issues

that include: (1) providing a more quantitative understanding of the sources and fate of chemicals entering streams, including atmospheric deposition of potential pollutants such as mercury; (2) determining the effects of land use and management practices for controlling non-point source contamination of surface and ground waters by energy development, including coal bed methane extraction, abandoned and active mining, and agriculture; (3) understanding the relationships between water quality and the health of stream ecosystems; (4) characterizing linkages between hazards, such as wildfires, on water quality and ecosystem health; (5) assisting States in setting Total Maximum Daily Load (TMDL) requirements of the Clean Water Act; (6) improving strategies to identify and protect drinking water sources; and (7) increasing the availability of water-quality information, including real-time data, for rivers and coastal waters throughout the Nation.

Hydrologic Data Networks— Hydrologic-data networks constitute the foundation for watershed and aquifer management and for many other USGS programs. They continue to be a high priority item. Present and future USGS initiatives will require access to a comprehensive, uniform, and accurate foundation of surface-water, ground-water, water-quality, and water-use data of national scope. Emphasis will be placed on biological monitoring to assess conditions that affect human health and aquatic health. Large amounts of water data and specialized interpretation often are required for management of the resource and for water-rights determination by State and Federal agencies, as well as for development and operation of models to simulate and forecast hydrologic events. Enhancement of the hydrologic-data networks; improved accessibility and presentation of available information, such as an increase in the availability of real-time data for surface water and ground water and presenting regional summaries of current conditions, and coordination of program activities with those of other agencies continue to be high-priority activities.

Water Availability and Use—The future health and economic welfare of the Nation's population is dependent upon a continuing supply of uncontaminated freshwater. Many existing sources of water are being stressed by increasing withdrawals and instream-flow requirements. More comprehensive water-use data and analysis of water-use information are needed to quantify the stress on existing supplies and to better model and evaluate possible demand management options to supplement the traditional supply approaches. Improved watershed characterization and flow-system definition and simulation also are needed for the management of aquifers and streams that serve as important local or regional sources of water supply and for the management and support of watershed ecosystems. Because aquifers and streams often are highly interdependent, improved tools for simulating interactions between ground and surface water that account quantitatively for effects of withdrawals and climate variations also are needed so that watersheds can be managed more readily as systems. Long-term hydrologic data and hydrologic systems models that are capable of showing the consequences of climatic variability or climate change will be very helpful to local water managers.

Additionally, one of most pressing questions to aquatic ecologists, hydrologists, and water resource and wildlife managers is understanding the hydrologic flow regime that must be maintained in order to sustain a healthy aquatic community. The Cooperative Water Program is in a strong position to develop and test tools and techniques that can be used nationwide to help resource managers understand water use and ecosystem function. Specifically, studies are needed to understand the ecological requirements of the affected aquatic communities and how they can be safeguarded from the potentially detrimental effects of ground-water depletion, altered water levels and flows of our nation's lakes, rivers, streams, wetlands, and estuaries

Wetlands, Lakes, Reservoirs, and Estuaries—These valuable ecosystems merit special attention from the USGS because of their importance as fish and wildlife habitats, recreational areas, and sources of water supply for which the Department of the Interior (DOI) has substantial mission responsibility. Wetlands, in particular, are areas where important water treatment processes can occur naturally. In many areas wetlands are being restored or constructed without pre- or post-scientific evaluations. Studies that integrate and contribute to a better understanding of the physical, chemical, and biological processes of these ecosystems and their watersheds are needed to evaluate development and management alternatives.

Water Resources Issues in the Coastal Zone—Effects of land use and population increases on the water resources in the coastal zone are major national concerns. Hydrologic monitoring and studies are needed to address issues of erosion, loss of wetlands, subsidence, saltwater intrusion, and problems associated with excessive nutrients, disease-causing micro-organisms, and toxic chemicals, originating upstream from industrial activities and agricultural practices. These pollutants can degrade habitat and health of fish and other wildlife and make beaches and other areas unsuitable for recreational use. The 2004 recommendation of the Ocean Policy Commission that the U.S. establish an integrated monitoring network for marine and freshwater resources gives added weight to the issue of monitoring fluxes of water and materials from rivers to oceans.

Environmental Effects on Human Health—Major gaps exist with regard to understanding the processes and activities leading to the exposure of human disease-causing contaminants. Issues include: (1) waterborne microbiological threats to human health, including bacteria, viruses, protozoa, and potentially toxic algae, and tracking their sources in watersheds; (2) bioaccumulation of trace elements in plants and fish that humans eat; (3) naturally-occurring contaminants, such as arsenic, radium, and trace elements; (4) occurrence and persistence of harmful organic compounds in ground waters, rivers, and reservoirs; and (5) so-called “emerging contaminants” such as antibiotics, hormones, and the metabolites of pesticides.

National Synthesis

One of the major strengths of the Cooperative Water Program is its ability to provide data and assessments on varied topics from across the country, which, when synthesized, can be useful in addressing broad, national USGS mission goals. As recommended by the External Task Force that reviewed the Coop Program, we plan to expand these efforts by “pre-planning” selected synthesis products. The memorandum describes four topics for possible future national synthesis over the next few years. We encourage Water Science Centers to explore the needs of cooperating agencies for addressing these issues and, to the extent that is mutually agreeable, follow the guidance that will be provided by the contact for each synthesis topic. We believe that including this guidance in project planning will help enhance Water Science Center capabilities, promote use of valid, standard approaches, and enhance future synthesis products. The topics for National Synthesis are:

1. **Regional Ground Water Availability Studies –** The USGS Ground Water Resources Program is conducting large-scale multidisciplinary regional studies of ground-water availability in the Nation’s principal aquifer systems to better respond to basic questions about the Nation’s ability to meet current and future water demands. Six regional studies distributed across the United States are currently underway. The first three studies (the Atlantic Coastal Plain in North

Carolina and South Carolina, the Denver Basin in Colorado, and the Central Valley in California) began in 2004. These were followed by new studies of the Lake Michigan Basin in 2005, the Mississippi Embayment in 2006, and the Great Basin Carbonates in 2007. These ground water availability studies are meant to quantify current ground-water resources, evaluate how these resources have changed over time, and provide tools to forecast system responses to stresses from human uses and environmental variability. The regional studies are designed to supplement local studies conducted under the USGS Cooperative Water program and will build on a foundation of previous and ongoing studies and data collection that will be staged with other studies to leverage resources to the extent possible. It is anticipated that one new study will be funded each year. If you are planning new state-wide or regional aquifer assessments within one of these principal aquifer systems, please contact Kevin Dennehy (kdennehy@usgs.gov), coordinator, Ground-Water Resources Program, so that this work can be coordinated with the National Ground-Water Availability Assessment.

2. **Fluvial sediment--** USEPA has declared fluvial sediment the most prevalent impairment to the Nation's surface waters; as such, sediment is playing a major role in river restoration efforts and TMDL evaluations. The Offices of Water Quality and Surface Water, and the National Research Program continue their collaboration to identify methods, tools, and capabilities for sediment data collection and analysis that WRD can bring to bear in support of stream restoration and TMDL projects. A variety of new technologies are creating opportunities for producing more accurate and/or more efficient estimates of sediment flux. See, for example, the published proceedings of the Turbidity and Other Sediment Surrogates Workshop, now available at: http://water.usgs.gov/pubs/circ/2003/circ1250/. Those Water Science Centers currently or potentially involved in fluvial-sediment research or data collection may contact the Office of Surface Water's John Gray (jrgray@usgs.gov) for additional information on the potential to contribute to future synthesis efforts on sediment topics.

3. **Changes in Flood Frequency--** Many urban areas are concerned about changes in flood frequencies resulting from land use changes, and FEMA recently issued revised regulations for its Flood Insurance Rate Maps (FIRM's). For example, under the new regulations, communities may now include a delineation of the floodplain based on anticipated "future conditions." The Office of Surface Water has prepared a Fact Sheet summarizing this issue and describing USGS capabilities and data needs for future projects. The fact sheet is available at: http://water.usgs.gov/pubs/fs/fs07603/. Those Water Science Centers currently or potentially involved in evaluating flow frequencies in urban settings should contact Tim Cohn (tacohn@usgs.gov) for additional information on planning projects for enhanced synthesis opportunities in the future.

4. **Synthesis of Water Quality Information--** In FY 2003, the NAWQA Program began synthesizing water-quality information in the principal aquifers and major river systems that they sampled during the first decade of sampling (1991-2000). Cooperative Water Program Studies often collect water quality data using protocols that match or approximate the NAWQA protocols and these regional synthesis efforts can be greatly improved by including additional data collected by other sources in portions of the principal aquifers and major river basins that lie both inside and outside of the NAWQA study units. A list of the principal aquifers for which synthesis activities began in FY 2003 - 2004 are listed on the web at

http://water.usgs.gov/nawqa/studies/praq/, and a list of the major river basins can be found on the web at http://water.usgs.gov/nawqa/studies/mrb/. We appreciate those Water Science Centers that have already contributed information from the Cooperative Water Program to these synthesis efforts. Continuing into FY 2007, we encourage other Water Science Centers currently or potentially involved in collecting and/or compiling water-quality data in any of these principal aquifers or major river basins to contact the ARHN (Area Regional Hydrologist for NAWQA) and Wayne Lapham (wlapham@usgs.gov) (principal aquifer studies) or Charles Crawford (cgcrawfo@usgs.gov) (major river basins) for additional information on opportunities for the Cooperative Water Program to help contribute to these synthesis activities.

Also in 2007 we encourage synthesis of project results related to agricultural land use and water quality. Examples might include effects of crop or animal production on water quality, or water-quality effects of management practices designed to improve water quality. Those interested may contact Janice Ward (jward@usgs.gov).

5. Determination of Water Needs for Ecological Functions

Valuable collaborations of hydrologists and biologists have arisen in the Cooperative Water Program in recent years to help determine the hydrologic conditions, in terms of high flows, low flows, minimum levels, and varying hydrographs, needed to support healthy ecosystems. These studies pertain to both ground water and surface water, and sometimes to interconnected systems of both. Products include data, research results, and tools such as models that can provide a scientific basis for critical decisions on timing of flow releases and allocation or reallocation of precious water resources. As this issue takes on greater importance nationally, the USGS will seek opportunities to synthesize geographically varied examples into a national summary. Those interested are encouraged to contact Christopher Konrad (cpkonrad@usgs.gov).

Competition with the Private Sector

In order to avoid competition with the private sector, we must continue to ensure that each study we undertake helps fulfill one or more of the Federal roles described in WRD Memorandum No. 04.01, "Avoiding Competition with the Private Sector" (http://water.usgs.gov/admin/memo/policy/wrdpolicy04.01.html) In general, if the project provides services readily available from the private sector and is driven solely by an operational need of the cooperator to meet an information requirement for a permit or regulation, we should not undertake it. However, if services are not readily available from the private sector or the cooperator's operational need can be satisfied along with one or more of the following broader WRD mission goals, then the work may be considered appropriate. These broader goals, as enumerated in WRD Memorandum No. 04.01, are:

- advancing knowledge of the regional hydrologic system
- advancing field or analytical methodology
- advancing understanding of hydrologic processes
- providing data or results useful to multiple parties in potentially contentious inter-jurisdictional conflicts over water resources

- furnishing hydrologic data required for interstate and international compacts, Federal law, court decrees, and congressionally mandated studies
- furnishing hydrologic data or information that contribute to protection of life and property
- providing standardized, quality-assured data to national data bases available to the public that will be used to advance the understanding of regional and temporal variations in hydrologic conditions.

Projects under discussion for cooperative funding sometimes contain a mixture of tasks, some of which meet these criteria, while others may not. Water Science Centers are encouraged to work with their cooperators to identify these non-appropriate tasks and to facilitate participation of the private sector in accomplishing them. When these opportunities arise, we need to emphasize to our staffs the need to foster a close working relationship with private consulting firms to ensure the successful completion of the project.

/signed/

Ward W. Staubitz
National Coordinator – Cooperative Water Program

Copy to: Regional Directors
Distribution: A, B, DC, S, FO, PO
This memorandum supersedes WRD INFORMATIONAL MEMORANDUM NO. 2005.01

The memorandum is being distributed by e-mail only

2004 CWP Taskforce Report
Executive Summary

Dear Reader,

The 2004 Task Force is pleased to submit this report of our review of the progress made to date by the U.S. Geological Survey in addressing the recommendations made by the 1999 Cooperative Water Program Review Task Force. We appreciate the opportunity to conduct this review. The collection of sound, scientific water data nationwide is important to a large constituency across the country. We commend the U.S. Geological Survey for this review process and their efforts to make the program as strong as possible. In addition to an Executive Summary, our report consists of four main sections and two appendices, as follows:

I. **Background** provides a brief overview of the activities of the 1999 Task Force and lists the members of the 2004 Task Force and their affiliations.

II. **USGS progress since 1999** describes the number of recommendations from the 1999 report that have been completed or where substantial progress has been made in the past 5 years.

III. **Areas of disagreement or insufficient progress** describes issues identified as needing additional focus or areas in which the USGS did not agree with the 1999 Task Force recommendation.

- Long-term data and core competency
- Relationship with the private sector
- Use of in-kind services
- Availability of information on proposals on the internet
- Billing cooperators based on actual, rather than average costs
- Scheduling/timing of reports
- Funding issues

IV. **Summary of 2004 Task Force findings**

Appendix A provides the terms of reference of the 2004 Task Force.

Appendix B lists, for each of the 59 recommendations made by the 1999 Task Force, the status, the priority rating and assessment by our Task Force and provides an implementation schedule for those recommendations needing additional attention.

On behalf of the 2004 Task Force members,

Barney Austin,
Chairman

Executive Summary

In 1998 the Advisory Committee on Water Information (ACWI) established a Task Force to review the Cooperative Water Program (CWP). The 1999 review was the first external review of the CWP in its 105-year history. The purpose of the 1999 review was to gather information, assess the effectiveness of the program, and recommend improvements. In 2004, five years after the CWP Task Force report was released, the USGS and ACWI expressed interest in an external evaluation of the progress made to date by the USGS in responding to the recommendations of the 1999 Task Force. A new Task Force was assembled under ACWI to provide such an evaluation. This report contains details of that evaluation.

Significant progress has been made by the USGS since the release of the 1999 Cooperative Water Program Task Force report. Although the total number of water monitoring stations is slightly lower now than in past years, the number of stations across the country for which real-time water resources monitoring data are available is significantly higher, which has been of great benefit to water users, water managers and the general public. Furthermore, in the few years since the Task Force report was released, data quality has improved, due in part to the ability of the new telemetry equipment to help identify faults in a timely manner and the advent and use of acoustic technology.

Of the 59 recommendations made in the 1999 Task Force report, most have either been adopted by USGS or are in various stages of planning or implementation. Recommendations where the USGS is not in total agreement, or the present Task Force felt that insufficient progress had been made are discussed in this report. Recommendations that need special attention or may involve a change in USGS philosophy are also given special attention and are summarized here:

1. To make the best use of limited funds when funding shortfalls occur, the members of the present Task Force believe that the USGS should place emphasis on data collection, rather than interpretive studies. If anything the balance of Federal funds used as match by the USGS has gone the other way, thereby exacerbating an already difficult situation for data collection. It is important that the USGS continue to perform interpretive studies to validate their work, but they need to be careful not to reduce their data collection efforts.

2. When funding shortfalls occur, it makes sense to examine existing resources available from both the USGS and their Cooperators and make sure they are being used most effectively. Sometimes Cooperators could do more of the actual work with their staff, but have no money to pay the USGS to do the same work. Cooperators have a vested interest in ensuring the highest quality of data and often have a lot of expertise and non-fiscal resources to bring to the table. The USGS should re-examine the use of in-kind service credit and continue to look for ways to foster better working relationships with cooperators.

3. The USGS should continue to be extra vigilant in avoiding competition with the private sector. Some basic data collection and dissemination functions are inherently governmental and these duties belong to the USGS. Government oversight and criteria are needed to ensure consistent information is collected in a consistent format. However

some studies could realistically be done by the private sector and the USGS needs to make sure that they are not competing unfairly with the private sector in bidding for and conducting this work.

Many of the recommendations that have not been fully implemented are due to lack of funding, rather than lack of will on the part of the USGS. There is a serious need for adequate and consistent Federal funding of the CWP. Recent shortfalls in Federal funding have resulted in the loss of important water monitoring stations and a greater financial burden being placed on cooperators, who now provide approximately 68% of the total costs. Also, vital interpretive studies were either significantly cut, or not funded at all. The TF regards Federal funding shortfalls as the most critical issue currently facing the program and a major impediment to implementing the remaining Task Force recommendations. In realizing the need and calling for additional Federal appropriations for the CWP, it should be noted that any new funds secured for the CWP should not come at the expense of water-related environmental protection, public health protection, or other related programs

National Streamflow Information Program (NSIP)

National Streamflow Information Program – 2007 Update

The National Streamflow Information Program (NSIP) provides the Nation with streamflow information to help protect life and property from floods and manage our water resources and aquatic environment. The streamgaging network is supported by four funding sources: the USGS Cooperative Water Program, the USGS NSIP, other Federal agencies (primarily the Corps of Engineers and Bureau of Reclamation) and 800 State and local funding partners (figure 1). The last two sources currently account for over 69 percent of the USGS streamgaging network funding.

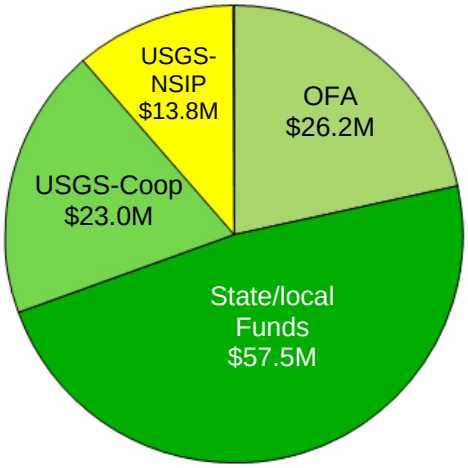


Figure 1. Funding for USGS Streamgages, FY 2005 Total = $121M

In 2005, the USGS operated about 7,450 streamgages. This number had been rising slightly in recent years (figure 2), but fell for the first time since 1977 from 7,627 streamgages in 2004. Because the streamgaging network depends heavily on partner interests and funds, there are often significant year-to-year changes in individual streamgages in operation causing instability in the network. While the network grew slightly in some parts of the Nation, other areas had significant numbers of important long-term streamgages being discontinued due to a lack of cooperator funds. Currently, there are nearly 200 streamgages either at risk of being discontinued or that already have been shut down since October 2005 (Figure 3). The USGS has been unable to locate other funding partners to support these streamgages and has inadequate funds in the NSIP to maintain them. Not only are there a large number of streamgages being discontinued in some areas, but those streamgages can also account for a substantial percentage of the network in that area. There is a vast amount of information accumulated through the records of these streamgages. The longest period of record for these at risk streamgages is 98 years, with many of these streamgages having 70 to 90 years of record. For a complete list of the currently at risk streamgages, see the USGS web page: http://water.usgs.gov/osw/lost_streamgages.html Network instability also reduces the potential value of streamflow records for most infrastructure design applications and environmental assessments. Long records of streamflow are vital to the characterization of regional hydrologic conditions (for purposes of water supply planning and for flood hazard assessments) as well as for documenting and understanding changes that occur in streamflow due to changes in land use, water use, groundwater development, and climate. However,

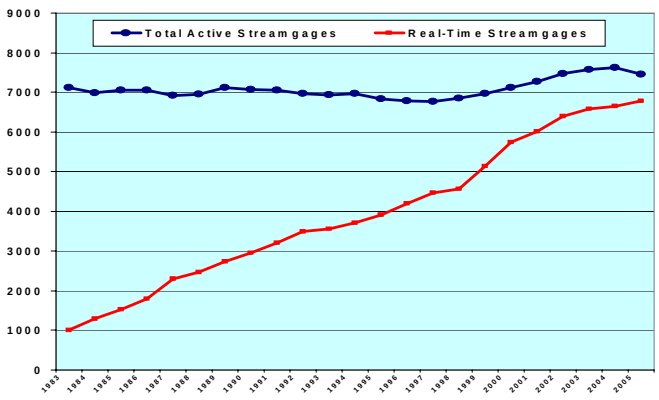


Figure 2. USGS Streamgages 1983 - 2005

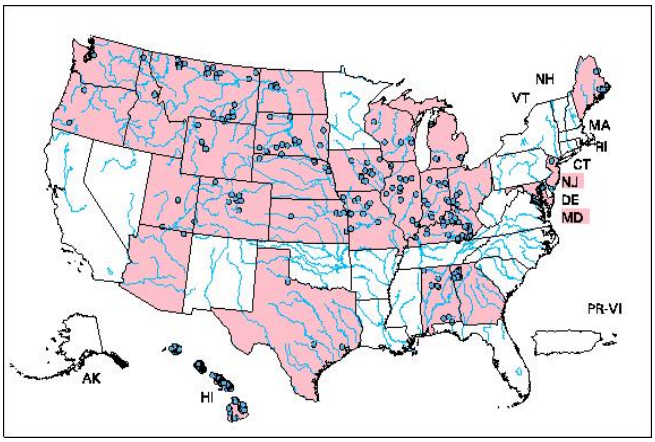


Figure 3. Streamgages at risk of being discontinued

from 1995 to 2006, 870 critical streamgages with 30 or more years of record were discontinued. The increase in NSIP funding in 2001 reduced substantially the loss of these critical streamgages, from an average of over 75 lost per year to just 24 lost in 2001. However, in FY 2005, a near-record 142 critical long record streamgages were discontinued.

The federal funding for the streamgaging program is shown in Figure 4. Currently, the 2007 funding levels for NSIP and the CWP are uncertain. The proposed NSIP FY 2008 funding is an increase of $4.2M over the FY 2006 level (includes $1.2M for the USGS Hazards Assessment and Mitigation Initiative). The total proposed CWP FY 2008 budget would be a decrease of about $4.2M from FY 2006, but the CWP funding for streamgaging is expected to remain level. Figure 4 shows level to slightly declining funding for these two programs except for the NSIP increase in 2001 as part of the Title VIII Hazards Initiative until 2007.

The USGS continues to make great advances in upgrading streamgages with near real-time data delivery capabilities (figure 2). About 91 percent of the streamgages have telemetry (satellite, radio, or phone) and are now able to deliver data to users in near real-time via the World Wide Web. NSIP is also investing resources into long-term improvements in the overall delivery of streamflow information to users. These improvements include: database enhancements to streamline the computational process and to improve user's access to real-time and historical streamflow information, new assessment methods to define trends and estimate streamflow at ungaged locations, and research and development to measure streamflow more accurately, less expensively, and more safely. For more information on recent improvements, see "U.S. Streamflow Measurements and Data Dissemination Improve", EOS, v. 85, No. 21, May, 2004 or http://water.usgs.gov/osw/pubs/EOS-Streamflow.pdf

The National Academy of Sciences recently completed a review of the USGS's plan for the NSIP (located at http://www.nap.edu/books/0309092108/html) that concluded the NSIP was "a sound, well conceived program that meets the nation's needs for streamflow measurement, interpretation, and information delivery" (The National Academia Press, 2004, Assessing the National Streamflow Information Program).

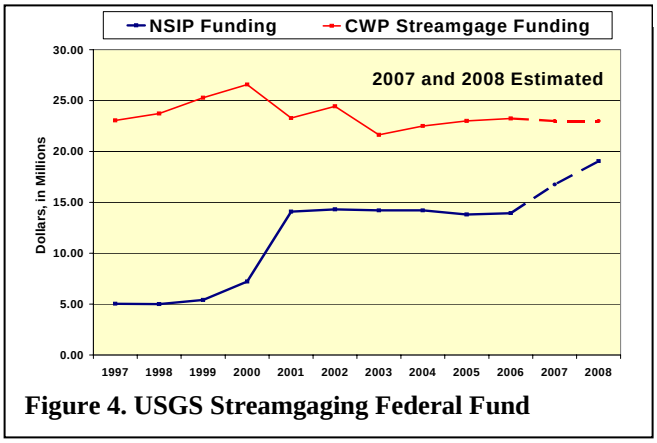


Figure 4. USGS Streamgaging Federal Fund

The National Hydrologic Warning Council has completed a two part cost/benefit analysis of the USGS streamgaging program. The first phase report on the uses of streamflow information can be found at: http://nhwc.udfcd.org/PDF/nhwc_nsip_phaseA.pdf The second phase was completed in Oct., 2006 and the report "Flood Management Benefits of USGS Streamgaging Program" can be viewed at http://www.udfcd.org/temp/Flood_Mngmt_Benefits.pdf.

For additional information on the National Streamflow Information Program, contact the program coordinator, J. Michael Norris, mnorris@usgs.gov, 603-226-7847, or visit http://water.usgs.gov/nsip/

Estimated Benefits of a Fully Implemented U.S. Geological Survey National Streamflow Information Program for the Nation

… from the National Streamflow Information Program

This Fact Sheet is one in a series that highlights information or recent research findings from the USGS National Streamflow Information Program (NSIP). The investigations and scientific results reported in this series require a nationally consistent streamgaging network with stable long-term monitoring sites and a rigorous program of data collection, quality assurance, management, archiving, and synthesis. NSIP produces multipurpose, unbiased surface-water information that is readily accessible to all.

One goal of the U.S. Geological Survey's National Streamflow Information Program (NSIP) is to provide a national 'backbone' streamgage network with about 4,780 federally funded streamgages selected to provide streamflow information to meet national needs. These national-need streamgages would be supplemented with partnership-funded streamgages to help fulfill the need for local, state, and regional streamflow-information. National streamflow-information needs are defined in NSIP as follows:

- Streamflow forecast locations of the National Weather Service (NWS) and the National Resource Conservation Service (NRCS);
- Interstate compacts, court decrees, international treaties, and major national and state-line crossings;
- Major river basin outflows to downstream basins, estuaries, oceans, and Great Lakes;
- Watersheds mostly unaffected by diversion and regulation to evaluate the responses to climate, land, and water use; and
- USGS major water-quality programs.

To fully implement NSIP for the nation would require $116.8M in one-time costs and $108.6M annually (in 2006 dollars)**.** These one-time costs include reactivating 971 discontinued streamgages, installing 433 new streamgages, flood hardening streamgages used by the NWS for flood forecasts, and updating real-time telemetry on all streamgages for the nation. The annual costs are for operation and maintenance of the 4,780 NSIP federal-goal streamgages, to cover the fixed costs of the entire network for the nation, regional assessments of streamflow information, additional data collection and analysis during and following floods and droughts, improved streamflow-information delivery, and development of new equipment and techniques to measure streamflow more accurately, reliably, and at less cost.

Savings to Current Streamgaging Partners for the nation

The USGS currently (2007) operates about 7,620 continuous-record discharge streamgages for the nation, of which 2,951 were selected to be part of the NSIP federal-goal streamgage network. Currently, 2,350 of these 2,951 streamgages are funded through the Cooperative Water Program (CWP) and 601 are fully funded by NSIP. If NSIP were fully funded for the nation, all 2,951 of these streamgages would be completely federally funded (as would 1,829 additional streamgages not currently operated by the USGS). In addition, for the 4,669 existing streamgages (and for any future/new streamgages) that would remain funded through the CWP, the cost of operation would be about 40 percent less than the current costs because NSIP would cover the infrastructure costs of all streamgages operated across the country. These infrastructure costs are costs of the streamgaging network that are for

the most part independent of the number of streamgages operated and cover such items as salary for management and supervision of the network, maintenance and updates of the database, and administrative support of the program. These changes would translate into a savings to current funding partners nationally of about **$20.75M per year** for full federal funding of the 2,350 existing NSIP national needs streamgages not already NSIP funded and **$17.68M per year** savings due to the infrastructure costs being covered for the 4,669 streamgages that would remain cooperatively funded for a total savings to funding partners for the nation of about **$38.43M per year** (accounts for the USGS CWP contribution in existing funding – see Appendix for computations).

Additional Benefits to the nation of a fully implemented NSIP

In addition to the fiscal benefits discussed above, users of streamflow information for the nation also will benefit from NSIP based on the other enhancements the program will provide. These enhancements will include the following:

1. A total of 4,780 streamgages would be operated and maintained for the nation funded entirely by federal funds (total network for the nation is now about 7,400 streamgages; an equivalent of 632 are fully funded by NSIP). Many, if not all, of the existing (and future new) streamgages not funded by NSIP would remain funded through the Cooperative Water Program at a 50-50 cost share, but at a cost approximately 40 percent less than today.

2. Developments in data input and analyses techniques, as well as investments in other new software and hardware for the National Water Information System (NWIS) database will enhance data delivery to provide more accurate and timely streamflow information.

3. Enhanced data acquisition and analyses during and after floods and droughts will provide a better understanding of these hydrologic extremes for better predictions in the future.

4. Regional assessments of the streamflow information will provide better estimates of streamflow at locations distant from streamgages and also information as to where to place new streamgages to optimize the streamgaging network. This information will also be central to the NSIP goal of being able to predict streamflow characteristics at any point on any stream in the nation. These assessments will also provide insight to any trends in streamflow caused by changes in land use, water use, or climate.

5. Research and development will provide better equipment and techniques to measure and understand streamflow.

Appendix — Computations for National Partner Savings from USGS NSIP

1. Full Federal funding for existing NSIP streamgages not already funded by NSIP:
2,350 streamgages X $14,475 = $34.02M per year; USGS partners currently (2007) pay about 61 percent to the USGS's 39 percent — $34.02M X 0.61 = **$20.75M/year partner savings**

2. Reduced cost per streamgage because infrastructure costs covered:
$14,475/streamgage X 0.40 = $5,790 reduction in per streamgage costs;
Cooperative Water Program partners currently pay 61 percent, so their share of these savings = 0.61 X $5,790 = $3,532. Savings = (4,669 CWP funded streamgages – 526 OFA funded streamgages) X $3,532 = **$14.63M per year;** 526 OFA funded streamgages X $5,790 = **$3.05M per year;** $14.63M + $3.05M = **$17.68M per year**

3. Total savings = $20.75M + $17.68M = **$38.43M per year**

Estimated Benefits of a Fully Implemented U.S. Geological Survey National Streamflow Information Program in California

… from the National Streamflow Information Program

This Fact Sheet is one in a series that highlights information or recent research findings from the USGS National Streamflow Information Program (NSIP). The investigations and scientific results reported in this series require a nationally consistent streamgaging network with stable long-term monitoring sites and a rigorous program of data collection, quality assurance, management, archiving, and synthesis. NSIP produces multipurpose, unbiased surface-water information that is readily accessible to all.

One goal of the U.S. Geological Survey's National Streamflow Information Program (NSIP) is to provide a national 'backbone' streamgage network with about 4,780 federally funded streamgages selected to provide streamflow information to meet national needs. In California, there will be 225 of these planned federally-funded streamgages. These national-need streamgages would be supplemented with partnership-funded streamgages to help fulfill the need for local, state, and regional streamflow-information. National streamflow-information needs are defined in NSIP as follows:

- Streamflow forecast locations of the National Weather Service (NWS) and the National Resource Conservation Service (NRCS);
- Interstate compacts, court decrees, international treaties, and major national and state-line crossings;
- Major river basin outflows to downstream basins, estuaries, oceans, and Great Lakes;
- Watersheds mostly unaffected by diversion and regulation to evaluate the responses to climate, land, and water use; and
- USGS major water-quality programs.

To fully implement NSIP in California only would require $5.86M in one-time costs and $5.11M annually (in 2006 dollars)**.** These one-time costs include reactivating 56 discontinued streamgages, installing 16 new streamgages, flood hardening streamgages used by the NWS for flood forecasts, and updating real-time telemetry on all streamgages in California. The annual costs are for operation and maintenance of the 225 NSIP federal-goal streamgages, to cover the fixed costs of the entire network in California, regional assessments of streamflow information, additional data collection and analysis during and following floods and droughts, improved streamflow-information delivery, and development of new equipment and techniques to measure streamflow more accurately, reliably, and at less cost.

Savings to Current Streamgaging Partners in California

The USGS currently (2007) operates 448 continuous-record streamgages in California, of which 128 were selected to be part of the NSIP federal-goal streamgage network. Currently, 109 of these 128 streamgages are funded through the Cooperative Water Program (CWP) and 19 are fully funded by NSIP. If NSIP were fully funded in California, all 128 of these streamgages would be completely federally funded (as would 97 additional streamgages in California not currently operated by the USGS). In addition, for the 320 existing streamgages (and for any future/new streamgages) in California that would remain funded through the CWP, the cost of operation would be about 40 percent less than the current costs because NSIP would cover the infrastructure costs of all streamgages operated in the Nation. These infrastructure costs are costs of the streamgaging network that are for the most part

independent of the number of streamgages operated and cover such items as salary for management and supervision of the California network, maintenance and updates of the database, and administrative support of the program. These changes would translate into a savings to current funding partners in California of about $1,516,844 per year for full federal funding of the 109 existing NSIP national needs streamgages not already NSIP funded and $1,988,054 per year savings due to the infrastructure costs being covered for the 320 streamgages that would remain cooperatively funded for a total savings to funding partners in California of about $3,504,898 per year (accounts for the USGS CWP contribution in existing funding – see Appendix for computations).

Additional Benefits to California of a fully implemented NSIP

In addition to the fiscal benefits discussed above, users of streamflow information in California also will benefit from NSIP based on the other enhancements the program will provide. These enhancements will include the following:

1. A total of 225 streamgages would be operated and maintained in California funded entirely by federal funds (total network in California is now 448 streamgages; an equivalent of 29 are fully funded by NSIP). Many, if not all, of the existing (and future new) streamgages not funded by NSIP would remain funded through the Cooperative Water Program at a 50-50 cost share, but at a cost approximately 40 percent less than today.

2. Developments in data input and analyses techniques, as well as investments in other new software and hardware for the National Water Information System (NWIS) database will enhance data delivery to provide more accurate and timely streamflow information.

3. Enhanced data acquisition and analyses during and after floods and droughts will provide a better understanding of these hydrologic extremes for better predictions in the future.

4. Regional assessments of the streamflow information will provide better estimates of streamflow at locations distant from streamgages and also information as to where to place new streamgages to optimize the streamgaging network. This information will also be central to the NSIP goal of being able to predict streamflow characteristics at any point on any stream in the nation. These assessments will also provide insight to any trends in streamflow caused by changes in land use, water use, or climate.

5. Research and development will provide better equipment and techniques to measure and understand streamflow.

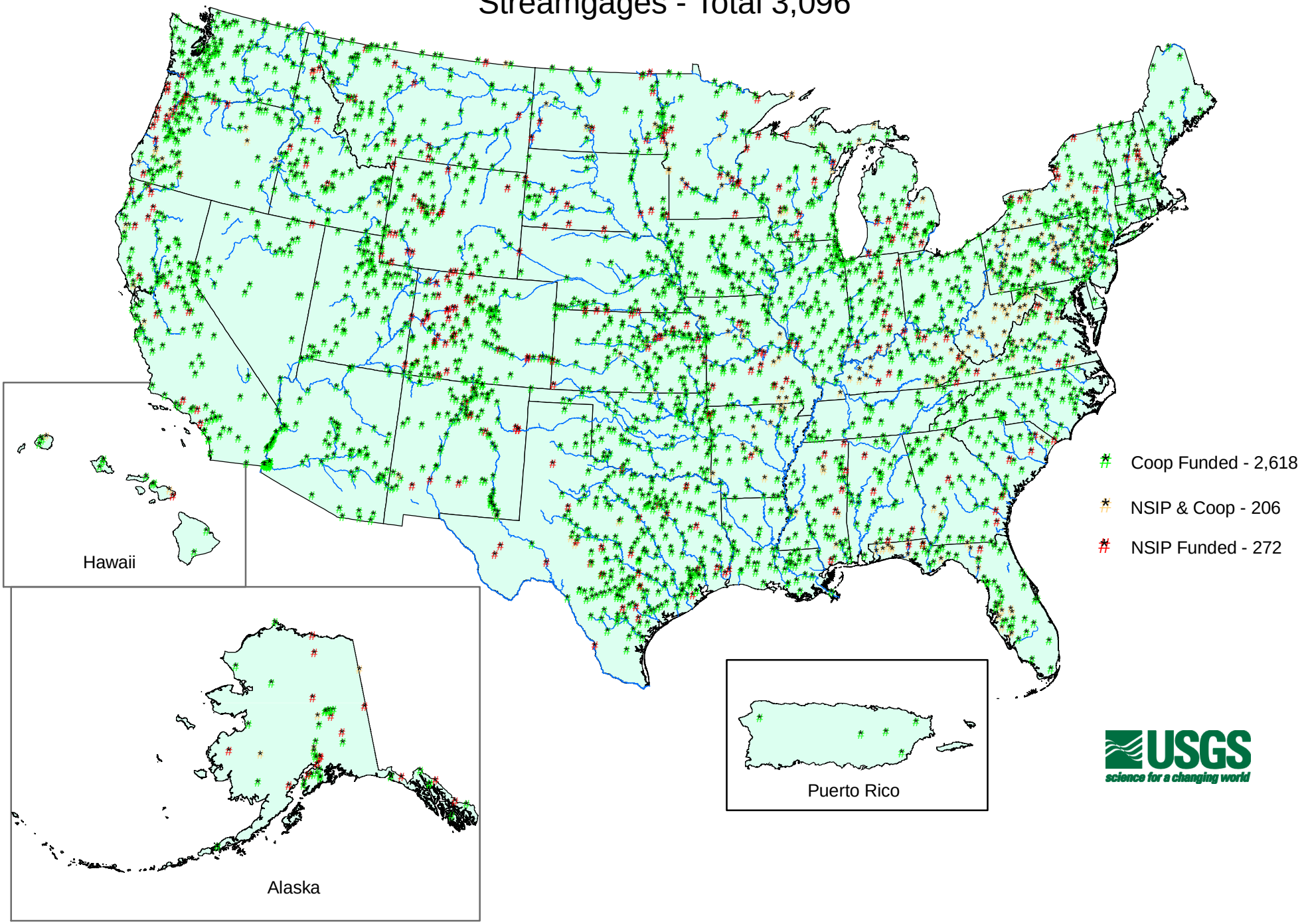
Appendix — Computations for California Partner Savings from USGS NSIP

1. Full Federal funding for existing NSIP streamgages not already funded by NSIP:
109 streamgages X $19,600 = $2,136,400 per year; USGS partners currently (2007) pay about 71 percent to the USGS's 29 percent — $2,136,400 X 0.71 = **$1,516,844/year partner savings**

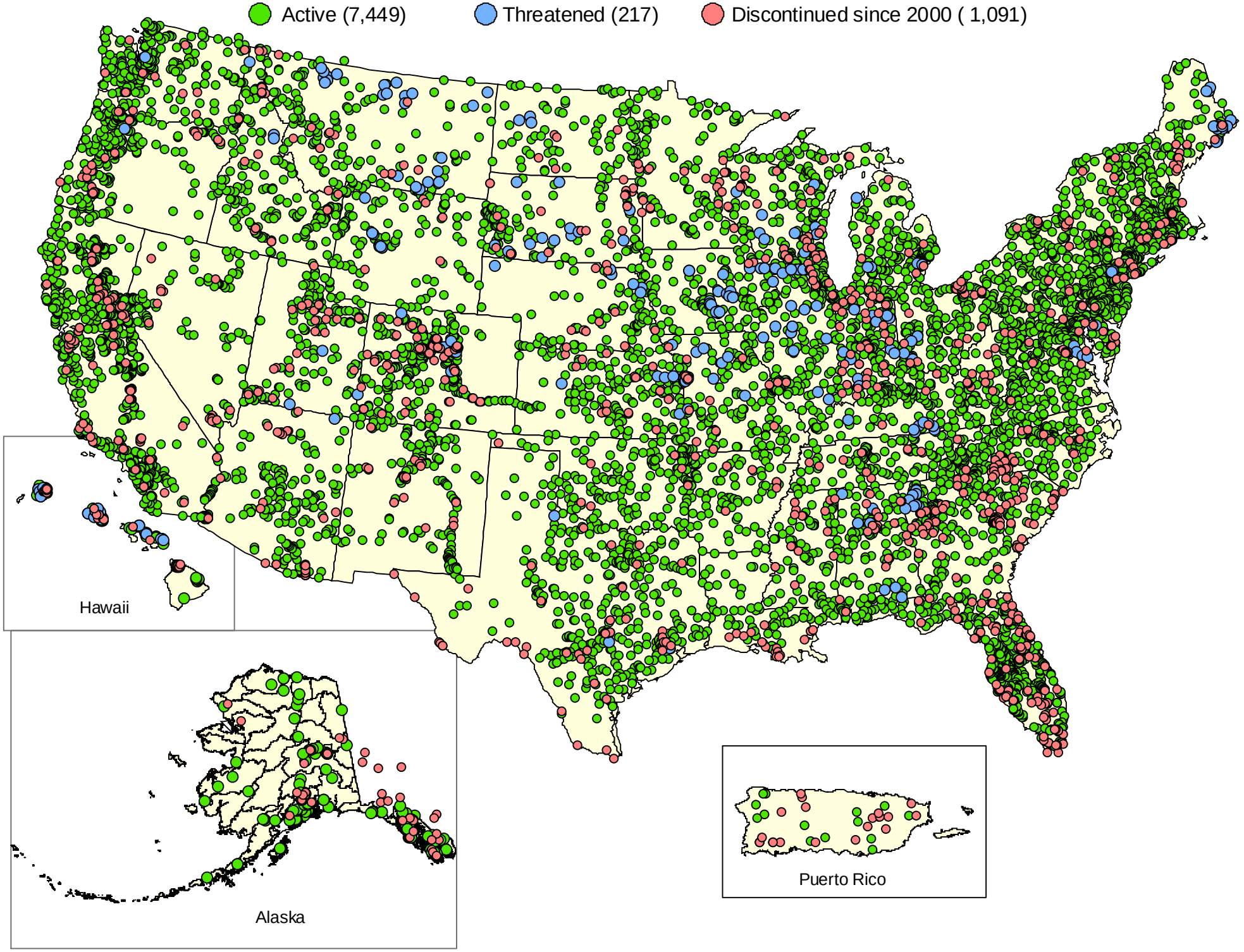
2. Reduced cost per streamgage because infrastructure costs covered:
$19,600/streamgage X 0.40 = $7,840 reduction in per streamgage costs;
Cooperative Water Program partners currently pay 71 percent, so their share of these savings = 0.71 X $7,840 = $5,566. Savings = 229 CWP streamgages X $5,566 = **$1,274,614 per year;** OFA's get no match, 91 OFA streamgages X $7,840 = **$713,440**
$1,274,614 + $713,440 = 1,988,054

3. Total savings = $1,516,844 + $1,988,054 = **$3,504,898 per year**

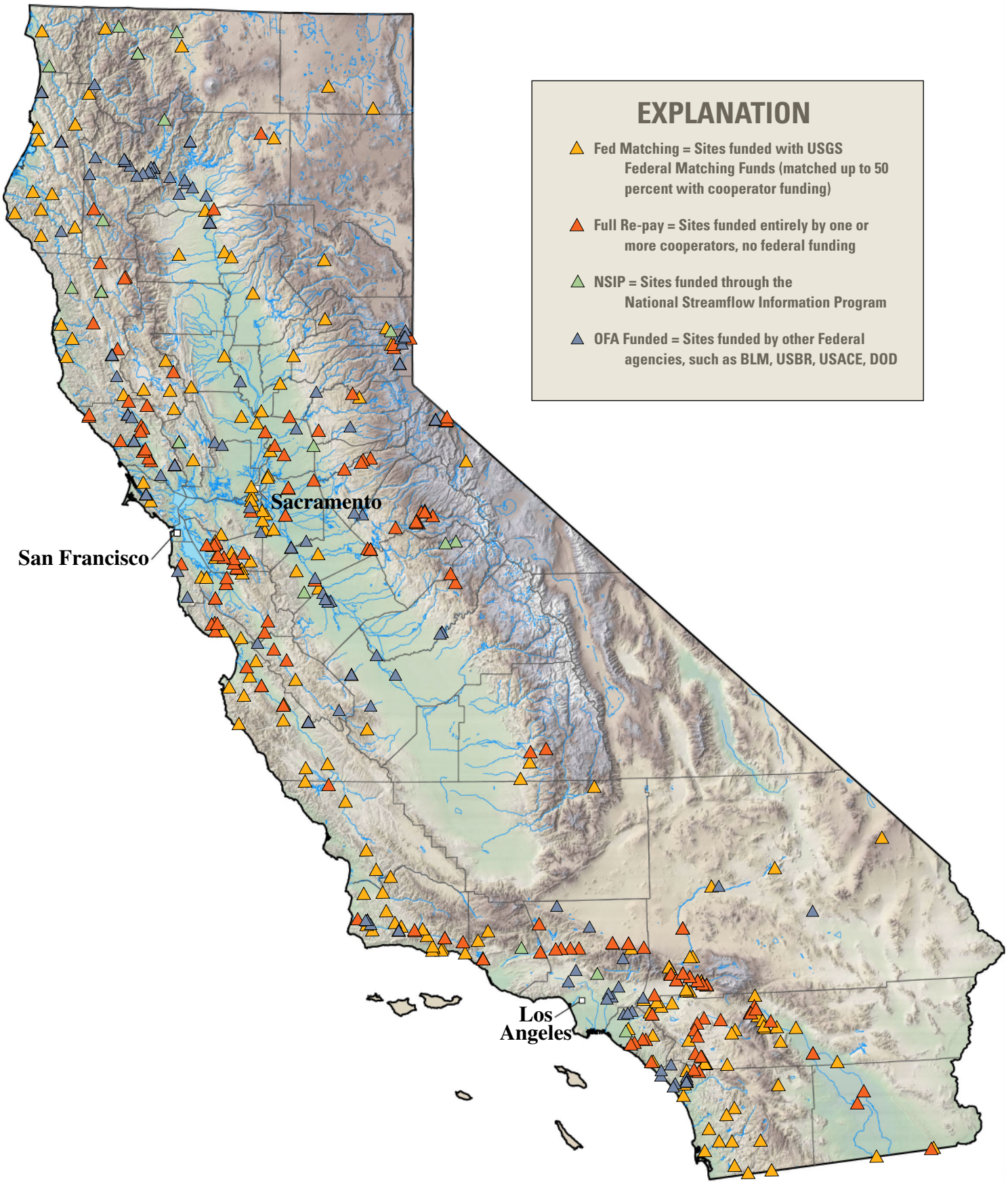
Funding Sources of the Active USGS National Streamflow Information Program Streamgages - Total 3,096



USGS Streamgages



USGS STREAMGAGING NETWORK IN CALIFORNIA



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U.S. Geological Survey Typical Streamgaging Operation and Maintenance Cost Evaluation

. . . from the National Streamflow Information Program

This Fact-Sheet is one in a series that highlights information or recent research findings from the USGS National Streamflow Information Program (NSIP). The investigations and scientific results reported in this series require a nationally consistent streamgaging network with stable long-term monitoring sites and a rigorous program of data collection, quality assurance, management, archiving, and synthesis. NSIP produces multipurpose, unbiased surface-water information that is readily accessible to all.

To help meet the goal of providing earth science and information to the Nation, the U.S. Geological Survey operates and maintains the largest streamgaging network in the world, with over 7,400 active streamgages in 2006. This network is operated in cooperation with over 800 federal, tribal, state, and local funding partners. The streamflow information provided by the USGS is used for the protection of life and property; for water assessment, allocation, and management; for design of roads, bridges, dams, and water works; for the delineation of flood plains, for assessment and evaluation of habitat; for understanding the effects of land-use, water-use, and climate changes; for evaluation of water quality; and for recreational safety and enjoyment.

USGS streamgages are managed and operated to rigorous national standards, allowing analyses of data from streamgages in different areas and spanning over long time periods, some with more than 100 years of data. More than 90% of USGS streamgages provide data real-time on the web. Physical measurements of discharge are made at streamgages 10-20+ time a year, depending on channel conditions, to ensure the highest level of accuracy possible in discharge figures.

In 2006, The U.S. Geological Survey conducted a review of the activities, operations, equipment, support and costs associated with operating and maintaining a streamgaging program. Presented in Table 1 is a summary of the typical costs and activities required to operate a streamgage on an annual basis. This information represents the costs of a "typical" USGS streamgage. Actual costs are specific to a particular streamgage and can vary substantially depending on location and operational issues.

Table 1. Typical U.S. Geological Survey streamgaging costs.

Category	Cost/Streamgage/Year	Percent of Cost/Streamgage/Year
Labor for field and office	$5,777	0.41
Administration	$3,538	0.25
Building and utilities	$1,444	0.10
Field Equipment	$1,403	0.10
Data Management and Delivery	$985	0.07
Vehicles	$655	0.05
Travel	$317	0.02
Annual Cost per Typical Continuous Streamgage	$14,117	1.00

Typical Streamgage Operational and Cost Information

Labor for Field and Office

Field

- Routine visits to streamgages
- Emergency visits to streamgages
- Visits during flooding
- Maintenance and inspection visits
- Surveying visits
- Analysis of the discharge computations
- Technical training

Office

- Stage data edits
- Development and maintenance of rating curves
- Analysis of rating curve shifts due to changing channel conditions
- Monitoring real-time information for instrumentation problems
- Review of records for rating curve and discharge computations
- Finalization and publication of the streamflow information
- Safety and administrative training.

Administrative:

- Safety program management
- Management of the program,
- Local quality assurance
- Facility costs.
- Personnel management
- Purchasing, and contracts
- Financial management

- Salary of supervisors of the hydrographers
- Salary of administrative support required by the program
- Funding partner interactions (over 800 nationwide)
- Overhead to support appropriate items at the USGS national level
- USGS communications (with Congress, the public, and media)
- Streamgaging program management and support
- Development of separate joint funding agreements

Building and Utilities:

- Secure file storage space
- Vehicle parking space, boat storage
- Shop space, laboratory space, warehouse space
- Office space for the streamgaging program staff
- Heating, cooling, trash, water, gas, electric poser at streamgages

Field Equipment:

- Gage houses, data loggers, stage or velocity sensor, telemetry equipment, and other equipment for streamgage operation.
- Boats and motors, boat maintenance, snowmobiles, ATVs, annual repair and maintenance costs
- Generators, survey equipment, field laptop computers, power tools
- Equipment for measuring discharge (meters, ADCPs, bridge cranes, automated loggers)
- Safety equipment such as traffic control equipment and confined space safety equipment
- Waders, personal floatation devices, and cell phones.

Data Management and Delivery:

- Telemetry (satellite up-links and phone lines mostly)
- Local IT infrastructure, including servers, computers, printers, plotters, and scanners
- IT support, support of the NWIS data base, web access, data archival and retrieval, network communications.

Vehicles:

- Purchasing or leasing field vehicles
- Fuel and vehicle maintenance

Travel:

- Lodging and per diem

USGS Streamflow Information:

- http://waterdata.usgs.gov/nwis
- http://water.usgs.gov/waterwatch
- http://water.usgs.gov/nsip

USGS California Water Science Center

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WATER PROGRAMS IN CALIFORNIA

California is threatened by many natural hazards—fire, floods, landslides, earthquakes. The State is also threatened by longer-term problems, such as hydrologic effects of climate change, and human-induced problems, such as over use of ground-water and degradation of water-quality. The threats and problems are intensified by increases in population, which has risen to nearly 36.8 million. For the USGS California Water Science Center, providing scientific information to help address hazards, threats, and hydrologic issues is a top priority. To meet the demands of a growing California, USGS scientific investigations are helping State and local governments improve emergency management, optimize resources, collect contaminant-source and -mobility information, and improve surface- and ground-water quality. USGS hydrologic studies and data collection throughout the State give water managers quantifiable and detailed scientific information that can be used to plan for development and to protect and more efficiently manage resources. The USGS, in cooperation with State, local, and tribal agencies, operates more than 500 instrument stations, which monitor streamflow, ground-water levels, and surface- and ground-water constituents to help protect water supplies and predict the threats of natural hazards. The following are some of the programs implemented by the USGS, in cooperation with other agencies, to obtain and analyze information needed to preserve California's environment and resources.

Reducing Loss of Life and Property

In 2004, the USGS California Water Science Center responded to potential dangers resulting from wild fires in southern California by rapidly deploying instruments to bolster the ALERT network and local agencies' debris-flow and hydrologic-hazard warning systems. By coordinating with local, state, and federal emergency-management operations, the USGS was able to issue timely debris-flow watches and warnings, and maps detailing areas of potential landslides.

Ground-Water Resource Management

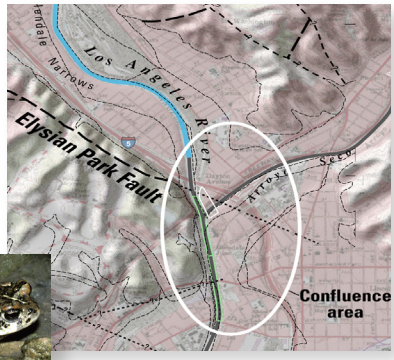
Water pumped from the Joshua Tree subbasin has been the sole source of water for the community of Joshua Tree in the southern Mojave Desert. To improve the long-term sustainability of this water supply, the USGS, in cooperation with the Joshua Basin Water District, defined the geohydrologic framework, determined the quantity and distribution of recharge, and developed a ground-water flow model that can be used to help manage the water resources of the region.

Statewide Ground-Water Assessment

The California State Water Resources Control Board has partnered with the U.S. Geological Survey to carry out a comprehensive assessment of water quality in the State's ground-water basins. This Ground-water Ambient Monitoring and Assessment Program (GAMA) is designed to provide information on the quality of ground water in California's aquifers. The GAMA program provides the resulting monitoring data to a broad public audience, along with contextual information such as drinking water standards and background levels. GAMA provides drinking water purveyors with data not otherwise available, including chemical analyses that provide an early awareness of emerging water-quality issues. State and local agencies will be provided with a statistically based description of ground-water quality in the basins they are working to protect. GAMA data can also be used to support broad risk assessments and policy development.

River Restoration

USGS scientists from three disciplines—geology, hydrology, and biology—collaborated to provide the Santa Monica Mountains Conservancy information on key scientific issues relevent to a proposed new park at the confluence of the Los Angeles River and the Arroyo Seco in Los Angeles. Information on faulting, earthquake ground motion, liquefaction, landsliding, hydraulics and water quality of surface and ground-water, wildlife colonization–extinction dynamics, wildlife corridors, wildlife reintroduction, non-native species, and potential restoration of local habitat and ecology was submitted to the Conservancy.

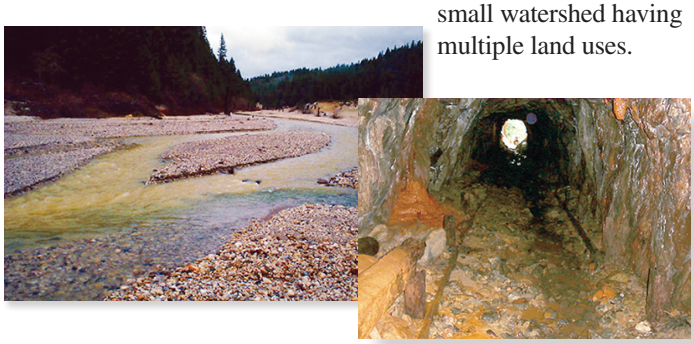


Urban Encroachment on Farmland

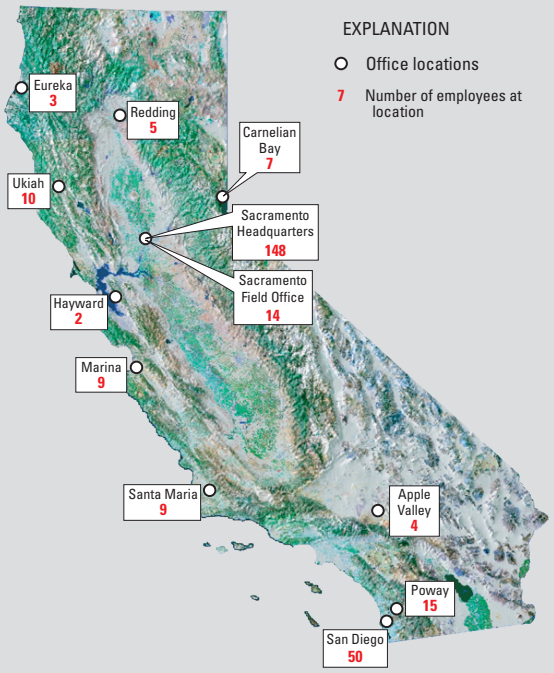
Cities such as Modesto in California's Central Valley have some of the highest growth rates in the Nation, resulting in a gradual urbanization of adjacent farmlands and an increased reliance on ground water. The USGS California Water Science Center, in cooperation with the Modesto Irrigation District, compiled nearly 3,500 drillers' logs. USGS scientists are analyzing the logs to help develop a detailed computer model of the ground-water system. The model will be used to evaluate water-resources management strategies to help ensure adequate water supplies.

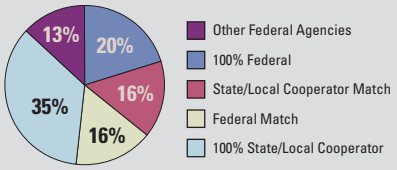
Wetland Restoration and Mercury Studies

Wetland and floodplain restoration is taking place in California on a massive scale, transforming thousands of acres of salt ponds, subsided farmland, and river corridors in the same watersheds where gold and mercury mining has left a legacy of contamination. USGS scientists are working to unravel a puzzle about what is keeping most of this legacy mercury from getting into the food chain, whether current wetlands export bioavailable mercury, and how restoration projects and other land-use management practices affect bioaccumulation. Current projects include measuring methyl and total mercury carried into and out of a natural marsh with each phase of the tide in the Sacramento-San Joaquin Delta, and a detailed assessment of the three ingredients needed to make methyl mercury—sulfur, organic carbon, and mercury—in a small watershed having multiple land uses.



USGS California Water Science Center





USGS California Water Science Center funding

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STREAMGAGE PROGRAM

The U.S. Geological Survey (USGS) California Water Science Center streamgage program is part of the nationwide program that provides streamflow information for a variety of purposes—from flood and landslide forecasting to detecting changes in streamflow caused by human activities or climate change. This information is critical to resource managers, farmers, fishermen, kayakers, land-use planners, engineers, environmentalists, and flood forecasters. The program relies on a network of streamgaging stations to accurately and reliably measure stream height and flow and to accumulate data over long periods for many locations. One such gage is the Happy Isles streamgage in Yosemite National Park, which has been continuously measuring water flowing in the Merced River since 1915. The long-term record for this gage is providing scientists the clearest picture yet of the effects of long-term climate change. The USGS operates nearly 7,000 streamgages nationwide, of which more than 500 gages are operated by the USGS California Water Science Center (CAWSC). 400 of these CAWSC gages provide real-time online data. The gages provide daily streamflow records that are accessible to the public.

Water Information Critical to California

The availability of fresh water is central to the health of the citizens and the environment of the United States and to the growth of the Nation's economy. This is especially true in California, where water resources are in high demand and water-resource managers often must contend with satisfying conflicting water-use needs. Water-resource managers face human-induced problems, such as long-term groundwater over use and water pollution, and thus must do complex operational planning and meet strict water-quality standards. In addition, they must prepare for natural disasters, such as floods, landslides, droughts, and fires. The effects of these problems will continue to increase as California's population grows. Reliable, accurate, and timely information from the USGS streamgage program is crucial to State and local water-resource managers and to Federal agencies, such as the U.S. Bureau of Reclamation and the U.S. Army Corps of Engineers.

Flood Warning and Forecasting

Floods are among the most frequent and costly natural disasters. Flood warnings and river-level forecasts are essential tools for reducing loss of life and property. USGS streamgage information includes historical and up-to-date flow data needed to calibrate National Weather Service (NWS) models to assure timely and accurate NWS forecasts.

Landslides and Debris Flow

The USGS also measures rainfall and ground-water levels. These measurements provide critical information for issuing timely public warnings of landslide and debris-flow hazards. Following the southern California wildfires in October 2003, USGS scientists and technicians rapidly deployed instruments to prepare for the upcoming storm season. When the State was hit with a "pineapple express," USGS scientists issued landslide advisories to the NWS, the California Office of Emergency Services, and other State and Federal agencies.

Real-Time Information

USGS streamgaging stations equipped with real-time telemetry are integral components of reservoir operations and river-forecast and flood-warning systems. One of the strengths of the USGS streamgage real-time network is the ability to provide, at any time, a snapshot of the current hydrologic conditions in California and across the country. This real-time information, available on the Internet at *http://waterdata.usgs.gov/usa/nwis/rt/*, benefits not only engineers and resource, emergency, and disaster managers, but also those who enjoy recreational activities such as kayaking and fishing.

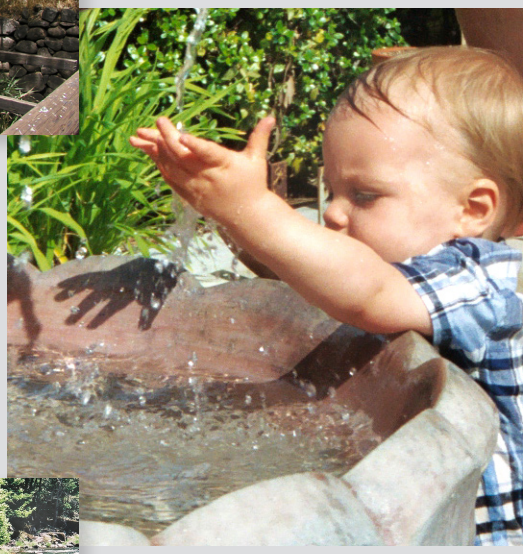
Cooperative Support for the Streamgage Program

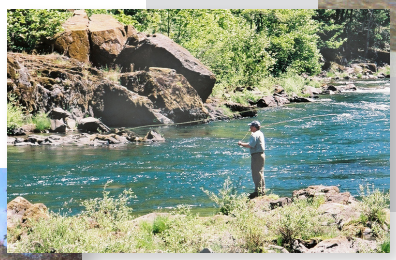
The USGS California Water Science Center streamgaging network is supported by two programs. The Cooperative Water Program funds more than 70 percent of the USGS streamgages using funds from nearly 130 State or local agencies. The National Streamflow Information Program funds the remainder of the program and supports the on-going modernization and improvement of the streamgaging network.

California Water Science Center Streamgage Network

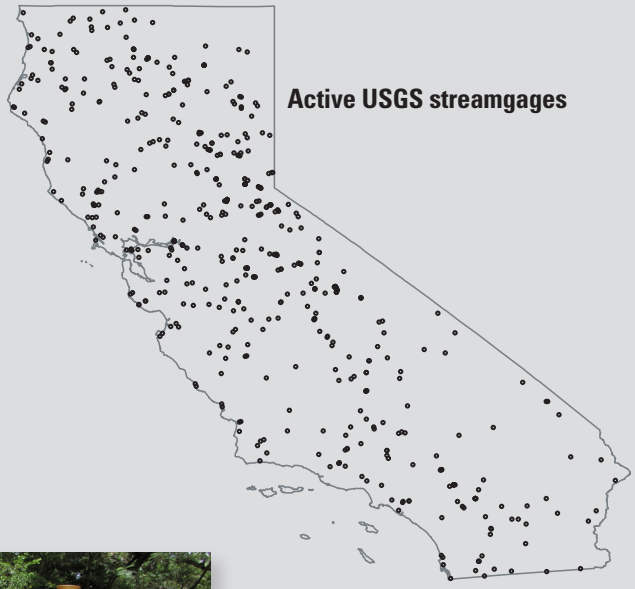
The USGS California Water Science Center operates about 500 streamgages in California to provide daily streamflow records accessible to the public. These streamgages are maintained by experienced staff from field offices located in Eureka, Redding, Ukiah, Carnelian Bay, Sacramento, Hayward, Marina, Santa Maria, Apple Valley, San Diego, and Poway.

For more than 100 years, California has depended on the USGS to provide streamflow information. Today the USGS California Water Science Center streamgage program, as part of the national program, continues to provide information needed to monitor changes in streamflow owing to changes in agricultural practices, urbanization, ground-water development, and climate change.





USGS California Water Science Center



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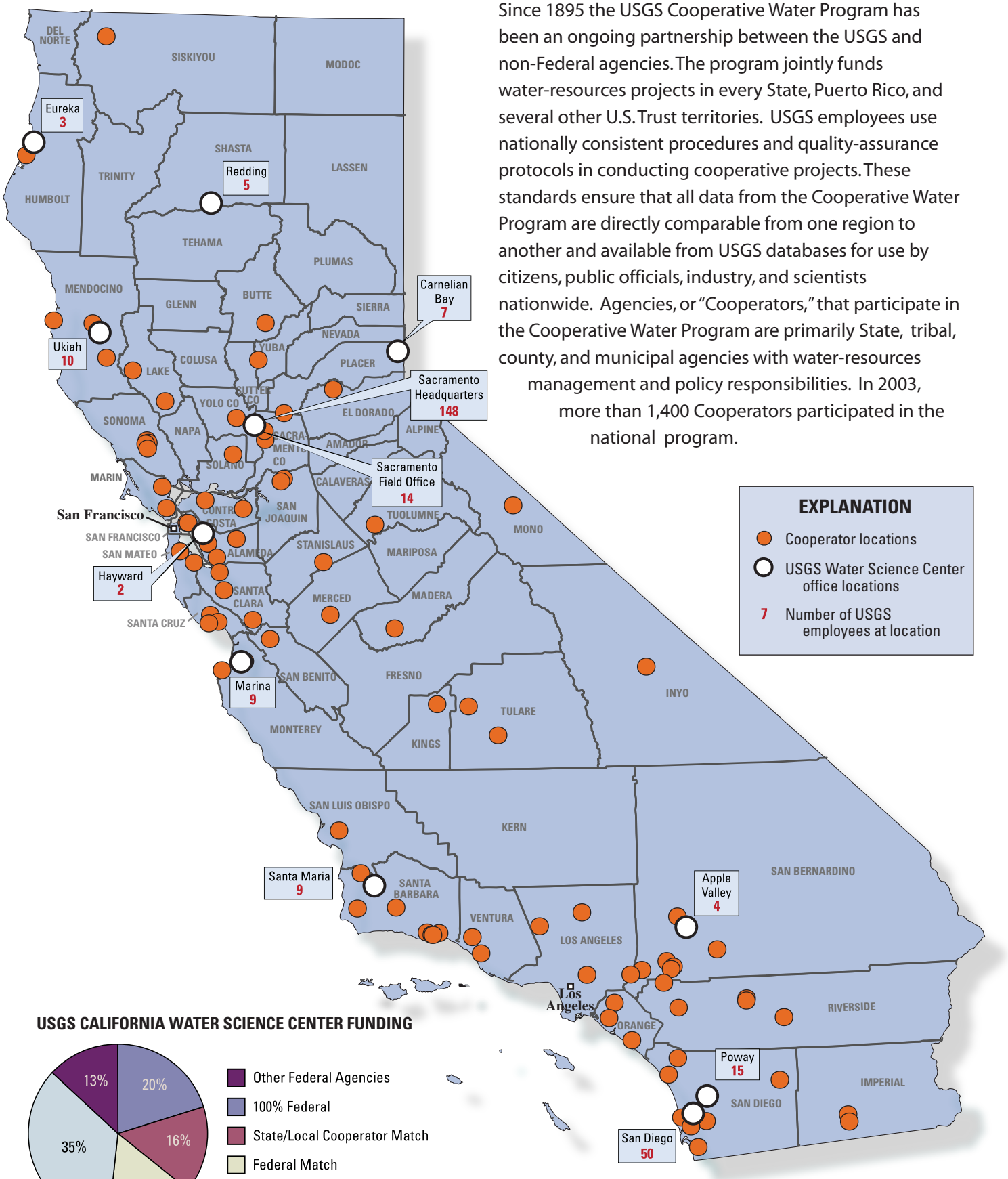
CALIFORNIA WATER SCIENCE CENTER COOPERATIVE WATER PROGRAM PARTNERS

Since 1895 the USGS Cooperative Water Program has been an ongoing partnership between the USGS and non-Federal agencies. The program jointly funds water-resources projects in every State, Puerto Rico, and several other U.S. Trust territories. USGS employees use nationally consistent procedures and quality-assurance protocols in conducting cooperative projects. These standards ensure that all data from the Cooperative Water Program are directly comparable from one region to another and available from USGS databases for use by citizens, public officials, industry, and scientists nationwide. Agencies, or "Cooperators," that participate in the Cooperative Water Program are primarily State, tribal, county, and municipal agencies with water-resources management and policy responsibilities. In 2003, more than 1,400 Cooperators participated in the national program.



EXPLANATION

- Cooperator locations
- USGS Water Science Center office locations
- 7 Number of USGS employees at location

USGS CALIFORNIA WATER SCIENCE CENTER FUNDING

Agua Caliente Band of Cahuilla Indians
Alameda County FC&WCD
Alameda County Water District
Alameda County Zone 7 Water Agency
Antelope Valley-East Kern Water Agency
Big Bear City CSD
Borrego Water District
City of Brentwood
Brooktrails CSD
City of Burbank
California Bay-Delta Authority
California Coastal Conservancy
California Dept. of Parks & Recreation
California Dept. of Water Resources
California Resources Agency
California State Water Resources Control Board
Carson-Truckee Water Authority, Nevada
Casitas Municipal Water District
Chino Basin WCD
Chino Basin Watermaster
Coachella Valley Water District
Contra Costa County FC&WCD
Contra Costa Water District
Desert Water Agency
East Bay Municipal Utility District
Eastern Municipal Water District
El Dorado Irrigation District
City of Elk Grove
City of Fort Bragg
Georgetown Divide Public Utility District
Goleta Water District
Hawaii Dept. of Land and Natural Resources
Hidden Valley Lake Community Services District
Hi-Desert Water District
Humbolt Bay Municipal Water District
Imperial County Department of Public Works
Imperial Irrigation District
Inyo County Planning Department
Joshua Basin Water District
Karuk Tribe of California
City of Los Angeles, Bureau of Sanitation, Department of Public Works
L.A. County Department of Public Works
Lake County Department of Public Works
City of Lompoc
Madera Irrigation District
Marin Municipal Water District
Mendocino County Water Agency
Merced County
Modesto Irrigation District
Mojave Water Agency
Mono County
Montecito Water District
Monterey County Water Resources Agency
Monterey Peninsula WMD
Northeastern San Joaquin County Groundwater Banking Authority
North Marin Water District
Nye County Department of Natural Resources, Nevada
City of Oceanside
Orange County Public Facilities and Resources Department
Orange County Water District
Padre Dam Municipal Water District
Pajaro Valley Water Management Agency
Pechanga Band of Luiseno Mission Indians
Riverside County FC&WCD
Sacramento County, Department of Water Resources
San Benito County Water District
San Bernardino County FCD
San Bernardino Valley MWD
San Diego County Flood Control District
San Francisco Water Department
San Gorgonio Pass Water Agency
City of San Jose
San Juan Basin Authority
San Luis and Delta-Mendota Water Authority
San Luis Obispo County FC&WCD
San Mateo County
Santa Ana Watershed Project Authority
City of Santa Barbara
Santa Barbara County
Santa Clara Valley Water District
City of Santa Cruz
Santa Cruz County DPW
Santa Margarita River Watershed
Santa Maria Valley WCD
City of Roseville
City of San Diego
City and County of San Francisco
City of Santa Rosa
Santa Ynez River Water Conservation District
Scotts Valley Water District
Scripps Institution of Oceanography
Solano County Water Agency
Sonoma County Permit& Resource Management Dept.
Sonoma County Water Agency
Soquel Creek Water District
South County Regional Wastewater Authority
City of Stockton
Sweetwater Authority
Tahoe Regional Planning Agency, Nevada
Truckee Meadows Water Authority, Nevada
Tulare County Flood Control District
Tule River Tribal Council
Turlock Irrigation District
United Water Conservation District
University of California, Davis
University of California, San Diego
Ventura County Public Works Agency
Victor Valley Water District
Washoe County, Nevada
Washoe County Water Conservation District, Nevada
Water Replenishment District of Southern California
Woodbridge Irrigation District
Yolo County FC and WCD
Yuba County Water Agency

A National Science Program That Addresses Local Concerns

The Cooperative Water Science Program
California Water Science Center
U.S. Geological Survey

The California Water Science Center collects, interprets, and provides unbiased and timely scientific information of the highest quality for the responsible planning, use, and management of California's water resources.

The USGS Cooperative Water Science Program enables scientists in the California Water Science Center to partner with state and local agencies to jointly develop new scientific knowledge, tools, and data.

The cooperative water program in California has grown more than five-fold over the past 20 years, and much of the success can be attributed to the quality of the partnerships with cooperating agencies throughout the state. The products of this collaboration are unbiased scientific information of direct import to local concerns and cutting edge science relevant to the nation.

For example, investigative results have been used to manage storm-water runoff, to develop ground-water management plans, and to identify areas of water-quality degradation. These investigations address many water issues:

- Water-quantity and -quality assessments
- Toxic substances in natural waters and biota
- Rural and urban nonpoint pollution
- Saltwater intrusion
- Surface-water / ground-water interactions
- Sediment transport and chemistry
- Effects of climate change
- Wetland functions and hydrology
- Aquifer and streamflow characterizations
- Frequency and magnitude of droughts and floods

Below are summaries of our current investigative projects:

Projects with State and Local Cooperators

Project: Agua Caliente Spring
Cooperator: Agua Caliente Band of Cahuilla Indians
Agua Caliente Spring is the only known hot spring in the Palm Springs area and one of only a handful in southern California. The spring is owned by the Agua

Caliente Band of the Cahuilla Indians. Agua Caliente Spring has been used for recreation and medicinal therapy for hundreds of years. The project is identifying the aquifer sources of these waters to allow the Cahuilla Indians to better manage and utilize the resource.

Project: California Stream Condition and Multiple Biological Assemblages
Cooperator: California Department of Fish and Game
The California Department of Fish and Game has an extensive dataset on stream habitat, water chemistry, benthic algae and macroinvertebrate communities, fish, and amphibians from over 250 sites statewide. Scientists from the USGS are working with CDFG to examine these data and identify useful vertebrate indicators, evaluate the suitability of national EMAP indicators for California streams, analyze relationships between vertebrate and benthic macroinvertebrate indicators, and if possible, develop an index using multiple assemblages of organisms.

Project: The Effect of Animal Feeding Operations on Water Quality
Cooperator: The CALFED Bay-Delta Program and the Merced County Health Department
California is the nation's No. 1 producer of dairy products but also produces approximately 30 million tons of manure each year, most of which is contained onsite. USGS scientists are working with dairy farmers and agricultural specialists to help determine whether, and if so how, pathogens and pharmaceuticals generated at animal holding facilities migrate from on-farm holding systems into surface and shallow ground-waters.

Project: Enterococcus Surface Protein as an Indicator of Human Fecal Pollution in the Lower Russian River Basin
Cooperator: Sonoma County Water Agency
The Russian River in Mendocino and Sonoma Counties provides water supplies to many of the communities in the watershed as well as being a recreational destination. The river water has been found to contain bacteria concentrations which vary considerable from reach to reach and from year to year. Moreover, tributaries that continuously flow throughout the summer exhibit higher dissolved oxygen and bacteria concentrations than the mainstem Russian River. The USGS is working with the Sonoma County Water Agency to better define how the river’s tributaries may be affecting Russian River bacteria levels in the late spring and early summer with a targeted water quality sampling program.

Project: Geohydrologic Study of the Central and West Coast Basins
Cooperator: Water Replenishment District of Southern California
Use of ground-water in the Central and West Coast Basins in Los Angeles County has caused large water-level declines and seawater intrusion into the aquifer and prompted numerous management activities. These include increasing recharge; injecting water to form barriers to salinity intrusion; increasing the amount of water imported for use in the area, and increasing the use of reclaimed

water. USGS scientists have been working for several years to develop knowledge and tools to enable efficient management of these multiple activities. The project includes collecting and modeling three-dimensional geochemical data to assess the sources of recharge and the movement and age of ground water; simulating changes in ground-water budgets and flows between 1971 and 2000 with a four-layer model; running the model with two different potential scenarios of future ground-water development activities; simulating advective transport of water from the spreading ponds, the coastline, and the seawater injection barriers; and linking these models to an optimization model which allows for the selection of least-cost strategies for improved hydraulic control of seawater intrusion.

Project: Ground-Water Nitrate and Organic Carbon Inputs to the Lower San Joaquin River
Cooperator: CALFED Bay-Delta Program
Nitrates in the lower San Joaquin River play a role in stimulating algal growth, which can contribute to higher concentrations of dissolved carbon and associated higher drinking water treatment costs, as well as low dissolved oxygen concentrations in a stretch of the river near Stockton. Previous USGS studies have found that nitrate concentrations in the San Joaquin River have been increasing over the past 50 years, largely because of high levels in ground-water reaching the river. USGS scientists are working to characterize the loading to the river from these sources by identifying ground-water inflow areas and differences in water quality up and downstream of these sites. They are also monitoring ground-water levels and quality in the aquifers at several key points, and conducting intensive sampling of the river during four hydrologic seasons.

Project: Geohydrology of the Big Bear Valley
Cooperator: Big Bear City Community Services District
The Big Bear Valley ground-water basin is a key water supply for a growing population and was significantly affected by a recent 6-year drought during which there was a great reliance on ground-water supply. In June 2003, a water shortage emergency was declared, limiting new water connections and putting some restrictions on water use. To help meet water demand, the local water agency is working with the USGS to develop a more detailed understanding of the ground-water basin. The project involves defining the depth and structure of basin geology and estimating the quantity of rainfall and runoff contributing to aquifer recharge.

Project: Ground-Water Recharge and Distribution of Chlorides in the San Joaquin Valley
Cooperator: Northeastern San Joaquin County Groundwater Banking Authority
Ground-water levels are declining and chloride concentrations are increasing in eastern San Joaquin County as a result of more water being pumped than is being recharged. This study focuses on (1) the quantification of source, areal extent,

and vertical distribution of high-chloride water to wells, and (2) the sources, distribution, and rates of recharge to aquifers in eastern San Joaquin County.

Project: Hydrogeologic Characterization of the Modesto Area Ground-Water Basin and Evaluation of Water Resource Management Alternatives
Cooperator: Stanislaus-Tuolumne River Groundwater Basin Association
Strategies for managing local water supplies and ground-water quality are being formulated and evaluated by the Stanislaus-Tuolumne River Groundwater Basin Association. The Association is considering using the ground-water system in the upper part of the basin for storage of surface water as part of a system to efficiently manage both surface and ground-water supplies. USGS scientists are developing a simulation/optimization model that consists of a transient model of ground-water flow coupled with optimization tools. The transient model simulates ground-water flow as dictated by aquifer-system properties and annual and seasonal water supply, water use, and land use. The model will be a helpful tool to address water levels in an area of the lower basin and the intra- and inter-basin migration of poor-quality ground-water.

Project: Hydrogeology of the San Diego Area
Cooperator: Sweetwater Authority
No comprehensive geologic and hydrologic study has been made of the San Diego area. As a result, it is difficult for state and federal agencies, water purveyors, and consultants to understand the effects of urbanization on the local surface-water, ground-water, and biologic resources or to critique ideas and opportunities for additional ground-water development. USGS scientists are working with local water supply agencies to develop a detailed, integrated understanding of the geology and hydrology of the San Diego area, focusing on the San Diego Formation and the overlying alluvial deposits, and the relationship between ground-water extraction and biologic resources along riparian corridors.

Project: Injection, storage, and extraction of water
Cooperator: City of Roseville and the California Department of Water Resources
The purpose of this study is evaluate how vertical variations in aquifer properties and well hydraulics may affect the injection, storage, and extraction of water and the transport of associated disinfection by-products in the Mehrten Formation underlying the City of Roseville.

Project: The Effects of Artificial Recharge on Nitrate Concentrations in Ground Water in the Joshua Tree Subbasin
Cooperator: Joshua Basin Water District
The Joshua Basin Water District (JBWD) is planning to use imported water to artificially recharge the aquifer in the Joshua Tree ground-water subbasin of the Morongo ground-water basin. This program is intended to both reverse the decline of ground-water levels which have sunk by as much as 35 ft between the late 1950s and late 1990s, and to use the sub-basin as a storage reservoir.

Because septic tanks are the primary form of wastewater treatment in this area, JBWD is concerned with nitrate from existing development reaching the water table and the possible mixing of sewage into ground water with rising ground-water levels. This project will involve refining ground-water flow and solute-transport models, allowing JBWD to use the models for more precise management questions.

Project: Land Subsidence Monitoring in Coachella Valley
Cooperator: Coachella Valley Water District
The Coachella Valley is about 65 miles long with an area of about 400 square miles and includes the cities and communities of Palm Springs, Palm Desert, Indio, and Coachella. As part of overall water-management strategy, changes in land-surface elevation need to be monitored on a regular basis to assess whether and where land subsidence may be occurring. Continued monitoring will become even more important as allocations of Colorado River water decrease, causing more reliance on the ground-water resource. This study is mapping the location, extent, and magnitude of changes in land-surface elevation in Coachella Valley using Interferometric Synthetic Aperture Radar (InSAR). USGS is assessing the relationship between ground-water-level changes, ground-water-production volumes, and land-surface-elevation changes.

Project: Low Intensity Chemical Dosing (LICD), Dissolved Organic Carbon, and Peat Accretion
Cooperator: California Department of Water Resources via the CALFED Bay-Delta Program
This project assesses the feasibility of using low-intensity chemical dosing of coagulants to remove dissolved organic carbon from Delta island drainage water, thereby reducing the load of DOC and disinfectant byproduct precursors to Delta waters. It also examines the feasibility of trapping the coagulated DOC in constructed wetlands, thereby increasing sediment accumulation to mitigate subsidence.

Project: Mercury and Dissolved Organic Matter in Delta Wetlands
Cooperator: California Bay-Delta Authority
Between 1860 and 1914, hydraulic mining activities sent more than 800 million cubic yards of mercury-laden sediment into the Delta, altering the landscape and water flows and contributing to the reclamation of the Delta's marshes. Transport of mercury from historic mining areas continues today. At the same time, restoring wetlands and increasing the amount of organic carbon in the food web are core elements of Delta ecosystem restoration activities. This study is determining whether dissolved organic matter from Delta wetlands is contributing to dissolution of mercury currently bound up in minerals, and quantifies the total of methyl mercury from tidal wetlands. The results of this study will provide knowledge and insights helpful for guiding restoration of wetlands in such a way that MeHg production and export are minimized to the greatest extent possible.

Project: Pathogen Loads Modeling in the Chino Basin
Cooperator: Santa Ana Watershed Project Authority
The Santa Ana River in Southern California is a highly managed system and the primary water supply for approximately 2 million people. Base flow in the river consists primarily of secondary treated wastewater, with periodic storm events adding pulses of urban runoff and drainage from a large concentration of dairies in the Chino Basin. Regulators and water managers are concerned about pathogen levels in this runoff. USGS scientists are developing a rainfall/runoff/transport model which will represent the hydrologic and surface-water transport processes in the Chino Basin and develop a better understanding of watershed processes affecting water quality. This information will allow managers to assess the relative effects of various land uses on pathogen levels in the river.

Project: Pesticides in Suspended Sediment of the Alamo and New Rivers
Cooperator: Colorado River Regional Water Quality Control Board
The Alamo and New Rivers in the Salton Sea Basin are in existence because of drainage from irrigated agricultural lands. Past water quality studies have found legacy and current-use pesticides in the water and indications that many of these compounds adhere to sediment particles. USGS scientists are working to determine the distribution of pesticides between water and suspended sediments in this project, thus helping the Regional Board better understand the fate and transport of pesticides in surface water within the Salton Sea watershed.

Project: Quantifying Loads and Assessing Management Strategies for Reducing Drinking Water Constituents of Concern in the Willow Slough Watershed, Yolo County.
Cooperator: California Bay-Delta Authority
Agricultural watersheds are often implicated as sources of excess nutrients, salts, sediment, and dissolved organic carbon to waters which serve as drinking water supplies, affecting the cost of water treatment, efficiency of water reuse, and

overall environmental quality. This project involves quantifying the dominant chemical and physical processes affecting the export of dissolved organic carbon, nutrients, sediments, and salts from land areas used for different purposes and managed in different ways, and tracking how these quantities change as water is routed down an entire watershed system. When completed, this information will allow drinking water managers to anticipate and plan for changes in water quality anticipated from changing land use or climate variability, and assist in assessing the relationship between farming practices --
such as crop rotation, tillage and irrigation -- and the release of constituents.

Project: Quantity and Direction of Ground-Water Flow in the Funeral Mountains, Inyo County
Cooperator: Inyo County
The southern Funeral Mountains and Furnace Creek springs in Inyo County are down-gradient of a proposed high-level nuclear waste repository at Yucca Mountain, but the exact direction and magnitude of flow from the proposed repository is uncertain. In addition, just up-gradient of Inyo County are the farming areas and rural community of Amargosa Farms. USGS scientists are compiling previous information on springs and water levels in Death Valley, and using a previously developed regional ground-water flow model to help understand the flow paths in the area and quantifying the ground-water flow through the regional carbonate aquifer in the southern Funeral Mountains. This information will help reduce the uncertainty as to where and how long it will take for these contaminants to reach Inyo County and the possible effect of pumping in the Amargosa Desert on the flow toward Inyo County and the springs at Furnace Creek.

Project: Rialto-Colton Basin Aquifer Susceptibility to Low-level Contamination
Cooperator: San Bernardino Valley Municipal Water District
A superfund site in the Rialto-Colton ground-water basin contains a large plume of perchlorate, a chemical associated with rocket fuel. Aside from long-term confinement of the plume, managers are concerned about the distribution and migration of low levels of contaminants throughout the aquifer. USGS scientists are working to define the geohydrologic controls which could affect perchlorate migration and refining an existing ground-water flow model.

Project: Russian River Water Quality, Sonoma County
Cooperator: Sonoma County Water Agency
The Sonoma County Water Agency draws water from the alluvial aquifer underlying and adjacent to the Russian River for drinking water supplies. Currently, the natural process of riverbank filtration provides the necessary treatment to the river water. However, to meet future water supply demands, SCWA must extend its riverbank filtration facilities to new areas along the Russian River. Furthermore, federal officials have proposed to cut summer flows in the Russian River to improve the habitat for three salmonid species protected

under the Endangered Species Act. USGS scientists are working to characterize riverbank filtration processes and changes in Russian River water quality during reduced flows by evaluating the chemical, isotopic, and microbiological composition of the surface water and ground water

Project: San Bernardino – Optimal Groundwater Basin Management
Cooperator: San Bernardino Valley Municipal Water District
Water managers in the San Bernardino area have a complex portfolio of water supplies and storage systems which they actively manage by adjusting groundwater pumping by area and season, enhancing recharge of native water along streams, artificially recharging aquifers, treating and blending reused water, and employing various forms of water sales and exchanges. The USGS has recently completed a project linking detailed geologic information, ground water flow, and mathematical optimization models which together simulate the response of the network to the combined effects of natural hydrology and management activities. The new models were applied to selected water-management scenarios designed by the cooperator, yielding information about how the geohydrologic system may respond to a variety of conditions.

Project: San Francisco Bay-Delta Hydrodynamics
Cooperators: CA Department of Water Resources, USBR, Contra Costa Water District, CA Bay Delta Authority
The San Francisco Bay-Delta is a maze of channels and islands forming the hub of the state's water supply system. It supports a broad range of estuarine organisms including endangered fish species. It also has critical transportation and energy infrastructure, thousands of acres of rich farmland, and many recreational sites. The USGS hydrodynamics team's principal research objective is to learn what factors control the movement of water and associated transport of salt, fish, and other material both across the entire Delta and in specific junctions. The team manages a real-time acoustic flow monitoring network, develops multi-dimensional models, and plays a lead role in multidisciplinary research projects. Recent projects include a detailed study of juvenile salmon movement in Clarksburg Bend channel junctions under a variety of flow conditions, analysis of Middle and Old River flows and fish salvage data, and the addition of eight stations to the Delta monitoring network.

Project: San Gorgonio Pass Artificial Recharge Investigations
Cooperator: San Gorgonio Pass Water Agency
San Gorgonio Pass Water Agency (SGPWA) serves an area of 220 square miles in the mountain pass between the Upper Santa Ana River Basin to the west and the Coachella Valley to the east. To prepare for future demands for water, the SGPWA has proposed to conjunctively use local ground water and imported State Water Project water in the Beaumont, Banning, and Cabazon storage units. USGS scientists are working to identify, characterize, and evaluate potential artificial-recharge sites, model the unsaturated and saturated flow systems, and

develop site-specific optimization models to help SGPWA evaluate different conjunctive use alternatives.

Project: Simulation of Water Resources in the Pajaro Valley
Cooperator: Pajaro Valley Water Management Agency
In the Pajaro Valley, key concerns of water managers are to minimize ground-water mining of the lower aquifer systems and overdraft, minimize seawater intrusion of the upper aquifer system, and maximize the sustainable yield of renewable water resources. The USGS is working to refine knowledge about sedimentary layering and depth of the aquifer being recharged, upgrade the existing ground water flow model to enable application of new packages supporting the simulation of irrigation and real-time land use, and design a site-specific optimization model to enable the cooperator to test system responses to various scenarios.

Project: Simulation of Ground-Water Flow and Land Subsidence in the Antelope Valley
Cooperator: Los Angeles County Department of Public Works
Ground-water drawn from the Antelope Basin provides between 50 and 90 percent of the valley's water supply. In 1995, ground-water pumping had resulted in water-level declines of more than 200 feet in some parts of the ground-water basin and land subsidence of more than 6 feet in some areas. Future urban growth, increased agricultural demand, and limits on the supply of imported water will continue to increase the demand for ground water. USGS is working to improve the certainty of the quantity, spatial distribution, and temporal distribution of natural recharge and irrigation return flow and incorporate this into a ground-water flow model that will help the local cooperator manage the basin with a greater degree of certainty.

Project: Sources of Disinfection Byproduct-Forming Material in the State Water Project
Cooperator: CA Department of Water Resources
Water from the Sacramento-San Joaquin Delta contains high concentrations of disinfection byproduct-forming materials when treated for potable use. These materials form when dissolved organic compounds in water react with disinfectants such as chlorine and ozone. The amount of these materials that form during the treatment process is a function of both the concentration and source of dissolved organic matter—characteristics which can change over a period of days. The goals of this project are to examine the dissolved organic material entering the State Water Project from the Delta; develop analytical models for predicting levels of organic material and its propensity to form disinfection byproducts based on measurable properties in the Sacramento and San Joaquin River systems, and identify monitoring strategies, locations, and parameters that will most effectively improve our ability to assess changes in these compounds.

Project: Sources of Microbial Contamination at Public Beaches, Santa Barbara
Cooperator: City of Santa Barbara
Streams and ocean beaches in Santa Barbara, California, have concentrations of fecal indicator bacteria that exceed public health standards for recreational water, but the source of these bacteria is unknown. The USGS is working on a study to pin down where fecal bacteria are entering and traveling through a system where urban creeks and shallow ground-water interact, municipal wastewater is discharged offshore, and ground-water seeps into ocean waters off the beach. Preliminary results suggest that bacteria levels are higher in ocean waters than the creek, and that leakage from lateral sewer lines into shallow groundwater may be the culprit. The study is using a combination of geological, water quality, and advanced microbiological techniques.

Project: Ground Water Quality Monitoring and Assessment in California (GAMA)
Cooperator: State Water Resources Control Board
The statewide GAMA program provides comprehensive and systematic information about the quality of water in aquifers supplying drinking water across the state. The program is designed to monitor the current quality of the ground-water resource, detect changes in water quality over time, and provide information about the human and natural factors which affect ground-water quality in these basins. GAMA is in the process of sampling 116 ground-water basins in all areas of the state for a full range of regulated compounds, constituents which can be used as tracers for different water sources, “emerging contaminants,” and standard water characteristics such as ph, and total dissolved solids. To date, over 1100 public supply wells have been sampled.

Project: The Role of a Non-Native Clam in Regulating Organic Carbon in the San Joaquin River Watershed
Cooperator: Interagency Ecological Studies Program (multiple)
Sources and fate of various forms of organic carbon in the Sacramento-San Joaquin Delta (Delta) and San Joaquin River watershed are of concern because of the importance of identifying the sources of carbon contributing to the oxygen depletion zone on the San Joaquin River near the city of Stockton, the need to understand the causes of the low primary and secondary production in the Delta, and the potential for limited restoration success of the system given the aforementioned low productivity.

Project: Tomales Bay Watershed Sediment Transport Monitoring
Cooperator: San Francisco Bay Regional Water Quality Control Board
Tomales Bay and its two major freshwater drainages, Lagunitas Creek and Walker Creek, have been listed under water quality laws as “impaired” by sediment. The project involves adding a combination of standard daily and seasonal suspended-sediment monitoring at two existing USGS stream gages, and more frequent monitoring using optical technology to capture the rapid

temporal variations in sediment concentration. These measurements will provide a much greater degree of certainty regarding the amount of sediment transported in these watersheds. They will also provide a better understanding of the flow conditions and sediment transport processes.

Project: Trends in Dissolved Organic Carbon and Related Parameters in the Sacramento-San Joaquin Delta
Cooperator: CA Department of Water Resources
Several studies have noted long-term changes in dissolved organic carbon concentration in river systems, likely a response to land use and climate change. This study examines a decade of water quality monitoring information in the Sacramento and San Joaquin Rivers for evidence of changes in dissolved organic carbon concentration and composition. Preliminary results suggest that no trends in dissolved organic carbon concentrations can be detected, possibly because of the sampling frequency (2-4 weeks) and a typical four-fold increase in concentration each winter. However, there does seem to be a long-term trend in two other drinking water quality parameters.

Project: Warren Basin Artificial Recharge and Nitrate
Cooperator: Hi Desert Water District
The Hi Desert Water District implemented an artificial ground-water recharge program in 1995 to reverse the decline of ground-water levels in the 19 square mile Warren subbasin of the Morongo ground-water basin ~100 miles east of Los Angeles. In response, water levels recovered as much as 250 feet in the vicinity of the recharge ponds. However, ground-water nitrate concentrations have shown a marked increase from 10 milligrams per liter to more than 110 milligrams per liter. The objectives of this study are to identify the vertical distribution of nitrogen species in the unsaturated zone, determine the potential for de-nitrification, monitor water levels in response to artificial recharge and adapt a ground-water flow and solute-transport model to allow the cooperator to incorporate nitrate in their management strategies.

Project: Water Resources Availability and Management in Sonoma County
Cooperator: Sonoma County Water Agency
The Sonoma County Water Agency is responsible for supplying water to about 570,000 people throughout Sonoma County and neighboring Marin County, using a combination of Russian River water and native ground water to meet demand. In order to design and evaluate new strategies for delivering water, SCWA has partnered with the USGS to carry out a detailed assessment of hydrologic conditions and quantify the interconnections between surface and ground water. For a ground-water system as large and complex as in Sonoma County, a set of numerical models that simulate the hydrologic systems in each of the different ground-water basins will ultimately be linked with an optimization model.

Projects for Other Federal Agencies

Project: Ecological Role of Grizzly Bay as Habitat for Resident Fishes
Cooperators: California Department of Water Resources, Interagency Ecological Program

Shallow-water habitats (shoals) are believed to provide important nursery areas for young fishes in Suisun, Grizzly, and Honker Bays; however, recent drifter studies in Honker Bay and Grizzly Bay suggest that water residence times in the shoal areas are very short. USGS projects, including deployment of hydrodynamic instruments in the area of Grizzly Bay, provide a unique opportunity to evaluate the importance of shoals to zooplankton and young fishes. This study's objectives are (1) determine if zooplankton and larval/juvenile fishes maintain abundance in the SWH in Grizzly Bay, (2) determine if zooplankton and larval fish are passively transported by hydrodynamic forces onto (or off of) shoals, or if they exhibit behaviors that enable them to maintain position in the shoals, (3) if larval/juvenile fish are able to maintain position in the shoals, determine if they accrue a benefit, defined as an increased growth rate or better condition, (4) determine the species and life stages of zooplankton consumed by larval/juvenile fishes and determine fish feeding rates, and (5) determine if Suisun (or Montezuma) Slough provide a conduit for the input or export of organisms to Grizzly Bay.

Project: Delta Fish Community Analyses
Cooperators: Interagency Ecological Program

Several long-term or geographically extensive data sets on fishes have been collected by the Interagency Ecological Program and its member agencies. These data sets have primarily been analyzed to address species-specific management questions rather than questions about community. The lack of understanding regarding the structure of fish communities and their relations to environmental variables has limited the ability of CALFED and IEP to predict the outcome of proposed ecosystem restoration actions. Thus, there is disagreement about the potential benefits of such actions. The primary objective of this project is to conduct community-level analyses of existing IEP data sets from the Sacramento-San Joaquin Delta and Suisun Bay in support of the missions of both IEP and CALFED. Secondary objectives include development of project proposals and pilot programs in response to questions raised by the analyses or in response to needs of IEP and CALFED.

Project: Santa Margarita Watershed—Temecula
Cooperator: US Marine Corps

The Santa Margarita Watershed, located in southern California near the town of Temecula, provides most of the water to local residents living in the upper basin and to Camp Pendleton Marine Corps Base in the lower basin. The upper and lower basins are separated by a coastal range of mountains. Urbanization and increased pumping in the upper basin has caused concern at Camp Pendleton that surface-water flow to the lower basin has decreased and will continue to decline

in the future. The primary objective of this project is to develop a more complete understanding of surface and ground-water patterns in the hydrogeologic system in the upper basin of the Santa Margarita Watershed as an aid in achieving a resolution of the present water-rights controversy.

Project: Water-Quality Inventory Pesticides in the Golden Gate National Recreation Area
Cooperator: National Park Service
In the Golden Gate National Recreation Area, there is concern regarding pesticide use within parklands. These pesticides can be harmful to aquatic life including threatened species. Pesticides have been tested in soils, sediments, surface water, and groundwater in some areas within the park through the Presidio remediation program, but there is no information on pesticides in surface waters within Golden Gate National Recreation Area. This reconnaissance project will measure pesticide concentrations in these areas.

Project: Water-Quality Inventory of Springs at Pinnacles National Monument, California
Cooperator: National Park Service
This reconnaissance study is designed to provide water-quality information from multiple springs at the park to provide managers with information about how water quality varies geographically, and a basic understanding of sources, flow paths, and recharge ages of ground-water supplying the springs.

Project: Whiskeytown Aquatic Inventory Assessment
Cooperator: National Park Service
Whiskeytown National Recreation Area hosts more than 700,000 visitors annually and is an integral component of the Central Valley Water Project. An extensive history of logging, mining, and fire suppression threatens the sustainability of the park's aquatic ecosystems. The park has insufficient information on the condition of its aquatic resources, particularly such biological resources as benthic algae, benthic macroinvertebrates, and resident fishes. The project focuses on the assessment of aquatic biology, habitat, and water quality conditions of the major park watersheds, and responses of aquatic communities to disruptions caused by fires and mining.

USGS Federal Programs

Irrigation and Ground-water in California's Central Valley
For more than 50 years, California's Central Valley has been one of the most productive agricultural regions in the world. Large increases in population have increased the competition for water within the Central Valley and statewide. USGS is developing a numerical model that can be used to quantitatively address groundwater issues in the Central Valley. The work consists of three major tasks. The first task, “texture modeling,” addresses the objective of developing a better understanding of the internal architecture of the deposits in the Central Valley.

The second task, the “Farm Process,” addresses the objective of developing a systematic approach for estimating water budget components, which in this study will be based upon the consumptive use of water by plants and available surface water deliveries. The third task, “Ground-water Modeling,” addresses the objective of developing a model at a scale relevant to management decisions, including water availability issues.

REPEAT: Rates and Evolution of Peat Accretion in the Sacramento San Joaquin Delta

Wetland restoration shows great promise for mitigating land subsidence in the Sacramento-San Joaquin Delta. Currently, little is known about the temporal variability of peat accretion rates in the Delta, nor the processes controlling them. Such information is crucial for choosing the best potential sites for wetland restoration, i.e., those areas that can maintain their elevation relative to sea level and not get inundated. The goal of this project is to define and quantify processes affecting rates of peat and sediment accretion during both pre-European (ca. 10,500 B.P. - 300 B.P.) and post-European settlement (ca. 300 B.P.- present) and to use this information to understand current processes of peat formation within the Delta. We are using a broad range of biogeochemical techniques such as geochemical tracers, radioisotope analysis, palynological analysis, and environmental magnetic measurements to estimate historical rates of accretion.

San Francisco Bay Priority Ecosystem Studies

The USGS has a long-term program of study which has provided much of the fundamental knowledge about changes in the hydrology, geology, chemistry and ecology of the San Francisco Bay system. Past findings include documenting changes in the estuary's shoreline and linking patterns of water and sediment movement to contaminants and alterations of biological communities. The project is currently focusing the processes influencing the character and stability of remnant and restored wetlands, projections of freshwater flow shifts under climate change regimes, the effect on communities of aquatic organisms of invasive species, linkages between pollutant loading and biological effects, and shifts in fish communities over time.

San Joaquin-Tulare Basin -- National Water Quality Assessment Program

The long term goals of this national program are to assess the status of and trends in the quality of freshwater streams and aquifers, and to provide a sound understanding of the natural and human factors that affect the quality of these resources. During the first round of study, existing water quality conditions of streams and aquifers were surveyed. During the second round of study which is just concluding, trends in surface and groundwater quality and the natural and anthropogenic factors which affect them were studied.

Urban Earth: A Multi-hazards Demonstration Project in Southern California

Southern California, in particular, has one of the Nation's highest potentials for extreme catastrophic losses due to natural hazards such as earthquakes, tsunamis, wildfires, landslides and floods. Estimates of expected losses from all these hazards in the eight counties of Southern California exceed $3 billion a year. These numbers are expected to increase as the present population of 20 million grows at more than 10 percent a year. The overarching objective of the project is to increase resiliency to natural hazards by incorporating the needs of the Southern California decision-making community into natural hazards science in new and existing research activities. The natural hazards to be investigated in this project include earthquakes, floods, wildfires, landslides, coastal erosion and tsunamis.

Results from Previous Cooperator Roundtable Meetings

USGS
science for a changing world

Cooperative Water Program - 2007
Response to Stakeholders

Background

For more than 100 years, the U.S. Geological Survey (USGS) has partnered with State, Tribal, and local agencies through the Cooperative Water Program (CWP) to provide hydrologic information and scientific understanding needed to manage and protect water resources across the Nation. Such partnerships allow the USGS to carry out its mission in the most efficient and cost effective manner.

To maintain effective partnerships, the CWP solicits external input at all levels. At local and State levels, managers and scientists within USGS Water Science Centers located in nearly all 50 States work cooperatively with more than 1,400 partners (or "cooperators") to address priority water needs within individual States, localities, and communities. At the regional and national level, USGS hosts stakeholder roundtable discussions—a total of four since 1999—to identify water issues of regional and national importance to help focus the direction of the CWP Program.

"Sound water management cannot happen without good planning, and good planning cannot happen without good data"

--Weir Labatt, III, Texas Water Development Board, at the USGS Cooperative Water Program 2nd National Stakeholders Roundtable, Austin Texas, January 2006

This briefing sheet summarizes stakeholder feedback and recommendations raised in the most recent roundtable discussion in January 2006 in Austin, Texas, hosted by the Interstate Council on Water Policy (ICWP) (http://icwp.org). Steps taken by the USGS to address the recommendations during the past year also are highlighted, as well as future directions of the Program.

The USGS Cooperative Water Program is an ongoing partnership between the USGS and non-Federal agencies. The Program jointly funds water-resources projects in every State, Puerto Rico, and several other U.S. Trust territories. Agencies or "cooperators" that participate in the Cooperative Water Program are primarily State, Tribal, county, and municipal agencies with water-resource management and policy responsibilities. In 2006, more than 1,400 cooperators participated in the Program. In terms of funding, Federal appropriations to the CWP totaled $62.8 million in 2006. Although the Program originated as a 50:50 fund-matching arrangement, cooperator funds have grown faster than USGS funds in recent years. Cooperators now contribute about two-thirds of the total costs of the Program.

Stakeholder Input on the Benefits of the Cooperative Water Program

Overall, stakeholders have expressed appreciation for the interdisciplinary, multi-scale, and long-term USGS perspective on water conditions, which complement much of the regulatory management, protection, monitoring, and research conducted by local, State, and other Federal agencies, the private sector, and the university community. Feedback indicates that stakeholders continue to value the agency's ability to look at:

- The totality of the resource, including all components of the hydrologic system—ground water, streams, lakes, reservoirs, and atmosphere—and the interconnections among these components;
- Conditions over the long term and in real time; and
- Interconnections between water quantity, water quality, and biological systems in an overall hydrologic context.

The spatial, temporal, and interdisciplinary nature of the data-collection and interpretative studies allow for application to a wide range of water-management issues, including flood forecasting,

emergency response, water supply planning, water withdrawal, and waste-water permitting, Total Maximum Daily Load (TMDL) estimates, and stream restoration. The stakeholders also continue to note and support several specific characteristics of the Program, including:

- Nationally consistent methodologies, which result in high-quality and comparable data over time and at multiple scales;
- Field, laboratory, and data analyses that adhere to rigorous quality-assurance and quality-control procedures;
- Innovative technology for collecting, managing, and disseminating many kinds of hydrologic data; and
- Infrastructure and commitment to monitor and assess resources over the full range of hydrologic conditions, including major flood events and droughts.

USGS measures stream flow under all hydrologic conditions, including floods and droughts.

Stakeholder Recommendations on Program Focus and Directions

Although the CWP supports both data collection and a diversity of water-quantity, quality, and biological interpretative studies, stakeholder recommendations from the most recent roundtable discussions strongly focused on stream monitoring, and specifically management and funding of the USGS streamgaging network through the CWP and National Streamflow Information Program (NSIP) (http://water.usgs.gov/nsip/). The focus and recommendations are appreciated by the USGS, as the USGS national streamgaging network provides the backbone of information that supports the management of the Nation's water resources. However, Federal budgets to support such monitoring have declined in real terms as the demand for this information continues to increase.

Specific recommendations from the discussions of the CWP are the need for:

- Enhanced communication to local, State, and regional cooperators and other stakeholders on the national context of the Program;
- Optimization of costs and enhanced Federal funding; and
- Prioritization of data collection over interpretive studies.

USGS Steps to Address Stakeholder Recommendations

Over the last year, USGS has initiated several efforts in response to stakeholder recommendations, outlined below.

1. Enhanced communication

A series of roundtable discussions is planned in different regions of the country with local and State CWP cooperators and other interested stakeholders. In these meetings the USGS hopes to continue the dialogue with stakeholders on the technical challenges, budget trends, and funding priorities for the program. These events—2 to 3 per year—will be facilitated by the Interstate Council on Water Policy, and will include managers and scientists within Water Science Centers and USGS regional and national offices. During 2007, discussions will be held in Athens, Georgia (March 28-29) to solicit input from stakeholders interested in water issues in the south-eastern coastal states of Georgia, South Carolina, and North Carolina; in California (Spring); and in the Upper Mississippi Basin or the Ohio River Basin (Summer). Meetings will be announced on the CWP website (http://water.usgs.gov/coop/), and are open to the public.

2. Optimization of costs

Streamgaging Cost Comparison Study—During 2006, USGS worked with three State and local agencies—the Colorado State Engineers Office, Washington Department of Ecology, and the Lower Colorado River Authority—to assess and compare streamgaging procedures and associated costs. These three non-Federal agencies independently operate streamgaging networks. Because each agency has its own objectives for their streamgaging stations, data records and cost-accounting procedures differ from those of USGS. The comparisons were useful to benchmark USGS procedures and costs, and the results indicate that USGS streamgaging costs are slightly higher than those of the non-Federal agencies. This is due in part because of differences in how agencies account for overhead costs and differences in the purposes and uses of the data that agencies collect. USGS data are designed to fulfill a wide range of purposes. As a result, the USGS has higher costs associated with year-round measurements during floods and hydrologic extreme events, resulting in a robust, multi-purpose long-term record of all hydrologic conditions. The comparisons also indicated that USGS equipment and data-management (IT) costs were lower than those of the non-Federal agencies, overall.

Internal review of streamgaging costs—USGS formed an internal committee, comprised of USGS scientists, hydrologic technicians, and managers from Water Science Centers and headquarters, to investigate long-term tends in the costs, quality, and funding of the USGS streamgaging program and to identify opportunities for increased efficiencies and cost savings without degrading data quality. The committee developed a report, currently under final review, that shows that costs have increased since 1990 above commonly assessed indexes of inflation. This trend was largely driven by increased labor costs and the increased complexity of streamgaging work and the improved quality, types, and reliability of streamflow information products. Because of relatively flat Federal funding to the CWP, State and local cooperators have absorbed most of the increased costs. Recommendations are included in the report to improve efficiency, through additional automation of data collection and record computations, and to rigorously prioritize Federal matching funds to support key streamgages. In addition, the committee report fully supports the National Streamflow Information Program (NSIP), which is designed to secure Federal funding to support a “backbone” or core of streamgages of critical national importance, and recommends continued use of a single and strong message on the importance of the NSIP and CWP programs for water-resource management.

Agreements with Private Parties—As funding has become tighter for streamgaging, the USGS has actively sought participation by additional funding partners. During the past year, USGS has developed a standard set of funding agreements for private parties to support streamgaging activities. Many of these organizations, including private corporations and non-governmental organizations, for example, realize the benefit of real-time and long-term streamgaging information for water-resource allocations, management, and protection, and are willing to share in the cost of supporting the USGS streamgaging network over the long term.

Streamgaging guidance document—More and more, the USGS has come to recognize the value of cooperator participation in interpretive studies and data collection. For example, the USGS data base contains streamflow data from over 600 sites that are collected by others and quality assured and published by USGS. To support this effort, USGS is developing a guidance document that describes data collection procedures, quality-assurance standards, and data management for CWP cooperators and other stakeholders interested in operating streamgages to USGS standards. The guidance will be useful in further developing collaborative networks and sharing of comparable and consistent streamflow information. The guidance document currently is in review and will be available on the CWP website when completed.

Technological Advances—USGS continues to pursue innovative technology to more cost-effectively collect and manage streamflow information. Innovations over the recent years include (1) conversion from mechanical-current meters to acoustic meters, which allow more rapid streamflow measurements; (2) installation of more reliable water-level-measurement devices and batteries, which reduce field visits and repairs and labor costs; and, (3) computerized graphical rating tools, which enhance the development, accuracy, and maintenance of stage-discharge rating curves.

In 2006, the USGS released the Aquatic Informatics Graphical Rating and Shift Application Tool (GRSAT). This graphical software package, which is used by USGS Water Science Centers across the Nation, simplifies the development and maintenance of stage-discharge rating curves at an annual estimated time savings of about 8 hours for each of the 7,400 gaging stations.

3. Prioritization of data collection

The integrity and long-term sustainability of data collection is a high priority of the CWP, as these data serve as the foundation of all USGS studies and stakeholder water-information needs. However, such efforts should not be at the cost of reducing support for CWP studies. Not only do these studies continue to address local, Tribal, State, regional, and national water information needs, but they also play an important role in designing and maintaining effective data-collection by defining data gaps and optimizing networks. Balancing funding to support data-collection and interpretative studies will continue to be a challenge for the CWP. USGS is committed to soliciting continued input and discussions with CWP cooperators, as well as building continued support for the Program with other interested partners and decision makers.

Here's a Federal agency willing and enthusiastic to work with the States and local partners to use science to solve real-life problems. The USGS gets it, and the State of Washington is better off for it.

--Dr. Jeff Koenings, Director, Washington Department of Fish and Wildlife, July 2004

Long-Term Directions of the Cooperative Water Program

The steps outlined above are only the beginning of a long-term process for the CWP, with the goal of improving the efficiencies, responsiveness, and effectiveness of the Program. In large part, the Program to-date has been most successful at solving real-life water issues at the local and State levels—such as the hydrologic effects of urbanization, dam removal, agricultural practices, and energy development. However, the Program realizes that because data-collection adheres to national guidelines, information is directly comparable across geographic regions and through time. Therefore, large-scale synthesis and application of these data to national-level societal and environmental issues are possible. Recent examples include using historical streamflow information to evaluate climate variability in different regions of the country (http://pubs.usgs.gov/fs/2005/3017/); linking land-use changes to the physical habitat of streams (http://pubs.usgs.gov/circ/circ1175/; and assessing freshwater-saltwater interactions in ground water underlying the Atlantic coast (http://pubs.usgs.gov/circ/circ1262). The CWP recognizes the value of its large information base and will continue to seek ways to apply water resources information collected at local and State scales to better address emerging national water policy issues.

In addition, the CWP will continue to increase communication of local and State findings, as well as provide interactive interfaces to allow users to access information, including models and other statistical tools, online. These tools and information, although generated at the local or State scale, have broad transferability to other parts of the Nation where similar water-resource issues exist. A recent example is a CWP study documenting seal-coating sources of polycyclic aromatic hydrocarbons (PAHs) in streams in Austin, Texas (http://pubs.usgs.gov/fs/2005/3147/); findings have been recently included in land-use and stream improvement discussions in Madison, Wisconsin and have broad applicability to other communities across the Nation.

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Summary:
1st National Cooperators' Roundtable
for the
USGS Cooperative Water Program

March 9, 2005, Washington, DC

On March 9, 2005 twenty-six representatives of USGS Cooperators joined 14 managers from the USGS for the 1st National Stakeholders Roundtable for Cooperative Water Program. The Cooperators represented a cross section of the nearly 1,400 government entities at the State, local, and tribal government level who participate with the USGS in jointly funded water data collection and studies. The meeting was jointly sponsored by the USGS and the Interstate Council on Water Policy (ICWP). Marci DuPraw of Resolve served as the Facilitator.

The objectives of the meeting were to provide an opportunity for the cooperators to hear about the status and recent achievements of the Program, to learn about the nearly-completed external review of the Program, to give feedback to the USGS about the Cooperative Water Program (CWP), and to share common ideas with each other.

The meeting began with a tribute by Joe Hoffman of the Interstate Commission on the Potomac River Basin and Bob Hirsch of USGS to Tom Stiles of the Kansas Department of Health and Environment for his outstanding service to the ICWP, the USGS, and the federal Advisory Committee on Water Information (ACWI).

Bob Hirsch gave a presentation that highlighted some background information on the Program, trends in funding, outlook for FY-2006, examples of recent projects and data-collection activities, and actions taken in response to the recommendations of the 1999 External Review Taskforce. For 110 years, the USGS has been collecting data and conducting interpretive studies in jointly-funded efforts under this program. The distinguishing feature of the program is joint funding for shared benefits of water data and science. The data help to populate the National Water Information System, the USGS comprehensive and publicly available water database. Indeed, 65 percent of the USGS streamgaging network is funded through the CWP. In addition to streamgaging, the CWP also includes collection of data on ground water and water quality. Much of the data collected through the Program, including an increasing amount of the ground-water and water-quality data, is made available in near-real time via telemetry and the internet.

The CWP represents 44 percent of the entire USGS Water Resources program. The Program was operated for many years on a 50-50 cost-share basis, but in recent years the Cooperator share has risen to about 67 percent while the Federal share has fallen to about 37 percent. In Fiscal Year 2004 cooperators contributed $138 million to the Program, while the USGS, through its Congressional appropriation, contributed $64 million.

Bob illustrated the data collection and interpretive studies in the CWP with the following examples:

- Real-time streamgaging nationwide
- Real-time monitoring of shallow ground water in Pennsylvania
- Effects of acid deposition and logging practices on forests and water quality in the New York City watersheds in the Catskills
- Effect of solids retention time on removal of pharmaceuticals and other organic wastewater contaminants, New York City
- Saltwater intrusion into aquifers under Long Island
- Methodology for determination of ecological water needs in New Jersey streams
- Phosporus in the Illinois River, Oklahoma
- Pesticides and PCB's in fish in Lake Texoma, Oklahoma

- Land subsidence due to ground-water withdrawals in California and elsewhere

In 1999 the USGS requested that an external review of the Program be conducted by a Task Force of cooperator and other-Federal-agency representatives under the auspices of the Advisory Committee on Water Information. The Task Force made 59 recommendations, nearly all of which are in various stages of being implemented, or have been implemented. This has resulted in a stronger program through improvements in:

- Communications with cooperators on priorities
- Interaction with other USGS disciplines
- Avoiding competition with the private sector
- Establishment of NSIP program
- Ground-water Climate Response Network
- Timeliness of reports

Bob noted that continuing efforts are still underway to complete improvements in:

- Federal matching funds
- Further improvement in timeliness of reports
- Growth of NSIP
- Cooperator involvement in data collection
- Defining appropriate balance of data and projects

Bob finished with two scenarios regarding financial impacts if funding were available to return to a 50-50 match ratio. In one scenario the total funding in the Program would remain at the 2004 level of $202 million, but the contributions would be equalized. This would save the cooperators $37 million. In the second scenario, the total contributions from cooperators would remain the same ($138 million), and USGS contributions would rise to match that level. This would provide an additional $74 million for new data collection and studies.

Barney Austin gave an overview of the work of the 2004 External Task Force review of the CWP, reporting that USGS has made some good strides implementing recommendations of the 1999 Task Force, including:

- USGS data collection and dissemination are unique, free, and comprehensive.
- CWP web site has been established.
- USGS is making significant progress putting reports on the internet.

Of the 59 recommendations in the 1999 Task Force report, the 2004 Taskforce found that:

- 6 are complete,
- 50 have been accepted and are in various stages of implementation,
- 2 have been partially accepted (in-kind services, and proposals on the web), and
- 2 have been rejected (billing for gaging based on actual cost for each station, use of outside contractors for gaging.

Of the recommendations that are still in need of additional effort, those given highest priority included:

- Restoration of 50:50 match in the CWP
- Establishment and funding of the National Streamflow Information Program to provide Federal funding for streamgaging (it has been established but is not fully funded.)
- Emphasis on long-term data collection versus interpretive studies
- Greater use of in-kind services as cooperator match
- Concentrate on core competency (long-term data collection)
- Improve timeliness of reports, explain review process, make unpublished data available, maintain point of contact for long-term projects, and improve knowledge transfer within USGS.

Like Bob, Barney closed by emphasizing the growing gap between USGS and Cooperator contributions to the Program, which grew by 50% from $40M in 1999 to about $60M in 2004.

A **Panel of Three Cooperators** gave their views on strengths of the CWP, challenges the USGS could work on, and things that cooperators can do to improve the Program.

Tom Stiles, Kansas Department of Health and Environment, noted that there are sometimes issues related to the cost and timeliness of USGS products, but emphasized three strengths in a philosophical way:

- When you tap into the CWP, you buy into an innovative ability to solve problems.
- The CWP pulls in nationwide expertise.
- The USGS streamgaging network is at "the top of the list", and is helpful to States in many ways, including determination of total maximum daily loads.

As for challenges, Tom mentioned several:

- Need to close out projects more efficiently.
- District Chiefs are pulled in two directions, meeting the needs of Cooperators and meeting the objectives of the USGS and the national interest. In an ideal Program, these needs and objectives overlap nicely, but in reality they sometimes conflict.
- Pressure from the Department of the Interior to turn the USGS inward, away from the needs of States, and toward the needs of DOI Bureaus.

Tom suggested that Cooperators can help the USGS with:

- The Program Assessment Rating Tool (PART) exercise, by documenting benefits derived from the USGS programs and products.
- Being more transparent in sharing state's strategic plans.
- Press for greater funding for basic hydrologic work, which is needed as the foundation for much additional water-resources work such as water-quality management.
- Taking greater ownership of CWP studies, including greater use of in-kind services and more co-authored reports.

Duane Smith, Oklahoma Water Resources Board, described several pressing water management issues facing Oklahoma, such as the growth of animal feeding operations and interstate rivalries. While Duane is a proponent of outsourcing, his agency tried doing some streamgaging on their own and he found that collecting flood data is expensive. He concluded that the USGS is really not that expensive, and that the USGS credibility is worth the expense. He still feels that with sufficient training and quality assurance, willing cooperators can effectively participate in some data collection.

With respect to Federal funding for the CWP, Duane said the Oklahoma Delegation feels the problem is too large for one delegation to handle.

Jeff Myers, New York Department of Environmental Conservation, highlighted the value of the cooperative effort with USGS on real-time surface-water data collection. He also said a cooperative effort on ground-water monitoring has grown from 5 to 60 sites in recent years.

Among the strengths of the program, Jeff listed USGS expertise and the benefits of leveraged funding. There is a related challenge, however: his agency puts a large amount of unmatched funding into the agreements, but they are reaching the limit of their ability to absorb more than their share of additional increases.

Jeff suggested cooperators could help with strategic planning for the program.

In Bob Hirsch's feedback on the items suggested above, he referred to the balance of data and interpretive studies. Bob is reluctant to cut back too much on projects—after all, the USGS is responding to local needs as expressed by cooperators. Data and projects support each other and

need each other. The USGS mourns the loss of a gage, but we also mourn the loss of scientists who do the interpretive work.

As for the boundary between science and policy, Bob agreed that the USGS needs to be policy-relevant but policy-neutral.

Bob pledged to strive for even better communications with cooperators and their associations.

The **final discussion** was a session just among the cooperators. Among the comments emanating from this session:

- Cooperators cannot continue absorbing more than their fare share of cost increases. USGS needs to pick up some of the increased costs; both theCWP and the NSIP are in need of additional Congressional funding.
- Cooperators would like to be partners, not just payers.
- Cooperators, working at times with each other and at times with the USGS, can help with public relations, political strategy, and strategic planning. They should discuss these issues with their association members and encourage them to make their feelings known to influential groups.
- Four national organizations emerged as potential leaders in promoting Cooperator actions: Interstate Council on Water Policy, Western States Water Council, Association of State Floodplain Managers, and National Association of Flood and Stormwater Management Agencies. ICWP will put the notes from this meeting on their website.
- Cooperators can be a part of the work, including data collection and projects.
- USGS should protect data first before interpretive studies.
- A follow-up meeting similar to this one might be helpful.

Bob Hirsch closed the meeting by expressing sincere gratitude for the time, effort, and thoughts contributed by the participants.

Summary:
2nd National Cooperators' Roundtable
for the
USGS Cooperative Water Program

January 31-February 1, 2006 in Washington, DC

There was a very good turnout for the reception Monday evening and for the Roundtable meeting Tuesday, January 31, 2006, including approximately 70 people representing Cooperators from 20 states and 45 people from USGS Headquarters and Water Science Centers in 18 states.

In addition to 18 very informative CWP project displays, 5 corporate sponsors (Sutron Corp, YSI Environmental, Hach Environmental, In-Situ and Tyco Environmental-Greenspan) displayed and described monitoring and information management equipment!

Following a challenging and informative series of presentations regarding current capabilities of the CWP, its relation to the NSIP and the management of both programs, we broke into 5 smaller groups to explore and evaluate options for improving the CWP. Each group included a random mix of Cooperator and USGS representatives in a discussion and refinement of suggestions. However, USGS representatives did not participate in the prioritization of these ideas, since they are especially interested in the Cooperators' viewpoint. As a first cut, the following outline summarizes the ideas of greatest interest to the participating Cooperators:

What can USGS do to Improve the CWP?

Communication:

- Hold future Cooperator meetings at state or regional level
- Broaden the "customer base" for gaging (e.g., identify underpaying beneficiaries)
- Give Cooperators more input on the use of cost-sharing funds; include opportunity to consider environmental justice, data/study balance, *etc*
- Communicate with broader community of interested stakeholders regarding any threatened gages (not just the Cooperators directly involved in funding those specific gages)

Setting Program Priorities

- Give first priority to monitoring (*vs* investigations) when funds are limited
- Have more stakeholder input into setting the priorities of the CWP
- Implement national policy for state-by-state prioritization scheme (Cooperator's match rate could be based on importance of issues)

Funding Issues

- Re-establish 50-50 match in the CWP
- Continue to seek to full fund NSIP as a way to bring CWP closer to a 50-50 split

Cost Containment

- Control costs—examine 3 biggest costs for gaging and look for ways to save; include Cooperators and equipment suppliers in evaluation
- Be more creative in finding ways to reduce costs; USGS could provide QA and disseminate data collected by Cooperators
- Consider greater use of in-kind (especially if Cooperators provide certified operators, data)
- More coordination up front on how funds are being spent could help with cost efficiency (e.g., cooperator handle low-flow gaging)

Technical

- Give cooperators access to unit-value data

- Make internet access to data more user-friendly
- Improve QA for estimated peak flows

What can Stakeholders do to Improve the CWP?

Communication

- Ask the Administration and Congress for additional support; organize our leaders for a "Water Day" in DC to inform their representatives and agency officials
- Become more organized and active as a Cooperator community; get more Cooperators involved
- Enhance public awareness of USGS water data programs.
- Use USGS data in user-friendly ways to increase recognition of CWP data.

Funding Issues between Cooperators and USGS

- Identify non-traditional Cooperators in private sector to fund gages (e.g., power companies)
- States (or other large Cooperators) might be able to reduce number of cost share agreements (and associated overhead expense) by consolidating groups of interested stakeholders; maybe by establishing a general fund to allowing any entity to contribute (e.g., recreation and environmental groups)
- Increase effort to coordinate contributions from multiple funding partners
- Increase Cooperator involvement in deciding which NSIP gages to support

Cost Containment

- Make greater use of in-kind services
- Cooperators could be involved in the USGS cost comparison exercise
- States could take over data collection and provide the data to USGS ("furnished records")

Technical

- Stay current with the state of the art (e.g., in data transmission technology)

On Wednesday, February 1, about 35 of the Roundtable participants attended a briefing on the latest results of several local investigations supported with CWP cost-share funds. These included an investigation of water pollution by polycyclic aromatic hydrocarbon ("PAH") associated with the use of pavement sealants (e.g., in parking lots) in relation to the Barton Springs System and the sensitivity of an endangered salamander that inhabits ponds and streams associated with those springs. We also visited the Barton Springs and observed the Acoustic Doppler velocity meter and learned how it recorded hydrologic patterns that illuminated surprising features of the limestone karst aquifer system behavior!

The Roundtable presentations on Tuesday included a panel of USGS and Union County (Arkansas) Water Conservation Board experts concerning water supply development and depletion of the Sparta Aquifer. In combination with the tour briefing on Wednesday by City of Austin and USGS experts, Cooperators witnessed a thought-provoking exposure to the choices involved in allocating limited cost-share funds between data collection and water resource investigations with scientific and resource management implications.

A more detailed summary with meeting presentation slides and Cooperator recommendations details is available on the ICWP website at http://www.icwp.org/conferences/2ndrountable.htm

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June 30, 2006

Mr. Robert M. Hirsch
Associate Director for Water
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409 National Center
Reston, VA 20192

Mr. Glenn G. Patterson
Coordinator, Cooperative Water Program

Regarding **COOPERATIVE WATER PROGRAM, Roundtable Recommendations**

Dear Mr. Hirsch and Mr. Patterson,

We are pleased to present recommendations for future management improvements in the Cooperative Water Program on behalf of the broader group of non-federal Cooperators and with the benefit of ideas and priorities developed during the 2nd National Stakeholders' Roundtable in January 2006. These recommendations were selected and refined through discussion with a leadership team representing many of the Cooperators and consisting of representatives of the Western States Water Council, National Water Resources Association, National Wildlife Federation, National Association of Flood and Stormwater Management Agencies, Interstate Council on Water Policy, Association of State and Interstate Water Pollution Control Administrators and Association of State Flood Plain Managers.

We appreciate the opportunity to provide recommendations and we accept the challenge of helping to shape a more capable Cooperative Water Program (CWP) in the coming years. We are convinced that significant efforts to assure and demonstrate that CWP funds are being applied as intelligently and efficiently as possible must go hand-in-hand with efforts to bring additional resources into the CWP and the National Streamflow Information Program (NSIP). Communication among the non-federal Cooperators indicates a willingness to engage as a reliable partner in both efforts. Given the cost-share character of the CWP, the substantial investment made by the Cooperators and their dependence upon the results, your willingness to consider greater participation by the non-federal Cooperators is greatly appreciated.

Our first recommendation is that the USGS should engage the Cooperators more directly and more consistently in CWP decisions, especially those concerning use of cost-shared funds. Based upon the reaction of many Cooperators (federal as well as non-federal) and USGS staff, we believe that this should involve meeting periodically with Cooperators to enable them to learn about and help guide CWP policies and priorities at the national and regional levels, working together toward more efficient use of resources and reduced program cost. We hope you will agree that the two national Cooperators' Roundtable meetings held in 2005 and 2006 present solid prospects for future success.

In light of the national scope of the first two Cooperators' Roundtables, we believe that a series of regional meetings should be designed to cultivate a significantly greater sense of connection and appreciation for the management challenges facing USGS, its Water Science Centers and the Cooperative Water Program. Engaging the Cooperators at a regional or watershed scale should help connect individual Cooperators with the larger management decisions related to the allocation of cost-share funds

and the priorities that drive the selection of stations and investigations for continuation, improvement, etc. If we build that awareness and appreciation for the larger aspects of the CWP, more Cooperators will have the ability to contribute ideas and identify opportunities for extending our mutual capabilities in support of a strong national water science framework.

We have also developed several cost-containment recommendations. First, we believe that the cost-comparison workgroup you established can provide a very helpful response to Cooperators' concerns that the cost of some CWP elements and activities is too high. CWP stakeholder have raised these concerns during the past several years and they require understanding, not just answers. We appreciate the time, expertise and effort you have dedicated to the collection and organization of appropriate data from three Cooperators and your presentation of preliminary results to the Cooperators at several recent meetings. However, the Cooperators' assessment of those preliminary results indicates significant reservations about the data and the preliminary results. Therefore, we believe that consultation between your cost-comparison workgroup and the contributing Cooperators is necessary before the comparison proceeds; toward that end, representatives of the Washington Department of Environmental Quality, Colorado Division of Water Resources and Lower Colorado River Authority are willing and prepared to meet with your workgroup this summer.

Once the cost comparison is completed with a reasonable level of agreement between the USGS and the Cooperators, we believe the results should provide an excellent foundation for further exploration of potential improvements that would help extend the CWP capabilities and benefits of the CWP and NSIP. That cost comparison should provide the basis for understanding the major differences between USGS and Cooperator programs and to examine options for constraining the largest expense categories in the CWP budget. These options should, as we have discussed, include potential tiering of stations within the CWP to collect separate sets of measured parameters and meet different levels of data quality. As acknowledged during the Austin meeting, it seems very logical to include Cooperators and equipment suppliers in the exploration and development of those options.

We are recommending a collaborative development of effective ways to extend the capabilities of CWP and Cooperator data collection efforts that should eventually include opportunities to avoid duplication of efforts, understand and agree on priorities for selecting stations and investigations, and expand in-kind contributions (including the provisions for "furnished records") to the CWP while assuring that the overall quality, consistency and accessibility of the resulting information will meet appropriate, long-term, national standards.

With regard to funding, we continue to be very concerned by the level of federal support available to the NSIP and CWP. The NSIP budget still provides only a small fraction of the necessary support, which seems to require the redirection of funds designated for the CWP. The non-federal Cooperators indicated a high level of priority should be placed on efforts to secure better federal funding for the NSIP and the CWP to recover the capacity lost in recent years and restore the CWP cost share to the traditional 50:50 partnership that Cooperators and the USGS supported for so many decades.

We would also like to extend our discussions with you and with key federal Cooperators into the exploration of effective arrangements that would enable more federal Cooperators and other stakeholders to contribute their fair share. In the meantime, we believe it will be necessary to give still greater priority to data collection over interpretive studies while CWP capability is limited by funding, to minimize gaps in important monitoring records.

To summarize, our recommendations are:

Strengthen Partnership with Stakeholders

- Engage the Cooperators more directly and more consistently in CWP and NSIP decisions, especially those concerning use of cost-shared funds; this should involve meeting regularly with Cooperators

(federal and non-federal) to enable them to learn and help guide program policies, capabilities and priorities at the national and regional levels.

Improve Funding, Funding Base & Cost Containment

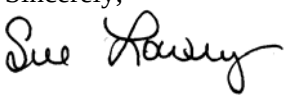
- Continue to seek full federal funding for the NSIP as a way to bring CWP closer to a 50-50 cost-share;
- Expand opportunities for in-kind contributions within the CWP to expand the data collection network while assuring quality, consistency and accessibility of data meet appropriate national standards;
- Focus initially on constraining the three largest expense categories in reducing cost of CWP; include Cooperators and equipment suppliers in evaluation; and
- Make provision for more federal Cooperators and other stakeholders to contribute their fair share.

Fund Data Collection First

- Give higher priority to data collection (over interpretive studies) while CWP capability is limited by funding, to minimize gaps in important monitoring records.

We recognize that these recommendations will require continued time, attention and effort on your part and on the part of Water Science Center managers. The Cooperators wouldn't expect or ask so much if the communities we serve weren't so dependent upon the good science that the CWP and NSIP produce. We are prepared to match our expectations for these programs with hard work and accountability and look forward to continuing the productive, professional relationship with you and the rest of your team.

Sincerely,



Sue Lowry, Chair
Interstate Council on Water Policy

On behalf of:

Larry Larson
Association of State Flood Plain Managers

Sue Lowry
Interstate Council on Water Policy

Susan Gilson
National Association of Flood and Stormwater Management Agencies

David Conrad
National Wildlife Federation

Dale Swensen
National Water Resources Association

Tony Willardson
Western States Water Council

United States Department of the Interior
U.S. GEOLOGICAL SURVEY
Reston, VA 20192

In Reply Refer to:
Mail Stop 409

September 13,2006

Larry Larson
Association of State Flood Plain Managers

Sue Lowry
Interstate Council on Water Policy

Susan Gilson
National Association of Flood and Stormwater Management Agencies

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Thank you for participating in the Second National Stakeholders Roundtable for the U.S. Geological Survey Cooperative Water Program (CWP) in Austin, Texas during January 30February 1,2006. We would like to take this opportunity to respond to the excellent suggestions that arose from the Roundtable.

We would like to start by thanking the Association of State Flood Plain Managers, the Interstate Council on Water Policy, the National Association of Flood and Stormwater Management Agencies, the National Wildlife Federation, the National Water Resources Association, the Western States Water Council, the Texas Water Development Board, the Texas Water Conservation Association, and other organizations for being generous with time and effort in order to make the Second Roundtable a success. We would also like to thank the individual participants for their time and effort. It is very helpful to us to receive advice and recommendations about the Cooperative Water Program from a broad spectrum of stakeholders.

We, at the USGS, also appreciate the positive, collaborative tone that permeated the discussions at the Roundtable, as exemplified during the opening comments by Weir LaBatt of the Texas Water Development Board:

> *Good, reliable and consistent water data are the key pieces that tie together our water supply decisions, our flood control plans, our drought management efforts, our water quality protection, our environmental needs and many other important responsibilities. The USGS is a key partner in our water planning and management ...*

We view partnerships as crucial to meeting the Nation's needs for water science and data, and in that spirit will work to keep our partnerships with State, local, and tribal water organizations strong, productive, and mutually beneficial.

The discussions during the Roundtable included a wide spectrum of voices from the stakeholder community, and touched on a broad range of issues related to the Program. This response will focus on those recommendations that were included in the summary you provided to us in your letter (from Sue Lowry) of June 20, 2006. Some of the recommendations included in the summary are similar to recommendations made by the External Task Force to review the Cooperative Water Program. Our responses to the recommendations of the Task Force can be found at http://acwi.gov/coop2004/index.html. The parts that are relevant to the issues included in your summary are excerpted in the appendix attached to this letter.

1. **Strengthen Partnerships with Stakeholders.** The collaborative nature and joint-funding structure of the Cooperative Water Program have traditionally made it both mandatory and desirable to have frequent communication at the Water Science Center level among scientists and managers from the USGS and from the Cooperating agencies. In meetings that traditionally have tended to be bilateral, the USGS and the Cooperators have discussed priorities for science and data collection, development of specific proposals, progress on existing projects, resolution of problems, and results of the efforts.

Multi-lateral discussions have been one of the more recent developments, and are on the rise and continue to be encouraged. The multi-lateral 5-year Strategic Planning Reviews held by many of our Water Science Centers, the annual USGS Customer Listening Sessions, and the two recent National Stakeholder Roundtables on the Cooperative Water Program exemplify this trend. We agree with the suggestion to try a Regional approach to multi-lateral cooperator communications, and would like to explore with you how we might proceed to implement this idea.

Additional thoughts about strengthening partnerships with stakeholders are included below in section 2 under the subheading, "Expand opportunities for in-kind contributions," and in section 1 of the appendix.

2. Improve Funding, Funding Base, and Cost Containment

Restore the funding ratio in the CWP to 50:50. We are keenly aware that the funding share shouldered by cooperators has increased from 50 percent to about 70 percent in recent decades, and we share the concern that this places an increasingly heavy burden on the cooperators. We will continue dialogues with stakeholders, with the Department of the Interior, and others about this issue. Any resolution will have to take into account the limited new funding available to the Department and the Bureau during these challenging budgetary times, and the many priorities that vie for the available dollars. Stakeholder input is crucial to this process. The fiscal year (FY) 2007 appropriations bills for the USGS, as currently approved individually by the House and Senate, would fund the Cooperative Water Program at the FY 2006 level plus a 2-percent increase to cover inflation of fixed costs. The USGS response to the Task Force on this topic is included in section 2 of the appendix.

Enhance funding for the National Streamflow Information Program as a means to fund some of the highest priority streamgages. The USGS is committed to the concept of a Federally funded backbone for the National streamgaging network, and will continue to implement it as funds are available. Based on recent action in the House and Senate we are optimistic that the proposed increase in NSIP for 2007 will be enacted.

Here are three other items that may be of interest on the subject of USGS streamgages:

D Changes in the USGS streamgaging network take place every year as a result of changes in requirements and changes in available funding among the more than 800 agencies that participate in funding the network. The numbers we report here are national totals. There are significant regional differences in network trends with some States or river basins having a stable or growing network while other States or river basins show decreases. Nationally, the total number of continuous record stream gages declined by 178 between Water Year 2004 and 2005, from a total of7627 to 7449.

D In evaluating trends in the network we also pay close attention to our long-record streamgages (those with 30 or more years of record). The long-record streamgages are particularly important to water resources and infrastructure planning and to the analysis of longterm changes in water availability, drought characteristics and flood hazards. In 2005, we reactivated 29 long-record streamgages but had to discontinue 142. Although we are not all the way through Water Year 2006, it appears to us that these kinds of trends are continuing.

D The use of our data continues to increase. Our NWIS Web database (which contains all of our historical and real-time data for streamflow, water chemistry, and ground water levels) hit a newall-time record number of requests on June 28 of this year. The average number of data requests that our system fulfills has been averaging about 1 million per day over the past year. On June 28, 2006 we fulfilled about 1.9 million requests. This increased activity was, no doubt, triggered by the widespread flooding taking place in the Northeast at that time.

Expand opportunities for in-kind contributions. During the past two decades the way in which the USGS partners with the water resources community has been evolving. As funds to address water resource concerns have become scarcer and water resources problems have become more challenging, stakeholder organizations have joined together to do the work that is

necessary to address the water resources issue. State agencies, federal agencies, local governments, and tribal governments have banded together to develop strategies and work plans to provide the data, do the analyses, answer questions, and build the decision-making tools needed to address the water resource issue. This team then assesses the work tasks needed and divides up the work among them based on what each organization can easily and economically offer to the effort. Then they pool their cash resources to accomplish what project tasks none of them could provide.

The USGS has proven itself to be an important partner in these "stakeholder teams" that are addressing water resources issues. The USGS always brings valuable scientific expertise to the team. We can often draw on examples of similar issues and studies from across our nation wide program, we have a ready tool-box of non-proprietary software and models to bring to the issue, we have access to a cadre of world-class hydrologic research scientists in the USGS offices across the Nation, we have access to outstanding analytical laboratories and database management tools, and we often have a little Cooperative Water Program matching funds to throw into the mix.

More and more, the USGS has come to recognize the value and wisdom of cooperator participation in interpretive studies and data collection. The examples in section 1 of the appendix help to illustrate this point. Future meetings of USGS water program leadership will place emphasis on the value of such collaborations. This approach represents a culture change for many in the USGS water program, but, it is the right thing to do and many of our field managers are already recognizing it and implementing it. Weare also working on a guidance document for our Water Science Centers and their current and potential streamgaging partners, laying out the options and requirements for successful collaborative efforts in streamgaging. We will promote the continuation of this evolutionary change.

Improve the cost-effectiveness of the CWP. The USGS has established two teams to look at options for improving the cost-effectiveness of the Streamgaging Program. One team, headed by Robert Holmes, has been comparing streamgaging costs among the USGS and three State or local entities that also conduct streamgaging. The other, headed by Scott Gain, is looking at USGS operations to search for ways to save money without compromising quality. We look forward to sharing the draft reports of these teams with the stakeholder community for review and comment prior to being finalized, and we are interested in meeting with representatives of the cooperator community to discuss them. As described in the attached document, we are also committed to examining options and examples for improving cost-effectiveness by increasing cooperator involvement in data collection and interpretive studies where such involvement promises to help reduce overall costs.

In the work of the stream gaging cost comparison team, an attempt was made to ensure that costs were compared for similar activities and budget items. Results so far indicate that the USGS is comparable in cost to the local streamgaging entity, but, more expensive than the two State agencies. Most of the difference in cost is attributable to administrative and facilities costs at the USGS. The USGS has been directed by the Department of the Interior and the Office of Management and Budget to ensure that administrative and facilities costs attributable to reimbursable programs are funded through those reimbursable programs, and not through

Congressional appropriations. The USGS uses more labor per streamgage, in both the field and the office, than the non-Federal entities, resulting in a higher labor charge per stream gage for the USGS.

Due to differences in the intended uses of the streamflow data collected, there are substantial differences between the USGS streamflow data and the data collected by the two state agencies. These differences include number and frequency of calibration measurements made, frequency of updates of adjustments of calibration (rating curves), and timing and availability of the dissemination of both provisional and final streamflow data. Our analysis to-date strongly suggests that those streamgaging programs that operate at significantly lower average cost per streamgage provide a substantially different type of product for many of their stream gages than the product produced by the USGS. We invite our stakeholders to identify other streamgaging operations with which we can compare our approaches, costs, and delivery mechanisms, and to provide further comment on the comparisons already made. All ideas for improved efficiency of the network are welcome.

Make Provision for More Stakeholders to Contribute their Fair Share. As funding has become tighter for streamgaging, the USGS has actively sought participation by additional funding partners. Whenever funding for a streamgage is threatened, a message to that effect is posted on the web site for that streamgage's data, so that all data users can be informed about the impending loss of the station; and may have an opportunity to contribute to the continued operation of the streamgage. In addition, Water Science Center managers are always seeking additional funding partners for streamgages. In some instances novel approaches have been used, such as using the gift authority to accept funds from private entities. These efforts will be continued and expanded as you recommend. Exploration of strategies for expanding the cooperator base would be a worthwhile topic for future discussions with your organizations. We fully agree with its importance and note that new cooperators are added to the program each year. We would, however, add a note of caution. Extensive efforts to add new cooperators come at a real cost in terms of the time invested by scientists, managers, and administrative staff.

3. Fund Data Collection First. The USGS places a high value on long-term data-collection activities. The USGS commitment to maintaining a consistent long-term data-collection network is reflected not only in our contributions from the CWP, but also from other data-oriented water programs such as: the National Streamflow Information Program, the National Water Quality Assessment, the Ground-Water Resources Program, and the Hydrologic Networks and Analysis Program, which includes data-collection activities such as the National Stream Quality Accounting Network (NASQAN), the Benchmark Network for water-quality monitoring in relatively pristine headwater areas, and the National Atmospheric Deposition Program (NADP). Along with our commitment to these long-term data-collection programs, however, goes a similar commitment to interpretive studies that inform the Nation and our cooperators about the messages contained in the data we collect. A body of long-term data is of crucial importance, but its value is not fully realized without a corresponding body of applied science and research that interprets the data, advances understanding of hydrologic processes, and stimulates the development of new data-collection techniques. The Nation benefits directly from USGS data, but also benefits from the synthesis of regional knowledge that USGS scientists bring together and publish in the form of interpretive reports and in the form of deterministic or statistical

models that can be used for planning, design, and decision making. The value of the USGS water science staff is greatly increased because it is a mix of staff engaged in data collection along with a cadre of trained scientists who can study and interpret the data.

The States, tribes, local government, other Federal agencies, and the public depend on the hydrologic knowledge and scientific capacity of the USGS workforce to help them evaluate hydrologic systems and resolve new and emerging water resource issues. Defending long-term data networks without supporting USGS interpretive studies would result in a staff that would be much less able to provide a robust suite of services to the Nation. Without a strong interpretive and research program, the USGS would lack the staff that will enable it to contribute to new and emerging water issues at the regional or national scale. USGS leadership seeks to maintain a balance among long-term data, interpretive studies, and research in its water science portfolio.

The balance between data and studies in the CWP is not dictated by Headquarters or Regions, but is left to the discretion of Water Science Center (WSC) Directors, who are in frequent communication with State and local cooperators regarding the needs of the water-resources community in each State. This leads to variations from one WSC to another, but in aggregate the balance and funding levels have remained relatively steady.

One step in dealing with this issue is to ensure that we have accurate information about the history of expenditures on data and studies within the CWP. The USGS has relied on centrallyreported expenditures in "data accounts" (project accounts intended primarily for surface-water, ground-water, water-quality, sediment, precipitation, and water-use data collection) to account for the data effort. In 2006, we have begun checking these records with Water Science Center Directors and verifying the data expenditures in greater detail. We will continue to track these expenditures more closely each year.

A careful analysis of FY 2005 expenditures in the CWP shows that nationwide, 57 percent of expenditures of Federal funds were in the data accounts, and 43 percent were for studies that were primarily interpretive. This distribution of the Federal funds demonstrates an emphasis on data collection. In addition, the matching ratio of Federal to non-Federal funds in each category also reflects an emphasis on data collection. The ratio of Federal funds to cooperator funds in the data category in FY 2005 was 37:63, while the ratio in the studies category was 32:68. In other words, current management practice is to slightly favor data activities over interpretive studies in terms of the allocation of Federal matching funds.

Traditionally, Federal funding in the Cooperative Water Program has increased slightly each year to cover inflation, with occasional additional increases that bring about slight program growth. That situation was suitable for providing consistent long-term funding for data collection, as long as cooperator funding was available. In recent years, however, flat or slightly declining Federal funding, with little or no increase to cover inflation, has eroded the purchasing power of the Federal side for both data collection and studies. When cooperator budgets cannot pick up the slack, the program is faced with the difficult prospect of discontinuing needed datacollection stations as well as cutting back on studies. This issue has been prominently addressed by cooperators in their communications with policy makers, and their voices have been heard. The President's proposed FY 2007 budget contains a $2.3 million increase for the National

Streamflow Information Program, to help slow the gradual erosion of the stream gaging network. Furthermore, the proposed $2.0 million cut in the Cooperative Water Program was aimed specifically at interpretive studies, and not at data collection.

The USGS will continue to monitor this issue and discuss it regularly in leadership meetings. Where trends show a disproportionate decline in the data collection program compared with interpretive studies, the USGS will seek to protect the data collection network. The USGS will also continue to explore, through the National Streamflow Information Program and other federally funded data-collection programs, the possibility of full federal funding for a core set of streamgages and for other data-collection activities. The USGS response to the Task Force on this issue is included in section 3 of the appendix.

Again, we thank you for your continuing interest in the Cooperative Water Program and its future. We welcome a continuing dialogue and hope that you will feel free to respond.

Sincerely,

~~. ~~*c911*

Robert M. Hirsch
Associate Director for Water

Glenn G. Patterson Coordinator,
Cooperative Water Program

Attachment: Appendix

Copies to: Assistant Secretary-Water and Science Assistant
Deputy Secretary- Water and Science Acting
Director USGS

Appendix

Excerpts from USGS Response to the External Task Force to Review the Cooperative Water Program

(Full text of the USGS response to the Task Force report can be viewed at http://acwi .gov/coop2004/response tfreport. pdf)

1. Fostering better working relationships with cooperators. The Task Force recommended that, in the interest of cost-efficiency and effective use of resources, the USGS should reexamine the use of in-kind service credit and continue to look for ways to foster better working relationships with cooperators.

During the past two decades the way in which USGS partners with the water resources community has been evolving. As funds to address water resource concerns have become scarcer and water resources problems have become more challenging, stakeholder organizations have joined together to do the work that is necessary to address the water resources issue. State agencies, federal agencies, local governments, and tribal governments have banded together to develop strategies and work plans to provide the data, do the analyses, answer questions, and build the decision-making tools needed to address the water resource issue. This team then assesses the work tasks needed and divides up the work among them based on what each organization can easily and economically offer to the effort. Then they pool their cash resources to accomplish what project tasks none of them could provide.

USGS has proven itself to be an outstanding partner in these "stakeholder teams" that are addressing water resources issues. USGS always brings additional scientific expertise to the team, we can often draw on applicable examples from a nation-wide program, we have a ready tool-box of non-proprietary software and models to bring to the issue, we have access to outstanding analytical laboratories and database management tools, and we often have a little Cooperative Water Program matching funds to throw into the mix.

The policy of the USGS is to embrace cooperator participation in interpretive studies and data collection when doing so is in the interest of the project. We will be giving internal publicity to this policy and to some of the following examples of such collaboration:

Examples of Collaboration on Interpretive Studies:

Oregon: For about 15 years, the Oregon Water Resources Department has collocated two State employees in the USGS Oregon Water Science Center office. These two State employees have desks in the USGS office and spend several days a week there working cooperatively on groundwater studies and models. State and local agencies rely on these studies and models to make prudent management decisions regarding withdrawals of ground water for irrigation, industrial, and public-supply use. Over the 15 years, they have worked together with USGS scientists to conduct and plan studies in 5 different watersheds (the Portland Basin, Willamette Basin, Deschutes Basin, Klamath Basin, and most recently the Umatilla Basin) and have co-authored

over 20 products with USGS co-authors. Having the cooperator on-site, working directly with UGSG scientists, has increased communication with the State on these studies and on other issues, leading to joint planning of studies and development of county workshops aimed at providing additional expertise to their efforts. State employee involvement also has brought addition geology and data synthesis expertise to USGS studies. It has also ensured that the models are put into useful service in the hands of capable, trained employees. Most importantly, this close association has ensured real-time feedback on tasks accomplished by USGS scientists, ensuring that products are on target and immediately useful for the State.

Oklahoma: The USGS is working in partnership with the Oklahoma Water Resources Board (OWRB) to conduct a study of the Arbuckle-Simpson Aquifer and develop a ground-water model that can be used to ensure that management alternatives will maintain flows from streams and springs connected to the aquifer. OWRB, the U.S. Bureau of Reclamation, USGS, and the Chickasaw Tribe are the funding partners for this project. A representative from the OWRB manages the overall project and chairs a Technical Advisory Committee comprised of representatives from the Water Resources Board, USGS, EP A, Oklahoma State University, and the Oklahoma Geological Survey. This committee provides technical expertise and synthesis ofproject activities. Specifically, the OWRB is providing management assistance to the project and collecting most of the hydrologic data needed, including ground-water-level data, stream flows, and water use data, and providing GIS support. The Oklahoma Mesonet is providing basic climatic data. The University of Oklahoma is evaluating past climatic conditions using tree ring analyses, and predicting rainfall, runoff, and ground-water recharge to the aquifer using NEXRAD data. Oklahoma State University is providing field assistance, literature reviews, and technical expertise regarding the geology and fracturing of the aquifer. The USGS is doing streamflow monitoring, ground-water modeling, geochemistry, analyses of well hydraulics, and GIS support, and is developing an Earth vision geologic model and gravity geophysics as part of separate studies of the area. Other stakeholders, including city governments and special interest groups, are also involved in the project. So again, here is another example of a strong partnership within the water resources community to address complex and critical aquifer use issues.

Examples of Collaboration on Data Collection:

Virginia: For 25 years the USGS Virginia Water Science Center and the Virginia Department of Environmental Quality (VDEQ) have been collaborating on data collection at about 150 stream gages. VDEQ uses USGS protocols and equipment to install and operate gages, make measurements, and work records. The State provides quality assurance and enters the records directly into the USGS National Water Information System database under a flag that signifies "Station operated by VDEQ". USGS provides training and mentoring; access to the USGS Hydrologic Instrumentation Facility for procurement of equipment, access to the real-time data network, and access to the National Water Information System for entering records.

Oregon: The USGS Oregon Water Science Center collaborates with several entities on a multiyear data collection program. In this case, the Nez Perce Tribe is the primary cooperator to the USGS, but the Grande Ronde Model Watershed Program and the State of Oregon Water Resources Department also are providing support. The project involves running a five-gage, surface-water network. Total cash outlay needed by the Tribe for the network was reduced by incorporating services from the two other agencies. An employee of the Watershed Program conducts the field work associated with the gages and the Water Resources Department computes and checks the discharge record. The USGS trained the Watershed Program employee collecting the data, operates four DCPs in the network, reviews and provides *QA*/*QC* on the field work and records
computations, and publishes the data. In addition to requiring less cash outlay for the Tribe, this partnership also benefited the Watershed Program by keeping their employee well trained on discharge measurement techniques. Also, more measurements were obtained and problems were fixed more quickly by a local Watershed Program person than they would have been if maintained by a USGS employee located about 2.5 hours away from the network.

Other States with similar examples of data-collection collaborations include California, Texas, and New Jersey.

The USGS will continue to inventory examples of successful collaborations in which cooperators contribute effort as well as funding to a project, and will publicize these examples throughout the Water Resources Discipline. Additional ideas for forging successful working partnerships, including use of credit for in-kind services will be encouraged where appropriate. In addition, the USGS has convened a Streamgaging Cost Efficiency Committee to look at ways of improving the cost-effectiveness of the streamgaging program. One of the measures the Committee is considering is to increase use of such collaborations. This is expected to result in more formal policies and practices embracing such collaborations.

2. Funding for the Cooperative Water Program

The Task Force emphasized that they consider full funding of the CWP (restoration of a 50:50 matching ratio) as the highest priority of all the recommendations. The USGS acknowledges the recent trend toward cooperators bearing an increasing share of the cost of the CWP, and agrees that bringing the match ratio back closer to the traditional 50:50 would be appropriate for a true partnership. Federal funding for all programs of the USGS and all of the Department of the Interior is very limited. Many excellent programs are funded at levels that are less than their stakeholders wish. Difficult funding choices must be made, and stakeholder input is crucial to this priority-setting process. The USGS also recognizes that this recommendation, combined with the recommendation to emphasize data collection, carries special significance for funding related to data collection. The USGS will continue a dialogue on this issue with stakeholders
and budget officials. In these discussions the CWP will be mentioned along with other funding mechanisms for related work, such as the National Streamflow Information Program.

3. Balance between data collection and interpretive studies. The Task Force recommended (10.1) that the USGS should place emphasis on data collection, rather than interpretive studies, in the CWP. The Task Force recognized the continuing importance of interpretive studies, but said the USGS needs to be careful not to reduce data-collection efforts.

As stated in the report, the USGS places a high value on long-term data-collection activities. The USGS commitment to maintaining a consistent long-term data-collection network is reflected not only in our contributions from the CWP, but also from other data-oriented water programs such as the National Streamflow Information Program, the National Water Quality Assessment, the Ground-Water Resources Program, and the Hydrologic Networks and Analysis Program, which includes data-collection activities such as the National Stream Quality Accounting Network (NASQAN), the Benchmark Network for water-quality monitoring in relatively pristine headwater areas, and the National Atmospheric Deposition Program (NADP). Along with our commitment to these long-term data-collection programs, however, goes a similar commitment to interpretive studies that inform the Nation and our cooperators about the messages contained in the data we collect. A body of long-term data is of crucial importance, but its value is not fully realized without a corresponding body of applied science and research that interprets the data, advances understanding of hydrologic processes, and stimulates the development of new data-collection techniques. The real value of the USGS to the Nation stems from this combination of data and a cadre of trained scientists who can study and interpret the science contained in the data.

The States, tribes, local government, other Federal agencies, and the public depend on the hydrologic knowledge and scientific capacity of the USGS workforce to help them evaluate hydrologic systems and resolve new and emerging water resource issues. Defending long-term data networks without supporting USGS interpretive studies would result in incomplete hydrologic-science service to the Nation. USGS leadership seeks to maintain a balance among long-term data, interpretive studies, and research in its water science portfolio.

The balance between data and studies in the CWP is not dictated by Headquarters or Regions, but is left to the discretion of Water Science Center (WSC) Directors, who are in frequent communication with Stare and local cooperators regarding the needs of the water-resources community in each State. This leads to variations from one WSC to another, but in aggregate the balance and funding levels have remained relatively steady.

One step in dealing with this issue is to ensure that we have accurate information about the history of expenditures on data and studies within the CWP. The USGS has relied on centrallyreported expenditures in "data accounts" (project accounts intended primarily for surface-water, ground-water, water-quality, sediment, precipitation, and water-use data collection) to acco~nt for the data effort. In 2006 we have begun checking these records with Water Science Center Directors and verifying the data expenditures in greater detail. We will continue to track these expenditures more closely each year.

A careful analysis of FY '05 expenditures in the CWP shows that nationwide, 57 percent of expenditures of Federal funds were in the data accounts, and 43 percent were for studies that were primarily interpretive. This distribution of the Federal funds demonstrates an emphasis on

data collection. In addition, the matching ratio of Federal to non-Federal funds in each category also reflects an emphasis on data collection. The proportion of Federal funds in the data category in FY '05 was 37 percent, while the proportion in the studies category was 32 percent.

Traditionally Federal funding in the Cooperative Water Program has increased slightly each year to cover inflation, with occasional additional increases that bring about slight program growth. That situation was suitable for providing consistent long-term funding for data collection, as long as cooperator funding was available. In recent years, however, flat or slightly declining Federal funding, with little or no increase to cover inflation, has eroded the purchasing power of the Federal side for both data collection and studies. When cooperator budgets cannot pick up the slack, the program is faced with the difficult prospect of discontinuing needed data-collection stations as well as cutting back on studies. This issue has been prominently addressed by cooperators in their communications with policy makers, and their voices have been heard. The President's proposed FY 2007 budget contains a $2.3 million increase for the National Streamflow Information Program, to help stem the gradual erosion of the streamgaging network. Furthermore, the proposed $.7 million cut in the Cooperative Water Program is aimed specifically at interpretive studies, and not at data collection.

The USGS will continue to examine this issue in greater detail, including trends. Where trends show a disproportionate decline in the data collection program compared with interpretive studies, USGS will seek ways to protect the data collection network. USGS will also continue to explore, through the National Streamflow Information Program and other federally funded data-collection programs, the possibility of full Federal funding for a core set of stream gages and for other data-collection activities.

We appreciate additional support for this program from our friends at