- Effects of climate on water-resources management;
- Surface-water and ground-water interactions as related to water-resource management; and
- Hydrologic system management, including optimization of ground water and surface water.

The Cooperative Water Program will be expected to play a key role in the examination of these issues as partnerships are created with other Federal agencies, Water Resource Research Institutes, the academic community, Tribes, local governmental agencies, and members of the large private sector. The WRD cannot lose sight of the fact that one of the primary functions of the Cooperative Water Program is to gather the fundamental data that will be necessary to address these nine emerging issues and other water-related issues as they arise.

Conduct of Work

Traditionally, almost all work performed under the Cooperative Water Program was done by USGS scientists and technicians. This arrangement was designed to enhance quality control, provide national consistency in data collection and methods of analysis, and provide a stable core of experienced water scientists nationwide. This practice evolved in part from an era when the WRD employed most of the trained personnel in the world that were experienced in collecting water-resources data. Over the past 40 years, however, there has been a dramatic increase in the number of individuals receiving training in water-resources related science, the capabilities and use of sophisticated data-collection equipment, and the capabilities and use of hydrologic and hydrogeologic modeling.

Due to rising travel costs and the difficulty of maintaining small isolated work locations, it is incumbent on the WRD to investigate all means possible to provide increased efficiencies while controlling cost. This may occur through the increased use of remote sensing, use of personnel from outside the USGS, and/or developing quality assurance (QA) and quality control (QC) procedures that will allow acceptance of data from third-party sources.

Regardless of the methods employed by the WRD, it is vital that, above all else, the USGS maintain its reputation for providing correct, unbiased data. If this reputation were impaired, the WRD's ability to be a significant contributor in the water-resources field would be seriously impacted.

Products

In general, the products of the program are well balanced with respect to achieving the needs of the Cooperators. Products made possible by the Cooperative Water Program are well regarded, credible, reliable, unbiased, and generally of excellent quality (for example, technical correctness, thoroughness, graphics, innovation, and use of new technologies, such as the Internet). However, the Task Force does offer suggestions (see "Findings and Recommendations" section) for improvement in several areas. The ability of the USGS to share information and products generated by the Cooperative Water Program, either free of charge (for example, models and data) or for nominal cost (certain publications), is a strong benefit of the program to Cooperators and other users.

Although program products are of high quality, achieving that level of excellence is inherently time consuming. Timely issuance of some products (for example, in adherence to deadlines in agreements), particularly interpretive project final reports, has been and remains a significant problem in the program. However, USGS staff has made significant strides to correct this important problem, in part, by revising the peer-review process and establishing review authority at the regional and District level.

FINDINGS AND RECOMMENDATIONS RESULTING FROM THE REVIEW OF THE COOPERATIVE WATER PROGRAM

The findings and recommendations that follow have the consensus acceptance and support of the entire Task Force. These findings and recommendations are organized in this section as answers to questions raised by the ACWI in the Terms of Reference for the Task Force. The Cooperative Water Program is vital to the Nation in terms of assuring adequate quantity and quality of water for a wide variety of uses, mitigating the impacts of floods and other water-related hazards, and understanding short-term and long-term changes in water resources. Nonetheless, the Task Force finds that there are opportunities to improve the Cooperative Water Program and makes recommendations in the following areas:

- Mission;
- Priorities for Funding;
- Funding Levels;
- A National Streamgaging Program;

- Collaboration and Communication;
- Competition with the Private Sector;
- Quality of USGS work, and
- Products.

Is the Cooperative Water Program Meeting Its Mission? Is the Mission Still Valid? And, if not, How Should It Be Altered?

The Cooperative Water Program is critical to improving the management of the Nation's water resources. It is important to the Nation because the Program addresses the keen shared-interest of Federal, State, Tribal, and other government agencies in appraising the Nation's water resources and seeking solutions to water-related problems. In today's climate of growing demands on, and increasing competition for, the Nation's water resources, there is an increased need for all types of water-related data and analyses now and in the future. The Cooperative Water Program offers the highest level of scientific knowledge, objectivity, and technical expertise. The Cooperative Water Program is integral to providing long-term data collection and analysis of water quantity, quality, and use on a national basis. Without the Cooperative Water Program, the Nation would not have information vital to the routine management of the Nation's water resources and critical in the management of water-related emergencies.

The Advisory Committee on Water Information (ACWI) provided the Task Force with this description of the Cooperative Water Program:

> "Historically, the Cooperative Water Program has been designed to develop hydrologic data and technical analyses needed to assist in meeting the USGS mission of continuously assessing the Nation's water resources, and to provide technical assistance to State, Tribal, and local water management agencies in seeking solutions to water-resource issues of national concern through a matched funding arrangement."

Finding 1: The Cooperative Water Program is meeting its Mission, and the Program Mission is still valid.

Because no specific mission statement exists for the Cooperative Water Program, the Task Force derived the following Mission Statement:

The Mission of the USGS Water Resources Division Cooperative Water Program is to provide reliable, impartial, and timely information needed to understand the Nation's water resources through a program of shared efforts and funding with State, Tribal, and local partners to enable decision makers to wisely manage the Nation's water resources.

Recommendation 1.1: The Task Force recommends that this Mission statement be adopted as the Mission Statement of the Cooperative Water Program, or that this statement be used as an initial attempt in the formulation of such a Mission Statement.

Recommendation 1.2: The Task Force recommends that the words "Federal-State" be removed from the USGS Cooperative Water Program title in recognition of the broader range of cooperative partners involved in the program.

Finding 2: The Cooperative Water Program has been a very successful part of the WRD's "ongoing" Mission of continually assessing the Nation's water resources.

The Cooperative Water Program is successful as a result of the pooling of support and resources. There is a mutual benefit to all levels of government and public data users alike. There is a need to recognize the importance of the Cooperator, partner, and stakeholder in what the USGS accomplishes through the Cooperative Water Program.

Does the Cooperative Water Program adequately contribute to the broad USGS Mission, while keeping abreast of emerging water-resources issues at the State and local level?

Finding 3: The Cooperative Water Program makes a vital contribution to the broad USGS Mission by collecting and archiving large volumes of water supply data, by intergovernmental cooperation and coordination, and by keeping abreast of emerging water-resources issues at the State and local level.

Given that there is more funding available from the State and local side than there is matching Federal funding, are matching

funds applied to the most important topics and issues?

Finding 4: There are significant levels of cooperative funds for worthy proposals that the USGS cannot match. Many Cooperators are bound by agency policies and budgets to not provide more than 50% matching funds in cooperative agreements. At the same time, for Cooperators that are not constrained, the unmatched funds demonstrate the increasing demand for Cooperative Water Programs and services.

Data collected from the Cooperative Water Program are used for hydrologic studies, water planning, water administration, allocation, interstate river compact administration, flood forecasting, snowmelt forecasting, watershed management and water-quality assessments. Interpretive studies provide important information for many water-resources management decisions. The water community places great value on the independent, objective products of the Cooperative Water Program, a point that was heard over and over again from Cooperators and other users of the information produced.

Current (1999) funding for the Cooperative Water Program is not adequate to satisfy all the needs identified for additional streamflow data, regional groundwater information, updated hydrologic models, and technical publications. There also is little doubt that the program has not achieved its full potential and that there have been some loss of benefits due to inadequate funding. Funding levels have not kept pace with inflation. At the same time, there has been increased demand for the services of the program due to the additional need for water-resources data, tools, and information, mainly to satisfy growth while meeting new environmental challenges.

The main impact of the reducing levels of funding, when compared to inflation, have been on the streamgaging network, which has seen a continuing loss of critical long-term stations and consequent loss of information vital to Federal, State, Tribal, and local agency interests. However, technology development and interpretive studies have also been affected.

Although some gains may be achieved by increased efficiency, effectiveness, and more judicious choice of programs, the conclusion is inescapable that additional funds will improve the program and benefit all sides.

Recommendation 4.1: The funds for the Cooperative Water Program should be increased to a level sufficient to achieve a full match for the current and future Cooperator offerings and should be indexed for inflation.

Recommendation 4.2: Projects that are appropriately funded 100 percent by a cooperating agency should be reported separately. These projects should nonetheless meet the criteria of WRD Memorandum No. 95.44 to prevent the appearance or reality of competition with the private sector.

Finding 5: There is no consistent, documented process for setting priorities at the District, regional, or national levels. Current allocation of Cooperative Water Program funds to regions and to Districts appears to be based on historical patterns.

Recommendation 5.1: District Chiefs should include the following considerations in setting priorities for individual projects and in determining the percentage of match that the USGS puts into a given project:

A. Availability of funds;
B. Ability of the project to clearly meet the USGS's Congressional mandate to work within the national domain or on issues determined by Congress or the Secretary of the Interior to be in the national interest;
C. Ability of the project to meet Cooperator needs consistent with national priorities that are established in the USGS Strategic Plan, the WRD Strategic Plan, and the memorandum issued annually by the Chief Hydrologist concerning Cooperative Water Program priorities; and
D. Ability of the project to meet multiple goals among the eight outlined in WRD Memorandum No. 95.44 (with the understanding that generally a project that meets more of these goals will have a higher priority than one that meets fewer).

Recommendation 5.2: Establish a special panel to meet at least once every 5 years to review lessons learned and to provide improvements to the process for allocating funds to Districts.

Finding 6: In 1995, the USGS discontinued an internally competitive merit program for addressing high-priority research needs with partial funding from the Cooperative Water Program.

Recommendation 6.1: The USGS should consider establishing a program on a regional basis to address high-priority national needs using a small percentage of Cooperative Water Program funds. The objective of

this program is to fund pressing needs without permanently reallocating funds between Districts.

What changes could be made in the approach to project selection to help ensure maximum effectiveness for the program?

Recommendations 5.1, 5.2, and 6.1 are also applicable to this question.

Finding 7: The effectiveness of the USGS Cooperative Water Program is constrained by institutional and political boundaries.

Recommendation 7.1: Improve collaboration between regional and District offices on water issues that cross jurisdictional boundaries.

Recommendation 7.2: Annually review and report all cooperative projects for the purpose of identifying emerging issues that cross institutional and political boundaries and include these issues in the Chief Hydrologist's annual memorandum on Cooperative Water Program priorities.

Is there proper balance between funding of long-term data collection and short-term interpretative studies?

Finding 8: The number of streamgaging stations involved in the Cooperative Water Program has decreased over the recent history of the Program. In nearly all cases, long-term streamgaging stations have been discontinued because of the lack of funds.

The costs for operation and maintenance of streamgaging stations have increased over time with insufficient increases in Congressional appropriations for the Cooperative Water Program. This funding approach to the Cooperative Water Program has resulted in fewer net dollars being available for long-term, data-collection sites and interpretive studies. The number of long-term stations is declining at an alarming rate. Many stations are discontinued because of Cooperator budget cuts.

Of the total number of nearly 35,000 long-term data-collection stations (streamgaging, water quality, sediment, and ground water) in the Cooperative Water Program, nearly 26,000 stations were funded through the Cooperative Water Program in 1997.

Recommendation 8.1: Produce a report of how the USGS derives current billable costs of the streamgaging network.

Recommendation 8.2: Utilize the Streamgaging Task Force to determine feasibility of billing Cooperators for data-collection activities that are based on actual costs.

Finding 9. A network of continually operated streamgaging stations is critical to management of water resources. Long-term data collection has strong support from all user groups. The need for continued support of long-term streamgaging stations was stressed as a priority.

This network serves a number of purposes with immediate importance, including real-time forecasting, water management, water-quality modeling, flood- and drought- frequency analysis, stream/aquifer interaction, and hydroclimatological studies related to the impact of natural climate variability and potential global-climate change.

Recommendation 9.1: Establish an adequate and permanent streamflow monitoring network in the national interest. Funding for long-term data collection should be stressed as a national priority. The Task Force supports the concept that the Federal government should provide 100 percent funding for a national streamgaging network, and that the funding for this network should not come at the expense of the Cooperative Water Program.

Recommendation 9.2: ACWI (or its Streamgaging Task Force) should make a specific finding regarding the number, distribution, and character of long-term data sites necessary to meet national data-collection objectives. Similar findings should be developed for ground-water and water-quality data sites.

Recommendation 9.3: The USGS should work to limit the loss of long-term streamgaging stations funded by the Cooperative Water Program, until the ACWI Streamgaging Task Force has presented its findings.

Recommendation 9.4: Supplement the national data networks with additional stations funded through the

Cooperative Water Program to address State, Tribal, and other governmental water management needs.

Finding 10: The emphasis and level of need for the two components (data collection and interpretive studies) of the Cooperative Water Program vary from Cooperator to Cooperator. The distribution of funds has evolved over time to about 55 percent for long-term data collection and about 45 percent for interpretive studies.

Recommendation 10.1: The emphasis of the Cooperative Water Program should be on long-term data-collection activities. Data collection should not be sacrificed for interpretive studies.

What is the appropriate relationship with the private sector, States, universities, etc.? Could this arrangement be improved without sacrificing its benefits?

Finding 11: The majority of the hydrologic data in the USGS national data base has been collected by and quality assured by USGS staff. Data collected by others are sometimes entered into the data base but not always quality assured by the USGS.

Recommendation 11.1: USGS should take advantage of all available expertise and technology, regardless of where it resides, provided that the USGS certifies final quality.

Recommendation 11.2: USGS should consider employing outside contractors and cooperating agencies for data collection under strict USGS supervision when doing so can reduce costs.

Recommendation 11.3: Increase the use of in-kind services to maintain data-collection stations and provide the data to USGS for quality assurance and publication.

Finding 12: There is a significant amount of non-USGS data that could contribute to assessing the Nation's water resources.

Recommendation 12.1: Establish guidelines for accepting and disseminating data from non-USGS sources and include appropriate data from other sources in USGS data bases.

Recommendation 12.2: Be aware of data-collection efforts of other Federal agencies, such as the U.S. Environmental Protection Agency and the U.S. Department of Agriculture, and strive for compatibility with their data bases.

Finding 13: In some Districts, Cooperator panels have been convened to review program implementation issues. This has proven to be very beneficial to all parties.

Recommendation 13.1: USGS should continually strive to increase their awareness of Cooperators' needs.

Recommendation 13.2: Promote increased collaboration with Cooperators in data-collection work, interpretive work, report preparation and presentation activities consistent with maintaining the objective nature of the work.

Recommendation 13.3: At the District level, annually convene a general meeting of all Cooperators and interested parties to review overall progress, critique quality of work, assist in development of priorities, and offer feedback on water-resources issues present or in development within the District.

Recommendation 13.4: Each cooperative agreement should contain an explicit and detailed scope of work, including tasks, timelines, costs, staffing levels, and identification of Project Chief.

Recommendation 13.5: Improve technology transfer to Cooperators through joint effort in the field, laboratory and office work, topical seminars, and training-center offerings.

Finding 14: Although most cooperative projects address national issues, a small number of projects appear to meet only local interests and are not appropriate for the USGS Cooperative Water Program.

Recommendation 14.1: In project proposals and in project information that is available to the public, Districts should document how each project is in the national interest and specifically meets the applicable criteria outlined in WRD Memorandum No. 95.44.

Finding 15: The private sector has raised issues relating to work performed by the USGS under the Cooperative Water Program that could be more appropriately performed by the private sector. This problem is reported to be increasing.

Nonetheless, competition is a concern in only a small number of projects nationwide.

Recommendation 15.1: Partnering with private-sector and university practitioners should be encouraged. This would enhance technology transfer to those who apply these investigative tools. It would also help to engage the best and brightest experts on particular projects.

Recommendation 15.2: The Cooperative Water Program should concentrate on its core competency. The Program should continue to advance its capabilities in long-term data collection and analysis, technology and model development, and the transfer of technology to end users.

Recommendation 15.3: The USGS must refrain from unfairly competing with or giving the impression of unfairly competing with the private sector.

Finding 16: WRD Memorandum No. 95.44 addresses the issue of competition with the private sector. The Task Force endorses the criteria specified in WRD Memorandum No. 95.44 for project selection.

Recommendation 16.1: WRD Memorandum No. 95.44 should be amplified to include specific examples of activities that have been deemed inappropriate for USGS involvement (for example, routine site-specific investigations of bridge scouring, wellhead-protection-area delineation, and ground water).

Recommendation 16.2: Convene ad hoc committees by project type, and which are composed of private sector, other agencies, and Cooperators to resolve emerging competition issues, and to help determine what types of projects are appropriate for the USGS to undertake.

Recommendation 16.3: Create and convene biennially a review panel to update WRD Memorandum No. 95.44 as necessary.

Recommendation 16.4: Produce a biennial report for ACWI on successful collaborative work efforts with the private sector, as well as a listing of projects the USGS deemed inappropriate on the basis of WRD Memorandum 95.44. Include a description of projects that are affected by competition issues.

Finding 17: Public knowledge of USGS Cooperative projects is important. Currently, the USGS posts the project title, the problem statement, objectives, and approach on the Internet at the time that the Cooperator and the District Chief sign the joint funding agreement.

Recommendation 17.1: This information should be posted on the public Internet at the time the proposal is forwarded to the Regional Hydrologist for approval. The Regional Hydrologist should consider comments, but not lengthen the timeframe in which projects are approved. The decision shall be communicated to the District and to all those who submitted written comments. The information should include a Statement of how the project is in compliance with WRD Memorandum No. 95.44.

Recommendation 17.2: Copies of WRD Memoranda Nos. 95.44 and 84.21, and any future updates to them, should be posted on the Web for easy reference.

Finding 18: USGS management and scientists interact with State, Tribal, and local water-resource experts on a frequent basis. USGS personnel attend and participate in water-resource planning and management meetings at the request of State, Tribal, and other governmental water authorities.

Recommendation 18.1: Continue to be active in, conduct regular project reviews at, and have a greater visible presence at State, Tribal, and other governmental water workshops, forums, and seminars to share knowledge, technology advancements, and data access.

Recommendation 18.2: Increase involvement in professional and local scientific society forums.

Recommendation 18.3: Annually assess emerging water-resources issues and include these issues in the memorandum referred to in Recommendation 7.2.

Recommendation 18.4: Prepare and publish on the Internet a national summary of projects to increase public awareness of the USGS role in water resources.

What would be the implications of altering current work arrangements on the unique qualities of the Cooperative Water Program and water management nationwide?

Finding 19: The perceived quality and objectivity of USGS data and studies, together with the

USGS cost share, are the primary reasons many entities become Cooperators.

Finding 20: The USGS is nationally recognized as providing the highest quality, long-term water-resources data available.

Finding 21: Any activity that appears to reduce the objectivity of the USGS might negatively impact potential Cooperator interest and confidence.

Recommendation 21.1: The USGS must continue to act professionally and objectively to preserve its respected reputation.

To what extent should the products of the Cooperative Water Program support: (1) national needs, as compared to (2) the needs of Cooperators and other information users?

Finding 22: In general, the products of the program meet Cooperator and other information users needs, while contributing to the national interest. The balance between data collection and interpretive studies is currently meeting the needs of Cooperators and national needs and is in overall proper balance.

Recommendation 22.1: The Cooperative Water Program should be driven by the needs of the users (State, Tribal, and local users and other Federal agencies), where those aggregate interests form a basis for meeting the national interest.

Recommendation 22.2: Establish core data collection networks (streamgaging, water quality, sediment transport, and ground water) to serve the national interest (See also Recommendation 9.1).

Are the products meeting the needs of the primary users as well as the multiple needs of ancillary parties?

Finding 23: The Cooperative Water Program products are well regarded, credible, reliable, unbiased, and generally of excellent quality (for example, technical correctness, thoroughness, graphics, innovation, and use of new technologies, such as the Internet).

Recommendation 23.1: Continue to develop products that are effective in communicating to the diverse audiences concerned with water-management issues. Products being produced by the program, such as fact sheets and fast-read summaries are excellent examples. To continue to improve in this area, develop a program to subject such products to a critical review by non-scientists to assure understandability.

Finding 24: Maintaining a strong objective scientific program is essential to create products that meet Cooperator and user needs.

Recommendation 24.1: Maintain high standards of unbiased, credible products of superior quality through assignment of experienced professionals, quality assurance/quality control techniques, and peer review.

Finding 25: Timely issuance of some products (for example, in adherence to deadlines in agreements), particularly interpretive project final reports, has been and remains a significant problem in the program. Achieving the high standard of current products is inherently time consuming. USGS staff has made significant progress in correcting this important problem, in part, by revising the peer review process and establishing review authority at the regional and District level.

Recommendation 25.1: To facilitate continued improvement in achieving deadlines for the release of products, especially interpretive reports:

A. Secure agreement between Cooperator and USGS staff up front as to the date for the receipt of deliverables;
B. Improve efforts to explain to Cooperators the process for report preparation, review, and release;
C. Continue to cultivate approaches to provide information to Cooperators when they need it (for example, "Open-File" reports, real-time data, Cooperator staff serving as peer reviewers;
D. Develop the capability to be prepared for and respond to situations when USGS staff, who are serving as report authors, are disengaged from the responsibility (for example, retirement, resignation, transfer, or other action); and

E. Take appropriate action to transfer knowledge and experience to others in the organization to reduce the degree of corporate knowledge loss.

Finding 26: The USGS provides information and products generated by the Cooperative Water Program either free of charge (for example, models and data) or for nominal cost (certain publications).

Recommendation 26.1: The long-standing policy that provides for program products to be made available free or for minimal charge should remain unchanged.

What changes in products should the USGS consider to strengthen the Cooperative Water Program's impact?

Finding 27: Use of the Internet and other state-of-the-art technologies by the Cooperative Water Program has been innovative and highly effective. These technologies are and will continue to be an extremely important medium for the timely dissemination of streamgaging data and other program products.

Recommendation 27.1: USGS should continue to aggressively explore ways to incorporate use of the Internet and other available and emerging electronic communication technologies in the development, review, and release of all its products.

Recommendation 27.2: Make reports available in an appropriate electronic format, beginning with current reports and ultimately working back in time to include historic reports.

Finding 28: Cooperative Water Program products tend to be written for technical professionals and can be difficult for lay readers to understand. Recent use of fact sheets and other such products are important improvements.

Recommendation 28.1: Products should address the critical issues of the Cooperator as specified in the cooperative agreement. When appropriate, the USGS should expand the use of lay summaries and fact sheets for the general public.

Finding 29: Some data bases are difficult to use (for example, the USGS Ground Water Site Inventory (GWSI) data base).

Recommendation 29.1: Update, maintain, and make more accessible existing data bases, such as GWSI.

Recommendation 29.2: Make historical data and metadata available in electronic formats at the shortest available temporal resolution.

Finding 30: Data dissemination practices vary between Districts, ranging from release to the Cooperator as data are collected, to release upon approval of the final interpretive report.

Recommendation 30.1: Develop a consistent nationwide policy that results in the earliest possible release of data to Cooperators.

Are there ways to further stimulate the development of new approaches and methods and to enhance the transfer of these approaches and methods to interested parties?

Finding 31: The Cooperative Water Program has been the vehicle for the development of many technologies and important national information summaries that have been successfully transferred to the private sector. Examples are the MODFLOW ground-water-flow model, numerical methods, and acoustic Doppler and ultrasonic velocity-meter technology for measuring streamflow.

Recommendation 31.1: Increase resources for the development of national synthesis products to enhance information and technology transfer.

Recommendation 31.2: Increase resources to update previously developed modeling technologies.

Recommendation 31.3: Strengthen partnerships between USGS divisions. Such partnerships are necessary to synthesize diverse information and provide comprehensive answers to resource questions.

Recommendation 31.4: Strengthen coordination between the Cooperative Water Program and other Federal, State, Tribal and local programs to achieve improved focused and economical products.

Recommendation 31.5: As appropriate, continue to co-locate USGS staff with Cooperators (and conversely) to facilitate day-to-day information transfer

and to promote better understanding of local issues and perspectives.

Finding 32: The WRD's National Training Center located in Denver is a valuable resource that appears to be underutilized.

Recommendation 32.1: Promote the National Training Center in Denver as an available resource for professional development.

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